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MSO1000HD Series High-Resolution Oscilloscopes

Quick Start Guide

This manual applies to model:

MSO1000HD Series

V1.0

January 21st, 2025

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1. MSO1000HD Series Oscilloscopes

MSO1000HD series digital oscilloscopes includes the following models.

Model	Analog channel number	Analog bandwidth	Digital	Gen
MSO1154HD	4	150 MHz	●	×
MSO1154HD-S	4	150 MHz	●	●
MSO1254HD	4	250MHz	●	×
MSO1254HD-S	4	250MHz	●	●

2. Getting Started Guide

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 MSO1000HD series oscilloscopes 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

Please check appendix for the list of accessories. If any of the accessories are missing or damaged, please contact UNI-T or 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.

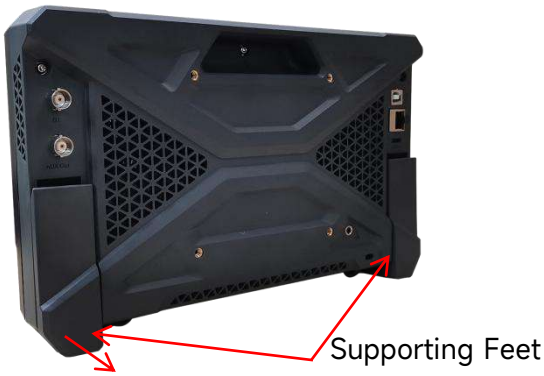
If the equipment is damaged due to shipping, please keep the packaging and notify both the transportation department and UNI-T distributors, UNI-T will arrange maintenance or replacement.

2.2.Before Use

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

(1) Adjust the Supporting Feet

Adjust the supporting feet properly to use them as stands, tilting the oscilloscope upward for stable placement, improved operation, and better observation. You can also fold the supporting feet when the instrument is not in use for easier storage or transport.



Unfold the supporting feet

Fold the supporting Feet

(2) Connect to Power Supply

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

Power Adaptor Specifications

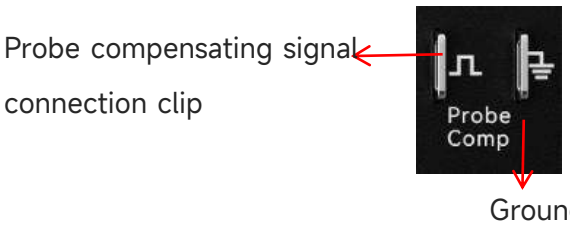
Terminal	Specification
Input	100V - 240 V, 50 Hz - 60 Hz, 1.6 A Max
output	DC, 12 V, 3 A, 65 W

(3) 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.

(4) Connect Probe

This oscilloscope provides 1 pieces of compensating signal probe. Connect the BNC of the probe to the BNC of oscilloscope's CH1 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.



Probe Compensating Signal Connection Clip and Ground Terminal

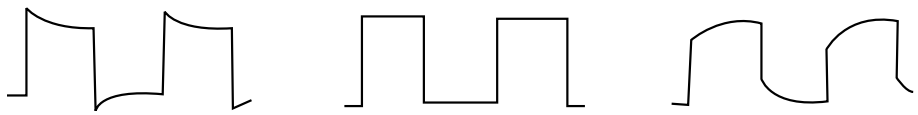
(5) Function Check

Press the AUTO key, a square wave (amplitude 3 Vpp, frequency 1 kHz) should appear on the screen. Repeat the step 3 to check all channels.

(6) 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 mistake. Please follow the following steps to adjust the probe compensation.

- Set the attenuation coefficient in the probe menu to 10x and set the probe switch to 10x. Connect the oscilloscope probe to CH1. If using the probe's hook tip, ensure it makes stable contact. Connecting the probe to the "Probe Compensating Signal Connection Clip" of the oscilloscope and connect the ground alligator clip to the ground terminal of probe compensating signal connection clip. Open CH1 and press the AUTO key.
- View the displayed waveform, as shown in the following figure.



Excessive Compensation Correct Compensation Insufficient Compensation

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.

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

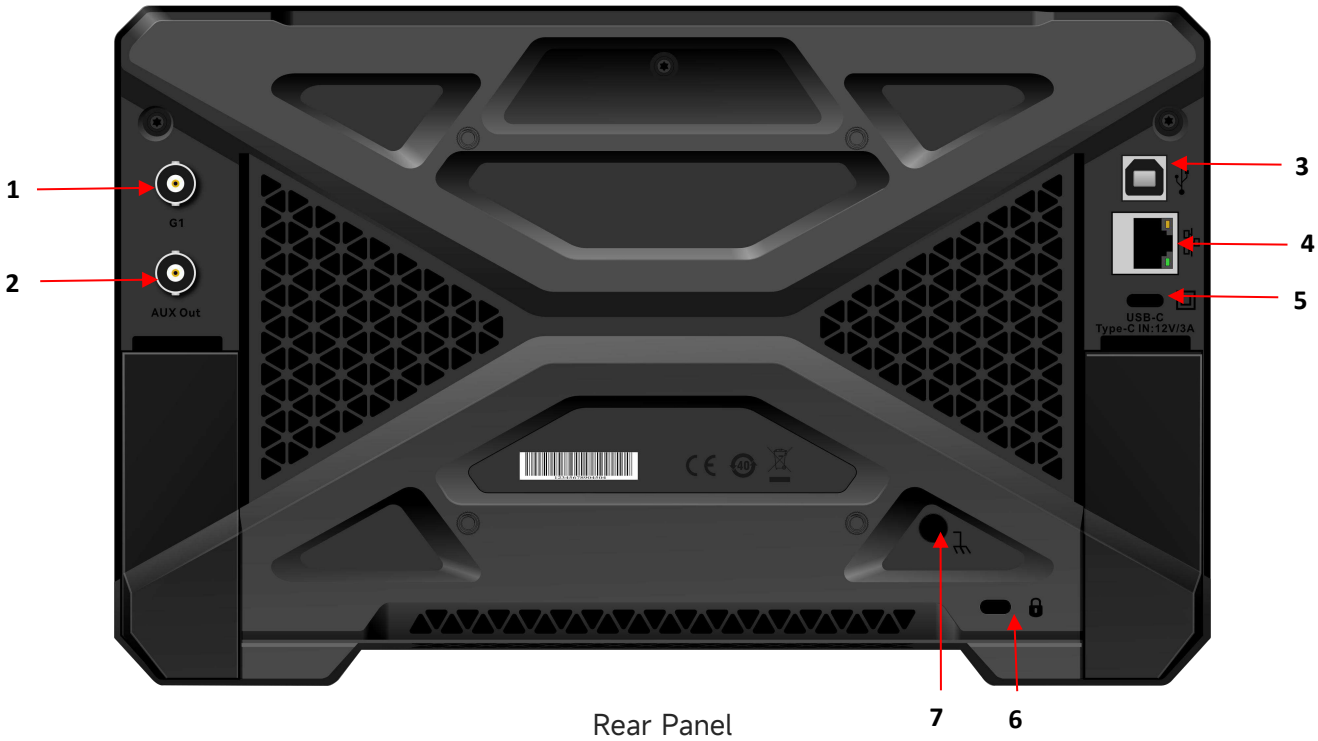
Table 1 Button and Terminal on Front Panel

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
5	Horizontal control area	12	USB HOST port
6	Trigger control area (Vertical)	13	Power soft switch key
7	Shortcut keys and search navigation		

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. Please refer to the "Before Use - Connect Probe" section.

② Analog channel input terminal: Connect the oscilloscope probe or BNC cable to these BNC connectors to input a signal into the oscilloscope.

2.4. Rear Panel



Rear Panel

Table 2 Terminal on Rear Panel

No.	Description	No.	Description
1	G1	5	USB Type-C Power Connector
2	AUX Out	6	Safety lock
3	USB Device	7	Ground terminal
4	LAN port		

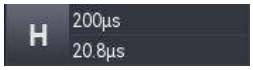
2.5.Operation Panel

(1) Vertical Control

- 1 , 2 , 3 , 4 : Analog channel setting key respectively represents CH1, CH2, CH3, and CH4. 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.
- Digital: Press this key to enter Digital setting and 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 the 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 CH1 to CH4. 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 illuminates green.
  In the STOP state, the key illuminates 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

illuminates orange.

(5) Measurement Analysis Area

- Measure: Press the Measure key to enter the measurement menu and set the counter, voltmeter, parameter snapshot, measurement statistics, add measurement, clear measurement, and global settings.
- Cursor: Press the Cursor key to enter the cursor measurement menu and 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

- Multipurpose A: Multi-function knob A. When a numerical menu is selected in the function popup window, 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) Shortcut key area

- Quick: Press the Quick key to quickly save the screen waveform as a PNG bitmap to the default or a custom image path.
- : 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; the backlight will turn on. To enable the touchscreen again, press the key once more, and the backlight will turn off.
- Default: Restore factory settings. Press the Default key to reset all oscilloscope settings to their default values.

(8) Signal Output Area

- Gen: Press the Gen key to open the signal source Gen settings menu.

(9) Home Menu

Press the Home icon in the top right corner to open Home quick menu, including the quick menu: Voltmeter, FFT, signal source, Math, reference, help, cursor, storage, counter, measurement, regional drawing, display, auxiliary, decoding, search, regional diagram, navigation, waveform recording, power analysis, and pass/fail. Press the quick menu to enter the corresponding function module.

2.6. User Interface

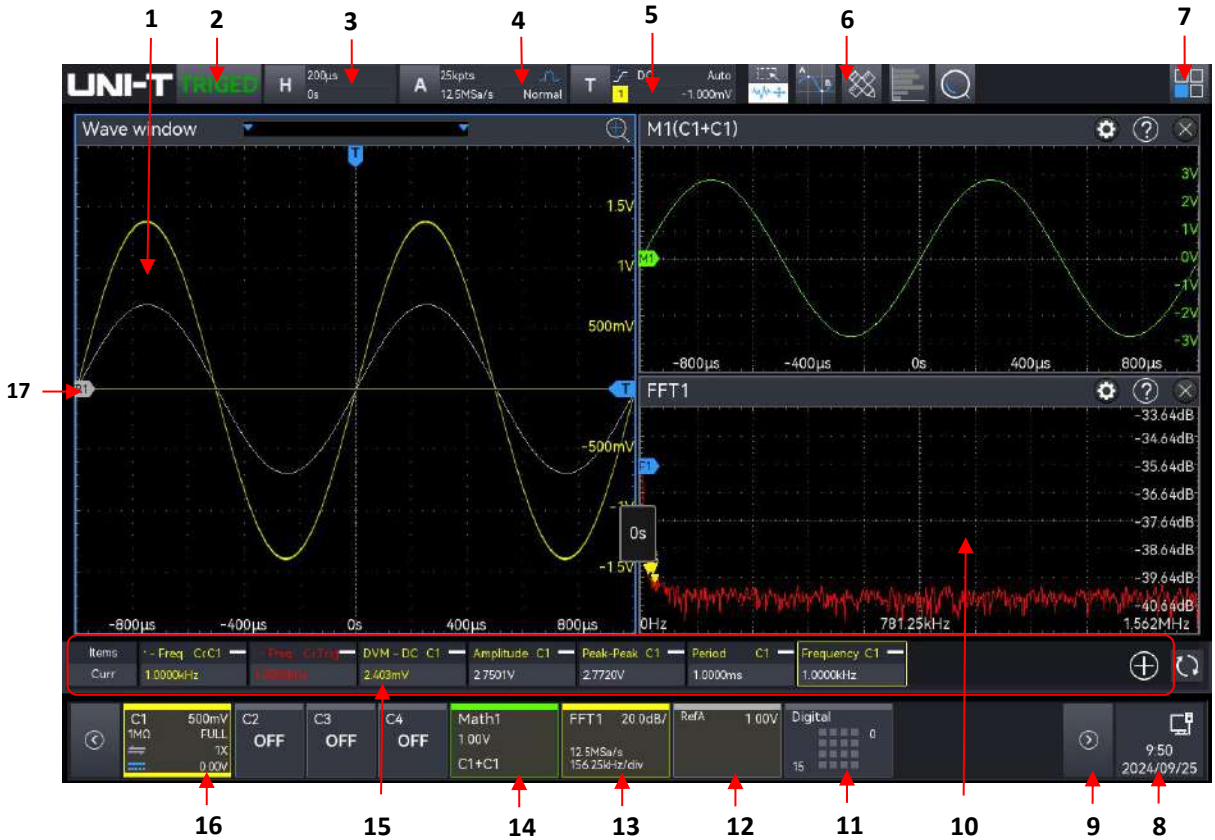


Table 3 User Interface

No.	Description	No.	Description
1	Waveform display window	10	Multi-window display area
2	Trigger state icon	11	Digital channel
3	Horizontal base label	12	Ref label
4	Sampling rate and storage 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

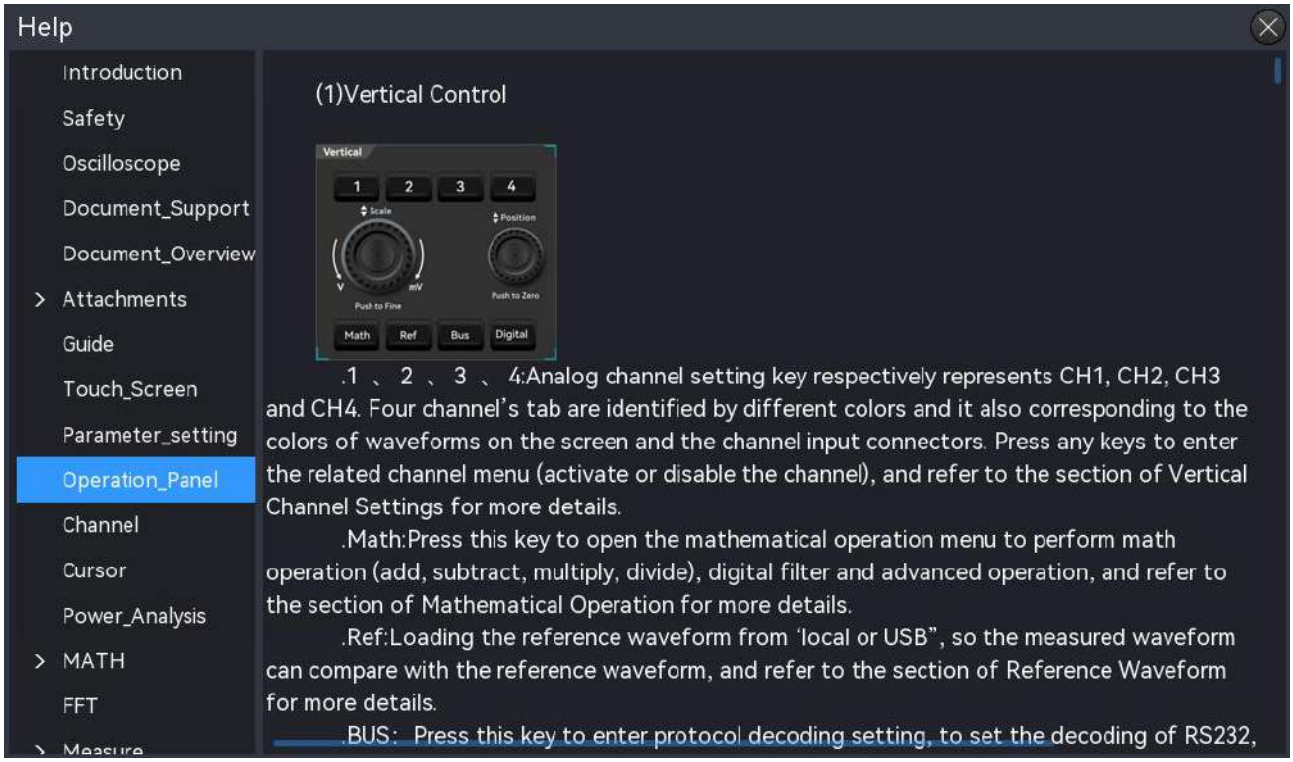
The help system provides information about the function keys (including menu keys) on the front panel.

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

MSO1000HD series supports use the Multipurpose A (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, rotating 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 the 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

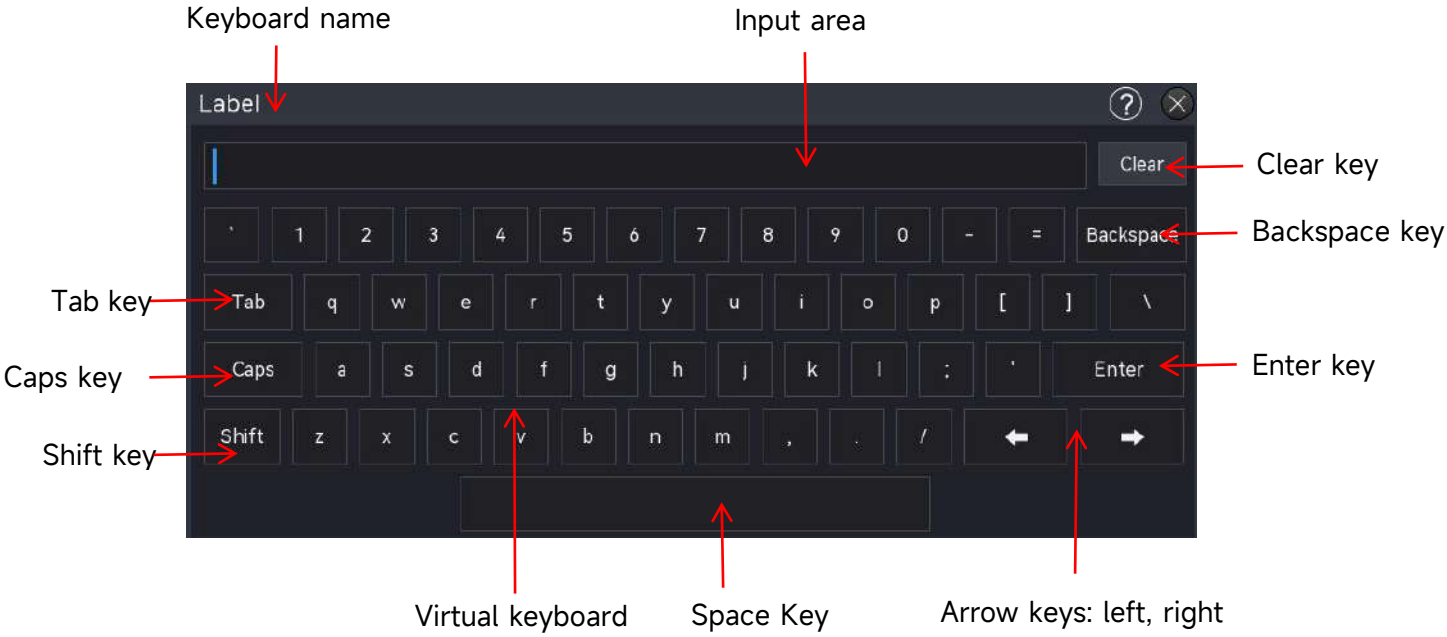
Press the Space key to enter one space in the text field.

i. Backspace key

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

j. Enter key

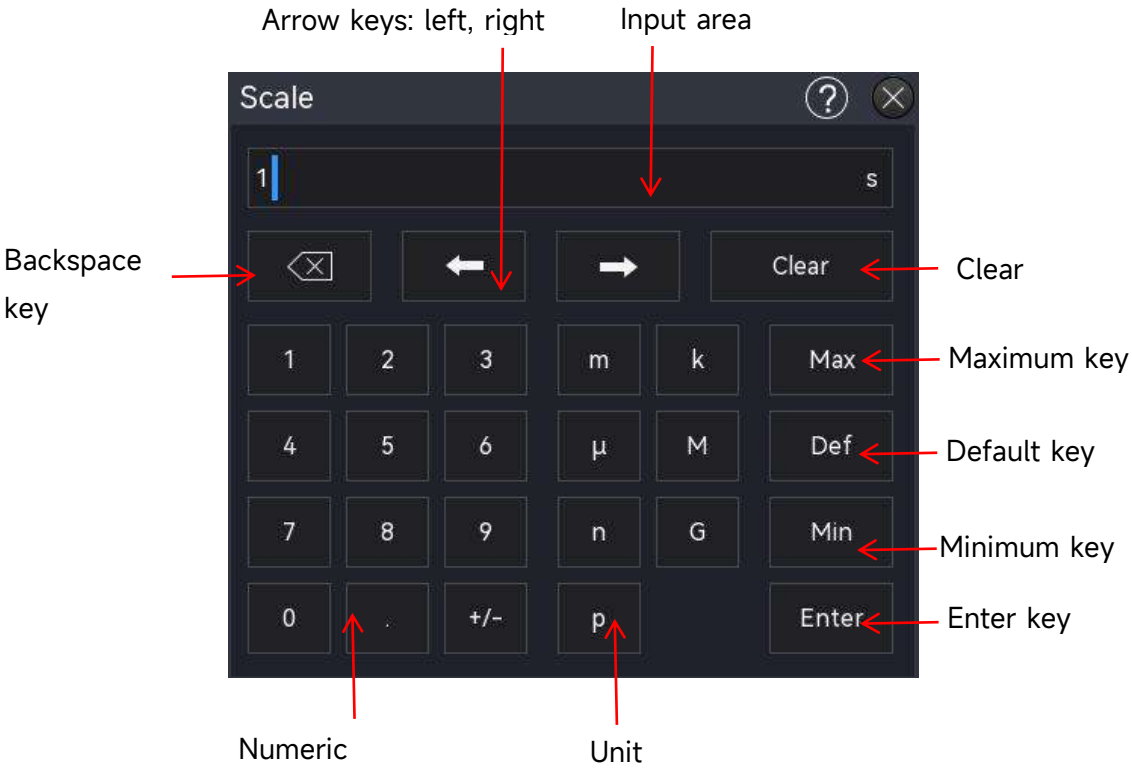
Once the content has been entered, press the Enter key to confirm the setting and close the virtual keyboard.



(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:

a. Delete the entered parameter value.

b. Set the parameter to the maximum or minimum value (sometimes specifically the maximum or minimum value for the current state).

c. Set the parameter to the default value.

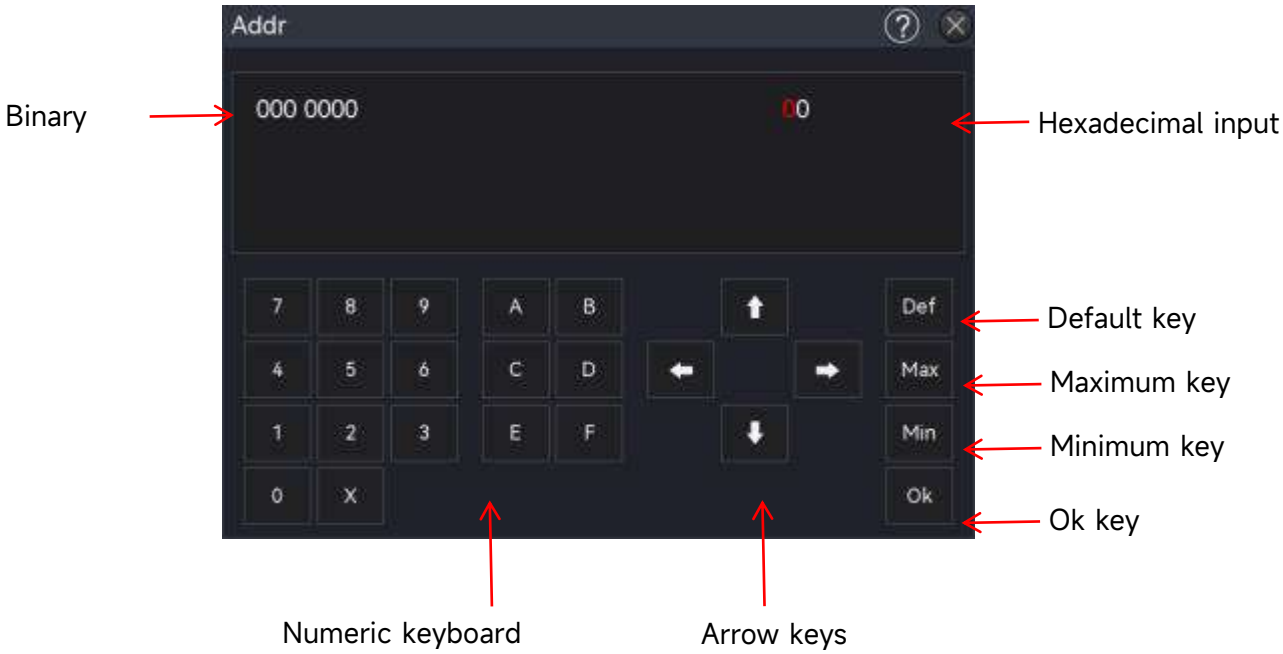
d. Clear the parameter input field.

e. 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, you can perform the following operations:

a. Move the cursor to modify the parameter value.

b. Set the parameter to the maximum or minimum value (sometimes specifically for the current state).

c. Set the parameter to the default value.

d. Clear the parameter input field.

e. Delete the entered parameter value.

4. Touch Screen

MSO1000HD series provides 7-inch super capacitive touch screen, multiple point touch control and gesture control. MSO1000HD has easily 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 pop up a ⊗ button on the top right corner to close the pop-up window.
- Tap another window displayed on the screen and then set up.
- Tap a message to reveal help key in the top right corner. Clicking this key will open the corresponding function's help menu, providing detailed guidance on the selected feature.

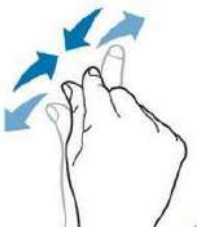
Tap Gestures

(2) Pinch

Squeeze two fingers together or separate. Pinch gesture 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.



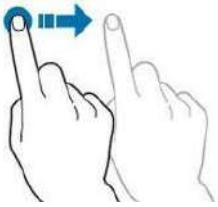
Pinch Gestures

(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:

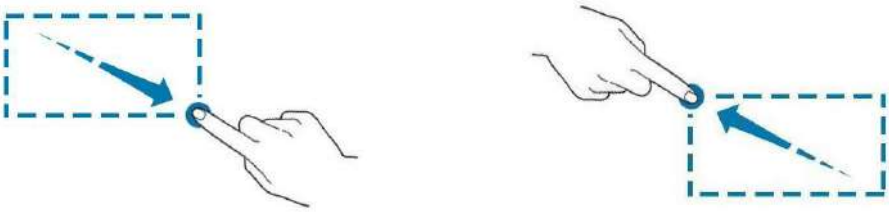
- Drag the waveform to change the waveform position.
- Drag the window to change the window position.
- Drag the cursor to change the cursor position.



Drag Gestures

(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, Region A, Region 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 the trigger zone A
- Open the trigger zone A
- Open zone trigger menu

Select Zone B:

- Draw the trigger zone B
- Open the trigger zone B
- Open one 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 indicates that rectangle drawing mode is enabled; if the icon shows , it indicates that operating waveform mode is enabled.

5. Remote Control

MSO1000HD series digital 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).

MSO1000HD 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 *MSO1000HD Series High-Resolution Oscilloscopes-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). This device supports remote control through communication with a computer via USB, LAN interfaces. Remote control is implemented using the SCPI command set, allowing users to operate and configure the device remotely.

(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 whether the power plug is properly connected, and the power supply is normal.

b. Check whether 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 coefficient 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 with the trigger.

(5) No waveform is displayed 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.

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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