ADS800A Series Quick Guide

- ADS802A/804A
- ADS812A/814A
- ADS822A/824A

For product support, visit:www.owon.com.hk/download

※:The illustrations, interface, icons and characters in the user manual may be slightly different from the actual product. Please refer to the actual product.

General Warranty

We warrant that the product will be free from defects in materials and workmanship for a period of 3 years from the date of purchase of the product by the original purchaser from our company. The warranty period for accessories such as probes is 12 months. This warranty only applies to the original purchaser and is not transferable to a third party.

If the product proves defective during the warranty period, we will either repair the defective product without charge for parts and labour, or will provide a replacement in exchange for the defective product. Parts, modules and replacement products used by our company for warranty work may be new or reconditioned like new. All replaced parts, modules and products become the property of our company.

To obtain service under this warranty, the customer must notify our company of the defect before the expiration of the warranty period. Customer shall be responsible for packaging and shipping the defective product to our designated service centre, a copy of the customer's proof of purchase is also required.

This warranty shall not apply to any defect, failure or damage caused by improper use or improper or inadequate maintenance and care. We shall not be obligated to furnish service under this warranty a) to repair damage resulting from attempts by personnel other than our company representatives to install, repair or service the product; b) to repair damage resulting from improper use or connection to incompatible equipment; c) to repair any damage or malfunction caused by the use of not our supplies; or d) to service a product that has been modified or integrated with other products when the effect of such modification or integration increases the time or difficulty of servicing the product.

Please contact the nearest sales and service offices for services.

Excepting the after-sales services provided in this summary or the applicable warranty statements, we will not offer any guarantee for maintenance definitely declared or hinted, including but not limited to the implied guarantee for marketability and special-purpose acceptability. We should not take any responsibilities for any indirect, special or consequent damages.

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1.General Safety Requirements

Before use, please read the following safety precautions to avoid any possible bodily injury and to prevent this product or any other connected products from damage. In order to avoid any contingent danger, ensure this product is only used within the range specified.

Only the qualified technicians can implement the maintenance.

To avoid Fire or Personal Injury:

- **Connect the probe correctly. The grounding end of the probe corresponds to the grounding phase. Please don't connect the grounding end to the positive phase.**
- **Use Proper Power Cord.** Use only the power cord supplied with the product and certified to use in your country.
- **Connect or Disconnect Correctly.** When the probe or test lead is connected to a voltage source, please do not connect and disconnect the probe or test lead at random.
- **Product Grounded.** This instrument is grounded through the power cord grounding conductor. To avoid electric shock, the grounding conductor must be grounded. The product must be grounded properly before any connection with its input or output terminal.

  When powered by AC power, it is not allowed to measure AC power source directly, because the testing ground and power cord ground conductor are connected together, otherwise, it will cause short circuit.
- **Check all Terminal Ratings.** To avoid fire or shock hazard, check all ratings and markers of this product. Refer to the user's manual for more information about ratings before connecting to the instrument.
- **Do not operate without covers**. Do not operate the instrument with covers or panels removed.
- **Use Proper Fuse.** Use only the specified type and rating fuse for this

instrument.

- **Avoid exposed circuit**. Do not touch exposed junctions and components when the instrument is powered.
- **Do not operate if in any doubt.** If you suspect damage occurs to the instrument, have it inspected by qualified service personnel before further operations.
- **Use your Oscilloscope in a well-ventilated area.** Make sure the instrument installed with proper ventilation, refer to the user manual for more details.
- **Do not operate in wet conditions.**
- **Do not operate in an explosive atmosphere.**
- **Keep product surfaces clean and dry.**

2.Safety Terms And Symbols

Safety Terms

Terms in this manual. The following terms may appear in this manual:

⚠ **Warning:** Warning indicates the conditions or practices that could result in injury or loss of life.

⚠ **Caution:** Caution indicates the conditions or practices that could result in damage to this product or other property.

Terms on the product. The following terms may appear on this product:

Danger: It indicates an injury or hazard may immediately happen.

Warning: It indicates an injury or hazard may be accessible potentially.

Caution: It indicates a potential damage to the instrument or other property might occur.

Safety Symbols

Symbols on the product. The following symbol may appear on the product:

	Hazardous Voltage		Protective Earth Terminal
	Chassis Ground		Test Ground
	Direct current (DC)		Fuse
	Alternating current (AC)		Caution, risk of danger (refer to this manual for specific Warning or Caution information)
	Both direct and alternating current	CAT II	Category II overvoltage protection
CE	Conforms to European Union directives	CAT III	Category III overvoltage protection
	Equipment protected throughout by double insulation or reinforced insulation	CAT IV	Category IV overvoltage protection

To avoid body damage and prevent product and connected equipment damage, carefully read the following safety information before using the test tool. This product can only be used in the specified applications.

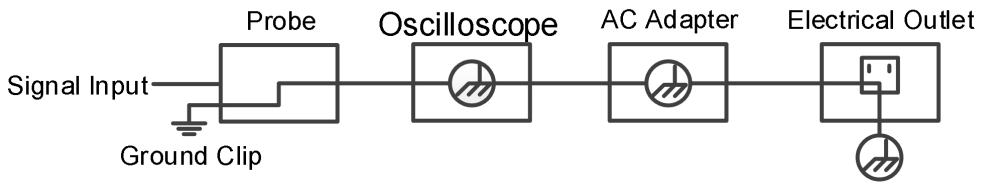
⚠ **Warning:**

The four channels of the oscilloscope are not electrically isolated. The channels should adopt a common ground during measuring. To prevent short circuits, the 4 probe grounds must not be connected to 4 different non-isolated DC levels.

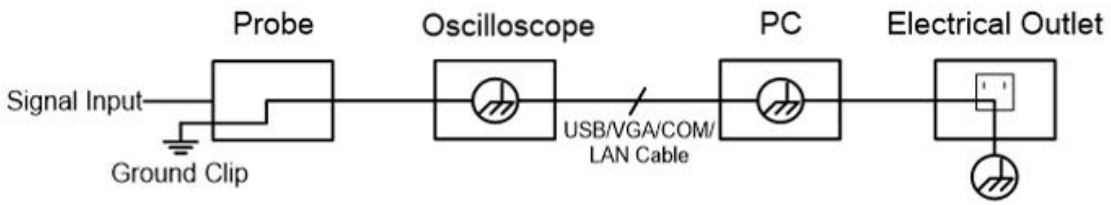
⚠ **Warning:**

Note when measuring the channel to the public base, otherwise may cause short circuit because of the oscilloscope probe ground wire.

The diagram of the oscilloscope ground wire connection:



The diagram of internal ground connection when the instrument is connected to the computer (AC power supply) via a port.



When the oscilloscope is powered by AC and connected to a computer with AC power supply via a port, the primary side of the power grid cannot be measured.

⚠ Warning:

To avoid fire or electrical shock, when the oscilloscope input signal connected is more than 42V peak (30Vrms) or on circuits of more than 4800VA, please take note of below items:

- **Only use accessory insulated voltage probes and test lead.**
- **Check the accessories such as probe before use and replace it if there are any damages.**
- **Remove probes, test leads and other accessories immediately after use.**
- **Remove USB cable which connects oscilloscope and computer.**
- **Do not apply input voltages above the rating of the instrument because the probe tip voltage will directly transmit to the oscilloscope. Use with caution when the probe is set as 1:1.**
- **Do not use exposed metal BNC or banana plug connectors.**
- **Do not insert metal objects into connectors.**

How To Conduct A General Inspection

After you get a new device, it is recommended that you should make a check on the instrument according to the following steps:

1. **Check whether there is any damage caused by transportation.**

   If it is found that the packaging carton or the foamed plastic protection cushion has suffered serious damage, do not throw it away first till the complete device and its accessories succeed in the electrical and mechanical property tests.

2. **Check the Accessories.**

   The supplied accessories have been already described in the "Appendix A: Enclosure" of this Manual. You can check whether there is any loss of accessories with reference to this description. If it is found that there is any accessory lost or damaged, please get in touch with our distributor

responsible for this service or our local offices.

3. **Check the Complete Instrument.**

If it is found that there is damage to the appearance of the instrument, or the instrument can not work normally, or fails in the performance test, please get in touch with our distributor responsible for this business or our local offices. If there is damage to the instrument caused by the transportation, please keep the package. With the transportation department or our distributor responsible for this business informed about it, a repairing or replacement of the instrument will be arranged by us.

How To Conduct Function Inspection

Conduct a quick function inspection to confirm if the instrument is running in normal state.

Power-on Inspection

To power on the instrument, long press(1~2 seconds) in the lower left of the host.

The instrument screen shows the startup screen, and wait a few seconds, the relay in the host will make a slight click sound. After performing all self-inspection items on the instrument, the instrument will directly enter instrument system.

3.Primary User Guide

The following are illustrated with four channels as an example, and for two channels, please refer to four channels.

Model	**Channel**
ADS802A	2
ADS804A	4
ADS812A	2
ADS814A	4
ADS822A	2
ADS824A	4

This chapter elaborates the following topics:

- **A general knowledge of the structure of the instrument**
- **A general knowledge of the user interface of the instrument**
- **How to conduct probe compensation**
- **How to set the probe attenuation coefficient**
- **How to use the probe safely**
- **How to conduct self-calibration**

A General Knowledge Of The Structure Of The Instrument

This chapter gives a brief description and introduction to the operations and functions of the front panel of the instrument, so as to facilitate your operations of the instrument in the shortest time.

Front Panel

On the instrument panel, knobs and function buttons are used to enter different function menus or directly use specific function application.

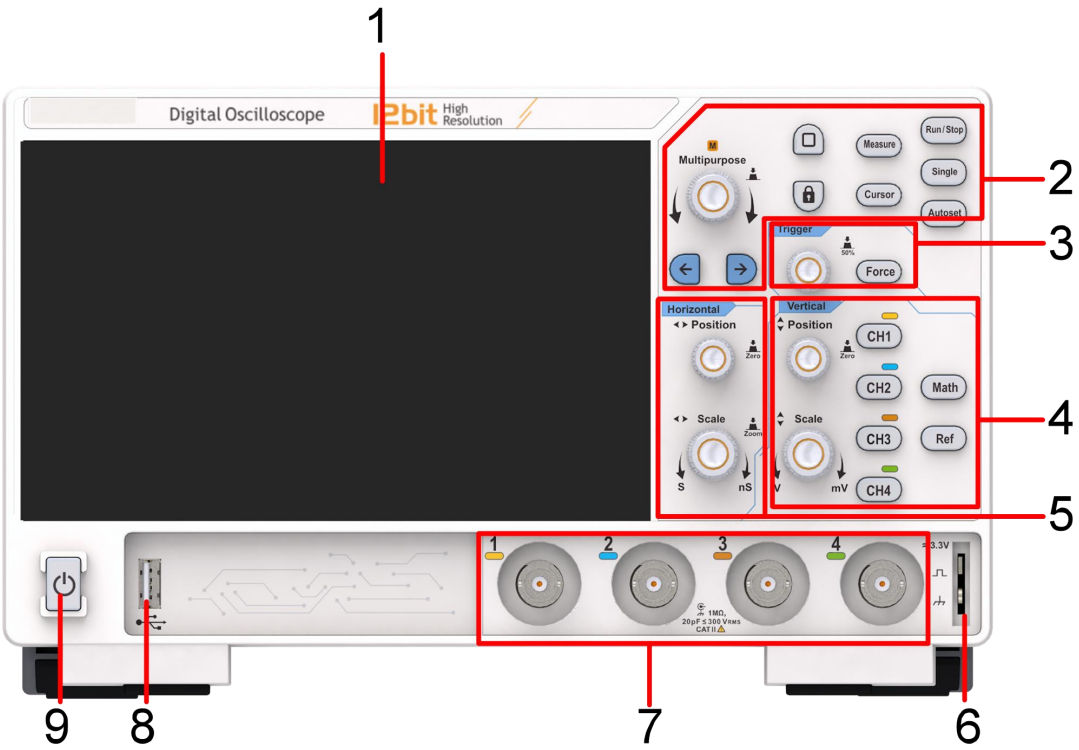


Figure 3-1: Front panel

1. The display area supports touch (Note: 10 seconds idle user configuration auto save).
2. General knob and arrow keys.
   - **General knob:** When M appears in the screen menu, it can be

turned to set the value. Example

can rotate the knob to change the offset value.

- **Arrow keys** **:** Move to select the parameter.
- **Home key** **:** Return to the main homepage.
- **Touch key** **:** Press it to disable the touch screen, the key light turns on; and press it again to enable the touch screen, the key light turns off (**Note:** The Touch Lock is only available in EduInstr system and does not work on the main homepage and other application interface.).
- "Measure" key corresponds to enable/disable the measurement function.
- "Cursor" key corresponds to enable/disable the cursor function.
- Shortcut key: Run/Stop, Single, Autoset.

3. **Trigger control area:** Contain one key and one knob.
   - "Trigger Level" knob is to adjust trigger level;
   - Force key is the forced trigger shortcut key.
4. **Vertical control area:** Contain six keys and two knobs.
   - "CH1", "CH2", "CH3", "CH4" key are correspond to the channel switch of Channel 1, Channel 2, Channel 3 and Channel 4 respectively;
   - "Math" key corresponds to enable/disable the waveform math function;
   - "Ref" key corresponds to enable/disable the reference waveform function;
   - "Vertical Position" knob is to control the vertical position of selected channel;
   - "Vertical Scale" knob is to control the voltage scale for selected channel.
5. **Horizontal control area:** Contain two knobs.
   - "Horizontal Position" knob is to control the horizontal position triggered.

- “Horizontal Scale” knob is to control time base scale.

6. Probe compensation: about 3.3V/1kHz signal output.
7. Channel input port area.
8. USB Host Interface: When the oscilloscope is connected to an external USB device as a “master device”, the USB Host interface is used to transmit the data (Note: the devices that can be connected include a mouse, keyboard, USB flash drive, etc.).
9. Instrument switch with memory (self-lock) switch and auto memory of last shutdown; if the instrument is shut down by powering the supply off, there is no need to press the switch to start it up after next power-on; if the instrument is shut down by pressing the switch key, it is required to press the switch key again to power it on.

Rear Panel

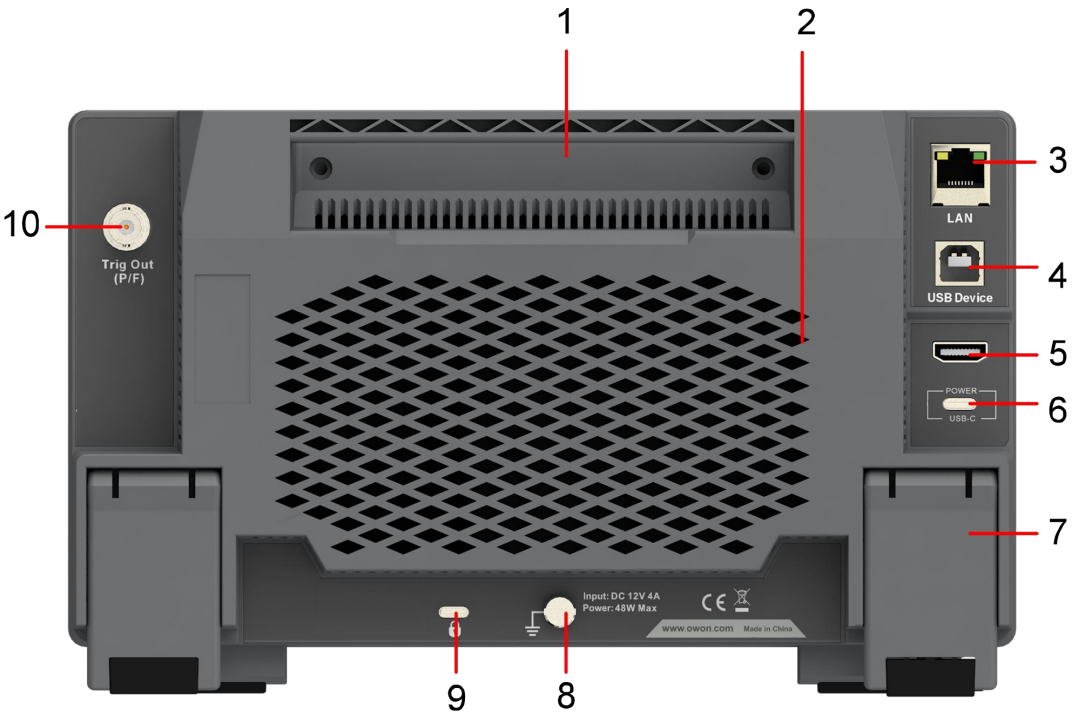


Figure 3-2: Rear Panel

1. Foldable Handle.
2. Heat Emission Hole.
3. LAN Interface: The network interface to connect a PC or router.
4. USB Device Interface: When the oscilloscope is connected to an external

USB device as a “slave device”, the USB Device interface is used to transmit the data. For example, use the interface to connect a PC.

5. HDMI Interface: To connect HDMI output to the external monitor or projector.
6. USB-C power supply interface.
7. Foot Rest: To adjust the inclined angle of the oscilloscope.
8. Ground screw.
9. Safety lock.
10. Trig Out (P/F) Interface: Trigger output or pass/fail output port.

A General Knowledge Of The User Interface Of The Instrument

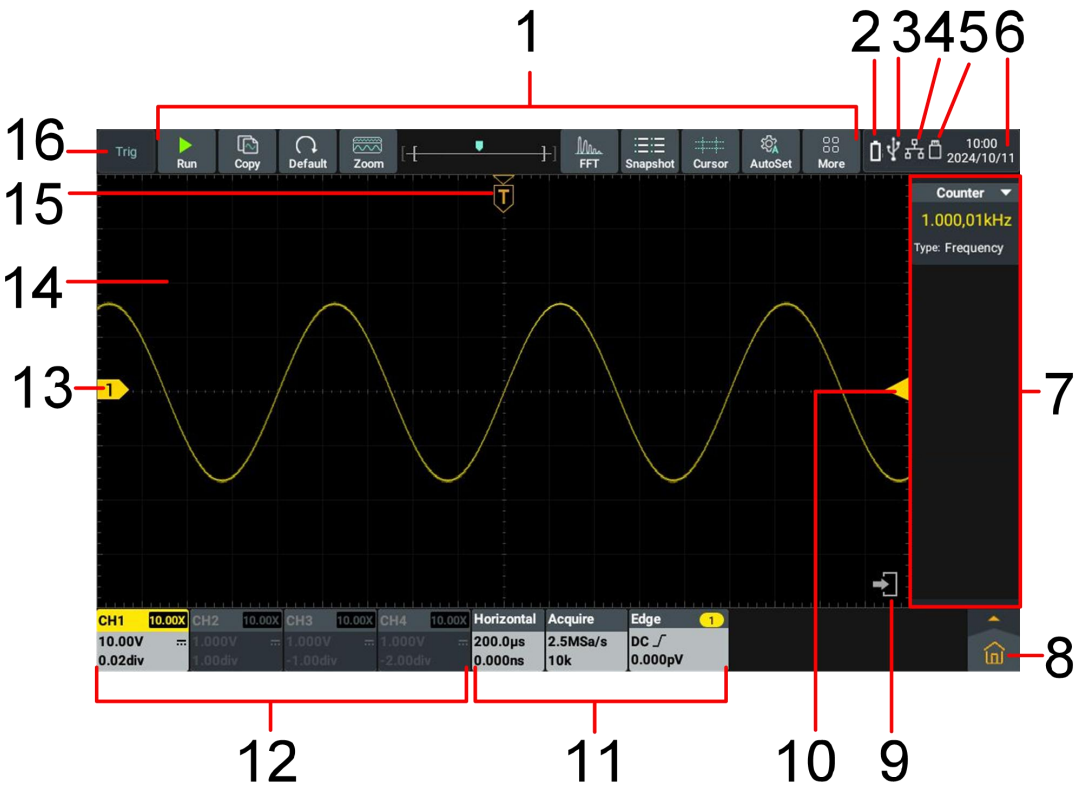


Figure 3-3:Illustrative Drawing of Display Interfaces

1. Shortcut soft keys of oscilloscope functions.
2. Battery Identifier (Optional).
3. USB Device access identifier.

4. LAN port access identifier (If icon for the , it indicates the Wi-Fi is enabled and connected currently). Click the icon will switch to the Wireless&networks setting interface.
5. U disk access identifier.
6. System set time, click the icon will switch to the Date&time setting interface.
7. Counter and others function information display bar (Note: click ▲/▼ on the left corner corresponds to enable/disable statistic). Right swipe the information display bar to close the corresponding function.
8. Main menu key, click to show/hide the main menu.
9. Hide/show the information display bar on the right.
10. Trigger level position, press and hold can be center.
11. Function information display bar: display Horizontal, Acquire, Trigger information respectively. Click the bar can show/hide the corresponding setting window.
12. Channel information display bar. Display the configure information of Channel 1, Channel 2, Channel 3 and Channel 4 respectively (Note: The swipe down the bar can turn on or off the waveform display).

    Among:

    BW indicates that the bandwidth limit is 20MHz.

    " ⎓ " indicates DC coupling;

    " ∼ " indicates AC coupling;

    " ⏚ " indicates Ground coupling.
13. Channel waveform.
14. Waveform display area.
15. Time base position, press and hold can be center.
16. Display the current running status.

Oscilloscope Inspection

1. Set the Switch in the Oscilloscope Probe as 10X and Connect the Oscilloscope with CH1 Channel.

Align the slot in the probe with the plug in the CH1 connector BNC, and then tighten the probe with rotating it to the right side.

Connect the probe tip and the ground clamp to the connector of the probe compensator.

2. Perform Autoset.

The square wave of 1 kHz frequency and about 3.3V peak-peak value will be displayed in several seconds (see Figure 3-4). Check CH2, CH3 and CH4 by repeating Step 2 and Step 3.

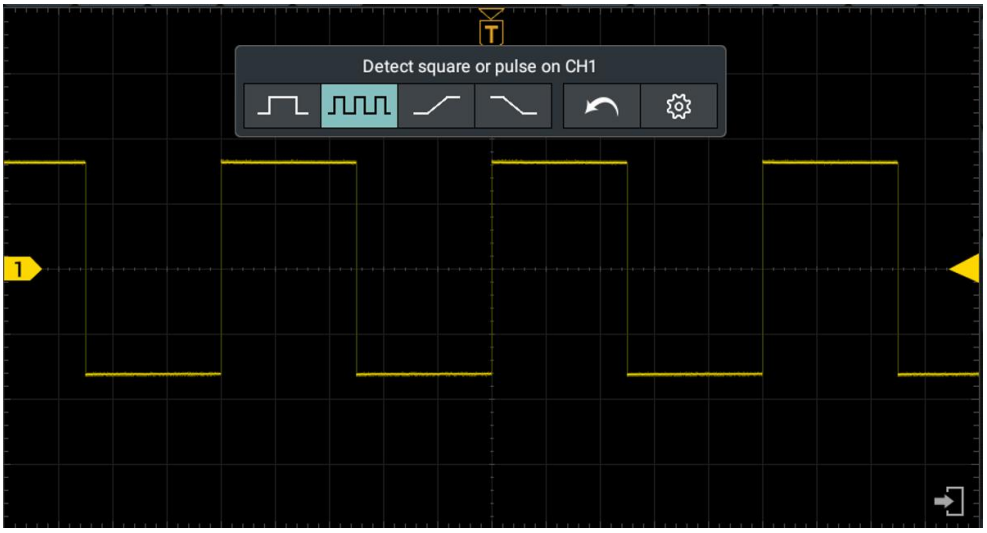


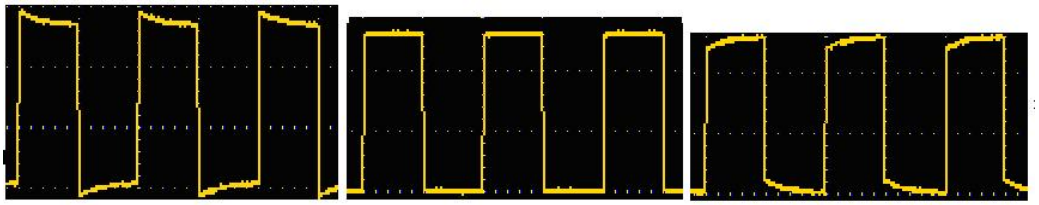
Figure 3-4:Autoset

How To Implement The Probe Compensation

When connect the probe with any input channel for the first time, make this adjustment to match the probe with the input channel. The probe which is not compensated or presents a compensation deviation will result in the measuring error or mistake. For adjusting the probe compensation, please carry out the following steps:

1、 Set the attenuation coefficient of the probe in the menu as 10X and that of the switch in the probe as 10X (see "How to Implement the Probe Compensation" on P13), and connect the probe with the CH1 channel. If a probe hook tip is used, ensure that it keeps in close touch with the probe. Connect the probe tip with the signal connector of the probe compensator and connect the reference wire clamp with the ground wire connector of the probe connector, and then push the **Autoset** button on the front panel.

2、 Check the displayed waveforms, see Figure 3-5. Regulate the probe till a correct compensation is achieved, see Figure 3-6.



Overcompensated **Compensated correctly** **Under compensated**

Figure 3-5: Displayed Waveforms of the Probe Compensation

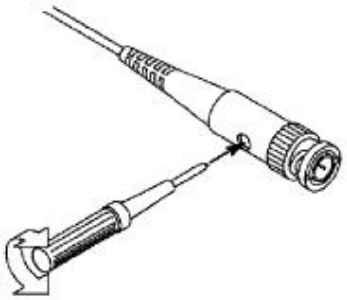


Figure 3-6: Adjust Probe

3、 Repeat the steps mentioned if needed.

How To Set The Probe Attenuation Coefficient

The probe has several attenuation coefficients, which will influence the vertical scale factor of the oscilloscope.

To change or check the probe attenuation coefficient in the menu of oscilloscope:

(1) Click the channel information display bar on the bottom left of the screen (CH1 Channel, CH2 Channel, CH3 Channel or CH4 Channel).

(2) Select **Probe Attenu** (**1X,10X or** other custom probe magnifications) in the displayed channel setting window. The setting will remain in effect until changed again after selection.

Caution:

The default attenuation coefficient of the probe on the instrument is preset to 10X.

Make sure that the set value of the attenuation switch in the probe is the same as the menu selection of the probe attenuation coefficient in the oscilloscope.

The set values of the probe switch are 1X and 10X,see Figure 3-7.

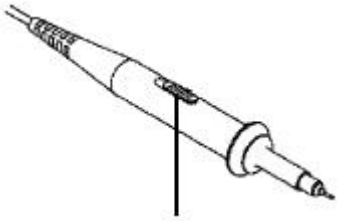


Figure 3-7: Attenuation Switch

Caution:

When the attenuation switch is set to 1X, the probe will limit the bandwidth of the oscilloscope in 5MHz. To use the full bandwidth of the oscilloscope, the switch must be set to 10X.

How To Use The Probe Safely

The safety guard ring around the probe body protects your finger against any electric shock, see Figure 3-8.

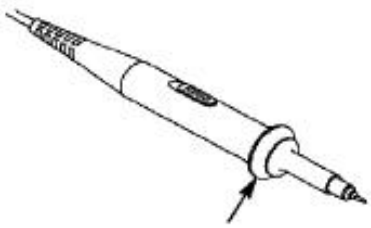


Figure 3-8: Finger Guard

Warning:

To avoid electric shock, always keep your finger behind the safety guard ring of the probe during the operation.

To protect you from suffering from the electric shock, do not touch any metal part of the probe tip when it is connected to the power supply.

Before making any measurements, always connect the probe to the instrument and connect the ground terminal to the earth.

How To Conduct Self-Calibration

Self-calibration program is used to quickly make the oscilloscope be in the optimum condition to obtain the most accurate measurement. This program can be performed at any time. It is especially necessary when the ambient temperature reaches or exceeds 5℃.

To conduct self-calibration, disconnect all probes and wires from the input connector. Then, click " " in the lower right of the screen,select **Self-Calibration** from the menu displayed and click **Start** in the self-calibration display box.

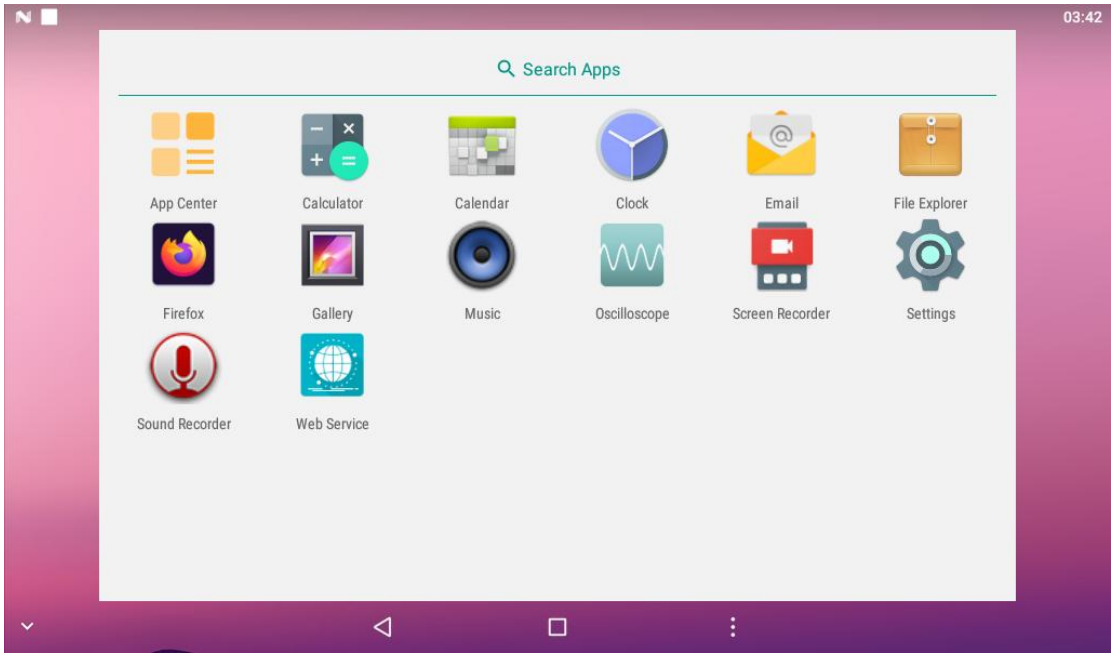
4.Use the Android System

Android System Homepage Window

1. Application shortcut key. If you click the oscilloscope shortcut key, you can enter the oscilloscope interface.
2. App Drawer (Click to see all apps).
3. Task key.
4. Home key.
5. Back key.

System Built-in Application List

Open the application drawer of the main page. The system built-in application including: App Center, Calculator, Calendar, Clock, Email, File Explorer, Firefox, Gallery, Music, Oscilloscope, Screen Recorder, Settings, Sound Recorder, Web Service, as show in the following figure.


03:42
Search Apps
App Center
Calculator
Calendar
Clock
Email
File Explorer
Firefox
Gallery
Music
Oscilloscope
Screen Recorder
Settings
Sound Recorder
Web Service

5.Use the Oscilloscope

A General Knowledge Of Trigger System

As shown in Figure 5-1, there are one knob and one key. The following exercises are to guide you through the use of the trigger system.

Figure 5-1: Trigger control area

1. Use **Trigger Level** knob to change the settings of the trigger level.

   Rotary the **Trigger Level** knob, the trigger pointer on the screen moves up and down as the knob turns. While moving the trigger pointer, the value of the trigger level on the screen changes accordingly.

   Note: Turning the **Trigger Level** knob can not only change the trigger level value, but also set the shortcut key of the trigger level at the vertical midpoint of the trigger signal amplitude.

2. Press **Force** key to generate a trigger signal forcibly, mainly used in the "Normal" and "Single" trigger mode.

A General Knowledge Of Horizontal System

As shown in Figure 5-2,there are two knobs.The following exercises to guide you through the use of the horizontal system.

Figure 5-2:Horizontal control area

1、 Rotary **Horizontal Position** knob to adjust the horizontal position of the signal in the waveform window.

The **Horizontal Position** knob is to control the triggered horizontal position of the signal; when turning the knob, the waveform moves horizontally with the knob. When pressing the **Horizontal Position** key, the horizontal displacement can be zero.

2、 Rotary the **Horizontal Scale** knob to change the settings of the horizontal time base and thus observe the resulting change of the status information, then the corresponding **Horizontal Time Base** in the status bar changes accordingly. Press the **Horizontal Scale** knob enter or exit waveform zoom mode.

A General Knowledge Of Vertical System

As shown in Figure 5-3, there are six keys and two knobs. The following exercises are to guide you through the use of the vertical system.

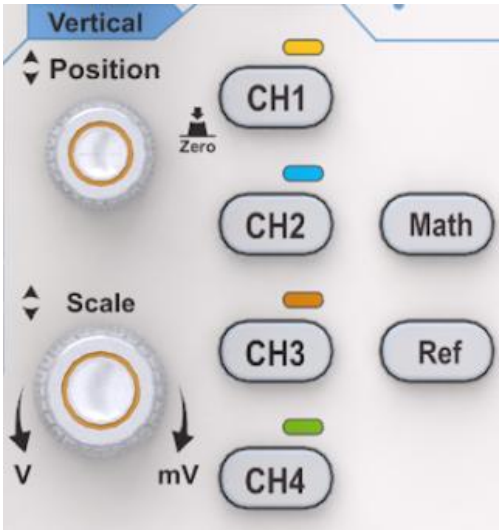


Figure 5-3: Vertical control area

1. **Vertical Position** knob to control the vertical display position of the signal. When turning the Vertical Position knob, the pointer indicating the **Grounding Reference Point** of the channel moves up and down following the waveform. When pressing the **Vertical Vertical** key, the vertical position can be zero.

   Measuring Skills

   If the DC coupling mode is adopted for the channel, observe the gap between the waveform and the signal ground to quickly measure the DC component of the signal.

   If the AC coupling mode is adopted for the channel, the DC component of the signal is filtered out, facilitating you to display the AC component of the signal with higher sensitivity.

   If the Ground coupling mode is adopted for the channel, indicates that the internal input is grounded and the external input is disconnected. It can effectively reduce the influence of external interference on the measurement results and ensure the accuracy of the measurement.

2. Change the vertical settings and observe the resulting status change. You can determine the change of the vertical scale factor of any channel

through the information displayed in the information display bar at the lower part of the waveform window.

- Turn the **Vertical Scale** knob to change the **Vertical Scale Factor (Voltage Scale)**, and the scale factor of corresponding channel in the information display bar changes accordingly.

3. Press CH1、CH2、CH3、CH4 key to enable or disable the corresponding channel.
   - If the current channel is disable, press it to enable and select the channel;
   - If the current channel is enable but no selected, press it to select the channel;
   - If the current channel is enable and selected, press it to disable the channel.
4. Press **Math** key to enable/disable waveform math function; press **Ref** key to enable/disable reference waveform function.

How To Use Touch Screen Control

The touch screen can be used to control the oscilloscope by various gestures.

Operate the touch screen when the light of the touch lock in the upper right of the front panel is off; click the key to light up the indicator; the touch function is disabled when the touch lock is in locked state.

The instructions of the touch screen operations are as follows, the contents in the parentheses indicate the key or knob that plays the same role.

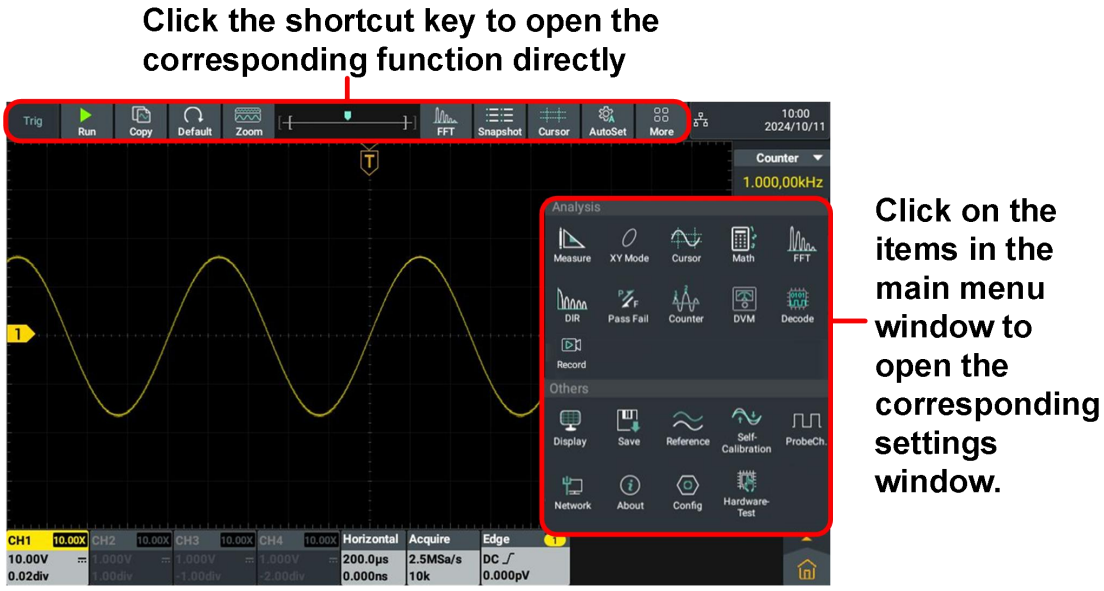
Use The Touch Screen To Operate The Menu

- **Open the Settings window function:** Directly click the below or right information display bar to pop up the corresponding function of the setting window.

- **Set Menu Item:**In the Settings window, you can change the configuration of the relevant menu item by touching it. The types of operable parts include: switch, button, radio, gear hobbing (scrolling list), etc. The following box selects the radio type, click directly to switch the options.

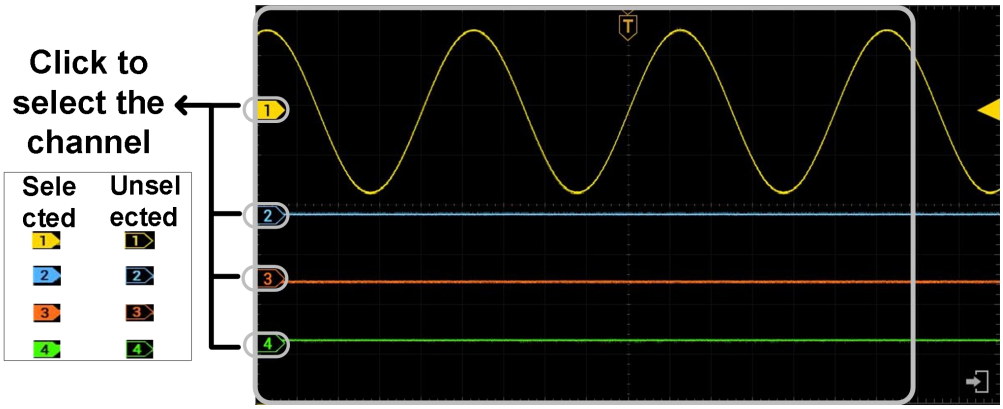
- **Scroll List:** When the scroll bar appears in the menu, swipe the screen up and down with the finger to scroll the list, as shown in the figure below.

- **Open Main Menu:** Click the icon in the lower right of the display area, the main menu window pops up, as shown below. Click each item in the main menu window to open the settings window of the corresponding function, and click the shortcut key at the top of the screen to open the corresponding function.

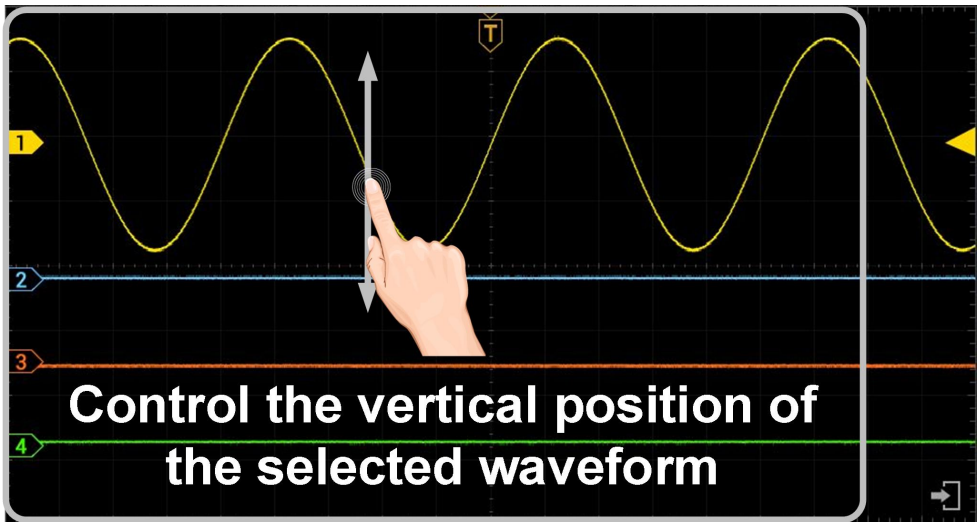


Operate The Touch Screen

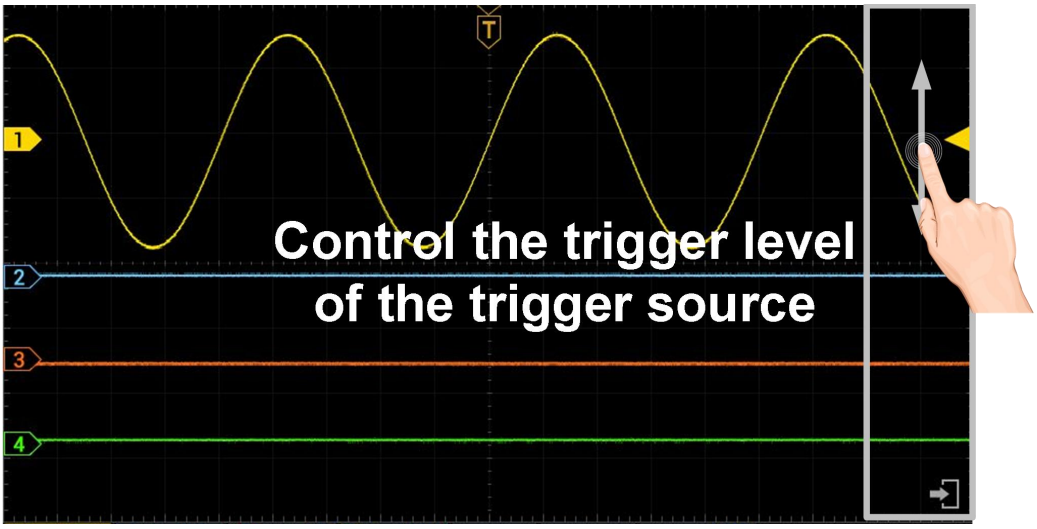
- **Select a Channel (CH1 channel,CH2 channel,CH3 channel or CH4 channel):** Click the channel pointer on the left or click the channel waveform to make the channel pointer selected. Long press the channel pointer, the vertical position of waveform can be center (Note: Dual channel only have CH1 channel and CH2 channel).



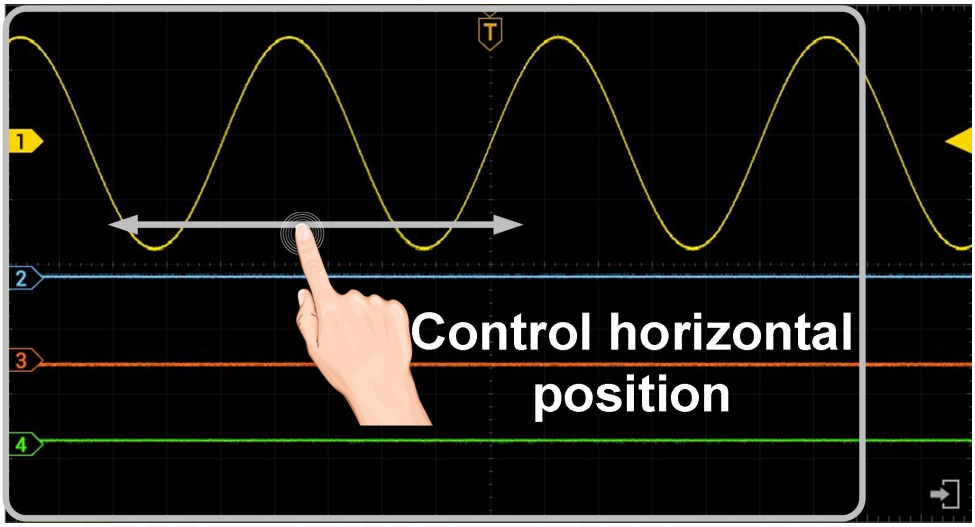
- **Set the vertical position of the selected channel waveform (Vertical Position** knob**):** The vertical position of the waveform can be changed by swiping your finger up and down in the blank position of the waveform display area, as shown in the figure below.



- **Set the trigger level of the signal source in the Trigger Menu (Trigger Level** knob**):** The two grids on the right of the waveform area are the trigger level touch moving area, and the trigger level can be changed by sliding up and down in this area, as shown in the figure below.

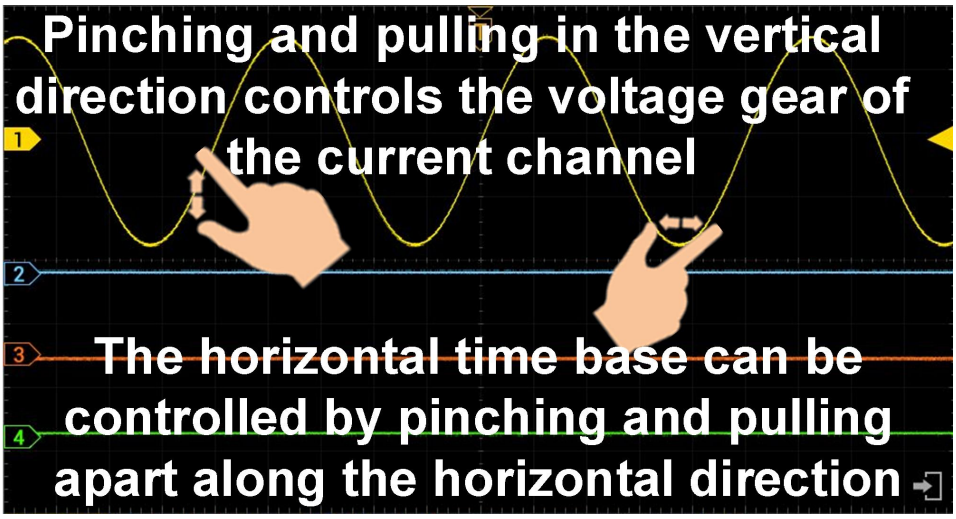


- **Set Horizontal Position (Horizontal Position** knob**):** The horizontal position of the waveform can be changed by swiping your finger around the waveform display area, as shown in the figure below.



- **The control voltage gear and time base can be scaled in the following way:**

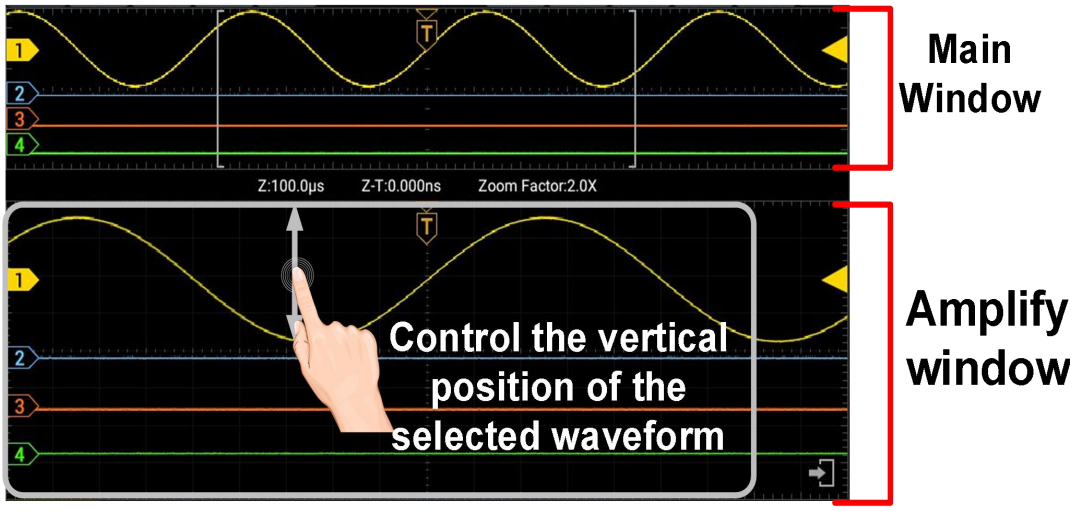
■ In the waveform display area, up and down/left and right zoom thumb and index finger to zoom control voltage scale and time base, as shown in the figure below.

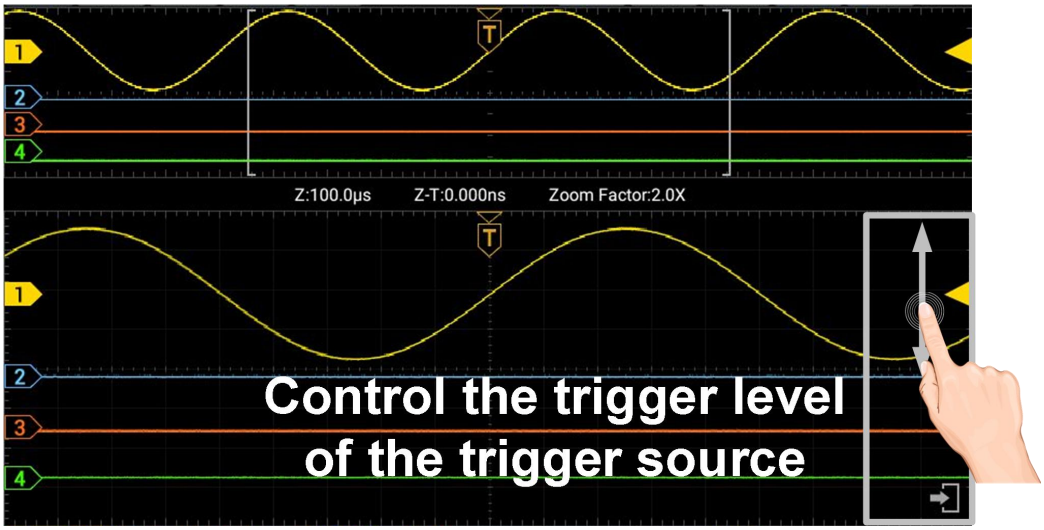


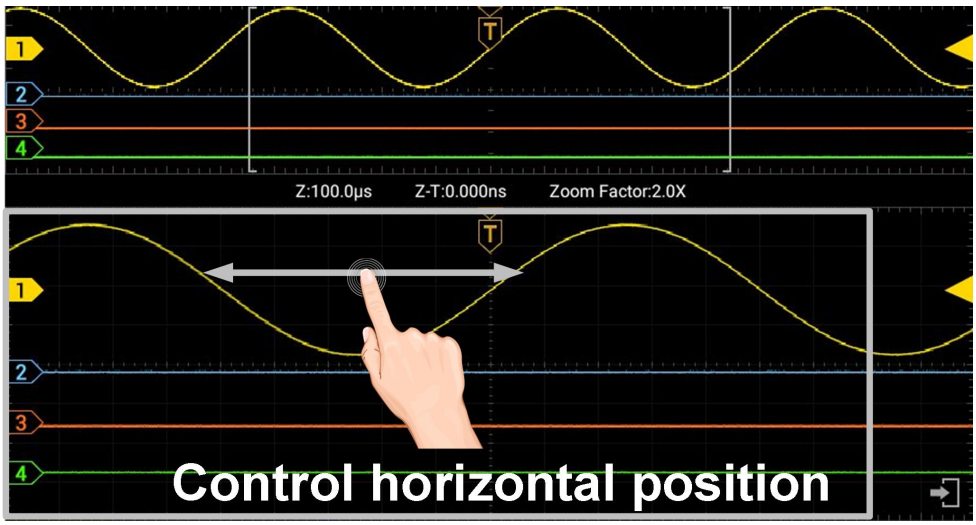
■ In the waveform display area, double-click the screen and slide the hand up and down/left and right to zoom the control voltage scale and time base.

Operate The Touch Screen In Waveform Amplification Mode

Press **Horizontal Scale** knob to enter the waveform zoom mode, the main window is displayed at the top half of the screen and the amplified window is displayed at the bottom half of the screen. The amplified window is the amplified part of the main window that is selected.

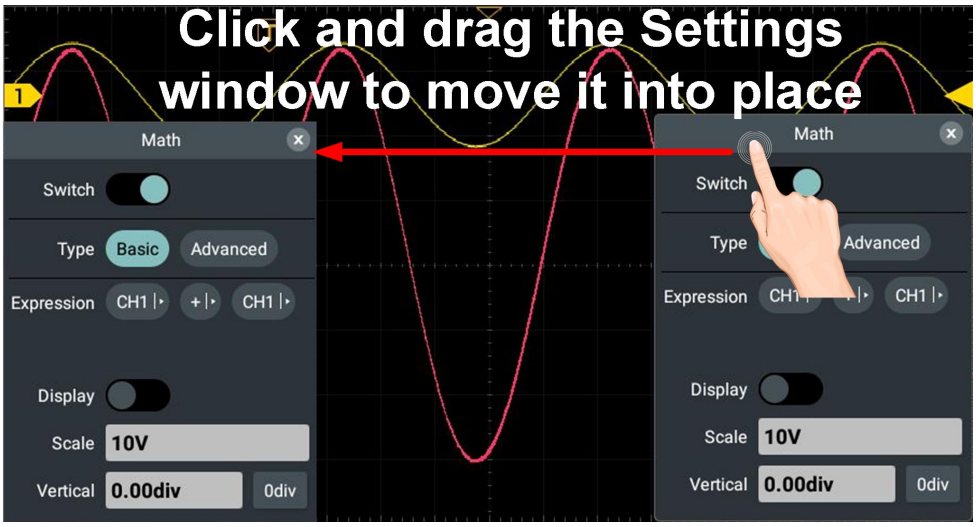




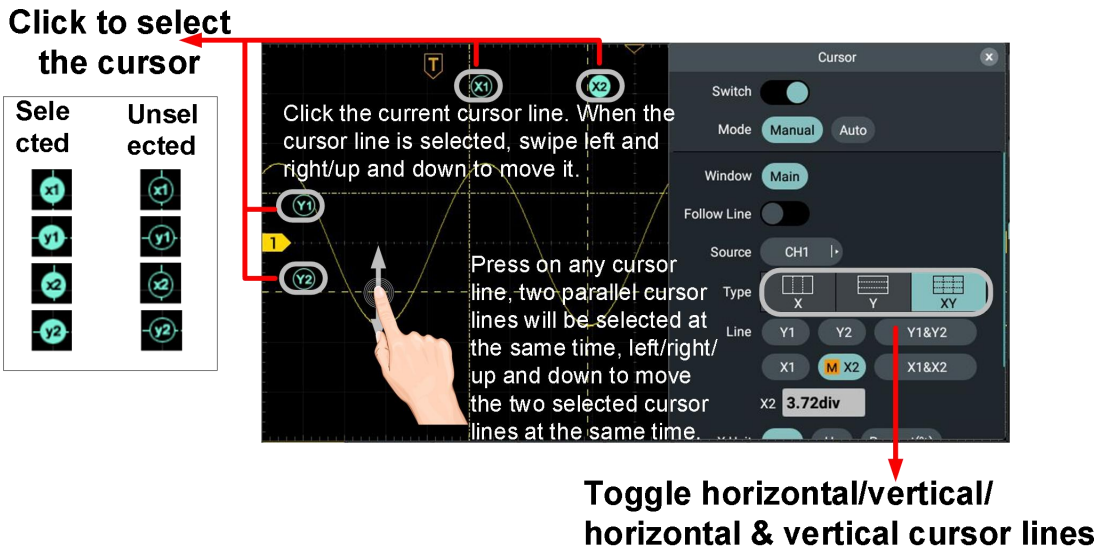


Other Touch Screen Operations

- Click and drag the open menu item to move itself to the appropriate location.

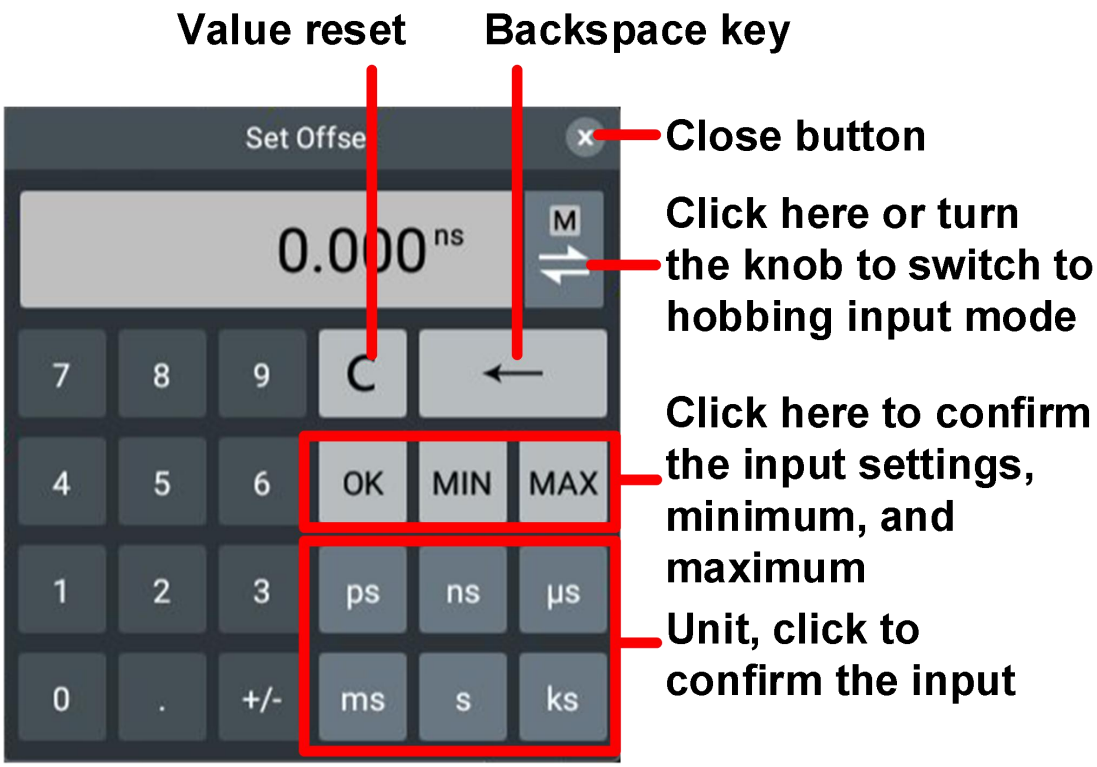


- Control the horizontal or vertical cursor lines under cursor measurement, as shown in the figure below.

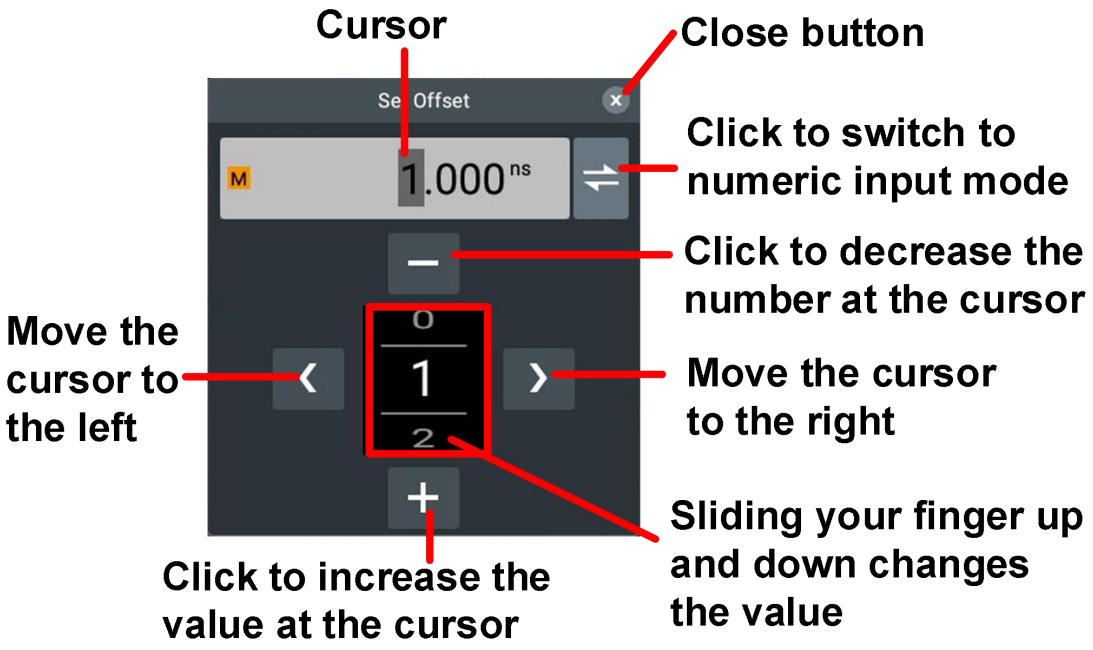


- **Run/Stop:** Click ▶ or ❚❚ in the upper left of the display area to switch Run/Stop.
- **Parameter Setting Keyboard in Menu Item:** There are digital input mode and hobbing input mode.

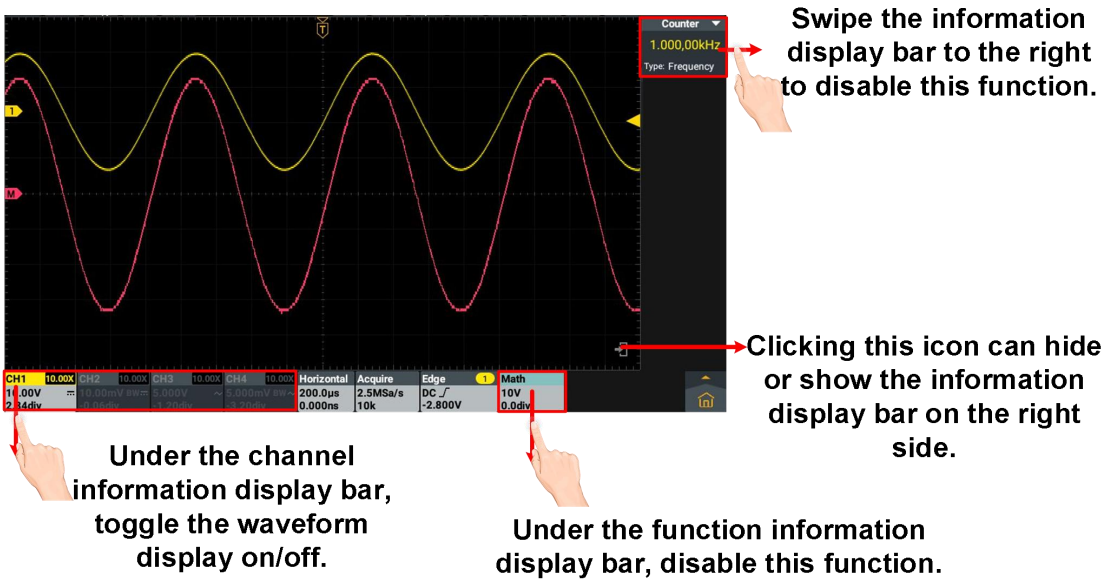
  Digital input mode, as shown in the figure below.



Hobbing input mode, as shown in the figure below.



- **Swipe the information display bar**



How To Set Automatic Measurement

Press the **Measure** button to perform automatic measurements. There are a total of 43 measurement types, and the screen can display up to 8 types of measurements at the bottom left corner.

There are 43 kinds of measurement including:Period, + Width, Rise Time, +Duty, Frequency, - Width, Fall Time, -Duty, ScrDuty, Vavg, Vpp, Vamp, StdDev, Vmax, Vtop, VRMS, Overshoot, Vmin, Vbase, CycRms ,

Preshoot, +PulseCnt, -PulseCnt, RiseCnt, FallCnt, Area, CycArea, Delay(1卐-2卐), Delay(1卐-2卍), Delay(1卍-2卐), Delay(1卍-2卍), Phase(1卐-2卐), Phase(1卐-2卍), Phase(1卍-2卐), Phase(1卍-2卍), FRR(1卐-2卐), FRF(1卐-2卍), FFR(1卍-2卐), FFF(1卍-2卍), LRR(1卐-2卐), LRF(1卐-2卍), LFR(1卍-2卐) and LFF(1卍-2卍).

Automatic measurement can not be performed when storing the waveform or calculating double waveforms. In slow sweep, both the cycle and frequency can not be measured.

For example: To measure the cycle and +Width of CH1 channel signal, operate according to the following steps:

1. Press **Measure** key and the setting window is displayed on the screen.
2. Click the **Switch** to On state and the circle is highlighted.
3. Click Signal Source **CH1** to highlight it.
4. Click **Period** and **+Width** in the horizontal measurement, and the circle is checked and highlighted.

The measured values will be automatically displayed at the lower left of the screen.

6.Appendix

Appendix A: Enclosure

(The accessories subject to final delivery.)

Standard Accessories:

Power Cord

Quick Guide

USB Cable

Probe

Power Supply Adaptor

Optional Accessories:

BNC to alligator clip cable

Appendix B: General Care And Cleaning

General Care

Do not store or leave the instrument where the liquid crystal display will be exposed to direct sunlight for long periods of time.

Caution: To avoid any damage to the instrument or probe, do not exposed it to any sprays, liquids, or solvents.

Cleaning

Inspect the instrument and probes as often as operating conditions require.

To clean the instrument exterior, perform the following steps:

1. Wipe the dust from the instrument and probe surface with a soft cloth. Do not make any scuffing on the transparent LCD protection screen when clean the LCD screen.

2. Disconnect power before cleaning your Oscilloscope. Clean the instrument with a wet soft cloth not dripping water. It is recommended to scrub with soft detergent or fresh water. To avoid damage to the instrument or probe, do not use any corrosive chemical cleaning agent.

⚠ **Warning:** Before power on again for operation, it is required to confirm that the instrument has already been dried completely, avoiding any electrical short circuit or bodily injury resulting form the moisture.

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