JT-DMSO2D72

Portable 3-in-one oscilloscope, signal generator and multimeter

1. GENERAL INFORMATION

Dear customer,

Thank you for choosing our product. Please read the following important information before putting the device into operation.

This oscilloscope is compact, portable and flexible. It has a TFT-LCD color display with a resolution of 320 x 240 pixels and adjustable backlight brightness.

The maximum real time sampling rate can be up to 250 MSa/s. USB memory devices are also supported, the user can upgrade the firmware via USB, the edge trigger function is automatically detected and it has a user-defined fast offset calibration with A/D converter that can sample each channel simultaneously.

2. SAFETY INSTRUCTIONS

Safety Terms and Symbols:

following terms may appear on product:

Danger It represents that harms may be caused to you at once if you perform the operation.

Warning It represents that latent harms may be caused to you if you perform the operation.

Notice It represents that damage may possibly caused to the product or other properties if you perform the operation.

Symbols on the product: following symbols may appear on product:

| Notice Please read the manual | Protective ground terminal | Measuring ground terminal | Chassis ground terminal |

General Safety Summary

Read the following safety precautions to avoid injury and prevent damage to this product or any products connected to it. To evade potential hazards, use this product only as specified.

Only qualified personnel should perform maintenance.

Use suitable power cord. Use only the power cord specified for this product and certified for the country of use.

Connect and disconnect properly. Connect a probe with the oscilloscope before it is connected to measured circuits; disconnect the probe from the oscilloscope after it is disconnected from measured circuits.

Ground the product. This product is grounded through the grounding conductor of the power cord. To avoid electric shock, the grounding conductor must be connected to earth ground. Before making connections to the input or output terminals of the product, ensure that the product is properly grounded.

Connect the probe the right way. The probe ground lead is at ground potential. Do not connect the ground lead to an elevated voltage.

Check all terminal ratings. To avoid fire or shock hazard, check all ratings and markings on the product. Refer to the product manual for detailed information about ratings before making connections to the product.

Do not operate without covers. Do not operate this product with covers or panels removed.

Avoid exposed circuitry. Do not touch exposed connections and components when power is present.

Do not operate with suspected failures. If you suspect there is damage to this product, have it inspected by qualified service personnel.

Assure good ventilation.

Do not operate in wet/damp environments.

Do not operate in an explosive atmosphere.

Keep product surfaces clean and dry.

3. TECHNICAL SPECIFICATIONS

Channels	2
Bandwidth	70 MHz
Sampling Rate	250 MSa/s Single channel 125 MSa/s Dual channel

Oscillospe Specifications: -Horizontal

Rising time	≤ 5 ns
Waveform Interpolation	(sin x)/x
Record length	6000 samples Single channel 3000 samples Dual channel
SEC/DIV Range of 1, 2, 5 Sequence	5 ns/div - 500s/div

Oscilloscope Specifications: -Vertical

A/D converter	8-bit resolution
VOLTS/DIV range	10mV/div –10V/div at BNC input
Measurement Range	± 5 div
Rising time at BNC input, typical	≤ 5 ns

Selectable analog bandwidth limit, typical	Typical 20 MHz (reduced to 6 MHz when using a 1x probe)
Low frequency response (-3db)	≤ 10 Hz
DC gain accuracy	10V/div - 10mV/div ±3% for normal or average acquisition mode

Trigger

Type	Edge
Mode	Auto, Normal, Single
Level	± 4 divisions from centre of screen
Trigger level accuracy	0,2 div*volts/div within 4 div.
Slope	Rising, falling, rising & falling
Source	CH1, CH2

Input

Coupling	DC, AC or GND
Input impedance (DC coupled)	25pF ±3pF, 1MΩ ±2%
Probe attenuation	1X, 10X
Supported probe attenuation factors	1X, 10X, 100X, 1000X
Input protection voltage	150 V_{RMS}

Measurement

Values between cursors	Voltage Difference: $\triangle$V Time Difference: $\triangle$T
Automatic measurement	Frequency, Amplitude

General specifications

Display type	2.6 inch 64K color TFT-LCD
Display resolution	320 horizontal x 240 vertical pixel
Display contrast	Adjustable
Power supply voltage	100-240V AC, 50-60Hz OR 5V DC, 2A
Power consumption	< 2.5 W
Fuse	T, 3 A
Battery	2 x 2600 mAh
Operating temperature	0– 50°C
Storage temperature	-20-60°C

Allowed relative humidity	≤ 40°C: ≤90% RH, 40-50°C: ≤60% RH
Cooling Method	Convection
Altitude:	
-Operating and Nonoperating	3 000 m (10 000 feet)
-Random vibration	0.31 g_{RMS} from 50 - 500Hz, 10 minutes on each axis
-Nonoperating	2,46 g_{RMS} from 5 - 500 Hz, 10 minutes on each axis
Mechanical shock in operation	50 g, 11 ms, half sine
Dimensions	199 x 98 x 40 mm
Weight	624 g

Arbitrary Waveform Generator:

Waveform Frequency	Sine: 1Hz-25MHz; Square: 1Hz-10MHz; Ramp: 1Hz-1MHz; Expon: 1Hz-5MHz
Sampling rate	250 MSa/s
Amplitude	2.5 Vpp (50Ω)/5Vpp (High impedance)
Frequency resolution	0,1 %
Channel	CH1 waveform output
Waveform depth	512Sa
Vertical resolution	12 bit
Output impedance	50 Ω
Square Characteristics:	
Pulse width accuracy	± 10 ns

Digital Multimeter:

Maximum resolution	4000 Counts
Testing Modes:	Voltage, Current, Resistance, Capacity, Diode, On-Off
Maximum Input Voltage	AC: 600 V/ DC: 600 V
Maximum Input Current	AC: 10 A / DC: 10 A

Range		Accuracy	Resolution
DC Voltage	400.00mV	±（0.8% + 5）	100uV
	4.000V		1mV
	40.00V		10mV
	400.0V		100mV
	600.0V	±（1% + 2）	1V
	Overload protection: 400mV: 250V, other: 600Vrms.		
AC Voltage	4.000V	±（1.2% + 5）	1mV
	40.00V		10mV
	400.0V		100mV
	600.0V	±（1.5% + 5）	1V
	Frequency: 40Hz~400Hz; Frequency of 400V and 600V: 40Hz~100Hz		
DC Current	40.00mA	±（1% + 2）	10uA
	200.0mA	±（1.5% + 2）	100uA
	4.000A	±（1.8% + 2）	1mA
	10.00A	±（3% + 2）	10mA
	Overload protection: self restoring fuse: 200mA/250V, 4A and 10A range no fuse.		
AC Current	40.00mA	±（1.3% + 2）	10uA
	400.0mA	±（1.8% + 2）	100uA
	4.000A	±（2% + 3）	1mA
	10.00A	±（3% + 5）	10mA
	Frequency: 40Hz~400Hz; self restoring fuse: 200mA/250V, 4A and 10A range no fuse.		
Resistance	400.0Ω	±（1% + 3）	0.1Ω
	4.000KΩ	±（1.2% + 5）	1Ω
	60.00KΩ		10Ω
	400.0KΩ		100Ω
	4.000MΩ		1KΩ
	40.00MΩ	±（1.5%±3）	10KΩ
	Overload protection: 220Vrms		
Capacity	40.00nF	±（3% + 5）	10pF
	400.0nF		100pF
	4.000uF		1nF
	40.00uF		10nF
	100.0uF		100nF
	Overload protection: 220Vrms		
Diode	0V~1.0V		
On-Off	<50Ω		

All specifications herein mentioned apply to the series oscilloscopes. Before checking an oscilloscope to see if it complies with these specifications, make sure it meets the following conditions:

The oscilloscope must have been operating continuously for twenty minutes under the specified operating temperature.

The Do Self Cal operation must be performed through the Utility menu if the operating temperature changes by more than 5°C.

The oscilloscope must be within the factory calibration interval.

All specifications are guaranteed unless noted 'typical'.

4. GETTING STARTED

This Oscilloscope is a small, lightweight portable instrument which provides the user with a convenient and easy to operate front panel with which you can perform basic tests.

- **General Inspection:**

Please check the instrument as following steps after receiving:

Check the shipping container for damage: Keep the damaged shipping container or cushioning material until the contents of the shipment have been checked for completeness and the instrument has been checked mechanically and electrically.

Check the accessories: Accessories supplied with the instrument are listed in "Accessories" in this manual. If the contents are incomplete or damaged, please notify the franchiser.

Check the instrument: In case there is any mechanical damage or defect, or the instrument does not operate properly or fails performance tests, please notify your reseller.

- **Use of safety keyhole:**

A safety keyhole is reserved on the back shell of the oscilloscope. Users need to purchase the safety lock by themselves. Wrap one end of the safety lock around a hard-to-move object, insert the other end into the safety lock hole, turn the key clockwise to lock the instrument, and then pull out the key. In this way, the most basic anti-theft requirements can be achieved.

Adjust the bracket

When using the instrument, you can open the support foot to tilt the instrument upward for easy operation and observation. When the instrument is not in use, the user can close the support foot to facilitate placement or handling.
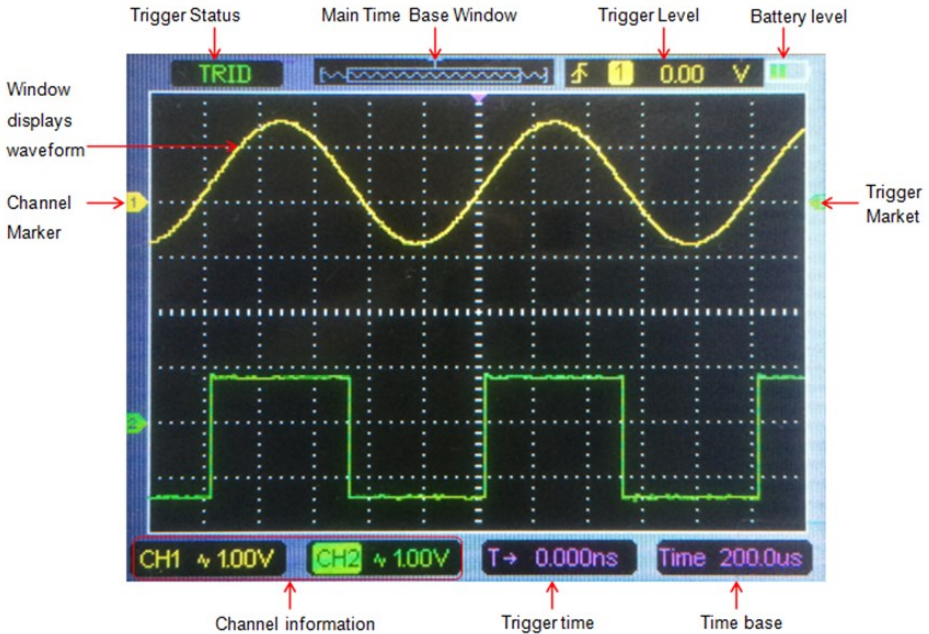After adjusting the rack, the instrument can be suspended on the vertical plane.

• **Front Panel**

The following diagram briefly describes the front panel of this oscilloscope.
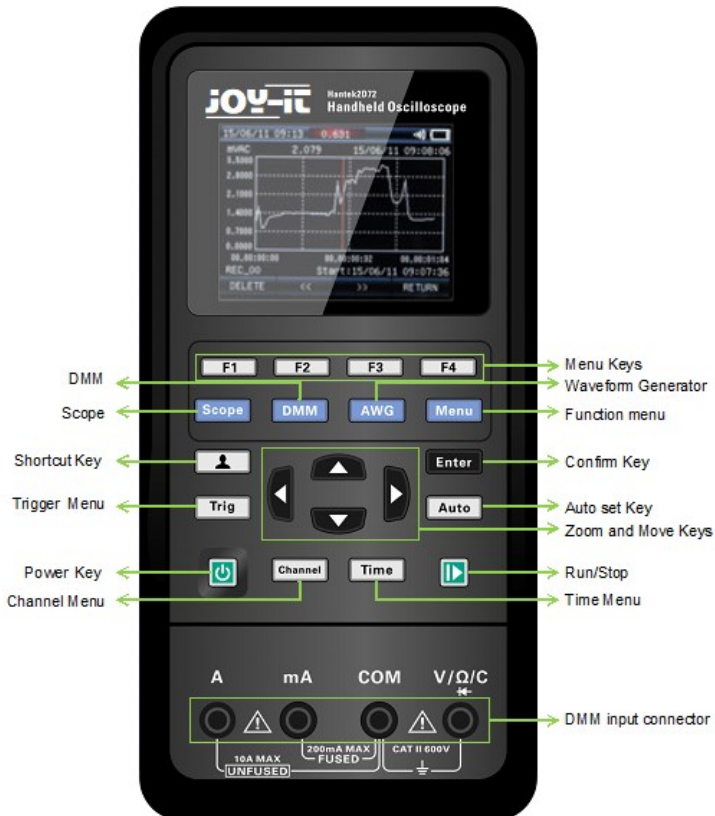
- **The user interface**

- **Functional Check**

Follow the steps below to perform a quick functional check to your oscilloscope.

Power

Press the power key and the device starts. Press the power key again, and the device will shut down. Before starting it, please confirm that the battery has enough power. The oscilloscope is supplied with a power adapter with USB-Type-C plug. The input AC power supply is 100~240V, 50~60Hz. The output is 5V@2A. The power adapter can be used to supply the oscilloscope or charge the battery.

When connect the power adapter to the oscilloscope, if the battery is not installed inside the oscilloscope, the power key backlight is red and flash; if the battery is installed inside the oscilloscope and the battery power is not filled, the power key backlight is red; if the battery is installed inside the oscilloscope and the battery power is full, the backlight of the source key is extinguishes.

Observe the waveform

1. Set the switch on the probe to 1X and connect the probe to Channel 1 on the oscilloscope. First, align the slot in the probe connector with the protuberance on the CH1 BNC and push to connect; then, turn to right to lock the probe in place.
2. If you use the probe hook-tip, the hook end should be removed, the probe pin should be inserted into the Gen Out output terminal, and the probe grounding clamp should be clamped on the metal outer ring of the Gen Out output terminal. Recommended input ~2V@1KHz peak-peak square wave.

3. Press the **Auto** button and you should see within a few seconds a square wave of about 2V peak-to-peak at 1KHz in the display. Repeat the steps to observe CH2.

- ## Probe check

Safety

When using the probe, keep your fingers behind the guard on the probe body to avoid electric shock. Do not touch metallic portions of the probe head while it is connected to a voltage source. Connect the probe to the oscilloscope and connect the ground terminal to ground before you start any measurements.

Finger Guard
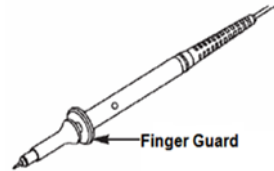
Manual Probe Compensation

Upon the first connection of a probe and an input channel, you should manually perform this adjustment to match the probe to the input channel. Uncompensated or wrong compensated probes may lead to errors or faults in measurement. To adjust the probe compensation, follow the steps below.

1. Press **Channel** button to enter channel setting menu, Set the Probe option attenuation in the channel menu to 10X. Set the switch on the probe to 10X and connect the probe to Channel 1 on the oscilloscope. If you use the probe hook-tip, the hook end should be removed, the probe pin should be inserted into the Gen Out output terminal, and the probe grounding clamp should be clamped on the metal outer ring of the Gen Out output terminal. The oscilloscope with signal generator function needs to set output signal as 2V @ 1KHz square wave; The Gen Out terminal of the oscilloscope without signal generator function automatically outputs 2V @ 1KHz square wave. Press the **Auto** button.

2. Check the shape of the displayed waveform.
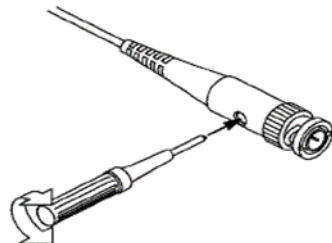
Compensated correctly

Overcompensated

Undercompensated

3. If necessary, use a nonmetallic screwdriver to adjust the variable capacity of your probe until the shape of the waveform turns to be the same as the above figure. Repeat this step as necessary. See the figure below for the way of adjustment.


Probe Attenuation Setting: Probes are of various attenuation factors which affect the vertical scale of the signal. The Probe Check function is used to verify if the Probe attenuation option matches the attenuation of the probe.

You can press Channel button to enter the channel setting menu and select CH1, and select the Probe option that matches the attenuation factor of your probe.

Make sure that the Attenuation switch on the probe matches the Probe option in the oscilloscope. Switch settings are 1X and 10X.

When the Attenuation switch is set to 1X, the probe limits the bandwidth of the oscilloscope to 6MHz. To use the full bandwidth of the oscilloscope, be sure to set the switch to 10X.

Attenuation Switch
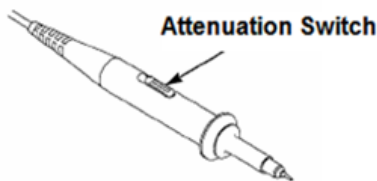
5. FUNCTION INTRODUCTION

Menu and Control Keys
All the keys are described as follows:
Scope: Oscilloscope mode

DMM：Multimeter mode

AWG：Waveform generator

Menu：Function menu

Trig：Trigger setting menu

Enter: In **scope**, it saves the user-defined settings of the oscilloscope;

In **generator**, press the button to confirm after entering the character.

Auto: It adjusts the horizontal and vertical scales of the oscilloscope automatically and sets the trigger coupling, type, position, slope, level

and mode, etc., to acquire a stable waveform display.
Channel: Channel setting menu
Time: Horizontal setting menu

Zoom and move keys:
In the trigger menu, the left and down keys push the trigger level down, and the right and upper direction keys push the trigger level up;

In the channel menu, the upper and lower direction keys change the zero level position of the channel, and the left and right direction keys change the volt/div of the channel;

In the time base menu, the upper and lower direction keys change the time/div, and the left and right direction keys change the horizontal trigger position;

In DMM, switch measurement function;

In generator, after choosing a parameter, the left and lower direction key will reduce the parameter value, the right and up direction key will increase the parameter value; it is also used for the digital selection of the virtual keyboard.

F1/F2/F3/F4: Multi function key, in each menu mode, is responsible for selecting corresponding menu items in the screen.

Shortcut keys. Long press this button to enter the menu, and choose shortcut key function; After setting, press this button single time to respond to the corresponding function.
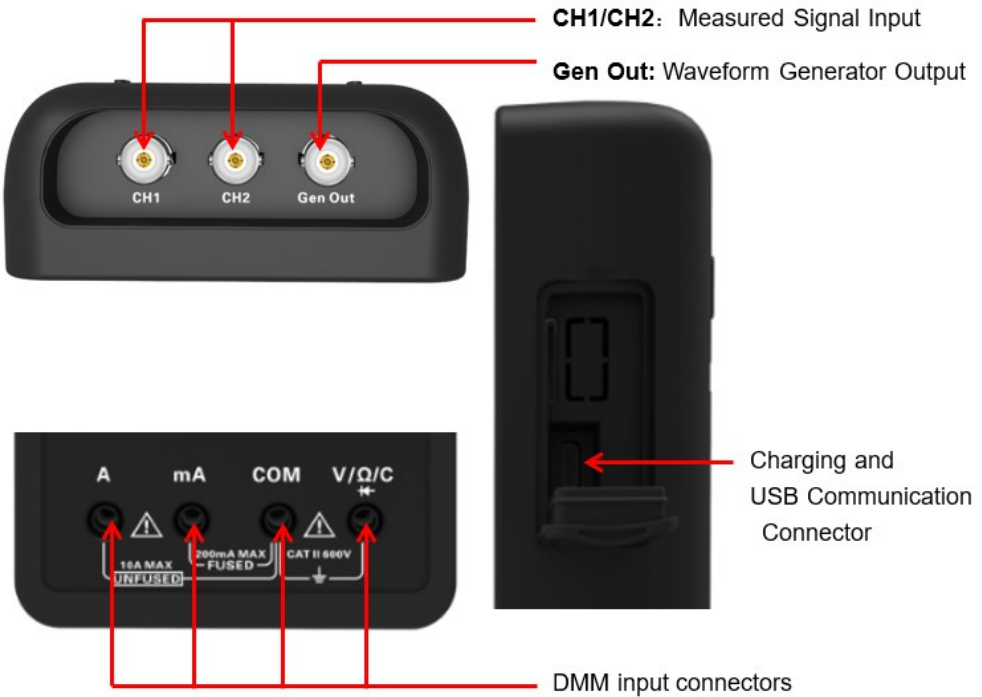
In scope, stop or run the waveform acquisition;

In DMM, hold the measuring data or update data;

In generator, turn on or off the waveform output.

Power key.

- **Connectors**

CH1/CH2: Measured Signal Input

Gen Out: Waveform Generator Output

CH1   CH2   Gen Out

Charging and
USB Communication
Connector

A   mA   COM   V/Ω/C

10A MAX
UNFUSED

200mA MAX
- FUSED -

CAT II 600V

DMM input connectors

Gen Out: The Gen Out terminal of the oscilloscope without signal generator function always outputs 2V @ 1KHz square wave.

• **Automatic set**

Auto set is one of the advantages digital oscilloscopes have. When you push the Auto button, the oscilloscope will identify the type of waveform (sine or square wave) and adjust controls according to input signals so that it can accurately display the wave-form of the input signal.

Functions	Settings
Cursor	Off
Display Format	Set to YT
Horizontal Position	Adjusted
SEC/DIV	Adjusted
Trigger Level	Set to 50%
Trigger Mode	Auto
Trigger Source	Adjusted
Trigger Slope	Adjusted
Trigger Type	Edge
Vertical Bandwidth	Full
Vertical Coupling	Unchanged
VOLTS/DIV	Adjusted

The Auto function examines all channels for signals and displays corresponding waveforms. Auto determines the trigger source according to the following conditions :

If multiply channels get signals, the oscilloscope will use the channel with the lowest frequen-cy signal as the trigger source.

If no signals are found, the oscil-loscope will use the lowest-numbered channel displayed in Auto Scale as the trigger source.

If no signals are found and no channels are displayed, the oscilloscope will display and use Channel 1 as the trigger source.

• **Default settings**

Menu or Sys-tem	Option, Button or Knob	Default Setting
Cursor	Type	Off
	Source	CH1
	Horizontal (amplitude)	±4div
	Vertical (time)	±4div
Display	Format	YT
Horizontal	Position	0.00s
	SEC/DIV	500µs
Measure	On or Off	Off
Trigger (Edge)	Source	CH1
	Slope	Rising
	Mode	Auto
	Level	0.00v
Vertical Sys-tem, All Channels	Bandwidth Limit	Unlimited
	Coupling	AC
	Probe Attenuation	1X
	Position	0.00div (0.00V)
	VOLTS/DIV	1V

Long press ![person icon] button, to enter Short key setting menu, and select **Default**.
Press ![person icon] button, pops up the prompt to recall the default settings on the screen, now press **F1** to confirm. The oscilloscope will display the CH1 waveform and remove all the others. Press F4 to cancel. The table below gives the options, buttons and controls that change settings at default setup.

The following settings do not change when you recall default settings:

Language options, saved settings, saved waveforms, saved reference waveforms, calibration data.

• **Horizontal System**

Press **Time** button to enter horizontal system menu, use the direction keys to change the horizontal scale (time base) and the horizontal trigger position. When you change the horizontal scale, the waveform will expand or contract to the screen center.

1. SEC/DIV Knob: Used to change the horizontal time scale to magnify or compress the waveform horizontally. If the waveform acquisition is stopped (by using button), ![play icon] press **Time** button and **Up** or **Down** buttons to expand or compress the waveform.

2. Horizontal Position Knob: Used to control the trigger position against the screen center. Press Time button and Right or Left buttons to move the waveform right or left. The key resolution vary according to time base. Press "AUTO" key can make the horizontal position return to zero.

3. Mode: Y-T, X-Y, Roll, Scan.

Y-T: YT format shows the vertical voltage in relation to time (horizontal scale). Press **Time->Mode** to set.

X-Y: The XY mode is used to analyze phase differences, such as those represented by Lissajous patterns. The format plots the voltage on CH1 against the voltage on CH2, where CH1 is the horizontal axis and CH2 is the vertical axis. You may view the same waveform in XY mode. To perform this operation, stop the acquisition and press **Time ->Mode** to change the display mode to **X-Y**.

Roll: In Roll mode, the waveform display rolls from right to left. Trigger or horizontal offset control of waveforms is available during Roll Mode, and it's only available when set to 100ms/div or slower. Press Time->Mode to change the display mode to Roll, the time/div will be changed to 100ms/div automatically.

Scan: In Scan Mode, the waveform display scan updates from left to right. In Scan mode, trigger and horizontal offset control of waveforms are available during Scan Mode. This mode is only available when set to 100ms/div or slower. Generally, used for measuring low frequency signal. When the time/div is 100ms/div or slower, the oscilloscope automatically enters the scan mode.

Vertical System

Vertical system can be used to adjust the vertical scale and location and other settings of the channel. Each channel has a separate vertical menu, and each channel can be set separately.

1.Vertical Position
Press Channel->F1 to select the channel, and press Up or Down direction keys to move the vertical position of the selected channel.

2. VOLTS/DIV Settings
The range of Volt/div is 10mV/div-10V/div (1X), or 100mV/div-100V/div (10X), 1V/div-1000V/div (100X), step by 1-2-5. Press Channel->F1 to select the channel, and press Right or Left direction keys to change the Volt/div of the selected channel.

3. Channel Setting Menu

| Options	Settings	Comments
On/Off	On Off	Turn on the waveform display. Turn off the waveform display.
Coupling	DC AC GND	DC passes both DC and AC components of the input signal. AC blocks the DC component of the input signal and attenuates signals below 10Hz. GND disconnects the input signal.
Probe	1X 10X 100X	Selects a value according to the probe attenuation factor so as to ensure correct vertical readouts. Reduce bandwidth to 6MHz when using a 1X probe.
BW Limit	On Off	Limits the bandwidth to reduce display noise; filters the signal to eliminate noise and other unnecessary HF components.
Invert	On Off	The invert function turns the displayed waveform 180 degrees, with respect to the ground level. When the oscilloscope is triggered on the inverted signal, the trigger is also inverted.

- **Trigger System**

The trigger determines when the oscilloscope begins to acquire data and display a waveform. Once a trigger is properly set up, the oscilloscope can convert unstable displays or blank screens to meaningful waveforms.

The triggering mode of this series oscilloscope is edge trigger.
Edge trigger distinguishes the trigger points by seeking the specified edge (rising, falling, rising & falling) and trigger level.
Press **Trig** button to enter trigger menu.

Trigger Source: Select the trigger source signal to CH1 or CH2. You can use the trigger source options to select the signal that the oscilloscope uses as a trigger.
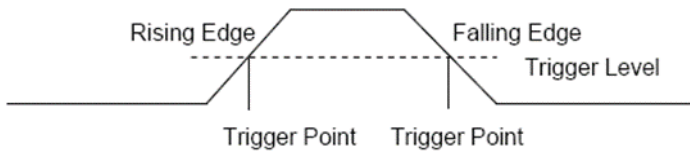
Slope: Select the trigger slope to rising, falling, rising & falling**.**

Trigger Mode: You can select the Auto or Normal mode to define how the oscilloscope acquires data when it does not detect a trigger condition. **Auto Mode** performs the acquisition freely in absence of valid trigger. It allows the generation of untriggered waveforms with the time base set to 100ms/div or slower. **Normal Mode** updates the displayed waveforms only when the oscilloscope detects a valid trigger condition. Before this update, the oscilloscope still displays the old waveforms. This mode shall be used when you only want to view the effectively triggered waveforms. In this mode, the oscilloscope displays waveforms only after the first trigger. To perform single trigger acquisition, the trigger mode can be set to "single". When triggered, a single waveform is acquired and then stop.

Force Trigger: Used to complete an acquisition regardless of an adequate trigger signal. This button becomes useless if the acquisition is already stopped.

Trigger Level: It sets the amplitude level the signal must cross to cause an acquisition when using the Edge or Pulse Width trigger. Press Trig button to enter, and press Up or Down direction keys to change the trigger level.

- **Save Waveforms**

Press **Menu** button to enter, and select **Save** to enter store waveform menu. The waveform can be saved to the oscilloscope inside, also can be recalled to view.

The Save Menu Table:

Menu	Setting	Description
Position	1,2,3,4,5,6	Select the internal storage position.
Save		Save waveform data.
Recall		Recall the waveform.

To save the waveform, follow these steps:

1. Press **F1** to select the storage position of the waveform.

2. Press **F2** to save the waveform data to the specified position. Also, users can long press button to enter, and select F4->F2 (Data Save) as shortcut keys.

Press button one time to save the current waveform data.

3. Press **F3**, to recall the saved waveform. The waveform can be enlarged or reduced in the Channel or Time menu by using the direction keys.

Attention:

1. Waveform storage can not only save the waveform of the current channel, but also save the current state settings at the same time.

2. Users can permanently store 6 waveforms in the oscilloscope memory and rewrite them at any time.

Reference Waveform

The REF channel is used to display the reference waveform, which can compare the actual waveforms with the reference waveforms to find out the differences.

Press **Menu** button to enter, and select **Ref** to enter reference Waveform menu.

REF Menu Table:

Menu	Setting	Description
Position	Ref-A Ref-B	The REF waveform is saved to the oscilloscope Ref-A or Ref-B.
Enable	On	Open the REF waveform.
	Off	Close the REF waveform.
Source	CH1	Select CH1 to save as a REF waveform.
	CH2	Select CH2 to save as a REF waveform
Save		Save the REF waveform.

To save the reference waveform, follow these steps:

Press **F1** to select the position of the reference waveform.

Press **F2** to open the REF channel.

Press **F3** to select the source to CH1 (or CH2), and only select the open channel.

Press **F4** to save the current waveform to the specified location.

- **Measurement**

Scale measurement

Graticule: This method allows you to make a quick, visual estimate and take a simple measurement through the graticule divisions and the scale factor.

For example, you can take simple measurements by counting the major and minor graticule divisions involved and multiplying by the scale factor. If you counted 6 major vertical graticule divisions between the minimum and maximum values of a waveform and knew you had a scale factor of 50mV/division, you could easily calculate your peak-to-peak voltage as follows: 6 divisions x 50mV/division = 300mV.

Cursor measurement

The cursor measurement has two parallel lines on the screen, and move two lines to measure the time and voltage parameters of the input signal. The result of cursor measurement will be displayed on the second page of the cursor menu. Before use cursor measurement, make sure that the measured source is the signal you need to measure. Cursor Measurement Menu Table:

Menu	Setting	Description
Enable	On	Open the cursor measurement.
	Off	Close the cursor measurement.
Type	Voltage Time	The horizontal line is shown to measure the voltage parameters. The vertical line is shown to measure the time parameters.
Source	CH1 CH2	Select the measured source.
Cursor1		Select Cursor1 and press up, down, left and right keys to move the Cursor1 position, and display the Cursor1 value.
Cursor2		Select Cursor2 and press up, down, left and right keys to move the Cursor2 position, and display the Cursor2 value.
Increment		The difference between the Cursor1 and the Cursor2.

Press **Menu** button to enter, and select **Cursor** to enter cursor measurement

To do cursor measurement, follow these steps:

1. Press F1 to open the cursor measurement;

2. Press F2 to select a type of cursor measurement.

3. Press F3 to select the channel that needs to be measured.

4. Press F4 to enter the second page, press F1 or F2 to select Cursor1 or Cursor2, press up, down, left and right to move Cursor1 or Cursor1;

5. The result of cursor measurement will be displayed on the cursor menu.

Automatic Measurement

The oscilloscope provides 2 kinds of automatic measurements, including frequency and amplitude.

Press **Menu** button to enter, select **Measure** to enter automatic measurement. Press **F1** to open, the measurement results will be displayed in the top left corner of the screen.

Attention:

In the measurement result, the yellow font is the result of CH1, and the green font is the result of CH2.

Menu	Description
Frequency	Measure the frequency of the signal.
Maximum Voltage	Measure the maximum voltage of the signal.
Minimum Voltage	Measure the minimum voltage of the signal.

- **Utility**

Press the **Menu** Button to enter.

Menu	Setting	Description
Language	German English French	Set the menu language.
Sound	On Off	Open the key sound. Close the key sound.
Backlight luminance	1~10	Set backlight brightness of the screen.
Backlight time	30s 60s 90s 120s Unlimited	Set the screen backlight time.
System information		Display system information, such as software version or PCB version.
Automatic shutdown	5 Minute 10 Minute 20 Minute 30 Minute Unlimited	Set automatic shutdown time.
Calibration	Start Return	Start the self calibration. Exit the self calibration.

Note:

1. Backlight time and automatic shutdown time will not be executed when the oscilloscope is plugged in with an external charging device or connected to a computer via a USB cable.

2. Shutdown automatically saves last setup.

Self calibration

The self calibration routine helps optimize the oscilloscope signal path for maximum measurement accuracy. You can run the routine at any time but should always run it if the ambient temperature changes by 5°C or more. For a more accurate calibration, please power on the oscilloscope and wait for 20 minutes until it has adequately warmed up.

To do self calibration, follow these steps:

1. Ensure that no input signal is input, otherwise it may damage the instrument.

2. Press **Menu** button to select the self calibration function.

Shortcut key

Long press ⎣👤⎦ button to enter shortcut key settings menu, and choose shortcut key function; After setting, press this button single time to respond to the corresponding function.

Default settings: Long press ⎣👤⎦ button to enter, and select F1 (Default) as the

shortcut key, then press ⎣👤⎦ button one time and select F1 TO confirm to recall the default settings

Custom settings: Long press ⎣👤⎦ button to enter, and select F2 or F3 (custom 1 or 2) as shortcut keys. Now press **Enter** button and click F1 to confirm to save the cur-

rent settings to custom settings. Press ⎣👤⎦ button one time and click F1 to confirm to recall the custom settings.

Save data: Long press ⎣👤⎦ button to enter, and select F4->F1 (Data Save) as shortcut keys. Press **Menu -> Save** to enter the save menu, select a location, press

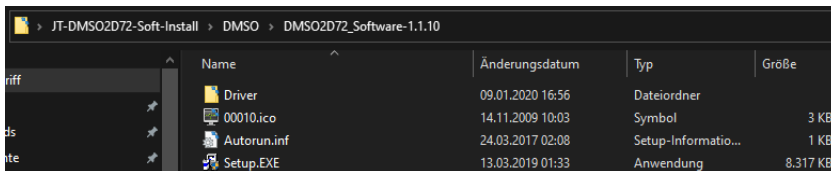⎣👤⎦ button one time to save the current waveform data.

1. Install the software

Download the latest version of the software from us by clicking here and then follow the steps below to install the software.

1.1

First, unzip the file you just downloaded.

1.2

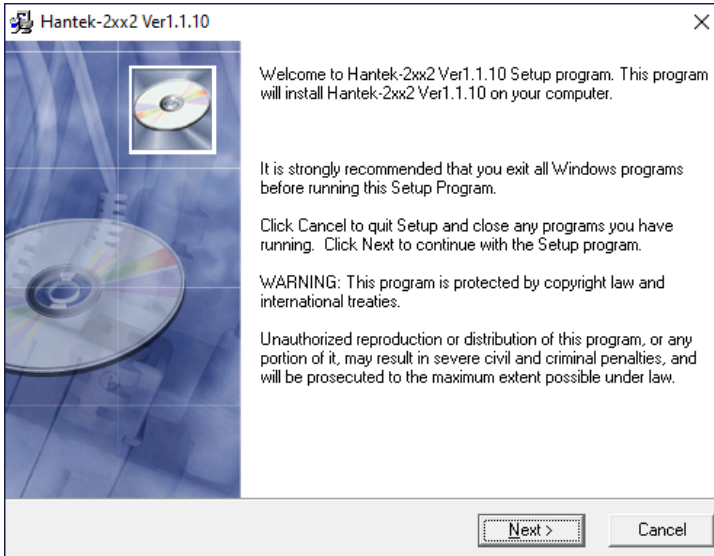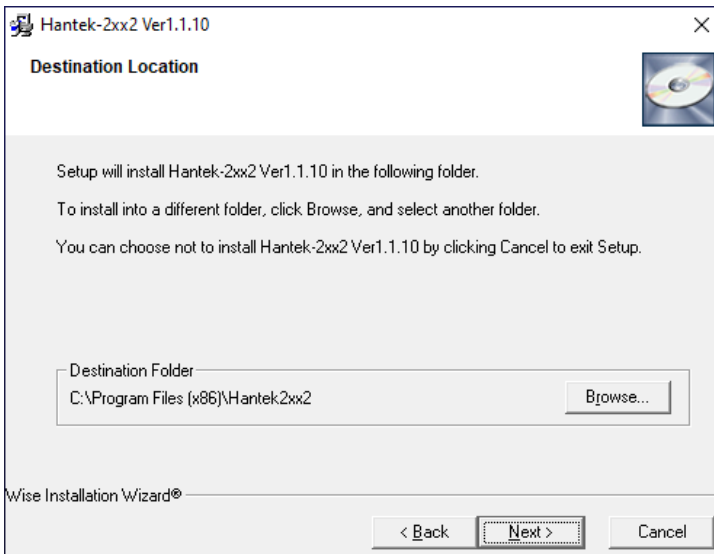Now go to the folder you just unzipped and run Setup.EXE to start the installation.

1.3

Now that you have started the installation you will see the following:
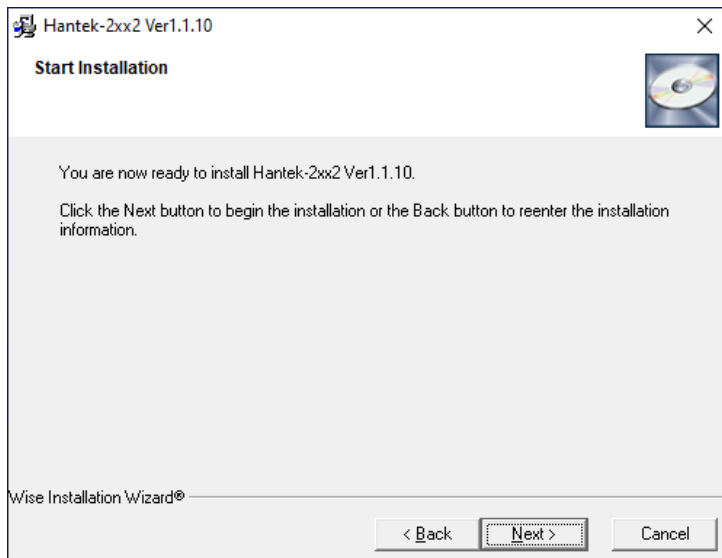

Just click **Next >** here to get to the next step.

1.4

The next step prompts you to select a folder in which to install the program. Select the installation path and click **Next >**.

1.5

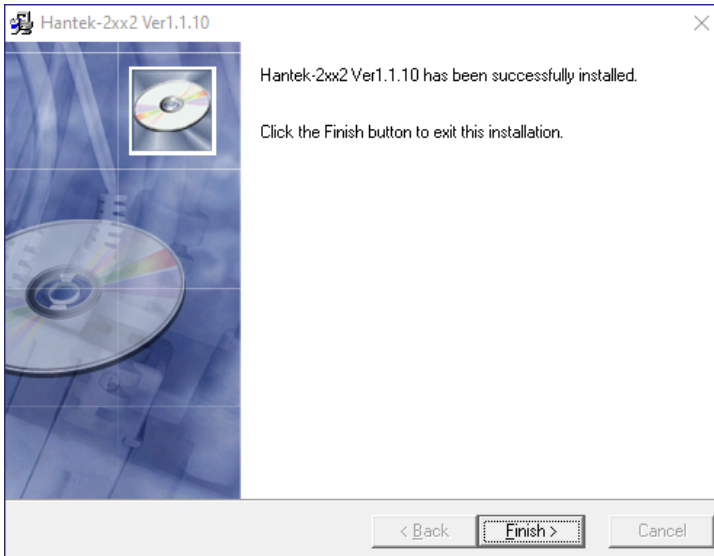Just click **Next >** here to start the installation.

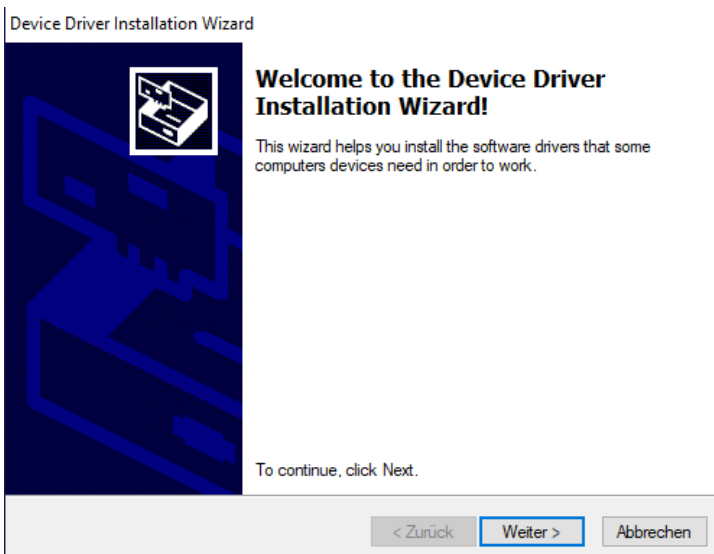Just wait until this has finished the process.
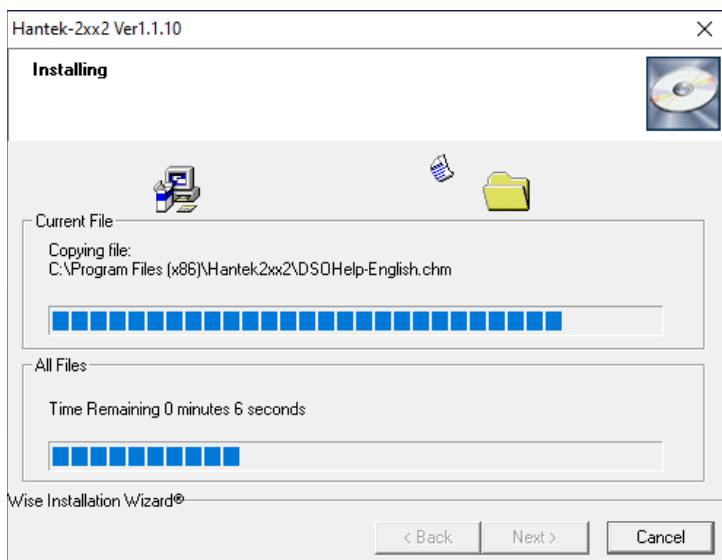
1.7

Now you can finish the software installation by clicking **Finish >.**
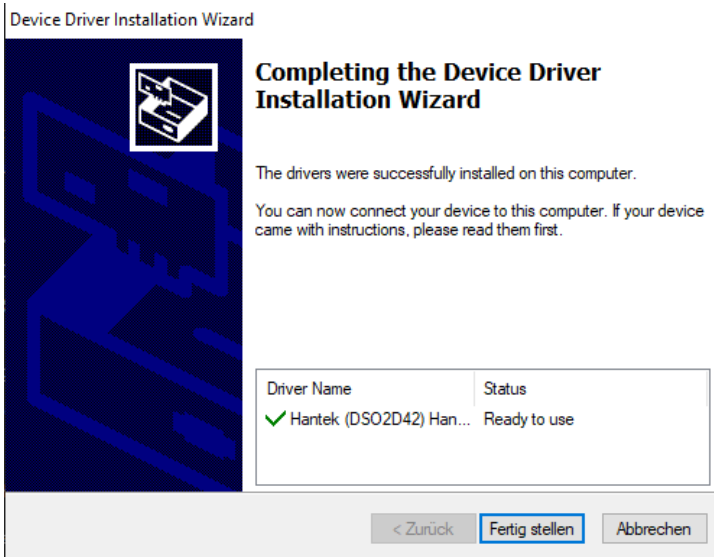

1.8

After the installation of the software is completed, the installation for the device driver starts.



Just click **Next >** here to go to the next step.

1.9

The next step will only show you that the driver installation is complete.


Just click **Finish >** to move to the next step.

2.

Now you can connect the device to your PC and check the installation of the driver. To do this, open the computer's device manager and find the oscilloscope. If the device icon is displayed as in this picture, you have to install the driver manually.
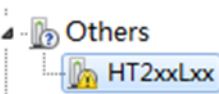
The drivers are located in the software package in the Driver folder. Right-click on the device in the Device Manager and select "Update the driver software" and select the file path to install the driver.
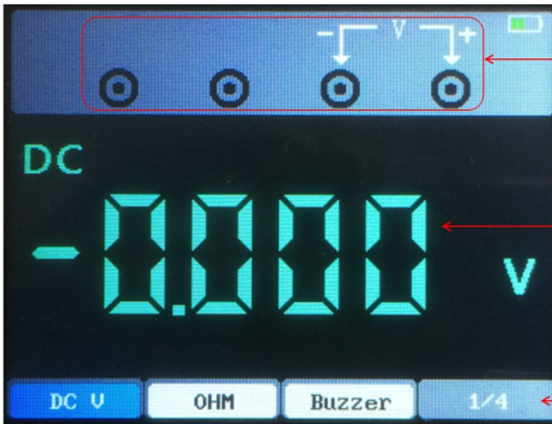
After successful installation of the driver, the following will be displayed:
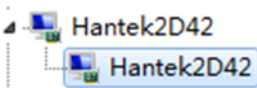
Interface

This chapter introduces the multimeter function.

The measuring types include DC voltage (V, mV), AC voltage, DC current (A, mA), AC current (A, mA), resistance, capacitance, diode, and on-off test.

Measurement
1. DC and AC voltage measurement
Press the power button to turn on, then press the "DMM" button to enter to the multi meter function interface;
Press the up, down, left and right direction keys or F1, F2, F3, F4 multi-function keys to select "DC V", "DC mV" or "AC V";
Insert the black pen into the input port of the COM banana socket, and insert the red pen into the input port of the V/Ω/C banana port;
Connect the red and black forms to the measured point. The voltage value of the measured point will be displayed on the screen.

2. DC and AC current measurement
Press the power button to turn on, then press the "DMM" button to enter to the multi meter function interface;
To measure the DC current greater than 200mA, press the up, down, left and right keys or F1, F2, F3, F4 multi function keys to select "DC A" or "AC A", and insert the black pen to the input end of the COM banana socket, and insert the red pen into the input port of the "A" banana socket;
To measure the DC current less than 200mA, press the up, down, left and right keys or F1, F2, F3, F4 multi function keys to select "DC mA" or "AC mA", and insert the black pen to the input end of the COM banana socket, and insert the red pen into the input port of the "mA" banana socket.;
Connect the red and black forms to the measured point. The current value of the measured point will be displayed on the screen.

3. Resistance measurement
Press the power button to turn on, then press the "DMM" button to enter to the multi meter function interface;
Press the up, down, left and right direction keys or F1, F2, F3, F4 multi-function keys to select "OHM";

and insert the red pen into the input port of the V/Ω/C banana port;
Connect the red and black forms to the measured point. The resistance value of the measured point will be displayed on the screen.

4. Capacity measurement
Press the power button to turn on, then press the "**DMM**" button to enter to the multi meter function interface;
Press the up, down, left and right direction keys or **F1, F2, F3, F4** multi-function keys to select "⊣⊢"; Insert the black pen into the input port of the COM banana socket, and insert the red pen into the input port of the V/Ω/C banana port;
Connect the red and black forms to the measured point. The capacitance value of the measured point will be displayed on the screen.

5. Diode measurement
Press the power button to turn on, then press the "**DMM**" button to enter to the multi meter function interface;
Press the up, down, left and right direction keys or **F1, F2, F3, F4** multi-function keys to select "▷⊢"; Insert the black pen into the input port of the COM banana socket, and insert the red pen into the input port of the V/Ω/C banana port;
Connect the red and black forms to the measured point. The diode value of the measured point will be displayed on the screen.
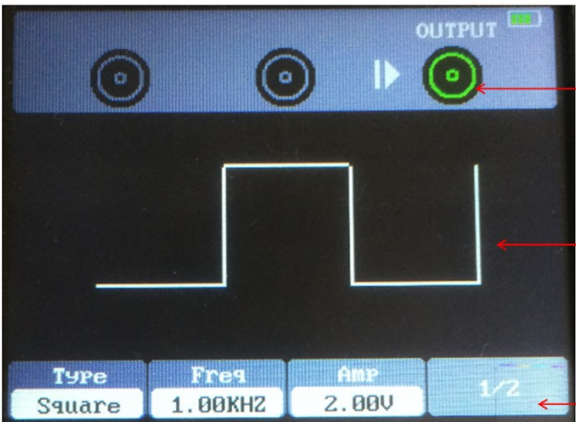
6. Buzzer measurement
Press the power button to turn on, then press the "**DMM**" button to enter to the multi meter function interface;
Press the up, down, left and right direction keys or **F1, F2, F3, F4** multi-function keys to ᵒ¹⁾⁾ select " ";

Insert the black pen into the input port of the COM banana socket, and insert the red pen into the input port of the V/Ω/C banana port;
Connect the red and black forms to the measured point. If the resistance of the measured point is less than 50 ohms, the instrument will emit "drop" sound.

7. Data   hold function
Press the ⏸ button on the instrument, and the displayed data will hold on the display, even if the input signal changes or eliminates, the value will not change.

This chapter introduces the function of waveform generator.

Operation description

8. SIGNAL GENERATOR

Press the power button to turn on, and then press the "AWG" button to enter the waveform generator function interface.

1. Set type

Press **F1** button to select the desired signal waveform, the optional waveform type includes square, triangle, sine, trapezoidal and four arbitrary.

2. Set frequency

Press **F2** button to select **Frequency**, then use the up, down, left and right direction keys to adjust the frequency, press **F2** button to open the digital keyboard again, use the up, down, left, right direction keys and **Enter** key to set frequency parameter, select "OK" and press **Enter** button to confirm.

3. Set amplitude

Press **F3** button to select **Amplitude**, then use the up, down, left and right direction keys to adjust the frequency, press **F3** button to open the digital keyboard again, use the up, down, left, right direction keys and **Enter** key to set frequency parameter, select "OK" and press **Enter** button to confirm.

Note that the entered voltage is the half of the peak-to-peak voltage.

4. Set offset

Press **F4** button to enter the second page. Press **F2** to select **Offset,** then use the up, down, left and right direction keys to adjust the frequency, press **F2** button to open the digital keyboard again, use the up, down, left, right direction keys and "Enter" key to set frequency parameter, select "OK" and press **Enter** button to confirm.

5. Set duty cycle

Enter the second page. Press **F3** to select **Duty**, then use the up, down, left and right direction keys to adjust the frequency, press **F3** button to open the digital keyboard again, use the up, down, left, right direction keys and **Enter** key to set frequency parameter, select "OK" and press **Enter** button to confirm.

6. Generate an arbitrary waveform

It is necessary to edit the arbitrary waveform in connection with the software and download it into the machine. There are 4 arbitrary wave positions, and each position can permanently store an arbitrary wave.

7. After setting the waveform parameters, press the button to turn on or off the signal output. The output waveform of the signal generator can be observed through an oscilloscope.

• **Output the sine waveform**

Output a sine waveform with 10KHz/2.5Vpp as follows:

1.Press **AWG** button to enter the waveform generator function interface.

2. Press **F1** to select "Sine"

3. Frequency: First press **F2** button to select **Frequency**, then use the up, down, left and right direction keys to adjust the frequency. Second, press **F2** button to open the digital keyboard again, use the up, down, left, right direction keys and "Enter" key to set frequency parameter, select "OK" and press **Enter** button to confirm.

4. Amplitude: First press **F3** button to select **Amplitude,** then use the up, down, left and right direction keys to adjust the amplitude. Second, press **F3** button to open the digital keyboard again, use the up, down, left, right direction keys and **Enter** key to set amplitude parameter, select "OK" and press **Enter** button to confirm. Set the amplitude to 2.5V

5. Offset: Press **F4** to enter the second page. First press **F1** button to select **Off-set**, then use the up, down, left and right direction keys to adjust the offset.
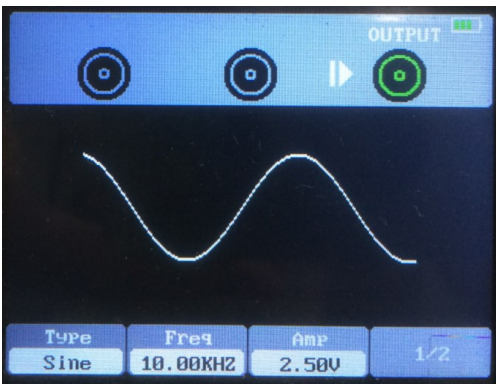

Second, press **F1** button to open the digital keyboard again, use the up, down, left, right direction keys and "Enter" key to set offset parameter, select "OK" and press **Enter** button to con-firm.

**6.** Press the button, the backlight of the button turns green, i.e. output sine waveform.
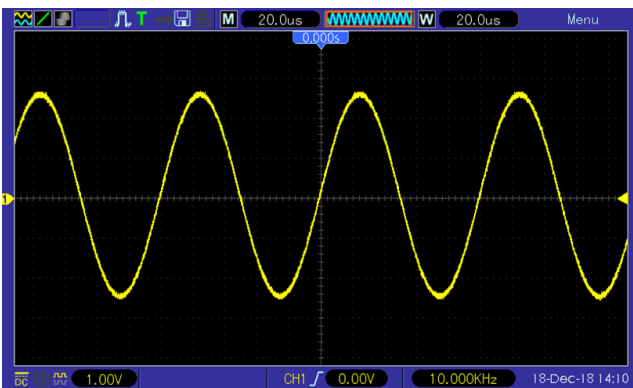
7. The waveform ob-served by an oscilloscope is as follows:

2. Place a checkmark "√" in the box in front of "on/off" to open the signal output.
3. Under "Signal type", select "arb" and set the appropriate frequency and amplitude.
4. Under "Arb Channel" select Arb1/Arb2/Arb3/Arb4. Any channel can store only any waveform which was downloaded last. After power off, turn on the power again and it will be recalled automatically.

5. Draw any waves with the mouse in the waveform area.
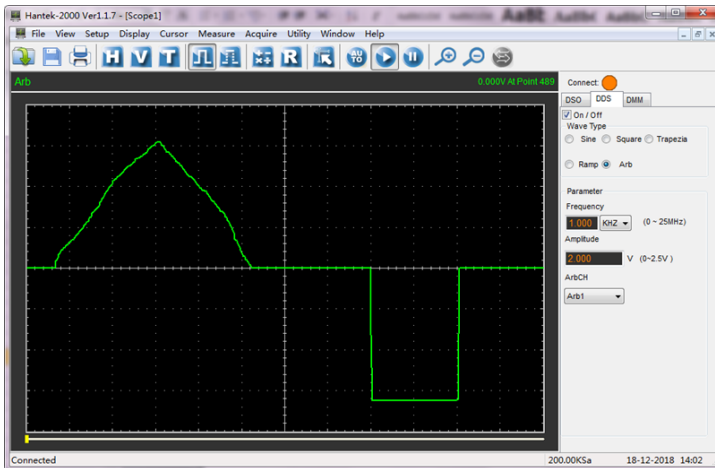
6. Connect the **Gen Out** connector to the oscilloscope for monitoring.
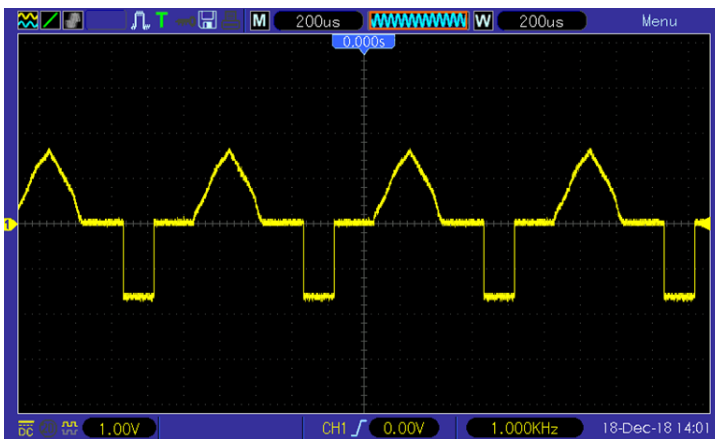
When the battery on the screen is displayed as blank, it indicates that the battery is about to run out. When the battery power is too low, the oscilloscope will prompt "Power off after 5s". In order to avoid the automatic shutdown of the oscilloscope due to insufficient power supply, please charge it in time.

If the power button is pressed, the oscilloscope will not react, indicating that the battery power may be exhausted.
You can charge the oscilloscope in the following way:

Charge the oscilloscope through charger: Connect the oscilloscope to the power socket through the USB data line and charger distributed by the instrument for charging.
Charge the oscilloscope through the USB interface: Connect the oscilloscope to a computer or other equipment through the USB data line.
When charging, turn on the oscilloscope and the battery frame on the screen will change.
When the battery is full, the oscilloscope will automatically stop charging.

- ## Storage and Replacement of the battery
Storage
Lithium batteries must be stored in clean, dry and ventilated rooms. Contact with corrosive substances should be avoided and the have to be kept away from fire and heat sources.
If the lithium battery is not used for a long time (for example, more than 6 months), it should be charged with 50%-70% electricity, and removed from the instrument, and stored in a dry and cool environment.
If the lithium battery rusts, leaks, bulges and other phenomena, it should be removed immediately and scrapped.

Screw

Replacement

Batteries can be recharged repeatedly, but they are vulnerable to wear and tear. If standby time is found to be greatly reduced, batteries need to be replaced.
The battery specification is 18650 lithium battery, 3.7V, 2600mA.
Please refer to the following to replace it. Unfold the supporting leg, there are two screws. Remove the screws and remove the battery cover, you will see the batteries. Now you can remove the battery and replace.
Attention: Pay attention to the positive and negative poles of batteries when replacing baterries.
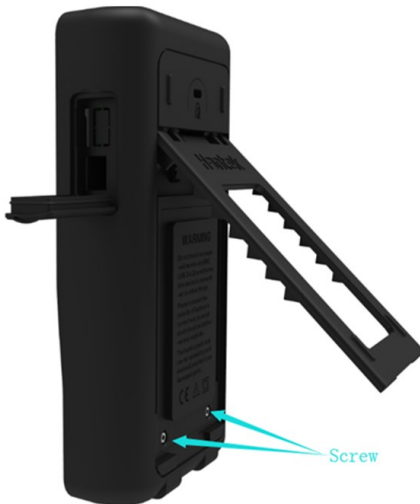
9. TROUBLESHOOTING

1. If the oscilloscope does not start up at power on, follow these steps:

Check whether the battery is installed and confirm whether the battery level is enough.
If the battery level is not enough, use the power adapter to charge.
Restart the instrument after the battery level is enough.

Contact your local distributor or directly keep touch with Joy-IT Support department if the oscilloscope still can not be turned on normally.

2. If there is no display of waveforms on the screen when the oscilloscope is turned on, follow these steps:
Check the probe to assure its proper connection to the input BNC.
Check the channel switch (Channel button) to make sure it has been turned on.
Check the input signal to verify it has been connected to the probe correctly.
Affirm that all measured circuits have signals to output.
Turn up the magnitude for DC signals with large magnitude.

In addition, you may press the Auto button to perform an automatic detection of signals at first.
Contact Joy-IT Technical Support department in time if there is still no display of waveforms.

3. If the waveform of the input signal is distorted seriously, follow these steps:

Check the probe to assure its proper connection to the channel BNC.
Check the probe to assure its good connection to the measured object.
Check the probe to verify it has been well calibrated.
Otherwise, refer to the content about calibration described in this manual.

4. If the waveform is rolling continuously on the screen but can not be triggered, follow these steps:

Check the trigger source to make sure it consistent with the input channel.
Check the trigger level to assure its correct adjustment.

You may press TRIGGER button to enter trigger menu, and use Up, Down, Right, Left direction keys to adjust trigger level to return to signal.

10. GENERAL CARE AND CLEANING

General Care

Do not place or leave the instrument in a location where the LCD screen may be exposed to direct sunlight for extended periods of time.
Note: To avoid damage to the oscilloscope or probes, do not expose them to sprays, liquids, or solutions.

Cleaning

Inspect the oscilloscope and probes as often as working conditions require. To clean the external surfaces, perform the following steps:
Use a lint-free rag to remove dust on the oscilloscope and probes. Be careful not to scratch the smooth display filter. Use a cloth dampened with water to clean the oscilloscope. For an even more thorough cleaning, you can also use a solution of 75% isopropanol diluted with water.
Note: To avoid damage to the surface of the oscilloscope or probes, do not use corrosive or chemical cleaners.

11. ACCESSORIES

The following accessories are available:
- 1x Passive probe oscilloscope (1:1) / (1:10)
- 1x Charger
- 1x USB-A to USB-C cable
- 2x BNC to crocodile clip cable
- 2x Measuring tip cable Multimeter

12. PRODUCT RECYCLING

Our information and take-back obligations under the Electrical and Electronic Equipment Act (ElektroG).
Symbol on electrical and electronic equipment:

This crossed-out trash can means that electrical and electronic equipment does not belong in the household trash. You must hand in the old equipment at a collection point. Before handing in, you must separate used batteries and accumulators that are not enclosed by the old device.
Return options: As an end-user, when you purchase a new device, you may return your old device (which performs essentially the same function as the new device you purchased from us) for disposal at no charge. Small devices for which no external Dimensions larger than 25 cm are can be returned in household quantities regardless of the purchase of a new device.

Possibility of return at our company location during opening hours: Simac GmbH, Pascalstr. 8, D-47506 Neukirchen-Vluyn, Germany.

Possibility of return in your area: We will send you a parcel stamp with which you can return the device to us free of charge. To do so, please contact us by e-mail at Service@joy-it.net or by phone.

Information on packaging: Please pack your old device securely for transport. If you do not have suitable packaging material or do not wish to use your own, please contact us and we will send you suitable packaging.

13. SUPPORT

We are also there for you after the purchase. If any questions remain or problems arise, we are also available to assist you via email, phone and ticket support system:

E-Mail: **service@joy-it.net**
Ticket System: http://support.joy-it.net
Phone: +49 (0)2845 9360-50   (Mon - Thur: 09:00 - 17:00 o'clock,
                                                          Fri: 09:00 - 14:30 o'clock)

For more information, please visit our website:
www.joy-it.net

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