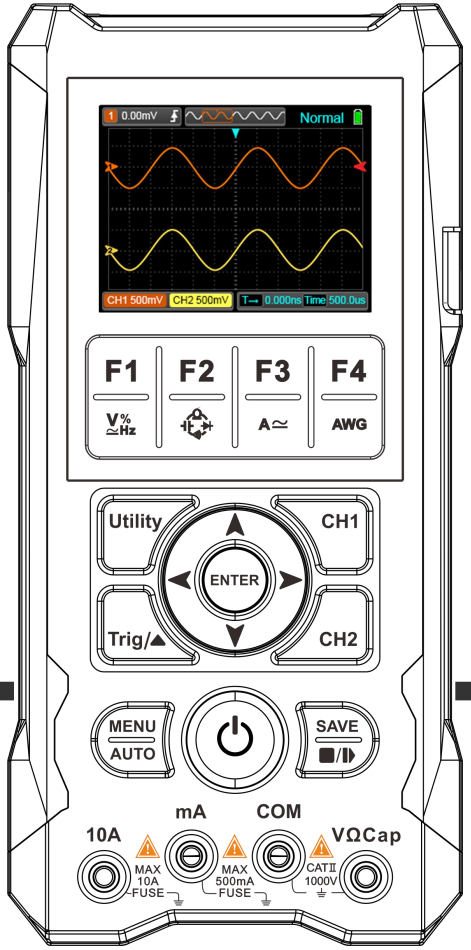


Oscilloscope Multimeter User Manual

Foreword

Dear users,

Thank you for choosing this digital storage wave multimeter, and believe that the product's innovative combination of functions and user-friendly design will bring you great convenience in field testing. Before use, please read this manual carefully, especially the "Safety Instructions" section. After reading, please keep this manual in a safe place so that you can refer to it whenever you need it.

Catalogue

Security Instructions

The technical design of this digital storage apparent wave multimeter complies with IEC1010-1 safety specification, overvoltage electrical measurement category II CAT II - 1000V, pollution protection level: 1.

1. Check the case before use, don't use the meter with damaged case, check if there are cracks or missing plastic parts, please pay special attention to the insulation layer of the meter pen and connecting wires. Do not touch the metal part of the meter probe with your fingers when using the test meter pen;

2. Do not operate in hot, humid, rainy and flammable environments or when the instrument is wet;

3. Never apply more voltage/current to the instrument than the maximum limit that the instrument can withstand;

Measurement Function	Using the input	Maximum limit
V DC	V/Ω, COM	1000V DC+AC peak, within 10 seconds
V AC	V/Ω, COM	750V DC+AC RMS, within 10 seconds
Hz%	V/Ω, COM	750V DC/AC RMS, within 10 seconds
mA AC/ DC	500mA, COM	500mA DC/AC RMS, 250V/500mA fused fuse
A AC/ DC	10A, COM	10A DC/AC RMS, within 30 seconds, 15 minute cooling interval. 250V/10A fused fuse
Ω ⊣◀))) ⊣⊢	V/Ω, COM	250V DC/AC RMS, within 10 seconds

4. Before changing the measurement function, unplugging the meter and switching the power on/off, be sure to detach the meter probe from the test point;

5. Pay attention to the safety warning signal displayed by the instrument: the measured voltage exceeds the "safety voltage" (24VDC/AC) and the warning message "  " is displayed to indicate safety;

6. Do not perform voltage measurements when the voltage to ground on the reference input "COM" of the instrument reaches 500 V;

7. Do not perform AC current measurements on circuits with voltages above AC 250V;

8. Never connect the meter pen across both ends of the voltage source when the measurement function selects the current, resistance, on/off test, diode, capacitance and other gears;

9. Before conducting resistance and diode/on/off tests, the power to the equipment under test must be turned off and the discharge of the capacitors in the power circuit must be confirmed to be exhausted;

10. Before opening the back cover of the instrument to replace the fuse, the instrument must be powered off and the meter pen must be removed from the circuit under test; the same specifications must be used to replace the fuse;

11. Do not modify, disassemble or use the product and accessories for purposes other than the functional design of the product, and all accessories and accessories cannot be replaced at will.

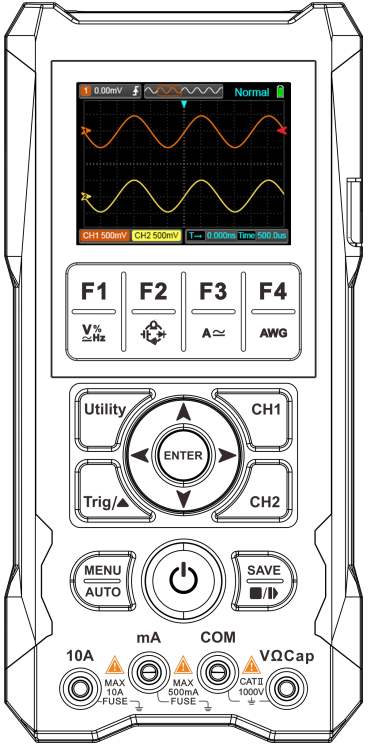
Security signs

	Watch out, danger! This symbol, when located near other symbols or socket terminals, indicates that the user must follow the instructions in this manual in order to prevent instrumentation/personal injury.
	Watch out, electric shock danger! This symbol is located near one or more terminals to indicate that these terminals may carry dangerous voltages in use. For maximum safety, avoid touching the test end of the meter pen with your hand when these terminals carry voltage.
Tips!	The reminder statement states that special care should be taken when operating, as incorrect operation can result in incorrect measurement results or damage to accessories.
Attention!	The cautionary statement states that extreme care must be taken when handling the product and that errors or irregularities may result in damage to this product and other property.
Warning!	The warning statement states that the operation should be very concentrated and that wrong or illegal operation may cause personal injury or even endanger life.

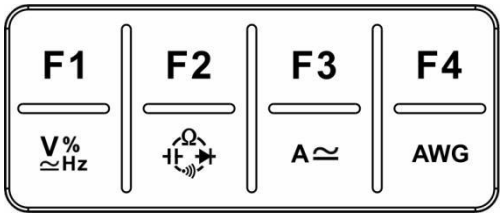
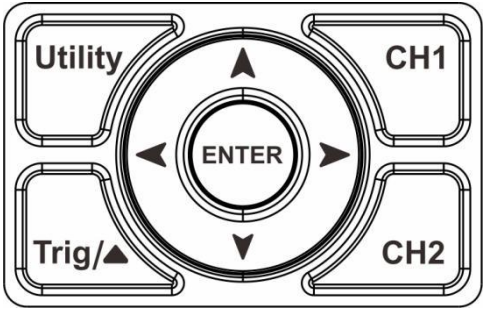
Instrument Profile

Main Features

- 200Msps high speed sampling, 80MHz analog bandwidth, 6000 count auto-range Ture RMS DMM.
- Knob to convert the visual wave, there are three waveform scanning modes such as automatic / conventional / single.
- Data waveform hold function during measurement, can store 2000 sets of data, 200 waveforms.
- Self-setting parameters such as time base, waveform scan mode, etc. during waveform measurement.
- True RMS, measuring the RMS value of a waveform without regard to waveform parameters and distortion.
- Relative value measurement, effectively eliminating lead resistance, distributed capacitance or interference signals.
- Functions include DC/AC voltage/current, resistance, capacitance, frequency, duty cycle diode/on/off testing.
- Automatic/manual range switching, displaying measurement data and historical data on the same screen.
- Overload protection 500mA/10A double fuse, double protection instrument
- 15 minutes no operation automatic shutdown function; high bright backlight, clear display.
- Panel calibration, memory calibration factor without potentiometer adjustment, higher reliability.



Key Function

Key	Name	Function
	F1 ~ F4	The actual function varies with the range and operating mode.
	V% Hz	AC/DC voltage/frequency/duty cycle
	Ω	Resistance / Diode / On-Off Test / Capacitance
	A	AC/DC mA/10A
	AWG	Signal Source
	Utility	System Function Setting
	Trig/△	DSO trigger menu selection (trigger channel/edge type/trigger mode) DMM selects relative value measurements
	CH1	Select oscilloscope channel CH1
	CH2	Select oscilloscope channel CH2
	▲▼◀▶	Up, down, left and right direction selection
	ENTER	Confirm

	MENU	Function menu of DSO and DMM
	AUTO	DSO automatic setting DMM selects automatic or manual range
	SAVE	Save
	Run/Stop	Stop and run
	⏻	Power key

Basic operation

Power on and off

Press the ⏻ key and hold it for more than 2 seconds to turn on the device. Press the ⏻ key again and hold it for more than 2 seconds to turn the device off.

Attention!	Be sure to keep the test probe away from the test point before shutting down. The instrument must be powered off in time after use.

Automatic shutdown

If there is no key operation within the set time, the meter will automatically shut down. To change the time of auto shutdown or turn off the auto shutdown function, you can press Utility to enter the system function setting and select 15min~60min auto shutdown or never shutdown. To protect the battery from over-discharging, it will also shut down automatically when the battery power is about to run out.

Backlight brightness and time

Using the backlight can improve the display of the meter in dark environments, but excessive use of the backlight will shorten the continuous battery operating time.

1. To change the brightness of the backlight, you can press Utility to enter the system function setting and select 5 different brightness levels from 1 to 5.

2. To change the backlight time, you can press Utility key to enter the system function setting and select the backlight time from 30S to 120S or the backlight long light.

Sound Cues

The meter can be adjusted to mute mode. To enter the mute mode, you can press Utility to enter the system function setting and choose to turn off the sound.

Battery Charging

The upper right corner of the meter's LCD screen displays the approximate remaining battery power in the unit at all times, allowing the user to estimate how long the meter can continue to operate and choose when to recharge. When the battery box on the screen shows blank, it means that the battery power is about to run out and needs to be charged in time; or, when the meter does not respond when the power button is pressed, it indicates that the battery power may be depleted and also needs to be charged in time. To charge, connect the meter to a power outlet using the USB cable and power adapter.

When charging, turn on the meter and there will be a charging prompt on the screen; after the battery is fully charged, the meter will automatically stop charging.

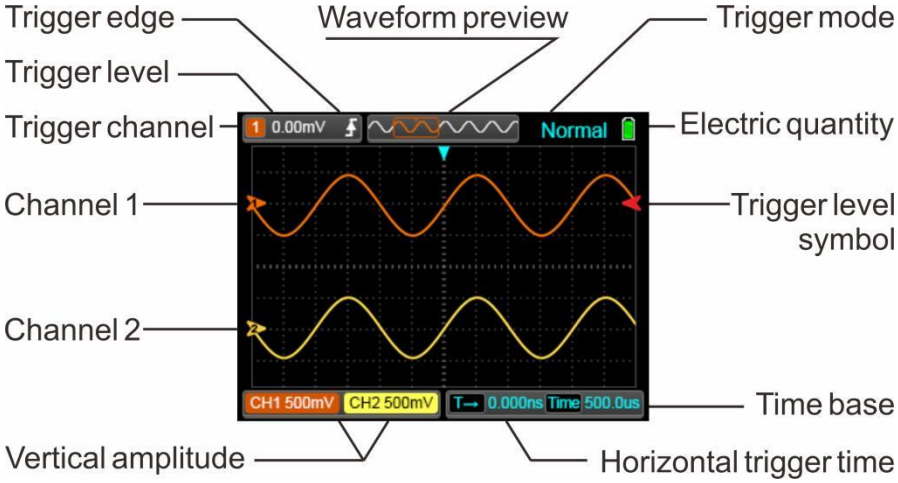
Oscilloscope operation

Enter oscilloscope mode

Press CH1 or CH2 to select the oscilloscope (OSC) mode.

1. Press CH1 key to enter oscilloscope mode and open oscilloscope channel CH1, the function menu floating window of channel CH1 pops up, and press CH1 key again to close oscilloscope channel CH1 before the floating window hides automatically.

2. Press CH2 key to enter oscilloscope mode and open oscilloscope channel CH2, the function menu floating window of channel CH2 pops up, press CH2 key again to close oscilloscope channel CH2 before the floating window hides automatically.



Function keys and function menu floating window

Function keys F1~F4 are located at the bottom of the LCD screen, these keys with the on-screen menu prompts can complete the operation of a variety of functions. Press the CH1 key or CH2 key to bring up the function menu floating window. The function menu can be set for the oscillator channels, and each channel has a separate function menu.

The function menu is the prompt for the basic operation of the oscilloscope by this machine, as follows:

Coupling	Probe	BW Limit	
DC	10:1	On	▶
F1	F2	F3	F4

1. Press F1 key to select the coupling method, the coupling methods are DC, AC and GND.
2. Press the F2 key to select the probe attenuation ratio, which is 1:1, 10:1 and 100:1.
3. Press F3 to select 20MHz bandwidth limit on or off. Turning on bandwidth limit reduces display noise and filters the signal.

4 Press the F4 key to enter the next page of the function menu.

	Position	Vertical	Horizontal
◀	Off	Reset	Reset
F1	F2	F3	F4

1. Press the F1 key to enter the previous page function menu.
2. Press the F2 key to turn on or off the horizontal and vertical trigger position adjustable function of the oscilloscope.

3. Press the F3 key to set the vertical trigger point at the default position (right in the vertical direction of the screen).

4. Press the F4 key to set the horizontal trigger point at the default position (right in the horizontal direction of the screen).

Function menu setting instructions

Options	Settings	Instructions
Coupling	DC (Direct Current Coupling)	Both AC and DC components of the signal are able to pass through.
	AC (Alternating Current coupling)	The DC component of the signal is blocked, but the dynamic AC part of it can pass.
	GND (grounding)	The input signal is disconnected and the input of the internal circuit is connected to zero level (ground).
Probe	1:1	Select one of the settings based on the probe attenuation factor to maintain the vertical scale reading. When using a 1X probe attenuation ratio, the bandwidth is reduced to 5MHz.
	10:1	
	100:1	
BW Limit	On	Enable the 20MHz bandwidth limit to filter the signal and reduce noise and other excess high frequency components.
	Off	Disable the 20MHz bandwidth limit.

Position	On	Horizontal and vertical trigger positions are adjustable. ◄ (left), ► (right) arrow keys to adjust the horizontal trigger position; ▲ (up) and ▼ (down) arrow keys adjust the vertical trigger position.
	Off	The horizontal and vertical trigger positions are not adjustable. ◄ (left), ► (right) arrow keys to adjust the time base; ▲ (up) and ▼ (down) arrow keys adjust the vertical amplitude.

Probe check

When connecting the probe to an oscilloscope, make this adjustment first to match the probe to the input channel. An uncompensated or biased probe can cause measurement errors or mistakes. To adjust the compensation of the probe, follow the steps below.

1. Press CH1 to open the oscilloscope channel CH1 and set the probe attenuation factor to 10:1.
2. Set the probe switch to 10X and connect the BNC end of the probe to CH1 of the oscilloscope and rotate it until it locks into place.
3. The signal source is set to output a 1KHz/3Vpp square wave signal.
4. Insert the probe into the center round hole on the Gen Out of the signal source and press the AUTO key.
5. Check the shape of the waveform and, if necessary, adjust the variable capacitance on the probe with a non-metallic screwdriver until the waveform displayed on the screen is "correctly compensated" as shown below.

Figure of Correct compensation:

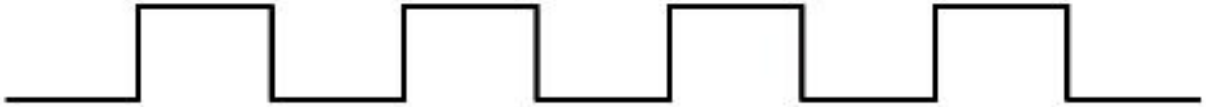


Figure of Under compensation:

Figure of Over compensation:

Time base control

In the oscilloscope mode and the setting value of Position is Off, use the ◄ (left) and ► (right) direction keys to change the horizontal scale (time base).

	Scanning time base	
The Position setting is Off	◄	►

1. Press the ◀ (left) arrow key to increase the time base, and the waveform level narrows.
2. Press the ▶ (right) arrow key to reduce the time base, and the waveform is horizontally amplified.

Tips!	When measuring a signal of unknown frequency, you should try waveform acquisition from the fastest time base (see related content in this manual), and then gradually select a slower time base until the signal can be displayed correctly. Otherwise, the waveform may not reflect the actual signal correctly due to the "aliasing effect". There are various ways to avoid the aliasing effect: adjust the time base or press the AUTO key.

Horizontal position adjustment

In the oscilloscope mode and the setting value of Position is On, use the ◀ (left) and ▶ (right) arrow keys to adjust the trigger position. As the trigger position changes, the horizontal position of the waveform changes accordingly, so the trigger position adjustment is also called horizontal position adjustment here.

	Horizontal position adjustment		Horizontal
The Position setting is On	◀	▶	Reset

1. Press the ◀ (left) arrow key to adjust the trigger point position to the left and change the horizontal position of the waveform on the screen, and the current trigger point position will be marked on the display.
2. Press the ▶ (right) arrow key to adjust the trigger point position to the right and change the horizontal position of the waveform on the screen, and the current trigger point position will be marked on the display.
3. To zero the horizontal position, press the F4 key (Reset) under the Horizontal option in the Function menu to set the trigger point at the default position (horizontal center of the screen).

Vertical amplitude control

In the oscilloscope mode and the setting value of Position is Off, use the ▲ (up) and ▼ (down) direction keys to change the vertical amplitude. The vertical amplitude range is 10mV/div~10V/div (probe 1X) in 1-2-5 steps; or 100mV/div~100V/div (probe 10X); or 1V/div~1000V/div (probe 100X).

	Vertical sensitivity adjustment	
The Position setting is Off	▲	▼

1. Press the ▲ (up) direction key to reduce the vertical amplitude and the waveform is amplified vertically.
2. Press the ▼ (down) direction key to increase the vertical amplitude and the waveform shrinks vertically.

Tips!	To ensure the stability of the meter's internal circuitry, there may be a slight delay in the meter's action to adjust the vertical sensitivity when pressing the ▲ (up) and ▼ (down) direction keys to adjust the vertical sensitivity.

Vertical position adjustment

The trigger position can be adjusted by using the ▲ (up) and ▼ (down) arrow keys in the oscilloscope mode and when the Position setting is On. Since the horizontal position of the waveform changes with the change of trigger position, the trigger position adjustment is also called vertical position adjustment here.

	Vertical position adjustment		Vertical
The Position setting is On	▲	▼	Reset

1. Press the ▲ (up) direction key to adjust the trigger point position upward and change the vertical position of the waveform on the screen, and the current trigger point position will be marked on the display.

2. Press the ▶ (right) arrow key to adjust the trigger point position downward and change the vertical position of the waveform on the screen, and the current trigger point position will be marked on the display.

3. To zero the horizontal position, press the F4 key (Reset) under the Vertical option in the Function menu to set the trigger point at the default position (vertical center of the screen).

Trigger control

In oscilloscope mode, press Trig/△ to enter the trigger setting menu.

Trigger source selection	Trigger edge type	Trigger mode	Trigger Level
Channel	Slope	Mode	Level
CH1	Rising	Auto	Reset
F1	F2	F3	F4

1. Press F1 key to select the trigger source, the trigger source selection has CH1 and CH2.
2. Press the F2 key to select the trigger edge type. The trigger edge types are Rising, Falling and Double.
3. Press the F3 key to select the trigger mode, the trigger modes are Auto, Normal and Single.
4. Press the F4 key to set the level to 0 volts.

Trigger level adjustment

In the mode of trigger setting, use the ▲ (up) and ▼ (down) arrow keys to adjust the trigger level.

Trigger level	
▲	▼

1. Press the ▲ (up) arrow key to increase the trigger level, and the position corresponding to the current trigger level will be marked on the display.

2. Press the ▼ (down) arrow key to reduce the trigger level and the position corresponding to the current trigger level will be marked on the display.

About Trigger Mode

Auto: The oscilloscope can acquire waveforms even if no trigger condition is detected. If there is no trigger condition, when the oscilloscope waits for a certain period of time, it will trigger itself and start collecting data. Without the correct trigger, the waveform displayed by the oscilloscope scrolls on the screen because it cannot be synchronized. Once a legitimate trigger signal is detected, the waveform can be stabilized on the screen. Users can use this mode to monitor irregular signals at low frequencies or to observe the amplitude of signals, such as the waveform of a DC power supply, etc.

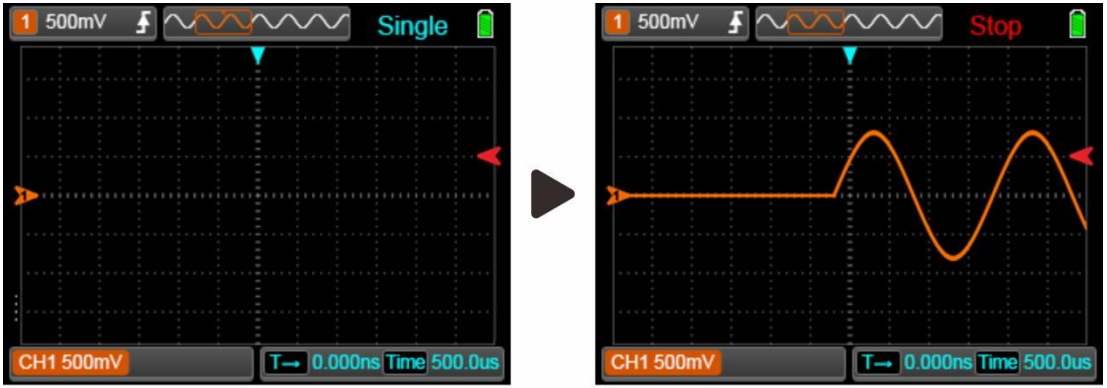
Normal: Start collecting waveform data only after the trigger signal is detected. If no trigger occurs, the oscilloscope will not acquire a new waveform. The display content will not be refreshed.

Single: In single mode, the oscilloscope starts waveform data acquisition once the trigger condition is detected. When new data is acquired, the latest waveform is automatically held.

Trigger operation for single scan

Perform single-trigger data acquisition as follows:

1. Adjust the vertical amplitude V/div and the horizontal amplitude S/div to fit the waveform to be acquired.
2. Select the appropriate trigger source, trigger level, slope and choose the single trigger mode Single.
3. Once the signal is present, the oscilloscope will be triggered and will capture it.



Before triggering

After triggering

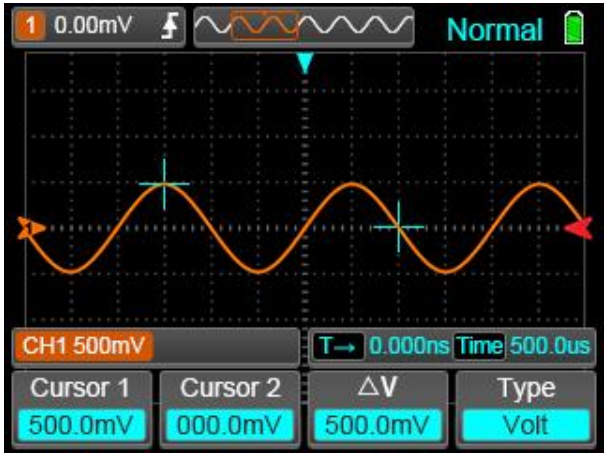
Tips!	Once the single trigger mode is selected, any adjustment to the waveform will be disabled. If you need to change the scan time base, vertical amplitude, waveform position, etc., you can press the Trig/△ key to activate the adjustment for the trigger mode and set the trigger mode to Auto or Normal.

Cursor measurement readout function

The cursor measurement readout function can be used to measure the voltage difference (ΔV) or time difference (Δt) between two verniers on the display. Press the MENU key to enter the main menu of measurement functions, select the AI Cursor, and then select the oscilloscope channel that needs cursor measurement.

When performing the cursor measurement readout function, the current value of cursor 1 and cursor 2, as well as the voltage difference (ΔV) or time difference (Δt) between the cursors, will be shown on the display at all times.

Cursor 1	Cursor 2	ΔV	Type
500.0mV	000.0mV	500mV	Volt
F1	F2	F3	F4



1. Press the F1 key to select Cursor 1. Use the ◀ (left) and ▶ (right) arrow keys to adjust the position of the cursor.
2. Press the F2 key to select Cursor 2. Use the ◀ (left) and ▶ (right) arrow keys to adjust the position of the cursor.
3. Press the F4 key to select the measurement type of the cursor, which is either voltage difference (ΔV) or time difference (Δt).

Automatic measurement of waveforms

The oscilloscope measures the amplitude and frequency of the current waveform automatically, and the measurements are more accurate than visual observation or cursor measurements. The voltage measurement parameters of the waveform are peak-to-peak, peak value, maximum value, minimum value, average value, and rms value. The temporal measurement parameters of the waveform are frequency, period, positive pulse width, negative

pulse width, positive duty cycle, and negative duty cycle.

1. Press the MENU key to enter the main menu of measurement functions.

2. Select "Volt" and press Enter to enter the sub-menu, select the parameter and press Enter again to confirm, the result of this measurement parameter will be shown on the display.

3. Select "Time" and press Enter to enter the sub-menu, select the parameter and press Enter again to confirm, the result of this measurement parameter will be shown on the display.

Automatic setting of scanning parameters

The auto-set function provides users with a stable waveform display. This function can automatically set the vertical and horizontal amplitude, as well as the trigger level and trigger mode. If you need to observe a signal in a circuit but do not know its amplitude and frequency, and you want to quickly get a waveform display and measure its frequency, period, amplitude and other parameters, you can follow these steps for automatic setup:

1. Connect the probe of the oscilloscope probe to the signal test point.

2. Press the AUTO key.

The oscilloscope will automatically set the vertical and horizontal amplitude, as well as the trigger level. If you need to optimize the display of the waveform, you can further adjust this manually. If the instrument cannot find the appropriate scan parameter, it will exit the automatic setting and the instrument will still display the waveform according to the original scan parameter.

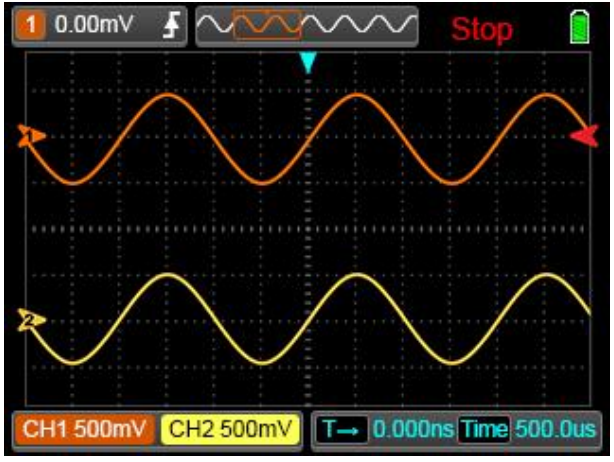
Tips!	The automatic setting of the scan parameters is most effective for stable periodic signals. Due to the aliasing effect, the oscilloscope may select the wrong time base when the frequency of the measured signal is close to or exceeds the upper frequency limit of the meter. Users should use this function carefully and observe carefully whether the display results after automatic setting are reasonable.

Holding of signal waveforms

As data acquisition continues, the waveform of the signal is constantly refreshed. Stopping data acquisition will keep the display content. The main purpose of the hold waveform is to hold the current data or waveform for closer inspection.

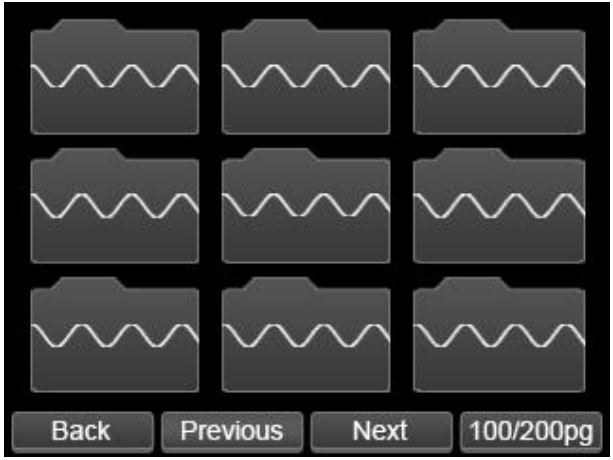
There are two ways to hold the waveform: press the Run/Stop key or use the single-trigger scan mode.

Press the Run/Stop key to start and stop waveform data acquisition. The last waveform on the screen can be held immediately after pressing the Run/Stop key. Once the oscilloscope has stopped collecting waveform data, the display is held.



Storage and readout of signal waveforms

The instrument OSC database has memory space for 200 OSC waveform data. Press the SAVE key to save the waveform.



To view the saved waveforms, follow these steps:

1. Press the MENU key to enter the main menu.
2. After selecting "Waveform", press Enter to enter the waveform preview area, which supports browsing waveform thumbnails, selecting the waveform you want to view and then pressing Enter to view it in full screen.

The menu of the waveform preview area is as follows.

Back	Previous	Next	Waveform position
Back	Previous	Next	100/200Pg
F1	F2	F3	F4

1. Press the F1 key to return to the main menu.
2. Press the F2 key to turn up the page.
3. Press the F3 key to turn down the page.

After entering the full screen to view the memory waveform, the stored waveform and related parameters will be displayed on the screen. The results of automatic waveform measurements can also be optionally displayed.

Multimeter operation

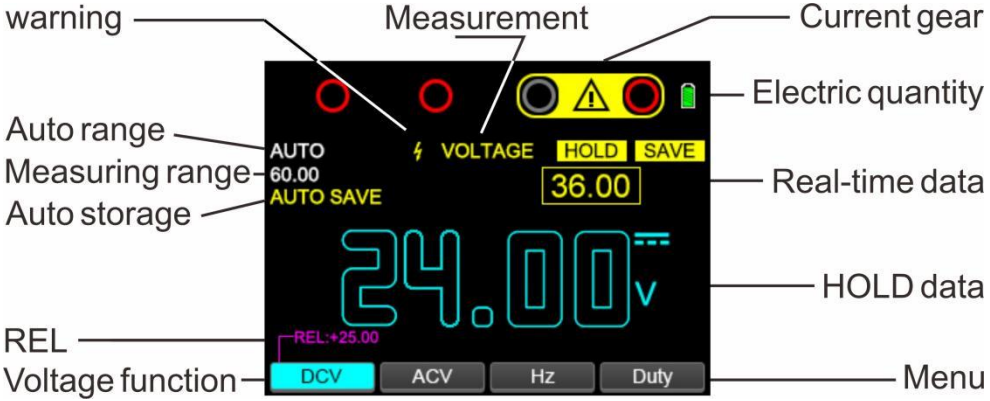
Enter the multimeter mode

Press the V%/Hz , or , or A≃ key to select the multimeter (DMM) mode.

Warning!	Please read, understand, and follow the safety rules and practices indicated below. When changing the measurement function, be sure to detach the probe of the meter pen from the test point first.

Basic display contents in multimeter mode

The following figure shows the basic condition of the screen display in the DMM state. Note that the symbols in the figure do not include the full set of characters for the meter, and they may not all appear at the same time.



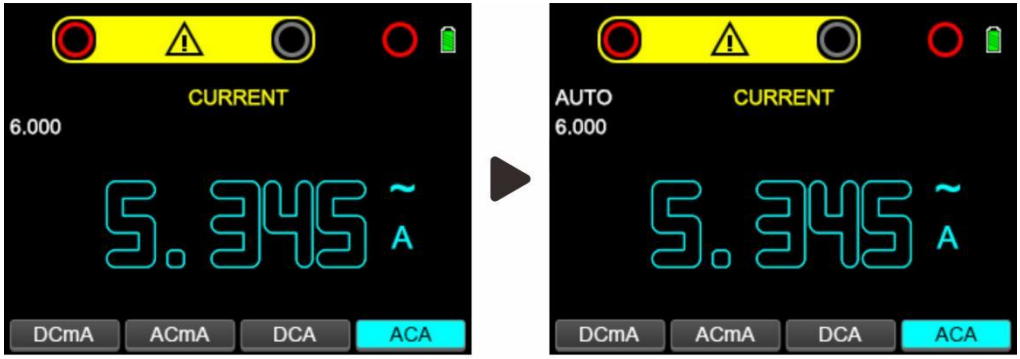
Type of measurement function

The types of measurement functions include DC voltage, AC voltage, frequency, duty cycle; resistance, diode, on/off, capacitance; DC current (mA, 10A), AC current (mA, 10A).

Manual/automatic range selection

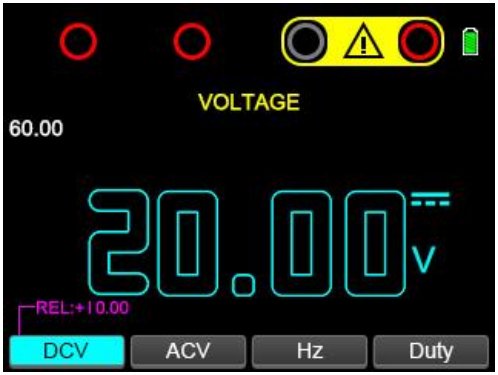
The initial state after powering on or switching the measurement function is auto range. For most applications, this is the most convenient method of measurement. In cases where a range needs to be fixed the following can be done:

1. Press the AUTO key, the automatic range mark "AUTO" will disappear and the meter will enter manual range mode.
2. Each press of the AUTO key switches the meter to the next range.
3. Press the AUTO key and hold it for more than 2 seconds to return to the auto range state.



Turn off auto range　　Turn on auto range

Relative value measurement mode



The relative value mode is a measurement mode that displays the difference between the actual measured value and the reference value. Most of the functions of this instrument can be used in relative value mode.

1. After pressing the Trig/△ key, the currently displayed measured value is stored as a reference value, and then the relative value mode is activated.
2. The value displayed on the screen is the difference between the current measured value and the pre-stored reference value.
3. Press the Trig/△ key to exit the relative value mode.
4. The meter will automatically switch the range control mode to manual mode after entering the relative value mode.
5. When the measurement function or range is changed, the relative value mode is automatically disengaged.

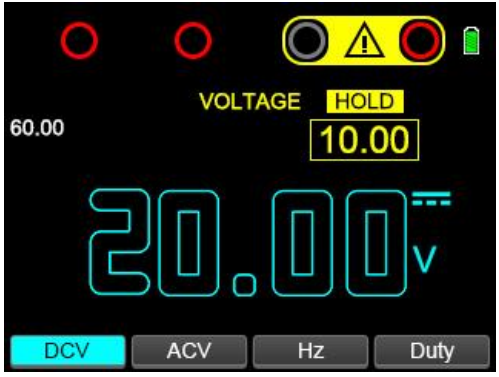
Measurement data hold

Press the Run/Stop key and the reading being displayed will be held and the LCD screen will display the data hold icon "HOLD". Press the Run/Stop key again to resume normal operation.

1. In the data hold state, a small window (dynamic data window) appears at the top right of the meter's display. The data in this window remains refreshed.

2. Once the meter enters the data hold state, the range control mode is switched to the manual mode.

3. The meter will automatically exit the hold state when switching ranges or changing measurement functions.

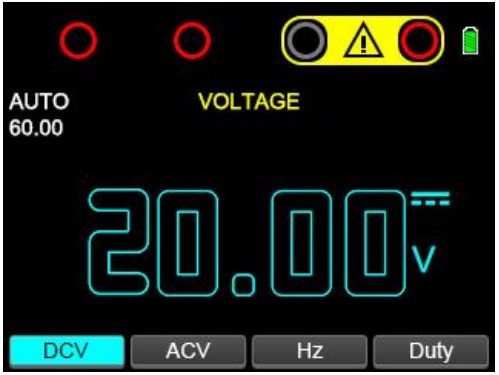


DC and AC voltage measurement

Press the V%/≃Hz key to select the multimeter (DMM) mode and enter the measurement function interface of DC voltage, AC voltage, frequency and duty cycle.

Tips!	If the measured voltage exceeds the "safety voltage" (24VDC/AC), a warning message " ⚡ " will be displayed. Prompt users for safety.
Warning!	To avoid damage to the meter, do not apply 700V AC or 1000V DC for more than 10 seconds to the measurement terminal.

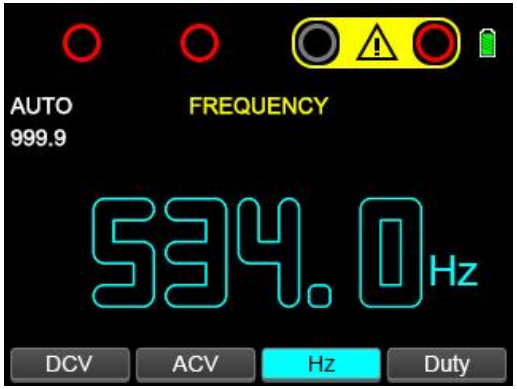
1. Plug the banana plug of the black test lead into the COM socket with negative polarity and the banana plug of the red test lead into the "V" socket with positive polarity.
2. After pressing F1 key or F2 key to select DCV or ACV function, the word "VOLTAGE" will appear at the top of the screen to indicate that the user is currently in the voltage measurement function.
3. Touch the test point with a meter pen.
4. Reads the voltage value displayed by the meter. The display includes the value, the decimal point and the polarity.

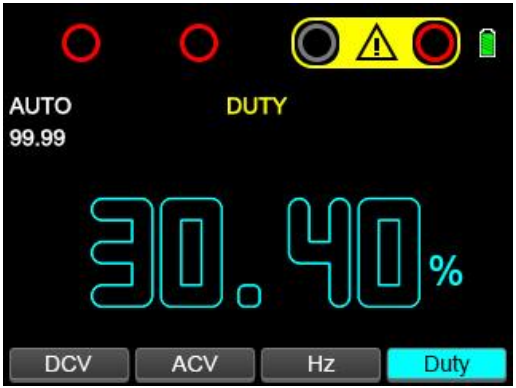


Frequency and duty cycle measurements

Press the V% ≃Hz key to select the multimeter (DMM) mode and enter the measurement function interface of DC voltage, AC voltage, frequency and duty cycle.

Attention!	For frequency and duty cycle measurements, the signal must reach a certain amplitude: 500mVp-p voltage signal amplitude. For signals close to 10 MHz, higher amplitude voltage signals may be required. Frequency and duty cycle measurement functions without relative value (REL) and manual/auto range functions.
Tips!	Higher frequency measurements can be made using the automatic measurement function in the oscilloscope mode of this instrument.





1. Plug the banana plug of the black test lead into the COM socket with negative polarity and the banana plug of the red test lead into the "V" socket with positive polarity.

2. After pressing the F3 key to select the Hz function, the word "Frequency" will appear at the top of the screen, indicating that the user is currently in the frequency measurement function.

3. Press the F4 key to select the Duty function, the word "Duty" will appear at the top of the screen, indicating that the user is currently in the duty cycle measurement function.

4. Touch the test point with a meter pen.

5. Reads the frequency, or duty cycle value displayed by the meter, and the display includes the value, decimal point, etc.

DC and AC current (500mA, 10A) measurement

Press the A≃ key to select the multimeter (DMM) mode and enter the measurement function interface of DC current (mA, 10A) and AC current (mA, 10A).

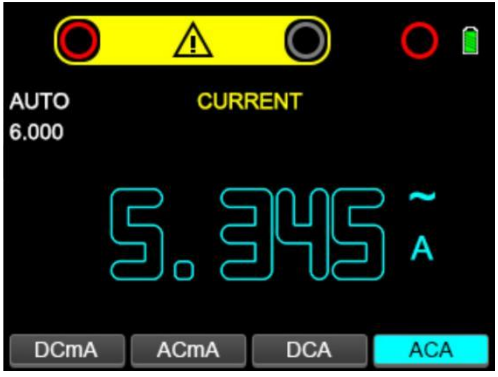
Warning!	To avoid electric shock, do not perform AC current measurement on circuits with AC 250V or more.

1. Plug the banana plug of the black test lead into the negative polarity COM socket and the banana plug of the red test lead into the positive polarity 500mA or 10A socket.

2. When the DCmA or ACmA function is selected by pressing the F1 key or F2 key, the word "CURRENT" will appear at the top of the screen to indicate that the user is currently in the current measurement function.

3. Press the F3 key, or F4 key to select the DCA, or ACA function.

4. Insert the meter pen in series with the circuit under test. Reads the current value displayed by the meter as well as the decimal point, polarity, etc.



Resistance measurement

Press the key to select the multimeter (DMM) mode and enter the measurement function interface of resistance, diode, on/off and capacitance.

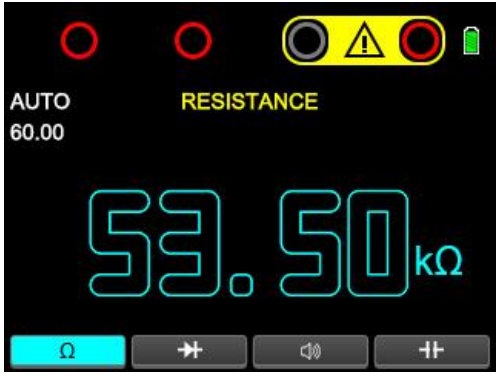
Warning!	To avoid electric shock, when performing resistance measurements, first disconnect the power to the device under test (remove the battery/unplug the power cord) and discharge the capacitor in the power supply.

1. Plug the banana plug on the black test meter connecting wire into the COM socket of negative polarity; plug the banana plug on the red meter connecting wire into the resistor socket of positive polarity.

2. After pressing the F1 key to select the resistance function, the word "RESISTANCE" will appear at the top of the screen to indicate that the user is currently in the resistance measurement function.

3. Connect a meter pen across the circuit or component under test. It is best to disconnect one end of the measured part online from the original wiring connection to ensure that the rest of the circuit does not affect the correctness of the readings.

4. Reads the resistance value displayed by the meter as well as the unit and decimal point.

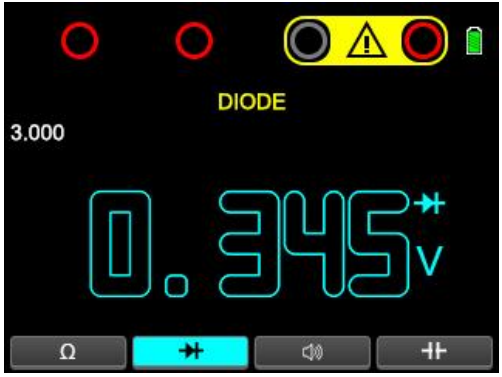


Diode and continuation

Press the key to select the multimeter (DMM) mode and enter the measurement function interface of resistance, diode, on/off and capacitance.

Diode testing

Warning!	To avoid electric shock, diodes containing voltage should not be tested.



1. Plug the banana plug on the black test meter connecting wire into the COM socket of negative polarity; plug the banana plug on the red meter connecting wire into the resistor socket of positive polarity.

2. After pressing the F2 key to select the diode function, the word "DIODE" will appear at the top of the screen to indicate that the user is currently in the diode measurement function.

3. Use the meter pen across the ends of the diode or semiconductor PN junction under test. Note the meter readings.

4. Swap the position of the meter pen to reverse the polarity of the pen. Note the meter readings.

5. The nature of a diode or semiconductor PN junction can be determined based on the following situation:

If one reading shows a voltage value (about 0.2V to 0.7V) and the other reading shows "O.L", the diode is good.

If both readings show "O.L", the diode is broken. If both readings are small or 0, the diode is shorted.

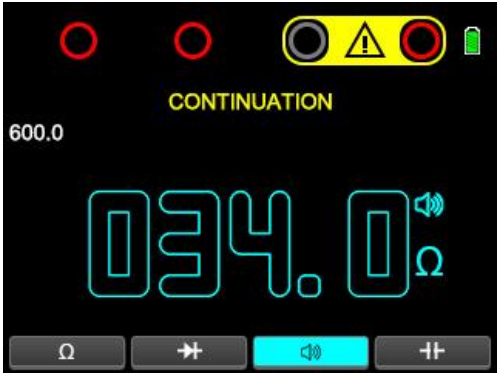
Continuation

Warning!	To avoid electric shock, the line containing the voltage should not be tested on and off.

1. Plug the banana plug on the black test meter connecting wire into the COM socket of negative polarity; plug the banana plug on the red meter connecting wire into the resistor socket of positive polarity.

2. When the F3 key is pressed to select the Cont measurement function, the word "Continuation" will appear at the top of the screen to indicate that the user is currently in the on-off measurement function.

3. Contact the circuit under test with a meter pen, if the resistance is less than 50Ω, the buzzer will sound a beeping sound.



Capacitance measurement

Warning!	To avoid electric shock, capacitors containing voltage should not be tested.

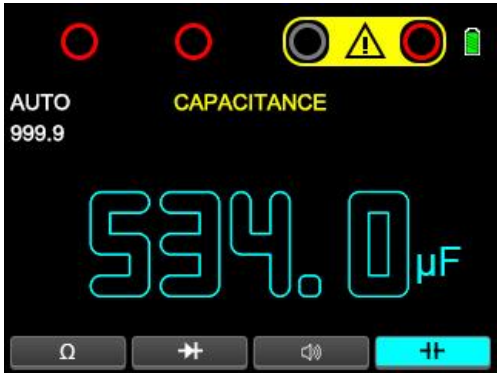
1. Plug the banana plug on the black test lead into the COM socket with negative polarity; plug the banana plug on the red test lead into the CAP socket with positive polarity.

2. After pressing the F4 key to select the capacitance measurement function,

the word "CAPACITANCE" will appear at the top of the screen to indicate that it is in the capacitance measurement function.

3. For capacitance measurement, the range selection of the meter is only available in automatic mode.

4. Touch the meter pen to the capacitor under test and read out the capacity, decimal point, and units, etc.



Attention!	The capacitance measurement function cannot be used with the manual range, nor with the relative value (REL) function!

Storage and readout of measurement data

The database of this instrument can save 2000 DMM measurement data. Measurement data is saved in two ways:

1. Press the SAVE key to save the data.

2. Press the MENU key to enter the main menu, select "Autosave" and then press ENTER to enter the sub-menu, select "On" and then press ENTER to confirm, then the data will be saved automatically at short intervals.

To view the saved data, follow these steps:

1. Press the MENU key to enter the main menu.

2. Select "Data" and then press ENTER to enter the instrument's database.

3. Press the MENU key to enter the main menu.

4. In the database, the LCD will list the 20 storage locations on the first page and indicate whether the current storage location of the data is present at those locations.

5. If there is data in a location, the value and unit of this data will be listed.

6. Press the ▲ (up), or ▼ (down) arrow keys to select the previous, or next storage location.

7 Press the ◀ (left), or ▶ (right) arrow keys to select page up, or page down.

The menu operations of the database are as follows:

Back	Erase	Data Location	Erase all
Back	Erase	1/1000	Erase all
F1	F2	F3	F4

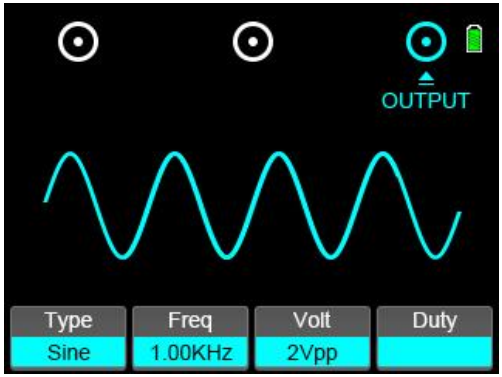
1. Press the F1 key to return to the main menu.
2. Press the F2 key to delete the current record.
3. Press the F4 key to delete all records.

Signal Source Operation

Enter signal source mode

Press the AWG key to enter the source mode.

Operating instructions for basic display content



Signal output in signal source mode

In signal source mode, function keys F1~F4 are located at the bottom of the LCD screen, with the on-screen menu prompts to adjust the signal output.

Waveform Type	Frequency	Range	Duty Cycle
Type	Freq	Volt	Duty
Sine	1.00kHz	2Vpp	
F1	F2	F3	F4

1. Press F1 to select the type of waveform. The types of waveform are sine wave, square wave and triangle wave.

2. Press the ◄ (left) and ► (right) arrow keys to adjust the frequency level. Alternatively, press the F2 key to open the numeric keypad, use the ▲ (up), ▼ (down) and ◄ (left), ► (right) arrow keys and the ENTER key to set the frequency parameter, and finally select "OK" and press the ENTER key to confirm.

3. Press the ▲ (up) and ▼ (down) arrow keys to adjust the amplitude range. Or, press the F3 key to enter the amplitude selection menu, use the ▲ (up), ▼ (down) and ◄ (left), ► (right) arrow keys to select the desired amplitude, and finally press ENTER to confirm.

Technical parameters and instrument sets

Instrument characteristics and technical parameters

General Characteristics

Display	320×240; 2.8-inch TFT color screen	Observation area	58mm x 45mm
Backlight brightness	Adjustable	Backlighting time	30s~120s or disabled
Battery	2000mAh×2	Automatic shutdown	15min~60min or disabled
Low Power Alert	▭	Charger	DC5A/3A(To be purchased separately)
Usage time	About 10 hours	Storage capacity	2000 records of DMM data, 200 records of OSC waveforms
Usage Environment	0°C~+40°C; <75%RH	Storage condition	-10°C~+60°C; <90%RH
Outline Dimension	100*210*40(mm)	Weight	480g without other accessories

Digital Storage Oscilloscope Features

Analog bandwidth	80MHz	Max real-time sampling rate	200Msps
Vertical Resolution	8 bits	Nonlinearity	±1 bit
Channel quantity	2	Coupling method	DC, AC, GND
Input impedance	Approx. 1MΩ	Indexing	Vertical 4.0, Horizontal 6.0
Vertical sensitivity range	Input BNC at 10mV/div ~ 10V/div	Time base range	5ns/div ~ 50s/div, 1-2-5 steps
Vertical wave amplitude accuracy	±(5%+ 0.2div)	Time Base Accuracy	±(0.01%+ 0.1div)
Automatic Zero Reference	In DC measurement	Scan mode	Auto, Normal, Single
Trigger Level	± 4 div (0.04 div per step)	Trigger slope selection	Rising, Falling, Double
Trigger position adjustment	± 4 div (0.04 div per step)	Automatic settings	Automatic setting of time base and vertical amplitude

Cursor measurement function	△V, △T	Optional bandwidth limitation	20MHz, typical
Voltage measurement parameters	Vp-p, Vp, Vmax, Vmin, Vavg, Vrms	Time measurement parameters	Freq, Period, +Width, -Width, +Duty, -Duty
Automatic measurement accuracy	±(5%+ 0.2div)	Record length	6K maximum for single channel, 3K per channel for dual channel

Signal source characteristics

Waveform frequency	Sine wave: 1Hz~5MHz	Waveform Amplitude	5Vpp, 3Vpp, 2Vpp, 1Vpp 500mVpp, 200mVpp, 100mVpp, 0Vpp
	Square wave: 10Hz~1MHz		
	Triangle wave: 10Hz~1MHz		

Digital Multimeter Features

All range uncertainties are expressed as ± (a% reading + word count). The calibration period is one year and needs to be adjusted upon expiration, see the after-sales service section. The guaranteed uncertainty environmental conditions are: 23°C±5°C, <75%RH.

Function	Measurement range	Resolution	Uncertainty
DC voltage	600.0mV	0.1mV	(0.75.0%rdg + 10dgt)
	6.000V	1mV	
	60.00V	10mV	
	600.0V	100mV	
	1000V	1V	
AC Voltage True RMS	600.0mV	0.1mV	50Hz~400Hz (1%rdg + 10dgt) 400Hz~1kHz (above 1kHz for reference only) (1.2%rdg + 10dgt)
	6.000V	1mV	
	60.00V	10mV	
	600.0V	100mV	
	750V	1V	
DC Current	60.00/500.0mA	10μA /100μA	(1.2%rdg + 10dgt)
	6.000/10.00A	1mA /10mA	
AC Current True RMS	60.00/500.0mA	10μA /100μA	(1.5%rdg + 10dgt) 50Hz~1kHz (above 1kHz for reference only)
	6.000/10.00A	1mA /10mA	

Resistance	600.0Ω	0.1Ω	(1.0%rdg + 5dgt)
	6.000kΩ	1Ω	
	60.00kΩ	10Ω	
	600.0kΩ	100Ω	
	6.000MΩ	1k	
	60.00MΩ	10k	(3.0%rdg + 5dgt)
Capacitance	9.999nF	1pF	(2.0%rdg + 10dgt)
	99.99nF	10pF	
	999.9nF	100pF	
	9.999μF	1nF	(3.0%rdg + 10dgt)
	99.99μF	10nF	
	999.9μF	100nF	
	9.999mF	1μF	(10.0%rdg + 10dgt)
	99.99mF	10μF	
Frequency	9.999Hz~9.999MHz	0.001Hz~1kHz	(1.0% rdg + 5dgt), signal amplitude not less than 1Vp-p

Duty Cycle	0.01~99.99% (AC 500mVp-p)
Diode Testing	Open circuit voltage about 3.0 V, maximum test current about 2 mA
On-Off Test	Judgment resistance: about 50Ω
Automatic range switching	Can be applied to each measurement function
Range overflow indication	"O. L" (Over load)
Multimeter measurement rate	2.5 times/s
Dynamic Data Window	Dynamic refreshing of actual measurement data continues after the main display is held
Fuse specification	500mA/250V 10A/500V

Display symbols and icons

A	Ampere	AC ~	Alternating Current
AUTO	Auto Range / Auto Scan / Auto Set	Vavg	Average voltage
Cursor	Cursor	COM	Measurement reference (near the input reference socket)
DC	Direct Current	mV	Millivolt

div	Indexing (oscilloscope mode)	DUTY	Duty Cycle
Erase	Erase	Back	Return to the previous level of status or menu
F	Farad (unit of capacitance)	mF	Millifarads (capacitance units)
μF	Microfarads (capacitance units)	nF	Nafa (capacitance unit)
HOLD	Data/waveform hold	Hz	Hertz (unit of frequency)
Max	Maximum value	Min	Minimum value
mA	Milliamp	ms	Millisecond
Normal	Normal trigger method	RANGE	Manual range selection
Position	(Horizontal/vertical) position	Reset	Reset or position back to center
REL	Relative Value	Stop	Stop
SAVE	Store the current signal into the memory	Level	Trigger Level
Time	Time, Time Base	Trig	Scanning trigger
Single	Single waveform	▮	Battery remaining charge
Volt	Voltage, Input Sensitivity	V	Volt
s	Microsecond	Ω	Ohm (unit of resistance)
V	Voltage difference	t	Time Difference

⟋⟍	Trigger slope (rising/falling edge)		Signal ringing, on/off test
⏻	Power on/off		Diode
ϟ !	Safety warnings (injurious or extreme voltages, current alerts)		

Daily maintenance and troubleshooting

Keep dry

If the meter is wet, dry it as soon as possible and do not use it until you can be sure it is dry.

Use and storage of instruments at room temperature

Extreme ambient temperatures can shorten the life of the electronics, deform the plastic parts of the meter, and even render the meter unusable.

Carefully and gently hold and place the meter

Drops may damage the LCD, electronic components or the case.

Keeping clean

Wipe the instrument's housing frequently with a damp cloth dampened with a tiny amount of detergent. Do not use rough objects, chemical solvents or alcohol, etc.

Fuse replacement

1. Remove the probe from the test point and turn off the power.
2. Loosen the set screw, remove the back cover, and the fuse is on the back of the test socket.
3. Remove the burnt fuse and replace it with a new fuse of the same specification: 500mA /250V fused fuse for 500mA, 10A /250V fused fuse for 10A.
4. Install the back cover and secure it with screws.

Repair of instruments

1. This product is a precision instrument, and unauthorized modification of wiring, replacement of components and product calibration and repair work are not allowed without authorization from our product service center.

2. All test pens, accessories or options that come with the instrument must not be replaced, repaired or otherwise substituted at will.

Warning!	Be sure to disconnect the probe from any voltage source before opening the battery back cover, and do not use the meter until the back cover is covered and secured.

Troubleshooting

If your meter is malfunctioning, you may wish to check it yourself as follows before you determine that the meter must be repaired.

No screen display, no keys response

1. If no power supply is available, check whether the battery is exhausted.
2. Check that the power supply is powered, and that the battery and battery cells are intact and properly connected.

Incorrect voltage readout

1. The zero voltage reference point for OSC mode is incorrect.

2. When measuring the rms value (RMS) in OSC mode, please make sure that at least 1 full cycle of the waveform is displayed.

OSC cannot display waveform or incorrect frequency measurement

1. Incorrect time base setting. You can try the automatic setting function.

2. The meter is in waveform pause (Stop) or single scan (Single) mode.

3. The waveform does not reach the trigger level. Try to use the automatic setting function.

4. The input signal is too large or the vertical position is wrong. Readjust the vertical amplitude (Volt/div) or try the auto-set function.

Current cannot be measured

Fuse is blown, replace the fuse.

Warm Tip: The product is subject to the receipt of the physical object.