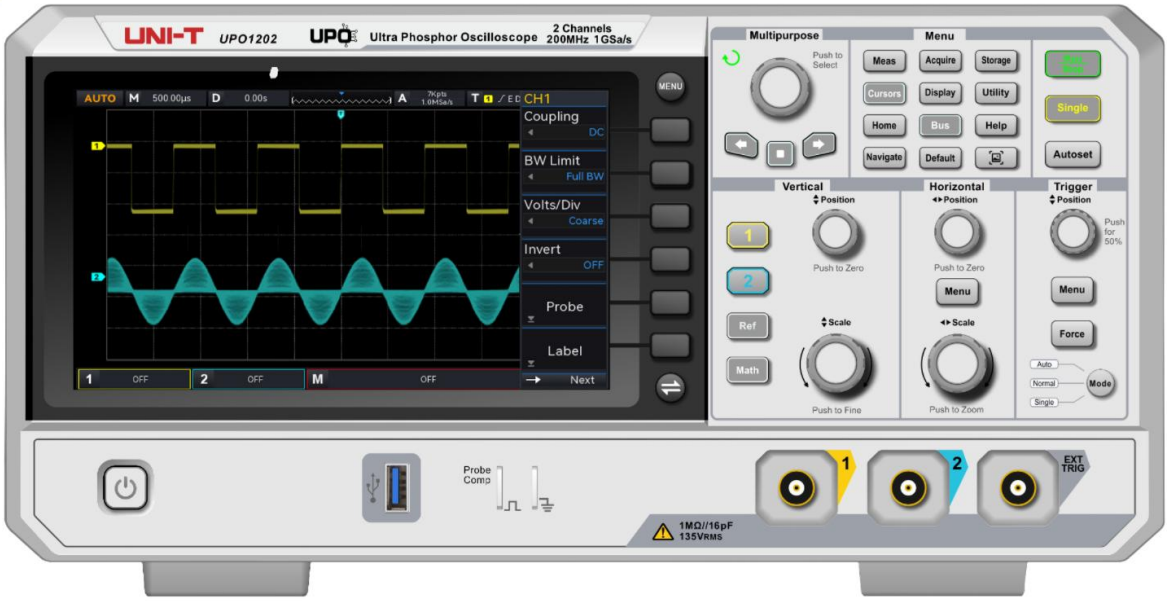
UNI-T®

Instruments.uni-trend.com



Quick Guide

UPO1002 Series Digital Phosphor Oscilloscope

V 1.1

2024.07

Foreword

Dear Users,

Hello! Thank you for choosing this brand new UNI-T instrument. In order to use this instrument safely and correctly, please read this manual thoroughly, especially the Safety Requirements part. After reading this manual, it is recommended to keep the manual at an easily accessible place, preferably close to the device, for future reference.

Warranty

If the product is proved to be defective within the warranty period, UNI-T reserves the rights to either repair the defective product without charging of parts and labor, or exchange the defected product to a working equivalent product. Replacement parts and products may be brand new, or perform at the same specifications as brand new products. All replacement parts, modules, and products become the property of UNI-T.

The "customer" refers to the individual or entity that is declared in the guarantee. In order to obtain the warranty service, "customer" must inform the defects within the applicable warranty period to UNI-T, and to perform appropriate arrangements for the warranty service. The customer shall be responsible for packing and shipping the defective products to the designated maintenance center of UNI-T, pay the shipping cost, and provide a copy of the purchase receipt of the original purchaser. If the product is shipped domestically to the location of the UNI-T service center, UNI-T shall pay the return shipping fee. If the product is sent to any other location, the customer shall be responsible for all shipping, duties, taxes, and any other expenses.

This warranty shall not apply to any defects or damages caused by accidental, machine parts' wear and tear, improper use, and improper or lack of maintenance. UNI-T under the provisions of this warranty has no obligation to provide the following services:

a) Any repair damage caused by the installation, repair, or maintenance of the product by non UNI-T service representatives.

b) Any repair damage caused by improper use or connection to an incompatible device.

c) Any damage or malfunction caused by the use of a power source which does not conform to the requirements of this manual.

d) Any maintenance on altered or integrated products (if such alteration or integration leads to an

increase in time or difficulty of product maintenance).

This warranty is written by UNI-T for this product, and it is used to substitute any other express or implied warranties. UNI-T and its distributors do not offer any implied warranties for merchant ability or applicability purposes.

For violation of this guarantee, regardless of whether UNI-T and its distributors are informed that any indirect, special, incidental, or consequential damage may occur, UNI-T and its distributors shall not be responsible for any of the damages.

Trademark

UNI-T is the registered trademark of Uni-Trend Technology (China) Co., Ltd.

File Number

UPO1002-20240529-V1.1

Statement

- **UNI-T** products are protected by patent rights in China and foreign countries, including issued and pending patents.
- **UNI-T** reserves the rights to any product specification and pricing changes.
- **UNI-T** reserves all rights. Licensed software products are properties of Uni-Trend and its subsidiaries or suppliers, which are protected by national copyright laws and international treaty provisions.

  Information in this manual supersedes all previously published versions.
- Technical data are subject to change without prior notice.

1. Safety Requirements

This section contains information and warnings that must be followed to keep the instrument operating under safety conditions. In addition, user should also follow the common safety procedures.

Safety Precautions

Warning	**Please follow the following guidelines to avoid possible electric shock and risk to personal safety.**
	Users must follow the following conventional safety precautions in operation, service and maintenance of this device. UNI-T will not be liable for any personal safety and property loss caused by the user's failure to follow the following safety precautions. This device is designed for professional users and responsible organizations for measurement purposes.
	Do not use this device in any way not specified by the manufacturer. This device is only for indoor use unless otherwise specified in the product manual.

Safety Statement

Warning	"Warning" indicates the presence of a hazard. It reminds users to pay attention to a certain operation process, operation method or similar. Personal injury or death may occur if the rules in the "Warning" statement are not properly executed or observed. Do not proceed to the next step until you fully understand and meet the conditions stated in the "Warning" statement.
Caution	"Caution" indicates the presence of a hazard. It reminds users to pay attention to a certain operation process, operation method or similar. Product damage or loss of important data may occur if the rules in the "Caution" statement are not properly executed or observed. Do not proceed to the next step until you fully understand and meet the conditions stated in the "Caution" statement.
Note	"Note" indicates important information. It reminds users to pay attention to procedures, methods and conditions, etc. The contents of the "Note" should be highlighted if necessary.

Safety Sign

	**Danger**	It indicates possible danger of electric shock, which may cause personal injury or death.
	**Warning**	It indicates that you should be careful to avoid personal injury or product damage.
	**Caution**	It indicates possible danger, which may cause damage to this device or other equipment if you fail to follow a certain procedure or condition. If the "Caution" sign is present, all conditions must be met before you proceed to operation.
	**Note**	It indicates potential problems, which may cause failure of this device if you fail to follow a certain procedure or condition. If the "Note" sign is present, all conditions must be met before this device will function properly.
	**AC**	Alternating current of device. Please check the region's voltage range.
	**DC**	Direct current device. Please check the region's voltage range.
	**Grounding**	Frame and chassis grounding terminal
	**Grounding**	Protective grounding terminal
	**Grounding**	Measurement grounding terminal
	**OFF**	Main power off
	**ON**	Main power on
	**Power Supply**	Standby power supply: when the power switch is turned off, this device is not completely disconnected from the AC power supply.
CAT I	Secondary electrical circuit connected to wall sockets through transformers or similar equipment, such as electronic instruments and electronic equipment; electronic equipment with protective measures, and any high-voltage and low-voltage circuits, such as the copier in the office.	
CAT II	CATII: Primary electrical circuit of the electrical equipment connected to the indoor socket via the power cord, such as mobile tools, home appliances, etc. Household appliances, portable tools (e.g. electric drill), household sockets, sockets more than 10 meters away from CAT III circuit or sockets more than 20 meters away from CAT IV circuit.	

CAT III		Primary circuit of large equipment directly connected to the distribution board and circuit between the distribution board and the socket (three-phase distributor circuit includes a single commercial lighting circuit). Fixed equipment, such as multi-phase motor and multi-phase fuse box; lighting equipment and lines inside large buildings; machine tools and power distribution boards at industrial sites (workshops).
CAT IV		Three-phase public power unit and outdoor power supply line equipment. Equipment designed to "initial connection", such as power distribution system of power station, power instrument, front-end overload protection, and any outdoor transmission line.
CE	**Certification**	CE indicates a registered trademark of EU.
UKCA	**Certification**	UKCA indicates a registered trademark of the United Kingdom.
ETL Intertek 4007682	**Certification**	It conforms to UL STD 61010-1, 61010-2-030, CSA STD C22.2 No.61010-1 and 61010-2-030.
	Waste	Do not place equipment and its accessories in the trash. Items must be properly disposed of in accordance with local regulations.
40	**EFUP**	This environment-friendly use period (EFUP) mark indicates that dangerous or toxic substances will not leak or cause damage within this indicated time period. The environment-friendly use period of this product is 40 years, during which it can be used safely. Upon expiration of this period, it should enter the recycling system.

Safety Requirements

Warning	
Preparation before use	Please connect this device to AC power supply with the power cable provided; The AC input voltage of the line reaches the rated value of this device. See the product manual for specific rated value. The line voltage switch of this device matches the line voltage; The line voltage of the line fuse of this device is correct; Not use to measure the main circuit.
Check all terminal rated values	Please check all rated values and marking instructions on the product to avoid fire and impact of excessive current. Please consult the product manual for detailed rated values before connection.
Use the	You can only use the special power cord for the instrument approved by the

power cord properly	local and state standards. Please check whether the insulation layer of the cord is damaged or the cord is exposed, and test whether the cord is conductive. If the cord is damaged, please replace it before using the instrument.
Instrument Grounding	To avoid electric shock, the grounding conductor must be connected to the ground. This product is grounded through the grounding conductor of the power supply. Please be sure to ground this product before it is powered on.
AC power supply	Please use the AC power supply specified for this device. Please use the power cord approved by your country and confirm that the insulation layer is not damaged.
Electrostatic prevention	This device may be damaged by static electricity, so it should be tested in the anti-static area if possible. Before the power cable is connected to this device, the internal and external conductors should be grounded briefly to release static electricity. The protection grade of this device is 4KV for contact discharge and 8KV for air discharge.
Measurement accessories	Measurement accessories are of lower class, which are definitely not applicable to main power supply measurement, CAT II, CAT III or CAT IV circuit measurement. Probe assemblies and accessories within the scope of IEC 61010-031 and current sensors within the scope of IEC 61010-2-032 shall meet their requirements.
Use the input / output port of this device properly	Please use the input / output ports provided by this device in a properly manner. Do not load any input signal at the output port of this device. Do not load any signal that does not reach the rated value at the input port of this device. The probe or other connection accessories should be effectively grounded to avoid product damage or abnormal function. Please refer to the product manual for the rated value of the input / output port of this device.
Power fuse	Please use power fuse of specified specification. If the fuse needs to be replaced, it must be replaced with another one that meets the specified specifications by the maintenance personnel authorized by UNI-T.
Disassembly and cleaning	There are no components available to operators inside. Do not remove the protective cover. Maintenance must be carried out by qualified personnel.
Service environment	This device should be used indoors in a clean and dry environment with ambient temperature from 0 °C - 40 °C. Do not use this device in explosive, dusty or humid air.
Do not operate in humid	Do not use this device in a humid environment to avoid the risk of internal short circuit or electric shock.

environment	
Do not operate in flammable and explosive environment	Do not use this device in a flammable and explosive environment to avoid product damage or personal injury.
Caution	
Abnormality	If this device may be faulty, please contact the authorized maintenance personnel of UNI-T for testing. Any maintenance, adjustment or parts replacement must be done by the relevant personnel of UNI-T.
Cooling	Do not block the ventilation holes at the side and back of this device; Do not allow any external objects to enter this device via ventilation holes; Please ensure adequate ventilation, and leave a gap of at least 15 cm on both sides, front and back of this device.
Safe transportation	Please transport this device safely to prevent it from sliding, which may damage the buttons, knobs or interfaces on the instrument panel.
Proper ventilation	Poor ventilation will cause the device temperature to rise, thus causing damage to this device. Please keep proper ventilation during use, and regularly check the vents and fans.
Keep clean and dry	Please take actions to avoid dust or moisture in the air affecting the performance of this device. Please keep the product surface clean and dry.
Note	
Calibration	The recommended calibration period is one year. Calibration should only be carried out by qualified personnel.

1.1 Environmental Requirements

This instrument is suitable for the following environment:

- Indoor use
- Pollution degree 2
- In operating: altitude lower than 3000 meters; in non-operating: altitude lower than 15000 meters
- Unless otherwise specified, operating temperature is 0 to +40°C; storage temperature is -20 to +70°C

- In operating, humidity temperature below to +35°C, ≤90% relative humidity;
  In non-operating, humidity temperature +35°C to +40°C, ≤60% relative humidity

There are ventilation opening on the rear panel and side panel of the instrument. So please keep the air flowing through the vents of the instrument housing. To prevent excessive dust from blocking the vents, please clean the instrument housing regularly. The housing is not waterproof, please disconnect the power supply first and then wipe the housing with a dry cloth or a slightly moistened soft cloth.

1.2 Connecting Power Supply

The specification of input AC power.

Voltage Range	Frequency	Maximum Power
100-240 VAC (fluctuant: ±10%)	50/60 Hz	75 W
100-120 VAC (fluctuant: ±10%)	400 Hz	

Please use the attached power cable to connect to the power port.

Connecting to service cable

This instrument is a Class I safety product. The supplied power lead has good performance in terms of case ground. This spectrum analyzer is equipped with a three-prong power cable that meets international safety standards. It provides good case grounding performance for the specification of your country or region.

Please install AC power cable as follows.

- Ensure the power cable is in a good condition.
- Leave enough space for connecting the power cord.
- Plug the attached three-prong power cable into a well-grounded power socket.

1.3 Electrostatic Protection

Electrostatic discharge may cause damage to component. Components can be damaged invisibly by electrostatic discharge during transportation, storage and use.

The following measure can reduce the damage of electrostatic discharge:

- Testing in anti-static area as far as possible.
- Before connecting the power cable to the instrument, inner and outer conductors of the

instrument should be briefly grounded to discharge static electricity.

- Ensure all the instruments are properly grounded to prevent the accumulation of static.

2. Introduction of UPO1002

UPO1002 series digital phosphor oscilloscope contains two models.

Model	Analog Bandwidth	Analog Channel	Sampling Rate
UPO1202	200 MHz	2	1 GSa/s
UPO1102	100 MHZ	2	1 GSa/s

UPO1002 series digital phosphor oscilloscope adopts innovative UNI-T 3D technique Ultra Phosphor 2.0 with new appearance upgrade and the function of deep storage, high waveform capture rate, real-time waveform recording and playback and 256-level grayscale display.

The series is equipped with the bandwidth of 100 MHz/200 MHz, real-time sampling rate up to 1 GSa/s, 2 analog channels, maximum storage depth of 56 Mpts, maximum waveform capture rate of 100,000 wfms/s, hardware real-time waveform uninterrupted recording and waveform analysis up to 120,000 waveform frames, support DVM module, rich trigger and bus decoding functions, and support full memory hardware real-time decoding.

It widely used in many fields, including communication, semiconductor, computer, IC design, instrumentation, industrial electronics, consumer electronics, automotive electronics, field maintenance, R&D and education.

3. Getting Started Guide

This chapter is to introduce on using the oscilloscope for the first time, the front and rear panels, the user interface, as well as the built-in help system.

3.1 General Inspection

It is recommended to inspect the instrument follow the steps below before using the UPO1002 series for the first time.

(1) Check for Damages caused by Transport

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

(2) Check Attachment

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

(3) Machine Inspection

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

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

3.2 Before Use

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

(1) Connecting to the Power Supply

AC power specification of UPO1002 series digital storage oscilloscope refers to the section of Connecting Power Supply. Use the assembled power line or other power line that meets the local country standards to connect the oscilloscope. The power soft switch indicator  in the left lower on the front panel is extinguished when the oscilloscope is not connect to the power supply. The power soft switch indicator  in the left lower on the front panel is illuminated with red when the oscilloscope connects to the power supply. At this point, press the soft

switch key to enable the oscilloscope.

(2) Boot Check

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

(3) Connecting Probe

Use BNC of the port to connect to BNC of CH1 of the oscilloscope. Connecting the probe to the "probe compensation signal connection clip" and connecting the ground alligator clip to the "ground terminal" under the "probe compensation signal connection clip". The output of probe compensation signal connection clip is the amplitude about 3 Vpp and the frequency defaults to 1 kHz.

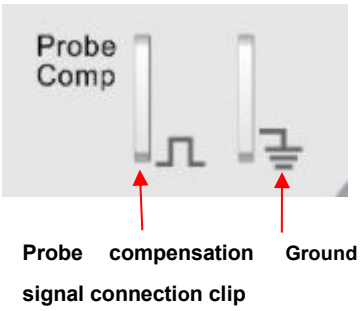


Figure 1 Probe Compensation Signal Connection Clip and Ground Terminal

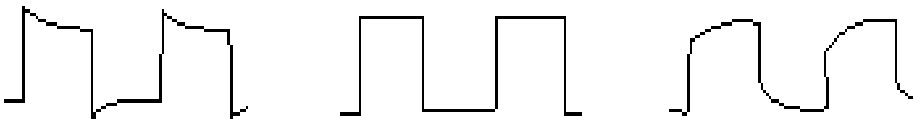
(4) Function Check

Press the AUTO key, a square wave (amplitude of 3 Vpp, frequency of 1 kHz) should appear on the screen. Repeat the step 3 to check all channels. If the actual displayed squared wave does not match the above figure, please perform the next step "Probe Compensation".

(5) Probe Compensation

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

- Set the attenuation coefficient in the probe menu to 10x and the switch of the probe at 10x, and connecting the probe of the oscilloscope to CH1. If use the probe's hook head, make sure it stably touch to the probe. Connecting the probe to the "probe compensation signal connection clip" and connecting the ground alligator clip to the "ground terminal" under the "probe compensation signal connection clip". Open CH1 and press the AUTO key.
- View the displayed waveform, as shown in Figure 2.



Excessive Compensation Correct Compensation Insufficient Compensation

Figure 2 Calibrating Probe Compensation

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

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

4. Front Panel

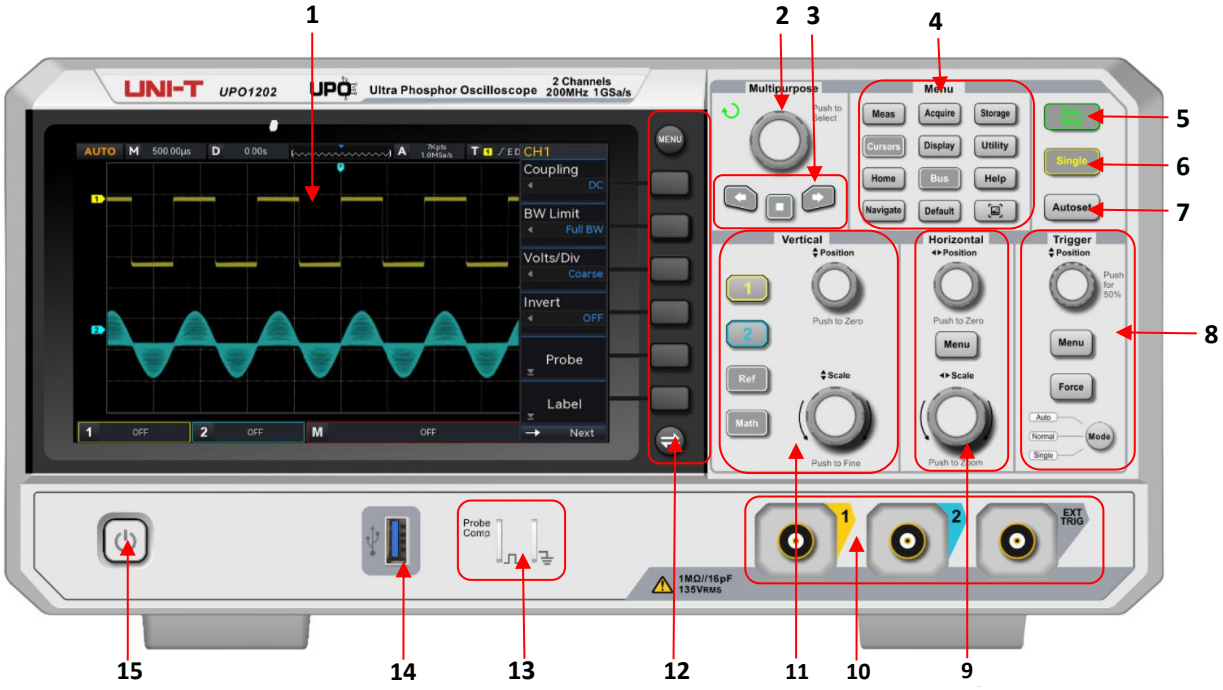


Figure 3 Front Panel

Table 1 Function Key of Front Panel

No,	Function Key	No,	Function Key
1	Screen display area	9	Horizontal control area (HORIZONTAL)
2	Multipurpose rotary knob	10	Analog channel input port
3	Navigation function area	11	Vertical control area (VERTICAL)
4	Functional menu key	12	Menu control soft key
5	Run/Stop control key	13	Probe compensation signal connection clip and ground terminal
6	Single trigger control key	14	USB HOST port
7	Auto setting control key	15	Power switch soft key
8	Trigger control area (TRIGGER)		

5. Rear Panel

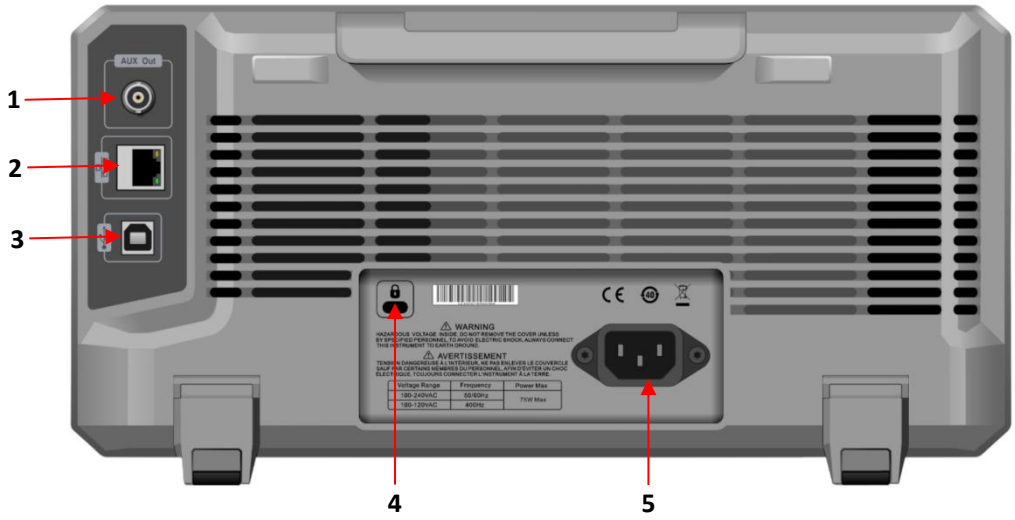


Figure 4 Rear Panel

Table 2 Description of Rear Panel

No.	Description	No.	Description
1	AUX Out (output port)	4	Safety Lock
2	LAN	5	AC Power Input Socket refer to Connecting Power Supply
3	USB Device		

6. User Interface

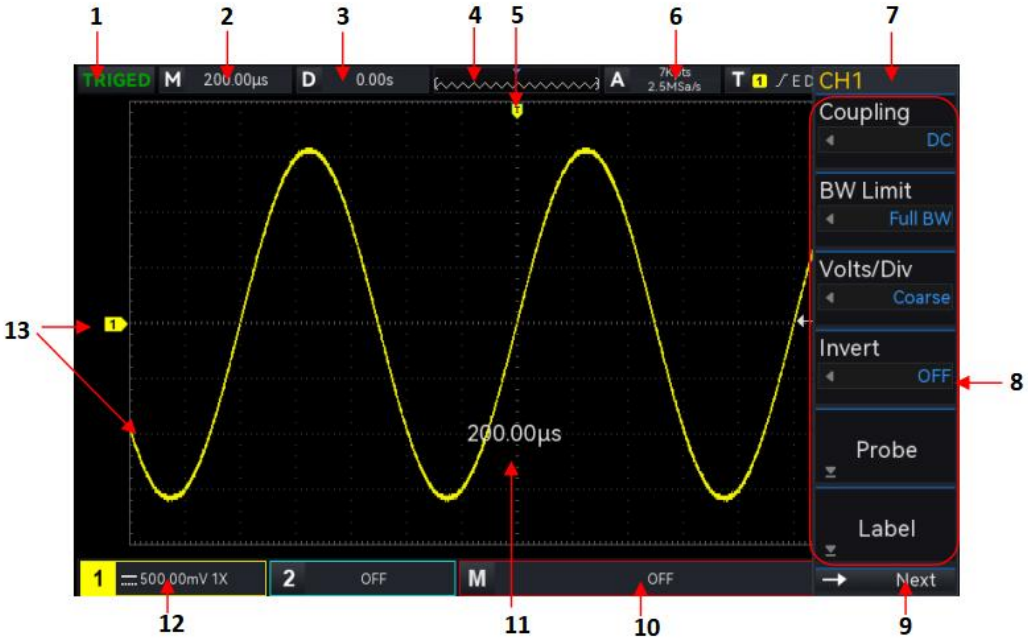


Figure 5 User Interface

Table 3 Icon on User Interface

No.	Description	No.	Description
1	Operating state	8	Operating menu
2	Horizontal time base	9	Next page/System time /USB icon /LAN icon
3	Horizontal offset	10	Math vertical state icon
4	Waveform indicator	11	Time base, Volts/div popups
5	Trigger position	12	CH1 state icon
6	Sampling rate and storage depth	13	Analog channel state and waveform
7	Trigger information		

7. Menu Symbol

Press any soft key to activate the corresponding menu, the following symbol may display in the menu.

 This symbol represents use the multipurpose rotary knob on the front panel to select the parameter and adjust the parameter value.

 This symbol represents the current menu have several options.

 This symbol represents the current menu has a next level menu.

 This symbol represents open the numerical keyboard to input the parameter.



This symbol represents the current page can be page up and page down.

 This symbol represents use the rotary knob Multipurpose on the front panel or tap ☐ in the navigation menu to open the numerical keyboard to set the parameter.

8. Remote Control

UPO1002 series digital phosphor oscilloscope supports communication with computer via USB and LAN interfaces to realize remote control. The remote control is realized based on SCPI (Standard Commands for Programmable Instruments).

UPO1002 series digital phosphor oscilloscope supports three remote control methods.

(1) User-defined programming

The user can remote control the instrument by SCPI. For detailed instructions on commands and programming, please refer to the UPO1002 series programming manual.

(2) PC software (instrument manager)

The user can remote control the instrument by PC software. The instrument manager displays the interface that shown in the screen of the instrument in real-time, the oscilloscope can be controlled by clicking the mouse in instrument manager page. It is recommend to use the PC software provided by UNI-T. You can download this software on UNI-T official website (https://www.uni-trend.com.cn/).

Operation steps

- Setup the communication between the instrument and computer
- Running the instrument manager and search the instrument source
- Right clicking to open the oscilloscope, operating the instrument manager to control the oscilloscope (for specific operation methods, please refer to the Instrument Manager Instruction.)

  This instrument supports communication with computer via USB and LAN interfaces to realize remote control, which based on SCPI.

(3) Web Control

When connecting to the network, you can open the Web page via IP. After logging in by user name and password, you can realize the control of the instrument. Web Control displays the interface that shown in the screen of the instrument in real-time. It supports logging in the web page on PC, cell phone and iPad, and the network supports remote control of the device using intranet and extranet. The user name and password is “admin” and “uni-t”.

9. Troubleshooting

(1) When press the button, the oscilloscope is black screen.

a. Check whether the power is correctly connected, power supply is normal or not.

b. Check whether the power switch is really on, press the front panel power key and confirm green light and a relay sound is present.

c. If there is a relay sound, it indicates that the oscilloscope starts normally. Try the following operations: press the Default key, then press F1, if device returns to normal, it means backlight brightness is too low.

d. After completing the above steps, restart the oscilloscope.

e. If the product still does not work properly, contact the UNI-T service center for assistance.

(2) After signal acquisition, the waveform of the signal does not appear in picture.

a. Check whether the two ends of BNC line are connected properly.

b. Check whether the output channel of signal source is opened.

c. Check whether the input channel of the oscilloscope is opened.

d. Check whether the signal in signal source has DC offset.

e. Plug out the input signal, check whether the baseline is in the center of the screen (if the baseline is not in the center of the screen, it should be self-calibration.)

f. If the product still does not work properly, contact the UNI-T service center for assistance.

(3) The measured voltage amplitude value is 10 times larger or 10 times smaller than the actual value. Check whether the channel probe attenuation coefficient settings are consistent with the used probe attenuation rate.

(4) There is a waveform display but not stable.

a. Check the trigger settings in trigger menu whether is consistent with the actual signal input channel.

b. Check the trigger type: general signals should use “Edge” trigger. Only when the proper trigger type is used, the waveform can be displayed stably.

c. Try to change trigger coupling to HF rejection or LF rejection to filter out the high-frequency or low-frequency noise that interfere the trigger.

(5) No waveform display after press Run/Stop key.

a. Check whether the trigger mode in the trigger menu is on “Normal” or “Single” and whether the trigger level exceeds the waveform range.

b. If it exceeds, set the trigger level to the middle or set the mode to “Auto”.

c. The above settings can be completed automatically by pressing the Auto key.

(6) Waveform refresh is very slow.

a. Check whether the acquisition method is average and the average times are large.

b. Check whether the storage depth is the maximum.

c. Check whether the trigger hold-off time is greater.

d. Check whether the trigger is normal and the current time base is slow.

e. All he above reasons will lead to slow refresh of waveform. It is recommended to restore the factory settings, and the waveform can be refreshed normally.

10. Appendix Contact Us

If the use of this product has caused any inconvenience, if you in mainland China you can contact UNI-T company directly.

Service support: 8am to 5.30pm (UTC+8), Monday to Friday or via email. Our email address is infosh@uni-trend.com.cn

For product support outside mainland China, please contact your local UNI-T distributor or sales center.

Many UNI-T products have the option of extending the warranty and calibration period, please contact your local UNI-T dealer or sales center.

To obtain the address list of our service centers, please visit our website at URL: http://www.uni-trend.com