UNI-T®

Instruments.uni-trend.com

Quick Guide

UPO1000 Series Digital Phosphor Oscilloscope

Copyright

Copyright © Uni-Trend Technology (China) Co., Ltd. All rights reserved.

Trademark

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

File Version

20230822-V1.00.0018

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.
	Certification	CE indicates a registered trademark of EU.
	Certification	UKCA indicates a registered trademark of the United Kingdom.
	Certification	It conforms to UL STD 61010-1, 61010-2-030, CSA STD C22.2 No.61010-1 and 61010-2-030.
	Waste	This product complies with the marking requirements of WEEE Directive (2002/96/EC). This additional label indicates that this electrical / electronic product must not be discarded in household waste.
	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 power cord properly	You can only use the special power cord for the instrument approved by the 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 ℃ - 40 ℃. Do not use this device in explosive, dusty or humid air.
Do not operate in humid environment	Do not use this device in a humid environment to avoid the risk of internal short circuit or electric shock.
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℃; storage temperature is -20 to + 70℃
- In operating, humidity temperature below to +35℃, ≤90% relative humidity;
  In non-operating, humidity temperature +35℃ to +40℃, ≤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 UPO1000

UPO1000 series digital phosphor oscilloscope includes three models.

Model	Analog Bandwidth	Analog Channel	Sampling Rate
UPO1204	200 MHz	4	2 GSa/s
UPO1104	100 MHz	4	2 GSa/s
UPO1054	50 MHz	4	2 GSa/s

UPO1000 series digital phosphor oscilloscope adopts 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 three levels of bandwidth of 50 MHz/100 MHz/200 MHz, real-time sampling rate up to 2 GSa/s. The whole series are equipped with 4 channels, the maximum storage depth is 56Mpts, up to 500,000wfms/s in Fast Acquire mode. 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 and R&D/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 UPO1000 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 UPO1000 series digital storage oscilloscope refers to Connecting Power Supply section. Use the assembled power line or other power line that meets the local country standards to connect the oscilloscope. The power soft indicator  in the left bottom on front panel is extinguished and this soft switch key is no-effect when the power switch on rear panel is not opened. The power soft indicator  in the left bottom on front panel is illuminated with red and then 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 3Vpp and the frequency defaults to 1 kHz.

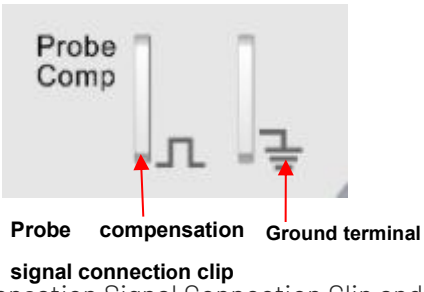


Figure 4-1 Probe Compensation Signal Connection Clip and Ground Terminal

(4) Function Check

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

(5) Probe Compensation

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

- 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 4-2.

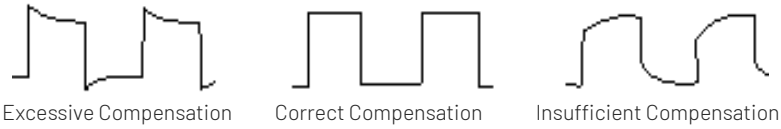


Figure 4-2 Compensating Calibration of Probe

- 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

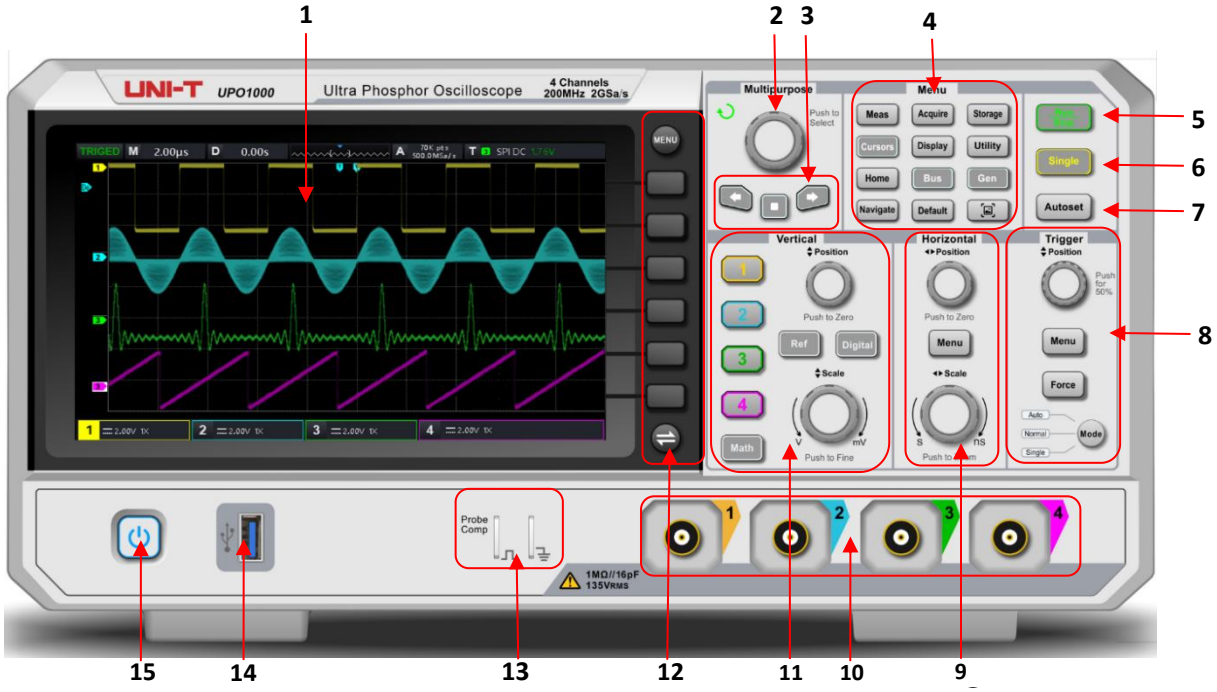


Figure 3 Front Panel

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

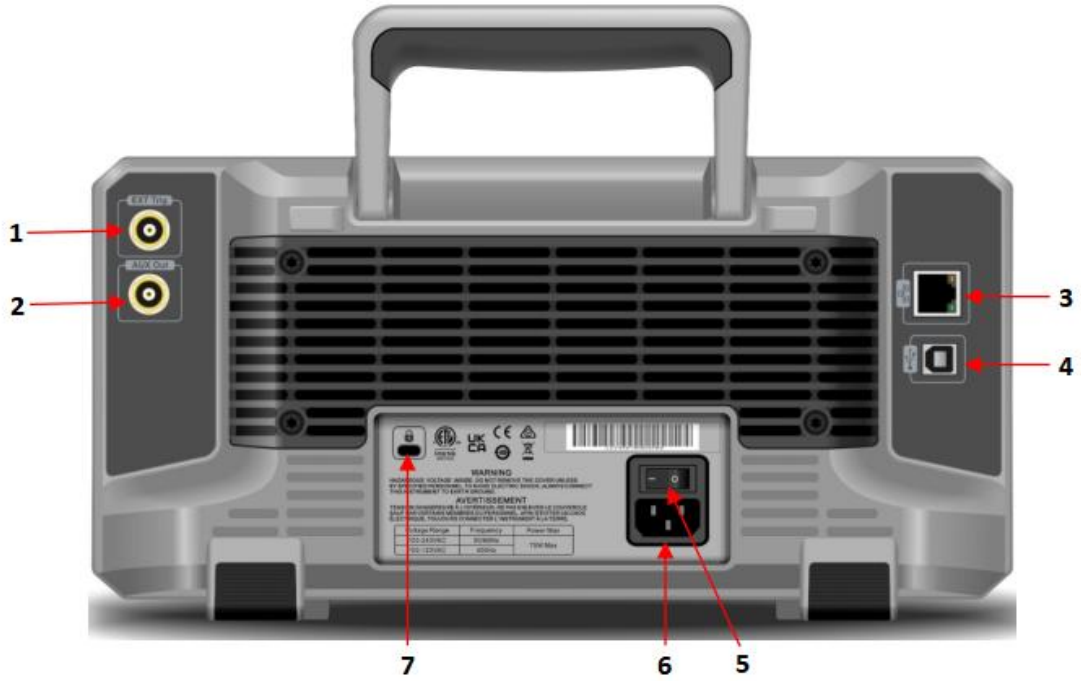


Figure 4 Rear Panel

Table 1 Function Key of Rear Panel

No,	Function Key	No,	Function Key
1	EXT Trig	5	Power switch
2	AUX Out (output port) and arbitrary waveform signal output	6	AC Power input socket，refer to Connecting Power Supply
3	LAN interface	7	Safety lock
4	USB Device interface		

6. User Interface

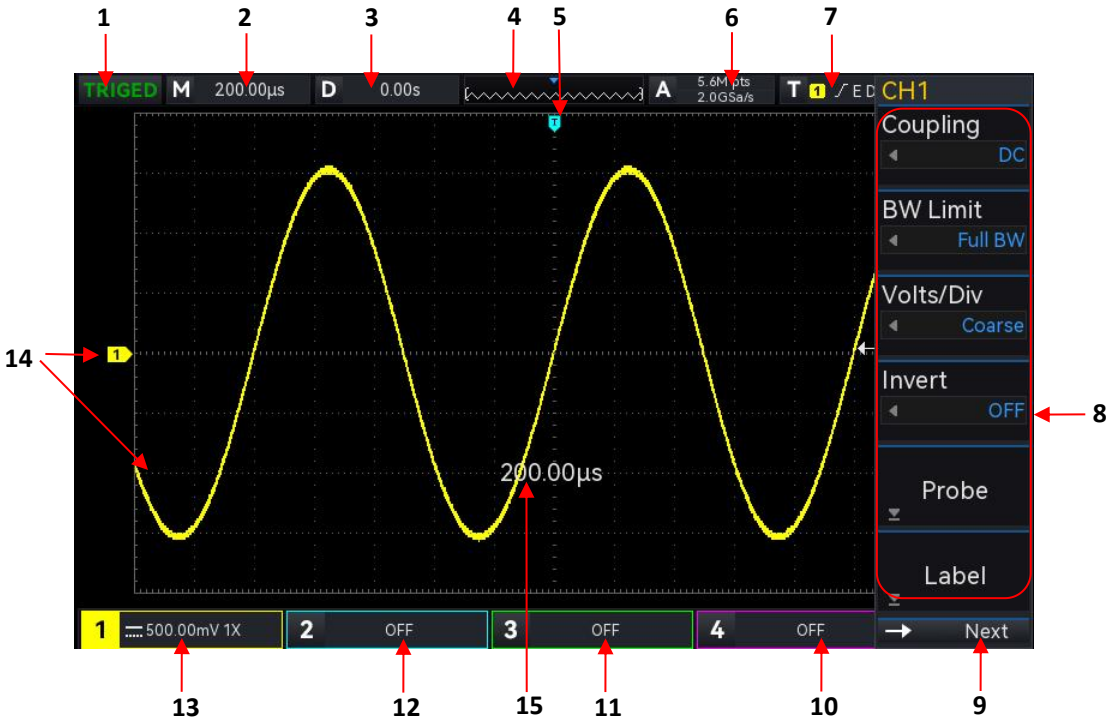


Figure 5 User Interface

Table 3 Icon of User Interface

No.	Description	No.	Description
1	Trigger status	9	Next page /System time/USB icon/LAN icon
2	Horizontal time base	10	CH4 state label
3	Horizontal offset	11	CH3 state label
4	Waveform indicator	12	CH2 state label
5	Trigger position	13	CH1 state label
6	Sampling rate and Storage depth	14	Analog channel label and waveform
7	Trigger information	15	Time base scale, volts/div scale popup
8	Operation menu		

7. Menu Symbol

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

 represents use the multipurpose rotary knob to select the parameter and adjust the parameter value.

 represents the current menu have several options.

 represents the current menu has a next menu.

 represents use numerical keyboard to input the parameter.



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

 represents use the multipurpose rotary knob or press the  in the Navigation bar to open the numerical keyboard and adjust the parameter value.

8. Remote Contr

UPO1000 series digital phosphor oscilloscope supports communicate with computer through USB interface and LAN interface, so as to realize remote control. Remote control is based on SCPI (Standard Commands for Programmable Instruments) to realize.

UPO1000 series digital phosphor oscilloscope supports three methods for remote control.

(1) User-defined programming
User can program control the instrument by SCPI. The details can refer to UPO Series Programming Manual.

(2) PC software (instrument manager)
User can send the command via PC software to remote control the instrument. It is recommended to use UNI-T PC software instrument manager.
You can log in UNI-T official website (https://www.uni-trend.com) to download the software.

Operation Steps

- Setup the communication between instrument and computer
- Running the instrument manager and search instrument source
- Open remote command control panel to send command. This instrument supports communication with the computer via USB, LAN and RS232 interface, so as to realize remote control. Remote control is based on SCPI to realize.

(3) Web Control
Open Web via IP, use user name and password to log in and remote control the instrument. It supports remote control the instrument by using local network or outer network.

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 you still cannot use this product normally, please contact UNI-T.

(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 intput 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 you still cannot use this product normally, please contact UNI-T.

(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 he 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 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

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