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# UNI-T

## UNI-T MSO7000X Digital Phosphor Oscilloscopes



## Limited Warranty and Liability

UNI-T guarantees that the Instrument product is free from any defect in material and workmanship within three years from the purchase date. This warranty does not apply to damages caused by accident, negligence, misuse, modification, contamination, or improper handling. If you need a warranty service within the warranty period, please contact your seller directly. UNI-T will not be responsible for any special, indirect, incidental, or subsequent damage or loss caused by using this device. For the probes and accessories, the warranty period is one year. Visit [instrument.uni-trend.com](https://instrument.uni-trend.com) for full warranty information.



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## UPO7000L Overview

UPO7000L series digital phosphor oscilloscopes feature a compact, rack-mounted structural design with a slim and lightweight body. 1U height is designed for multi-machine system integration, high-density rack setups, and remote system operations, making it ideal for various application scenarios. The system supports multi-unit synchronous triggering and can be expanded to accommodate up to 128 oscilloscopes. Each unit integrates 4 analog channels, 1 external trigger channel, and 1 function/arbitrary waveform generator channel. With a flat body design and machine feet pads, the oscilloscopes are easy to stack and organize. leveraging the 7000 series platform, it ensures a smooth transition for users familiar with 7000X operation. Additionally, an external touch display can be connected, enabling a responsive touch

experience similar to that of the 7000X series. For multi-machine integration, the series includes a rack-mounting kit for quick and straightforward installation right out of the box. Whether in system development, testing, or other demanding environments, UPO7000L excels in reliability and performance.



**UPO7000L series digital phosphor oscilloscopes include the following models.**

Model	Analog Channel	Analog Bandwidth	AWG	Power Analysis	Jitter Analysis	Eye Diagram
UPO7204L	4	2GHz	○	○	○	○
UPO7104L	4	1GHz	○	○	○	○

○: Indicates option

## Quick Guide

This chapter introduces basics of using the UPO7000L series oscilloscope for the first time, including the front panel, rear panels, and user interface.

## General Inspection

It is recommended to inspect the instrument by following the steps below before using

the UPO7000L series oscilloscope.

1. Check for transport damage

If the packaging carton and the plastic foam cushions damage. If significant damage is found, please contact the UNI-T distributor.

2. Check accessories

Refer to the appendix for the list of included accessories. If any accessories are missing or damaged, please contact the UNI-T distributor.

3. Machine inspection


Examine the instrument for any visible damage, operational issues, or failures during the functionality test. If problems are detected, contact the UNI-T distributor.

If the instrument is damaged during shipping, retain the packaging materials and notify both the transportation department and the UNI-T distributor. UNI-T will arrange for maintenance or replacement as necessary.

## **Before Use**


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

### **Connecting Power Supply**

The power supply voltage ranges from 100VAC to 240VAC, with a frequency range of 50Hz to 60Hz. Use the assembled power cable or another power cable that meets the local country standards to connect the oscilloscope. When the power switch on the rear panel is disabled, the power soft indicator  in the left bottom on the rear panel lights up orange, press the

soft power key to turn on the oscilloscope; when the power switch on the rear panel is enabled, the oscilloscope will automatically power on.

### **Boot-up Check**

Press the soft power key to turn on the oscilloscope, the indicator  will change from orange to blue. The oscilloscope will show a boot animation before entering the normal interface.

## Connecting Probe

Use the assembled probe, connect BNC of probe to CH1 BNC on the oscilloscope, connect the probe tip connects to “Probe Compensation Signal Connection Sheet”, and connect the ground alligator clip to the “Ground Terminal” of probe compensation signal connection sheet, as shown in the following figure. The probe compensation signal connection sheet outputs an amplitude of approximately 3Vpp and a default frequency of 1kHz.

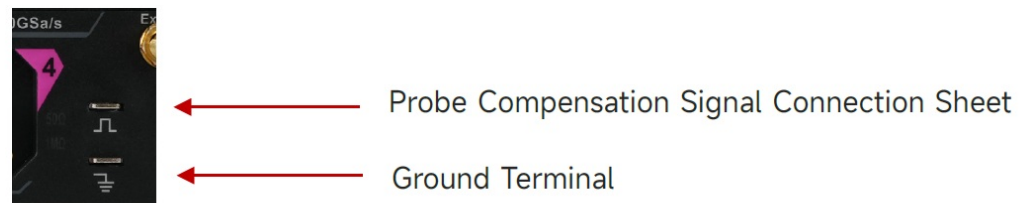


Figure 1 Probe Compensation Signal Connection Sheet and Ground Terminal

## Function Inspection

Press the Autoset (Automatic Setting) icon, a square wave with an amplitude of approximately 3Vpp and a frequency of 1kHz will appear on the screen. Repeat step 3 to check all channels. If the displayed square wave shape does not match the one shown in the figure above, proceed to the next step “Probe Compensation.”

## Probe Compensation

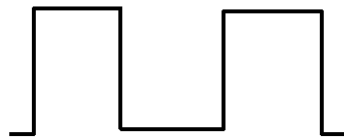
When the probe is connected to any input channel for the first time, this step may need to be adjusted to match the probe and the input channel. Uncompensated probes can lead to measurement errors or inaccuracies. Please follow the steps below to calibrate probe compensation.

1. Set the attenuation coefficient in the probe menu to 10x and ensure the probe switch is set to 10x. Connect the probe to CH1 on the oscilloscope. If using the probe's hook head, ensure it makes stable contact with the probe.
2. Connect the probe tip to the “Probe Compensation Signal Connection Sheet” and the ground alligator clip to the “Ground Terminal” of the “Probe Compensation Signal Connection Sheet.” Open CH1 and press the Autoset icon.

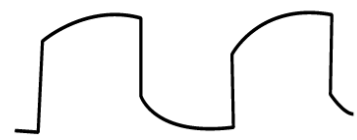
View the displayed waveform, as shown in the following figure.



Excessive Compensation



Correct Compensation



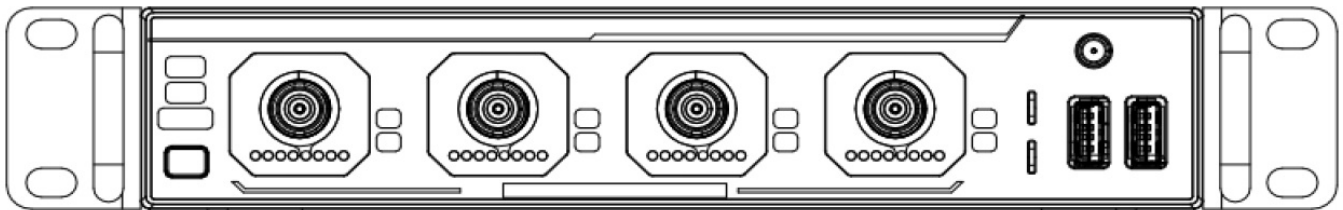
Insufficient Compensation

Figure 2 Probe Compensation Calibration

If the displayed waveform appears as “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 the risk of electric shock when using the probe to measure high voltage, ensure that the probe insulation is intact and avoid physical contact with any metallic parts of the probe.

## Appearance and Dimensions



Front View

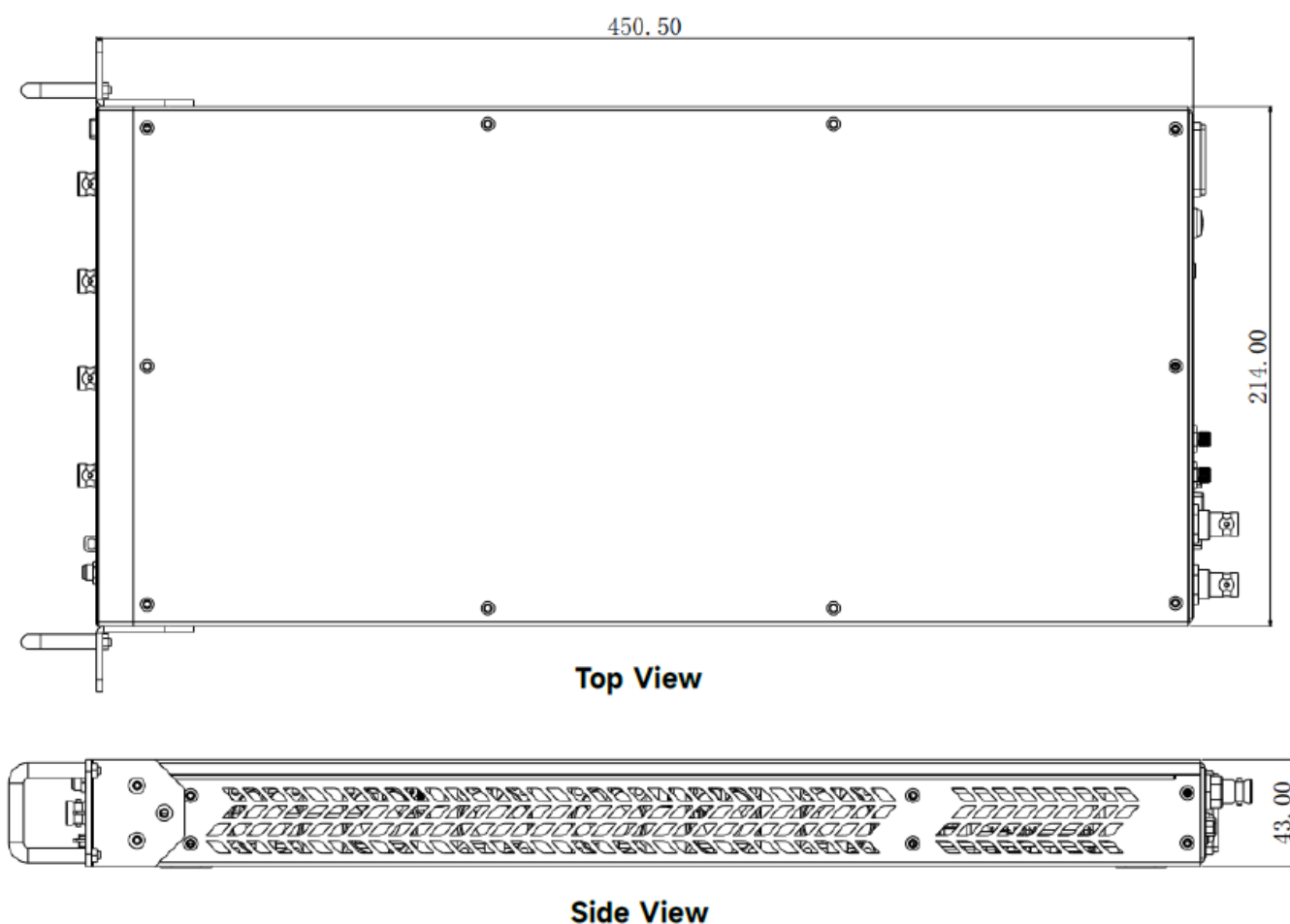


Figure 3 Front Panel

Table 1 Front Panel Connectors

No.	Description	No.	Description
1	Nameplate/Model series	4	Probe compensation signal connection sheet and ground terminal
2	External trigger SMA connector	5	Analog channel input terminal
3	USB HOST 2.0	6	Soft power switch



**Table 2 Front Panel Key Indicator**

Key Indicator	Red	Green	Blue	Yellow	None
Power			Powered on	Powered on but not enabled	
RunStop	Stop	Run	The channel's microcontroller has been powered on, but the software has not been started yet	Abnormal	
Lan	Network connection failed	Network connection normal			
Acq	Stop acquisition	Triggered		The oscilloscope is currently capturing pre-trigger data.	
Impedance			1MΩ	50Ω	The channel is not opened

**Rear Panel**

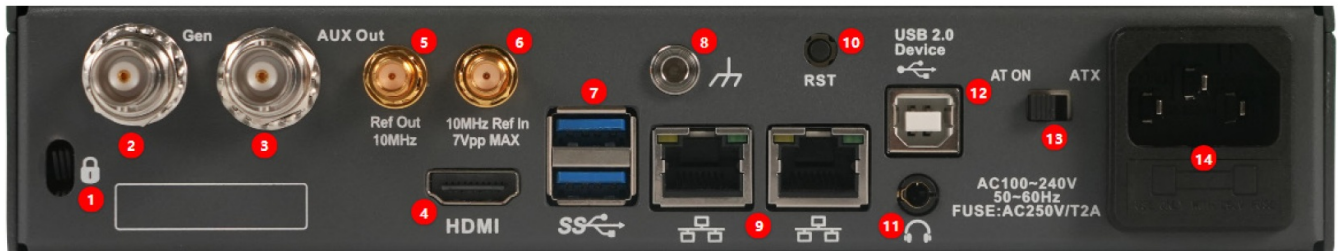


Figure 4 Rear Panel

Table 3 Icon in User Interface

No.	Description	No.	Description
1	Safety Keyhole	8	Ground Hole
2	Gen Out	9	LAN
3	Aux Out	10	RST
4	HDMI	11	Audio port
5	10MHz Ref Out	12	USB DEVICE 2.0
6	10MHz Ref In	13	Auto Power On
7	USB Host	14	AC power supply

1. Safety Keyhole: A safety lock (purchased separately) can be used to lock the oscilloscope in a fixed position through the keyhole.
2. Output port of function/arbitrary waveform generator.
3. Aux Out: Trigger synchronous input; Pass/Fail test results; AWG trigger output.
4. HDMI: High-definition multimedia interface.
5. 10MHz Ref Out: A BNC on the rear panel that outputs the oscilloscope's 10MHz reference clock for synchronization with other external instruments.
6. 10MHz Ref In: Provides the reference clock for oscilloscope's acquisition system.
7. USB Host: Through this interface, USB-compatible storage devices can be connected to the oscilloscope. When connected, waveform files, setting files, data, and screen images can be saved or retrieved. Additionally, if updates are available, the oscilloscope's system software can be locally upgraded via the USB Host port.

- 8. Ground Hole: The device can be grounded to generate static electricity.
- 9. LAN: Use this port to connect the oscilloscope to the LAN (local area network) for remote control.
- 10. RST: Restart device.
- 11. Audio port.
- 12. USB DEVICE 2.0: Use this port to connect the oscilloscope to PC for communication.
- 13. Auto Power On: Automatic power-on setting switch, toggle the switch to AT ON, oscilloscope power on automatically after startup.
- 14. AC power supply: 100-240VAC, 50-60Hz.

### User Interface



Figure 5 User Interface

Table 4 Icon in User Interface


No.	Description	No.	Description
1	UNI-T Logo	17	Zone triggering
2	Trigger state icon	18	Window extension

3	Single trigger	19	Main window setting menu
4	Autoset	20	Trigger level cursor
5	Horizontal scale and delay	21	Frequency meter

6	Acquisition mode, storage depth and sampling rate	22	Digital voltmeter
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6	Acquisition mode, storage depth and sampling rate	22	Digital voltmeter
7	Trigger information	23	Function/arbitrary waveform generator
8	Cursor measurement	24	Protocol analyzer
9	FFT	25	Reference waveform
10	UltraAcq® mode	26	Mathematical operation
11	Search Navigation	27	Channel state label
12	Save	28	Measurement menu
13	Screenshot	29	Analog channel cursor and waveform
14	Delete	30	Trigger position cursor
15	System setting		
16	Start menu		

## Measurement Menu

Click the measurement label icon  at the bottom left to open the measurement menu,

as shown in Figure 6.

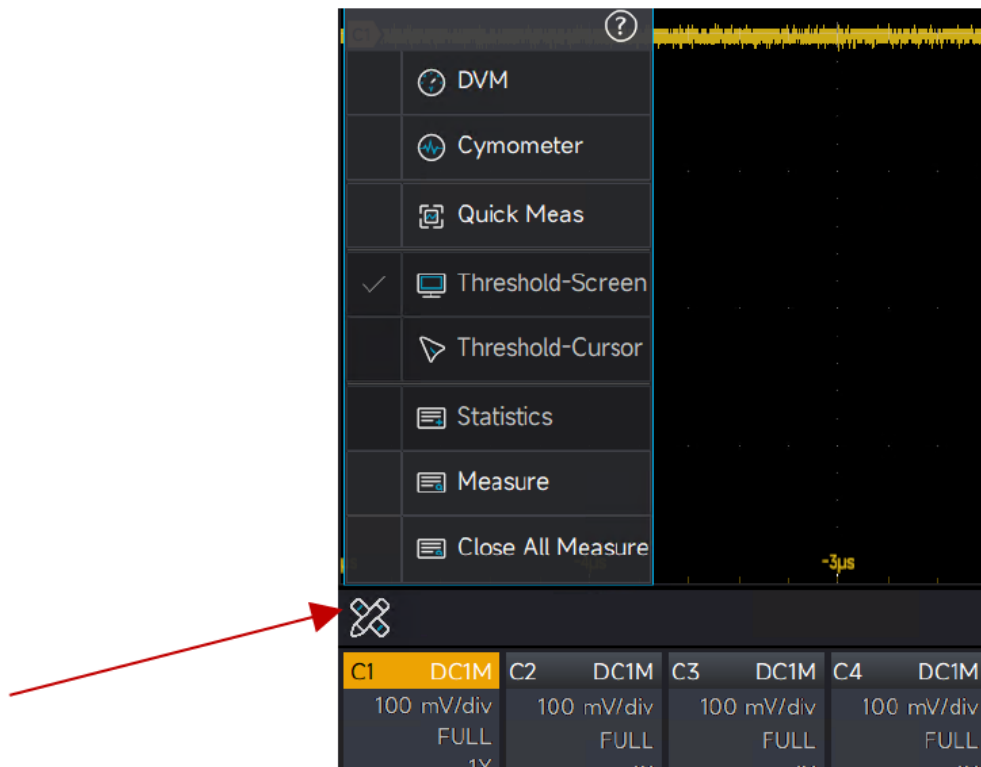
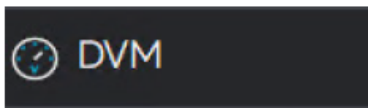
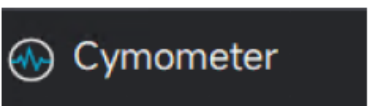


Figure 6 Measurement Menu

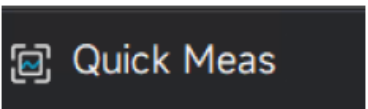
- **Digital voltmeter:** Click to enable the digital voltmeter measurement, which supports 4-digit AC RMS, DC, and DC+AC RMS measurements.
- **Frequency meter** Click to enable 8-digit high precise frequency meter.
- **Parameter snapshot** Click to enable the parameter snapshot to view various parameter measurements.



Digital voltmeter:



Frequency meter:

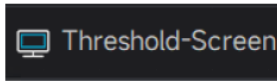


Parameter snapshot:

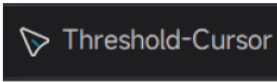
- **Measurement threshold-screen:** The measurement range covers the entire screen.
- **Measurement threshold-cursor:** Select the parameter measurement range based on

the cursor position.

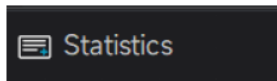
- **Measurement statistics:** Click to enable the measurement statistics, including the current value, maximum, minimum, average, standard deviation, and count.
- **Parameter measurement:** Turn on/off the parameter measurement function.
- **Close all measurement items** Close all active measurement items with a single click.



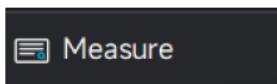
Measurement threshold-screen:



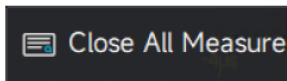
Measurement threshold-cursor:



Measurement statistics:



Parameter measurement:




Close all measurement items:

## Communication

UPO7000L series digital phosphor oscilloscopes support communication with a computer via the USB and LAN interfaces for remote control. Remote control is enabled using the SCPI (Standard Commands for Programmable Instruments) command set.

UPO7000L series supports three communication methods:

1. LAN: SCPI
2. USB: SCPI
3. WebServer: SCPI, remote control, export data via browser

Click the auxiliary setting icon  to open the setting menu, and select “Communication” option.

## Network

Before using the LAN interface, connect the oscilloscope to the local area network using a network cable. The oscilloscope’s network port is located on the rear panel. The settings menu and network connection interface (as shown in Figure 7) allow the user to view the current network settings and configure network parameters.

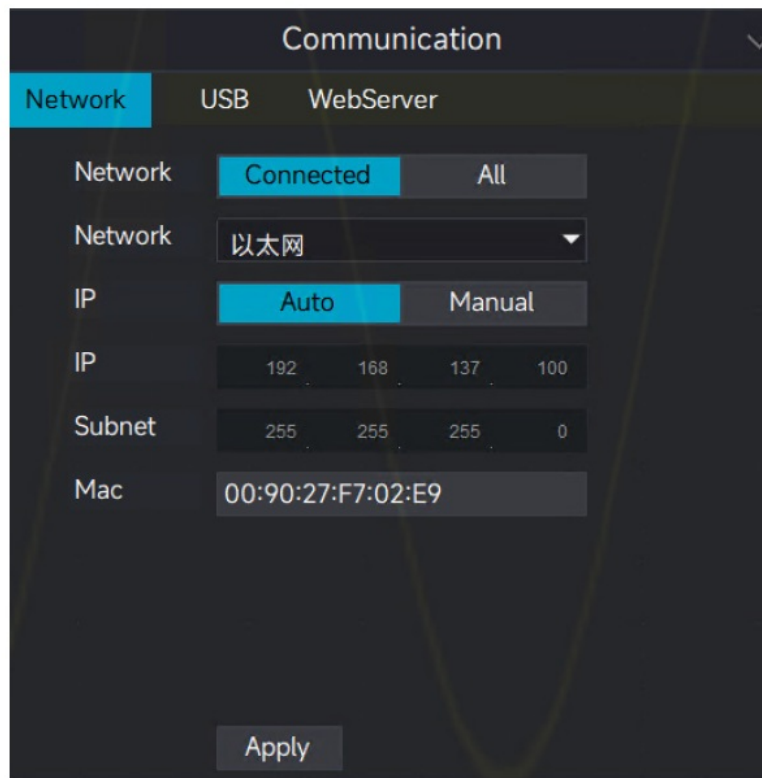


Figure 7 Network Configuration

## USB

USB interface can display the vendor ID, product ID, serial number, and the currently used VISA address, as shown in Figure 8. This oscilloscope can communicate directly with the host computer via the USB device interface on the rear panel, without requiring additional configuration.

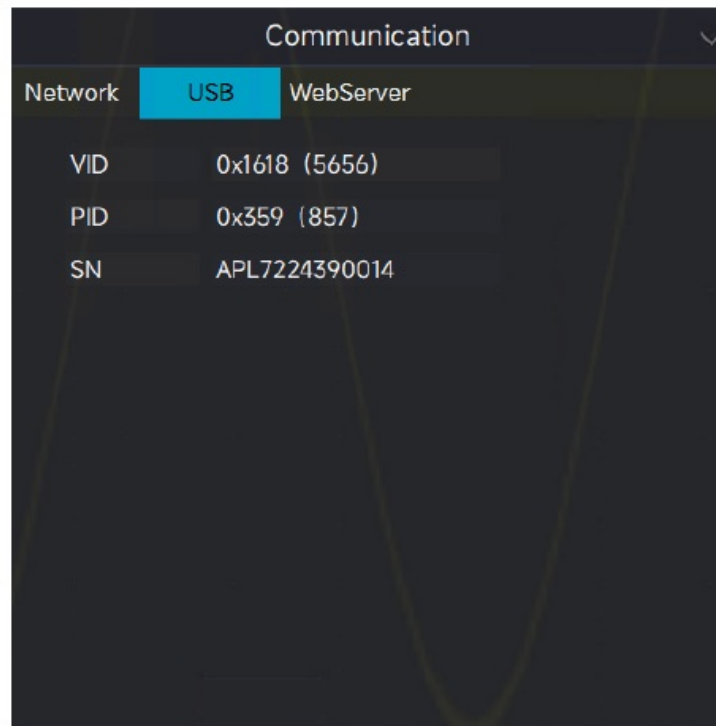



Figure 8 USB Communication

### WebServer

Web Server displays the current network switch state. The default network port is set to 80.

### PC Access

The computer and the oscilloscope must be connected to the same LAN and capable of ping each other. The user can view the oscilloscope's local IP address by clicking the setting icon  to view, and then can view the oscilloscope's local IP address by IP: 80, as shown in Figure 9.

### Example

PC IP 192.168.137.101

Oscilloscope IP 192.168.137.100

Gateway 192.168.137.1

To access the oscilloscope, enter 192.168.137.222: 80 in the browser. The available features are displayed in Figure 10.

- Device information and remote control: View and control the oscilloscope remotely.
- SCPI control: Send and execute SCPI commands.



- Export data file: Export waveforms and files.

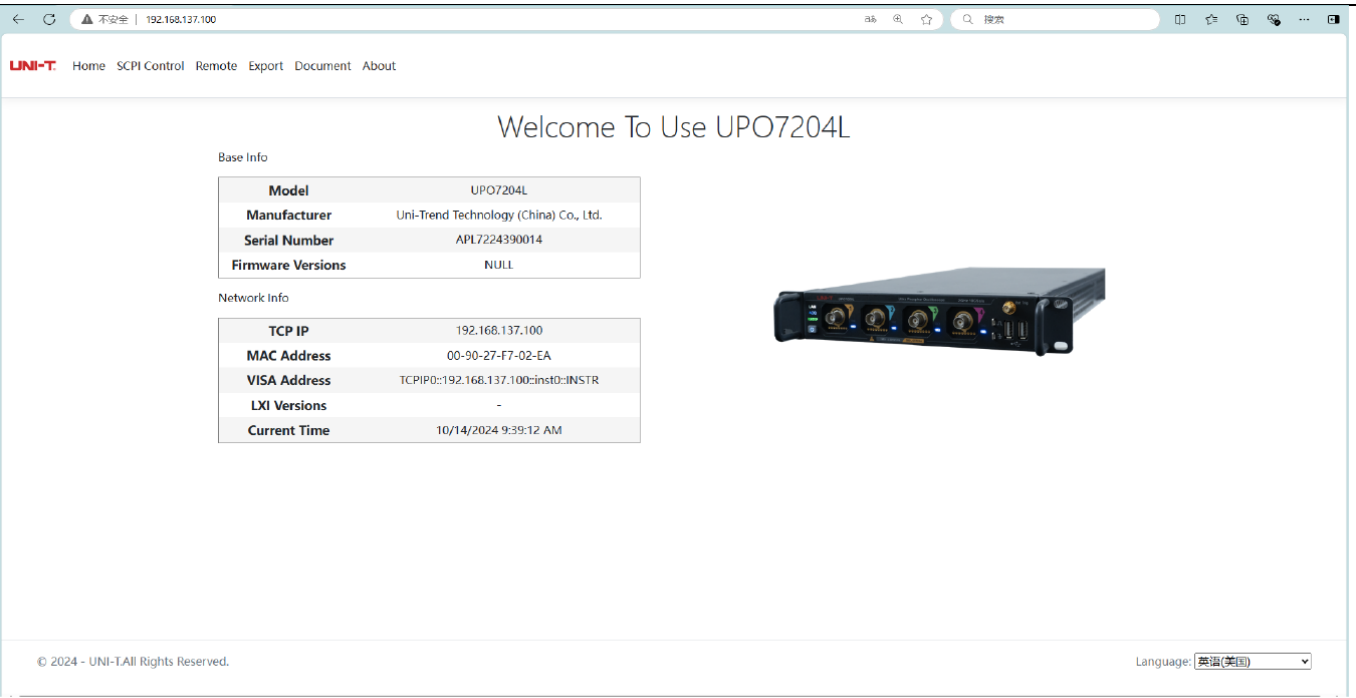


Figure 9 Web Server Home Page



Figure 10 Remote Control

Cellphone Access

The cellphone and the oscilloscope must be connected to the same LAN (usually under the same WLAN band). The user can view the oscilloscope’s local IP address on the setting menu and access the oscilloscope via a web browser by entering its IP address followed by IP: 80, as shown in Figure 11 and 12.

The functionality on the cellphone is identical to that on the computer, with differences only in the layout.

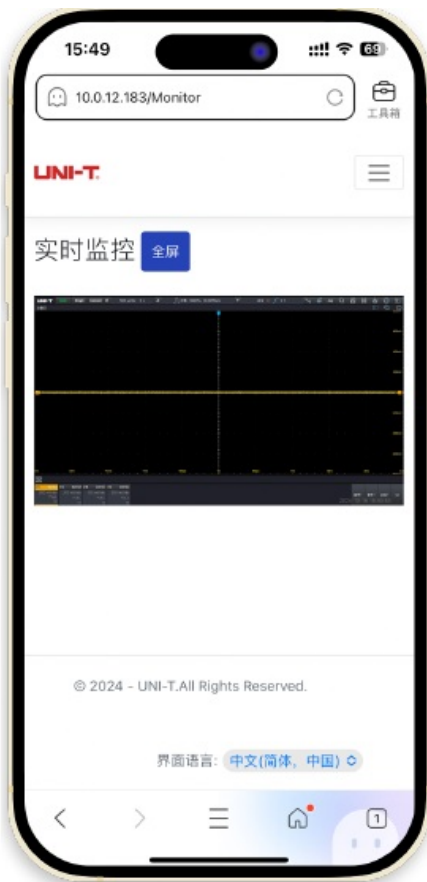


Figure 11 Web Server Home Page



Figure 12 Remote Control

## Troubleshooting

This section provides a list of potential faults and troubleshooting methods that may occur while using the oscilloscope. If you encounter any of these issues, please follow the corresponding steps to resolve them. If the problem persists, contact UNI-T and provide the equipment information for your device.

1. If the oscilloscope remains on a black screen without any display when press the soft power button.
  - Check if the power plug is properly connected and the power supply is normal.
  - Check whether the power switch of the oscilloscope is turned on. Once the switch is on, the power soft switch button on the front panel should display a red light. After pressing the start soft switch, the soft power switch button will turn blue, and the oscilloscope will emit a startup sound.
  - If a sound is heard, it indicates that the oscilloscope has booted up normally.

- 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 on the screen.
    - Check whether probe and DUT are connected properly.
    - Check whether the signal connecting line is connected to analog channel.
    - Check whether the analog input terminal of the signal matches the channel that is currently selected on the oscilloscope.
    - Connect the probe tip to the probe compensation signal connector on the front panel of the oscilloscope and verify whether the probe is functioning properly.
    - Check if the device under test is generating a signal. The user can connect the signal-generating channel to the problematic channel to help diagnose the issue.
    - Click Autoset to allow the oscilloscope to automatically reacquire the signal.
  3. The measured voltage amplitude value is 10 times larger or 10 times smaller than the actual value.
    - Check whether the probe attenuation setting on the oscilloscope matches the attenuation factor of the probe being used.
  4. There is a waveform display, but it is unstable.
    - Check the trigger settings in the trigger menu to ensure they match the actual signal input channel.
    - Check the trigger type: general signals should typically use the “Edge” trigger. The waveform will display stably only if the trigger mode is set correctly.
    - Try changing the trigger coupling to HF rejection or LF rejection to filter out high-frequency or low-frequency noise that may be interfering with the trigger.
  5. Waveform refresh is very slow.
    - Check whether the acquisition method is set to “Average” and if the average times are large.
    - To accelerate the refresh speed, the user can reduce the number of averaging times or select other acquisition methods.

## Maintenance and Cleaning

### General Maintenance

Keep the probe and its accessories away from the direct sunlight.

**Caution:** Avoid contact with sprays, liquids, or solvents to prevent probe damage.

## Cleaning

Check the probe frequently according to the operating condition. Follow these steps to clean the external surface of the probe:

Use a soft cloth to remove dust from the probe.


Disconnect the power supply and clean the probe with mild detergent or water.

Do not use abrasive or chemical cleaners, as they may damage the probe.

**Warning:** Please confirm that the instrument is completely dry before use, to avoid electrical shorts or even personal injury caused by moisture.

[www.uni-trend.com](http://www.uni-trend.com)

## Documents / Resources

	<p><a href="#">UNI-T MSO7000X Digital Phosphor Oscilloscopes [pdf]</a> User Guide</p> <p>MSO7000X, UPO7000L, MSO7000X Digital Phosphor Oscilloscopes, Digital Phosphor Oscilloscopes, Phosphor Oscilloscopes, Oscilloscopes</p>
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## References

- [User Manual](#)

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Digital Phosphor Oscilloscopes, MSO7000X, MSO7000X Digital Phosphor Oscilloscopes, Oscilloscopes, Phosphor Oscilloscopes, UNI-T, UPO7000L

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