

Optical Time Domain Reflectometer



VO4500 USER'S MANUAL

PREFACE

Thank you very much for purchasing and using this series of optical time domain reflectometers. This manual mainly contains the common operation and maintenance information of the instrument, as well as the common troubleshooting guide and other information. In order to facilitate your use, please read the contents of this manual carefully before operating the instrument, and follow the instructions of this manual correctly.

This manual is only used with this instrument. Any company or person is allowed to tamper, copy and disseminate the contents of this manual for commercial purposes without the authorization of the company.

The contents of this manual are subject to change without notice. If you have any questions, please call the supplier, we will provide you with the best service!

Due to the need of design improvement, the contents are subject to change without notice.

Summary

This series of OTDR is a multi-functional optical measuring instrument, which integrates OTDR, event map, optical power meter, visual fault location, light source, optical loss test, cable line length / sequence test, cable tracking and other functions. It has touch screen and Keys. It is the right assistant for optical cable construction, installation and maintenance, project acceptance and on-site repair.

Warning

When using the instrument, do not look directly at the laser output port or the end of the optical fiber with your eyes, avoid eye damage! Except for 1625nm/1650nm, all the others are off-line test wavelengths, which will cause damage to internal components of the instrument if forced to use. Any change or modification not explicitly permitted in this manual will deprive you of the right to operate the equipment. To reduce the risk of fire or electric shock, do not expose the equipment to thunderstorm or humid environment. In order to prevent electric shock, please do not open the shell. It must be repaired by qualified personnel designated by the manufacturer.

Attentions

Battery: the battery is a special polymer lithium battery, the charging voltage is 5V/2A, and the charging temperature range is 0 °C ~ 50 °C. When the ambient temperature is too high, the charging will automatically terminate. It is recommended that the battery should be charged once a month to avoid long-term storage and battery failure due to self-discharge. The temperature range of battery during long-term storage is: -20 °C ~ 50 °C.

Please use the special adapter attached with the instrument box and use the external power supply in strict accordance with the specifications, otherwise the equipment may be damaged.

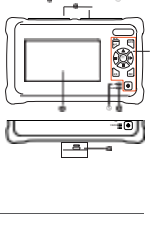
End Face Cleaning: Before testing, clean the end face of the tested fiber joint with alcohol cotton.

LCD screen: the display of this series of instruments is 4.3 inch color LCD. In order to maintain good viewing effect, please keep the LCD screen clean. When cleaning, wipe the LCD screen with soft fabric.

Guarantee description: The whole machine is guaranteed (36 months at home and 18 months abroad). The battery, charging adapter and optical interface consumables are guaranteed for 6 months. The warranty date shall be postponed one month from the date of manufacture.

Host

1.



Top

- OTDR/LS port
- OPM port
- VFL port
- Flashlight
- RJ45 Sequence/Length port
- TF card
- Type C USB

Main view

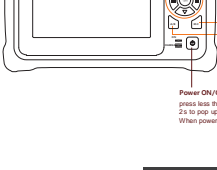
- Dust cover
- 4.3 inch color LCD
- Function keys
- Charging indicator
- Power on status indicator

Bottom

- RJ45 Sequence test remote

Function keys

2.



Average test key

Enter the OTDR interface, Press this key to perform the average test function

Auto test key

Enter the OTDR interface, Press this button to perform automatic test function

Direction key up, down, left and right

ESC key exit current function

SET key enter the OTDR parameter setting interface

Power ON/OFF key

press less than 2s to turn on the machine, press more than 2s to pop up the shutdown confirmation pop-up window; When power on, short press to turn on or off the flashlight.

Main interface

3.

Enter the main menu after power on, there are 10 function modules. Press the direction key to select the module, and then press the "OK" key or directly press the function icon to enter the corresponding function interface.



OTDR-Quick parameter setting

4.

Correctly setting the parameters of the instrument is a necessary condition for accurate measurement. Therefore, before using this instrument, the parameters must be set as required. Standard tests only need to set the wavelength, range, pulse width, measurement time, and measurement mode on the main interface of the OTDR.

Wavelength (nm): Used to set the test wavelength of the OTDR

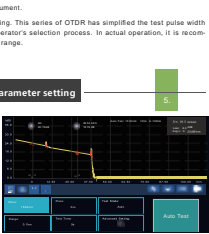
Setting method: On the main interface of the OTDR, click [Wave], and drag [1310nm], [1550nm] or [1310/1550nm] to the center frame.

Range (km): Set the range of the scanning track.

The setting of the range is to select the corresponding pre-defined range according to the actual length of the fiber, which must be greater than the length of the fiber to be tested, usually set to about twice the length of the fiber to be tested. The longer the distance, the longer the test time.

Pulse width (ns): Set the laser pulse width with the instrument.

The pulse width setting will change with the distance setting. This series of OTDR has simplified the test pulse width for various length ranges, which greatly facilitates the operator's selection process. In actual operation, it is recommended to use the upper limit pulse width of the optional range.



Attention: Please do not make online test except online wavelengths!

OTDR-Quick parameter setting

5.

Narrow pulse width: Can measure close time (reflection point and loss), but cannot measure long distances.

Wide pulse width: Long distances can be tested, but multiple adjacent events are recognized as a single event.

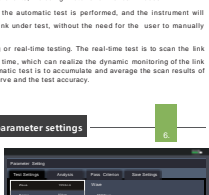
Setting method: In the parameter setting interface, press the [Pulse] menu, the option of 5ns-2000ns will appear, press to select the corresponding pulse width.

Measurement time (s): In the "Average Test" and "Auto Test" modes, it is used to set the average processing time of the test. Does not work in "Real Time Test" mode. The setting range is between 5 and 300 seconds.

Measurement mode: Used to select how the OTDR scans events, including "Auto" and "Manual" modes.

Automatic mode: Intelligent test method. In this mode, the automatic test is performed, and the instrument will automatically match the test conditions according to the link under test, without the need for the user to manually set parameters.

Manual Mode: You can choose between average testing or real-time testing. The real-time test is to scan the link under test in real time, and display the test results of each time, which can realize the dynamic monitoring of the link and the status before and after the connection. The automatic test is to accumulate and average the scan results of multiple times to further improve the quality of the test curve and the test accuracy.



Attention: Please do not make online test except online wavelengths!

OTDR-Advanced parameter settings

6.

Advanced parameter setting includes quick parameter setting parameters, which are used when further parameters need to be set. Standard tests only need to set the wavelength, range, pulse width, measurement time, and measurement mode on the main interface of the OTDR.

1) Measurement parameters

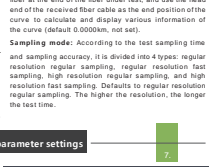
Refractive index: The refractive index of the optical fiber affects the transmission speed of the laser in the optical fiber, so whether the refractive index value is set accurately or not directly affects the accuracy of the distance measurement. The optical fiber refractive index parameter is provided by the optical fiber manufacturer.

Setting method: In the parameter setting interface, select [Refractive Index], click the refractive index of the wavelength to be changed, the refractive index input interface will pop up, enter the refractive index of the fiber under test, and press [Enter] to exit the window.

Unit: Select the length unit of the currently displayed curve, including kilometers (km), thousand feet (kt), and miles (mi).

Guide optical cable: Set the length of a section of optical fiber connected from the output port of the device, and use the tail end of the guide optical cable as the starting position of the curve to calculate and display various information of the curve (default 0.0000km, not set).

Receive fiber optic cable: Set the length of a section of



fiber at the end of the fiber cable under test, and use the head end of the received fiber cable as the end position of the curve to calculate and display various information of the curve (default 0.0000km, not set).

Sampling mode: According to the test sampling time and sampling accuracy, it is divided into 4 types: regular resolution regular sampling, regular resolution fast sampling, high resolution regular sampling, and high resolution fast sampling. Defaults to regular resolution regular sampling. The higher the resolution, the longer the test time.

OTDR-Advanced parameter settings

7.

Analysis parameters

Event loss threshold: It is used to set the loss threshold of the connection point, splice point or macro-bend in the link that the OTDR can test. When analyzing the link under test, events larger than the event threshold will be listed in the event table, and events smaller than the event threshold will be ignored.

Reflection threshold: It is used to set the loss threshold of the link reflection events that the OTDR can test.

End threshold: used to set the loss threshold of the end of the link that the OTDR can test. The range is between 1 and 30, and the default is 10.

The threshold value is generally selected to be automatic.

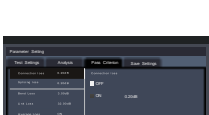
Save Settings

Naming Type: Used to set the naming method of the file during automatic saving

Auto save: whether to enable the function of automatically saving the file after the curve test is completed.

File name: The default naming method for manually saving sor data files.

Fiber ID: Set the fiber number of the currently tested fiber.



OTDR-Advanced parameter settings

8.

Pass Criterion

Connection loss: It is used to set the threshold for passing the judgment of the loss of the connection joint. If the threshold is exceeded, it is considered that the loss of the connection joint is too large and the judgment is not passed.

Splice loss: used to set the threshold for judging the position loss of the splice point. If the threshold is exceeded, it is considered that the loss of the splice point is too large and the judgment is not passed.

Bending loss: It is used to set the threshold for passing the bending loss judgment. If the threshold is exceeded, it is considered that the bending point loss is too large and the judgment is not passed.

Link loss: used to set the threshold for passing the overall link loss judgment. If the threshold is exceeded, the entire link loss is considered too large and the judgment is not passed.

Average loss: It is used to set the threshold for passing the average loss of the link. If the average loss exceeds the threshold, the average loss of the link is considered to be too large and the judgment is not passed.

Live Fiber Check: Set whether to judge the optical information of the fiber under test



OTDR-View event analysis results

9.

After the OTDR test is completed, the loss distribution trace of the fiber link under test is obtained, and the event points are screened and located according to the set event threshold, and the length, loss, average loss and other information of the fiber link are obtained. At the same time, the event point information is displayed in the event list column of the OTDR operation window. At this time, by pressing the event list, or pressing the ▲ or ▼ key in the navigation key, you can view the information of all event points in the event list one by one.

In the event list window:

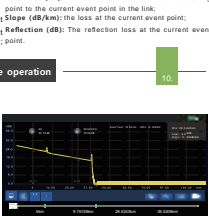
Event type: the event type of the current event point.

(1) **Fiber start point:** Indicates that this event is the start position of the fiber under test;

(2) **Drop event:** Indicates that this event point is a non-reflection event point in the middle of the optical fiberlink, usually an event caused by a fusion point, fiber bending or extrusion, etc.;

(3) **Rising event:** Indicates that this event point is a non-reflection event point in the middle of the optical fiber link, usually an event generated by testing different types of optical fibers;

(4) **Reflection event:** Indicates that this event point is a reflection event point, usually an event caused by an active connector in an optical fiber link;



(5) **Splitter:** Indicating that this event point is a splitter or light splitter;

(6) **Fiber end:** Indicates that the event point is the end of the fiber.

Distance (km): the distance to the current event point;

Section (km): the distance between the current event and the previous event;

Loss (dB): The loss at the event point location in the fiberlink;

Total loss (dB): the total loss of the link from the starting point to the current event point in the link;

Slope (dB/km): the loss at the current event point;

Reflection (dB): The reflection loss at the current event point.

OTDR-Trace operation

10.

Trace operation

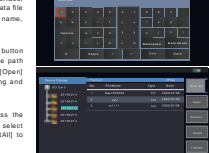
Move and switch markers

You can move left and right by pressing key ◀, ▶ of the navigation key or by dragging the A/B marker line. Menu [A/B] or key [A/B] to switch AB marking line. When the ◀ or ▶ key is held down continuously, the marker line can move quickly. Release the ◀ or ▶ key, the marker line stops moving.

Trace scaling

After test or the data is loaded, drag the trace at a single point to follow the movement; Two-point touch controls the scaling of the trace.

Double-click the trace area or click [1:1] to restore the trace to the original scale display.



OTDR-File operations

11.

File save

The storage format of this series of OTDR test traces is based on the SR-4731 standard terms of the Bell Communication Research Center, and the file extension is .sor. In the OTDR main interface, select the [Save] picture button below the trace, and the data file saving interface will pop up, enter the corresponding file name, and press the [Save] button to save.

File open

In the OTDR main interface, select the [Open] picture button below the trace to enter the file open interface. Select the path where the file is located, select the file, and press the [Open] menu to open the selected file. Support multi-file opening and file renaming functions.

File deletion

On the OTDR file list interface, select the file and press the [Delete] menu to delete the selected file. Click [MultiSel] to select multiple files, and under [MultiSel], you can use [SelectAll] to select all files in the current directory.

Tip: Please use the delete all function with caution, the data cannot be recovered after deletion!

File transfer

In the file management interface, select the file as above, and click [Transfer] to copy the selected file to the external U disk.

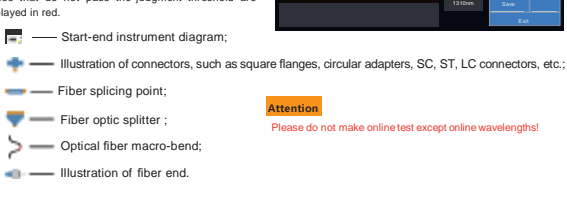
Tip: In order to shorten your copying time, when the number of copied traces is less than 500, you can directly copy to the U disk; when the number of copied traces is more than 500, connect to the computer through the data cable for copying!



On the main menu interface, press the [Event Map] icon to enter the event map interface.

Click to select the test wavelength (multiple wavelengths can be selected), click [Start Test] to proceed.

After the test, the link test trace is displayed, and all event information in the link is displayed in the list. Link information displays test wavelength, fiber link length, total link loss, and number of events. Sections and loss values that do not pass the judgment threshold are displayed in red.



Attention

Please do not make online test except online wavelengths!

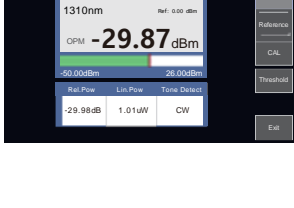
On the main menu interface, press the [OPM] icon to enter the optical power meter test interface.

Connect the measured optical signal to the OPM optical interface through the fiber jumper, select the test wavelength, and start the power measurement.

Absolute power, relative power and linear power values are converted as follows:

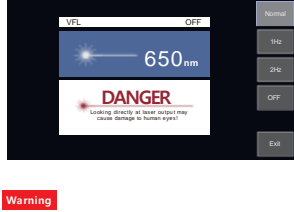
$$P_{Abs.Pow} = 10 \lg P_{Lin.Pow} / 1mW$$

$$P_{Rel.Pow} = P_{Abs.Pow} - P_{Ref.Pow}$$



On the main menu interface, press the [VFL] icon to enter the visible light source interface.

Press the [Open] menu, the red light is turned on, continuous light output; press [1Hz] or [2Hz], the red light output modulated light with a frequency of 1Hz or 2Hz.

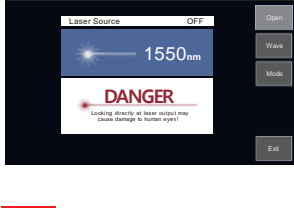


Warning

Avoid looking directly at the laser output port, laser will cause damage to human eyes!

On the main menu interface, press the [Laser Source] icon to enter the stable laser source test interface.

The output optical interface and output wavelength of the stable laser source function are consistent with the OTDR. The right button selects the functions of turning on the laser source, switching the wavelength, and switching the laser source mode.



Warning

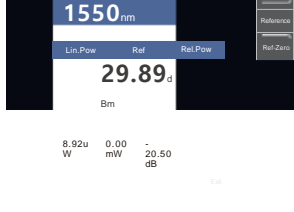
Avoid looking directly at the laser output port, laser will cause damage to human eyes!

On the main menu interface, press the [Optical Loss Test] icon to enter the optical loss test interface.

The loss measurement steps are as follows:

Connect the LS and OPM optical interfaces with a standard jumper, press [Open], after the power is stable, press [Reference];

Connect the DUT to the LS and OPM optical interfaces with a standard jumper, and press [Open] to obtain the insertion loss of the DUT.



RJ45 Line Sequence

In the main menu interface, press the [RJ45 Sequence] icon to enter the line sequence test interface. There are two types of RJ45 network cables: straight-through cable and cross-connect cable.

Test of straight-through connection: During the test, the indicator lights of the host and the remote test end should flash one by one from 1 to 8.

Test of staggered line connection: During the test, the indicator lights of the host flash one by one from 1 to 8, and the indicator lights of the remote test end flash one by one in the order of 3, 6, 1, 4, 5, 2, 7, and 8 Bright.

RJ45 Length

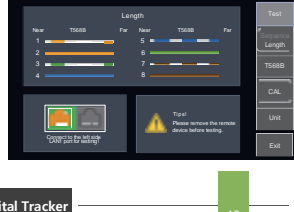
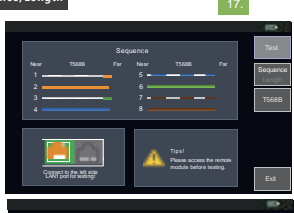
In the main menu interface, press the [RJ45 Length] icon to enter the optical loss test interface.

Used for length testing of RJ45 cables.

Attention

When the test cable is long, one end of the network cable should be inserted into the LAN1 port at the bottom of the instrument, and the other end should not be connected to a normal switch.

This function prohibits live test!



After the cable tracking function is started, touch the cable under test with the tracker, and when hear the sound of continuous "drip drop", the target cable is found.

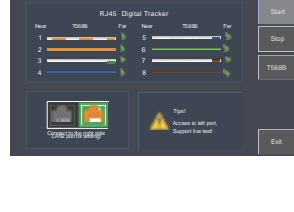
The equipment is pressure resistant, and can be directly tested online. Weak current equipment with DC voltage less than 60V such as ethernet switch and router.

Test: turn on RJ45 cable tracking function.

The line finding mode of this machine is digital radar type, which has strong anti-jamming ability. According to the target distance and proximity, the frequency of prompt tone is different.

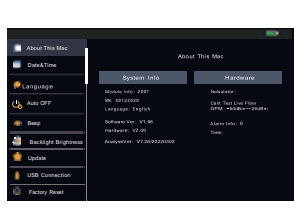
Attention

The cable tracking port is designated as the port on the right side of the OTDR displayed in yellow. Please connect correctly or it may cause damage to the equipment!



On the main menu interface, press the [System] icon to enter the system settings interface.

Including: local information, time and date settings, automatic shutdown settings, backlight highlight adjustment, sound settings, language selection, USB connection function, software update function.



The description in the table on the right is for reference only. Please refer to the new instruction for detailed usage. In the process of using the instrument, if you have any questions, you can contact the instrument supplier.

Fault description	caused failure	solutions
OTDR cannot start normally.	The battery is dead.	Charge the battery and observe the charging indicator. If the red light is displayed, continue charging, otherwise, contact the supplier.
OTDR cannot be charged normally.	Charging conditions are not met.	Charge the instrument to 100%.
Normal curve cannot be measured.	Battery or internal circuit problem.	Contact the supplier to replace the battery.
	OTDR parameters are not set correctly.	Reset the correct test parameters.
	Fiber output end face is polluted.	Clean the OTDR output end face.
The noise of the test curve is big and the waveform is not smooth.	Output connector of OTDR is damaged.	Connect to OTDR output connector.
	Optical output connector mismatch.	Replace the matched connector.
	The connector is not connected properly.	Reconnect the appropriate output interface.
The test curve decreases slowly. There is a tailing phenomenon.	The pulse width setting is too small.	Increase the test pulse width.
	The pulse width is too large.	Decrease the test pulse width parameter.
No reflection peak at the beginning of the test curve decreases slowly. There is a tailing phenomenon.	Fiber output end face is polluted.	Clean the OTDR output end face.
	Fiber output end face is polluted.	Replace the OTDR output connector.
	Optical output connector mismatch.	Replace the matched connector.
No reflection peak at the end of the fiber cannot be measured.	The test range is too small.	Increase the test range value.
	The pulse width is too small.	Increase the test pulse width parameter.
	The pulse width is too small.	Increase the pulse and the event threshold value.
False positive in curve analysis.	Event threshold setting is too small.	Reset the appropriate parameters.
The tested fiber length is not accurate.	OTDR parameters are not set correctly.	Reset the correct test parameters.
The slope of optical fiber is not accurate.	The refractive index is not set correctly.	Reset the refractive index.
	The front and tail of the test curve is too long.	Clean the OTDR output end face.
	Improper setting of cursor position.	Reset the cursor position.

Cleaning of connectors

The optical output interface of this series of OTDR is a replaceable universal interface, and the end face must be kept clean during use. When the instrument fails to test the normal curve or the test result is not accurate, first consider cleaning the connector.

When cleaning, be sure to turn off OTDR and visible red light fault location function. Screw off the output port and wipe the connection end face with a special dust-free paper towel or cotton swab wetted with alcohol.

At the same time, please cover the dust cap after using the instrument, and keep the dust-proof clean at the same time.

Instrument screen cleaning

The display of this series of optical time domain reflectors is 4.3 inch TFT full view color LCD with capacitive touch screen. When using, do not click on the LCD with sharp objects, or the derivative LCD screen may be damaged. When cleaning, clean the LCD screen with soft paper. Do not wipe the LCD screen with organic solvent, otherwise it may damage the LCD screen.