

# Optical Time Domain Reflectometer

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 OTDR, event map, visual fault location, RJ45 Test(cable line length ,sequence test ,cable tracking),optical multimeter(Laser Source,optical loss test),optical power meter, end face detection,and other functions. It has touch screen and rears. 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!Dual wavelength testing of 1310nm&1550nm is prohibited online, as forced use may cause damage to internal components of the instrument!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 -5°C~+45°C. When the ambient temperature is too high, the charging will automatically terminate. The battery should be charged every one month to avoid long storage time and failure of battery 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.

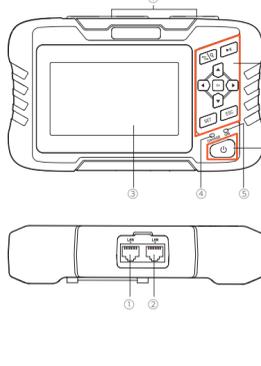
**End Face Cleaning:** Before testing, clean the end face of the tested fiber joint with alcohol cotton.

**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 for 24 months. 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

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### Top

- ① OTDR port
- ② VFL port
- ③ OPM port
- ④ Flashlight
- ⑤ Type-C
- ⑥ TF (Mico SD) card
- ⑦ USB

### Main view

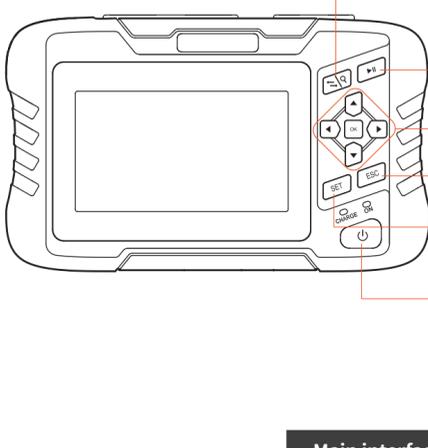
- ① Dust cover
- ② Function keys
- ③ 4.3 inch color LCD
- ④ Charging indicator
- ⑤ Power on status indicator

### Bottom

- ① RJ45 Sequence test port
- ② RJ45 Cable line length/cable tracking port

## Function buttons

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### Zoom control/AB cursor switch key

For OTDR waveforms, operate with directional keys to switch between curve scaling and AB cursor movement functions

### Measurement/Stop button

In the OTDR interface, press to start or stop the test

### Direction keys

Choose up, down, left, right

### ESC key

Exit the current function

### SETUP key

Enter the OTDR parameter setting interface

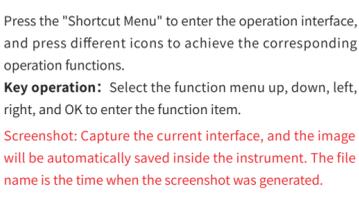
### Press and hold the flashlight switch

Press>2s to turn on or pop up a shutdown prompt box  
Long press>8s to force shutdown

## Main interface

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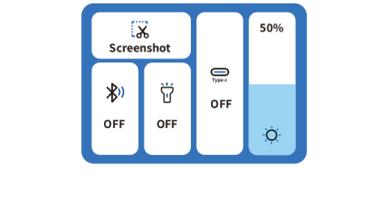
After booting up, enter the main menu with a total of 9 functional modules. Press the directional keys to select the module, then press the "OK" key or directly press the function icon to enter the corresponding functional interface.



Press the "Shortcut Menu" to enter the operation interface, and press different icons to achieve the corresponding operation functions.

**Key operation:** Select the function menu up, down, left, right, and OK to enter the function item.

**Screenshot:** Capture the current interface, and the image will be automatically saved inside the instrument. The file name is the time when the screenshot was generated.



## OTDR

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Select the testing wavelength, range, pulse width, time, and mode. Different ranges correspond to different selectable pulse widths.

**Advanced settings:** Analysis parameters, qualification criteria, and other parameter settings;

**Quick setup:** [Event map] :Event List [Curve switching]

### Curve operation

**Curve scaling and dragging:**Touch screen gesture operation

**Restore initial curve:**Click on the screen [1]

**Move cursor:**Drag A or B

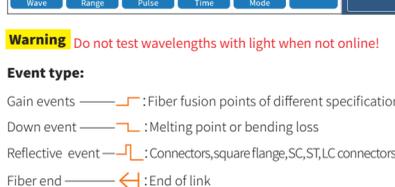
### Physical button operation:

**SET:** Pop up options for setting test parameters and automatic saving

**ESC:** Return

**||:** Testing and Stopping

**↔:** Cursor switching (move cursor position with left and right buttons), zoom in mode (zoom in with up, down, left and right buttons)



**Warning:** Do not test wavelengths with light when not online!

### Event types

- Gain event ———— : Fiber fusion points of different specifications
- Down event ———— : Melting point or bending loss
- Reflective event ———— : Connectors, square flange, SC, ST, LC connectors, etc
- Fiber end ———— : End of link

## OTDR-Set test parameters

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**Wave:** The wavelength at which light waves are emitted.

**Range:** Select the corresponding predefined range based on the actual length of the optical fiber, which must be greater than the length of the measured optical fiber, usually set to about twice the length of the measured optical fiber.

**Pulse:** Refers to the time width of the optical pulse signal emitted during measurement. The larger the pulse width, the stronger the optical power injected into the fiber, the stronger the backscatter signal of a fiber, and the farther the OTDR can effectively detect. However, a large pulse width can cause saturation of the initial reflection signal, resulting in a large blind spot. The selection of pulse width is related to the length of the measuring fiber. The longer the length, the greater the pulse width, which can only be modified in real-time/average measurement mode.

**Mode:** The equipment is divided into three modes: automatic testing, average testing, and real-time testing. Automatic testing automatically selects testing conditions without the need for manual selection. Average testing and real-time testing require manual selection of testing conditions.

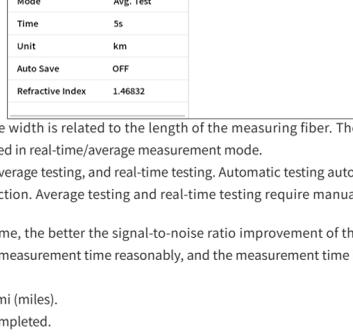
**Time:** In the average testing mode, the longer the detection time, the better the signal-to-noise ratio improvement of the signal, and the more accurate the test results. Users should choose the measurement time reasonably, and the measurement time is directly proportional to the measurement dynamics.

**Unit:** Select the desired unit, with three options available: km, kft, and mi (miles).

**Auto save:** Whether to automatically save the test file after testing is completed.

**Reflective Index:** Determined by the inherent characteristics of optical fibers and provided by cable or fiber manufacturers, refractive index is a key parameter for calculating distance and cannot be set arbitrarily. The range of refractive index is 1-2.

**Key operation:** Press the SET key to enter parameter settings, select parameters up, down, left, right, and OK to confirm the parameters.



## OTDR-Threshold/Criterion

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### Threshold setting

**Event loss threshold:** Set the loss threshold for the connection points, fusion points, or macro bends in the link that can be tested, between 0.01dB and 9.99dB, with a default of 0.20dB. While exceeding the set threshold will be listed in the event table, events below the threshold will be ignored.

**Reflection threshold:** Set the return loss threshold for the link reflection events that can be tested, between -99.99dB~-1.00dB, with a default of -40.00dB.

**End threshold:** Set the loss value at the end of the link that can be tested, between 1dB and 30dB, with a default of 10dB.

### Qualification criteria

Set a judgment value for the average loss of connection/fusion/bending/link. If it is less than the judgment value, it is judged as "PASS", otherwise it is "FAIL".

**Connection loss:** Reflection event, referring to flange, SC, LC and other joints;

**Welding loss:** Non reflective event, often referring to the welding point;

**Bending loss:** Non reflective event caused by fiber bending, requiring simultaneous testing of two wavelengths;

**Link loss:** The total loss threshold value of the tested link.

**Average loss:** The loss value per kilometer of the tested link.



## OTDR-Curve

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Selecting the correct parameter settings and completing the test will display test results such as curves and event lists.

### Curve scaling

Touch screen gesture operation enters zoom out and zoom in mode.

### Event List

**List:** The measurement results are displayed in the form of a list.

**Total length of optical cable:** The total length of the currently tested link

**Total loss:** The total loss of the currently tested link

**Average loss:** The loss per kilometer of the currently tested link

### In the event list:

**Serial number:** The order of the current event

**Type:** The type of the current event point

**Distance:** The location of the current event point

**Section:** The distance between the previous event point and the current event point



No.	Type	Dis. km	Sec. km	Loss dB	Tot. Loss dB	Avg. L dB/km	Return dB
1	FL	0.0050	0.0050	0.00	0.00	0.35	-51.37
2	FL	0.0251	0.0201	0.49	0.50	0.37	-45.51
3	FL	0.0451	0.0200	.....	0.51	0.39	-40.56

**Loss:** The loss value at the current event point

**Slope:** Loss value per kilometer from the starting point to the current event point

**Reflection:** Return loss value of the current event point

**Total loss:** The cumulative loss value from the starting point to the current event point

## OTDR-File save

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After the measurement is completed, press [Save] to save the file, enter the file name, and press "Enter" to save the file. The file is saved in a folder named after the current date.

**Auto save:** Open the file auto save function, and the file name will be automatically generated according to the rules.

### Naming Type:

File Name+FiberID, with FiberID increasing in sequence;

File Name+Range+FiberID, with FiberID increasing in sequence;

File Name+Range+Pulse+FiberID, with FiberID increasing in sequence.

**File Name:** Manually enter the file name.

**FiberID:** Manually enter the fiber number.



## OTDR-File operation

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### File operation

All test curves are saved in the TF card that comes standard with the instrument. Press [File] to enter the file operation interface, where you can open, delete, and rename files.

[Open] Support for comparing up to 4 curves. The internal test sor data of the machine TF card can be exported through a USB flash drive.

### Physical button operation:

**ESC:** Delete

**SET:** Return

**▲▼▶▶:** Choice

**↔:** Export

**OK:** Confirm



## Event map

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This function is completely one click automatic testing, displaying the length, connector type, breakpoint position and other information of the measured optical fiber link in a graphical form, with clear and easy to understand results.

**START** — Starting point of the link

— Drop event, mostly involving fusion points

— Connector, square flange, SC, ST, LC connectors, etc

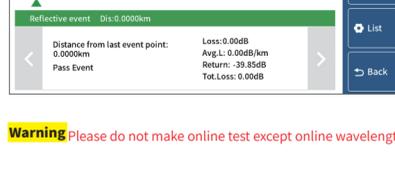
— Fiber optic macro bending, high loss bending point

— End of link

### Physical button operation:

**||:** Testing and Stopping **◀▶:** Switching events

**↔:** Save test results **ESC:** Return



**Warning:** Please do not make online test except online wavelengths!

Used for signal power testing and insertion loss testing of various devices and optoelectronic components. Can identify and measure the power of 270Hz/1kHz/2kHz frequency light.

**Wavelength:** Switching the testing wavelength of the power meter

**Calibration:** Enter calibration mode

**Reference:** Set the current power as the reference power

**Zeroing:** Reference power set to zero

**Physical button operation:**

▲▼: Switching wavelengths

OK: Set reference power

ESC: Return



The conversion relations of absolute power, relative power and linear power are as follows:

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

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

## VFL

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VFL, abbreviated as VFL, injects visible light (red light) into the optical fiber and observes the leakage position on the measured fiber to conveniently and accurately determine the location of the fiber fault point. Suitable for detecting near end fault points and high loss sections caused by micro bends in bare optical fibers, fiber jumpers, and other optical fibers and cables that can leak red light.

🔴: Click to turn on/off the red light and output it in continuous mode

1Hz: Red light flashes at a frequency of 1Hz

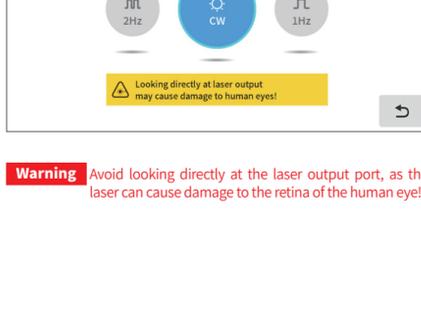
2Hz: Red light flashes at a frequency of 2Hz

**Physical button operation:**

OK: Testing and Stopping

◀▶: Switch flashing frequency

ESC: Return



**Warning** Avoid looking directly at the laser output port, as the laser can cause damage to the retina of the human eye!

## Multimeter-LS

## 13

LS, abbreviated as LS, can output laser with the same wavelength as OTDR function, used for parameter testing of telecommunications, cable TV, and LAN optical cables; Insertion loss, isolation, and return loss testing of optical passive components; Detector wavelength responsivity testing, etc.

There are five working modes of the light source: CW, 270Hz, 330Hz, 1kHz and 2kHz.

**Open:** Turn on the light source

**Wavelength:** Switching the wavelength of the light source

**Mode:** Switch light source mode, CW, 270Hz, 330Hz, 1kHz, and 2kHz

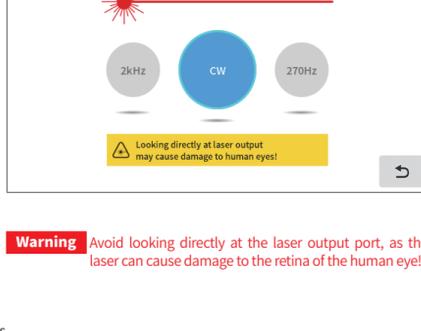
**Physical button operation:**

OK: Testing and Stopping

▲▼: Switching wavelengths

◀▶: Switch working mode

ESC: Return



**Warning** Avoid looking directly at the laser output port, as the laser can cause damage to the retina of the human eye!

## Multimeter-Insertion loss

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**Used to test the insertion loss value of optical passive components.**

The steps for measuring optical loss are as follows:

1) First, connect the LS and OPM optical interfaces with a standard jumper, press [ Enable ], and after the power stabilizes, press [ Reference ];

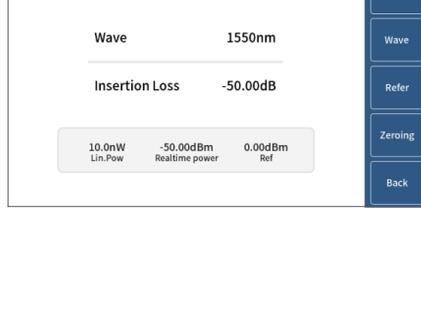
2) Use standard jumpers to connect the tested component to the LS and OPM optical interfaces, press [ Enable ], and the 'Relative Power' will be the insertion loss of the tested component.

**Physical button operation:**

▶||: Testing and Stopping

▲▼: Switching wavelengths

ESC: Return



## RJ45 Test-RJ45 cable line length /sequence test

## 15

**Line sequence measurement:** During testing, connect the remote end of the accessory to the other end of the network cable. The testing modes are direct connection and interleaved connection. Click to start testing and the order of the network cables will be displayed.

**Wire length test:** RJ45 wire length is used to test the length and status (open circuit, short circuit) of Ethernet cables, and supports live testing. The testing distance range is 1-300m, with a distance deviation of approximately ± 1.5m.

There are two types of wires for RJ45 connectors: straight through wires and patch cords.

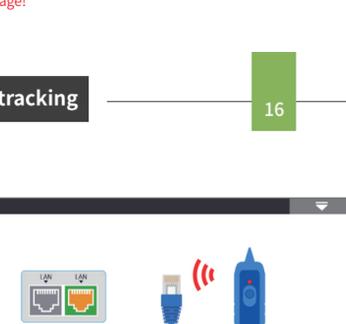
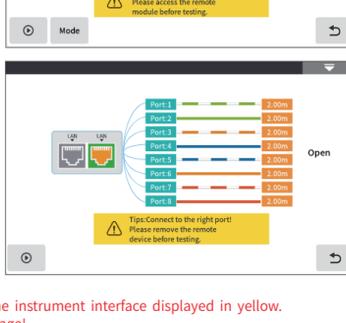
**Network cable standard:** T568A/T568B, the color order of the network cable varies depending on the standard.

**Physical button operation:**

▶||: Testing and Stopping

↔: Switch network cable standard(T568A/T568B)

ESC: Return



**Warning** The line length/line sequence interface is designated as the instrument interface displayed in yellow. Please do not connect it incorrectly to cause equipment damage!

## RJ45 Test-RJ45 cable tracking

## 16

**RJ45 cable tracking test**

After the line finding function is activated, touch the tested cable with the line finder and hear a continuous "beep beep beep" sound, which is the cable being searched for.

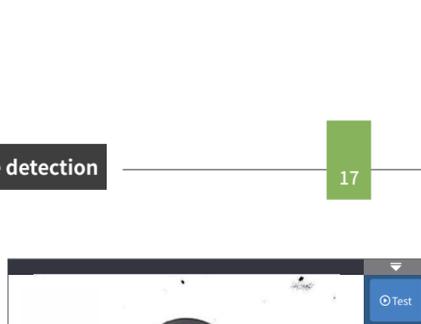
This equipment is pressure resistant and heat-resistant, and can be directly used for live wire tracing. Ethernet switches, routers, and other low-voltage equipment with a DC voltage less than 60V.

**The line finding method of this machine is based on digital radar, with strong anti-interference ability. The frequency of the prompt sound varies according to the distance of the target.**

**Physical button operation:**

▶||: Testing and Stopping

ESC: Return



**Warning** The wire tracing interface is designated as the instrument interface displayed in yellow. Please do not connect it incorrectly to cause equipment damage!

## End face detection

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**End face inspection can achieve real-time monitoring of the cleanliness of fiber optic joints.**

**Step 1:** Connect the end face detection probe to the USB-A interface;

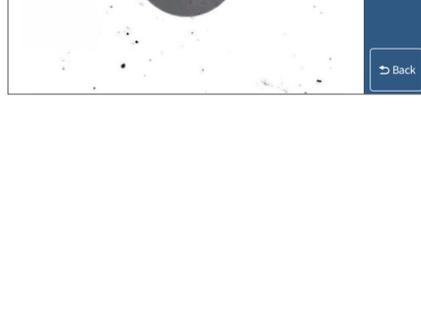
**Step 2:** Click to start;

**Step 3:** Connect the tested fiber optic cable and check the cleanliness of the tested end face in real time.

**Physical button operation:**

▶||: Testing and Stopping

ESC: Return



## System settings

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**Time:** Set instrument time and date

**Power management:** Strong light mode, sound, 100% power-saving settings (0-100%), Automatic shutdown (shutdown/5/15/30/60/120 minutes)

**Connection:** Bluetooth connection, Type-C connection

**Language:** Display the native language type

**Factory mode:** Upgrade (local software update), restore factory settings (restore default parameter values)

**About this machine:** View local information and alarm records



## OTDR-Pulse width selection

## 19

Under automatic OTDR, when manually setting the measurement range, OTDR will automatically select the most suitable reference pulse width.

In manual averaging mode, the measurement range and pulse width can be manually adjusted. The list on the right is for reference only:

Pulse	Test range	0.1km	0.5km	1.25km	2.5km	5km	10km	20km	40km	80km	125km	260km
		3ns	✓	✓	✓	✓	✓	✓	✓	-	-	-
5ns	✓	✓	✓	✓	✓	✓	✓	-	-	-	-	
10ns	✓	✓	✓	✓	✓	✓	✓	-	-	-	-	
20ns	✓	✓	✓	✓	✓	✓	✓	-	-	-	-	
30ns	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	
50ns	-	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	
80ns	-	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
100ns	-	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
200ns	-	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
300ns	-	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
500ns	-	-	✓	✓	✓	✓	✓	✓	✓	✓	✓	
800ns	-	-	-	-	-	-	-	-	-	✓	✓	
1000ns	-	-	-	-	-	-	-	-	-	✓	✓	
2000ns	-	-	-	-	-	-	-	✓	✓	-	✓	
3000ns	-	-	-	-	-	-	-	-	-	✓	✓	
5000ns	-	-	-	-	-	-	-	✓	✓	✓	✓	
8000ns	-	-	-	-	-	-	-	-	✓	✓	✓	
10000ns	-	-	-	-	-	-	-	-	-	✓	✓	
20000ns	-	-	-	-	-	-	-	-	-	-	✓	

## Faults and Solutions

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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	Cause of 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. Battery or internal circuit problem.	Charge the instrument in an environment of -5°C-45°C. Contact the supplier to replace the battery.
Normal curve cannot be measured.	OTDR parameters are not set correctly.	Reset the correct test parameters.
	Fiber output end face is polluted.	Clean OTDR output end face.
The noise of test curve is big and the waveform is not smooth.	Output connector of OTDR is damaged.	Connect OTDR output connector.
	Optical output connector mismatch.	Replace the matched connector.
Saturation (flat top) appeared in the front of the test curve.	The connector is not connected properly.	Re connect the appropriate output interface.
	The pulse width setting is too small.	Increase the test pulse width.
The reflection peak at the beginning of the test curve decreased slowly. There is a tailing phenomenon.	The pulse width is too large.	Decrease test pulse width parameter.
	Fiber output end face is polluted.	Clean OTDR output end face.
The reflection peak at the end of the fiber cannot be measured.	Fiber output end face is polluted.	Replace OTDR output connector.
	Optical output connector mismatch.	Replace the matched connector.
False positive in curve analysis.	The test range is too small.	Increase test range value.
	The pulse width setting is too small.	Increase test pulse width parameter.
The tested fiber length is not accurate.	Event threshold setting is too small.	Increase the pulse and the event threshold value.
	OTDR parameters are not set correctly.	Reset the appropriate parameters.
The slope of optical fiber is not accurate.	The refractive index is not set accurately.	Reset fiber index.
	The front and tail of the test curve is too long.	Clean OTDR output end face.
	Improper setting of cursor position.	Reset cursor point position.

## Instrument maintenance

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**Cleaning of connectors**

The instrument output interface of this series OTDR is replaceable, and the end face must be kept clean during use. When the instrument fails to test a normal curve or the test results are inaccurate, the first consideration is to clean the connector.

When cleaning, please ensure that both OTDR and visible red light fault location functions are turned off. Unscrew the output interface and use a dedicated dust-free tissue or cotton swab dampened with alcohol to wipe the connection end face.

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

**Instrument screen cleaning**

The display of this series of optical time domain reflectometer is a 4.3-inch TFT full view color LCD with a capacitive touch screen. When using, sharp objects should not be used to click on the LCD screen, as it may be damaged. When cleaning, a soft paper can be used to wipe and clean the LCD screen. Do not use organic solvents to wipe the LCD screen, otherwise it may cause damage to the LCD screen.