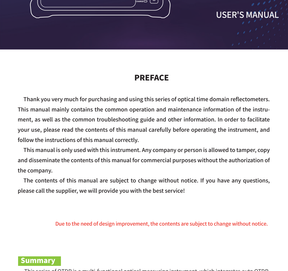
Mini PRO series

# 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**

The series of OTDR is a multi-functional optical measuring instrument, which integrates auto OTDR, expert OTDR, event map, optical power meter, visual fault location, power adjustable stable light source, end face detection, optical loss test, cable line length / sequence line, 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 authorized by the manufacturer 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.

**Attention**

**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. 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 -10 °C ~ 45 °C.

Please use the special adapter attached with the instrument 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 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.

## Host

Top
- ① OTDR/1/3 port
- ② OPM port
- ③ VFL port
- ④ Flashlight
- ⑤ RJ45 Cable Tracker port
- ⑥ RJ45 Sequence/Length port
- ⑦ TF card
- ⑧ Type C USB

Main view
- ⑨ Dust cover
- ⑩ 4.3 inch color LCD
- ⑪ Function keys
- ⑫ Charging indicator
- ⑬ Power on status indicator

Bottom
- ⑭ RJ45 Sequence test remote

## Function keys

**Zoom control / AB cursor switch key** According to the OTDR test options, combined with the direction key operation, in the switch curve scaling, A/B cursor movement function.

**Test / Stop key** OTDR press to start or stop test

**Direction key** up, down, left and right

**ESC key** exit current function

**SET key** enter the OTDR parameter setting interface

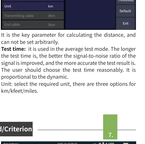
**Power ON/OFF key**
press less than 2s to turn on the machine, p.ess more than 2s to pop up the shutdown confirmation pop-up window; When power on, short press to turn on or off the flashlight.

## Main interface

Enter the main menu after power on, there are 12 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.


Press the "Shortcut menu" icon to enter the quick operation menu, and press different function icons to enter the corresponding function interface or realize the corresponding operation function.

**Print Screen:** Capture the current interface, the picture is automatically saved in the instrument, and the file name is the time when the screenshot is generated.




## Auto OTDR

OTDR is an optoelectronic integrated instrument made of Rayleigh scattering and Fresnel reflection when optical signal is transmitted in optical fiber. It is widely used in the maintenance, construction and monitoring of optical cable lines. It can measure the length of optical fiber, transmission attenuation of optical fiber, attenuation of connector and fault location.

**Auto OTDR:** it only needs to set the wavelength and measurement time, and other parameters are automatically selected by the instrument to complete the test. For the specific meaning and explanation of each parameter, please refer to "expert OTDR".


**Attention**

Please do not make online test except online wavelengths!

## Expert OTDR

**Expert OTDR:** parameters such as wavelength, test range and pulse width shall be set.

The test results are obtained by selecting the appropriate measurement parameters in the expert mode. You can zoom in on the curve to see the details of each event.

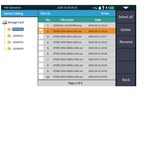
| | |
|---|---|
| Curve | The curve and event list are displayed at once. |
| List | Link results are summarized to a list. |
| Event/Map | Switch to event icon display mode. |
| Fast/Save | Save current curve file quickly. |
| Fast/Set | Enter parameter setting interface. |


**Attention**

Please do not make online test except online wavelengths!

## Parameter setting

**Wave:** the emit wavelength, which can be measured at 1310nm, 1550nm or 1310/1550nm at the same time.
Test range:
**Auto test:** OTDR automatically matches the most suitable parameters for the current test, and the selected values of test range and pulse width cannot be modified.
**Manual mode:** set the value of measurement range and pulse width manually.
**Pulse width:** refers to the time width of the optical pulse signal emitted during test. The larger the pulse width, the stronger the optical power injected into the optical fiber, the stronger the backscattering signal of the optical fiber is, and the farther the effective detection distance of the OTDR can be. However, the large pulse width will cause saturation of the initial reflection signal and a large blind area. The choice of pulse width is related to the length of the optical fiber. The longer the length, the larger the pulse width, which can only be modified in real-time/average measurement mode.
**IOR:** provided by optical cable or fiber manufacturer.




It is the key parameter for calculating the distance, and can not be set arbitrarily.
**Test time:** it is used as the average test mode. The longer the test time is, the better the signal-to-noise ratio of the signal is improved, and the more accurate the test result is. The user should choose the test time reasonably. It is programmable by the dynamic.
Unit: select the required unit, there are three options for km/Met/miles.

## Threshold/Criterion

**Threshold settings**
**Event loss threshold:** set the loss threshold of connection point, fusion point or reserve. Based in the link can be tested, between 0.2~30dB, and the default value is 0.2dB. Events larger than the set threshold will be listed in the event table, or those will be ignored.
**Reflection threshold:** set the reflection threshold of the link reflection events that can be tested, ranging from (-)-80dB, 10dB by default.
**End threshold:** set and loss at the end of the link that can be tested, ranging from (-)-80dB, 10dB by default.

**Eligibility criteria**
**Set the** judgment value for the average loss of connection/fusion/bending link. If it is less than the value, it is judged as "PASS", otherwise it is "FAIL".
**Connection loss:** reflective event, refers to flange, SC, LC and other joints.
**Welding loss:** non reflective event, refers to fusion.
**Bending loss:** non reflective events caused by fiber bending, need to be tested at two wavelengths at once;
**Average loss:** the loss value per kilometer of the link under test.




## OTDR-Curve

Select correct parameter, the test results such as curve and event list will be displayed after test completed.
**Curve zoom**
Press the [zoom] menu to enter the zoom in and zoom out mode.
◀ / ▶ Zoom in or out in X direction
▲ / ▼ Zoom in or out in Y direction
Press [1] to return to the original scale display
**Event list**
**List:** the tested results are displayed in the form of a list.
**Total length:** the total length of the link under test.
**Total loss:** the total loss of the link under test.
**Slope:** the loss per kilometer of the link under test.
**Total events:** the total number of events, the number of passed events and the number of failed events of the link under test.
**In the event list:**
**NO.:** the order of the current event.
**Type:** the type of the current event.
**Distance:** the location of the current event.




**Segment:** the distance between the previous event and the current event.
**Loss:** the loss of the current event.
**Total loss:** the loss from the starting point to the current event.
**Slope:** the loss per kilometer from the starting point to the current event.
**Reflection:** the return loss of the current event.

## OTDR-File save




After the measurement, press [save] to save the file, enter the file name, and press [enter] to save the file. You can also press [Fastsave] to save the file. The file is saved in a folder named the same day' s date.
Auto save: open the auto save function, the file name will be automatically generated according to the rules;
**File naming method** (only valid for "auto save" and "one click save"):
①+④: file name = fiber number naming, fiber number increasing in order;
①+②+④: file name = wavelength + fiber number naming, fiber number increasing in order;
①+②+③+④: file name = wavelength + pulse width + fiber number, and the fiber number increases in order.
File name: enter the file name manually;
**Optical fiber code ID:** the optical fiber number and code set when the line is initially laid;
**Location A:**Link start point location
**Location B:**Link termination point location
**Direction:**Optical fiber test direction, from A to B, from B to A;
**Operator:** enter the name of the tester.

## File Operation

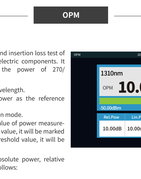



**File operation**
All the test curves are saved in the standard SD card of the instrument. Press [File] to enter the file operation interface. You can open, delete and rename files.

## Event Map

11.

The function is fully one key automatic test, and the information such as the length of the optical fiber link to be measured, the type of the joint and the position of the breakpoint are displayed graphically, and the results are clear and easy to understand.




The starting point of the link, after the guiding fiber is added to the front

Drop event, representing fusion point

Rising event, caused by the inconsistency of refractive index of two sections of fiber

Connector, square flange, SC, LC etc

Optical fiber macro bending

Optical fiber splitter

End of link

**Attention**

Please do not make online test except online wavelengths!

## OPM

12.

It is used for signal power test and insertion loss test of various equipment and photoelectric components. It can identify and measure the power of 270/330/1k/2kHz frequency laser.

**Wavelength:** switch the test wavelength.

**Reference:** set the current power as the reference power.

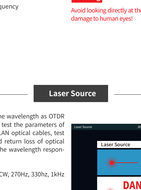
**Calibration:** enter the calibration mode.

**Threshold:** set the threshold value of power measurement. If it exceeds the threshold value, it will be marked in red; if it is lower than the threshold value, it will be marked green.

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

$P_{REL(dBm)}=10lg(P_{LIN(mW)}/1mW$

$P_{REF(mW)}=P_{REL(dBm)}P_{REF(dBm)}$




## VFL

13.

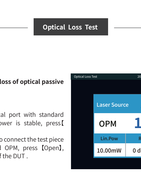
The visible light (red light) is injected into the optical fiber, and the position of optical fiber fault point can be easily and accurately determined by observing the light leakage position on the tested fiber. It is suitable for the detection of bare optical fiber, optical fiber jumper and other optical fiber which can leak red light, and the near end fault point and high loss section caused by micro bending.

**Open:** turn on the red light and output in continuous mode

**1Hz:** red light flashes at 1Hz

**2Hz:** red light flashes at 2Hz frequency

**Close:** turn off red light




**Warning**

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

## Laser Source

14.

It can output Laser with the same wavelength as OTDR function, which can be used to test the parameters of telecommunication, CATV and LAN optical cables, test the insertion loss, isolation and return loss of optical passive components, and test the wavelength responsivity of detector.

There are five working modes : CW, 270Hz, 330hz, 1KHz and 2kHz.

**Open:** turns on the laser source

**Wavelength:** switch the wavelength of laser source

**Mode:** switch laser source frequence, CW, 270HZ, 330Hz, 1kHz and 2kHz

**Power +:** increase the output power

**Power -:** reduce the output power

Prompt the power adjustment progress bar at the bottom: sliding left and right can reduce and increase the output power of the light source respectively.


**Warning**

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

## Optical Loss Test

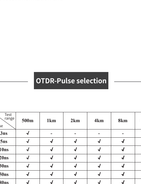
15.

**It is used to test the insertion loss of optical passive devices.**

The OLT steps are as follows:

1) Connect LS and OPM optical port with standard jumper, press【Open】, after power is stable, press【Reference】;

2) The standard jumper is used to connect the test piece to the optical port of LS and OPM, press【Open】, 'Ref.Pow' is the insertion loss of the DUT .




## RJ45 Sequence/Length

16.

**Cable sequence:**When testing, please connect to the remote module at the bottom of the instrument.

There are two kinds of wires for RJ45 connector: straight line and interleaved line.

**Direct connection test:** during the test, the indicator lights of the host and remote device flash from 1 to 8 one by one.

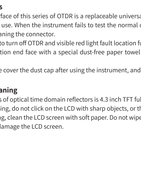
**Interleaved wire connection test:** during the test, the indicators of the remote test end will flash one by one in the order of 3, 6, 1, 4, 5, 2, 7, 8.

**Cable length test:** test the length of network cable.

**Calibration:** input the overall calibration factor of network cable length.

Display length = last result × calibration factor.

**Network cable standard:** T568A/T568B, the color order of network cable is different according to different standards.


**Attention**

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

**Warning**

Please cut off the electricity before test!

## RJ45 Digital Tracker

17.

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 left side of the OTDR displayed in yellow. Please connect correctly or it may cause damage to the equipment!

## System setting

18.

Set the system automatic shutdown, backlight brightness, time and other information.

**Automatic shutdown:**

5/15/30/45/60 minutes/never

**Backlight brightness:** 20%/40%/60%/80%/100%

**Sound:** turn on or off touch and key tone

**Language:** displays the native language type

**USB connection:** connect to the computer after opening and transfer data

**Time & date:** set the time and date

**Restore factory settings:** restore default values

**Upgrade:** native software update

**System information:** check the local information and alarm record.




## OTDR-Pulse selection

19.

Auto OTDR: test range is set manually, OTDR will automatically select the most suitable reference pulse width. Expert OTDR (real-time / average test): test range and pulse width can be adjusted manually. The list on the right is for reference only:

| Test Length / Pulse | 500m | 1km | 2km | 4km | 8km | 16km | 32km | 64km | 100km |
|---|---|---|---|---|---|---|---|---|---|
| 2m | ✓ | - | - | - | - | - | - | - | - |
| 5m | ✓ | ✓ | ✓ | ✓ | ✓ | - | - | - | - |
| 10m | ✓ | ✓ | ✓ | ✓ | ✓ | - | - | - | - |
| 20m | ✓ | ✓ | ✓ | ✓ | ✓ | - | - | - | - |
| 30m | ✓ | ✓ | ✓ | ✓ | ✓ | - | - | - | - |
| 50m | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | - | - | - |
| 80m | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | - | - |
| 160m | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | - |
| 320m | - | - | - | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| 500m | - | - | - | - | ✓ | ✓ | ✓ | ✓ | ✓ |
| 800m | - | - | - | - | - | ✓ | ✓ | ✓ | ✓ |
| 1000m | - | - | - | - | - | ✓ | ✓ | ✓ | ✓ |
| 2000m | - | - | - | - | - | - | - | ✓ | ✓ |
| 3000m | - | - | - | - | - | - | - | ✓ | ✓ |
| 5000m | - | - | - | - | - | - | - | ✓ | ✓ |
| 8000m | - | - | - | - | - | - | - | ✓ | ✓ |
| 10000m | - | - | - | - | - | - | - | ✓ | ✓ |
| 20000m | - | - | - | - | - | - | - | - | ✓ |

## Faults and Solutions

20.

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. | Charge the instrument at 0℃-50℃ |
| | Battery or internal circuit problem. | 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. |
| | Output connector of OTDR is damaged. | Connect OTDR output connector. |
| | Optical output connector mismatch. | Replace the matched connector. |
| The noise of test curve is big and the waveform is not smooth. | The connector is not connected properly. | Reconnect the appropriate output interface. |
| | The pulse width setting is too small. | Increase the test pulse width. |
| | The pulse width is too large. | Decrease test pulse width parameter. |
| The reflection peak at the beginning of the test curve decreased slowly. | Fiber output end face is polluted. | Clean OTDR output end face. |
| | Fiber output end face is polluted. | Replace OTDR output connector. |
| There is a tailing phenomenon. | Optical output connector mismatch. | Replace the matched connector. |
| The reflection peak at the end of the fiber cannot be measured. | The test range is too small. | Increase test range value. |
| | The pulse width is too small. | Increase test pulse width parameter. |
| False positive in curve analysis. | Event threshold setting is too small. | Increase the pulse and the event threshold value. |
| The tested fiber length is not accurate. | OTDR parameters are not set correctly. | Reset the appropriate parameters. |
| | The refractive index is not set accurately. | Reset fiber index. |
| The slope of optical fiber is not accurate. | The front and tail of the test curve is too long. | Clean OTDR output end face. |
| | Improper setting of curser position. | Reset curser point position. |

## Maintenance

21.

### 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.