PREVAIL

WR-1002-JL-CEAM

Outdoor Optical Workstation

Operation and Maintenance Manual

FOREWORD

- This manual is suitable for WR-1002-JL-CEAM outdoor optical workstation.
- For insuring the equipment can be successfully installed and safely work, please carefully read the manual before using it. Installation and debugging strictly according to the specified operation steps to prevent equipment or operator from unnecessary damage or harm. If there is any question, please contact with local distributor timely, or call our company's support hotline directly.

Special Notice:

- Please carefully read the manual before installation and debugging to avoid misoperation damage the device or accidental injury to the operator.
- Earthing first before turning on the power and being sure that the housing and the outlet earthing well, Earthing resistance should ＜4Ω to avoid static damage the laser devices and integrated circuits, and improve the capacity of anti-lightning.
- The equipment failure should be repaired by professional technicians. If the professional technicians can not solve the problem, you should immediately contact local dealer, or directly call our technical support hotline.
- When install and debug the optical workstation, there might be invisible laser bean from the optical fiber active connector, so should not face to human body or looked with the naked eye to avoid permanence harm to the eyes or body.
- When the optical fiber connector is not used, use the dust catcher to prevent the dust pollution. Before using it, use the degrease alcohol cotton clean the optical fiber connector, and dry it in the air before connect.
- When receive the optical signal, make sure the input optical power is in the range of -9dBm ~ +2dBm**,** avoid the input power is too strong to damage the optical detector.
- To ensure the long-term steady operation, in the area of voltage instability or poor voltage waveform, suggest the users to configure the dedicated magnetic saturation power supply or AC regulated power supply.
- To ensure the waterproof performance of the outdoor device, when users connect the optical cables, must correctly choose the dedicated waterproof pig-tail cables. After completing installation and debugging, close the housing, fasten the fixed screws and waterproof connector of all electric cable (optical cable), in order to avoid water leakage.

1. Product Summary

WR-1002-JL-CEAM Outdoor optical workstation is mainly used in FTTB structural CATV bi-directional HFC network. Adopt modular mechanical combination structure, RF amplifier unit and switching power supply module share one modular frame in the bottom cover. The top cover can be configured 1 forward optical receiver module, 1 reverse optical transmitter module and 1 II class responder module.

2. Performance Characteristics

- Advanced optical AGC function, the input optical power range up to -9～+2dBm.
- Downlink RF operating bandwidth extended to 1GHz, the highest output level ≥108dBμV.
- Professional RF electrical adjustable attenuation chip, RF electrical adjustable equilibrium circuit, good linearity, high precision.
- The return path adopts professional RF electrical adjustable attenuation chip instead of the three-state switch.
- Reverse transmitter can configure burst mode, sharply decrease the noise collection and reduce the front-end receivers number.
- Full CPU control the machine work, LCD displays the parameters, and can be configured national standard II class network management responder.
- The structure adopts embedded modular design, easy to maintenance and replacement.

3. Technique Parameter

3.1 Link testing conditions

The performance parameters of this manual according to the measuring method of GY/T 194-2003 < Specifications and methods of measurement on optical node used in CATV systems >, and tested in the following conditions.

1. Forward optical receive part: with 10km standard optical fiber, passive optical attenuator and standard optical transmitter composed the testing link. Set 59 PAL-D analog TV channel signal at range of 45/87MHz～550MHz under the specified link loss. Transmit digital modulation signal at range of 550MHz～862/1003MHz, the digital modulation signal level (in 8 MHz bandwidth) is 10dB lower than analog signal carrier level. When the input optical power of optical receiver is -1dBm, the RF output level is 108dBμV, with 9dB output tilt, measure the C/CTB, C/CSO and C/N.
2. Backward optical transmit part: Link flatness and NPR dynamic range are the link indexes which is composed of backward optical transmitter and backward optical receiver. Note: When the rated output level is the system full configuration and the receiving optical power is -1dBm, equipment meets the maximum output level of link index. When the system configuration reduce (that is, actual transmission channels reduce), the output level of equipment will be increased.

Friendly Notice: Suggest you setting the RF signal to 6~9dB slope output in the practical engineering application to improve the nonlinear index (under the node) of the cable system.

3.2 Performance Parameters

Item	Unit	Performance Parameters	
Forward Optical Receive Part			
Optical Parameters			
Receiving Optical Power	dBm	-9 ~ +2	
Suggested Use Range	dBm	-3 ~ +1	
Optical Return Loss	dB	> 45	
Optical Receiving Wavelength	nm	1100 ~ 1600	
Optical Connector Type		FC/APC, SC/APC (or specified by the user)	
Optical Fiber Type		Single mode	
Link Performance			
C/N	dB	≥ 51 received optical power (-1 dBm)	
C/CTB	dB	≥ 65	
C/CSO	dB	≥ 60	
RF Parameters			
Frequency Range	MHz	45/47/54/70/85～862(1003)	
Flatness in Band	dB	±0.75	
Rated Output Level	dBμV	≥ 108	
Max Output Level	dBμV	≥ 112 (-9 ~ +2dBm optical power received)	
		≥ 116 (-7 ~ +2dBm optical power received)	
Optical AGC Range		(-9dBm/-8dBm/-7dBm)—(+2dBm) adjustable	
Output Return Loss	dB	≥16	
Output Impedance	Ω	75	
Reverse Optical Transmit Part			
Optical Parameters			
Optical Transmit Wavelength	nm	1310±10, 1550±10 or specified by the user	
Laser Type		DFB or FP laser	
Output Optical Power	mW	0.5, 1, 2	
Optical Connector Type		FC/APC, SC/APC (or specified by the user)	
RF Parameters			
Frequency Range	MHz	5 ~ 30/42/55/65	
Flatness in Band	dB	±0.75	
Input Level	dBμV	75～85	
Input Return Loss	dB	≥ 16	
Output Impedance	Ω	75	
NPR dynamic range	dB	≥15（NPR≥30 dB） Use DFB laser	≥10（NPR≥30 dB） Use FP laser
General Performance			
Power Voltage	V	A: AC 135~250 V/50Hz; B: AC35～90V/50Hz	
Operating Temperature	℃	－30～＋70	
Storage Temperature	℃	－30～＋70	
Relative Humidity	%	Max 95% no condensation	
Consumption	W	≤40	
Dimension	mm	295（L）╳210（W）╳150（H）	

Note： The forward RF indexes above are tested when adopt NEC module. Use other module, the indexes will be slightly different.

4. Optional components and accessories

4.1 Optional components and accessories of WR-1002-JL-CEAM outdoor optical workstation

4.1.1 Component 1: Backward optical transmit modules

When ordering the products, customer should specified the optical output power (0.5 ～ 2mw), optical operating wavelength (1310±10, 1550±10 or specified by the user), laser type, optical fiber active connector type (SC/APC, FC/APC or specified by the user) and optional backward laser emission mode (burst or continuous).

4.1.2 Component 2: Network Management Responder Modules

Network management responder modules are the necessary components for remote network management and monitoring functions, including: Network management responder module and state acquisition component.

4.1.3 Component 3: Plug-in duplex filter

Duplex filter common specifications: 5～30/45～1003MHz, 5～65/87～1003MHz

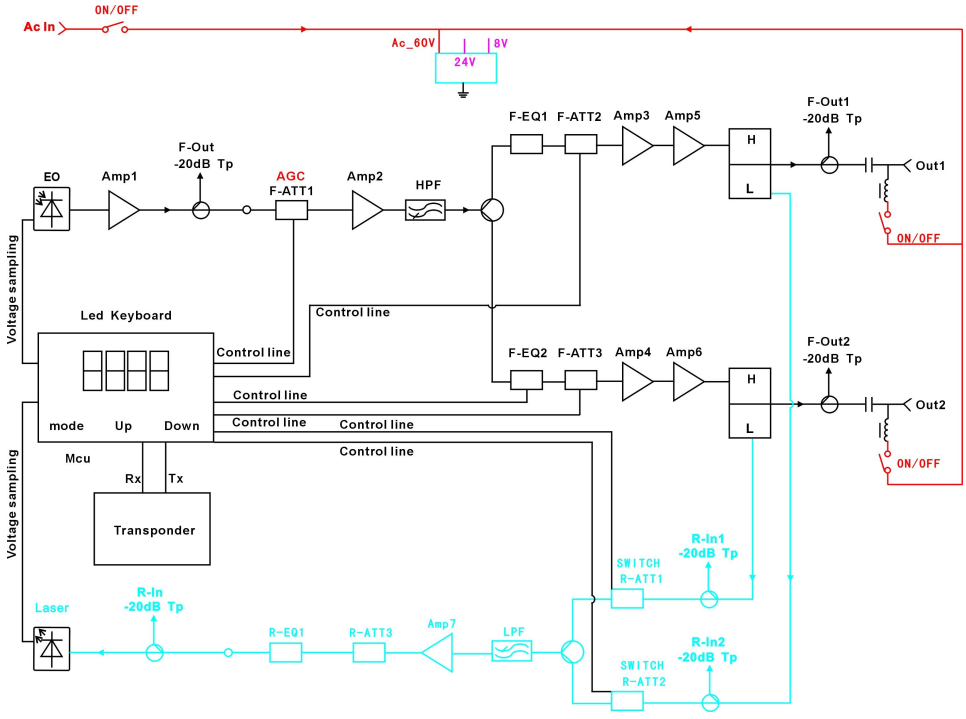
4.1.4 Component 4: Waterproof pig-tail cables (user should buy it)

Waterproof pig-tail cable is the optical cable connecting feeder line with special waterproof connector, which can effectively improve the waterproofing performance of optical cable feeder line input port. We recommend that users choose the correct waterproof tail cables in accordance to the equipment recommend configuration requirement to ensure normal operation.

4.1.5 Component 5: Plug-in fixed equalizer

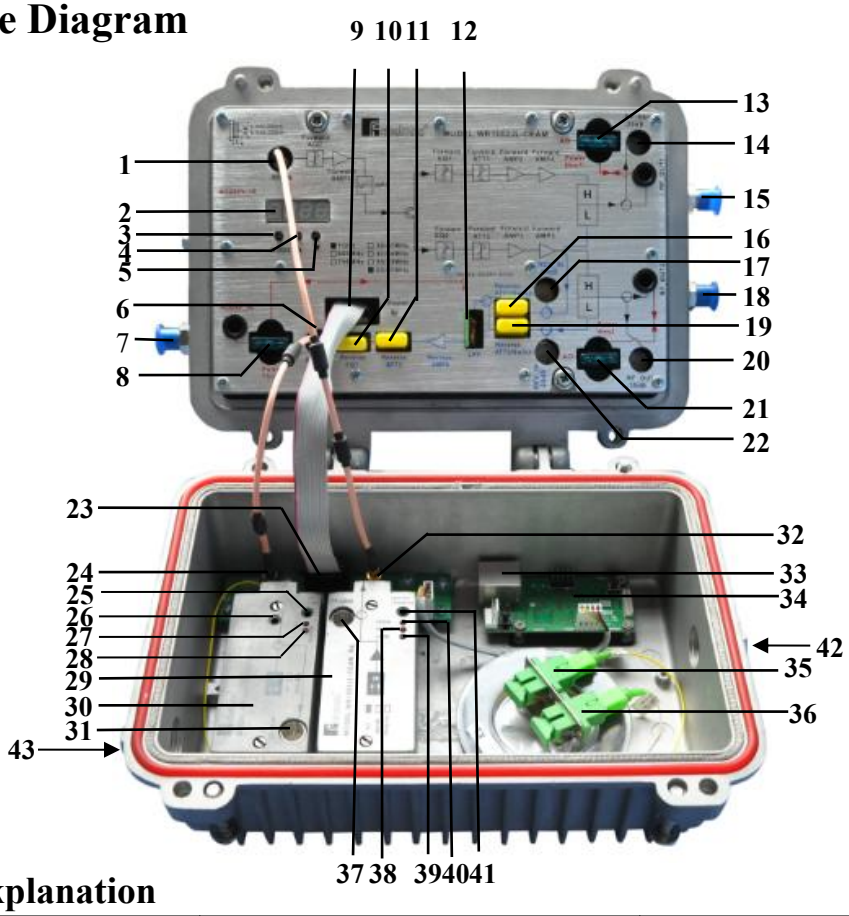
Adjust the backward equilibrium by changing the fixed equalizer inserter, 3dB, 6dB and 9dB three specifications. If customer needs other specifications please order.

5. Block Diagram



WR-1002-JL-CEAM block diagram

6. Structure Diagram



Structure Explanation

1. Signal input of forward RF module	2. LED display screen	3. Mode key
4. Variable increase key	5. Variable decrease key	6. Reverse signal output
7. AC 60V input	8. AC 60V input voltage switch	9. Module data acquisition and power supply interface
10. Input total equalizer of reverse signal	11. Input total attenuator of reverse signal	12. Reverse low pass filter
13. RF output 1 feeder switch	14. Channel 1 forward RF signal output test port	15. Channel 1 forward RF signal output (channel 1 reverse RF signal input)
16. Channel 1 reverse RF signal input attenuator	17. Channel 1 reverse RF signal input test port	18. Channel 2 forward RF signal output (channel 2 reverse RF signal input)
19. Channel 2 reverse RF signal input attenuator	20. Channel 2 forward RF signal output test port	21. RF output 2 feeder switch
22. Channel 2 reverse RF signal input test port	23. Module data acquisition and power supply interface	24. Reverse signal input interface
25. Reverse output optical power monitor port	26. Reverse laser current monitor port	27. Reverse laser optical power output state display (normal)
28. Reverse laser optical power output state display (warning)	29. Forward optical modules	30. Reverse optical modules
31. Laser drive level monitor port	32. Forward RF module signal output interface	33. Transponder RJ45 interface
34. Transponder module	35. Reverse optical signal connector interface	36. Forward optical signal connector interface
37. Forward modules RF signal output monitor port	38. Forward receiving optical power state display (normal)	39. Forward receiving optical power state display (Low)
40. Forward receiving optical power state display (High)	41. Forward receiving optical power state voltage monitor point	42. Optical cable in
43. Network cable out		

Note: If the emission components are RFOG mode, the reverse laser current monitor port is invalid.

7. Operating Instruction

Mode 1:

Input optical power (unit dBm)

Lo :Means that the optical power is low or none

1 :Means that the displayed data is the input optical power

Mode 2:

The actual value of +8V working voltage

2 :Means that the displayed data is the actual value of +8V

Mode 3:

The actual value of +24V working voltage

3 :Means that the displayed data is the actual value of +24V

Mode E1:

RF equilibrium, can be adjusted by▲or▼button.
The maximum range is 15dB.

E 1 : EQ mode, means that the controlled and displayed data is the RF channel 1 equilibrium.

Mode A1:

RF attenuation, can be adjusted by▲or▼button.
The maximum range is 20dB.

A 1 :ATT mode, means that the controlled and displayed data is the RF channel 1 attenuation.

Mode E2:

RF equilibrium, can be adjusted by▲or▼button.
The maximum range is 15dB.

E2 : EQ mode, means that the controlled and displayed data is the RF channel 2 equilibrium.

Mode A2:

RF attenuation, can be adjusted by▲or▼button.
The maximum range is 20dB.

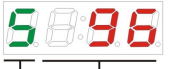
A2 : ATT mode, means that the controlled and displayed data is the RF channel 2 attenuation.

Mode 4:

The actual number of channels enters into the current network system.
It can be adjusted by▲or▼button. The maximum number is 200.

4 :The menu is used to display the actual number of channels enters into the current network system, in order to display the RF output level more accurately.

Mode 5:



Output level of RF output 1 (unit dBuV)

5 : Means that the displayed data is the output level of RF output 1 under the current system.

Mode 6:

Output level of RF output 2 (unit dBuV)

6 : Means that the displayed data is the output level of RF output 2 under the current system.

Mode A3:

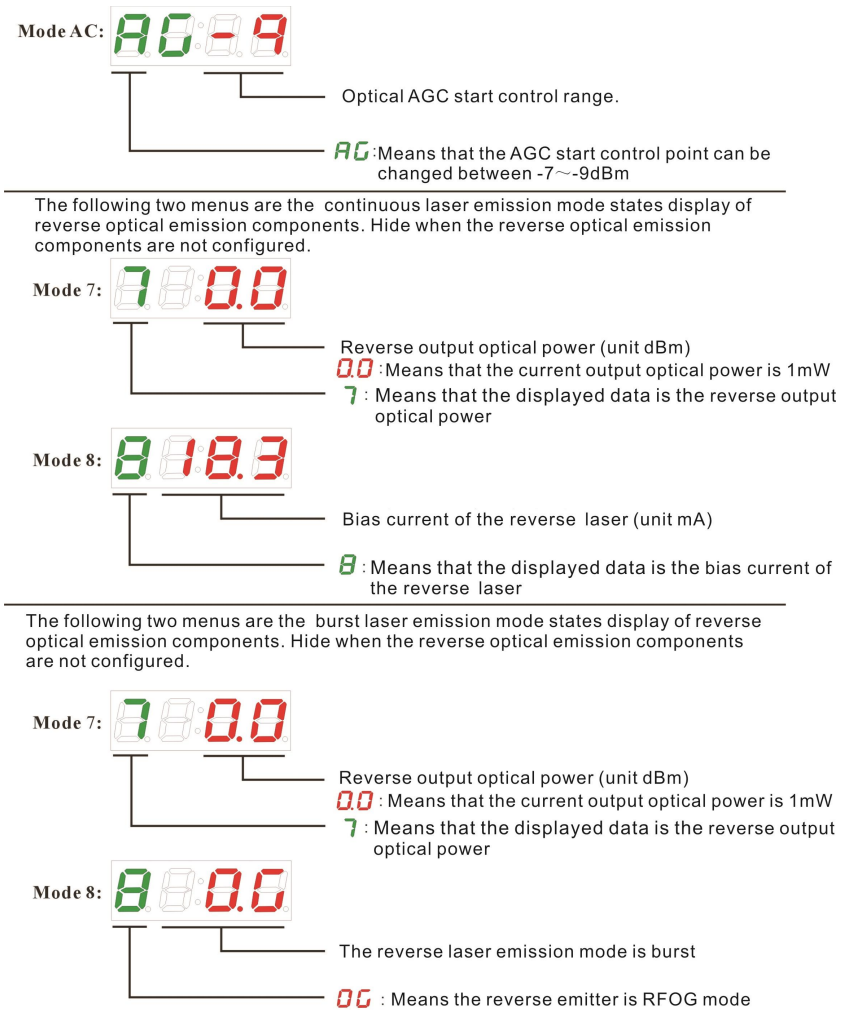
Reverse RF attenuation, can be adjusted by▲or▼button.
The maximum range is 30dB.

A3 : Means reverse input attenuation of channel 1 (effective when configured the electrically controlled attenuator)

Mode A4:

Reverse RF attenuation, can be adjusted by▲or▼button.
The maximum range is 30dB.

A4 : Means reverse input attenuation of channel 2 (effective when configured the electrically controlled attenuator)



8. NMS setup instructions

If users configured the network management responder, need to do the following settings:

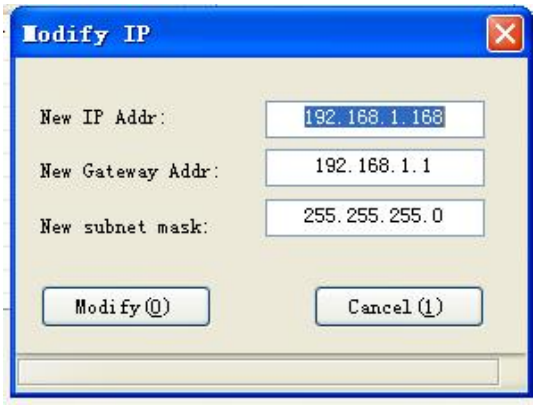
Responder IP setup instruction:

Network management directly modify:

1. Default IP is 192.168.1.168， default gateway is 192.168.1.1， default subnet mask is 255.255.255.0
2. Connect the computer and responder (can be direct connected), and change the computer IP to 192.168.1.XXX (XXX is any number from 0 to 255 except 168); start upper computer network management software, then search the device and log in.

3. Right-click device icon and choose modify the device IP.

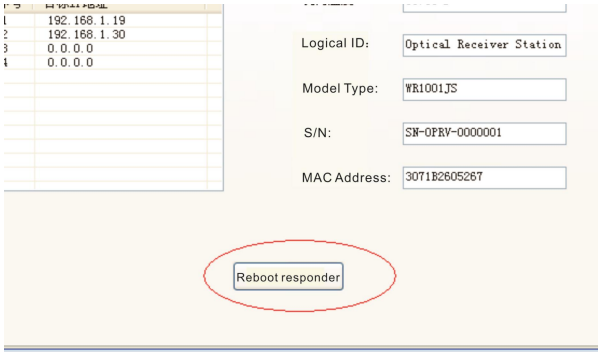
4. Enter new IP address, gateway and subnet mask.



5. Click modify， then exit, it is done. There will show new IP address and gateway on operational logbook.

Log Number	Log Type	Log Contents	Login time
1752	ChangIPAddress	Modify equipment192.168.1.168 IP address: New IP: 192.168.1.167;New gateway:192.168.1.1	2009-9-9 12:39:03

6. Reboot the responder, the new IP take effect (Click the reboot button in the network management software or power on again)



9. Installation debugging

9.1 Unpack and Check

Insure the package is not defaced. If have any damage or water mark, please contact local agency or carrier.

Unpack and check equipment and accessories according to package list. Any question, please contact local agency or our company.

If you think the equipment has been damaged, please don't power on, avoid worse damage to the equipment or accidental injury to the operator. And immediately contact local agency or our company.

9.2 Instruments and tools

1. An optical power meter;
2. A digital multimeter;
3. A Spectrum analyzer (or field-strength meter);
4. Some absolute alcohol and medical cotton wool;

9.3 Installation and debugging

1. Before install the equipment, please read the <Operation and Maintenance Manual> carefully, install and debug the equipment according to the <Operation and Maintenance Manual>.
2. Get out the equipment from the packing box, optical cable signal feeder line access into the equipment and reliably earthing the housing. (earthing resistance＜4Ω).
3. Using an optical power meter to test the real power of input optic signal, confirm optical power within the specified scope; use the degrease alcohol cotton clean the optical fiber active connector, and then connect the dry optical fiber active connector to the optical fiber input interface of optical receiver. When connect the optical active connector should be careful and notice to make force appropriate to avoid the ceramic tube in the adapter crack.
4. Using the multimeter to test the power voltage, confirm the operation voltage is in the specified range, then turn on the power; observe whether the power supply indicator and the optical power indicator are normal on; otherwise, the connection of optical fiber active connector may has problem, the resolve method see “11. Common Failure Analysis and Troubleshooting”.
5. Connect RF output interface to the spectrum analyzer or field-intensity meter, by adjusting the adjustable attenuator and equalizer on the front panel, the output RF signal reach the network design requirements. For high indexes output, better not allow output level higher than the rated level.
6. Remove the spectrum analyzer or field-intensity meter, connect the equipment to the network; Close the housing, fasten the fixed screws and cable connector; The equipment complete installation.
7. The installation and debugging of reverse optical transmitter components, network management responder components and other expanded function components, please refer to the relevant manuals.

10. Common Failure Analysis and Troubleshooting

Failure phenomenon	Failure cause	Solution
After connecting the network, the image of the optical contact point has obvious netlike curve or large particles highlights but the image background is clean.	1. The input optical power of the optical receiver is too high, make the output level of the optical receiver module too high and RF signal index deteriorate. 2. The RF signal (input the optical transmitter) index is poor.	1. Check the input optical power and make appropriate adjustments to make it in the specified range; or adjust the attenuation of optical receiver to reduce the output level and improve index. 2. Check the front end machine room optical transmitter RF signal index and make appropriate adjustments.
After connecting the network, the image of the optical contact point has obvious noises.	1. The input optical power of the optical receiver is not enough, result the decrease of C/N. 2. The optical fiber active connector or adapter of the optical receiver has been polluted. 3. The RF signal level input the optical transmitter is too low, make modulation degree of the laser is not enough. 4. The C/N index of system link signal is too low.	1. Check the received optical power of the optical contact point and make appropriate adjustments to make it in the specified range. 2. Recover the received optical power of the optical contact point by cleaning the optical fiber connector or adapter etc methods. Specific operation methods see “Clean and maintenance method of the optical fiber active connector”. 3. Check the RF signal level input the optical transmitter and adjust to the required input range. (When the input channels number less than 15, should higher than nominal value.) 4. Use a spectrum analyzer to check the system link C/N and make appropriate adjustments. Make sure the system link signal C/N > 51dB.
After connecting the network, the images of several optical contact points randomly appear obvious noises or bright traces.	The optical contact point has open circuit signal interference or strong interference signal intrusion.	1. Check if there is strong interference signal source; change the optical contact point location if possible to avoid the influence of strong interference signal source. 2. Check the cable lines of the optical contact point, if there is shielding net or situation that the RF connector shielding effect is not good. 3. Tightly closed the equipment enclosure to ensure the shielding effect; if possible add shielding cover to the optical contact point and reliable grounding.
After connecting the network, the images of several optical contact points appear one or two horizontal bright traces.	Power supply AC ripple interference because of the bad earth of equipment or power supply.	Check grounding situation of the equipment, make sure that every equipment in the line has been reliably grounding and the grounding resistance < 4Ω.
After connecting the network, the received optical power of the optical contact point is unstable and has large continuous change. The output RF signal is unstable, too. But the detected output optical power of the optical transmitter is normal.	The optical fiber active connector types do not match, maybe the APC type connect to PC type, make the optical signal cannot normal transmission. The optical fiber active connector or adapter may be polluted seriously or the adapter has been damaged.	1. Check the type of optical fiber active connector and adopt the APC type optical fiber active connector to ensure the normal transmission of optical signal. 2. Clean the polluted optical fiber active connector or adapter. Specific operation methods see “Clean and maintenance method of the optical fiber active connector”. 3. Replace the damaged adapter.

11. Clean and maintenance method of the optical fiber active connector

In many times, we misjudge the decline of the optical power or the reduce of optical receiver output level as the equipment faults, but actually it may be caused by the incorrect connection of the optical fiber connector or the optical fiber connector has been polluted by the dust or dirt.

Now introduce some common clean and maintenance methods of the optical fiber active connector.

1. Carefully screw off the optical fiber active connector from the adapter. The optical fiber active connector should not aim at the human body or the naked eyes to avoid accidental injury.
2. Wash carefully with good quality lens wiping paper or medical degrease alcohol cotton. If use the medical degrease alcohol cotton, still need to wait 1~2 minutes after wash, let the connector surface dry in the air.
3. The cleaned optical fiber active connector should be connected to optical power meter to measure output optical power to affirm whether it has been cleaned up.
4. When screw the cleaned optical fiber active connector back to adapter, should notice to make the force appropriate to avoid the ceramic tube in the adapter crack.
5. If the output optical power is not normal after cleaning, should screw off the adapter and clean the other connector. If the optical power still low after cleaning, the adapter may be polluted, clean it. (Note: Be carefully when screw off the adapter to avoid hurting inside fiber.)
6. Use the dedicated compressed air or degrease alcohol cotton bar to clean the adapter. When use the compressed air, the muzzle of the compressed air tank should aims at the ceramic tube of the adapter, clean the ceramic tube with compressed air. When use degrease alcohol cotton bar, carefully insert the alcohol cotton bar into the ceramic tube to clean. The insert direction should be consistent, otherwise can not reach ideal cleaning effect.