

OLP–Optical Line Protection

Device Manual

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Explanation

Our products includes two series: optical protection series (OPS) ,cable monitoring system, OPS series including: optical line protection (OLP) system ,optical bypass protection (OBP) system ,optical cross matrix protection (OCP) system. This manual covers device specification and technical specification of OLP system.

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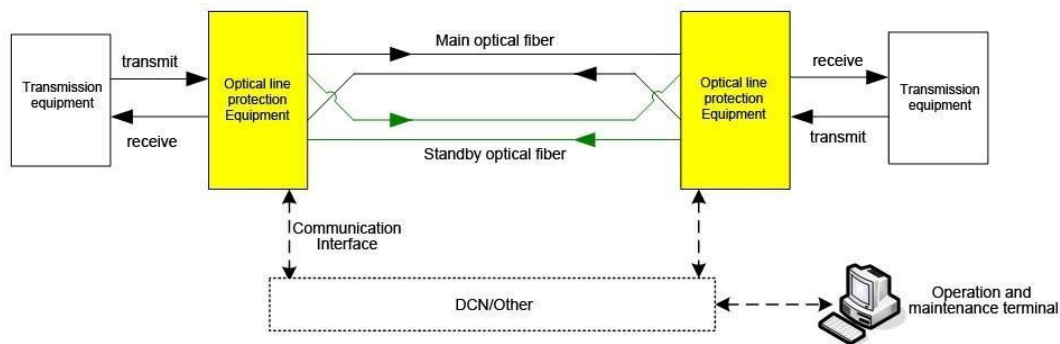
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1. System Introduction

Optical line protection system is combination of OLP–Optical Line Protection and operation maintainance terminal, it can realize optical power monitoring, optical line auto-switching and network management etc. In optical communication network, OLP monitors optical power of optical fiber and standby optical fiber at real time. In case the current optical power of optical fiber is less than pre-set switching threshold value, then alarm is on and it would switch to standby optical fiber automatically to protect optical transmission system line. OLP can provide a protection scheme for all routes and main lines easily with low cost, can protect all networks which needs optical line switching, all these above can make a optical communication network with no-block, high reliability, safety and high anti-disaster strength.

Here is the diagram of optical line protection system:



| ◆ System Performance |
|---|
| Reduce interrupt time of communication and improve maintenance efficiency with quickly recovering communication |
| Remarkably reduce damage to network caused by fiber failure |
| Increase network reliability and improve service quality |
| Harmless switch between working path and secondary path and convenient for line overhaul and cutover |
| Real-time monitoring power level of fiber |
| Support remote control, easy management and maintenance |
| Transparent transmission |

2. Optical Line Protection (OLP) Device

2.2 Technical Specification

| Parameter | H15FOLP-001/D | |
|-----------------------------|---------------|---|
| Working wavelength | nm | 1310±50nm and 1550±50nm |
| Monitoring Power range | dBm | +23~-50 |
| Monitoring power accuracy | dB | ±0.25 |
| Monitoring power resolution | dB | ±0.01 |
| Return loss | dB | ≥45 |
| PDL | dB | ≤0.05 |
| WDL | dB | ≤0.1 |
| Insertion loss | dB | TX<1.2 , RX<1.2 |
| Switching time | ms | <15 |
| Durability(Life) | times | >10 ⁷ |
| Operating temperature | °C | -10~+60°C |
| Storage temperature | °C | -20~+75°C |
| Power supply | V | DC(36-72)V and AC(85-264)V/50~60Hz, dual power supply |
| Power-down Condition | | hold in working path or switch to backup path |
| Optical connectors | | SC/UPC |
| Dimension | | Standard 19' 1U/4U |

2.3 Device Model Explanation

Classification based on device case model as follows:

| | Device Model | | |
|----|---------------|---------------|---------------|
| 1U | H15FOLP-001/D | H15FOLP-002/D | H15FOLP-003/D |

2.4 Device Appearance and Component performance

1U Device Panel

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(1) LCD screen: Display work mode, current channel, power value, wavelength and other related information.

(2) RJ45 Ethernet interface, RS-232 RS: device communication interface for monitoring data;

< RJ45 Ethernet interface >

To connect device and computer through switch, it should use straight-through cable (Wire connecting for both ends is the same as: 1- orange white, 2-orange, 3- green white, 4-blue, 5- blue white, 6- green, 7- Brown white, 8-brown); to connect device and computer directly, it should use cross-over cable (One end: 1-orange white, 2-orange, 3-green white, 4-blue, 5-blue white, 6-green, 7-brown white, 8-brown; the other end: 1-green white, 2-green, 3-orange white, 4-blue, 5-blue white, 6-orange, 7-brown white, 8-brown);

<RS-232 RS >

To connect device and computer, it should use RS crossover cable DB9 of “hole” shape for both ends, that is to say, #2, #3 pin at both ends connect across status, #5 at both ends docking (or connecting), other pins no need connecting.

(3) Indicating light

Power1, Power2: indicate current power status, “light on” means “power on”, “light off” means “power off” .

Run: light to show device running status, normally it flashes 1 time/second.

Auto: indicate current work mode of device, “light on” means “device is under auto mode” ,

“light off” means “device is under manual mode” .

Pri, Sec: indicate current channel of device, Pri light on means device is working under primary route, Sec light on means device is working under standby channel.

R1, R2: indicate current receiving status for device primary & secondary (or standby) route, green light means receiving normally (current receiving power is higher than current channel switching power value), red light means non-normal receiving (current receiving power is lower than current channel switching power value)

Tx: indicate current connecting status of transmitting interface between device and transmission device, green light means received light from transmission device, red light means not-received light from transmissio

device.

LS: indicate current work status of inside-mounted light source, green light means running well, no light means this device has no inside-mounted light source(or inside-mounted laser not workable) ,green light flashes once per 5 seconds means current channel receiving power is less than threshold switching. LS light would be off for 3 seconds for every switching. (Inside mounted source is available for device 1:1 only, which is used for monitoring standby route.)

(4) Enter: Push this button to enter menu(Hold enter/exit menu, press “Enter” to confirm operation and save the result.)

▲▼: Push these 2 buttons to move menu. Esc:
exit from menu.

(5) Optical interface(or connector) explanation: there are 6 optical interfaces on device panel, including Rx(connect with receiving port of transmission device) ,R1(connect with primary receiving port of ODF.) ,R2(connect with standby receiving port of ODF) and Tx(connect with transmitting port of transmission device) ,T1 (connect with primary transmitting port of ODF) ,T2(connect with standby transmitting port of ODF)

(6) DC power interface: + positive pole,-negative pole,GND ground;(can connect another two sets of external DC power)

(7) AC power interface

2.5 Device Operation Instruction

A. Work Mode Setup

The device has two work modes: manual mode & auto mode, manual mode is used for device debugging or enforced switching.



Note: Device can switch from Manual mode to Auto mode automatically, the return time set by manufacturer is 30 minutes. It can be reset through program control interface; the time available for option is 0~999 minutes. 0 minute means from Manual mode to Auto mode must be operated by manual.

After operation completed, must set device under auto mode, otherwise, it might possibly lead to protection-fail.

B. Work channel setup

R1 means the primary work channel (Pri), R2 means standby/secondary work channel (Sec)

While under auto mode status, device would select work channel automatically according to line status.

- 1) Only one route can be used: work in relevant channel of usable route.
Both routes available to use: work in relevant channel of well route(If work in standby channel, device would return to primary channel in 10 minutes,

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the premise is: device has started “switching back” function. While changing optical channel through panel or program interface, device would switch to Manu mode.



When device cut over to optical network, to set OLP device under Manual mode in one side, then select relevant work channel.

C. Wavelength setup

The device has 2 wavelength for option: 1310nm, 1550nm, customer might select relevant wavelength according to actual requirement.

D. Threshold-switching power value set-up

The initial threshold-switching power value of device is -30dBm, customer can reset according to device type and active loss status.

Principle: Threshold-switching power value should be a little higher than min. receiving power value of optical transmission device, tolerance value is 0.5~1dB. (Min. receiving power value is subject to the one which can guarantee the whole system in normal transmission.)

Refer to 1:1 protection, as 1:1 OLP monitors standby path by inside-mounted light source, it should consider whether the inside-mounted light power value received (from the device on the other side) is within the threshold-switching power value range or not.

E. g. :

Supposed optical transmission device transmission power is +15dBm, inside-mounted light source of OLP device is -2dBm, primary line loss (including OLP, jumping fiber, connector loss) is 25dB, the standby line loss (including OLP, jumping fiber, connector loss) is 27dB, the min. receiving power value of optic transmission device is -28dBm;

Receiving signal power of primary line on this end is -10dBm, monitoring optical power received by standby line is -29dBm;

Monitoring optical power of primary line on this end is -27dBm, signal power received by standby line is -12dBm;

If set threshold switching power of primary & standby route as -27dBm, system is working at primary route, in this case, system would not switch to standby route while primary route is broken, because monitoring optical power received by standby route is less than threshold switching power, system takes the standby route is under fault status.

In this situation, the way to set threshold switching power is: $-45\text{dBm} < \text{threshold switching power} < (\text{standby route monitoring optical power} - 6\text{dBm})$

E. Switching-back setup

“Switching back” definition: Under auto mode, device switch from standby route to primary route status. It can set as “auto switching back” or “non-auto switching back”. Under “non-auto switching back” status, even if meet switching back requirements (Primary & standby route are work well), auto switching is not available from standby to primary route.

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F. “Switching back” delay setup

When device is under “auto switching back” , optical route is under standby status, and working under auto mode, device would do real time optical detection for primary & standby route. If optical power detected for primary & standby route in M time period (0-999 minutes) is normal, device would switch back automatically to primary route status. M=0 minute means non-switching back.

Switching back delay can be set through program control interface. Switching back delay pre-set by manufacturer is 10 minutes.

2.6 Program Control Order

This device receives control signal from computer through RS-232 interface to realize auto measure or real time monitoring and control (By using RS monitoring system or RS software), or to realize long distance monitoring by optical protection monitoring system(network management software) through Ethernet interface.

Program and Control Order

- (1) This device executes only 1 order every time. Usually input another order after program returns to relevant value.
- (2) Please use block letter.
- (3) In operation process, input “<” as start symbol, “>” as ending symbol.

| Order | Description | Example |
|----------|--|--|
| <AZ_A_?> | Check current power and wavelength for every port 1. Successful return format: <AZ_R1 wavelength and power_R2 wavelength and power> or <AZ_R1 wavelength and power _R2 wavelength and power _TX wavelength and power> | <A1_1-15.00_1-20.00> means R1 wavelength is 1550nm, power is -15.00dBm , R2 wavelength is 1550nm, power is -20.00dBm or <A1_0-15.00_0-20.00_0+15.00> means R1 wavelength is 1310nm, power is -15.00dBm ; R2 wavelength is 1310nm, power is -20.00dBm ; TX wavelength is 1310nm, power is +15.00dBm. |
| <AZ_B_?> | Check switch power, work mode and channel: 1. Successful return format: <AZ_R1 switching power_R2 switching power _work mode_ current channel> Work mode: 1 means auto mode, 2 means manual mode; Current channel: 1 means R1 channel, 2 means R2 channel. | <A1_-30.00_-30.00_1_2> Means R1 switching power is -30.00dBm, R2 switching power is -30.00dBm, auto mode, current channel: R2 channel. |
| <AZ_C_?> | Check delay time 1. Successful return format: <AZ _ switching back delay (minute) _ switching delay(second) _ from manual mode to auto mode delay (minute) > | <AZ_010_000_030> means sub-module A (or rack-mount 1U) switching back time is 10 minutes(000 means non-switching back), when switching back delay time is 0, from manual mode to auto mode needs 30 minutes. (000 means no return) |

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| | | |
|------------------|--|---|
| <AZ_D_?> | <p>Check device info.</p> <p>1. Successful return format: <AZ_ device case type, protection way, with TX monitoring or not, push-key usage limit> device case type:1 means 1U, 4 means 4U;protection way: 1 means 1+1, 2 means 1-1, 3 means 1:1, 4 means 1:1A, 5 means 1:1B main device , 6 means 1:1B sec device, 7 means S1310, 8 means S1550; with TX monitoring or not:0 means without TX monitoring, 1 means with TX monitoring; push-key usage limit:0 means prohibit, 1 means permit.</p> | <p><A1_1_5_0_1> means device case of sub-module A (or rack-mount 1U)is 1U,protection way is 1:1B device(optical module communication), without TX monitoring, push-key can be used.</p> |
| <AZ_RX_W_Y> | <p>R1,R2 wavelength setup.</p> <p>1. X is 1,2 means R1, R2 channel. 2 . Y is 0,1 means 1310nm , 1550nm; 3. Return Successfully: <AZ_RX_W_OK> 4. Fail to return: <AZ_RX_W_ER></p> | <p><A1_R1_W_0> means R1 wavelength of sub-module A device is 1310nm. Return Successfully: <A1_R1_W_OK></p> |
| <AZ_TX_W_Y> | <p>TX wavelength setup.</p> <p>1. Y is 0, 1 means 1310, 1550; 2. Return successfully: <AZ_TX_W_OK> 3. Fail to return: <AZ_TX_W_ER></p> | <p><A1_TX_W_0> means TX wavelength of sub-module A device is 1310nm. Return successfully: <AZ_TX_W_OK></p> |
| <AZ_M_X> | <p>Manual/auto mode setup</p> <p>1. X is 1,0 means auto, manual; 2 . Return successfully: <AZ_M_OK> 2. Fail to return: <AZ_M_ER></p> | <p><A1_M_1> means sub-module A device is under auto mode. Return successfully: <A1_M_OK></p> |
| <AZ_S_X> | <p>Channel switch setup</p> <p>1. X is 1,2 means R1,R2 channel; 2 . Return successfully: <AZ_S_OK> 3. Fail to return: <AZ_S_ER></p> | <p><A1_S_1> means sub-module A device switching to R1 channel. Return successfully: <AZ_S_OK></p> |
| <AZ_RX_P_XXX.XX> | <p>Switch power setup.</p> <p>1. X is 1,2 means R1, R2 channel 2. XXX.XX means setup value; e.g. : -35.00 means setup switching power is -35dBm 3. Return successfully: <AZ_RX_P_OK> 4. Fail to return: <AZ_RX_P_ER></p> | <p><A1_R1_P_-30.00> means: switch power of R1 channel is -30.00dBm Return successfully: <A1_R1_P_OK></p> |
| <AZ_KEY_X> | <p>Push-key usage limit</p> <p>1. X is 0,1 means prohibit, permit; 2. Return successfully: <AZ_KEY_OK></p> | <p><A1_KEY_0> means prohibit to use push keys of sub-module A (or rack-mount 1U) device</p> |
| <AZ_RESET> | Switch reset | <A1_RESET> means sub-module A |

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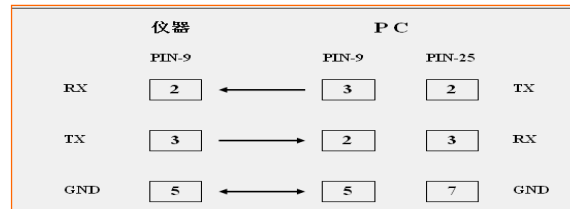
| | | |
|------------|--|--|
| | 1. Return successfully: <AZ_RESET_OK> | (or rack-mount 1U) device resets. |
| <AZ_Q_XXX> | Auto-switching delay 1. XXX means delay time, unit: minute 2. Return successfully: <AZ_Q_OK> 3. Fail to return: <AZ_Q_ER> | <A1_Q_010> means switching-back delay is 10 minutes for sub-module A (or rack-mount 1U) device <A1_Q_000> means no switching-back. |
| <AZ_R_XXX> | Delay from manual mode to auto mode: 1. XXX means delay time, unit: minute 2. Return successfully: <AZ_R_OK> 3. Fail to return:<AZ_R_ER> | <A1_R_030> means sub-module A (or rack-mount 1U) device from manual mode to auto mode needs 30 minutes; <A1_R_000> means no return. |
| <AZ_OFF> | Click to turn off buzzer. | |

Note!

- (1) The first letter “A” in order means the first module no on the left of 4u device case(other modules are B, C, D, E, F, G, H), 1U device case has A only.
- (2) The value of second letter “Z” in order is 1, the value of protection way is 1.
- (3) “_” means underscore.
- (4) Return data takes “<” as start symbol and “>” as ending symbol .

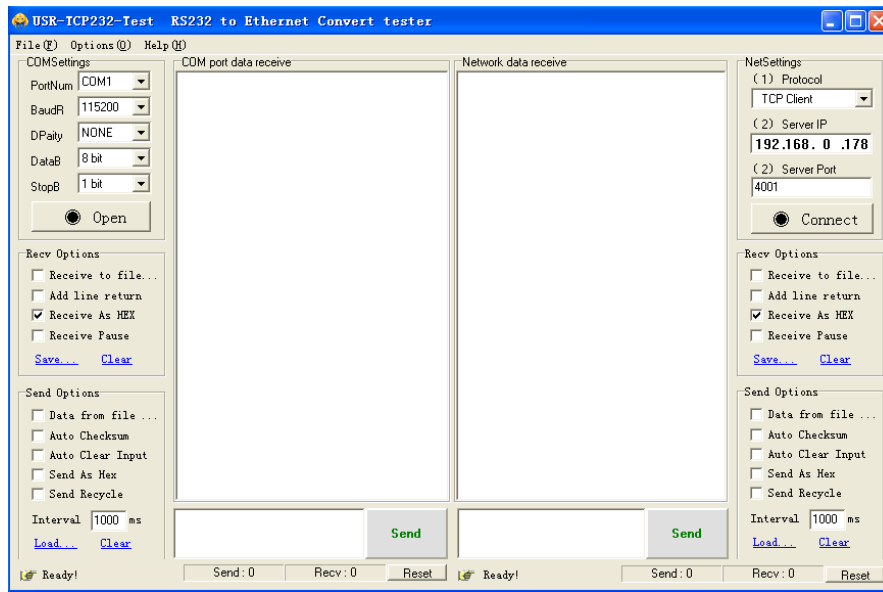
2.7 Serial Port Debugging

Serial port connect way and serial port control



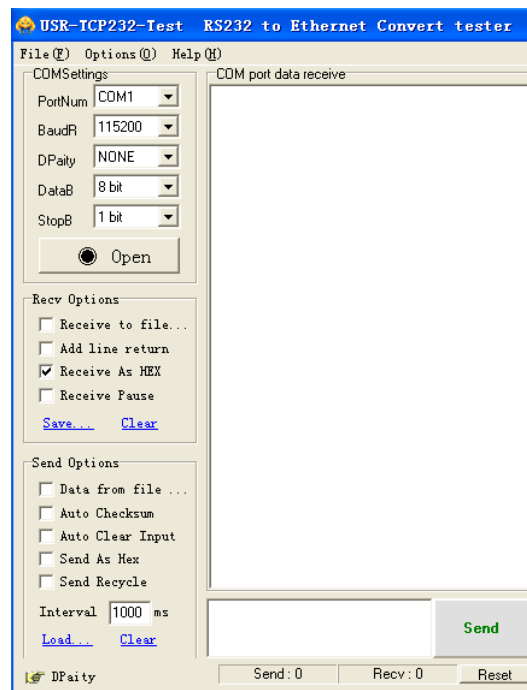
RS-232 serial port connecting diagram

(1) The software for debugging RS and Ethernet Port is USR-TCP232-Test, and it can be downloaded at <http://www.usr.cn/Download/27.html>. The following shows the interface of USR-TCP232-Test, the left of interface can debug the RS Port and the right one can debug Ethernet Port.



(2) The Serial Port setting is 115200 Baud rate, 8 data bits, 1 stop bit, and non-parity checking. The Serial Port number often sets as COM1. (it also can be set as your computer actual RS number.)

(3) After RS connecting well between device and upper computer, send control order by USR-TCP232-Test, device would return related data to monitor the related status of device.



2.8 Ethernet Interface Configuration Explanation

Important!!! The Ethernet port is settled when the device is selling. User only needs to revise the IP Address when using.

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When use RJ45 Ethernet interface to monitor device, should make sure the IP address of upper computer and device are in the same network section. For example, the IP address of computer before revised: 192.168.2.45, subnet mask 255.255.255.0, and default gateway: 192.168.2.1. Then the IP, subnet mask and default gateway of device should be revised to similar one as follows: 192.168.2.11 、 255.255.255.0 、 192.168.2.1, please see details as follows:

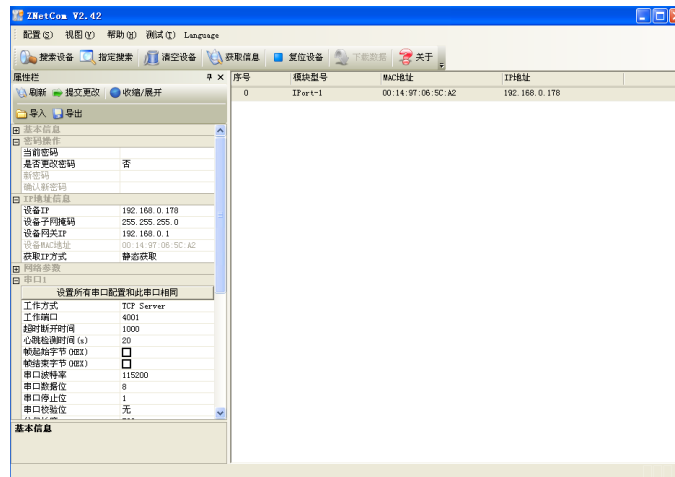
(1) Setup IP address through the ZNETCOM software

ZNetCom is a kind of network port configuration software, and it can operate at Windows. No matter what is the current IP, it is available to get current IP of device, and make configuration. From the below linkage can download the latest ZNetCom software.

http://www.embedcontrol.com/products/Ethernet_tools/ethernetsoft.asp

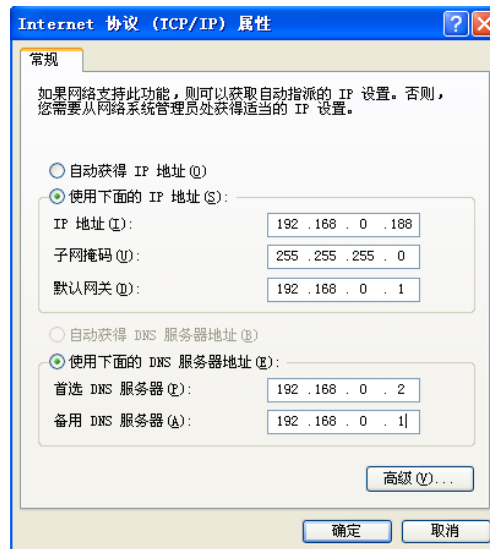
Procedure to set device IP by using ZnetCom is as follows:

Click  to run the ZNetCom software, confirm computer and device connecting, then click “searching” in software, if the above setting is correct, the IP address would display on ZNetCom software.



(2) Set computer IP address

To revise computer IP to 192.168.0.188, subnet mask to 255.255.255.0, default gateway to 192.168.0.1, and DNS might be left blank. Because the device IP address set by us is 192.168.0.178 , subnet mask is 255.255.255.0, default gateway is 192.168.0.1. Computer only can visit or operate device after setting the same network section as device. Details as below:



(3) Device configuration on WEB page

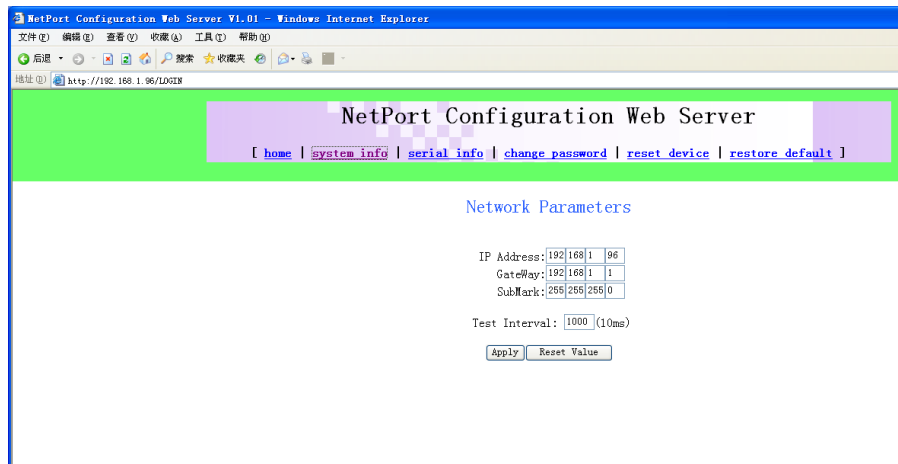
① Login in configuration system

Firstly open internet explorer, then input initial IP address of device in address column (such as <http://192.168.0.178>), click “enter” button after input. If network line connect in right way, it would display as in below website page, then input password in 【Password】 column (Initial password set by manufacturer is “88888”), click “Login” to enter “setup” interface.



② Revise device IP address

Click “system info” to open system parameter setup page, then input IP address at “IP: ” (e.g. 192.168.2.11), subnet mask (e.g. 255.255.255.0) at “Sub Mark: ”, gateway (e.g. 192.168.2.1) at “Gateway: ”. It is no necessary to revise other parameters. Click “Apply” to save revised IP. Then click “reset device” to restart device make revised parameters be effective, as below shows:



(4) Revise computer IP address again

After the revise of device IP, do not forget to change the upper computer's IP, subnet mask and gateway with the new IP in the same network section. Then the device and computer can connect well.

2.9 Note, Device Maintenance and Fault Solution

Note

- (1) Prior to use this device, must connect all ports as in connecting explanation.
- (2) Power supply must connect ground wire, and make sure the voltage meets the requirement of device.
- (3) In case device gets abnormal because of abrupt jamming, please power off the device, then take the necessary measure.
- (4) Must connect input port correctly, make accurate locating, otherwise it can't guarantee the accuracy of measured result and insertion loss.

Device Maintenance

Run and keep the device in right way might keep good performance of device, and extend its lifetime, please see as follows:

- (1) To avoid strong vibration, collision, and other damages. For shipment, must use good quality package with anti-vibration and water-proof.
- (2) Must keep the device clean, working environment must without corrosion substances like acid, alkali etc. Use towel to clean the case and panel with water and soap. Alcohol is prohibited.
- (3) Must cover dust proof guard once disassembly optical fiber, to avoid hard substance, dust or other dirty substance touch with the end surface of optical fiber.

General Fault Solution

| Fault | Analysis | Solution |
|--------------------------|----------------------|---|
| No display when power on | Power no connecting | Power on after connecting well |
| Optical power | Optical coupling not | Clear Fiber end, then connect and fix it. |

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| | | |
|----------------------------|-------------------------------------|---|
| error is too large | well | Check Fiber end and make sure it is well. |
| Insertion loss is too much | Fiber end is dirty or worn | Clear Fiber end, then connect and fix it. Check Fiber end and make sure it is well. |
| Computer order invalid | Cable and serial line no connecting | Power off computer firstly, check cable and serial line, then power on computer. |

2.10 Connecting Diagram in Project

