

**EDFA-17-220SA04G**

**SNMP NMS  
Erbium-Doped Fiber Amplifier**

**User Manual**

**CE**

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## ***Notice:***

Please carefully read the User Manual before operating the product. The information contained in this manual is subject to change without notice. The EDFA (Erbium-doped fiber amplifier) described here can be used with other transmitting and receiving equipment in optical communications systems. Please strictly follow the instructions in this manual, otherwise any improper operations may unintentionally damage the product or even cause the personnel injury.

EDFA is a member of Class 3B laser products. Before operating the product, the individuals must be familiar with the safety symbols on the EDFA panel and their meanings, strictly follow the instructions in chapter 8 '**Laser Safety Considerations**', and avoid direct laser radiation without proper safety protection.

## ***Cautions:***

Only trained and qualified personnel should be allowed to install, maintain, or trouble-shoot the device.

Please replace the fuse with the same type, model, and trademark to avoid the fire hazards. User manual in local official languages will be provided when the product is sold to other countries where official languages are other than English.

## ***Warranty:***

The EDFA is warranted against defects in material and workmanship for a period of one year from date of shipment. During the warranty period, DKT will, at its option, either repair or replace products that prove to be defective.

The warranty does not apply to defects resulting from improper or inadequate maintenance by users, or improper operation exceeding the environmental requirements for the products, or improper site preparation or maintenance.

For warranty service or repair, this product must be returned to a service facility designated by DKT. Buyer shall pay all shipping charges, duties, and taxes for products returned to DKT.

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## 1. Introduction

An Erbium-doped fiber amplifier (EDFA) is shown in Figure 1-1. It consists of erbium-doped optical fiber, optical couplers, isolators, GFF and pump lasers etc.. An incoming optical signal (within the wavelength range of 1530nm to 1565nm) is amplified with pump lasers while traveling through a certain length of erbium-doped fiber. The amplified signal is finally coupled into four output fibers by the output connector for further transmission. The tap-couplers and detectors at input and output allow real-time monitoring of EDFA's input and output power.

The EDFA is polarization, modulation and frequency independent. All the components used in the product are built to meet Telcordia GR-1221, GR-1209 and GR-468 standards, which makes the EDFA highly reliable.

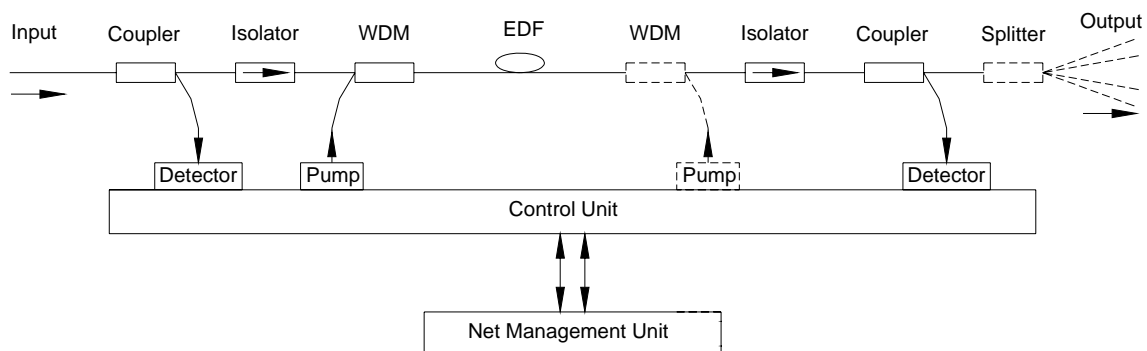


Figure 1-1 Block Diagram

## 2. Features

- Low noise figure and wide operating wavelength range over 1530nm to 1565nm
- Excellent gain and output power stability and reliability over environmental temperature of 0~50°C
- Polarization, modulation and frequency independent
- Low power consumption
- Real-time monitor and safety alarm of operating conditions
- Complies with SNMP (Simple Network Management Protocol)

### 3. Applications

- Optic fiber communications networks
- CATV networks
- Computer information networks
- Fiber-optic sensor systems
- Instrumentation and equipment

### 4. Technical Specifications

| Parameters                               | Unit            | Min  | Typ   | Max  | Note   |
|--|-----------------|--|-------|------|--|
| Optical Specifications                   |                 |  |       |      |  |
| Optical input power                      | dBm             | 0  |       | 10   | total  |
|  |                 | 4  |       |      |  |
| Optical output power at each output port | dBm             | 16.8   | 17    | 17.2 | total  |
| Wavelength                               | nm              | 1530   | 1550  | 1564 |  |
| Noise figure                             | dB              |  |       | 5.0  | Pin=0dBm   |
| Gain flatness                            | dB              |  |       | 1.2  | Based on 0dBm input power, 20°C environment temperature. |
| PDG                                      | dB              |  |       | 0.3  |  |
| Pump leakage at input                    | dBm             |  |       | -30  |  |
| Pump leakage at output                   | dBm             |  |       | -30  |  |
| Input Return Loss                        | dB              | 45   |       |      |  |
| Output Return Loss                       | dB              | 45   |       |      |  |
| Fiber connector                          |                 | SC/APC   |       |      |  |
| Electrical Specifications                |                 |  |       |      |  |
| Voltage supply                           | VAC             | 100  | 230   | 240  |  |
| Power consumption                        | W               |  |       | 30   |  |
| Frequency                                | Hz              |  | 50/60 |      |  |
| Environmental Requirements               |                 |  |       |      |  |
| Operating temperature                    | °C              | 0  |       | 50   |  |
| Storage temperature                      | °C              | -25  |       | 70   |  |
| Operating relative humidity              | %               | 5  |       | 95   | (non-condensation)                                       |
| Others                                   |                 |  |       |      |  |
| User Interface                           |                 | Front panel LCD display work parameter           |       |      |  |
|  |                 | Front panel LED display working status and alarm |       |      |  |
| Network management Interface             |                 | RJ45 RS232                                       |       |      |  |
| Dimension                                | mm <sup>3</sup> | 483×252×43.6                                     |       |      |  |

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## 5. Products Acceptance Check

### 5.1 Check the Accessories

Please check the accessories against the accessories list enclosed in the package.

### 5.2 Check appearance and performance

| Items       | Inspection Contents  | Possible Defect  |
|-------------|--|--|
| Crust       | <ul style="list-style-type: none"><li>●Mechanism damage</li><li>●Slight deformation</li></ul>  | <ul style="list-style-type: none"><li>●Scratches on the surface</li><li>●Crust partial cupped</li><li>●Facial coating partial peel off</li></ul>   |
| Panel       | <ul style="list-style-type: none"><li>●Switch</li><li>●Power outlet</li><li>●Fiber adapter</li><li>●Indicator light</li><li>●Brand</li></ul> | <ul style="list-style-type: none"><li>●Switch not responsive indicators</li><li>●Outlet damaged</li><li>●Protective cover break off or damaged</li><li>● Indicators not properly positioned</li><li>●Brand damaged</li></ul> |
| Surface     | Coating  | Coating not even or peel off   |
| Accessories | Refer to “Accessory List”  | <ul style="list-style-type: none"><li>●Incomplete or damaged accessories</li><li>●Insufficient test data sheet</li><li>●Product not conforming to product serial number</li></ul>  |

### 5.3 Sanity Check

#### 5.3.1 Checking Power Supply

Before connecting power cable, make sure that

- The voltage of the power supply is within specified range
- The key is turned to OFF position
- The input power is within the range specified in chapter 4 ‘Technical Specifications’

Once Switching on the power supply, the buzzer beeps and the LCD display should be working, the status indicator should be in green and the indicator of pump laser should remain dark, otherwise the EDFA is not working properly. Switch the lock from ‘OFF’ to ‘ON’, the indicator of pump laser should be in green and the LCD displays data, otherwise the EDFA is not working properly and the buzzer beeps.

#### 5.3.2 Optical Output Power

Get the output power read of each port from the LCD display or optical power-meter through fiber adapters. Comparing it with the data on the test report , the difference should be less than  $\pm 0.5\text{dB}$ .

#### 5.3.3 Optical Output Stability

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Get the output power read out from the LCD display or power-meter through fiber adapter and under the condition of stable input power, the change of output power during a short period should be less than 0.1dB.

## 6. Monitoring Functionality

### 6.1 LCD Interface

#### 6.1.1 Boot Display

Fig. 6-1.1 is displayed for around 1s, next fig. 6-1.2 around 2s.

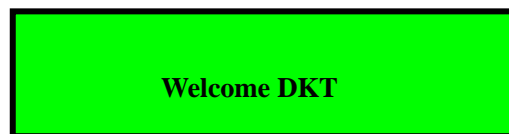


Fig. 6-1.1 Company name display

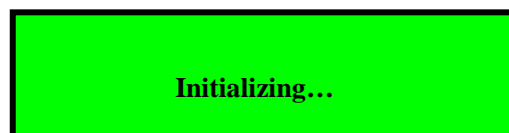


Fig. 6-1.2 System initializing display

#### 6.1.2 Parameter Search

6.1.2.1 Fig. 6-2.1 shows output optical power value of current equipment with unit dBm.

- Shows output power value, see fig. (a)
- Shows no output power, see fig. (b)

6.1.2.2 Fig. 6-2.2 shows input optical power value of current equipment with unit dBm.

- Shows input power value, see fig. (a)
- Shows no input power, see fig. (b)

6.1.2.3 Fig. 6-2.3 shows pump temperature of current equipment with unit °C.

- Shows pump #1 temperature of double-pump EDFA, see fig. (a)
- Shows pump #2 temperature of double-pump EDFA, see fig. (b)

6.1.2.4 Fig. 6-2.4 shows pump bias current value of current equipment with unit mA.

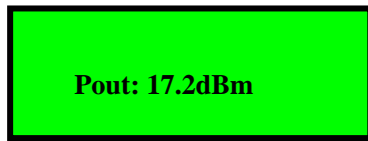
- Shows pump #1 bias current value of double-pump EDFA, see fig. (a)
- Shows pump #2 bias current value of double-pump EDFA, see fig. (b)

6.1.2.5 Fig. 6-2.5 shows pump cooler current value of current equipment with unit mA.

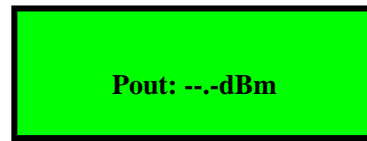
- Shows pump #1 cooler current value of double-pump EDFA, see fig. (a)

- 
- Shows pump #2 cooler current value of double-pump EDFA, see fig. (b)
- 6.1.2.6 Fig. 6-2.6 shows the temperature of current equipment with unit °C.
- 6.1.2.7 Fig. 6-2.7 shows the unit power consumption of current equipment with unit W.
- 6.1.2.8 Fig. 6-2.8 shows the model of current equipment.
- 6.1.2.9 Fig. 6-2.9 shows the serial number of current equipment with 10 figure.
- 6.1.2.10 Fig. 6-2.10 shows the version number of both firmware and hardware of current equipment.
- 6.1.2.11 Fig. 6-2.11 shows the current state of NIC/ network connection
- No NIC or power supply fault of the NIC of the equipment, see fig. (a)
  - NIC is linking with the network, see fig. (b)
  - DHCP service applying the IP address fail, see fig.(c)
  - The Conflict of setting IP address and the IP address of other network equipments, see fig.(d)
  - Network communications abnormality (gateway not found /UTP not connected), see fig.(e)
  - NIC work abnormality, see fig.(f)
  - Network Communications work well, see fig.(g)
- 6.1.2.12 Fig. 6-2.12 shows whether the service function of current DHCP has started up.
- 6.1.2.13 Fig. 6-2.13 shows the local IP address of current setting . When using DHCP service, the equipment will get the local IP address from the DHCP server.
- 6.1.2.14 Fig. 6-2.14 shows the server IP address of current setting.
- 6.1.2.15 Fig. 6-2.15 shows the gateway IP address of current setting. When using DHCP service, the equipment will get the gateway IP address from the DHCP server.
- 6.1.2.16 Fig.6-2.16 shows the subnet mask of the current setting. When using DHCP service, the equipment will get the subnet mask from the DHCP server.



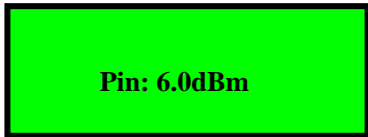


(a)



(b)

Fig. 6-2.1 Output optical power display



(a)

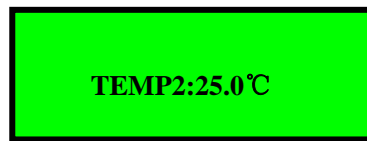


(b)

Fig. 6-2.2 Input optical power display

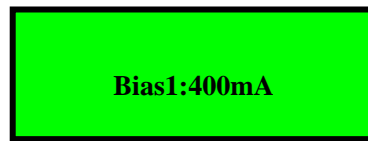


(a)

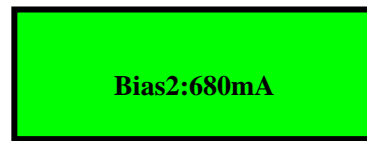


(b)

Fig. 6-2.3 Pump temperature display

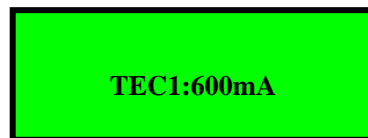


(a)

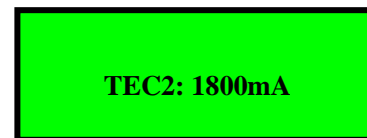


(b)

Fig. 6-2.4 Pump bias current display



(a)



(b)

Fig. 6-2.5 Pump cooler current display

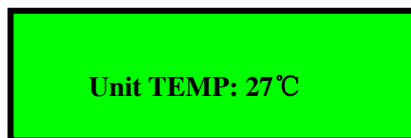


Fig. 6-2.6 Unit temperature display

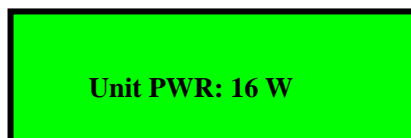


Fig. 6-2.7 Unit power consumption display



Fig. 6-2.8 Product model display

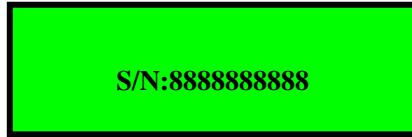


Fig. 6-2.9 Product serial number display

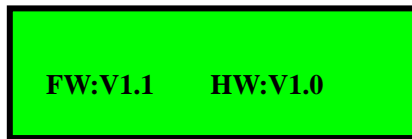
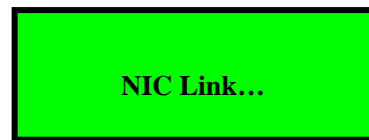


Fig. 6-2.10 Version number of firmware and hardware



(a)



(b)



(c)



(d)



(e)



(f)

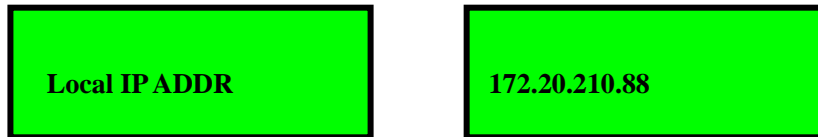


(g)

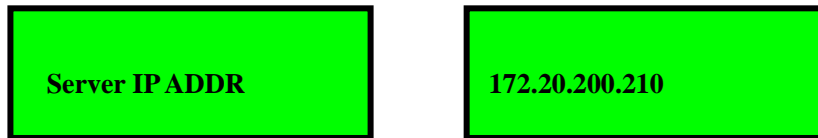
Fig. 6-2.11 Network state display



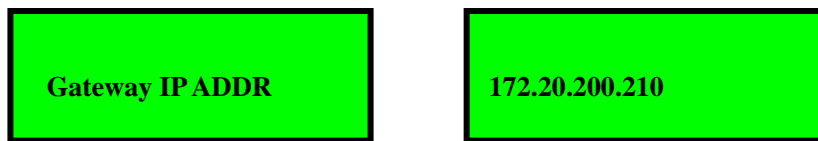
Fig. 6-2.12 DHCP service state display



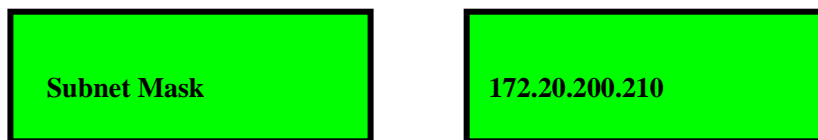
(a) (b)  
Fig. 6-2.13 Local IP address display



(a) (b)  
Fig. 6-2.14 Server IP ADDR display



(a) (b)  
Fig. 6-2.15 Gateway IP ADDR display



(a) (b)  
Fig. 6-2.16 Subnet mask display

### 6.1.3 Alarm Display Interface

Note: Buzzer in the unit will warn when below information appears on LCD, press any key to cancel.

6.1.3.1 Fig. 6-3.1 shows alarm of input optical power alarm;

(a)no input, (b) low, (c) high

6.1.3.2 Fig. 6-3.2 shows alarm of output optical power alarm;

(a)low, (b)high

6.1.3.3 Fig. 6-3.3 shows alarm of pump temperature alarm;

(a)too low, (b)too high, (c)low, (d)high

6.1.3.4 Fig. 6-3.4 shows alarm of pump bias current alarm;

(a)too high, (b)high

6.1.3.5 Fig. 6-3.5 shows alarm of pump cooler current;

(a)too high, (b)high



(a)



(b)



(c)



(d)

Fig. 6-3.1 Alarm of input optical power display



(a)



(b)

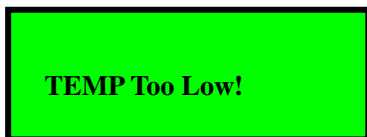


(c)



(d)

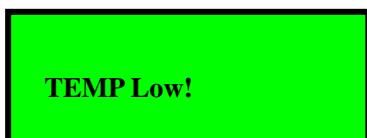
Fig. 6-3.2 Alarm of output optical power display



(a)



(b)



(c)

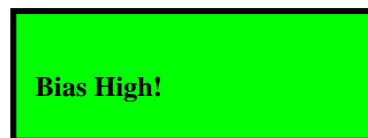


(d)

Fig. 6-3.3 Alarm of pump temperature display

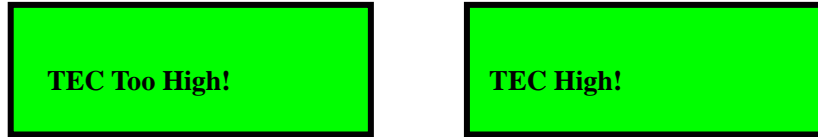


(a)



(b)

Fig. 6-3.4 Alarm of pump bias current display



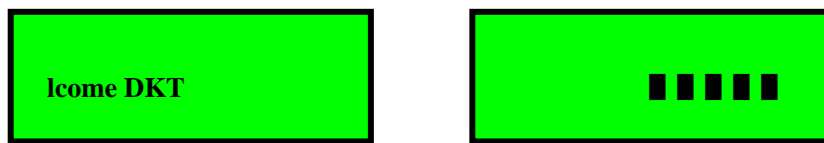
(a)

(b)

Fig. 6-3.5 Alarm of pump cooler current display

#### 6.1.4 Screen Saver Interface

The screen saver is made up of two parts, one of which is “Welcome DKT” (see fig 6-4.1(a)) that move from left to right, another is “■” that increase gradually from left to right(see fig 6-4.1(b)). These two parts of figures circulate again and again.



(a)

(b)

Fig. 6-4.1 Screen saver display

## 6.2 Key Press Operation

In the front panel of the unit, there are two keys ('UP' and 'DOWN' ), which is used to turn over the page for LCD menu display.

The menu turns forward for one page if pressing 'DOWN' while the menu turns backward for one page if pressing 'UP'.

Keep pressing 'DOWN' or 'UP', the menu will keep turning forward or backward with a speed of about two pages per second.

When the menu turns to the first page (Pout parameter display), it won't turn backward if pressing 'UP'.

When the menu is in the last page (submask parameter display), it will turn to the first page (pout parameter display) if pressing 'DOWN'.

Pressing 'UP' and 'DOWN' for 5S at the same time, the systems will renew the parameter to factory setting and LCD will display 'Restore set.... '.

Press 'UP' when switching on the equipment, and the NMS main control program will turn to upgrading mode. At this mode the NMS main control program can be upgrade.

Pressing 'DOWN' when switching on the equipment, and the NMS communication program will turn to upgrading mode. At this mode the NMS communication program can

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be upgrade.

The buzzer will alarm when there is an alarm occurred. At this time pressing 'UP' or 'DOWN', the buzzer will be closed.

### 6.2.3 Pump Switch

The indicator light will go out when the key turn to the turn off position. The system will switch to screen saver interface automatically if there is no other alarm of the current system.

When the key turn to the turn on position, the pump will open and the indicator light of the pump is lightened in the following conditions.

- There is no firmware protection for the pump.
- There is no "No Input" alarm of the optical input power.

## 6.3 Parameter Checking

### 6.3.1 Checkable Parameters

| <b>Parameter</b>              | <b>Display for short</b> | <b>Unit</b> |
|-------------------------------|--------------------------|-------------|
| Optical Output Power          | Pout                     | dBm         |
| Optical Input Power           | Pin                      | dBm         |
| Pump Temperature              | TEMP                     | mA          |
| Pump Bias Current             | Bias                     | mA          |
| pump cooler current           | TEC                      | mA          |
| Unit Temperature              | Unit TEMP                | °C          |
| Unit Power Consumption        | Unit PWR                 | W           |
| Equipment Model               | Model                    |             |
| Serial Number                 | S/N                      |             |
| Version Number of<br>Firmware | FW                       |             |
| Version Number of<br>Hardware | HW                       |             |
| DHCP Service                  | DHCP Server              |             |

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Network State: Communications state of NIC and network

Local IP Address: IPv4 Standard

Server IP Address: IPv4 Standard

Gateway IP Address: IPv4 Standard

Subnet Mask: IPv4 Standard

### 6.3.2 Parameter Display and Instructions

For the detail, please see the 6.1.2 Parameter Checking Interface.

### 6.3.3 Network State Indication

6.3.3.1 The meanings of network state indication is as following:

- No NIC or NIC power supply fault of the equipment, see fig. 6-2.11(a)
- NIC is linking with the network, see fig. 6-2.11 (b)
- DHCP service applying the IP address fail, see fig. 6-2.11 (c)
- The conflict of setting IP address and the IP address of other network equipments, see fig. 6-2.11 (d)
- Network communications abnormality (gateway not found /UTP not connected), see fig. 6-2.11 (e)
- NIC work abnormality, see fig. 6-2.11 (f)
- Network Communications work well, see fig. 6-2.11 (g)

6.3.3.2 The methods of trouble shooting

(a)

- Checking whether there is an installed NIC or not.
- Checking the situation of NIC communications line/ power supply line.

(b)

- Applying the DHCP service (0~2 minutes) .
- Checking whether there is a conflict of IP (0~6 sec.) .
- Inquiring the state of server (0~6 sec.).

(c)

- Install DHCP server or cancel DHCP service function setting static IP address
- Keep waiting DHCP application or restart the equipment to apply again.

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(d)

- Use other IP address that hasn't been used before.
- Use DHCP service function to get IP address automatically.

(e)

- Insert the network line properly/change network line.
- Check whether the system software of network administration in the server end work properly or not.
- Try to restart the equipment.

(f)

- Try to restart the equipment.

**Notice: If you still can't get rid of the trouble by the above methods, please contact with the manufacturer directly.**

## 6.4 Alarm Mode

### 6.4.1 EDFA Parameter Alarm and Alarm type

The parameter of alarm: Optical Input Power, Optical Output Power, Pump Temperature, Pump Bias Current, Pump Refrigeration Current.

Alarm type: Too Low、Low、High、Too High、No Input、No Output

### 6.4.2 Conditions of alarm occurred

The equipment starts alarming when the current collected parameter match the pre-setting alarm scope.

e.g. The optical input power low alarm is set to -6.0dBm. The alarm occurred when the collected optical input power is smaller than -6.0dBm.

### 6.4.3 The Condition of Alarm Restoration

When the collected parameter is divorced from the alarm scope, and the divorce exceeds the pre-setting alarm sluggish value, the alarm restores (except the pump protecting alarm).

e.g. The too low alarm of setting optical input power is -10dBm and the alarm sluggish value is 0.5dB. When the optical input power is no larger than -10dBm, the system starts alarming automatically. The alarm will release when then optical input power is larger than



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-9.5dBm after the alarm.

#### 6.4.4 Alarm Display

6.4.4.1 The alarm display interfaced have been introduced in Chapter 6.1.3.

#### 6.4.4.2 Alarm Display/Operating

- When the alarm occurs, LCD displays current alarm content automatically. (e.g. No Input) Meanwhile if there is more than one alarms occur, the alarm content displays with a alarm /5s speed roll screen automatically.
- When UP or DOWN is pressed, the buzzer will stop alarming, and the LCD will shift to parameter state. If no key action is done within 10 seconds and the alarming state is not restored, the LCD will automatically shift to alarming state.

#### 6.4.5 Pump Protecting Function

In order to avoiding the damage of pump, when the following alarms occur, the system closes the pump automatically, forbids opening the pump again before shutting off the power supply, and keep the alarm, which arose the pump protecting, displaying with alarm mode (the alarm won't disappear even when the parameter renews to normal).

- Pump temperature is too high
- Pump temperature is too low
- Pump bias current is too high
- Pump refrigeration current is too high

### 6.5 Monitoring the Equipment through RJ45 Port

Key Words:

- IP Address: The network identification number. The exclusive must be ensured, or else will lead to network disorder.
- Server IP Address: The IP address of the server.
- Local IP Address: The IP address of the equipment itself.
- Gateway IP Address: When communications with non-local network equipment, gateway conversion is needed.
- Subnet Mask: Estimate whether the IP address of objective end is in the same network segment with local IP address. If the result of ((Local IP ⊙ objective

---

IP) ⊕ subnet mask) is the same with subnet mask, they are in the same network segment. The two IP are not in the same network segment if they are not the same and gateway conversion is needed.

- DHCP Service: The service of getting local IP, gateway IP and subnet mask automatically.

### 6.5.1 Serial Port Setting

#### 6.5.1.1 IP Address Setting Roles

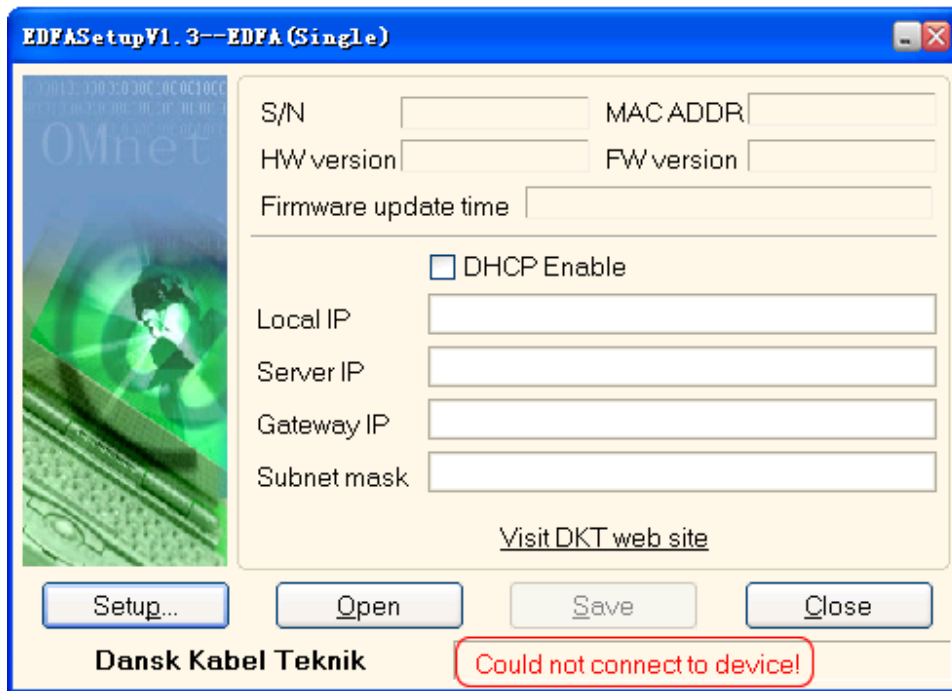
- When there is DHCP server in the network, recommend using DHCP service function in order to get local IP, gateway IP and subnet mask automatically.
- When not using DHCP server, setting the local IP, gateway IP and subnet mask by hand is needed. The exclusive of local IP must be ensured, or else the device with the same IP can't work properly. Only Setting the subnet mask correctly can make sure the device distinguish the network segment correctly. When the server and device are in the different network segment, only the correct setting of gateway IP can make sure the device communications properly.

**Notice: The incorrect setting IP address may lead to the communications error of other connected network devices. The incorrect gateway and subnet mask setting may also lead to the device communications improperly. Thus DHCP service function is recommended. If there is no DHCP server in the network, contacting with internal network manager before setting is needed to make sure whether there is a conflict comes from the IP address. Setup if there is no mistake.**

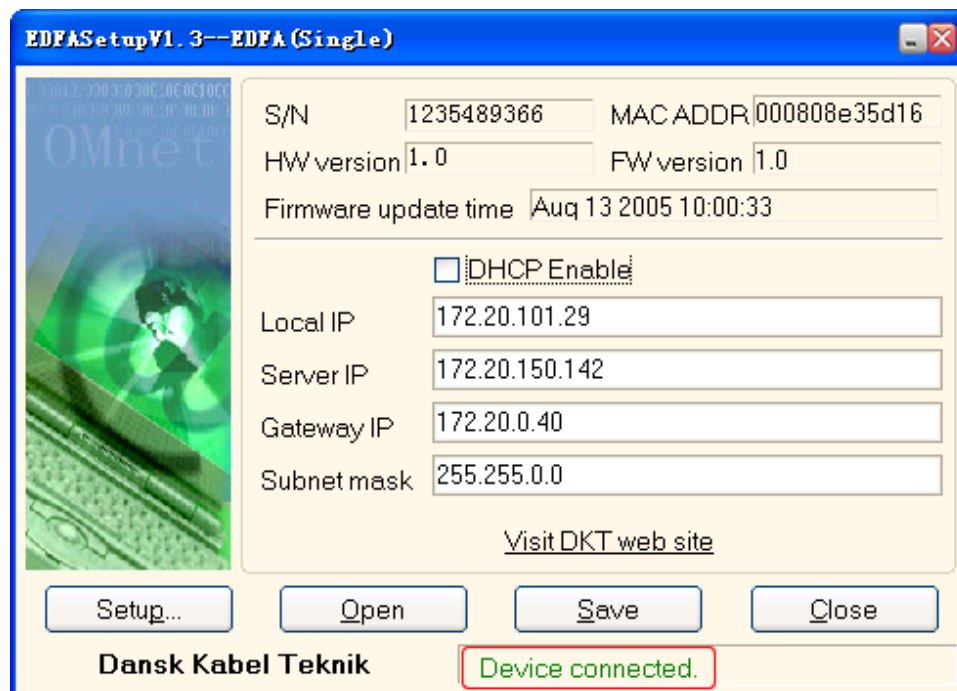
#### 6.5.1.2 EDFA Serial Port Setting Steps

- 1) Open EDFA Serial Port Setting Software named "Setup".

There will be an automatic check on whether there is a device connected to current serial interface after running the software. Fig 6-5.1(a) is displayed if there is no connected device. The device parameter is get automatically and Fig 6-5.1(b) is displayed if there is connected device. Click 'Open' button, the current displayed data can be refreshed.



(a)



(b)

Fig 6-5.1 EDFA serial port setup interface

**Notice:** When Fig (a) appeared, check whether the setting of the serial port is correct first; Click ‘Setup...’ button, see Fig 6-5.2, check whether the setting of the serial port is correct or not.

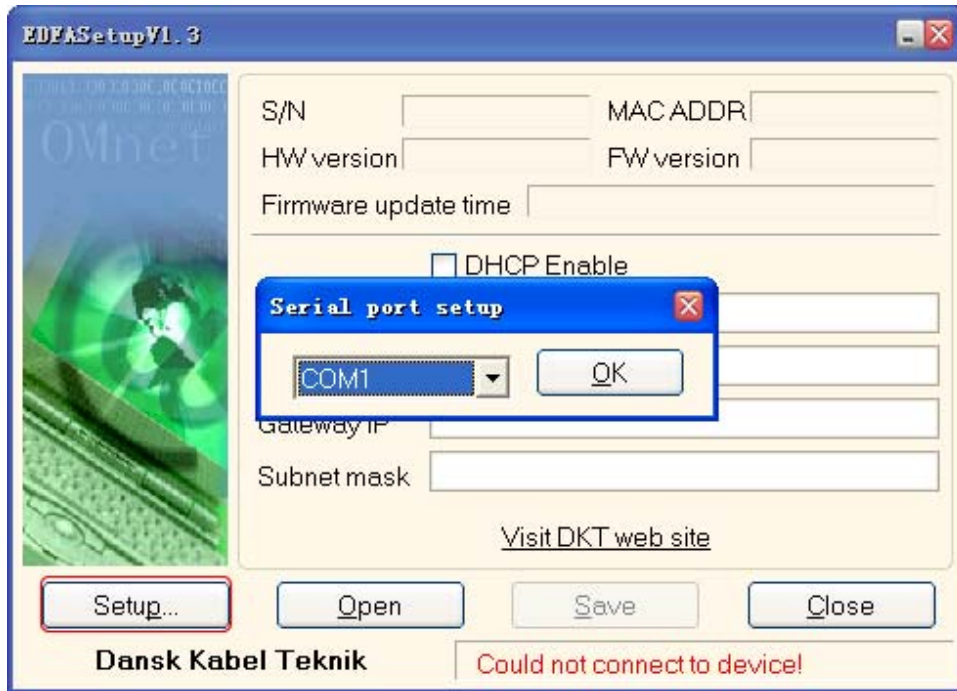
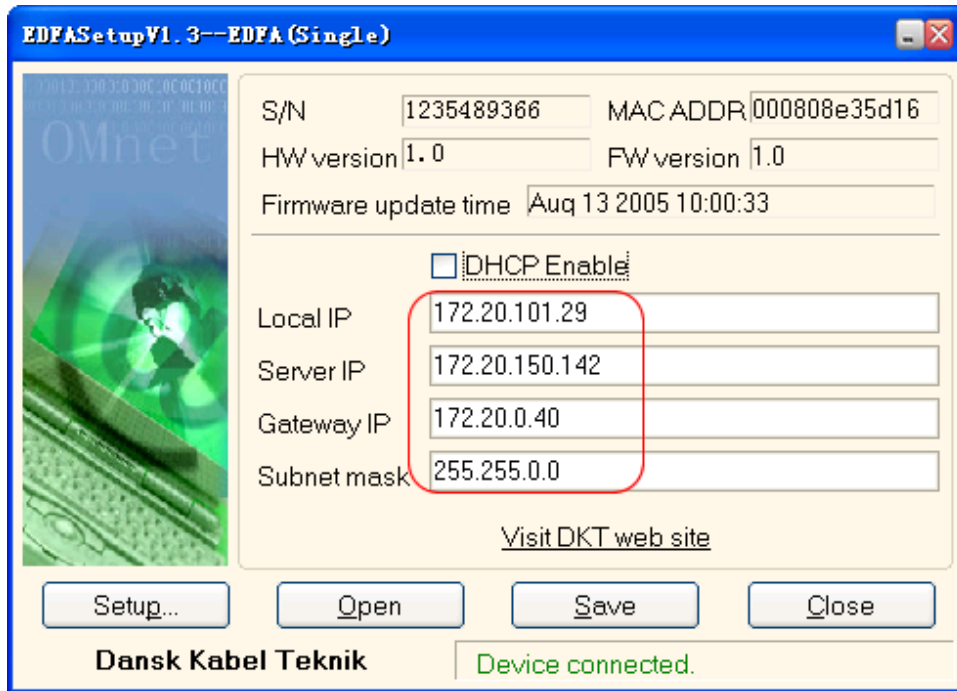


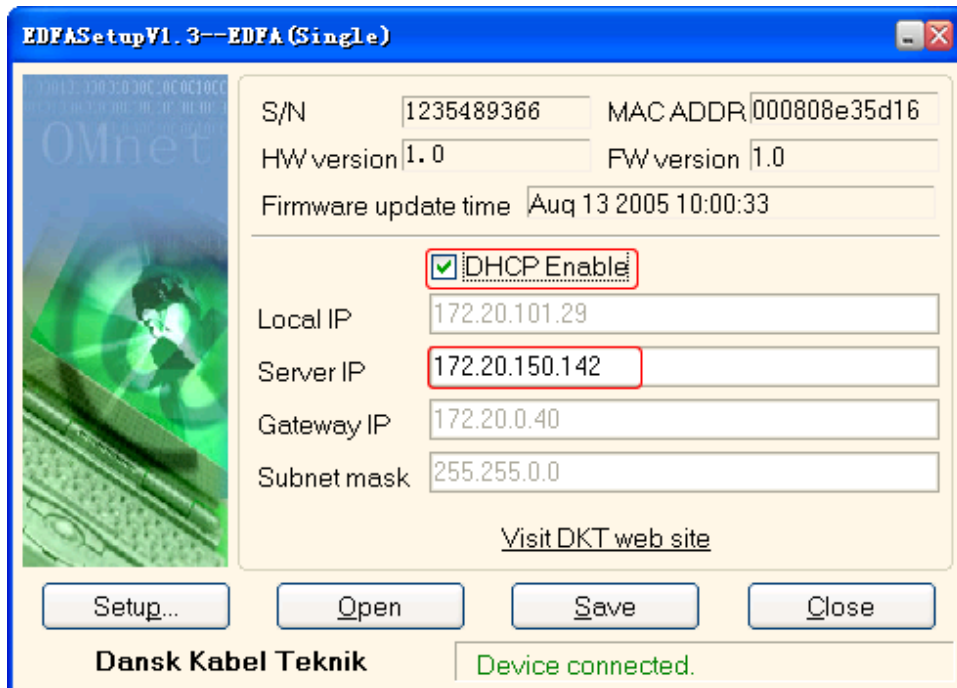
Fig 6-5.2 Serial port setting

2) Setup IP Address:

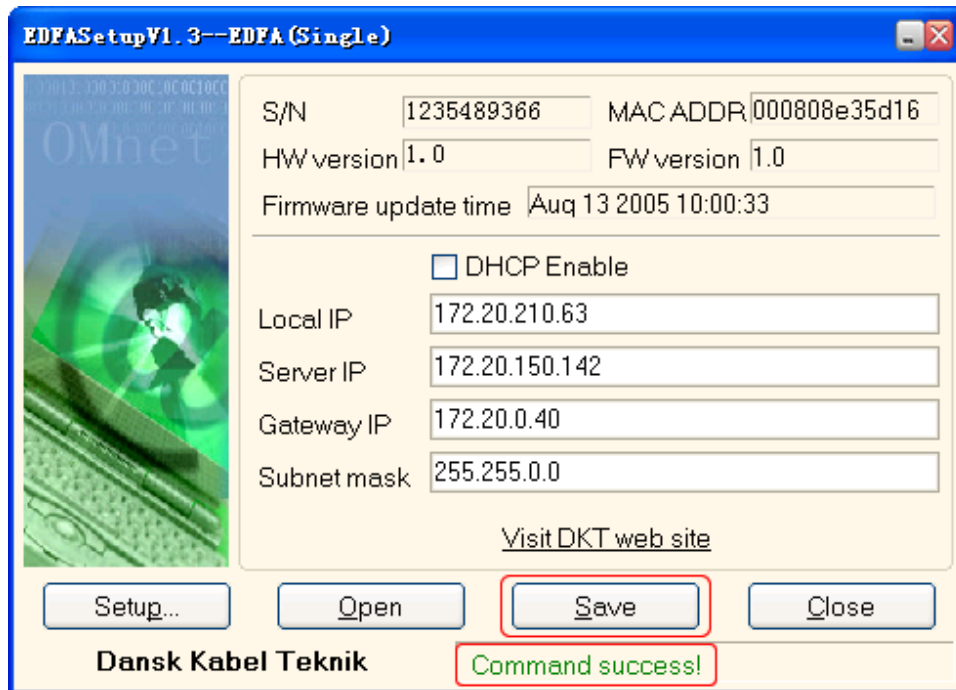
When not using DHCP service, the setting of local IP address, server IP address, gateway IP address, subnet mask is needed. The input format is showed in fig 6-5.3(a). Select 'Using DHCP Service' option when using DHCP service, only need to input the virtual server IP address, see fig 6-5.3(b).



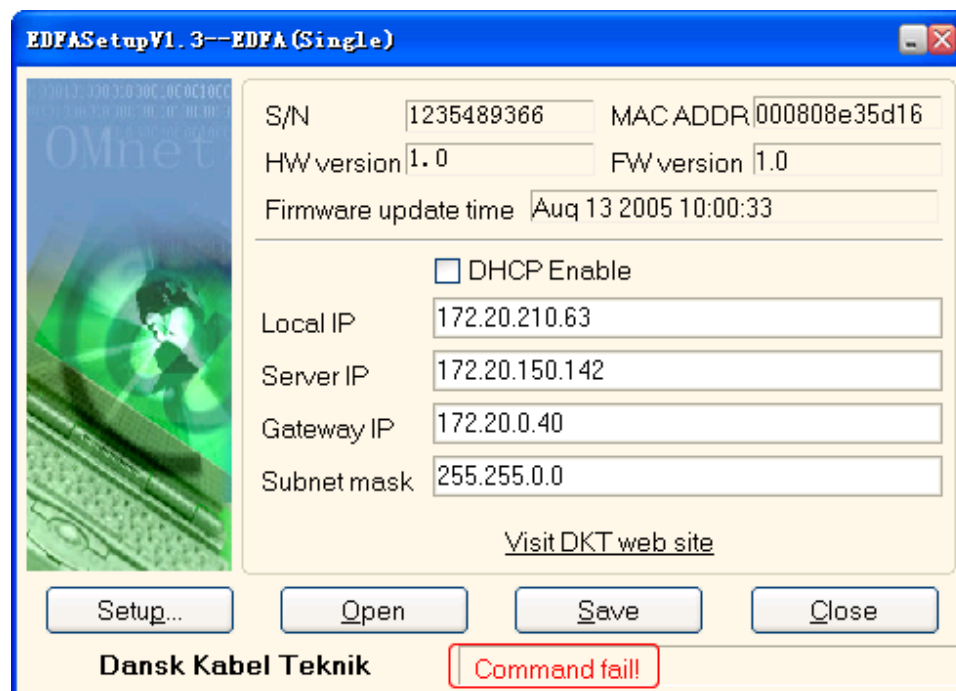
(a)



(b)



(c)



(d)

Fig 6-5.3 IP Address Setting

Input the right information, click "Save". It will display "success" or "failure" at the corner of right bottom. As shown in figure 6-5.3(c)(d).

---

When IP address is successfully set, the unit will reset automatically . If failed, please press "Open " to see whether the "serial port" has been connected properly or not. If not, please recheck it or restart the device.

### 6.5.2 Testing network through RJ45 Port

After successfully setting the equipment, and RJ45 connector in rear panel getting connected with UTP, you can test whether the network is connected. The method is as following:

6.5.2.1 Opening the MS-DOS Window of the computer (If in the Win2000 Operating Systems, click the 'Start' button on the left bottom, --->Program--->Accessories --->Command Prompt).

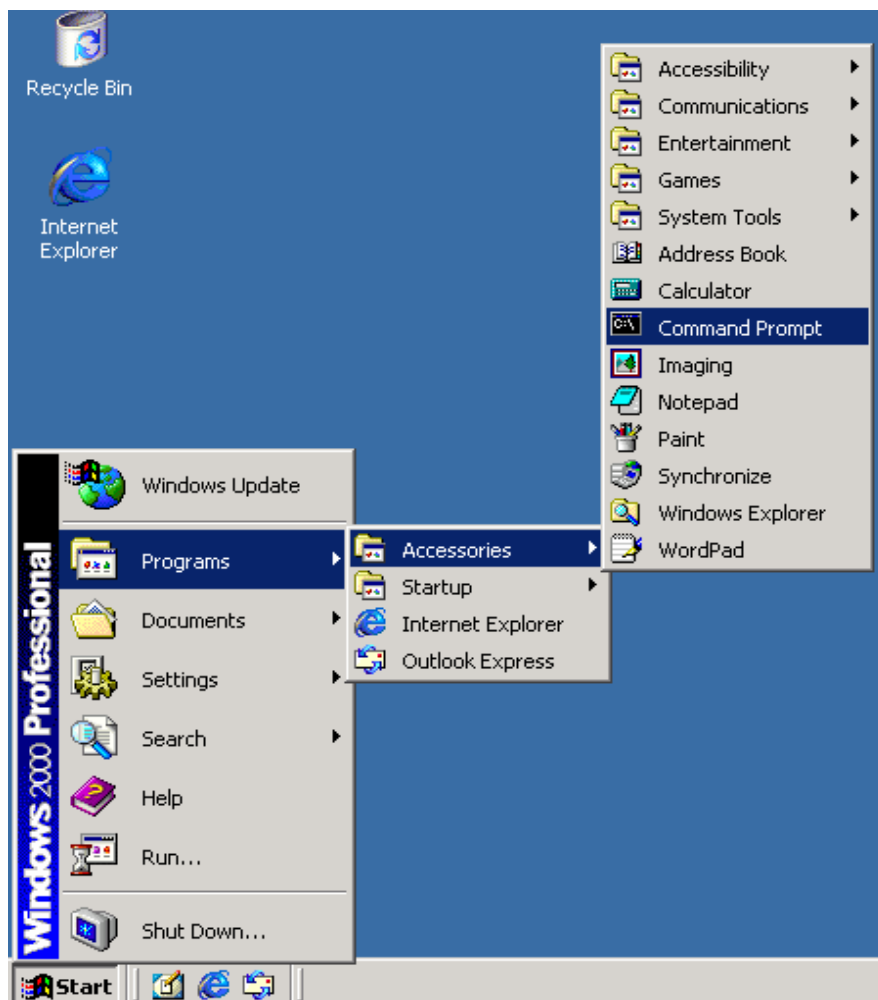


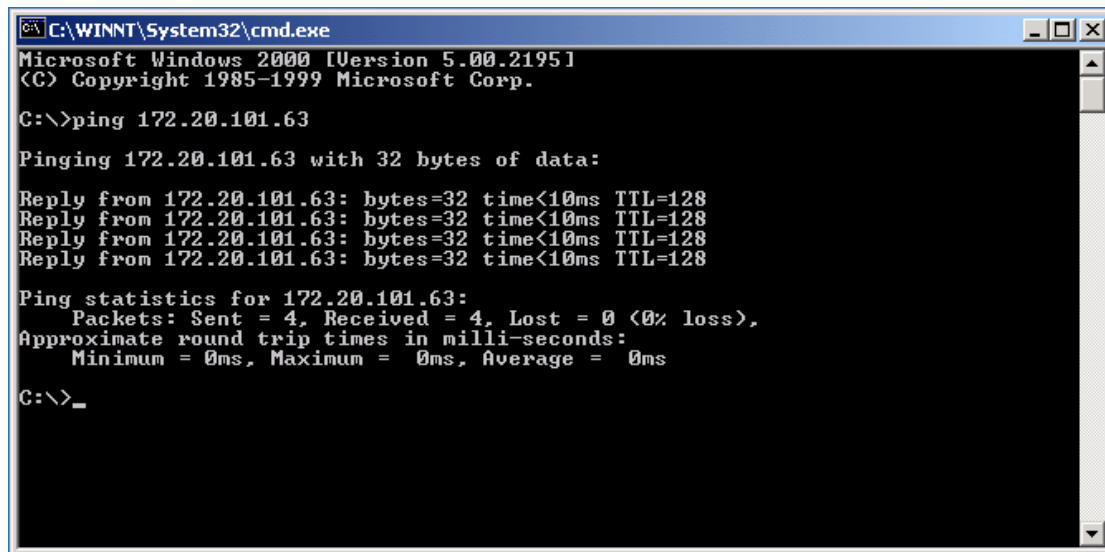
Fig 6-5.4 Opening MS-DOS Window

6.5.2.2. Input 'ping xxx.xxx.xxx.xxx' (the local IP address of the equipment) in the MS-DOS Window.

6.5.2.3 If there is a prompt as follow:

*“Reply from xxx.xxx.xxx.xxx:bytes=32 time<10ms TTL=128”*

It shows that the network communications of the equipment work properly.



```
C:\WINNT\System32\cmd.exe
Microsoft Windows 2000 [Version 5.00.2195]
(C) Copyright 1985-1999 Microsoft Corp.

C:\>ping 172.20.101.63

Pinging 172.20.101.63 with 32 bytes of data:

Reply from 172.20.101.63: bytes=32 time<10ms TTL=128
Reply from 172.20.101.63: bytes=32 time<10ms TTL=128
Reply from 172.20.101.63: bytes=32 time<10ms TTL=128
Reply from 172.20.101.63: bytes=32 time<10ms TTL=128

Ping statistics for 172.20.101.63:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms

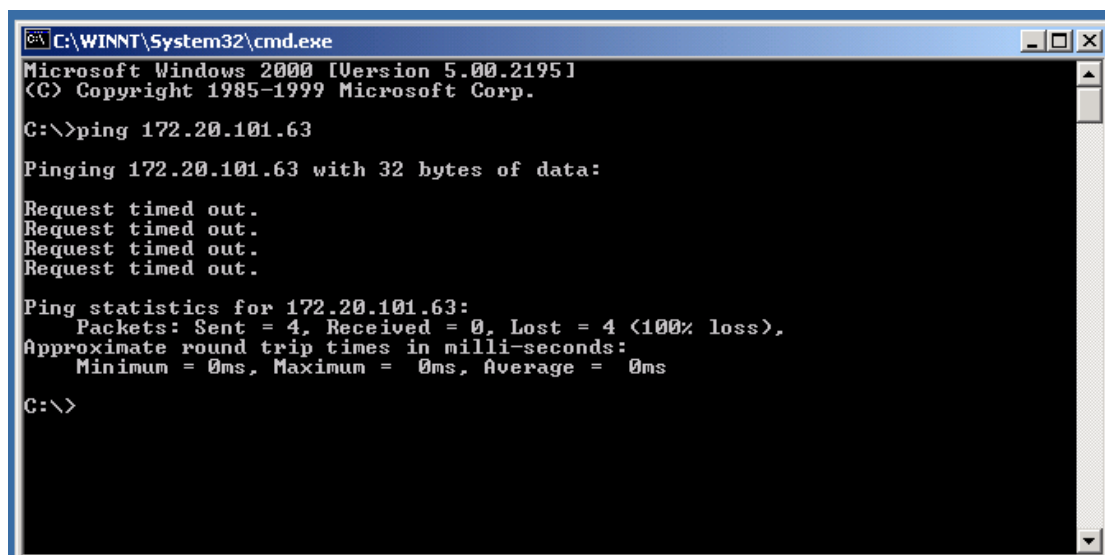
C:\>_
```

Fig 6-5.5 Ping Command Successful

6.5.2.4. If there is a prompt as follow:

*“Request time out”*

It shows that the network communications of the equipment work by error.



```
C:\WINNT\System32\cmd.exe
Microsoft Windows 2000 [Version 5.00.2195]
(C) Copyright 1985-1999 Microsoft Corp.

C:\>ping 172.20.101.63

Pinging 172.20.101.63 with 32 bytes of data:

Request timed out.
Request timed out.
Request timed out.
Request timed out.

Ping statistics for 172.20.101.63:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>
```

Fig 6-5.6 Ping Command Unsuccessful

If ping command is unsuccessful, please check whether the cable connection of the equipment and the setting of the equipment IP, gateway IP, subnet mask is correct.



### 6.5.3 SNMP interface

The equipment supports SNMP V1, and conforms to SCTE HMS. With MIB file, it can easily be deployed into management of any Network Management System that supports SNMP.

## 7. Physical Description and Installation

The mechanical design for the EDFA is based on 19-inch ETS equipment rack as Figure 7-1 shows. All dimensions are in mm.

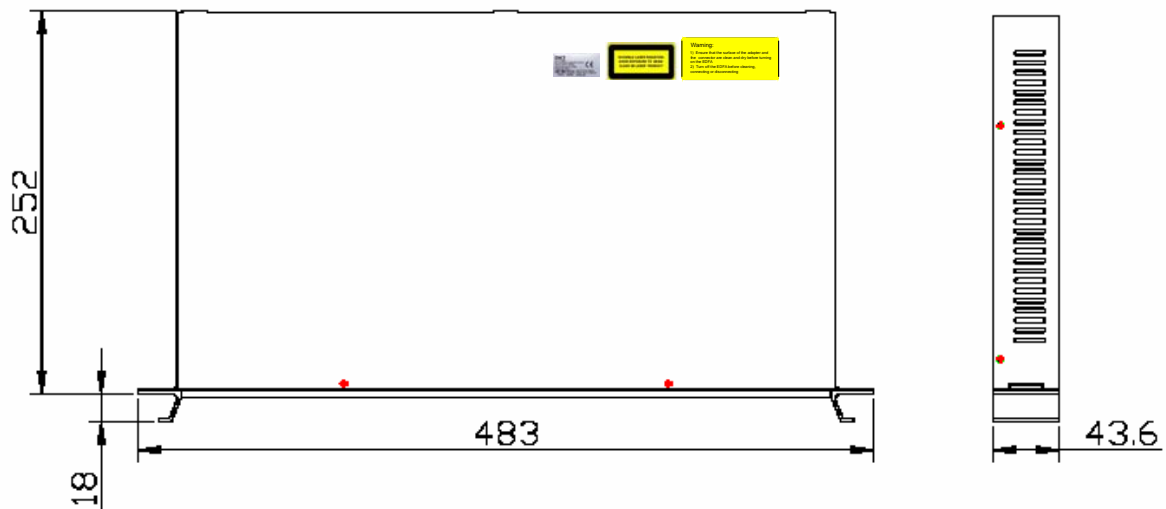


Figure 7-1 Physical View

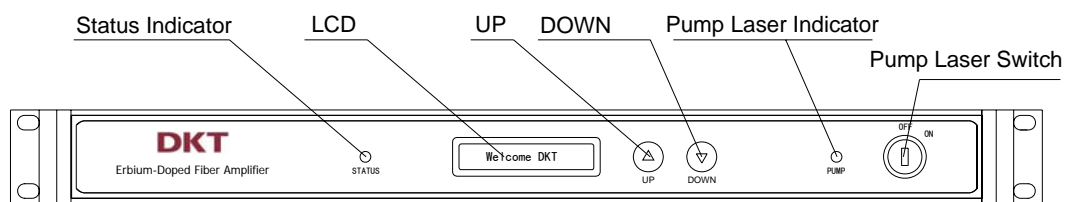


Figure 7-2 Front Panel

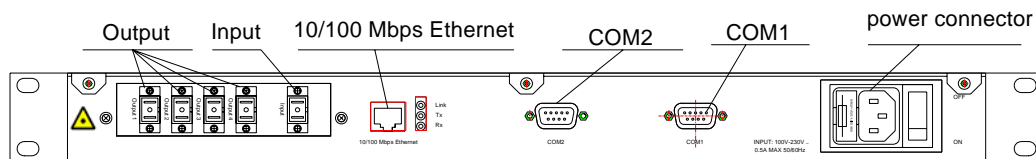


Figure 7-3 Rear Panel (EDFA-17-220SA04G)

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## Installation

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**Warning** *Only trained and qualified personnel should be allowed to install, replace, or service this device.*

---

The EDFA can be mounted in a standard 19-inch rack. To install, please follow these steps:

Step 1. Turn the EDFA chassis so that its front panel is facing you;

Step 2. Determine the desired point of mounting and fix the brackets

by four M6 bolts accordingly;

Step 3. Attach the device to the rack with the rack mounting screws using a screwdriver.

## Optical Connection

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**Warning** *Invisible laser radiation may be emitted from the end of the unterminated fiber cable or connector. Do not stare into the beam or view directly with optical instruments. Viewing the laser output with certain optical instruments within a short distance may cause an eye hazard.*

---

Step 1. Connect the input optical fiber cable to the input connector. Avoid making sharp bends in the fiber cable;

Step 2. Connect the output optical fiber cable to the output connector. Avoid making sharp bends in the fiber cable.

## AC Power Connection

Step 1. Connect the device with a AC power source;

Step 2. Apply AC power;

Step 3. Switch on the device.

---

## 8. Laser Safety Considerations

Erbium-Doped Fiber Amplifier (EDFA) is a member of Class 3B laser products.

### 8.1 Safety Symbols

The direct laser radiation to skin and eyes may cause personnel injury, even eyes blindness.

**Warning Symbol**



**Caution Symbol**

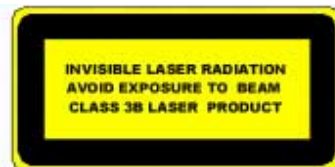


Figure 8-1 Laser Warning Symbol and Caution Symbol

Warning symbol indicates hazardous laser radiation.

Caution symbol means this device is a member of Class 3B laser products and users should avoid direct laser beam radiation.

### 8.2 Laser Safety Guidance

Do not remove the protective cover outside the fiber adapter or jumper connector at the EDFA output port until it has been completely connected to the system or test equipments. This is to prevent personnel or eyes from injury in case the power supply is switched on by accident.

### 8.3 Safe Operation Measurement

1. The protective cover should be on the fiber adapter and jumper connector when not in use.
2. When the power supply is on, the power indicator light should be green.
3. When pump laser is on, the pump indicator light should be green.
4. The personnel engaged in the installation or service of the optical fiber cable or system should:

- 
- observe all rules, procedures and practices established for the safe operation of optical fiber communication systems;
  - immediately notify the supervisor of conditions or practices that have the potential to cause personnel injury or property unintended damage;
  - immediately report to the supervisor any known or suspected abnormal exposure to laser radiation.

The direct laser contact to skin and eyes may cause human body injury, even blindness.

## 8.4 Training

1. The operator should be trained to have a clear understanding of the background information on optical fiber communication systems;
2. The operator should understand that the EDFA is a member of Class 3B laser products. The safety information and safety practices in Chapter 8 must be strictly followed by the operator. Pay special attention to the laser classification system and hazard levels, avoid direct laser contact to either skin or eyes.

# 9. Maintenance and Trouble Shooting

## 9.1 Maintenance



**Warning** *At any rate, please avoid direct eye face to the input/output port of fiber connector in case of any injury of eyes and skin. Make sure the EDFA is switched off before taking away the fiber connector at the output port. Do not turn on the EDFA without coupling with the optical fiber connector.*

---

### Cleaning connectors

The procedures in this section provide the proper steps for cleaning fiber cables and adapters.

The initial cleaning, using the alcohol as a solvent, gently removes any grit and oil. If a caked-on layer of material is still present, a second cleaning should be performed. It is not uncommon for a cable or connector to require more than one cleaning.

---

### **To clean a connector**

1. Apply alcohol (IPA) to a clean lint-free cotton swab or lens paper. Cotton swabs can be used as long as no cotton fibers remain on the fiber end after cleaning.
2. Clean the ferrules and other parts of the connector while avoiding the end of the fiber.
3. Apply alcohol (IPA) to a new clean lint-free cotton swab or lens paper.
4. Clean the fiber end with the swab or lens paper. Do not scrub during this initial cleaning because grit can be caught in the swab and become a gouging element.
5. Immediately dry the fiber end with a clean, dry, lint-free cotton swab or lens paper.
6. Blow across the connector end face from a distance of 6 to 8 inches using filtered, dry, compressed air. Aim the compressed air at a shallow angle to the fiber end face. Nitrogen gas or compressed dust remover can also be used.
7. As soon as the connector is dry, connect or cover it for later use. If the performance after the initial cleaning seems poor, try cleaning the connector again. Often a second cleaning will restore proper performance. The second cleaning should be more arduous with a scrubbing action.

### **To clean an adapter**

1. Apply alcohol (IPA) to a clean foam swab. Cotton swabs can be used as long as no cotton fibers remain after cleaning. The foam swabs listed in this section's introduction are small enough to fit into adapters. Although foam swabs can leave filmy deposits, these deposits are very thin, and the risk of other contamination buildup on the inside of adapters greatly outweighs the risk of contamination by foam swabs.
2. Clean the adapter with the foam swab.
3. Dry the inside of the adapter with a clean, dry, foam swab.
4. Blow through the adapter using filtered, dry, compressed air. Nitrogen gas or compressed dust remover can also be used.

## **9.2 Troubleshooting**

This section discusses basic fault investigation and diagnostic (troubleshooting) procedures for EDFA.

| Alarm Status          |       |        | Cause  | Actions  |
|-----------------------|-------|--------|--|--|
| Pump Chip Temperature | Input | Output |  |  |
| ●                     |       | ●      | Pump chip temperature abnormal                                       | Check ambient temperature  |
| ●                     |       |        | Pump chip temperature abnormal                                       | Check ambient temperature  |
|                       | ●     |        | Input power out of range<br>Input connector failed                   | Clean fiber connector<br>Check input signal power                              |
|                       | ●     | ●      | Input power or wavelength out of range;<br>input connector defective | Clean fiber connector<br>Check input signal power<br>Ask for technical support |
|                       |       | ●      | Input wavelength out of range or optical module defective            | Check signal wavelength and signal power                                       |



**Warning**

***Only trained and qualified personnel should be allowed to perform troubleshooting task to avoid any unintended further damages.***

Please read carefully the following tables to perform troubleshooting tasks. Multiple alarms could happen at the same time and some analysis maybe required to diagnose the root causes of the faults. For further technical support, please contact a service facility designated by DKT.

## 10. Accessories List

| NO. | Contents                     | Quantity | Remark |
|-----|------------------------------|----------|--------|
| 1   | Power Cord                   | 1        |        |
| 2   | Pump Laser Switch Key        | 1        |        |
| 3   | Optical Fiber Jumper(SC/APC) | 4        |        |
| 4   | RS-232 Port Cable            | 1        |        |
| 5   | Fuse Tube (2A)               | 2        |        |
| 6   | User Manual                  | 1        |        |
| 7   | Testing Report               | 1        |        |

## Appendix A: The Manufactory Default Alarm Setting Table

|                             | Too High Alarm | High Alarm | Low Alarm | Too Low Alarm | Alarm Renew Sluggish | Remark                       |
|-----------------------------|----------------|------------|-----------|---------------|----------------------|------------------------------|
| Optical Input Power (dBm)   | -----          | 10.0       | -6.0      | -10.0         | 0.3                  |                              |
| Optical Output Power (dBm)  | -----          | 25.0       | 11.0      | -----         | 0.5                  |                              |
| Pump #1 Temperature (°C)    | 30             | 28         | 22        | 20            | 1                    |                              |
| Pump #1 Bias Current (mA)   | 1000           | -----      | -----     | -----         | 50                   |                              |
| Pump #1 Cooler Current (mA) | 1200           | -----      | -----     | -----         | 50                   |                              |
| Pump #2 Temperature (°C)    | 30             | 28         | 22        | 20            | 1                    |                              |
| Pump #2 Bias Current (mA)   | 1000           | -----      | -----     | -----         | 50                   |                              |
| Pump #2 Cooler Current (mA) | 1200           | -----      | -----     | -----         | 50                   | 2500mA<br>(EDFA-17-220SA04S) |

**Notice: When the alarm of pump #1, #2 temperature is too high or too low, bias current or refrigeration current is too high occurs, the firmware closes the pump automatically, forbids opening the pump again before shutting off the power supply, and keep the alarm that arose the pump protecting. All the alarm of optic output power will be renewed after close the pump.**

---

## Appendix B : Program Upgrade

### NMS Main Control Program Download

Firstly open the download tools Download.exe, see Fig.B-1.

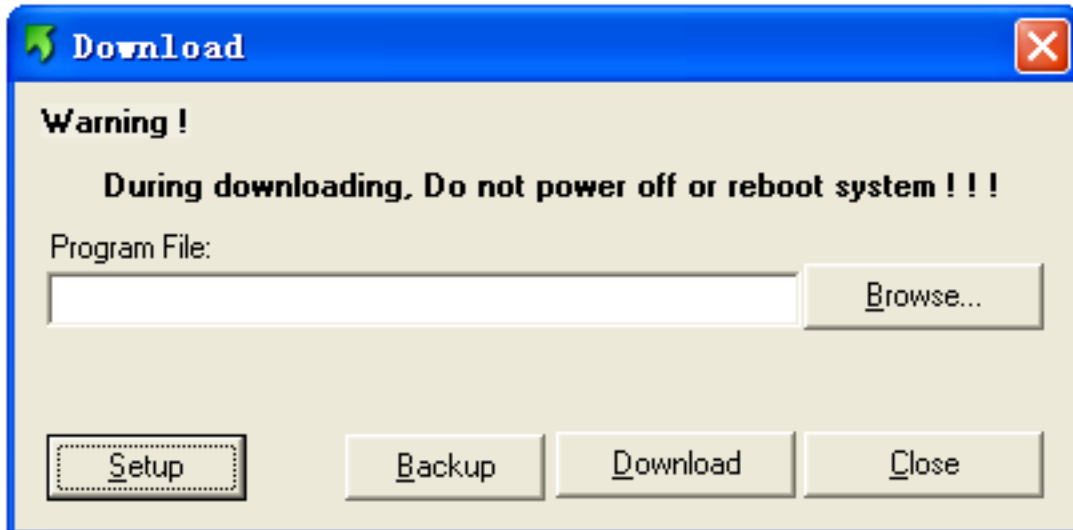


Fig.B-1

Then click 'Browse' to choose the download file of NMS main control program code, see Fig.B-2.

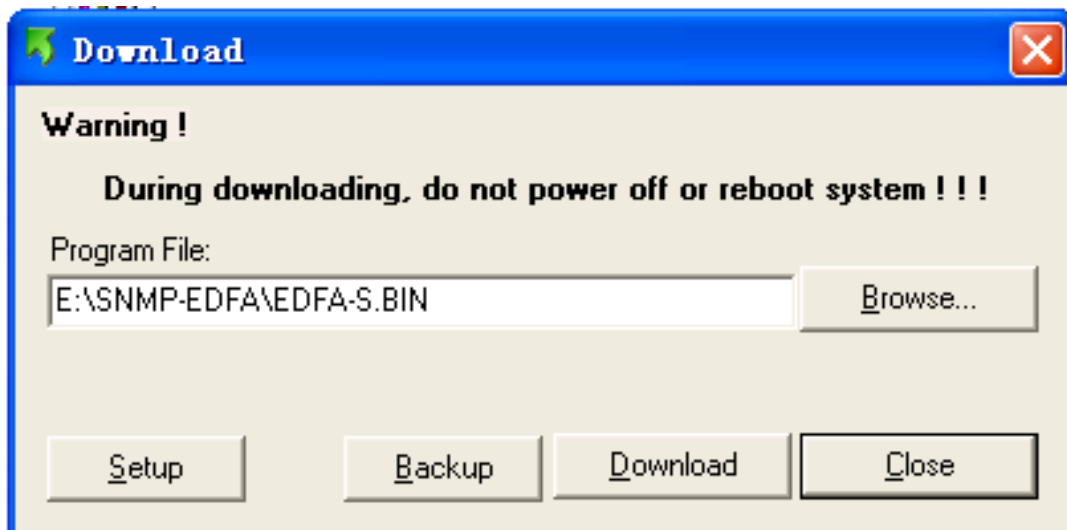


Fig.B-2

After that, please make sure that the serial port connecting line has been connected to COM1 (serial port of NMS main control PCB) of the equipment, the hardware has been connected correctly and the serial port setting is correct (serial port can be set by 'Setup').



Click 'Download', then click 'yes' in the confirm window (see Fig.B-3), it starts downloading, see Fig.B-4.



Fig.B-3

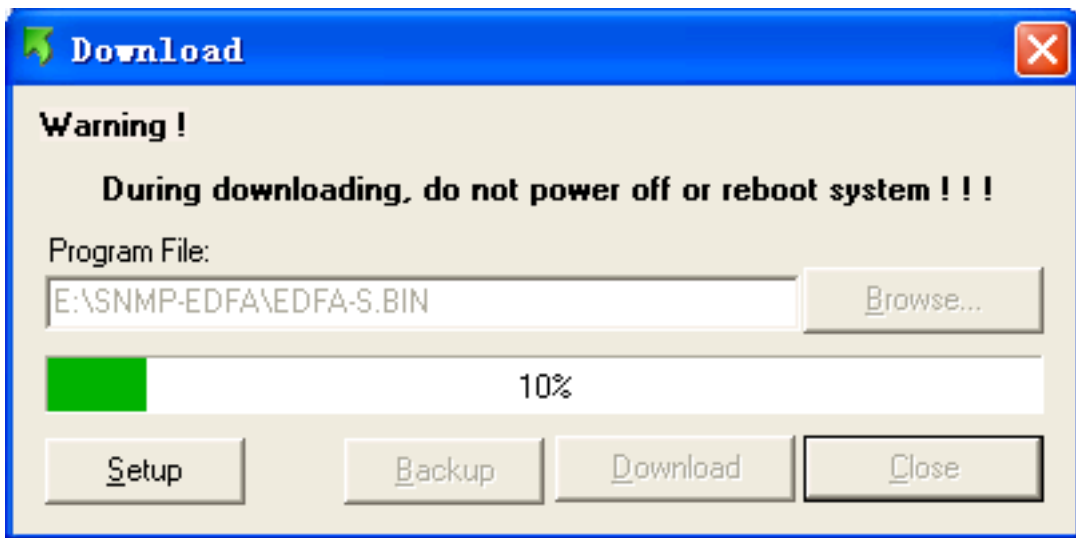


Fig.B-4

The system shows that download success when finished, see Fig.B-5.

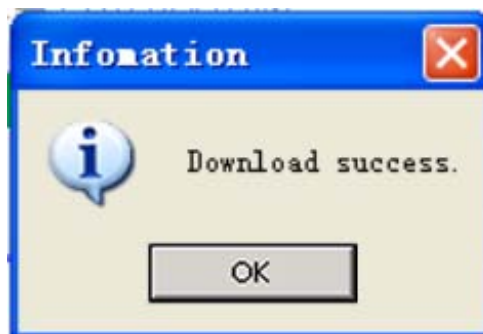


Fig.B-5

If it appears the window like Fig.B-6 when starting downloading, it shows that the selected

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file doesn't match the connected serial port and the selected file is not the program file of NMS main control PCB.



### **NMS Communication Program Download**

The download of NMS communication program is nearly the same as NMS main control program. Please also note that the connecting line must be connected to COM2 (the serial port of NMS communication PCB) of the equipment before upgrading the NMS communication program.