



AT5000 EDFA Erbium-Doped Fiber Amplifier

Quick Reference Guide

Revision E

ACT AT5000 Erbium-Doped Fiber Amplifier

Quick Reference Guide

ACT Document Number: ACT AT5000 32 Port EDFA Quick Reference Guide

User Guide Revision E

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This document is produced to assist professional and properly trained personnel with installation and maintenance issues for the product. The capabilities, system requirements and/or compatibility with third-party products described herein are subject to change without notice.

For more information, contact ACT: support@ascentcomtec.com



Revision History

Revision	Date	Reason for Change
A	08/22/2016	Initial release
B	10/11/2016	Added warnings
C	01/28/2017	Updated pictures
D	01/30/2017	Updated GUI section
E	10/25/2017	Updated software description section

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1 Precautions



Warning

Exposure to class 1M laser radiation is possible. Access should be restricted to trained personnel only. Do not view exposed fiber or connector ends when handling optical equipment.

- Ensure adequate cooling and ventilation as specified.
- The installation and operation manual should be read and understood before units are put into use.
- Always replace protective caps on optical connectors when not in use.
- The typical connectors fitted are SC/APC 8°. **Note:** 8° angle polished connectors must be used.

Cleaning

Use only a damp cloth for cleaning the front panel. Use a soft dry cloth to clean the top of the unit.

Do not use spray cleaner of any kind.

Overloading

Overloading wall outlets and extension cords can result in a risk of fire or electric shock.

Use approved electrical cords.

Damage requiring service

Unplug unit and refer servicing only to Ascent Communication Technology qualified service personnel.

Servicing

Do not attempt to service this unit yourself. Refer all servicing only to Ascent Communication Technology qualified service personnel.

General Reminders and Warnings

Review these reminders and warnings before you inspect and clean your fiber-optic connections.

Reminders

- Always turn off any laser sources before you inspect fiber connectors, optical components, or bulkheads.
- Always make sure that the cable is disconnected at both ends and that the card or pluggable receiver is removed from the chassis.
- Always wear the appropriate safety glasses when required in your area. Be sure that any laser safety glasses meet federal and state regulations and are matched to the lasers used within your environment.
- Always inspect the connectors or adapters before you clean.
- Always inspect and clean the connectors before you make a connection.

- Always use the connector housing to plug or unplug a fiber.
- Always keep a protective cap on unplugged fiber connectors.
- Always store unused protective caps in a resealable container in order to prevent the possibility of the transfer of dust to the fiber. Locate the containers near the connectors for easy access.
- Always discard used tissues and swabs properly.

Warnings

- Never use alcohol or wet cleaning without a way to ensure that it does not leave residue on the endface. It can cause damage to the equipment.
- Never look into a fiber while the system lasers are on.
- Never clean bulkheads or receptacle devices without a way to inspect them.
- Never touch products without being properly grounded.
- Never use unfiltered handheld magnifiers or focusing optics to inspect fiber connectors.
- Never connect a fiber to a fiberscope while the system lasers are on.
- Never touch the end face of the fiber connectors.
- Never twist or pull forcefully on the fiber cable.
- Never reuse any tissue, swab, or cleaning cassette reel.
- Never touch the clean area of a tissue, swab, or cleaning fabric.
- Never touch any portion of a tissue or swab where alcohol was applied.
- Never touch the dispensing tip of an alcohol bottle.
- Never use alcohol around an open flame or spark; alcohol is very flammable.

2 Introduction

2.1 Overview

AT5000 1RU or 2RU Erbium-Doped Fiber Amplifier (EDFA) offers a flexible and scalable optical amplification for high quality video transmission in CATV networks. Together with ACT 1RU 1550nm transmitter, the AT5000 EDFA provides an ideal video overlay solution in high density FTTX networks to bring the video services to business and home premises.

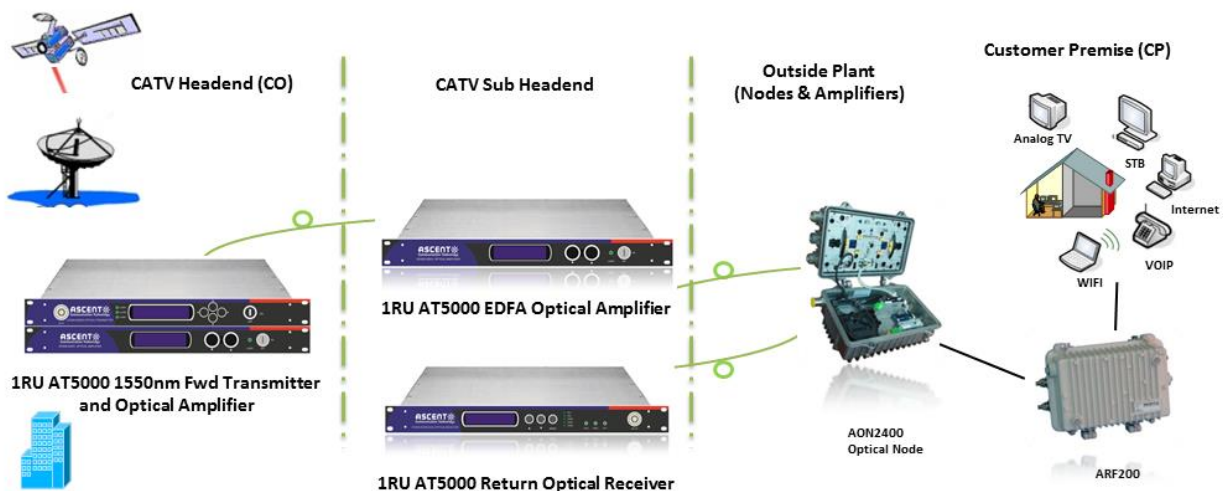
AT5000 EDFA series simplifies the application by offering low noise, high output power, and intuitive front panel LCD display to make operator's life easier. The optical amplifier is packaged in a self-contained 19" sub-rack of 1 or 2 RU with universal mains power supply and SNMP management.

The optical output power level can be ordered from 13 dBm to 26dBm with variable output features from 20dBm up. Multiport EDFAs accommodates up to 16 output ports in 1RU setting and 32, 64 output ports in 2RU setting. Combined with our AT5000 1550nm direct or externally modulated laser transmitter, MSOs can quickly deploy and activate advanced multi-media services in long distance video transmission and high subscriber count FTTH networks.

2.2 Features

- Low noise, high performance
- Suitable for analog and digital CATV systems, DOCSIS, FTTH and more applications
- Suitable for 1550 nm DWDM applications for multiple wavelengths on single fibre
- Nominal output powers from 13dBm to 26dBm per port
- Adjustable output power
- Extend analog and digital CATV to suit long distance feeders or larger FTTH distribution systems
- Local or remote monitoring and configuration
- SNMP/HTTP monitoring, remote network management and control support

2.3 Application Diagram



2.4 Specifications

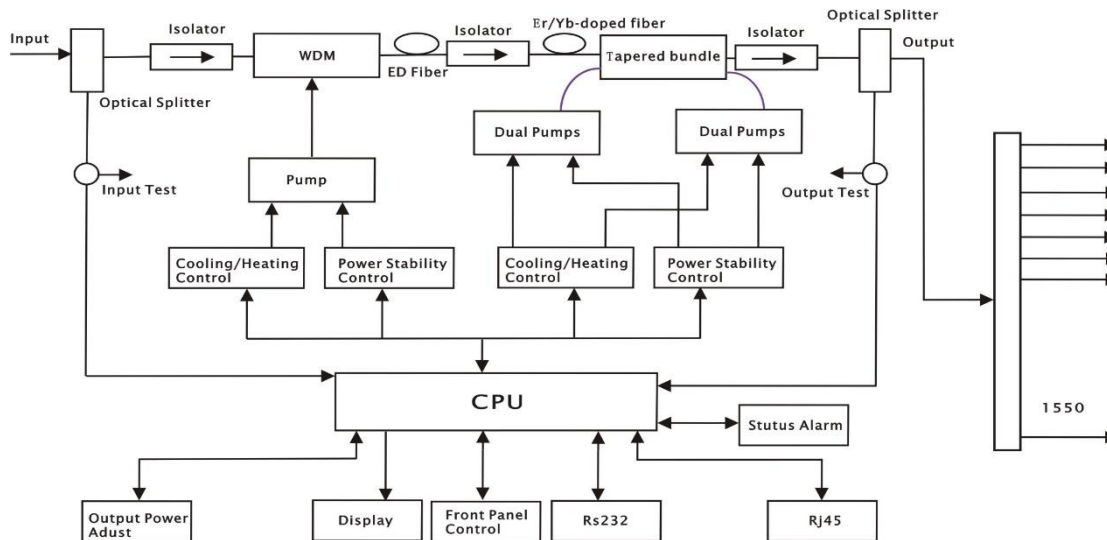
AT5000 EDFA Erbium-Doped Fiber Amplifier - 19" 1RU

Item	Description									
Total Output Power (dBm)	31	32	33	34	35	36	37	38	39	40
Total Output Power (mW)	1250	1600	2000	2500	3200	4000	5000	6400	8000	10000
Input Power	-8 dBm to +10 dBm									
Range of Output Adjustment	-3 dBm									
Wavelength	1530 nm to 1565 nm									
Output Stability	<±0.3 dB									
Optical Return Loss	≥45 dB									
Fiber Connector	FC/APC, SC/APC									
Noise Figure	<6.0 dB (input 0 dBm)									
Web Port	RJ45 (SNMP)									
Power Consumption	≤80 W									
Voltage	AC: 220 V (90 V to 265 V) DC: -48 V									

Operating Temperature	0 °C to +55 °C
Dimensions (L × W × H)	370 mm × 486 mm × 44 mm
Net Weight	6.0 kg

2.5 Diagram

Single input, standard model



3 Installation

3.1 Equipment Inventory

On receiving your new EDFA, you should carefully unpack and examine the contents for loss or damage that may have occurred during shipping. Refer to warranty registration if loss or damage has occurred. The EDFA pack will consist of the following:

Qty	Description
1	EDFA, Erbium Doped Fiber Amplifier
1	Product user manual (includes individual test sheet)
1	Key for switching laser ON / OFF
1	Power supply cord

3.2 Packaging and Transportation

Keep all packing boxes and packaging of the EDFA for future transport.

Use only the original packaging of the EDFA when transporting. This packaging has been specifically designed to protect the equipment.

3.3 Power and Cooling Requirements

The EDFA requires an input of 90 to 264 Vac at 50/60 Hz. The mains input socket on the unit is IEC configuration. Over-load and over-voltage protection is included in the unit, which may

cause it to shut down in extreme circumstances. If this occurs, remove the fault condition and the system will recover automatically.

The unit should be located in an environment not exceeding a temperature range from 0 °C to +50 °C. The internal temperature should never reach +70 °C. If the temperature exceeds the above limits, the unit should be relocated in the equipment rack where the ambient temperature will be less than +50 °C.

Horizontal, fan-forced airflow permits the mounting of multiple laser transmitters without the need for a 1 RU rack space clearance between other devices, thus maximising rack space at the headend location. Ensure adequate space behind the unit for ventilation as air flow is through the back of the unit.

3.4 Module Installation and Adjustment

The following steps explain how the EDFA is to be installed. Please read them carefully:

Unpack the optical amplifier and inspect the unit as stated in **Section 3.1**.

Locate the optical amplifier in a 19" cabinet, ensuring adequate ventilation and space for accessing the rear ports and front-panel keypad.

Prior to connecting any fiber patch leads to optical transmission equipment, always ensure that the ends of the fiber optic connectors are clean and free of contaminants.



Warning

Do not view exposed fibers or connector ends when handling optical equipment.
Exposure to invisible laser radiation may cause permanent eye damage.

Connect the optical output ports to the system.

Always place protective dust caps on all optical ports when not in use.

Connect the optical input signal to the input port of the EDFA.

Ensure the input optical power is within the range of -10 to +10dBm with the typical value at +3dBm.

Before connecting AC power to the unit, make sure that the LASER ON/OFF key is switched OFF (front panel).

Use the supplied power cord to apply mains power to the transmitter.

Switch the AC power ON (switch located on the rear panel).

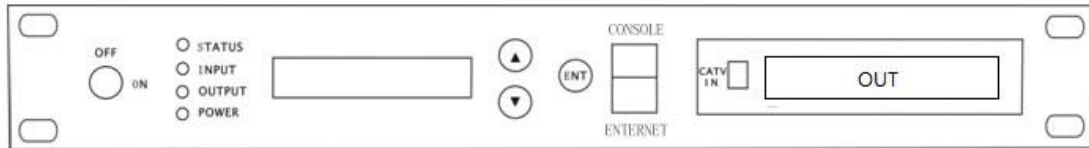
Switch on the laser using the key switch.

Front panel shows "KEY ON..." Laser status lamp turns green from red, and the machine enters self-checking. After checking, it enters working status and display "**Descriptor**".

If the laser is not on, you will have to activate the laser and check that the output power is as specified in the EDFA Certificate of Performance (COP). To activate the laser, set **CONTROL1**, see **Section 5.2**.

See **Section 5** for instructions on how to view the status information about the EDFA.

3.5 Front Panel Layout



LED display

Displays the working parameter of the machine

STATUS Indication light

Green: Normal Condition

Red: No input or abnormal condition

INPUT Indication Light

Green: Normal

OUTPUT Indication Light

Green: Normal

Power Indication Light

Green: Power Connected

Key

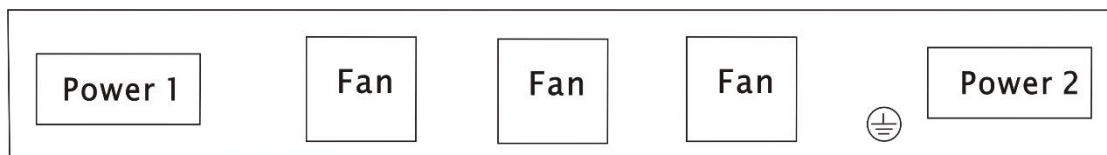
ON: Turn on the laser

OFF: Turn off the laser

RF Test

Output level 70 dBμV

3.6 Rear Panel Layout



Power Switch (220 V)

ON: Turn on the power

OFF: Turn off the power

Power Socket

AC 220 V or DC -48 V

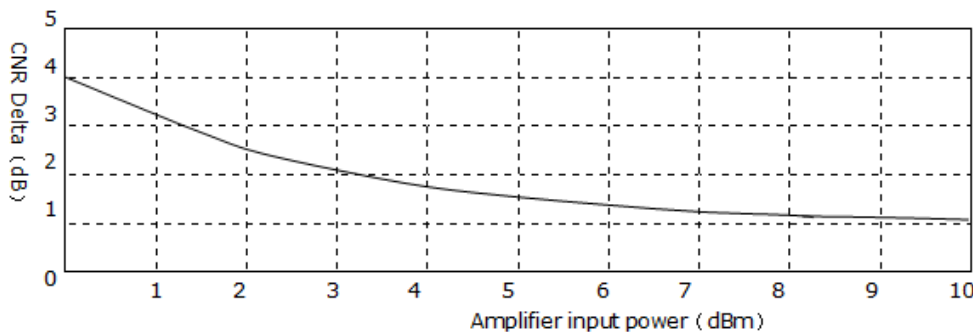
4 Technical Description

4.1 Optical Gain Block

The Optical Gain Block has an input optical signal range of -10 to +10 dBm for which the output will be stable at its nominated optical power. Although the pump lasers will operate with input optical signals down to -10dBm, optimum specifications will be met above 0dBm.

The optical gain will be determined by the required optical output power minus the optical input power. The higher the gain the higher the noise figure (typically ≤ 5.0 dB).

The Optical Gain Block is driven by the Control Board which also performs the shutdown function of the lasers. The optical connectors available are SC/APC, E2000/APC and FC/APC.



4.2 Alarm System

The EDFA alarm system is designed to generate only urgent alarms. This is due to the importance of the EDFA, as this module will usually drive a large portion of the optical distribution network. Working status indication (LED) is next to the power switch in the front panel. When it is green, the device is working properly; when it is red, the laser does not work; when it is red flashing, there is an alarm. The urgent alarm communicates to the control module and makes the LCD flash when displaying STATUS.

1. With 220 V power supply, if the unit is good, the digital panel will display "READY: KEY OFF" and there is Red light.
2. Turn on with the switch key, the digital panel will display "KEY ON". After a few seconds, the laser is turned on automatically and the indication light turns into Green from Red.
3. Pressing ▲\▼ bottom to display parameters.
4. If any fault listed above occurred, there will be an alarm (Red flashing), Microprocessor will shut off the laser pump automatically, and digital panel will show the fault message.
5. In order to protect the laser, the power supply of the laser has time-delay function. After turning on with the key, the laser will start to work after 10 seconds.

4.3 Cooling System

The EDFA is cooled by 3 fans. The fans will activate when the amplifier is turned on to prevent the device from overheating.

5 Software Description – Operation

5.1 Board Operation Guide

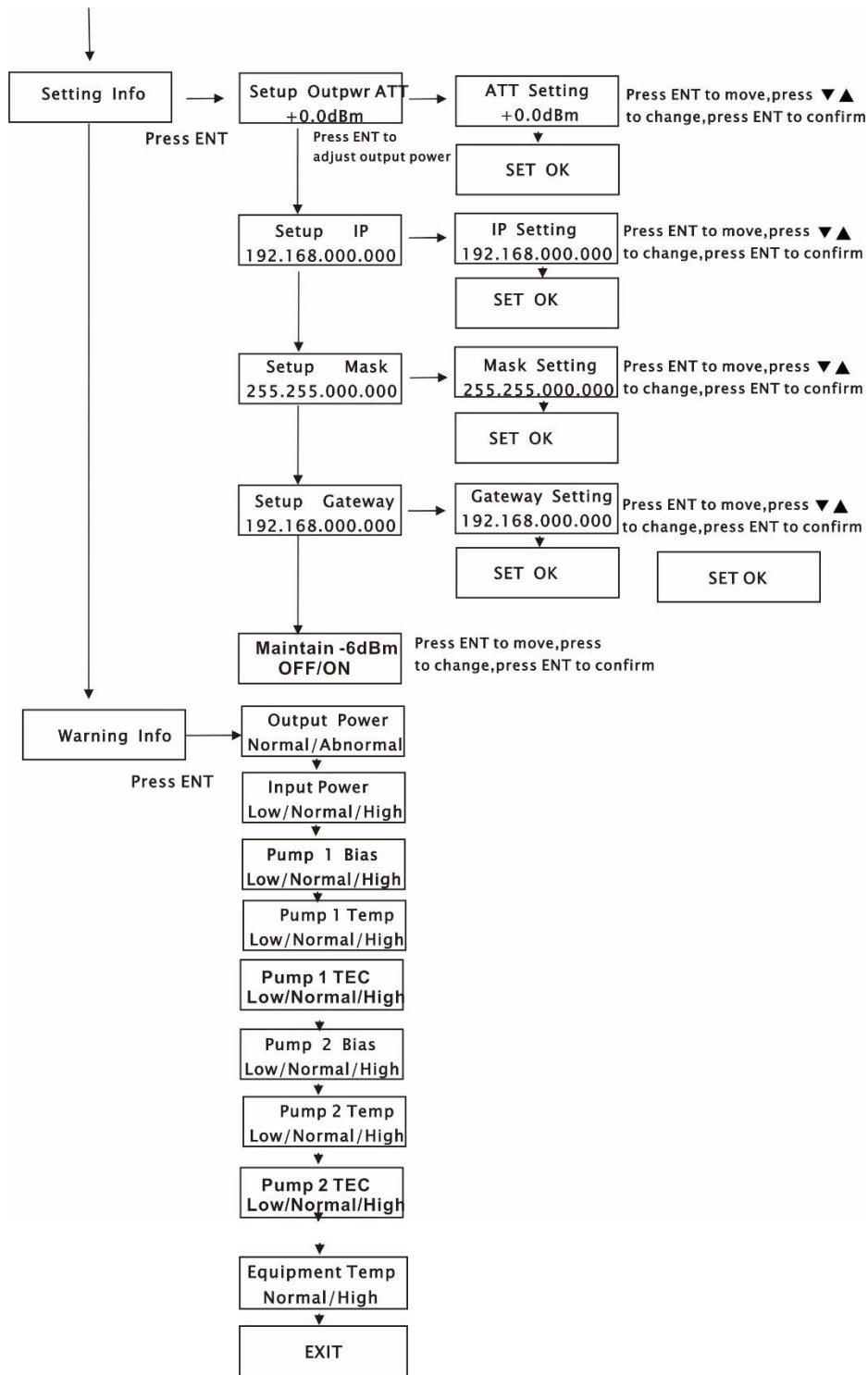
Press the button “▼” in the board, the working parameter of this machine can be seen in turn as follows,

1. Model
2. Output Power: display the output power of this machine (dB).
3. Input Power: display the input power of this machine (dB).
4. The bias current/TEMP/TEC of the laser is the main working parameter of the laser. If there are more than one laser, the board will display the working current of BIAS 1, BIAS2, BIAS3, BIAS4 in turn. The red light will shine to warn when the parameter comes out of the fixed value.
5. Equipment Temp: Control fan. When equipment Temp reach more than 35 °C, the fan begins work; Below 30 °C, the fan stops.
6. Parameters info: showing the +5V power, Dual power working statues, Serial number, Firmware version.
7. Setting info: Set output pwr ATT, Ip, Mac address and so on.
8. Warning info: showing work parameters warn. Output pwr, Input pwr, pump laser statues, etc.

LCD Menu Sequence

```

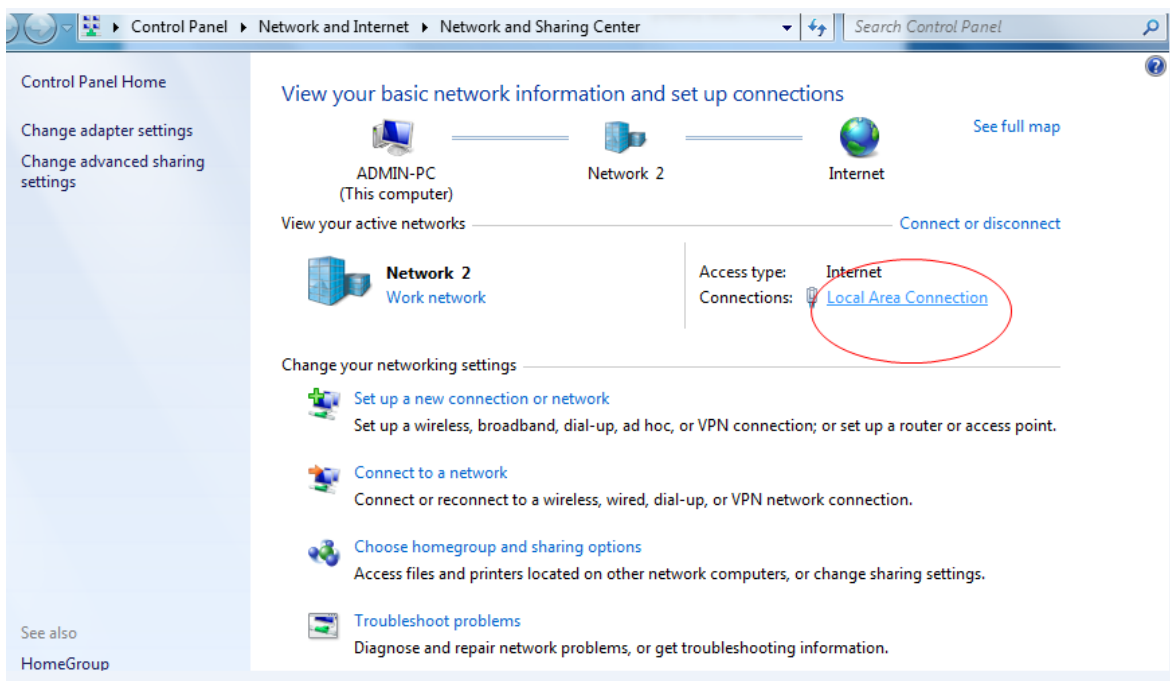
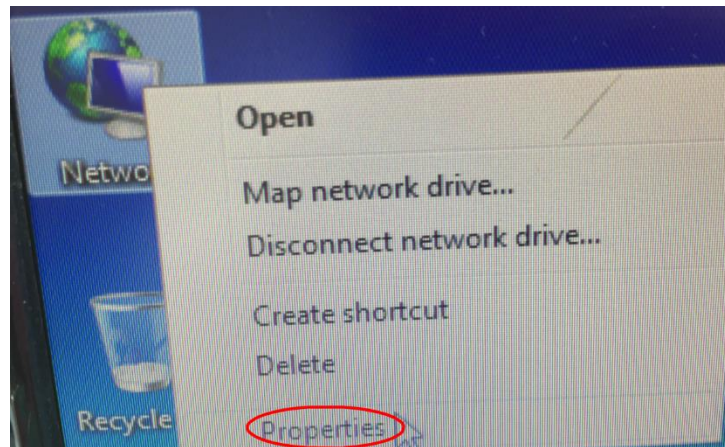
graph TD
    A[XXXXXXXXXX  
Each Outpwr] --> B[Total Outpwr]
    B --> C[Input Power]
    C --> D[Pump 1 Current]
    D --> E[Pump 1 Temp]
    E --> F[Pump 1 TEC]
    F --> G[Pump 2 Current]
    G --> H[Pump 2 Temp]
    H --> I[Pump 2 TEC]
    I --> J[Equipment Temp]
    J --> K[Paramrters Info]
    K -- "Press ENT" --> L[+5V Power]
    K --> M[ ]
    L --> N[+3.3V Power]
    N --> O[+12V Power]
    O --> P["PS1 Normal  
Ps2 Normal"]
    P --> Q[Serial Number]
    Q --> R[Firmware Version]
    R --> S[EXIT]
    
```

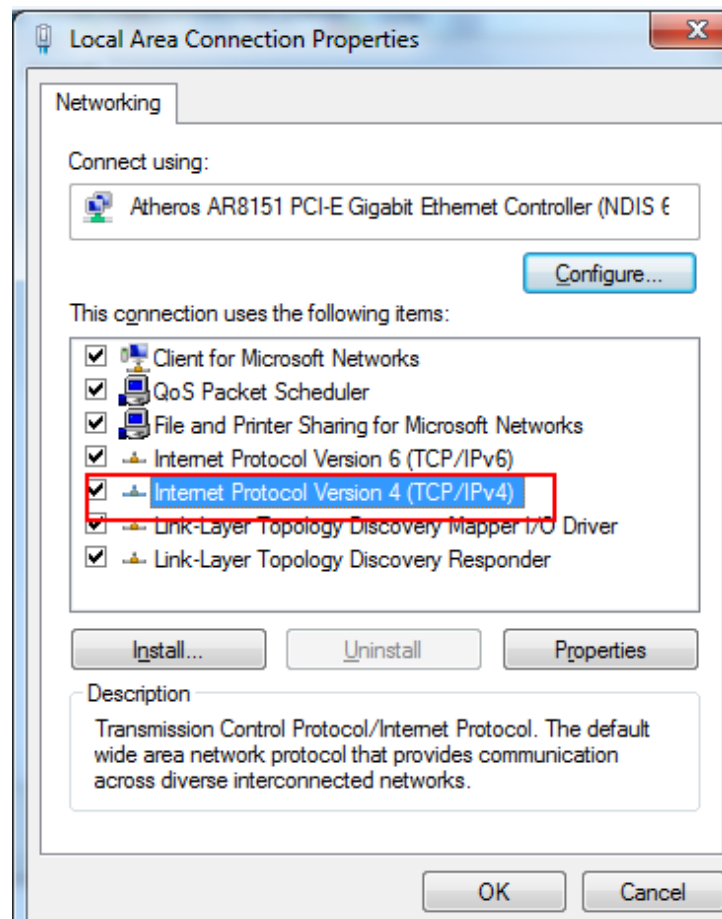
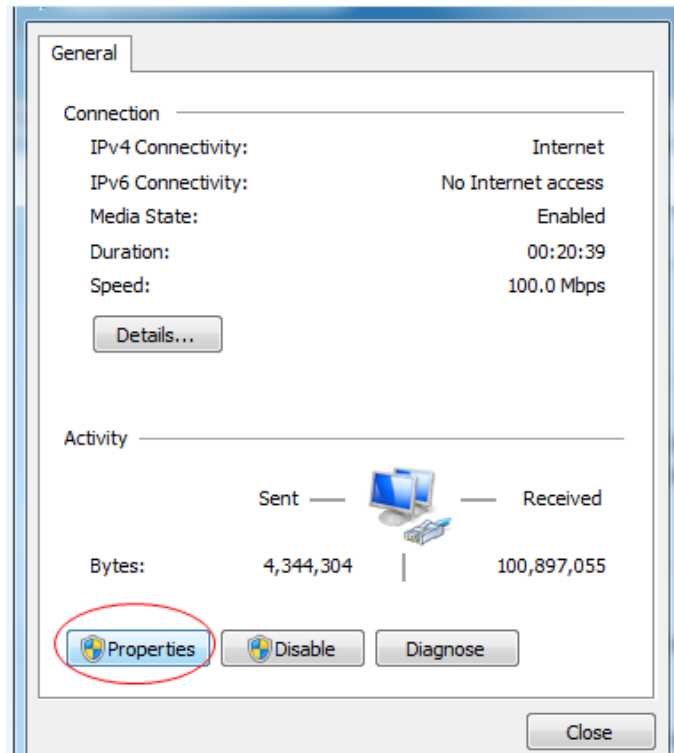


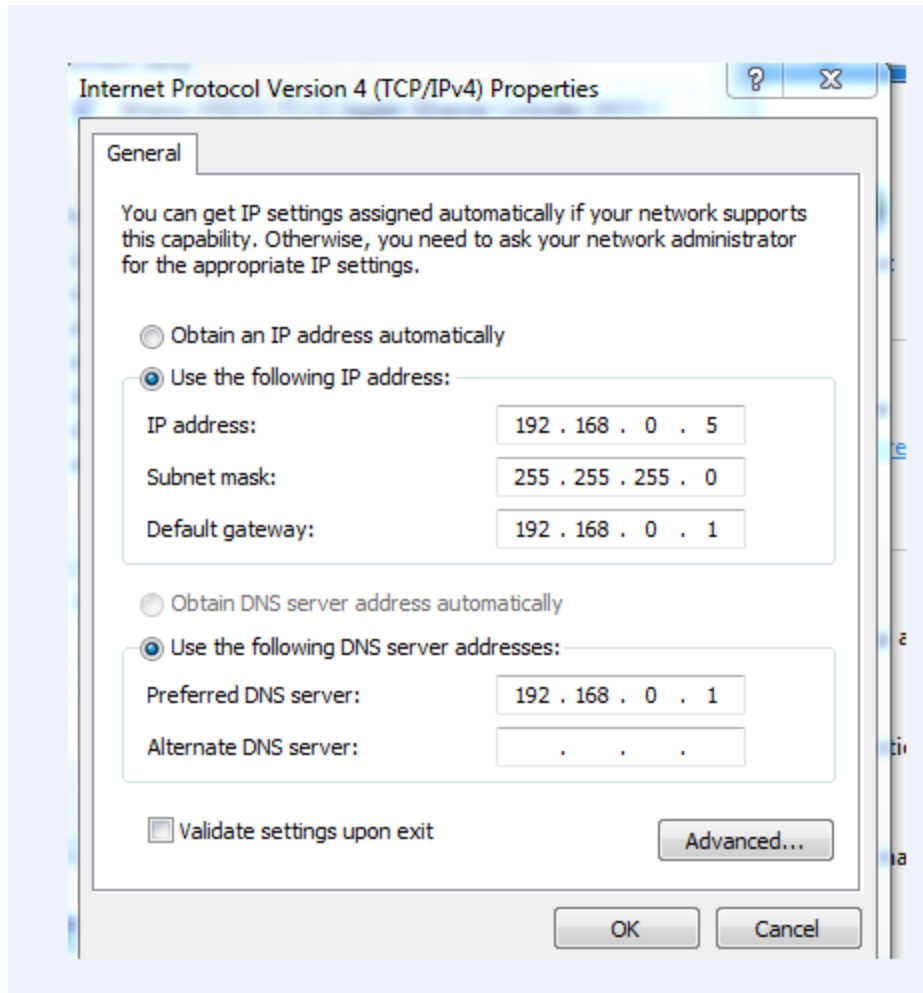
5.3 WEB Management Interface (Web GUI)

The user can use a web browser to check the working conditions and basic parameters of the amplifier. The amplifier supports IE, Chrome, Firefox, Opera and other web browsers. The following examples are based on Opera browser.

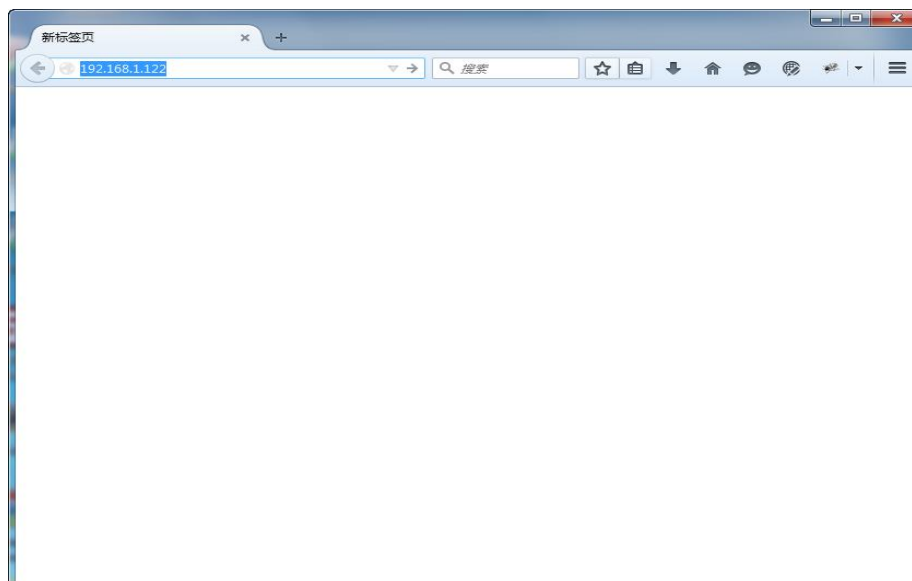
1. Find the IP add in the machine, normally it is 192.168.0.22, set the IP address of the PC in the same range as the following images:



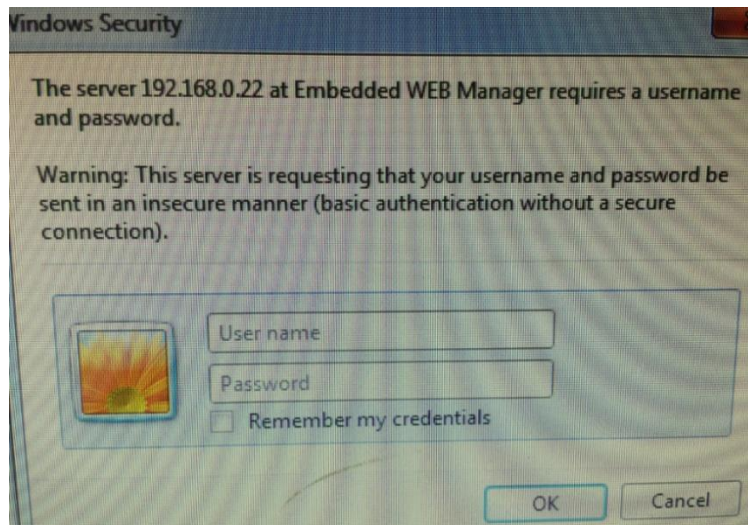




2. Open web browser, input the IP address, For example: 192.168.0.22



Log in to the page.



Default user name and password:

User name: admin

Password: ascent

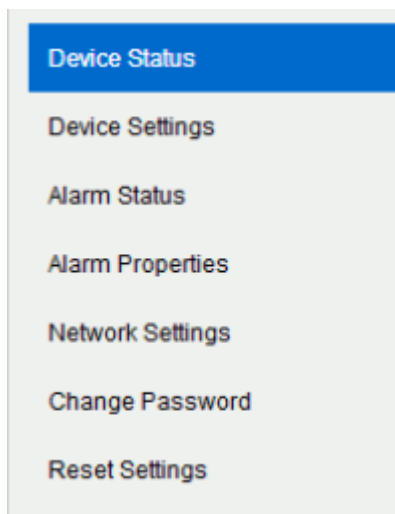
(Password is **123456** after factory reset)

3. Working condition version:

A screenshot of a web browser displaying the "AT5000 EDFA WEB Manager" interface. The browser's address bar shows "192.168.1.122". The page has a blue header with the "ASCENT Communication Technology" logo and the title "AT5000 EDFA WEB Manager". On the left is a sidebar menu with options: "Device Status", "Device Settings", "Alarm Status", "Alarm Properties", "Network Settings", "Change Password", and "Reset Settings". The "Device Status" section is active, showing various parameters in a list: "Device Model" (AT-50-EDFA-20-16-SC), "Serial Number" (180205123456), "Internal Temperature" (44.1 °C), "Input Power" (6.7 dBm), "Total Output Power" (34.0 dBm), "Single Output Power" (20.0 dBm), "DC Power +5V" (5.3 V), "Power Supply 1" (Fault), "Power Supply 2" (Normal), "FAN1 Status" (Normal), "FAN2 Status" (Normal), and "FAN3 Status" (Normal). Below this list is a table with 4 columns: "Pump", "BIAS", "TEMP", and "TEC". The table has 2 rows of data. At the bottom right of the page, there is a small circular gauge showing "38%". The footer of the page reads "Copyright © 2011-2017 Ascent Communication Technology Limited".

Pump	BIAS	TEMP	TEC
1	350 mA	24.4 °C	0.29 A
2	6560 mA	25.0 °C	0.00 A

4. Items guide on the left, click to enter:



Embedded WEB Manager x

192.168.1.122

ASCENT Communication Technology **AT5000 EDFA WEB Manager**

Device Status

Device Settings

Alarm Status

Alarm Properties

Network Settings

Change Password

Reset Settings

Device Status

Device Model AT-50-EDFA-20-16-5C

Serial Number 180205123456

Internal Temperature 44.1 °C

Input Power 6.7 dBm

Total Output Power 34.0 dBm

Single Output Power 20.0 dBm

DC Power +5V 5.3 V

Power Supply 1 Fault

Power Supply 2 Normal

FAN1 Status Normal

FAN2 Status Normal

FAN3 Status Normal

Pump	BIAS	TEMP	TEC
1	350 mA	24.4 °C	0.29 A
2	6560 mA	25.0 °C	0.00 A

0.1K/s
0K/s
38%

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Embedded WEB Manager x 192.168.1.122

ASCENT Communication Technology **AT5000 EDFA WEB Manager**

Device Status
Device Settings
 Alarm Status
 Alarm Properties
 Network Settings
 Change Password
 Reset Settings

Device Settings

PUMP Status:
 Set Output ATT: dB

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Embedded WEB Manager x 192.168.1.122

ASCENT Communication Technology **AT5000 EDFA WEB Manager**

Device Status
 Device Settings
Alarm Status
 Alarm Properties
 Network Settings
 Change Password
 Reset Settings

Alarm Status

Index	Parameter Name	Alarm Status
1	Output optical power	Nominal
2	Input optical power	Nominal
3	FAN1	Nominal
4	FAN2	Nominal
5	FAN3	Nominal
6	Power Supply 1	DiscreteMajor
7	Power Supply 2	Nominal
8	Internal Temp	Nominal
9	Pump1 BIAS	Nominal
10	Pump2 BIAS	Nominal
11	Pump1 TEC	Nominal
12	Pump1 Temp	Nominal
13	DC +5V	Nominal

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Embedded WEB Manager x 192.168.1.122

ASCENT Communication Technology **AT5000 EDFA WEB Manager**

Device Status
Device Settings
Alarm Status
Alarm Properties
Network Settings
Change Password
Reset Settings

Alarm Properties

Index	Parameter Name	HHH	HI	LO	LOLO	Deadband	Action
1	Output optical power (dBm)	27.0	26.0	11.0	10.0	0.5	Set
2	Input optical power (dBm)	10.0	8.0	-6.0	-10.0	0.2	Set
3	Internal Temp (°C)	85	70	5	0	2	Set
4	Pump1 BIAS (mA)	900	800	100	80	20	Set
5	Pump2 BIAS (mA)	15000	10000	100	80	20	Set
6	Pump1 TEC (A)	2.00	1.50	-1.50	-2.00	0.10	Set
7	Pump1 Temp (°C)	35.0	30.0	20.0	15.0	1.0	Set
8	DC +5V (V)	6.5	6.0	4.0	3.5	0.2	Set

Index	Parameter Name	Control	Action
1	FAN1	EnableMajor	Set
2	FAN2	EnableMajor	Set
3	FAN3	EnableMajor	Set
4	Power Supply 1	EnableMajor	Set
5	Power Supply 2	EnableMajor	Set

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Embedded WEB Manager x 192.168.1.122

ASCENT Communication Technology **AT5000 EDFA WEB Manager**

Device Status
Device Settings
Alarm Status
Alarm Properties
Network Settings
Change Password
Reset Settings

Network Settings

Device MAC: 00 : B9 : A0 : 12 : 4E : 1C

Update Identifier: OA138TG11

Agent Version: V1.0.0

Static IP Address: 192 . 168 . 1 . 122

Subnet Mask: 255 . 255 . 255 . 0

Default Gateway: 192 . 168 . 0 . 1

Trap Address 1: 192 . 168 . 1 . 200

Trap Address 2: 255 . 255 . 255 . 255

Trap Address 3: 0 . 0 . 0 . 0

Trap Address 4: 0 . 0 . 0 . 0

Trap Address 5: 0 . 0 . 0 . 0

Trap Address 6: 0 . 0 . 0 . 0

Trap Address 7: 0 . 0 . 0 . 0

Trap Address 8: 0 . 0 . 0 . 0

Read Community: public

Write Community: public

Trap Community: public

SNMP Version: V1

Save

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Embedded WEB Manager x 192.168.1.122

ASCENT Communication Technology **AT5000 EDFA WEB Manager**

Device Status
Device Settings
Alarm Status
Alarm Properties
Network Settings
Change Password
Reset Settings

Change Password

Username:
Password:
New Username:
New Password:
Confirm Password:

Submit Reset

0 K/s 41%
0 K/s

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Embedded WEB Manager x 192.168.1.122

ASCENT Communication Technology **AT5000 EDFA WEB Manager**

Device Status
Device Settings
Alarm Status
Alarm Properties
Network Settings
Change Password
Reset Settings

Restore settings and Reboot device

- Reboot device

Reboot device

- Restore factory settings

Warning!!
Click the restore button, all parameters will be restored to factory default.

Restore Factory

- Restore Net parameters:
 - IP Address: 192.168.1.8
 - Subnet Mask: 255.255.255.0
 - Gateway Address: 192.168.1.1
 - TRAP Address 1: 192.168.1.200
 - TRAP Address 2: 255.255.255.255
- User parameters:
 - User name: admin
 - Password: 123456

Restore net

0 K/s 41%
0 K/s

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6 Troubleshooting

6.1 Fiber Optic Maintenance

Any time the fiber leads to the amplifier are disconnected, there is the potential for contamination of the ends of the fiber connectors. Dirt or other contaminants on these components can reduce the amplifier's performance and can result in permanent damage to the device. It is recommended that the fiber connectors be cleaned prior to connection, or reconnection, to the system.

6.2 Troubleshooting Conditions

<i>No lights ON</i>	Is the power on? Is the fuse OK?
<i>Pin fail ON</i>	Is the optical input power too low? Is the input connector dirty?
<i>Pout fail ON</i>	Check the optical output power and pump parameters on the LCD. Contact ACT Technical Support.
<i>Pump alarm ON</i>	Check the pump parameters on the LCD. Contact ACT Technical Support.



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