Erbium-Ytterbium-Doped

Fiber Amplifier

HF300-3915 series

User's Manual

1 Use safety matters

Please read the following carefully before installing and using the product. The company does not assume any responsibility for any losses caused by breach of safety.

- The output of the laser and the erbium-doped fiber amplifier is high-power invisible radiation. When the device is working, the connecting end face should not be directly viewed to avoid burning eyes and skin.
- The device contains precision optics, so as to avoid damage caused by severe impact, please avoid violent vibration and collision. The pigtail is easy to break, please be careful.
- The device contains static sensitive components. Please be careful and ensure that the grounding is good and the power supply is normal.
- In areas where the grid voltage is unstable or where the grid voltage waveform is poor, it is best to use an AC voltage regulator to supply power.

Special considerations for fiber end faces:

(1) Be sure to keep the input and output pigtail end faces clean before use. In particular, if there is any object on the output end face, it is easy to burn the output pigtail end face and make the output power smaller. When cleaning the fiber end face or inserting the optical jumper, please turn off the input light. If you clean the end face with alcohol, you need to wait until the alcohol on the end face is completely dry before passing the light.

(2) The correct order of plugging and unplugging optical ports is: insert, first insert the output port optical jumper and then plug in the input port optical jumper; pull out, first pull out the input port optical jumper, then pull out the output port optical jumper.

(3) This EYDFA is a high-precision and high-stability product. In order to achieve high stability of output power, please use an optical jumper that is of good quality and matched with the interface to connect the output port. In principle, the shorter the jumper, the better, and do not let the jumper move freely.

(4) If the EYDFA is not in use, if there is no active cable connector connected to the input and output of the EYDFA, please cover the dust cap to avoid contamination of the input and output terminals.

If you encounter any problems, please contact us. Do not disassemble the outer casing and internal modules, as this will cause irreparable damage.

2 product description

HF300-3915 series Erbium-Ytterbium-Doped Fiber Amplifier(EYDFA) core device uses high reliability pump laser, using unique APC (automatic power control) and ATC (automatic temperature control) circuit and software control technology, output Power stability, good environmental stability, etc.; unique optical path design to ensure excellent optical path indicators; high stability and high precision microprocessor with well-designed control software, so that reliable system automatic adjustment, accurate display parameters, intelligent operation .

The EYDFA consists of two parts: the optical gain module and the microprocessor control system. The working principle is shown in Figure1 as below

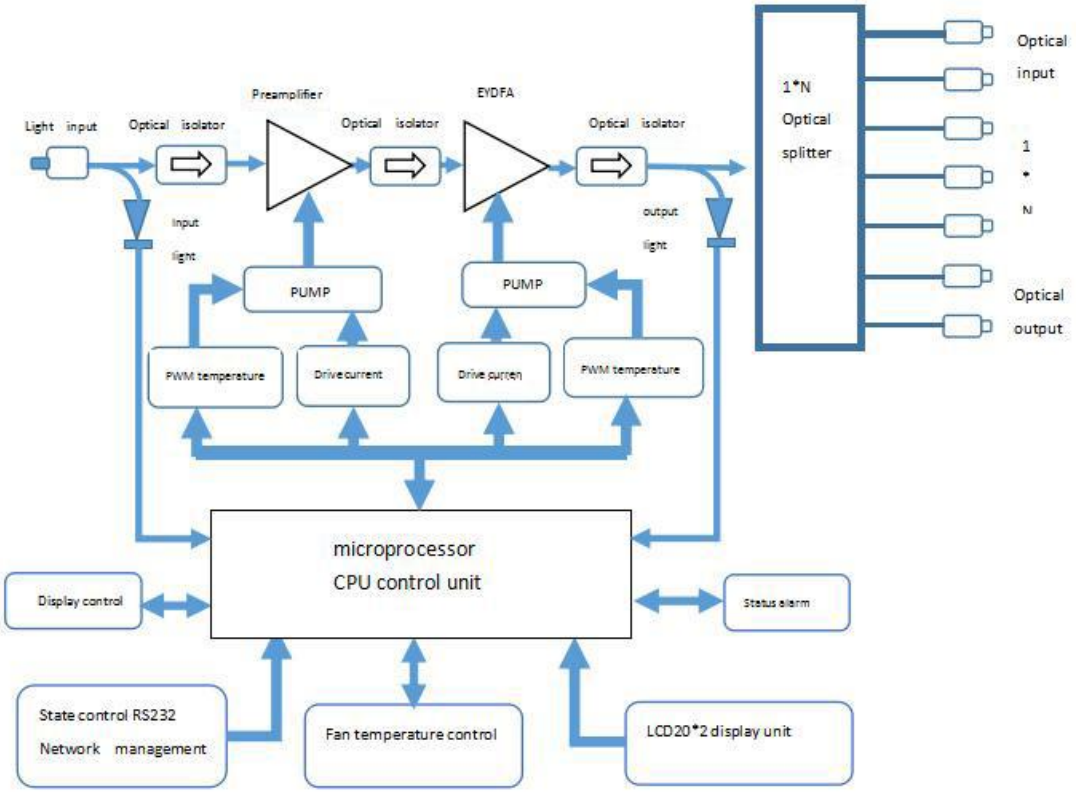

Figure 1 HF300-3915 series EYDFA schematic

The system controller performs the following functions:

(1) Monitor and display the basic parameters of the erbium-doped fiber amplifier, including the parameters of each PUMP laser (bias current, cooling current (single mode pump), operating temperature), input and output optical power, etc. Value, as well as system parameters.

(2) Alarm function: Each PUMP bias current, cooling current (single mode pump), temperature, input and output optical power and various power supply voltages exceed the standard alarm.

(3) Intelligent monitoring and management system. The RJ45 network management interface can monitor all internal states of EYDFA in real time in the remote equipment room.

3 Use instructions

To ensure that EYDFA works properly, be sure to do the following:

(1) Connection

- Ensure that the whole machine is well grounded;
- Measure the input optical power, confirm that it is within the EYDFA input optical power range, check whether the connector type of the optical jumper used for input and output is consistent with the EYDFA optical interface connector, and clean the connector end face;
- Connect the input and output optical jumpers.

(2) Switching machine

- With the key switch turned off, plug in the rear panel power cord, connect the power cord, and turn on the power switch; at this time, the front panel LCD display is lit and the LED indicator power light is green. After a while, open the front panel key switch, and after 5-10 minutes of warm-up, the amplifier will enter normal operation;
- The shutdown sequence is the opposite of the startup. Turn off the key switch first, then turn off the power switch after a while, and unplug the power cord.

(3) LED indicator

The front panel LED indicators indicate the following:

- Power indication

  When the power light is turned on, the green LED lights up.
- Alarm status display

  The warning light should be off during normal operation, and the red light flashes after the pump laser is turned off (including the key switch is off and various alarm states, such as: input optical power is less than -5dBm)
- Alarm

  Various alarm status flash red LED.
- Remote monitoring

  When the external computer is connected to the amplifier, you can view the working parameters of the device through the web page. First enter 192.168.1.100 (default IP address) in the address bar of the browser, confirm the carriage return, and the login interface will enter the default user name "admin". , the password "admin".

(4) Button description

- Page up button ▲

  Press this button to view the parameters of EDFA from bottom to top. When modifying, this button will adjust the data.
- Enter ▶

  Go to the next submenu; after the modification is completed, the key confirms the modification.
- Page down button ▼

Press this button to view the parameters of EDFA from top to bottom. When modifying, this button will adjust the data.

- Exit button ◀

Go to the next submenu; after the modification is completed, the key will exit the modification.

(5) Display menu description

The device manufacturer and model number are displayed at power-on. When any of the status display buttons are not pressed for more than 60 seconds, the display backlight will be automatically dimmed to maintain the current display information. Press the page up button and the display backlight will be illuminated and displayed. Display the device manufacturer and model number when powering up. When any of the status display buttons are not pressed for more than 60 seconds, the display backlight will be automatically dimmed to maintain the current display information. As long as you press any button again, the display backlight will be illuminated and display 1 page.

At this time, only the up and down buttons are valid, press the button to jump to the 2 display, press the button to jump to the last page.

E	**Y**	**D**	**F**	**A**														
						H	**F**	**3**	**0**	**0**	**-**	**3**	**8**	**1**	**5**	**C**	**-**	**2**	**2**

A) Display the input optical power interface. If the input optical power is normal, the display is as follows

I	**N**	**P**	**U**	**T**		**P**	**W**	**R**										
													5	**.**	**0**	**0**	**d**	**B**	**m**

If the input optical power is lower than -15.00dBm, the second line will display "NO INPUT".At this time, only the up and down buttons are valid, press the button to jump to the 3 display, press the up button, and jump 1 to display.

I	**N**	**P**	**U**	**T**		**P**	**W**	**R**										
												N	**O**		**I**	**N**	**P**	**U**	**T**

B) Display the single output optical power interface. If the output optical power is normal, the optical power of the current single output is displayed as follows.

E	**A**	**C**	**H**		**O**	**U**	**T**	**P**	**U**	**T**		**P**	**W**	**R**				
												2	**2**	**.**	**3**	**0**	**d**	**B**	**m**

If the output optical power is lower than -7.00dBm, the second line will display "NO OUTPUT"At this time, only the up and down buttons are valid, press the button to jump to the 4 display, press the up button, and jump 2 to display.

E	A	C	H		O	U	T	P	U		P	W	R						
											N	O		O	U	T	P	U	T

C) shows the total output optical power interface if The optical power is low -7.00dBm, and the second line will display "NO OUTPUT"

T	O	T	A	L		O	U	T	P	U	T		P	W	R				
											N	O		O	U	T	P	U	T

At this time, only the up and down buttons are valid, press the button to jump to the 5 display, press the up button, and jump to the 3 display.If the total output optical power is normal, the current total output optical power is displayed as follows

T	O	T	A	L		O	U	T	P	U	T		P	W	R				
											3	7	.	3	0	d	B	m	→

At this time, only the up and down right buttons are valid, press the button to jump to the 5 display, press the up button, and jump to the 3 display.Press the right button to jump to the total output optical power setting interface display.When the total output optical power is normal, press the right button to enter the total output optical power setting interface, as shown below.

S	E	T	U	P		T	O	T	A	L		O	U	T	P	U	T		←
											3	7	.	3	0	d	B	m	→

When the button is pressed, the output optical power is increased by 0.10dBm each time. When the button is pressed, the output optical power is reduced by 0.10dBm each time, and the setting range defaults to 29.30dBm-35.30dBm. Automatically becomes the minimum value when the maximum value is exceeded. Press the right button on the total output optical power setting interface to save the set value, press the left button to exit the current page and return to the total output optical power interface.

D) Display pump 1 laser bias current interface When the key is turned on, the normal display to 403mA, the display is as follows

P	U	M	P	1		C	U	R	R	E	N	T							
													4	0	3	.	0	m	A

At this time, only the up and down buttons are valid, press the button to jump to the 6 display, press the up button, and jump to the 4 display.

E) Display TEC cooling / heating current interface is shown below

P	U	M	P	1		T	E	C		C	U	R	R	E	N	T			
															0	.	0	0	A

At this time, only the up and down buttons are valid, press the button to jump to the 7 display, press the up button, and jump to the 6 display.

F) display laser temperature interface display as follows

P	U	M	P	1		T	E	M	P	E	R	A	T	U	R	E			
														2	5	.	0	°	C

At this time, only the up and down buttons are valid, press the button to jump to the 8 display, press the up button, and jump to the 6 display.

G) shows the pump 2 current interface

P	U	M	P	2		C	U	R	R	E	N	T							
															6	.	5	6	A

At this time, only the up and down buttons are valid, press the button to jump to the 9 display, press the up button, and jump to the 7 display.

H) display machine pump 2 temperature interface

P	U	M	P	2		T	E	M	P	E	R	A	T	U	R	E	T		
														2	9	.	0	°	C

At this time, only the up and down buttons are valid, press the button to jump to the 10 display, press the up button, and jump to the 8 display.

I) Display the internal temperature interface of the chassis as shown below

I	N	T	E	R		T	E	M	P	E	R	A	T	U	R	E	T		
														2	7	.	0	°	C

At this time, only the up and down buttons are valid, press the button to jump to the 11 display, press the up button, and jump to the 9 display.

J) Display the alarm status interface

A	L	A	R	M		S	T	A	T	U	S								
																			→

At this time, only the up and down right buttons are valid, press the button to jump to the 12 display, press the up button, jump to the 10 display, press the right button, enter the submenu to display the alarm status page information display priority in the following order from high to Low display 1. Laser key is off; 2. Input optical power alarm, alarm is mainly divided into current alarm, temperature alarm, total output

optical power alarm, cooling and heating alarm, internal temperature alarm, power supply 10.5V, 11. In addition to the key alarm The status is one of 2 (OFF, ON) states, and the remaining alarms are all one of 5 (HIHI, HI, LO, LOLO, NORMAL) states; entering the submenu, only the up and down left buttons are valid, press the button, jump To the alarm status display of the next item, press the up button to jump to the previous alarm status display, press the left button to exit the submenu and return to the display alarm status interface.The submenu alarm page is as follows

L	**A**	**S**	**E**	**R**		**K**	**E**	**Y**										←
																O	**F**	**F**

I	**N**	**P**	**U**	**T**		**P**	**W**	**R**		**A**	**L**	**A**	**R**	**M**				←
																H	**I**	**H**	**I**
T	**O**	**T**	**A**	**L**		**O**	**U**	**T**	**P**	**U**	**T**		**P**	**W**	**R**			←
A	**L**	**A**	**R**	**M**												**L**	**O**	**L**	**O**
P	**U**	**M**	**P**	**1**		**C**	**U**	**R**	**R**	**E**	**N**	**T**		**A**	**L**	**A**	**R**	**M**	←
																L	**O**	**L**	**O**

P	**U**	**M**	**P**	**1**		**T**	**E**	**C**		**C**	**U**	**R**	**R**	**E**	**N**	**T**		←
A	**L**	**A**	**R**	**M**										**N**	**O**	**R**	**M**	**A**	**L**
P	**U**	**M**	**P**	**1**		**T**	**E**	**M**	**P**	**E**	**R**	**A**	**T**	**U**	**R**	**E**	**T**	←
A	**L**	**A**	**R**	**M**										**N**	**O**	**R**	**M**	**A**	**L**

P	**U**	**M**	**P**	**2**		**C**	**U**	**R**	**R**	**E**	**N**	**T**		**A**	**L**	**A**	**R**	**M**	←
																L	**O**	**L**	**O**
P	**U**	**M**	**P**	**2**		**T**	**E**	**M**	**P**	**E**	**R**	**A**	**T**	**U**	**R**	**E**			←
A	**L**	**A**	**R**	**M**										**N**	**O**	**R**	**M**	**A**	**L**

P	**W**	**R**	**1**															←
															L	**O**	**L**	**O**

P	**W**	**R**	**2**															←
													N	**O**	**R**	**M**	**A**	**L**

K) Interface for displaying device information

P	**A**	**R**	**A**	**M**	**E**	**T**	**E**	**R**	**S**		**I**	**N**	**F**	**O**					
																		→

At this time, only the up and down right buttons are valid, press the button to jump to the 13 display, press the up button, jump to the 11 display, press the right button to enter the submenu device information.

Sub-menu device information, the current working voltage of two 5V power supplies, serial number SN code, factory date, device online time, sub-menu, only the up and down left buttons are valid, press the button to jump to the next item of device information Display, press the up button, skip to the previous device information display, press the left button to exit the submenu and return to the display device information interface.The submenu is shown below

5	**.**	**0**	**V**		**P**	**W**	**R**	**1**							**0**	**.**	**0**	**V**	←
5	**.**	**0**	**V**		**P**	**W**	**R**	**2**							**5**	**.**	**0**	**V**	

S	**e**	**r**	**i**	**a**	**l**		**N**	**u**	**m**	**b**	**e**	**r**							←
F	**A**	**1**	**3**	**0**	**1**	**-**	**1**	**8**	**0**	**2**	**0**	**0**	**0**	**0**	**0**	**1**			

M	**a**	**n**	**u**	**f**	**a**	**c**	**t**	**u**	**r**	**e**		**D**	**a**	**t**	**a**				←
												1	**8**	**/**	**0**	**1**	**/**	**0**	**1**
O	**n**	**l**	**i**	**n**	**e**		**T**	**i**	**m**	**e**									←
				x	**x**	**x**	**x**	**D**	**a**	**y**	**s**		**x**	**x**	**H**	**o**	**u**	**r**	**s**

L) Display device network information interface main display is as follows

N	**E**	**T**	**W**	**O**	**R**	**K**		**I**	**N**	**F**	**O**							
																		→

At this time, only the up and down right buttons are valid, press the button to jump to the 14 display, press the up button, jump to the 12 display, press the right button to enter the first level submenu of the network information.The first level submenu has the display device information IP address, subnet mask address, gateway address, submenu, the up, down, left and right buttons are valid, press the button, jump to the next item's network address display, press the button, Skip to the previous network address display, press the left button to exit the first level submenu and return to the display device information interface, right click to enter the second level submenu.

In the second-level submenu, modify the corresponding address up, down, left and right buttons to be valid, left button to exit the secondary menu and save the modification, right button is to move the cursor to the right, the number of the up key increases, the number of the down key decreases.The primary IP address submenu display and secondary IP address submenu are modified as follows.

I	**P**		**A**	**D**	**D**	**R**												←
				1	**9**	**2**	**.**	**1**	**6**	**8**	**.**	**0**	**0**	**1**	**.**	**1**	**0**	**0**	→

S	**E**	**T**	**U**	**P**		**I**	**P**		**A**	**D**	**D**	**R**							←
				1	**9**	**2**	**.**	**1**	**6**	**8**	**.**	**0**	**0**	**1**	**.**	**2**	**2**	**2**	→

The subnet mask address submenu display and the secondary netmask address submenu are modified.

M	**A**	**S**	**K**		**A**	**D**	**D**	**R**										←
				2	**5**	**5**	**.**	**2**	**5**	**5**	**.**	**2**	**5**	**5**	**.**	**0**	**0**	**0**	→
S	**E**	**T**	**U**	**P**		**M**	**A**	**S**	**K**		**A**	**D**	**D**	**R**					
					2	**5**	**5**	**.**	**2**	**5**	**5**	**.**	**2**	**5**	**5**	**.**	**0**	**0**	**0**

The primary gateway address submenu display and secondary mesh mask address submenu are modified as follows.

G	**A**	**T**	**E**	**W**	**A**	**Y**		**A**	**D**	**D**	**R**							
					1	**9**	**2**	**.**	**1**	**6**	**8**	**.**	**0**	**0**	**1**	**.**	**0**	**0**	**1**

S	E	T	U	P		G	A	T	E	W	A	Y		A	D	D	R		
					1	9	2	.	1	6	8	.	0	0	1	.	0	0	1

M) Restore factory settings interface main display is as follows

R	E	S	T	O	R	E		F	A	C	T	O	R	Y					
																			→

At this time, only the up and down right buttons are valid, press the button to jump to 1 display, press the up button, skip to 13 display, press the right button to enter the restore factory settings confirmation interface submenu.

In the submenu, press the left button to cancel the factory reset and jump to the factory reset main interface; press the right button to confirm the factory reset, the display restores the factory settings successfully, and then press the left button to jump to the factory reset. Main interface.

R	E	S	T	O	R	E		F	A	C	T	O	R	Y					←
												C	O	N	F	I	R	M	→

R	E	S	T	O	R	E		F	A	C	T	O	R	Y					←
												S	U	C	C	E	S	S	

Main Specifications

description	value	unit	Condition/content
Optical characteristics			
Working wavelength	1540 ～ 1563	nm	Single wavelength
Input optical power	-10 ～ 10	dBm	
Output optical power	+27 ～ 38	dBm	
Number of output ports	8 ～ 64	PCS	2U（The number of output ports can be customized）
Output power per port	+16 ～ 23	dBm	can be customized
Output power adjustable range	-6 ～ 0	dBm	
Output optical power stability	±0.2	dB	

Polarization sensitivity	0.2	dB	
Polarization mode dispersion	0.5	PS	
Noise Figure	< 5.5	dB	Input 3 dBm
Input and output pump light eakage	<-35	dBm	
Input reverse noise power	<-30	dBm	
Input and output reflection loss	> 45	dB	
Carrier-to-Noise Ratio (CNR)	≥51	dB	EDFA input optical power +5dBm, standard optical transmitter, 10km optical fiber (input 10km optical fiber power is not more than 16.5dBm), ambient temperature 25°C, in AGC mode, 59 PAL-D carriers, modulation per channel is 4.0% , 0dBm input optical power receiver
Secondary distortion (CSO)	≥60	dB	
Third distortion (CTB)	≥65	dB	
Fiber optic connector	SC/APC，LC/APC		optional
Power supply requirements			
voltage	110～265	VAC	Single and dual power supply optional
working frequency	50～60	Hz	
Power consumption	<150	W	
Environmental parameters			
range of working temperature	0～50	℃	
Storage temperature range	-25～80	℃	
Storage relative humidity	≤95	%	No condensation

Mechanical structure

Adopt 19" standard 2U chassis: 485.0 (long) X440 (wide) X88.0 (height).

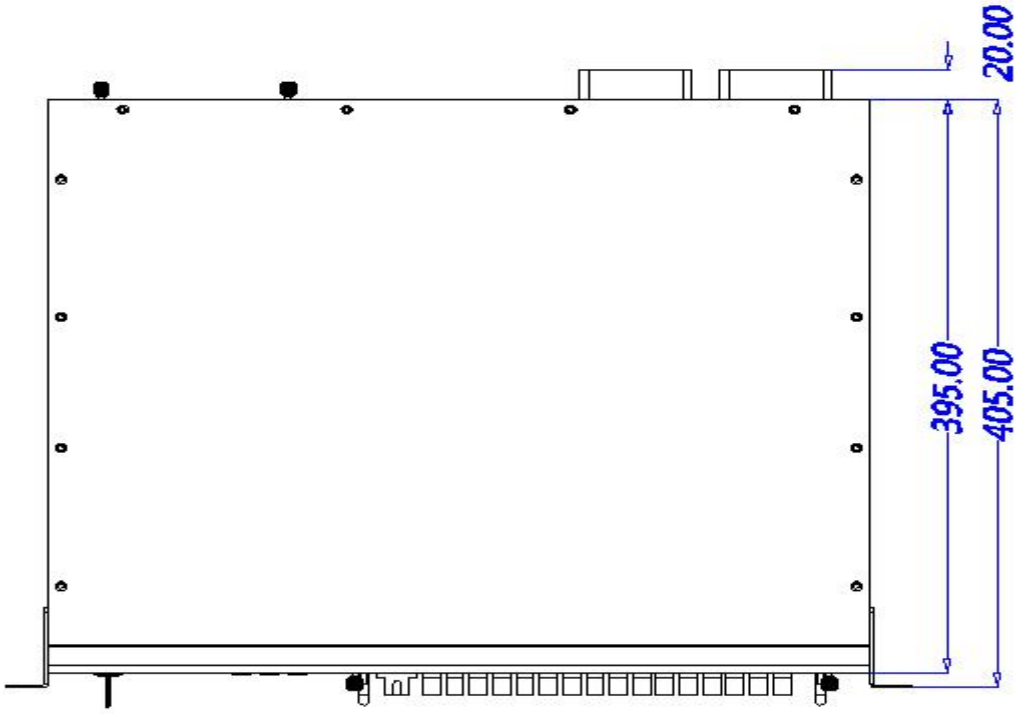

Figure 1 EYDFA dimensions

Front panel schematic

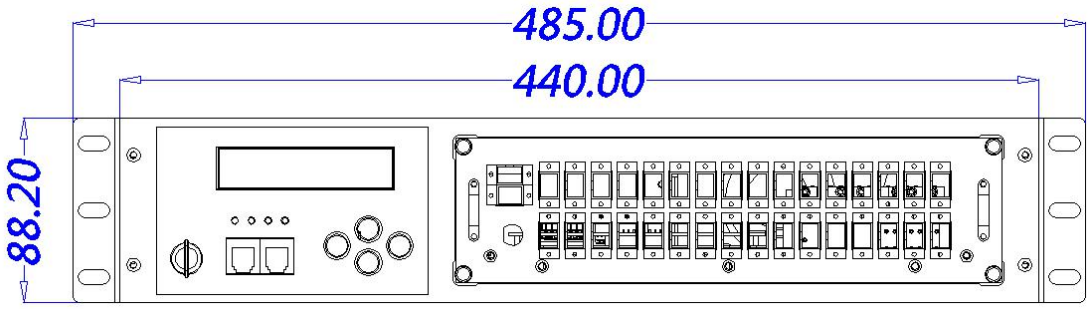

Figure 2 Front panel schematic

Rear panel schematic

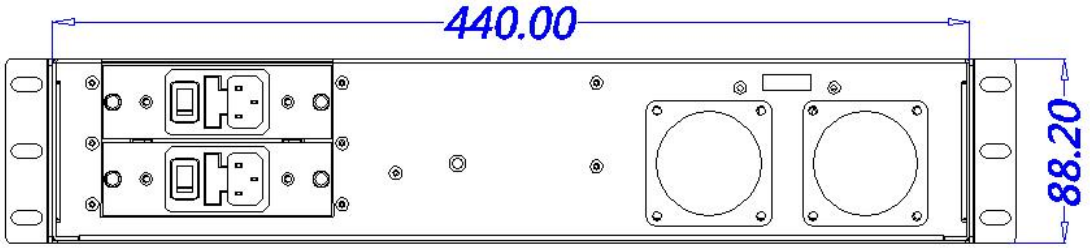

Figure 3 Rear panel schematic

Alarm failure analysis

Alarm content	possible reason	Pre-repair inspection
Pin<input threshold, input no light alarm	1.The optical transmitter has no light output; 2.The input connector is not connected; 3.The connector end face is damaged; EYDFA is damaged;	1.Check the input optical power with an optical power meter; 2.Clean the input optical connector;Re-plug the connector;
Pout<output threshold, output no light alarm	1. The pump switch is not turned on; 2.The input light wavelength is not between 1530nm and 1560nm; EYDFA is damaged;	1.Check if the pump switch status is in the ON state; 2.Confirm that the input light wavelength is between 1550 nm and 1560 nm;Whether the ambient temperature is too high, causing the pump to automatically shut down;
Pump current varies greatly, pump current alarm	1.Changes in pump laser characteristics; 2. Internal circuit detection deviation; The pump laser is damaged;	1. Whether the ambient temperature is too high, the working temperature of the chassis is 0-50 °C, and the temperature inside the cabinet is much higher than the ambient temperature when the ventilation is not good; 2. Whether the cooling and ventilation of the cabinet environment is good; 3. Whether the cooling vents on both sides of the chassis are blocked;Whether to place the EYDFA between the devices with the heat source up and down, and the device spacing is less than 20mm;
Pump output power drops, output light alarm	1. Internal circuit detection deviation; 2. The pump laser is degraded; The pump laser is damaged;	
Pump laser high cooling current, TEC current alarm	1. The ambient temperature of EYDFA is too high; 2. The pump laser refrigerator fails; The pump laser is damaged;	
Pump laser temperature is too high, pump temperature alarm	1. The ambient temperature of EYDFA is too high; Pump laser refrigerator failure;	