



**EDFAMUX V2**  
**User & Installation Manual**

**EDFAMUX | SO-DUAL-EDFA | SO-EDFA**

Version 2.6 (April 2024)



## INTRODUCTION

Please note: Reading this entire manual is mandatory for a full understanding of the correct use of this product.

This manual is written with the intent to fully inform the user as to the specific installation instructions and safety requirements of the Solid Optics EDFAMUX product line.

Solid Optics EDFAMUX products undergo extensive internal testing procedures in order to meet our strict quality control standards and are in full compliance with CE (including RoHS and REACH), WEEE and FCC regulations.

This manual will first give an overview of specific warning symbols (**"1. WARNINGS & SYMBOLS"**), prior to instructing the user on the technical aspects of the EDFAMUX (**"7. Prior to connecting the dark fiber to the COM port, conduct cleaning and inspection procedures."**) and then will cover specific installation procedures (**"3. CONFIGURATION"**). In the final chapters the manual will cover the specific risks and considerations when using, installing or altering the EDFAMUX (**"3. CONFIGURATION"** and **"6. DRAWINGS, CIRCUIT DIAGRAMS & SIMPLEX CHANNELS"**). In conclusion, the manual covers what to do when a malfunction occurs (**"7. IN CASE OF MALFUNCTION"**), or maintenance needs to be performed ("").

Please be advised that our EDFAMUX is specifically designed and sold to customers in the business-to-business market. Only trained and experienced network professionals should install, remove or service a Solid Optics EDFAMUX. For any

questions regarding the EDFAMUX, including installation, malfunction, or maintenance - please contact our Technical Support Department at the email addresses and phone numbers listed on page 17. This manual is not intended as part of any agreement and is merely used to provide the customer with general information regarding the installation of the EDFAMUX.

Please read this manual carefully and ensure that you comply with all strict warnings provided herein. For specific product information, please refer to the datasheet of your respective EDFAMUX. The latest version of each datasheet is published on our website [www.solid-optics.com](http://www.solid-optics.com) and contains important technical requirements and other product specific information.

[Should you have any comments on this manual, please direct them to:](#)

Solid Optics EU N.V. | Veluwezoom 15E 1327 AE Almere | Phone: +31(0)88 342 3776 | Mail: [info@solid-optics.com](mailto:info@solid-optics.com)



## WARRANTY AND LIABILITY

We guarantee that the product you receive has been thoroughly tested to ensure that it meets its published specifications. The warranty included in the conditions of delivery is valid only if the product has been installed and used according to the instructions supplied by Solid Optics. We shall in no event be liable for incidental or consequential damages, including without limitation: lost profits, loss of income, loss of business opportunities, loss of use and other related exposures, however caused, arising from the faulty and incorrect use of the product.





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## 1. WARNINGS & SYMBOLS



### CAUTION: IMPORTANT SAFETY INSTRUCTIONS

This warning symbol indicates that the reader should be cautious. Please take notice of the fact that when you use an item labelled with this symbol, improper use may cause bodily injury. Before you work on any equipment, be aware of the hazards involved with electrical circuitry and be familiar with standard practices for preventing accidents.



### CAUTION: CLASS 1 LASER PRODUCT

This warning indicates caution is necessary. There is visible laser radiation present. Avoid viewing of the laser with naked eye.



### DO NOT DISPOSE

This symbol indicates that you may not dispose the equipment as unsorted municipal waste as per 2002/96/EC (WEEE directive). For proper recycling, return the equipment to your local supplier upon the purchase of equivalent new equipment, or dispose of it at designated collection points. For more information see: [www.recyclethis.info](http://www.recyclethis.info).



### RECYCLING

This symbol indicates that the equipment (packaging) may require recycling in accordance with your own local laws. Contact your local regulatory authorities for more information. #31 = Paper or Fibreboard / Plastic

### RoHS

#### HAZARDOUS GOODS

This symbol indicates that the equipment complies with Directives 2011/65/EU (RoHS II) and 2002/95 EC (RoHS I).



### CE MARK

This symbol indicates that Solid Optics EU N.V. tested the equipment in accordance with applicable European standards and it is safe. The CE-symbol indicates that this product also complies with the requirements of Directive 2014/30/EU. It does not generate, or is not affected by, electromagnetic disturbance.



### FCC MARK

This symbol indicates that Solid Optics EU N.V. tested the equipment in accordance with the applicable Federal Code Of Regulation (CFR) FCC 47 Part 15, subpart B and it is safe. The FCC- symbol indicates that the electromagnetic interference from the product is under limits approved by the Federal Communications Commission. It does not generate, or is not affected by, electromagnetic disturbance.



### ESD

This symbol indicates that the user should only (dis)connect the equipment in an EPA (ESD Protected Area), while using only certified equipment and taking all necessary precautions.



### LASER CLASS 3B

This symbol indicates that the equipment complies with 21 CFR 1040.10 and 1040.11, except for deviations pursuant to Laser Notice No. 50, dated June 24, 2007.



### ANATEL

This symbol indicates that Solid Optics EU N.V. has tested the equipment in accordance with the relevant Brazilian standard, ensuring its safety. The Anatel symbol confirms compliance with Anatel regulations, indicating that the product does not generate electromagnetic disturbance or is affected by it.



### Warnings:

The intra-building port(s) (list the port or ports) of the equipment or subassembly is suitable for connection to intra-building or unexposed wiring or cabling only. The intra-building port(s) of the equipment or subassembly MUST NOT be metalically connected to interfaces that connect to the OSP or its wiring for more than 6 meters (approximately 20 feet). These interfaces are designed for use as intra-building interfaces only (Type 2, 4, or 4a ports as described in GR-1089) and require isolation from the exposed OSP cabling. The addition of Primary Protectors is not sufficient protection in order to connect these interfaces metalically to an OSP wiring system.

### Compliance Statement:

The EDFAMUX complies with relevant Directives and Regulations of the European Union (EU) and the United States of America (US) such as the EMC- and ROHS-Directive, as well as the Reach Regulation. Please consult your sales agent or our office for further detailed information on compliance and conformity statements. For safety reasons, the EDFAMUX should not be switched on or in operation/processing data/running measurements when installing or removing it. Only trained and qualified network professionals should install, replace, or service the EDFAMUX. For further (safety) warnings please read chapter "6. DRAWINGS, CIRCUIT DIAGRAMS & SIMPLEX CHANNELS" carefully.

## 2. TECHNICAL DESCRIPTION

The EDFAMUX is an all-in-one optical transmission device which incorporates the functions of a Mux/Demux, Amplifier/s, and a Dispersion Compensator in order to aggregate multiple optical channels over long distances. It utilizes a non-harmful Class 3B laser which sends out light in the non-visible infrared spectrum. This equipment can operate with 110v AC, 220v AC and 48v DC, depending on which power supplies are installed.

## 3. PHYSICAL INSTALLATION

### Requirements:

Before proceeding, make sure you have the following items:

- console cable conforms to CISCO specification using a speed of 115200.
- ethernet cables.
- compatible transceivers.
- LC patch cables to connect transceivers.
- OTDR report of the dark fiber.
- one-click cleaner tools (LC Connector).

### Physical Installation Steps:

1. Unbox the EDFAMUX and its accesories
2. Mount the EDFAMUX onto the standard 19-inch rack and establish a grounding connection between the device and the rack.
3. Power:
  - i. AC Power:
    - a. Utilize the provided power cord to connect each power supply to the primary power source
  - ii. DC Power:
    - a. Employ 12 to 24AWG cables to connect the included DC block (reference images of the DC Block and DC Power supply).
    - b. Connect the Input PWR (-) of the Power Supply to the -48V of the DC Feed.
    - c. Connect the Input PWR (+) of the Power Supply to the 0V of the DC Feed.
    - d. Establish a connection between the Power Supply's GND and the GND of the DC Feed. If the DC Feed lacks a GND terminal, connect to the rack ground.

Please refer to AC and DC Power drawings p.17.



4. Connect the console port (marked as CON) to the computer using a rollover RJ45 to RS232 or USB console cable.
5. Connect the Ethernet port (marked as ETH) to the switch using a straight rj45 cable (CAT5 or greater)
6. Before connecting the optical patches from the transceivers, perform cleaning and inspection, then connect each patch to the corresponding port.
7. Prior to connecting the dark fiber to the COM port, conduct cleaning and inspection procedures.

## 4. CONFIGURATION

### 4.1. Initial Configuration

To ensure a smooth installation process for the Solid Optics EDFAMUX, please follow these steps:

#### Before you begin:

- For comprehensive visual guidance on installation, please click [here](#)<sup>1</sup>. Our Knowledge Base for instructional videos covering both initial setup and maintenance procedures (see chapter "").
- For pairing EDFAMUX Simplex channels, please refer to Chapter **"5. DRAWINGS, CIRCUIT DIAGRAMS & SIMPLEX CHANNELS"**

#### Installation Steps:

1. Before making any connections, ensure all fiber cable ports and transceivers are thoroughly cleaned.
2. Connect the dark fiber cable on both ends to the EDFAMUX COM Port.
3. Ensure electrical redundancy by connecting the EDFAMUX to two separate

<sup>1</sup>Edfamux QuickStart Tutorial: <https://www.youtube.com/watch?v=wSP2RWWATr8>

<sup>2</sup>After changing the password, the default password **"admin"** won't apply in the next steps

<sup>3</sup>This won't interrupt the functionality of the EDFA DCM

<sup>4</sup>Aggregate damage threshold of the optic

<sup>5</sup>Please be aware that the booster and pre-amp will change automatically according to the fiber distance

power sources.

4. Connect the console, ethernet cable and power up all devices.

5. Begin the CLI initial configuration:

- a. Configure (use "admin" as the password).
- b. Set ethernet to static.
- c. Set ethernet IP, mask and gw.
- d. Set system passwd<sup>2</sup>.
- e. Commit changes and reboot<sup>3</sup>

Repeat these steps at the corresponding site of the network.

6. If continuing with the CLI, refer to chapter **"4.5. Command Line Reference"** for command line details.

Alternatively, access the EDFAMUX management website by typing the previously assigned IP address into a web browser.EDFAMUX that you created in the previous step to continue in the EDFAMUX

management website:

- a. Navigate to settings (see **"Figure 1"** p.8) and select **"optical"** submenu.
- b. Use default **"admin"** or newly assigned password (from step 5).
- c. Enter the **"Fiber Length"** in the TDCM box<sup>4</sup>
- d. Click **"Apply changes"**

7. Using Single Mode Fiber patch cables, connect each DWDM optical transceiver to the corresponding channel on the EDFAMUX.

8. After connecting each DWDM optic, verify the RX values:

- a. For 100G EDFAMUX: between 2 and 6 dBm<sup>5</sup>
- b. For EDFAMUX SIMPLEX & Next Generation: between -5 and 3 dBm<sup>1</sup>
- c. For 10G EDFAMUX: between -21 and -7 dBm.<sup>5</sup>



If adjustments are needed, follow these steps (based on "Figure 1" p.8):

- a. Click on the slide button to enable:  
**"Manually override amplification values",**
- b. Modify values accordingly:
  - if values are too high, adjust Pre-Amp first, then Booster Amp.
  - if values are too low, adjust Booster Amp first, then Pre-Amp.
- c. Apply changes and repeat the process at the corresponding site of the network if necessary.

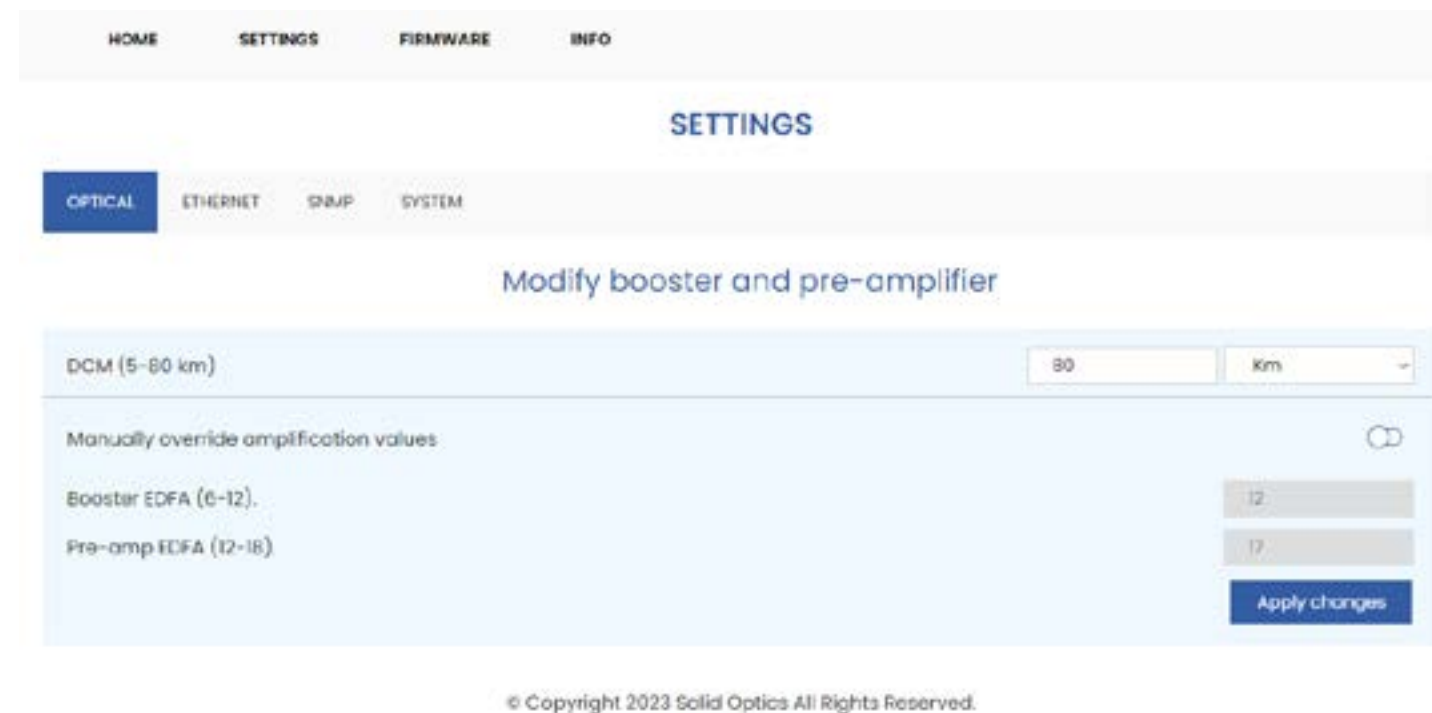


Figure 1

## 4.2. Network Configuration

### 4.2.1. ETHERNET CONFIGURATION

Access the EDFA web browser and navigate to settings. Click on the Ethernet configuration submenu to perform the following operations:

1. Enable Static IP<sup>1</sup> by clicking on the slide button.
  - a. Configure IP Address, Gateway and Subnet mask.

<sup>1</sup> By default the EDFAMUX will use DHCP

- b. Click on **"Save"**.
2. Perform a Ping (For troubleshooting or verification):
  - a. Enter the destination IP address.
  - b. Click on **"Ping"**.

### 4.2.2. SNMP CONFIGURATION

Access the EDFA web browser and navigate to settings. Click on the SNMP submenu:

1. Configure System contact, System location, port, and the community string as necessary (see "Figure 2" p.8)
2. To configure SNMP traps:
  - a. Enable SNMP traps by clicking on the slide button.
  - b. Set the destination IP address
  - c. Click on **"Save"**

The EDFAMUX uses SNMP version 2c – You can download the MIB file from the EDFA web browser in the SNMP submenu.

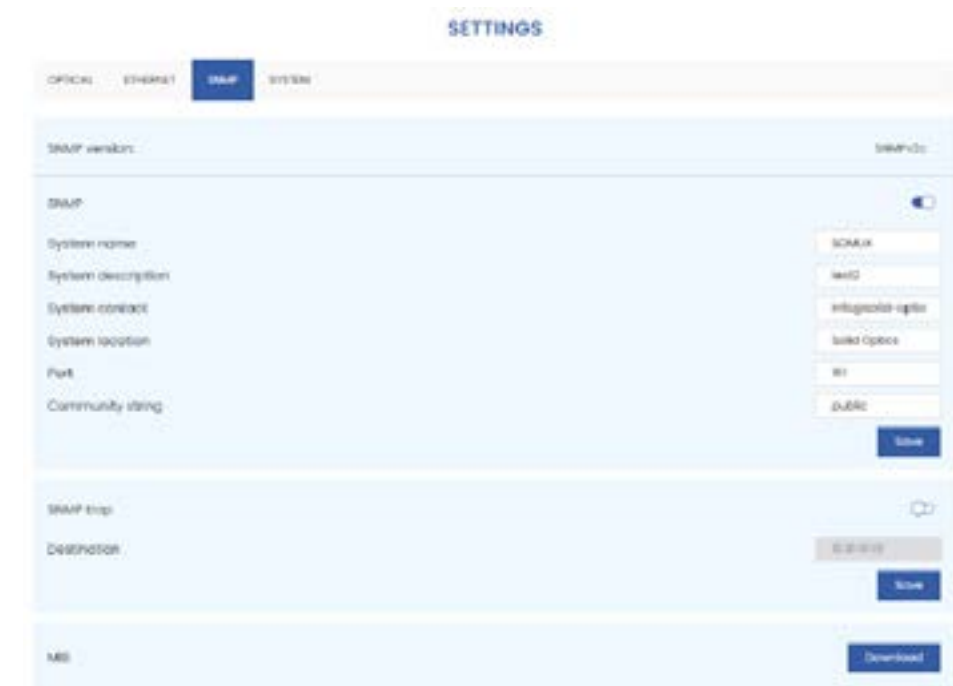


Figure 2





### 4.3. Firmware Upgrade

For firmware updates, navigate to the EDFA management site and select the Firmware menu. Click on the download button to access the download page, where you can find the latest firmware version.

Once on the download page, scroll down and locate the version labeled **NMUv2** (the file name begins with [unified\\_nmuv2](#) ....., as shown in "Figure 3" p. 9)

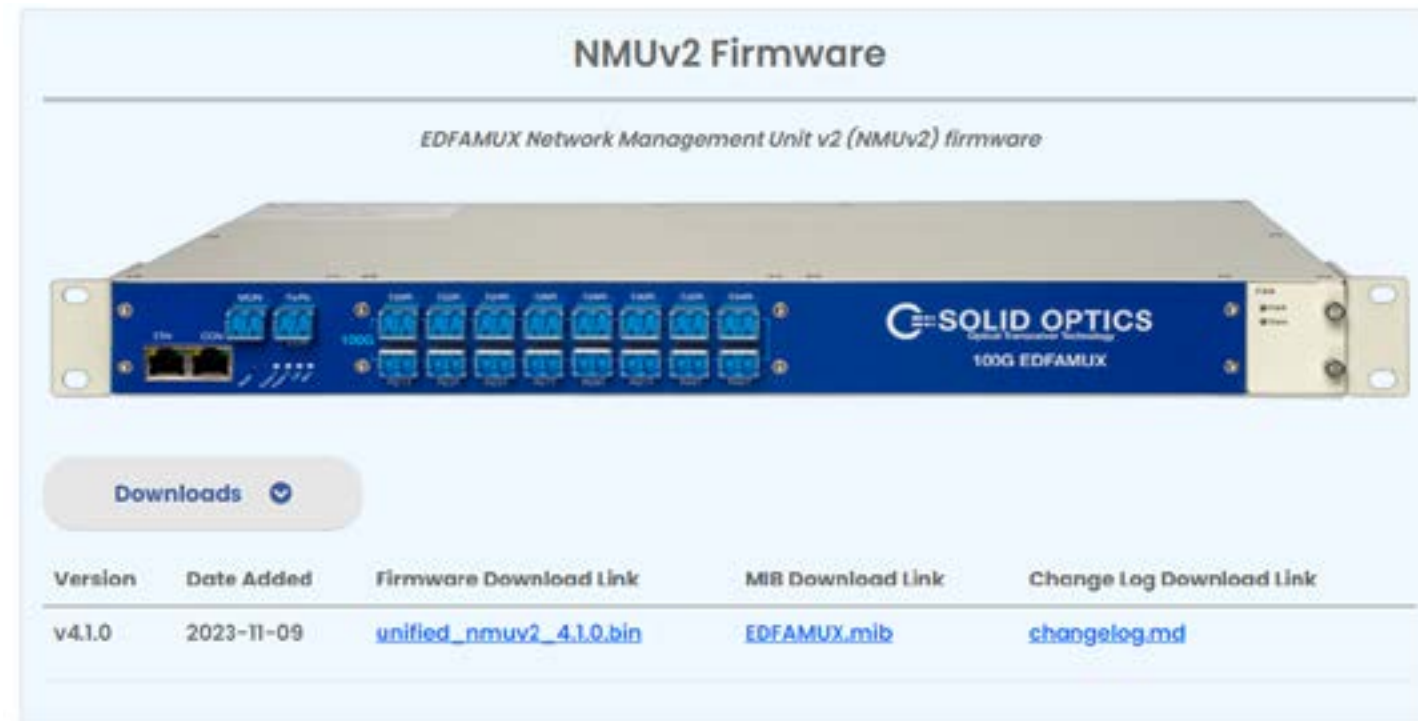


Figure 3

To update your Firmware, (refer to "Figure 4" p.9) follow these steps:

- Return to the Firmware menu on the EDFA management site.
- Click on "Choose File" to upload the firmware file.
- Click on "Update".

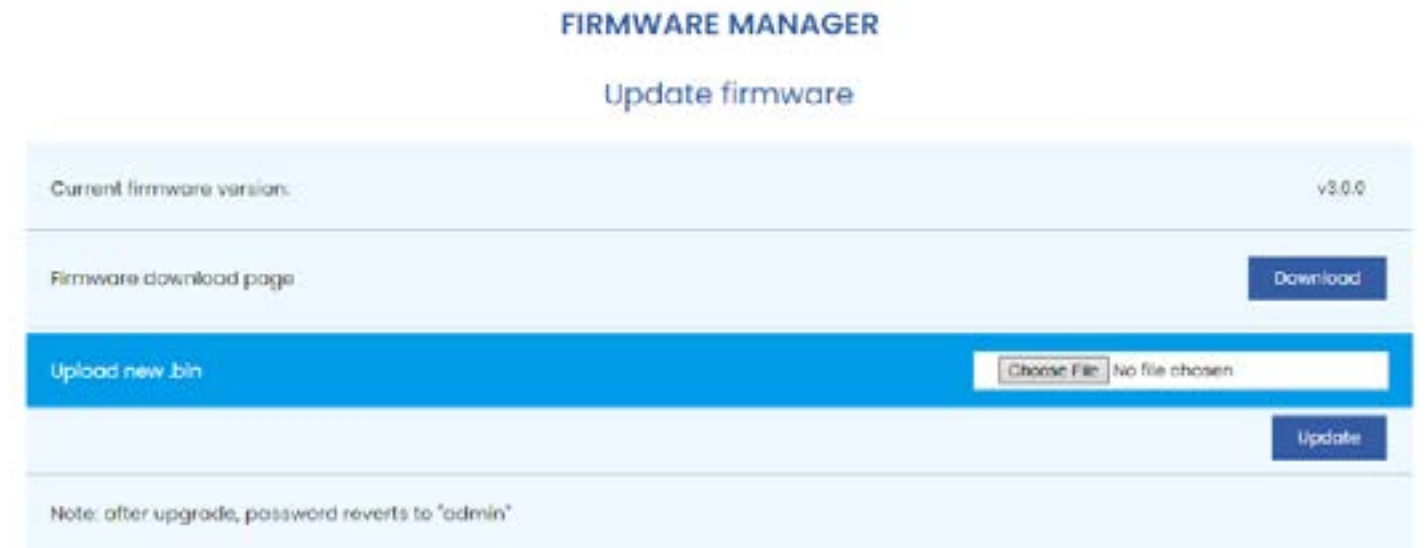


Figure 4

### 4.4. Password Configuration

The password grants access to the Settings and Firmware menu, with a timeout period of 15 minutes.

To change the password, follow these steps:

- Navigate to the EDFA management site.
- Access the Settings menu and then select System.
- Scroll down to locate the section for changing the settings password.
- Input the old password (1), new password (2), confirm new password (3), and click on "Change" (4).



## 4.5. Command Line Reference

The serial console connector adheres to Cisco specifications, Baud rate 115200, 8 bits, 1 stop bit, no parity or flow control. The available commands are as follows: Commands in **red** require authentication, Commands in **green** are to read

only, all other commands are get/set. All set commands require the user to be in configure mode. Exit can be used to leave configure mode without committing changes.

-	get   show								
-	set								
-	configure								
-	commit								
-	exit								
-	ping								
-	clear   cls								
-	<b>reboot</b>								
-	help   ?								
		<b>optical</b>	↴					<b>system</b>	↴
				pre	<float>			ntp	↴ <enable   disable>
				booster	<float>			ip	<ip address>
				dcm distance	<integer>			timezone	GMT <-12 - +14>
		<b>ethernet</b>	↴					dst	<enable   disable>
				static	<enable   disable>			time	<d/m/y H:M:S>
				ip	<ip address>			timeformat	<12   24>
				mask	<mask>			dateformat	<dmy   ymd>
				gw	<gateway>			<b>status</b>	
				dns	<dns>			<b>apikey</b>	
				<b>mac</b>				<b>passwd</b>	
				autonegotiate	<enable   disable>			hostname	
		<b>monitor</b>	↴						
				snmp	↴				
						port	<0-65535>		
						sysdescr	<string>		
						syscontact	<string>		
						sysname	<string>		
						syslocation	<string>		
						community	<string>		
				syslog	↴				
						port	<int>		
						ip	<ip address>		



## 4.6. HTTP API Specification

All API requests are unsecured. Only the reboot command is protected with a basic authentication key, which must be passed with the header, "Authorization" c.q. "Authorization: xxxxxxxx". The authentication key is generated from the system password and you can find it here:

**the EDFA management site page > Settings > System**

Furtermore, you can use the http API for monitoring EDFAMUX:

[http://<edfamux\\_IPaddress>/api/setting/get?type=<number>](http://<edfamux_IPaddress>/api/setting/get?type=<number>)

The base request url must be fill out with <edfamux\_IP\_address> in the beginning and <number> that stands for the specific information by the end. Below you can find the numbers that you can use in the request:

- 1 Device data  
(serial number, firmware version, power supply status, uptime)
- 2 WLAN data  
(Wi-Fi status, SSID, password)
- 5 EDFA data  
(readings, min/max values, tunable/static, DCM status)
- 6 Reboot device (see above) 10- SNMP data
- 22 Sensor data  
(same data as in API 5/readings, but keyed as floating-point values for easy readouts)

All data is returned as JSON objects.

## 5. SAFETY GUIDELINES AND WARNINGS

When removing or (un)installing Fiber-optic cables / EDFAMUX, please note the following warnings:



Warning CLASS 1 Laser Product: Do not look directly into an EDFAMUX or into the ends of fiber optic cables. EDFAMUX and Fiber-optic cables which are connected to a transceiver emit laser light that can damage your eyes.



Do not leave an EDFAMUX uncovered except when inserting or removing a cable. The safety cap keeps the port clean and prevents accidental exposure to laser light.



Only trained and qualified personnel should be permitted to install, replace, or service the EDFAMUX.

### General:

- Use the Solid Optics EDFAMUX only for the purpose it was designed for.
- To avoid overheating the EDFAMUX, please use the appropriate and qualified rack space and only use the EDFAMUX in spaces designed to store/use regular network equipment (no harsh or extreme environments).
- To minimize shock hazard, the EDFAMUX must be connected to a properly grounded receptacle. Not properly grounding the EDFAMUX is considered dangerous and may lead to damage.
- Do not use the EDFAMUX in the presence of flammable gases or fumes.
- Do not allow unqualified persons to remove covers.
- Do not allow unqualified persons replace components.



- Do not allow unqualified persons to make any internal adjustments.
- Always disconnect power, discharge circuits, and remove external voltage sources before touching components.
- Because of the danger of introducing additional hazards, do not
- install substitute parts or perform any unauthorized modification to the EDFAMUX. In the case of malfunction and/or maintenance please read chapters: "7. IN CASE OF MALFUNCTION".

#### Regarding Fiber Optic Cables:

The EDFAMUX is designed to include fiber optic components/products, including optical connectors to connect optical cables. Unlike electrical wires, the insides of optical cables contain a fiber made of glass. Due to the different properties of optical fiber when compared to the copper used in electrical wires, some additional precautions must be taken as detailed below:

- Avoid bending fiber-optic cable beyond its minimum bend radius. An arc smaller than a few inches in diameter can damage the cable and cause problems which are difficult to diagnose.
- Do not let fiber-optic cable hang free from the connector. Do not allow fastened loops of cable to dangle, which stresses the cable at the fastening point.
- Secure cables in the cable management system so that they are not supporting their own weight. Place excess cable out of the way in a neatly coiled loop, using the cable management system. Placing fasteners on a loop helps to maintain its shape.

#### Regarding The Laser:

The EDFAMUX includes a Laser (Class 3B). which is generally a harmless laser but extra precaution is still advised, therefore it is noted:

- To take extra care when connecting or disconnecting optical fibre cabling or optical transceivers, and to follow the instructions provided in the manuals of

those products;

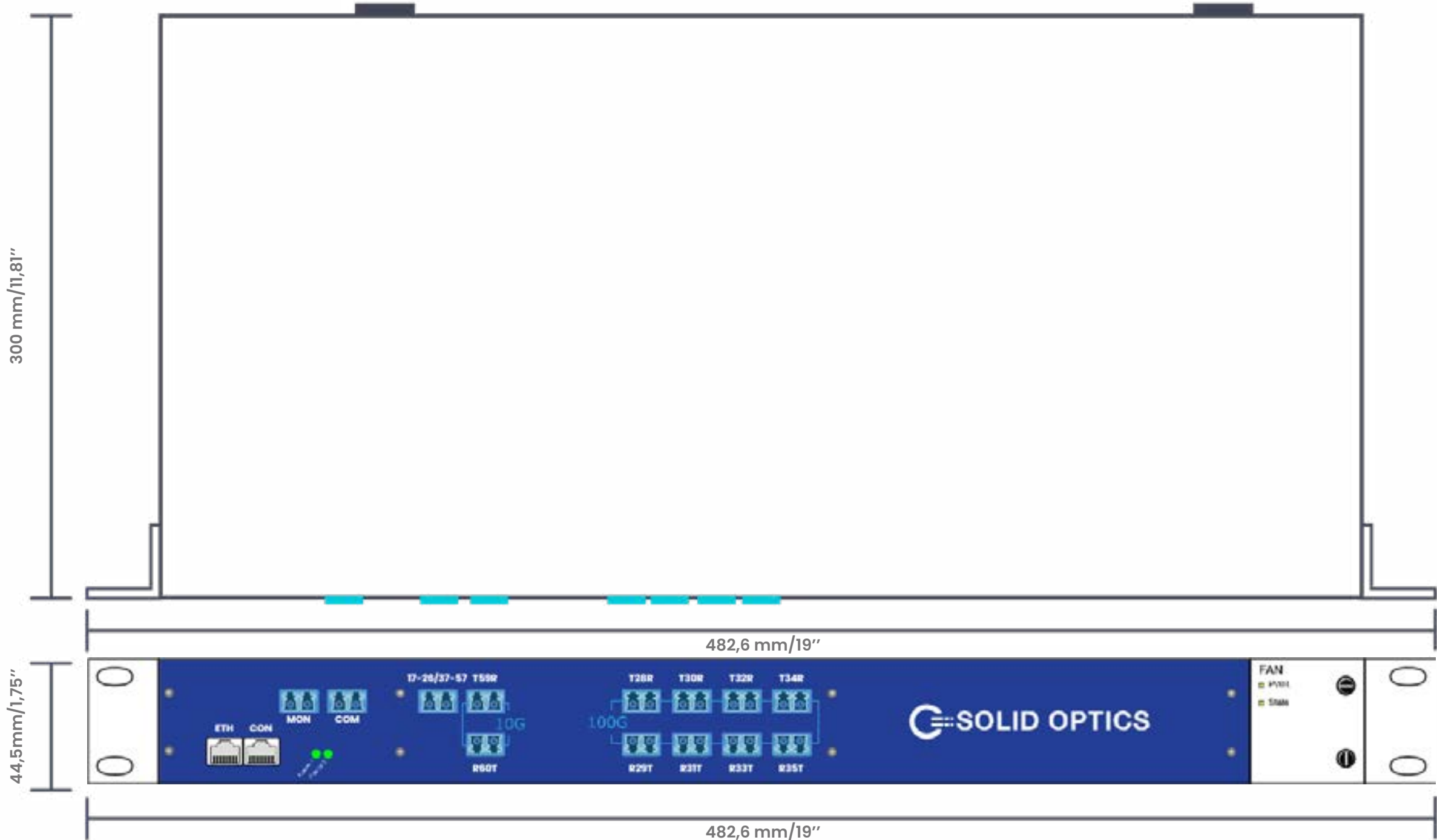
- Not to open the casing of the EDFAMUX, especially when in operation;
- Never to look directly into the end of the fiber or in any opening of the EDFAMUX;
- Never to use a microscope, magnifying glasses, or any kind of eye loop to look into a fiber end or in any opening of the EDFAMUX;
- Always wear appropriate safety eyewear when working with the EDFAMUX.

#### End-of-Life Disposal:

Please follow all local and national laws and regulations when disposing of the Solid Optics EDFAMUX after deinstallation.

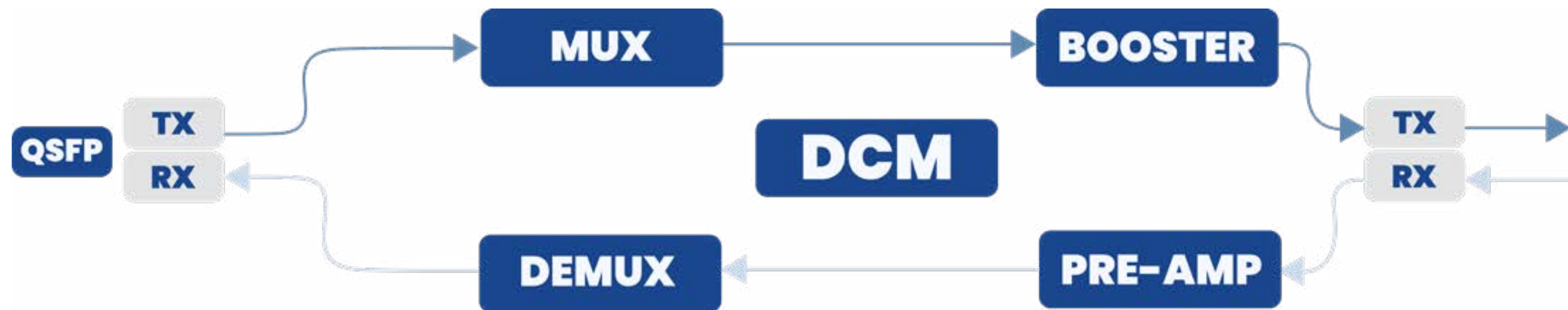


6. DRAWINGS, CIRCUIT DIAGRAMS & SIMPLEX CHANNELS





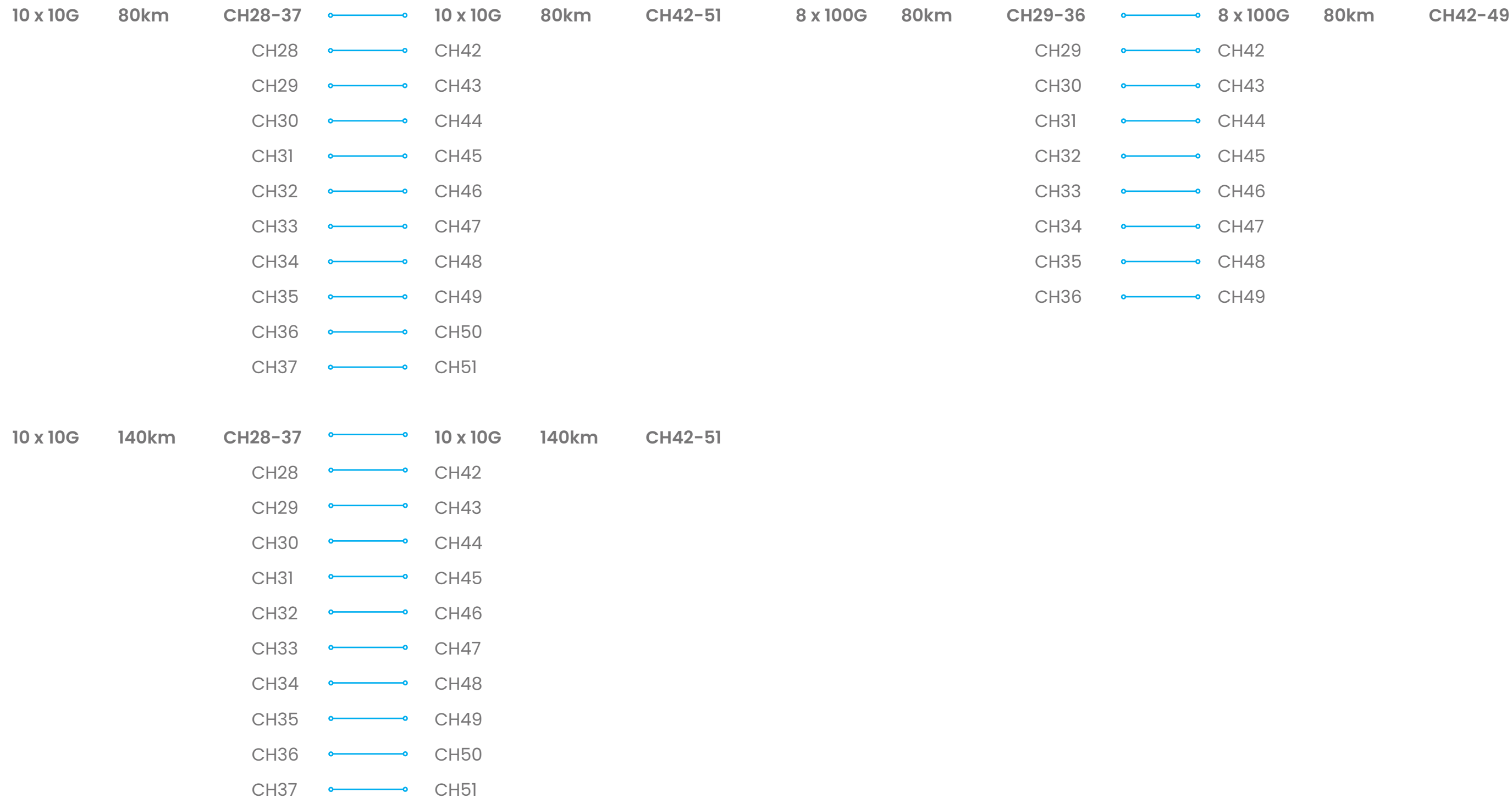
# EDFAMUX Interface Block Diagram<sup>1</sup>



<sup>1</sup> QSFP included for connection clarification



## SIMPLEX Channels





## 7. IN CASE OF MALFUNCTION

If you encounter difficulties with the EDFAMUX, please recheck the instructions and specifications as outlined in the previous pages of this manual.

Also, verify the following:

1. Cables/connectors: Check that all cables/connectors have been properly connected (see chapters "**3. CONFIGURATION**" and "**6. DRAWINGS, CIRCUIT DIAGRAMS & SIMPLEX CHANNELS**");
2. That the unit is receiving power;
3. If possible: Replace the EDFAMUX with a known working EDFAMUX to see if the issue resolves.

In case a malfunction is not resolved, do not open the unit or attempt to alter or repair the EDFAMUX yourself. It contains no user-serviceable parts and may contain hazardous substances. EDFAMUX units which appear damaged or defective, should be made inoperative and secured against unintended operation until they can be repaired by qualified service personnel. For Technical Support Contact, please refer to chapter "**9. Technical Support**" of this manual.

### Warranty

We offer a 3-year warranty for normal usage of the Solid Optics EDFAMUX, provided that the user has not altered the EDFAMUX in any way or used it contrary to its intended purpose. For specific information regarding our warranty, please visit [www.solid-optics.com](http://www.solid-optics.com) for our general terms and conditions.





## 8. MAINTENANCE

No regular maintenance is required for the EDFAMUX when placed in a normal clean environment compliant to the requirements set forth in the specific data-sheet applicable to the chosen EDFAMUX model.

When connecting or disconnecting, follow the procedures as detailed in Chapter "3. CONFIGURATION".

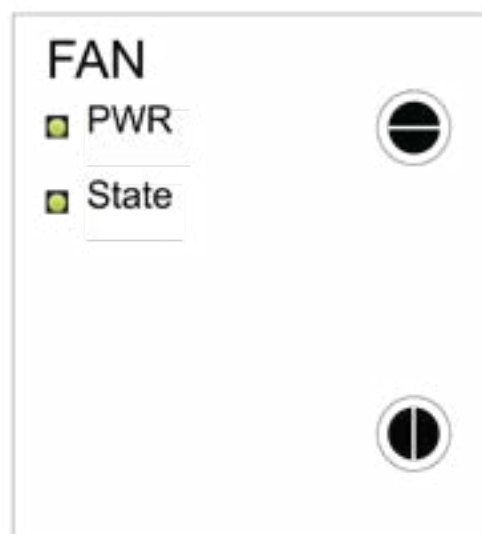
When connecting or disconnecting the EDFAMUX, caution is advised.

For specific warnings, please refer to chapter "6. DRAWINGS, CIRCUIT DIAGRAMS & SIMPLEX CHANNELS" of this manual.

In case of faulty fan tray or power supply, please proceed as follows:

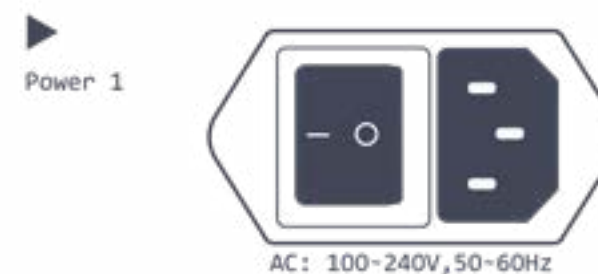
### Fan Tray Replacement Instructions:

1. Please have the replacement fan tray on hand.
2. Unscrew the fan tray and take it out. Please mind you have only 30 seconds to replace it.
3. Insert the replacement and screw it.



### Power Supply Replacement Instructions:

1. Please have the replacement power supply on hand.
2. Unscrew the power supply and take it out.
3. Insert the replacement and screw it.



### AC Power



### DC Power



## 9. TECHNICAL SUPPORT

### EUROPE:

Solid Optics EU N.V.  
 Veluwezoom 15E  
 1327 AE Almere  
 The Netherlands  
 Phone: +31 883 423 776  
 edfamux@solid-optics.eu

### USA:

Solid Optics US  
 Phone: +1 855 678 4271  
 edfamux@solid-optics.com



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Version	Date	Author	Owner	Approved
Version 1.0	08.2019	C.R. Angel	S.Nel	
Version 2.0	10.2019	S.Alonso	S.Nel	
Version 2.1	02.2020	S.Alonso	S.Nel	
Version 2.2	10.2020	S.Alonso	S.Nel	
Version 2.3	09.2021	A. de Kock	S. Nel	S.Alonso
Version 2.4	09.2022		S.Nel	S.Alonso
Version 2.5	06.2023	M.Golebiowska & R. Pernas	S.Nel	S.Alonso
Version 2.6	04.2024	M.Golebiowska	S.Nel	S.Alonso



## Get in touch

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 EU Customer Support  
+31 (0) 88 342 3776  
[info@solid-optics.com](mailto:info@solid-optics.com)

 US Customer Support  
+1 855 678 4271  
[infous@solid-optics.com](mailto:infous@solid-optics.com)