



F-AMP-SM User's Manual

Caution: The user must read this manual before operating the F-AMP-SM unit. Operations other than those described in this manual may result in personal injury and damage to the unit.

Note that any attempt to open or fix the equipment without prior approval by MKS Instruments voids the warranty.

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1. General Information

1.1 Introduction

This manual contains information on the installation and operation of the F-AMP-SM modular which is an erbium doped fiber amplifier unit.

1.2 Product Overview

The MKS F-AMP-SM is a high-gain pre-amplifier module in a multiple source agreement footprint housing. It is an easy-to-use and cost-efficient solution for photonic subsystems, OEM integration, and fiber optic system integration. Using a high gain design, this pre-amp module provides over 30 dB gain with a 4.5 dB noise figure, good for input power level as low as -40 dBm. Software control via an a standard TTL RS-232 interface is available for status monitoring and pump current adjustments. It also features pump laser protection and alarms to ensure the reliability and safety of the device. The F-AMP-SM only requires a single +5 Volt DC power supply for operation. Contact MKS Instruments for more information.

1.3 Features

- F-AMP-SM footprint
- RS-232 standard for remote control
- Wide wavelength operation range
- 30 dB gain
- Low noise figure
- Designed for low input level
- +5V power supply (not included)
- 10+ years of operation life

1.4 User Safety

1. The F-AMP-SM unit emits high intensity invisible light from the optical output receptacle. Avoid direct exposure to skin and eyes.
2. The module case is fully certified for EMS protection. The user should never open the module case; any attempt will void the warranty and may result in electric shock and EMS attack to equipment in the vicinity.
3. The user should avoid using any solvent or vaporizing chemical to clean the exterior. It may result in damage to the surface and internal circuits.

2. Operation

2.1 Introduction

This chapter describes how to operate the F-AMP-SM unit and discusses the location and function of the controls and connectors.

2.2 Initial Inspection

Your F-AMP-SM was carefully inspected before it left the manufacturer. It should be in proper working order upon receipt. You should, however, inspect the unit for any damage that may have occurred in transit. If the shipping container or the packing material is damaged, keep it until the contents of the shipment have been checked to be free of mechanical and electrical damages. Notify MKS Instruments promptly if any notable damage is found.

2.3 Controls

F-AMP-SM – Module and Cables



FEATURE	FUNCTION
① ELECTRICAL CONNECTION PORT, 30 PIN	This port is used to connect the F-AMP-SM module to the power supply and RS232 cable. It is a 30-pin type connector, with the full pin-out diagram shown on page 3 of this manual
② OPTICAL INPUT AND OUTPUT FIBER PORTS	The optical input and output fiber ports for the unit. The fiber ports shown are FC/APC type.
③ AC/DC ADAPTOR	+5V power source that connects to the +5V round port of the F-AMP-SM power adapter

An external optical isolator at specified wavelength should be used to protect the F-AMP-SM from optical feedback and to improve stability.

2.4 30-Pin Connector Pinout Diagram

Listed below is the pin-out diagram for the 30-pin port on the external of the F-AMP-SM module:

+5V	NC	GND	NC	GND	P IN	NC	Alarm	EN	NC	GND	RX TTL	GND	NC	+5V
29	27	25	23	21	19	17	15	13	11	9	7	5	3	1
30	28	26	24	22	20	18	16	14	12	10	8	6	4	2
+5V	NC	GND	NC	GND	P OUT	NC	NC	NC	NC	GND	TX TTL	GND	NC	+5V

F-AMP-SM – Adapter Box



FEATURE	FUNCTION
① F-AMP-SM MODULE CONNECTOR PORT, 30 PIN	This port is used to connect the power supply assembly device to the F-AMP-SM module for operation. It is a 30-pin connector.
② DC POWER SOCKET	The DC power socket is connected to a DC power source. The standard DC power source is the AC/DC power adapter.
③ RS232 PORT	Using a RS232 port, this cable allows for remote control and monitoring through a PC workstation. User can choose between using either USB or RS232.
④ USB PORT	Using a RS232 port, this cable allows for remote control and monitoring through a PC workstation. User can choose between using either USB or RS232.
⑤ ENABLE BUTTON	Hardware button to Enable/Disable F-AMP-SM output.

2.5 Operation Instructions

Start-up Procedure

1. Ensure that the proper cable connections are made, which includes the cable assembly interconnects (as shown on page 4) and the 30-pin connection between the module and power supply.
2. Plug in the After plugging in the AC/DC Power Adaptor into the appropriate socket, the 5V VDC supply will automatically be enabled to the F-AMP-SM.
3. Ensuring the optical input signal is turned off, connect the optical signal for amplification via the optical input port using the indicated connector patchcords.
4. Connect the optical output port using the indicated connector patchcords to the appropriate signal destination to utilize the amplified optical output signal.
5. After checking all physical patch cord connections, turn the input signal laser source on.
6. The F-AMP-SM is now enabled, with the gain current set to maximum amplification for the current input signal level.

Optical Output Adjustment Procedure

To adjust the optical output level via current bias adjustment for the F-AMP-SM, please refer to the PC connection mode in sections 2.6 and 2.7 for more information.

Patchcord Swapping Procedure

1. Through either the AC/DC Power Adaptor disconnection or the computer interface lowering the bias current, disable the optical output of the F-AMP-SM module.
2. Swap patchcords as desired. Only connect the indicated connector patchcords to the optical input/output receptacles, cleaning them as necessary.
3. Re-enable the desired output power by reversing the procedure in step one; normal operation will resume in a few seconds.

Over-temperature Procedure

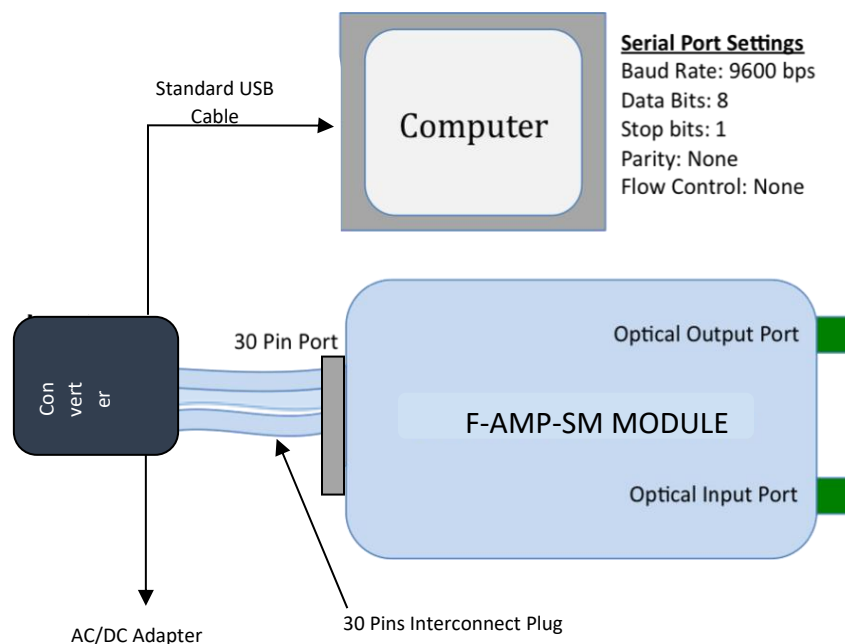
1. When the **Temp Overheat** warning enables the pump laser will shut down automatically and the system will freeze up.
2. Disconnect the AC/DC power adaptor.
3. Restart the unit using the Start-up Procedure described above.

4. To prevent temperature issues in the future, please allow for adequate ventilation and increased heat sinks for proper dissipation of heat.

2.6 PC Connection Mode

For the standard F-AMP-SM, connecting the module to an external PC will allow for parameter monitoring and pump current adjustments. If you have an F-AMP-SM with additional software control, please refer to the additional supplemental manual for complete information.

Using the USB port on the cable assembly, connect the F-AMP-SM module to a PC using the following connection diagram and serial port settings:



2.7 RS232 Command Set

When the electrical connections have been made, and the software settings for serial port transmission are set correctly, you are now able to send commands to the F-AMP-SM module. For the basic F-AMP-SM, there are two commands available:

READ – Displays the current parameters and settings.

SETC:XXX – Sets the current for the output of the laser, in which it will adjust from the current setting to the selected setting in a few seconds. The current selection range is between 0 – 440 mA.

NOTE: All commands are appended with a carriage return and a line feed {CR-LF}.

3. Troubleshooting

SYMPTOM	POSSIBLE CAUSE AND SOLUTION
OPTICAL OUTPUT POWER NOT HIGH ENOUGH.	C: No optical input or optical input power too small. S: Check optical input present or check optical input power is correct.
	C: Optical input/output connectors dirty. S: Disable optical output and clean optical connectors.
	C: Use of incorrect optical adapters or connectors. S: Use only the indicated optical adapters and connectors. If measurement instruments accept different connector type, then use hybrid patchcords.
	C: Optical output connector damaged. S: Measure optical output power with power meter and compare with readout on PC connection 'READ' command. Return to MKS Instruments for repair if the difference is high (>4 dB) and cannot be corrected by cleaning or replacing the optical connectors. Always apply dust cover plugs to unused optical ports to prevent the damage of optical connectors.
F-AMP-SM MODULE IS OVERHEATING	C: Improper pin connections S: If directly connecting the voltage to the 30-pin connector, ensure that all +5 VDC pins are making adequate contact to your supply.
	C: Insufficient ventilation / heat dissipation. S: Place unit in well-ventilated area or supply additional fans for ventilation. You may need to add a heat sink for additional heat dissipation.
OPTICAL OUTPUT POWER UNSTABLE.	C: Insufficient optical output isolation. S: Connect isolator of corresponding wavelength to optical output connector.
UNIT DOES NOT POWER UP.	C: Improper pin connections S: If directly connecting the voltage to the 30-pin connector, ensure that all +5 VDC pins are making adequate contact to your supply.
	C: Insufficient electrical voltage. S: Check that the electrical supply is at least 110 VAC.
	C: AC Power cord is loose. S: Plug power cord is firmly into the unit.
UNIT RESETS OR BLINKS ON AND OFF.	C: Insufficient electrical voltage. S: Check that the electrical supply is at least 110 VAC.

4. Service and Support

4.1 Warranty

MKS Instruments guarantees its F-AMP-SM unit is to be free of defects for 1 year from the date of shipment. The guarantee does not cover any damages resulting from the misuse or improper handling of the equipment, or any incidental or consequential loss. Note that the warranty will be void upon any attempt to open or to fix the equipment by the user without prior approval of MKS Instruments.

4.2 Service and Calibration

Your F-AMP-SM unit has been designed to provide years of trouble-free operation. No internal maintenance is required provided that the equipment is properly handled, operated and kept away from contamination. For any questions regarding the operation and performance of the unit, please contact MKS Instruments at:

MKS Instruments
2 Tech Drive, Suite 201
Andover, MA 01810
United States

Phone: (978)-645-5500

4.3 Care of Fiber-optic Connectors

Damage to optical connectors accounts for more than 70 percent of equipment performance degradation. To avoid such damage, the user should use only industrial grade 99% pure isopropyl alcohol and follow the procedures below to keep the connectors, adaptors and receptacles clean.

Cleaning Optical Connector End-face with Wipe and Alcohol

To properly clean optical connectors utilizing lens tissue grade wipes and alcohol follow the procedure below. The moist wipe removes dust particles, oil and contaminants that may damage or blot the end-face of the connector during connection. The dry wipe removes residual alcohol that may be ignited by optical emission.

1. Disable the optical output and turn off unit to prevent accidental exposure or damage to the optical connector by optical emission.
2. Moisten a wipe with alcohol by placing on top of the alcohol dispenser and push down to saturate the wipe.
3. Place the moist wipe on a work surface and place a second dry wipe next to it.
4. Wipe the optical connector, end-face down on the moist wipe 3 times and then repeat on the dry wipe.
5. Visually inspect the end-face of the optical connector with an optical microscope to verify cleanliness. Repeat steps 2 to 5 as needed.

Cleaning Optical Connector Sides, Receptacles, Adaptors with Swab and Alcohol

Dust or particles can adhere to the insides of receptacles and adaptors or the sides of the optical connector ferrule. Their presence can affect the alignment of the optical fiber connectors and increase connection loss. To properly clean optical connectors, receptacles, and adaptors utilizing a swab and alcohol follow the procedure below:

1. Disable the optical output and turn off unit to prevent accidental exposure or damage to the optical connector by optical emission.
2. Moisten the swab by placing it on top of the alcohol dispenser and push down to saturate the swab.
3. For receptacles, adapters, or other connection points, insert the moistened swab and rotate the tip 1/2 turn clockwise and counterclockwise 6 times while applying light but firm pressure.
4. For fiber connectors, rotate the tip of the moistened swab 5 revolutions around the connector while applying light but firm pressure.
5. Visually inspect the end face of the connector with an optical microscope to verify cleanliness. Clean end-face as needed.