

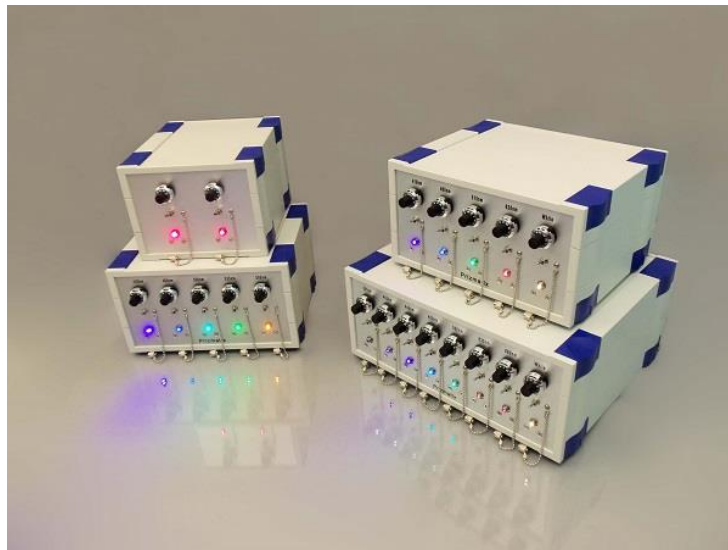
USER MANUAL

FC2-LED

FC3-LED

FC5-LED

Fiber Coupled Multi Wavelength
LED Light Sources



Version: 6.0

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1 Introduction

The FC-LED is designed to provide multiple wavelength excitation fiber-coupled light sources for various photonics applications. The current controller provides low noise current for driving the high-power LEDs in continuous (CW) or chopped operation mode via external TTL input. Analog modulation mode provides means for LED output power control from computer by Digital to Analog Converter (DAC).

Remark: This User Manual refers to FC3-LED. However, unless stated explicitly information provided here is relevant to all versions of the device (FC2-LED, FC3-LED, FC5-LED).


1.1 Features


- High Power
- Independent high power LEDs and LED drivers for each channel
- Constant current or chopping operation modes
- Precisely adjustable power by 10 turns potentiometer
- Low optical noise <0.05% RMS
- TTL external modulation input (up to 50KHz)
- Analog input (0-5V) for power control
- TTL and Analog Inputs are Optically Isolated
- Computer control through USB – optional

2 Safety

Please make yourself familiar with the contents of these operating instructions before using the FC-LED illuminator system.

The following symbols are used for the warnings:

 **CAUTION!** Non-observance of the safety notes constitutes a hazard for the user.

 **CAUTION!** Non-observance of the safety notes constitutes the risk of damage to the instrument.

Do not use the illuminator if it is damaged. Before you use the illuminator, inspect the case. Look for cracks or missing parts.

Do not use the device around explosive gas.

Never operate the illuminator with the cover removed or the case open.

Any maintenance should ONLY be performed by a Prizmatix authorized technician.

Prizmatix products are NOT authorized for use as components in life support devices or systems.

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2.1 Eye Safety

The FC-LED illuminator is assigned to following risk groups according to IEC 62471: 2006. The assignment done based on worst case assumptions and maximal power setting as well as maximal power that can delivered by best transmitting fiber. The assignment results are summarized in Table 1. The channel type is marked by naming of specific LED P/N for example: FC-LED-365B.

Table 1: FC-LED illuminator assignment to risk groups according to IEC 62471: 2006.

Product Type	Assignment to Risk Group		
	Exempt RG0	Low Risk RG1	Mod Risk RG2
FC-LED-365B		√	
FC-LED-390B FC-LED-405B FC-LED-415S FC-LED-445CA FC-LED-455L FC-LED-465CA All other in wavelengths range 380 – 510 nm			√
FC-LED-525L FC-LED-550A FC-LED-590A FC-LED-630L FC-LED-655A All other in wavelength range 510 – 700 nm	√		

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2.1.1 Special Safety Notes

Table 2 summarize the safety notes specific to various product types (IEC 62471-2/TR (1st edition, 2009), Table 2 page 17).

Table 2: safety notes specific to various product types

Product	Safety Note
FC-LED-365B	⚠ CAUTION! Minimize exposure to eyes or skin. Use appropriate shielding.
FC-LED-390B	⚠ CAUTION! Eye or skin irritation may result from exposure. Use appropriate shielding.
FC-LED At wavelengths 400nm - 510nm	⚠ CAUTION! Do not stare at operating lamp. May be harmful to the eyes

2.1.2 Hazard distances (HD)

Following Table 3 provides the distance from distal end of the fiber at which the threshold illuminance EL returns the product to RG 1.

Table 3: Distances from distal end of the fiber at which the photochemical hazard reduces to Risk group 1, for relevant products.



Product	Distance at which Blue-Light hazard reduced to Risk group 1 [m]
FC-LED-405B	0.9
FC-LED-415S	0.6
FC-LED-445CA	0.9
FC-LED-455L	1.1
FC-LED-465CA	1.0

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3 Set-up of the Device

Remove the device from packaging and inspect the device for loose components or any signs of damage. Notify Prizmatix if the device appears damaged in any way: do not install a damaged device.

3.1 Package Contents List

FC-LED	Power Adaptor / Mains Power Cord
	


	Item	Description	Quantity
1	FC-LED	High Power Fiber Coupled LED light source	1
2	Power Adaptor / Mains Power Cord	Universal power adaptor, Cord to connect the power adaptor to mains voltage	1

4 Specifications

4.1 Electrical Specifications

TTL and Analog inputs		Optically isolated BNC connectors
Rise / Fall time (10% - 90%)	µs	<5
Analog input voltage range	V	0-5
Analog modulation frequency	Hz	DC-100
Input Voltage	V	12
Power Adaptor Input		85-264 VAC, 47-63Hz, 1.5A

4.2 General Specifications

Operation temperature range	°C	10 - 35
Storage temperature range	°C	-10 - 55
Operating relative humidity (Non-condensing)	%	<90
Dimensions (L x W x H)	mm	197 x 174 x 80
Weight	g	450
Power adaptor dimensions (L x W x H)	mm	90 x 53 x 35
Power adaptor weight	g	190
Power Adaptor Safety		

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Dimensions:

FC2-LED: 174mm x 130mm x 197mm (W x H x D) without extrusions.

FC3-LED: 174mm x 130mm x 197mm (W x H x D) without extrusions.

FC5-LED: 241mm x 130mm x 197mm (W x H x D) without extrusions.

Specifications are subject to change without notice.

5 Operating the FC-LED Illuminator

5.1 Overview



Fig. 1: Front Panel controls of FC3-LED: (1) SMA Female connector with dust cup, (2) LED ON / OFF switch, (3) Power control dial

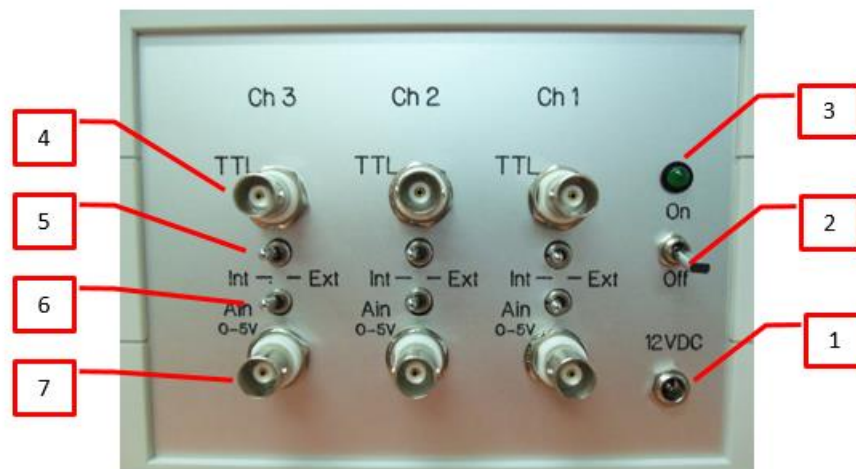


Fig. 2: Back panel controls of FC3-LED: (1) 12Vdc power input from power adaptor, (2) System main power switch, (3) Power indicator, (4) TTL input BNC connector for fast LED switching from external source, (5) TTL input enable switch, (6) Analog input enable switch, (6) Analog input BNC connector for LED power control from external source.

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5.2 System Setup and Usage

5.2.1 Power measurements

Connect the power adaptor to the FC-LED.

Switch ON the system by the ON/OFF toggle switch on the back panel of the device.

Change all the **Int / Ext** toggle switches to **Int** position (both TTL and Ain). In this position the LED power will be controlled by the front panel dial.

Connect the optical fiber to the Fiber Output connector on the front panel. Connect the distal end of the fiber to a power meter.

Turn counter-clockwise all potentiometer dials to zero except for the one to be tested. Turn clockwise the desired dial to get maximum power of the channel. If using a laser power meter for the reading, select appropriate wavelength at the power meter settings.

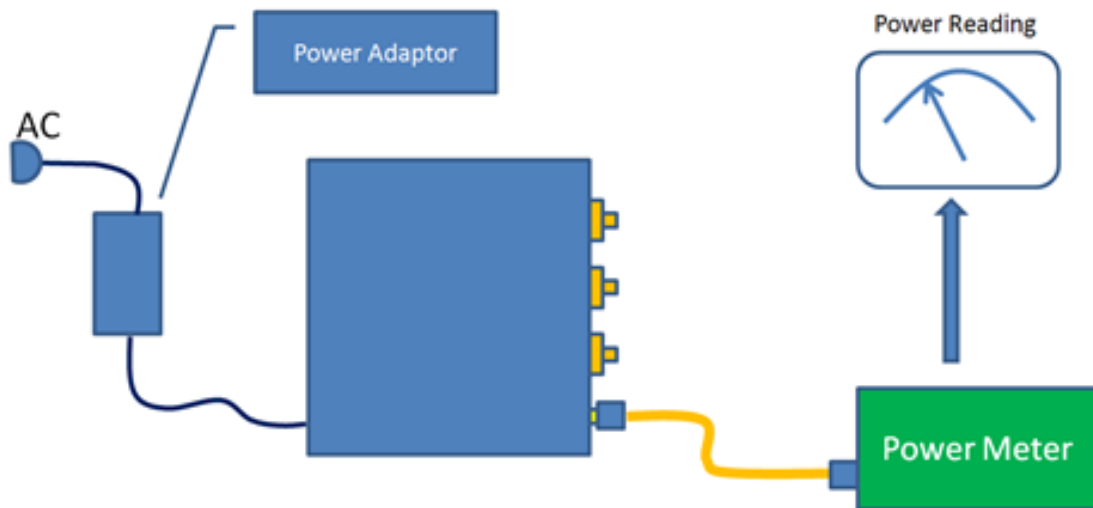


Fig. 3: Connection of FC-LED for power measurement.

Remark: When using Laser Power Meter for FC3-LED power measurement only a single LED should be tested at a time and the correct measurement wavelength shall be selected on the power meter.

5.2.2 Spectral Measurements

To measure the spectrum of one of the LEDs it is preferable to use an additional thin fiber patch cord, and to connect this fiber between the spectrometer and the fiber connected to the FC-LED, as shown at the following figure.

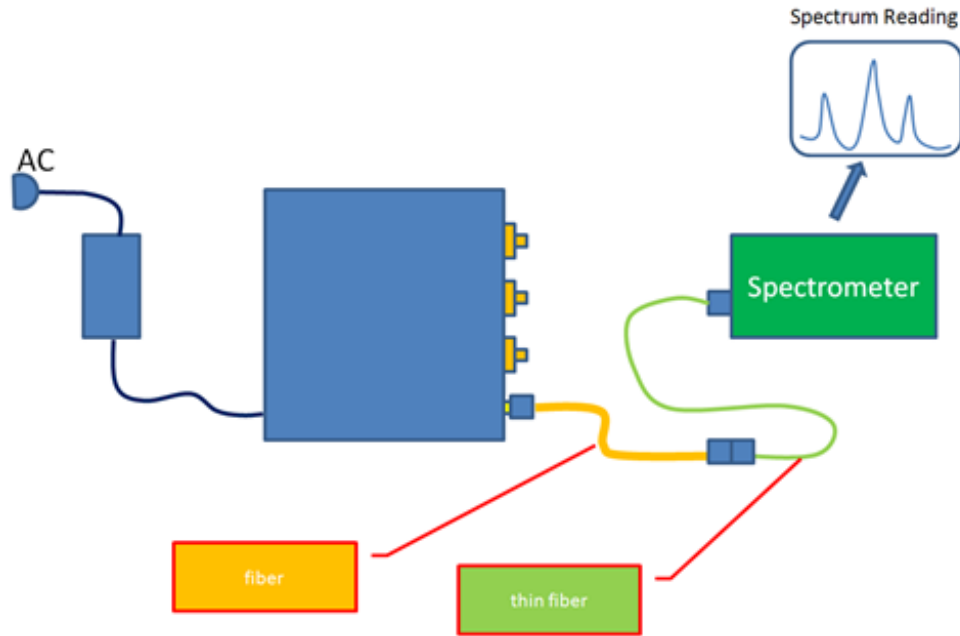


Fig. 4: Connection of FC-LED for LED spectrum measurement.

In the case of a spectrum measurement, all 3 LEDs may be measured at once by utilizing a Y-shaped bundle unless no significant overlap between the LED emission bands exists.

Tip: Use the fastest data acquisition time of the spectrometer to prevent detector saturation.

Remark: In some spectrometers due to unsuppressed second order dispersion you may notice additional virtual peaks at x2 wavelength. For example, while measuring LED peaking at 400nm smaller peak at 800nm may be noticed. These are NOT real emission peak but a measurement artifact.

5.2.3 External TTL Triggering

The external TTL input on the back panel enables external control of LED ON/OFF state - Triggering. This can be useful for example to synchronize the LED with camera. The TTL Low state will switch the LED OFF and the TTL High state will switch the LED ON with the power controlled by the dial on the front panel of the FC-LED. To enable this operation mode switch Int / Ext toggle switch to Ext position.

5.2.4 Power Control by Analog Input

The LED output power can be controlled from computer by Digital to Analog Converter (DAC). The DAC need to be configured to provide 0-5Vdc to be compatible with the

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Analog Input (Ain) of the FC-LED. The 0V at Ain will switch the LED OFF, the 5Vdc at Ain will drive the LED at highest output power. To enable this operation mode switch Int / Ext toggle switch to Ext position. While at Ext position the Dial on the front panel will not function.

5.3 Cleaning

Keep the connector port clear from dirt and do not leave it open. Keep closing the SMA port with the chained cap when the fiber is not connected.

! **CAUTION:** Do not try to clean inside the port – you may damage the illuminator!

The box can be wiped with mild wet-wipes.

! **CAUTION:** Do not attempt to use chemicals, e.g. Alcohol or Acetone – you may damage plastic components