

# LLS Series LED Light Sources Installation and Operation Instructions

## Description

Ocean Optics' LED Series light sources (LLS) are engineered to be a versatile tool for scientific and general lighting applications. Light is coupled directly into a fiber with the highest efficiency possible via the SMA 905 connection. You can adjust the optical intensity in continuous (CW) and pulse modes. The LLS Series support a 'pulse mode' to allow higher current and thus higher optical power when in pulsed mode. The LLS module is designed to accommodate external control of intensity, pulse and lamp on/off. This system also has the ability to have interchangeable light modules.



LLS Series Light Sources

## LLS Models

LLS LED light sources are available in nearly 50 different wavelength options. See the table below for a list of models.

Part Number	Wavelength	FWHM	Min. Power Coupled into a 600 $\mu\text{m}$ .22NA Fiber	Max. Drive Current CW	Max. Drive Current Pulsed	Max. Duty Cycle in Pulsed Mode
LLS-240	240	11 nm	2 $\mu\text{W}$	30mA	200mA	1%
LLS-245	245	10 nm	2 $\mu\text{W}$	20mA	200mA	1%

**LLS Series Installation and Operation Instructions**

Part Number	Wavelength	FWHM	Min. Power Coupled into a 600 $\mu\text{m}$ .22NA Fiber	Max. Drive Current CW	Max. Drive Current Pulsed	Max. Duty Cycle in Pulsed Mode
LLS-250	250	12 nm	5 $\mu\text{W}$	30mA	200mA	1%
LLS-255	255	12 nm	5 $\mu\text{W}$	30mA	200mA	1%
LLS-260	260	12 nm	15 $\mu\text{W}$	30mA	200mA	1%
LLS-265	265	12 nm	15 $\mu\text{W}$	30mA	200mA	1%
LLS-270	270	12 nm	15 $\mu\text{W}$	30mA	200mA	1%
LLS-275	275	12 nm	15 $\mu\text{W}$	30mA	200mA	1%
LLS-280	280	12 nm	15 $\mu\text{W}$	30mA	200mA	1%
LLS-285	285	12 nm	15 $\mu\text{W}$	30mA	200mA	1%
LLS-290	290	12 nm	15 $\mu\text{W}$	30mA	200mA	1%
LLS-295	295	12 nm	15 $\mu\text{W}$	30mA	200mA	1%
LLS-300	300	12 nm	15 $\mu\text{W}$	30mA	200mA	1%
LLS-305	305	12 nm	15 $\mu\text{W}$	30mA	200mA	1%
LLS-310	310	12 nm	15 $\mu\text{W}$	30mA	200mA	1%
LLS-315	315	10 nm	15 $\mu\text{W}$	30mA	200mA	1%
LLS-325	325	12 nm	15 $\mu\text{W}$	30mA	200mA	1%
LLS-335	335	15 nm	20 $\mu\text{W}$	30mA	200mA	1%
LLS-345	345	12 nm	20 $\mu\text{W}$	30mA	200mA	1%
LLS-355	355	15 nm	20 $\mu\text{W}$	30mA	200mA	1%
LLS-365	365	9 nm	1mW	500mA	1000mA	50%
LLS-385	385	10 nm	1mW	500mA	1000mA	50%
LLS-405	405	14 nm	750 $\mu\text{W}$	500mA	1000mA	50%
LLS-455	455	20 nm	1mw	1500mA	3000mA	50%
LLS-470	470	25 nm	1mw	1500mA	3000mA	50%
LLS-490	490	20 nm	1mw	1000mA	3000mA	50%
LLS-505	505	30 nm	1mw	1500mA	3000mA	50%
LLS-530	530	35 nm	750 $\mu\text{W}$	1500mA	3000mA	50%
LLS-590	590	14 nm	750 $\mu\text{W}$	700mA	1400mA	50%
LLS-617	617	20 nm	750 $\mu\text{W}$	700mA	1400mA	50%
LLS-627	627	20 nm	750 $\mu\text{W}$	700mA	1400mA	50%
LLS-Cool White	VIS 6500K CCT	N/A	1mw (measured at 550nm)	1500mA	3000mA	50%

Part Number	Wavelength	FWHM	Min. Power Coupled into a 600 $\mu\text{m}$ .22NA Fiber	Max. Drive Current CW	Max. Drive Current Pulsed	Max. Duty Cycle in Pulsed Mode
LLS-Neutral White	VIS 4100K CCT	N/A	1mw (measured at 550nm)	1500mA	3000mA	50%
LLS-Warm White	VIS 3000K CCT	N/A	1mw (measured at 550nm)	1500mA	3000mA	50%

## Controls

The LLS Light source features two control knobs on the front. The knob on the right controls the input mode. The switch turned fully clockwise is the continuous mode, “off” is the middle position and fully counter-clockwise is pulse mode. Remember that an external trigger is required for pulsing. This can be accomplished via a cable connected to your electronics, or through an optional USB controller.

The left knob controls intensity. Turn clockwise for maximum intensity. The intensity control will work in both pulse and continuous modes.

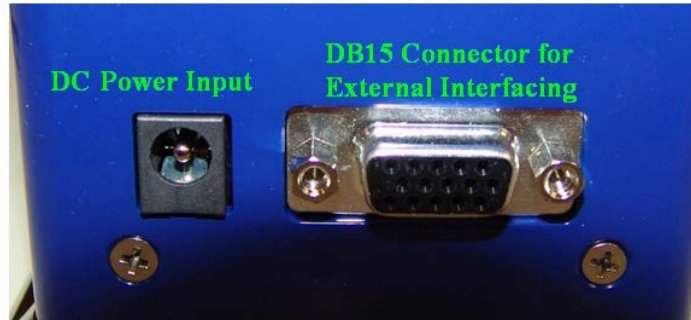


Front View of LLS Light Source

# Light Source Connection and Operation

External interface is accomplished through a female high density DB15 connector. All external signals are TTL compatible and will work with 3.3V or 5V logic. Please see [DB15 Connector](#) for a complete list of pins.

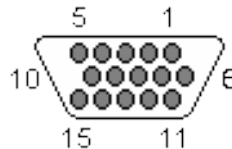
The lamp can be externally turned off when in continuous mode by controlling pin 3. The signal is internally pulled high and will return to ON when no low level signal is present.



**Rear View of Cool Red Light Source**

Pin 1 is the external trigger for pulse mode. See [External Triggering and Control](#) for more detailed information. Never modulate this pin with a greater duty cycle and current than recommended by the LED manufacturer as damage to the LED can result.

## DB15 Connector



Pin #	Description
1	Pulsed input (rising edge). Use for pulsed mode
2	Pulse end output. This pin goes high at the end of the internal fixed length pulse.
3	Lamp enable (used in CW only)
4	5 volt output. Can be used to power external controller.
5	Address line A1 (for onboard EEPROM) 24LC64
6	Address line A2 (for onboard EEPROM) 24LC64
7	SCL for I2C EEPROM
8	SDA for I2C EEPROM
9	Ground
10	Ground
11	3.3V input for I2C EEPROM (required for accessing memory)

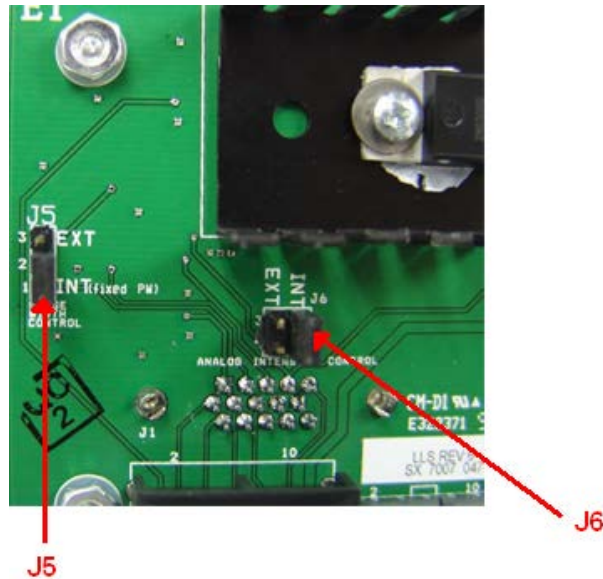
Pin #	Description
12	N/A
13	N/A
14	N/A
15	Analog Control Input (requires a jumper change to use.) Never exceed 2.5Volts into this pin.

## External Triggering and Control

There are two sets of internal jumpers located on the main PCB board. These are accessible by removing the four screws located on the top of the light source.



- **J5** controls the modulation mode and switches the control from single trigger to direct modulation.
- **J6** selects the source of the analog control voltage.



## Internal/External Control (J5)

When in the EXT position, as shown above, modulation will follow the external TTL input control directly. When in the INT position it will switch to a 500  $\mu$ s pulse which triggers on a rising edge. This feature is extremely important when modulating deep UV LEDs (250nm-355nm). These LEDs should not be modulated faster than 150Hz. All other LEDs can be modulated up to 1 kHz. The circuit for these UV LEDs is pre-configured to deliver a 200mA maximum pulse current. The LLS comes pre-configured to work in this internal pulse width mode.

## Intensity Control Jumper (J6)

When externally controlling the intensity, the control input channel must be set via the external control jumper to coordinate with the desired input channel. The control input voltage is from 0 to 2.5 Volts. The drive current will proportionally follow this voltage. For example, if the control voltage is 1.25 Volts, the LED will be driven 1.25/2.5 Volts or 50% of the maximum current. Therefore if the LED circuit is configured for 1500mA maximum, the drive current will be 750mA. (See the table in [LLS Models](#) for current drive specifications.) Do not drive this voltage with more than 2.5 Volts as damage to LEDs may occur. This control will work for both Pulse and CW modes.

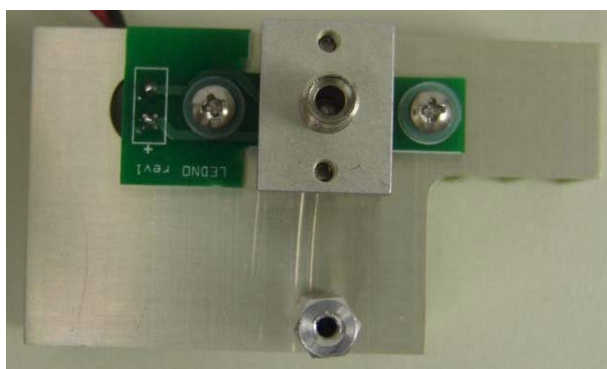
# Exchanging LED Modules

LED modules can be easily exchanged in the LLS. Each LED module has a small printed circuit board that programs the drive current for the device attached to it. Therefore there is no need to worry about driving too much current into the new LED module. Just plug it in and go.

It is not recommended to replace LEDs without exchanging the included module. These modules also have EEPROM memory that store critical information about the devices. The EEPROM memory is read by the external USB controller and can identify which LEDs are in which locations.

## LED Module Types

There are two types of modules, high power and fiber-coupled. The high power modules have an attached heatsink. To replace these, it is necessary to have a 5/16" nut driver and Phillips head screwdriver.



**High Power LED Module**

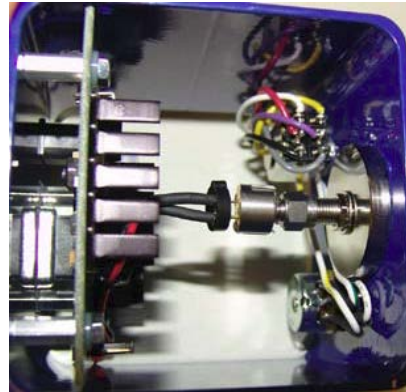


**Installed High Power LED Module**

The fiber-coupled LED module has an SMA connection so that it can be screwed into the SMA connector on the front of the LED light source.



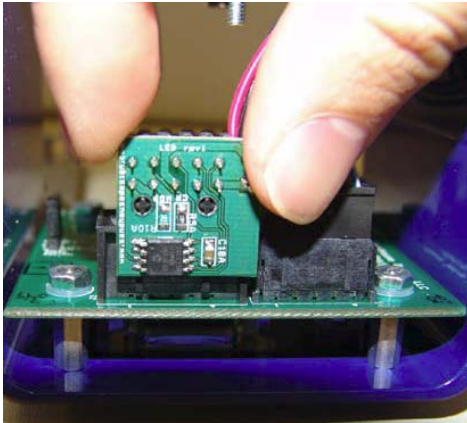
**Fiber-coupled LED Module**



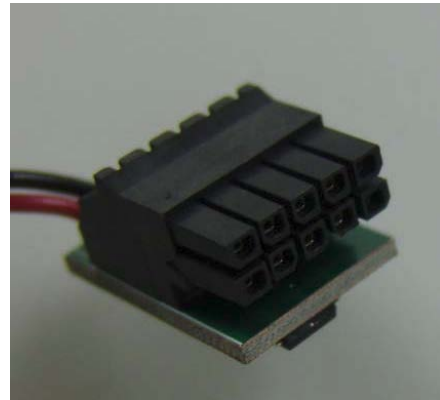
**Installed Fiber-coupled LED Module**

## Removing the LED Module

The LEDs all use the same style of module to plug into the LLS board. This can be accessed at the bottom of the LLS box. The LED module board can be unplugged by simply pulling it out of its “blind mate” socket. Gently rocking the connector from side to side helps to loosen it.



**Removing the LED Connection Board**



**LED daughter**

## External Power Requirements

Wavelengths 240nm - 355nm	6W 15V .4A
Wavelengths 365nm – 627nm and Visible	18W 6V 3A

