UP TO 4 CHANNEL ULTRA HIGH SPEED LED LIGHT SOURCE (<25 µsecs)

LLG OR DIRECT MOUNT CONNECTION OPTIONS FOR ALL COMMON MICROSCOPES

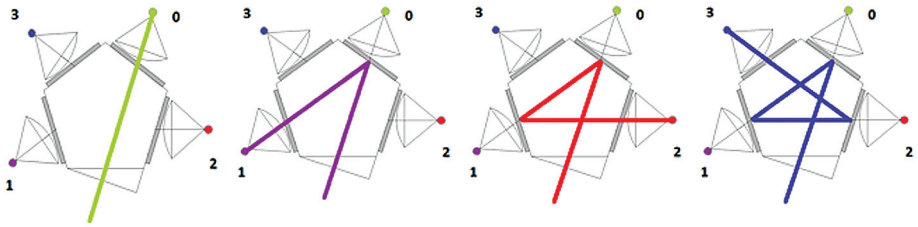
CAPABLE OF COMBINING ANY COMBINATION OF LEDS
OR ANY LIQUID LIGHT GUIDE DELIVERED LIGHT SOURCES

EASY TO RECONFIGURE

LEDS DRIVEN BY OUR PROVEN FLED CONTROLLERS

LAMBDA OBC OPTICAL BEAM COMBINER

The **Lambda OBC** (optical beam combiner) is a new, patented, concept for combining separate light sources with different spectra into a single common output beam. Each separate light source is collimated before entering the optical path through a bandpass filter. The filters for each light source also function as mirrors that reflect the collimated beams from the previous light sources. In the diagram below the optical paths are outlined for each position including the reflections that occur:



Optical path for each light source position from 0 through 3. The position number of the light sources are labeled based on the number of total reflections.

Traditionally, combining more than two light sources required the use of a dichroic ladder. Dichroic mirrors, which switch from transmission to reflection at one point in the spectrum, allow the combining of separate light sources, provided that those sources do not have overlapping wavelengths. The downside of this approach is that light sources cannot be easily changed.

Dichroic ladders also demand careful attention to the order in which the light sources are introduced into the optical path to avoid having the light blocked by the next dichroic in line. Typically, additional bandpass filters must be added in front of each light source before the dichroic, to select the desired range of wavelengths for each source. Each filter and dichroic used in the ladder decreases the total light output of the system.

The pentagon shape of the **Lambda OBC** was designed to keep the size of the beam combiner small and the optical path short and efficient. Thin-film bandpass filters, such as Semrock's STR, reflect greater than 90% of out-of-band light. If the band pass of each light source does not overlap, it is possible to use the filters for both attenuation and reflection of the light from the other sources. By arranging the filters and sources into a pentagon, we could combine four light sources in a compact design with lower losses than previously achievable. As an added benefit, the last position in the optical train does not require any filter, since no other input reflects from that position. This input can be used with any sort of light source if you are aware of the possible losses if there are filters in use that overlap this light source. The fifth side of the pentagon becomes the output for the combined sources. The filters are easily exchangeable and are installed on small sliders inside the core of the pentagon. Filters and associated light sources can be arranged in any order around the pentagon.

(CONTINUED ON BACK)

SUTTER INSTRUMENT®

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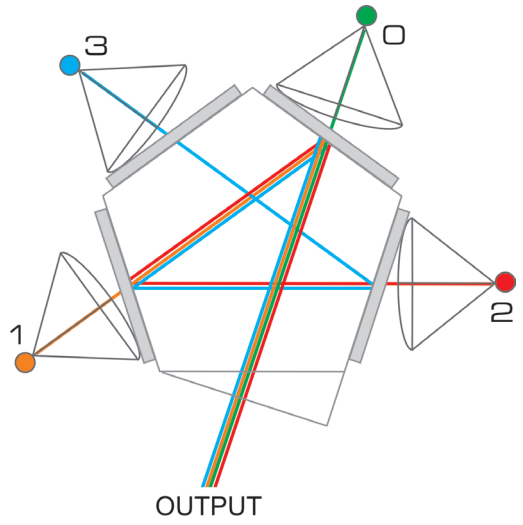
MADE IN USA

10-2019

In the diagram below the position number of the light sources are labeled based on the number of total reflections.



Notes:

The light from position #0 goes directly to the device output without being reflected. This position might be preferred for the source with the greatest desired output.

The filter for the fourth light source is not used as a reflective surface and could be omitted if a broad-band source were desired.

In configurations with fewer than 4 light sources, sources should be filled from lowest to highest number of reflections to ensure the greatest light output.

The optical path for each input is tilted by 18 degrees relative to the filter for that port. This will cause a small shift in the band pass toward shorter wavelengths. While it would be ideal to have a coating optimized for this application, we have found that stock -STR filters can be used if you correct for the shift in the band pass when selecting the filters. This lends itself to combining narrow-band sources such as LEDs and lasers with a broad-band sources such as arc lamps or white light LEDs. In the case of LEDs, wavelengths can be shuttered at the speed of the individual source. Sutter Instrument **Lambda HPX** and **Lambda FLED** products can switch in 10 to 25 microseconds respectively.

The **Lambda OBC** is designed for ultimate flexibility and expandability. Should your illumination needs change over time, a simple configuration change and possibly additional filters can produce an entirely different output.

OPTICAL BEAM COMBINER

Includes Lambda OBC optical beam combining pentagon that accommodates up to 4 LED modules (purchased separately).

LB-OBC-N	Lambda Optical Beam Combiner for Nikon
LB-OBC-Y	Lambda Optical Beam Combiner for Olympus
LB-OBC-Z	Lambda Optical Beam Combiner for Zeiss
LB-OBC-L	Lambda Optical Beam Combiner for Leica
LB-OBC-C	Lambda Optical Beam Combiner for C-mount
LB-OBC-LLG	Lambda Optical Beam Combiner with 3 mm series 380 liquid light guide

CONTROLLER FOR LED MODULES

One Lambda FLED controller is needed for each LED ordered (part numbers OBC-XXX). Up to 4 controllers can be used with the Optical Beam Combiner.

FLED-E	Lambda FLED Controller (one needed for each LED module ordered (part numbers OBC-XXX).

LED MODULES FOR LAMBDA OBC

The LED modules consist of the LED and the appropriate Semrock®-STR excitation filter for the output of the LED. Four LED modules can be installed in the Optical Beam Combiner at one time, however, the purchase of additional LED modules adds versatility to the system as you can reconfigure the Lambda OBC by substituting wavelengths as needed for your application.

OBC-340	LED, 340 nm for Optical Beam Combiner
OBC-365	LED, 365 nm for Optical Beam Combiner
OBC-385	LED, 385 nm for Optical Beam Combiner
OBC-410	LED, 410 nm for Optical Beam Combiner
OBC-440	LED, 440 nm for Optical Beam Combiner
OBC-460	LED, 460 nm for Optical Beam Combiner
OBC-480	LED, 480 nm for Optical Beam Combiner
OBC-506	LED, 506 nm for Optical Beam Combiner
OBC-530	LED, 530 nm for Optical Beam Combiner
OBC-561	LED, 561 nm for Optical Beam Combiner
OBC-590	LED, 590 nm for Optical Beam Combiner
OBC-617	LED, 617 nm for Optical Beam Combiner
OBC-630	LED, 630 nm for Optical Beam Combiner
OBC-660	LED, 660 nm for Optical Beam Combiner
OBC-740	LED, 740 nm for Optical Beam Combiner
OBC-810	LED, 810 nm for Optical Beam Combiner
OBC-850	LED, 850 nm for Optical Beam Combiner
OBC-940	LED, 940 nm for Optical Beam Combiner
OBC-W5	LED, White Light for Optical Beam Combiner