

User Notes

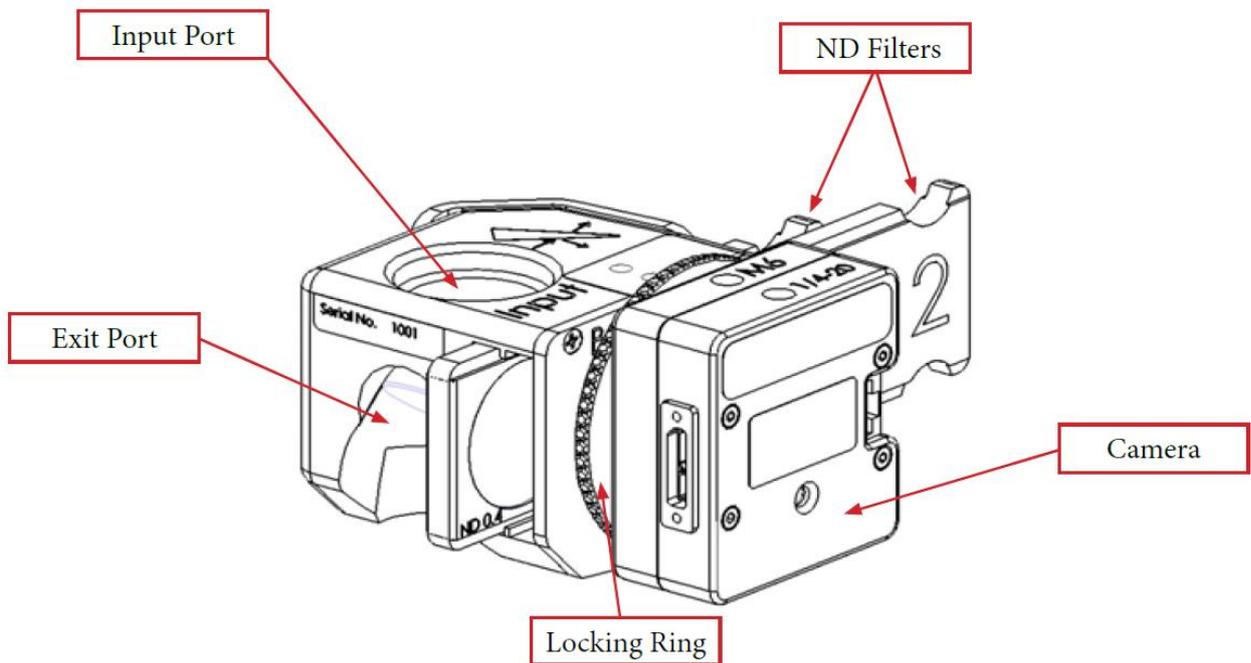
## LBS-300s - OPHIR BEAM SAMPLER FOR C-MOUNT CAMERAS

P/N SP90464, SP90465, SP90466 and SP90467

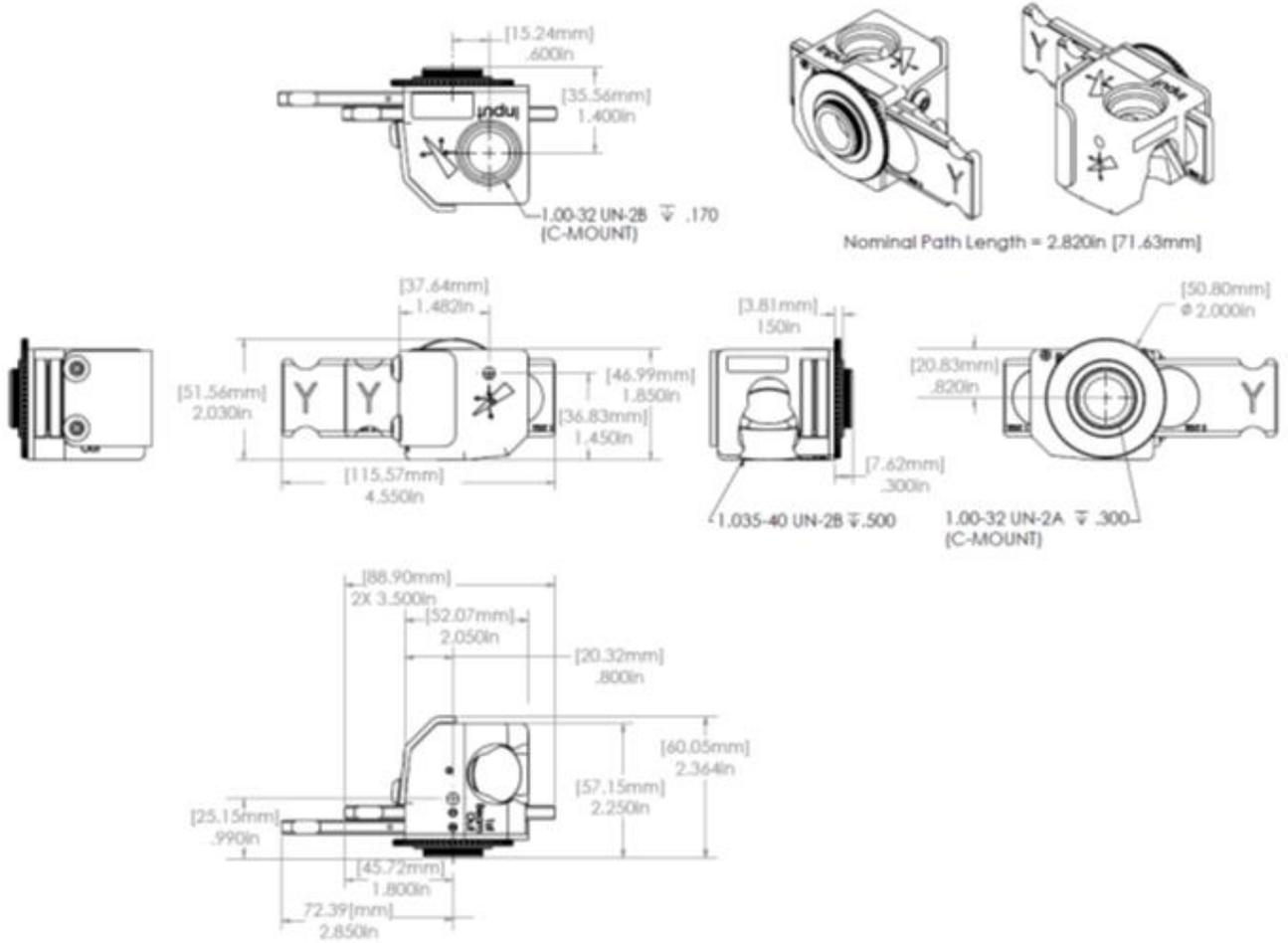


# LBS-300s - Ophir Beam Sampler for C-mount Cameras User Notes

## COMPONENTS



DIMENSIONS



**INTRODUCTION**

The LBS-300s beam sampler attachment for C-mount, CS-mount, or Ophir mount cameras allows you to measure laser beams with diameters up to 15mm and powers ranging from 10mW to ~400W<sup>1</sup>.



LBS-300s and SP900 camera

The design of the beam sampler maintains the original polarization of the beam under test conditions.

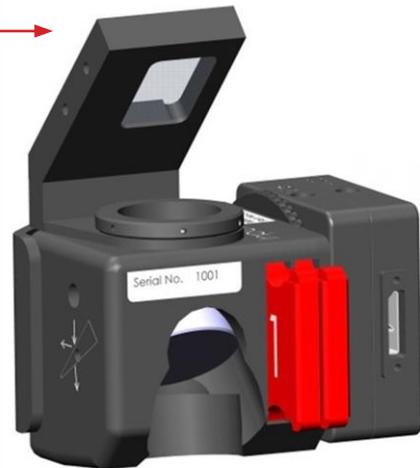
The front surface reflection from two beam splitters directs the beam through the filter slides and then on to the camera sensor. Approximately 97-99% of the beam is transmitted through the beam sampler with  $\geq 0.01\%$  passed on to the camera<sup>2</sup>.

A set of interchangeable ND filters are provided to make final intensity adjustments to the beam before it reaches the camera imager.

For additional attenuation, an external wedge

(Part Number SPZ17015 or SP90273) may be mounted at the input port; however, this 3rd wedge will cause polarization selectivity when the beam is significantly polarized in the S and P planes.

Alternatively, two LBS 300s' can be coupled in series providing up to  $10^{-8}$  attenuation<sup>3</sup>.



<sup>1</sup> 0.5mW to ~400W for SP90467. For Gaussian beam diameter  $< 1/2$  the clear aperture and depending on ND filter and camera saturation limits the maximum power may be as high as 1000W.

<sup>2</sup> The SP90467 passes 0.16% to the camera.

<sup>3</sup>  $6 \times 10^{-6}$  attenuation for the SP90467.

INSTALLATION AND SETUP

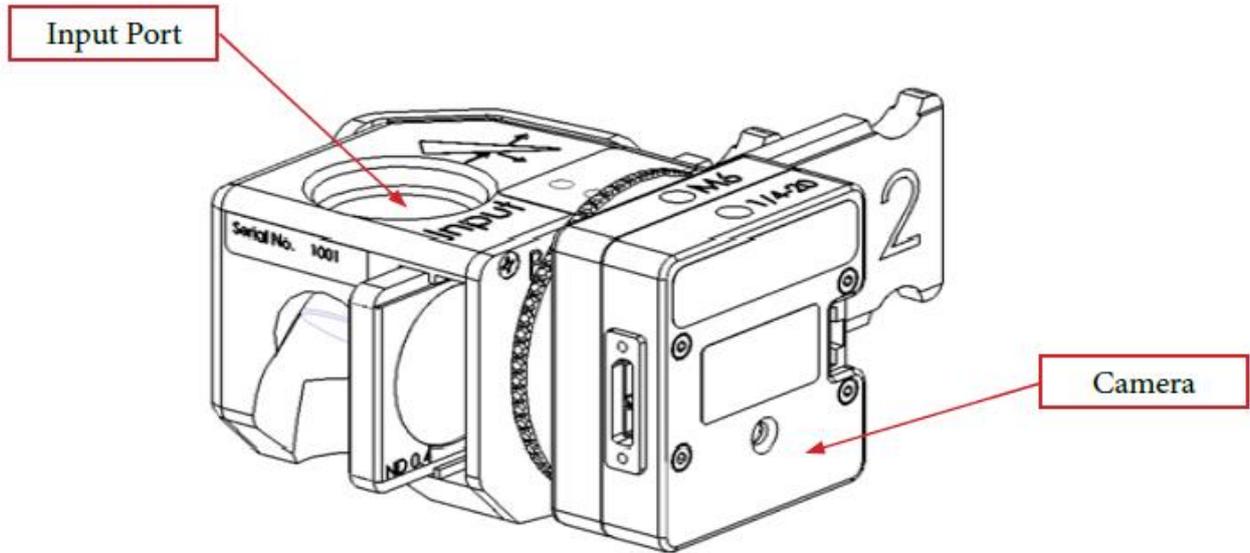


Figure 1

1. The LBS-300s is attached to the camera as shown above in Figure 1. An adjustable locking ring is provided so that the beam sampler can be rotated in any orientation.

2. Position the LBS-300s so the laser beam enters the center of the input port at a 90° incidence. The beam will exit the LBS-300s turned approximately 6 degrees in the direction shown in Figure 2. Provision must be made to safely contain the transmitted beam. An optional beam dump is available to contain the beam if required.

A 1.035-40 thread is provided behind each wedge along the axis of the output beam that can be used to directly mount accessories with 1" lens tubes such as beam dumps or even power and energy sensors to the LBS-300s.

**Warning:** You must provide a beam stop for the laser beam that passes through the beam sampler. The beam stop must be able to withstand the continuous power/energy of the input beam.

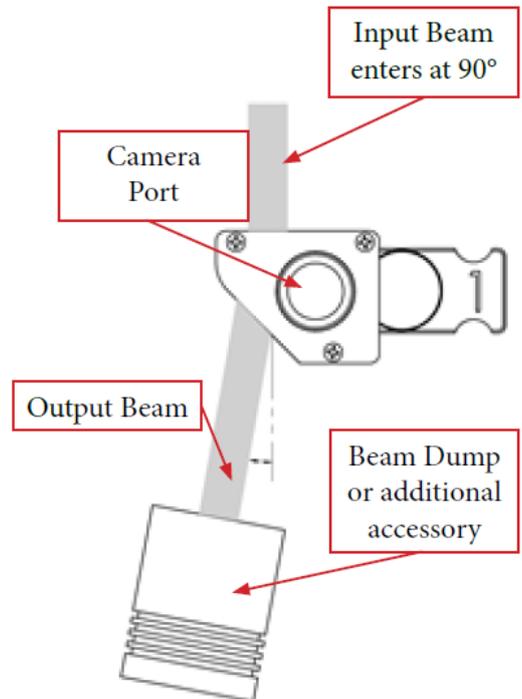
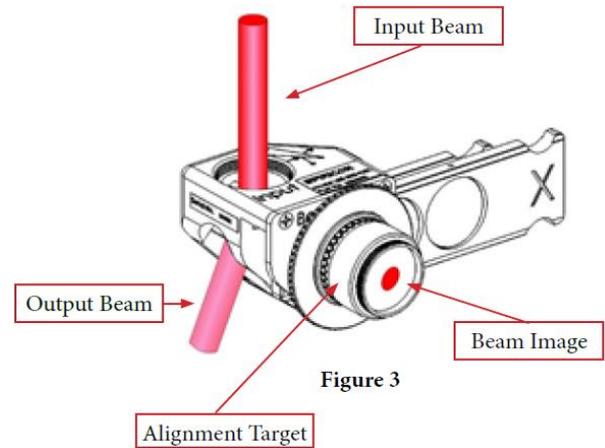


Figure 2

3. Adjust the position of the LBS-300s so that the beam will exit the center of the camera port. An alignment fixture consisting of a ground glass plate is provided to assist in aligning visible beams to the camera imager. This plate allows you to directly view a visible or UV beam (UV by secondary emissions). In the NIR, you will need to use an NIR viewer or a visible alignment beam. To use the alignment fixture. Screw the fixture onto the camera port and center the image of the beam in the plate. See Figure 3. When the LBS-300s is aligned, remove the alignment fixture and attach the camera.



## OPERATION

1. Start the beam profiler software and adjust the ND filter holders until the maximum beam intensity is approximately 80% of saturation. See Appendix A for ND filter details. If there are interference effects seen, slight angling of the camera-sampler setup to the beam path may eliminate this.
2. If no picture is seen, check again that the beam is aligned into the sampler. If the image is saturated when the maximum ND filters are in place, lower the camera signal below saturation by reducing the camera exposure setting. This can also be done by removing the camera, adding one or more of the C-mount ND filters provided with the camera, and remounting the camera.

**Note:** Distortion of the beam due to thermal lensing, may occur with average power densities of  $5\text{W}/\text{cm}^2$  for beam size 5mm,  $10\text{W}/\text{cm}^2$  for 2mm beam and  $>30\text{W}/\text{cm}^2$  for 1mm beam

**Caution:** The damage threshold for the ND filters is  $50\text{ Watts}/\text{cm}^2$ . Make sure the power density in the beam as it hits the ND filters does not exceed this amount. If the beam is converging (focusing) rather than collimated, be sure to take this effect into consideration as well.

**ORDERING INFORMATION**

<b>Compact Laser Beam Sampling Systems for C-mount Cameras</b>				
<b>Model</b>	<b>LBS-300s-UV</b>	<b>LBS-300s-VIS</b>	<b>LBS-300s-NIR</b>	<b>LBS-300s-BB</b>
<b>Part No.</b>	<b>SP90464</b>	<b>SP90465</b>	<b>SP90466</b>	<b>SP90467</b>
<b>Wavelength</b>	266-400nm	400-950nm	950-1800nm	190-2500nm
<b>Wedge Material</b>	UVFS	UVFS	UVFS	UVFS
<b>Wedge Coating</b>	A/R ≤1%	A/R ≤1%	A/R ≤1%	Uncoated: 4% reflection
<b>Reflection</b> (Reflectance Spectra below)	0.01%	0.01% 400-700nm 0.16% 700-950nm	0.01% 1070nm 0.09% 1000-1050nm 0.16% 1100-1800nm 0.25% 950-1000nm	0.16%
<b>Clear aperture</b>	17.5mm	17.5mm	17.5mm	17.5mm
<b>Wedge ND value, each</b>	ND ≥2	ND ≥2	ND ≥2	ND ~1.3
<b>Recommended Maximal Mower<sup>1</sup></b>	400W 1MW/cm <sup>2</sup> 5 J/cm <sup>2</sup>	400W 1MW/cm <sup>2</sup> 5 J/cm <sup>2</sup>	400W 1MW/cm <sup>2</sup> 5 J/cm <sup>2</sup>	400W 10MW/cm <sup>2</sup> 20 J/cm <sup>2</sup>
<b>ND Filters</b>	Inconel	Bulk ND	Bulk ND	Combination of Inconel and Bulk ND
<b>ND Values, nominal</b>	.3, .7, 1.0, 1.5, 2.5, 3.0 (Blue holders)	.3, .7, 1.0, 2.0, 3.0, 4.0 (Green holders)	.4, .8, 1.0, 2.0, 3.0, 4.0 (Red holders)	See Broad Band (BB) chart below
<b>Filter Slides</b>	3	3	3	5
<b>Filter Damage<sup>2</sup></b>	100 W/cm <sup>2</sup> CW 20mJ/cm <sup>2</sup> , 10ns pulse	50 W/cm <sup>2</sup> 1J/cm <sup>2</sup> , 10ns pulse	50 W/cm <sup>2</sup> 1J/cm <sup>2</sup> , 10ns pulse	See UV, VIS and NIR specifications
<b>Accessories</b>				
<b>Additional Wedge Splitters</b>	<b>SPZ17015</b>	15mm clear aperture		
	<b>SP90273</b>	30mm clear aperture		

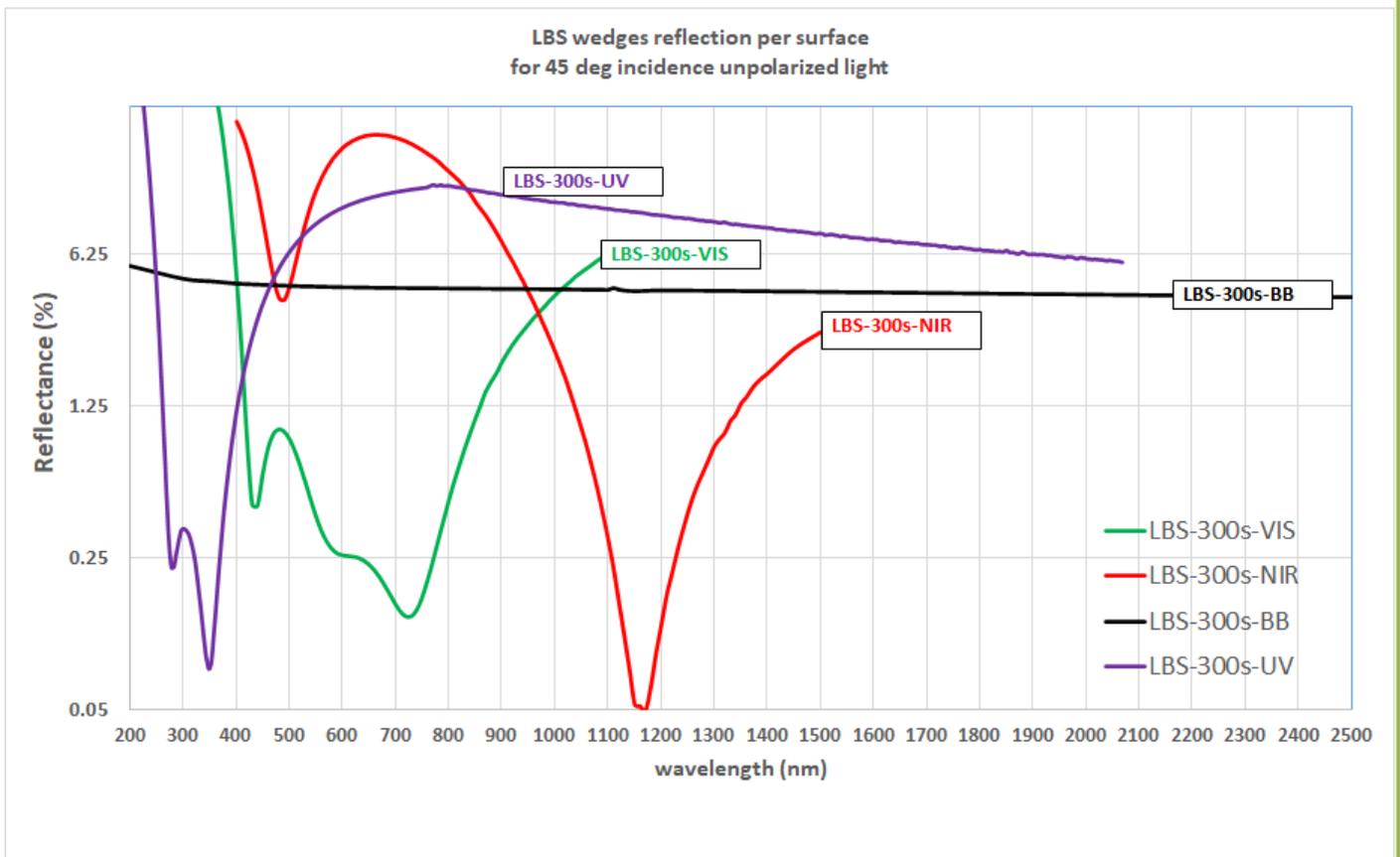
<sup>1</sup> For Gaussian beam diameter <1/2 the clear aperture and depending on ND filter and camera saturation limits the maximum power may be as high as 1000W.

<sup>2</sup> This is the damage threshold of the filter glass of the filters. Assuming all filters mounted with ND1 (red housing) filter in the front. Distortion of the beam may occur with average power densities of 5W/cm<sup>2</sup> for beam size 5mm, 10W/cm<sup>2</sup> for 2mm beam and >30W/cm<sup>2</sup> for 1mm beam

### FEATURES

- C-mount stackable design compatible with most other C-mountable accessories
- Wedges removable for replacement and cleaning
- Multiple mounting points
- Marked for easy use
- Lenses can be added for Focal Spot Analysis operation and divergence analysis
- Power/Energy meter at 1st exit port can measure ~99% (~95%-BB) of input beam

### REFLECTANCE SPECTRA

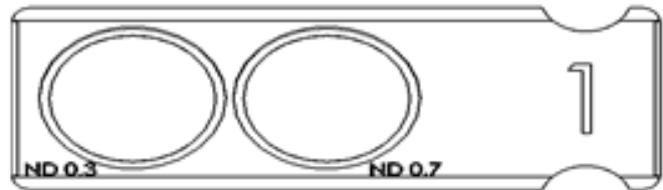


Reflectance Spectra demonstrates single surface reflection. The reflection of both LBS-300s surfaces is a multiplication of percentage value of single surface.

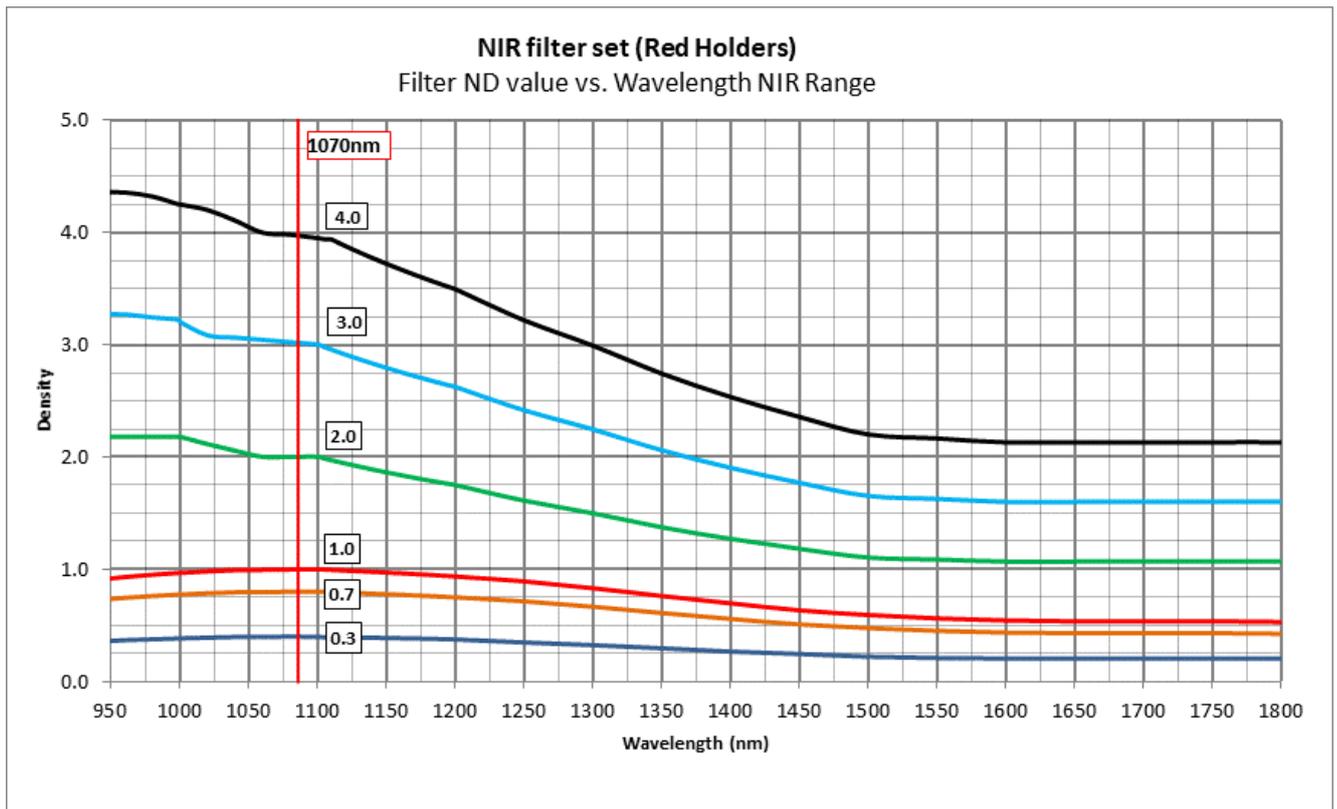
**APPENDIX A: ND FILTERS**

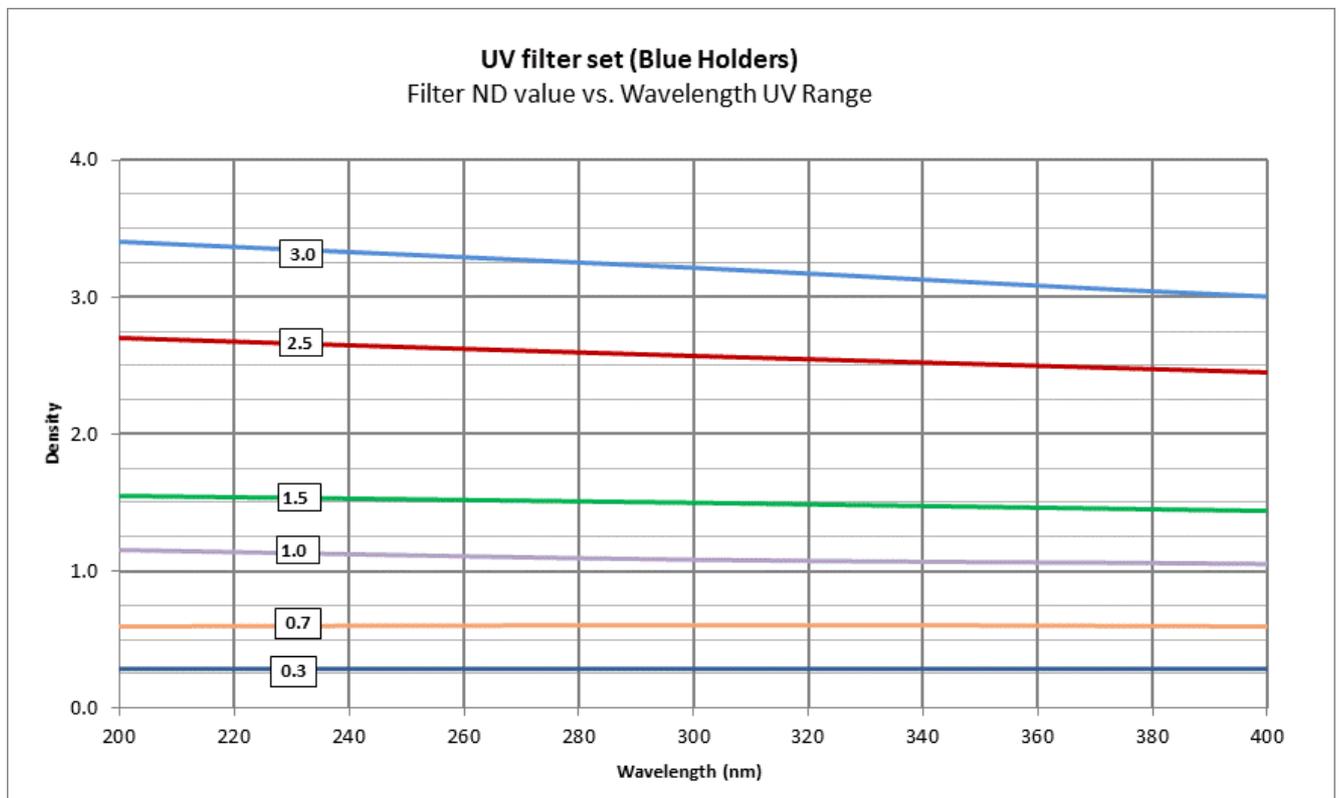
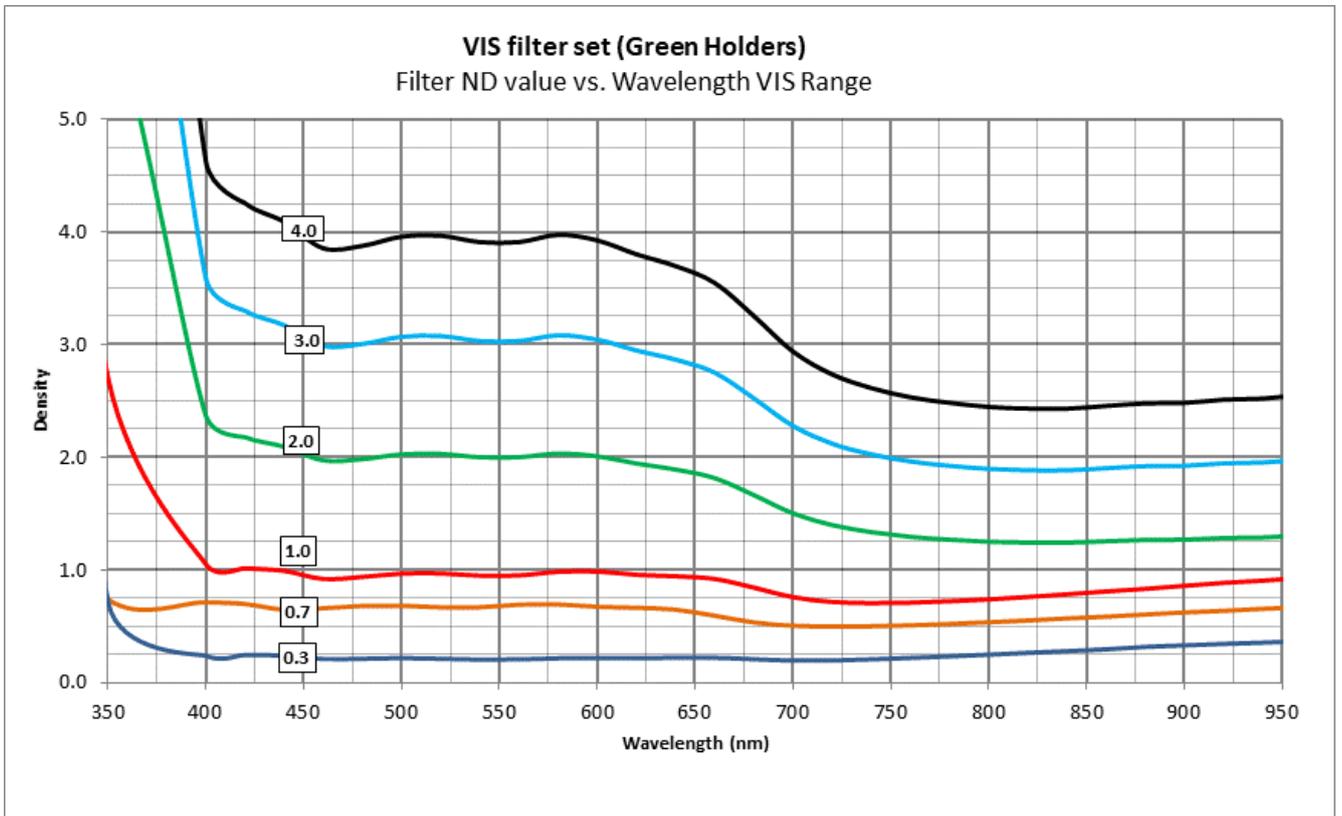
The ND filters provided with each LBA-300s allow for final attenuation of the laser beam up to ND 6. Each filter in the holder provides for a different value of attenuation. To use, slide the desired holder into the slot in the LBS-300s. A click is felt when the filter is properly aligned with the beam.

Holder Number	Filter A	Filter B
1	0.3	0.7
2	1	2
3	3	4



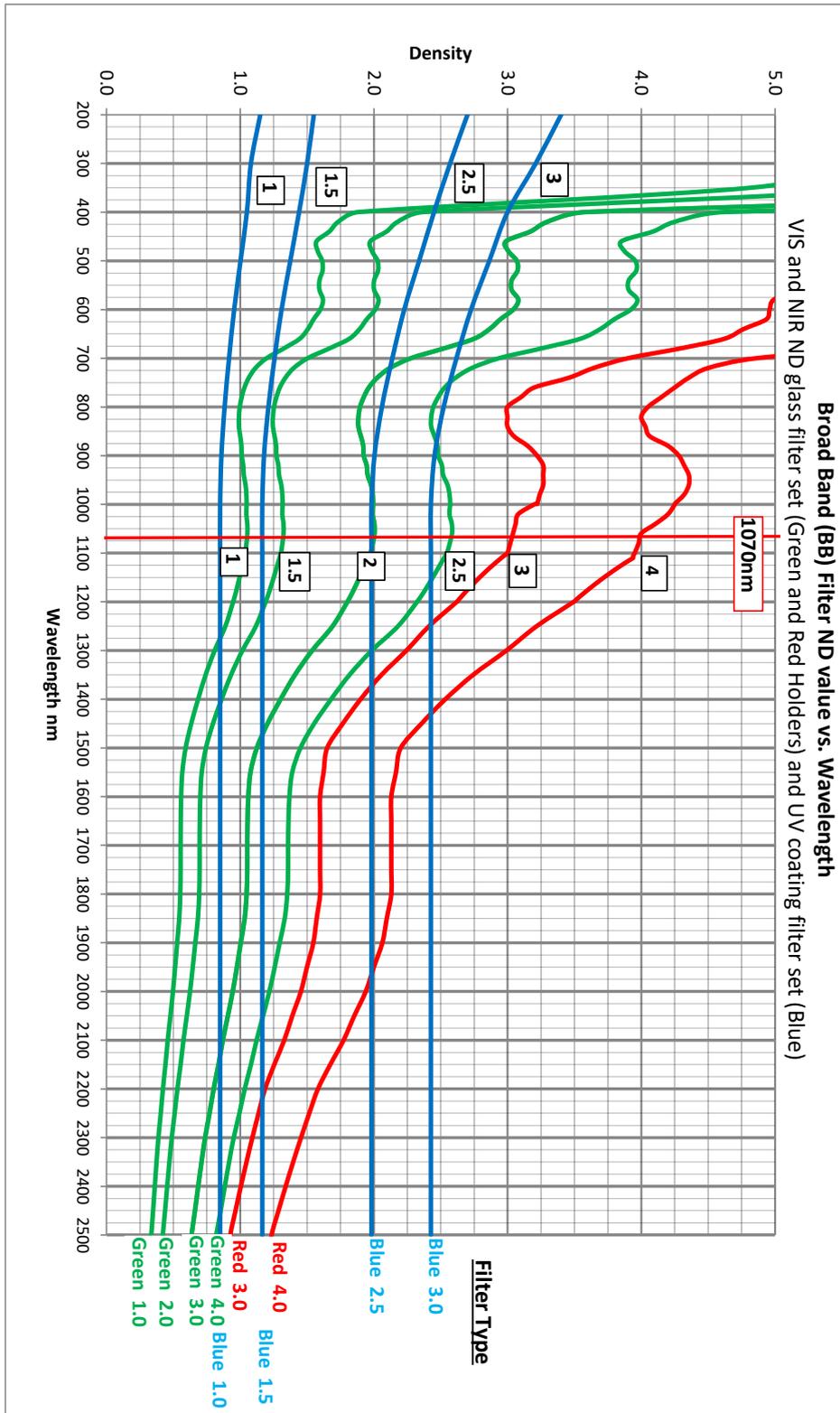
The attenuations at specified wavelengths are available in the charts below.





### Broad Band (BB) filter set (Red, Blue and Green Holders)

Filter ND value vs. Wavelength Visible Range



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