

User Notes

## 4X REDUCING UV IMAGE CONVERTER

P/N SPZ17024

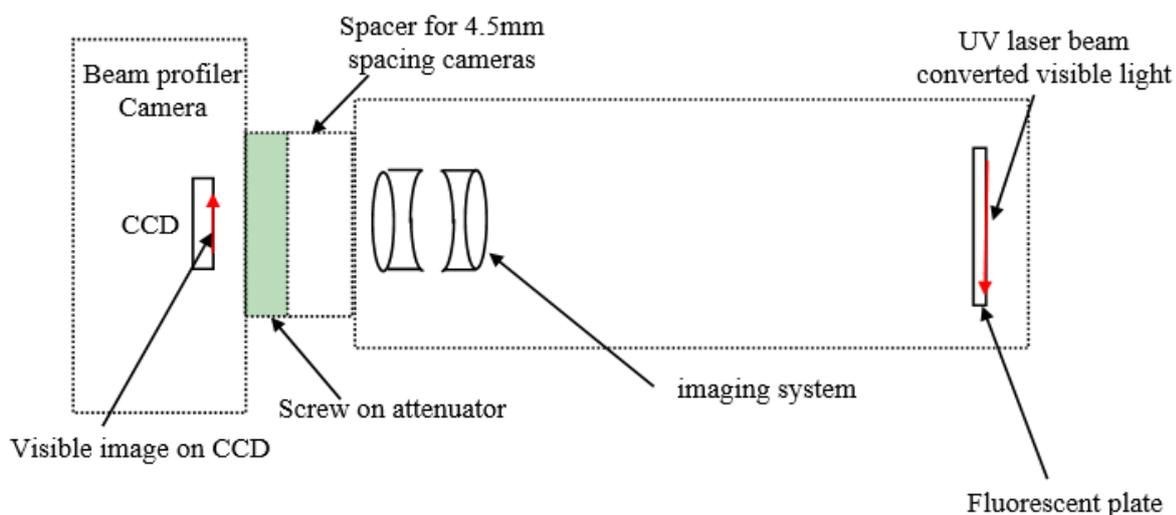
WITH OPTIONAL BEAM SPLITTER P/N SPZ17007



## 4x UV Reducing Image Converter P/N SPZ17024 with Optional Beam Splitter P/N SPZ17007

The 4X Image Converter is an attachment to the beam profiler which enables it to operate in the UV from 157nm to 360nm. The 4X Image Converter operates as follows (see diagram):

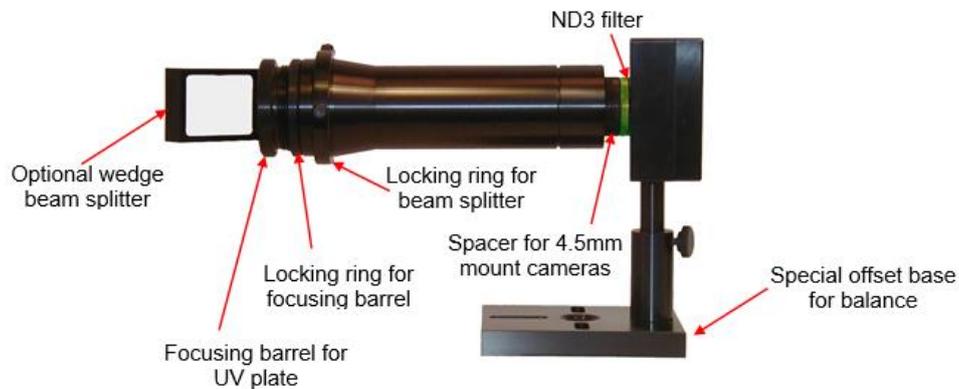
The UV beam falls on the fluorescent plate which fluoresces in the visible. The fluorescent plate is transparent to the visible light but not the UV therefore only the light which is converted from UV to visible is transmitted <sup>(1)</sup>. The optical system then images the beam on the sensor of the beam profiler, while reducing the size by approximately 4X. A screw-on attenuator is provided to optimize the light level on the sensor to give maximum dynamic range without the light saturating the sensor.



### 1. ATTACHING THE 4X IMAGE CONVERTER TO THE BEAM PROFILER CAMERA

1. Unscrew any filters on the beam profiler camera.
2. If the camera is a Ophir camera with 4.5mm spacing from the front of the camera to the sensor, leave the 8mm spacer on the converter. If you are using a camera with a CS mount having spacing of 12.5mm to the sensor, remove the 8mm spacer.
3. The green housing ND3 attenuator P/N SPZ08253 provided is optimized so that the light on the sensor is close to saturation at the same time the light on the fluorescent plate is close to saturation. In this manner, you have the most dynamic range of measurement. If you are working with a low light level far from saturation of the camera, it is then best to use a less dense filter which will lower the light level on the camera. You can try the black housing ND2 attenuator P/N SPZ08235 or for even lower light levels, the red housing ND1 filter P/N SPZ08234. (In many cases, these are the original filters provided with the camera). Note also that for energy densities greater than the saturation of the UV plate ( $\sim 30\text{mJ/cm}^2$  at 193nm and  $\sim 15\text{mJ/cm}^2$  at 248nm) you should use the optional beam splitter to lower the light level on the UV plate to below saturation.
4. Screw the converter as assembled with spacers and onto the camera until it is tight.
5. Mount the assembly on the base and rod until it is optimized for the laser beam to be centered on the fluorescent plate.

- If you have purchased the beam splitter for higher energy density beams, mount the beam splitter to the barrel of the 4X image converter behind the locking nut as shown.



4X UV Image Converter with beam splitter as mounted on camera

## 2. OPERATING THE IMAGE CONVERTER WITH A PULSED LASER BEAM

- Operate the BeamGage software. On the control panel, open the „Computations“ tab and set the optical scaling factor to the number shown on the barrel of the beam reducer (the number will be close to 4.00). This will set the BeamGage to the exact reduction factor of the reducer.
- Center the laser beam on the fluorescent plate at the entrance of the image converter. Make sure the energy density of the beam is within the limits given by the specification. It is best to eliminate sources of stray light such as excessive room light. If the 90 degree beam splitter is being used, place it so the reflected beam is centered on the fluorescent plate.
- Set the camera to pulsed mode and synchronize the laser pulses with the camera as described in the manual.
- If the laser is a strong source of visible light as well as UV light (such as the flash lamp light coming out of the laser), or if you are measuring a wavelength for which the glass is transparent (e.g. above 310nm), you may have to place the camera-image converter assembly at an angle of ~5 degrees to the laser beam. In this way, the sensor will see the light scattered from the fluorescent plate but not the visible light from the laser.
- Set up the camera exposure or use Auto Exposure to fit optimal beam intensity on the sensor. In case the intensity is lower than 20% of the dynamic range, try using a less dense filter, the black barrel ND2 filter P/N SPZ08235 (which comes with the camera). This may result in better signal to noise ratio.
- Adjust the position of the fluorescent plate for the sharpest image on the sensor by turning the barrel back and forth. When the optimum is found, lock with the locking nut. (Note that the position has been adjusted in the factory and you should ordinarily not have to change the original focus setting).

**Table 1 – 4X UV Image Converter specifications**

Specifications	
Beam Reduction	4X reduction $\pm 2\%$ with included correction factor
Spectral range	193 to 360nm <sup>(1)</sup>
Minimum signal	~1uJ/cm <sup>2</sup> with a blank ND filter
Saturation intensity	~30mJ/cm <sup>2</sup> at 193nm, ~15mJ/cm <sup>2</sup> at 248nm with included filter 20 times above values with optional beam splitter
Resolution	50µm x 50µm
Effective Aperture	Ø30mm but effective beam size is limited to 4X sensor dimensions
Damage threshold with beam splitter	100W/cm <sup>2</sup> or 2J/cm <sup>2</sup>
Dimensions	Ø50mm dia x 185mm length
Adaptable Beam Analyzer Camera Systems	<p>The 4x UV converter and optional Beam Splitter wedge can be used with the following cameras employed by BeamGage products: (This product will work with any CS-mount camera, but not with C-mount cameras.)</p> <p>SP932U SP204S SP920s</p>

Note(1): Past 310nm the glass is transparent to the UV light also and therefore you may see some of the original lasers light also as background interference

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