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User Notes

1X UV IMAGE CONVERTER

P/N SPZ17023

WITH OPTIONAL BEAM SPLITTER P/N SPZ17015

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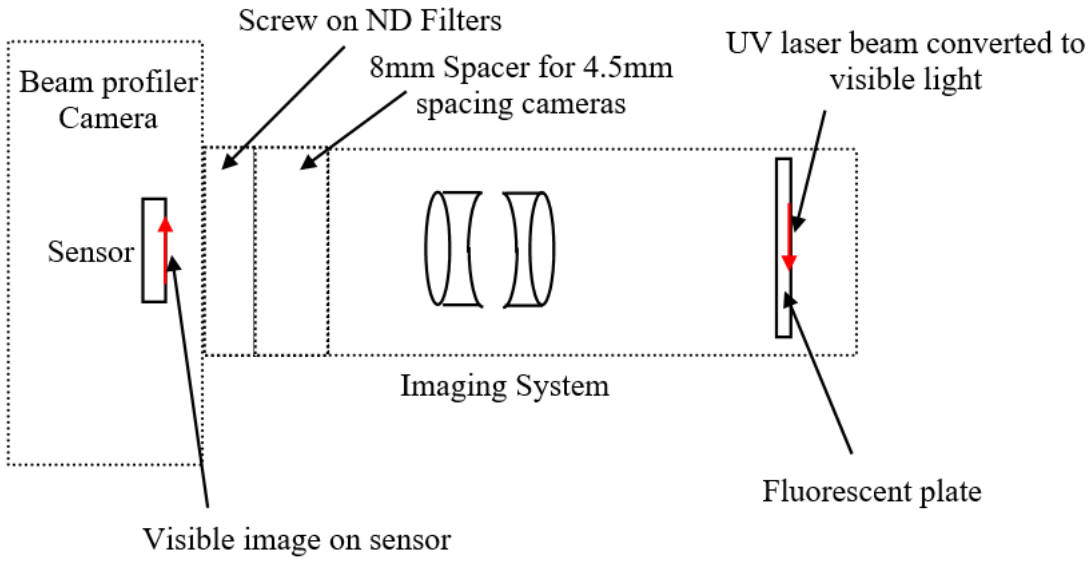
1X UV Image Converter (P/N SPZ17023) With Optional Beam Splitter (P/N SPZ17015)

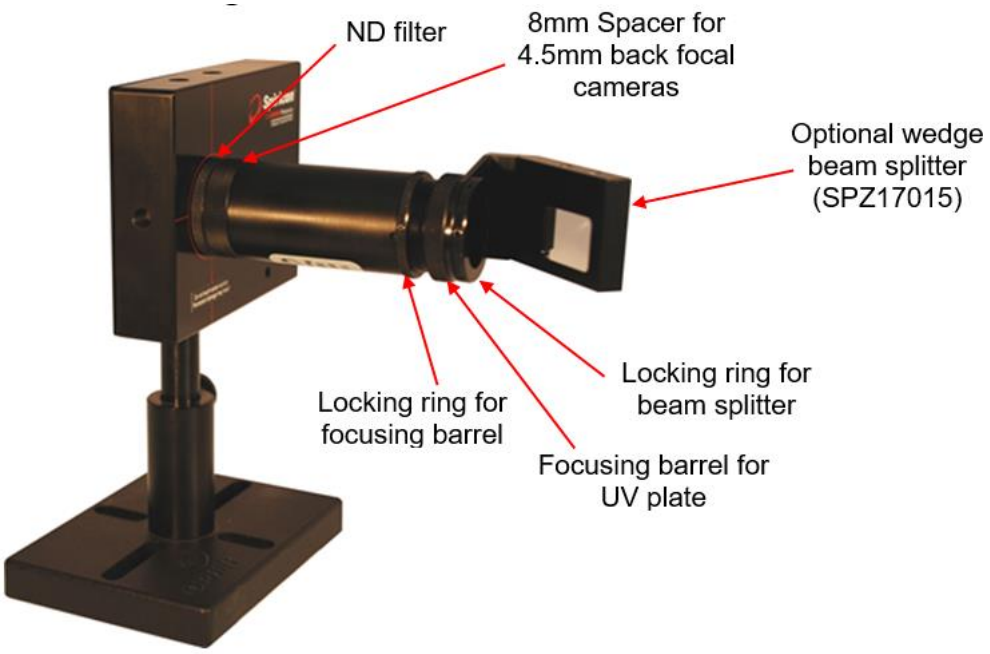
The 1X Image Converter is an attachment to a beam profiler camera that enables it to operate better in the UV from 157nm to 360nm. The 1X Image Converter operates as follows (see diagram): The UV beam falls on the fluorescent plate which fluoresces in the visible. The fluorescent plate is transparent to the visible light but not the UV[1]. Thus only the bright fluorescing image is seen by the camera. The optical system images the beam plane onto the sensor of the camera, keeping the image size the same as the object size. Replaceable ND filters are chosen by the user to optimize the light level on the camera to give maximum dynamic range without the light saturating the sensor.



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

1. Unscrew any filters on the beam profiler camera.
2. If the camera is a camera with 4.5mm back focal 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.
   Note: This device will not work with cameras that have a fixed C-mount spacing of 17.5mm.
3. If the energy density on the UV plate is larger than ~8mJ/cm², use the red ND filter attenuator. If the energy density is lower than this, use the empty (no ND glass inside) spacer. Note that these values are approximate and if in doubt, experiment to see which way gives an image with the best signal-to-noise without saturating the camera. Note also that for energy densities greater than the saturation of the UV plate (~15mJ/cm² at 193nm and ~25mJ/cm² at 248nm) you should use the optional beam splitter to reduce the UV light level on the phosphor plate to below saturation.
4. Screw the converter as assembled onto the camera until it is tight.

5. Center the laser beam onto the fluorescent plate. If you have purchased the beam splitter for higher energy density beams, mount the beam splitter to the barrel of the 1X image converter behind the locking nut as shown.



1X UV Image Converter with beam splitter option on a Ophir camera

Camera operation is controlled through BeamGage. Consult the BeamGage User Guide to learn how to setup the system for either pulsed or CW mode whichever applies. Since UV converters are commonly used with pulsed Excimer lasers the following example discusses pulsed mode operation. The UV converter works best in darkened room light.

2. OPERATING THE IMAGE CONVERTER WITH A PULSED LASER BEAM

1. The 1X converter may slightly reduce or magnify the imaged beam, thus the scaling values in the software may need to be adjusted to compensate for this error. The magnification number shown on the barrel of the converter will tell you if the beam is slightly larger or smaller. Use this factor as needed in BeamGage to adjust the spatial results computations.
2. 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.
3. Set the camera to pulsed mode as described in the instruction manual. Synchronize the laser pulses with the camera as described in the manual.
4. 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) 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.
5. Add or remove ND filter attenuation as needed, but maintain the 12mm spacing distance when used on 4.5mm back focus cameras or the 4mm distance when used on CS back focus cameras.
6. Adjust the Focusing barrel containing the fluorescent plate for the sharpest image on the sensor. When best focus is found lock it 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 – 1X UV Image Converter specifications

Specifications	
Spectral range	193 to 360nm (1)
Minimum signal	~1uJ/cm² with blank filter
Saturation intensity	~15mJ/cm² at 193nm, ~20mJ/cm² at 248nm with included filter 20x greater with optional beam splitter
Resolution	35µm x 35µm
Damage threshold	100W/cm² or 2J/cm² with beam splitter
Aperture	Ø18mm. Maximum beam size is the same as for the particular camera used since the image size is not changed from the original beam size.

Note (1) Above 310nm the glass begins to transmit UV light. Therefore you may see some of the original laser's light also as background interference.

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