

3.4.4 Beam Expanders Microscope Objectives



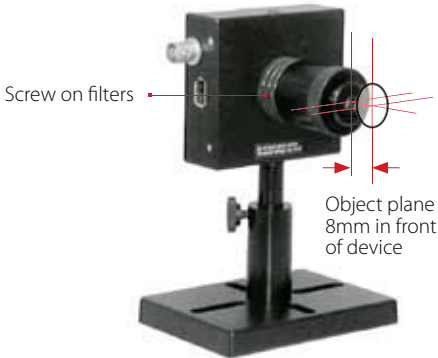
Model	4X Beam Expander with UV Converter	Beam Expander
Wavelength	193nm-360nm	400-1800nm
Beam Size Change	4X Expansion	4X, 6X, 12X, 22X
Clear aperture	1/4 the size of the CCD imager	
Mounting	C-Mount Threads	

Beam expanders are available for 4.5mm spacing CS mount 12.5mm spacing cameras. The 4X beam expander is an expanding telescope that images the beam as it looks at 8mm from the end of the expander onto the CCD while enlarging the image 4X. In addition to the 4X beam expander, other microscope objectives are available for expanding the beam even more. There are objectives for 6X, 12X and 22X expansion. The various expanders allow the use of our 2% and 10% filters as well as the variable attenuator so as to accommodate the camera to a wide range of source intensities .

With a camera having 4.4µm pixel spacing using the beam expander, the effective resolution can be as good as 0.5µm. The object plane that is imaged onto the CCD is located several mm in front of the assembly so even hard to get to focal spots and other small images are easy to image. The beam expanders are designed to accommodate up to 3 screw on filters or a variable attenuator behind them so a wide range of intensities can be accommodated.

For intensities too large to be accommodated by just filters, beam splitters are available to reduce the intensity before the beam expander. The beam expander is primarily intended for nonparallel beams such as focal spots and fiber tips. If small parallel beams are imaged, interference effects may occur.

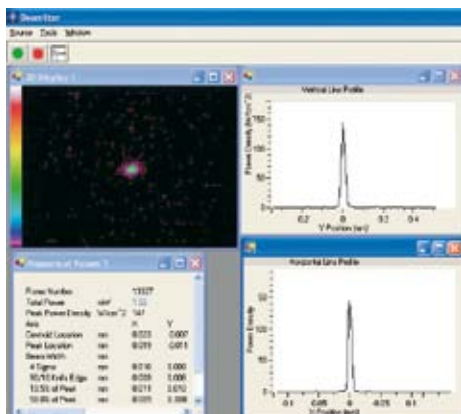
The 4X Beam expander can also be fitted with a UV converter plate at its object plane so that you can look at small beams in the spectral range 193-360nm and expand them 4X. See ordering information for further details.



Camera with 4X Beam Expander



Microscope objective assembly with beam splitter mounted



Shown is an image of the tip of a single mode fiber of 9 μ m diameter. The beam width as measured on the profiles shows 4X the actual size so we see a resolution of $\sim 2\mu$ m.



UV converter
assembly for 4X
Beam Expander

Approximate expansion ratio	Spectral range	Distance from lens barrel to focus	Distance from focus to 1 st beam splitter	Distance of closest approach to focus with 1 beam splitter	Total length of assembly
4X	400 - 1800nm	8mm	18mm	32mm	50mm
6X	600 - 1064nm	16mm	10mm past 1 st surface	4.5mm	107mm
12X	600 - 1064nm	6mm	6mm	20mm	101mm
22X	600 - 1064nm	2.4mm	8mm	22mm	102mm

Ordering Information

Item	Description	P/N
4X reimaging beam expander	Screw optical assembly that images the plane 8 mm in front of the expander onto the CCD while enlarging it 4X. Fits 4.5mm recess and CS mount cameras.	SPZ17022
Fiber adapter bracket for 4X beam expander	Screw on bracket to use with Ophir fiber adapters so fiber is held in correct position to image fiber tip onto camera. Will give exact focus with FC type fiber.	SPG01649
UV converter assembly for 4X beam expander	Screw on assembly which has UV plate that converts 193 - 360nm radiation to visible. This plate is at the object plane of the 4X expander so it produces a 4X enlarged image on the CCD.	SPZ17019
6X expanding microscope objective	Screw optical assembly that images the plane 16mm in front of the lens onto the CCD while enlarging it $\sim 6X$. Fits 4.5mm recess and CS mount cameras. Needs spacer assy below.	SPZ08257
12X expanding microscope objective	Screw optical assembly that images the plane 6mm in front of the lens onto the CCD while enlarging it $\sim 12X$. Fits 4.5mm recess and CS mount cameras. Needs spacer assy below.	SPZ08259
22X expanding microscope objective	Screw optical assembly that images the plane 2.6mm in front of the lens onto the CCD while enlarging it $\sim 22X$. Fits 4.5mm recess and CS mount cameras. Needs spacer assy below.	SPZ08260
Spacer assy for objectives	Spacer assembly for above. One only needed for all expanders above.	SPZ08261
Beam splitter for expanders above	45 degree angle wedge beam splitter which mounts onto beam expander. Reduces beam intensity by ~ 20 times. For spectral range 190 - 2500nm. Introduces 35mm extra beam path to object plane.	SPZ17027
Additional beam splitter for above	Additional beam splitter to mount to 1st beam splitter.	SPZ17026