



**6X, 12X and 22X Expanding Microscope Objectives
SPZ08257, SPZ08259, SPZ08260
Mounting Kit SPZ08261
And Optional Beam Splitter SPZ17027
User Notes**

Ophir-Spiricon, LLC
3050 North 300 W
North Logan, UT 84341

For Sales, Service, or Technical Support
Phone (435) 753-3729
Fax (435) 753-5231
E-mail: sales@us.ophiropt.com
E-mail: service@us.ophiropt.com

© Copyright 2013, Ophir-Spiricon, LLC, N. Logan, UT

Notice

© 2013 Ophir-Spiricon, LLC. All Rights Reserved. Ophir-Spiricon, LLC reserves the right to make improvements in the product described in this User Guide at any time and without notice.

All rights to the product and any accompanying operator's manuals are reserved. While every precaution has been taken in the preparation of this product, the publisher and author assume no responsibility for errors, omissions, or any loss of data because of said errors or omissions.

6X, 12X and 22X Expanding Microscope Objectives SPZ08257, SPZ08259, SPZ08260 Mounting Kit SPZ08261 And Optional Beam Splitter SPZ17027 User Notes

The 6X, 12X and 22X beam expander consist of precision microscope objectives and mounting hardware to image a point in front end of the lens onto the CCD image plane while enlarging it 6X, 12X or 22X. In many cases, this allows the effective resolution of high pixel resolution cameras to reach 1 μ m or less. In cases where the object plane of the objective is accessible, a beam splitter can be mounted in front of the objective to lower the intensity of the beam before it enters the objective.

Instructions for use:

General

The microscope objective set is designed to work either with 4.5mm spacing between the front of the camera and the CCD as exists in most Ophir-Spiricon cameras or the 12.5mm spacing of CS Mount type cameras. It is designed to image nonparallel beams such as focal spots of fiber tips.

Assembly

Note: The instructions are shown with a 4.5mm spacing camera for illustration but most of the instructions are the same when using a 12.5mm spacing CS Mount camera.

Order the following items to build a complete microscope objective system:

- SPZ08257, SPZ08259, or SPZ08260 microscope objectives in holder, only.
Requires item "b." below.
- SPZ08261 Objective mounting kit, with: 3-4mm spacers, 1-8mm spacer, 1 mounting barrel, (only one kit required to be used with any one of above objectives)
- SPZ17027 Optional Beam Splitter wedge, recommended.



Assemble as follows:

1. Leave the three attenuators that are supplied with your Ophir-Spiricon camera mounted on the camera. If you need less attenuation, substitute one or more of the 4mm spacers that have been supplied with P/N SPZ08261. The total combination has to be exactly three (3) 4mm spacer/ND filters, in order to maintain proper focus and magnification.
2. If the camera employs a CS lens mount, leave out the 8mm spacer, but for 4.5mm spaced cameras attach with 3-4mm (spacer/ND filters) and 1-8mm spacer in place as shown. Note: This device is compatible with CS mount and special Spiricon 4.5mm CCD spaced cameras only. It will not operate with C-mount (17.5mm spaced) cameras.
3. Attach the lens mounting barrel as shown.
4. Install the lens into the objective holder and attach the objective as shown.



Example above is with special Spiricon style 4.5mm CCD recessed detector array. Omit the 8mm spacer when mounting onto CS-lens mount cameras.

Use with Optional Beam Splitter SPZ17027

If the power density entering the objective exceeds 1000W/cm² or the energy density about 1J/cm² then the expander optics are likely to be damaged by the beam. This could well be the case when imaging a focal spot. In this case, or even at lower intensities, it is recommended to use the wedge beam splitter SPZ17027 as illustrated below. The beam splitter reduces the intensity ~20 times.



Shown with Optional Beam Splitter installed.

Note in the table below the distance available from the object plane to the beam splitter and make sure you have enough space in your system to get the beam to that position. If you have enough room between your system and the spot you want to image, you may add another beam splitter to the first one. Each additional beam splitter adds 35mm to the beam path.

Nominal expansion ratio	Spectral range	Distance from lens barrel to object plane	Max full angle beam divergence*	Distance from object plane to 1 st beam splitter surface	Distance of closest approach to focus with 1 beam splitter	Total length of assembly
6X	600 – 1064nm	16mm	7.5°	10mm behind 1 st surface	4.5mm	107mm
12X	600 – 1064nm	6mm	27.4°	6mm in front	20mm	101mm
22X	600 – 1064nm	2.4mm	32.0°	8mm in front	22mm	102mm

*To image the object plane w/o distortion, the entire beam must pass thru the lens clear aperture without clipping the edge of the objective. A focused and expanding beam must not be diverging faster than the specified beam divergence or diffraction effects may distort the obtained image.

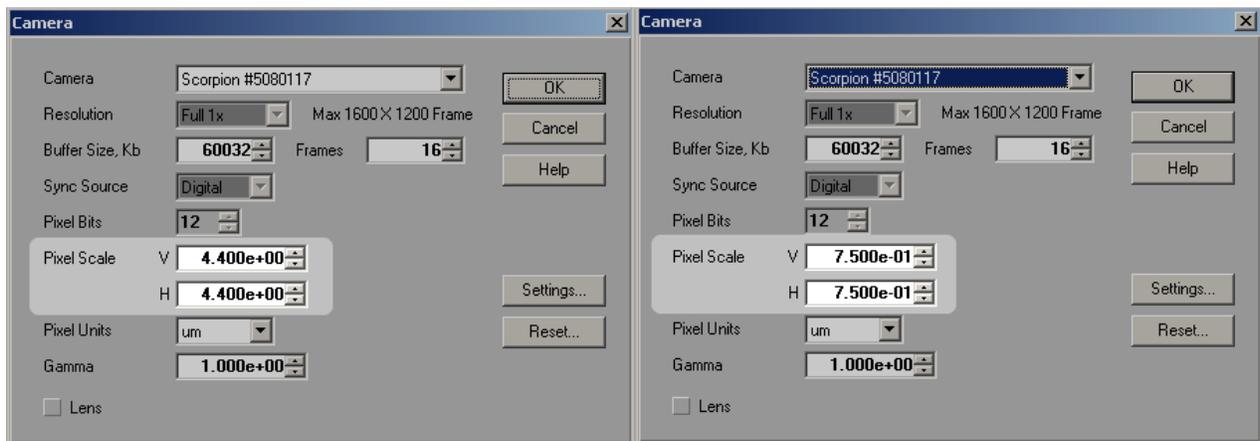
Operation

In order to use the microscope objective, place the beam or source to be examined so the spot to be imaged is the distance "lens barrel to object plane" in the table above and is centered in front. In order to get correct numerical readings from the software, you must set the scaling factor to the correct expansion factor (which is close to nominal value but not exactly equal). The exact value of the expansion factor is found on the barrel of the microscope objective lens.

For BeamGage Software, operate as follows: In the **Computations** ribbon, enable **Optical Scaling** and enter the inverse of the number shown on the barrel of the microscope lens. This will set the camera to the exact expansion factor of the expander so that the numerical measurements in the software will be correct. In the example on the right, the value on the lens barrel was 11.7 ($1/11.7 = .08547$)



For LBA Software, operate as follows: From **options > camera** open the **camera dialog box**. **Divide** the V and H **pixel scale** that appears for your camera by the number shown on the microscope lens and enter the result into the pixel scale. Save the configuration **file > save config**. The example below is for a 12x lens with the SCOR20 camera: $4.4\mu\text{m} / 12 = 0.75\mu\text{m}$



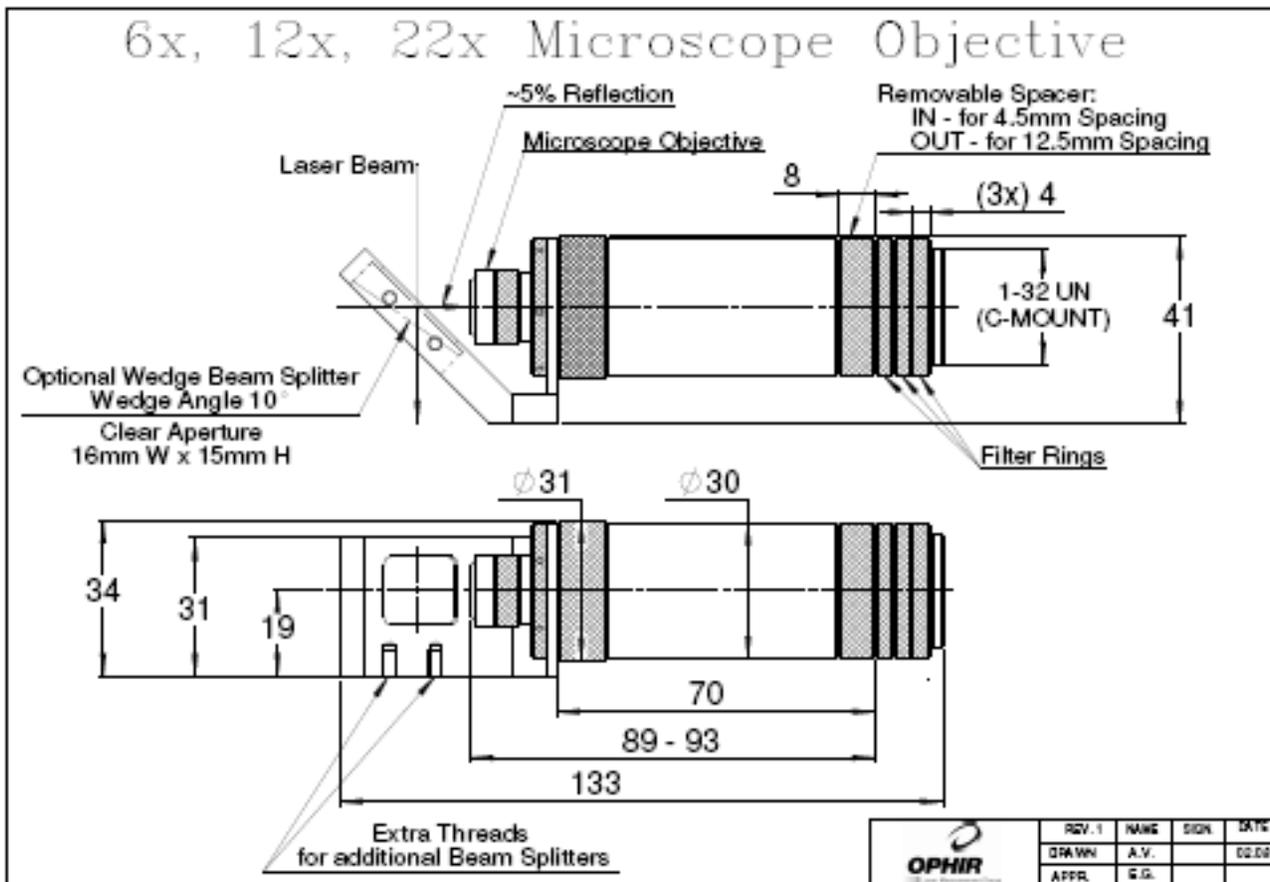
Tips for Getting Best Performance from the Microscope Objectives

1. When measuring with the camera using intervening optics, there are a number of things that can potentially disturb the measurement. These can be:
 - a. Particles on the optics can obscure part of the beam and be a source of diffraction effects.
 - b. Optical surfaces partially reflect, and under the adverse conditions cause interference patterns.
2. Be willing to play a little bit with positioning of the camera and the optics. Maybe a small adjustment in position or angle will remove the beam from a particle (which is a source of diffraction) or will move the beam from a position that causes interference fringes.

Ordering information is given below.

6X expanding microscope objective	Objective lens that images the plane 16mm in front of the lens holder ~6X magnification. Lens only in holder. Requires MO Mounting/spacer kit SPZ08261 shown below.	SPZ08257
12X expanding microscope objective	Objective lens that images the plane 6mm in front of the lens holder ~12X magnification. Lens only in holder. Requires MO Mounting/spacer kit SPZ08261 shown below.	SPZ08259
22X expanding microscope objective	Objective lens that images the plane 2.6mm in front of the lens holder ~22X magnification. Lens only in holder. Requires MO Mounting/spacer kit SPZ08261 shown below.	SPZ08260
MO mounting kit	Mounting kit w/spacers for above microscope objectives. One only needed for all powers of microscope objectives listed above. For 4.5mm spaced imagers and CS-mount cameras only.	SPZ08261
Beam splitter for above objectives	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 1 st beam splitter	SPZ17026

Mechanical Dimensions



These microscope objectives are compatible with the following products:

- SP90152, LBA-USB-SP503
- SP90153, BS-USB-SP503
- SP90154, LBA-USB-SP620
- SP90155, BS-USB-SP620
- SP90043, LBA-USB-L070
- SP90044, LBA-USB-L139
- SP90045, LBA-USB-L230
- SP90001, LBA-FW-SCOR20
- SP90040, LBA-FW-FX50 (OBSOLETE)
- SP02561, BS-FW-FX50 (OBSOLETE)
- SP90041, LBA-FW-FX33 (OBSOLETE)
- SP02562, BS-FW-FX33 (OBSOLETE)
- SP90043, LBA-FW-FX33HD (OBSOLETE)
- SP02565, BS-FW-FX33HD (OBSOLETE)