Visionen leben

asphericon

SPA™ Beam Expander Kit

SPA™ Beam Expander | SPA™ Waveλdapt | SPA™ Adapter

User Manual

Dear customer,

We would like to congratulate you on your purchase of a quality product from asphericon and thank you for putting your trust in us.

Our beam expansion system, consisting of one or more SPA™ Beam Expanders and the optional SPA™ Wavelλdapt, is the right choice when it comes to beam expansion with outstanding quality and precision.

Before using the SPA™ Beam Expander and the SPA™ Wavelλdapt for the first time, we recommend you read our manual carefully and note the information contained in it.

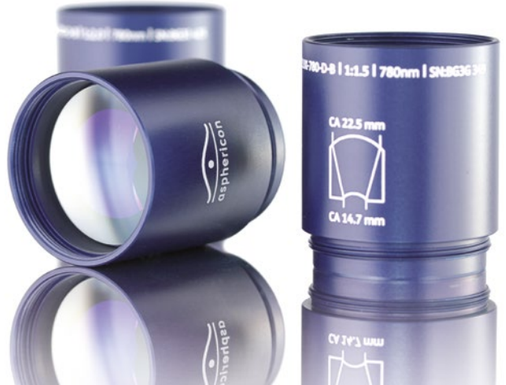
If you need any further advice, please contact customer service.

Best regards,

Stefan Klinzing
Head of Sales
asphericon GmbH

Sabrina Matthias
President
asphericon, Inc.

Content



General notes

Safety and warning notes

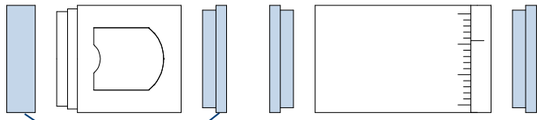
To use this product safely and with best performance, please note the following information:

= Protect against severe fluctuations in temperature and direct sunlight.
= Never look into light sources with the SPA™ Beam Expander - risk of serious eye damage.
= Keep away from water, fire, corrosive substances and other hazardous environmental conditions.

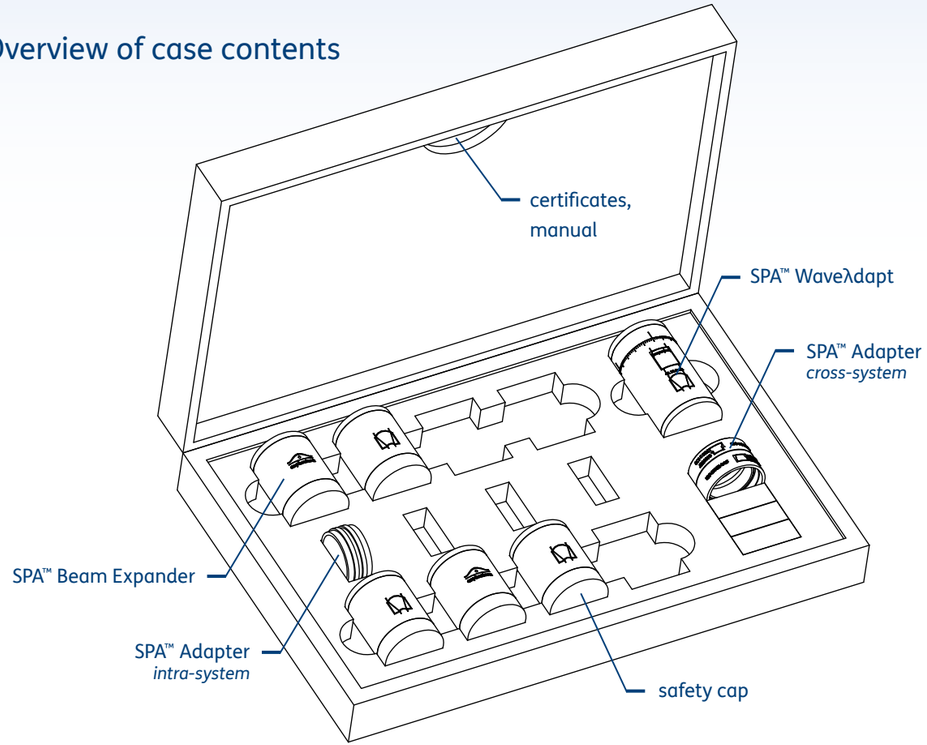
Care and use

To ensure the product functions correctly over the long term, we recommend you note the following information:

= After use, always attach the corresponding safety caps to the SPA™ Beam Expanders and SPA™ Wavelλdapt.
= When not in use, store all parts in the appropriate positions in the case.
= If the product needs to be cleaned, use suitable cleaning cloths, cleaning agents and procedures.



Overview of case contents



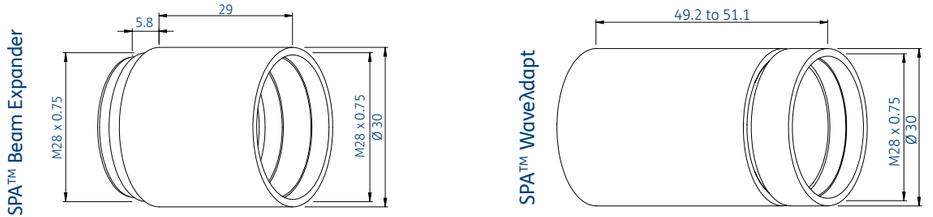
Technical data

Parameters

	Product code	Expansion ratio	Input apertures [mm]	Output apertures [mm]
SPA™ Beam Expander	B25-200LVX-[...]*-D	1:2.0	10.6	22.5
SPA™ Beam Expander	B25-175LVX-[...]*-D	1:1.75	12.4	22.5
SPA™ Beam Expander	B25-150LVX-[...]*-D	1:1.5	14.7	22.5
SPA™ Wavelλdapt	B25-100LXX-[...]*-D	1:1.0	22.5	22.5

***available for the wavelengths 532, 632, 780, 1064 [nm]**

Dimensions [mm]



Laser labelling

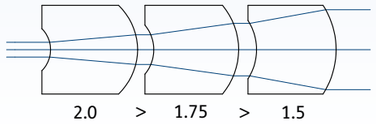
SPA™ Beam Expander

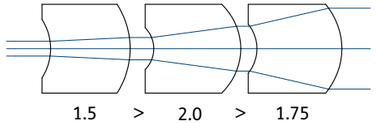
Every SPA™ Beam Expander can be used individually and in various combinations with other SPA™ Beam Expanders. By inverting, a SPA™ Beam Expander can be used as a beam reducer.

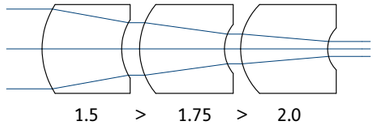
Key Benefits

= Using one aspheric lens for the highest level of precision
= Diffraction-limited performance for any combination with up to five SPA™ Beam Expanders
= 230 intermediate stages are possible
= Simple assembly through the unique threading mechanism and integrated stops - no adjustment is needed
= Files for optical design available for download: Zemax, CodeV, OSLO, VirtualLab™
= Files for drawings and documents: Step-files

» www.aspheric-beamexpander.com







When combining several SPA™ Beam Expanders, the element with the largest expansion is positioned at the point of the smallest beam diameter.

SPA™ Beam Expander

Combinations for beam expansion (selection)

Magnification	1.5	1.75	2.0
3.00x	1	-	1
5.25x	1	1	1
10.5x	1	1	2
21.0x	1	1	3
32.0x	-	-	5

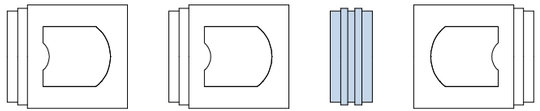
Configurator

= Find the right combination for the desired beam expansion quickly and easily.
= Pictograms show the correct arrangement in all combinations.

» www.aspheric-beamexpander.com

SPA™ Adapter *intra-system*

To combine SPA™ Beam Expanders in both functional directions for certain magnifications an intra-system adapter is required between the beam-enlarging and beam-reducing SPA™ Beam Expanders.



Mounting concepts

The SPA™ Beam Expander can be integrated in an optical construction using a variety of mounting concepts specifically adapted to suit the respective requirements.

= The SPA™ Beam Expanders can be screwed together with a high level of alignment.
= Use one or two mounting elements to fix the SPA™ Beam Expanders in place.
= For best wavefront quality, use asphericon intra-system adapters between the SPA™ Beam Expanders.
= Minimize the number of adapters used.

Four mounting concepts for holding multiple SPA™ Beam Expanders are shown on page 08.

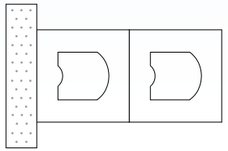
		Mounting	
	Number of elements	adjustable	static
	≤ 3	A or B	
	≥ 3	B	C or D
with SPA™ WaveλAdapt	≤ 3	A or B	
	≥ 3	B	D

= A main distinguishing feature is the resulting adjustability of the position of the SPA™ Beam Expanders in the optical assembly.
= The load bearing capacity of the holder must be checked for one-sided mounting of three or more elements.

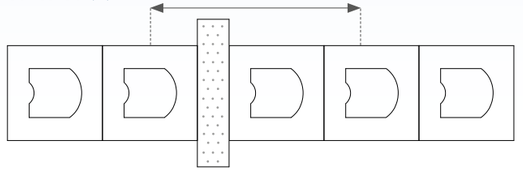
Mounting concepts

Adjustable mounting

On one end (A)

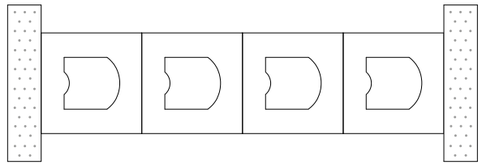


Centered (B)



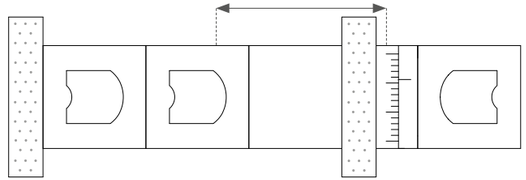
Static mounting

On both ends (C)



One holder has to be clamped.

On one end and centered (D)



It should still be possible to adjust the SPA™ WaveλAdapt by turning it.

SPA™ Adapter *cross-system*

Compatibility

The SPA™ Beam Expander is compatible with most mounting systems either directly or with cross-system adapters (C-Mount, SM1, 1.2“ circumference adapter) available from asphericon.

Circumference holders and threaded mounts can be used to construct all the mounting concepts shown on page 08.

Circumference mounting

= SPA™ Beam Expanders can be mounted directly, e.g. with systems provided by Qioptiq, Edmund Optics or Owis.

= Sometimes a 1.2“ adapter is needed for circumference mounting, e.g. systems from Thorlabs and Newport.

End mounting

= For threaded mounting we recommend two standard adapters – C-Mount or SM1 – both available for male and female threads.

Cross-system adapters

Adapter types	Product code	Thread types
1.2“ circumference adapter	U25-28MII-1.2in-28	female/female
C-Mount male	U25-28MI0-C-25	female/male
C-Mount female	U25-28MII-C-25	female/female
SM1 male	U25-28MI0-SM1-26	female/male
SM1 female	U25-28MII-SM1-26	female/female

asphericon cross-system adapters to hold the SPA™ Beam Expander in the mounting systems various providers.

In general, it should be noted:

= For a high wavefront quality, use asphericon adapters between the SPA™ Beam Expanders.

= Minimize the number of adapters used.

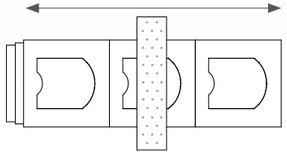
= All SPA™ Adapters come with a female M28 x 0.75 thread.

SPA™ Adapter *cross-system*

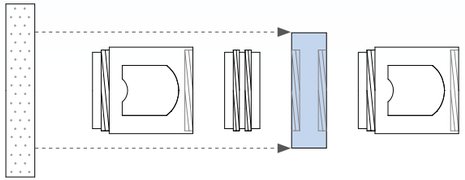
Utilization

Circumference mount configurations

Direct circumference mounting (30 mm ID) – continuous

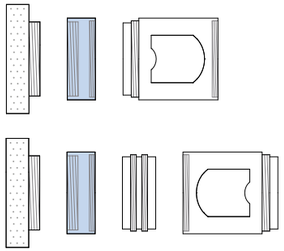


Circumference mounting with 1.2“ adapter – discreet

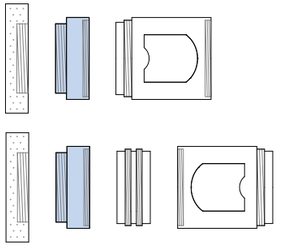


End mount configurations

Male threaded mount with female/female adapter



Female threaded mount with male/female adapter



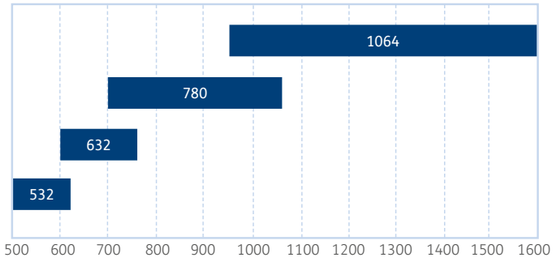
SPA™ Wavelλdapt

Key features

By using the SPA™ Wavelλdapt, the SPA™ Beam Expanders can also be used with wavelengths other than one of the four basic wavelengths (532 nm, 632 nm, 780 nm, 1064 nm). The SPA™ Wavelλdapt adjusts the divergence and corrects the wavefront deformation while retaining the beam diameter.

= Can be combined with up to five SPA™ Beam Expanders – completely diffraction-limited.
= A matching SPA™ Wavelλdapt is available for every SPA™ Beam Expander set.
= Simple mounting of all components by screwing together the metric fine thread.
= Optimized adaptation to all wavelengths between 500 nm and 1600 nm (see diagram below).
= Adaptation of divergent incoming beams up to 1 mrad.

Wavelength ranges of the SPA™ Wavelλdapt



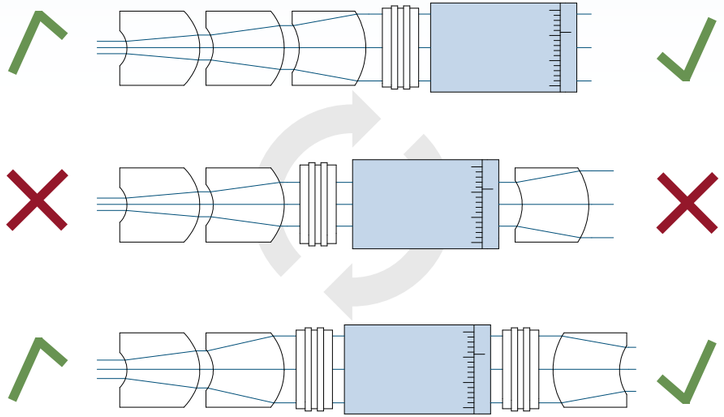
Covered wavelength range [nm] for different SPA™ Beam Expander sets using the associated SPA™ Wavelλdapt.

SPA™ Wavelλdapt with laser engraving on the mount.

SPA™ Wavelλdapt

Arrangement

for beam expansion



for beam reduction

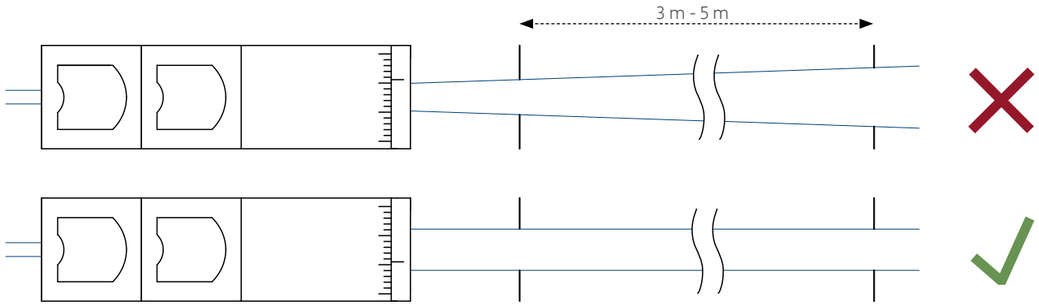
= Always mount the SPA™ Wavelλdapt at the position with the largest beam diameter (orientation according to diagram).
= An intra-system adapter between the SPA™ Beam Expanders and the SPA™ Wavelλdapt is required for mounting.
= When using SPA™ Beam Expanders both in enlarging and reducing orientation, an intra-system adapter is required on both sides of the SPA™ Wavelλdapt.

SPA™ Waveλdapt

Setup procedure

When the SPA™ Beam Expanders are used with a wavelength that differs from its basic wavelengths, the SPA™ Waveλdapt has to be set to this wavelength. Diffraction-limited performance is achieved by collimating the outgoing beam at the new wavelength.

- Measure the beam diameter first at a short distance (10 cm - 30 cm) and then at a long distance (3 m - 5 m).
- Twist the adjustable part of the SPA™ Waveλdapt until the correct setting for identical beam diameters is achieved.
- The SPA™ Waveλdapt is set correctly when the beam diameters match at both measurement locations.



Residual divergence

Assumption: diameter can be measured precisely to ± 0.5 mm.
At a distance of 3 m ⟶ 0.00955° = 160 µrad = 35“ | At a distance of 5 m ⟶ 0.00573° = 100 µrad = 21“

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The standard reference for laser safety is the American Standard for the Safe Use of Lasers, Z136.1-2000, developed by the American National Standards Institute. This reference is the basis for many of the federal regulations for laser and laser system manufacturers, and for the Occupational Safety and Health Administration laser safety guidelines. It contains detailed information concerning proper installation and use of laser systems and should be referenced when using lasers and laser systems. Copies of Standard Z136.1-2000 are available from: Laser Institute of America, 12424 Research Parkway, Suite 125 Orlando, FL 32826, (407) 380-1553.

Warranty

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We hope that you are happy with our products.
You can simply and conveniently order our complete SPA™ – Standard Precision Aspheres range online in our SPA™ Webshop:

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