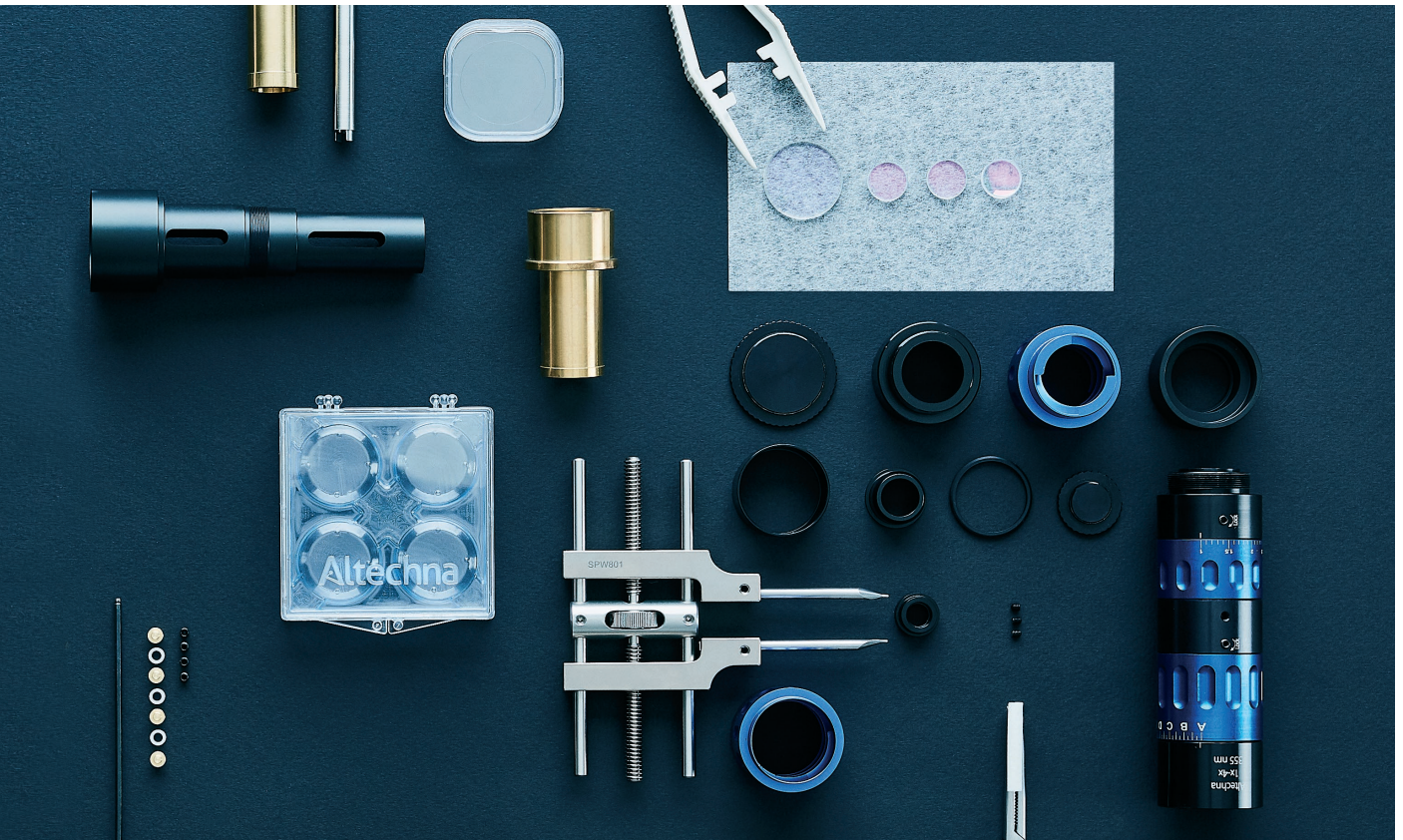


# COMPONENTS FOR LASER BEAM DELIVERY



Altechna

# A company you can rely on

Altechna is a Lithuania-based OEM manufacturer of high LIDT optical equipment – from optical coatings to motorized optomechanical assemblies. We have spent more than 28 years creating and developing complex technological solutions and custom designs for laser optics, related accessories and optomechanical assemblies.

Our in-depth knowledge on dielectric coatings and optical designs allows our industrial customers to reconsider their laser geometries and achieve even higher peak levels of power or reduce the weight of commercial products. From test batch to mass production, the quality and repeatability of each product are assured at our in-house metrology laboratory. So, if your challenge involves anything from femtosecond to continuous-wave technology, we are here to support you with our innovative solutions.

## Position

### Products:



### Customers:



## Vision

We seek to become the go-to source for custom made thin-film coatings, optical components and solutions for leading industrial and R&D institutions in selected photonics industries across the globe.

## Mission

We adopt a fables business strategy across global supply chain. We build and preserve key light technology knowledge and in-house expertise to serve our partners' needs best.

## Facts

~90%  
Export



14  
Years

participation in leading photonics exhibitions worldwide

In-house coating technologies



E-beam, IBS, MS

50:50  
Male to female ratio



150  
Employees



60% have degree in Physics, Engineering

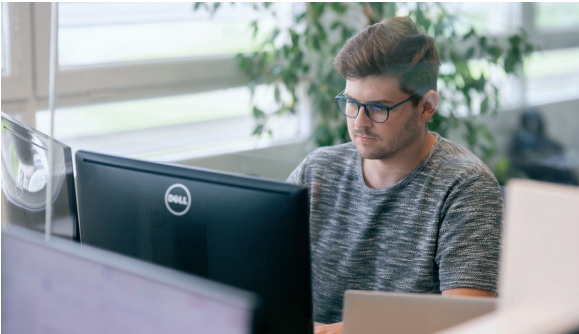
Copy Exactly!



High repeatability



# Why Altechna?



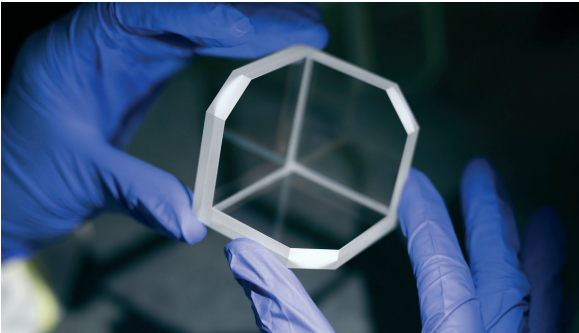
## Professional Team

- Finest solutions to complex problems
- Technical consultations
- Fast reaction time
- High performance culture
- Customer-oriented approach



## Technological Capabilities

- Advanced coating technologies
- Optical and optomechanical assemblies
- Optical system development according to customer-specific applications
- A fully equipped measurement laboratory



## Custom Laser Optics Solutions

- Laser optics
- Polarization optics
- Laser crystals
- Optomechanics

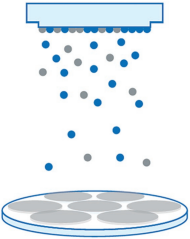
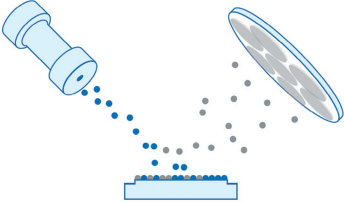
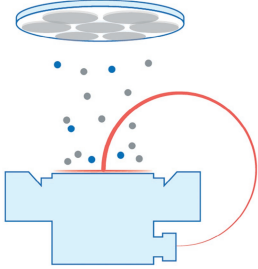
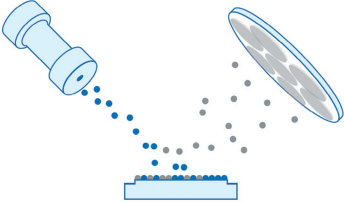
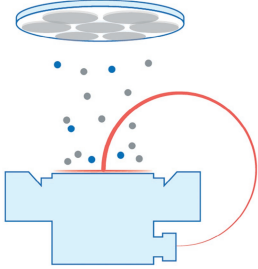
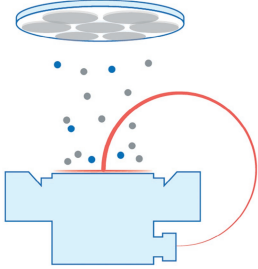


## Quality Assurance

- ISO 9001 certified
- Copy-exactly!
- In-house metrology laboratory
- Continuous process improvement and optimization

# Technological Capabilities

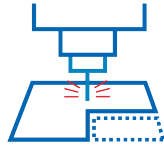
## Coating Technologies

<h3>MAGNETRON SPUTTERING</h3>  <th data-bbox="515 379 961 945"><h3>ION BEAM SPUTTERING</h3><th data-bbox="966 379 1397 945"><h3>ION ASSISTED E-BEAM</h3></th></th>	<h3>ION BEAM SPUTTERING</h3>  <th data-bbox="966 379 1397 945"><h3>ION ASSISTED E-BEAM</h3></th>	<h3>ION ASSISTED E-BEAM</h3> 
<p><b>Key features</b></p> <ul style="list-style-type: none"><li>• Great solution for large coating batches (340 pcs. of 1" substrates)</li><li>• Outstanding spectral coating accuracy</li><li>• Low absorption coatings</li><li>• High contrast polarization coatings</li><li>• High performance bandpass and notch filters with over 200 layers or layers up to 20 <math>\mu\text{m}</math> thick</li></ul>	<p><b>Key features</b></p> <ul style="list-style-type: none"><li>• Complex and long lifetime coatings</li><li>• Very low absorption and scattering losses</li><li>• Very high spectral coating accuracy</li><li>• Stress-controlled by complementary processes</li><li>• Excellent stability and performance in harsh environments</li><li>• Exceptional LIDT: from ultrashort pulsed to continuous wave applications</li></ul>	<p><b>Key features</b></p> <ul style="list-style-type: none"><li>• Custom coatings design</li><li>• Low stress coatings</li><li>• Wide spectral range: 193 - 3000 nm</li><li>• High deposition rates</li><li>• Best cost-performance ratio</li><li>• Perfect solution for mass production (652 pcs. of 1" substrates)</li><li>• Large area (up to <math>\text{\O}300\text{ mm}</math>) coating</li></ul>

# Markets We Serve

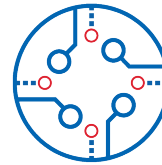
Altechna's wide variety of optical offerings allows us to provide the best solutions for our customers in multiple markets.

## INDUSTRY (OEM)



Serving most sophisticated needs of companies leading in laser manufacturing and integration

## SEMICON



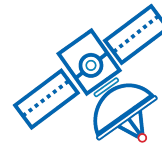
Combining various coating technologies with deep knowledge in laser-accessory manufacturing

## MEDICAL & BIO



Mass production capabilities, high repeatability, fast customization, strict, multi-step quality control

## DEFENSE & AEROSPACE



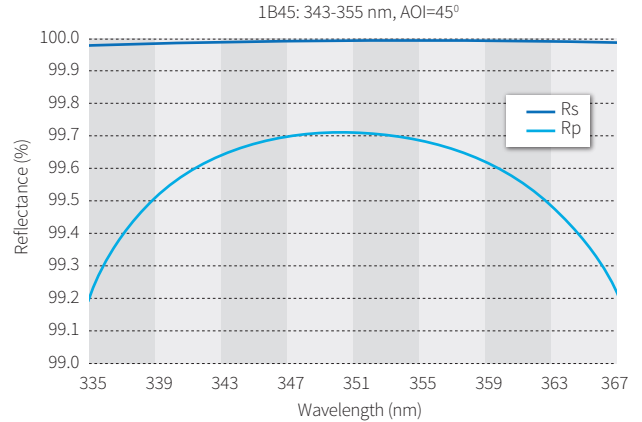
Ready to meet the highest standards of our security, defense and aerospace customers

# HR Laser Line Mirrors



## Description

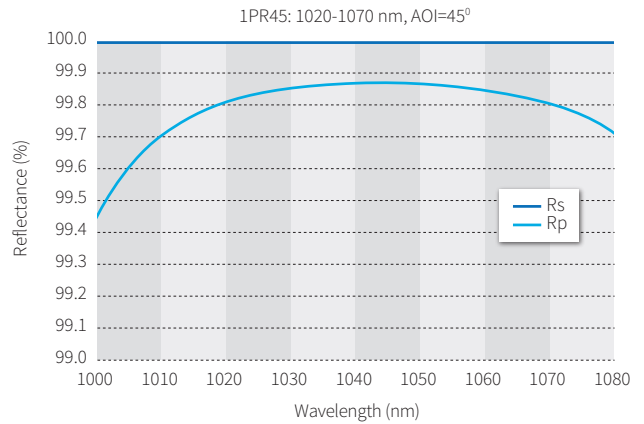
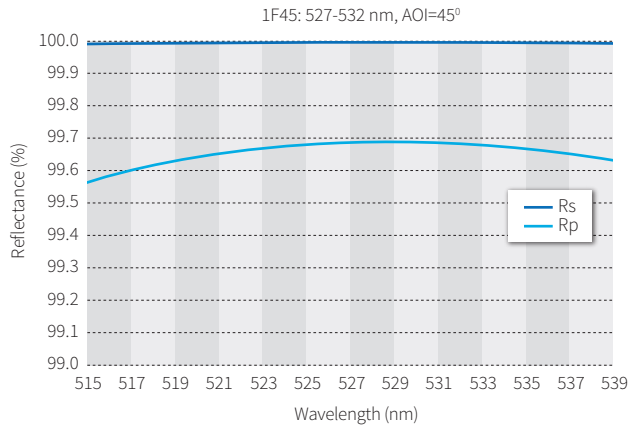
Dielectric HR Laser Line Mirrors provide higher reflectivity values than metallic mirrors, making them a perfect choice for high-performance laser systems. HR mirrors can be optimized for certain wavelength, angle of incidence and polarization. We design mirrors in-house to meet your desired specifications and provide high-performance optics. Every coating batch is tested to confirm reflectivity values. Mirrors can also be optimized for high LIDT and LIDT measurements can be conducted upon request.



## Features

- HR laser line coatings (HR) highly reflect at wavelength range of <math><10\%</math> of the central wavelength (CWL)
- Custom coatings are available for any wavelength in the range 0.19 - 3  $\mu\text{m}$
- Surface flatness, P-V:  $< \lambda/10$  @ 632.8 nm
- Laser damage threshold up to 35.2 J/cm<sup>2</sup> @ 532 nm, 6.2 ns, 50 Hz





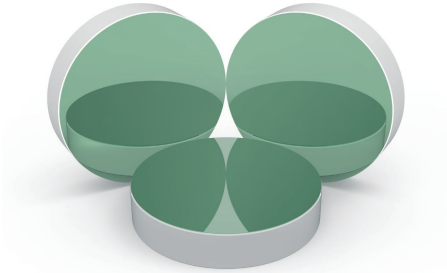
**Typical items\***

Wavelength, nm	Reflectance s/p,%**	Substrate material	Product ID for AOI=45°, Ø25.4 mm
250-266	>99.0/>98.0	UVFS	1-OS-2-0254-5-[2AA45]
343-355	>99.5/>99.0	UVFS	1-OS-2-0254-5-[1B45]
380-420	>99.5/>99.0	UVFS	1-OS-2-0254-5-[1C45-GDD]
515	>99.5/>99.0	UVFS	1-OS-2-0254-5-[1E45]
527-532	>99.8/>99.3	BK7	1-OS-1-0254-6-[1F45]
760-840	>99.5/>99.0	UVFS	1-OS-2-0254-5-[1K45-GDD]
1030	>99.5/>99.0	UVFS	1-OS-2-0254-5-[1P45]
1020-1070	>99.8/>99.6	UVFS	1-OS-2-0254-5-[1PR45]
	<b>Reflectance, %</b>		<b>Product ID for AOI=0°, Ø25.4 mm</b>
343-355	>99.5	UVFS	1-OS-2-0254-5-[1B00]
760-840	>99.5	UVFS	1-OS-2-0254-5-[1K00-GDD]
1000-1060	>99.5	UVFS	1-OS-2-0254-5-[1P00]

\* Customized HR Laser Line Mirrors are available on request.

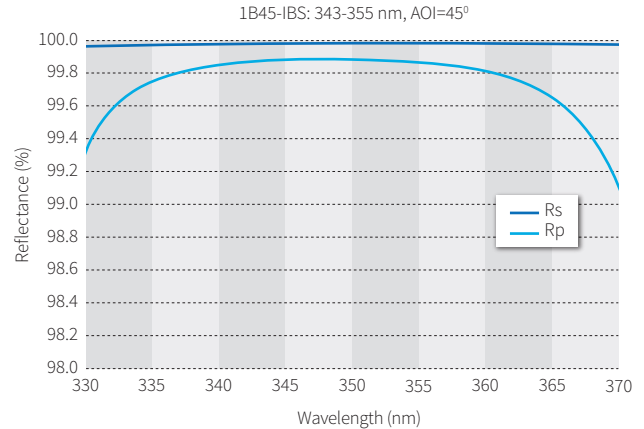
\*\* “p” stands for value of reflected p polarization at 45°, “s” stands for value of reflected s polarization beam at 45°.

# Low Loss HR Mirrors



## Description

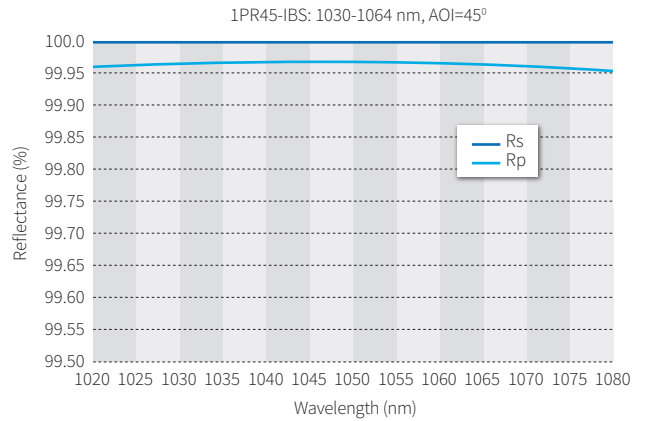
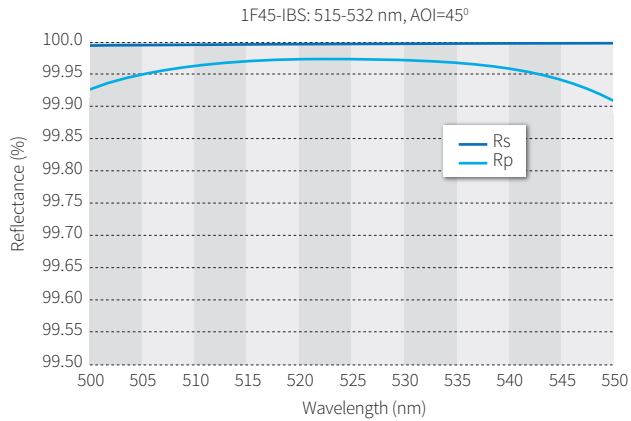
Low Loss HR mirrors are essential in laser systems where the lowest possible losses are required. Mirrors are manufactured with advanced sputtering technology reach extremely high-quality specifications. Such thin films feature higher density and durability than e-beam coatings, making them resistant to environmental conditions such as heat, humidity and pressure. Mirrors reach highest reflectance (>99.9%) in a certain wavelength range and angles of incidence (AOI). Furthermore, scattering is minimized which is usually a limiting factor for high reflectivity.



## Features

- Resistant to environmental conditions
- Wide-angle (AOI=0-50°) mirrors are available
- Mass production capabilities: >500 pcs of Ø25.4 mm substrates per single batch
- Reflectance higher than 99.9%
- Typical surface flatness, P-V: < $\lambda/10$  @ 632.8 nm
- Laser damage threshold up to 17 J/cm<sup>2</sup> @ 1064 nm, 10 ns, 10 Hz





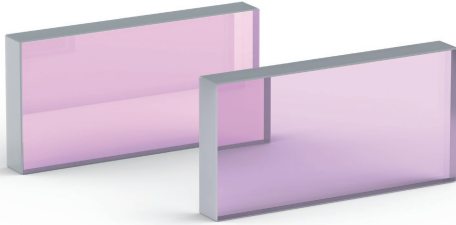
**Typical items\***

Wavelength, nm	Reflectance, %	Substrate material	Dimensions, mm	Product ID for AOI=0°
343-355	>99.9	UVFS	Ø25.4x5	1-OS-2-0254-5-[1B00-IBS]
515-532	>99.9	UVFS	Ø25.4x5	1-OS-2-0254-5-[1F00-IBS]
1030-1064	>99.95	UVFS	Ø25.4x5	1-OS-2-0254-5-[1PR00-IBS]
	<b>Reflectance s/p, %</b>			<b>Product ID for AOI=45°</b>
343-355	>99.9/>99.7	UVFS	Ø25.4x5	1-OS-2-0254-5-[1B45-IBS]
515-532	>99.97/>99.93	UVFS	Ø25.4x5	1-OS-2-0254-5-[1F45-IBS]
1030-1064	>99.98/>99.93	UVFS	Ø25.4x5	1-OS-2-0254-5-[1PR45-IBS]

\* Customized Low Loss HR Mirrors are available on request.

\*\* “p” stands for value of reflected p polarization at 45°, “s” stands for value of reflected s polarization beam at 45°.

# High Contrast Thin Film Polarizers



## Description

High Contrast Thin Film Polarizers (TFP) are made using advanced Ion Beam Sputtering (IBS) coating technology. These thin film polarizers separate s- and p-polarization components of high energy laser beams. Due to very low losses they are perfect for intra and extra cavity usage. Because of their high damage threshold and extinction ratio (>1000:1), thin film polarizers are a good replacement for Glan laser polarizing prisms or polarizing cube beam splitters. For optimal performance, polarizers should be mounted in an appropriate holder allowing angular adjustment. We offer two types of high contrast polarizers: with higher LIDT or higher contrast values.

## Features

- High Tp, low absorption & scattering
- No aging effects due to negligible porosity of the coatings
- Transmitted wavefront distortion (TWD), P-V:  $<\lambda/10$  @ 632.8 nm
- Laser damage threshold up to 20 J/cm<sup>2</sup> @ 532 nm, 10 ns, 10 Hz (s-pol)

## Typical items\*

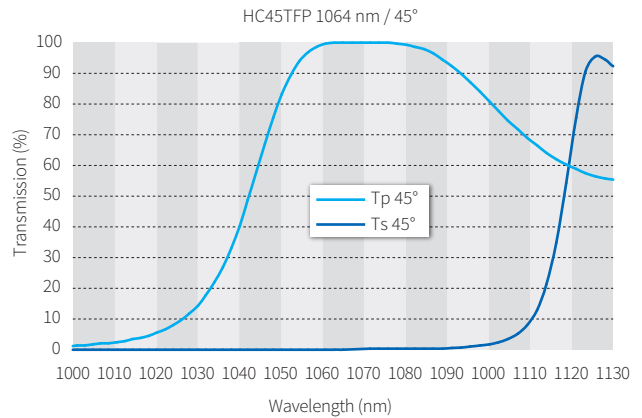
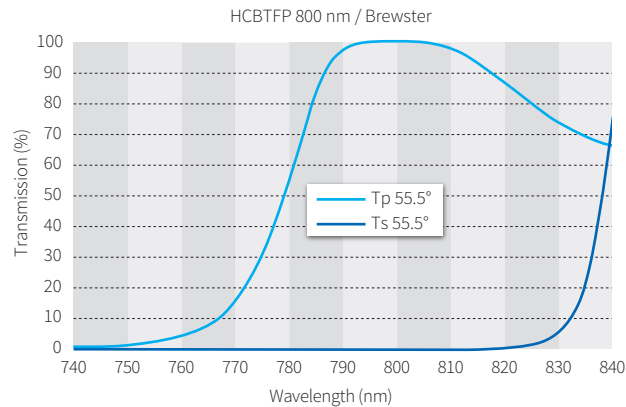
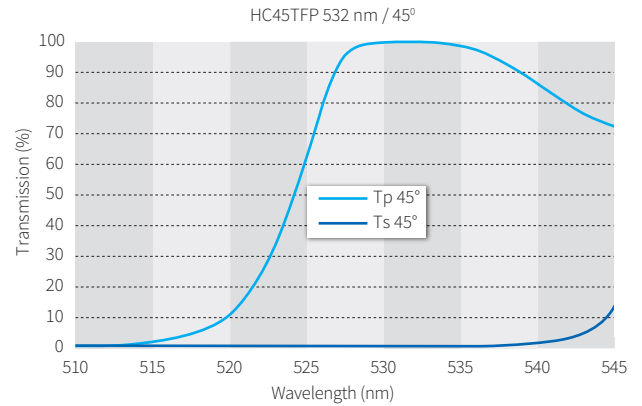
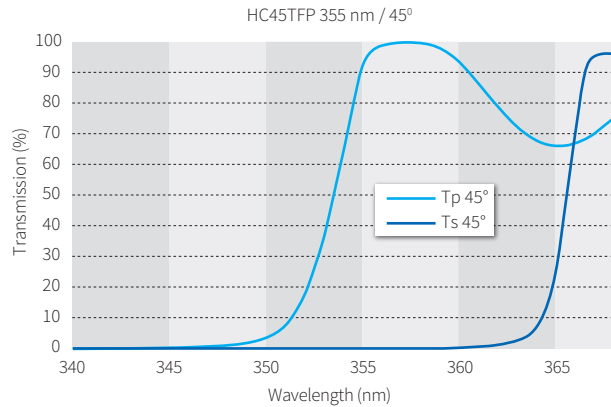
Wavelength, nm	Transmission, p-pol, %	Reflection, s-pol, %	Contrast, (Tp/Ts)	Typical LIDT @ 10 ns, 10 Hz for s-pol, J/cm <sup>2</sup>	Typical LIDT @ 10 ns, 10 Hz for p-pol, J/cm <sup>2</sup>	Product ID for AOI=Brewster
343	>97	>99.7	>300:1	>4	>1	2-HCBTFP-0343-0254
355	>97	>99.7	>300:1	>4	>1	2-HCBTFP-0355-0254
515	>99	>99.9	>1000:1	>5	>2	2-HCBTFP-0515-0254
532	>98	>99.8	>500:1	>7	>3	2-HCPBTFP-0532-0254
532	>99	>99.9	>1000:1	>5	>2	2-HCBTFP-0532-0254
800	>99	>99.9	>1000:1	>7	>3	2-HCBTFP-0800-0254
1030	>99	>99.8	>500:1	>20	>10	2-HCPBTFP-1030-1020
1030	>99	>99.9	>1000:1	>7	>3	2-HCBTFP-1030-0254
1064	>99	>99.8	>500:1	>20	>10	2-HCPBTFP-1064-1020
1064	>99	>99.9	>1000:1	>7	>3	2-HCBTFP-1064-0254

\* Customized solutions are available on request. Typical dimensions are Ø25.4 x 5 mm, 20 x 40 x 5 mm and 10 x 20 x 5 mm.

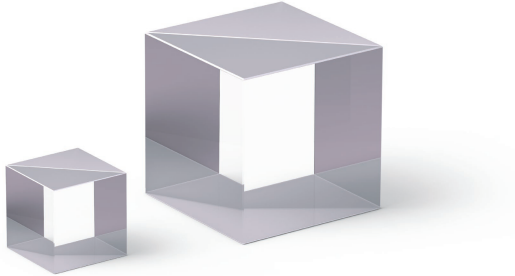
### Typical items\*

Wavelength, nm	Transmission, p-pol, %	Reflection, s-pol, %	Contrast, (Tp/Ts)	Typical LIDT @ 10 ns, 10 Hz for s-pol, J/cm <sup>2</sup>	Typical LIDT @ 10 ns, 10 Hz for p-pol, J/cm <sup>2</sup>	Product ID for AOI=45°
355	>95	>99.8	>500:1	>4	>1	2-HC45TFP-0355-0254
532	>98	>99.8	>500:1	>7	>3	2-HCP45TFP-0532-0254
532	>97	>99.9	>1000:1	>5	>2	2-HC45TFP-0532-0254
1030	>97	>99.8	>500:1	>20	>10	2-HCP45TFP-1030-0254
1030	>97	>99.8	>1000:1	>7	>3	2-HC45TFP-1030-0254
1064	>97	>99.8	>500:1	>20	>10	2-HCP45TFP-1064-0254
1064	>97	>99.9	>1000:1	>7	>3	2-HC45TFP-1064-0254

\* Customized solutions are available on request. Typical dimensions are Ø25.4 x 5 mm, 20 x 40 x 5 mm and 10 x 20 x 5 mm.



# Polarizing Cubes for High Energy Applications



## Description

Polarizing beamsplitter cubes offer several advantages over plate beamsplitters. They are easy to handle, high contrast and high extinction ratio polarizers that split a randomly polarized beam into two orthogonal linearly polarized components. These products are typically used in laser-beam separation, combination and optical-isolation applications. The epoxy-free construction of the cubes enables a superior performance at high energy levels.

## Features

- Easy, deformation-free mounting
- High extinction ratio in transmission:  $T_p/T_s > 1000:1$
- Low reflected and transmitted wavefront distortion, P-V:  $< \lambda/10$  @ 632.8 nm
- No ghost reflections
- Minimal beam displacement
- Negligible absorption of reflected and transmitted beams
- High transmission of p-polarization:  $T_p > 97\%$
- No material fluorescence in UV region
- Laser damage threshold up to  $20 \text{ J/cm}^2$  @ 1064 nm, 10 ns, 100 Hz

## Typical items\*

Wavelength, nm	Dimensions, mm	Reflection s-pol, %	Transmission p-pol, %	Product ID
345-365 (centered @ 355)	12.7x12.7x12.7	>99.5	>96	2-HPCB-A-0125
	25.4x25.4x25.4	>99.5	>96	2-HPCB-A-0254
510-550 (centered @ 532)	12.7x12.7x12.7	>99.5	>97	2-HPCB-B-0125
	25.4x25.4x25.4	>99.5	>97	2-HPCB-B-0254
1020-1090 (centered @ 1064)	12.7x12.7x12.7	>99.5	>97	2-HPCB-C-0125
	25.4x25.4x25.4	>99.5	>97	2-HPCB-C-0254
1510-1580 (centered @ 1550)	12.7x12.7x12.7	>99.5	>97	2-HPCB-D-0125

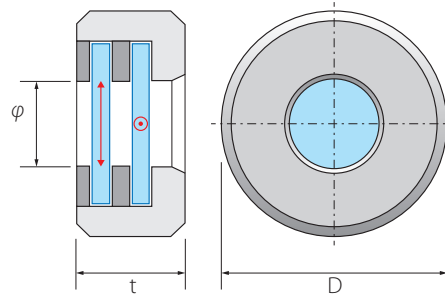
\* Customized solutions are available on request.

# Crystalline Quartz Waveplates



## Features

- High extinction ratio
- Wide wavelength range
- Low transmitted wavefront distortion
- High LIDT



## Description

Crystalline quartz waveplates are made from materials that have a birefringence property. Most common types are designed so that an ordinary ray will exhibit a half ( $\lambda/2$ ) or quarter ( $\lambda/4$ ) wave retardation with respect to an extraordinary ray. Such waveplates are used to rotate the plane of polarization, converting a linear polarization to a circular one and vice versa. Such elements are used for electro-optic modulations and as a variable ratio beamsplitter when used in conjunction with a polarization cube. Although the latter two types of waveplates are the most common, Altechna also offers custom retardation values on request.

One of the most common arrangements of the waveplates is the zero order (ZO) air-spaced version. These waveplates are built of two crystalline quartz plates with specific thicknesses and crossed axes, which results in a zero order performance. This arrangement allows us to reach a better performance for a wider wavelength range and is less sensitive to temperature changes when compared with low order (LO) waveplates. High purity crystalline quartz materials and precise parallelism between the two air-spaced plates allows the transmitted wavefront distortion to be better than  $\lambda/10$  at 632.8 nm.

**Typical items Ø12.7 x 6 mm****ZO Crystalline Quartz Waveplates (air-spaced)**

Wavelength, nm	Product ID	
	$\lambda/2$ retardation, clear aperture >8 mm	$\lambda/4$ retardation, clear aperture >8 mm
343	2-CPW-ZO-L2-0343-S	2-CPW-ZO-L4-0343-S
355	2-CPW-ZO-L2-0355-S	2-CPW-ZO-L4-0355-S
400	2-CPW-ZO-L2-0400-S	2-CPW-ZO-L4-0400-S
515	2-CPW-ZO-L2-0515-S	2-CPW-ZO-L4-0515-S
532	2-CPW-ZO-L2-0532-S	2-CPW-ZO-L4-0532-S
800	2-CPW-ZO-L2-0800-S	2-CPW-ZO-L4-0800-S
1030	2-CPW-ZO-L2-1030-S	2-CPW-ZO-L4-1030-S
1064	2-CPW-ZO-L2-1064-S	2-CPW-ZO-L4-1064-S

**Typical items Ø25.4 x 6 mm****ZO Crystalline Quartz Waveplates (air-spaced)**

Wavelength, nm	Product ID	
	$\lambda/2$ retardation, clear aperture >18 mm	$\lambda/4$ retardation, clear aperture >18 mm
266	2-CPW-ZO-L2-0266-W	2-CPW-ZO-L4-0266-W
343	2-CPW-ZO-L2-0343-W	2-CPW-ZO-L4-0343-W
355	2-CPW-ZO-L2-0355-W	2-CPW-ZO-L4-0355-W
400	2-CPW-ZO-L2-0400	2-CPW-ZO-L4-0400
515	2-CPW-ZO-L2-0515	2-CPW-ZO-L4-0515
532	2-CPW-ZO-L2-0532	2-CPW-ZO-L4-0532
633	2-CPW-ZO-L2-0633	2-CPW-ZO-L4-0633
780	2-CPW-ZO-L2-0780	2-CPW-ZO-L4-0780
800	2-CPW-ZO-L2-0800	2-CPW-ZO-L4-0800
852	2-CPW-ZO-L2-0852	2-CPW-ZO-L4-0852
1030	2-CPW-ZO-L2-1030	2-CPW-ZO-L4-1030
1064	2-CPW-ZO-L2-1064	2-CPW-ZO-L4-1064
1550	2-CPW-ZO-L2-1550	2-CPW-ZO-L4-1550

\* Customized solutions are available on request.

# High Energy Waveplates



## Description

Altechna provides standard (air-spaced) and high power (optically bonded) waveplates. They are made from materials that has a birefringence property. Most common types are designed so ordinary ray would exhibit half ( $\lambda/2$ ) or quarter ( $\lambda/4$ ) wave retardation with respect to an extraordinary one. Such waveplates are used to rotate the plane of polarization, convert linear polarization to circular and vice versa. Such elements are used for electro-optic modulation and as a variable ratio beamsplitter, when used in conjunction with a polarization cube. Although latter two types of waveplates are the most common, Altechna offers custom retardation values on request.

## Features

- High extinction ratio
- Wide acceptance angle
- Wide temperature bandwidth
- Exceptional durability in UV applications
- Wide wavelength range available

## Typical items\*

Wavelength, nm	Product ID		
	Mount size $\varnothing 12.7 \times 6$ mm	Mount size $\varnothing 25.4 \times 6$ mm	Mount size $\varnothing 25.4 \times 6$ mm
	$\lambda/2$ retardation, clear aperture >8 mm	$\lambda/2$ retardation, clear aperture >18 mm	$\lambda/4$ retardation, clear aperture >18 mm
266		2-CPW-TSO-L2-0266	2-CPW-T40-L4-0266-W
343	2-CPW-TFO-L2-0343-S	2-CPW-TFO-L2-0343-W	2-CPW-TSO-L4-0343-W
355	2-CPW-TFO-L2-0355-S	2-CPW-TFO-L2-0355-W	2-CPW-TSO-L4-0355-W
400	2-CPW-TFO-L2-0400-S	2-CPW-TFO-L2-0400	2-CPW-TSO-L4-0400
515	2-CPW-TZO-L2-0515-S	2-CPW-TFO-L2-0515	2-CPW-TSO-L4-0515
532	2-CPW-TZO-L2-0532-S	2-CPW-TFO-L2-0532	2-CPW-TFO-L4-0532
800	2-CPW-TZO-L2-0800-S	2-CPW-TZO-L2-0800	2-CPW-TFO-L4-0800
1030	2-CPW-TZO-L2-1030-S	2-CPW-TZO-L2-1030	2-CPW-TFO-L4-1030
1064	2-CPW-TZO-L2-1064-S	2-CPW-TZO-L2-1064	2-CPW-TFO-L4-1064
1550	2-CPW-TZO-L2-1550-S	2-CPW-TZO-L2-1550	2-CPW-TZO-L4-1550

\* Customized solutions are available on request.



# PowerXP Motorized Attenuators

## Description

Altechna offers four types of laser beam intensity attenuators for high energy applications:

- CA 8 mm – Compact version
- CA 18 mm – Maxi Reflection/Transmission version
- CA 18 mm – Maxi Transmission Collinear version
- CA 18 mm – Maxi Cube version

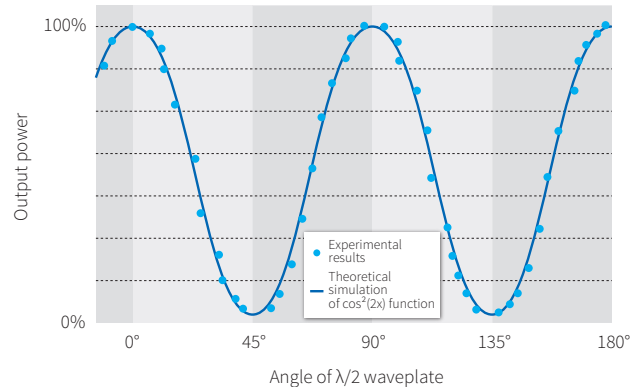
Watt Pilot attenuators. New generation PXP units have upgraded belt-driven rotator mechanism for quick and precise laser beam intensity control and also brand new electronics and control driver for more connectivity options and reliable long-distance communication.

PowerXP motorized attenuators are a reliable solution for industrial applications. Each attenuator includes motorized rotating quartz  $\lambda/2$  phase waveplate, optically aligned to a single/dual thin film polarizers or polarizing beamsplitting cube which separates the input beam into individual s-polarized and p-polarized parallel or perpendicular output beams.

Special PowerXP Transmission Collinear version includes an additional uncoated UVFS window positioned at Brewster angle after the polarizer to compensate the lateral beam shift caused by polarizing plate and guarantees less than 100  $\mu\text{m}$  radial beam displacement between input and output laser beam for ultra-precise applications.

High energy applications compatible optics, fast rotation speed of PowerXP Maxi version, compensated beam displacement output of Maxi Collinear version, convenient polarization separation angle of Maxi Cube version and small footprint of Compact version makes PowerXP motorized attenuators a go-to solution for power control, attenuation, and beam-splitting in demanding laser processing applications.

Example of performance provided by attenuator comprising a waveplate and a polarizer.



## Features

- User-friendly software interface, USB, RS232, Ethernet connection
- Divides laser beam into two s-pol and p-pol beams of adjustable intensity ratio
- Low dispersion optics for ultrashort and high energy laser pulses
- Ideal for integration into other systems
- Time between min and max attenuation less than 0.2 sec

## Optional model without attenuating optics set

- A PowerXP Attenuator can also be ordered as a separate motorized waveplate rotator based on the PowerXP Maxi model without attenuating optics set and a polarizer holder
- A motorized waveplate rotator without attenuating optics set is also available on request

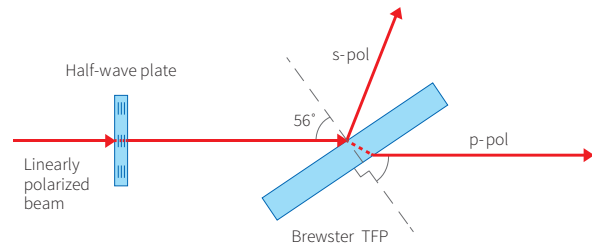
## Compact version

### Standard specifications

Clear aperture	Ø8 mm
Recommended maximum input beam diameter at $1/e^2$	Ø5 mm
Optimization	Transmission type
Configuration	$\lambda/2$ Optically bonded waveplate + IBS technology High Contrast Thin Film Polarizer
Attenuation range* @ CWL	From <0.1% to >99%
Typical applications	High power pulsed and CW lasers
Damage threshold	>20 J/cm <sup>2</sup> @ 1064 nm, 10 ns, 10 Hz
Dimensions H x L x W	35 x 55 x 60 mm
Time between min and max attenuation	<0.2 sec
Steps between min and max attenuation	14400
Resolution	<11.25 arcsec/step
Maximum power transmission	$T_{max}$ >99% at p-pol output
Maximum power blocking	$T_{min}$ <0.1% at p-pol output
*Optional attenuation range	$T_{max}$ >99.7%, $T_{min}$ <4% at s-pol beam dump output



### Transmission type



### Typical items

Wavelength, nm	Configuration	Optimization	Attenuation range at p-pol output ( $T_{min}$ - $T_{max}$ ) @ CWL	Product ID
343	$\lambda/2$ Optically bonded waveplate + HCTFP	Transmission	0.3-96%	PXP-08-0343
355	$\lambda/2$ Optically bonded waveplate + HCTFP	Transmission	0.3-96%	PXP-08-0355
515	$\lambda/2$ Optically bonded waveplate + HCTFP	Transmission	0.1-99%	PXP-08-0515
532	$\lambda/2$ Optically bonded waveplate + HCTFP	Transmission	0.1-99%	PXP-08-0532
1030	$\lambda/2$ Optically bonded waveplate + HCTFP	Transmission	0.1-99%	PXP-08-1030
1064	$\lambda/2$ Optically bonded waveplate + HCTFP	Transmission	0.1-99%	PXP-08-1064

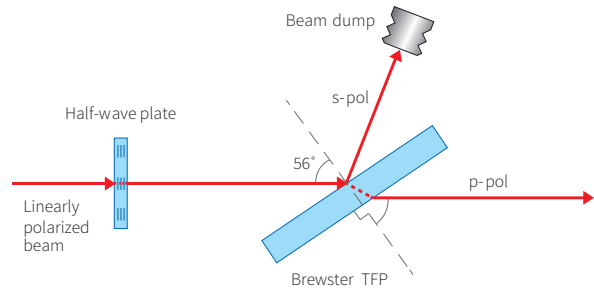
## Maxi Transmission version

### Standard specifications

Clear aperture	Ø18 mm
Recommended maximum input beam diameter at $1/e^2$	Ø12 mm
Optimization	Transmission ("T" model)
Configuration	$\lambda/2$ Air-spaced or Optically bonded waveplate + Thin Film Polarizer
Attenuation range* @ CWL	From <0.5% to >95%
Typical applications	High power pulsed and CW lasers
Damage threshold	>10 J/cm <sup>2</sup> @ 1064 nm, 10 ns, 10 Hz
Dimensions H x L x W	56 x 99 x 90 mm
Time between min and max attenuation	<0.2 sec
Steps between min and max attenuation	24000
Resolution	<7 arcsec/step
Maximum power transmission	$T_{\max}$ >95% at p-pol output
Maximum power blocking	$T_{\min}$ <0.5% at p-pol output
Integrated beam dump power limit	15 W
*Optional attenuation range	$T_{\max}$ >99.5%, $T_{\min}$ <5% at s-pol beam dump



### Transmission type



### Typical items

Wavelength, nm	Configuration	Optimization	Attenuation range at p-pol output ( $T_{\min}$ - $T_{\max}$ ) @ CWL	Product ID
266	$\lambda/2$ Optically bonded waveplate + TFP	Transmission	0.5-95%	PXP-18-T-0266
343	$\lambda/2$ Optically bonded waveplate + TFP	Transmission	0.5-95%	PXP-18-T-0343
355	$\lambda/2$ Optically bonded waveplate + TFP	Transmission	0.5-95%	PXP-18-T-0355
515	$\lambda/2$ Air-spaced waveplate + TFP	Transmission	0.5-95%	PXP-18-T-0515
532	$\lambda/2$ Air-spaced waveplate + TFP	Transmission	0.5-95%	PXP-18-T-0532
1030	$\lambda/2$ Air-spaced waveplate + TFP	Broadband Transmission	0.5-95%	PXP-18-T-1030
1064	$\lambda/2$ Air-spaced waveplate + TFP	Transmission	0.5-95%	PXP-18-T-1064

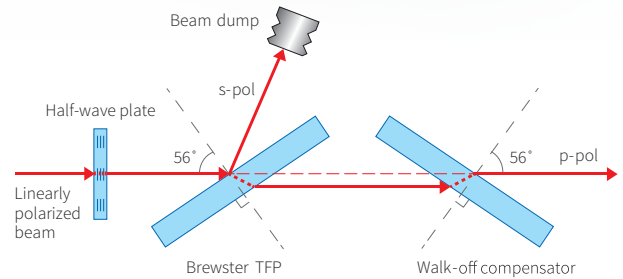
## Maxi Collinear version

### Standard specifications

Clear aperture	Ø18 mm
Recommended maximum input beam diameter at $1/e^2$	Ø12 mm
Optimization	Transmission type with lateral beam shift compensation ("CL" model)
Configuration	$\lambda/2$ Air-spaced or Optically bonded waveplate + TFP and Compensating Window
Attenuation range @ CWL	From <0.5% to >95%
Typical applications	High power pulsed and CW lasers
Damage threshold	>10 J/cm <sup>2</sup> @ 1064 nm, 10 ns, 10 Hz
Dimensions H x L x W	56 x 144 x 90 mm
Time between min and max attenuation	<0.2 sec
Steps between min and max attenuation	24000
Resolution	<7 arcsec/step
Maximum power transmission	$T_{\max}$ >95% at p-pol output
Maximum power blocking	$T_{\max}$ <0.5% at p-pol output
Integrated beam dump power limit	15 W



### Collinear type



### Typical items

Wavelength, nm	Configuration	Optimization	Attenuation range at p-pol output ( $T_{\min}$ - $T_{\max}$ ) @ CWL	Product ID
343	$\lambda/2$ Optically bonded waveplate + TFP + compensating window	Transmission	0.5-95%	PXP-18-CL-0343
355	$\lambda/2$ Optically bonded waveplate + TFP + compensating window	Transmission	0.5-95%	PXP-18-CL-0355
515	$\lambda/2$ Air-spaced + TFP + compensating window	Transmission	0.5-95%	PXP-18-CL-0515
532	$\lambda/2$ Air-spaced + TFP + compensating window	Transmission	0.5-95%	PXP-18-CL-0532
1030	$\lambda/2$ Air-spaced + TFP + compensating window	Transmission	0.5-95%	PXP-18-CL-1030
1064	$\lambda/2$ Air-spaced + TFP + compensating window	Transmission	0.5-95%	PXP-18-CL-1064

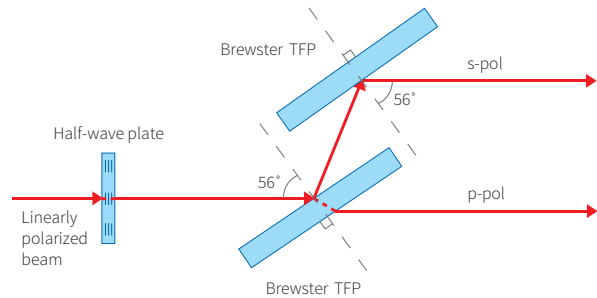
## Maxi Reflection version

### Standard specifications

Clear aperture	Ø18 mm
Recommended maximum input beam diameter at $1/e^2$	Ø12 mm
Optimization	Reflection ("R" model)
Configuration	$\lambda/2$ Air-spaced or Optically bonded waveplate + 2x Thin Film Polarizers
Attenuation range* @ CWL	From <0.3% to >99%
Typical applications	High power pulsed and CW lasers
Damage threshold	>10 J/cm <sup>2</sup> @ 1064 nm, 10 ns, 10 Hz
Dimensions H x L x W	56 x 99 x 90 mm
Time between min and max attenuation	<0.2 sec
Steps between min and max attenuation	24000
Resolution	<7 arcsec/step
Maximum power transmission	$T_{\max}$ >99% at s-pol output
Maximum power blocking	$T_{\min}$ <0.3% at s-pol output
*Optional attenuation range	$T_{\max}$ >95%, $T_{\min}$ <0.5% at p-pol output



### Reflection type



### Typical items

Wavelength, nm	Configuration	Optimization	Attenuation range at s-pol output ( $T_{\min}$ - $T_{\max}$ ) @ CWL	Product ID
266	$\lambda/2$ Optically bonded waveplate + 2x TFP	Reflection	0.3-99%	PXP-18-R-0266
343	$\lambda/2$ Optically bonded waveplate + 2x TFP	Reflection	0.3-99%	PXP-18-R-0343
355	$\lambda/2$ Optically bonded waveplate + 2x TFP	Reflection	0.3-99%	PXP-18-R-0355
515	$\lambda/2$ Air-spaced waveplate + 2x TFP	Reflection	0.3-99%	PXP-18-R-0515
532	$\lambda/2$ Air-spaced waveplate + 2x TFP	Reflection	0.3-99%	PXP-18-R-0532
1030	$\lambda/2$ Air-spaced waveplate + 2x TFP	Broadband reflection	0.3-99%	PXP-18-R-1030
1064	$\lambda/2$ Air-spaced waveplate + 2x TFP	Reflection	0.3-99%	PXP-18-R-1064

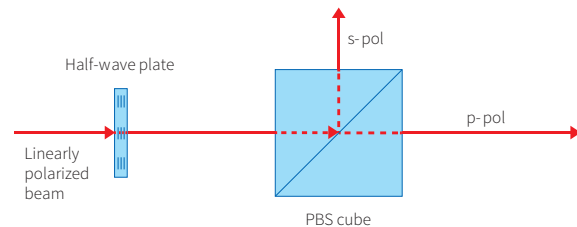
## Maxi Cube version

### Standard specifications

Clear aperture	Ø18 mm
Recommended maximum input beam diameter at $1/e^2$	Ø12 mm
Optimization	Transmission and Reflection
Configuration	$\lambda/2$ Air-spaced or Optically bonded waveplate + Optically bonded PBS cube
Attenuation range @ CWL	From <0.3% to 97% in transmission mode From <3% to 99% in reflection mode
Typical applications	High power pulsed and CW lasers
Damage threshold	>10 J/cm <sup>2</sup> @ 1064 nm, 10 ns, 10 Hz
Dimensions H x L x W	56 x 82 x 90 mm
Time between min and max attenuation	<0,2 sec
Steps between min and max attenuation	24000
Resolution	<7 arcsec/step
Transmission mode:	
Maximum power transmission	$T_{\max}$ >97% at p-pol output
Maximum power blocking	$T_{\min}$ <0.3% at p-pol output
Reflection mode:	
Maximum power transmission	$T_{\max}$ >99% at s-pol output
Maximum power blocking	$T_{\min}$ <3% at s-pol output



### Cube type



### Typical items

Wavelength, nm	Configuration	Attenuation range at p-pol output ( $T_{\min}$ - $T_{\max}$ ) @ CWL	Attenuation range at s-pol output ( $T_{\min}$ - $T_{\max}$ ) @ CWL	Product ID
355	$\lambda/2$ Optically bonded waveplate + Optically bonded PBS cube	0.3-96%	4-99%	PXP-18-C-0355
515	$\lambda/2$ Air-spaced waveplate + Optically bonded PBS cube	0.3-97%	3-99%	PXP-18-C-0515
532	$\lambda/2$ Air-spaced waveplate + Optically bonded PBS cube	0.3-97%	3-99%	PXP-18-C-0532
1030	$\lambda/2$ Air-spaced waveplate + Optically bonded PBS cube	0.3-97%	3-99%	PXP-18-C-1030
1064	$\lambda/2$ Air-spaced waveplate + Optically bonded PBS cube	0.3-97%	3-99%	PXP-18-C-1064

# Fixed Ratio Beam Expanders



## Description

Fixed ratio beam expander is a device dedicated to increase the diameter of a laser beam.

Altechna's beam expanders are assembled using one diverging and one converging lens. As there is no focal point inside of the beam expander, it can be used with high power laser sources. Special treatment of lenses and mechanics is performed for UV application to improve lifetime and LIDT of the expander. Standard magnifications are from 1.1x to 5x. Beam expanders for any wavelengths between 266 – 1064 nm are available upon request.

## Features

- Custom magnification and design on request
- Extended lifetime and LIDT for UV applications
- Individual reports of beam ellipticity,  $M^2$  and pointing stability parameters
- Custom wavelengths are available in the range of 266-1064 nm

## Standard specifications

Lens material	UVFS
Transmitted wavefront distortion	$<\lambda/4$ @ 632.8 nm
Overall transmission	$>98\%$
LIDT	$>10 \text{ J/cm}^2$ @ 1064 nm, 10 ns, 10 Hz
Housing material	Clear anodized
Mounting thread	SM1



# Variable Beam Expanders



## Features

- Individual reports of beam ellipticity,  $M^2$  and pointing stability parameters
- Mounting adapters at the input, output and middle are available on request
- Extended lifetime and LIDT for UV applications
- High overall system LIDT:  $>6.5 \text{ J/cm}^2 @ 1064 \text{ nm}$ , 10 ns, 100 Hz for 1x-4x model

## Description

Variable beam expanders are ideal for systems in which different magnifications and precise control of laser beam divergence are required. Altechna offers Galilean type variable beam expanders with high LIDT AR coatings that minimize ghost reflections. Our variable beam expanders allow individual magnification and divergence adjustment. Two main standard products change magnification in the range of 1x-4x and 2x-8x.

## Standard specifications

Wavelength range	266 – 1064 nm
Expansions	1x-4x or 2x-8x
Pointing stability	$<1 \text{ mrad}$
Lens material	UVFS
Transmitted wavefront distortion, P-V	$< \lambda/4 @ 632.8 \text{ nm}$
Overall transmission	$>97\%$ ( $>99\%$ on request)
Mounting thread (input side)	SM1
Mounting thread (output side, on request)	M42 x 1.5 (outer), SM1 (inner)
LIDT for 2x-8x model	$>5 \text{ J/cm}^2 @ 1064 \text{ nm}$ , 10 ns, 100 Hz
LIDT for 1x-4x model	$>6.5 \text{ J/cm}^2 @ 1064 \text{ nm}$ , 10 ns, 100 Hz

# Motorized Beam Expanders



## Features:

- High pointing stability: <math><100 \mu\text{rad}</math>
- High expansion repeatability:  $\pm 0.6\%$
- Long service life: >3.6 million cycles
- Suitable for high power applications

## Typical items

Magnification	Wavelength, nm	Max input beam diameter*, mm	LIDT, J/cm <sup>2</sup> @ 10 ns, 100 Hz	Product ID
1x-5.5x	343-355	1X - Ø5.0 2X - Ø6.0 3X - Ø5.5 4X - Ø4.5 5.5X - Ø4.0	>0.6	MBE-1X-5.5X-0343-0355-v.3.4.3
1.1x-5.5x	515-532	1.1X - Ø5.0 2X - Ø7.0 3X - Ø6.5 4X - Ø5.5 5.5X - Ø4.5	>0.9	MBE-1X-5.5X-0515-0532-v.3.4.3
1.1x-5.5x	1030-1064	1.1X - Ø6.0 2X - Ø9.0 3X - Ø8.0 4X - Ø7.0 5.5X - Ø5.5	>2.2	MBE-1X-5.5X-1030-1064-v.3.4.3

\* Max input beam diameter at  $1/e^2$  intensity level ensuring diffraction limited performance.

## Description

Motorized Beam Expander (MBE) is a precision beam expander designed for automated applications. Device allows rapid and independent divergence as well as magnification adjustment during its operation. MBE features high pointing stability as well as expansion accuracy.  $\pm 61 \mu\text{m}$  focal plane deviation is ensured for 1x-2x model after warp-up using +160 mm focal length F-theta lens and Ø4.9 mm input beam.

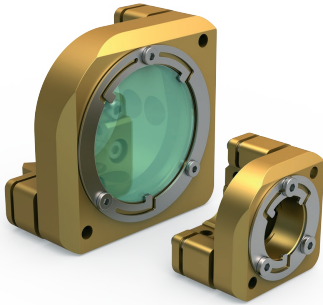
Moreover, high expansion repeatability and longevity of the product help to increase the efficiency of the application as frequent calibration and replacement can be avoided. In addition, MBE optical design enables it to be used in high power laser applications as there are no internal foci.

## Standard specifications

Expansion ranges	1x(1.1x)*-5.5x
Pointing stability	<math><100 \mu\text{rad}</math>
24/7 expansion repeatability	$\pm 0.6\%$
Expansion accuracy	<math><\pm 5\%</math> (1x(1.1x)-5.5x model)
Operation speed	<math><1 \text{ sec}</math> from min to max
Suitable for long beam path	>2 meters propagation
Minimum service life	>3500 hours of non-stop operation
Transmittance	>98% (> 99% on request)
Control interfaces	RS232, USB, LAN

\*515-532 nm and 1030-1064 nm models are limited to 1.1x-5.5x range.

# Type SD Industrial Mirror Mounts



## Standard specifications

Mechanical angular range*	$\pm 3.5^\circ$
Resolution*	10 mrad/rev
Pointing stability	$<2 \mu\text{rad}$ deviation after extensive temperature cycling on Type SD mount size

\* Depends on Type SD mount size.

## Typical items\*\*

Optics diameter, mm	Optics thickness, mm	Physical dimensions (H x W x L), mm	Product ID
12.7	3	25.4 x 25.4 x 20.0	SD-127-03-VC-RS-M
25.4	6	40.0 x 40.0 x 25.0	SD-254-06-VC-RS-M
30.0	6	45.0 x 45.0 x 25.4	SD-300-06-VC-RS-M
38.1	5	55.0 x 55.0 x 27.8	SD-381-05-VC-RS-M
50.8	6	69.0 x 69.0 x 29.4	SD-508-06-VC-RS-M
50.8	8	69.0 x 69.0 x 29.4	SD-508-08-VC-RS-M

\*\* Custom mount configurations are available on request.

## Description

Type SD industrial precisely adjustable mirror mount provides excellent performance for demanding applications. Design ensures stress free low distortion mounting for optics, excellent holding force and pointing stability. Type SD mount allows precise mirror adjustment in both X and Y directions. 100TPI micro screws provide accurate adjustment and easily accessible fully integrated locking mechanism ensuring excellent angle stability. Depending on the application, optics can be held either by specially designed ZeroDef flexure ring or by semi-permanent optical adhesives. Type SD mount is precisely machined from special alloys to provide optimum beam pointing stability over changing environmental conditions such as temperature and transportation shock as well as vibrations and humidity.

## Features

- Vertical adjustment mounts available
- Vacuum compatible, no outgassing
- High temperature and vibrational stability
- Reliable and easy to use lock mechanism
- Fast & easy replacement of optics using ZeroDef flexure ring (RS)
- Stable and distortion free mounting of optics

# Vertically Adjustable Mirror Mount



## Standard specifications

Mechanical angular range	$\pm 4^\circ$
Fine screw thread	100 TPI
Resolution	10 mrad/rev
Pointing stability	$<2 \mu\text{rad}^*$
Tilt range	$\pm 4^\circ$
Weight	220 g
Material	Stainless steel, brass**

\*After thermal cycling

\*\* Possibility to change main frame material

## Typical items\*\*\*\*

Optics diameter, mm	Optics thickness, mm*	Dimensions, (H x W x L), mm	Product ID
12.7	6.35	55.8 x 37 x 28	VSD-127-06-SS
25.4	6.35	59.4 x 50 x 28.8	VSD-254-06-SS

\*\*\*\* Custom mount configurations are available on request. The recommended thickness of optics tolerance is  $+0.15/-0.15$  mm.

## Description

Our newest addition to the industrial-mount range: vertically adjustable mirror.

Designed and manufactured at Altechna, this item truly encapsulates our vision for an industry-leading product. It comprises carefully selected highest-grade materials combined into an ultra-stable, compact, oil-free and vacuum-compatible mirror mount, with the added benefit of easy and fast mounting for optics using ZeroDef flexure rings.

One of the key features of this product is that the mount angles can be adjusted from the top. This provides the opportunity to use limited system space with higher efficiency and enables easier access to the mount's adjustment. For even more convenience, our product was also designed so that the x and y axes move independently of one another when being adjusted.

The product's ease of use is coupled with superb thermal and environmental stability. All our mounts are tested in-house via thermal cycling and show the best-in-market x- and y-axis beam stability with the smallest amplitude of beam movement.

All of this has been achieved thanks to our years of experience working with industry leaders and basing our designs on the principles of reliability, stability and longevity.

## Features

- Oil-free, cleanroom compatible
- Vacuum-ready\*\*\*
- No outgassing materials
- Separate X, Y axis control
- Ultra-stable under thermal exposure
- Fast and easy, distortion-free optics mounting via ZeroDef flexure ring

\*\*\* Extra preparation is needed for vacuum-use, please notify us during purchase.

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