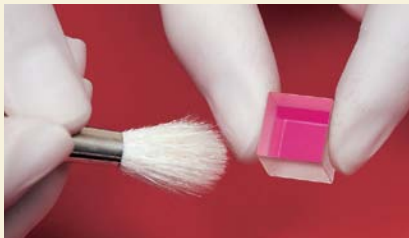


Nd:YAG LaserLine Components Selection Guide



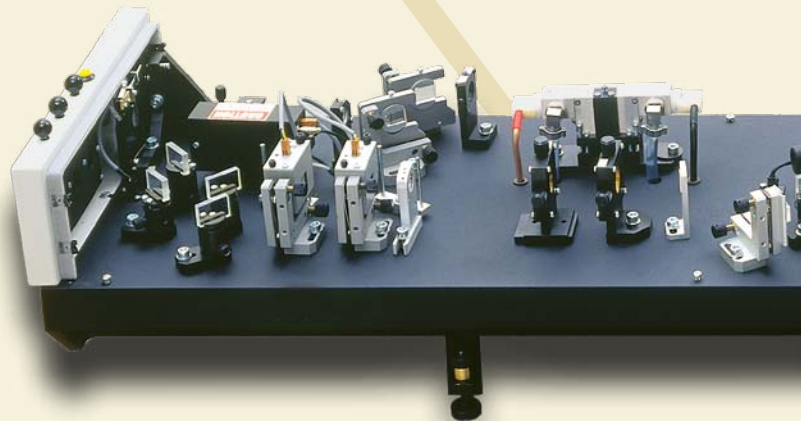
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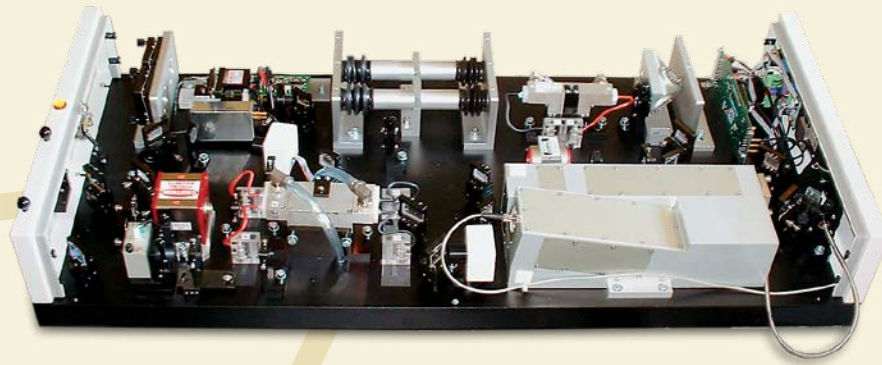
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**OPTICAL COMPONENTS
CLEANING INSTRUCTIONS**

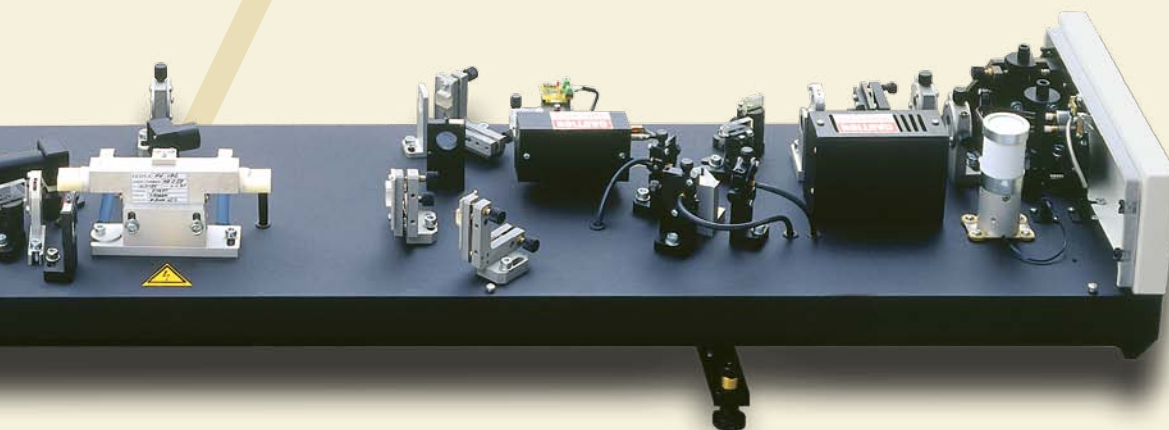
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Nd:YAG Laser Optics

Nd:YAG LASER OPTICS

LASER MIRRORS

Our Nd:YAG laser mirrors are suitable for fundamental Nd:YAG laser 1064 nm, frequency-doubled 532 nm, frequency-tripled 355 nm and frequency quadrupled 266 nm wavelength application. Two kinds of substrate material are available. Laser line mirrors are designed for 45° angle of incidence. Featuring high polishing quality, low scattering and high damage threshold, our dielectric reflectors enables perfect beam steering for Nd:YAG lasers.

SUBSTRATE

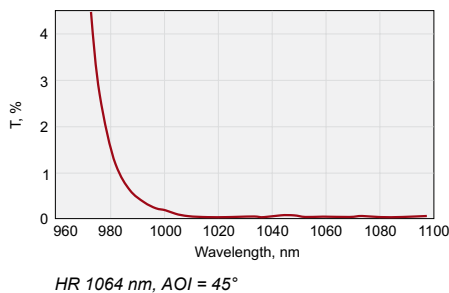
Material	UV grade fused silica or BK7 glass
S1 Surface Flatness	$\lambda/10$ at 633 nm
S1 Surface Quality	20–10 scratch & dig laser quality
S2 Surface Quality	Commercial polish
Diameter Tolerance	+0.00 mm -0.12 mm
Thickness Tolerance	± 0.25 mm
Wedge	< 3 min
Chamfer	0.3 mm at 45° typical

COATING

Technology	Electron beam multilayer dielectric
Adhesion and Durability	Per MIL-C-675A. Insoluble in lab solvents
Clear Aperture	Exceeds central 85% of diameter
Damage Threshold:	
BK7 laser line mirrors	5 J/cm ² , 8 nsec pulse, 1064 nm typical
FS laser line mirrors	8 J/cm ² , 8 nsec pulse, 1064 nm typical
BK7 dual line mirrors	1 J/cm ² , 8 nsec pulse, 1064 nm typical
FS dual line mirrors	2 J/cm ² , 8 nsec pulse, 1064 nm typical
Coated Surface Flatness	$\lambda/10$ at 633 nm over clear aperture
Angle of Incidence	45 degrees

Laser Line Wavelength

Substrate material: **BK7 grade A**



Size – **Ø12.7 × 3 mm**

Wavelength, nm	R, % (s+p)/2	Catalogue number	Price, EUR
351–361	99.5	031-0350	59
527–532	99.5	031-0530	56
1047–1064	99.5	031-1060	57

Size – **Ø25.4 × 6 mm**

Wavelength, nm	R, % (s+p)/2	Catalogue number	Price, EUR
351–361	99.5	032-0350	95
527–532	99.5	032-0530	74
1047–1064	99.5	032-1060	75

Size – **Ø50.8 × 8 mm**

Wavelength, nm	R, % (s+p)/2	Catalogue number	Price, EUR
351–361	99.5	035-0350	128
527–532	99.5	035-0530	110
1047–1064	99.5	035-1060	110

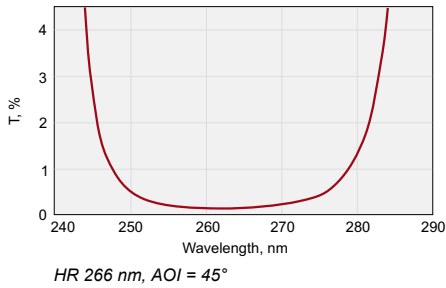
Size – **Ø76.2 × 12.7 mm**

Wavelength, nm	R, % (s+p)/2	Catalogue number	Price, EUR
527–532	99.5	037-0530	185
1047–1064	99.5	037-1060	185

Nd:YAG LASER AND NONLINEAR CRYSTALS

Laser Line Wavelength

Substrate material: **Fused Silica**



Size – $\varnothing 12.7 \times 3$ mm

Wavelength, nm	R, % (s+p)/2	Catalogue number	Price, EUR
262–266	99	041-0260	81
351–361	99.5	041-0350	77
527–532	99.5	041-0530	72
1047–1064	99.5	041-1060	72

Size – $\varnothing 25.4 \times 6$ mm

Wavelength, nm	R, % (s+p)/2	Catalogue number	Price, EUR
262–266	99	042-0260	111
351–361	99.5	042-0350	107
527–532	99.5	042-0530	102
1047–1064	99.5	042-1060	102

Size – $\varnothing 50.8 \times 8$ mm

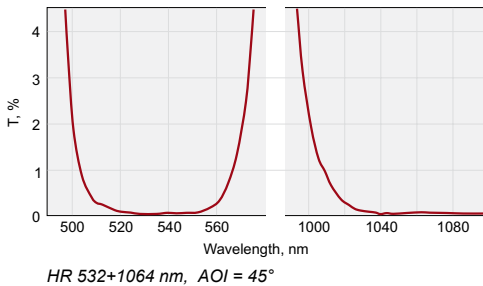
Wavelength, nm	R, % (s+p)/2	Catalogue number	Price, EUR
262–266	99	045-0260	207
351–361	99.5	045-0350	187
527–532	99.5	045-0530	169
1047–1064	99.5	045-1060	169

Size – $\varnothing 76.2 \times 12.7$ mm

Wavelength, nm	R, % (s+p)/2	Catalogue number	Price, EUR
351–361	99.5	047-0350	281
527–532	99.5	047-0530	258
1047–1064	99.5	047-1060	258

Dual Laser Line Mirrors

Substrate material: **BK7 grade A**



Size – $\varnothing 12.7 \times 3$ mm

Wavelength, nm	R, % (s+p)/2	Catalogue number	Price, EUR
532+1064	99.5	051-5306	85
633+1064	99.5	051-6306	85

Size – $\varnothing 25.4 \times 6$ mm

Wavelength, nm	R, % (s+p)/2	Catalogue number	Price, EUR
532+1064	99.5	052-5306	103
633+1064	99.5	052-6306	103

Size – $\varnothing 50.8 \times 8$ mm

Wavelength, nm	R, % (s+p)/2	Catalogue number	Price, EUR
532+1064	99.5	055-5306	151
633+1064	99.5	055-6306	151

Size – $\varnothing 76.2 \times 12.7$ mm

Wavelength, nm	R, % (s+p)/2	Catalogue number	Price, EUR
532+1064	99.5	057-5306	227
633+1064	99.5	057-6306	227

HOUSING ACCESSORIES

- Adapter for Mirror at 45°
840-0115
See page 7.72



Dual Laser Line Mirrors

Substrate material: **Fused Silica**

Size – **Ø12.7 × 3 mm**

Wavelength, nm	R, % (s+p)/2	Catalogue number	Price, EUR
532+1064	99.5	061-5306	109
633+1064	99.5	061-6306	109
355+532	99.5	061-3553	115

Size – **Ø25.4 × 6 mm**

Wavelength, nm	R, % (s+p)/2	Catalogue number	Price, EUR
532+1064	99.5	062-5306	134
633+1064	99.5	062-6306	134
355+532	99.5	062-3553	139

Size – **Ø50.8 × 8 mm**

Wavelength, nm	R, % (s+p)/2	Catalogue number	Price, EUR
532+1064	99.5	065-5306	209
633+1064	99.5	065-6306	209
355+532	99.5	065-3553	215

Size – **Ø76.2 × 12.7 mm**

Wavelength, nm	R, % (s+p)/2	Catalogue number	Price, EUR
532+1064	99.5	067-5306	318
633+1064	99.5	067-6306	318
355+532	99.5	067-3553	323

RELATED PRODUCTS

- Laser Line and Dual Laser Line Mirrors of other wavelengths

See page 1.8



Femt* Line

- Laser Line and Dual Laser Line Mirrors for femtosecond applications

See page 4.2

LASER HARMONIC SEPARATORS

- Offered on Ø 0.5 or 1 inch substrates of BK7 or FS with surface flatness $\lambda/10$

Harmonic separators are dichroic beamsplitters that reflect one wavelength and transmit the others. Reflectance is better than 99.5% for the wavelength of interest and transmittance is at least 90% for the rejected wavelengths. The rear surface of harmonic separators is antireflection coated.

SUBSTRATE

Material	UV grade fused silica or BK7 glass
S1 Surface Flatness	$\lambda/10$ typical at 633 nm
S1 Surface Quality	20–10 scratch & dig laser quality
S2 Surface Flatness	$\lambda/10$ typical at 633 nm
S2 Surface Quality	20–10 scratch & dig laser quality
Diameter Tolerance	+0.00 mm -0.12 mm
Thickness Tolerance	± 0.25 mm
Parallelism	< 30 arcsec
Chamfer	0.3 mm at 45° typical

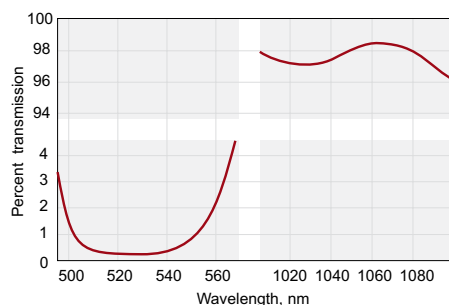
COATING

Technology	Electron beam multilayer dielectric
Adhesion and Durability	Per MIL-C-675A. Insoluble in lab solvents
Clear Aperture	Exceeds central 85% of diameter
Damage Threshold:	
BK7	>5 J/cm ² , 8 nsec pulse, 1064 nm typical
FS	>8 J/cm ² , 8 nsec pulse, 1064 nm typical
Coated Surface Flatness	$\lambda/10$ at 633 nm over clear aperture
Back side antireflection coated	AOI 45°, R<0.5%
	AOI 0°, R<0.1%

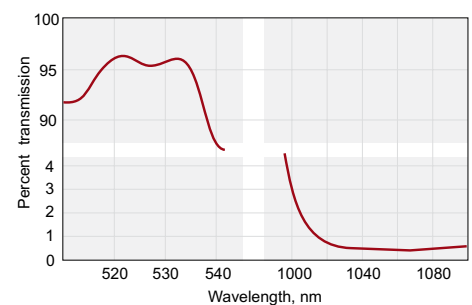
Femt* Line

- Laser Harmonic Separators for femtosecond applications

See page 4.6



031-5105.
HR > 99.5% @ 532 nm, HT > 95% @ 1064 nm, AOI = 45°



031-6500.
HR > 99.5% @ 1064 nm, HT > 93% @ 532 nm, AOI = 0°

Reflected wavelength, nm, R > 99.5%	Transmitted wavelength, nm	Transmission, %	AOI	Substrate material	Code		Price, EUR Ø12.7 / Ø25.4
					Ø12.7x3 mm	Ø25.4x6 mm	
355	1064	>95	0	FS	041-3100	042-3100	115 / 145
355	1064	>95	45	FS	041-3105	042-3105	115 / 145
355	532	>95	0	FS	041-3500	042-3500	115 / 145
355	532	>95	45	FS	041-3505	042-3505	115 / 145
355	532+1064	>90	0	FS	041-3510	042-3510	125 / 155
355	532+1064	>90	45	FS	041-3515	042-3515	125 / 155
532	1064	>95	0	BK7	031-5100	032-5100	90 / 115
532	1064	>95	45	BK7	031-5105	032-5105	90 / 115
532	1064	>95	0	FS	041-5100	042-5100	115 / 145
532	1064	>95	45	FS	041-5105	042-5105	115 / 145
1064	532	>93	0	BK7	031-6500	032-6500	95 / 120
1064	532	>93	45	BK7	031-6505	032-6505	95 / 120
1064	532	>93	0	FS	041-6500	042-6500	120 / 150
1064	532	>93	45	FS	041-6505	042-6505	120 / 150

HOUSING ACCESSORIES

- Adapter for Beamsplitter at 45°
840-0116
See page 7.72



- Kinematic Mirror and Beamsplitter Mount
840-0020
See page 7.54



LASER OUTPUT COUPLERS

An output coupler is a partially reflecting dielectric mirror used in a laser cavity. It transmits a part of the circulating intracavity power for generating a useful output from the laser.

A low transmission output coupler leads to a low laser threshold, but also possibly to poor laser efficiency if the losses due to output coupling do not dominate over other parasitic losses in the laser cavity. The output coupler transmission is often chosen to maximize the achieved output power, although its optimum value may be lower or higher if there are other design purposes (minimizing the intracavity intensities or suppressing Q-switching instabilities in a passively mode-locked laser).

SUBSTRATE

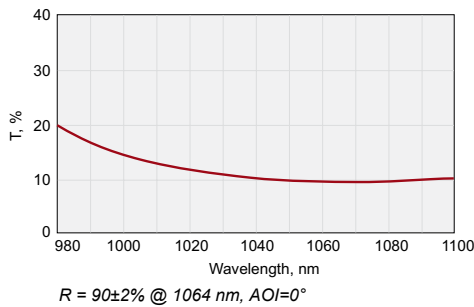
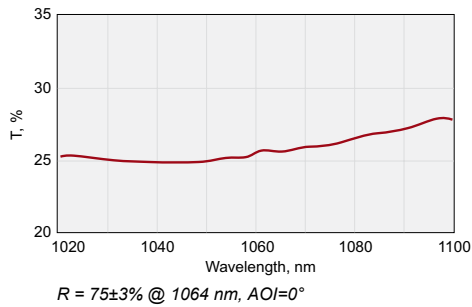
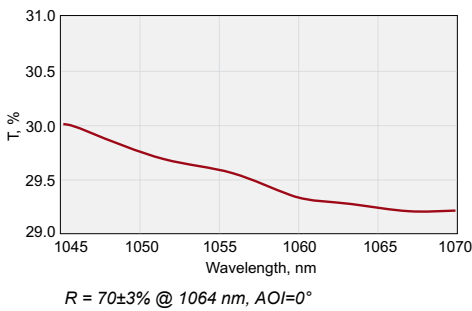
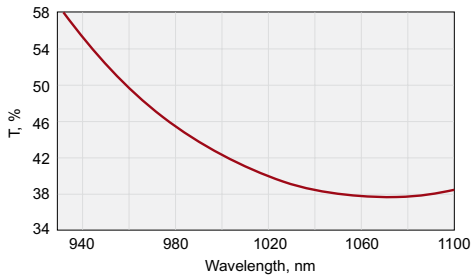
Material	UV grade fused silica or BK7 glass
S1 Surface Flatness	$\lambda/10$ typical at 633 nm
S1 Surface Quality	20–10 scratch & dig laser quality
S2 Surface Flatness	$\lambda/10$ typical at 633 nm
S2 Surface Quality	20–10 scratch & dig laser quality
Diameter Tolerance	+0.00 mm -0.12 mm
Thickness Tolerance	± 0.25 mm
Parallelism	30 arcsec
Chamfer	0.3 mm at 45° typical

COATING

Technology	Electron beam multilayer dielectric
Adhesion and Durability	Per MIL-C-675A. Insoluble in lab solvents
Clear Aperture	Exceeds central 85% of diameter
Damage Threshold:	
BK7	>3 J/cm ² , 8 nsec pulse, 1064 nm typical
FS	>6 J/cm ² , 8 nsec pulse, 1064 nm typical
Coated Surface Flatness	$\lambda/10$ at 633 nm over clear aperture
Angle of Incidence	0°–8° (normal)
Back side antireflection coated	R<0.2%

Laser Output Couplers

Nd:YAG LASER OPTICS



Nd:YAG LASER AND NONLINEAR CRYSTALS

Size – Ø12.7 × 3 mm

Wavelength, nm	Reflection, %	Transmission, %	Substrate material	Code	Price, EUR
1064	50±3	50±3	BK7	031-0050	75
1064	60±3	40±3	BK7	031-0060	75
1064	65±3	35±3	BK7	031-0065	75
1064	70±3	30±3	BK7	031-0070	75
1064	75±3	25±3	BK7	031-0075	75
1064	80±3	20±3	BK7	031-0080	75
1064	85±3	15±3	BK7	031-0085	75
1064	90±2	10±2	BK7	031-0090	82
1064	95±2	5±2	BK7	031-0095	82
1064	97±1	3±1	BK7	031-0097	89
1064	98±1	2±1	BK7	031-0098	89
1064	99.0±0.5	1.0±0.5	BK7	031-0099	96
1064	50±3	50±3	FS	041-0050	95
1064	60±3	40±3	FS	041-0060	95
1064	65±3	35±3	FS	041-0065	95
1064	70±3	30±3	FS	041-0070	95
1064	75±3	25±3	FS	041-0075	95
1064	80±3	20±3	FS	041-0080	95
1064	85±3	15±3	FS	041-0085	95
1064	90±2	10±2	FS	041-0090	102
1064	95±2	5±2	FS	041-0095	102
1064	97±1	3±1	FS	041-0097	109
1064	98±1	2±1	FS	041-0098	109
1064	99.0±0.5	1.0±0.5	FS	041-0099	116

Size – Ø25.4 × 6 mm

Wavelength, nm	Reflection, %	Transmission, %	Substrate material	Code	Price, EUR
1064	50±3	50±3	BK7	032-0050	95
1064	60±3	40±3	BK7	032-0060	95
1064	65±3	35±3	BK7	032-0065	95
1064	70±3	30±3	BK7	032-0070	95
1064	75±3	25±3	BK7	032-0075	95
1064	80±3	20±3	BK7	032-0080	95
1064	85±3	15±3	BK7	032-0085	95
1064	90±2	10±2	BK7	032-0090	102
1064	95±2	5±2	BK7	032-0095	102
1064	97±1	3±1	BK7	032-0097	109
1064	98±1	2±1	BK7	032-0098	109
1064	99.0±0.5	1.0±0.5	BK7	032-0099	116
1064	50±3	50±3	FS	042-0050	115
1064	60±3	40±3	FS	042-0060	115
1064	65±3	35±3	FS	042-0065	115
1064	70±3	30±3	FS	042-0070	115
1064	75±3	25±3	FS	042-0075	115
1064	80±3	20±3	FS	042-0080	115
1064	85±3	15±3	FS	042-0085	115
1064	90±2	10±2	FS	042-0090	122
1064	95±2	5±2	FS	042-0095	122
1064	97±1	3±1	FS	042-0097	129
1064	98±1	2±1	FS	042-0098	129
1064	99.0±0.5	1.0±0.5	FS	042-0099	136

Femt* Line

- Laser Output Couplers for femtosecond applications
See page 4.7

HOUSING ACCESSORIES

- Kinematic Mirror and Beamsplitter Mount 840-0020
See page 7.54



LASER REAR MIRRORS

High reflectivity ($R > 99.8\%$) coatings are applied on laser rear mirrors. The FS substrates are suggested for pulsed and CW high power fundamental Nd:YAG laser application.

Femt* Line

- Laser Rear Mirrors for femtosecond applications

See page 4.8

SUBSTRATE

Material	Fused silica or BK7 glass
S1 Surface Flatness	$\lambda/10$ at 633 nm
S1 Surface Quality	20–10 scratch & dig laser quality
S2 Surface Quality	Commercial polish
Diameter Tolerance	+0.00 mm-0.12 mm
Thickness Tolerance	± 0.25
Chamfer	0.3 mm at 45° typical

COATING

Technology	Electron beam multilayer dielectric
Adhesion and Durability	Per MIL-C-675A. Insoluble in lab solvents
Clear Aperture	Exceeds central 85% of diameter
Damage Threshold:	
BK7	$> 2 \text{ J/cm}^2$, 8 nsec pulse, 1064 nm
FS	$> 5 \text{ J/cm}^2$, 8 nsec pulse, 1064 nm
Angle of Incidence	0°–8° (normal)

Wavelength, nm	Substrate type	Radius, mm	Substrate material	Code	Price, EUR
				Ø25.4×6 mm	
1047–1064	Plano	∞	BK7	032-8000	75
1064	Plano-concave	-50	BK7	032-8005	89
1064	Plano-concave	-100	BK7	032-8010	89
1064	Plano-concave	-150	BK7	032-8015	89
1064	Plano-concave	-200	BK7	032-8020	89
1064	Plano-concave	-250	BK7	032-8025	89
1064	Plano-concave	-500	BK7	032-8050	89
1064	Plano-concave	-1000	BK7	032-8100	89
1064	Plano-concave	-2000	BK7	032-8200	89
1064	Plano-concave	-2500	BK7	032-8250	89
1064	Plano-concave	-4000	BK7	032-8400	89
1064	Plano-concave	-5000	BK7	032-8500	89
1047–1064	Plano	∞	FS	042-8000	102
1064	Plano-concave	-50	FS	042-8005	109
1064	Plano-concave	-100	FS	042-8010	109
1064	Plano-concave	-150	FS	042-8015	109
1064	Plano-concave	-200	FS	042-8020	109
1064	Plano-concave	-250	FS	042-8025	109
1064	Plano-concave	-500	FS	042-8050	109
1064	Plano-concave	-1000	FS	042-8100	109
1064	Plano-concave	-2000	FS	042-8200	109
1064	Plano-concave	-2500	FS	042-8250	109
1064	Plano-concave	-4000	FS	042-8400	109
1064	Plano-concave	-5000	FS	042-8500	109
1064	Plano-convex	+100	BK7	032-9010	93
1064	Plano-convex	+200	BK7	032-9020	93
1064	Plano-convex	+500	BK7	032-9050	93
1064	Plano-convex	+1000	BK7	032-9100	93
1064	Plano-convex	+2000	BK7	032-9200	93
1064	Plano-convex	+4000	BK7	032-9400	93
1064	Plano-convex	+100	FS	042-9010	113
1064	Plano-convex	+200	FS	042-9020	113
1064	Plano-convex	+500	FS	042-9050	113
1064	Plano-convex	+1000	FS	042-9100	113
1064	Plano-convex	+2000	FS	042-9200	113
1064	Plano-convex	+4000	FS	042-9400	113

HOUSING ACCESSORIES

- Kinematic Mirror Mount 840-0010

See page 7.54



LASER BEAMSPLITTERS

- Designed for average polarization: $R=(R_s+R_p)/2$ and $T=(T_s+T_p)/2$

Beamsplitter splits average polarized laser beam in two beams separated 90° from each other.

Femt* Line

- Laser Beamsplitters for femtosecond applications

See page 4.10

SUBSTRATE

Material	UV FS, FS, BK7
S1 Surface Flatness	$\lambda/10$ at 633 nm
S1 Surface Quality	20-10 scratch & dig laser quality
S2 Surface Flatness	$\lambda/10$ at 633 nm
S2 Surface Quality	20-10 scratch & dig laser quality
Diameter Tolerance	+0.00 mm-0.12 mm
Thickness Tolerance	± 0.25
Parallelism	30 arcsec
Chamfer	0.3 mm at 45° typical

COATING

Technology	Electron beam multilayer dielectric
Adhesion and Durability	Per MIL-C-675A. Insoluble in lab solvents
Clear Aperture	Exceeds central 85% of diameter
Damage Threshold:	
BK7	>2 J/cm ² , 8 nsec pulse, 1064 nm
FS	>5 J/cm ² , 8 nsec pulse, 1064 nm
Angle of Incidence	45±3 degrees
Backside antireflection coated	R<0.5%

Designed for average polarization: $R=(R_s+R_p)/2$ and $T=(T_s+T_p)/2$

Wavelength, nm	Reflection, %	Transmission, %	Substrate material	Size		Price, EUR
				Ø12.7x3 mm	Ø25.4x6 mm	
1064	20±3	80±3	BK7	031-7120	032-7120	75 / 95
1064	30±3	70±3	BK7	031-7130	032-7130	75 / 95
1064	50±3	50±3	BK7	031-7150	032-7150	75 / 95
1064	70±3	30±3	BK7	031-7170	032-7170	75 / 95
1064	80±3	20±3	BK7	031-7180	032-7180	75 / 95
532	20±3	80±3	BK7	031-7220	032-7220	73 / 93
532	30±3	70±3	BK7	031-7230	032-7230	73 / 93
532	50±3	50±3	BK7	031-7250	032-7250	73 / 93
532	70±3	30±3	BK7	031-7270	032-7270	73 / 93
532	80±3	20±3	BK7	031-7280	032-7280	73 / 93
1064	20±3	80±3	FS	041-7120	042-7120	95 / 115
1064	30±3	70±3	FS	041-7130	042-7130	95 / 115
1064	50±3	50±3	FS	041-7150	042-7150	95 / 115
1064	70±3	30±3	FS	041-7170	042-7170	95 / 115
1064	80±3	20±3	FS	041-7180	042-7180	95 / 115
532	20±3	80±3	FS	041-7220	042-7220	93 / 113
532	30±3	70±3	FS	041-7230	042-7230	93 / 113
532	50±3	50±3	FS	041-7250	042-7250	93 / 113
532	70±3	30±3	FS	041-7270	042-7270	93 / 113
532	80±3	20±3	FS	041-7280	042-7280	93 / 113
355	20±3	80±3	FS	041-7320	042-7320	105 / 135
355	30±3	70±3	FS	041-7330	042-7330	105 / 135
355	50±3	50±3	FS	041-7350	042-7350	105 / 135
355	70±3	30±3	FS	041-7370	042-7370	105 / 135
355	80±3	20±3	FS	041-7380	042-7380	105 / 135
266	20±3	80±3	UVFS	041-7920	042-7920	115 / 145
266	30±3	70±3	UVFS	041-7930	042-7930	115 / 145
266	50±3	50±3	UVFS	041-7950	042-7950	115 / 145
266	70±3	30±3	UVFS	041-7970	042-7970	115 / 145
266	80±3	20±3	UVFS	041-7980	042-7980	115 / 145

Designed for S- polarization

Wavelength, nm	Reflection, %	Transmission, %	Substrate material	Size		Price, EUR
				Ø12.7x3 mm	Ø25.4x6 mm	
1064	20±3	80±3	BK7	031-7120S	032-7120S	75 / 95
1064	30±3	70±3	BK7	031-7130S	032-7130S	75 / 95
1064	50±3	50±3	BK7	031-7150S	032-7150S	75 / 95
1064	70±3	30±3	BK7	031-7170S	032-7170S	75 / 95
1064	80±3	20±3	BK7	031-7180S	032-7180S	75 / 95
532	20±3	80±3	BK7	031-7220S	032-7220S	73 / 93
532	30±3	70±3	BK7	031-7230S	032-7230S	73 / 93
532	50±3	50±3	BK7	031-7250S	032-7250S	73 / 93
532	70±3	30±3	BK7	031-7270S	032-7270S	73 / 93
532	80±3	20±3	BK7	031-7280S	032-7280S	73 / 93
1064	20±3	80±3	FS	041-7120S	042-7120S	95 / 115
1064	30±3	70±3	FS	041-7130S	042-7130S	95 / 115
1064	50±3	50±3	FS	041-7150S	042-7150S	95 / 115
1064	70±3	30±3	FS	041-7170S	042-7170S	95 / 115
1064	80±3	20±3	FS	041-7180S	042-7180S	95 / 115
532	20±3	80±3	FS	041-7220S	042-7220S	93 / 113
532	30±3	70±3	FS	041-7230S	042-7230S	93 / 113
532	50±3	50±3	FS	041-7250S	042-7250S	93 / 113
532	70±3	30±3	FS	041-7270S	042-7270S	93 / 113
532	80±3	20±3	FS	041-7280S	042-7280S	93 / 113
355	20±3	80±3	FS	041-7320S	042-7320S	105 / 135
355	30±3	70±3	FS	041-7330S	042-7330S	105 / 135
355	50±3	50±3	FS	041-7350S	042-7350S	105 / 135
355	70±3	30±3	FS	041-7370S	042-7370S	105 / 135
355	80±3	20±3	FS	041-7380S	042-7380S	105 / 135
266	20±3	80±3	UVFS	041-7920S	042-7920S	115 / 145
266	30±3	70±3	UVFS	041-7930S	042-7930S	115 / 145
266	50±3	50±3	UVFS	041-7950S	042-7950S	115 / 145
266	70±3	30±3	UVFS	041-7970S	042-7970S	115 / 145
266	80±3	20±3	UVFS	041-7980S	042-7980S	115 / 145

Designed for P- polarization

Wavelength, nm	Reflection, %	Transmission, %	Substrate material	Size		Price, EUR
				Ø12.7x3 mm	Ø25.4x6 mm	
1064	20±3	80±3	BK7	031-7120P	032-7120P	75 / 95
1064	30±3	70±3	BK7	031-7130P	032-7130P	75 / 95
1064	50±3	50±3	BK7	031-7150P	032-7150P	75 / 95
1064	70±3	30±3	BK7	031-7170P	032-7170P	75 / 95
1064	80±3	20±3	BK7	031-7180P	032-7180P	75 / 95
532	20±3	80±3	BK7	031-7220P	032-7220P	73 / 93
532	30±3	70±3	BK7	031-7230P	032-7230P	73 / 93
532	50±3	50±3	BK7	031-7250P	032-7250P	73 / 93
532	70±3	30±3	BK7	031-7270P	032-7270P	73 / 93
532	80±3	20±3	BK7	031-7280P	032-7280P	73 / 93
1064	20±3	80±3	FS	041-7120P	042-7120P	95 / 115
1064	30±3	70±3	FS	041-7130P	042-7130P	95 / 115
1064	50±3	50±3	FS	041-7150P	042-7150P	95 / 115
1064	70±3	30±3	FS	041-7170P	042-7170P	95 / 115
1064	80±3	20±3	FS	041-7180P	042-7180P	95 / 115
532	20±3	80±3	FS	041-7220P	042-7220P	93 / 113
532	30±3	70±3	FS	041-7230P	042-7230P	93 / 113
532	50±3	50±3	FS	041-7250P	042-7250P	93 / 113
532	70±3	30±3	FS	041-7270P	042-7270P	93 / 113
532	80±3	20±3	FS	041-7280P	042-7280P	93 / 113
355	20±3	80±3	FS	041-7320P	042-7320P	105 / 135
355	30±3	70±3	FS	041-7330P	042-7330P	105 / 135
355	50±3	50±3	FS	041-7350P	042-7350P	105 / 135
355	70±3	30±3	FS	041-7370P	042-7370P	105 / 135
355	80±3	20±3	FS	041-7380P	042-7380P	105 / 135
266	20±3	80±3	UVFS	041-7920P	042-7920P	115 / 145
266	30±3	70±3	UVFS	041-7930P	042-7930P	115 / 145
266	50±3	50±3	UVFS	041-7950P	042-7950P	115 / 145
266	70±3	30±3	UVFS	041-7970P	042-7970P	115 / 145
266	80±3	20±3	UVFS	041-7980P	042-7980P	115 / 145

HOUSING ACCESSORIES

- Kinematic Mirror and Beamsplitter Mount 840-0030-02
See page 7.54



- Adapter for Beamsplitter at 45° 840-0116
See page 7.72



LASER LINE ANTI-REFLECTION COATED PRECISION WINDOWS

- Made of premium quality FS, UV FS and BK7
- AR coated at 266 nm, 355 nm, 532 nm, 1064 nm

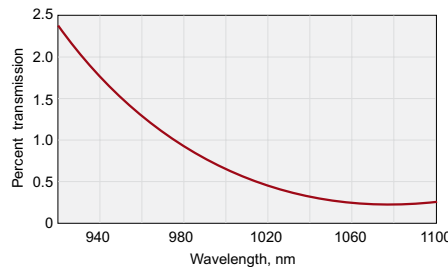
Precision windows are mostly used in laser systems. High quality AR multilayer coatings are applied on windows for fundamental Nd:YAG laser 1064 nm, frequency-doubled 532 nm, frequency-tripled 355nm and frequency-quadrupled 266nm applications. Featuring high optical transmission with little distortion of the transmitted signal, precision windows are a good solution for applications that require protective windows.

SPECIFICATIONS

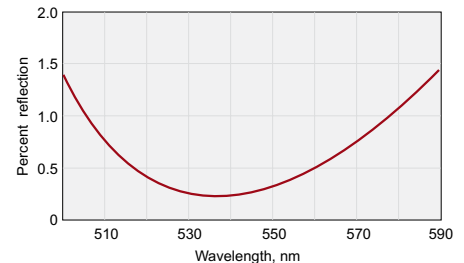
Material	BK7, FS, UV FS
Surface quality	20-10 scratch & dig
Clear aperture	90% of the diameter
Diameter tolerance	+0.00-0.12 mm
Thickness tolerance	±0.2 mm
Surface flatness	λ/10@633 nm
Parallelism	30 arcsec or 3 arcsec

COATING

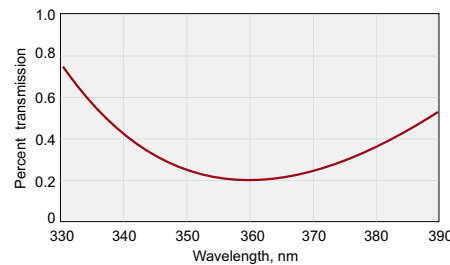
Technology	Electron beam multilayer dielectric
Adhesion and Durability	Per MIL-C-675A. Insoluble in lab solvents
Clear Aperture	Exceeds central 85% of diameter
Damage Threshold:	
BK7	>5 J/cm ² , 8 nsec pulse, 1064 nm
FS	>10 J/cm ² , 8 nsec pulse, 1064 nm
Angle of Incidence	0 degrees
Coated Surface Flatness	λ/10 at 633 nm over clear aperture



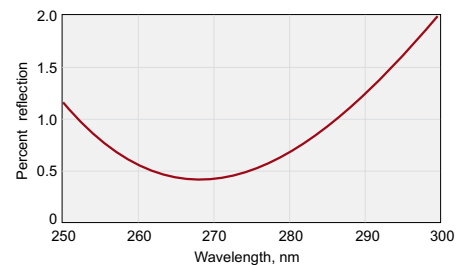
R<0.25%@1064 nm AOI=0°



R<0.25%@532 nm AOI=0°



R<0.25%@355 nm, AOI=0°



R<0.4%@266 nm, AOI=0°

Parallelism 30 arcsec

Catalogue number			Wavelength, nm	Diameter D, mm		Thickness T, mm	Price, EUR
BK7	UV FS	FS		Metric	English		
-	224-1101	-	266	12.5	12.7	3.0	- / 98 / -
-	223-1101	223-3101	355	12.5	12.7	3.0	- / 92 / 86
222-0101	222-1101	222-3101	532	12.5	12.7	3.0	56 / 87 / 81
221-0101	221-1101	221-3101	1064	12.5	12.7	3.0	56 / 87 / 81
-	224-1201	-	266	25.0	25.4	6.0	- / 124 / -
-	223-1201	223-3201	355	25.0	25.4	6.0	- / 118 / 107
222-0201	222-1201	222-3201	532	25.0	25.4	6.0	66 / 113 / 103
221-0201	221-1201	221-3201	1064	25.0	25.4	6.0	66 / 113 / 103
-	224-1402	-	266	40.0	38.1	8.0	- / 178 / -
-	223-1402	223-3402	355	40.0	38.1	8.0	- / 172 / 151
222-0402	222-1402	222-3402	532	40.0	38.1	8.0	86 / 167 / 146
221-0402	221-1402	221-3402	1064	40.0	38.1	8.0	86 / 167 / 146
-	224-1502	-	266	50.0	50.8	10.0	- / 216 / -
-	223-1502	223-3502	355	50.0	50.8	10.0	- / 210 / 171
222-0502	222-1502	222-3502	532	50.0	50.8	10.0	99 / 205 / 166
221-0502	221-1502	221-3502	1064	50.0	50.8	10.0	99 / 205 / 166

Parallelism 3 arcsec

Catalogue number			Wavelength,	Diameter D, mm		Thickness T,	Price, EUR
BK7	UV FS	FS	nm	Metric	English	mm	BK7 / UV FS / FS
-	224-1103	-	266	12.5	12.7	3.0	- / 107 / -
-	223-1103	223-3103	355	12.5	12.7	3.0	- / 101 / 92
222-0103	222-1103	222-3103	532	12.5	12.7	3.0	70 / 96 / 87
221-0103	221-1103	221-3103	1064	12.5	12.7	3.0	70 / 96 / 87
-	224-1203	-	266	25.0	25.4	6.0	- / 139 / -
-	223-1203	223-3203	355	25.0	25.4	6.0	- / 133 / 124
222-0203	222-1203	222-3203	532	25.0	25.4	6.0	93 / 128 / 119
221-0203	221-1203	221-3203	1064	25.0	25.4	6.0	93 / 128 / 119
-	224-1403	-	266	40.0	38.1	10.0	- / 195 / -
-	223-1403	223-3403	355	40.0	38.1	10.0	- / 189 / 166
222-0403	222-1403	222-3403	532	40.0	38.1	10.0	121 / 184 / 162
221-0403	221-1403	221-3403	1064	40.0	38.1	10.0	121 / 184 / 162
-	224-1503	-	266	50.0	50.8	12.0	- / 241 / -
-	223-1503	223-3503	355	50.0	50.8	12.0	- / 235 / 196
222-0503	222-1503	222-3503	532	50.0	50.8	12.0	148 / 230 / 191
221-0503	221-1503	221-3503	1064	50.0	50.8	12.0	148 / 230 / 191

RELATED PRODUCTS

- Uncoated Precision Windows
See page 1.31

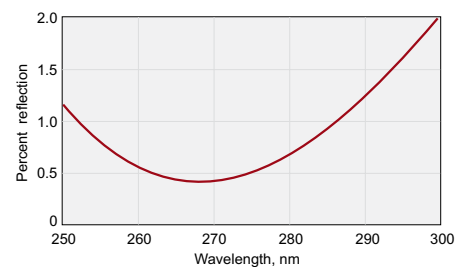
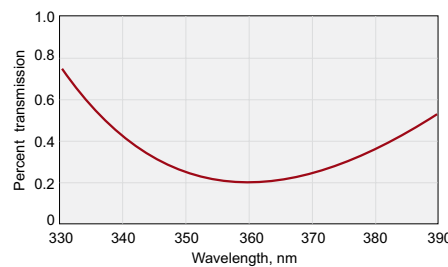
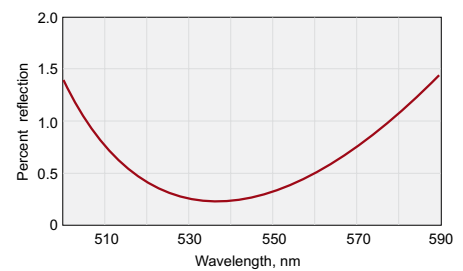
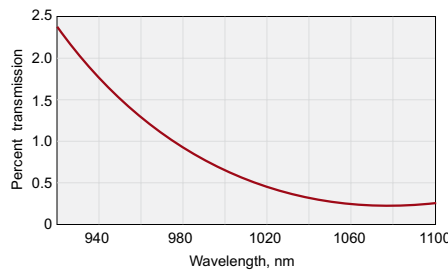
AR COATED LENS KITS

The lens kits consist of four basic types of lenses with various focal lengths. Focal lengths of plano-concave lenses range from -50 to -300 mm, biconcave lenses from -25 to -200. Plano-convex and biconvex lenses cover a focal distance from 25 to 1000 mm. The lenses are 25.4 diameter. Kits are available with multilayer anti-reflection coatings for Nd:YAG laser fundamental and harmonics wavelength: 266 nm or 355 nm or 532 nm or 1064 nm. Lenses are placed in a hardwood box. Size of the box is 30×7×40 cm (W×H×D).

The lens kits are available from two kinds of substrate material:

- BK7 lens kit includes 40 lenses
- UV FS lens kit includes 36 lenses.

Code	Material	Coating	Price, EUR
141-0240	BK7	AR 1064	1900
142-0240	BK7	AR 532	1900
141-1236	UV FS	AR 1064	2750
142-1236	UV FS	AR 532	2750
143-1236	UV FS	AR 355	2870
144-1236	UV FS	AR 266	2960



List of the lenses in BK7 series lens kits

Code	Configuration	Dia*, mm	F, mm
Plano-convex lenses (16 pcs.)			
110-0205	pl/cx	25.4	30
110-0207	pl/cx	25.4	40
110-0209	pl/cx	25.4	50
110-0211	pl/cx	25.4	60
110-0215	pl/cx	25.4	75
110-0219	pl/cx	25.4	100
110-0223	pl/cx	25.4	125
110-0227	pl/cx	25.4	150
110-0231	pl/cx	25.4	200
110-0235	pl/cx	25.4	250
110-0239	pl/cx	25.4	300
110-0241	pl/cx	25.4	350
110-0243	pl/cx	25.4	400
110-0247	pl/cx	25.4	500
110-0251	pl/cx	25.4	700
110-0259	pl/cx	25.4	1000
Biconvex lenses (12 pcs.)			
111-0204	bi/cx	25.4	25
111-0206	bi/cx	25.4	30
111-0208	bi/cx	25.4	40
111-0210	bi/cx	25.4	50
111-0214	bi/cx	25.4	60
111-0216	bi/cx	25.4	75
111-0218	bi/cx	25.4	100
111-0222	bi/cx	25.4	150
111-0226	bi/cx	25.4	200
111-0228	bi/cx	25.4	250
111-0234	bi/cx	25.4	500
111-0250	bi/cx	25.4	1000
Plano-concave lenses (6 pcs.)			
112-0209	pl/cv	25.4	-50
112-0215	pl/cv	25.4	-75
112-0219	pl/cv	25.4	-100
112-0227	pl/cv	25.4	-150
112-0231	pl/cv	25.4	-200
112-0239	pl/cv	25.4	-300
Biconcave lenses (6 pcs.)			
114-0204	bi/cv	25.4	-25
114-0208	bi/cv	25.4	-50
114-0212	bi/cv	25.4	-75
114-0214	bi/cv	25.4	-100
114-0220	bi/cv	25.4	-150
114-0224	bi/cv	25.4	-200

* Diameter tolerance: +0.0/-0.5 mm.

List of the lenses in UVFS series lens kits

Code	Configuration	Dia*, mm	F, mm
Plano-convex lenses (12 pcs.)			
110-1203	pl/cx	25.4	30
110-1205	pl/cx	25.4	50
110-1209	pl/cx	25.4	75
110-1211	pl/cx	25.4	100
110-1216	pl/cx	25.4	125
110-1217	pl/cx	25.4	150
110-1219	pl/cx	25.4	200
110-1221	pl/cx	25.4	250
110-1223	pl/cx	25.4	300
110-1227	pl/cx	25.4	400
110-1233	pl/cx	25.4	500
110-1245	pl/cx	25.4	1000
Biconvex lenses (12 pcs.)			
111-1204	bi/cx	25.4	25
111-1207	bi/cx	25.4	40
111-1210	bi/cx	25.4	50
111-1214	bi/cx	25.4	75
111-1218	bi/cx	25.4	100
111-1222	bi/cx	25.4	150
111-1226	bi/cx	25.4	200
111-1230	bi/cx	25.4	250
111-1234	bi/cx	25.4	300
111-1238	bi/cx	25.4	400
111-1240	bi/cx	25.4	500
111-1260	bi/cx	25.4	1000
Plano-concave lenses (6 pcs.)			
112-1205	pl/cv	25.4	-50
112-1209	pl/cv	25.4	-75
112-1211	pl/cv	25.4	-100
112-1217	pl/cv	25.4	-150
112-1219	pl/cv	25.4	-200
112-1223	pl/cv	25.4	-300
Biconcave lenses (6 pcs.)			
114-1204	bi/cv	25.4	-25
114-1208	bi/cv	25.4	-50
114-1212	bi/cv	25.4	-75
114-1216	bi/cv	25.4	-100
114-1220	bi/cv	25.4	-150
114-1224	bi/cv	25.4	-200

* Diameter tolerance: +0.0/-0.5 mm.

RELATED PRODUCTS

- Uncoated Lens Kits
See page 1.27

Femt* Line

- Femtline AR coated Lens Kits
See page 4.12

HOUSING ACCESSORIES

- Self-Centring Lens Mounts 830-0010
See page 7.44



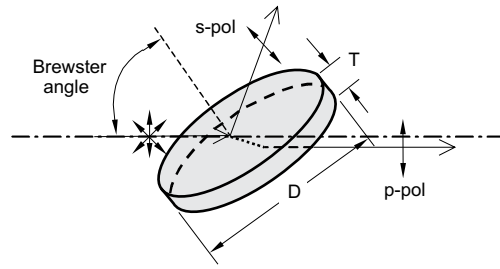
THIN FILM LASER POLARIZERS

- $R_s > 99.5\%$, $T_p > 95\%$ for 1064 nm
- $R_s > 99.5\%$, $T_p > 95\%$ for 532 nm
- $R_s > 99.5\%$, $T_p > 93\%$ for 355 nm

Thin Film Polarizers separate the s- and p-polarization components. Thin Film Polarizers can be used as an alternative to Glan-Taylor laser polarizing prisms or cube polarizing beamsplitters because of the high damage threshold that reaches 6 J/cm² at 1064 nm, 8 ns.

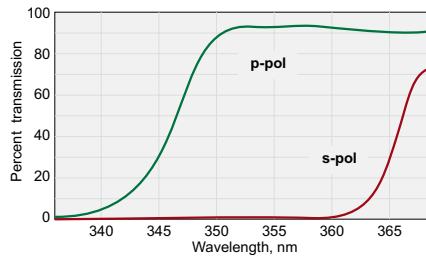
Thin Film Polarizers are used in high energy lasers. They can be used as extracavity attenuators for Nd:YAG laser fundamental and its harmonics or intracavity Q-switch hold-off polarizers. The most efficient way to use thin film polarizers is at Brewster angle – 56° with minimal ±2° losses. Typical polarization ratio T_p/T_s is 200:1.

We provide Thin Film Laser Polarizers with $T_p > 99\%$ under customer request.

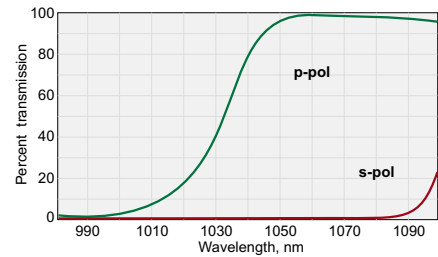


SPECIFICATIONS

Material	BK7, FS, UV FS
Surface quality	20–10 scratch & dig
Surface flatness	$\lambda/10$ @ 633 nm
Parallelism	<30 arcsec
Clear aperture	>90%
Angle of incidence	Brewster angle ±2°
Diameter tolerance	+0.0 -0.12 mm
Thickness tolerance	±0.2 mm
Laser damage threshold	6 J/cm ² 10 nsec pulse at 1064 nm typical



Typical transmission curve @ 355 nm



Typical transmission curve @ 1064 nm

Material BK7

Catalogue number	Diameter D, mm		Thickness T, mm	Wavelength, nm	Price, EUR
	Metric	English			
420-0124	12.5	12.7	3.0	532	97
420-0128	12.5	12.7	3.0	1064	94
420-0254	25.0	25.4	3.0	532	115
420-0258	25.0	25.4	3.0	1064	110
420-0504	50.0	50.8	6.0	532	185
420-0508	50.0	50.8	6.0	1064	185

Catalogue number	Rectangular dimensions		Thickness T, mm	Wavelength, nm	Price, EUR
	Length, mm	Width, mm			
420-0284	28.6	14.3	3.0	532	127
420-0288	28.6	14.3	3.0	1064	125

RELATED PRODUCTS

- Thin Film Laser Polarizers of other wavelengths
See page 1.44

Femt* Line

- Thin Film Laser Polarizers for femtosecond applications
See page 4.13

Material UV FS

Catalogue number	Diameter D, mm		Thickness T, mm	Wavelength, nm	Price, EUR
	Metric	English			
420-1122	12.5	12.7	3.0	355	149
420-1124	12.5	12.7	3.0	532	119
420-1128	12.5	12.7	3.0	1064	115
420-1252	25.0	25.4	3.0	355	165
420-1254	25.0	25.4	3.0	532	140
420-1258	25.0	25.4	3.0	1064	135
420-1502	50.0	50.8	6.0	355	315
420-1504	50.0	50.8	6.0	532	269
420-1508	50.0	50.8	6.0	1064	263

Catalogue number	Rectangular dimensions		Thickness T, mm	Wavelength, nm	Price, EUR
	Length, mm	Width, mm			
420-1282	28.6	14.3	3.0	355	255
420-1284	28.6	14.3	3.0	532	215
420-1288	28.6	14.3	3.0	1064	210

Material FS

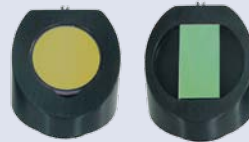
Catalogue number	Diameter D, mm		Thickness T, mm	Wavelength, nm	Price, EUR
	Metric	English			
420-3122	12.5	12.7	3.0	355	143
420-3124	12.5	12.7	3.0	532	117
420-3128	12.5	12.7	3.0	1064	113
420-3252	25.0	25.4	3.0	355	159
420-3254	25.0	25.4	3.0	532	133
420-3258	25.0	25.4	3.0	1064	130
420-3502	50.0	50.8	6.0	355	300
420-3504	50.0	50.8	6.0	532	259
420-3508	50.0	50.8	6.0	1064	251

Catalogue number	Rectangular dimensions		Thickness T, mm	Wavelength, nm	Price, EUR
	Length, mm	Width, mm			
420-3282	28.6	14.3	3.0	355	247
420-3284	28.6	14.3	3.0	532	201
420-3288	28.6	14.3	3.0	1064	195

Please contact us if you need thin film laser polarizers for other wavelengths or other types of substrates.

HOUSING ACCESSORIES

- Adapters for Polarizer at 56°
840-0117, 840-0118
See page 7.74



RELATED PRODUCTS

- Variable Attenuator for Nd:YAG linearly Polarized Laser Beam 990-0070
See page 3.20



QUARTZ RETARDATION PLATES

Quartz Retardation Plates are made of material enabling linear birefringence. These plates are made of high quality optical grade crystalline quartz, featuring high damage threshold. Retardation

plates rotate polarization's direction ($\lambda/2$) or convert linear into circular polarization or vice versa ($\lambda/4$). Quartz retardation plates are supplied mounted and AR coated.

ZERO ORDER OPTICALLY CONTACTED PLATES



- Zero Order Plates for Nd:YAG fundamental and its harmonics
- Easily aligned
- Temperature insensitive
- Moderately insensitive to wavelength

Zero order plates are comprised of two different plates cut parallel to their optical axis. This construction makes plates less dependent on temperature. The plates are polished to different thicknesses enabling to achieve required retardation difference. These component plates have orthogonal optic axis directions, so that the roles of the ordinary and extraordinary rays are interchanged in passing from one plate to another. The thickness of the plate determines the phase shift between the ordinary and extraordinary beams for any specific wavelength.

SPECIFICATIONS

Material	Single crystal quartz
Optical axis	normal to facet on circumference of retarder
Clear aperture	17 mm for 20 mm diameter (other dimensions on request)
Ring mount outer diameter	25.4 (or 25.0) +0.0 -0.12 mm
Nominal thickness of waveplate	1.5–2.5 mm
Wavefront distortion	$\lambda/10$ @ 633 nm
Parallelism	< 10 arcsec
AR coating	R < 0.4%
Laser damage threshold	> 0.5 J/cm ² , 10 nsec pulse, 1064 nm typical

Wavelength, nm	Retardation $\lambda/2$		Retardation $\lambda/4$	
	Catalogue number	Price, EUR	Catalogue number	Price, EUR
1064	460-4205	245	460-4405	245
532	460-4230	245	460-4430	245
355	460-4240	270	460-4440	270
266	460-4245	280	460-4445	280

RELATED PRODUCTS

- Zero Order Optically Contacted Plates of other wavelengths
See page 1.49

Femt* Line

- Zero Order Optically Contacted Plates for femtosecond applications
See page 4.15

ZERO ORDER AIR-SPACED PLATES



- For high power laser application

SPECIFICATIONS

Material	Single crystal quartz
Optical axis	normal to facet on circumference of retarder
Clear aperture	Ø17 mm
Ring mount outer diameter	25.4 +0.0 / -0.12 mm
Wavefront distortion	$\lambda/10$ @ 633 nm
Surface quality	20–10 scr/dig
Parallelism	< 10 arcsec
AR coating	R < 0.5%
Laser damage threshold	>10 J/cm ² , 10 nsec pulse, 1064 nm typical

Wavelength, nm	AR coating range, nm	Retardation $\lambda/2$		Retardation $\lambda/4$	
		Catalogue number	Price, EUR	Catalogue number	Price, EUR
1064	1035–1095	464-4205	310	464-4405	310
532	515–545	464-4230	310	464-4430	310
355	345–365	464-4240	335	464-4440	335
266	257–275	464-4245	345	464-4445	345

Femt* Line

- Zero Order Air-Spaced Plates for femtosecond applications

See page 4.15

LOW ORDER PLATES

- Thickness 0.15–0.35 mm
- Thinner than multiple order

Low order plates are less temperature sensitive and temperature dependent than multiple order plates. These plates are suitable for high and low power applications.

SPECIFICATIONS

Material	Single crystal quartz
Optical axis	normal to facet on circumference of retarder
Clear aperture	17 mm for 20 mm diameter (others dimensions on request)
Ring mount outer diameter	25.4 (or 25.0) +0.0 -0.12 mm
Nominal thickness of waveplate	0.15–0.35 mm
Wavefront distortion	$\lambda/10$ @ 633 nm
Parallelism	< 10 arcsec
AR coating	R < 0.4%
Laser damage threshold	10 J/cm ² , 10 nsec pulse, 1064 nm typical

Wavelength, nm	Retardation $\lambda/2$		Retardation $\lambda/4$	
	Catalogue number	Price, EUR	Catalogue number	Price, EUR
1064	461-4205	160	461-4405	160
532	461-4230	160	461-4430	160
355	461-4240	192	461-4440	192
266	461-4245	196	461-4445	196

RELATED PRODUCTS

- Low Order Plates of other wavelengths

See page 1.52

Femt* Line

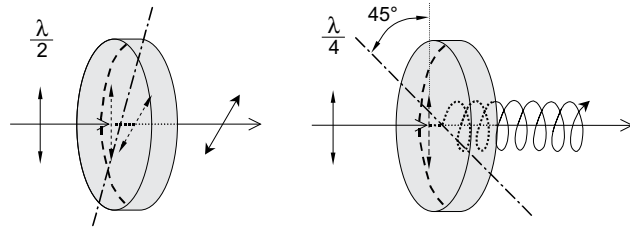
- Low Order Plates for femtosecond applications

See page 4.16

MULTIPLE ORDER PLATES

- Polished to 1-1.5 mm thickness
- Made from a single crystalline plate

Multiple order plates are more dependent on the temperature changes than zero order plates. A change of $\pm 1\%$ from the designed wavelength of multiple order plate can result in difficulties in retardation. Contrary, with zero order plates $\pm 1\%$ and even $\pm 2\%$ change from the designed wavelength can cause only small retardation change.



SPECIFICATIONS

Material	Single crystal quartz
Optical axis	Normal to facet on circumference of retarder
Clear aperture	17 mm for 20 mm diameter (others dimensions on request)
Ring mount outer diameter	25.4 (or 25.0) +0.0 -0.12 mm
Nominal thickness of waveplate	0.8–1.5 mm
Wavefront distortion	$\lambda/10$ @ 633 nm
Parallelism	< 10 arcsec
AR coating	R < 0.4%
Laser damage threshold	10 J/cm ² , 10 nsec pulse, 1064 nm typical

Wavelength, nm	Retardation $\lambda/2$		Retardation $\lambda/4$	
	Catalogue number	Price, EUR	Catalogue number	Price, EUR
1064	462-4205	138	462-4405	138
532	462-4230	138	462-4430	138
355	462-4240	143	462-4440	143
266	462-4245	153	462-4445	153

RELATED PRODUCTS

- Multiple Order Plates of other wavelengths
See page 1.52

HOUSING ACCESSORIES

- Adjustable Polarizer Holder of Side Drive 840-0195
See page 7.86



MULTIPLE ORDER DUAL WAVELENGTH PLATES

- Operate at both first and second Nd:YAG laser harmonics
- Retardation tolerance < $\lambda/300$

SPECIFICATIONS

Material	Single crystal quartz
Optical axis	normal to facet on circumference of retarder
Wavefront distortion	$\lambda/10$ @ 633 nm
Clear aperture	$\varnothing 17$ mm of $\varnothing 20$ mm
Ring mount outer diameter	25.4 (or 25.0) +0.0 -0.12 mm
Surface quality	20-10 scratch & dig
Parallelism	< 10 arcsec
AR coating	R < 0.5%
Nominal thickness of waveplate	0.2-1.2 mm
Laser damage threshold	5 J/cm ² , 10 nsec pulse, 1064 nm typical

Retardation and Wavelength	Catalogue number	Price, EUR
λ @ 1064 nm + $\lambda/2$ @ 532 nm	463-4120	215
λ @ 1064 nm + $\lambda/4$ @ 532 nm	463-4140	215
$\lambda/2$ @ 1064 nm + λ @ 532 nm	463-4210	215
$\lambda/2$ @ 1064 nm + $\lambda/2$ @ 532 nm	463-4220	215
$\lambda/2$ @ 1064 nm + $\lambda/4$ @ 532 nm	463-4240	215
$\lambda/4$ @ 1064 nm + λ @ 532 nm	463-4410	215
$\lambda/4$ @ 1064 nm + $\lambda/2$ @ 532 nm	463-4420	215
$\lambda/4$ @ 1064 nm + $\lambda/4$ @ 532 nm	463-4440	215

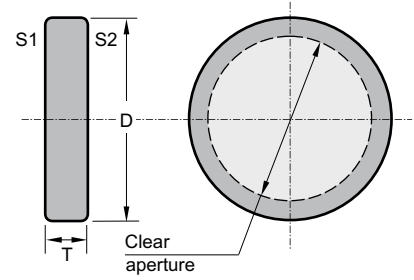
Femt* Line

- Dual Wavelength Plates for femtosecond applications
See page 4.17

POLARIZATION PLANE ROTATORS

- Made of crystalline quartz
- Intended to rotate a beam polarization plane strictly to an appropriate angle using the circular birefringent effect

Compared to a waveplate, a rotator has an intrinsic advantage, being independent of rotation around its own optical axis. It needs no adjustment, only to be installed normal to incident radiation. A polarization plane rotator is normally used for the specific wavelength. It is only slightly dependent on ambient temperature.



Polarization plane rotators for any wavelength from 200 to 2300 nm are available.

SPECIFICATIONS

Material	Single crystal quartz
Optical axis	Normal to faces S1, S2 of rotator
Clear aperture	17 mm for 20 mm diameter
Ring mount outer diameter	D = 25.4 mm (or 25.0 mm) +0.0 mm -0.12 mm
Mount Thickness	T = 6–20 mm (depending on wavelength and rotation angle)
Surface quality	20–10 scratch & dig
Wavefront distortion	$\lambda/10$
Parallelism	< 10 arcsec
AR coating	R < 0.2% both sides
Laser damage threshold	5 J/cm ² , 10 nsec pulse, 1064 nm typical

Catalogue number	Wavelength, nm	Rotation angle of polarization plane, deg	Price, EUR
470-4264	266	45	245
470-4269	266	90	245
470-4354	355	45	195
470-4359	355	90	195
470-4534	532	45	195
470-4539	532	90	195
470-4644	1064	45	215
470-4649	1064	90	215

Please contact us for other size or wavelengths requirements.

RELATED PRODUCTS

- Polarization plane rotators of other wavelengths
See page 1.54

Femt* Line

- Polarization Plane Rotators for femtosecond applications
See page 4.17

VARIABLE ATTENUATOR FOR Nd:YAG LINEARLY POLARIZED LASER BEAM 990-0070



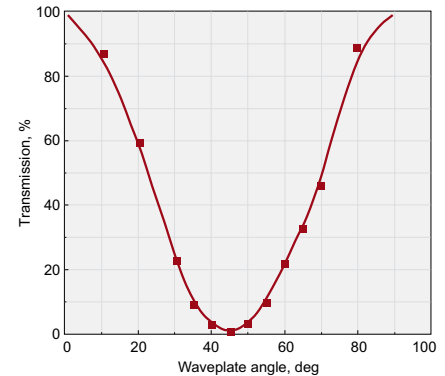
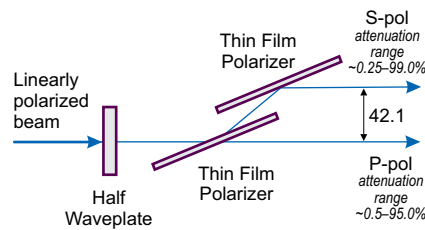

Note: Movable base 820-0090, Rod Holder 820-0050-02 and standard rod should be ordered separately.

- Divides laser beam into two parallel beams of manually adjustable intensity ratio
- Large dynamic range
- Negligible beam deviation
- High Optical damage threshold
- Weight – 0.35 kg

This variable attenuator/beamsplitter consists of special design opto-mechanical Adapter and precision opto-mechanical holder 840-0197. Two thin film brewster type polarizers, which reflect s-polarized light while transmitting p-polarized light, are housed into adapter. A quartz multiple order half waveplate is housed in rotating holder 840-0197.

The intensity ratio of those two beams may be continuously varied without alteration of other beam parameters by rotating the waveplate. The intensity of either exit beam, or their intensity ratio, can be controlled over a wide dynamic range. P-po-

larization could be selected for maximum transmission, or high-purity s-polarization could be reflected when maximum attenuation of the transmitted beam takes place. The holder 840-0197 allows to adjust angle of incidence of the Thin Film Brewster type polarizers by $\pm 2^\circ$ and to get the maximum polarization contrast.



SPECIFICATIONS

Aperture diameter	17 mm
Damage threshold	5 J/cm ² pulsed at 1064 nm, typical
Polarization Contrast (after 1st polarizer)	>1:200
Polarization Contrast (after 2nd polarizer)	>1:500

Catalogue number	Wavelength, nm	Price, EUR
990-0070-266	266	850
990-0070-355	355	750
990-0070-532	532	650
990-0070-1064	1064	650

RELATED PRODUCTS

- Motorized Variable Attenuator for Linearly Polarized Laser Beam 990-0070M
See page 6.10
- Multiple Order Plates for Nd:YAG applications
See page 3.18
- Thin Film Laser Polarizers for Nd:YAG applications
See page 3.14
- Beam dumps 990-0800, 990-0820
See page 6.24

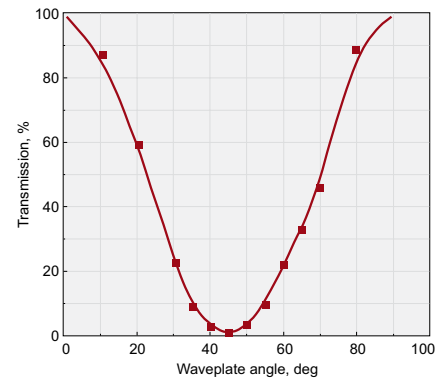
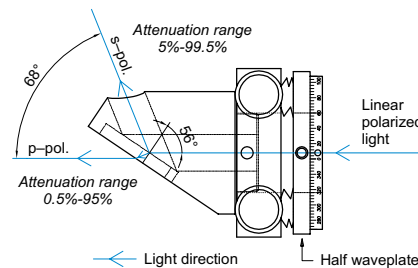
VARIABLE ATTENUATOR FOR Nd:YAG LINEARLY POLARIZED LASER BEAM 990-0071



Note: Solid Base Height Extender 820-0210 and Standard Rod 820-0020-20 should be ordered separately

This variable attenuator/beamsplitter consists of special design opto-mechanical adapter for polarizer at 56° 840-0117A or 840-0118A and precision opto-mechanical holder 840-0197. Thin Film Brewster type polarizer, which reflect s-polarized light at 56° while transmitting p-polarized light, is housed into adapter for polarizer at 56°. Quartz multiple order half waveplate is housed in rotating holder 840-0197. The intensity ratio of those two beams may be continuously varied without alteration of other beam parameters by rotating the waveplate. The intensity of

either exit beam, or their intensity ratio, can be controlled over a wide dynamic range. P-polarization could be selected for maximum transmission, or high-purity s-polarization could be reflected when maximum attenuation of the transmitted beam takes place. The holder 840-0197 allows to adjust Angle Of Incidence of the Thin Film Brewster type polarizer by $\pm 2^\circ$ and to get the maximum polarization contrast.



- Divides laser beam into separated by 68° angle two beams of manually adjustable intensity ratio
- Large dynamic range
- Negligible transmitted beam deviation
- High Optical damage threshold
- Weight – 0.25 kg

SPECIFICATIONS

Aperture diameter	10 mm
Damage threshold	5 J/cm ² pulsed at 1064 nm, typical
Polarization Contrast	>1:200

Catalogue number	Wavelength, nm	Price, EUR
990-0071-266	266	510
990-0071-355	355	475
990-0071-532	532	445
990-0071-1064	1064	445

Multiple order half waveplate is housed in rotating holder 840-0197.

RELATED PRODUCTS

- Motorized Variable Attenuator for Linearly Polarized Laser Beam 990-0071M
See page 6.12
- Multiple Order Plates for Nd:YAG applications
See page 3.18
- Thin Film Laser Polarizers for Nd:YAG applications
See page 3.14



Nd:YAG Laser Crystals

Nd:YAG CRYSTALS (Standard Rods)



EKSMA OPTICS offers standard specifications high optical quality Nd:YAG rods with high damage threshold AR @ 1064 nm coatings.

SPECIFICATIONS OF STANDARD Nd:YAG LASER RODS

Nd Doping Level	0.8% or 1.1%
Orientation	<111> crystalline direction
Surface Quality	10-5 scratch/dig as per MIL-O-13830A
Surface Flatness	$\lambda/10$ at 633 nm
Parallelism	< 10 arcsec
Perpendicularity	< 5 arcmin for plano/plano ends
Diameter Tolerance	+0/-0.05 mm
Length Tolerance	+1/-0.5 mm
Clear Aperture	> 90 % of full aperture
Chamfers	0.1 mm at 45 deg
Coating	Both sides coated AR @ 1064 nm, R < 0.2%, AOI = 0 deg
Barrel Grooving	All dia 6.35, 8, 10, 12 mm rods with barrel grooving

Code	Description	Diameter, mm	Length, mm	Doping, %	Wedge of the ends, deg	Coating	Application	Sales price, EUR
E-Y-3-0.8-A/A	Nd:YAG	3	65	0.8	0/0	AR/AR @ 1064 nm	Generation @ 1064 nm	265
E-Y-3-1.1-A/A	Nd:YAG	3	65	1.1	0/0	AR/AR @ 1064 nm	Generation @ 1064 nm	325
E-Y-4-0.8-A/A	Nd:YAG	4	65	0.8	3/3 parallel	AR/AR @ 1064 nm	Generation @ 1064 nm	410
E-Y-4-1.1-A/A	Nd:YAG	4	65	1.1	3/3 parallel	AR/AR @ 1064 nm	Generation @ 1064 nm	410
E-Y-6.35-1.1-A/A	Nd:YAG	6.35	85*	1.1	3/3 parallel	AR/AR @ 1064 nm	Generation @ 1064 nm	875
E-Y-8-1.1-A/A	Nd:YAG	8	85*	1.1	3/3 parallel	AR/AR @ 1064 nm	Generation @ 1064 nm	1065
E-Y-10-1.1-A/A	Nd:YAG	10	85*	1.1	3/3 parallel	AR/AR @ 1064 nm	Generation @ 1064 nm	1695
E-Y-12-0.8-A/A	Nd:YAG	12	100*	0.8	3/3 parallel	AR/AR @ 1064 nm	Generation @ 1064 nm	2280
E-Y-12-1.1-A/A	Nd:YAG	12	100*	1.1	3/3 parallel	AR/AR @ 1064 nm	Generation @ 1064 nm	2280

* rods with barrel grooving, except 10 mm at both ends of the rod without grooving.

RELATED PRODUCTS

- Laser Safety Eyewear
See page 1.36



- Visualizator 990-0840
See page 1.36



NONLINEAR CRYSTALS for SHG@1064 nm

LBO crystals

LBO crystals feature the highest damage threshold, small walk-off and have high efficiency. These crystals are the best choice for harmonics generation of relatively high power and high repetition rate Q-switched or mode-locked lasers.

Catalogue number	Size, mm	Orientation		Type	Coating	Application	Price, EUR
		Theta, deg	Phi, deg				
LBO-401	3x3x10	90	11.6	Type 1	AR/AR @ 1064+532 nm	SHG@1064 nm	245
LBO-402	3x3x15	90	11.6	Type 1	AR/AR @ 1064+532 nm	SHG@1064 nm	325
LBO-403	5x5x15	90	11.6	Type 1	AR/AR @ 1064+532 nm	SHG@1064 nm	765
LBO-404	3x3x15	90	0	Type 1	AR/AR @ 1064+532 nm	NCPM SHG@1064 nm, T=149 °C	325
LBO-405	3x3x20	90	0	Type 1	AR/AR @ 1064+532 nm	NCPM SHG@1064 nm, T=149 °C	405

KTP crystals

KTP crystals feature the highest efficiency and are suited for low average power or CW lasers applications. These crystals are temperature change insensitive and operate with sharply focused or highly divergent laser beams.

Catalogue number	Size, mm	Orientation		Type	Coating	Application	Price, EUR
		Theta, deg	Phi, deg				
KTP-401	3x3x5	90	23.5	Type 2	AR/AR @ 1064+532 nm	SHG@1064 nm	76
KTP-402	3x3x10	90	23.5	Type 2	AR/AR @ 1064+532 nm	SHG@1064 nm	109
KTP-403	4x4x6	90	23.5	Type 2	AR/AR @ 1064+532 nm	SHG@1064 nm	118
KTP-404	7x7x9	90	23.5	Type 2	AR/AR @ 1064+532 nm	SHG@1064 nm	529

DKDP crystals

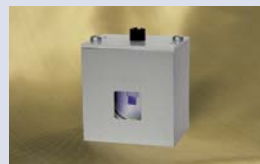
Large aperture DKDP crystals are used for high energy Q-switched lasers with large beam diameters.

Catalogue number	Size, mm	Orientation		Type	Coating	Application	Price, EUR
		Theta, deg	Phi, deg				
DKDP-401	15x15x13	36.5	45	Type 1	AR/AR @ 1064/1064+532 nm	SHG@1064 nm	485
DKDP-402	15x15x13	53.5	0	Type 2	AR/AR @ 1064/1064+532 nm	SHG@1064 nm	485
DKDP-404	12x12x20	53,5	0	Type 2	AR/AR @ 1064/1064+532 nm	SHG@1064 nm	475
DKDP-405	15x15x20	53,5	0	Type 2	AR/AR @ 1064/1064+532 nm	SHG@1064 nm	579

Please contact EKSMA OPTICS
for special OEM and large volume pricing.

RELATED PRODUCTS

- Ovens of various sizes are available
See pages 2.27–2.31



NONLINEAR CRYSTALS for THG@1064 nm

LBO crystals

Catalogue number	Size, mm	Orientation		Type	Coating	Application	Price, EUR
		Theta, deg	Phi, deg				
LBO-406	3x3x10	42.2	90	Type 2	AR/AR @ 1064+532/355 nm	THG@1064 nm	245
LBO-407	3x3x15	42.2	90	Type 2	AR/AR @ 1064+532/355 nm	THG@1064 nm	325
LBO-408	5x5x15	42.2	90	Type 2	AR/AR @ 1064+532/355 nm	THG@1064 nm	765

DKDP crystals

Catalogue number	Size, mm	Orientation		Type	Coating	Application	Price, EUR
		Theta, deg	Phi, deg				
DKDP-403	12x12x20	59.3	0	Type 2	AR/AR @ 1064+532/355 nm	THG@1064 nm	475
DKDP-406	15x15x20	59.3	0	Type 2	AR/AR @ 1064+532/355 nm	THG@1064 nm	579

NONLINEAR CRYSTALS for 4HG@1064 nm

BBO crystals

Catalogue number	Size, mm	Orientation		Type	Coating	Application	Price, EUR
		Theta, deg	Phi, deg				
BBO-700	7x7x6	47.6	90	Type 1	P/P @ 532/266 nm	SHG@532 nm	807

KDP crystals

Catalogue number	Size, mm	Orientation		Type	Coating	Application	Price, EUR
		Theta, deg	Phi, deg				
KDP-401	12x12x5	76.5	45	Type 1	AR/AR @ 532/266 nm	SHG@532 nm	408
KDP-402	15x15x7	76.5	45	Type 1	AR/AR @ 532/266 nm	SHG@532 nm	480

HOUSING ACCESSORIES

- Ring Holders for Nonlinear Crystals
See page 2.24
- Positioning Mount 840-0199 for Nonlinear Crystal Housing
See page 2.26

