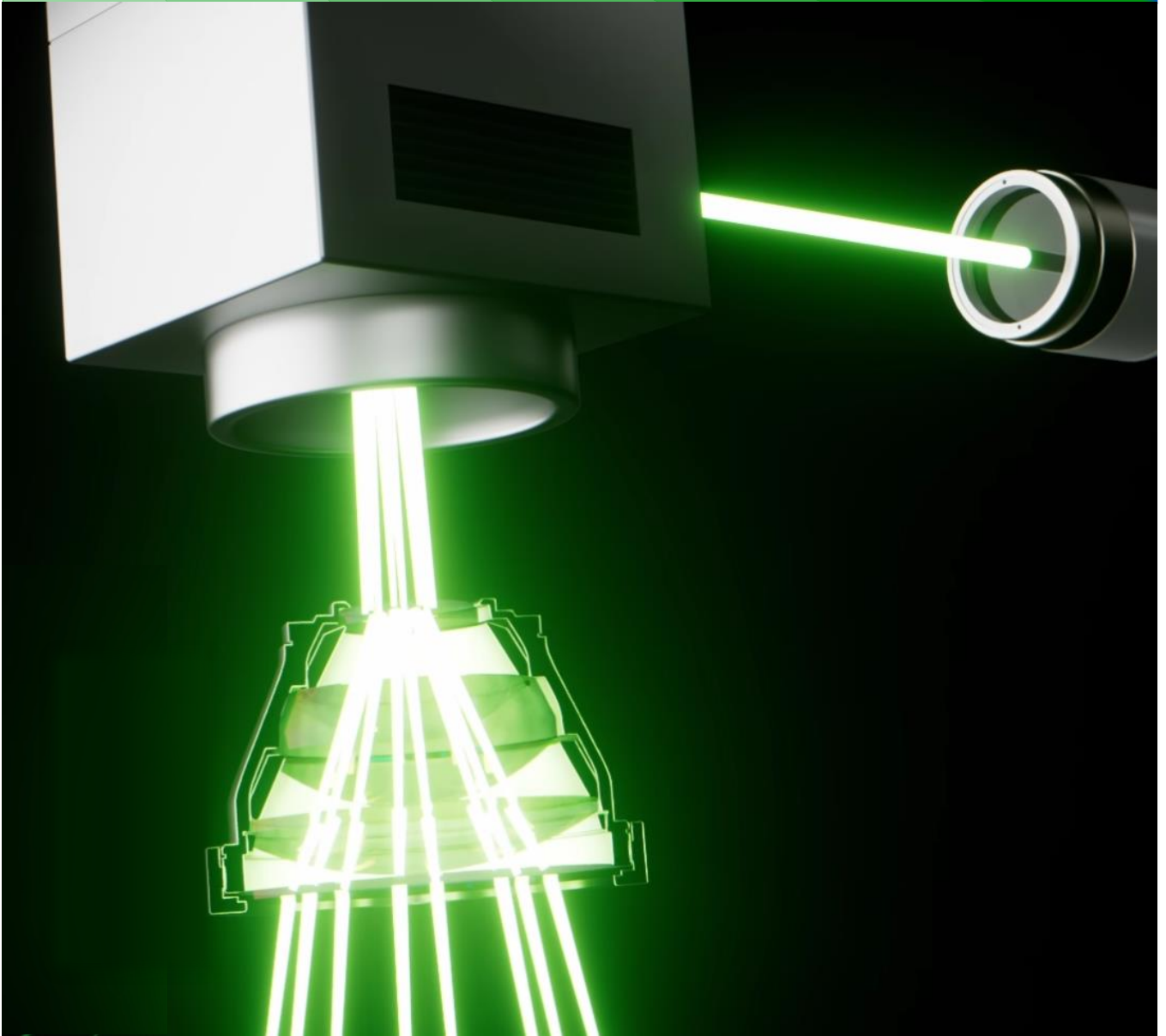




MORE LIGHT



Laser Material Processing

Application Guide 01/2026

Internal use

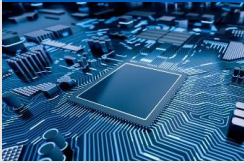




Jenoptik Group – Company introduction

Overview

- Jenoptik is a global technology group operating in the photonics market. Optical technologies are the core of our business.
- Our growth areas primarily include semiconductor technology, medical technology, metrology as well as smart mobility.
- Approximately 4,600 people worldwide work for the Jenoptik Group, which is headquartered in Jena, Germany.
- JENOPTIK AG is listed on the German Stock Exchange in Frankfurt and is traded on the SDax and TecDax.



Strategic business units

<p>Semiconductor & Advanced Manufacturing</p> 	<p>Biophotonics</p> 	<p>Metrology & Production Solutions</p> 	<p>Smart Mobility Solutions</p> 	<p>Prodmax Automation Canada</p> 
<p>Global Group Functions</p>				

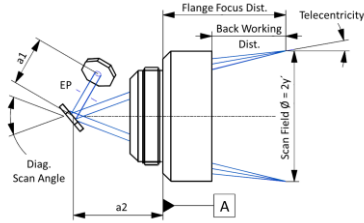
Quick Selection Guide – F-Theta Lenses

F-Theta JENar™ Silverline™



Focal Length	Scan Field Diagonal	Max. Full Diagonal Scan Angle	Max. Input Beam Diameter For 2-axis-scan	Focus Size at 1/e ² Intensity Level	a1 a2 Recomm. Mirror Separation 2nd Mirror to Flange	Telecentricity only F-Theta with Scanner	Back Working Distance from last mechanical surface (incl. window)	Window Order Number for Spare Part	Mounting Thread	Mara Order No.	Hawa Order No.
Wavelength 1030...1080 nm											
160 mm	110 mm	40°	14 mm	22 µm	17 mm 40 mm	5.2° 5.4°	184 mm	576225	M85x1	017700-025-26	739343
255 mm	160 mm	36°	20 mm	25 µm	25 mm 48 mm	7.2° 7.4°	303 mm	576225	M85x1	017700-026-26	739346
423 mm	360 mm	48°	14 mm	59 µm	17 mm 40 mm	16.4° 16.4°	500 mm	629206	M85x1	609120	740042
Wavelength 900...1100 nm											
160 mm	110 mm	40°	14 mm	19 µm	17 mm 40 mm	5.2° 5.4°	182 mm	602021	M85x1	601787	739802
255 mm	160 mm	36°	20 mm	21 µm	25 mm 48 mm	7.2° 7.4°	302 mm	602021	M85x1	601804	739803
423 mm	360 mm	48°	14 mm	50 µm	17 mm 40 mm	16.4° 16.4°	500 mm	628981	M85x1	628951	740058
Wavelength 515...540 nm											
115 mm	71 mm	36°	14 mm	8 µm	17 mm 40 mm	3.5° 3.7°	146 mm	628062	M85x1	624103	740053
163 mm	92 mm	16.4°	12 mm	14 µm	17 mm 49 mm	0.4° 1.0°	235 mm	660158	M85x1	659612	739816
330 mm	332 mm	27.6°	16 mm	21 µm	19 mm 50 mm	23.5° 23.5°	216 mm	674648	M102x1	663834	739819
Wavelength 355 nm											
55 mm	22 mm	23°	6 mm	6 µm	13 mm 46 mm	0.8° 1.6°	60 mm	576243	M85x1	605678	739808
55 mm	17 mm	17°	8 mm	4.5 µm	13 mm 46 mm	0.5° 1.1°	60 mm	576243	M85x1	605678	739808
103 mm	71 mm	40°	9 mm	8 µm	14 mm 47 mm	2.4° 2.8°	135 mm	576239	M85x1	017700-402-26	739892
125 mm	75 mm	18°	10 mm	8 µm	13 mm 42 mm	0.01° 0.97°	163 mm	641319	M85x1	628956	740059
170 mm	140 mm	50°	10 mm	11 µm	13 mm 42 mm	4.8° 4.8°	236 mm	610829	M85x1	586840	739798
255 mm	240 mm	54°	10 mm	17 µm	13 mm 42 mm	12.7° 12.7°	314 mm	579878	M85x1	017700-406-26	739895
510 mm	464 mm	51°	14 mm	24 µm	14 mm 42 mm	18.2° 18.2°	609 mm	576241	M85x1	017700-405-26	739894
340 mm	332 mm	27°	14 mm	16.8 µm	17 mm 34 mm	22.8° 22.8°	234.8 mm	665673	M85x1	663830	739817
Wavelength 266 nm											
103 mm	71 mm	40°	9 mm	6 µm	14 mm 46 mm	2.6° 2.9°	133 mm	610812	M85x1	017700-601-26	739750

Definition of parameters



F-Theta JENar™ APTAline™



Focal Length	Scan Field Diagonal	Max. Full Diagonal Scan Angle	Max. Input Beam Diameter for 2-axis-scan	Focus Size at 1/e ² Intensity Level	a1 a2 Recomm. Mirror Separation 2nd Mirror to Flange	Telecentricity only F-Theta with Scanner	Back Working Distance from last mechanical surface (incl. window)	Window Order Number for Spare Part	Mounting Thread	Mara Order No.	Hawa Order No.
Wavelength 1030...1080 nm (*VIS)											
160 mm	110 mm	40.0°	14 mm	22 µm	17 mm 40 mm	5.2° 5.4°	183 mm	691387	M85x1	689620	739986
161 mm	71 mm	12.7°	14 mm	23 µm	17 mm 40 mm	4.1° 4.2°	153 mm	690809	M85x1	679781	739985
255 mm	160 mm	36.0°	20 mm	25 µm	25 mm 48 mm	7.2° 7.4°	303 mm	576225	M85x1	689622	739987
340 mm	255 mm	21.7°	20 mm	34.2 µm	26 mm 36 mm	11.6° 11.6°	484.7 mm	707589	M85x1	697568	739989
340 mm	297 mm	25.4°	14 mm	48.6 µm	17 mm 35.5 mm	13.6° 13.7°	422.6 mm	707589	M85x1	697568	739989
639 mm	580 mm	25.0°	20 mm	65.3 µm	25.6 mm 31.5 mm	22.3° 22.4°	565 mm	741117	M85x1	726577	739662
675 mm	707 mm	28.4°	14 mm	79.09 µm	25 mm 40.5 mm	23.2° 23.2°	673.8 mm	696058	M110x1	666682*	739968
Wavelength 515...540 nm											
429 mm	339 mm	22.8°	16 mm	2f 9 µm	17 mm 32.5 mm	12.4° 12.4°	547.7 mm	740337	M85x1	728095	739668
Wavelength 355 nm											
103 mm	71 mm	3.0°	9 mm	8 µm	14 mm 47 mm	2.4° 2.8°	135.0 mm	576239	M85x1	689627	739988
340 mm	332 mm	27.0°	20 mm	11.8 µm	26.6 mm 46.2 mm	21.6° 21.7°	181.5 mm	703512	M102x1	663832	739818
420 mm	353 mm	24.0°	15 mm	18.9 µm	17 mm 35.1 mm	14.7° 14.7°	496.0 mm	741118	M85x1	727640	739569
205 mm	136 mm	19.6°	17 mm	7.2 µm	24.0 mm 49.7 mm	0.9° 0.9°	276.9 mm	751687	M85x1	746972	746972

Applications

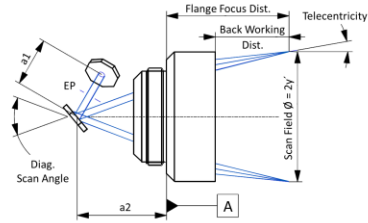
- Solar cell production
- 3D printing
- Lithium battery production
- Display manufacturing

Quick Selection Guide – F-Theta Lenses

F-Theta JENar™



Definition of parameters



Focal Length	Scan Field Diagonal	Max. Full Diagonal Scan Angle	Max. Input Beam Diameter for 2-axis-scan	Focus Size at 1/e ² Intensity Level	a1 a2 Recomm. Mirror Separation 2nd Mirror to Flange	Telecentricity only F-Theta with Scanner	Back Working Distance from last mechanical surface (incl. window)	Window Order Number for Spare Part	Mounting Thread	Mara Order No.	Hawa Order No.
Wavelength 1030...1080 nm; T@500...680 nm > 85% (VIS*)											
125 mm	80 mm	37°	15 mm	16 μm	18 mm 38 mm	4.9° 5.1°	155 mm	602019	M85x1	601926*	739805
160 mm	170 mm	60°	10 mm	31 μm	13 mm 43 mm	17.1° 17.2°	178 mm	576234	M85x1	601914*	739804
255 mm	239 mm	53°	20 mm	24 μm	25 mm 39 mm	14.3° 15.0°	291 mm	602019	M85x1	601948*	739606
Wavelength 1030...1080 nm											
100 mm	93 mm	54°	10 mm	19 μm	13 mm 43 mm	8.7° 9.1°	87 mm	576230	M85x1	017700-024-26	739165
125 mm	80 mm	37°	15 mm	16 μm	18 mm 38 mm	4.9° 5.1°	155 mm	575267	M85x1	017700-003-26	740040
160 mm	170 mm	60°	10 mm	31 μm	13 mm 43 mm	17.1° 17.2°	178 mm	576230	M85x1	017700-019-26	737081
170 mm	170 mm	57°	14 mm	24 μm	17 mm 41 mm	11.6° 11.7°	194 mm	575267	M85x1	017700-018-26	740064
255 mm	239 mm	53°	20 mm	24 μm	25 mm 39 mm	14.3° 15.0°	291 mm	575267	M85x1	017700-017-26	740063
347 mm	355 mm	58°	15 mm	46 μm	17 mm 41 mm	18.2° 18.2°	404 mm	575267	M85x1	609661	740044
347 mm	354 mm	57.6°	16 mm	46 μm	17 mm 40.5 mm	18.7° 18.7°	403.8 mm	575267	M85x1	017700-022-26	-
350 mm	452 mm	71°	15 mm	45 μm	13 mm 25 mm	23.7° 24.0°	395 mm	610826	M85x1	017700-009-26	740041
420 mm	420 mm	57°	15 mm	55 μm	17 mm 41 mm	18.7° 18.8°	501 mm	575267	M85x1	017700-021-26	739157
Wavelength 515...540 nm											
100 mm	90 mm	53°	10 mm	10 μm	13 mm 43 mm	7.7° 7.8°	95 mm	576232	M85x1	017700-209-26	739868
108 mm	75 mm	40°	15 mm	7 μm	16 mm 39 mm	4.9° 5.1°	130 mm	599379	M85x1	017700-203-26	739862
170 mm	160 mm	54°	14 mm	12 μm	17 mm 41 mm	10.9° 11.0°	195 mm	576228	M85x1	017700-206-26	739864
255 mm	233 mm	52°	20 mm	12 μm	25 mm 39 mm	14.2° 14.3°	294 mm	576228	M85x1	017700-205-26	739863
330 mm	347 mm	58°	16 mm	23 μm	17 mm 41 mm	18.4° 18.4°	384 mm	576228	M85x1	017700-208-26	739866
420 mm	420 mm	57°	15 mm	27 μm	17 mm 41 mm	19.3° 19.3°	485 mm	576228	M85x1	017700-207-26	739865

*VIS

Quick Selection Guide – Beam Expander

Fix-BEX beam expander with fixed magnification



Zoom Factor	Group Delay Dispersion GDD	LIDT ¹⁾	Transmission	Mounting	Weight	Clear input aperture	Clear output aperture	Diffraction limited up to an diameter (°) of	Mara Order No.	Hawa Order No.
Wavelength 355 nm (UV)										
1.5x	1171 fs ²	CW: 1.0 MW/cm ² Pulsed (ns): 1.0 J/cm ² * (τ/ns) ^{0.40}	99 %	M30x1/M50x1	0.421 kg	16 mm	40 mm	8 mm	663991	739842
2x	1171 fs ²		99 %	M30x1/M50x1	0.421 kg	16 mm	40 mm	8 mm	663992	739843
4x	1171 fs ²		99 %	M30x1/M50x1	0.601 kg	12 mm	40 mm	5 mm	663993	739844
8x	1757 fs ²		> 98 %	M30x1/M50x1	0.662 kg	7 mm	40 mm	3 mm	663994	739849
Wavelength 515...540 nm (GR)										
1.5x	659 fs ²	CW: 2.5 MW/cm ² Pulsed (ns): 2.5 J/cm ² * (τ/ns) ^{0.35}	99 %	M30x1/M50x1	0.243 kg	16 mm	40 mm	8 mm	665477	743228
2x	659 fs ²		99 %	M30x1/M50x1	0.243 kg	16 mm	40 mm	8 mm	665474	739937
4x	659 fs ²		99 %	M30x1/M50x1	0.297 kg	12 mm	40 mm	5 mm	665480	739888
8x	659 fs ²		> 98 %	M30x1/M50x1	0.324 kg	7 mm	40 mm	3 mm	665483	739851
Wavelength 1030...1080 nm (IR)										
1.5x	161 fs ²	CW: 5.0 MW/cm ² Pulsed (ns): 5.0 J/cm ² * (τ/ns) ^{0.30}	99 %	M30x1/M50x1	0.243 kg	16 mm	40 mm	8 mm	665479	739961
2x	161 fs ²		99 %	M30x1/M50x1	0.243 kg	16 mm	40 mm	8 mm	665475	744451
4x	161 fs ²		99 %	M30x1/M50x1	0.297 kg	12 mm	40 mm	5 mm	664787	739936
8x	242 fs ²		> 98 %	M30x1/M50x1	0.324 kg	7 mm	40 mm	3 mm	664689	739884

¹⁾ For UV lasers, the LIDT values are valid for pulse durations > 10 ps. For shorter pulses please be advised to test.
²⁾ Beam diameter vignetted @ 1/e²

Vario-BEX beam expander with manually adjustable magnification – part I



Wavelength	355 nm	515...540 nm	1030...1080 nm
Beam expander 1x-4x Fused Silica			
Group Delay Dispersion GDD	972 fs ²	547 fs ²	134 fs ²
LIDT ¹⁾	1.0 J/cm ² * (τ/ns) ^ 0.40; 1.0 MW/cm ²	2.5 J/cm ² * (τ/ns) ^ 0.35; 2.5 MW/cm ²	0.50 J/cm ² * (τ/ns) ^ 0.35; 0.50 MW/cm ²
LIDT ¹⁾	0.20 J/cm ² * (τ/ns) ^ 0.40; 0.20 MW/cm ²	5.0 J/cm ² * (τ/ns) ^ 0.30; 5.0 MW/cm ²	1.00 J/cm ² * (τ/ns) ^ 0.30; 1.00 MW/cm ²
Order no. Mara Hawa	017052-402-26 740038	017052-202-26 740036	017052-012-26 740033
Beam expander 1x-4x steadfast			
Group Delay Dispersion GDD	972 fs ²	547 fs ²	134 fs ²
LIDT ¹⁾	1.0 J/cm ² * (τ/ns) ^ 0.40; 1.0 MW/cm ²	2.5 J/cm ² * (τ/ns) ^ 0.35; 2.5 MW/cm ²	5.0 J/cm ² * (τ/ns) ^ 0.30; 5.00 MW/cm ²
LIDT ¹⁾	0.20 J/cm ² * (τ/ns) ^ 0.30; 0.10 MW/cm ²	0.5 J/cm ² * (τ/ns) ^ 0.35; 0.5 MW/cm ²	1.00 J/cm ² * (τ/ns) ^ 0.30; 1.00 MW/cm ²
Order no. Mara Hawa	593354 739799	593355 739800	582823 739795
Beam expander 2x-10x			
Group Delay Dispersion GDD	1640 fs ²	1070 fs ²	288 fs ²
LIDT ¹⁾	1.0 J/cm ² * (τ/ns) ^ 0.40; 1.0 MW/cm ²	2.5 J/cm ² * (τ/ns) ^ 0.35; 2.5 MW/cm ²	5.0 J/cm ² * (τ/ns) ^ 0.30; 5.00 MW/cm ²
LIDT ¹⁾	0.10 J/cm ² * (τ/ns) ^ 0.40; 0.10 MW/cm ²	0.25 J/cm ² * (τ/ns) ^ 0.35; 0.25 MW/cm ²	0.50 J/cm ² * (τ/ns) ^ 0.30; 0.50 MW/cm ²
Order no. Mara Hawa	017052-401-26 740037	017052-201-26 740035	017052-001-26 740001
Beam expander 1x-8x			
Group Delay Dispersion GDD	2810 fs ²	1580 fs ²	339 fs ²
LIDT ¹⁾	1.0 J/cm ² * (τ/ns) ^ 0.40; 1.0 MW/cm ²	2.5 J/cm ² * (τ/ns) ^ 0.30; 2.5 MW/cm ²	5.0 J/cm ² * (τ/ns) ^ 0.30; 5.00 MW/cm ²
LIDT ¹⁾	0.10 J/cm ² * (τ/ns) ^ 0.40; 0.10 MW/cm ²	0.20 J/cm ² * (τ/ns) ^ 0.30; 0.20 MW/cm ²	0.35 J/cm ² * (τ/ns) ^ 0.30; 0.35 MW/cm ²
Order no. Mara Hawa	586117 739797	627443 740054	606997 740031

¹⁾ For UV lasers, the LIDT values are valid for pulse durations > 10 ps. For shorter pulses please be advised to test.
²⁾ Beam diameter vignetted @ 1/e²

Quick Selection Guide – Beam Expander

Vario-BEX beam expander with manually adjustable magnification – part II



Beam expander 1x-4x Fused Silica				∅ Entrance pupil ³⁾	Transmission	Mounting ∅	Weight
Wavelength	355 nm	515...540 nm	1030...1080 nm				
1x	4.0 mm	4.0 mm	4.0 mm	≥ 97 %	37.6 (0/-0.1) mm or mounting thread M30x1	0.19 kg	
2x	4.0 mm	4.0 mm	4.0 mm				
3x	4.0 mm	4.0 mm	4.0 mm				
4x	4.0 mm	4.0 mm	4.0 mm				
Mara Order no.	017052-402-26	017052-202-26	017052-012-26				
Hawa Order no.	740038	740036	740033				



Beam expander 1x-4x steadfast						
Wavelength	355 nm	515...540 nm	1030...1080 nm			
1x	4.0 mm	4.0 mm	4.0 mm	≥ 97 %	45.0 (+0.0/-0.04) mm or mounting thread M30x1 at both entrance and exit	0.37 kg
2x	4.0 mm	4.0 mm	4.0 mm			
3x	4.0 mm	4.0 mm	4.0 mm			
4x	4.0 mm	4.0 mm	4.0 mm			
Mara Order no.	593354	593355	582823			
Hawa Order no.	739799	739800	739795			

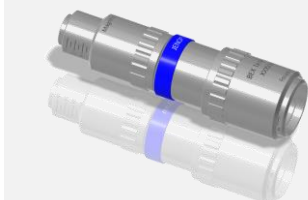


Beam expander 2x-10x						
Wavelength	355 nm	515...540 nm	1030...1080 nm			
2x	6.0 mm	8.0 mm	8.0 mm	≥ 96 %	37.6 (0/-0.1) mm	0.23 kg
3x	6.0 mm	7.0 mm	8.0 mm			
4x	5.0 mm	6.0 mm	7.0 mm			
5x	4.5 mm	5.0 mm	6.0 mm			
6x	4.0 mm	4.0 mm	5.0 mm			
7x	3.5 mm	4.0 mm	4.0 mm			
8x	3.0 mm	3.5 mm	3.5 mm			
9x	2.7 mm	3.2 mm	3.2 mm			
10x	2.2 mm	3.0 mm	3.0 mm			
Mara Order no.	017052-401-26	017052-201-26	017052-001-26			
Hawa Order no.	740037	740035	740001			



Beam expander 1x-8x						
Wavelength	355 nm	515...540 nm	1030...1080 nm			
1x	9.0 mm	9.0 mm	9.0 mm	≥ 97 %	55.0 (+0.0/-0.05) mm or mounting thread M30x1	0.54 kg
2x	9.0 mm	9.0 mm	9.0 mm			
3x	9.0 mm	9.0 mm	9.0 mm			
4x	7.5 mm	7.5 mm	7.5 mm			
5x	6.0 mm	6.0 mm	6.0 mm			
6x	4.0 mm	4.0 mm	5.0 mm			
7x	4.5 mm	4.5 mm	4.5 mm			
8x	4.0 mm	4.0 mm	4.0 mm			
Mara Order no.	586117	627443	606997			
Hawa Order no.	739797	740054	740031			

Beam expander 1x-4x LA | Wavelength 355nm | Fused Silica Systems



Magnification	Magnification Scale	Focus Scale	Group Delay Dispersion GDD	LIDT coating pulsed CW ¹⁾	LIDT system pulsed CW ¹⁾	Max. input beam ∅ 1/e ²	Max. entrance aperture ∅	Transmission	Mounting ∅ (entrance exit)	Weight
1x	0.0 mm	0.0 mm	2224 fs ²	1.0 J/cm ² * (τ/(ns)) ^{0.40} ; 1.0 MW/cm ²	0.17 J/cm ² * (τ/(ns)) ^{0.40} ; 0.17 MW/cm ²	6 mm	12 mm	≥ 97 %	M30x1 thread M56x1 thread	2.15 kg
1.5x	4.0 mm	12.3 mm								
2x	7.9 mm	18.4 mm								
2.5x	11.8 mm	22.1 mm								
3x	15.8 mm	24.5 mm								
3.5x	19.8 mm	26.3 mm								
4x	23.9 mm	27.6 mm								
Mara Order no.	664272									
Hawa Order no.	739850									

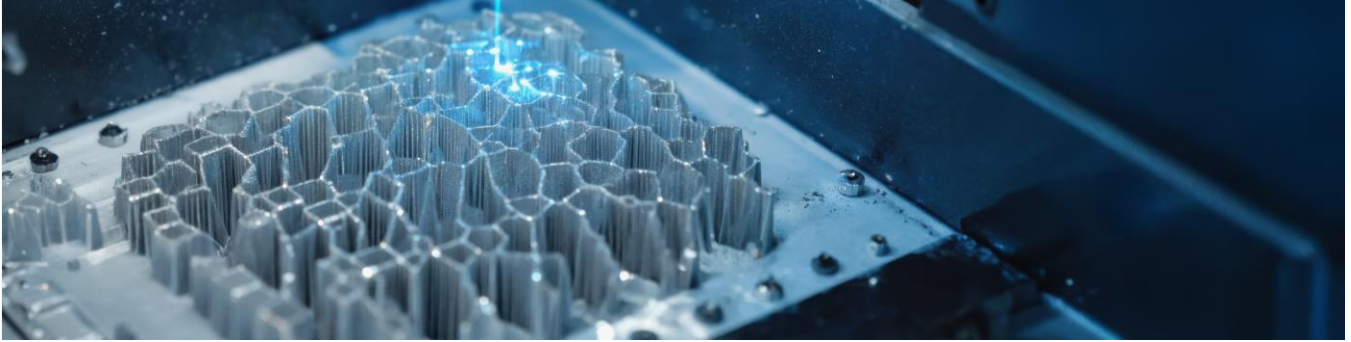
¹⁾ For UV lasers, the LIDT values are valid for pulse durations > 10 ps. For shorter pulses please be advised to test.

New

- Benefits:**
- ✓ Novel optical design and optical elements with higher LIDT (UV-grade fused silica)
 - ✓ Stainless steel mechanics (with steadfast design) → closed system with high beam-pointing stability
 - ✓ Protective window on beam entrance side (to be exchanged with special tooling)
 - ✓ Reverse usage possible + mounts on both sides

Application Examples – 3D Printing Industry

F-theta lenses, beam expanders and optical gratings are essential components in laser-based additive processes such as selective laser sintering (SLS) and stereo-lithography (SLA). Especially when combined with Jenoptik’s newly introduced, customizable beam shaping solutions, they demonstrate how modern technology is pushing the boundaries of 3D printing: Uniform exposure of the printing materials enables the production of high-resolution components with exceptional dimensional accuracy. At the same time, accelerated processing speeds significantly shorten prototype development cycles and speed up mass production.



Discover our optical and microoptical components



F-Theta JENar™ APTAline™ 639-1030...1080-580-AL

- ✓ Wavelength range: 1030–1080 nm
- ✓ Focal length: 639 mm
- ✓ Scan field: 410 mm × 410 mm (Ø 580mm)
- ✓ Excellent homogeneity across the full scan field, ensuring uniform exposure and curing of printing materials.
- ✓ High beam stability for accurate laser positioning and repeatable results in additive manufacturing.
- ✓ Minimized back-reflections, making it suitable even for high-power and ultrashort-pulse (USP) lasers.
- ✓ Durable and reliable optical design, using fused silica and advanced coatings for maximum longevity.
- ✓ Cost-effective performance, that allows optimized throughput and lower production costs without compromising quality.

Mara Order No.: 726577

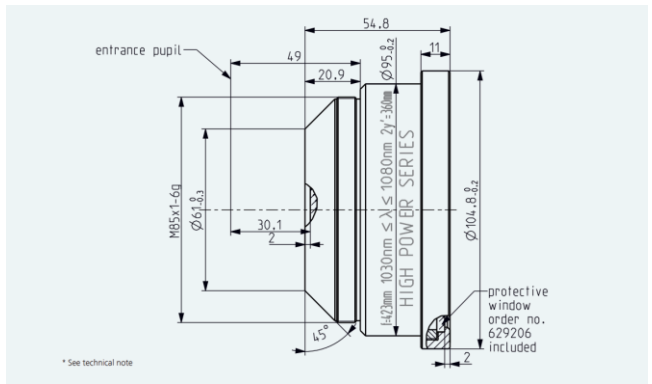
Hawa Order No.: 739662

F-Theta JENar™ Silverline™ 423-1030...1080-360

- ✓ Wavelength range: 1030–1080 nm
- ✓ Focal length: 423 mm
- ✓ Scan field: 255 mm × 255 mm (Ø 360mm)
- ✓ Excellent homogeneity across the full scan field, ensuring uniform exposure and curing of printing materials.
- ✓ High beam stability for accurate laser positioning and repeatable results in additive manufacturing.
- ✓ Minimized back-reflections, making it suitable even for high-power and ultrashort-pulse (USP) lasers.
- ✓ Durable and reliable optical design, using fused silica and advanced coatings for maximum longevity.
- ✓ Cost-effective performance, that allows optimized throughput and lower production costs without compromising quality.

Mara Order No.: 609120

Hawa order No.: 740042



Application Examples – Lithium Battery Industry

Laser technology empowers efficient and intelligent battery production

In battery manufacturing, precision is paramount for both safety and performance. F-theta lenses enable precise cutting of electrode materials, thereby improving overall battery performance. Low heat exposure prevents material damage and extends the service life of lithium-ion batteries (LIBs). As important components in automated production lines, they also significantly increase production speed and efficiency when combined with JENOPTIK's unique shaping processes. Optical components are used in advanced laser systems and offer high precision and minimal burrs when laser cutting electrodes and separators. In laser welding, they ensure seamless cell encapsulation, thereby guaranteeing reduced contact resistance. Laser technology is also used for reliable and efficient cleaning and marking.



Discover our optical and microoptical components



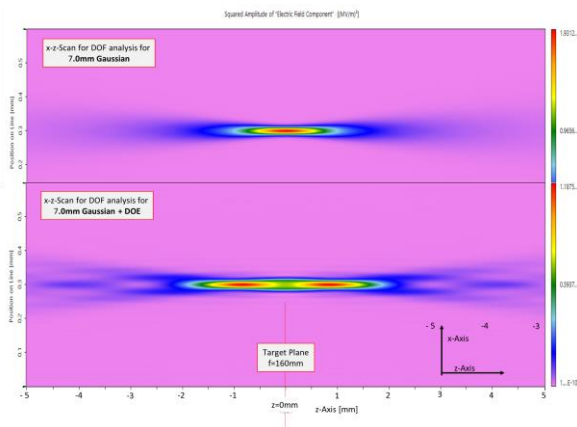
F-Theta JENar™ APTAline™ 161-1030...1080-71-AL

- ✓ Wavelength range: 1030–1080 nm
- ✓ Focal length: 161 mm
- ✓ Scan field: 50 mm × 50 mm (Ø 71 mm)
- ✓ Excellent homogeneity across the full scan field, ensuring uniform exposure and curing of printing materials.
- ✓ High beam stability for accurate laser positioning and repeatable results in additive manufacturing.
- ✓ Minimized back-reflections, making it suitable even for high-power and ultrashort-pulse (USP) lasers.
- ✓ Durable and reliable optical design, using fused silica and advanced coatings for maximum longevity.
- ✓ Cost-effective performance, that allows optimized throughput and lower production costs without compromising quality.

Mara Order No.: 679781
Hawa Order No.: 739985

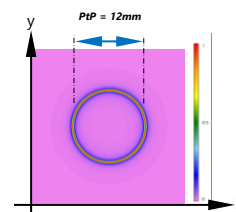
Diffractive Optical Elements DOE: DOF

DOF increase depth of focus means offset lens thermal lesing effect



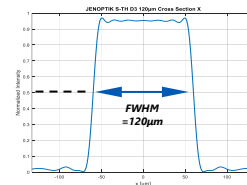
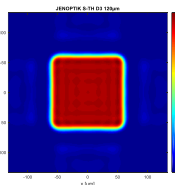
Axicon DOE

Output beam profile
e.g.: Ring distribution

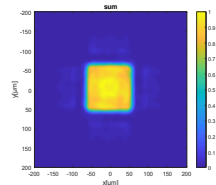


Beam Shaper DOE

Simulation



Measurement



Application Examples – Solar Cell Manufacturing

F-theta lenses play a crucial role in the manufacture of solar cells

They enable precise cutting and microstructuring on a microscopic scale. In combination with Jenoptik's unique laser beam shaping technology, they offer flexible support for complex pattern designs to optimize light yield. Their high focusing properties minimize material waste, thus ensuring economic advantages. Through the use of sustainable technologies such as photovoltaics, they make a valuable contribution to environmental protection.



Discover our optical and microoptical components



F-Theta JENar™ APTAline™ 429-515...540-339-AL

- ✓ Focal length 429 mm
- ✓ Wavelength 515 - 540 nm
- ✓ Scan field (X x Y); Ø (240 mm x 240 mm); 339 mm

Order No.
[Mara](#) | [Hawa](#)
 728095 | 739668

F-Theta JENar™ APTAline™ 420-355-353-AL

- ✓ Focal length 420 mm
- ✓ Wavelength 355 nm
- ✓ Scan field (X x Y); Ø (250 mm x 250 mm); 353 mm

Order No.
[Mara](#) | [Hawa](#)
 727640 | 739569

F-Theta JENar™ APTAline™ 340-355-332 L

- ✓ Focal length 340 mm
- ✓ Wavelength 355 nm
- ✓ Scan field (X x Y); Ø (235 mm x 235 mm); 332 mm

Order No.
[Mara](#) | [Hawa](#)
 663832 | 739818



Beam expander 1x-4x | Fused Silica

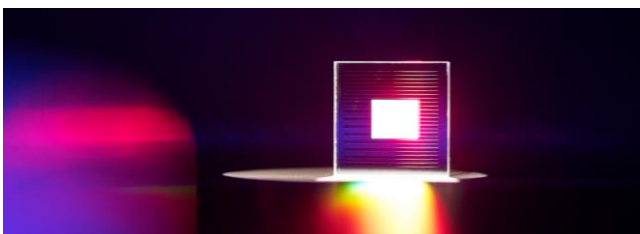
- ✓ Wavelength 355 nm

Order No.
[Mara](#) | [Hawa](#)
 017052-202-26 | 740036

Beam expander 1x-4x LA | Fused Silica

- ✓ Wavelength 355 nm

Order No.
[Mara](#) | [Hawa](#)
 664272 | 739850



Diffractive Optical Elements DOEs (Square, Rectangular Tophat)

190µm square beam shaper @F420, 355nm
 195µm square beam shaper @F330, 532nm

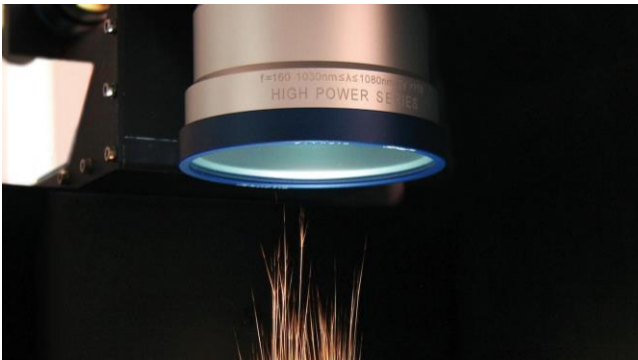
Application Examples – PCB and Consumer Electronics

High-precision PCB manufacturing: Optical components enable efficient laser material processing

Laser material processing plays a crucial role in the manufacture of printed circuit boards (PCBs), as it enables precise and efficient cutting, drilling, and engraving of PCBs used in everything from smartphones to aerospace applications. Lasers offer high precision and accuracy, which are essential for the complex patterns and small components of modern PCBs. Using high-precision optical components, laser technology improves the quality and reliability of printed circuit boards, shortens manufacturing time, and minimizes material waste, making it an indispensable tool in the electronics industry.



Discover our optical and microoptical components



F-Theta JENar™ Silverline™ 103-355-71 Telecentric fused silica lens

Order No.

[Mara](#) | [Hawa](#)

[017700-402-26](#) | [739892](#)

- ✓ Focal length 103 mm
- ✓ Wavelength 355 nm
- ✓ Scan field (X x Y); Ø (50 mm x 50 mm); 71 mm

F-Theta JENar™ Silverline™ 125-355-75 Fused silica lens

Order No.

[Mara](#) | [Hawa](#)

[628956](#) | [740059](#)

- ✓ Focal length 125 mm
- ✓ Wavelength 355 nm
- ✓ Scan field (X x Y); Ø (53 mm x 53 mm); 75 mm*

* 14 mm aperture and a1 = 17 mm possible for 66 mm scan field diagonale



BEX-M Beam expander 1x-8x with motorized adjustment of zoom

Wavelength	355 nm	515...540 nm	1030...1080 nm
Mara Order no.	613266	627445	611842

[Hawa Order no.](#)

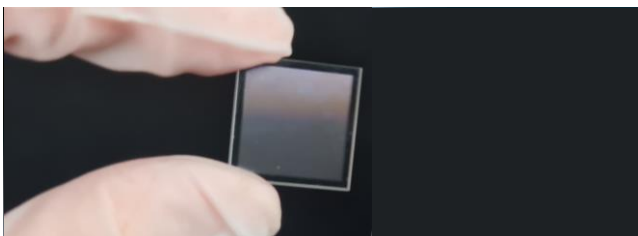
Vario-BEX Beam expander 1x-4x | Fused Silica

Order No.

[Mara](#) | [Hawa](#)

[017052-402-26](#) | [740038](#)

- ✓ Wavelength 355 nm
- ✓ Manual adjustment of zoom



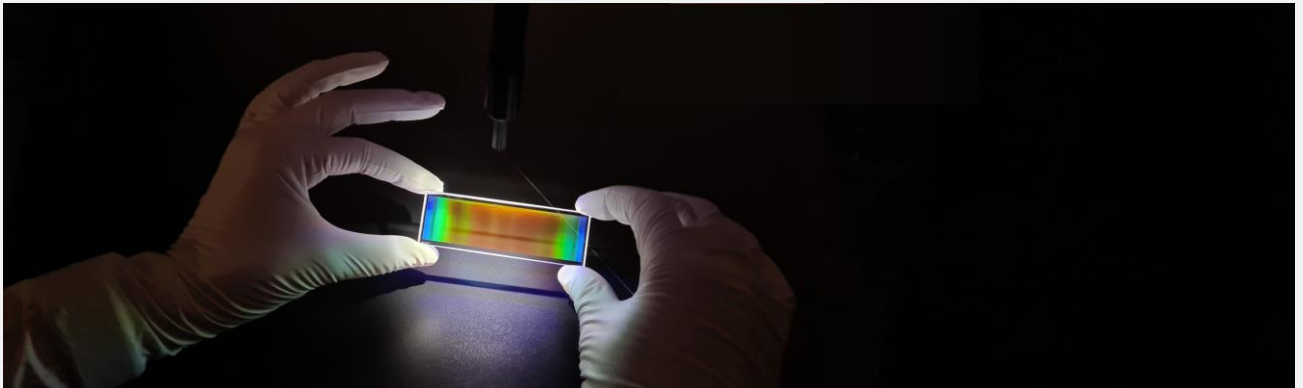
Diffractive Optical elements DOE (Square, Rectangular Tophat)

- ✓ Customized beam splitters, shapers and diffusers
- ✓ Customized spot numbers, sizes and distances
- ✓ High efficiency and maximized spot uniformity
- ✓ Compact solution for laser material processing



Recommendation for Ultrafast Laser – Pulse Compression Grating

In modern laser technology, gratings are critical optical components whose performance directly affects the efficiency, stability and range of applications of laser systems. Today, we will focus on the e²® transmission grating, an innovative technology introduced by Jenoptik that delivers unprecedented performance enhancements for laser systems.



Application scenarios:

The e²® transmission grating has a wide range of applications in various fields, including ultrafast laser systems and high-power laser tuning.

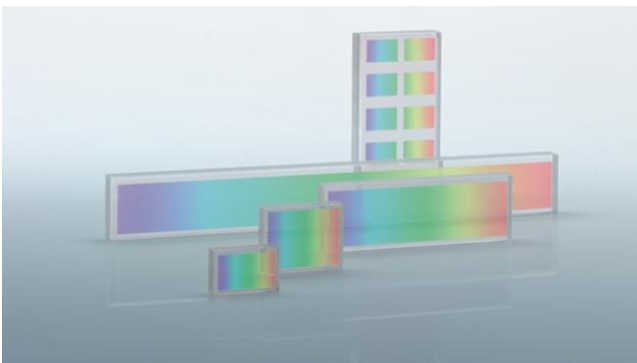
Pulse compression in ultrafast laser systems

In ultrafast laser technology, pulse compression is essential for generating high-energy, short pulses. The e²® transmission grating, with its high efficiency and low astigmatism evolution characteristics, significantly improves the effectiveness of pulse compression. In practical applications, the tested efficiency after four passes through the compressor exceeds 95%, greatly improving pulse quality stability and consistency. This high-performance pulse compression capability provides robust technical support for fields such as material processing, biomedical imaging, and fundamental physics research.

Wavelength selection and tuning for high-power lasers

The e²® transmission grating enables precise wavelength selection, tuning and bandwidth compression for high-power laser systems. Its high line density (up to 5000 lines/mm) and customizable design meet the diverse requirements of laser systems for wavelength accuracy and power density. This capability is highly valuable in laser cutting, welding, and lidar technologies.

Jenoptik's Pulse Compression Gratings PCGs e²®



Key features and benefits at a glance:

- ✓ Encapsulated fused silica transmission grating, up to 5000 lines/mm
- ✓ Efficiency close to 100%
- ✓ Customized design from UV to IR
- ✓ Ideal for pulse compression or beam combining
- ✓ Also available as reflection grating



Always next to you

Jenoptik Locations Asia



- Bangalore, IND
- Beijing, CHN
- Lane Cove, AUS
- Nes Ziona, ISR
- Shanghai, CHN
- Shizuoka-city, JPN
- Singapur, SGP
- Suwon-si, Gyeonggi-do, KOR
- Taiwan, TWN
- Wuhan, CHN
- Yokohama, JPN

You direct contact in your region

China

Sales Consultation

Mr. Alan Yang

Mobile: +86 13564406490

E-mail: alan.yang@jenoptik.com

JENOPTIK (Shanghai) Precision Instrument and Equipment Co., Ltd.

Building 15, No. 3999 Xiupi Road
201315 Shanghai

Japan

Sales Consultation

Ms. Yuko Tanaka

Phone: +81 45 670-9140

E-mail: yuko.tanaka@jenoptik.com

JENOPTIK Japan Co., Ltd.

2-3-8 Shin-Yokohoma, Kohoku-Ku,
Yokohama, Kanagawa 222-0033

Korea

Sales Consultation

Mr. Cavin Kim

Phone: +82 10 3753-2503

E-mail: changhwan.kim@jenoptik.com

JENOPTIK Korea Corporation, Ltd.

91, Hyeongoksan-ro 93 beon-gil,
Cheongbuk-myeon, Pyeongtaek-si,
Gyeonggi-do, 17812 Pyeongtaek City

业纳 (上海) 精密仪器设备有限公司
上海市浦东新区秀浦路3999弄15号楼
021-38252380 | info@jenoptik.com.cn



MORE LIGHT