fθ Lenses | fθL

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It is used for laser marking, bar code reader, laser micromachining and so on.

- It converts a rotational movement of a galvanometer mirror into a linear motion on the focal plane by using distortion effects.
- Telecentric type is also available that can be irradiated vertically to the focusing plane.
- Also available for fundamental YAG laser (1064nm), harmonic lasers (266nm, 355nm, 532nm) and CO_2 lasers (9.3 – 10.6μm).

Guide

- We accept orders to suit customized requirements.
- Also available to fabricate the laser scanning system which combines the galvanometer mirror and fθ lens unit.

Attention

- We do not recommend the use of the fθ lens to the imaging system because it is designed for the optical system of the scanning type.
- Please place in accordance with the position of the incident pupil of the fθ lens beam into the scanning system (galvanometer mirror). If the incident pupil is not in position of the beam scanning system, the optimum focusing spot cannot be achieved because the aberration will increase.

fθ Lenses dimension table

Part Number	A (mm)	B (mm)	C (mm)	D (mm)	E (mm)	F (mm)	G (mm)	H (mm)	I (mm)	J (mm)	K (mm)
fθL-100-266T	60	57.8	43	5	6	6	ϕ97	ϕ82g6	M80 P1	ϕ69	74.8
fθL-150-266T	80	73.3	65	3	6	6	ϕ122	ϕ102g6	M100 P1	ϕ89	88.3
fθL-500-325	50	43.4	34	—	10	6	ϕ117	ϕ82g6	M80 P1	—	59.4
fθL-1000-325	50	50.3	36	—	8	6	ϕ127	ϕ82g6	M80 P1	—	64.3
fθL-100-355T	60	56.3	42	6	6	6	ϕ97	ϕ82g6	M80 P1	ϕ69	74.3
fθL-100-355THG	80	109.6	59	9	6	6	ϕ112	ϕ102g6	M100 P1	ϕ84	130.6
fθL-150-355T	80	72.3	64	4	6	6	ϕ122	ϕ102g6	M100 P1	ϕ89	88.3
fθL-1000-442	50	50	36	—	8	6	ϕ127	ϕ82g6	M80 P1	—	64
fθL-100-532T	60	51.5	50	—	6	4	ϕ92	ϕ82g6	M80 P1	—	61.5
fθL-300-1064	39	35.9	27.3	3.7	8	—	ϕ91	—	M80 P1	ϕ76	47.6
fθL-100-1064T	60	49.5	47.5	—	6.5	6	ϕ92	ϕ82g6	M80 P1	—	62
fθL-100-9300T	80	45	48	20	6	6	ϕ122	ϕ102g6	M100 P1	ϕ90	77

fθ Lenses

Part Number	Design wavelength [nm]	Focal length f [mm]	Entrance pupil diameter [mm]	Scanning angle [°]	Scanning Range [mm]	Telecentric	Working distance (WD) [mm]	Transmittance [%]
fθL-100-266T	266	100.4	ϕ12	±15	ϕ52	○	135.9	93
fθL-150-266T	266	149.9	ϕ12	±15	ϕ78	○	205.2	93
fθL-500-325	325	501.8	ϕ20	±22	ϕ385	—	605.4	94
fθL-1000-325	325	1002.0	ϕ14	±25	ϕ870	—	1169.4	94
fθL-100-355T	355	99.85	ϕ12	±15	ϕ52	○	136.1	93
fθL-100-355THG	355	100.1	ϕ14	±15	ϕ52	○	60.94	90
fθL-150-355T	355	150.2	ϕ12	±15	ϕ78	○	207.2	93
fθL-1000-442	442	1000.0	ϕ14	±25	ϕ870	—	1169.7	95
fθL-100-532T	532	100.3	ϕ12	±15	ϕ52	○	121.1	90
fθL-300-1064	1064	299.8	ϕ16	±23	ϕ240	—	361.4	95
fθL-100-1064T	1064	100.3	ϕ12	±15	ϕ52	○	123.1	95
fθL-100-9300T	9300 (10600)	100.1 (99.68)	ϕ24	±23	ϕ80	○	73.3 (72.52)	please contact

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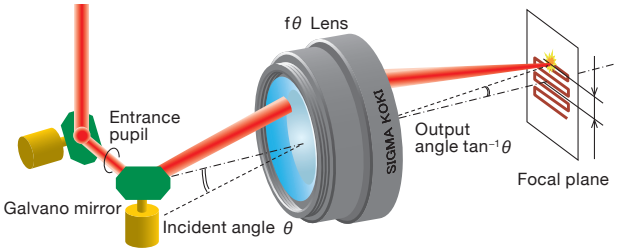
Schematic

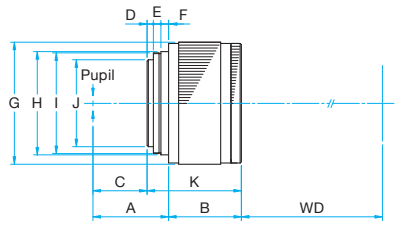


By using the f theta lens, it is possible to be moved a laser light spot in constant speed linear motion on the focal plane by scanning the mirrors such as galvanometer scanner mirrors.
The f theta lens enables this by the effect of distortion.
Mathmatically it is expressed as following;
focal length = "f", ideal image height = "y", the angle of scanned = "θ" therefore, y = fθ.
In the normal single lens, the ideal image height "y" is represented by "y = f tanθ".
Characteristics of both are the same in a small angle range. However, the difference is greater angle increases.

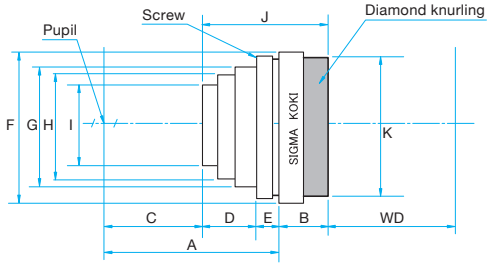
Outline Drawing

(in mm)

fθL Lenses



fθL Lenses for YAG (fθL-L/fθL-B/fθL-270-1064)



fθ Lenses for YAG dimension table

Part Number	A (mm)	B (mm)	C (mm)	D (mm)	E (mm)	F (mm)	G (mm)	H (mm)	I (mm)	J (mm)	K (mm)	Screw
fθL-100-532L	53.3	17.8	22.5	22.8	8	ϕ89	ϕ80	ϕ72	ϕ60	48.6	ϕ83	M85 P1
fθL-100-1064L	53.3	17	20	25.3	8	ϕ87	ϕ80	ϕ69	ϕ57	50.3	ϕ83	M85 P1
fθL-150-1064B	63	19.8	26.8	28	8.2	ϕ87	ϕ80	ϕ74.5	ϕ64	56	ϕ86	M85 P1
fθL-220-1064L	59.8	21.1	32.1	19.7	8	ϕ97	ϕ80	—	ϕ68	48.8	ϕ97	M85 P1
fθL-270-1064	59.7	33.5	26.0	24.7	9	ϕ106	ϕ74	—	ϕ64	67.2	ϕ106	M85 P1

fθ Lenses for YAG

Part Number	Design wavelength [nm]	Focal length f [mm]	Entrance pupil diameter [mm]	Scanning angle [°]	Scanning Range [mm]	Telecentric	Working distance (WD) [mm]	Transmittance [%]
fθL-100-532L	532	100.2	ϕ12	±22.9	ϕ80	—	114.7	≧95
fθL-100-1064L	1064	99.93	ϕ12	±22.9	ϕ80	—	109.6	≧95
fθL-150-1064B	1064	152.1	ϕ15	±24.0	ϕ127.4	—	168.6	≧95
fθL-220-1064L	1064	220.0	ϕ12	±24.0	ϕ184	—	254.2	≧95
fθL-270-1064	1064	273.0	ϕ15	±24.13	ϕ230	—	318.9	≧95