



Very intense and uniform LED pattern projector

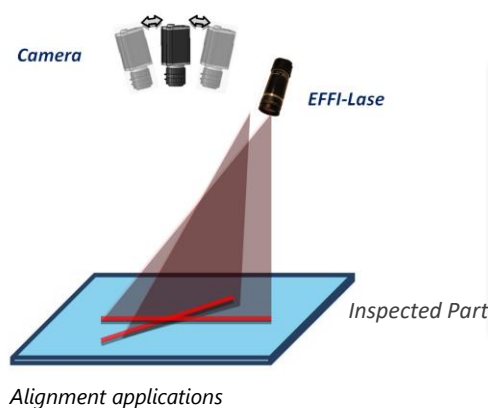
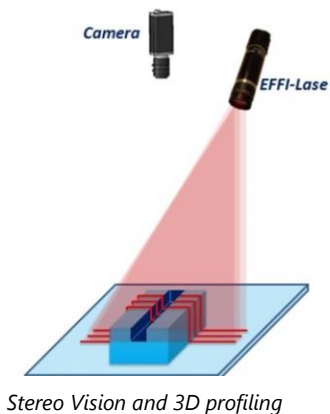
Full range of colors: from UV to IR, white

Long lifetime and few maintenance

Compatible with most objectives

		Standard version	Power version
Electronics	Connectors	M12 4 Contacts (with LED driver) OR M8 3 Contacts (direct current)	
	Power supply	24V DC	
	Illumination mode	Continuous or strobe mode	
	Power consumption	5W	15W
Optics	Wavelength	Various wavelengths (from UV to IR, white)	
	Projected pattern	Various designs for alignment, 3D profiling and stereovision	
Mechanics	Weight	180g	580g
	Width x length	32mm x 105mm (without the objective)	85 mm x 125 mm (without the objective)
	Objective adjustment	A C-mount adaptor on the projector	
	Fastener	4X M4 holes on the side of the device	2 M4 holes and 1 M6 hole on the backside of the device
	Material	Device body: Aluminum alloy	
Environment	Working temperature	0°C to 50°C	
	IP code	IP54	

Applications



EFFI-Lase (up) vs. Laser (down):
No speckle = more precision

Part Number



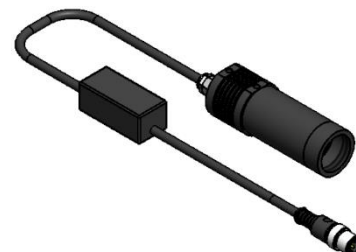
Reference : EFFI-LASE- VVV -CM- YYY - ZZZ					
VVV : Electrical Version					
Standard : EFFI-LASE-CM-YYY-ZZZ Power version : EFFI-LASE- PWR -CM-YYY-ZZZ					
Caution: The electrical version has an impact on mechanical dimensions					
YYY : Wavelength (nm) / Color (other wavelengths available on demand)					
● UV 405	● Blue 465	● Green 525	● Red 625	● IR 850	○ White 000 (T°= 5500 K ± 500 K)
ZZZ : Type of Mask (custom masks are possible)					
3D Profilometry (line length: 13mm)			Stereovision and Alignment (A01/A02/A03)		
L01	1 line: 50 µm		G01	Round Ø50 µm Surface (mm²) 10x10 separated by 50 µm	
L02	1 line: 20 µm		G02	Round Ø50 µm Surface (mm²) 13x13 separated by 50 µm	
L03	1 line: 10 µm		G03	Grid 40*40, lines 50 µm Surface (mm²) 10x10 separated by 50 µm	
L04	3 lines: 50 µm separated by 500 µm		G04	Grid 50*50, lines 50 µm Surface (mm²) 13x13 separated by 50 µm	
L05	3 lines: 50 µm separated by 200 µm		G05	Square 50*50 µm² Surface (mm²) 10x10 separated by 100 µm	
L06	5 lines: 50 µm separated by 750 µm		C02	Cloud of dots density 50% Surface (mm²) 12,8x9,6	
L07	100 lines: 45 µm separated by 67,5 µm		C03	Cloud of dots density 17% Surface (mm²) 12,8x9,6	
L08	22 lines: 50 µm		A01	Cross 50 µm Line length: 13mm	
L09	1 line: 5 µm		A02	Concentric circles	
L41	1 line 75 µm + 40 lines 45 µm		A03	Square 50*50 µm² Line length: 10mm	
Option Driving control					
Strobed Version allows to inject more current in the LEDs and so to obtain a lighting more powerful.					
Caution : Direct current = no protection					
If strobe, add -STR in the part number					
Part number : EFFI-LASE- VVV -CM- YYY - ZZZ - STR					

Electronical considerations

Contact arrangement

The EFFI-Lase & EFFI-Lase PWR are powered by a constant voltage 24V with the EFFI-Supply cable (attached to the projector). Power consumption = 5 W for the standard version & 15 W for the power version.

Driven Version : M12 male connector			
Contact arrangement	Number	Color Contact	Designation
	1	Brown	+24V
	2	White	n.a.
	3	Blue	GND
	4	Black	DIM - max 15V Consumption = 2mA @15V



A current source can be used to power the EFFI-Lase in STR version (direct control). The power consumption depends on the intensity which flows through the LED. **⚠ In expert mode, the LED is wired directly to the M8 : no protection for the LED !**

⚠ M8 connector – direct control (expert mode) ⚠			
Contact arrangement	Pin number	Color contact	Designation
	1	Brown	n.a.
	3	Blue	+ (Max 700mA dc)
	4	Black	GND



Electrical control

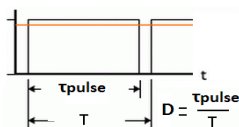
DIMMING CONTROL – ONLY WITH THE ELECTRONICAL STANDARD VERSION (M12)	STR : Electrical scheme
<div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <p>DIMMING CONTROL ON@[0-4.5V] OFF@[4.5V-15V]</p> </div> <div style="text-align: center;"> <p>Option ELS-IN-700-24V DIMMING CONTROL ON@[0-22V] OFF@24V</p> </div> </div>	<p>Standard version :</p> <p>Power version :</p>

Power supply

The projector, supplied with a 700mA constant current, is considered as the reference. The frequency of the cycle (ON & OFF) has been fixed to 10Hz. Be aware that the maximum duty cycle for a given current, given in the following table, cannot be exceeded. The maximal duty cycle (D) dependent on the injected current, required to safely pulse the LED projector is defined by:

Config.	Current	Max pulse duration (µs)	D
1	1.2A	50000	0.5
2	1.5A	10000	0.1
3	2A	1000	0.01
4	2.5A	100	0.001
5	3.5A	40	0.0004

G_{max}	405 nm	465 nm	525 nm	590 nm	625 nm	850 nm	White
Config. 1	1.5	1.4	1.4	1.5	1.6	1.5	1.4
Config. 2	2	1.8	1.7	2.1	2	1.8	1.7
Config. 3	2.6	2.2	2.1	2.7	2.6	2.4	2
Config. 4	3.2	2.6	2.3	3.4	3.2	2.9	2.4
Config. 5	4	3.1	2.9	4	4.4	3.6	2.8



$$G_{max} = \frac{\text{luminous flux } (I_{max})}{\text{luminous flux } (I_{700mA})}$$

Optical considerations



Any C-mount objective can be mounted on the EFFI-Lase.

To guarantee the quality of the projector, the pattern is directly mounted in the projector body. However, the pattern can be observed through the aperture of the projector. Avoid any contact with the mask: this one is sensitive and can easily be damaged.

Objective selection

EFFILUX recommends using one of the following objectives with the EFFI-LASE (2/3" 1.5MP and 1" 1.5MP):

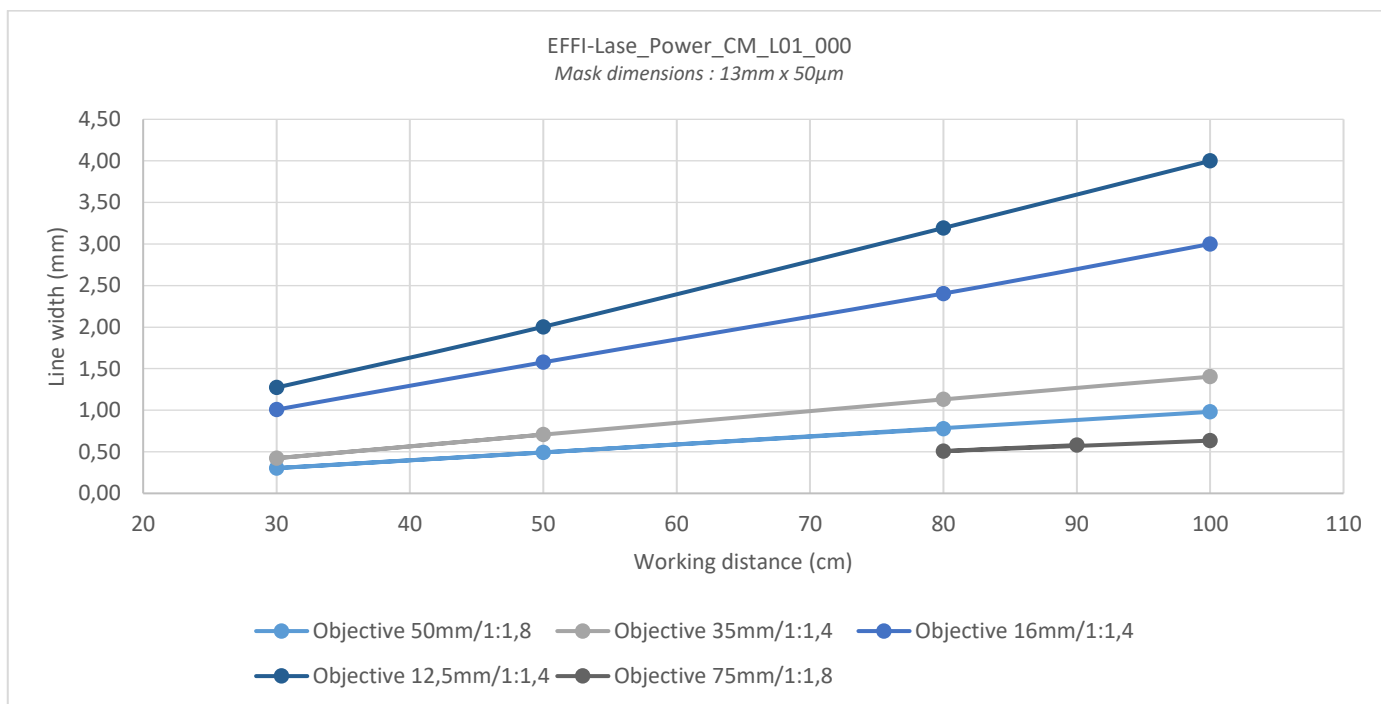
	OBJ-2-3-F9 HF9HA-1B	OBJ-2-3-F12.5 HF12.5HA-1B	OBJ-2-3-F16 HF16HA-1B	OBJ-2-3-F25 HF25HA-1B	OBJ-2-3-F35 HF35HA-1B	OBJ-2-3-F50 HF50HA-1B	OBJ-2-3-F75 HF75HA-1B
<i>Focal length (mm)</i>	9	12.5	16	25	35	50	75
<i>Iris Range</i>	F1.4 – F16				F1.6 – F22		F2.8 – F22
<i>Angle of View (HxV)</i>	52°06' x 40°16'	38°47' x 29°35'	30°45' x 23° 18'	19° 58' x 15° 02'	14° 20' x 10° 46'	10° 03' x 07° 33'	6° 43' x 5° 02'
<i>Filter thread</i>	M27 x 0.5 mm		M25.5 x 0.5 mm				M30.5 x 0.5 mm
<i>L x Ø</i>	35 x 29.5 mm	29.5 x 29.5 mm	29.5 x 29.5 mm	29.5 x 29.5 mm	29.5 x 29.5 mm	29.5 x 29.5 mm	48 x 29.5 mm

	OBJ-1-F12.5 CF12.5HA-1	OBJ-1-F16 CF16HA-1	OBJ-1-F25 CF25HA-1	OBJ-1-F35 CF35HA-1	OBJ-1-F50 CF50HA-1	OBJ-1-F75 CF75HA-1
<i>Focal length (mm)</i>	12.5	16	25	35	50	75
<i>Iris Range</i>	F1.4 – F22				F1.8 – F22	
<i>Angle of View (HxV)</i>	45° 13' x 42° 01'	43° 36' x 33° 24'	28° 43' x 21° 44'	20° 43' x 15° 37'	14° 35' 10° 58'	9° 45' x 7° 19'
<i>Filter thread</i>	M49 x 0.75 mm					
<i>L x Ø</i>	68.5 x 51 mm	70.5 x 51 mm	75.5 x 51 mm	48.5 x 51 mm	55.5 x 51 mm	76 x 51 mm

Depending on the working distance (WD) and the C-mount objective selected, different pattern sizes are obtained:

Objective	Line width (mm)			
	Mask dimensions: 13mm x 50µm (L01)			
	WD = 30cm	WD = 50cm	WD = 80cm	WD = 100cm
f = 12.5 mm	1.27	2	3.19	4
f = 16 mm	1.01	1.58	2.40	3
f = 35 mm	0.42	0.71	1.13	1.40
f = 50 mm	0.30	0.49	0.78	0.98
f = 75 mm	n.a.	n.a.	0.51	0.63

The relation between the line width and the working distance is linear. For a 50µm mask width, the following graphs are obtained:



Objective	Pattern dimensions HxW (cm)			
	Dimensions of a 12.8x9.6mm cloud of dots pattern (C02)			
	WD = 30cm	WD = 50cm	WD = 80cm	WD = 100cm
f = 12.5 mm	32 x 23	51 x 37	82 x 59	102 x 73
f = 16 mm	25 x 19	41 x 31	66 x 49	82 x 61
f = 35 mm	11 x 8	18 x 14	29 x 22	36 x 27
f = 50 mm	n.a.	12 x 9	20 x 15	25 x 19
f = 75 mm	n.a.	n.a.	13 x 10	16 x 12

The optical power of each EFFI-LASE versions are:

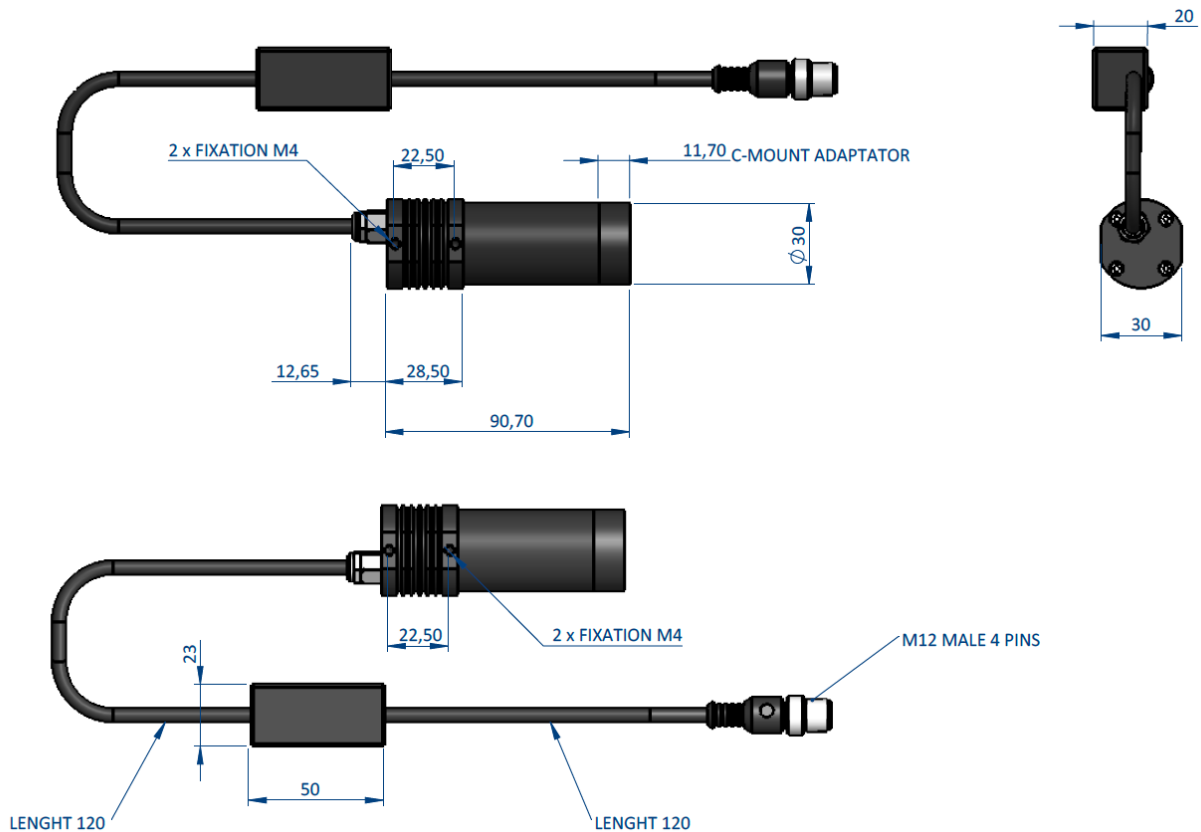
Colour reference	Optical power (mW)	
	Mask dimensions : 13mm x 50µm (L01)	
	Standard Version	Power Version
0	0.62	1.75
465	0.77	1.79
625	0.45	0.72

Mechanical considerations (Dimensions in mm)

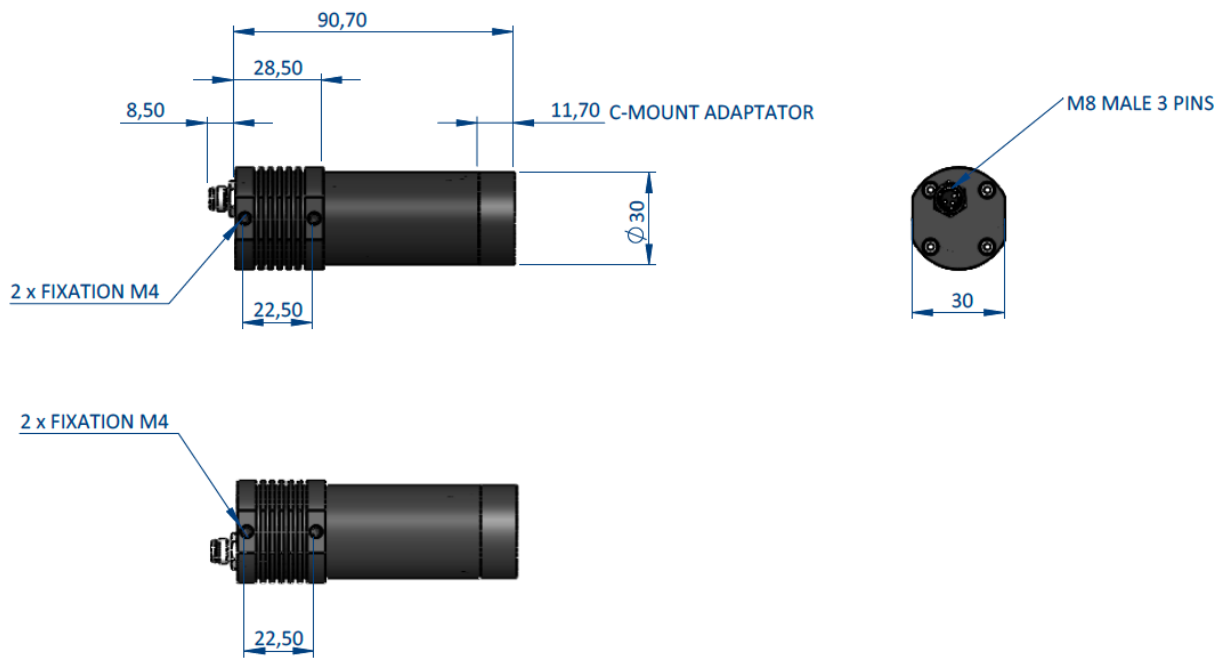


	Standard Version : EFFI-LASE	Power Version : EFFI-LASE-PWR
Standard connection (M12 connector) With Driver		
Specific strobe connection (M8 connector) Direct current : -STR		

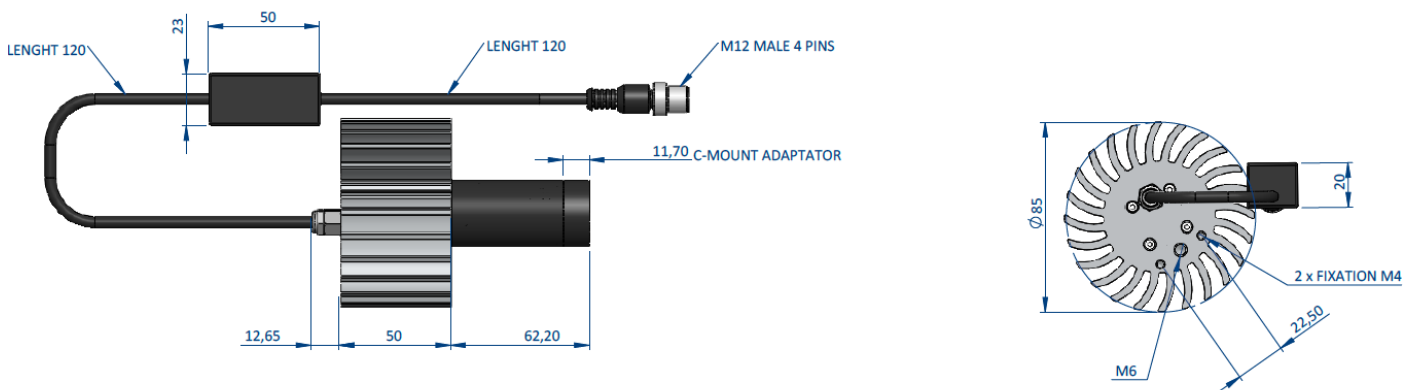
EFFI-LASE



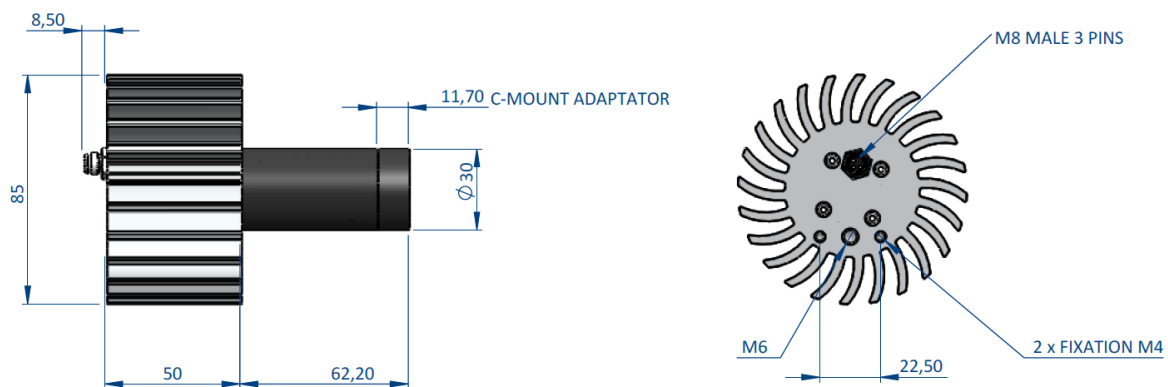
EFFI-LASE-STR



EFFI-LASE-PWR

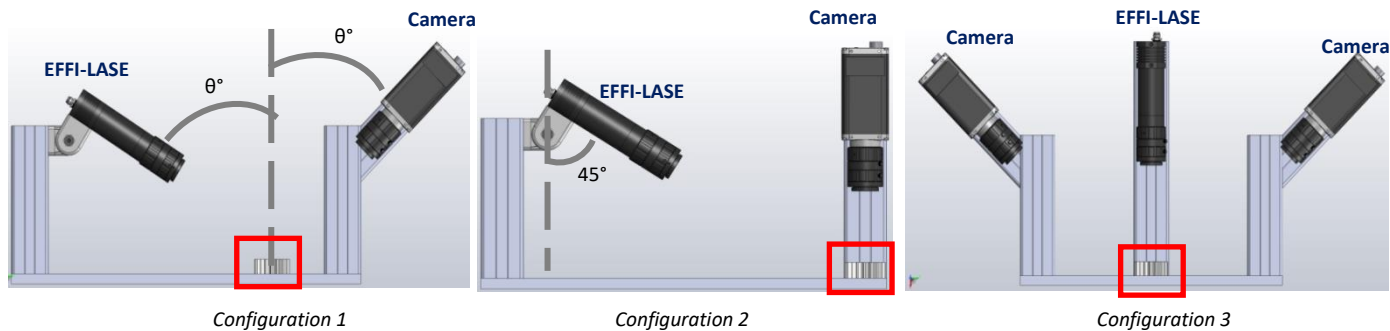


EFFI-LASE-PWR-STR



Configurations

Three examples of recommended configurations:



The selection between configuration 1 and configuration 2 depends on the object to observe: either the specular reflection needs to be captured (configuration 1) or reflections different from the specular reflections (configuration 2) are considered.