

FLEXPOINT® MVpulse SERIES (2025)

Machine Vision Laser with Pulse Control



INCREASED PEAK POWER (UP TO 5 TIMES) WITHIN THE SAME LASER CLASS.

High light intensity and therefore high laser power is a key factor in various machine vision applications. However, when using laser light, obeying laser class regulations is sometimes a limiting factor.

Laser manufacturers classify their lasers in continuous-wave operation, which, in combination with a camera, is not the most commonly used operating mode. The pulse control can align the laser signals with the camera, so that up to 5-times higher peak power (compared to cw mode) can be achieved while staying in the same laser class.

The MVpulse (2025) is available in 5 wavelengths (450 – 785 nm) at peak powers up to 100 mW. Various fan angles (1–90°) are available to achieve the required line length, and six different optical options provide a suitable combination of line width and depth of field for your application. The modules come with fixed or adjustable focus in different housings: Standard or 2H (two separate housings - one for the optics with the laser diode and the other for the electronics).

FEATURES

- / Safe laser classes so that no safety equipment is required (can be set to laser class 2 or 3R)
- / High pulse power, low average optical power
- / High output power for high-contrast images and higher accuracy
- / Pulse control by integrated microcontroller

APPLICATIONS

- / 3D Triangulation
- / 3D Laser Scanners
- / Industrial Inspection
- / Structured Lighting

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SPECIFICATIONS

Model	Line laser with uniform power distribution (FOV correction available)				
Wavelength [nm]	450	520	640	660	785
Wavelength tolerance (typ.) [nm]	±10	±10	±5	±5	±10
Output power (max. peak power) [mW] ¹	10-80	10-80	10-100	10-100	10-100
Power stability at 25 °C (after warm up) [%]	≤ 5				
Operating voltage [VDC]	10-30		4.5-30		
Current consumption [mA]	< 200 @ 5VDC				
Operating temperature (housing temp.) [°C] ²	0 to +50	0 to +50	0 to +50	0 to +60	0 to +60

Peak power increase compared to cw mode in same laser class

5x @ pulse length < 0.38ms, laser off time between pulses > 1.52ms
 4x @ pulse length < 0.9ms, laser off time between pulses > 2.7ms
 3x @ pulse length < 2.9ms, laser off time between pulses > 5.8ms
 2x @ pulse length < 15ms, laser off time > 15ms

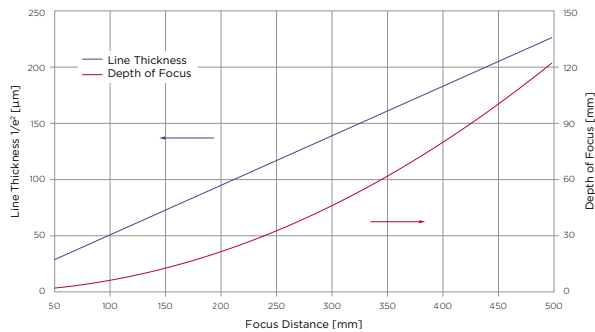
Fan angle [°] ³	5, 10, 15, 20, 30, 45, 60, 75, 90
Focusing range [mm]	50-5000
Line intensity variation (typ) ⁴ [%]	±20 related to average power (within 80% of the line)
Line straightness ⁴ [%]	±0.1 (±0.05 as option)
Pointing stability [μrad/K]	≤ 10 (improved pointing stability as option)
Boresight deviation [mrad]	≤ 10 (≤ 3 as option)
Storage temperature [°C]	-20 to +60
Modulation	Digital modulation 0-20 kHz, (0-1MHz on request), digital High or Low active, Low = 0V, High = 5V, input impedance of 10 kOhm at 5V
Housing	Aluminium (blue anodized, potential free) ST (Standard) or 2H (separate housing for optics and electronics)
Connector	Open leads (length 500mm): Brown: +VDC, Black: MOD (digital modulation), Blue: GND M12-connector on request
Laser class	Laser preset at factory to 2 or 3R (IEC 60825-1:2014, EN60825-1:2014+A11:2021)
Accessories available (optional, order separately)	Mount; Power supply for 5V (≥ 640nm); Power supply for 12V with M12 connector

Foot Note

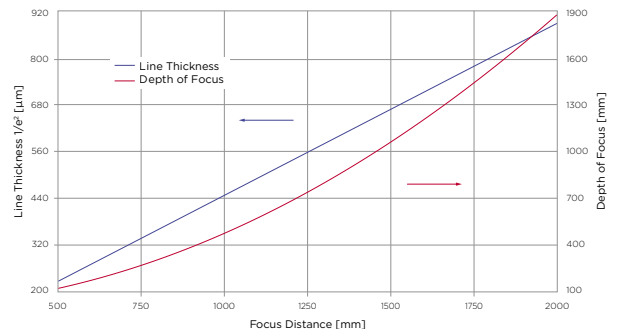
- 1 The output power is defined as the laser power emitted from the laser module
- 2 Condensate formation must be avoided (due to optical and electronic components)
- 3 Fan angle: Defined by the ends of the laser line using FWHM based on the average power (within 80% of line)
- 4 Line intensity variation and line straightness are measured at 80% of the fan angle

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Line Thickness and Depth of Focus (DOF) for Standard (STD) Focus Option at 660 nm



Standard laser line characteristics (short range)



Standard laser line characteristics (long range)

Focus Options

MVpulse (2025) lasers are available with different focus options to achieve the right combination of line thickness and depth of focus for the application.

To calculate line thickness and DOF, note the value in the graphs above and multiply them by the factors for your requested wavelength, output power, and focus option listed in the following table.

P _{out} and λ			Focus options (conversion factor related to standard laser marked in red)											
λ	P _{out}	Δλ	DLSE		DLE		DL		STD		TS1		TS2	
[nm]	[mW]	[nm]	LT	DOF	LT	DOF	LT	DOF	LT	DOF	LT	DOF	LT	DOF
450	1–80	±10	0.25	0.10	0.33	0.16	0.45	0.30	0.69	0.69	1.49	3.25	2.20	7.06
520	1–80	±10	0.29	0.11	0.39	0.19	0.53	0.36	0.78	0.78	1.71	3.69	2.55	8.23
640	1–20	±5	0.39	0.16	0.51	0.27	0.69	0.48	1.02	1.07	1.65	2.79	2.43	6.08
640	21–30	±5	0.39	0.16	0.51	0.27	0.69	0.48	1.02	1.07	1.47	2.23	2.18	4.87
640	31–100	±5	0.47	0.23	0.59	0.36	0.80	0.67	1.20	1.47	1.65	2.79	2.43	6.08
660	1–30	±5	0.39	0.15	0.49	0.24	0.67	0.44	1.00	1.00	1.51	2.27	2.25	5.07
660	31–100	±5	0.51	0.26	0.65	0.42	0.88	0.78	1.31	1.72	1.51	2.27	2.25	5.07
785	1–10	±10	0.35	0.10	0.45	0.17	0.61	0.31	0.90	0.68	1.65	2.28	2.43	4.96
785	11–100	±10	0.65	0.35	0.82	0.57	1.12	1.05	1.65	2.28	2.00	3.36	2.98	7.45

Foot Note / Abbreviations

LT = Line Thickness DOF = Depth of Focus

DL = Thin Line FD = Focus Distance

TS1 = Enhanced depth of focus TS2 = Enhanced depth of focus, higher factor

STD = Standard, good compromise for Line Thickness and Depth of Focus

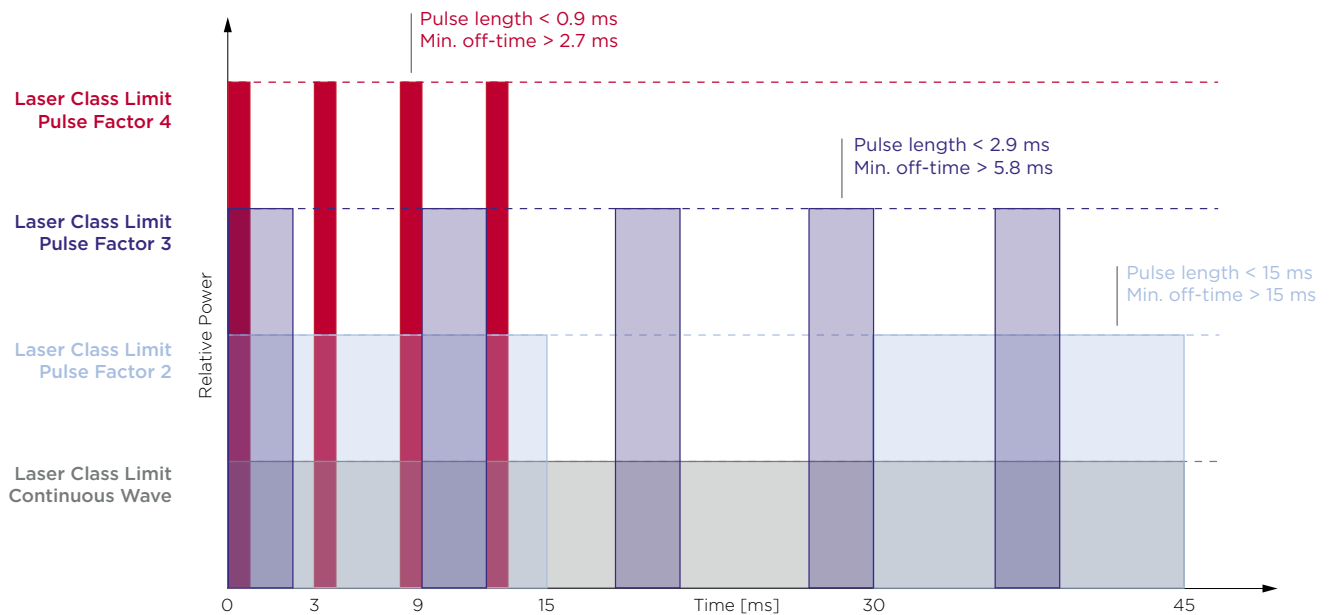
DLE = Thin line enhanced

DLSE = Thin line super enhanced

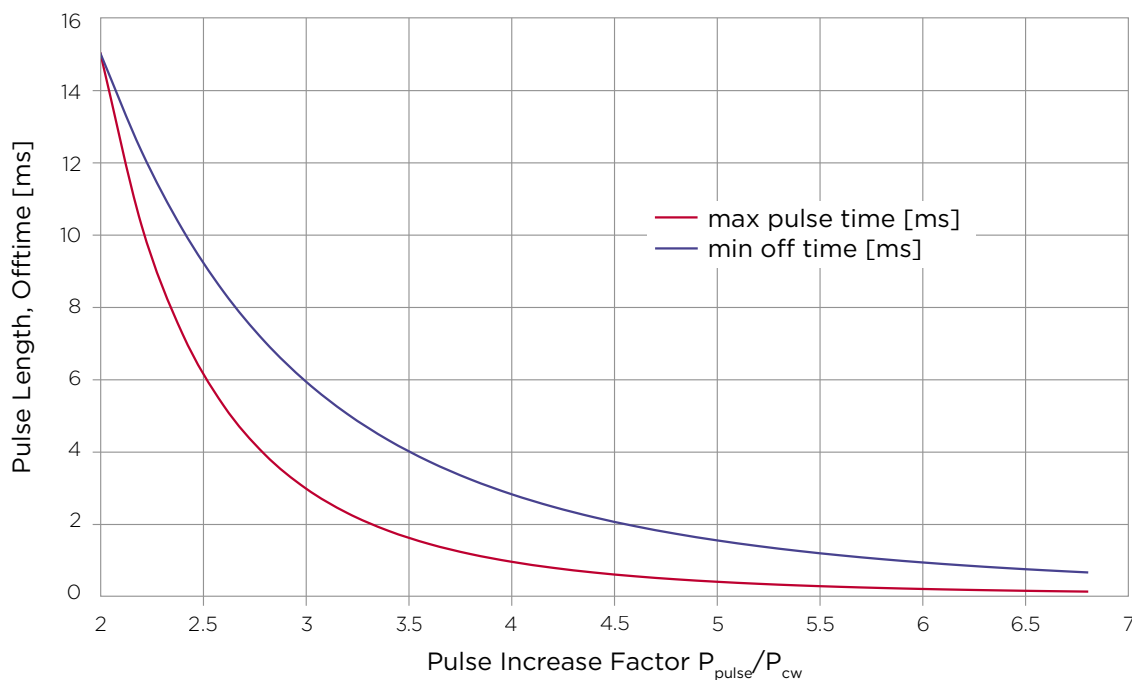
Pulse and Monitor / Control Features

The pulse peak power can be increased by the factor 2/3/4/5 compared to the maximum continuous wave average power whilst the laser still stays within the limits of laser class 2 or laser class 3R. By increasing the pulse peak power, the maximum pulse length has to be limited.

Below is a visualization how the pulse peak power can be increased to the limits of laser class 2 and how the pulse length and the minimum off-time will change accordingly.



The following graph shows the relation between the pulse increase factor, the max. pulse length and the minimum off-time valid for both laser class 2 and laser class 3R.



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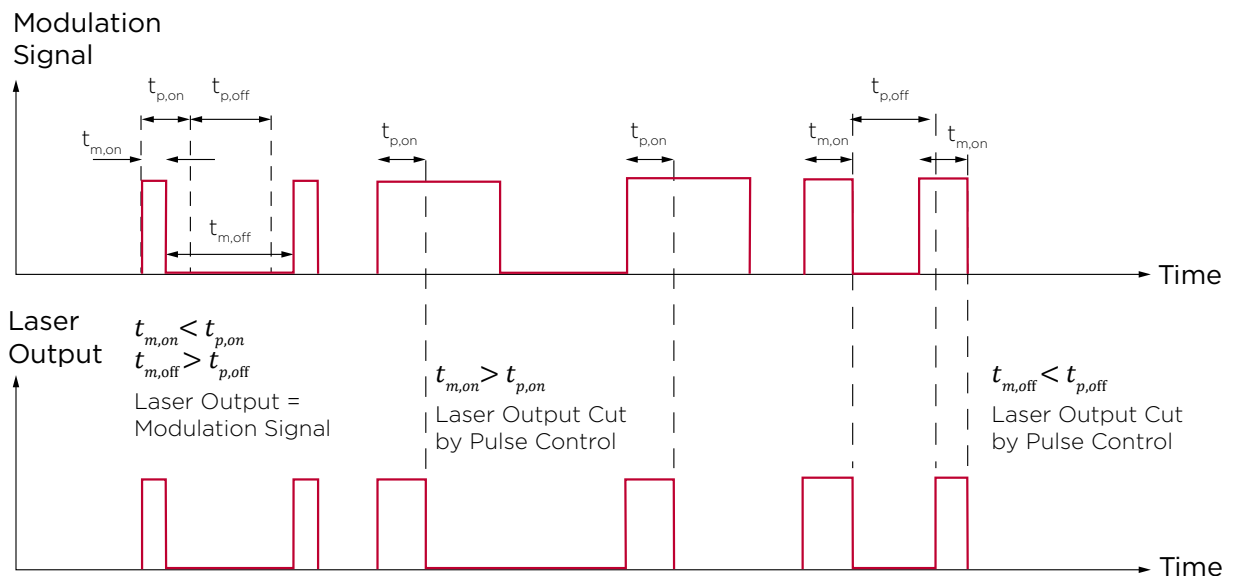
Machine Vision Laser with Pulse Control



Pulse increase factor compared to cw	5x	4x	3x	2x
Max. Pulse Length [ms]	0.38	0.9	2.9	15
Min. Laser off time [ms]	>1.52	>2.7	>5.8	>15

The MVpulse (2025) driver electronics automatically monitors and controls the pulse modulation function. If the user applies a higher duty cycle or longer pulse length to the modulation input of the laser which would lead to an exceedance of the laser class, the driver electronics will ignore the signal and will limit the laser output power to stay in the specified laser class. Refer to the examples below.

$t_{m,on}$ | $t_{m,off}$ Modulation signal: on time | off time
 $t_{p,on}$ | $t_{p,off}$ Pulse control: factory preset maximum on time | minimum off time



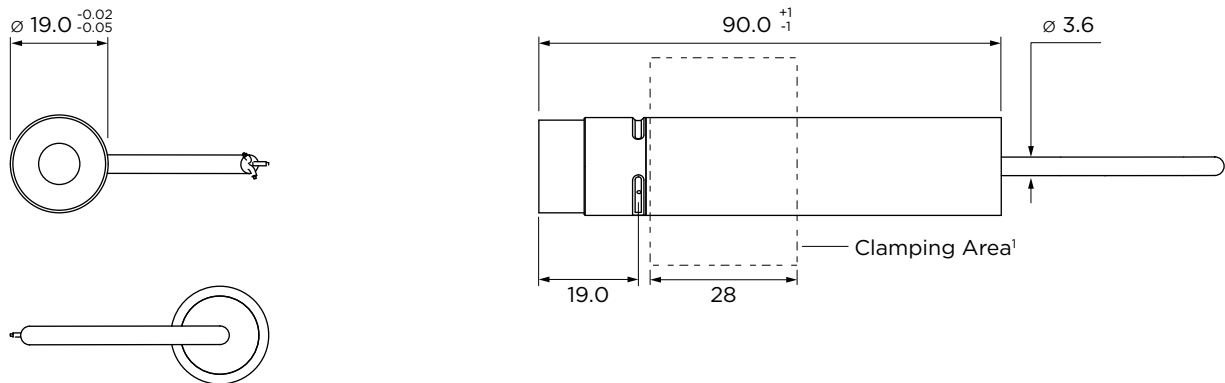
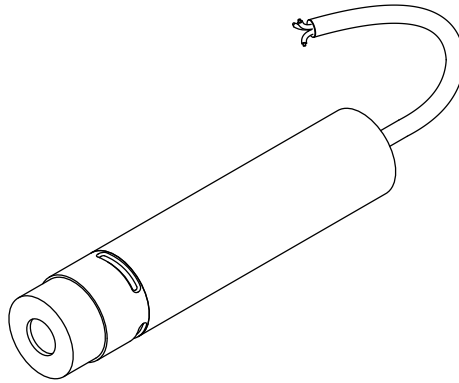
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Machine Vision Laser with Pulse Control



TECHNICAL DRAWING

MVpulse (2025) with adjustable focus and standard housing (ST-F)



MVpulse 25 ST-F

¹For optimal heat dissipation in a mount, we recommend to apply thermal paste on the surface overlap.

Units: mm

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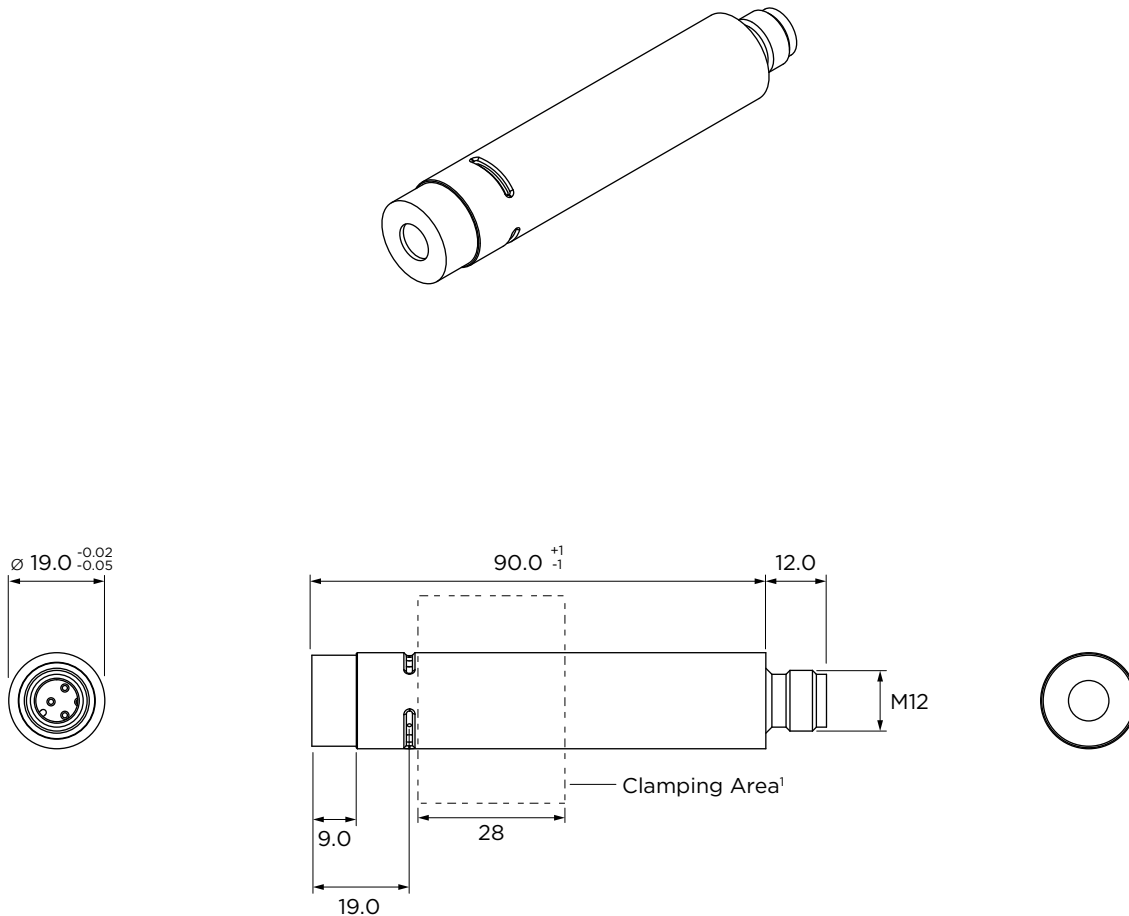
FLEXPOINT® MVpulse SERIES (2025)

Machine Vision Laser with Pulse Control



TECHNICAL DRAWING

MVpulse-25 with adjustable focus, standard housing (ST-F) and M12-connector (on request)



MVpulse 25 ST-F-M12

¹For optimal heat dissipation in a mount, we recommend to apply thermal paste on the surface overlap.

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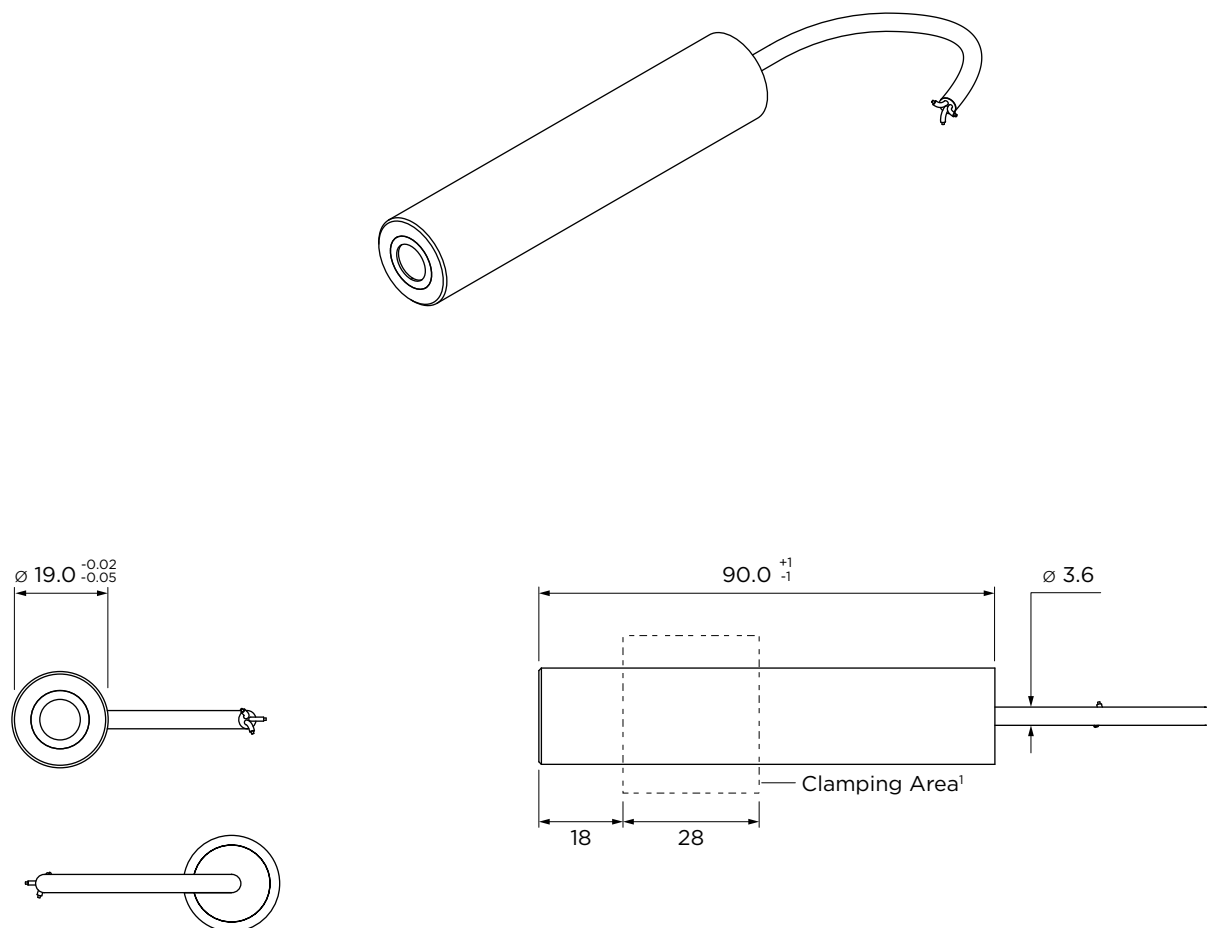
FLEXPOINT® MVpulse SERIES (2025)

Machine Vision Laser with Pulse Control



TECHNICAL DRAWING

MVpulse (2025) with fixed focus and standard housing (ST-FIX)



MVpulse 25 ST-FIX

¹For optimal heat dissipation in a mount, we recommend to apply thermal paste on the surface overlap.

Units: mm

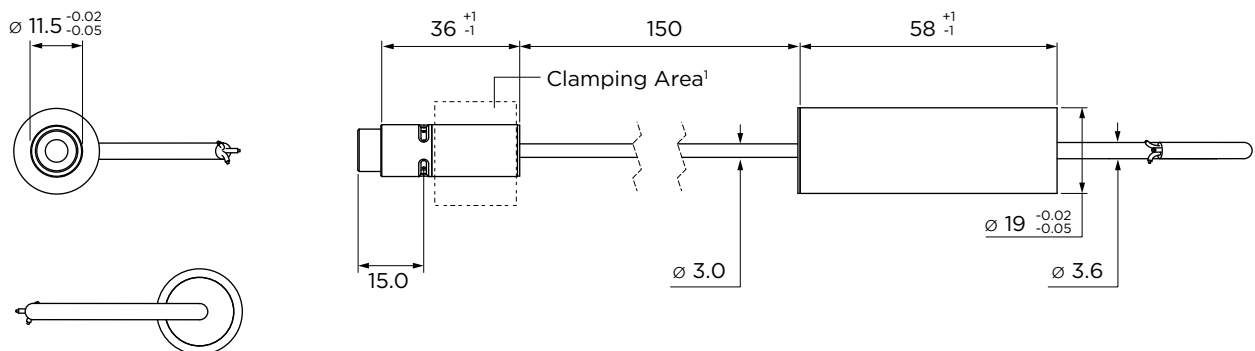
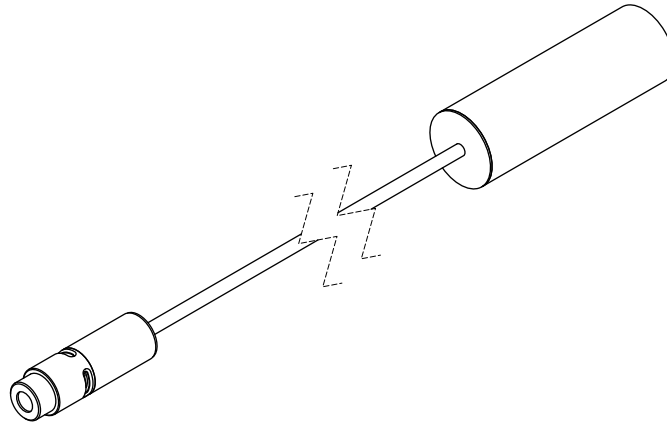
FLEXPOINT® MVpulse SERIES (2025)

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TECHNICAL DRAWING

MVpulse (2025) with adjustable focus and 2 housings (separate housing for optics and electronics) (2H-F)



MVpulse 25 2H-F

¹For optimal heat dissipation in a mount, we recommend to apply thermal paste on the surface overlap.

Units: mm

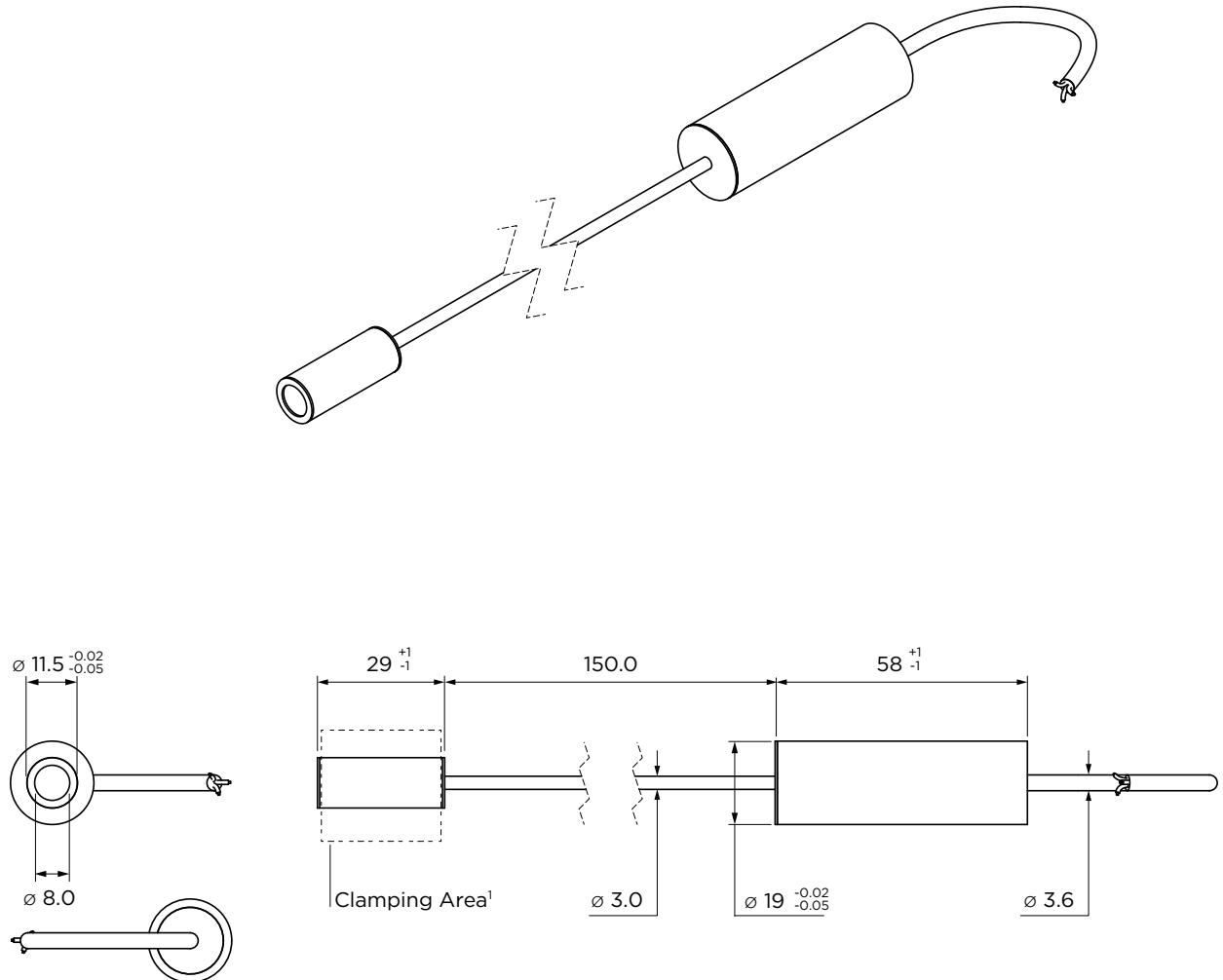
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TECHNICAL DRAWING

MVpulse (2025) with fixed focus and 2 housings (separate housing for optics and electronics) (2H-FIX)



MVpulse 25 2H-FIX

¹For optimal heat dissipation in a mount, we recommend to apply thermal paste on the surface overlap.

Units: mm

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ORDERING CODE

	Housing	Wavelength [nm]	Output Power [mW]	Modulation / Power Adjustment	Fan Angle [°]	Focus [mm]	Optics	Laser Class	Pulse Increase Factor
FP-MVpulse-25	- X	- X	- X	- X	- X	- X	- X	- X	- X
	ST	450	1-80	M Digital Modulation, active low	5	F Focus adjustable	STD	1	2x
	2H	520			10		DL	2	3x
		640	1-100		15	FYYY Focus factory-preset to YYY mm, but still adjustable	DLE	3R	4x
		660		MI Digital Modulation inverted, active high	20		DLSE		5x
		785			30		TS1		
					45		TS2		
					60				
					75	FIXYYY Fixed Focus to YYY mm			
					90				

Example: FP-MVpulse-ST-785-50M-30-F-DL-1-2x

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ORDERING INFORMATION

Products can be ordered directly from LASER COMPONENTS or its representatives. For a complete listing of representatives, visit our website at www.lasercomponents.com

Custom designed products are available on request.

SAFETY AND HANDLING INFORMATION

Personal Hazard

Depending on the mode of operation, these devices emit highly concentrated non visible infrared light which can be hazardous to the human eye. Products which incorporate these devices have to follow the safety precautions given in IEC 60825-1 »Safety of laser products«.

Handling Precautions

Products are subject to the risks normally associated with sensitive electronic devices including static discharge, transients, and overload.

