

FLEXPOINT® Machine Vision Lasers MVmicro Series

The FLEXPOINT® MVmicro series was developed for stand alone machine vision applications, primarily in use together with industrial cameras in 3D measurements.

The MVmicro lasers are available with different line optics and wavelengths. Output powers up to 100 mW and a sophisticated focusing mechanism make them a universal tool for industrial inspection and 3D triangulation.



Features

- Uniform line
- Multiple lines
- Different focussing/optic options
- Available with adjustable or fixed focus
- Adjustable focus without removing the line optics
- Superior line and focussing quality
- Up to 100 mW
- Digital and analogue modulation
- Ruggedized housing for stand-alone applications
- Many options

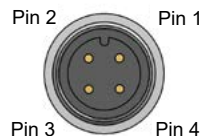
Applications

- Industrial inspection
- 3D triangulation
- Structured lighting

Specifications

Wavelength	405 nm, 450 nm, 520 nm, 635 – 640 nm, 650 – 660 nm, 685 nm, 785 nm, 830 nm (other wavelengths on request)
Wavelength stability	≤ 0,25 nm/°C
Output power	< 1 mW – 100 mW (depending on wavelength) see wavelength/output power matrix
Output power stability	< 5% (after warm up at 25 °C)
Fan angle	5°, 10°, 15°, 20°, 30°, 45°, 60°, 75°, 90°
Focus	adjustable or fixed
Line uniformity	± 20% (related to average power, within 80% of the line)
Focus options	Standard DL (for smaller line thickness) TS1 (for enhanced depth of focus)
Multiple lines	5 lines with 1.54° interbeam angle 11 lines with 1.6° interbeam angle
Bore sighting	≤ 10 mrad
Pointing stability	10 μrad/°C
Modulation options	Dimmable, option D/DI: by 0 – 5V signal, active high/low, see figure 2 Digital, option M/MI: 0 – 10 kHz (higher frequency on request), active high/low, see table 1
Operating voltage (VCC)	4.5 – 30 VDC (reverse voltage protection), 10 – 30 VDC for 405/450/520 nm
Current consumption	< 200 mA (depending on laser diode)
Operating temperature (housing)	-20 to +50 °C (depending on wavelength)
Storage temperature	-20 to +60 °C
Housing size	Ø 19 mm, l = 65 mm with adjustable focus, l = 66,5 mm with fixed focus, l = 90 mm for DL option, l = 85 mm for multiline
Housing material	Aluminum, red anodized, potential free
Connector	Binder series 713 Pin 1: VCC Pin 2: Option M/MI or D/DI if ordered one of them, option D/DI if ordered both Pin 3: GND Pin 4: Option M/MI if ordered both modulation options Option: 2 m cable instead of M12 connector
Protection class	IP54 (IP67 as option)
Accessories	mount, connecting cable, laser safety eyewear, power supply, battery pack

Fig.1:
M12 connector,
laser side



Wavelength / Output Power Matrix

The table below shows the available output power levels at different wavelengths (power measured after optics).

Power after Laser Module MVmicro Series

405 nm	1 – 100 mW
450 nm	5 – 70 mW
520 nm	1 – 40 mW
635 – 640 nm	1 – 40 mW
650 – 660 nm	1 – 100 mW
685 nm	1 – 30 mW
785 nm	1 – 40 mW
830 nm	1 – 100 mW

Modulation Options

MVmicro lasers can either be ordered with digital modulation or analog power adjustment (dimnable). Both modulations are optional.

The digital option is called option 'M', power adjustment is called option 'D'.

The individual options are:

- M: digital modulation, active low
- MI: digital modulation (inverted), active high
- D: Dimmable, active low
- DI: Dimmable (inverted), active high

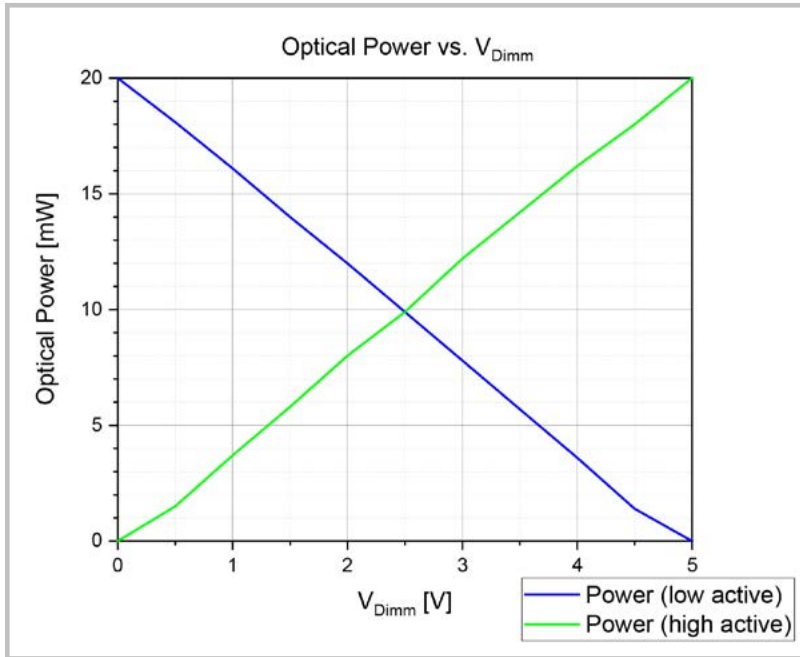


Fig. 2: Typical graph of an active high/active low logic for option D/DI (dimnable)

Digital Modulation with External Trigger

V _{Modulation}	State	Laser	
		Low active	High active
-0.3 V to +0.8 V	Low	on	off
2.0 to 5.3 V	High	off	on

Table 1: Definition of state of laser

For voltages of $0.8 \text{ V} < V_{\text{Modulation}} < 2.0 \text{ V}$, the state of the laser is not defined.
 The frequency and duty cycle are determined by the external modulation voltage $V_{\text{Modulation}}$.

In order to obtain reasonable pulses, the following values should be taken into account:

- Maximum frequency $f_{\text{Max}} = 3 \text{ MHz}$
- Minimum pulse width $t_{\text{ON_min}} = 200 \text{ ns}$

Focus Options

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

The individual options are:

- STD: Standard, good compromise for line thickness vs. depth of focus
- DL: Thin line
- TS1: Enhanced depth of focus

(Abbreviations: LT = line thickness / DoF = depth of focus)

Line Width and Depth of Focus

The following figures show the typical minimum line width (at $1/e^2$) and the typical focal depth that can be achieved with FLEXPOINT® MVmicro lasers at different distances. The depth of focus is defined as the range in which the minimum line width increases by factor $\sqrt{2}$. Line lasers of the MVmicro series can be focused between 100 mm and infinity. The lasers can be ordered with either adjustable focus, preset focus but still focusable or with fixed focus.

Farfield

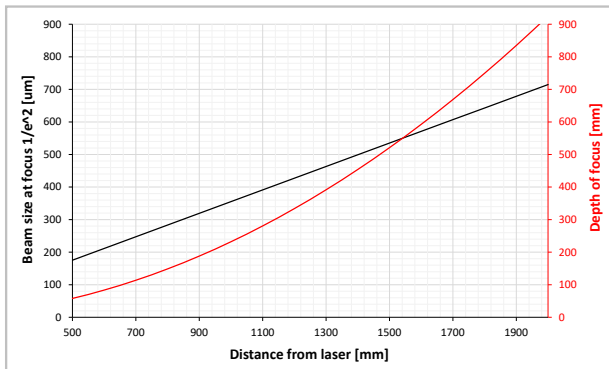


Fig. 3:
Line width and depth of focus
(long distance from 500 – 2000 mm)

Nearfield

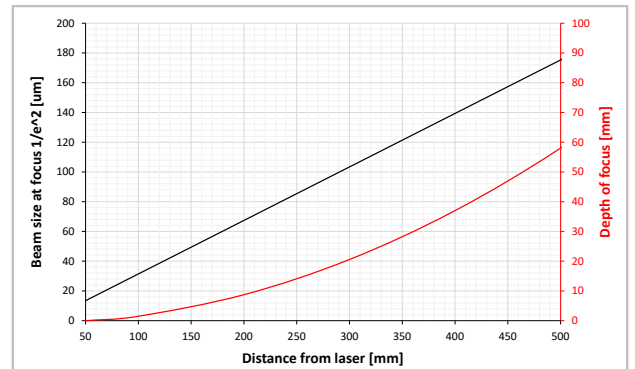


Fig. 4:
Line width and depth of focus
(short distance 50 – 500 mm)

The Line thickness (LT) and Depth of Focus (DoF) depend on the used laser diode.
Laser Components is offering different focussing options for enhanced DoF or minimized line thickness.

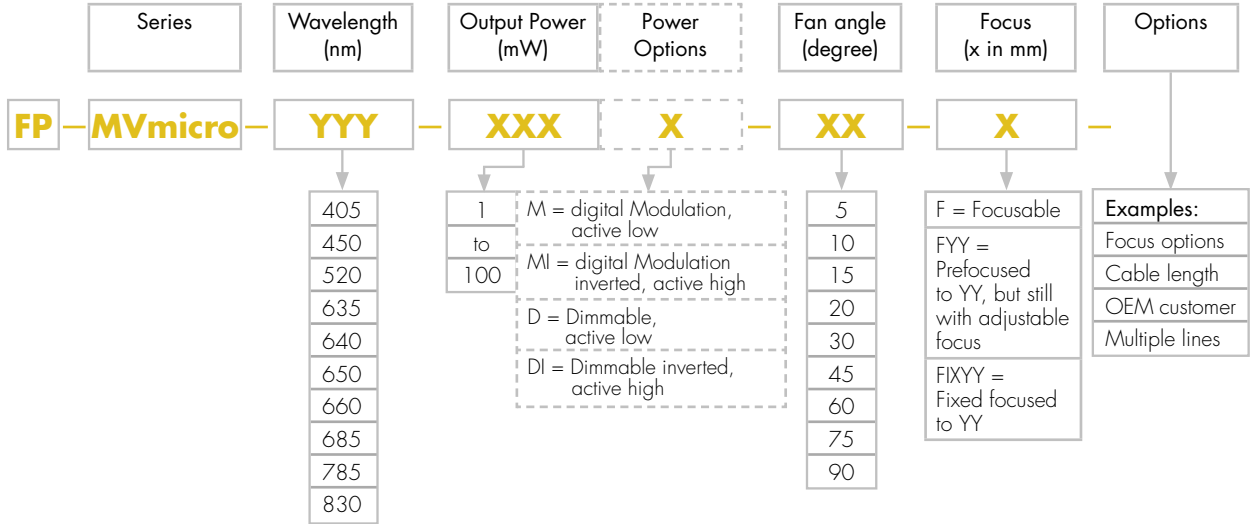
MVmicro Model		Focussing Options					
Wavelength [nm]	Module Power [mW]	Standard		DL		TS1	
		D _{LT}	D _{DoF}	D _{LT}	D _{DoF}	D _{LT}	D _{DoF}
405	1-10	1.65	0.53	0.84	0.13	2.35	1.07
405	100	1.65	0.53	0.84	0.13	2.35	1.07
450	1-70	0.88	0.18	0.84	0.16	2.90	1.94
520	1-7	1.80	0.13	1.63	0.11	5.98	1.47
520	40	1.73	0.12	1.63	0.11	5.68	1.31
635	1-4	1.18	0.23	1.18	0.23	3.80	2.38
635	5-7	1.18	0.23	1.18	0.23	3.80	2.38
640	8-12	1.30	0.28	1.18	0.23	2.84	1.33
640	13-30	1.30	0.28	1.18	0.23	2.84	1.33
650	1-4	0.67	0.43	0.67	0.43	1.78	3.05
660	5-20	0.67	0.44	0.67	0.44	1.80	3.10
660	21-40	0.94	0.84	0.67	0.44	1.80	3.10
660	41-70	1.47	2.05	0.68	0.44	2.33	5.15
660	71-100	2.08	0.69	1.22	0.24	2.96	1.38
685	1-50	2.16	0.62	2.16	0.62	3.92	2.03
785	1-40	2.16	0.62	1.46	0.29	3.92	2.03
830	1-70	2.14	0.58	1.54	0.30	4.14	2.15

Table 2: Table of line thickness/DoF correction factor, depending on wavelength and output power:

To get the line thickness and DoF of a particular MVmicro module, note the value from the graph Fig. 3 or Fig. 4 and multiply with the factor of table 2.

Example for a 660 nm laser with TS1 focus option, 20 mW and focus distance 150 mm:
line width about 50 µm (figure 4) multiplied by 1.80 (table 2) = 90 µm line width for this laser at 150 mm.

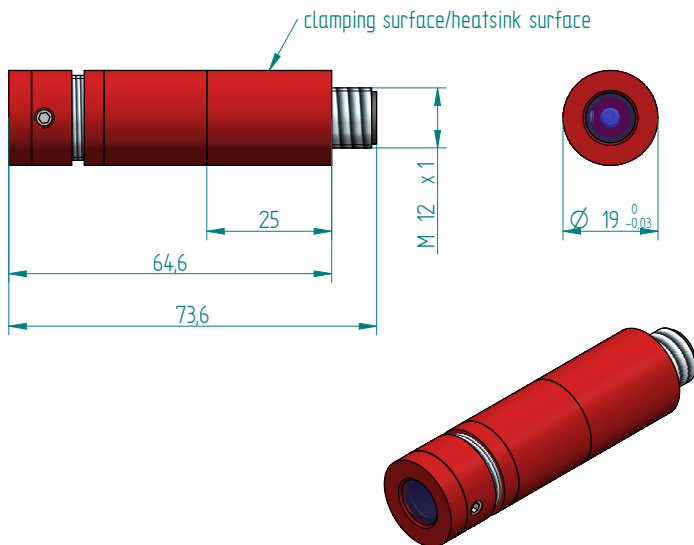
Ordering Code FLEXPOINT® MVmicro Series



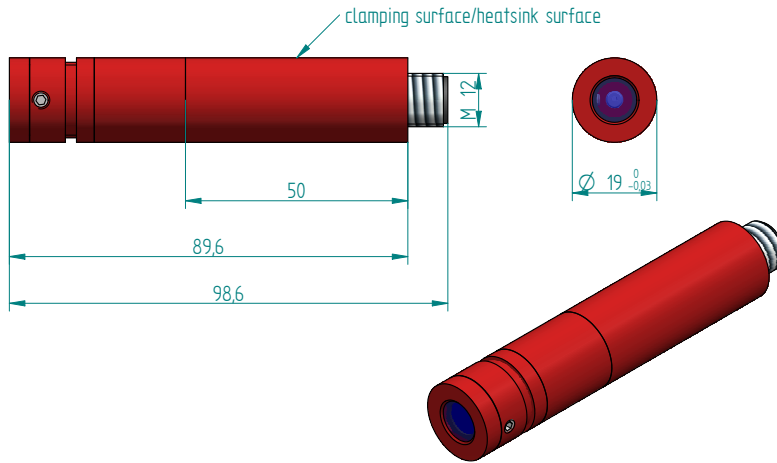
Mechanical Drawings

MVmicro with Adjustable Focus

Standard Housing (for Standard Optic and TS1)

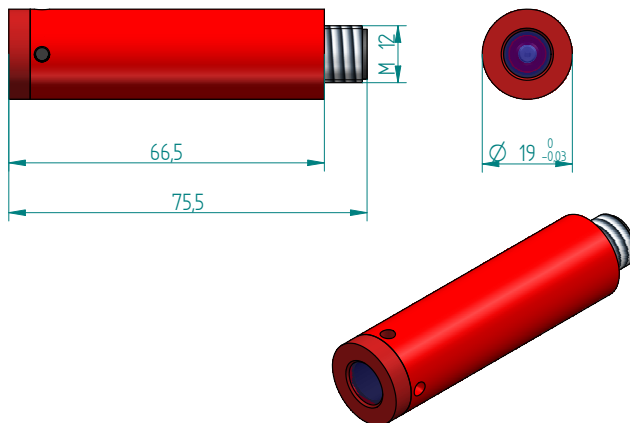


MVmicro with DL Option

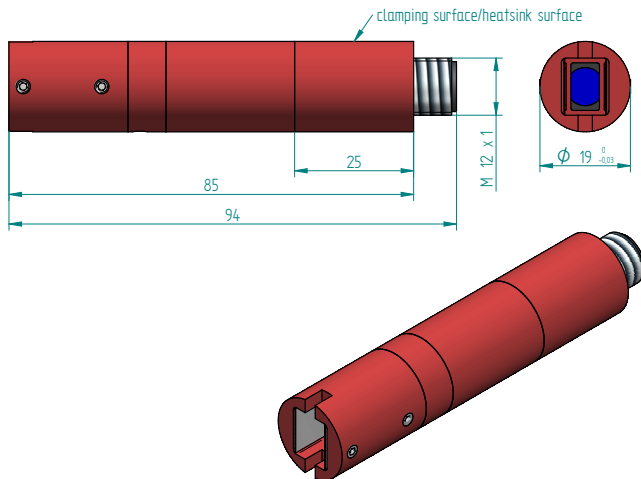


MVmicro With Fixed Focus

(For Standard Optic, DL, and TS1)



MVmicro with Multiline Option



Product Changes

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