

Лазеры ZX10

Технические характеристики

По вопросам продаж и поддержки обращайтесь:

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Product Family ZX10-M

Small size, high performance

The ZX-laser series offers diverse, application specific customization possibilities. The user can choose different red wavelengths depending on the application and material to be inspected. The focusing optics achieves a boresight error of less than 0.8 mrad. The industrial-suited design along with stable performance works perfectly as an integrated module in machine vision applications, sensors or processing machines.



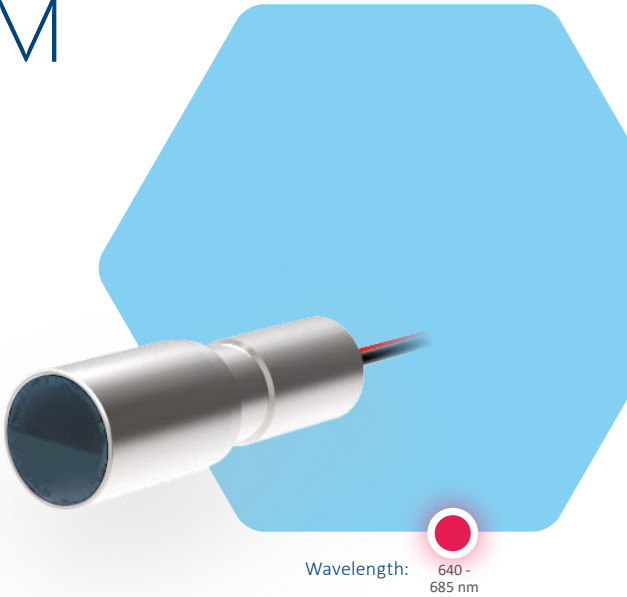
IP 50
(IP 67 optional)



Boresight
Accuracy



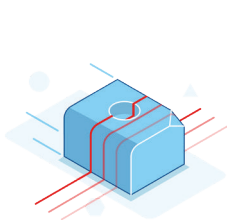
High Process
Reliability



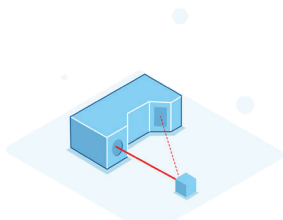
Wavelength: 640 - 685 nm

Highlights

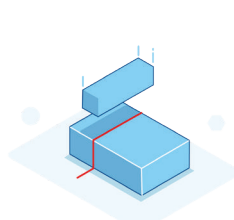
- Repeatable high product quality due to automated production processes
- Highest reproducibility of beam quality
- Optical output power up to 40 mW
- Wavelengths from 640 nm - 685 nm
- Fixed focus
- IP 50 (optional IP 67)



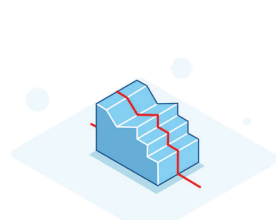
Machine
Vision



Triangulation
Sensors



Positioning
Tasks



3D-Measurement

Order Code

Z??	-	X10	-	?	-	?	-	?
Power		Product family Size of head		Electronics		Wavelength		Optics

System specifications

Wavelength	nm	640	685
Wavelength tolerance	nm (typical)	±10	±10
Wavelength drift	nm / K (typical)	< 0,25	< 0,25
Output power	mW	30	40
Spatial mode	(typical)	Single transverse mode	
RMS noise (20 Hz to 20 MHz, typical)	%	< 0.5	
Peak-to-Peak Noise (20 Hz to 20 MHz, typical)	%	< 1	
Boresight error ⁽¹⁾	mrاد (typical)	< 0.8	
Line orientation ⁽²⁾	mrاد	< 10	
Pointing stability	μrad / K	< 10	
Long-term power stability (24h)	%	±3 over the entire temperature range	
Start-up time	μs	< 70	
Laser operation mode		APC	

Electrical specification ⁽³⁾

Operating voltage	VDC	3.5 - 5.5
Operating current (max. at 25 °C)	mA	< 250
Protection		Reverse polarity protection, ESD
Electrical isolation		Potential-free housing
Connection		flying leads
Power consumption	W	< 1.5

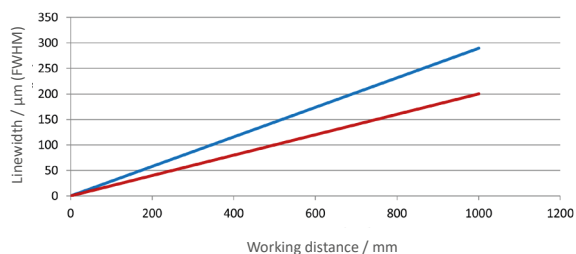
Optical specifications

Fan angles ⁽³⁾	Degrees °	5, 10	20, 30, 45, 60, 75, 90	(homogeneous line)
Line straightness ⁽⁴⁾	% (of line length)	< 0.08	< 0.05	
Line uniformity ⁽⁵⁾	% (typical)	< 25		
Dot		Point elliptical		
DOE		Multi line, crosses, grids, etc.		
Focus range (only available as fixed focus)	mm	< 100 up to 10,000 < 100 up to 980 (5° fan angle)		

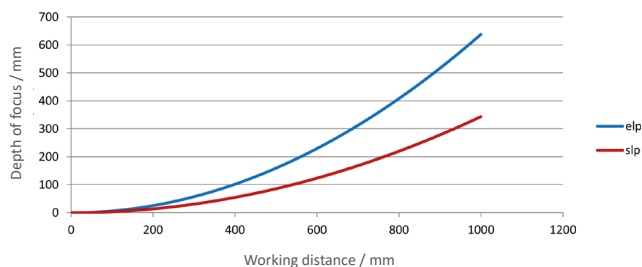
Keynotes

¹ Boresight error	Also known as pitch and skew
² Line orientation	Also known as line tilt (roll), with reference to the indentation in the clamping area
³ In combination with M-electronic (M=mini).	Also available as ND-version (no driver) without driver electronics for OEM applications.
⁴ Line length / fan angle	at > 13.5 % I _{max}
⁵ Line straightness	Deviation from best fit line over the middle 80% of the line, for homogeneous lines
⁶ Line uniformity	Maximum relative optical power variation over the middle 80% of the line, for homogeneous lines and fixed focus

Line thickness vs. working distance*



DOF vs. working distance*



Wavelength		Calculation factor for line width		Calculation factor for depth of focus	
		<i>slp</i>	<i>elp</i>	<i>slp</i>	<i>elp</i>
Red	640 nm	1.28	1.00	1.70	0.95
Red	660 nm	1.00	1.00	1.00	1.00
Red	685 nm	1.68	1.40	1.97	1.99

Optical configurations for several line settings are available.

- *slp* = standard line Powell; standard setup with medium line thickness and depth of focus.

- *elp* = extended line Powell; lines with advanced depth of focus and thicker lines. Recommended for fan angles > 75° at working distances < 500 mm.

The graphs above show the values for line width and depth of focus of a 660 nm laser. To get the values for a different wavelength the factor from the table above has to be multiplied by the values from the graphs.

Example: 660 nm laser focused at 500 mm working distance: line width approx. 150 μm (@ *elp* optic); Depth of focus approx. 175 mm (values from the graphs)

Calculated: 405 nm laser focused at 500 mm working distance: line width approx. 150 μm x 0.82 = 123 μm; Depth of focus approx. 175 mm x 1.02 = 179 mm

* Values in the graphs for homogenous line profiles

** Fan angle: 10° - 90°

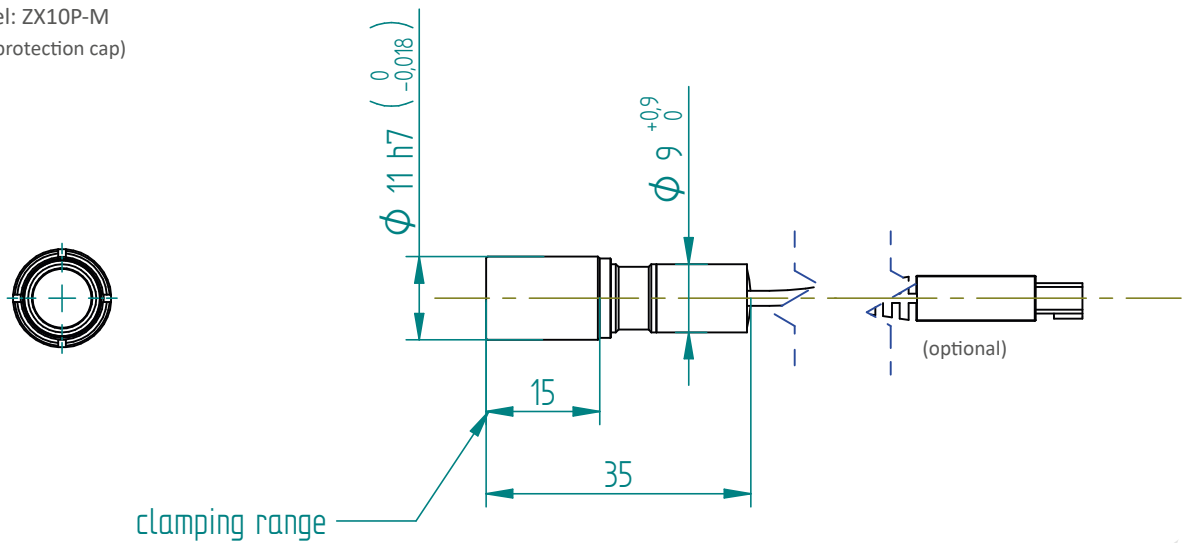
Environmental conditions

Operating temperature	°C / °F	-10 to +50 / 14 to +122
Storage temperature	°C / °F	-40 to +85 / -40 °F to +185
Humidity	%	< 90 non-condensing
Dissipated heat	W	< 1
Shock and vibration		According to IEC EN 61373:2011, cat. 2

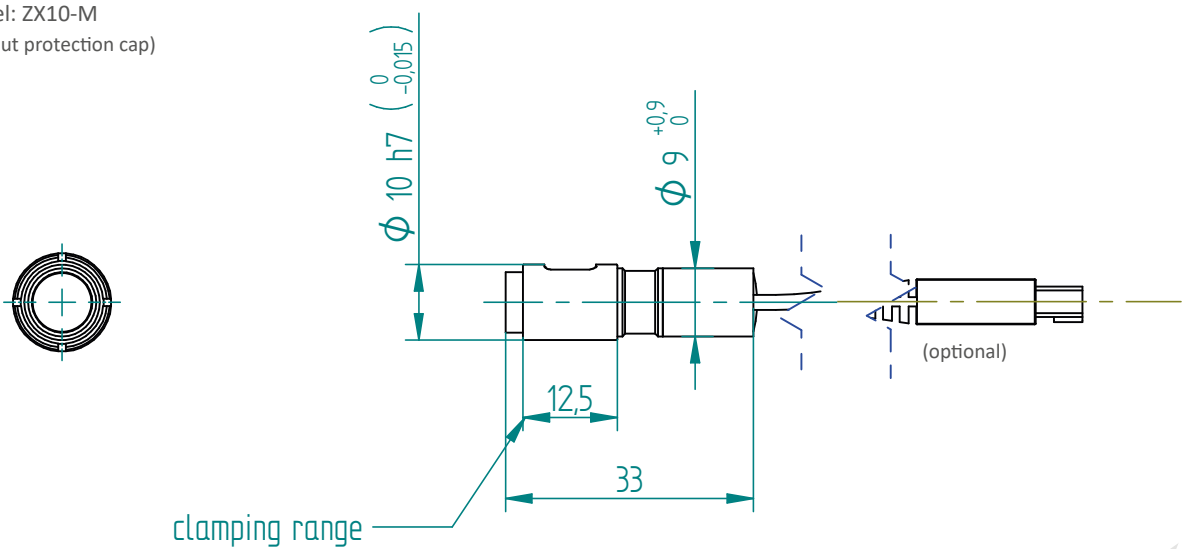
Mechanical specifications

Weight	g / lbs	30 / 0.07
Length	mm / inch	33 / 1.30 in
Diameter head ø	mm / inch	11h7 / 0.43 in
		with protection cap
		without protection cap
Length of cable	mm / inch	2,000 / 78.74 in
Connection		2 flying leads (optional Texas plug)
Material		Stainless steel
Protection class		IP 50
		(IP 67 with protection cap)

Model: ZX10P-M
(with protection cap)



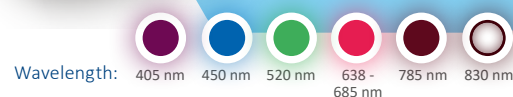
Model: ZX10-M
(without protection cap)



ZX10-LD & ZX10-ND

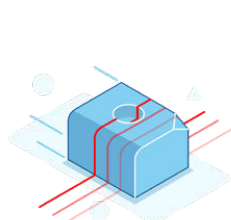
Small size, high performance

The ZX-laser series offers diverse, application specific customization possibilities. The user can choose from violet to infrared wavelengths depending on the application and material to be inspected. The focusing optics achieves a boresight of less than 0.8 mRad. The industrial-suited design along with stable performance works perfectly as an integrated module in machine vision applications, sensors or processing machines. The laser module contains no driver electronics (ZX10-ND) and is therefore ideally suited for OEM applications. Upon request, licensing and integration of the Z-LASER electronics can be provided (ZX10-LD).

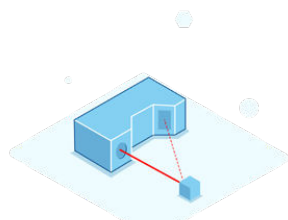


Highlights

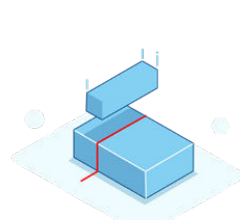
- Repeatable high product quality due to automated production processes
- Highest reproducibility of beam quality
- Optical output power up to 200 mW
- Wavelengths from 405 nm - 830 nm
- Fixed focus
- IP 50 (optional IP 67)
- ZX-LD = "License driver"
- ZX-ND = "No driver" (optic / diode package)



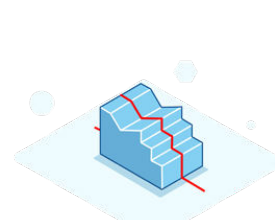
Machine
Vision



Triangulation
Sensors



Positioning
Tasks



3D-Measurement

Order Code

Z??	X10	?	?	?
Power	Product family Size of head	Electronics	Wavelength	Optics

System specifications

Wavelength	nm
Wavelength tolerance	nm (typical)
Wavelength drift	nm / K (typical)
Output power (elp)	mW
Spatial mode	(typical)
RMS noise (20 Hz to 20 MHz, typical)	%
Peak-to-Peak Noise (20 Hz to 20 MHz, typical)	%
Boresight error ⁽¹⁾	mrad (typical)
Line orientation ⁽²⁾	mrad
Pointing stability	μrad / K
Long-term power stability (24h)	%
Start-up time	μs
Laser operation mode	

405	450	520	635-685	785	830
±10	±10	-5 +10	±10	±10	±4
0,06	0,02	0,06	0,25	0,25	0,25
≤ 160	≤ 60	≤ 40	≤ 160	≤ 80	≤ 200

Single Transverse Mode

< 0,5

< 1

< 0.8

< 10

< 10

±3 over operating temperature range

< 70

Depending on the LD driver

Optical specifications

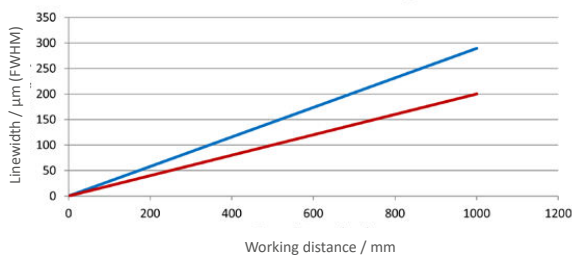
Fan angles ⁽³⁾	Degrees °
Line straightness ⁽⁴⁾	% (of line length)
Line uniformity ⁽⁵⁾	% (typical)
Dot	
DOE	
Focus range	mm

10	20, 30, 45, 60, 75, 90 (homogeneous line)
< 0.08	< 0.05
< 25	
Point elliptical	
Multi line, crosses, grids, etc.	
< 100 up to 10,000 (only available as fixed focus)	

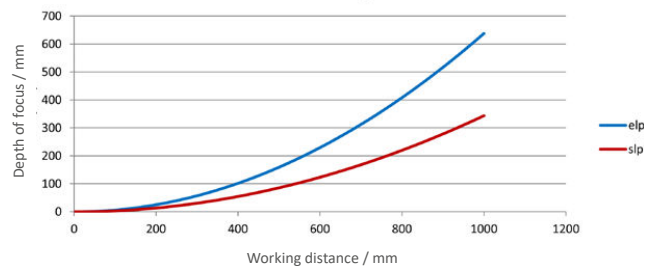
Keynotes

¹ Boresight error	Also known as pitch and skew
² Line orientation	Also known as line tilt (roll), with reference to the indentation in the clamping area
³ Line length / fan angle	at > 13,5 % I _{max}
⁴ Line straightness	Deviation from best fit line over the middle 80% of the line, for homogeneous lines
⁵ Line uniformity	Maximum relative optical power variation over the middle 80% of the line, for homogeneous lines and fixed focus

Line thickness vs. working distance*



DOF vs. working distance*



Wavelength		Calculation factor for line width		Calculation factor for depth of focus	
		<i>slp</i>	<i>elp</i>	<i>slp</i>	<i>elp</i>
Blue	405 nm	0.62	0.82	0.70	1.02
Blue	450 nm	0.67	1.83	1.74	4.29
Green	520 nm	0.78	1.20	0.80	2.61
Red	640 nm	1.28	1.00	1.70	0.95
Red	660 nm	1.00	1.00	1.00	1.00
Red	685 nm	1.68	1.40	1.97	1.99
IR	830 nm	1.30	2.11	1.03	2.20

Optical configurations for several line settings are available.

- *slp* = standard line Powell; standard setup with medium line thickness and depth of focus.

- *elp* = extended line Powell; lines with advanced depth of focus and thicker lines. Recommended for fan angles > 75° at working distances < 500 mm.

The graphs above show the values for line width and depth of focus of a 660 nm laser. To get the values for a different wavelength the factor from the table above has to be multiplied by the values from the graphs.

Example: 660 nm laser focused at 500 mm working distance: line width approx. 150 μm (@ *elp* optic); Depth of focus approx.

175 mm (values from the graphs)

Calculated: 405 nm laser focused at 500 mm working distance: line width approx. 150 μm x 0.82 = 123 μm; Depth of focus approx. 175 mm x 1.02 = 179 mm

* Values in the graphs for homogenous line profiles

** Fan angle: 10° - 90°

Environmental conditions

Operating temperature	°C / °F
Storage temperature	°C / °F
Humidity	%
Dissipated heat	W
Shock and vibration	

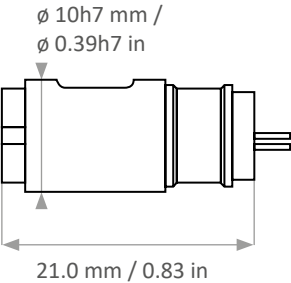
Depending on laser diode
Depending on laser diode
< 90, non-condensing
Depending on laser diode
According to IEC EN 61373:2011, cat. 2

Mechanical specifications

Weight	g / lbs
Length	mm / inch
Diameter head ø	mm / inch
Connection	
Material	
Protection class	

10 / 0.02
22.5 / 0.89
10h7 / 0.39
LD pins
Stainless steel
IP 50

Model: ZX10-LD | ZX10-ND



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