

Product Family ZXS

The flexible laser module

The structured light laser ZXS sets new standards for machine vision illumination due to its automated production in which all optical components are aligned by a high-accuracy robot.

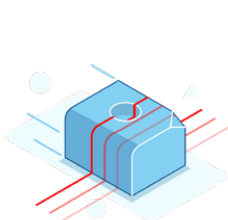
The ZXS-laser reaches an unrivalled accuracy with its boresight error of less than 0.8 mrad.

The separated electronics enables the user to mount the laser individually. An OEM-Version with a customized electronics for the integration onto an existing PCB is also available.

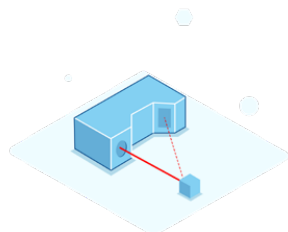


Highlights

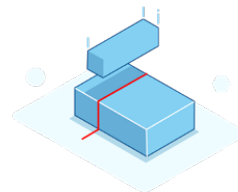
- Industrial standard
- IP 67 (ZXS20) / IP 50 (ZXS10)
- Repeatable product performance due to automated production processes
- Highest reproducibility of beam quality
- Optical output power up to 200 mW
- Wavelengths from 405 – 830 nm
- Manually focusable (ZXS20)
- TTL modulation up to 150 kHz
- Analog intensity control



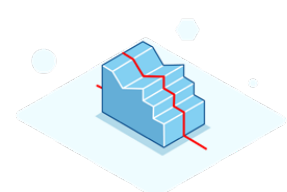
Machine Vision



Triangulation Sensors



High-Precision Positioning Tasks



3D-Measurement

Order Code

Z??	XS20	?	?	?	?
Power	Product family Size of head	Electronics	F-Focusable	Wavelength	Optics

System specifications

Wavelength	nm
Wavelength tolerance	nm (typical)
Wavelength drift	nm / K (typical)
Available with optical head	
Output power ZX510	mW
Output power ZX520 (elp)	mW
Output power ZX520 (flp)	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	sec
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

n. a.	≤ 45	≤ 35	≤ 100	≤ 100	≤ 100
≤ 160	≤ 60	≤ 40	≤ 100	≤ 80	≤ 200
≤ 120	≤ 45	≤ 30	≤ 90	≤ 60	≤ 150

Single Transverse Mode

< 0.5
< 1
< 0.8 (fixed focus)
< 10
< 10
±3 over operating temperature range
< 2
APC

Electrical specifications

Operating voltage	VDC
Operating current (max. at 25 °C)	mA
Protection	
Electrical isolation	
Connection	
Power consumption	W
Communication interfaces	

9 - 30	9 - 30	9 - 30	5 - 30	5 - 30	5 - 30
< 300	< 300	< 300	< 400	< 500	< 500

Over temperature protection and LED pre-failure indicator, reverse polarity and transient protection (ESD, burst & surge)

Potential-free housing

5-pin M12 plug; cable with flying leads or customized

< 2.7	< 2.7	< 2.7	< 2	< 2.5	< 2.5
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I²C, RS-232 (5 V)

Optical specification

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

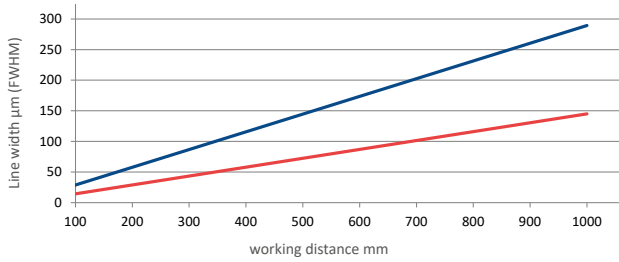
5, 10, 20, 30, 45, 60, 75, 90 (homogeneous lines)
3, 5, 10, 15, 20, 30, 90 (Gaussian line profile)

< 0.05
< 25
Point elliptical
Multi line, crosses, grids, etc.
100 up to 10,000 (or fixed focus available)

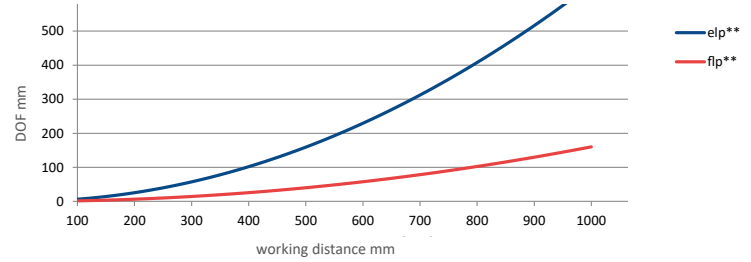
Keynotes

(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 width vs. working distance*



DOF vs. working distance*



Wavelength		Calculation factor for line width		Calculation factor for depth of focus	
		flp**	elp**	flp**	elp**
Blue	405 nm	0.66	0.82	0.75	1.02
Blue	450 nm	1.03	1.83	1.49	4.29
Green	520 nm	0.97	1.20	0.99	2.61
Red	640 nm	1.05	1.00	1.04	0.95
Red	660 nm	1.00	1.00	1.00	1.00
IR	830 nm	1.42	2.11	1.71	2.20

Optical configurations for several line settings are available.

- flp** = fine line Powell; thin lines for all working distances with smaller depth of focus (recommended for fan angles between 5° - 60° at working

distances < 500 mm and for fan angle of 90° at working distances > 500 mm). This optical configuration cannot supply the maximum output mentioned on page 2. Only approx. 75% can be achieved.

- 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: 5° - 90°

Software

GUI
Serial communication
I²C, RS-232 (5 V)

Features (e. g.):

- Status query
- Output power control
- System configuration
- Digital Modulation
- Intensity control
- Weighted end of life indication

Digital modulation

Maximum frequency	kHz	up to 150
Rise time (Mod High ⇒ 90%)	ns	< 160
Fall time (Mod Low ⇒ 10%)	ns	< 100
Signaling levels	V	V _{IL_max} < +0.9 V _{IH_min} > +2.2
Operation range	VDC	0 - 30

Analog modulation

Maximum bandwidth	Hz	< 10
Linearity	%	< 5 (from 10 % to 100 % of laser power)
Active range	VDC	0 - 2
Impedance		100 kΩ to internal VCC (3.3 V)
Operation range	VDC	0 - 30

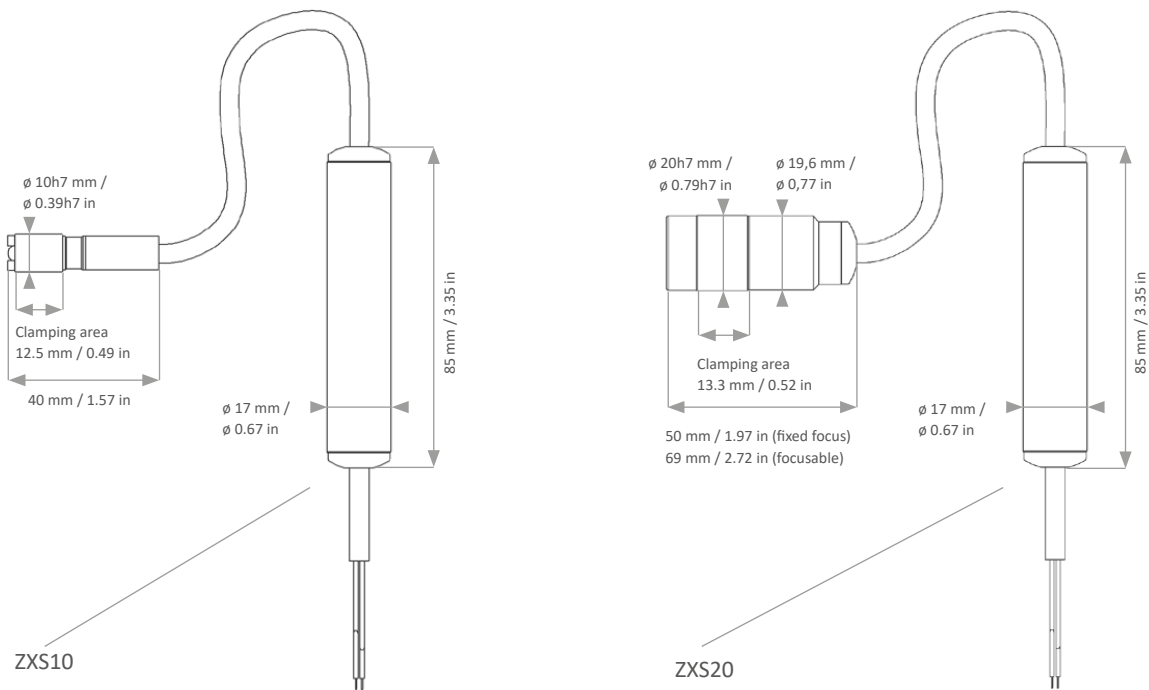
Environmental conditions

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

-10 to +50 14 to +122
-40 to +85 40 to +185
< 90, non-condensing
Max. 4
According to IEC EN 61373:2011, cat. 2

Mechanical Specifications - DEPENDING ON LASER HEAD VERSION

Weight	g / lbs	ZXS10 140 g / 0.09 lbs	ZXS20 180 g / 0.39 lbs	ZXS20-F 220 g / 0.49 lbs
Length	mm / inch	please see technical drawing below		
Diameter head ϕ	mm / inch	please see technical drawing below		
Length of cable between optics and electronics	mm / inch	100 mm / 3.53 in (others on request)		
Length of connection cable	mm / inch	1,000 mm / 39.37 in (others on request)		
Material		Stainless steel (laser head) / aluminum (housing of electronics)		
Protection class		IP 50 (IP 67 optional)	IP 67	IP 67



6-lead cable

X 1.1 brown	405 nm - 520 nm: 9 - 30 VDC, 15 VA	635 nm - 830 nm: 5 - 30 VDC, 15 VA
X 1.2 orange	Digital modulation TTL	
X 1.3 black	GND	
X 1.4 yellow	Analog modulation (0-2 VDC)	
X 1.5 green	Fail out (open-drain)	
X 1.6 red	Shielding	

Coding scheme shows default configuration at delivery, individual setup possible.