

Model: ZXS

Max. power 200 mW	IP 67	Serial communication	Boresight error < 0.8 mrad	Manual focus or fixed	Serial communication	TTL-modulation	Analog intensity control
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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

APPLICATIONS

- Machine Vision
- Triangulation sensors
- 3D-Measurement
- High-precision positioning tasks

ORDER CODE

Z??	-	XS20	-	?	-	?	-	?	-	?
Power		Product name Size of head		Electronics		F = focusable		Wavelength		Optics

SYSTEM SPECIFICATIONS

		405 nm	450 nm	520 nm	635-685 nm	785 nm	830 nm
Wavelength	nm						
Wavelength tolerance	nm (typical)	±10 nm	±10 nm	-5 nm +10 nm	±10 nm	±10 nm	±4 nm
Wavelength drift	nm / K (typical)	0,06 nm	0,02 nm	0,06 nm	0,25 nm	0,25 nm	0,25 nm
Available with optical head							
Output power ZXS10 (slp / elp)	mW	n. a.	≤ 45 mW	≤ 35 mW	≤ 100 mW	≤ 100 mW	≤ 100 mW
Output power ZXS20 (slp / elp)	mW	≤ 160 mW	≤ 60 mW	≤ 40 mW	≤ 100 mW	≤ 80 mW	≤ 200 mW
Output power ZXS20 (flp)	mW	≤ 120 mW	≤ 45 mW	≤ 30 mW	≤ 90 mW	≤ 60 mW	≤ 150 mW
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⁾	mrad (typical)	< 0.8 mrad (fixed focus)					
Line orientation ⁽²⁾	mrad	< 10 mrad					
Pointing stability	µrad / K	< 10 µrad / K					
Long-term power stability	(24 h)	±3 % over operating temperature range					
Start-up time	sec	< 2 s					
Laser operation mode		APC					

ELECTRICAL SPECIFICATIONS

Operating voltage		9 - 30 VDC	9 - 30 VDC	9 - 30 VDC	5 - 30 VDC	5 - 30 VDC	5 - 30 VDC
Operating current	(max. at 25 °C)	< 300 mA	< 300 mA	< 300 mA	< 400 mA	< 500 mA	< 500 mA
Protection		Over temperature protection and LED pre-failure indicator, reverse polarity and transient protection (ESD, burst & surge)					
Electrical isolation		Potential-free housing					
Connection		5-pin M12 plug; cable with flying leads or customized					
Power consumption		< 2.7 W	< 2.7 W	< 2.7 W	< 2 W	< 2.5 W	< 2.5 W
Communication interfaces		I ² C, RS-232 (5 V)					

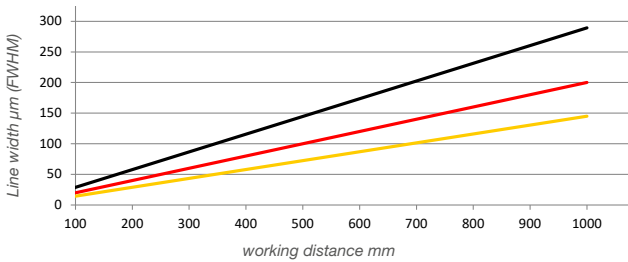
OPTICAL SPECIFICATION

Fan angles ⁽³⁾	Degrees	5°, 10°, 20°, 30°, 45°, 60°, 75°, 90° (homogeneous lines) 3°, 5°, 10°, 15°, 20°, 30°, 90° (Gaussian line profile)					
Line straightness ⁽⁴⁾	% (of line length)	< 0.05 %					
Line uniformity ⁽⁵⁾	% (typical)	< 25 %					
Dot		Point elliptical					
DOE		Multi line, crosses, grids, etc.					
Focus range	mm	100 mm up to 10,000 mm (or fixed focus available)					

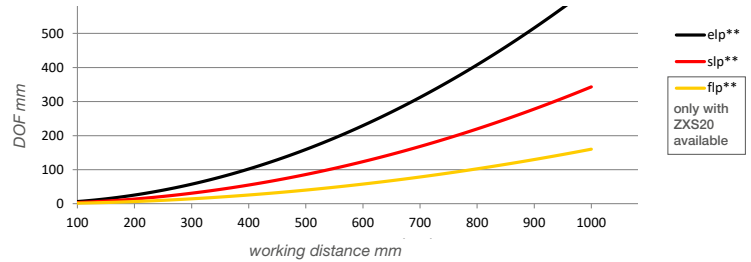
KEYNOTES

⁽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**	slp**	elp**		
Blue 405 nm	0.66	0.62	0.82	0.75	0.70	1.02
Blue 450 nm	1.03	0.67	1.83	1.49	0.74	4.29
Green 520 nm	0.97	0.78	1.20	0.99	0.80	2.61
Red 640 nm	1.05	1.28	1.00	1.04	0.70	0.95
Red 660 nm	1.00	1.00	1.00	1.00	1.00	1.00
IR 830 nm	1.42	1.30	2.11	1.71	1.03	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). Only available with ZXS20.

This optical configuration cannot supply the maximum output mentioned on page 2. Only approx. 75% can be achieved.

- 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 1 m working distance: line width approx. 200 µm (@ slp** optic); Depth of focus approx. 350 mm (values from the graphs)

Calculated: 450 nm laser focused at 1 m working distance: line width approx. 200 µm x 0.67 = 134 µm; Depth of focus approx. 350 mm x 0.74 = 259 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	up to 150 kHz
Rise time (Mod High ⇒ 90%)	< 160 ns
Fall time (Mod Low ⇒ 10%)	<100 ns
Signaling levels	VIL_max < +0.9 V VIH_min > +2.2 V
Operation range	0 - 30 VDC

ANALOG MODULATION

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

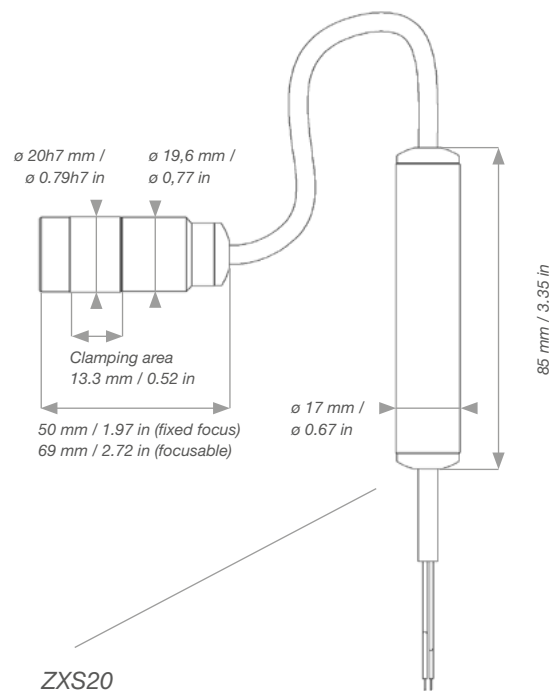
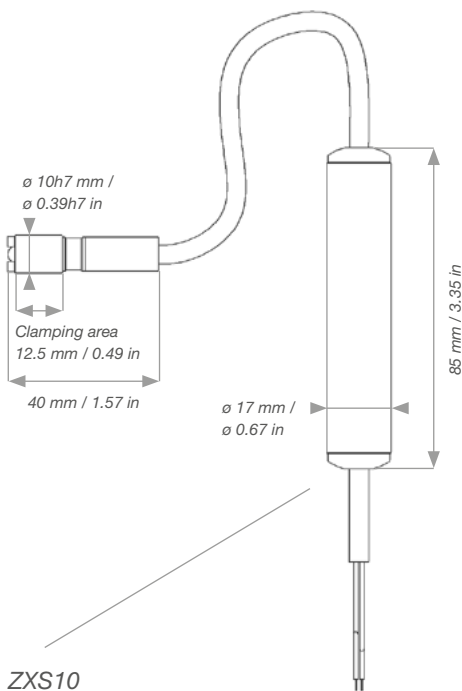
ENVIRONMENTAL CONDITIONS

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

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

MECHANICAL SPECIFICATIONS - DEPENDING ON LASER HEAD VERSION

Weight		ZXS10	ZXS20	ZXS20-F
Head:	g / lbs	8 g / 0.02 lbs	110 g / 0.24 lbs	155 g / 0.34 lbs
Electronics:	g / lbs	40 g / 0.09 lbs	40 g / 0.09 lbs	40 g / 0.09 lbs
Length	mm / inch	please see technical drawing below		
Diameter head \varnothing	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	2,000 mm / 78.74 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.