ZXS10 & ZXS20

Z-LASER
Intelligent Solutions in Light

Max Power 250 mW

IP 67

Diode Laser

Focus-able

The structured light laser ZXS is a specialized system for even more customization possibilities for OEM. The focus is set on modular components like just the optic head, individual cable connections, licenced boards/electronics.

Depending on the application and material to be inspected, the user can choose from IR, red, green, or blue wavelengths. With the tool-free manual focus option, the user can easily adjust the right working distance for the application.

The industrial-suited laser design along with stable performance works also in rough environments. This laser can be integrated efficiently in a sophisticated machine vision setup as well as solid processing machine like saws.

HIGHLIGHTS

- Industrial standard
- IP67
- Repeatable product performance due to automated production process
- Optical output power up to 250 mW
- Standard wavelength from 405 – 830 nm
- Manually focusable (depending)
- TTL modulation up to 500 kHz
- Analog intensity control
- Optical head and electronics separated and modular available

APPLICATIONS

Basic positioning tasks

Machine Vision

Triangulation sensors

3D-Measurement

Metrology

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SYSTEM SPECIFICATIONS

		405-450 nm	520 nm	635-685 nm	785-830 nm
Wavelength	nm				
Wavelength tolerance	nm (typical)	±10 nm	±10 nm	±10 nm	±4 nm
Wavelength drift	nm / K (typical)	0,06 nm	0,06 nm	0,25 nm	0,25 nm
Output power	mW	≤160 mW	≤60 mW	≤120 mW	≤200 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 (in x and y)	<0.2 mrad			
Line orientation [2]	mrad (target specification)	<10 mrad			
Pointing stability over temp.	µrad/ K (target specification)	<10 µrad/ K			
Long-term power stability	(24h)	±3 % over operating temperature range			
Long-term power stability	(over lifetime)	<5 %			
Start-up time	sec	<2 s			
Laser operation mode		APC			

ELECTRICAL SPECIFICATIONS

Operating voltage		9 - 30 VDC	9 - 30 VDC	5 - 30 VDC	5 - 30 VDC
Operating current	(max. at 25 °C)	<500 mA			
Protection		Over temperature protection and LED pre-failure indicator e.g. end of life 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		<2.5 W			
Communication interfaces		I²C, 5V UART			

OPTICAL SPECIFICATIONS (LINE LP) *

Fan angles [3]	Degrees (at >13,5 % I_{max})	5°, 10°, 20°, 30°, 45°, 60°, 75°, 90° (homogeneous lines)
Line straightness [4]	% (of line length)	<0.1 %
Line uniformity [5]	% (typical)	<25 %
Dot		Point elliptical
Focus range	mm	>100 mm (or fixed focus available)

*** other DOE optics on request**

KEYNOTES

[1] Boresight error	Also known as pitch and skew.	
[2] Line orientation	Also known as roll.	
[4] Line length / fan angle	Fan angle is the angle of the projection taken at the 80% clip. Line length is the physical length at the given working distance taken at 80% clip.	
[4] Line straightness	Deviation from best fit line.	$\Delta = \Delta 1 + \Delta 2$ $S = (\Delta / L) \times 100$
[5] Line uniformity	Maximum relative optical power variation over medially 80% of the line.	$\frac{P_{high} - P_{low}}{P_{high} + P_{low}}$

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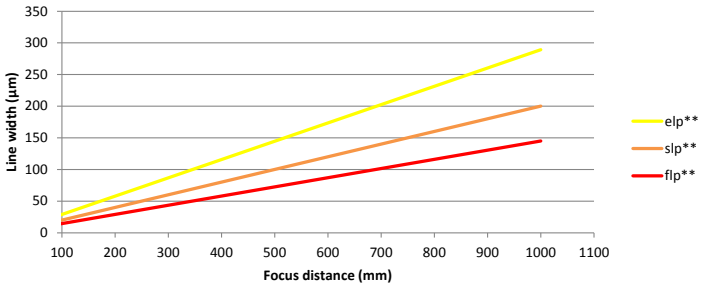
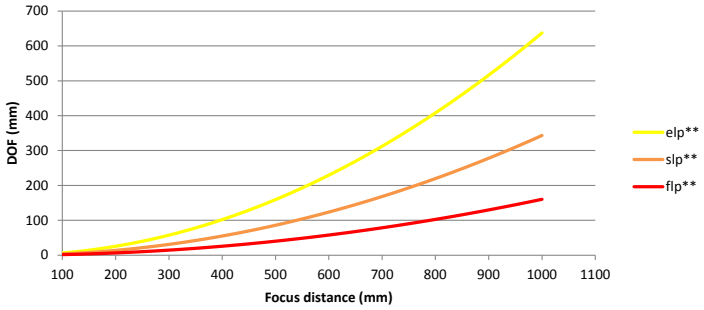
Line thickness vs working distance



DOF vs working distance



Wavelength		Line thickness / distance			Depth of focus / distance		
		elp**	slp**	flp**	elp**	slp**	flp**
Blue	405 nm	0,82	0,62	0,66	1,02	0,70	0,75
Blue	450 nm	1,83	0,67	1,15	4,29	0,74	1,49
Green	520 nm	1,20	0,78	0,97	2,61	0,8	0,99
Red	640 nm	1,00	1,28	1,05	0,95	0,7	1,04
Red	660 nm	1,00	1,00	1,00	1,00	1,00	1,00
IR	830 nm	1,99	1,90	1,42	3,44	2,37	1,71

Explanation to the calculation:

Z-LASER offers optical configurations for several settings (* = fan angle 10 - 90°):
- flp** = fine line Powell; especially thin lines for all working distances with a smaller range at depth of focus (recommended for angles between 1 - 60°)
- slp** = standard line Powell; standard setup with medium line thickness and depth of focus, but best line homogenity
- elp** = extended line Powell; lines with advanced depth of focus and thicker lines

The graph above shows 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 graph.

Sample: 660 nm laser focused at 1 m working distance: line width ca. 200 µm (@ slp** optic);
Depth of focus approx. 350 mm (values from graph)

Calculated: 450 nm laser focused at 1m working distance: line width ca. 200 µm x 0,67 = 134 µm;
→ Depth of focus approx. 350 mm x 1,71 = 259 mm

SOFTWARE FEATURES

GUI **Serial communication interface** **I²C and 5V UART**	Functions (e.g.): - Status query - Output power control - System configuration - Digital Modulation - Analog intensity control - End of life indication

DIGITAL MODULATION

ANALOG MODULATION

*** Only available at modules with H-electronics; B versions only have protection, no modulation**

Maximum frequency	up to 250 kHz	**Maximum bandwidth**	<10 Hz
Rise time (Mod High ➡ 90%)	<1 µs	**Linearity**	<5 % (from 5 % to 100 % of laser power)
Fall time (Mod Low ➡ 10%)	<350 ns	**Active range**	0-2 VDC
Signaling levels	VIL_max < +1.2 V VIH_min > +2.8 V		
Operation range (VDC)	0-30 VDC	**Operation range (VDC)**	0-30 VDC
Protection	Full reverse polarity, independent from power supply, ESD, transient, Burst & Surge	**Protection**	Full reverse polarity, independent from power supply, ESD, transient, Burst & Surge

ENVIRONMENTAL CONDITIONS

Operating temperature	°C / °F	-10 °C to +50 °C / 14 °F to +122 °F
Storage temperature	°C / °F	-40 °C to +85 °C / -40 °F to +185 °F
Humidity	%	<90 %, non-condensing
Dissipated heat	W	Max. 4 W
Shock and vibration		According to DIN EN 60068-2-6

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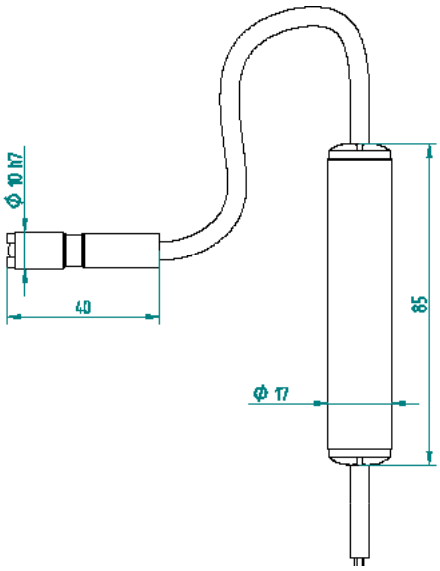
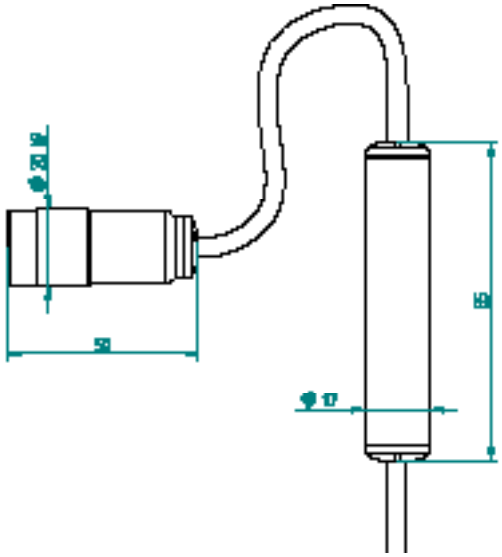
MECHANICAL SPECS / HOUSING DATA - DEPENDING ON LASER HEAD VERSION

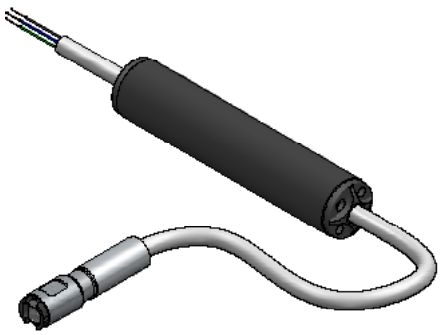
Weight	kg / lbs	
Dimension	mm / inch	please see technical drawing below
Diameter head Ø	mm / inch	please see technical drawing below
Material		Stainless steel (laser head)/aluminum (housing of electronics)
Protection class		IP 67
Mounting		depending on laser head version - please ask or consultant

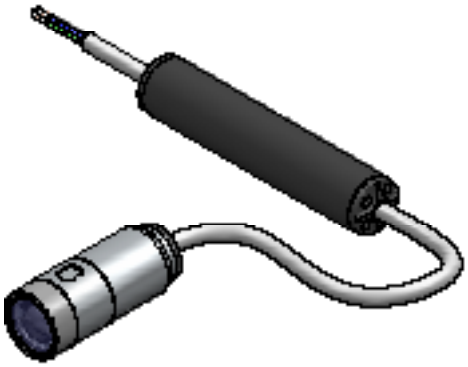
ZXS10



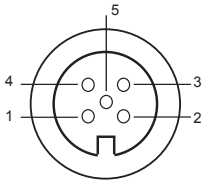
ZXS20







M12 5-Pin: A-Coding Male Connector



According to IEC 61076-2-101

X 1.1	VCC (9-30 Volt, 15 VA)
X 1.2	Digital-Modulation TTL
X 1.3	GND
X 1.4	Analog-Modulation (0-2 V)
X 1.5	Fail out (open-drain)

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

CE CE-Conformity according to the directives 2004/108/EC and 73/23/ECC.
Temporary status, subject to technical change, Oct. 2016.

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