

Product Family ZX20

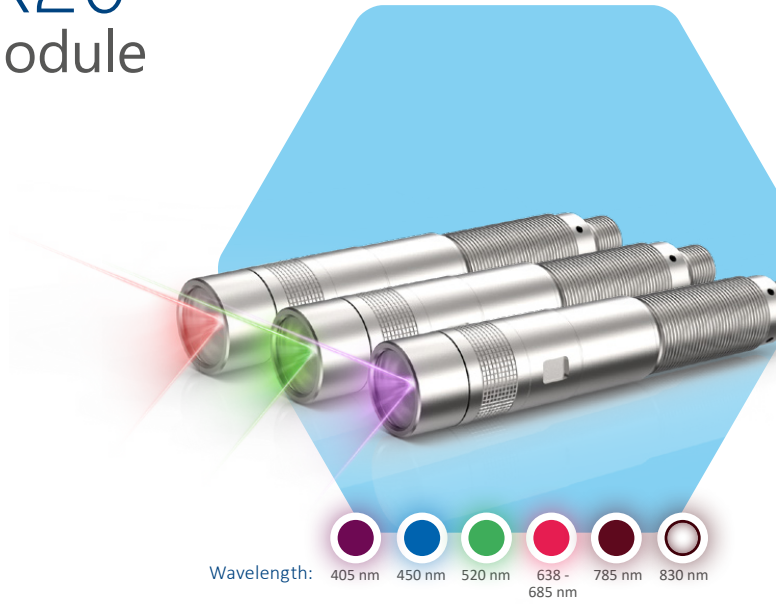
The high-precision laser module

The laser module ZX20 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 ZX-laser impresses with precision. The Boresight error is less than 0.8 mrad.

The user can choose from IR, red, green, or blue wavelengths depending on the application and material to be inspected. The right working distance can easily be adjusted with the tool-free manual focus option.

The ZX20 with its industrial-suited design and stable performance works perfectly as an integrated module in machine vision applications, sensors, or processing machines.



IP 67



Boresight Accuracy



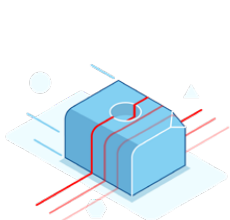
High Process Reliability



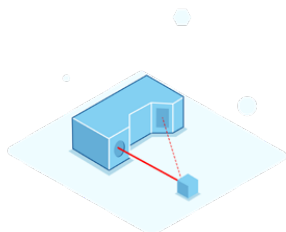
Output Power up to 200 mW

Highlights

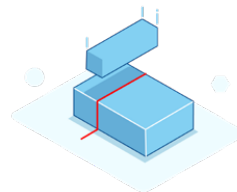
- IP 67
- Repeatable product performance due to automated production processes
- Highest reproducibility of beam quality
- Optical output power up to 200 mW
- Wavelengths from 405 – 830 nm
- Manually focusable (optional)
- TTL modulation up to 400 kHz
- Analog intensity control
- I²C, RS-232 (5 V)
- Stainless steel housing



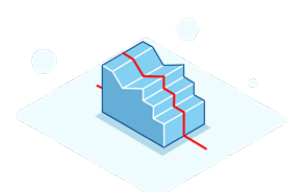
Machine Vision



Triangulation Sensors



Positioning Tasks



3D-Measurement

Order Code

Z??	X20	?	?	?	?
Power	Product family Size of head	Electronics	F-Focusable	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	sec
Laser operation mode	

405	450	520	640	660	685	785	830
±10	±10	-5 +10	±10	±10	±10	±10	±4
0,06	0,02	0,06	0,25	0,25	0,25	0,25	0,25
≤ 160	≤ 60	≤ 40	≤ 70	≤ 120	140	≤ 80	≤ 200

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	5 - 30	5 - 30
< 300	< 300	< 300	< 500	< 500	< 500	< 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	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5
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I²C, RS-232 (5 V)

Optical specifications

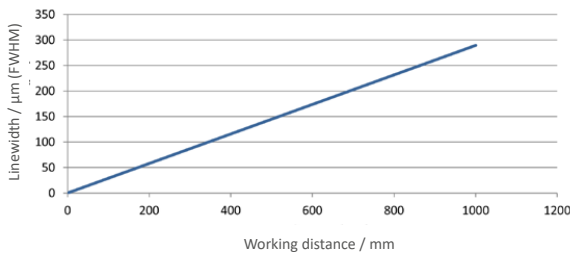
Fan angles ⁽³⁾	Degrees °
Line straightness ⁽⁴⁾	% (of line length)
Line uniformity ⁽⁵⁾	% (typical)
Dot	
DOE	
Focus range (only available as fixed focus)	mm

5, 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		
< 100 up to 980 (5° fan angle)		

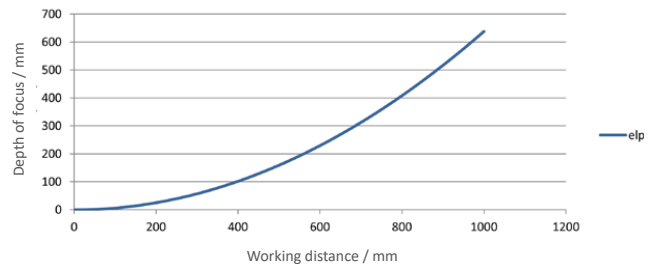
Keynotes

⁽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⁾ 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>elp</i>	<i>elp</i>
Blue	405 nm	0.82	1.02
Blue	450 nm	1.83	4.29
Green	520 nm	1.20	2.61
Red	640 nm	1.00	0.95
Red	660 nm	1.00	1.00
Red	685 nm	1.40	1.99
IR	830 nm	2.11	2.20

Optical configurations for several line settings are available.

- *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°

Software

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

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 400
Rise time (Mod High ⇒ 90%)	ns	< 100
Fall time (Mod Low ⇒ 10%)	ns	< 100
Signaling levels	V	VIL_max < +0.9 VIH_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

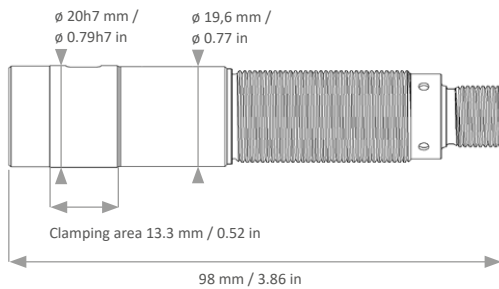
Operating temperature	°C / °F
Storage temperature	°C / °F
Humidity	%
Dissipated heat	W
Shock and vibration	

-10 to +50	/	14 to +122
-40 to +85	/	-40 to +185
< 90 non-condensing		
< 1		
According to IEC EN 61373:2011, cat. 2		

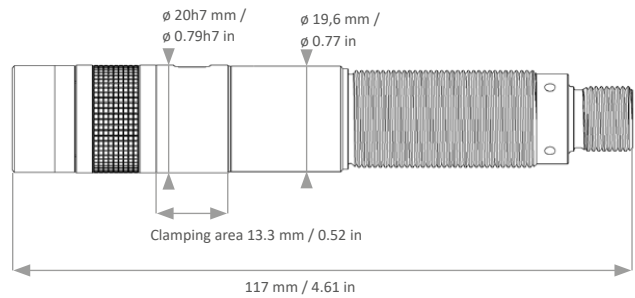
Mechanical specifications

	ZX20	ZX20-F
Weight	90 g / 0.20 lbs	125 g / 0.28 lbs
Length	98 mm / 3.86 in	117 mm / 4.61 in
Diameter head \varnothing	20h7 mm / 0.79 in	
Material	Stainless steel	
Protection class	IP 67	
Mounting	(Option) 20 mm mount (alternative M18-thread)	

Model: ZX20



Model: ZX20-F



M12 5-Pin: A-Coding Male Connector

1	405 nm - 520 nm: 9 - 30 VDC, 15 VA	635 nm - 830 nm: 5 - 30 VDC, 15 VA
2	Digital modulation TTL	
3	GND	
4	Analog modulation (0-2 VDC)	
5	Fail out	

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

