

ZQ1 Compact high-performance laser

The ZQ1 series has been developed for the most demanding measurement applications in the market. Wherever a high output power, exceptional beam performance, and industrial-suited design is needed, the ZQ1 series is the right choice. The user can easily adjust the right working distance for the application with its manual focus option.



IP 67



Manually focusable



Active cooling integrated



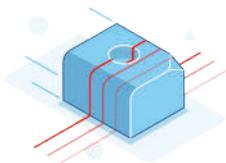
High Process Reliability



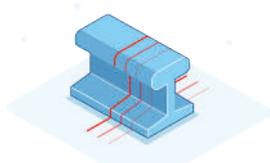
Output Power up to 2,5 W

Highlights

- Repeatable high product quality due to automated production processes
- Optical output power up to 2.5 W (450 nm)
- Standard wavelengths from 405 - 830 nm
- Manually focusable
- Active cooling integrated
- TTL modulation up to 200 kHz
- Analog intensity control
- IP 67
- Certified according to the railway standard: DIN EN 61373:2011-04
- PC control via Graphical User Interface (GUI)



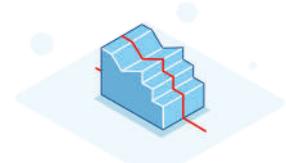
Machine Vision



Road and rail inspection



Analytic



3D-Measurement

Order Code

Z??	-	Q1	-	?	-	?	-	?	-	?
Power		Product family		Electronics		F-Focusable		Wavelength		Optics

System specification

Wavelength	nm
Wavelength tolerance	nm (typical)
Wavelength drift	nm (temperature stabilized, over total operating temperature)
Output power (elp)	mW
Output power (slp)	mW
Spatial mode	
RMS noise (20 Hz to 20 MHz)	%
Peak-to-Peak Noise (20 Hz to 20 MHz) %	
Boresight error ⁽¹⁾	mrad (in x and y)
Line orientation ⁽²⁾	mrad
Pointing stability over temp.	μrad / K
Emission point height ⁽³⁾	mm
Long-term power stability (24 h)	%
Warm-up time	min
Laser operation mode	

	405	450	520	640	660	760	808	830
	±5	±10	±10	±5	±5	±5	±10	±5
< 1								
	≤900	≤2500	≤800	≤1000	≤1000	≤1700	≤1700	≤1700
	≤800	≤2100	≤700	≤800	≤800	≤1200	≤1200	≤1200
Multi Transverse Mode								
< 0.5								
< 1								
< 5								
< 10 Orientation parallel to base plate								
< 6								
28.3								
< 1								
< 2								
APC								

Electrical specification

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

12 - 24
< 4
Over temperature protection and LED pre-failure indicator, reverse polarity and transient protection (ESD, burst & surge)
high-impedance to GND (1 MΩ)
5-pin M12 plug; 8-pin M12 plug (communication)
< 40
I ² C, RS-232

Optical specification

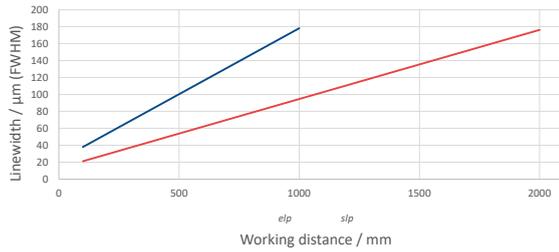
Fan angles ⁽⁴⁾	Degrees °
Line straightness ⁽⁵⁾	% (of line length)
Line uniformity ⁽⁶⁾	% (typical)
Dot	
Focus range	mm

5, 10, 20, 30, 45, 60, 75, 90 (homogeneous line profile)
< 0.1
< 25
Dot elliptical
100 up to 10,000

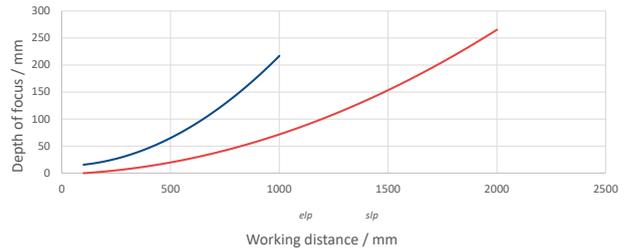
Keynotes

⁽¹⁾ Boresight error	Also known as pitch and skew
⁽²⁾ Line orientation	Also known as roll, with reference to the ground plate
⁽³⁾ Emission point height	Offset of optical axis to ground plate
⁽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

LINE WIDTH VS. WORKING DISTANCE*



DOF VS. WORKING DISTANCE*



Wavelength (nm)	Output power (up to) (mW)	Calculation factor for line width		Calculation factor for depth of focus	
		<i>elp</i>	<i>slp</i>	<i>elp</i>	<i>slp</i>
405	900	0.83	0.84	1.01	1.53
450	1300	0.84	1.25	0.96	2.32
	2500	1.00	1.09	1.17	1.02
520	800	0.90	0.87	1.06	1.77
640	500	0.96	1.11	1.06	1.53
	1000	0.84	0.91	0.99	1.49
660	1000	1.00	1.00	1.00	1.00
760	1700	1.12	1.42	1.22	1.89
808	1700	1.06	1.34	1.09	1.78
830	1700	1.02	1.27	1.05	1.71

Optical configurations for several line settings are available.

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

- *elp* = extended line Powell; lines with advanced depth of focus and thicker lines

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 has to be multiplied by the values from the graphs.

Example: 660 nm laser focused at 1 m working distance: line width approx. 95 μm; Depth of focus approx. 72 mm (@ *slp*** optic, values from the graphs)

Calculated: 450 nm Laser (1300mW) focused at 1m working distance: line width ca. 95 μm x 1.25 = 119 μm;

Depth of focus approx. 72 μm x 2.32 = 167 μm

* Values in the graphs for homogenous line profiles.

** Fan angle: 5° - 90°

Software

Serial communication

I²C und RS-232

Features (e. g.):

Status query
Output power control
System configuration
Digital Modulation
Intensity control
Operation time counter (LD, Module)

Digitale modulation

Maximum frequency	kHz	up to 200
Rise time (Mod High ⇒ 90 %)	ns	< 500
Fall time (Mod Low ⇒ 10 %)	ns	< 350
Signaling levels	V	V _{IL_max} < +1.1 V _{IH_min} > +2.5
Operation range	VDC	0 - 30

Analoge modulation

Maximum bandwidth	Hz	< 10
Linearity	%	<5 (from 10 % to 100 % of laser power)
Active range	VDC	0 - 2
Impedance	kΩ	240 to internal VCC (3.6 V)
Operation range	VDC	0 - 30

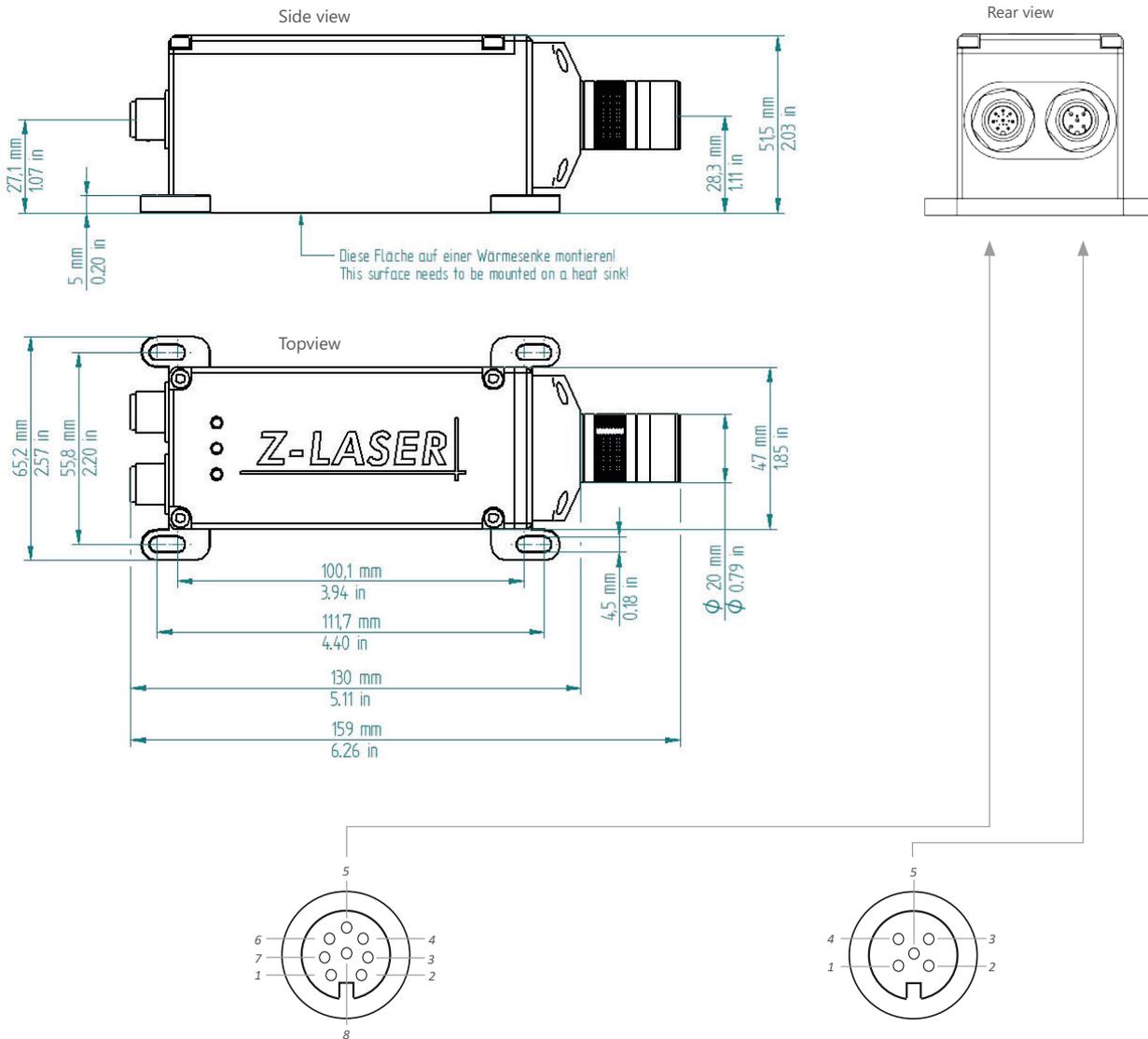
Environmental conditions

Base Plate 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. 35
	According to DIN EN 61373:2011-04, cat. 2, Railway applications – Rolling stock equipment – Shock and vibration tests (IEC 61373:2010)

Mechanical Specifications

Weight	kg / lbs	0.69 / 1.52
Dimension	mm / inch	159 x 65.2 x 51.5 / 6.26 x 2.57 x 2.03
Diameter head ϕ	mm / inch	20 / 0.79
Material		Aluminum (black anodized/blue-lacquered), Optic head: stainless steel
Protection class		IP 67
Mounting		4x M4 screws



M12 8-Pin: A-Coding Male Connector

1	RX IN (RS-232)
2	TX OUT (RS-232)
3	SCL (I ² C)
4	SDA (I ² C)
5	RDY FAIL OUT
6	System Enable OUT
7	GND
8	System Enable IN

M12 5-Pin: A-Coding Male Connector

1	12-24 VDC, 40 VA
2	Digital-Modulation TTL
3	GND
4	Analog-Modulation (0-2 VDC)
5	Fail out (open-drain)