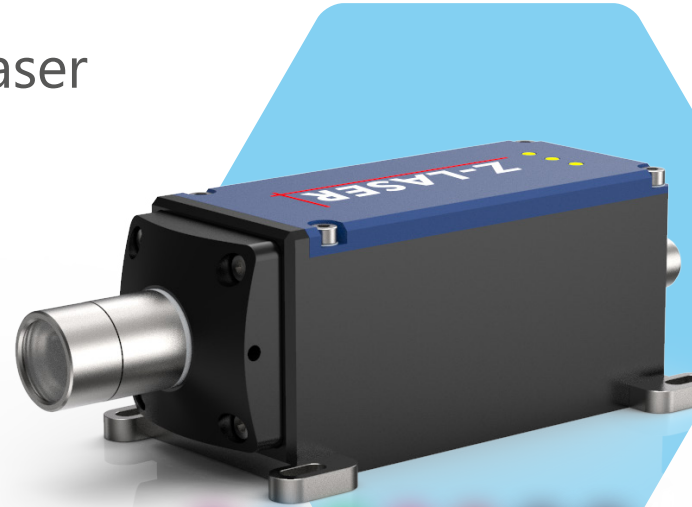


# ZQ1

## Compact high-performance laser

The ZQ1 laser series has been designed for the most demanding measurement applications on the market. Wherever high output power, excellent beam characteristics and industrial-grade design are required, the ZQ1 series is the right choice. Thanks to the tool-free focusing, the user can optimally adjust the working distance of the module to the application requirements. Combined with its intelligent monitoring functions, the laser allows for high power stability even in harsh environments. The integrated active peltier cooling supports this function by keeping the laser diode constantly in the optimal temperature range.



Wavelengths: 405 nm 450 nm 520 nm 640 nm 660 nm 760 nm 808 nm



IP 67



Manually focusable



Active cooling integrated



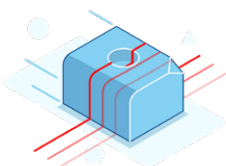
High Process Reliability



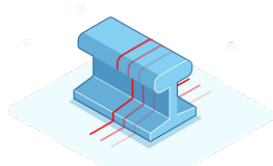
Output Power up to 2,5 W

## Highlights

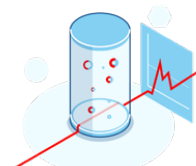
- Repeatable high product quality due to automated production processes
- Optical output power up to 2.500 mW (450 nm)
- Standard wavelengths from 405 - 808 nm
- Manually focusable
- Active cooling integrated
- TTL modulation up to 200 kHz
- Analog intensity control
- IP 67
- Certified according to the railway standard: DIN EN 61373:2011-04
- PC control via Graphical User Interface (GUI)



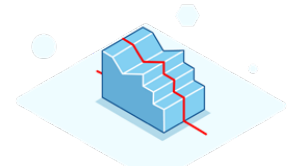
Machine Vision



Road and rail inspection



Analytic



3D-Measurement

### Order Code

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

## System specification

Wavelength	nm	405 nm	450 nm	520 nm	640 nm	660 nm	760 nm	808 nm
Wavelength tolerance	nm (typical)	±5 nm	±10 nm	±10 nm	±5 nm	±5 nm	±5 nm	±4 nm
Wavelength drift	nm (temperature stabilized, over total operating temperature)	< 1 nm						
Output power (elp)	mW	≤900 mW	≤2500 mW	≤800 mW*	≤1000 mW	≤1000 mW	≤1700 mW	≤1700 mW
Output power (slp)	mW	≤800 mW	≤2100 mW	≤700 mW	≤800 mW	≤800 mW	≤1200 mW	≤1200 mW
Spatial mode		Multi Transverse Mode						
RMS noise	(20 Hz to 20 MHz)	< 0.5 %						
Peak-to-Peak Noise	(20 Hz to 20 MHz)	< 1 %						
Boresight error <sup>(1)</sup>	mrad (in x and y)	< 5 mrad						
Line orientation <sup>(2)</sup>	mrad	< 10 mrad   Orientation parallel to base plate						
Pointing stability over temp.	μrad / K	< 6 μrad / K						
Emission point height <sup>(3)</sup>	mm	28.3 mm						
Long-term power stability	(24 h)	< 1 %						
Warm-up time	min	< 2 min						
Laser operation mode		APC						

## Electrical specification

Operating voltage		12 - 24 VDC
Operating current	(max. at 25 °C)	< 4 A
Protection		Over temperature protection and LED pre-failure indicator, reverse polarity and transient protection (ESD, burst & surge)
Electrical isolation of housing		high-impedance to GND (1MΩ)
Connection		5-pin M12 plug; 8-pin M12 plug (communication)
Power consumption		< 40 W
Communication interfaces		I <sup>2</sup> C, RS-232

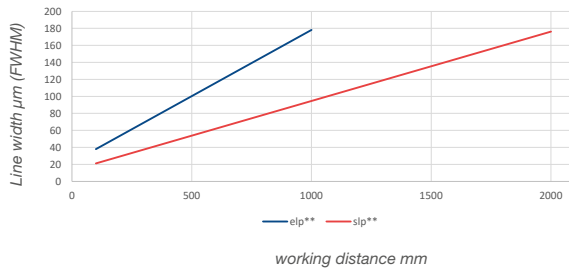
## Optical specification

Fan angles <sup>(4)</sup>	Degrees	5°, 10°, 20°, 30°, 45°, 60°, 75°, 90° (homogeneous line profile)
Line straightness <sup>(5)</sup>	% (of line length)	< 0.1 % (typ. 0,05%)
Line uniformity <sup>(6)</sup>	% (typical)	< 25 %
Dot		Dot elliptical
Focus range	mm	100 mm up to 10,000 mm

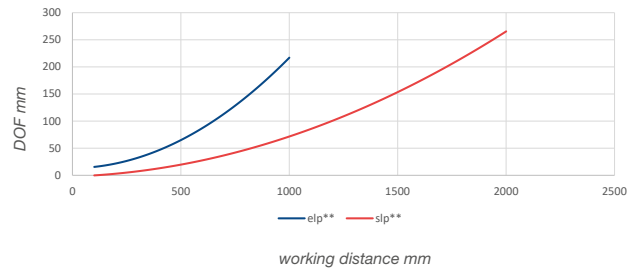
## Keynotes

* (520 nm   elp: ≤800 mW)	coming soon
<sup>(1)</sup> Boresight error	Also known as pitch and skew
<sup>(2)</sup> Line orientation	Also known as roll, with reference to the ground plate
<sup>(3)</sup> Emission point height	Offset of optical axis to ground plate
<sup>(4)</sup> Line length / fan angle	at > 13.5 % I <sub>max</sub>
<sup>(5)</sup> Line straightness	Deviation from best fit line over the middle 80% of the line, for homogeneous lines
<sup>(6)</sup> 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\*



Wellenlänge (nm)	Ausgangsleistung (bis zu) (mW)	Berechnungsfaktor für Liniendicke		DOF Berechnungsfaktor für Tiefenschärfe	
		elp**	slp**	elp**	slp**
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

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

Serielle Kommunikation

I<sup>2</sup>C und RS-232

Features (e. g.):

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

## Digitale modulation

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

## Analoge modulation

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

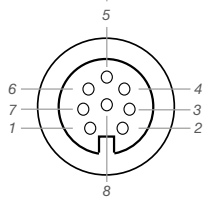
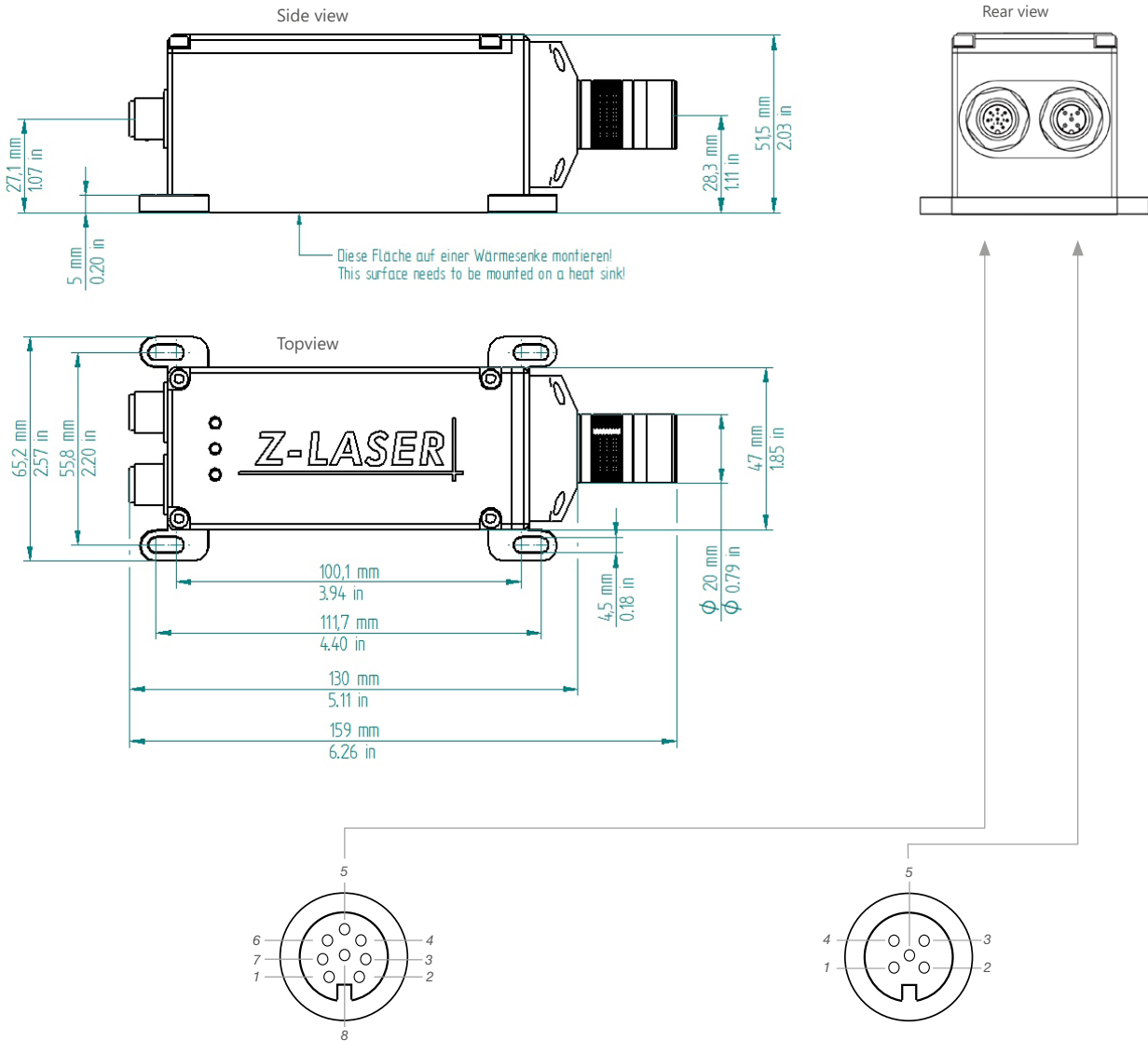
## Environmental conditions

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

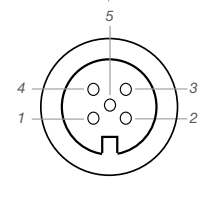
## Mechanical Specifications

Weight	kg / lbs	0.69 kg / 1.52 lbs
Dimension	mm / inch	159 x 65.2 x 51.5 mm / 6.26 x 2.57 x 2.03 in
Diameter head $\varnothing$	mm / inch	20 mm / 0.79 in
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

X 2.1	RX IN (RS-232)
X 2.2	TX OUT (RS-232)
X 2.3	SCL (I <sup>2</sup> C)
X 2.4	SDA (I <sup>2</sup> C)
X 2.5	RDY FAIL OUT
X 2.6	System Enable OUT
X 2.7	GND
X 2.8	System Enable IN



### M12 5-Pin: A-Coding Male Connector

X 1.1	12-24 VDC, 40 VA
X 1.2	Digital-Modulation TTL
X 1.3	GND
X 1.4	Analog-Modulation (0-2 VDC)
X 1.5	Fail out (open-drain)