



QuickStartGuide

a

ZQ1-MagicLine



Welcome to the world of industrial applications with Z-Laser!

This quick start guide will help you set up your device quickly. For comprehensive details and advanced information, please refer to the user manual, which can be downloaded from www.z-laser.com or contact our sales team for support.

**CAUTION NOTE**

PLEASE READ THE ENTIRE MANUAL BEFORE ATTEMPTING TO OPERATE THIS PRODUCT.
AVOID EXPOSURE TO DIRECT OR SCATTERED RADIATION FROM THE LASER.

It is extremely important to follow laser safety rules when working around these lasers. Generally, you should avoid eye or skin exposure to direct or scattered radiation from these lasers.

All laser safety-warning labels are provided on the Unit and comply with IEC 60825-1. This Product is in full compliance with the European IEC 60825-1 and the United States CDRH laser Safety Regulations.

Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure or failure of functionality.

Notice:

Contents in this technical document can be changed without any notice due to the product modification. In the absence of confirmation by device specification sheets, Z-LASER takes no responsibility for any defects that may occur in equipment using any Z-LASER devices. .



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1 Introduction

1.1 Applications and Benefits

1.1.1 USPs (Unique Selling Propositions)

- Brightest eye-safe line laser in the world**
 - Safety Certification:** Certified as laser class 2M, the ZQ1 MagicLine is eye-safe and provides maximum safety for the user.
 - Wide Opening Angle:** The opening angle of 70° allows for broad coverage and versatile use in various industrial applications.
- Robustness:** The IP67 construction ensures high resistance to dust and water, making it suitable for demanding outdoor environments.
- Temperature Stability:** Thanks to active temperature management, the optical output remains nearly perfect and stable even with temperature fluctuations.
- Free Focus Functionality:** The ability to freely focus allows precise adjustments and optimal results in different application areas.
- Use in Difficult Lighting Conditions:** Even in challenging lighting conditions and bright daylight, the ZQ1 MagicLine delivers reliable results. NOTE: The working area should be shaded in bright daylight.

In summary, the ZQ1 MagicLine offers a combination of high performance, safety, robustness, and versatility, making it an outstanding tool for precise positioning tasks.

1.1.2 Applications

The versatility and robustness of the ZQ1 MagicLine make it suitable for numerous other applications, such as:

- Metal and Wood Cutting:** Optimizes precise cutting of wood and metal for efficient production and ensures accurate alignment of workpieces.
- Loading and Unloading Aid for Trucks:** A reliable positioning aid for precise loading and unloading, e.g., garbage trucks at landfills.
- Marking Truck Parking Spaces:** Provides effective marking of truck parking spaces even in darkness and snow, aiding efficient fleet organization.
- Brake and Stop Markings:** Ensures accurate stop markings, contributing to safe and efficient operation, for example, for trains, trams, and streetcars.

and many other applications, such as: precision surveying in the construction industry, alignment of components in manufacturing, warehouse management and organization, quality control and inspection processes, laser projections for advertising and event purposes, navigation and positioning in automated logistics systems, etc.

These diverse applications make the ZQ1 MagicLine an indispensable tool for precise positioning tasks in various industrial and logistical sectors.



1.2 Legal Notices

Please note that due to the current patent situation, certain countries are excluded from using this product, including the USA, China, Japan, and South Korea.

2 General Notes / Safety Precautions

Before using the laser module, familiarize yourself with the safety guidelines included in the manual, including proper usage procedures and potential hazards.

- Keep the safety cap on the laser emission port until you have correctly set up the laser. Be sure to remove it immediately before operating the laser.
- Ensure that no one in your vicinity is accidentally or intentionally exposed to the laser radiation.
- Always follow the safety instructions corresponding to the laser class. You can find the laser class on the label of your laser module.
- Opening the housing is strictly prohibited.
- The IP67 protection class can only be guaranteed if the M12 connectors are correctly sealed (with a protective cap or cable).
- The laser line emission is parallel to the base plate.

3 Delivery Contents

- ZQ1-MagicLine
- Quick Start Guide

3.1 Unpacking and Checking

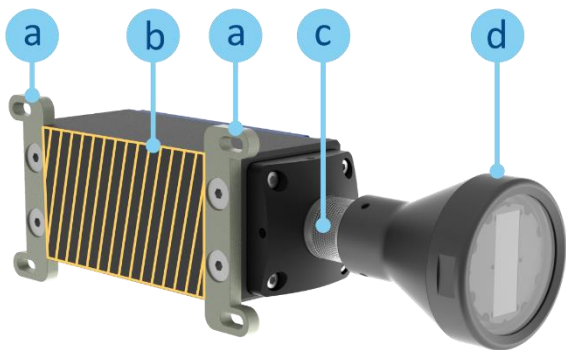
Unpack your Z-Laser device carefully and inspect it for any visible damage that may have occurred during transit. If you notice any issues, please contact our sales team immediately.

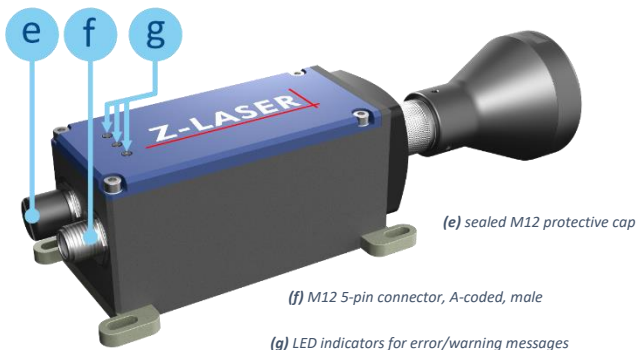
(a)
*mounting
legs for fixing
the ZQ1
Magic Line*

(b)
*cooling
surface*

(c)
*focus ring
for laser
focusing*

(d)
Optics head





(e) sealed M12 protective cap

(f) M12 5-pin connector, A-coded, male

(g) LED indicators for error/warning messages

4 Product Overview

4.1 Labels on the Product

The warning label and nameplate are attached to the ZQ1 MagicLine.

4.1.1 Warning Labels

A **warning sticker indicating Laser Class 2M** according to EN60825-1:2015-07 is affixed to the product in German language.

Four additional stickers are provided in the following languages: English, Italian, Spanish and French.



4.1.2 Nameplate

The nameplate contains information regarding the article number, article descriptions, markings, and serial number.



- (1) Product description
- (2) Item number
- (3) Serial number
- (4) QR code for Z-Laser
- (5) "Made in Germany" quality seal
- (6) CE marking
- (7) UKCA marking
- (8) WEEE marking

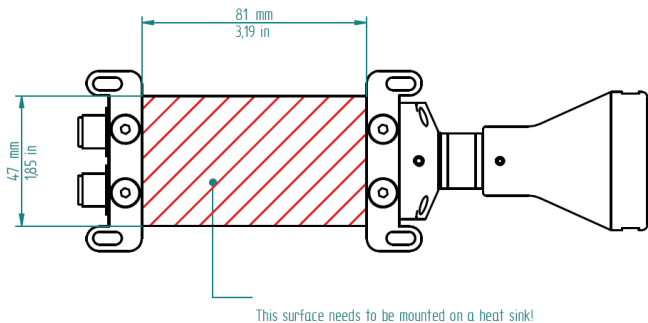
5 Handling the Laser Module

5.1 Assembly

1. Mount the laser module on a heat-conducting heat sink. Ensure that it is flat and without air holes or grooves.
2. Provide adequate cooling. Maximum 30 W of heat must be dissipated. Mount the laser so that the heat can be dissipated through the bottom cooling plate.
(Note: further instructions can be found in the user manual).
3. Use four M4 mounting screws (not included) at the designated positions (red markings) to ensure necessary contact between the bottom plate and the heat sink.

Note:

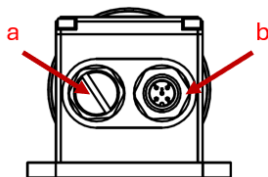
The bottom plate is 0.1 mm higher than the mounts. However, mounts can also be mounted mirrored.



5.2 Electrical Connection

The ZQ1 MagicLine has two electrical interfaces: a 5-pin M12 connector with A-coding (male) and an 8-pin M12 connector with A-coding (male). Only the M12 5-pin connection is used for the ZQ1 MagicLine.

The reason for having two connectors is the product family ZQ1 as the base and their utilization for product calibration during production, as well as in cases of repair.

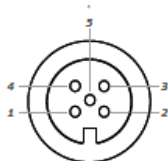


a	M12 connector, 8-pin A-coding, male	Sealed with locking nut and cannot be used.
b	M12 connector, 5-pin A-coding, male	For power supply/ground, control signals, and temperature sensors.

5.2.1 5-Pin M12 A-Coding

The pin assignment corresponds to other Z-LASER products with M12 connectors, providing power supply, TTL trigger, pin for analog modulation (intensity control), as well as an additional fail-out output.

5.2.2 Pin assignment M12 5-pin connector A-coded male



Pin	
1	Input Voltage: 12-24 VDC, 40 VA
2	Digital Modulation: TTL
3	Ground (GND)
4	Analog Modulation: 0-2 VDC
5	Fail Out: Open Drain

5.3 Commissioning








Here's a simple test procedure to ensure the device is functioning correctly:

1. Connect the electrical supply according to the instructions in the user manual or refer to the pin assignment for the M12 5-pin connector with A-coding male. Use the provided accessories if necessary.
2. Remove the protective cap before applying power.
3. Connect the laser to the power supply (green LED blinks).
The laser beam will emit after <2 minutes (yellow LED blinks) -> Laser in operation.
4. Adjust the focus using the focus ring.
5. Turn off the laser by disconnecting the power supply, interrupting the power source.

Make sure to follow safety protocols and guidelines while performing the test.

6 Basic Operation and Functions

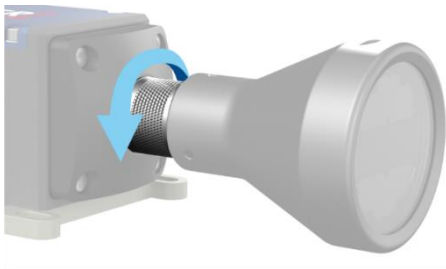
6.1 LED- Indicators

	Error/Warning Indicator	wavy light	Error message
		steady light	Warning message
	Laser ON Indicator	illuminated	Laser beam emitted
		not illuminated	No laser beam emitted
	Blink Code Indicator	blinking	Error/Warning code description



6.2 Focusing

The line thickness of a laser is determined by focusing: When focusing, a narrower line with higher intensity is generated, while defocusing results in a wider line with lower intensity. Precise adjustment of the focus is crucial to achieve the desired line thickness and quality. Applications such as cutting,XXXXXX greatly benefit from this control.



7 Troubleshooting

If the ZQ1 MagicLine does not turn on, try the following solutions:

- Ensure that no protective cap is on the device.
- Make sure the power supply or cable is properly connected.
- Check the LED indicators (see section 3.2 LED Indicators).

If the problem persists, do not hesitate to contact our sales team for assistance. Please use the information from the error code/warning code description for error reporting.

8 Error Code/Warning Code Description

To interpret a blink code, follow these steps:

1. **Count the number of blinks:** Observe how many times the LED blinks before it pauses and the cycle repeats. Note this pattern.



2. **Note the length of pauses:** Pay attention to the duration of the pauses between the blink sequences. This can also be part of the code.
3. Consult the **error message** (see section 5.2) or **warning messages** (see section 5.3).
4. **Fix the error:** Once you have identified the error, follow the instructions in section 9 for troubleshooting.

8.1 Interpretation of a Blink Code

Red LED	blinking (2 Hz)	➔	Error message	See error message
Red LED	steady light	➔	Warning message	See warning message

If you need the exact meaning of the blink code for the ZQ1 MagicLine, refer to the manual. It contains detailed information for error diagnosis and troubleshooting based on the blink code.

8.1.1 Error Messages

In case of an error, the **red LED blinks at a frequency of 2 Hz**. The blink code describes the number of blinks of the green LED. The meanings are listed below:

Green LED	ERROR - Meaning
Blink Code	
1	TEC-Driver Error
2	Flash/EEPROM/RAM/CPU/Watchdog Check Error
3	Peltier Verification Error
4	Watchdog Reset Error
5	Set Power Error CMD Execution Error TWI Error UART Error
6	Case Over/Under Temperature Error
7	Over/Under Current Error
8	Laser Diode Over/Under Temperature Error
9	RAM Variable Error
10	Missing Calibration Error
11	Calibration Table
12	NTC Unterschied Error
13	Start Up Test Error



8.1.2 Warning Messages

In case of a warning, the **red LED remains constantly on**. The blink code describes the number of blinks of the green LED. The meanings are listed below:

Green LED	WARNING-Meaning
Blink Code	
2	End of Life Warning
4	System Enable Warning
5	Invalid CMD Frame Warning CMD Out of Range Warning Access Violation Warning
6	Case Over/Under Temperature Warning
7	Extrapolation Warning
8	Laser Diode Over/Under Temperature warning
10	Cal_Temp_MIN_MAX_Limit Warning
13	TEC Current Warning

9 Accessories

You can use the following Z-Laser accessories. A detailed overview can be found in the accessories catalog.

9.1.1 Power Supply

WPS-24-M12-65W

NETZTEIL: WPS-24-M12-65W	
INPUT:	100-240V~, 50-60Hz, 1.5A
INPUT CONNECTOR:	Euro plug
ELECTRIC POWER [W]:	65.0
OUTPUT VOLTAGE [VDC]:	24.0
OUTPUT CURRENT [A]:	2.7
OUTPUT CONNECTOR:	5-pin M12, A-coded, female
PROTECTION CLASS:	IP 68



9.1.2 Cable

Various M12 cable options are available, including 5-pin versions with straight or angled connectors and different lengths (2.5 and 10 meters).

M12 cable variants (<i>different lengths</i>)		
Pin	Meaning	Cable color
1	12-24 VDC, 40A	Brown
2	Digital Modulation TTL	White
3	GND	Blue
4	Analog Modulation (0-2VDC)	Black
5	Fail Out (opden-drain)	Gray





10 Maintenance

Regular maintenance is essential to ensure the longevity and optimal performance of your Z-Laser device. Refer to the maintenance section in the user manual for specific instructions on cleaning and upkeep.

11 Warranty Information

The ZQ1 MagicLine from Z-LASER is warranted for one year from the date of shipment against defects in material and workmanship. This warranty replaces all other express or implied warranties and does not cover incidental or consequential damages.

Any modification to the product voids the warranty and may also pose the risk of altering the laser class of the product.

12 Conformity

This Declaration of Conformity is issued under the sole responsibility of the manufacturer.

We hereby declare that the following products, i.e. their design and construction as well as the version we have put in circulation, correspond with the rules and regulations stated below:

Producer:	Z-Laser GmbH Merzhauser Str. 134 79100 Freiburg Germany
Product:	ZQ1, ZQ1-MagicLine, ZQ1 High power
Types:	This declaration is valid for all product types of the listed products including accessories (where relevant).

The subjects of the declaration described above are in conformity with the relevant Union harmonization legislation:

2014/30/EU	EMC-Regulation (Norm: EN IEC 61000-6-4:2020-10-01, DIN EN IEC 61000-6-2:2019-11)
2011/65/EU	RoHS Directive including RoHS 2 acc. to 2015/863/EU (Norm: EN IEC 63000:2018-12)

Note: the products mentioned were classified according to the following norm

DIN EN 60825-1:2022-07 "Safety of laser products - Part 1: Equipment classification and requirements", Please note the information in the product documentation



13 Disposal



The ZQ1 MagicLine is an electronic device that should not be disposed of in regular waste bins. The disposal of the product must comply with the EU Directive WEEE 2002/96/EG.

14 Returns

At Z-LASER, you can return purchased electronic devices through our RMA process. You can find the form and detailed information about the process at:

<https://z-laser.com/service/kundenservice/rma/>

There is NO obligation to return devices to Z-LASER. Product Care Instructions

To maximize the lifespan of your Z-LASER products, regular maintenance and care are recommended. Here are some general product care tips:

1. **Regular Cleaning:** Keep the devices clean by wiping them with a soft, dry cloth. Avoid using harsh chemicals or abrasive materials.
2. **Proper Storage:** Store the devices in a cool, dry place when not in use. Avoid exposure to extreme temperatures or humidity.
3. **Handling:** Handle the devices with care to prevent physical damage. Avoid dropping or striking the devices.
4. **Preventive Maintenance:** Schedule regular check-ups and maintenance to ensure optimal performance.
5. **Follow Manufacturer Instructions:** Always adhere to the manufacturer's instructions for use and maintenance.

By following these guidelines, you can ensure that your Z-LASER products remain in good working condition for a longer period.

15 Further Support/Contact

For questions, technical support, or additional information beyond this quick start guide, please refer to the user manual or contact our sales team for personalized assistance.