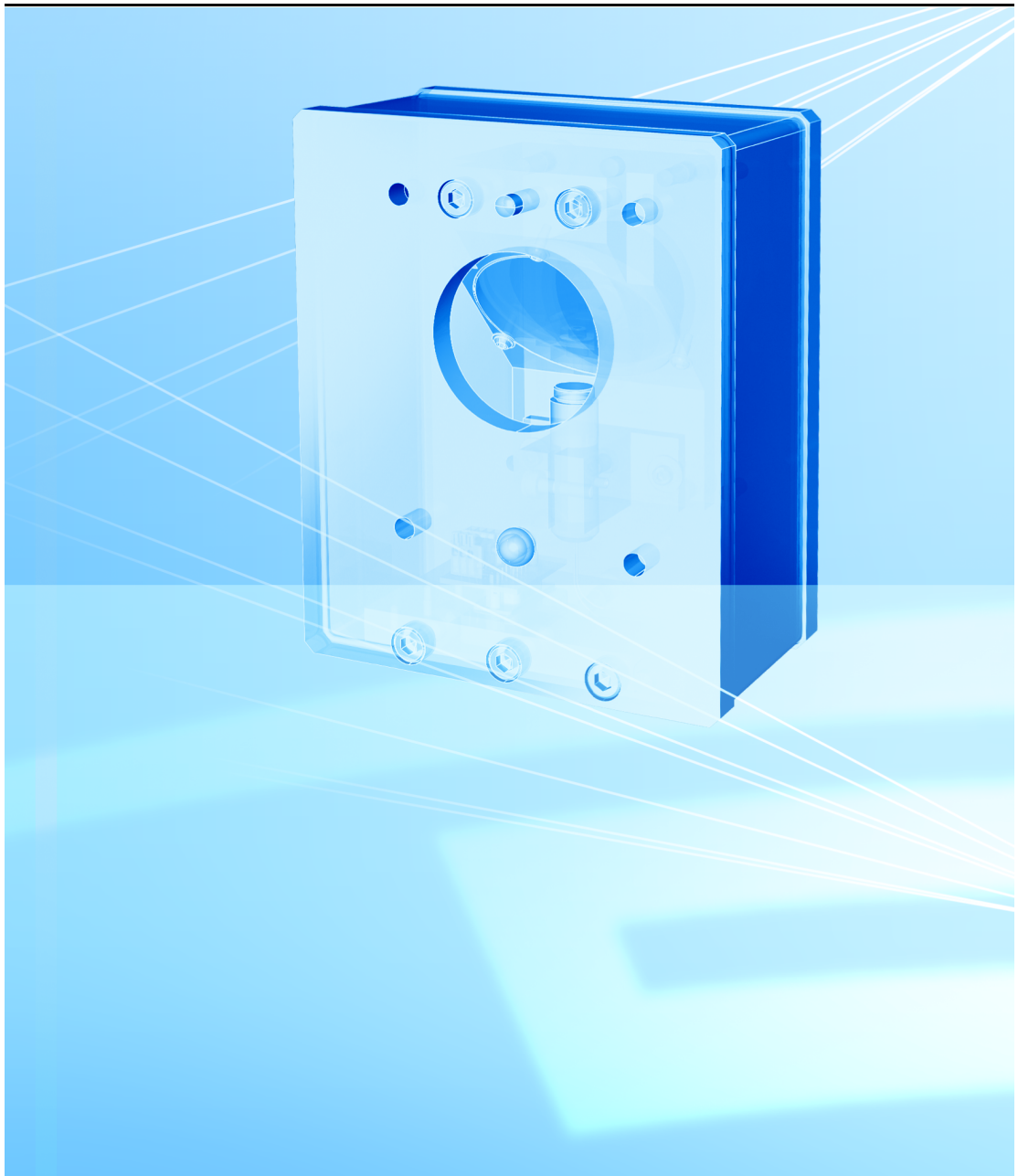

Beam Combiner



This manual has been compiled by RAYLASE for its customers and employees.

RAYLASE reserves the right to change the information contained in this manual without prior notice.

All rights are reserved. Duplication of this manual in whole or in part, particularly by photocopying, scanning or imaging, and reproduction by any means are forbidden without the prior, written consent of RAYLASE.

CONTENTS

1	BASIC INFORMATION	5
1.1	Introduction	5
1.2	Intended Use	5
1.3	Package contents	5
1.4	Warranty	6
1.5	Manufacturer	6
1.6	Customer Service	6
2	BASIC SAFETY INSTRUCTIONS	7
2.1	Laser safety	7
2.2	Goggles and pilot laser	7
2.3	Risks posed by pilot laser	7
2.4	Special hazards caused by optics made of zinc selenide	7
2.5	Signs	8
2.6	Classification of laser devices	8
2.7	Laser area	9
2.8	Conformity with directives	9
3	FUNCTIONAL DESCRIPTION	10
3.1	Connector plug	10
4	INSTALLATION	11
4.1	Preparation	12
4.2	Mount beam combiner	13
4.3	Mount LTM	13
5	CLEANING	14
5.1	Cleaning the housing	14
5.2	Cleaning optics	14
5.2.1	Special notes for optics made of zinc selenide	14
6	DISPOSAL	15

1 BASIC INFORMATION

1.1 Introduction

This manual describes the general handling of the beam combiner. For details of the type you are using, refer to the rating plate.

This manual contains important information on qualified and safe handling. You should therefore familiarize yourself with the content of this manual before using the beam combiner for the first time. In case of any queries, please contact RAYLASE.

The manual must be accessible to anyone who will be involved in developing, installing or using a laser device featuring the RAYLASE beam combiner. If the beam combiner is sold on, this manual or an authorized copy must be passed on with it.

1.2 Intended Use

The beam combiner can be used in combination with the RAYLASE deflection units AS-20/AS-30 for CO₂ lasers with a power of up to 400W. The integrated pilot laser is coupled coaxial into the CO₂ laser. This allows you to set up marking jobs with the pilot laser and to check it during execution.

Before mounting the beam combiner, check whether the wavelength indicated on the type plate corresponds to the wavelength of the CO₂ laser.



Warning:

Do not attempt to observe the laser processing with the unprotected eye. The reflected laser radiation can damage the eye irreparably.

1.3 Package contents

- Beam Combiner

1.4 Warranty

The rights of the customer in respect of any defects in quality or deficiencies in title are governed by the general conditions of business of RAYLASE AG. These conditions are available for review on our website.

For shipping, pack the product in the original packaging or in packaging that provides equivalent protection.

RAYLASE shall not be obliged to repair defects under the following circumstances:

- If persons not authorized by RAYLASE have attempted to repair the product.
- If persons not authorized by RAYLASE have modified the product.
- If the product has been used improperly.
- If the product has been connected to incompatible devices.
- If the product has been damaged because of inadmissible high laser power or focusing the laser on optical surfaces.
- If the product has been damaged because of unqualified cleaning of the optical surfaces.
- If the warranty period is expired.

Note: No implicit guarantee or warranty of suitability for specific purposes has been made. RAYLASE is not responsible for damages arising from use of the product. Individual assemblies or other assemblies manufactured by RAYLASE may be subjected to separate warranty conditions. Refer to corresponding manuals for information.

1.5 Manufacturer

RAYLASE AG
Argelsrieder Feld 2-4
82234 Wessling
Germany
Tel.: +49 (0) 81 53 - 88 98 - 0
Fax: +49 (0) 81 53 - 88 98 - 10
<http://www.raylase.de>
E-mail: info@raylase.de

1.6 Customer Service

The RAYLASE customer service is available for your problems either in respect to the beam combiner or this manual. Before calling the customer service, please make sure you have referred to any appropriate sections in the manuals on the supplied CD, that may answer your question.

If you need further assistance call RAYLASE customer service, Monday through Friday between 8 A.M. and 5 P.M. (Central European Time).

Germany (Wessling)
+49 (0) 81 53 - 88 98 - 0
E-Mail: support@raylase.de

... ask for the customer service

2 BASIC SAFETY INSTRUCTIONS

2.1 LASER SAFETY

The user is responsible for safe operation and for safeguarding the surrounding area against hazards that can be caused by laser radiation. OEM customers must ensure compliance with all local and national regulations.

2.2 Goggles and pilot laser

The pilot laser is in the visible wavelength range. Please note that the CO₂ protection goggles do not protect against the radiation of the pilot laser.

2.3 Risks posed by pilot laser

The intensity of the pilot laser exceeds the intensity of a harmless laser pointer approximately by factor 16. The pilot laser falls under protection class 3B. At this intensity the eye-blink reflex is not sufficient to protect the eye effectively. Therefore, never look directly into the pilot laser. Note that also the reflected laser beam is dangerous to the eyes. Wear protection goggles, which also protect against the radiation of the pilot laser.

2.4 Special hazards caused by optics made of zinc selenide

Zinc selenide optics can be destroyed by improper loading. This can lead to release of dust with hydrogen selenide and selenium dioxide. These dusts can cause cancer, are toxic if swallowed and very toxic by inhalation.

Please observe the specified maximum applicable laser power in the data sheet.

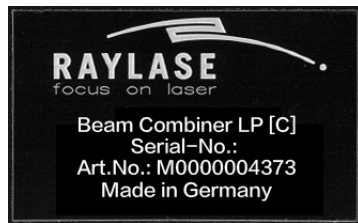
Please note also, that soiled optics strengthen the absorption of laser power and thereby increase the risk of destruction of the optics.

Therefore it is essential to ensure suitable suction in the production environment. In addition, the outer protective glass of the F-Theta lens must be checked for dirt regularly and cleaned if necessary. For non-removable deposits and after wear, which is caused by frequent cleaning, the protective glass of the F-theta lens should be replaced.

(⇒ page 14, Special notes for optics made of zinc selenide)

2.5 Signs

The following signs must be attached to the beam combiner. These signs may not be removed. Signs that have become illegible must be replaced.



The rating plate and the identification code printed on it allow the determination of the beam combiner type. The serial number and the part number are also used to identify the beam combiner.



The CE symbol confirms the beam combiner's compliance with European directives. It indicates that the beam combiner is approved for free trade within the EU.



The CO₂ beam coupler is equipped with an optical component made of ZnSe.

Also note (⇒ page 7, Special hazards caused by optics made of zinc selenide).

2.6 Classification of laser devices

The beam combiner can be fitted on various laser devices. Every laser device is assigned to a particular danger class, which must be specified at the point where laser radiation is emitted, e.g. by using a warning sign. The following classifications are defined in DIN EN 60825-1:

Class	Description
1	The accessible laser radiation is not dangerous under reasonable foreseeable conditions.
1M	The accessible laser radiation is in the wavelength range of 302.5nm to 4,000nm. The accessible laser radiation is not dangerous to the eyes, as long as the cross-section is not reduced by optical instruments (magnifying glasses, lenses, telescopes).
2	The accessible laser radiation is in the visible spectrum (400nm to 700nm). Short-term exposure (up to 0.25s) is not dangerous to the eyes. Additional radiation components outside the wavelength range from 400nm-700nm comply with the requirements for class 1.
2M	The accessible laser radiation is in the visible spectrum from 400nm to 700nm. Short-term exposure (up to 0.25s) is not dangerous to the eyes, as long as the cross-section is not reduced by optical instruments (magnifying glasses, lenses, telescopes). Additional radiation components outside the wavelength range from 400nm-700nm comply with the requirements for class 1M.
3R	The accessible laser radiation is in a wavelength range of 302.5nm to 10,600nm and is dangerous to the eyes. The power or energy is a maximum of five times the limit for permissible class 2 radiation in the wavelength range from 400nm to 700nm.
3B	The accessible laser radiation is dangerous to the eyes and frequently to the skin.
4	The accessible laser radiation is extremely dangerous to the eyes and dangerous to the skin. Even diffuse scattered radiation can be dangerous. The laser radiation can cause fires or a risk of explosion.

2.7 Laser area

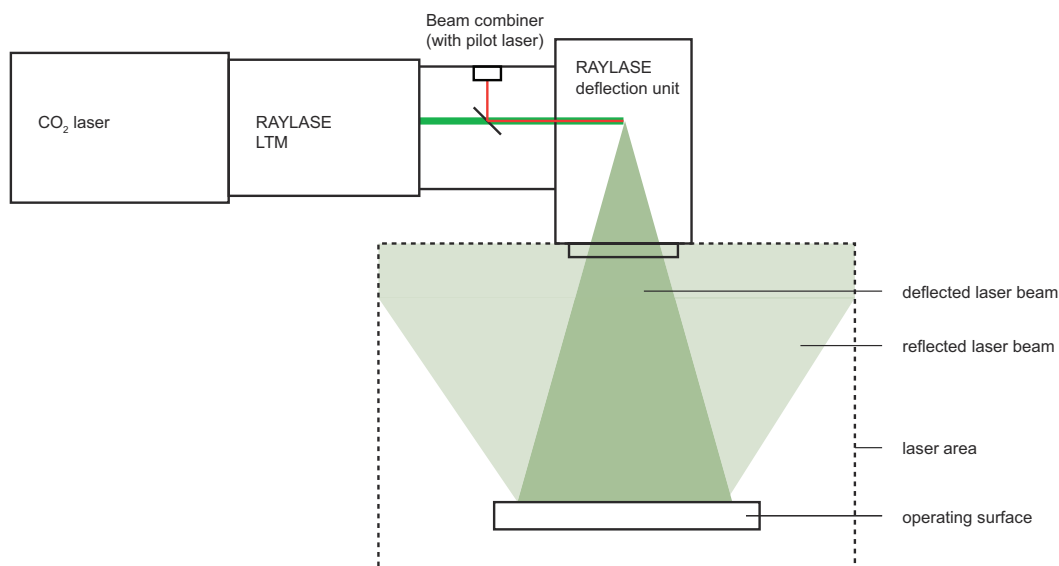
For the purposes of accident prevention, the laser area is defined as the area in which the maximum permitted radiation value can be exceeded. This is generally applicable for class 3B, 3R and 4 lasers. For class 1 to 2M laser devices, a laser area can be produced by focusing the laser beam.

The laser area is the area that can be exposed to radiation covering the entire radiation angle of the subsystem and including the reflection from objects. Note that even matte and dark surfaces can reflect laser radiation and that a laser beam which has been reflected several times can still be dangerous.

The laser area must be indicated by corresponding warning signs or lamps and protected by appropriate shading and interlock switches.

No flammable or explosive objects or liquids should be located in the laser area, since they could be ignited by the energy of the laser beam.

This operating manual interprets a selection of accident prevention regulations from the point of view of using laser subsystems in industrial plants. However, the applicable local and national standards, rules and regulations are binding.



2.8 Conformity with directives

The beam combiner conforms to the requirements of the following directives:

- EU Directive 2004/108/EC (EMC)
- WEEE Directive 2012/19/EC
- RoHS II 2011/65/EU

For details of conformity to other directives, contact RAYLASE.

3 FUNCTIONAL DESCRIPTION

3.1 Connector plug

The beam combiner is connected to a RAYLASE control card by the following connector:

PIN	Signal	PIN	Signal
1	nc	6	+5V
2	I /Modulation	7	I /Disable
3	nc	8	nc
4	I nc	9	nc
5	I GND		

I = Input, nc = not connected

The pilot laser can be operated in two ways:

Permanent on

PIN 2 is set to GND. Thus, the pilot laser is switched on permanently and the preview mode of weldMARK can be used. The pilot laser may calibrated as described in the weldMARK manual.

Synchronous with CO₂ Laser

PIN 2 is connected to the signal "LM gate" of the control card. Thus, the pilot laser is synchronously switched synchronous with the marking laser. When PIN 7 is set to GND, the pilot laser is switched off.

4 INSTALLATION

With the following steps, the beam combiner will be mounted between deflector and LTM.



Warning:

- The laser beam can cause severe injury to the eyes and the skin. Note that even apparently matte objects can reflect the laser radiation. All personnel in the room must wear appropriate laser protection goggles and, if necessary, protective clothing.
- Never look directly into the laser beam, even when wearing protective goggles.
- The laser must be switched off during installation.
- We recommend that the laser area is completely protected by an appropriate working chamber. If this is not possible, appropriate protective measures for the laser class must be implemented.
- The laser device must be of sufficient quality that the laser beam can only be emitted at the beam output on the deflection unit.
- The "Laser radiation" accident prevention regulations (BGV B2) must be observed.
- The optical components may only be touched when wearing suitable cotton gloves.
- The power density of the input laser radiation may not exceed the maximum permissible power density of the deflecting mirror.
- We recommend performing all tests with a danger class 1 or 2 laser to minimize the risk of injury. If this is not possible, the laser used must be set to the lowest possible power. This setting must be secured against accidental adjustment.

4.1 Preparation

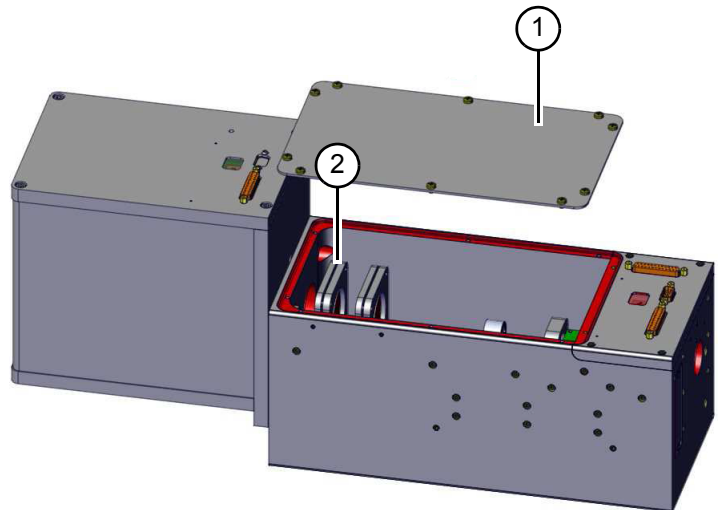


Caution: dust-sensitive optics

- Make sure that the work is carried out in a dust-free environment. Upon exposure of the laser beam, dust may burn in the optics and destroy it.

Fig. 1
Dismantle LTM

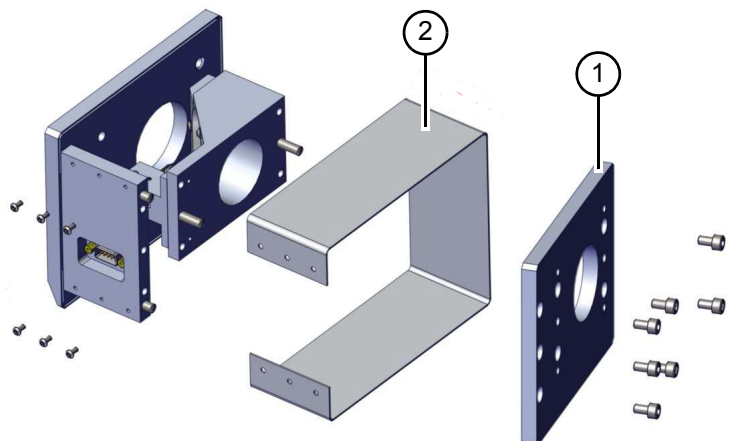
- (1) Cover
- (2) Focusing lens(es)



- Remove the cover (1) of the LTM.
- Remove according to the model one or two focusing lenses (2).
- Remove the screws that secure the LTM to the deflection unit or to the spacer (depending on model).
- If necessary, remove the spacer too.

Fig. 2
Preparing the
beam combiner

- (1) Mounting plate
- (2) Cover



- Remove the mounting plate (1) from the beam combiner.
- Remove the cover (2).

4.2 Mount beam combiner

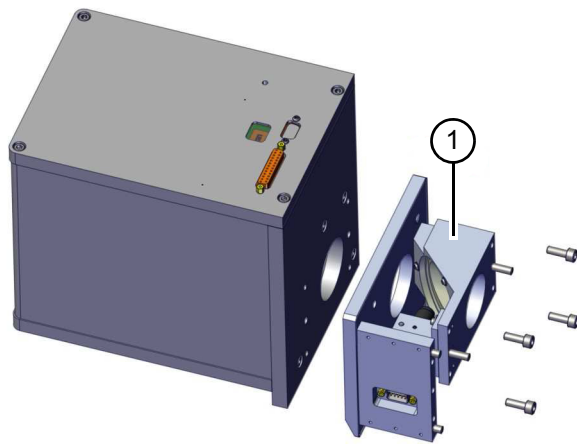


Fig. 3
Mount beam combiner

- Mount the opened beam combiner (1) on the deflection unit.
- Mount the cover of the deflection unit (see Fig. 1).
- Remove, if existing, the protective film of the mounting plate.
- Mount the mounting plate.

4.3 Mount LTM

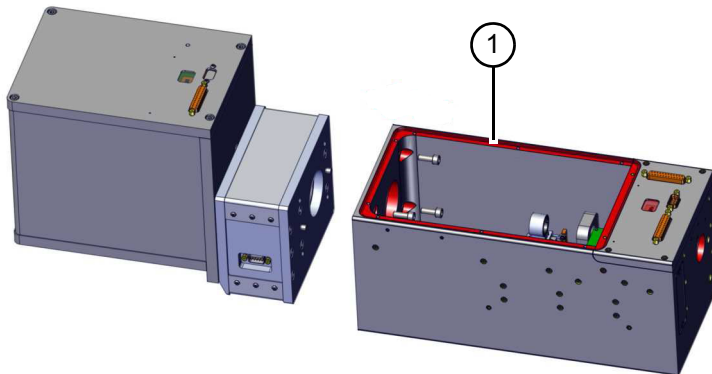


Fig. 4
Mount LTM

- Mount the LTM to the beam coupler.
- Mount the previously removed focusing lenses (see Fig. 1).
- Mount the LTM cover.

5 CLEANING



Warning:

The laser beam can cause severe injury to the eyes and the skin. Before cleaning, make sure that the laser device is switched off and secured against accidentally being switched on.

5.1 Cleaning the housing

The housing of the beam combiner can be cleaned using a duster. If it is very dirty, the duster can be moistened with a light and non-aggressive cleaning solution (e.g. soap solution).

5.2 Cleaning optics

The optical surfaces are very sensitive and should only be cleaned by experienced persons. We strongly recommend sending the beam combiner in to RAYLASE for the mirror to be cleaned.

5.2.1 Special notes for optics made of zinc selenide



Warning:

If the deflection unit is provided with one of the adjacent signs, there is a health hazard coming from the material of the optical components.

Behaviour if optics may be or are actually destroyed

- Turn the laser device off immediately!
- Leave the room for at least 30 minutes!
- Under no circumstances remove the protective glass or the F-Theta lens of the deflection unit, to check a possible destruction.
- In the deflection unit, toxic dust or fragments may be created.
- If the deflection unit has nevertheless been opened and fragments have been fallen out, the fragments must be collected wearing appropriate protective clothing and respirators and disposed of as a hazardous substance according to the local regulations.
- Label the defective deflection unit with a clear warning and send the unit airtight and well packaged to RAYLASE.
- The persons commissioned with the dismantling of the deflection unit must wear suitable protective clothing and respirators.
- The room in which the zinc selenide optics has been destroyed, must be cleaned, decontaminated and ventilated sufficiently.
- Wear gloves and a surgical mask for the following steps!
- Gather all the broken pieces carefully and pack them in a sealed plastic container.
- Clean all contaminated components and surfaces with a damp cloth and pack the cloth in a sealed plastic container.
- Send the container to your supplier. He is responsible for the proper disposal of the material.

Hazardous properties of zinc selenide

With the destruction of the optics made of zinc selenide, toxic dusts may be generated with hydrogen selenide and selenium dioxide. These dusts can cause cancer, are toxic if swallowed and very toxic by inhalation.

In order to improve the optical properties of the material, zinc selenide is often provided with an anti-reflective coating, which can contain thorium fluoride. Thorium is an α -emitter and weakly radioactive. It is potentially hazardous to health if inhaled or swallowed. Since the thorium-containing coating is embedded between layers of non-radioactive layers, there is no risk for the user under normal circumstances.

6 DISPOSAL

For the disposal of the beam combiner, note local policies, regulations and laws.

Index

B

Basic safety instructions 7

C

Classification of laser devices 8

Cleaning 14

Conformity with directives 9

Connector plug 10

Customer service 6

G

Goggles and pilot laser 7

I

Intended Use 5

L

Laser area 9

Laser safety 7

M

Manufacturer 6

P

Package contents 5

R

Risks posed by pilot laser 7

S

Sicherheitshinweise 5

Signs 8

W

Warranty 6

Z

Zinc selenide 7, 14