

Technical Instruction

FISBA READYBeam™
Compact multi-wavelength laser source



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1 Safety

1.1 Explanation of symbols



This symbol is used for all points in these operating instructions to which special attention is to be paid so that all directives, regulations, instructions and the correct work sequence are observed, and to prevent minor or serious damage to the laser system or plant.

1.1.1 General safety instructions

The operating instructions and the safety instructions are to be read and observed prior to installation and commissioning! The operating instructions must be read, understood and followed by the operators responsible for the unit. Along with the instructions in these operating instructions, also observe the generally applicable safety and accident prevention regulations! All work on installation and commissioning as well as all maintenance is to be performed by appropriately qualified personnel. National accident prevention regulations, EN and IEC standards are to be observed. Appropriately qualified personnel in the context of these basic safety instructions are persons who are familiar with the fitting, installation, placing in operation and operation of the product and have qualifications appropriate to their task.

1.1.2 Laser safety

The unit is a class 3B laser device. Both the direct beam and its reflections from diffuse reflective surfaces are dangerous. The unit emits strong power beams in the visible spectral range (approx. 400 nm to 700 nm, for more detailed information see the data sheet, page 14). The radiation can cause irreversible damage to the eyes if the necessary protective measures are not taken.

1.1.3 Laser area



The laser area is the area in which the values for the maximum permissible irradiation can be exceeded. Here the possibility of unintentional deflection of the laser beam is also to be taken into account. If operational equipment other than that given in this manual or another procedure is used, dangerous exposure to the radiation may result.

Laser system screened inside a protective cover

By using suitable screening it can be ensured that people are not exposed to the laser radiation. In this way the laser class is reduced and it is possible to work with the closed arrangement without additional limitations or further measures.

However, in this case the following requirements apply to the protective cover:

- The protective cover must be appropriate to adequately shield the laser radiation. It is therefore necessary to use laser safety glass or laser safety film for viewing windows.
- The cover itself as well as any doors or flaps in the cover must be protected using the interlock circuit that automatically shuts down and inhibits the laser immediately on intentional or unintentional opening.

If the interlock circuit is disabled for service or maintenance work on the system with the cover open, the laser area is enlarged again and the regulations in the next section «Presence of persons in the laser area» apply.

Presence of persons in the laser area

In the laser area, people are subject to hazards, in particular ocular. Therefore the following measures must be taken and the following safety regulations observed:

- The room must have an emergency exit.
- The room must be optically screened from the environment (e.g. laser safety film on the windows).
- The laser area is to be kept as small as possible, to be bounded by suitable screening and protected against access by unauthorized persons. The number of persons in the laser area should be reduced to the minimum.
- There must be a warning device on all entrances to the room that indicates the laser radiation hazard.
- If the entry doors are not protected using the interlock circuits, opening the doors easily from the outside must be impossible to prevent thoughtless entry.
- All persons who are in the laser area during operation must be informed about the dangers of the laser radiation.
- Laser safety glasses/goggles must be worn in the laser area. The operating organisation must ensure that suitable safety glasses/goggles are available. The glasses/goggles are selected in accordance with DIN EN 207. Please see the data sheet on the unit for the actual wavelength of your laser. Hereinafter, the term safety glasses is always used to refer to suitable laser safety glasses/goggles. **Caution:** in some circumstances your laser safety glasses/goggles may not protect you from a powerful red pilot beam.
- There must not be any potentially explosive substances in the laser area. Easily inflammable substances may catch fire.
- Glossy reflective equipment must be either removed from the laser area or covered. Windows and reflecting walls are also to be covered with material with low inflammability.

1.2 Sécurité

1.2.1 Explication des symboles



Dans ce mode d'emploi, ce symbole indique qu'une attention particulière est requise, afin d'observer l'ensemble des directives, réglementations et consignes, ainsi que la séquence de travail correcte pour éviter tous dommages mineurs ou importants au système laser ou à l'installation.

1.2.2 Consignes de sécurité générales

Le mode d'emploi et les consignes de sécurité doivent être lus et observés rigoureusement avant l'installation et la mise en service. Les opérateurs responsables de l'unité doivent lire, comprendre et suivre le mode d'emploi. Outre les consignes de ce mode d'emploi, il convient également d'observer les réglementations relatives à la sécurité et à la prévention des accidents applicables en général. L'installation, la mise en service et l'entretien doivent être réalisés par un personnel qualifié de manière appropriée. Les réglementations nationales concernant la prévention des accidents et les normes EN et CEI doivent être observées. Dans le cadre de ces consignes de sécurité élémentaires, le personnel dûment qualifié désigne des personnes qui ont des connaissances en montage, installation, mise en service et fonctionnement du produit et qui ont les qualifications appropriées.

1.2.3 Sécurité du laser

L'unité est un dispositif laser de classe 3B. Le faisceau direct et les réflexions des surfaces réfléchissantes diffuses sont dangereux. L'unité émet des faisceaux de forte puissance dans le domaine spectral invisible, visible et infrarouge (environ 400 nm-700 nm, voir fiche technique pour en savoir plus, page 14). Le rayonnement peut endommager les yeux de manière irréversible, si les mesures de protection nécessaires ne sont pas correctement appliquées.

1.2.4 Zone laser



La zone laser est la zone dans laquelle les valeurs du rayonnement maximum autorisé peuvent être dépassées. La possibilité d'une déviation accidentelle du faisceau laser doit également être prise en compte.

Si un autre équipement que celui indiqué dans ce manuel ou une autre procédure est utilisé, une exposition dangereuse au rayonnement peut avoir lieu.

Système laser protégé dans une enceinte

Une protection adaptée garantit que les personnes ne sont pas exposées au rayonnement laser. Ainsi, la classe du laser est baissée et il est possible de travailler avec la configuration fermée, sans limitations ou mesures supplémentaires.

Toutefois, dans ce cas, les exigences suivantes s'appliquent à l'enceinte de protection:

- L'enceinte de protection doit être adaptée de sorte à enfermer correctement le rayonnement laser. Il est donc nécessaire d'utiliser un verre ou un film de sécurité laser pour les fenêtres.
- L'enceinte, ainsi que les portes ou volets doivent être équipés d'un circuit de verrouillage, qui éteint automatiquement le laser, en cas d'ouverture volontaire ou non.

Si le circuit de verrouillage est désactivé pour l'entretien ou la maintenance du système avec l'enceinte ouverte, la zone laser est élargie et les instructions de la section suivante «Présence de personnes dans la zone laser» s'appliquent.

Présence de personnes dans la zone laser

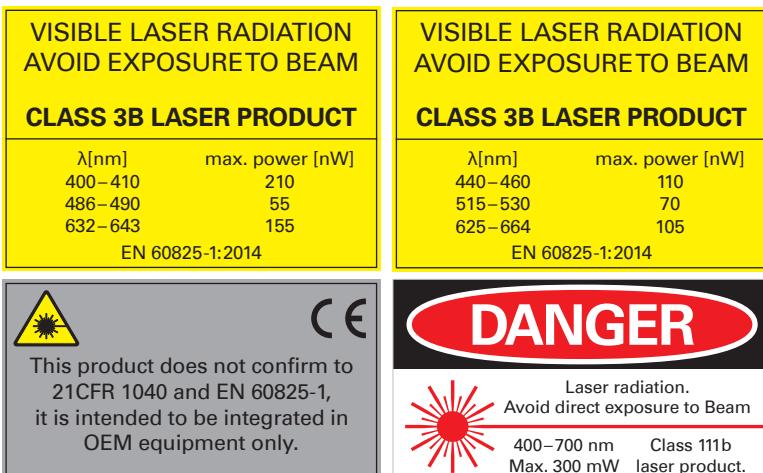
Toute personne se trouvant dans la zone laser s'expose à des risques, notamment oculaires. Il convient donc de prendre les mesures nécessaires suivantes et d'observer les dispositions de sécurité qui suivent:

- La pièce doit avoir une issue de secours.
- La pièce doit être protégée (p. ex. film de sécurité laser sur les fenêtres).
- La zone laser doit être réduite au minimum, délimitée par une protection adaptée et protégée contre tout accès non autorisé. Le nombre de personnes présentes dans la zone laser doit être réduit au minimum.
- Un dispositif d'avertissement doit être installé au niveau de toutes les entrées de la pièce, pour signaler clairement les risques du rayonnement laser.
- Si les portes d'accès ne sont pas protégées au moyen de circuits de verrouillage, leur ouverture depuis l'extérieur doit être impossible, afin d'empêcher toute entrée inconsidérée.
- Toute personne se trouvant dans la zone laser, pendant le fonctionnement de l'unité doit être informée des dangers du rayonnement laser.
- Le port de lunettes de protection laser est obligatoire pour toutes les personnes dans la zone laser. L'organisation opérationnelle doit veiller à mettre à disposition des lunettes de protection adaptées. Les lunettes sont choisies conformément à la norme DIN EN 207. Reportez-vous à la fiche technique de l'unité pour connaître la longueur d'onde réelle de votre laser. Les termes «lunettes de protection» utilisés ci-après font toujours référence aux lunettes de protection laser adaptées. Attention : dans certains cas, vos lunettes de protection laser peuvent ne pas vous protéger correctement contre un puissant faisceau pilote rouge.
- Il ne doit pas y avoir de substances potentiellement explosives dans la zone laser. Les substances facilement inflammables peuvent facilement prendre feu.

- Les équipements brillants et réfléchissants doivent être enlevés de la zone laser ou recouverts de manière appropriée. Les fenêtres et les murs réfléchissants doivent également être recouverts d'un matériau de faible inflammabilité.

1.3 Warning and information labels

The following warning labels are fitted to laser and processing head:



1.4 Correct and specified use of the unit

It is forbidden to commission the laser system until it has been ensured that the machine or plant in which the laser system has been fitted complies with the applicable safety regulations. The organisation operating the plant is solely liable for any damage caused by incorrect use of the unit. The organisation operating the system is responsible for the correct conditions in relation to operation, maintenance and repair. The only personnel to be tasked with operation, maintenance and repair are personnel who have been adequately instructed in the function of the laser system and who have also been instructed specifically on the dangers and risks of incorrect handling of the system.

1.5 Warranty conditions

The warranty period is 12 months from delivery. The warranty covers the entire laser module. The warranty will become void on the

- unauthorized opening of the unit's components
- operation of the unit in an unauthorized configuration
- improper use, storage or transport (e.g. vibration, temperature shock, the action of frost)

1.5.1 Limits of the warranty

No warranty of the suitability of the product for specific applications is provided. FISBA is not liable for indirect, direct or consequential damages caused by the use of this product.

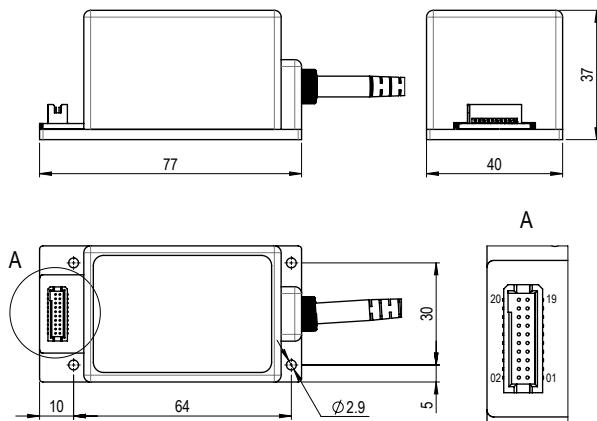
2 Technical system



The laser module emits laser radiation with different wavelengths. Combination of different laser diodes can emit radiation in the UV, VIS and/or NIR range. The correct combination is documented within the data sheet, see page 14.

2.1 Laser module

Dimensions of the laser module in mm:



Connector: Samtec SFSD-10-28G24.00SR

Pin assignment: documented in the appendix (Table 1 on page 12)

2.2 Installation and commissioning



Note that the laser module with electronic driver is not a product for direct use. Security elements, such as interlock, and emergency switch are not included in the laser module. If the laser module is used as part of system or product, then the responsibility for safety lies with the product development team of the product. When operating the laser module, the laser safety regulations must be observed.

2.2.1 Unpacking and checking for visible damage

Check the completeness of the delivery and check that all the items supplied are in good condition. In case of errors please contact FISBA AG (readybeam@fisba.com). If possible, keep the packaging in which the laser system was supplied. It will then be possible to pack the unit in its original packaging and transport it safely in case of repair.

2.2.2 Installation

The laser module can be mounted with screws on a flat bottom plate. The bottom plate should be cooled and the heat transfer should be at least 7W to hold the module on a stable operating temperature. The laser module READYBeam is TEC-controlled.



Incorrect cooling effects the laser power and can destroy the laser diodes. During assembly of the laser module on a plane cooling surface, attention is required so that no tension can apply to the casing. Tension influences the beam quality very strongly. The connection must be handled carefully.

2.2.3 Operating the FISBA READYBeam™

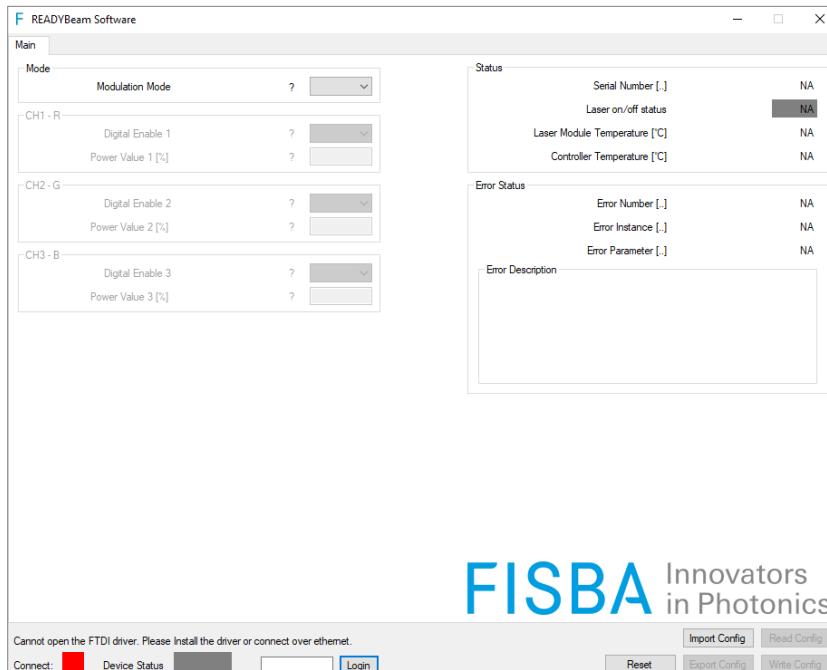
- The safety regulations must be carefully observed
- A power supply between +12 and +24V with max. 4 Ampere is needed to start the READYBeam
- FISBA READYBeam™ can be started digital with the software application and RS485 interface or analog based controlled

2.2.4 Digital operating with the software application

- Visit fisba.com/readybeam-software to download the software
- Unpack the files from downloaded folder
- Start «RGB Service Software Setup.msi» and follow the installation instructions
- You need an USB - RS485 interface cable for the digital operating mode
See the details in the appendix (Figure 1 on page 13)

- Connect the USB plug to your laptop and the RS485 plug to the laser module interface cable
- Connect the power supply to the interface cable
- Connect the interface cable to the laser module connector
- Start the READYBeam software
- Now it is possible to control the lasers via the software

2.2.5 Software interface



1. Set Modulation Mode: choose «Digital»
2. Set Power Value 1 (red), Power Value 2 (green) and Power Value 3 (blue): values in % of the max. laser power
3. Switch the Laser on/off with Digital Enable 1, 2 or 3
4. Enter the command with «Write Config» Button

The READYBeam software is provided for download at fisba.com/readybeam-software

2.2.6 Analog controlled operation

- Connect the power supply and signals according the pin configuration on Table 1, page 12
- Connect the Interface cable at READYBeam
- Switch ON +12/+24V Power

Appendix

Pin configuration and power values

Connector: Samtec SFSD-10-28G24.00SR
Enable Laser: low = 0V, high = 3.3V
Analog In: 0V ... 3.3V → 10% ...100% of Laser power
Power: +12V ... + 24V max. 4A

Pin 1 is marked on the connector with arrow (not notch)	
Pin 1	Analog In- Laser red
Pin 2	Analog In+ Laser red
Pin 3	Analog In- Laser green
Pin 4	Analog In+ Laser green
Pin 5	Analog In- Laser blue
Pin 6	Analog In+ Laser blue
Pin 7	Gnd
Pin 8	Enable Laser red
Pin 9	Enable Laser green
Pin 10	Enable Laser blue
Pin 11	RS 485 B
Pin 12	RS 485 A
Pin 13	Gnd
Pin 14	Gnd
Pin 15	Gnd
Pin 16	Gnd
Pin 17	Power +12V ... +24V
Pin 18	Power +12V ... +24V
Pin 19	Power +12V ... +24V
Pin 20	Power +12V ... +24V

Table 1



Figure 1

Data sheet FISBA READYBeam™

Technical Specifications

Optical parameters	bio			ind		
Wavelengths	405 nm	488 nm	638 nm	450 nm	520 nm	660 nm
Min. optical power from fiber	≥ 40 mW	≥ 30 mW	≥ 40 mW	≥ 40 mW	≥ 30 mW	≥ 40 mW
NA fiber			0.12			
Laser class			3B			
Fiber connector			FC/APC			
Fiber type	Single-mode with or without polarization maintaining properties					
Electrical parameters						
Power supply	12 V ... 24 V					
Modulation	ON / OFF Enable up to 1 MHz Set power input bandwidth up to 20 kHz (0..3.3 V -> 10%..100%)					
Operation mode	cw / modulated					
Digital interface	RS 485 (ON / OFF Modulation up to 100 Hz)					
Mechanical parameters						
Dimensions length x width x height	77 mm x 40 mm x 37 mm					
Weight	≤ 200 g					
Environmental conditions						
Operation temperature	15°C – 40°C					
Storage temperature	-10°C ... +60°C					
Thermal properties	TEC controlled					
Heat dissipation	~ 7 watts					

FISBA AG

Rorschacher Str. 268
9016 St.Gallen
Switzerland

FISBA Photonics GmbH

Schwarzschildstrasse 10
12489 Berlin
Germany

FISBA LLC

6296 E. Grant Rd Suite 150
Tucson, AZ 85712
United States

FISBA (Shanghai) Co., Ltd.

9F-4
World Square Building, No. 855
Pudong South Rd.
Shanghai
China