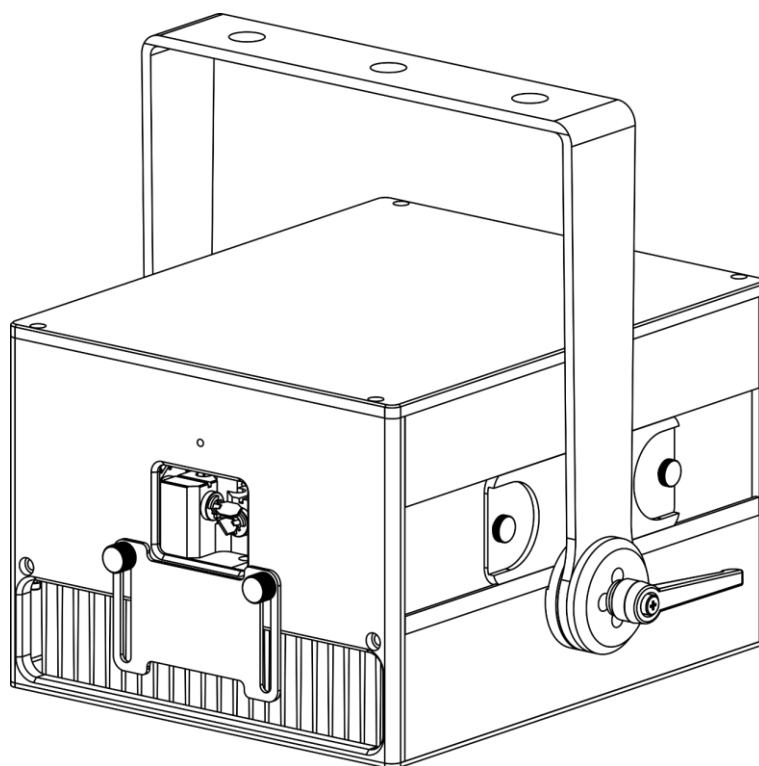




## USER MANUAL



ENGLISH

# Solaris 5.5 incl. FB4

# V1

Product code: 51363

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## 1. Introduction

### 1.1. Before Using the Product



#### Important

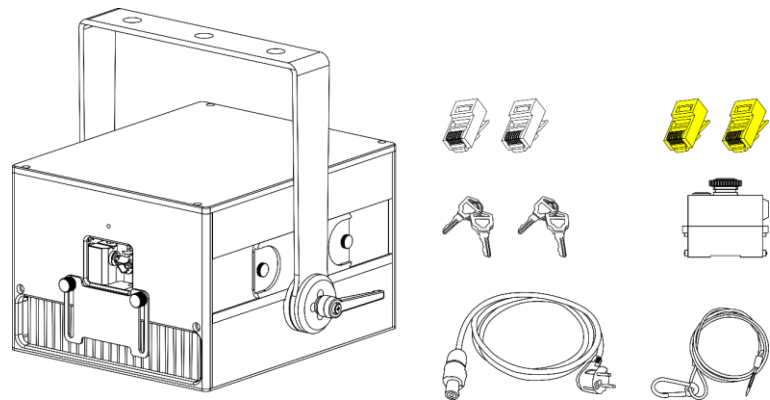
**Read and follow the instructions in this user manual before installing, operating or servicing this product.**

The manufacturer will not accept liability for any resulting damages caused by the non-observance of this manual.

After unpacking, check the contents of the box. If any parts are missing or damaged, contact your Highlite International dealer.

Your shipment includes:

- Showtec Solaris 5.5 incl. FB4
- Seetronic power cable
- Remote interlock
- 2 sets with 2 keys for key switch
- 2 RJ45 connectors (shunt)
- 2 RJ45 connectors (yellow)
- Safety cable
- User manual



**Fig. 01**

### 1.2. Intended Use

This device is intended for professional use as a laser projector to produce laser displays and show effects. It is suitable only for indoor installation. This device is not suitable for households.

Any other use, not mentioned under intended use, is regarded as non-intended and incorrect use.

### 1.3. Product Lifespan

This device is not designed for permanent operation. Disconnect the device from the electrical power supply when the device is not in operation. This will reduce the wear and will improve the device's lifespan.

### 1.4. Text Conventions

Throughout the user manual the following text conventions are used:

- References: References to chapters and parts of the device are in bold lettering, for example: "Refer to **2. Safety**", "turn the **adjustment screw (02)**"
- 0–255: Defines a range of values
- Notes: **Note:** (in bold lettering) is followed by useful information or tips

### 1.5. Acronyms and Abbreviations

3D	Three-dimensional	LED	Light-Emitting Diode
AC	Alternating Current	LSO	Laser Safety Officer
EN	European Standard ( <i>Europäische Norm</i> )	MPE	Maximum Permissible Exposure










IEC International Electrical Committee  
 ILDA International Laser Display Association  
 IP Ingress Protection

NEN Dutch Standard (*Nederlandse Norm*)  
 NOHD Nominal Ocular Hazard Distance  
 OLED Organic Light-Emitting Diode

### 1.6. Symbols and Signal Words

Safety notes and warnings are indicated throughout the user manual by safety signs.

Always follow the instructions provided in the user manual.

-  **DANGER** Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.
-  **WARNING** Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.
-  **CAUTION** Indicates a potentially hazardous situation, which, if not avoided, may result in minor or moderate injury.
-  **Attention** Indicates important information for the correct operation and use of the product.
-  **Attention** Indicates that eye protection must be used.
-  **Important** Read and observe the instructions in this document.
-  **Electrical hazard**
-  **Laser beam hazard**
-  Provides important information about the disposal of this product.

### 1.7. Laser Hazard Labels

This device is a class 4 laser device and is provided with the following labels and hazard warnings. Refer to Fig. 02 for the position of the labels.



**DANGER**  
 Avoid exposure – laser radiation is emitted from this aperture



**DANGER**  
 Class 4 Laser according to NEN-EN-IEC 60825-1:2014  
 Avoid eye or skin exposure to direct or scattered radiation



**DANGER**  
 Class 4 Laser when open  
 Avoid eye or skin exposure to direct or scattered radiation

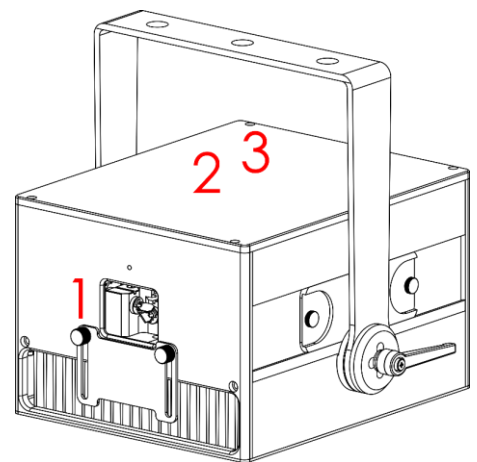


Fig. 02

## 1.8. Symbols on the Information Label

This product is provided with an information label. The information label is located at the top panel of the device.

The information label contains the following symbols:



This device is designed for indoor use.



This device shall not be treated as household waste.



This device falls under IEC protection class I.



CAUTION: Risk of electric shock. Disconnect input power before opening.  
WARNING: This unit must be earthed.



Warning: Laser beam



Read and follow the instructions in this user manual before installing, operating or servicing this product.

## 2. Safety



### Important

**Read and follow the instructions in this user manual before installing, operating or servicing this product.**

The manufacturer will not accept liability for any resulting damages caused by the non-observance of this manual.

### 2.1. Warnings and Safety Instructions



#### DANGER

**Danger for children**

For adult use only. The device must be installed beyond the reach of children.

- Do not leave various parts of the packaging (plastic bags, polystyrene foam, nails, etc.) within children's reach. Packaging material is a potential source of danger for children.



#### DANGER

**Electric shock caused by dangerous voltage inside**

There are areas within the device where dangerous touch voltage may be present.

- Do not open the device or remove any covers.
- Do not operate the device if the covers or the housing is open. Before operation, check if the housing is firmly closed and all screws are tightly fastened.
- Disconnect the device from electrical power supply before service and maintenance, and when the device is not in use.



#### DANGER

**Electric shock caused by short-circuit**

This device falls under IEC protection class I.

- Make sure that the device is electrically connected to ground (earth). Connect the device only to a socket-outlet with ground (earth) connection.
- Do not cover the ground (earth) connection.
- Do not bypass the thermostatic switch or fuses.
- For replacement use fuses of the same type and rating only.
- Do not let the power cable come into contact with other cables. Handle the power cable and all connections with the mains with caution.
- Do not modify, bend, mechanically strain, put pressure on, pull or heat up the power cable.
- Make sure that the power cable is not crimped or damaged. Examine the power cable periodically for any defects.
- Do not immerse the device in water or other liquids. Do not install the device in a location where flooding may occur.
- Do not use the device during thunderstorms. Disconnect the device from the electrical power supply immediately.





**WARNING**  
**Laser radiation**  
**Avoid eye or skin exposure to direct or scattered radiation.**

This device is a class 4 laser device according to the classification in NEN-EN-IEC 60825-1:2014. It emits visible radiation in the wavelength range 400–700 nm. Exposure to the direct or scattered laser beam can result in severe eye damage and serious skin injuries.

Check all applicable national and international regulations concerning laser safety before using this device. The user is responsible for the safety of all persons present during the use of the laser device.

- Do not look into the laser beam.
- Do not open the device and do not modify the device.
- Do not use the device if the housing or the optics are damaged.
- Do not point the laser beam at people or animals.
- Make sure that the beam is terminated on non-reflective and non-combustible surface.
- Do not point the laser beam at reflective surfaces such as windows, mirrors and shiny metal.
- Do not operate the device without supervision.



**Attention**  
**Risk of fire**

Can instantly burn materials.

- Do not point the laser beam at flammable materials.



**Attention**  
**Power supply**

- Before connecting the device to the power supply, make sure that the current, voltage and frequency match the input voltage, current and frequency specified on the information label on the device.
- Make sure that the cross-sectional area of the extension cords and power cables is sufficient for the required power consumption of the device.



**Attention**  
**General safety**

- Do not insert objects into the air vents.
- Do not connect the device to a dimmer pack.
- Do not switch the device on and off in short intervals. This decreases the device's life.
- Do not shake the device. Avoid brute force when installing or operating the device.
- Change the aperture glass if it is visibly damaged. Contact your Highlite International dealer for more information, as servicing can be performed only by instructed or skilled persons.
- If the device is dropped or struck, disconnect the device from the electrical power supply immediately.
- If the device is exposed to extreme temperature variations (e.g. after transportation), do not switch it on immediately. Let the device reach room temperature before switching it on, otherwise it may be damaged by the formed condensation.
- If the device fails to work properly, discontinue the use immediately.



**Attention**  
**For professional use only**  
**This device shall be used only for the purposes it is designed for.**

This device is designed to be used as a professional laser projector. Any incorrect use may lead to hazardous situations and result in injuries and material damage.

- This device is not suitable for households.
- This device is not designed for permanent operation.
- This device does not contain user-serviceable parts. Unauthorized modifications to the device will render the warranty void. Such modifications may result in injuries and material damage.



**Attention**  
**Before each use, examine the device visually for any defects.**

Make sure that:

- All screws used for installing the device or parts of the device are tightly fastened and are not corroded.
- The safety devices are not damaged.
- There are no deformations on housings, fixations and installation points.
- The aperture glass is not cracked or damaged.
- The power cables are not damaged and do not show any material fatigue.



**Attention**  
**Do not expose the device to conditions that exceed the rated IP class conditions.**

This device is IP20 rated. IP (Ingress Protection) 20 class provides protection against solid objects greater than 12 mm, such as fingers, and no protection against harmful ingress of water.

## 2.2. Requirements for the User

This product may be used only by instructed or skilled persons. Installation and maintenance can be carried out by instructed or skilled persons. Service shall be carried out only by skilled persons. Contact your Highlite International dealer for more information.

This product may not be used by ordinary persons. Users, operators and installers should have received sufficient training in laser safety to be able to accurately assure that the maximum permissible exposure (MPE) is not exceeded in spectator occupied areas and that the required separations are maintained between spectators and projections that exceed the MPE.

Instructed persons have been instructed and trained by a skilled person, or are supervised by a skilled person, for specific tasks and work activities associated with the operation, installation, service and maintenance of this product, so that they can identify risks and take precautions to avoid them.

Skilled persons have training or experience, which enables them to recognize risks and to avoid hazards associated with the operation, installation, service and maintenance of this product.

Ordinary persons are all persons other than instructed persons and skilled persons.

## 2.3. Laser Safety



### CAUTION

**Use of controls or adjustments, or performance of procedures, other than those specified in the user manual, may result in hazardous radiation exposure.**

Check all applicable national and international regulations concerning laser safety before using this device. In some countries, there may be specific requirements, such as government permissions or notifications of shows, or prohibitions, such as against laser scanning of spectators without appropriate safeguards.

Laser displays and shows, where class 3B and/or class 4 lasers are used, should be supervised by a laser safety officer (LSO). LSOs are trained to evaluate and control laser hazards and are responsible for overseeing the control of laser hazards. An LSO is recommended but not required for laser displays and shows, where only class 1, 1M, 2, 2M and/or 3R lasers are used.

During laser displays and shows the applicable eye and skin maximum permissible exposure (MPE) may not be exceeded. Under no circumstance should any person be exposed to laser radiation exceeding the applicable eye and skin MPE. MPE for spectators, ancillary personnel and performers is specified in IEC 60825-14, IEC 60825-3, and in the applicable local laser regulations.

Each time before operation of the device, make sure that:

- The beam is aligned and properly terminated
- All controls, including scan failure safeguards and emergency stop controls, are properly working
- Warning signs and barriers are in place as appropriate
- All components are securely mounted and locked into position

The device should be secured and protected against misalignment or maladjustment between alignment completion and the beginning of the laser display or show.

## 2.4. Safety Devices

This device is equipped with a key switch, a scan fail function and is supplied with a remote interlock with a key switch. The key switch prevents that unauthorized and untrained persons can operate the device. If the key is removed, you cannot operate the device.

When the scan fail is activated, the laser radiation is terminated immediately if the laser beam stops moving or when the laser beam becomes too narrow.

The remote interlock is used to terminate the laser radiation remotely. When you press the remote interlock, the laser radiation is terminated immediately.

Refer to **5.5. Using the Safety Devices** on page 23 for more information.

## 2.5. Personal Protective Equipment



### Attention

**Use laser protective eyewear during alignment and setup.**

Wearing of laser protective eyewear is necessary for Class 4 lasers. Make sure that you follow any applicable national and site-specific regulations.

During alignment and setup use protective eyewear that complies with the requirements of EN 208. In all other cases laser protective eyewear must be in compliance with EN 207.

### 3. Description of the Device

The Solaris 5.5 incl. FB4 is a 5500-mW RGB laser projector with built-in Pangolin FB4 control module, intended for professional use in large venues. By using linear analogue dimming modulation, the Solaris 5.5 can generate the full spectrum of colors. It comes with all necessary safety features, like scanning system overload protection, a key switch, scan-fail safety, an aperture masking plate, and a remote interlock.

#### 3.1. Front View

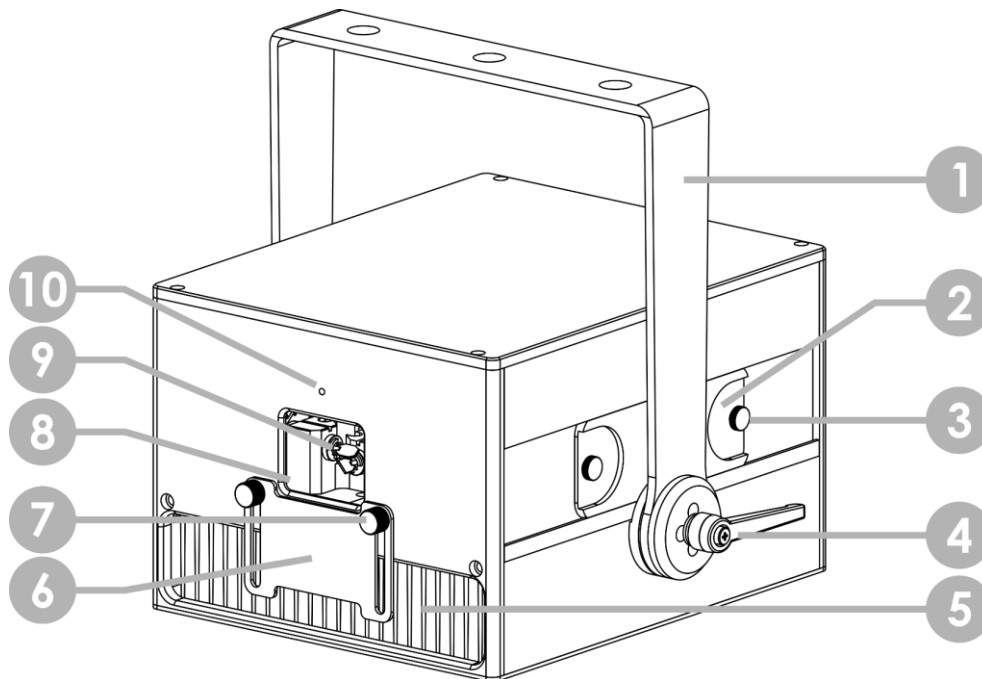


Fig. 03

- 01) Mounting bracket
- 02) 2 x cover plate
- 03) 2 x cover plate adjustment screws
- 04) 2 x adjustment screws
- 05) Ventilation openings
- 06) Aperture masking plate
- 07) 2 x masking plate adjustment screws
- 08) Aperture glass
- 09) Laser beam aperture
- 10) Laser emission LED indicator

### 3.2. Back View

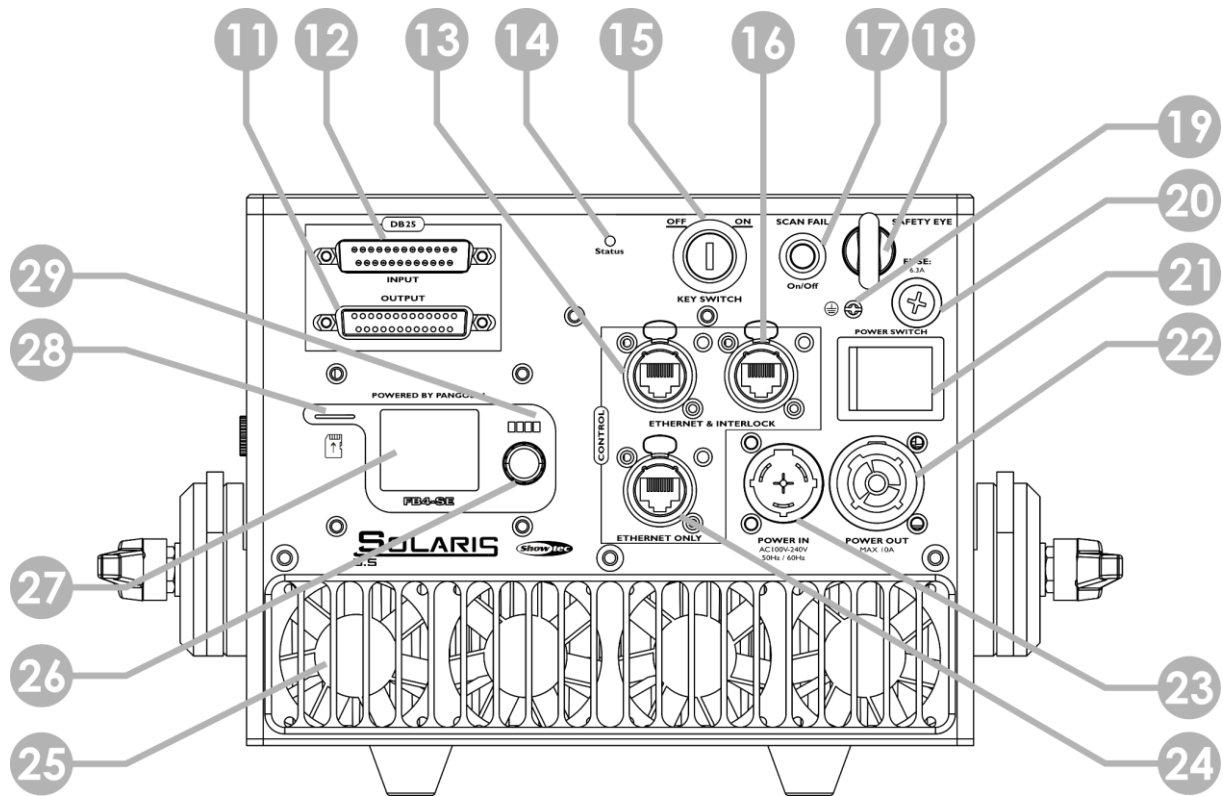
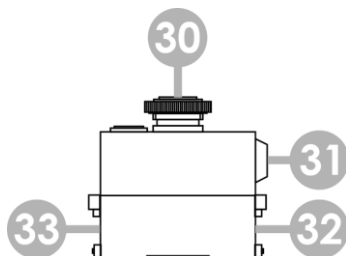


Fig. 04

- |   |  |
|---|--|
| 11) ILDA-compatible DB-25 connector OUTPUT          | 22) Power connector OUT, 100–240 V, 50–60 Hz, max 10 A         |
| 12) ILDA-compatible DB-25 connector INPUT           | 23) Power connector IN, 100–240 V, 50–60 Hz                    |
| 13) Ethernet & interlock RJ45 connector             | 24) Ethernet only RJ45 connector                               |
| 14) Status LED indicator                            | 25) Axial fans   |
| 15) Key switch (OFF/ON)                             | 26) Rotary control   |
| 16) Ethernet & interlock RJ45 connector             | 27) OLED display   |
| 17) Scan fail button (On/Off) with an LED indicator | 28) MicroSD card slot  |
| 18) Safety eye                                      | 29) Status LED indicators (SD card, network, ArtNet, emission) |
| 19) Ground (earth) connection                       |  |
| 20) Fuse: 6,3 A                                     |  |
| 21) Power switch (ON/OFF)                           |  |

### 3.3. Remote Interlock



- 30) Palm button
- 31) Key switch (OFF/ON)
- 32) RJ45 connector
- 33) RJ45 connector

Fig. 05

### 3.4. Product Specifications

Model:	Solaris 5.5 incl. FB4	
<b>Electrical:</b>		
Input voltage:	100–240 V AC, 50/60 Hz	
Power consumption:	150 W	
Fuse:	6,3 A, 250 V	
<b>Physical:</b>		
Dimensions:	309 x 298 x 288 mm (L x W x H) (without accessories)	
Weight:	9,3 kg (without accessories)	
<b>Laser:</b>		
Laser class:	4	
Applicable standard:	NEN-EN-IEC 60825-1:2014	
Laser power (total):	5500 mW	
Laser power:	637 nm = 1500 mW (red) 520 nm = 1800 mW (green) 445 nm = 2200 mW (blue)	
Laser source:	Diode	
Laser modulation:	Analogue	
Beam diameter at aperture:	4 mm	
Beam divergence:	1,1 mrad at full output	
NOHD:	830 m	
MPE:	25 W·m <sup>-2</sup> for exposure duration of 0,25 s	
<b>Scanning system:</b>		
Scanner speed:	35 kpps @ 8°	
Scan angle:	45° (max)	
<b>Operation and control:</b>		
Control module:	Pangolin FB4 (built-in)	
Control protocols:	Art-Net, ILDA	
Control panel:	OLED display and rotary control	
<b>Connections:</b>		
Power connections:	Power connector IN, 100–240 V, 50–60 Hz Power connector OUT, 100–240 V, 50–60 Hz, max 10 A	
Data connections:	ILDA-compatible DB-25 connectors IN/OUT 3 x RJ-45 data connectors MicroSD card slot	
<b>Construction:</b>		
Housing:	Aluminum	
Color:	Black	
IP rating:	IP20	
Cooling:	Axial fans	
<b>Thermal:</b>		
Maximum ambient temperature $t_a$ :	40 °C	
Minimum ambient temperature:	0 °C	

### 3.5. Dimensions

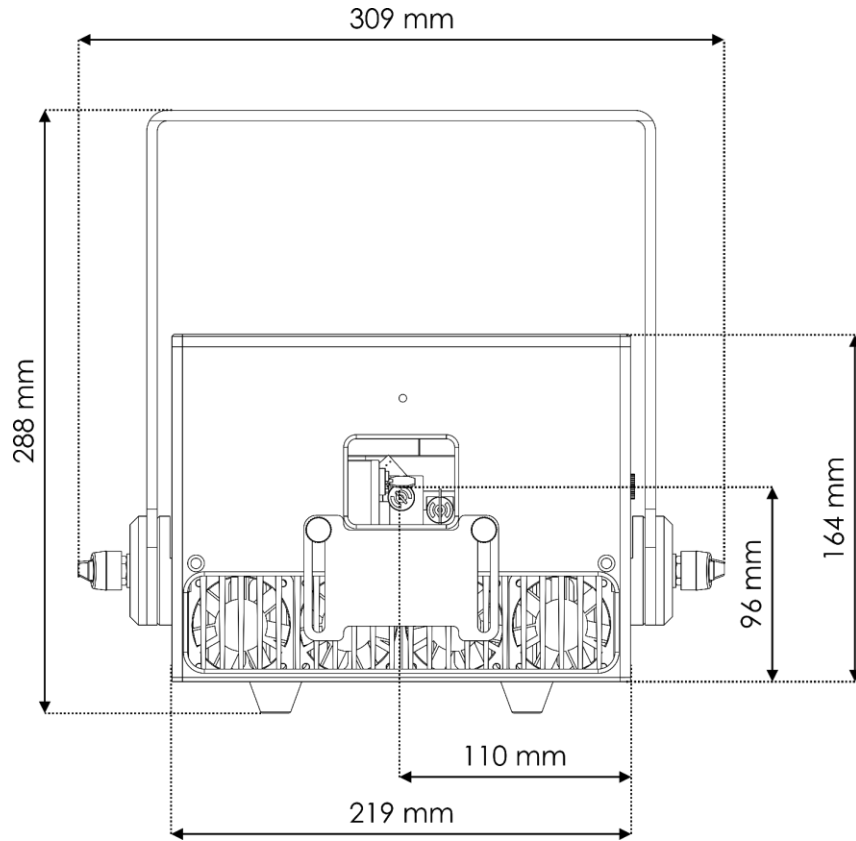


Fig. 06

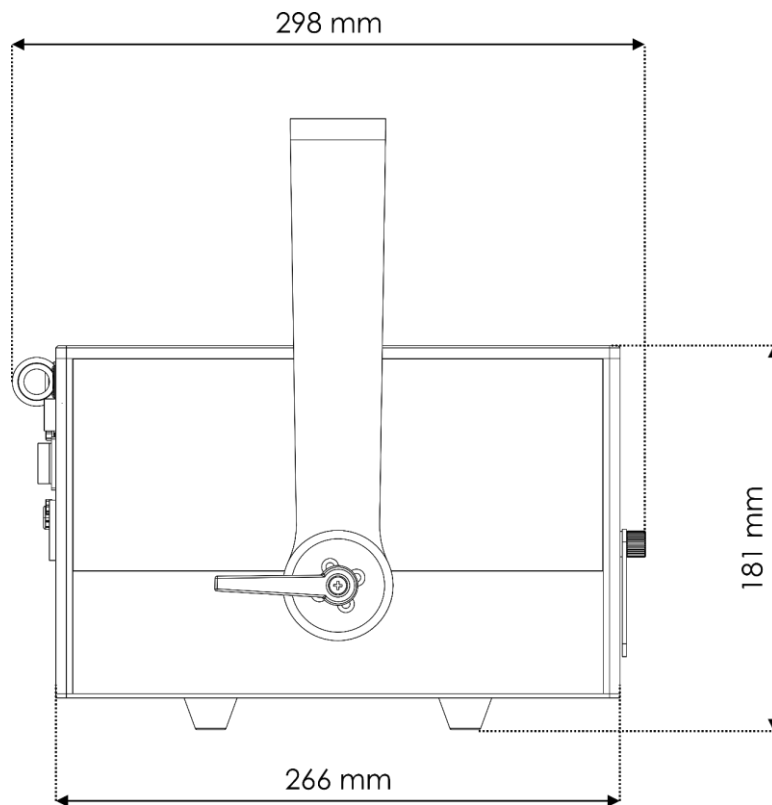


Fig. 07

## 4. Installation

### 4.1. Safety Instructions for Installation



#### WARNING

Incorrect installation can cause serious injuries and damage of property.

If trussing systems are used, installation must be carried out only by instructed or skilled persons.

- Make sure that the device is rigidly mounted to prevent movement due to vibration or jarring.
- Follow all applicable European, national and local safety regulations concerning rigging and trussing.

The device should be installed in such a way that there is at least 3 m distance in height and 2,5 m laterally between the laser beam that exceeds the spectator MPE and the surface where spectators are expected to stand.

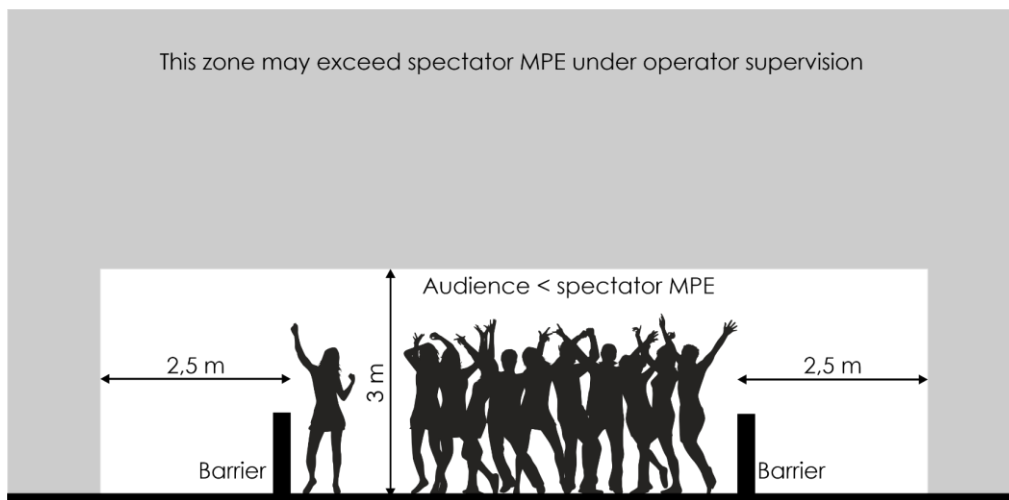


Fig. 08

If the laser display or show is not under the continuous control of an operator who can immediately terminate laser radiation in the event of a problem, the MPE shall not exceed 5 times the spectator MPE in the space between 3 m and 6 m above the surface where spectators are expected to stand.

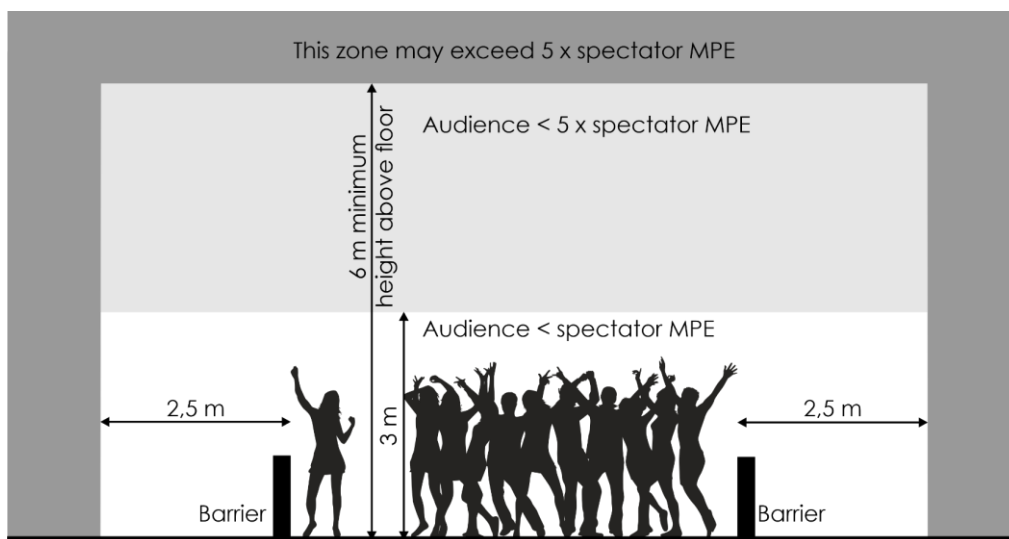


Fig. 09





**Attention**

**Make sure that there is enough space for ventilation around the device.**

- Do not block the ventilation openings. Without proper heat dissipation and air circulation, the internal components may overheat. This can result in product damage.
- Do not install the device near equipment that produces heat, for example spotlights.

## **4.2. Personal Protective Equipment**

During installation and rigging wear personal protective equipment in compliance with the national and site-specific regulations.

## **4.3. Installation Site Requirements**

- The device must be installed only indoors.
- The device is only for overhead mounting. It can be positioned on a flat surface or mounted to a truss or other rigging structure.
- The minimum distance to other objects must be bigger than 0,5 m.
- The maximum ambient temperature  $t_a = 40\text{ °C}$  and the minimum ambient temperature  $t = 0\text{ °C}$  must never be exceeded.
- The relative humidity must not exceed 50 % with an ambient temperature of  $40\text{ °C}$ .

#### 4.4. Rigging

The device is only for overhead mounting. The device can be positioned on a flat surface or mounted to a truss or other rigging structure. Make sure that all loads are within the pre-determined limits of the supporting structure.



#### CAUTION

Restrict the access under the work area during rigging and/or derigging.

To mount the device, follow the steps below:

- 01) Use a clamp to attach the device to the supporting structure, as shown in Fig. 10. Make sure that the device cannot move freely.
- 02) Secure the device with a secondary suspension, for example a safety cable. Make sure that the secondary suspension can hold 10 times the weight of the device. If possible, the secondary suspension should be attached to a supporting structure independent of the primary suspension. Put the safety cable through the **safety eye (18)**, as shown in Fig. 10.

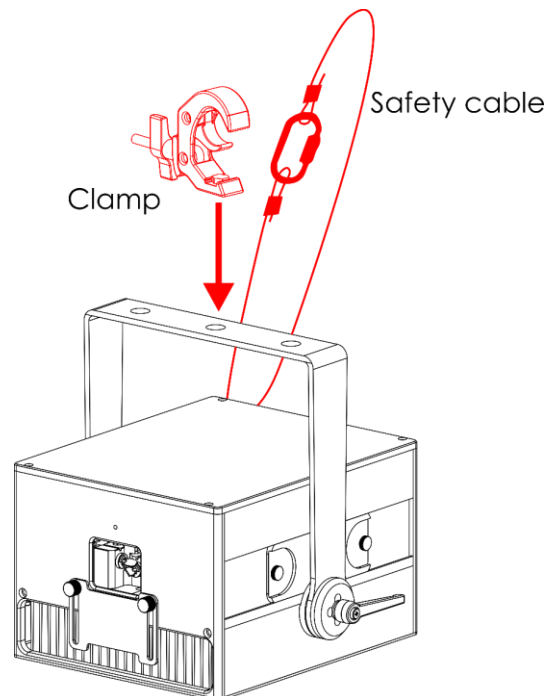


Fig. 10

#### Note:

If you position the device on a flat surface, make sure that the device is secured with a secondary suspension, for example a safety cable.

#### 4.4.1. Angle Adjustment

You can adjust the angle of the device with the **adjustment screws (04)**.

- 03) Turn the **adjustment screws (04)** counterclockwise to release them.
- 04) Tilt the device at the desired angle (see Fig. 11).
- 05) Turn the **adjustment screws (04)** clockwise to tighten them. Make sure that the device cannot move freely after the **adjustment screws (04)** are tightened.

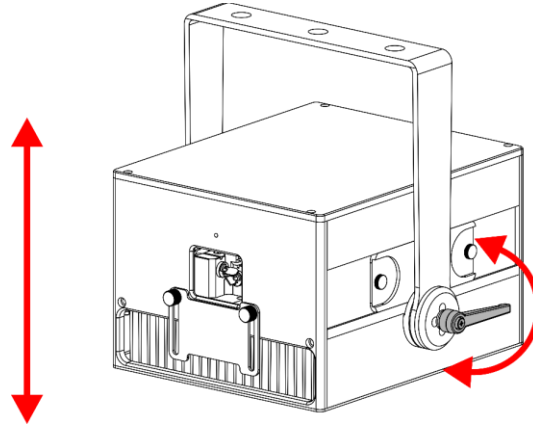


Fig. 11

#### 4.5. Connecting to Power Supply



**DANGER**  
Electric shock caused by short-circuit

The device accepts AC mains power at 100–240 V and 50/60 Hz. Do not supply power at any other voltage or frequency to the device.

This device falls under IEC protection class I. Make sure that the device is always electrically connected to the ground (earth).

Before connecting the device to the socket-outlet:

- Make sure that the power supply matches the input voltage specified on the information label on the device.
- Make sure that the socket-outlet has ground (earth) connection.

Connect the device to the socket-outlet with the power plug. Do not connect the device to a dimmer circuit, as this may damage the device.

Make sure that the socket-outlet is easily accessible.

#### 4.6. Power Linking of Multiple Devices

This device supports power linking. Power can be relayed to another device via the power OUT connector. Note that the input and the output connectors have different designs: one type cannot be connected to the other.

Power linking of multiple devices must be carried out only by instructed or skilled persons.



**WARNING**

**Incorrect power linking may lead to overload of the electrical circuit and result in serious injuries and damage of property.**

To prevent overload of the electrical circuit, when power linking multiple devices:

- Use cables with sufficient current-carrying capacity. The power cable supplied with the device is not suitable for power linking of multiple devices.
- Make sure that the total current draw of the device and all connected devices does not exceed the rated capacity of the power cables and the circuit breaker.
- Do not link more devices on one power link than the maximum recommended number.

Maximum recommended number of devices:

- at 100–120 V: 5 devices Solaris 5.5 incl. FB4
- at 200–240 V: 10 devices Solaris 5.5 incl. FB4

## 5. Setup

### 5.1. Warnings and Precautions



**WARNING**  
Laser radiation  
Avoid eye or skin exposure to direct or scattered radiation.



**Attention**  
Use laser protective eyewear during alignment and setup.

During alignment and setup the access of unauthorized persons to the area, where the laser radiation exceeds the spectator MPE, must be restricted. The temporary laser controlled area must be marked accordingly.

Follow all applicable national and site-specific regulations regarding laser safety.

### 5.2. Adjusting the Aperture Masking Plate

The device is equipped with an aperture masking plate that can be used to cut off the laser beam. To adjust the **aperture masking plate (06)** follow the steps below:

- 01) Turn the 2 **masking plate adjustment screws (07)** counterclockwise to release them.
- 02) Slide the **aperture masking plate (06)** up or down to adjust its position (see Fig. 12).
- 03) Turn the 2 **masking plate adjustment screws (07)** clockwise to tighten them. Make sure that you do not overtighten them.

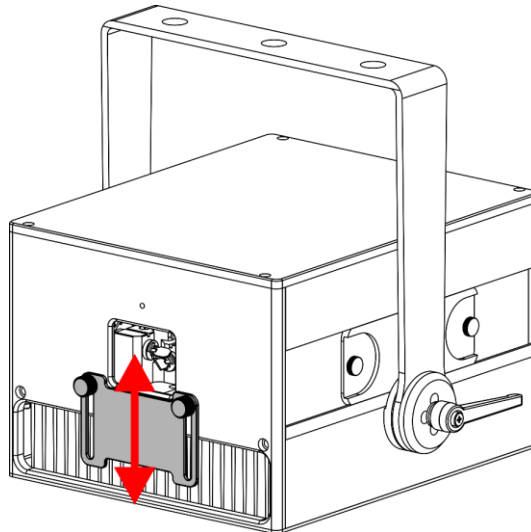


Fig. 12

### 5.3. Setup Example with One Device

Fig. 13 shows a typical setup with one device. Follow the steps below to connect the device to a computer/lighting controller and the remote interlock:

- 01) Connect the RJ45 connector of the computer/lighting controller to the **Ethernet only RJ45 connector (24)** of the device with a CAT-5/CAT-5E/CAT-6 cable.
- 02) Connect the **RJ45 connector (33)** of the remote interlock, supplied with the device, to one of the **Ethernet & interlock RJ45 connectors (13)/(16)** of the device with a CAT-5/CAT-5E/CAT-6 cable.
- 03) Insert the RJ45 connector (yellow), supplied with the device, into the **RJ45 connector (32)** of the remote interlock.

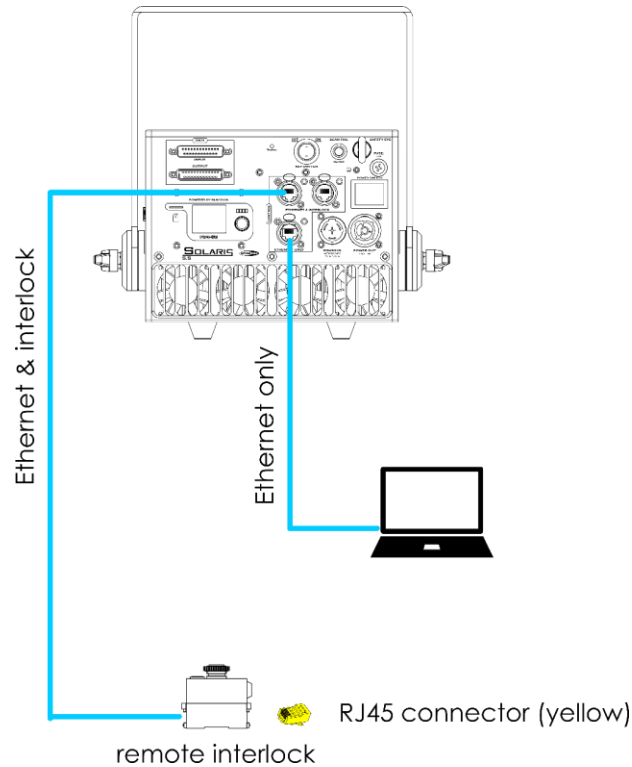


Fig. 13

## 5.4. Setup Example with Multiple Devices

Fig. 14 shows a typical setup with multiple device. Follow the steps below to connect the device to a computer/lighting controller, to the remote interlock, and to other devices:

- 01) Connect the RJ45 connector of the computer/lighting controller to the **Ethernet only RJ45 connector (24)** of the first device with a CAT-5/CAT-5E/CAT-6 cable. For larger setups you can use a switch between the first device in the setup and the computer/lighting controller.
- 02) Connect the **RJ45 connector (33)** of the remote interlock, supplied with the device, to one of the **Ethernet & interlock RJ45 connectors (13)/(16)** of the first device in the setup with a CAT-5/CAT-5E/CAT-6 cable.
- 03) Connect the other **Ethernet & interlock RJ45 connector (13)/(16)** of the first device to one of the **Ethernet & interlock RJ45 connectors (13)/(16)** of the second device in the setup with a CAT-5/CAT-5E/CAT-6 cable.
- 04) Repeat step 3 to connect all devices as shown in Fig. 14.
- 05) Insert the RJ45 connector (yellow), supplied with the device, into the **RJ45 connector (32)** of the remote interlock.

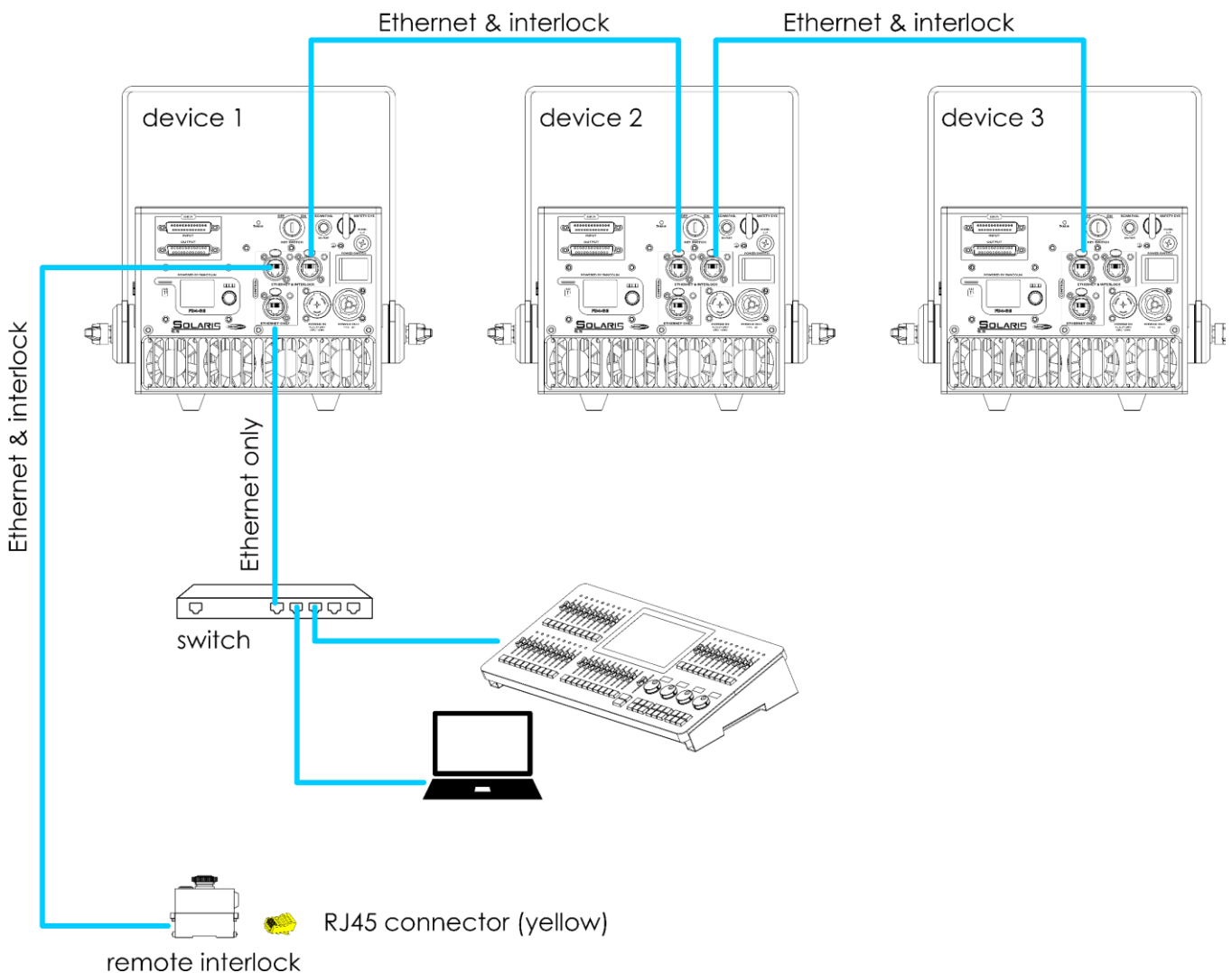


Fig. 14

## 5.5. Using the Safety Devices

The device is equipped with a key switch, a scan fail function and is supplied with a remote interlock with a key switch.

### 5.5.1. Key Switch

The key switch prevents that unauthorized and untrained persons can operate the device. If the key is removed, you cannot operate the device.

The device is supplied with 2 sets of keys. Make sure that one key is inserted into the **key switch (15)** on the device and the other key into the **key switch (31)** of the remote interlock in order to operate the device.

- Turn the **key switch (15)** of the device and the **key switch (31)** of the remote interlock in ON position to turn on the laser beam. The laser emission begins 10 seconds after the laser beam is turned on. See **6.2. Starting the Device** on page 26 for more information.
- Turn the **key switch (15)** of the device and the **key switch (31)** of the remote interlock in OFF position to turn off the laser beam.

#### Note:

If one of the key switches is in OFF position the device will not produce a laser projection.

### 5.5.2. Scan Fail

When the scan fail is activated, the laser radiation is terminated immediately if the laser beam stops moving or when the laser beam becomes too narrow.

- Press the **scan fail button (17)** to activate the scan fail function. The LED indicator, integrated in the button, lights up in green.
- Press the **scan fail button (17)** again to deactivate the scan fail function. The LED indicator, integrated in the button, turns off.

### 5.5.3. Remote Interlock

The remote interlock is used to terminate the laser radiation remotely.

Connect the **RJ45 connector (33)** of the remote interlock to one of the **Ethernet & interlock RJ45 connectors (13)/(16)** of the device with a CAT-5/CAT-5E/CAT-6 cable.

#### Note:

If you connect the remote interlock to the **Ethernet only RJ45 connector (24)**, the remote interlock will not work and you cannot operate the device.

- Push the **palm button (30)** on the remote interlock to terminate the laser radiation.
- Turn the **palm button (30)** in the direction of the arrows to release it. The device is now operational.

For testing and programming purposes you may use the supplied RJ45 connector (shunt) instead of connecting the remote interlock to the device. If the RJ45 connector (shunt) is not inserted into the **Ethernet & interlock RJ45 connector (13)/(16)**, you cannot operate the device.



## 5.6. Beam Alignment



**WARNING**  
**Laser radiation**  
 Avoid eye or skin exposure to direct or scattered radiation.



**Attention**  
 Use laser protective eyewear during alignment and setup.

During alignment and setup the access of unauthorized persons to the area, where the laser radiation exceeds the spectator MPE, must be restricted. The temporary laser controlled area must be marked accordingly.

Follow all applicable national and site-specific regulations regarding laser safety.

During transportation or rigging the internal optical parts can move slightly which can result in misalignment of the laser beam. When this occurs, the red, blue and green colors do not overlay physically and it is not possible to create other colors like magenta, yellow or white.

In order to align the 3 colors, follow the steps below:

- 01) Turn the 2 **cover plate adjustment screws (03)** counterclockwise, as shown on Fig. 15.
- 02) Slide the 2 **cover plates (02)** to the sides of the device, as shown on Fig. 16, to access the **beam alignment screws (A)** and **(B)**.

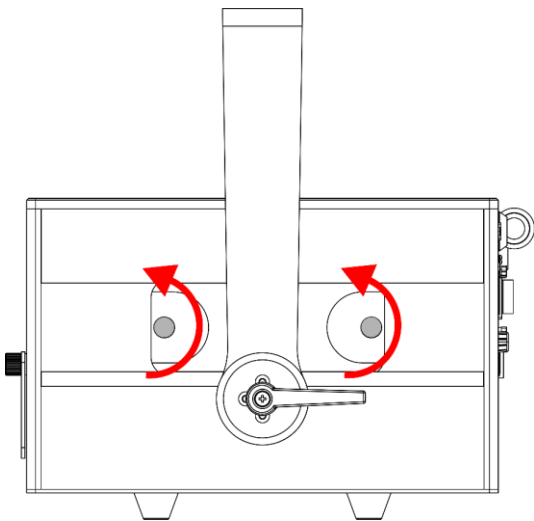


Fig. 15

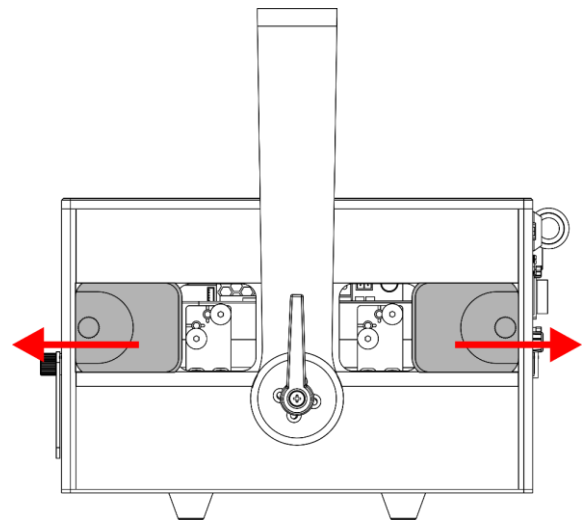


Fig. 16

- 03) Project a circle with the laser on a wall or other suitable projection surface (see Fig. 17). You can also use one of the test patterns available in the Pangolin software.

**Note:**

The greater the distance between the laser output and the projection surface is, the more precise is the laser beam alignment.

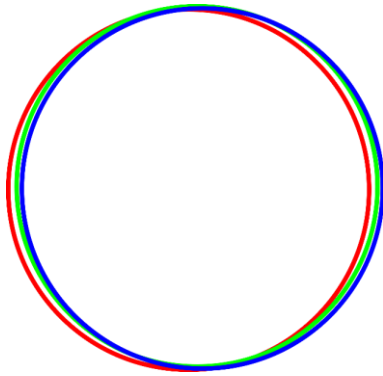


Fig. 17

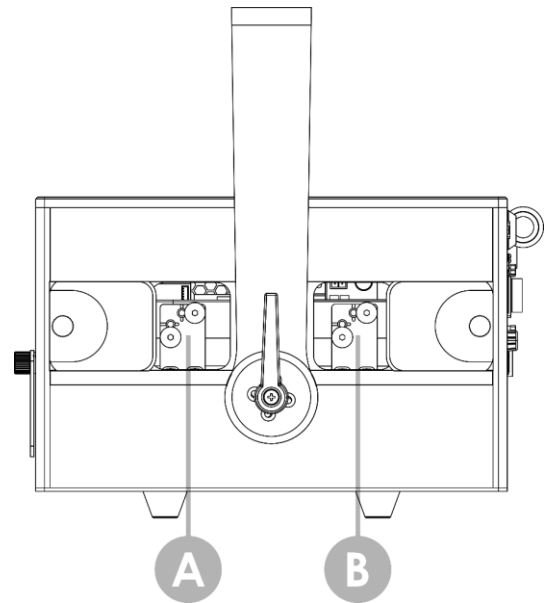


Fig. 18

- 04) Turn the **beam alignment screws (A)** and **(B)** to adjust the horizontal and vertical positions of the red and blue beams (see Fig. 18):
- **beam alignment screws (A)** – red color
  - **beam alignment screws (B)** – blue color
- 05) After the beams are aligned, slide the 2 **cover plates (02)** to the middle of the device to close the access to the **beam alignment screws (A)** and **(B)**.
- 06) Push and turn the 2 **cover plate adjustment screws (03)** clockwise to tighten them. Make sure that you do not overtighten them.

## 6. Operation

### 6.1. Safety Instructions for Operation



**WARNING**

**Laser radiation**

**Avoid eye or skin exposure to direct or scattered radiation.**

This device is a class 4 laser device according to the classification in NEN-EN-IEC 60825-1:2014. It emits visible radiation in the wavelength range 400–700 nm. Exposure to the direct or scattered laser beam can result in severe eye damage and serious skin injuries.

Check all applicable national and international regulations concerning laser safety before operating this device.



**Attention**

**This device must be used only for the purposes it is designed for.**

This device is intended for professional use as a laser projector to produce laser displays or show effects. It is suitable only for indoor installation. This device is not suitable for households.

Any other use, not mentioned under intended use, is regarded as non-intended and incorrect use.



**Attention**

**Power supply**

Before connecting the device to the power supply, make sure that the current, voltage and frequency match the input voltage, current and frequency specified on the information label on the device.

### 6.2. Starting the Device

- 01) Make sure that all laser safety measures are in place and working. See **2.3. Laser Safety** on page 10 for more information.
- 02) Connect all data cables, if applicable. See **5.3. Setup Example with One Device** on page 21 and **5.4. Setup Example with Multiple Devices** on page 22 for more information.
- 03) Connect the remote interlock to one of the **Ethernet & interlock RJ45 connectors (13)/(16)** of the device. See **5.5. Using the Safety Devices** on page 23 for more information.
- 04) Connect the device to the socket-outlet with the power plug. See **4.5. Connecting to Power Supply** on page 18 for more information.
- 05) Set the **power switch (21)** in ON position. The device is powered.
- 06) Insert the keys into the **key switch (15)** on the device and the **key switch (31)** on the remote interlock. The device is now operational.
- 07) Turn the **key switch (15)** of the device and the **key switch (31)** of the remote interlock in ON position to turn on the laser beam. See **5.5. Using the Safety Devices** on page 23 for more information. The **status LED indicator (14)** starts blinking. The laser emission begins 10 seconds after the laser beam is turned on. The **status LED indicator (14)** and the **laser emission LED indicator (10)** light up during laser emission.

**Note:**

The laser emission begins 10 seconds after the laser beam is turned on. See step 7 above.

### 6.3. Control Modes

The device is equipped with a built-in Pangolin FB4 control module.

You can control the device:

- manually from the control panel,
- from a laptop/computer with the QuickShow software by Pangolin,
- from a laptop/computer with ILDA software, or
- from a lighting controller via Art-Net.

You can also play a show directly from a microSD card.

For more information about how to control the device, visit the website of Pangolin:  
<https://wiki.pangolin.com/>.

### 6.4. DMX Channels

You can find a complete overview of the DMX channels on the website of Pangolin:  
<https://pangolin.com/pages/dmx-profiles>.

## 7. Troubleshooting

This troubleshooting guide contains actions which can be carried out by the user. The device does not contain user-serviceable parts.

Unauthorized modifications to the device will render the warranty void. Such modifications may result in injuries and material damage.

Refer servicing to instructed or skilled persons. Contact your Highlite International dealer in case the solution is not described in the table.

Problem	Probable cause(s)	Solution
The device does not power up	No power to the device	<ul style="list-style-type: none"> <li>• Check if power is switched on and cables are plugged in</li> </ul>
	Main fuse is blown	<ul style="list-style-type: none"> <li>• Replace the fuse. See <b>8.3.1. Replacing the Fuse</b> on page 29</li> </ul>
The device does not produce a laser projection	The key switch is not in ON position	<ul style="list-style-type: none"> <li>• Insert the key switch and turn it in ON position. See <b>5.5. Using the Safety Devices</b> on page 23</li> </ul>
	The remote interlock or the RJ45 connector (shunt) is not connected	<ul style="list-style-type: none"> <li>• Connect the remote interlock or the RJ45 connector (shunt). See <b>5.5. Using the Safety Devices</b> on page 23</li> </ul>
	The palm button of the remote interlock is pushed in OFF position	<ul style="list-style-type: none"> <li>• Release the palm button. See <b>5.5. Using the Safety Devices</b> on page 23</li> </ul>
	The scan fail function is activated and the projected beam is too narrow	<ul style="list-style-type: none"> <li>• Deactivate the scan fail function. See <b>5.5. Using the Safety Devices</b> on page 23</li> </ul>
The laser output is flickering in Art-Net control mode	The Art-Net framerate of the device does not correspond to the framerate of the lighting controller	<ul style="list-style-type: none"> <li>• Adjust the framerate. Refer to the online manual of the Pangolin FB4 control module: <a href="https://wiki.pangolin.com/hardware:fb4:manual">https://wiki.pangolin.com/hardware:fb4:manual</a></li> </ul>

## 8. Maintenance

### 8.1. Safety Instructions for Maintenance



**DANGER**  
Electric shock caused by dangerous voltage inside

Disconnect power supply before servicing or cleaning.



**WARNING**  
Laser radiation  
Avoid exposure to beam.

This device is a class 4 laser device according to the classification in NEN-EN-IEC 60825-1:2014.

Maintenance can be carried out by instructed or skilled persons. Service shall be carried out only by skilled persons. Contact your Highlite International dealer for more information.

### 8.2. Preventive Maintenance



**Attention**  
Before each use, examine the device visually for any defects.

Make sure that:

- All screws used for installing the device or parts of the device are tightly fastened and are not corroded.
- The safety devices are not damaged.
- There are no deformations on housings, fixations and installation points.
- The power cables are not damaged and do not show any material fatigue.

#### 8.2.1. Basic Cleaning Instructions



**WARNING**  
Laser radiation  
Avoid exposure to beam

To avoid laser emission, remove the key before cleaning the device.

To clean the device, follow the steps below:

- 01) Disconnect the device from the electrical power supply.
- 02) Allow the device to cool down for at least 5 minutes.
- 03) Remove the dust collected on the external surface with dry compressed air and a soft brush.



**Attention**

- Do not immerse the device in liquid.
- Do not use alcohol or solvents.

### 8.3. Corrective Maintenance

The device does not contain user-serviceable parts. Do not open the device and do not modify the device.

Refer repairs and servicing to skilled persons. Contact your Highlite International dealer for more information.

#### 8.3.1. Replacing the Fuse



**DANGER**  
**Electric shock caused by short-circuit**

- Do not bypass the thermostatic switch or fuses.
- For replacement use fuses of the same type and rating only.

Power surges, short-circuit or incorrect electrical power supply may cause a fuse to burn out. If the fuse burns out, the device will not function anymore. If this happens, follow the steps below.

- 01) Disconnect the device from the electrical power supply.
- 02) Allow the device to cool down for at least 5 minutes.
- 03) Loosen the fuse cover with a screwdriver and remove the fuse holder.
- 04) If the fuse is brown or unclear, it is burned out. Remove the old fuse.
- 05) Insert a new fuse in the fuse holder. Make sure that the type and the rating of the replacement fuse are the same as the ones specified on the information label of the product.
- 06) Replace the fuse holder in the opening and tighten the fuse cover.

## 9. Deinstallation, Transportation and Storage

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### 9.1. Instructions for Deinstallation



**WARNING**

**Incorrect deinstallation can cause serious injuries and damage of property.**

- Let the device cool down before dismounting.
- Disconnect power supply before deinstallation.
- Always observe the national and site-specific regulations during deinstallation and derigging of the device.
- Wear personal protective equipment in compliance with the national and site-specific regulations.

### 9.2. Instructions for Transportation

- Use the original packaging to transport the device, if possible.
- Always observe the handling instructions printed on the outer carton box, for example: "Handle with care", "This side up", "Fragile".

### 9.3. Storage

- Clean the device before storing. Follow the cleaning instructions in chapter **8.2.1. Basic Cleaning Instructions** on page 28.
- Store the device in the original packaging, if possible.

## 10. Disposal

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### Correct disposal of this product



#### Waste Electrical and Electronic Equipment

This symbol on the product, its packaging or documents indicates that the product shall not be treated as household waste. Dispose of this product by handing it to the respective collection point for recycling of electrical and electronic equipment. This is to avoid environmental damage or personal injury due to uncontrolled waste disposal. For more detailed information about recycling of this product contact the local authorities or the authorized dealer.

## 11. Approval

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Check the respective product page on the website of Highlite International ([www.highlite.com](http://www.highlite.com)) for an available declaration of conformity.

This product is in compliance with NEN-EN-IEC 60825-1:2014.



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