



User Manual

Arcturus

Image Engineering GmbH & Co KG

User manual – English copy

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Product name: Arcturus

Item number: 100200517

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Contents

1	About these operating instructions	6
1.1	General information	6
1.2	Presentation of information	6
	Structure of instructions.....	6
	Structure of the warnings	7
	Technical terms and abbreviations used.....	8
2	General safety regulations	9
2.1	Principles	9
2.2	Intended use	9
2.3	Foreseeable misuse.....	10
2.4	Safety regulations	11
	General information.....	11
	Personal protective equipment.....	13
	During installation.....	13
	During operation.....	13
	Care, maintenance and inspection work.....	14
	Waste disposal	14
2.5	Selection and qualification of personnel	15
2.6	Safety	15
2.7	Safety signs	15
2.8	Expansion and conversion	15
2.9	Fire protection.....	16
2.10	Actions in an emergency.....	16
	Fire fighting.....	16
	Expected emissions	17
	First aid measures.....	17
3	Scope of delivery and identification of the machine	18
	Type plate.....	18
3.1	Accessories + compatibility list.....	18



- 4 Structure and function..... 19**
- 4.1 General overview and assemblies..... 19
- 4.2 Arcturus light source 20
- 4.3 Lightcube-Controller..... 20
- 4.4 Interfaces 20
- 4.5 Functional diagram / functional sequence 21
- 5 Transportation and storage..... 22**
- 5.1 Transportation..... 22
 - Requirements for the installation site 22
 - Transporting the light source..... 22
 - Unpacking the light source 22
- 5.2 Storage 22
 - Requirements for the storage location 22
- 6 Installation and commissioning..... 23**
- 6.1 Installation..... 23
 - Carry out installation..... 23
- 6.2 Commissioning 25
- 7 Operating and display elements 27**
- 7.1 Control elements on the device 27
- 7.2 Test button usage 27
- 8 Operating software 28**
- 8.1 Introduction 28
- 8.2 Minimum requirements..... 28
- 8.3 Software installation..... 28
- 8.4 Software Use 28
- 9 Help with faults 29**
- 9.1 Procedure in the event of faults or errors 29
- 9.2 Eliminate faults..... 29



10	Maintenance and inspection work for operators	30
10.1	General information	30
10.2	Care.....	30
11	Maintenance	31
12	Disposal and recycling	32
13	Appendix	33
13.1	Service addresses	33
	Europe.....	33
	USA.....	33
	China	33



1 About these operating instructions

Before using the Arcturus for the first time or starting another task that uses the Arcturus, you must read these operating instructions.

Pay particular attention to the **Chapter 2**, "General safety regulations".

1.1 General information

These instructions are intended to simplify the use of Arcturus and ensure it's utilized for its intended purpose.

The operating instructions contain important information on how to operate the Arcturuslight source safely and properly. Observing them will help:

- Avoid dangers
- Reduce repair costs and downtime
- increase the reliability and service life of the product

These instructions must be read and applied by every person who is tasked with working with the Arcturus.

In addition to these operating instructions, the regulations on accident prevention and environmental protection applicable in the country of destination and at the place of use must also be observed.

1.2 Presentation of information

Structure of instructions

Instructions for action are divided into:

- Action steps
- Results of the actions
- Application tips for optimal use

Each piece of information is identified by a symbol:



Icon	Meaning
1. 2. 3.	Action steps: These action steps are numbered consecutively and must be carried out in the specified order from top to bottom.
✓	Result symbol: The text after this symbol describes the result or intermediate result of an action.
TIP:	Application tip: Additional information on optimal use of the product.

Tab. 1.1 Meaning of symbols

Structure of the warnings

Signal word	Used for ...	Possible consequences if the safety instructions are not observed:
DANGER	Personal injury (imminent danger)	Death or very serious injuries!
WARNING	Personal injury (potentially dangerous situation)	Death or very serious injuries!
CAUTION	Personal injury	Slight or minor injuries
NOTE	Material damage	Damage to the device and/or objects in the surrounding area

Tab. 1.2 Warning levels

The warnings are structured as follows:

- Warning sign with signal word corresponding to warning level
- Type of hazard (description of the hazard)
- Hazard consequences (description of the possible consequences of the hazard)
- Advice to avert danger (measures to prevent danger)



DANGER!

Type of hazard

Consequences of danger

1. Advice



Warning signs Special warnings are provided at the relevant points in these instructions. They are marked with the following symbols.



General danger zone
This sign warns of personal injury.

If there is a clear source of danger, it is preceded by one of the following symbols.



Damage to the eyes
This symbol warns of damage to the eyes (retina) due to high radiation energy.

Technical terms and abbreviations used

Abbreviation	Meaning
OECF	Opto Electronic Conversion Function

Tab. 1.3 Abbreviations used

Technical term	Meaning
Opto Electronic Conversion Function	The OECF describes how a camera converts different lighting conditions (optical input) into electronic signals (digital output).

Tab. 1.4 Technical terms used



2 General safety regulations

2.1 Principles

The Arcturus light source is intended for use only with the Lightcube-Controller.

Before putting the device into operation, please carry out the checks listed in **Chapter 6**.

Ensure that the device:

1. Is in perfect condition (visual inspection).
2. securely standing (well-balanced), and
3. securely connected to the Lightcube-Controller.

The device is built in accordance with current recognized safety regulations. Nevertheless, its use may pose a risk to life and limb of the user or third parties, or cause damage to the appliance and other property.

2.2 Intended use

The Arcturus light source is a temperature-stabilized, DC-controlled and dimmable light source with versatile flicker functionality. It is used to characterize sensors and camera systems.

Special features of the Arcturus:

1. Temperature-stabilized and dimmable light source
2. Very high luminance for testing sensors close to saturation
3. Versatile flicker functionality for realistic tests

It is mainly controlled via the wired USB interface using the Vega software supplied or via the Vega API (available separately).

The Arcturus may only be operated indoors.



2.3 Foreseeable misuse

Possible foreseeable misuse is listed below:

1. Damage to the eyes (retina) due to high radiant energy caused by looking directly into the output window from a short distance during operation of the light source.



CAUTION!

Hazard: Damage to the eyes

Danger: Damage to the eyes (retina) due to high radiation energy caused by looking directly into the output window from a short distance during operation.

Advice: Avoid looking directly into the output window during operation.

2. Covering the output window.



CAUTION!

Hazard: Overheating or malfunction

Danger: When the (light) output window is covered.

Advice: Avoid blocking or covering the output window to prevent the surface from overheating.

3. Blocked fan cover.



CAUTION!

Hazard: Overheating or malfunction

Danger: If the fan cover is blocked

Advice: Avoid blocking the fan cover or the side panels. Please leave at least 5 cm clearance to the ventilation holes.



4. Risk of epilepsy due to flicker mode



CAUTION!

Hazard: Risk of epilepsy due to flicker mode

Danger: For a small number of users with pre-existing medical conditions, use of the flicker mode of Arcturus light source may cause epilepsy. Certain combinations of frequency and intensity can trigger seizures even in people with no known medical history of seizures.

Advice: Stop using the device immediately and seek medical help if you experience symptoms such as nausea, dizziness or visual irritation while using the Arcturus light source.

5. Pressing the Test button may unintentionally activate the light source.



CAUTION!

Hazard: Damage to the eyes

Danger: Damage to the eyes (retina) due to high radiation energy caused by looking directly into the output window from a short distance during operation.

Advice: Avoid looking directly into the output window during operation. Ensure that no one is in front of the light source before pressing the Test button.

2.4 Safety regulations

General information



CAUTION!

Hazard: Damage to the eyes

Danger: Damage to the eyes (retina) due to high radiant energy by looking directly into the output window from a short distance during operation of the light source.

Advice: Avoid looking directly into the output window during operation.



CAUTION!

Hazard: Overheating or malfunction

Danger: When the (light) output window is covered.

Advice: Avoid blocking or covering the output window to prevent the surface from overheating.



CAUTION!

Hazard: Overheating or malfunction

Danger: If the fan cover is blocked

Advice: Avoid blocking the fan cover or the side panels. Please leave at least 5 cm clearance to the ventilation holes.



CAUTION!

Hazard: Risk of epilepsy due to flicker mode

Danger: For a small number of users with pre-existing medical conditions, use of the flicker mode of Arcturus light source may cause epilepsy. Certain combinations of frequency and intensity can trigger seizures even in people with no known medical history of seizures.

Advice: Stop using the device immediately and seek medical help if you experience symptoms such as nausea, dizziness or visual irritation while using the Arcturus light source.



CAUTION!

Hazard: Damage to the eyes

Danger: Damage to the eyes (retina) due to high radiation energy caused by looking directly into the output window from a short distance during operation.

Advice: Avoid looking directly into the output window during operation. Ensure that no one is in front of the light source before pressing the Test button.



Personal protective equipment

No protective equipment is required when using the Arcturus.

During installation



CAUTION!

Hazard: Overheating or malfunction

Danger: When the output window is covered.

Advice: Avoid blocking or covering the output window to prevent the surface from overheating.



CAUTION!

Hazard: Overheating or malfunction

Danger: If the fan cover is blocked

Advice: Avoid blocking the fan cover or the side panels. Please leave at least 5 cm clearance to the ventilation holes.

During operation



CAUTION!

Hazard: Damage to the eyes

Danger: Damage to the eyes (retina) due to high radiation energy by looking directly into the output window from a short distance during operation.

Advice: Avoid looking directly into the output window during operation.



CAUTION!

Hazard: Overheating or malfunction

Danger: When the (light) output window is covered.

Advice: Avoid blocking or covering the output window to prevent the surface from overheating.



CAUTION!

Hazard: Overheating or malfunction

Danger: If the fan cover is blocked

Advice: Avoid blocking the fan cover or the side panels. Please leave at least 5 cm clearance to the ventilation holes.



CAUTION!

Hazard: Damage to the eyes

Danger: Damage to the eyes (retina) due to high radiation energy caused by looking directly into the output window from a short distance during operation.

Advice: Avoid looking directly into the output window during operation. Ensure that no one is in front of the light source before pressing the Test button.



CAUTION!

Hazard: Risk of epilepsy due to flicker mode

Danger: For a small number of users with pre-existing medical conditions, use of the flicker mode of Arcturus light source may cause epilepsy. Certain combinations of frequency and intensity can trigger seizures even in people with no known medical history of seizures.

Advice: Stop using the device immediately and seek medical help if you experience symptoms such as nausea, dizziness or visual irritation while using the Arcturus light source.

Care, maintenance and inspection work

The device is maintenance-free.

Any necessary repairs may only be carried out by specialists appointed by Image Engineering.

Waste disposal

At the end of its service life, the Arcturus must be disposed of properly. Please follow the disposal instructions in **Chapter 12**.



2.5 Selection and qualification of personnel

Arcturus may only be operated by persons who have read these operating instructions carefully and who are not sensitive to fluctuations in light brightness. Only such persons may be in the vicinity of the device during operation.

2.6 Safety

To take the appliance out of operation safely, disconnect the mains cable from the socket. All safety regulations as described in **Chapter 2.4** generally apply.

2.7 Safety signs

The following warnings are attached to the Arcturus light source:



Other hazards

Damage to the eyes (retina) due to high radiation energy during operation by looking directly into the output window from a short distance.

Avoid looking directly into the output window during operation.

2.8 Expansion and conversion

Modifications to the device are not permitted.



2.9 Fire protection

There are no special requirements for fire protection as long as the following precautions are observed:

**CAUTION!****Hazard: Overheating or malfunction**

Danger: When the output window is covered.

Advice: Avoid blocking or covering the output window to prevent the surface from overheating.

**CAUTION!****Hazard: Overheating or malfunction**

Danger: If the fan cover is blocked

Advice: Avoid blocking the fan cover or the side panels. Please leave at least 5 cm clearance to the ventilation holes.

2.10 Actions in an emergency

Take the device out of operation. To do this, unplug the power cable of the Lightcube-Controller from the socket.

Fire fighting

The Arcturus light sources do not require any special protective equipment for firefighting.

If the appliance itself catches fire:

- Use a suitable class C fire extinguisher (for fires involving electrical appliances and installations).
- Ensure that the appliance is disconnected from the power supply, if this is safely possible, before starting to fight the fire.
- Avoid using water, as this could further damage the electronics of the device, and an electric shock is possible.
- Make sure that there are no flammable materials near the appliance that could fuel the fire.



Expected emissions

The Arcturus light source does not contain any particularly hazardous substances. Therefore, no harmful emissions are expected.

First aid measures

No serious injuries are to be expected even in the event of a fault.

In the event of minor injuries or accidents, notify a first aider or contact the nearest emergency center.

If there are signs of epilepsy, stop using the device immediately and seek medical help. Seek medical help also if you experience symptoms such as nausea, dizziness or visual irritation while using the Arcturus light source.



3 Scope of delivery and identification of the machine

The Arcturus light source is delivered fully assembled.

The following accessories are supplied:

- DC voltage cable + CAN cable.
- 20 × 20 mm light mask to ensure homogeneity of brightness
- Acceptance protocol.
- Operating Instructions.

Type plate

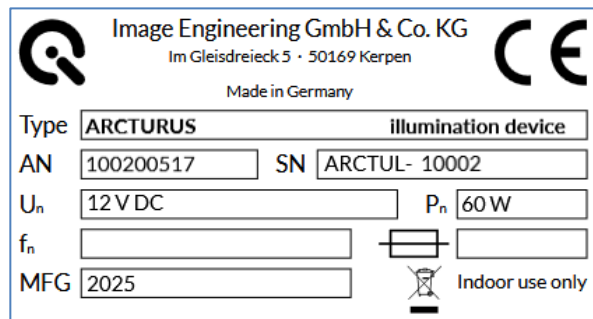


Fig. 3.1 Type plate

Listed are:

- Manufacturer + address
- Type= Type designation
- AN = manufacturer number
- SN = Serial number
- U_n = nominal voltage
- P_n = rated power
- MFG = Year of manufacture
- Note: For indoor use only
- WEEE note: Do not dispose of in household waste.

3.1 Accessories + compatibility list

The Arcturus light source is intended for use with the Lightcube-Controller. It is not permitted to use other voltage sources or combine the light source with other devices.



4 Structure and function

4.1 General overview and assemblies

Arcturus is a temperature-stabilized, DC-controlled and dimmable light source with versatile flicker functionality. It is used to characterize sensors and camera systems, particularly with regard to exposure times. Precise data is obtained by measuring close to the saturation of automotive camera sensors.

The Arcturus light source can be controlled via the Lightcube-Controller. The Lightcube-Controller comprises the system whereby up to 7 modules can be connected to one controller. For more information and to install the Lightcube-Controller, please refer to the corresponding operating instructions for the Lightcube-Controller.

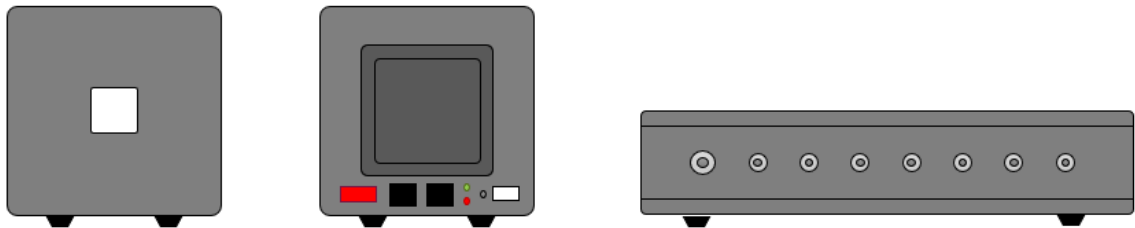


Fig. 4.1 Arcturus light source and the Lightcube-Controller



4.2 Arcturus light source

The Arcturus light source has the following dimensions (depth x width x height): 120 mm x 120 mm x 130 mm. The exit window of the Arcturus light source is 30 mm x 30 mm, while the active light surface, which is masked by the aperture, has a size of 20 mm x 20 mm and, according to the device's data sheet, has homogeneity on the exit plane.

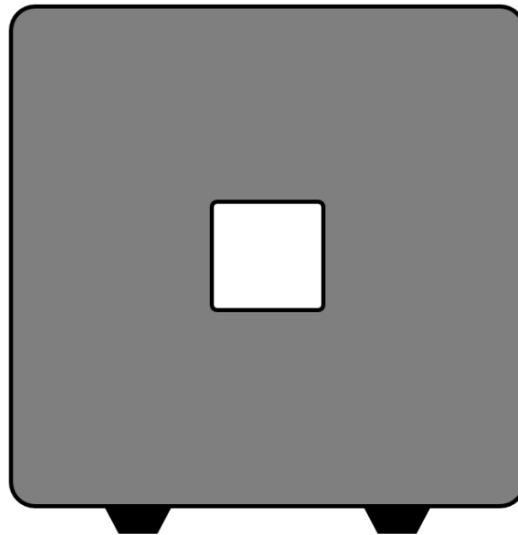


Fig. 4.2 Arcturus light source

4.3 Lightcube-Controller

The Lightcube-Controller is designed to power and control the Arcturus modules. It enables communication between the modules and offers numerous safety functions.

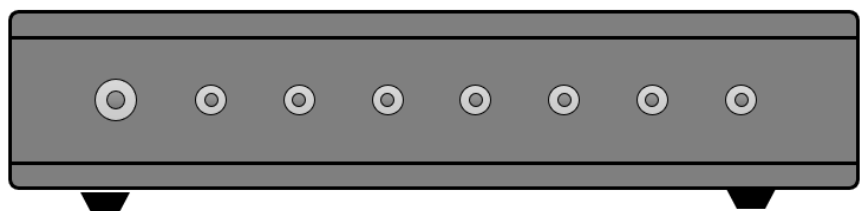


Fig. 4.3 Lightcube-Controller

4.4 Interfaces

The Arcturus light source is controlled via a PC using USB.



4.5 Functional diagram / functional sequence

Functional sequence with use of the software:

1. Make sure that there is a USB connection between the PC and the Lightcube-Controller and a CAN connection between the Lightcube-Controller and the Arcturus light source if you want to operate the device via the software.
2. Start the Vega software. Control the functions of the Arcturus light source according to the detailed instructions for using the software (see Chapter 8).



5 Transportation and storage

5.1 Transportation

Requirements for the installation site

There are no requirements for the installation location.

Transporting the light source

Before transportation, make sure that the cables of the Arcturus light source are disconnected from the Lightcube-Controller.

Unpacking the light source

The Arcturus light source is supplied separately from the Lightcube-Controller in a cardboard box.

If the light source is ordered in combination with other light sources and/or the Lightcube-Controller, it is supplied in a case.

To unpack:

1. Open the box or case.
2. Remove the plastic bag containing the documentation and accessories.
3. Remove the light source.

5.2 Storage

Requirements for the storage location

- Temperature range: -10 to 45°C
- Sand and dust-free environment.
- Humidity: 10 ~ 95% RH, no condensation.



6 Installation and commissioning

6.1 Installation

The appliance may only be operated indoors.

Set up your system in a dry, constant temperature environment without extraneous light interference.

The optimum ambient temperature for photometric measurements is between 22 and 26 °C. The acceptable ambient temperature range is between 18 and 28 °C.

The system has an internal temperature management system. In the event of an issue relating to the internal temperature, the status LED indicates an error, and the system switches off automatically to prevent damage.

Carry out installation

Installation consists of:

1. Setting the CAN IDs,
2. Connecting the Lightcube-Controller to the lights and to the computer
3. Installing the software on the computer.

Step 1: Setting the CAN IDs

Before connecting any cables, make sure that each Arcturus module has a correct CAN ID. The CAN ID is set using small switches on the back of the module, called DIP switches. These switches use binary values. Each switch has a value of 2^n , where n is the switch number. For example:

- Switch 1 ($n=0$) = $2^0 = 1$
- Switch 2 ($n=1$) = $2^1 = 2$
- Switch 3 ($n=2$) = $2^2 = 4$

and so on. You calculate the CAN ID by adding the values of the switches that are turned ON.

Example: If switches 1 and 3 are ON → $1 + 4 =$ CAN ID 5.

Each module must have a unique CAN ID, starting from 1 and going up (e.g., 1, 2, 3...). Do not use a CAN ID higher than 7 – the software will not recognize it. The last module in the CAN chain must have the TR switch (switch 8) set to ON. This is called termination.



Step 2: Connecting the Hardware

Connect the CAN cable from the Lightcube-Controller to the module with CAN ID 1. Then, connect the remaining modules in series — one after the other — using their CAN ports. After that, connect the power cables to each module as shown in Figure 6.1. Finally, connect the USB cable to the computer, and then switch on the Lightcube-Controller.

Step 3: Installing the Software

Please refer to **Chapter 8** for detailed instructions on how to install and use the software.

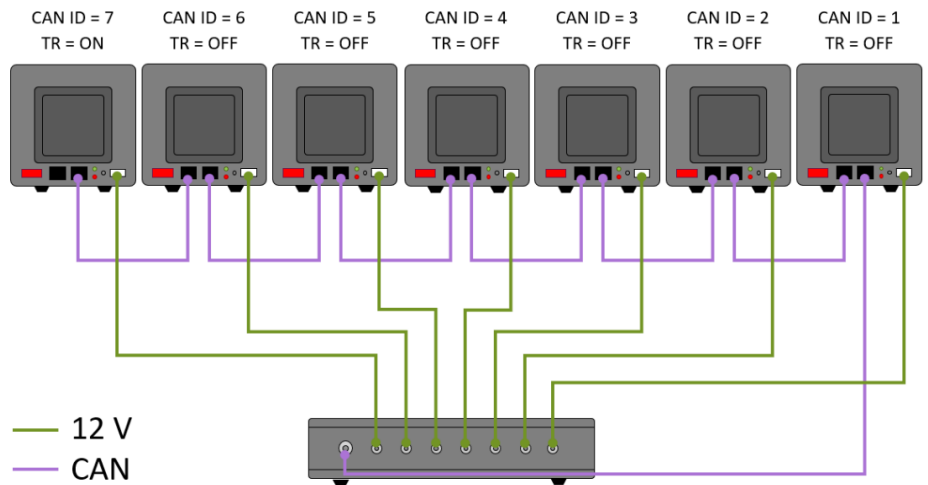


Fig. 6.1 Connection to the Lightcube-Controller

Example for 7 modules:

- CAN ID 1 = 10000000
- CAN ID 2 = 01000000
- CAN ID 3 = 11000000
- ...
- CAN ID 7 = 11100001

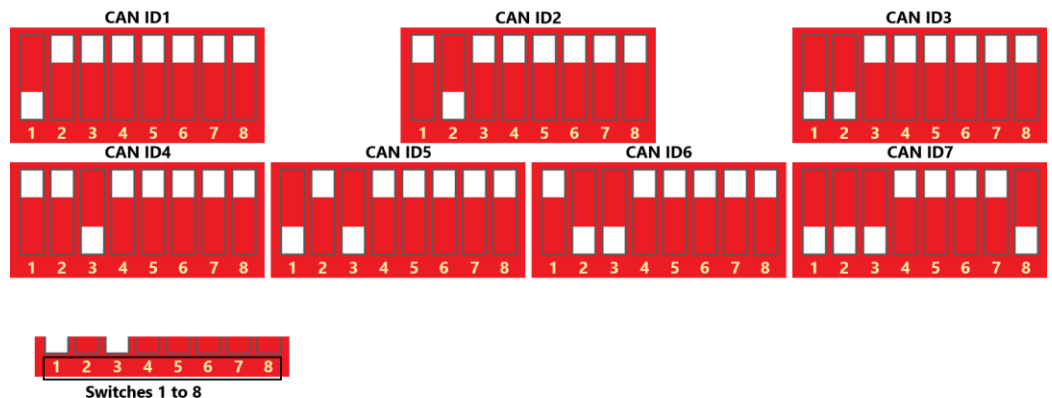


Fig. 6.2 Settings for CAN IDs



6.2 Commissioning

Commissioning by the software:

Install the software on your PC.

Once the device has been installed as described in section **6.1 - Installation**, the Arcturus light source can be controlled via software.

Please refer to **Chapter 8** for information on using the software.



CAUTION!

Hazard: Damage to the eyes

Danger: Damage to the eyes (retina) due to high radiant energy by looking directly into the output window from a short distance during operation of the light source.

Advice: Avoid looking directly into the output window during operation.



CAUTION!

Hazard: Overheating or malfunction

Danger: When the (light) output window is covered.

Advice: Avoid blocking or covering the output window to prevent the surface from overheating.



CAUTION!

Hazard: Overheating or malfunction

Danger: If the fan cover is blocked

Advice: Avoid blocking the fan cover or the side panels. Please leave at least 5 cm clearance to the ventilation holes.



CAUTION!

Hazard: Risk of epilepsy due to flicker mode

Danger: For a small number of users with pre-existing medical conditions, use of the flicker mode of Arcturus light source may cause epilepsy. Certain combinations of frequency and intensity can trigger seizures even in people with no known medical history of seizures.

Advice: Stop using the device immediately and seek medical help if you experience symptoms such as nausea, dizziness or visual irritation while using the Arcturus light source.



CAUTION!

Hazard: Damage to the eyes

Danger: Damage to the eyes (retina) due to high radiation energy caused by looking directly into the output window from a short distance during operation.

Advice: Avoid looking directly into the output window during operation. Ensure that no one is in front of the light source before pressing the Test button.



7 Operating and display elements

7.1 Control elements on the device

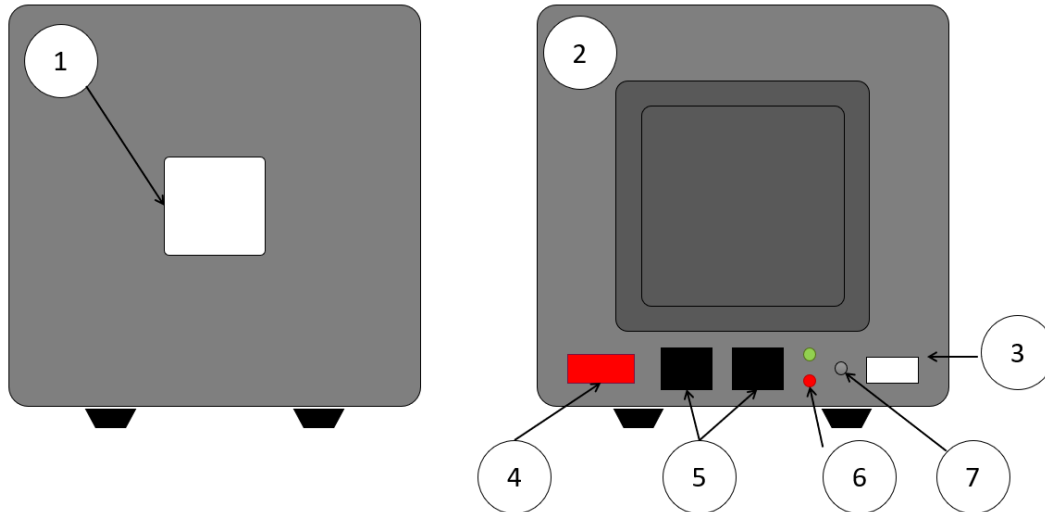


Fig. 7.1 Operating and display elements on Arcturus

1. Exit window (diffuser)
2. Fan cover
3. 12 V power input
4. CAN ID selection switch (DIP switch)
5. CAN IN/OUT (interchangeable)
6. Status LEDs
7. Test button

7.2 Test button usage

The test button is used to quickly check the functionality of Arcturus:

1. Pressing it once turns it on at 100% intensity.
2. Pressing it a second time changes the intensity to 50%.
3. Pressing it a third time changes the intensity to 4%.
4. Pressing it a fourth time changes the intensity to 0.1%.
5. Pressing it a fifth time turns it off (intensity 0%).



8 Operating software

8.1 Introduction

The Vega control software is suitable for using a computer to control Arcturus and Vega modules built by Image Engineering.

8.2 Minimum requirements

- Windows 10 with 32 / 64 bit
- USB 2.0 or higher

8.3 Software installation

The Vega control software is available in 32bit and 64bit. Please ensure that you install a suitable version. Start the installation program 'setup_vega_winXX_X.X.X.exe' and follow the instructions.

8.4 Software Use

For commissioning with the Vega Software, please refer to the operating instructions for the Lightcube-Controller.



9 Help with faults

9.1 Procedure in the event of faults or errors

In the event of faults or malfunctions of an Arcturus light source, please contact Image Engineering support immediately.

9.2 Eliminate faults

Faults that cannot be rectified without opening the device may only be repaired by specialist personnel trained by Image Engineering.

Please contact our support team (see Chapter 13).



10 Maintenance and inspection work for operators

10.1 General information

Perform a visual check that the Arcturus light source is in perfect condition every day before starting work and commissioning.

10.2 Care

If the Arcturus light source window is dirty, clean it with a dry cloth.



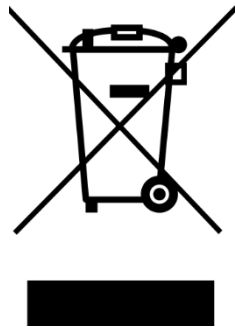
11 Maintenance

The Arcturus light source is maintenance-free.



12 Disposal and recycling

If you wish to dispose of an Arcturus light source, please contact Image Engineering Support Europe (see chapter 13.1) to discuss the details of the return procedure. After returning your device, Image Engineering will ensure that it is disposed of properly by a certified disposal company and will bear the disposal costs. Within the European Union, Image Engineering will also bear the costs for return transportation.





13 Appendix

13.1 Service addresses

For support requests, please contact us directly:
support@image-engineering.de

Europe

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50169 Kerpen

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Tel: +49 2273 99 99 1-0

Email: info@image-engineering.de

USA

Photecture Inc.
120 Terminal Drive
Plainview, NY 11803

Mon-Fri: 8 a.m. to 6 p.m. (CT)

Phone: +1 408 386 1496

Email sales@image-engineering.us

China

Shenzhen Image Engineering Optoelectronic Equipment Co, Ltd (IE China Subsidiary)

深圳艾宜光电设备有限公司 (IE中国全资子公司)

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