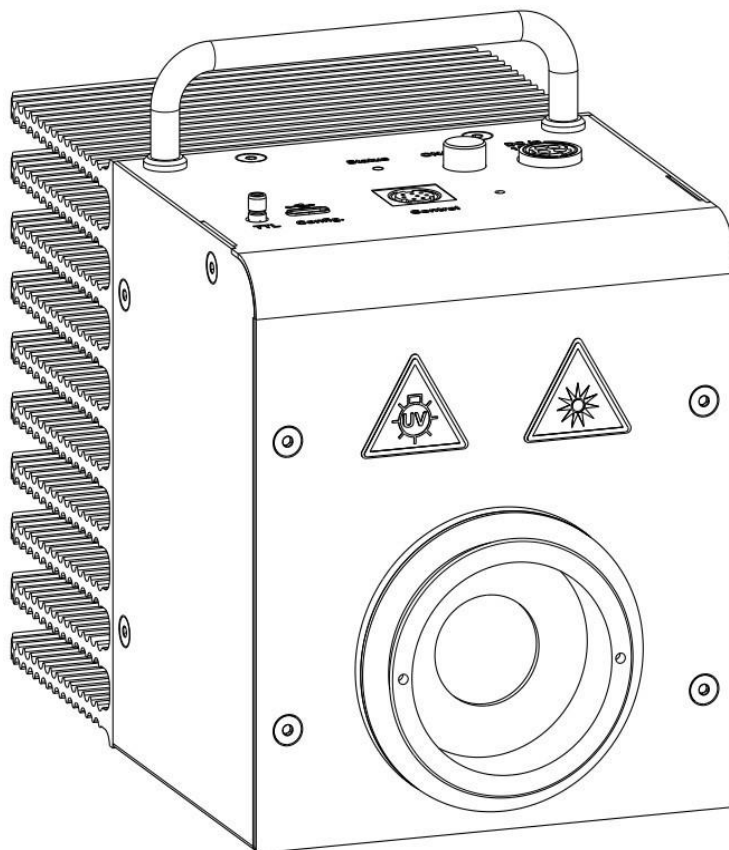


AF-2100

2-channel LED light source Instruction Manual

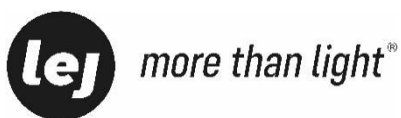


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We reserve the right to make changes in the interest of technical development; this operating manual is not regularly updated.

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1. BASICS

1.1. GENERAL INFORMATION

Use these operating instructions to familiarize yourself with the device and its operation before connecting and using the device. The device may only be operated by trained personnel. These operating instructions are part of the device and must be kept for the entire service life of the device. If the user of the device changes, it must be handed over to the new user.

The device has been tested in accordance with standard EN 61010-1:2020-3 "Safety requirements for electrical equipment for measurement, control and laboratory use" ,in compliance with the relevant requirements of Annex 1 of Directive 2014/35/EU.

The device complies with the requirements of EG Directive 2014/30/EU. The standards which this device complies with in this respect are listed in section 3 "Technical data" of these operating instructions. Conformity with the listed standards is documented by the CE symbol.

The following symbols are used in these operating instructions to indicate notes and warnings:



NOTE

This symbol indicates a note that requires special attention.



NOTE

Before carrying out the specified activity, all poles of the device must be disconnected from the mains supply.



CAUTION

This symbol indicates a danger that may arise for the device or components connected to it.



CAUTION

This symbol indicates a danger which may arise for the user.



CAUTION

This symbol indicates a hazard due to optical radiation, which may arise for the user.



CAUTION

This symbol indicates a danger due to ultraviolet radiation, which may arise for the user.

1.2. DEVICE SAFETY INFORMATION



The device may only be used for the applications described in these operating instructions. The manufacturer cannot accept any liability for any other application. In addition, all warranty claims become void in this case. The manufacturer's liability as well as warranty claims also expire in the event of the use of defective components or components that are not suitable for the device or in the event of unauthorized service and repair work on the device.



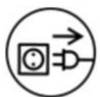
If safety defects or malfunctions are detected on the device, the device must be put out of operation immediately, disconnected from the power supply and secured against further use. The device must be sent to the supplier or to an authorized representative for repair. The same applies correspondingly to the power supply unit supplied.



The device generates high-energy incoherent light, which also contains nonvisible components. There is a risk of glare and blindness! Never look directly into the light output of the device. Before switching on the device, always connect this to the system to be illuminated.



The unit and the power supply unit included in the scope of delivery may only be operated at a properly connected earthed socket. The unit and all supplied components are intended exclusively for operation in dry rooms. Use in rooms where there is a risk of explosion is not permitted.



Before connecting components to the unit, disconnect the unit's power supply from the mains supply.






The power supply unit supplied is designed for a voltage range of 100 to 240 VAC, 50 to 60 Hz. Within this voltage and frequency range, the device automatically adapts to the mains voltage applied. Operation with a mains voltage outside this range can lead to the destruction of the power supply unit, the device and the connected components!



Attention! It must always be ensured that intense optical radiation is emitted from the light source. For example, when changing the magnification on the microscope, the brightness on the eyepiece can change and possibly lead to injuries


Basics

1.3. NOTES ON TRANSPORT, STORAGE AND UNPACKING

-  The environmental conditions specified in this instruction manual with regard to transport and storage must be observed. The original packaging must be used to transport the device safely. If damage to the device is detected during unpacking, the supplier or the transport company commissioned by him must be informed immediately.
-  The parts included in the scope of delivery of the light source (see 2.3) must be checked for completeness.
-  After unpacking, the device should be allowed to acclimatize for about 1 hour before it is put into operation. This serves to prevent damage due to condensation that can form inside the device as a result of temperature differences.

1.4. WARRANTY INFORMATION


The manufacturer of the device provides a legal warranty that the device is free of material and manufacturing defects at the time of handover. Defects that have occurred must be reported immediately and every effort must be made to minimize the damage. If such a defect is reported, the supplier of the device shall be obliged to remedy the defect by repair or delivery of a device free of defects, at his discretion. No warranty shall be given for defects resulting from natural wear and tear (especially in the case of wearing parts) or improper handling.

-  The manufacturer of the device and the supplier of the device are not liable for damage caused by incorrect operation, negligence, unauthorized use, tampering with the device or the use of non-approved spare parts and components. This invalidates all warranty claims.

With the exception of the activities listed in this instruction manual, no maintenance or repair work may be carried out on the device. Repairs may only be carried out by the manufacturer of the device or by specially authorized representatives.

2. DEVICE DESCRIPTION

2.1. INTENDED USE

-  The AF-2100-Metasystems is a light source for direct connection to microscopes of various manufacturers via manufacturer-specific adapters. Any other use is considered improper.

2.2. DEVICE IDENTIFICATION

The nameplate of the device is located on its bottom side. It contains the information necessary for the identification of the device.

2.3. SCOPE OF DELIVERY

The scope of delivery of the light source includes the following components:

- 1x light source “AF-2100-Metasystems”
- 1x power supply unit
- 1x Instruction manual
- 1x Microscope adapter for Zeiss-microscopes
- 1x dust cap for optics

2.4. SPECIAL FEATURES OF THE DEVICE

- Homogeneous illumination
- High luminous flux (CW up to 800 lm)
- Gamma corrected brightness control
- Pulsed operation with TTL trigger up to 100 kHz possible
- Silent and vibration-free operation
- Compact design & low weight

The light source can be controlled manually, directly at the control panel (optional accessory, see 6.2), or via the USB interface.

Device description

2.5. OPERATING MODES

The light source can be operated in three different modes. If both LED channels are activated, they are operated simultaneously.

2.5.1. Steady mode

The light source emits light continuously when the light source is switched on and at least one LED channel is activated.

2.5.2. Pulse mode

The light source emits a defined light pulse when a rising edge is applied to the trigger input. Both the pulse duration and the delay between trigger and pulse can be configured as follows:

- 5 to 9999 μ s (1 μ s - steps)
- 1 to 9999 ms (1 ms - steps)
- 1 to 9999 s (1 s - steps)

2.5.3. Follow mode

The light source follows the trigger signal and emits light when a high level is applied to the trigger input. If a low level is present, no light is emitted.

3. TECHNICAL DATA

Dimensions (W x H x D) approx. 105 mm x 150 mm x 160 mm

Weight approx. 2.0 kg

3.1. ENVIRONMENTAL CONDITIONS:

Storage and transport (in packaging):

Permissible ambient temperature -20 to 85 °C

Permissible relative humidity 10 to 90 %, non-condensing

Operation:

Permissible ambient temperature 0 to 40 °C

Permissible relative humidity 10 to 90 %, non-condensing

3.2. OPERATING DATA:

Application area dry, closed rooms

Operating altitude max. 2,000 m a.s.l.

protection class IP20 (EN 60529)

Electromagnetic compatibility:

Standard DIN EN 61326-1

The device complies with the requirements of the EC - Directive 2014/30/EU.

Electrical safety:

Standard DIN EN 61010-1

3.3. POWER SUPPLY:

Mains voltage for power supply 90 to 264 VAC Mains

frequency 47 to 63 Hz Power

consumption power supply unit max. 40 VA Output voltage

power supply 12 VDC \pm 5 %.

Safety DIN EN 60601-1 Types

..... XP-Power VES90PS12

The use of a power supply other than the one included in the scope of delivery is considered as improper use!

3.4. OUTPUT PARAMETERS:

Pupil diameter	23 mm
Numerical aperture	0.074
Light ripple	< 0.5 % compensation
of thermal drift of the luminous flux	< 5 %
Spectral distribution	Figure 1 Thread
type	M 48 x 0,5

LED-channel	Light color	Peak wavelength	Radiant power typical	Integral luminous flux typica
white	white	-	-	> 1900 mW
UVA385	UV-A	385 nm ± 5	110 mW/nm	> 1500 mW

Table 1: Optical power parameters of the different LED channels

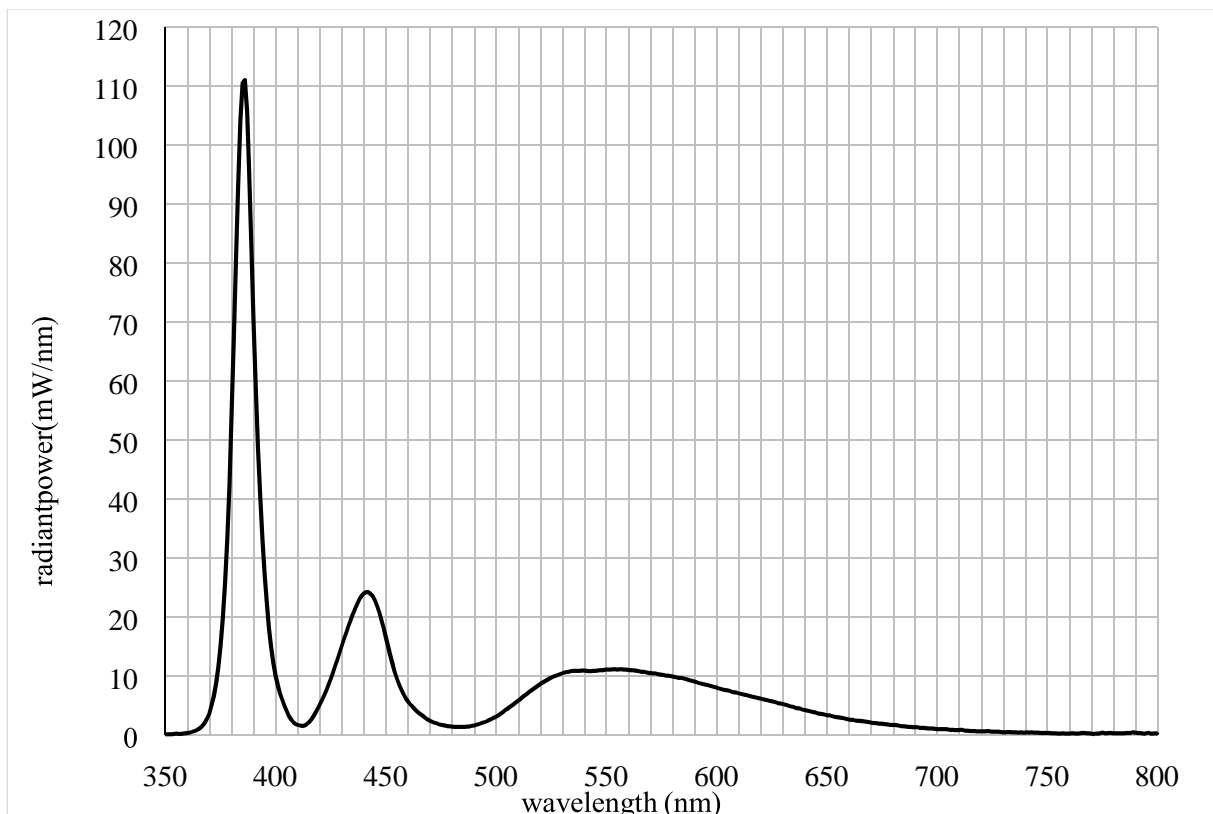


Figure 1: Spectral radiant power of the light source

3.5. INTERFACES

"TTL" (input)

Function level-controlled switching on/off of the light source Level
 TTL (0-0.8V = low; 3.2-5V = high), potential-free to supply current
 consumptionmax. 20 mA

ConnectorSMB socket

Operating modes

Pulse mode preconfigured light output after low-high edge

Rise time of optical output $t_{10-90} \leq 2 \mu\text{s}$ Fall
 time of the optical output $t_{90-10} \leq 2 \mu\text{s}$ Signal
 propagation time in pulse mode $< 5 \mu\text{s}$
 Minimum pulse length 10 μs

Follow mode Light output at high level Rise
 time of optical output $t_{10-90} \leq 2 \mu\text{s}$ Fall time of
 the optical output $t_{90-10} \leq 2 \mu\text{s}$
 Signal propagation $< 1 \mu\text{s}$

"Config." (Input)

Function Control of the light source via software

Connector USB 2.0 (Type C)

"Control" (input)

Function Control of the light source via control panel (optional accessory)

Connector Mini DIN socket 8 pole

"DC in" (input):

Function Supply of the light source

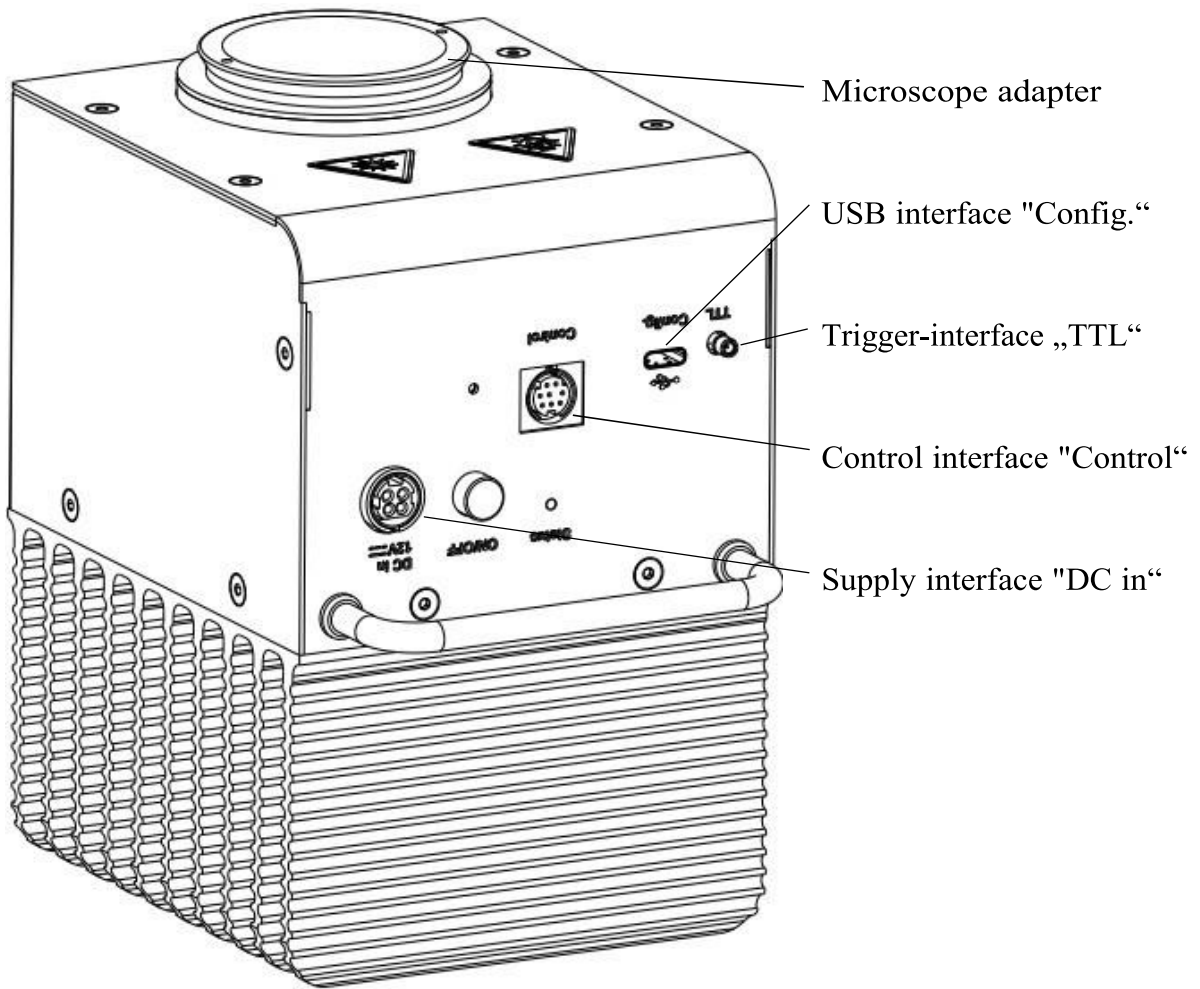


Figure 2: Interfaces on the light source

Connector Power DIN
 Technical data

4. START-UP

4.1. MOUNTING THE MICROSCOPE ADAPTER



The microscope adapter is attached by screwing it into the optical output of the light source (see Figure 3). The microscope adapter is screwed in by hand, making sure that it is firmly seated in the end position. The light source can then be attached to the microscope. The instructions of the microscope manufacturer must be followed.

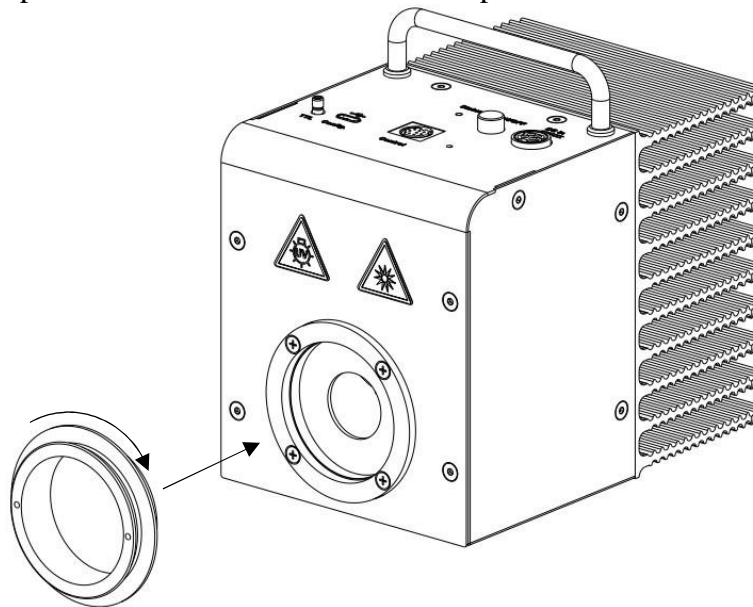


Figure 3: Attaching the microscope adapter

4.2. INSTALLATION / MOUNTING



The device generates high-energy light, partly with non-visible components. There is a risk of glare and blindness! The device must always be connected to the target system (e.g. microscope) first before the supply is connected!



Connect the light source to the target system using a suitable adapter in such a way that the cooling fins on the rear of the device are vertical and can flow through easily. Make sure that the white dust protection cap is removed. The dust protection cap must be put back in the microscope adapter when it is shipped or not in use.



Parts of the housing become warm during operation. Do not cover the cooling fins!

Start-up

4.3. CONNECTING THE ELECTRONIC ACCESSORIES



When connecting the electronic accessories, the following sequence must be observed for safety reasons:



-
1. connection of the control panel to the "Control" socket (optional accessory)
 2. connection of the PC to the "Config" USB port (optional)
 3. connection of the signal for triggered operation to the "TTL" interface (optional)
 4. connection of the power supply unit to the "DC in" supply connector
 5. connection of the included power supply unit with mains

5. OPERATION

5.1. OPERATING OPTIONS

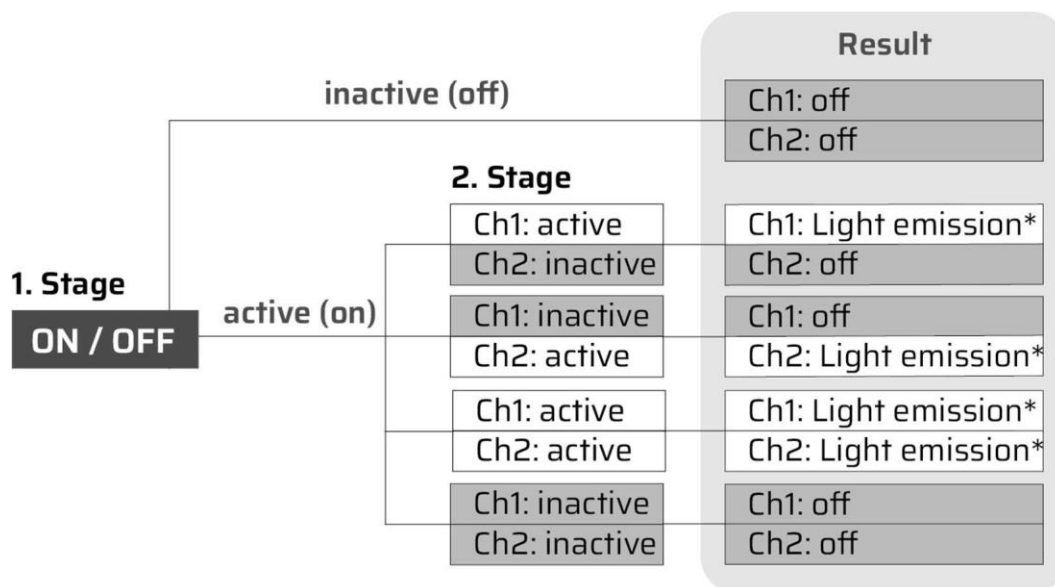
The light source is operated via an optionally available control panel or a GUI. The required hardware and software for operation via control panel or GUI are to be obtained from the manufacturer or supplier of the light source. Both options have an operating manual which must be observed in addition to this one. In addition, the light source has a complex command set (see 5.4), which can be used to integrate it into existing systems via a USB serial com port.

5.2. OPERATING CONCEPT

In order for the light source to emit light, a two-stage activation and corresponding configuration is required.

The first stage (GUI: Main Power) puts the light source in an active state. This means that LED channels emit light depending on their state and configuration. If the stage is inactive, the light source does not emit any light, regardless of the rest of the configuration. On the light source, this stage is implemented by the “ON / OFF” button. The respective state is signaled by the status LED (see 5.3).

The second stage (GUI: Channel State) is implemented separately for each LED channel. If this stage is activated, the corresponding LED channel emits light in the configured brightness depending on the operating mode (see 2.5). The prerequisite for this is the activation of the first stage.



*dependent on set operating mode and preconfigured brightness

Figure 4: Operating concept

5.3. CONTROLS AND INDICATORS

“ON / OFF” button

Pressing the ON/OFF button of the light source (see Figure 5) changes the state of the optical output between active and inactive or vice versa when the power supply is connected. After connecting the power supply, this state is always inactive. Therefore, no light is emitted after the supply is connected, even if an LED channel is activated.

“Status” LED

There is a indicator LED at the light source (see Figure 5), which signals different states:

- Red glowing Supply connected; light source turned off
- Green glowing Supply connected; light source turned on
- Red flashing Error condition (see 5.5)

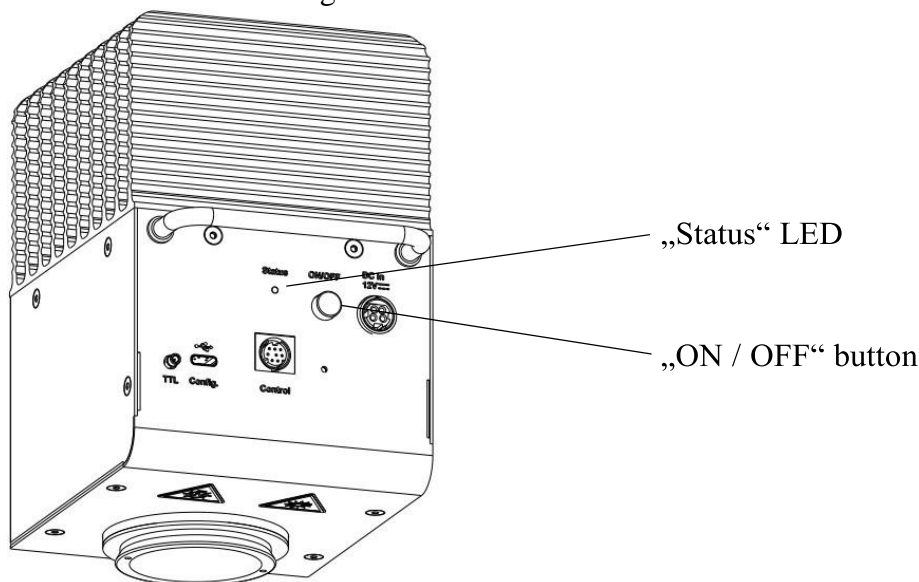


Figure 5: Controls and indicators

5.4. OPERATION VIA USB INTERFACE (SDK)

The operation and configuration of the light source is possible by communication via USB. For this purpose, the light source must be connected to a USB port on the operating PC. The information and commands must be sent or received via a terminal program (e.g.: h-term).

5.4.1. Configuration of the terminal program:

- Baud rate: 57600
- Stop bit: 1 Data bits: 8
- Parity: none
- CTS: no
- Newline:..... CRLF
- Send on enter: .. CRLF

5.4.2. Switching on/off the light source (master enable)

This function switches the light source on or off. It is to be set equal to the on / off button at the light source (see figure 5). It should also be noted that each channel must still be activated separately (see 5.4.4).

Command:

SET LEJ MASTER STATE [ON|OFF]

Example:

SET LEJ MASTER STATE ON ► Light source is switched on

5.4.3. Reading the switching state of the light source (master enable)

Command:

GET LEJ MASTER STATE

Example response:

ANS MASTER CHANNEL STATE ON

5.4.4. Activating / deactivating the LED channels

This function is used to activate the respective LED channel. If a LED channel is activated and the light source is switched on (see 5.4.2), the corresponding LED is lit. If both LED channels are activated, they are operated simultaneously.

Command:

SET LEJ LED STATE [CHn] [ON|OFF]

Example:

SET LEJ LED STATE CHA ON ► LED channel A is activated

5.4.5. Reading the state of the LED channels

Command:

GET LEJ LED STATE [CHn] Example:

GET LEJ LED STATE CHA

Example response:

ANS LED STATE OF CHANNEL A IS ON

5.4.6. Setting the brightness of LED channels

This function sets the brightness of a LED channel. The value of the specified brightness must be between 0 and 100. The minimum adjustable brightness value depends on the type of the installed LED (see 5.4.8).

Command:

SET LEJ LED BRIGHTNESS [CHn] [0-100]

Example:

SET LEJ LED BRIGHTNESS CHA 50 ► sets brightness of channel A to 50%

5.4.7. Reading the set brightness of an LED channel

Command:

GET LEJ LED BRIGHTNESS [CHn] Example:

GET LEJ LED BRIGHTNESS CHA

Example response:

ANS BRIGHTNESS OF CHA IS AT 50 PERCENT

5.4.8. Reading the minimum adjustable brightness of an LED channel

Command:

GET LEJ LED MIN BRIGHTNESS [CHn] Example:

GET LEJ LED MIN BRIGHTNESS [CHA]

Example response:

ANS ABSOLUTE MINIMUM BRIGHTNESS OF CHA IS 7 PERCENT

5.4.9. Reading the model of the light source

Command:

GET LEJ MODEL

Example response:

ANS LUXYR-LED MAGNA

5.4.10. Reading the serial number of the light source

Command: GET LEJ

SERNUM

Example response:

ANS SERIAL NUMBER IS XXXXXXXXXXXXXXXXXXXX

5.4.11. Setting the operating mode

Command:

SET LEJ OPERATION MODE [CW | PULSE | FOLLOW]

Example:

SET LEJ OPERATION MODE CW ► sets light source to Steady mode

5.4.12. Reading the operating mode

Command:

GET LEJ OPERATION MODE

Example response:

ANS MODE CW

5.4.13. Configuring the pulse length in pulse mode

Command:

SET LEJ PULSE LENGTH [X{VALUE}] [Y{UNIT}] □ UNIT US, MS, S

Example:

SET LEJ PULSE LENGTH 100 MS ► configures pulse length of 100 ms

5.4.14. Reading the pulse length in pulse mode

Command:

GET LEJ PULSE LENGTH

Example response:

ANS PULSE LENGTH IS 100 MS

5.4.15. Configuring the delay time in pulse mode

Command:

SET LEJ DELAY LENGTH [X{VALUE}] [Y{UNIT}] □ UNIT US, MS, S

Example:

SET LEJ DELAY LENGTH 100 MS ► configures delay of 100 ms

5.4.16. Reading the delay time in pulse mode

Command:

GET LEJ DELAY LENGTH

Example response:

ANS DELAY LENGTH IS 100 MS

5.4.17. Locking / unlocking the control panel

Command:

SET LEJ CONTROLPOD LOCK [ON|OFF]

Example:

SET LEJ CONTROLPOD LOCK ON ► Control panel lock is activated

5.4.18. Reading the control panel lock

Command:

GET LEJ CONTROLPOD LOCKSTATE

Example response:

ANS CONTROLPOD IS LOCKED

5.4.19. Reading the firmware version

Command:

GET LEJ FIRMWARE VERSION

Example response:

ANS FIRMWARE IS V1.0

5.4.20. Reading the LED type of a LED channel

Command:

GET LEJ LED ID [CHn]

Example response:

ANS LED ID OF CHA IS UVA385

5.4.21. Reading the wavelength of a LED channel

Command:

GET LEJ LED WAVELENGTH [CHn]

Example response:

ANS LED WAVELENGTH OF CHA IS 385

5.5. BEHAVIOR IN THE EVENT OF A FAULT

5.5.1. Overtemperature

The temperatures of the LED modules are monitored in the light source. If they exceed a critical value, the light source is switched off and an error is signaled by red flashing of the status LED.

After the LED module has cooled down, the status LED stops flashing and the light source can be used again. To do this, the light source must be switched on again.

If the error occurs, check that the light source is properly installed (see 4.2) and that the cooling fins are well ventilated (vertical orientation, not covered).

5.5.2. Internal faults

There are different types of internal errors. If an error is not serious, and the light source can continue to be used after a restart (interruption of the supply). If such an error occurs repeatedly, the light source must be repaired for further use (see 6.3).

Serious errors mean that the light source can no longer be used. If the status LED flashes red even after a restart (interruption of the supply), the light source signals such an error. The light source must be repaired for further use (see 6.3).

Errors are possible which cannot be registered by the error monitoring system. These errors are expressed by the fact that the light source does not behave as described, although no error is signaled. In this case, the light source must be repaired for further use (see 6.3).

6. SERVICE

6.1. MAINTANANCE AND CLEANING



The light source does not require regular maintenance. This does not release from the performance of legally regulated regular inspections with regard to electrical safety and accident prevention.



Before carrying out any cleaning work, the light source must be switched off and secured against being switched on again. If it has been in operation before, it is advisable to wait until the light source has cooled down.



Type	kind	Part number
Control Pod	Accessories (optional)	L70-005

Power supply	Spare part	L70-21PSU
--------------	------------	-----------

Only a dry, lint-free cloth may be used for cleaning. When cleaning, make sure that no dust or other foreign objects get onto the optics of the unit, as this may affect the function of the light source. In the event of damage (including external), the light source must be taken out of service immediately and repaired for further use (see 6.3).

If the light source is not used for a longer period of time, it must be covered with a suitable cover (e.g. foil bag of the original packaging) to protect the light source from dust.

6.2. SPARE PARTS AND ACCESSORIES

The light source has no wear or spare parts that can be replaced by the user. Only the optional accessories, such as microscope adapters, can be attached or replaced by the user if necessary.

For additional information and information about other accessories, contact the supplier or manufacturer of the light source.

6.3. REPAIRS

Repairs are only permitted by Leistungselektronik JENA GmbH or by specially authorized representatives.

If it becomes necessary to send the light source to the supplier or his authorized representative in case of a defect, use the original packaging of the device for this purpose and insert the supplied dust protection flap into the microscope adapter.