

# SCHOTT

## KL 2500 LED



## Operating instructions



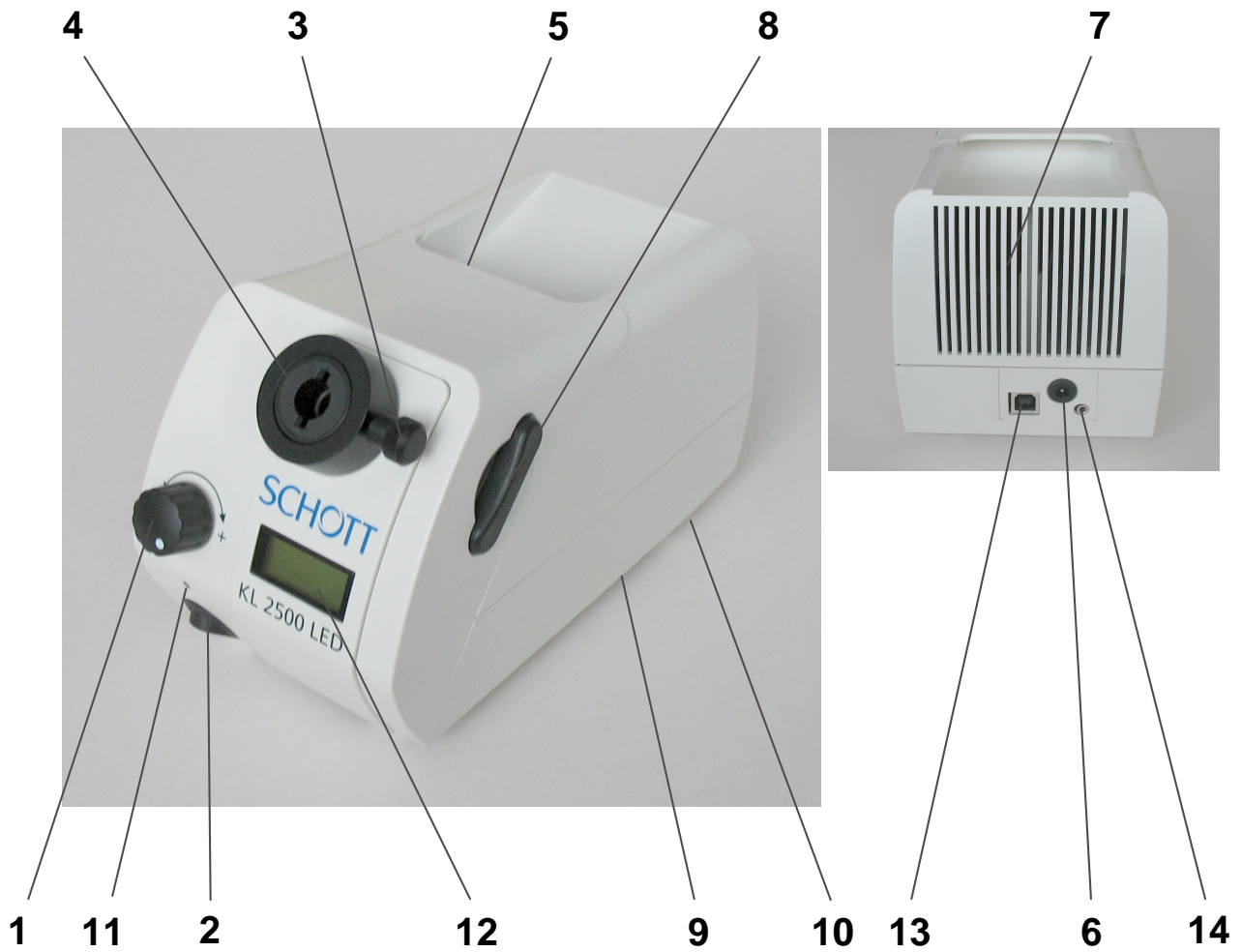
# KL 2500 LED – Operating instructions

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## Instrument overview





- |      |  |     |
|------|--|-----|
| (1)  | Electronic light intensity setting           | 2.4 |
| (2)  | On/off switch                                | 2.3 |
| (3)  | Locking screw                                | 2.1 |
| (4)  | Light guide socket                           | 2.1 |
| (5)  | Carrying handle                              |     |
| (6)  | Mains connection socket (back of instrument) | 2.2 |
| (7)  | Ventilation grid (back of instrument)        | 1.  |
| (8)  | Filter slide                                 | 2.5 |
| (9)  | Air vents (base of instrument)               | 1.  |
| (10) | Model plate (base of instrument)             | 1.  |
| (11) | Indicator light                              | 2.3 |
| (12) | LCD display                                  | 2.4 |
| (13) | USB connection socket                        | 3.1 |
| (14) | Foot switch connection socket                | 4.  |

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## 1. Important information

### Symbols used

Symbol	Meaning
	Warning of danger (caution, obey documentation)
	LED-radiation (caution, do not stare into beam!)

### Intended use

The KL 2500 LED cold light source is intended for industrial and laboratory applications.

Cold light sources are used for the intensive illumination of all types of objects. High-intensity visible light is guided to the object using flexible or self-supporting, movable light guides.

In accordance with the EN 60825-1 standard LED illuminations, as is the case with the KL 2500 LED, are classed as products under LED class 2 (380-780 nm wavelength, maximum power output < 1mW).

The KL 2500 LED fiber optic light source conforms to the following European directives:

EMC Directive 2004/108/EC with amendments

Low Voltage Directive (LVD) 2006/95/EC with amendments

The technical documentation and full compliance with the standards listed below proves the conformity of the illumination system with the essential requirements of the above-mentioned EC Directives:

EN 61010-1:2001

EN 60825-1:1994 + A1:2002 + A2:2001

EN 61326-1:2006

EN 55011:2007 + A2:2007 Class B

EN 61000-3-2 :2006

EN 61000-3-3:1995 + A1:2001 + A2:2005



### Safety information:

**Please read and obey these instructions carefully. The instrument's safety cannot be guaranteed if they are not obeyed.**

Never look directly into the open light guide socket or the light guide exit during operation (danger of ophthalmic injury)!

The KL 2500 LED emits high-intensity visible light. Because light-absorbing materials have the physical property of converting incident light into heat, damage can arise to heat-sensitive or flammable light-absorbing materials. To avoid such thermal damage and the potential danger of fire or burns, please obey the following instructions:

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- Never cover up the light guide socket or light guide exit (danger of fire)!
- Never cover up the open light guide socket or light guide exit with your hands or other parts of the body (danger of burns)!
- When illuminating heat-sensitive or flammable light-absorbing objects (e.g. in microscopy), special care must be taken to ensure that an appropriate suitable distance between light guide and object, and a suitable lamp brightness level are selected so that no thermal damage occurs.
- When the light source is switched on, all light guide exists not being used in the working procedure must always be a safe distance – at least 10 cm – away from heat-sensitive or flammable light-absorbing materials (prevention of possible danger of fire). Care must, therefore, be taken that each light guide exit is at the above-mentioned safe distance away from, for example, dark/colored textiles and dark/colored wooden or plastic surfaces.
- To avoid unnecessary stressing of biological tissue by illuminating with visible light, reduce the brightness and duration of illumination to the absolute minimum required level.

**Please make sure that your KL 2500 LED cold light source is operated at the voltage stated on the model plate (10).**

- ◆ The light source has been developed for operation in dry rooms only! (See Point 8 “Technical data”)
- ◆ The instrument must not be used in explosive areas.
- ◆ Please ensure the air vents (7, 9) are always kept free. In the case of insufficient cooling an integrated thermo switch continuously regulates the light intensity (see Point 6 “Troubleshooting”)
- ◆ Safe disconnection from the power supply occurs only by pulling out the mains plug.
- ◆ The instrument may neither be opened nor dismantled. Technical modifications are forbidden. Repairs must only be carried out by the manufacturer or by its authorized customer service agency
- ◆ Please ensure that every user of the system has quick access to these operating instructions.
- ◆ The manufacturer is not liable for damage caused by failure to obey these instructions.

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## 2. Operation

### 2.1 Light guide connection



First loosen the locking screw (3) on the light guide socket (4) by turning it anti-clockwise. Insert the light guide as far as the stop and tighten the locking screw (3) by turning it clockwise.

Please note: When inserting light guides with a locating pin, care must be taken to ensure that the pin fits into one of the two guide slots.

### 2.2 Power connection

Insert the hollow plug of the supplied power cord into the mains supply plug-in socket (6) of the light source.

Please take care to ensure that you only operate your KL 2500 LED light source with the power supply provided.

Insert the three-pole power cable (available as accessory) into the designated power supply connection socket. This is connected to the mains supply (100-240 V AC, 50-60 Hz).



### 2.3 Start-up procedure



Switch on/off the KL 2500 LED by pressing the on/off switch (2).

When the instrument is switched on both the green control light (11) and the LCD display (12) are lit.

Please disconnect power by pulling out the power plug!



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## 2.4 Light intensity setting

The brightness can be adjusted continuously by turning the light intensity setting knob (1). The brightness setting is shown in the LCD display (12) as a percentage.

Every stop position of the setting knob increases or decreases the value by 1.0%.

Maximum brightness is reached at a setting of 100.0%. When the brightness control is set at 0.0% there is no more intensity, i.e. the lamp is off.

**Attention:** Please note that when the brightness control is set at 0.0% the instrument is not switched off. When the instrument is switched on the green control light (11) is lit. Switch off the KL 2500 LED by pressing the on/off switch (2) once (see point 2.3 “Start-up procedure”).

Please ensure safe power disconnection by pulling out the power plug!



The LCD display (12) indicates the LED energy consumption as a percentage. The control is linear, whereas the illumination power of the LEDs is not proportional to the current consumption. For this reason the change in intensity in the upper control range (> approx. 50.0%) is not particularly great, whilst in the lower control range accordingly greater.

To ensure sensitive brightness adjustment in the lower control range or coarse brightness adjustment in the higher control range, press the light intensity setting knob (1) to achieve fine-tuned control in increments of 0.1% or coarse-tuned control in increments of 5.0%. If the light source is in “fine-tuning mode”, “FINE” is shown in the LCD display (12). If the light source is in “rough setting mode”, “COARSE” is shown in the display (12). To reset the light source to “standard setting mode” press the light intensity setting knob (1) again; the indication will be removed from the display.

## 2.5 Filter slide



The KL 2500 LED has a filter slide (8) which can be fitted with an insert filter from the filter set (available as accessory).

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When operating the light source the filter slide must always be engaged in one of the end positions or in the rest position. This is the only way to guarantee optimum air cooling of the light source.



### **Safety information:**

#### **WARNING !**

Operating the light source with the filter slide in an intermediate position can cause damage to the slide.

### **Fitting the filter slide**

Please ensure the filter slide (8) has cooled down before fitting the insert filter.

Completely pull out the filter slide (8) from the light source and slot the required filter from the filter set into the provided holder, ensuring the filter is lying flat in the holder.

Push the filter slide as far as the stop to ensure the filter is positioned in the optical light path.

If you wish to operate the light source for a short time without a filter then only pull the slide out to the first rest position. In this position the filter is still in the light source, but no longer in the light path.

## **3. Control via USB**

Your KL 2500 LED comes with a USB port making it possible to be controlled by computer using the USB connecting cable supplied. SCHOTT provides demo software (see Point 3.2) to demonstrate the control function, installable on request at below mentioned address. It is also possible to integrate the light source controlling in individual software by linking the corresponding protocol commands (see Point 3.3.).

### **3.1 Installation of USB driver**

To facilitate communication between the KL 2500 LED and your computer, the corresponding driver first has to be installed. This can be requested at the below mentioned address.

Connect the light source via the connecting socket (13) to your computer using the USB connecting cable provided and switch the light source on at the on/off switch (2). When first switching on, your operating system prompts you to install the new USB appliance. Follow the instructions of your operating system. Make sure that the driver is saved in a suitable path.



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### **3.2 Demo software**

SCHOTT's demo software is designed to show which control functions are possible using the USB connection. It is not fully developed control software and only serves to demonstrate!

SCHOTT's demo software can be requested at the below mentioned address.

### **3.3 Protocol**

All information such as port settings, formats, control commands, error codes etc. for integrating the KL 2500 LED into individual control software are described in our separate info sheet.

The "Protocol for Communication with KL 2500 LED" info sheet can be downloaded from our website at

["http://www.schott.com/lightingimaging/english/lifescience/microscopyproducts/KL/KL2500LED.html"](http://www.schott.com/lightingimaging/english/lifescience/microscopyproducts/KL/KL2500LED.html).

## **4. Control via foot switch or remote control**

Illumination using the KL 2500 LED can be switched on and off via a foot switch (accessory) or key button (shuttering).

Connect at the corresponding connecting socket (14) on the back of the light source.

If the illumination is switched off (brightness 0.0%) this will be shown in the display (12) via the indicator "SHUTTER".

Further, the brightness setting of the KL 2500 LED can be adjusted via a remote control (accessory).

For this purpose connect the remote control at the corresponding connecting socket (14) on the back of the light source.

By pushing the plus- or minus button at the remote control, light source can be switched on or off (shuttering). To activate the remote control modus at the light source, the light intensity setting knob (1) of the light source must be pushed and hold for a while. The LCD-display (12) indicates "REMOTE". By pushing the plus- or minus button at the remote control, the brightness setting of the light source can be adjusted. Increment steps are the current adjusted (0.1%, 1.0%, 5.0%).

The remote control modus can be switched off by pushing the light intensity setting knob (1). The indication "REMOTE" disappears at the LCD-display (12).

## **5. Maintenance**

Your KL 2500 LED is maintenance-free.

The light source should not be disinfected for use in medical applications.

To clean the outside of the instrument please use a soft dry cloth or commercially available plastic cleaning cloths.

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### 6. Troubleshooting

Should you be unable to rectify the faults by the measures listed below, please contact your specialist dealer or the nearest SCHOTT agency. More extensive repairs must be carried out by an authorized after sales service.

Fault	Possible cause	Remedial action
Lamp out	Instrument not switched on	Switch instrument on
	Plug not in socket	Plug in socket
	No mains electricity voltage	Check mains voltage
Light intensity dropping	Electronics overheated	Switch off instrument. Ensure adequate cooling, switch on again after prolonged cooling time.
Light source switches to "Shutter mode"	Inadvertent electro-static discharge at connecting socket of foot switch (14)	Switch instrument off and on again.

### 7. KL 2500 LED accessories

A wide range of accessories is available for your KL 2500 LED. Please see our separate catalogue for further details (contact address for additional requirements can be found on page 16).

Proper functioning, safety and optimum luminous efficiency can only be guaranteed with SCHOTT light guides and accessories.

Self-supporting and flexible light guides are available in various lengths and diameters, as well as spot and slit illuminations.

Optical filters can either be inserted in the filter slide or used as screw-in or clip-on filters in conjunction with a focusing attachment (accessory) in front of the light guide exit.

Details on the focusing attachment and available standard filter types can be found in our catalogue.

## 8. Technical data for KL 2500 LED

Properties		Values
<b>General information</b>		
Type description		KL 2500 LED
Dimensions (W x D x H)	mm	approx. 220 x 113 x 137
Weight	kg	approx. 2.45
Cooling		Axial fan
Ambient temperature*	°C	+ 5 ... + 40
Relative air humidity*	%	Up to 31°C ambient temperature: 85% From 31°C to 40°C ambient temperature: decreasing linearly to 75%
Air pressure*	hPa	700 ... 1060
Transport and storage		
Temperature	°C	-20 ... +70
Rel. air humidity	%	10 ... 95 (non-condensing)
Air pressure	hPa	500 ... 1200
Contamination level		2
IP-Protection class		IP20
<b>Electrical information</b>		
Operating voltage, frequency		90 – 264 V ~ 47 - 63 Hz
Input voltage	V	24, DC
Power consumption, max.	VA	max. 80
Protection class		II
Overvoltage category		II
Diodes		Osram Ostar Compact
LED nominal output	W	9 x 7
Average LED lifetime LED 100% setting	h	50,000 (luminous flux reduced to 70%)

\* Test conditions of DIN EN 61010-1 and UL61010-1 standards

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<b>Lighting information</b>	
Maximum effective light guide bundle diameter mm	9
Total luminous flux at light guide exit (SCHOTT light guide Ø 9 mm, typical value) 100% setting lm	1,000
Color temperature K	Approx. 5,600
Light exit angle ( $2\alpha_{\text{eff}}$ )	Approx. 40°
Conformity	CE
EMC emission class	(power supply CE, UL, PSE) B

We reserve the right to make changes in the design and supplied items within the scope of on-going technical improvements.



### WEEE declaration

Your SCHOTT product was produced and developed with high quality materials and components. The symbol indicates that electrical and electronic devices must be separated from domestic waste and appropriately disposed of after useful life.

SCHOTT AG Lighting and Imaging has arranged a waste management system for recycling. Please use this system for removal and help to protect the environment we live in.

Further information regarding our waste management system, please refer to

[www.schott.com/lightingimaging/recycle](http://www.schott.com/lightingimaging/recycle)

## SCHOTT AG

Business Unit Lighting and Imaging

Otto-Schott-Strasse 2

55127 Mainz

GERMANY

Tel. + 49 / 6131 / 66 - 0