

Colibri 7 **Operating Manual**

Knowledge of this manual is required for operation of the device. You should therefore familiarize yourself with its contents, paying particular attention to instructions concerning safe handling of the device.

We reserve the right to make changes to the product in the light of technical developments. The manual is not covered by an update service.

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1 INTRODUCTION

1.1 Notes on device safety

The Colibri 7 solid-state light source has been designed, produced and tested in compliance with the European standard DIN EN 61010-1 (IEC 61010-1), "Safety requirements for electrical equipment for measurement, control and laboratory use", meets the requirements set forth in the RoHS Directive 2011/65/EC and carries the  mark.

The Colibri 7 solid-state light source meets the Low Voltage Directive 2014/35/EU and the EMC Directive 2014/30/EC.

The devices must be disposed of in compliance with the WEEE Directive 2012/19/EC.

This operating manual contains information and warnings that must be followed by the operator.

The following warning and information symbols are used in this operating manual:

**CAUTION**

This symbol indicates a potential hazard to the user.

**CAUTION LED radiation!**

LED risk group 3 according to DIN EN 62471:2009 when the user looks directly into the Colibri 7 light output.

UV radiation is emitted.

Any direct looking into the Colibri 7 light output is to be avoided.

Failure to heed this caution may result in eye damage.

Skin and eye irradiation is to be minimized by appropriate shielding.

**WARNING of possible laser radiation!**

The safety screw for fastening the lamp module to the microscope may only be removed by ZEISS Service (not a customer interface). Otherwise there is a risk of eye damage upon laser coupling.

**CAUTION: High-energy UV radiation!**

Risk of damage to the eyes and skin!

**CAUTION**

Disconnect the device from the line before any intervention!

**CAUTION**

Hot surfaces on lamp module!

**ATTENTION**

This symbol indicates a potential hazard to the instrument or system.

**NOTE**


This symbol designates information that should be closely followed.


Depending on the design of the microscope, the risk for the user must be assessed as being markedly lower.


When it comes to the intended use of the Axio Observer microscope with Colibri 7, for example, the risk status of the overall system is downgraded to LED risk group 2 according to DIN EN 62471:2009.


Colibri 7 and its original accessories may only be used for the purposes described in this operating manual.


Particular attention should be paid to the following:

 Use Colibri 7 for ZEISS microscopes only. The manufacturer cannot assume any liability for any other applications of the instrument, including the use of individual modules or components. This also applies to any service or repair work that is not carried out by authorized service personnel. Failure to comply with this shall render all warranty claims invalid.


 To ensure safe operation of the Colibri 7 solid-state light source in connection with the microscope, pay attention to the operating manual of the microscope.

 Colibri 7 is not to be used in explosive environments.

 Keep combustible and easily inflammable materials away from the light beam and its surroundings.

 Colibri 7 is not equipped with any special devices for protection from substances that are corrosive, potentially infectious, toxic, and radioactive or other substances that may be hazardous to health. Observe all legal regulations, particularly the relevant national accident prevention regulations when handling such substances.



 Disconnect the power plug of the desktop power supply unit prior to assembly / disassembly of the lamp module.



 Only specially authorized experts or service staff are permitted to open the lamp module.



The desktop power supply unit of the Colibri 7 solid-state light source permits mains voltages in the 100 V to 240 V $\pm 10\%$, 50 Hz to 60 Hz range without the voltage setting on the instrument having to be changed.

The desktop power supply unit should not be brought into contact with moisture. If the housing is damaged, the desktop power supply unit should be taken out of use. Colibri 7 must only be operated with the desktop power supply unit contained in the scope of delivery.



Before connecting the desktop power supply unit to a power outlet check whether it is suitable for the available line voltage.



The power plug of the desktop power supply unit must be inserted in an outlet featuring a grounding (earth) contact. The protective capacity must not be rendered ineffective by the use of extension cables with no grounding conductor.



Do not substitute detachable power cables with power cables that do not meet the specifications. Only the specified power cables should be used.



If it is determined that protective measures are no longer effective, the instrument must be taken out of service and secured against inadvertent operation. To repair the instrument, contact the ZEISS service team in Germany (see page 33) or your local ZEISS overseas representative.



Colibri 7, if equipped with the corresponding LED modules, emits ultraviolet radiation that may cause burns to the eyes and skin. Never look directly into the light and avoid direct skin exposure. When operating the microscope, always use the protective devices belonging to the instrument.




Never look into the light beam – neither with nor without optical instruments, even not if you simply want to observe the specimen. Failure to follow these instructions may result in eye injury!





Take appropriate protective measures if the specimen releases noxious gases, dust, and vapors, secondary radiation or explosive substances as a result of the UV radiation!




Hot surfaces on lamp module! Avoid touching the hot lamp housing.

 Placing objects against or covering ventilation slats of the control unit may lead to heat build-up that may damage the device and, in extreme cases, cause a fire. Always keep the ventilation slots clear and ensure that no objects enter or fall into the instrument through the ventilation slats.

 Dust and dirt may impair the instrument's performance. Therefore, the device must largely be protected from these influences and covered with the dust cover when not being in use. Always check whether the instrument is switched off before you cover it.

 Defective devices must not be disposed of with the household waste. Dispose them of in compliance with the relevant legal requirements or return them to the manufacturer of the device.

 The manufacturer of the device is under the legal obligation to take defective devices back.

1.2 Warning labels

Standard labeling

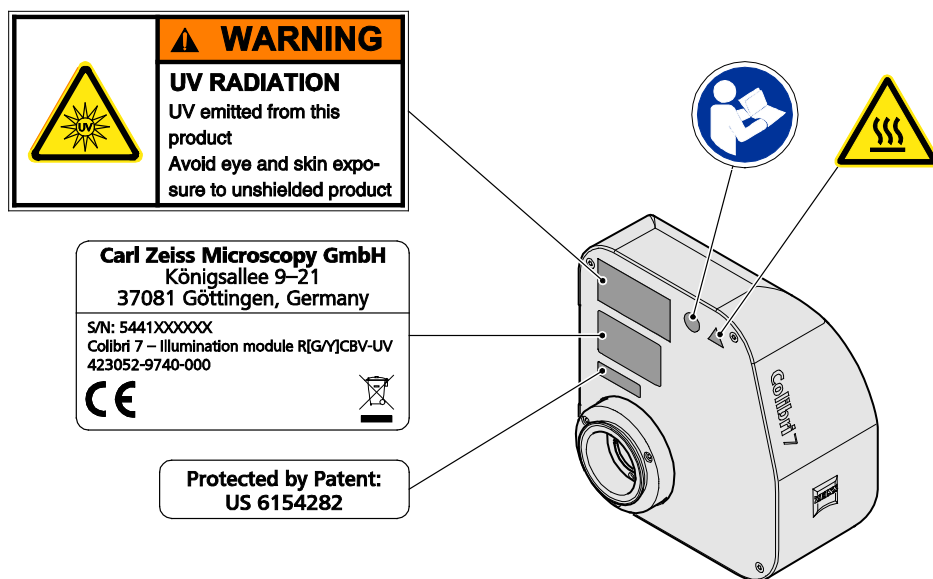
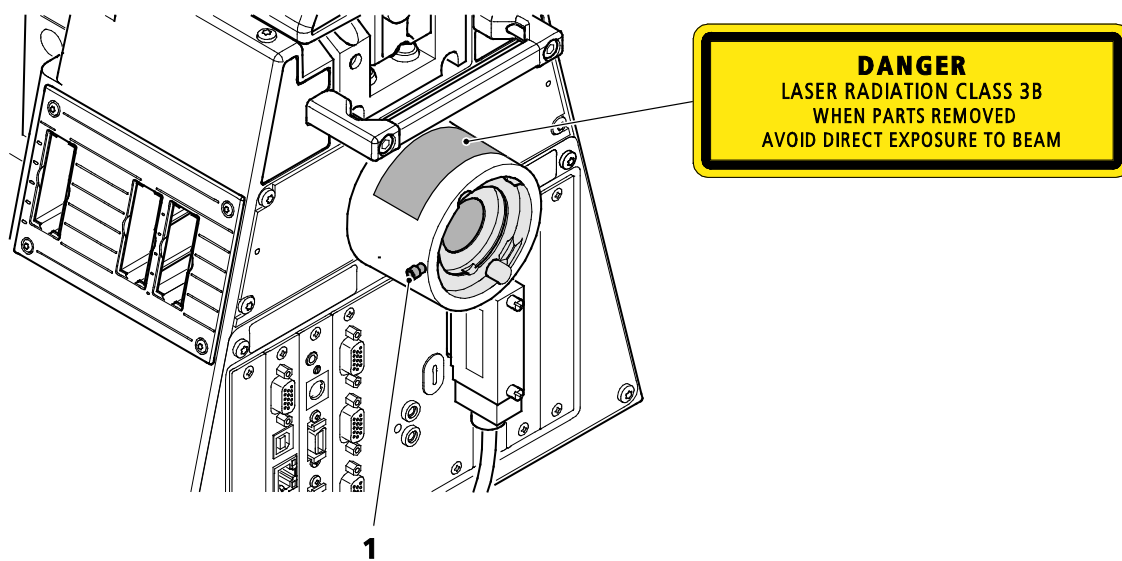


Fig. 1 Warning labels on the lamp module

Labels on the reflected light mount of the microscope for laser application with Colibri 7**Fig. 2** Warning label on reflected light mount of microscope

The safety screw (Fig. 2/1) on the reflected light mount for fastening the lamp module to the microscope may only be removed by ZEISS Service (not a customer interface). Otherwise there is a risk of eye damage upon laser coupling.

1.3 Warranty notes

The manufacturer guarantees that the device is free of material or manufacturing defects upon delivery. Any defects must be reported immediately and steps taken to minimize damage. If such a defect is reported, the device manufacturer shall be obliged to correct the default, either by repairing the device or replacing it with a new one, at the manufacturer's discretion. No warranty is given for defects caused by natural wear (particularly of wearing parts) and improper use of the device.

The device manufacturer shall not be liable for damage caused by misuse, negligence or any other tampering with the device, particularly the removal or replacement of instrument components, or the use of accessories from other manufacturers. Such actions shall invalidate any warranty claims.

With the exception of the work described in this manual, no maintenance or repair work is to be carried out on these microscopes. Repairs may only be carried out by ZEISS Service or individuals specially authorized by ZEISS Service. In the event of a problem occurring with the instrument, please contact the ZEISS Service in Germany (see page 33) or your local ZEISS overseas representative.

2 DESCRIPTION OF THE DEVICE

2.1 Name, intended use, and main features

Manufacturer's designation: Colibri 7

Colibri 7 is designed to be used as a light source for reflected light fluorescence applications.

It can be used in connection with the following upright microscopes:

- Axio Imager
- Axio Examiner
- AxioPlan 2
- Axioskop 2
- Axioskop 2 FS
- Axioskop 40
- Axio Scope.A1

and with the following inverted microscope:

- Axio Observer
- Axio Vert.A1
- Axiovert 200

The device has the following essential features:

- High-end LED light source for fluorescence applications with visible and UV light for direct connection to the microscope, no adjustment necessary
- Four different variations (fixed LEDs), equipped with four to seven excitation lines with different emission wavelengths and fixed excitation filters
- LED emission is individually adjustable for each LED in increments of 1 % (1 – 100 %)
- Standby mode to reduce power consumption
- Real-time stabilization of brightness for low-noise image captures
- Long-time stabilization and performance optimization to improve the comparability of image captures
- Integrated and motorized switchable excitation filters
- Calibrated and monitored lamp intensity to improve quantification of image results
- Very quick switching on, over and off of the LED modules, no shutter required
- Control via the TFT display of Axio Observer 7 / Z1 stands via CAN connector
- Optional control via software ZEN 2.3 (blue edition), manual control panel or Trigger Box
- Integrated interface for triggered image capture from ZEN 2.3 (blue edition)
- Specific filter sets (as P&C filter modules without excitation filters) for the LED variations deliverable
- Minimum heat development
- Guaranteed lifetime 15,000 h for each bulb per LED line
- Easy integration in 3rd party software packages via LED Trigger Box

2.2 Components overview

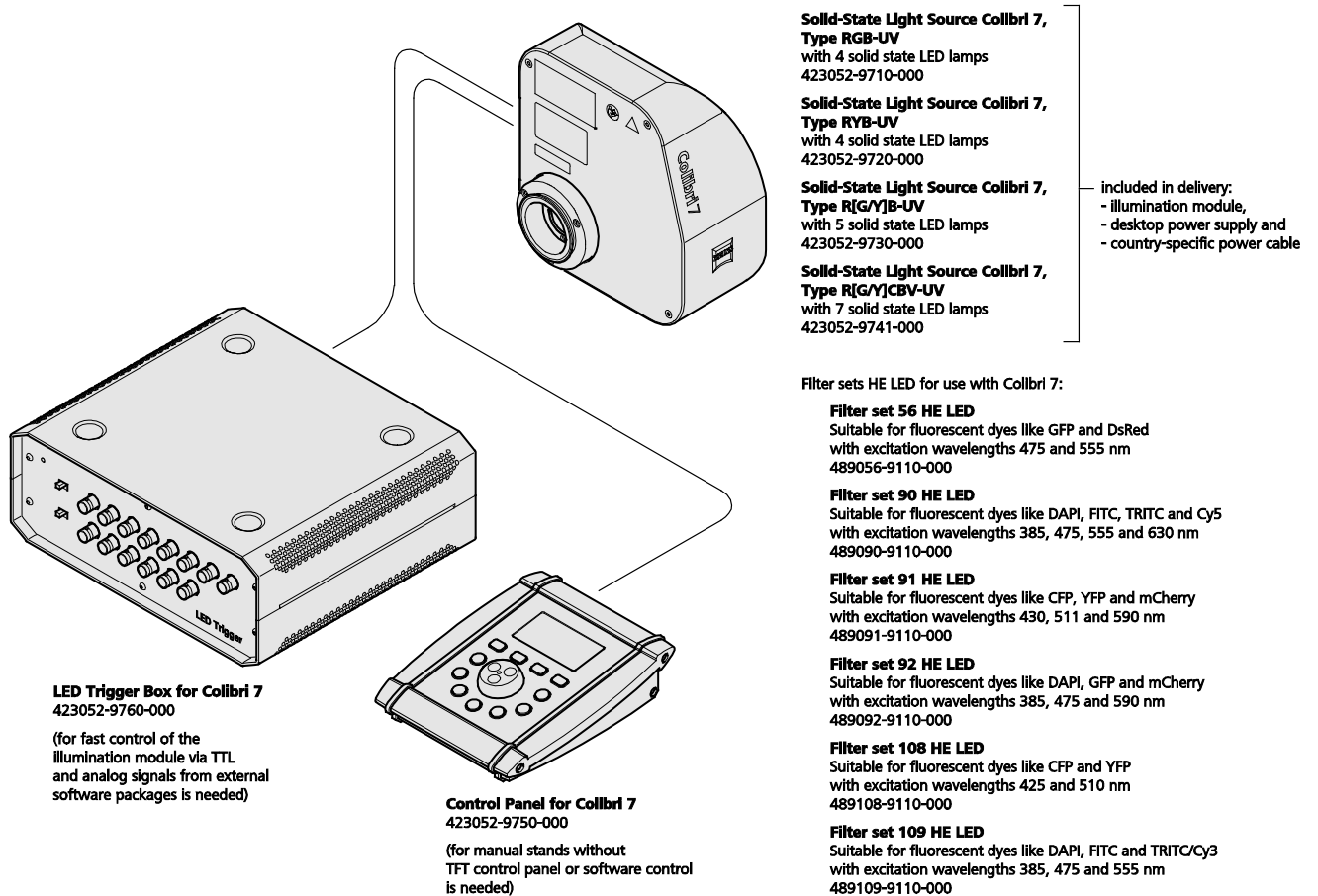


Fig. 3 Components overview of the Colibri 7 solid-state light source

2.3 Technical data**Dimensions**

Lamp module (length × width × height)	167 mm x 183 mm x 103 mm
LED Trigger Box (length × width × height)	220 mm x 245 mm x 105 mm
Control panel (length × width × height)	180 mm x 110 mm x 70 mm

Weight

Lamp module	up to 1,900 g
LED Trigger Box	approx. 2,100 g
Control panel.....	approx. 590 g

Excitation wavelengths

Solid-state light source Colibri 7, type RGB-UV	630, 555, 475, 385 nm
Solid-state light source Colibri 7, type RYB-UV	630, 590, 475, 385 nm
Solid-state light source Colibri 7, type R[G/Y]B-UV	630, 590, 555, 475, 385 nm
Solid-state light source Colibri 7, type R[G/Y]CBV-UV	630, 590, 555, 511, 475, 430, 385 nm

Ambient conditions**Transport (in packaging):**

Permissible ambient temperature.....-40 °C to +70 °C

Storage:

Permissible ambient temperature.....+10 °C to +40 °C

Permissible relative air humidity (no condensation)..... max. 75 % at 35 °C

Operation:

Permissible ambient temperature.....+10 °C to +40 °C

Permissible relative air humidity (no condensation)..... max. 75 % at 35 °C

Altitude of operating site

Atmospheric pressure800 hPa to 1060 hPa

Degree of pollution.....2

Operating data

Operating area	Enclosed rooms
Protection class	I
Ingress protection rating	IP 20
Electrical safety	in compliance with DIN EN 61010-1 (IEC 61010-1) and conforming to CSA and UL regulations
Overvoltage category	II
Radio interference suppression	in compliance with EN 55011 Class B
Noise immunity	in accordance with DIN EN 61326-1
Line voltage of controller module	100 to 240 VAC ($\pm 10\%$)
Line frequency	50 to 60 Hz
Power consumption of controller module	70 VA

Colibri 7 overall LED classification	LED risk group 3 according to DIN EN 62471:2009
Solid-state light source Colibri 7, type RGB-UV	LED risk group 3 according to DIN EN 62471:2009
Solid-state light source Colibri 7, type RYB-UV	LED risk group 3 according to DIN EN 62471:2009
Solid-state light source Colibri 7, type R[G/Y]B-UV	LED risk group 3 according to DIN EN 62471:2009
Solid-state light source Colibri 7, type R[G/Y]CBV-UV	LED risk group 3 according to DIN EN 62471:2009

2.4 Operating and function controls**2.4.1 Connection panel on the lamp module**

The following connectors are located on the lamp module (Fig. 4):

- 1 Increment** connection socket
- 2 USB** connection socket
- 3 Remote** connection socket
- 4 Breakout** connection socket
- 5 Power** connection socket
- 6 CAN** connection socket

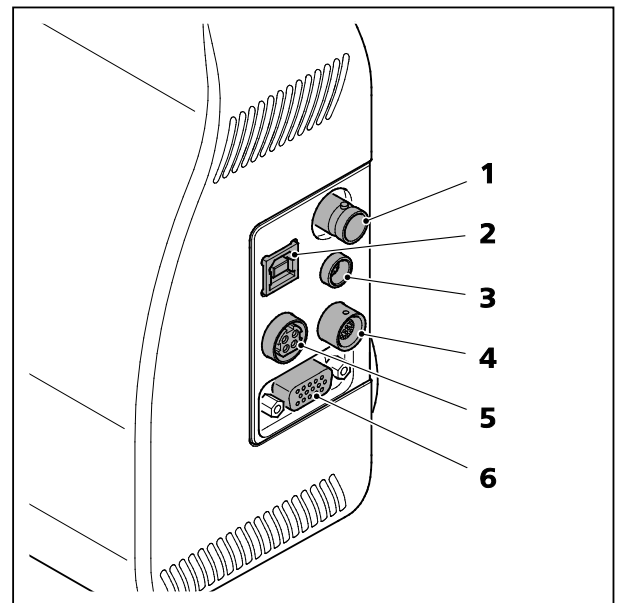


Fig. 4 Connection panel on the lamp module

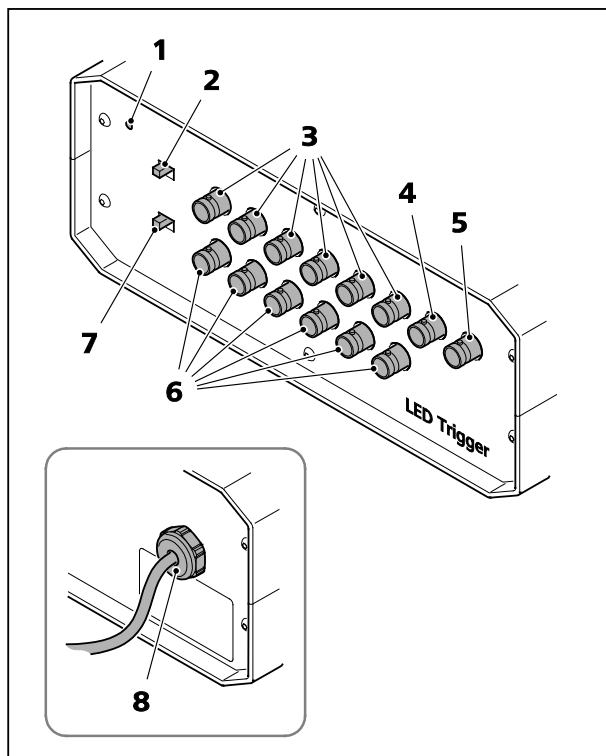


Fig. 5 LED Trigger Box for Colibri 7 (front and rear side)

2.4.2 LED Trigger Box for Colibri 7 (optional)

The LED Trigger Box is only needed if Colibri 7 is to be controlled via a third-party software.

The front of the LED Trigger Box contains the following elements (Fig. 5):

- 1** Power indicator light
- 2** Digital off / on selection button
- 3** 6x trigger sockets (**Digital In**) for the LEDs to be switched: **UV, V, B, C, G/Y, R**
- 4** Filter socket
- 5** Reserve socket
- 6** 6x trigger sockets (**Analog In**) for the LEDs to be switched: **UV, V, B, C, G/Y, R**
- 7** Analog off / on selection button

The rear of the LED Trigger Box contains the following elements (Fig. 5):

- 8** Output of connection cable to Colibri 7 (to **Breakout** connection socket)

Function and description of the selection buttons and trigger sockets

Selection buttons	
Digital: on	The LED can only be switched on via the trigger sockets (Fig. 5/3).
Digital: off	The LED can only be switched on via the control panel or the CAN interface.
Analog: on	The LED intensity can only be adjusted via the trigger sockets (Fig. 5/6).
Analog: off	The LED intensity can only be adjusted via the control panel or the CAN interface.
Trigger sockets	
Digital In	TTL level
Analog In	0 to 10 V

2.4.3 Control panel for Colibri 7 (optional)

The control panel has the following operating and function controls (Fig. 6):

- 1** Control dial for brightness with pushbutton to select the LED to be controlled
- 2** **Settings** button
- 3** **Standby** button
- 4** **Shutter** button
- 5** **Brightness control of all activated LEDs switched on** button
- 6** Display
- UV** LED button for wavelength **385 nm**
- V** LED button for wavelength **430 nm**
- B** LED button for wavelength **475 nm**
- C** LED button for wavelength **511 nm**
- G** LED button for wavelength **555 nm**
- Y** LED button for wavelength **590 nm**
- R** LED button for wavelength **630 nm**

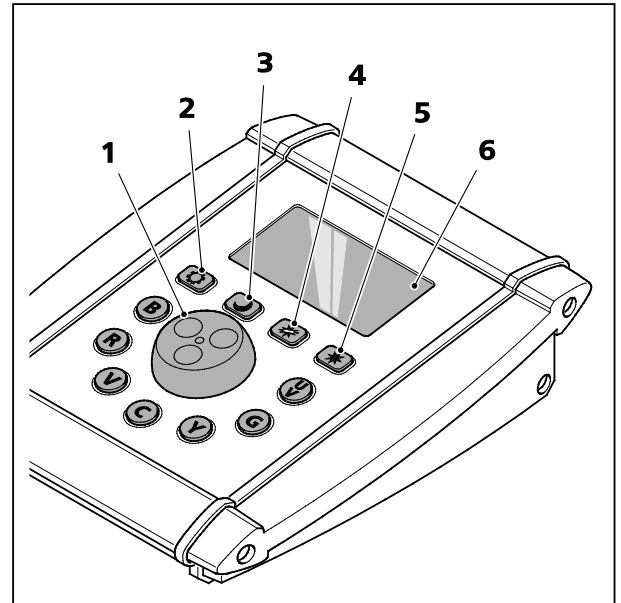
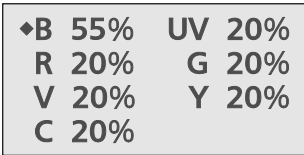

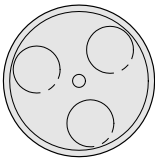






Fig. 6 Control panel for Colibri 7 – operating and function controls

Functions of the control panel

Display / control element	Function	Description
Display 	Status display of LEDs or of the device	<ul style="list-style-type: none"> – On / off state of LEDs – Current brightness value of the switched on LEDs in % – Highlighting of controllable LEDs – Error messages
LED buttons 	Switching one or several LEDs on or off	LED on: LED button lights up LED off: LED does not light up Using the 7 LED buttons, up to 6 LEDs can be switched on simultaneously.
Control dial 	Rotating function: Brightness control	Control from dark to bright in steps of 1 % to 100 %
	Push function: Selecting the LEDs to be controlled	<ul style="list-style-type: none"> – Transit switching between switched-on LEDs to activate for brightness control. – A maximum of 6 LEDs can be switched on simultaneously so that up to 6 LEDs can be switched through. – The LED which is currently controlled flashes.

Display / control element	Function	Description
Settings button 	Setting of brightness for buttons and display	Menu navigation as follows: <ul style="list-style-type: none"> - Enable feature: Press Settings button - Adjusting brightness: Turn the control dial - Exit feature: Press Settings button
Standby button 	Colibri 7 standby	Activate standby: <ul style="list-style-type: none"> - Press Standby button In standby mode, the backlighting of all buttons will be switched off, only the standby button will light up. All LEDs will be switched off. Exit standby: <ul style="list-style-type: none"> - Press Standby button
Shutter button 	Switching all LEDs on and off	All LEDs (up to 6) will be switched on or off simultaneously.
Brightness control of all activated LEDs button 	Brightness control of all activated LEDs switched on	Activating all switched-on LEDs for brightness control <ul style="list-style-type: none"> - Control takes place in an adjusted ratio relative to the wavelengths of the LEDs - Control: Rotate the control dial
-	Default values of individual LEDs	20 % after initialization and activation of the LEDs
-	Intensity value memory	In Standby mode: <ul style="list-style-type: none"> - Set brightness will be stored after switching off the device, i.e. when the device is switched on again, the previously selected value will be restored. After deenergizing the device: <ul style="list-style-type: none"> - Default values are set.

3 START-UP

The Colibri 7 solid-state light source consists of the following components:

- Colibri 7 lamp module (available in 4 variations, incl. SPU65-102 desktop power supply unit)
- Control panel for Colibri 7 (optional)
- LED Trigger Box for Colibri 7 (optional)



The device can be commissioned by the customer.

The lamp module of the Colibri 7 solid-state light source is delivered completely assembled in accordance with the equipment ordered (e.g. RGB-UV variation with 4 excitation lines).

3.1 Terminal diagrams

3.1.1 Terminal diagram for stand-alone operation

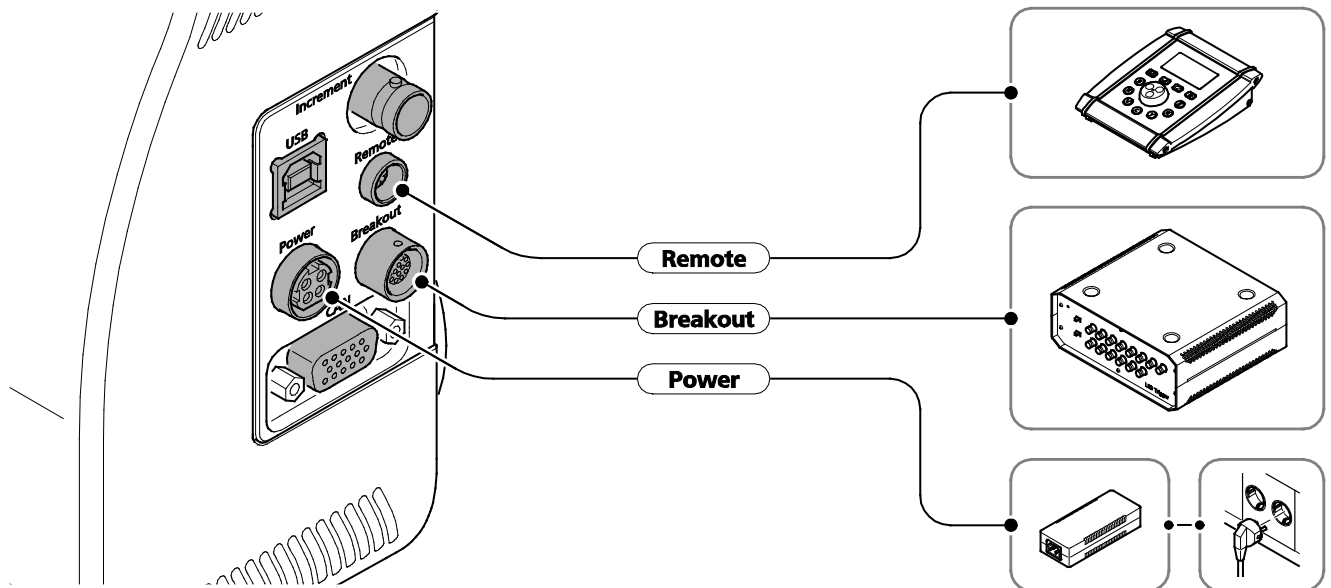
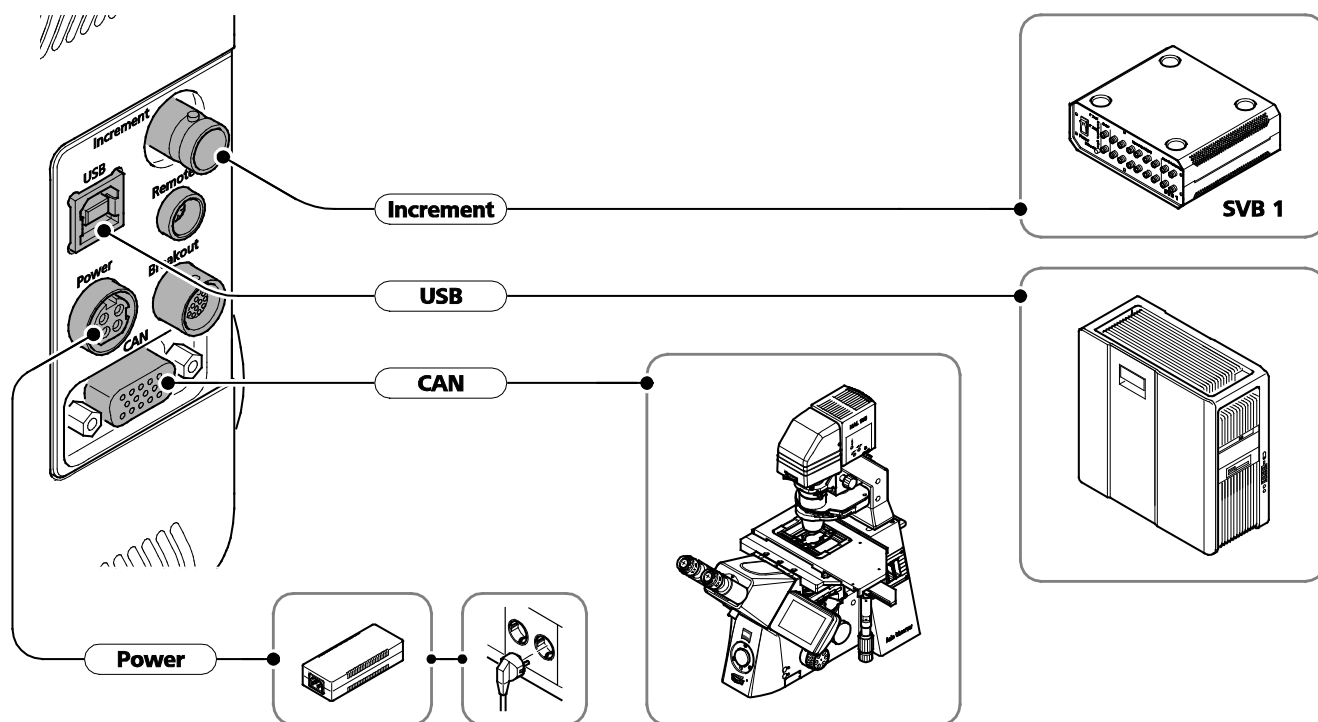


Fig. 7 Terminal diagram for stand-alone operation

3.1.2 Terminal diagram with PC and motorized microscope



SVB 1 signal distribution box
CAN / USB

optional, only for fast acquisition
optional:
CAN for control via ZEN 2.3 (blue edition) ZEISS software
USB for control via third-party software

Fig. 8 Terminal diagram with PC and motorized microscope for fast acquisition

3.2 Unpacking Colibri 7

The lamp module, the desktop power supply unit and other optional accessories are supplied separately in customary packaging.

- Remove all parts from the packaging.
- Check them for completeness according to the delivery note.

3.3 Attaching Colibri 7 to the microscope and connecting it

The lamp module is operated via the reflected light mount of the microscope.



In case of microscope systems with laser application, the clamping screw (Fig. 9/4) on the reflected light mount for fastening the lamp module to the microscope is a safety screw and may only be removed by ZEISS Service (not a customer interface). Otherwise there is a risk of eye damage upon laser coupling.

In case of microscope systems without laser applications proceed as follows:

- Attach dovetail (Fig. 9/1) of the lamp module (Fig. 9/2) to the reflected light mount (Fig. 9/3).
- Tighten clamping screw (Fig. 9/4).

The lamp module does not require any adjustment.

Depending on equipment variation, the Colibri 7 can be controlled via the TFT display of the microscope, the control panel, the LED Trigger Box or via PC.

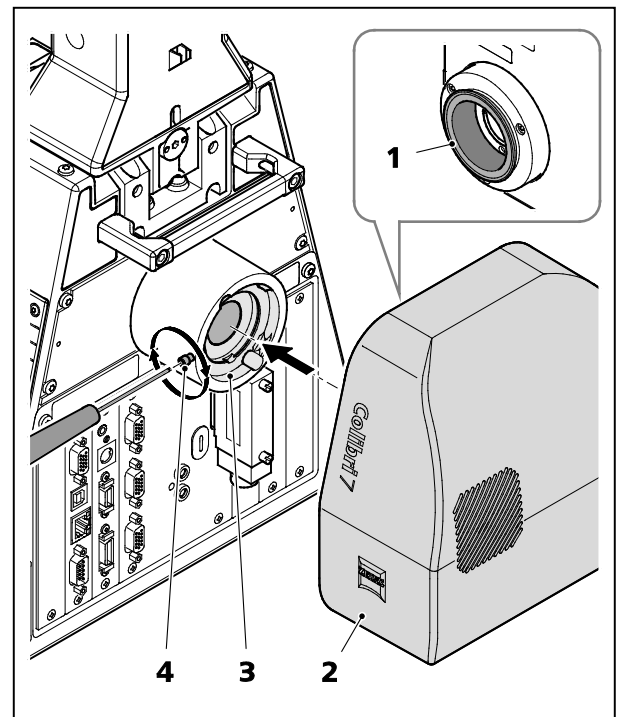


Fig. 9 Attaching the lamp module to the microscope

Depending in the existing microscope equipment, ensure the correct connection type as follows:

- Connect the connection cable of the desktop power supply unit (Fig. 10/7) to the **Power** connection socket (Fig. 10/5) of the lamp module (Fig. 10/1).
- If used, connect the control panel (Fig. 10/8) with connecting cable to the **Remote** connection socket (Fig. 10/2) of the lamp module.
- If used, connect the LED Trigger Box (Fig. 10/9) with connecting cable to the **Breakout** connection socket (Fig. 10/3) of the lamp module.
- If the microscope has a TFT display, connect the **CAN** connection socket (Fig. 10/4) of the lamp module via the CAN cable to the microscope stand.
- If Colibri 7 is to be controlled via a third-party software on the PC, connect the **USB** connection socket (Fig. 10/6) of the lamp module via USB cable to the PC.

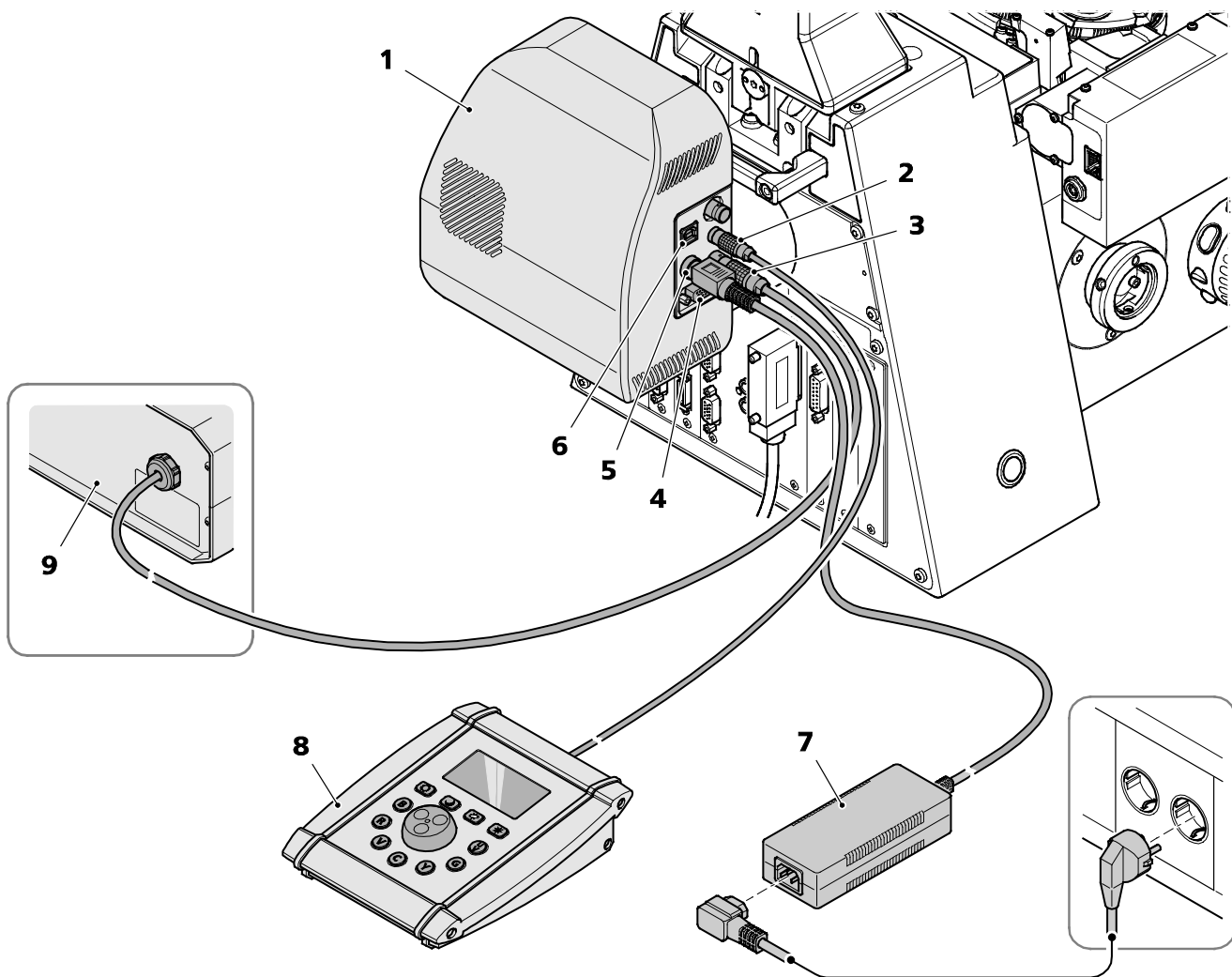



Fig. 10 Connecting the lamp module and components

3.4 Configuring Colibri 7 with MicroToolBox (MTB)

 If the installed lamp module has been connected to the PC via the CAN bus of the motorized stand, it will be automatically recognized and registered by the **Auto Configuration** function.

If Colibri 7 is connected directly to a PC via USB, the connection type and the lamp module type must be selected manually in the MTB and transferred to the hardware configuration.

Please proceed as follows for manual configuration:

- Start **MTB2011 Configuration** by double-clicking on the corresponding icon on the desktop.
- Alternatively, launch the program with:
Start -> All programs -> Carl Zeiss -> MTB 2011 – 2.x.x.x -> MTB2011 Configuration

 Like other fluorescence illuminators, Colibri 7 will be used in the reflected light path and will be displayed in the **Reflected Light Path** directory (Fig. 11/1) of the microscope.

- Select the **Reflected Light Path** folder (Fig. 11/1) and then **Colibri 7** (Fig. 11/2) in the window of the MTB which will be displayed upon selecting the configuration in the microscope directory (e.g. **Axio Imager.Z2**).
- Select the **USB** connection type (Fig. 11/3) in the selection list under **Colibri 7 / Connection / Type:** and click on **Check Connection**, if required.
- Then click on **Apply** (Fig. 11/4).

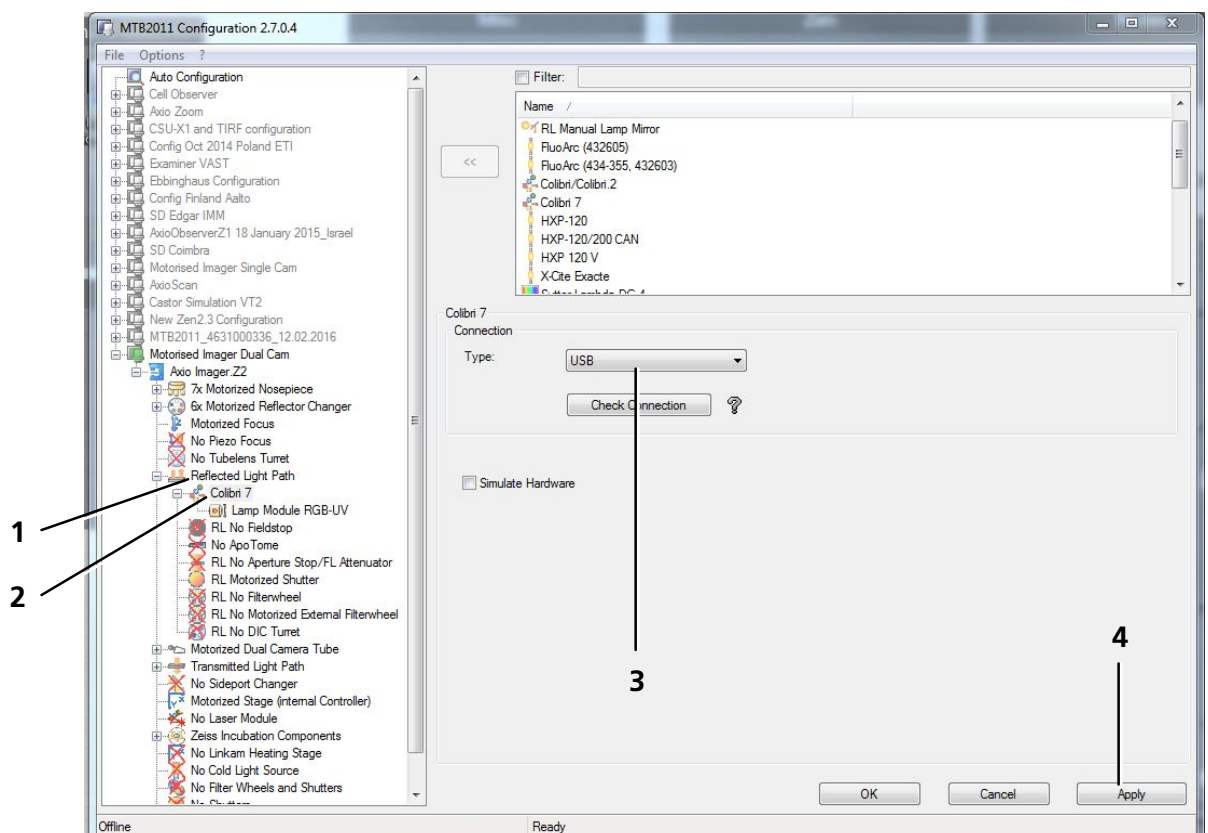


Fig. 11 MTB – Configuring the connection type

- Click on the lamp module entry in the **Colibri** directory (Fig. 12/1)
- Select the name of the installed lamp module in the selection window of lamp modules (Fig. 12/2).
- Then click on **Apply** (Fig. 12/3).
- Finally, click the current configuration (e.g. **Motorized Imager Dual Cam**) and click on the **Write configuration to hardware** button which will appear next to activate the configuration.
- Exit the MTB program.

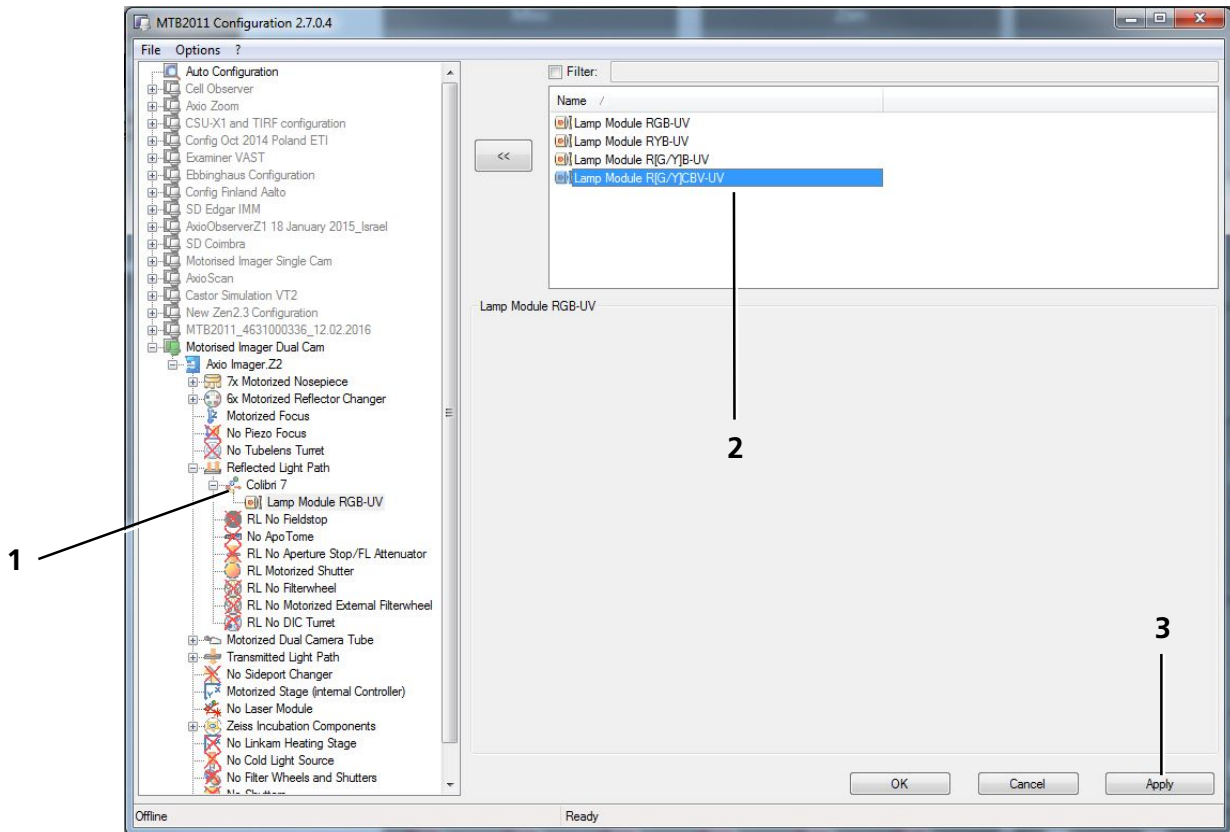


Fig. 12 MTB – Configuring the lamp module type

4 OPERATION

4.1 Starting operation of Colibri 7 for the first time

Colibri 7 does not have a separate on / off switch.

After mounting it to a microscope it only has to be connected to a power outlet.

- Connect the Colibri 7 desktop power supply unit (Fig. 10/7) with a power supply cable to a power outlet.

After a short initialization time Colibri 7 is ready for operation.

- Switch on the microscope.
- Start the control software used (from ZEN 2.3 (blue edition) or third-party software).

If the control panel or the LED Trigger Box are connected, they will be powered via Colibri 7 and are also ready for use.

4.2 Controlling the Colibri 7 solid-state light source

Colibri 7 can be controlled in various ways depending on the available components:

- via TFT display and selector wheel for illumination intensity at the Axio Observer, Axio Imager or Axio Examiner microscopes, see section 4.2.1
- via the control panel for Colibri 7, see section 4.2.2
- via PC and installed software ZEN 2.3 (blue edition), see section 4.2.3
- via LED Trigger Box or external triggering via third-party software

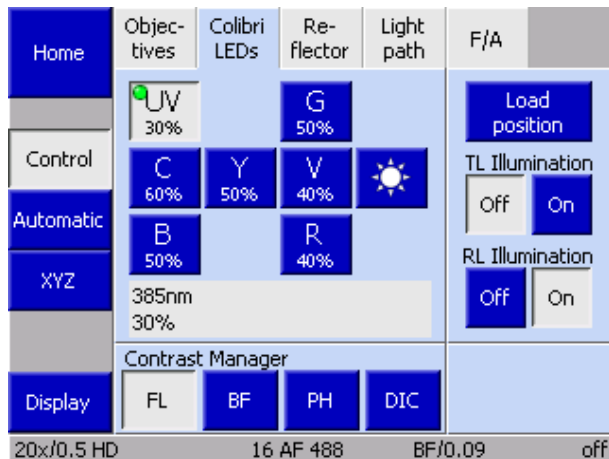


Fig. 13 TFT display, page "Colibri LEDs": one LED switched on and activated for brightness adjustment

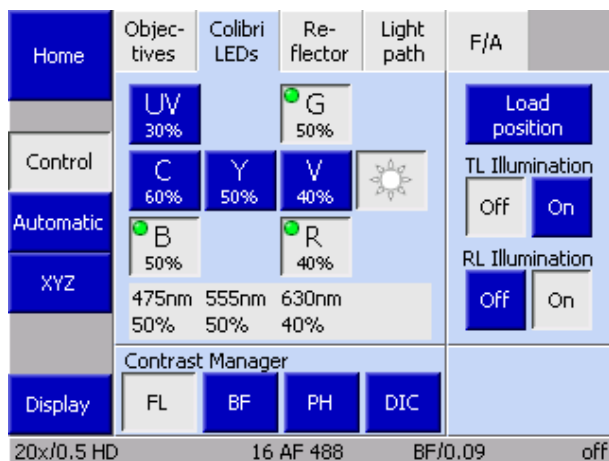


Fig. 14 TFT display, page "Colibri LEDs": three LEDs switched on and activated for brightness adjustment

- To adjust the brightness control of all LEDs switched on simultaneously press the  button (sun).

This button will now be gray , and all LEDs switched on are activated and marked with a green circle (see Fig. 14).

- Set the desired brightness for the LEDs switched on simultaneously using the selector wheel on the microscope.

In the display field below the LED buttons the wavelength and current brightness settings are displayed for the selected LED.

4.2.1 Control via TFT display of the microscope



Colibri 7 has been mounted on the microscope, connected via CAN and powered via the desktop power supply unit.

The microscope has been switched on.

- Select the **Colibri LEDs** page on the TFT display of the microscope: Press **Microscope** -> **Control** -> **Colibri LEDs** (see Fig. 13).
- Open the shutter in the reflected light path by clicking the **RL Illumination** -> **On** button.
- Switch on the desired LED by shortly pressing the corresponding button, e.g. **UV** button.

The button changes its color from blue to gray.

- To activate the LED for brightness adjustment, press the corresponding button longer.


The marking circle in the upper left of the button changes to green.


- Set the desired brightness with the selector wheel on the microscope stand (e.g. on front side of Axio Observer).


The current brightness adjustment of the LED will be displayed in percent in the button below the letter.




The **G** and **Y** intensity has always an identical value because the same LED is used for both excitation colors.

 If the brightness of several LEDs is controlled simultaneously, the LEDs which are switched on are controlled relative to each other. Thus, various adjustment values may be displayed for the LEDs. If an LED reaches 100 % it cannot be set to a higher value. The remaining LEDs can be controlled simultaneously, until they have reached their maximum at 100 %.

If the  (sun) button is activated, further LEDs will be automatically controlled when switched on.

 If RL and TL are switched on at the same time, the selector wheel on the microscope stand will control the intensity of the selected LEDs. To control TL illumination intensity, the RL shutter must be closed.

4.2.2 Control via the control panel for Colibri 7

 Colibri 7 has been mounted on the microscope and powered via the desktop power supply unit. The control panel is connected to the Colibri 7. The microscope has been switched on.

- Open the reflected light path shutter on the stand, if required.
- Switch on the desired LED by shortly pressing the corresponding LED button (see Fig. 15/5), e.g. **UV** LED button.

The LED button lights up. On the display (Fig. 15/1), the current brightness value is shown as a percentage to signal that the LED is switched on.

- If required, switch on further LEDs by pressing the corresponding LED buttons (up to 6 LEDs simultaneously).
- Activate the brightness adjustment for an LED by pressing the control dial (Fig. 15/6) shortly downwards.

The LED which is switched on and activated for brightness adjustment will flash. The LED which has been activated for brightness adjustment will be marked with a circle (Fig. 15/2) left of the letter.

- If several LEDs have been switched on, press the control dial shortly until the LED button of the desired LED flashes. The LEDs which are switched on can be switched through by shortly pressing the control dial.
- Set the desired brightness for the activated LEDs using the control dial on the control panel.

The brightness setting is updated synchronously on the display.

- To adjust the brightness control of all LEDs switched on simultaneously press the  button (Fig. 15/4).

All LEDs which are switched on will flash.

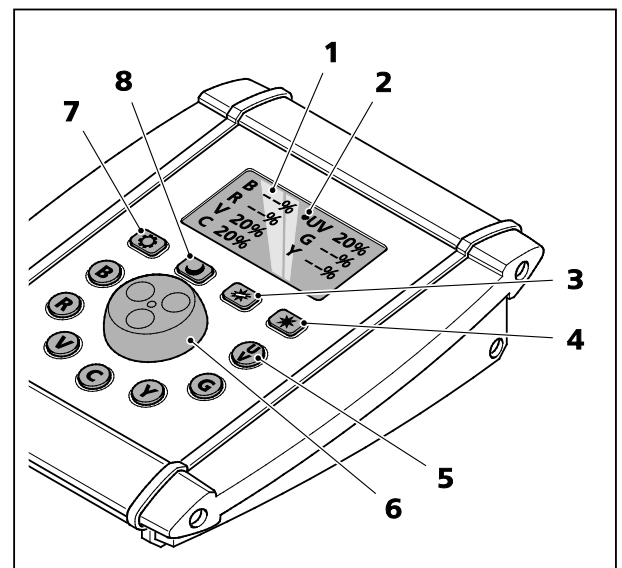






Fig. 15 Control panel for Colibri 7

- Use the control dial to set the brightness for the activated LEDs simultaneously.

If the brightness adjustment of several LEDs is controlled simultaneously, the LEDs which are switched on are controlled relative to each other. Thus, various adjustment values may be displayed for the LEDs. If an LED reaches 100 % it cannot be set to a higher value. The remaining LEDs can be controlled simultaneously, until they have reached their maximum at 100 %. When decreasing the brightness, the brightness of all LEDs will be decreased in reverse order.

- To quickly switch on and off all LEDs switched on simultaneously press the  button (Fig. 15/3).
- To activate / deactivate the standby mode press the  button (Fig. 15/8).
- To change the brightness of buttons and display press the  button (Fig. 15/7) and set the desired brightness using the control dial. To finish the setting, press the  button again.

4.2.3 Operation with PC via the ZEN 2.3 (blue edition) software





Colibri 7 has been mounted on the microscope, connected via CAN and powered via the desktop power supply unit.

The microscope and the PC have been switched on.

The ZEN software (blue edition) has been started.

4.2.3.1 Control of Colibri 7 with the "Microscope Control" tool in the "Locate" tab

- Click on the **Locate** tab in the software (see Fig. 16).
- Expand the **Microscope Control** tool by clicking on the  expander.
- If required, activate the **Show All** option.
- Click on the **Colibri 7**  icon to open the **Colibri 7** control menu.



After opening, the default mode of the control menu is **Continuous**.

- Switch the LEDs on or off by activating / deactivating the respective checkbox, e.g. 385 (see Fig. 17).
- Adjust the brightness for the selected wave length using the sliders, entry fields or arrow buttons.
- Activate the excitation filter for LED 567 by clicking on the **555** or **590** button at **Excitation filter for LED 567**.
- Switch all LEDs simultaneously on or off by clicking on **Deactivate all LEDs** or **Activate all LEDs**.
- Click on **Continuous** or **Gated** to select the desired mode for image acquisition (see also next page).

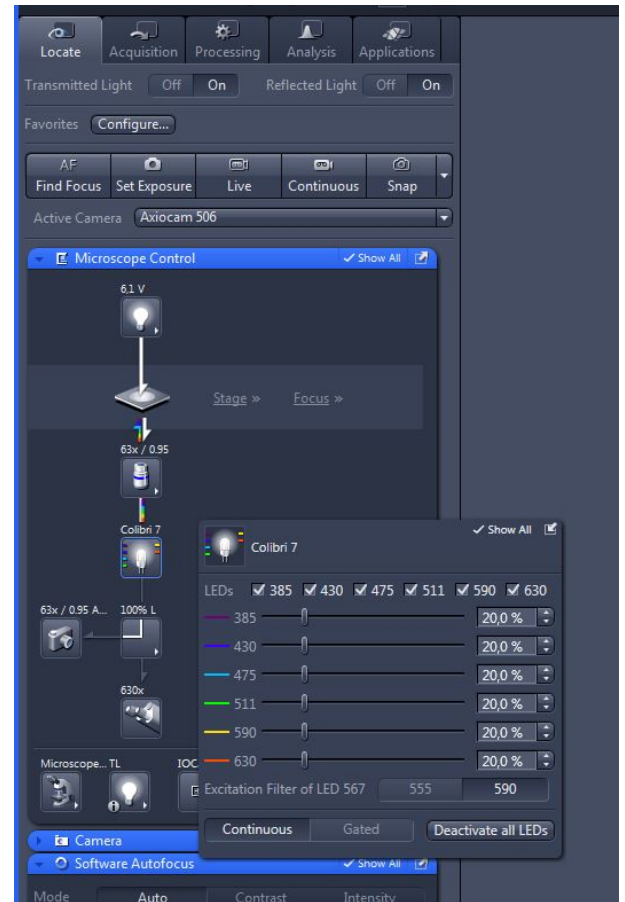


Fig. 16 Colibri 7 control via "Microscope Components" tool



Fig. 17 Control menu for Colibri 7

Image acquisition in "Continuous" mode in the "Locate" tab

Continuous is the default setting for Colibri 7 in the ZEN 2.3 (blue edition) control software.

When acquiring images with a camera mounted to the microscope system, the corresponding LEDs must be manually switched on in the **Locate** tab and switched off again after acquisition.

- Switch on all required LEDs by clicking the corresponding checkbox and set the desired brightness.
- Use the **Live**, **Continuous** or **Snap** buttons to acquire images (see Fig. 16).
- Switch the LEDs off by clicking with the mouse.

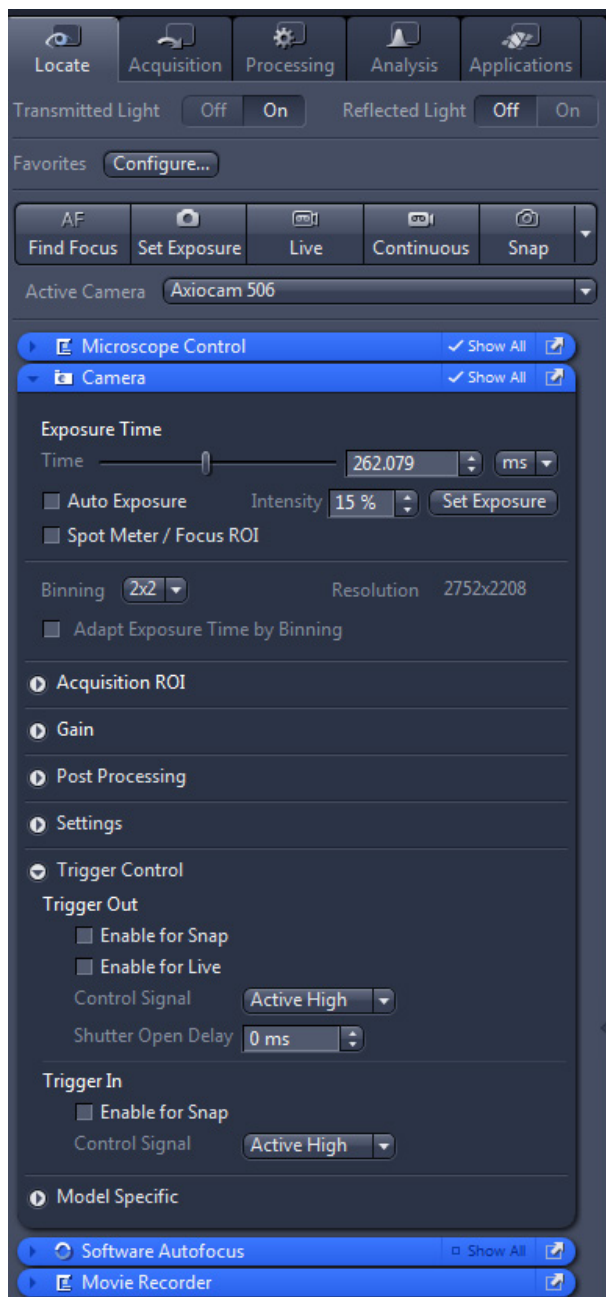



Fig. 18 "Locate" tab – "Camera" tool

Image acquisition in "Gated" mode in the "Locate" tab

Gated allows the direct control of LEDs via the trigger output of the camera.

The active LED will be switched on or off with the adjusted brightness in parallel to camera exposure.

The bleaching impact on the probe will be reduced by synchronizing the exposure time of Colibri 7 with that of the camera.

- Connect the trigger output of the camera (e.g. Axiocam 506) using the trigger cable (accessory for Axiocam, order number 426557-0001-000, see operating manual Axiocam) with the **Increment** outlet socket on Colibri 7 (see (Fig. 4/1).
- In the **Locate** tab, expand the **Camera** tool by clicking on the expander  (see Fig. 18).
- Activate the checkboxes **Enable for Snap** and **Enable for Live** in **Trigger Control -> Trigger Out** (see Fig. 18)
- Activate the **Gated** mode in the **Colibri 7** control menu (see Fig. 17).
- Select the LEDs by clicking the corresponding checkbox and set the desired brightness.



The LEDs will only be switched on or off automatically during image acquisition.

- Open the reflected light shutter of the microscope.
- Use the **Live**, **Continuous** or **Snap** buttons to acquire images.

4.2.3.2 Control of Colibri 7 with the "Channels" tool in the "Acquisition" tab



- Click on the **Acquisition** tab in the software (see Fig. 19).
- Open the **Channels** tool by clicking on the expander .
- Set the channels manually or via Smart Setup. Alternatively, you can load a saved experiment.
- If required, activate the **Show All** option.
- If required, select Colibri 7 as light source in **Selected Lightsource**.
- Switch the LEDs on or off by activating / deactivating the respective checkbox, e.g. .
- Adjust the brightness for the selected wave length using the sliders, entry fields or arrow buttons.
- Activate the excitation filter for LED 567 by clicking on the **555** or **590** button at **Excitation filter for LED 567**.
- Select all LEDs simultaneously by clicking on **Deactivate all LEDs** or **Activate all LEDs**.
- Click on **Continuous** or **Gated** to select the desired mode for image acquisition.

Image acquisition in "Continuous" mode in the "Acquisition" tab

Continuous is the default setting for Colibri 7 in the ZEN control software.

The camera and Colibri 7 are automatically controlled via software commands. Manual switching on or off is not necessary.

Image acquisition during the experiment: The LEDs are shuttered between exposures via software commands.

- Select the required LEDs by clicking the corresponding checkbox and set the desired brightness.
- Use the **Live**, **Continuous** or **Snap** buttons to acquire images.

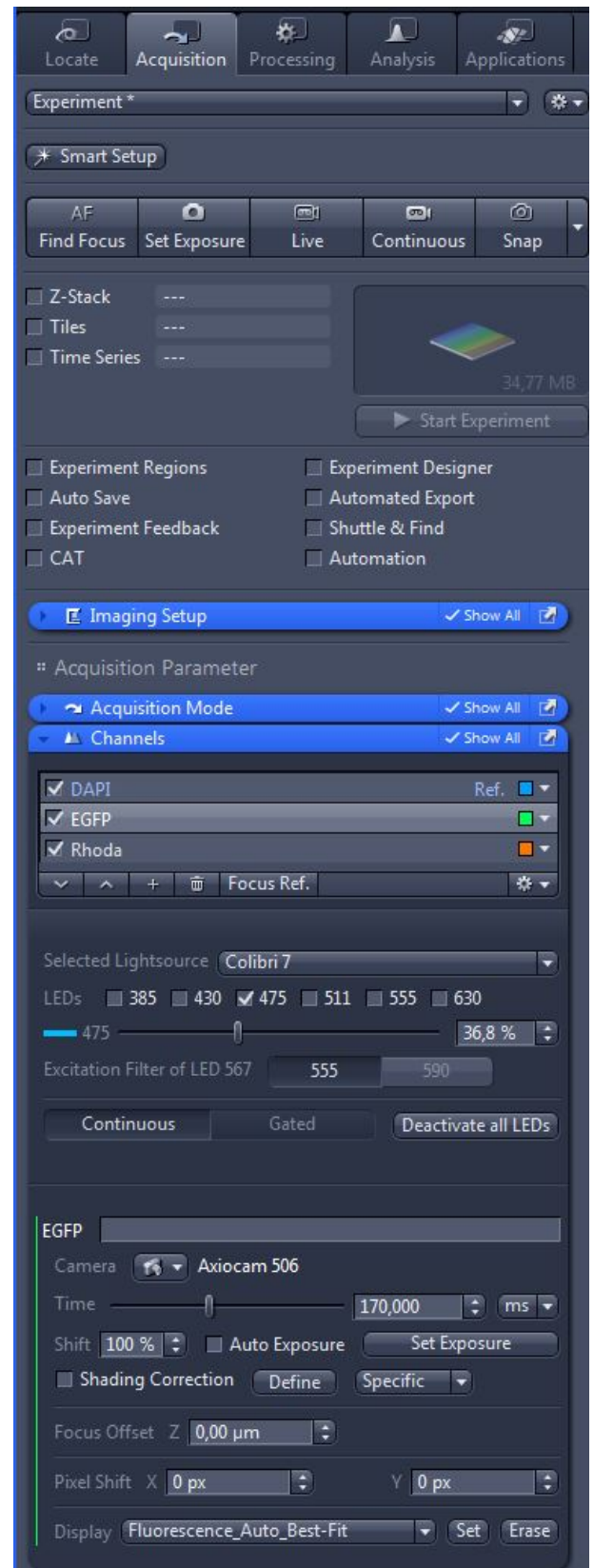


Fig. 19 Colibri 7 control via "Channels" tool

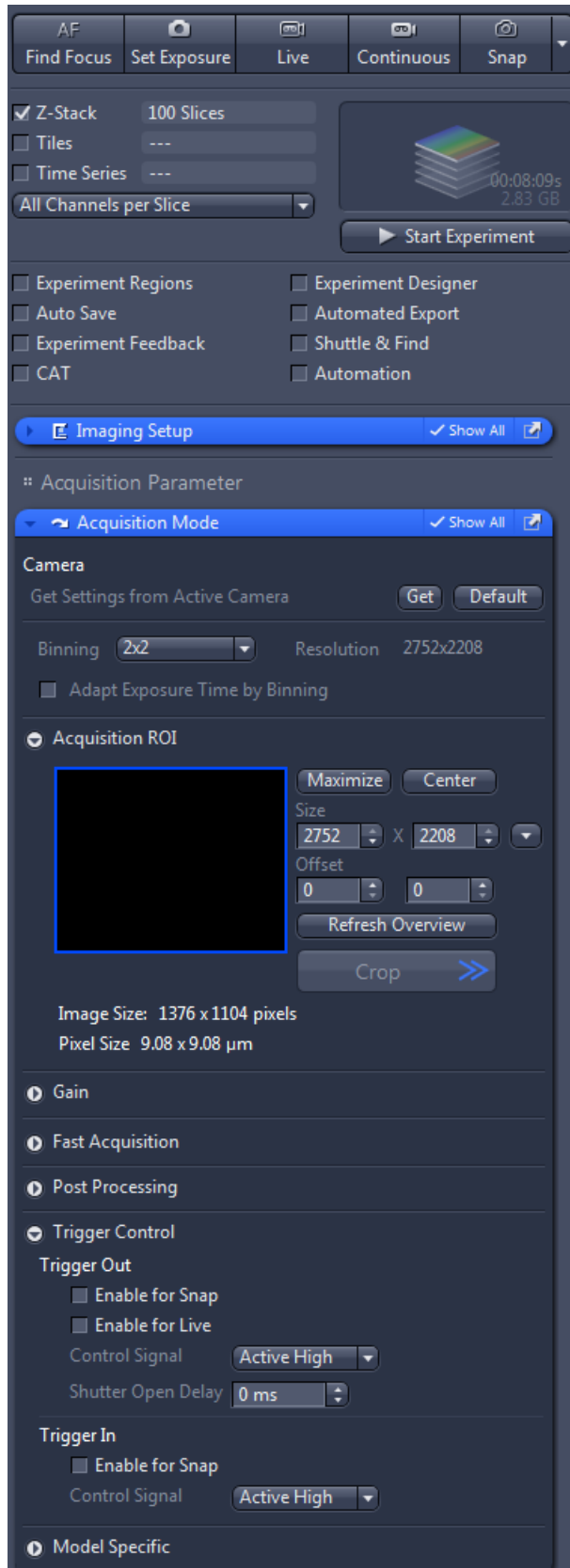


Fig. 20 "Acquisition" tab – "Acquisition mode" tool

Image acquisition in the "Gated" mode


Gated allows the direct control of LEDs via the trigger output of the camera.

The active LED will be switched on or off with the adjusted brightness in parallel to camera exposure.

All relevant shutters will be automatically controlled by ZEN.

The bleaching impact on the probe will be reduced by synchronizing the exposure time of Colibri 7 with that of the camera.

In an experiment, the **Gated** mode is typically faster than the **Continuous** mode.

- Connect the trigger output of the camera using the trigger cable (accessory for Axiocam, order number 426557-0001-000, see operating manual Axiocam) with the **Increment** outlet socket on Colibri 7 (see (Fig. 4/1)).
- In the **Acquisition** tab, expand the **Acquisition mode** tool by clicking on the expander  (see Fig. 20).
- Activate the checkboxes **Enable for Snap** and **Enable for Live** in **Trigger Control -> Trigger Out**.
- Activate the **Gated** mode in the **Colibri 7** control menu.
- Activate LEDs by clicking the corresponding checkbox and set the desired brightness.
- Use the **Live**, **Continuous** or **Snap** buttons to acquire images.

4.2.3.3 Colibri 7 control via "Imaging Setup" tool and including of hardware settings into the "Acquisition" tab

The control of Colibri 7 in the **Imaging Setup** tool of the **Acquisition** tab is analogous to the **Microscope Control** tool.

Additionally, the switching states of LEDs and the image acquisition mode can be saved here by clicking the check boxes in the **Include in this Setting...** field (Fig. 21).

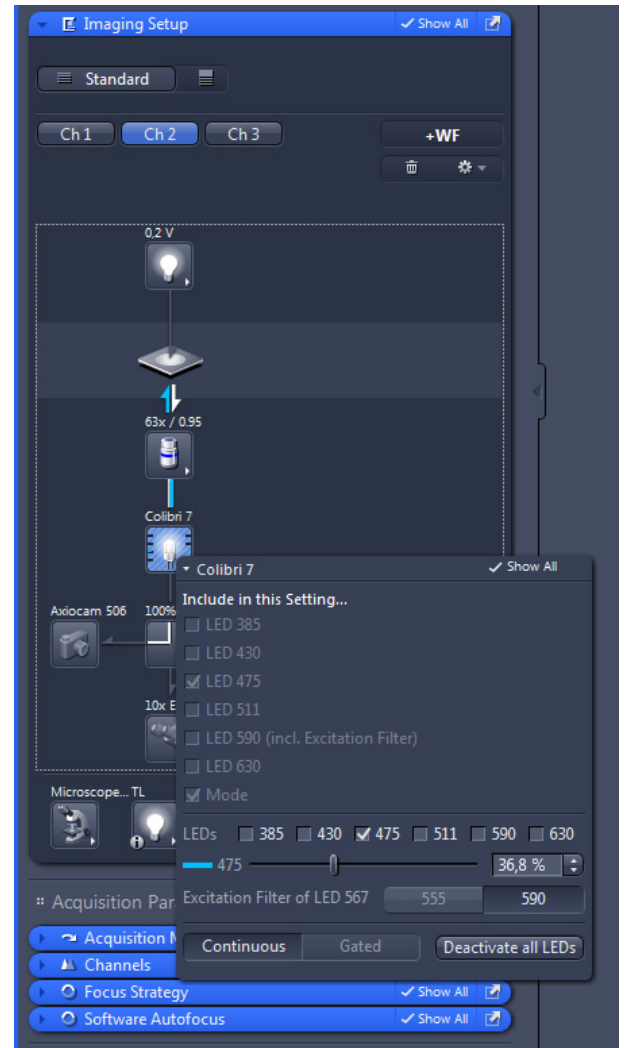


Fig. 21 Colibri 7 control via "Imaging Setup" tool

5 CARE AND SERVICE

5.1 Care



Disconnect the power plug of the desktop power supply unit prior to cleaning!



Clean labels and desktop power supply unit only dry.

- Clean lamp module, control panel and LED Trigger Box only with a slightly moist cloth (not dripping wet). Do not allow moisture to penetrate the inside of the devices.
- All labels on the components and the desktop power supply unit may only be cleaned using a dry cotton cloth. Do not allow moisture to penetrate the inside of the desktop power supply unit.

When using the device in warm and humid climatic zones, pay attention to the following instructions:

- Store the device in bright, dry and well-ventilated rooms with a humidity of less than 65 %; store particularly sensitive optical components and accessories, such as objectives and eyepieces, in a dry cabinet.
- If the microscope is to be stored in closed containers for a prolonged period, fungicide-soaked cloths should be placed in the containers to prevent mould.



The risk of growth of fungus on opto-mechanical instruments always exists in the following conditions:

- relative humidity > 75 % and temperatures between +15 °C and +35 °C for more than three days
- installation in poorly-ventilated, dark rooms and
- dust deposits and fingerprints on optical surfaces.

5.2 Service

Any repairs to optical components or moving parts inside the instrument or any work on the power supply may only be carried out by service technicians or specially **authorized** personnel.

If servicing is required, please contact your local representative or

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6 ANNEX**6.1 Property rights**

Devices, parts of devices or any procedures described in this manual are protected by the following patents:

US 6154282 A1 Semiconductor based excitation illuminator for fluorescence and phosphorescence microscopy.