User Guide

Axiocam 305 color

Microscope Camera

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1 About this guide

1.1 Introduction

Welcome

Welcome to the Axiocam 305 color user documentation.

The camera is a professional digital camera for universal light microscopy with a high resolution 5 Megapixel sensor and a USB 3.0 interface. To set up the camera correctly, follow the instructions in this guide step by step.

This color camera is capable of covering a broad range of imaging needs due to its robust engineering to fully utilize the sensor's remarkable performance capabilities.

Content

Chapter	Content
About this manual	Introduction and overview about this manual.
Safety	Important information on a safe handling with the Axiocam 305 color. **Read this chapter, before unpacking the camera and putting it into operation.**
Shipment	The contents of delivery and optional attachments will be described here.
Technical Data	Here you will find the technical data of your camera.
Connecting the camera	In this chapter you will find detailed instructions on connecting and using the camera.
Installing software and drivers	Here you will learn how to install ZEISS software and camera drivers.
Trouble-shooting	In this chapter we have listed some solutions to various problems. If you can not solve your problem, contact the ZEISS support.
Maintenance	This chapter describes some measures for the maintenance and care of your camera. For greater damage always contact ZEISS support.
Disposal and Recycling	Important instructions for disposal and recycling.

1.2 Safety notes conventions

The safety notes in this document follow a system of risk levels, defined in the following manner:

⚠ CAUTION

Risk of personal injury

CAUTION indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate personal injury.

NOTICE

Risk of property damage

NOTICE indicates a property damage message. In addition, NOTICE is used for data loss or corrupt data.

i INFO

Indicates useful additional information. It helps you to make your daily work easier, but it is optional. There is no risk for personal injury or property damage involved.

1.3 Text formats and conventions

Bold texts

Bold is used for texts within the software like names of GUI elements (e.g. buttons, sections, tools, menus), buttons on a device, and product names (e.g. **MTB 2011**).

Font type "Courier"

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Used for programming code, e.g. macro code as well as
for anything that you would type literally when
programming, including keywords, data types, constants,
method names, variables, class names, and interface
names.
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Shortcuts and key commands

Shortcuts are written like *Crtl*+*C*, meaning you should press *Crtl*-Key and *C*-Key simultaneously.

Procedures

The following formats are used for procedures (instructive sequences):

Prerequisites ■ stands for a condition which must be fulfilled before starting with the action.

Procedure **1** stands for a single step the user is asked to perform.

Web-Links

Web links appear in blue text. To open the linked website, simply click on the link. Please make sure you have an internet connection established before opening the web link.

2 Safety

2.1 Safety Notes

The Axiocam 305 color has been manufactured and tested by ZEISS according to the regulations specified in CE and has left the manufacturer's premises in perfect working order. In order to ensure that this condition is maintained and to avoid any risks when operating the system, the user must comply with any notes and warnings contained in this manual. The manufacturer shall be exempt from statutory liability for accidents should the operator fail to observe the safety regulations.

⚠ CAUTION

Personal Injury

To avoid personal injury, read and adhere to the safety notes below.

- To avoid the risk of fire or explosion, do not use the camera near inflammable liquids or gases.
- Setup, expansions, re-adjustments, alterations, and repairs must be carried out only by persons who have been authorized by ZEISS.
- Do not allow any cables, particularly power cords, to trail across the floor, where they can be snagged by people walking past.
- Protect the cables from excessive heat (e.g. halogen lamps, microscope fluorescence illumination).

NOTICE

To avoid equipment damage, data loss, or corrupted data, read and adhere to the safety notes below.

- Protect the camera against mechanical impact. External damage may affect the operation of inner components.
- Keep chemicals and fluids away from the camera.
- Make sure there is sufficient ventilation of the camera head. Avoid direct exposure to sunlight and locations near heat sources (radiators, stoves). Overheating can cause noisy images.
- Use the camera in a clean and dry location.
- Attach all connectors firmly and securely.
- Use only the accessories supplied by ZEISS, when applicable.
- Use only normal microscope cleaning material to clean the camera housing.
- Contact your local ZEISS service organization if a repair is necessary.
- Save all your data, such as images, measurement data, archives, reports, forms and documents, at regular intervals on an external storage medium. Otherwise it cannot be avoided that access to this data may be lost as a result of operational errors or hardware defects. ZEISS accepts no liability for consequential damage resulting from insufficient data protection.

2.2 Limitation of liability

No warranty shall be assumed by ZEISS during the warranty period if the equipment is operated without observing the safety regulations. In any such case, ZEISS shall be exempt from statutory liability for accidents resulting from such operation.

2.3 Warranty

ZEISS shall be exempt from any warranty obligations should the user fail to observe the safety regulations. ZEISS only guarantees the safety, reliability, and performance of the system if the safety notes are closely observed.

3 Technical Data

3.1 Axiocam 305 color

Feature	Value
Sensor Model	Sony IMX 264, Exmor Pregius Global Shutter CMOS
Sensor Pixel Count	5.07 Megapixel: 2464 (H) × 2056 (V)
Pixel Size	3.45 µm x 3.45 µm
Sensor Size	Image Diagonal 11.1mm , equivalent to 2/3" Sensor Format
Spectral Sensitivity	App. 400 nm-720 nm, Coated Hoya C5000 IR Cut Filter, RGB Bayer color filter mask
Full Well Capacity (typical)	10500 e- per pixel
Signal Amplification	Adjustable analog amplification 1x, 2x, 4x, 8x, 16x
Digitization	8 and 12 Bit / Pixel
Read Out Speed	37 MHz
Readout Noise (typical)	2.2 e-
Dynamic Range (typical)	> 4800: 1 (>73dB)
Dark Current (typical)	< 1 e-/p/s at 25°C sensor temperature
Cooling	Temperature stabilized at 25°C for ambient temperatures between 18°C and 30°C
Dark Current Compensation	Digital Dark Current Compensation for optimum low light performance at long exposure times, Automatic Hot Pixel Correction
Exposure Time Range	100 µs to 4 s
Data-Post Processing (optional)	■ Objective specific shading correction ■ Sharpening, Noise Filter ■ Black Reference, Dark Current Compensation

Feature	Value
Color Interpolation Modes	“Fast”: optimum speed color interpolation “High”: optimum quality color interpolation
Binning	Digital Binning from 1x1 up to 5x5 for enhancing signal intensity (Selectable Analog Gain options are limited at higher Binning factors).
Subsampling	Camera subsampling from 1x1 to 2x2 for faster image acquisition speeds and data reduction. Software subsampling from 1x1 to 5x5 for data reduction.
Region of Interest (ROI)	User defined imaging sub area for improvement of readout speed and data reduction
Status LED	Camera Status (acquisition, power, speed) Adjustable intensity
Interface	USB3.0 SuperSpeed (5 Gbit/s), bandwidth max. 300 Mbytes/s USB2.0 optional, with lower speed
Optical Interface	C-Mount (17.5 mm)
Max. File Size per image	app. 29.8 MB per image with 2464 x 2056 Pixels at 3 x 12 Bit/Pixel
Operating Systems	Microsoft Windows 7 Enterprise and higher
Size / Weight	10.8 cm x 7.8 cm x 4.3 cm / 580 g
Housing	Blue anodized aluminum, ¼“ thread for camera equipment, Cooling fins on the top plate, C-mount thread
Certificates	CE
Power Supply	Max. 4W power consumption, power by USB3.0-Bus from PC
Ambient Conditions (Operation)	+5° ... +35° Celsius max. 80% relative humidity, non-condensing, free air circulation required,
Ambient Conditions (Storage)	-15° ... +60° Celsius 90% relative humidity at +40° Celsius, 80% relative at +20° Celsius, non-condensing

3.2 Frame Rates

Subsampling	H x V	Mode	FPS @ 1ms
1x1	2464 x 2056	Color/Mono	36
2x2	1232 x 1028	Color/Mono	88
1x1, ROI	2048 x 2048	Color/Mono	36
1x1, ROI	1920 x 1080	Color/Mono	67
1x1, ROI	1024 x 1024	Color/Mono	70
1x1, ROI	512 x 512	Color/Mono	136
1x1, ROI	256 x 256	Color/Mono	255
1x1, ROI	128 x 128	Color/Mono	456

INFO

Computer hardware, operating system and software may decrease the frame rates. Selecting a part of the sensor area or applying camera subsampling can increase the frame rate. All specifications are subject to change without notice.

3.3 Spectral Sensitivity

Axiocam 305 color

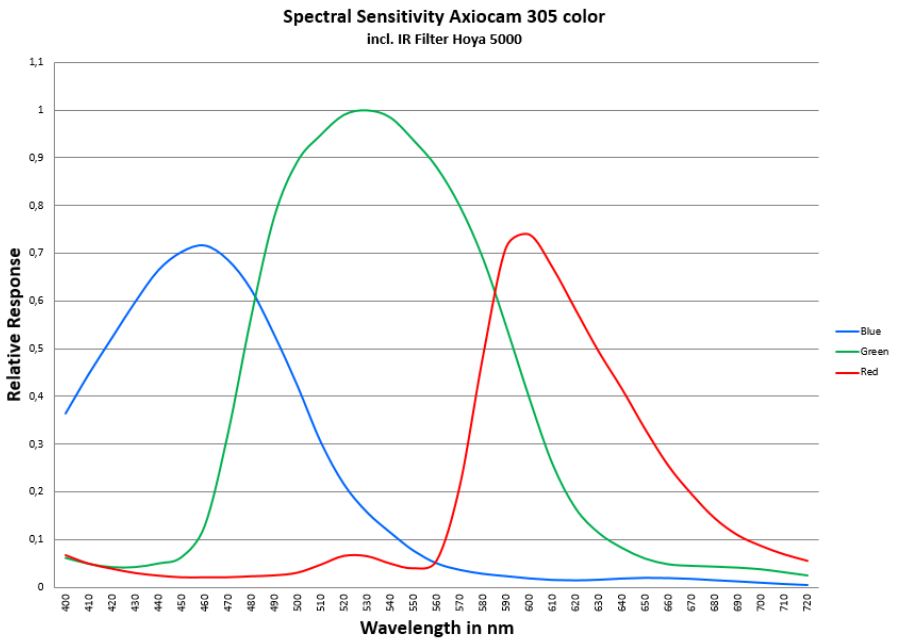

Fig. 3.1: Axiocam 305 color incl. Hoya C5000 IR Cut Filter

4 Shipment

Fig. 4.1: Shipment Axiocam 305 color

Content	Order Number
1 x Axiocam 305 color color camera	426560-9030-000
1 x USB 3.0 cable for power supply and data transfer	
1 x PCI express interface card (2 x USB 3.0)	
1 x DVD with device driver for ZEISS software as well as this guide as a PDF file.	

5 Connecting the camera

5.1 Camera Connections & Status LED

Fig. 5.1: Camera (Back Side)

Number	Description
1	Status LED, see *Function Indicator* [▶ 16]
2	USB 3.0 connection for image / controller data and power supply
3	¼ " photo thread (tripod connection)

5.2 Building in the interface card

This chapter describes how to insert the PCI express interface card (2 x USB 3.0) into your PC.

NOTICE

Static Electricity

Static electricity can damage electronic components, e.g. the interface card. To protect it against static electricity, do not touch it until you have grounded yourself to the casing of the device. Never touch the contacts of an electronic component. We also recommend that you work only on an antistatic mat when inserting in the interface card.

Prerequisites

- You have read the documentation of the interface card and of your computer before inserting the interface card.

Procedure

1. Switch off your PC and all connected peripherals.
2. Disconnect the PC and the peripherals from the mains and open the computer case.
3. Insert the PCIe interface card into the appropriate slot on your computer.
4. Close the computer case and reconnect the peripherals.

You can now mount the camera on the microscope and connect it to the PC via the USB 3.0 interface, see *Connecting the camera with PC* [▶ 16].

5.3 Mounting the camera on the microsope

NOTICE

Loss of warranty

The Axiocam 305 color is delivered with an integrated IR Cut filter (Infrared Cut Filter). The filter protects the camera against dust and reduces optical interferences. If you remove the filter the warranty will be lost.

- The IR filter is situated approx. 5 mm behind the outer edge of the C-mount opening in the camera.
- Due to this position, C-mount adapters that screw more than 5 mm into the thread cannot be screwed into the camera.
- Do not remove the filter otherwise the warranty will be lost.

To mount the camera onto your microscope's TV port, use a C-mount adapter. The adapter is not included in the shipment. You will find some suitable examples for adapters in the list below:

Port	Name	Order Number
44	Video Adapter 44 C 2/3" 1.0x	452995-0000-000
60	Camera Adapter 60 C 1" 1.0x	456105-9901-000
60	Video Adapter 60 C 2/3" 0.63x	000000-1069-414
60	Video Adapter 60 C 1/2" 0.5x	000000-1069-415
60N	Camera Adapter 60N-C 1" 1.0x	426114-0000-000
60N	Camera Adapter 60N-C 2/3" 0.63x	426113-0000-000
60N	Camera Adapter 60N-C 2/3" 0.5x	426112-0000-000

Procedure

1. Remove the dust cap from the camera's C-mount port.
2. Screw the adapter in as far as it will go.
3. Mount the camera onto the microscope's TV port. Ensure that no dust enters the opening of the camera or the microscope's TV port.

5.4 Connecting the camera to the PC

Procedure

1. Lay the USB cable carefully between the camera and the PC.
2. Connect the USB cable to the USB 3.0 interface card of the PC.
3. Connect the USB cable with the camera.
4. If you switch on the PC, the camera will be also switched on.

Power is supplied via the USB 3.0 cable. By switching off the PC, the camera will be switched of as well. If the camera is installed correctly, the status LED will be red. If you start the software the LED will turn blue. You`ll find a detailed description of the LED status light in the chapter *Function indicator* [▶ 16].

5.5 Function Indicator

Signal color	Description
Blue	USB 3.0 connection (Camera) connected with USB 3.0 connection (PC) Recommended configuration for best camera performance
Green	USB 3.0 connection (Camera) connected with USB 2.0 connection (PC)
Red	Power supply attached, no driver loaded, camera not yet initialized
No light	No power supply or software shut down (camera in power down mode)

6 Installing software and drivers

Prerequisites

- To acquire images with the Axiocam 305 color on a PC, you must install ZEISS software (e.g. ZEN or AxioVision). You will find the software installation on the DVD delivered. The camera drivers will be installed automatically during the installation of the software.
- In some instances, an extra file is needed for proper camera installation. If the camera is not recognized after software installation, check the camera product website for installation notes.
- Before starting the installation of the software and drivers, the camera must be connected to the PC, see chapter *Connecting the camera to the PC* [▶ 16].

Procedure

1. Install the software according to the installation guide delivered with the software.
2. During the installation you will be asked to install the camera drivers. Follow the procedure by confirming the upcoming messages.
3. Restart your PC after the installation.
4. You can check in the device manager if the driver installation was successful.

You have installed the software and the camera drivers. You can now start acquiring images with your camera using ZEISS software. For more information, please read the software documentation.

7 Trouble-shooting

7.1 Software

7.1.1 The camera does not appear in the menu of selectable cameras

- Make sure that you have connected the camera and installed the software and drivers in accordance to the instructions in this manual.
- Make sure that you installed the software and drivers with administrative rights. Install the driver with administrative rights again if necessary.

7.1.2 You don't see a camera image on your screen

- Check the light path setting of the microscope.
- Is the status LED on the camera on? If not, check the cable connections between camera and computer.
- Execute a reset of the camera.
- Execute an automatic exposure measurement.
- Check the display adjustments for the live image.
- Check the aperture diaphragm of the microscope.
- Check the position of the beam splitter between the ocular and the TV port.

7.1.3 The color of my image does not correspond to the impression through the ocular

In case of color cameras:

- Check white balance and, if necessary, repeat white balance.
- Check the monitor’s color temperature setting. If necessary, reduce this to the lowest value that can be set (usually 5200 K).

In case of monochrome cameras:

- Images of monochrome cameras are displayed by using overlay colors to represent the colors of fluorescence dyes on the monitor. If the color is different to the visual impression in the eyepiece, select a different overlay color.

7.2 Hardware

7.2.1 Vibrations

Sudden jolt, vibration or moving objects during the acquisition can detract from the image quality. The light intensity during exposure can change as well.

- To avoid jolts, use damping systems on your microscope.
- Repeat the acquisition and take care to ensure the conditions remain calm.

8 Maintenance

8.1 Optical System

The internal optical components of the camera should always be protected. If no lens, or TV adapter with optics, is screwed into the camera's C-Mount thread, the camera's sensor and protective glass must be protected by screwing the protective cap onto the camera's C-Mount thread.

8.2 Cleaning the infrared filter or protective glass

Contamination of the IR filter (for color cameras only) or the protective glass has an adverse effect on the quality of the resulting image (dark points, cloudy structures in the image). If there is dry dust on the front side of the infrared filter or protective glass, you can clean it with a soft brush or with cotton (wool). Use cleaning fluid for optics/lenses only to clean the IR filter. Do not use tap water to clean the IR filter.

9 Disposal and Recycling

This product has been developed, tested and manufactured in accordance with the applicable environmental provisions and directives of the European Union:

- The product and its accessories comply with EU directives 2002/95/EC (RoHS) and 2002/96/EC (WEEE), insofar as these apply to this product.
- ZEISS has implemented a take-back and recycling process that ensures that proper recycling is carried out in accordance with the aforementioned EU directives.
- Please contact your ZEISS sales/service organization for details relating to disposal and recycling.
- This product must not be disposed of with domestic waste or using municipal waste disposal services. In the event of resale, the seller must inform the buyer of the need to dispose of the product appropriately.

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