

All-in-one Fluorescence Microscope BZ-X800L/BZ-X810

User's Manual

Read this manual before using the product in order to achieve maximum performance.
Keep this manual in a safe place after reading it so that it can be used at any time.



1	Getting Started
2	Installing the Equipment
3	Observing and Capturing Images
4	Camera Settings
5	Sectioning (Optional)
6	Improving Image Quality
7	Measurement
8	Observing and Capturing Multi-Stained Samples
9	Capturing Thick Specimens
10	Stitching and Multi-Point Capture (Optional)
11	Video/Time Lapse Capture (Optional)
12	Performing the Image Cytometer Capture (Optional)
13	Viewer Operation Settings
14	Maintenance
Appendix	Outside Dimensions and Specifications

Introduction

This manual describes the handling and operation precautions and procedures for the BZ-X800L/BZ-X810 All-in-One Fluorescence Microscope. Read this manual thoroughly before using the system to ensure optimal performance. Keep this manual in a safe place for future reference.

Symbols

The following symbols alert you to important messages.
Be sure to read these messages carefully.

	Indicates a hazardous situation which, if not avoided, will result in death or serious injury.
	Indicates a hazardous situation which, if not avoided, could result in death or serious injury.
	Indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.
	Indicates a hazardous situation which, if not avoided, could result in product damage as well as property damage.
	Indicates cautions and limitations that must be followed during operation.
	Indicates additional information on proper operation.
	Indicates tips for better understanding or useful information.
	Indicates reference pages in this manual or another manual.

General cautions

- Unauthorized reproduction of this manual in whole or part is prohibited.
- Please note that the content of this manual is subject to change without notice for the purpose of improvement.
- Should you find any problem with the content of this manual, such as an unclear point, mistake, or erroneous omission, contact your nearest KEYENCE office.
- If there are missing or misplaced pages, we will provide a new copy of this manual.

The company names and product names used in this manual are registered trademarks or trademarks of the respective companies.

Safety Precautions

To prevent damage and to correctly use the BZ-X800L/BZ-X810 Series All-in-One Fluorescence Microscope (hereafter referred to as BZ-X800 Series), follow the precautions below.

Precautions for use

	• Do not use this product for the purpose of protecting a human body or a part of human body. • This product is not intended for use as an explosion-proof product. Do not use this product in a hazardous location and/or potentially explosive atmosphere. • Be sure to disconnect the AC power code before replacing the fuse. Failure to do so may cause damage or electric shock.
	• If the equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired. • Turn off the main power of the device before connecting cables or performing maintenance procedures to prevent electric shock. • Do not forcibly bend the AC power cable or put heavy objects on it. The cable may become damaged, leading to a fire or electric shock. Do not use a damaged cable. • The AC power cable is not supplied with the BZ-X800 Series. Use a power cable fitting the plug shape used in each country. Also, be sure to check if the cable complies with the relevant regulations and standards in each country. • Do not allow any foreign material to enter the BZ-X800 Series. Doing so may cause a fire, electric shock, fault or accident. • Never remove the case cover of the BZ-X800 Series. Touching the inside of the device may result in an electric shock. • Radiation light of the LED lamp may cause damage to eyes and skin. Avoid eye and skin exposure to the radiation emitted from the aperture of the fiber cable connector. Be sure to connect the fiber cable to the controller before turning on the lamp. • Do not touch the motorized stage in operation. Your hand or fingers may be caught. • When installing this device, connect the protective grounding terminal of the AC power plug to the protective grounding conductor of the installation location. Otherwise, an electric shock or product damage may result.
	• Do not use at a location with an altitude of 2000 m or higher. An electric shock may occur. • Do not install the BZ-X800 Series at an unstable location where the device may fall. • Radiation potentially hazardous to eyes and skin is emitted from the aperture of the lens turret and objective lens. Avoid eyes and skin exposure to the radiation. Be sure to turn off the main power when mounting or dismounting the lens. • Do not remove or modify the case cover of the BZ-X800 Series. • Do not disassemble or modify the BZ-X800 Series for use. Doing so may cause a fire or electric shock.

NOTICE	• Apply the correct power voltage. Failure to do so may cause malfunction of the device. • Do not wipe the BZ-X800 Series with thinner or organic solvent. Doing so may damage the device. • If the BZ-X800 Series becomes dirty, wipe with a dry cloth. • Do not sit or stand on the BZ-X800 Series. Doing so may damage the device. • Do not put things on the BZ-X800 Series. Doing so may damage the device. • Be sure to turn off the main power when connecting or disconnecting the AC power cable, etc. Failure to do so may cause malfunction of the device. • The BZ-X800 Series uses precise optical parts. Do not subject the device to any vibration or impact. Doing so may damage the device. • Do not place objects that weigh 1 kg or more on the stage. Doing so may damage the device.
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► Important

- The BZ-X800 Series uses the hard disk drive (HDD) of the control PC to save image data. If the HDD malfunctions, the data stored in the HDD may be lost. Be sure to periodically back up the data stored in the HDD. It is recommended to back up important data immediately.
- KEYENCE does not guarantee the data stored in the hard disk drive (HDD) of the control PC at the time of repair. When repairing the control PC, be sure to back up the data.

Precautions at the time of a malfunction

CAUTION	Turn off the power immediately in the following cases. Using the device in abnormal conditions may cause a fire, electric shock, or fault. Contact your nearest KEYENCE office for repair. • When a foreign object or water enters the inside of the BZ-X800 Series • When the BZ-X800 Series is dropped or the case is damaged • When the BZ-X800 Series emits smoke or a strange odor
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Cautions for installation

NOTICE	• Install the BZ-X800 Series, control PC and display on a level surface. • Do not place the BZ-X800 Series on its side. Doing so may damage the device. • Do not obstruct the ventilation hole or the ventilation fan of the BZ-X800 Series and the control PC. If the ventilation hole or the ventilation fan is obstructed, the internal temperature will rise, leading to malfunction. • Do not install the device in the following locations. Doing so may damage the device. • Locations where the device may be directly subjected to vibration or impact • Locations where the ambient temperature drops below 15°C or exceeds 35°C • Locations where the ambient humidity drops below 35 % RH or exceeds 80 % RH (No condensation) • Locations where the temperature changes abruptly • Locations where the device is exposed to a direct breeze from an air conditioner • Locations where there are corrosive gases or volatile inflammable materials • Locations where there are dust, salt, ferrous particles or greasy fumes • Locations where water, oil or chemicals may splash onto the device • Locations where a strong magnetic or electric field is generated. • Locations where the power voltage greatly varies
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Cautions for storage

NOTICE	• Do not store the BZ-X800 Series in the following locations: • Locations where the ambient temperature drops below 15 °C or exceeds 35 °C • Locations where the ambient humidity drops below 35 % RH or exceeds 80 % RH (No condensation) • Locations where the device may be exposed to direct sunlight, wind or rain • Locations near corrosive chemicals or volatile inflammable materials
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Cautions for transportation

NOTICE	• If the cables need to be disconnected for transportation, be sure to turn off the main power. • The BZ-X800 Series uses precise optical parts. Do not subject the device to any vibration or impact. Doing so may damage the device. • Before transportation, be sure to dismount the objective lens, stage plate, and all filters. Failure to do so may damage the device. • Be sure to use the packing material specified by KEYENCE CORPORATION for transportation. Failure to do so may damage the device. • When transporting the BZ-X810, carry the device by its recessed parts (handles). Carrying the device by other parts may cause damage.
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A line drawing of a person from the waist up, carrying a rectangular device. The person's hands are placed on the recessed handles of the device, which are indicated by dashed lines. The device has a front panel and a top surface.

Regulations and Standards

CE and UKCA Marking

KEYENCE CORPORATION has confirmed that this product complies with the essential requirements of the applicable EU Directive(s) and UK regulations, based on the following specifications. Be sure to consider the following specifications when using this product in the Member States of European Union and in the United Kingdom.

EMC Directive (CE) and Electromagnetic Compatibility Regulations (UKCA)

- Applicable standards (BS)EN61326-1, Class A

Remarks: These specifications do not give any guarantee that the end-product with this product incorporated complies with the essential requirements of EMC Directive and Electromagnetic Compatibility Regulations. The manufacturer of the end-product is solely responsible for the compliance on the end-product itself according to EMC Directive and Electromagnetic Compatibility Regulations.

Low-Voltage Directive (CE) and Electrical Equipment (Safety) Regulations (UKCA)

- Applicable standard (BS)EN61010-1
(BS)EN62471
- Overvoltage category II
- Use this product under pollution degree 2.
- Indoor use only.
- Use this product at the altitude of 2000 m or less.
- This product is a Class 1 device. When installing this device, connect the protective grounding terminal of the AC power plug to the protective grounding conductor of the installation location.
- The appliance inlet functions as a disconnecting device. Install this product so that the AC power cable can be removed immediately from the appliance inlet when an abnormality occurs.

North American Regulations

This product complies with the following regulations specified by the FCC.

- Applicable regulation FCC Part 15 Subpart B Class A
ICES-003, Class A Digital Apparatus

Note:

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

- FCC CAUTION

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

CSA Certifications

This product complies with the following CSA and UL standards and has been certified by CSA.

- Applicable standard CAN/CSA C22.2 No.61010-1
 UL61010-1

Be sure to consider the following specifications when using this product as a product certified by CSA.

- Overvoltage category II
- Use this product under pollution degree 2.
- Indoor use only.
- Use this product at the altitude of 2000 m or less.
- This product is a Class 1 device. When installing this device, connect the protective grounding terminal of the AC power plug to the protective grounding conductor of the installation place.
- The appliance inlet functions as a disconnecting device. Install this product so that the AC power cable can be removed immediately from the appliance inlet when an abnormality occurs.

Best Management Practice for Perchlorate Materials - California only

This product uses components containing perchlorate material. When you ship this product or your end-product installing this product to California, you must label or mark the following statement on the exterior of all outer shipping packages and on consumer packages or you must include the following statement in an instruction manual or MSDS accompanied with the product.

“Perchlorate Material - special handling may apply, See
www.dtsc.ca.gov/hazardouswaste/perchlorate.”

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"BZ-X800 Viewer" is provided when you agree to the following terms of the license agreement on use of the software.

Be sure to read the following terms of the license agreement before using this software.

By starting to use this software, you signify that you accept all the terms and conditions of this agreement and the agreement shall be concluded.

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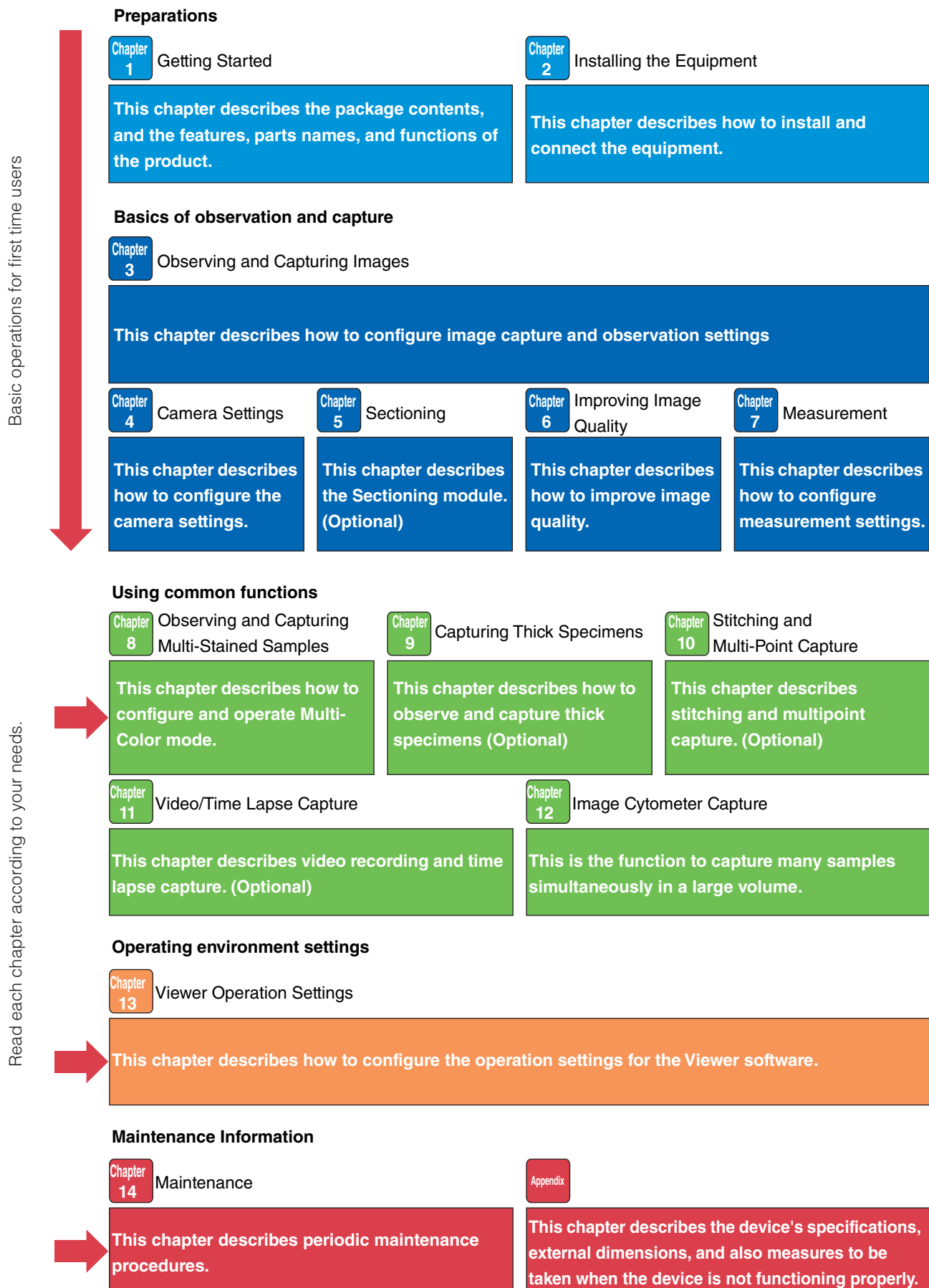
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- 2 KEYENCE may rescind this agreement unilaterally if you fail to comply with any of the terms of this agreement. In such a case, you shall immediately return this software and its copy to KEYENCE or discard them.
- 3 If KEYENCE incurs damage due to the violation of this agreement on your side, you shall compensate KEYENCE for the damage.

Item 8: Applicable laws

This agreement shall be carried out under Japanese laws and regulations.

Manual Flow



MEMO

Manual Overview

Chapter 1	Getting Started	This chapter describes the package contents, and the features, parts names, and functions of the product.
Chapter 2	Installing the Equipment	This chapter describes how to install and connect the equipment.
Chapter 3	Observing and Capturing Images	This chapter describes how to configure image capture and observation settings.
Chapter 4	Camera Settings	This chapter describes how to configure the camera settings.
Chapter 5	Sectioning (Optional)	This chapter describes the Sectioning module.
Chapter 6	Improving Image Quality	This chapter describes how to improve image quality.
Chapter 7	Measurement	This chapter describes how to configure measurement settings.
Chapter 8	Observing and Capturing Multi-Stained Samples	This chapter describes how to configure and operate Multi-Color mode.
Chapter 9	Capturing Thick Specimens	This chapter describes how to observe and capture thick specimens.
Chapter 10	Stitching and Multi-Point Capture (Optional)	This chapter describes stitching and multi-point capture.
Chapter 11	Video/Time Lapse Capture (Optional)	This chapter describes video recording and time lapse capture.
Chapter 12	Performing the Image Cytometer Capture (Optional)	The image cytometer capture is the function to perform many samples simultaneously in a large volume.
Chapter 13	Viewer Operation Settings	This chapter describes the operation settings for the Viewer software.
Chapter 14	Maintenance	This chapter describes periodic maintenance procedures.
Appendix	Appendix	This chapter describes the device's specifications, external dimensions, and also the measures to be taken when the device is not functioning properly. Read this chapter as required.

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Getting Started

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Overview of the BZ-X800L/BZ-X810

No dark room required; fluorescence observation can be performed anywhere.

1

Getting Started

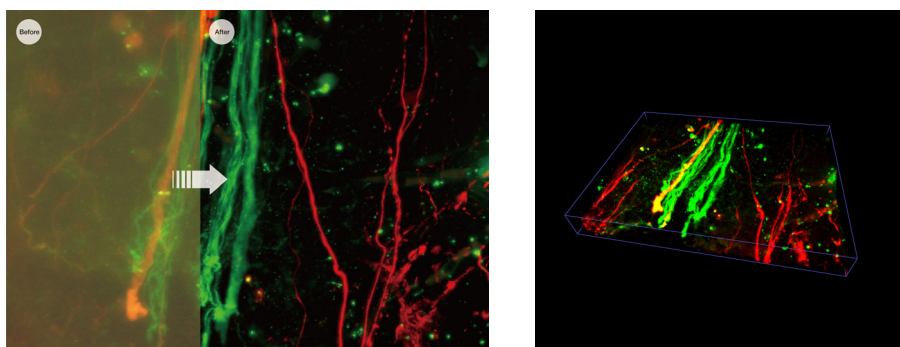
Fluorescence observation can be performed anywhere in the lab just by closing the front panel to create a built-in darkroom.



Sectioning function

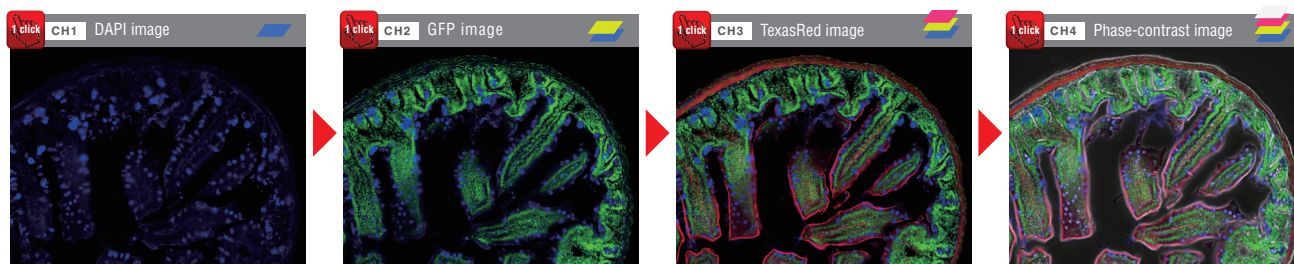
The device is equipped with a Sectioning function that eliminates fluorescence blurring using a grid projection to capture only the in-focus light.

Images can be captured with higher resolution than conventional fluorescent microscopes.



Real-time overlay

Exposure time can be individually adjusted while overlaying images in real time on one screen.



Compact design

The BZ-X Series can be installed anywhere due to its compact size and portable design.

Fully-motorized control

A fully-motorized setup allows the user to control the XY/Z-axis stage, aperture stop, phase contrast rings, neutral density filter, monochrome/color camera switching, shutter speed, filter turret, and lens turret.

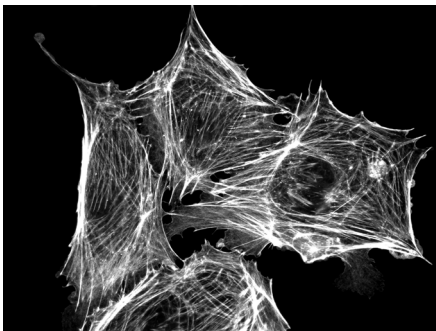
Large motorized stage supports observation of an entire multi-well plate

The large, fully-motorized XY stage allows for rapid scanning and observation of slides, dishes, and multi-well plates. This allows researchers to observe their samples faster and more efficiently, leading to quicker results. The Navigation and Stage View functions facilitate the simultaneous observation of multiple samples, without ever losing sight of areas of interest.



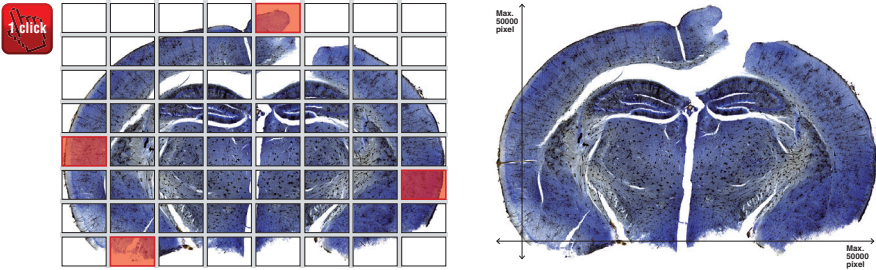
High-resolution 2.8 megapixel monochrome CCD

The cooled monochrome CCD enables highly-sensitive imaging of weak fluorescent signals, which allows for accurate brightness quantification for applications measuring protein expression. Additionally, a color filter allows one-click transition between monochrome and high-resolution color observation. Unlike a color camera, the color filter is not attached to the CCD, which can lead to distortions during fluorescence viewing.



Fully-focused XYZ image stitching

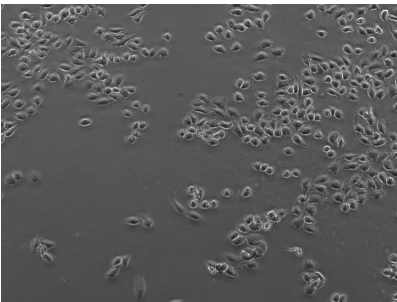
Quickly capture a wide-area image of an entire tissue section just by specifying its outer edges. All fields-of-view will be automatically captured and merged together to create a seamless, high-resolution image of up to 50,000 x 50,000 pixels. XY stitching can be combined with the Z-stack function to create fully focused images of thick or unevenly cut sections.



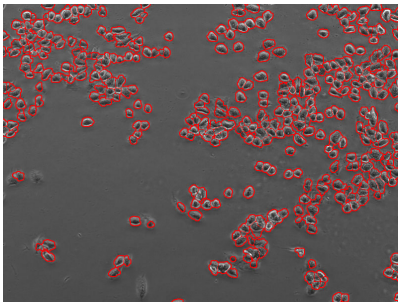
Hybrid cell count/Macro cell count

This advanced quantification software separates, counts, and measures cells with ease. Conditions used for counting can be saved and applied to up to 400 images with a single click to produce repeatable results free of user bias.

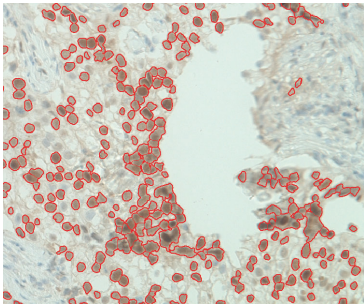
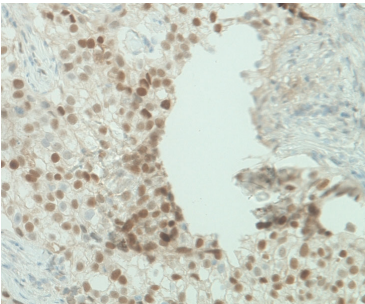
Phase contrast mode



Cultured cells (Phase contrast image)

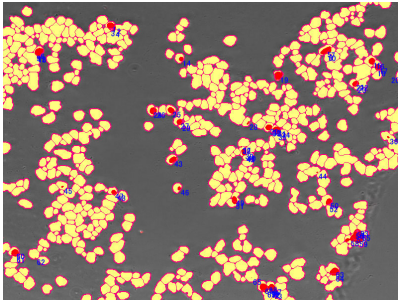
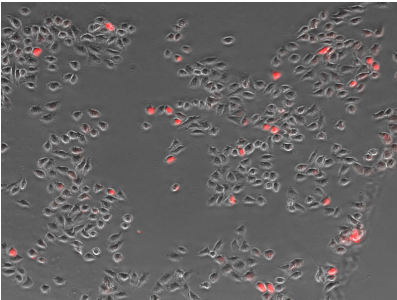


Color extraction mode



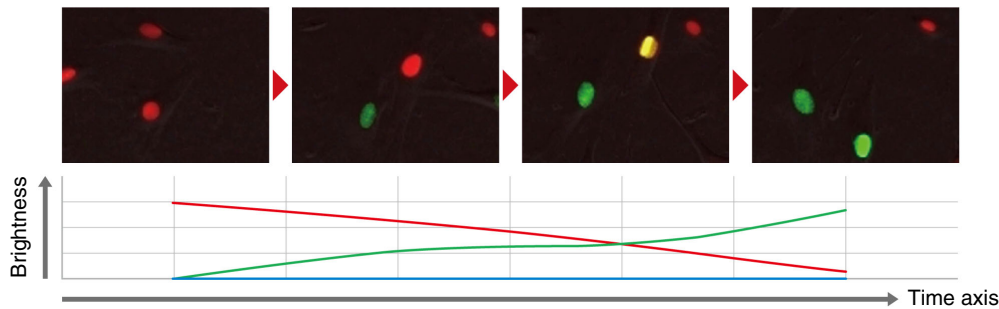
Courtesy of Hiroshima University Hospital Department of Anatomical Pathology Prof. Koji Arihiro

Mask function



Multi-dimensional time lapse

Perform time-lapse experiments with bright field, phase contrast, and fluorescence samples by specifying the capture settings and interval time. By using the Multi-point function, up to 99 different areas of interest can be captured in a given interval, each with unique capture settings such as magnification, exposure time, etc. This drastically improves the efficiency of time-lapse experiments, allowing for multiple samples to be observed simultaneously throughout the duration of the experiment.

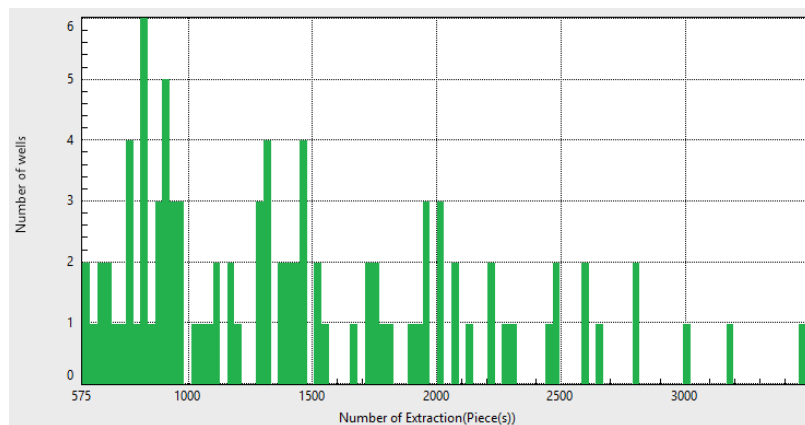
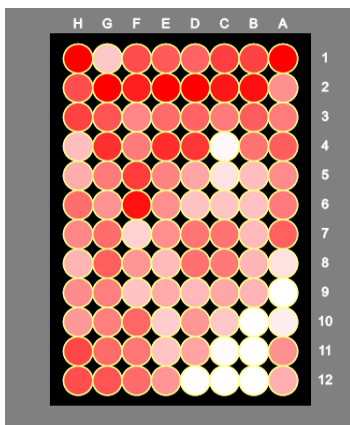


Multiple sample analysis

Capture and analyze multiple samples simultaneously and collectively by the image cytometer function.

Easy and direct captures can be made with the same condition to multiple wells.

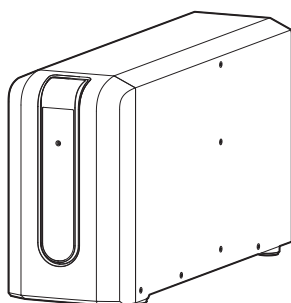
Analysis conditions can be specified easily by referring to images. Since many samples can be analyzed simultaneously, more reliable statistical data can be acquired effectively. The chronological change of a living cell can be confirmed by combination with the time lapse.



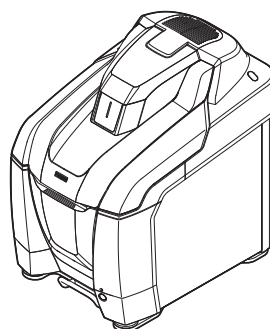
Checking the Package Contents

Unpack the BZ-X800 Series, and check that the parts and equipment listed below are all included in the package. We have thoroughly inspected the package contents before shipment. However, in the event of defective or broken items, please contact the nearest KEYENCE office.

■ Controller (BZ-X800L)

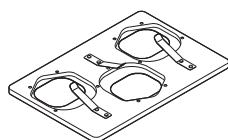


■ Head (BZ-X810)

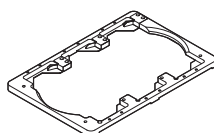


■ Accessories

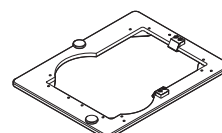
☐ Sample holder
(35 mm dish × 3) 1



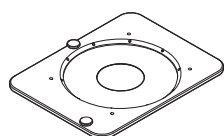
☐ Sample holder (slide × 3) 1



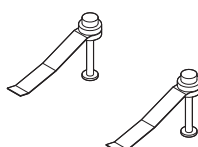
☐ Holder frame 1



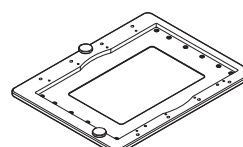
☐ Versatile holder 1



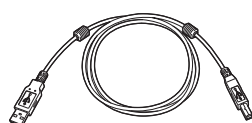
☐ Stage clips 4



☐ Versatile holder (Large) 1



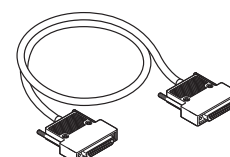
☐ USB cable (ferrite core) 1



☐ Dust cover for head 1



☐ Controller cable 1



☐ Fiber cable locking plate 1

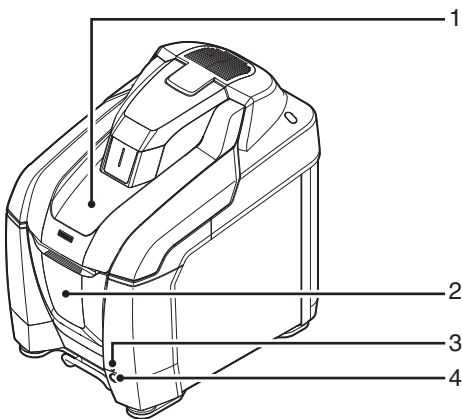


☐ Fiber cable locking screw 1

- ☐ Viewer CD-ROM 1
- ☐ BZ-X800L/BZ-X810 User's Manual (this manual) 1
- ☐ Cell Count Simple Operation Guide 1
- ☐ Analyzer CD-ROM 1
- ☐ BZ-X800/BZ-X810 Analyzer Reference Manual 1
- ☐ Quick Operation Guide 1
- ☐ French/Chinese simplified Warning label 1

Part Names

Head



1 Top panel

Open this when mounting specimens or changing lenses.

2 Front panel

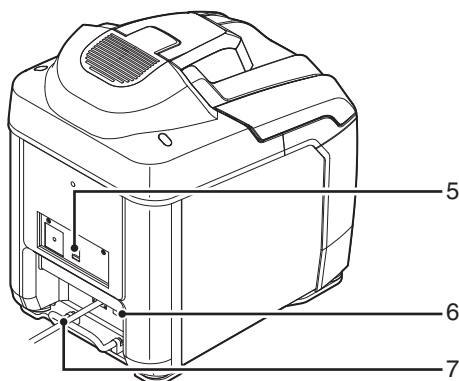
Open this when installing or replacing the filter cubes.

3 Power indicator

This illuminates when the power is turned on.

4 Power button

Turn the power on. Press it again to turn the power off. When the power is turned on, the main power switch of the controller must already be turned on.



5 USB connector

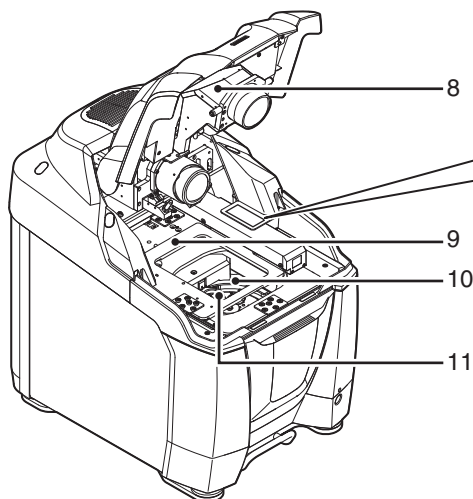
Connect to the control PC with the included USB cable.

6 Controller cable connection terminal

Connect to the controller with the included controller cable.

7 Fiber cable

Connect the fiber cable to the controller.



**警告 WARNING
AVERTISSEMENT**

- ・ 挟み込み注意
ステージ周囲に手を入れないでください。
挟まれて負傷するおそれがあります。
- ・ 電動レボルバ及び対物レンズの開口部
から目や皮膚に危害を及ぼす可能性が
ある UV 光及び可視光が出ます。
これらの放射光に対する目や皮膚の
暴露を避けてください。
- ・ Crushing hazard
Do not put your hand around
the stage.
Doing so may lead to injury.
- ・ Potentially hazardous UV and
optical radiation is emitted
from the aperture of nosepiece
and objective lens.
Avoid eye and skin exposure.
- ・ Risque d'écrasement
Ne placez pas votre main
autour de la platine.
Vous pourriez vous blesser.
- ・ Un rayonnement optique et
UV potentiellement dangereux
sont émis par l'ouverture de la
torelle et de l'objectif.
- ・ Eviter toute exposition des
yeux et de la peau.

8 Transmitted light unit

The top panel houses the LED transmitted light used for bright field and phase contrast observation. Flip it up when mounting a specimen. When it is raised, the light automatically turns off.

9 Motorized XY stage

This moves a specimen in the X and Y-axis directions to adjust the viewing position.

10 Motorized Z stage

This moves the lens turret in the Z-axis direction to adjust focus.

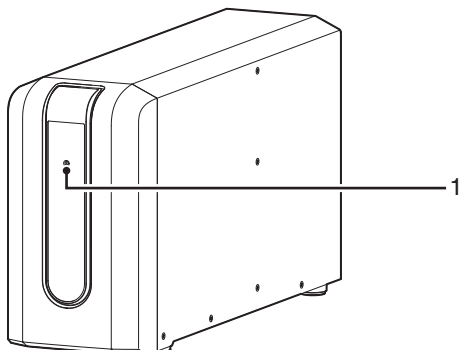
11 Motorized Lens turret

Mount the objective lenses here.

Controller

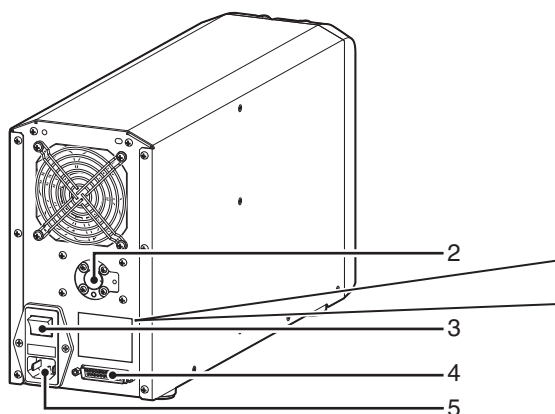
1

Getting Started



1 Power indicator

This illuminates when the power is turned on.



警告 WARNING AVERTISSEMENT		
リスクグループ3	RISK GROUP 3	GROUPE DE RISQUÈ 3
• この開口部から目や皮膚に危害を及ぼす放射光が出ます。この放射光に対する目や皮膚の暴露を避けてください。ランプ点灯前に必ずファイバケーブルを接続してください。 • Hazardous optical radiation is emitted from this aperture. Avoid eye and skin exposure. Connect the fiber cable before turning on the lamp. • Cette ouverture émet un rayonnement optique dangereux. Eviter toute exposition des yeux et de la peau. Connecter le câble avant d'allumer la lampe.		

2 Fiber cable connector

Connect to the controller with the fiber cable.

3 Main power switch

This turns on/off the main power of the BZ-X800 Series.

4 Controller cable connector

Connect to the head with the controller cable.

5 Power terminal

Connect to the power supply with included AC power cable.

Control PC Specifications

Use the PC specified by KEYENCE to control the BZ-X800 Series

1

Getting Started

OS	Windows 11 Pro (22H2) 64bit
CPU	Intel® Core™ i5 processor (6 cores, 4.8 GHz, 18 MB)
Memory	16GB (2x8GB/DDR5 4800MHz SO-DIMM, Non-ECC)
Storage	1 TB
Graphic card	NVIDIA® T400 4GB
Display resolution	Full HD (1920 × 1080)

Installing the Equipment

Installation Environment	Page 2-2
Connecting the Equipment.....	Page 2-3
Installing/Uninstalling the BZ-X800 Viewer ...	Page 2-5
Starting up and Shutting down the System	Page 2-8
Menu Screen	Page 2-9
Mounting and Registering an Objective Lens.....	Page 2-10
Setting Lens Correction Values	Page 2-12
Setting Channels	Page 2-13
Mounting a Specimen	Page 2-14

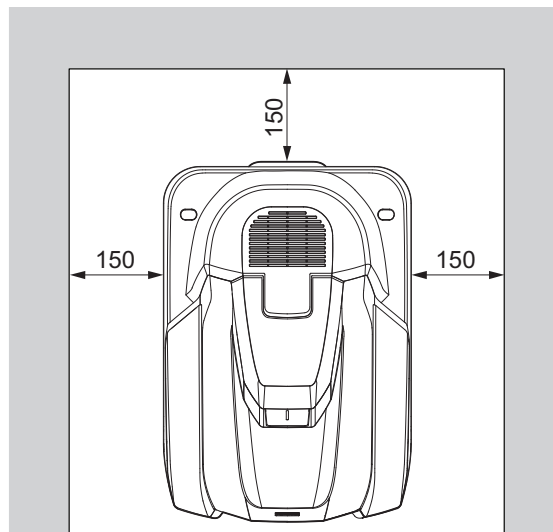
Installation Environment

The installation environment must satisfy the following requirements.

Common to Head and Controller Units:

Ambient temperature	15°C to 35°C
Ambient humidity	35 to 80% RH (No condensation)

Head

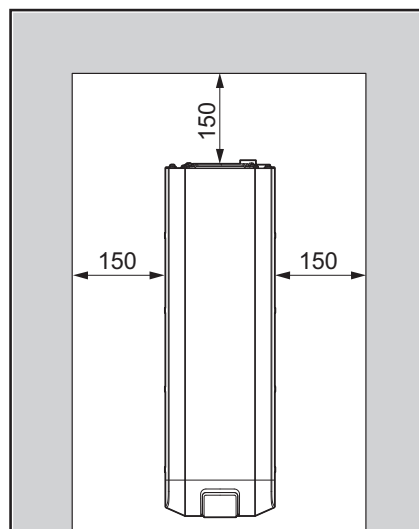


Unit: mm

A space of 300 mm or more above the equipment is required.

Use the fiber cable with bending radius of 100 mm or more.

Controller



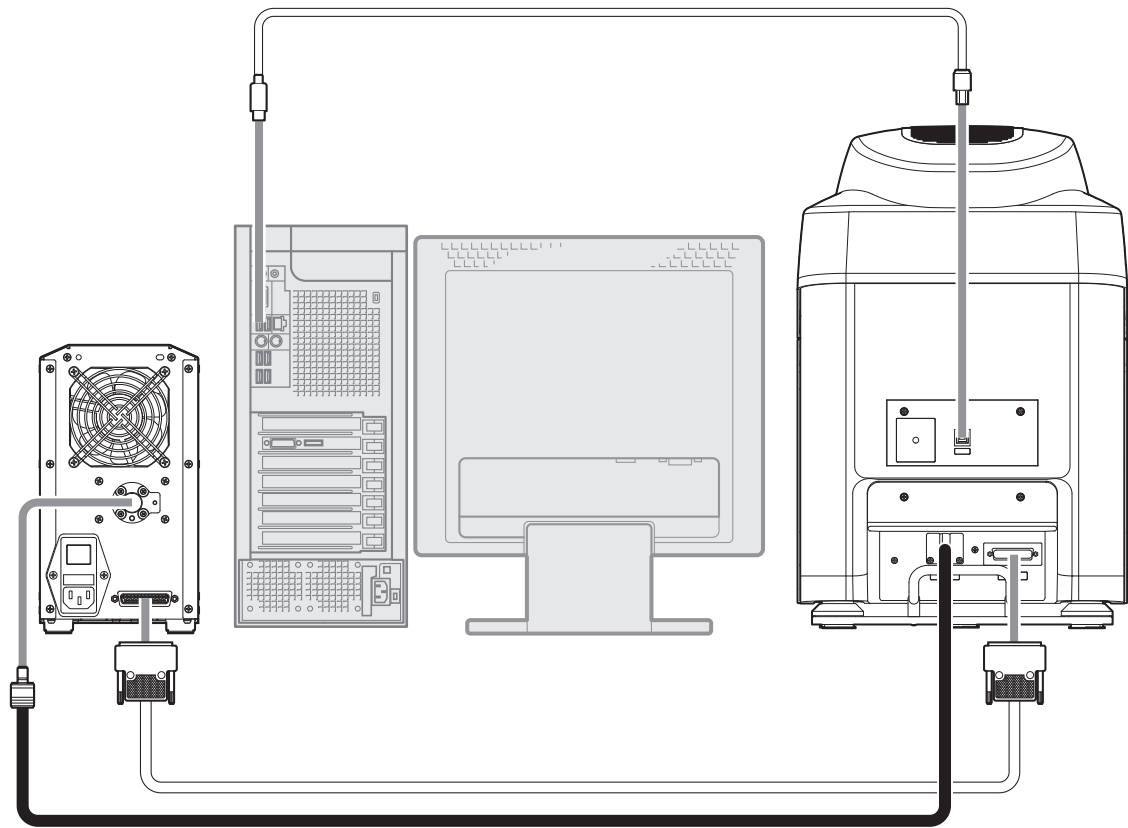
Unit: mm

A space of 150 mm or more above the equipment is required.

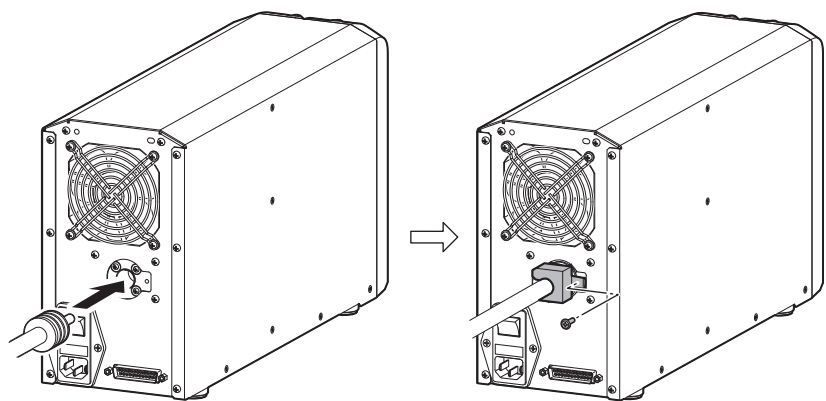
Connecting the Equipment

Head, Controller and Control PC connections

Connect the head and controller, and the head and control PC as shown below.



After inserting a fiber cable to the controller, attach a fiber cable locking plate and fix with screw.



	• Be sure to connect the power cable to an outlet that has a grounding terminal. • Radiation light from the LED lamp may cause damage to eyes and skin. Avoid eye and skin exposure to the radiation emitted from the aperture of the fiber cable connector. Be sure to connect the fiber cable to the controller before turning on the lamp.
	• Make sure that the BZ-X800 Series and all peripherals are turned off before connecting cables. • Do not apply excessive force when connecting cables since this can break the connector pins. • Fix the connectors with the screws after they are connected.

Connecting the power source

Connect the AC power cable to the power source after all equipment is connected.

2

Installing the Equipment



- Securely ground the grounding terminal (ground wire) of the AC power cable. Otherwise, an electric shock or product damage may result.
- If the AC power connector has 2 holes, use the supplied 3 hole - 2 hole power adaptor for connection. In this case, be sure to ground the grounding wire.

1 Connect the AC power cable to the controller, and connect to the outlet.

Installing/Uninstalling the BZ-X800 Viewer

Place the BZ-X800 Viewer CD-ROM in the CD drive and operate according to the on-screen instructions.



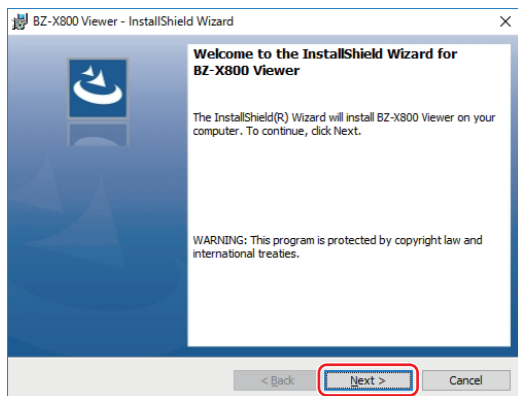
- When installing the Viewer, use administrator privileges.
- When updating or reinstalling the Viewer, uninstall the currently installed Viewer beforehand.

Installing the BZ-X800 Viewer

1 Place the BZ-X800 Viewer CD-ROM in the CD drive of the control PC.

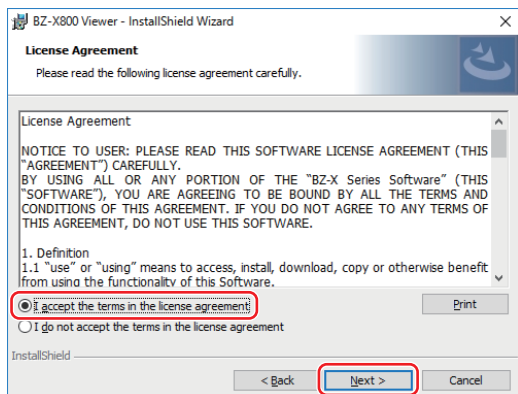
The installation software starts automatically and the installation wizard window appears.

2 Click [Next].



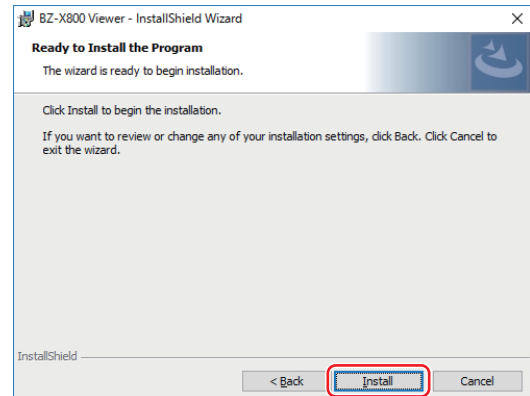
The License Agreement appears.

3 Confirm the agreement, select [I accept the terms in the license agreement] and click [Next].



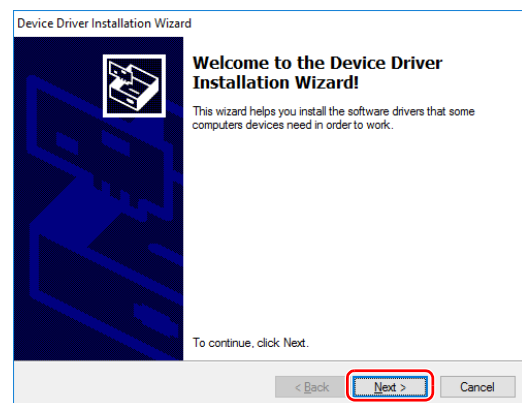
A message appears to notify the wizard is ready to begin installation.

4 Click [Install].



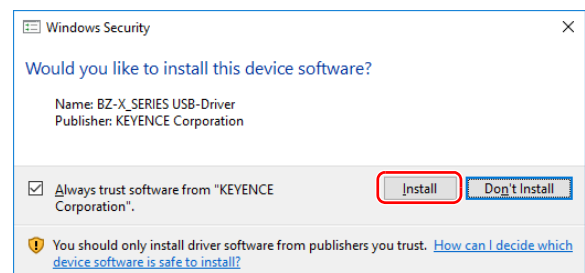
The installation starts and the device driver installation wizard appears.

5 Click [Next].



A message appears to confirm the installation of the device driver.

6 Click [Install].

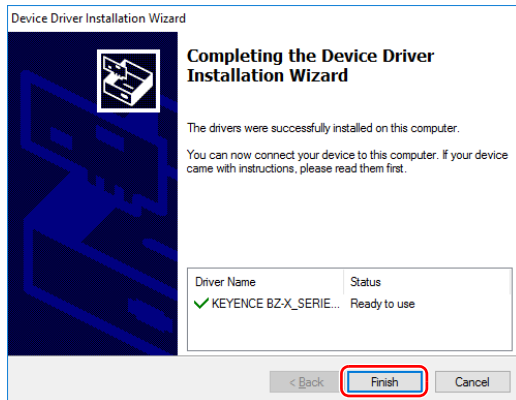


The installation of the device driver starts. After the installation is completed, a confirmation message appears to notify the drivers were successfully installed on the computer.

2

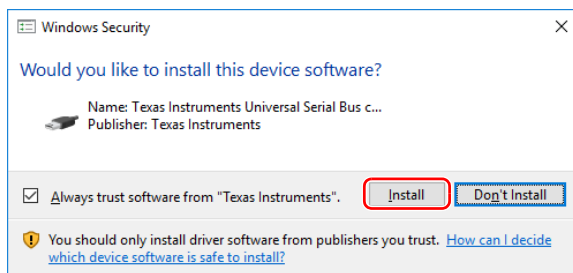
Installing the Equipment

7 Click [Finish].



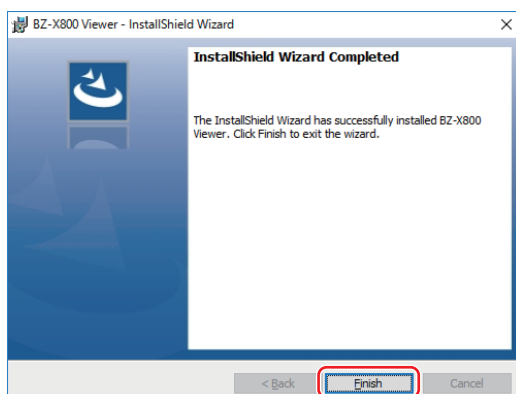
After the wizard is completed, a confirmation message appears to notify the BZ-X800 Viewer has been successfully installed.

8 Click [Install].



The installation of the device driver starts. After the installation is completed, a confirmation message appears to notify the drivers were successfully installed on this computer.

9 Click [Finish].



The installation is completed and [BZ-X800 Viewer] is displayed on the desktop and start menu.



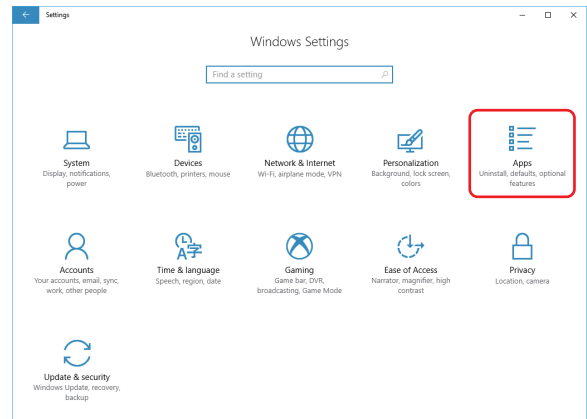
- When installing the BZ-X800 Viewer, the USB driver is installed at the same time.
- If the [User Account Control] dialog appears, click [Yes].

Uninstalling the BZ-X800 Viewer

1 Select [Settings] from the start menu.

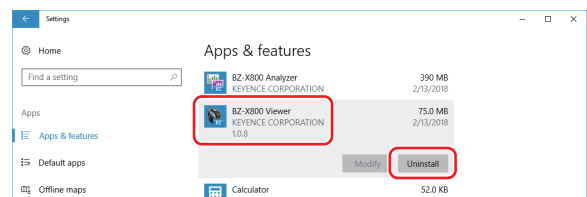
The [Settings] window appears.

2 Click [Apps] on the [Windows Settings] window.

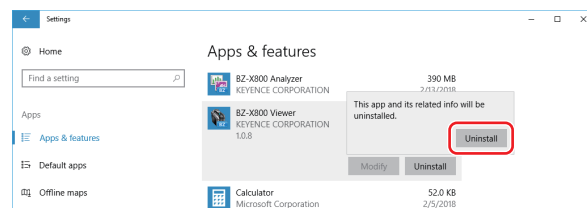


The [Apps & features] window appears.

3 Select [BZ-X800 Viewer] and click [Uninstall].

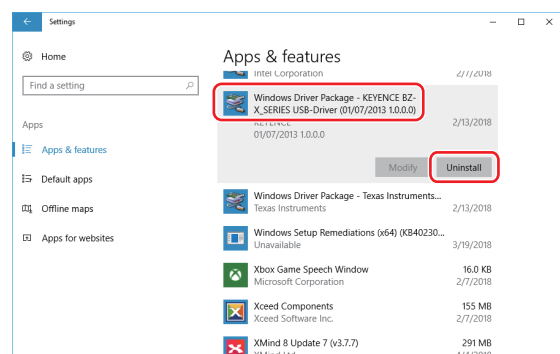


4 Click [Uninstall].

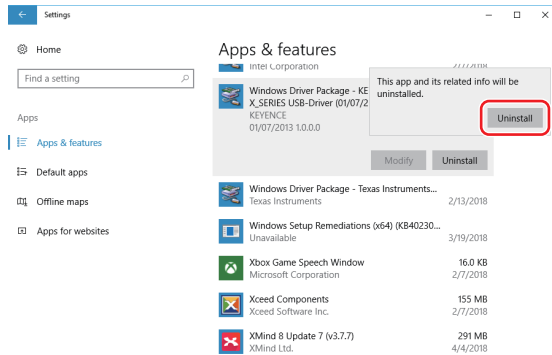


The BZ-X800 Viewer is removed.

5 Selecting [Windows Driver Package - KEYENCE BZX_SERIES USB Driver] and click [Uninstall].



6 Click [Uninstall].



The USB driver is deleted.

Reference

If a confirmation message appears to delete shared files, click [Yes] for all.

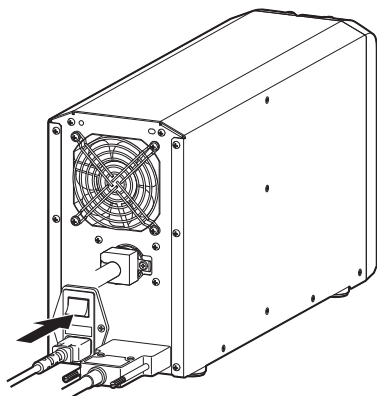
Starting up and Shutting down the System

2

Installing the Equipment

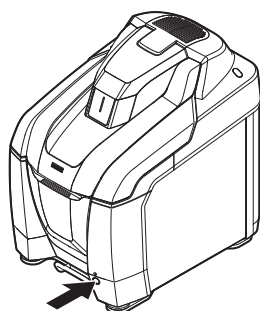
Starting up

- 1 Turn on the main power switch of the controller.



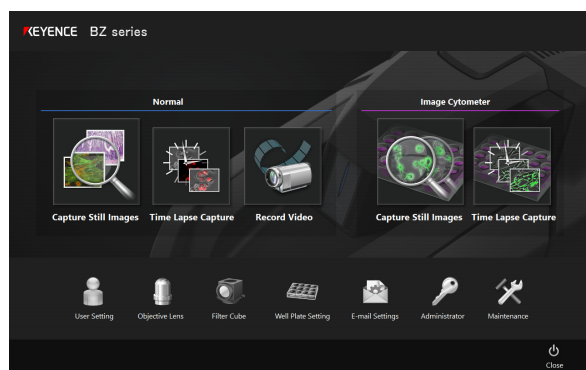
The Power indicator of the controller illuminates in orange.

- 2 Press the Power button on the head.



The Power indicator of the controller illuminates in blue.

- 3 Turn on the power of the control PC.
- 4 Double-click the [BZ-X800 Viewer] icon on the desktop.
The Viewer starts up and the menu screen is displayed.



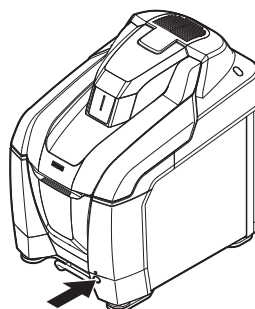
- Selecting [BZ-X800 Viewer] on the start menu will also open the Viewer.

Point

When the Power indicator of the controller is lit in orange, the main power switch is already on. No operation is required for the main power switch on the rear.

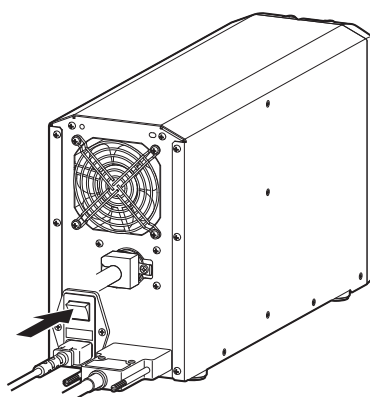
Shutting down

- 1 Click the close button on the upper right of the window.
The menu screen returns.
- 2 Click [Close].
The BZ-X800 Viewer finishes.
- 3 Turn off the power of the control PC.
- 4 Press the Power button on the head.



The Power indicator blinks and then turns off.

- 5 Turn off the main power switch on the rear of the controller.

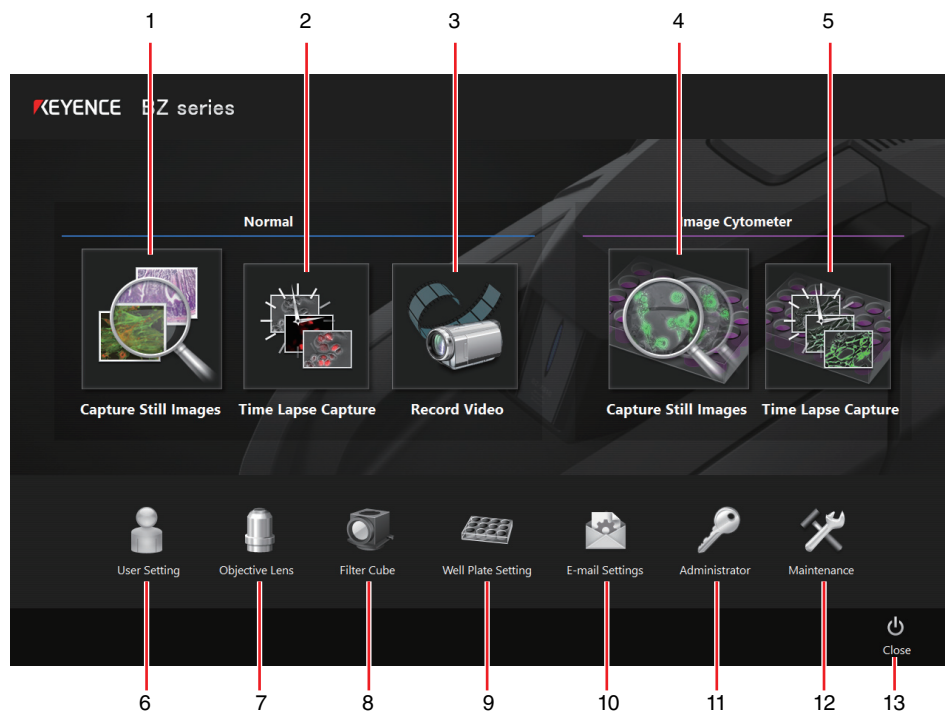


Reference

You do not need to turn off the main power switch of the controller every time operation is finished. Turn it off when the controller will not be used for a long period of time (ie. overnight) or when you transport the unit.

Menu Screen

The menu is used to launch capture modes and configure various settings.



1 Capture Still Images

📖 "Observing and Capturing Images" (Page 3-1)

2 Time Lapse Capture

📖 "Time Lapse Capture" (Page 11-3)

3 Record Video

📖 "Record Video" (Page 11-2)

4 Image Cytometer : Capture Still Images

📖 "Capturing Still Images" (Page 12-2)

5 Image Cytometer : Time Lapse Capture

📖 "Time Lapse Capture" (Page 12-4)

6 User Setting

📖 "User Settings" (Page 13-13)

7 Objective Lens

📖 "Mounting and Registering an Objective Lens" (Page 2-10)

8 Filter Cube

📖 "Setting Channels" (Page 2-13)

9 Well Plate Setting

📖 "Well plate settings" (Page 13-9)

10 E-mail Settings

📖 "E-mail settings" (Page 13-7)

11 Administrator

📖 "Administrative Settings" (Page 13-11)

12 Maintenance

📖 "Maintenance Settings" (Page 13-14)

13 Close: Exit the Viewer.

Mounting and Registering an Objective Lens

2

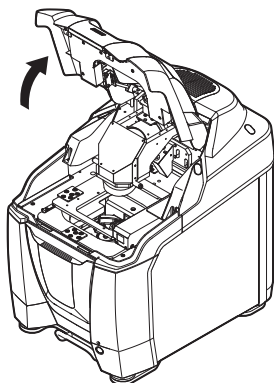
Installing the Equipment

Mounting an objective lens

► Important

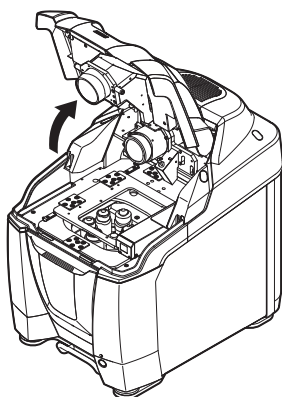
- Select the most suitable lens based on the thickness of the (transparent) observation medium of the container. If an unsuitable lens is used, it will not perform optimally.
 □ "Lens Recommendations" (Page A-6)
- If using a lens containing a correction ring, be sure to set the correction ring to the appropriate value based on the container being used.
 □ "Lenses with correction rings - Correction values for each observation container" (Page A-7)
- When switching out lenses, be sure to register each new lens.

1 Raise the top panel.



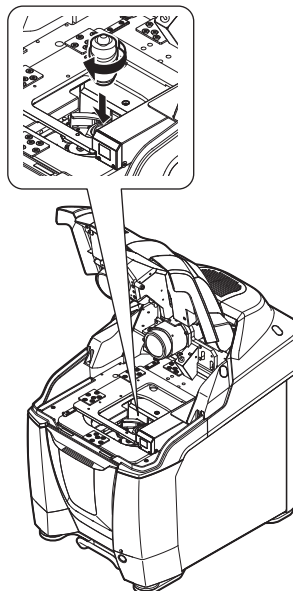
To close, push down the top panel slowly.

2 Raise the transmitted light unit.



To close, push down the transmitted light unit slowly.

3 Mount the objective lens to the motorized lens turret.



Screw the lens into the turret threads by turning the lens clockwise until it no longer rotates.

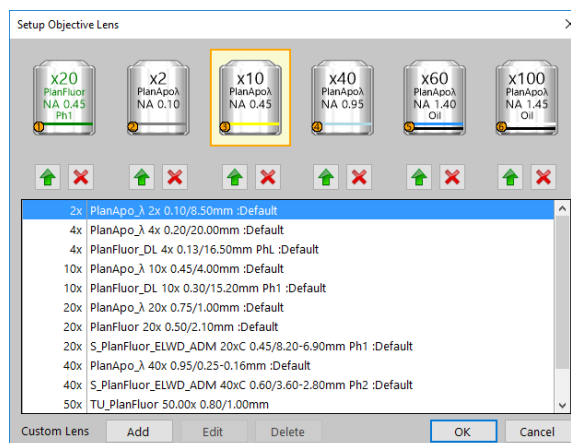
Reference

- Up to 6 objective lenses can be mounted.
- To remove an objective lens, turn it counterclockwise to unscrew it.

Registering an objective lens

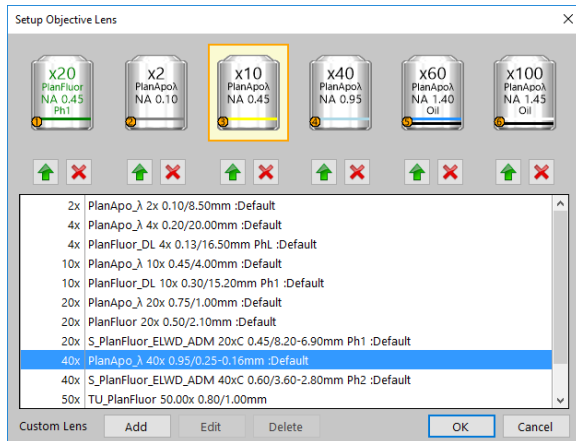
1 Click [Objective Lens] on the menu screen.

The [Set Objective Lens] dialog box is displayed.



2 Select the lens to be mounted from the supplied list and click .

An illustration of the registered lens is displayed.



Reference If click the registered target position of lens, the motorized lens turret moves and, the position is selected.

3 Repeat steps 2 to register all objective lenses.

4 Click [OK].

The objective lenses have been registered.

Reference To specify an empty location on the turret, select the lens to remove and click .

3 Enter the information of the new lens to register and click [Register].

The newly registered lens is displayed in the lens list.

4 Click [OK].

The lens registration is completed.

Reference When adding a lens manufactured by Olympus or Zeiss, enter 1.111 times for the Olympus lens and 1.212 times for the Zeiss lens as much magnification as that of the objective lens.

Changing/Deleting lens information

1 Click [Objective lens] on the menu screen.

The [Setup Objective Lens] dialog box is displayed.

2 Click [Edit].

The [Edit Lens] dialog box is displayed.

3 Make the necessary changes and click [Register].

4 Click [OK].

The lens information is updated to reflect the changes.

Reference To delete a lens from the list, select the lens to delete in step 2 and click [Delete].

Adding lens information

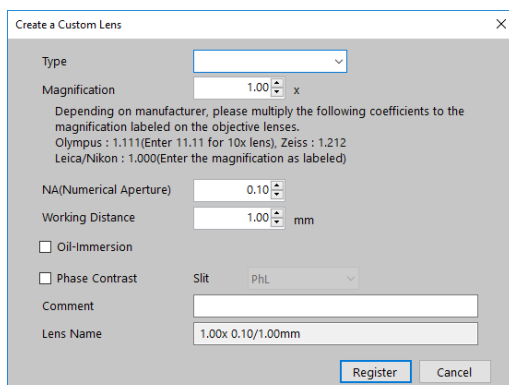
Use this procedure to add lens information for a lens that is not listed at the time of purchase.

1 Click [Objective Lens] on the menu screen.

The [Setup Objective Lens] dialog box is displayed.

2 Click [Add].

The [Create a Custom Lens] dialog box is displayed.



Setting Lens Correction Values

This corrects the focus and the field of view due to individual differences between lenses.

2

Installing the Equipment

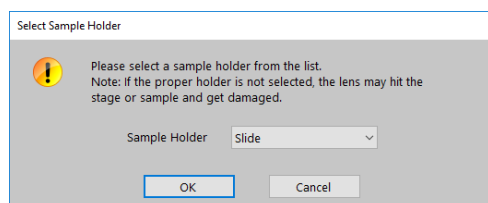
Important

Be sure to correct for each lens registered in the lens turret. Perform these correction steps for every new lens that is added.

1 Click [Capture Still Images] on the menu screen.

2 Select the sample holder to use.

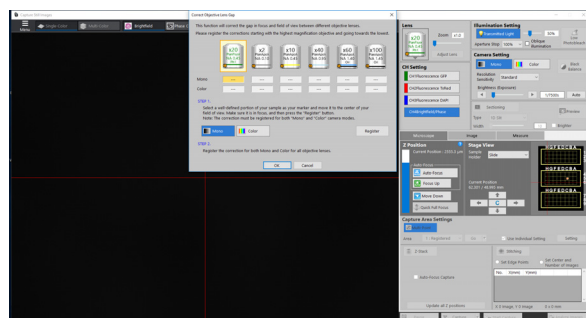
The slide or dish can be selected. If there is no applicable holder, select "Versatile (Wide)". As for a well plate, a newly registered one can also be selected.



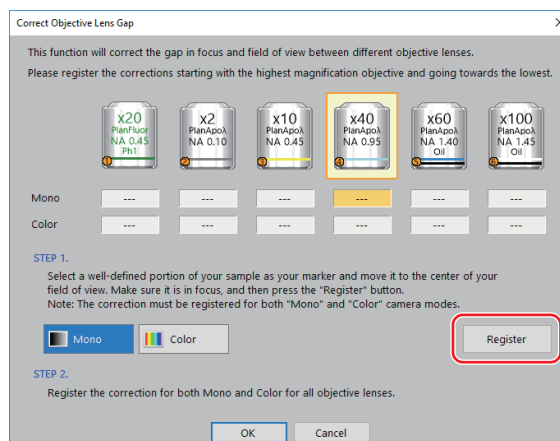
3 Select the lens with the highest magnification among those registered in the lens turret.

4 Click [Correct Lens Gap...] in the menu.

The [Correct Objective Lens Gap] dialog box is displayed, and red cross-shaped reference lines appear on the observation screen.



5 Select a distinguishable area on the sample and adjust the XY position to bring it to the center of the screen and then adjust the focus. When the object appears focused and at the center of the screen, click [Register].



- How to adjust the XY position and focus.

☞ "Positioning (Moving the XY Stage)" (Page 3-4)

☞ "Adjusting the Focus (Moving the Z-Axis)" (Page 3-5)

6 Click [Mono] and [Color] respectively to switch the camera mode.

7 Repeat steps 5 to 6 to carry out the lens correction registration for all lenses in order from the highest magnification to the lowest.

Reference

- If the lens correction procedure is performed starting with the lowest magnification, the target area may no longer be within the field-of-view at high magnification.
- If [Correct Lens Gap...] is clicked after the lens correction procedure has been performed, a message appears to select between correcting all lenses or a single lens.

Setting Channels

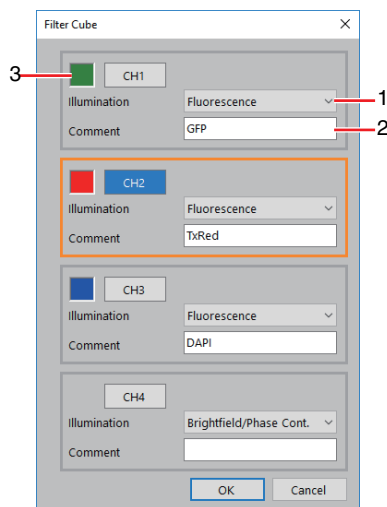
This sets filter channels for observation and capture. Register the observation method and filter to use for each channel, and install the appropriate filter cube(s).

Channel setting



The following procedure shows how to set channels on the observation and capture screen. Mount the filter cube correctly according to the channel settings.

- 1 Click [Filter Cube] on the menu screen.
The [Filter Cube] dialog box is displayed.
- 2 Click the channel from [CH1] to [CH4] to set.
The filter turret moves.
- 3 Set the observation method for each channel.



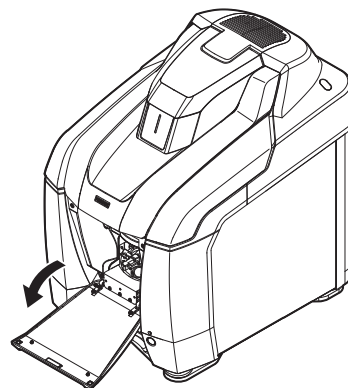
- 1 **Illumination** : Select the observation method from [Fluorescence] and [Brightfield/Phase Cont.]. When selecting [Fluorescence], select the pseudo color from the color pull-down list. For unused channels, select [OFF].
- 2 **Comment** : Enter a comment to display for each channel on the observation and capture screen.
- 3 **Pseudo color**: If a capture method is [Fluorescence], a color for displaying it can be selected. Clicking it displays the color to be selected.
- 4 Click [OK].
The setting contents are saved.

Installing a filter cube

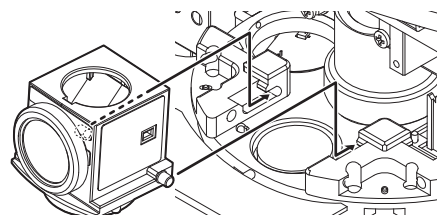


- If a filter cube is installed that is not appropriate for the fluorescent dye being visualized, it will not be possible to obtain an image of the fluorescent signals. If KEYENCE does not offer the required filter cube, use a commercially available filter set.
 "Using Commercially Available Fluorescence Filters" (Page A-3)
- Make sure that each filter cube is installed properly and locked into each slot in the turret. If a cube is floating in the slot, damage to the cube and the system can occur when the turret is rotated. Also, the filter will not emit light properly unless it is installed correctly.
- Be sure to update the channel settings when changing filter cubes.

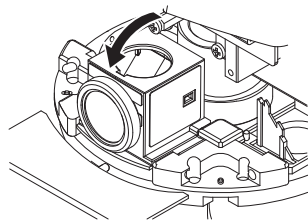
- 1 Open the front panel.



- 2 Click the channel to install the filter cube on the [Filter Cube] dialog box.
The filter turret moves.
- 3 Prepare the filter cube suitable for the set channel. Insert the filter cube by sliding its protrusions into the grooves on the filter turret.



- 4** Press down on the lifted portion on the front side of the filter cube to lock it into place.



- 5** Repeat steps 2 to 4 to install all filter cubes.

Mounting a Specimen

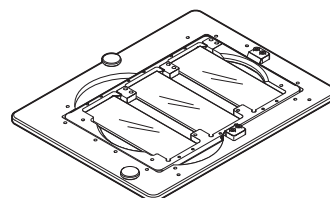
Place the specimen to be observed in a sample holder suitable for the container. Place the sample holder within a holder frame and mount the holder frame on the stage.

► Important

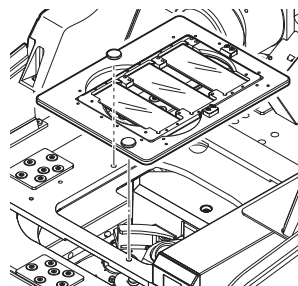
- When using a slide, mount the specimen downward (inverted).
- The sample holder is not fixed to the holder frame. Remove the sample holder from the holder frame when replacing the specimen.

- 1** Set the sample holder on the holder frame.

- 2** Set the specimen on the sample holder.

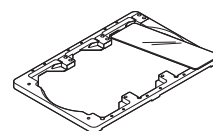


- 3** Set the holder frame on the XY stage.

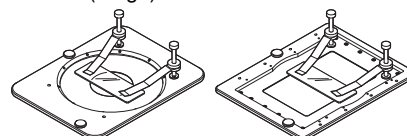


Reference

- Set a multi-well plate or a flask directly on the holder frame.
- Set a large dish on the Versatile holder.
- Attach a slide while pressing it to the left spring of the holder frame.



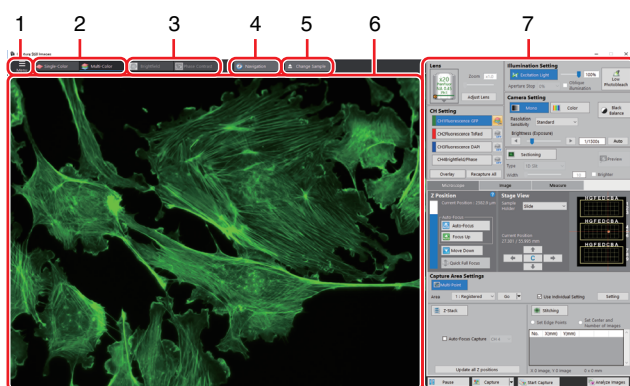
- If the slide cannot be set because of its irregular size, use the Versatile holder or Versatile (Large) holder.



Observing and Capturing Images

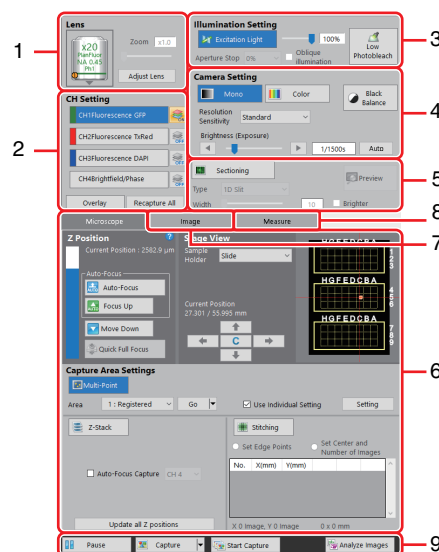
Observation and Capture Screen	Page 3-2
Control panel	Page 3-2
[Microscope] Tab.....	Page 3-3
Changing the Observation Magnification ...	Page 3-3
Positioning (Moving the XY Stage).....	Page 3-4
Adjusting the Focus (Moving the Z-Axis) ...	Page 3-5
Adjusting Brightness (Exposure)	Page 3-6
Pausing and Capturing Images.....	Page 3-7
Adjusting the Illumination	Page 3-9
Using Oblique Illumination.....	Page 3-10
Adjusting the Lens	Page 3-10
Using the Navigation Function (Optional) ...	Page 3-12

Observation and Capture Screen



- 1 Menu button**
Perform supplementary operations, such as option specification or lens correction.
- 2 Multi-color capture**
Select a capture method from [Single-Color] or [Multi-Color].
- 3 Brightfield/Phase contrast observation**
Select the observation method from [Brightfield] and [Phase Contrast].
- 4 Navigation**
"Using the Navigation Function (Optional)" (Page 3-12)
- 5 Sample change**
The stage moves to the place where it is easiest to change the sample.
- 6 Image observation area**
This area displays the live image from the CCD.
- 7 Control panel**
Observation and capture conditions are set in this area. The display is switched depending on the active function. Further descriptions are available in individual function chapters.

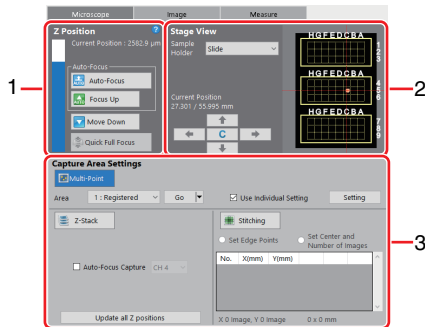
Control panel



- 1 Lens settings**
 - "Changing the Observation Magnification" (Page 3-3)
 - "Adjusting the Lens" (Page 3-10)
- 2 Filter and channel setting**
Specify a filter channel to be used for observation.
- 3 Light source settings**
 - "Adjusting the Illumination" (Page 3-9)
 - "Using Oblique Illumination" (Page 3-10)
- 4 Camera settings**
 - "Adjusting Brightness (Exposure)" (Page 3-6)
- 5 Sectioning**
High-resolution images free of out-of-focus fluorescence blurring can be captured.
 - To perform Sectioning, the optional software module needs to be purchased.
- 6 Microscope tab**
Set the capture position or capture area.
- 7 Image tab**
Perform settings to improve the image quality.
- 8 Measure tab**
Perform settings for measurement.
- 9 Still capture**
 - "Pausing and Capturing Images" (Page 3-7)

[Microscope] Tab

Basic operations such as magnification setting and focus adjustment are performed in this tab.
Clicking the [Microscope] tab displays the screen as shown below.



- 1 Motorized Z stage control**
📖 "Adjusting the Focus (Moving the Z-Axis)"
(Page 3-5)
- 2 Motorized XY stage control**
📖 "Positioning (Moving the XY Stage)" (Page 3-4)
- 3 Multi-dimensional capture**
Select the function or combination of functions to be used from [Stitching], [Z-Stack] and [Multi-Point].
 - To use these advanced observation functions, additional software must be purchased.

Changing the Observation Magnification

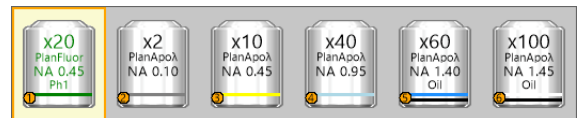
You can change the observation magnification by selecting a different lens to be used.

Changing the lens

- 1 Click the lens icon.**



- 2 Select the lens with the desired magnification and click on it.**

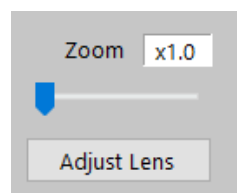


The motorized lens turret rotates to bring the selected lens into the active position.

Setting the magnification using the digital zoom

Using the magnification slider

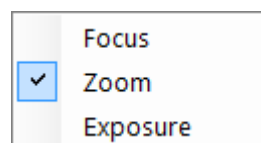
- 1 Drag the slider using the mouse.**



Using the mouse wheel

- 1 Move the pointer to the image observation area, and right-click.**

- 2 Select [Zoom].**
The check mark is added.



- 3 Scroll the mouse wheel to change the magnification.**

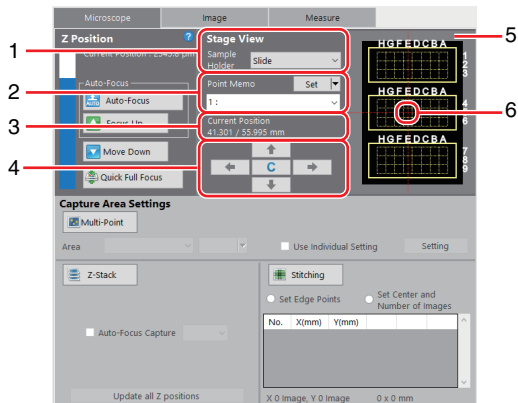
3

Observing and Capturing Images

Positioning (Moving the XY Stage)

Operation screen

Move the stage to view other areas of the specimen.



- 1 **Stage View** : "Changing the type of the holder" (Page 3-5)
- 2 **Point Memo** : Specified positions can be stored.

Set	Stores the coordinates of the stage.
Go	The stage moves to the stored position.
Delete	Deletes the selected stored coordinates.
Delete All	Deletes all stored coordinates.
- 3 **Coordinates** : XY coordinates of the selected position are displayed.
- 4 **Arrow key** : The stage moves in the direction of the arrow key. The stage moves to the original point when the [C] key is pressed.
- 5 **Stage map** : A map is displayed according to the type of the folder.
- 6 **Current position** : The position where the straight lines cross indicates the current position of the stage. This position will be the center of view for the image observation area.

Operating instructions

Moving by dragging the mouse (fine adjustment)

- 1 **Place the mouse on the image observation area and click-and-drag to move the field of view.**
The stage moves according to the mouse movement.

Moving by displaying the current position (rough adjustment)

- 1 **Click on an area on the stage map.**
The stage moves to the clicked position.

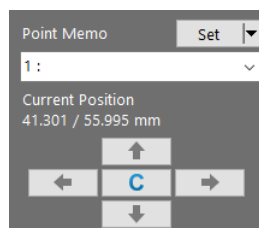


If double-clicking the well at the well plate display, it moves to the center of the well.

Moving by double-clicking

- 1 **Double-click in the image observation area.**
The screen centers on the area that was double-clicked.

Moving by arrow keys



- 1 **Press an arrow key.**
The stage moves in the direction of the arrow key. The stage moves 70% in a single field of view.
The stage moves to the center of the stage when the [C] key is pressed.



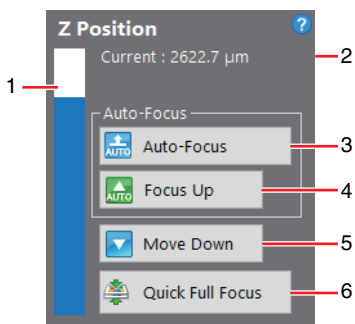
To merge images when the "Multi-dimensional capture module BZ-H4XD" is not purchased, press the movement arrow buttons and capture multiple images. Up to 30 images can be merged. For details, refer to Analyzer Reference Manual (P4-12)

Adjusting the Focus (Moving the Z-Axis)

Move the Z-axis stage using the mouse to adjust the focus. Using [Auto-Focus] can also adjust the focus.

Adjusting on the Z-axis control screen

- 1
- Click [Auto-Focus].
- After the lens moves downward to the bottom, it moves automatically to search for focus.



- 1
- Slider** : Display the Z-axis position.
- 2
- Coordinates** : Display the current position.
- 3
- Auto-Focus** : After the lens is moved downward to the bottom, focus is searched.
- 4
- Focus up** : Search for focus from the current Z-axis position to the top.
- 5
- Move Down** : The lens is moved downward to the bottom.
- 6
- Quick Full Focus** : Capture a fully focusing image when observing thick specimens.
📖 "Using Quick Full Focus" (Page 9-2)

Reference

The registered point memos are saved with the user setting information.

- 1
- Select the location number to register, adjust the Z-axis, and click [Set].
- The coordinates are stored with the number displayed for the Point Memo. Up to 30 points can be stored.

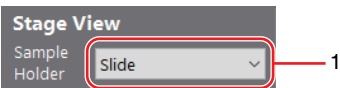
Reference

A name can be applied by entering characters on the point memo.

- 2
- Select the desired location number from the pull-down list for the Point Memo, and click [Go].
- The stage moves to the selected coordinates.

- Reference
- To overwrite coordinates, select a registered point memo and click [Set].
 - To delete stored coordinates, select the point memo to delete and select [Delete] from the pull-down list. To delete all coordinates, select [Delete All].

Changing the type of the holder



- 1
- Sample Holder** : Select an item in harmony with the type of the set holder.

Reference

The displayed stage map can be saved as an image (TIFF format) . The point memo can also be saved simultaneously (CSV format). Select [Save Stage Image] from the menu on the top of the screen.

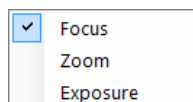
Reference

If the position focused by [Auto-Focus] is the bottom of the container, the specimen should be on the upper position, thus focus is searched by [Focus up].

Adjusting using the mouse wheel

1 Move the pointer to the image observation area, and right-click.

2 Select [Focus].
The check mark is added.



3 Scroll the mouse wheel to adjust the focus.



Scrolling the mouse wheel while pressing the keys below will allow for fine or rough movements of the Z-stage.

Operation	Lens movement
[Ctrl] key + [Shift] key + wheel	The stage makes very rough movements.
[Ctrl] key + wheel	The stage makes rough movements.
[Shift] key + wheel	The stage makes fine movements.

Adjusting Brightness (Exposure)

Exposure time can be adjusted between 1/7500 to 60 seconds.

Using the slider

1 Drag the slider using the mouse.



Using the buttons

1 Click the buttons on both ends of the slider.



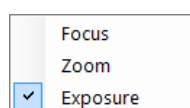
Adjusting automatically

1 Click [Auto].
Brightness is adjusted to the suitable level automatically.

Using the mouse wheel

1 Move the pointer to the image observation area, and right-click.

2 Select [Exposure].
The check mark is added.



3 Scroll the mouse wheel to adjust the brightness.

Pausing and Capturing Images

Pausing images

This pauses the observation screen temporarily without saving the image.



- While paused, stage movement, image capture, etc. cannot be performed.
- To prevent photobleaching or discoloration of samples, the screen enters the paused state each time an image is captured.

1 Click [Pause].

- Click [Live Image] to return to the live image.

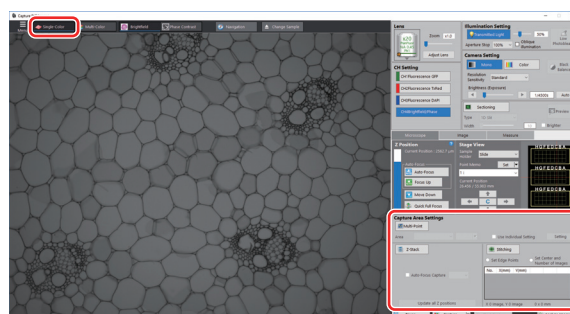


[Excitation Light] is turned off while paused during fluorescence observation.

Capturing images (Single-Color)

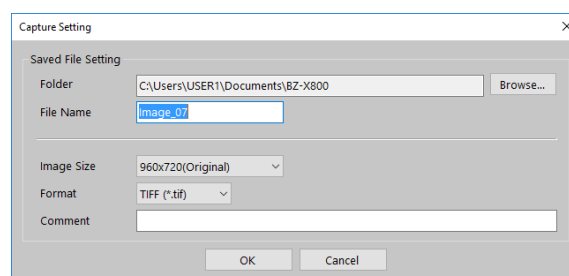
This saves the image displayed in the image observation area as a still image.

1 Select the Single Color.



2 To save the field of view displayed in the observation area, click [Capture].

The image is acquired as a still image, and the [Capture Setting] dialog box is displayed.

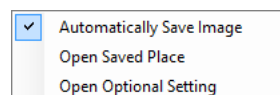


3 Enter the location to save the image and click [OK].

The captured image is saved.



Clicking the mark next to capture button selects [Automatically Save Image], [Open Saved Place], and [Open Optional Setting].
Checking Automatically Save Image can save the image with the condition set by the option settings.



3

Observing and Capturing Images

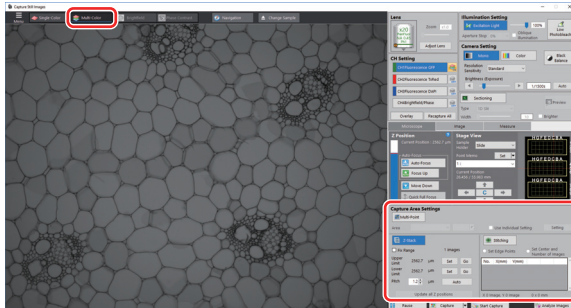
Capturing multiple images (Multi-Color/Multi-Dimensional Capture)

This describes how to capture images when using multi-color capture or the multi-dimensional capture functions such as stitching, Z-stack and multi-point.

3

Observing and Capturing Images

1 Select the Multi-Color.

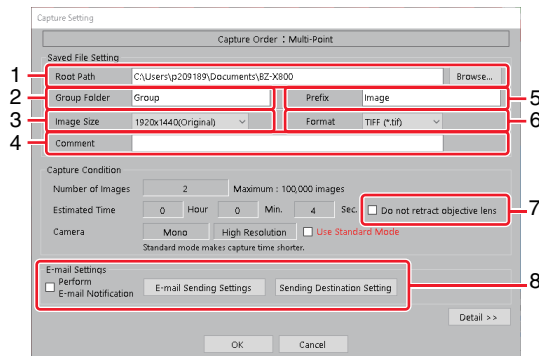


- See Chapter 8 for multi-color capture and Chapters 9 to 11 for multi-dimensional capture.

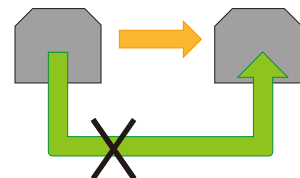
2 Click [Capture] for multi-color capture or click [Start Capture] for multi-dimensional capture.

The [Capture Setting] dialog box is displayed.

3 Enter the save folder, etc. as necessary and click [OK].



- Route Path** : Specify the folder where the images are to be saved.
- Group Folder** : Specify the group folder name for saving the group of images.
- Image Size** : Select the image size to use for capture.
- Comment** : Enter comments regarding the group of images.
- Prefix** : Specify the character string to be appended to the beginning of the file name(s).
- Format** : Select the file format (TIFF or JPEG) for the saved images.
- Do not retract** : This option is effective when capturing images of multiple locations such as with multi-point capture and image cytometer capture. Check [Do not retract to objective lens] to reduce the image capturing time by moving without lowering the lens. Note that if there are obstacles in the movement path, the objective lens may collide with them and be damaged.



- E-mail Settings** : Check [Perform E-mail Notification] to notifying a capture state by e-mail. Refer to the following for more information about the e-mail sending settings and sending destination settings.
 "E-mail settings" (Page 13-7)

4 Confirm the number of images and time required for capture, and click [OK].

Capturing starts.

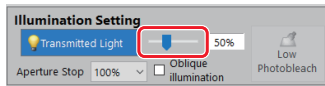
Reference

Depending on the functions being used for capture, the following options may be displayed in the [Capture Setting] dialog box.

- Checking [Use Standard Mode] can reduce the capture time.
- Clicking [Detail] can confirm the setting contents.

Adjusting the Illumination

Adjusting the brightness of the transmitted light (Brightfield/Phase contrast observation)



1 Drag the slider using the mouse.

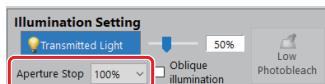
- Adjust the amount of light from 4 levels. (25%, 50%, 75%, 100%)



Clicking [Transmitted Light] switches ON or OFF of the transmitted light.

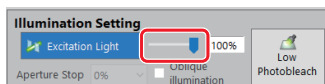
Adjusting the aperture stop of the transmitted light (Brightfield observation)

1 Select the value from the pull-down list.



- Adjust the aperture stop from 5 levels. (0%, 20%, 40%, 60%, 80%, 100%)

Adjusting the excitation power (Fluorescence observation)



1 Drag the slider using the mouse.

- Adjust the excitation power from 6 levels. (0.3%, 5%, 10%, 20%, 40%, 100%)

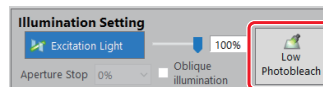


- Clicking [Excitation Light] switches ON or OFF of the excitation light.
- Light settings can be made on the option screen called from the menu.

Using Low Photobleach Mode (Fluorescence observation)

Low Photobleach Mode is designed to pulse excitation light only at the time of image capture so that the sample is not exposed to light for prolonged periods of time. This mode prevents discoloration caused by excessive exposure to excitation light during fluorescence observation.

1 Click [Low Photobleach].



The device enters the low photobleach mode.

- To disable the low photobleach mode, click [Low Photobleach] again.

Using Oblique Illumination

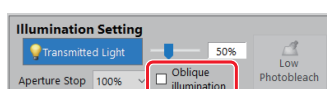
Point

Oblique Illumination cannot be used during phase contrast observation.

Using Oblique Illumination

Using this function during brightfield imaging can help bring out small texture and topography changes on the surface of a sample.

1 Click [Oblique illumination].



Oblique illumination observation is enabled.

- To disable oblique illumination observation, uncheck [Oblique illumination].

Reference

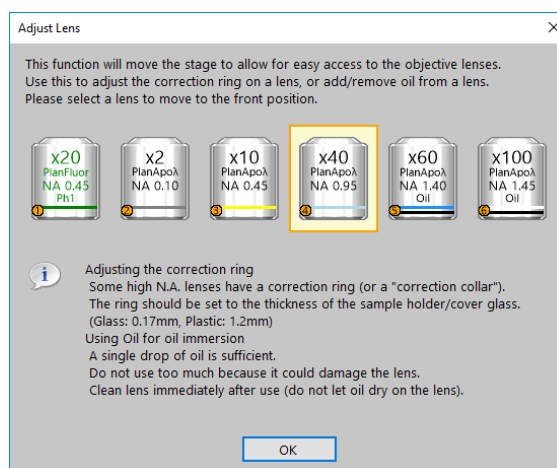
In order for oblique illumination to be successful, the NA of the lens being used cannot exceed the NA of the condenser lens. When using oblique illumination, be sure that the NA of the lens is 0.5 or less.

Adjusting the Lens

When applying oil or adjusting the correction ring on a lens, it is helpful to have the lens in the front position of the turret for unobstructed access.

1 Click [Adjust Lens].

The [Adjust Lens] dialog box is displayed.



2 Click the illustration of the lens to be adjusted.

The motorized lens turret moves and the lens moves to the front.

3 Open the top panel or front panel, and adjust the lens.

4 When the adjustment is completed, click [OK].

3

Observing and Capturing Images

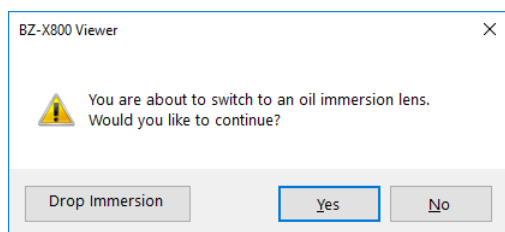
Using the oil-immersion lens

When switching a normal lens to an oil-immersion lens, a guide screen is displayed to apply or wipe oil easily.

Switching to the oil-immersion lens

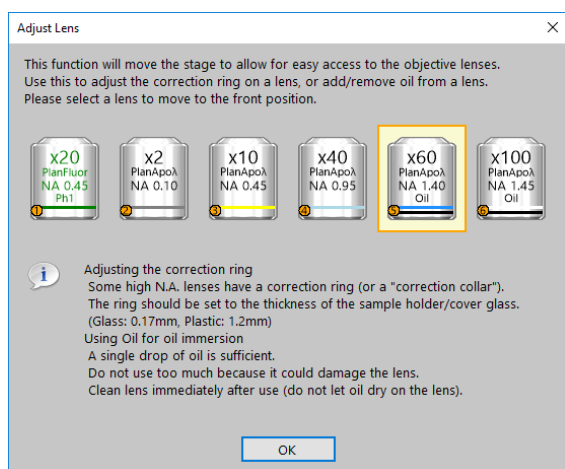
1 Click the lens to select the oil-immersion lens.

2 Click [Drop Immersion].

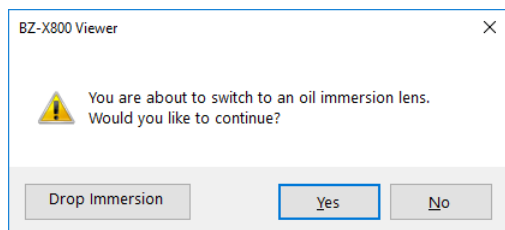


The oil-immersion lens moves to the front to apply oil easily.

3 Click [OK] after applying oil.



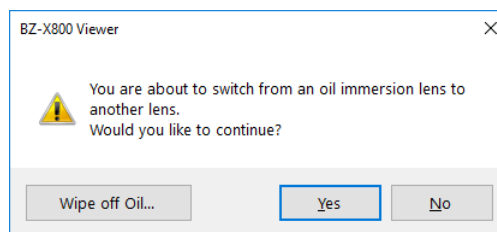
4 Click [Yes] on the confirmation screen for switching to the oil-immersion lens



Switching from the oil-immersion lens to the normal lens

1 Click the lens to select the normal lens.

2 Click [Wipe off Oil].

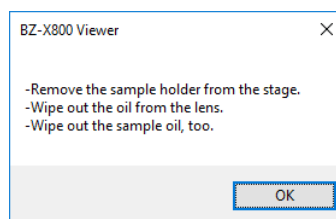


The lens moves to the bottom to wipe oil easily.

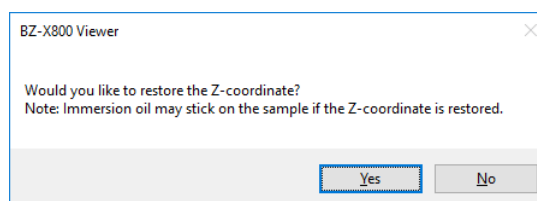
However, the lens will not move to the front.

Remove the sample holder, and wipe oil on the lens and specimen.

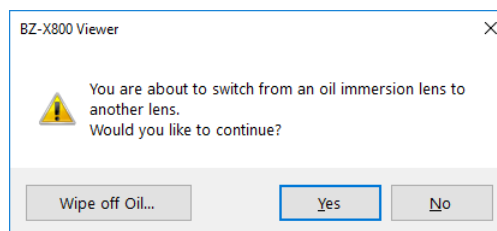
3 Click [OK] after wiping oil.



4 Confirm that it is no problem if the lens returns to Z position, and click [Yes]



5 Click [Yes] on the confirmation screen for switching to another lens.



Using the Navigation Function (Optional)

This function rapidly stitches together neighboring fields-of-view to create a larger image of the sample and make it easier to observe at high magnification.

 Point

- To use this function, the separately sold "Advanced Observation module BZ-H4XD" is necessary.

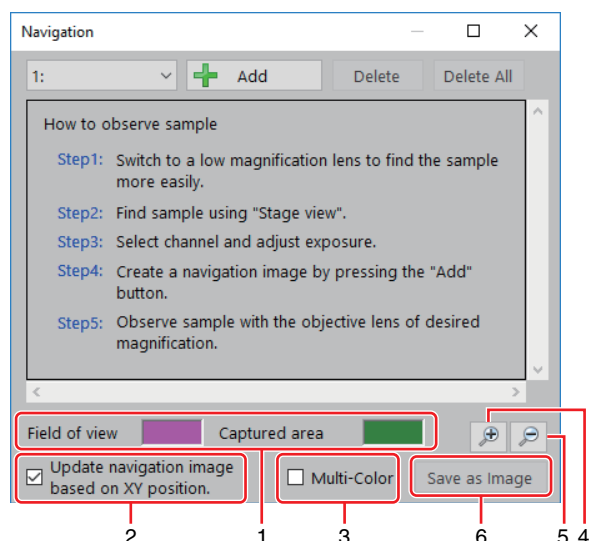
3

Observing and Capturing Images

1 Use a low magnification lens for observation.

2 Click [Navigation].

The [Navigation] window is displayed.



- 1 Color** : Change the color of "Field of view".
- 2 Update navigation image based on XY position** : When multiple navigation images have been created, this will automatically switch to the appropriate image based on location.
- 3 Multi-Color** : The navigation screen is created by multiple color.
- 4 Enlarge** : Enlarge the size.
- 5 Redure** : Redure the size.
- 6 Save as image** : Save the navigation image.

3 Move to the area where you would like to create a navigation image, and click [Add].

Images are merged together in a clockwise spiral pattern with the original field-of-view at the center.

4 When the desired area is captured, click [Stop].

The navigation image is created. If [Stop] is not clicked, the navigation window will continue to add images until it reaches a 7x9 grid.

 Reference

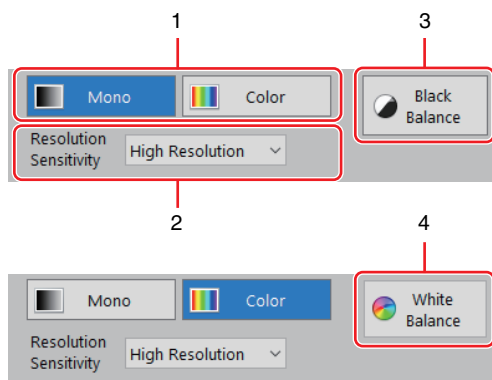
- Up 10 different navigation images can be created and stored.
- The image can be deleted by selecting the created image and clicking [Delete]. All images are deleted by clicking [Delete All].

Camera Settings

Camera Setting	Page 4-2
Switching Monochrome/Color	Page 4-2
Capture Settings.....	Page 4-3
Camera Settings	Page 4-4

Camera Setting

Switching Monochrome/Color



Select whether to display observation images in monochrome or color.

1 Click [Mono] or [Color].

The mode is switched.



- When observing samples with higher resolution, it is recommended to use monochrome mode.
- If fluorescence observation is performed with a channel displaying in pseudo color, the images are displayed in pseudo color even in monochrome mode.

4

Camera Settings

1 Monochrome/Color switching

📖 "Switching Monochrome/Color" (Page 4-2)

2 Resolution setting

📖 "Setting the resolution for capture" (Page 4-3)

3 Black balance

📖 "Black balance" (Page 4-4)

4 White balance

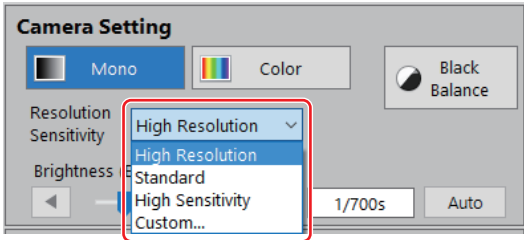
📖 "White balance" (Page 4-4)

Capture Settings

Setting the resolution for capture

Select from the provided options, or customize the gain and binning.

- 1 Select the resolution from the pull-down list.



- Selectable items are as follows.

Monochrome mode

Resolution setting	Gain	Binning
High Resolution	6 dB	OFF
Standard	6 dB	2 × 2
High Sensitivity	6 dB	3 × 3
Custom	0 to 24 dB	OFF to 12 × 12

Color mode

Resolution setting	Gain	Binning
High Resolution	0 dB	OFF
Custom	0 to 24 dB	OFF to 12 × 12



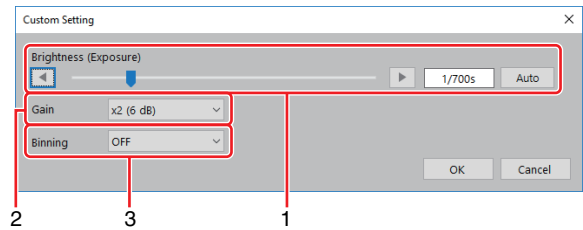
- Gain is a function to increase the CCD's sensitivity by electrically amplifying the video signals. Increasing the value makes the image brighter, however, it also increases the noise component. As a result, the image quality may be degraded.
- Binning is a function which bundles several adjacent pixels on a CCD chip to virtually widen the light-receiving area in order to amplify and detect the signal.

Customizing image quality

Brightness, gain and binning can be adjusted according to your preference.

- 1 Select [Custom] from the pull-down list.

The [Custom Setting] dialog box is displayed.



- 1 **Brightness (Exposure)** : The operation method is the same as that for normal observation. "Adjusting Brightness (Exposure)" (Page 3-6)
- 2 **Gain** : Select from 5 levels.
- 3 **Binning** : Select from 6 levels.

Camera Settings

4

Camera Settings

Black balance

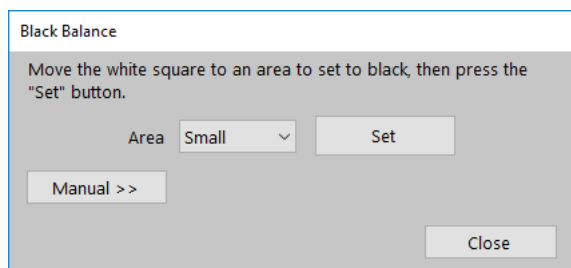
This improves the image by creating a more uniform black background for fluorescent images. This is effective only during fluorescence observation (monochrome mode).

Pushset

This sets the pushset area and automatically adjusts the black balance based on that area.

1 Click [Black Balance].

The pushset area is displayed in the image observation area, and the [Black Balance] dialog box appears.



2 Select the area size from the pull-down list for [Area].

- Select from 3 sizes.

3 Use the mouse to click-and-drag the pushset area to the position where you want to adjust the black balance.

4 Click [Set].

The black balance of the entire image observation area is adjusted.



By setting the pushset area close to fluorescent signals, the background color adjustment will be more severe.

Manual

Use the slider to adjust the black balance manually.

1 Click [Manual] in the [Black Balance] dialog box.

2 Drag the slider for [Shadow] using the mouse.



The slider can also be adjusted by clicking the slider and scrolling the mouse wheel or entering the value.

White balance

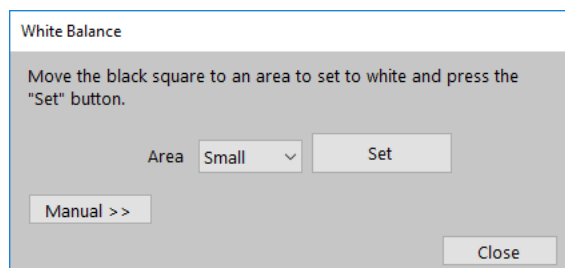
This adjusts the white balance of a brightfield image background. This is effective in color camera mode.

Pushset

This sets the pushset area and automatically adjusts the white balance based on that area.

1 Click [White Balance].

The pushset area is displayed in the image observation area, and the [White Balance] dialog box appears.



2 Select the area size from the pull-down list for [Area].

- Select from 3 sizes.

3 Use the mouse to click-and-drag the pushset area to the position where you want to adjust the white balance.

4 Click [Set].

The white balance of the entire image observation area is adjusted.



Use white balance to create a uniform white (transparent) background during brightfield observation.

Manual

Use each slider to adjust the white balance manually.

1 Click [Manual] in the [White Balance] dialog box.

2 Drag the slider to adjust using the mouse.



The slider can also be adjusted by clicking the slider and scrolling the mouse wheel or entering the value.

Initializing settings

- 1** Click [Manual] in the [White Balance] dialog box.
- 2** Click [Default].
The settings return to the default values.

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4

Camera Settings

Sectioning (Optional)



To use this function, the separately sold "Sectioning Module BZ-H4XF" is necessary.

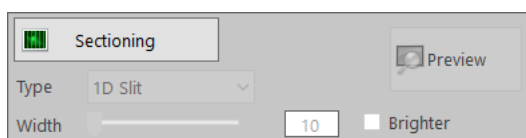
Sectioning function.....Page 5-2

Sectioning function

By illuminating the sample using a grid projection pattern, high-resolution images free of out-of-focus fluorescence blurring can be captured.

▶ Important

To perform Sectioning, be sure to use the filters recommended by KEYENCE.



5

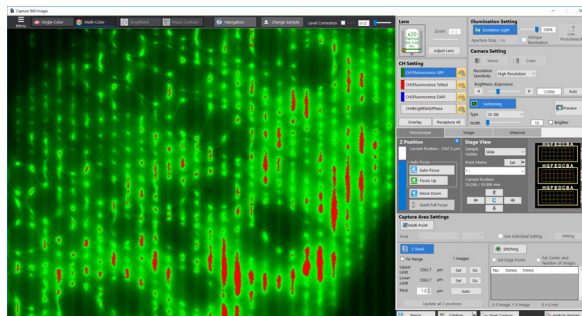
Sectioning (Optional)

1 Click [Sectioning].

2 Using the [Type] drop-down list, drag the slider to set the width of the illumination grid.

The illumination pattern using the specified settings is displayed in the image observation area.

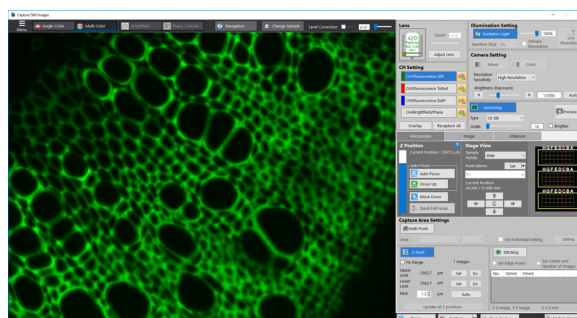
- Moving the slider further to the right will have a more drastic blur-removal effect, but it will lower the resolution of the final image. Adjust the illumination pattern and width to create an appropriate balance of blur-removal and resolution for each application.
- Checking [Brighter] doubles the brightness of the image.
- Locations where pixels are fully saturated with light are displayed in a different color.



3 Adjust the brightness so that the number of saturated pixels is minimized.

- Clicking [Auto] adjusts the brightness automatically (recommended).

4 Click [Preview] to check the sectioning image.

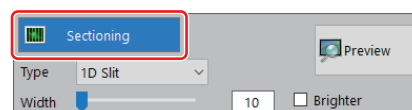


5 Click [Capture] to capture the sectioning image.

📖 "Capturing images (Single-Color)" (Page 3-7)

Reference

- When using Z-Stack, adjust the brightness (exposure) so that there are no saturated pixels throughout the whole Z-axis range of the Z-stack.
- Adjusting the XY position or Z-axis can be made after turning OFF the sectioning. When the adjustment is completed, click [Sectioning] to return.

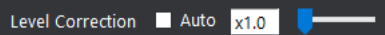


Point

When combining Z-stack capture with sectioning, refer to the following:
📖 "Z-Stack Capture (Optional)" (Page 9-3)

Level correction

Image contrast can be adjusted.



1 Check [Auto].

The contrast is adjusted automatically.

Reference

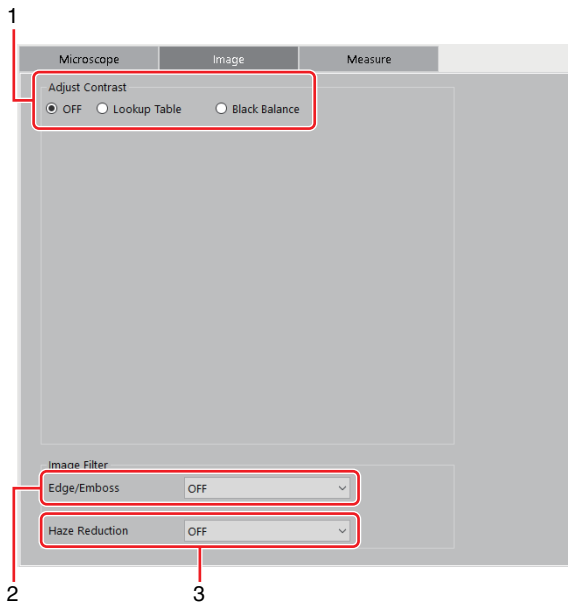
The correction value can also be adjusted by dragging the slider.

Improving Image Quality

[Image] Tab	Page 6-2
Correcting Contrast	Page 6-2
Adding the Filter Effect.....	Page 6-3

[Image] Tab

Use this tab to adjust contrast and set the image filter to improve image quality.
Clicking the [Image] tab displays the screen shown below.



- Adjust Contrast**
📖 "Correcting Contrast" (Page 6-2)
- Edge/Emboss**
📖 "Edge/Emboss" (Page 6-3)
- Haze Reduction**
📖 "Haze reduction" (Page 6-3)

Correcting Contrast

The image currently being observed can be viewed more clearly by adjusting the color contrast and brightness. These corrections are applied to the entire observation area in order to better observe the specimen.

Lookup table correction

Regardless of the observation method, the image can be improved by adjusting shadow, highlight and gamma.

Adjustable items

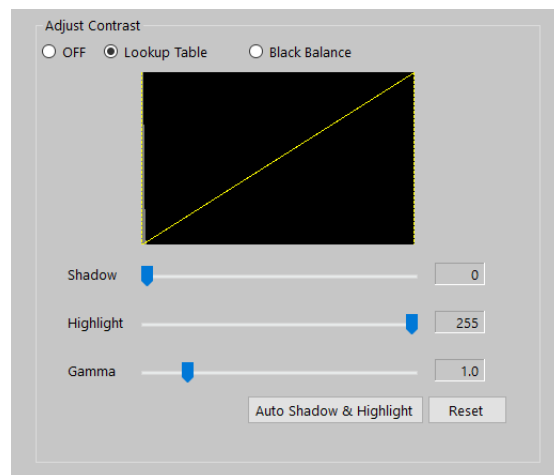
Item	Description
Shadow	Adjusting the shadow intensifies the dark portions of the image to create more contrast between the bright and dark areas.
Highlight	Adjusting the highlight intensifies the bright portions of the image to create more contrast between the bright and dark areas.
Gamma	Adjusting the gamma will alter the brightness of areas between shadows and highlights.

Correcting using the lookup table

For images that cannot be adjusted using [Black Balance] or [White Balance], fine contrast adjustments can be made using the lookup table.

1 Check [Lookup Table].

The lookup table is displayed.



Adding the Filter Effect

2 Move the slider for Shadow to adjust the dark portion.

The dark portion increases/decreases according to the slider movement. Increasing the shadow value increases the dark part to be removed.

3 Move the slider for Highlight to adjust the bright portion.

The bright portion increases/decreases according to the slider movement. Decreasing the highlight value increases the bright part to be removed.

4 To increase the contrast more, adjust Gamma.

The image contrast changes according to the slider movement.

Reference

- Clicking [Auto Shadow & Highlight] adjusts the shadow and the highlight to optimized values.
- Clicking [Reset] returns the adjusted value to the defaults.
- If a slider is clicked and selected, the slider can be moved by scrolling the mouse wheel.

Setting Black Balance

1 Check [Black Balance].

The operation method is the same as for normal observation.

📖 "Black balance" (Page 4-4)

Edge/Emboss

This performs real-time processing for the image displayed in the image observation area.

1 Select the effect from the pull-down list for [Edge/Emboss].

OFF	The filter process is not applied.
Edge	This enhances the outlines on the image. Select from strong, middle and weak.
Emboss	This enhances the contrast. Select from strong and weak.

The processed image is displayed.

Haze reduction

This improves the image by removing out-of-focus haze around fluorescent signals to produce a clear, sharp image.

1 Select the setting from the pull-down list for [Haze Reduction].

The processed image is displayed. Increasing the setting number makes the haze reduction effect more intense.

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Improving Image Quality

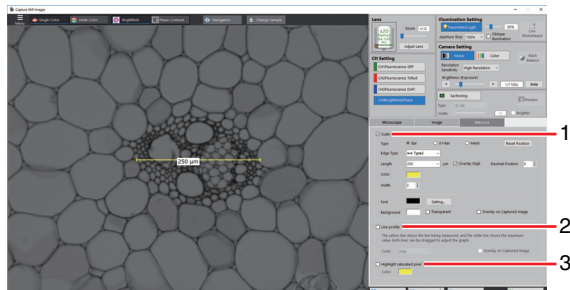
Measurement

[Measure] Tab	Page 7-2
Displaying a Scale.....	Page 7-2
Using the Line Profile Tool.....	Page 7-3

[Measure] Tab

Use this tab to add a scale or reference line for measurement.

Clicking the [Measure] tab displays the screen shown below.



1 Scale

📖 "Displaying a Scale" (Page 7-2)

2 Line profile

📖 "Displaying a line profile" (Page 7-3)

3 Highlight saturated pixel

📖 "Displaying saturated pixels" (Page 7-3)

7

Measurement

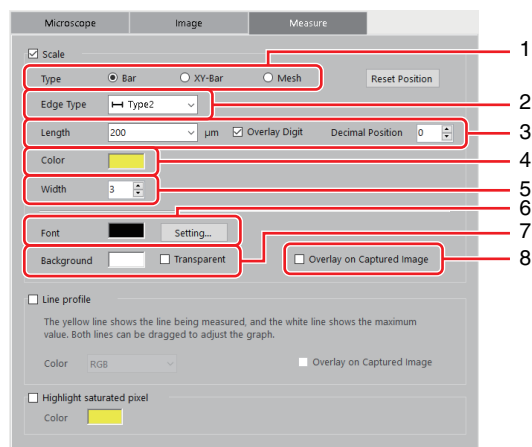
Displaying a Scale

Measurement can be performed with a scale displayed on the observation image.

1 Check [Scale].

The scale is displayed on the image observation area.

2 Adjust the scale as necessary.



- 1 **Type** : Select the shape of the scale.
- 2 **Edge Type** : Select the type of bar when [Bar] or [XY-Bar] is selected for [Type].
- 3 **Length** : Set the scale length. Select the length from the pull-down list or enter any value in the box. The length can also be changed by dragging the end of the scale on the image. Checking [Overlay Digit] displays the value of the scale length on the image. Set the number of decimal places for [Decimal Position].
- 4 **Color** : Select the color of the scale.
- 5 **Width** : Select the line width.
- 6 **Font** : Select the color of the displayed characters. Clicking [Setting] shows options for font and sizing.
- 7 **Background** : Select the background color for the displayed characters. Checking [Transparent] makes the background transparent.
- 8 **Overlay on Captured Image** : Save the captured image with the scale displayed.



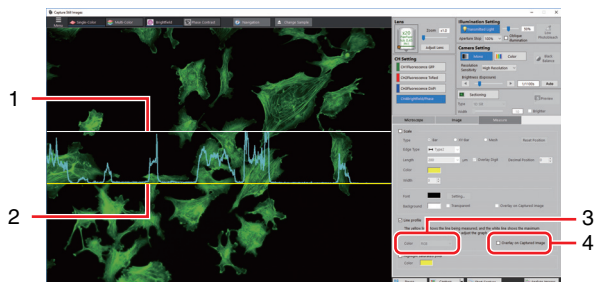
- Clicking and dragging the scale can move the scale. Clicking [Reset Position] restores the scale to the initial position.
- The range of the length that can be set for the scale is determined by the magnification of the observed image.

Using the Line Profile Tool

Displaying a line profile

This measures the brightness distribution of the specified measurement position.

- 1 Check [Line profile].
- 2 Select the profile to display.



- 1 **Maximum value** : Maximum value of the displayed (white) brightness profile
- 2 **Measurement position (yellow)** : Pixels showing a brightness value
- 3 **Color** : In color mode, choose what color brightness values to display (R, G, B).
- 4 **Overlay on Captured Image** : Save the captured image with the line profile displayed.

- 3 Drag the measurement position to move to the position to measure.

The luminance distribution of the measurement position is displayed.

- 4 Drag the maximum value to adjust the height of the brightness profile.

The displayed height of the brightness profile is changed.

Displaying saturated pixels

Pixels that are saturated with light can be displayed in a specified color. This tool can only be used in monochrome camera mode.

- 1 Check [Highlight saturated pixel] and select the color to display from the pull-down list for [Color].

Pixels that are saturated with light will display as the selected color.

MEMO

Chapter

8

Observing and Capturing Multi-Stained Samples

Multi-Color Observation and Capture ...Page 8-2

8

Observing and Capturing Multi-Stained Samples

Multi-Color Observation and Capture

Samples displaying multiple fluorescence colors can be observed by switching filters. Also, multiple fluorescent images can be overlaid for observation and capture.



Set the observation method for each channel beforehand.

📖 "Setting Channels" (Page 2-13)

■ Channel setting example

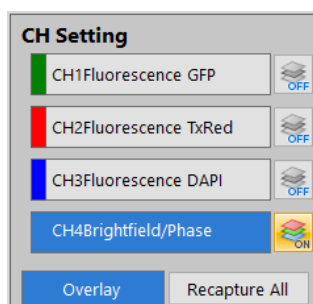
	CH1	CH2	CH3	CH4
Observation method	Fluorescence	Fluorescence	Fluorescence	Brightfield
Pseudo color display	Green	Red	Blue	-
Comment	GFP	TRITC	DAPI	-



1 Select the observation and capture location, and adjust the focus and brightness of each channel.

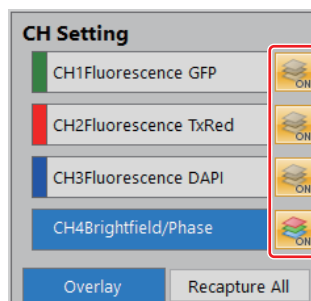
2 Click [Multi-Color].

[Overlay] turns ON, and the overlay button is displayed for CH settings.



3 Click the overlay button for each channel to add to the overlay.

The overlaid images are displayed in the image observation area.



- The overlay button turns orange for each channel added. There is an orange frame around the active channel.
- Brightfield, fluorescence, and phase contrast channels can all be overlaid with each other.
- The overlay can be switched ON or OFF by clicking the [Overlay] button to the right of the channel display.

4 When the overlaid image is completed, capture the image.

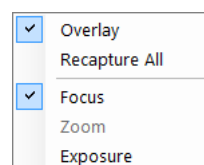
Each channel image and the overlaid image are saved.

📖 "Capturing multiple images (Multi-Color/Multi-Dimensional Capture)" (Page 3-8)

- If a channel image is not properly displayed in the overlaid image, adjust the brightness and contrast and recapture.



- If the field-of-view is moved, only the active channel will move. After moving to a new location, click [Recapture All], or right-click on the image observation area and select [Recapture All]. All channels in the overlay are updated.



- Available common settings for all channels are the gain, transmitted light, excitation power, resolution and color/monochrome settings.

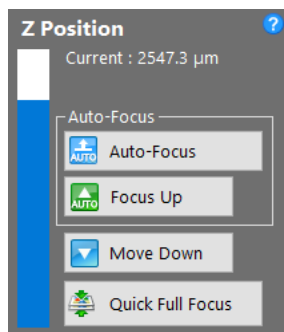
📖 "Use the same parameters for all channels" (Page 13-3)

Capturing Thick Specimens

Using Quick Full Focus	Page 9-2
Z-Stack Capture (Optional).....	Page 9-3

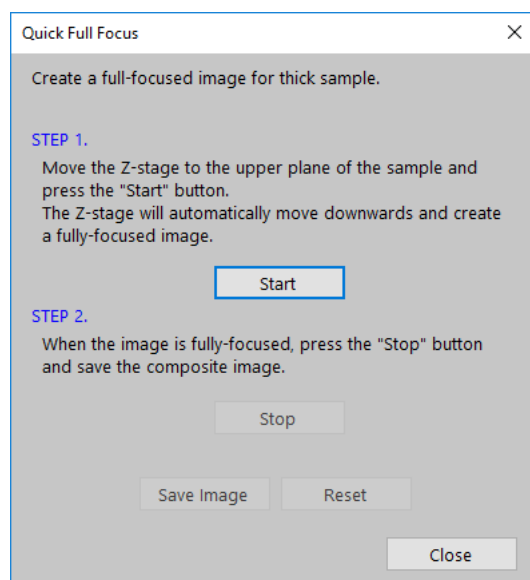
Using Quick Full Focus

When there is a depth-of-field limitation on a thick or unevenly sliced sample, the Z-stage can automatically scan and compile a fully-focused image.



1 Click [Quick Full Focus].

The [Quick Full Focus] dialog box is displayed.



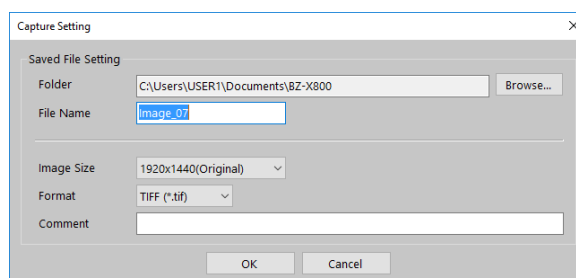
2 Focus on the top of the sample and click [Start].

The Z stage automatically moves downwards, and the full-focused image is compiled.

3 Confirm the entire image is fully-focused and click [Stop].

4 Click [Save Image].

The [Capture Setting] dialog box is displayed.



5 Enter the save folder, etc. as necessary and click [OK].

The fully-focused composite image is saved.

Z-Stack Capture (Optional)

Samples that are thick and span multiple focal planes can be captured using the Z-Stack function. This function captures more detailed information than the Quick Full Focus tool.



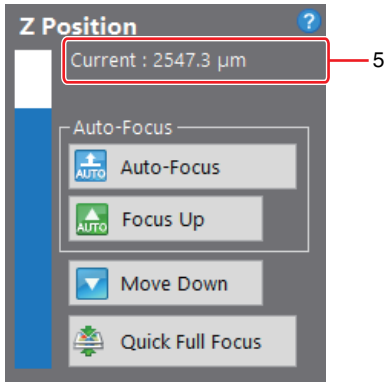
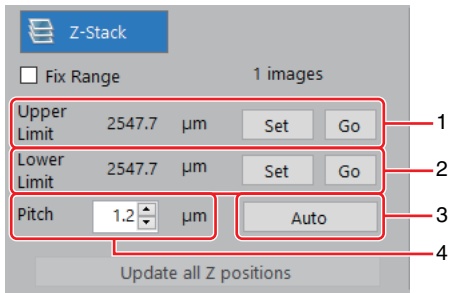
To use this function, the separately sold "Advanced Observation module BZ-H4XD" is necessary.

Specifying the width of the upper/lower limit to capture



1 Click [Z-Stack].

The operation area will switch to the Z-stack screen.



- 1 Upper Limit** : Stores the upper limit position in the Z-axis direction. Clicks [Set] to set the upper limit. Clicks [Go] to move to the set upper limit.
- 2 Lower Limit** : Stores the lower limit position in the Z-axis direction. Clicks [Set] to set the lower limit. Clicks [Go] to move to the set lower limit.
- 3 Auto** : Sets the most suitable pitch for each lens magnification.
- 4 Pitch** : Adjusts the Z-stage movement interval. The pitch can be adjusted in 0.1 μ m increments within a range of 0.1-99.0 (μ m).
- 5 Current** : Displays the current position on the Z-axis direction.

2 Move the XY position to the position where you want to capture.

3 Move the lens upwards using the slider on the Z-axis control screen until the image is completely out of focus, and then click [Set] of [Upper Limit]. The upper limit for the Z-Stack is stored.

4 Similarly, move the lens downward until the image is completely out of focus, then click [Set] of [Lower Limit]. The lower limit for the Z-Stack is stored.

5 Adjust the pitch.

The number of images to be captured is calculated based on the upper limit, lower limit and pitch, then displayed automatically.

- The maximum number of images that can be captured is 500 images.

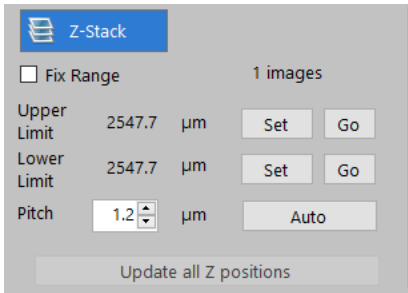
6 Click [Capture].

"Capturing multiple images (Multi-Color/Multi-Dimensional Capture)" (Page 3-8)

Specifying the range of the Z-stack



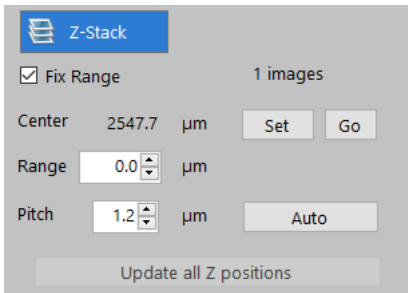
1 Click [Z-Stack].



2 Move the XY position to the position where you want to capture.

3 Check [Fix Range].

The contents of the Z-Stack screen switches.



4 Focus the center position of Z.

5 Click [Set].

6 Enter the width of the upper/lower limit in [Range].

For example, if setting [Range] to 20μm, capture the range of 10μm upward and 10μm downward from the center position.



If entering the upper/lower limit range in [Range], the upper/lower limit settings can be made easily by only setting the Z position as the center again.

7 Adjust the pitch value.

8 Click [Capture].

"Capturing multiple images (Multi-Color/Multi-Dimensional Capture)" (Page 3-8)

Stitching and Multi-Point Capture (Optional)



Point

To use this function, the separately sold "Advanced Observation module BZ-H4XD" is necessary.

Stitching Capture	Page 10-2
Multi-Point Capture	Page 10-4

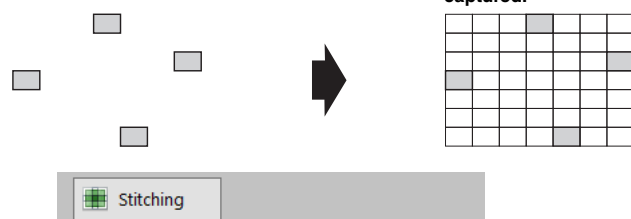
Stitching Capture

Specifying the area to capture

This captures a stitched image by specifying the edge points of the capture area.

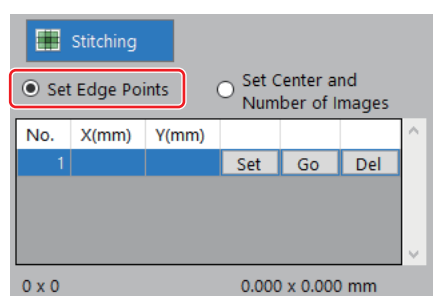
Specify 4 edge points of the area to capture.

The area within the edge points is automatically captured.



1 Click [Stitching].

2 Click [Set Edge Points].



3 Move the image observation area until you are viewing one edge of the desired capture area, and click [Set].

Green points are added on the stage map and the location is registered.

- Up to 10 edge points can be registered.
- Clicking [Go] to move the stage to the set point.
- Clicking [Del] to delete the set point.

4 Click [Start Capture].

📖 "Capturing multiple images (Multi-Color/Multi-Dimensional Capture)" (Page 3-8)



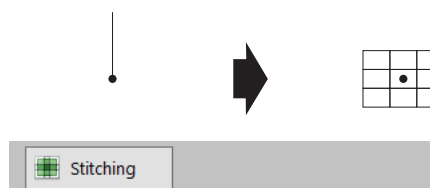
- Checking [Auto-Focus Capture] automatically adjusts the focus for each field-of-view prior to capture. Note that the required time for capture will be longer using auto-focus.
- XY-stitching capture can be performed for up to 40000 images with maximum size of 100000 × 100000 pixels.

Specifying the number of images to capture

This allows the user to specify the central field-of-view and the total number of images to capture for the stitched image.

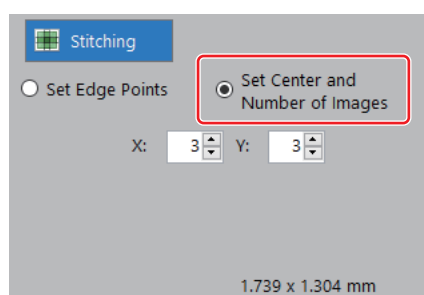
Point on the image observation area

The specified number of images are captured around the center point (e.g. X - 3 images, Y - 3 images).



1 Click [Stitching].

2 Select [Set Center and Number of Images].



3 Move the image observation area to the desired center location, and enter the number of images to capture.

- Up to 31 images can be set in X and Y directions respectively.

4 Click [Start Capture].

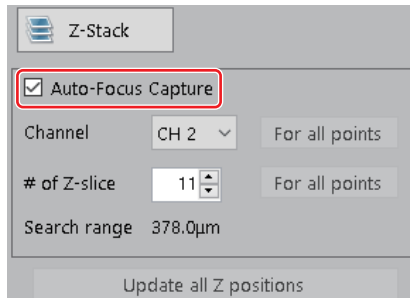
📖 "Capturing multiple images (Multi-Color/Multi-Dimensional Capture)" (Page 3-8)

10

Stitching and Multi-Point Capture (Optional)

Reference

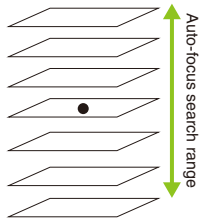
Checking [Auto-Focus Capture] automatically adjusts the focus for each field-of-view prior to capture. Note that the required time for capture will be longer using auto-focus.



You can specify the channel for auto-focus with multi-color capture.

The auto-focus search range is specified by the number of Z-slices.

The auto-focus search range during stitching and multi-point capture is narrower than normal image capturing, so adjust this range as necessary.



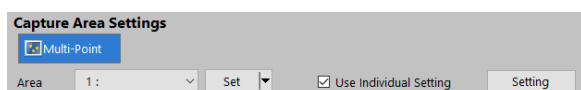
Multi-Point Capture

Specifying points to capture

When multiple capture points are registered, they can be automatically captured in sequential order.



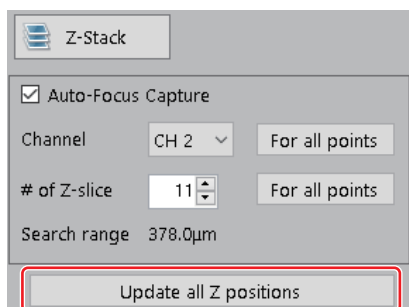
1 Click [Multi-Point].



2 Move the image observation area to the desired location to register, and click [Set]. Repeat as necessary for each location.

Orange points are added on the stage map and registered as capture points.

- Up to 999 capture points can be registered.
- Clicking [Update all Z positions] applies the current Z settings to all points that have been set.



- The auto-focus settings are recorded for each capture point.
- In addition to the on/off setting, the target channel and the number of Z-slices are also recorded for each capture point.
- Clicking [For all points] applies the current target channel or the number of Z-slices to all points.



The following operations can be made to the registered points.

Set	Stores the coordinates of the stage.
Go	The stage moves to the stored position.
Delete	Deletes the selected stored coordinates.
Delete All	Deletes all stored coordinates.

3 Click [Start Capture].

"Capturing multiple images (Multi-Color/Multi-Dimensional Capture)" (Page 3-8)



If point memos have been registered, a message appears to ask whether to use them as additional capture points.

Setting capture conditions for each capture point

Capture conditions (e.g. lens magnification, channel setting, observation method, exposure, filter setting) can be set for each registered capture point individually.

1 Check [Use Individual Setting] on the Multi-Point screen.

2 Display the location to capture on the image observation area, set the desired capture conditions, and click [Set].

The capture point is registered with the set conditions.



Clicking [List View] displays the set capture conditions in the selected area.

10

Stitching and Multi-Point Capture (Optional)

Video/Time Lapse Capture (Optional)



Point

To use this function, the separately sold "Time Lapse Module BZ-H4XT" is necessary.

Record VideoPage 11-2

Time Lapse CapturePage 11-3

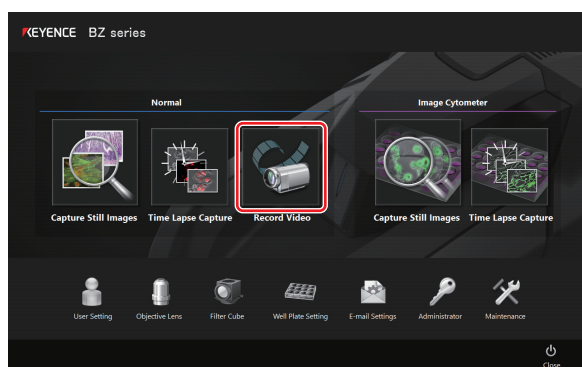
Record Video

The image being displayed in the image observation area can be saved as a motion picture in AVI file format.

▶ Important

The video function saves only preview images as motion pictures regardless of the capture mode.

1 Click [Record Video] on the menu screen.

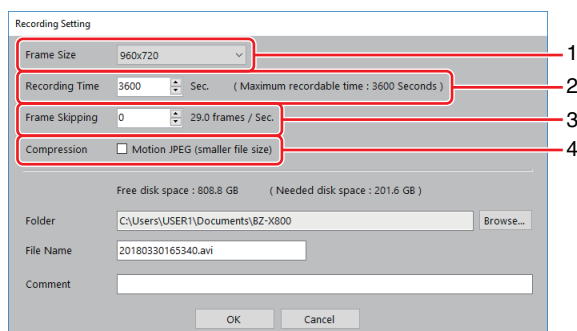


2 Using the same method as capturing a still image, adjust the image settings and focus to obtain the optimal view of the sample.

3 Click [Start Recording].

The [Recording Setting] dialog is displayed.

4 Enter the folder to save the video in, the file name, and recording settings.



- 1 **Frame Size** : Select the resolution of the motion picture frame.
- 2 **Recording Time** : Specify the recording time.
Setting range: 1 to 3600 seconds
- 3 **Frame Skipping** : Specify the frame skip.
Setting range: 0 to 30
- 4 **Compression** : Set whether to compress the video. If motion JPEG is selected, each frame will be compressed, which may reduce the quality of the video.

5 Click [OK].

Recording starts.

If the specified time elapses, the recording is finished and the video is saved.

If you want to stop the recording, click [Stop Recording].

Reference

- While recording videos, only the XY-stage and Z-axis can be adjusted.
- The scale and line profile display are not displayed or saved with a video.

Time Lapse Capture

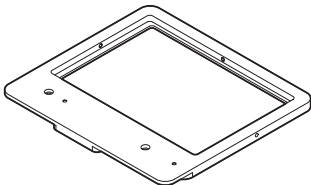
The time lapse function captures images at regular time intervals for a specified number of intervals. This allows for the viewing of chronological changes to a sample, such as cell proliferation or engulfment.

Required equipment

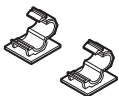
The following equipment is necessary (in addition to the BZ-X800 Series).

☐ **Time lapse module (Optional module)**

- BZ-H4XT
- License registration form 1
- Activation procedure manual 1
- Chamber frame..... 1

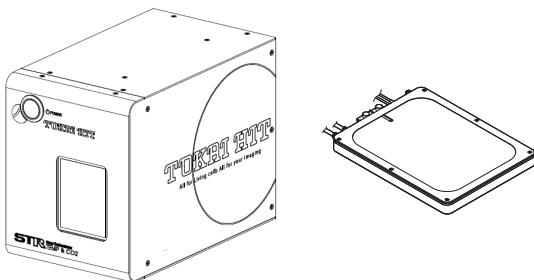


- Cable clamps 2



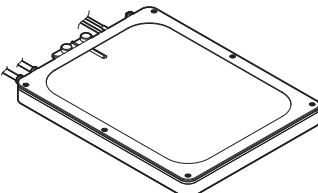
☐ **Culture device for microscopes (manufactured by Tokai Hit Co., Ltd.)**

972082 KIW(MIX) TOKAI HIT (STRG-KIW) /
972083 KIW(5PER) TOKAI HIT (STRF-KIW)



For details on how to attach this device, see the instruction manual and startup guide for the Tokai Hit Stage Top Incubator.

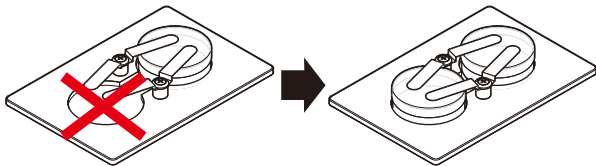
Cautions for use of the incubation chamber

NOTICE	As for the chamber, heating is conducted by putting water or culture medium around it. If the vapor is filled inside the case, it can cause condensation to result in damage. Be sure to use it so that the vapor overflows from the chamber. 
----------------------	---

Dish

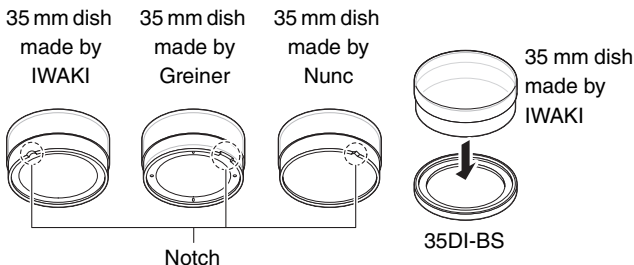
Be sure to set 2 dishes at observation with 35 mm dish. Set a vacant dish on the other portion at observation with 1 dish only.

If one of the holes is open, vapor leaks out.



There is a notch with each 35 mm dish made by IWAKI, Greiner, and Nunc.

Since vapor can leak from the notch, use a spacer for the dishes for the dish above.



Please contact with TOKAI HIT Co., Ltd. about spacers for dishes.

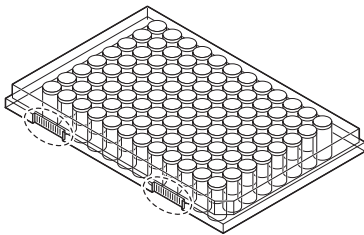
35 mm dish made by IWAKI : 35DI-BS

35 mm dish made by Greiner/Nunc : 35DGN-BS

Well plate

There is a notch with a well plate made by IWAKI and Eppendorf.

Use a well plate without a notch, or cover the notch with sponge tape etc.



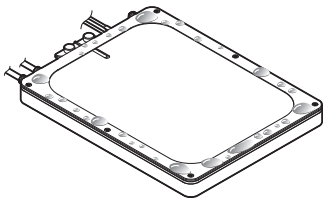
NOTICE

If a water drop falls the case, it can cause damage.
Please be careful when adding water or culture medium to the chamber, or dismantle the chamber.

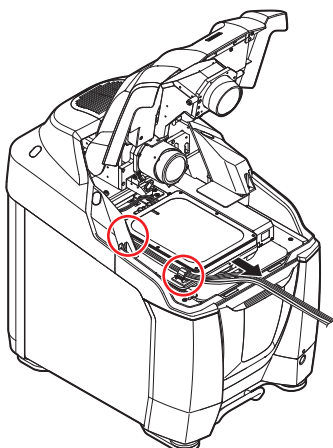
Cautions for dismantlement

There may be condensation on the back side of the chamber cover.

When taking out a sample by removing the chamber cover, be careful that the water drop falls in the case.



Use the [Change Sample] button to move the stage toward the front, and remove the cable cramp not to be caught when the chamber cover is moved, then remove the cover carefully.

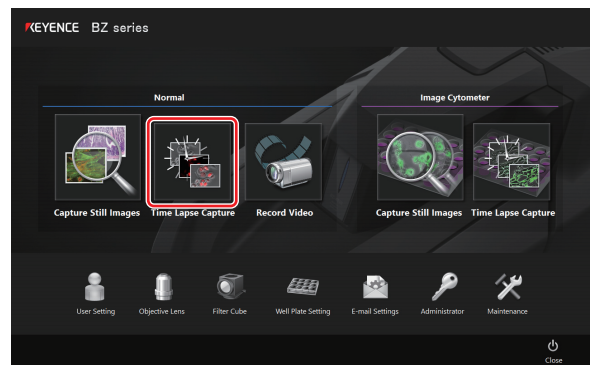


Observing

Important

As for the multi-well plate or flask, place it directly in the chamber without using any attachment.

- 1 Set the dish to be observed in the chamber.
- 2 Click [Time Lapse Capture] on the menu screen.

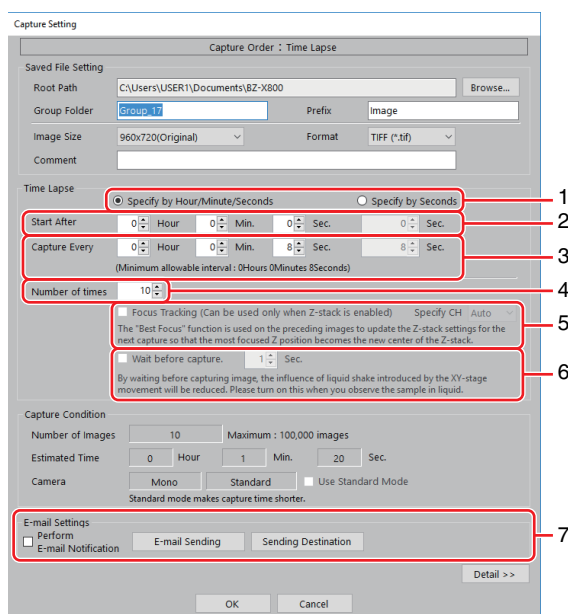


- 3 Adjust the dish position by operating the XY stage.
 "Positioning (Moving the XY Stage)" (Page 3-4)

Time lapse capture

- 1 Click [Time Lapse Capture] on the menu screen.
- 2 Select the multi-dimensional tasks as necessary.
- 3 Mount the specimen, and make preparations such as magnification adjustment, brightness adjustment, etc.
- 4 Click [Time Lapse Capture].
The [Capture Setting] dialog box is displayed.
- 5 Enter the saving destination as necessary.

6 Configure the time lapse settings outlined below.



- 1 Time Setting:** Select the method for setting the start time and capture interval.
- 2 Start After:** Specify the waiting time (max. 24 hours) from when [OK] is clicked until when capturing starts. If 0 seconds is set, the first capture is performed when [OK] is clicked.
- 3 Capture Every:** Specify the time interval for capture.
- 4 Number of times:** Specify the number of capture intervals to be performed. Maximum intervals: 2880.
- 5 Focus Tracking:** This can be selected when [Z-Stack] is used. Focus tracking will analyze each captured Z-stack and adjust the parameters so that the focal plane always remains in the center of the Z-stack. The best focus position is calculated to the CH specified in the [Specify CH].
- 6 Wait before capture:** Set the waiting time after moving the stage. This helps reduce the influence of liquid movement when capturing images using a dish or a well.
- 7 E-mail Settings:** Check [Perform E-mail Notification] to notifying a capture state by e-mail. Refer to the following for more information about the e-mail sending settings and sending destination settings.
 "E-mail settings" (Page 13-7)

7 Click [OK].

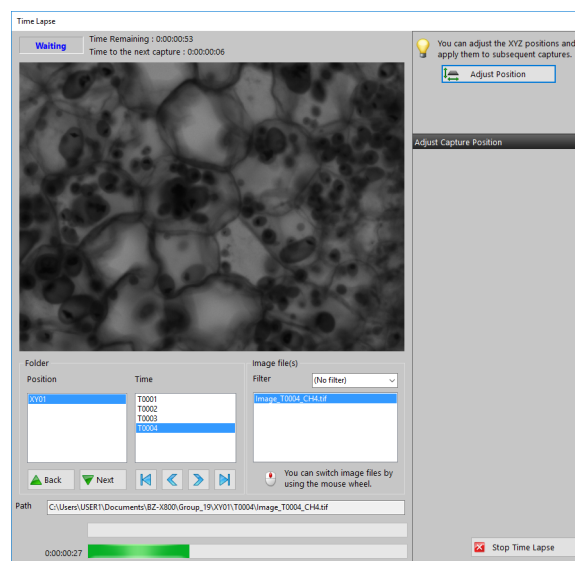
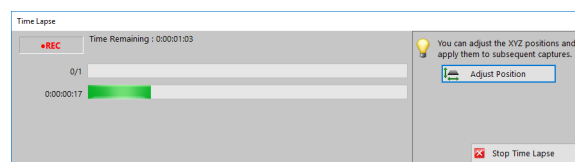
A message appears to confirm the number of captures and capture time.

8 Click [Yes].

The time lapse dialog box is displayed, and capturing starts.

After a capture interval is completed, the Position Adjustment dialog box is displayed until the next capture event.

The same operation is repeated for the set number of capture intervals, and the display returns to the original observation screen when all intervals are completed.



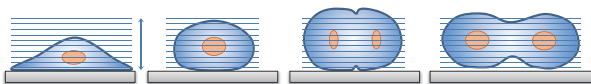
Focus tracking

Using the focus tracking reduces the number of Z stack capturing during time lapse.

The best focused image is selected automatically from the data captured by Z stack, and the Z stack will be performed by centering the image at the next capture.

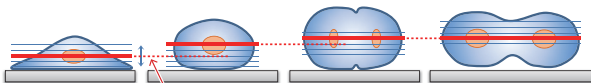
■ Focus tracking OFF

The Z stack range must be set more than assumed by expecting shape change.



■ Focus tracking ON

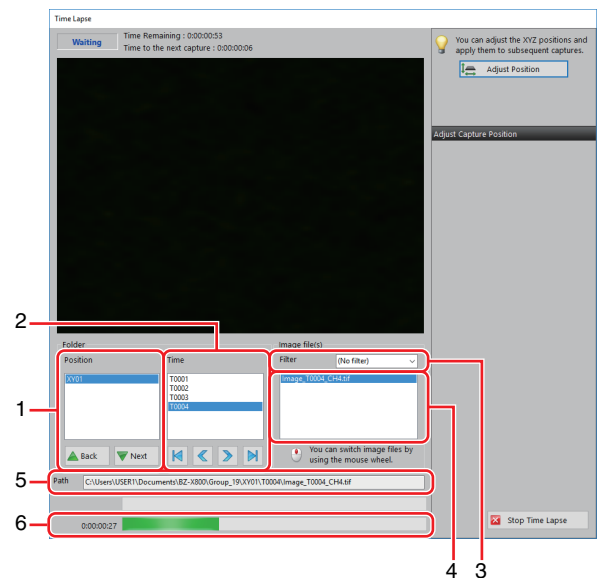
The Z stack range can be decreased.



The best focus is detected, and capture will be performed by centering the Z position at next time.

XY position adjustment dialog box

Between capture intervals, the XY capture position can be adjusted to account for XY drift or moving samples.



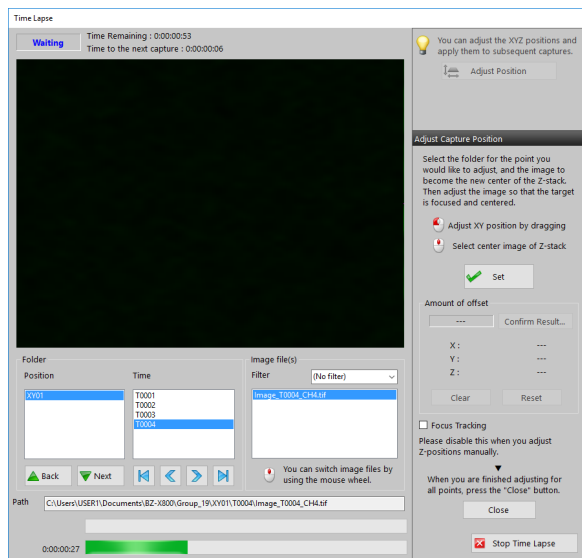
- 1 Position** : If multiple XY locations are being captured, select the location point to adjust.
- 2 Time** : Select the capture interval to use for adjustment.
- 3 Filter** : If multiple channels are used for capture, select the channel to view for adjustment.
- 4 Image list** : The names of the captured images selected for Position, Time and Filter are displayed on the list.
- 5 Path** : The save location of the image files is displayed.
- 6 Progress bar** : Time progress is displayed.

Adjusting the XY capture position

While time lapse capture is being performed, follow these steps to adjust the position of a capture point.

1 Click [Adjust Position] in the XY position adjustment dialog box.

The screen to adjust the capture position is displayed.



2 Drag the preview display screen by mouse to adjust the XY position.

3 The Z axis can also be adjusted by manually selecting a new center plane for the Z-stack.

4 After the XY position and Z-axis are adjusted, click [Set].

A message appears to ask whether to use the adjustment result for the next capture.

5 Click [Yes].

The new adjustment values are displayed for [Amount of offset].

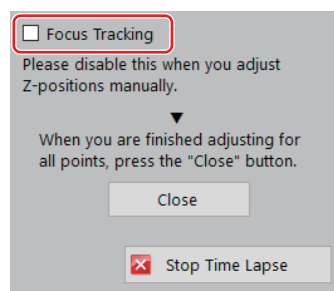
- Clicking [Clear] restores the adjusted values to the original values.
- Clicking [Reset] restores all adjusted values for all points to their original values.
- Clicking [Confirm Result] can confirm the image display when the position was adjusted.

6 Click [Close].

A message appears to indicate that the capture position will be reflected for the next and all subsequent captures. Then, the adjustment is finished.

Reference

- Adjustments can only be made between capture intervals.
- The capture interval time is paused while position adjustment is being performed.
- When adjusting the Z-axis manually, do not check the [Focus Tracking] check box.



MEMO

Performing the Image Cytometer Capture (Optional)

Point

To use this function, the separately sold "Image Site Module BZ-H4XI" and "Advanced Observation Module BZ-H4XD" are necessary.

To use it simultaneously with the time lapse capture function, the separately sold "Time Lapse Module BZ-H4XT" is necessary as well.

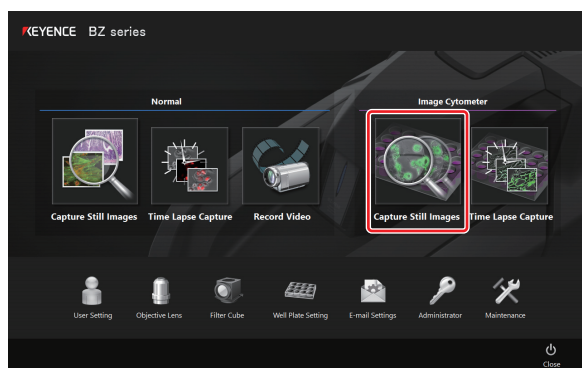
Capturing Still ImagesPage 12-2

Time Lapse CapturePage 12-4

Capturing Still Images

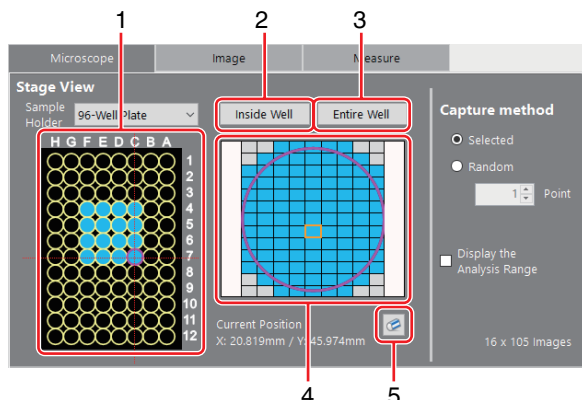
By the image cytometer function, capture and analyze multiple samples collectively.
Easy and direct operations for a capture can be made with the same condition to multiple wells.

- 1 Click [Capture Still Images] of [Image Cytometer] on the menu screen

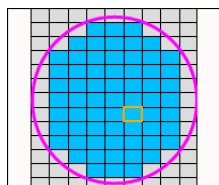


Selecting the Targeted Field of View

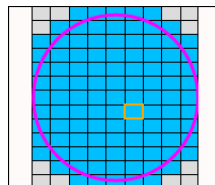
- 1 Move on the position of the observation object to give focus
- 2 Right-click and drag the well map, and select the targeted field of view.



- 1 **Stage Map**
Indicate the current position of view in the stage.
The well that becomes the object for capture is displayed in blue.
The view moves to the specified position by left-click.
- 2 **Inside Well**
Select the view in the well excluding the well boundary.



- 3 **Entire Well**
Select the view of a whole well including the well boundary.



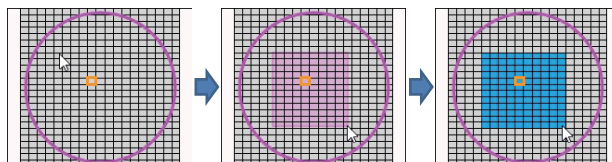
- 4 **Well Map**
Indicate the current position of view in the well.
Each grid indicates 1 view.
The current view is displayed in an orange frame.
The view that becomes the object for capture is displayed in blue.

The view moves to the specified position by left-click.
The capture view is selected by right-click.

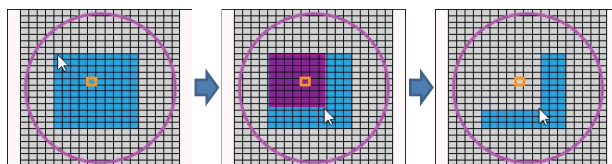
- 5 **Clear**
Clear the selected view.

View Selection

Multiple fields of view to be targeted can be selected by right-click and drag.

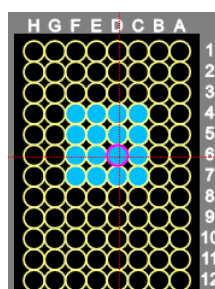


If right-click and drag is done by setting the selected view to the starting point, the selection is cleared.

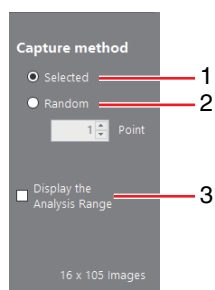


Selecting the Targeted Well

- 1 **Select the targeted well by right-click on the stage map**
Multiple wells can be selected by right-click and drag using view selection on a well map.



Specifying the Capture Method



1 Selected

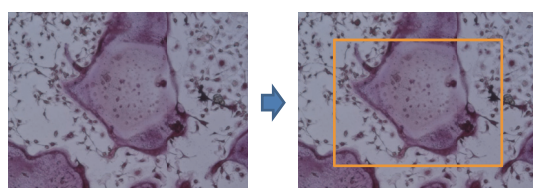
Capture all targeted fields of view that are selected.

2 Random

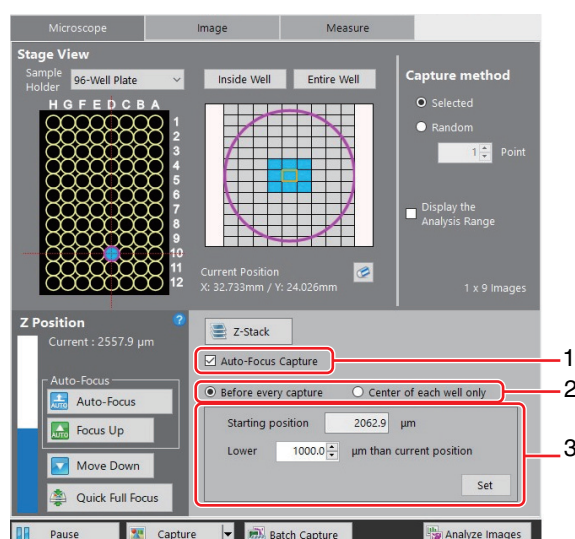
Perform capture with only the specified number at random from the selected fields of view to be targeted.

3 Display the Analysis Range

Display in orange which area is analyzed as one screen among current fields of view.



Specifying auto-focus



1 Check [Auto-Focus Capture] for capturing images with auto-focus.

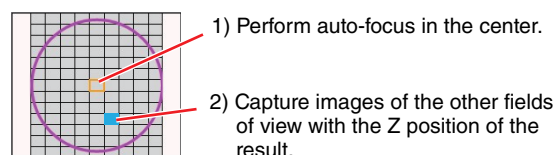
2 Specify the auto-focus frequency.

Before every capture:

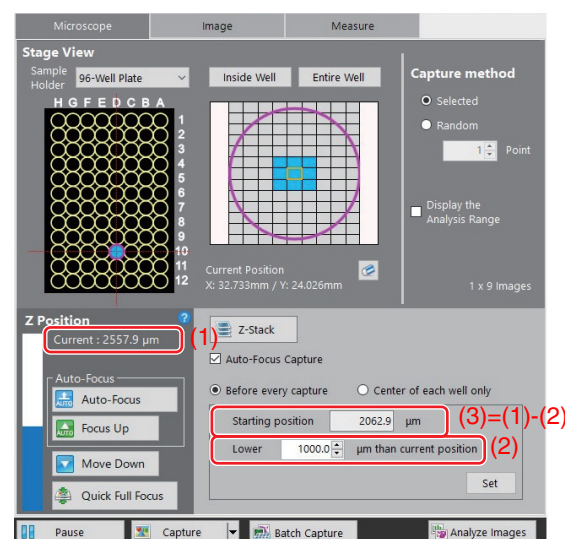
Every images are captured with auto-focus. This takes time but gives accurate results.

Center of each well only:

Before capturing the target fields, it moves to the center of the well to find the Z-position by auto-focus. Then images are captured with that Z-position. It takes less time because auto-focus is only performed once per well, but it may give inaccurate results when there is no sample in the center of the well.



3 Adjust the auto-focus starting position.



You can reduce the time required for auto-focus by adjusting the auto-focus starting position.

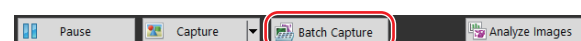
Click [Set] to set the [Starting position] to the current Z position – the specified value.

The default value is the Z position that the lens moves to when [Move Down] is clicked, so it is not necessary to adjust this value.

Also, [Starting position] cannot be set lower than the default value.

Capturing Collectively

1 Click [Batch Capture]



"Capturing multiple images (Multi-Color/Multi-Dimensional Capture)" (Page 3-8)

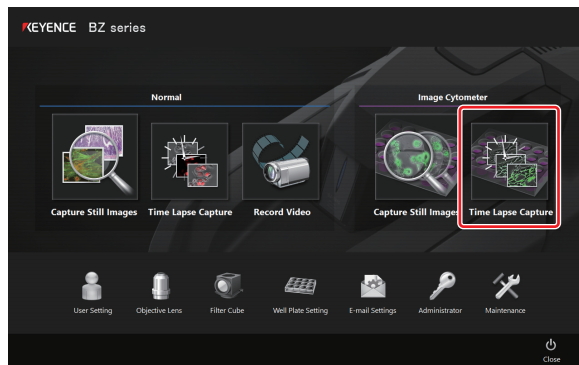
12

Performing the Image Cytometer Capture (Optional)

Time Lapse Capture

If confirming the time-series change to a living cell, the image cytometer function and time lapse function can be used simultaneously.

- 1 Click [Time Lapse Capture] of [Image Cytometer] on the menu screen



📖 "Time Lapse Capture" (Page 11-3)

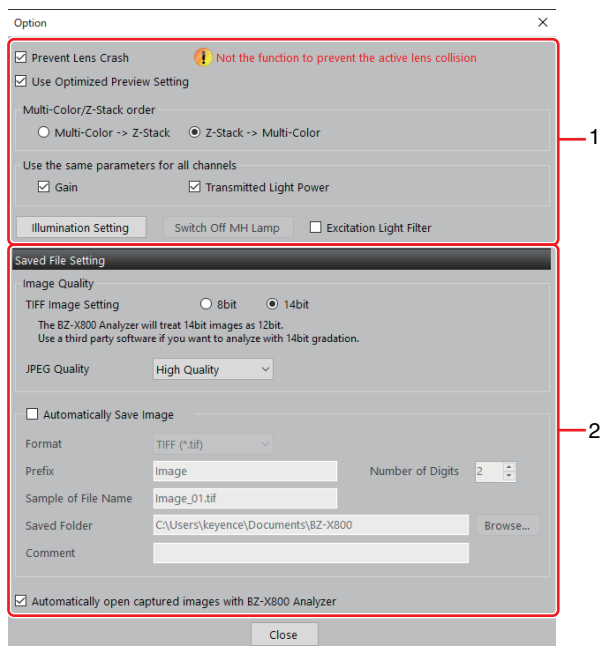
12

Performing the Image Cytometer Capture (Optional)

Viewer Operation Settings

Option settings	Page 13-2
Saving and Loading Capture Conditions.....	Page 13-5
E-mail settings.....	Page 13-7
Well plate settings.....	Page 13-9
Administrative Settings	Page 13-11
User Settings	Page 13-13
Maintenance Settings	Page 13-14

Option settings



1 Options

📖 "Viewer options" (Page 13-2)

2 Saved File Setting

📖 "Saved File Settings" (Page 13-3)

Viewer options

Prevent Lens Crash

Checking this box will prevent the active lens from moving above the Z-plane of the stage in order to prevent it from crashing into the stage or sample.

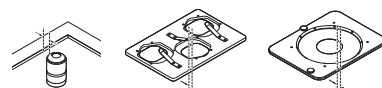
Also, the movable range on the XY direction is restricted within the range in which crash does not occur.

If the position of a specimen is high and out of the movable range, perform uncheck.

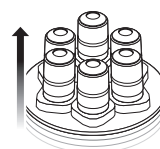
• This is not the function to prevent the active lens from crashing, but the function to prevent the other lenses from crashing with the stage. If short WD lenses such as WD0.13mm are selected, the lenses have to get close to the specimen etc., thus the selected lenses may crash on the specimen even if the lens crash prevention is ON.

• Do not use a lens with short WD within 4 mm around the hole end of a versatile holder or sample holder. Be careful of the lens position when a sample holder is set.

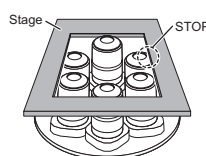
Also, be careful when a lens with long WD is switched to one with short WD around on the hole end position.



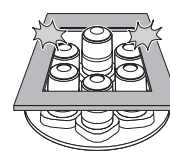
Lenses are move upward or downward by revolver. Therefore, when the lens crash prevention is OFF, the lenses near the circumference may crash with the stage.



When the lens crash prevention ON



When the lens crash prevention OFF



The shorter the lens WD set on the circumference is, the more it may have potentiality to crash with the stage. If the lens crash prevention is OFF, do not use other lenses simultaneously.

Use Optimized Preview Setting

When the checkbox is selected, the camera will use 2 x 2 binning for the image observation screen in order to have a faster frame rate for viewing and navigating. Captured images will not be affected by this and will have the resolution set in the camera settings.

Multi-Color/Z-Stack order

Select the capture order when using Multi-Color and Z-Stack simultaneously.

Multi-Color → Z-Stack	Images are captured in every channel at a single Z-plane before moving to the next plane of the Z-stack. The overlay channel is also captured in this process.
Z-stack → Multi-Color	The complete Z-stack is completed for a single channel before switching to the next channel. The overlay channel is not displayed/captured. This method is faster and the excitation time is shorter, so use this setting to prevent damage to delicate samples.

Use the same parameters for all channels

The same [Gain] and [Transmitted Light Power] settings can be selected for all channels.

1 Check the items to use as common settings.

Excitation Light Filter

This corrects for any unevenness in the excitation light. It is recommended to keep this box selected, however it may cause a slight loss in resolution for some samples.

Saved File Settings

TIFF Image Setting

Set the number of bits for saved monochrome images.

1 Select [8bit] or [14bit].



When opening images saved as 14 bits in the analysis application, the images are converted to 12 bits. To open as 14bit, use image viewing software that supports 14bit images.

JPEG Quality

Specify the compression rate when saving images in JPEG format.



Setting higher quality increases the file size (the compression rate will be lower).

1 Select the image quality from the pull-down list of [JPEG Quality].

Automatically Save Image

This is valid only for singular image capture.

ON	Captured images are automatically saved using the selected settings.
OFF	Each captured image must be manually saved.

Format

1 Select the file format from the pull-down list of [Format].



"TIFF" files are reversible compression, whereas "JPEG" files are non-reversible compression

Prefix

Specify the character string to be attached at the beginning of the file name. Up to 64 characters can be used. If it is remained as blank, a serial number will be put.



Do not use the following characters.
Space \ / : * ? " < > |

Number of Digits

Add an index of the specified number of digits (1 to 5 digits) at the end of the file name.

- 1 Set the number of digits using the button or entering the number.**

Saved Folder

Specify the destination folder to save files to.

- 1 Click [Browse].**
The [Browse For Folder] dialog box is displayed.
- 2 Select the folder for saving.**
The save folder is set.

Comment

Enter comments to be added to the file. Up to 32 characters can be used.

13

Automatically open captured images with BZ-X800 Analyzer

Still images are automatically opened in the Analyzer when captured.



Only singularly captured images will automatically open in the Analyzer.

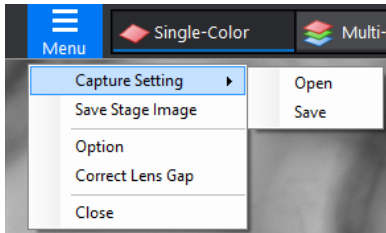
Saving and Loading Capture Conditions

Conditions and settings used to capture images can be saved and loaded. Also, setting conditions can be read from the capture screen.

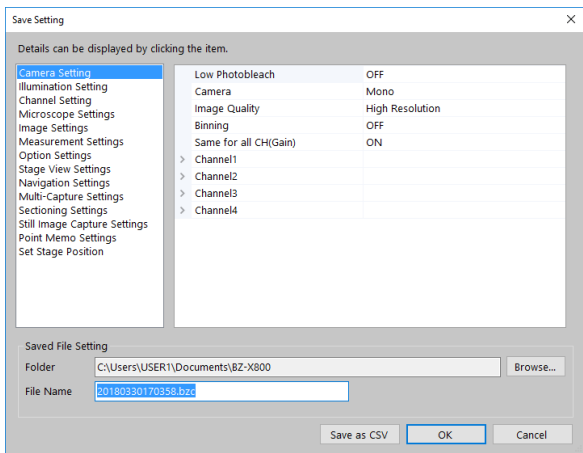
Saving current capture conditions

This saves the current observation and capture conditions.

- 1 Select [Capture Setting] from [Menu], and click [Save].



The [Save Setting] dialog box is displayed.



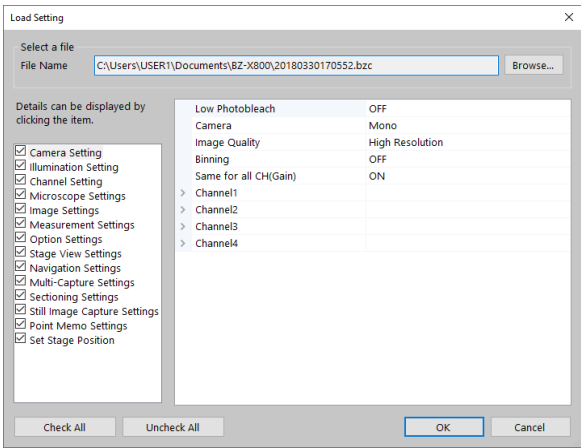
- 2 Confirm the capture conditions.
- 3 Set the save folder and file name, and click [OK].
The capture conditions are saved.
It is saved as a capture setting file (*.bzc) at normal capturing. It is saved as an image cytometer capture setting file (*.ibc) at image cytometer capturing.

Reference Selecting [Save as CSV] can save the capture conditions with CSV format, and the capture conditions can be confirmed by other software. However, the CSV file cannot be read as capture conditions.

Reading conditions from a file

Point The capture conditions saved by a previous device such as BZ-X700 cannot be read.

- 1 Select [Capture Setting] from [Menu], and click [Open].
The [Load Settings] dialog box is displayed.
- 2 Click [From a Setting File].
- 3 Select the setting file, and click [Open].
The [Load Setting] dialog box is displayed.



Reference If turning OFF the check boxes on the front of each item, reading can be done without the item.

- 4 Confirm the contents, and click [OK].
The conditions are applied.

Reading conditions from an image



Point

The capture conditions saved by a previous device such as BZ-X700 cannot be read.

1 Select [Capture Setting] from [Menu], and click [Open].

The [Load Settings] dialog box is displayed.

2 Click [From a Image File].

3 Select the captured image, and click [Open].

The capture conditions are loaded.



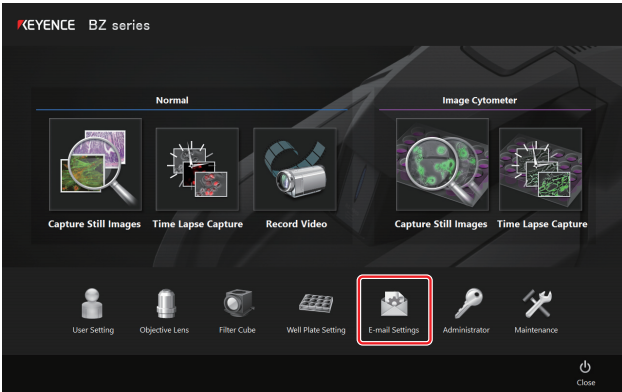
Reference

The loaded capture conditions are as follows.

- XY coordinates and Z-axis capture position
- Gain, Binning
- Brightness (Exposure)
- Transmitted light/Aperture stop, Excitation power
- Lookup table, Black balance, White balance
- Edge/Emboss, Haze reduction
- Lens, Digital zoom
- Channel, Phase contrast, Oblique illumination observation
- Color mode, Monochrome mode
- Sectioning settings

E-mail settings

Conditions of capture that is completed or in progress can be received by e-mail when performing the e-mail settings. Even if leaving the place during capture which takes time, you can go on the remained process promptly after the capture is finished.



E-mail sending settings

Set a mail server.

- 1

Send Mail Server

: Specify a sending mail server.
- 2

Port Number

: Specify a port number used for mail sending.
- 3

Use SSL / TLS

: Check this if the server supports SSL/ TLS and you perform encryption using the SSL/TLS.
- 4

Authentication Method

: Specify an authentication method of the sending mail server.

No Authentication	No authentication is performed at mail sending.
SMTP Authentication	An authentication is performed by SMTP-AUTH method at mail sending.
POP before SMTP	An authentication is performed by POP reception at mail sending.
- 5

Receive Mail Server

: Specify a receiving mail server. If the authentication method of the mail sending is [No Authentication] or [SMTP Authentication], the receiving operation is not needed, so the receiving mail server needs not be specified.
- 6

Port Number

: Specify a port number used for mail receiving.
- 7

Timeout

: An error occurs if an email cannot be sent within the specified time.
- 8

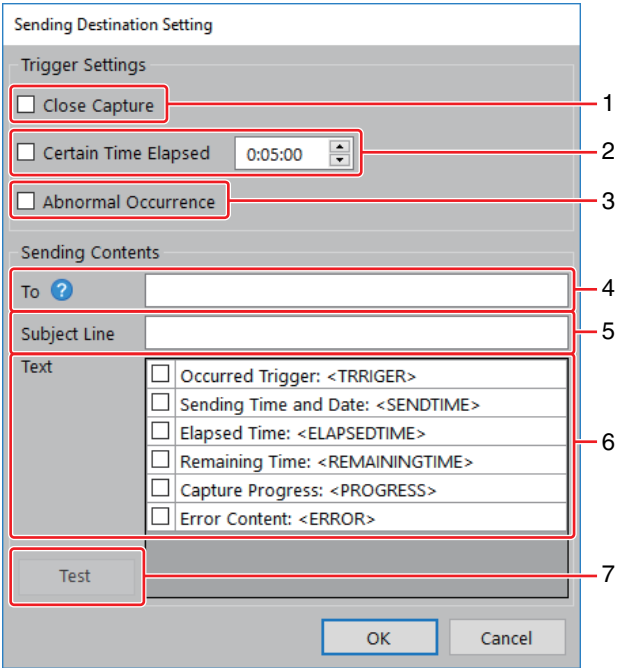
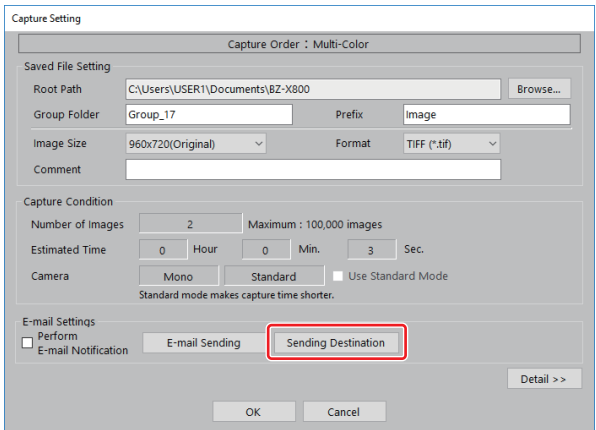
Test E-Mail Sending Destination

: Click [Send] to send a test e-mail to a specified e-mail address.

Sending destination settings

Notify capture conditions by e-mail.

The capture conditions can be sent by e-mail when the capture takes a time, such as at the multi-color capture or multi dimensional capture, and image cytometer capture. This item is called from [Sending Destination] of the [Capture Setting] dialog box of the multi-dimensional capture etc.



- 1 Close Capture** : An e-mail is sent when the capture is finished.
- 2 Certain Time Elapsed** : E-mails are sent regularly to inform the capturing progress on a specified time interval.
- 3 Abnormal Occurrence** : An e-mail is sent at abnormal occurrence such as an error.
- 4 To** : Specify an e-mail address for sending.
- 5 Subject Line** : Specify a title for the e-mail.
- 6 Text** : Specify the contents which is included in the body text as follows:

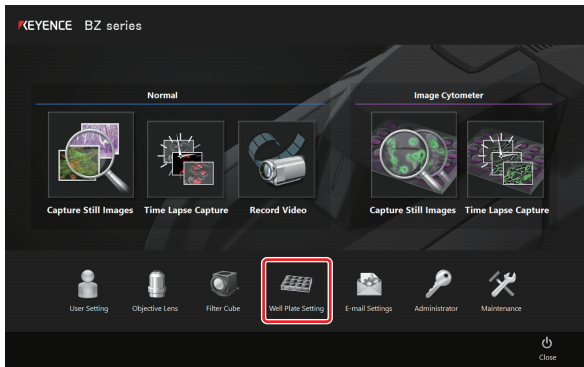
Occurred Trigger	Describes "what triggered to send" the e-mail.
Sending Time and Date	Describes the occurrence date of e-mail sending.
Elapsed Time	Describes the elapsed time from the capture start.
Remaining Time	Describes the prediction time until the capture is finished.
Capture Progress	Describes the capturing progress.
Error Content	Describes the detailed information at abnormal occurrence.

- 7 Test** : An e-mail to be received by setting contents can be confirmed.

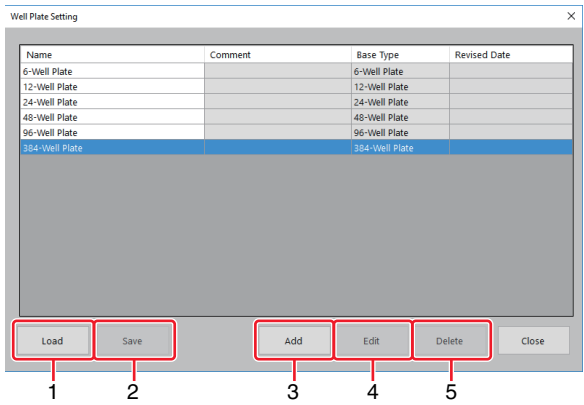
Well plate settings

If the size of the using well plate does not match the existing settings, the settings with customizing the size of a well plate can be created.

1 Click [Well Plate Setting] on the menu screen.

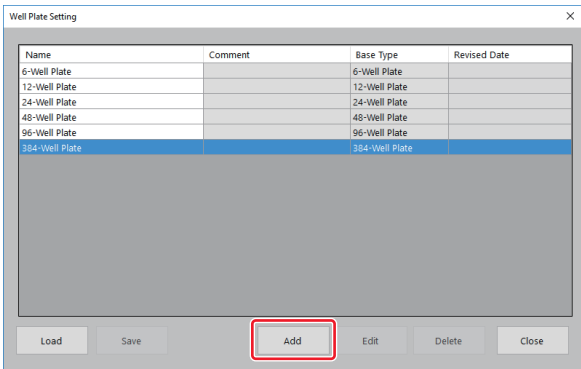


The [Well Plate Setting] dialog box is displayed.

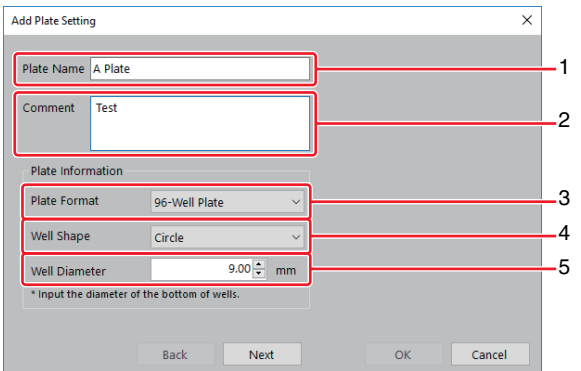


- 1 **Load** : Load saved well plate settings.
- 2 **Save** : Save added well plate settings.
- 3 **Add** : Register new well plate settings.
- 4 **Edit** : Edit registered well plate settings.
- 5 **Delete** : Delete registered well plate settings.

2 Click [Add].



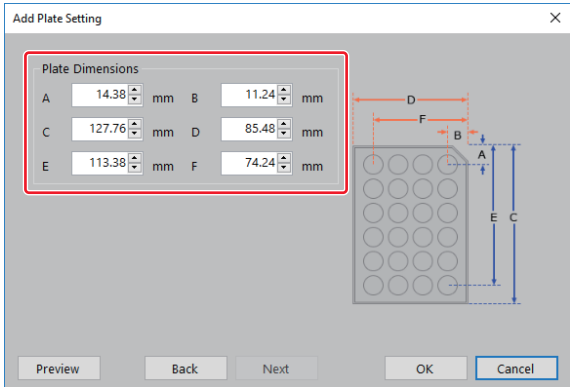
The [Add Plate Setting] dialog box is displayed.



- 1 **Plate Name** : Enter a well plate name. This name appears in the list.
- 2 **Comment**: Enter supplementary information on the well plate.
- 3 **Plate Format** : Enter the number of holes of the well plate.
- 4 **Well Shape** : Specify that the well is circle shape or square shape.
- 5 **Well Diameter** : Specify the size of the bottom of the well.

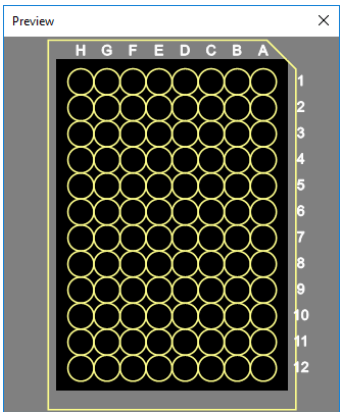
3 Click [Next].

4 Enter the each size of the plate.



Reference

Clicking [Preview] confirms the shape of the plate according to the entered size.



5 Click [OK].
The registration completes.

Administrative Settings

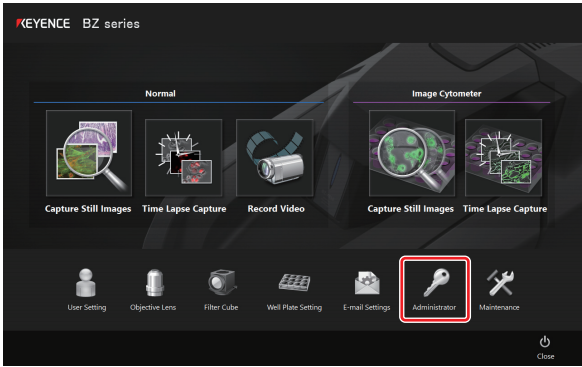
The single-user mode for an individual user and the multi-user mode for multiple users can be switched in the administrative settings.

Adding/Deleting Users

Register different users so that capture and condition settings can be saved by each user.

Registering users

- 1 Click [Administrator] on the menu screen.**
The [Administrative Setting] dialog box is displayed.



- 2 Check [Enable multi-user account service].**
A message appears that multiple users are allowed.
- 3 Click [OK].**
- 4 Click [Add User].**
The [Add User] dialog box is displayed.

- 5 Enter information as necessary.**

- 1 User Name :** Up to 15 single-byte alphanumerical characters can be used.
- 2 Capture Setting :** Select the initial capture settings to be loaded whenever this user opens the Viewer software.

bzc file	Specifies a capture setting file.
ibc file	Specifies an image cytometer capture setting file.

- 6 Click [Add User].**
- 7 Repeat steps 4 to 5 to add users.**
- 8 Click [Close].**
The user setting is complete.

Deleting users

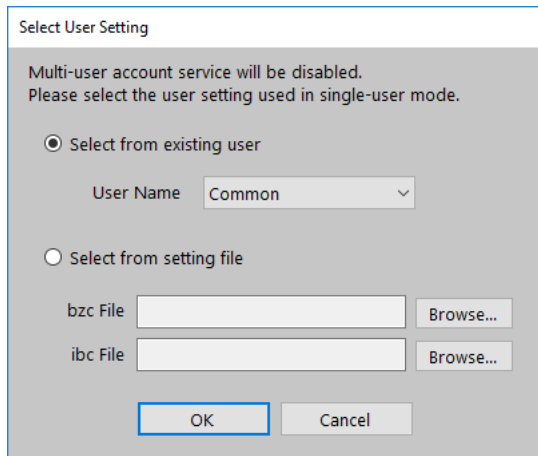
- 1 Click [Administrator] on the menu screen.**
The [Administrative Setting] dialog box is displayed.
- 2 Click [Delete User].**
The [Delete User] dialog box is displayed.
- 3 Select the user to delete from the pull-down list.**
- 4 Click [Delete].**
- 5 Click [Close].**
The user is deleted.

Deleting users collectively



Be sure to log in as the user whose settings you would like to keep, and then delete all other users collectively.

- 1** Click **[Administrator]** on the menu screen.
The [Administrative Setting] dialog box is displayed.
- 2** Remove the check mark from **[Enable multi-user account service]**.
- 3** Click **[Yes]**.
The [Select User Setting] dialog box is displayed.



- 4** Select the user setting used in the single-setting mode, and click **[OK]**.
Users are collectively deleted and the mode is switched to the single-user mode.
- 5** Click **[OK]**.

Changing the administrator password

To use some functions, you need to enter the administrator password in order to manage application settings. Up to 20 single-byte alphanumerical characters can be used for the password.

- 1** Click **[Administrator]** on the menu screen.
The [Administrative Setting] dialog box is displayed.
- 2** Enter the password in the fields for **[New Password]** and **[New Password (retype)]**
- 3** Click **[Change Password]**.
The administrator password is set.

Changing/Deleting the administrator password

- 1** Click **[Administrator]** on the menu screen.
The [Administrative Setting] dialog box is displayed.
- 2** Enter the current password in the field for **[Current Password]**.
- 3** Enter the new password in the fields for **[New Password]** and **[New Password (retype)]**
 - To delete the administrator password, leave the field blank.
- 4** Click **[Change Password]**.
The administrator password is changed.

Initializing settings

This restores the setting contents of the Viewer to factory defaults.

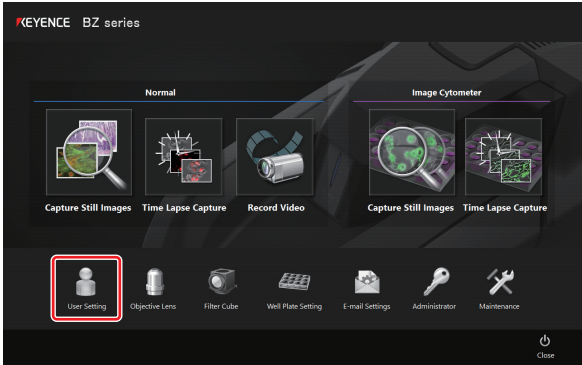
- 1** Click **[Administrator]** on the menu screen.
The [Administrative Setting] dialog box is displayed.
- 2** Click **[Reset to Factory Setting]**.
A message appears notifying that all settings will be deleted.
- 3** Click **[Yes]**.
All settings will be initialized.

User Settings

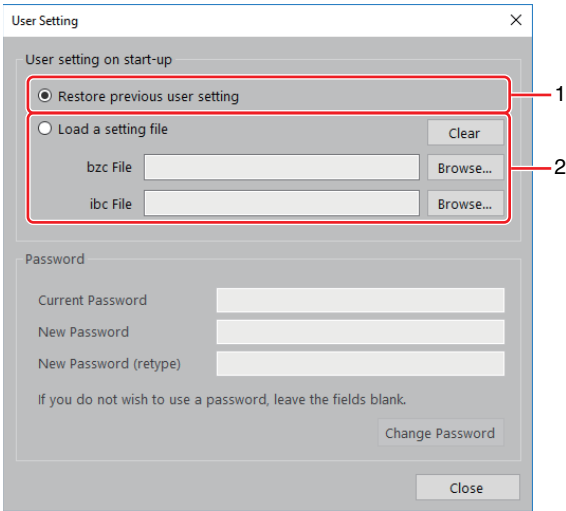
The setting conditions and password for each user in the multi-user mode can be set.

Selecting the start-up settings

- 1 Click **[User Setting]** on the menu screen.
The **[User Setting]** dialog box is displayed.



- 2 Select the user setting on start-up.



- 1 **Restore previous user setting** : The application starts up using the settings from the previous operation.
- 2 **Load a setting file** : The application starts with the setting contents of the specified setting file.

Setting the user password

Up to 20 single-byte alphanumeric characters can be used for a user password.

- 1 Click **[User Setting]** on the menu screen.
The **[User Setting]** dialog box is displayed.
- 2 Enter the password in the fields for **[New Password]** and **[New Password (retype)]**.
- 3 Click **[Change Password]**.
The password is set.

Changing/Deleting the user password

- 1 Click **[User Setting]** on the menu screen.
The **[User Setting]** dialog box is displayed.
- 2 Enter the current password in the field for **[Current Password]**.
- 3 Enter the new password in the fields for **[New Password]** and **[New Password (retype)]**
 - To delete the password, leave the field blank.
- 4 Click **[Change Password]**.
The password is changed.

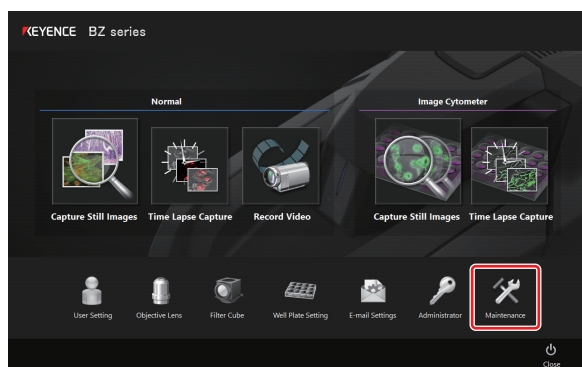
Maintenance Settings

The version and license information of the Viewer can be confirmed.

Confirming the Viewer version

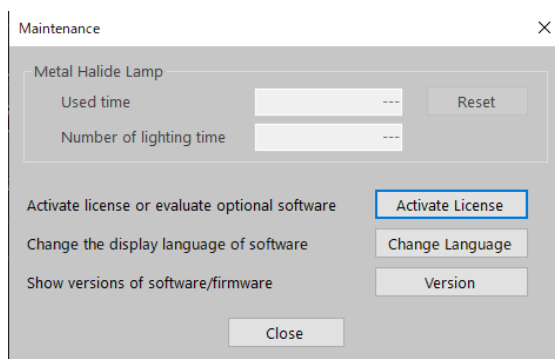
- 1 Click [Maintenance] on the menu screen.

The [Maintenance] dialog box is displayed.



- 2 Click [Version].

The version information is displayed.



Confirming the license information

Evaluating optional module

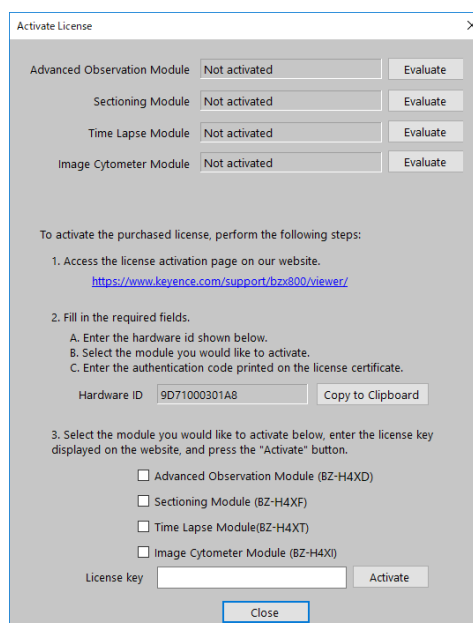
You can evaluate the Viewer optional modules for 180 days.

- 1 Click [Maintenance] on the menu screen.

The [Maintenance] dialog box is displayed.

- 2 Click [Activate License].

The [Activate License] dialog box is displayed.



- 3 Click [Evaluate] for each module you would like to activate.

A message appears to confirm the start of evaluation.

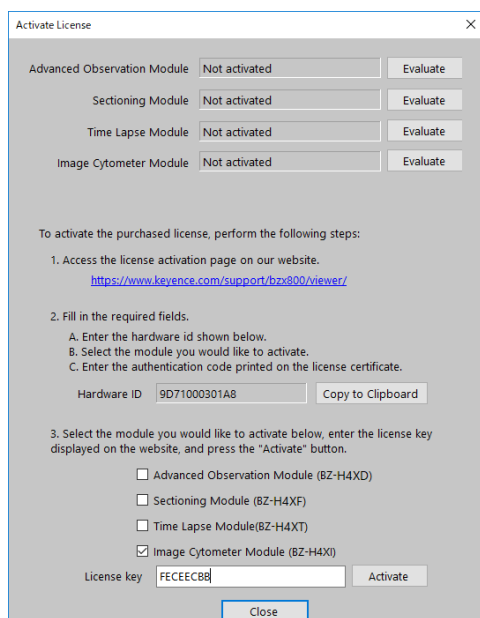
- 4 Click [OK].

The evaluation period is displayed and the optional module is activated.

Activating the license of purchased optional module

When the Viewer optional module is purchased, license activation is required.

- 1 Click **[Maintenance]** on the menu screen.
The **[Maintenance]** dialog box is displayed.
- 2 Click **[Activate License]**.
The **[Activate License]** dialog box is displayed.
- 3 Click on the URL and access the license activation site.
The license activation site is displayed.
- 4 Check the purchased optional module on the license activation site, and enter the Authentication Code from the supplied license certificate and the Hardware ID displayed on the **[Activate License]** dialog box.
The License Key is displayed.
- 5 Enter the License Key in the field for License Key on the **[Activate License]** dialog box, and check the purchased optional module.



- 6 Click **[Activate]**.
A message appears to notify the activation is complete.

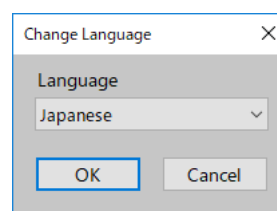
- 7 Click **[OK]**.
The license activation is complete.



Clicking **[Copy to Clipboard]** allows you to enter the Hardware ID on the license activation site by pasting.

Changing the language

- 1 Click **[Maintenance]** on the menu screen.
- 2 Click **[Change Language]**.
- 3 Select the language to display.



- 4 Click **[OK]**.
After the dialog box of user account control is displayed, a message appears to confirm the change of the device setting. Click **[Yes]**.
- 5 Exit the BZ-X800 Viewer and restart it.
The display is changed to the selected language.

MEMO

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Replacing the Fuse	Page 14-2

Cleaning the Objective Lenses

► Important

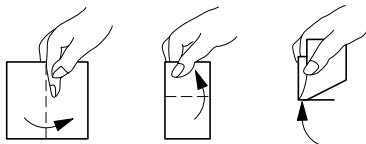
Do not use a screwdriver, metal tweezers or wooden rod. They may scratch the lens.

Prepare the following.

- Compressed air blower
- Lens paper
- Non-woven cotton swab
- Petroleum benzine or anhydrous alcohol (ethanol).

1 Blow compressed air in short bursts and at an angle to the surface of the lens to remove dust or dirt.

2 Wrap a sheet of lens paper around your finger, and lightly wipe the surface of the lens.

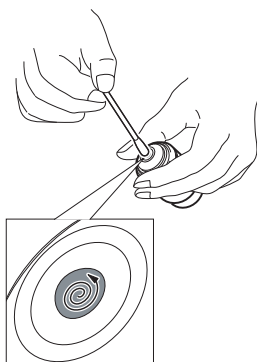


Wipe the lens from the center to the periphery in a circular motion.

Be sure not to touch the lens surface with your finger, as this will transfer oil and dirt to the lens.

3 If the lens is still dirty after step 2, apply a small amount of petroleum benzine or anhydrous alcohol (ethanol) to a non-woven cotton swab or lint-free lens cloth.

4 Lightly and carefully wipe the lens from the center to the periphery in a circular motion.



Reference

If the lens will not be used for a long time, store it in a desiccator to prevent mold growth.

Replacing the Fuse

► Important

Use the following fuse for replacement.
SOC Corporation HT Series fuse,

Rated voltage : 250 V

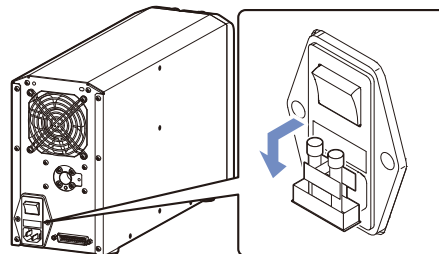
Rated current : 6.3 A

Fuse characteristics : Time lag

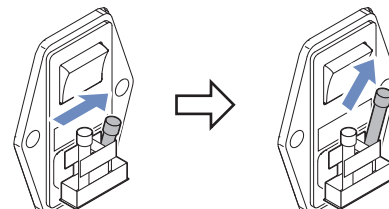
1 Shut down the system and turn off the main power of the controller.

2 Remove the AC power cable.

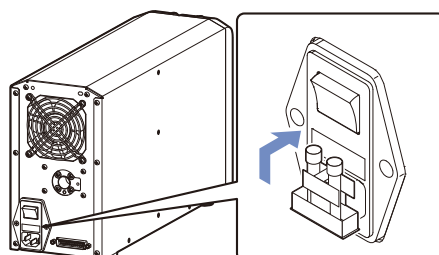
3 Pull out the fuse holder from the power connector.



4 Install new fuses in the fuse holder.



5 Return the fuse holder to the power connector.



- With the protrusion of the fuse holder facing down, insert it straight so that the fuses come in contact with the electrode of the fuse holder.

Appendix

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Troubleshooting

This section describes problems that may occur while operating the BZ-X800 Series and how to troubleshoot each of them. Check the contents described in this section before contacting your nearest KEYENCE office.

Problem	Possible cause	Solution
No image is displayed during brightfield observation.	The observation method is incorrectly set in the channel setting.	Set the channel setting to Brightfield.
	[Transmitted Light] is set to OFF.	Set [Transmitted Light] to ON.
Hue is not adjusted properly during brightfield observation.	The white balance setting is incorrect.	Select and adjust [White Balance].
	A fluorescent filter cube is in the brightfield channel.	Remove the fluorescent filter cube.
The image is out of focus during brightfield observation	The slide is not placed with the cover glass side facing downward (inverted).	Mount the slide with the cover glass side facing downward (inverted).
No image is displayed during fluorescence observation.	A filter cube is not installed.	Install the filter cube that matches the fluorescent reagent.
	The filter cube is not mounted correctly.	Mount the filter cube on the turret correctly.
	The exposure time is not set to its optimum value.	Prolong the exposure time.
	The LED lamp is expired.	Lamp replacement will be repaired.
	The observation method in the channel setting is not set to fluorescence observation.	Set the observation method in the channel setting to fluorescence observation.
	The shutter on the LED lamp is closed.	Click [Live] to turn on the LED lamp.
Image appears noisy and has low resolution.	Sometimes images contain excessive noise when [Use Optimized Preview Setting] is selected.	Set [Use Optimized Preview Setting] to OFF.
	The excitation power is weak.	Adjust the excitation power.
Images are blurry during fluorescence observation. Clear focus is not obtained.	The filter cube is not mounted correctly.	Mount the filter cube on the turret correctly.
	The surface of the objective lens is dirty.	Clean the objective lens.
There are dark spots and/or bright spots on the screen.	The connected LCD monitor has defective pixels.	If dark spots, bright spots, or colored spots (red, blue, or green) remain on the screen when the software is closed, the LCD monitor has defective pixels.
	The CCD has defective pixels.	If dark spots or bright spots appear in the image observation area and remain in the same location when the XY position is changed, the CCD has defective pixels. It is normal for CCDs to contain some defective pixels.

Using Commercially Available Fluorescence Filters



Orientations of filters vary depending on the manufacturer. Check the orientation of the filter before inserting it.

Using commercially available filters

Commercially available fluorescence filters can be used by installing them in an empty filter cube (part number OP-87767).



When using the sectioning function, a dichroic mirror specified by KEYENCE is required. Consult your nearest KEYENCE sales representative for purchase.

■ Manufacturers of the commercially available fluorescence filters that can be installed

- OMEGA OPTICAL
- Chroma Technology Corporation
- Semrock, Inc.

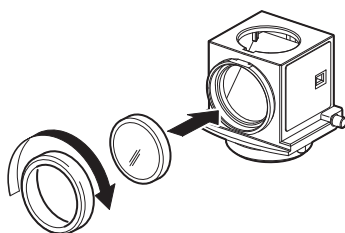
■ Required size of fluorescence filters

Absorption filter	φ25 mm, maximum thickness 6 mm
Excitation filter	
Dichroic mirror	25.7 mm × 36 mm, maximum thickness 1 mm

Installing commercially available filters

Installing the excitation filter and the absorption filter

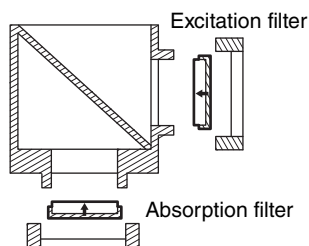
- 1 Insert the excitation or absorption filter into the filter cube, and fasten it by rotating the cap.



When removing the fluorescence filters, reverse the steps of installation.

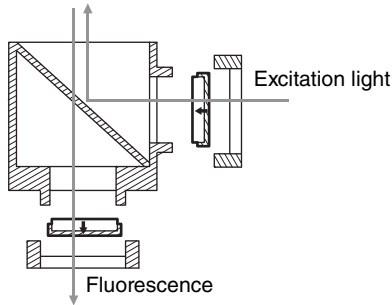
■ For filters manufactured by Chroma

Insert the filter so that the arrow on the filter frame faces the inside of the filter cube.



■ For filters manufactured by OMEGA or Semrock

Insert the filter so that the arrow on the filter frame faces the same direction as the direction in which the light flows.

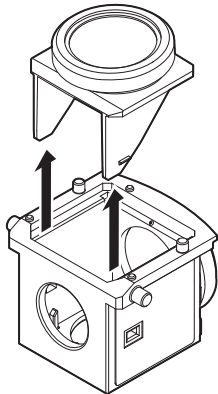


Installing the dichroic mirror

► Important

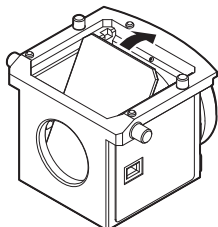
- Insert the dichroic mirror by holding its edges to avoid contamination with finger prints.
- When using the sectioning function, a dichroic mirror specified by KEYENCE is required. Consult your nearest KEYENCE sales representative for purchase.

1 Remove the cube bottom of the filter cube.

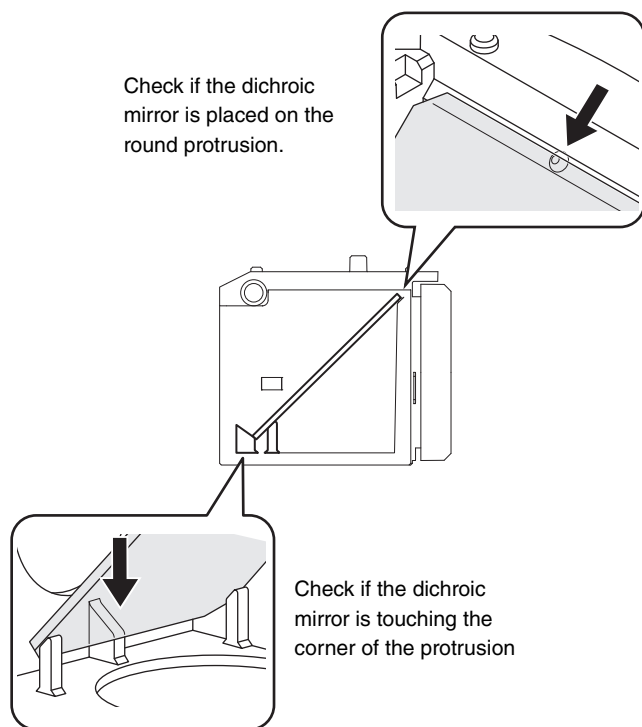


2 Place the mirror on the protrusion in the filter cube at an angle, and then tilt it down into the appropriate position.

- Set the mirror so that the membrane surface faces downward.

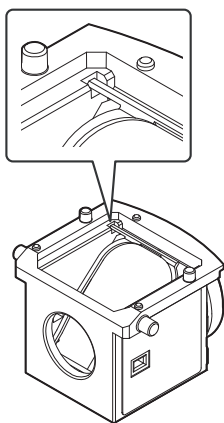


3 Check if the mirror is correctly set.



4 Set the leaf spring.

- Set the leaf spring so that the protrusion of the leaf spring contacts the side of the mirror.



5 Reattach the cube bottom to the filter cube.

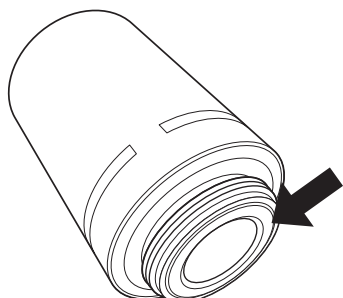
- A clicking sound can be heard when the cube bottom is properly attached.



When removing a dichroic mirror, reverse the steps of installation.

Lens Recommendations

Protective film for lens



For Plan Apochromat 20X / 40X / 60X / 100X, remove the protective film at the bottom of the lens after the product is delivered.

There is a cushion on the lens cap side. This is used to protect the lens during transportation and not required for observation.

Lens for each observation container

Select lenses with a ○ mark.

Lens name	Slide (Cover glass facing down)	Slide (Cover glass facing up)	Glass bottom dish	Plastic petri dish	Well plate	Phase contrast observation
Plan Apochromat 2X	○	○	○	○	○	×
Plan Apochromat 4X	○	○	○	○	○	×
Plan Apochromat 10X	○	○	○	○	○	×
Plan Apochromat 20X	○	×	○	×	×	×
Plan Apochromat 40X	○	×	○	×	×	×
Plan Apochromat 60X Oil	○	×	○	×	×	×
Plan Apochromat 100X Oil	○	×	○	×	×	×
Plan Fluorite 4X PH	○	○	○	○	○	○
Plan Fluorite 10X PH	○	○	○	○	○	○
Plan Fluorite 20X LD PH	○	○	○	○	○	○
Plan Fluorite 40X LD PH	○	○	○	○	○	○

Reference

- Select the lens according to the thickness of the transparent medium at the bottom surface of the container.
- If the transparent medium is thin, images can be captured with high-resolution. (It is recommended to use a glass bottom dish rather than a plastic petri dish.)
- If observation is performed with the cover glass of the slide fixed and set upside down, images can be captured with high-resolution. (If the cover glass cannot be fixed, images can be captured from the glass base side of the slide, however, the resolution will be decreased due to the slide thickness.)

Lenses with correction rings - Correction values for each observation container

Lens with correction ring	Slide (Cover glass facing down)	Slide (Cover glass facing up)	Glass bottom dish	Plastic petri dish	Well plate
Plan Apochromat 40X	0.17 (mm)	×	0.17 (mm)	×	×
Plan Fluorite 20X LD PH	0.17 (mm)	1.2 (mm)	0.17 (mm)	1.2 (mm)	1.2 (mm)
Plan Fluorite 40X LD PH	0.17 (mm)	1.2 (mm)	0.17 (mm)	1.2 (mm)	1.2 (mm)

- The above values are approximate. Check the thickness of the container to be used, and make adjustments according to the thickness.



- Adjust the scale of the correction ring to the thickness of the bottom surface (transparent medium) of the sample container. (This will account for variances in the refractive index of different container types.)
- If the correction ring is set to an incorrect value, appropriate focus can not be obtained on the image.

Standard lens specifications

Type	Name	NA	WD (mm)	Slide thickness	Depth of field (Approx. μm)	Field of view (μm)
BZ-PA02	Plan Apochromat 2X	0.1	8.5	-	55	7247×5456
BZ-PA04	Plan Apochromat 4X	0.2	20	-	14	3623×2728
BZ-PA10	Plan Apochromat 10X	0.45	4	0.17	2.7	1449×1091
BZ-PA20	Plan Apochromat 20X	0.75	0.6	0.17	1.0	725×546
BZ-PA40	Plan Apochromat 40X	0.95	0.17 to 0.25	0.11 to 0.23	0.6	362×273
BZ-PA60	Plan Apochromat 60X Oil	1.4	0.13	0.17	0.4	242×182
BZ-PA100	Plan Apochromat 100X Oil	1.45	0.13	0.17	0.4	145×109
BZ-PF04P	Plan Fluorite 4X PH	0.13	16.5	1.2	33	3623×2728
BZ-PF10P	Plan Fluorite 10X PH	0.3	14.5	1.2	6.1	1449×1091
BZ-PF20LP	Plan Fluorite 20X LD PH	0.45	7.5 to 8.8	0 to 2	2.7	725×546
BZ-PF40LP	Plan Fluorite 40X LD PH	0.6	2.2 to 3.3	0 to 2	1.5	362×273

Fluorescent Filter Wavelength Characteristics

Standard filter cube

Name	Excitation wavelength	Absorption wavelength	Dichroic mirror wavelength
OP-87762 BZX filter DAPI	360/40	460/50	400
OP-88359 BZX filter DAPI-V	395/25	460/50	425
OP-87763 BZX filter GFP	470/40	525/50	495
OP-87764 BZX filter TRITC	545/25	605/70	565
OP-87765 BZX filter TexasRed	560/40	630/70	585
OP-87766 BZX filter Cy5	620/60	700/75	660

(Unit: nm)

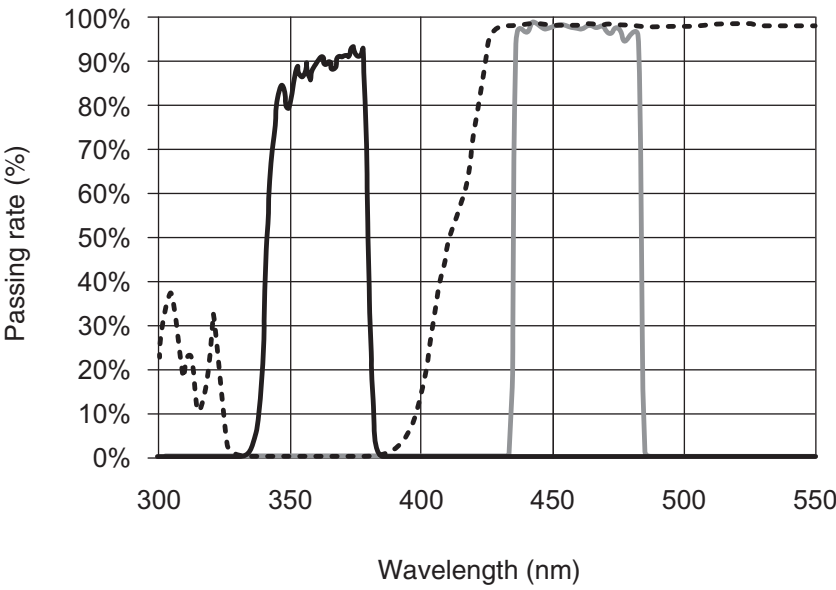


When using filter cubes other than the standard filter cubes, refer to "Using Commercially Available Fluorescence Filters".
"Using Commercially Available Fluorescence Filters" (Page A-3)

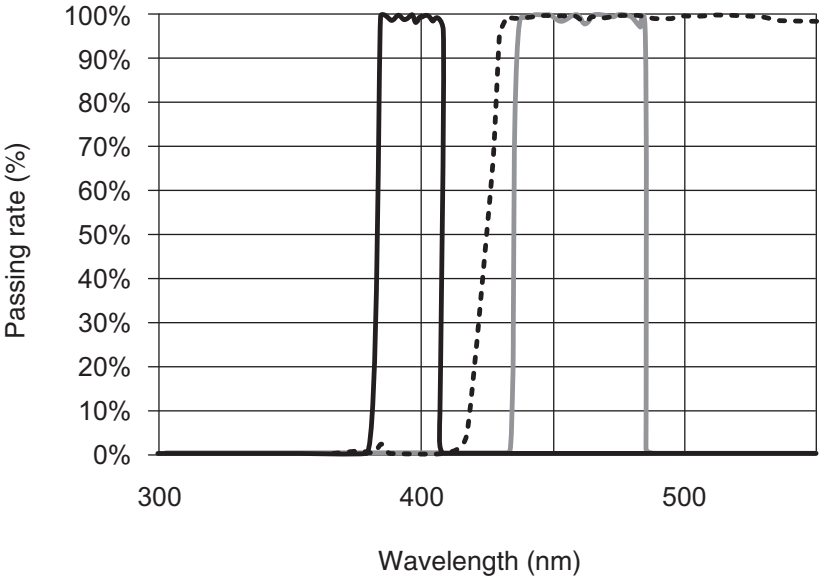
Wavelength characteristic graphs

— : Excitation wavelength — : Absorption wavelength - - - : Dichroic mirror wavelength

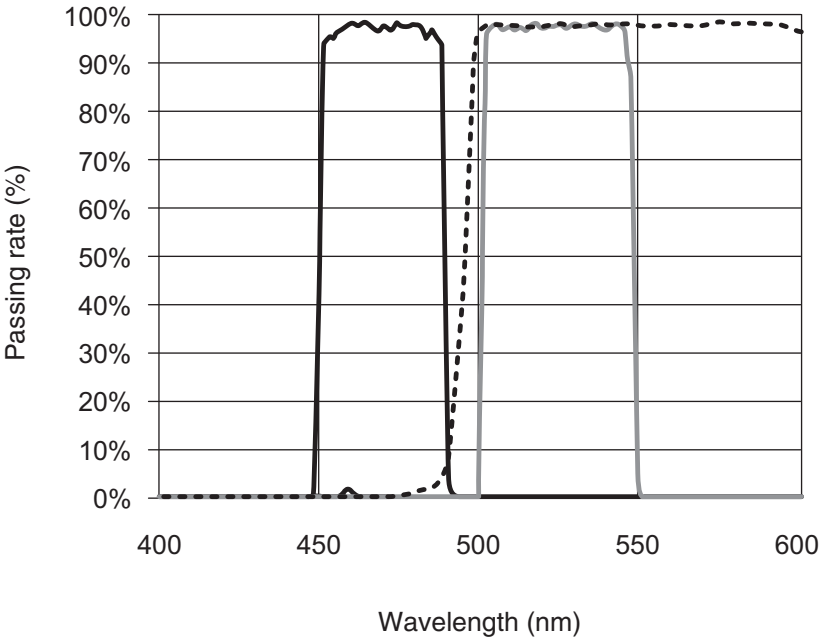
■ DAPI



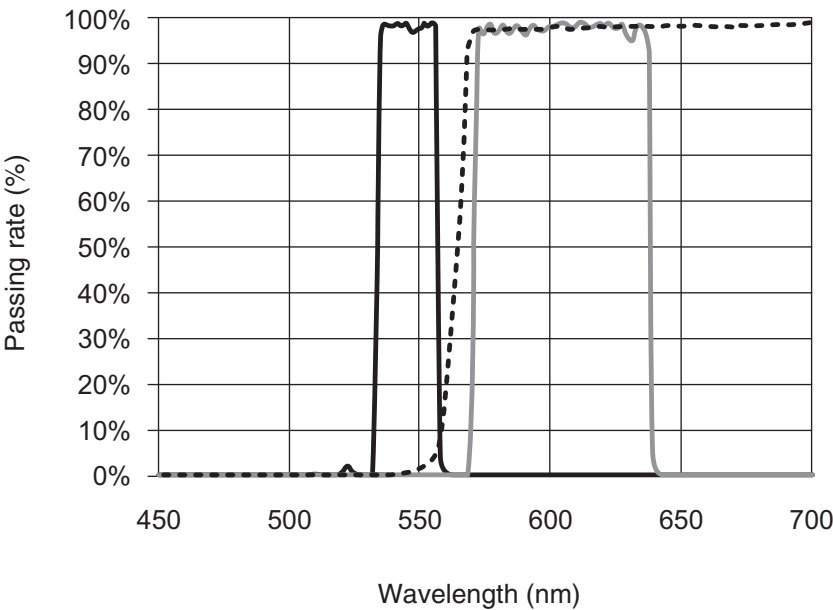
■ DAPI-V



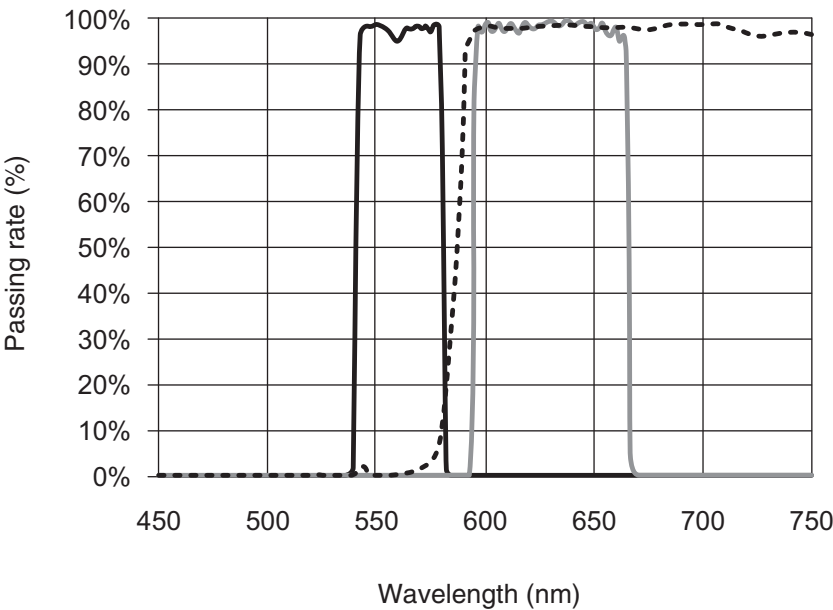
■ GFP



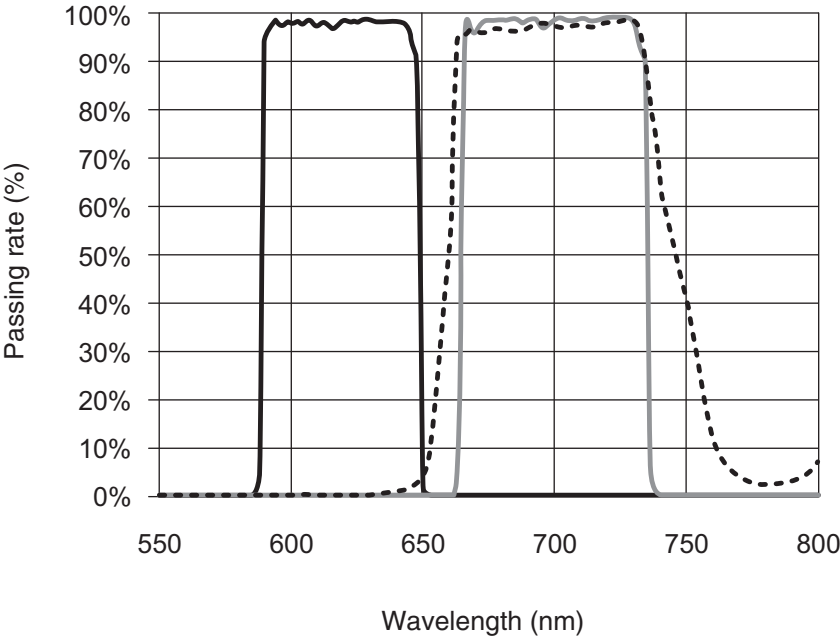
■ TRITC



■ TexasRed



■ Cy5



Specifications

Model		BZ-X800L/BZ-X810
Microscope unit	Basic optical system	Inverted fluorescence phase contrast microscope
	Objective lenses	Nikon CFI60 Series infinite optical system
	Observation modes	Brightfield, fluorescence (wide field, sectioning), phase contrast (PhL, Ph1, Ph2), oblique illumination
	Objective lens switching	six-mount electronic revolver
	Image-formation optical system	Fixed image-forming lens, electronic LC filter insertion/removal mechanism
	Motorized XY stage	Stroke 114 × 80 mm, minimum 1 μm pitch
	Motorized Z stage	Stroke 8 mm, minimum 0.1 μm pitch
	Motorized filter turret	Up to four filters can be mounted. Automatic position recognition and automatic excitation shutdown during filter replacement
	Fluorescent incident illumination	Optical sectioning system
	Fluorescent dimming mechanism	Electronic reduction (0.3%, 5%, 10%, 20%, 40%, 100%)
	Transmitted illumination optical system	Operating distance 45 mm, pop-up mechanism (with automatic lamp shut off function)
	Transmitted illumination mechanism	Electronic bright field aperture stop (0%, 20%, 40%, 60%, 80%, 100%) Phase contrast slit (PhL, Ph1, Ph2)
	Transmitted light source	3.7 W LED
	Fluorescent incident light source	40 W LED
	Specimen enclosure	The stage is fully contained in a built-in darkroom
Camera unit	Image receiving element	2/3-inch, 2.83 mega pixel monochrome CCD (colored by a LC filter)
	CCD cooling mechanism	Peltier cooling: 5°C (Reduction amount: -25°C)
	Output signal gradations	Monochrome 14-bit/8-bit, RGB 8-bit each
	Frame rate	Monochrome: 15 fps (max 95 fps with binning) Color: 8.5 fps
	Binning	On-chip binning (2 × 2, 3 × 3, 4 × 4, 8 × 8, 12 × 12)
	Recording pixels	Max 4080 × 3060 (12.5 mega pixels, high-quality interpolation)
	Video capture	8-bit monochrome 1280 × 960: 15 fps Binning: 960 × 720: 29 fps, 640 × 480: 40 fps, 480 × 360: 50 fps, 240 × 180: 75 fps, 160 × 120: 100 fps Color 1280 × 960: 8.5 fps
	Electronic shutter	Auto, 1/7500 to 60 seconds (77 increments)
	Gain	0 dB, +6 dB, +12 dB, +18 dB, +24 dB
	White balance	Pushset, manual
	Black balance	Pushset, manual

Model		BZ-X800L/BZ-X810
Option	Basic viewing software	Multi-color, auto-focus, quick full focus, scale display, motorized lens turret, motorized stage control, stage view
	Sectioning Module	Optical sectioning image mode
	Advanced Observation Module	Navigation, image stitching capture, Z-stack capture, coordinate-specific capture conditions
	Time Lapse Module	Time lapse imaging, video recording
	Image Cytometer Module	Macroize from viewing to analyzing
	Analyzer Application	Image stitching, haze reduction, full focus
	Measurement Application	XY measurement, area measurement, brightness measurement (line profile, histogram)
	3D Application	3D analysis, XYZ slice, max projection, 3D measure, 3D cell count
	Motion Analysis Application	Motion tracking, time series cell count
	Hybrid Cell Count	Cell count (phase contrast, brightfield, fluorescent images), mask cell count
	Macro Cell Count	Macro cell count (Collective analysis of multiple images)
Controller	Compatible OS	Windows 10 Pro 64 bit
	PC interface	USB 2.0
	Operating temperature range	+15 to 35°C
	Operating humidity range	35 to 80%RH (No condensation)
	Dimensions	Head: H 517 × W 340 × D 496 mm ^{*1} Controller: H 227.5 × W 125 × D 408 mm
	Weight	Head: Approx. 33 kg Controller: Approx. 4.8 kg
	Power supply voltage	AC 100 to 240 V ±10% 50/60 Hz
	Power consumption	200VA or less
	Overvoltage category	II
	Pollution degree	2

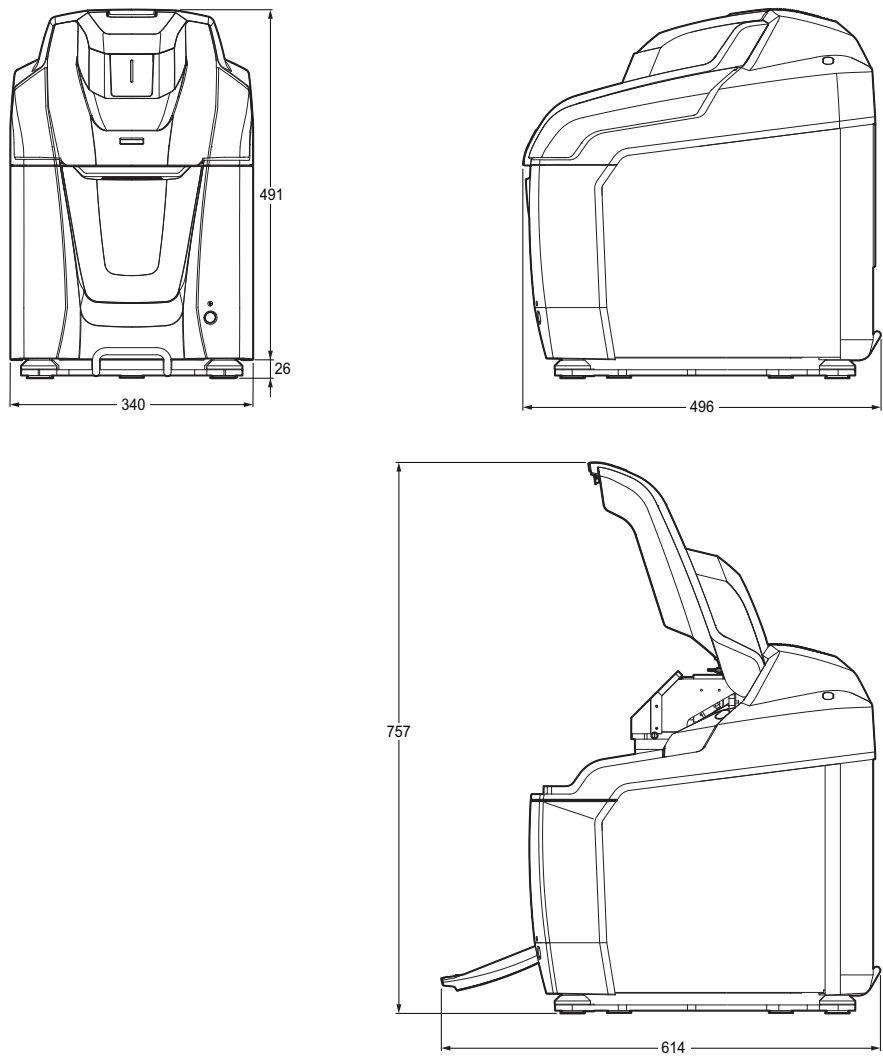
* Windows 10 is a registered trademark of Microsoft Corporation, U.S.A.

*1 When the top panel is closed

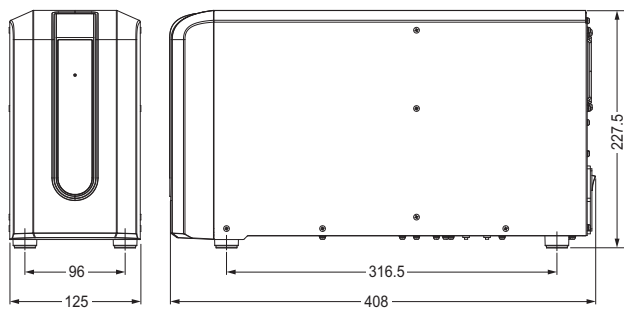
Outside Dimensions

Head

All dimensions are in millimeters (mm).



Controller



A

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MEMO

Revision history

Print of printing	Version	Revision contents
February 2022 May 2024	1st edition 2nd edition	

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