

Modules described in this manual

U-AFA2M-VIS/DUV

U-AFA2M-CB

U-AFA2M-CBL2M/CBL3M

INSTRUCTIONS

U-AFA2M

ACTIVE AUTOFOCUSING UNIT

This instruction manual is for the Evident Active AF Unit Model U-AFA2M. To ensure the safety, obtain optimum performance and to familiarize yourself fully with the use of this unit, we recommend that you study this manual thoroughly before operating the unit.
Retain this instruction manual in an easily accessible place near the work desk for future reference.

Optical Microscope Accessory

This product is applied with the requirements of standard IEC/EN61326-1 concerning electromagnetic compatibility.

- Emission Class A
- Immunity Industrial electromagnetic environment

Emissions exceeding the level required by aforementioned standards may occur if this product is electrically connected to other equipment.

Some interference may occur if this product is used in residential environments.



In accordance with European Directive on Waste Electrical and Electronic Equipment, this symbol indicates that the product must not be disposed of as unsorted municipal waste, but should be collected separately.

Refer to your local Evident distributor in EU for return and/or collection systems available in your country.

For Korea only

A급 기기 (업무용 방송통신기자재)

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CONTENTS

IMPORTANT – Be sure to read this section for safe use of the equipment. – 1-4

1 Applicability of the System

2 Notes on AF (Autofocusing)

3 Getting Ready

4 Maintenance and Storage

5 Caution

1 MICROSCOPE MODULES 5

2 NOMENCLATURE 6

3 ASSEMBLY – Have your local Evident representative perform the assembly operations. – 7-10

4 SYSTEM STARTUP PROCEDURE 10

5 REFLECTED LIGHT DIC AND SIMPLIFIED POLARIZED LIGHT OBSERVATIONS 11,12

6 TV OBSERVATION/PHOTOMICROGRAPHY 13

7 SPECIFICATIONS 14,15

8 TROUBLESHOOTING GUIDE 16,17

IMPORTANT

- The U-AFA2M active AF unit is an intermediate attachment to be used with the BX61 microscope or the BXFMA-F motorized vertical illuminator. The AF (autofocusing) operation is available by running the dedicated software on a PC.
- This unit employs a laser diode (wavelength 775-800 nm) as the AF light source. The pupil division active AF system enables high-speed focusing and the multi-spot projection improves the stability of focusing of specimens with variable difference in heights.
- The following two kinds of AF units are available.
 - U-AFA2M-VIS: Visible AF unit (For exclusive use with visible light).
 - U-AFA2M-DUV: DUV AF unit (For visible and DUV light).

! Safety Precautions

“Caution – Use of controls or adjustment or performance of procedures other than those specified herein may result in hazardous radiation exposure.”

1. This unit uses a laser diode (wavelength 775-800 nm) for autofocusing. It is designed to be safe by reducing the laser power (Class 1), but it is still not recommended to view the laser light directly by removing the cover, etc. (Before maintenance, be sure to set the power switch to “○” (OFF))
Never remove the warning and caution labels on the unit.




Class 1 Laser Product (IEC60825-1:2007 / IEC60825-1:2014)

This product complies with 21 CFR 1040.10 and 1040.11 except for deviations pursuant to Laser Notice No. 50, dated June 24, 2007.

2. When using the DUV AF unit in combination, keep in mind that DUV (Deep Ultra-Violet light) is harmful to your eyes and skin. Be sure to observe strictly the cautions given in the instruction manual provided with the DUV microscopy unit.
3. Always use the power cord provided by Evident. If the proper power cord is not used, the product performance as well as its safety performance cannot be warranted.
4. Always ensure that the **grounding terminal** is properly grounded/earthed. If the equipment is not grounded, Evident can no longer warrant the electrical safety performance of the equipment.
5. Distribute the connection cables at a distance from the lamp housing. If a connection cable contacts the lamp housing or its surroundings, the cable may be melted and cause an electric shock hazard.
6. Never insert metallic objects into the air vents of the unit as this could result in electrical shock, personal injury and equipment damage.
7. To prevent the microscope system from turning over, do not install modules which cause the microscope system height to exceed 1 meter.
8. Do not place anything on the top of the AF unit as it may fall.

Safety Symbols

The following symbols are found on the unit. Study the meaning of the symbols and always use the equipment in the safest possible manner.

Symbol	Explanation
	Before use, carefully read the instruction manual. Improper use could result in personal injury to the user and/or damage to the equipment.
	Indicates that the main switch is ON.
	Indicates that the main switch is OFF.

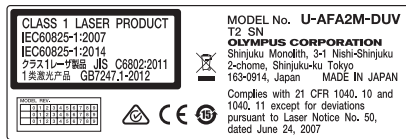
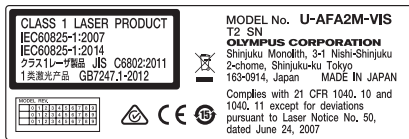
CAUTION Use of controls or adjustment or performance of procedures other than those specified herein may result in hazardous radiation exposure.

Warning labels

Warning labels related to laser beam are attached to the unit. Always heed the warnings.

Warning label position (U-AFA2M AF unit)

Left side panel



Right side panel



The border and letter are black and the background is yellow.

When a warning label becomes dirty or is peeled off, contact Evident for replacement.

1 Applicability of the System

1. Applicable modules

- Motorized microscope frame: BX61TRF
- Motorized vertical illuminator: BX-RLAA or BXFMA-F
- Motorized revolving nosepieces
 - For brightfield objectives: U-D6REMC, U-P5REMC or U-D6REM
 - For brightfield/darkfield objectives: U-D6BDREMC, U-D5BDREMC U-P5BDREMC, or U-D5BDREM
- (Note) When a brightfield objective is mounted on a revolving nosepiece by means of the BD-M-AD objective adapter, the AF performance is not guaranteed due to deviation of centering of focusing.
- Objectives
 - Brightfield objectives: LMPLFLN 5X to 100X, MPLFLN 5X to 100X, LMPlanFI 5X to 100X, UMPlanFI 5X to 100X, LMPlanApo 150X or MApo 100X for 248 nm light (exclusively for use in DUV observation)
 - Brightfield/darkfield objectives: LMPLFLN 5X to 100XBD, MPLFLN 5X to 150XBD, LMPlanFI 5X to 100XBD, UMPlanFI 5X/10X/20XBD (BD2) and 50X/100XBD, LMPlanApo 150XBD, MPlanFI 50XBD (BD2) or MPplanFI 100XBD (BD2).
- (Note) Objectives with WDs (Working Distances) of 1 mm or more are recommended. When the WD is below 1 mm, special care is required in setting the AF zone and Near limit.
- Observation tube: U-BI30-2, U-TR30-2, U-ETR-4, U-TLU, U-SWTR-3, U-SWETR, U-SWETTR-5 or MX-SWETTR.

◎The previous objective series are also applicable provided that the model names are the same.

2. Applicable observation methods

- ◎For details on the observation methods, read the instruction manuals for the microscope and microscope accessories.
- Reflected light brightfield, reflected light darkfield, reflected light DIC (Differential Interference Contrast)*, reflected light simplified polarized light* and reflected light DUV (Deep Ultra-Violet light) ** observations
 - * The MX-AFDIC analyzer slot unit, U-AN analyzer and U-PO-3 polarizer are required.
 - ** The U-AFA2M AF unit and the U-UVF248 DUV microscopy unit are required.
- The FN (Field Number) of the eyepieces should be no more than 22. The FN of the camera/TV light path is no more than 20.
- In the DIC observation, AF may sometimes be impossible due to reduction of return light in certain retardation positions.
- In the DIC and simplified polarized light observations, the visual field may become irregular with certain specimens.
- Except in the DIC observation, be always sure to use a dummy slider to prevent flare.
- In the CCD camera observation, the laser spot for AF may be visible when the CCD camera does not incorporate an IR cut filter (this does not cause a safety problem).

2 Notes on AF (Autofocusing)

1. Applicable specimens

AF is available with any specimen with reflectivity from 3% (glass) to 100% (mirror).

However, the AF position may be deviated from the desired focusing position in the following cases.

- When observing a specimen with double structure (deposited thin film or an electrode under glass, etc.): AF on the desired layer may be unavailable due to the multi-layer reflections.
- When observing a thin specimen with reflection from backside (glass, etc.): The AF may be unstable due to the backside reflection.
- When observing a specimen with a regular fine pattern using a low-power objective.
- When observing a specimen with diffused surface reflections using a low-power objective.
- When observing a specimen in the reflected light DIC observation: AF may be unavailable in certain retardation positions.

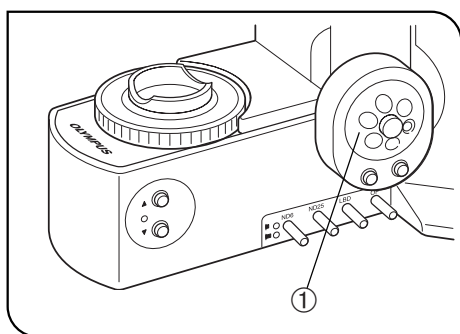


Fig. 1

Stopping the Stage in the Middle of Motorized Focusing Operation

The movement of the stage can be stopped immediately by turning the fine adjustment dial ① on the BX61 microscope frame (in either direction). When the unit is mounted on the BXFMA, the same effect can be obtained using the focusing knob of the U-FH.

Recovering from an Error in the Motorized Focusing Module

- ⊙ When the focusing module catches something in the middle of motorized operation, a “focusing module error” occurs and the focusing operation is stopped.

Recovery procedure

1. Provided that the motor operation error is not occurring, the caught item can be taken out by turning the fine adjustment dial ①.
2. If the motor operation error also occurred, the fine adjustment dial is defeated. In this case, remove the nearby modules and take out the caught item. Be sure to attach the removed nearby modules after this.
3. Set the main switch to “○” (OFF) then “|” (ON) again.
The microscope will restart unless the motor is failed.

3 Getting Ready

1. This unit is a precision instrument. Handle it with care and avoid subjecting it to sudden or severe impact.
2. Do not use the unit where it is subjected to direct sunlight, high temperature and humidity, dust or vibrations. (For the operating conditions, refer to chapter 7, “SPECIFICATIONS” on page 15.)

4 Maintenance and Storage

1. Do not attempt to use organic solvents to clean the unit and the modules but wipe them dry with a soft cloth. When they are extremely dirty, use a lint-free, soft cloth slightly moistened with a diluted neutral detergent.
2. To clean a glass component of the analyzer or polarizer, etc., simply blow dirt away using a commercially available blower and wipe gently using a piece of cleaning paper (or clean gauze).
If a glass component is stained with fingerprints or oil smudges, wipe it with cleaning paper slightly moistened with commercially available absolute alcohol.
▲ Since the absolute alcohol is highly flammable, it must be handled carefully.
Be sure to keep it away from open flames or potential sources of electrical sparks – for example, electrical equipment that is being switched on or off.
Also remember to always use it only in a well-ventilated room.
3. Do not disassemble any part of the unit as this could result in malfunction or reduced performance.
4. When not using the microscope system, make sure that the lamp housing is cool enough, and cover the microscope system with the dust cover before storage.
5. When disposing of this unit, check the regulations and rules of your local government and be sure to observe them.

5 Caution

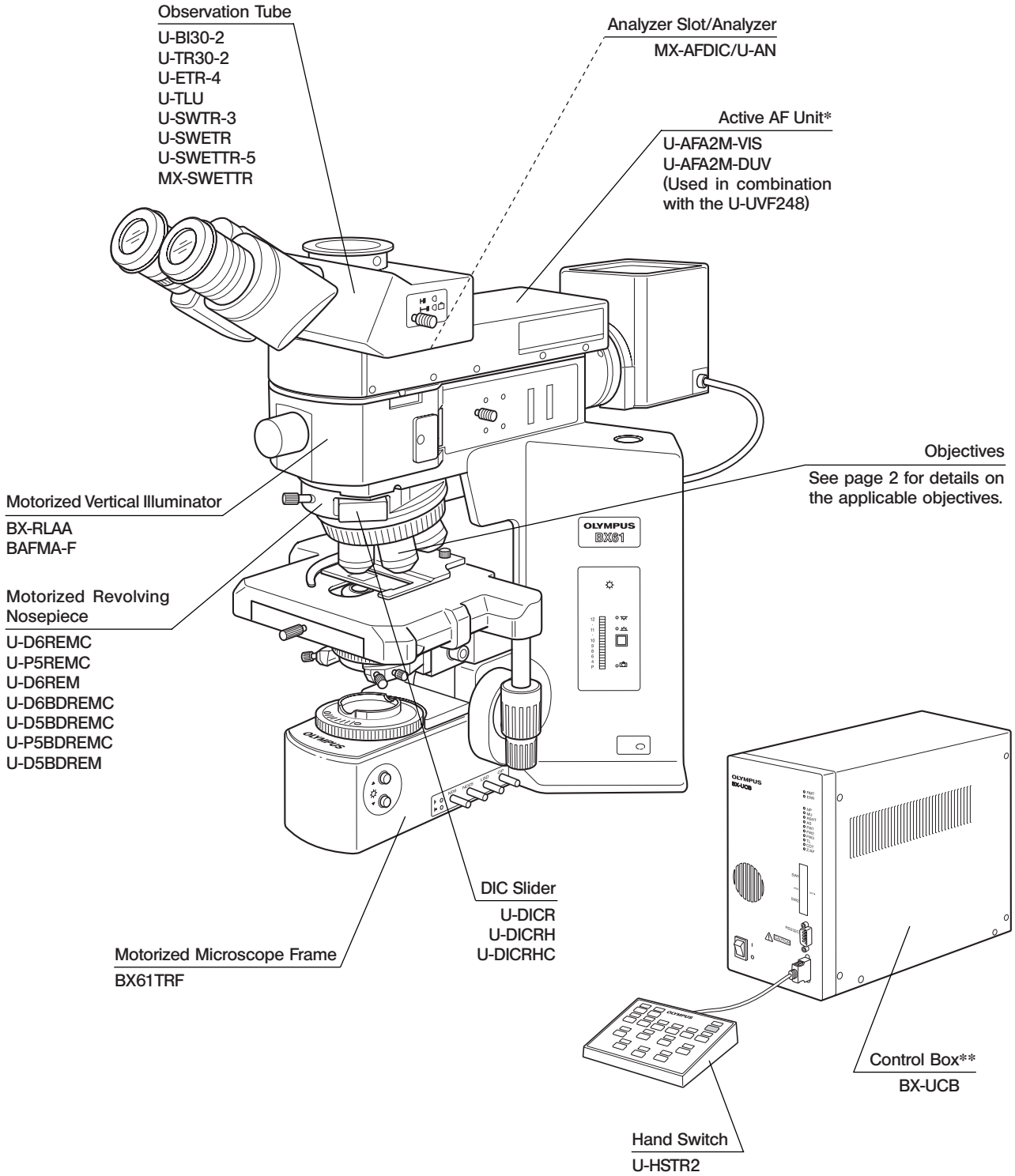
If the unit is used in a manner not specified by this manual, the safety of the user may be imperiled. In addition, the equipment may also be damaged. Always use the equipment as outlined in this instruction manual.

The following symbols are used to set off text in this instruction manual.

- ▲ : Indicates that failure to follow the instructions in the warning could result in bodily harm to the user and/or damage to equipment (including objects in the vicinity of the equipment).
- ★ : Indicates that failure to follow the instructions could result in damage to equipment.
- ◎ : Indicates commentary (for ease of operation and maintenance).

1 MICROSCOPE MODULES

* The modules marked * are provided to the U-AFA2M active AF unit.
Other required applicable modules are to be prepared separately.

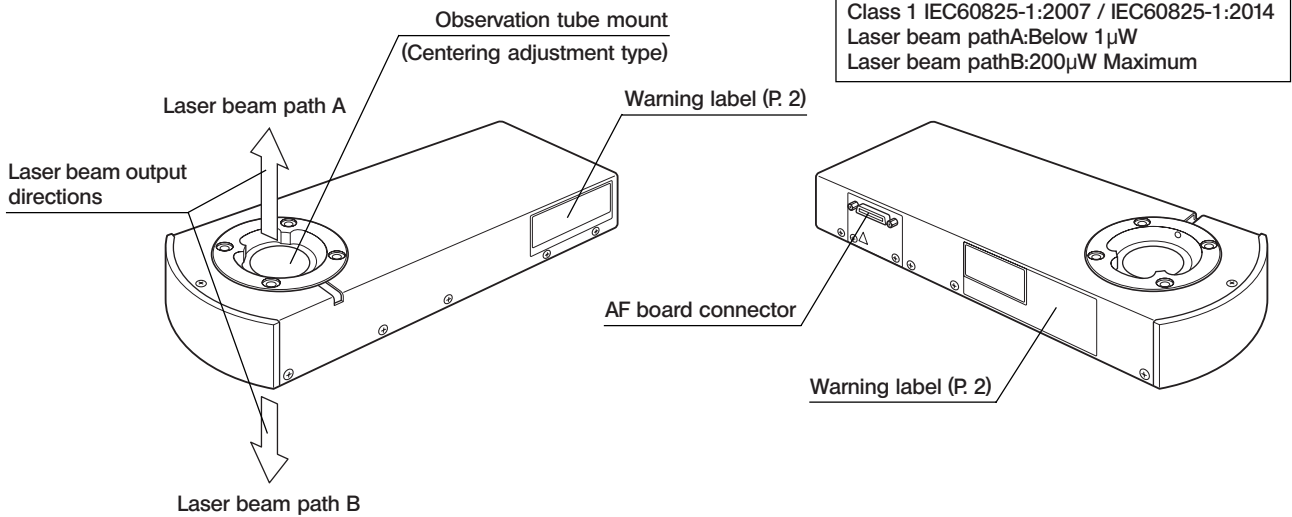


** The U-AFA2M active AF unit is provided with the U-AFA2M-CB AF control board, which is to be installed inside the BX-UCB control box.

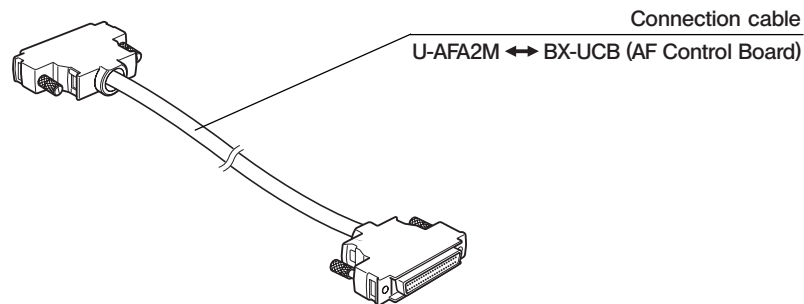
2 NOMENCLATURE

Active AF Unit U-AFA2M-VIS/U-AFA2M-DUV

- ▲ Be sure to use the connection cable designated by Evident.
The computer in use should meet the IEC60950 requirements.
If any item other than specified is used, the entire performance of the system cannot be guaranteed.



AF Cable U-AFA2M-CBL2M (2 m)/U-AFA2M-CBL3M (3 m)



AF Control Board U-AFA2M-CB

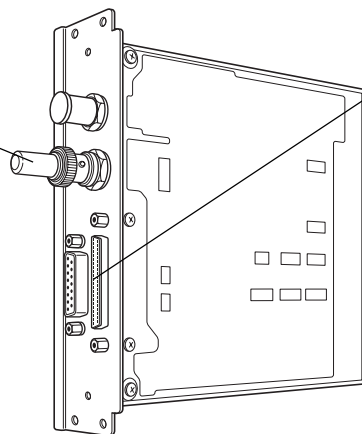
© To be installed in the BX-UCB Control Box.

Termination connector

★ If disconnected, AF operation will be unavailable.

AF control board connector
The three other connectors are not used.

CAUTION If another Z-focusing control board (U-ZPCB, U-AFP1-CB, etc.) is already installed in the BX-UCB, be sure to remove it before installing this board. Otherwise, malfunction will result.



3 ASSEMBLY

3-1 Assembly Diagram

★ For the assembly and adjustments of the unit, have Evident perform them.

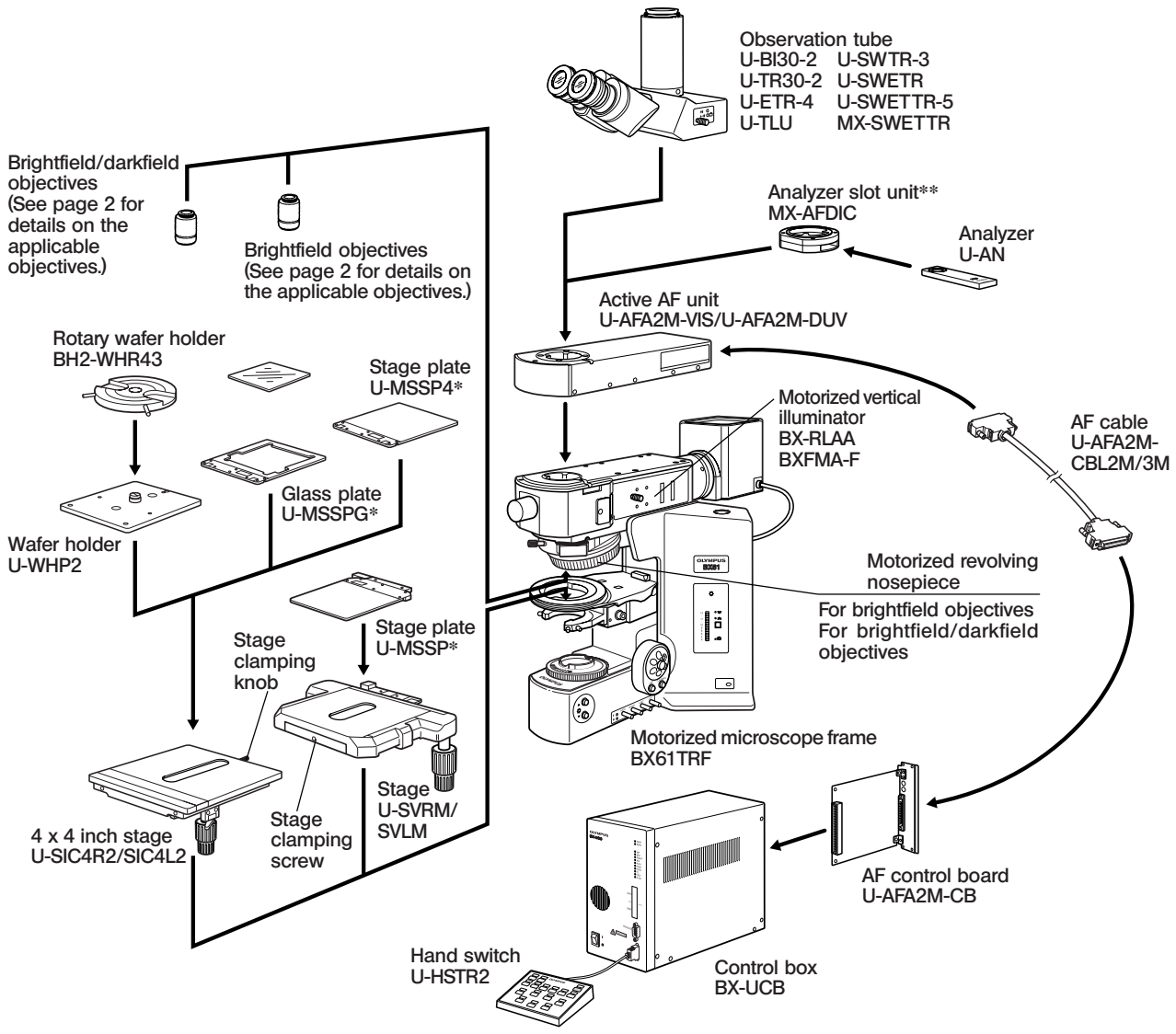
★ After re-assembling the module, re-adjustments are required. Consult Evident in such a case.

Ⓞ For the connection using an RS-232C cable (to be prepared by the user) and computer, refer to the instruction manuals for the BX-UCB control box and U-HSTR2 hand switch.

CAUTION The BX-RLAA motorized vertical illuminator will not work properly if the connector of the U-UCD8A motorized universal condenser is connected to the BX-UCB control box. Be sure to detach the connector before using the illuminator.

Ⓞ In consideration of the observation of metallurgical specimens, it is recommended to use a dedicated metallurgical stage or replace the specimen holder with a stage plate to improve the ease of operation.

If only the stage plate is replaced, the back surface of the stage plate may be worn after long period of use because the upper surface of the biological stage is coated with ceramic.



* Warp prevention pins (2 for each) are attached on the bottom sides of the U-MSSP/MSSP4 stage plate and the U-MSSPG glass plate when the system is shipped from the factory. Remove the pins before use.

** Attach the MX-AFDIC so that the model nameplate faces straight the rear.

CAUTION When a brightfield objective is mounted on the revolving nosepiece by means of the BD-M-AD objective adapter, the AF centering error may occur. In this case, the AF performance of the system cannot be guaranteed.

3-2 Detailed Assembly Procedures

1 Installing the U-AFA2M Active AF Unit

(Figs. 2 & 3)

CAUTION Be sure to adjust centering of the AF unit.

▲ To ensure safety, be sure to unplug the AF cable during installation and adjustment of the AF unit.

1. Fully loosen the observation tube clamping screw ① using an Allen screwdriver, attach the circular dovetail on the bottom of the active AF unit ②, and then tighten the clamping screw ① again.

★ The centering of the AF unit should be adjusted before mounting it on the observation tube.

2. Attach the standard straight tube ③ on the observation tube mount on the AF unit, then insert the scaled CT ④ into the standard straight tube. Rotate the helicoid on the top of the CT to focus on the cross scale.

3. Engage the objective with the highest magnification of the ones being used in the light path.

4. Set the observation path of the vertical illuminator to reflected light brightfield (BF).

5. Slide the top of the CT to focus on the objective pupil.

6. Loosen the clamping screws in the four holes ⑤ on the top of the sensor unit, align the center of the objective pupil with the cross of the CT (within one scale in both up/down and left/right directions), then tighten the clamping screws firmly.

7. Remove the standard straight tube and CT, and block the 4 holes with the provided contamination stickers.

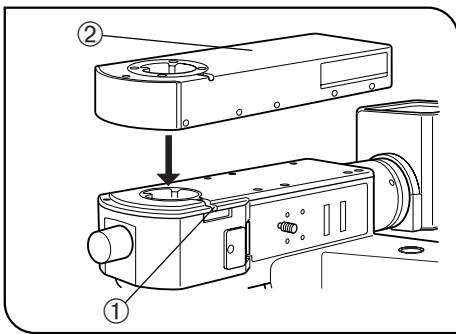


Fig. 2

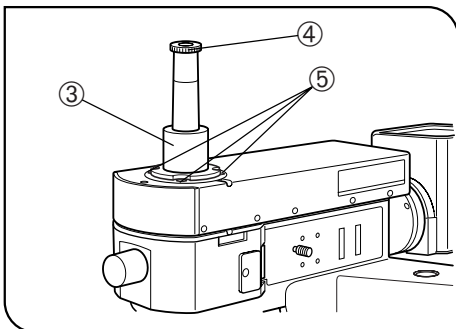


Fig. 3

2 Installing the U-AFA2M-CB Control Board

(Figs. 4 & 5)

Ⓞ Install only the U-AFA2M-CB AF control board in the BX-UCB control box. Remove any other Z-focusing control board (U-ZPCB, U-AFP1-CB, etc.) if any is installed. Otherwise, malfunction will result.

★ Do not unplug the termination connector. Otherwise, AF operation will be unavailable.

★ The AF control board is a precision part that may be damaged critically by static electricity. Since the human body is charged with a very small amount of static electricity, it should be discharged before handling the board. The static electricity can be discharged by simply touching a nearby metallic object.

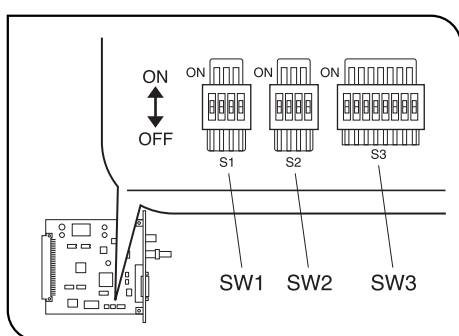


Fig. 4

Changing the Settings of On-Board DIP Switches

Ⓞ The on-board DIP switches on the AF control board have been set for use with the BX61 before shipment from the factory.

In this condition, all switches of SW1, SW2 and SW3 are set to OFF.

When the AF Unit is Installed on the BX61

1. The DIP switches can be used without modifying the factory shipment condition.
2. Change the DIP switch positions only when the following functions are required.

SW2 Set No. 4 to ON.

- This replaces the functions of the F/C switching and stage escape buttons on the left side of the BX61 with the stage DOWN and UP functions.

SW3 Set No. 4 to ON.

- When the U-FWT filter wheel is not used, this changes the focus adjustment stroke from 15 mm to 25 mm.
- Set the switch to OFF when the U-LWUCD long-WD universal condenser is used.

When the AF Unit is Installed on the BXFMA

1. Be sure to change the settings of the DIP switches for the BXFMA.

SW2 Set No. 2 and No. 3 to ON.

SW3 Set No. 2 and No. 5 to ON*.

- * This is required to align the focusing knob rotation directions with the objective up/down movement directions when the U-FH is used. As a result of this, rotating the focusing knob towards you move the objective downward.

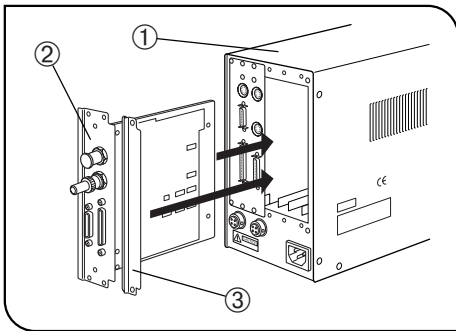


Fig. 5

Installing the AF Control Board

★ Be sure to set the main switch on the BX-UCB control box ① to “○” (OFF) before proceeding to installing the U-AFA2M-CB AF control board.

1. Loosen the six clamping knobs on the two option slot covers on the rear of the BX-UCB and remove the covers and knobs.
 - Ⓞ To stabilize the installation operation, attach two of the removed clamping knobs on the AF control board ②.
2. Insert the AF control board ② into the BX-UCB by aligning the orientation of the connector inside the BX-UCB and that of the AF control board. Push in the board along the board rails all the way so that the connector is plugged in securely.
 - Ⓞ A space of two board rails is required for installation. Use two adjacent option slots on either the central or right.
3. Clamp the AF control board ② using the clamping knobs removed above. Also attach the other removed cover ③ using the other clamping knobs removed above.
 - Ⓞ Store the other, unused option board cover in a safe place.

3 Assembling Other Modules

Mount all of the applicable modules selected by the user. At the end, confirm that the main switches of the connected modules are set to “○” (OFF) and connect the cables.

4 SYSTEM STARTUP PROCEDURE

- Ⓞ The system can be started using dedicated software (analySIS FIVE or MX2-BSW). For details, refer to the instruction manual for the software.

5 REFLECTED LIGHT DIC AND SIMPLIFIED POLARIZED LIGHT OBSERVATIONS

(Note) The modules required for simplified polarized light observation are the MX-AFDIC analyzer slot, U-AN analyzer and U-PO3 polarizer.

DIC (Differential Interference Contrast) observation is possible by adding the U-DICR series of DIC slider to the above combinations.

★ The performance of the polarizer may deteriorate when it has been exposed to light for a long period (about continuous 2000 hours). If this happens, replace the polarizer.

★ When using the high-intensity light source, be sure to use the U-25L42 UV cut filter for prevention of the polarizer burn.

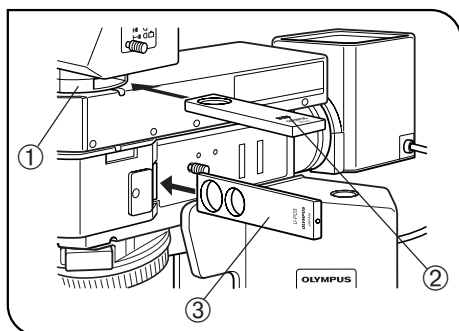


Fig. 6

1 Setting the Analyzer and Polarizer (Fig. 6)

1. Insert the U-AN analyzer ② in the analyzer insertion slot of the analyzer slot unit ① so that the analyzer's surface with indication faces upward. (The analyzer can also be inserted through the slot on the other side of the unit.)

2. Insert the U-PO3 polarizer ③ so that the surface with indication comes on the front.

Ⓞ An approximate cross-Nicol position for the simplified polarized observation can be obtained when both the analyzer and polarizer are engaged in the light path. In this condition, polarized light observation can be started immediately after placing a specimen.

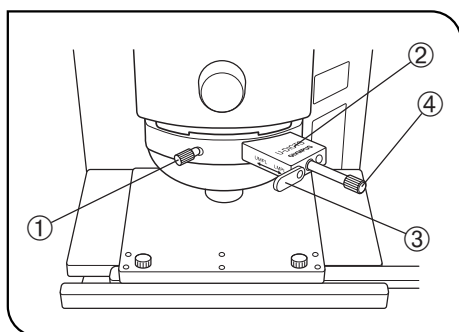


Fig. 7

2 Setting the DIC Slider (Fig. 7)

1. Loosen the mounting knob ① on the front of the DIC revolving nosepiece, insert the DIC slider ② so that the surface with indication faces up, and clamp by tightening the mounting knob.

2. With the U-DICR interference slider, set the slide lever ③ according to the objective in use.

Lever ③ position	Applicable Objectives	
Pushed in	UIS2	MPLFLN/MPLFLN-BD series
	UIS	UMPlanFI/UMPlanFI-BD series MPlanApo20X, 100X MPlanApo100XBD
Pulled out	UIS2	LMPLFLN/LMPLFLN-BD series
	UIS	LMPlanFI/LMPlanFI-BD series LMPlanApo/LMPlanApo-BD series

3. With the U-DICRH or U-DICRHC slider that does not have the slide lever, the applicable objectives are as follows.

DIC Slider	Applicable Objectives	
U-DICRH	UIS2	MPLFLN/MPLFLN-BD series
	UIS	UMPlanFI/UMPlanFI-BD series MPlanFI-BD series MPlanApo20X, 100X
U-DICRHC	UIS2	LMPLFLN/LMPLFLN-BD series
	UIS	LMPlanFI/LMPlanFI-BD series LMPlanApo/LMPlanApo-BD series

3 Observation Method

(Fig. 7)

1. Place the specimen on the stage and adjust the focus by moving the stage up or down.
2. Adjust the field iris diaphragm so that its image circumscribes the field of view.
3. The contrast may sometimes be enhanced by closing the aperture iris diaphragm slightly.

U-DICR

U-DICRHC

1. Adjust the background contrast by turning the prism movement knob ④ on the DIC slider as described below. (Fig. 7)
2. When the prism movement knob on the DIC slider is turned, the interference color in the background varies continuously from the gray sensitive color to magenta sensitive color (from -100 to 600 nm). Set the interference color which can provide best contrast with respect to the specimen.
 - Selecting a gray background color enables 3D-looking observation with high contrast thanks to the highest sensibility of the gray sensitive color.
 - Selecting a magenta sensitive color allows even small phase variation to be observed as a change in color.

U-DICRH

1. Adjust the background contrast by turning the prism movement knob ④ on the DIC slider as described below. (Fig. 7)
 2. When the prism movement knob on the U-DICRH DIC slider is turned, the interference color in the background varies from -100 to 100 nm. Set the interference color which can provide best contrast.
 - Selecting a gray background color enables 3D-looking observation with high contrast thanks to the highest sensibility of the gray sensitive color.
 - Selecting a magenta sensitive color allows even small phase variation to be observed as a change in color.
- ★ **Since the DIC observation has a high detection sensitivity, take care against contamination on the specimen surface.**
- Ⓞ The detection sensitivity is variable depending on direction so it is recommended to use a rotary stage.

4 Switching Between Brightfield and Darkfield Observations

(Fig. 7)

1. Loosen the mounting knob ① on the front of the DIC revolving nosepiece, gently pull out the DIC slider ② to remove, and insert the dummy slider as far as it will go and then clamp it with the mounting knob.
2. Slide out the analyzer and polarizer to disengage them from the light path.

6 TV OBSERVATION/PHOTOMICROGRAPHY

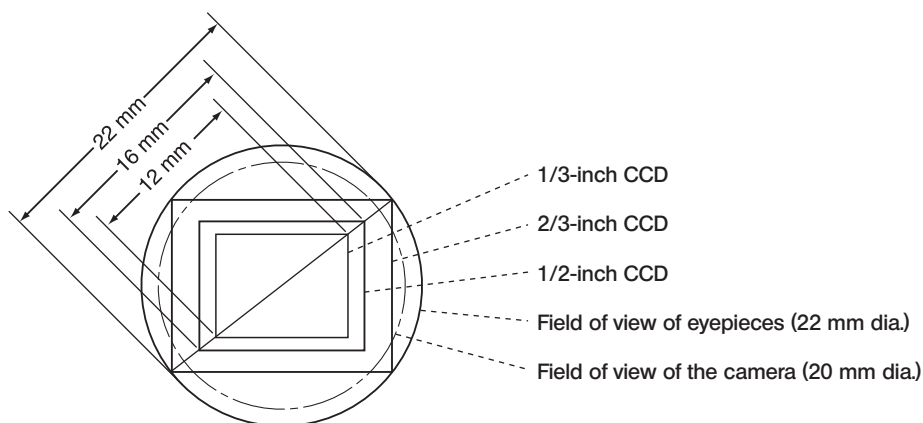
© Use a trinocular observation tube or the U-TLU when observing microscope images on a TV screen or photographing them.

The U-TV0.35XC-2/TV0.5XC-3/TV0.63XC C-mount camera adapter or the combination of U-TV1X-2 + U-CMAD3, etc. can be mounted on the straight observation tube.

As adapters for mounting a camera with a mount other than the C-mount are also available, please contact Evident.

1 Selecting the TV Adapter Magnification

The magnification of the TV adapter is determined by the size of the CCD used in the TV camera or digital camera. The following illustration shows the image pickup areas of the 0.5X TV adapter when only the U-AFA2M is used as the intermediate attachment of the microscope.



When the 0.5X TV adapter is used

CCD size	C-mount camera adapter			
	U-TV0.35XC-2	U-TV0.5XC-3	U-TV0.63XC	U-TV1X + U-CMAD3
1/3-inch	17.1 mm	12 mm	9.5 mm	6 mm
1/2-inch	*22.9 mm	16 mm	12.7 mm	8 mm
2/3-inch	*31.4 mm	*22 mm	17.5 mm	11 mm

*The four corners of image may be cut off or obscured.

© The fields of view of the eyepieces and camera vary depending on other intermediate attachments used.

Intermediate attachments	Eyepiece visual field	Camera visual field
U-AFA2M	22 mm	20 mm
U-AFA2M + MX-AFDIC	22 mm	20 mm
U-AFA2M + U-UVF248	20.8 mm	18.6 mm
U-AFA2M + U-UVF248 + MX-AFDIC	20 mm	18.1 mm

7 SPECIFICATIONS

■ AF Unit

Item	U-AFA2M-VIS	U-AFA2M-DUV
Applicable microscope frame	BX61TRF + BX-RLAA BXFMA	
Applicable illuminator	BX-RLAA, BXFMA-F	
Applicable intermediate attachment	—	U-UVF248-IM
Applicable observation tube	U-BI30-2, U-TR30-2, U-ETR-4, U-TLU, U-SWTR-3, U-SWETR, U-SWETTR-5, MX-SWETTR.	
Applicable revolving nosepiece	U-D6REMC, U-D6BDREMC, U-D5BDREMC, U-P5REMC, U-P5BDREMC, U-D6REM, U-D5BDREM.	
Applicable observation modules	Polarizer: U-PO3, U-POTP3. Analyzer: U-AN, U-AN360-3. DIC slider: U-DICR, U-DICRH, U-DICRHC. Analyzer slot unit: MX-AFDIC.	
Applicable control box	BX-UCB (The U-AFA2M-CB and dedicated software are required)	
Controller	Computer	
AF detection method	Pupil-division reflection active autofocus using a laser diode and 2-division detector. Multi-spot projection. Laser wavelength: 775-800 nm (Class 1 IEC60825-1:2007 / IEC60825-1:2014) Laser pulse duration: 0.5 to 2.5ms Pulse frequency: 100 Hz Momentary maximum power: 200 μW. (Parallel beam) Output from internal laser diode: Beam divergence: $\theta // = 7$ to 13 deg, $\theta \perp = 23$ to 33 deg Maximum power: 10mW	
Applicable objectives	See page 2 for details on the applicable objectives.	
Applicable observation methods	Reflected light brightfield. Reflected light darkfield. Reflected light DIC (using U-AN analyzer + MX-AFDIC). Reflected light simplified polarized light (using U-AN analyzer + MX-AFDIC).	Reflected light brightfield. Reflected light darkfield. Reflected light DIC (using U-AN analyzer + MX-AFDIC). Reflected light simplified polarized light (using U-AN analyzer + MX-AFDIC).
Field number	22 (20 for camera observation)	
AF rate	0.2 sec. from the proximity of focal point.	
AF repeatability	Within the focal depth of the objective in use.	
Specimen tracking range	5X: ±5000 μm or more. 10X: ±2000 μm. 20X: ±1100 μm. 50X: ±400 μm. 100X: ±100 μm. 150X: ±50 μm. The tracking range is dependent on the specimen reflectivity and objective in use. The figures above are some of examples in a brightfield observation of an IC wafer specimen (reflectivity about 45%) using a LMPlanFI 5X to 100XBD or LMPlanApo150XBD objective.	5X: ±5000 μm or more. 10X: ±2000 μm. 20X: ±1100 μm. 50X: ±400 μm. 100X: ±100 μm. 150X: ±50 μm. DUV: ±50 μm. The tracking range is dependent on the specimen reflectivity and objective in use. The figures above are some of examples in a brightfield observation of an IC wafer specimen (reflectivity about 45%) using a LMPlanFI 5X to 100XBD or LMPlanApo150XBD objective.
Dimensions	108(W) x 45(H) x 313(D) mm	
Weight	2.6 kg	


■ Operating Environment

- Indoor use.
- Altitude: Max. 2000 meters
- Ambient temperature: 10 to 35°C (50 to 95° F)
- Relative humidity: 15% to 85%
- Supply voltage fluctuations: $\pm 10\%$
- Pollution degree: 2 (in accordance with IEC60664)
- Installation (overvoltage) category: II (in accordance with IEC60664)

8

TROUBLESHOOTING GUIDE

Under certain conditions, performance of the unit may be adversely affected by factors other than defects. If problems occur, please review the following list and take remedial action as needed. If you cannot solve the problem after checking the entire list, please contact Evident for assistance.

Problem	Cause	Remedy	Page
The unit cannot be turned ON.	A wrong cable is connected.	Connect the appropriate cable.	BX-UCB Instructions
The focusing module is not initialized after power ON.	The DIP switches are set improperly.	Set them properly.	9
	The AF control board is connected improperly.	Check its connection.	10
The control from the dedicated software is not available.	The microscope is being initialized.	Wait until the initialization completes before launching the software.	Software Instructions
	The DIP switches on the BX-UCB are set improperly.	Set them properly.	BX-UCB Instructions
	A wrong RS-232C cable is connected.	Connect a straight cable with D-SUB 9-pin female-female connectors.	BX-UCB Instructions
	There is wire connection or contact failure in the connection cables.	Check the connections of the cables.	7
AF is not successful in DIC observation.	The prism movement knob on the DIC slider is set improperly.	Turn the prism movement knob and retry AF operation.	12
AF is not successful.			
An error occurs immediately after the start of AF.	No limits are set for the focusing module.	Set the focusing limits.	Software Instructions
	The AF zone is not set.	Set the AF zone.	Software Instructions
	The termination connector is unplugged.	Plug it in.	6
	A motorized unit is operating.	Wait until the motorized unit completes operation.	—
	 The AF laser spot is captured in the photomicrograph.	Use a CCD camera incorporating an IR cut filter.	2
An error occurs after the focusing module starts to move after the start of AF.			
The error occurs with all objectives.	The limits are set improperly.	Re-set the focusing module limits.	Software Instructions
	The AF zone is set improperly.	Re-set the AF zone.	Software Instructions
	The DIP switches are set improperly.	Set them properly.	9
	The retardation in DIC observation is set to a position with low return light.	Execute AF with a different retardation position, and then re-adjust it.	12
	The objective on the revolving nose-piece is different from that handled with the control software.	Check if the objective on the revolving nosepiece matches that handled with the software.	Software Instructions

Problem		Cause	Remedy	Page
	The error occurs with low-power objectives.	The diopter between the eyepieces and camera are deviated.	Re-adjust the diopter.	Microscope Instructions
		The color aberration lens is in an improper position.	Adjust the color aberration lens.	Software Instructions
		The specimen causes diffused reflections.	Focus the specimen manually.	3
	The error occurs with high-power objectives.	A time-out error occurred because AF with a high-power objective was started when the specimen was far from the focused position.	Use a lower-power objective and retry AF.	—
		The specimen has low reflectivity.	Focus the specimen manually.	3
		The optical axis of the objective is deviated from that of the AF unit.	Contact Evident.	8
AF results in focusing on a region other than the region of interest.	Dirt is attached to the specimen.	Remove dirt.	—	
	The color aberration lens is in an improper position.	Adjust the color aberration lens.	Software Instructions	
Long time is taken before completion of AF.	A time-out error occurred because AF with a high-power objective was started when the specimen was far from the focused position.	Use a lower-power objective and retry AF.	—	
	The objective on the revolving nosepiece is different from that handled with the control software.	Check if the objective on the revolving nosepiece matches that handled with the software.	Software Instructions	
The field of view is obscured.	The FN of the eyepieces or CCD camera is larger than specified.	Use eyepieces and CCD camera with the specified FN.	13	
	The field iris diaphragm is stopped down.	Open it properly.	Microscope Instructions	

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