INSTRUCTIONS

IX3-ZDC2

Z DRIFT COMPENSATOR

Optical Microscope Accessory

This instruction manual is for the Z drift compensator model IX3-ZDC2.
To ensure the safety, obtain optimum performance and to familiarize yourself fully with the use of this product, we recommend that you study this manual thoroughly before operating this product, and always keep this manual at hand when operating this product.
Retain this instruction manual in an easily accessible place near the work desk for future reference.

This product is a part of the system product which complies with the CE marking.
Please refer to the instruction manual of your system product for the safety instructions related to the CE marking.

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

이 기기는 업무용 환경에서 사용할 목적으로 적합성평가를 받은 기기로서 가정용 환경에서 사용하는 경우 전파간섭의 우려가 있습니다.

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Introduction

- ◎ Combination use of the Z drift compensator IX3-ZDC2 and the research inverted microscope IX83 features the capability of compensating for the Z drift that poses problems during long hours of time-lapse observation of live cells.
  IX3-ZDC2 has two Z drift compensation modes including the focus search mode and continuous focus mode, which are to be selected according to the specimen.
- ◎ IX3-ZDC2 can be controlled either with the touch panel controller or the cellSens Imaging Software. Contact EVIDENT for information on supported versions of cellSens.
- ◎ For the applicable modules, contact EVIDENT or check the latest brochure for this product.

Configuration of instruction manuals

Read all the instruction manuals supplied with the units you purchased.
The following instruction manuals are prepared for the units to be used with this microscope.

Instructions	Major contents
IX3-ZDC2 Z Drift Compensator (this manual)	Contains the cautions, usage of the product and the Z drift compensation.
IX83 Research Inverted Microscope	Contains the usage of the Research Inverted Microscope.
IX3-CBH / U-MCZ Control Box / Controller	Contains the function of the IX3-CBH Control Box and the operations with the U-MCZ Controller.

Label of the immersion oil

Read the label of the immersion oil you purchased.

Immersion oil	Major contents
IMMOIL-8CC IMMOIL-500CC IMMOIL-F30CC	Contains the cautions and handling methods of the immersion oil.

Important

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

The following symbols are used in this instruction manual.

⚠ CAUTION : Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.

NOTE : Indicates a potentially hazardous situation which, if not avoided, may result in damage to the product or other property.

TIP : Indicates commentary (for ease of operation and maintenance).

⚠ CAUTION - Safety precautions -

1. The Z drift compensation function uses a laser diode (wavelength 790 nm) for Z drift compensation. Never remove the warning and caution labels on the product. The semiconductor laser for Z drift compensation incorporated in this product it designated as a product of the following class.

   CLASS 1 LASER PRODUCT (IEC60825-1:2014, EN60825-1:2014/A11:2021)

   This product complies with 21 CFR 1040.10 and 1040.11 except for conformance with IEC 60825-1 Ed. 3., as described in Laser Notice No. 56, dated May 8, 2019.

2. Never attempt to remove the cover using a tool. There is a risk of exposure to the internal strong laser beam as well as other malfunction or failure.
   [Semiconductor laser, wavelength 790 nm, output (max.) 20 mW, equivalent to Class 3B]
3. Always use the power cord provided by EVIDENT. If no power cord is provided, please select the proper power cord by referring to the section ""6 Proper selection of the power supply cord" on page 20. If the proper power cord is not used, the safety and EMC performance of the product can not be assured.
4. Always connect the power cord correctly and ensure that the grounding terminal of the product and that of the wall outlet are properly connected. If the product is not grounded, our intended electric safety and EMC performance of the product can not be assured.
5. Keep the power cord and cables well away from the lamp housing. If the power cord and cables contact a hot area of the lamp housing, they could melt and cause electric shock.
6. After operation or in case of abnormality, be sure to disconnect the power cord from the connector on the product or from the outlet.
7. Do not permit tools or metal fragments to get into air vents, or other apertures. Doing so could cause failure of the product or electric shock to the user.
8. If this product is used in combination with laser products classified above CLASS 1, this instruction manual is not effective. Follow the instruction manuals of the laser products.
9. When holding the IX3-ZDC2, be sure to hold the specified areas. For details, see page 7. If the slippery areas of the IX3-ZDC2 is held, it may fall off and result in an injury.
10. Before transporting the microscope, be sure to remove the IX3-ZDC2. If the microscope is transported with the IX3-ZDC2 attached, it may be damaged and its parts may fall off, resulting in an injury.
11. Do not place any objects on the IX3-ZDC2. If anything is placed on it, the IX3-ZDC2 may malfunction, causing damage to the specimen or pinched finger or other injury.
12. Set the focus limit (upper-limit position within the focus moving range) for each objective in order to prevent the objective from touching the specimen during the Z drift compensation operation.
13. A lifetime of this product is 8 years. If you are going to use it exceeding 8 years, contact EVIDENT.

Safety Symbols

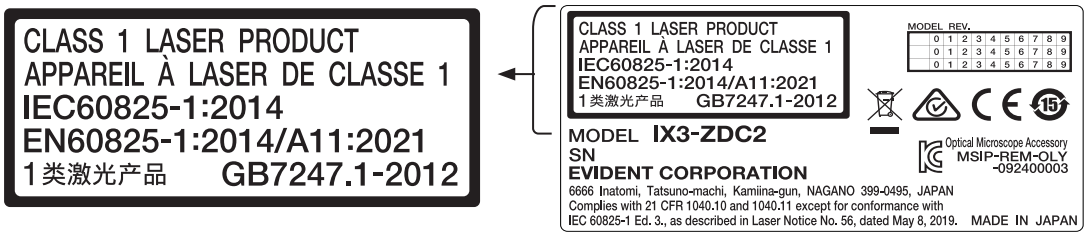
The following symbols are found on the product. Study the meaning of the symbols and always use the product in the safest possible manner.

Symbol	Explanation	Location
⚠	Indicates a non-specific general hazard. Follow the description given after this symbol or in the instruction manual.	See page 7
⚠	Indicates that the surface becomes hot, and should not be touched with bare hands.	See page 7

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

Warning label

Positions of caution labels: See page 7



When a caution label becomes dirty or is peeled off, contact EVIDENT for replacement.

Handling precautions

1. This product is a precision instrument. Handle it with care and avoid subjecting it to sudden or severe impact.
2. Do not use the product where it is subjected to direct sunlight, high temperature and humidity, dust or vibrations. (For the operating conditions, see “3 Specifications” on page 16.
3. For the objectives applicable to the product, see the list on page 5-6.
4. In order to operate the Z drift compensation function properly, be sure to place the microscope on the anti-vibration table and install the control box under the table.
5. During the Z drift compensation, be careful not to give vibration to the microscope including the vibration caused by changing optical elements.

Maintenance and storage

1. Do not leave stains or fingerprints on the lenses and filters. If they get dirty, blow away dust with a commercially available blower and gently wipe the lens or filter with a piece of cleaning paper (or clean gauze).
   For cleaning fingerprints and oil stains, slightly moisten a piece of cleaning paper with commercially available absolute alcohol and wipe them off with it.

⚠ CAUTION **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, which could cause ignition of a fire.**
Also remember to always use absolute alcohol only in a well-ventilated room.

2. Wipe the portions other than lens with a dry soft cloth.
   If the dirt cannot be removed by dry-wiping, moisten a soft cloth with diluted neutral detergent and wipe the dirty surface with it.

NOTE **Do not use organic solvents because they may deteriorate the coated surface or plastic parts.**

3. After using the product, set the main switch to “ O ” (OFF), wait for the lamp housing to cool down sufficiently, and keep it covered with a dust cover during storage.
4. When disposing of this product, be sure to follow the regulations and rules of your local government.

Notes on Z drift compensation

1. When using an objective with correction collar, always adjust the correction collar before using the Z drift compensation function. Otherwise, the Z drift compensation will not be available.
2. Be sure to use an anti-vibration bench to enable the Z drift compensation function properly.
3. About the focus search mode:
   In this mode, a desired focus position is reproduced by adjusting the focus position of the objective to the bottom of the specimen container using the 790 nm laser beam, and then mechanically moving that focus position to a position in the cell to be observed.
   However, this requires the time to move the focus position.
4. About the continuous focus mode:
   In this mode, the objective can be focused onto a position in the cell to be observed while the 790 nm laser beam is focused on the bottom of the specimen container. Continuous (video rate) observation is possible, but the available focus range is limited.
   The available continuous focus range differs depending on the objective. The following shows the details.

When using the glass-bottom specimen container (the bottom is 0.17 mm thick.)

Last characters of the objective name	Available continuous focus range (above the upper surface of the bottom)
100XO	10µm
60XO	20µm
60XS	20µm
60X	50µm
40XO	40µm
40XW	70µm
40X	150µm
30XS	150µm
20XO	50µm
20X	500µm
10X	500µm

When using the plastic-bottom specimen container (the bottom is 1 mm thick.)

Last characters of the objective name	Available continuous focus range (above the upper surface of the bottom)
20X	400µm
10X	500µm

5. With DIC (Differential Interference Contrast) observation, Z drift compensation is possible only with the gray sensitive color and in the focus search mode. In addition, unevenness of the image is increased due to the polarization characteristic of the dichroic mirror.
6. In case the analyzer (U-ANT) is attached to the slider for DIC observation, the light intensity is decreased extremely. Do not use the analyzer (U-ANT) but use the transmitted DIC mirror unit IX3-FDICT.
7. Use the objective with its product iris diaphragm opened if any.
8. The focus time for the Z drift compensation is approximately 0.5 to 2 seconds. However, it may take longer depending on the setting of the Z drift compensation search range.
9. When attaching the reflected light fluorescence illuminator to the microscope, attach the spacer for reflected illumination provided with the IX3-ZDC2 to a place between the reflected light fluorescence illuminator and the lamp house, in order to ensure optical performance during the fluorescence observation.

10. If the commercially available glass thermo plate is used as the stage center plate, the Z drift compensation function is not available.
11. The focus position in the continuous focus mode may not be kept under the observation condition where the focal depth is extremely shallow, such as super resolution imaging, etc.
12. The following lists the specimen container with which the performance of the Z drift compensation is guaranteed.
    - Glass-bottom dish:
      Manufacturer: Iwaki, Matsunami, Corning
      Thickness of the bottom: No1S (0.15 to 0.19 mm)
    - Plastic-bottom dish:
      Manufacturer: Nunc, Corning
      Thickness of the bottom: 0.7 to 1.3 mm
    - Glass-bottom 96-well microplate:
      Manufacturer: Iwaki, Corning
      Thickness of the bottom: 0.15 to 0.19 mm
    - Plastic-bottom 96-well microplate:
      Manufacturer: Nunc, Corning
      Thickness of the bottom: 1.0 to 1.3 mm
13. Objective available for Z drift compensation (when using the glass-bottom specimen container)

O: Applicable –: Not applicable

Objective Name	NA	WD	FL		DIC		PH	
			Continuous	Focus search	Continuous	Focus search	Continuous	Focus search
APON 100XHOTIRF	1.70	0.08	O	O	–	O	–	–
UAPON20XW340	0.7	0.35	O	O	–	–	–	–
UAPON40XO340-2	1.35	0.10	O	O	–	O	–	–
UAPON40XW340	1.15	0.25	O	O	–	O	–	–
UPLXAPO10X	0.4	3.1	O	O	–	–	–	–
UPLXAPO20X	0.8	0.6	O	O	–	O	–	–
UPLXAPO40X	0.95	0.18	O	O	–	O	–	–
UPLXAPO40XO	1.4	0.13	O	O	–	O	–	–
UPLXAPO60XO	1.42	0.15	O	O	–	O	–	–
UPLXAPO60XOPH	1.42	0.15	–	O	–	–	–	O
UPLXAPO100XO	1.45	0.13	O	O	–	O	–	–
UPLSAPO10X2	0.4	3.1	O	O	–	–	–	–
UPLSAPO20X	0.75	0.6	O	O	–	O	–	–
UPLSAPO30XS	1.05	0.8	O	O	–	O	–	–
UPLSAPO30XSIR	1.05	0.8	O	O	–	O	–	–
UPLSAPO40X2	0.95	0.18	O	O	–	O	–	–
UPLSAPO40XS	1.25	0.3	O	O	–	O	–	–
UPLSAPO60XW	1.2	0.28	O	O	–	O	–	–
UPLSAPO60XS2	1.3	0.3	O	O	–	O	–	–
UPLSAPO100XO	1.4	0.13	O	O	–	O	–	–
UPLSAPO100XS	1.35	0.13-0.19	O	O	–	O	–	–
UPLAPO60XOHR	1.5	0.11	O	O	–	O	–	–
UPLAPO100XOHR	1.5	0.12	O	O	–	O	–	–

Objective Name	NA	WD	FL		DIC		PH	
			Continuous	Focus search	Continuous	Focus search	Continuous	Focus search
UPLFLN10X2	0.3	10	○	○	–	–	–	–
UPLFLN10X2PH	0.3	10	○	○	–	–	○	○
UPLFLN20X	0.5	2.1	○	○	–	○	–	–
UPLFLN20XPH	0.5	2.1	○	○	–	–	○	○
UPLFLN40X	0.75	0.51	○	○	–	○	–	–
UPLFLN40XPH	0.75	0.51	○	○	–	–	○	○
UPLFLN60X	0.9	0.2	○	○	–	○	–	–
UPLFLN60XOI	1.25-0.65	0.12	○	○	–	○	–	–
UPLFLN100XO2	1.3	0.2	○	○	–	○	–	–
UPLFLN100XOI2	1.3-0.6	0.2	○	○	–	○	–	–
UPLFLN100XO2PH	1.3	0.2	○	○	–	–	○	○
LUCPFLN20X	0.45	6.6-7.8	○	○	–	○	–	–
LUCPLFLN20XPH	0.45	6.6-7.8	–	○	–	–	–	○
LUCPFLN40X	0.6	2.7-4	○	○	–	○	–	–
LUCPFLN40XPH	0.6	3.0-4.2	○	○	–	–	○	○
LUCPFLN60X	0.7	1.5-2.2	○	○	–	○	–	–
LUCPFLN60XPH	0.7	1.5-2.2	○	○	–	–	○	○
PLAPON60XOSC2	1.4	0.12	○	○	–	○	–	–
UCPLFLN20X	0.7	0.8-1.8	○	○	–	○	–	–
UCPLFLN20XPH	0.7	0.8-1.8	○	○	–	–	○	○
CPLFLN10XPH	0.3	9.5	○	○	–	–	○	○

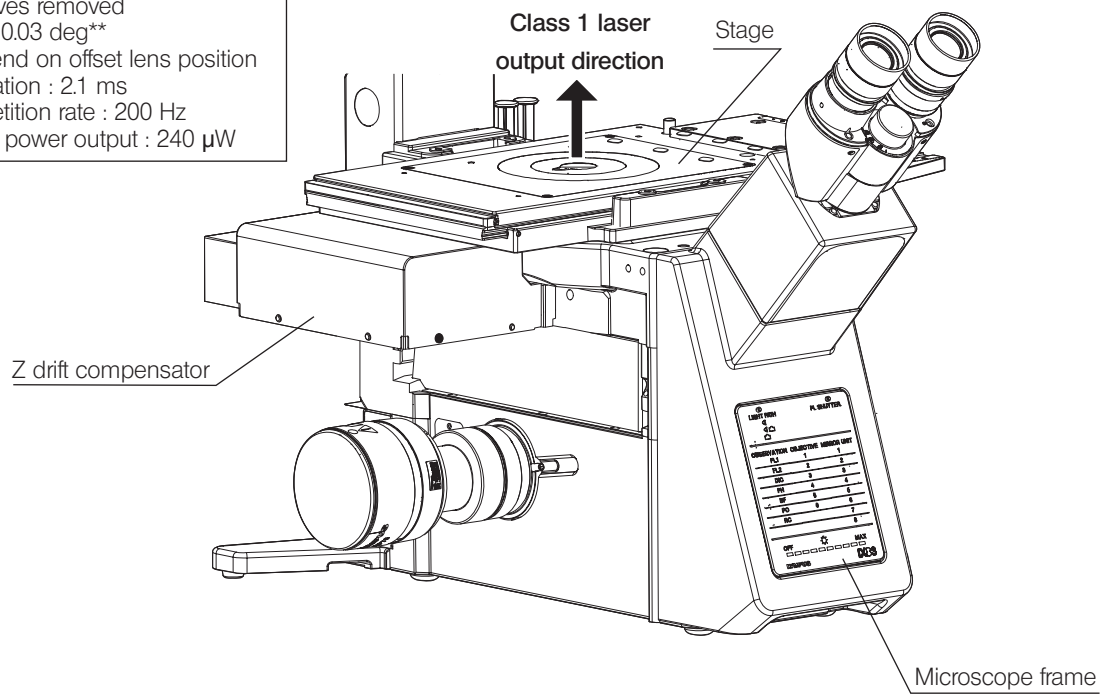
14. Objective available for Z drift compensation (when using the plastic-bottom specimen container)

○ : Applicable – : Not applicable

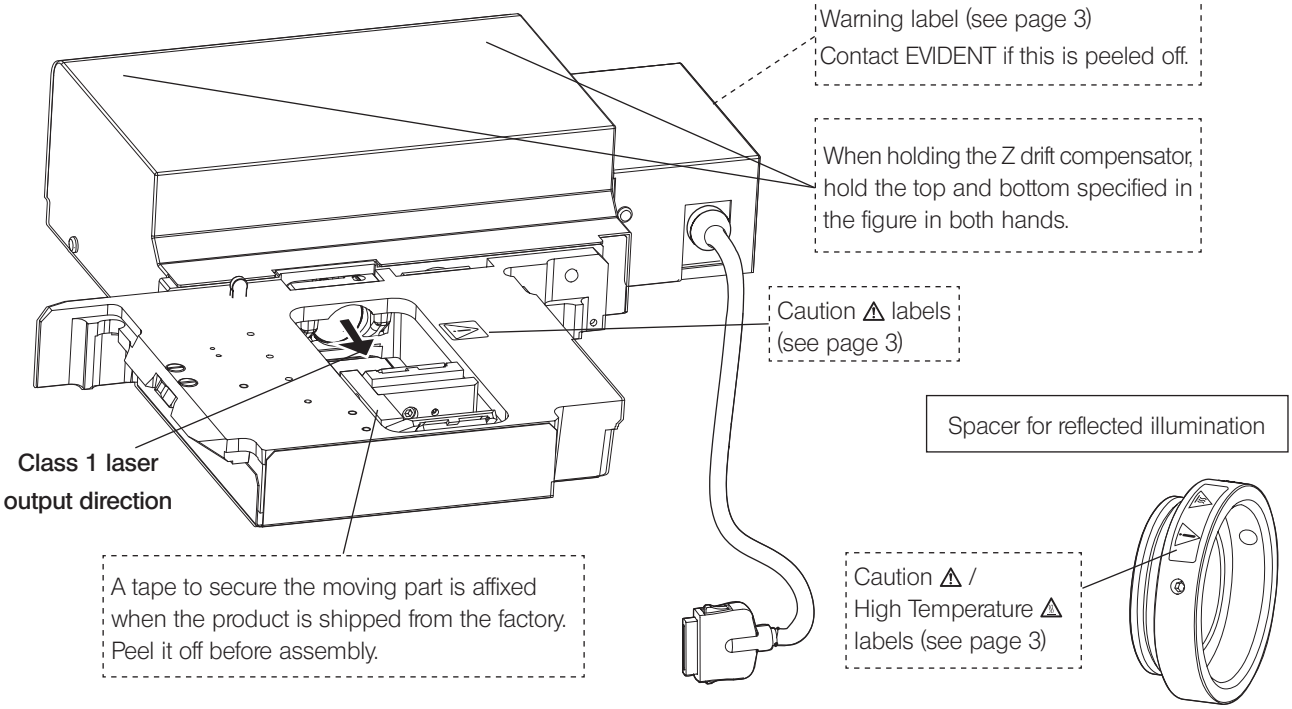
Objective Name	NA	WD	FL		DIC		PH	
			Continuous	Focus search	Continuous	Focus search	Continuous	Focus search
LUCPFLN20X	0.45	6.6-7.8	○	○	–	–	–	–
LUCPLFLN20XPH	0.45	6.6-7.8	○	○	–	–	○	○
LUCPFLN40X	0.6	2.7-4	–	○	–	–	–	–
LUCPFLN40XPH	0.6	3.0-4.2	–	○	–	–	–	○
LUCPFLN60X	0.7	1.5-2.2	–	○	–	–	–	–
LUCPFLN60XPH	0.7	1.5-2.2	–	○	–	–	–	○
UCPLFLN20X	0.7	0.8-1.8	○	○	–	–	–	–
UCPLFLN20XPH	0.7	0.8-1.8	○	○	–	–	○	○
CPLFLN10XPH	0.3	9.5	–	○	–	–	–	○

1 Nomenclature

Wavelength : 790 nm
Beam divergence :
① Objectives attached
0 to 1.49 NA *
* Depend on objective
② Objectives removed
-0.14 to 0.03 deg**
** Depend on offset lens position
Pulse duration : 2.1 ms
Pulse repetition rate : 200 Hz
Maximum power output : 240 μW



Z drift compensator



Spacer for reflected illumination

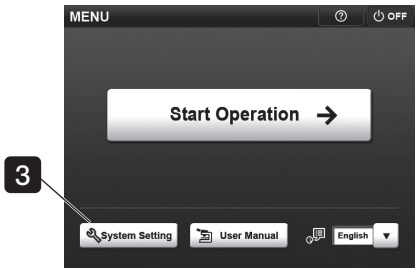
2-1 Settings of the Z drift compensation function

Various settings of the Z drift compensation function can be set by touch panel controller or imaging software cellSens.

This section explains the outline of the setting procedures by touch panel controller. For details, see Help of Touch Panel Controller. For the setting procedures by Imaging software cellSens, see Help of cellSens.

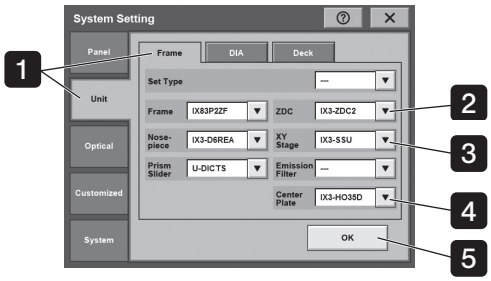
In the IX83 system, the sequence for turning on or off the main switches of the units, including the ones that are not described in this instruction manual, at startup or at the end respectively, is predetermined. For details, see the IX83 instruction manual.

1 Starting the system



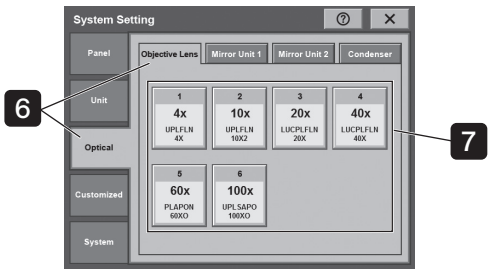
1. Turn ON the main switch of the control box IX3-CBH.
2. Turn ON the main switch of the touch panel controller.
   The [MENU] screen is displayed in the touch panel controller.
3. Tap [System Setting] on the [MENU] screen. The [System Setting] screen is displayed.

2 Setting the unit



1. Tap the [Unit] tab and then the [Frame] tab.
2. Tap the down arrow button for [ZDC] and then select and tap [IX3-ZDC2] from the list.
3. Tap the down arrow button for [XY Stage] and then select and tap a stage to be used from the list.
4. Tap the down arrow button for [Center Plate] and then select and tap a specimen holder to be used from the list.
5. Set the other required units accordingly and tap the [OK] button.

TIP If [XY Stage] and [Center Plate] are not set, the recommended values for [Focus Limit Setting], which will be described later, cannot be used.

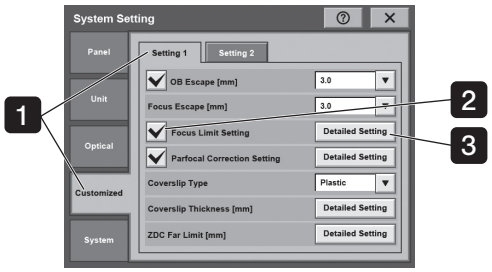


6. Tap the [Optical] tab and then the [Objective Lens] tab.
7. Set the objective to be used for each revolver position.

TIP If the objective to be used is not set properly, the Z drift compensation function cannot be used correctly.

3 Settings for [Focus Limit Setting]

TIP Set the focus limit (upper-limit position within the focus moving range) for each objective in order to prevent the objective from touching the specimen during the Z drift compensation operation.



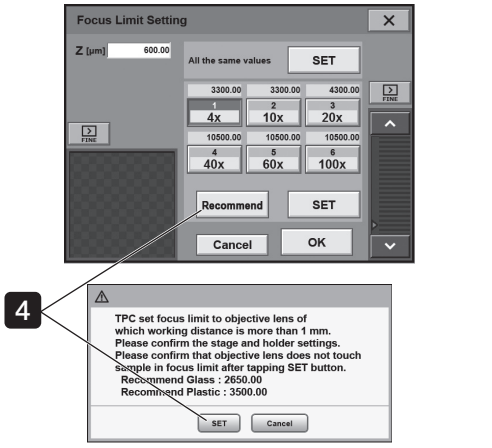
1 Tap the [Customized] tab and then the [Setting 1] tab.

2 Tap and select the check box for [Focus Limit Setting].

3 Tap the [Detailed Setting] button for [Focus Limit Setting]. The [Focus Limit Setting] screen is displayed.

Setting the objective for which to use the recommended value

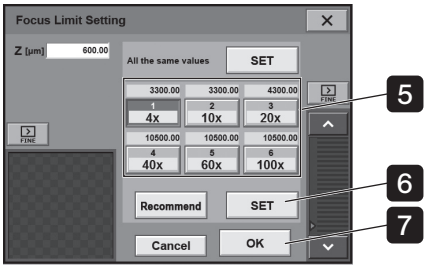
TIP When "IX3-SSU" is selected for [XY Stage] and "IX3-HOW" is not selected for [Center Plate] during the unit settings, the focus limit of an objective whose working distance is 1 mm or longer can be easily set to the recommended value. (See "List of recommended values for the focus limit" on page 16.)



4 Tap the [Recommend] button. Read the text in the dialog box that appears and tap the [SET] button.
The focus limit of an objective whose working distance is 1 mm or longer is set to the recommended value.

Settings for an objective that does not use the recommended value

TIP For an objective that does not (cannot) use the recommended value, set the focus limit individually.



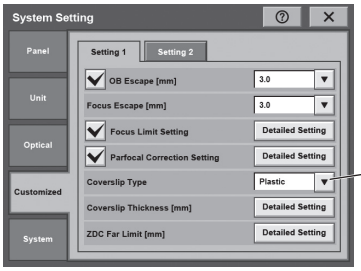
5 Tap the objective button.

6 Focus on the specimen. After moving the focus position upward (the direction which the objective moves closer to the specimen), tap the [SET] button. This focus position is the focus limit.

Repeat 5 to 6 for the number of objectives to set the focus limit.

7 After completing the focus limit setting, tap the [OK] button. The [Focus Limit Setting] screen is closed.

4 Settings for [Coverslip Type]

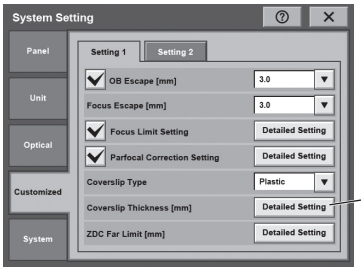


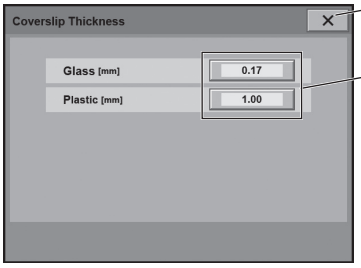
TIP Set the material (glass or plastic) of the bottom of the specimen container to be used.

1 Tap the down arrow button for [Coverslip Type] and select and tap [Plastic] or [Glass] from the list.

TIP If only a glass-bottom specimen container can be used for the objective, the glass setting is applied even if [Plastic] is selected.

5 Settings for [Coverslip Thickness]





TIP Set the thickness of the bottom of the specimen container to be used for each material (glass or plastic).

1 Tap the [Detailed Setting] button for [Coverslip Thickness]. The [Coverslip Thickness] screen is displayed.

TIP On the [Coverslip Thickness] screen, the setting value (mm) for the thickness of the bottom of the specimen container is displayed for each material (glass or plastic).

TIP By default, 0.17 mm and 1.00 mm are set for glass and plastic respectively. Change the setting value depending on the specimen container to be used.

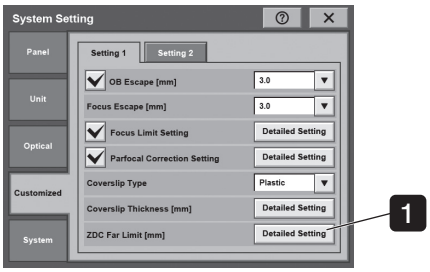
2 Tap the display area of the setting value to be changed. The [Numeric Keypad] screen is displayed.

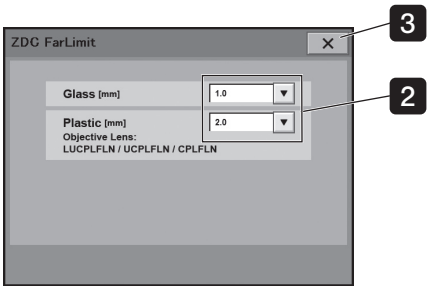
3 Tap the Numeric Keypad buttons to enter the thickness of the bottom. To clear the entered value, tap the [C] or [Back space] button.

4 Once the value has been entered, tap the [OK] button. The [Numeric Keypad] screen is closed.

5 When the thicknesses of both the glass and plastic bottoms have been set, tap the [X] button on the [Coverslip Thickness] screen. The [Coverslip Thickness] screen is closed.

6 Settings for [ZDC Far Limit]





TIP Set a moving range to search for the bottom of the specimen container, considering the focus limit as the upper limit position during the Z drift compensation.
The smaller this setting value is, the less time the Z drift compensation takes. However, it also increases the risk of the Z drift compensation failing because the bottom of the specimen container is not found.

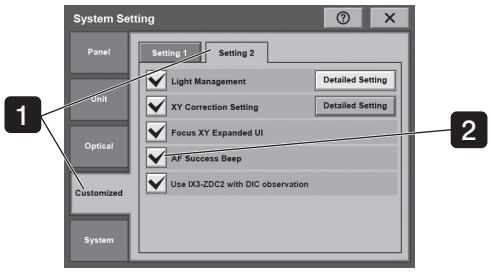
1 Tap the [Detailed Setting] button for [ZDC Far Limit]. The [ZDC Far Limit] screen is displayed.

TIP On the [ZDC Far Limit] screen, the setting value (mm) for the moving range to search for the bottom of the specimen container is displayed for each of the bottom materials (glass or plastic). By default, 1.0 mm and 2.0 mm are set for the glass and plastic respectively.

2 Tap the down arrow button for the setting value to be changed. Select and tap the setting value from the list.

3 Once values have been set for glass and plastic, tap the [X] button on the [ZDC Far Limit] screen. The [ZDC Far Limit] screen is closed.

7 Settings for [AF Success Beep]

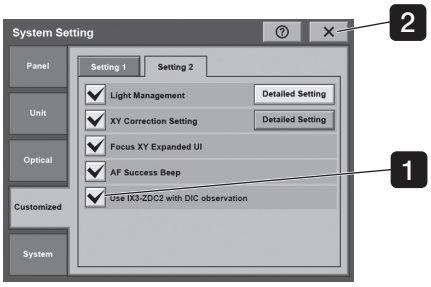


TIP Set whether or not to sound a beep from the control box IX3-CBH when the Z drift compensation is successful.

1 Tap the [Customized] tab and then the [Setting 2] tab.

2 Tap the check box for [AF Success Beep]. When the check box is unselected, the control box IX3-CBH is set to not sound a beep when the Z drift compensation is successful.

8 Other settings, and finishing the system settings

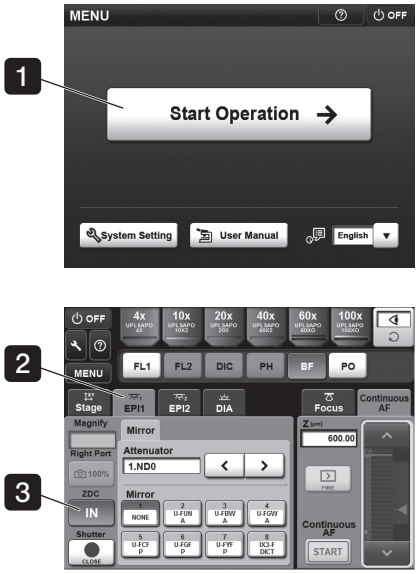


1 If IX3-ZDC2 is to be used in DIC observation, tap and select the check box for [Use IX3-ZDC2 with DIC observation].

2 When all system settings are finished, tap the [X] button on the [System Setting] screen. The [System Setting] screen is closed and the [MENU] screen is displayed.

2-2 Observation using the Z drift compensation

The Class 1 laser beam that is output from the objective is not hazardous (but direct staring for an extended period is still inhibited), and the laser beam intensity will not increase even in the case of malfunction.
As the laser beam is an infrared light, it is not visible by eyes. Never look at the vicinity of the objective directly for a long time.



1 Switching [ZDC IN]

1. On the [MENU] screen of the touch panel controller, tap [Start Operation]. The [Operation] screen is displayed.
2. Tap the [EPI1] or [EPI2] tab.
3. Tap the [ZDC IN] button to switch [ZDC IN] between ON and OFF.

TIP When [ZDC IN] is turned ON (the button background is in blue and the button text is in white), the dichroic mirror of the IX3-ZDC2 enters the observation optical path of the microscope and the Z drift compensation becomes available.

TIP When [ZDC IN] is turned OFF (the button background is in white and the button text is in gray), the dichroic mirror of the IX3-ZDC2 deviates from the observation optical path of the microscope. When the Z drift compensation is not used, turning OFF [ZDC IN] allows observation without even a slight loss of the observation light amount and observation of infrared light (790 nm or longer).

2 Adjusting the correction collar objective

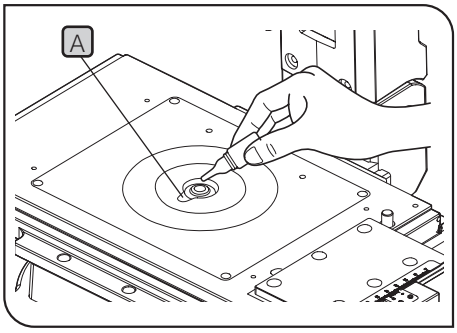
If you use an objective with correction collar, perform the following adjustments.

When the thickness of the bottom of the specimen container is known

Match the scale reading of the correction collar to the thickness of the glass bottom.

When the thickness of the bottom of the specimen container is unknown

The optimum position for the correction collar can be obtained by judging the image resolution and contrast. When a satisfactory image is not obtained after focusing, rotate the correction collar to the left and right, refocus each time and compare the images at both sides. Then rotate the collar in the direction yielding a better image, and rotate the correction collar to the left and right, refocus each time and compare the images. Repeat this cycle until the position with the optimum image is found.



3 Using oil- or water-immersion objective

TIP If you use an oil-immersion objective, use immersion oil as described below.

NOTE **Always use immersion oil supplied by EVIDENT.**

TIP If the objective in use can accommodate the oil-proof cap, be sure to mount the cap.

1 Using a low-power objective, bring the specimen into focus.

2 Rotate the revolving nosepiece to engage the oil immersion objective.

3 Remove the specimen and move the stage insert cut-out A close to the objective front lens. Apply a drop of the provided immersion oil to the objective front lens. Place the specimen and rotate the fine adjustment knob to bring the specimen into focus.

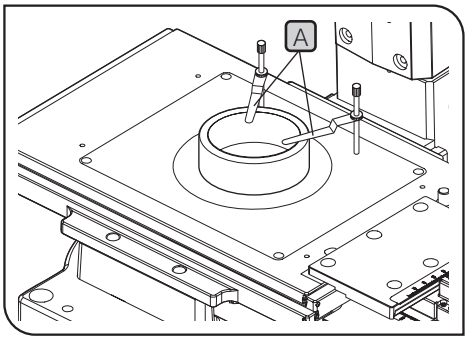
NOTE
- **Use as little oil as possible. After gently wiping off the oil on the oil-proof cap, remove the cap. Then clean the tip of the objective and areas around it as well as the cap.**
- **If the oil contains air bubbles, the image will be degraded. In addition, Z drift compensation function does not work properly. Make sure the oil is free of air bubbles.**

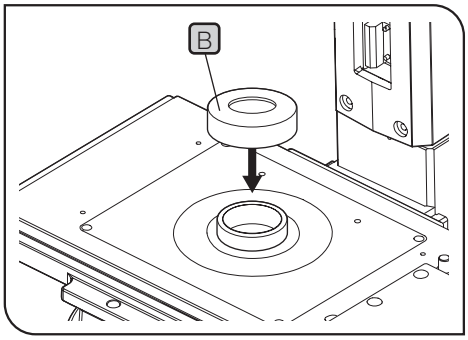
TIP To check for air bubbles, remove the eyepieces, completely open the field iris diaphragm and aperture iris diaphragm, and look at the objective exit pupil (looking like a bright circle) in the observation tube. Any air bubbles can be seen in this way.

4 After use, remove immersion oil from the objective front lens by wiping with gauze slightly moistened with absolute alcohol.

TIP The same procedure is applicable when using a water immersion objective.

⚠ CAUTION **Follow the cautions indicated in the label of the immersion oil.**



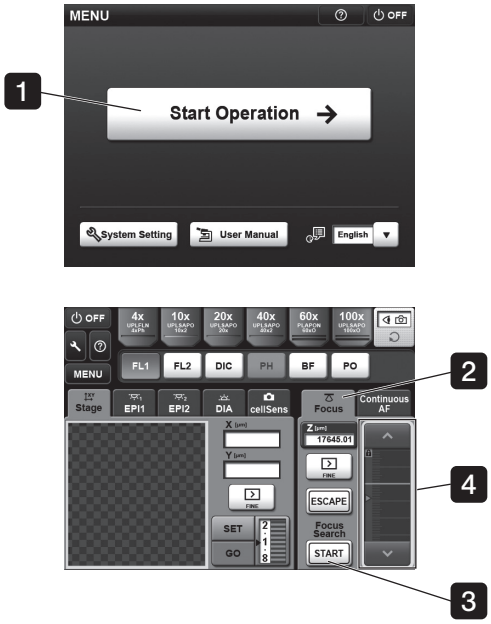


4 Placing the specimen

Put the specimen in the glass-bottom dish (with cover glass thickness of 0.16 to 0.18 mm) and place the dish on the center of the stage.

TIP If you use the oil-immersion objective, the Z drift compensation may be failed due to the floated specimen. Attach the stage clips (IX-SCL) A or use the weight B provided with IX3-ZDC2.

5 Observation in the focus search mode



1 On the [MENU] screen of the touch panel controller, tap [Start Operation]. The [Operation] screen is displayed.

2 Tap [Focus] tab.

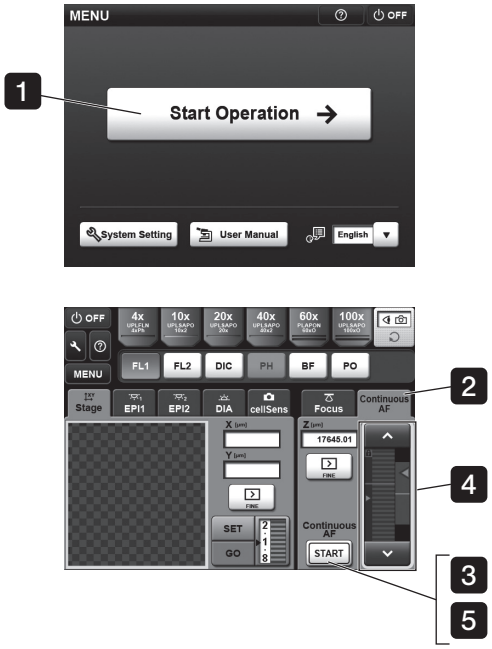
3 Tap [START] button. The Z drift compensation starts.

TIP In the focus search mode, when the bottom of the specimen container is focused on, the Z drift compensation is completed.

When the Z drift compensation is successful, a beep sounds once (“bip”) only if the check box for [AF Success Beep] is selected.
When the Z drift compensation fails, the beep sounds three times (“bip-bip-bip”).

4 Move the focus position upward (the direction which the objective moves closer to the specimen), and focus on the observation position.

6 Observation in the continuous focus mode



1 On the [MENU] screen of the touch panel controller, tap [Start Operation]. The [Operation] screen is displayed.

2 Tap [Continuous AF] tab.

3 Tap [START] button. The Z drift compensation starts.

TIP In the continuous focus mode, the Z drift compensation keeps working until the [START] button is tapped again.

TIP When the Z drift compensation is successful, a beep sounds once (“bip”) only if the check box for [AF Success Beep] is selected.
When the Z drift compensation fails, the beep sounds three times (“bip-bip-bip”).

4 Move the focus position to focus on the observation position.

5 Tap [START] button. The Z drift compensation finishes.

TIP In the next continuous focus mode, the last focus position of the previous operation is focused.
However, in following cases, the bottom of the specimen container is focused on.

- When the objective is changed.
- When the focus search mode is performed.
- When [Coverslip Type] is changed.

3 Specifications

Item	Specification
Applicable microscope frame	IX83P1ZF, IX83P2ZF
Applicable observation tubes	U-BI90, U-TBI90, U-TR30H-2*, U-TR30NIR*, U-TR30-2* * : in combination with the IX-ATU
Applicable control box	IX3-CBH
Controller	U-MCZ Touch panel controller PC (software “cellSens” is required to be installed in the PC.)
Laser	Laser diode Laser wavelength: 790 nm, (Class 1 IEC60825-1:2014, EN60825-1:2014/A11:2021) Laser pulse duration: 2.1 ms, Repetition rate: 200 Hz Accessible laser emission (Maximum instantaneous power): 240 µW Output from laser diode: Beam divergence: 0.1 to 0.49 rad Maximum power: 20 mW
Observation method	Reflected light fluorescence observation (excitation wavelength range : 340 to 700nm) TIRF (excitation wavelength range : 340 to 700nm) Phase contrast observation DIC (applicable only with focus search mode)
Field number	22
Dimensions & weight	287(W) x 63(H) x 272(D) mm, approx. 2.5 kg
Operating Environment	• Indoor use. • Altitude: Max. 2,000 meters. • Ambient temperature: 5 to 40 °C (41 to 104 °F) • Maximum relative humidity: 80 % for temperatures up to 31 °C (88 °F) (without condensation) In case of over 31 °C (88 °F), the relative humidity is decreased linearly through 70 % at 34 °C (93 °F), 60 % at 37 °C (99 °F), and to 50 % at 40 °C (104 °F). • Supply voltage fluctuations: ±10%. • Pollution degree: 2 (in accordance with IEC60664-1) • Installation (overvoltage) category: II (in accordance with IEC60664-1)

■ List of recommended values for the focus limit

Objective	TPC setting [Center Plate]	Focus limit recommended value
UPLXAPO10X UPLSAPO10X2 UPLFLN10X2 UPLFLN10X2PH UPLFLN20X UPLFLN20XPH UPLFLN40X UPLFLN40XPH	IX3-HO35D	2650µm
	IX3-HOS	2250µm
	---	3450µm
CPLFLN10XPH LUCPFLN20X LUCPLFLN20XPH LUCPFLN40X LUCPFLN40XPH LUCPFLN60X LUCPFLN60XPH	IX3-HO35D	3500µm
	IX3-HOS	2250µm
	---	4300µm

4 Troubleshooting guide

Under certain conditions, performance of the product 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
Z drift compensation is impossible.	The [ZDC IN] button of the touch panel controller is turned OFF.	Turn ON the [ZDC IN] button.	12
	Bubbles are present in the oil or water.	Remove the bubbles.	13
	An objective other than specified is in use.	Use the objective available for the Z drift compensation.	5, 6
	The objective is mounted improperly.	Screw in the objective firmly.	–
	The transmitted light bulb generates infrared light.	Close the shutter or turn off the light bulb during Z drift compensation	–
	Electrical noise is interfering with operation.	Ground the IX3-CBH. Be also sure to ground the ancillary equipment.	–
	The specimen has a large scratch.	Use another glass bottom dish or use manual focusing.	–
	Immersion oil (or water) of oil- or water-immersion objective is dried.	Supply immersion oil (or water).	13
	When a water-immersion objective is used, the lower surface of the bottom of the specimen container is focused on.	Set [ZDC Far Limit] to a smaller value.	11
	The interference color during the DIC observation is not adjusted to the gray sensitive color.	Set the interference color to the gray sensitive color by adjusting the contrast of the DIC slider.	–
Z drift compensation takes long time or fails.	Z drift compensation is set improperly.	Set up Z drift compensation properly.	8
	Electrical noise is interfering with operation.	Securely connect the grounds of the IX3-CBH and peripheral devices.	–
	There is significant vibration in the installed environment, or an anti-vibration bench is not used.	Be sure to use an anti-vibration bench.	–
	The specimen is vibrating.	Secure the specimen with the stage clips, etc. Also, check the insert plate of the stage for any abnormalities.	14
	When the DIC slider is set to OUT from the touch panel controller or the cellSens Imaging Software, the Z drift compensation using the 100x objective is performed with the manual DIC slider (such as U-DICTS and U-DICT) inserted to the observation optical path.	Set the DIC slider to IN from the touch panel controller or the cellSens Imaging Software.	–
	The values of [ZDC Far Limit] and [Focus Limit Setting] are not set properly.	Set [ZDC Far Limit] to a larger value and set an appropriate value for [Focus Limit Setting].	9, 11
Z drift compensation is applied to a position deviated from the target position.	In the cellSens Imaging Software, the offset amount is not set properly.	Refer to “Help” in the cellSens Imaging Software to set the offset amount properly.	–
	Immersion oil (or water) of oil- or water-immersion objective is dried.	Supply immersion oil (or water).	13
	The lower surface of the bottom of the specimen container is focused on when a water-immersion objective is used.	Set [ZDC Far Limit] to a smaller value.	11
The specimen moves in the X-Y directions during Z drift compensation.	The specimen is not locked.	Secure the specimen with the stage clips, etc. Also confirm that the stage center plate is free of abnormality.	14

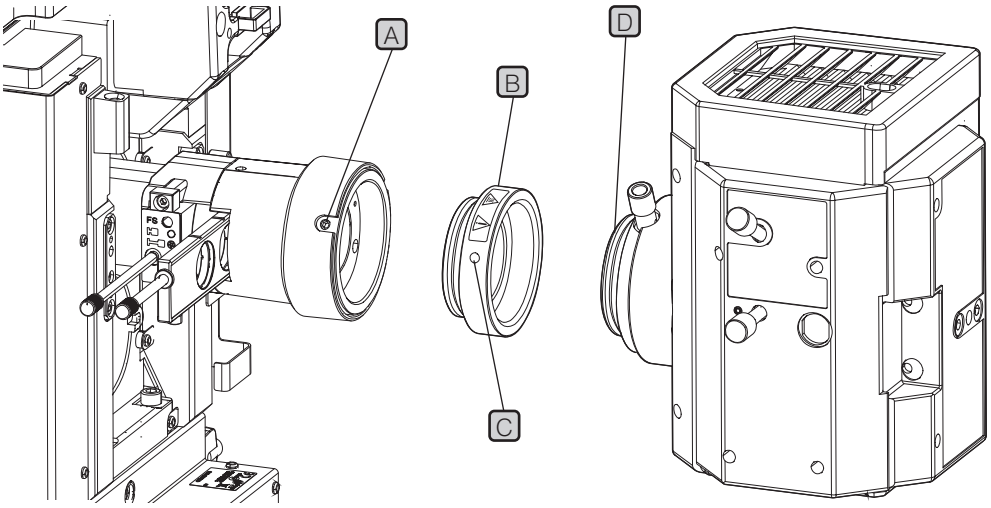
5 Attaching or removing the units

As to attaching or removing procedures of the microscope and other units, refer to the dedicated instructions.

1 Attaching the spacer for reflected illumination

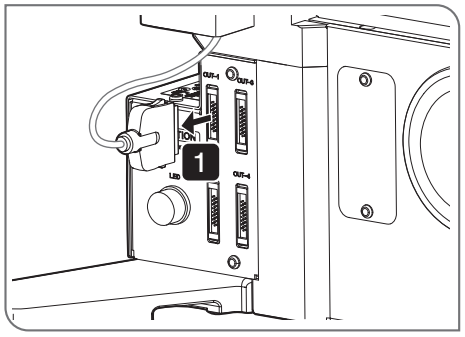
⚠ CAUTION **Do not turn on the lamp without attaching the lamp house to the microscope. The light from the mercury and xenon lamps radiates UV light. Looking directly into the light may damage your eyes. Also, it could cause fire.**

1. Loosen the fixing screws [A] (2 pcs.) of the illuminator by using the Allen screwdriver provided with the microscope
2. Insert the spacer for reflected illumination to the illuminator facing the label [B] upward, and tighten the fixing screws [A] to secure the spacer.
3. Loosen the fixing screws [C] (2 pcs.) of the spacer for reflected illumination by using the Allen screwdriver provided with the microscope.
4. Insert the mounting dovetail [D] of the lamp house to the spacer for reflected illumination, and tighten the fixing screws [C] to secure the lamp house.



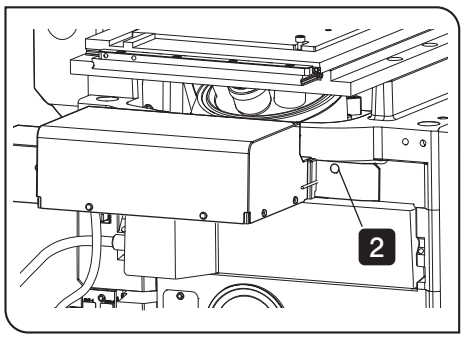
2 Removing and attaching the Z drift compensator

NOTE **When attaching units on the deck of the microscope frame or replacing the disc of IX3-DSU, the Z drift compensator has to be removed from the microscope frame in advance.**

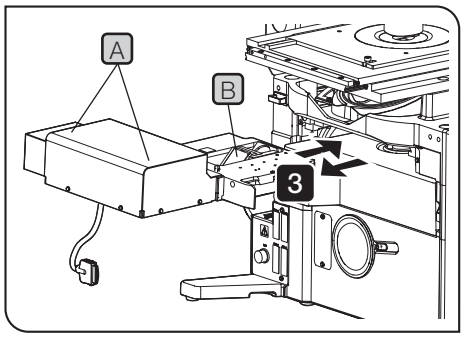


1. Remove the cable connector of the Z drift compensator from the connector of the microscope frame.

NOTE **Before removing the connector, be sure to check that the main switch of the control box IX3-CBH is turned OFF.**

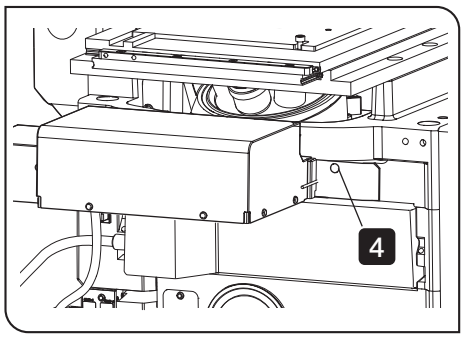


2 Loosen the clamping screw of the Z drift compensator using the Allen screwdriver provided with the microscope frame.

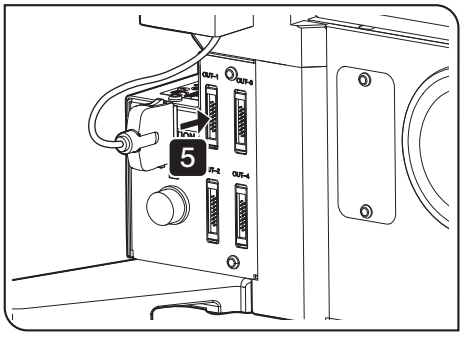


3 Hold the top and bottom parts indicated in the figure by the lines A in both hands, and pull out the Z drift compensator from the microscope frame.
When attaching/removing the units to/from the microscope frame is finished, insert the Z drift compensator to the microscope frame until it touches the end completely.

NOTE
- **Be careful not to touch the dichroic mirror B.**
- **Handle the Z drift compensator with care and avoid subjecting it to sudden or severe impact.**
- **If the Z drift compensator is not inserted up to the predefined position, the Z drift compensation function cannot be used properly.**



4 While keeping the Z drift compensator pushed in, tighten the clamping screw of the Z drift compensator using the Allen screwdriver provided with the microscope frame.



5 Connect the cable connector of the Z drift compensator to the connector of the microscope frame.

NOTE **Before connecting the connector, be sure to check that the main switch of the control box IX3-CBH is turned OFF. Also, be aware of the direction of the connector.**

6 Proper selection of the power supply cord

If no power supply cord is provided, please select the proper power supply cord for the product by referring to “Specifications” and “Certified Cord” below:

Caution : In case you use a non-approved power supply cord for EVIDENT products, EVIDENT can no longer warrant the electrical safety of the product.

Specifications

Voltage rating	125 V AC (for 100-120 V AC area) or, 250 V AC (for 220-240 V AC area)
Current rating	6 A minimum
Temperature rating	60 ˚C minimum
Length	3.05 m maximum
Fittings configuration	Grounding type attachment plug cap. Opposite terminates in molded-on IEC configuration appliance coupling.

Table 1 Certified cord

A power supply cord should be certified by one of the agencies listed in Table 1 , or comprised of cordage marked with an agency marking per Table 1 or marked per Table 2. The fittings are to be marked with at least one of the agencies listed in Table 1. In case you are unable to buy locally the power supply cord which is approved by one of the agencies mentioned in Table 1, please use replacements approved by any other equivalent and authorized agencies in your country.

Country	Agency	Certification mark	Country	Agency	Certification mark
Argentina	IRAM		Italy	IMQ	
Australia	SAA		Japan	JET	
Austria	ÖVE		Netherlands	KEMA	
Belgium	CEBEC		Norway	NEMKO	
Canada	CSA		Spain	AEE	
Denmark	DEMKO		Sweden	SEMKO	
Finland	FEI		Switzerland	SEV	
France	UTE		United Kingdom	ASTA BSI	,
Germany	VDE		U.S.A.	UL	
Ireland	NSAI				

Table 2 HAR flexible cord

Approval organization	Printed or embossed harmonization marking (May be located on jacket or insulation of internal wiring)		Alternative marking utilizing black-red-yellow thread (Length of color section in mm)		
			Black	Red	Yellow
Comite Electrotechnique Belge (CEBEC)	CEBEC	‹HAR›	10	30	10
Verband Deutscher Elektrotechniker (VDE) e.V. Prüfstelle	‹VDE›	‹HAR›	30	10	10
Union Technique de l´Electricite´ (UTE)	USE	‹HAR›	30	10	30
Instituto Italiano del Marchio di Qualita´ (IMQ)	IEMMEQU	‹HAR›	10	30	50
British Approvals Service for Electric Cables (BASEC)	BASEC	‹HAR›	10	10	30
N.V. KEMA	KEMA-KEUR	‹HAR›	10	30	30
SEMKO AB Svenska Elektriska Materielkontrollanstalter	SEMKO	‹HAR›	10	10	50
Österreichischer Verband für Elektrotechnik (ÖVE)	‹ÖVE›	‹HAR›	30	10	50
Danmarks Elektriske Materialkontroll (DEMKO)	‹DEMKO›	‹HAR›	30	10	30
National Standards Authority of Ireland (NSAI)	‹NSAI›	‹HAR›	30	30	50
Norges Elektriske Materiellkontroll (NEMKO)	NEMKO	‹HAR›	10	10	70
Asociacion Electrotecnica Y Electronica Espanola (AEE)	‹UNED›	‹HAR›	30	10	70
Hellenic Organization for Standardization (ELOT)	ELOT	‹HAR›	30	30	70
Instituto Portages da Qualidade (IPQ)	np	‹HAR›	10	10	90
Schweizerischer Elektro Technischer Verein (SEV)	SEV	‹HAR›	10	30	90
Elektriska Inspektoratet	SETI	‹HAR›	10	30	90

Underwriters Laboratories Inc. (UL)	SV, SVT, SJ or SJT, 3 X 18AWG
Canadian Standards Association (CSA)	SV, SVT, SJ or SJT, 3 X 18AWG

Appendix 1: Installing the Z drift compensator

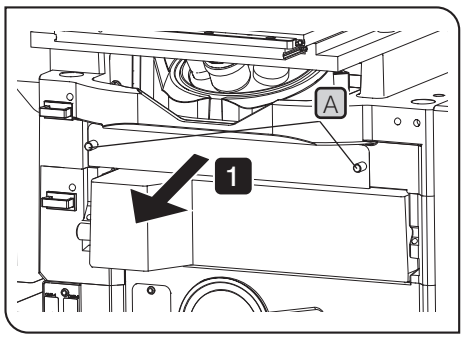
This section describes the procedure to install the Z drift compensator.

NOTE **This work must be performed by EVIDENT. Do not perform this work by yourself.**

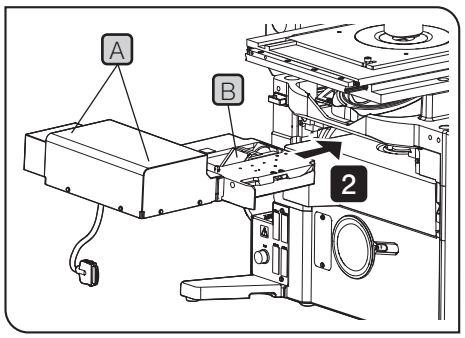
When a unit, such as the IX3-RFACA, is to be used together, attach it on the deck of the microscope frame before installing the Z drift compensator. If the Z drift compensator is installed first, no unit can be attached on the deck.

A tape to secure the moving part is affixed to the Z drift compensator. Peel it off before assembly (see page 7).

When the Z drift compensator is attached, the cable cover provided with the microscope frame cannot be used.

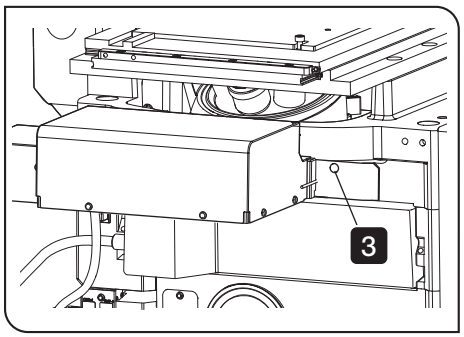


1 Remove the clamping screws A and remove the cover of the microscope frame.

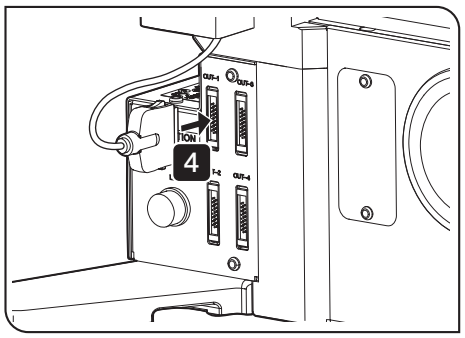


2 Hold the top and bottom parts indicated in the figure by the lines A in both hands, and insert the Z drift compensator to the microscope frame until it touches the end completely.

NOTE
- **Be careful not to touch the dichroic mirror B .**
- **Handle the Z drift compensator with care and avoid subjecting it to sudden or severe impact.**
- **If the Z drift compensator is not inserted up to the predefined position, the Z drift compensation function cannot be used properly.**



3 While keeping the Z drift compensator pushed in, tighten the clamping screw of the Z drift compensator using the Allen screwdriver provided with the microscope frame.



4 Connect the cable connector of the Z drift compensator to the connector of the microscope frame.

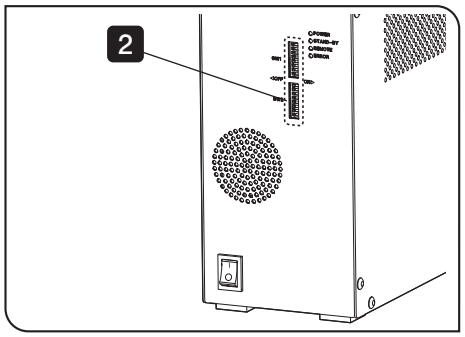
NOTE **Before connecting the connector, be sure to check that the main switch of the control box IX3-CBH is turned OFF. Also, be aware of the direction of the connector.**

Appendix 2: Adjustment of dichroic mirror position

This section describes the procedure to adjust the dichroic mirror position to perform the Z drift compensation properly.

NOTE **This work must be performed by EVIDENT. Do not perform this work by yourself.**

1 Preparation before adjustment

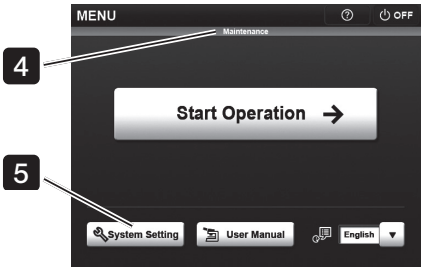


1 Set the main switch of the IX83 system (including all units) to OFF.

TIP Including the units not described in this instruction manual, the order to set the main switch to ON when starting the system and the order to set the main switch to OFF when exiting the system is determined.
For details, refer to the IX83 instruction manual.

2 Set the Dip switch SW2-No.6 of the control box IX3-CBH to ON.

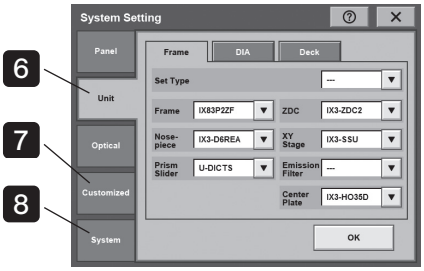
3 Set the main switches of the control box IX3-CBH and the touch panel controller to ON.



4 The [MENU] screen appears on the touch panel controller.
Confirm that the [Maintenance] mode is set.

5 Tap [System Setting] on the [MENU] screen.
The [System Setting] screen appear.

6 Tap the [Unit] tab to set the unit.
For details, see “Setting the unit” on page 8.



NOTE **Before adjustment, [Prism Slider], [ZDC], [XY Stage], [Center Plate] and [Condenser] must be set in advance.**

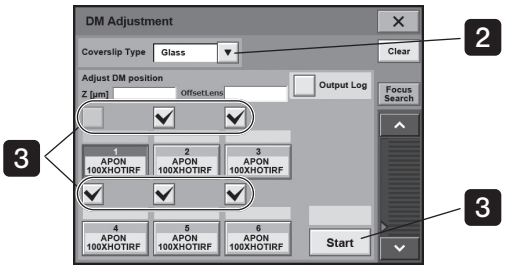
7 Tap the [Customized] tab to set [Focus Limit Setting] and [Coverslip Thickness]. For details, see “Settings for [Focus Limit Setting]” on page 9 and “Settings for [Coverslip Thickness]” on page 10.

8 Tap the [System] tab and then tap [DM Adjustment].
The [DM Adjustment] screen appears.

2 Procedures for position adjustment

1 Place the specimen container that contains the water on the center of the stage.

NOTE
- **If the water is not in the container, the bottom surface of the specimen container may not be detected.**
- **The material of the bottom plate of the specimen container must be same as the material you select in 2.**

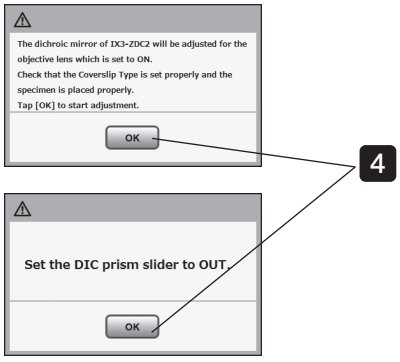


2 Tap the down arrow button of [Coverslip Type] on the [DM Adjustment] screen, select [Glass] or [Plastic] from the list and tap it.

3 Tap the check box of the objective to be adjusted and tap the [Start] button.

4 When the dialog box appears, confirm followings and tap the [OK] button.

- The material of the bottom plate of the specimen container is same as [Coverslip Type].
- The correction collar of the objective is adjusted to the value of the bottom plate thickness of the specimen container.
- No dirt or dust is attached to the objective and the bottom plate of the specimen container.
- If the focal point is moved to the focus limit position, the specimen container does not contact with the objective.

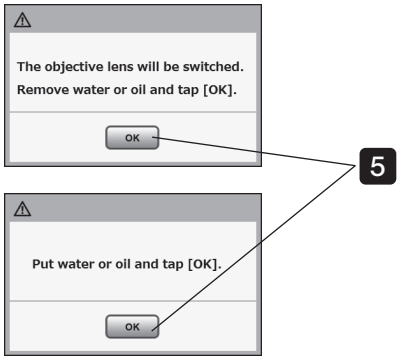


When setting the unit, if the manual DIC slider (other than IX3-DICTA) is selected in [Prism Slider], the "Set the DIC prism slider to OUT." dialog box appears. Remove the DIC slider from the light path and tap the [OK] button.

The adjustment of the dichroic mirror position starts.

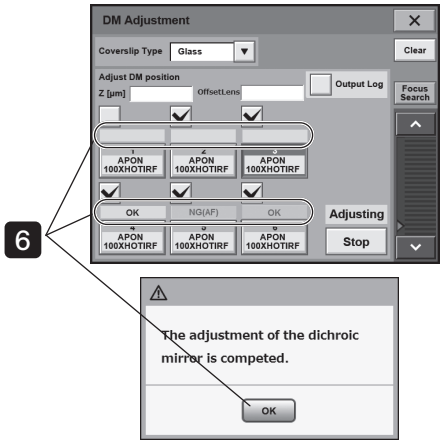
If the objective to be adjusted is 100XO, the "Set the DIC prism slider to IN." dialog box appears in the middle of the position adjustment. Engage the DIC slider in the light path and tap the [OK] button.

5 When the "The objective lens will be switched. ···" dialog box appears, check the immersion liquid of the objective to be adjusted next. If you change the immersion liquid, wipe the current immersion liquid off from the bottom surface of the specimen container. Tap the [OK] button to select the objective.



If the selected objective is a liquid immersion objective, the "Put water or oil and tap [OK]." dialog box appears. Apply a drop of immersion liquid to the objective and tap the [OK] button.

TIP The adjustment starts from the high magnification objective in the order from the immersion liquid is oil, silicon, water and dry. If the magnification is same, the adjustment starts from the objective with larger NA. If there are two objective types: normal and PH, the adjustment starts from the normal objective.



6 The adjustment results by objective are displayed on the touch panel controller.

The adjustment results are displayed below the objective check box by OK (Adjustment is successful.) or NG (Adjustment fails).
When OK or NG appears to all objectives selected, the adjustment is completed.

When the "The adjustment of th dischroic mirror is competed." dialog box appears, tap the [OK] button.

- If NG (Adjustment fails.) appears to the objective, check the solutions described in "Solutions for the objective that failed in adjustment" and start from Step **2** again.

TIP Even though the adjustment is interrupted in the middle, if OK has been displayed for the objective, the adjusted value is saved.

7 Set the main switches of the control box IX3-CBH and the touch panel controller to OFF, and set the Dip switch SW2-No.6 of the control box IX3-CBH to OFF.

Solutions for the objective that failed in adjustment

■ **If NG(AF) or NG(Limit) appears:**

Cause: The Z drift compensation was not performed properly.

Solution: Check following settings again.

- Set [Focus Limit Setting] to a larger value than the current value and move the focus limit closer to the specimen. (See page 9.)
- Set [ZDC Far Limit] to a larger value than the current value and increase the focus moving range. (See page 11.)
- Place the specimen container correctly. (See page 14.)
- Check that the immersion liquid (oil/water) does not contain air bubbles. (See page 13.)
- Set [Coverslip Type] correctly by selecting the same malarial as the material (glass or plastic) of the bottom plate of the specimen container to be used. (See page 10.)

■ **If NG(EF), NG(RNG) or NG(Other) appears:**

Cause: Failed in acquiring the data necessary for adjustment.

Solution: Check the solution items for NG(AF). If the error still occurs even after readjustment, contact EVIDENT.

Memo

Manufactured by

EVIDENT CORPORATION
6666 Inatomi, Tatsuno-machi, Kamiina-gun, Nagano 399-0495, Japan

Distributed by

EVIDENT EUROPE GmbH
Caffamacherreihe 8-10, 20355 Hamburg, Germany

EVIDENT EUROPE GmbH UK Branch
Part 2nd Floor Part A, Endeavour House, Coopers End Road, Stansted CM24 1AL, U.K.

EVIDENT SCIENTIFIC, INC.
48 Woerd Ave Waltham, MA 02453, U.S.A.

EVIDENT AUSTRALIA PTY LTD
97 Waterloo Road, Macquarie Park, NSW 2113, Australia

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