

# INSTRUCTIONS

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# STM7-AF

## AUTOFOCUS UNIT

This instruction manual is for the Evident autofocus unit STM7-AF.

To ensure the safety, obtain optimum performance and to familiarize yourself fully with the use of this attachment, 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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## Introduction

This AF unit is the autofocus unit to be mounted to the measuring microscope STM7.

### Contents of instruction manuals


This instruction manual is for the autofocus unit STM7-AF only. In addition to this manual, refer to the instruction manuals for the microscope and the modules to be used together.


Manual name	Main contents
Autofocus unit STM7-AF (this manual)	Functions of the autofocus
Measuring microscope STM7	Operating procedures of the measuring microscope
Hand switch/Focus controller quick guide STM7-HS/STM7-MCZ	Easy operation procedures of the hand switch or the focus controller
Control box STM7-CB/STM7-CBA	Functions of the control box STM7-CB/CBA

## Safety precautions

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 equipment according to 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.

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

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

## **⚠ CAUTION - Electric safety -**

### **Do not use the device in close proximity to the sources of strong electromagnetic radiation.**

Proper operation may be interfered. The electromagnetic environment should be evaluated prior to operation of the device.

### **Be sure to turn OFF the power of the device before connecting /disconnecting cables and units.**

This device is designed for use in Class A industrial environment for IEC61326-1 International Standard concerning EMC. Using it in a domestic environment may cause radio interference.

This device complies with the emission and immunity requirements described in IEC61326 series.

## **⚠ CAUTION - Laser safety -**

### **Use of controls or adjustments or performance of procedures other than those specified here in 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 never remove the cover, etc.

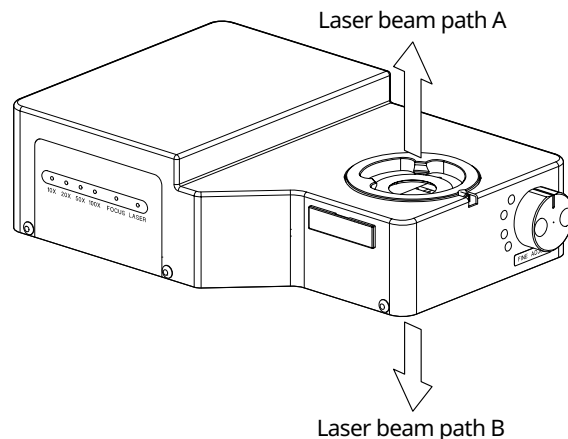
Class 1 Laser Product (IEC60825-1:2014, EN60825-1:2014/A11:2021)

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. The laser output of this unit does not exceed the maximum permissible exposure (MPE) level, and this unit is a Class 1 laser product.  
\* MPE is the level of laser radiation to which a person may be exposed without hazardous effect on or adverse biological changes in the eye or skin.

#### **Laser beam radiation position and power**

This product irradiates the laser beam from the positions illustrated below.



Class 1 IEC60825-1:2014,  
EN60825-1:2014/A11:2021  
Laser beam path A: Below 1  $\mu$ W  
Laser beam path B: 200  $\mu$ W Maximum

## **⚠ CAUTION - Safety symbols -**

The following symbols are placed on the product.

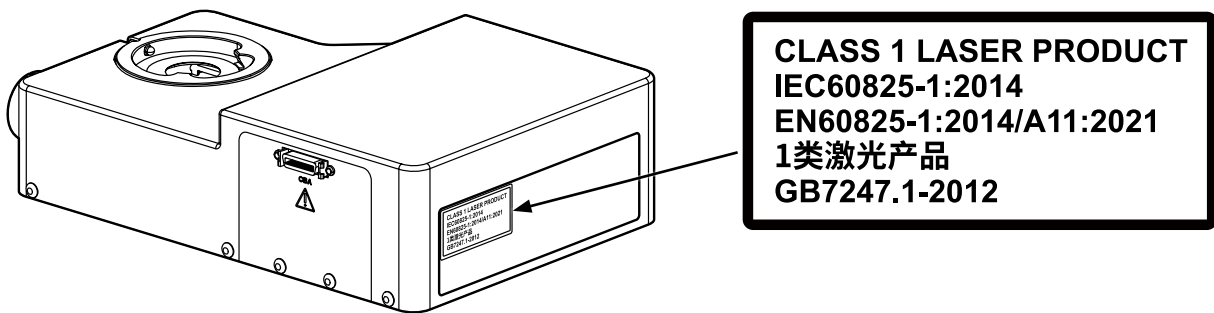
Study the meaning of the symbols and always use the equipment in the safest possible manner.

Symbol	Meaning
⚠	Indicates a non-specific general hazard. Follow the cautions given after this symbol or in the instruction manual.

### **Laser safety label**

Laser safety label related to the laser beam are attached to the unit. Always pay attentions to the label.

### **Warning label position**



When caution labels are dirty or peeled off, contact Evident for replacement or inquiries.

## **⚠ CAUTION - Autofocus unit -**

**Do not look into the opening of the AF unit.**

## Handling precautions

**CAUTION** · This product is a precision instrument. Handle it with care and avoid subjecting it to a sudden or severe impact.

- Never disassemble any part of the product. Otherwise, failure could be caused.
- Do not use the system in areas where it may be subjected to direct sunlight, high temperature and/or humidity, dust or vibrations.  
(For the operating environmental condition such as temperature and/or humidity, see "1 SPECIFICATIONS" (page 5).)

Avoid using the instrument in the following places.

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| <ol style="list-style-type: none"><li>(1) Near an inlet or exhaust outlet of air conditioning equipment, etc.</li><li>(2) In a place subjected to large vibrations or change in temperature.</li><li>(3) Near equipment producing abnormal noise (including non-Evident equipment)</li><li>(4) In a place subjected to direct sunlight.</li><li>(5) In a place subjected to excessive dirt or high temperature and humidity.</li><li>(6) Near flammable substance (gasoline, lacquer thinner, alcohol, etc.)</li></ol> |
|--|

1. When the AF (autofocusing) unit is installed, it may affect the observations as described below.
  - When the AF unit is combined with the MM6C-KMAS or MM6C-RLAS, the periphery of the observation field of view may become dark. If this bothers you, replace the cross-frame part of the eyepiece with that provided with the AF unit. Refer to the instruction manual for the measuring microscope STM7 for the replacement method.
  - The color unevenness is noticed in the DIC (Differential Interference Contrast) observation performance if this AF unit is not used together.

## Caution on Autofocusing

1. The objectives compatible with autofocusing are the 10X to 100X objectives in the LMPLFLN/LMPlanFI or LMPLFLN-BD/LMPlanFI-BD series. However, the autofocusing with 10x will not be repeated. Do not use it for measurement purpose.
2. When measuring a height, use an objective with 20X or higher power.
3. Autofocusing is possible on specimens with reflectance of 3% (glass) to 100% (mirror). With the following types of specimens, however, the intended focusing position may differ from the Autofocusing position or the autofocusing may not be possible.
  - Specimens with very irregular surface (surface of a plastic mold, etc.)
  - Thin, transparent structures (back surface reflections from a thin glass plate, etc.)
4. When performing a darkfield observation for a specimen with high reflectance, if you use the objective with low magnification particularly, a red spot may be observed near the center of field. (As this is not a laser beam, there is no safety problem.)
5. Depending on the specimen pattern, the autofocusing may take some time or may be entirely impossible.
6. To prevent collision between the objective and specimen, be sure to set the lower software limit. (For the setting procedure, refer to the instruction manual for the measuring microscope STM7.)
7. For the DIC (Differential Interference Contrast) observation, insert the analyzer U-AN360-3 in the analyzer slot.
8. When autofocusing is executed during DIC observation, the intended autofocusing performance may not be obtained with the adjustment areas (where the interference color is near orange) of certain DIC prisms.
9. There is a gap by 1.1 mm at maximum on the view field between the center position of the cross line of the eyepiece attached with the focusing plate and the position to which AF is applied.
10. The aberration correction position varies depending on combinations of the AF unit or objective lenses.
11. After the AF unit is assembled, attach the seal for aberration correction which shows the aberration correction position to the AF unit. (For details, refer to "Instruction manual of Measuring Microscope STM7".)

## Maintenance and storage

1. Do not use organic solvents, which cause painted and plastic parts to deteriorate. Do not use organic solvents to clean device components other than the glass components. To clean them, use a lint-free, soft cloth slightly moistened with a diluted neutral detergent.
2. Before disposing of this product, be sure to follow the regulations and rules of your local government.



# 1 SPECIFICATIONS

Item	Specification
Focusing detection method	Confocal active autofocus using a laser diode Laser wavelength: 775-800 nm (IEC60825-1:2014, EN60825-1:2014/A11:2021) Laser pulse duration: 2.5 ms Pulse frequency: 100 Hz. Momentary maximum power: 200 $\mu$ W. (Parallel beam) Output from internal laser diode: Beam divergence: $\theta_{//}$ = 7 to 13 deg, $\theta_{\perp}$ = 23 to 33 deg Maximum power: 10 mW
Applicable microscope frame	STM7
Applicable objective	LMPLFLN/LMPlanFI 10X to 100X LMPLFLN-BD/LMPlanFI-BD 10X to 100X However, the autofocus with 10x will not be repeated. Do not use it for measurement purpose.
Focusing detection correction range & reproducibility	With 10X objective Correction range: $\pm 1$ mm With 20X objective Correction range: $\pm 1$ mm Reproducibility: 2 $\mu$ m (2 $\sigma$ ) With 50X objective Correction range: $\pm 0.5$ mm Reproducibility: 1 $\mu$ m (2 $\sigma$ ) With 100X objective Correction range: $\pm 0.3$ mm Reproducibility: 1 $\mu$ m (2 $\sigma$ ) The above figures are values measured using specimens provided by Evident. Note that the detection range is different from the trackable level differences in Track mode.
Applicable observation methods	Reflected light brightfield observation Reflected light darkfield observation Reflected light DIC observation
Dimensions & weight	245(W) x 169(D) x 71(H) mm Approx. 3.4 kg
Operating environment	Accuracy guarantee Temperature: 20°C $\pm$ 1°C. Humidity: 65% $\pm$ 10% Operation guarantee Temperature: 10°C to 35°C. Humidity: 30% to 85% Standby condition Temperature: 0°C to 40°C. Humidity: 20% to 85% Storage condition Temperature: -10°C to 60°C. Humidity: 10% to 90% Safety standards: 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: Not to exceed $\pm$ 10% of the normal voltage. Pollution degree: 2 (in accordance with IEC60664-1) Installation/Overvoltage category: II (in accordance with IEC60664-1)

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