

Digital Microscope VHX-600E

User's Manual

Read this manual before using the system in order to achieve maximum performance.

Always keep this manual in a safe place for future reference.



Preface

This manual describes the handling, operation procedures, and precautions for the VHX-600E Series Digital Microscope. Before starting operation, please read this manual carefully to get the most from your VHX-600E Series Digital Microscope. Always keep this manual handy for future reference.

Symbols

The following symbols alert you to important messages. Be sure to understand the meaning of each symbol and read the messages carefully.



Failure to follow instructions may lead to injury. (Electric shock, burn, etc.)



Failure to follow instructions may lead to product damage.

Note: Provides additional information for operations requiring extra caution.

Tips Provides useful information for utilizing the VHX-600E.

✧ Provides reference.

General precautions

- At startup and during operation, be sure to monitor the functions and performance of the VHX-600E.
- We recommend that you take substantial safety measures to avoid any damage in the event of product failure.
- Do not modify the VHX-600E Series or use it in any way other than as described in the specifications. Otherwise, the product's function and performance cannot be guaranteed.
- When the VHX-600E Series is used in combination with other instruments, its function and performance may be degraded, depending on operating conditions and the surrounding environment.

About this manual

This user's manual is common for the VHX-600E, VHX-600E (5M), and VHX-600E (10M).

"VHX-600E" used in this manual includes the VHX-600E (5M) and VHX-600E (10M).

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Safety Precautions

Be sure to follow the precautions below in order to use the VHX-600E correctly and to prevent product malfunctions.

Cautions regarding usage

WARNING

- *The lamp is very hot and may cause burns immediately after turning off the VHX-600E. To replace the lamp, wait at least 30 minutes after turning off the power switch.*
- *Viewing the illumination light directly through the LIGHT connector (the optical fiber connecting port) of the VHX-600E may cause eye injury. Be sure to turn off the VHX-600E before removing the fiber optic cable.*
- *To avoid electric shock, turn off the VHX-600E before connecting cables or performing maintenance procedures.*
- *Do not forcefully bend or place any heavy objects on the power cable. The cable may be damaged and lead to a fire or electric shock. Do not use a damaged cable.*
- *Do not allow any foreign material to enter the VHX-600E. Otherwise, fire, electric shock, product breakdown, or an accident may occur.*
- *Do not remove the housing cover of the VHX-600E. Touching the inside of the VHX-600E is very dangerous and may cause an electric shock.*
- *Do not disassemble or modify the VHX-600E. Otherwise, fire, electric shock, product breakdown, or an accident may occur.*

CAUTION

- *Use the correct power supply voltage. Improper voltage may cause damage to the VHX-600E.*
- *Do not wipe the VHX-600E or the LCD monitor with thinner or any organic solvent. Otherwise, product damage may result.*
- *Do not step on the VHX-600E. Otherwise, product damage may result.*
- *Do not place anything on top of the LCD monitor. Otherwise, product damage may result.*
- *The LCD monitor is susceptible to deterioration due to ultraviolet light. Do not use the LCD monitor for a long time in direct sunlight or strong ultraviolet light.*
- *Be sure to turn off the power before connecting or disconnecting the power cable or camera unit. Otherwise, product breakdown may result.*

Note:

- *The VHX-600E uses a hard disk drive (HDD) to store image data and measurement data. If the VHX-600E malfunctions, the data stored in the HDD may be lost. Be sure to periodically back up the data stored in the HDD. KEYENCE also recommends backing up any vital data often as possible.*
- *KEYENCE does not guarantee the data stored in the hard disk drive (HDD) of the VHX-600E at the time of repair. When repairing the VHX-600E, stored data should be backed up first.*

Note:

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Cautions regarding installation



WARNING

Be sure to ground the grounding cable for the power cable. Improper grounding may cause electric shock or product breakdown.



CAUTION

- *The VHX-600E is designed for indoor use only.*
- *Install the VHX-600E in a vertical position in the direction shown on page 5.*
- *Do not block the ventilation opening. Otherwise, the inner temperature will rise, causing product breakdown.*

Avoid installing the VHX-600E in the following locations:

- *Locations where the VHX-600E may be directly subjected to vibration or impact*
- *Locations where the ambient temperature drops below +5°C (41°F) or exceeds +40°C (104°F)*
- *Locations where the relative humidity drops below 35% or exceeds 80% (no condensation)*
- *Locations where the temperature changes suddenly*
- *Location where the VHX-600E is exposed to a direct breeze from an air conditioner*
- *Locations where volatile, flammable substances or corrosive gases exist*
- *Locations where dust, salt, ferrous particles or greasy fumes exist*
- *Locations where water, oil, or chemicals may splash onto the VHX-600E*
- *Locations where a strong magnetic field is generated*
- *Locations where the AC voltage varies greatly*
- *Locations where the altitude is above 2000m (1.24mi.)*

Cautions regarding storage



CAUTION

Avoid storing the VHX-600E in the following locations

- *Locations where the ambient temperature drops below +5°C (41°F) or exceeds +40°C (104°F)*
- *Locations where the relative humidity drops below 35% or exceeds 80% (no condensation)*
- *Locations where the VHX-600E is exposed to direct sunlight, wind, or rain*
- *Locations close to volatile, flammable substances or corrosive gases*
- *Unstable locations from which the VHX-600E may fall*
- *Locations where the altitude is above 2000m (1.24mi)*

Cautions regarding transportation



CAUTION

- *Be sure to turn off the power before disconnecting cables for transportation.*
- *When transporting the VHX-600E, be sure to use the packing material specified by KEYENCE to avoid any damage.*

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How this manual is organized

Chapter 1	Before Operation	This chapter describes the package contents, product features, and part names and functions of the VHX-600E.
Chapter 2	Preparation (Connection procedures)	This chapter describes how to connect the VHX-600E with accessories and optional devices required for observation.
Chapter 3	Basic Operations	This chapter describes the basic operation procedures for the VHX-600E and part names of the windows.
Chapter 4	Observation	This chapter describes the basic procedure required for observing targets.
Chapter 5	Useful Functions for Observation	This chapter describes various useful functions for observation including magnified display and split display.
Chapter 6	Recording and Reproducing Images	This chapter describes the procedures for recording images, playback and editing functions.
Chapter 7	Measuring Images	This chapter describes the procedures for measuring the observed images and saving the measurement results.
Chapter 8	Depth Composition and 3D Display	This chapter describes the procedures for composing, displaying, and measuring 3D images using the depth composition function.
Chapter 9	Camera Setting and Image Enhancement	This chapter describes the camera settings and image enhancement features that can be set and adjusted using the [Camera/Image] command on the Menu bar.
Chapter 10	Printing Images	This chapter describes the procedure for printing observed images.
Chapter 11	Environment Setting	This chapter describes the procedures for setting the operating environment and network of the VHX-600E.
Chapter 12	Connecting with a PC	This chapter describes the procedures for connecting the controller with a PC.
Appendices		This chapter describes periodic maintenance procedures and the specifications of the VHX-600E.

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Chapter 1

Before Operation

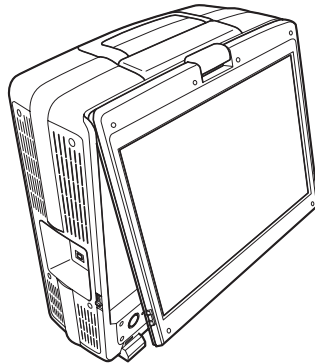
This chapter describes the package contents, product features, and part names and functions of the VHX-600E.

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1.3	Part names and functions.....	1-5

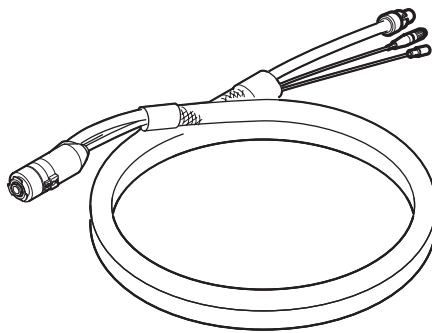
1.1 Checking the contents of the package

Check that the parts and equipment listed below are included in the VHX-600E package before using the unit. We have thoroughly inspected the package contents before shipment. However, in the event of defective or missing items, please contact your nearest KEYENCE office.

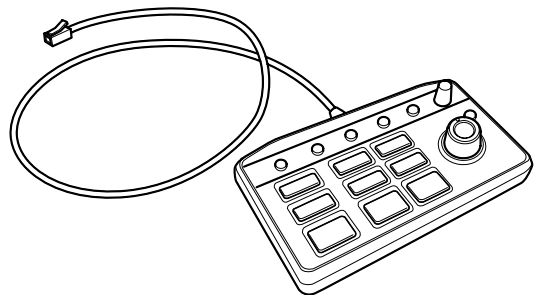
1



☐ Controller: 1



☐ Camera unit: 1



☐ Console: 1

- ☐ Mouse with scroll wheel: 1
- ☐ Lens case: 1
- ☐ Record/Freeze remote terminal connector: 1
- ☐ Stands (already attached to VHX-600E): 2
- ☐ VHX Communication software (CD-ROM): 1
- ☐ User's Manual (this document): 1
- ☐ Quick Setup Guide: 1

1.2 Features of the VHX-600E

This section describes the features of the VHX-600E.

■ All-in-one, super finehand-held camera

Observation can be performed without placing the target on a stage or breaking, cutting, or processing the target. With built-in features including an super fineCCD camera, high-intensity halogen lamp, image-processing circuit, hard disk drive, and CD-R/RW drive, the all-in-one design of the VHX-600E integrates “observation”, “recording” and “measuring” functions.

■ Maximum 54 million pixel images-6 levels of high-definition images selectable for your purpose

The microscopic movement of the actuator is capable of shifting the 2.11 million-pixel CCD (pixel-shift function). You can select from 6 options for the number of pixels (54 million/18 million/8 million/4 million/2.11 million) according to the observation purpose.

■ Digital focusing (Depth composition) function

When a conventional microscope is used for observing a target with large projections and depressions, only part of the target can be brought into focus because of the shallow depth-of-field. The VHX-600E features extensive depth composition functions to provide an image with overall focus by composing and superimposing images captured at different focus positions. The VHX-600E is packed with digital focusing functions using industry-first technologies. These functions include Real-time depth composition providing real-time display of an image with overall focus just by turning the focus adjustment dial, High-quality depth composition ensuring highly accurate images, and Quick depth composition providing instant composition.

■ Optimal image mode (e-Preview mode)

Even first-time users of the VHX-600E can observe effective images by simply pressing the OPTIMIZE button. Pressing the OPTIMIZE button displays a list of the four types of image modes. Simply click the image best suited for the purpose of the observation to start observation under the optimal mode.

■ Bump enhancement function

Pressing the ENHANCE button instantly switches the lighting to the partial illumination mode that enhances the projections, depressions, and edges.

■ Digital Zoom for more detailed observations

The VHX-600E features a digital zoom function for instantly enlarging the desired area. The split screen function splits the screen vertically, horizontally, or into four parts for simplified comparative observations.

■ Various image correction functions

The VHX-600E features Contrast optimization for automatically adjusting the image quality. The Halation reduction function suppresses the halation from highly reflective targets and adjusting the luminosity, the Wide-range view function for displaying the image with proper brightness even when the target has both excessively dark and bright areas, the Supercharge shutter function for enhancing the brightness of the screen due to insufficient light intensity by extending the shutter time, the Edge enhancement function for emphasizing the edges of the observation area in real time, and the Gamma correction function for emphasizing the outline by enhancing the contrast.

■ **One-touch lens replacement**

The camera unit and lens can be attached and detached with one-touch operation, enabling quick exchange of lens types. The camera unit is compatible with all lens types in the VH Series, allowing the users to utilize various lens models in the conventional VH Series. In addition, commercially available C-mount lenses can be attached using the C-mount attachment (option).

■ **Video recording function**

Observed images can be digitally saved as a video file, which can be played back on the VHX-600E or on a computer.

■ **Network-ready**

Dedicated software is available for data transmission between the VHX-600E and a Windows-based PC. High-speed data transmission can be performed between the VHX-600E and a PC via LAN connection. In addition, the VHX-600E features the FTP server function.

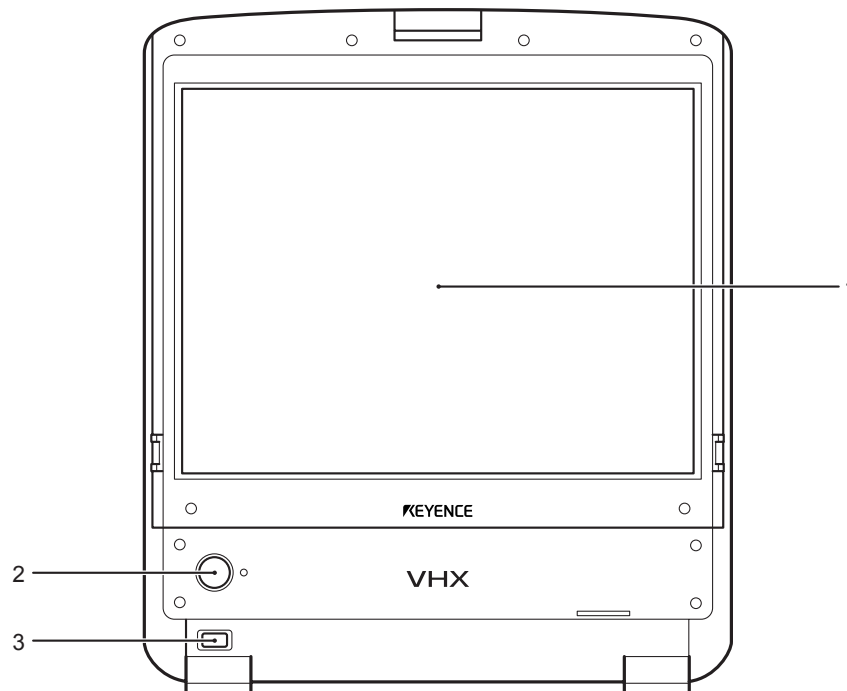
■ **Advanced measurement functions**

The length, angle, and area of the target can be measured by simple mouse operations. The VHX-600E features a wide range of functions to support measurement, such as the Auto edge selection for eliminating operator error, Auto extraction of areas, and Auto calibration providing one-touch, accurate calibrations. The measurement data can be displayed on the screen, printed, or saved in files in CSV format to be used with spreadsheet software.

1.3 Part names and functions

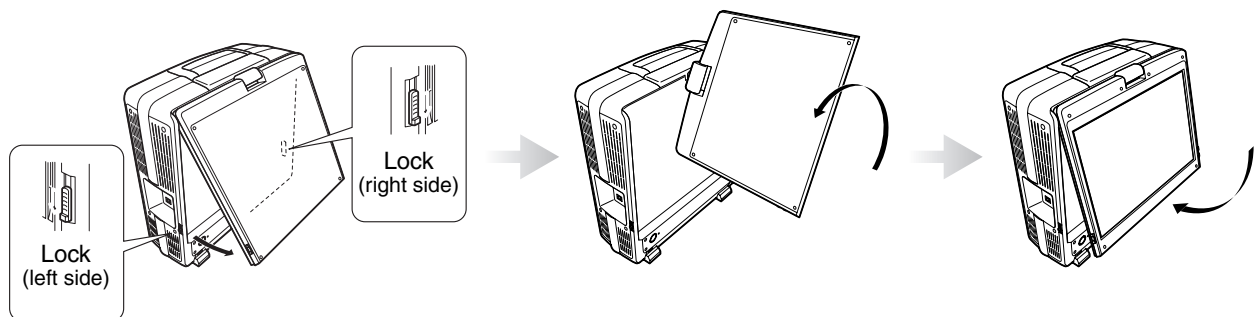
This section describes the part names and functions of the VHX-600E.

1.3.1 Front panel



1. LCD panel

15-inch UXGA (1600 x 1200 pixels) LCD monitor



Slide the locks down on both sides of the front panel to release the LCD panel. Twist the panel 180 degrees counterclockwise and set the LCD panel facing forwards.

2. POWER button (with LED)

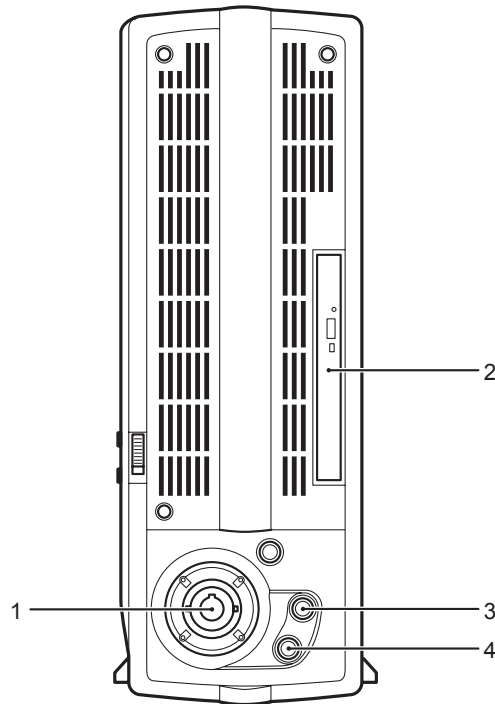
Press to turn on the power supply. (The main power supply switch on the rear panel should be turned on as well.) Pressing the switch again turns off the power supply.

3. USB expansion port

Connects the VHX-600E to a peripheral, such as an external USB hard disk drive or USB media.

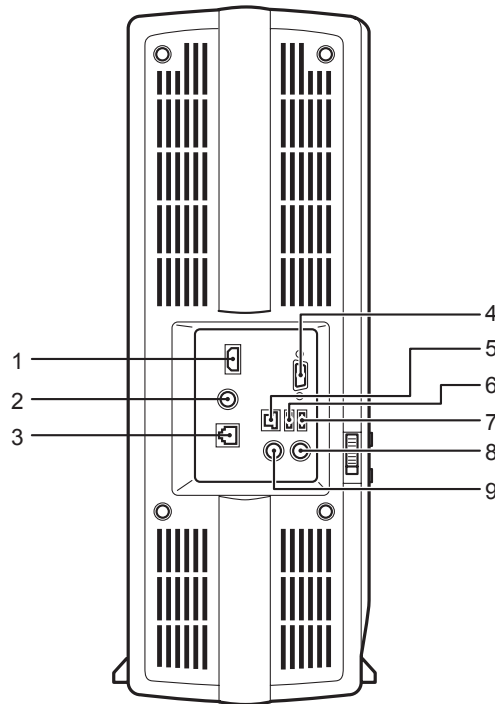
- Note:**
- Multifunction USB memories such as the ones with fingerprint authentication function cannot be used on the USB expansion port.
 - USB hubs cannot be used on the USB expansion port. The USB expansion port can be used to connect one USB device at a time.
 - Either one external USB hard disk drive or USB memory can be connected as an external drive to the USB expansion port.

1.3.2 Side panel (Right)



- 1. LIGHT connector**
Connects to the fiber optic cable on the camera.
- 2. CD-R/RW drive**
Insert a CD-R or CD-RW. You can write image or video files to the CD-R/RW or read files from the CD-R/RW.
- 3. CAMERA connector**
Connects to the camera cable.
- 4. SCAN CONTROL connector**
Connects to the scan control cable on the camera.

1.3.3 Side panel (Left)



1. USB expansion port

Connects the VHX-600E to a peripheral, such as an external USB hard disk drive or USB media.

Tips

The USB expansion port can be used to connect to one drive at a time. Either an external USB hard disk drive or USB media can be connected.

2. REMOTE connector

Connects the cable in order to remotely control the Freeze/Record operation.

3. CONSOLE connector

Connects to the console cable.

4. External monitor connector

Connects to the monitor cable for an external LCD monitor, CRT monitor, projector, or other similar display. (UXGA, 75 kHz (Horizontal), 60 Hz (Vertical))

5. LAN port

Connects a LAN cable between the VHX-600E and a LAN. (RJ-45 10BASE-T/100BASE-TX/1000BASE-T)

6. USB port for printer connection

Connects a USB cable between the specified printer (CP30DW) and the VHX-600E.

7. Exclusive USB port for the automatic 3D shape measurement unit

Connects a USB cable to the automatic 3D shape measurement unit (VHX-S15).

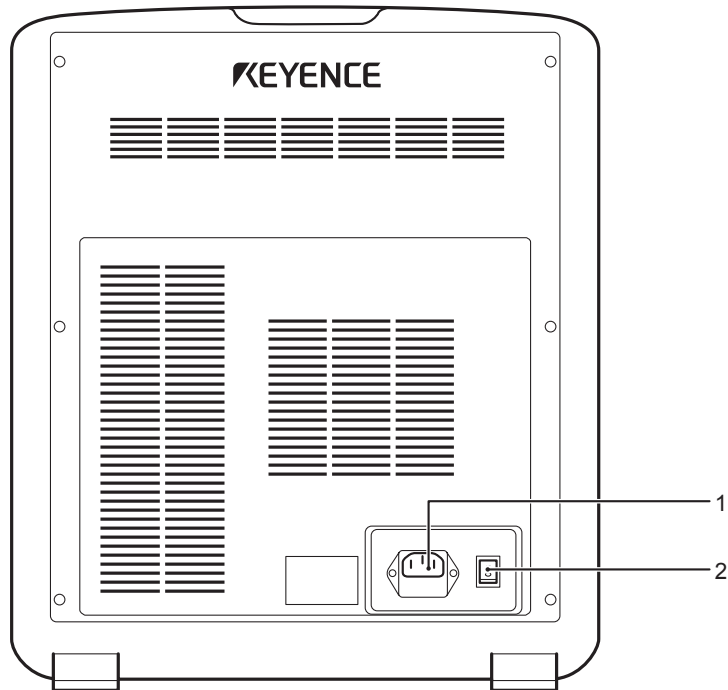
8. Keyboard connector

Connects a keyboard (sold separately). When a keyboard is not connected to the VHX-600E, a software keyboard is displayed on the screen, providing text input.

9. Mouse connector

Connects to the provided mouse.

1.3.4 Rear panel



1. AC power input connector

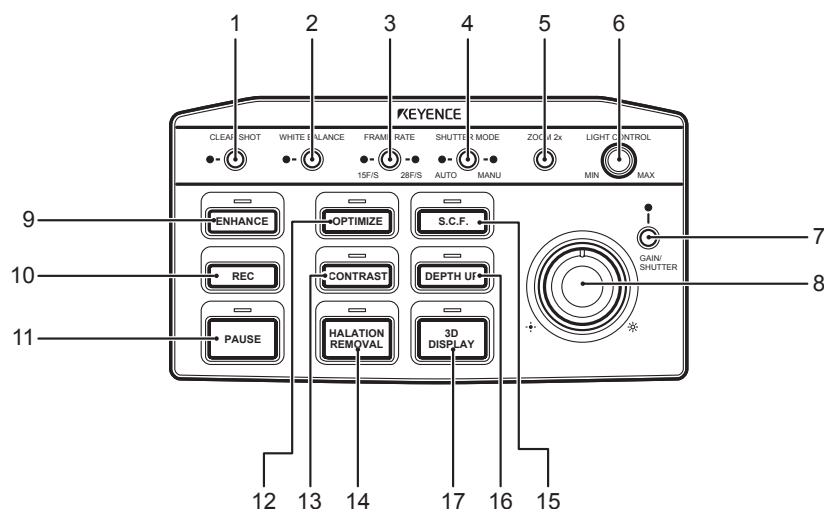
Connect the AC power supply cable here. (100 to 240 V AC, 50/60 Hz)

2. Main power supply switch

Used to turn on or off the main power supply. When the main power supply is turned off, the POWER button on the front panel will not function.

1.3.5 Console

This console can be used to quickly and easily perform the major observation tasks with the touch of a button.



1. CLEAR SHOT button

Use the CLEAR SHOT function to freeze the screen.

⇒ Refer to page 6-4

2. WHITE BALANCE button

Adjusts the WHITE BALANCE function.

⇒ Refer to page 9-16

3. FRAME RATE selector button

Switches the frame rate. (15 frames per second, or 28 frames per second)

⇒ Refer to page 9-27

4. SHUTTER MODE selector button

Switches the camera shutter mode. (Auto/Manual)

⇒ Refer to page 9-10

5. ZOOM 2x button

Enlarges (digital zoom) the moving image displayed on the screen and displays it at twice the normal size.

⇒ Refer to page 5-8

6. LIGHT CONTROL knob

Adjusts the intensity of the halogen lamp. Use "MAX" under normal conditions.

⇒ Refer to page 9-29

7. GAIN/SHUTTER selector button

Switches between increased gain or the supercharge shutter when observing a dark target with the brightness adjustment knob.

⇒ Refer to page 4-4

8. Brightness adjustment knob

Adjusts the shutter speed to adjust the brightness of the image. When the target is dark, the VHX-600E automatically uses increased gain or the supercharge shutter.

⇒ Refer to page 9-6

9. ENHANCE button

Changes the direction of the light to enhance surface bumps (projections and depressions) on the target.

⇒ Refer to page 9-30

10. REC button

Saves the image displayed on the screen to the VHX-600E hard disk.

⇒ Refer to page 6-2

11. PAUSE button

Freezes the screen. Press the button again to cancel the frozen screen and return to a moving image.

⇒ Refer to page 4-9

12. OPTIMIZE button

The user can select from four images of the target that have been captured and automatically processed. (Normal/Bump enhancement/Image enhancement 1/Image enhancement 2)

⇒ Refer to page 5-2

13. CONTRAST button

Automatically adjusts the image for the optimal contrast between light areas and dark areas for the sensitivity of the human eye.

⇒ Refer to page 9-24

14. HALATION REMOVAL button

Suppresses the halation from highly reflective targets and adjusts the luminosity.

⇒ Refer to page 9-26

15. S.C.F. button (Shake Correction Function button)

Reduces the effects of environmental vibration on observation.

⇒ Refer to page 9-28

16. DEPTH UP button

Instantaneously creates a depth composition image. This is useful when there is a large difference between the height of bumps or when the entire image is not in focus.

⇒ Refer to page 8-2

17. 3D DISPLAY button

Composes a 3D image simply by lowering the focus from top to bottom.

⇒ Refer to page 8-5

Chapter 2

Preparation (Connection procedures)

This chapter describes how to connect the VHX-600E with accessories and optional devices required for observation.

2.1	Mounting/removing the stands	2-2
2.2	Connecting the AC power supply cable	2-3
2.3	Connecting the camera unit and lens	2-4
2.4	Connecting the mouse and a keyboard	2-9
2.5	Connecting the console	2-11
2.6	Connecting an external monitor	2-12
2.7	Connecting a printer	2-13
2.8	Connecting the external remote switch.....	2-14

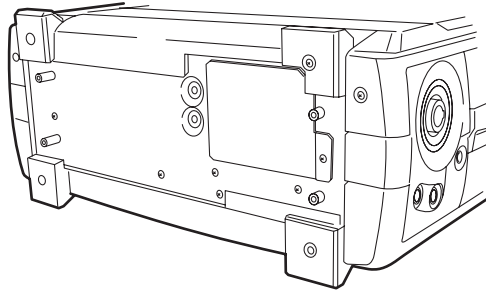
2.1 Mounting/removing the stands

This section explains how to mount or remove the stands provided with the controller. The stands will position the display at an ideal viewing angle. They will also help prevent the unit from tipping over.

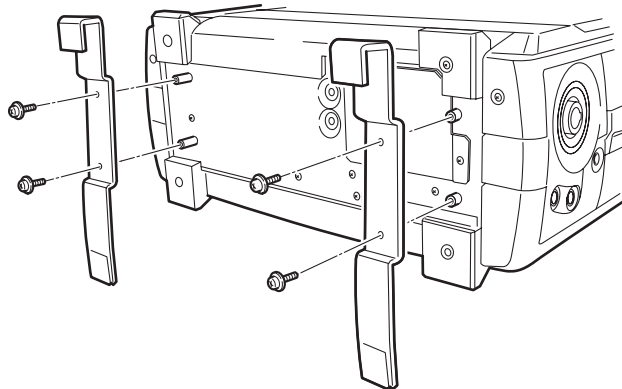
Note: The stands are attached to the controller when it is shipped from the factory.

2.1.1 Mounting the stands

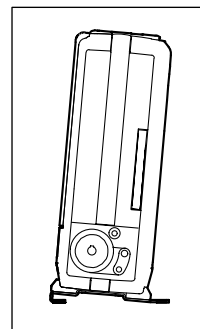
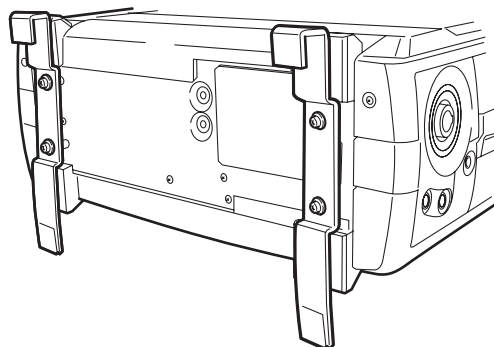
1. Place the controller with the LCD monitor facing up.



2. Attach the stands to the bottom of the panel.
Attach the stands so that the U-shaped portions face forwards.



3. Tighten the screws to fix the stands in place.



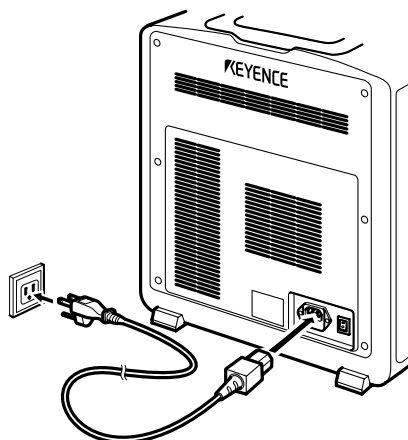
2.1.2 Removing the stands

To remove the stands, perform steps 1 to 3 in the reverse order.

2.2 Connecting the AC power supply cable

Connect the AC power supply cable to the VHX-600E.

1. Connect the AC power supply cable to the AC power input connector on the rear panel of the VHX-600E.

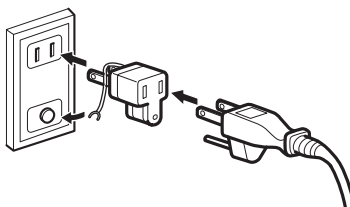


Note: The VHX-600E operates by automatically detecting the power supply voltage that is being input.
Operable range of voltage: 100 to 240 VAC

CAUTION

Be sure to turn off the power to the VHX-600E before connecting and disconnecting the AC power supply cable. Connecting or disconnecting the cable while the power is turned on may cause product malfunction.

2. Connect the other end of the AC power supply cable to the AC power outlet.



WARNING

- *Be sure to ground the Protective Ground Terminal of the AC power supply cable. Improper grounding may cause electric shock.*

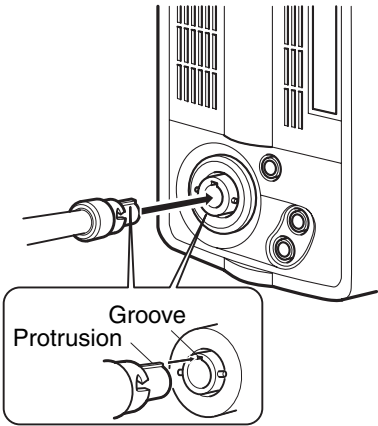
2.3 Connecting the camera unit and lens

Connect the camera cable, fiber optic cable, and scan control cable for the camera unit to the corresponding connectors.

2.3.1 Connecting the camera to the controller

Connecting the fiber optic cable

1. Insert the fiber optic cable into the LIGHT connector on the right side panel of the VHX-600E, and secure the connection.

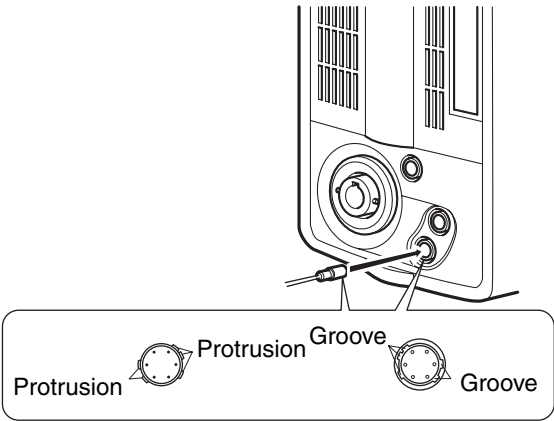


Note: When connecting the fiber optic cable, insert the cable with the protrusion on the connector facing up, and push until you hear a click.

Tips When disconnecting the fiber optic cable, pull the cable while turning the connector ring to the left.

Connecting the scan control cable

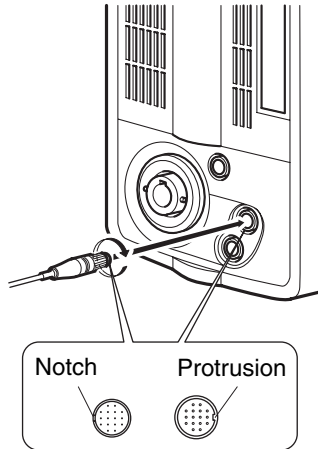
1. Insert the scan control cable into the SCAN CONTROL connector on the right side panel of the VHX-600E, and secure the connection.



Note: When connecting the scan control cable, insert the cable while aligning the protrusion on the connector with the groove on the VHX-600E.

Connecting the camera cable

1. Insert the camera cable into the CAMERA connector on the right side panel of the VHX-600E, and secure the connection.



Note: When connecting the camera cable, insert the cable with the notch on the connector facing to the right.

CAUTION

- *Be sure to turn off the power supply to the VHX-600E before connecting and disconnecting the cable. Connecting or disconnecting the cable while the power is turned on may cause product breakdown.*
- *Do not connect the cable while the power is turned on. Otherwise, the camera may become damaged.*
- *Be sure to check the orientation of the connector before connecting the cable. Inserting the connector in the wrong orientation may break the connector pins, causing malfunctions.*

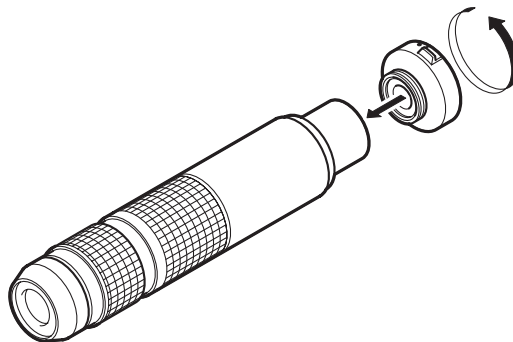
2.3.2 Attaching the lens of the VH series

Use a VHX bayonet lens attachment or an optional C-mount lens attachment depending on the type of lens you want to attach.

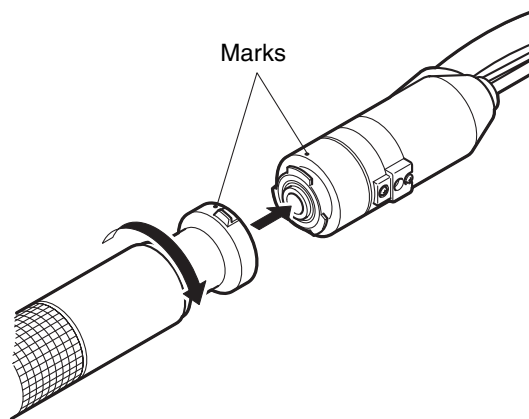
- When attaching a VH Series lens, use an optional VHX bayonet lens attachment (OP-51478).
- When attaching a C-mount lens, use an optional C-mount lens attachment (OP-51479).

Attaching a lens

1. Attach the lens to the VHX bayonet lens attachment.



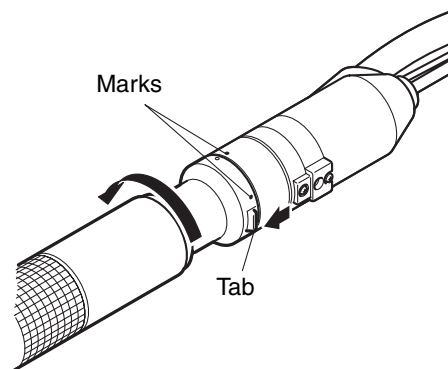
2. Align the “o” mark on the lens attachment with the “o” mark on the camera unit, and secure the connection by turning the attachment until you hear a click.



Tips Attach the lens attachments to each of your lenses to simplify the lens replacement procedure.

2.3.3 Detaching the lens

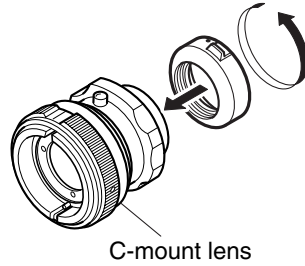
1. Press down on the tab and turn the lens attachment counter-clockwise until the “o” marks align. Detach the lens.



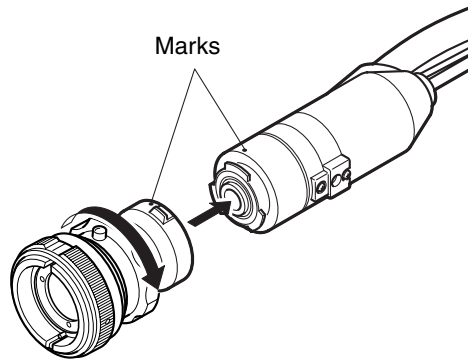
2.3.4 Attaching a C-mount lens

Connect a C-mount lens to the VHX-600E using the optional C-mount lens attachment.

1. **Attach the optional C-mount lens attachment (OP-51479) to the C-mount lens.**



2. **Align the “o” mark on the C-mount lens attachment with the “o” mark on the camera unit, and secure the connection by turning the attachment until you hear a click.**



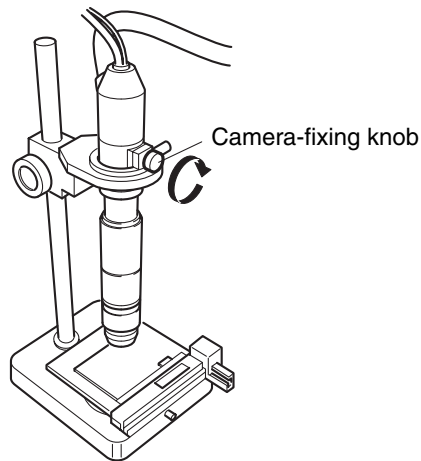
-
- Note:**
- The optional C-mount lens attachment cannot be attached to some C-mount lenses depending on the shape of the lens. Make sure to check for compatibility in advance.
 - When using the C-mount lens, do not use the illumination of the VHX-600E but use a separate illumination source. Otherwise, the monitor screen may appear whitish.
-

2.3.5 Mounting the camera unit onto the stand

Mount the camera unit onto the stand.

The mounting procedure varies depending on the stand. For details, refer to the “Lens & Stand Manual”.

1. **Attach the camera unit to the camera-mounting bracket, and turn the camera-fixing knob to secure it in place.**



When detaching the camera unit from the stand, make sure to hold the camera unit while loosening the camera-fixing knob. Otherwise, the camera unit may fall, leading to product damage.

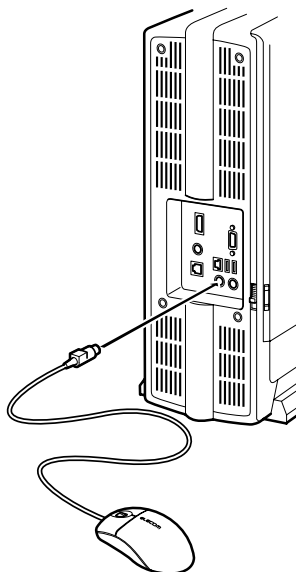
2.4 Connecting the mouse and a keyboard

2.4.1 Connecting the mouse

Connect the provided mouse to the VHX-600E.

Note: Only a mouse with a PS/2 connector for a Windows-based PC can be connected with the VHX-600E. A mouse with a USB connector is not supported.

1. Connect the provided mouse to the Mouse connector on the left side panel of the VHX-600E.



CAUTION

- *Be sure to turn off the power supply to the VHX-600E before connecting and disconnecting the mouse. Connecting or disconnecting the mouse while the power is turned on may cause malfunctions of the mouse.*
- *Be sure to check the orientation of the connector before connecting the cable. Inserting the connector in the wrong orientation may break the connector pins, causing malfunctions.*

2.4.2 Connecting a keyboard

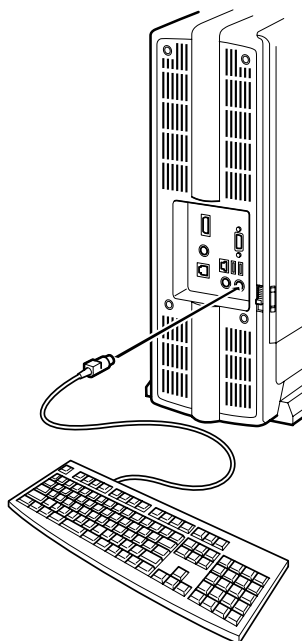
Connect a keyboard to the VHX-600E.

When a keyboard is not connected to the VHX-600E, a software keyboard is displayed on the screen, enabling text inputs.

☞ *When using the software keyboard, refer to 3.1 "Keyboard operation" on page 3-2.*

-
- Note:**
- A keyboard is not provided with the VHX-600E. Provide one as necessary. For recommended keyboards for VHX-600E, please contact your nearest KEYENCE office.
 - Only a keyboard with a PS/2 connector for a Windows-based PC can be connected with the VHX-600E. A keyboard with a USB connector is not supported.
-

1. **Connect the Keyboard connector to the left side panel of the VHX-600E.**



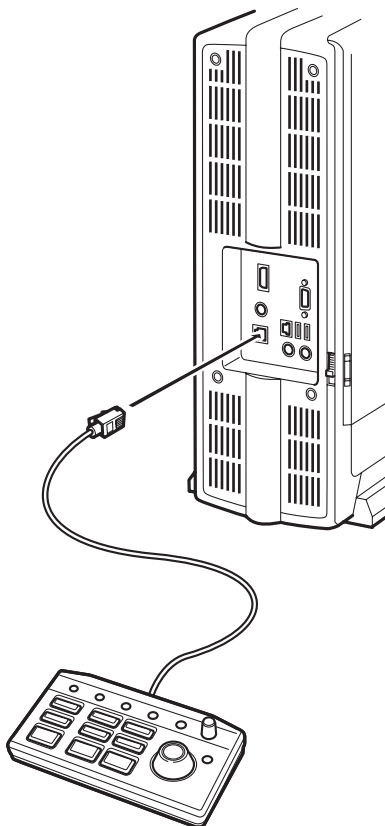
CAUTION

- ***Be sure to turn off the power supply to the VHX-600E before connecting and disconnecting the keyboard. Connecting or disconnecting the keyboard while the power is turned on may cause malfunctions of the keyboard.***
- ***Be sure to check the orientation of the connector before connecting the cable. Inserting the connector in the wrong orientation may break the connector pins, causing malfunctions.***

2.5 Connecting the console

Connect the included console to the VHX-600E.

1. Connect the console to the console connector on the left side panel of the VHX-600E.



2



Be sure to turn off the power supply to the VHX-600E before connecting and disconnecting the console. Connecting or disconnecting the cable while the power is turned on may cause the console to behave with errors.

Be sure to check the orientation of the connector before connecting the console. Inserting the connector in the wrong orientation may break the connector pins, causing malfunctions.

2.6 Connecting an external monitor

Connect a monitor to the VHX-600E.

2.6.1 Supported monitors

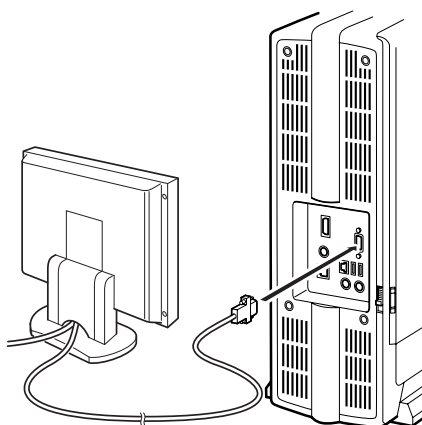
In addition to the built-in LCD monitor, a monitor (CRT, LCD, projector, etc.) with the following specifications can be connected to the VHX-600E.

- Horizontal scanning frequency: 75 kHz
- Vertical scanning frequency: 60 Hz
- Resolution: UXGA (1600 x 1200 pixels) compatible
- Recommended color temperature: 6500 K

Tips The picture quality and color may vary depending on the model or manufacturer of each monitor. Refer to the instruction manual provided with the monitor to adjust the color and picture quality.

2.6.2 Connection procedure

1. Connect the monitor to the External monitor connector on the left side panel of the VHX-600E using the monitor cable.



Note: Use a 15-pin mini D-sub connector for the connector on the VHX-600E.

CAUTION

- **Be sure to turn off the power supply to the VHX-600E before connecting and disconnecting the monitor. Connecting or disconnecting the monitor while the power is turned on may cause malfunctions.**
- **Be sure to check the orientation of the connector before connecting the cable. Inserting the connector in the wrong orientation may break the connector pins, causing malfunctions.**

2.7 Connecting a printer

Connect a digital photo printer (the CP30DW produced by Mitsubishi Electric Corporation) to the VHX-600E.



Note: Only the CP30DW produced by Mitsubishi Electric Corporation can be connected to the VHX-600E.

1. Connect the USB port for the printer on the left side panel of the VHX-600E to the USB port on the rear face of the digital photo printer using a USB cable.

Tips Other printers cannot be used with the VHX-600E.



CAUTION

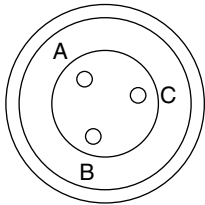
- **Be sure to check the orientation of the connector before connecting the cable. Inserting the connector in the wrong orientation may break the connector pins, causing malfunctions.**
- **Connect the USB cable to the USB port marked with  on the rear panel of the VHX-600E. Do not connect the cable to the USB port marked with .**

2.8 Connecting the external remote switch

An external remote switch (foot switch, etc.) can be connected to the REMOTE connector on the left side panel of the VHX-600E to freeze the images or save the images on the hard disk of the VHX-600E.

⇒ Refer to "A.2 REMOTE connector (Record/Freeze)" on page Appendices-5.

2.8.1 REMOTE connector



REMOTE connector
(on VHX-600E controller)

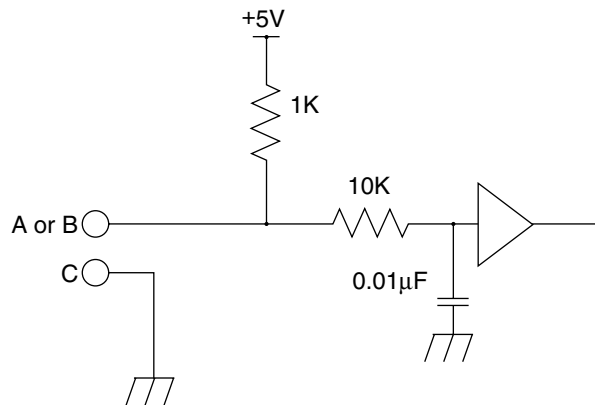
Pin assignment

Pin No.	Terminal name
A	Pause remote terminal
B	Record remote terminal
C	COM

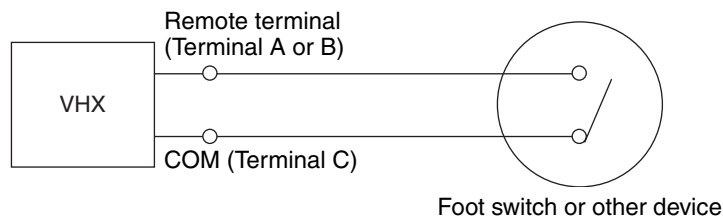
2.8.2 Electrical specifications

- Non-voltage input
- Contact/solid state
- The VHX-600E recognizes the signal when the input terminal is short-circuited (operates when turned to LOW for 100 ms or longer).

2.8.3 Internal circuit



2.8.4 Connection example



Note: When a signal is input to Pause remote terminal and Record remote terminal simultaneously, the Record remote terminal signal is given priority.

Chapter 3

Basic Operations

This chapter describes the basic operation procedures for the VHX-600E and part names of the windows.

3.1	Keyboard operation	3-2
3.2	Using the slider bar.....	3-5
3.3	Menu options	3-6
3.4	Right-click menu	3-13

3.1 Keyboard operation

Characters can be entered using the software keyboard shown on the screen or the keyboard connected to the VHX-600E. This section describes how to enter characters using the software keyboard.

Tips A software keyboard is displayed on the screen when a keyboard is not connected to the VHX-600E.

Note: Symbol characters (\ / : ; . , * ? “ < > |) and spaces cannot be used in a file name or folder name

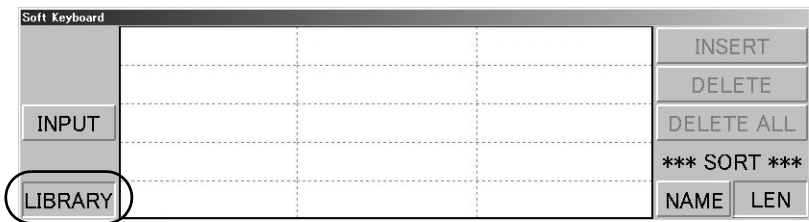
3.1.1 Entering characters using a software keyboard

A software keyboard appears on the screen when characters are to be entered.

■ **Library**

Character strings can be registered in advance. A character string can be entered by simply selecting the desired text from the list of registered character strings.

- To register character strings in the library, drag the mouse to select the entered text, right-click the mouse to display a shortcut menu, and then select [Reg to library].
- ⇒ Refer to "3.1.3 Entering from the library" on page 3-3 for the procedure for registering text to the library.



■ **Operation of other special keys**



1. **[BS] key**
Deletes one character immediately before the cursor position.
2. **[DEL] key**
Deletes one character immediately after the cursor position. To delete two or more characters with this key, select the characters by dragging the mouse, and click the [DEL] key.
3. **[SPACE] key**
Enters a space.
4. **[ESC] key**
Stops character entry and closes the dialog box.
5. **[ENTER] key**
Operates similarly to the [OK] button on a dialog box.
6. **Direction keys**
Moves the cursor by one character in the selected direction.

3.1.2 Entering characters

This section describes how to enter characters using a software keyboard. In the sample below, enter the filename “VHX” for the recorded image.

1. Click the [INPUT] key on the software keyboard on the screen.
2. Click the [CAPS] key to select capital letter mode.
Upper-case alphanumeric characters are displayed on the software keyboard.
3. Click the “V”, “H”, “X” keys successively.



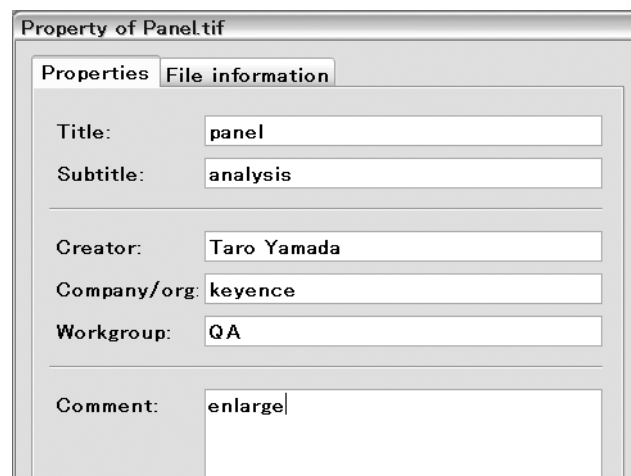
3.1.3 Entering from the library

Frequently used character strings can be registered in the library, which provides quick entry by selecting the text from the library.

Note: The library function is enabled when entering characters using a software keyboard.

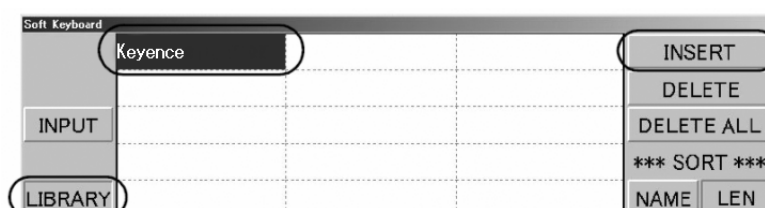
■ Procedure for registering characters in the library

1. Select the entered character strings by dragging the mouse.
2. Right-click the mouse to display the shortcut menu on the screen, and select [Reg to library].
The selected character string is registered in the library.



■ Entering characters using the library

1. Click the point at which you want to enter the characters.
2. Click the [LIBRARY] button on the software keyboard.
Registered character strings are displayed.



3. Click the character string to be entered, and then click the [INSERT] button.

The screenshot shows a dialog box titled "Property of Panel.tif". It has two tabs: "Properties" (selected) and "File information". Under the "Properties" tab, there are several text input fields. The "Title" field contains "panel". The "Subtitle" field contains "analysis". The "Creator" field contains "Taro Yamada". The "Company/org" field contains "keyence" and is circled with a black oval. The "Workgroup" field contains "QA".

The character string is inserted.

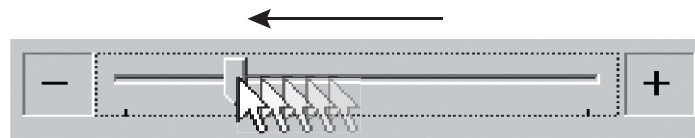
3.2 Using the slider bar

This section describes the function of the slider bar that is frequently used for adjusting images.

Dragging the slider bar

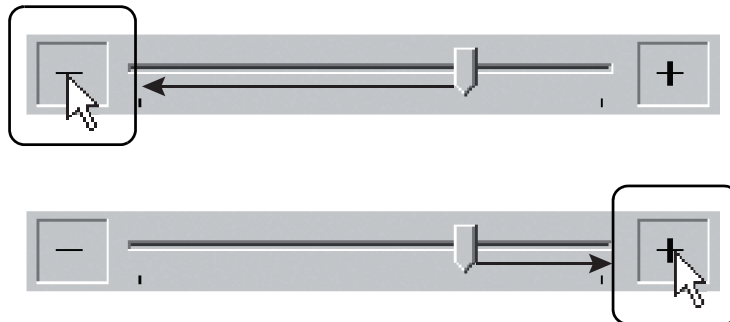
Place the mouse pointer on the slider and move it to the desired position while holding down the left mouse button.

- This operation is effective for moving the slider a large distance.



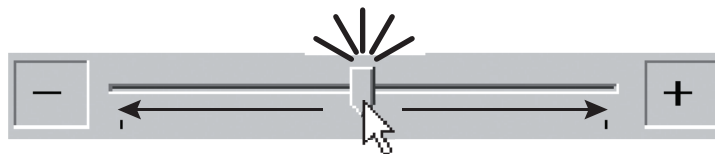
Adjusting the bar using the buttons

Clicking the [+] or [-] button will move the slider by the minimum increment.



Adjusting the bar using the wheel button

Click the slider using the mouse pointer and then rotate the wheel button to make minute adjustments to the slider position.



3.3 Menu options

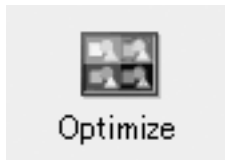
This section describes the menu bar and task bar displayed on the screen when the VHX-600E is activated.

3.3.1 Menu bar

This section describes the configuration of the Menu bar.



3



Optimize

Used to display images with four typical settings. Select the optimal image from the four images.

⇒ Refer to "5.1 Selecting the optimal images (e-Preview)" on page 5-2.



Rec Settings

Used to set up image size, Auto Rec settings, and Timer recording settings. The table below shows the names and functions of the commands.

Command	Function
Record	Saves the image currently displayed on the screen onto the hard disk of the VHX-600E. ⇒ Refer to "6.1 Recording images (still images)" on page 6-2.
Rec size-Normal [1600x1200]	Records the image currently displayed on the screen. (2.11 million pixels) ⇒ Refer to "6.1 Recording images (still images)" on page 6-2.
Rec size-Clear [1600x1200]	Records the currently displayed image with clear picture quality by repeatedly shifting the CCD by 1 pixel in the vertical direction. (Equivalent of 4 million pixels) ⇒ Refer to "6.1 Recording images (still images)" on page 6-2.
Rec size-3CCD [1600x1200]	Records the image in the 3CCD mode, which features good color reproduction. (2 million pixels x 3) ⇒ Refer to "6.1 Recording images (still images)" on page 6-2.
Rec size-High Definition [3200x2400]	Records the currently displayed image with high definition by using the pixel-shift function. (8 million pixels) ⇒ Refer to "6.1 Recording images (still images)" on page 6-2.
Rec size-Super Fine [4800x3600]	Records the currently displayed image with super fine by using the pixel-shift function. (18 million pixels) ⇒ Refer to "6.1 Recording images (still images)" on page 6-2.
54 Mega Pixel - 3CCD [4800x3600]	Records the currently displayed image in the super fine and 3CCD modes using the pixel shift function. ⇒ Refer to "6.1 Recording images (still images)" on page 6-2
Auto Rec Mode	Enables automatic recording by one-touch operation. ⇒ Refer to "6.1 Recording images (still images)" on page 6-2.
Auto Rec settings	Specifies the destination folder and the initial file name. ⇒ Refer to "6.1 Recording images (still images)" on page 6-2.
Timer Rec	Activates timer-controlled recording for specified times and intervals. ⇒ Refer to "6.1 Recording images (still images)" on page 6-2.
Restore recording settings	Reruns the setting used for recording a saved image. ⇒ Refer to "6.7 Rerunning the setting used for a saved image" on page 6-30.
File Properties	Appends additional information to the image file. ⇒ Refer to "6.1 Recording images (still images)" on page 6-2.



Rec video

Rec video

Saves the observation image digitally in the AVI format.

⇒ Refer to "6.4 Recording video" on page 6-27



Album

Album

Used to edit recorded image files and can read from or write to CD-R/RW or external USB drives.

⇒ Refer to "6.2 Reproducing and editing images (Album)" on page 6-8.



Measure

Measure

Used to measure the observation image. The table below lists the names and functions of the commands.

⇒ Refer to "Chapter 7 Measuring Images" on page 7-1.

Command	Function
Main Measure·Area Measure	Measures distances, angles, and areas. ⇒ Refer to "7.3 Main measurement" on page 7-5 and "7.5 Area measurement" on page 7-26.
Scale setting	Displays the scale on the screen. ⇒ Refer to "7.7 Displaying the scale" on page 7-44.
Auto Wide-area 2-pt Measure	Accurately measures the area between two points that fits into the screen only at low magnification. ⇒ Refer to "7.8 Measuring with high precision in a wide range (2-Points measurement)" on page 7-47.
RGB Color Measurement	Measures brightness of RGB colors on the screen. ⇒ Refer to "7.12 Measuring brightness of RGB colors" on page 7-57



DepthUP

DepthUP

Used when focus cannot be achieved due to the large difference in height (depressions and projections) of the target to be observed. The table below lists the names and functions of the commands.

Command	Function
Real-time Depth composition	Performs depth composition quickly with an easy operation. ⇒ Refer to "8.1 Real-time Depth composition" on page 8-2.
Quick 3D display	Creates a high-quality composition image instantly and displays it in 3D simply by moving down the lens. ⇒ Refer to "8.2 Quick depth composition and 3D" on page 8-5.
Fine depth composition	Captures the target multiple times, and performs depth composition in high definition, or measures its shape in 3D. ⇒ Refer to "8.3 Fine (high-quality) depth composition and 3D" on page 8-7.



Print

Print

Used to print the images with the dedicated printer (CP30DW).

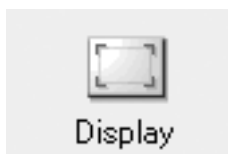
⇒ Refer to "Chapter 10 Printing Images" on page 10-1



Comment

Used to enter comments such as text, markers, and arrows. The table below lists the names and functions of the commands.

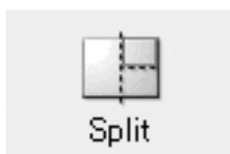
Command	Function
Comment Toolbar	Displays the frequently used comment commands such as text, markers, and arrows.
New Comment	Displays new text as a temporary comment.
Residual Comment	Displays text as a residual comment. Only one item can be entered.
File Title	Displays the title of the file name as a temporary comment.
Lens Name	Displays the lens name as the residual comment.
Date	Displays the date as the residual comment.
Time	Displays the time as the residual comment.
Circle Marker	Displays a Circle Marker as a temporary comment.
Rectangle Marker	Displays a Rectangle (square) Marker as a temporary comment.
Arrow Marker	Displays an Arrow Marker as a temporary comment.
Arrow/Text comment	Displays an Arrow Marker and New Comment as temporary comments.
Del Comment	Deletes a desired comment.
Del All Comments	Deletes all comments.



Display

Used to set up the display settings for scale and comments. The table below lists the names and functions of the commands.

Command	Function
Fit Display	Select "Real-pixel display" to display the image captured with the 54 mega pixel 3CCD (4800x3600), super fine (4800x3600) or high-definition (3200x2400) mode in real size, or "Fit Display" to reduce the image to display the entire image on the screen.
Show Comments	Displays all temporary comments (including markers). This command is not effective for residual comments. ⇒ Refer to "5.5.2 Switching the Show/Hide mode for comments" on page 5-25.
Hide Comments	Hides all temporary comments (including markers). This command only hides the comments and will not delete the data. This command is not effective for residual comments. ⇒ Refer to "5.5.2 Switching the Show/Hide mode for comments" on page 5-25.
Delete All	Deletes data for all temporary comments (including markers). In addition, hides all residual comments.
Full Screen	Displays the image on the full screen. (The Menu bar and toolbars are not displayed.) Clicking on the screen during Full Screen mode returns to the normal display mode.
Crop Image to Screen Size	The images captured in the 54 mega pixel 3CCD (4800 x 3600), super fine (4800x3600) or high-definition (3200x2400) mode can be reduced to the screen size (1600x1200).

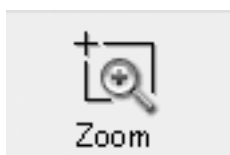


Split

Used to split the screen for comparative observations. The table below lists the names and functions of the commands.

Command	Function
Overall view	Displays the image on the full screen.
Vertical Split	Vertically splits the screen into two parts for displaying images.
Horizontal Split	Horizontally splits the screen into two parts for displaying images.
Quarter Split	Splits the screen into four parts for displaying images.

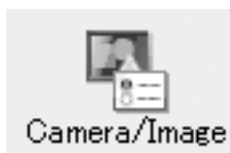
⇒ Refer to "5.2 Splitting the screen" on page 5-4.



Zoom

Used to specify the desired area and magnify (digital zoom) the area in real time.

⇒ Refer to "5.4 Magnifying the screen (Live digital zoom)" on page 5-8



Camera/Image

Used to set up the camera settings for recording or enhancing the images. The table below lists the names and functions of the commands.

Command	Function
Camera Settings/Image enhancement	Adjusts the image-enhancement settings, brightness, white balance, and monochrome settings. ⇒ Refer to "Chapter 9 Camera Setting and Image Enhancement" on page 9-1.
Wide-range view	Captures an image at two different shutter speeds, and binds the parts that have appropriate brightness to create an optimal image. ⇒ Refer to "9.5 Wide-range view" on page 9-23
Optimum contrast	Adjusts the contrast to the level optimal for the human eye's sensitivity. ⇒ Refer to "9.6 Adjusting the optimum contrast" on page 9-24
Halation removal	Eliminates halation caused by the reflected light from the target. ⇒ Refer to "9.7 Removing halation" on page 9-26
High frame rate	Displays the image with a frame rate of 30 frames/sec. ⇒ Refer to "9.8 Setting the camera environment" on page 9-27.
Shake correction mode	Corrects the camera shake for hand-held observation. ⇒ Refer to "9.8.2 Correcting camera shake" on page 9-28.
Continuous Clear Mode	Continuously displays the 4-million-pixel clear images as a quasi-movie with a frame rate of 2 frames/sec. ⇒ Refer to "9.8.3 Observing targets with the Continuous Clear Mode" on page 9-28.
Light control	Adjusts the brightness of the light (illumination).
Bump enhancement mode	Displays the target by enhancing the depressions and projections of the target. ⇒ Refer to "9.8.5 Bump enhancement mode" on page 9-30



Option

Used to set up the network and system settings of the VHX-600E. The table below lists the names and functions of the commands.



Command	Function
Option Settings	Configures the system settings of the VHX-600E.
User settings	Manages the system of the VHX-600E for each user.
Network settings	Configures the network settings. ⇨ Refer to "11.3 Network Setting" on page 11-7.
Security Settings	Configures the security settings of the VHX-600E.
Start FTP Server	Starts up the FTP server. ⇨ Refer to "12.5 Connecting via FTP" on page 12-37.
Stop FTP Server	Stops the FTP server. ⇨ Refer to "12.5 Connecting via FTP" on page 12-37.
Share Network ON	Enables the share network settings. ⇨ Refer to "12.6 Sharing a network" on page 12-41.
Share Network OFF	Disables the share network settings. ⇨ Refer to "12.6 Sharing a network" on page 12-41.
Change Language	Switches interface languages to use.
Text Input mode	Switches input languages.
Zoom Correction mode	Automatically corrects the fluctuation of magnification that occurs when the focus position is moved.
Initialize	Initializes the settings of the VHX-600E.



Func Guide

Displays a description of basic operations of the VHX-600E.

3.3.2 Reducing the menu bar

Clicking the  button on the top right corner of the menu bar will change the menu bar to the reduced mode that displays only frequently used functions. Clicking the  button on the same position will return to the previous mode.

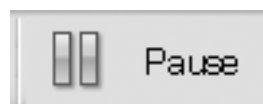


Click the  or  button.



3.3.3 Status bar

Frequently used functions can be displayed by simply clicking the icon on the status bar.



Pause

Freezes the image.

⇨ Refer to "4.2 Freezing Images" on page 4-9.



Rec

Saves the image currently displayed on the screen onto the hard disk of the VHX-600E.

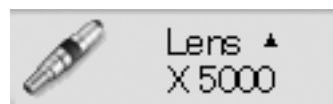
⇨ Refer to "6.1 Recording images (still images)" on page 6-2



Print

APrints the image currently displayed on the screen using the dedicated printer (CP30DW).

⇨ Refer to "Chapter 10 Printing Images" on page 10-1



Lens

Used to select the power of the lens to be used.

⇨ Refer to "7.9 Calibration" on page 7-50



Menu

Clicking the [Menu] button will show or hide the menu bar.

Tips

When the menu bar disappears during operation, click the [Menu] button.





Full screen

Displays the observed image on the full screen.

Clicking on the screen during the Full Screen mode will return to the previous display mode.

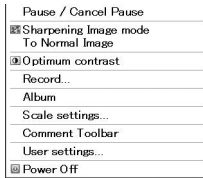


Move buttons

Clicking the  button will display the status bar on the top of the screen. Clicking the  button will display the status bar on the bottom of the screen.

3.4 Right-click menu

The following describes the shortcut menu that appears when the user right-clicks on the screen.



■ Pause/Cancel pause

Selecting this command freezes/cancels the freezing of the image.

☞ Refer to "4.2 Freezing Images" on page 4-9.

■ Sharpening Image mode

When selecting this menu, the color of the image turns vivid and the edges turn sharp.

☞ Refer to "9.9 Sharpening Image Mode" on page 9-31.

■ To Normal Image

Returns to the default setting from the mode for enhancing projections and depressions or the image sharpening mode.

■ Optimum contrast

Adjusts the contrast to a sensitivity that is best suited for the human eye.

☞ Refer to "9.6 Adjusting the optimum contrast" on page 9-24.

■ Record

The image currently being displayed can be saved on the hard disk.

☞ Refer to "6.1 Recording images (still images)" on page 6-2.

■ Album

Reproduces and edits the recorded image files.

☞ Refer to "6.2 Reproducing and editing images (Album)" on page 6-8.

■ Scale Settings

The scale can be displayed on the observation screen.

☞ Refer to "7.7 Displaying the scale" on page 7-44.

■ Comment Toolbar

Displays a toolbar to enter comments such as text or markers onto the observation images.

☞ Refer to "5.5 Displaying text and markers" on page 5-10.

■ User settings

Settings such as [Camera/Image] and [Option] can be saved.

☞ Refer to "11.2 User settings" on page 11-5.

■ Power OFF

Turns off the power for the VHX-600E.

3

Chapter 4

Observation

This chapter describes the basic procedures required for observing targets. For useful functions, refer to “Chapter 5 Useful Functions for Observation” and “Chapter 9 Camera Setting and Image Enhancement”.

4.1	Observing targets	4-2
4.2	Freezing Images	4-9

4.1 Observing targets

This section describes the basic operations for observing targets.

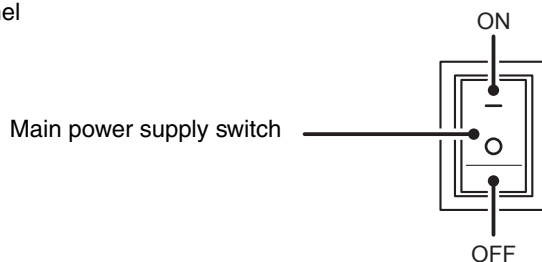
4.1.1 Starting the VHX-600E

Turn on the power supply to the VHX-600E.

Note: Check that all of the cables are connected correctly before turning on the power.

1. **Check that the main power supply switch on the rear panel is set to the on position.**
When the switch is set to the off position, turn it to the on position.

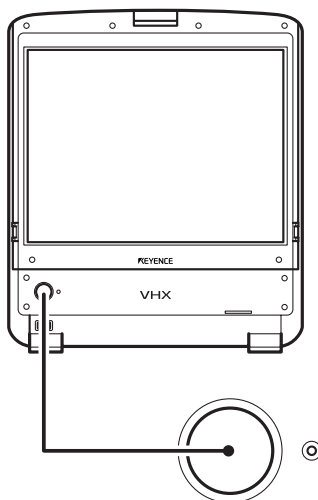
Rear panel



Tips

- The main power supply switch normally remains on. Use the POWER button described in the next step to turn on or off the VHX-600E.
 - Turn off the main power supply switch if you do not plan on using the VHX-600E for a long period of time or when you are moving the VHX-600E.
-

2. **Press the POWER button on the front panel of the VHX-600E.**
The power is turned on and the POWER LED illuminates.

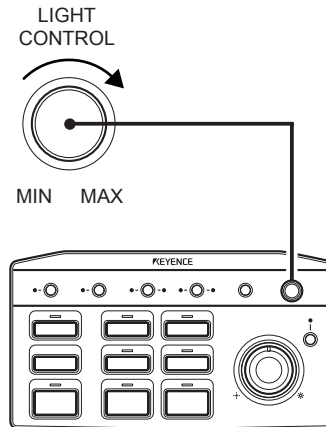


4.1.2 Adjusting the brightness

Adjust the brightness of the light source to be applied to the target.

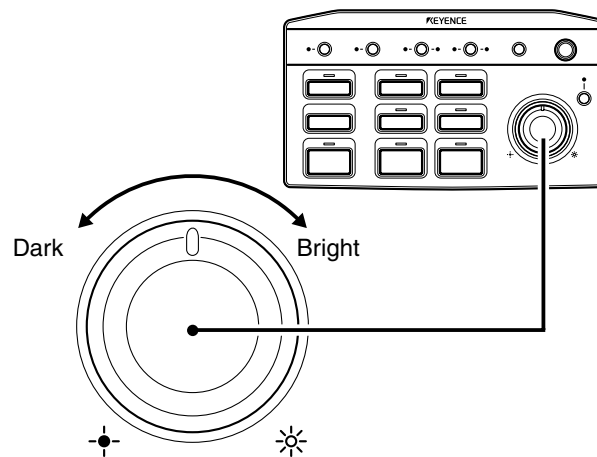
- The detailed settings can be configured by selecting the [Camera Setting/Image Enhancement] command from the [Camera/Image] icon on the menu bar.
⇒ Refer to "9.2 Adjusting the brightness of the image" on page 9-6.

1. **Turn the LIGHT CONTROL knob on the console to MAX (maximum).**
The light intensity of the halogen lamp is enhanced to the maximum level.


Tips

Set the LIGHT CONTROL knob to the MAX position for normal operations. To adjust the brightness, use the Brightness adjustment knob described in the following step.

2. **Turn the brightness adjustment knob on the console to adjust the brightness.**
Turn the knob to the right to make the image brighter and to the left to make the image darker.



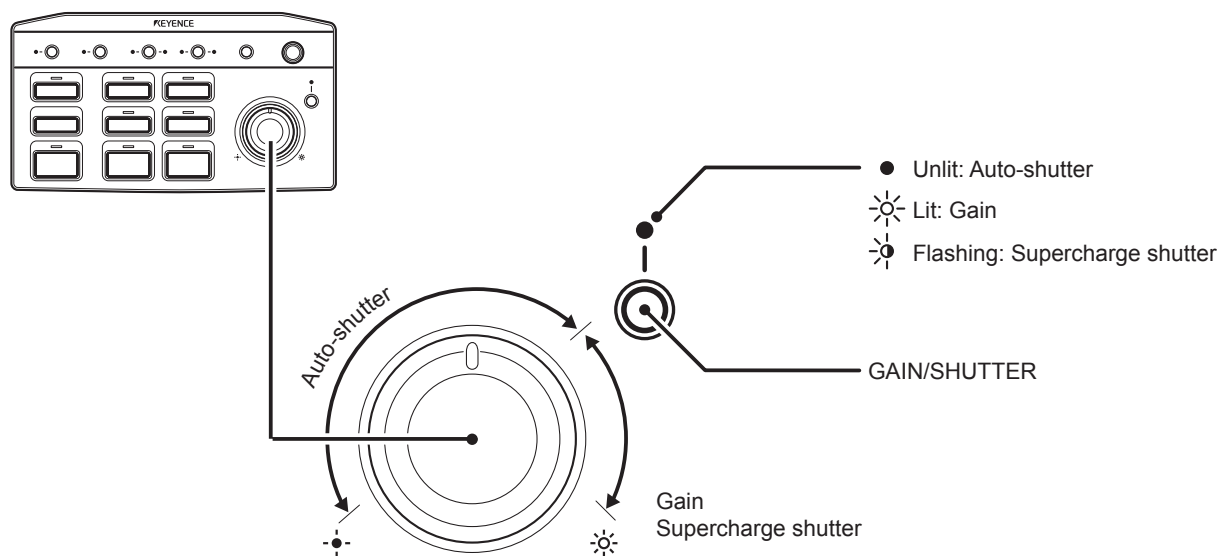
Using gain or supercharge shutter

When the brightness adjustment knob is turned in the clockwise direction, gain or the supercharge shutter is activated automatically at a certain point (2 o'clock position) and further enhances the brightness of the image. As a result, even a dark target can be observed with proper brightness by simply turning the brightness adjustment knob to the right.

- To switch between gain and supercharge shutter, press the GAIN/SHUTTER selector switch on the console of the VHX-600E.
- The LED lamp of the GAIN/SHUTTER selector switch illuminates while gain is activated, and flashes while supercharge shutter is activated.

1. To switch between gain and supercharge shutter, press the GAIN/SHUTTER selector switch on the console.

The mode switches every time the switch is pressed.



Glossary:

Gain

Enhances the brightness of the screen by electrically amplifying the video signal from the camera. The image can be displayed at high speed; however, the image quality may deteriorate when the target is extremely dark.

Supercharge shutter

Enhances the brightness of a dark screen by extending the elapsed time of the camera (exposure time) between 0.2 and 17 seconds. Use this function when the overall image is dark due to insufficient light intensity, or halation (bleaching) of the target is noticeable.

However, this function is not suitable for moving or vibrating targets because the display speed is lowered according to the exposure time. The exposure time can be extended up to 4 seconds by using the brightness adjustment knob. To further extend the exposure time, configure the setting by selecting the [Bright Adj] command from [Camera Setting/Image Enhancement] in the [Camera/Image] option on the menu bar.

➡ Refer to "Supercharge shutter" on page 9-12.

Tips

Keyence recommends using gain for positioning the targets or adjusting the focus and supercharge shutter for capturing images.

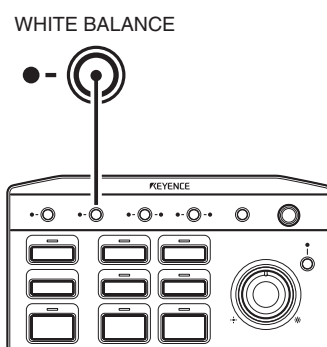
4.1.3 Adjusting colors

Adjust the white balance to adjust the color.

White balance is a function used to adjust the ability of the camera to produce color so that a white target can be projected white on the screen.

- More detailed settings can be configured by selecting the [Camera Setting/Image Enhancement] command from the [Camera/Image] option on the menu bar.
⇒ Refer to "9.3 Adjusting the colors of images (White balance)" on page 9-16.

1. Inspect a white target (such as white paper) on the screen to adjust the colors.



2. Press the WHITE BALANCE button on the console.

The white balance is automatically adjusted.

Note: When the white balance cannot be adjusted successfully, the error message, "Failed to push-set white balance." appears on the screen. In this case, adjust the white balance again while checking the following points.

- Is the screen too bright or too dark? Adjust the brightness to the proper level.
- Is the screen partially too bright or too dark? Make sure that the brightness of the entire screen is consistent.
- Is the target white? Place a white target with a non-shiny finish (such as white matte paper) under the camera lens.

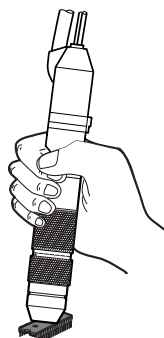
4.1.4 Adjusting the lens power and focus

Adjust the magnification and focus of the lens.

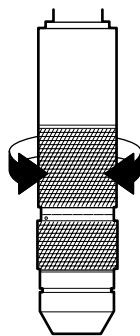
When using a contact-type illumination head

This section describes how to adjust the power and focus for hand-held observation using a contact-type illumination head attached to the camera.

1. Adjust the end of the illumination head so that it makes contact with the target.

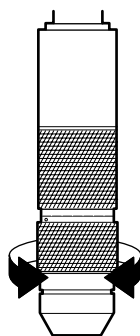


2. Turn the zoom-drive ring to adjust the power while monitoring the screen.

**Tips**

When adjusting the power, it is recommended that you start at a lower magnification. It is easier to achieve focus at a lower magnification. In addition, the wider field of view makes it easier to find the target.

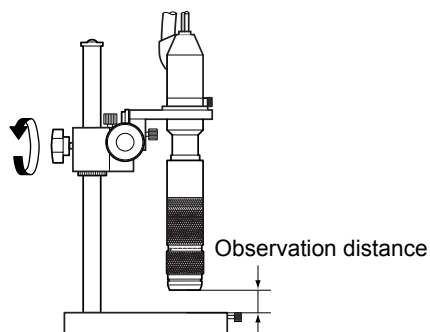
3. Turn the focus ring to adjust the focus while monitoring the screen.



When using a non-contact type illumination head

This section describes how to adjust the power and focus for observation using the camera unit fixed on a stand with a non-contact type illumination head attached to the camera.

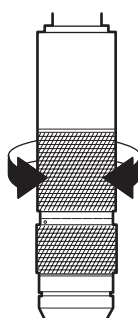
1. **Adjust the height of the stand so that the illumination head is near the target and focus is almost obtained.**
 ⇨ Refer to "Lens & Stand Manual" to use lenses and the stand.



Observation distances of main lenses

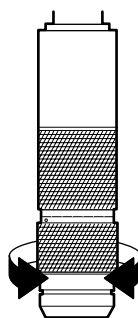
Lens name	Lens power	Observation distance
VH-Z00R	0 to 50x	Approx. 95 mm (at 5 to 50x)
VH-Z20R	20 to 200x	Approx. 25.5mm
VH-Z25	25 to 175x	Approx. 25.5mm
VH-Z35	35 to 245x	Approx. 54mm
VH-Z50L	50 to 500x	Approx. 85mm
VH-Z100R	100 to 1000x	Approx. 25mm
VH-Z150	150 to 800x	Approx. 12 mm (Approx. 6.5 mm when using coaxial incident light)
VH-Z450	450 to 3000x	Approx. 7.3mm
VH-Z500R	500 to 5000x	Approx. 4.4 mm

- Turn the zoom-drive ring to adjust the power while monitoring the screen.


Tips

When adjusting the power, it is recommended that you start at a lower magnification. It is easier to achieve focus at a lower magnification. In addition, the wider field of view makes it easier to find the target.

- Turn the focus ring to adjust the focus while monitoring the screen.



4.1.5 Observation

Observe a target. Slightly adjust the brightness, magnification, and focus as necessary.

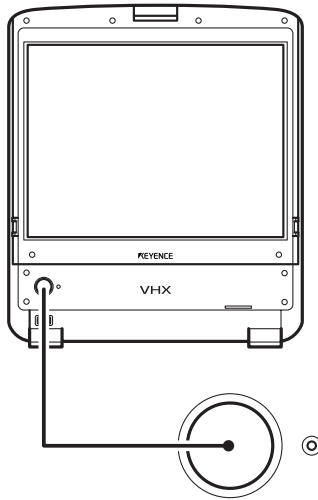
- ⇒ Refer to "4.1.2 Adjusting the brightness" on page 4-3 to adjust the brightness.
- Refer to "4.1.3 Adjusting colors" on page 4-5 to adjust the lens power and focus.

4.1.6 Finishing the observation

Turn off the power supply of the VHX-600E.

1. **Press the POWER switch on the front panel of the VHX-600E.**

The power is turned off and the POWER LED goes off.



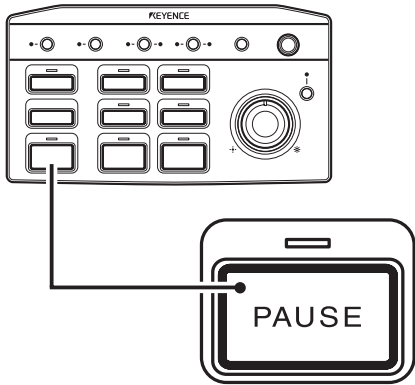
Note: When the power cannot be turned off, press down the POWER switch on the front panel for 5 seconds or longer to force the power off. If the power still does not turn off, then turn off the main power supply switch on the rear panel of the VHX-600E.

4.2 Freezing Images

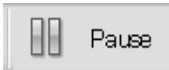
This section describes how to freeze the screen.

Tips When the screen is split, only the selected area of the screen is frozen.
➡ Refer to "5.2 Splitting the screen" on page 5-4.

1. **Press the PAUSE button on the console.**
The screen freezes.
 - The LED above the PAUSE button illuminates.

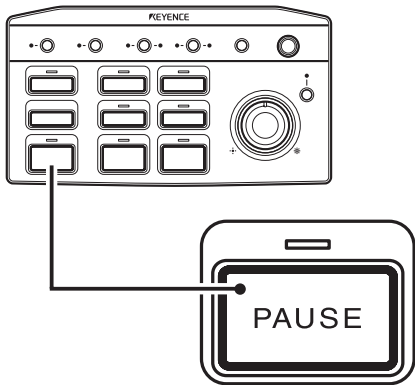


Tips The screen can also be frozen by clicking the [Pause] button on the status bar.



Canceling the freeze status of the screen

1. **Press the PAUSE button on the console again.**
The LED above the PAUSE button turns off.



Tips The freeze status of the screen can also be canceled by clicking the [Pause] button on the status bar.



Chapter 5

Useful Functions for Observation

This chapter describes various useful functions for observation including magnified display, split display, and comment insertion.

5.1	Selecting the optimal images (e-Preview)	5-2
5.2	Splitting the screen	5-4
5.3	Enhancing the projections and depressions of targets	5-6
5.4	Magnifying the screen (Live digital zoom)	5-8
5.5	Displaying text and markers	5-10

5.1 Selecting the optimal images (e-Preview)

The e-Preview function allows the user to select the optimal image mode for observation from 4 types of possible images and perform observation under the selected mode.

Even a first-time user of the VHX-600E can observe effective images by simply pressing the [OPTIMIZE] button.

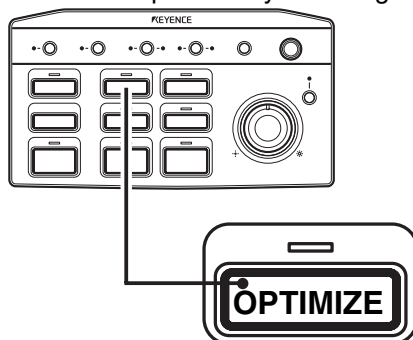
1. Adjust the brightness, magnification, and focus in advance to use this function.

- ◇ Refer to "4.1.2 Adjusting the brightness" on page 4-3 to adjust the brightness.
- ◇ Refer to "4.1.4 Adjusting the lens power and focus" on page 4-5 to adjust the focus and magnification.

2. Press the OPTIMIZE button on the console.

Four types of images are displayed on the screen.

- The LED lamp above the OPTIMIZE button illuminates.
- This function can also be operated by selecting the [Optimize] option from the menu bar.



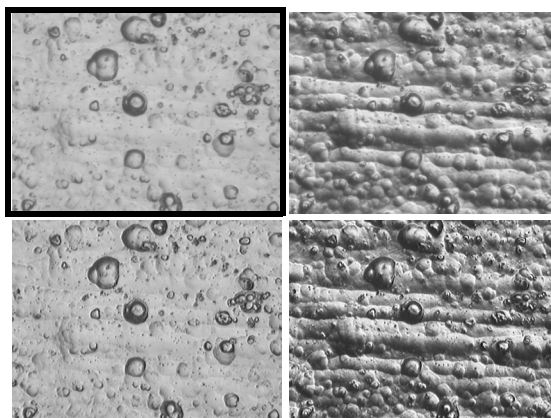
3. Select the optimal image from the four types of images, and double-click on the image.

The image selected by double-clicking is displayed on the entire screen, and observation starts.

- The LED lamp above the OPTIMIZE button goes off.

4. Save the selected image on the hard disk as necessary.

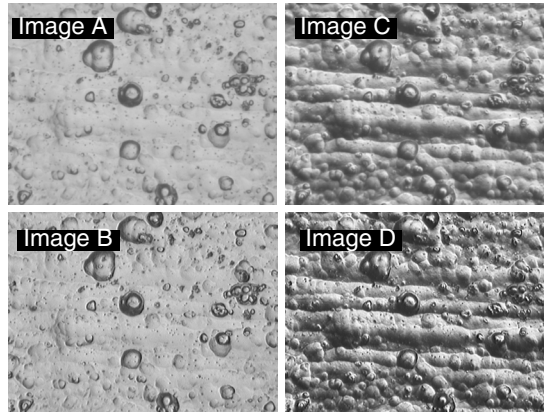
- ◇ Refer to "6.1 Recording images (still images)" on page 6-2.



Glossary:

- **Optimal Image function (e-Preview)**

The following shows the sample images displayed on the screen when the Optimal Image function is executed, and the settings for each mode.



	Description of the setting
Image A (Normal mode)	Target is observed with normal settings.
Image B (Image-enhancement mode)	Target is observed using the image-enhancement function.
Image C (Bump-enhancement mode)	Target is observed by applying the illumination from a single direction. Fine projections and depressions are more enhanced compared with the Normal mode.
Image D (Sharpening Image mode)	Target is observed with vivid color and sharp edges.

5.2 Splitting the screen

The monitor screen can be split horizontally, vertically, or into four parts.

- The split screen function can be used for displaying the overall image and magnified image side by side, or for comparative observation of a stored sample image and live image.
 - The split screens can be printed or saved.
- Refer to "Printing Images" on page 10-1 to print images.
- Refer to "6.1 Recording images (still images)" on page 6-2 to save images.

5.2.1 Vertical Split, Horizontal Split, Four-part Split (Quarter Split) and Overall view

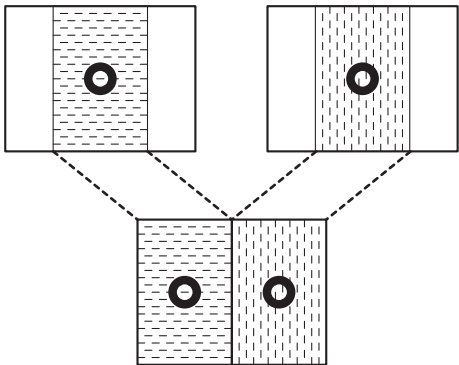
Three types of Split screens are available: Vertical split, Horizontal split, and Four-part split. The Overall view function switches the display from Split screen to Full screen display.

Note: Live images can be displayed on only one part of the split screen.

Vertical Split

Vertically splits the screen into two.

Displays the center of the image and cuts both sides of the original image by 25%.

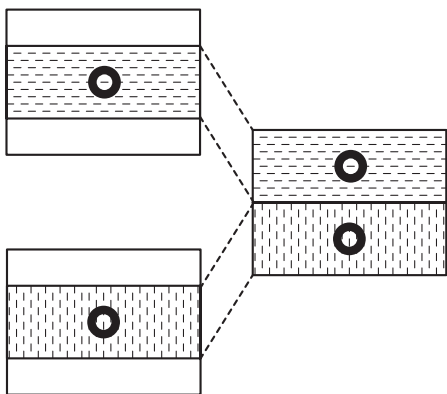


Note: Make sure to place the target so that it is projected in the center of the screen.

Horizontal Split

Horizontally splits the screen into two.

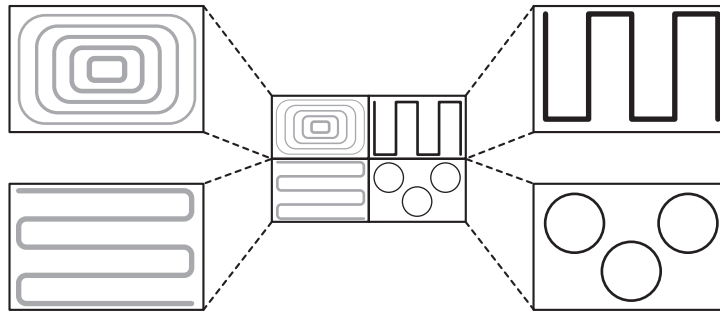
Displays the center of the image and cuts the top and bottom of the original image by 25%.



Note: Make sure to place the target so that it is projected in the center of the screen.

Four-part Split (Quarter Split)

Splits the screen into four parts.
Reduces the image to 25% of the original size.



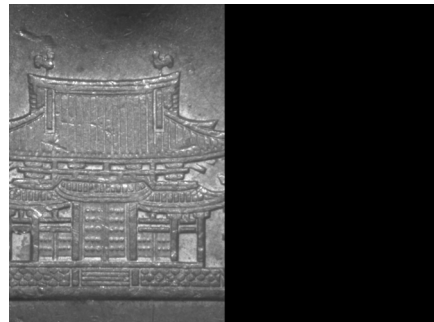
Note: The text and measurement line may be hard to read. In such a case, adjust the character size or width of the measurement line.

Splitting the screen for comparative observation

This section describes the procedure using Vertical split as an example.

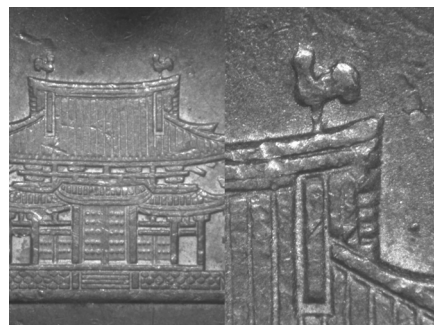
1. **Select [Vertical Split] from the [Split] command on the menu bar.**

The screen is split vertically and the center of the original image is displayed on the left half of the screen.



2. **Move the mouse pointer to the right half of the screen and click the mouse button.**

The right half of the screen displays a live image.
The left half of the screen displays the frozen image.



3. **Display the image for comparative observation on the right half of the screen.**

Tips

To move the live image to the left half of the screen, move the mouse pointer over the left screen and then click the mouse button.

4. **To exit the Split screen mode, select [Overall view] from the [Split] command on the menu bar.**

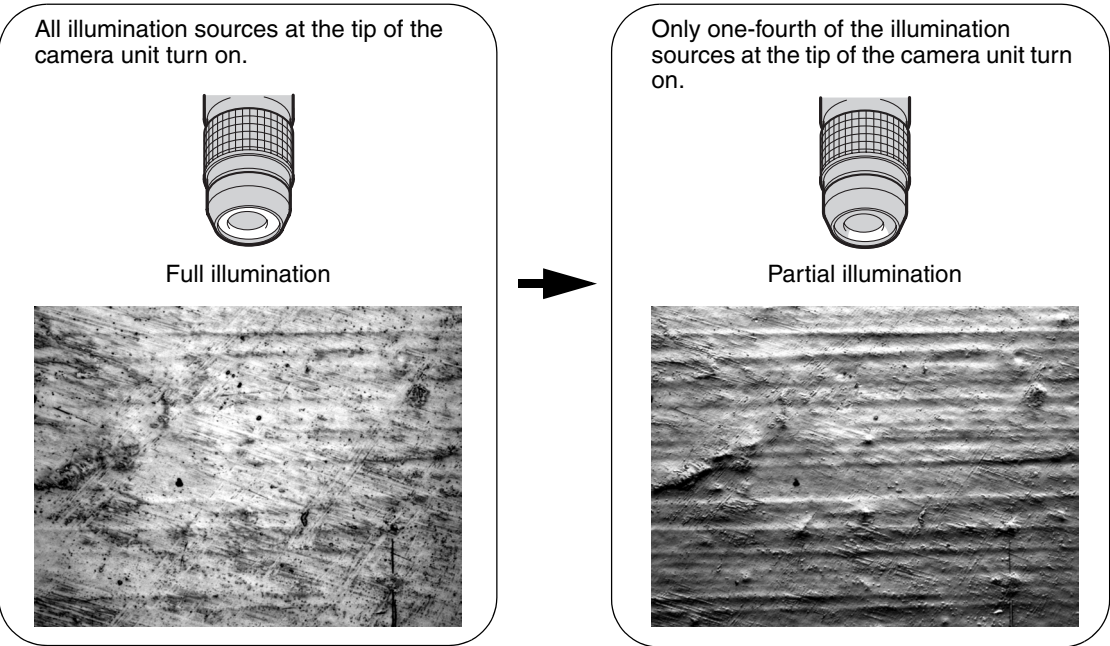
5.3 Enhancing the projections and depressions of targets

This section describes how to enhance the projections and depressions of targets to be displayed.

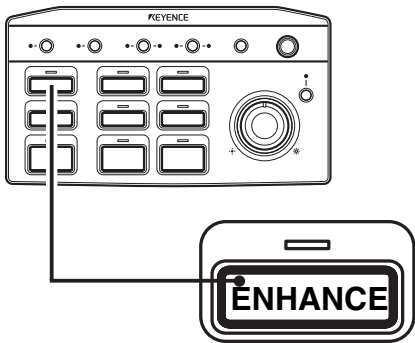
This function is effective when the profile of the target is hard to see due to small height differences.

5.3.1 Partial illumination (Bump enhancement illumination)

The light source is applied to the entire target (full illumination) for normal observation. On the contrary, partial illumination enhances the shadows created by projections and depressions by applying the light from one direction. Minute projections and depressions can be observed using this lighting mode.



1. **Press the ENHANCE button on the console.**
The LED lamp above the ENHANCE button illuminates.
The projections and depressions of the image currently being displayed become sharp.



Tips This operation can also be executed by selecting [Bump enhancement mode] from the [Camera/Image] command on the menu bar.

2. **To exit the Bump enhancement display, press the ENHANCE button on the console again.**
This mode can also be exited by selecting [Bump enhancement mode] from the [Camera/Image] command on the menu bar.

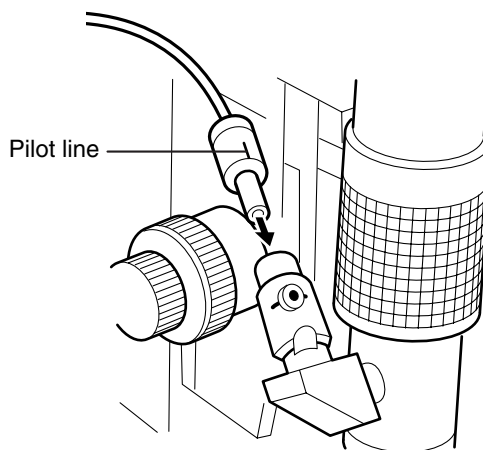
Using the high-power zoom lens VH-Z50L/VH-Z100R/VH-Z450/VH-Z500R

When the high-power zoom lens VH-Z50L/VH-Z100R/VH-Z450/VH-Z500R and optional fiber cable (OP-51480) are used with the VHX-600E, the illumination method switches in the order of Full illumination- Partial illumination (Bump enhancement)- Flanking illumination every time the ENHANCE button on the console is pressed.

Tips When [Bump enhancement mode] is selected from the [Camera/Image] command on the menu bar, the illumination method is switched between Full illumination and Partial illumination (Bump enhancement).

Note: When the Partial illumination mode is selected while the high-power zoom lens VH-Z50L/VH-Z100R/VH-Z450/VH-Z500R and optional fiber cable (OP-51480) are used with the VHX-600E, the illumination light is emitted from the pilot line of the fiber tip. Adjust the pilot line so that the target can be observed most effectively. (Set the pilot line to the near side for normal operations.)

- When the projections and depressions are inverted, change the position of the pilot line. The bumps may be projected correctly.



Using the HD middle-power zoom lens VH-Z75

When the HD middle-power lens VH-Z75 and optional fiber cable (OP-51481) are used with the VHX-600E, the illumination method switches between Full illumination and Partial illumination (Bump enhancement) every time the ENHANCE button on the console is pressed.

Note: When the Partial illumination mode is selected while the HD middle-power zoom lens VH-Z75 and optional fiber cable (OP-51481) are used with the VHX-600E, the illumination light is emitted from the pilot line of the fiber tip. Adjust the pilot line so that the target can be observed most effectively. (Set the pilot line to the near side for normal operations.)

- When the projections and depressions are inverted, change the position of the pilot line. The bumps may be projected correctly.

5.4 Magnifying the screen (Live digital zoom)

This section describes how to magnify the currently displayed image.

- The image can be magnified for observation without replacing the lens with a higher power lens.
- There are two functions available: A function for doubling the magnification with one-touch operation and a function to select the desired magnification.

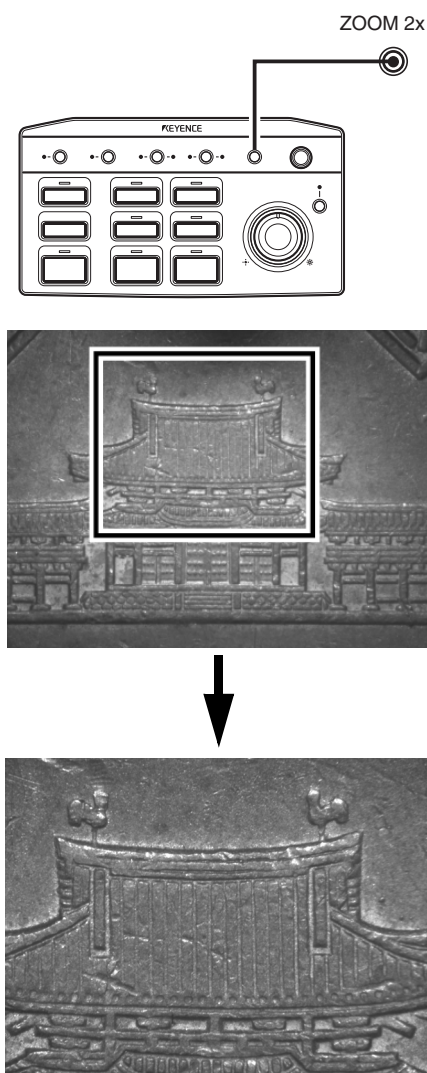
Note: Since the image is magnified using digital processing, the image may be displayed as a mosaic image when the magnification is too high. In this case, replace the lens with a higher power lens.

5.4.1 Doubling the magnification with one-touch operation (ZOOM 2x)

1. Press the ZOOM 2x button on the console.

The LED lamp above the ZOOM 2x button illuminates.

The currently displayed image is magnified to 200%.



- Note:**
- The center of the screen is magnified. Place the target properly so that it is projected in the center of the screen.
 - The image on the magnified display is grainier than the normal display.

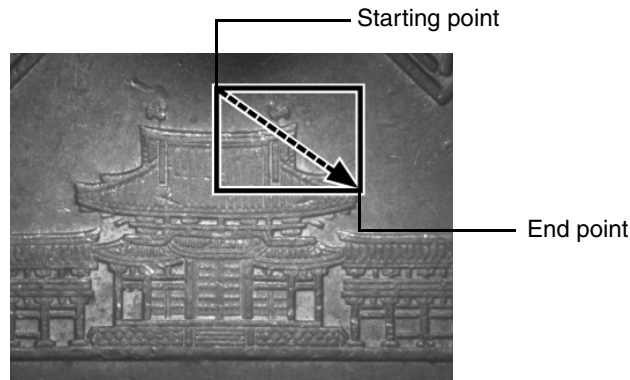
Tips

To return to the normal display, press the ZOOM 2x button on the console again.

5.4.2 Observing an image with the desired zoom power

1. Click the [Zoom] button on the menu bar.

The menu bar disappears and the image is displayed on the full screen.



2. Select the area to be displayed as a magnified image by dragging the mouse.

The selected area is magnified and displayed on the screen.

The [Zoom Display] dialog box appears on the top right of the screen.

- The Overview field displays the area selected by dragging the mouse.



3. To change the area for the magnified display, drag the frame displayed on the Overview field.

The observation point can be changed without moving the target.

* Clicking the [Update] button refreshes the overview screen.



4. To return to the normal display, click the [Zoom] button on the menu bar.

The magnified display returns to the normal display mode.

- When the VHX-600E is in the freeze display mode, the display will not return to the normal display mode. Press the PAUSE button on the console or click the [Pause] button on the status bar to cancel the freeze mode.

5.5 Displaying text and markers

This section describes how to enter and display comments such as characters and markers onto the observation images.

5.5.1 Displaying characters and objects

This section describes the procedure for displaying characters and objects.

Overview

Characters and objects can be entered and displayed using the menu bar or the [Comment Toolbar]. There are two types of comments: A temporary comment is deleted when the power is turned off, and a residual comment is saved even when the power is turned off.

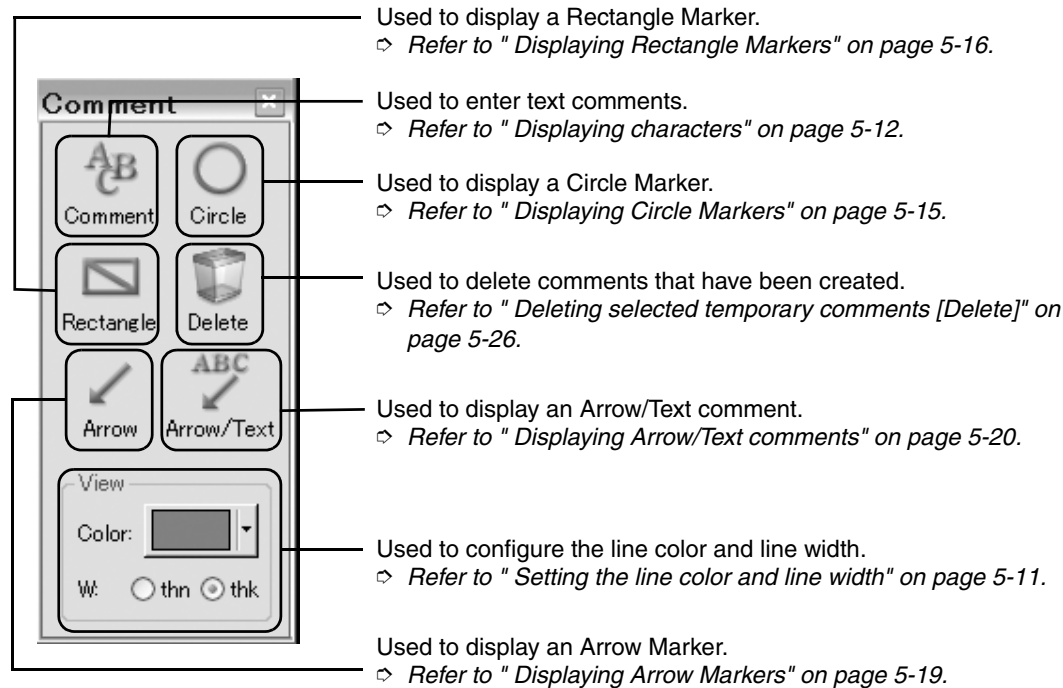
Command name on the menu bar for comment input	Command name on the Comment Toolbar	Type of comment
New Comment	Comment	Temporary comment
Circle Marker	Circle	Temporary comment
Rectangle Marker	Rectangle	Temporary comment
Arrow Marker	Arrow	Temporary comment
Arrow/Text comment	Arrow/Text	Temporary comment
File Title	--	Temporary comment
Lens Name	--	Residual comment
Date	--	Residual comment
Time	--	Residual comment
Residual Comment	--	Residual comment

■ Displaying the Comment Toolbar

When entering two or more comments, using the Comment Toolbar will enhance the efficiency of the operation. This section describes how to display the Comment Toolbar. To enter each comment, refer to the pages specified below.

1. Select [Comment Toolbar] on the menu bar.

The Comment Toolbar appears on the screen.



Setting the line color and line width

The line color and line width can be specified for Circle Markers, Rectangle Markers, and Arrow Markers.

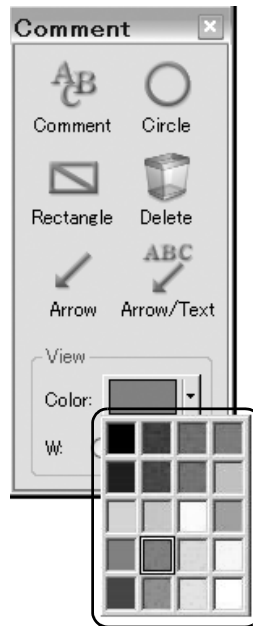
- During normal operations, configure the settings before creating objects.

Tips The color and width of the line can be changed after the object is created.

■ Setting the line color

1. Click the [▼] button displayed next to [Color] on the [Comment Toolbar].

The color palette appears on the screen.



2. Click on the desired color.

■ Setting the line width

1. Select the [thn] (Thin) or [thk] (Thick) radio button for the [W:] (Width) field on the [Comment Toolbar].



Displaying characters

Characters can be displayed on the observation screen.

The comment display for characters or sentences can be categorized into New Comment and Residual Comment.

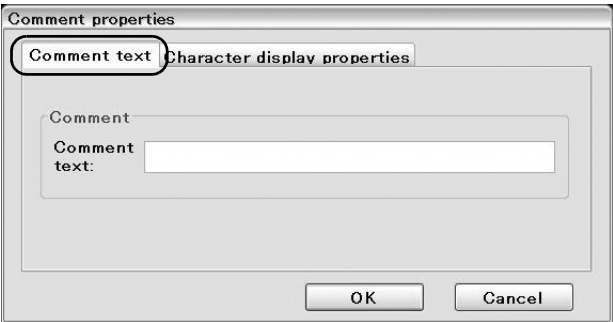
■ Displaying New Comments

Two or more text items can be displayed on the observation screen.

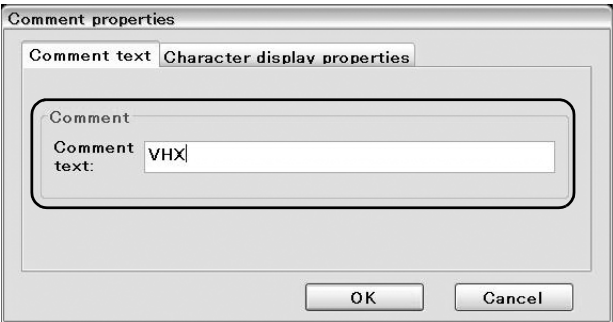
1. Click the [Comment] button on the [Comment Toolbar].
The [Comment properties] dialog box appears on the screen.
 - The same operation can be performed by selecting [New Comment] from the [Comment] command on the menu bar.



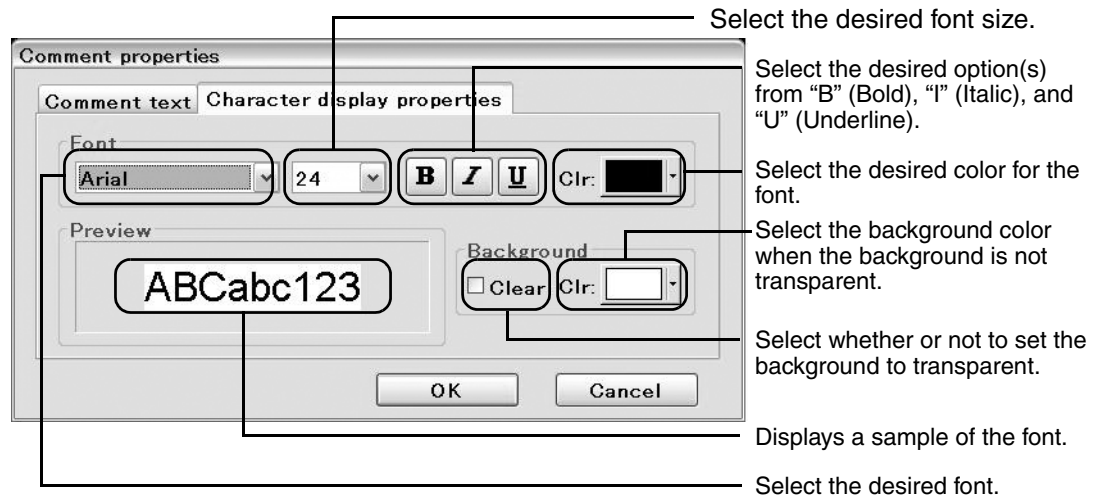
2. Click on the [Comment text] tab.



3. Enter the desired characters in the [Comment text:] field.



4. Click on the [Character display properties] tab.

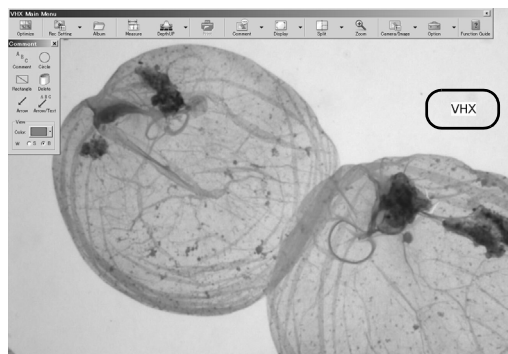


5. Click the [OK] button.

6. Click the mouse button on the point where you want to display the comment on the observation screen.

The entered characters or sentences are displayed at the specified point.

- To move the new comment, drag the mouse while holding down the left mouse button.
- To change the new comment, double-click on the currently displayed comment. When the [Comment properties] dialog box described in step 4 appears on the screen, change the [Comment text] or [Character display properties] settings.



■ Displaying Residual Comments

Preprogrammed text can be displayed all the time on the observation screen.

- The residual comments are not deleted when the power is turned off, and are displayed when the power is turned on again. Only one text item can be displayed as a residual comment.

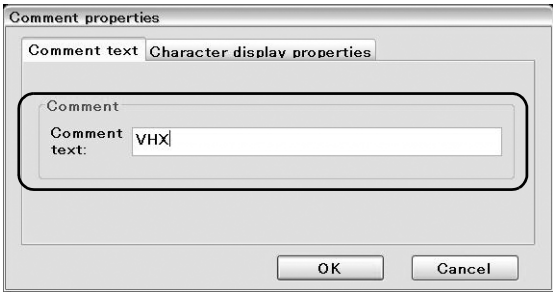
1. Select [Residual Comment] from the [Comment] command on the menu bar.

The [Comment properties] dialog box appears on the screen.

2. Click on the [Comment text] tab.

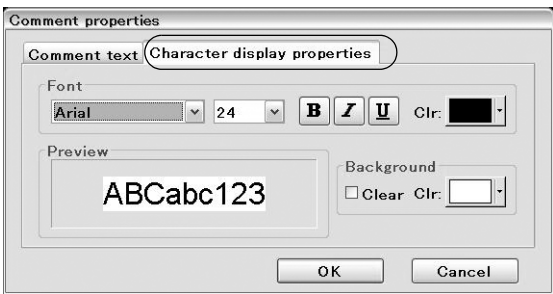


3. Enter the desired characters in the [Comment text:] field.



4. Click on the [Character display properties] tab.

⇒ Refer to "Displaying New Comments: Operation procedure Step 4" on page 5-13.



5. Click the [OK] button.

6. Click the mouse button on the point where you want to display the comment on the observation screen.

The entered characters or sentences are displayed at the specified point.

- To move the new comment, drag the mouse while holding down the left mouse button.
- To change the new comment, double-click on the currently displayed comment. When the [Comment properties] dialog box appears on the screen, change the [Comment text] or [Character display properties] settings.

⇒ Refer to "5.5.2 Switching the Show/Hide mode for comments" on page 5-25



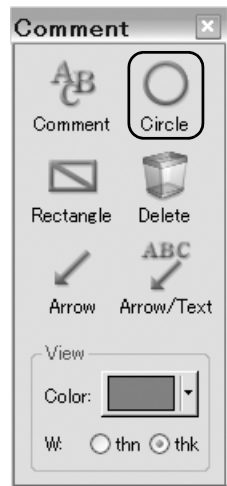
Displaying Circle Markers

Circle Markers can be drawn on the observation screen.

- Select the line color and line width before drawing the marker.

1. Click the [Circle] icon on the [Comment Toolbar].

The same operation can be executed by selecting [Circle Marker] from the [Comment] command on the menu bar.



2. Click on the center of the circle on the observation screen.



3. Click on a point on the circle's perimeter.

A circle is drawn with the point specified in step 2 as the center.



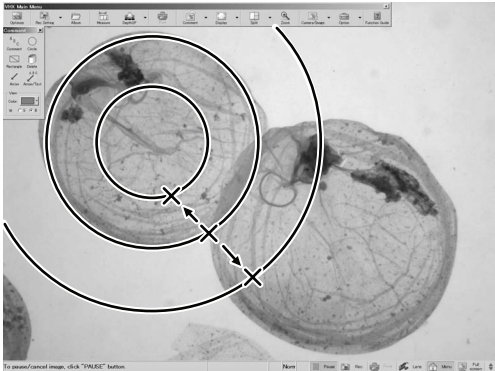
■ Moving a Circle Marker

1. Place the mouse pointer on the line of the Circle Marker and drag the mouse to the desired position while holding down the left mouse button.

The Circle Marker moves to the desired position.

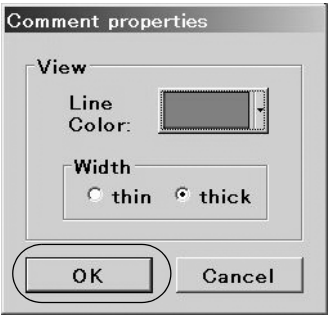
■ Changing the size of a Circle Marker

- 1. Place the mouse pointer on the line of the Circle Marker and drag the mouse while holding down the right mouse button.
The radius of the Circle Marker changes.



■ Changing the line color and line width of a Circle Marker

- 1. Double-click on the line of the Circle Marker.
The [Comment Properties] dialog box appears on the screen.
 - The same operation can be performed using the [View] field on the [Comment Toolbar].



- 2. Click the [OK] button.

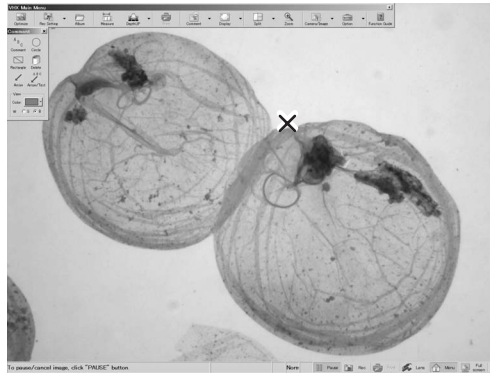
Displaying Rectangle Markers

Rectangle Markers can be drawn on the observation screen.

- Select the line color and line width before drawing the marker.
- 1. Click the [Rectangle] icon on the [Comment Toolbar].
The same operation can be executed by selecting [Rectangle Marker] from the [Comment] command on the menu bar.



2. Click on a point on the observation screen to specify one corner of the rectangle.
A cross is displayed at the selected point.



3. Click on a point that is diagonal to the point specified in step 2.
A rectangle is displayed using the points specified in steps 2 and 3 as the opposing corners.



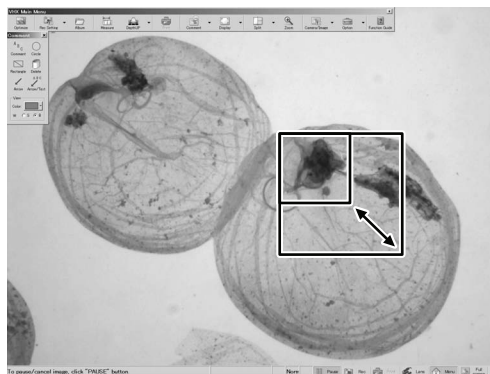
5

■ Moving a Rectangle Marker

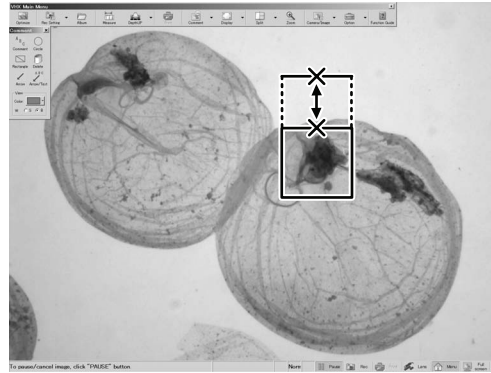
1. Place the mouse pointer on the line of the Rectangle Marker and drag the mouse to the desired position while holding down the left mouse button.
The Rectangle Marker moves to the desired position.

■ Changing the size of a Rectangle Marker

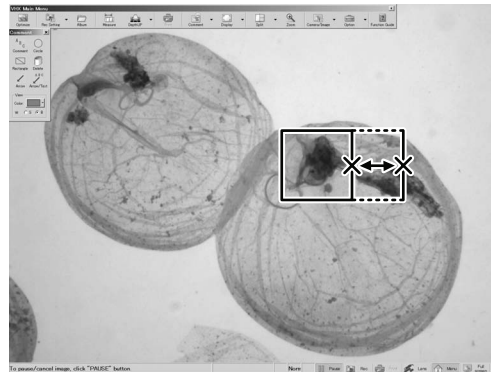
1. Place the mouse pointer on the line of the Rectangle Marker and drag the mouse while holding down the right mouse button.
Drag the corner of the rectangle to change the size of the rectangle while keeping the aspect ratio.



Drag the horizontal line upward or downward to change the height of the rectangle.



Drag the vertical line to the right or left to change the width of the rectangle.

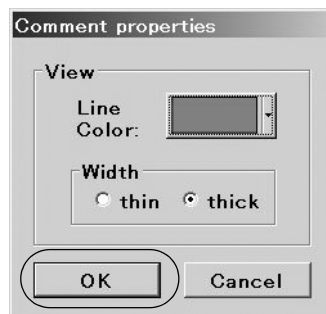


■ Changing the line color and line width of a Rectangle Marker

1. Double-click on the line of the Rectangle Marker.

The [Comment Properties] dialog box appears on the screen.

- The same operation can be performed using the [View] field on the [Comment Toolbar].



2. Click the [OK] button.

Displaying Arrow Markers

Arrow Markers can be drawn on the observation screen.

- Select the line color and line width before drawing the marker.

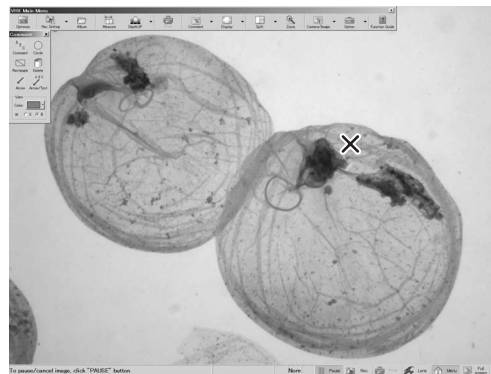
1. Click the [Arrow] icon on the [Comment Toolbar].

- The same operation can be executed by selecting [Arrow Marker] from the [Comment] command on the menu bar.



2. Click on a point on the observation screen to specify the head of the arrow.

A cross is displayed at the specified point.



3. Click on a point to specify the end point of the arrow.

An arrow is displayed using the point specified in step 2 as the head.



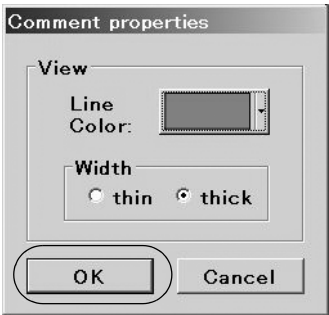
■ Moving an Arrow Marker

1. Place the mouse pointer on the line of the Arrow Marker and drag the mouse to the desired position while holding down the left mouse button.

The Arrow Marker moves to the desired position.

■ Changing the line color and line width of an Arrow Marker

- 1. **Double-click on the line of the Arrow Marker.**
The [Comment Properties] dialog box appears on the screen.
 - The same operation can be performed using the [View] field on the [Comment Toolbar].



- 2. Click the [OK] button.

Note: The size of the arrow cannot be changed.

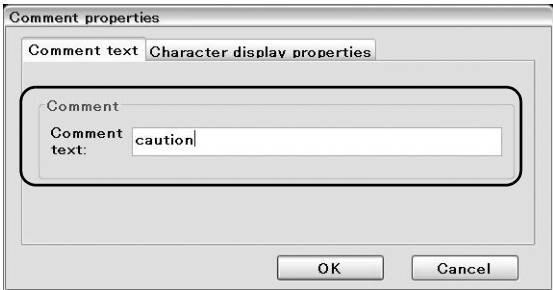
Displaying Arrow/Text comments

Arrow/Text comments can be drawn on the observation screen.

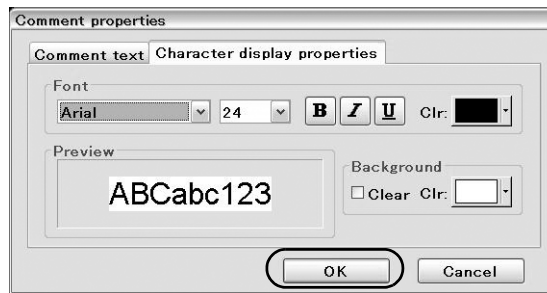
- Select the line color and line width before drawing the marker.
- 1. **Click the [Arrow/Text] icon on the [Comment Toolbar].**
The [Comment properties] dialog box appears on the screen.
 - The same operation can be executed by selecting [Arrow/Text comment] from the [Comment] on the menu bar.



- 2. Click on the [Comment text] tab.



3. Enter the desired characters in the [Comment text:] field.
4. Specify the font type, font size, and color as necessary, and then click the [OK] button.
 ⇨ Refer to "Displaying New Comments: Operation procedure Step 4" on page 5-13.



5. Click on a point on the observation screen to specify the head of the arrow.



6. Click on a point to specify the end point of the arrow.
 An arrow with text comment is displayed on the observation screen.
 - The displayed arrow and text are independent of each other. They can be edited or moved individually.
 - ⇨ Refer to "4. Click on the [Character display properties] tab." on page 5-13 to change the comments.
 - ⇨ Refer to "Displaying Arrow Markers" on page 5-19 to move the arrow or change the line color or line width.

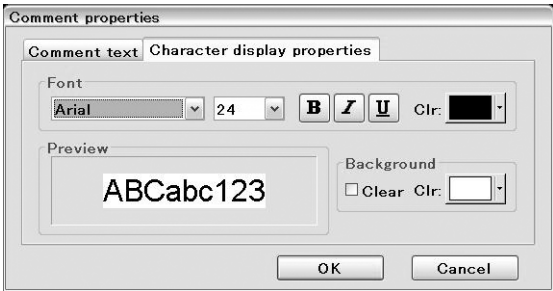


Note: The arrow size cannot be changed.

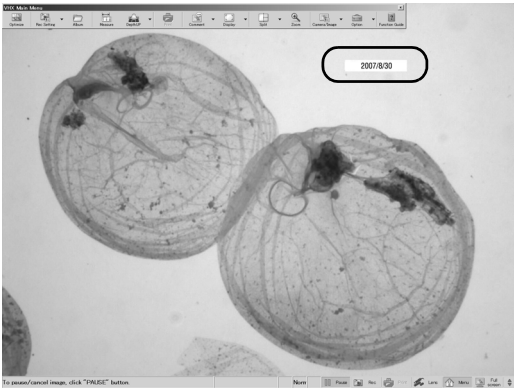
Displaying the File Title

The filename of the observed image can be displayed as the title.

- 1. **Select [File Title] from the [Comment] command on the menu bar.**
The [Comment properties] dialog box appears on the screen.



- 2. **Specify the font type, font size, and color, and then click the [OK] button.**
 - ⇒ To set up the [Character display properties] settings, refer to "Displaying New Comments" on page 5-12
- 3. **Click on the desired point on the screen.**
The title designated in [Comment properties] is displayed at the specified point.



- ⇒ Refer to "6.1.5 File Properties" on page 6-7 to set up the filename.
- To move the File Title, drag the mouse while holding down the left mouse button.
- Double-clicking the File Title will display the [Character display properties] dialog box, allowing the user to change the font, font size, color and other settings.
- ⇒ To change the [Character display properties] settings, refer to "Displaying New Comments" on page 5-12.

Note: The content of the File Title cannot be changed.

Displaying the Lens Name

The lens power currently being used for observation can be displayed on the screen.

- The lens name will be displayed after turning the power off and then on again.

1. Select [Lens Name] from the [Comment] command on the menu bar.



2. Click on the desired point on the screen.

The lens power configured using the [Lens] command on the status bar is displayed at the specified point.

- To move the Lens Name, drag the mouse button while holding down the left mouse button.
- Double-clicking the Lens Name will display the [Character display properties] dialog box, allowing the user to change the font, font size, color and other settings.

⇒ To change the [Character display properties] settings, refer to "Displaying New Comments" on page 5-12

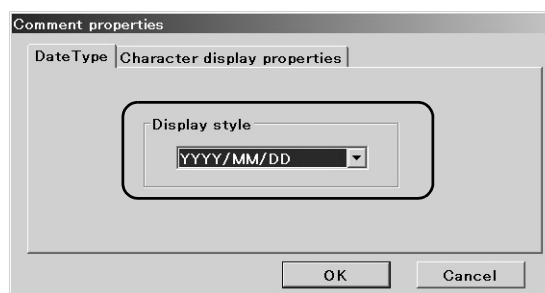
Displaying the Date

The date can be displayed on the screen.

- The Date display will be displayed on the screen even when the power is turned off and then on again.

1. Select [Date] from the [Comment] command on the menu bar.

The [Comment properties] dialog box appears on the screen.



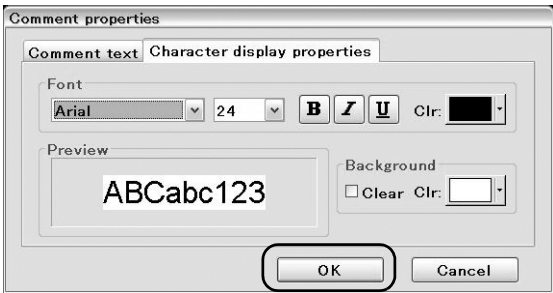
2. Select the desired style for the date display.

When displaying "May 31, 2006":

Display style	Sample display
YYYY/MM/DD	2007/08/31
YY/MM/DD	2007/08/31
MM/DD/YYYY	2007/08/31
MM/DD/YY	2007/08/31
DD/MM/YYYY	2007/08/31
DD/MM/YY	2007/08/31

3. Click on the [Character display properties] tab.

4. **Configure the font type, font size, and color as necessary, and then click the [OK] button.**
- ⇒ To set up the [Character display properties] settings, refer to "Displaying New Comments" on page 5-12



5. **Click on the desired point on the screen.**
- The date is displayed at the specified point.
- To move the Date display, drag the mouse while holding down the left mouse button.
 - Double-clicking the Date display will display the [Character display properties] dialog box, allowing the user to change the font, font size, color and other settings.
- ⇒ To change the [Character display properties] settings, refer to "Displaying New Comments" on page 5-12



Displaying the Time

The time can be displayed on the screen.

- The Time display will be displayed on the screen even when the power is turned off and then on again.

1. **Select [Time] from the [Comment] command on the menu bar.**

2. **Click on the desired point on the screen.**

The time is displayed at the specified point.

- To move the Time display, drag the mouse while holding down the left mouse button.
- Double-clicking the Time display will display the [Character display properties] dialog box, allowing the user to change the font, font size, color and other settings.

⇒ To change the [Character display properties] settings, refer to “Displaying New Comments: Operation procedure Step 4” on page 5-13.



5.5.2 Switching the Show/Hide mode for comments

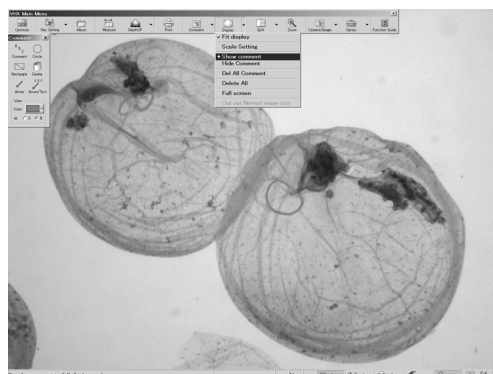
This section describes the procedure for selecting whether to show or hide the entered characters or objects on the observation screen.

Switching the Show/Hide mode for comments

1. **Select [Show comment] from the [Display] command on the menu bar.**

The Show/Hide mode is switched every time the command is selected.

- Selecting the [Show] mode displays all temporary comments (including markers) that have been entered.
- Selecting the [Hide] mode hides all temporary comments (including markers) that have been entered.
- The entered data is stored even when the [Hide] mode is selected. The data will be displayed when the [Show] mode is selected again.



Tips

- The Show/Hide mode setting applies only to temporary comments and does not apply to residual comments.
- To hide the residual comment, select the [Comment] command from the menu bar, and remove the checkmarks from the [Residual Comment], [Lens Name], [Date], and [Time] checkboxes.

5.5.3 Deleting characters and objects

This section describes the procedure for deleting characters and objects.

Deleting selected temporary comments [Delete]

1. Click [Delete] on the [Comment Toolbar].
2. Click on the temporary comment displayed on the screen.
The selected temporary comment (including a marker) is deleted.

Tips The residual comment cannot be deleted.
The display mode can be switched between Show and Hide only.

Deleting all temporary comments [Dell All Comments]

1. Select [Dell All Comments] from the [Display] command on the menu bar.
All temporary comments that have been entered are deleted.
 - The residual comment will not be deleted.

Deleting all temporary comments and hiding all residual comments [Delete All]

1. Select [Delete All] from the [Display] command on the menu bar.
All temporary comments that have been entered are deleted. In addition, all residual comments will be hidden on the display.

Chapter 6

Recording and Reproducing Images

This chapter describes the procedures for recording images and playback and editing functions.

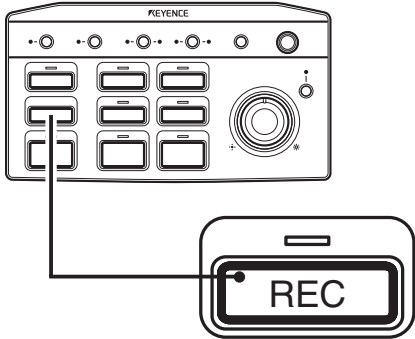
6.1	Recording images (still images)	6-2
6.2	Reproducing and editing images (Album)	6-8
6.3	Observing images with high definition	6-25
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6.7	Rerunning the setting used for a saved image	6-30

6.1 Recording images (still images)

This section describes the procedures for recording images.

6.1.1 Recording an image

The image currently being displayed can be saved on the hard disk.



Tips The image is recorded at the resolution set using the [Rec Setting] option on the menu bar.

1. Press the REC button on the console.

The Rec dialog box appears on the screen.

➤ Refer to "1.3.5 Console" on page 1-9 for details of the REC button.

- The image can also be recorded by selecting the Recording option from the [Rec Settings] command on the menu bar.



- The image can also be recorded by clicking the [Rec] button on the status bar.



2. Configure the conditions for saving the image.

Click the drive in which the image will be saved. When saving to an external drive connected by USB, click on the removable disk folder on the left of the window.

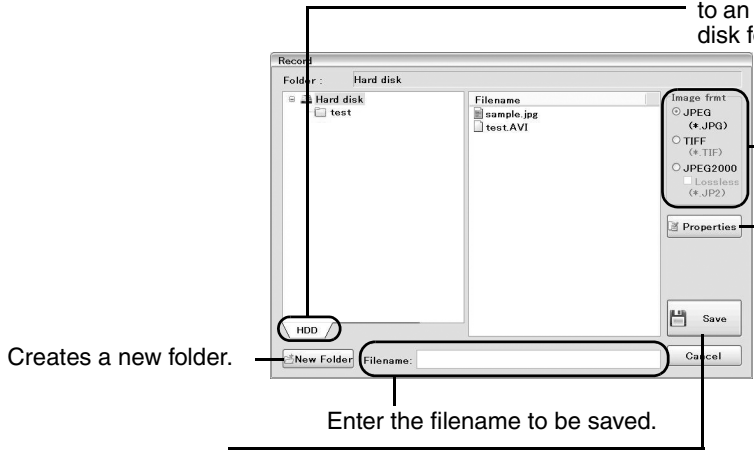


Image format: Select a format to save the image.

- Tips**
- For a JPEG, select [Normal Mode] or [High compress mode] for [JPEG Quality] in [Option Setting].
 - For a JPEG2000, select [High compress mode] or [Super High compress] for [JPEG2000 Quality (Lossless OFF)] in [Option Setting].

Properties: Configure the title, creator, and comments, etc.

➤ Refer to "6.1.5 File Properties" on page 6-7.

3. Click the [Save] button.

The image will be saved in the hard disk.

6.1.2 Recording an image in high definition

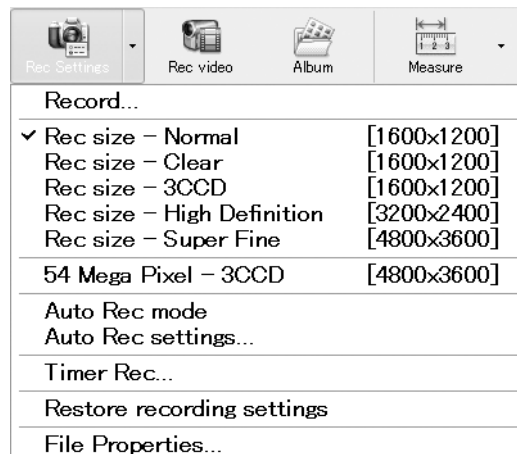
The pixel-shift function enables the recording of high-quality images at a resolution higher than normal images. The CCD used by the VHX-600E has 1600 x 1200 pixels. Using the pixel-shift function on the CCD with the actuator allows the VHX-600E to record high resolution images.

There are five recording sizes.

Tips In this section, the image is recorded by pressing the REC button on the console of the VHX-600E after setting the resolution.

Picture quality	Resolution (Pixels)	No. of pixels
Normal	1600 x 1200	2.11 million pixels
Clear	1600 x 1200	Equivalent of 4 million pixels
3CCD	1600 x 1200	2 million pixels x 3CCD
High definition	3200 x 2400	8 million pixels
Super fine	4800 x 3600	18 million pixels
54 mega pixel 3CCD	4800 x 3600	18 mega pixels x 3CCD

⇒ Refer to "6.1 Recording images (still images)" on page 6-2 for details.



1. Select the desired Rec size from the Rec Setting option on the menu bar.
2. Press the REC button on the console of the VHX-600E.
The [Rec] dialog box appears on the screen.
3. Configure the Recording dialog box and save the settings.

⇒ Refer to "6.1.1 Recording an image" on page 6-2 for the recording procedure.

Note: When using high resolution recording (Clear, High definition, 3CCD, Super fine, 54 mega pixel 3CCD), some functions are limited and cannot be used.

[The following functions do not apply to high resolution recording]

Scale display, Digital zoom, Real time depth composition, Split function, Shake correction function, Monochrome, Relief, Wide range view, Comment, Slide movie

■ Normal [1600 x 1200]

Records an image without using the pixel-shift function.

■ Clear [1600 x 1200]

Records an image while the CCD shifts each pixel vertically by one pixel.

This allows the CCD to record more precise brightness data, which increases the resolution of the image.

Tips Select [Continuous Clear Mode] from the [Camera/Image] command on the menu bar to view the target with a frame rate of 2 frames per second.

■ 3CCD [1600 x 1200]

Records an image in 3CCD mode to provide high color reproducibility.

■ High definition [3200 x 2400]

Records an image using the same method as Super fine mode [4800 x 3600], but reduces the data size.

■ Super fine [4800 x 3600]

The CCD shifts each pixel vertically and horizontally nine times.

This mode records nine times as many pixel information as Normal mode, providing extremely high resolution.

■ 54 mega pixel 3CCD [4800 x 3600]

Records an image in the super fine and 3CCD modes using the pixel shift function.

This mode provides high resolution and high color reproducibility.

Note: The indicated recording size only refers to still image files.

Recording images with the Clear Shot function

Using the Clear Shot function will enable recording with higher picture quality.

- The desired effects of the Clear Shot function may not be achieved depending on the target.

1. Press the CLEAR SHOT button on the console.

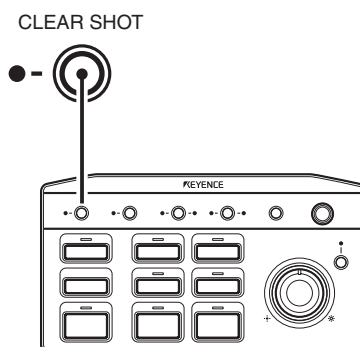
The screen is frozen using the [Clear Shot] function.

2. Press the REC button on the console.

The [Rec] dialog box appears on the screen.

3. Configure the Recording dialog box and save the settings.

➤ Refer to "6.1.1 Recording an image" on page 6-2 to record images.



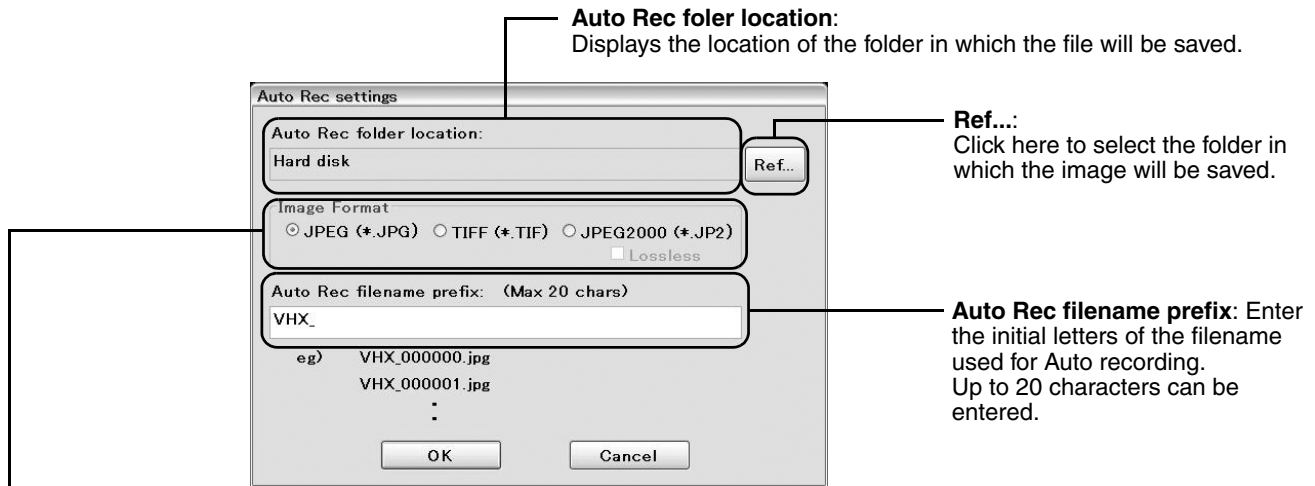
6.1.3 Recording images automatically

Images can be recorded automatically with the preprogrammed image filename, folder location, and image format.

It is not required that you enter the filename and other settings for each recording.

Setting up the Auto Rec mode

1. Select the **[Auto Rec Settings]** command from the **[Rec Settings]** menu on the menu bar.
The Auto Rec setting dialog box appears on the screen.
2. Configure the Auto Rec parameters.



Img Format:

Select JPEG or TIFF for the image format.

Tips

- For a JPEG, select [Normal Mode] or [High compress mode] for [JPEG Quality] in [Option Setting].
- For a JPEG2000, select [High compress mode] or [Super High compress] for [JPEG2000 Quality (Lossless OFF)] in [Option Setting].

3. Click the **[OK]** button.

The Auto Rec Settings is completed.

Tips

Sample filename

When JPEG is selected for the image format, and "VHX_" is entered in the "Auto Rec filename" textbox, the filenames will be assigned as follows.

VHX_000000.jpg
VHX_000001.jpg
VHX_000002.jpg

Performing Auto Recording

The Auto Rec can be executed with the preprogrammed parameters.

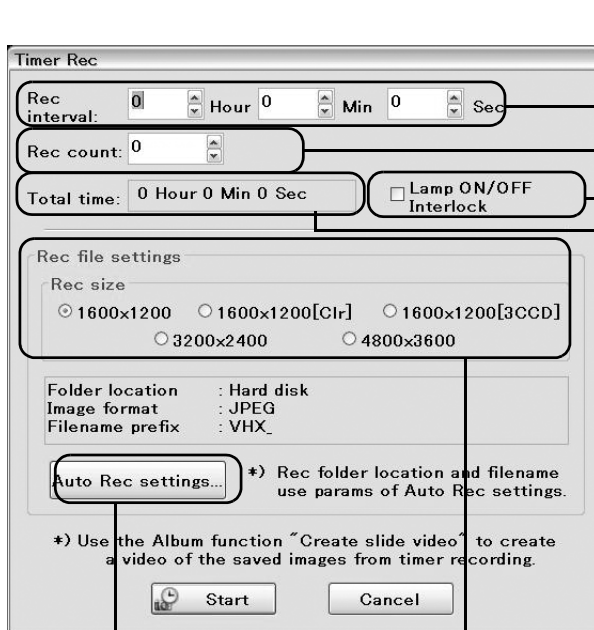
1. Select the **[Auto Rec Mode]** option from the **[Rec Settings]** menu on the menu bar.
The Rec Mode is switched to the Auto Rec Mode. All recordings will now be executed under the Auto Rec Mode.
 - To cancel the Auto recording, select the Auto Rec Mode option from the Rec Setting menu on the menu bar again.
 - When the Auto Rec Mode is enabled, a check mark (☑) is placed to the left of the command name on the menu bar.
- Refer to "6.1.1 Recording an image" on page 6-2 for the recording procedure.

6.1.4 Recording images via timer control

Images can be recorded using the Timer Rec mode by setting the recording interval and recording count. A slide show can be created by using the Timer Rec mode to save images.

⇒ Refer to "6.6 Create slide video" on page 6-29 for detailed information on slide shows.

1. **Select the [Timer Rec] command from the [Rec Settings] menu on the menu bar.**
The Timer Rec dialog box appears on the screen.
2. **Configure the Timer Rec parameters.**



Timer Rec

Rec interval: 0 Hour 0 Min 0 Sec

Rec count: 0

Total time: 0 Hour 0 Min 0 Sec

☐ Lamp ON/OFF Interlock

Rec file settings

Rec size

☒ 1600x1200 ☐ 1600x1200[Clr] ☐ 1600x1200[3CCD]

☐ 3200x2400 ☐ 4800x3600

Folder location : Hard disk

Image format : JPEG

Filename prefix : VHX_

Auto Rec settings... *) Rec folder location and filename use params of Auto Rec settings.

*) Use the Album function "Create slide video" to create a video of the saved images from timer recording.

Start **Cancel**

Rec interval:
Specify the interval for the timer-controlled recording. The interval can be configured in the units of Hour, Min, and Sec.

- Set a 15-second or longer recording interval when Normal size is selected.
- Set a 1-minute or longer recording interval when Clear, 3CCD, High definition, or Super fine size is selected.

Rec count:
Specify the number of recordings to be performed.

Lamp ON/OFF Interlock:
When this checkbox is selected, the halogen lamp turns on slightly before the start of the recording, and goes off when the recording is completed.

- This option can be enabled only when the Rec interval is set to 15 minutes or longer.

Total time:
Displays the guide of the total recording time.

Rec file settings:
Determine whether to record the image using the Normal function or the pixel-shift function.

⇒ Refer to "6.1 Recording images (still images)" on page 6-2 for details of the pixel-shift function.

[Auto Rec setting] button:
Clicking the button will display the Auto Rec settings dialog box on the screen. Configure the folder in which the image file will be saved, the image format, and the initial letters of the filename.

⇒ Refer to "6.1.3 Recording images automatically" on page 6-5 for the Auto Rec settings.

3. **Click the Start button.**
The timer-controlled recording starts.

6.1.5 File Properties

A supplementary description can be set up for an image file. The following items can be set up.

- Title
- Subtitle
- Creator
- Company/organization
- Work group
- Comment
- Lens name

The following describes the procedure for setting up the properties.

1. **Select [File Properties] from the [Rec Settings] menu on the menu bar.**

The [File Properties] dialog box appears on the screen.

2. **Enter text in the textboxes as necessary.**

3. **Click the [OK] button.**

Tips

- The properties set up here can be referred to when editing the file in the VHX Album window, or appended as comments when printing the data.
- The File Properties can be set up via the [Properties] button on the VHX Album window.

⇒ Refer to "4. Properties" on page 6-10.

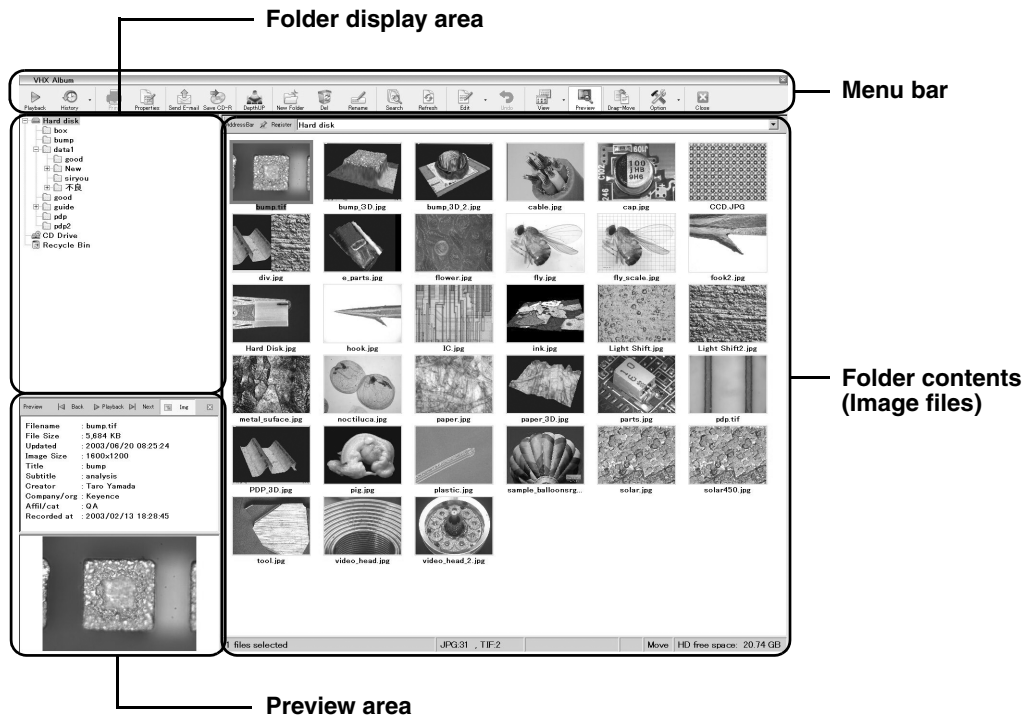
6.2 Reproducing and editing images (Album)

This section describes the VHX Album window used for reproducing and editing the recorded image files.

6.2.1 Part names and functions of the VHX Album window

This section describes the names and functions of each part of the VHX Album window.

☞ Refer to "6.2.2 Functions of the menu bar" on page 6-9 for details about the Album functions.



Folder display area:

Displays the configuration of the folders.

- Hard disk: The hard disk drive of the VHX-600E
- CD Drive: The CD-R/RW drive located on the right side panel of the VHX-600E.
- Recycle Bin: Deleted files are stored here. Selecting the [Empty Recycle Bin] command from the shortcut menu displayed by right-clicking the mouse will delete all image files and folders in the Recycle Bin to empty the Recycle Bin.

Menu bar:

Album window commands can be operated using the menu bar.

☞ Refer to "6.2.2 Functions of the menu bar" on page 6-9.

Folder contents (Image files):

Displays the list of image files stored in the folder. The four display modes available are List, Details, Show property, and Show thumbnails.

☞ Refer to "15. View" on page 6-19.

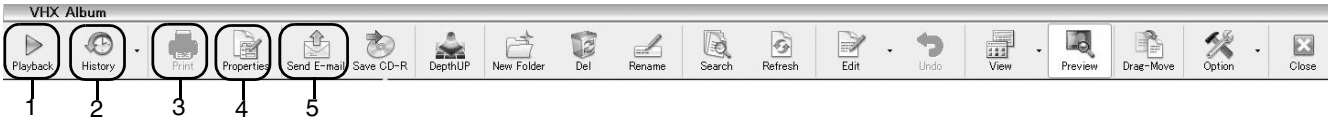
Preview area:

Displays the preview image and information about the selected image file. The preview image file can be switched using the [Back] and [Next] buttons. Pressing the [Playback] button will display the selected preview image on the entire screen.

☞ Refer to "16. Preview" on page 6-20.

6.2.2 Functions of the menu bar

This section describes the function of the menu bar.



1. Playback

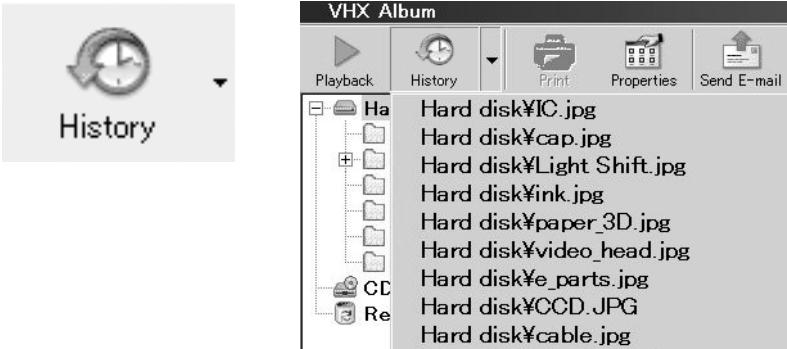
Select the desired image file from the Folder contents area and click the [Playback] button. The selected image is displayed on the entire screen.

- ✦ Refer to "Displaying the depth composition image" on page 8-12 for displaying 3D images.
- ✦ Refer to "6.5 Reproducing video" on page 6-28 for detailed information on viewing AVI format video.



2. History

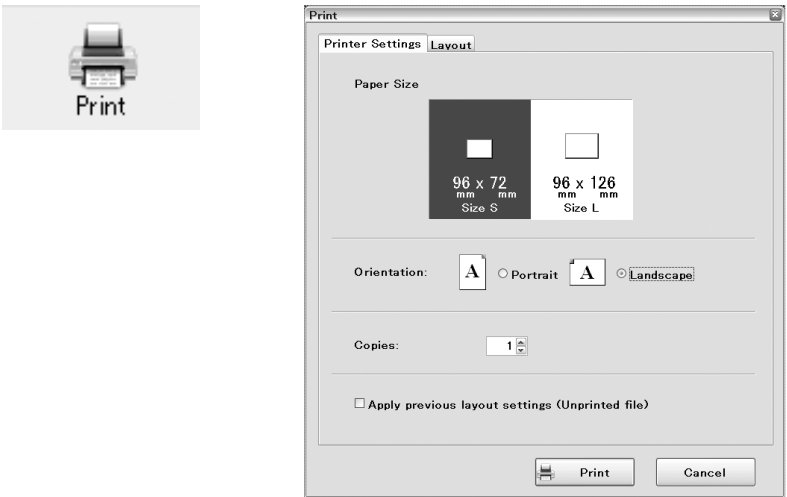
The history of the image files that have been played is displayed in the drop-down list. The desired image can be selected from the list to display on the entire screen.



3. Print

Prints the image currently displayed on the screen using the dedicated printer (CP30DW). The [Print Setup] dialog box appears.

- ✦ Refer to "10.1 Overview of the print operation" on page 10-2.



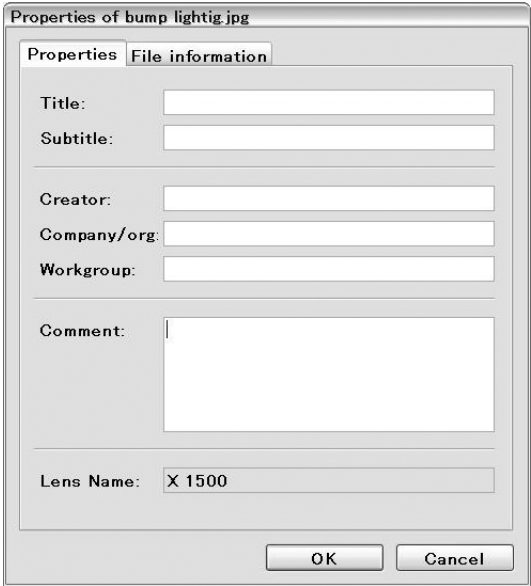
4. Properties

The properties of the file and file information can be displayed. Clicking the [Properties] button will display the following dialog box on the screen.

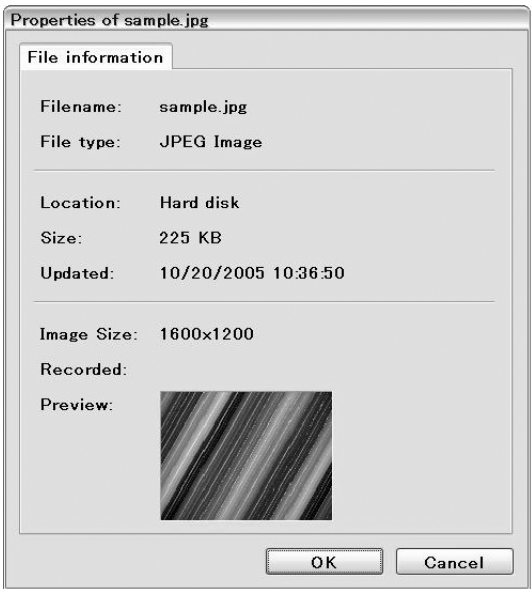
➤ Refer to "6.1.5 File Properties" on page 6-7.



The properties of the image file being selected can be configured.



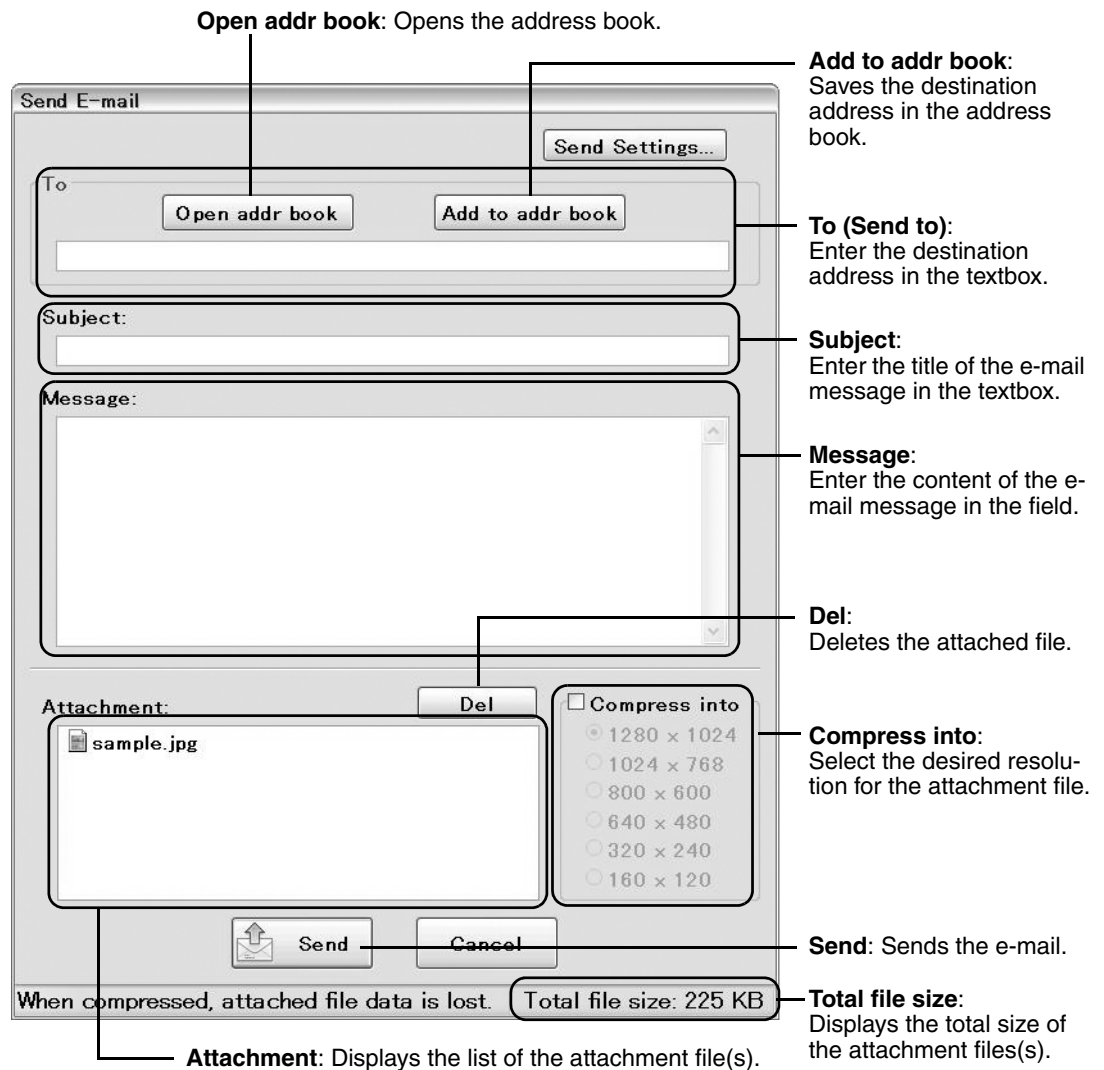
The file information for the image file being selected can be displayed.

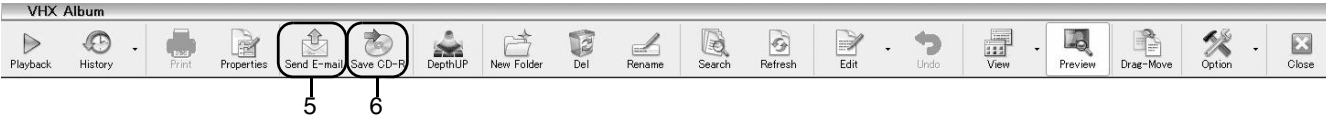


5. Send E-mail

Image files can be sent as an attachment to an e-mail message.

- Two or more files can be sent with one e-mail transmission; however, the maximum file volume that can be sent in one transmission is 1.4 MB.
- Only one file can be attached to a 3D image file.





The following describes the procedure for sending e-mail messages.

Note: It is necessary to designate the Sender's address and Mail server settings in advance.
➤ Refer to "Send E-mail" on page 6-23 for setting the Mail server and Sender's address.

1. Select the file to be sent from the VHX Album window.

Note: Two or more files can be selected using the following procedure.

- Click the wheel button of the mouse.
- Click the mouse button while holding down the Shift key on the keyboard.

2. Select the [Send E-mail] command from the menu bar.

The [Send E-mail] dialog box appears on the screen. The file that was selected in step 1 is displayed in the Attachment field.

3. Enter the e-mail address to which you want to send the e-mail in the To field.

The destination address can be selected from the Address Book after clicking the [Open addr book] (Open the address book) button.

Note: Enter the e-mail address to which you want to send the e-mail in the To field, and then click the [Add to addr book] button. The e-mail address is saved in the Address Book.

4. Enter the subject in the [Subject] field.

5. Enter the content in the [Message] field.

6. Check the attached file(s).

- To delete the attached file, select the file and then click the [Del] button.
- To reduce the size of the image file, put a checkmark in the Send compress checkbox. The File Properties information is lost when the file size is reduced.

7. Click the [Send] button.

The e-mail is sent to the destination address.

6. Save to CD-R

Note:

- Make sure to use new CD-R/RW disks. A disk that has been formatted in a drive for other devices including a PC cannot be used.
- All communication ports (LAN and USB) are disabled while saving data on the CD-R/RW.

Saves image file(s) or the 3D display software on a CD-R/RW.

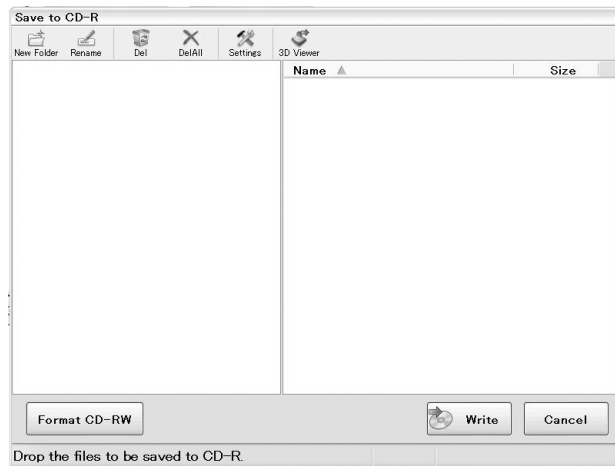


The following describes the procedure for saving image file(s) on a CD-R/RW.

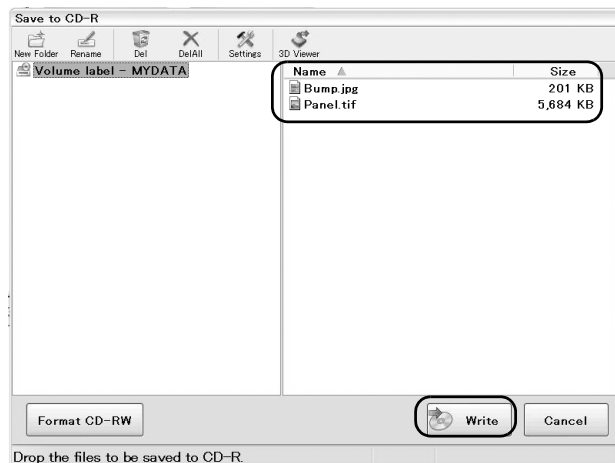
1. Select the [Save CD-R] command on the menu bar.

The [Save to CD-R] dialog box appears on the screen.

Tips Click on the [3D] button to save software for viewing 3D images on a computer to the CD-R/RW.

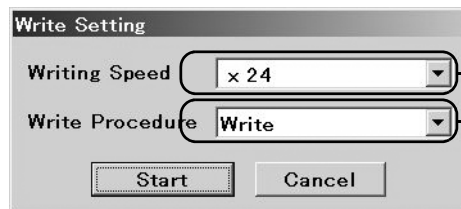


2. Drag the file to be saved on the CD-R to the [Save to CD-R] dialog box.



3. Click the [Write] button.

4. Specify the [Writing Speed] and [Writing Procedure] settings, and then click the [Start] button.



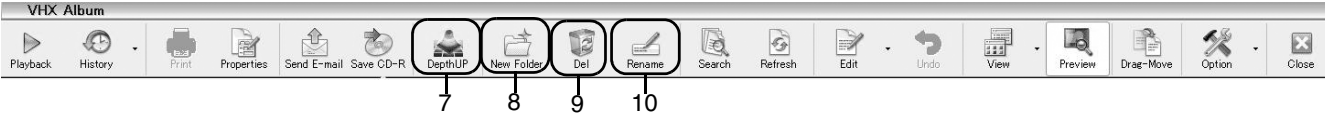
Writing Speed: Select the desired speed from 4/10/16/24-speed.

Writing Procedure: Select either Write or Test only.

Note: For the Writing Speed setting, select the writing speed supported by the disk.

The [Status] dialog box appears on the screen, indicating the status of the operation.





The CD-R is ejected when the writing is completed.

- Note:**
- When writing the data on a CD-RW, the [Format CD-RW] button is enabled.
 - Clicking the [Format CD-RW] button will delete all data on the CD-RW.

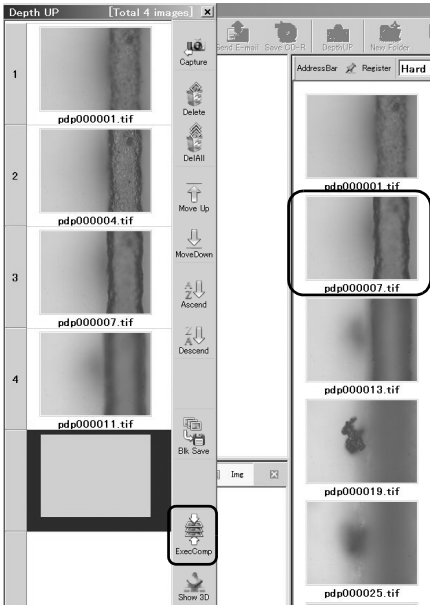
7. Depth UP

When proper focus cannot be achieved due to large projections and depressions on the observation target, a composite image is generated from two or more image files created with different focus points. The composite image can be displayed on the screen or displayed as a 3D image using this function.

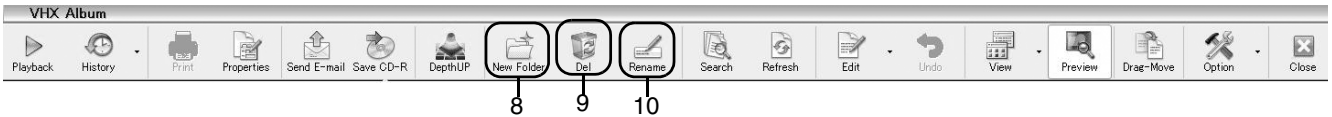


- Tips** The DepthUP function on the VHX Album window is used to compose two or more image files that have been recorded.
- ➡ Refer to "8.1 Real-time Depth composition" on page 8-2 for details about the Depth UP functions.

1. Select the image file for which you want to enhance the depth from the Folder contents area.



2. Click the [Add] button.
The selected image file is added to the [Depth UP] dialog box.
3. Repeat steps 1 and 2, adding all image files required for the Depth UP processing.
4. Click the [ExecComp] button.
An image with enhanced depth is displayed on the entire screen.



8. New Folder

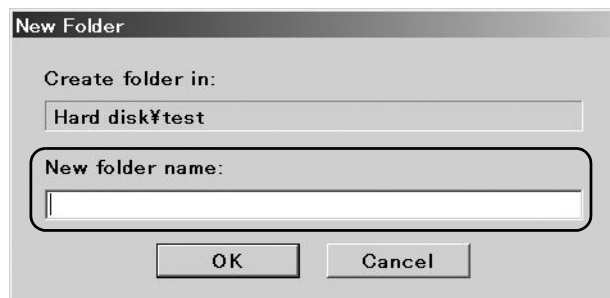
Creates a new folder on the hard disk drive of the VHX-600E.



1. Select the destination for creating a new folder in the folder display area.



2. Click the [New Folder] button.
The [New Folder] dialog box appears on the screen.
3. Enter the desired folder name in the textbox and then click the [OK] button.
A new folder is created.



Note: Symbol characters (\ / : ; , * ? " < > | and space) cannot be used in filenames.

9. Del

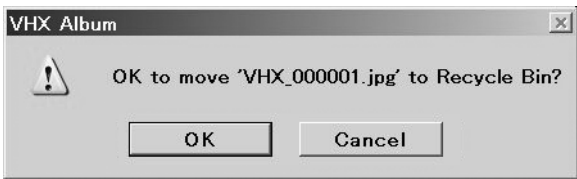
Moves the selected file to the Recycle Bin.



1. Select the file to be deleted in the Folder contents area.
The selected file is highlighted in reverse video.
2. Click the [Del] button.
The confirmation window appears on the screen.

3. Click the [OK] button.

The selected file is moved to the Recycle Bin.



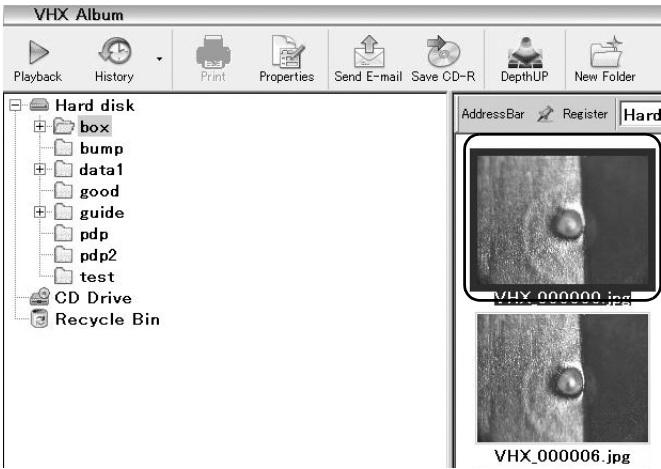
- Tips
- Two or more files can be selected in one operation by clicking the wheel button of the mouse.
 - Files can be deleted via the short-cut menu displayed by right-clicking the mouse in the Folder contents area or the Folder display area.

10. Rename

Changes the name of the image file.



1. Select the file you want to rename in the Folder contents area.

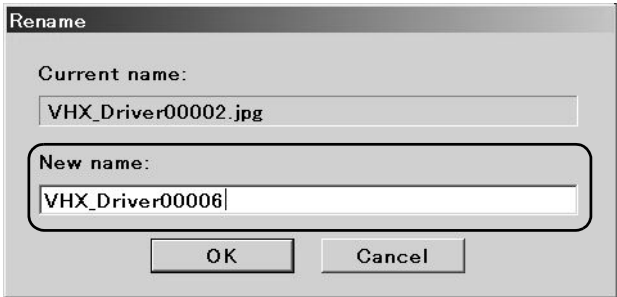


2. Click the [Rename] button.

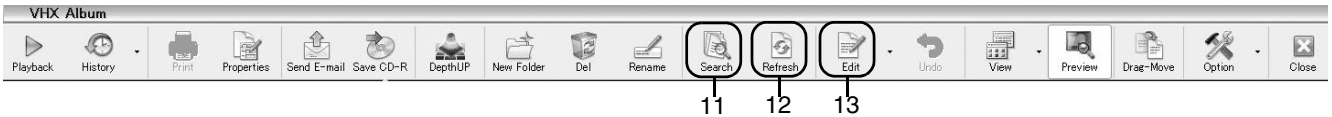
The [Rename] dialog box appears on the screen.

3. Enter the new name in the New Name: field and click the [OK] button.

The name is changed.

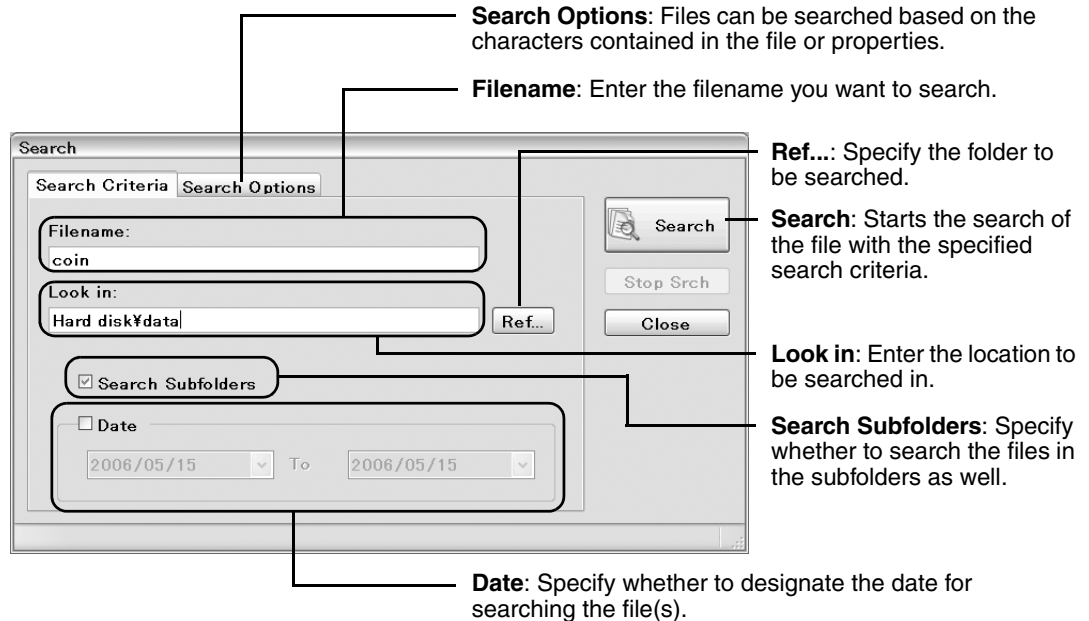
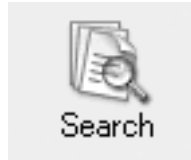


Note: Symbol characters (\ / : ; , * ? " < > | and space) cannot be used in filenames.



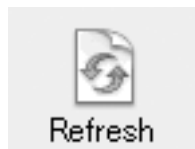
11. Search

Searches specific file(s). The following search parameters can be specified.



12. Refresh

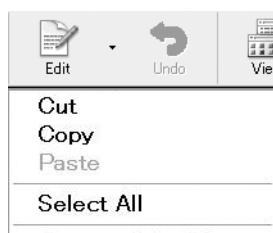
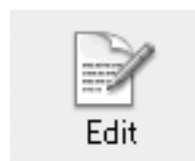
Refreshes the display of the Album window to the most recent image.



Tips When copying a file from a PC, the file may not be reflected on the screen immediately. Use this button in such a case.

13. Edit

Edits the files.



- ✧ refer to "17. Drag-Move/Drag-Copy" on page 6-21 for the procedures for the move or copy operations in the drag mode.
- ✧ Refer to "6.6 Create slide video" on page 6-29 to create slide shows.

■ Cut

Cuts the selected image file and copies the file onto the clipboard.

1. **Select the desired image file from the Folder contents area.**
2. **Select the [Cut] command from the [Edit] menu on the menu bar.**
The selected image file is cut and copied onto the clipboard.
3. **Click on the destination folder to open the folder.**
4. **Select the [Paste] command from the [Edit] menu on the menu bar.**
The image file that has been cut is displayed in the Folder contents area.

Tips

The Cut operation can also be executed via the shortcut menu displayed by right-clicking the mouse in the Folder contents area or the folder in the Folder display area.

■ Copy

Copies the selected image file onto the clipboard.

1. **Select the desired image file from the Folder contents area.**
2. **Select the [Copy] command from the [Edit] menu on the menu bar.**
The image file is copied onto the clipboard.
3. **Click on the destination folder to open the folder.**
4. **Select the [Paste] command from the [Edit] menu on the menu bar.**
The pasted image file is displayed in the Folder contents area.

Tips

The Copy operation can also be executed via the shortcut menu displayed by right-clicking the mouse in the Folder contents area or the folder in the Folder display area.

■ Paste

Pastes the image file from the clipboard.

1. **Copy the desired image file onto the clipboard using the Copy or Cut function.**
2. **Click on the destination folder to open the folder.**
3. **Select the [Paste] command from the [Edit] menu on the menu bar.**
The copied or cut image file is displayed in the Folder contents area.

Tips

The Paste operation can also be executed via the shortcut menu displayed by right-clicking the mouse in the Folder contents area or the folder in the Folder display area.

■ Select All

Selects all files that are displayed in the Folder contents area.



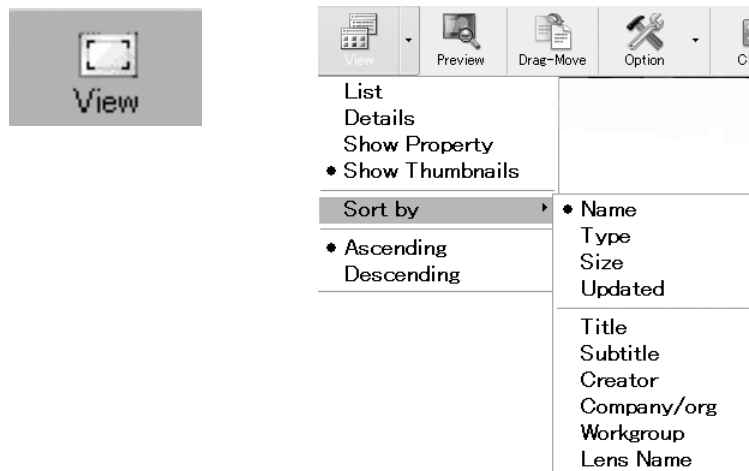
14. Undo

Undo the last operation. The Undo command cannot be used for some operations.



15. View

Designate the display mode of the image files. The display modes listed below are available. When Show Thumbnails is selected, the display order can be selected as follows.



■ List

Displays the filenames.



■ Details

Displays the detailed information about the files.

Displays the type, size, and last saved date in addition to the filename.

Name	Type	Size	Updated
bump.tif	TIFF Image	5,684 KB	2003/06/20 08:25:24
bump_3D.jpg	JPEG Image	134 KB	2003/06/19 21:00:41
bump_3D_2.jpg	JPEG Image	75 KB	2003/06/19 21:00:41
cap.jpg	JPEG Image	226 KB	2003/06/19 21:00:41
cap.jpg	JPEG Image	379 KB	2003/06/19 21:00:44
CCD.JPG	JPEG Image	1,578 KB	2003/06/19 21:00:40
div.jpg	JPEG Image	302 KB	2003/06/26 20:41:14
e_parts.jpg	JPEG Image	87 KB	2003/04/25 10:05:22
flower.jpg	JPEG Image	326 KB	2003/06/19 21:00:41
fly.jpg	JPEG Image	190 KB	2003/02/14 09:32:58
fly_scale.jpg	JPEG Image	290 KB	2003/06/26 20:39:24
fook2.jpg	JPEG Image	313 KB	2003/03/19 08:13:06
Hard Disk.jpg	JPEG Image	423 KB	2003/06/19 21:00:41
hook.jpg	JPEG Image	139 KB	2003/03/19 08:13:06

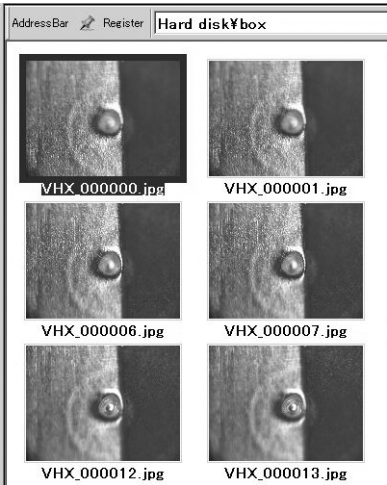
■ Show Properties

Displays the properties of the files.
When properties are set up for the image file, the Name, Title, Subtitle, Creator, Company/org (Company/organization), Work group, and Lens name are displayed.

Name	Title	Subtitle	Creator	Company/org	Affil/cat
bump.tif	bump	analysis	Taro Yamada	Keyence	QA
bump_3D.jpg					
bump_3D_2.jpg					
cable.jpg					

■ Show Thumbnails

Displays the thumbnail images of the files.




16. Preview


Displays the preview image of the selected file in the lower-left corner of the Album window.
File information is displayed in addition to the image display.





Preview buttons: Used for file operations in the preview area.

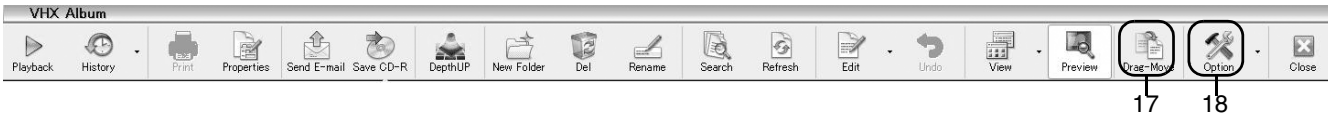
 Back : Displays the previous file.

 Next : Displays the next file.

 Playback : Displays the image shown in the preview area on the entire screen.

 Img : Displays the image and information in the preview area.

 : Closes the display in the preview area.



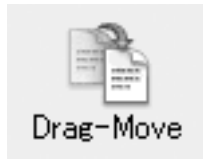
17. Drag-Move/Drag-Copy

Image files can be moved or copied by dragging the desired file. The display is switched between [Drag-Move] and [Drag-Copy] every time the button is clicked.

➤ Refer to "13. Edit" on page 6-17 for the procedures for cutting, copying or pasting the files using the Edit button.

■ Drag-Move

Drags and moves the selected file to another folder.



1. Click the button to display the [Drag-Move] command.
2. Select the desired image file from the Folder contents area.
3. Drag the selected image file to the destination (move to) folder in the folder display area.
The selected image file is moved to the destination folder.

■ Drag-Copy

Drags and copies the selected file to another folder.



1. Click the button to display the [Drag-Copy] command.
2. Select the desired image file from the Folder contents area.
3. Drag the selected image file to the destination (copy to) folder in the folder display area.
The selected image file is copied to the destination folder.

18. Options

Configure the Display Setting, Recycle Bin, and Send-E-mail parameters here.



■ Display Setting

The following dialog box appears on the screen.

Album Option

Display SettingsRecycle BinSend E-mailSave to CD-R

Display Mode

☒ Show All Files☐ Selected File types only

Select File type to display

☒ JPEG Image file (*.jpg)
☒ TIFF Image file (*.tif)
☒ JPEG2000 Image file (*.jp2)
☒ CSV Text file (*.csv)

☒ Other files (other extensions)

☐ Show file properties in pop-up when Thumbnail specified.

☐ Confirm before deleting Search Results.

☒ Confirm playback method of 3D image file.(3D/2D)

OKCancel

Display Mode: Select whether to display all files or only the selected files.

Show Selected Files:Designates the files to be displayed under the Show Selected mode.

Show file property in pop-up when Thumbnail specified.: When the checkbox is selected, placing the mouse near the thumbnail image on the Album window will display the file properties of the file as a pop-up message.

Display confirmation dialog when deleting Srch Result.: When a file search operation is performed, the search result is displayed in the Srch dialog box. When attempting to open another folder while the search results are displayed in thumbnail mode, the search results will disappear. However, when a checkmark is put in the checkbox, the warning message window will appear on the screen.

Confirm playback method of 3D image file. (3D/2D): Checks the display method (3D images or 2-D images) when displaying 3D images. If no display method is checked, the images are displayed as 3D images.

■ Recycle Bin

The usage methods for the Recycle Bin can be configured here.

Album Option

Display SettingRecycle BinSend E-mailSave to CD-R

☐ Remove files without moving them to Recycle Bin.

Empty Recycle Bin

Recycle Bin use rate:

0 %

OKCancel

Remove files without moving them to Recycle Bin.: When a checkmark is put in the checkbox, the Del command will not move the file to the Recycle Bin, but immediately delete the file.

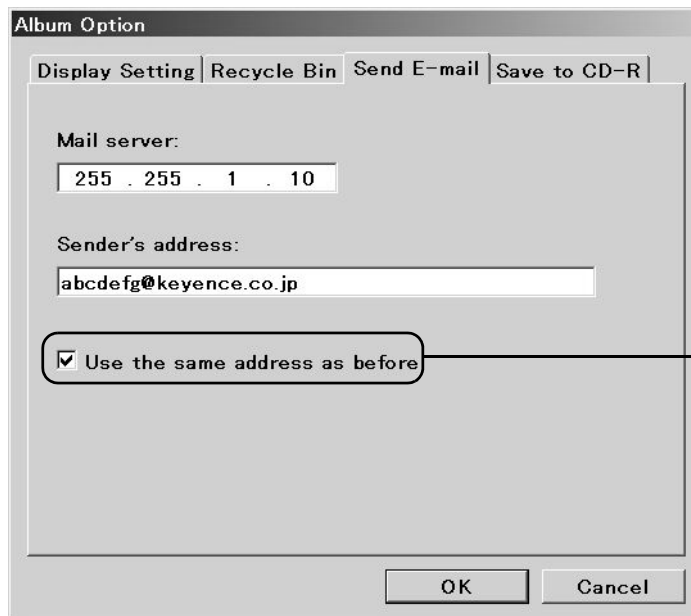
Empty Recycle Bin: Deletes the files in the Recycle Bin.

Recycle Bin usage ratio: Displays the current usage ratio of the Recycle Bin.

■ Send E-mail

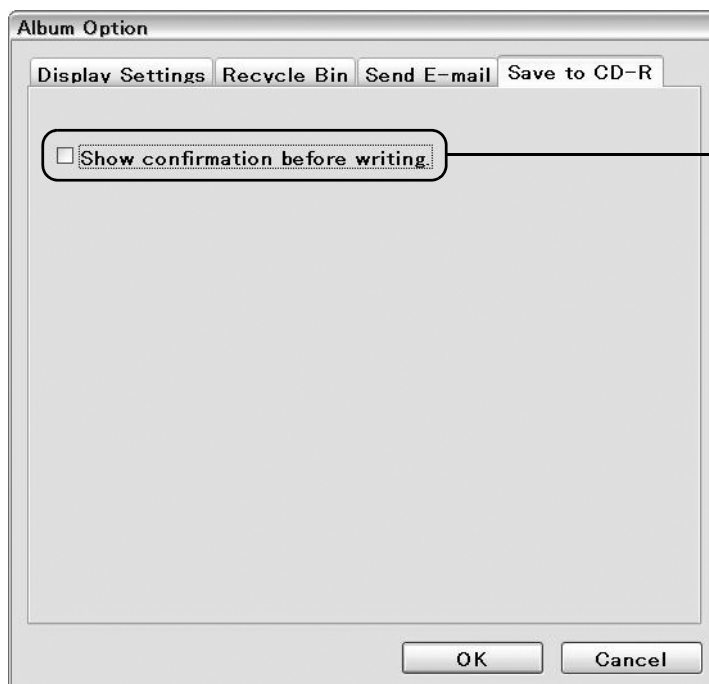
The mail server and sender's address can be specified here.

- Make sure to configure these settings before sending e-mails using the [Send E-mail] button on the menu bar.

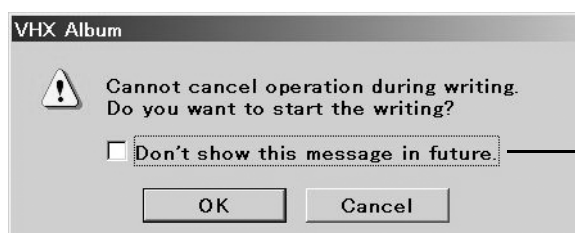


Use the same address as before: The most recently used address is displayed automatically when the [Send E-mail] dialog box is open.

■ Save to CD-R



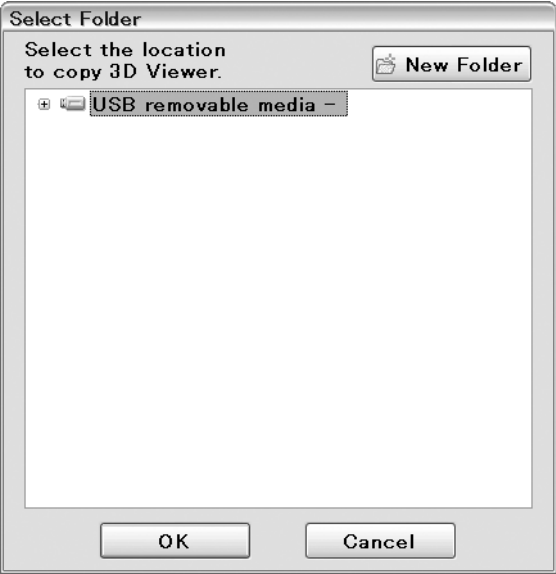
Show confirmation before writing.: When a checkmark is put in the checkbox, a confirmation dialog box appears upon writing the data on a CD-R.



■ Copy 3D software

Copy 3D software:

Copies the VHX-600E 3D software "VHX3DViewer" to the USB media.



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19. Close

Closes the Album window and displays the observation screen.



6.3 Observing images with high definition

Images captured with the 54 mega pixel 3CCD (4800x3600), super fine (4800x3600) or high definition (3200x2400) mode cannot be displayed as a full image on the UXGA (1600x1200) monitor. The VHX-600E allows the user to select either the “Fit display” or the “Real-pixel display” mode for the observation. The “Fit display” mode reduces the image so that the full image can be displayed on the monitor, and the “Real-pixel display” mode displays the image at the actual size.

⇒ Refer to “6.1.2 Recording an image in high definition” on page 6-3 for capturing high definition images.

Fit display

The Fit display mode displays the images captured under the 54 mega pixel 3CCD (4800x3600), super fine (4800x3600) or high definition (3200x2400) mode by reducing the image into the UXGA (1600x1200) size.

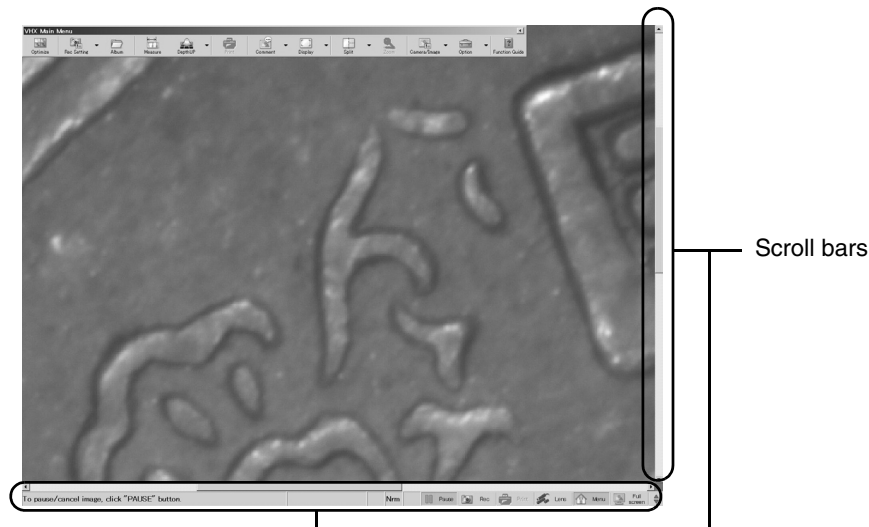
1. **Select the [Display] command on the menu bar, and then enable the [Fit display] option.**

The “Fit display” mode is enabled when the option is set to the “on” position.

Real-pixel display

The Fit display mode displays the images captured under the 54 mega pixel 3CCD (4800x3600), super fine (4800x3600) or high definition (3200x2400) mode in the actual size.

1. **Select the [Display] command on the menu bar and then disable the “Fit display” option.**
The “Real-pixel display” mode is enabled when the “Fit display” option is set to “off”.
2. **Move the scroll bar up and down, or left to right to display the part of the image you want to observe.**



Tips

The Real-pixel display mode displays the image at a higher magnification than the lens power.

The high-definition image is captured using the pixel-shift function. It provides images with higher definition compared with images captured using the digital zoom function or by attaching an adapter to the lens to enhance the magnification by two or three times.

- In the 54 mega pixel 3CCD (4800x3600) or super fine (4800x3600) mode, the image is magnified three times higher than the lens power.
- In the Super Fine (4800x3600) mode, the image is magnified three times higher than the lens power.
For example, when using a 3000x lens, the image is magnified by 9000x.
- In the High Definition (3200x2400) mode, the image is magnified two times higher than the lens power.
For example, when using a 3000x lens, the image is magnified by 6000x.

■ Crop Image to Screen Size

The images captured in the 54 mega pixel 3CCD (4800 x 3600), super fine (4800 x 3600) or high definition (3200 x 2400) mode can be cropped to the visible screen size (1600 x 1200). The images will retain the original definition.

1. **Display the images captured under the Super Fine or High Definition mode in "Real-pixel display" and display the portion you want to crop by using the scroll bar.**

⇒ Refer to "Real-pixel display" on page 6-25 to display the cropped images.

2. **Select "Crop Image to Screen Size" from "View" on the menu bar.**

The magnified image is cropped to the visible screen size (1600 x 1200).

Tips

Cropped images can be saved. Refer to "6.1.1 Recording an image" on page 6-2 to save the cropped images.

6.4 Recording video

Observed images can be digitally recorded as AVI format video and played back. The recorded video can be up to 1 hour long with 15 frames per second. These saved files can be played back on the VHX-600E or a computer.

Tips The recorded image size is 800 x 600, with an actual capture area of 800 x 480.



1. Click [Rec video] on the menu bar.

The [Record video] dialog box appears.

2. Set the conditions for recording video.

Record time: Set the length of time for recording video.

The units for [Hour], [Min], and [Sec] can be set.

Note: Set the recording time for at least 15 seconds. The following values represent the maximum recording time:

Compressed: 1 hour

Uncompressed: 1 minute, 30 seconds (15 F/s), 45 seconds (28 F/s)

Recording frame rate

28 FPS: Records at 28 frames per second. This setting is effective for fast-moving targets.

15 FPS: Records at 15 frames per second.

Create compressed AVI file: Select whether to compress the AVI file.

Display title: A title can be displayed at the upper left corner of the screen when recording video.

Rec folder loc: Specify the folder in which to save AVI files.

Rec filename: Set the file name for the saved AVI file.

3. Check the settings and click the [Start rec] button.

The video starts recording using the set conditions.

When recording is complete, the message [Create motion picture AVI file now?] appears. To create the AVI file right away, click [Yes]. To create the AVI file later, click [No]. When you click on [No], the AVI file can be created at a later time by clicking [Rec motion pic] on the menu bar.

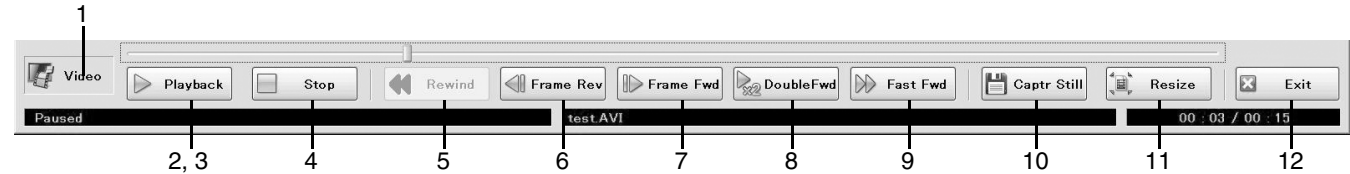
Note: If power is turned off without creating the AVI file, the recorded data is lost.

6.5 Reproducing video

This section describes how to reproduce a video file in AVI format on the VHX-600E.

- Note:**
- For information about how to play back the files on a computer, check the instruction manual for the video playback software.
 - The video files are not guaranteed to play back on all computers or with all video playback software.

1. **Select the AVI format video file from the Album window.**
2. **Click [Playback] on the menu bar.**
The Motion Play screen appears in full screen and the video starts playing.



The menu that appears at the bottom of the playback screen can perform the following functions.

- | | |
|-------------------------|---|
| 1. Slide bar: | Drag the slider to fast forward or rewind the video. |
| 2. Pause: | Pauses the playback. |
| 3. Playback: | Starts playing the paused video. |
| 4. Stop: | Stops playback. |
| 5. Rewind: | When viewing an uncompressed video, you can rewind the video. Compressed videos cannot be rewind. |
| 6. Frame Rev: | When the video is paused, it can be rewound one frame at a time. |
| 7. Frame Fwd: | When the video is paused, it can be forwarded one frame at a time. |
| 8. DoubleFwd: | Plays back at 2x normal speed. |
| 9. Fast Fwd: | Fast forwards the video. |
| 10. Captr Still: | Saves the displayed image as a still image. |
| 11. Resizing: | Changes the size of the video file being played and saves it. |

Note: Images that are resized and saved can only be played back on a computer. They cannot be played back on the VHX-600E.

Tips You can change the size to 640 x 480 or 320 x 240.

- | | |
|------------------|---|
| 12. Exit: | Exits the Motion Play screen and returns to the Album screen. |
|------------------|---|

6.6 Create slide video

This section explains how to gather multiple image files saved with Timer Rec mode or Auto Rec Mode and create one video file.

1. Select the first file to use in the video from the Album window.

Note: The names of the image files should have consecutive numbers.

Tips

Sample file selection

VHX_000001.jpg

VHX_000002.jpg

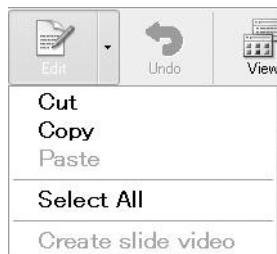
VHX_000003.jpg

When using the above files

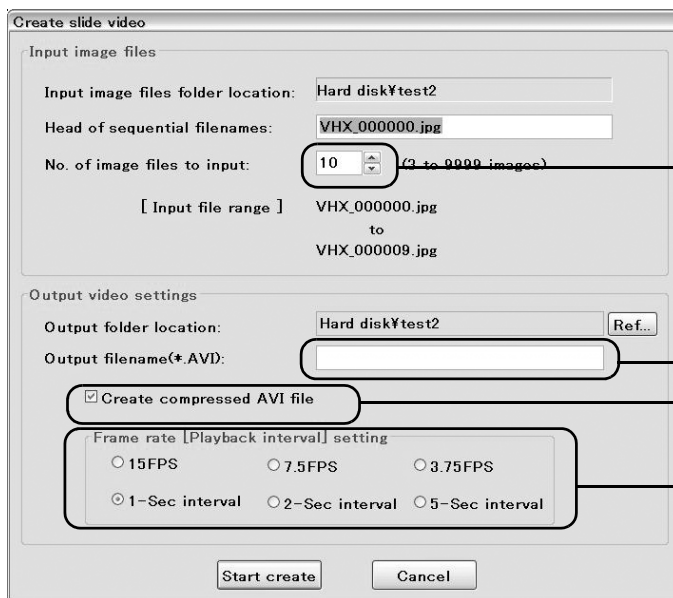
Select "VHX_000001.jpg".

2. Select [Create slide video] from [Edit] of the menu bar.

The [Create slide video] dialog box appears on the screen.



3. Set the conditions for Create slide video.



4. Click the [Start create] button to start creating the slide show.

Note: The original image size is 1600 x 1200, but the image size for video files is 800 x 600.

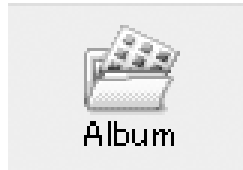
6.7 Rerunning the setting used for a saved image

This section explains how to gather multiple image files saved with Timer Rec mode or Auto Rec Mode and create one video file.

Note: This function is not available for HDR images and 3D images.

1. Select **[Album]** on the menu bar, and then reproduce the image with the settings you wish to rerun.

⇒ Refer to "6.2 Reproducing and editing images (Album)" on page 6-8.



2. Select **[Restore recording setting]** from **[Rec Settings]** command on the menu bar.
The settings used for recording the reproduced image can be rerun.

Chapter 7

Measuring Images

This chapter describes the procedures for measuring observed images and saving the measurement results.

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7.1 Overview of the Measurement windows

This section describes an overview of the windows used for the Main measurement and Area measurement menu.

7.1.1 Displaying the Measurement windows

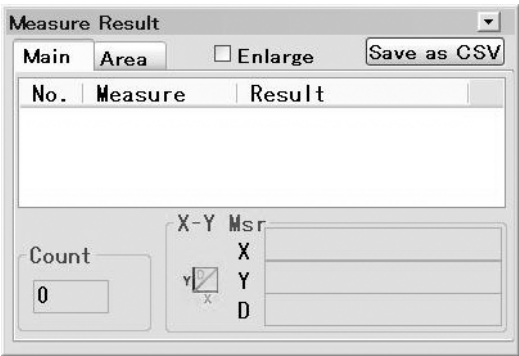
1. Select [Main measurement•Area measurement] from the menu bar.
The [Measure Tool] window and [Measure Result] window appear on the screen.



Measure Tool window



Measure Result window



7.1.2 Closing the windows

1. Click the [Exit] button on the [Measure Tool] window.

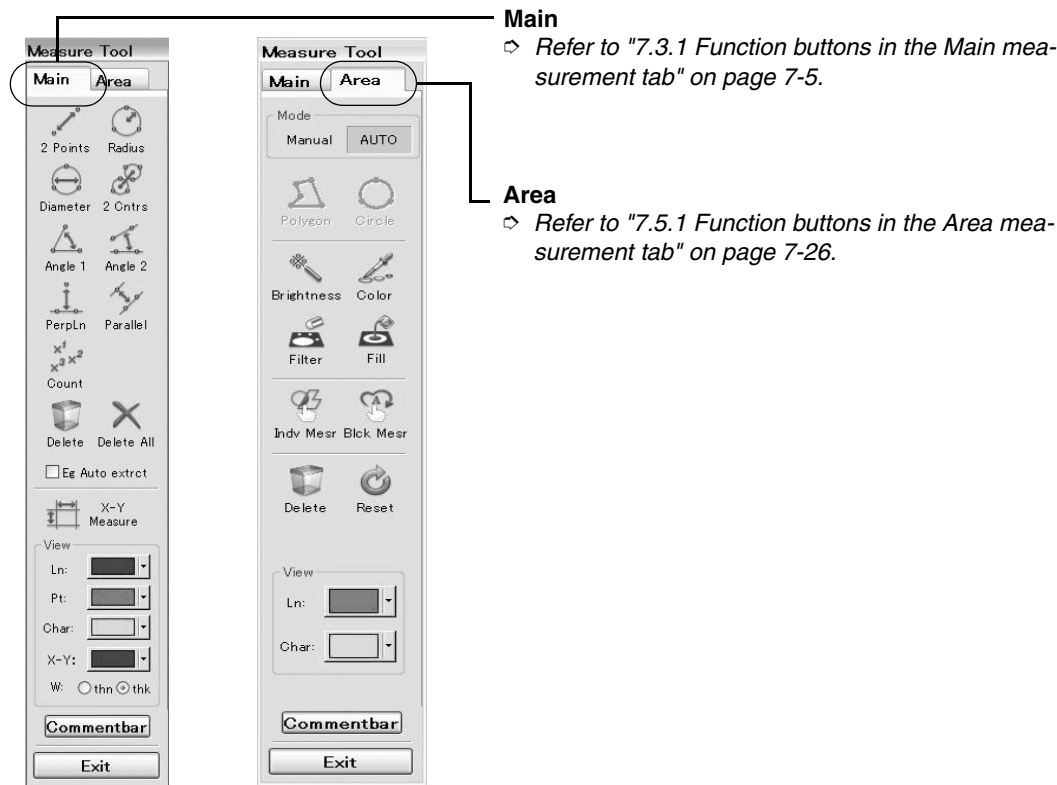


7.1.3 Overview of the Measurement windows

This section describes an overview of the Measure Tool window and Measure Result window that are displayed when the Measurement menu is activated.

Measure Tool window

This window includes the [Main] tab with tools for measuring distance, and the [Area] tab with tools for measuring area. Select the Main or Area tab, and then click on the button corresponding to the desired operation to perform the measurement operation.

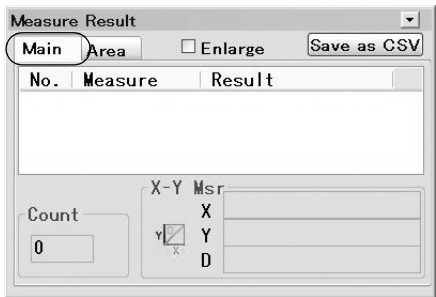


Measure Result window

This window includes the [Main] tab which displays the results of distance measurements, and the [Area] tab which displays the results of area measurements. Select the Main or Area tab to select the desired window in which to display the results of the operation to be performed.

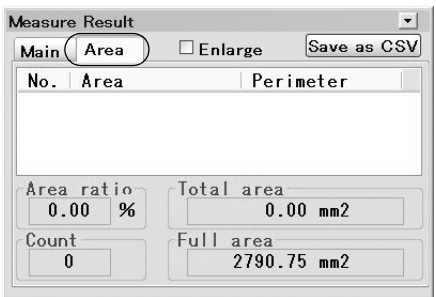
Main

Refer to "7.3.2 Functions of the Measure Result display window (Main measurement)" on page 7-7.



Area

Refer to "7.5.2 Functions of the Measure Result display window (Area measurement)" on page 7-27.



7.2 Preparation for measurement

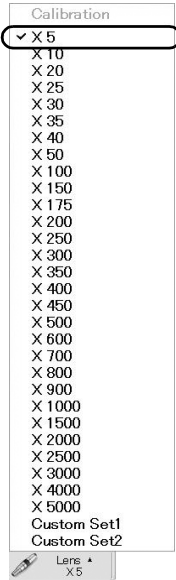
This section describes how to prepare for measurement by selecting the proper lens power.

Note: The lens power should be set properly in order to obtain accurate measurement results.

- 1. Click the [Lens] button on the status bar.
The lens power menu is displayed on the screen.



- 2. Select the lens power to be used for the measurement.



7.3 Main measurement

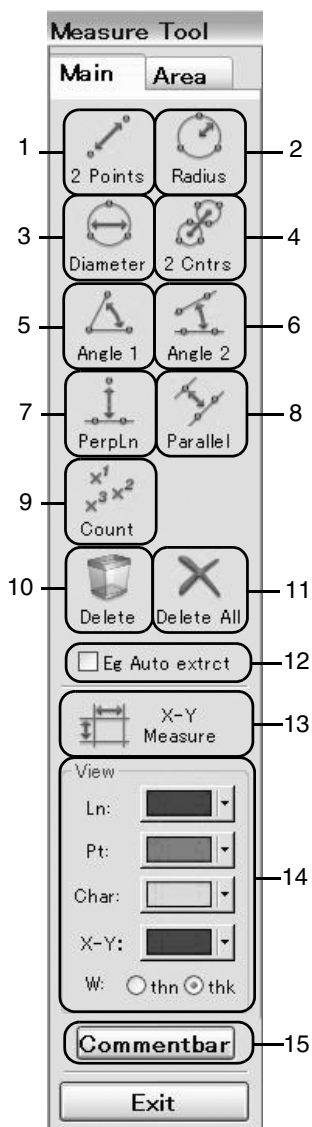
The distance between two points, angles, X-Y distance, and number of targets in the observation image can be measured or counted.

Note: Make sure to perform the calibration procedure before taking any measurements in order to obtain accurate measurement results.

✧ Refer to "7.9 Calibration" on page 7-50.

7.3.1 Function buttons in the Main measurement tab

The following describes the function buttons used for Main measurement operations.



1. 2 Points

Measures the distance between two points specified on the screen.

✧ Refer to "7.3.3 Measuring the distance between two points" on page 7-7.

2. Radius

Measures the radius of the circle that connects the three points specified on the screen.

✧ Refer to "7.3.4 Measuring the radius of a circle" on page 7-9.

3. Diameter

Measures the diameter of the circle that connects the three points specified on the screen.

✧ Refer to "7.3.5 Measuring the diameter of a circle" on page 7-11.

4. 2 Cntrs (2 circle centers)

Measures the distance between the centers of two circles specified on the screen.

✧ Refer to "7.3.6 Measuring the distance between two circle centers" on page 7-12.

5. Angle 1

Measures the degree of the interior angle formed by the three points (including the apex) specified on the screen.

✧ Refer to "7.3.7 Measuring an angle (1)" on page 7-14.

6. Angle 2

Measures the degree of the interior angle (the smaller angle) with the cross point formed by the two specified straight lines as the apex.

✧ Refer to "7.3.8 Measuring an angle (2)" on page 7-15.

7. PerpLn (Perpendicular line)

Measures the length of a line perpendicular to the desired reference line.

✧ Refer to "7.3.9 Measuring a perpendicular line" on page 7-16.

8. Parallel (Parallel lines)

Measures the distance between a desired reference line and a line parallel to the reference line (the shortest distance from the reference line to the parallel line).

✧ Refer to "7.3.10 Measuring the distance between parallel lines" on page 7-18.

9. Count

Counts the number of points on the specified image.

⇒ Refer to "7.3.11 Counting the number of points" on page 7-20.

10. Delete

Deletes the specified individual measurement item displayed on the screen.

⇒ Refer to "Delete" on page 7-25.

11. Delete All

Deletes all measurement lines and measurement results displayed on the screen.

⇒ Refer to "Delete All" on page 7-25.

12. Eg Auto extrct (Edge Auto extract)

Put a checkmark in the checkbox to automatically extract the edges of the target and draw a straight line when drawing a measurement line.

⇒ Refer to "7.4.1 Edge Auto extract" on page 7-23.

13. X-Y Measure

Measures the horizontal (X), vertical (Y), and diagonal (D) distances between two points on a target.

⇒ Refer to "7.3.12 [X-Y Measure]" on page 7-21.

14. View (Ln, Pt, W, Char)

The colors of the measurement line (Ln) and measurement point (Pt), characters (Char) color, and the line width (Thin/Thick) displayed on the screen can be specified here.

⇒ Refer to "7.4 Other measurement functions (Edge Auto Extract/Label Color/Delete)" on page 7-23.

15. Comment Bar

Displays the Comment Toolbar.

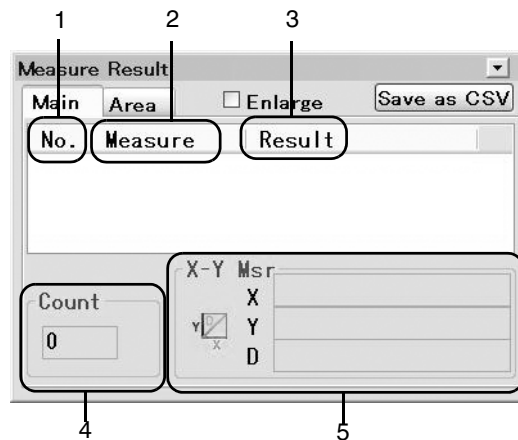
⇒ Refer to "Displaying the Comment Toolbar" on page 5-10.

Note:

- Up to 999 points in total can be measured with the [2 Points], [2 Cntrs], [Radius], [Diameter], [Angle1], [Angle2], [PerpLn], and [Parallel] operations.
- Up to 999 points can be counted with the [Count] operation.

7.3.2 Functions of the Measure Result display window (Main measurement)

The following describes the Measure Result display window (Main measurement) used to display the measurement results.



- 1. No.**
Displays the number corresponding to the label (subscript) assigned to the measurement segment.
- 2. Measure**
Displays the type of measurement operation.
- 3. Result**
Displays the result of the measurement.
- 4. Count**
Displays the number of points counted by the Count operation.
- 5. X-Y Msr (X-Y Measure)**
Displays the results of the X-Y Measure operation.
⇒ Refer to "7.3.12 [X-Y Measure]" on page 7-21.

7.3.3 Measuring the distance between two points

This section describes the procedure for measuring the distance between two points specified on the screen.

First, click the [Lens] button and specify the power of the lens to be used for the measurement.



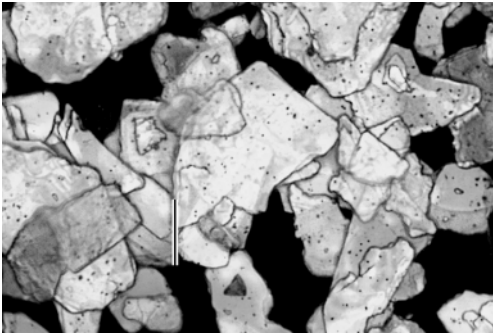
⇒ Refer to "7.2 Preparation for measurement" on page 7-4.

- 1. Click the [2 Points] button.**
The button is set to the on position.



- 2. Click on the starting point of the distance between the two points to be measured on the observation image.**

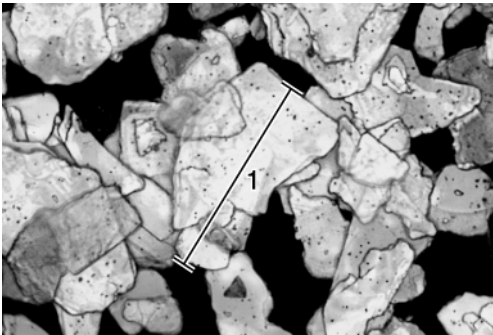
The starting point is confirmed.



- Tips
- Right-click on the point to cancel the current point and specify a new point.
 - Right-click the mouse during the measurement operations described below (before the command is confirmed) to return to the previous operation.

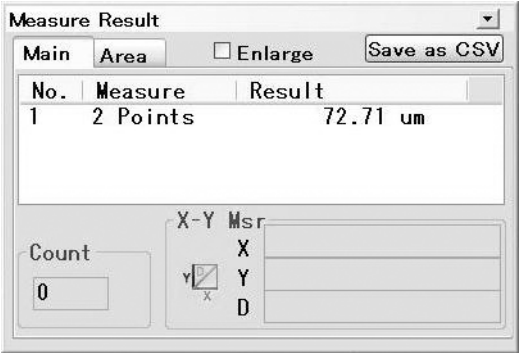
3. Click on the end point.

A straight line connecting the two selected points is displayed along with the label (subscript).



The distance between the two specified points is displayed in the Measure Result display window.

- The number shown in the [No.] column in the Measure Result window corresponds to the label (subscript) displayed beside the measurement line.
- To perform another measurement of distance between two points, repeat steps 2 and 3.



7.3.4 Measuring the radius of a circle

This section describes the procedure for measuring the radius of a circle that connects the three points specified on the screen.

First, click the [Lens] button and specify the power of the lens to be used for the measurement.



⇒ Refer to "7.2 Preparation for measurement" on page 7-4.

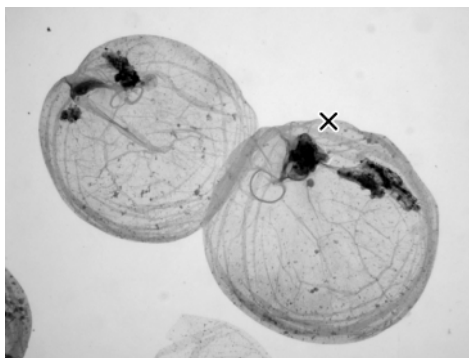
1. Click the [Radius] button.

The button is set to the on position.



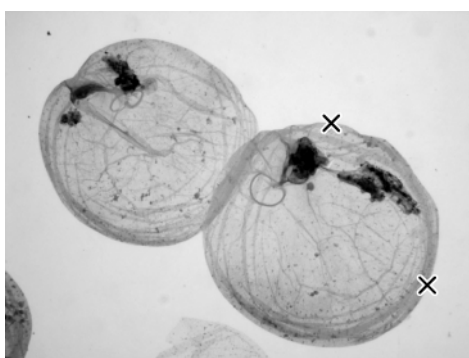
2. Click on the first point on the circle perimeter.

The point specified by clicking is marked with an "x" (cross).

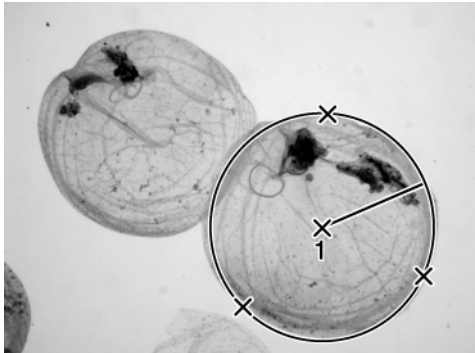


3. Click on the second point on the circle perimeter.

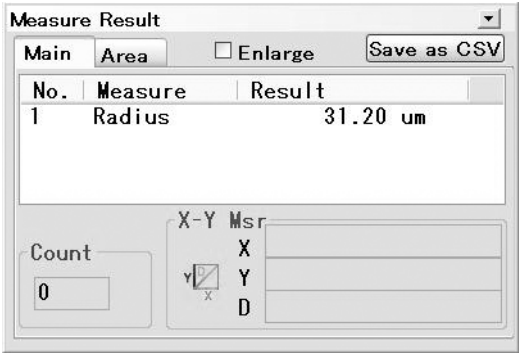
The second "x" (cross) is displayed on the screen.



4. **Click on the third point on the circle perimeter.**
The third point is marked with an “x” (cross), and the circle connecting the three points, the radius, and the circle center are displayed on the screen.



- The radius of this circle is displayed in the Measure Result display window.**
- The number shown in the [No.] column in the Measure Result window corresponds to the label (subscript) displayed beside the circle center.
- To perform another measurement of the radius of a circle, repeat steps 2 through 4.



7.3.5 Measuring the diameter of a circle

This section describes the procedure for measuring the diameter of a circle that connects the three points specified on the screen.

First, click the [Lens] button and specify the power of the lens to be used for the measurement.



⇒ Refer to "7.2 Preparation for measurement" on page 7-4.

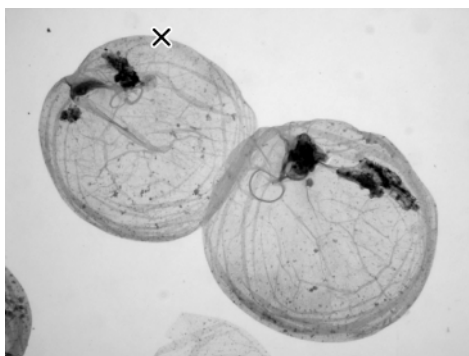
1. Click the [Diameter] button.

The button is set to the on position.



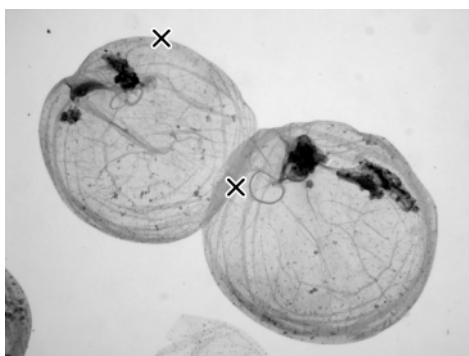
2. Click on the first point on the circle perimeter.

The point specified by clicking is marked with an "x" (cross).

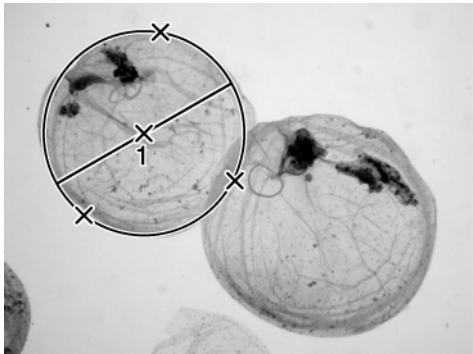


3. Click on the second point on the circle perimeter.

The second "x" (cross) is displayed on the screen.



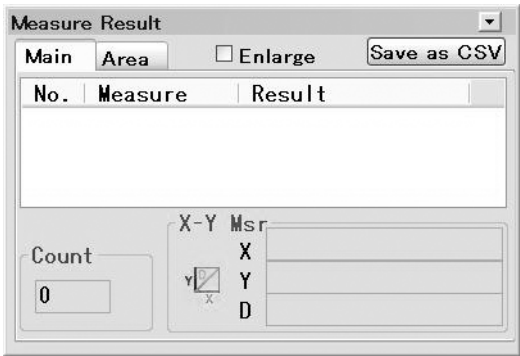
4. **Click on the third point on the circle perimeter.**
The third point is marked with an “x” (cross), and the circle connecting the three points, the diameter, and the circle center are displayed on the screen.



The diameter of this circle is displayed in the Measure Result display window.

The number shown in the [No.] column in the Measure Result window corresponds to the label (subscript) displayed beside the circle center.

- To continue another measurement of the diameter of a circle, repeat steps 2 through 4.



7.3.6 Measuring the distance between two circle centers

This section describes the procedure for measuring the distance between the centers of two circles specified on the screen.

First, click the [Lens] button and specify the power of the lens to be used for the measurement.

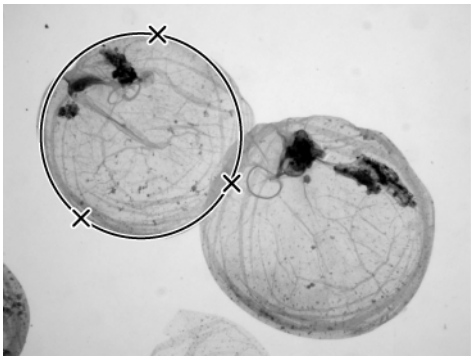


➤ Refer to "7.2 Preparation for measurement" on page 7-4.

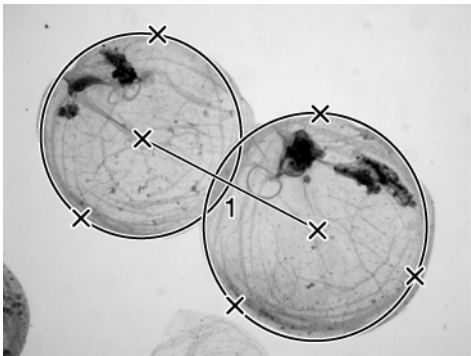
1. **Click the [2 Cntrs] button.**
The button is set to the on position.



2. Click on the desired three points on the screen to specify the starting (first) circle.
The starting circle is displayed on the screen.



3. Repeat the procedure in step 2 to specify the end (second) circle.
The end circle, a straight line connecting the two circle centers, and a label (subscript) are displayed on the screen.

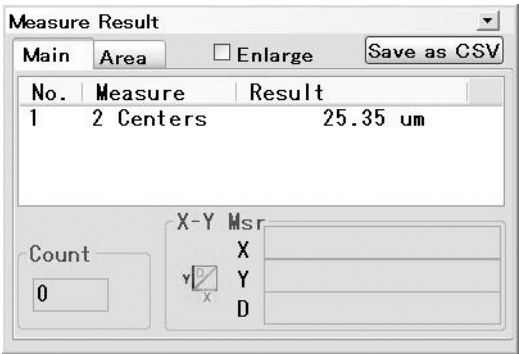


7

The distance between two circle centers is displayed in the Measure Result display window.

The number shown in the [No.] column in the Measure Result window corresponds to the label (subscript) displayed on the mid point of the line segment.

- To continue another measurement of the distance between two circle centers, repeat steps 2 and 3.



7.3.7 Measuring an angle (1)

This section describes the procedure for measuring the degree of the interior angle formed by the three points (including the apex) specified on the screen.

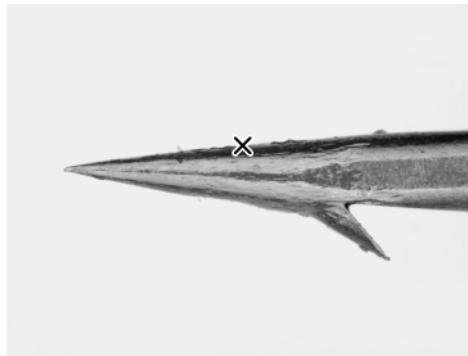
1. Click the [Angle 1] button.

The button is set to the on position.



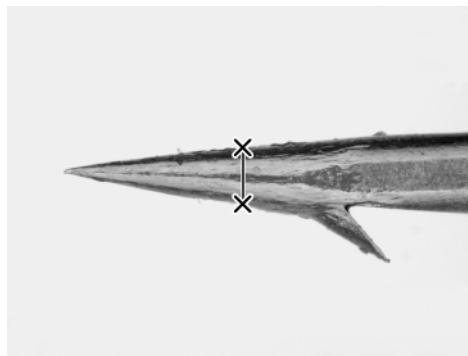
2. Click on a point on the straight line forming the interior angle.

The point specified by clicking is marked with an "x" (cross).



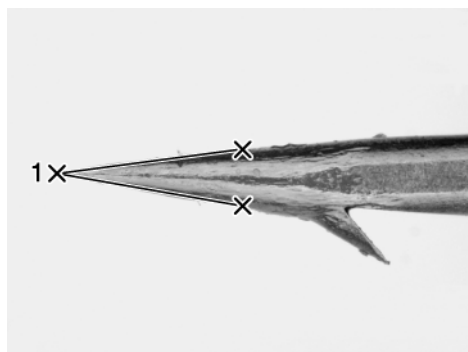
3. Click on a point on the other line forming the interior angle.

The point specified by clicking is marked with an "x" (cross), and the points specified in steps 2 and 3 are connected with a straight line.



4. Click on the apex of the interior angle to be measured.

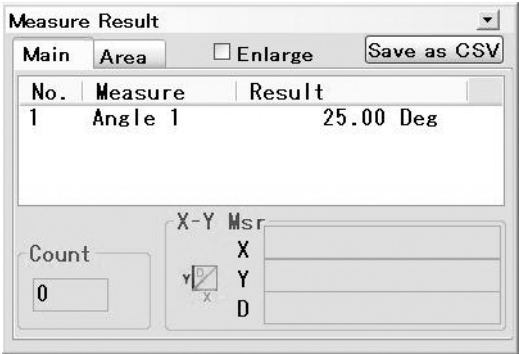
The point specified by clicking is marked with an "x" (cross).



The degree of the interior angle with the specified point as the apex is displayed in the Measure Result display window.

The number shown in the [No.] column in the Measure Result window corresponds to the label (subscript) displayed beside the apex of the angle.

- To continue another measurement of interior angle, repeat steps 2 through 4.



7.3.8 Measuring an angle (2)

This section describes the procedure for measuring the degree of the interior angle with the cross point formed by the two specified straight lines as the apex.

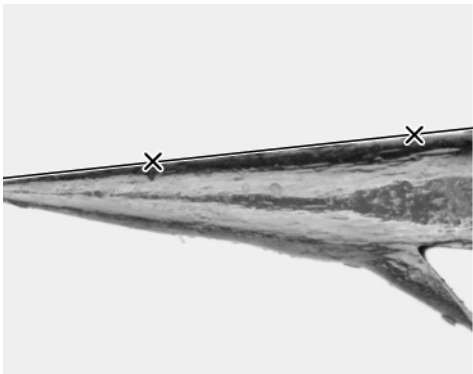
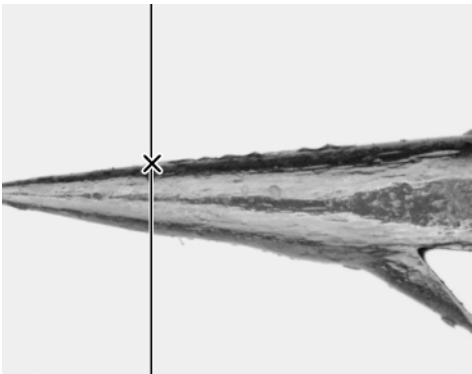
1. Click the [Angle 2] button.

The button is set to the on position.

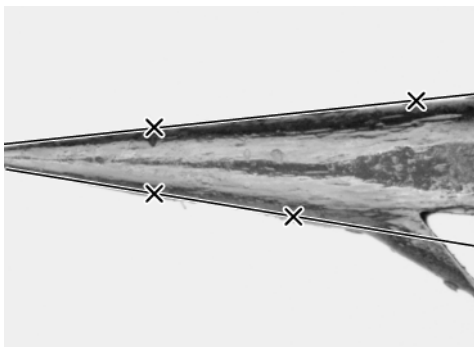


2. Specify the two points (the first and second points) on the first line forming the angle to be measured.

Click on the first point, and then click on the second point to determine the slope of the line.



3. **Specify the two points (the third and fourth points) on the other line forming the angle.**
Click on the third point, and then click on the fourth point to determine the slope of the line.

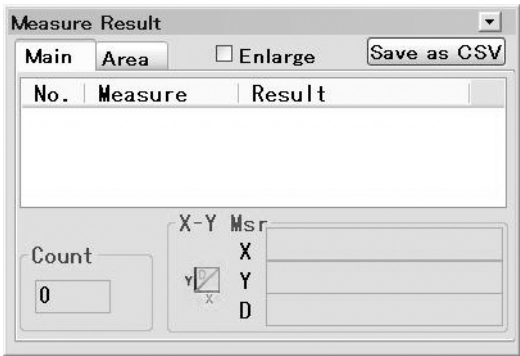


Tips Right-click the mouse to re-calculate the slope of the line.

The degree of the interior angle (smaller angle) with the cross point of the two specified lines as the apex is displayed in the Measure Result display window.

The number shown in the [No.] column in the Measure Result window corresponds to the labels (subscripts) displayed beside the two straight lines forming the angle.

- To continue another measurement of interior angle, repeat steps 2 and 3.



7.3.9 Measuring a perpendicular line

This section describes the procedure for measuring the length of a line perpendicular to the desired reference line.

First, click the [Lens] button and specify the power of the lens to be used for the measurement.

☞ Refer to "7.2 Preparation for measurement" on page 7-4.



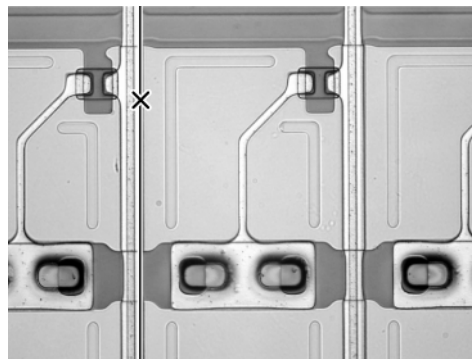
1. **Click the [PerpLn] button.**

The button is set to the on position.



2. Click on the point where you want to place the reference line.

A reference line (dashed line) passing through the point appears on the screen.



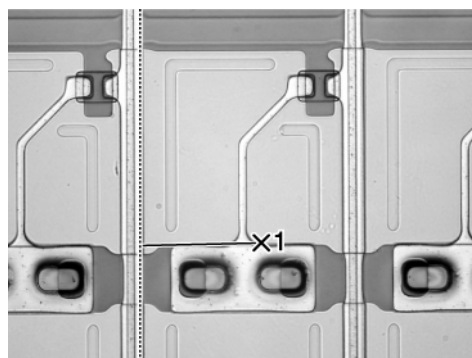
Tips Right-click the mouse to cancel the reference line and specify a new reference line.

3. Determine the slope of the reference line and click the mouse.

The reference line is confirmed.

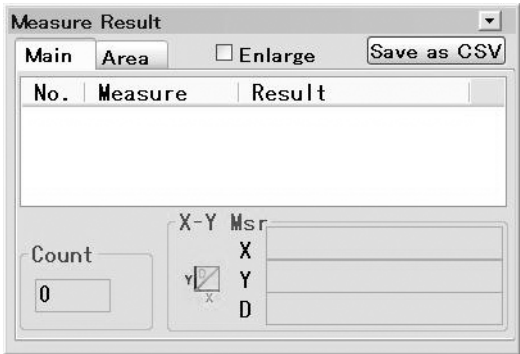
**4. Click on the point from which you want to measure the distance to the reference line.**

The point specified by clicking is marked with an "x" (cross), and the length of the perpendicular line from this point to the reference line is displayed in the Measure Result display window.



The number shown in the [No.] column in the Measure Result window corresponds to the label (subscript) displayed beside the point specified by clicking in step 4.

- To measure the length of another line perpendicular to the same reference line, repeat step 4.
- To complete the measurement of perpendicular line(s) for the reference line, double-click the mouse in step 4.



7.3.10 Measuring the distance between parallel lines

This section describes the procedure for measuring the distance between a desired reference line and a line parallel to the reference line.

First, click the [Lens] button and specify the power of the lens to be used for the measurement.

☞ Refer to "7.2 Preparation for measurement" on page 7-4.



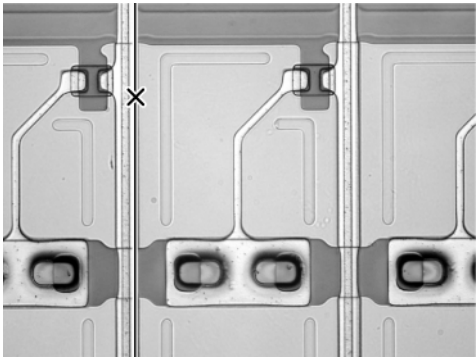
1. Click the [Parallel] button.

The button is set to the on position.

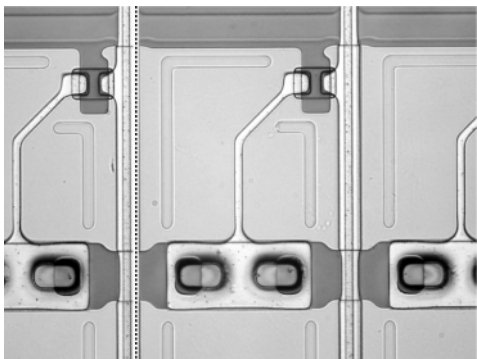


2. Click on the point where you want to place the reference line.

A reference line passing through the point appears on the screen.

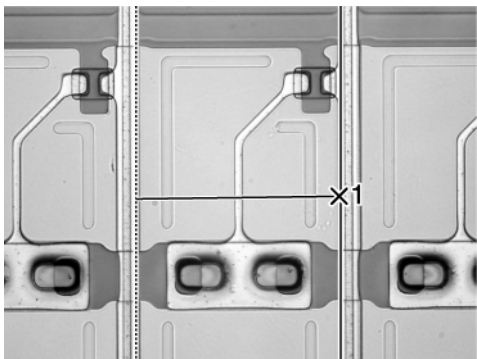


3. **Determine the slope of the reference line and click the mouse.**
The reference line is confirmed.



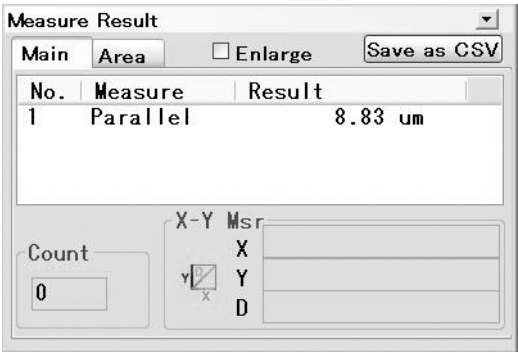
Tips Right-click the mouse to cancel the reference line and specify a new reference line.

4. **Click on the point from which you want to measure the distance to the reference line.**
The distance between the parallel line passing through the point specified by clicking and the reference line is displayed in the Measure Result display window.



The number shown in the [No.] column in the Measure Result window corresponds to the label (subscript) displayed beside the point specified by clicking in step 4.

- To measure the distance between another line parallel to the same reference line, repeat step 4.
- To complete the measurement of distance between parallel lines, double-click the mouse in step 4.

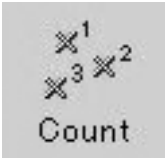


7.3.11 Counting the number of points

This section describes the procedure for counting the number of points on the specified image.

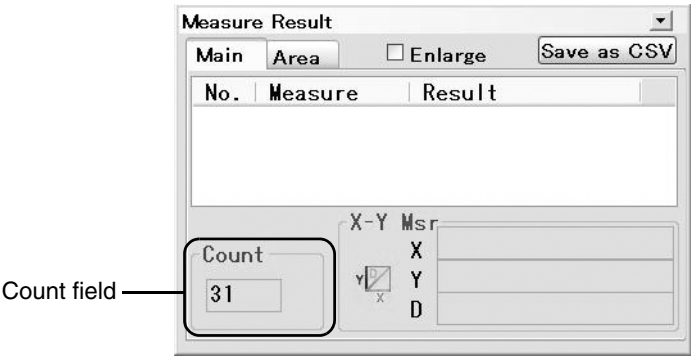
- 1. Click the [Count] button.

The button is set to the on position.



- 2. Click on the target for which you want to count the specified points.

The point specified by clicking is marked with an “x” (cross) and the number of points counted will be shown in the Count field of the Measure Result window.



7.3.12 [X-Y Measure]

This section describes the X-Y Measure that encloses the target with horizontal (X-axis) and vertical (Y-axis) lines, and measures the horizontal and vertical lengths of the target and the diagonal line of the rectangle formed by the two lines.

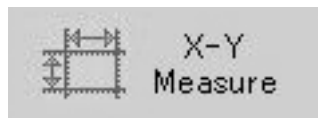
First, click the [Lens] button and specify the power of the lens to be used for the measurement.

➤ Refer to "7.2 Preparation for measurement" on page 7-4.

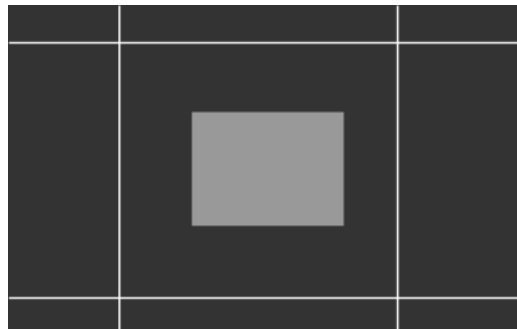


1. Click the [X-Y Measure] button.

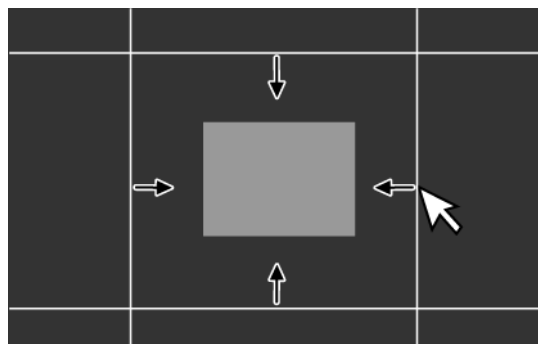
The button is set to the on position.



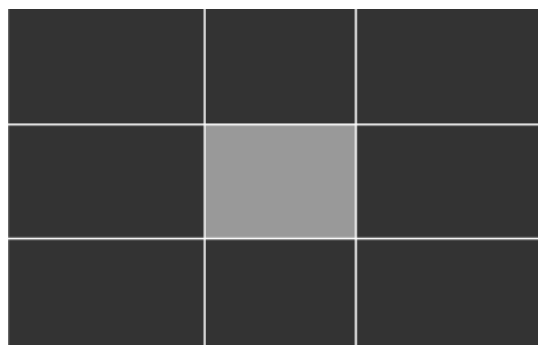
The X-axis (horizontal axis) and Y-axis (vertical axis) are displayed on the screen.



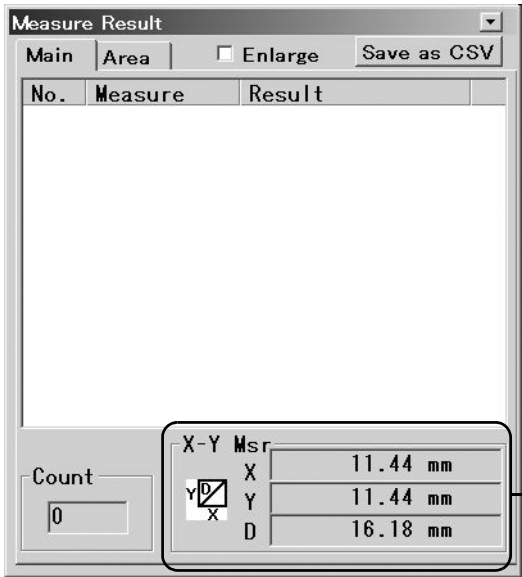
2. Place the mouse pointer on the X-axis and Y-axis, and drag the measurement lines to the desired position.



3. Enclose the target to be measured with the X-axis and Y-axis lines.

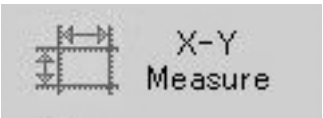


The horizontal (X), vertical (Y) and diagonal (D) distances of the target are displayed in the display area of the X-Y Msr (X-Y Measure) results.



X: The horizontal length of the target
Y: The vertical length of the target
D: The length of the diagonal line of the rectangle enclosing the target

7.3.13 Show/Hide X-Y Measurements



- Setting the [X-Y Measure] button to the on position will display the measurement results of the X-axis, Y-axis, and X-Y measurement.
- Setting the [X-Y Measure] button to the off position will hide the measurement results of the X-axis, Y-axis, and X-Y measurement.

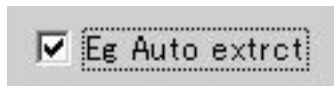
7.4 Other measurement functions (Edge Auto Extract/Label Color/Delete)

This section describes the other functions used for the Main measurement.

7.4.1 Edge Auto extract

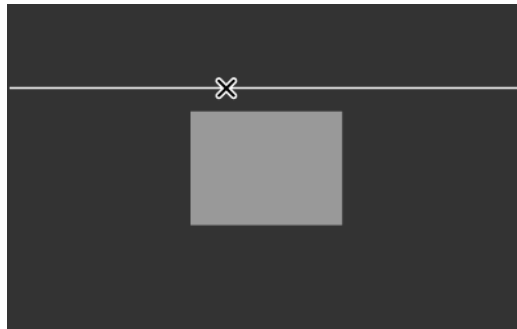
The Edge Auto extract function extracts the edge of the target and automatically draws a straight line when drawing the measurement line. This function helps minimize operator errors when taking readings. The Edge Auto extract function can be used for the "Radius", "Diameter", "2 Cntrs (2 Centers)", "Angle2", reference line for "PerpLn (Perpendicular line)" and reference line of "Parallel (Parallel lines)".

1. Put a checkmark in the [Eg Auto extrect] checkbox to enable the function.



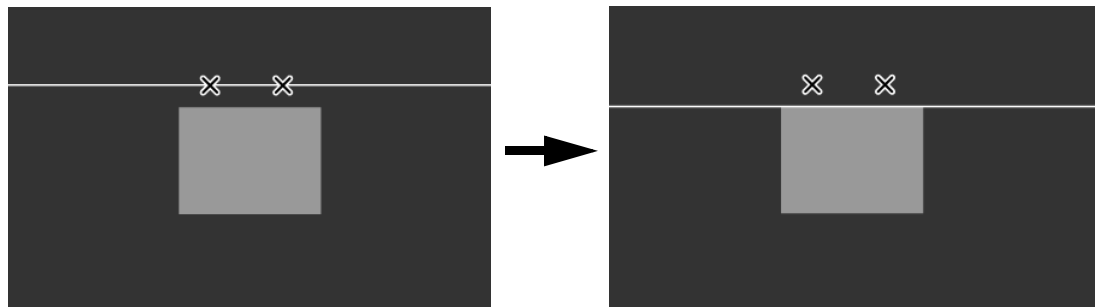
2. Click on a point close to the target for which you want to extract the edge.

The reference line passing through the point specified by clicking is displayed on the screen.




3. Determine the slope of the reference line and click the mouse button.

The edge close to the reference line is extracted automatically and the line is confirmed.



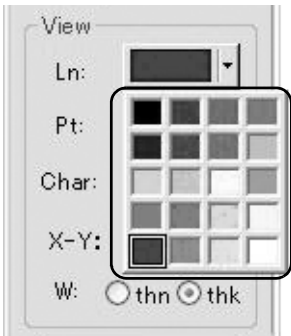
7.4.2 Setting the colors of lines, points and characters

Set the colors of the measurement lines and measurement points.

1. In the View field, click the  button (color selector button) beside the [Ln(line)], [Pt(point)], [Char(characters)], or [X-Y] pulldown box.
The color palette is displayed on the screen.



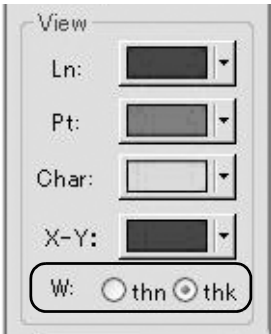
2. Click on the desired color.
The display color for the line, point, or character indicated in the menu window changes.
The modified color(s) will be effective starting from the measurement lines/points specified in the next operation.



Changing the thickness of the measurement lines

The thickness of the measurement line displayed on the screen can be changed. The setting is reflected on all measurement lines displayed on the screen.

1. In the View field, select either the [thn (Thin)] or [thk (Thick)] radio button for the W (width) option.
 - thn (Thin): The measurement line is drawn with a thin line.
 - thk (Thick): The measurement line is drawn with a thick line.

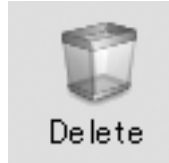


7.4.3 Deleting the measurement results

Delete

The measurement items displayed on the screen can be deleted individually.

1. Click the [Delete] button.



2. Click on the measurement point or measurement line for the measurement item to be deleted.

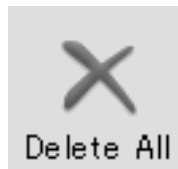
The measurement line (point) and the measurement result are deleted.

Delete All

All measurement items displayed on the screen can be deleted in one operation.

1. Click the [Delete All] button.

All measurement lines (points) and measurement results displayed on the screen are deleted.

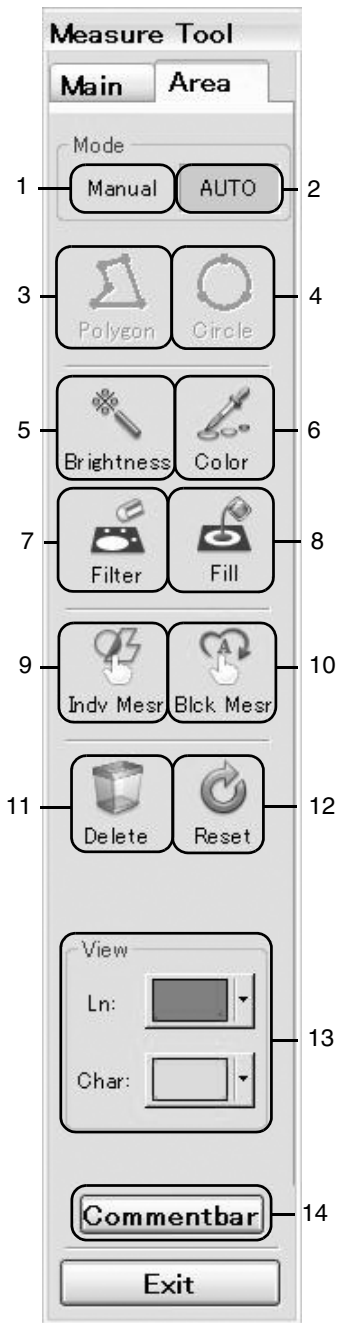


7.5 Area measurement

The area on the target can be specified with a circle or polygon for manually measuring the area (Manual mode), or areas with the same brightness level or color level can be extracted for automatically measuring the area (Auto mode).

7.5.1 Function buttons in the Area measurement tab

The following describes the functions of the buttons used for Area measurement operations.



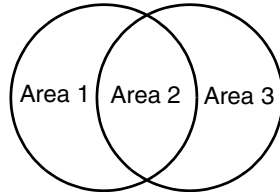
- 1. Manual**
Measures the area of a specified polygon or circle.
- 2. AUTO**
Extracts the areas that have the same brightness level or the same color level as the specified point on the image, and then measure the area.
- 3. Polygon**
Specifies the measuring area with a polygon.
✦ Refer to "7.5.4 Measuring the area of a polygon" on page 7-28.
- 4. Circle**
Specifies the measuring area with a circle.
✦ Refer to "7.5.5 Measuring the area of a circle" on page 7-30.
- 5. Brightness**
Extracts the area that has the same brightness level as the specified point on the image, and measures the area.
✦ Refer to "7.5.7 Brightness (Extraction)" on page 7-33.
- 6. Color**
Extracts the area that has the same color level as the specified point on the image, and measures the area.
✦ Refer to "7.5.8 Color Extraction" on page 7-37.
- 7. Filter**
Eliminates grain (noise) smaller than the specified size from the binary images.
✦ Refer to "Filtering noise" on page 7-40.
- 8. Fill**
Fills the spots smaller than the specified size in the binary images.
✦ Refer to "Filling spots" on page 7-41.
- 9. Indv Mesr (Individual measurement)**
Measures the specified or extracted areas one at a time.
- 10. Blck Mesr (Block measurement)**
Measures the specified or extracted areas in one operation.
- 11. Delete**
Deletes the measurement areas displayed on the screen one at a time.
- 12. Reset**
Resets the areas specified for Area measurement and the Area results.
- 13. View (Ln, Char)**
The color of the measurement lines and labels (subscripts) displayed on the image can be specified here.

14. Comment Bar

Displays the Comment Toolbar.

➤ Refer to "Displaying the Comment Toolbar" on page 5-10.

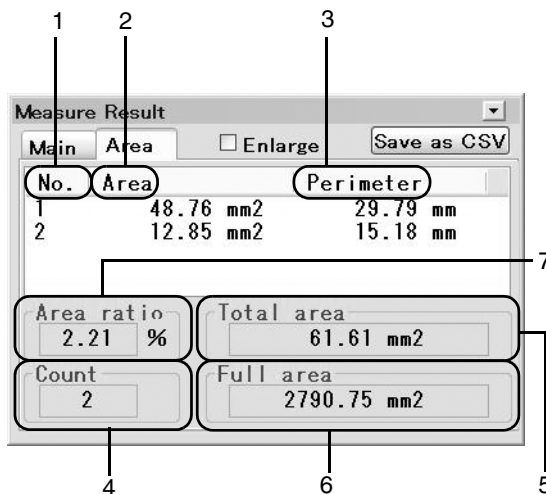
- Up to 999 areas enclosed with circles or polygons can be measured.

Note: Overlapping measurement lines

When the measurement lines overlap one another when specifying the area using circles or polygons, the specified area is divided into parts and measured separately as shown on the left.

7.5.2 Functions of the Measure Result display window (Area measurement)

The following describes the Measure Result display window (Area measurement) used to display the measurement results.



- No.**
Displays the number corresponding to the label (subscript) assigned to the measurement segment.
- Area**
Displays the area measurement result.
- Perimeter**
Displays the length of the perimeter of the measured area.
- Count**
Displays the number of measured areas.
- Total Area**
Displays the measurement result of the total area.
- Full area**
Displays the entire screen area.
- Area ratio**
Displays the ratio of the total screen area to the entire area.

7.5.3 Overview of the Manual measurement function

The Manual measurement function measures the area specified with the Circle or Polygon areas. The user can select the Indv Mesr (Individual Measurement) mode for measuring the areas one at a time, or the Blck Mesr (Block Measurement) mode for measuring all specified areas at once.

- Up to 999 areas enclosed with polygons or circles can be measured.
- A label (suffixed number) is displayed on the observation image and in the Measure Result display window to show the corresponding measurement results of the specified area.
- The confirmed polygons or circles can be erased by right-clicking the mouse on the "x" mark on the polygon or on a point on the circle perimeter.
- When any area is erased, the labels (number) assigned to the areas are updated and the unassigned numbers are excluded.

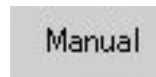
7.5.4 Measuring the area of a polygon

First, click the [Lens] button and specify the power of the lens to be used for the measurement.

☞ Refer to "7.2 Preparation for measurement" on page 7-4.



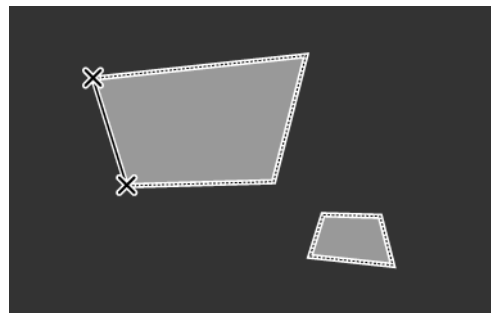
1. Click the [Manual] button in the Specify Area field..



2. Click the [Polygon] button.



3. Click on a point to specify the vertex of the area (polygon) to be measured.

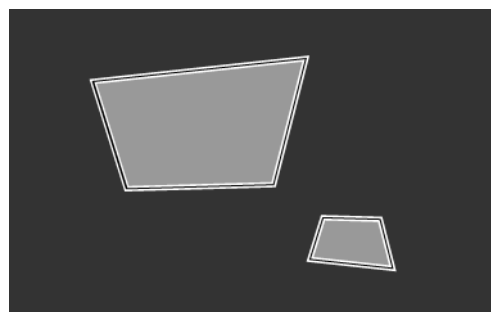


4. Click on the desired points (vertexes) sequentially so that the area to be measured is enclosed with a polygon.

5. Double-click the mouse button on the last vertex of the area to be measured.

A polygon enclosing the area to be measured is drawn on the screen.

To specify two or more areas (polygons), repeat steps 2 through 4.

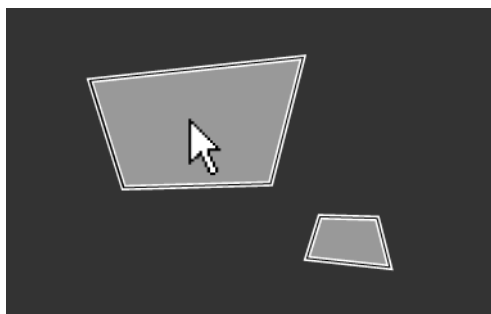

Tips

Right-clicking the mouse button before double-clicking the mouse button will cancel the point specified most recently.

6. Click the [Indv Mesr] button



7. Place the mouse pointer on the area enclosed in the polygon you want to measure, and then click the mouse.



The measurement result of the polygon area is displayed in the Measure Result display window.

Measure Result		
Main		Area
		<input type="checkbox"/> Enlarge Save as CSV
No.	Area	Perimeter
1	48.76 mm2	29.79 mm
2	12.85 mm2	15.18 mm
Area ratio		Total area
2.21 %		61.61 mm2
Count		Full area
2		2790.75 mm2

Tips To measure two or more areas in one operation, click the [Blick Mesr] button.

7.5.5 Measuring the area of a circle

First, click the [Lens] button and specify the power of the lens to be used for the measurement.

⇒ Refer to "7.2 Preparation for measurement" on page 7-4.



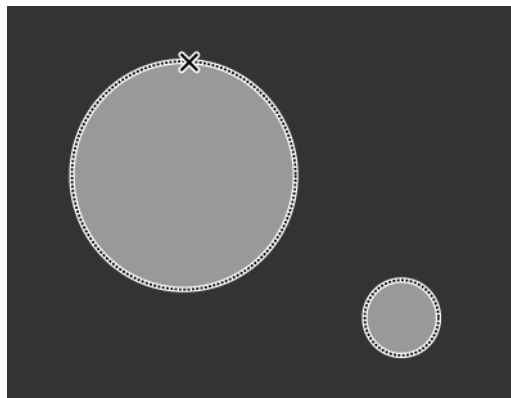
1. Click the [Manual] button in the Specify Area field.



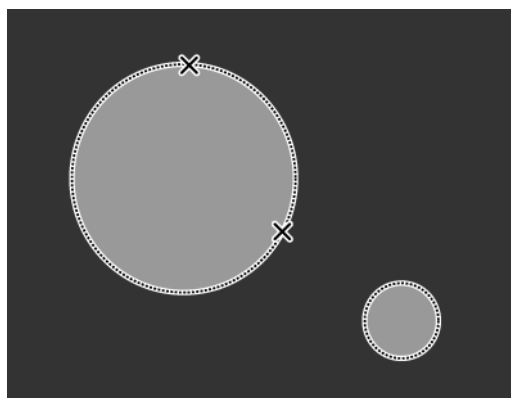
2. Click the [Circle] button.



3. Click on one point on the perimeter of the circle to be measured.
The point specified by clicking is marked with an "x" (cross).



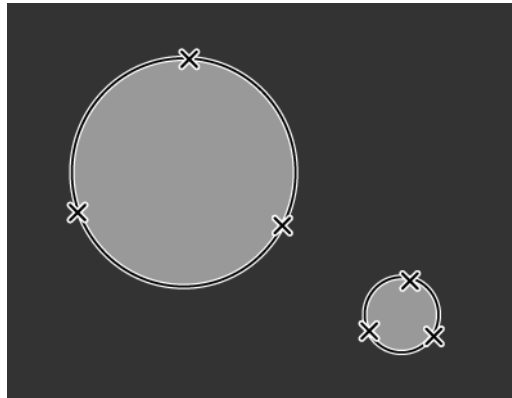
4. Click on the second point on the circle perimeter.
The second "x" (cross) is displayed on the screen.



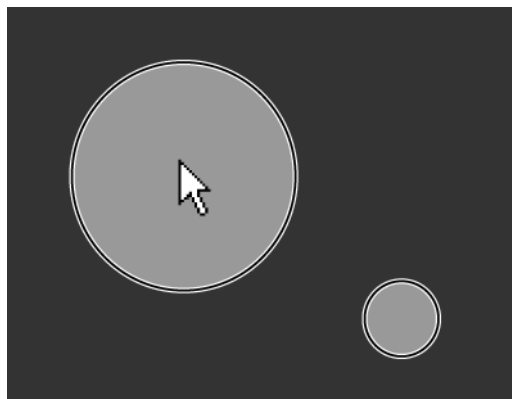
5. Click on the third point on the circle perimeter.

The third point is marked with an “x” (cross), and a circle connecting the three points and the circle center is displayed on the screen.

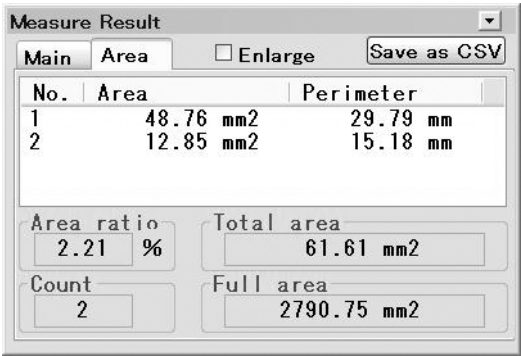
To specify two or more areas (circles), repeat steps 2 through 4.

**Tips**

Right-clicking the mouse button before clicking on the third point on the circle perimeter will cancel the point specified most recently.

6. Click the [Indv Mesr] button.**7. Place the mouse pointer on the area enclosed in the circle you want to measure, and then click the mouse.**

The measurement result of the circle area is displayed in the Measure Result display window.



Tips To measure two or more areas in one operation, click the [Blick Mesr] button.

7.5.6 Preparation for Auto measurement

In the Auto measurement mode, the areas to be measured should be extracted before measuring the areas individually or in one operation.

- 1. Freeze the image on the screen.
- 2. Click the [Lens] button on the status bar to display the pull-down menu, and select the power of the lens to be used for the measurement.



Note: The lens power should be set properly in order to obtain accurate measurement results.

- 3. Click the [Area] tab on the Measure Tool window.
- 4. Click the [AUTO] button.
The Auto measurement mode features the Brightness extract and Color extract modes. The following describes the extraction procedure for each mode.

Tips The Brightness extraction mode (page 7-33) extracts the areas with the same brightness level as the specified point. On the other hand, the Color extraction mode (page 7-37) extracts the areas with the same color level as the specified point.

7.5.7 Brightness (Extraction)

The areas to be measured are extracted according to the brightness of the target.

The areas can be extracted using the histogram extraction and picker extraction modes.

Extraction histogram

Specify the brightness range on the brightness distribution histogram for the area to be extracted.

Glossary:

- **Brightness distribution histogram**

The histogram displays the distribution of the brightness of the image. The horizontal axis indicates the brightness level, with the right end being brightest. The vertical axis indicates the frequency (the distribution number).

1. **Click the [Brightness] button.**

The [Extract brightness area] dialog box appears on the screen.



Brightness distribution histogram:
Displays the distribution of the brightness on the image. The initial value is shown in black. When the [Area Desig] option is selected, the specified area turns into the extraction color and the background turns into green.

Area Design enabled :
The range of the brightness level can be specified by dragging either end of the green area in the Brightness distribution histogram or the slider.
 ⇨ "When the Area Design option is enabled (Window Mode)" on page 34
 The starting value and end value of the specified brightness range are displayed to the right of the histogram in 0 to 255-level figures.

Brightness Tolerance:
Set the range of the brightness between 0 and 128 levels when specifying the brightness level for the Extract picker mode.

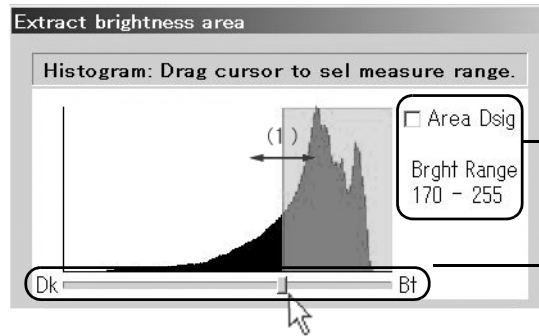
Extrct clr (Extraction Color):
Select the color used to fill the brightness area that has been extracted.

View:
Select Color or Monochrome mode to display the portion of the image outside the extracted brightness area before the binary processing.

Clr Extrct (Clear Extract): Cancels all brightness levels that have been extracted.

Hide Extrct (Temporary erase extract):
Temporarily erases the colored extraction region and displays the raw image. Clicking on it once again restores the colored image.

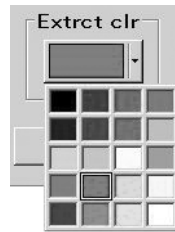
Ext picker (Extract picker):
When the point used as the reference of the brightness level you want to measure is specified, areas with the same brightness level are extracted.
 ⇨ Refer to "Extraction picker" on page 7-35.

**Area Desig disabled:**

The brightness range can be set up using the slider below the Brightness Distribution histogram.

The starting value and end value of the specified brightness range are displayed to the right of the histogram in 0 to 255-level figures.

2. On the [Extract brightness area] dialog box, select the color to be extracted.



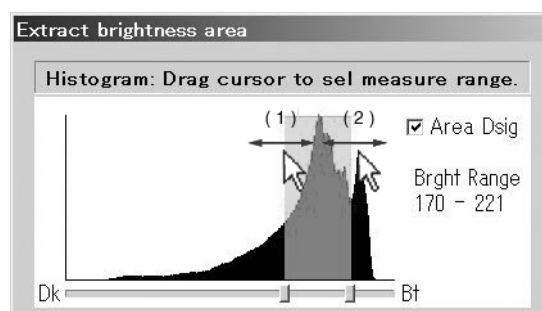
3. Specify the area to be extracted on the Histogram.

In the Histogram mode, the brightness range can be specified on the histogram. The procedure for specifying the range differs depending on whether the Area Desig option is enabled or disabled.

The following describes the procedures for specifying the range when the [Area Desig] checkbox is selected and deselected.

■ **When the Area Desig option is enabled (Window Mode)**

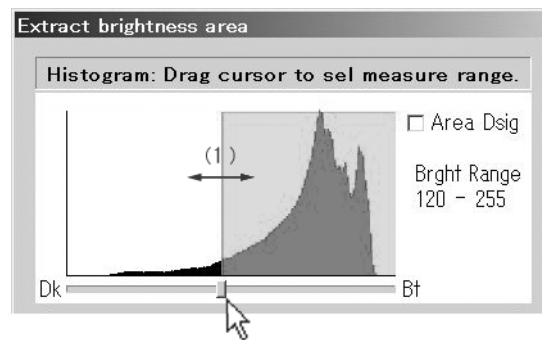
- Determine the “(1) Dark level” and “(2) Bright level” on the Brightness distribution histogram while monitoring the image.
Areas darker than (1) and areas brighter than (2) are excluded, and areas with a brightness between (1) and (2) (green area) are extracted.
- To change the levels of (1) and (2), use the mouse to drag the border on the histogram or the slider below the histogram.



■ **When the Area Desig option is disabled (Level Mode)**

- Move the slider to the right or left to determine the “(1) Dark level” on the Brightness distribution histogram while monitoring the image. Areas darker than (1) are excluded and areas brighter than (1) (green area) are extracted.

- To change the level of (1), use the mouse to drag the border on the histogram or the slider below the histogram.

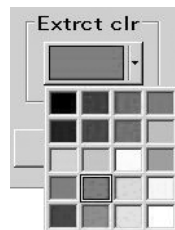


- Tips**
- The Bright Range indicates the difference in the brightness between the specified point and the area you want to extract.
 - When greater values are set for the Bright Range, a wider area will be extracted.
 - The area to be extracted on the image can be changed while monitoring the Bright Range settings.
 - To start the extraction operation from the beginning, click the [Clr Extract] button.

Extraction picker

When the point on the image in the area to be measured is picked, the areas with the same brightness as the picked point and the areas in the brightness range specified in the Brightness Tolerance field will be extracted.

1. Select the color to be extracted in the [Extract brightness area] dialog box.

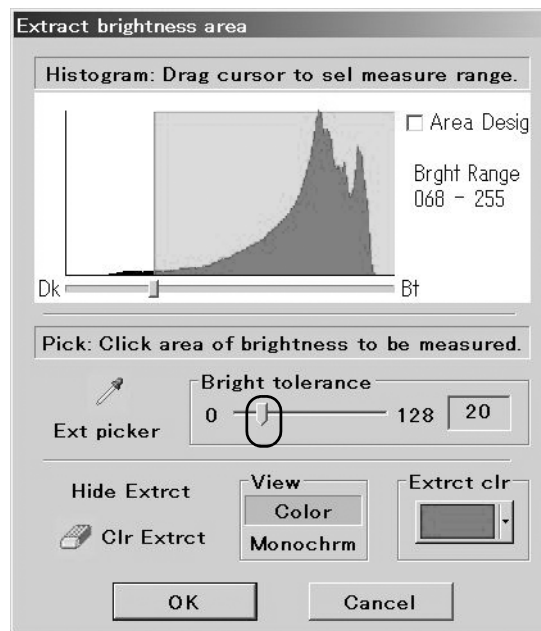


2. Click the [Ext picker] button.



3. Set the brightness tolerance by moving the slider.

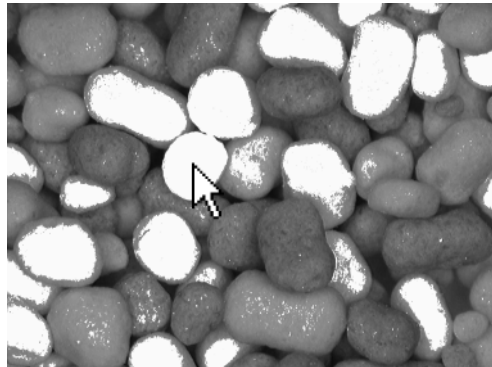
The value of the selected brightness tolerance level is displayed to the right of the slider.

**Tips**

The brightness tolerance can be set in the range of 0 to 128. The greater the set value of the Brightness Tolerance, the wider the area to be extracted will become.

4. Click on the area to be measured.

The areas with the same brightness level are filled with the predetermined extraction color.

**Tips**

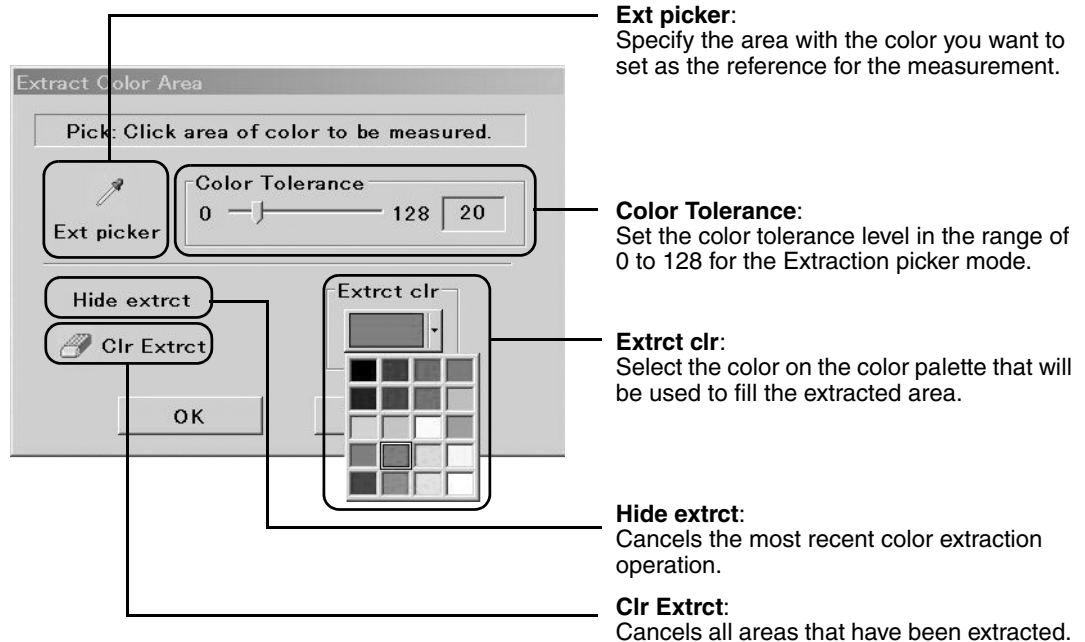
- To change the point to be extracted, click the [Hide Extrct] button and then specify the point again.
- To start the extraction operation from the beginning, click the [Clr Extrct] button.

7.5.8 Color Extraction

When the point on the image in the area to be measured is picked, the areas with the same color as the picked point and the areas in the color range specified in the Brightness Tolerance field will be extracted.

1. Click the [Color] button.

The [Extract Color Area] dialog box appears on the screen.



2. Click the [Ext picker] button.

3. Set the color tolerance by moving the slider.

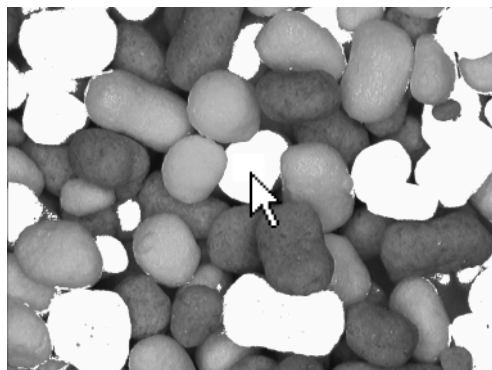
The value of the selected color tolerance level is displayed to the right of the slider.

Tips The color tolerance can be set in the range of 0 to 128. The greater the set value of the Color Tolerance, the wider the area to be extracted will become.

4. Specify the extraction color on the color palette.

5. Click on the point to be extracted on the image.

The areas with the same color as the point picked on the image and the areas within the color range specified in the Color Tolerance field are filled with the predetermined extraction color.



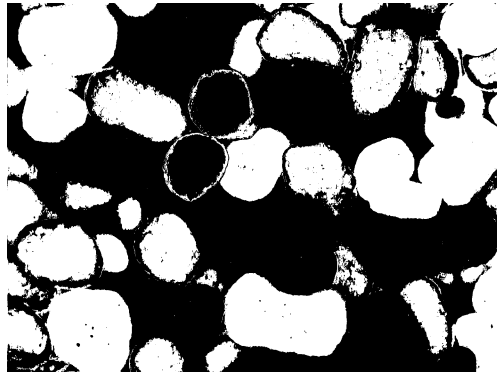
Tips

- To cancel the most recent operation, click the [Hide extract] button.
- To start the color extraction operation from the beginning, click the [Clr Extract] button.

7.5.9 Measuring the extracted areas

1. Once the areas to be measured are extracted using the procedures described in the previous section, click the [OK] button.

The image is converted to binary data. The extracted areas are displayed in white and the background is displayed in black.


Tips

To erase small spots or noise on a binary image, use the [Filter] or the [Fill] function to correct the binary image.

⇒ Refer to "Filtering noise" on page 7-40 for eliminating noise, and "Filling spots" on page 7-41 for filling small spots on the image.

2. Click the [Indv Mesr] button.


Tips

To measure the extracted areas one at a time, select the Indv Mesr mode.

To measure all areas in one operation, select the Bld Mesr mode.

3. Place the mouse pointer on the area you want to measure and click the mouse button.



The area and perimeter are displayed in the Measure Result display window.

The screenshot shows a software window titled "Measure Result". It has a tabbed interface with "Main" and "Area" tabs. The "Area" tab is active, showing a table with two columns: "Area" and "Perimeter". The table contains two rows of data. Below the table, there are four summary fields: "Area ratio" (2.21 %), "Total area" (61.61 mm2), "Count" (2), and "Full area" (2790.75 mm2). There are also checkboxes for "Enlarge" and "Save as CSV".

No.	Area	Perimeter
1	48.76 mm2	29.79 mm
2	12.85 mm2	15.18 mm

Area ratio: 2.21 %
Total area: 61.61 mm2
Count: 2
Full area: 2790.75 mm2

-
- Tips**
- The white areas on the image are measured.
 - To measure two or more areas, repeat the steps described above.
 - The Black Mesr mode measures the perimeters along with the areas. In this case, the labels (subscripts) are assigned automatically.
 - The number of areas measured is displayed in the Count field.
-

Filtering noise

The Filter function removes the small white areas in the binary image.

- When necessary, perform Filter processing before measuring the area.

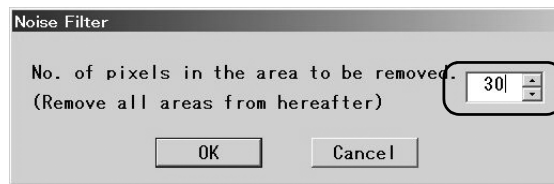
1. Click the [Filter] button on the [Area] menu.

The [Noise Filter] dialog box appears on the screen.



2. In the [No. of pixels in the area to be removed] textbox, enter the number of pixels for the areas you want to remove.

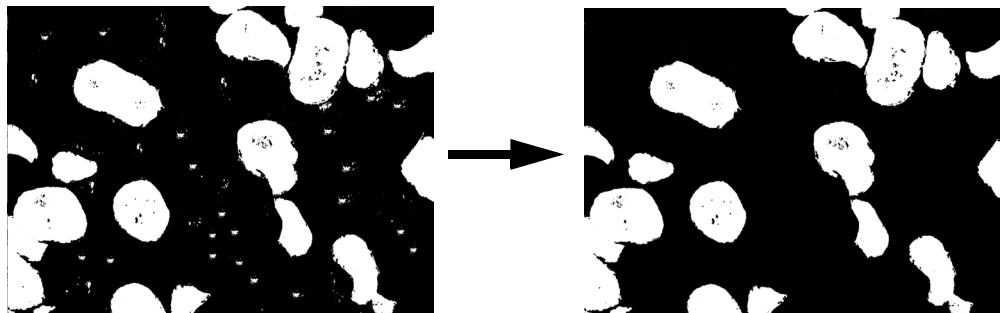
All areas smaller than the specified number of pixels will be removed.



3. Click the [OK] button.

The small white areas in the image are removed.

- Sample image corrected with the Filter function



Filling spots

When there are spots (areas displayed in black) within the white areas in the binary image, the spots can be filled with white using the Fill function.

- When necessary, perform Fill processing before measuring the area.

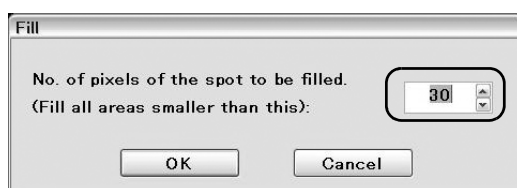
1. Click the [Fill] button on the [Area] menu.

The [Fill] dialog box appears on the screen.



2. In the [No. of pixels of the spot to be filled] textbox, enter the number of pixels for the areas you want to fill.

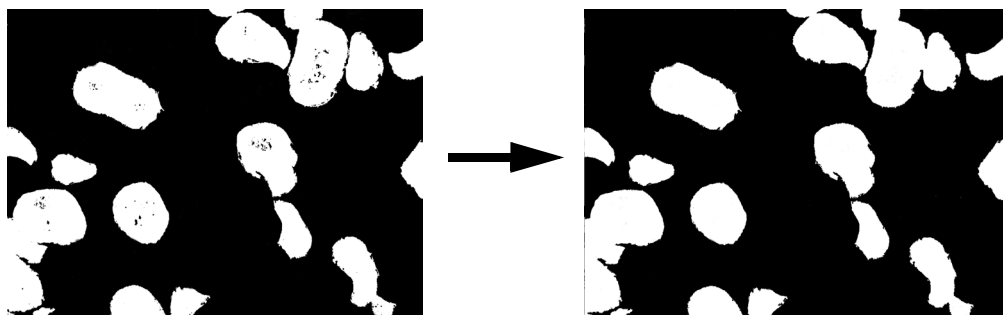
All areas smaller than the specified number of pixels will be filled.



3. Click the [OK] button.

The small black spots within the white areas in the image are filled.

- Sample image corrected with the Fill function



7.6 Measuring images with high definition

The high definition measurement function accurately measures the images captured in high definition. The measurement method allows high accuracy measurement by clicking the proximate area you want to specify to magnify the area, and then specifying the measurement point on the magnified image.

This section describes the procedure using 2-Points measurement as an example.

1. Capture or display a high definition still image.

⇒ Refer to "6.1.2 Recording an image in high definition" on page 6-3 for capturing high definition images.

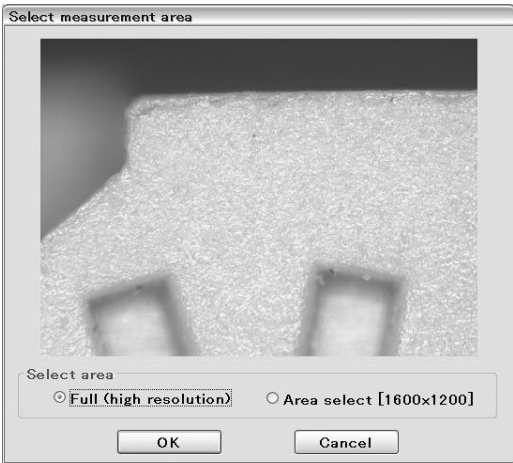


2. Click the [Measure] command on the menu bar.

The [Select Measurement Area] dialog box appears on the screen.

3. Select [Full (high resolution)] and then click [OK].

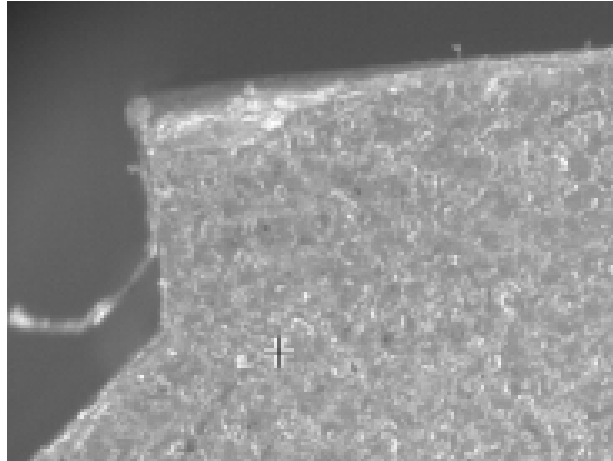
A whole image is displayed on the screen.



4. Click [2 Points] in the [Measure Tool] box.



5. The proximate area clicked is magnified and then a cross is displayed.

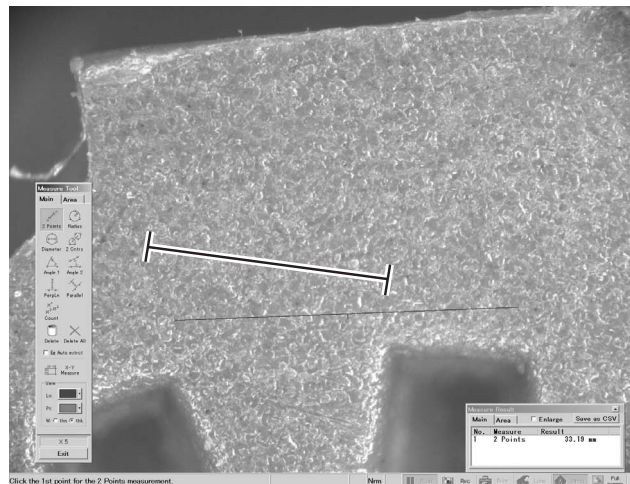


6. **Click the first point on the magnified image to specify.**
The display returns to the entire image.
7. **Click the area proximate to the second point you want to specify.**
The proximate area clicked is magnified and then a cross is displayed.
8. **Click the second point on the magnified image to specify.**
The screen returns to the entire image display and then the measurement result is displayed.

Tips

To exit the measurement of a perpendicular line or parallel lines, double-click on the magnified image.

- Note:**
- Counting or high definition measurement of area cannot be performed.
 - The image is not magnified when using Edge Auto Extract.



7.7 Displaying the scale

This section describes the procedure for displaying a scale on the observation screen.

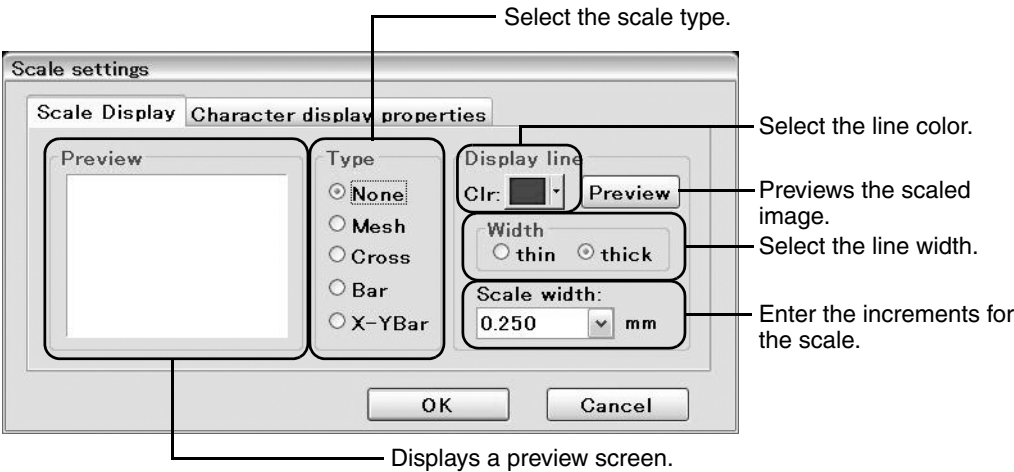
Note: The lens power should be adjusted (calibrated) in advance.

☞ Refer to "7.9 Calibration" on page 7-50.

The scale function is not supported when capturing images in high definition.

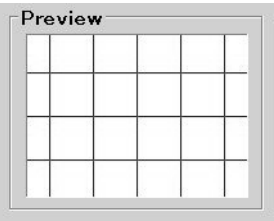
- 1. Select [Scale Setting] from [Measure] of the menu bar.
The [Scale Setting] dialog box appears on the screen.

- 2. Click on the [Scale Display] tab.

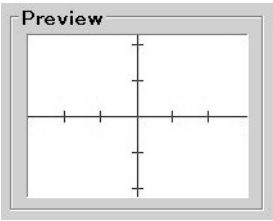


- 3. Select the scale type to be displayed on the screen.

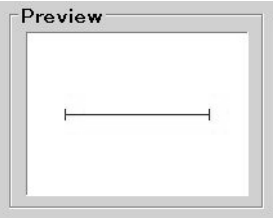
Mesh



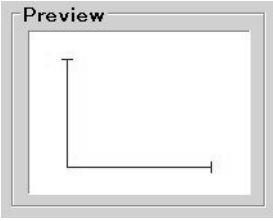
Cross



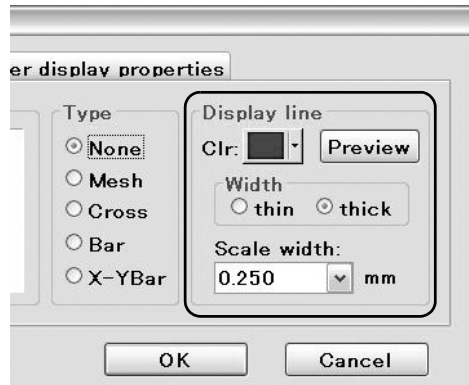
Bar



X-Y Bar



4. Specify the [Scale Width:], [Color], and [Width] settings.



5. Click the [OK] button.

The configured scale is displayed on the screen.

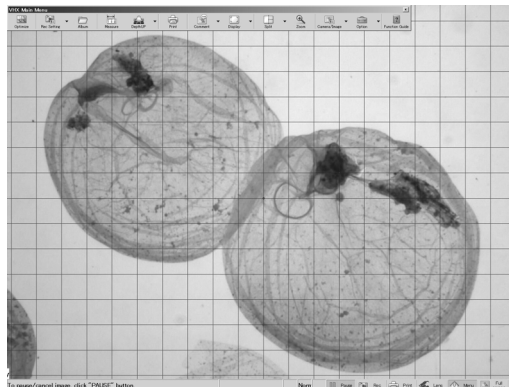
Tips

- The scale type can be changed.
- The scale can be moved to the desired position.
- ⇒ Refer to "Moving a scale" on page 7-46.

6. To hide the scale, select the [None] option in the Type field and then click the [OK] button.

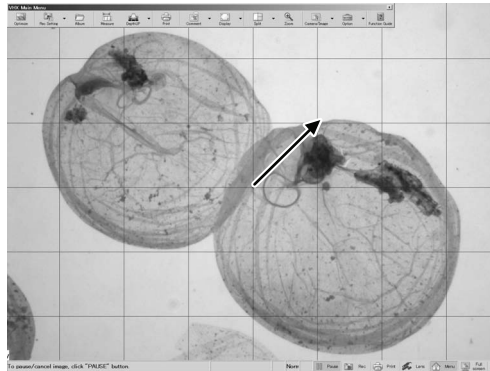
Changing the scale type

To change the scale setting, double-click on a part that displays the scale width value. When the [Scale Setting] dialog box appears on the screen, change the scale type, scale width, color, or line width.

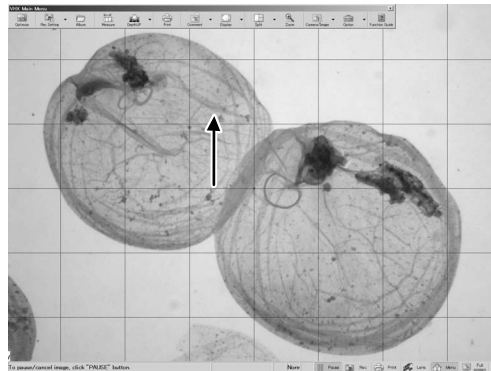


Moving a scale

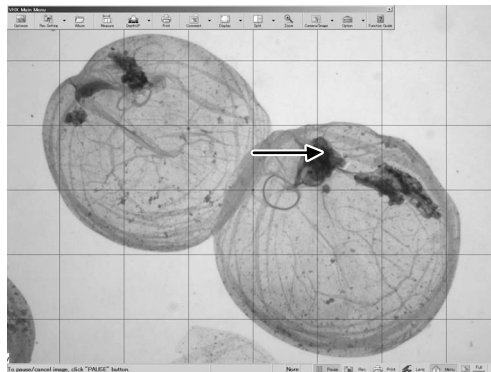
Place the mouse pointer on an intersecting point and drag the point to move the scale in the desired direction.



Place the mouse pointer on a vertical line and drag the line to move the scale up or down.



Place the mouse pointer on a horizontal line and drag the line to move the scale to the right or left.



7.8 Measuring with high precision in a wide range (2-Points measurement)

This section describes performing high precision measurement on two points that can both be displayed on the screen only when using low magnification.

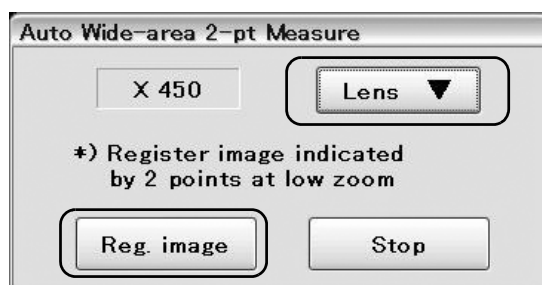
1. Select **[Auto Wide-area 2-pt Measure]** from **[Measure]** of the menu bar.

The **[Auto Wide-area 2-pt Measure]** dialog box appears.



2. Click the **[Lens]** button and select a low magnification so that the two points you want to measure both appear on the screen.

Tips Set target so that there is as little halation on the screen as possible.



3. Click the **[Reg. image]** button to register the image.

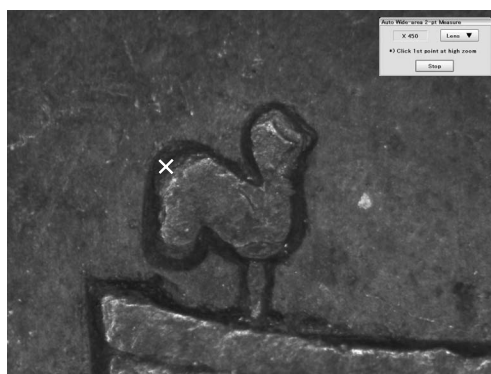
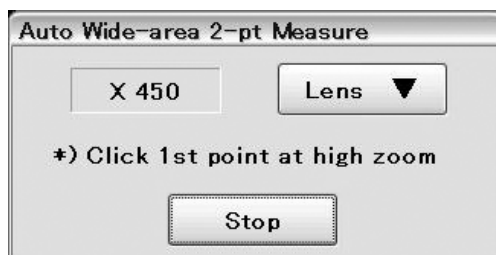
The **[Auto Wide-area 2-pt Measure]** dialog box changes.



4. Increase the magnification and select the first of the two points.

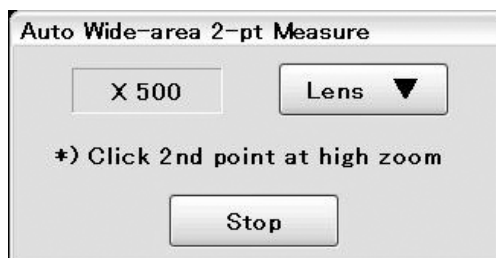
The [Auto Wide-area 2-pt Measure] dialog box changes.

Tips Only move the target in the X or Y directions. Do not rotate it.

**5. Set the second point.**

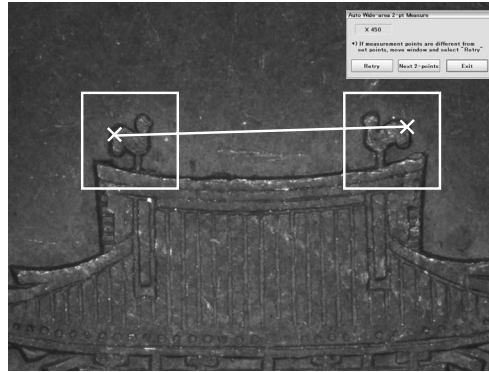
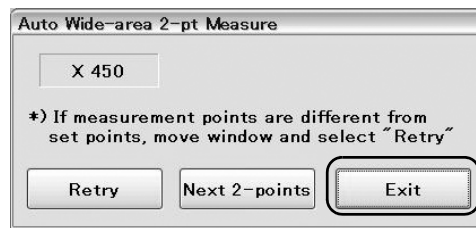
The [Auto Wide-area 2-pt Measure] dialog box changes.

- If the points you want to measure are different from the set points, drag the blue or green frame and click the [Retry] button to perform the measurement again.



6. Click the [Exit] button to finish the measurement.

This function provides high precision measurements even with a wide range.



7.9 Calibration

This section describes the procedures for selecting the lens power, reference length, and measurement units. The calibration can be performed using either the Auto or Manual mode.

7.9.1 Auto Calibration

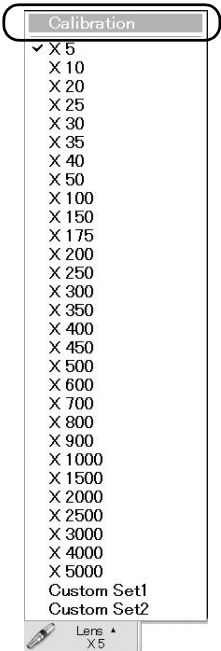
This section describes the procedure for automatically executing the calibration.

Note: The optional reference scale OP-51483 or OP-51491 is required for executing the Auto Calibration.

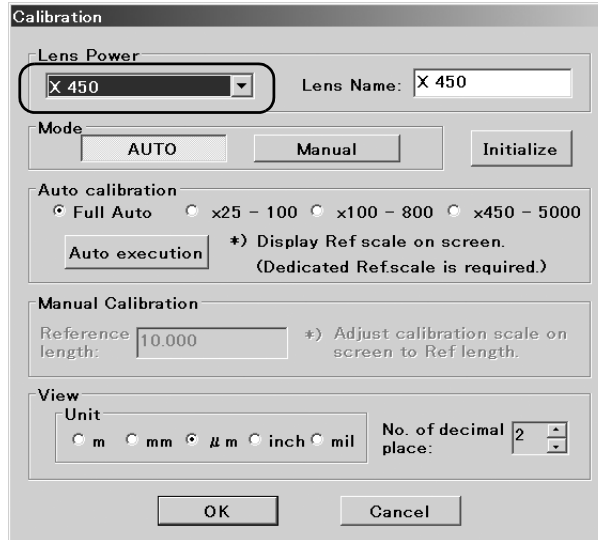
- 1. Click the [Lens] button on the status bar.
The Lens menu appears on the screen.



- 2. Select the Calibration option.
The [Calibration] dialog box appears on the screen.

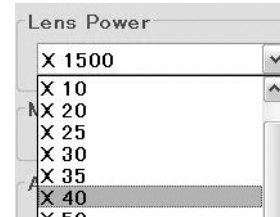


3. Click  and select the magnification of the lens currently being used.



The Calibration dialog box contains the following fields and buttons:

- Lens Power:** A dropdown menu currently showing 'X 450'.
- Lens Name:** A text field containing 'X 450'.
- Mode:** Three buttons: 'AUTO' (highlighted), 'Manual', and 'Initialize'.
- Auto calibration:** Four radio buttons: 'Full Auto' (selected), 'x25 - 100', 'x100 - 800', and 'x450 - 5000'. Below them is an 'Auto execution' button and a note: '*) Display Ref scale on screen. (Dedicated Ref scale is required.)'.
- Manual Calibration:** A 'Reference length:' text field containing '10.000' and a note: '*) Adjust calibration scale on screen to Ref length.'.
- View:** A 'Unit' section with radio buttons for 'm', 'mm', 'μm' (selected), 'inch', and 'mil'. Next to it is a 'No. of decimal place:' spinner set to '2'.
- Buttons:** 'OK' and 'Cancel' at the bottom.



The Lens Power dropdown menu is open, showing a list of magnification options: X 1500, X 10, X 20, X 25, X 30, X 35, X 40, and X 450. The 'X 450' option is currently selected.

4. Click the [AUTO] button in the Mode field.



The Mode section of the dialog box, showing the 'AUTO' button highlighted.

5. Set up the reference scale according to the illumination method.

The reference scale includes side A and side B. Select the appropriate side according to the illumination method.



Tips

For how and when to use side A and B appropriately, see the description on the reverse side of the base plate.

- Under normal illumination
Overlap the scale on the base plate with side A facing up.
There are two notches on the base plate. There are two holes on side B of the reference scale. Align the notches to the holes, and put the scale on the base plate with side A facing up.
- Under coaxial illumination or transmitting illumination
Place the scale with side B facing up. The base plate is not necessary.

6. **Project the scale marks of the reference scale on the screen.**

There are three types of scale marks. Select the appropriate scale mark according to the lens power. Adjust the focus and brightness so that the contrast between black and white is shown clearly.

Tips

The magnification of the lenses is marked beside the scale marks.

The scale is marked with a certain number of underline(s) according to the magnification of the lens.

- 25x to 100x (No. of underlines: 3)
- 100x to 800x (No. of underlines: 2)
- 450x to 3000x (No. of underlines: 1)
- For 3000x or more, select 450 to 3000x.
- For 20x, select 25 to 100x.

7. **Select the [Full Auto] radio button and then click the [Auto execution] button. When automatic calibration is not executed successfully with the [Full Auto] mode, select one of the radio buttons for [25 – 100x], [100 – 800x], and [450 – 3000x], and then click the [Auto execution] button.**
The calibration is executed automatically.

Auto calibration

☒ Full Auto ☐ x25 – 100 ☐ x100 – 800 ☐ x450 – 5000

Auto execution

*) Display Ref scale on screen.
(Dedicated Ref.scale is required.)

Manual Calibration

Reference length: 10.000

*) Adjust calibration scale on screen to Ref length.

View

Unit

☐ m ☐ mm ☒ μ m ☐ inch ☐ mil

No. of decimal place: 2

OK

Cancel

8. **Click the [OK] button.**
The calibration is confirmed and the calibration setup operation is completed.

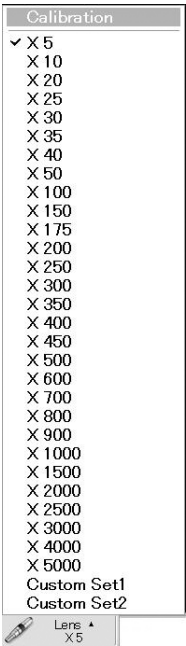
7.9.2 Manual calibration

This section describes the procedure for manually executing the calibration.

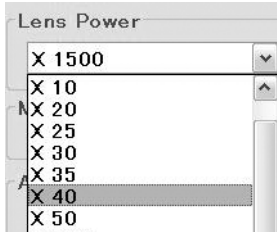
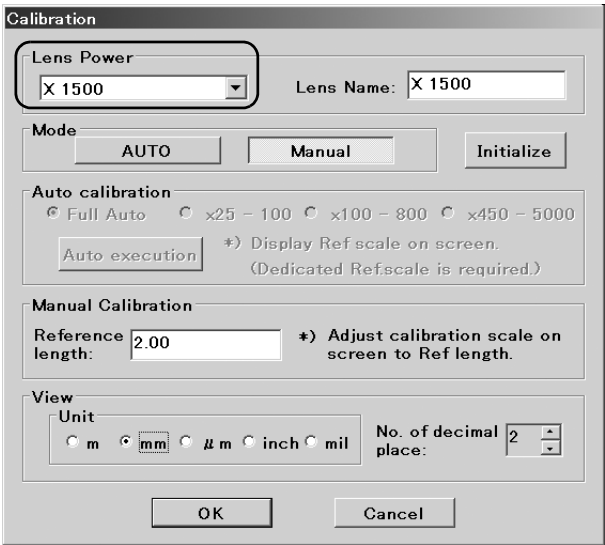
1. **Click the [Lens] button on the status bar.**
The Lens menu appears on the screen.



2. **Select the Calibration option.**
The Calibration dialog box appears on the screen.



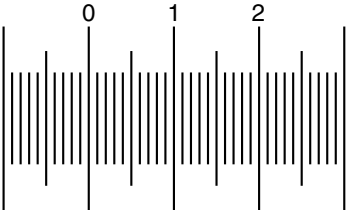
3. Click  and select the magnification of the lens currently being used.



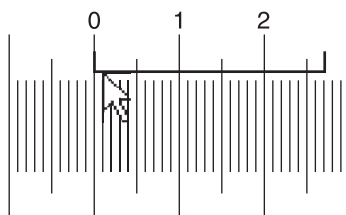
4. Click the [Manual] button in the Mode field.



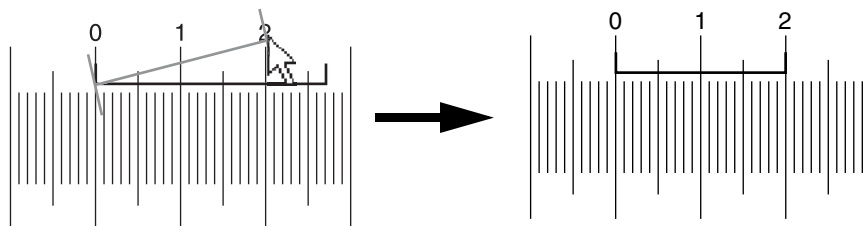
5. **Capture an image of the target (a scale, etc.) that can be used as a reference for the length.**



6. Drag and move the calibration scale on the screen to the scale marks of the target.
7. Align the left end of the scale to the target (starting point of the reference length).



8. Drag and align the right end of the scale to the end point of the reference length.



9. Enter the length used as the reference (the length specified in step 8) in the Reference length: textbox in the Manual Calibration field.

Manual Calibration

Reference length:

10. Enter the desired number of decimal places for the measurement value to be displayed in the No. of decimal place: textbox. (Valid range: 0 to 10)

No. of decimal place:

11. Select the desired unit for the reference length in the [Unit] area in the View field.

Unit

☐ m ☒ mm ☐ μ m ☐ inch ☐ mil

Note: When the Unit option is changed, the displayed number of digits in numeric values will change as well. Change the [No. of decimal place] setting as necessary.

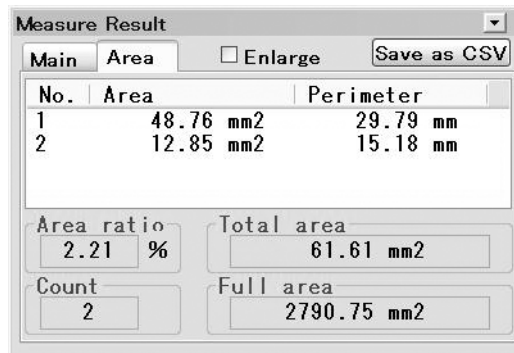
12. Click the [OK] button to exit the calibration setting.

7.10 Saving the measurement results (CSV log saving)

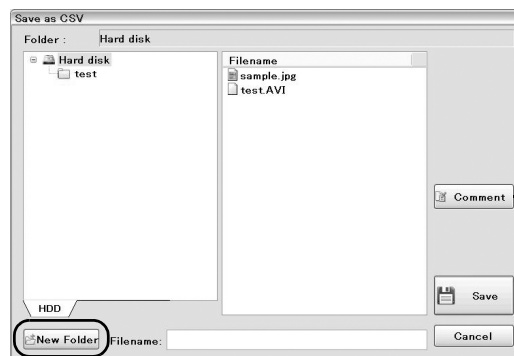
The measurement results can be saved in CSV file format.

Tips CSV files can be used in spreadsheet applications such as Excel.

1. Click the [Save as CSV] button on the Measure Result display window.
The Save as CSV dialog box appears on the screen.



2. Enter the filename and click the [Save] button.



Comments can be entered as necessary.

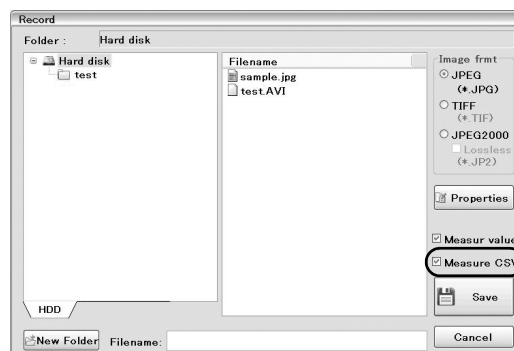
A new folder can be created as necessary.

Embedding CSV data to an image file

1. After the measurement, click the [Rec] button on the status bar.



2. Put a checkmark in the [measure CSV] checkbox and save the image.
Save the image file in which the CSV file is embedded.



7.11 Displaying CSV files

Up to four CSV files can be selected and displayed simultaneously.

Displaying CSV files

1. On the album screen, double-click on a CSV file to be displayed.
2. A CSV file is displayed.

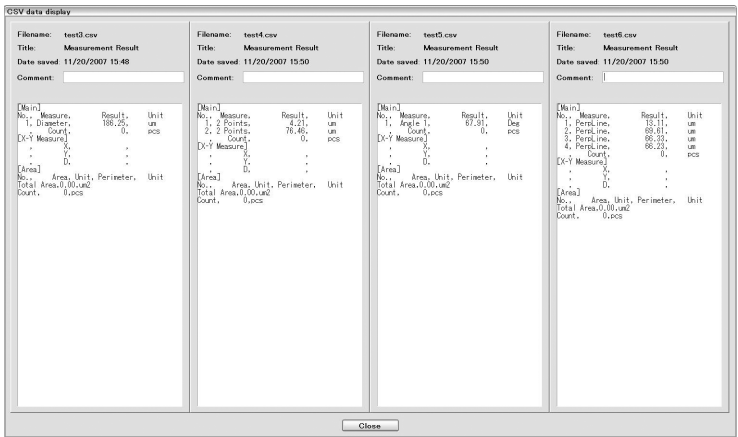
Tips Comments can be entered as necessary.



Displaying CSV files simultaneously

1. On the album screen, select two or more CSV files to be displayed.
2. Right-click the mouse and then select the [Display] command from the menu.
3. CSV files are displayed.

Tips Up to four files can be displayed simultaneously.



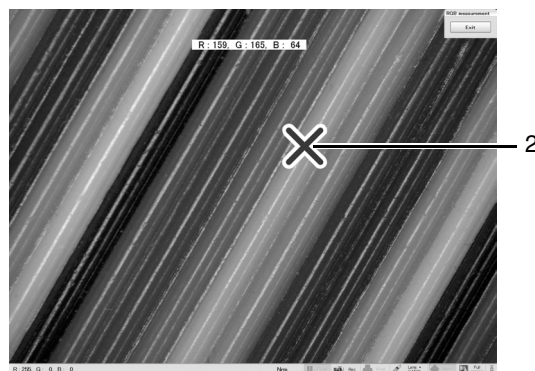
7.12 Measuring brightness of RGB colors

Measures brightness of R, G, and B colors at a point of the screen.

1. Select [RGB measurement] from the [Measure] command on the menu bar.

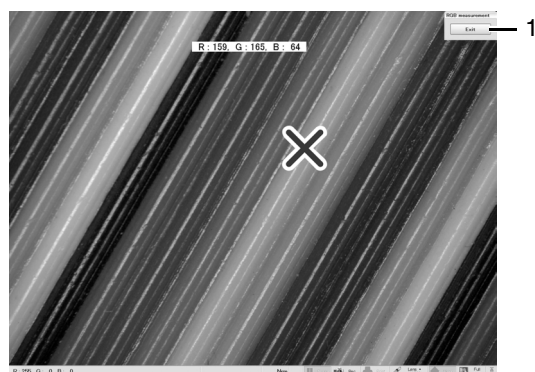


2. Click on the point where you wish to measure the color brightness.
Color brightness for the R, G, and B colors appear.



Ending the RGB color measurements

1. Click the close button of the [RGB measurement] dialog box.



Chapter 8

Depth Composition and 3D Display

This chapter describes the procedures for displaying 3D images, measuring 3D images, and composing 3D images with depth composition.

8.1	Real-time Depth composition	8-2
8.2	Quick depth composition and 3D.....	8-5
8.3	Fine (high-quality) depth composition and 3D	8-7
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8.6	3D profile measurement (Optional)	8-22
8.7	3D measurement (Optional)	8-30
8.8	3D comparison mode	8-33

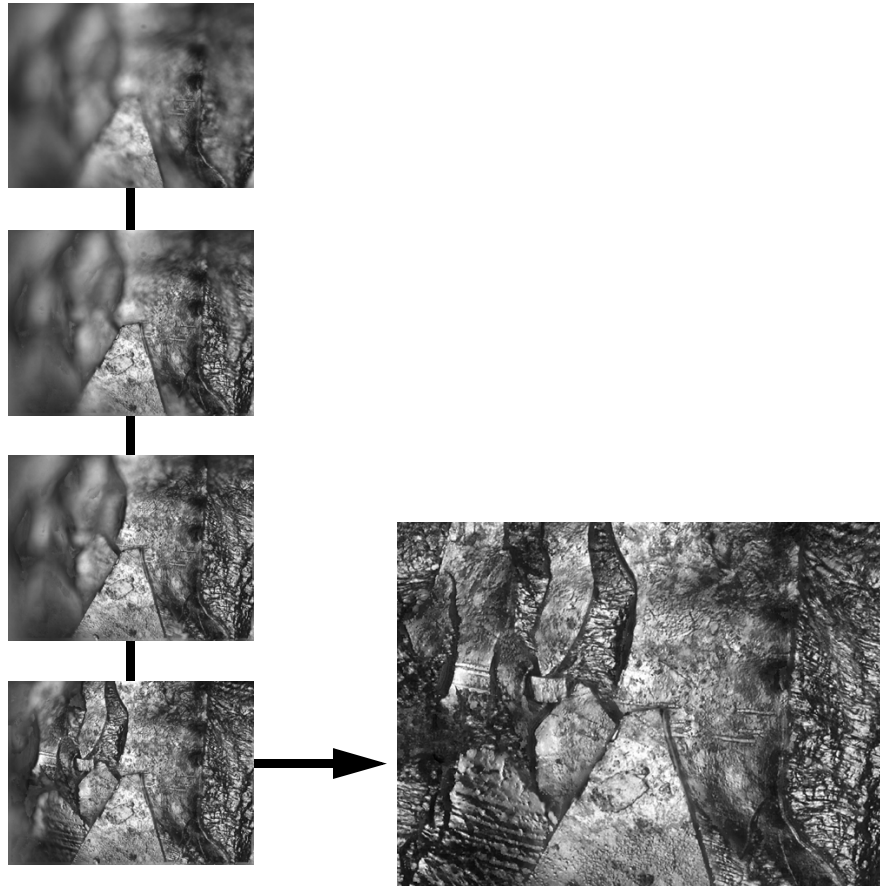
8.1 Real-time Depth composition

When overall focus cannot be obtained due to the large projections and depression of the target, using this function will compose an image with overall focus.

8.1.1 Real-time Depth composition

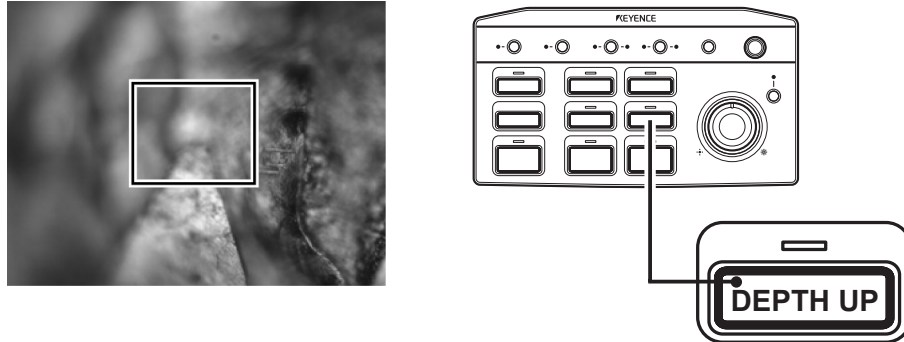
The Real-time Depth composition function quickly achieves focus on the area of the target with large projections and depressions.

A composite image can be automatically generated only from in-focus areas by simply focusing on the highest point to the lowest point in the desired area sequentially.



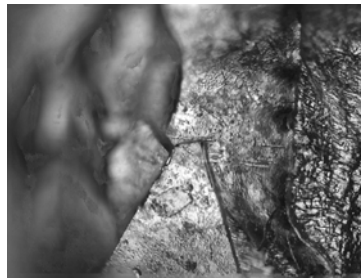
Operation procedure

1. Focus on the highest point of the target.
2. Press the DEPTH UP button on the console.
The [Real-time Depth composition] dialog box appears on the screen.
A square frame appears on the screen, indicating the focus area.


Tips

The same operation can be performed by selecting [Real-time Depth composition] from the [DepthUP] command on the menu bar.

3. Focus on a point a little lower than the highest point.
The in-focus areas are composed.



4. Repeat step 3 until the focus is obtained at the lowest point of the target.
The image is automatically composed every time the focus is obtained, displaying a composite image with overall focus.
 - To pause the image, press the PAUSE button on the console. To cancel the pause, press the PAUSE button again.
 - To save the composed image to the hard disk, press the REC button on the console.

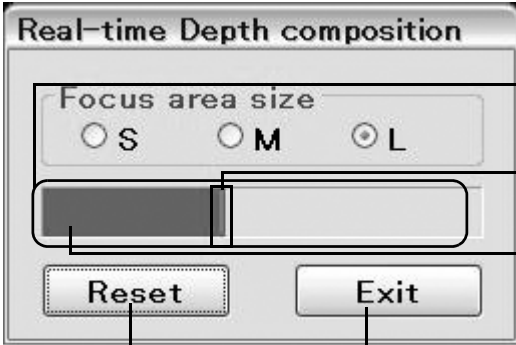


5. To exit the Real-time Depth composition mode, click the [Exit] button on the [Real-time Depth compositionn] dialog box.

8.1.2 How to use the focus indicator

The Real-time Depth composition function confirms the composite image every time the focus is obtained. Referring to the focus indicator allows the user to check the focus position.

- 1. **Select [Real-time Depth composition] from the [DepthUP] command on the menu bar.**
The [Real-time Depth composition] dialog box appears on the screen.



Focus indicator: The meter used to find the optimal focus position.

Red peak line: The peak value of the focus.

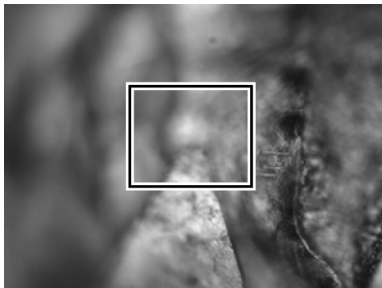
Level meter: The meter that displays the degree of focus.

Exit: Finishes the Quick depth composition.

Reset: Restarts the Quick depth composition from the beginning.

- 2. **Click the desired size (Small/Medium/Large) from the [Focus area size] field.**
A square frame appears on the screen, indicating the focus area.
- 3. **Drag the focus area and move the focus area frame to the location for which you want to check the focus status.**

8



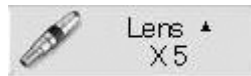
- 4. **The location at which the level meter increases greatly is the focus position.**
The red peak-line indicates the maximum position to which the level meter increases.



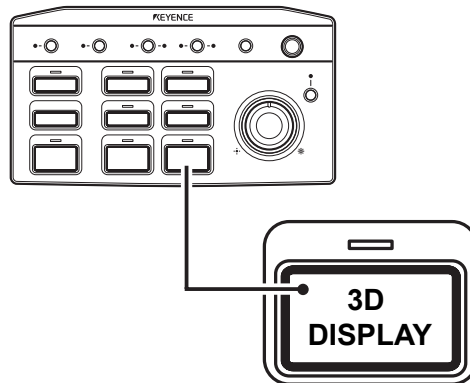
8.2 Quick depth composition and 3D

This section describes how to perform instantaneous depth composition by moving the focus from top to bottom and how to display the 3D image.

1. First, use the [Lens] button in the status bar to select the magnification for the lens.



2. Set the focus for the highest point on the target.
3. Press the 3D display button on the console.



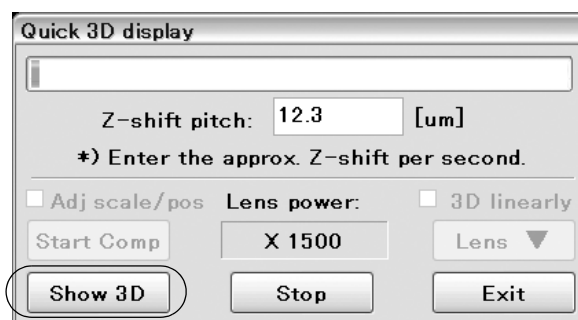
Tips This operation can also be executed by selecting [Quick 3D display] from the [Depth UP] command on the menu bar.

The [Quick 3D Display] dialog box appears.

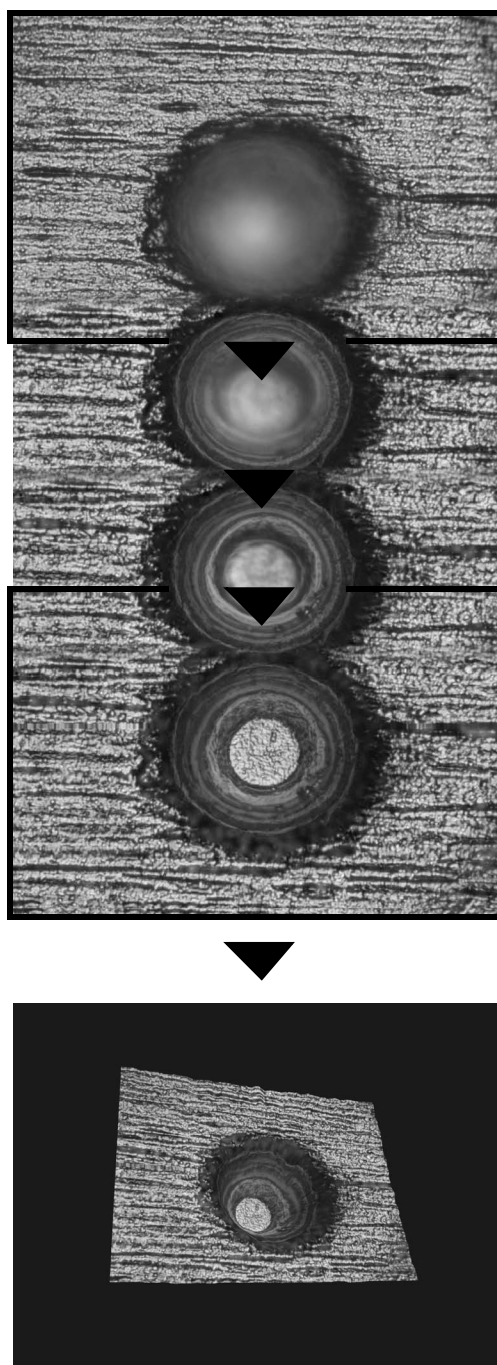
4. Move the lens down.

Tips When performing the operation by selecting [Quick 3D display] from the [Show 3D] command on the menu bar, click on the [Start Comp] button before moving the lens.

5. When the composition is finished, click on the [Show 3D] button.



The 3D image is displayed.

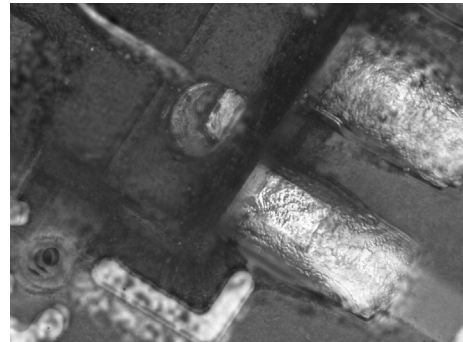
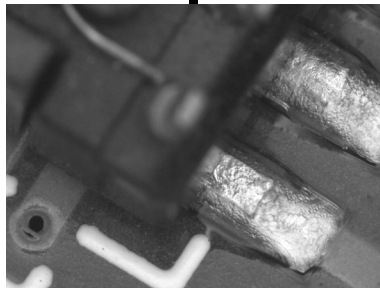
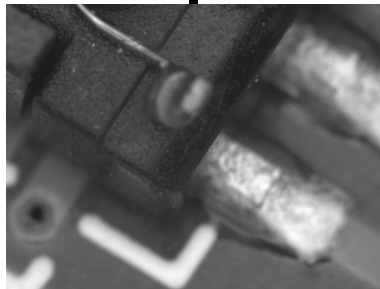
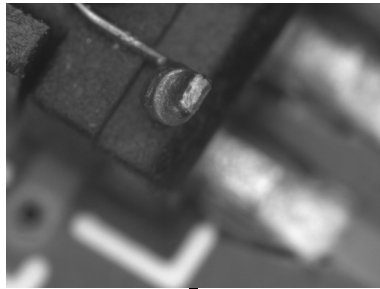


8

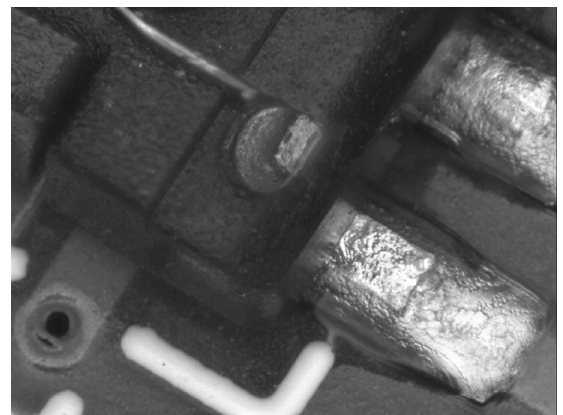
Tips Refer to "Display operations for 3D images" to manipulate 3D images.
☞ Refer to page 8-16.

8.3 Fine (high-quality) depth composition and 3D

The Fine depth composition function captures two or more images that focus on areas with different heights and composes them into one image, or composes them into a 3D image.



Depth composition without position correction



Depth composition with position correction

Operation procedure

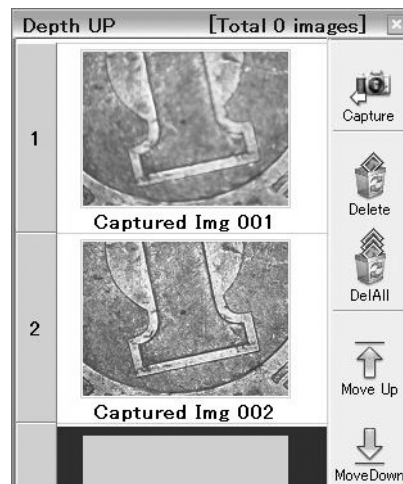
- 1. Select [Fine Depth composition] from the [DepthUP] command on the menu bar.
The [Depth UP] dialog box appears on the screen.



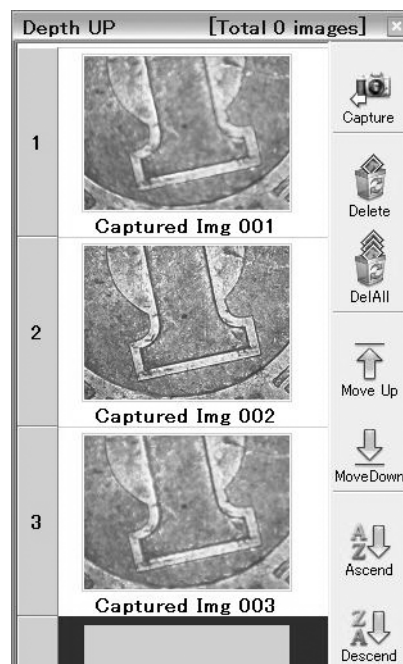
- 2. Focus on the highest point of the target and click the [Capture] button.
The image is added to the list.



3. **Focus on a point a little lower than the highest point and click the [Capture] button.**
The image is added to the list.

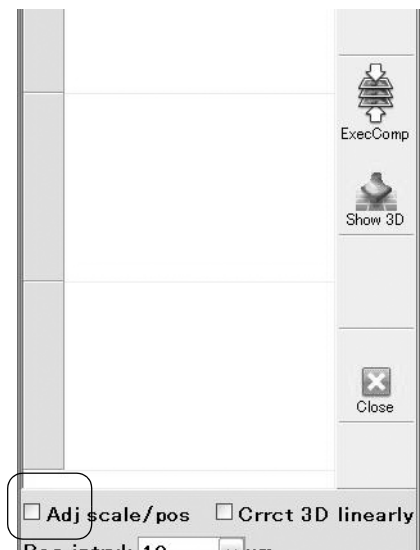


4. **Repeat step 3 until the focus is obtained at the lowest point of the target.**
The image is added to the list every time the capture operation is repeated.
 - From 2 to 50 images can be captured.

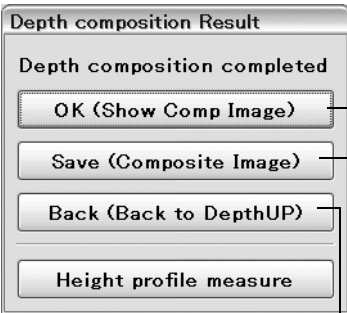
**Tips**

When more images are captured, more time will be required for depth composition and 3D display.

5. Check the status of the [Adj scale/pos] check box.
- When the position is corrected, more time is required for composition, but a higher quality composite image can be obtained.
 - When the position is not corrected, composition can be performed faster, but the composite image may become grainy.



6. Click the [ExecComp] button.
The composite image is displayed on the screen.
The [Depth composition Result] dialog box appears on the screen.
7. Check the result of depth composition.
The VHX-600E exits the depth composition processing and displays the result of composition.



OK: Displays the image generated with the depth composition processing.

Tips The image is a still image. To return to the live image mode, press the PAUSE button on the console, or click the [Pause] button on the status bar.

Save: Save the image generated with the depth composition processing.

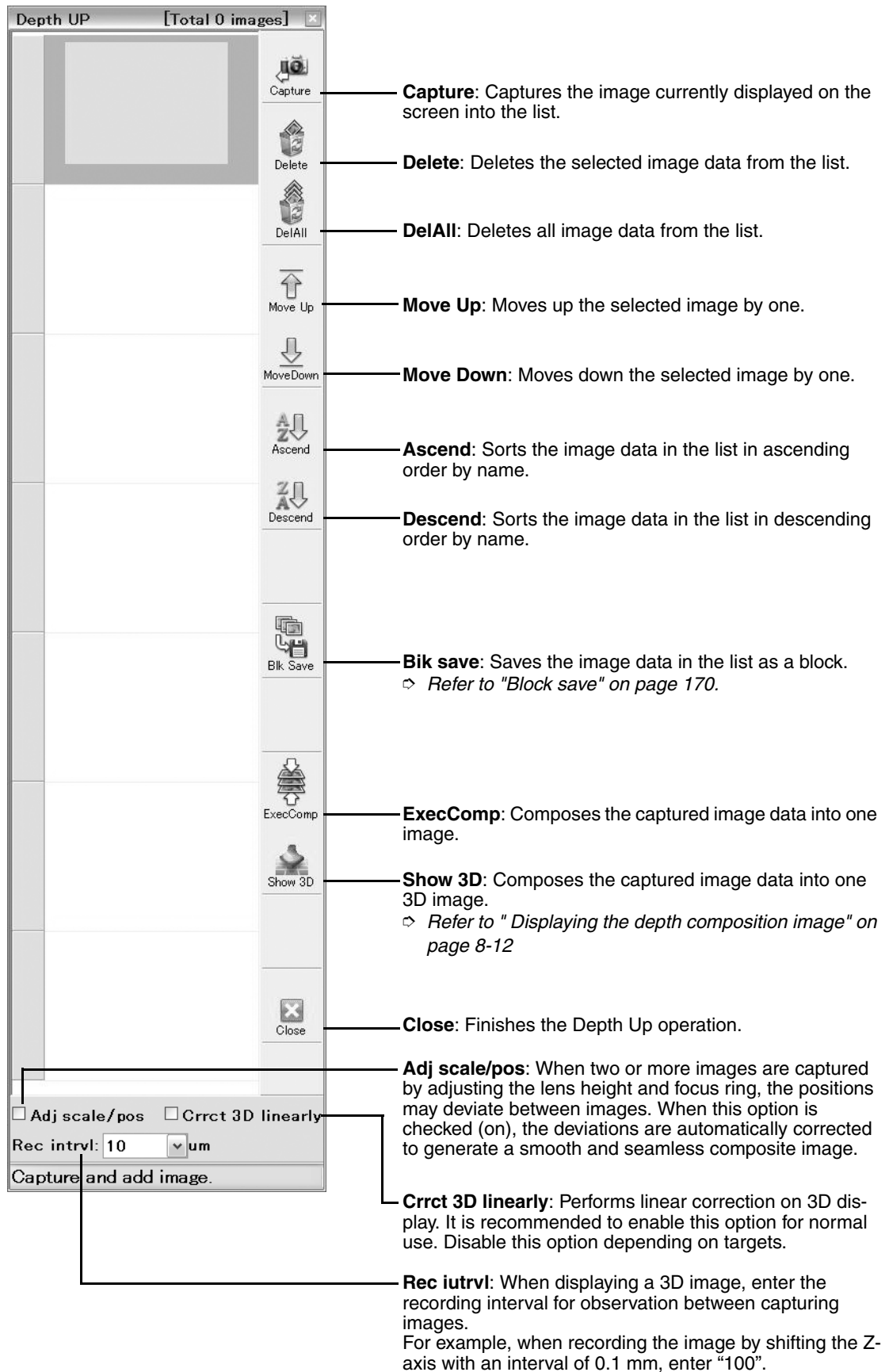
Back: Returns to the [Depth UP] dialog box.
Height profile measure (option): Measures the shape (Height profile) of the desired cross-section of the 3D image.

Note: When [OK (Show Comp Image)] or [Save (Composite Image)] is selected, the captured images in the list are deleted. To save the images for the depth composition processing, click [Back (Back to DepthUP)] to return to the Depth UP dialog box, and then click the [Blk Save] button.

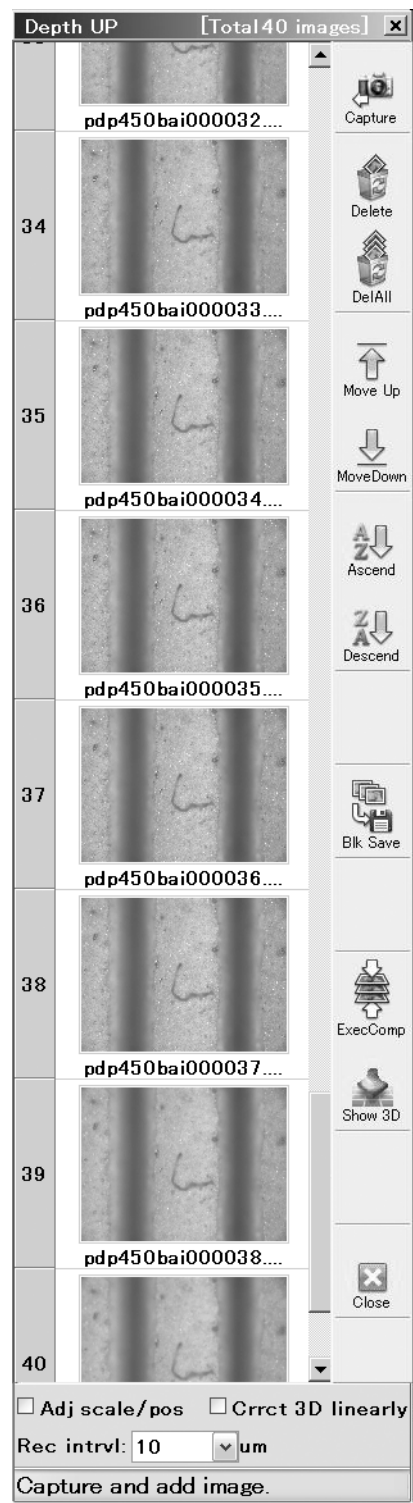
Configuration of the [Depth UP] dialog box

Selecting [Fine Depth composition] from the [DepthUP] command on the menu bar will display the [Depth UP] dialog box.

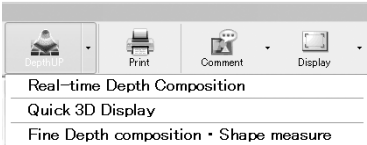
Depth composition, Block save, and 3D display can be executed using the buttons on this dialog box.



Displaying the depth composition image



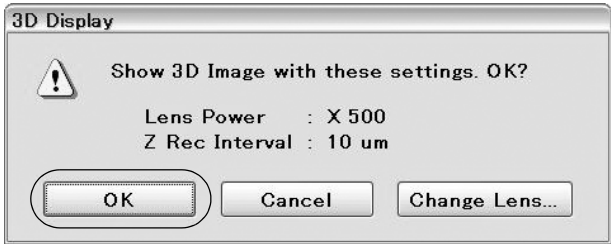
1. Select [Lens] from the status bar and choose the desired lens power.
2. Select [Fine Depth composition] from the [DepthUP] command on the menu bar. The [Depth UP] dialog box appears on the screen.



3. Focus on the highest point of the target and click the [Capture] button. The image is added to the list.
4. Lower the lens in small increments and click the [Capture] button. The image is added to the list.

Note: Make sure to move the lens downward in small increments from the top.

5. Repeat step 4 until the focus is obtained at the lowest point of the target.
 - To display 3D images, capture 4 or more images (5 or more images when the [Crrct 3D Linearly] checkbox is selected).
6. Enter the value in the [Rec intrvl] field.
 - For the [3D Rec interval], enter the distance by which the lens was lowered in units of μm .
7. Click the [Show 3D] button. The confirmation dialog box appears, displaying the lens power and 3D Rec interval.



8. Check the settings and then click the [OK] button. A 3D image is displayed on the entire screen. The [3D Display] dialog box is displayed on the right end of the screen.
9. Rotate, magnify, or reduce the image as necessary to observe the image.

**10. Click the [Exit] button.**

The image is added to the list.

Save: Saves the displayed 3D image.

Print: Prints the displayed 3D image.

Reset: Returns the 3D image to the original state.

Height: Move this slider bar to adjust the height of the image.

8.4 3D display

You can display the 3D image data stored in the album, or observe the image by applying a virtual light.

3D display allows the user to observe the target from various angles; as a result, the flaws (depressions), foreign objects (projections), and stains (flat surface) become clear.

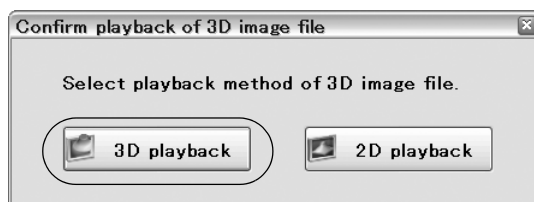
8.4.1 Displaying a 3D image

This section describes how to display the 3D image data stored in the album.

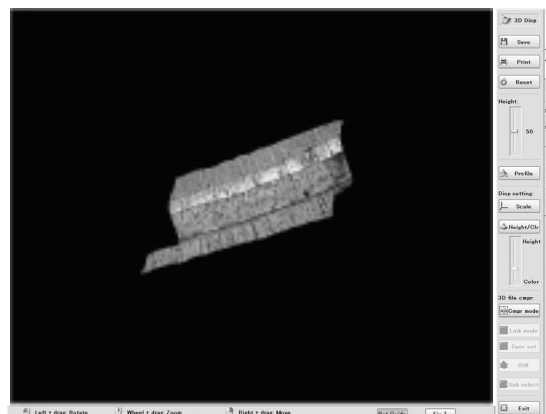
1. Select **[Album]** from the main menu to display the album screen.
2. Select a desired **3D image** from the images stored in the album.
The **[Confirm playback of 3D image file]** dialog box appears on the screen.



- 3. Click the [3D playback] button.**
The 3D display screen appears.



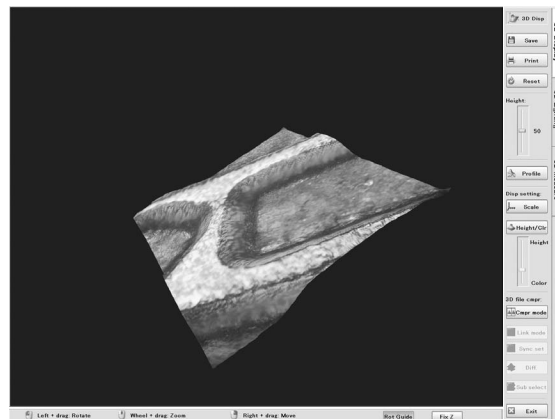
3D display screen



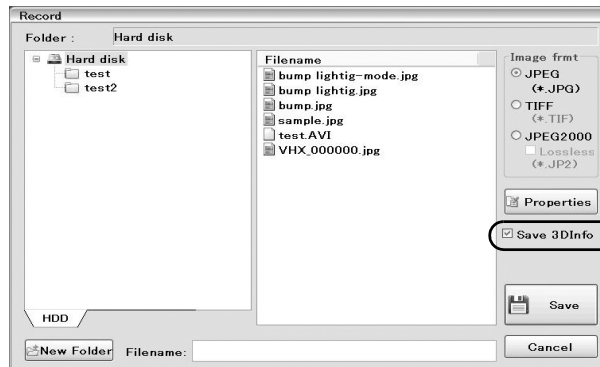
8.4.2 Saving 3D images

1. Click the [Save] button.

The [Capture] dialog box appears on the screen.



2. Enter the file name and then click the [Save] button.

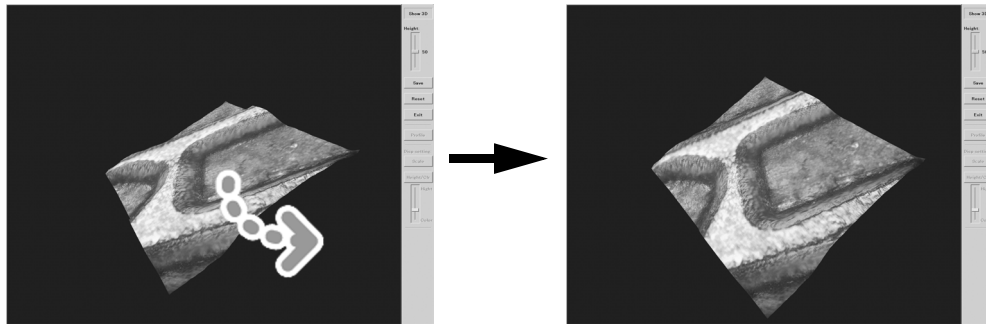


When saving the file as a 3D data, select the [Save 3DInfo] checkbox.

8.4.3 Display operations for 3D images

3D images can be rotated, magnified, reduced, or moved using the mouse.

■ Rotating images

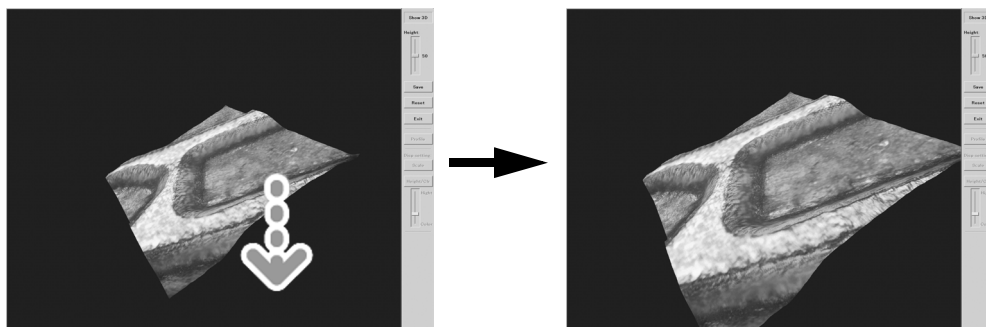


Hold down the left button while dragging the mouse to the right, left, up, down or any angle you want to rotate the object.

Release the mouse button to rotate the image continuously.

- To stop the continuous rotation, click the left mouse button.

■ Magnifying images

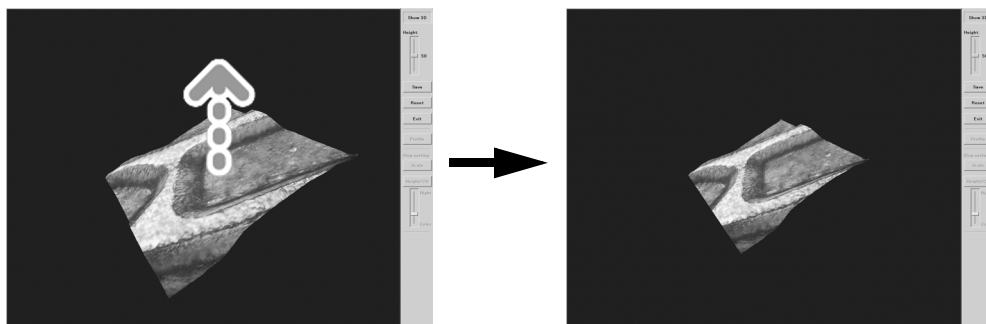


Hold down the wheel button while dragging the mouse downward.

Release the mouse button to magnify the image continuously.

- To stop the continuous magnification, click the left mouse button.

■ Reducing images

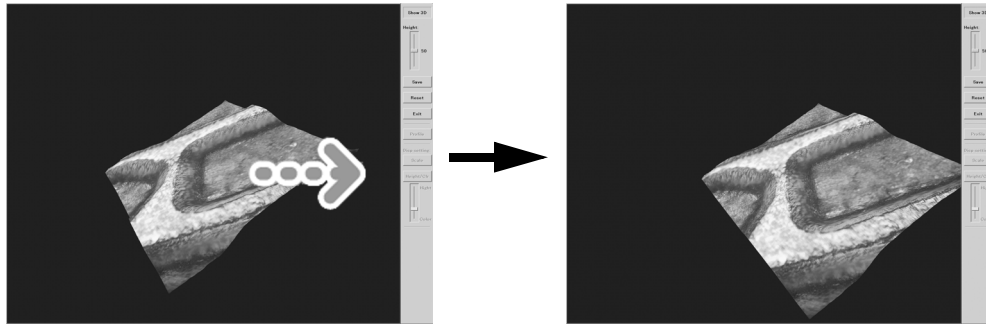


Hold down the wheel button while dragging the mouse upward.

Release the mouse button to reduce the image continuously.

- To stop the continuous reduction, click the left mouse button.

■ Moving images

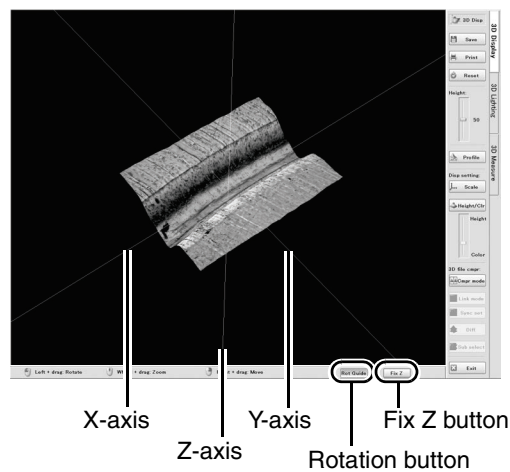


Hold down the right button while dragging the mouse to the right, left, up, down or any angle you want to move the object.

Release the mouse button to move the image continuously.

- To stop the continuous movement, click the left mouse button.

■ Rotation/Fix Z



Click the [Rotation] button to display the X, Y, and Z-axes while dragging the mouse.

Click the [Fix Z] button to rotate or move the object with its Z-axis fixed.

- To rotate the object with the Z-axis fixed, hold down the left button while dragging the mouse.
- To move the object with the Z-axis fixed, hold down the right button while dragging the mouse.

Note: When the image disappears from the screen during the display operation, click the [Reset] button on the right side of the screen to return to the initial condition.

Tips

- The speed of the continuous rotation, magnification, reduction, or movement is proportional to the speed of the drag operation of the mouse.
- The image is rotated, magnified, reduced, or moved with the center of the target as the reference point.

8.4.4 Illumination simulation

3D images can be rotated, magnified, reduced, or moved by operating the wheel mouse.

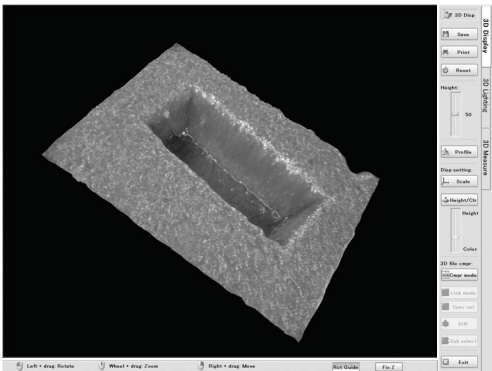
3D illumination simulation function

Illumination simulation allows the user to apply a virtual light on the target, and observe it from various angles or in different brightness; as a result, the surface of the target can be observed in detail.

- 1. Select a stored 3D image (with a red triangle) from the album screen to display.

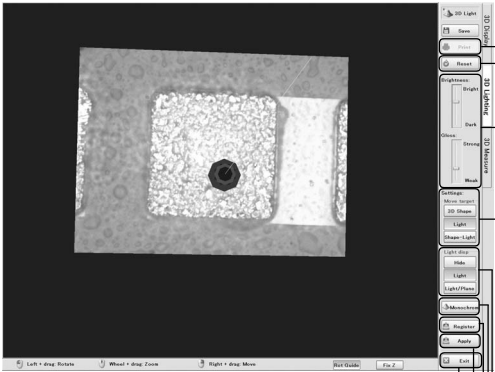
Tips Illumination simulation can be applied to the 3D composition images created in the [Depth UP] screen.

- 2. Press the [3D Lighting mode] button.



- 3. The [3D Lighting] screen appears.

3D illumination



Save: Saves the target on the screen and the 3D illumination information.

Tips The direction of light emission can be changed for the saved 3D images when they are displayed in 3D by using the "VHX communication software" on the personal computer.

- Print:** Prints the displayed image.
- Reset:** Returns the target and illumination positions to the original state.
- Brightness:** Adjusts the brightness of the illumination.
- Gloss:** Adjusts the gloss of the target.
- Settings: Move target**
 - 3D Shape:** Moves the target when operating the mouse. The direction of illumination does not move.
 - Light:** Moves the direction of illumination when operating the mouse. The target does not move.
 - Shp-Light:** Moves both the target and the illumination when operating the mouse.
- Settings: Light disp**
 - Hide:** Hides the light emission line. The illumination stays lit at this time.
 - Light:** Shows the light emission line.
 - Light/Plane:** Shows the light emission line and the coordinate lines of the illumination.
- Monochrome:** Displays the 3D image in monochrome.
- Register:** Registers the direction of light emission and the relative position to the target.
- Apply:** Loads the registered direction of light emission and the relative position to the target.
- Exit:** Exits the 3D illumination simulation function.

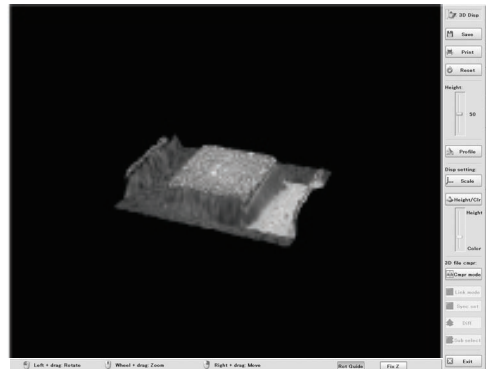
8.5 3D Scale Height and Color Display (Optional)

By using the optional 3D profile measurement software, a scale can be displayed on the 3D image to measure the height.

Note: The "3D Profile Measurement Software" must be installed in the VHX-600E to use the 3D profile measurement function.

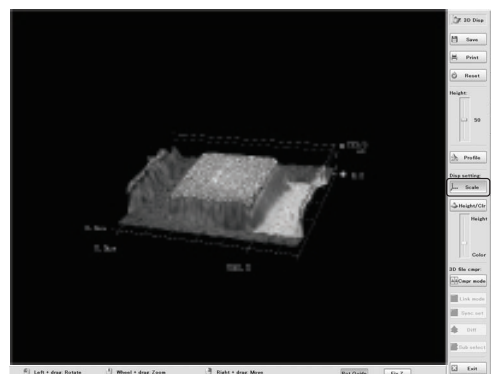
1. Display or reproduce the 3D image.

- ⇒ Refer to "8.2 Quick depth composition and 3D" on page 8-5.
- ⇒ Refer to "8.3 Fine (high-quality) depth composition and 3D" on page 8-7.
- ⇒ Refer to "8.4 3D display" on page 8-14.



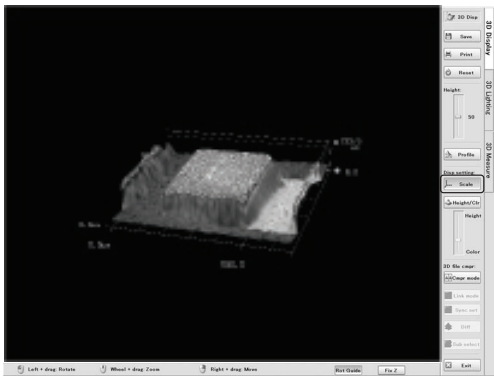
8.5.1 Scale display

1. Click on the [Scale] button to display the scale on the screen.



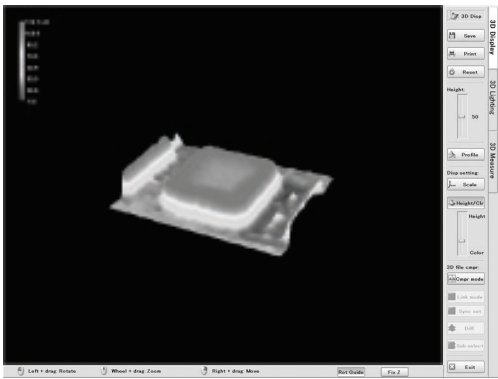
2. Drag the circle (●) and square (■) symbols on the measurement guide to change the height value.
Sandwich an area between these two planes to measure the height for a cross section.

Tips To hide the scale display, click the [Scale] button again.

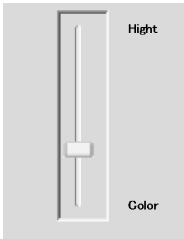


Grouping height by color

1. Click on the [Height/Clr] button to display the 3D image with differences in height grouped by color.

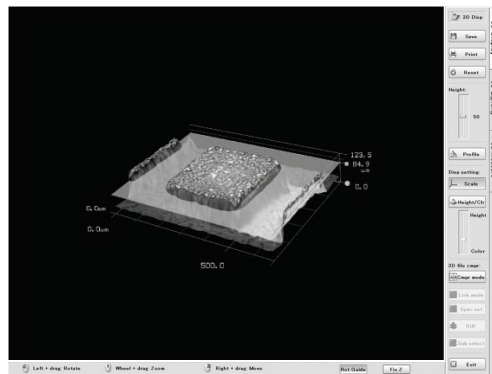


Tips Move the [Height/Clr] slider up and down to adjust the ratio of the height image to the color image.
To hide the height and color display, click on the [Height/Clr] button again.



Ending 3D Scale and Height Measurement

1. Click on the [Exit] button to end 3D scale and height measurement and to return to the Album screen.



8.6 3D profile measurement (Optional)

A 3D profile can be measured by using the optional 3D profile measurement software.

8.6.1 Part names and functions of the window

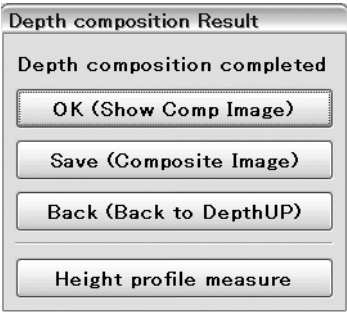
This section describes names and functions of the 3D profile measurement window.

Note: The "3D Profile Measurement software" must be installed in the VHX Series controller to use the 3D profile measurement function.

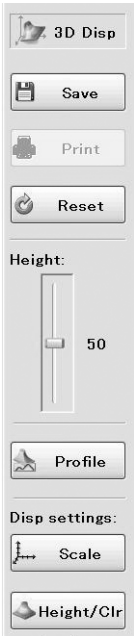
Display operations for 3D images

The following procedures can be used to display the 3D profile measurement window.

- **Display the high-quality depth composition image and click the [Height profile measure] button from the [Depth composition Result] dialog box.**
⇒ Refer to "8.3 Fine (high-quality) depth composition and 3D" on page 8-7.



- **Display the 3D image and click [Profile] from the menu.**
⇒ Refer to "8.4 3D display" on page 8-14.

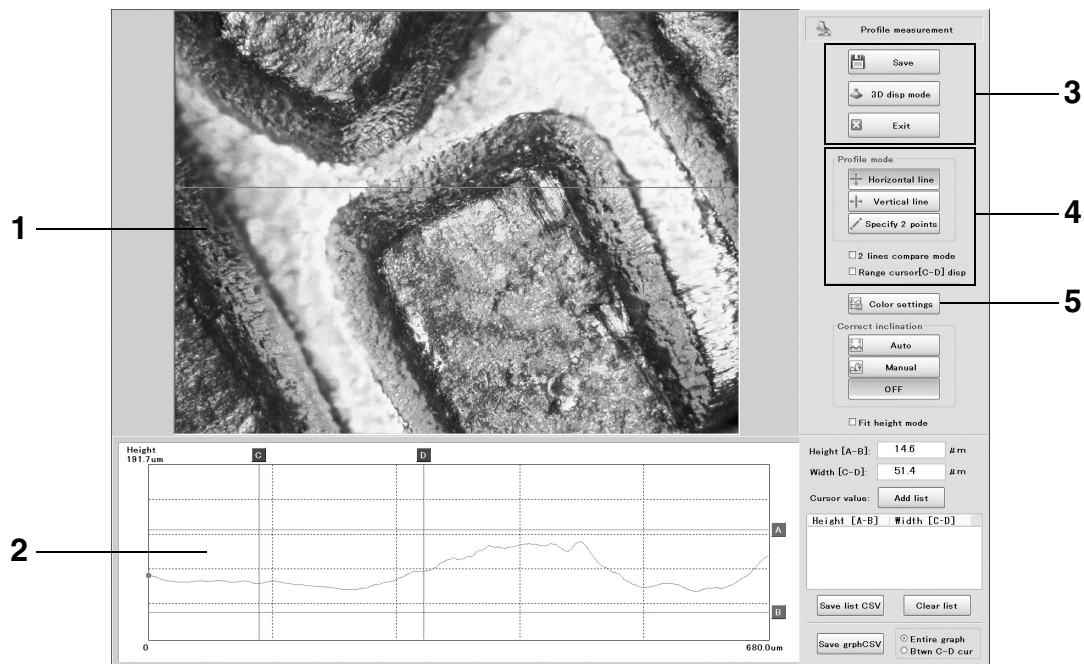


Tips

You can also create the fine depth composition image or 3D image from the images that are stored in the album.
Height profile measurement can be performed also on the fine depth composition image or 3D image created from the album.

⇒ Refer to "6.2 Reproducing and editing images (Album)" on page 6-8.

8.6.2 Part names and functions of the window



1. Image display area

Use this to display the target image and the measurement line.

⇒ Refer to "8.6.3 Setting the measurement line" on page 8-25.

2. Profile chart display area

The height data of the measurement line is displayed in the chart.

3. File operation buttons

Save: Saves the whole window as an image data.

3D disp mode: Displays the 3D image in the image display area.

⇒ Refer to "8.6.7 3D Display mode" on page 8-29.

Exit: Closes the Profile Measurement window.

4. Profile mode

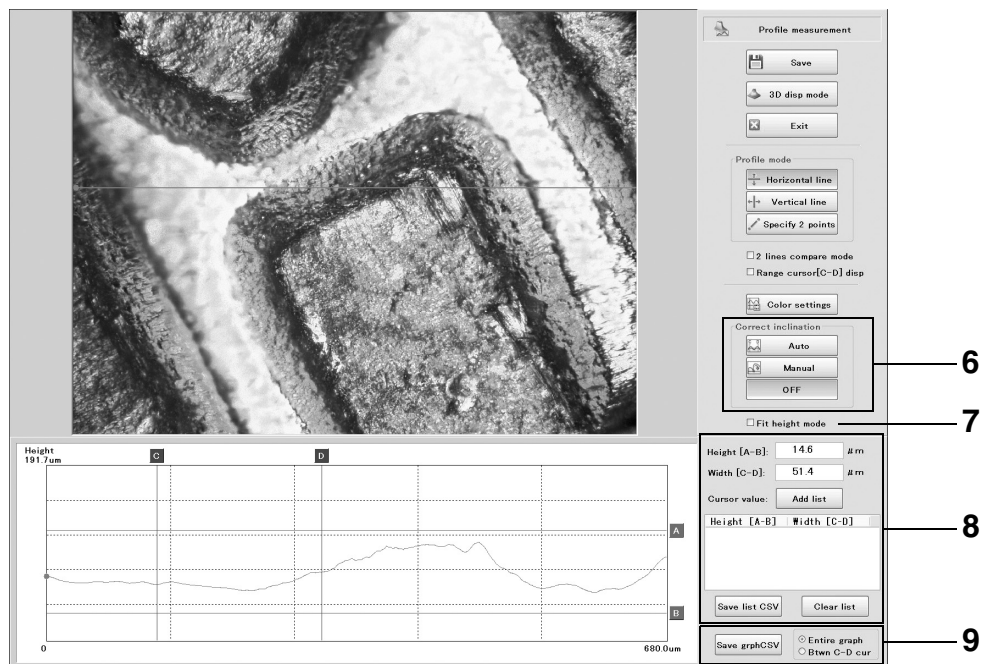
Use these buttons to set the measurement line.

⇒ Refer to "8.6.3 Setting the measurement line" on page 8-25.

5. Color Setting

Use this button to set the colors of the chart or cursor displayed in the chart area.

⇒ Refer to "8.6.6 Color setting" on page 8-28.



6. Inclination Correction

Use these buttons to correct the inclination of the chart in the chart area.

➤ Refer to "8.6.5 Inclination correction" on page 8-27.

7. Fit height mode

Use this check box to adjust the vertical axis of the chart.

ON: Set the vertical axis to show the range between the minimum and the maximum measured values.

OFF: The vertical and horizontal axes are set to have the same proportion as that of the actual size, so that the entire motion range is displayed.

8. Cursor measurement display area

Use the chart area reference lines to measure the height and width.
The measured values are saved as a list.

➤ Refer to "8.6.4 Measuring height and width using the reference lines" on page 8-26.

9. Save as a waveform

The wave form that is displayed in the chart area is saved as numeric data in CSV format.

Entire graph: The whole waveform is saved in the CSV format.

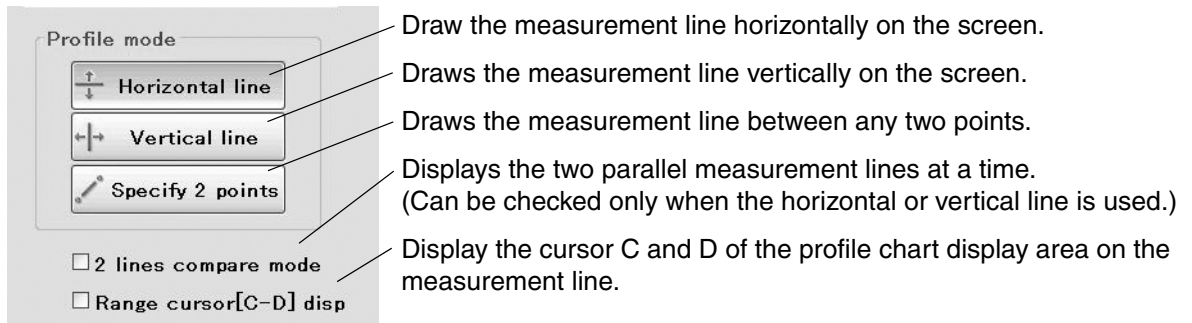
Btwn C-D cur: The range delimited by the C and D cursor is saved in CSV format.

8.6.3 Setting the measurement line

This section describes the procedure for setting and adjusting the measurement line.

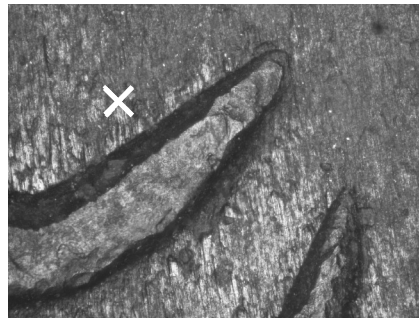
Profile mode

Use these buttons to select the direction of the measurement line.

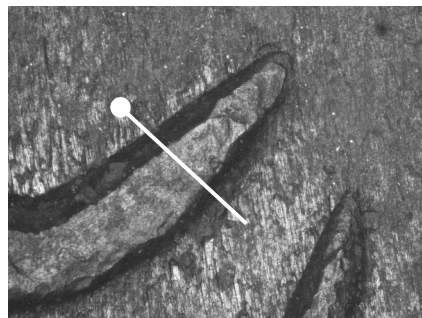


Specifying any two points

1. **Click on any point on the image to specify the starting point of the measurement line.**
The X mark is displayed at the starting point.



2. **Click on the end point of the measurement line.**
The measurement line is determined to display the profile chart.
The ● mark is displayed at the start point of the measurement line and the profile chart.

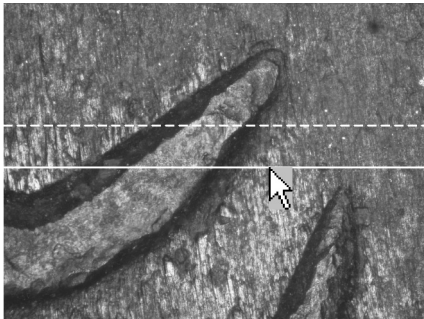


Note: The profile chart is displayed showing the left edge as a start point and the right edge as an end point.

Moving the measurement line

To move the horizontal or vertical line, drag the measurement line with a mouse on the image display area.

As the measurement line is moved, the profile chart is updated to show the changed position.



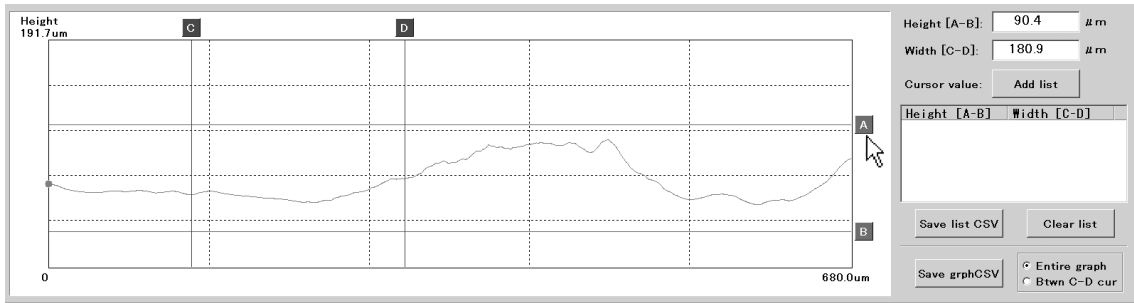
Note: For two points measurement line, moving by dragging is not possible. Set the measurement line again by specifying the start and end points.

8.6.4 Measuring height and width using the reference lines

Use the reference lines on the profile chart area to measure the height and width.

Measuring height and width

Display the numeric values by moving the reference lines of **A**, **B**, **C**, and **D**.

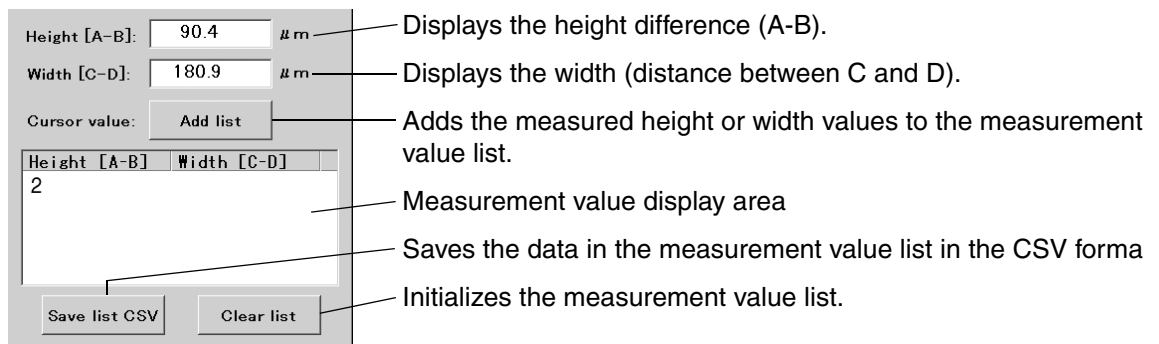


Move the reference lines **A**, **B**, **C**, and **D** to the desired positions to be measured in the profile chart.

To move the reference lines, drag the tab or line of the cursor with a mouse.

The measurement results are displayed in the right window.

Measuring height and width

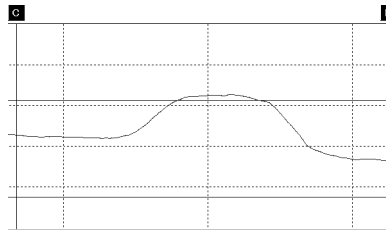


8.6.5 Inclination correction

Use this feature to correct and display the inclination of the chart in the profile chart display area. You can perform inclination correction either automatically or manually.

Procedure for operating automatic inclination correction

1. Specify the desired range to be displayed horizontally by moving the cursor **C** and **D**. To move the cursor, drag the tab or line of the cursor with a mouse.



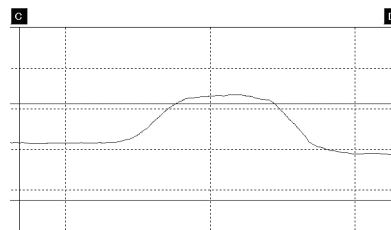
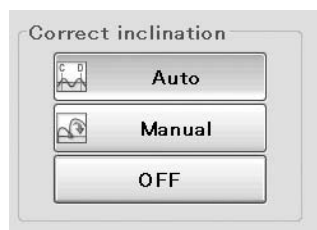
Tips

The auto inclination correction corrects the inclination for the entire chart in the manner that the range delimited by cursor C-D will be displayed horizontally.

2. Click **[Auto]** in the **[Correct inclination]**.

The inclination of the profile chart is corrected to show the chart between the cursor **C** and **D** horizontally.

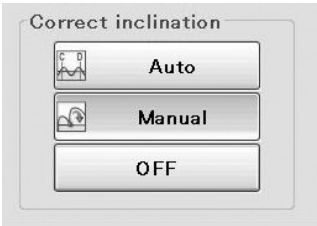
Click the **[OFF]** button to release the auto inclination correction.



- Note:**
- The valid correction range for the auto inclination correction is within 45 degrees when the **[Fit height mode]** check box is unchecked.
 - If **[Auto]** inclination correction is used together with the **[Fit height mode]**, a part of the chart may be out of the displayed range and may not be able to be displayed.

Procedure for operating manual inclination correction

1. Click [Manual] in [Correct inclination].



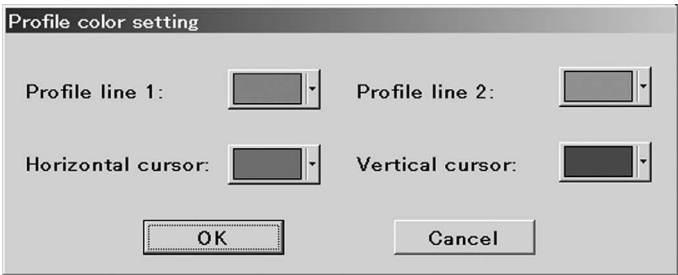
2. The inclination angle of the profile chart is changed according to the movement of the mouse cursor in the profile chart display area.
3. Click the cursor at the desired angle.
The angle of the chart is determined by clicking the mouse.
When you want to correct the inclination again, repeat Steps 1 to 3.
Click the [OFF] button to release the inclination correction.

8.6.6 Color setting

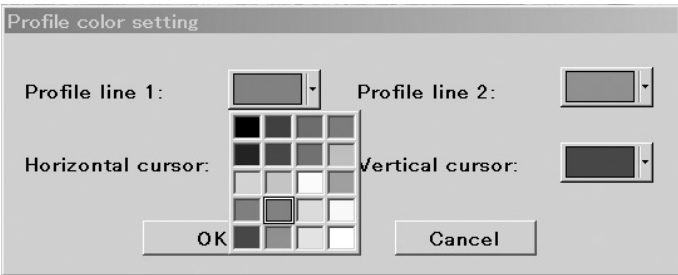
You can change the color of the measurement line, profile chart, and the measurement cursors.

Procedure for setting the color

1. Click the [Color Setting] button.
The [Profile color settings] dialog box appears.



2. Click the button of the item of which you want to change the color.
The color pallet appears.



3. Click the desired color and click [OK].
The displayed color is changed.

8.6.7 3D Display mode

You can display the 3D image containing the measurement line in the image display area. Operations such as magnification and rotation of the 3D image are available.

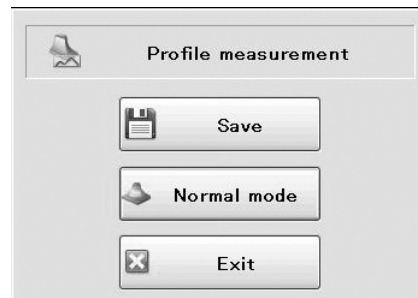
Operation procedure

■ Procedure for switching to the 3D display mode

Click the [3D disp mode] button.

The 3D image is displayed in the image display area.

To exit the 3D display mode and return to the depth composition image screen, click the [Normal mode] button.



Note: Changing the profile mode and setting the measurement line can be performed only in the standard mode. To change the mode, first exit the 3D display mode by using the [Normal mode] button.

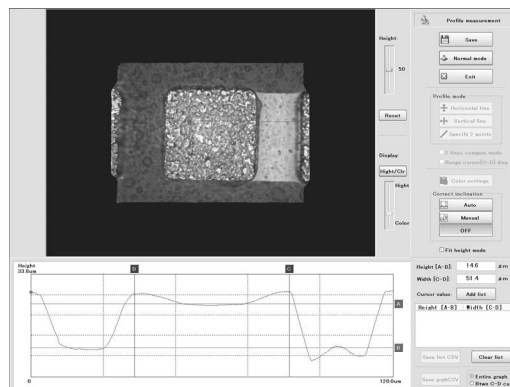
■ Procedure for operating the 3D image

Height: Move this slider bar to adjust the height of the image.

Reset: Returns the 3D image to the original state.

Height/clr: Displays the 3D image by denoting the highest portions in red and lowest in dark blue.

☞ Refer to "Grouping height by color" on page 8-20.



Display operation on the 3D image: The 3D image can be rotated, magnified, reduced, or moved using the wheel mouse operations.

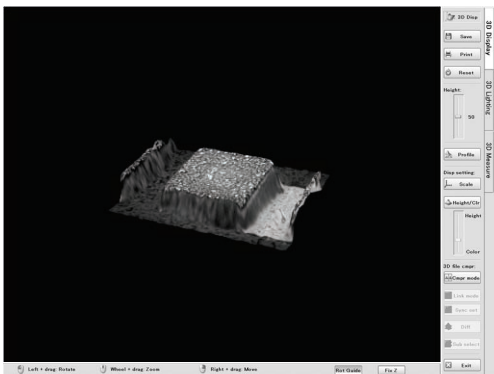
☞ Refer to "8.4.3 Display operations for 3D images" on page 8-16.

8.7 3D measurement (Optional)

By using the optional 3D profile measurement software, a cross-section profile from the 3D image can be displayed and measured.

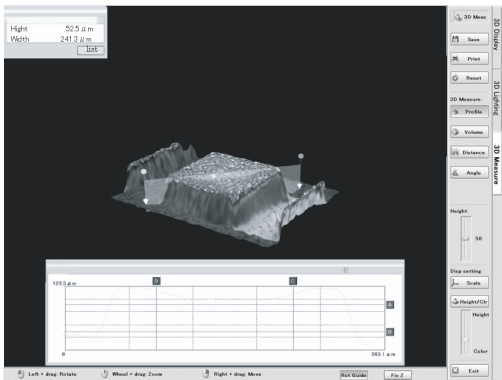
Note: The "3D Profile Measurement Software" must be installed in the VHX-600E to use the 3D profile measurement function.

- 1. **Display or reproduce the 3D image.**
 - ⇨ Refer to "8.2 Quick depth composition and 3D" on page 8-5.
 - ⇨ Refer to "8.3 Fine (high-quality) depth composition and 3D" on page 8-7.
 - ⇨ Refer to "8.4 3D display" on page 8-14.
- 2. **Select the [3D measurement] tab in the 3D display screen.**
The 3D measurement screen is displayed.



8.7.1 Profile

- 1. **Click on the [Profile] button in the [3D measurement] menu.**
The cross section measurement guidelines appear on the screen.
- 2. **Drag the circle (●) symbol on the measurement guide to set the cross-section for measurement.**
The cross-section profile appears in the profile chart display area.



8.7.2 Volume and surface area measurement

1. Click on the [Volume] button in the [3D measurement] menu.

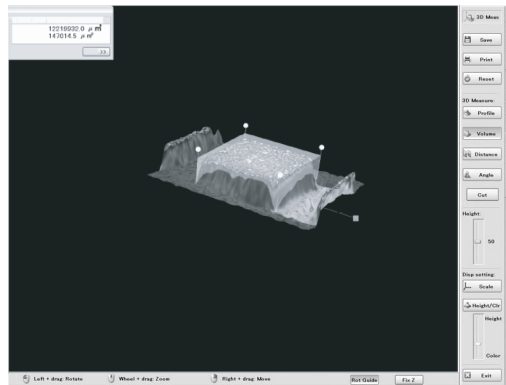
The measurement guidelines form a cube shape on the screen.

Tips

Click on the [Cut] button to cut areas of the image that are not being measured.

2. Drag the circle (●) and square (■) symbols on the measurement guide to enclose the area that you want to measure.

The volume and surface area of the enclosed area appear in the [3D measurement] window.



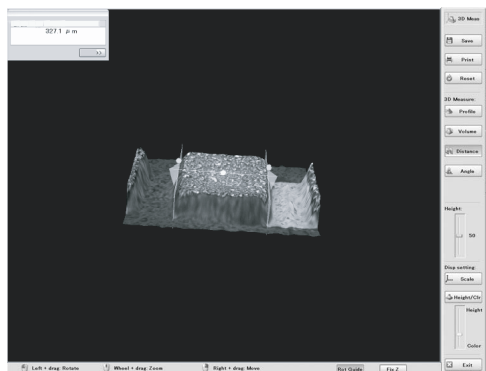
8.7.3 Surface distance measurement

1. Click on the [Distance] button in the [3D measurement] menu.

The two measurement guidelines for measuring distance along the surface appear on the screen.

2. Drag the circle (●) symbol on the measurement guide to enclose the area that you want to measure between the two measurement guides.

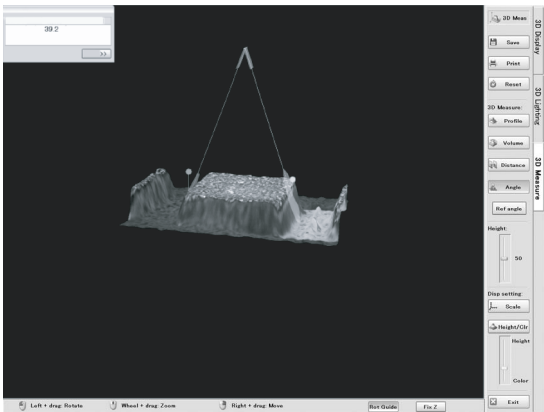
The distance enclosed by the two measurement guidelines appears in the [3D measurement] window.



8.7.4 Surface angle measurement

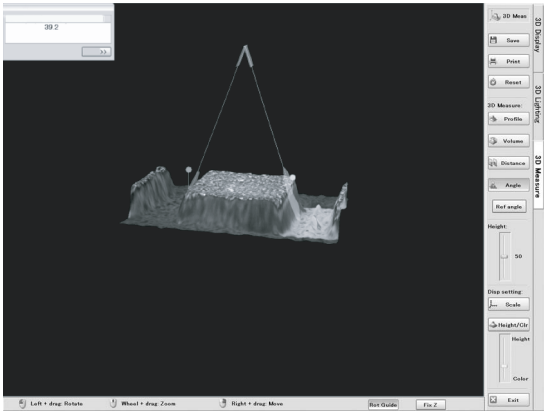
- 1. Click on the [Angle] button in the [3D measurement] menu.
The measurement guidelines for measuring the surface with an angle appear on the screen.
- 2. Drag the circle (●) symbol on the measurement guide to set the surface measured by the angle.
The interior angle of the intersecting point for the cross section appears in the [3D measurement] window.

Tips Click on the [Ref angle] button to switch between the measurements with the measurement guidelines screen and with the reference line (a line that is parallel to the optical axis of the lens while capturing an image).



8.7.5 Saving 3D measurements

- 1. The [Save As] dialog appears on the screen.



- 2. Enter a save location and a file name, and then click the [Save] button.
- 3. Click on the [Exit] button to end the 3D measurement.
This action ends the 3D measurement and returns to the Album screen.

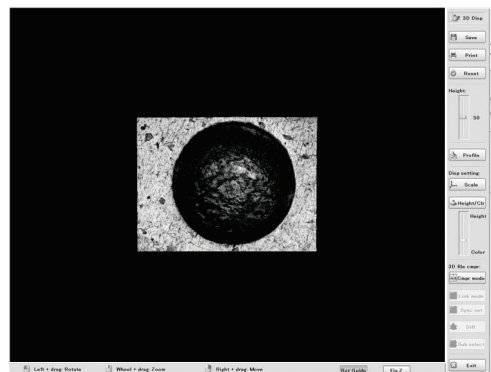
Tips Click on the [3D display] tab to hide the measurement guidelines and the [3D measurement] window.

8.8 3D comparison mode

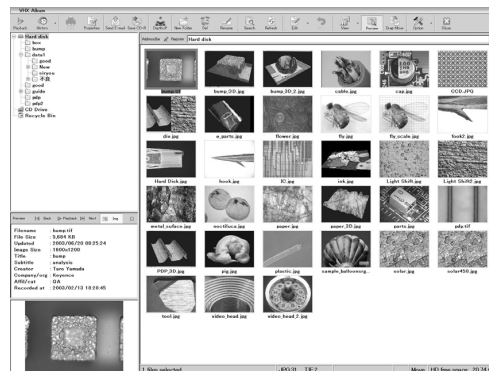
3D comparison mode lines up 3D images from two different targets (main image and sub image) and allows the two images to be compared by rotating the images and changing the observation angle. This mode displays the comparative difference by visually showing the differences in profiles from layering 3D data.

8.8.1 3D comparison display

1. On the Album screen, select one of the 3D images for comparison as the main image and reproduce it in 3D.
The main image appears on the 3D display screen.
2. Click the [Cmpr mode] button.



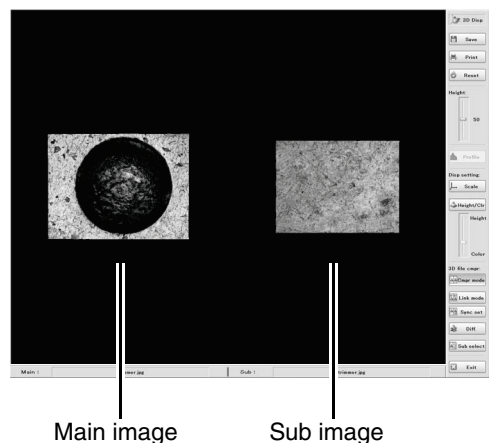
The screen returns to the Album screen.



3. Select the sub image.

The screen returns to the 3D display screen, with the main image on the left side and the sub image on the right.

➤ Refer to "8.4.3 Display operations for 3D images" on page 8-16.

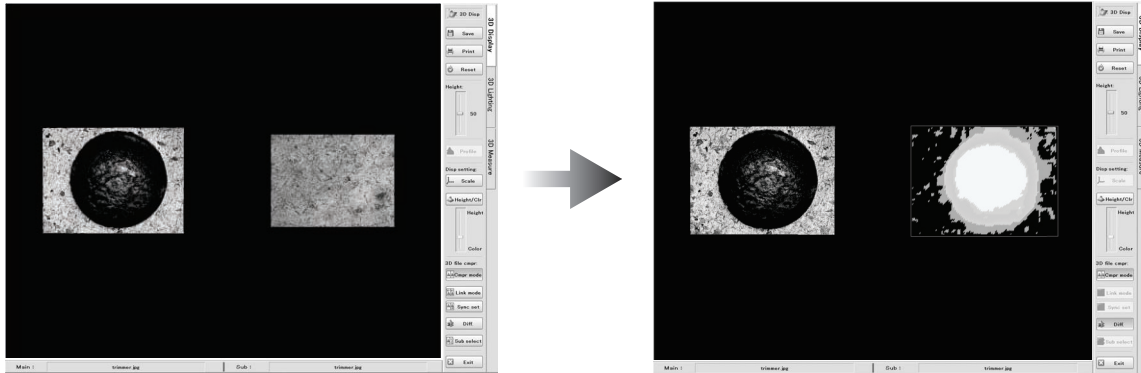


8.8.4 Difference display

This functions layers the main image and the sub image on top of each other and displays the comparative height differences in color.

1. **Display the main image and the sub image in 3D comparison mode and click on the [Diff.] button.**

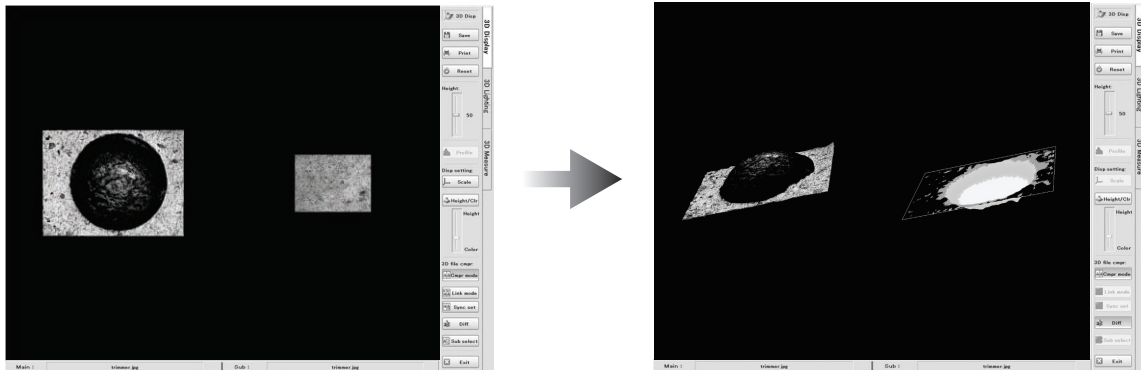
The left side of the screen displays the main image and the sub image layered on top of each other, while the right side of the screen displays the layered image with the height differences indicated by different colors.



Sub image operations

1. **The main image and the sub image can be rotated together by dragging the mouse on the sub image while pressing the left mouse button.**

You can zoom in or out on just the sub image by clicking and dragging with the mouse wheel button.

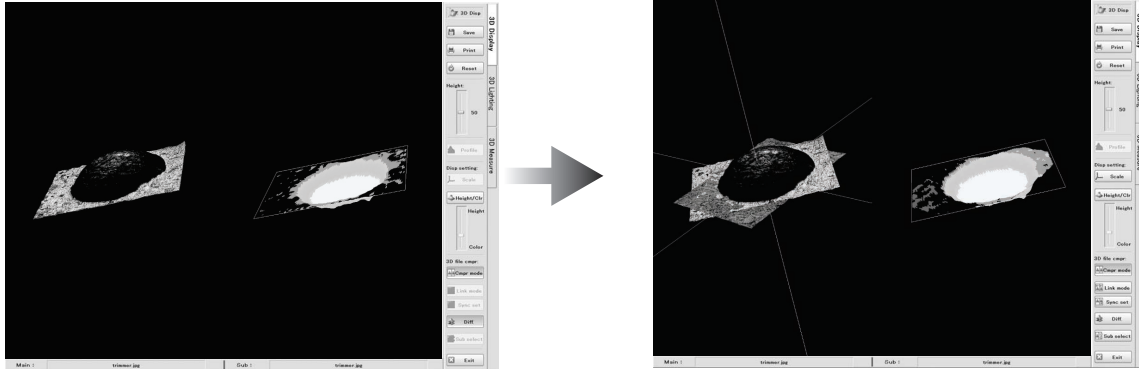


Main image operations

1. Left click and drag the mouse on the main image to rotate only the sub image.

Tips The images are rotated on a fixed Z-axis.

You can zoom in or out on just the main image by clicking and dragging with the mouse wheel button.



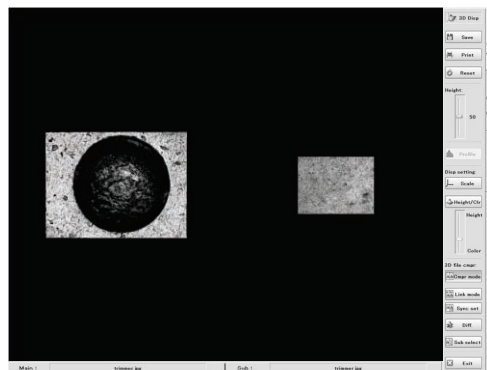
8.8.5 Switching the sub image

The sub image can be changed.

1. Click on the [Sub select] button on the 3D comparison mode screen.

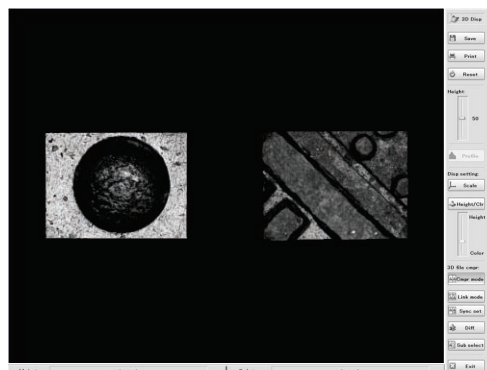
The screen returns to the Album screen.

Note: To switch the main image, click on the [Exit] button to return to the Album screen. Select the image that you want to display and reproduce it in 3D.



2. Select the sub image that you want to display from the Album screen and reproduce it in 3D.

Return to 3D comparison mode and the selected image appears as the sub image.



Chapter 9

Camera Setting and Image Enhancement

This chapter describes the camera settings and image enhancement features that can be set and adjusted using the [Camera/Image] command on the Menu bar.

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9.2	Adjusting the brightness of the image	9-6
9.3	Adjusting the colors of images (White balance)	9-16
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9.1 Image enhancement

This section describes the image enhancement functions that correct the image appearance observation.

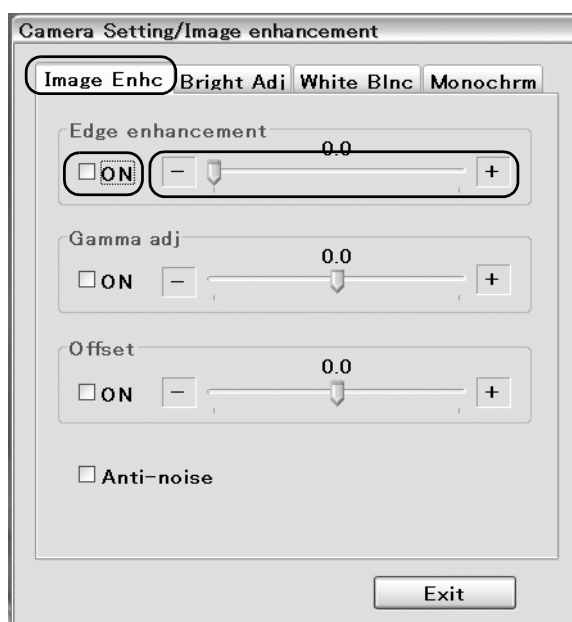
The image enhancement functions include Edge enhancement, Gamma adjustment, Offset adjustment, and Noise elimination.

9.1.1 Edge enhancement

This section describes the Edge enhancement function that emphasizes the edges in the image so that flaws and minute objects can be observed easily.

1. **Select [Camera Setting/Image enhancement] from the [Camera/Image] command on the menu bar.**

The [Camera Setting/Image enhancement] dialog box appears on the screen.



2. **Click on the [Image Enhc] tab.**
3. **Put a checkmark in the [Edge enhancement] checkbox.**
The edge enhancement processing is applied to the image currently being observed.
4. **Move the slider to the right or left to make fine adjustments.**
Adjust the value in the range of 0 to 20.
⇒ Refer to "3.2 Using the slider bar" on page 3-5 to move the slider bar.

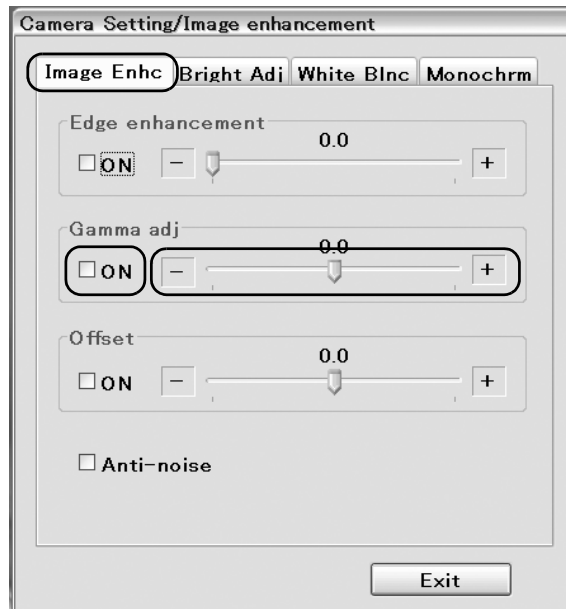
9.1.2 Gamma adj (Gamma adjustment)

This section describes the Gamma adjustment function which corrects the contrast of bright and dark areas of the images.

Procedure for setting the Gamma adjustment

1. Select [Camera Setting/Image enhancement] from the [Camera/Image] command on the menu bar.

The [Camera Setting/Image enhancement] dialog box appears on the screen.



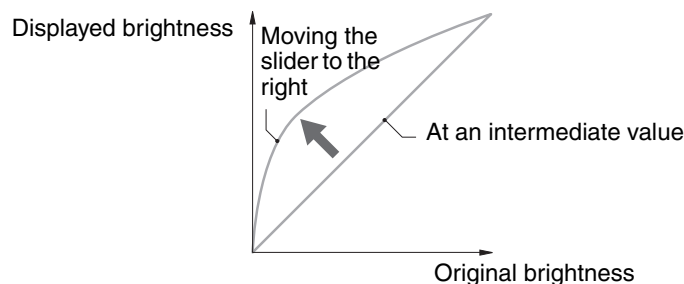
2. Click on the [Image Enhc] (Image Enhancement) tab.
3. Put a checkmark in the [Gamma adj] checkbox.
4. Move the slider to the right or left.

Adjust the value in the range of -10 to +10.

⇒ Refer to "3.2 Using the slider bar" on page 3-5 to move the slider bar.

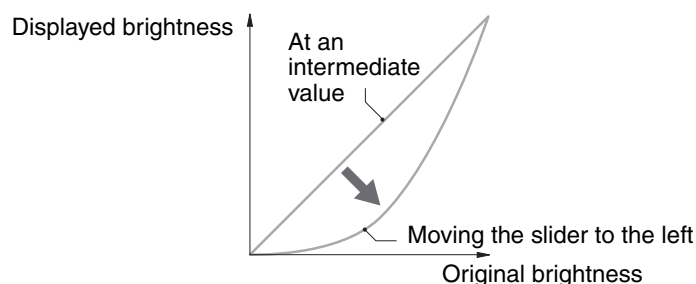
Moving the slider to the right will emphasize the contrast and gradations in the bright area.

- This processing is effective for enhancing the contrast of images in which the gradation is not clear due to excessive brightness, or when the image is washed-out.



Moving the slider to the left will emphasize the contrast and gradations in the dark area.

- This processing is effective for enhancing the contrast of images in which the gradation is not clear due to excessive darkness.



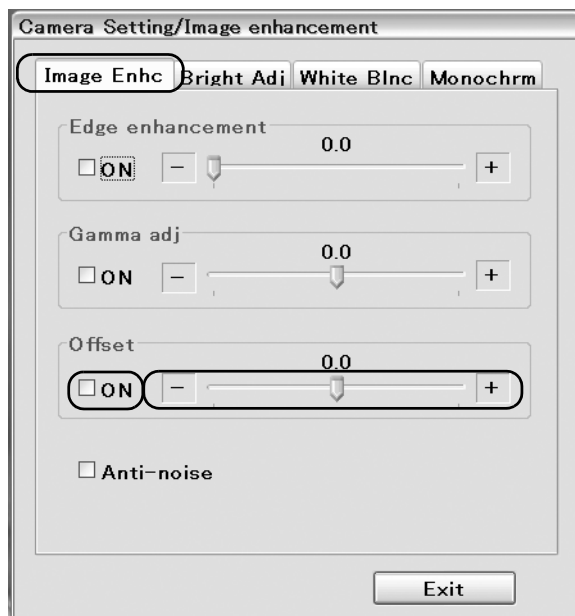
9.1.3 Offset

This section describes the Offset function that adjusts the brightness of the entire image.

Procedure for setting the Offset

1. Select [Camera Setting/Image enhancement] from the [Camera/Image] command on the menu bar.

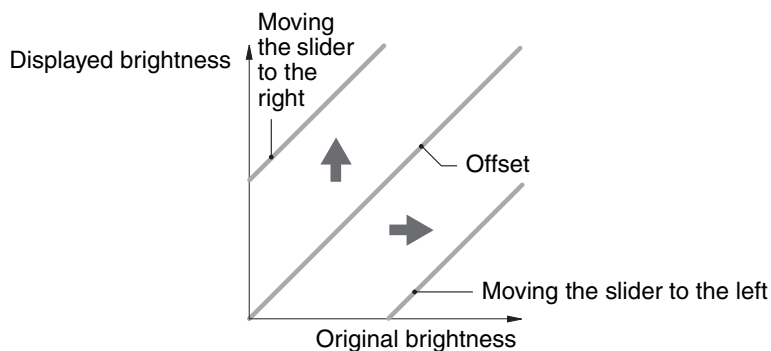
The [Camera Setting/Image enhancement] dialog box appears on the screen.



2. Click on the [Image Enhc] (Image Enhancement) tab.
3. Put a checkmark in the [Offset] checkbox.
4. Move the slider to the right or left.
Adjust the value in the range of -10 to +10.
⇒ Refer to "3.2 Using the slider bar" on page 3-5 to move the slider bar.

Moving the slider to the right will brighten the entire image.

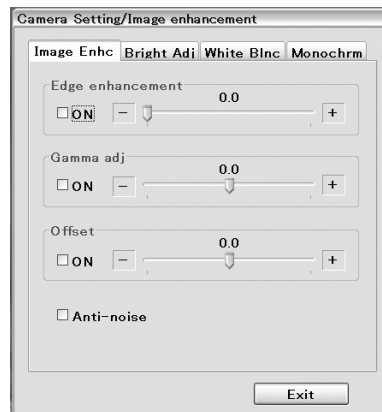
Moving the slider to the left will darken the entire image.



9.1.4 Anti-noise

This section describes the Noise elimination function that eliminates only noise elements while preserving the information of the image.

1. **Select [Camera Setting/Image enhancement] from the [Camera/Image] command on the menu bar.**
The [Camera Setting/Image enhancement] dialog box appears on the screen.
2. **Click on the [Image Enhc] (Image Enhancement) tab.**
3. **Put a checkmark in the [Anti-noise] checkbox.**



9.2 Adjusting the brightness of the image

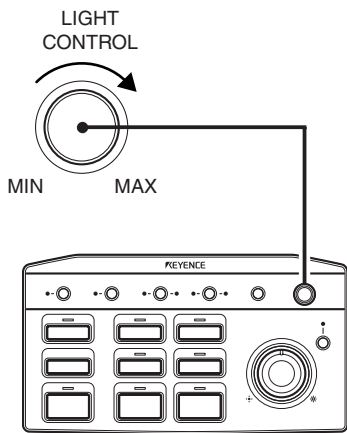
This section describes the procedure for adjusting the brightness of images. The brightness of images can be controlled by adjusting the Brightness adjustment control on the console, shutter speed, or camera gain.

Tips Use the Brightness adjustment control on the console to adjust the brightness for normal operations.

9.2.1 Adjusting the brightness with the Brightness adjustment control

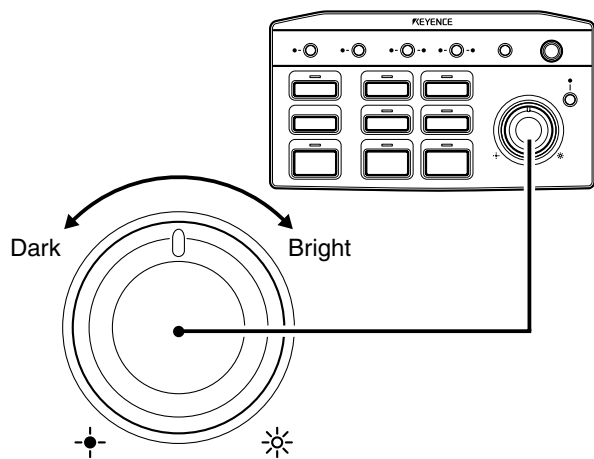
Adjust the brightness of the light source to be applied to the target.

1. Turn the **LIGHT CONTROL knob on the console to MAX (maximum)**.
The light intensity of the halogen lamp is enhanced to the maximum level.



Tips Set the LIGHT CONTROL knob to the MAX position for normal operations. To adjust the brightness, use the Brightness adjustment knob described in the following step.

2. Turn the **Brightness adjustment knob on the console to adjust the brightness**.
Turn the knob to the right to make the light brighter and to the left to make the light darker.



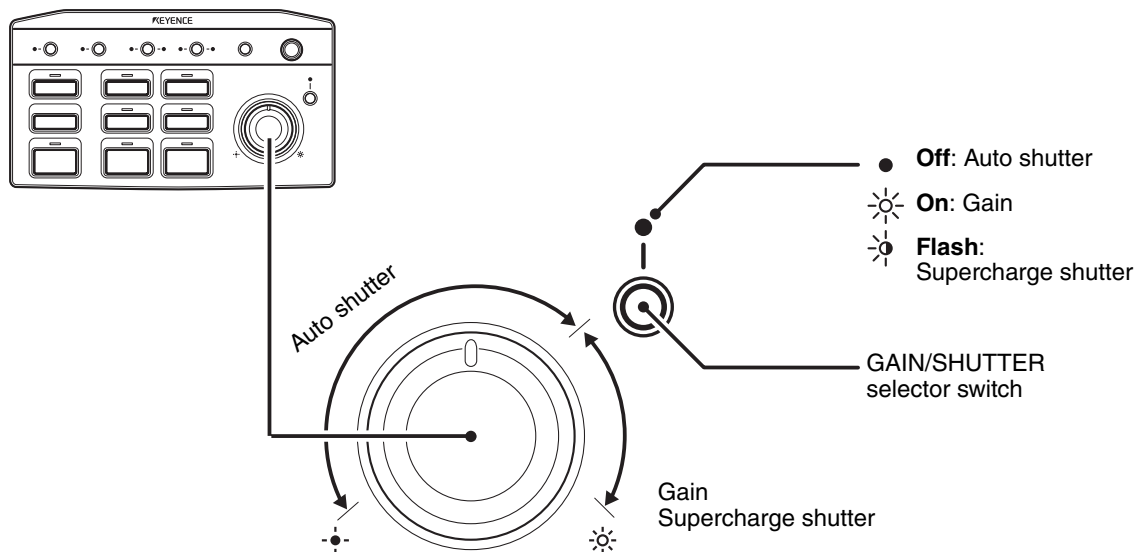
Using Gain/Supercharge shutter functions

While the Brightness adjustment knob is turned in the clockwise direction, the Gain or Supercharge shutter is activated automatically at a certain point (2 o'clock position of the clock's short hand) and further enhances the brightness of the image. As a result, even a dark target can be observed with proper brightness by simply turning the Brightness adjustment knob to the right.

- To switch between the Gain and Supercharge shutter functions, press the GAIN/SHUTTER selector switch on the console.
- The LED lamp of the GAIN/SHUTTER selector switch illuminates while GAIN is activated, and flashes while Supercharge shutter is activated.

1. To switch between the Gain and Supercharge shutter functions, press the GAIN/SHUTTER selector switch on the console.

The mode switches every time the switch is pressed.



Glossary:

- **Gain**
Enhances the brightness of the screen by electrically amplifying the video signal from the camera. The image can be displayed at high speed; however, the image quality may deteriorate when the target is extremely dark.
- **Supercharge shutter**
Enhances the brightness of a dark screen by extending the elapsed time of the camera (exposure time) to 0.2 to 17 seconds. Use this function when the overall image is dark due to insufficient light intensity, or halation (gloss reflections) of the target is excessive. However, note that this function is not suitable for moving or vibrating targets because the display speed is lowered according to the exposure time. The exposure time can be extended up to 4 seconds by using the Brightness adjustment knob. To further extend the exposure time, configure the setting by selecting the [Camera Setting/Image enhancement]-[Bright Adj] command from the [Camera/Image] option on the menu bar.

⇒ For details about the Supercharge shutter function, refer to n "Supercharge shutter" on page 9-12

Tips

It is recommended to use GAIN for positioning the targets or adjusting the focus, and Supercharge shutter for capturing images.

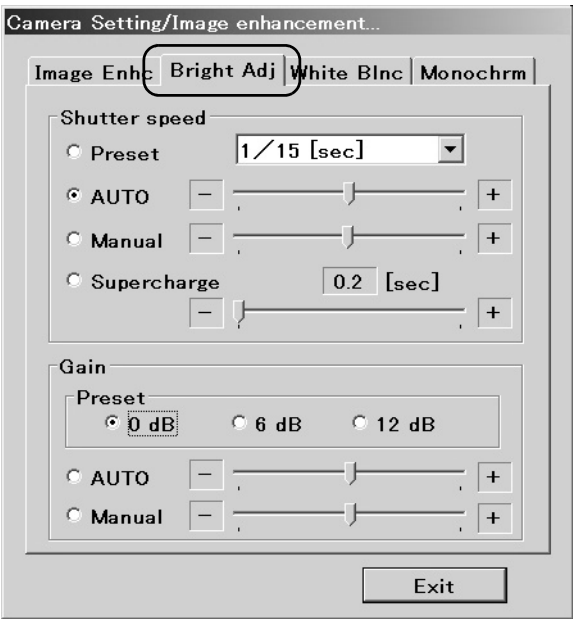
9.2.2 Adjusting the brightness with the shutter speed

The brightness of the image can be adjusted by controlling the shutter speed. When the image is too bright, increase the shutter speed (shorter exposure time) to subdue the brightness. On the contrary, when the image is dark, reduce the shutter speed (longer exposure time) to brighten the image. The shutter speed can be controlled with Preset, Auto, Manual, and Supercharge modes.

Tips It is recommended to use Auto control for normal operations.

Displaying the dialog box to adjust the shutter speed

1. Select [Camera Setting/Image enhancement] from the [Camera/Image] command on the menu bar.
The [Camera Setting/Image enhancement] dialog box appears on the screen.



2. Click on the [Bright Adj] tab.
3. Select the desired mode from [Preset], [Auto], [Manual], and [Supercharge] to adjust the shutter speed.

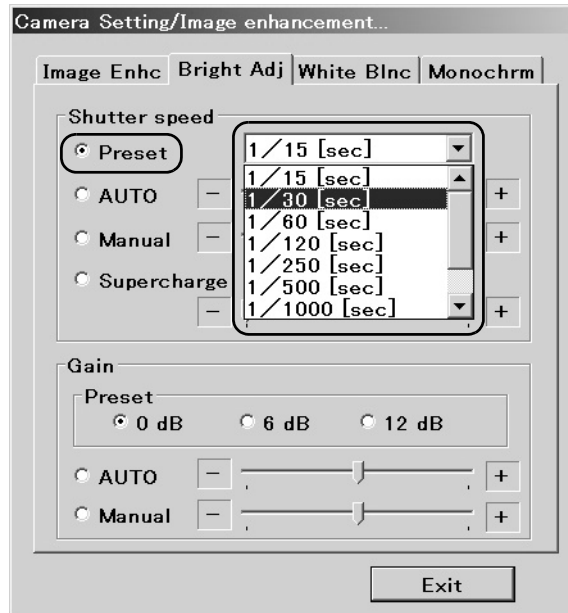
■ Preset

The shutter speed can be selected from preprogrammed settings.

1. Click the [Preset] radio button.

2. Click the [▼] button and select the desired shutter speed.

Select the desired shutter speed from preprogrammed settings of 1/15 sec to 1/5000 sec.

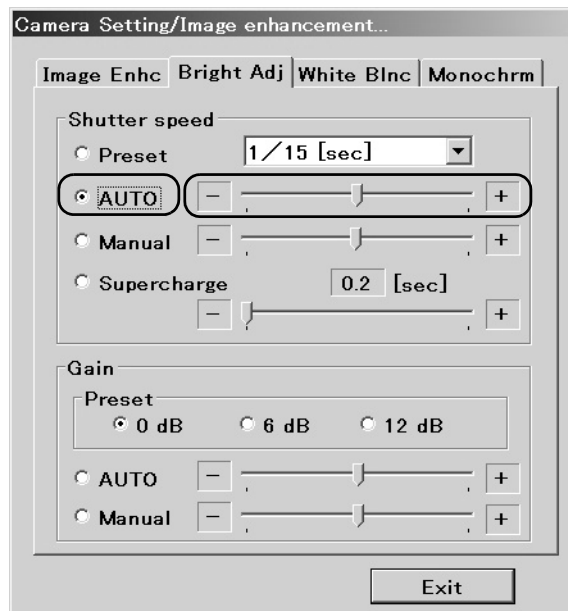


■ Auto

The shutter speed is automatically adjusted so that the image is displayed with proper brightness.

1. Click the [Auto] radio button.

The VHX-600E enters the Auto shutter speed mode.



2. Make fine adjustments with the slider bar as necessary.

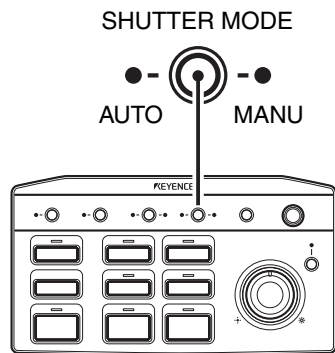
Adjust the brightness while monitoring the observation image.

- Moving the slider to the right will brighten the image, and moving the slider to the left will darken the image.

➤ Refer to "3.2 Using the slider bar" on page 3-5 to move the slider bar.

- Instead of the slider bar, the shutter speed can also be controlled using the Brightness adjustment knob on the console.

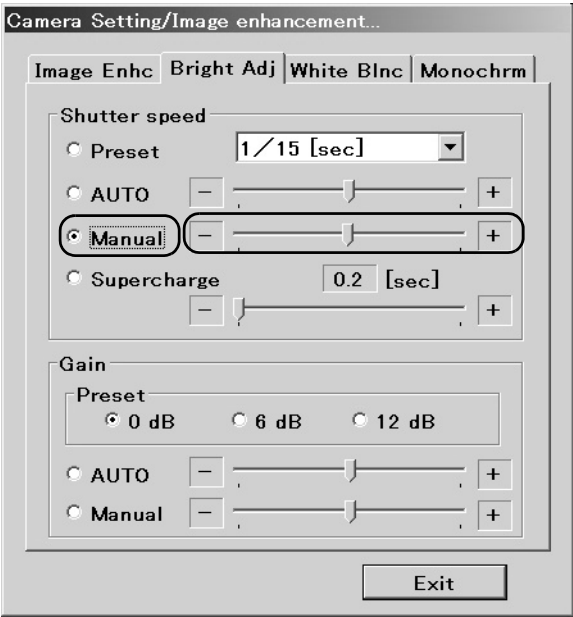
Tips The Auto/Manual mode of the shutter speed can also be switched by using the SHUTTER MODE selector switch on the console.



Manual

The shutter speed can be adjusted manually to achieve the desired brightness while monitoring the observation image.

1. Click the [Manual] radio button.
The VHX-600E enters the Manual shutter speed mode.

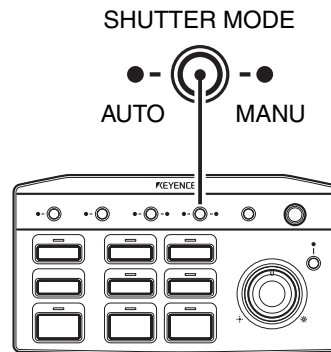


2. Adjust the slider while monitoring the brightness of the observation image.
The shutter speed is set at the brightness specified with the slider bar.
 - Moving the slider to the right will brighten the image, and moving the slider to the left will darken the image.

⇒ Refer to "3.2 Using the slider bar" on page 3-5 to move the slider bar.

- Instead of the slider bar, the shutter speed can also be controlled using the Brightness adjustment knob on the console.

Tips The Auto/Manual mode of the shutter speed can also be switched by using the SHUTTER MODE selector switch on the console.

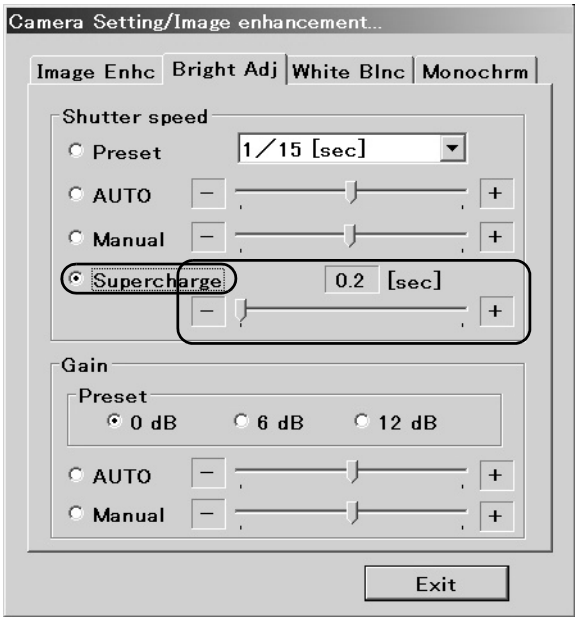


■ Supercharge shutter

The supercharge shutter function enhances the brightness of a dark screen by extending the elapsed time of the camera (exposure time) to 0.2 to 17 seconds. Use this function when the overall image is dark due to insufficient light intensity, or halation (gloss reflections) of the target is excessive.

- Note:**
- When the supercharge shutter is used, the image may become blurred due to the movement or vibration of the target.
 - When using the supercharge shutter, make sure to secure the camera by using a special stand (option) or another device.

1. Click the [Supercharge] radio button.



Tips It will take more time to refresh the screen with the supercharge shutter. It is recommended to enhance the brightness by using the gain before adjusting the lens power and focus.

⇒ Refer to "9.2.3 Adjusting the brightness with the camera gain" on page 9-13.

2. Set the speed of the supercharge shutter using the slider.

- Moving the slider to the right will extend the shutter speed, and moving the slider to the left will reduce the shutter speed.
- ⇒ Refer to "3.2 Using the slider bar" on page 3-5 to move the slider bar.
- Instead of the slider bar, the shutter speed can also be controlled using the Brightness adjustment knob on the console.
- ⇒ Refer to "9.2.1 Adjusting the brightness with the Brightness adjustment control" on page 9-6.

Tips When the halation (gloss reflections) of the target is excessive, the supercharge shutter may alleviate the problem.

Procedure: Turn down the light intensity of the halogen lamp on the VHX-600E and observe the target with the room light. Adjust the speed of the supercharge shutter so that the image is displayed with proper brightness.

9.2.3 Adjusting the brightness with the camera gain

The brightness of images can be enhanced by increasing the gain.

The Gain enhances the brightness of the entire image by electrically amplifying the video signal.

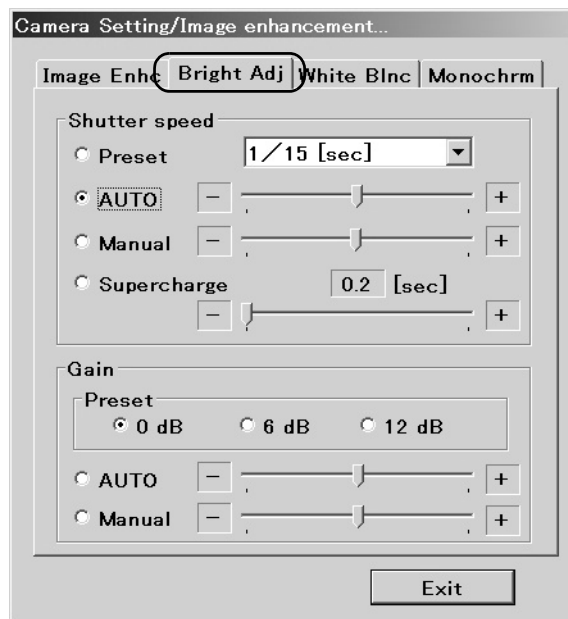
☞ Refer to "Glossary: " on page 9-7 for details about the Gain.

Displaying the dialog box to adjust the camera gain

1. Select [Camera Setting/Image enhancement] from the [Camera/Image] command on the menu bar.

The [Camera Setting/Image enhancement] dialog box appears on the screen.

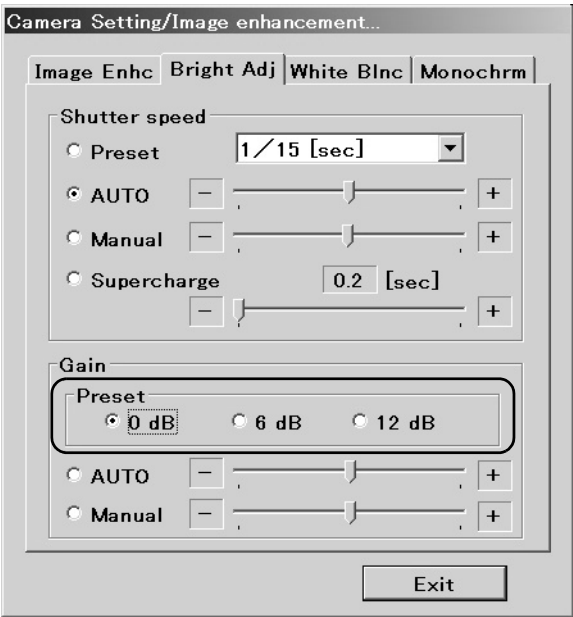
2. Click on the [Bright Adj] tab.



3. In the Gain field, select the desired mode from [Preset], [Auto], and [Manual] for adjusting the camera gain.

■ Preset

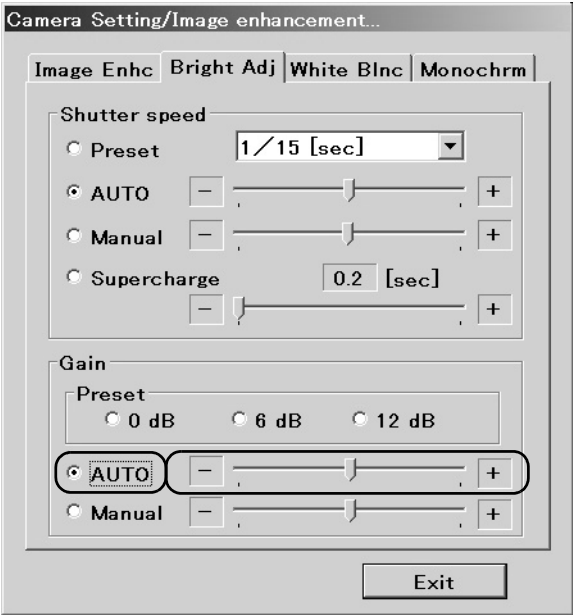
1. **Select the desired gain from [0 dB], [6 dB], and [12 dB] in the [Preset] field.**
When [0 dB] is selected, the gain will not be increased.
When the [6 dB] or [12 dB] radio button is selected, the gain is increased by 6 dB or 12 dB respectively.



■ Auto

The gain is automatically adjusted so that the image is displayed with proper brightness.

1. **Click the [Auto] radio button.**
The VHX-600E enters the Auto gain adjustment mode.



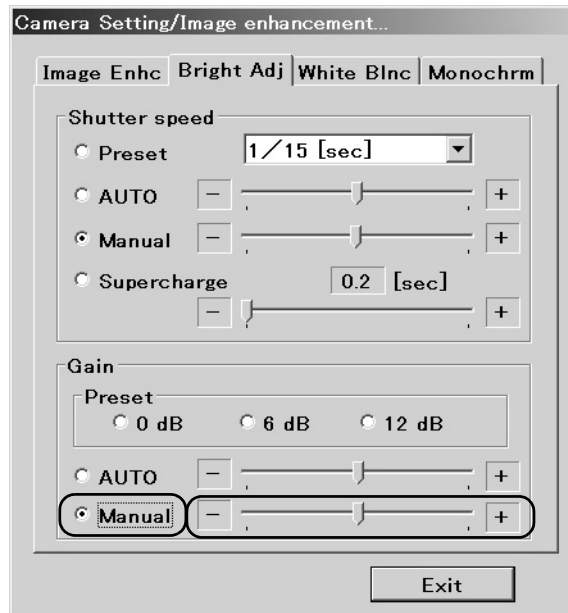
2. **Make fine adjustments with the slider bar as necessary.**
Adjust the brightness of the image that will be used as the reference for gain adjustment, while monitoring the observation image.
- Moving the slider to the right will brighten the image, and moving the slider to the left will darken the image.
- ⇒ Refer to "3.2 Using the slider bar" on page 3-5 to move the slider bar.

■ Manual

The gain can be controlled manually to achieve the desired brightness while monitoring the observation image.

1. Click the [Manual] radio button.

The VHX-600E enters the Manual gain adjustment mode.



2. Adjust the slider bar while monitoring the brightness of the observation image.

The gain is set as specified on the slider bar.

- Moving the slider to the right will brighten the image, and moving the slider to the left will darken the image.

⇒ Refer to "3.2 Using the slider bar" on page 3-5 to move the slider bar.

9.3 Adjusting the colors of images (White balance)

This section describes how to adjust the colors of images (White balance). The colors of the images can be adjusted using the console of the VHX-600E or using the [Camera Setting/Image enhancement] dialog box displayed on the screen.

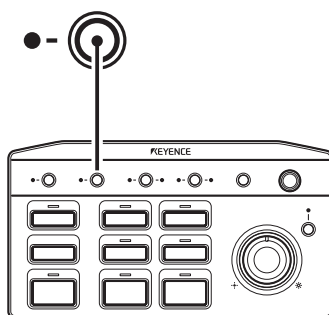
Tips It is recommended to adjust the colors using the WHITE BALANCE button on the console in normal operations.

9.3.1 Adjusting the colors of images using the console

This section describes the procedure for adjusting the colors of images using the WHITE BALANCE button.

1. **Place a white target (white paper, etc) under the camera lens at the correct focal distance to adjust the colors.**

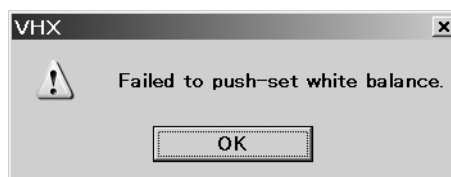
WHITE BALANCE



2. **Press the WHITE BALANCE button on the console.**

The white balance is automatically adjusted.

Note: When the white balance cannot be adjusted successfully, the error message, "Failed to push-set the white balance." appears on the screen. In this case, adjust the white balance again while checking the following points.



- Is the screen too bright or too dark? Adjust the brightness to the proper level.
- Is the screen partially too bright or too dark? Make sure that the brightness of the entire screen is consistent.
- Is the target white? Place a white target with a non-shiny finish (white matte paper, etc.) on the screen.

Tips The white balance adjustment operation using the console can also be executed using the "Push Set" operation on the [Camera Setting/Image enhancement] dialog box.

9.3.2 Adjusting the colors of images using the dialog box

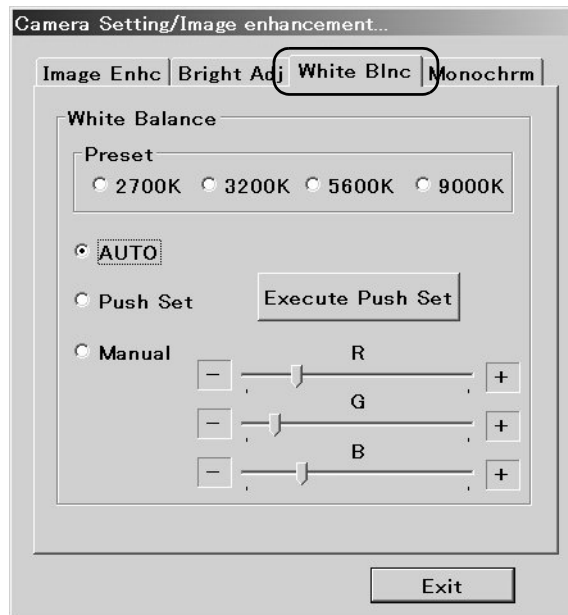
This section describes the procedure for adjusting the color of images using the [Camera Setting/Image enhancement] dialog box.

The White balance can be adjusted using the dialog box with the Preset, Auto, Push Set value or Manual mode.

Displaying the dialog box

1. Select [Camera Setting/Image enhancement] from the [Camera/Image] command on the menu bar.

The [Camera Setting/Image enhancement] dialog box appears on the screen.

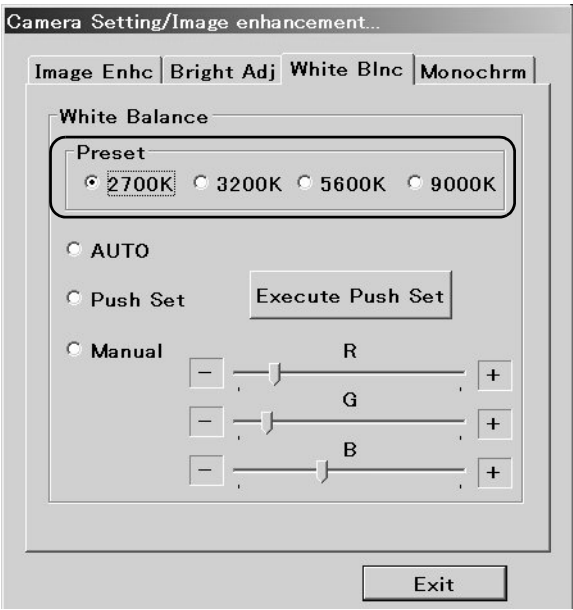


2. Click on the [White Blnc] (White Balance) tab.
3. Select the desired mode from [Preset], [Auto], [Push Set], and [Manual] for adjusting the white balance.

■ Preset

The color temperature can be selected from the preprogrammed setting values.

- 1. Click the radio button of the desired color temperature in the [Preset] field.
The white balance is configured according to the selected color temperature.

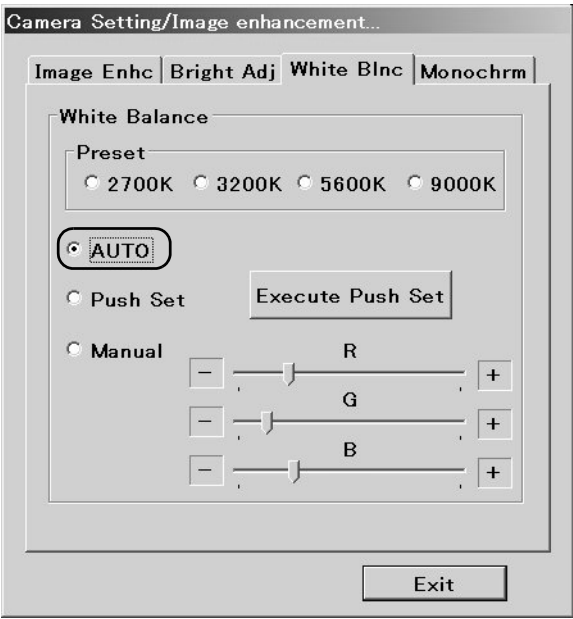


Tips The color temperature is expressed in units of “K” (Kelvin). When “2700 K” is selected, the colors of the image become bluish. When “9000 K” is selected, the colors of the image become reddish.

■ Auto

The white balance is automatically adjusted when observing targets.

- 1. Click the [Auto] radio button.
The white balance is automatically adjusted when observing targets, and the optimal hue is achieved automatically.



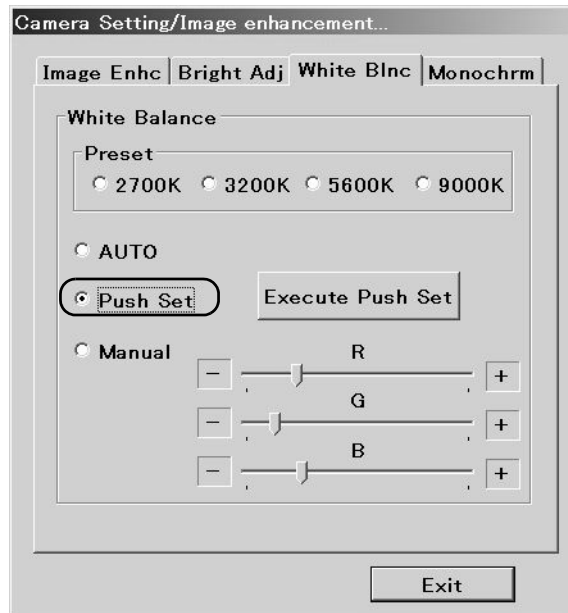
■ Push Set

The white balance can be adjusted based on a white target used as the reference color.

Tips The white balance adjustment operation using the Push Set function can also be executed by pressing the WHITE BALANCE button on the console.

⇒ Refer to "Using gain or supercharge shutter" on page 4-4 to adjust the white balance using the console.

1. Place a white target (white matte paper, etc.) on the stage for adjusting the colors.

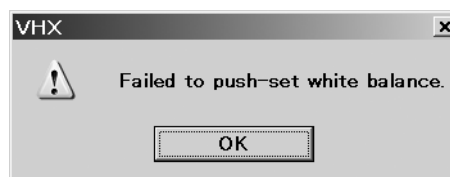


2. Click the [Push Set] radio button.

3. Press the [Execute Push Set] button.

The white balance is adjusted automatically.

Note: When the white balance cannot be adjusted successfully, the error message, "Failed to push-set the white balance." appears on the screen. In this case, adjust the white balance again while checking the following points.



- Is the screen too bright or too dark? Adjust the brightness to the proper level.
- Is the screen partially too bright or too dark? Make sure that the brightness of the entire screen is consistent.
- Is the target white? Project a white target with a non-shiny finish (white matte paper, etc.) on the screen.

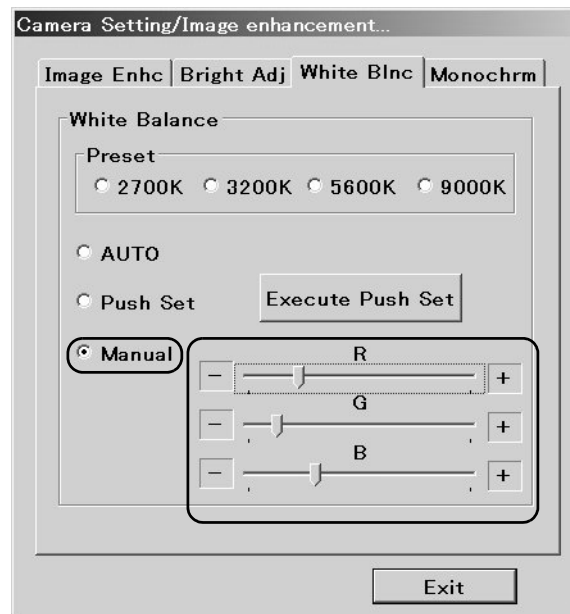
The Push Set function cannot be used with the supercharge shutter.

■ Manual

The white balance can be controlled manually to achieve the desired colors while monitoring the observation image.

1. Click the [Manual] radio button.

The white balance setting enters the manual adjustment mode.



2. Move the sliders for R (red), G (green), and B (blue) to the right or left.

Moving the sliders to the right will enhance the corresponding color, and moving the sliders to the left will attenuate the corresponding color.

⇒ Refer to "3.2 Using the slider bar" on page 3-5 to move the slider bar.

9.4 Monochrome and relief mode

This section describes images with special effects such as Monochrome and Relief.

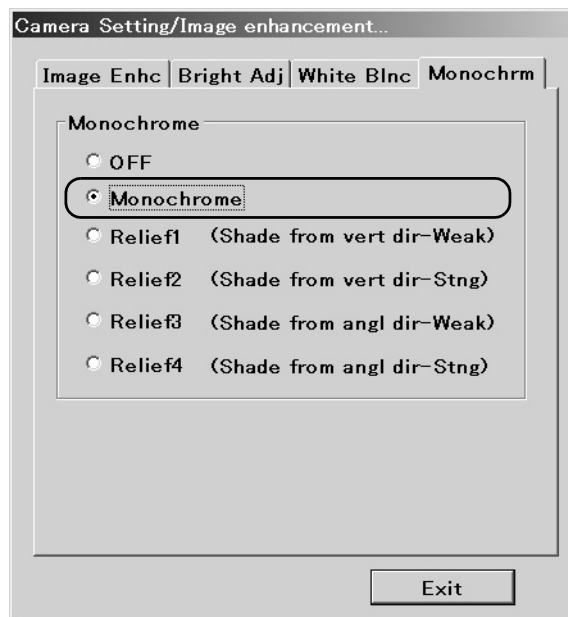
9.4.1 Monochrome

This section describes the Monochrome mode that provides observation unaffected by color.

Note: While the Monochrome mode is being selected, the [Edge enhancement] function of the [Image Enhc] (Image Enhancement) tab cannot be used.

1. Select [Camera Setting/Image enhancement] from the [Camera/Image] command on the menu bar.

The [Camera Setting/Image enhancement] dialog box appears on the screen.



2. Click on the [Monochrm] tab.
3. Put a checkmark in the checkbox next to the [Monochrome] field.

The observation image is displayed in monochrome mode.

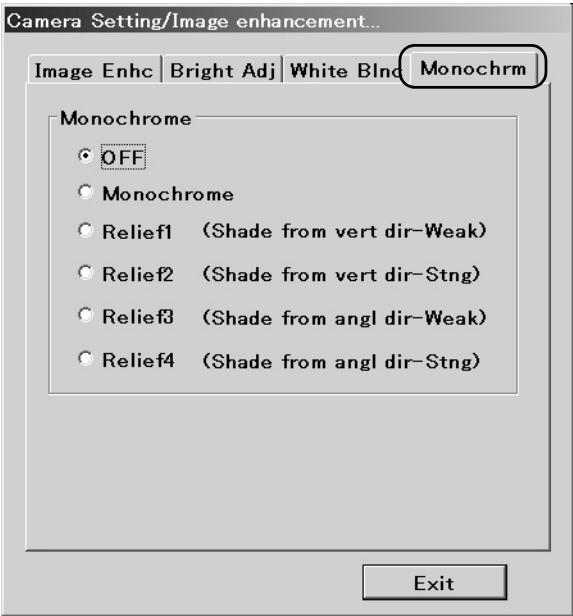
Note: The Monochrome setting is applied only for the image that is being observed through the camera. Images that are saved with color settings cannot be displayed in monochrome mode even when the Monochrome option is enabled.

9.4.2 Relief

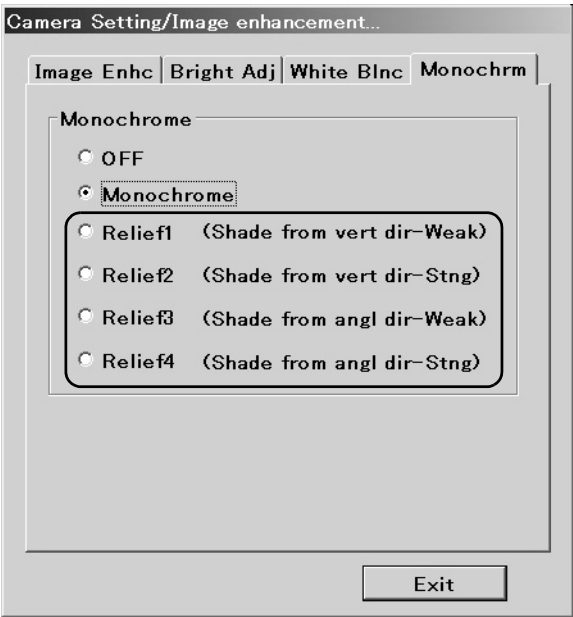
This section describes the Relief (emboss) function that emphasizes the area in which the brightness of the image changes so that flaws and minute objects can be observed easily.

Note: While the Relief mode is being selected, the [Edge enhancement] function of the [Image Enhc] (Image Enhancement) tab cannot be used.

- 1. **Select [Camera Setting/Image enhancement] from the [Camera/Image] command on the menu bar.**
The [Camera Setting/Image enhancement] dialog box appears on the screen.



- 2. **Click on the [Monochrm] tab.**
- 3. **Select the desired option from [Relief1] to [Relief4], and click the radio button.**
The Relief processing is applied to the observation image.
Relief1: (Shade from vert dir-Weak)
Relief2: (Shade from vert dir-Stng)
Relief3: (Shade from angl dir-Weak)
Relief4: (Shade from angl dir-Stng)

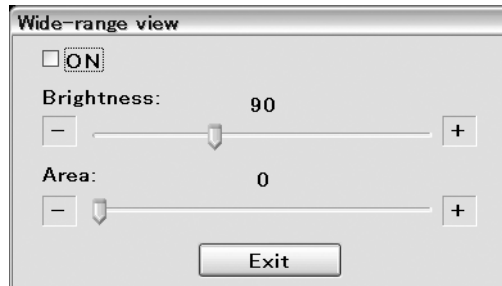


9.5 Wide-range view

This section describes the Wide-range view function that provides observation of dark and bright areas of a target with suitable brightness.

1. Select **[Wide-range view]** from the **[Camera/Image]** command on the menu bar.

The **[Wide-range view]** dialog box appears on the screen.



2. Put a checkmark in the **[ON]** checkbox.
3. Move the slider to the right or left and stop the slider when the image is clearly observed.
 - Brightness adjustment: Adjusts the brightness for the optimal shutter speeds.
 - Area adjustment: Adjusts the area to bring into focus for the target with deep depth-of-field.

⇒ Refer to "3.2 Using the slider bar" on page 3-5 to move the slider bar.

Tips Use the Offset and Gamma adjustment together with the Wide-range view as necessary.

⇒ Refer to "9.1.3 Offset" on page 9-4.

⇒ Refer to "9.1.2 Gamma adj (Gamma adjustment)" on page 9-3.

Glossary:

- **Wide-range view**

When observing a target, the brightness of the image is adjusted by changing the shutter speed. When a target has both a bright area and dark area, selecting a fast shutter speed to adjust to the bright area will result in a hard-to-see image in the dark area. On the contrary, when a slow shutter speed is selected to adjust to the dark area, the bright area will be affected by halation. The wide-range view function displays easy-to-see images suitable for observation in real time by composing the appropriate areas from two kinds of images captured with fast and slow shutter speed settings.

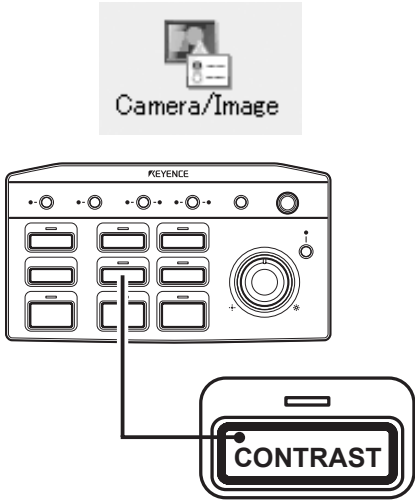
9.6 Adjusting the optimum contrast

This section explains how to adjust the contrast to a sensitivity that is best suited for the human eye.

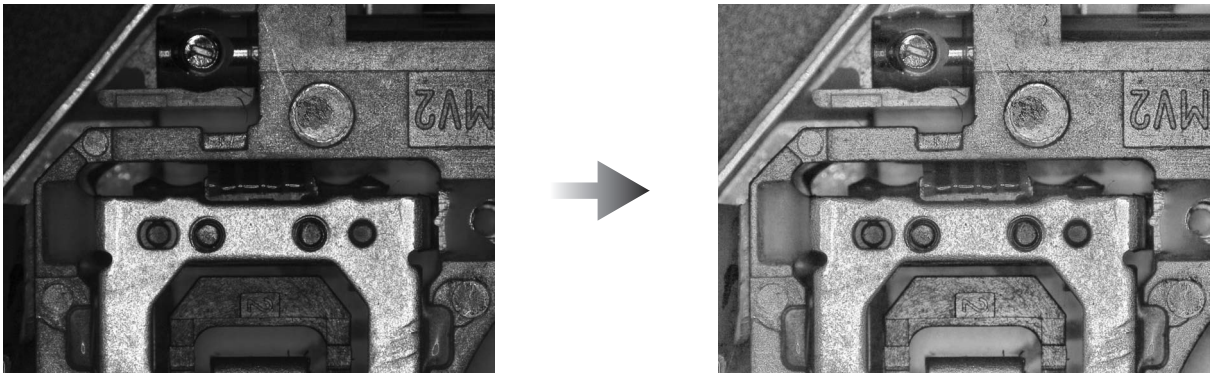
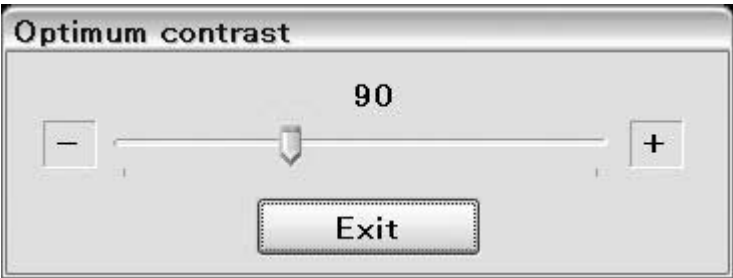
1. Press the **CONTRAST** button on the console.

The [Optimum contrast] dialog box appears.

Tips This operation can also be executed by selecting [Optimum contrast] from the [Camera/Image] command on the menu bar.



2. Move the slider to the left and the right to fine tune the image to the optimum contrast.

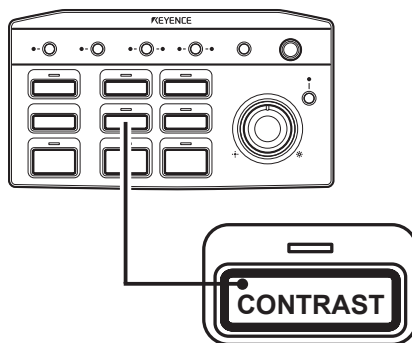


3. Click the [Exit] button.

9.6.1 Clearing contrast

1. **Press the CONTRAST button on the console again.**

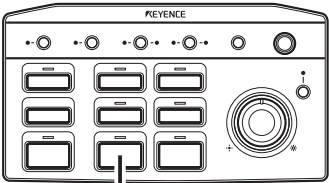
The contrast is removed and the LED for the CONTRAST button turns off.



9.7 Removing halation

This section explains how to remove glare from targets that reflect a large amount of light.

1. Press the HALATION REMOVAL button on the console.



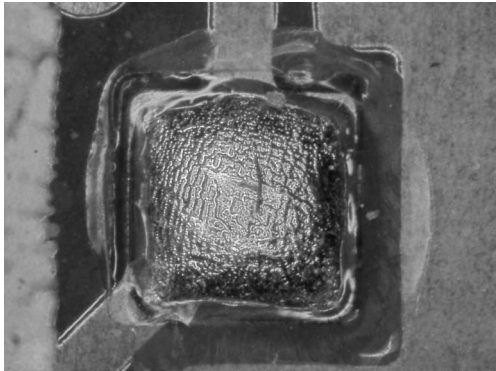
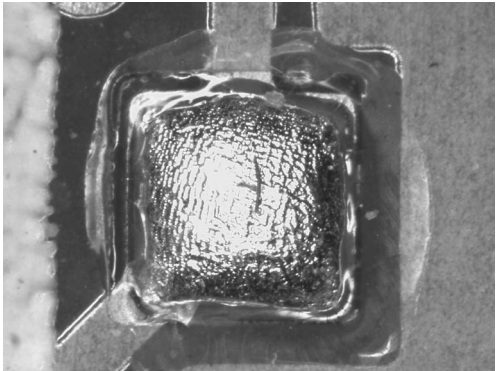
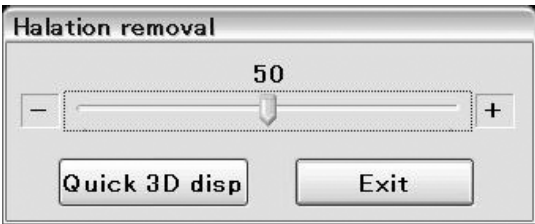
The glare from reflected light is removed on the image.

Tips This operation can also be executed by selecting [Halation removal] from the [Camera/Image] command on the menu bar.

2. Move the slider to the left and the right to fine tune the brightness to the optimum condition.

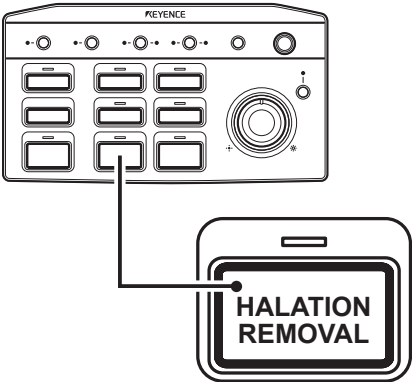
Click the [Quick 3D display] button to use the quick depth composition function while the halation removal function is in use.

➤ Refer to "8.2 Quick depth composition and 3D" on page 8-5.



9.7.1 Clearing halation removal

1. To clear the halation removal, press the HALATION REMOVAL button again.



9.8 Setting the camera environment

9.8.1 Increasing the display speed (frame rate)

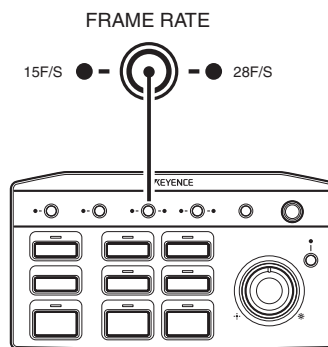
This section describes the procedure for increasing the display speed (frame rate) from the standard 15 frames/second to 28 frames/second.

When the High frame rate is selected, even moving targets can be displayed in smooth motion.

1. Press the FRAME RATE selector switch on the console.

The LED (28F/S) illuminates and the monitor is switched to display the image with the high-speed frame rate.

- The [High frame rate] dialog box appears on the screen.
- The operation can be executed by selecting [High frame rate] from the [Camera/Image] command.



2. Press the FRAME RATE selector switch on the console again to return to the standard mode of 15 frames/second.

The same operation can also be executed by clicking the [Exit] button in the [High frame rate] dialog box.



Glossary:

• **Frame rate**

The frame rate indicates the number of frames displayed per second when displaying the image captured by the camera. The VHX-600E displays image data at a speed of 15F/S (15 frames per second) as the normal setting. When the mode is switched to High frame rate, the VHX-600E displays the image data at a speed of 28F/S (28 frames per second).

9.8.2 Correcting camera shake

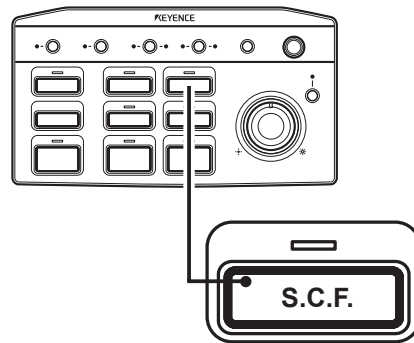
This section describes the camera Shake Correction Function that corrects the color deviations caused by camera shake in hand-held observations.

1. Press the S.C.F. button on the console.

The LED above the S.C.F. button illuminates, and the VHX-600E is switched to the Camera-Shake Correction mode.

Tips

The same operation can be executed by selecting [Shake correction mode] from the [Camera/Image] command.



9.8.3 Observing targets with the Continuous Clear Mode

In continuous clear mode, the target is shown as a 4 million pixel equivalent, high quality quasi-video by shifting each pixel in the CCD.

- ⇒ Refer to "6.1 Recording images (still images)" on page 6-2 for more information about continuous clear mode.

9.8.4 Lamp intensity adjustment (LIGHT CONTROL)

Adjusts the intensity of the light that hits the target.

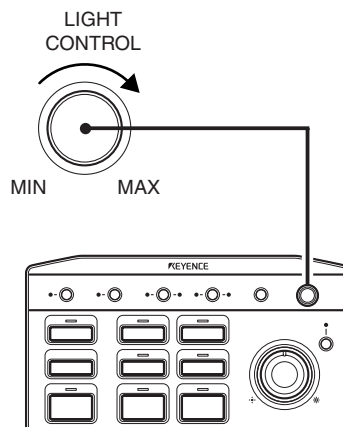
1. Turn the **LIGHT CONTROL** knob on the console to adjust the light to the intensity that permits the clearest image of the target.

Tips This operation can also be executed by selecting [Light control] from the [Camera/Image] command on the menu bar.

- 1 Select [Light control] from [Camera/Image] of the menu bar.
The [Light control] dialog box appears on the screen.
 - 2 Use the adjustment dial when adjusting the brightness of the image to maximum.
- ⇒ Refer to "9.2 Adjusting the brightness of the image" on page 9-6.



⇒ Refer to "3.2 Using the slider bar" on page 3-5.



9.8.5 Bump enhancement mode

This section describes how to enhance the projections and depressions of targets to be displayed.

⇒ Refer to "5.3 Enhancing the projections and depressions of targets" on page 5-6 for the Bump enhancement mode.

1. Press the ENHANCE button on the console.

The LED lamp above the ENHANCE button illuminates.

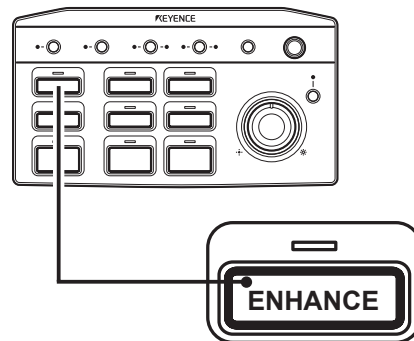
The projections and depressions of the image currently being displayed become sharp.

Tips

This operation can also be executed by selecting [Bump enhancement mode] from the [Camera/Image] command on the menu bar.

2. To exit the Bump enhancement display, press the ENHANCE button on the console again.

This mode can also be exited by selecting [Bump enhancement mode] from the [Camera/Image] command on the menu bar.

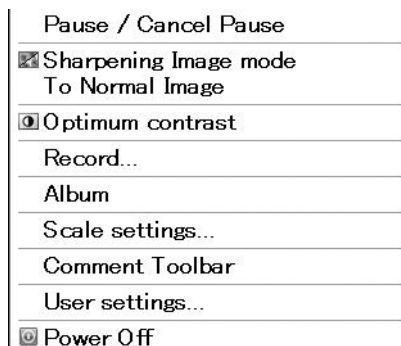


9.9 Sharpening Image Mode

This section describes the procedure for displaying the desired part vividly and sharply.

1. Right-click the mouse on the observation screen.

The menu appears on the screen.



2. Select [Sharpening Image mode] from the menu.

The color of the image turns vivid and the edges turn sharp.

3. To cancel [Sharpening Image mode], select [To Normal Image] from the menu.

Chapter 10

Printing Images

This chapter describes the procedure for printing observed images.

10.1	Overview of the print operation.....	10-2
10.2	Setting the paper size, print direction, and No. of copies	10-4
10.3	Arranging the layout for printing comments	10-5

10.1 Overview of the print operation

This section describes the basic operational procedure for printing observed images.

Note: Use the dedicated printer (CP30DW) that is sold separately.

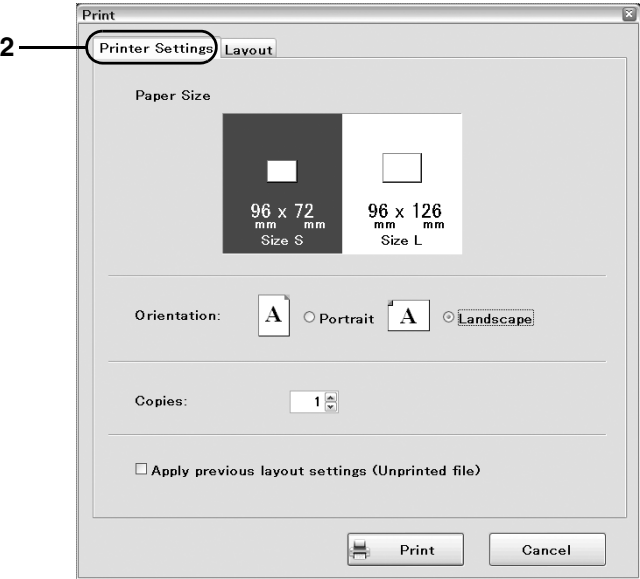
➤ “Digital Photo Printer CP30DW User’s Manual”

10.1.1 Printing images after setting parameters

1. **Click the [Print] icon on the menu bar.**
The [Print] dialog box appears on the screen.
 - The [Print] dialog box can also be displayed by clicking the [Print] button on the status bar.
 - When a printer is not connected to the VHX-600E, the icon is grayed out and cannot be selected by clicking.



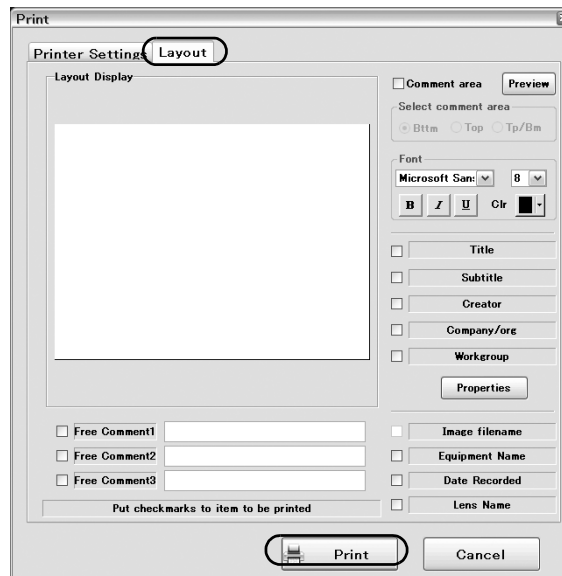
2. **Click on the [Printer Setting] tab.**
Set the Paper Size, Print Direction, and Copies parameters.
➤ Refer to “10.2 Setting the paper size, print direction, and No. of copies” on page 10-4 for details about the Paper Size, Print Direction, and Copies parameters.



3. Click on the [Layout] tab.

Configure the layout of the observed image and comments.

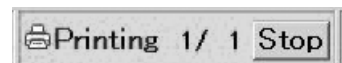
- When printing the observed image as it is without arranging the layout, proceed to the next step.
- ⇒ Refer to "10.3 Arranging the layout for printing comments" on page 10-5 for details about the layout.



4. Click the [Print] button.

The print operation starts.

Note: To stop the printing, click the [Stop] button. The print operation is stopped after the current print job is completed.



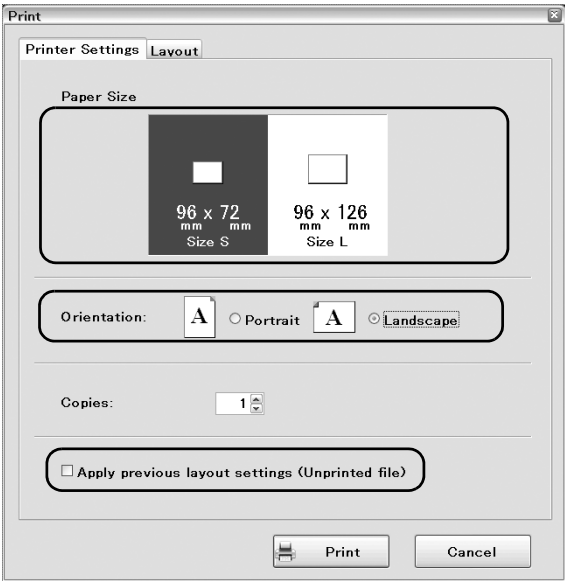
10.2 Setting the paper size, print direction, and No. of copies



This section describes the procedure for setting the parameters on the Print Setup tab used to set up the paper size, print direction, and number of copies.

Note: These settings are required for printing images.

1. **Select the desired [Paper Size].**
 Select the desired paper size from the following four types.

Size name	Paper size
SizeS	96 x 72 mm
SizeL	96 x 126 mm



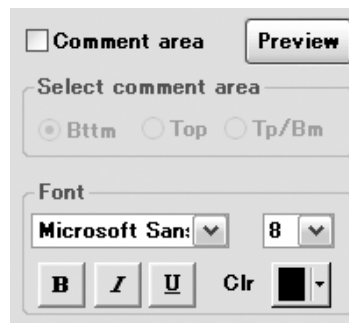
2. **Select either [Portrait] or [Landscape] for the Orientation.**
 Select “Landscape” for normal operations.
3. **Click the  or  button to specify the desired value for the Copies option.**
 The desired value can also be entered directly into the textbox from the keyboard.

10.3 Arranging the layout for printing comments

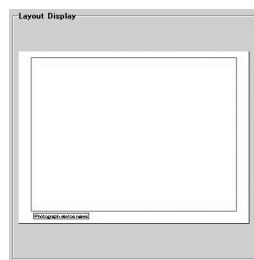
This section describes the procedure for setting the Layout tab used to specify the comments to be printed.

10.3.1 The display and functions of the Layout screen

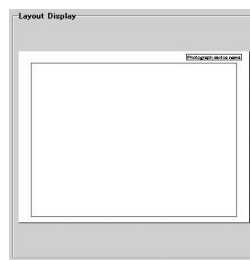
1. Enable or disable the comment area by selecting or deselecting the “Comment area” checkbox.
 - Enabling this option will make a margin around the image in which comments can be printed. The print area is displayed with a red frame.
 - Disabling this option will make rimless prints without margins.
 - Comments can be placed on the image regardless of the on/off state of the Comment area option.



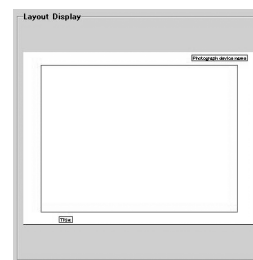
2. When the [Comment area] checkbox is set to the on state, select comment area from [Down (Bottom)], [Up (Top)], [Vert (Top and Bottom)].



[Down]



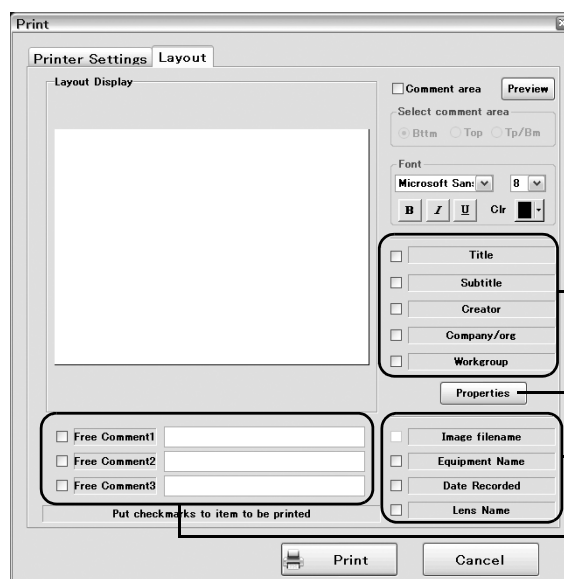
[Up]



[Vert]

3. Put a checkmark in the checkbox for each comment to be used.

The items that have been enabled are displayed with blue frames in the layout display area.



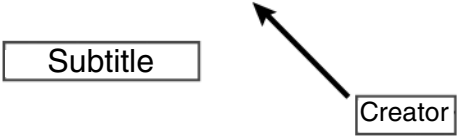
The settings configured using the [File Properties] command of the [Rec Setting] menu on the menu bar will be used when printing. To change the settings, click the [Properties] button.

Clicking this button displays the [File Properties] settings dialog box. The property settings can be reviewed or changed before printing.

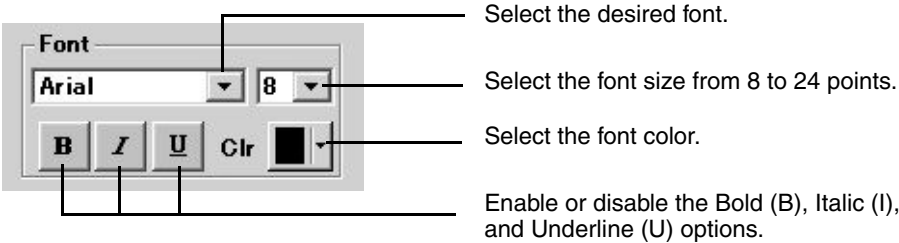
Image filename, Photograph device, and Rec Date can be printed.

The desired text or phrases can be entered and printed.
 ⇨ Refer to "Entering free comments" on page 10-6.

4. **Drag the comment and place it in the desired position.**
Comments can be arranged on the image as well as in the comment area.



5. **Specify the font, size, style and color in the Font field.**



Tips

It is recommended to select a “Sans-serif” typeface (eg. Arial) for the font.
When characters with a small font size are printed in “Serif” typeface (eg. Times New Roman), the characters may become faint.

Entering free comments

Desired sentences you want to print can be entered on the Layout tab window.

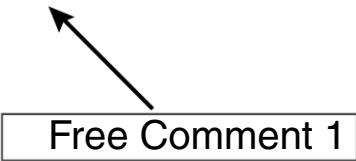
1. **Put a checkmark in the [Free Comment] checkbox on the [Layout] tab.**
A free comment textbox (blue frame) is displayed on the layout area.



2. **Click on the textbox.**
The character cursor flashes and switches to the text entry mode.
3. **Enter the desired characters using the keyboard.**
The sentence you entered is displayed in the textbox.
- The entered text is not displayed in a blue frame. The [Free Comment] display remains in the blue frame.



4. **Drag the textbox (blue frame) to the desired position.**



Note: Up to 64 characters can be entered for a free comment. The characters may extend off the frame and will not be printed depending on the text layout or when a large font size is selected.

Verifying the layout

1. Click the [Preview] button.

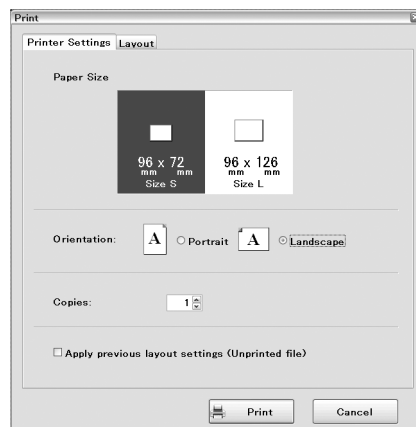
The configured layout and image can be verified.



Applying the created layout to other images

1. Put a checkmark in the [Apply previous layout settings (Unprinted file)] checkbox to apply the created layout to other images by default.

Tips The layout is applied only to the files not yet printed.



2. Remove the checkbox to set a layout for each image.

Chapter 11

Environment Setting

This chapter describes the procedures for setting the operating environment and network of the VHX-600E.

11.1	Options	11-2
11.2	User settings.....	11-5
11.3	Network Setting	11-7
11.4	Starting and stopping the FTP server.....	11-8
11.5	Share Network ON/OFF	11-9
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11.1 Options

This section describes the operating environment and network settings of the VHX-600E.

11.1.1 Option Setup

The following describes the operating environment of the VHX-600E.

System

Configures various system settings.

Option settings

System

DateTime

Sound

☒ Use sound function

JPEG Quality

☒ Normal mode ☐ High compress

JPEG2000 Quality (Lossless OFF)

☒ High compress ☐ Super High compress

Cursor color

☒ White ☐ Black

3D bkgd color

☒ Black ☐ White

OK

Cancel

Sound:
Putting a checkmark in the checkbox will play sounds for events from the built-in speaker.

JPEG Quality:
Select the compression ratio used for saving the image here.

JPEG2000 Quality (Lossless OFF):
Select the compression ratio used for saving in JPEG2000 format.

Cursor Color:
Select the color of the mouse cursor here.

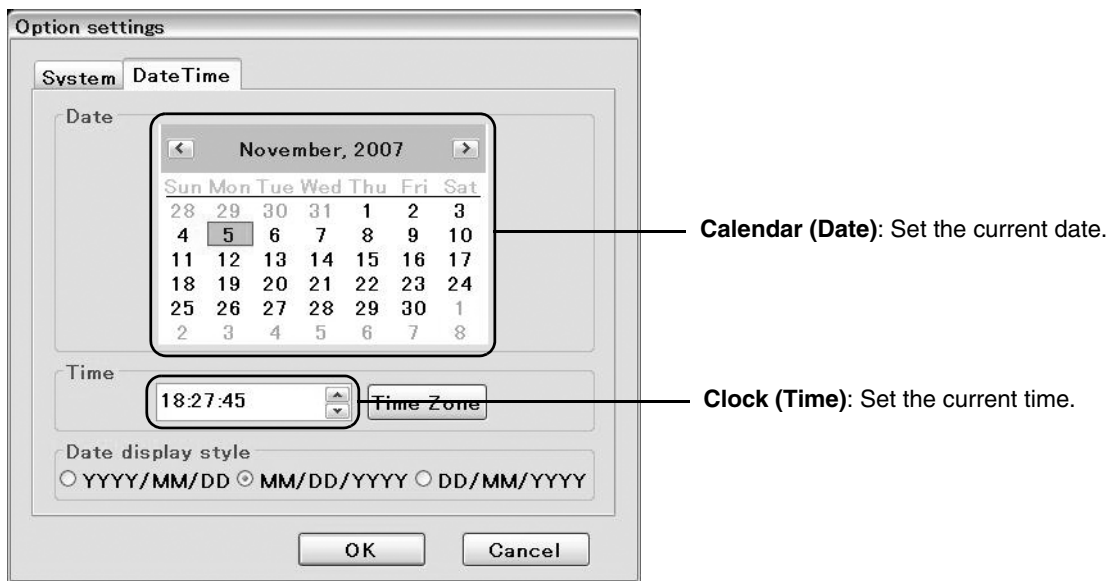
3D bkgd color:
Select the background color of the 3D display.

- Tips

 - When the sound function is enabled, the shutter makes a clicking sound when recording, allowing the user to use the sound to confirm that the image is recorded.
 - When [High compress mode] is selected for the JPEG Compress Mode, the size of the image file is reduced; however, the displayed image will be grainy compared to the [Normal Mode] image.

Date Set

The date and time of the VHX-600E can be set up on the Date Time tab.



Procedure for setting the date and time

1. Click the ◀ or ▶ button and select the current year and month.
2. Click on the current date.
3. Select the hour, minute, or second to be adjusted, and change the value using the ▲ or ▼ button.
4. Click the [OK] button.
The configured date and time settings are activated.



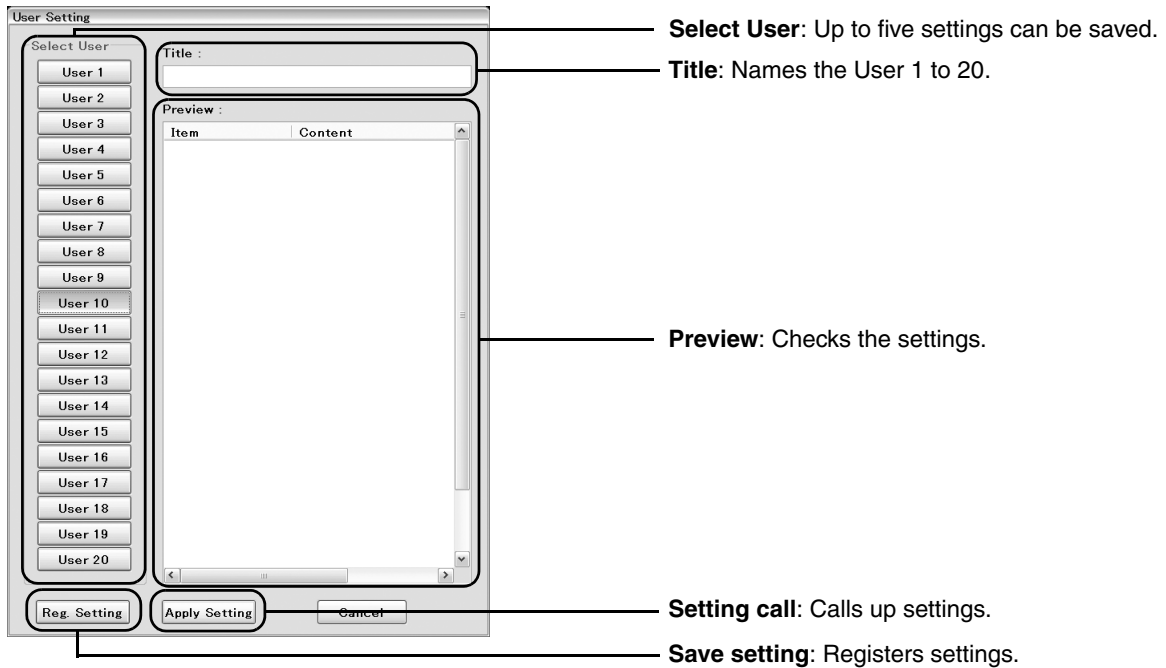
11.2 User settings

Settings such as [Camera/Image] and [Option] can be saved.

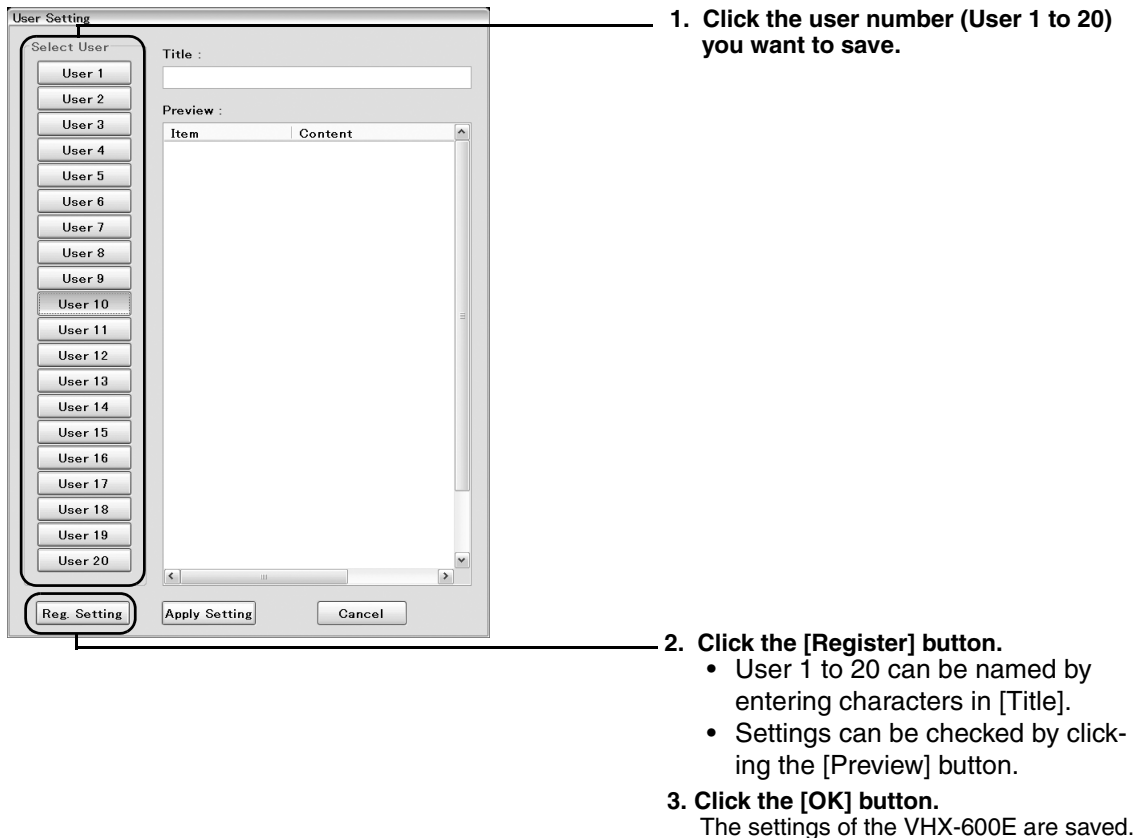
11.2.1 Performing user settings

Up to 20 user settings can be saved.

The saved settings can also be called up and used. The settings can be checked on the preview window.



Saving settings



Calling up settings

1. **Click the user number (User 1 to 20) you want to call up.**
Settings can be checked by clicking the [Preview] button.
2. **Click the [Setting call] button.**
3. **Click the [OK] button.**
Setting changes to the called up setting.

Tips The VHX-600E starts operating with the normal settings when the power is turned on.

11.3 Network Setting

The network settings can be configured on the Network Setting window.

The screenshot shows the 'Network settings' window. It contains the following fields and callouts:

- IP Address settings:**
 - IP Address:** 192 . 168 . 0 . 1
 - Subnet mask:** 255 . 255 . 255 . 0
 - Default gateway:** 192 . 168 . 0 . 254
- MAC Address:** (Empty field)
- Network hostname:** PC8718XP
- *) Settings are enabled after reboots.**
- VHX communication software mode:**
 - ☐ OFF
 - ☐ Standard
 - ☒ High-speed

Callouts:

- IP Address Setting:** Set up the IP address, subnet mask, and default gateway.
- MAC Address:** Displays the MAC address of the VHX-600E when connected to the network..
- Shared network name:** Displays the name of the VHX-600E used when sharing the network.
⇒ Refer to "11.5 Share Network ON/OFF" on page 11-9 for details about the network.
- VHX Communication Software Mode:** Configures communication parameters between the VHX-600E and the PC.
⇒ Refer to "12.1 Overview of PC connection" on page 12-2 for network setting.

- Note:**
- When the network settings are changed, it is necessary to restart the VHX-600E before the new settings take effect.
 - When connecting to an intra-office network, make sure to consult the system administrator in advance to set up the IP address and required settings. Setting up an IP address arbitrarily may cause problems with the network.


11.4 Starting and stopping the FTP server

The VHX-600E can serve as an FTP server, which can be connected with a PC to execute file transmissions.

⇒ Refer to "12.5 Connecting via FTP" on page 12-37 for details about the FTP connection.

Starting the FTP server

Select the [Start FTP Server] command from the [Option] menu on the menu bar. The VHX-600E functions as the FTP server.

Tips When the FTP server is activated, a checkmark  is displayed to the left of the [Start FTP Server] command on the menu bar.

Stopping the FTP server

Select the [Stop FTP Server] command from the [Option] menu on the menu bar. The VHX-600E stops operating as the FTP server.

11.5 Share Network ON/OFF

The VHX-600E can be connected to the LAN to form a network with other PCs.

⇒ Refer to "12.6 Sharing a network" on page 12-41 for details about the network sharing.

Sharing the network

Select the [Share Network ON] command from the [Option] menu on the menu bar, and the folders and files can be shared with the PC(s) connected to the network.

Tips

To share the network, select the [Share Network ON] command from the [Option] menu on the menu bar, and select [All network funcs] in [Network enable setting] in the [Network Setting] dialog box.

When the network is shared, a checkmark ☒ is displayed to the left of the [Share Network ON] command on the menu bar.

Stopping the network sharing

Select the [Share Network OFF] command from the [Option] menu on the menu bar, and the VHX-600E stops sharing the folders and files with the PC(s) connected to the network.

11.6 Switching languages

Initialize the settings after switching languages.

1. Select the [Change Language] command from the [Option] menu on the menu bar.
The [Change Language] dialog box appears on the screen.

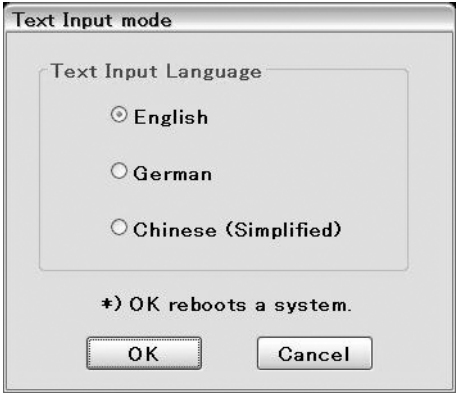


2. Click the language you want to switch to, and click the [OK] button.
The setting takes effect after the VHX-600E is restarted.

11.7 Text Input mode

You can switch input languages.

1. **Select the [Text Input Language] command from the [Option] menu on the menu bar.**
The [Text Input Language] dialog box appears on the screen.



2. **Click the language you want to switch to, and click the [OK] button.**
The setting takes effect after the VHX-600E is restarted.

The following languages can be selected:

- English
- German
- Chinese (Simplified)

Note: A keyboard must be connected to input German or Chinese.
Use the appropriate keyboard for each language as shown in the following table.


Input language	Keyboard type
English	English keyboard (101 keyboard)
German	German keyboard
Chinese	English keyboard (101 keyboard)

- Note:** The switched language cannot be used for the following items:
- File name or folder name for the CD-R writing function
 - E-mail transmission function
 - CSV file (text file)
 - Lens name

11.8 Zoom correction mode

This function is used to adjust the field of view to fit into the 1/2-inch CCD.

1. **Select the [Zoom correction mode] command from the [Option] menu on the menu bar.**
The observation switches to the Zoom correct.
2. **Select the [Zoom correction mode] command again from the [Option] menu on the menu bar.**
The Zoom correct returns to the normal display mode.

Tips During the Zoom correct mode, a checkmark  is displayed to the left of the [Zoom correct] command on the menu bar.

11.9 Initialization

The settings on the VHX-600E can be initialized.

1. **Select the [Initialize] command from the [Option] menu on the menu bar.**
A dialog box confirming the execution of initialization appears on the screen.
2. **Click the [OK] button to initialize the settings stored in the VHX-600E.**

Tips

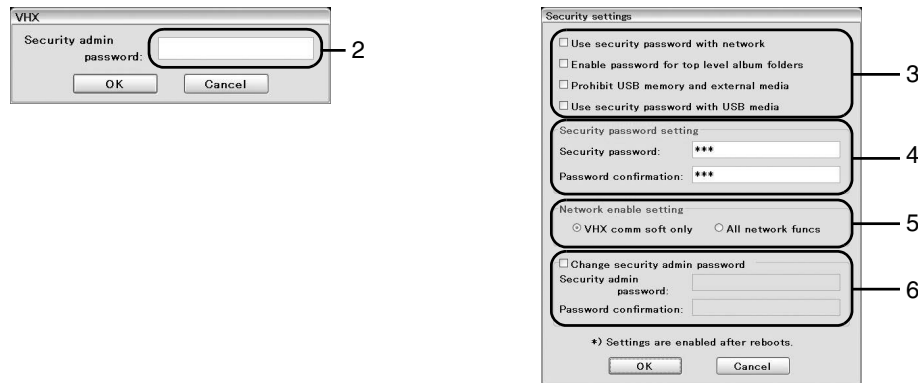
Put a checkmark in the [Initialize Calibration setting as well.] checkbox and click the [OK] button to return the calibration values to the factory default settings.



11.10 Security settings

Configures the security settings including functional restrictions and password setting.

1. Select [Security setting] from the [Option] command on the menu bar.
2. Enter a password for security management.
No password is entered by default. Click the [OK] button.



3. Configure the various security settings.
 - Use a security password when using the network:
Putting a checkmark in this checkbox means that the security password must be entered before using the network.
 - Enable password setting for the root folders of albums:
Putting a checkmark in this checkbox enables passwords to be set for the root folders of albums.
 - Forbid using external media including USB storage devices:
Putting a checkmark in this checkbox prevents the device from recognizing USB media. CD-R/RWs can be used for reading (but not for writing to).
 - Use a security password when using USB media:
Putting a checkmark in this checkbox means that the security password must be entered before using USB media.
4. Set a security password.
Set a security password for security purposes.
5. Set the Network enable setting
 - VHX Communication software only
Allows only the VHX Communication Software to perform communication between the VHX-600E and the PC. FTP Server or Shared Network cannot be used.
Select this mode when using the VHX Communication Software.
As this mode allows only the port dedicated for the VHX Communication Software, it enhances the computer virus protection via network.
 - All network functions
This mode allows FTP Server, Shared Network as well as the VHX Communication Software to perform communication between the VHX-600E and the PC. Select this mode when using FTP Server or Shared Network.
6. Set a password for security management.
The password setting will be enabled once the [OK] button is clicked and the VHX-600E is restarted.

Note:

- After setting a password for security management, security settings cannot be changed unless the password is entered.
- Take note of the security management password and keep it in a safe place.

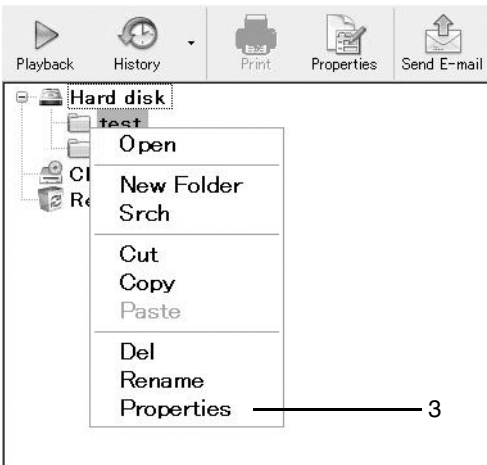
11.11 Setting a password for the root folder of an album

Set a different password for each root folder of an album.

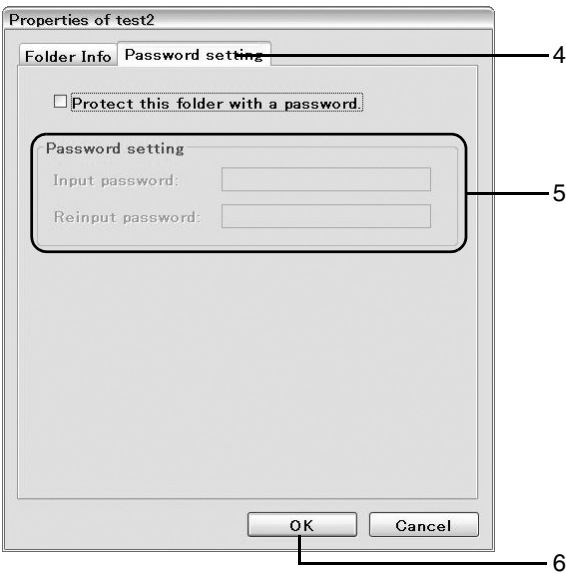
- 1. Select [Album] on the menu bar.
- 2. Select and right-click on a folder to set a password for the folder.

Tips Passwords can only be set to the folders directly under the hard disk.

- 3. Select [Properties].
The properties dialog of the folder opens.



- 4. Select [Set password] tab, and then put a checkmark in the [Protect this folder with password] checkbox.
- 5. Enter a password and re-enter it for confirmation.
- 6. Click the [OK] button.
The password is now set to the specified folder.



Chapter 12

Connecting with a PC

This chapter describes the procedures for connecting the controller with a PC.
The controller can be connected with a PC by using the VHX communication software, using FTP, or sharing a network.

12.1	Overview of PC connection	12-2
12.2	Connecting via LAN.....	12-5
12.3	Installing the file management software (VHX Communication Software)	12-8
12.4	Using the file management software (VHX Communication Software)	12-13
12.5	Connecting via FTP	12-37
12.6	Sharing a network.....	12-41

12.1 Overview of PC connection

This section describes an overview of the PC connection.

12.1.1 System requirements for the PC

Ensure that the PC to be connected with the controller conforms to the following conditions.

Compliant OS	Windows 2000/XP/Vista/7 Preinstall version
CPU	Pentium4 1.6 GHz or higher (SSE2 compliant)
Memory space	512 MB or more (1 GB or more is recommended.)
Connection inter- face	The following LAN port should be available as standard: LAN (RJ-45 1000BASE-T/100BASE-TX/10BASE-T)
Display resolution	1024x768 or higher (1600x1200 pixels is recommended.)
Display color	16.77 million colors (24 bits) or greater
Hard disk space	200 MB or more *1
Graphic memory space	16 MB or more (32 MB or more is recommended.)
Other	CD-ROM drive should be included. (For installing the VHX communication software)

*1 When saving image files, additional disk space for the image files is required.

Also ensure that the PC conforms to the following requirements when using the VHX 3D Viewer software.

Compliant OS	Windows 2000/XP/Vista/7 Preinstall version
CPU	Pentium4 1.6 GHz or higher (SSE2 compliant)
Memory space	512 MB or more
Display color	32 bits or greater
Graphics chip	DirectX9.0b compliant (Hardware T&L compliant)
Graphic memory space	32 MB or more (32 MB or more is recommended.)
DirectX	Version 9.0b or higher

- Proper operation is not guaranteed on all PCs that satisfy the above requirements.
- Make sure that the CPU performance and memory space satisfy the requirements of the OS.

Note: When processing high-definition images (4800 x 3600, 3200 x 2400 pixels), higher specifications than those listed above are required.

12.1.2 Communication methods

The information below lists the methods for accessing the controller from a PC.

VHX communication software (Recommended. CD-ROM included.)

The Windows machine is capable of remotely controlling the controller or editing the files (functions such as copy or delete).

⇒ Refer to "12.4 Using the file management software (VHX Communication Software)" on page 12-13

FTP

Files can be copied between the controller and the PC.

⇒ Refer to "12.5 Connecting via FTP" on page 12-37.

Sharing a network

The Windows machine is capable of accessing the shared folder of the controller, and the files can be copied to and from the controller and the PC

⇒ Refer to "12.5.3 Copying files" on page 12-38

Tips Computer virus protection of the controller

As the system block in the controller is hardware-protected, the system is refreshed every time the power is turned on. Therefore, the controller starts up clean every time the power is turned on, even if it happens to become infected by a computer virus.

KEYENCE recommends using the "VHX communication software" to improve the security against computer viruses and setting the Network enable setting to "VHX Com Soft only".

12.1.3 Connection types and conditions

The controller can connect to a PC by three different methods. Be sure that the conditions to allow connection (1) through (5) are all marked as Yes.

Type	Connection procedure (Recommended)	Windows				"Option" menu				"Network Setting" in the "Option" menu			"Security Setting" in the "Option" menu	
						FTP server		Shared Network		VHX Communication software mode			Network enable setting	
		2000	XP	Vista	7	Start	Stop	ON	OFF	OFF	Standard	High speed	VHX Communication software only	All network functions
VHX communication software (recommended)	LAN	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes
FTP	LAN	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	No	Yes
Shared Network	LAN	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	No	Yes
Conditions to allow connections		(1)*1				(2)*2		(3)*3		(4)*4			(5)*5	

*1 ⇒ Refer to page 12-2.

*2 When using the VHX communication software or the shared network, the FTP server can be started or stopped.

⇒ Refer to page 12-37.

*3 When using the VHX communication software or the FTP, the network can be on or off.

⇒ Refer to page 12-41.

*4 When using the FTP or the shared network, the software mode can be off, normal, or high speed.

⇒ Refer to page 12-4.

*5 ⇒ Refer to page 12-4.

Network Setting

The network settings such as IP address, VHX Communication software mode, and network enable setting can be configured on the Network Setting window.

Network settings

IP Address settings

IP Address: 192 . 168 . 0 . 1

Subnet mask: 255 . 255 . 255 . 0

Default gateway: 192 . 168 . 0 . 254

MAC Address:

Network hostname: PC8718XP

*) Settings are enabled after reboots.

VHX communication software mode

☐ OFF ☐ Standard ☒ High-speed

OK Cancel

IP Address Setting:

Set up the IP address, subnet mask, and default gateway.

MAC Address:

Displays the MAC address of the controller when the controller is connected to the network.

Network hostname:

Displays the name of the controller used when sharing the network.

VHX Communication software mode

Note: When the communication mode is changed from the VHX Communication software mode on the VHX side, all the connections are temporally cut. When the VHX Communication Software is reconnected, communication resumes in the new mode.

VHX Communication software mode

Sets the communication speed between the controller and a PC using the VHX Communication Software.

OFF	Stops communication between the controller and the PC (LAN or USB). It is recommended to set the VHX Communication software mode to OFF because communication between the controller and the PC during motion picture recording may cause screen distortion.
Standard	Performs communication in the normal speed during LAN connection. This mode allows simultaneous communication between the controller and two or more PCs.
High speed	Performs higher speed communication than standard connection. This mode allows only one PC to be connected to the controller.

12.2 Connecting via LAN

This section describes the procedures for connecting the controller and the PC to an intra-group LAN and for connecting the controller and a PC in a one-to-one configuration.

12.2.1 Connecting to an intra-group LAN

All LAN connections in a group using the VHX communication software, FTP, and network sharing can be set up using the following procedure.

Obtaining the address

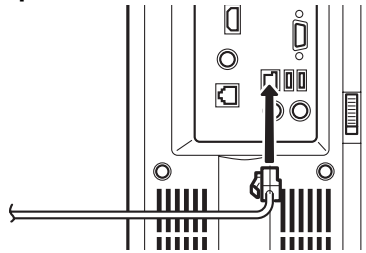
Consult the network administrator and obtain the IP setup information (IP address, subnet mask, and default gateway) of the controller.

Tips The PC refers to this IP address when the PC accesses the controller.

Connecting the LAN cable

Use LAN straight cables.

1. Connect the hub and the LAN port on the left side panel of the controller using a LAN straight cable.
2. Connect the LAN port of the PC and the hub using a LAN straight cable.



Setting the Network Setting of the controller

1. Select the [Network settings] command from the [Option] menu on the menu bar and set up the IP address, Subnet mask, and Default gateway parameters.
Enter the values obtained from the network administrator in the IP Address, Subnet mask, and Default gateway fields.
⇒ Refer to "11.3 Network Setting" on page 11-7 to input the parameters.

 A screenshot of a 'Network settings' dialog box. It contains fields for IP Address (192.168.0.1), Subnet mask (255.255.255.0), Default gateway (192.168.0.254), MAC Address (empty), and Network hostname (PC8718XP). Below these fields is a note: '* Settings are enabled after reboots.' At the bottom, there is a section for 'VHX communication software mode' with three radio buttons: OFF, Standard, and High-speed (which is selected). At the very bottom are 'OK' and 'Cancel' buttons.

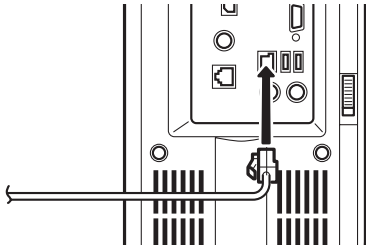
12.2.2 Connecting in a one-to-one configuration

All LAN connections in a group using the VHX communication software, FTP, and network sharing can be set up using the following procedure.

Connecting the LAN cable

Use a LAN cross cable.

- 1. Connect the LAN port on the rear panel of the controller to the LAN port of the PC using a LAN cross cable.

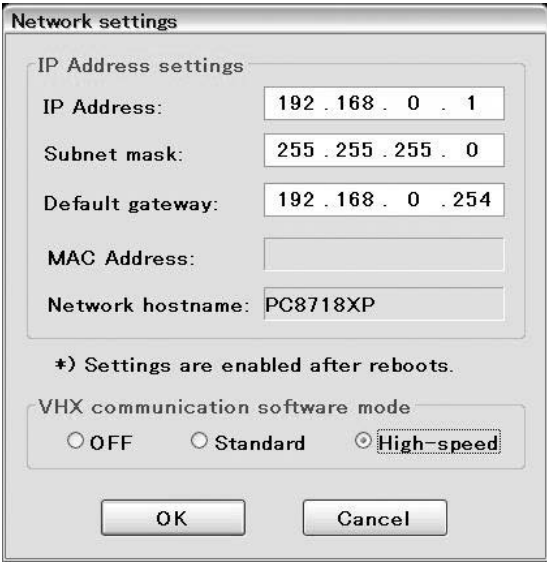


Setting up the network for the controller and the PC

After connecting the controller and the PC, set up the network for the controller and the PC. The PC refers to the IP address configured here when the PC accesses the controller.

■ Setting up the Network Setting of the controller

- 1. Select the [Network settings] command from the [Option] menu on the menu bar, and set up the IP address, Subnet mask, and Default gateway parameters.
 - Refer to "11.3 Network Setting" on page 11-7 to set up the IP address and the subnet mask.



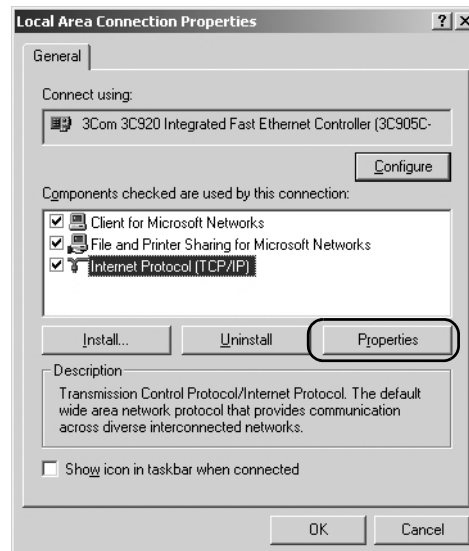
Note: The following are the recommended values for the IP address and subnet mask settings.

IP Address	192.168.0.1
Subnet mask	255.255.255.0
Default gateway	192.168.0.254

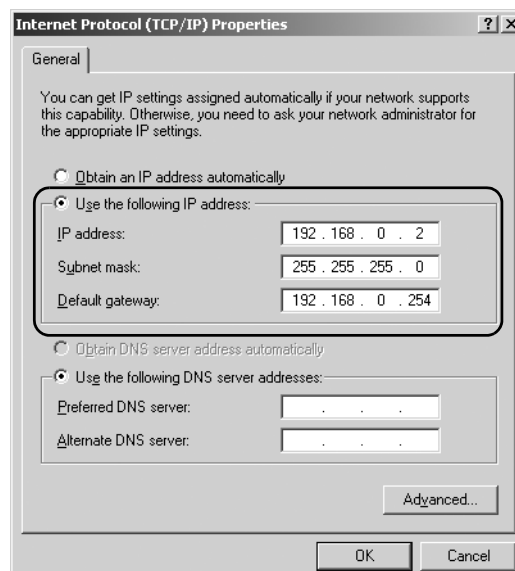
■ Setting up the network settings of the PC

This section describes the procedure for setting the network settings on a Windows XP machine.

1. **Right-click on [My Network] and select [Properties].**
The [Network Connection] window appears on the screen.
2. **Right-click on [Local Area Connection] and select [Properties].**
The [Local Area Connection Properties] dialog box appears on the screen.
3. **Select [Internet Protocol (TCP/IP)] from the [Components checked are used by this connection] field, and then click the [Properties] button.**
The [Internet Protocol (TCP/IP) Properties] dialog box appears on the screen.



4. **Click the [Use the following IP address] radio button to set up the IP address, subnet mask, and default gateway.**



Note: The following are the recommended values for the IP address and subnet mask settings.

IP Address	192. 168. 0. 2
Subnet mask	255. 255. 255. 0
Default gateway	192.168.0.254

5. **Click the [OK] button.**

12.3 Installing the file management software (VHX Communication Software)

This section describes the procedure for preparing and installing the VHX Communication Software on the PC to be connected with the controller.

12.3.1 Functions

Remotely controlling the controller from a PC

- The image currently being observed with the controller can be captured on the PC.
- The image being observed can be paused, recorded, automatically recorded, or recorded in timer-controlled mode by remote control from the PC.

Various file editing functions

- Files from the controller and the PC can be monitored on the same screen, allowing the user to perform file editing including copy, move, and delete operations with ease.
- Files in CSV format can be output to Excel files.

LAN connection

- The controller can be connected with two or more PCs via LAN connection. When the group does not have a LAN environment, the controller can be connected with a PC in a one-to-one configuration.

12.3.2 Connection methods

Connecting via LAN in a group

The controller can be connected to a LAN environment in a group.

- ⇒ Refer to "12.2.1 Connecting to an intra-group LAN" on page 12-5 for the connection procedures.

Making a one-to-one connection between the controller and PC

When there is not a LAN environment, connect the controller and the PC in a one-to-one configuration.

- ⇒ Refer to "12.2.2 Connecting in a one-to-one configuration" on page 12-6 for the connection procedures.

12.3.3 Installing the VHX Communication Software and VHX 3D Viewer

This section describes the procedure for installing the VHX Communication Software and 3DViewer on the PC.

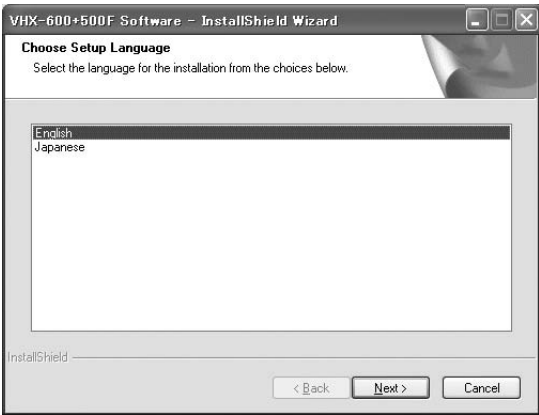
Note: When installing “VHX Communication Software” and “VHX 3D Viewer” on the PC with Windows 2000, XP, Vista or 7, log on as a user (Administrator) with administrator privileges.

The following two types of software can be installed from the provided CD-ROM.

VHX Communication Software	Allows the PC to remotely control the controller, or to edit files.
3DViewer	Displays the 3D image files saved in the controller on the PC. * This software is an add-on to the “VHX Communication Software”.

Installing “VHX Communication Software” and “VHX 3DViewer” (Std)

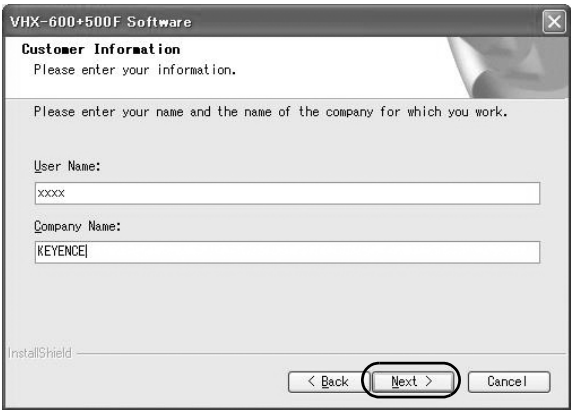
1. **Insert the provided “VHX Communication Software” and “VHX 3D Viewer” CD-ROM in the CD-ROM drive of the PC.**
The [InstallShield Wizard] window appears on the screen.



2. **Click the [Next] button.**
A window for setting the User Information appears on the screen.

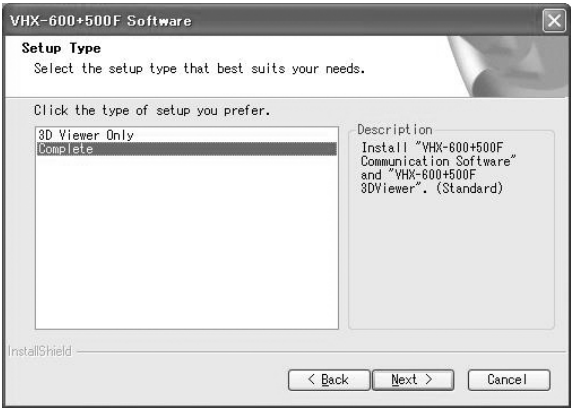


3. Enter the User name and Company name and then click the [Next] button.
A window appears, asking the user to select the “Setup type” option.

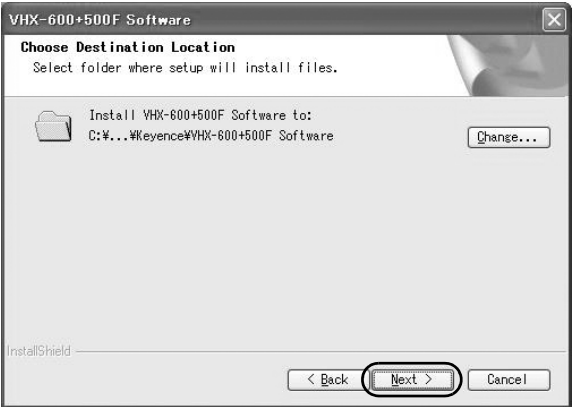


4. Select [Complete], and click [Next].
The [Choose Destination Location] window appears.

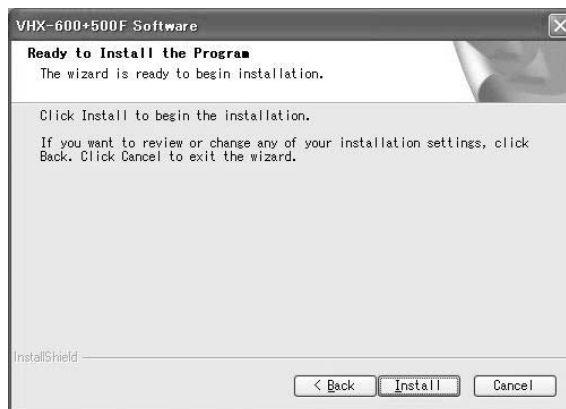
Tips Only “3DViewer” can be installed by selecting Install “VHX 3DViewer” [Playback of 3D Image file only].



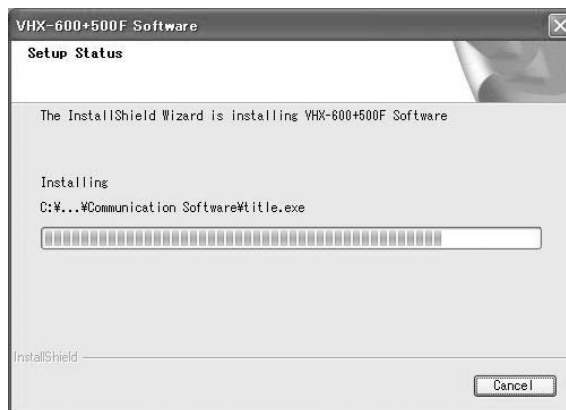
5. Confirm the folder in which the software will be installed and then click the [Next] button.
The window that starts installation appears.



6. Click the [Install] button.



7. After the Setup Status window appears on the screen, the [InstallShield Wizard Complete] window appears on the screen.



8. Click the [Finish] button.

The installation of the VHX Communication Software and the 3DViewer is completed.



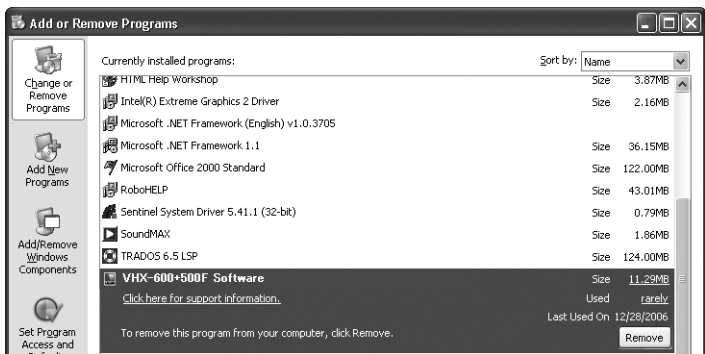
12.3.4 Uninstalling the VHX Communication Software and VHX 3D Viewer

This section describes the procedure for removing the VHX Communication Software and 3DViewer from the PC.

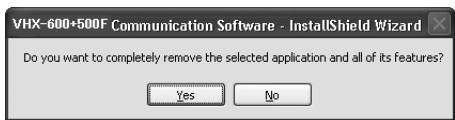
Note: When deleting “VHX Communication Software” and “VHX 3D Viewer” from the PC with Windows 2000, XP, Vista or 7, log on as a user (Administrator) with administrator privileges.

Removing the software using the System program

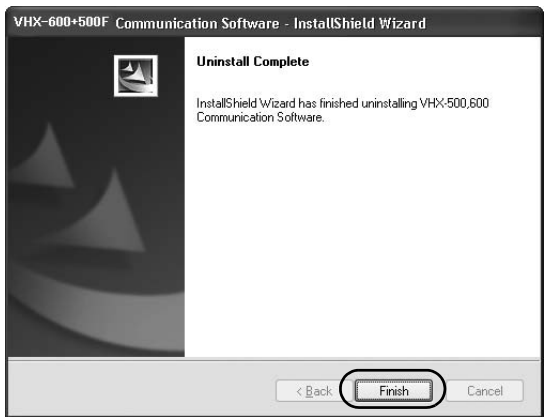
- 1. **Select [Control Panel] from the [Start] menu.**
The [Control Panel] window appears on the screen.
- 2. **Double-click on [Add/Remove Programs].**
The [Add/Remove Programs] window appears on the screen.



- 3. **Select “VHX-600+500F Communication Software” or “VHX 3D Viewer” from the “Currently installed programs” field, and then click the [Change/Remove] button.**
The [Confirm File Deletion] window appears on the screen.
- 4. **Click the [OK] button.**
The [Setup Status] window appears on the screen, and the system starts the delete processing.



- 5. **Click the [Finish] button.**
The VHX Communication Software or VHX 3D Viewer has been removed.



12.4 Using the file management software (VHX Communication Software)

This section describes the procedures for starting up and using the VHX Communication Software.

12.4.1 Startup

The following explains the procedures for starting up the VHX Communication Software for the first and subsequent times.

Note: Make sure to check the following before starting up the VHX-600+500F Communication Software.

- The controller is connected to the PC with a LAN cable.
- The power to the controller and PC is turned on.

Initial startup

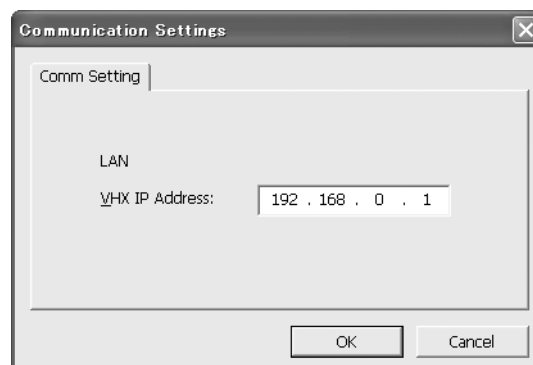
When starting the VHX Communication Software for the first time, the settings for communication with the controller should be configured.

1. Double-click the [VHX Communication Software] icon on the desktop.

The [VHX Communication Software] window and [Communication Setting] dialog box appear on the screen.



2. Enter the IP address in the VHX IP Address.



Tips

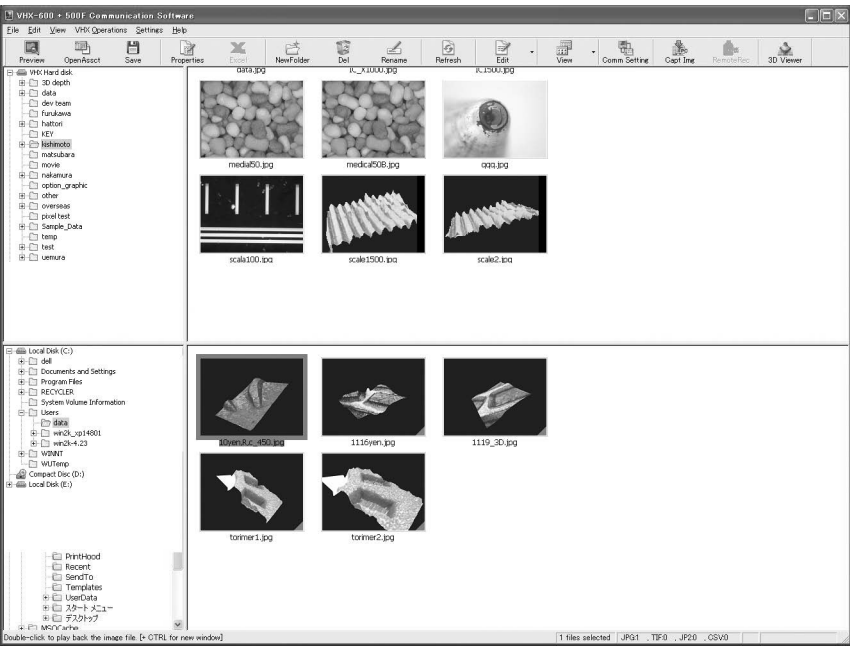
In the VHX IP Address textbox, enter the IP address that was configured in the Network Setting window displayed using the Option menu of the controller.

➡ Refer to "11.3 Network Setting" on page 11-7

3. Click the [OK] button.

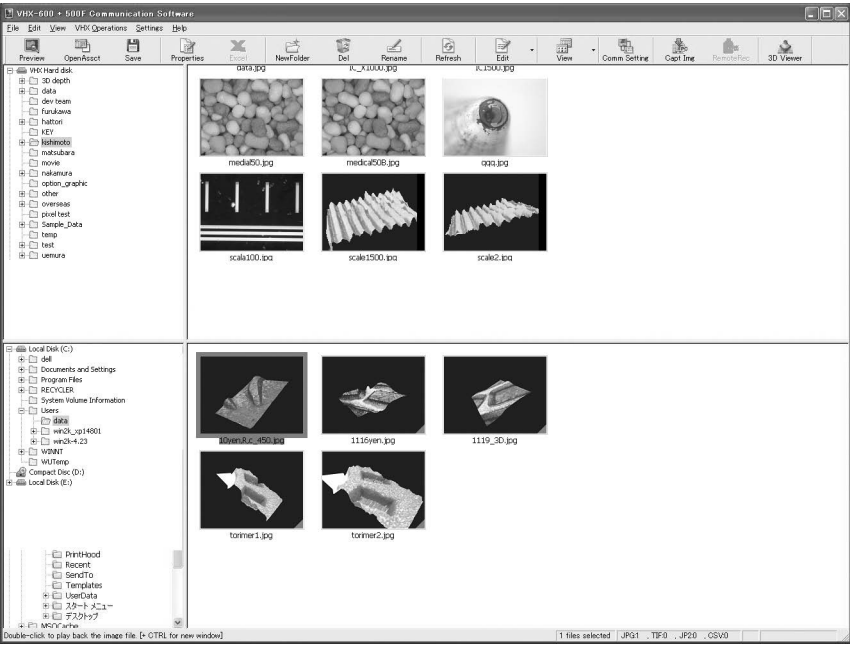
The [VHX Communication Software] window is activated.

- When a password is set on the controller, password entry is required. Entering the password activates the VHX Communication Software window.



Second and subsequent startups

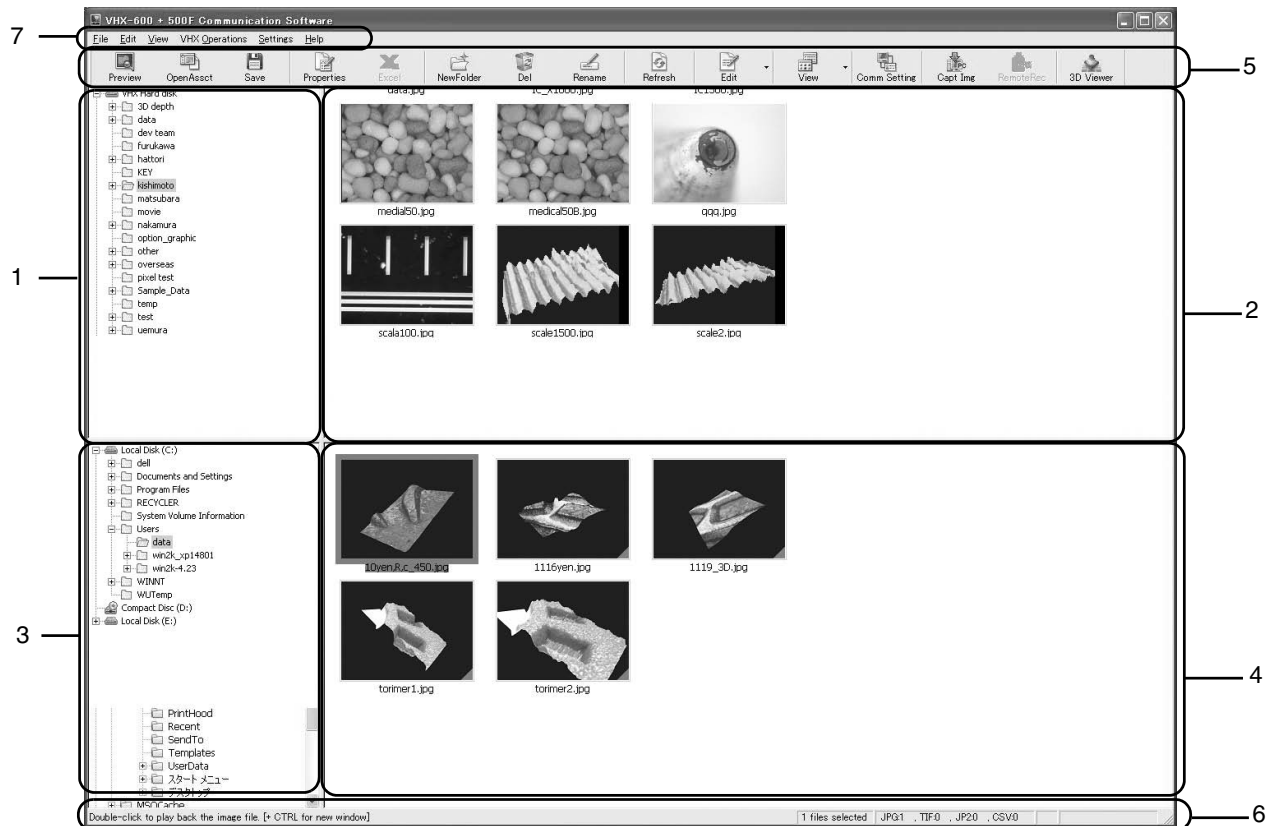
- 1. Double-click the [VHX Communication Software] icon on the desktop.
The [VHX Communication Software] window appears on the screen.
 - When a password is set on the controller, password entry is required. Entering the password activates the VHX Communication Software window.



12.4.2 Part names and functions of the window

The upper half of the window displays the contents of the CD-R/RW and the hard disk drive of the controller.

The lower half of the window displays the contents of the hard disk drive of the PC.



1. VHX folders display area

Displays the folder hierarchy of the hard disk drive of the controller and the CD-R/RW. The folders displayed in this area are referred to as the “VHX folders” in this section.

2. VHX files viewer area

Displays a list of the files in the VHX folder. The files displayed in this area are referred to as the “VHX files” in this section.

3. PC folders display area

Displays the folders stored on the hard disk drive and connected drive(s) of the PC. The folders displayed in this area are referred to as the “PC folders” in this section.

4. PC files viewer area

Displays a list of the files stored in the local folder. The files displayed in this area are referred to as the “PC files” in this section.

Tips

The PC folders display area and PC files viewer area can be hidden on the screen.

- In the Display menu, switch the on/off mode of the Show local files command as desired.

Note: The following types of files can be displayed as thumbnail images.

- JPEG files (*.jpg)
- JPEG2000 (*.jpg2)
- TIFF files (*.tif)
- AVI files (*.avi)

5. **Toolbar**

Displays the buttons for the frequently used commands.

➤ Refer to "12.4.3 Names and functions of the buttons" on page 12-17 for the names and functions of the buttons.

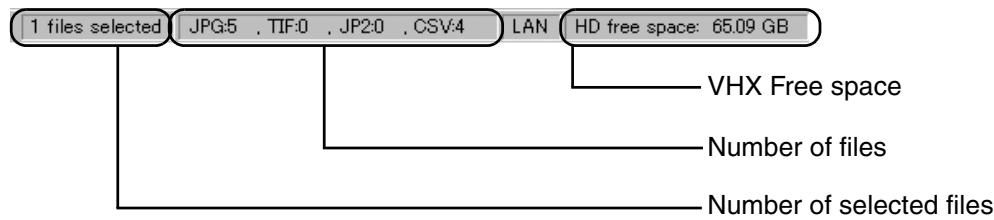
Tips

The Toolbar can be hidden on the screen.

- In the Display menu, switch the on/off mode of the Toolbar command as desired.

6. **Status bar**

The right end of the status bar displays the following information.



- VHX Free space: The amount of free space remaining on the hard disk drive of the controller.
- Number of files: The number of JPEG, TIFF, JPEG2000, and CSV files in the displayed folder.
- Number of selected files: The number of selected files

Tips

The status bar can be hidden on the screen.

- In the View menu, switch the on/off mode of the Status Bar command as desired.

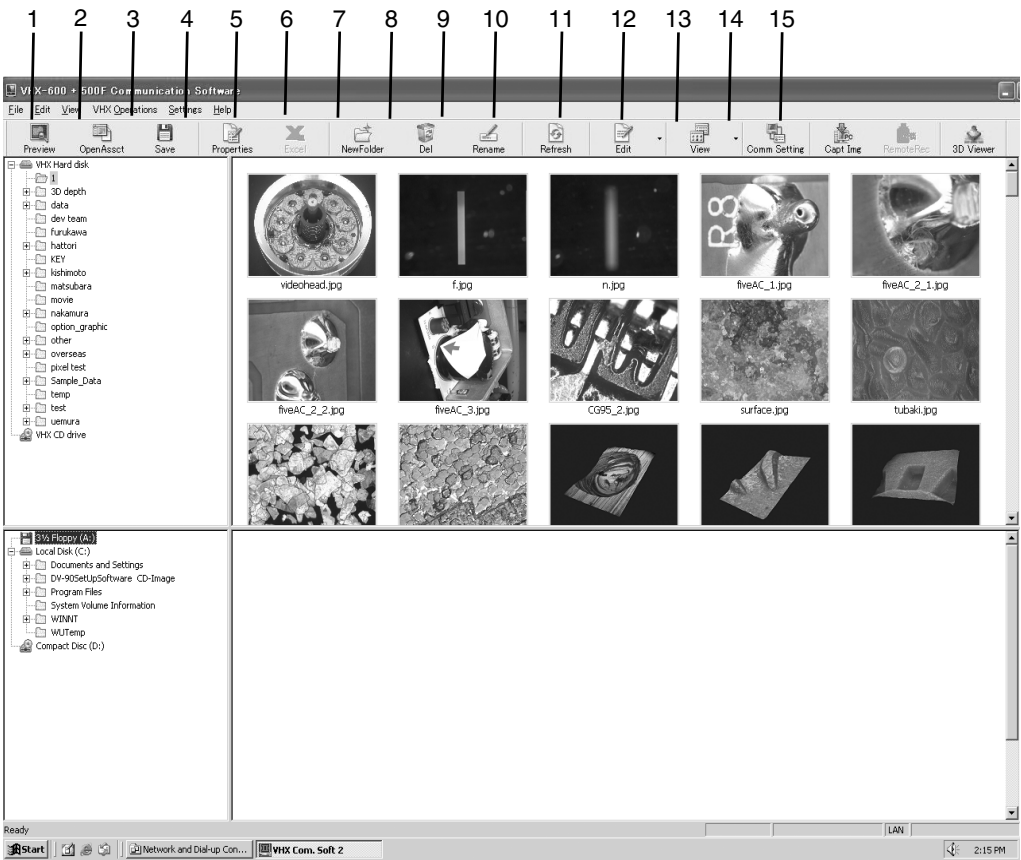
7. **Text bar**

Common features can be selected with these options.

➤ Refer to "12.4.4 Text bar options" on page 12-27.

12.4.3 Names and functions of the buttons

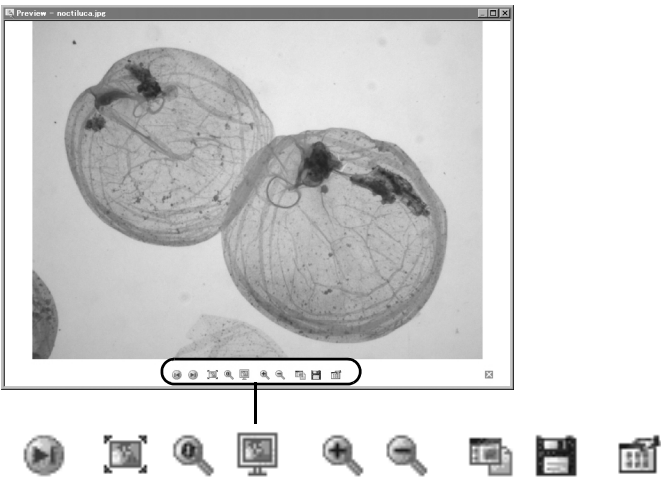
This section describes the names and functions of the buttons on the Toolbar.















1. Preview



Displays the selected file in the Preview window. AVI files cannot be previewed.



	Previous Image Displays the previous file within the displayed folder.
---	--

	Next Image Displays the next file within the displayed folder.
	Fit window size Displays the image at the appropriate size to fit the window size.
	Full Scale Displays the image at its actual size.
	Full Screen image Displays the image on the entire screen.
	Zoom In Displays the magnified image. Tips The Zoom In operation can also be performed by rotating the mouse wheel button away from you.
	Zoom Out Displays the reduced image. Tips The Zoom Out operation can also be performed by rotating the mouse wheel button toward you. The image cannot be reduced to smaller than the window size.
	Open associated application Starts the associated applications and displays the image file in the new window.
	Save As Saves the currently displayed file with a filename. Note: Files can only be saved in the PC folders.
	Save selected area Cuts and saves an image of the specified area.
	Copy selected area Cuts and copies an image of the specified area.
	Show property The on/off mode of the property display can be selected here.

2. Open Assctt

Automatically starts the application associated with the file extension to display the selected files.

For example, the command starts the commercially available image editing software to display the image file.

Note: Only JPEG, JPEG2000, TIFF, AVI, and CSV files can be started from the associated applications.

3. Save

Saves the selected file with a filename.

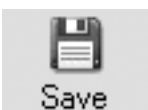
Note: Files can only be saved in the PC folders.

1) Select the file to be saved.

A VHX file or PC file can be selected.

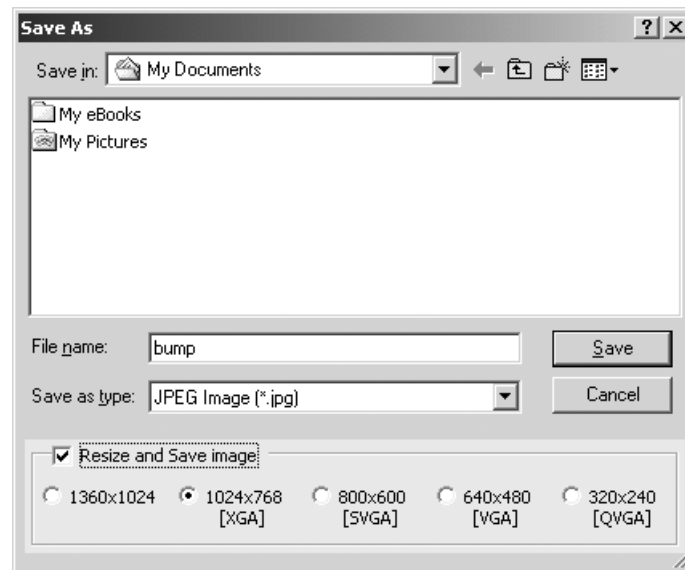
2) Click the [Save] button.

The [Save As] dialog box appears on the screen.

3) Enter the folder and filename to be saved.

4) Click the [Save] button.

The selected file is saved with the assigned filename.



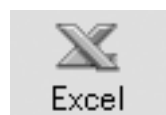
⇒ Refer to "Resize and Save image" on page 12-36 for the procedure to save resized images.

4. Properties

Displays the property information for the selected image file that has been configured on the controller.

Note: The properties can be updated only when a PC file is selected.

⇒ Refer to "File Properties" on page 6-7 for the procedures for entering properties.

5. Excel

Outputs the data from the selected CSV file to an Excel file.

Note: Only files in the CSV format can be output to Excel files.

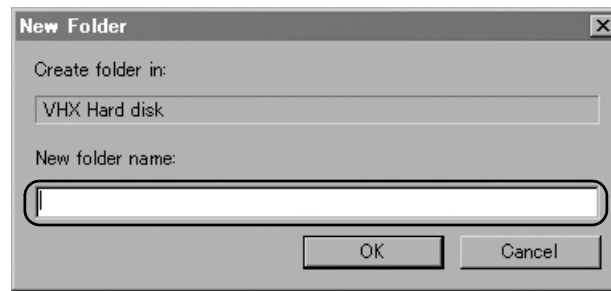
6. New Folder**1) Select the folder in which you want to create a new folder.**

A VHX file, VHX folder, PC file, or PC folder can be selected.

2) Click the [New Folder] button.

The [New Folder] dialog box appears on the screen.

3) **Enter the folder name in the [New folder name] textbox.**



4) **Click the [OK] button.**
The new folder is created.

7. **Del**



Deletes the selected file or folder. When a folder is selected, the folder and all files in the folder are deleted.

Note:

- The VHX files and VHX folders are permanently deleted without being moved to the Recycle Bin.
- The PC files and PC folders are moved to the Windows Recycle Bin.

- 1) **Select the file to be deleted.**
A VHX file, VHX folder, PC file, or PC folder can be selected.
- 2) **Click the [Del] button.**
The Confirm File Deletion dialog box appears on the screen.
- 3) **Click the [Yes] button.**
The selected file or folder is deleted.

8. **Rename**



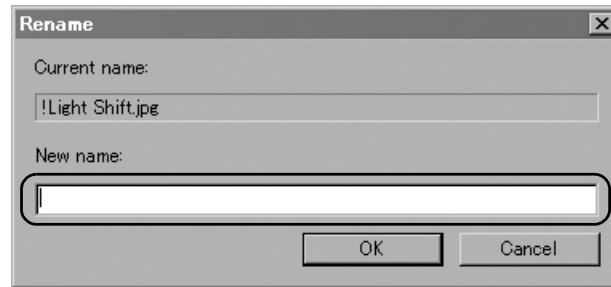
Changes the name of the selected file or folder.

Note:

- Only the PC files and PC folders can be renamed.
- The VHX files and VHX folders cannot be renamed.

- 1) **Select the file for which you want to change the name.**
To change the folder name, select the desired folder.
- 2) **Click the [Rename] button.**
The [Rename] dialog box appears on the screen.
- 3) **Enter the new name.**
- 4) **Click the [OK] button.**

The name of the selected file or folder is changed.

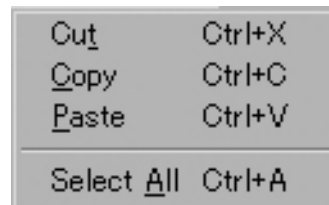
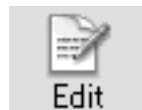


9. Refresh



Updates the display to the latest information.

10. Edit



Use the commands to edit a file or folder.

Cut: Cuts the selected file or folder and copies it to the clipboard.

Note:

- The Cut operation can only be used for PC files and PC folders.
- The Cut operation cannot be used for VHX files and VHX folders.

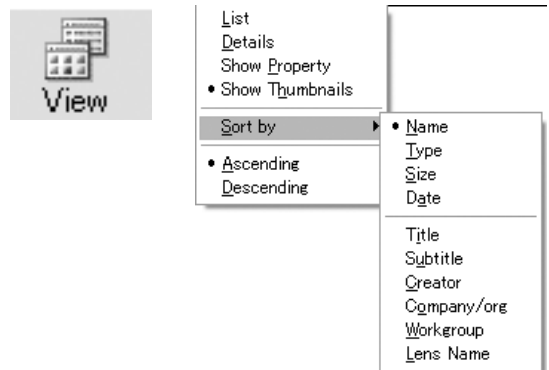
Copy: Copies the selected file or folder to the clipboard.

Paste: After the Cut operation, moves the file or folder that has been cut to the selected folder. After the Copy operation, pastes the copied file or folder to the selected folder.

Tips Files that have been copied can be pasted into other applications.

Select All: Selects all files in the folder that is currently open.

11. View



The display mode of the image files can be selected from the following.

List : Displays a list of the filenames.

Details : Displays the file details including the filename, size, date of the last update, etc.

Show Property : Displays the list of filenames and property information.

Show Thumbnails: Displays the list of files as thumbnail images.

The order of display can be selected from the list to the above.

12. Comm Setting



The communication settings can be configured here.

Enters the IP address of the controller.

⇒ Refer to "Initial startup" on page 12-13 for the procedure for setting the Com Set.

13. Capt Img



Captures the image currently displayed on the controller into the PC and displays the image in the Preview window.

The image can be saved in a file by clicking the Save button on the Preview window.

⇒ Refer to "Capture Image" on page 12-31 for the procedure for capturing the images.

14. Remote Rec



Automatically or remotely records the image that is currently displayed on the controller from the PC.

⇒ Refer to "Remote Rec" on page 12-32 for details about the remote recording.

15. 3D Viewer



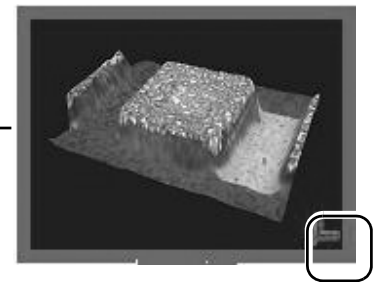
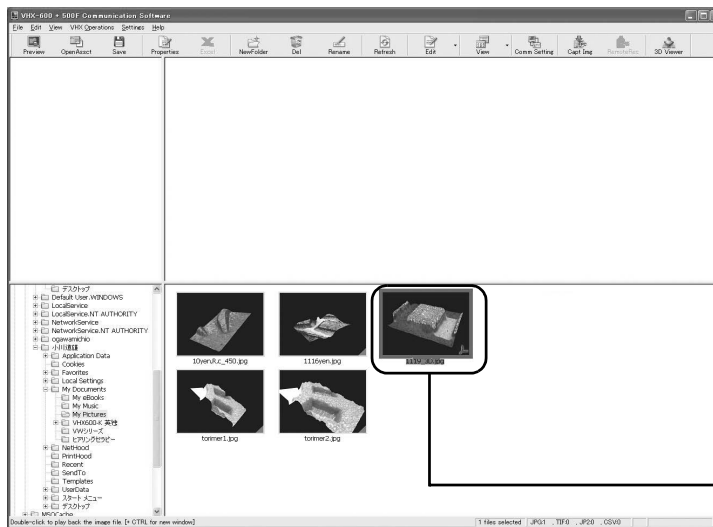
The 3D image files saved using the 3D display function of the controller can be displayed in 3D.

Displaying 3D images

■ 3D display

1. Select a 3D image file and then click [3D display].

A 3D image is displayed.




For 3D image files, a red triangle is marked on the lower right corner of the thumbnail image.

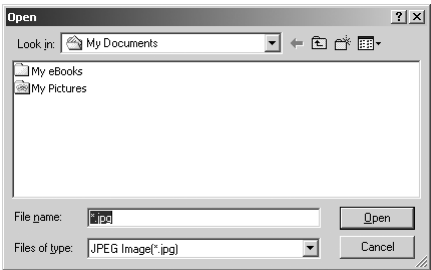
2. Edit the displayed 3D image as necessary.


The displayed 3D image can be rotated, magnified, reduced, or moved.

➤ Refer to "8.4.3 Display operations for 3D images" on page 8-16 for details about the operation procedure.


**Open**

Select another image to display in 3D.




**Save as 2D**


Saves the displayed image in the JPEG or TIFF format.

**Copy**


The displayed image is saved onto the clipboard on the PC.
The copied images can be copied onto commercially available softw
* Such as Microsoft Word

**Reset**

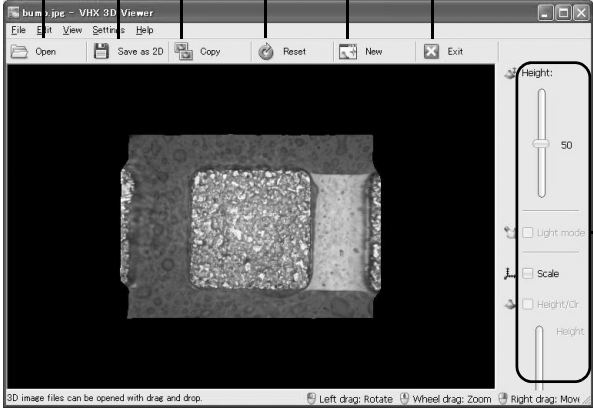
Returns the screen to its default state.

**New**

Open another window. Displaying another screen allows the 3D images to be compared.

**Exit**

Exits the 3D display mode.

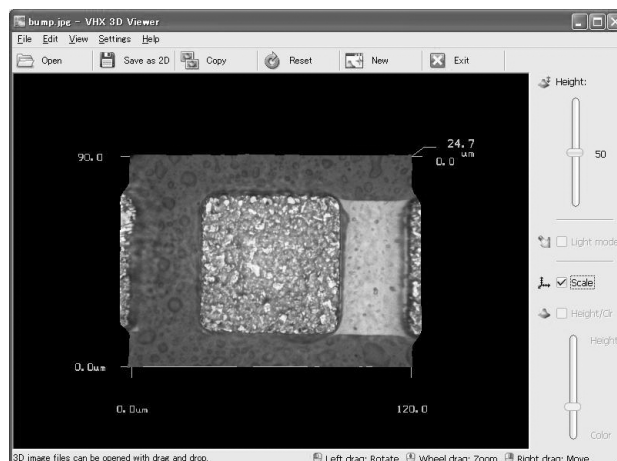


Move the slider up and down to adjust the height of the image.

Scale display

A simple scale is displayed by putting a checkmark in the [Scale] checkbox during the 3D display.

Tips A standard scale is displayed on the 3D image file saved in the 3D profile measurement software.



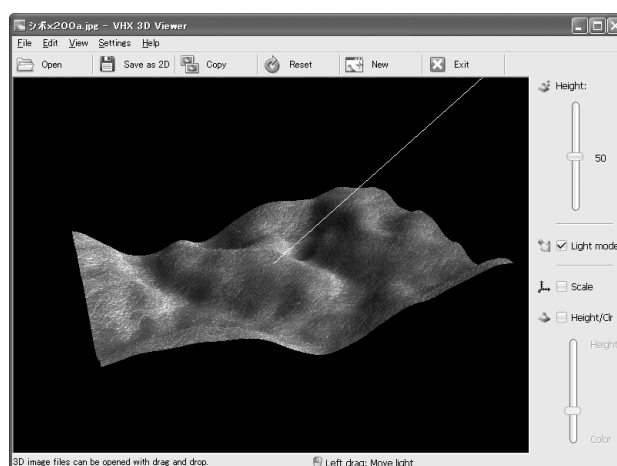
3D Illumination

Put a checkmark in the [Light mode] checkbox while in the 3D display to activate the illumination simulation function, which allows you to apply light to the target from a desired direction.

Drag the mouse to change the direction of the illumination so that you can observe the bumps in the image.

Note: The 3D illumination simulation function can only be applied for the file saved in the 3D illumination mode.

➤ Refer to "8.4.4 Illumination simulation" on page 8-18.

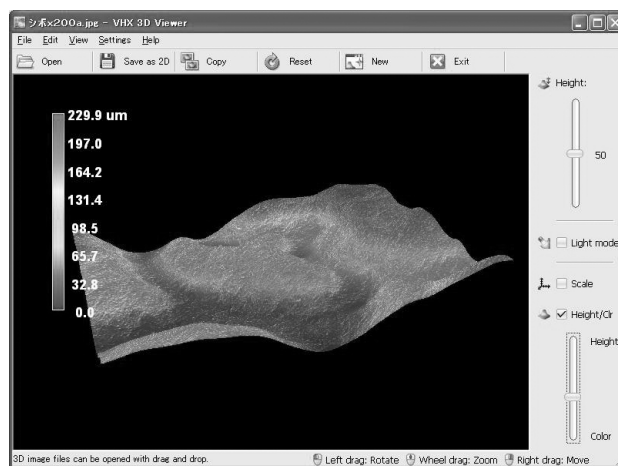


Height Color Display

Put a checkmark in the [Height/Clr] checkbox while in the 3D display. The highest area in the 3D image is displayed in red, and the lowest area is displayed in dark blue.

Tips

The 3D image files saved by the 3D profile measurement software can be displayed using the height color function.

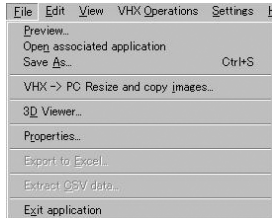


12.4.4 Text bar options

List of the names and functions of the menus

[File]

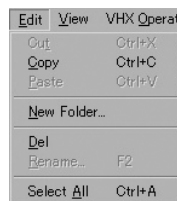
File operations can be executed with the commands listed here.



Command name	Command name shown on the toolbar	Function	VHX file	PC file	Reference page
Preview	Preview	Displays the image file.	Applicable	Applicable	page 12-17
Open associated application	Open Assct	Opens and displays the image file with the associated application.	Applicable	Applicable	page 12-18
Save As	Save	Saves the file in a PC folder with a filename.	Select: Not applicable Save: Not applicable	Select : Applicable Save: Applicable	page 12-18
VHX -> PC Resize and copy images		Resizes images saved in the VHX and saves them in a PC.	Select: Applicable Save: Not applicable	Select: Not applicable Save: Applicable	page 12-36
3D Viewer	3D Viewer	Displays 3D images on the 3DViewer.	Applicable	Applicable	page 12-23
Properties	Properties	Displays and updates the image file properties.	Display: Applicable Update: Not applicable	Display: Applicable Update: Applicable	page 12-19
Export to Excel	Excel	Transfers the CSV file to an Excel file.	Applicable	Applicable	page 12-19
Extract CSV data	--	Extracts the CSV data.	--	--	--
Exit application	--	Exits the VHX Communication software.	--	--	--

[Edit]

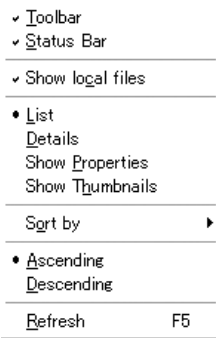
The editing operations for files and folders can be executed with the commands listed here.



Command name	Command name shown on the toolbar	Function	VHX file	PC file	Reference page
Cut	Cut	Cuts the file or folder.	Not applicable	Applicable	page 12-21
Copy	Copy	Copies the file or folder to the clipboard.	Applicable	Applicable	page 12-21
Paste	Paste	Pastes the file or folder.	Applicable	Applicable	page 12-21
New Folder	New Folder	Creates a new folder.	Applicable	Applicable	page 12-19
Del	Del	Deletes the file or folder.	Applicable	Applicable	page 12-20
Rename	Rename	Changes the filename.	Not applicable	Applicable	page 12-20
Select All	Select All	Selects all files in the currently displayed folder.	Applicable	Applicable	page 12-21

[View]

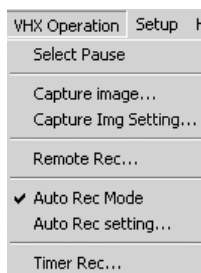
The display modes can be switched with the commands listed here.



Command name	Command name shown on the toolbar	Function	VHX file	PC file	Reference page
Toolbar	--	Switches the Show/Hide mode of the Toolbar.	--	--	page 12-16
Status Bar	--	Switches the Show/Hide mode of the Status Bar.	--	--	page 12-16
Show local files	--	Switches the Show/Hide mode of the PC files.	Not applicable	Applicable	page 12-15
List	List	Displays a list of the files.	Applicable	Applicable	page 12-22
Details	Details	Displays the file details.	Applicable	Applicable	page 12-22
Show Properties	Show Properties	Displays the file properties.	Applicable	Applicable	page 12-22
Show Thumbnails	Show Thumbnails	Displays thumbnail images of the files.	Applicable	Applicable	page 12-22
Sort by (By Name/By Type/By Size/By Date)	By Name By Type By Size By Date Title Subtitle Creator Company/org Workgroup LensName	Sorts the thumbnail images for display.	Applicable	Applicable	page 12-22
Refresh	Refresh	Updates the currently displayed file with the latest data.	Applicable	Applicable	page 12-21

[VHX Operation]

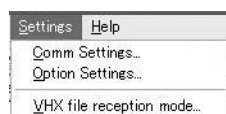
Remote operations of the controller can be executed with the commands listed here.



Command name	Command name shown on the toolbar	Function	VHX file	PC file	Reference page
Select Pause	--	Switches between live and still images for the image currently being displayed on the controller.	--	--	page 12-30
Capture image	Capt Img	Captures the image currently being displayed on the controller into the PC.	--	Save: Applicable	page 12-31
Capture Img Setting	--	Configures the file format for capturing the image from the controller.	--	--	page 12-31
Remote Rec	Remote Rec	Saves the image in the folders on the controller.	Applicable	--	page 12-32
Auto Rec Mode	--	Switches the on/off mode of the automatic recording.	--	--	page 12-32
Auto Rec settings	--	Configures the file format and starting filename for automatic recording.	--	--	page 12-33
Timer Rec	--	Executes timer-controlled recording of the image currently being displayed on the controller.	Save: Applicable	--	page 12-35

[Settings]

Communication settings can be configured with the commands listed here.



Command name	Command name shown on the toolbar	Function	VHX file	PC file	Reference page
Com Setting	Com Set	Enters the IP address.	--	--	page 12-22
Option Settings	--	Displays or hides the title screen at startup.	--	--	--
VHX file reception mode	--	Setting for receiving files from the VHX.	--	--	

[Help]

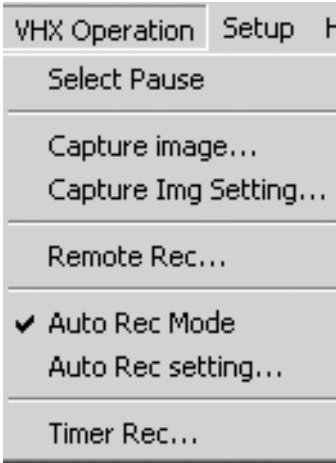
Topic search operation and display of version information can be executed with the commands listed here.



Command name	Command name shown on the toolbar	Function	VHX file	PC file	Reference page
Search Topic	--	Displays the Help file of the VHX Communication software.	--	--	--
About	--	Displays the version of the VHX Communication software.	--	--	--

VHX Operations

This section describes the operations selected on the [VHX Operations] menu.



- Note:**
- The operations of the controller cannot be executed simultaneously from two or more PCs. While a controller operation is being executed from a PC, VHX operations will be ignored.
 - When Capture Image, Remote Rec, Auto Rec, or Timer Rec is executed from a PC, the image is recorded at the Normal size [1600x1200] even when the Rec size setting of the controller is set to High Definition [3200x2400] or Super Fine [4800x3600] mode.

■ Select Pause

The command corresponds to the operation of the PAUSE button located on the console.
The state (live/still image) of the currently displayed image can be switched.

1. **Select the [Select Pause] command from the [VHX Operations] menu.**
When the controller is displaying a live image, the display is switched to the still mode; on the contrary, the still image is switched to the live image.

■ Capture Image

Captures the image currently displayed on the controller onto the PC, and displays it in the Preview window.

This function is similar to the [Capt Img] command on the toolbar.

1. Select the [Capture Image] command from the [VHX Operation] menu.

The image currently being observed with the controller is displayed in the Preview window.

⇒ Refer to "1. Preview" on page 12-17.

2. Click [Save As] to save the image.



Tips

Execute the Capture Image operation when the controller displays a normal observation image.

- The Capture Image operation cannot be executed from the Album screen, Depth composition display screen, and various setting screens including the measurement screen.

■ Capture image setting

Select the file format for performing image capture.

Select compressed or uncompressed.

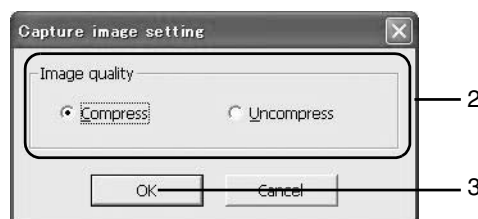
1. Select the [Capture image setting] command from the [VHX Operation] menu.

The [Capture image setting] dialog box appears on the screen.

2. Select compressed or uncompressed for the image quality.

3. Click the [OK] button.

The image quality in which the image will be captured is configured.



■ Remote Rec

The image currently being displayed on the controller can be recorded remotely or automatically from the PC.

The function of this command is similar to the [Remote Rec] command on the Toolbar.

Note: To record images automatically, set up the following before starting the remote recording operation.

- Configure the recording conditions on the [Auto Rec setting] dialog box via the [VHX Operation] menu.
 - Set the [Auto Rec Mode] on the [VHX Operation] menu to the on position.
- Refer to "Auto Rec Mode" on page 12-32.

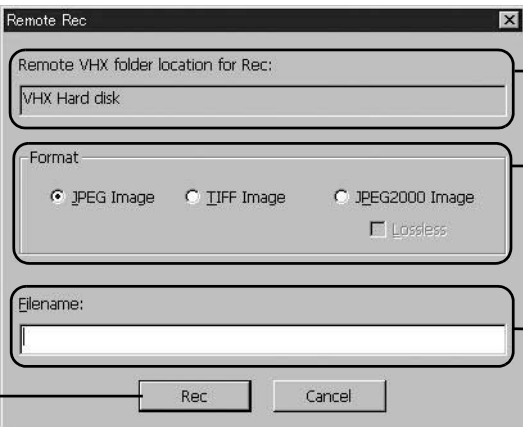
1. Select the folder in which you want to save the image.

Note: Only the VHX folders can be designated for saving files.

2. Click the [Remote Rec] button.

The [Remote Recording] dialog box appears on the screen.

3. When the Auto Rec Mode is set to the off position, configure the recording conditions. When the Auto Rec Mode is set to the on position, confirm the recording conditions.



Remote VHX folder location for Rec:
Displays the selected VHX folder in which the file will be saved.

format:
When the Auto Rec Mode is in the off position, select JPEG, TIFF, or JPEG2000 in the File Format field. When the Auto Rec Mode is in the on position, the JPEG, TIFF, or JPEG2000 radio button is set.

filename:
When the Auto Rec Mode is in the off position, enter the filename of the file to be saved. When the Auto Rec Mode is in the on position, the filename of the file to be saved is displayed in the textbox.

4. Click the [Rec] button.

The image file is saved in the VHX folder that is currently being displayed.

Tips To review the saved file, click the [Refresh] button on the Toolbar.

■ Auto Rec Mode

The Auto Rec Mode of the Rec Setting menu of the controller can be enabled or disabled here.

1. Select the [Auto Rec Mode] option from the [VHX Option] menu.

The option is set to off when Auto Rec is currently activated, or on when Auto Rec is currently deactivated.

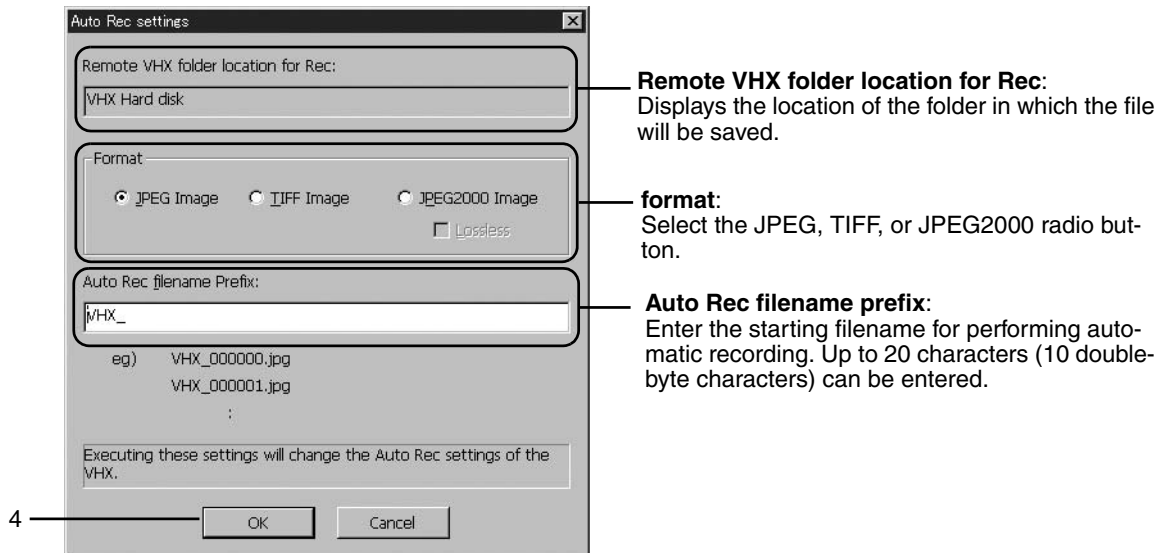
Note: Setting this option to on will execute automatic recording when recording the images remotely from the PC.

■ Auto Rec settings

The recording conditions can be set here for recording the images displayed on the controller with timer-controlled recording or automatic recording from the PC.

The recorded file will be saved in the VHX folder that is selected and open.

1. **Select the folder in which you want to save the recorded files.**
2. **Select the [Auto Rec settings] option from the [VHX Operation] menu.**
The [Auto Recording settings] dialog box appears on the screen.
3. **Set up the conditions for the automatic recording.**



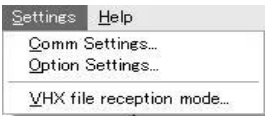
4. **Click the [OK] button.**

The conditions for automatic recording are set up.

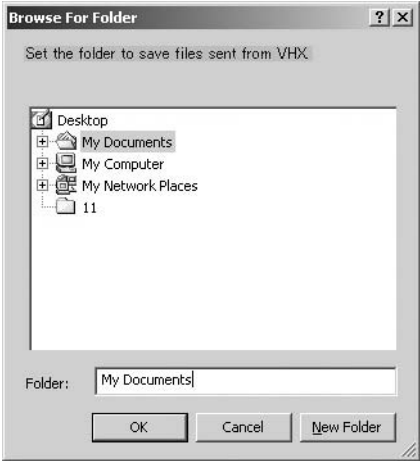
- Sample filenames to be saved: When JPEG is selected for the File format, and “VHX_ “ is entered in the Top of Auto Rec filename textbox (starting filename).
VHX_000000.jpg
VHX_000001.jpg
VHX_000002.jpg

■ Transferring a file from the VHX to a PC

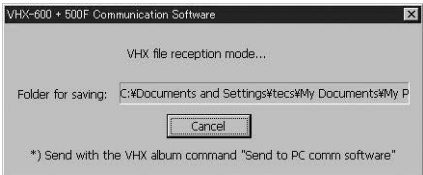
- 1. Select [VHX file reception mode] from [Settings] menu.
The [Browse For Folder] dialog box appears on the screen.



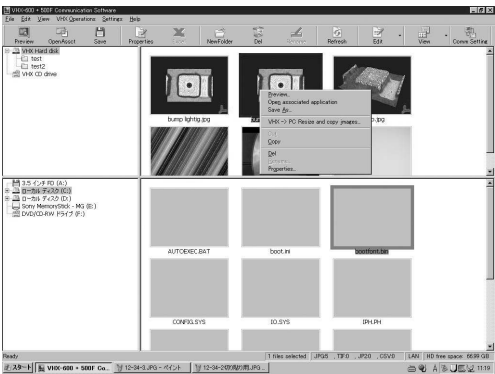
- 2. Specify a folder on the PC to save files transferred from the VHX.



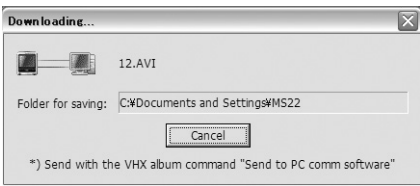
- 3. The VHX communication software is now in VHX file reception mode.
Files can be sent from albums on the VHX.



- 4. Select and right-click on a file that you wish to send from albums on the VHX.
- 5. Select [Send to PC comm software].



- 6. The selected file is sent to the specified folder on the PC.



■ Timer Rec

The images currently being displayed on the controller can be recorded with timer-controlled recording from the PC.

Make sure to set up the file format, filename and folder in which the files are saved on the Auto Rec settings dialog box before performing timer-controlled recording.

1. Select the [Timer Rec] option from the [VHX Operation] menu.

The [Timer Recording] dialog box appears on the screen.

2. Set up the conditions for timer-controlled recording.

Rec interval:

Specify the interval for the timer-controlled recording. Enter desired values for the [Hour], [Min] and [Sec] text-boxes respectively.

- Specify 15 seconds or longer for the recording interval.
- When using the Clear, 3CCD, High Definition, or Super Fine mode, specify 1 minute or longer for the recording interval.

Rec count:

Specify the number of times to execute the recording.

Rec Time:

Displays an estimate of the total time required for the recording.

3. Click the [Start] button.

The timer-controlled recording starts.

Note: During the Timer Rec operation, all operations are disabled except stopping the Timer Rec operation.

Image resize function

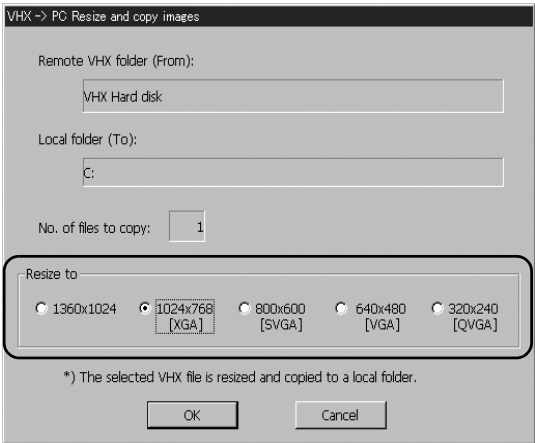
Two types of image resizing are available: Resizing the images in the VHX and saving a resized image with a new name.

■ Resizing the images in the VHX.

Resizes the images stored in the VHX and then saves them in the PC.

1. **Select an image in the VHX files viewer area.**
2. **Select [VHX → PC Resize and copy images] in the [File] menu.**
3. **Select an image size.**
4. **Click the [OK] button.**

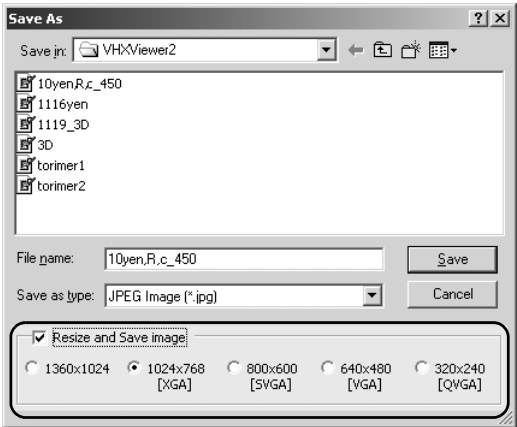
The folder in which the files will be saved is the PC folder currently being open.



■ Resize and Save image

Resizes the images stored in the PC or the VHX and then saves them in the PC with a new file-name.

1. **Select an image in the PC files viewer area or the VHX files viewer area.**
2. **Select [Save As] in the [File] menu.**
The [Save As] dialog box appears on the screen.
3. **Put a checkmark in the [Resize to] checkbox and then select an image size.**
4. **Click the [Save] button.**



12.5 Connecting via FTP

Files can be copied to and from the controller and the PC connected via FTP.

This section describes the procedures for connecting the controller with the PC and copying files.

12.5.1 FTP

FTP stands for File Transfer Protocol. A Protocol is a set of rules required for communicating with personal computers. FTP enables file transfer over the network by allowing files and folders to share the same protocol.

The controller serves as an FTP server. Access is available from the personal computer connected to the controller to capture the image files stored in the controller.

12.5.2 Connection procedure

Connect the controller and the PC to the intra-group LAN, or connect the controller and the PC in a one-to-one configuration.

- ⇒ Refer to "12.2.1 Connecting to an intra-group LAN" on page 12-5 for the procedure for connecting to the intra-group LAN.
- ⇒ Refer to "12.2.2 Connecting in a one-to-one configuration" on page 12-6 for the procedure for connecting the controller and a PC in a one-to-one configuration.

Note: • For FTP, use a PC in which Windows 2000, XP, Vista or 7 is preinstalled.

- When password entry is required for accessing the controller from the PC, enter the following single-byte characters.
- User name: **VHX_User** (Fixed)
- Password: The password set up on the controller (Default: **VHX**)

1. Select [Network Setting] from [Option] on the menu bar of the controller, and select [All network funcs] in [Network enable setting].
2. Select the [Start FTP Server] command from the [Option] menu on the menu bar of the controller.
The [Start FTP Server] option is activated.



12.5.3 Copying files

Access can be made from a PC to the controller to copy files.

- Files can be copied from the controller to the PC and vice versa.

Copying the files in the controller to the PC

This section describes the procedure for copying the files from the controller to a Windows XP machine using Internet Explorer.

Microsoft Internet Explorer Ver5.5 or higher is recommended.

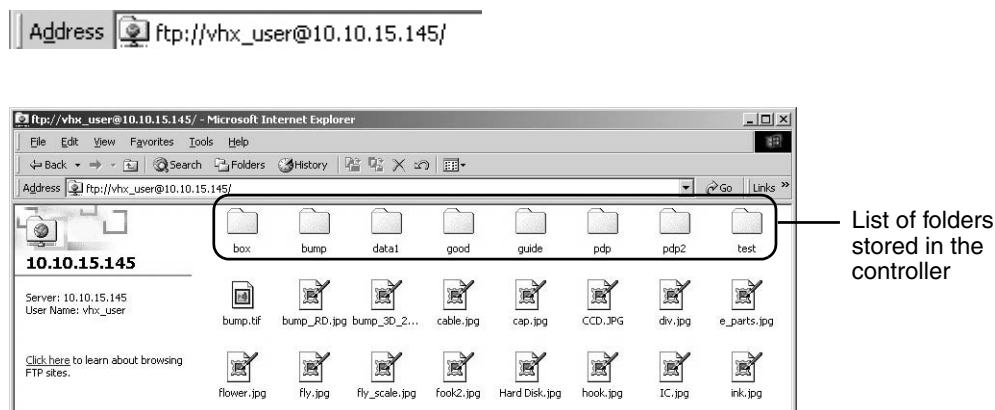
1. Turn on the power to the controller and the PC.
2. Start up Microsoft Internet Explorer and enter the IP address of the controller in the Address field.

The folders stored on the hard disk drive of the controller are displayed.

- When user name and password are required, enter the following:

User name: **VHX_User** (Fixed)

Password: The password set up on the controller (Default: **VHX**)

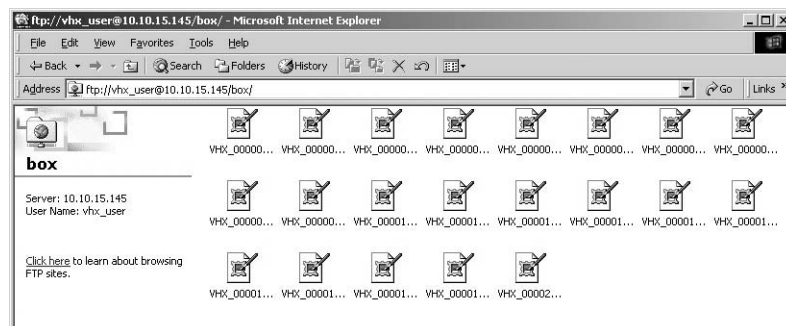


Tips

In the Address field, enter the IP address of the controller after "ftp://".

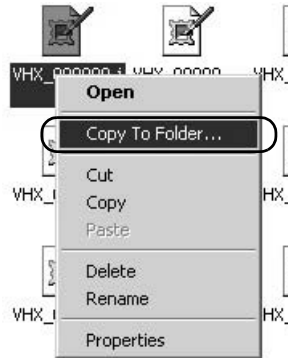
➤ Refer to "11.3 Network Setting" on page 11-7 for the IP address of the controller.
Microsoft Internet Explorer Ver5.5 or higher is recommended.

3. Open the desired folder to display a list of the files inside.
4. Right-click on the file you want to copy.
The shortcut menu appears on the screen.

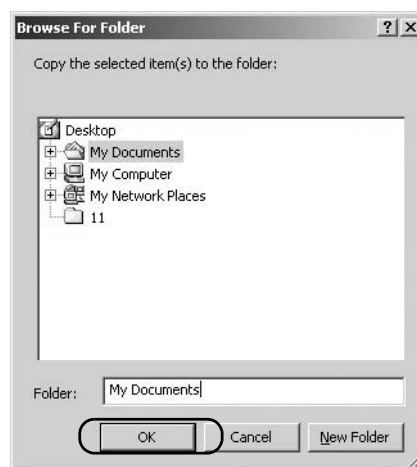


5. Select the [Copy to Folder] command.

The [Browse For Folder] dialog box appears on the screen.



6. **Select the destination folder and click the [OK] button.**
The selected file stored in the controller is copied to the PC.



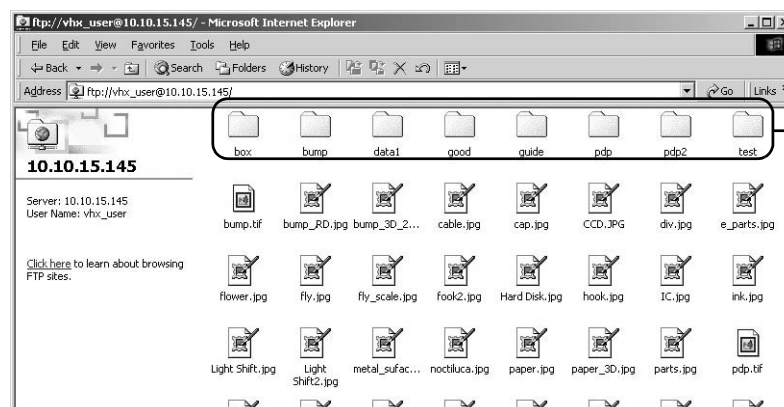
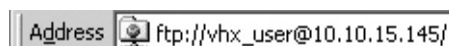
Tips A folder can be copied as well. Select the desired folder in step 4.

Copying the files on the PC to the controller

Use Microsoft Internet Explorer.

1. **Turn on the power to the controller and the PC.**
2. **Start up Microsoft Internet Explorer and enter the IP address of the controller in the Address field.**

The folders stored on the hard disk drive of the controller are displayed.

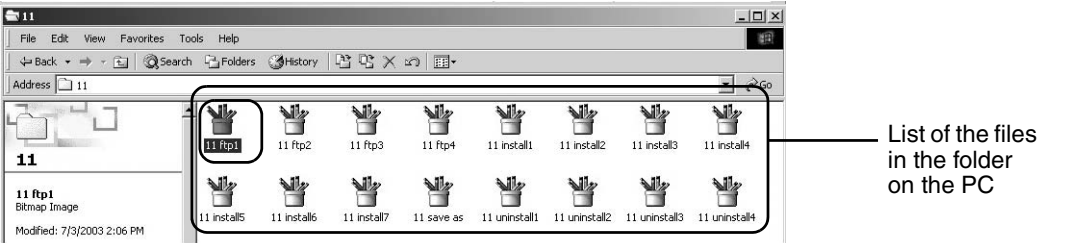


List of folders
stored in the
controller

- When user name and password are required, enter the following:
User name: **VHX_User** (Fixed)
Password: The password set up on the controller (Default: **VHX**)

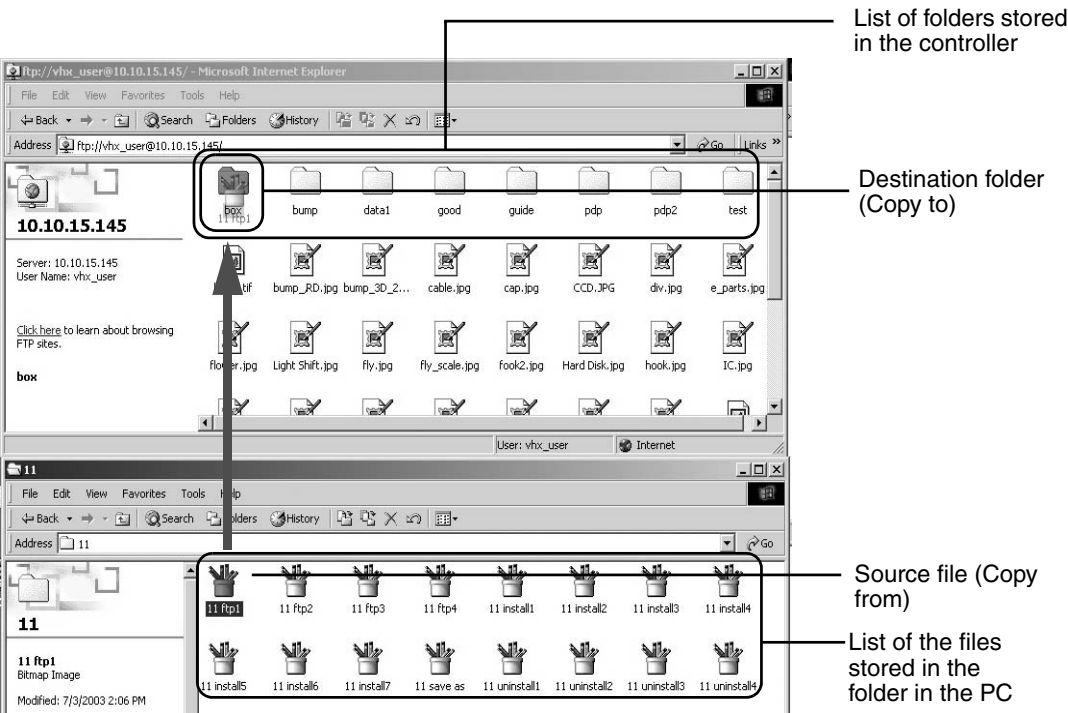
Tips In the Address field, enter the IP address of the controller after “ftp://”.
⇨ Refer to “11.3 Network Setting” on page 11-7 for the IP address of the controller.

3. Open the folder stored in the PC via Explorer and display the list of the files inside.



4. Select the file you want to copy.
5. Check that the desired file is selected and drag the file to the folder of the controller. The selected file stored in the PC is copied to the folder of the controller. The file operation can be executed with the Copy & Paste operation instead of the drag operation.

Tips Open the folder in which the file is dragged to check that the file was copied successfully.



Tips A folder can be copied as well. Select the desired folder in step 4.

12.6 Sharing a network

Files can be copied to and from the controller and the PC using the Windows standard sharing function.

12.6.1 Connection procedure

Connect the controller and the PC to an intra-group LAN, or connect the controller and a PC in a one-to-one configuration.

- ⇒ Refer to "12.2.1 Connecting to an intra-group LAN" on page 12-5 for the procedure for connecting to an intra-group LAN.
- ⇒ Refer to "12.2.2 Connecting in a one-to-one configuration" on page 12-6 for the procedure for connecting the controller and a PC in a one-to-one configuration.

Note: For Share Network, use the PC in which Windows 2000, XP, Vista or 7 is preinstalled.

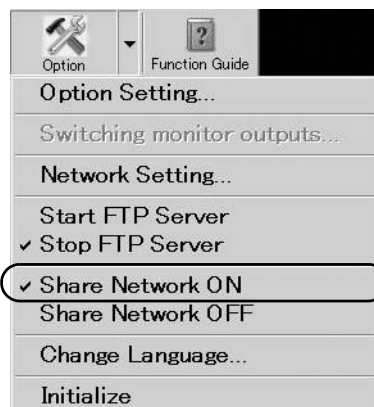
1. Select [Network Setting] from [Option] on the menu bar of the controller, and select [All network funcs] in [Network enable setting].

A dialog box appears to confirm restarting the controller to enable the setting. Restart the controller by clicking the [OK] button.

- ⇒ Refer to "Network Setting" on page 12-4 for network setting.

2. Select the [Share Network ON] command from the [Option] menu on the menu bar of the controller.

Network sharing is activated.



12.6.2 Copying files

Use Microsoft Internet Explorer.

1. Turn on the power to the controller and the PC.
2. Select the Shared network name to be connected from Workgroup in [My Network].

Note: • For FTP, use a PC in which Windows 2000, XP, Vista or 7 is preinstalled.

- When password entry is required for accessing the controller from the PC, enter the following single-byte characters.
- User name: **VHX_User** (Fixed)
- Password: The password set up on the controller (Default: **VHX**)

The folders stored on the controller are displayed..

Tips The controller can be found from Shared network name list in Workgroup as follows:

- The VHX is displayed as VHX-##### (##### is a string of random alphanumeric characters such as VHX-abcdefgh.)
This name is preset in the controller.
- If two or more units of the controller are connected to the network, the Shared network name can be checked by selecting [Network setting] from the [Option] menu on the menu bar.

Note: The workgroup name and the shared network name are fixed, and cannot be changed.

3. Double-click on the [HardDisk] folder.

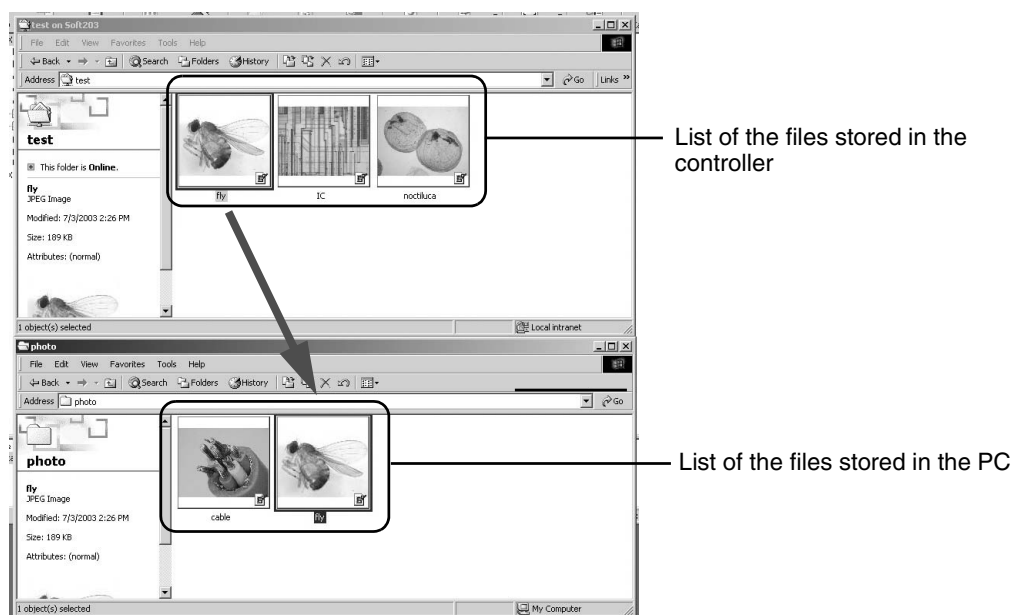
When another folder exists, double-click and open the folder that contains the source (destination) file.

4. Open the folder stored in the PC using Explorer and display the list of files inside.

5. Select the file you want to copy from the list of files on the controller or the PC.

6. Check that the desired file is selected and drag the file to the destination folder.

The file operation can be executed with the Copy & Paste operation instead of the drag operation.

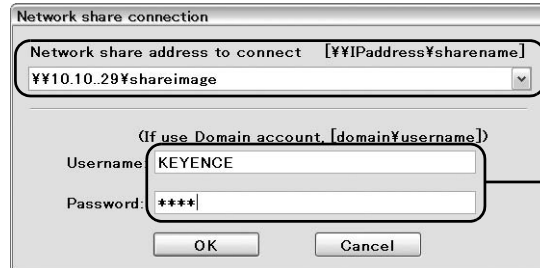


Tips A folder can be copied as well.

12.6.3 Exchanging files on the controller

1. Select the [Album] command on the menu bar, and select the [Network share connection] command on the [Option] menu.

The [Network share connection] dialog box appears on the screen.



Enter the name of the folder to be shared from its IP address in [Network share address to connect].
[\\IPaddress\sharename]

Enter the user name and the password of the computer to be shared on the network. To join a domain, enter [domain\username].

2. Click the [OK] button.

The network share folder is displayed in the folder display area, and you can exchange files.



Before connection



After connection

Appendices

A.1	Replacing the illumination lamp.....	Appendices-2
A.2	REMOTE connector (Record/Freeze).....	Appendices-5
A.3	Dimensions	Appendices-6
A.4	Specifications	Appendices-7
A.5	Cautions about CE Marking.....	Appendices-11
A.6	Cautions about UL Certificate	Appendices-12
A.7	Index	Appendices-13

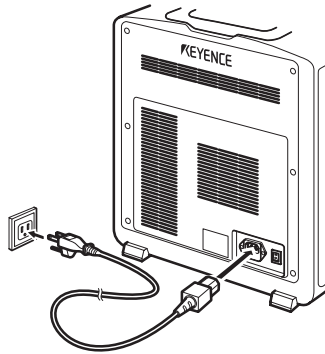
A.1 Replacing the illumination lamp

The average service life of the illumination halogen lamp is approximately 1,000 hours (at room temperature). When the lamp burns out, replace it using the following procedure.

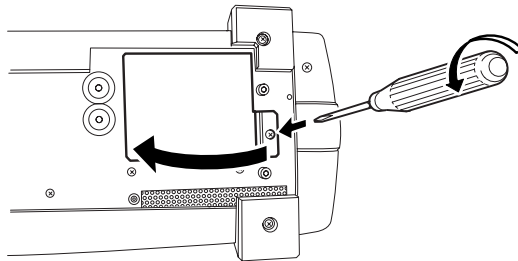


- **High voltage warning**
Be sure to turn off the power before replacing the lamp.
High voltage is applied to the lamp and cables while the current is being applied, which may cause electric shocks.
- **High temperature warning**
Be sure to wait at least 30 minutes after turning off the power switch when replacing the lamp. Otherwise, the heated lamp may cause burns.

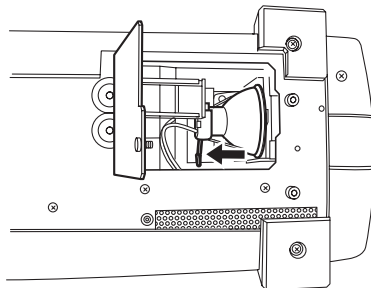
1. Turn off the power to the VHX-600E and disconnect the AC power cable.

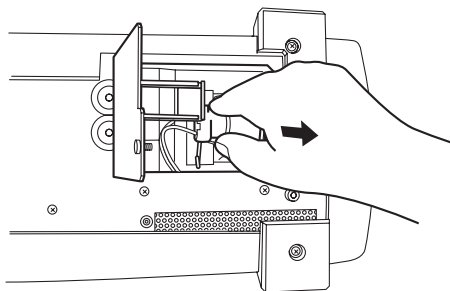


2. Remove the stands.
⇒ Refer to "2.1 Mounting/removing the stands" on page 2-2.
3. Place the VHX-600E in an upright position, remove the screws on the bottom, and open the cover.

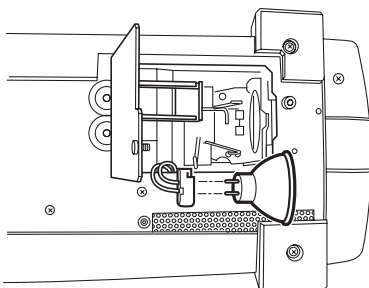


4. Move the lock lever to the socket side to release the lamp.

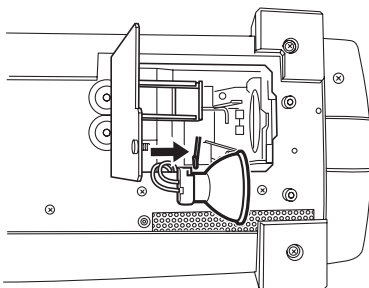


5. Pull out the lamp.

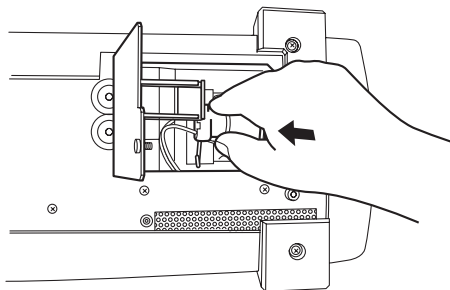
-
- Note:**
- Use JCR12V100W10H (OP-91641) for the replacement lamp.
 - When replacing the lamp, be careful not to let the VHX-600E fall or it may break.
 - Since socket cables are connected to the lamp, do not pull the lamp forcefully. Otherwise, the socket cables may be damaged.
-

6. Remove the lamp from the socket and then insert a new lamp in the socket.

-
- Note:** Discard the used halogen lamp in a similar manner to ordinary fluorescent lamps.
-

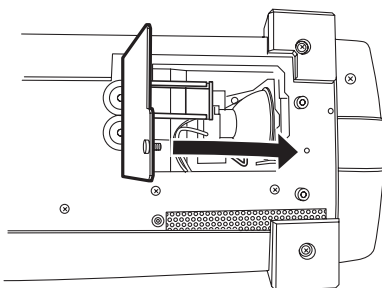
7. Return the lock lever to the original position.

8. Install the new lamp in the VHX-600E.



- When installing the lamp, align the projecting area on the lamp with the grooved area on the mounting bracket. Otherwise, the projecting area on the lamp will hit the mounting bracket, which may damage the lamp.

9. Close the cover and tighten the screw.

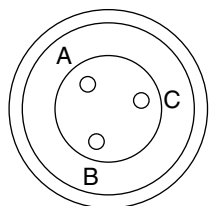


10. Re-attach the stands.

- ⇒ Refer to "2.1 Mounting/removing the stands" on page 2-2.

A.2 REMOTE connector (Record/Freeze)

A switch (e.g. footswitch) can be connected to the Record/Freeze remote connector to record or freeze the images.



REMOTE connector
(on the controller)

Pin assignment

Pin No.	Terminal name
A	Freeze remote terminal
B	Record remote terminal
C	COM

A.2.1 Recording images

The following describes the procedure for recording images using the Record/Freeze remote connector.

1. **Short-circuit the B-C segment of the Record/Freeze remote connector by using a foot-switch or other device.**
The PAUSE LED on the console illuminates and the [Rec] dialog box appears on the screen.
2. **Designate the conditions for saving the image.**
Specify the image format and properties.
3. **Click the [Save] button.**
The PAUSE LED on the console goes off and the recording of the image is completed.
⇒ Refer to "6.1 Recording images (still images)" on page 6-2 for the procedure to save the image.

Tips

Set the VHX-600E to the Auto Rec Mode to record the images sequentially. (The file-name does not need to be entered for each recording.)

A.2.2 Freezing an image and canceling the freeze

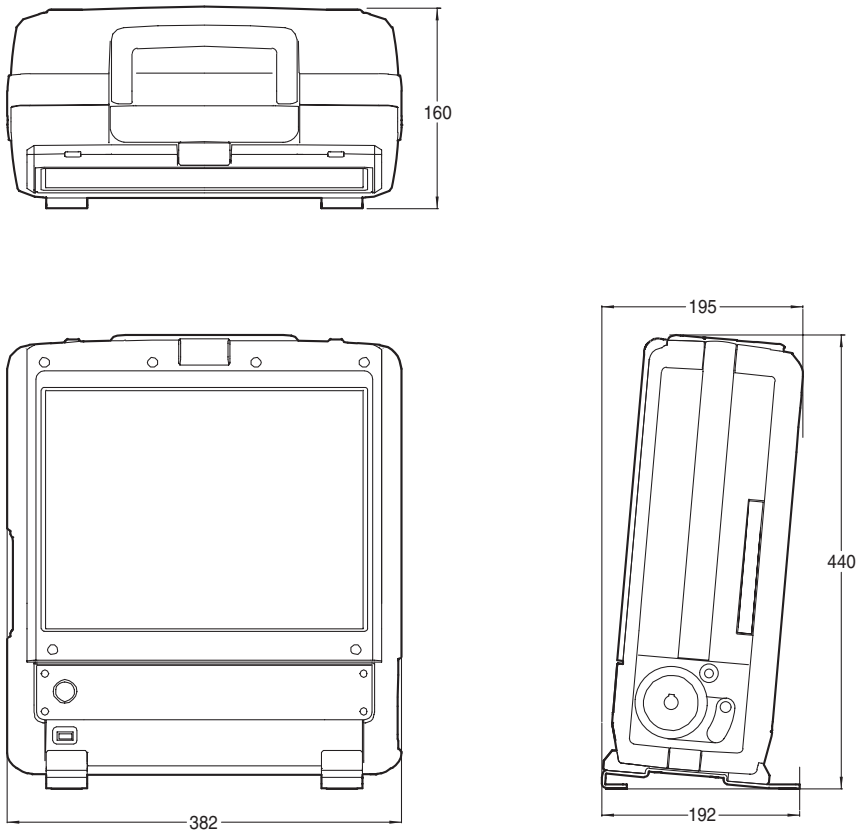
The following describes the procedure for freezing the image and canceling the freeze using the Record/Freeze remote connector.

1. **Short-circuit the A-C segment of the Record/Freeze remote connector by using a foot-switch or other device.**
The PAUSE LED on the console illuminates and the image is frozen.
2. **Short-circuit the A-C segment of the Record/Freeze remote connector again.**
The PAUSE LED on the console goes off and the freeze state of the image is canceled.

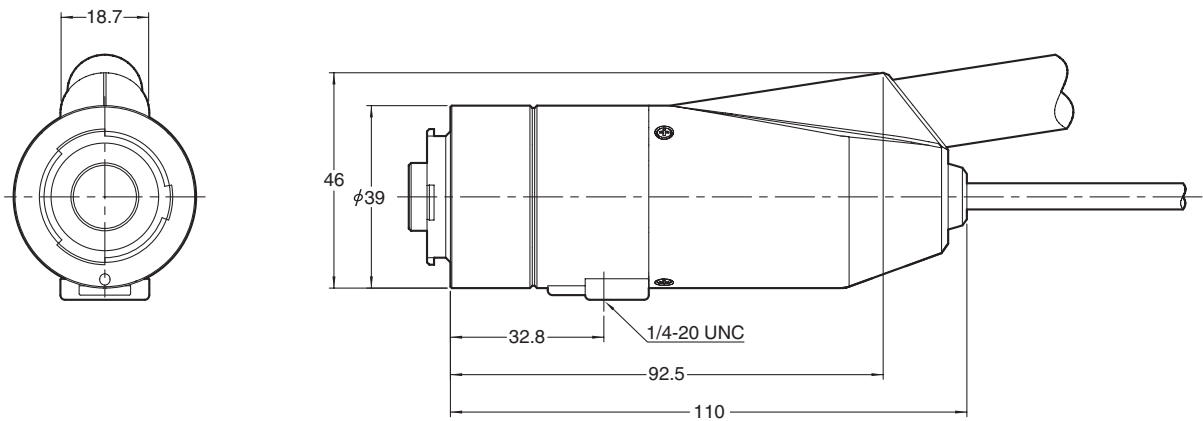
A.3 Dimensions

Unit: mm

■ VHX-600E Controller unit



■ VHX-600E Camera head



A.4 Specifications

■ Specifications (basic functions)

Model			VHX-600E	VHX-600E (5M)	VHX-600E (10M)
Camera	Image pick-up element		1/1.8-inch, 2.11-million-pixel CCD image sensor		
			Total pixels: 1688 (H) x 1248 (V)		
			Effective pixels: 1628 (H) x 1236 (V)		
			Executable pixels: 1600 (H) x 1200 (V)		
	Scan method		Progressive		
	Frame rate		15 frames/sec or 28 frames/sec (selectable)		
	Resolution	2 million pixels	1600 (H) x 1200 (V) Approx. 1000 TV lines or more		
		4 million pixel equivalent	1600 (H) x 1200 (V) Approx. 1200 TV lines or more		
		6 million pixels	1600 (H) x 1200 (V) Approx. 1200 TV lines (with excellent color reproducibility)		
		8 million pixels	3200 (H) x 2400 (V) Approx. 1600 TV lines or more		
		18 million pixels	4800 (H) x 3600 (V) Approx. 2000 TV lines or more		
		54 million pixels	4800 (H) x 3600 (V) Approx. 2000 TV lines (with excellent color reproducibility)		
	Gain		AUTO, NORMAL, MANUAL		
	Electronic shutter		AUTO, MANU, OFF, 1/15, 1/30, 1/60, 1/120, 1/250, 1/500, 1/1000, 1/2000, 1/5000		
Supercharge shutter		0.2 sec to 17 sec. Can be set in increments of 0.1 sec.			
White balance		Auto, Manual, One-push set, Preset (2700K, 3200K, 5600K, 9000K)			
Back focus adjustment		Not required			
LCD monitor ^{*4}	Size		Color LCD (TFT) 15"		
	Panel size		304.5 (H) x 228.4 (V) mm		
	Pixel pitch		0.1905 (H) x 0.1905 (V) mm		
	Number of pixels		1600 (H) x 1200 (V) (UXGA)		
	Display color		Approx. 16.77 million colors ^{*3}		
	Light intensity		200 cd/m ² (typical)		
	Contrast ratio		500: 1 (typical)		
	Viewing angle		±85° (typical, horizontal), ±85° (typical, vertical)		
CD-RW drive unit	Speed		24x Write, 10x Re-write, 24x Read		
	Used disk		CD-R/CD-RW		
	Storage capacity		700 MB, approx. 3500 images (when 2 million-pixel image is compressed) to approx. 117 images (when 2 million-pixel image is not compressed)		
Hard disk drive unit	Storage capacity		160 GB (45 GB area reserved internally) Approx. 575,000 images (when 2 million-pixel images are compressed) to 19,000 images (when 2 million-pixel images are not compressed)		
Image format			JPEG (With compression), TIFF (No compression)		
Light source	Lamp		12 V, 100 W, Halogen lamp		
	Lamp life		1000 hours (average)		
	Color temperature		3100K (at maximum light intensity)		
Output	Video output		Analog RGB (1600 x 1200 pixels)		
	Scanning frequency	LCD monitor	75 kHz (H), 60 Hz (V)		
		External monitor	75 kHz (H), 60 Hz (V)		
Input	Mouse input		MINI-DIN 6-pin connector (DOS/V-compatible PS/2 mouse)		
	Keyboard input		MINI-DIN 6-pin connector (DOS/V PS/2)		
	External remote input		Freeze/Record. Non-voltage input (Contact/Noncontact)		
Interface	LAN		RJ-45 (10BASE-T/100BASE-TX/1000BASE-T)		
	USB2.0 Series A		4 types: Special printer port x 1, VHX-S15 connection port x 1, External storage connection port x 2		
Power supply	Power-supply voltage		100 to 240 VAC ±10%, 50/60 Hz		
	Power consumption		310 VA		

Model		VHX-600E	VHX-600E (5M)	VHX-600E (10M)
Environmental resistance	Ambient temperature	+5 to 40°C (41 to 104 °F)		
	Relative humidity	35 to 80%, No condensation		
Weight	Controller	Approx. 12.6 kg		
	Camera unit	Approx. 950 g	Approx. 1700 g	Approx. 2900 g
	Console	Approx. 250 g		
Dimensions (Excluding the projected areas)		382 (W) x 425 (H) x 162 (D) mm		

- *1 2 million pixels x 3CCD mode
- *2 18 million pixels x 3CCD mode
- *3 Approximately 16.77 million pixels are realized with dithering processing of the display controller.
- *4 The LCD monitor mounted on the VHX-600E is manufactured using extremely sophisticated techniques. Dots not lighted (dark dots) or dots always lighted (bright dots) may exist, but it does not indicate malfunction.

■ Specifications (other functions)

	Model	VHX-600E	VHX-600E (5M)	VHX-600E (10M)
Controller functions	Depth composition function	Real-time Depth composition function		
		High-quality depth composition function		
	Accurate D.F.D method 3D display function	Available (Quick method)		
	Saving 360-degree data of 3D displays	Possible (360-degree rotation observation in 3D is possible after images are saved)		
	3D illumination simulation function	Available		
	3D comparison function	Available (interlock, comparison, and difference display modes)		
	Real time digital zoom	1.0 to 10.0x (100 steps)		
	Optimal contrast function	Available		
	Halation removal function	Available		
	Noise elimination function	Available		
	Super charge shutter function	Available		
	Edge enhance function	Available (200 steps), supporting live images		
	Wide range view function	Available		
	Gamma correction function	Available		
	Shake correction function	Available (supporting live images)		
	Sharpening Image mode	Available		
	Split function	Vertical, horizontal, and four-part splits		
	Movie recording/playback function	28 frames/second max., movie size: 800 x 600, actual movie size: 800 x 480		
	Timer recording function	Available		
Measurement function	Automatic unit VHX-S15 control function	Available		
	High definition size measurement function	Available		
	Wide range 2-points measurement	Available		
	Distance, angle, radius, area, etc.	Available		
	Auto count measurement function	Available (Length and area measurements are possible by brightness extraction and color extraction.)		
	Scale display	Available		
	Auto edge detection	Available		
	Auto calibration	Full automatic (no numerical value needs to be entered)		
Measurement function (Optional function of the VHX-H2M) *1	3D profile measurement	Available (The height profile on a desired line can be displayed on the 3D screen.)		
	Height color/scale display function	Available (The X, Y, and Z-height scales and the color bar that is linked to the height can be displayed.)		
	2 point height measurement function	Available		
	Auto focus function	Available		
	Cross-section profile measurement	Available		
	3D volume measurement	Available		
	Measurement of distance between 3D surfaces	Available		
	Measurement of angle between 3D surfaces	Available		

Model		VHX-600E	VHX-600E (5M)	VHX-600E (10M)
Utility	All-in-one style of observe, record and measure	Observation, record, and measurement functions can be operated without using the PC.		
	Mail send function	Available		
	Pop-up guide	Available		
	Bayonet attachment	Available		
	Keyboard input	Available		
	Foot switch support	Available		
	Function guide	Available		
Console (one-touch operation)	Pause	Available		
	Capture	Available		
	Shutter speed adjustment	Available		
	Super charger shutter	Available		
	One-touch 2x zoom	Available		
	Depth composition function	Available		
	Quick 3D display function	Available		
	Frame rate switch	Available (15F/S, 28F/S)		
	Light shift function (Bump enhancement)	Available (Full, Partial, and Flanking illuminations)		
	e-Preview mode	Available (The four types of image modes can be displayed together automatically, and the optimal image among them can be selected.)		
	Shake correction function	Available		
	Optimal contrast function	Available		
	Halation removal function	Available		
	Sensitivity quick adjustment dial	Can adjust the shutter speed and camera gain with one trimmer.		
	Halogen lamp intensity adjustment	Available		
Provided software	PC communication software	Image data can easily be transmitted between the VHX controller and the PC. (LAN are supported.)		
	PC 3D Display software	The 3D images stored in the VHX controller can be displayed on the PC.		

*1 VHX-H2M is software dedicated for the VHX-600E.

A.5 Cautions about CE Marking

KEYENCE has evaluated the conformity to the requirements of EU Directives, and confirmed that the VHX-600E meets the requirements when the following conditions are met.

When the VHX-600E is used in EU member states, the following conditions must be met.

<Precautions>

■ Precautions about the EMC Directive (2004/108/EC)

- Applicable standard (EMI/EMS): EN61326-1, Class A

■ Precautions about the Low-voltage Directive (2006/95/EC)

- Applicable standard: EN61010-1
- Overvoltage category: II
- Pollution degree: 2
- A power supply cord set is not included with the VHX-600E. When using the VHX-600E in EU member states, use a power supply cord set (max. length 3 m) that meets the EN standards.
- When replacing the fuse, be sure to use a fuse that meets the following rating:
Rated voltage: 250 V
Rated current: 4.0 A
Fuse characteristics: Time lag
- When replacing the halogen lamp, be sure to replace with the KEYENCE halogen lamp, Model: OP-91641.

A.6 Cautions about UL Certificate

The VHX-600E complies with the following UL standard and CSA standard. The VHX-600E has received UL and C-UL certificate.

- Applicable standard: UL61010-1

Safety Requirements for Electrical Equipment for Measurement, Control, and Laboratory Use
CAN/CSA C22.2 No. 61010-1

Safety Requirements for Electrical Equipment for Measurement, Control, and Laboratory Use

- UL File No.: E303317
- UL category: OGTK/OGTK7

<Precautions>

- Overvoltage category: II
- Pollution degree: 2
- A power supply cord set is not included with the VHX-600E. When using the VHX-600E in the USA, use a power supply cord set (max. length 3 m) that meets the UL standards.
- When replacing the fuse, be sure to use an HT series fuse from SOC Corporation that meets the following rating:
Rated voltage: 250 V
Rated current: 4.0 A
Fuse characteristics: Time lag
- When replacing the halogen lamp, be sure to replace with the KEYENCE halogen lamp, Model: OP-91641.

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