



Nikon

DS-U3 DS Camera Control Unit

DS Camera Head

DS-Fi1/ DS-Vi1

DS Cooled Camera Head

DS-Qi1Mc/DS-Fi1c/DS-Ri1

<Instructions>

(Ver.1.00)

Introduction

Thank you for purchasing a Nikon product.

This instruction manual is written for users of the DS-U3 DS Camera Control Unit, DS-Fi1 and DS-Vi1 DS Camera Heads, and DS-Qi1Mc, DS-Fi1c, and DS-Ri1 DS Cooled Camera Heads.

To ensure correct usage, read this manual carefully before operating the product.

- No part of this manual may be reproduced or transmitted in any form without prior written permission from Nikon.
- The contents of this manual are subject to change without notice.
- Although every effort has been made to ensure the accuracy of this manual, errors or inconsistencies may remain. If you note any points that are unclear or incorrect, please contact your nearest Nikon representative.
- Some of the equipment described in this manual may not be included in the set you have purchased.
- If you intend to use any other equipment with this product, read the manual for that equipment too.
- If the equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

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Safety Precautions

To ensure correct and safe operation, read this manual before using the product.

Warning and Caution Symbols Used in This Manual

Although this product is designed and manufactured to be completely safe during use, incorrect usage or failure to follow the safety instructions provided may cause personal injury or property damage. To ensure correct usage, read this manual carefully before using the product. Do not discard this manual and keep it handy for easy reference.

Safety instructions in this manual are marked with the following symbols to highlight their importance. For your safety, always follow the instructions marked with these symbols.

Symbol	Description
 Warning	Disregarding instructions marked with this symbol may lead to serious injury or death.
 Caution	Disregarding instructions marked with this symbol may lead to injury or property damage.

**Warning****1. Intended application of this product**

Use this product only for photomicrography. Do not use this product for other purpose.

2. Do not repair nor disassemble.

The AC adapter for the DS-U3 contains a high-voltage power supply. Never attempt to disassemble or repair the equipment by yourself; doing so may result in electric shock or equipment failure. Never attempt to disassemble any part of the equipment unless instructed to do so in this manual. If you notice any problems with the equipment, turn off the power and contact your nearest Nikon representative.

3. AC adapter

Use the specified AC adapter. Using a wrong adapter may result in fire or electric shock.

For details, refer to "3. DS AC Adapter" in Chapter 9, Specifications.

4. Power cord

To prevent electric shock, be sure to turn off the power switch of the DS-U3 before connecting or disconnecting the power cord.

For the DS-U3, use only the specified AC adapter and power cord.

The specifications of the power cord are shown below. Using a wrong power cord may result in fire or other hazardous condition.

The AC adapter for this product is classified as Class I protection against electric shock. Therefore, make sure that the power supply is connected to an appropriate ground terminal (protective earth terminal). If you lose or damage the power cord, contact your nearest Nikon representative.

- **When used in 100-120 V region, outside Japan**

UL listed detachable power cord set, 3 conductor grounding (3 conductor grounding Type SVT, No. 18 AWG, 3 m long maximum, rated at 125 V AC minimum)

- **When used in 220-240 V region**

Detachables power cord set approved according to EU/EN standard, 3 conductor grounding (3 conductor grounding Type H05VV-F, 3 m long maximum, rated at 250 V AC minimum)

- **When used inside Japan**

PSE approved detachable power cord set, 3 conductor grounding (3 conductor grounding Type VCTF 3 x 0.75 mm², 3 m long maximum, rated at 125 V AC minimum)

5. Bus power

When DS-Fi1 or DS-Vi1 camera head alone is connected, it can be IEEE 1394 bus-powered for operation. Before using IEEE bus power, check that your PC has sufficient capacity to supply power to the camera head and DS-U3.

6. Handling

- To prevent malfunctions or abnormal heating due to short circuits, do not wet this product and others used with this product nor allow foreign matters to be intruded. If these products get wet, or if foreign matter such as a piece of paper gets inside, immediately turn off the power switch of the DS-U3, unplug the power cord from the wall outlet, and disconnect the IEEE 1394b cable from the connector. Then, contact your nearest Nikon representative.
- To prevent fire or burn injury due to the breakage of a cable, do not bend nor twist the cables excessively.
- To prevent fire due to heating, do not place a cloth or paper on the DS-U3 nor block the vent of the DS-U3.



Caution

1. Installation location

- Do not use this equipment in locations subject to high temperatures, high humidity, vibration, or excessive amounts of dust. Doing so may result in fire or malfunction.
- Avoid pointing the camera at high-power laser light or the sun. In particular, do not attempt to photograph in such a condition.

Excessive light radiation may cause browning or burn-in to the image pickup device and may result in malfunction.

- Because the DS cooled camera is equipped with a cooling mechanism, it is slightly more susceptible to condensation than typical electronic devices if used for extended periods in locations subject to sudden temperature changes (from cold to hot and vice-versa) or high humidity. Pay particular attention to the ambient humidity when using the DS cooled camera for extended periods. After extended use, be sure to leave the camera off for a few hours before turning it on again.
- When used for an extended period of time, the DS-U3 may become hot. Do not place the DS-U3 on a surface that cannot withstand heat (such as vinyl or plastic). Always install the equipment with a surrounding clear area of 100 mm or more.
- Arrange a layout that allows easy removal of the power cord from the inlet of the AC adapter in the event of an emergency.

2. Turn off the power before assembling the product or connecting /disconnecting cables.

To prevent failure or malfunction, be sure to turn off the power switch of the DS-U3 before assembling the product or connecting/disconnecting a cable.

3. Connect only the devices specified to the connectors.

To prevent malfunction or damage, connect only the devices specified to the connectors on both the DS-U3 and the DS camera head.

4. Cautions on assembly, installation, and storage

- Always turn off the power switch before assembling the product, connecting or disconnecting cables.
- Be careful to avoid pinching your fingers or hands in the equipment during installation.
- To prevent malfunction, handle the product carefully and do not subject it to a strong physical shock or vibration.
- When installing the DS camera head to an optical device such as microscope, make sure that the product or its cable is not interfered with the movable part of the optical device.
- If you are not using the equipment for an extended period of time, unplug the power cord from the power outlet for safety.
- Store the product in a place with little vibration and dust.
- Do not store the product in a hot and humid place.

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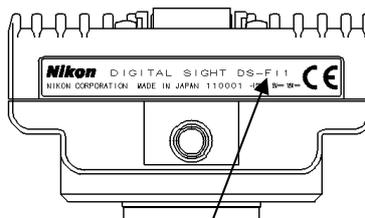
1

Before Use

1

Models of the DS Camera Head

There are five models available for the DS camera head as follows. The features differ depending on the model you have purchased. Check the model name indicated on the DS camera head before use.



Model name is indicated on the tripod mount or a place near the location for the camera cap attachment.

- Features of each model

Model	Image pickup device	Cooling	Pixel- shifting function	Body color
DS-Fi1	2/3-inch, color, 5.24-megapixel	---	---	White
DS-Vi1	1/1.8-inch, color, 2.11-megapixel	---	---	White
DS-Qi1Mc	2/3-inch, monochrome, 1.50-megapixel	Applied	---	Black
DS-Fi1c	2/3-inch, color, 5.24-megapixel	Applied	---	Black
DS-Ri1	2/3-inch, color, 1.50-megapixel	Applied	Applied	Black

* For details of the features above, refer to Chapter 9, "Specifications".

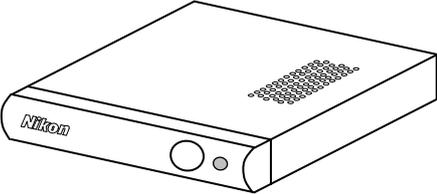
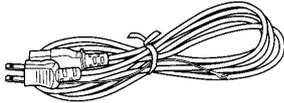
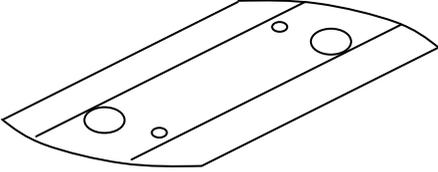
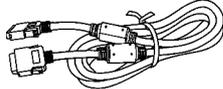
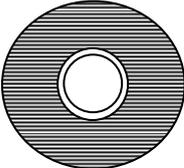
* Pixel-shifting is a high-resolution photographing function available by using NIS-Elements or other software on a PC connected with IEEE1394b cable.

2

Components

Check that all items listed below are provided in the package.

If any items are missing, contact your nearest Nikon representative immediately.

1	DS-U3 DS Camera Control Unit 	6	Power cord 
2	Vertical stand 	7	DS camera cable (DS Camera I/F cable 20-26; 3 m) 
3	Instruction manual 	8	DS Camera Head with a C mount cap 
4	NIS-Elements freeware package (CD-ROM) 	9	C mount adapter (optional) 
5	AC adapter 		

2

Peripheral Equipment

(1) PC

The DS-U3 is designed for use with a PC connected via an IEEE1394b (bilingual) interface. The DS-U3 performs the following operations via NIS-Elements freeware installed on a PC.

- 1) Display captured images on the PC monitor
- 2) Confirm/change the setting (for photographing conditions, etc.) of the DS-U3

Additionally, using the Nikon NIS-Elements software (optional) enables advanced measurement and analysis.

Contact your nearest Nikon representative for the NIS-Elements software. For details on control function, refer to the manual provided with the software.

The PC and its monitor to be connected to the DS-U3 must meet the following system requirements.

• PC unit

Item	Requirements
Type	Windows PC
CPU	Equivalent to Xeon 2.6 GHz or higher
Memory	2 GB or more
Hard disc	100 MB of free hard disk space for installation; 300 MB of free disk space for program execution
Video	1280 x 1024 pixels, High Color mode or better (True Color mode recommended)
OS	Windows 7/Windows XP (Japanese/English) Note) Use Windows 7 Professional/Windows XP Professional Service Pack 2.
IEEE1394b	IEEE1394b FireWire PCIe Card (NK653AA from Hewlett Packard recommended)

For installation of the IEEE1394b PCI board, refer to the instruction manuals of the PC and the IEEE1394b PCI board.

• PC monitor

Item	Requirement
Resolution	1280 x 1024 pixels, True Color mode displayable monitor recommended

It is not guaranteed that the software runs on all PCs that comply with the operating environments described above. For more details, contact your nearest Nikon representative.

(2) IEEE1394b cable

IEEE1394b cable is used to connect the DS-U3 to the PC. We recommend a cable provided with the IEEE1394b FireWire PCIe Card.

(3) C mount lens

The C mount lens is required to photograph subjects other than photomicrographs. Any lens that meets the following conditions may be used:

- Protrudes no more than 10 mm from the mount surface into the camera.
Less than 5 mm for DS-Ri1.
- The image circle of the DS-Vi1 is 1/1.8", and that of the DS-Fi1, DS-Fi1c, DS-Qi1Mc or DS-Ri1 is 2/3". Use a lens for 1" or 2/3".
- When using diaphragm settings brighter than F2.8, you may observe slight light fall off around the periphery.

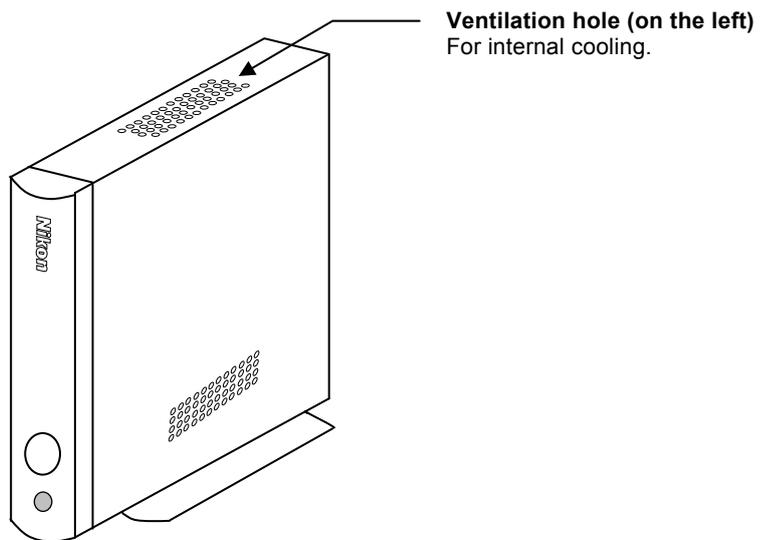
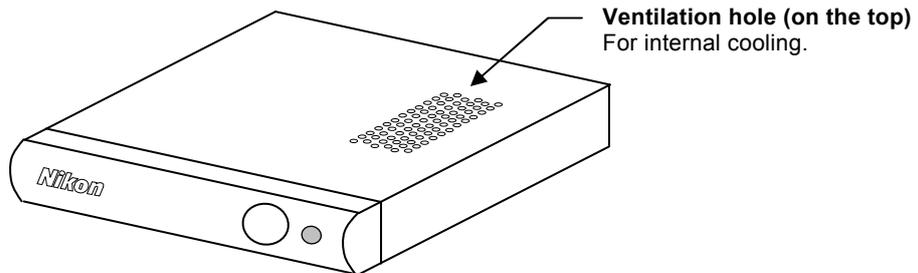
3

Names of Parts and Their Functions

1

DS-U3 DS Camera Control Unit

(1) External appearance of the DS-U3



(2) Front of the DS-U3

Power switch

This is a push switch. Press to turn it on. Press again to release and turn it off. When the power is on, the power indicator lights up.

Power indicator

When power is turned on, the indicator first flashes green, and then turns to green. When the indicator lights up in green, the DS-U3 is ready for operation.



(3) Rear of the DS-U3

IEEE1394 connector

Connects to a PC via an IEEE 1394b cable.

CAMERA 1 connector

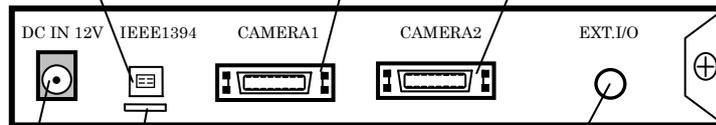
Connects to the DS camera head.

* Be sure to turn off power before connecting or disconnecting the connector: otherwise, the equipment malfunctions.

CAMERA 2 connector

Connects to the DS camera head.

* Be sure to turn off power before connecting or disconnecting the connector: otherwise, the equipment malfunctions.



Holder

Keeps the cable from being pulled off the IEEE1394 connector.

DC IN 12V connector

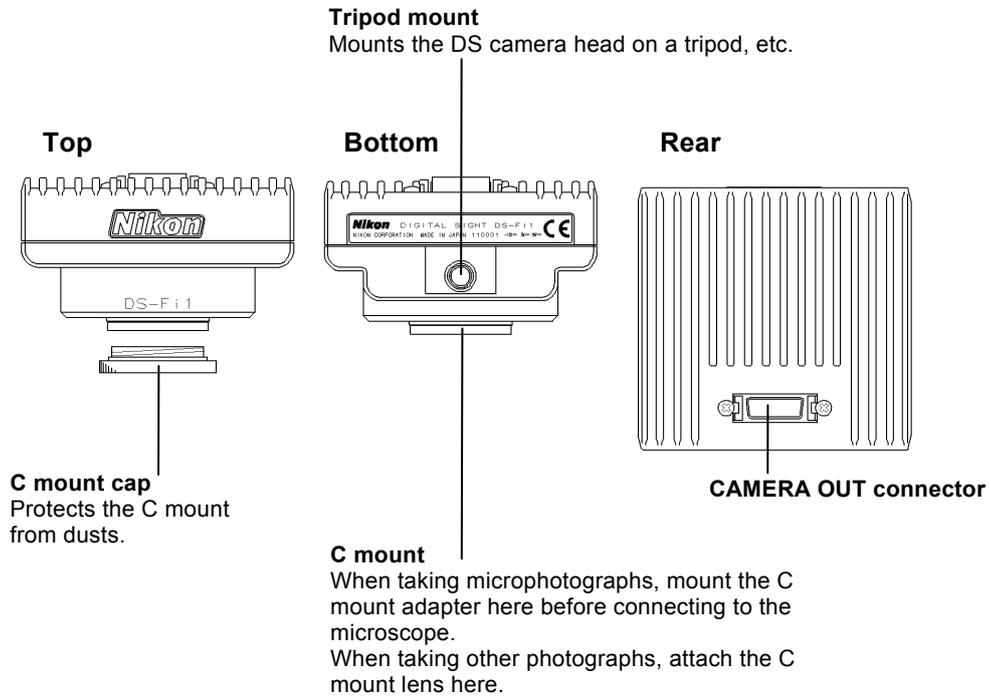
Use the supplied AC adapter.

EXT. I/O connector

When the DS-Qi1Mc is connected, image capture can be externally triggered by supplying external trigger signals from this port. (Cannot be used unless DS-Qi1Mc is connected.)

2

DS Camera Head



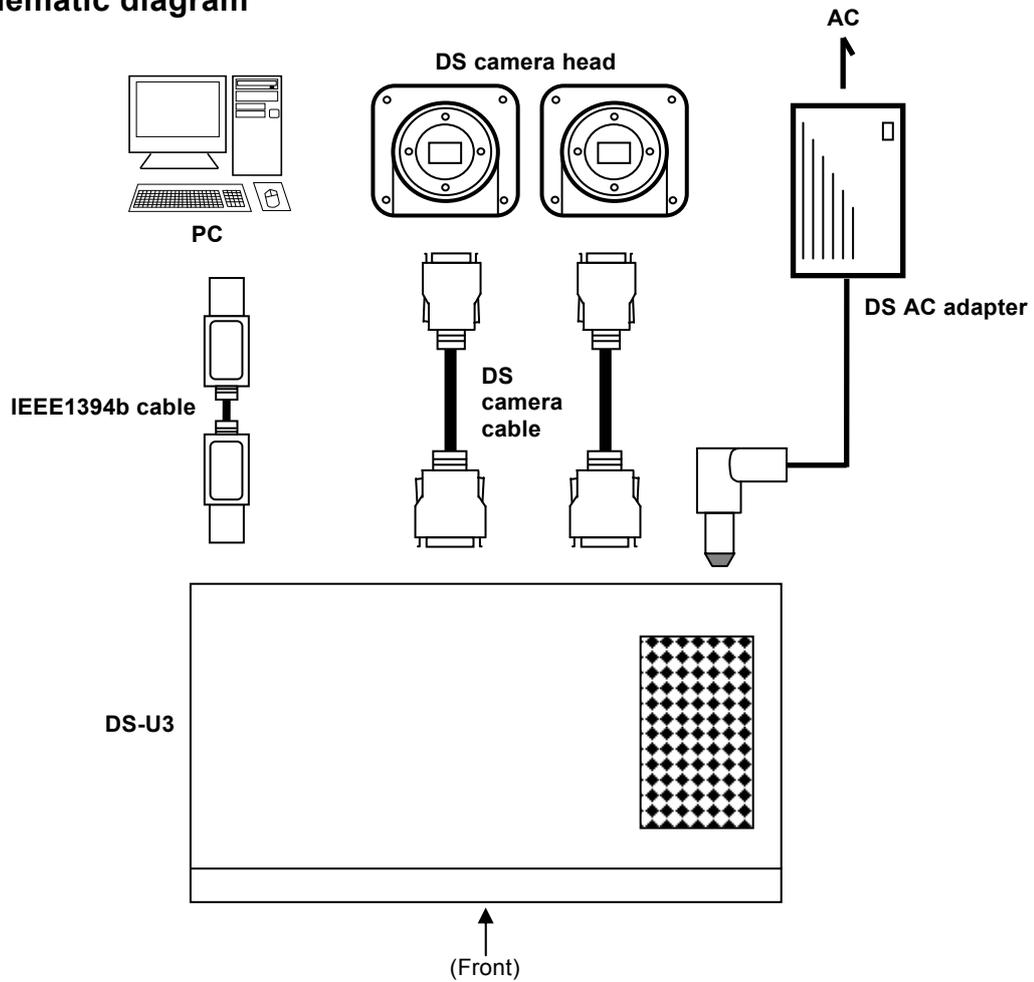
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4

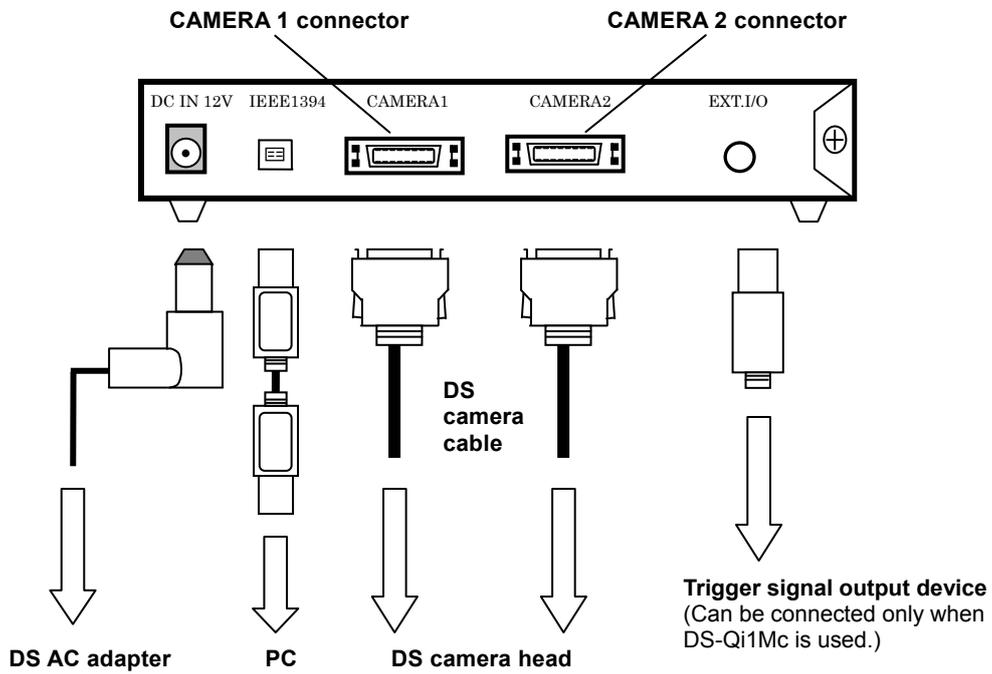
Connecting and Installing the Equipment

1 Connection Diagrams

(1) Schematic diagram



(2) Connectors (Rear of the DS-U3)



2

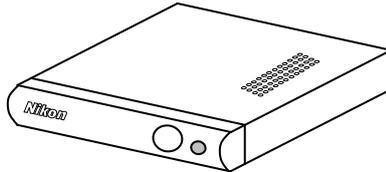
Installing the DS-U3

The DS-U3 can be installed horizontally or vertically.

- **Horizontal installation**

Set the DS-U3 horizontally on a flat surface.

Provide a clearance of approximately 100 mm around the product to release heat.

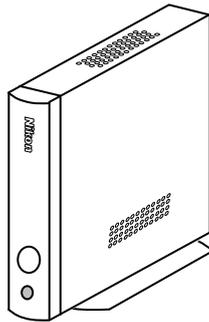


- **Vertical installation**

Attach the vertical stand to the DS-U3 for setting the product in the vertical position.

Set the DS-U3 vertically on a flat surface as shown below.

Provide a clearance of approximately 100 mm around the product to release heat.



Attach the vertical stand as follows:

Remove two of the four screws at the upper front position and the lower rear position on the right side of the DS-U3. (See Figure A below.)

Then, fix the stand to the right surface of the DS-U3 using the screws that have been removed. (See Figure B below.)

Use an M2.5-size Phillips driver to attach or remove screws.

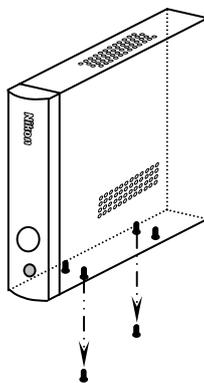


Figure A

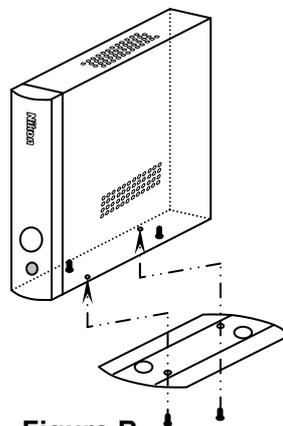


Figure B

3 Connection Methods

(1) Connecting the DS Camera Head

Be sure to turn off the DS-U3 before connecting the DS camera head.

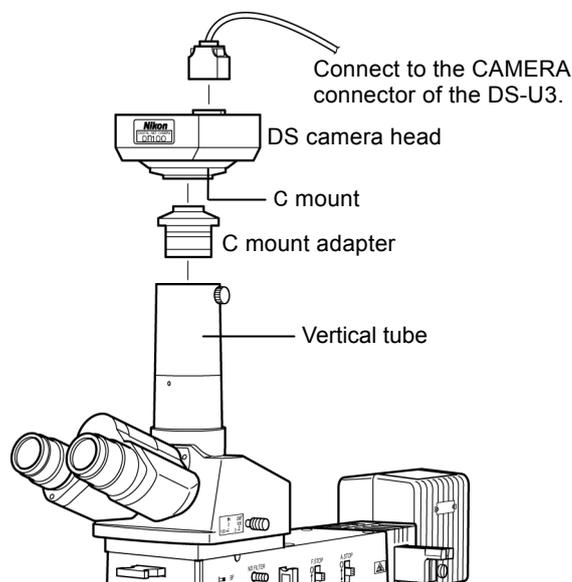
Plug one end of the supplied camera cable into the camera connector on the DS-U3, and the other end into the CAMERA OUT connector on the DS camera head. Plug the cable into the connectors while pinching the locking tabs. When the cable is inserted as far as it goes, the locking tabs return to their original positions, locking the connector in place.

DS-U3 is equipped with two connectors to connect DS camera heads. When two camera heads are connected, you can select and operate either camera head using NIS-Elements or other software.

When you use only one DS camera head, connect it to the CAMERA 1 connector.

Mounting the DS camera head on a microscope

- 1) Remove the C mount cap from the C mount on the DS camera head.
- 2) Make sure there is no dust on the C mount adapter.
If there is, use an air blower or the like to wipe it out.
- 3) Screw the C mount adapter into the C mount on the DS camera head.
Screw it in as far as it goes.
- 4) Plug the C mount adapter into the vertical tube of the microscope.
Use the clamping screw on the vertical tube to secure the C mount adapter.



Likewise, a relay lens can be attached.

The x0.7 relay lens is recommended for the DS-Fi1, DS-Fi1c, DS-Qi1Mc, and DS-Ri1.

The x0.55 relay lens is recommended for the DS-Vi1.

For setting the microscope with the DS camera head, see "Microscope Setting" in Chapter 5.

Installing an optional C mount lens on the DS camera head

Select an attachable lens (see "Peripheral Equipment" in Chapter 2), and then screw it into the C mount.

Note that the image quality produced by this product is tuned for microphotography. The tripod mount on the DS camera head can also be used to mount the DS camera head on a tripod.

(2) Connecting to a PC with an IEEE1394b Cable

Plug one end of an IEEE1394b cable into the IEEE1394b connector on the PC, and the other end into the one on the DS-U3.

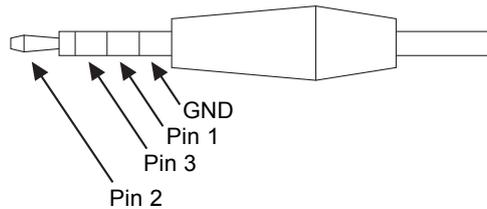
(3) When connecting external devices (trigger signal output devices)

Before making a connection, always turn off the DS-U3 and external devices.

When the DS-Qi1Mc is connected, image capture can be triggered from an external device by supplying trigger signals to the EXT. I/O connector.

If you are connecting your own external device, use a device that meets the following specifications.

Connector: $\phi 3.5$ mm, 3-pole pin jack

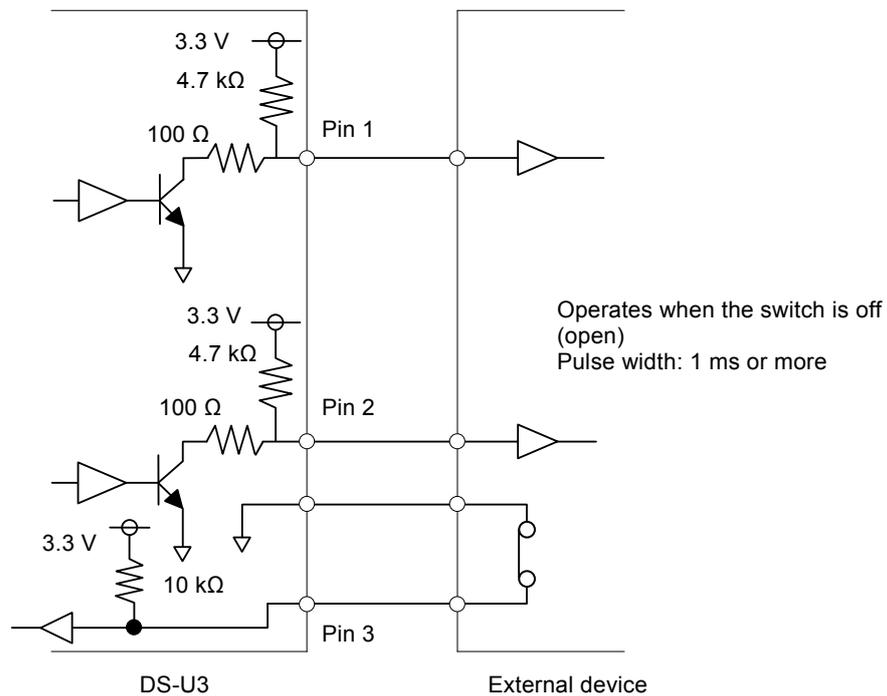


Functions

Pin 1: Exposure timing signal (output: HI active)

Pin 2: Trigger enable signal (output: HI active)

Pin 3: External trigger signal (input: HI active)

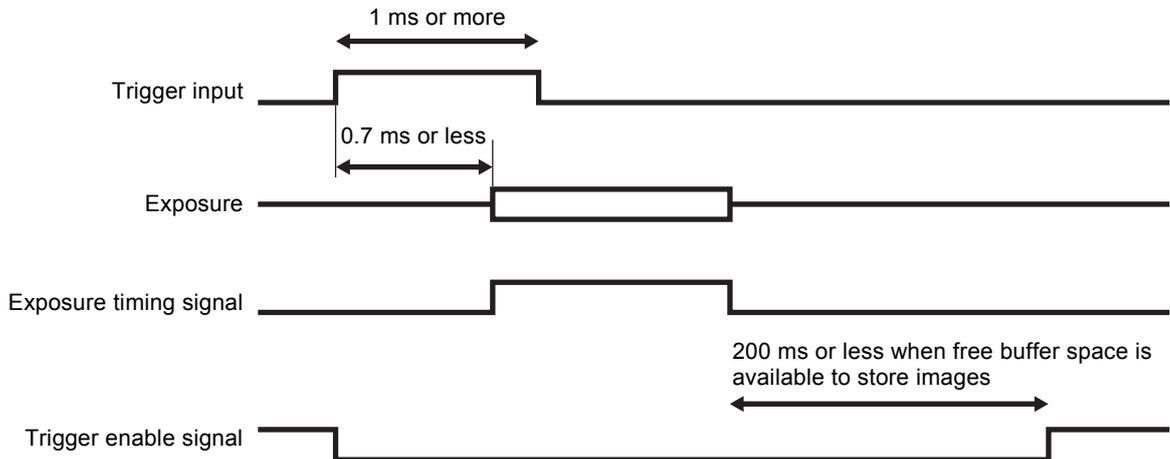


* The TTL or LVTTTL level signal can also be input from Pin 3.

3 Connection Methods

In triggered image capture, exposure is timed to the rising edge of the trigger signal. For exposure time and camera gain, settings previously configured on the NIS-Elements or other software are applied. Captured images are transferred via IEEE1394 and displayed on a PC.

The timing sequence of triggered image capture is as follows.



A time lag of up to 0.7 ms occurs between reception of the trigger signal and exposure.

Once a trigger signal is received, the next signal is not accepted unless the camera becomes ready to capture a new image. There will be no valid signal received during this waiting time. Triggers can be received again after the rising edge of the trigger enable signal.

For detailed instructions on triggered image capture, refer to the software instruction manual.

(4) Connecting to a Power Supply

Be sure to turn off the DS-U3 before connecting the DS camera head to prevent electric shock.

Make all other connections before connecting to a power supply.

Be sure to use the specified AC adapter (DS AC adapter). For details, refer to "3. DS AC Adapter" in Chapter 9, "Specifications". Connect the specified power cord to the specified AC adapter. Using an incorrect AC adapter or power cord may result in a fire or other dangerous conditions. This product is classified as Class I protection against electric shock. Make sure that the power supply is connected to a wall outlet with a protective ground terminal. If the power cord is misplaced or damaged, contact your nearest Nikon representative.

5

Microscope Setting

When the camera head is mounted on a microscope, set up the microscope as described below.

(1) Use the appropriate filters

When capturing a color image:

Insert the NCB filter into the optical path.

When capturing a monochrome image:

Insert the appropriate filter into the optical path, depending on the photographic purpose.

Normally, inserting a green interference filter (GIF) will heighten contrast.

Additionally, contrast is enhanced by using a filter with a color complementary to the specimen.

Notes

- * The method for inserting and removing a filter differs depending on the microscopes. Refer to the instruction manual of the microscope in use.
 - * A third-party color compensation filter (CC filter) can be inserted into the illumination optical path of the microscope to compensate for changes in color balance caused by the length of exposure time.
 - * When using a phase contrast microscope or an interference microscope (two luminous fluxes or multiple luminous fluxes), you can enhance contrast using a green interference filter (GIF) or a monochrome interference filter (IF).
 - * We recommend simultaneous use of an NCB filter and a green interference filter (GIF) for the DS-Qi1Mc.
 - * Some microscopes may require a heat-wave absorption filter.
-

Terms

What is an NCB filter?

An NCB (neutral color balance) filter is a color-balancing compensation filter used to adjust color temperature to daylight values in microscopes that use a halogen bulb as a light source.

What is a complementary color?

For example, green and magenta, red and cyan, and blue and yellow are all pairs of complementary colors. When complementary colors overlap, their respective hues cancel each other out.

(2) Adjusting the field diaphragm

Adjust the field diaphragm so that it circumscribes the viewfield. Especially for the fluorescent photo with dark background, be sure to adjust the field diaphragm due to its significant relationship with contrast. For details on adjustment, refer to the instruction manual of the microscope.

(3) Adjusting the aperture diaphragm

For diasopic illumination:

Normally, the numeric value of the condenser aperture diaphragm is adjusted to approximately 70% to 80% of the numerical aperture (N.A.) of the objective.

For episcopic illumination:

Normally, the aperture diaphragm is adjusted to approximately 70% to 80% of the pupil size of the objective that can be viewed by removing the eyepiece and looking into the eyepiece tube.

Notes

- * For details on the aperture diaphragm adjustment, refer to the instruction manual of the microscope.
 - * To capture the images that have greater depth of focus, decrease the opening size of the aperture diaphragm. Note that excessively decreasing the aperture may limit performance of the objective.
-

Terms

What is depth of focus?

“Depth of focus” refers to the range along the axis of the field of view over which the image is in apparent focus. Although decreasing the opening size of the aperture diaphragm extends the depth of focus, the resolution will be reduced. Adjust the aperture diaphragm according to your purposes.

(4) Adjusting the focus

Adjust the focus of the microscope so that the image can be clearly viewed on the display.

(5) Adjusting the lamp voltage

When photographing a color image, the color reproducibility of the image depends on the lamp voltage. When a halogen lamp is used as a light source, increasing the lamp voltage produces a bluish light, while decreasing the lamp voltage produces a reddish light. Except in cases where it is specifically necessary to adjust the color, the voltage must be set to the proper level for microphotography, which depends on the microscope in use. (Since the proper level depends on the microscope, refer to the instruction manual.)

When the lamp voltage is changed, readjust the white balance.

(6) Adjusting the exposure time

Adjust the illumination for the microscope to a level that yields a suitable exposure time (normally 1/15 to 1/250 s) using an ND filter. Otherwise, adjust the exposure condition of the camera.

Terms

What is an ND filter?

An ND filter is a filter that affects only the amount of light passed, not the color balance of the light. For example, an “ND2” filter cuts transmitted light in half, while an “ND16” filter reduces transmitted light to 1/16th of actual levels.

(7) Effects of ambient light

When capturing a dark specimen with a fluorescent microscope, darken the interior lighting for photomicrography as ambient light may enter the optical path. Attach the caps over the binocular eyepiece to prevent light from entering through the eyepiece.

(8) Effects of vibration

Because photomicrography involves extremely high image resolution, a slight vibration can affect image quality. To insulate the microscope from vibration, set it on a solid, stable surface on a solid floor. Using an anti-vibration table compatible with the microscope will further reduce the effects of vibration. During microphotography, avoid touching the microscope or the desk or stand on which the microscope is positioned.

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6

Operation Method

1

Connecting a Camera Head

The DS-U3 is applicable for five models of camera heads listed below.

The control unit (DS-U3) mode is automatically switched by changing the camera head.

DS-Fi1	5-megapixel CCD	/ color	/ non-cooled
DS-Fi1c	5-megapixel CCD	/ color	/ cooled
DS-Vi1	2-megapixel CCD	/ color	/ non-cooled
DS-Qi1Mc	1-megapixel CCD	/ monochrome	/ cooled
DS-Ri1	1-megapixel CCD	/ color	/ cooled / pixel-shift

Refer to Chapter 9, "Specifications" for details on those cameras.

2

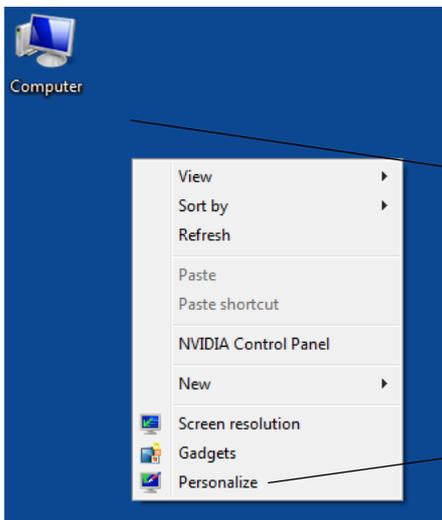
Installing the DS-U3 Device Driver

To connect the DS-U3 with the PC, the device driver must be installed in the PC.
Follow the procedure below to install the device driver.

Note: Administrator login is required to install the DS-U3 device driver.

(1) Close all the other applications.

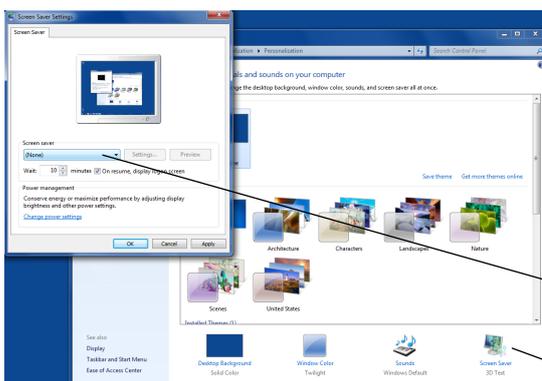
To avoid failure in the setup program, be sure to close all system-resident programs such as the screensaver and anti-virus utility. The procedure for closing the standard Windows screensaver is indicated in this manual. For other programs, refer to their instruction manuals.

Operation procedure

1. Right-click on the Windows desktop to display the shortcut menu.
Select "Personalize" in the shortcut menu to open the [Personalization] dialog box.

Right click on the desktop.

Select "Personalize".



2. Click the "Screen Saver" icon in the [Personalization] dialog box to open the [Screen Saver Settings] dialog box.
3. Click the [Screen saver] text box to show the pulldown menu. Select "(None)" from the menu, and click the [OK] button.

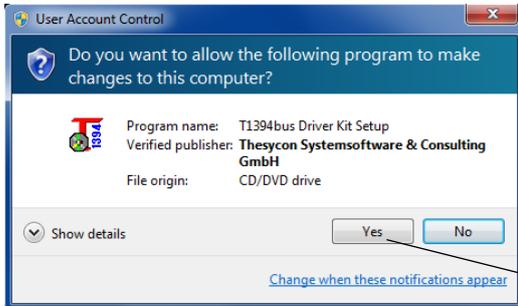
Select "(None)".

Click the "Screen Saver" icon

2 Installing the DS-U3 Device Driver

(2) Update the IEEE1394 driver.

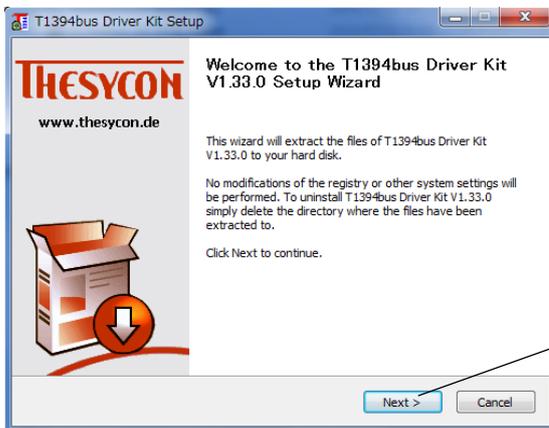
Follow the procedure below to update the IEEE1394 driver.

Operation procedure

1. Run the "t1394bus_v1.33.0_Nikon.exe" in the installer CD folder.

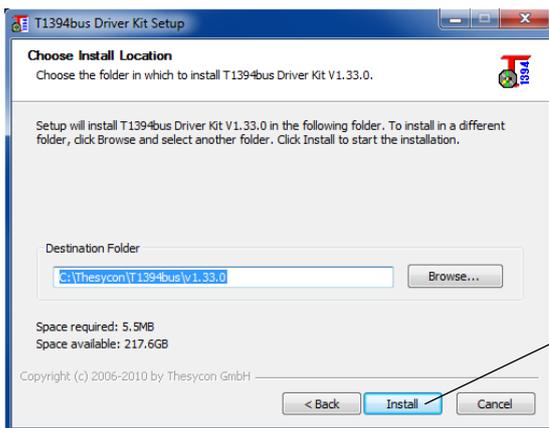
If the [User Account Control] dialog box appears, click the [Yes] button to continue.

Click the [Yes] button.



2. When the [T1394bus Driver Kit Setup] dialog box appears, click the [Next] button.

Click the [Next] button.

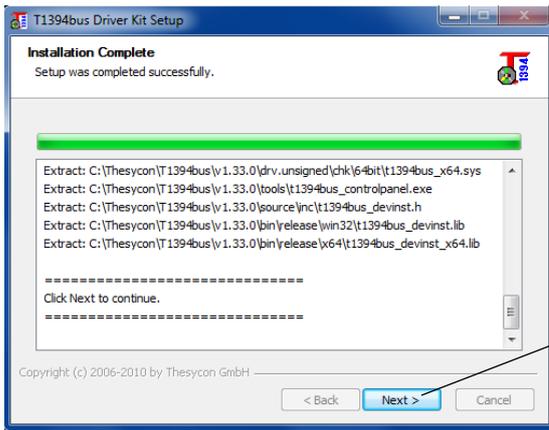


3. When the dialg box to select the destination folder appears, select an appropriate folder, and click the [Install] button.

Click the [Install] button.

2 Installing the DS-U3 Device Driver

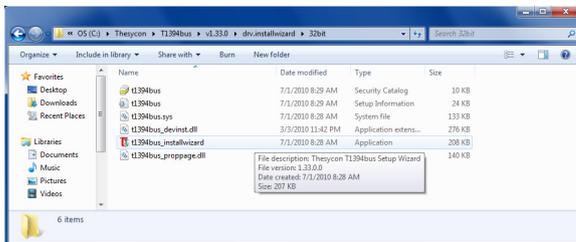
- When the installation is complete, the wizard displays the screen shown on the left. Click the [Next] button.



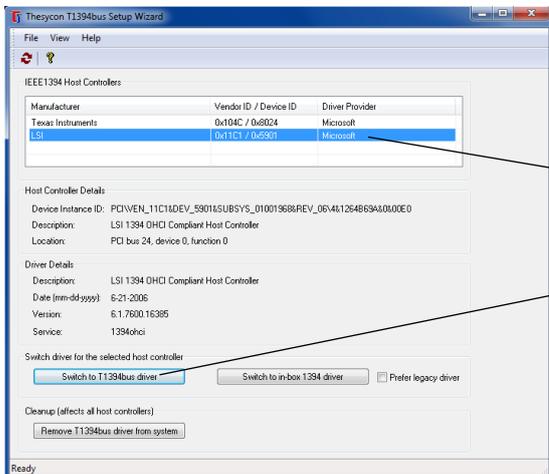
- Click the [Finish] button to quit the IEEE1394 installation wizard.



- Run the following file from the installed folder:
for the 32 bit OS, "Drv.installwizard\32bit\t1394bus_installwizard"
for the 64-bit OS, "Drv.installwizard\32bit\t1394bus_installwizard."

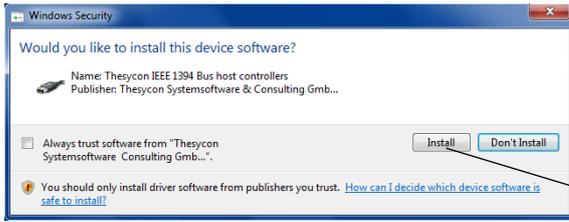


- When the dialog box shown on the left appers, select the host controller, and click the [Switch to T1394bus driver] button.



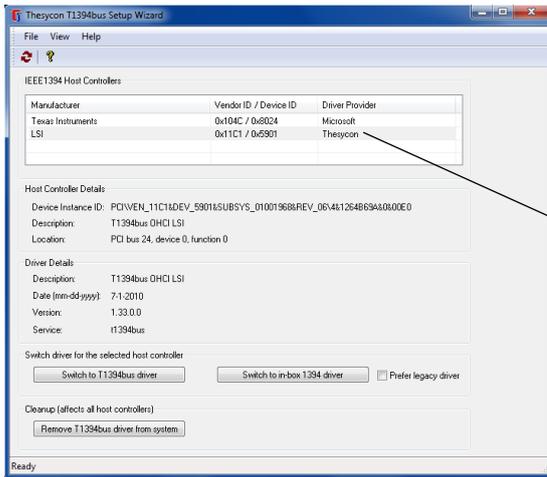
Select the host controller.

2 Installing the DS-U3 Device Driver



8. When the [Windows Security] dialog box appears, click the [Install] button.

Click the [Install] button.



9. Check that the "Driver Provider" for the IEEE1394 host controller selected above has changed to "Theycon".
Quit the wizard.

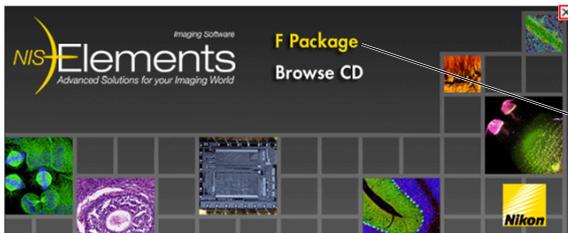
Check the Driver Provider for the host controller.

3 Installing Application Software

To operate the DS-U3, an application software must be installed on the PC connected to the DS-U3 via an IEEE 1394 interface.

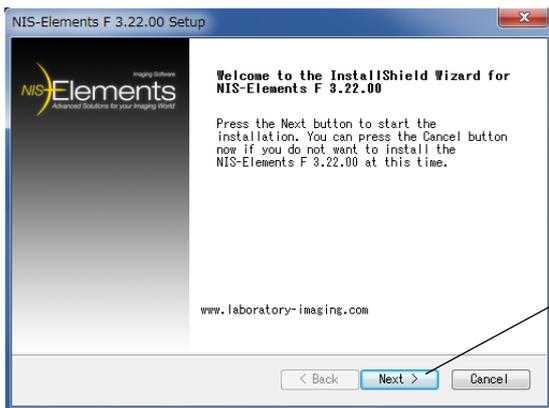
To use the NIS-Elements freeware package, insert the supplied CD-ROM on the PC and install it in the following procedures. Be sure that cables to the DS-U3 are connected properly, and the power to the DS-U3 is turned on before starting software installation.

Operation procedure



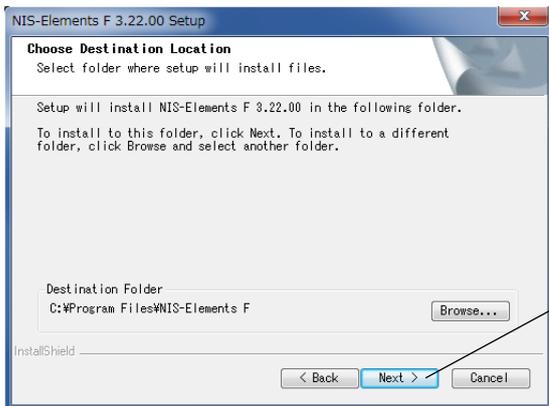
1. Click "F Package" on the installation screen.

Click "F Package".



2. The Setup screen appears. Click the [Next >] button.

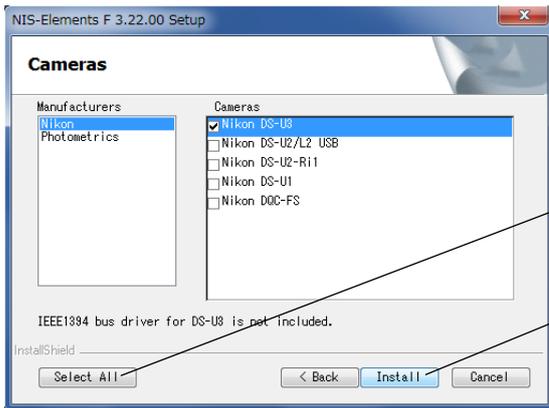
Click the [Next >] button.



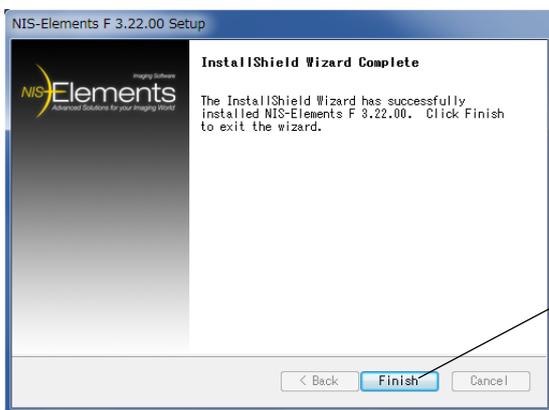
3. The Choose Destination Location screen appears. Click the [Browse] button when the folder for installation needs to be changed. Click the [Next >] button.

Click the [Next >] button.

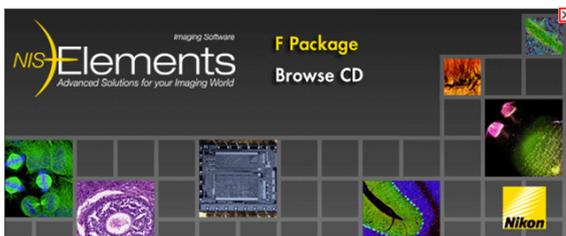
3 Installing Application Software



4. Click the [Select All] button to choose all the cameras. Click the [Install] button.



5. The Completion screen appears. Click the [Finish] button.



6. Click the [X] button to close the window.

To use the Nikon NIS-Elements software, which is sold separately, or another application dedicated to the DS-U3, install it in the PC according to the instruction manual provided with each software.

4

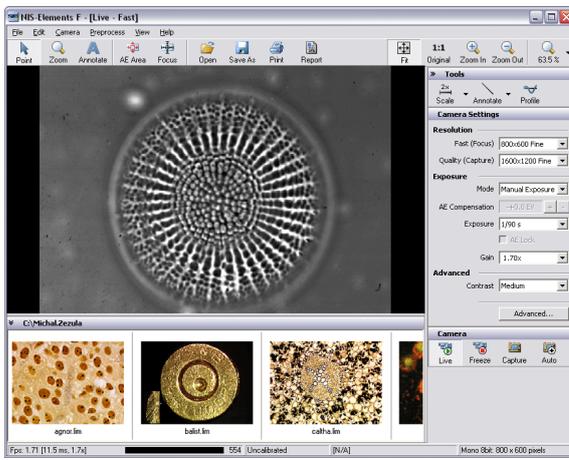
Operation

The operation method of the DS-U3 differs depending on the application used together.

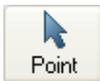
(1) For the NIS-Elements freeware

NIS-Elements freeware is provided with various functions that can be accessed from icons on the Main Window. Icon functions are described below:

Description of icons



1. Operation modes



This mode enables you to click on the image and move it within the image window. Zooming can be performed by a mouse wheel.



This mode changes the cursor to an interactive zoom tool that magnifies a circular part of the current image when clicked.



This mode enables you to insert annotation objects into pictures according to the Tools settings.

2. Areas of interest



This tool defines the area of the live image that is used to determine auto exposure parameters applied to the camera.



This tool defines the area of the live image that is used to determine the auto focus parameters. Place the rectangle to where you would like to focus.

3. Documents treatment



Opens an image file stored on hard disk.

4 Operation



This command can save a captured or modified picture on hard disk.



Opens a printing dialog window that enables you to print the current image if a printer is present.



This button creates a basic image report. It makes a pdf file that contains the current image, its name, path, dimensions, and the file date.

4. Zooming



Adjusts the zoom factor to view exactly the whole image as big as possible.



Adjusts the zoom factor to view the current image on the 1:1 scale.



Increases the zoom factor of the current image by one level.



Decreases the zoom factor of the current image by one level.



Enables to zoom the image within a range of 10% to 1200%. Click the arrow at the right of the button to select a zoom magnification.

5. Tools



Displays a scale in the bottom right corner of the image. Click the arrow at the right of the button to open the pop up menu, and then change the magnification of the scale. (2, 2.5, 4, 5, 10, 20, 40, 50, 60, 100, 150 times)



A number of annotation objects can be inserted into the image. Click the arrow at the right of the button to open the pop up menu, and then, select the object to be inserted from the line, arrow, text, rectangle, or circle mode.



An intensity profile of a user defined cross section can be displayed in the image.

6. Working with camera



Displays the live image in the picture window.



Freezes and grabs the live camera image into the picture window as the "Frozen" document.



This command captures Live or Frozen image to the application window. It creates a new document called "Captured".



This command captures Live or Frozen image and saves it automatically and names it according to the current settings ([File] menu > [Options]).

For details on the operation method, refer to the online help on the application.

(2) For the NIS-Elements software sold separately or other applications dedicated to the DS-U3

Operate the DS-U3 with reference to the instruction manual provided with each software.

-
- * Keep the following requirements in mind when running the NIS-Elements software. This is because if the computer enters the Standby mode, live images will not be updated after the computer wakes up. Other problems may also arise.
- Do not close the computer (if it is a notebook).
 - Do not press the Sleep button on the computer.
 - Do not put the computer in Standby mode manually from an operating system menu.
-

7

Care and Maintenance

1

Cleaning the System

- Use a soft cloth to remove dirt from the DS-U3 and the cables.
- After attaching the C mount cap, use a soft cloth to remove dirt from the DS camera head.
- Use an air blower to blow away dirt inside the DS camera head mount. While blowing away, be sure not to touch the glass filter on the front of the CCD. If you do touch the glass filter, or if dirt cannot be removed from it, contact your nearest Nikon representative and have them clean it.
- To prevent discoloration and separation of the printing, do not use organic solvents (e.g., alcohol, ether, or paint thinner) to clean the coated, plastic or printed parts.

2

Storage

- Turn off the power when the product is not in use.
- Unplug the power cord when the product is not in use for an extended period of time.
- Do not store the product in a hot and humid place or a dirty and dusty place.
- Store the product with the C mount cap attached.

☆☆☆

8

Troubleshooting

If you experience any troubles, check the troubleshooting list below.

If you are still not able to solve the trouble, consult with your nearest Nikon representative.

1

Power Supply

Trouble

Checkpoints

The power cannot be turned on.

- Be sure that the power cable or IEEE1394b cable (for bus-powered operation) is connected. Check the power plug, the wall outlet, the AC adapter, the IEEE1394b connector, and the DC IN 12 V connector of the DS-U3.
- Check that the power cord supplied with the product is used.
- Check that a specified AC adapter is used.
- Check that the power switch is turned on.
- Check that your PC has sufficient power capacity (for bus-powered operation).

The DS-U3 is hot.

- If the product is used in a hot or narrow place, it may become hot. Check if there is foreign smell such as burnt odor. If there is, unplug the power plug or IEEE 1394b cable, and request a repair service.

2

Application Software Startup

Trouble

Checkpoints

Application software does not start.

- Check that the DS-U3 and the PC are securely connected.
- Check that the power switch of the DS-U3 is turned on.
- Check that the device driver is properly installed.
- Check that the application software is properly installed.
When the DS-U3 is recognized by the PC, "Nikon 1394 DS Camera" is found under "Imaging devices" on the [Device Manager] screen.

3

Image Output to a PC Monitor

Trouble

Checkpoints

No image appears.

- Check that the cables are connected securely.
- Check that the cables are connected to the specified locations correctly.
- Check that the DS camera head is connected correctly.
- Check that the C mount cap is removed from the DS camera head.
- Check that the subject is placed within the viewfield of the microscope or the lens.
- Check that the optical path of the microscope is in the camera side.
- Check that the cable used is of IEEE1394-compliant. For shielded twisted pair cables, the cable connecting devices must be 4.5 m maximum.
- Check that the version of the OS is appropriate for the product. The product is not compatible with a Macintosh.
Applicable OS: Windows 7 Professional, Windows XP Professional Service Pack 2 (SP2)
- Check that the application software in use is compatible with the DS-U3.
- Check that exposure is set correctly using the application software.
⇒ Refer to the instruction manual for the application software.

Fixed images appear on the screen.

- Check that the camera cable is connected correctly.

3 Image Output to a PC Monitor

Trouble**Checkpoints****The image is out of focus.**

- Check that the edge enhancement is set properly using the application software.
⇒ Refer to the instruction manual for the application software.
- Check that the electronic zoom is not turned on by the application software.
⇒ Refer to the instruction manual for the application software.
- Check that the microscope and the lens are in focus.
- Check that the product is used in a place with little vibration.
- Check that the aperture diaphragm is adjusted correctly. (The aperture diaphragm must be adjusted to 70% to 80% of the numerical aperture of the objective, or 70% to 80% of the pupil of the objective.)
⇒ Refer to “Microscope Setting” in Chapter 5.
- Check that the enlargement factor is adjusted correctly. (The enlargement factor must be adjusted to 500 to 1000 times of the numerical aperture of the objective.)

The image is too dark or too bright.

- Check that exposure or tone is adjusted correctly using the application software.
⇒ Refer to the instruction manual for the application software.
- Check that the intensity of illumination of the microscope is appropriate.

The color is poor.

- Check that the white balance is set with the application software.
⇒ Refer to the instruction manual for the application software.
- Check that the color compensation is not set too high with the application software.
⇒ Refer to the instruction manual for the application software.
- Check that the hue adjustment is not performed with the application software.
⇒ Refer to the instruction manual for the application software.
- Check that the camera sensitivity is not set too high on the application software. If the camera sensitivity is too high, salt-and-pepper type, streaky type, or flecks-of-color type noise may appear on the image.
⇒ Refer to the instruction manual for the application software.
- Check that the color of the PC monitor is adjusted appropriately.
- Check that the color temperature of illumination is appropriate level.
- Image quality may be different between a live image and a saved image.

3 Image Output to a PC Monitor

Trouble**Checkpoints**

A specific area of an image is brighter or darker than the rest of the image.

- Shading correction read may have been failed.
Restart the DS-U3.

The image is blurred.

- Motion-blur can occur when capturing images of a moving subject with DS-Fi1 or DS-Fi1c in interlaced mode. It is not a system failure.

Brightness of the image is uneven.

- The AE function may be unstable during peak hold photometry under some imaging conditions.

The contrast is low.

- Check that the tone is adjusted correctly with the application software.
⇒ Refer to the instruction manual for the application software.
- Check that the black level is set appropriately with the application software.
⇒ Refer to the instruction manual for the application software.
- Check that the size of the field diaphragm is adjusted so that it circumscribes the view field.
- Check that the size of the aperture diaphragm is adjusted to approximately 70% to 80% of the numerical aperture of the objective lens.
- Check that an appropriate filter is used.
When using a phase contrast microscope or an interference microscope (two luminous fluxes or multiple luminous fluxes), insert the specified filter. With a black and white image, contrast is improved by inserting a green interference filter (GIF). Contrast in color images is enhanced by inserting a filter having a complementary color to that of the specimen.
- Check that the ambient light around the microscope does not affect.
If the ambient light affects, darken the room or attach a cap to the binocular eyepiece.
- Check that the contrast of the specimen is sufficient.

4

Camera Settings on the PC

Trouble

Checkpoints

Unable to control camera functions. (Or incorrect settings result.)

- Check that the specified device driver is installed on the PC. The specified device driver can be found on the supplied CD-ROM.
- Check that the application software in use is compatible with the DS-U3.
- Check that the DS-U3 and the PC are connected with the IEEE1394b cable.
- Check that the cable used is IEEE1394-compliant. For shielded twisted pair cables, the cable connecting devices must be 4.5 m maximum.
- Check that the version of the OS is appropriate for the product. The product is not compatible with the Macintosh.
Applicable OS: Windows 7 Professional, Windows XP Professional Service Pack 2 (SP2)

Noise is heard from the Camera Head (DS-Ri1)

- If you obtain a high-resolution image by pixel-shifting on DS-Ri1, noise may be heard from the movable part of the Camera Head. However, this is not a problem.

Adjusting the white balance gain setting seems to have no effect on the image.

- If you are using the GainUp mode (X 16) for DS-Ri1, be sure that the white balance gain is set to below 4. Setting the parameter to 4 or higher is invalid due to the hardware limitation.

5 Before Contacting Us

Before contacting Nikon or its sales partners, please have the following information ready, as this will speed up the response to your inquiry.

Date:	(Year)	(Month)	(Day)	
Date of purchase:	(Year)	(Month)	(Day)	Shop name:
Your name:				
Your contact address:				
Telephone				
DS camera control unit product name: DS-U3		Serial No.:		
DS camera head product name:		Serial No.:		
Peripheral devices connected (microscope, trigger signal generator, etc.)				
Manufacturer's name:		Model:		
Manufacturer's name:		Model:		
Your PC				
Manufacturer's name:		Model:		
Operating system (OS) version and Service Pack (SP) number:				
Type of CPU and its clock frequency:		Memory capacity:		
Types of applications and their versions (NIS-Elements, Freeware, etc.)				
Symptoms of the problem, displayed messages, and frequency with which the symptoms appear.				
Please supply us with as much information as possible.				
If there are problems in the images, please supply us with the images if available.				

Copy this page and use it as required.

9

Specifications

1

DS-U3 DS Camera Control Unit

Camera control system

Exposure control system	Program AE, shutter speed priority AE, focus AE, manual with single-push AE function
Photometry	Average photometry, peak hold photometry, photometry area position/size selectable
Electronic shutter	1/1000 s to 60 s (with DS-F1i or DS-Vi1) 1/1000 s to 600 s (with DS-Qi1Mc, DS-Fi1c, or DS-Ri1) 1/1000 s to 60 s (with DS-Ri1 in pixel-shifting mode)
Exposure compensation	13 steps
White balance	Set method, color balance adjustable
Color correction	Gamma (tone), black level, saturation, hue adjustment, special effects (monochrome, inversion)
Image correction	Shading correction, noise reduction, edge enhancement, horizontal/vertical inversion of image

Other functions

Scene mode	Selectable from five biological modes, four industrial modes, and other mode
-------------------	--

I/F

IEEE1394b bilingual	Connect this interface to the controller PC. Power supply from IEEE1394 bus power can operate one camera head connected, either DS-Fi1 or DS-Vi1
Transfer image format (IEEE1394 I/F)	RGB 24 bit, YUV411, YUV 811/monochrome 8 bit, or 16 bit for isochronous transfer RAW 12 bit for asynchronous transfer

General

External dimensions	193 (W) x 35 (H) x 196 (D) mm (when set in the horizontal orientation)
Weight	1.2 kg
Rated input voltage	12 VDC±5% (AC adapter operation and bus-powered operation)
Power consumption	36 VA (when the DS camera head and DS AC adapter are attached)
Acoustic Noise	Less than 70 dB Maschinenlärminformations- Verordnung –3.GPSGV, 06.01.2004: Der höchste Schalldruckpegel beträgt 70 dB(A) oder weniger gemäß EN ISO 7779

2

DS Camera Head

	DS-Fi1	DS-Vi 1
Image pickup device	2/3-inch square pixel, 5.24 megapixel interline CCD	1/1.8-inch square pixel, 2.11 megapixel interline CCD
Color/monochrome	Color	
Infrared blocking filter	Built in	
Max. frame rate *1	5.9 fps (5M interlaced) 10.0 fps (1.3M interlaced) 12.0 fps (1.3M progressive scan) 23.3 fps (center scan)	14.9 fps (2M progressive scan) 27.0 fps (800*6 progressive scan) 29.2 fps (800*5 progressive scan) 28.8 fps (center scan)
Number of recording pixels	2560 x 1920 1280 x 960 640 x 480	1600 x 1200 800 x 600 400 x 300
Quantization	12 bits	
Sensitivity	Equivalent to ISO 64	Equivalent to ISO 100
	(Settings: Tone 3; camera sensitivity x1)	
Lens Mount	C mount Supported lenses: Protruding no more than 10 mm from the mount surface into the camera.	
	Image circle: ϕ 11 mm	Image circle: ϕ 8.9 mm
Dimensions	77 (W) x 76 (D) x 44 (H) mm	
Weight	260 g	
Fixing tripod mount	Tripod screw for cameras	
Body color	White (with logo)	
CCD cooling	-----	

*1 The CCD mode is indicated in parentheses.

The frame rate figure indicates the maximum frame rate of the camera.

The image display speed of the PC varies significantly depending on the PC's operating environment and the IEEE1394 data transfer rate.

Given below are approximate maximum frame rates for image display:

DS-Fi1	640 x 480 pixels x 3 colors (RGB)	23 fps
DS-Vi1	800 x 600 pixels x 3 colors (RGB)	27 fps

2 DS Camera Head

	DS-Qi1Mc	Fi1c	DS-Ri1
Image pickup device	2/3-inch square pixel, 1.50 megapixel interline CCD	2/3-inch square pixel, 5.24 megapixel interline CCD	2/3-inch square pixel, 1.50 megapixel interline CCD
Color/monochrome	Monochrome	Color	
Infrared blocking filter	None	Built in	
Max. frame rate *1	19.0 fps (1.3M progressive scan) 31.5 fps (VGA progressive scan) 46.8 fps (QVGA progressive scan) 24.2 fps (center scan)	5.9 fps (5M interlaced) 10.0 fps (1.3M interlaced) 12.0 fps (1.3M progressive scan) 23.3 fps (center scan)	19.0 fps (1.3M progressive scan) 31.5 fps (VGA progressive scan) 46.8 fps (QVGA progressive scan) 24.2 fps (center scan)
Number of recording pixels *2	1280 x 1024 640 x 480 320 x 240	2560 x 1920 1280 x 960 640 x 480	1280 x 1024 640 x 512 640 x 480 320 x 256 320 x 240 4076 x 3116 (pixel-shifting mode) 3840 x 3072 (pixel-shifting mode) 2038 x 1558 (pixel-shifting mode) 1920 x 1536 (pixel-shifting mode) 1920 x 1440 (pixel-shifting mode) 1240 x 1024 (pixel-shifting mode) 960 x 720 (pixel-shifting mode) 640 x 480 (pixel-shifting mode)
Quantization	12 bits		
Sensitivity	Equivalent to ISO 800	Equivalent to ISO 64	Equivalent to ISO 200
	(Settings: Tone 3; camera sensitivity x1)		
Lens mount	C mount Supported lenses: Protruding no more than 10 mm from the mount surface into the camera. Image circle: ϕ 11 mm		C mount Supported lenses: Protruding no more than 5 mm from the mount surface into the camera.
Dimensions	77 (W) x 76 (D) x 44 (H) mm		
Weight	290 g		350 g
Fixing tripod mount	Tripod screw for cameras		
Body color	Black (with logo)		
CCD cooling	(Peltier cooling)		

3 DS AC Adapter

- *1 The CCD mode is indicated in parentheses.
 The frame rate figure indicates the maximum frame rate of the camera.
 The image display speed of the PC varies significantly depending on the PC's operating environment and the IEEE1394 data transfer rate.

Given below are approximate maximum frame rates for image display:

DS-Qi1Mc	640 x 480 pixels x one color (monochrome)	30 fps
DS-Fi1c	640 x 480 pixels x 3 colors (RGB)	23 fps
DS-Ri1	640 x 480 pixels x 3 colors (RGB)	29 fps

- *2 Pixel-shifting mode:
 Pixel-shifting is a high-resolution photographing function available by using software on PC which is connected with IEEE1394b cable.

3

DS AC Adapter

Model name	EA1050E-120
Manufacturer	EDAC POWER Electronics Co., Ltd
Rated input voltage	100 to 240 VAC, 50/60 Hz, 1.8 A maximum
Rated output voltage	12 VDC±5% 3.5 A maximum
External dimensions	120 (L) x 60 (W) x 35 (H) mm
Weight	253 g
Conforming standards	GS, CE, and UL

- * Be sure to connect the DS AC adapter to the DS-U3 in the following cases:
- when using a DS-Qi1Mc, DS-Fi1c, or DS-Ri1 camera head
 - when using two camera heads connected to the DS-U3 regardless of camera head models
 - when PC does not have sufficient power capacity
- Failure to use the DS AC adapter in any of the cases above may reduce performance of the device.

4

Overall Specifications

Operating environment

Temperature	0 to 40 °C
Humidity	60% RH maximum (no condensation) (DS-Qi1Mc and DS-Ri1 only: Can also be used in 0 to 30°C and 80% RH)
Altitude	2,000 m maximum
Pollution degree	Degree 2
Installation category	Category II
Electric shock protection class	Class I Indoor use only

Storage environment

Temperature	-20 to +60 °C
Humidity	90% RH maximum (no condensation)

VCCI

Note:

This is a Class A product based on the standard of the VCCI Council. If this equipment is used in a domestic environment, radio interference may occur, in which case, the user may be required to take corrective actions. VCCI A

Conforming standards

- C-UL US Listing Mark approved
- GS Mark approved
- This product meets FCC Part 15 Subpart B Class A requirements:
This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules.
These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment.
This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications.
Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.
- This product complies with Canadian EMI. (ICES-003 Class A)
This Class A digital apparatus complies with Canadian ICES-003.
Cet appareil numérique de classe A est conforme à la norme NMB-003 du Canada.
- This product complies with Australian EMI. (AS/NZS CISPR11 Class B)
- This product satisfies the EU EMC Directive.
- This product satisfies the EU Low Voltage Directive.
- This product conforms to the Korean KCC mark approval.

