

Nikon

Microscope Camera

Digital Sight 100

[Digital Camera]

Instruction Manual

Introduction

Thank you for purchasing a Nikon product.

This instruction manual is written for users of the Nikon Digital Sight 100 microscope camera. To ensure correct usage, read this manual carefully before operating this 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.
- The equipment described in this manual may differ from the actual product in its appearance.
- 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.

Symbols used in this manual

This manual uses the following symbols.



This icon marks precautions or information that should be observed for safety. Depending on the severity of the risk, "WARNING" and "CAUTION" are indicated together with this icon.



This icon marks precautions or information that should be observed to avoid malfunction and failure of this product.



This icon marks notes or information that should be read before use. It also marks tips or additional information that may be helpful when using this product.

Trademarks in this manual

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- Products and brand names are trademarks or registered trademarks of their respective companies.
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3.3 Connecting Peripheral Devices

! Cautions on connecting cables

Be sure that power cords of the AC adapter and peripheral devices are unplugged from the AC power socket before connecting or disconnecting cables. Failure to do so may cause malfunction.

3.3.1 Connecting a PC / Smart Device

This product can be connected to a PC and smart device using one of the methods shown in the table below.

Commercially available Wi-Fi and Ethernet adapters are required for Wi-Fi and Ethernet connections, respectively. For information of commercially available adapters, refer to “(6) Ethernet adapter” and “(7) Wi-Fi adapter (dongle)” in section 1.3.

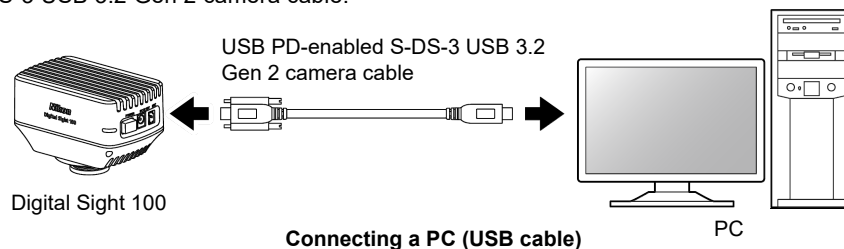
Connection method		PC/device connection availability		Required accessory
		PC	Smart device	
Wired	USB cable	✓	✓ (Note 1)	USB cable (S-DS-3)/ docking station ^(Note 1) (commercially available)
	LAN cable	-	✓ (Note 2)	Ethernet adapter (commercially available)/LAN cable (commercially available)
Wireless	Wi-Fi	✓	✓	Wi-Fi adapter (commercially available)

Note 1: Use of a docking station is recommended for connecting with a smart device.

Note 2: Can be connected to a smart device via a Wi-Fi router.

Connecting a PC using a USB cable

Connect the USB Type-C (PD) connector of this product to the USB connector (USB 3.2 Gen 2 or Gen 1) of the PC using the USB PD-enabled S-DS-3 USB 3.2 Gen 2 camera cable.



✓ Frame rate

The USB port of the PC must support Gen 2 to achieve the maximum frame rate.

When the USB port of the PC is Gen 1, the camera does not operate at the highest frame rate.

The frame rate may decrease depending on the load on the PC.

For PC specifications, contact your PC manufacturer.

✓ Connection to a USB 2.0 connector

This product does not operate when connected to a USB 2.0 connector.

When connecting this product to a PC, be sure to use a USB 3.2 Gen 2 or Gen 1 connector on the PC.

✓ PD power supply (PD power supply from a PC Type-C port)

This product complies with the USB PD standard (PD 3.0) (PD-compliant power: (PD-compliant power: 15 W (5 V/3 A) to 27 W (9 V/3 A)).

If the Type-C port of the connected PC supports PD power supply, the PC can supply power to the camera.

When this product remains connected to a PC, the camera indicator shows whether the camera is operational.

Operational: Blue Not operational: Off (POWER switch: Off)

When a PD power supply is used, no AC adapter is required, but the supply of power may be interrupted depending on the PC state. Use an AC adapter when stable operation is required, for example, during long capture times. For PC specifications, contact your PC manufacturer.

◆ Selecting an operation mode

Multiple operation modes are available for image capture using the product, including All pixels (4:3), All pixels (16:9), and 2x2 pixels average (16:9) modes. Refer to the table below to select the optimum operation mode for your subject, application, etc.

Microscope optical system	Relay lens	Operation mode	Recommended capture conditions
FN25	0.6x	Full-pixel mode (4:3)	High-resolution capture with FN25 field of view (4:3)
		Full-pixel mode (16:9)	High-resolution capture with FN25 field of view (16:9)
		2x2 pixel averaging mode (16:9) Note 1	High-frame rate capture with FN25 field of view (16:9)
FN22	0.6x	Full-pixel mode (4:3)	High-resolution capture with FN22 field of view (4:3)
		Full-pixel mode (16:9)	High-resolution capture with FN22 field of view (16:9)
		2x2 pixel averaging mode (16:9) Note 1	High-frame rate capture with FN22 field of view (16:9)
FN20	0.6x	Full-pixel mode (4:3)	High-resolution capture with FN20 field of view (4:3)
		Full-pixel mode (16:9)	High-resolution capture with FN20 field of view (16:9)
		2x2 pixel averaging mode (16:9) Note 1	High-frame rate capture with FN20 field of view (16:9)
FN16	0.55x	Full-pixel mode (4:3)	High-resolution capture with FN16 field of view (4:3)
		Full-pixel mode (16:9)	High-resolution capture with FN16 field of view (16:9)
		2x2 pixel averaging mode (16:9) Note 1	High-frame rate capture with FN16 field of view (16:9)

Note 1: Images are output in this mode for the Wi-Fi/LAN cable connection.

For more information on pixel count and frame rate for each operation mode, see “7 Major Specifications.” For information on settings of operation modes, refer to the instruction manual of the NIS-Elements.

◆ Adjusting the exposure time

An exposure time in the range of 1 ms to 30 ms is appropriate for a general image capturing. Adjust the light intensity for the microscope using an ND filter to get an appropriate exposure time.

While automatic exposure is selected, the camera gain and the exposure time are automatically changed to obtain an appropriate exposure.

For this reason, a weak light intensity causes a high camera gain making the image coarse, and a long exposure time making the focusing difficult.

Camera gain

Setting a higher value for the camera gain can increase brightness of the image without compromising the frame rate. However, the higher camera gain setting also increases image noises.

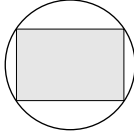
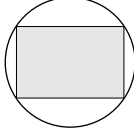
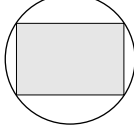
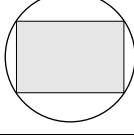
Random noises, unevenness, or bright spots may appear on images of dark subject during fluorescent or dark field microscopy. In such a case, turn off the power of the camera and leave the camera in a cool environment until its internal temperature drops, and then try capturing images again; those image noises may be minimized.

✓ 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.

4.2.2 Type of C-mount Adapter and Field of View

Field of view (or angle of view) and image resolution depends on the type of C-mount adapter used to add the product to a microscope or other optical device as shown in the table below.

Adapter type	Field of view	Aspect ratio	Max. resolution	Purpose
C-0 6x DS relay lens	A rectangle inscribed in a FN25/22/20 area 	Approx. 4:3	FN25: 4864 × 3648 FN22: 4320 × 3240 FN20: 4000 × 3000	For microscopes specially designed for FN25, 22, or 20
C-0.6x DS relay lens	A rectangle inscribed in a FN25/22/20 area 	Approx. 16:9	FN25: 5376 × 3024 FN22: 4672 × 2628 FN20: 4416 × 2484	For microscopes specially designed for FN25, 22, or 20
C-0.55x DS relay lens	A rectangle inscribed in a FN16 area 	Approx. 4:3	FN16: 2944 × 2208	For microscopes specially designed for FN16
C-0.55x DS relay lens	A rectangle inscribed in a FN16 area 	Approx. 16:9	FN16: 3200 × 1800	For microscopes specially designed for FN16

4.2.3 Calculating the Display Magnification for Microscopic Observation

The table below shows the pixel size, the maximum number of pixels stored, and the effective area (area for the effective number of pixels stored) of the image pickup device of this product.

Pixel size (μm)		Recorded pixel count		Effective area (mm)		
Width	Height	Width	Height	Width	Height	Diagonal
2.4	2.4	4864	3648	11.67	8.75	14.59

Use the following formula for calculating the magnification of the subject on the monitor.

- Magnification on the monitor

$$= \frac{\text{Optical magnification (objective lens magnification} \times \text{relay lens magnification)} \times \text{Diagonal size of monitor display}}{\text{Diagonal size of effective area for image pickup device}}$$

Symptom	Possible cause	Action
Color reproducibility is not good.	The color temperature of the illumination is improper.	Adjust the illumination of the optical device so that the subject is seen in the right color.
	The illumination is too bright or too dark.	Adjust brightness of the illumination properly.
		Adjust the exposure.
	The white balance is not set properly.	Enable the auto white balance function. Set the white balance under the same conditions for the observation and micrography.
	The setting of the camera gain is too high.	Adjust the camera gain properly. Note: Refer to the instruction manual of the NIS-Elements.
	The image adjustment is improper.	Set the saturation, hue, contrast, black level, etc. to an appropriate level. Note: Refer to the instruction manual of the NIS-Elements.
	Monitor is not properly adjusted.	Adjust the display quality of the monitor properly. Note: Refer to the instruction manual of the monitor.
The image texture is rough.	The camera gain is set too high.	Set the illumination brightness, the camera gain, and the exposure time to an appropriate level. Note: Image capturing with high camera gain may result in a noisy image (with texture, unevenness, unwanted lines). Lower the camera gain setting if such a problem occurs. Note: Refer to the instruction manual of the NIS-Elements for adjustment of the camera gain and exposure time.
The image is distorted.	The subject was moving during image acquisition.	Shorten the exposure time and adjust the brightness of the illumination and the camera gain value properly. Stop the movement of the subject. Note: When you move the XY stage right and left, etc., for image acquisition, the resulted image may look distorted. This is not a hardware failure: a distortion-free image can be acquired once the subject movement is stopped.
Image flickers or horizontal line noises appear on the image.	A fluorescent or sodium vapor lamp is used for illumination.	Change the illumination types or set a longer exposure time. Note: Fluorescent or sodium vapor lamp flickers at a high-speed. This causes flickering or horizontal line noises on an image, which can be minimized by setting a longer exposure time. Note: Refer to the instruction manual of the NIS-Elements for adjustment of the exposure time.

6.6 Other

Symptom	Possible cause	Action
The power indicator of this product is flashing in red (1 to 9 times)	A product failure has occurred.	Contact your nearest Nikon representative.

7.1 Digital Sight 100 Microscope Camera

Model	Digital Sight 100																																													
Image pickup device	1-inch color CMOS sensor with 177 k effective pixels																																													
Color/monochrome	Color																																													
Infrared blocking filter	Built-in																																													
Maximum frame rate (reference)	◆ USB/HDMI connection <table><tr><th colspan="2">I/F</th><th colspan="2">Operation mode (at FN25)</th><th>Maximum frame rate (reference *) (FPS)</th></tr><tr><td rowspan="6">USB</td><td rowspan="3">USB3.2 Gen2</td><td>Full-pixel mode 4:3</td><td>4864 x 3648</td><td>17</td></tr><tr><td>Full-pixel mode 16:9</td><td>5376 x 3024</td><td>19</td></tr><tr><td>2x2 pixel averaging mode 16:9</td><td>2688 x 1512</td><td>60</td></tr><tr><td rowspan="3">USB3.2 Gen1</td><td>Full-pixel mode 4:3</td><td>4864 x 3648</td><td>7</td></tr><tr><td>Full-pixel mode 16:9</td><td>5376 x 3024</td><td>9</td></tr><tr><td>2x2 pixel averaging mode 16:9</td><td>2688 x 1512</td><td>30</td></tr><tr><td rowspan="2">HDMI</td><td rowspan="2">HDMI</td><td>Full-pixel mode 4:3 / 16:9</td><td>3840 x 2160</td><td>30</td></tr><tr><td>2x2 pixel averaging mode 16:9</td><td>1920 x 1080</td><td>60</td></tr></table> *: Reference for transferring live view images ◆ Wi-Fi/Ethernet connection <table><tr><th colspan="2">I/F</th><th colspan="2">Operation mode (at FN25)</th><th>Maximum frame rate (reference *1) (FPS)</th></tr><tr><td>Wi-Fi *2 (5 Ghz band)</td><td rowspan="2">2x2 pixel averaging mode 16:9</td><td rowspan="2">2688 x 1512</td><td rowspan="2"></td><td rowspan="2">11</td></tr><tr><td>Ethernet (1000 BASE-T)</td></tr></table> *1: Reference for transferring live view images *2: IEEE802.11n (5 GHz) connection. The frame rate over a Wi-Fi connection may decrease due to radio interference or obstacles.	I/F		Operation mode (at FN25)		Maximum frame rate (reference *) (FPS)	USB	USB3.2 Gen2	Full-pixel mode 4:3	4864 x 3648	17	Full-pixel mode 16:9	5376 x 3024	19	2x2 pixel averaging mode 16:9	2688 x 1512	60	USB3.2 Gen1	Full-pixel mode 4:3	4864 x 3648	7	Full-pixel mode 16:9	5376 x 3024	9	2x2 pixel averaging mode 16:9	2688 x 1512	30	HDMI	HDMI	Full-pixel mode 4:3 / 16:9	3840 x 2160	30	2x2 pixel averaging mode 16:9	1920 x 1080	60	I/F		Operation mode (at FN25)		Maximum frame rate (reference *1) (FPS)	Wi-Fi *2 (5 Ghz band)	2x2 pixel averaging mode 16:9	2688 x 1512		11	Ethernet (1000 BASE-T)
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Quantization	Effective 12, 10 bit																																													
Sensitivity	Recommended exposure index (ISO sensitivity): • ISO80 equivalent (default: with gain set at 1.0x, and Tone set at 3)																																													
Cooling image pickup device	N/A																																													
Lens mount	C mount																																													
Output image format	• USB connection: YUV422 12bit,10bit • Wi-Fi/Ethernet connection: JPEG																																													
Color space	sRGB/adobeRGB																																													
Exposure	100 μsec to 10 sec																																													
Gain	1.00 to 64.0x																																													
Tone	7 levels																																													
Sharpness	Adjustable at 9 levels (-3: softest, +5: sharpest)																																													
Offset	-50 to +50 (1 step)																																													
Hue	-50 to +50 (1 step)																																													
Chroma	-50 to +50 (1 step)																																													
Scene mode	Neutral mode, five modes for biological application, four modes for industrial application, one asbestos mode																																													
White balance	Auto white balance, one-push white balance, set method (red/blue gain adjustable)																																													
Exposure mode	One-push program AE, continuous program AE, manual																																													
Photometry mode	Average photometry, peak photometry																																													
Photometry area	Can be specified within the effective number of pixels for the operation mode Can be specified in unit of four pixels																																													