CAMERA HEAD	DS-Qi1	DS-Fi1	DS-5Mc
CCD	2/3 in. square pixel CCD; Total number of pixels: 1.5 megapixels (effective 1.45 megapixels)	2/3 in. high-density CCD; Total number of pixels: 5.24 megapixels (effective 5.07 megapixels)	
Recordable pixels	1280 x 1024, 640 x 512, 640 x 480, 320 x 240	2560 x 1920, 1280 x 960, 640 x 480	
CCD cooling device	Peltier Device, 10˚C below ambient temperature (max.)	—	Peltier Device, 20˚C below ambient temperature (max.)
ISO Sensitivity (recommended exposure index)	Equivalent to ISO 800 (switchable sensitivity equivalent to ISO 400 to 8000)	Equivalent to ISO 64 (Can be varied between ISO 32-1250 equivalent)	
A/D conversion	12-bit		
Live display mode (DS-L2)	1280 x 1024 (max. 19 fps), 1280 x 720 (max. 24 fps), 640 x 480 (max. 32 fps), 320 x 240 (max. 48 fps) *Display reduced or enlarged to SXGA/XGA. Supports also 8 bit live display	2560 x 1920 (max. 5.9 fps), 1280 x 960 (max. 12 fps), ROI mode (max. 23 fps) * Display reduced or enlarged to SXGA/XGA	2560 x 1920 (max. 3.8 fps), 1280 x 960 (max. 7.5 fps), Center Scan (max. 15 fps) * Display reduced or enlarged to SXGA/XGA
Live display mode (DS-U2)	1280 x 1024 (max. 19 fps 8bit mode/Max 10fps 12bit mode), 645 x 512 (max. 19 fps), 640 x 480 (max. 32 fps), 320 x 240 (max. 48 fps), ROI mode (max. 48 fps) *Supports also 8 bit live display	1280 x 960 (max. 7.2 fps), 640 x 480 (max. 11.5 fps), ROI mode (max. 22 fps)	1280 x 960 (max. 5.6 fps), 640 x 480 (max. 7.6 fps), Center Scan (max. 15 fps)
Lens mount	C-mount		
Exposure time	1/1000 to 600 sec	1/1000 to 60 sec	1/1000 to 600 sec
Dimensions	77.0 (W) x 76.0 (D) x 44.0 (H) mm		91.0 (W) x 76.0 (D) x 41.0 (H) mm
Weight	Approx. 290g	Approx. 260g	Approx. 290g
System composition	Camera Cable (3m)		
Optional accessories	For wide field of view observations 0.7x Relay lens		

CAMERA HEAD	DS-Ri1	DS-2Mv	DS-2MBWc	DS-2MBW
CCD	2/3 in. square pixel CCD; Total number of pixels: 1.5 megapixels (effective 1.45 megapixels)	1/1.8 in. high-density CCD: Total number of pixels: 2.11 megapixels (effective 2.01 megapixels)		
Recordable pixels	1280x1024, 640 x 512, 320 x 256 (4076 x 3116, 3840 x 3072, 1920 x 1536 with DS-U2)	1600 x 1200, 800 x 600, 400 x 300		
CCD cooling device	Peltier Device, 10˚C below ambient temperature (max.)	—	Peltier Device, 20˚C below ambient temperature (max.)	—
ISO Sensitivity (recommended exposure index)	Equivalent to ISO 200 (switchable sensitivity equivalent 100 to 2000)	Equivalent to ISO100 (Can be varied between ISO 50-2000 equivalent)	Equivalent to ISO350 (Can be varied between ISO 160-6400 equivalent)	
A/D conversion	12-bit			
Live display mode (DS-L2)	1280 x 1024 (max. 19 fps), 640 x 480 (max. 32 fps), ROI mode (max.23 fps) *Display reduced or enlarged to SXGA/XGA	1600 x 1200 (max. 15 fps), 800 x 600 (max. 20 fps), 800 x 560 (max. 30 fps), Center Scan (max. 30 fps) * Display reduced or enlarged to SXGA/XGA		
Live display mode (DS-U2)	1280 x 1024 (max. 19 fps), 640 x 512 (max. 19 fps), 320x256 (max. 19 fps), ROI mode (max. 28 fps)	1600 x 1200 (max. 4.6 fps), 800 x 600 (max. 17 fps), Center Scan (max. 20 fps)	1600 x 1200 (max. 10 fps), 800 x 600 (max. 20 fps), Center Scan (max. 28 fps)	
Lens mount	C-mount			
Exposure time	1/1000 to 600sec, 1/1000 to 60sec (pixel-shifting mode)	1/1000 to 60 sec	1/1000 to 600 sec	1/1000 to 60 sec
Dimensions	77.0 (W) x 76.0(D) x 44.0(H) mm	91.0 (W) x 76.0 (D) x 41.0 (H) mm		
Weight	Approx. 350g	Approx. 260g	Approx. 290g	Approx. 260g
System composition	Camera Cable (3m)			
Optional accessories	For wide field of view observations 0.7x Relay lens	For wide field of view observations 0.55x Relay lens		

CONTROL UNIT	DS-L2	DS-U2
Exposure control	Program AE, Shutter-priority AE, Focus AE, Manual with AE lock function	
Exposure correction	Correction range: ±2.0, Step: 1/3	13 steps
Digital zoom	Up to 16x (8 steps)	5 to 2400%
Interval shooting	10 sec. - 6 hr. intervals	5 sec. - 12 hr. intervals
Exposure metering	Average metering, Peak hold metering	
Exposure metering range	Position/size adjustable	
White balance	Set method, Color balance adjustable	
Image adjustments	Gamma correction, shading adjustment, black level adjustment, hue adjustment, color saturation adjustment	
Storage format	BMP, JPEG (4-step compression), TIFF, RAW (only with monochrome cameras)	BMP, TIFF, JPEG, JPEG2000
Interface	USB device port x 1 (Mass Strage Class support, computer control connection, PictBridge) USB host port x 2 (USB mouse, USB memory stick, USB keyboard, microscope connection)	USB device port x 1 (computer control connection), USB host port x1 (microscope connection)
Power supply	AC100-240V 50/60Hz	
Power consumption	70VA	35VA
Dimensions	230 (W) x 64.5 (D) x 200 (H) mm	193 (W) x 195 (D) x35 (H) mm
Weight	CCU: approx. 1400g / AC Adapter: approx. 350g	CCU: approx. 1200g / AC Adapter: approx. 350g
Operating environment	0-40˚C, 60% RH max. (without condensation)	
System composition	AC adapter, Power cord, USB memory stick 128MB. Mouse	AC Adapter, Power cord, NIS-Elements F package
Networking	Ethernet (10/100Base-TX), DHCP compatible, HTTP, TELNET or FTP server, FTP client	—
LCD monitor	8.4-in. TFT color LCD XGA (1024 x 768, 60Hz)	—
External monitor output	DVI-I (Digital: Conforms to DVI 1.0/Analog: 0.7 Vpp (75Ω) SXGA/XGA	—
Storage media	CompactFlash™ card (Type I, Type II), USB memory stick, Microdrive	—
Direct printing	PictBridge printer (sold separately)	—
Optional accessories	DS remote controller, microscope control license	—

Specifications and equipment are subject to change without any notice or obligation on the part of the manufacturer. February 2008 ©2004/2005/2006/2008 NIKON CORPORATION

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⚠ WARNING TO ENSURE CORRECT USAGE, READ THE CORRESPONDING MANUALS CAREFULLY BEFORE USING THE EQUIPMENT.

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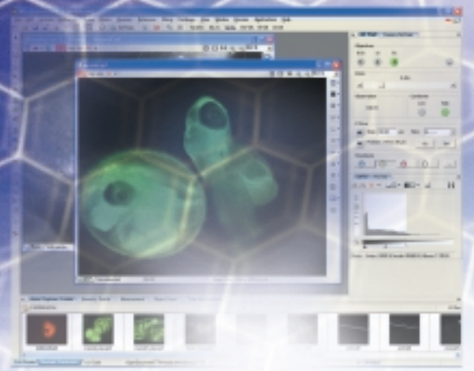
Code No. 2CE-MRGH-4

DIGITAL CAMERA SYSTEM FOR MICROSCOPY

DIGITAL SIGHT SERIES

En



DIGITAL CAMERA SYSTEM FOR MICROSCOPY

DIGITAL SIGHT SERIES

Build an imaging system optimized for your application

With 7 cameras, you can select the optimum camera from an extensive lineup to suit a wide range of applications for microscopic imaging.

The Digital Sight (DS) camera system allows you to freely combine camera heads with stand-alone or PC-based control units.

The DS series offers outstanding functionality and a wide range of incorporated functions, all in a compact design. You can build an optimal microscopic digital imaging system for any biomedical or industrial application, from documentation to advanced image processing and analysis.

Configuration of DS-Fi1-L2

Over 12 million pixels for high-definition color images

DS-Ri1

COLOR COOLED

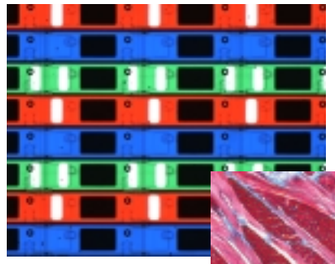
High resolution | Super-high output pixel | True color

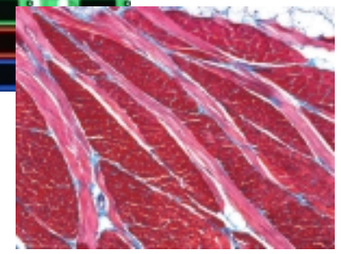
With 12.7 megapixel output, true color reproduction, low noise, and wide dynamic range, this color documentation camera is an ideal choice. Superb spatial resolution and accurate color rendition make the DS-Ri1 the camera of choice for many research, development, and analytical applications.

* Nikon recommends using the DS-U2 control unit.

12.7-megapixel high-definition images

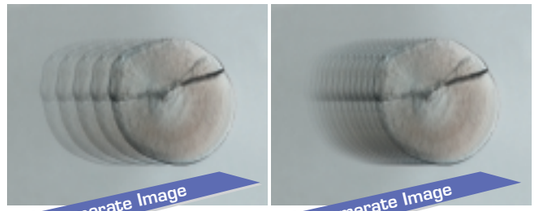
New, high-precision pixel shift technology brings high resolution to the CCD. The camera features super-high pixel output of 12.7 megapixels and high resolution at over 2,200 TV line.





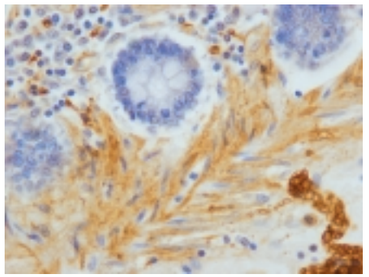
Smooth live image display

Accelerated data transfer offers a high maximum frame rate of 19 fps/ 1.4 M. Live images are displayed and updated smoothly, so focusing from a monitor is extremely simple and natural.



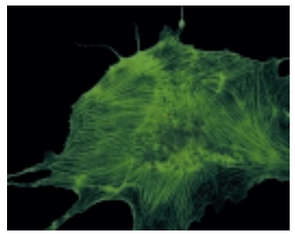
True color for samples

Nikon's newly developed color matching logic achieves unprecedented color reproducibility. You can develop hue and saturation conversion matrices optimized for the characteristic colors of your microscope samples, and faithfully record the color of dyed samples. The ability to capture the colors observed with the microscope enables high-precision color analysis in all fields of medicine and industry.



Better fluorescence images

The DS-Ri1 uses the Peltier cooling system to maintain the CCD at 10°C below ambient temperature, effectively minimizing thermal noise contributions.



Configuration of DS-Ri1-U2 with AZ100

High-definition color camera head

DS-Fi1

High resolution | True color

The DS-Fi1 is the industry standard for documentation applications in industrial and biomedical fields. With high performance in resolution, frame rate, and color fidelity, the DS-Fi1 fits a very wide range of imaging applications.

5.0-megapixel color CCD

Small pixel size and a field-of-view of 2,560 x 1,920 pixels allows you to acquire color images at very high resolution.

True color rendition of samples

Nikon's industry-leading imaging technology achieves the best true color image possible, duplicating exactly what is seen by the microscope.

Smooth live image display

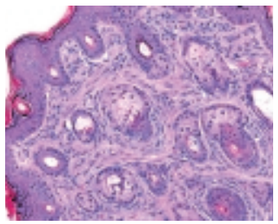
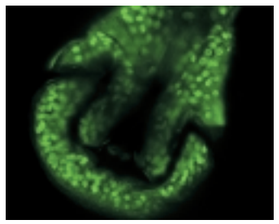
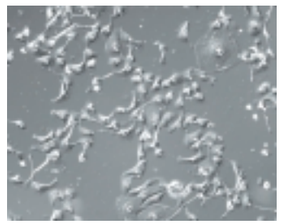
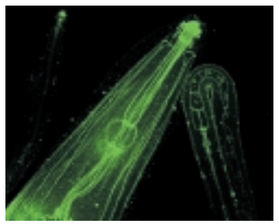
With a frame rate of 12 frames per second, live images are displayed and updated smoothly, so focusing from a monitor is a simple task, greatly increasing the speed of inspection, measurement tasks, and acquisition.

High red sensitivity

A newly designed IR cut filter eliminates unwanted infrared contributions from halogen light sources, while maintaining excellent red color rendition for outstanding color reproduction.

Support for a wide range of applications

The DS-Fi1 is a proven, cost-effective camera for a wide variety of applications including brightfield, phase contrast, and differential interference contrast (DIC).

Configuration of DS-Fi1-U2 with LV100

Cooled camera head for high-definition color images

DS-5Mc

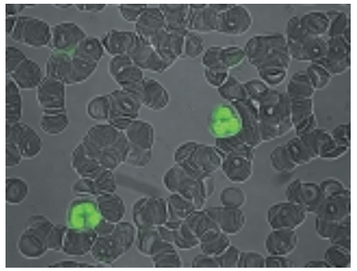
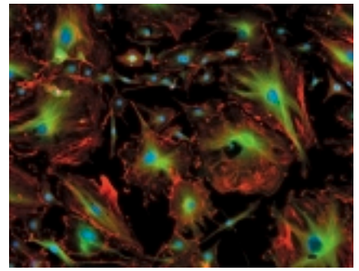
High resolution

Better fluorescence images

The DS-5Mc uses the Peltier cooling mechanism to cool the CCD to 20°C below the ambient temperature. When capturing fluorescence images where long exposures are required, thermal background noise is suppressed, enabling you to obtain high-contrast images.

5.0-megapixel color CCD

High-resolution images with a maximum size of 2,560 x 1,920 pixels allow you to capture even the microstructures of samples faithfully.

Configuration of DS-5Mc-L2 with ECLIPSE 80i

High-speed color camera head

DS-2Mv

High speed

Smooth live image display

The DS-2Mv is equipped with a 2.0-megapixel color CCD. SXGA live motion images can be displayed with a high speed of 15 fps (maximum 30 fps), and focusing is also performed easily.

High sensitivity

With high sensitivity and a wide dynamic range, you can obtain clear and sharp images.

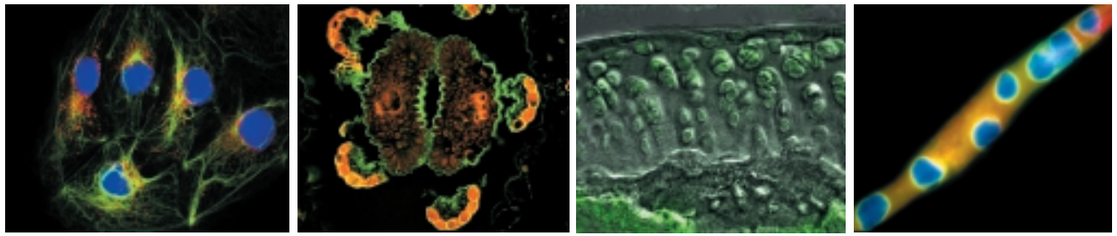
Configuration of DS-2Mv-L2 with SMZ1000

High-sensitivity cooled monochrome camera head

DS-Qi1 MONO COOLED

High speed | High sensitivity | Quantitative

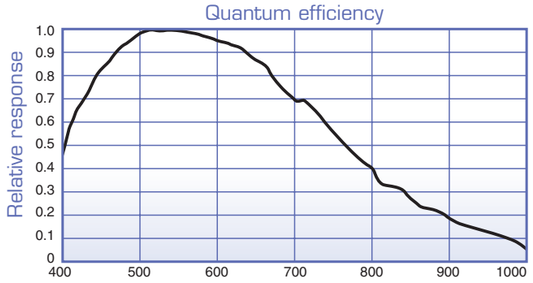
The DS-Qi1 is the definitive camera for time-lapse fluorescence observation. By combining low-noise electronics and a high-quantum efficiency detector, the DS-Qi1 can capture a wide dynamic range of intensities while maintaining quantitative linearity. Added features such as a fast analog-to-digital converter (ADC), very low read noise, and programmable gain control make the DS-Qi1 an ideal detector for fluorescence imaging applications.



Faint fluorescence detection

The high-sensitivity CCD, which has outstanding quantum efficiency (>60% at 500nm), combined with low read noise, allows the capture of even low-light fluorescence signals. Intensity and time of fluorescence excitation can therefore be minimized to reduce photobleaching.

Quantum efficiency

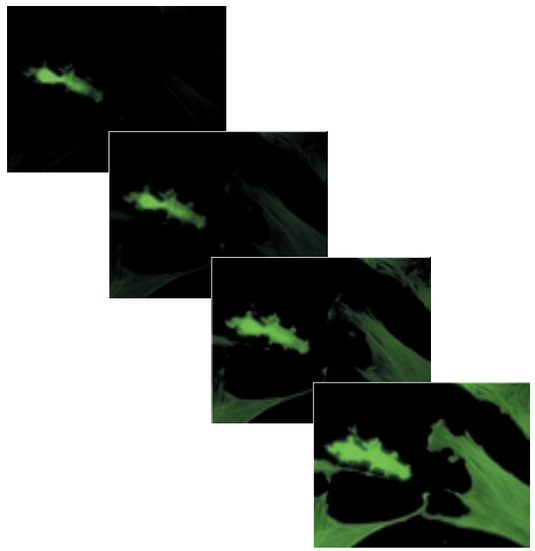


Smooth live image display

A high frame rate of up to 32fps with 640 x 480 pixel image size (2 x 2 binning) is possible, using a fast 36MHZ analog-to-digital converter. As images can be displayed near real time, focusing and positioning is easy, even in fluorescence . The CCD can also be binned and/or subregioned. Thus, the duration of a specimen's exposure to the excitation light can be reduced, resulting in less photobleaching.

Clear, high-contrast images

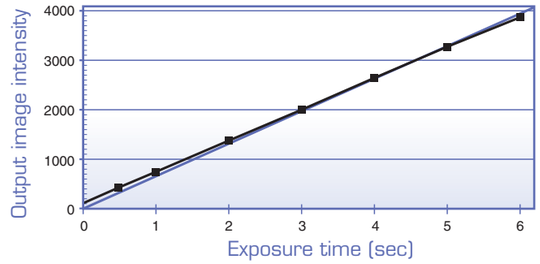
The Peltier cooling mechanism cools the CCD down to 10°C below ambient temperature, reducing the average dark current to 0.7e-/pixel/s. Also, the readout noise is reduced to 8e- rms with the newly developed CCD drive circuit. Thus, clear, high-contrast fluorescence images can be captured at a dynamic range of over 2000:1.

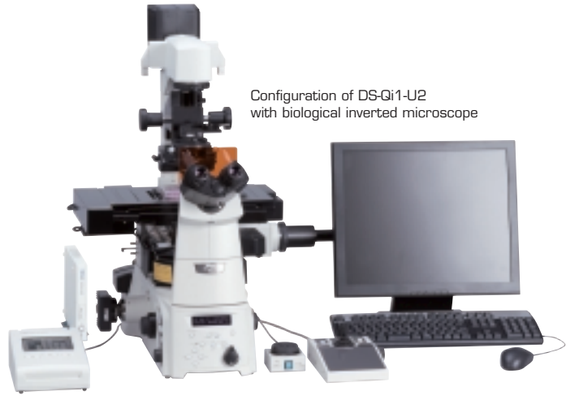


Reliable quantitative analysis

Linearity, a quantitivity index, has been improved to >98%. This, together with reduced noise, assures comparable, quantitative image data collection over a wide exposure range.

Qi1 exposure time and output image intensity





Configuration of DS-Qi1-U2 with biological inverted microscope

Cooled camera head for high-speed monochrome images

DS-2MBWc MONO COOLED

High speed

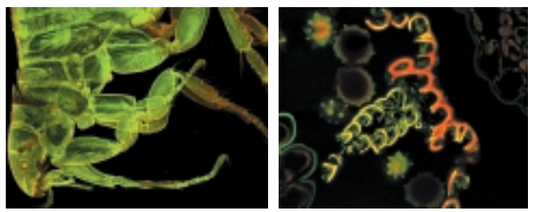
High-speed camera head for monochrome images

DS-2MBW MONO

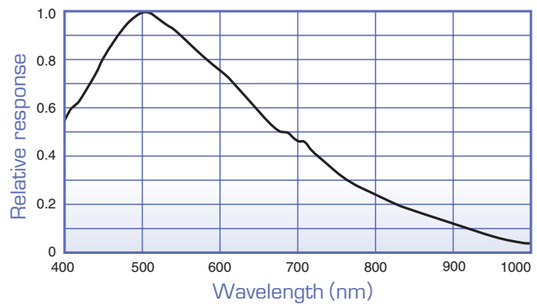
High speed

Better fluorescence images

The DS-2MBWc uses the Peltier cooling mechanism to cool the CCD to 20°C below the ambient temperature. When capturing fluorescence images where long exposures are required, thermal background noise is suppressed, enabling you to obtain high-contrast images.



Wavelength characteristic of DS-2MBWc/DS-2MBW



Smooth live image display

The cameras are equipped with a 2.0-megapixel monochrome CCD. Live motion images can be displayed with a high speed of 15 fps (maximum 30 fps), and focusing is also easy to perform.

Choose from two types of control units.

Select a stand-alone unit that does not require a computer, or a PC-based unit for integration with image processing software.

Stand alone control unit
DS-L2

No PC required. Simple operation with a mouse. Live observation and camera control are possible on the large built-in LCD monitor.

Built-in LCD display

A large 8.4-inch high-definition LCD monitor (XGA) is built into the controller. Image capture can begin simply by turning on power. No PC required!

On-screen GUI

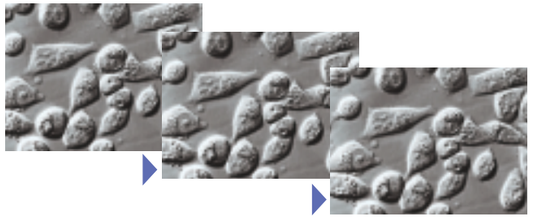
All operations can be performed by clicking on-screen menus. Users can concentrate on observing live images thanks to simple image capture while viewing the monitor.

Exceptional color representation

Nikon has created a system producing life-like color rendition by using newly-developed image processing technology, thereby enabling true natural color representation, so what is acquired as an image is perfectly matched to what you see in the microscope. The controller has seven default gamma (TONE) correction presets and another seven that can be customized by the user. It also allows the user to create an original look-up table (LUT), all features to satisfy exceptional color rendition for a variety of microscope applications.

Time-lapse recording

Image acquisition over periods of time can be performed using the DS-L2.



Scene mode enabling optimal image capture with a single click

Anyone can easily configure optimal image capture settings simply by selecting the observation method, such as brightfield or darkfield, and the type of sample. In the Biological Scene Mode, there is even a mode optimized for HE and ELA (Enzyme labeled antibody) stained specimens for use with medical specimens that require subtle color reproduction. There are also seven user-customizable modes.

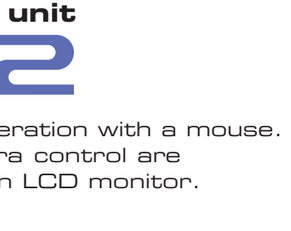
Biological scene mode

Industrial scene mode

Other

Two-screen split display

The screen can be split in half to display a still image alongside a live image. This is handy when you want to compare and contrast a sample image that serves as a reference with a live image.



Captured image Live image

Two USB ports

A mouse, keyboard, USB memory stick, or other USB device can be simultaneously connected without the need for a USB hub.

Save data without a PC

- **USB memory stick**
- **CompactFlash card**
- **Mass storage class:** Data on a CF card inserted into the DS-L2 can be read at high speed using a PC connected via the USB 2.0 interface.
- **Network:** Image files can be transferred (stored) at high speed to any connected server using the FTP client function. This enables you to capture images without worrying about storage space.

High expandability

Supports large screen output

A digital output port conforming to DVI 1.0 is provided. This enables the display of high-definition images on a large external display with no loss of image quality, as only digital imaging can do. Applications include observation by large numbers of people at conferences.

Supports direct printing (PictBridge)

No computer is required to print out images with a single click. Simply connect the unit's USB port to a printer supporting the PictBridge standard.

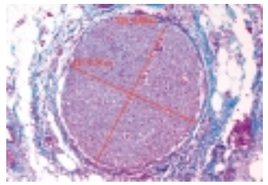
Shortcut menu for greater ease of use

Functions that are used frequently are displayed as buttons. This enables operation without obstructing the display of captured images. The buttons can also be customized.

An example of the shortcut menu (above: Short, below: Large)

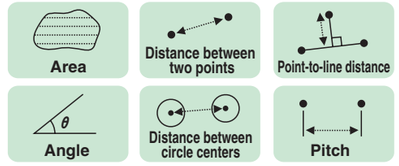
A wide variety of tools

Crosshairs

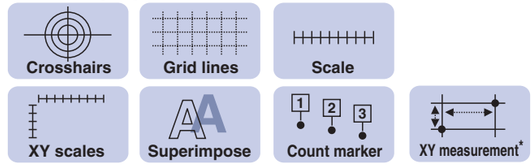


Distance between two points

Measurement



Scale display



*Measurement of the distance between two points in the x and y axis directions.

PC control-based control unit
DS-U2

Using NIS-Elements imaging software (→ page 10), you can perform image acquisition, processing, and analysis with integrated control of the camera and microscope peripherals.

- Features a USB 2.0 device port that can be easily connected with a PC. The USB 2.0 device port enables the transfer of image files to a PC at twice the speed of the previous model.
- Sophisticated thin and compact design.

Software that offers a total solution for microscope imaging

NIS-Elements, imaging software developed by Nikon, is an integrated platform for control of image acquisition and document data management using the DS-series of cameras. NIS-Elements supports multi-dimensional imaging tasks, including control of integrated motorized microscope components and peripheral devices. There are 3 packages available to match your needs and applications:

Ar NIS-Elements Advanced Research

NIS-Elements AR is optimized for advanced research applications. It features fully automated acquisition and device control through full 6D (X, Y, Z, λ (Wavelength), Time, Multipoint) image acquisition and analysis.

Br NIS-Elements Basic Research

NIS-Elements BR is suited for standard research applications. It features acquisition and device control through 4D (up to four dimensions can be selected from X, Y, Z, λ (Wavelength), Time, Multipoint) acquisition.

D NIS-Elements Documentation

NIS-Elements D supports color documentation requirements in bio-research, clinical and industrial applications, with basic measuring and reporting capabilities.

* The DS-U2 includes NIS-Elements F package, making basic image capture a snap.

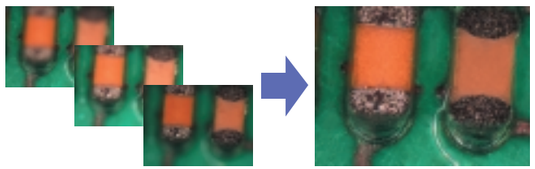
Various convenient plug-ins are available for advanced imaging and analysis capabilities

Multidimensional Capturing

NIS-Elements can combine X, Y, Z, λ (wavelength), Time and Multi points within one integrated platform for multidimensional imaging (depends on the capability of the software). All combinations of multidimensional images can be linked together in one ND2 file sequence using an efficient workflow and intuitive GUI.

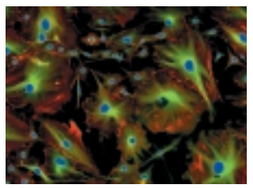
Extended Depth of Focus

With the Extended Depth of Focus (EDF) plug-in, images that have been captured in a different Z-axis can be used to create an all-in-focus image. Also, it is possible to create stereovision images & 3D surface images to achieve virtual 3D imaging.



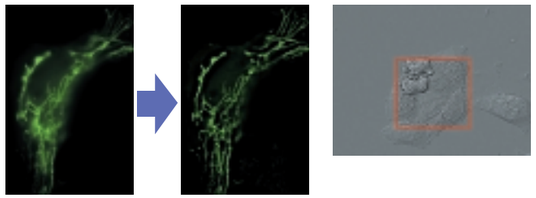
Object Counting

Using the Object Counting module, get real time analysis of morphometric features of objects. Apply thresholds to define objects, and classify objects by a range of morphometrics features all from a single, easy to use graphic user interface (GUI).



3D/2D Real Time Deconvolution

Haze and blur of the fluorescence image can be eliminated from the captured 3D image or from the 2D live preview image. (Separate plug-in for 3D and 2DRT) **(Ar package)**

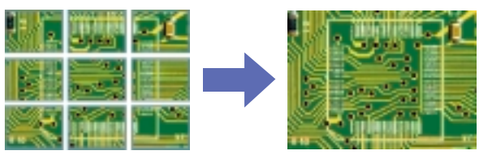


Database

NIS-Elements has a powerful image database module that supports image and meta data. Various databases & tables can easily be created and images can be saved to the database via one simple mouse-click. Filtering, sorting and multiple grouping are also available according to the database field given for each image.

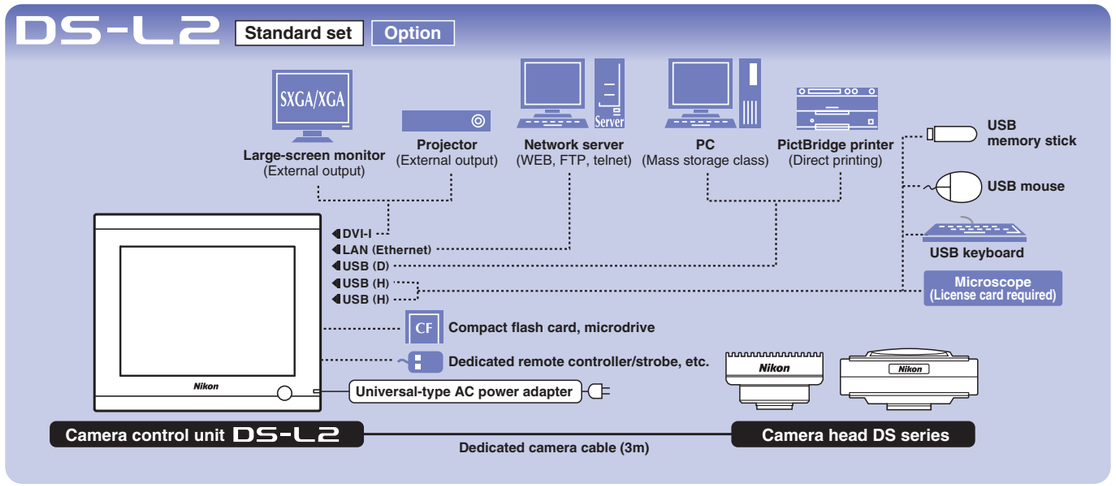
Large Image

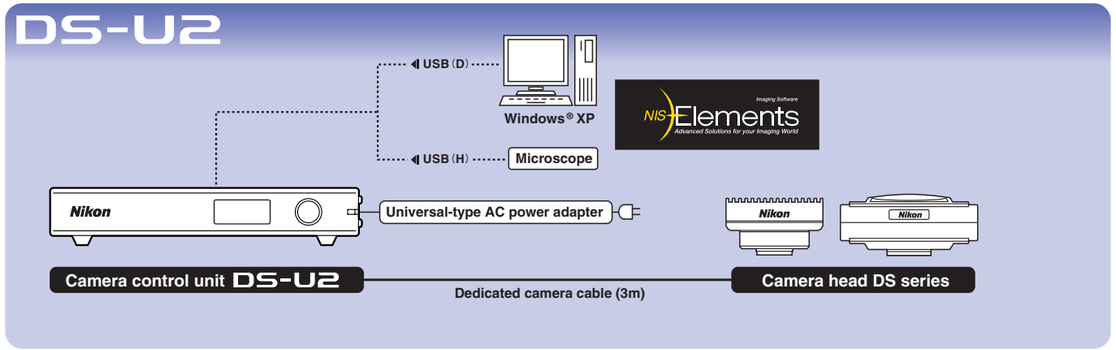
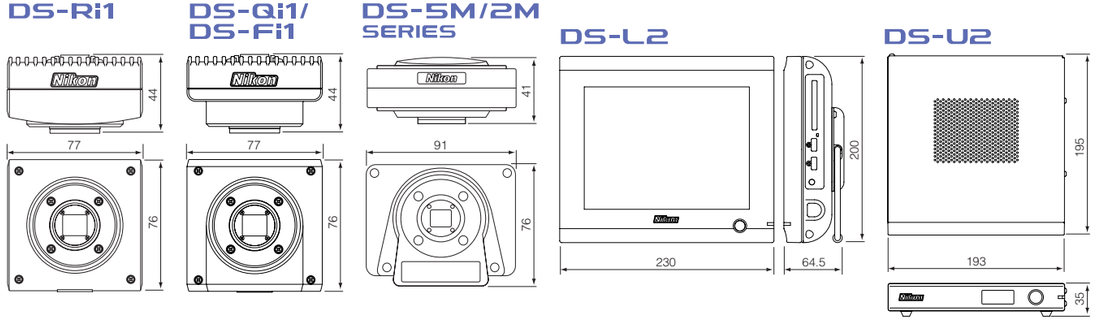
You can easily join (stitch) adjacent image fields together into a single, high-resolution result image by manually moving the microscope stage, or with optional modules, do it automatically using a motorized stage.



Visit www.nis-elements.com <http://www.nis-elements.com> for more detailed information

SYSTEM DIAGRAM





DIMENSIONS