Digital Camera System for Microscopy

**Digital Sight**

### Camera Head

**DS-F1**
- 12-bit A/D conversion
- Live display mode
- Exposure time: 1/1000 to 600 sec
- Lens mount
- Digital zoom: Up to 16x (8 steps)
- Sensitivity: Equivalent to ISO100 (Can be varied between ISO 50-2000 equivalent)
- CCD: 1/1.8 in. high-density CCD
- Recordable pixels: 1600 x 1200 pixels, 800 x 600 pixels, 400 x 300 pixels

**DS-2My**
- Live display mode
- A/D conversion
- Exposure time: 1/1000 to 60 sec
- Lens mount
- Digital zoom: Up to 16x (8 steps)
- Sensitivity: Equivalent to ISO350 (Can be varied between ISO 160-6400 equivalent)
- CCD: 1/1.8 in. high-density CCD
- Recordable pixels: 2560 x 1920 pixels, 1280 x 960 pixels, 640 x 480 pixels

**DS-2Mc**
- Live display mode
- A/D conversion
- Exposure time: 1/1000 to 60 sec
- Lens mount
- Digital zoom: Up to 16x (8 steps)
- Sensitivity: Equivalent to ISO350 (Can be varied between ISO 160-6400 equivalent)
- CCD: 1/1.8 in. high-density CCD
- Recordable pixels: 2560 x 1920 pixels, 1280 x 960 pixels, 640 x 480 pixels

**DS-2Mw**
- Live display mode
- A/D conversion
- Exposure time: 1/1000 to 60 sec
- Lens mount
- Digital zoom: Up to 16x (8 steps)
- Sensitivity: Equivalent to ISO350 (Can be varied between ISO 160-6400 equivalent)
- CCD: 1/1.8 in. high-density CCD
- Recordable pixels: 2560 x 1920 pixels, 1280 x 960 pixels, 640 x 480 pixels

### Control Unit

**DS-L2**
- Monitoring: LCD monitor
- USB interface: USB device port x 1 (Mass Storage Class support), USB device port x 1 (computer control connector)
- Power supply: AC 100-240 V, 50/60 Hz
- Interface: DVI-I (Digital: Conforms to DVI 1.0/Analog: 0.7 Vpp (75 Ω))
- Power consumption: 230 (W) x 193 (D) x 35 (H) mm, 0-40°C, 85% RH max. (without condensation)
- Storage media: CompactFlash™ card (Type I, Type II), USB memory stick, Microdrive
- Storage format: BMP, TIFF, JPEG, JPEG2000
- Image adjustments: Gamma correction, shading adjustment, black level adjustment, hue wheel variation, color saturation adjustment
- White balance: Average metering, Peak hold metering
- Optical zoom: 1.6x (4 steps)
- Interface: USB host port x 2 (USB mouse, USB memory stick, USB keyboard, microscope connection), USB host port x 1 (microscope connector)
- System composition: Camera Cable (3m), AC adapter, Power cord, USB memory stick 128MB
- Weight: Approx. 260g
- Dimensions: 91.0 (W) x 76.0 (D) x 41.0 (H) mm

**DS-U2**
- Monitoring: LCD monitor
- USB interface: USB device port x 1 (Mass Storage Class support), USB device port x 1 (computer control connector)
- Power supply: AC 100-240 V, 50/60 Hz
- Interface: DVI-I (Digital: Conforms to DVI 1.0/Analog: 0.7 Vpp (75 Ω))
- Power consumption: 230 (W) x 64.5 (D) x 200 (H) mm, 0-40°C, 85% RH max. (without condensation)
- Storage media: CompactFlash™ card (Type I, Type II), USB memory stick, Microdrive
- Storage format: BMP, TIFF, JPEG, JPEG2000
- Image adjustments: Gamma correction, shading adjustment, black level adjustment, hue wheel variation, color saturation adjustment
- White balance: Average metering, Peak hold metering
- Optical zoom: 1.6x (4 steps)
- Interface: USB host port x 2 (USB mouse, USB memory stick, USB keyboard, microscope connection), USB host port x 1 (microscope connector)
- System composition: Camera Cable (3m), AC adapter, Power cord, USB memory stick 128MB
- Weight: Approx. 290g
- Dimensions: 193 (W) x 195 (D) x 35 (H) mm

### Camera Cable (3m)
- 70VA (DS-F1, DS-2Mc, DS-2Mw)
- 35VA (DS-2My, DS-L2, DS-U2)
- Dimensions: 91.0 (W) x 76.0 (D) x 41.0 (H) mm
- Weight: Approx. 260g
- Dimensions: 91.0 (W) x 76.0 (D) x 41.0 (H) mm

### Monitor
- LCD monitor:
  - 8.4-in. TFT color LCD XGA (1024 x 768, 60Hz)
  - DVI-I (Digital: Conforms to DVI 1.0/Analog: 0.7 Vpp (75 Ω))
  - Networking: Ethernet (1000BASE-T)

### Power Supply
- AC adapter: 230 (W) x 64.5 (D) x 200 (H) mm
- Power cord: 193 (W) x 195 (D) x 35 (H) mm
- Power consumption: 70VA (DS-F1, DS-2Mc, DS-2Mw), 35VA (DS-2My, DS-L2, DS-U2)
- Power supply: AC 100-240 V, 50/60 Hz
The first fully interchangeable digital camera system in the microscope industry. Flexible configurations offer the versatility required for a rich variety of sample types and applications.

**CAME RA HEADS**

**High-definition color camera head**

**DS-Fi1**

The DS-Fi1 features a 5-megapixel CCD that can faithfully capture microstructures at a high resolution of 2560 x 1920 pixels. It accelerates frame rates beyond the past model and even improves resolution, expands dynamic range, and reduces noise using Nikon’s proprietary imaging technology.

The DS-Fi1 also improves red sensitivity by using a new IR cut filter and enhances image quality, including increased brightness through 4x binning. The camera itself is more compact. This is a highly functional, high performance-to-value camera head for a wide range of observational applications, including brightfield, phase contrast, and differential interference contrast (DIC).

**Cooled camera head for high-definition color images**

**DS-5Mc**

The DS-5Mc uses a Peltier cooling mechanism to cool the area around the imaging section to 20°C below room temperature (compared to its un-cooled state). This enables it to suppress thermal background noise and obtain high-contrast images when capturing fluorescence images that require long exposure times. The DS-5Mc also features a 5-megapixel CCD that can faithfully capture microstructures at a high resolution of 2560 x 1920 pixels.

**CONTROL UNITS**

**Stand-alone control unit**

**DS-L2**

The DS-L2 features a large built-in 8.4-inch LCD monitor. This standalone control unit can observe samples and capture images without being connected to a PC.
Nikon has developed a comprehensive range of digital camera systems that are optimized for capturing microscopic images of superb quality. The five types of camera heads and two types of control units all function seamlessly together, providing the ultimate in flexibility to configure the perfect digital system for many different applications. The Digital Sight series provides the solution for a variety of applications, from industrial to biological use, and from high-level research to simple capture of inspection results. It can be expanded as a system by combining various camera heads and control units.

Based on your intended use, choose from five different models, which offer flexible combinations of the following features: 5-megapixel high-definition/high-resolution; cooled with low thermal noise, even during long exposures; highly sensitive monochrome, and 2-megapixel high-speed display.

High-speed color camera head

**DS-2Mv**

The DS-2Mv features a 2-megapixel CCD that can smoothly display SXGA live motion images at 15 fps (max.30fps). This well-balanced camera head enables the smooth display of live images at high speeds and the capture of crystal-clear still images with a high sensitivity and a high dynamic range. It is so versatile, in fact, that it can even be used for monitoring.

Cooled camera head for high-speed monochrome images

**DS-2MBWc**

The DS-2MBWc features a cooling mechanism on a monochrome CCD that boasts five times the sensitivity of the past model. Its high frame rate and 2-megapixel CCD quickly capture images of fluorescence samples in which color quickly fades, enabling clear image capture with less noise.

High-speed camera head for monochrome images

**DS-2MBW**

The DS-2MBW is a reasonably priced non-cooled camera head that features a monochrome CCD that boasts five times the sensitivity of the past model. Its high frame rate and 2-megapixel CCD capture images in a short time.

Two control units, the DS-L2 and the DS-U2, are available, to match your intended use.

PC-based control unit

**DS-U2**

The DS-U2 controls steps from advanced image capture to image processing and analysis from a connected PC.
No PC required. Simple operation with a mouse.
Live observation and camera control are possible on the large

**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 managed to minimize the difference between the human eye’s receptors and the CCD sensitivity by using newly developed image processing technology, thereby enabling true natural color representation. The controller has seven default gamma (TONE) correction presets and another seven that can be registered by the user. It also allows the user to create an original look-up table (LUT).

**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 ELIZA (enzyme antibodies) stained specimens for use with medical specimens that require subtle color reproduction. There are also seven user-customizable modes.

Configuration of DS-Fi1-L2 with stereoscopic microscope
Configuration of DS-5Mc-L2 with biological upright microscope
**Time-lapse recording**
Continuous image capture is possible in time intervals.

**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.

**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 or written 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.

**A wide variety of tools**
- Crosshairs
- Distance between two points

**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.

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**System Diagram**

- **Large screen monitor (external output)**
- **Network Server (Ethernet) 10/100 Base T**
- **PC (Mass storage class)**
- **PicBridge Printer (Direct Print)**
- **USB memory stick**
- **USB mouse**
- **USB keyboard**
- **Compact flash card**
- **Dedicated remote controller**
- **Universal-type AC power adapter**

**Camera control unit DS-L2**
Dedicated camera cable (3m)

**Camera head DS series**

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*Measurement*
- Area
- Distance between two points
- Point-to-line distance

*Scale display*
- Angle
- Distance between circle centers
- Pitch
- Crosshairs
- Grid lines
- Scale
- XY measurement

*Measurement of the distance between two points in the x and y axis directions.*
PC control-based control unit

**DS-U2**

Live images can be viewed, recorded, measured, processed, by connecting the unit via the USB port to a PC running the

- 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 and thin, compact design.

- Includes the newly developed NIS-elements "F" package software. The new software enables total control of basic image capturing.

**Screen shot of "F" package software**

![Configuration of DS-Fi1-U2 with industrial microscope](image1)

![Configuration of DS-5Mc-U2 with biological inverted microscope](image2)

**System Diagram**

![Diagram showing the flow of the system](image3)
Multidimensional Capturing
NIS-Elements can combine X, Y, Z, Lambda (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.

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 plugin 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.

Optional imaging software with rich functionality

The NIS-Elements line-up of imaging software products comes in a broad selection of three distinct packages that you can match to your desired use or application. When combined with the DS-U2, NIS-Elements software enables functionality ranging from advanced image analysis to simple image capture.

NIS-Elements is an integrated platform of imaging software developed by Nikon to achieve comprehensive control of microscope image capture and document data management. NIS-Elements handles multidimensional imaging tasks flawlessly with support for capture, display, peripheral device control, and data management & analysis of images (up to six-dimensional images).

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, Lambda (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, Lambda (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

Visit www.nis-elements.com for more detailed information