Photos courtesy of:
Atsushi Miyawaki M.D., Ph.D, Ms. Asako Sakagami, RIKEN Brain Science Institute Laboratory for Cell Function Dynamics (P8)
Teruhiko Wakayama, Ph.D., Laboratory for genomic Reprogramming, Head of Laboratory, Riken Kobe Institute, Center for Developmental Biology (CDB) (P13)
Yuji Abe M.D.Ph.D., The 1st Department of Obstetrics & Gynecology School of Medicine, Toho University (P21)
Atsushi Miyawaki M.D., Ph.D, Ms. Ryoko Ando, RIKEN Brain Science Institute Laboratory for Cell Function Dynamics (P22, P26)
Atsushi Miyawaki M.D., Ph.D, Mr. Hideaki Mizuno, RIKEN Brain Science Institute Laboratory for Cell Function Dynamics (P25)
Tohru Murakami, M.D., Ph.D, Department of Neuromuscular and Developmental Anatomy, Gunma University Graduate School of Medicine (P23 above, zebra fish)
Dr. Takeshi Awasaki and Dr. Kei Ito, Institute of Molecular and Cellular Biosciences, The University of Tokyo (P23 below, drosophia)
Dr. Kazuo Kurokawa, Department of tumor virology, Research institute for microbial diseases, Osaka university (P24 below, Kaede-Crk II protein expressed in a HeLa cell)

- **OLYMPUS CORPORATION has obtained the ISO9001/ISO14001**
- **OLYMPUS CORPORATION has obtained the MD540624/ISO13485**
- **Illumination devices for microscope have suggested lifetimes. Periodic inspections are required. Please visit our web site for details.**

OLYMPUS®

www.olympus.com

OLYMPUS CORPORATION
Shinjuku Monolith, 3-1, Nishi Shinjuku 2-chome, Shinjuku-ku, Tokyo, Japan
OLYMPUS LIFE SCIENCE EUROPA GMBH
Postfach 10 49 08, 20034, Hamburg, Germany
OLYMPUS AMERICA INC.
3500 Corporate Parkway, Center Valley, Pennsylvania 18034-0610, U.S.A.
OLYMPUS SINGAPORE PTE LTD.
491B River Valley Road, #12-01/04 Valley Point Office Tower, Singapore 248373
OLYMPUS AUSTRALIA PTY. LTD.
31 Gilby Road, Mt. Waverley, VIC 3149, Melbourne, Australia.
OLYMPUS LATIN AMERICA, INC.
5301 Blue Lagoon Drive, Suite 290 Miami, FL 33126, U.S.A.
OLYMPUS (CHINA) CO., LTD.
A8F, Ping An International Financial Center, No. 1-3, Xinyuan South Road, Chaoyang District, Beijing, China, 100027

Printed in Japan M1539E-0909B

OLYMPUS®
Your Vision, Our Future

Research
Inverted System Microscope

IX71/IX81

IX2 Series

UIS2
World-leading optics

Built for live cell imaging

Motorized inverted system microscope

IX81/IX81-ZDC

Motorized System

UIS2

world-leading optics

Olympus IX2 inverted microscopes combined with the new UIS2 optical system opens a new world of live cell imaging.

As new fluorochromes are developed and new methods of light excitation and manipulation become more popular for live cell experiments, more and more researchers will require the use of low phototoxicity near-IR wavelengths in addition to the conventional visible spectrum. Olympus has equipped its IX2 series microscopes with the new UIS2 optical system precisely to meet those demands. With high S/N ratio, compensation for chromatic aberration over a much wider wavelength range and flat, high transmittance , this new system sets a new world standard of fluorescence performance — efficiently detecting even faint fluorescence signals without damaging the cell, optimizing multi-color observation. Delivering unprecedented image quality over a super wide light spectrum, the IX2 inverted system microscope will be your choice of live cell imaging now and in the future.

Research inverted system microscope

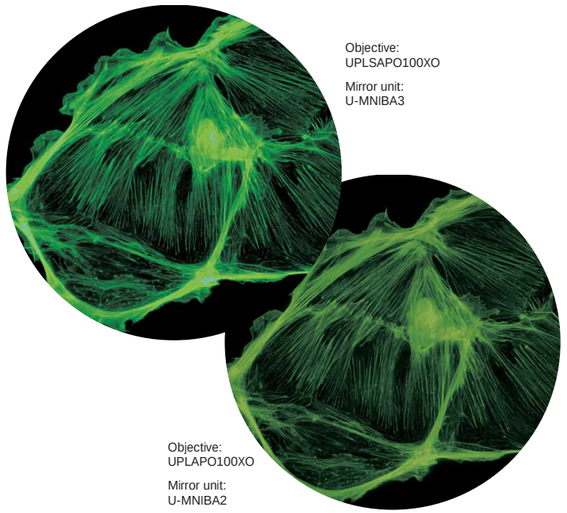
IX71

Manual System

UIS2 optics are designed to maximize S/N ratio and optical performance for live cell fluorescence imaging.

Superior S/N ratio delivers imaging excellence

UIS2 objectives' fluorescence S/N ratio is improved by using selected low fluorescence glass material, and minimized autofluorescence obtained by anti-reflection coating and cementing material. Also numerical aperture (N.A.) has improved in addition to the reduction of autofluorescence. Weak fluorescence emissions are efficiently detected even from weak excitation light, which is friendly for the living cell.
The ideal fluorescence imaging of live cells with the UIS2 systems!

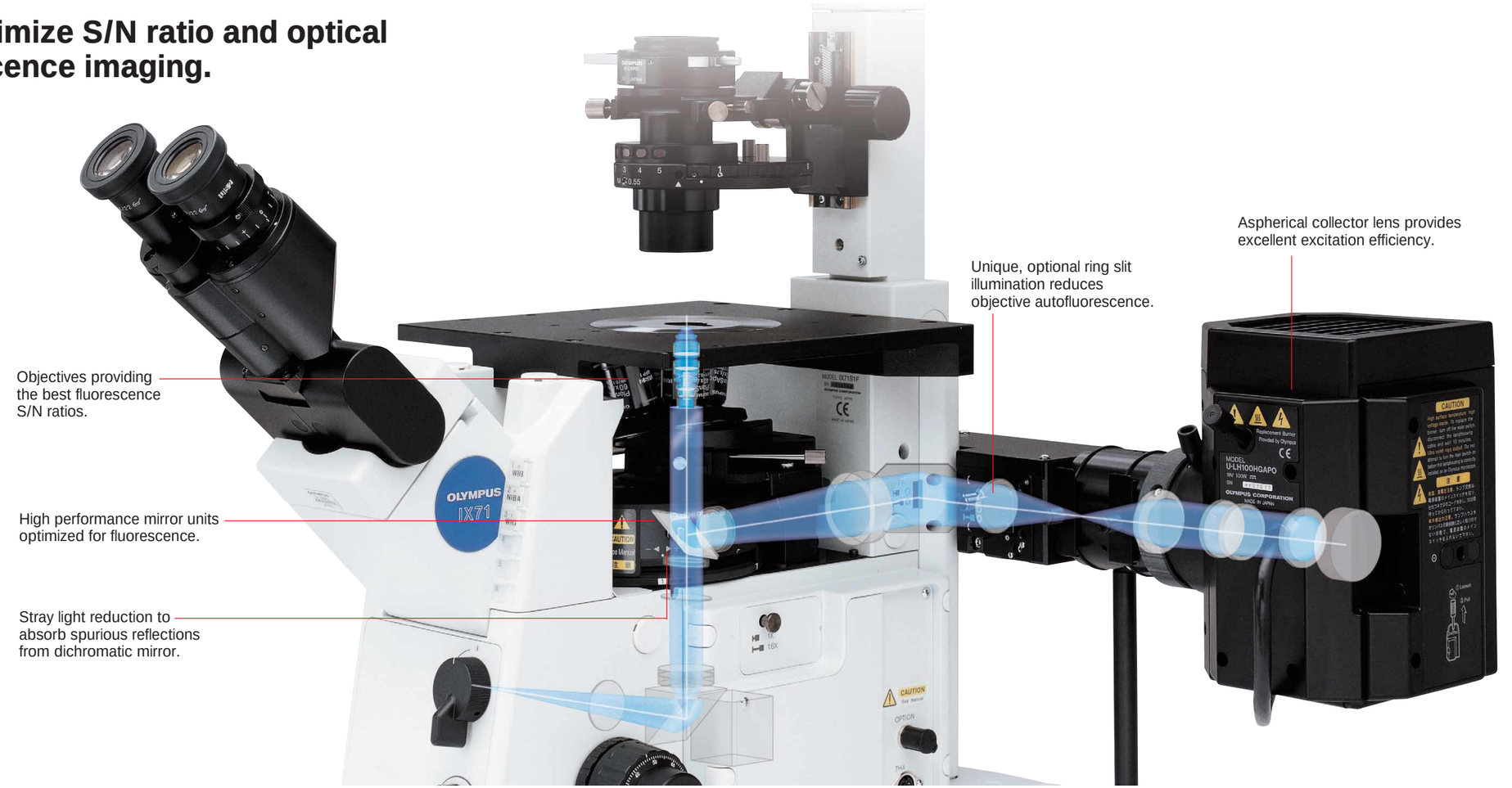


Objective:
UPLSAPO100XO

Mirror unit:
U-MNIBA3

Objective:
UPLAPO100XO

Mirror unit:
U-MNIBA2



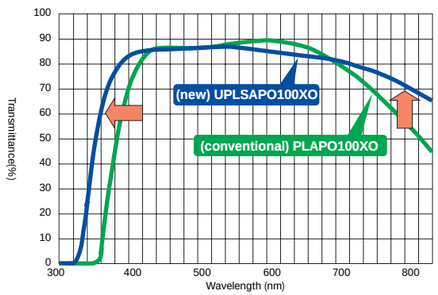
High N.A. objectives for fluorescence imaging

PLANAPO60XO and UPLSAPO100XO have outstanding N.A., 1.42 and 1.4 respectively, suitable for fluorescence imaging and bright-field observation as well. In addition to their high fluorescence S/N ratio, both these lenses are able to handle UV excitation light. The UPLSAPO100XO provides a transmission of down to 340 nm.

High transmittances over a wider wavelength range

UIS2 objective for the IX71/81 achieves flat, high transmittance from visible to near-infrared light, thanks to new UW multi-coating which effectively cuts reflection over the super wide band spectrum. In particular, transmission in the near infrared range is significantly enhanced. Overall, performance all across the wavelength range is ideally suited for today's most demanding research applications.

High transmittance UPLSAPO100XO

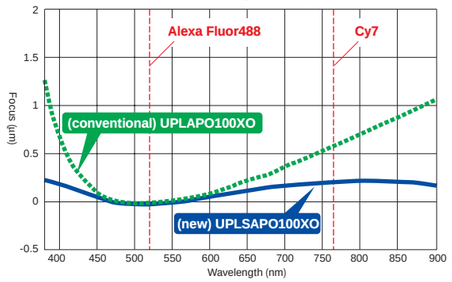


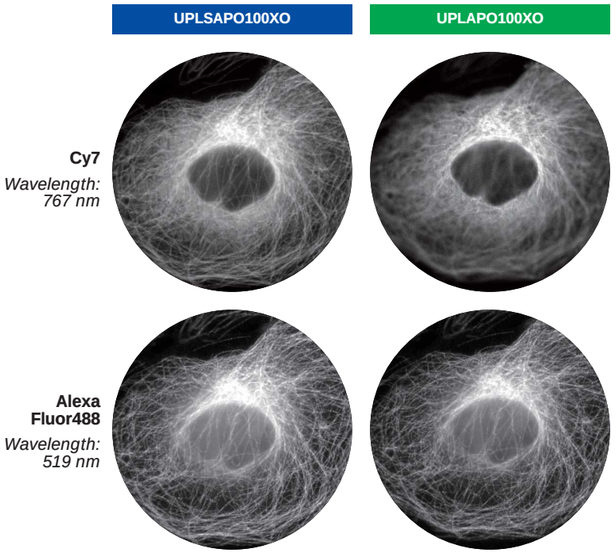
Effective compensation for chromatic aberration up to near-infrared

The UPLSAPO series is the highest class UIS2 objectives, whose super apochromatic features effectively compensate for chromatic aberration from the visible spectrum all the way to near IR. This means that just one objective covers imaging from UV to IR range. The series also offers outstanding image clarity without color shift for multi-color observations using fluorochromes covering a wide wavelength spectrum.

UPLSAPO series chromatic aberration compensation

Comparing chromatic aberration compensation levels:
(The smaller the figure the better)

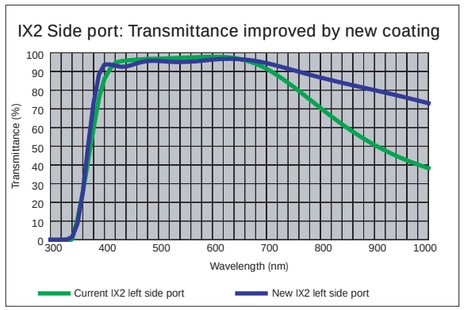


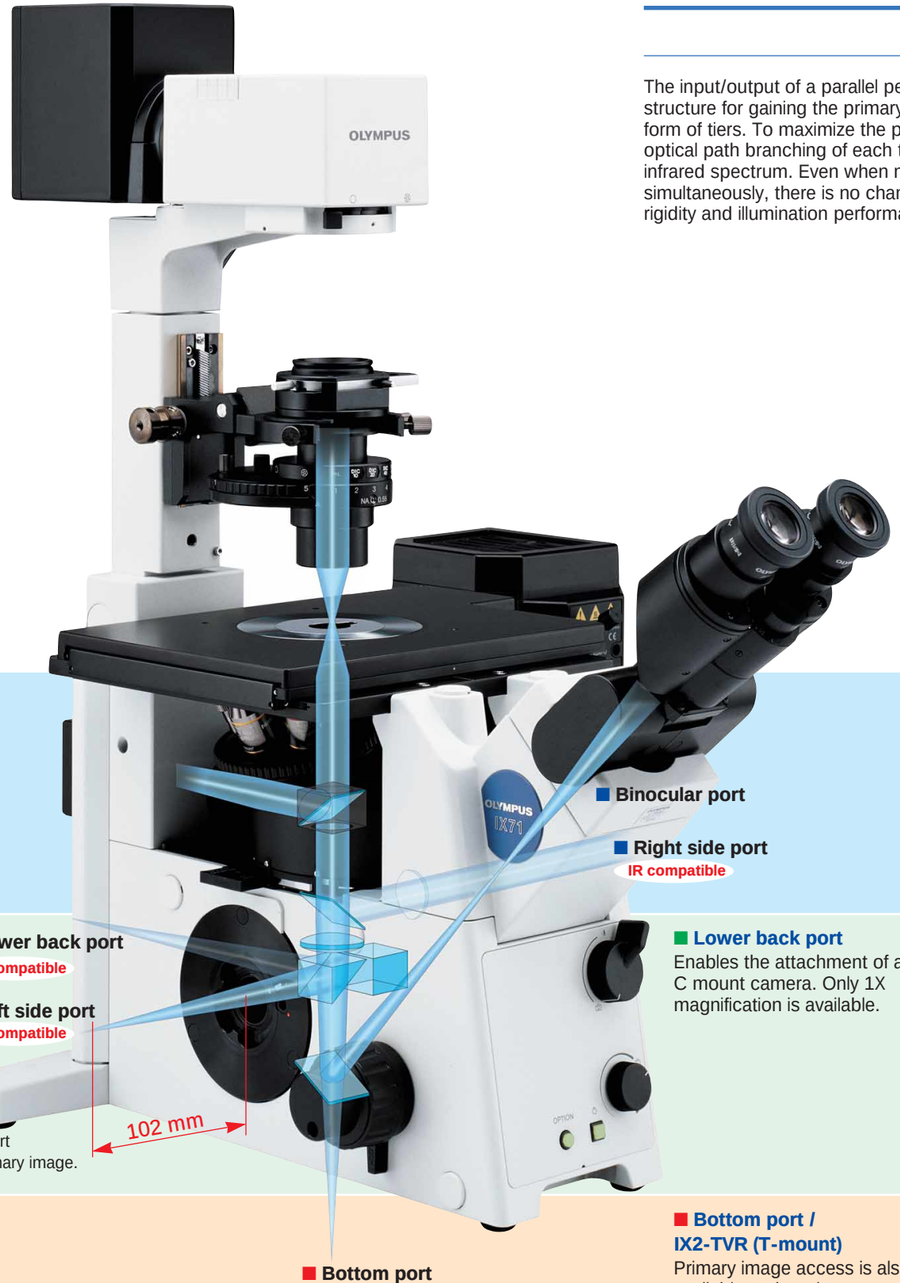


Two-tier multi-port design ensures input/output flexibility.

Improved near-infrared transmission

With the introduction of the new UIS2 optical system, the IX2 series offers improved IR transmittance for the side port, back port and bottom port, providing versatile, high-performance response to future research demands.

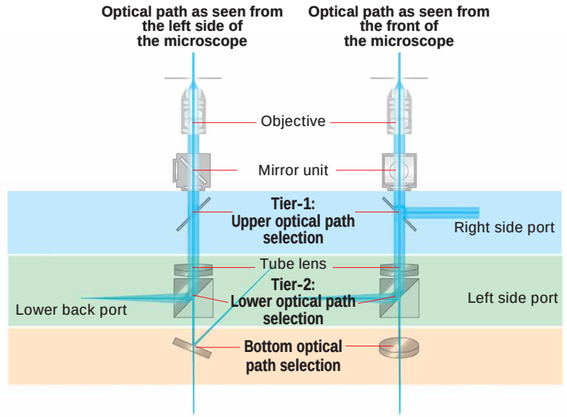




Two-tier optical design is also near-IR compatible

The input/output of a parallel pencil of rays and the multiple port structure for gaining the primary image are designed internally in the form of tiers. To maximize the possible wavelength width, the optical path branching of each tier is also compatible with the near-infrared spectrum. Even when more than one port is being used simultaneously, there is no change in the stage height; as a result, rigidity and illumination performance remain constant.

■ IX2 Two-tier optical path



Tier-1

Upper Tier Lightpath Selection (optional)

Located between objective and tube lenses so a parallel pencil of rays can be obtained or introduced. Primary image can be gained by adding a tube lens. Inserting optical components such as a dichromatic mirror does not produce a double image. (The alternative of the right side port)

■ Right side port / IX2-RSPC-2

The right side port unit (IX2-RSPC-2: option, F.N.: 16) comes with a tube lens and accepts a C-mount CCD camera.

Tier-2

Lower Tier Lightpath Selection (included)

Located below the tube lens inside the frame, this tier allows primary image access to either the left side port or lower back port.

■ Lower back port

IR compatible

Enables the attachment of a C mount camera. Only 1X magnification is available.

■ Left side port

IR compatible

This port offers a high quality primary image, located in 102 mm distance from the microscope frame for maximum flexibility in mounting filter wheels or any kinds of camera adapters.

Bottom

Bottom Lightpath Selection

A direct primary image can be obtained without any reflections and any optical components.

■ Bottom port / IX2-TVR (T-mount)

Primary image access is also available at the microscope bottom.

■ Dual port camera adapter / U-DPCAD* (C-mount, left side port)

This unique dual port adapter enables the provision of two primary images suitable for live cell imaging.

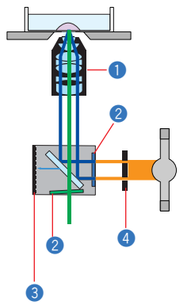
* optional unit

Improved S/N ratio enables efficient detection of even weak fluorescence.

FL Fluorescence Observation Units

Better S/N ratio delivers brighter, higher-contrast images in fluorescence observation.

The ideal microscope allows bright, high contrast fluorescence observation from the minimum amount of excitation light in order to minimize cell damage or fluorescence fading. To detect a weak fluorescence signal (S) efficiently, all other light noise (N) must be reduced. Therefore, it is very important for fluorescence observation to maximize the signal (S) and to minimize the noise (N).



S Measures to enhance the signal (S)

1. Fluorescence objectives with high N.A.
2. Filters matched to the wavelength characteristics of individual fluorochromes

N Measures to reduce noise (N)

1. Objectives without autofluorescence
2. No crossover between excitation & emission light with new introduced filters.
3. Optical system that prevents entry of stray light
4. Ring slit illumination to reduce autofluorescence

High S/N ratio objective with reduced autofluorescence

1 Olympus offers a range of other high numerical aperture objectives whose reduced autofluorescence and specially selected glass contribute to improved fluorescence S/N ratios. Especially the PLAPON60XO has outstanding N.A., which is 1.42.

	N.A.	W.D(mm)
UPLSAPO 10X2	0.40	3.1 mm
UPLSAPO 20X	0.75	0.6 mm
UPLSAPO 40X2	0.95	0.18 mm
UPLSAPO 60XO	1.35	0.15 mm
UPLSAPO 100XO	1.40	0.13 mm
PLAPON60 XO	1.42	0.15 mm
UPLFLN40XO	1.30	0.2 mm
LUCPLFLN 20X	0.45	6.6 — 7.8 mm
LUCPLFLN 40X	0.60	2.7 — 4 mm
LUCPLFLN 60X	0.70	1.5 — 2.2 mm

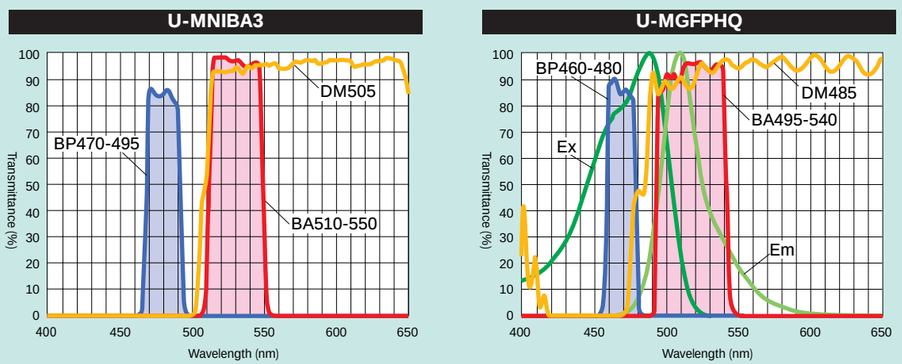
High-performance fluorescence mirror units for fluorescent proteins

2 Olympus has developed outstanding filter coating technology, which gives the high efficient transmission and the reflection as well as sharp cut off characteristics. This newly developed coating results in optimized mirror units for the various fluorochromes included ECFP/EGFP/EYFP/DsRed.

Improved performance of interference type fluorescence mirror unit

2 The S/N ratio of certain interference type fluorescence mirror units is now improved, thanks to the application of new coating technology to narrow the gap between excitation (Ex) and emission (Em). The line-up has been extended for wide variety of choice.

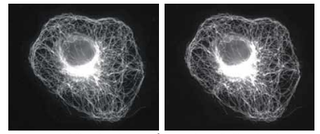
High performance mirror units



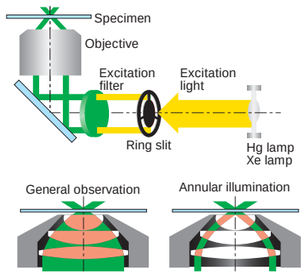
The sharp performance of the dichromatic mirror in the new mirror unit minimizes crossover with the excitation filter and reduces excitation light leakage to less than a tenth of our conventional models. Combined with the light absorbing mechanism (which absorbs more than 99% of stray light), a high S/N ratio is achieved without the need for any special mechanism to prevent excitation light leakage.

Ring slit illumination unit to reduce noise / IX2-RFRS

4 The ring slit illumination IX2-RFRS makes the ring shape illumination on the objective to allow excitation light to pass through the objectives outer portion to not to excite the objective auto-fluorescence generated at the center of an objective.



Illumination	Normal	Annular
SIGNAL	408	479
NOISE	36	18
S/N	11.3	26.6




IX2-RFRS and IX2-RS40/60/100

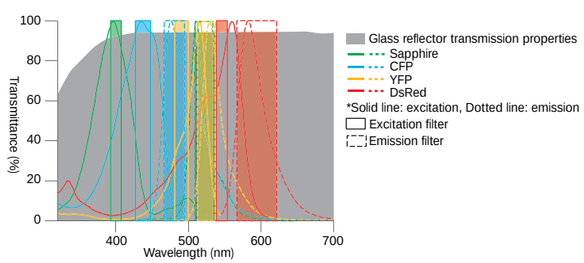
Glass reflector captures fluorescence of multiple color dyes

● A multi-band dichromatic mirror is normally used to obtain multi-color images of multiple stained fluorescent samples by using filter wheels on the excitation and emission sides. However, this kind of mirror encounters the problem that each fluorescence image gets darker as the number of color dyes increase, because the transmission spectrum becomes narrower and the transmittance falls to lower than 90% at best. Olympus has therefore developed the world's first glass reflector that is not wavelength-dependent, offering a high transmittance of 94% across a wide wavelength range from 430 nm to 700 nm. Used in combination with the filter wheels on the excitation and emission sides, a wider variety of color dyes can be used and fluorescence images are captured more efficiently. *Special order basis product

■ Glass reflector specifications

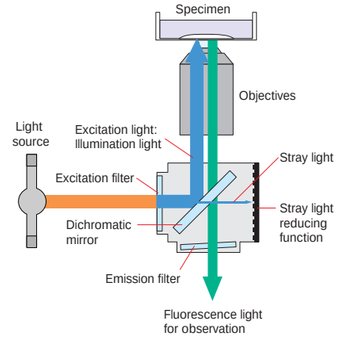
26 X 38 mm (t=1 mm) glass substrate
Transmittance 94% (at 430-700 nm)
26 X 38 mm

* Observations through eyepieces may have some restrictions

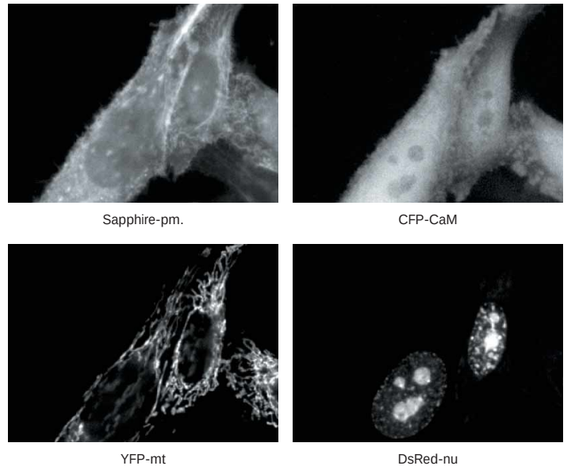


Stray light reduction function equipped on all mirror units

3 The slight transmission of stray light when excitation light is reflected in the dichromatic mirror causes a rise in the level of noise. Olympus mirror units absorb more than 99% of this stray light through their light absorber.



■ Usage examples of the glass reflector



Simultaneous imaging of Sapphire, CFP, YFP, and RFP. HeLa cells were imaged for Sapphire-pm, CFP-CaM, YFP-mt, and DsRed-nu. The images were obtained using the glass reflector in a normal cube.

Optical components used for a 4-fluorophore imaging

Dye	ND Filter*1	Excitation Light Path	Reflector	Emission Light Path
Sapphire-pm		400DF15		535DF2
CFP-CaM	—	440DF20	Glass	480DF30
YFP-mt		490DF20		535DF25
DsRed-nu		546DF10		595RDF60

*1 ND filters in the holder of the illuminator.

A wide range of accessories to enable different kinds of fluorescence imaging.

Fluorescence illumination light source

Bright excitation illumination for cell observation/manipulation

The Olympus lineup for fluorescence illumination equipment meets a wide variety of needs including multi-color fluorescence, ratio imaging, photobleaching and uncaging observations. The brightness at low magnification is greatly improved.

Lamp housings

Shape	Model	Aspherical*1 optics	Apochromatic*2 lens	Average lamp life	Lamp centering	IR illumination
	100 W mercury apo lamp housing/ U-LH100HGAPO	√	√	300 h	Required	Good
	100 W mercury lamp housing/ U-LH100HG	√		300 h	Required	Good
	75 W xenon apo lamp housing/ U-LH75XEAPO*3	√	√	200 h	Required	Excellent

*1: Can collect light more efficiently than conventional aspherical optics.
*2: Even illumination and no lamp focusing shift, even when changing excitation light wavelengths.
*3: Suitable for multi-color staining or ratio imaging because of flat light source spectrum.

Configuration example

Reflected light fluorescence illuminators

[L-shaped fluorescence illuminator/IX2-RFAL]

Provides easy access to burner centration and removable aperture and field stops. The L-shaped design maintains access to both back frame ports.

[Fluorescence illuminator/IX2-RFA]

Straight type illuminator designed for maximum throughput is 20% brighter than the previous model. Well suited for applications requiring high intensity excitation or multiple excitation filters. The field stop (FS) is built in.

[Double lamphouse illuminator/IX2-RFAW]

Two light sources can be used simultaneously, so that light stimulation can be performed during observation.

[Double lamp housing adapter/U-DULHA]

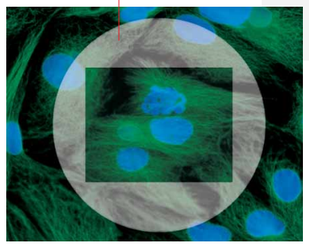
Allows simultaneous attachment of two light sources such as halogen and mercury. Selection mirror is replaceable for custom applications.

Illumination modular units

[Rectangular field stop/U-RFSS]

This unique field stop allows the user to control the area of fluorescence excitation anywhere inside the visual field. For example, photobleaching and phototoxicity can now be limited to only the area that is being imaged by the CCD improving overall brightness and cell viability over long term observations. The unit is attached at the field stop position of the fluorescence illuminator IX2-RFAL.

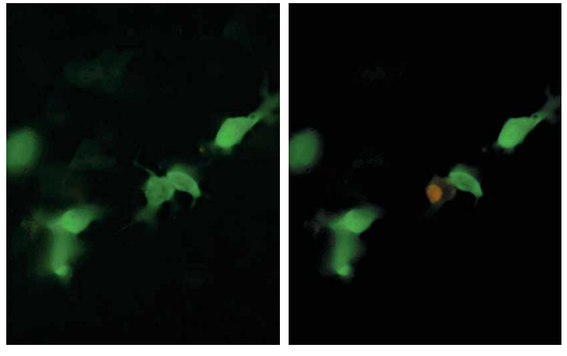
Unnecessary exposure area caused by a round field stop



[Pinhole field stop/IX2-RFSPOT]

Flexible field stop options IX2-RFSPOT pinhole field stop module can be mounted in the L-shaped illuminator for photobleaching experiments.

*Use commercially available pinhole plate



IR TV adapters

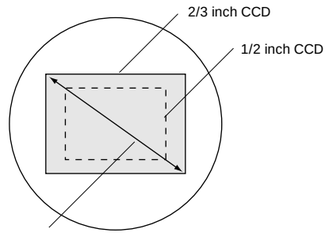
[C mount TV adapters/ U-TV0.35XC-2, U-TV0.5XC-3, U-TV0.63XC, U-TV1X-2]

These low-magnification camera adapters are attached to the left side port, and cover from visible light to near infrared red wavelength spectrum.

Camera adapter (Projection lens)	Projection magnifications	Projection area (F.N.)		
		2/3 inch CCD	1/2 inch CCD	1/3 inch CCD
① U-TV0.35XC-2	0.35X	—	22	17.1
② U-TV0.5XC-3	0.5X	22	16	12
③ U-TV0.63XC	0.63X	17.5	12.7	9.5
④ U-TV1X-2	1X	11	8	6

Practical field of view (mm) = $\frac{\text{Projection area (Field Number)}}{\text{Objective magnifications}}$

Practical field of view (F.N.)

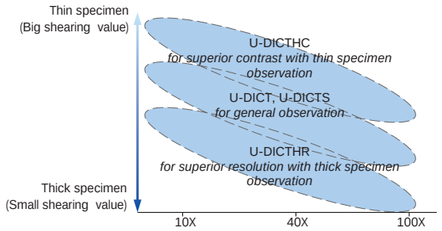


Nomarski DIC system offers the choice of optimal resolution or high contrast in live cell observation.

DIC Differential Interference Contrast

Live cells specimens vary in thickness from from that of a nematode worm such as *C. elegans* to a monolayer of cultured cells. The requirements for DIC are also varied according to the specimen from thinner cells being almost invisible to thicker specimens having a lot of inherent contrast. Olympus provides three DIC systems with varying amounts of shear. Small shear, high resolution sets are excellent for thicker specimens. High contrast prism with twice the normal shear are excellent for very thin specimens.

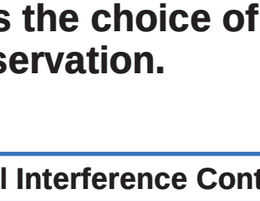
■ Selecting the optimum DIC prism optimum for specimen thickness and objective magnification



■ DIC sliders

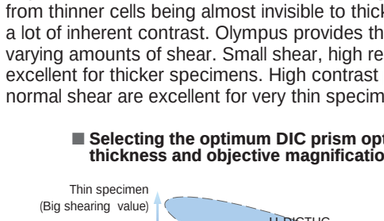
High resolution DIC slider for transmitted light/U-DICTHR

High contrast DIC slider for transmitted light/U-DICTHC

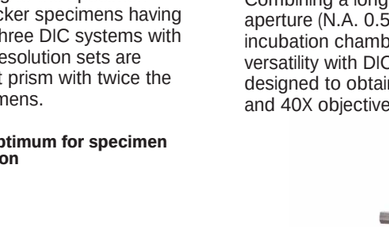


Shift DIC sliders for transmitted light/ U-DICTS
DIC sliders for transmitted light/U-DICT

■ Comparison of thick specimen (*C. elegans*), showing differences in shearing value

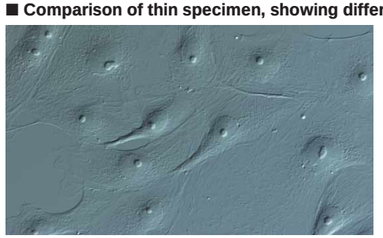


DIC observation using U-DICTHR

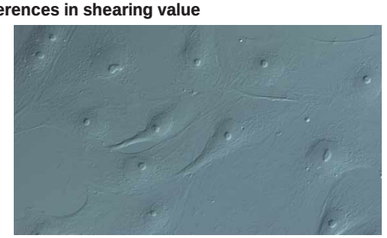


DIC observation using U-DICT/ U-DICTS

■ Comparison of thin specimen, showing differences in shearing value



DIC observation using U-DICTHC



DIC observation using U-DICT/ U-DICTS

Long working distance universal condenser/IX2-LWUCD

Combining a long working distance (27 mm) and a high numerical aperture (N.A. 0.55), the LWUCD condenser accommodates most incubation chambers and T-Flasks. The 5-position turret provides versatility with DIC or phase inserts. DIC components are specially designed to obtain high-contrast, high-resolution images with 20X and 40X objectives.

• New DIC system gives a wider choice

UIS2 expands the selection of DIC applicable objectives. Each condenser prism is compatible with more lenses making setup and configuration easier.

■ HR/HC optical elements for IX2-LWUCD and applicable objectives

DIC elements	Applicable objectives
IX2-DIC20HR IX2-DIC20HC	UPLSAPO20X UPLFLN20X LUCPLFLN20X
IX2-DIC40HR IX2-DIC40HC	UPLSAPO40X2 UPLFLN40X UPLFLN40XO LUCPLFLN40X

■ General type optical elements for IX2-LWUCD and applicable objectives

DIC elements	Applicable objectives
IX2-DIC10	UPLSAPO10X2 UPLFLN10X2
IX2-DIC20	UPLSAPO20X UPLFLN20X LUCPLFLN20X
IX2-DIC40	UPLSAPO40X2 UPLFLN40X UPLFLN40XO LUCPLFLN40X
IX2-DIC60	PLAPON60XO UPLFLN60X UPLFLN60XOI LUCPLFLN60X
IX2-DIC100	UPLSAPO100XO UPLFLN100XO UPLFLN100XOI

Water immersion DIC condenser/IX2-DICD

High performance DIC condenser designed for excellent optical performance and specimen access in high magnification observations. Designed for specimen access, all controls are front mounted including prism exchange and aperture control. Three high numerical aperture top lenses are available including the water immersion IX2-TLW that offers 0.9 N.A. with 3.7 mm of working distance and a 40° approach angle for micro manipulations.

■ Top lens combination

	Numerical Aperture (N.A.)	Working Distance (W.D.)	Immersion
IX2-TLW	0.9	3.7 mm	Water
U-TLD	0.9	1.5 mm	
U-TLO	1.4	0.63 mm	Oil

Water immersion DIC condenser IX2-DICD + water immersion top lens IX2-TLW

Condenser adapter/IX-ADUCD

This is the condenser adapter for upright microscope condensers on the IX2, including the 8-position turret condenser (U-UCD8) for maximum system flexibility. This combination allows the use of various optional element with high N.A., just rotating the smooth turret for switching them easily. The IX2 illumination pillar also offers a 'condenser-only' tilt mechanism to quickly allow access to the specimen without tilting the entire illumination pillar.

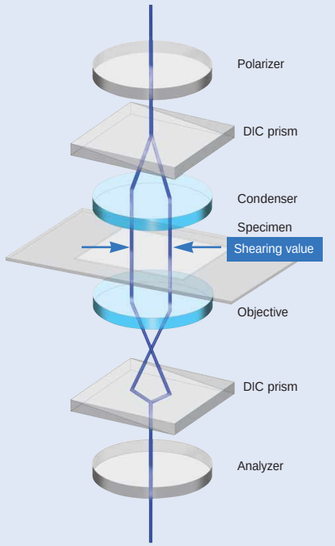
* IX2-TLW cannot be used for U-UCD8

Gliding stage/IX2-GS

The Gliding Stage was designed for quick rotation of the specimen using your fingertips. With 20 mm of X-Y travel, 360 degree rotation and completely flat surface, a specimen such as the nematode worm *C. elegans* can be quickly brought into the correct position and alignment for injection or micromanipulations.

■ Simple principle of Nomarski DIC microscopy

Nomarski DIC amplifies contrast by using the phase difference which occurs when light passes through material with different refraction or thickness value (e.g. a cell) in a particular medium (e.g. water). The wave direction of light from the microscope light source is unified in a polarizer (condenser side); and when it passes through the condenser side DIC prism, it separates into two beams which cross each other at right angles. The distance of separation is called the shearing amount. When two such separated beams pass through a medium with different refraction values (e.g. a cell), one of them is delayed; and when the two beams are re-composed by DIC prism (the observation side) and pass through the analyzer, the interference effect produces the contrast. This is the principle of Nomarski DIC.



Olympus has developed the most suitable DIC prisms for different types of specimen, based on the shearing amount. When DIC contrast is low, the specimen is hard to observe, while high contrast also hinders observation because of excessive glare. Olympus has therefore developed three different types of DIC prisms to ensure clear observation for every kind of specimen.

Special equipment for relief contrast and phase contrast.

RC Relief contrast equipment

The Olympus Relief Contrast system provides a high contrast, 3-D image similar to DIC for specimens mounted in plastic vessels. Relief contrast is designed for use in cellular fertilization and making the nuclear envelope easier to see and penetrate.

Relief contrast equipment
* Unifies the shadow directions of each objective, improving operability at all magnifications.
* A long working distance (45 mm) for the condenser (IX2-MLWCD) doesn't bother the operation of the manipulator.

Two types of objectives for relief contrast are selectable: cost-efficient Achromat models, or PlanSemiApochromat objectives with high resolution and excellent focusing right up to the image perimeters. Condenser (IX2-MLWCD) also supports DIC and phase contrast observations for maximum flexibility.

The IX2-MLWCD equipes with optical component RC1 (for 10X objective), RC2 (for 20X objective), RC3 (for 40X objective) and a polarizer to adjust the contrast.

Mouse embryo

■Objectives for Relief Contrast observation

		N.A.	W.D.
Achromat for Relief Contrast	CPLN 10XRC *1	0.25	9.7 mm
	LCACHN 20XRC *1	0.4	2.8 mm
	LCACHN 40XRC *1	0.55	1.9 mm
Plan Fluorite for Relief Contrast	CPLFLN 10XRC *1	0.3	9 mm
	LUCPLFLN 20XRC *2	0.45	6.6 — 7.8 mm
	LUCPLFLN 40XRC *2	0.6	3.0 — 4.2 mm

*1 Objective with compensation for 1 mm plastic dish plus 0.5 mm thick thermoplate
*2 Objective with compensation ring for 0~2 mm thick cover glass.

■ Phase contrast optical elements for IX2-MLWCD and applicable objectives

Optical elements for IX2-MLWCD	Applicable objectives
IX2-MPHL	UPLFLN4XPH
IX2-MPHC	CPLFLN10XPH, CPLN10XPH, LCACHN20XPH
IX2-MPH1	LUCPLFLN20XPH
IX2-MPH2	LUCPLFLN40XPH, LCACHN40XPH, LUCPLFLN60XPH

■ DIC optical elements for IX2-MLWCD and applicable objectives

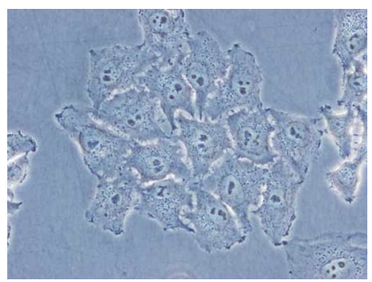
Optical elements	Objectives
IX2-MDIC20	UPLSAPO20X, UPLFLN20X, LUCPLFLN20X
IX2-MDIC40	UPLSAPO40X2, UPLFLN40X, UPLFLN40XO* , LUCPLFLN40X

* Use with shift DIC slider (U-DICTS).

PH Phase contrast equipment

Ultra long working distance condenser/IX-ULWCD

This universal condenser for phase contrast and brightfield observations offers excellent workability due to its long working distance (73 mm) and compatibility with large containers: it can be used in combination with 4X -40X phase contrast objectives. Phase contrast observation is also possible with the IX2-LWUCD condenser, whose working distance is 27 mm.



A wide lineup of UIS2 objectives.

UIS2 objectives

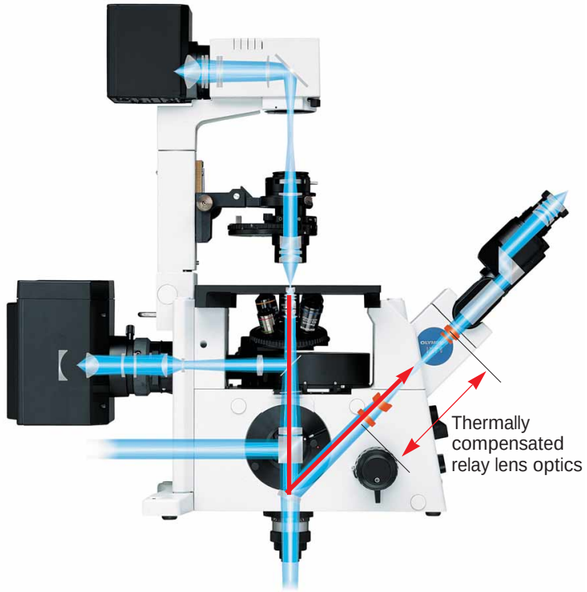
	Model	N.A.	W.D. (mm)	F.N.	Cover glass thickness (mm)	Immersion	Spring	Correction ring	Iris diaphragm	Water proof & oil proof function
UPLSAPO	UPLSAPO 4X	0.16	13	26.5	—					
	UPLSAPO 10X2	0.4	3.1	26.5	0.17					
	UPLSAPO 20X	0.75	0.6	26.5	0.17		○			
	UPLSAPO 20XO	0.85	0.2	26.5	—	Oil	○			
	UPLSAPO 40X2	0.95	0.18	26.5	0.11-0.23		○	○		
	UPLSAPO 60XW	1.2	0.28	26.5	0.13-0.21	Water	○	○		○
	UPLSAPO 60XO	1.35	0.15	26.5	0.17	Oil	○			○
	UPLSAPO 100XO	1.4	0.13	26.5	0.17	Oil	○			○
PLAPON	PLAPON 60XO	1.42	0.15	26.5	0.17	Oil	○			○
UPLFLN	UPLFLN 4X	0.13	17	26.5	—					
	UPLFLN 10X2	0.3	10	26.5	—					
	UPLFLN 20X	0.5	2.1	26.5	0.17		○			
	UPLFLN 40X	0.75	0.51	26.5	0.17		○			
	UPLFLN 40XO	1.3	0.2	26.5	0.17	Oil	○			○
	UPLFLN 60X	0.9	0.2	26.5	0.11-0.23		○	○		
	UPLFLN 60XOI	1.25-0.65	0.12	26.5	0.17	Oil	○		○	○
	UPLFLN 100XO	1.3	0.2	26.5	0.17	Oil	○			○
	UPLFLN 100XOI	1.3-0.6	0.2	26.5	0.17	Oil	○		○	○
LUCPLFLN	LUCPLFLN 20X	0.45	6.6-7.8	22	0-2			○		
	LUCPLFLN 40X	0.6	2.7-4	22	0-2			○		
	LUCPLFLN 60X	0.7	1.5-2.2	22	0.1-1.3			○		
	LUCPLFLN 20XPH	0.45	6.6-7.8	22	0-2			○		
	LUCPLFLN 20XRC	0.45	6.6-7.8	22	0-2			○		
	LUCPLFLN 40XPH	0.6	3.0-4.2	22	0-2			○		
	LUCPLFLN 40XRC	0.6	3.0-4.2	22	0-2			○		
	LUCPLFLN 60XPH	0.7	1.5-2.2	22	0.1-1.3			○		
UPLFLN-PH	UPLFLN 4XPH	0.13	17	26.5	—					
	UPLFLN 10X2PH	0.30	10	26.5	—					
UPLFLN-PHP	UPLFLN 4XPHP	0.13	16.4	22	—					
CPLFLN	CPLFLN 10XPH	0.3	9.5	22	1					
	CPLFLN 10XRC	0.3	9	22	1.5					
LCACHN	LCACHN 20XPH	0.4	3.2	22	1					
	LCACHN 20XPHP	0.4	3.2	22	1					
	LCACHN 20XRC	0.4	2.8	22	1.5					
	LCACHN 40XPH	0.55	2.2	22	1					
	LCACHN 40XPHP	0.55	2.2	22	1					
	LCACHN 40XRC	0.55	1.9	22	1.5					
CACHN & CPLN	CACHN 10XPHP	0.25	8.8	22	1					
	CPLN 10XPH	0.25	10	22	1					
	CPLN 10XRC	0.25	9.7	22	1.5					
TIRFM	APON 60XOTIRF	1.49	0.1	22	0.13-0.19	Oil		○		○
	UAPON 100XOTIRF	1.49	0.1	22	0.13-0.19	Oil		○		○
	UAPON 150XOTIRF	1.45	0.08	22	0.13-0.19	Oil		○		○

◆ All UIS2 objectives and WHN eyepieces: lead-free eco-glass

UIS objectives

	Model	N.A.	W.D. (mm)	F.N	Cover glass thickness (mm)	Immersion	Spring	Correction ring	Iris diaphragm	Water proof & oil proof cap
UAPO	UAPO 20X3/340	0.75	0.55	22	0.17		○			○
	UAPO 40X3/340	0.90	0.2	22	0.11-0.23		○	○		○
	UAPO 40XOI3/340	1.35-0.65	0.1	22	0.17	Oil	○		○	○
	UAPO 20XW3/340	0.70	0.4	22	0.17	Water	○			○
	UAPO 40XW3/340	1.15	0.25	22	0.13-0.25	Water	○	○		○
TIRFM	APO 100XOHR	1.65	0.1	22	0.15	Oil	○			○

High level basic performance makes a vital difference to experiment results.



Capture of high-clarity primary image

Since the UIS2 optical system is compensation-free (i.e. compensation is performed only by the objective lens), a clear primary image* can be captured through any camera port offering from IX2 system.

* The "primary image" is the first image created by convergence of the luminous flux after passing through an objective. There is no loss in light quantity and no image deterioration.

V-shaped optical path to reduce light loss

In order to minimize light loss from reflection, a simple V-shaped optical system is employed. This restricts reflection inside the microscope to one-time-only, reducing light loss and allowing observation of even weak fluorescent signals.

■ Thermally compensated relay lens optics

Used for the observation optical path, thermally-compensated relay lens optics involve combining lenses with different thermal characteristics to offset blurs caused by temperature change.

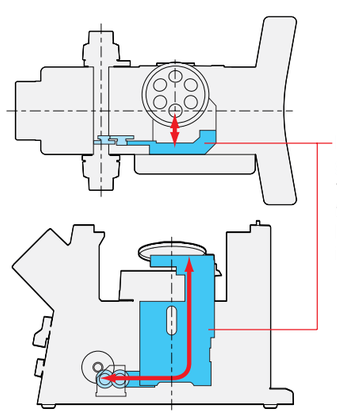
Against thermal expansion to prevent defocusing

■ External power supply

Time-lapse observation over a long period will cause some heat strain to the microscope, from temperature changes in the environment and air blown from an air-conditioner. Because such changes can cause blurring, the IX2 series design focuses on its structure in order to maximize rigidity and equips the external power supply for transmitted illumination on the outside of the microscope. Thereby IX2 series archives the highest level of thermal expansion compensation. Various accessories are provided to stabilize long-term time-lapses, such as an incubator that reduces temperature changes in the environment and the effects of air conditioning.

High body rigidity

In addition to maximizing rigidity of IX2 microscope frame, Olympus simplified or shortened mechanical structures from the focusing handle to the revolving nosepiece, thereby achieving to minimize the focus drift.



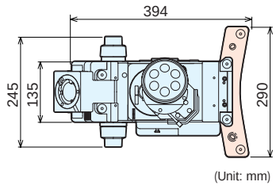
Revolving nosepiece guide structure

The shorter section in red, the less influence from heat and force — resulting in improved rigidity.

Ease of use in a compact body

[Compact body]

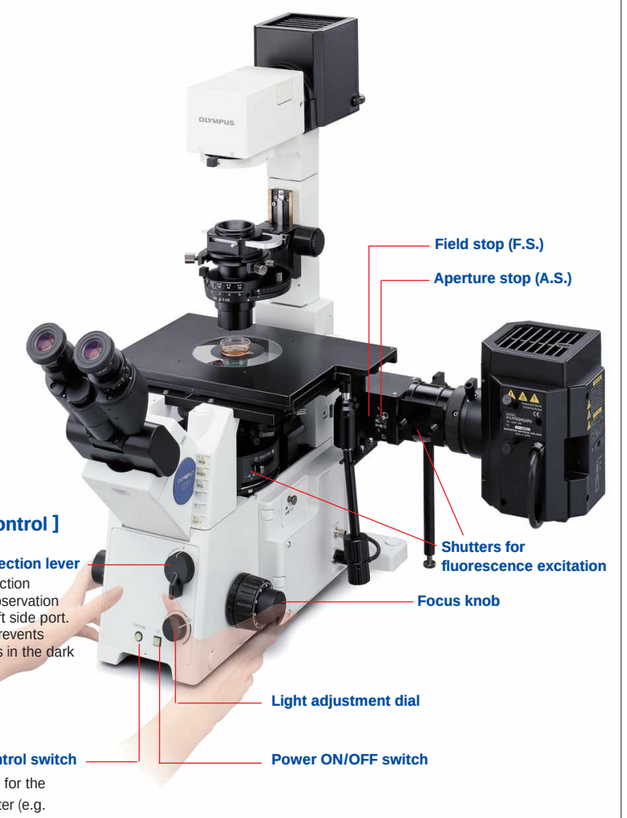
Compact body design allows wide port space for both left and right sides, the bottom and on the back. It allows you to use the variety of peripherals with offering an excellent operability.



(Unit: mm)

[Tilting binocular tube/U-TBI90]

A tilting observation tube with 35-85° elevation angle. This tube offers ergonomic operation for both sitting and even standing position.



[Frontal control]

Light path selection lever

Two-stage selection between the observation tube and the left side port. This big lever prevents operation errors in the dark room.

TTL Pulse control switch

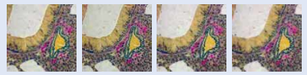
ON/OFF switch for the motorized shutter (e.g. made by UNIBLITZ).

[Focus free collection ring]

The newly developed LUCPLFLN40X (N.A. 0.6, W.D. 3.4 mm*) and LUCPLFLN60X (N.A. 0.70, W.D. 1.5-2.2 mm) are compatible with various container thickness. Turning the correction ring does not blur the focus when correcting spherical aberration caused by different container thickness. A simple correction operation optimizes the observation image. * When using 1 mm thickness container.

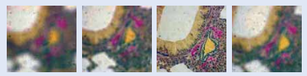
■ **LUCPLFLN 40X**

Operating the correction ring does not blur the focus.



■ **When using a conventional objective with correction ring**

Focus blurs when correction ring is operated.



[Oil immersion protection function]

Prevents immersion oil infiltrating through the tip of the objective.

[Magnification changer]

This intermediate magnification changer offers different magnification without switching the objective lens. 1.6X is standard (IX71/81) and 2.0X is optional.

[Glass stage insert plate/IX2-GCP]

The objective type and its magnifications can easily be recognized through this glass stage insert.

[Fluorescence indicator]

Bright,easy-to-see self-illuminated labels are used to denote fluorescence filter sets, easily visible in a dark room.

[Fluorescence turret confirmation window]

The fluorescent mirror unit can be confirmed from the space between the left and right eyepieces of the observation tube.

Motorized system for live cell imaging.

Controlling functions via PC, handset or operating buttons on the microscope body

Functions of IX81 control software /IX2-BSW

Nearly every operating function on the IX81 can be allocated to operation buttons on the PC, the hand switch and the microscope in any individual or multiple combinations by using IX2-BSW* control software. Some image analysis software can also be used to control microscope operation, image capturing and analysis; in this case, all operations are done from a single PC.

* Included with the system controller IX2-UCB2

Example : Switching from fluorescence observation to Nomarski DIC.

1. Close shutter for fluorescence illumination
2. Exchange FL mirror unit for DIC mirror unit
3. Open shutter for transmitted illumination

With the IX81, this sequence of functions can be allocated to a single button

■ Parfocal compensation function among objectives
This function allows the focus point to be matched from low to high magnification objectives. Refocusing each time the magnification is changed is no longer necessary.

■ Malfunction prevention
Motorized units ensure that complicated operations are performed without error. Once the usage conditions are set, the setting screen can be hidden to avoid accidental change leading to faulty operation.

■ Setting sensitivity of the fine focus movement for each objective magnification
Users can set the amount of the fine focus movement per rotation of the focus adjustment knob.

■ Save setting conditions for each operator
Customized data can be stored in folders, and each folder labeled for different users or sets of conditions.

Motorized universal condenser/ IX2-LWUCDA2

This condenser has six built-in optical components to enable brightfield, phase contrast and Nomarski DIC observations. Software allows switching optical components to be synchronized with the objective. (Manual AS included.)

Handset/U-HSTR2

A remote handset controls all motorized functions via a convenient and programmable interface.

Focus handle/U-FH

The remote focus handle duplicates the feel and function of the microscope's focus knobs. Additional controls include fine/coarse focus selection, lamp on/off, shutter open/close, and camera vs. visual observation.

Microscope front panel

Easy to use buttons allow selection of light path, light intensity and lamp on/off control. Auxiliary buttons can be custom programmed. Includes LED lamp intensity meter.

Motorized bottom port unit with C-mount/IX2-TVRAC

Motorized shutter/IX2-SHA

Can be mounted in both transmitted and reflected light paths.

Motorized filter wheel/ U-FWR and U-FWO

6 positions motorized filter wheel is offered for both excitation and observation.

Motorized sextuple revolving nosepiece

Up to 6 objectives are mounted simultaneously, included with microscope frame.

Motorized fluorescent cube turret/ IX2-RFACA

Accepts up to 6 fluorescence filter cubes, making it easy to switch between them during fluorescence observation of multistained specimens. (Manual shutter included)

Internal motorized focus drive

With minimum movement of 0.01 µm, the user has precise focus control.

Objective escape and zero-return buttons

Moves objective to lower focus limit. Allows setting of default focus position.

* Equipped on each side of microscope frame.

System controller/IX2-UCB2

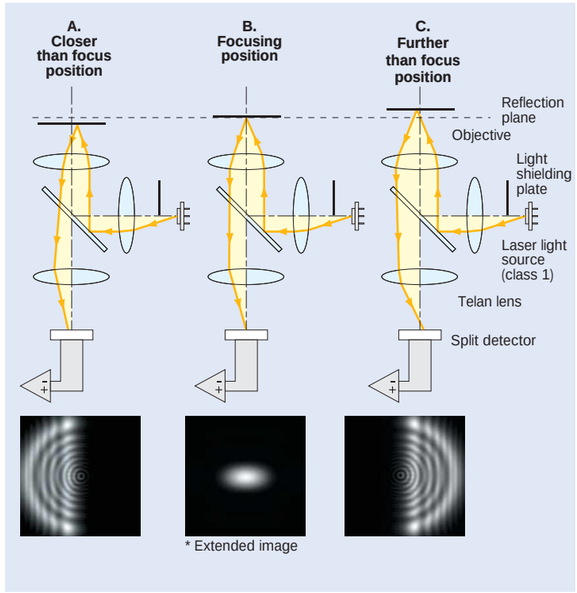
All motorized units are powered by this external system controller. Included is an RS232C connection for PC commands and expansion slots for future system upgrades.

Live cell imaging system

Focus drift compensation function for time-lapse experiments.

Motorized inverted research microscope with focus drift compensation/IX81-ZDC

This landmark microscope model makes it easy to reproduce any preset focus position. 785 nm weak laser light is introduced through the additional optical path between the tube lens and an objective to measure the distance between the objective and the reflection plane, which is normally the boundary of the reflective index difference such as the boundary between cover glass and cell. Therefore this system never cause unnecessary photobleaching of the specimen.



Accessories to improve stability in long-duration observations

[CO_2 incubators/MIU-IBC-I, MIU-IBC-IF]

Highly precise incubator control keeps the environment inside a laboratory dish completely stable, at just below 37°C temperature, 90% moisture and 5% CO_2 concentration (when using a CO_2 5% concentration bomb); in this way, live cell activity can be maintained for about 2 days. A special designed structure is employed to minimize the focus drift during temperature control. This is the ideal solution for time-lapse experiments under both a confocal laser scanning microscope and a wide field observation. The opening hole located on the top heater is available for the cell injection.

* Built-in stage warming plate
* Objective heater
* 5% CO2 supply tube with ø4 outer diameter, ø2 inner diameter and 400 mm length.
* Not available in some areas

MIU-IBC-I

Basic configuration for control of heaters for top, bath, stage and objective.

MIU-IBC-IF

High grade configuration with a built-in flowmeter for 5% CO_2 and 95% air. Use the 5% CO_2 and 95% air bombs.

[Incubators]

This box type incubator keeps the microscope temperature stable with enclosing many components inside the box. Please see your local supplier for more detail.

[Thermoplate/MATS series]

This thermoplate maintains the temperature of the sample at 37°C.

* Tokai Hit Company products

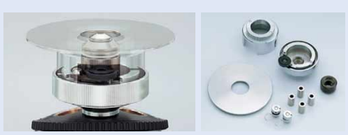
[Frame plate adapter/ IX2-FP]

This is used to fix the microscope frame to the anti-vibration stand.

*Screws (available separately) are required for fixing.

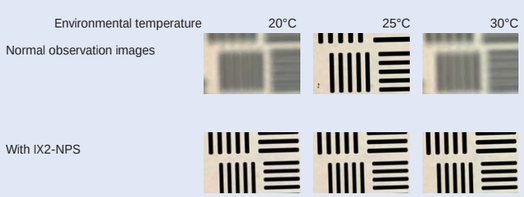
[Nosepiece stage/IX2-NPS]

This simple mechanical stage is designed for long time observations to minimize the distance change between the specimen and the objective in other words ‘focus drift’. It works by minimizing the effect of temperature change and prevents blur during long observations. Attach one objective in use.



[Comparison of normal observation images]

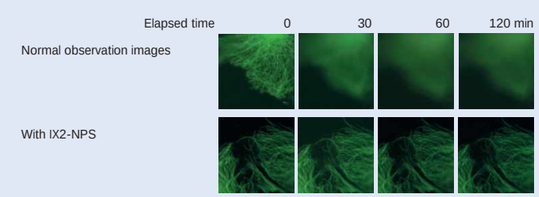
Change of focus when environmental temperature (25°C) changes by ±5°C. *When the microscope is used without an incubator.



[Comparison of fluorescence images]

Time-lapse observation images.

*When the microscope is used without an incubator.

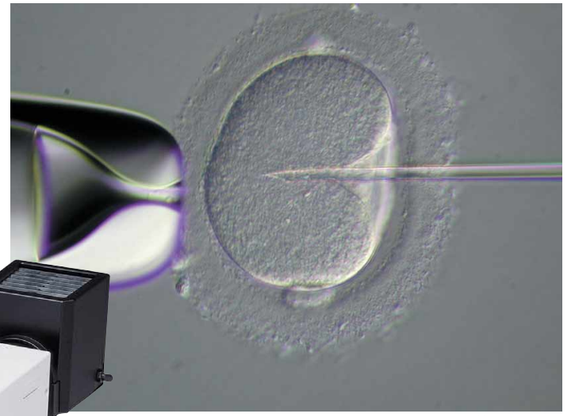


Manipulator

Manipulating cells.

Micromanipulation system/ON3

Olympus' original micromanipulator offers high stability and excellent stability because of its compact body. Motorized coarse and oil hydraulic fine three axes operation are designed in its compact and rigid body with hanging down ergonomic joystick control. ON3 micromanipulator is securely fixed through the screw holes on IX2 microscope frame.



Human embryo

ON3-99D

ON3-99D with return mechanism (UT-R)

Manual combination
(ONM-2D+ONO-301D+UT-D)

Manual combination with return mechanism
(ONM-2D+ONO-301D+UT-D+UT-R)

Laser Scanning Confocal

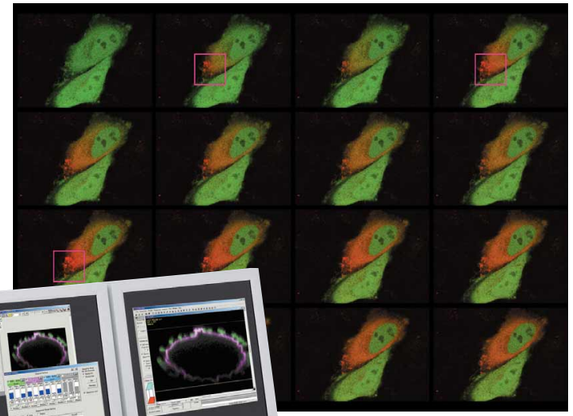
Application System

Simultaneous laser light stimulation and imaging.

Confocal laser scanning microscope/ FLUOVIEW FV1000 system

The Fluoview/FV1000 is a next-generation imaging system designed for high-resolution, confocal observation of both fixed and live cells. The FV1000 offers advances in confocal system performance while providing the speed and sensitivity required for live cell imaging with minimal risk of damage to living specimens. In addition, the FV1000 offers a revolutionary synchronized laser scanning system called the SIM Scanner. While one laser stimulates, the second laser simultaneously provides high resolution imaging. This coordination of laser stimulation and imaging makes the FV1000 an ideal choice for FRAP, FLIP and photoactivation.

* FV1000 is a class 3B laser product.



Images of Kaede-expressed cells demonstrating the photoactivation acquired every 300 msec and observed via 405 blue diode laser illumination with twin scanners.

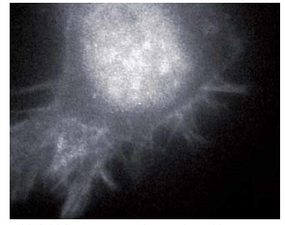
TIRFM

Ultra-sensitive fluorescence microscopy.

TIRFM (Total Internal Reflection Fluorescence Microscopy)

Since 1997, Olympus has been a market leader in objective based Total Internal Reflection microscope that allows an evanescent wave illumination approximately 200 nm into the specimen beyond the coverglass interface. Olympus extends that leadership role by offering four objectives for TIRFM including the world's highest N.A. objective, the 100X N.A. 1.65 objective.
The incredibly thin optical section created be TIRFM allows an extremely high signal to noise image to be collected. Popular applications include vesicle tracking, cellular adhesions and single molecule events.

Total Internal Reflection Fluorescence observation with evanescent wave excitation



Widefield fluorescence observation with mercury arc lamp excitation

• Olympus' original high N.A. objectives make it easy to produce an evanescent wave field. So little light is leaked that a high-contrast image can be obtained against a dark background.

- N.A. 1.65, 100X objective (APO100XOHR)
  (Use special cover glass and immersion oil)
- N.A. 1.49, 60X objective (APON60XOTIRF)
  (Use normal cover glass and immersion oil)
- N.A. 1.49, 100X objective (UAPON100XOTIRF)
  (Use normal cover glass and immersion oil)
- N.A. 1.45 150X objective (UAPON150XOTIRF)
  (Use normal cover glass and immersion oil)

• Once the initial alignment of the laser optical path is set, it is just simple operation switching between TIRF and widefield illumination.

* TIRFM is a class 3B laser product.

Micrometer

Spinning Disk Confocal

Obtaining confocal images easily by use of an arc light source.

Disk Scanning Confocal Microscope System

The Olympus Disk Scanning Unit (DSU) offers confocal images using a white light, arc excitation source and CCD camera. The heart of the system is a unique slit disk pattern, that offers excellent light throughput and thinness of optical Sectioning. Compatible with any IX71 and IX81.

• Compliance with various fluorochromes with different spectral characteristics.

Since an arc light source is used, the unit can meet different fluorochrome requirements across a wide wavelength spectrum by simply switching a standard mirror unit.

• Minimize excitation light damage to the specimen and maximize emission light throughput.

The excitation light volume is reduced to around 5% as a result of passing through the disk. So, there is almost no fading of fluorescence emission from the surface of the focused sample.

• Construction of 3D images.

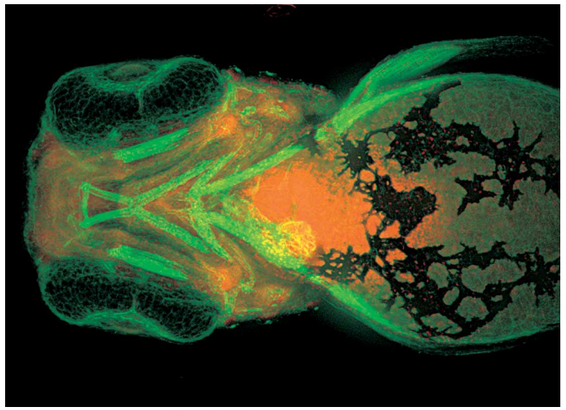
Brilliant 3D image can be easily captured with excellent optical sectioning with high precision motorized Z axis of IX81.

• Low and high magnification objective support.

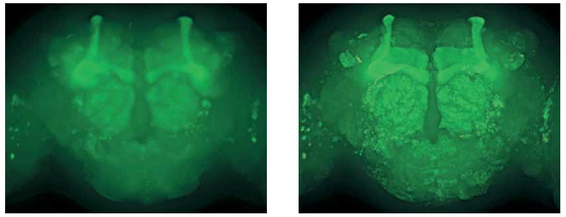
Five DSU disks are available of varying slit spacing and width for the wide variety of the objectives, included oil or water immersion high N.A. objectives.

• Easy switching between confocal and reflected light fluorescence observation .

IN/OUT of the confocal disk to or from the light path can be done by a hand switch or via software, so it is easy to switch observation methods between DSU and reflected light fluorescence.



Zebrafish 3-day embryo, ventral view, projection of 62 serial optical sections



Adult brain of *Drosophila*, reflected light fluorescence image (left) and DSU image (right)

* Not available in some areas

ARC EVA

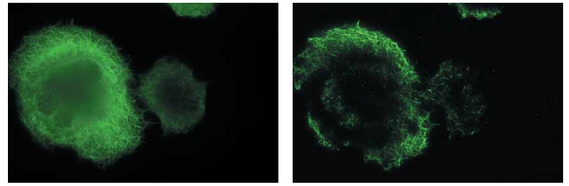
Application System

World's first evanescent illumination system from an arc lamp source.

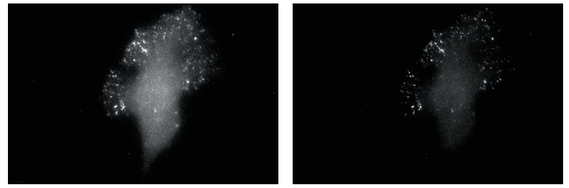
TIRFM (Total Internal Reflection Fluorescence Microscopy) system with arc lamp source

Featuring the Olympus-developed total internal reflection illumination system and slit mechanism to provide evanescent wave illumination from an arc lamp source. High signal to noise fluorescence observations with extremely thin optical sectioning can now be easily performed at the specimen-coverslip interface.
The arc lamp is focused on an off-center slit using a wedge prism and focused on the outer edge of the back focal plane of the objective, thus causing the excitation light to exit the objective beyond the critical angle resulting in Total Internal Reflection.
The wedge prism and slit can be easily removed from the light path via a slider for wide field fluorescence observation. Through the use of filters, this system enables a wider choice of excitation colors than current laser base system.

Conventional fluorescence observation | TIRFM observation



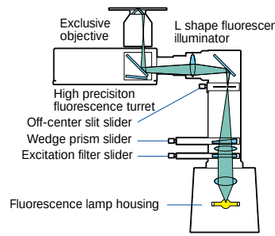
Microtubule of an NG108-15 cell labeled with Alexa488 through indirect fluorescence antibody test



Kaede-Crk II protein expressed in a HeLa cell

High-precision fluorescence turret /IX2-RFACEVA

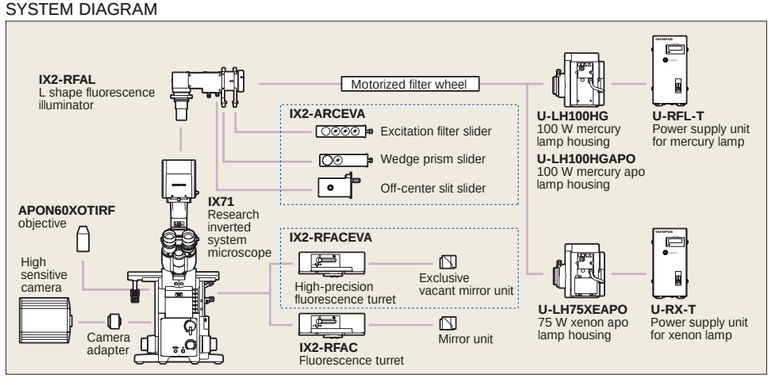
Turret includes three, highly precise, empty fluorescence filter cubes that permit dichromatic mirror switching while maintaining excitation light position on the back focal plane of the objective. This system makes multi-color observations easy and alleviates the additional adjustment of the excitation source when switching mirror units. Up to six mirror units can be installed.



Main specifications

Microscope	Research inverted system microscope IX71
Fluorescence illuminator	Arc illumination total internal reflection fluorescence unit IX2-ARCEVA (Slit slider, wedge prism slider and excitation filter slider) L-shape fluorescence illuminator IX2-RFAL
Mirror unit cassettes (choose from either fluorescence turret)	High-precision fluorescence turret IX2-RFACEVA (with centering mechanism and 3 vacant mirror units)
	Fluorescence turret IX2-RFAC
Lamp light source	100 W mercury lamp, 75 W Xenon lamp
Objective	APON60XOTIRF N.A. 1.49. W.D. 0.1 mm Used with normal cover glass and immersion oil
Stage	Left short handle stage IX-SVL2
Total internal reflection illumination F.N.	11
Observation	Recommend high sensitive camera

SYSTEM DIAGRAM

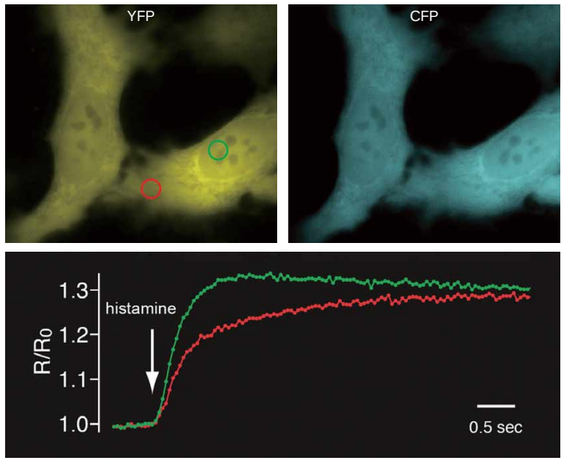


* Not available in some areas

Bright, simultaneous two-wavelength imaging using the primary image.

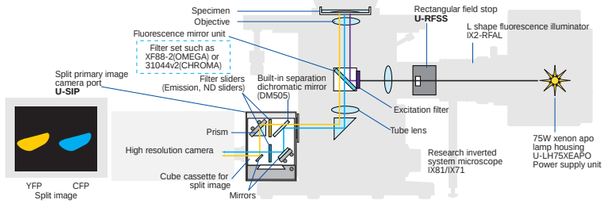
FRET Split imaging system

• Simultaneous two-color split imaging with one CCD camera.
• Unique design splits the primary image for the highest efficiency and light transmission necessary for weak fluorescence signals such as CFP/YFP FRET experiments.
•Compact and space-saving design takes advantage of the 70 mm of free space between the microscope frame and the primary image plane found on all Olympus Research Upright and Inverted Microscopes.
• Simple cassette mechanism makes it easy to switch between split and full frame imaging.
• Unit is up to 10% brighter than similar relay lens based, image splitting systems.
• When used with the rectangular field stop U-RFSS, excitation energy is limited to the camera's field of view, minimizing specimen photo-bleaching.



HeLa cell, in which YC3.1 (cytoplasm) and YC3.1nu (with nuclear localization signal) are coexpressed.

FRET changes are observed through histamine stimulation, and images are acquired at intervals of 50 msec.



U-SIP main specifications

Microscope	IX71/81
Image separation	Right and left 2-separation (can be adjusted independently)
Built-in separation dichromatic mirror	DM505 (special size)
Filter slider	Emission, ND filters' size ø25 mm, total thickness: 8 mm Used together with commercially available filter set (XF88-2 OMEGA) or 31044v2(CHROMA)
Field Number	Split image: 8 Full image: 11
Magnifications	1X (primary image)
Objectives	40X and higher
Camera mounting	C-mount
Recommended camera	Chip size 2/3 inch

* Not available in some areas

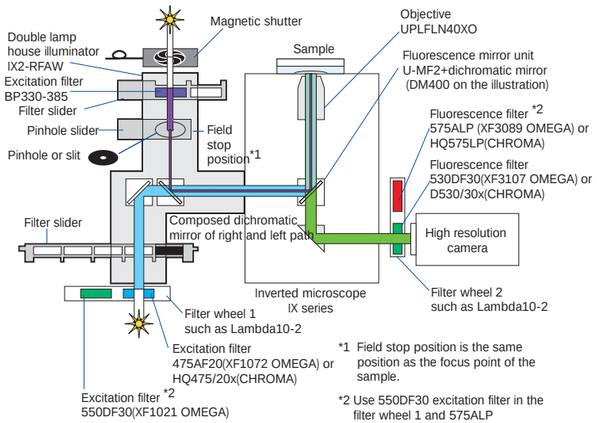
Photoactivation illuminator for inverted microscopy.

Photoactivation Fluorescence Microscope system

The photoactivation illuminator allows the exposure by UV light to specific regions of a cell for photoconversion, the uncaging of compounds and the photoactivation of specific fluorochromes.
• A specified area of the cell can be exposed to UV light while observing the targeted cell by fluorescence or transmitted (DIC) method.
• Compliance with FRAP or FLIP experiments (by special order).
• Easy system upgrade by attaching double lamphouse illuminator IX2-RFAW to IX2 series inverted microscope.

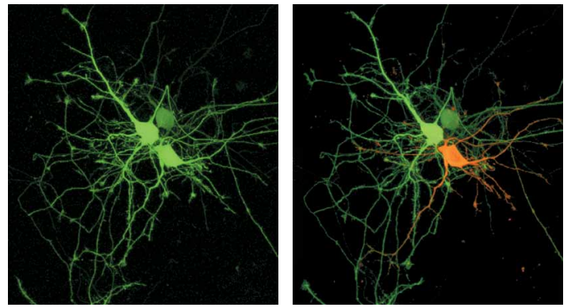
Double lamphouse illuminator IX2-RFAW

Setting up example for Kaede



*1 Field stop position is the same position as the focus point of the sample.

*2 Use 550DF30 excitation filter in the filter wheel 1 and 575ALP fluorescence filter in the filter wheel 2 when observing red Kaede protein. Exchange of the fluorescence mirror unit is not required.

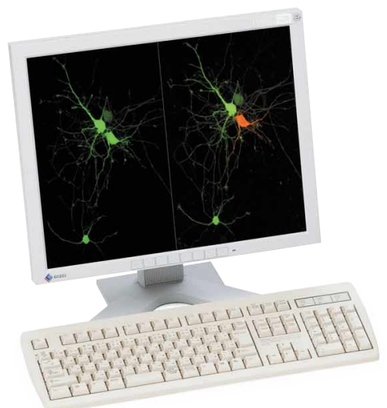


The novel Kaede gene is useful in biology because it exhibits photoconversion. Normally, the Kaede gene shows green fluorescence but after exposure to UV light will exhibit red fluorescence. By using UV light to only a specific region within a labeled cell and then noting the movement of red beyond that region, observations of internal cellular dynamics can easily be made. The photo on the left shows a nerve cell (from a rat hippocampus) pre-labeled with green Kaede gene.

The photo on the right side was taken after the right-most cell body was exposed to a 10 µm diameter spot of UV light for 60 seconds, thus changing the Kaede gene from green to red. Note the translocation of the red shifted gene outside of the 10 µm spot thus indicating intracellular transport mechanisms.

IX2-RFAW specifications

Microscope	IX81/71/51, IX70/50
Pinhole slider	2-step exchange (pinhole or slit/vacant hole) Pinhole and slit are available on the market (ø16 mm Melles Griot Inc. products)
Exposed area on the specimen	Pinhole diameter / objective magnification
Filter slider	3-step exchange (shutter/filter pocket/vacant hole) BP330-385 excitation filter equipped
Excitation filter slider	5-step exchange (4-step filter pocket/vacant hole)
Filter size	Excitation filter: ø25 mm, thickness: 6 mm and below ND filter: ø32 mm, thickness: 1 mm and below
Composed dichromatic mirror of right and left light path	DM400 (standard) Slide IN/OUT type
Power consumption	7.4 A
Dimensions	Width: 710 mm Depth: 740 mm (from the front of tilting tube to the end of the illuminator)



* Not available in some areas

IX71 specifications

Microscope body	Revolving nosepiece		Sextuple, simple waterproof mechanism incorporated
	Focus		9 mm stroke (from stage surface, 7 mm upward and 2 mm downward), coaxial coarse and fine focusing knobs (minimum fine focus graduation: 1 µm, full rotation of fine focusing knobs: 100 µm), upper limit stopper, torque adjustment for coarse focusing
	Primary image port		Lower port (standard left side port: S1F 100% or S8F 80%, or optional lower Back port selectable, 2-step light path selection), Upper port when built-in magnification changer 1X/1.6X is replaced (optional right side port), Bottom port (option)
	Frontal operation		Light path selector, Transmitted light intensity control and light ON/OFF switch, TTL Pulse control switch
Transmitted light illuminator	100 W transmitted light illumination pillar	IX2-ILL100	Pillar tilt mechanism (30° inclination angle, with vibration reducing mechanism), Condenser holder (with 50 mm stroke, swing-in/out mechanism), Field iris diaphragm adjustable, 4 filter holders (ø45 mm, t=6 mm or less)
	External power supply unit	TH4-100/200	Two versions available (100 V and 200 V), Optional TH4-HS hand switch can be used, 2.2 kg weight
Observation tube	Tilting binocular tube	U-TBI90	35-85° continuous angle adjustable (eyepoint height range: 406 mm-471 mm), interpupillary distance adjustable between 50-76 mm, diopter adjustment function, erect image, F.N. 22
	Binocular tube	U-BI90CT	Built-in focusing telescope, interpupillary distance adjustable 50-76 mm, diopter adjustment function, F.N. 22
		U-BI90	Interpupillary distance adjustable 50-76 mm, diopter adjustment function, F.N. 22
	Trinocular tube	U-TR30H-2+IX-ATU	3 step optical path selectable (observation : straight port = 100:0, 20:80, 0:100), interpupillary distance adjustable 50-76 mm, diopter adjustment function, F.N. 22
Stage	Cross stage with flexible right handle	IX2-SFR	50 mm (X) X 50 mm (Y) stroke, stage insert plate exchangeable (ø110 mm)
	Cross stage with short left handle	IX-SVL2	50 mm (X) X 43 mm (Y) stroke, stage insert plate exchangeable (ø110 mm)
	Plain stage	IX2-SP	232 mm (X) X 240 mm (Y) stage size, stage insert plate exchangeable (ø110 mm)
		IX-MVR	Mechanical stage to be used with IX2-SP, 130 mm (X) X 85 mm (Y) stroke
	Narrow plain stage	IX2-KSP	160 mm (X) X 240 mm (Y) stage size, stage insert plate exchangeable (ø110 mm)
		CK40-MVR	Mechanical stage to be used with IX2-KSP, 120 mm (X) X 78 mm (Y) stroke
	Gliding stage	IX2-GS	Upper circular stage 360° rotatable, 20 mm (X/Y) travel
Condenser	Long working distance universal	IX2-LWUCD	5 positions for optical devices (3 positions for ø30 mm and 2 position for ø38 mm), aperture iris diaphragm adjustable, N.A. 0.55 / W.D. 27 mm
	Long working distance Relief Contrast	IX2-MLWCD	4 positions for optical devices (for ø50 mm, Relief Contrast optical devices rotatable), aperture iris diaphragm adjustable, N.A. 0.5 / W.D. 45 mm
	Ultra long working distance	IX-ULWCD	4 positions for optical devices (for ø29 mm), aperture iris diaphragm adjustable, N.A. 0.3 / W.D. 73 mm
	Water immersion DIC	IX2-DICD + IX2-TLW	Single position for optical device (include two optical device holders), 40° injection pipette or electrode insertion angle, aperture iris diaphragm adjustable, N.A. 0.9 / W.D. 3.7 mm
Eyepiece		WHN10X	High eyepoint, F.N. 22
		WHN10X-H	High eyepoint, diopter adjustment function, F.N. 22
Reflected light fluorescence unit	Fluorescence illuminator	IX2-RFAL	L-shaped design with exchangeable F.S. and A.S. modules, two filter holder sliders (2 positions, ø32 mm, t=6 mm or less)
		IX2-RFA	Straight design with field iris diaphragm, filter holder slider (2 positions, ø32 mm, t=6 mm or less)
	Fluorescence cube turret	IX2-RFAC	6 positions in a rotating turret, built-in shutter
	Light source		100 W Hg lamp housing and transformer, or 75 W Xe lamp housing and transformer

IX81 specifications

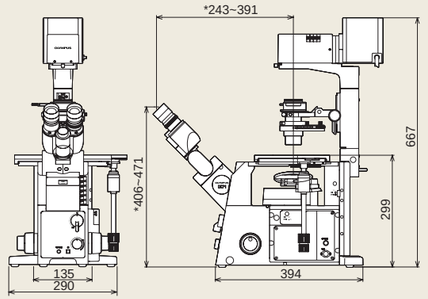
Microscope body	Revolving nosepiece		Sextuple motorized with objective lens retraction in PC mode, simple waterproof mechanism incorporated
	Focus		9 mm stroke (from stage surface, 7 mm upward and 2 mm downward), fine/coarse switchable focusing knobs (minimum graduation: 0.01 µm), objective lens escape/return buttons and return to memory position buttons (each side of microscope frame)
	Primary image port		Lower port (standard left side port: S1F 100% or S8F 80%, or optional lower Back port selectable, 2-step light path selection), Upper port when built-in magnification changer 1X/1.6X is replaced (optional right side port), Bottom port (option)
	Frontal operation		Light path selector button, Transmitted light intensity control buttons and light ON/OFF switch button, Fine/Coarse focus selector button, TTL Pulse control switch (auxiliary) buttons
Transmitted light illuminator	100 W transmitted light illumination pillar	IX2-ILL100	Pillar tilt mechanism (30° inclination angle, with vibration reducing mechanism), Condenser holder (with 50 mm stroke, swing-in/out mechanism), Field iris diaphragm adjustable, 4 filter holders (ø45 mm, t=6 mm or less)
	External power supply unit	IX2-UCB2	Auto voltage selector (100 V / 200 V), RS232C interface for PC operation, IX2-BSW driver software
Observation tube	Tilting binocular tube	U-TBI90	35-85° continuous angle adjustable (eyepoint height range: 406 mm-471 mm), interpupillary distance adjustable between 50-76 mm, diopter adjustment function, erect image, F.N. 22
	Binocular tube	U-BI90CT	Built-in focusing telescope, interpupillary distance adjustable 50-76 mm, diopter adjustment function, F.N. 22
		U-BI90	Interpupillary distance adjustable 50-76 mm, diopter adjustment function, F.N. 22
	Trinocular tube	U-TR30H-2+IX-ATU	3 step optical path selectable (observation: straight port = 100:0, 20:80, 0:100), interpupillary distance adjustable 50-76 mm, diopter adjustment function, F.N. 22
Stage	Cross stage with flexible right handle	IX2-SFR	50 mm(X) X 50 mm(Y) stroke, stage insert plate exchangeable (ø110 mm)
	Cross stage with short left handle	IX-SVL2	50 mm(X) X 43 mm(Y) stroke, stage insert plate exchangeable (ø110 mm)
	Plain stage	IX2-SP	232 mm(X) X 240 mm(Y) stage size, stage insert plate exchangeable (ø110 mm)
	Narrow plain stage	IX2-KSP	160 mm(X) X 240 mm(Y) stage size, stage insert plate exchangeable (ø110 mm)
		CK40-MVR	Mechanical stage to be used with IX2-KSP, 120 mm (X) X 78 mm (Y) stroke
	Gliding stage	IX2-GS	Upper circular stage 360° rotatable, 20 mm(X/Y) travel
Condenser	Motorized long working distance universal	IX2-LWUCDA2	Motorized turret with 6 position slots for optical devices (3 positions each for ø30 mm and ø38 mm), aperture iris diaphragm adjustable, N.A. 0.55 / W.D. 27 mm
	Long working distance Relief Contrast	IX2-MLWCD	4 positions for optical devices (for ø50 mm, Relief Contrast optical devices rotatable), aperture iris diaphragm adjustable, N.A. 0.5 / W.D. 45 mm
Eyepiece		WHN10X	High eyepoint, F.N. 22
		WHN10X-H	High eyepoint, diopter adjustment function, F.N. 22
Reflected light fluorescence unit	Fluorescence illuminator	IX2-RFAL	L-shaped design with exchangeable F.S. and A.S. modules, two filter holder sliders (2 positions, ø32 mm, t=6 mm or less)
		IX2-RFA	Straight design with field iris diaphragm, filter holder slider (2 positions, ø32 mm, t=6 mm or less)
	Fluorescence cube turret	IX2-RFACA	Motorized turret with 6 positions, built-in shutter
	Light source		100 W Hg apo lamp housing and transformer, 100 W Hg lamp housing and transformer or 75 W Xe lamp housing and transformer

IX81-ZDC specifications

Focusing position	Dry objective	Interface between air and cover glass	
	Oil immersion objective	Interface between sample (cultured liquid) and cover glass	
Offset method	Controlled by software	Compensation for shift of observation position toward the focusing plane is by Z-axis control (built into the IX81-ZDC)	
Observation methods		Fluorescence /DIC: DIC cannot be used beside gray-sensitive colors.	
Dichromatic mirror IN/OUT method for AF laser introduction		Manual exchange	
F.N. limitation		Light volume is low at the image perimeter for F.N. 22 when using 2X, 4X, 10X objectives	
Focusing speed		Within approx. 0.8 seconds (average) from near focusing position) (not including offset time through software	Speed also varies according to the start position of auto focusing, and individual PC performance
Focusing accuracy		±0.3 µm (when environmental temperature change is within 5°C)	
Laser safety standard		Class 1 (JISC6802, IEC825, CDRH)	
Laser safety function		Front monitor method (Laser light volume by special PD)	IEC60825
Camera port	Left side port	Can only be combined with U-TV1X-2+U-CMAD3, U-DPCAD, U-SIP (primary image , 1X)	
	Observation tube	IX-ATU+U-TR30H-2+IX-TVAD+U-CMT IX-ATU+U-TR30-2+U-TV1X-2+U-CMAD3	

IX71 dimensions

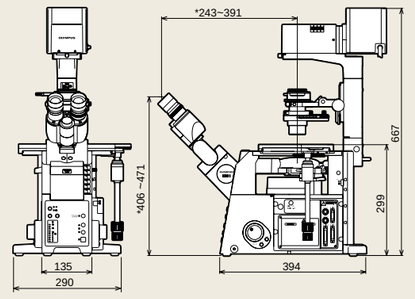
(unit: mm)



Weight: 16 kg Power consumption: 200 VA
* Lengths with an asterisk (*) vary according to interpupilllary distance.

IX81 dimensions

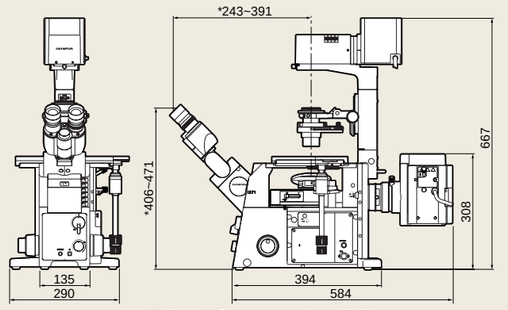
(unit: mm)



Weight: 16.9 kg Power consumption: 350 VA
* Lengths with an asterisk (*) vary according to interpupilllary distance.

IX71+fluorescence illuminator combination dimensions

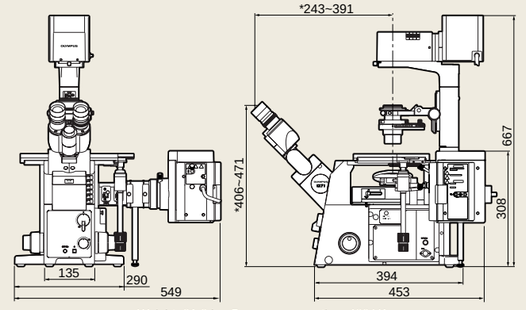
(unit: mm)



Weight: 20.2 kg Power consumption: 480 VA
* Lengths with an asterisk (*) vary according to interpupilllary distance.

IX71+L-shaped fluorescence illuminator dimensions

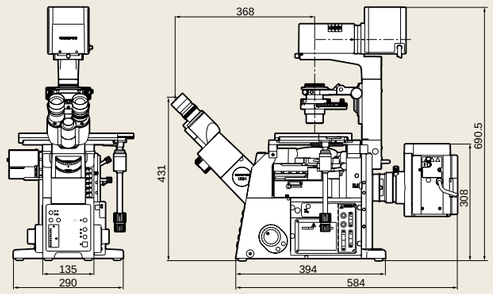
(unit: mm)



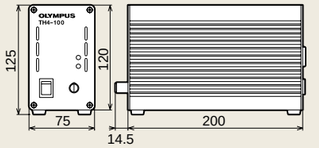
Weight: 21.2 kg Power consumption: 480 VA
* Lengths with an asterisk (*) vary according to interpupilllary distance.

IX81-ZDC dimensions

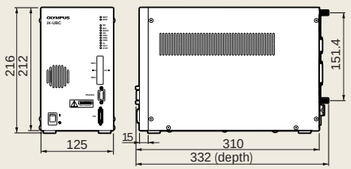
(unit: mm)



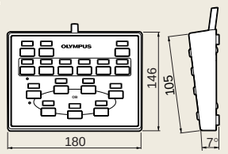
TH4 dimensions



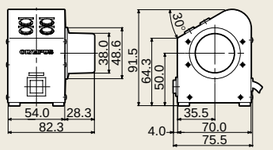
IX2-UCB2 dimensions



U-HSTR2 dimensions



U-FH dimensions



(unit: mm)

IX71/IX81 SYSTEM DIAGRAM

1 Stages

- **IX-HOP** Petri dish holder
- **IX-HOT** Terasaki plate holder
- **IX-HOS** Slide glass holder
- **IX-PPM** Millimeter scale
- **IX-PP24NUN** Scale for NUNC™ plate
- **IX-CLMT, IX-CLM96** Well positioner
- **MIU-IBC-I, MIU-IBC-IF** CO_2 incubator
- Incubator
- **CK40-MVR** Mechanical stage
- **IX-MVR** Mechanical stage
- **U-FMP** Mechanical stage
- Thermoplate
- **IX-CP50** Insert plate
- **IX2-GCP** Glass stage insert plate
- **IX-SCL** Slide clip
- **IX-SUSP** Stage plate
- **IX2-KSP** Narrow plain stage
- **IX2-SP** Plain stage
- **IX2-GS** Gliding stage
- **IX2-SFR** Cross stage with flexible right handle
- **IX-SVL2** Cross stage with short left handle
- **CK2-SS** Side stage
- **IX2-NPS** Nosepiece stage

2 Observation tubes, eyepieces

- **WHN10X, WHN10X-H** Eyepieces
- **U-BI90CT** Binocular tube with centering telescope
- **U-BI90** Binocular tube
- **U-TBI90** Tilting binocular tube
- **U-TR30H-2** Trinocular tube
- **U-TR30-2** Trinocular tube
- **U-FWO■** Motorized observation filter wheel
- **IX-ATU** Intermediate tube
- **GX-SPU** Side port intermediate tube
- **U-EPA2** Eyepoint adjuster
- **U-KPA** Intermediate attachment for simple polarising observation
- **U-CA** Magnification changer 1x, 1.25x, 1.6x, 2x
- **U-ECA1.6x** Magnification changer 1.6x
- **U-ECA** Magnification changer 2x

A B C D Adapters, camera ports

- Cube cassette for full image/ split images*
- **U-SIP*** Split primary image camera port
- **U-FMT** F mount adapter
- **U-CMT** C-mount adapter
- **U-TMAD** T mount adapter
- **U-SMAD** Sony mount adapter
- **U-BMAD** Bayonet mount adapter
- **U-CMAD3** C-mount adapter
- **IX-TVAD** Primary image camera port tube
- **U-TV1X-2** Primary image camera port tube
- **U-TVZ** Zoom camera port tube
- **U-DPCAD** Dual port tube with C-mounts
- **U-TV0.63XC** C-mount camera port tube with 0.63x lens
- **U-TV0.5XC-3** C-mount camera port tube with 0.5x lens
- **U-TV0.35XC-2** C-mount camera port tube with 0.35x lens
- **U-TV0.25XC** C-mount camera port tube with 0.25x lens
- **IX2-TVRAC ■▲** Motorized bottom port unit with C-mount
- **IX2-RSPC-2 ◆▲** Right side port attachment with C-mount
- **IX2-LBPC ▲●** Lower back port unit with C-mount unit
- **IX2-TVR ▲** Bottom port unit

3 Illumination pillars, condensers

- **IX-ADUCD** Condenser adapter
- Optical elements
- **U-UCD8** Universal condenser
- **U-TLO** Oil top lens
- **U-TLD** Dry top lens
- **IX2-MLWPO** Polarizer attachment
- Optical elements
- **IX2-MLWCD** Mid long working distance condenser
- **IX2-DICD** Water immersion DIC condenser
- **U-TLO** Oil top lens
- **U-TLD** Dry top lens
- **IX2-TLW** Water top lens
- **IX-LWPO** Polarizer attachment
- Optical elements
- **IX2-LWUCD** Long working distance universal condenser
- **IX2-LWUCDA2■** Motorized long working distance universal condenser
- Optical elements
- **IX-ULWCD** Ultra long working distance condenser
- **45LBDIF, 45ND25, 45ND6, 43IF550W45** Filter
- **IX2-ILL100** Transmitted illuminator
- **U-ANT** Analyzer for transmitted light
- **U-DICT** DIC slider for transmitted light
- **U-DICTS** Shift DIC slider for transmitted light
- **U-DICTHR** High resolution DIC slider for transmitted light
- **U-DICTHC** High contrast DIC slider for transmitted light
- **IX2-MDICT** Analyzer unit for transmitted light
- Mirror unts
- **IX2-RFACA■** Motorized fluorescent cube
- **IX2-RFAC** Mirror unit turret
- **IX2-CA2X-2 ▲** Intermediate magnification lens 2X unit
- **IX2-PRLBP1-2 (100%) ▲●** 100% prism unit for lower back port
- **IX2-PRLBP8-2 (20%/80%) ▲●** 20/80% prism unit for lower back port
- **IX2-AN** Analyzer
- **IX71S1F-3/ IX71S8F-3** IX71 frame with 100% prism/ IX71 frame with 20/80% prism
- **IX81F-3 ■▲** IX81 frame without prism
- **IX81S1F-3 ■▲** IX81 frame with 100% prism
- **IX81-ZDC ■▲** IX81-ZDC frame with 100% prism

5

- **IX2-UCB2** System controller
- RS232C calble
- **U-ZPCB2** Z motor control board
- **PC-AT** (Windows XP/Vista)
- **U-HSTR2** Handset
- **U-IFFH** Focus handle Interface
- **U-FH** Focus handle
- **IX2-IFSHA■** Shutter interface

4 Fluorescence illuminators

- **IX2-RFA** Fluorescence illuminator
- **IX2-SHA■** Motorized shutter
- **U-FWR■** Motorized reflected filter wheel
- **IX2-RFAL** L-shaped fluorescence illuminator
- **U-RFSS** Rectangular field stop
- **IX-RFSPOT** Pinhole field stop
- **IX2-RFRS** Ring slit illumination unit
- **IX2-RS40, IX2-RS60, IX2-RS100** Ring slit illumination unit
- **IX2-RFAW *** Double lamphouse illuminator
- **U-DULHA** Double lamp housing adapter
- **32ND6, 32ND12, 32ND25, 32ND50** Filters
- **U-LH100L-3** 100 W halogen lamp housing
- **U-LH100-3** 100 W halogen lamp housing
- **U-RMT** Extension cord
- **TH4-HS** Hand switch
- **TH4-100** Power supply unit
- **U-CLA** Collector lens adjustment
- **U-LH100HG** 100 W mercury lamp housing
- **U-LH100HGAPO** 100 W mercury apo lamp housing
- **U-RFL-T** Power supply unit for mercury lamp
- **U-LH75XEAPO** 75 W xenon apo lamp housing
- **U-RX-T** Power supply unit for xenon lamp
- **IX2-DSU*** Disk scanning unit
- **IX2-FP** Frame plate adapter

* Not avilable in some areas
■ Operation via IX2-UCB2
▲ To consult with local Olympus subsidiary
◆ Made to order product
▼ Not recommended for IX2-DSU combination
● Choose either prism unit for IX2-LBPC

Illustrations colored cyan shows motorized units.