OLYMPUS®

Your Vision, Our Future

Microscope Components Guide

OEM Microscope Components for Integration









Contents

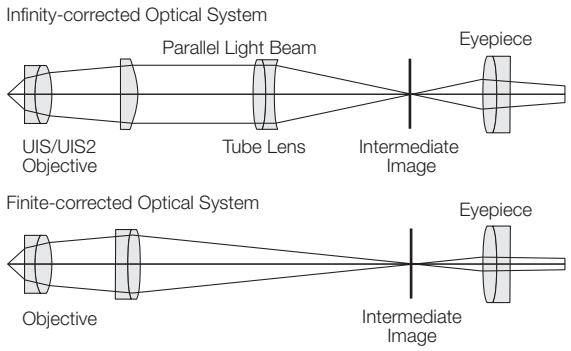
Welcome to UIS2 Optics

UIS2:
The System That Maximizes the Advantage of Infinity-corrected Optics

What is Infinity-corrected Optics?

UIS2 optics is an infinity-corrected optical system — in other words, a system in which light passes from the specimen through the objectives without forming an image along the way. Instead, it travels in the form of infinity parallel rays to the tube lens. The tube lens is where the intermediate image is formed, whereas in finite-corrected optics, this is done by the objective.

Figure 1 Infinity-corrected and Finite-corrected Optical System Principles



Advantages of Infinity-corrected Optics

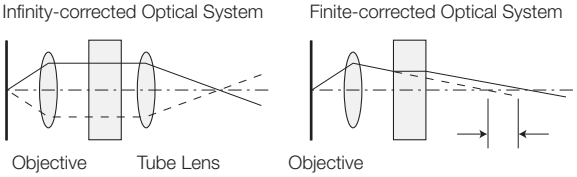
This system, known as "infinity-corrected optics", offers a number of advantages:

- There is no change in magnification even when the distance between the objective and tube lens is altered.
- With the total magnification remaining constant, there is no image aberration — even when prisms or sliders are interposed between the objectives and the tube lens.

As thousands of users have found by experience, these advantages are crucial to composing the ideal microscope optical system. What's more, it is even possible to freely insert or remove intermediate attachments in the parallel rays of light between the objectives and tube lens, allowing the creation of user-specific or task-specific optical systems. To establish real flexibility with such a system, it is necessary to eliminate the occurrence of coma aberration.

**In UIS2 Objectives, the parfocal distance is designed at 45 mm and the focal length of the tube lens is 180 mm.*

Figure 2 Advantages of Infinity-corrected Optical System

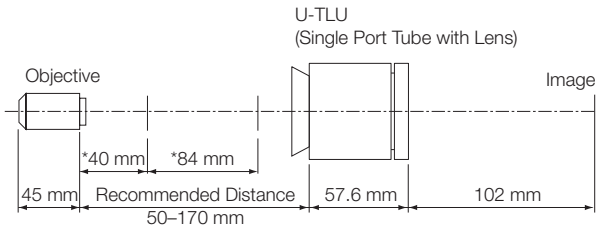


Basic Dimensions of UIS2 Optical System

The UIS2 optical system optimally corrects aberration with a dedicated telan lens and an eyepiece so that the coma aberration and flatness are not degraded even when the telan lens exit pupil position is changed by changing the objective and telan distance. This makes it possible to use a distance of 50 mm to 170 mm from objective mounting position to the single port tube with lens.

**Coma aberration: refer to the optical terminology at the end of this document.*

Figure 3 Basic Dimensions of UIS2 Optical System



*Basic dimensions when our revolving nosepiece and illuminator are combined. When the position of the illuminator above is changed, illumination performance cannot be maintained.

Features of UIS2 Objectives

UIS2 objective lenses provide compatibility (screw diameter, optical performance) with the UIS optical system and have the following features compared to conventional objectives.

1. Wavefront Aberration Control

The Olympus UIS2 objectives set a new standard, with wavefront aberration control in addition to common performance standards of NA and W.D. Olympus challenges farther advanced optics which has not been fulfilled by the conventional standards. We offer splendid performance objectives by minimizing the aberrations that lower resolution.

**Wave front aberration: refer to the optical terminology at the end of this document.*

2. Objective Lenses with Splendid Image Parcentricity

High power SemiApochromatic UIS2 objectives make the centration tolerance between objectives on the microscope nosepiece keep the image within the enter of the field of view even with digital cameras. (50X or higher power in both MPLFLN and LMPLFLN series)

3. Improvement of Color Reproducibility

UIS2 objectives realize true color reproduction without any chromatic shifts using stringently selected high transmittance glass and advanced coating technology that provides high transmittance which is flat over an wide band wavelength. In addition, since the total optical system, including the tube lens is designed to reproduce a true color, clear images faithful to the specimen are obtained even with digital imaging.

4. Lightening

Weight has been reduced to approximately 2/3 that of conventional products by using an aluminum objectives barrel cover. This has the effect of lightening the load on the devices at objective up/down, suppressing vibrations by lowering the inertial force at objective switching, etc. (MPLFLN series, LMPLFLN series)

5. Adoption of Eco-lens

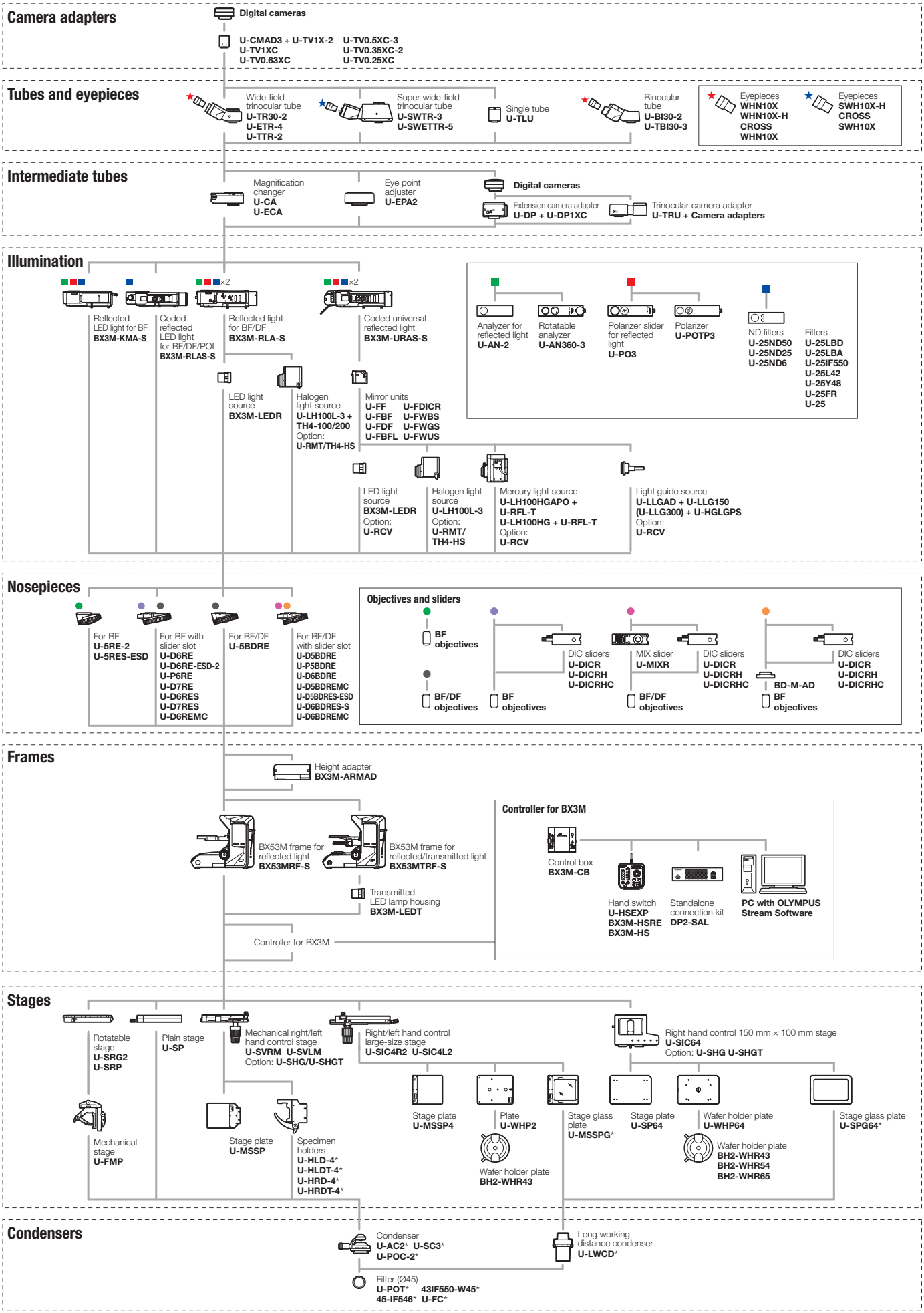
The glass materials of UIS2 objectives are all lead- and cadmium-free eco-glass.

Based on our conviction that the UIS2 system maximizes the advantages of infinity-corrected optical systems, we confidently recommend the UIS2-featured Olympus microscope units for all your high-precision needs in research, inspection and production equipment.

**Refer to the Olympus home page for detailed objective lenses specifications.*

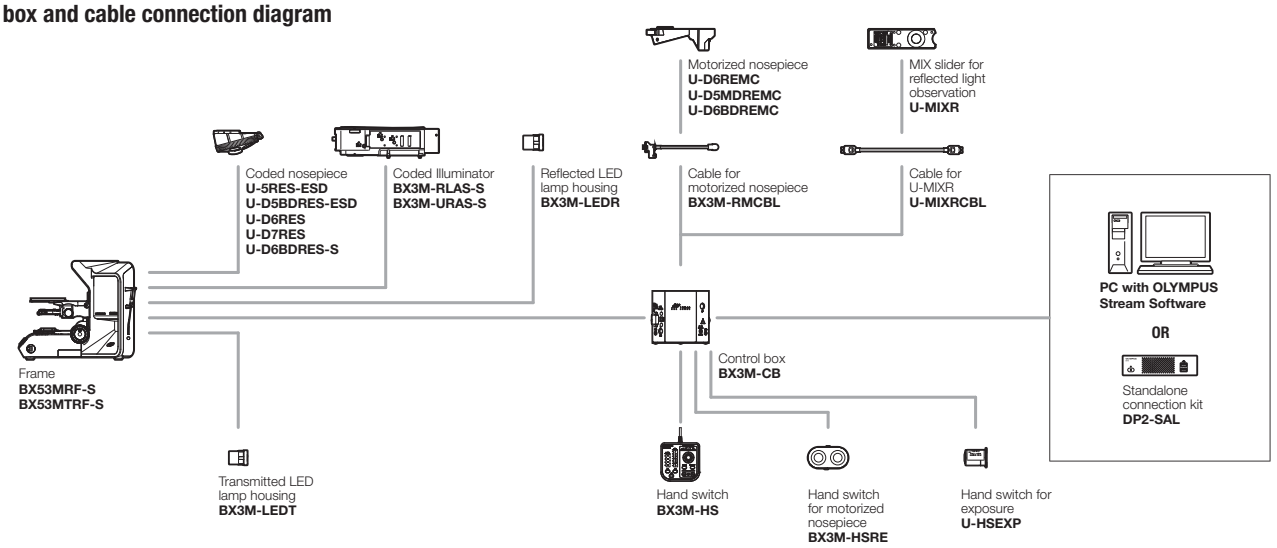
System Diagram

BX53M System Diagram (for Reflected and Reflected/Transmitted Light Combination)

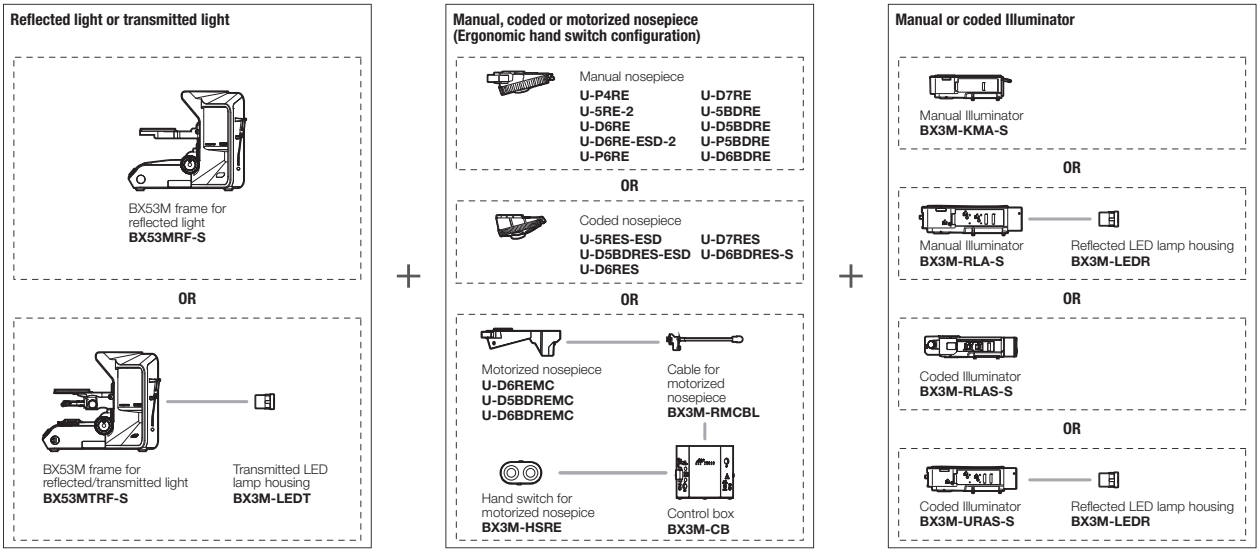


*For transmitted light combination only

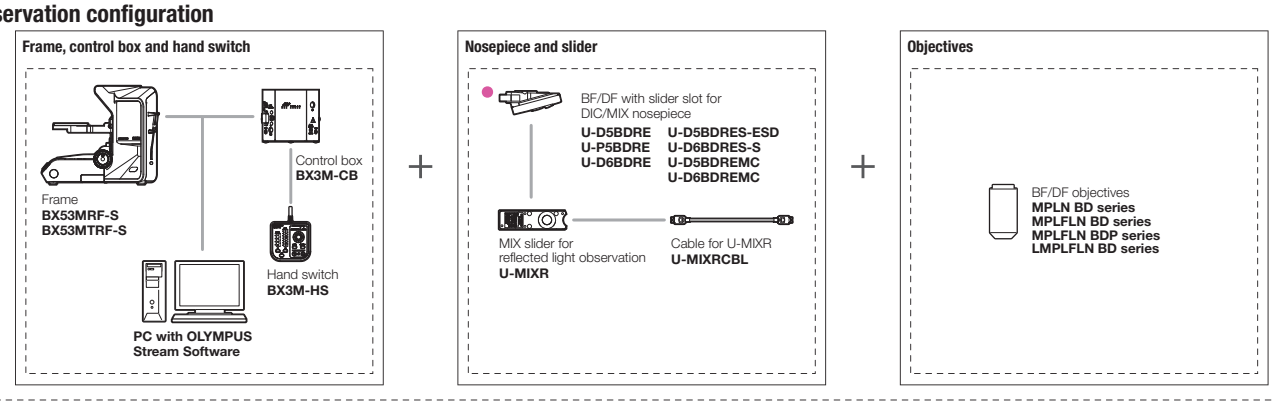
Control box and cable connection diagram



Stand-alone light manager configuration

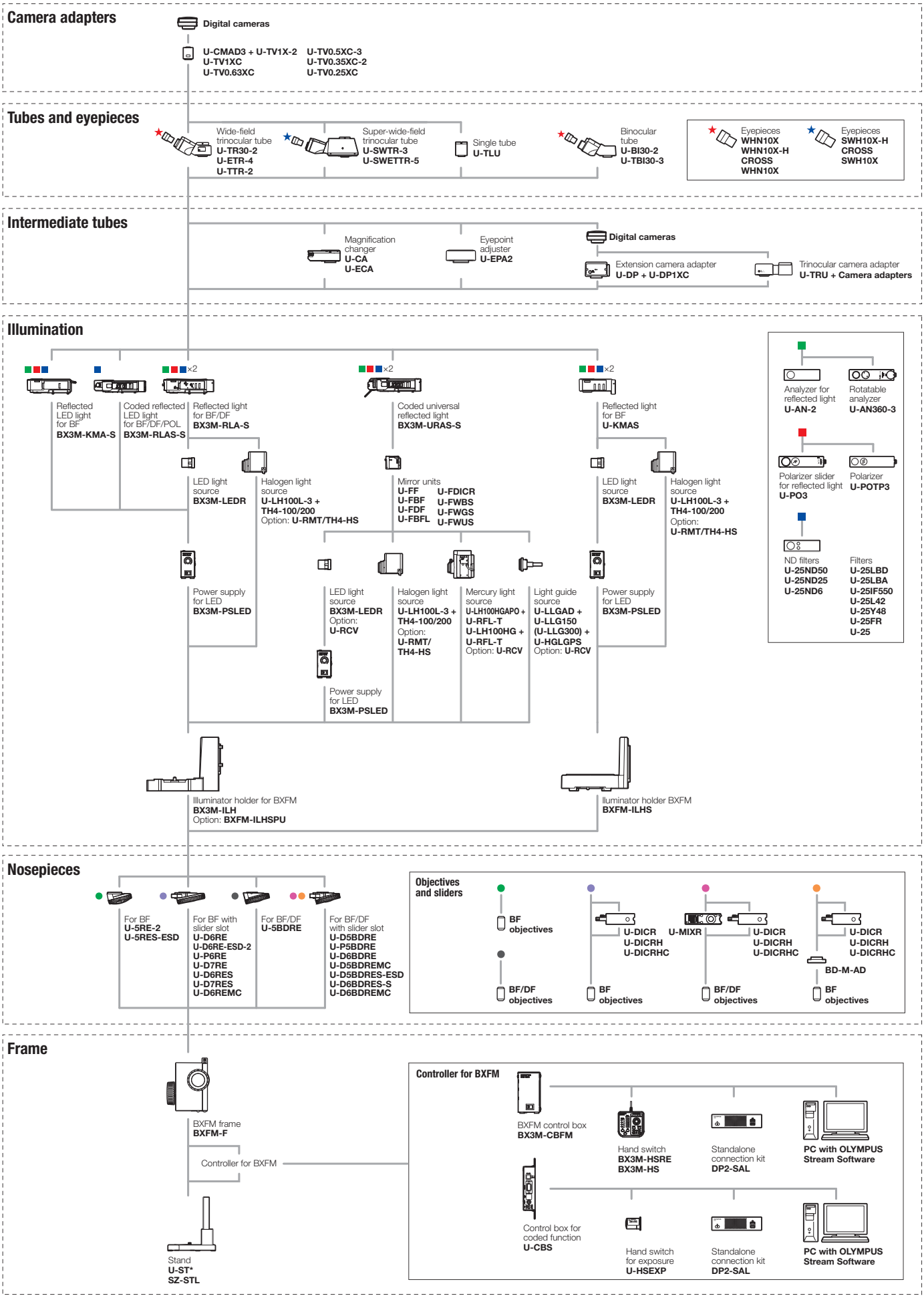


MIX observation configuration



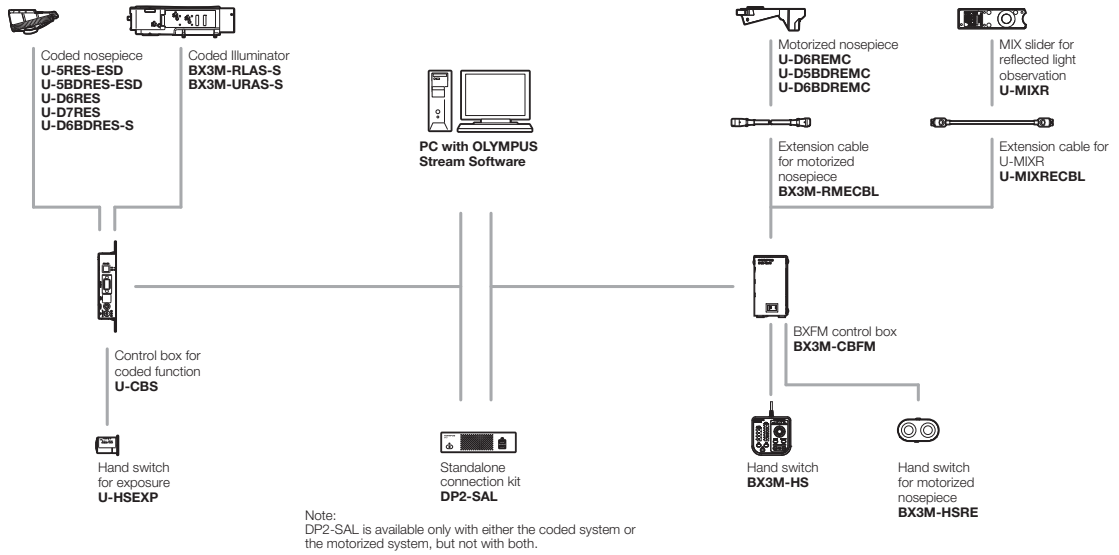
System Diagram

BXFM System Diagram



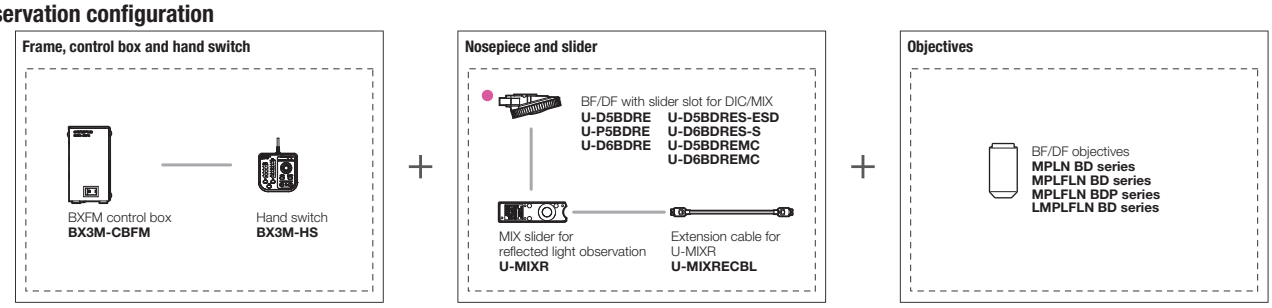
*U-ST is not available with BX3M-ILH.

Control box and cable connection diagram

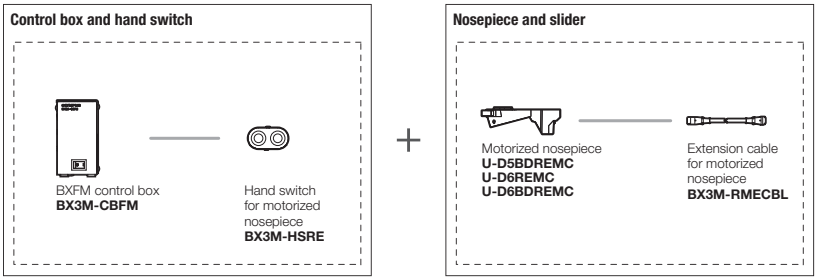


Note:
DP2-SAL is available only with either the coded system or the motorized system, but not with both.

MIX observation configuration

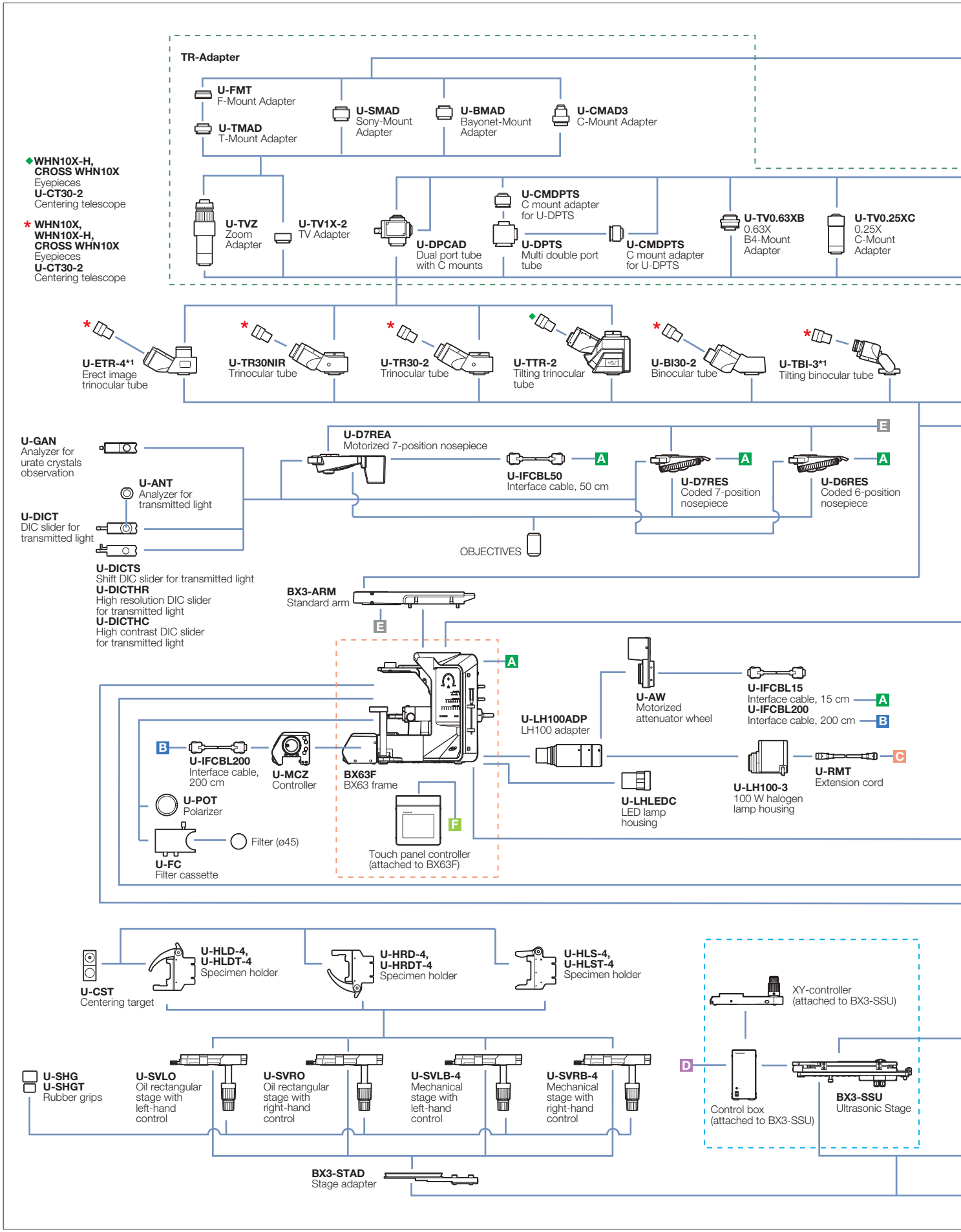


Motorized nosepiece configuration

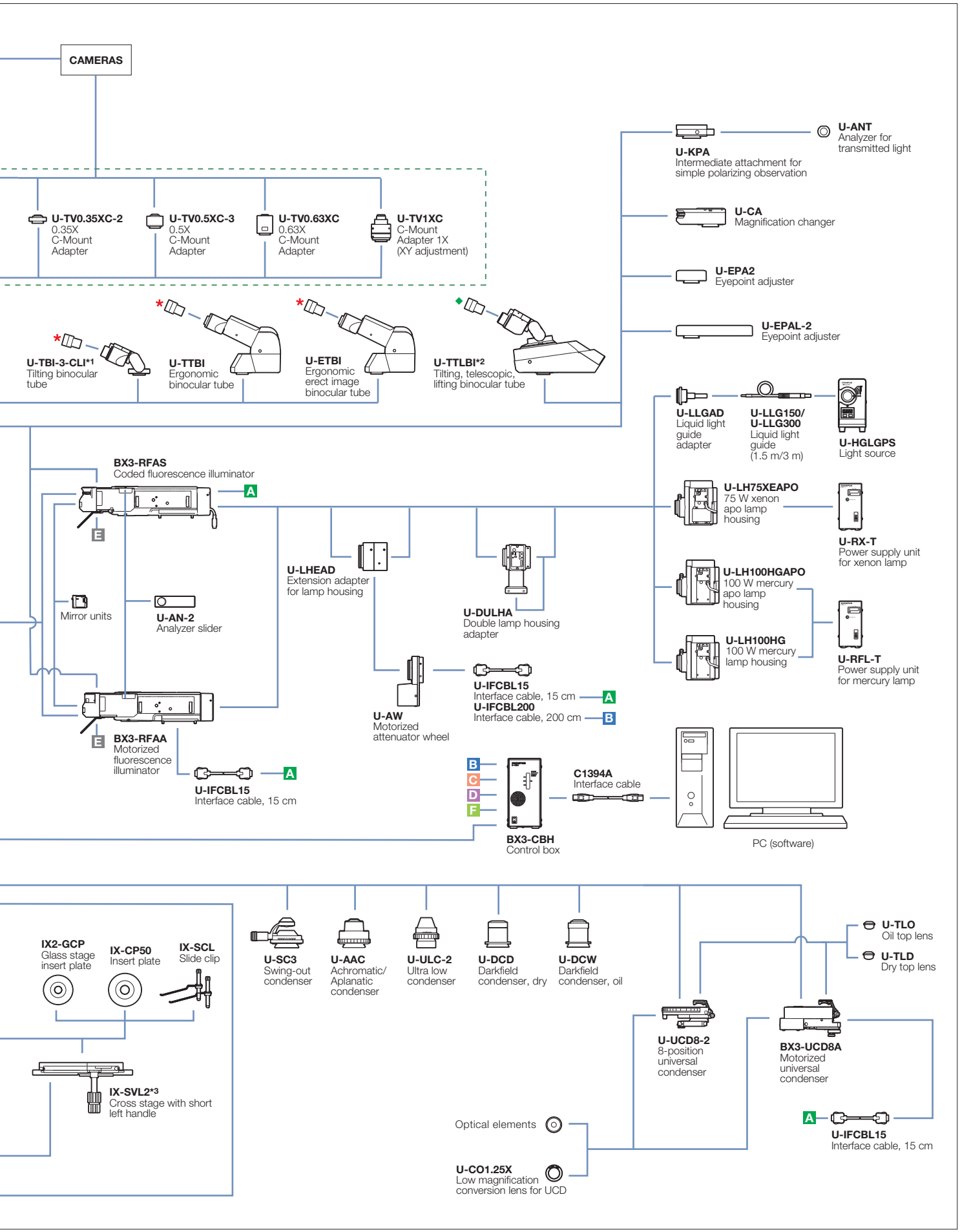


System Diagram

BX63 System Diagram

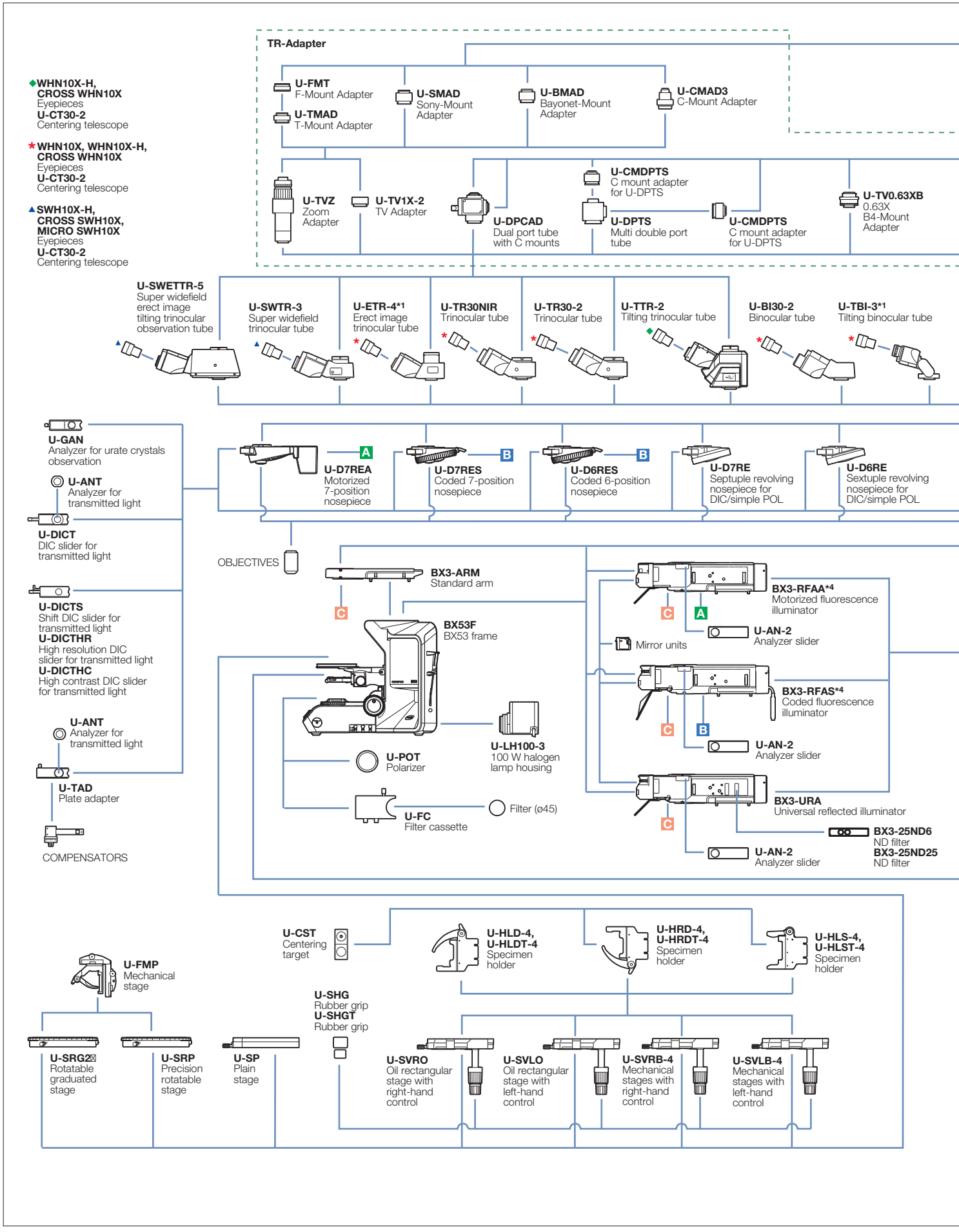


*1 Slight vignetting may occur in combination with an additional intermediate attachment or fluorescence illuminator. *2 Require an additional intermediate attachment or fluorescence illuminator.
*3 Cannot be used with BX3-UCD8A and U-UCD8-2

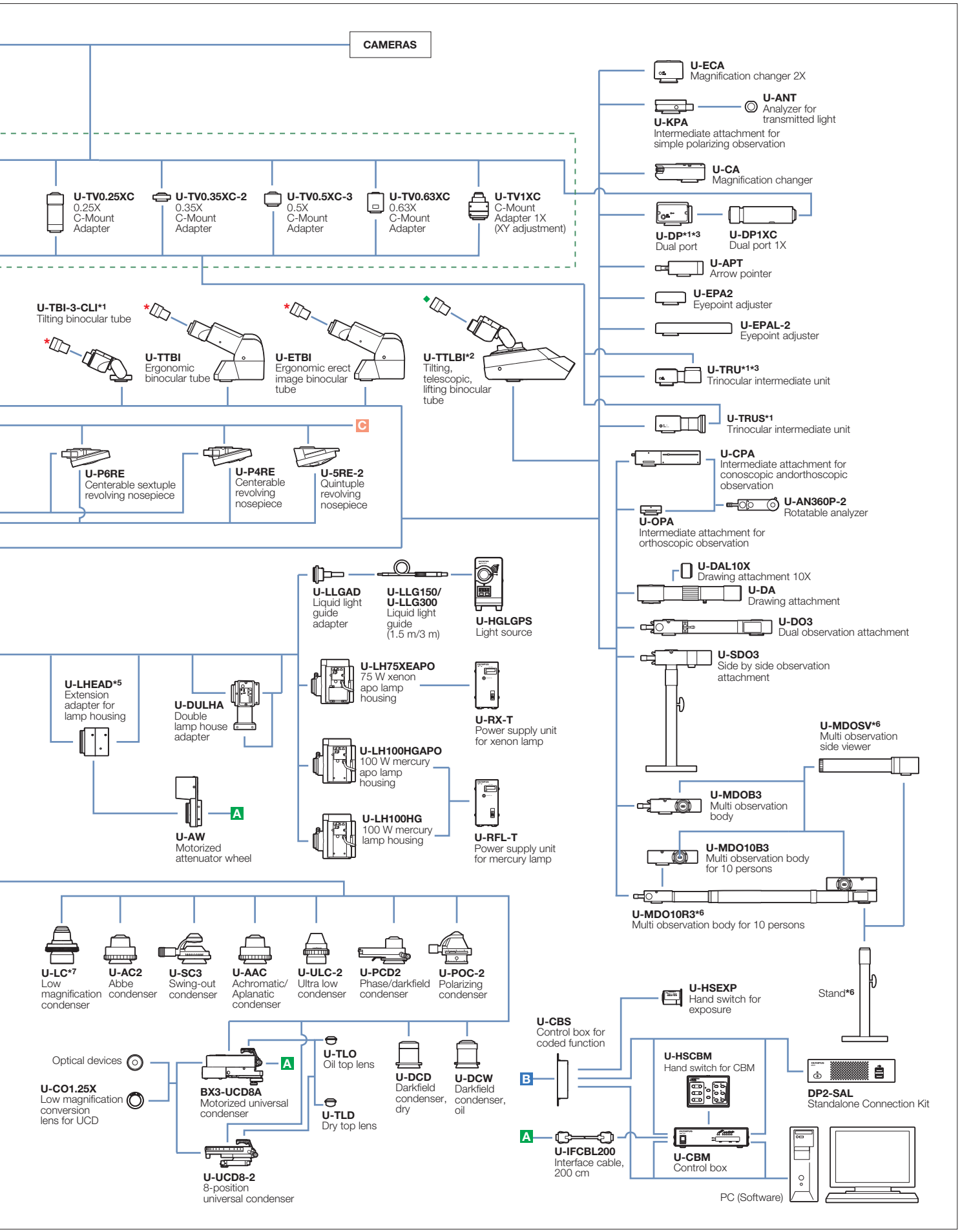

CAMERAS
U-TV0.35XC-2
0.35X
C-Mount
Adapter
U-TV0.5XC-3
0.5X
C-Mount
Adapter
U-TV0.63XC
0.63X
C-Mount
Adapter
U-TV1XC
C-Mount
Adapter 1X
(XY adjustment)
U-TBI-3-CLI*1
Tilting binocular
tube
U-TTBI
Ergonomic
binocular tube
U-ETBI
Ergonomic
erect image
binocular tube
U-TTLBI*2
Tilting, telescopic,
lifting binocular tube
U-KPA
Intermediate attachment for
simple polarizing observation
U-ANT
Analyzer for
transmitted light
U-CA
Magnification changer
U-EPA2
Eyepoint adjuster
U-EPAL-2
Eyepoint adjuster
U-LLGAD
Liquid light
guide
adapter
U-LLG150/
U-LLG300
Liquid light
guide
(1.5 m/3 m)
U-HGLGPS
Light source
BX3-RFAS
Coded fluorescence illuminator
A
E
U-LH75XEAPO
75 W xenon
apo lamp
housing
U-RX-T
Power supply unit
for xenon lamp
U-LHEAD
Extension adapter
for lamp housing
U-DULHA
Double lamp housing
adapter
Mirror units
U-AN-2
Analyzer slider
U-LH100HGAPO
100 W mercury
apo lamp
housing
U-LH100HG
100 W mercury
lamp housing
U-RFL-T
Power supply unit
for mercury lamp
U-IFCBL15
Interface cable, 15 cm
A
U-IFCBL200
Interface cable, 200 cm
B
U-AW
Motorized
attenuator wheel
E
BX3-RFAA
Motorized
fluorescence
illuminator
U-IFCBL15
Interface cable, 15 cm
A
B
C
D
F
C1394A
Interface cable
BX3-CBH
Control box
PC (software)
IX2-GCP
Glass stage
insert plate
IX-CP50
Insert plate
IX-SCL
Slide clip
IX-SVL2*3
Cross stage with short
left handle
U-SC3
Swing-out
condenser
U-AAC
Achromatic/
Aplanatic
condenser
U-ULC-2
Ultra low
condenser
U-DCD
Darkfield
condenser, dry
U-DCW
Darkfield
condenser, oil
U-TLO
Oil top lens
U-TLD
Dry top lens
U-UCD8-2
8-position
universal
condenser
BX3-UCD8A
Motorized
universal
condenser
A
U-IFCBL15
Interface cable, 15 cm
Optical elements
U-CO1.25X
Low magnification
conversion lens for UCD

System Diagram

BX53 System Diagram

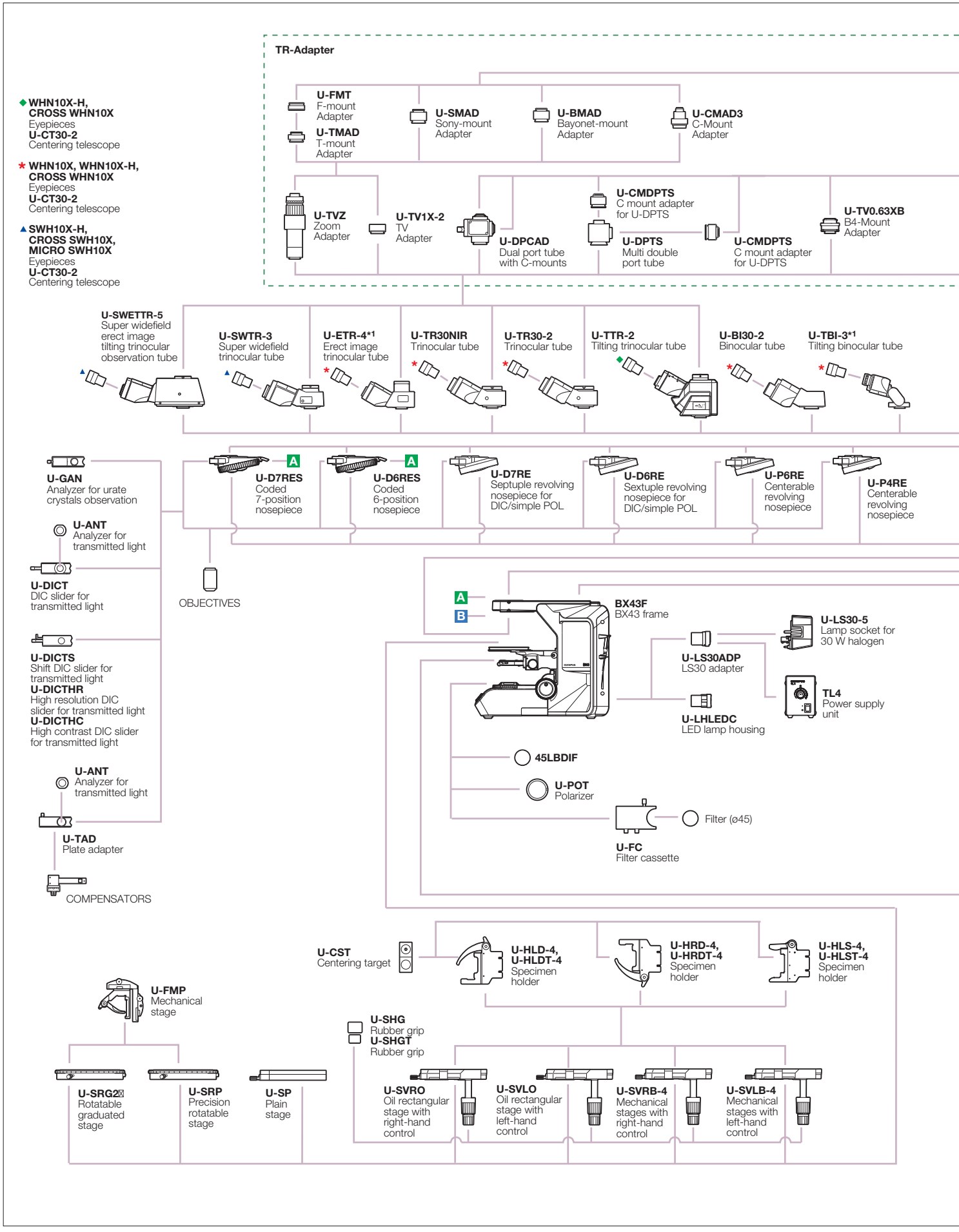


*1 Slight vignetting may occur in combination with an additional intermediate attachment or observation method. *2 Require an additional intermediate attachment or fluorescence illuminator. *3 Cannot be used with U-TTLBI. *4 Compatible with FN 22. *5 Cannot be used with BX3-URA. *6 Stand is a standard equipment of the U-MDOSV and U-MDO10R3. *7 An auxiliary lens is equipped.


CAMERAS
U-ECA
Magnification changer 2X
U-ANT
Analyzer for transmitted light
U-KPA
Intermediate attachment for simple polarizing observation
U-CA
Magnification changer
U-TV0.25XC
0.25X C-Mount Adapter
U-TV0.35XC-2
0.35X C-Mount Adapter
U-TV0.5XC-3
0.5X C-Mount Adapter
U-TV0.63XC
0.63X C-Mount Adapter
U-TV1XC
C-Mount Adapter 1X (XY adjustment)
U-DP*1*3
Dual port
U-DP1XC
Dual port 1X
U-APT
Arrow pointer
U-EPA2
Eyepoint adjuster
U-EPAL-2
Eyepoint adjuster
U-TRU*1*3
Trinocular intermediate unit
U-TRUS*1
Trinocular intermediate unit
U-TBI-3-CLI*1
Tilting binocular tube
U-TTBI
Ergonomic binocular tube
U-ETBI
Ergonomic erect image binocular tube
U-TTLBI*2
Tilting, telescopic, lifting binocular tube
C
U-P6RE
Centerable sextuple revolving nosepiece
U-P4RE
Centerable revolving nosepiece
U-5RE-2
Quintuple revolving nosepiece
U-CPA
Intermediate attachment for conoscopic andorthoscopic observation
U-AN360P-2
Rotatable analyzer
U-OPA
Intermediate attachment for orthoscopic observation
U-DAL10X
Drawing attachment 10X
U-DA
Drawing attachment
U-DO3
Dual observation attachment
U-SDO3
Side by side observation attachment
U-LLGAD
Liquid light guide adapter
U-LLG150/ U-LLG300
Liquid light guide (1.5 m/3 m)
U-HGLGPS
Light source
U-LHEAD*5
Extension adapter for lamp housing
U-DULHA
Double lamp house adapter
U-LH75XEAPO
75 W xenon apo lamp housing
U-RX-T
Power supply unit for xenon lamp
U-LH100HGAPO
100 W mercury apo lamp housing
U-LH100HG
100 W mercury lamp housing
U-RFL-T
Power supply unit for mercury lamp
A
U-AW
Motorized attenuator wheel
U-MDOSV*6
Multi observation side viewer
U-MDOB3
Multi observation body
U-MDO10B3
Multi observation body for 10 persons
U-MDO10R3*6
Multi observation body for 10 persons
U-LC*7
Low magnification condenser
U-AC2
Abbe condenser
U-SC3
Swing-out condenser
U-AAC
Achromatic/ Aplanatic condenser
U-ULC-2
Ultra low condenser
U-PCD2
Phase/darkfield condenser
U-POC-2
Polarizing condenser
U-HSEXP
Hand switch for exposure
Stand*6
U-CBS
Control box for coded function
Optical devices
U-CO1.25X
Low magnification conversion lens for UCD
A
BX3-UCD8A
Motorized universal condenser
U-TLO
Oil top lens
U-TLD
Dry top lens
U-DCD
Darkfield condenser, dry
U-DCW
Darkfield condenser, oil
U-UCD8-2
8-position universal condenser
B
U-HSCBM
Hand switch for CBM
DP2-SAL
Standalone Connection Kit
A
U-IFCBL200
Interface cable, 200 cm
U-CBM
Control box
PC (Software)

System Diagram

BX43 System Diagram



*1 Slight vignetting may occur in combination with an additional intermediate attachment or observation method. *2 Require an additional intermediate attachment or fluorescence illuminator.
*3 Cannot be used with U-TTLBI. *4 Compatible with FN 22. *5 An auxiliary lens is equipped.

CAMERAS

U-ECA
Magnification changer 2x

U-CA
Magnification changer

U-TV0.25XC
0.25X C-Mount Adapter

U-TV0.35XC-2
0.35X C-Mount Adapter

U-TV0.5XC-3
0.5X C-Mount Adapter

U-TV0.63XC-3
0.63X C-Mount Adapter

U-TV1XC
C-Mount adapter 1X (XY adjustment)

U-DP*1*3
Dual port

U-DP1XC
Dual port 1x

U-APT
Arrow pointer

U-TRU*1*3
Trinocular intermediate unit

U-TRUS*3
Trinocular intermediate unit

U-TBI-3-CLI*1
Tilting binocular tube

U-TTBI
Ergonomic binocular tube

U-ETBI
Ergonomic erect image binocular tube

U-TTLBI*2
Tilting, telescopic, lifting binocular tube

U-ANT
Analyzer for transmitted light

U-KPA
Intermediate attachment for simple polarizing observation

U-EPA2
Eyepoint adjuster

U-EPAL-2
Eyepoint adjuster

U-5RE-2
Quintuple revolving nosepiece

BX43-5RES
Coded 5-position nosepiece for BX43

U-LLGAD
Liquid light guide adapter

U-LLG150/ U-LLG300
Liquid light guide (1.5 m/3 m)

U-HGLGPS
Light source

U-LH75XEAPO
75 W xenon apo lamp housing

U-RX-T
Power supply unit for xenon lamp

U-LH100HGAPO
100 W mercury apo lamp housing

U-LH100HG
100 W mercury lamp housing

U-RFL-T
Power supply unit for mercury lamp

U-CPA
Intermediate attachment for conoscopic and orthoscopic observation

U-AN360P-2
Rotatable analyzer

U-OPA
Intermediate attachment for orthoscopic observation

BX3-URA
Universal reflected illuminator

U-PO
Polarizer

BX3-6ND6
ND filter
BX3-25ND25
ND filter

Mirror units

U-AN-2
Analyzer slider

U-DAL10X
Drawing attachment 10x

U-DA
Drawing attachment

U-DO3
Dual observation attachment

U-SDO3
Side by side observation attachment

BX3-RFAS*4
Coded fluorescence illuminator

U-DULHA
Double lamp house adapter

U-LC*5
Low magnification condenser

U-AC2
Abbe condenser

U-SC3
Swing-out condenser

U-AAC
Achromatic/ Aplanatic condenser

U-ULC-2
Ultra low condenser

U-PCD2
Phase/darkfield condenser

U-POC-2
Polarizing condenser

U-DCD
Darkfield condenser, dry

U-DCW
Darkfield condenser, oil

Optical devices

U-CO1.25X
Low magnification conversion lens for UCD

U-UCD8-2
8-position universal condenser

U-TLO
Oil top lens

U-TLD
Dry top lens

U-IFRES
Interface for coded nosepiece

U-CBS
Control box for coded function

U-HSEXP
Hand switch for exposure

U-RX-T
Power supply unit for xenon lamp

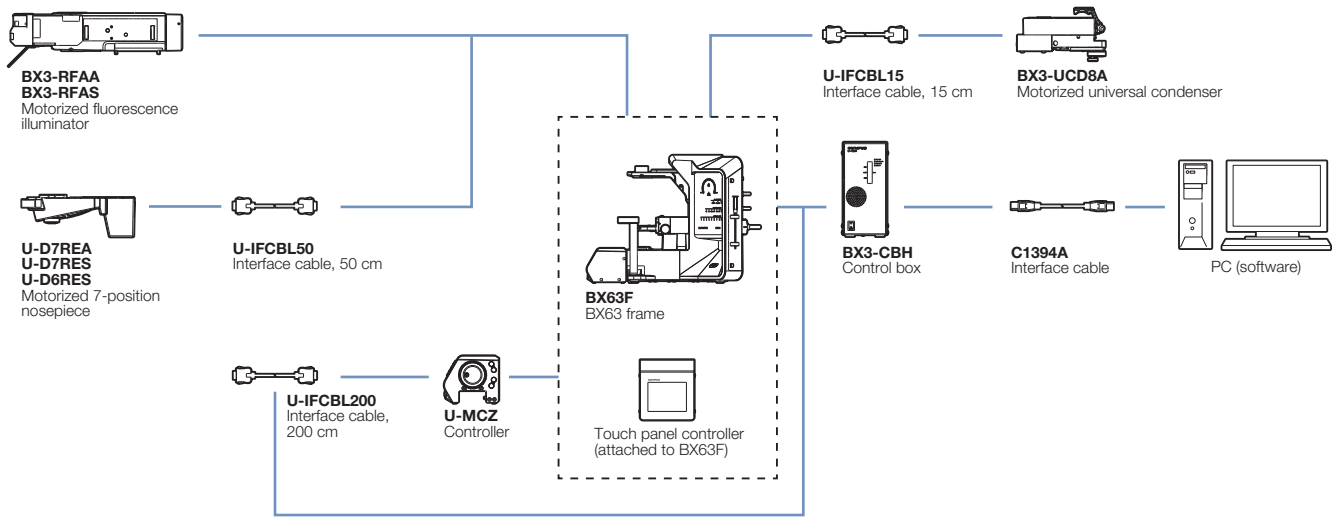
DP2-SAL
Standalone Connection Kit

PC (Software)

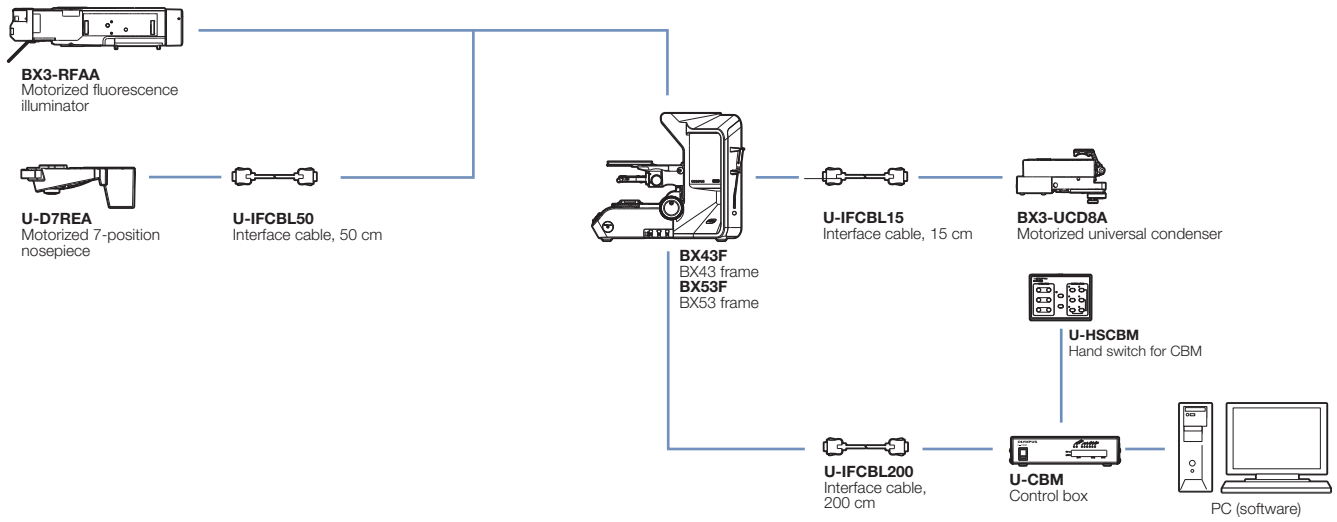
System Diagram

BX3 Series Basic Motorized System Diagram

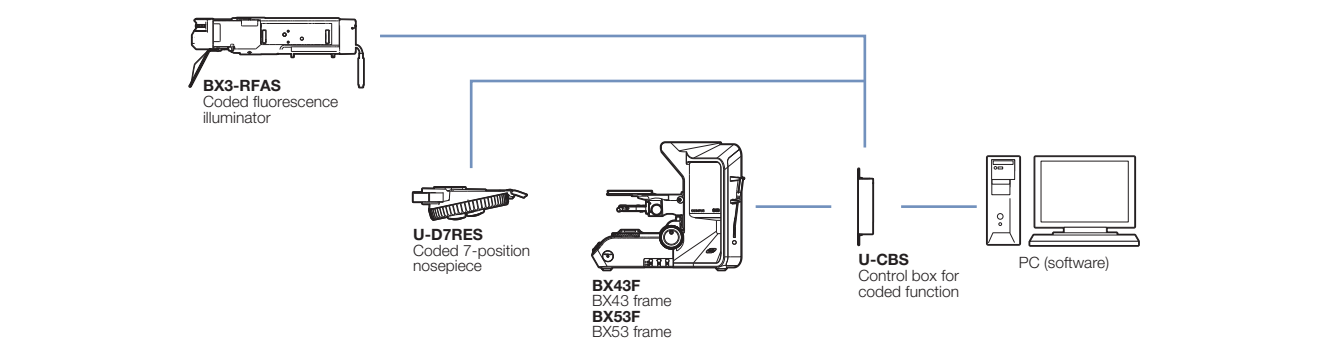
Full Motorized System Basic Configuration for BX3 series



Semi Motorized System Basic Configuration for BX3 series



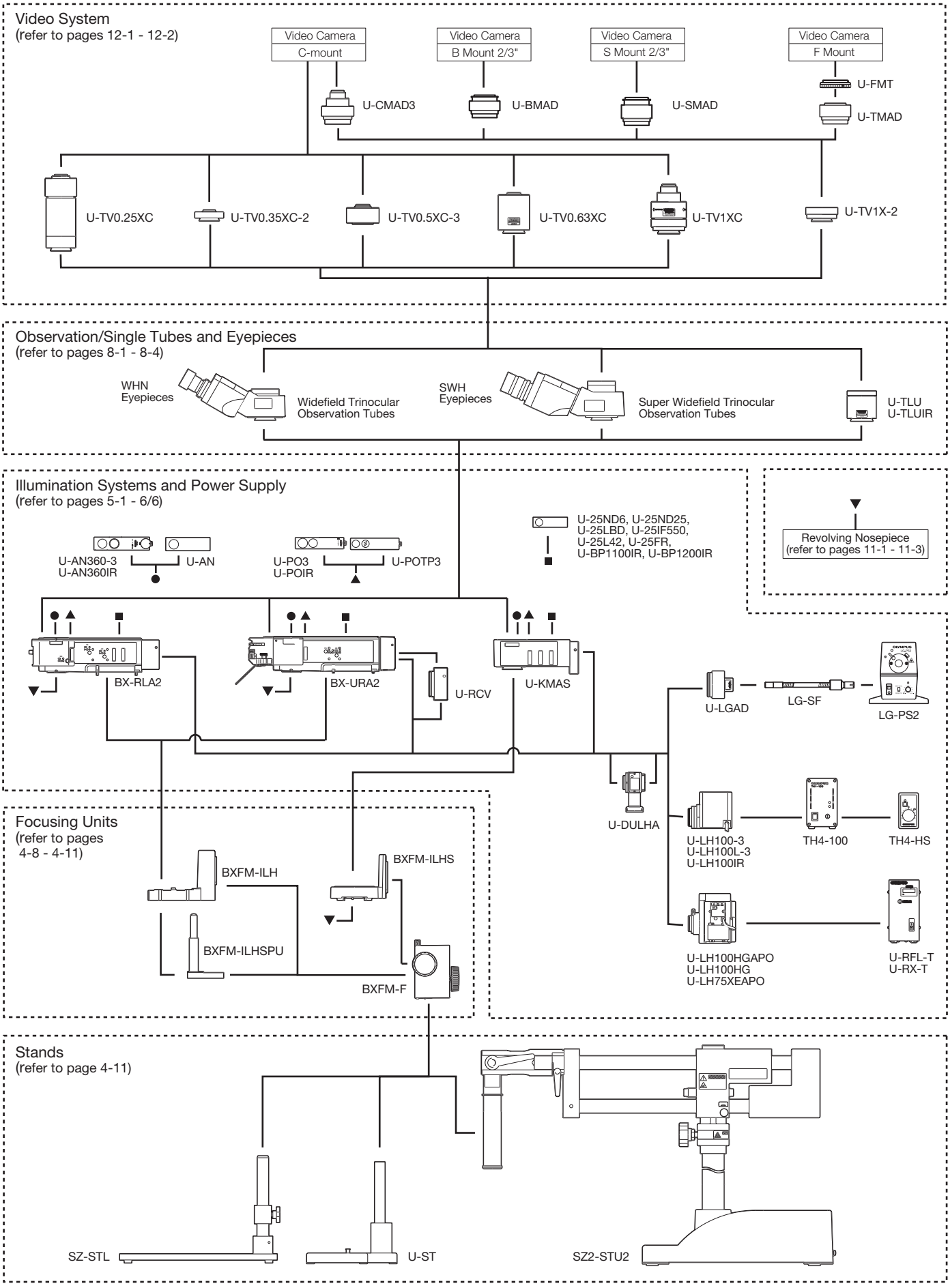
Coded System Basic Congratulation for BX3 series



*Please refer to "Section xx Motorized Unit" for each motorized unit in the detail.

**Please consult your nearest Olympus representative in you region about the detailed motorized system configuration and combination.

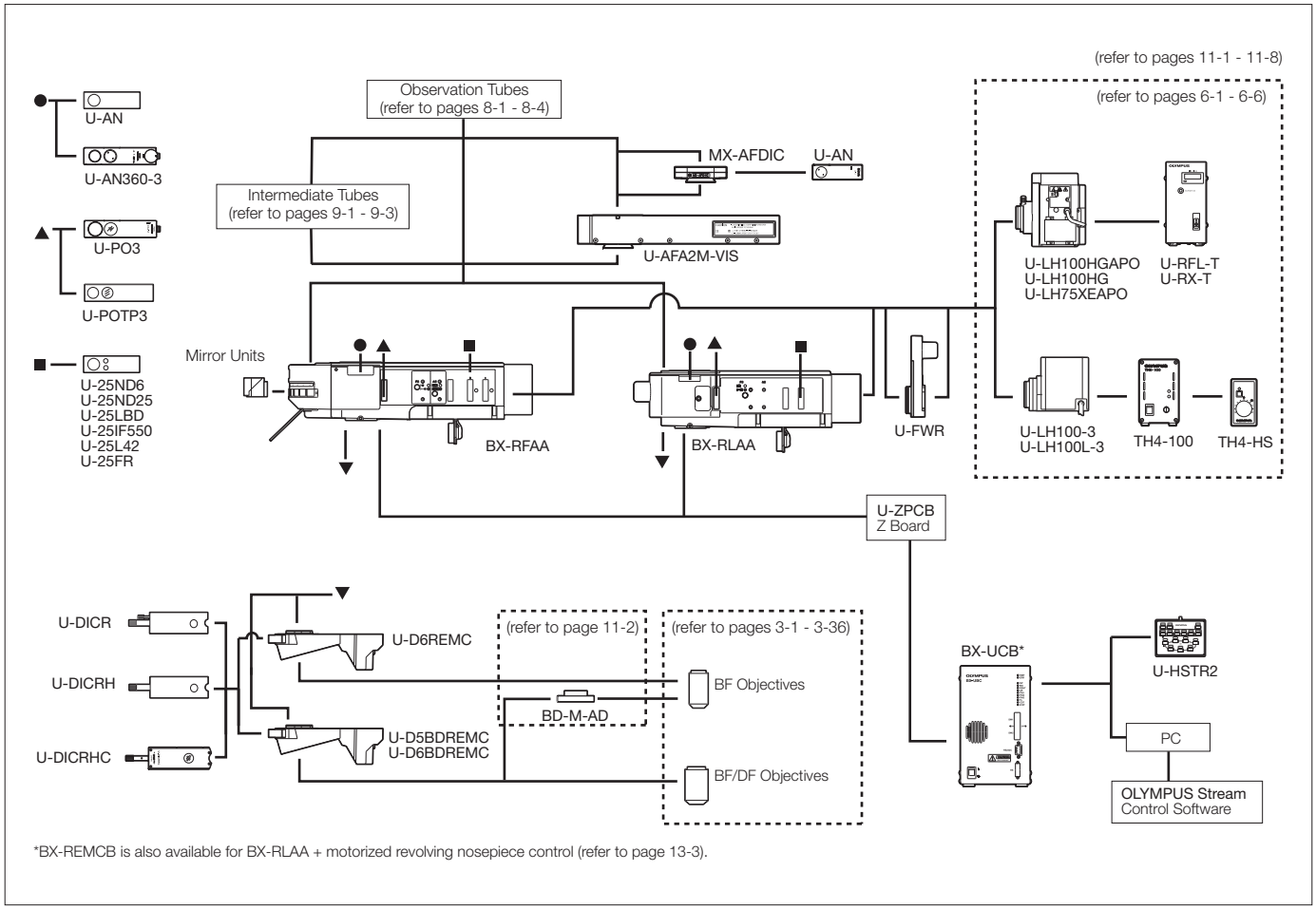
BX2 Series BXFM System Diagram



*Different types may be offered in each area.

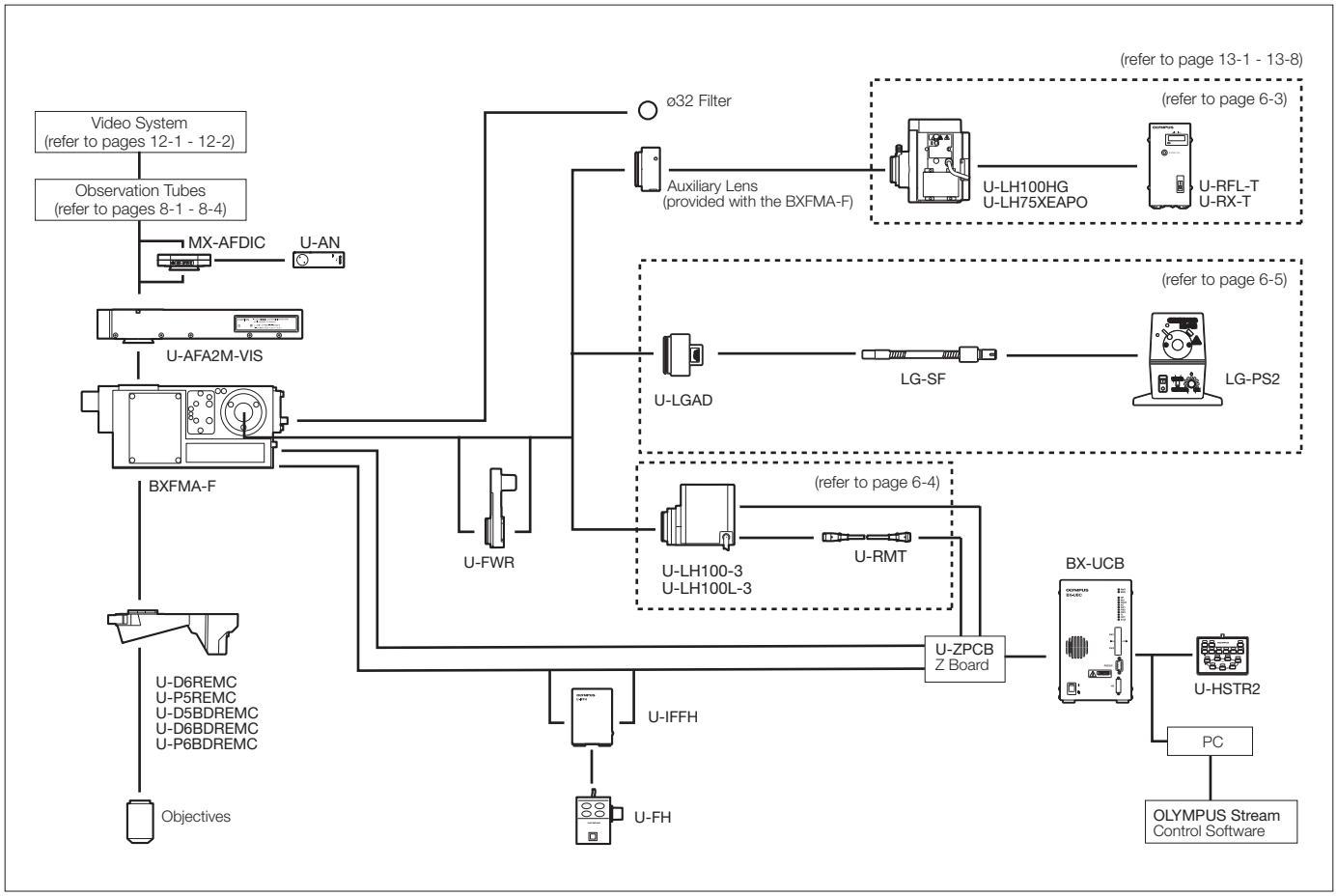
System Diagram

BX2 Series Motorized Unit System Diagram



*BX-REMCB is also available for BX-RLAA + motorized revolving nosepiece control (refer to page 13-3).

BXFM-A System Diagram



UIS2 Objectives (for Industrial Microscope)

UIS2 World-leading optics

■ Definition for Objective Abbreviations

M PL(Plan) F L N - 1 0 0 B D

- **M:** Metallurgical (no cover)
- **LM:** Long Working Distance Metallurgical Use
- **SLM:** Super Long Working Distance Metallurgical Use
- **LC:** Observation Through Substrate

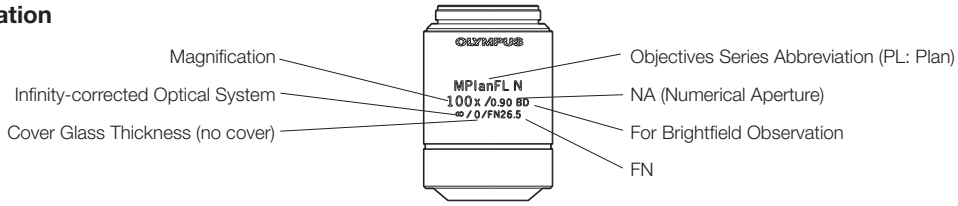
- **PL:** Plan/ Corrects Field Curvature of the Periphery of the Image Plane

- **None:** Achromat/ Corrects Aberration at 2 Wavelengths of Blue and Red
- **FL:** SemiApochromat/ Corrects Chromatic Aberration in the Visible Range (violet to red)
- **APO:** Apochromat/ Optimally Corrects Chromatic Aberration in the Entire Visible Band (violet to red)

- **Number:** Objective Magnification

- **None:** Brightfield
- **BD:** Brightfield/Darkfield
- **BDP:** Brightfield/Darkfield/ Polarizing
- **IR:** IR
- **LCD:** LCD

■ Objective Notation



■ Objective series List

Series	Magnification	BF	DF	DIC*1	POL	FL	FN	Remarks
MPLAPON	50/100	○		○U	○		26.5	
MPLAPON O	100	○					26.5	
MPLFLN	1.25/2.5	○					1.25X: 22/2.5X: 26.5	Use together with polarizer and analyzer recommended.
	5/10/20/40*2/50/100	○		○U	○	○*3	26.5	
LMPLFLN	5/10/20/50/100	○		○L	○	○	26.5	
MPLN	5/10/20/50/100	○					22	
LCPLFLN-LCD	20/50/100	○		○L			26.5	for LCD
SLMPLN	20/50/100	○					26.5	
LMPLN-IR	5/10	○					22	for near-IR observation
LCPLN-IR	20/50/100	○					22	for near-IR observation
MPLFLN-BD	5/10/20/50/100/150	○	○	○U	○	○*3	26.5	
MPLFLN-BDP	5/10/20/50/100	○	○	◎U	◎	○*3	26.5	
LMPLFLN-BD	5/10/20/50/100	○	○	○L	○	○	26.5	
MPLN-BD	5/10/20/50/100	○	○				22	
WLI100XMRTC	100X						22	Mirau objective

*1 DIC Prism U-DICR: UM/LM Position, U-DICRHC: LM Position Fixed, U-DICRH: UM Position Fixed. *2 40X: BF Only *3 5–20X: U Excitation Also Possible
○: Responds ◎: Optimally Responds BF: Brightfield DF: Darkfield DIC: Differential Interference Contrast POL: Polarized light FL: Fluorescence

■ Features of Objective Series

● MPLAPON series: M Plan Apochromat — P 3-2
Plan Apochromat objectives that correct chromatic aberrations at optimal level among Olympus objectives. Olympus guarantees* optical performance (wavefront aberration) with a Strehl ratio** of 95% or better. They are also designed for use with Olympus' U-AFA2M active AF unit.

● MPLAPON100XO: M Plan Apochromat — P 3-2
This is a Plan Apochromat objective of the oil-immersion type*** that features a numerical aperture of 1.4. It provides excellent chromatic aberration correction and a high resolving power.

● MPLFLN series: M Plan SemiApochromat — P 3-3
Plan SemiApochromat objectives, giving high-level correction for chromatic aberration. The lineup consists of 8 objectives ranging from 1.25X to 100X, and provides a W.D. of 1 mm or longer (except 40X). Since the exit pupil position of the 5X-100X objectives is standardized, the position of the DIC prism does not have to be switched when changing the magnification (40X is not applicable to DIC observation). For very low magnifications (1.25X, 2.5X), use together with analyzer and polarizer of the reflected light illuminator.

● LMPLFLN series: Long WD M Plan SemiApochromat — P 3-4
Long working distance Plan SemiApochromat objectives, giving high-level correction for chromatic aberration. Suitable with samples having a height difference and in preventing collision, as the working distance is long. Also, since the exit pupil position of the 5X-100X objectives is standardized, the position of the DIC prism does not have to be switched when changing the magnification.

● MPLN series: M Plan Achromat — P 3-5
Plan Achromat objectives providing excellent image flatness up to FN 22.

● LCPLFLN-LCD series: LCD Long WD M Plan SemiApochromat — P 3-6
Differentiated objective series for observation of LCD panels and other samples through a glass substrate. Aberration correction matched to the glass thickness is accomplished using a correction collar.

● SLMPLN series: Super Long WD M Plan Achromat — P 3-7
Plan Achromat objectives with high magnification and super long working distance. Three magnifications, 20X, 50X and 100X are available. For 5X or 10X objectives, select from the LMPLFLN series.

● LMPLN-IR series: IR Long WD M Plan Achromat — P 3-8
Objective series exclusive for the near-infrared microscopy largely of the internal structure in silicon wafers.

● LCPLN-IR series: IR Long WD M Plan Achromat — P 3-9
Exclusive for the near-infrared microscopy largely of the internal structure in silicon wafers, LCPLN-IR series has correction collar for aberration dependent on thickness of silicon or glass substrate.

● MPLFLN-BD series: M Plan SemiApochromat BD — P 3-10
Plan SemiApochromat objectives, giving high-level correction for chromatic aberration. The series provides a W.D. of 1 mm or longer. Since the exit pupil position of the 5X-150X objectives is standardized, the position of the DIC prism does not have to be switched when changing the magnification.

● MPLFLN-BDP series: M Plan SemiApochromat BDP — P 3-11
Plan SemiApochromat objectives, giving high-level correction for chromatic aberration. The series provides a W.D. of 1 mm or longer. Since the exit pupil position of the 5X-100X objectives is standardized, the position of the DIC prism does not have to be switched when changing the magnification. The BDP series optimizing brightfield/darkfield and polarized light characteristics is appropriate for Nomarski DIC and polarized light observations.

● LMPLFLN-BD series: Long WD M Plan SemiApochromat BD — P 3-12
Long working distance Plan SemiApochromat objectives, giving high-level correction for chromatic aberration. Suitable with samples having a height difference and in preventing collision, as the working distance is long. Also, since the exit pupil position of the 5X-100X objectives is standardized, the position of the DIC prism does not have to be switched when changing the magnification.

● MPLN-BD series: M Plan Achromat BD — P 3-13
Plan Achromat objectives providing excellent image flatness up to FN 22.

● WLI100XMRTC series: White Light Interferometry Objective — P 3-14
This objective is designed for the Mirau style of white light interferometers and maintains a high level of temperature tolerance. The optimized NA of 0.8 provides improved light gathering, with a working distance of 0.7 mm.

**Definition of guaranteed values: Measurements assessed with Olympus' Interferometer for Transmitted Wavefront Measurement under specified conditions (measurement: temp. 23°C±1°C; assessment: measurement within the 97% range of the pupil dia.).*

***Strehl ratio: Indicates in percent (%) the ratio of the proportion of light that an actual optical system can concentrate with respect to the proportion of light concentrated in the image plane (central intensity) by an ideal, aberration-free optical system, with the latter serving as 100%. A higher percentage indicates a higher quality optical system.*

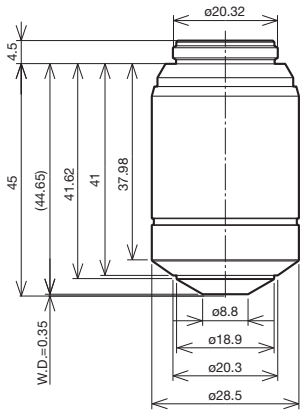
****Specified oil: IMMOIL-F30CC*

M Plan Apochromat

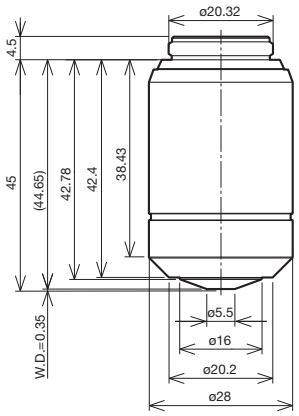
MPLAPON series

Plan Apochromat objectives that correct chromatic aberrations at optimal level among Olympus objectives. Olympus guarantees* optical performance (wavefront aberration) with a Strehl ratio** of 95% or better. They are also designed for use with Olympus' U-AFA2M active AF unit.

MPLAPON50X



MPLAPON100X



* *Definition of guaranteed values: Measurements assessed with Olympus' Interferometer for Transmitted Wavefront Measurement under specified conditions (measurement: temp. 23°C±1°C; assessment: measurement within the 97% range of the pupil dia.).*

** *Strehl ratio: Indicates in percent (%) the ratio of the proportion of light that an actual optical system can concentrate with respect to the proportion of light concentrated in the image plane (central intensity) by an ideal, aberration-free optical system, with the latter serving as 100%. A higher percentage indicates a higher quality optical system.*

Unit: mm

UIS2 Objectives					Widefield Eyepiece WHN10X FN 22			Super Widefield Eyepiece SWH10X FN 26.5		
Objective (magnification)	NA	W.D. (mm)	Focal Distance f (mm)	Weight (g)	Total Magnifications	Practical Field of View (mm)	Depth of Focus (µm)	Total Magnifications	Practical Field of View (mm)	Depth of Focus (µm)
MPLAPON50X	0.95	0.35	3.6	139	500	0.44	1	500	0.53	1
MPLAPON100X	0.95	0.35	1.8	125	1000	0.22	0.67	1000	0.27	0.7

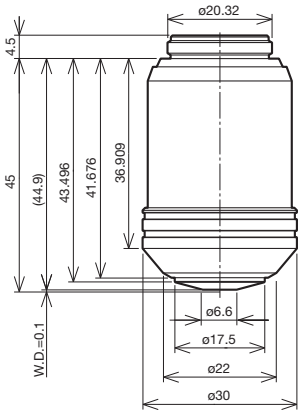
Screw: W20.32 × 0.706 (0.8" × 1/36")

M Plan Apochromat

MPLAPON100XO

This is a Plan Apochromat objective of the oil-immersion type*** that features a numerical aperture of 1.4. It provides excellent chromatic aberration correction and a high resolving power.

MPLAPON100XO



*** *Specified Oil: IMMOIL-F30CC*

Unit: mm

UIS2 Objectives					Widefield Eyepiece WHN10X FN 22			Super Widefield Eyepiece SWH10X FN 26.5		
Objective (magnification)	NA	W.D. (mm)	Focal Distance f (mm)	Weight (g)	Total Magnifications	Practical Field of View (mm)	Depth of Focus (µm)	Total Magnifications	Practical Field of View (mm)	Depth of Focus (µm)
MPLAPON100XO	1.4	0.1	1.8	158	1000	0.22	0.59	1000	0.27	0.59

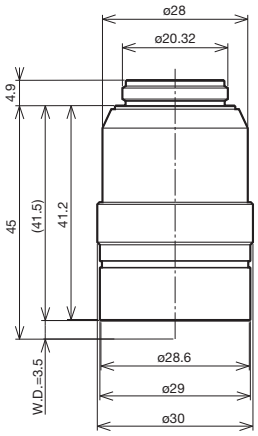
Screw: W20.32 × 0.706 (0.8" × 1/36")

M Plan SemiApochromat

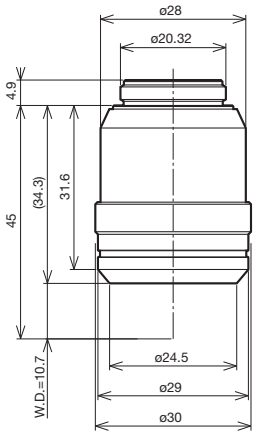
MPLFLN series

Plan SemiApochromat objectives, giving high-level correction for chromatic aberration. The lineup consists of 8 objectives ranging from 1.25X to 100X, and provides a W.D. of 1 mm or longer (except 40X). Since the exit pupil position of the 5X–100X objectives is standardized, the position of the DIC prism does not have to be switched when changing the magnification (40X is not applicable to DIC observation). For very low magnifications (1.25X, 2.5X), use together with analyzer and polarizer of the reflected light illuminator.

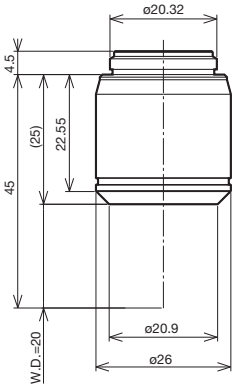
MPLFLN1.25X



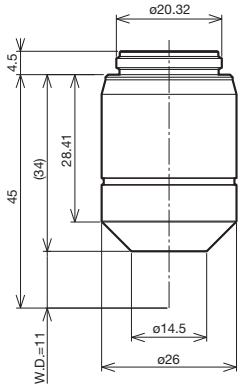
MPLFLN2.5X



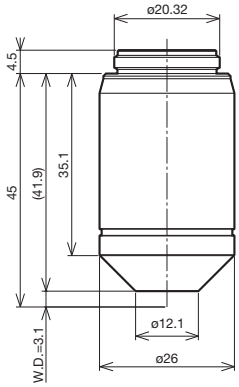
MPLFLN5X



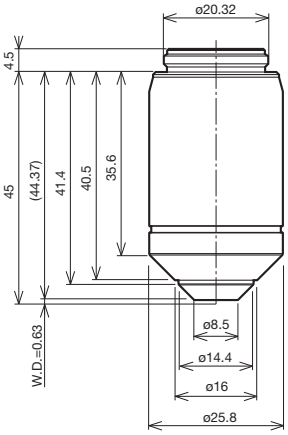
MPLFLN10X



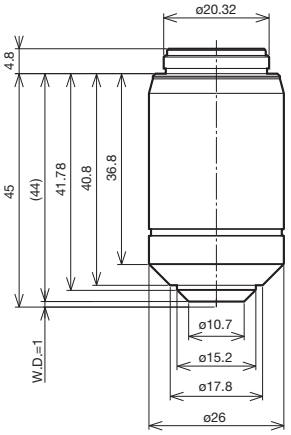
MPLFLN20X



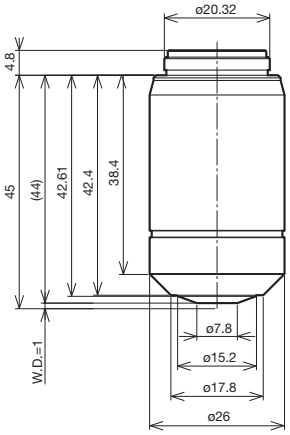
MPLFLN40X



MPLFLN50X



MPLFLN100X



Unit: mm

UIS2 Objectives					Widefield Eyepiece WHN10X FN 22			Super Widefield Eyepiece SWH10X FN 26.5		
Objective (magnification)	NA	W.D. (mm)	Focal Distance f (mm)	Weight (g)	Total Magnifications	Practical Field of View (mm)	Depth of Focus (µm)	Total Magnifications	Practical Field of View (mm)	Depth of Focus (µm)
MPLFLN1.25X	0.04	3.5	145	122	12.5	17.6	870	—	—	—
MPLFLN2.5X	0.08	10.7	72	106	25	8.8	220	25	10.6	220
MPLFLN5X	0.15	20	36	51.5	50	4.4	59	50	5.3	59
MPLFLN10X	0.3	11	18	68.1	100	2.2	15	100	2.7	15
MPLFLN20X	0.45	3.1	9	70.4	200	1.1	5.2	200	1.3	5.1
MPLFLN40X	0.75	0.63	4.5	120	400	0.55	1.66	400	0.66	1.66
MPLFLN50X	0.8	1	3.6	89.9	500	0.44	1.3	500	0.53	1.3
MPLFLN100X	0.9	1	1.8	90.9	1000	0.22	0.73	1000	0.27	0.73

Screw: W20.32 × 0.706 (0.8" × 1/36")

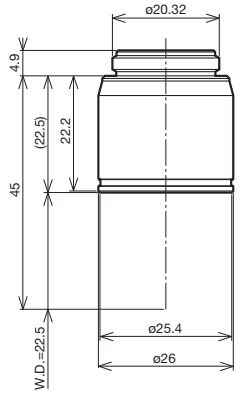
Long WD M Plan SemiApochromat

(W.D.: Working Distance)

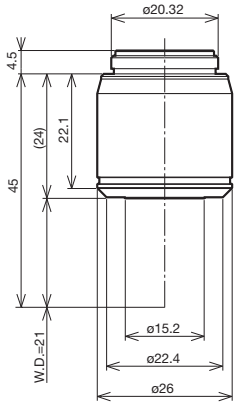
LMPLFLN series

Long working distance Plan SemiApochromat objectives, giving high-level correction for chromatic aberration. Suitable with samples having a height difference and in preventing collision, as the working distance is long. Also, since the exit pupil position of the 5X–100X objectives is standardized, the position of the DIC prism does not have to be switched when changing the magnification.

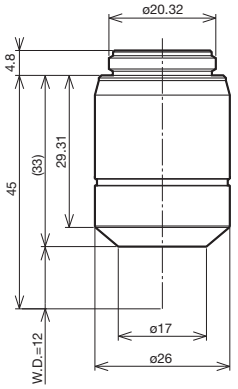
LMPLFLN5X



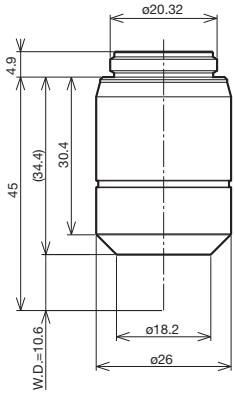
LMPLFLN10X



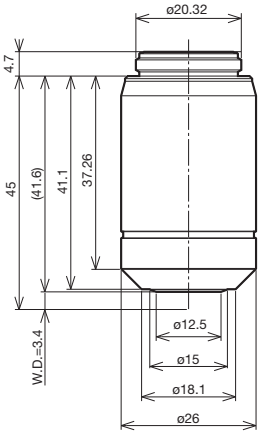
LMPLFLN20X



LMPLFLN50X



LMPLFLN100X



Unit: mm

UIS2 Objectives					Widefield Eyepiece WHN10X FN 22			Super Widefield Eyepiece SWH10X FN 26.5		
Objective (magnification)	NA	W.D. (mm)	Focal Distance f (mm)	Weight (g)	Total Magnifications	Practical Field of View (mm)	Depth of Focus (µm)	Total Magnifications	Practical Field of View (mm)	Depth of Focus (µm)
LMPLFLN5X	0.13	22.5	36	50	50	4.4	70	50	5.3	70
LMPLFLN10X	0.25	21	18	54	100	2.2	18	100	2.7	18
LMPLFLN20X	0.4	12	9	73	200	1.1	6.1	200	1.3	6.1
LMPLFLN50X	0.5	10.6	3.6	77	500	0.44	2.5	500	0.53	2.5
LMPLFLN100X	0.8	3.4	1.8	94	1000	0.22	0.87	1000	0.27	0.87

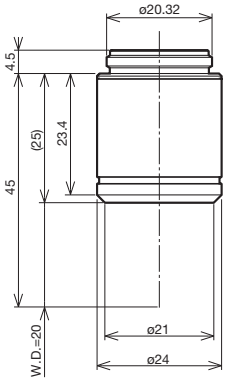
Screw: W20.32 × 0.706 (0.8” × 1/36”)

M Plan Achromat

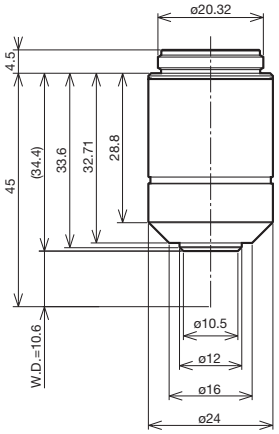
MPLN series

Plan Achromat objectives providing excellent image flatness up to FN 22.

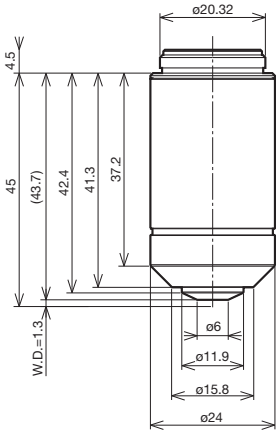
MPLN5X



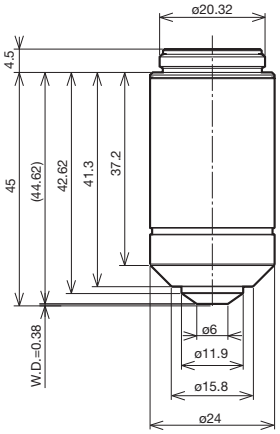
MPLN10X



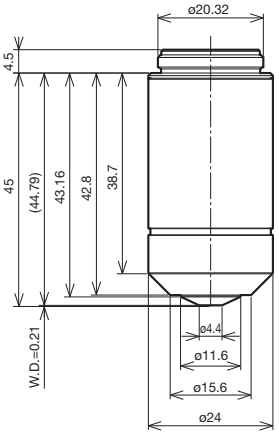
MPLN20X



MPLN50X



MPLN100X



Unit: mm

UIS2 Objectives					Widefield Eyepiece WHN10X FN 22		
Objective (magnification)	NA	W.D. (mm)	Focal Distance f (mm)	Weight (g)	Total Magnifications	Practical Field of View (mm)	Depth of Focus (µm)
MPLN5X	0.1	20	36	64	50	4.4	98
MPLN10X	0.25	10.6	18	80	100	2.2	18
MPLN20X	0.4	1.3	9	111	200	1.1	6.1
MPLN50X	0.75	0.38	3.6	13	500	0.44	1.4
MPLN100X	0.9	0.21	1.8	116	1000	0.22	0.73

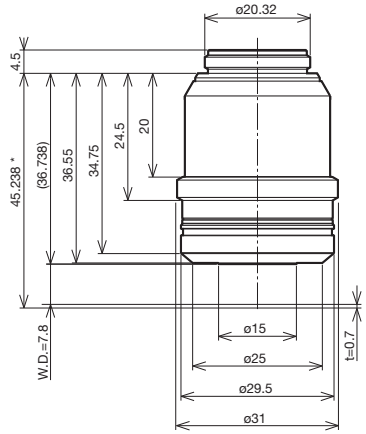
Screw: W20.32 × 0.706 (0.8” × 1/36”)

LCD Long WD M Plan SemiApochromat

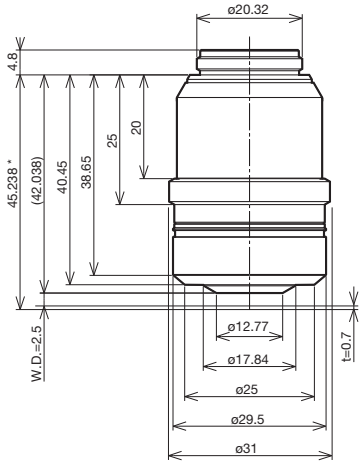
LCPLFLN-LCD series

Differentiated objective series for observation of LCD panels and other samples through a glass substrate. Aberration correction matched to the glass thickness is accomplished using a correction collar.

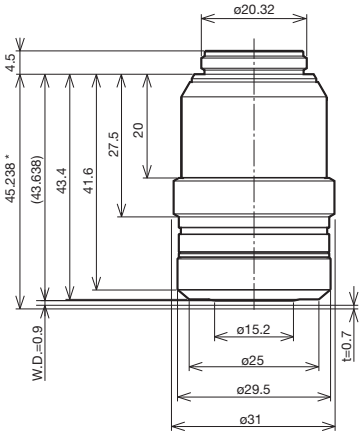
LCPLFLN20XLCD



LCPLFLN50XLCD



LCPLFLN100XLCD



*Value at glass thickness 0.7 mm observation.

Unit: mm

Objective	LCPLFLN20XLCD			LCPLFLN50XLCD			LCPLFLN100XLCD		
Corresponding Glass Thickness (mm)	0–1.2			0–1.2			0–0.7		
Correction Collar Indication	0	0.7	1.2	0	0.7	1.2	0	0.5	0.7
W.D. (mm)	8.3	7.8	7.4	3	2.5	2.2	1.2	0.98	0.9
Correction System	Correction Collar			Correction Collar			Correction Collar		

UIS2 Objectives					Widefield Eyepiece WHN10X FN 22			Super widefield Eyepiece SWH10X FN 26.5		
Objective (magnification)	NA	W.D.** (mm)	Focal Distance f (mm)	Weight (g)	Total Magnifications	Practical Field of View (mm)	Depth of Focus (µm)	Total Magnifications	Practical Field of View (mm)	Depth of Focus (µm)
LCPLFLN20XLCD	0.45	7.8	9	146	200	1.1	5.2	200	1.3	5.2
LCPLFLN50XLCD	0.7	2.5	3.6	170	500	0.44	1.6	500	0.53	1.6
LCPLFLN100XLCD	0.85	0.9	1.8	185	1000	0.22	0.79	1000	0.27	0.79

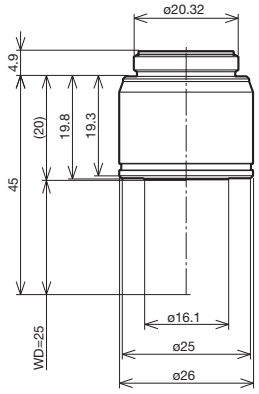
Screw: W20.32 × 0.706 (0.8” × 1/36”)
**The figure shown here is the value when the correction collar indication is 0.7.

Super Long WD M Plan Achromat

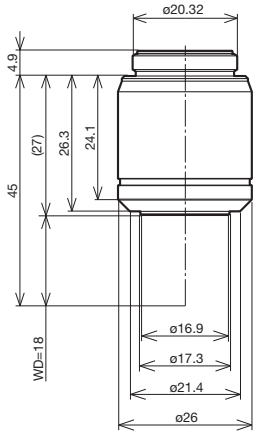
SLMPLN series

Plan Achromat objectives with high magnification and super long working distance. Three magnifications, 20X, 50X and 100X are available. For 5X or 10X objectives, select from the LMPLFLN series.

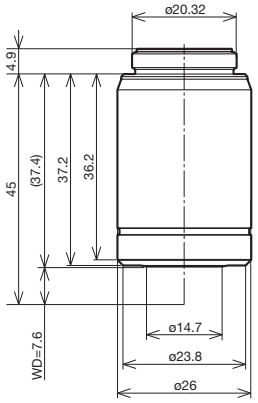
SLMPLN20X



SLMPLN50X



SLMPLN100X



Unit: mm

UIS2 Objectives					Widefield Eyepiece WHN10X FN 22			Super Widefield Eyepiece SWH10X FN 26.5		
Objective (magnification)	NA	W.D. (mm)	Focal Distance f (mm)	Weight (g)	Total Magnifications	Practical Field of View (mm)	Depth of Focus (µm)	Total Magnifications	Practical Field of View (mm)	Depth of Focus (µm)
SLMPLN20X	0.25	25	9	56	200	1.1	11.4	200	1.3	11.4
SLMPLN50X	0.35	18	3.6	74	500	0.44	4.2	500	0.53	4.2
SLMPLN100X	0.6	7.6	1.8	100	1000	0.22	1.3	1000	0.27	1.3

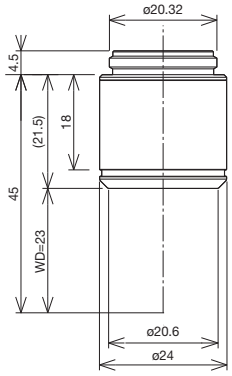
Screw: W20.32 × 0.706 (0.8” × 1/36”)

IR Long WD M Plan Achromat

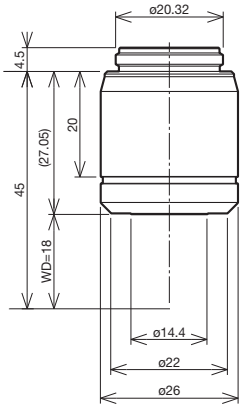
LMPLN-IR series

Objective series exclusive for the near-infrared microscopy largely of the internal structure in silicon wafers.

LMPLN5XIR



LMPLN10XIR



Unit: mm

UIS Objectives				
Objective (magnification)	NA	W.D. (mm)	Focal Distance f (mm)	Weight (g)
LMPLN5XIR	0.1	23	36	55
LMPLN10XIR	0.3	18	18	78

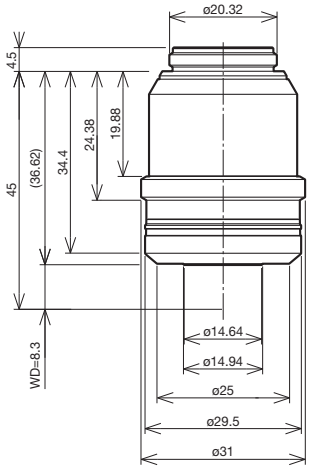
Screw: W20.32 × 0.706 (0.8” × 1/36”)

IR M Plan Achromat

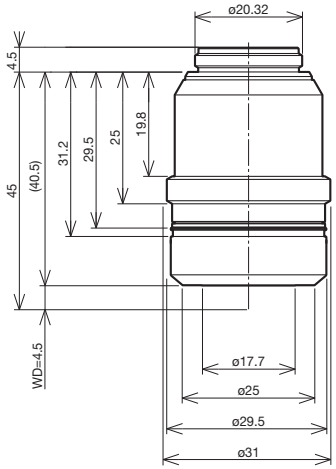
LCPLN-IR series

Exclusive for the near-infrared microscopy largely of the internal structure in silicon wafers, LCPLN-IR series has correction collar for aberration dependent on thickness of silicon or glass substrate.

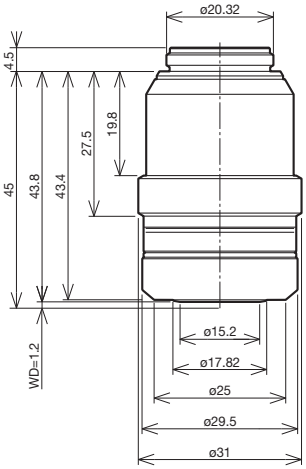
LCPLN20XIR



LCPLN50XIR



LCPLN100XIR



Unit: mm

Silicon thickness correction

Objective	LCPLN20XIR			LCPLN50XIR			LCPLN100XIR		
Corresponding Silicon Thickness (mm)	0–1.2			0–1.2			0–1.0		
Correction Collar Indication	0	0.7	1.2	0	0.6	1.2	0	0.5	1
W.D.* (mm)	8.3	8.2	8	4.5	4.3	4.1	1.2	1.1	1
Correction System	Correction Collar			Correction Collar			Correction Collar		

*With the use of 1100 nm laser.

Silicon thickness correction

Objective	LCPLN20XLCD			LCPLN50XLCD		LCPLN100XLCD	
Corresponding Glass Thickness (mm)	0–1.2			0–1.2		0–0.7	
Correction Collar Indication	0	0.7	1.2	0	1.2	0	0.7
W.D.* (mm)	8.3	7.9	7.6	4.5	3.7	1.2	0.9
Correction System	Correction Collar			Correction Collar		Correction Collar	

*With the use of 1064 nm laser.

UIS2 Objectives				
Objective (magnification)	NA*	W.D.* (mm)	Focal Distance f (mm)	Weight (g)
LCPLN20XIR	0.45	8.3	9	149
LCPLN50XIR	0.65	4.5	3.6	169
LCPLN100XIR	0.85	1.2	1.8	184

Screw: W20.32 × 0.706 (0.8” × 1/36”)
*The figure shown here is the value when the correction collar indication is 0.

M Plan SemiApochromat BD

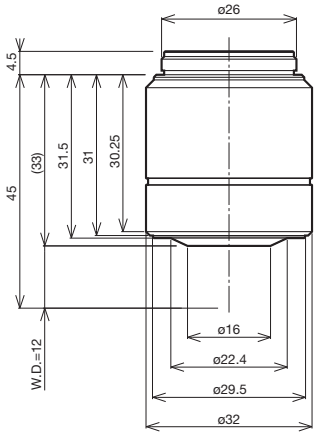
(BD: Brightfield/Darkfield)

MPLFLN-BD series

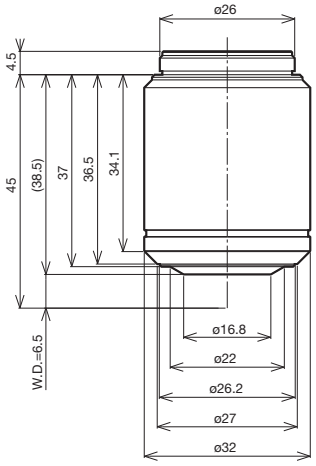
UIS2 World-leading optics

Plan SemiApochromat objectives, giving high-level correction for chromatic aberration. The series provides a W.D. of 1 mm or longer. Since the exit pupil position of the 5X-150X objectives is standardized, the position of the DIC prism does not have to be switched when changing the magnification.

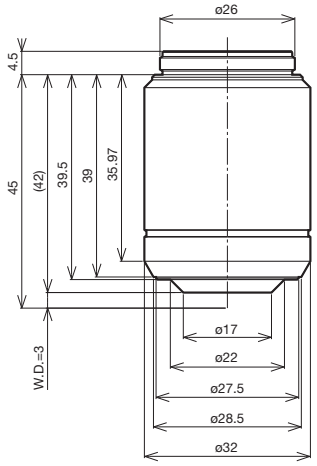
MPLFLN5XBD



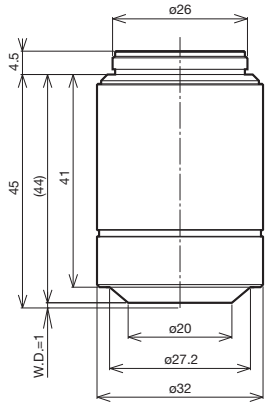
MPLFLN10XBD



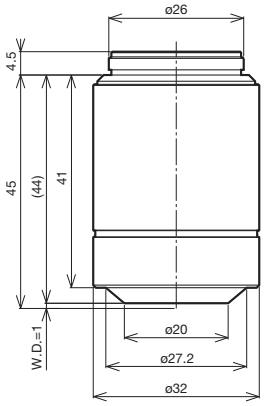
MPLFLN20XBD



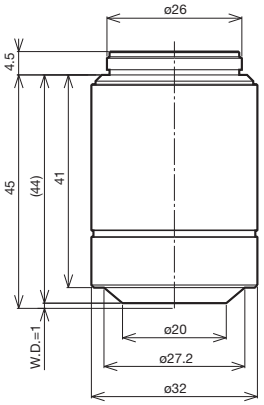
MPLFLN50XBD



MPLFLN100XBD



MPLFLN150XBD



Unit: mm

UIS2 Objectives					Widefield Eyepiece WHN10X FN 22			Super Widefield Eyepiece SWH10X FN 26.5		
Objective (magnification)	NA	W.D. (mm)	Focal Distance f (mm)	Weight (g)	Total Magnifications	Practical Field of View (mm)	Depth of Focus (µm)	Total Magnifications	Practical Field of View (mm)	Depth of Focus (µm)
MPLFLN5XBD	0.15	12	36	95.5	50	4.4	59	50	5.3	59
MPLFLN10XBD	0.3	6.5	18	82.8	100	2.2	15	100	2.7	15
MPLFLN20XBD	0.45	3	9	87.7	200	1.1	5.2	200	1.3	5.2
MPLFLN50XBD	0.8	1	3.6	99.8	500	0.44	1.3	500	0.53	1.3
MPLFLN100XBD	0.9	1	1.8	98.9	1000	0.22	0.73	1000	0.27	0.73
MPLFLN150XBD	0.9	1	1.2	104.8	1500	0.15	0.6	1500	0.18	0.6

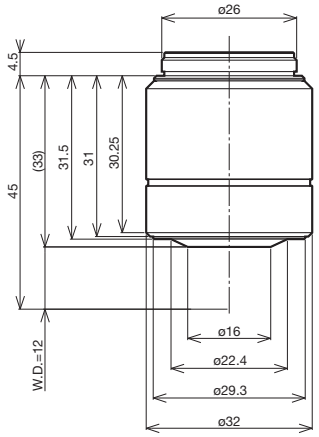
Screw: W26 × 0.706

M Plan SemiApochromat BDP

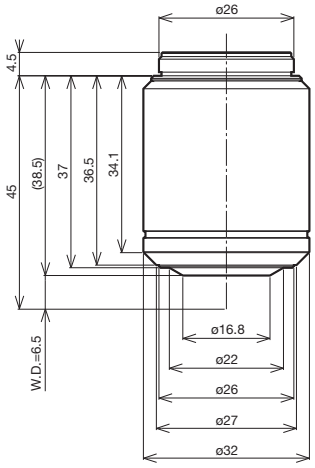
MPLFLN-BDP series

Plan SemiApochromat objectives, giving high-level correction for chromatic aberration. The series provides a W.D. of 1 mm or longer. Since the exit pupil position of the 5X-100X objectives is standardized, the position of the DIC prism does not have to be switched when changing the magnification. The BDP series optimizing brightfield/darkfield and polarized light characteristics is appropriate for Nomarski DIC and polarized light observations.

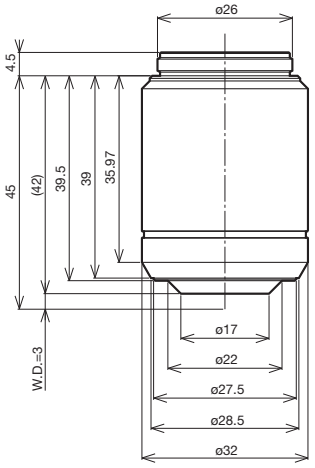
MPLFLN5XBDP



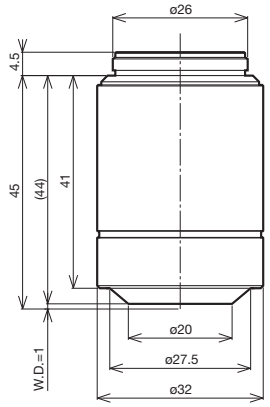
MPLFLN10XBDP



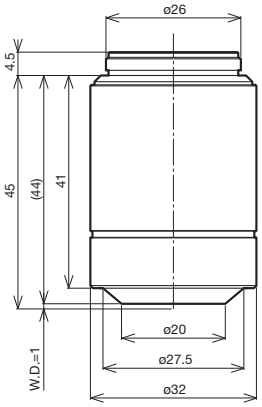
MPLFLN20XBDP



MPLFLN50XBDP



MPLFLN100XBDP



Unit: mm

UIS2 Objectives					Widefield Eyepiece WHN10X FN 22			Super Widefield Eyepiece SWH10X FN 26.5		
Objective (magnification)	NA	W.D. (mm)	Focal Distance f (mm)	Weight (g)	Total Magnifications	Practical Field of View (mm)	Depth of Focus (µm)	Total Magnifications	Practical Field of View (mm)	Depth of Focus (µm)
MPLFLN5XBDP	0.15	12	36	95.5	50	4.4	59	50	5.3	59
MPLFLN10XBDP	0.25	6.5	18	83.3	100	2.2	18	100	2.7	18
MPLFLN20XBDP	0.4	3	9	88.5	200	1.1	6.1	200	1.3	6.1
MPLFLN50XBDP	0.75	1	3.6	100.5	500	0.44	1.4	500	0.53	1.4
MPLFLN100XBDP	0.9	1	1.8	101.5	1000	0.22	0.73	1000	0.27	0.73

Screw: W26 × 0.706

Long WD M Plan SemiApochromat BD

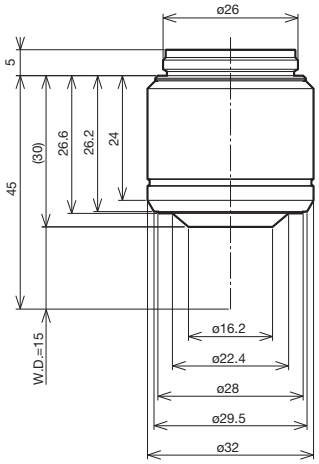
(BD: Brightfield/Darkfield)

LMPLFLN-BD series

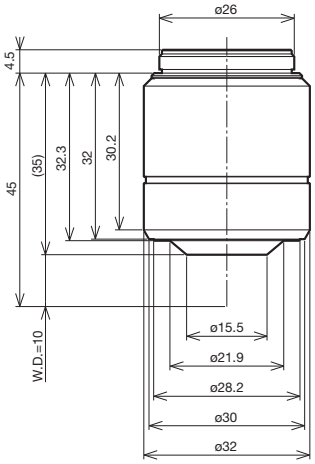
UIS2 World-leading optics

Long working distance Plan SemiApochromat objectives, giving high-level correction for chromatic aberration. Suitable with samples having a height difference and in preventing collision, as the working distance is long. Also, since the exit pupil position of the 5X-100X objectives is standardized, the position of the DIC prism does not have to be switched when changing the magnification.

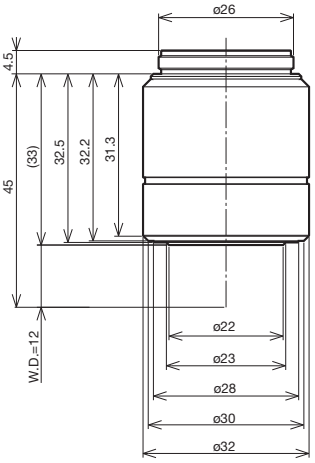
LMPLFLN5XBD



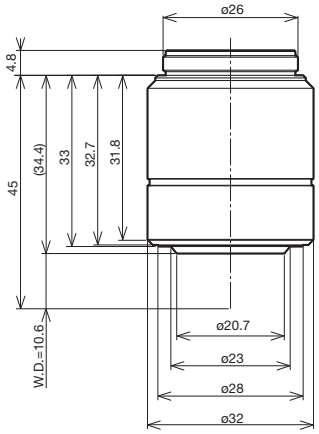
LMPLFLN10XBD



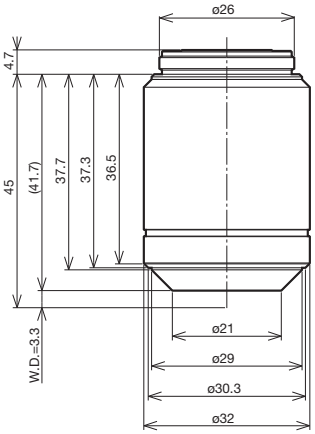
LMPLFLN20XBD



LMPLFLN50XBD



LMPLFLN100XBD



Unit: mm

UIS2 Objectives					Widefield Eyepiece WHN10X FN 22			Super Widefield Eyepiece SWH10X FN 26.5		
Objective (magnification)	NA	W.D. (mm)	Focal Distance f (mm)	Weight (g)	Total Magnifications	Practical Field of View (mm)	Depth of Focus (µm)	Total Magnifications	Practical Field of View (mm)	Depth of Focus (µm)
LMPLFLN5XBD	0.13	15	36	81	50	4.4	70	50	5.3	70
LMPLFLN10XBD	0.25	10	18	84	100	2.2	18	100	2.7	18
LMPLFLN20XBD	0.4	12	9	86	200	1.1	6.1	200	1.3	6.1
LMPLFLN50XBD	0.5	10.6	3.6	85	500	0.44	2.5	500	0.53	2.5
LMPLFLN100XBD	0.8	3.3	1.8	102	1000	0.22	0.87	1000	0.27	0.87

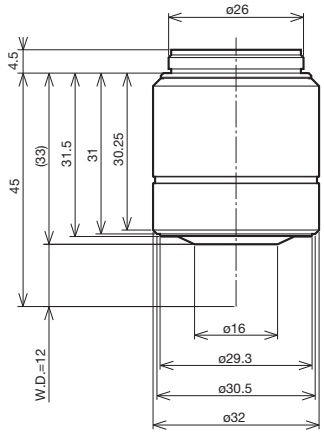
Screw: W26 × 0.706

M Plan Achromat BD

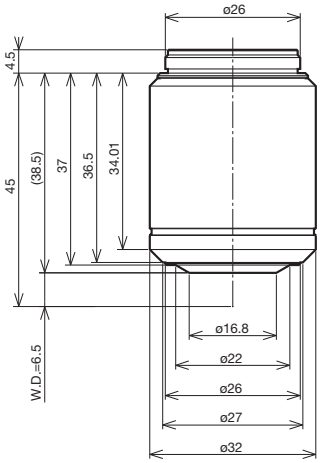
MPLN-BD series

Plan Achromat objectives providing excellent image flatness up to FN 22.

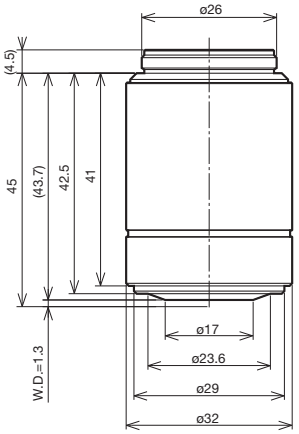
MPLN5XBD



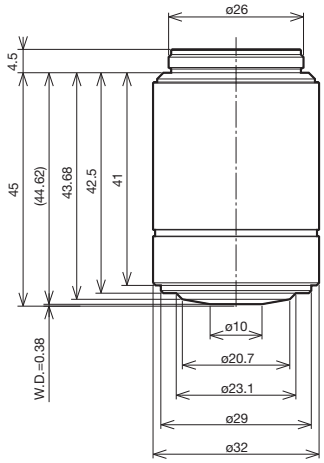
MPLN10XBD



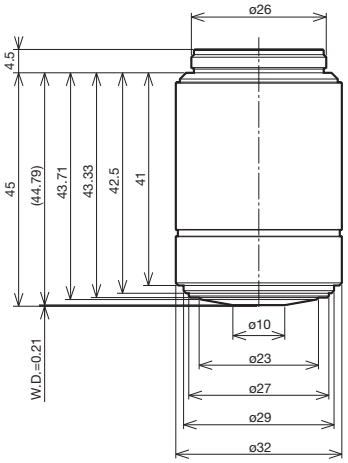
MPLN20XBD



MPLN50XBD



MPLN100XBD



Unit: mm

UIS2 Objectives					Widefield Eyepiece WHN10X FN 22		
Objective (magnification)	NA	W.D. (mm)	Focal Distance f (mm)	Weight (g)	Total Magnifications	Practical Field of View (mm)	Depth of Focus (µm)
MPLN5XBD	0.1	12	36	137	50	4.4	98
MPLN10XBD	0.25	6.5	18	155	100	2.2	18
MPLN20XBD	0.4	1.3	9	162	200	1.1	6.1
MPLN50XBD	0.75	0.38	3.6	157	500	0.44	1.4
MPLN100XBD	0.9	0.21	1.8	160	1000	0.22	0.73

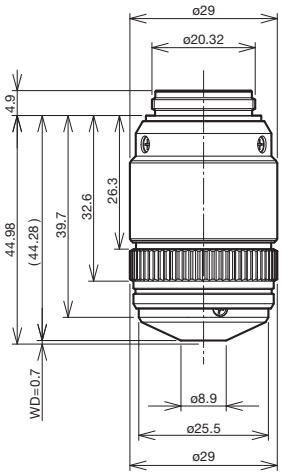
Screw: W26 × 0.706

White Light Interferometry Objective

WLI100XMRTC

This objective is designed for the Mirau style of white light interferometers and maintains a high level of temperature tolerance. The optimized NA of 0.8 provides improved light gathering, with a working distance of 0.7 mm.

WLI100XMRTC



unit: mm

Objective (Magnification)	NA	W.D. (mm) *	Cover Glass Thickness (mm)	Immersion	Spring	Fluorescence **	FN
WLI100XMRTC	0.8	0.7	0	—	—	—	22.0

Screw: W20.32 × 0.706 (0.8” × 1/36”)

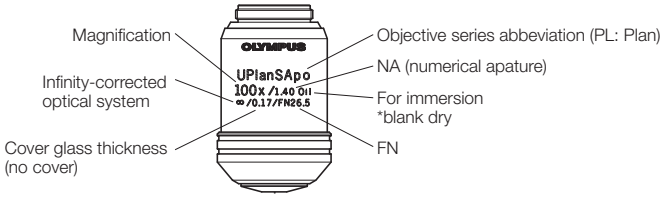
UIS2 Objectives (for Life Science Microscope)

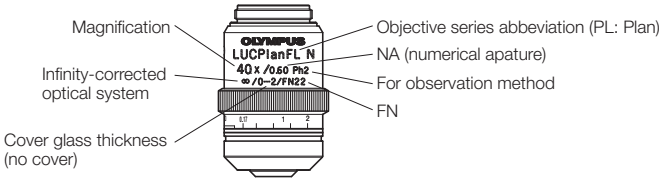
■ Definition for Objective Abbreviations

U PL (Plan) FL N 60X OI PH

- **U:** Universal objectives for fluorescence (U/BG) and DIC
  L: Long working distance
  C: Tissue culture observations through bottles and dishes
  M: For no cover observation
  ***XL:** Extra Large. Parfocal length exceeds 45 mm (e.g. XLUMPLFL20XW 75 mm)
- **PL (or PLN):** Plan/Corrects field curvature of the periphery of the image plane
  None: Non-Plan
- **ACHN:** Achromat/Corrects aberration at 2 wavelengths of blue and red
  FLN: SemiApochromat/Corrects chromatic aberration in the visible range (violet to red)
  APON: Apochromat/Optimally corrects chromatic aberration in the entire visible band (violet to red)
  SAPO: Super apochromat optimally corrects chromatic aberration in the entire visible band (violet to NIR)
- **Number:** Objective magnification
- **None:** Dry
  O: Oil immersion
  W: Water immersion
  S: Silicone immersion
  OI: Oil immersion with iris
- **None:** Brightfield
  P: Polarizing
  PH: Phase contrast
  PHP: Pre-center phase contrast
  RC: Relief contrast
  CY: Equiped with ND filter
  TIRF: High contrast TIRF imaging
  340 : High transmission at 340 nm wave length

■ Objective Notation





■ Objective series List

Objective series for standard biological samples

Series	Magnification	BF	DF	DIC*	POL	FL	FN	Remarks
UPLSAPO	4X/10X/20X/20XO/40X/60XO/60XW/100XO	○	10X/20X/20XO	○ (except 4X)	○	○	26.5	
PLAPON	1.25X/2X/60XO	○		60XO	60XO	60XO	26.5	
UPLFLN	4X/10X/20X/40X/40XO/60X/60XOI/100XO/100XOI	○	10X/20X/40X/60XOI/100XOI	○ (except 4X)	○	○	26.5	
PLFLN	100X	○				○	26.5	
PLN	2X/4X/10X/20X/40X/50XOI/100XO	○	10X/20X/40X/50XOI	10X/20X/40X/50XOI		○	22	
UPLFLN-PH	4XPH/10XPH/20XPH/40XPH/60XOIPH/100XOPH	○	10XPH/20XPH/40XPH/60XOIPH			○	26.5	
PLN-PH	10XPH/20XPH/40XPH/100XOPH	○	○ (excpet 100XOPH)				22	
UPLFLN-P	4XP/10XP/20XP/40XP/100XOP	○	10XP/20XP/40XP	○ (except 4XP)	○	○	26.5	
PLN-P/ACHN-P	4XP/10XP/20XP/40XP/100XOP	○	10XP/20XP/40XP		○	○	22	
PLN-CY	2XCY/4XCY/10XCY/20XCY/(FLN) 10XCY	○					22	PLFLN10XCY FN 26.5

*There objectives are suitable for standard biological samples embeded on slide glass with 0.17 mm cover slip and mainly used with upright microscopes.

Objective series for cultured samples

Series	Magnification	BF	DF	DIC	POL	FL	FN	Remarks
LUCPLFLN	20X/40X/60X	○	○	○	○	○	22	
LUCPLFLN-RC/ UCPLFLN-RC	10XRC/20XRC/40XRC	○	○			○	22	
LUCPLFLN-PH/ UCPLFLN-PH	10XPH/20XPH/40XPH/60XPH	○	○			○	22	
CPLN-PH/ LCACHN-PH	10XPH/20XPH/40XPH	○	○				22	
CPLN-RC/ LCACHN-RC	10XRC/20XRC/40XRC	○	○				22	

These objectives are suitable for cultured tissue/cell observation in dish/ bottle or micro-plate and mainly used with inverted microscopes.

Objective series for special applications

Series	Magnification	BF	DF	DIC	POL	FL	FN	Remarks
LUMPLFLN/ UMPLFLN	10XW/20XW/40XW/60XW	○	10XW/20XW	○	○	○	26.5	
XLUMPLFLN	20XW	○		○		○	22	Perocal length 75 mm
APON 340	20XW/40XO/40XW	○	20XW/40XW	○	○	○	22	
TIRF Objectives	60XO/100XHO/100XO/150XO	○		○	○	○	22	

■ Features of Objective Series (Please refer to the following page in the detail for each Objective.)

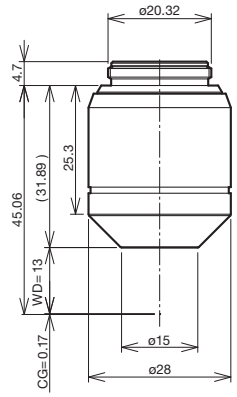
- UPLSAPO: Universal Plan Super Apochromat — P 3-16
- PLAPON: Plan Apochromat — P 3-18
- UPLFLN: Universal Plan Semi Apochromat/Plan Semi Apochromat — P 3-19
- PLN: Plan Achromat — P 3-21
- UPLFLN-PH UPlanFl-P Universal Plan Semi Apochromat for Phase Contrast — P 3-23
- PLN-PH: Plan Achromat for Phase Contrast — P 3-24
- UPLFLN-P: UPlanFl-P Universal Plan Semi Apochromat for Polarizing. — P 3-25
- PLN/ACHN-P: Achromat for Polarizing. — P 3-26
- PLN-CY: Plan Achromat (ND) — P 3-27
- LUCPLFLN, UCPLFLN: Long Working Distance Universal Plan Semi Apochromat — P 3-28
- LUCPLFLN/UCPLFLN-RC: Long Working Distance Universal Plan Semi Apochromat for Relief Contrast — P 3-29
- LUCPLFLN/UCPLFLN-PH: Long Working Distanse Universal Plan Semi Apochromat for Phase Contrast — P 3-30
- CPLN/LCACHN-PH: Culture Specimen Objectives for Phase Contrast — P 3-31
- CPLN/LCACHN-RC: Culture Specimen Objectives for Relief Contrast — P 3-32
- LUMPLFLN/UMPLFLN: No Cover Water Imarsion for Fixed Stage Upright Microscope — P 3-33
- XLUMPLFLN: No Cover Water Imarsion for Fixed Stage Upright Microscope — P 3-34
- APON 340: Universal Apochromat — P 3-35
- TIRF Objectives — P 3-36

Universal Plan Super Apochromat

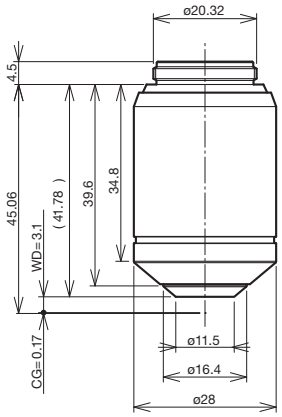
UPLSAPO series

The UPLSAPO Super Apochromat objectives fully compensate for both spherical and chromatic aberrations from the UV to the near-infrared region. The high sensitivity to fluorescence emissions allows the acquisition of sharp, clear images, without color shift, even in brightfield and Nomarski DIC observations. For quality and performance, they offer an unbeatable solution to every kind of digital imaging need.

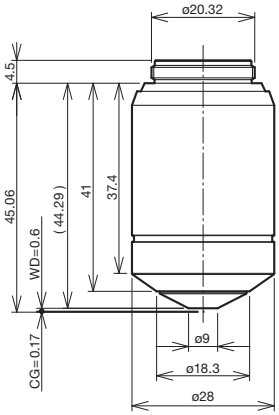
UPLSAPO4X



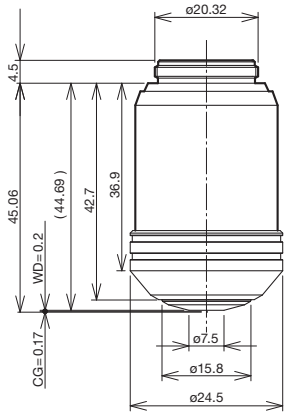
UPLSAPO10X2



UPLSAPO20X



UPLSAPO20XO



unit: mm

Objectives (Magnification)	NA	W.D. (mm) *	Cover Glass Thickness (mm)	Immersion	Spring	Fluorescence **	FN
UPLSAPO4X	0.16	13.0	—	—	—	U/BG/IR	26.5
UPLSAPO10X2	0.40	3.1	0.17	—	—	U/BG/IR	26.5
UPLSAPO20X	0.75	0.6	0.17	—	Yes	U/BG/IR	26.5
UPLSAPO20XO	0.85	0.2	—	Oil	Yes	U/BG/IR	26.5

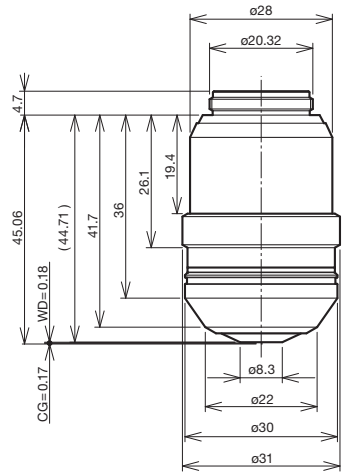
Screw: W20.32 × 0.706 (0.8" × 1/36")
*Defined with cover glass thickness shown as "CG" in the above drawings.
**U: UV excitation, BG: Visible Excitation, IR: Near IR. "( )" indicates that fluorescence might be slightly darker.

Universal Plan Super Apochromat

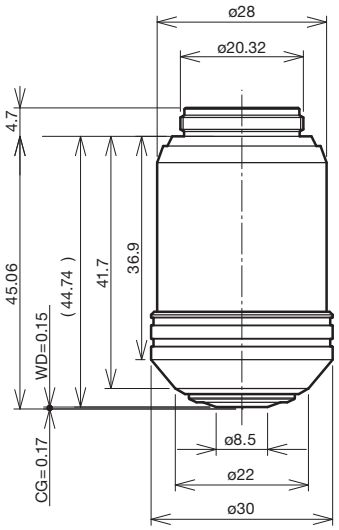
UPLSAPO series

The UPLSAPO Super Apochromat objectives fully compensate for both spherical and chromatic aberrations from the UV to the near-infrared region. The high sensitivity to fluorescence emissions allows the acquisition of sharp, clear images, without color shift, even in brightfield and Nomarski DIC observations. For quality and performance, they offer an unbeatable solution to every kind of digital imaging need.

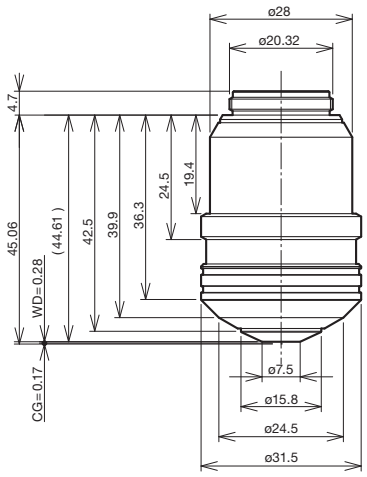
UPLSAPO40X2



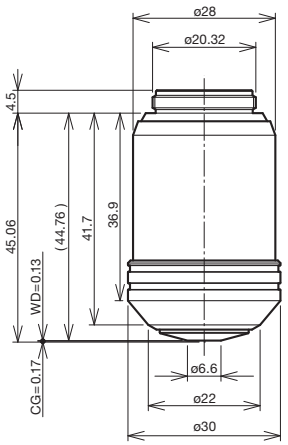
UPLSAPO60XO



UPLSAPO60XW



UPLSAPO100XO



unit: mm

Objectives (Magnification)	NA	W.D. (mm) *	Cover Glass Thickness (mm)	Immersion	Spring	Fluorescence **	FN
UPLSAPO40X2	0.95	0.18	0.11-0.23	—	Yes	U/BG/IR	26.5
UPLSAPO60XO	1.35	0.15	0.17	Oil	Yes	U/BG/IR	26.5
UPLSAPO60XW	1.20	0.28	0.13-0.21	Water	Yes	U/BG/IR	26.5
UPLSAPO100XO	1.40	0.13	0.17	Oil	Yes	U/BG/IR	26.5

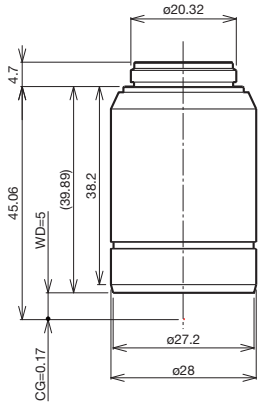
Screw: W20.32 × 0.706 (0.8" × 1/36")
*Defined with cover glass thickness shown as "CG" in the above drawings.
**U: UV excitation, BG: Visible Excitation, IR: Near IR. "( )" indicates that fluorescence might be slightly darker.

Plan Apochromat

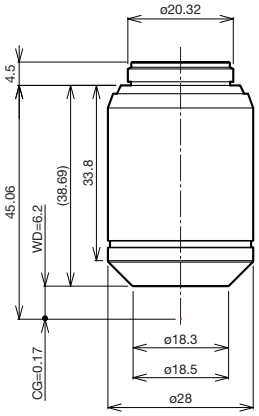
PLAPON series

The PLAPON Apochromat objectives display flat images from high transmission factors up to the near-infrared region of the spectrum. The high sensitivity to fluorescence emissions allows the acquisition of sharp, clear images, without color shift, even in brightfield and Nomarski DIC observations. For quality and performance, they offer an unbeatable solution to every kind of digital imaging need.

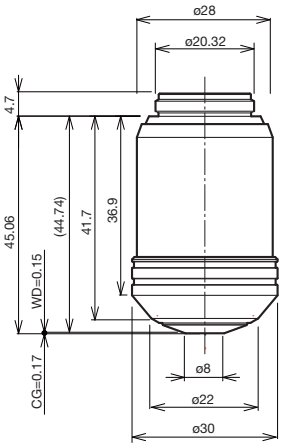
PLAPON1.25X



PLAPON2X



PLAPON60XO



unit: mm

Objectives (Magnification)	NA	W.D. (mm) *	Cover Glass Thickness (mm)	Immersion	Spring	Fluorescence **	FN
PLAPON1.25X	0.04	5.0	—	—	—	(BG)(/IR)	26.5
PLAPON2X	0.08	6.2	—	—	—	(BG)(/IR)	26.5
PLAPON60XO	1.42	0.15	0.17	Oil	Yes	(U)/BG/IR ***	26.5

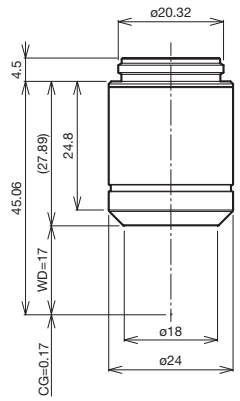
Screw: W20.32 × 0.706 (0.8" × 1/36")
*Defined with cover glass thickness shown as "CG" in the above drawings.
**U: UV excitation, BG: Visible Excitation, IR: Near IR. "( )" indicates that fluorescence might be slightly darker.
***IR excitation might cause out of focus slightly.

Universal Plan Semi Apochromat/Plan Semi Apochromat

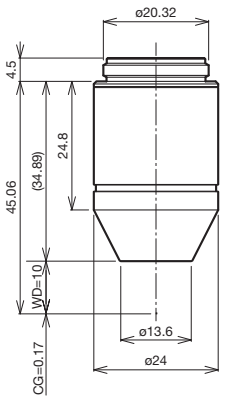
UPLFLN, PLFLN series

The UPLFLN and PLFLN objectives display flat images from high transmission factors up to the near-infrared region of the spectrum. With their high S/N ratio, high resolution and contrast imaging, they are especially effective in brightfield and Nomarski DIC observations. For quality and performance, they offer an unbeatable solution to every kind of digital imaging need.

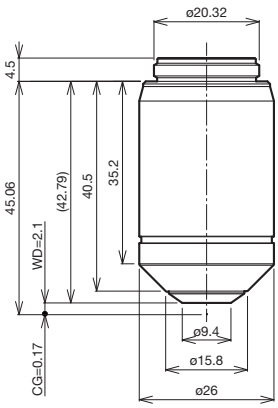
UPLFLN4X



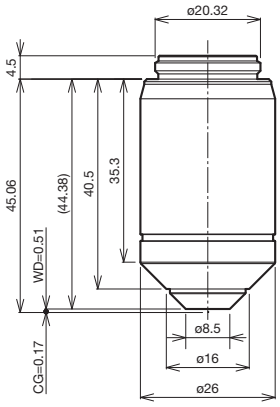
UPLFLN10X2



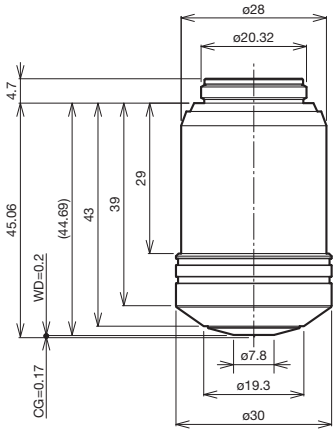
UPLFLN20X



UPLFLN40X



UPLFLN40XO



unit: mm

Objectives (Magnification)	NA	W.D. (mm) *	Cover Glass Thickness (mm)	Immersion	Spring	Fluorescence **	FN
UPLFLN4X	0.13	17	—	—	—	(U)(/BG)(/IR)	26.5
UPLFLN10X2	0.30	10	—	—	—	U/BG/IR ***	26.5
UPLFLN20X	0.50	2.1	0.17	—	Yes	U/BG/IR ***	26.5
UPLFLN40X	0.75	0.51	0.17	—	Yes	U/BG/IR ***	26.5
UPLFLN40XO	1.30	0.2	0.17	Oil	Yes	U/BG/IR ***	26.5

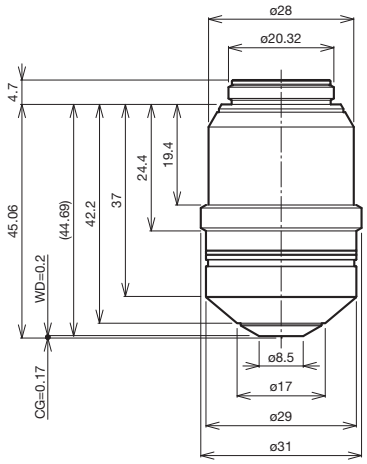
Screw: W20.32 × 0.706 (0.8" × 1/36")
*Defined with cover glass thickness shown as "CG" in the above drawings.
**U: UV excitation, BG: Visible Excitation, IR: Near IR. "( )" indicates that fluorescence might be slightly darker.
***IR excitation might cause out of focus slightly.

Universal Plan Semi Apochromat/Plan Semi Apochromat

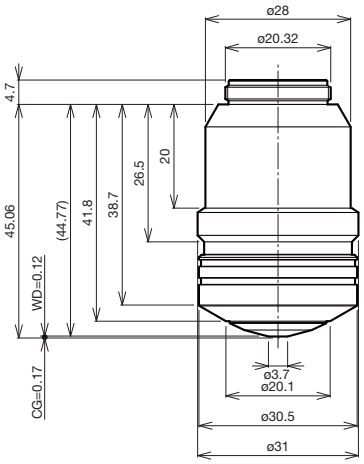
UPLFLN, PLFLN series

The UPLFLN and PLFLN objectives display flat images from high transmission factors up to the near-infrared region of the spectrum. With their high S/N ratio, high resolution and contrast imaging, they are especially effective in brightfield and Nomarski DIC observations. For quality and performance, they offer an unbeatable solution to every kind of digital imaging need.

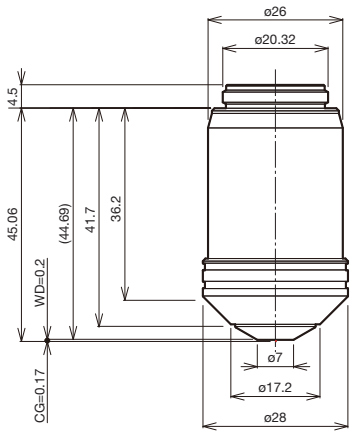
UPLFLN60X



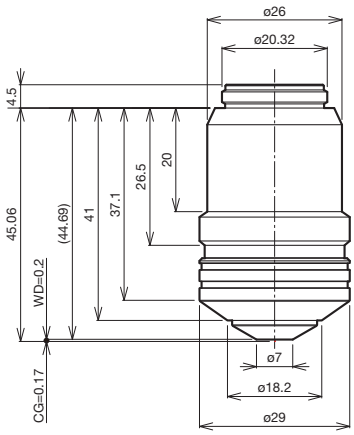
UPLFLN60XOI



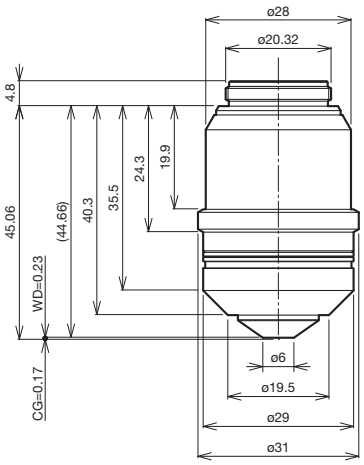
UPLFLN100XO2



UPLFLN100XOI2



PLFLN100X



unit: mm

Objectives (Magnification)	NA	W.D. (mm) *	Cover Glass Thickness (mm)	Immersion	Spring	Fluorescence **	FN
UPLFLN60X	0.90	0.2	0.11-0.23	—	Yes	U/BG/IR ***	26.5
UPLFLN60XOI	1.25-0.65	0.12	0.17	Oil	Yes	U/BG/IR ***	26.5
UPLFLN100XO2	1.30	0.2	0.17	Oil	Yes	U/BG/IR ***	26.5
UPLFLN100XOI2	1.3-0.6	0.2	0.17	Oil	Yes	U/BG/IR ***	26.5
PLFLN100X	0.95	0.2	0.14-0.2	—	Yes	BG	26.5

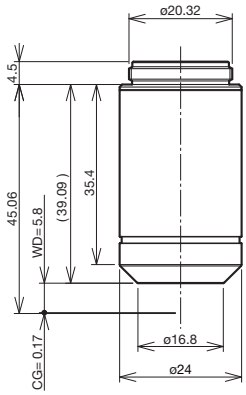
Screw: W20.32 × 0.706 (0.8" × 1/36")
*Defined with cover glass thickness shown as "CG" in the above drawings.
**U: UV excitation, BG: Visible Excitation, IR: Near IR. "( )" indicates that fluorescence might be slightly darker.
***IR excitation might cause out of focus slightly.

Plan Achromat

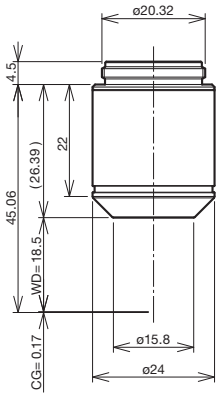
PLN series

The PLN standard objectives provide excellent field flatness with fluorescence, darkfield and brightfield observation in transmitted light. These objectives are suited to clinical laboratory and examination work.

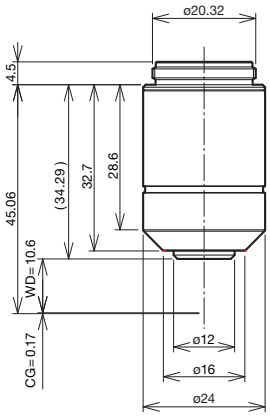
PLN2X



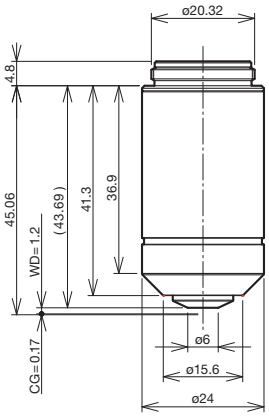
PLN4X



PLN10X



PLN20X



unit: mm

Objectives (Magnification)	NA	W.D. (mm) *	Cover Glass Thickness (mm)	Immersion	Spring	Fluorescence **	FN
PLN2X	0.06	5.8	—	—	—	(BG)	22.0
PLN4X	0.10	18.5	—	—	—	(BG)	22.0
PLN10X	0.25	10.6	—	—	—	(BG)	22.0
PLN20X	0.40	1.2	0.17	—	Yes	(BG)	22.0

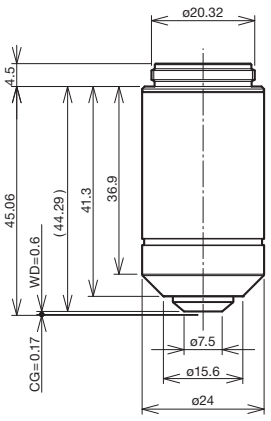
Screw: W20.32 × 0.706 (0.8" × 1/36")
*Defined with cover glass thickness shown as "CG" in the above drawings.
**U: UV excitation, BG: Visible Excitation, IR: Near IR. "( )" indicates that fluorescence might be slightly darker.

Plan Achromat

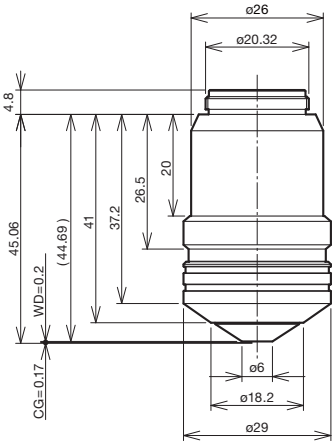
PLN series

The PLN standard objectives provide excellent field flatness with fluorescence, darkfield and brightfield observation in transmitted light. These objectives are suited to clinical laboratory and examination work.

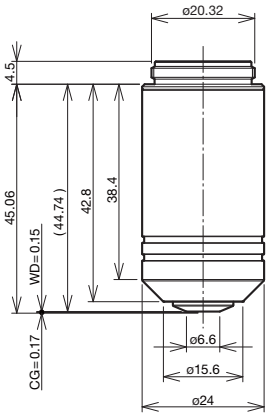
PLN40X



PLN50XOI



PLN100XO



unit: mm

Objectives (Magnification)	NA	W.D. (mm) *	Cover Glass Thickness (mm)	Immersion	Spring	Fluorescence **	FN
PLN40X	0.65	0.6	0.17	—	Yes	(BG)	22.0
PLN50XOI	0.9-0.5	0.2	—	Oil	Yes	(BG)	22.0
PLN100XO	1.25	0.15	—	Oil	Yes	(BG)	22.0

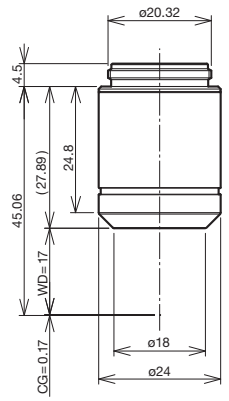
Screw: W20.32 × 0.706 (0.8" × 1/36")
*Defined with cover glass thickness shown as "CG" in the above drawings.
**U: UV excitation, BG: Visible Excitation, IR: Near IR. "( )" indicates that fluorescence might be slightly darker.

Universal Plan Semi Apochromat for Phase Contrast

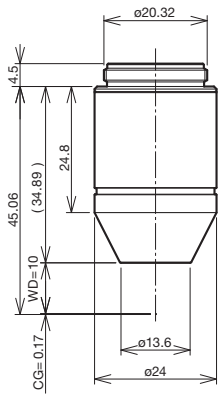
UPLFLN-PH series

The UPLFLN-PH objectives are especially effective in phase-contrast observations with their high S/N ratio, high resolution and contrast imaging. These objectives display flat images from high transmission factors up to the near-infrared region of the spectrum.

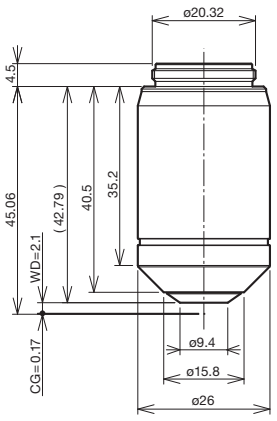
UPLFLN4XPH



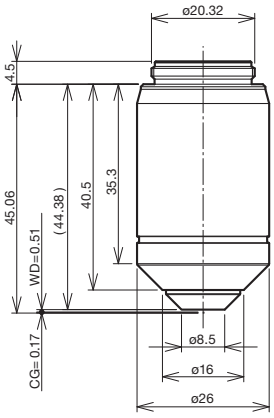
UPLFLN10X2PH



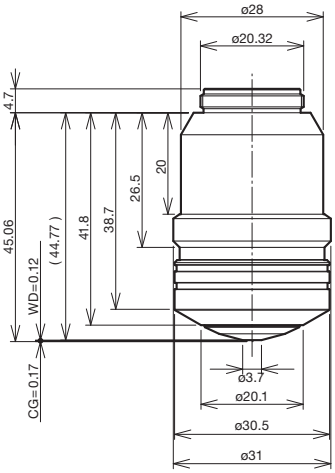
UPLFLN20XPH



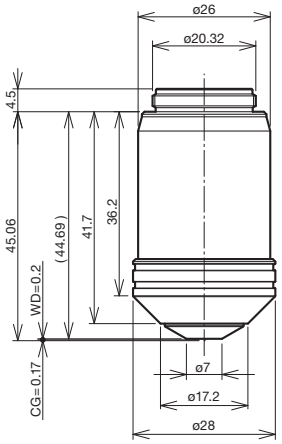
UPLFLN40XPH



UPLFLN60XOIPH



UPLFLN100XO2PH



unit: mm

Objectives (Magnification)	NA	W.D. (mm) *	Cover Glass Thickness (mm)	Immersion	Spring	Fluorescence **	FN
UPLFLN4XPH	0.13	17	—	—	—	U/BG/IR ***	26.5
UPLFLN10X2PH	0.30	10	—	—	—	U/BG/IR ***	26.5
UPLFLN20XPH	0.50	2.1	0.17	—	Yes	U/BG/IR ***	26.5
UPLFLN40XPH	0.75	0.51	0.17	—	Yes	U/BG/IR ***	26.5
UPLFLN60XOIPH	1.25-0.65	0.12	0.17	Oil	Yes	U/BG/IR ***	26.5
UPLFLN100XO2PH	1.30	0.2	0.17	Oil	Yes	U/BG/IR ***	26.5

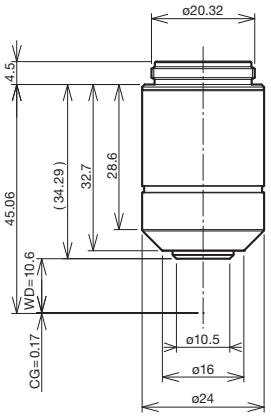
Screw: W20.32 × 0.706 (0.8" × 1/36")
*Defined with cover glass thickness shown as "CG" in the above drawings.
**U: UV excitation, BG: Visible Excitation, IR: Near IR. "( )" indicates that fluorescence might be slightly darker.
***IR excitation might cause out of focus slightly.

Plan Achromat for Phase Contrast

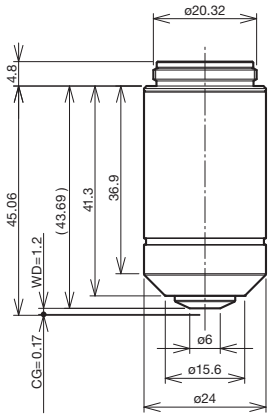
PLN-PH series

The PLN-PH standard objectives provide excellent field flatness with phase-contrast observation in transmitted light.

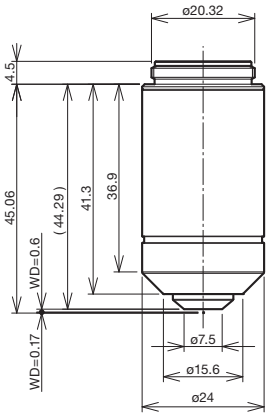
PLN10XPH



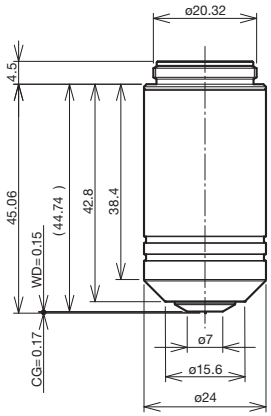
PLN20XPH



PLN40XPH



PLN100XOPH



unit: mm

Objectives (Magnification)	NA	W.D. (mm) *	Cover Glass Thickness (mm)	Immersion	Spring	Fluorescence **	FN
PLN10XPH	0.25	10.6	—	—	—	(BG)	22.0
PLN20XPH	0.40	1.2	0.17	—	Yes	(BG)	22.0
PLN40XPH	0.65	0.6	0.17	—	Yes	(BG)	22.0
PLN100XOPH	1.25	0.15	—	Oil	Yes	(BG)	22.0

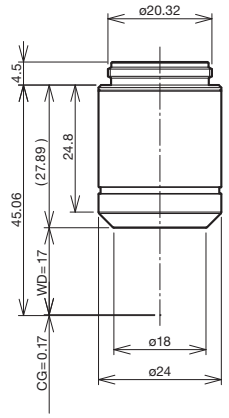
Screw: W20.32 × 0.706 (0.8" × 1/36")
*Defined with cover glass thickness shown as "CG" in the above drawings.
**U: UV excitation, BG: Visible Excitation, IR: Near IR. "( )" indicates that fluorescence might be slightly darker.

Universal Plan Semi Apochromat for Polarizing

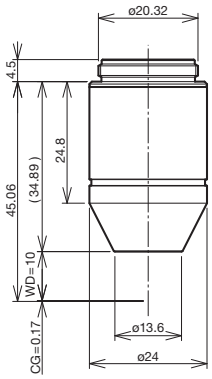
UPLFLN-P series

The UPLFLN-P universal objectives display flat images from high transmission factors up to the near-infrared region of the spectrum. These objectives reduce internal strain to a minimum and are proper for polarizing, Nomarski DIC, brightfield and fluorescence microscopy.

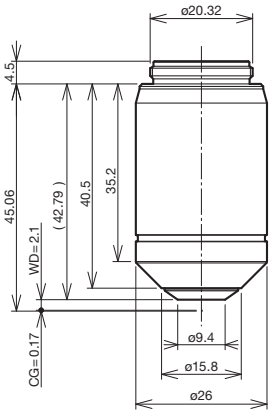
UPLFLN4XP



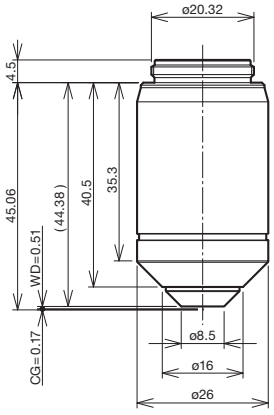
UPLFLN10XP



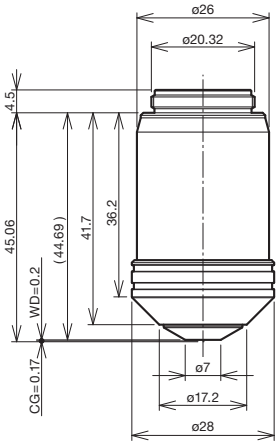
UPLFLN20XP



UPLFLN40XP



UPLFLN100XOP



unit: mm

Objectives (Magnification)	NA	W.D. (mm) *	Cover Glass Thickness (mm)	Immersion	Spring	Fluorescence **	FN
UPLFLN4XP	0.13	17	—	—	—	(U)(/BG)	26.5
UPLFLN10XP	0.30	10	—	—	—	U/BG	26.5
UPLFLN20XP	0.50	2.1	0.17	—	Yes	U/BG	26.5
UPLFLN40XP	0.75	0.51	0.17	—	Yes	U/BG	26.5
UPLFLN100XOP	1.30	0.2	0.17	Oil	Yes	U/BG	26.5

Screw: W20.32 × 0.706 (0.8" × 1/36")
*Defined with cover glass thickness shown as "CG" in the above drawings.
**U: UV excitation, BG: Visible Excitation, IR: Near IR. "( )" indicates that fluorescence might be slightly darker.

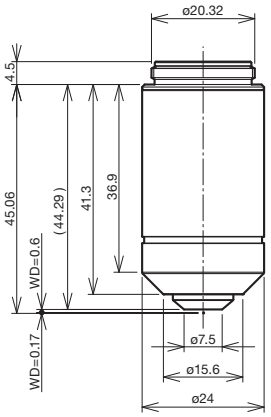
Achromat for Polarizing

PLN-P, ACHN-P series

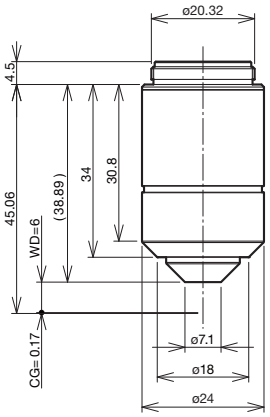
UIS2 World-leading optics

The PLN-P and ACHN-P cost-efficient objectives enable transmitted polarized light observations.

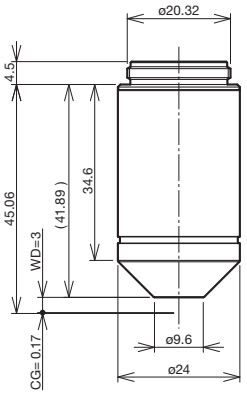
PLN4XP



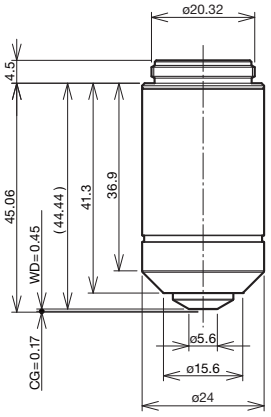
ACHN10XP



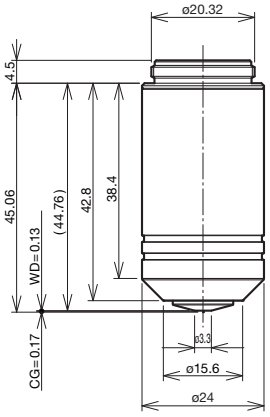
ACHN20XP



ACHN40XP



ACHN100XOP



unit: mm

Objectives (Magnification)	NA	W.D. (mm) *	Cover Glass Thickness (mm)	Immersion	Spring	Fluorescence **	FN
PLN4XP	0.10	18.5	—	—	—	(BG)	22.0
ACHN10XP	0.25	6	—	—	—	(BG)	22.0
ACHN20XP	0.40	3	0.17	—	—	(BG)	22.0
ACHN40XP	0.65	0.45	0.17	—	Yes	(BG)	22.0
ACHN100XOP	1.25	0.13	—	Oil	Yes	(BG)	22.0

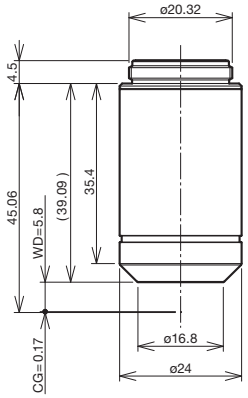
Screw: W20.32 × 0.706 (0.8" × 1/36")
*Defined with cover glass thickness shown as "CG" in the above drawings.
**U: UV excitation, BG: Visible Excitation, IR: Near IR. "( )" indicates that fluorescence might be slightly darker.

Plan Achromat (ND)

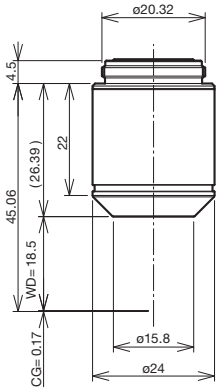
PLN-CY, PLFLN-CY series

The PLN-CY and PLFLN-CY standard objectives provide excellent field flatness. These objectives, equipped with ND filters, provide the same level of brightness even if the magnification is changed, thereby removing the need for brightness adjustment.

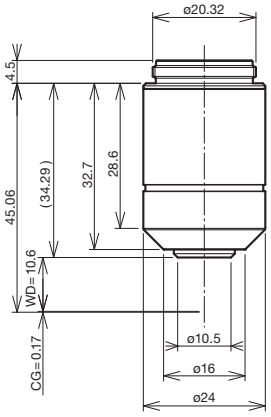
PLN2XCY



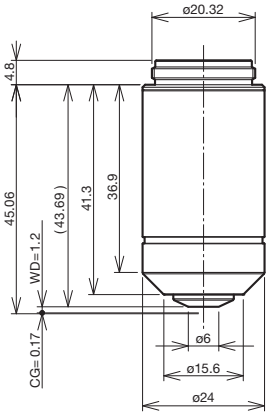
PLN4XCY



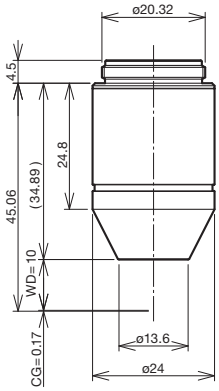
PLN10XCY



PLN20XCY



PLFLN10XCY



unit: mm

Objectives (Magnification)	NA	W.D. (mm) *	Cover Glass Thickness (mm)	Immersion	Spring	Fluorescence **	FN
PLN2XCY	0.06	5.8	—	—	—	—	22.0
PLN4XCY	0.10	18.5	—	—	—	—	22.0
PLN10XCY	0.25	10.6	—	—	—	(BG)	22.0
PLN20XCY	0.40	1.2	0.17	—	—	(BG)	22.0
PLFLN10XCY	0.30	9.9	—	—	—	BG	26.5

Screw: W20.32 × 0.706 (0.8" × 1/36")
*Defined with cover glass thickness shown as "CG" in the above drawings.
**U: UV excitation, BG: Visible Excitation, IR: Near IR. "( )" indicates that fluorescence might be slightly darker.

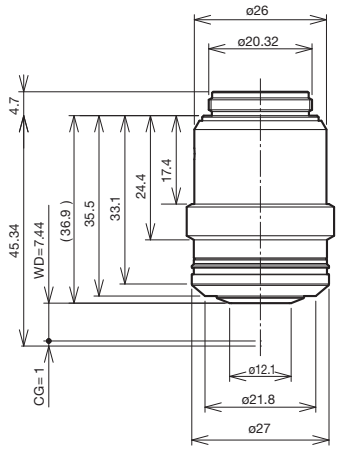
Long Working Distance Universal Plan Semi Apochromat

LUCPLFLN series

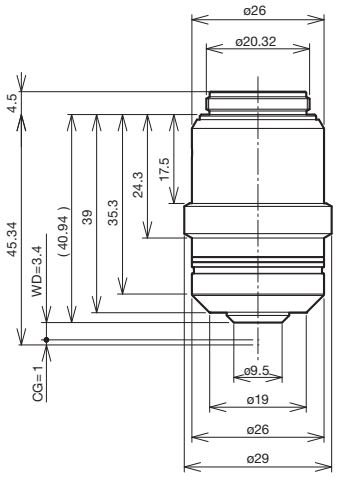
UIS2 World-leading optics

The LUCPLFLN long working distance, universal objectives display flat images from high transmission factors up to the near-infrared region of the spectrum. These objectives are dedicated to tissue culture observations through bottles and dishes, offering high contrast and resolution in brightfield, DIC and fluorescence observations.

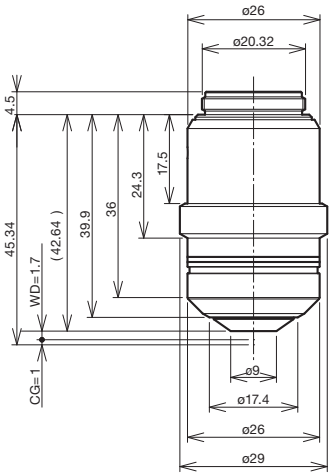
LUCPLFLN20X



LUCPLFLN40X



LUCPLFLN60X



unit: mm

Objectives (Magnification)	NA	W.D. (mm) *	Cover Glass Thickness (mm)	Immersion	Spring	Fluorescence **	FN
LUCPLFLN20X	0.45	7.8-6.6	0-2	—	—	U/BG/IR ***	22.0
LUCPLFLN40X	0.60	4-2.7	0-2	—	—	U/BG/IR ***	22.0
LUCPLFLN60X	0.70	2.2-1.5	0.1-1.3	—	—	U/BG/IR ***	22.0

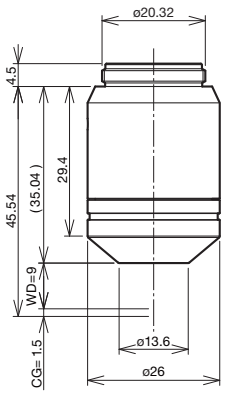
Screw: W20.32 × 0.706 (0.8" × 1/36")
*Defined with cover glass thickness shown as "CG" in the above drawings.
**U: UV excitation, BG: Visible Excitation, IR : Near IR. "( )" indicates that fluorescence might be slightly darker.
***IR excitation might cause out of focus slightly.

Long Working Distance Universal Plan Semi Apochromat for Relief Contrast

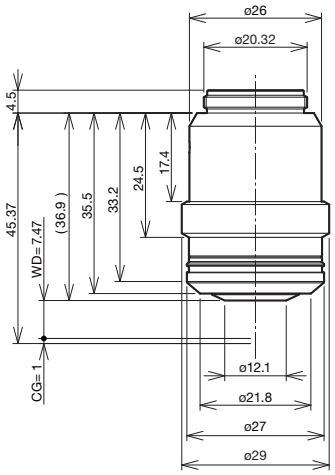
CPLFLN-RC, LUCPLFLN-RC series

The CPLFLN-RC and LUCPLFLN-RC long working distance, universal objectives display flat images from high transmission factors up to the near-infrared region of the spectrum. These objectives are designed for the observation of living cells, including oocytes. Plastic vessels can be used with these objectives for relief-contrast observations.

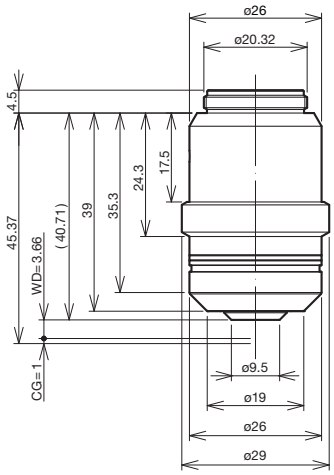
CPLFLN10XRC



LUCPLFLN20XRC



LUCPLFLN40XRC



unit: mm

Objectives (Magnification)	NA	W.D. (mm) *	Cover Glass Thickness (mm)	Immersion	Spring	Fluorescence **	FN
CPLFLN10XRC	0.30	9 ***	—	—	—	BG	22.0
LUCPLFLN20XRC	0.45	7.8-6.6	0-2	—	—	U/BG/IR ****	22.0
LUCPLFLN40XRC	0.60	4.2-3.0	0-2	—	—	U/BG/IR ****	22.0

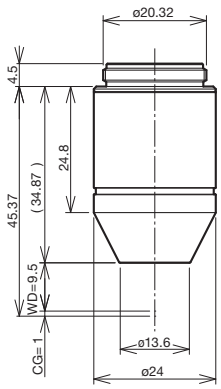
Screw: W20.32 × 0.706 (0.8" × 1/36")
*Defined with cover glass thickness shown as "CG" in the above drawings.
**U: UV excitation, BG: Visible Excitation, IR: Near IR. "( )" indicates that fluorescence might be slightly darker.
***Defined by 1 mm bottom thickness of Plastic Container, 0.5 mm bottom thickness of Glass Heat Plate (depends on the shape of container).
****IR excitation might cause out of focus slightly.

Long Working Distance Universal Plan Semi Apochromat for Phase Contrast

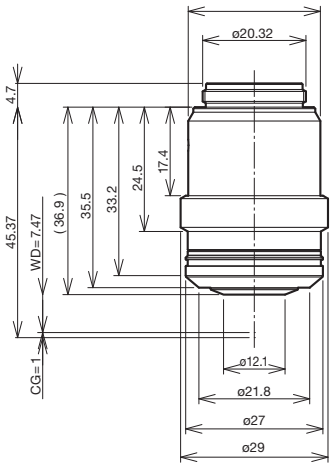
CPLFLN-PH, LUCPLFLN-PH series

The CPLFLN-PH and LUCPLFLN-PH long working distance, universal objectives display flat images from high transmission factors up to the near-infrared region of the spectrum. These objectives are exclusively designed for culture specimens and are optimized to produce exquisite phase-contrast images, regardless of the thickness and material of the vessel.

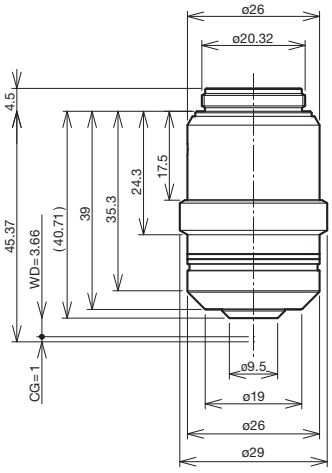
CPLFLN10XPH



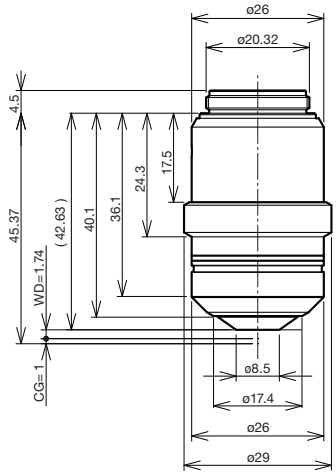
LUCPLFLN20XPH



LUCPLFLN40XPH



LUCPLFLN60XPH



unit: mm

Objectives (Magnification)	NA	W.D. (mm) *	Cover Glass Thickness (mm)	Immersion	Spring	Fluorescence **	FN
CPLFLN10XPH	0.30	9.5 ***	1	—	—	BG	22.0
LUCPLFLN20XPH	0.45	7.8-6.6	0-2	—	—	U/BG/IR ****	22.0
LUCPLFLN40XPH	0.60	4.2-3.0	0-2	—	—	U/BG/IR ****	22.0
LUCPLFLN60XPH	0.70	2.2-1.5	0.1-1.3	—	—	U/BG/IR ****	22.0

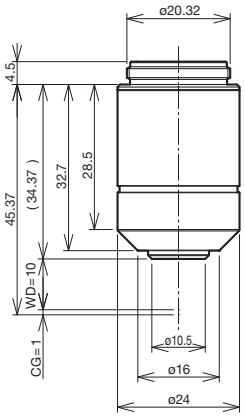
Screw: W20.32 × 0.706 (0.8" × 1/36")
*Defined with cover glass thickness shown as "CG" in the above drawings.
**U: UV excitation, BG: Visible Excitation, IR: Near IR. "( )" indicates that fluorescence might be slightly darker.
***Defined by 1 mm bottom thickness of Plastic Container.
****IR excitation might cause out of focus slightly.

Culture Specimen Objectives for Phase Contrast

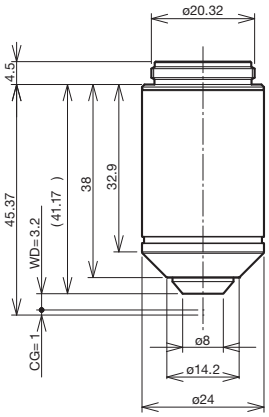
CPLN-PH, LCACHN-PH series

The CPLN-PH and LCACHN-PH standard objectives provide excellent field flatness with phase-contrast observation in transmitted light.

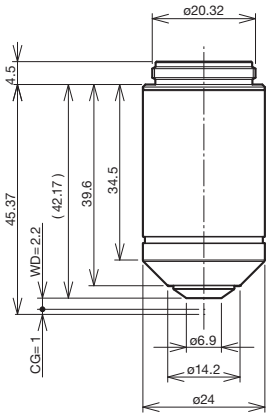
CPLN10XPH



LCACHN20XPH



LCACHN40XPH



unit: mm

Objectives (Magnification)	NA	W.D. (mm) *	Cover Glass Thickness (mm)	Immersion	Spring	Fluorescence **	FN
CPLN10XPH	0.25	10 ***	—	—	—	BG	22.0
LCACHN20XPH	0.40	3.2 ***	1	—	—	BG	22.0
LCACHN40XPH	0.55	2.2 ***	1	—	—	BG	22.0

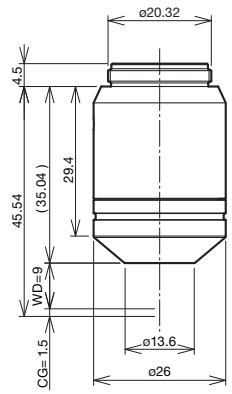
Screw: W20.32 × 0.706 (0.8" × 1/36")
*Defined with cover glass thickness shown as "CG" in the above drawings.
**U: UV excitation, BG: Visible Excitation, IR: Near IR. "( )" indicates that fluorescence might be slightly darker.
***Defined by 1 mm bottom thickness of Plastic Container.

Culture Specimen Objectives for Relief Contrast

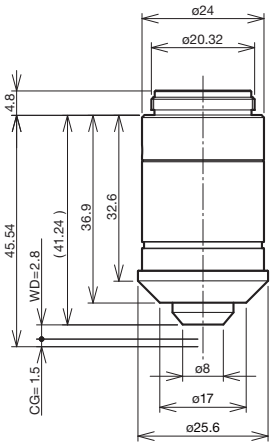
CPLN-RC, LCACHN-RC series

The CPLN-RC and LCACHN-RC standard objectives provide excellent field flatness with relief-contrast observation in transmitted light. These objectives are designed for the observation of living cells, including oocytes, in plastic vessels.

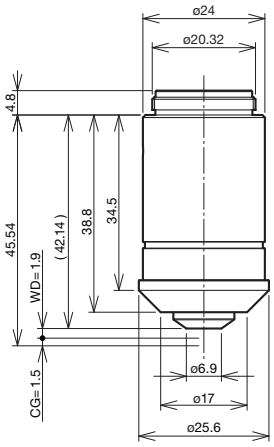
CPLN10XRC



LCACHN20XRC



LCACHN40XRC



unit: mm

Objectives (Magnification)	NA	W.D. (mm) *	Cover Glass Thickness (mm)	Immersion	Spring	Fluorescence **	FN
CPLN10XRC	0.25	9.7 ***	—	—	—	BG	22.0
LCACHN20XRC	0.40	2.8 ***	1.5	—	—	BG	22.0
LCACHN40XRC	0.55	1.9 ***	1.5	—	—	BG	22.0

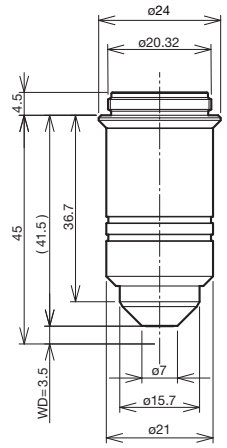
Screw: W20.32 × 0.706 (0.8" × 1/36")
*Defined with cover glass thickness shown as "CG" in the above drawings.
**U: UV excitation, BG: Visible Excitation, IR: Near IR. "( )" indicates that fluorescence might be slightly darker.
***Defined by 1 mm bottom thickness of Plastic Container, 0.5 mm bottom thickness of Glass Heat Plate (depends on the shape of container).

No Cover Water Immersion for Fixed Stage Upright Microscope

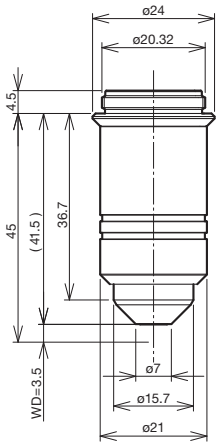
UMPLFLN-W, LUMPLFLN-W series

The UMPLFLN, LUMPLFLN-W and LUMFLN series of long working distance, water immersion objectives display flat images from high transmission factors up to the near-infrared region of the spectrum. These objectives achieve exquisite DIC and fluorescence from the visible range to infrared and are ideal for fluorescence imaging of brain tissue, as well as other tissue and specimens.

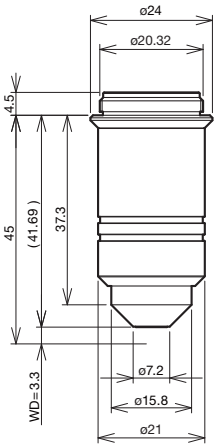
UMPLFLN10XW



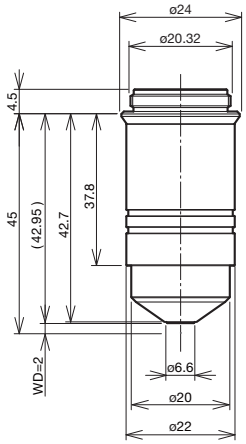
UMPLFLN20XW



LUMPLFLN40XW



LUMPLFLN60XW



unit: mm

Objectives (Magnification)	NA	W.D. (mm) *	Cover Glass Thickness (mm)	Immersion	Spring	Fluorescence **	FN
UMPLFLN10XW	0.30	3.50	0	Water	—	U/BG	26.5
UMPLFLN20XW	0.50	3.50	0	Water	—	U/BG	26.5
LUMPLFLN40XW	0.8	3	0	Water	—	U/BG	26.5
LUMPLFLN60XW	1.00	2	0	Water	—	U/BG	26.5

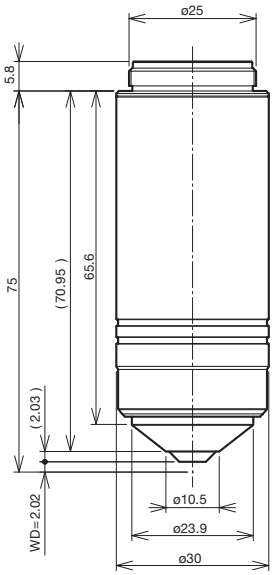
Screw: W20.32 × 0.706 (0.8" × 1/36")
*Defined with cover glass thickness shown as "CG" in the above drawings.
**U: UV excitation, BG: Visible Excitation, IR: Near IR. "( )" indicates that fluorescence might be slightly darker.

No Cover Water Immersion for Fixed Stage Upright Microscope

XLUMPLFLN20XW

The XLUMPLFLN-W high NA, long working distance objectives display flat images from high transmission factors up to the near-infrared region of the spectrum. These objectives achieve exquisite DIC and fluorescence from the visible range to infrared. These objectives allow the measurement of cell membrane electric potential as the design of the objectives provides easy access to patch clamp electrodes.

XLUMPLFLN20XW ***



unit: mm

Objectives (Magnification)	NA	W.D. (mm) *	Cover Glass Thickness (mm)	Immersion	Spring	Fluorescence **	FN
XLUMPLFLN20XW ***	1.00	2	0	Water	—	U/BG/IR ****	22.0

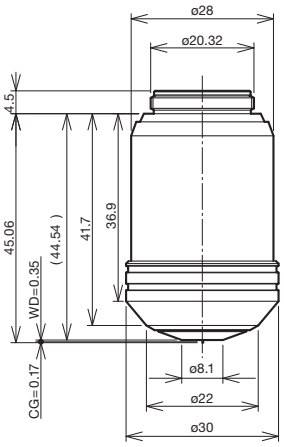
Screw: W25 × 0.75
*Defined with cover glass thickness shown as “CG” in the above drawings.
**U: UV excitation, BG: Visible Excitation, IR: Near IR. "( )" indicates that fluorescence might be slightly darker.
***Special dedicated nosepiece needed (WI-SNPXLU).
****IR excitation might cause out of focus slightly.

Universal Apochromat

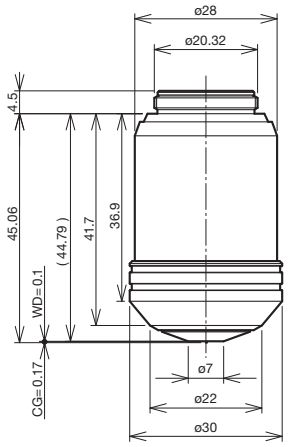
UAPON 340 series

The UAPON340 objectives feature high transmission of 340nm wavelength light, providing maximum performance in fluorescence microscopes through UV excitation.

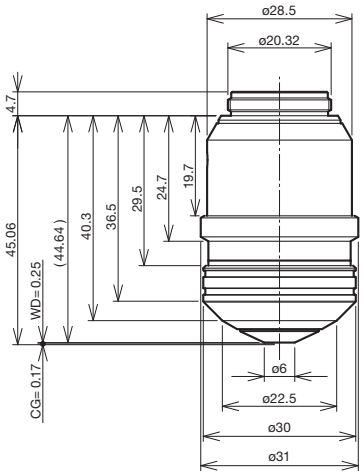
UAPON20XW340



UAPON40XO340-2



UAPON40XW340



unit: mm

Objectives (Magnification)	NA	W.D. (mm) *	Cover Glass Thickness (mm)	Immersion	Spring	Fluorescence **	FN
UAPON20XW340	0.70	0.35	0.17	Water	Yes	U/BG	22.0
UAPON40XO340-2	1.35	0.1	0.17	Oil	Yes	U/BG	22.0
UAPON40XW340	1.15	0.25	0.13-0.25	Water	Yes	U/BG	22.0

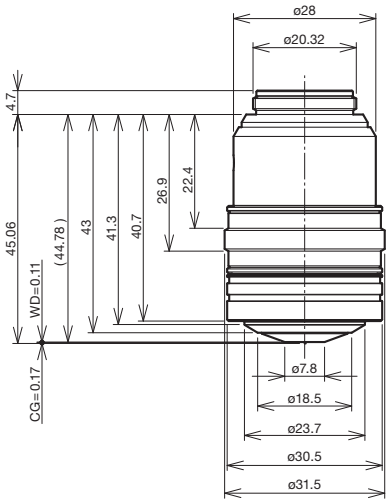
Screw: W20.32 × 0.706 (0.8" × 1/36")
*Defined with cover glass thickness shown as "CG" in the above drawings.
**U: UV excitation, BG: Visible Excitation, IR: Near IR. "( )" indicates that fluorescence might be slightly darker.

TIRF Objectives

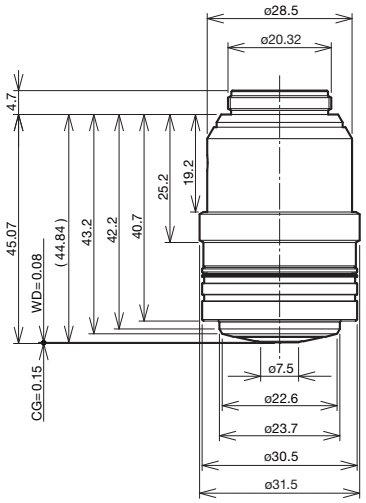
APON, UAPON series

These objectives feature the highest NA to create an evanescent wave field for high-contrast TIRF images.

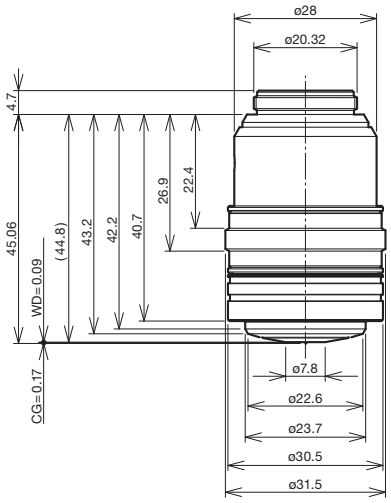
APON60XOTIRF



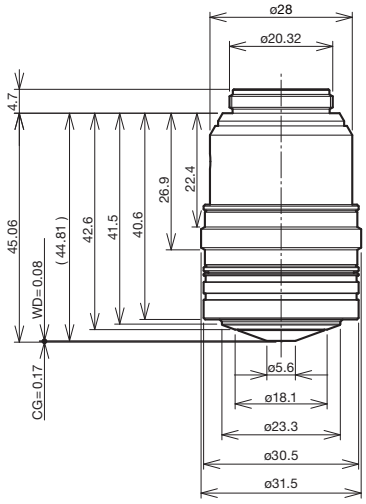
APON100XHOTIRF ***



UAPON100XOTIRF



UAPON150XOTIRF



unit: mm

Objectives (Magnification)	NA	W.D. (mm) *	Cover Glass Thickness (mm)	Immersion	Spring	Fluorescence **	FN
APON60XOTIRF	1.49	0.1	0.13-0.19	Oil	—	(U)/BG	22.0
APON100XHOTIRF ***	1.70	0.08	0.15	Special Oil	—	BG	22.0
UAPON100XOTIRF	1.49	0.1	0.13-0.19	Oil	—	U/BG	22.0
UAPON150XOTIRF	1.45	0.08	0.13-0.19	Oil	—	U/BG	22.0

Screw: W20.32 × 0.706 (0.8" × 1/36")
*Defined with cover glass thickness shown as "CG" in the above drawings.
**U: UV excitation, BG: Visible Excitation, IR: Near IR. "( )" indicates that fluorescence might be slightly darker.
***Special Dedicated Cover Glass and Immersion Oil needed.

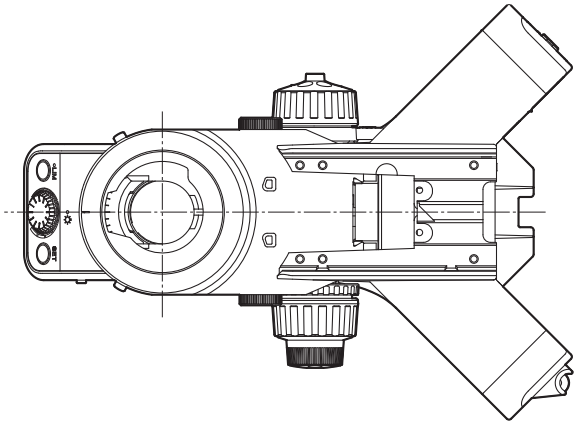
Microscope Frame

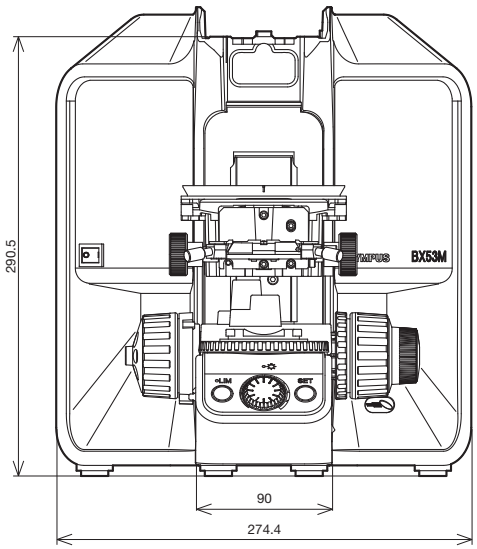
BX53M: Upright Transmitted & Reflected Light Microscope Frame

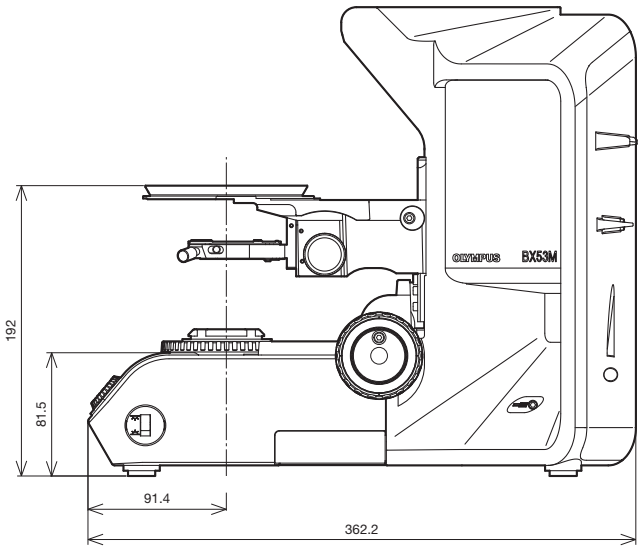
BX53MTRF-S

Designed with modularity in mind, the BX3M series provide versatility for a wide vriety of material science and industrial applications. The frames are outfitted with ESD capability to protect electronic samples.

BX53MTRF-S







Weight: 7.6 kg Unit: mm

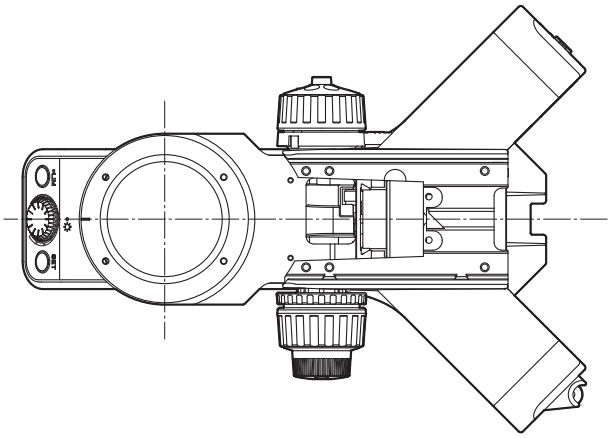
Microscope Frame

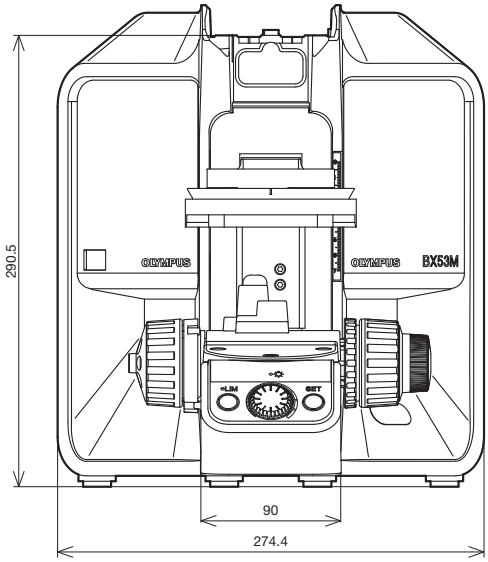
BX53M: Upright Reflected Light Microscope Frame

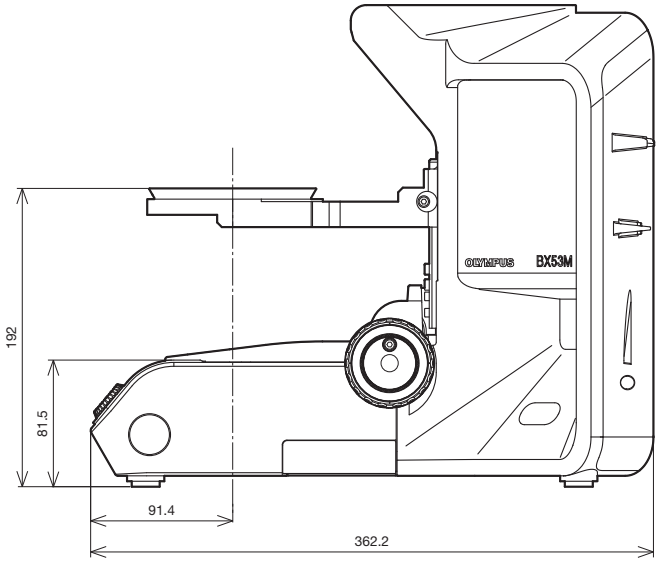
BX53MRF-S

Designed with modularity in mind, the BX3M series provide versatility for a wide vriety of material science and industrial applications. The frames are outfitted with ESD capability to protect electronic samples.

BX53MRF-S







Weight: 7.4 kg Unit: mm

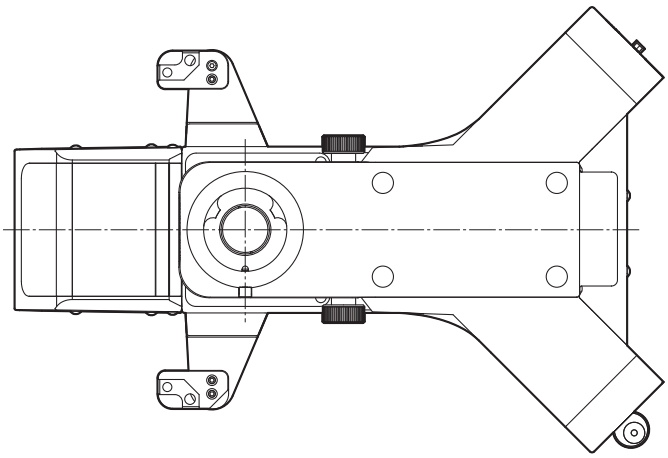
Microscope Frame

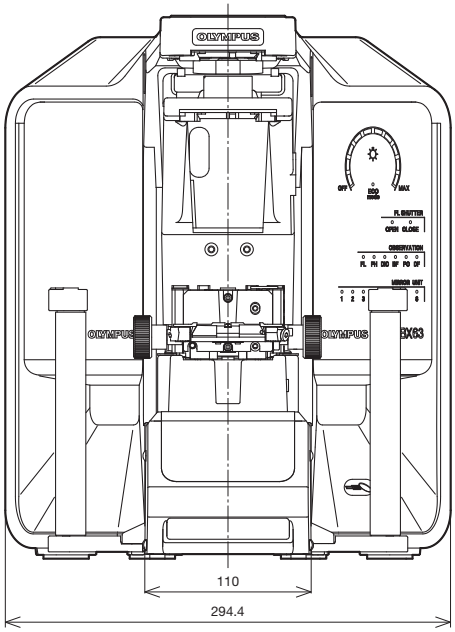
BX3: Automated Transmitted Light Microscope Frame

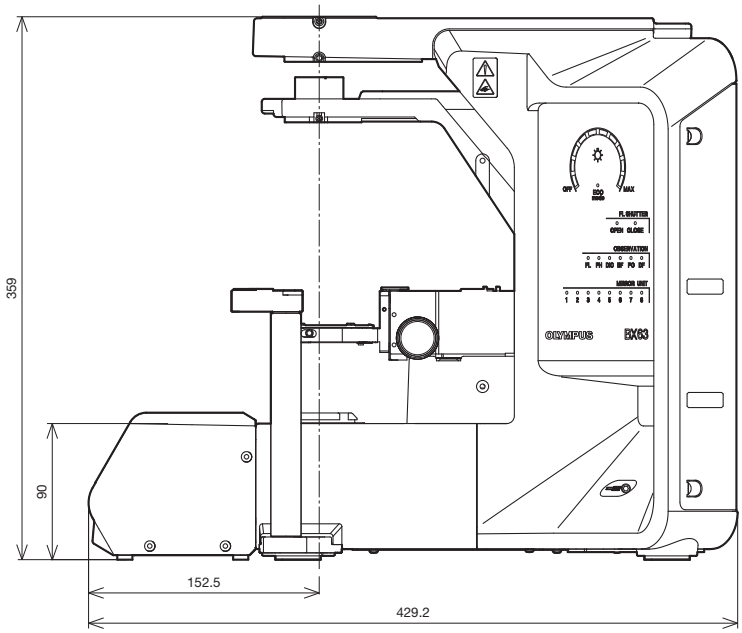
BX63F

Fully motorized system allows automation of complex multidimensional experiments, The precise motorized Z-drive, High stability due to fixed stage design.

BX63F







Weight: 14.1 kg Unit: mm

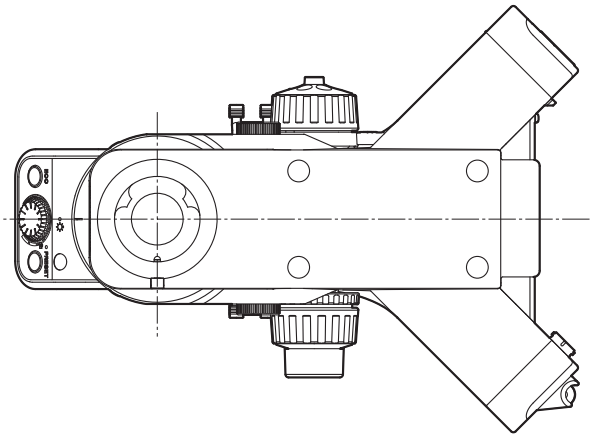
Microscope Frame

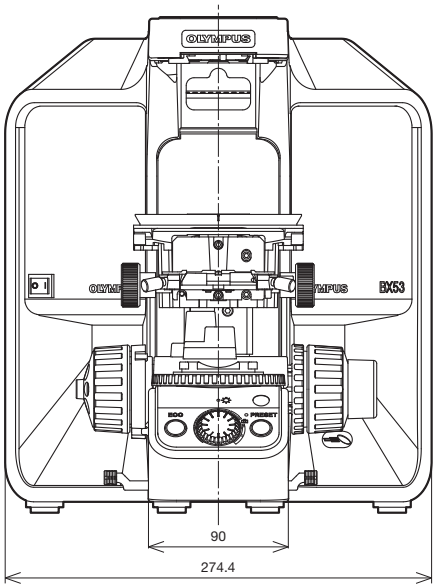
BX3: Semi-Motorized Fluorescence Transmitted Light Microscope Frame

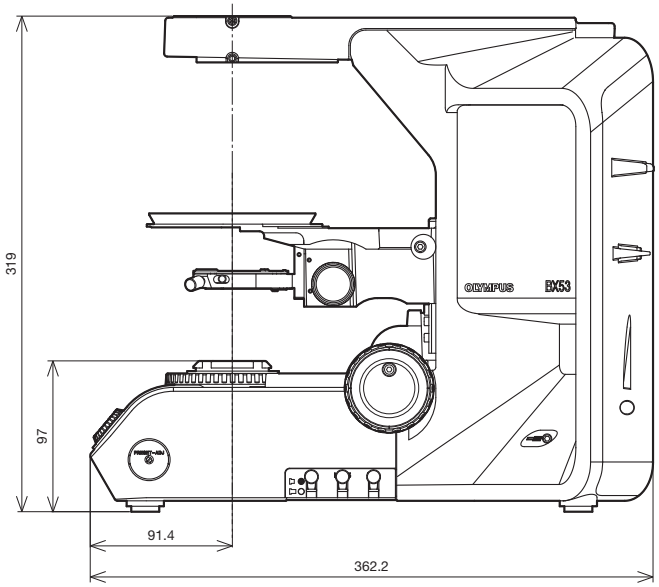
BX53F

The entire optical path of the BX53 is designed for optimal fluorescence imaging, using UIS2 components that set new standards in precision and clarity. Modular concept allows motorization of individual components.

BX53F







Weight: 8.3 kg Unit: mm

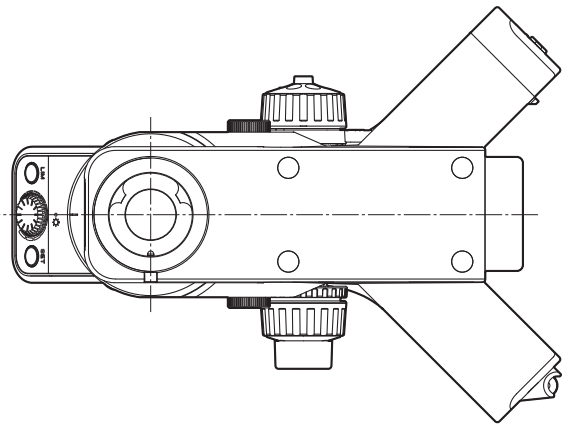
Microscope Frame

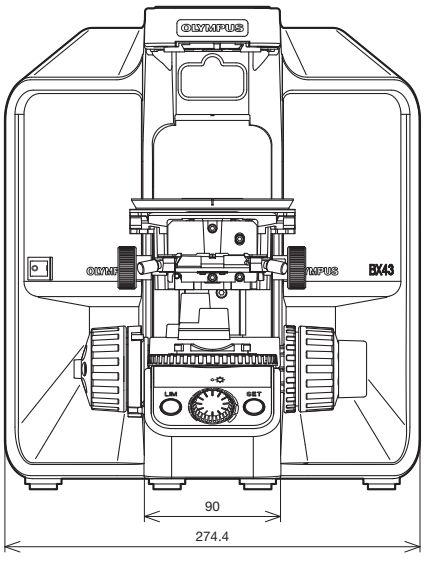
BX3: Manual System Transmitted Light Microscope Frame

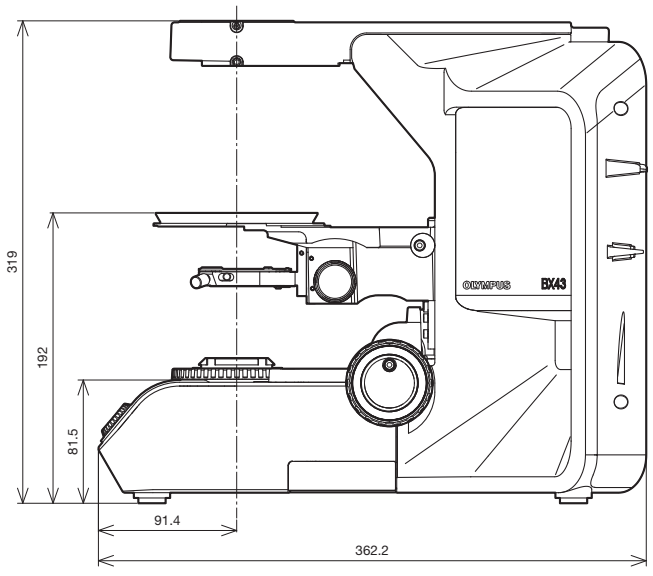
BX43F

The BX43 microscope offers a wide range of features, exquisite optical performance and is the ideal platform for digital imaging. This flexible microscope offers various contrast methods and prominent optics combined with true-color LED illumination for remarkable color rendering.

BX43F







Weight: 9.1 kg Unit: mm

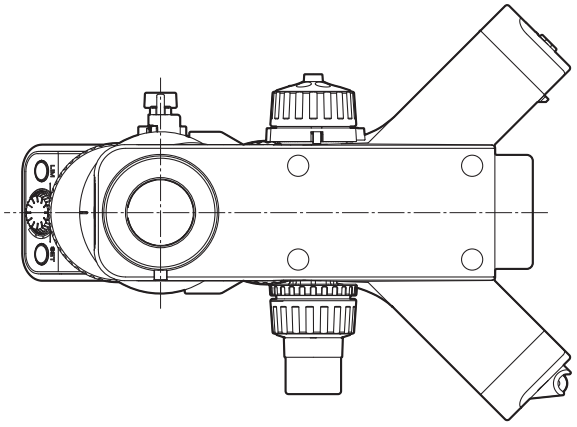
Microscope Frame

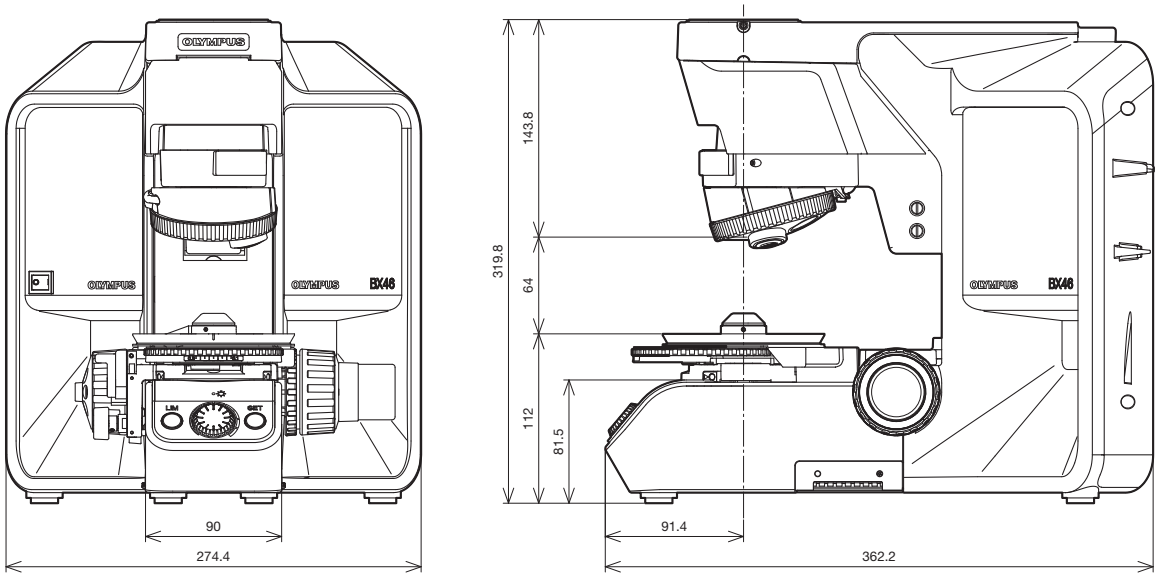
BX3: Transmitted Ergonomic Microscope Frame

BX46F

BX46 features unrivalled ergonomic design with low-position fixed stage and nosepiece focus that increase working comfort.

BX46F



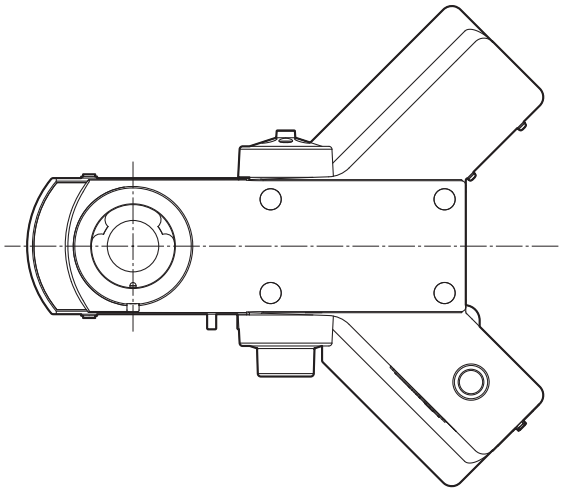


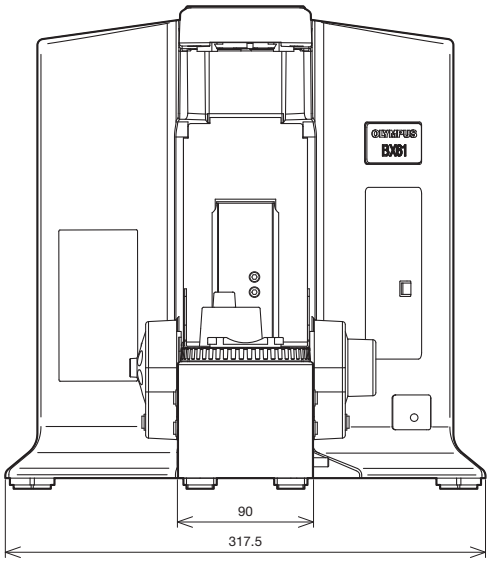
Weight: 9.8 kg Unit: mm

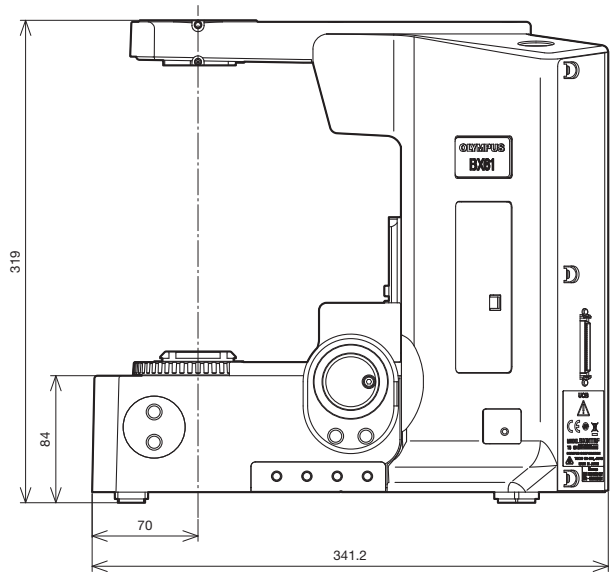
BX2: Upright Motorized Transmitted/Reflected Frame

BX61TRF

BX61TRF







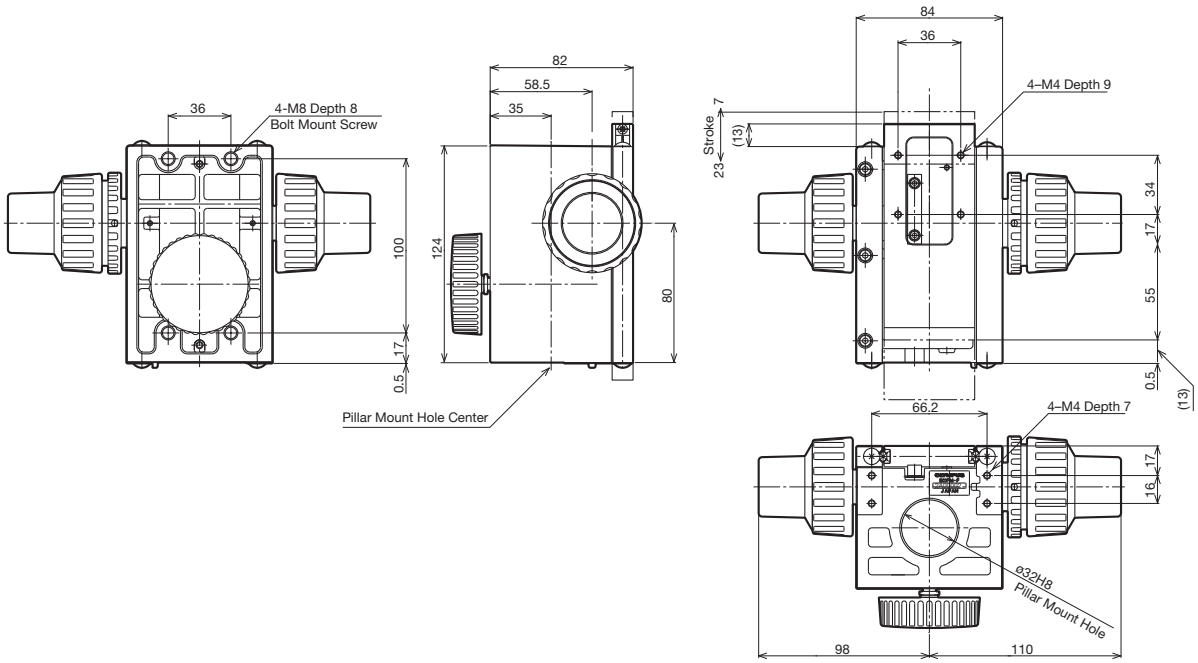
Weight: 11.4 kg Unit: mm

Microscope System BXFM

BXFM Frame

BXFM-F

Widely used system that allows use in combination with fiber illumination, motorized revolving nosepiece and telan lens unit. Can easily be integrated into other equipment. Attach to the equipment by rear bolt mounting screw or pillar mounting hole.



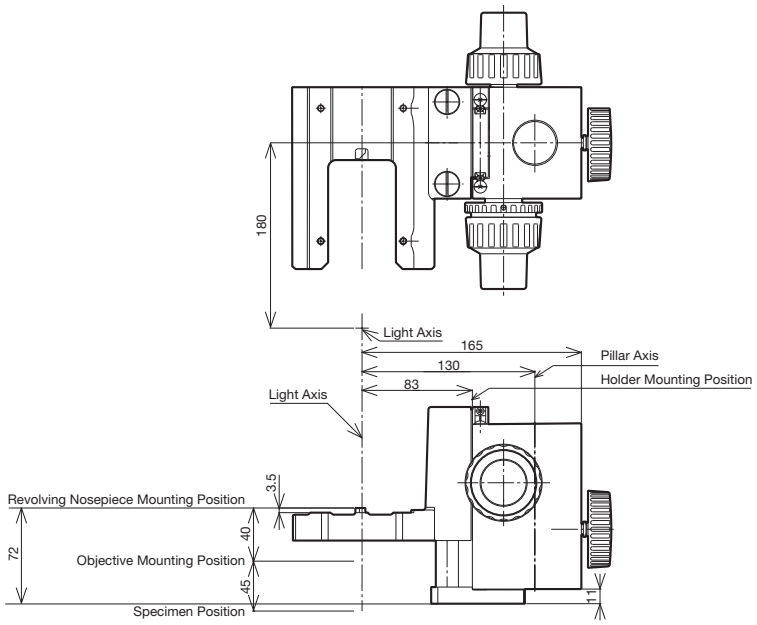
Weight: 1.9kg Unit: mm

Microscope System BXFM

BXFM System Configuration Example1

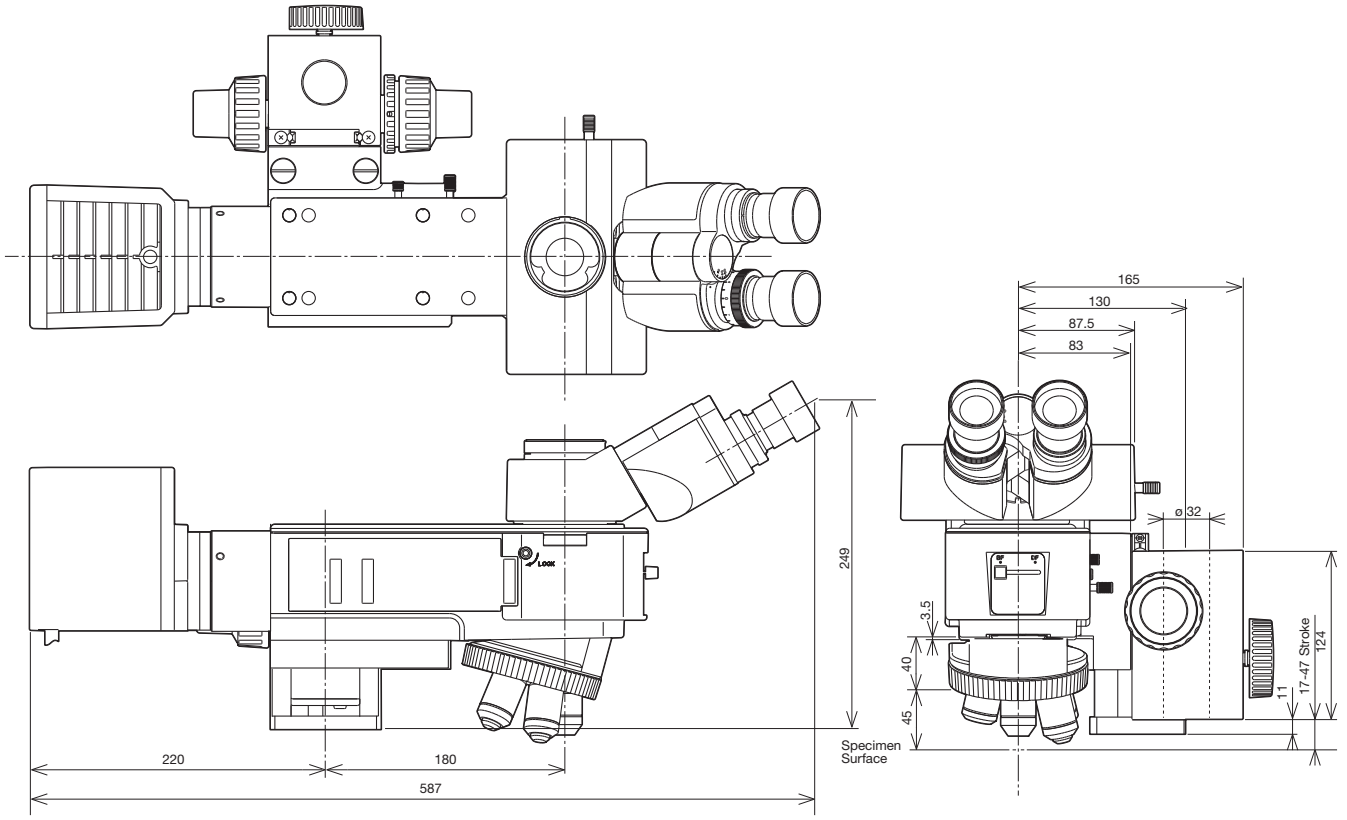
BXFM-F + BXFM-ILH + BXFM-ILHSPU

Accommodates the reflected light brightfield/darkfield and fluorescence illuminators.



Weight: 3.2kg Unit: mm

BXFM Combination Sample
BXFM-F + BXFM-ILH + BXFM-ILHSPU + TR30-2 + BX-RLA2 + U-LH100L-3



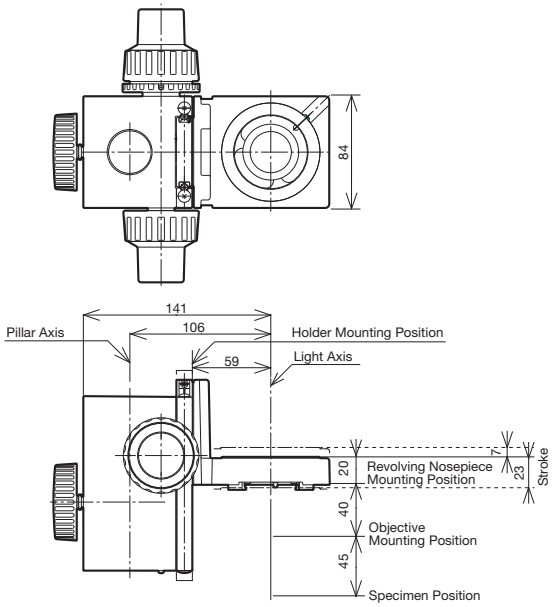
*For installation dimensions, refer to those for the BXFM-F.

Weight: 8.2kg (exclude objective) Unit: mm

BXFM System Configuration Example2

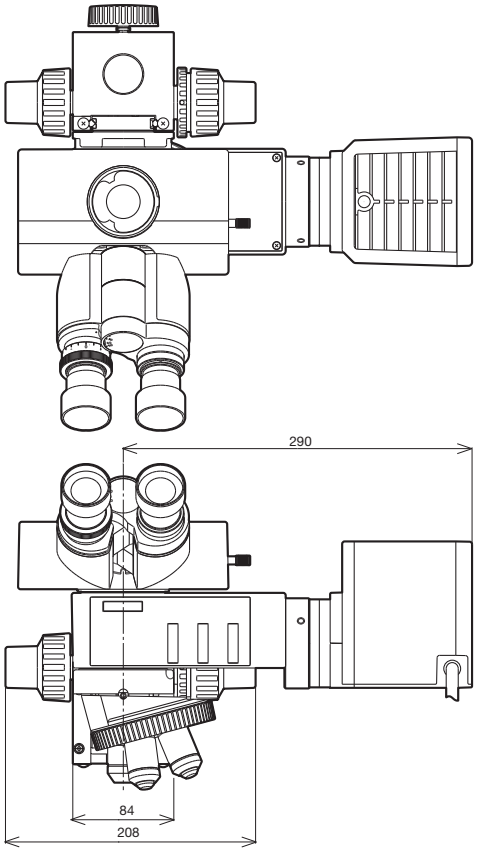
BXFM-F + BXFM-ILHS

Compact focusing unit suitable for building into existing equipment.



Weight: 2.4kg Unit: mm

BXFM-S Combination Sample
BXFM-F + BXFM-ILHS + TR30-2 + U-KMAS + U-LH100L-3



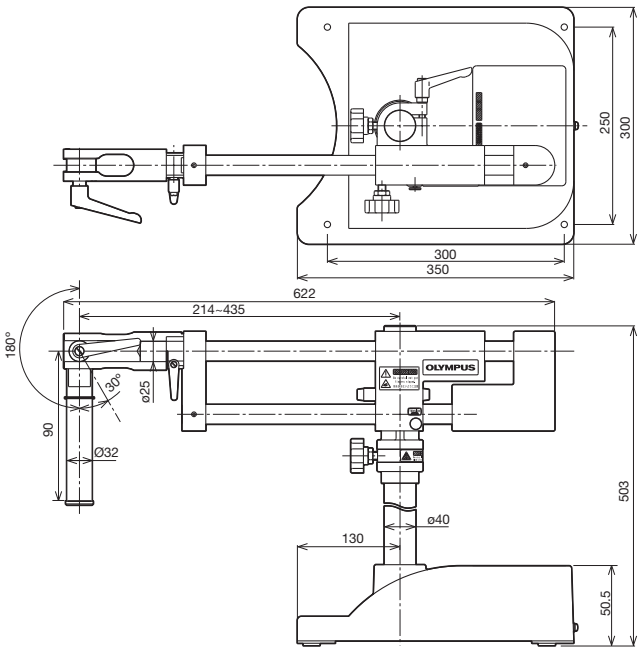
*For installation dimensions, refer to those for the BXFM-F.

Weight: 5.5 kg (exclude objective) Unit: mm

Stands for BXFM

A wide variety of stands are available to suit different applications and purposes.

SZ2-STU2
Universal Stand Type 2

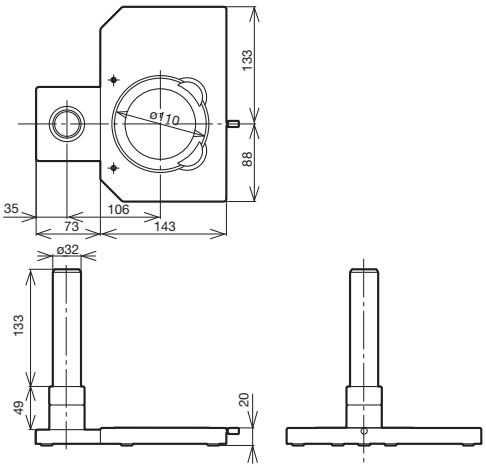


*The rotation angle of the horizontal arm can restrict to 90 degrees with stopper.

Major Specifications

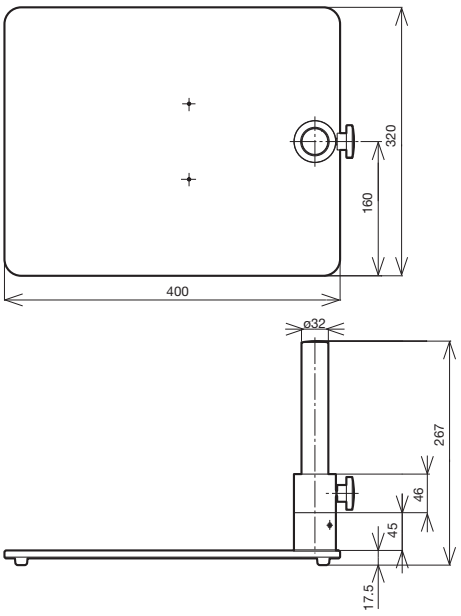
	Item	Specifications
1	Diameter of Focusing Arm or Fixing Section of Tube	ø32 mm
2	Vertical Pole Diameter	ø40 mm
3	Horizontal Poles Diameters	ø25 mm (both upper and lower poles)
4	Stroke	Horizontal: 234 mm, Vertical: 205 mm
5	Movement Range	Horizontal: 541 (435 + 106) mm max. (vertical pole — BXFM-S optical axis)
6	Maximum Specimen Weight	Forward: 10 kg (within 90-degree area) Transverse Direction: 6 kg Backward Direction: 7 kg (at maximum stroke)
7	Weight	30 kg

U-ST
Compact Stand



Weight: 1.8 kg

SZ-STL
Large Stand



Weight: 5 kg

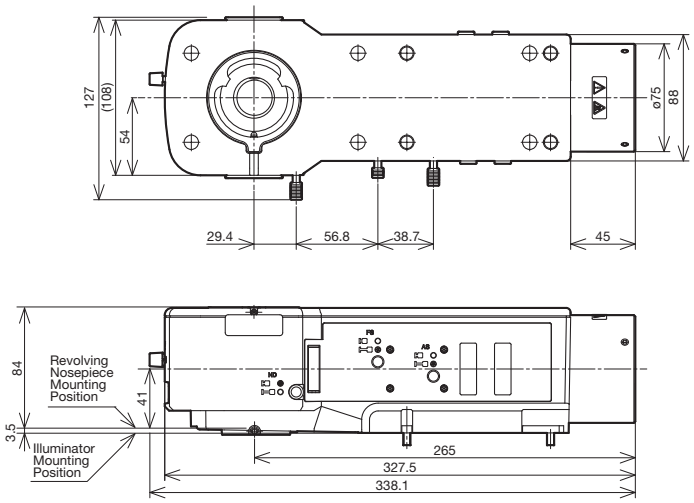
Unit: mm

Illumination Units

Reflected Light Illuminator for BX53M

BX3M-RLA-S

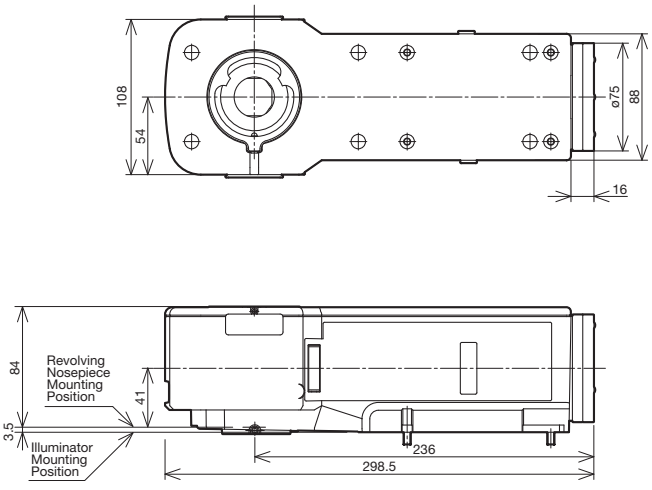
Reflected Light Illuminator for BF/DF for BX53M



Weight: 3.0 kg

BX3M-KMA-S

BF Reflected LED Light Illuminator for BX53M



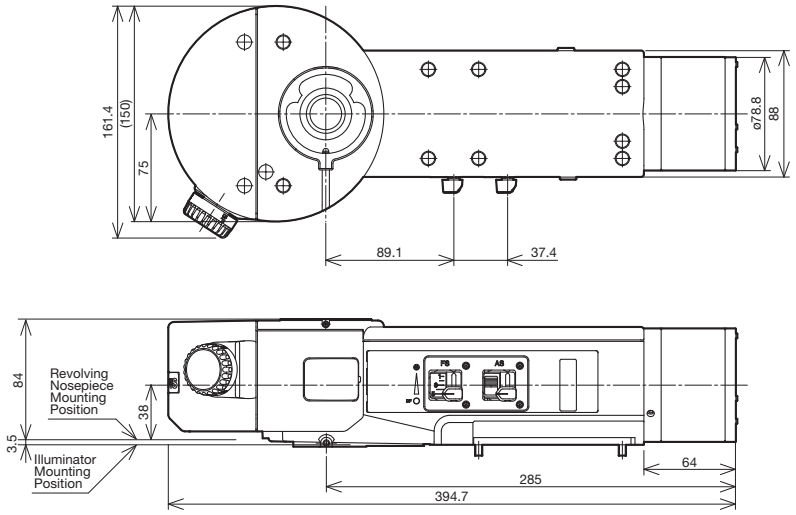
Weight: 2.4 kg

Unit: mm

Coded Reflected Light Illuminator for BX53M Frame

BX3M-RLAS-S

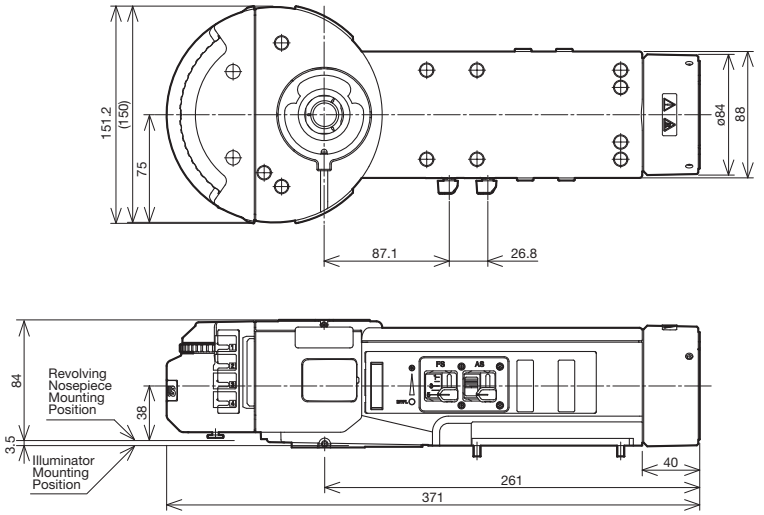
Coded Reflected Light Illuminator for BF/DF for BX53M



Weight: 3.6 kg

BX3M-URAS-S

Coded Universal Reflected Illuminator for BX53M



Weight: 3.2 kg

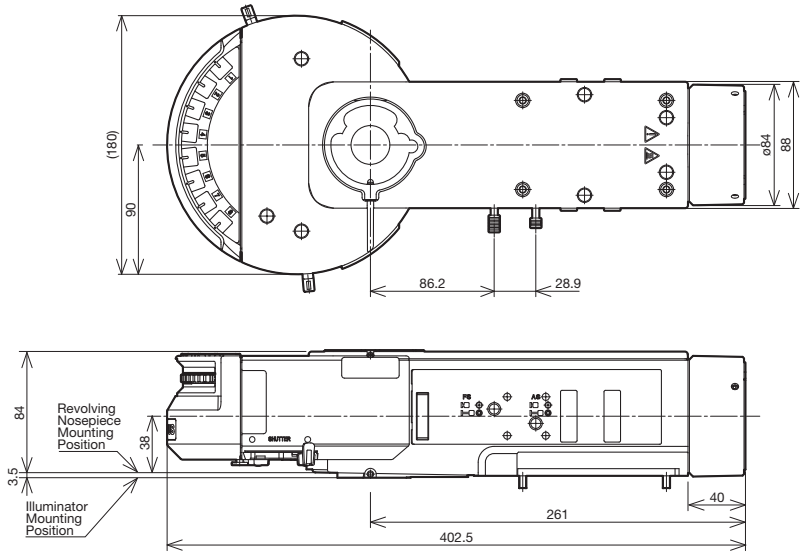
Unit: mm

Reflected Illuminator for BX3 Series

BX3-URA

Universal Reflected Illuminator for BX3 series

A total of eight fluorescence mirror units can be attached for comfortable multi-color fluorescence observations.

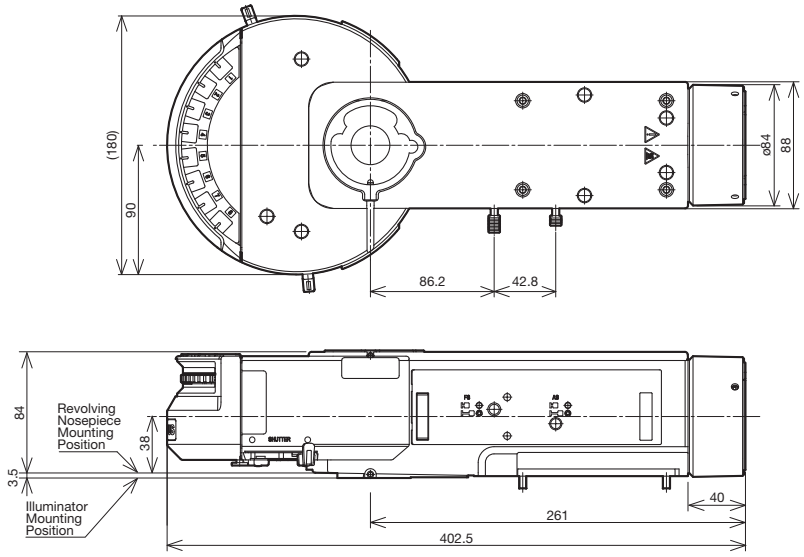


Weight: 3.8 kg

BX3-RFAS

Coded Fluorescence Illuminator for BX3 series

Eight fluorescence mirror units with coded function.



Weight: 3.9 kg

Unit: mm

Reflected Light Illuminator for BX2 series

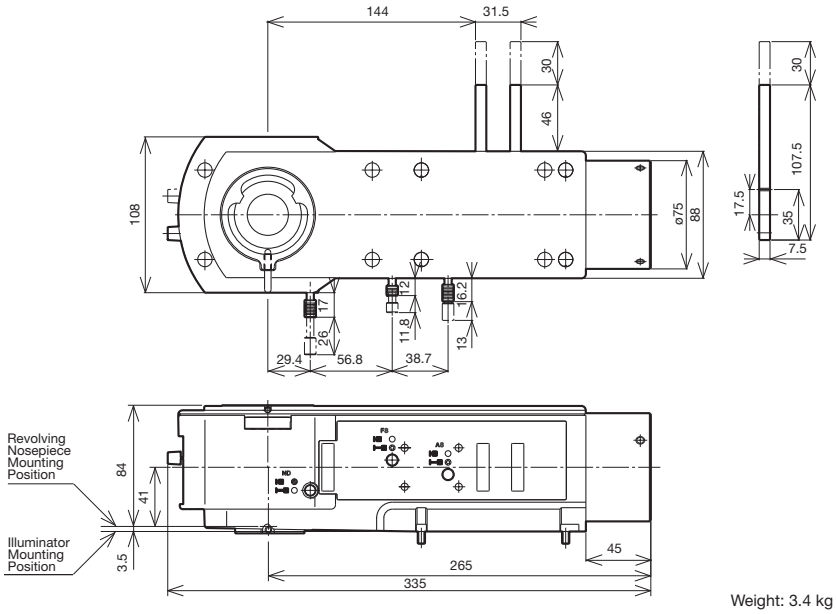
BX-RLA2

Reflected Light Illuminator for BF/DF

ND filters are linked when exchanging between brightfield and darkfield.

Accessories

Unit Name	Description	Weight (g)
U-25LBD	LBD Filter Slider	20
U-25IF550	IF550 Filter Slider	20
U-25ND6	ND Filter	20
U-25ND25	ND Filter	20
U-25FR	Frost Filter Slider	20
U-25L42	UV-cut Filter	20
U-PO3	Polarizer Slider for Reflected Light	71
U-POTP3	Polarizer Slider for Reflected Light with Tint Plate	71
U-AN360-3	360° Rotatable Analyzer Slider	79
U-AN	Analyzer Slider for Reflected Light	50
U-DICR	DIC Slider for Reflected Light	130
U-DICRH	DIC Slider for Reflected Light (Resolution type)	130
U-DICRHC	DIC Slider for Reflected Light (Contrast type)	130



Weight: 3.4 kg

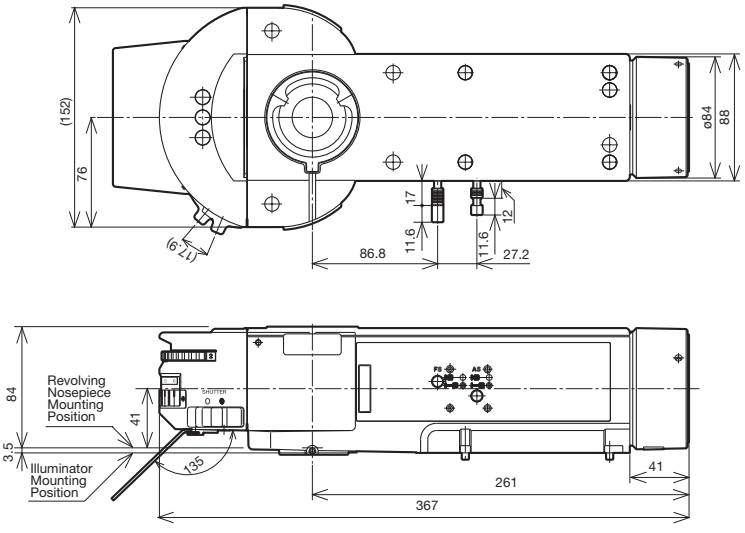
BX-URA2

Universal Reflected Light Illuminator

Suitable for observations ranging from brightfield to fluorescence.
Six mirror units can be attached to this reflected light illuminator simultaneously.

Accessories

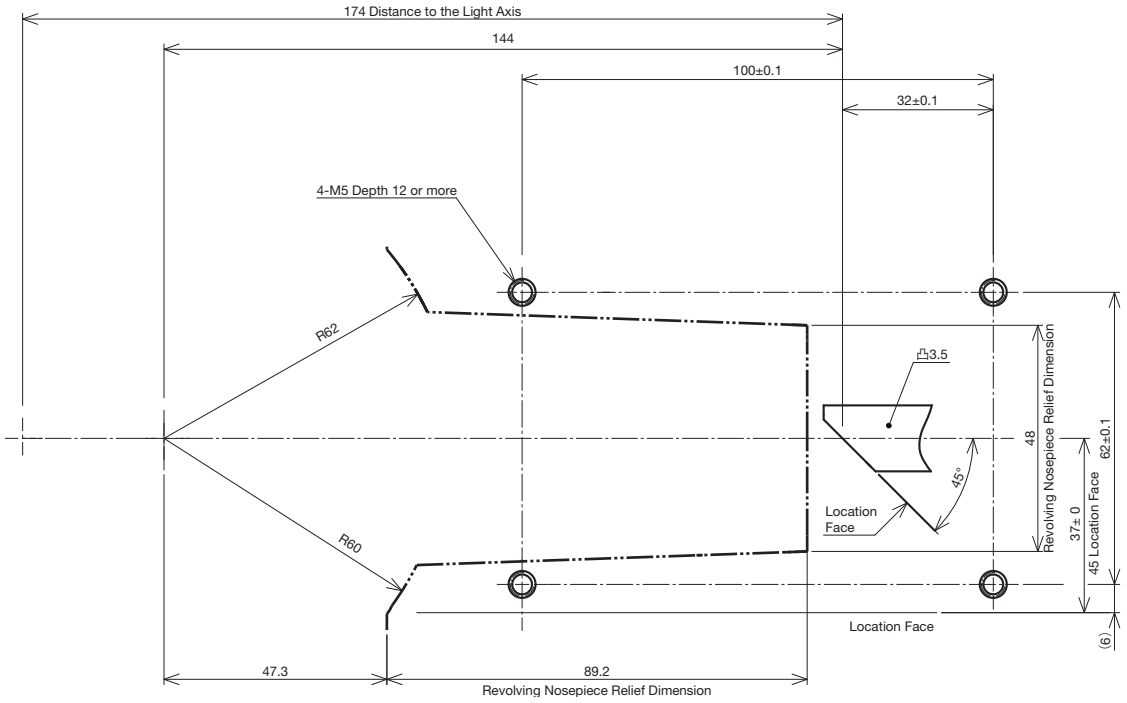
Unit Name	Description	Weight (g)
U-25LBD	LBD Filter Slider	20
U-25IF550	IF550 Filter Slider	20
U-25ND6	ND Filter	20
U-25ND25	ND Filter	20
U-25FR	Frost Filter Slider	20
U-25L42	UV-cut Filter	20
U-PO3	Polarizer Slider for Reflected Light	71
U-POTP3	Polarizer Slider for Reflected Light with Tint Plate	71
U-AN360-3	360° Rotatable Analyzer Slider	79
U-AN	Analyzer Slider for Reflected Light	50
U-DICR	DIC Slider for Reflected Light	130
U-DICRH	DIC Slider for Reflected Light (Resolution type)	130
U-DICRHC	DIC Slider for Reflected Light (Contrast type)	130
U-MBF3	Mirror Unit for Reflected Brightfield	80
U-MDF3*	Mirror Unit for Reflected Darkfield	80
U-MDIC3	Mirror Unit for Reflected DIC	80
U-MBFL3	Mirror Unit for Reflected Brightfield, for High Intensity Light Source	80
U-MWUS3	Fluorescence Mirror Unit for Reflected (U excitation)	80
U-MWBS3	Fluorescence Mirror Unit for Reflected (B excitation)	80
U-MWGS3	Fluorescence Mirror Unit for Reflected (G excitation)	80



Weight: 3.8 kg

Unit: mm

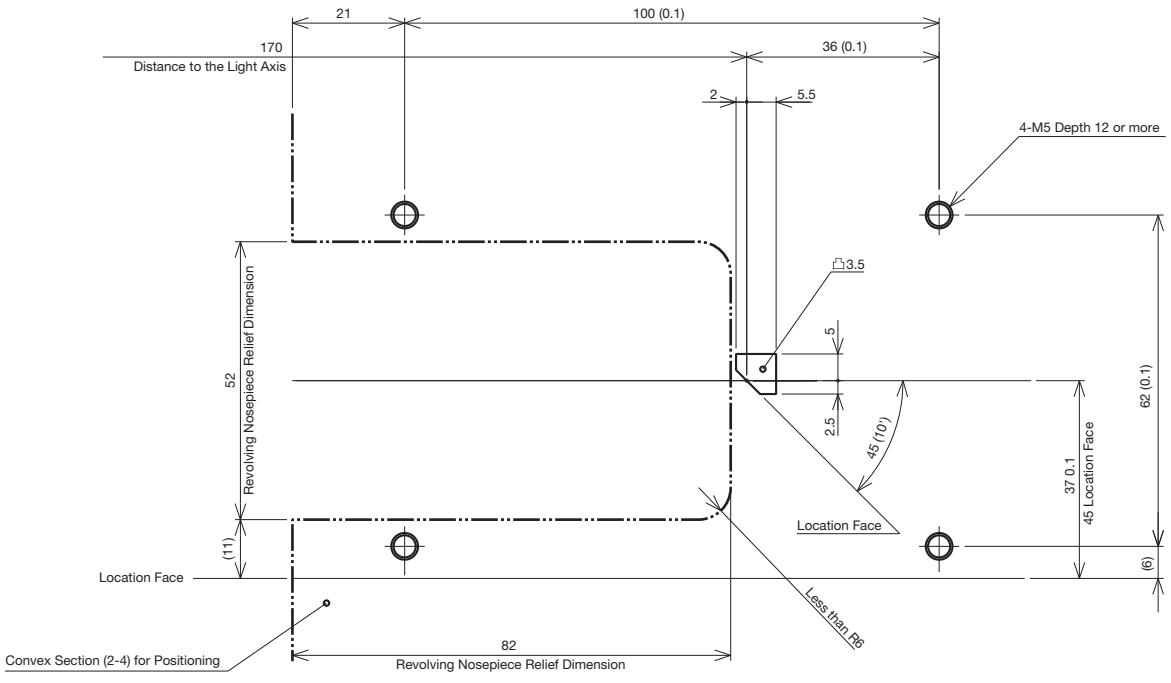
Mounting Dimensions of Illuminator (BX3M-RLA-S, BX3M-RLAS-S, BX3M-URAS-S, BX3M-KMA-S, BX3-RFAS, BX3-URA)



Fix illuminator using four M5 screws and projection for fastening.

Unit: mm

Mounting Dimensions of Illuminators (BX-RLA2 and BX-URA2)



Fix illuminator using four M5 screws and projection for fastening.

Unit: mm

Compact Reflected Light Illuminator for BF

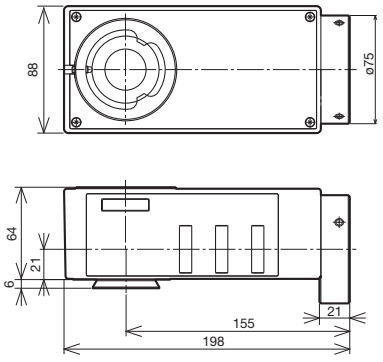
U-KMAS

Very compact reflected light illuminator with reduced depth.

U-KMAS

Accessories

Unit Name	Description	Weight (g)
U-25LBD	LBD Filter Slider	20
U-25IF550	IF550 Filter Slider	20
U-25ND6	ND Filter	20
U-25ND25	ND Filter	20
U-25FR	Frost Filter Slider	20
U-25L42	UV-cut Filter	20
U-PO3	Polarizer Slider for Reflected Light	71
U-POTP3	Polarizer Slider for Reflected Light with Tint Plate	71
U-AN360-3	360° Rotatable Analyzer Slider	79
U-AN	Analyzer Slider for Reflected Light	50
U-DICR	DIC Slider for Reflected Light	130
U-DICRH	DIC Slider for Reflected Light (Resolution type)	130
U-DICRHC	DIC Slider for Reflected Light (Contrast type)	130



Weight: 1.2 kg

Unit: mm

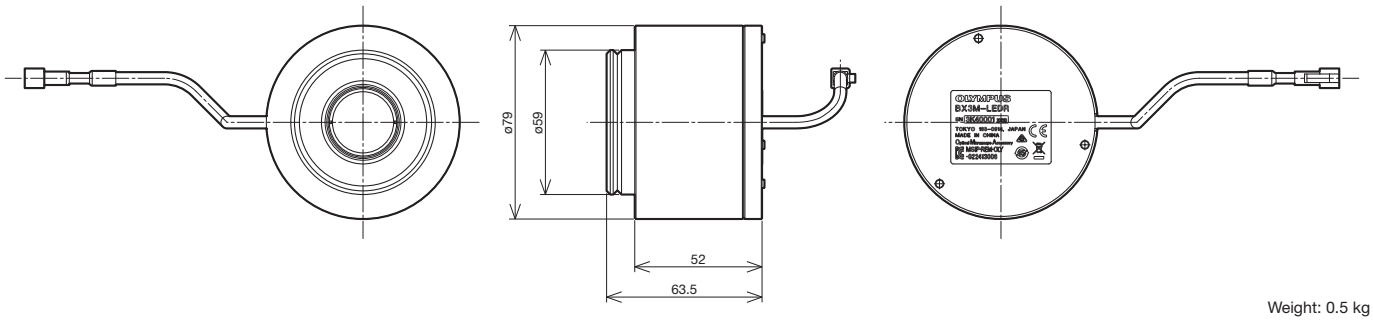
Light Source Units

LED Lamp Housing for BX53M

The BX3M utilizes a high-intensity white LED light source for both refl ected and transmitted light. High-intensity light support various observation modes such as BF, DF, DIC and Polarizing.

BX3M-LEDR

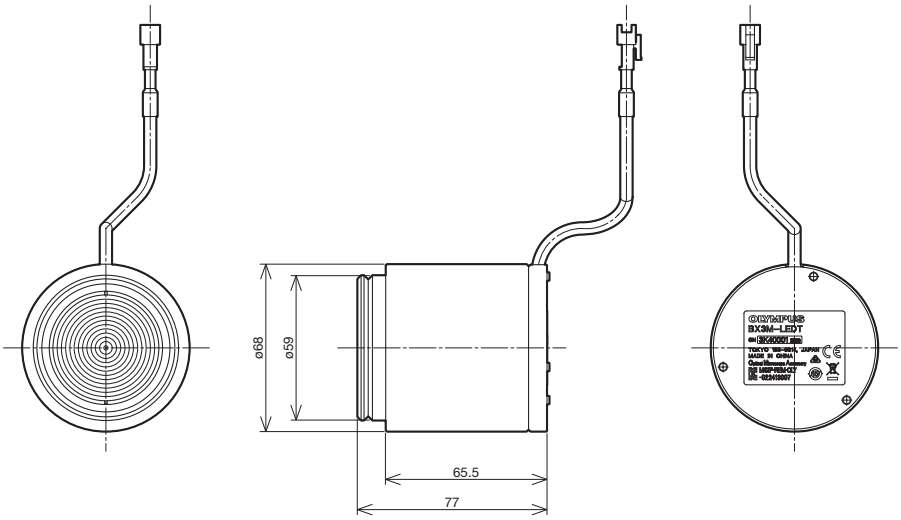
LED Lamp Housing for BX3M Reflected



Weight: 0.5 kg

BX3M-LEDT

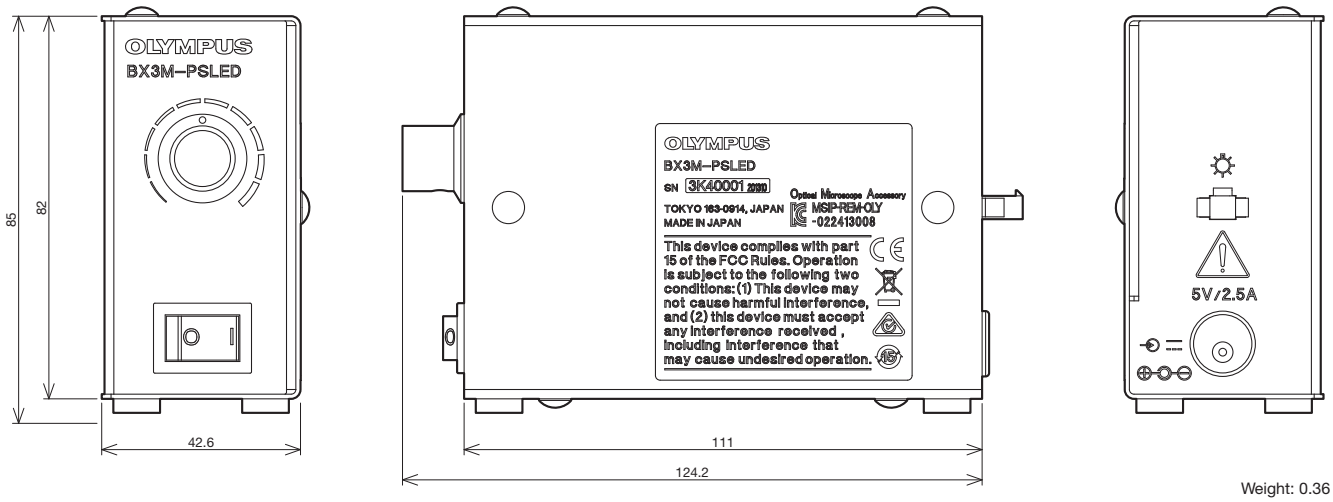
LED Lamp Housing for BX3M Transmitted



Weight: 0.5 kg

BX3M-PSLED

Power Supply for LED Lamp House (refuired with BXFM)



Weight: 0.36 kg

Unit: mm

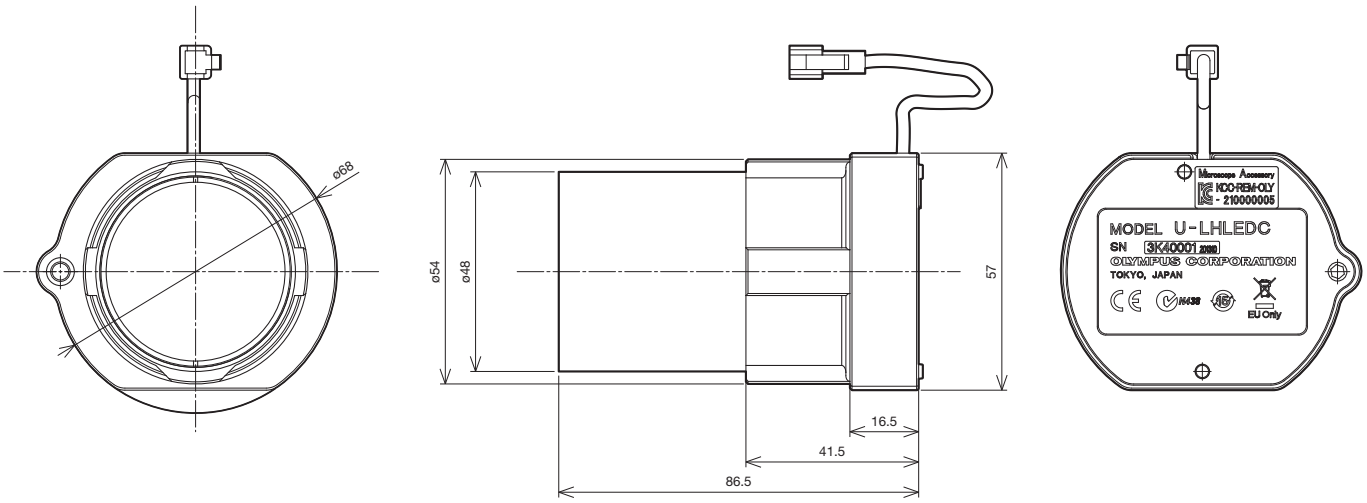
Light Source Units

LED Lamp Housing for BX3 Series

The BX3M utilizes a high-intensity white LED light source for both refl ected and transmitted light. High-intensity light support various observation modes such as BF, DF, DIC and Polarizing.

U-LHLEDC

LED Lamp Housing for BX3M Transmitted

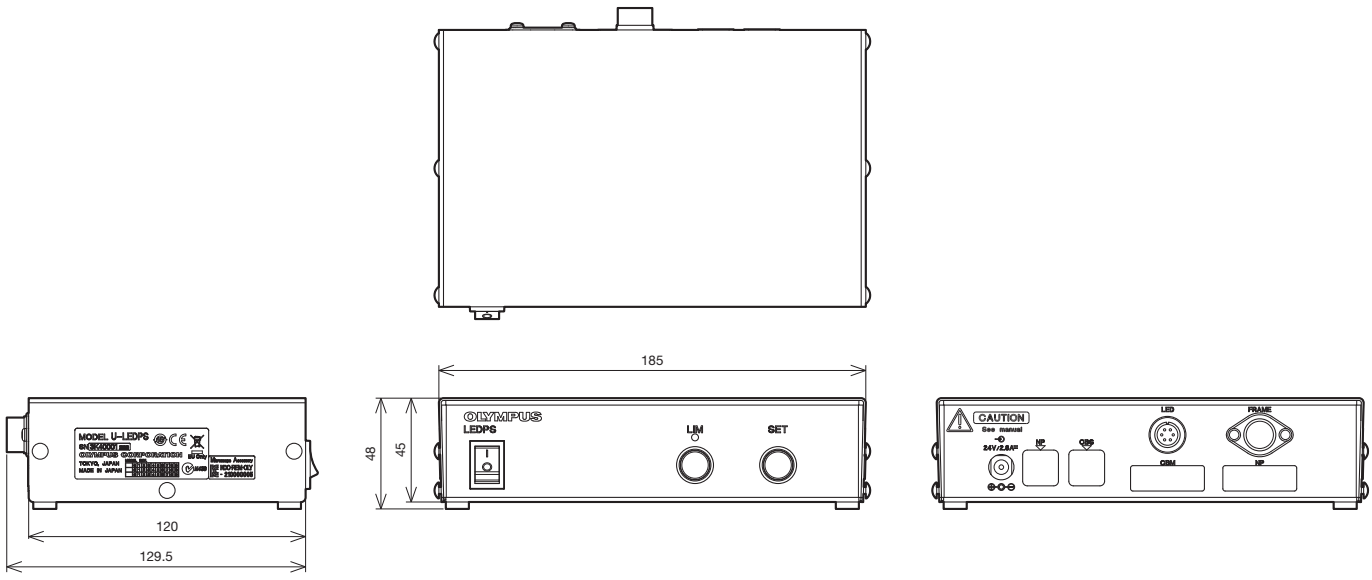


Weight: 0.5 kg

U-LEDPS

External Power Supply for U-LHLEDC

The BX3 utilizes a high color reproducible LED illumination that support a constant color temperature for consistent and support color reproduction of brightfield stains.



Weight: 0.78 kg

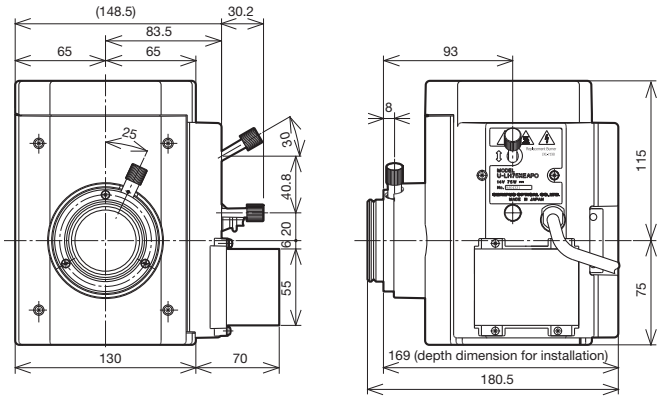
Unit: mm

Light Source Units

Lamp Housings

Various different lamp housings are available, for use with different light sources: choose to suit the intended purpose.
*If you use the units in your production line, please consult your nearest Olympus representative in your region about the use conditions beforehand.

U-LH75XEAPO
75W Xenon Apo Lamp Housing

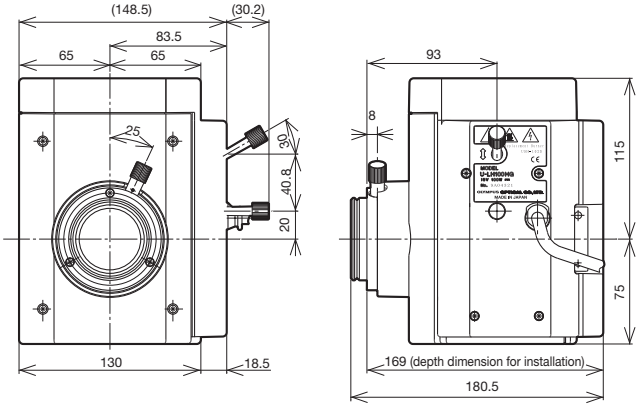


*Power supply unit (U-RX-T) and power cable (UYCP) are necessary for 75 W xenon lamp housing. These items are sold separately.

Cable Length 2,000 mm Accepted Lamp: USH-103OL Weight: 2.7 kg

U-LH100HGAPO
100W Mercury Apo Lamp Housing

U-LH100HG
100W Mercury Lamp Housing

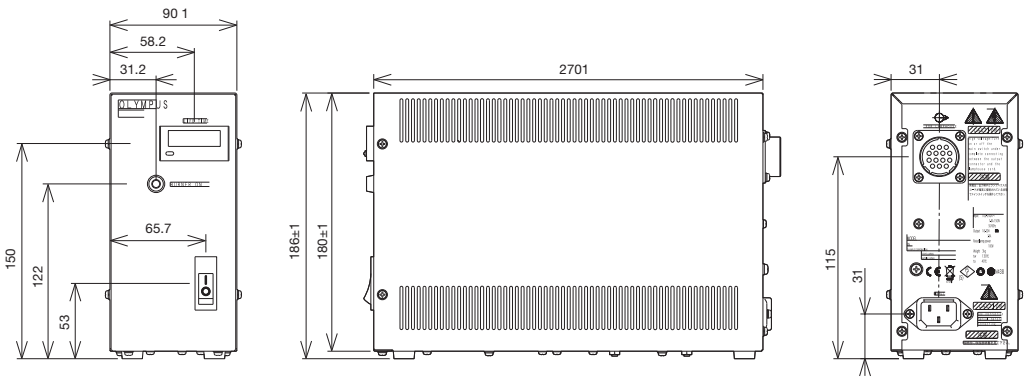


*Power supply unit (U-RFL-T) and power cable (UYCP) are necessary for 100 W mercury lamp housings. These items are sold separately.

Cable Length 2,000 mm Accepted Lamp: USH-103OL Weight: 2.7 kg

U-RFL-T
Power Supply Unit for Mercury Lamp

U-RX-T
Power Supply Unit for Xenon Lamp



Weight: Approximately 3 kg

Unit: mm

Light Source Units

Halogen Illumination

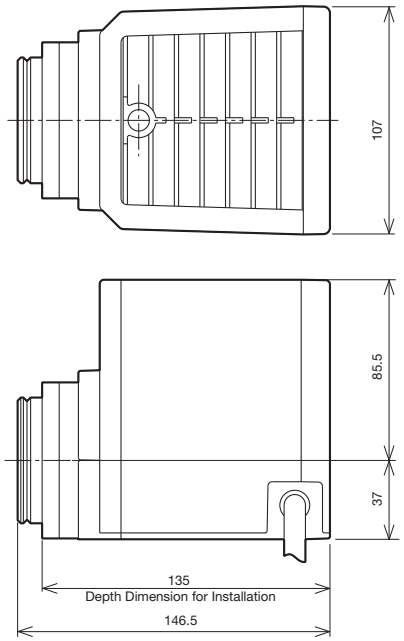
For the 100 W halogen lamp, the external power supply TH4-100/200 with an intensity adjustment switch and an ON/OFF switch, both are located close to the operator's hand, are provided.

*If you use the units in your production line, please consult your nearest Olympus representative in your region about the use conditions beforehand.

Illumination devices for microscope have suggested lifetimes. Periodic inspections are required. Please visit our web site for details.

U-LH100-3/U-LH100IR/U-LH100L-3

100 W Halogen Lamp Housings



Cable Length U-LH100-3: 290 mm
U-LH100IR: 290 mm
U-LH100L-3: 800 mm

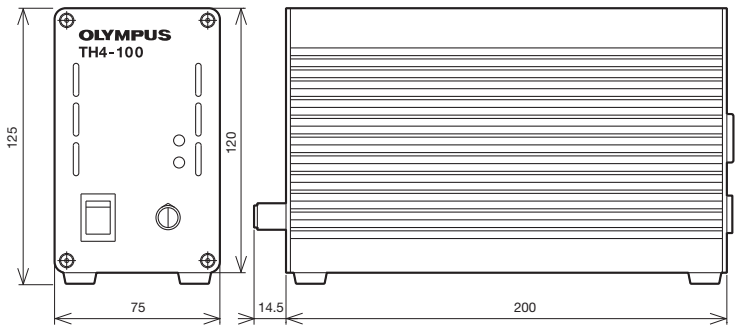
Accepted Lamp: 12V100WHAL (high intensity lamp)
12V100WHAL-L (long life lamp)

*External power supply (TH4-100 or TH4-200) and power cable (UYCP) are necessary for 100 W halogen lamp housings. These items are sold separately.

Weight: 880 g

TH4-100/200

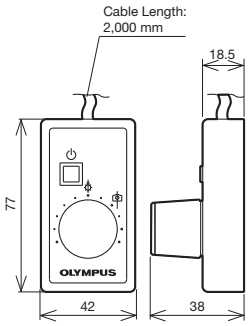
External Power Supply



Weight: 2.2 kg

TH4-HS

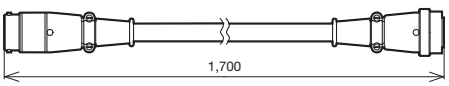
Hand Switch



Weight: 140 g

U-RMT

Extension Cord



Weight: 200 g

Unit: mm

Light Source Units

Halogen Fiber Illumination Accessories

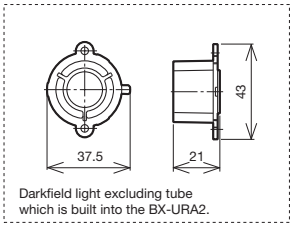
All Olympus reflected light illuminators can be used with fiber illumination.

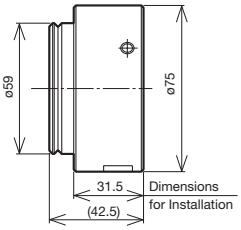
*If you use the units in your production line, please consult your nearest Olympus representative in your region about the use conditions beforehand.

Illumination devices for microscope have suggested lifetimes. Periodic inspections are required. Please visit our web site for details.

U-RCV

DF Converter for BX-URA2

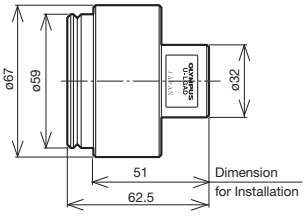




Weight: 315 g

U-LGAD

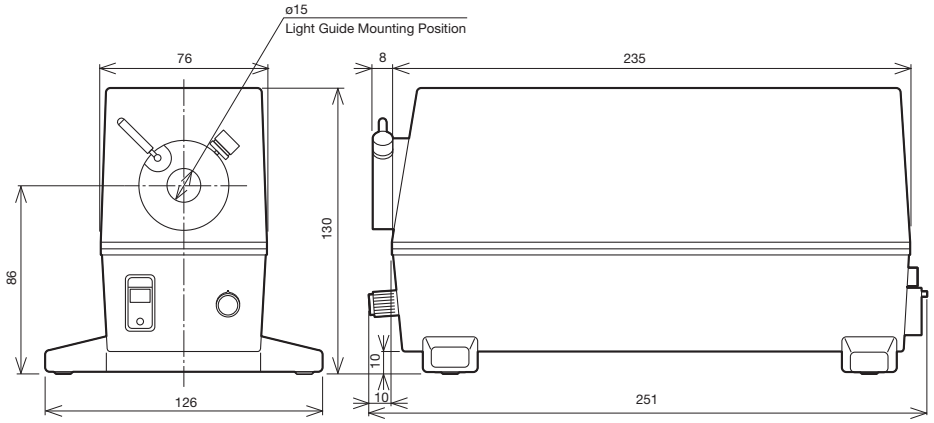
Fiber Adapter for Reflected Light Observation



Light Guide Mount Hole ø12 Weight: 390 g

LG-PS2*

Light Source

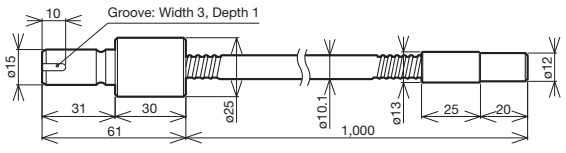


*The types of model varies by country in use.

Weight: 1.6 kg

LG-SF

Light Guide



Weight: 210 g

Unit: mm

Light Source Units

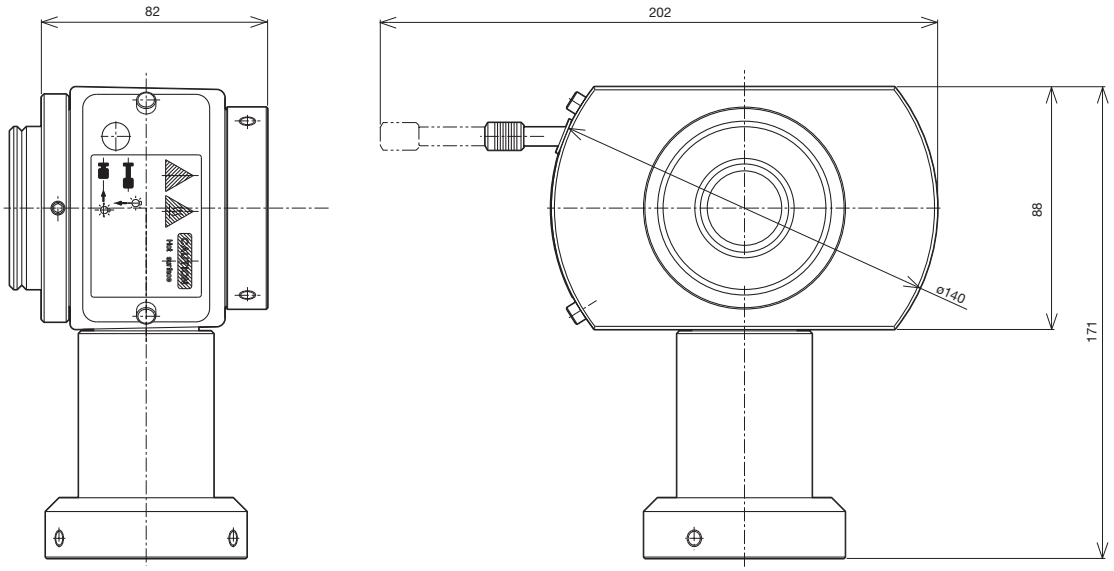
Lamp Housing Accessory

Two lamp housings can be attached simultaneously.

*If you use the units in your production line, please consult your nearest Olympus representative in your region about the use conditions beforehand.

U-DULHA

Double Lamp House Adapter



Weight: 1.2 kg

Unit: mm

Condenser Units

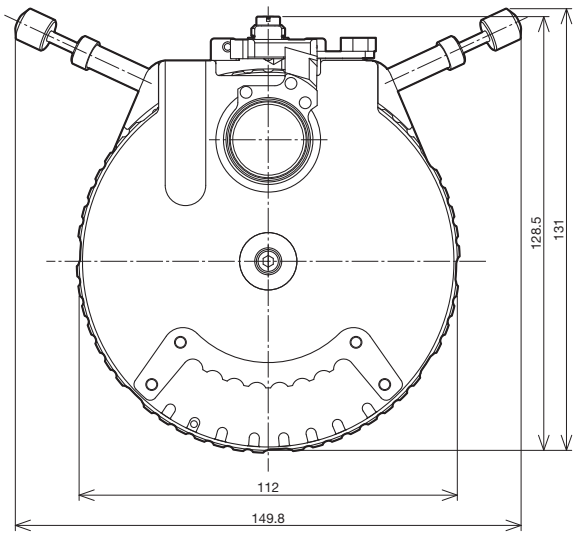
Universal Condenser

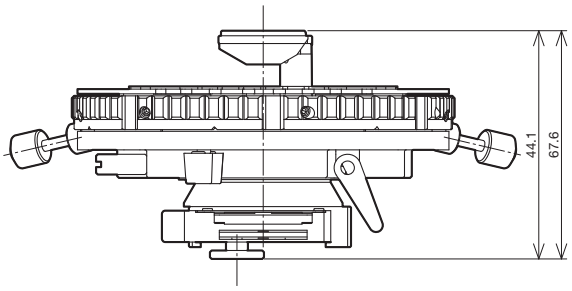
U-UCD8-2

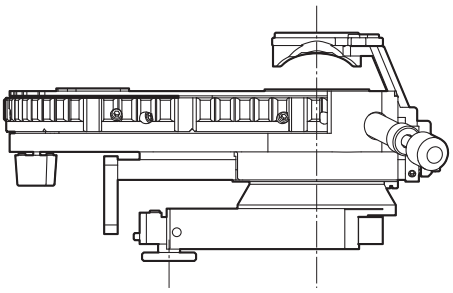
Universal condenser with 8 optical element slots.

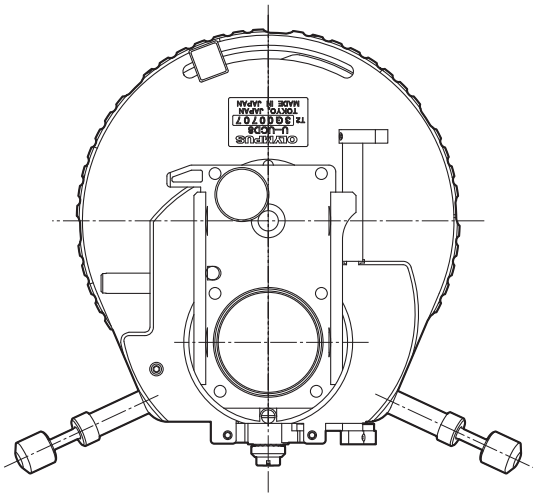
*Optical Elements are required. Please consult your nearest Olympus representative in you region about the Optical Elements Combination.

U-UCD8-2









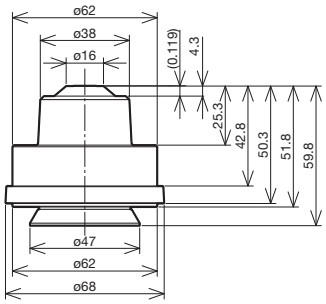
Weight: 700 g

Unit: mm

Condenser Units

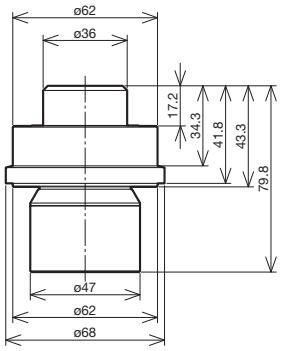
Condenser

U-AC2-7
Abbe Condenser



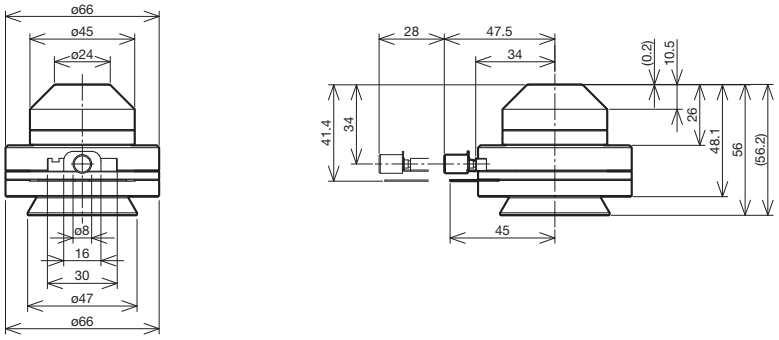
Weight: 174 g

U-LWCD
Long Working Distance Condenser



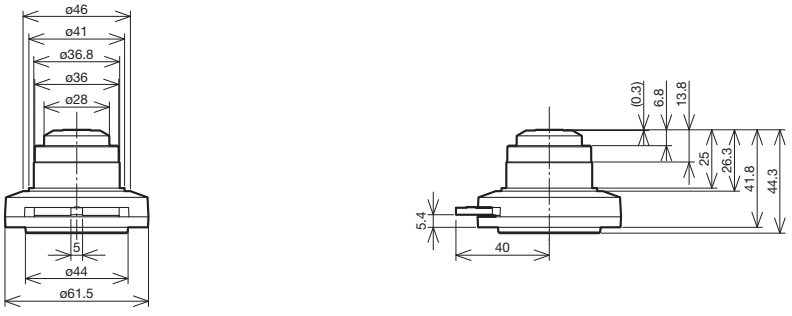
Weight: 380 g

WI-OBCD
Long Working Distance Oblique Condenser



Weight: 530 g

CH3-CD
Brightfield Condenser



Weight: 60 g

Unit: mm

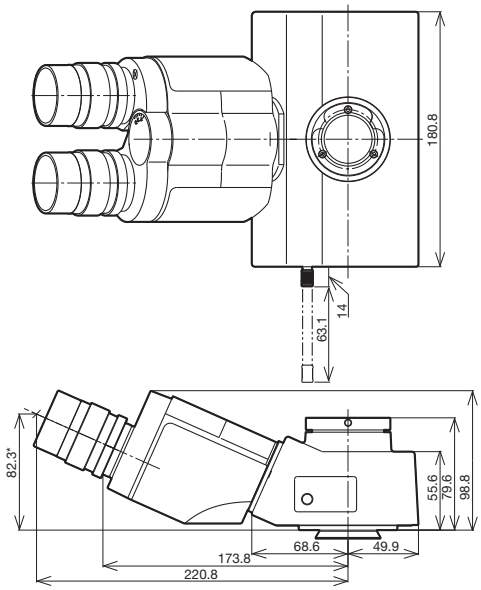
Observation Tubes

Super Widefield Trinocular Observation Tubes

Trinocular observation tubes with super widefield of view. Compatible with FN 26.5.

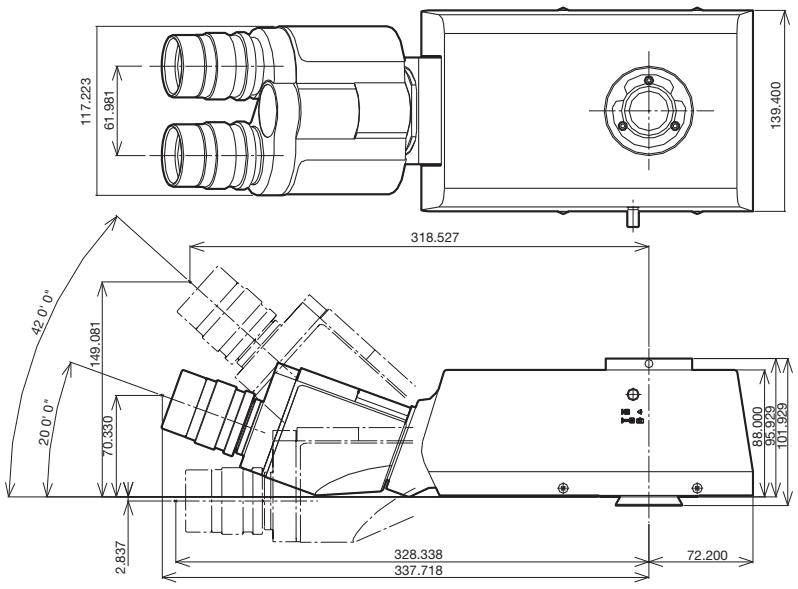
U-SWTR-3

Super Widefield Trinocular Tube



MX-SWETTR

Super Widefield Erect Image Tilting Trinocular Tube



Unit: mm

Name	FN	Inclination Angle (degree)	Interpupillary Distance (mm)	Light Path Selector (eyepiece/video port)	Observation Image	Weight (g)
U-SWTR-3	26.5	24	50-76	100/0, 20/80, 0/100	Inverted	2300
MX-SWETTR	26.5	0-42	50-76	100/0, 0/100	Erect	4200

*Length marked with an asterisk (*) may vary according to interpupillary distance. The distance for figure shown is 62 mm.

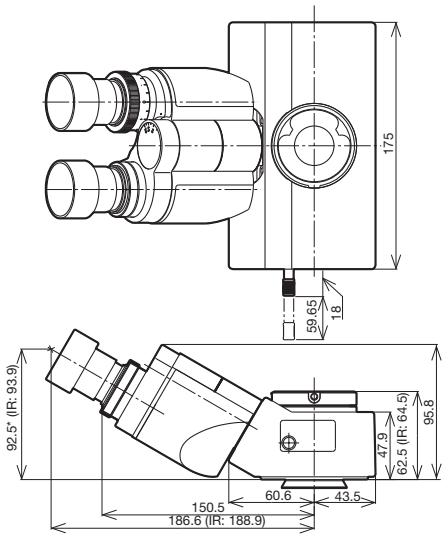
Observation Tubes

Widefield Trinocular Observation Tubes

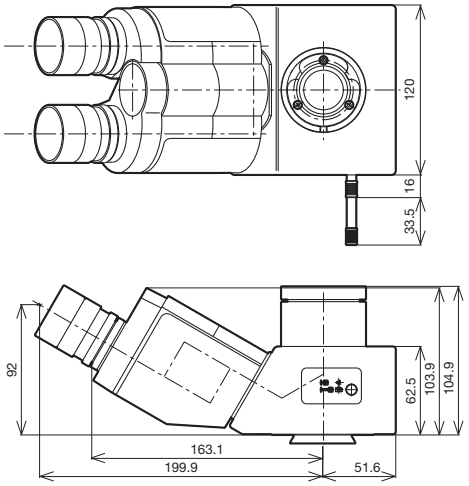
Trinocular observation tubes with widefield of view. Compatible with FN 22.

U-TR30-2
Widefield Trinocular Tube

U-TR30IR
Widefield Trinocular Tube for IR



U-ETR-4
Widefield Erect Image Trinocular Tube



Unit: mm

Name	FN	Inclination Angle (degree)	Interpupillary Distance (mm)	Light Path Selector (eyepiece/video port)	Observation Image	Weight (g)
U-TR30-2	22	30	50-76	100/0, 20/80, 0/100	Inverted	1600
U-TR30IR	22	30	50-76	100/0, 0/100	Inverted	1600
U-ETR-4	22	30	50-76	100/0, 0/100	Erect	1900

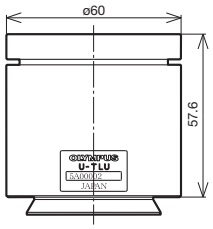
*Length marked with an asterisk (*) may vary according to interpupillary distance. The distance for figure shown is 62 mm.

Single Port Tube with Lens

When the visual observation is not needed and only video observation is required, a single port tube with a built-in telan lens can be attached directly to the video port.

U-TLU
Single Port Tube with Lens

U-TLUIR
Single Port Tube with Lens for IR



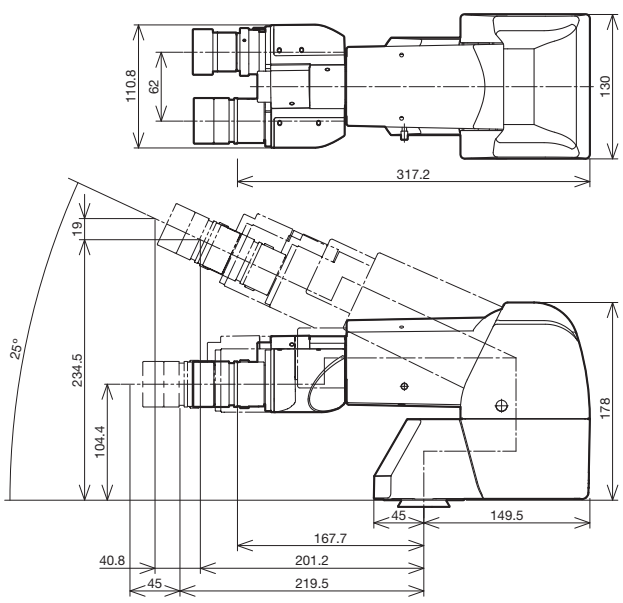
• For attachable video camera adapters, refer to video camera adapters system diagram page (pages 2-12 - 2-13).

Weight: 350 g Unit: mm

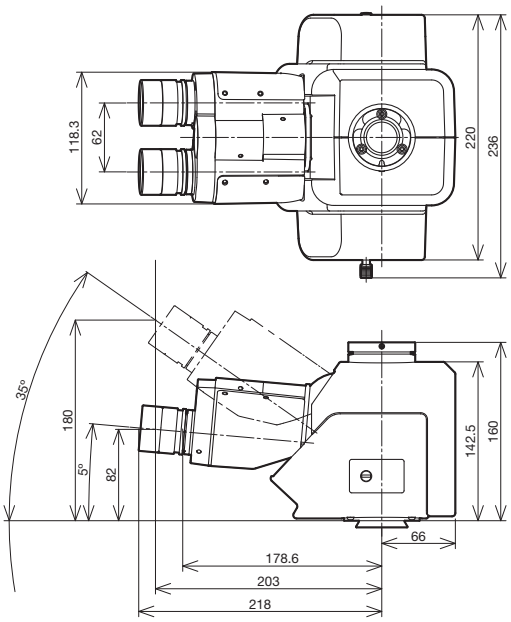
Observation Tubes

Tilting Binocular Tube

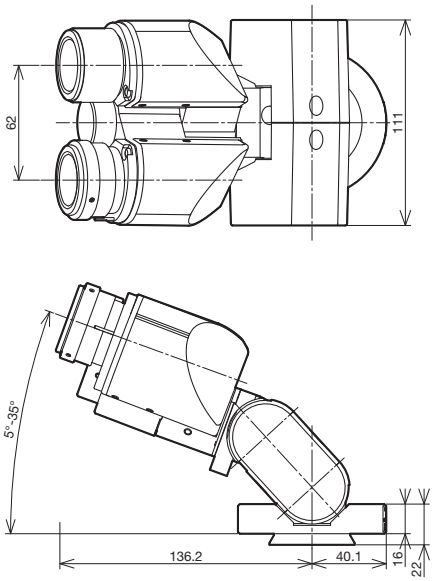
U-TTBI
Telescopic Tilting Binocular Tube



U-TTR-2
Tilting Trinocular Tube



U-TBI-3
Tilting Binocular Tube



Unit: mm

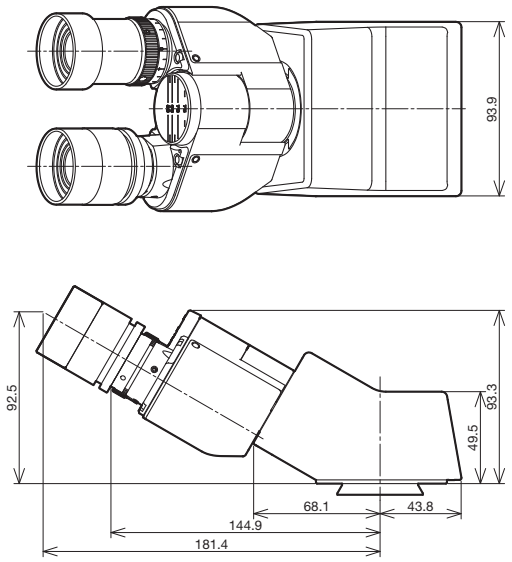
Name	FN	Inclination Angle (degree)	Interpupillary Distance (mm)	Light Path Selector (eyepiece/video port)	Observation Image	Weight (g)
U-TTBI	22	0-25	50-76	NA	Inverted	3800
U-TTR-2	22	5-35	50-76	100/0, 0/100, 50/50	Inverted	3200
U-TBI-3	22	5-35	50-76	NA	Inverted	1300

*In the case of combination with CX-RFA-2, FN reduces to 18.

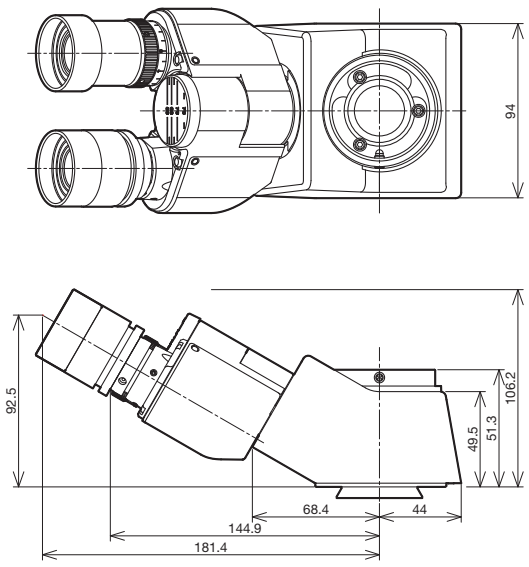
Observation Tubes

Binocular Tube

U-CBI30-2
Binocular Tube



U-CTR30-2
Trinocular Tube



Unit: mm

Name	FN	Inclination Angle (degree)	Interpupillary Distance (mm)	Light Path Selector (eyepiece/video port)	Observation Image	Weight (g)
U-CBI30-2	20, 18(*)	30	48-75	NA	Inverted	800
U-CTR30-2	20, 18(*)	30	48-75	NA	Inverted	900

*In the case of combination with CX-RFA-2, FN reduces to 18.

Intermediate Tubes & Accessories

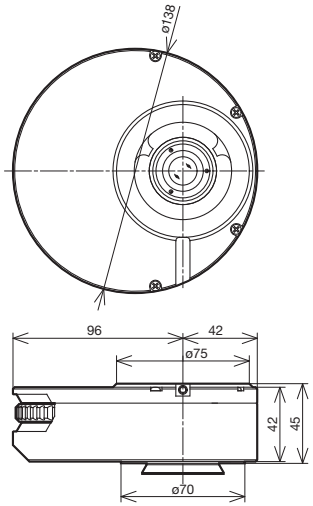
Intermediate Tubes

Various accessories for various observation need.

U-CA

Magnification Changer

Provides 1X, 1.2X, 1.6X and 2X intermediate magnifications.



Weight: 1.3 kg

U-ECA

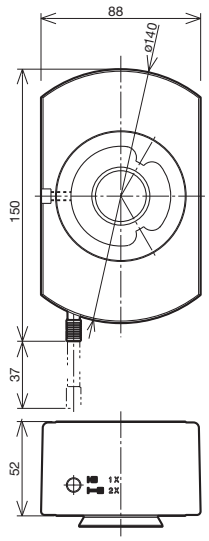
Magnification Changer 2C

Provides 1X and 2X intermediate magnifications.

U-ECA1.6X

Magnification Changer 1.6X

Provides 1X and 1.6X intermediate magnifications.

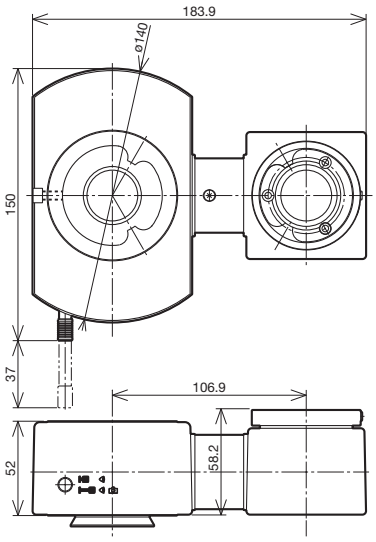


Weight: 1.3 kg

U-TRU

Trinocular Intermediate Attachment

Intermediate attachment which divides the light path, allowing attachment of both digital and video cameras.



BI:PT=100:0/20:80

Weight: 1.3 kg

Unit: mm

Intermediate Tubes & Accessories

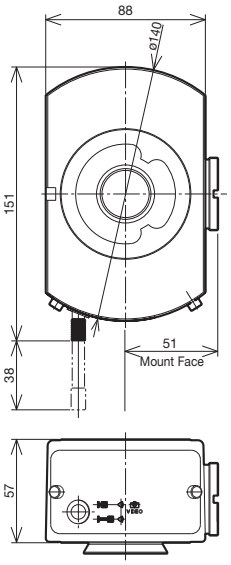
Intermediate Tubes

Various accessories for various observation need.

U-DP

Dual Port

Use this intermediate tube to divide the light path.



Weight: 1 kg

Light Path Selector by Mirror Unit

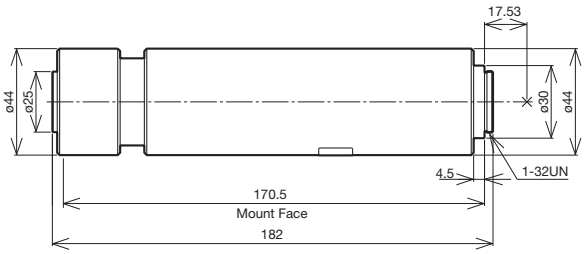
Transmitted Side Port: Side Port = 100:0

Transmitted Side Port: Side Port = 70:30 (with use of U-MBF3)

U-DP1XC

Dual Port 1X

Combine with U-DP to obtain a 1X image.

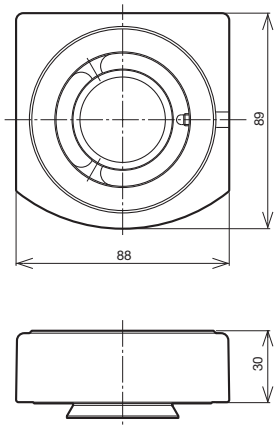


Weight: 500 g

U-EPA2

Eyepoint Adjuster

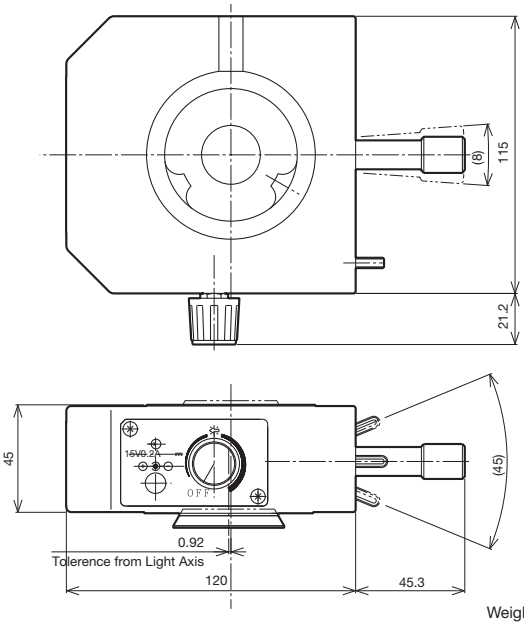
Raises eyepoint by 30 mm.



Weight: Approximately 500 g

U-APT

Arrow Pointer



Weight: 1.2 kg

Unit: mm

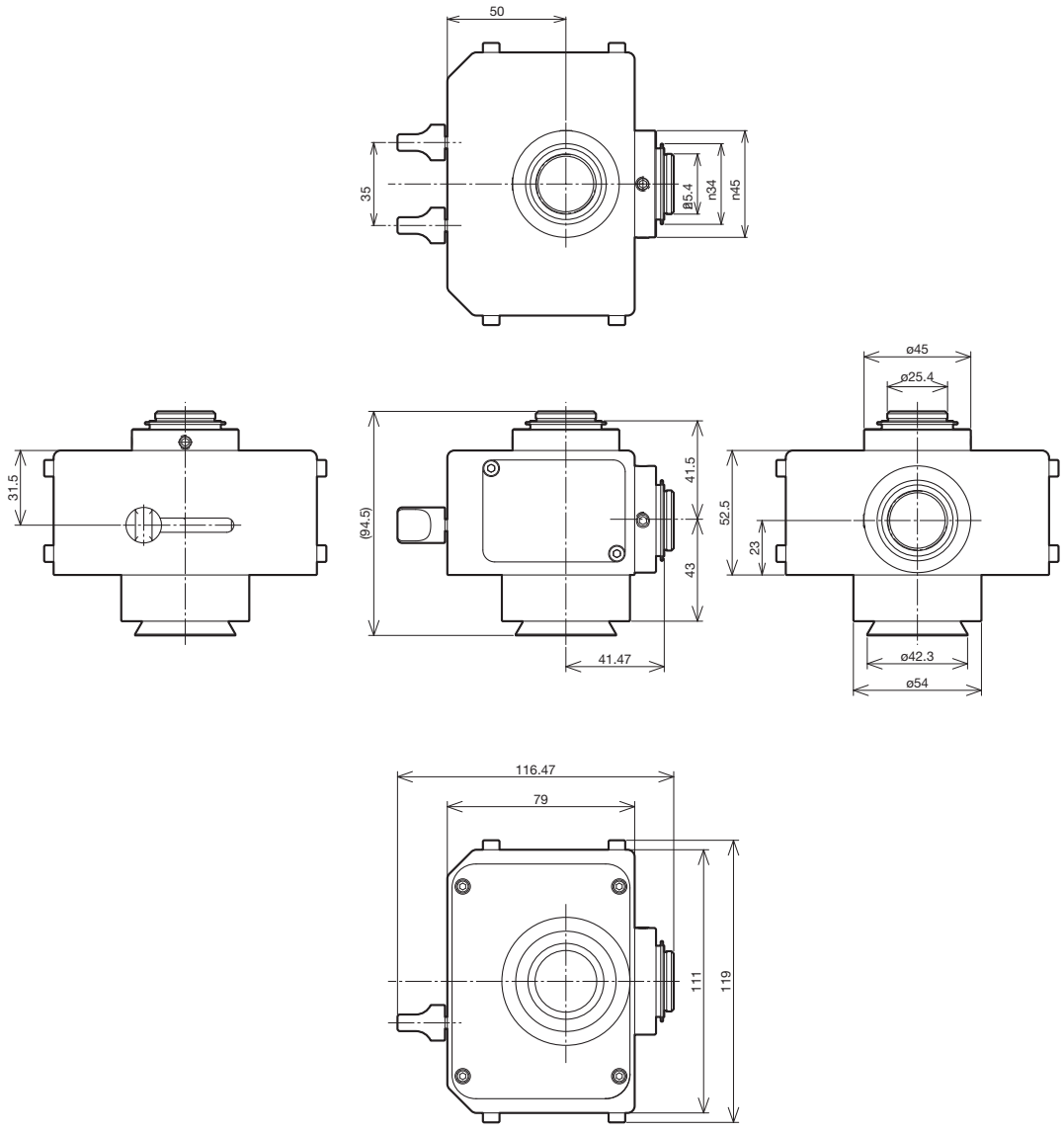
Intermediate Tubes & Accessories

Dual port tube with C mounts

U-DPCAD

Dual camera port allows the attachment of two cameras.

U-DPCAD



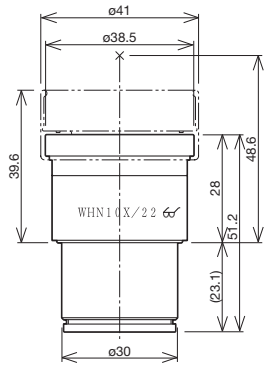
Weight: 0.9 kg Unit: mm

Eyepieces

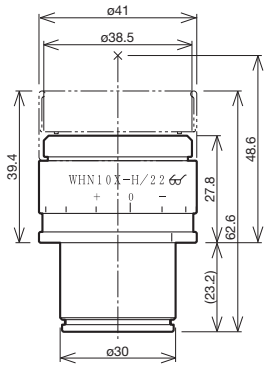
Eyepieces

Eyepieces for UIS2 optical system.

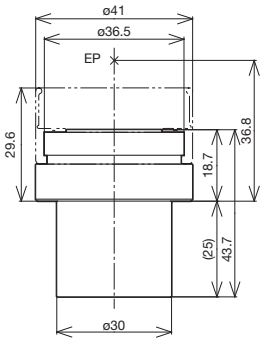
WHN10X
Widefield Eyepiece



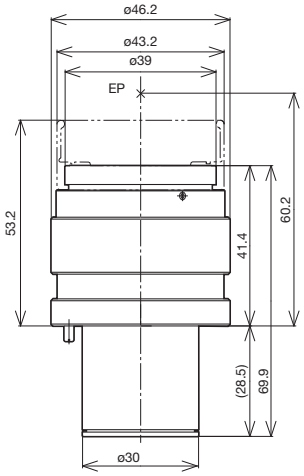
WHN10X-H
CROSSWHN10X
Widefield Eyepieces



WH15X
Widefield Eyepiece



SWH10X-H
MICROSWH10X
CROSSSWH10X
Super Widefield Eyepieces



unit: mm

Name	FN	Diopter Adjustment Range (1/m)	Micrometer Diameter (mm)	Weight (g)	Remarks
WHN10X	22	—	24	90	
WHN10X-H	22	-8 — +5	24	170	with Adjustable Diopter
CROSSWHN10X	22	-8 — +5	—	170	with Cross Lines and Adjustable Diopter
WH15X	14	—	24	90	
SWH10X-H	26.5	-8 — +2	—	210	with Adjustable Diopter
MICROSWH10X	26.5	-8 — +2	—	210	with Micrometer and Adjustable Diopter
CROSSSWH10X	26.5	-8 — +2	—	210	with Cross Lines and Adjustable Diopter

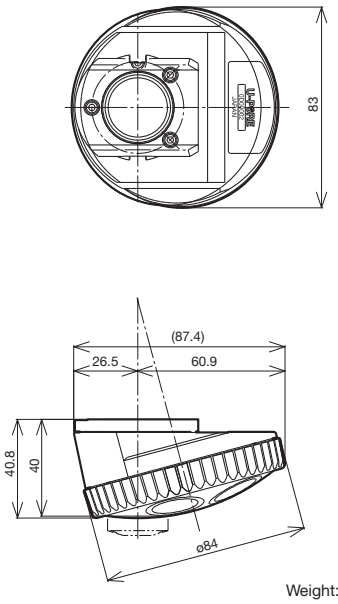
*EP=eyepoint

Revolving Nosepieces

Revolving Nosepieces for BF Objectives

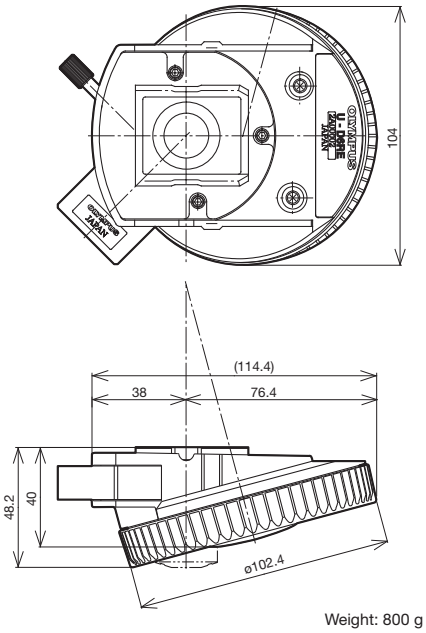
Choose from following 6 types. For motorized nosepieces, refer to motorized unit page.

U-5RE-2
Quintuple Revolving Nosepiece for BF/DF with Slider Slot for DIC



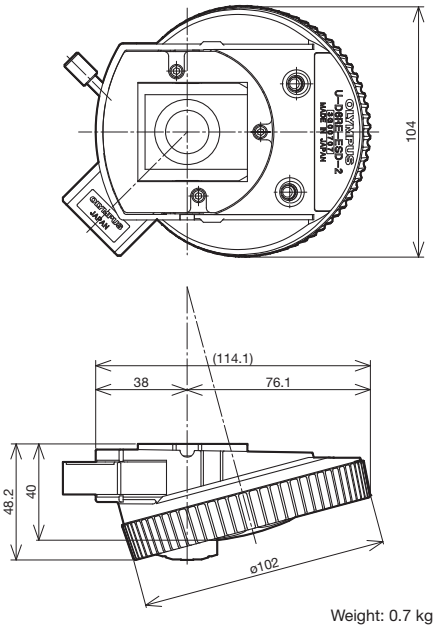
Weight: 520 g

U-D6RE
Septuple Revolving Nosepiece with Slider Slot for DIC



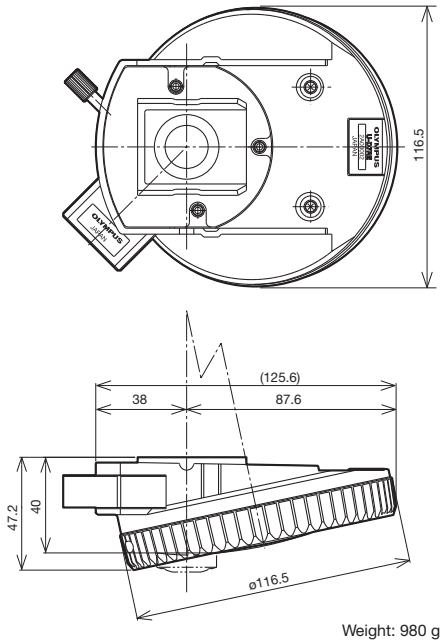
Weight: 800 g

U-D6RE-ESD
Sextuple Revolving Nosepiece with Slider Slot for DIC with ESD Treatment



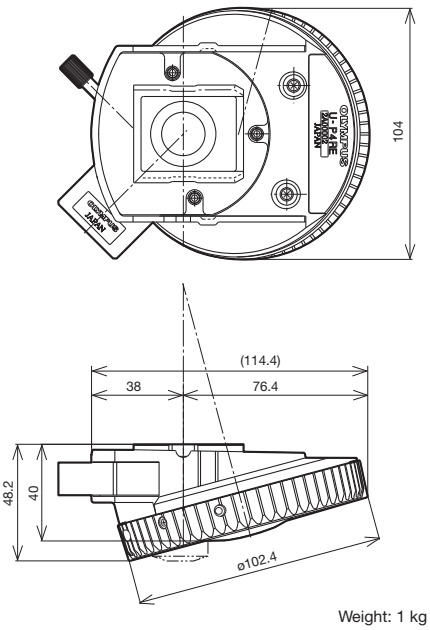
Weight: 0.7 kg

U-D7RE
Sextuple Revolving Nosepiece with Slider Slot for DIC



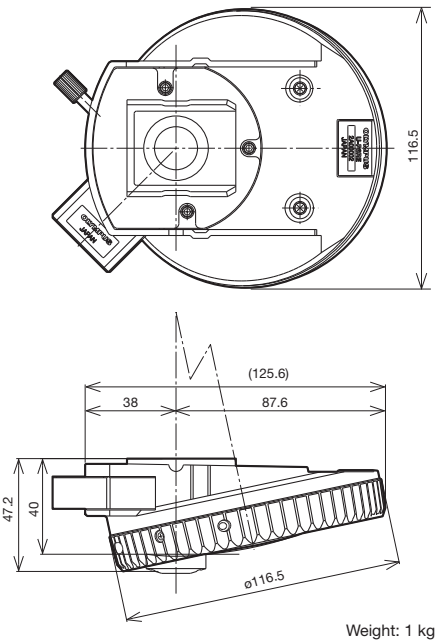
Weight: 980 g

U-P4RE
Centerable Quadruple Revolving Nosepiece with Slider Slot for DIC



Weight: 1 kg

U-P6RE
Centerable Sextuple Revolving Nosepiece with Slider Slot for DIC



Weight: 1 kg

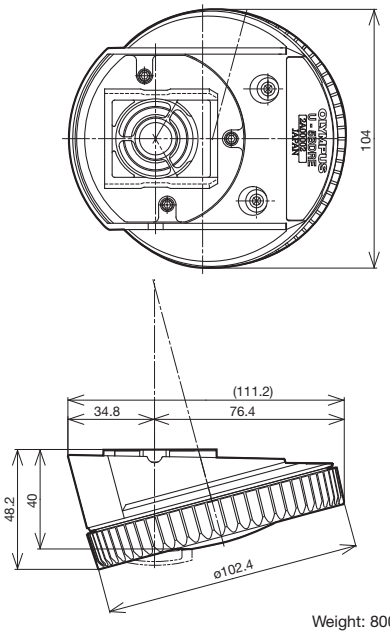
Insert the DIC dummy when not using the DIC slider. unit: mm

Revolving Nosepieces

Revolving Nosepieces for BF/DF Objectives

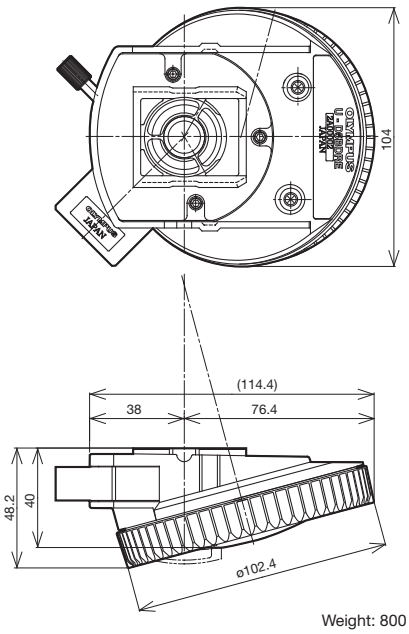
Choose from following 3 types. Use of adapter to mount BF objectives (BD-M-AD) enables attachment of brightfield objectives.
For motorized nosepieces, refer to motorized unit page.

U-5BDRE
Quintuple Revolving Nosepiece for BF/DF



Weight: 800 g

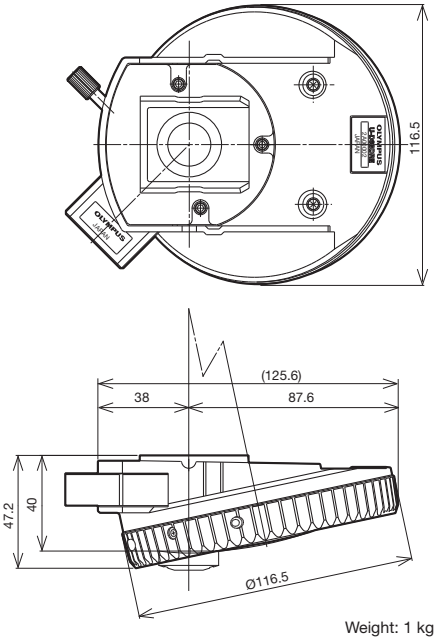
U-D5BDRE
Quintuple Revolving Nosepiece for BF/DF with Slider Slot for DIC



Weight: 800 g

U-P5BDRE
Centerable Quintuple Revolving Nosepiece with Slider Slot for DIC

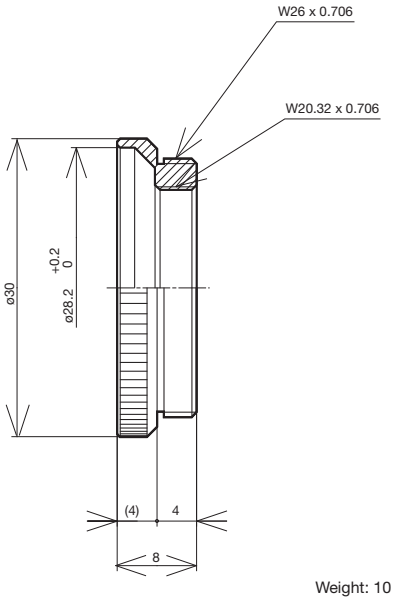
U-D6BDRE
Sextuple Revolving Nosepiece for BF/DF with Slider Slot for DIC



Weight: 1 kg

Insert the DIC dummy when not using the DIC slider.

BD-M-AD
Adapter to Mount BF Objectives



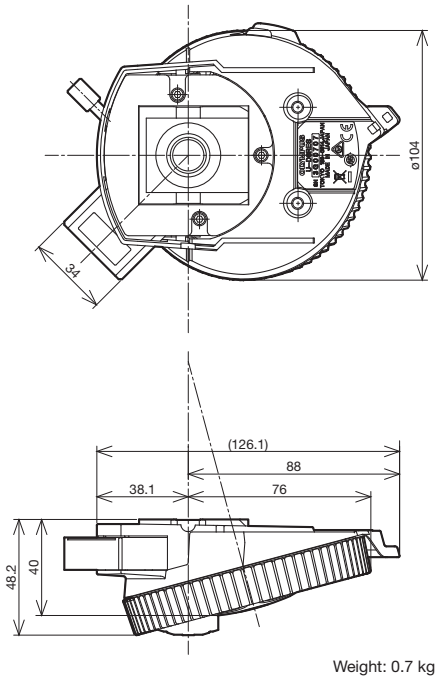
Weight: 10 kg

unit: mm

Revolving Nosepieces

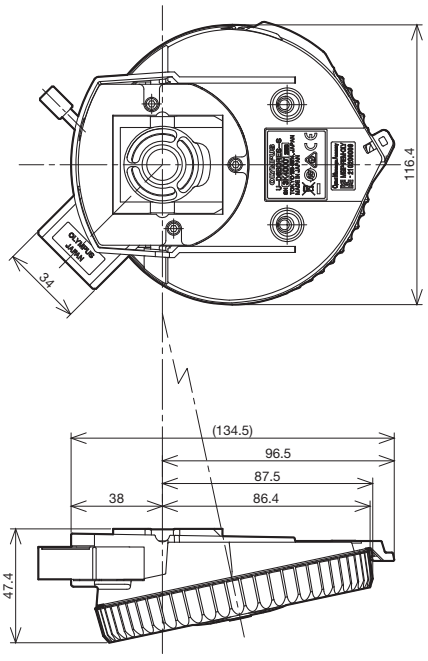
Coded Sextuple Revolving Nosepiece

U-D6RES
Coded Sextuple Revolving Nosepiece with Slider Slot for DIC



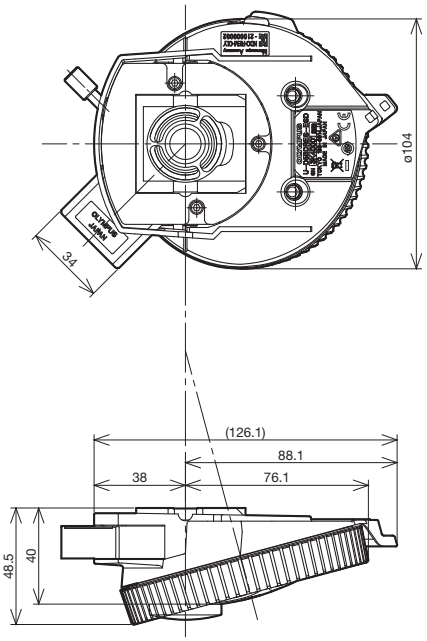
Weight: 0.7 kg

U-D6BDRES-S
Coded Sextuple BF/DF Revolving Nosepiece with Slider Slot for DIC



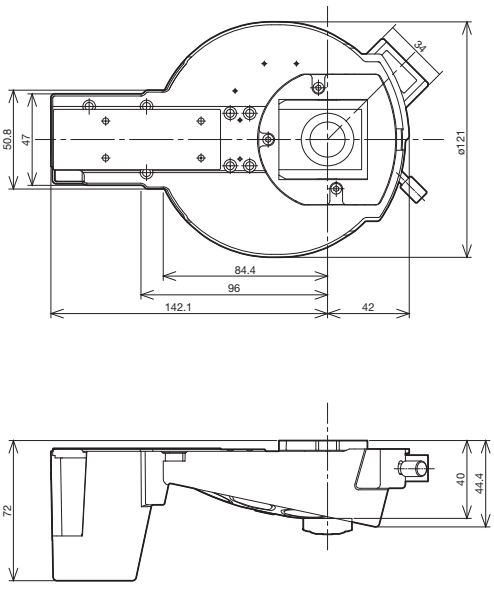
Weight: 0.9 kg

U-D5BDRES-ESD
Coded Quintuple BF/DF Revolving Nosepiece with Slider Slot for DIC with ESD Treatment



Weight: 0.75 kg

U-D7RES
Coded Septuple Nosepiece with Slider Slot for DIC



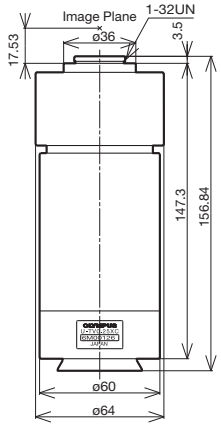
unit: mm

Video Camera Adapters

C-mount Video Camera Ports

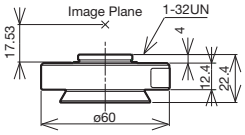
Allows direct attachment of a C-mount video camera. Five types are provided: 1X, 0.63X, 0.5X, 0.35X and 0.25X. All models feature a focus adjustment function.

U-TV0.25XC
C-mount Video Port with 0.25X Lens



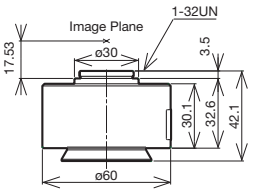
Weight: 1.2 kg

U-TV0.35XC-2
C-mount Video Port with 0.35X Lens



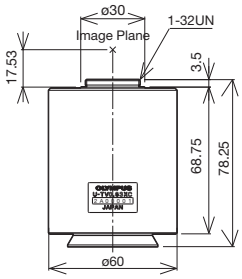
Weight: 100 g

U-TV0.5XC-3
C-mount Video Port with 0.5X Lens



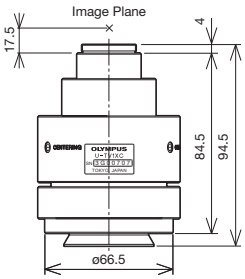
Weight: 200 g

U-TV0.63XC
C-mount Video Port with 0.63X Lens

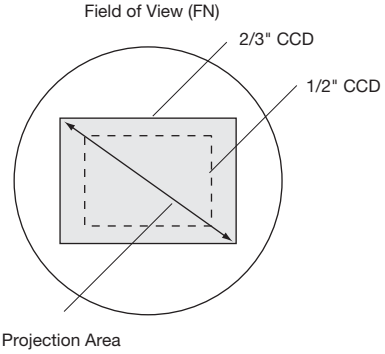


Weight: 430 g

U-TV1XC
C-mount Video Port with 1X Lens



Weight: 300 g



Video Camera Adapter (projection lens)	Projection Magnifications	Projection Area (FN)		
		2/3" CCD	1/2" CCD	1/3" CCD
U-TV1X-2	1X	11	8	6
U-TV1XC	1X	11	8	6
U-TV0.63XC	0.63X	17.5	12.7	9.5
U-TV0.5XC-3	0.5X	22	16	12
U-TV0.35XC-2	0.35X	—	22	17.1
U-TV0.25XC	0.25X	—	—	24

$$\text{Practical Field of View (mm)} = \frac{\text{Projection Area (FN)}}{\text{Objective Magnifications}}$$

Focus the video camera adapter to prevent defocusing the eyepiece image and defocusing by magnification switching.
Generally, the video camera adapter is focused by switching to a low magnification after focusing at a high magnification.objective.

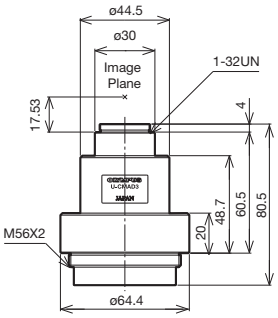
Unit: mm

Video Camera Adapters

Video Camera Mount Adapters

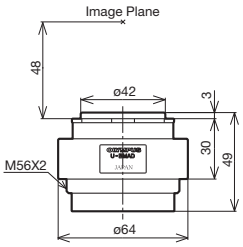
Allows attachment to video cameras with C, Bayonet, Sony and F mounts. Use with the U-TV1X-2. Focus by amount of screwing into U-TV1X-2.

U-CMAD3
C-mount Adapter



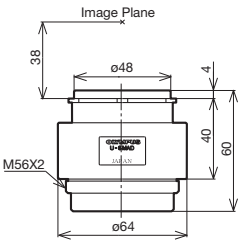
Weight: 165 g

U-BMAD
Bayonet Mount Adapter



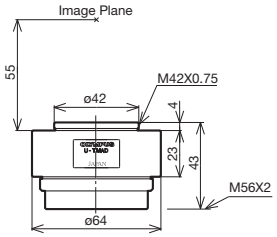
Weight: 80 g

U-SMAD
Sony Mount Adapter



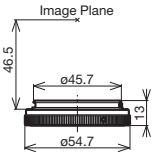
Weight: 90 g

U-TMAD
T Mount Adapter



Weight: 165 g

U-FMT
F/T Mount Adapter *



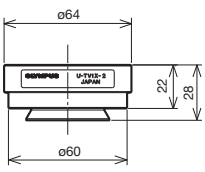
*It must be combined with U-TMAD.

Weight: 80 g

Video Camera Port

This port can be attached directly to the trinocular observation tube as well as to the single port tube with lens.

U-TV1X-2
Video Port 1X



Weight: 80 g

Unit: mm

Motorized Units

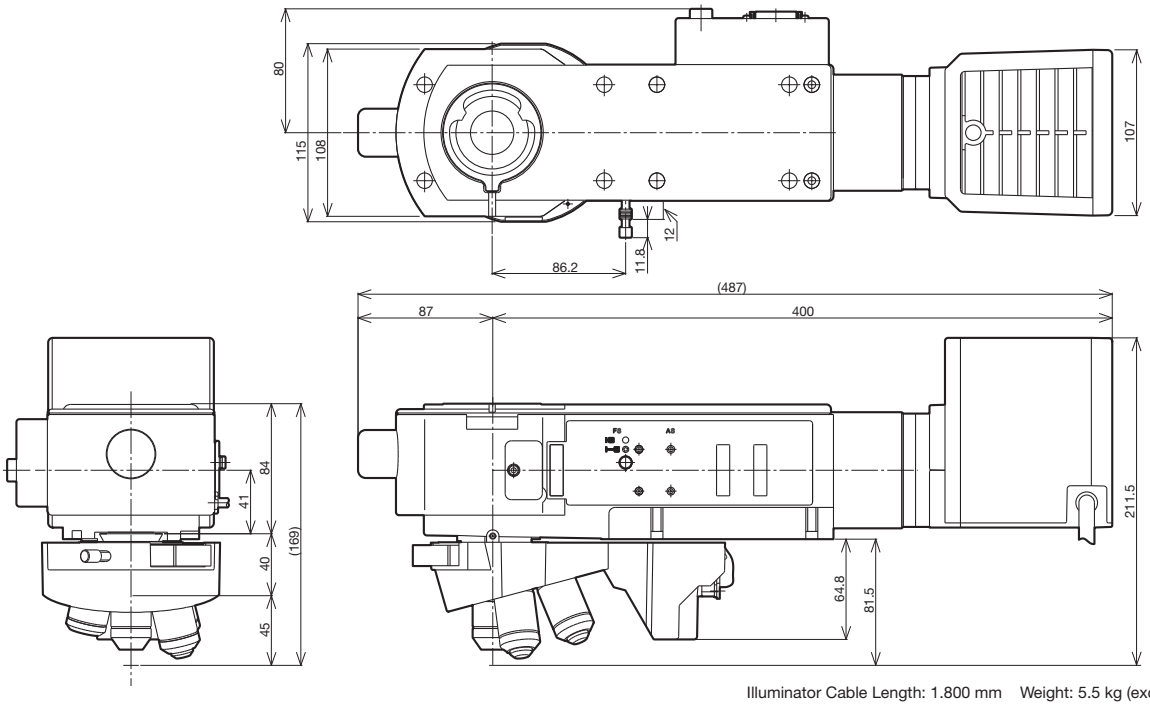
Motorized Universal Reflected Illminator for BX2 Series

Various motorized units, appropriate for automation of equipment, are available.

BX-RLAA + U-D6REMC + U-LH100-3

Motorized BF/DF Reflected Light Illuminator + Motorized Nomarski DIC Sextuple Revolving Nosepiece + 100 W Halogen Lamp Housing

Enables motorized exchange of objectives, selection between brightfield and darkfield observations as well as aperture diaphragm closing/opening. The BX-UCB control unit has an RS232C connector, allowing control via a PC. For method of attaching illuminator, refer to Mounting Dimensions of BX-RLA2.

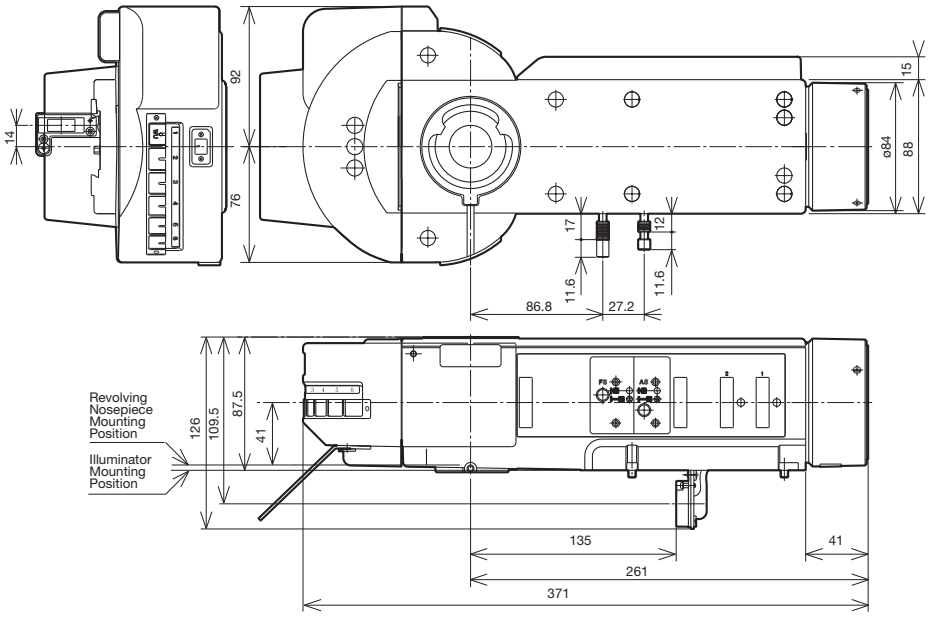


Illuminator Cable Length: 1.800 mm Weight: 5.5 kg (exclude objective)

BX-RFAA

Motorized Universal Reflected Light Illuminator

Reflected light fluorescence illuminator with simultaneous attachment of six mirror units. Incorporates motorized mirror unit changeover and shutter.



Illuminator Cable Length: 1.800 mm Weight: 4.3 kg

Unit: mm

Motorized Units

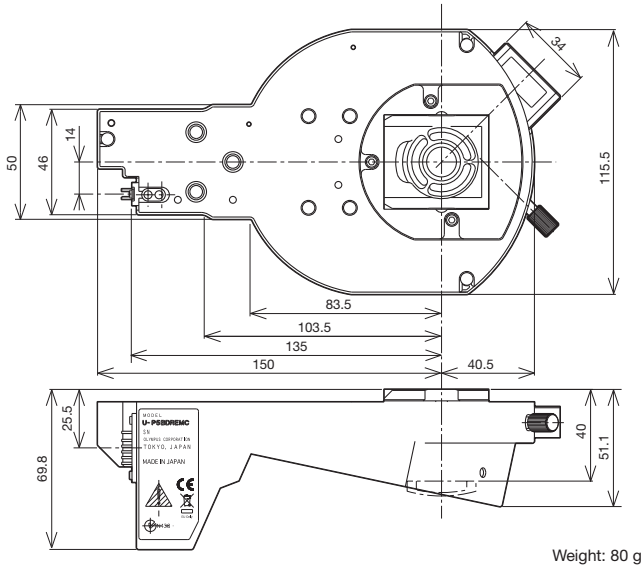
Various motorized units, appropriate for automation of equipment, are available.

U-P5BDREMC

Motorized Centerable Quintuple BD Revolving Nosepiece with Slider Slot for DIC

U-D6BDREMC

Motorized Sextuple BD Revolving Nosepiece with Slider Slot for DIC



Weight: 80 g

U-D5BDREMC

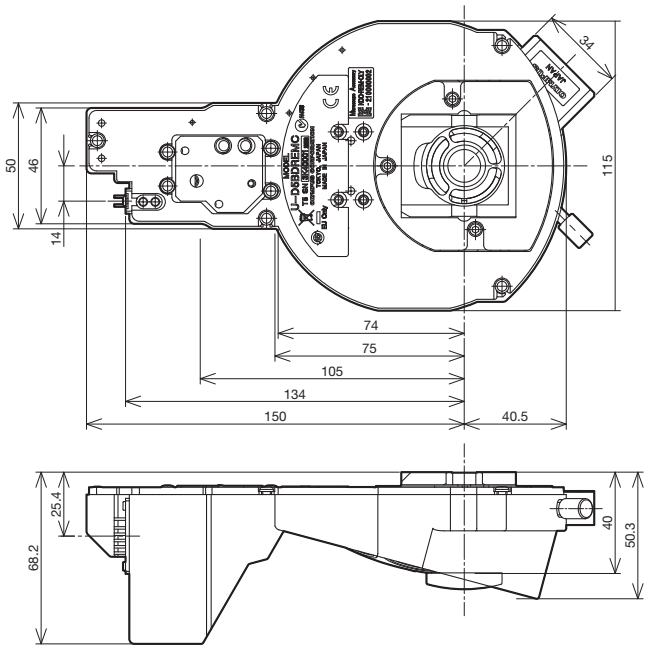
Motorized Quintuple BD Revolving Nosepiece with Slider Slot for DIC

U-D6REMC

Motorized Sextuple Revolving Nosepiece with Slider Slot for DIC

U-P5REMC

Motorized Centerable Quintuple Revolving Nosepiece with Slider Slot for DIC



Unit: mm

Motorized Units

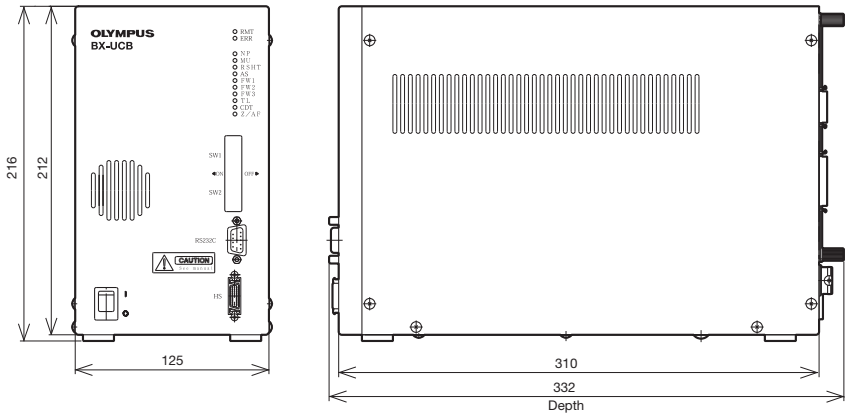
Control Box for BX2 Series

Various motorized units, appropriate for automation of equipment, are available.

BX-UCB

Control Unit

Motorized units including motorized illuminator and auto focus unit can be totally controlled from BX-UCB.

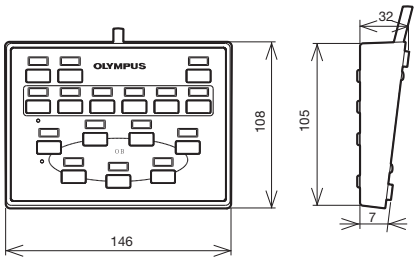


*Extension cord U-RMT (1700 mm) should be used to connect the lamp housing (U-LH100-3) to the BX-UCB.

Weight: 1.0 kg

U-HSTR2

Hand Switch



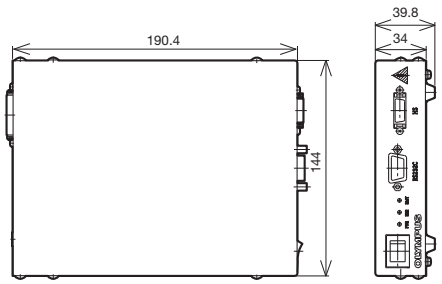
Cable Length 2000 mm Weight: 370 g

BX-REMCB

Control Box for Motorized Nosepiece and BF/DF Illuminator

BX-RLAA and U-D5BDREMC/U-D6REMC/U-P5REMC can be controlled from U-HSTR2, or direct from the computer keyboard via an RS232C connector.

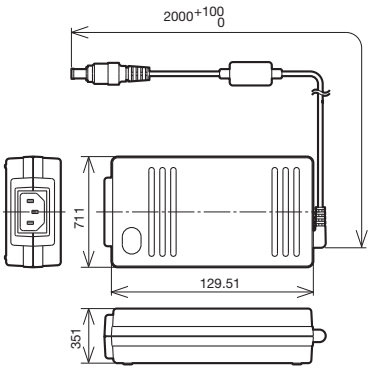
*BX-RFAA and U-D5BDREM/U-D6REM combination not applicable.



Weight: kg

U-ACAD4515

AC Adapter for BX-REMCB



Weight: kg

Unit: mm

Motorized Units

Motorized Units for BX2 Series

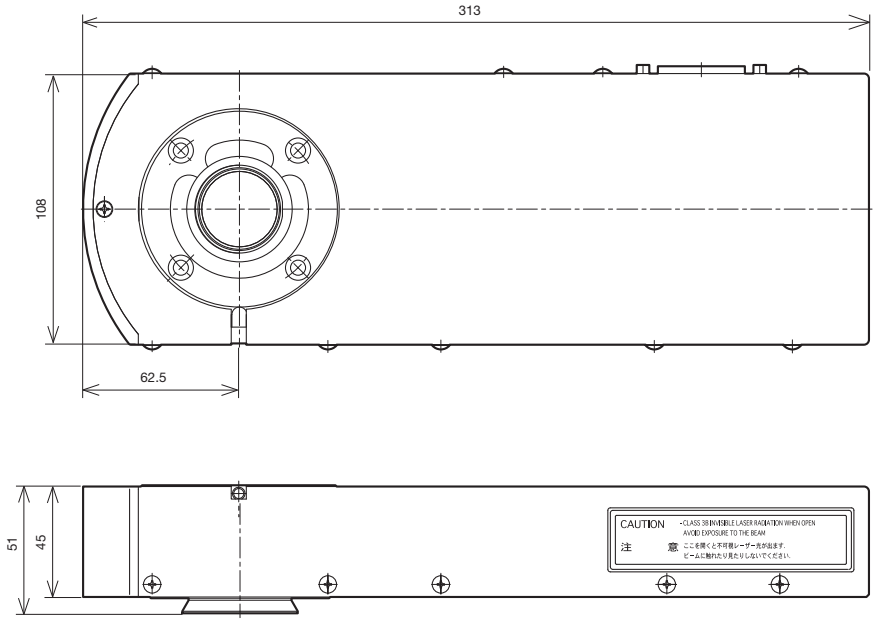
Various motorized units, appropriate for automation of equipment, are available.

U-AFA2M-VIS

Active Auto Focus Unit

Featuring an AF laser light source in wavelength 785 nm. The multiple-spots sensor enables the high-speed and stable focusing of specimens with variable height differences

*Class 1 laser product



*Consult your Olympus dealer about the motorized focus.

Weight: 2.6 kg

Cable

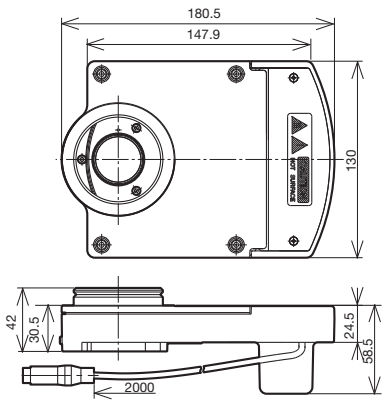
AFA2M-CBL2M Weight: 0.23 kg Length: 2 m

AFA2M-CBL3M Weight: 0.36 kg Length: 3 m

U-FWR

Motorized Reflected Filter Wheel

Accomplish maximum 6 filter position exchange.



Weight: 1.0 kg

Unit: mm

Motorized Units

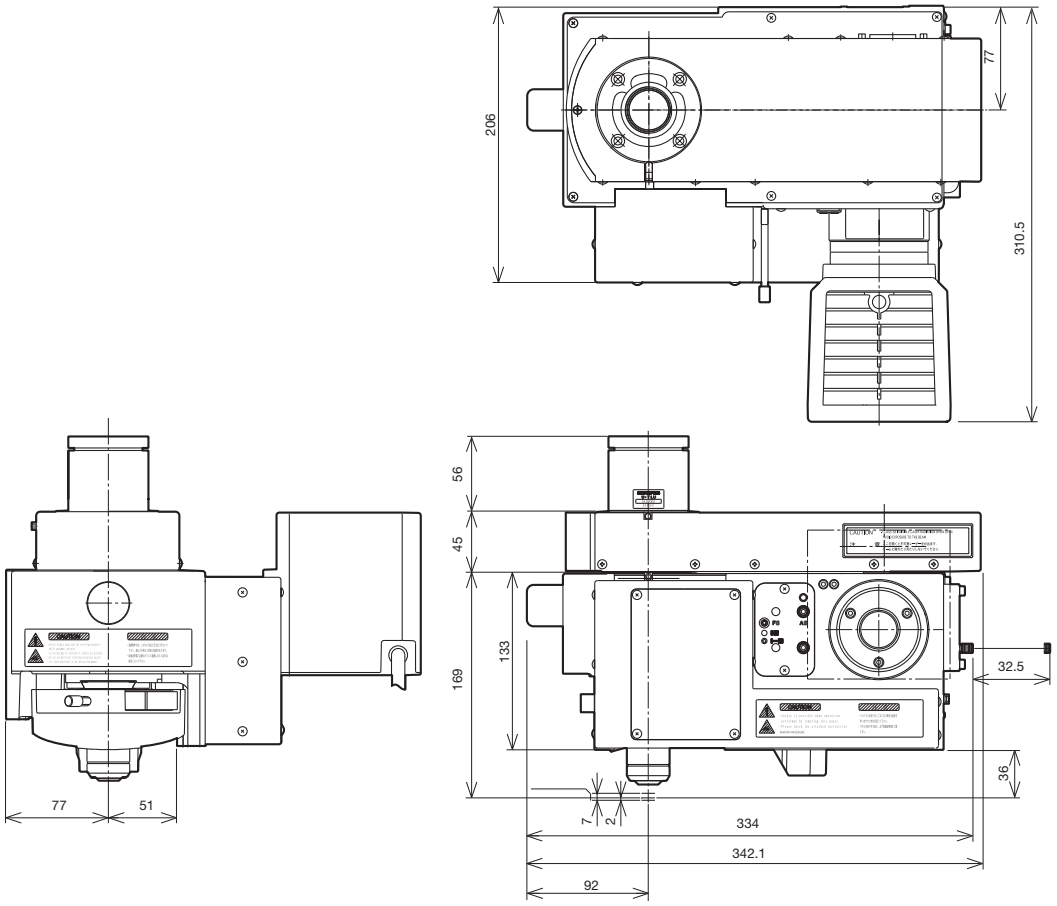
Motorized Modular Microscope

A motorized microscope unit for integration with your equipment. Motorized operations such as revolving nosepiece up/down, objective switching, aperture diaphragm open/close, and brightfield/darkfield switching are accomplished with this component. Several microscopic operations are totally controlled from an external unit by combining this component with an auto focus unit.

BXFMA-F

Motorized Illumination with Power Focus

This is the configuration combined with Active Auto Focus Unit U-AFA2M-VIS, Single Port Tube with Lens U-TLU, a lamp housing, a motorized nosepiece and objectives.

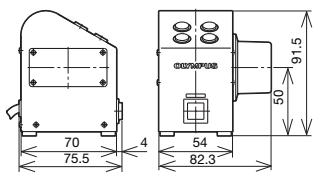


*Consult your Olympus dealer about the mounting dimensions.

Weight: 13 kg (BXFMA-F frame 7.6 kg)

U-FH

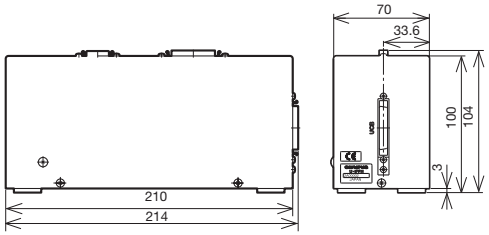
Focus Adjustment Knob Unit



Weight: 760 g

U-IFFH

Focus Adjustment Knob Interface



Weight: 1450 g

Unit: mm

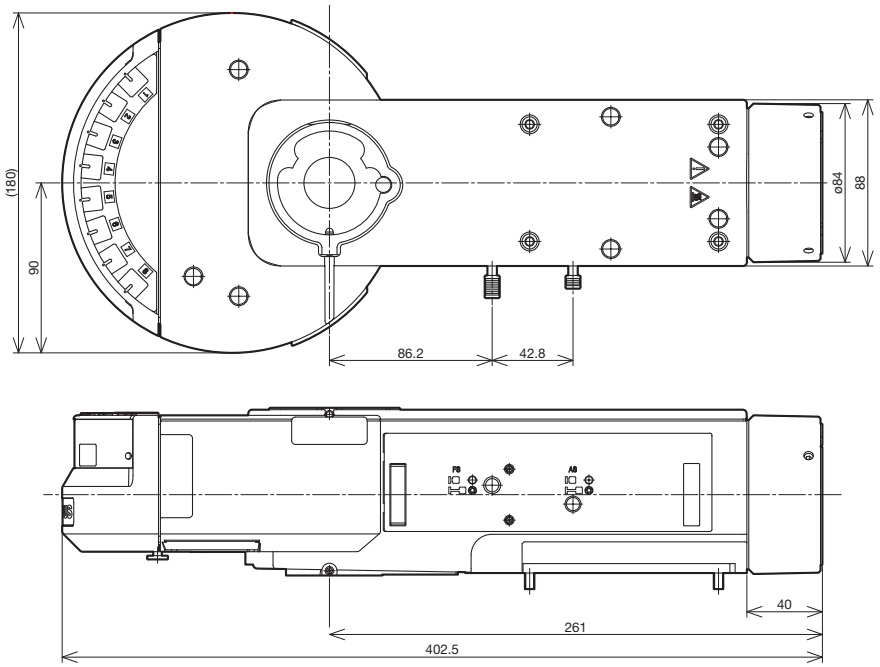
Motorized Units

Motorized Units for BX3 Series

The flexibility of the motorized fluorescence illuminator accommodates multi-color 'stained specimens. The 8-position mirror units permit quick changeover of fluorescence colors.

BX3-RFAA

Motorized Fluorescence Illuminator



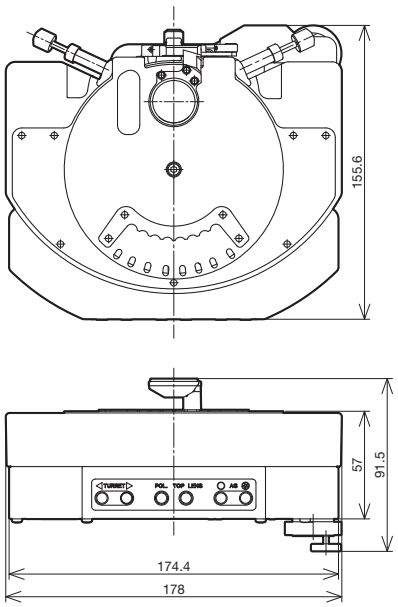
Weight: 4.2 kg

BX3-UCD8A

Motorized Universal Condenser

The motorized universal condenser integrates a variety of optical elements to accommodate transmitted light techniques including brightfield, DIC and phase contrast observation.

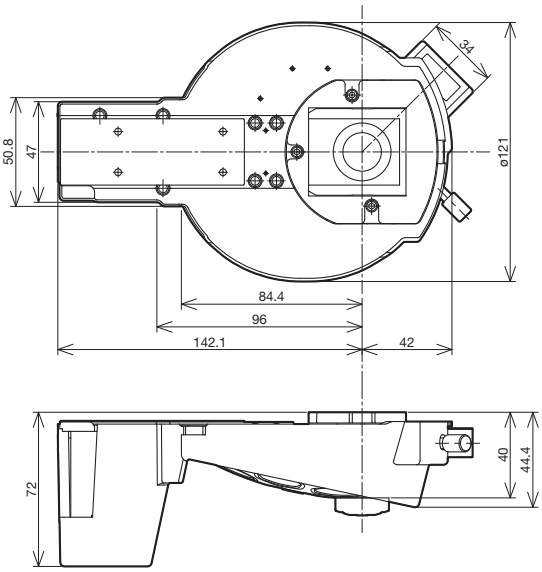
*Optical Elements are required. Please consult your nearest Olympus representative in you region about the Optical Elements Combination.



Weight: 1.6 kg

U-D7REA

Motorized Septuple Revolving Nosepiece with Slider Slot for DIC



Weight: 1.5 kg

Unit: mm

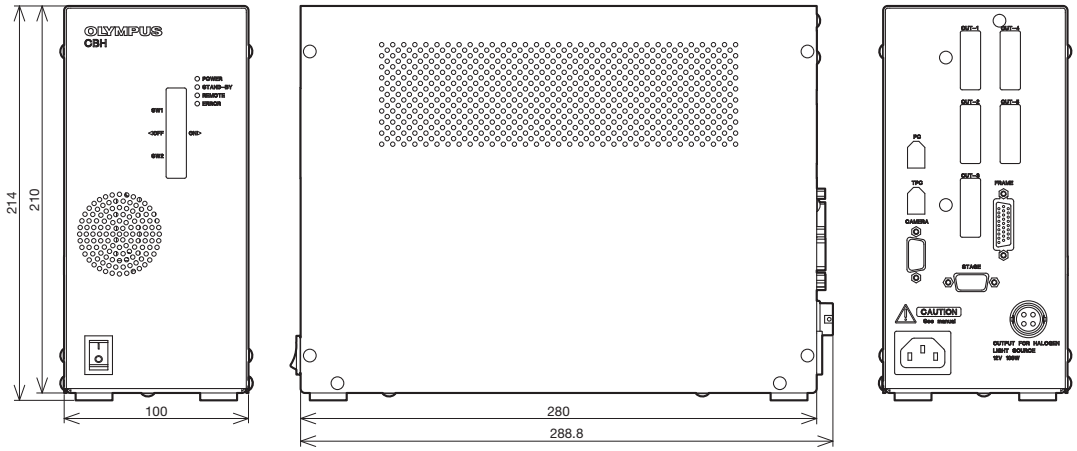
Motorized Units

Control Box for BX3 Series

BX3-CBH

Control Box for Fully-motorized Function

Control Box connected to PC via IEEE1394



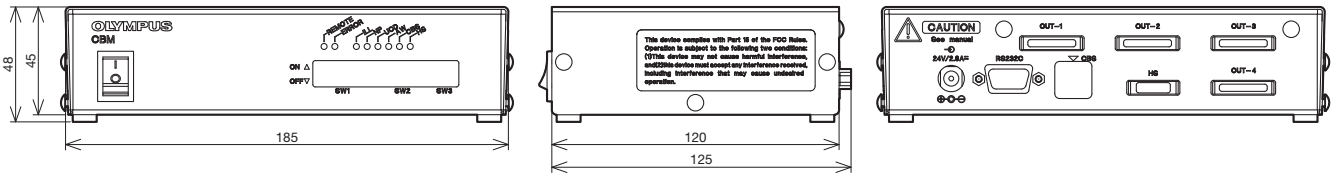
Weight: 4.2 kg

U-CBM

Control Box M for Motorized Function

Control box connected to PC via RS232

*Please consult your nearest Olympus representative in you region about the detailed system chart.



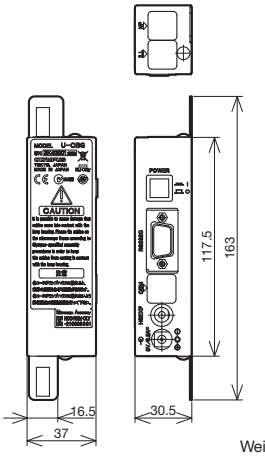
Weight: 0.82 kg

U-CBS

Control Box for Coded Function

Control Box connected to PC via RS232 (attached onto Microscope Frame)

*Please consult your nearest Olympus representative in you region about the detailed system chart.



Weight: 0.5 kg

Unit: mm

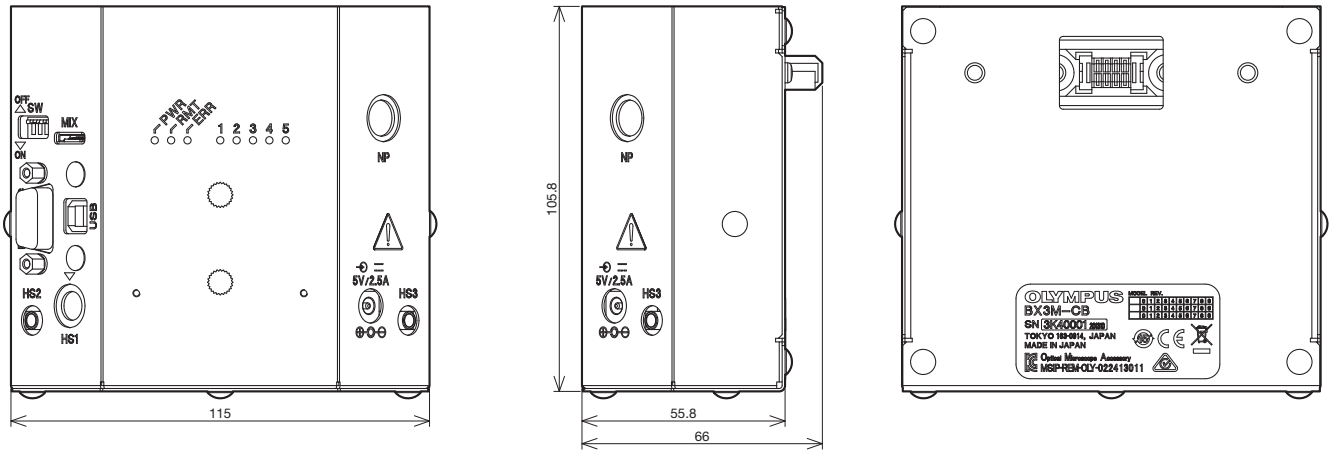
Control Box for BX53M/BXFM

BX3M-CB

Control Box for BXFM

Control Box connected to PC via RS232/USB2.0 (attached onto Microscope Frame)

*Please consult your nearest Olympus representative in you region about the detailed system configuration and conbination.



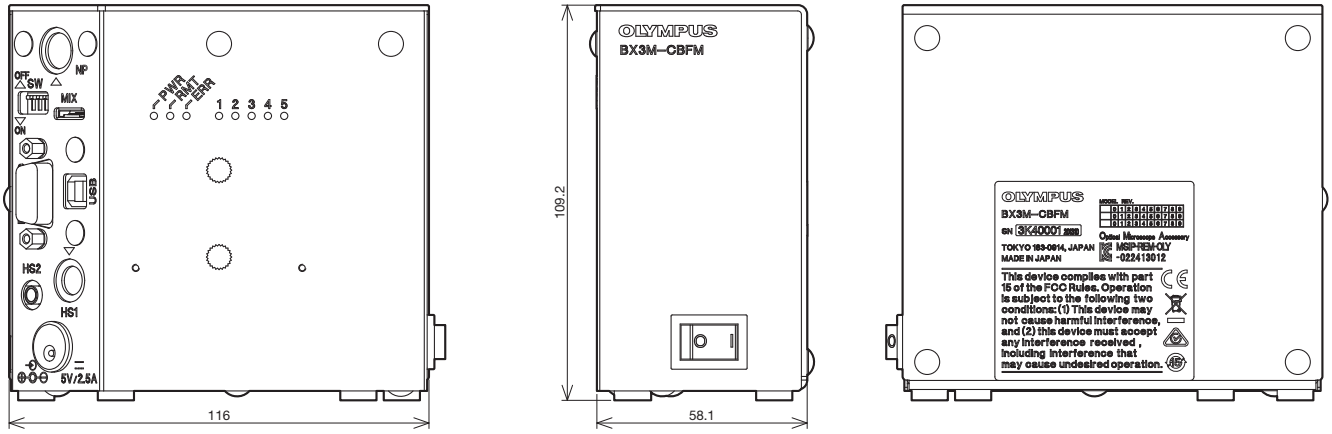
Weight: 0.49 kg

BX3M-CBFM

Control Box for BX53M Frame

Control Box connected to PC via RS232/USB2.0

*Please consult your nearest Olympus representative in you region about the detailed system configuration and conbination.



Weight: 0.67 kg

Unit: mm

Optical Terminology

1. FN and Practical Field of View

The field number (FN) is referred to as the diaphragm size of eyepiece in mm unit which defines the image area of specimen. The diaphragm diameter actually seen through eyepiece is known as the practical field of view (F.O.V.) which is determined by the formula:

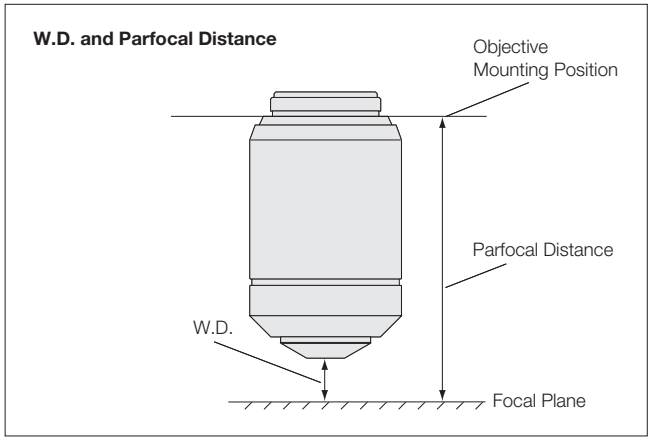
$$\text{F.O.V.} = \frac{\text{Eyepiece FN}}{\text{Objective Magnification}} \text{ (mm)}$$

2. W.D.

The distance between the front edge of the objective and the specimen surface (with the surface of the cover glass in case of the cover glass objective) when the specimen is focused.

3. Parfocal Distance

It is the distance between the objective mounting plane and the specimen. In UIS2/UIS objectives, the parfocal distance is designed at 45 mm.



For parfocal distance of the LCPLFLN-LCD series objectives, refer to the appropriate objective page.

4. Relationship Between the Objective's Focal Length and Magnifications

Indicated magnifications of UIS2/UIS objectives are the values when the focal length of the tube lens is 180 mm.

$$M_{(ob)} = \frac{\text{Focal Length of Tube Lens}}{f}$$

$M_{(ob)}$: Objective Magnification
f: Objective's Focal Length

5. Total Magnification

5.1 Observation Through Eyepiece (binocular observation)

$$M_{(bino)} = M_{(ob)} \times M_{(oc)}$$

$M_{(bino)}$: Total magnification for binocular observation
$M_{(ob)}$: Objective magnification
$M_{(oc)}$: Eyepiece magnification

5.2 Video Monitor Observation

●Total Magnification for Video Monitor

$$M_{(\text{video monitor})} = M_{(ob)} \times M_{(\text{video camera adapter})} \times \text{Monitor Magnification}^*$$

$M_{(\text{video monitor})}$: Total Magnification on the Video Monitor
$M_{(ob)}$: Objective Magnification
$M_{(\text{video camera adapter})}$: Projected Magnification for Video Camera Adapter Including Photo Eyepiece
(refer to Figure 1)

**Refer to Figure 3 for "Monitor Magnification"*

●Practical Field of View for Video Monitor Observation

$$\text{Practical Field of View for Video Monitor Observation} = \frac{\text{Image Device Size}^*}{M_{(ob)} \times M_{(\text{video camera adapter})}}$$

$M_{(ob)}$: Objective Magnification
$M_{(\text{video camera adapter})}$: Projected Magnification for Video Camera Adapter Including Photo Eyepiece
(refer to Figure 1 for projected magnifications)

**Refer to Figure 2 for Image Device Size*

Figure 1 Video Camera Adapter and Projection Magnifications

Video Camera Adapter (projection lens)	Projection Magnifications
U-TV1X-1 + Video Camera Mount Adapters	1X
U-TV1XC	1X
U-TV0.63XC	0.63X
U-TV0.5XC-3	0.5X
U-TV0.35XC-2	0.35X
U-TV0.25XC	0.25X

Figure 2 Imaging Device Size

Camera Format	Diagonal	Horizontal	Vertical
1/3"	6.0 mm	4.8 mm	3.6 mm
1/2"	8.0 mm	6.4 mm	4.8 mm
2/3"	11.0 mm	8.8 mm	6.6 mm

The above table is for standard image device sizes.
Check your device size for precise calculation.

Figure 3 Imaging Device Size and Monitor Magnifications

Camera Format	Monitor Size (diagonal)				
	10"	15"	17"	19"	21"
1/3"	42.3X	63.5X	72.0X	80.4X	88.9X
1/2"	31.8X	47.6X	54.0X	60.3X	66.7X
2/3"	23.1X	34.6X	39.3X	43.9X	48.5X

Example
What is total magnifications for video monitor when objective is 50X, video camera adapter U-TV0.5XC, 2/3" video camera and 21" monitor are used ?

•Total magnification on the video monitor:
$m_{(ob)}$=50X, $M_{(video\ camera\ adapter)}$ is 0.5X from Figure 1 and monitor magnification is 48.5× from Figure 3.
$M_{(monitor\ observation)}=M_{(ob)}\times M_{(video\ camera\ adapter)}\times$monitor magnification
=50×0.5×48.5=1213×

•Practical filed of view for video observation (horizontal side):
$M_{(ob)}$=50X, $M_{(video\ camera\ adapter)}$ is 0.5X from Figure 1 and horizontal side of 2/3" imaging device is 8.8mm from Figure 2

$$\text{Practical Field of View for Video Observation} = \frac{\text{Image Device Size}}{M_{(ob)}\times M_{(video\ camera\ adapter)}}$$

$$= \frac{8.8\ (mm)}{50 \times 0.5} = 52\ \mu m$$

6. NA

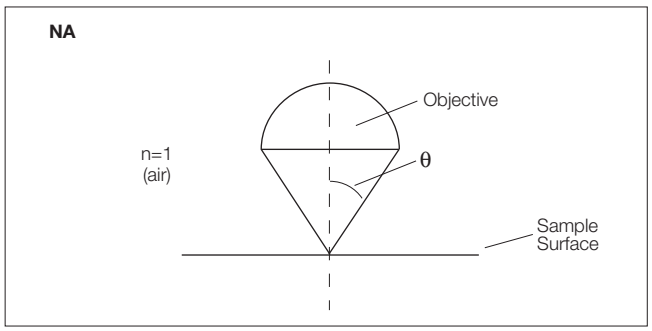
The numerical aperture is a key factor to the performance of objective (resolving power, focal depth and brightness). The NA is determined by the following formula:

$$NA = n \times \sin\theta$$

n=Refraction Rate of the Medium between Specimen and Objectives. (Air: n=1, oil: n=1.515)
θ: Angle Which is Made by the Optical Axis and Refraction of the Light Farthest from the Center of the Lens.

The visual field brightness (B) of the microscope is determined by the following formula in relation to the objective magnification (M). The larger the NA and the lower the objective magnification, brightness will increase in the factor of the second power.

$$B \propto \frac{NA^2}{M^2}$$



7. Resolving Power

The resolving power of an objective is measured by its ability to differentiate two lines or points in an object. The greater the resolving power, the smaller the minimum distance between two lines or points that can still be distinguished. The larger the NA, the higher the resolving power.

Resolving Power Formula

The following formula is generally used for determing resolution.

$$\varepsilon = 0.61 \times \frac{\lambda}{NA}\ \text{(Reyleigh formula)}$$

λ: Wavelength or Radiation in Use
(λ=0.55 μm is used for visible light.)
NA: Objective NA

Example
MPLFLN100X (NA=0.90), λ=0.55 μm

$$\varepsilon = 0.61 \times \frac{\lambda}{NA} = \frac{0.3355}{NA} = \frac{0.3355}{0.90} = 0.37\ \mu m$$

8. Focal Depth of Microscope

The focal depth refers to the depth of the specimen layer which is in sharp focus at the same time, even if the distance between the objective and the specimen plane is changed when observing and shooting the specimen plane by microscope. As human eyes are individually different in the ability of their focus adjustment, each person's perception of the focal depth varies.
At present, the Berek formula is generally used, because it gives a focal depth value that often coincides with that obtained through experiments.

Focal Depth formula

Visual Observation (Berek formula)

$$\pm\ D.O.F. = \frac{\omega \times 250{,}000}{NA \times M} + \frac{\lambda}{2\ (NA)^2}\ (\mu m)$$

D.O.F.: Depth Of Focus

ω: Resolving Power of Eyes 0.0014
(when optical angle is 0.5 degrees)
M: Total Magnification
(objective magnification x eyepiece magnification)

$$\rightarrow \pm\ D.O.F. = \frac{350}{NA \times M} + \frac{0.275}{NA^2}\ (\lambda=0.55\ \mu m)$$

This indicates that the focal depth becomes smaller as the numerical aperture becomes larger.

Example
With MPLFLN100X (NA=0.90), WHN10X:

$$\pm\ D.O.F. = \frac{350}{0.90 \times 1{,}000} + \frac{0.275}{0.81} = 0.39 + 0.34 = 0.73\ \mu m$$

Video Camera

In the case of a video camera, the focal depth will vary according to number of pixels of CCD, optical magnification, and numerical aperture. The above-mentioned formula is used as a rough guide only.

9. Aberrations

A difference between an ideal image and an actual image that passes through an optical system is called an “aberration.”

9.1 Requirements for Ideal Image Formation

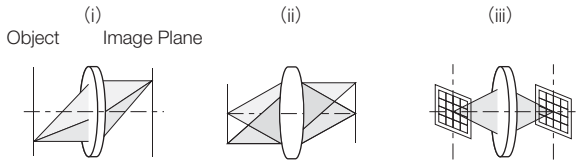
The following three requirements must be satisfied to form an image with no aberration, or an ideal image.

(i) All the light rays coming from a single point and passing through an image formation optical system converge on a single point.

(ii) Image points, which correspond to object points on the same plane perpendicular to the optical axis, are present on the same plane.

(iii) The planar shape of an object and the planar shape of an image that are on the same plane perpendicular to the optical axis have a similarity relation.

Figure 9-1 Requirements for Ideal Image Formation



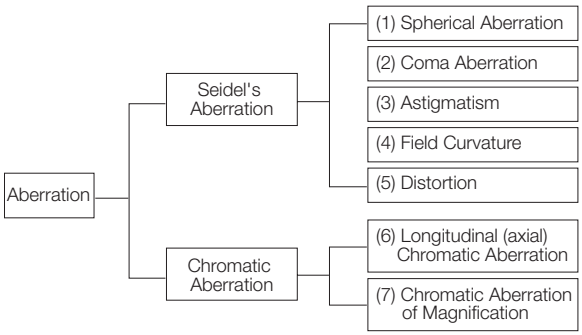
In an actual optical system, however, it is very difficult to strictly meet the requirements for ideal image formation and this causes “aberrations” that interfere with image forming performance.

9.2 Classification of Aberrations

Aberrations that interfere with image forming performance are classified as shown below in Figure 9-2.

Seidel’s Aberration = “Expansion of a Point Image” + “Curvature of Image Plane” + “Deformation”

Figure 9-2 Classification of Aberrations



Types (1) to (3) correspond to “expansion of a point image” that goes against requirement (i) for ideal image formation in Figure 9-1. Type (4) corresponds to “curvature of image plane” that goes against requirement (ii) in Figure 9-1.

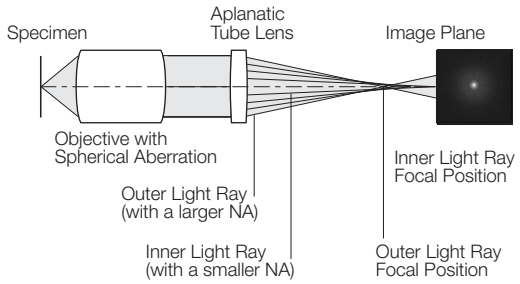
Type (5) corresponds to “deformation” that goes against requirement (iii) in Figure 9-1.

Types (6) and (7) correspond to “color blur” of images caused by characteristics of glass materials used for the optical system. “Expansion of a point image” can also be expressed by “wavefront aberration” that regards the light as “waves” and takes account of the phase to include the influence of diffraction.

(1) Spherical Aberration

When light rays coming out of an axial object point enter a lens, the light rays with a larger numerical aperture (NA) are subjected to stronger refraction power and cross the optical axis in positions with larger differences from the ideal image formation position. The aberration caused this way by different image forming positions due to differences in NA of axial light rays is called “spherical aberration.” (“Spherical aberration” is proportional to the cube of NA)

Figure 9-3 Spherical Aberration

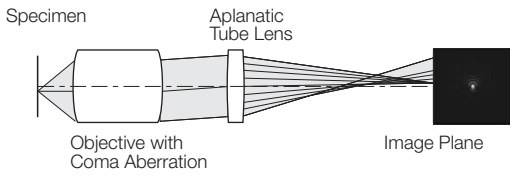


It is said that objectives with larger NA have better resolution but worsen spherical aberration. Our advanced design and manufacturing techniques have realized good optical performance even with large numerical aperture.

(2) Coma Aberration

Even though spherical aberration is compensated to be very small, there are cases where light rays coming out of an off-axis object point are not condensed to a single point on the image plane but generate asymmetric blur just like a comet leaving traces. This is called coma aberration.

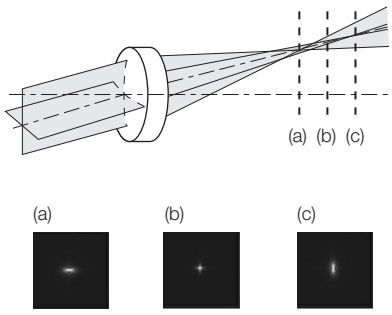
Figure 9-4 Coma Aberration and Spot Shape on the Image Plane



(3) Astigmatism

Even though a lens is compensated for spherical aberration and coma aberration, there are cases where an image of an off-axis object point is not focused to a single point but separated to a concentric line image and a radial line image. This is called “astigmatism.” When astigmatism is present, a point image blurs vertically and horizontally, before and after the focus position.

Figure 9-5 Astigmatism and Change in Spot Shape in Different Focus Positions



(4) Field Curvature

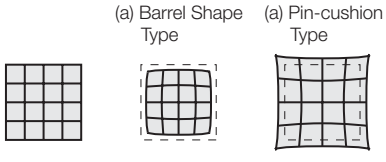
An image plane of an object on a plane perpendicular to an optical axis does not always become a plane perpendicular to the optical axis, but it generally becomes a curved plane. This symptom is called “field curvature.”

When field curvature is present, the image is more displaced as it becomes closer to the periphery of the visual field. Therefore, when the center of an image is brought into focus, blur occurs in the peripheral areas of the image. To bring the entire image, including the periphery, into clear focus, it is necessary to adequately compensate for this type of aberration.

(5) Distortion

When there is no similar relation between a planar shape on an object and a shape on the image plane, this is called “distortion.” When distortion is present, a square image appears in a shape of a barrel or pin-cushion as shown in Figure 9-6.

Figure 9-6 Distortion



The microscope optical system contains some distortion. When distortion is present, it can bring erroneous results of shape measurements. When a microscope is used for precision measurements, pay close attention to this aberration, for example, by providing it with an aberration compensation function.

(6) Chromatic Aberration

Glasses used for optical systems have different refractive indexes depending on the wavelength. This causes differences in focal length between wavelengths and generates displacement of image forming position. This phenomenon is called “chromatic aberration,” which is sometimes subdivided into axial displacement on the optical axis, called “axial chromatic aberration” (or lateral chromatic aberration) and displacement on the image plane, called “chromatic aberration of magnitude.”

Many special glass materials are used, e.g., for apochromats, to eliminate chromatic aberration in a wide range from violet light (g-rays with wavelength of 435 nm) to red light (c-rays with wavelength of 656 nm).

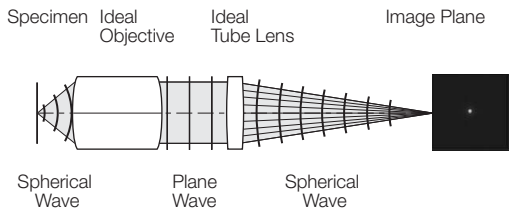
9.3 Wavefront Aberration

Since a long time ago, aberrations have been used in "geometric optics," which considers light as "light rays." Microscope optical systems are often used for observation of very small specimens at a wavelength level, and sometimes adopt "wave optics," which regards light as "waves" and handles the phase information, taking account of the influence of diffraction.

In such a case, "wavefront aberration" is used for evaluation.

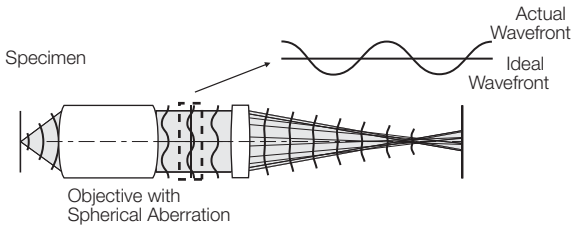
As shown below, when requirements for ideal imaging are satisfied in a microscope optical system, the spherical wavefront (spherical waves) coming from a single point on an object (specimen) is converted to plane waves through an ideal objective. The plane waves are converted to spherical waves through an ideal tube lens, and condensed to a single point. The wavefront of these waves is called the "ideal wavefront."

Figure 9-7 Ideal Microscope Optical System



Based on the figure indicated for (1) spherical aberration, the behavior of the wavefront in an optical system that has an aberration is described below.

Figure 9-8 Illustration of Wavefront Aberration



A difference (a degree of disagreement) between the ideal wavefront and the actual wavefront shown above is called "wavefront aberration."

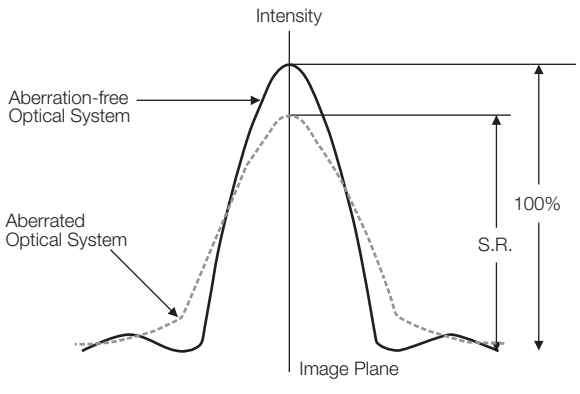
9.4 Strehl Ratio

When a point light source is observed with an aberration-free optical system and an aberrated optical system , the former concentrates the focal point to a point at the image formation position. In contrast, the latter fails to produce a focal point, instead causing a spread in the intensity distribution of the point image (this is known as "point spread"). The specific appearance of such a point image (i.e. point spread) is shown in Figure 9-9.

Figure 9-9 Appearance of Condensed Light in the Image Plane (point spread)

With the proportion of light concentrated in the image plane (intensity of light concentrated in the Airy disk) by an aberration-free optical system serving as 100%, the proportion of light concentrated by an aberrated optical system is known as the Strehl ratio. When graphed, the Strehl ratio reveals peaks in intensity as shown in Figure 9-10. The higher the S.R., the closer an optical system is to being aberration-free.

Figure 9-10 Strehl Ratio (S.R.)



A Strehl ratio of 80% is typically called the diffraction limit, and lenses with a lower ratio lack the performance required to serve as an objective. A ratio of over 95% means that the lens' performance in general observations is comparable to that of an aplanatic lens (which is corrected for spherical aberrations and coma).

Note: A laser interferometer is used for actual assessment of optical performance, so assessment is done at a single wavelength. Unless otherwise noted, Strehl ratio measurements are at the e-line (544 nm).

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