



# Microscope Components for Reflected Light Applications



CFI60-2 CFI60 CFI&TC



## Select a Nikon microscope unit for your manufacturing equipment and other systems that require high precision

The development, manufacture, and evaluation of products require sub-micron precision,  
as symbolized by semiconductor manufacturing technology.

Nikon's microscope units support such high precision and can be integrated with a variety of equipment.

This brochure presents technical data on using Nikon's microscope units.

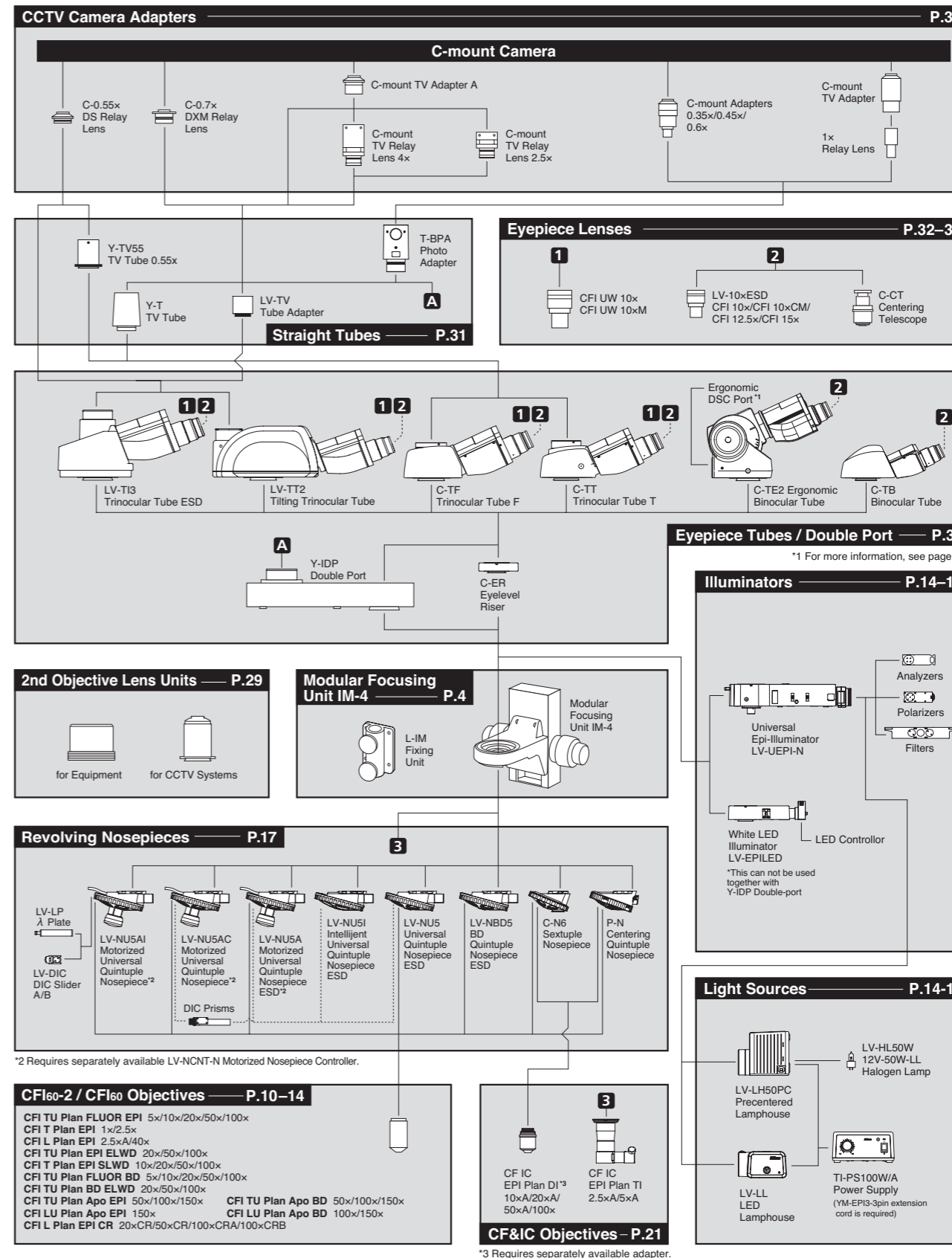
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# CFI60-2 IM

CFI60-2/CFI60  
Optical System  
(for modular  
focusing unit)

## System Diagram & Index





# L-IM Modular Focusing Unit (IM-4)

Accommodates an epi-illuminator and motorized nosepiece or a maximum load of 10 kg by adding a balancer.

Accommodates the LV-UEPI-N or LV-EPILED universal illuminator as well as a motorized nosepiece.

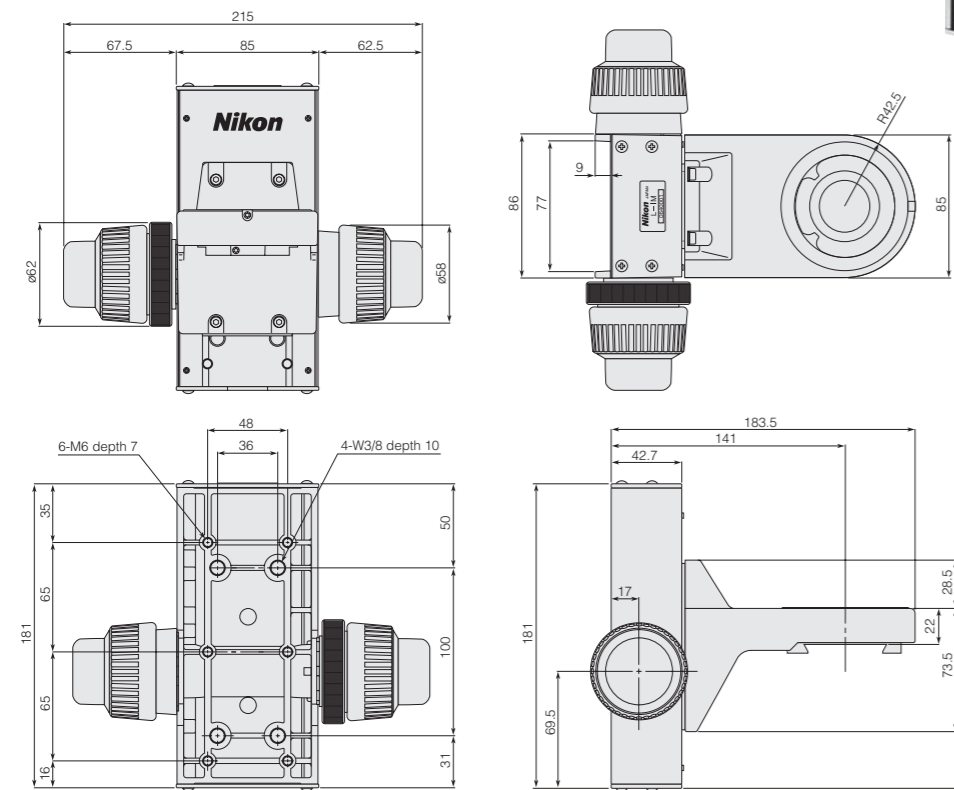
- Attachment of the LV-UEPI-N Universal Epi-illuminator enables the use of brightfield, darkfield and Nomarski DIC techniques.
- The built-in balancer ensures smoother vertical motion, even when the arm is heavily loaded.
- The standard maximum load is 4kg, which is expandable to 10 kg by adding a balancer.
- A coarse motion stroke of 5.2 mm per revolution improves the equipment's load handling capability and increases durability.
- The distance from the optical axis to the mounting surface is 141 mm.

Note: For adding a balancer, consult your Nikon representative.



**L-IM Modular Focusing Unit  
MBD64010 / 2000 g**

Stroke	30 mm
Coarse focusing	5.2 mm/rotation
Fine focusing	0.1 mm/rotation
Scale	1 μm

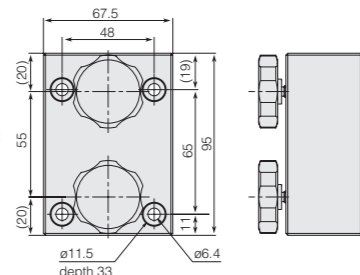
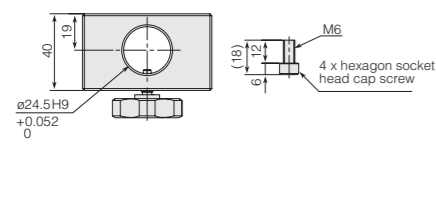


Unit: mm

## L-IM Adapter for Modular Focusing Unit (Option)

Used to attach the L-IM Modular Focusing Unit to a  $\phi 24.5$  mm post.

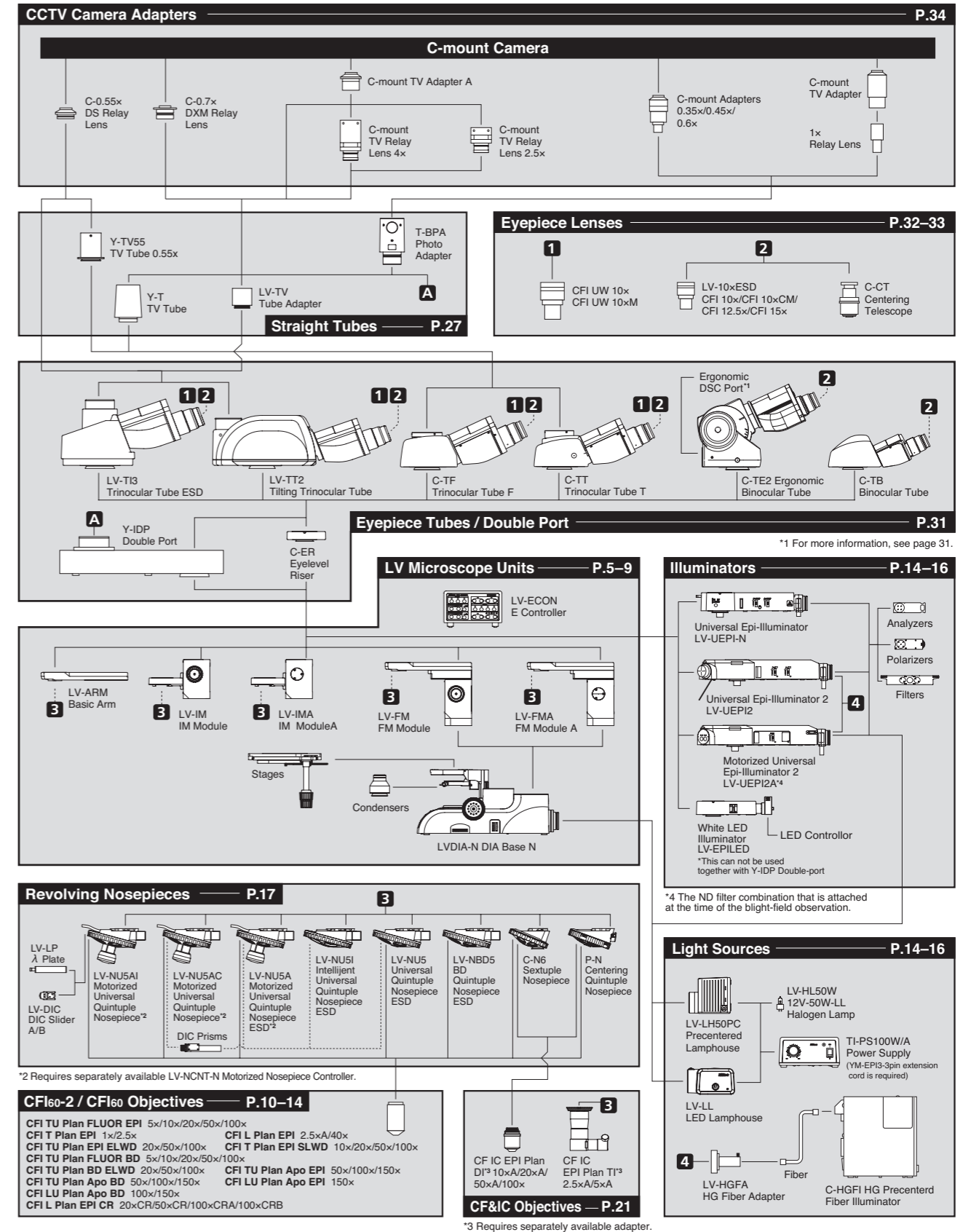
**L-IM Adapter for Modular Focusing Unit  
MXA23079 / 500 g**



Unit: mm

# CFI60-2 LV CFI60-2/CFI60 Optical System (for LV modules)

## System Diagram & Index



# LV-IM IM Modules

This focusing module enables the mounting of a universal illuminator (LV-UEPI-N/LV-UEPI2/LV-UEPI2A or LV-EPILED) and a motorized nosepiece.

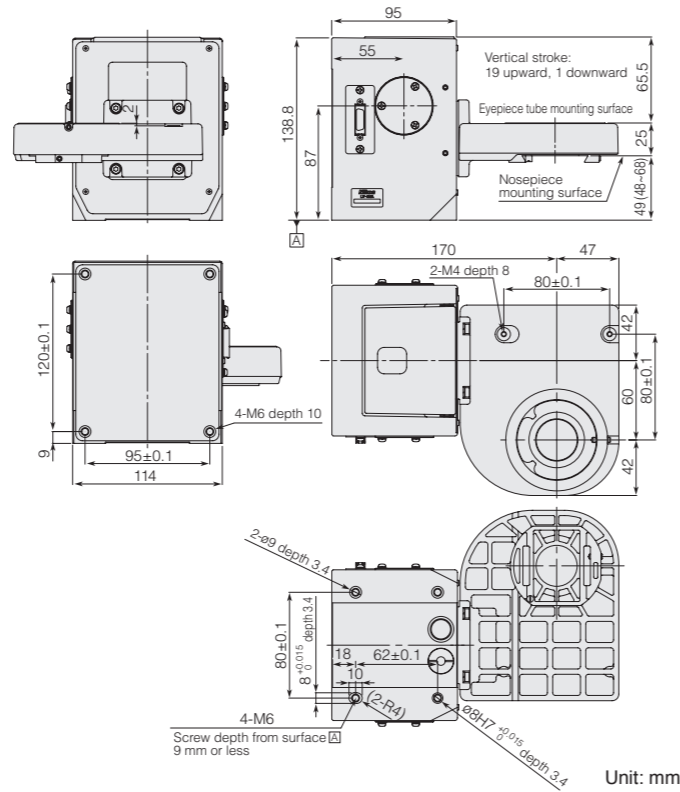
## LV-IMA IM Module A (Motorized)

- Selectable mounting surface (back or bottom).
- 20 mm vertical stroke.
- Dramatically improved rigidity enables the mounting of the LV-UEPI2A motorized universal illuminator, etc.
- External control is possible via LV-ECON E Controller.
- The standard maximum permissible weight is 4-7 kg, which is expandable to 10 kg by adding a balancer.



LV-IMA IM Module A (Motorized)  
MBD64070 / 4000 g

Vertical stroke	20 mm
Resolution	0.05 μm
Max. speed	2.5 mm/sec (Resolution 0.05 μm)



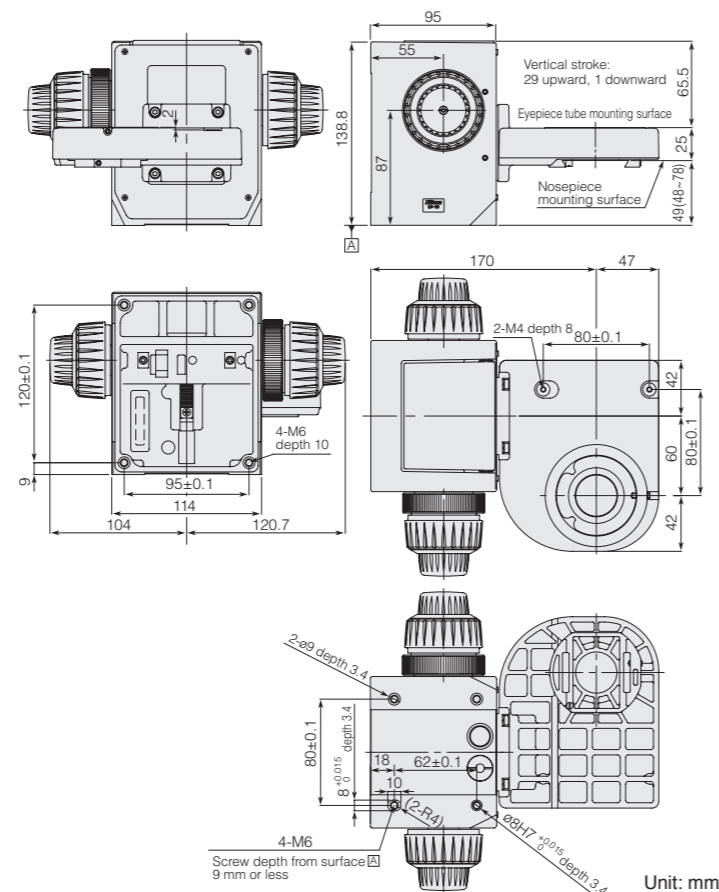
## LV-IM IM Module (Manual)

- Selectable mounting surface (back or bottom).
- 30 mm vertical stroke.
- Dramatically improved rigidity enables the mounting of the LV-UEPI2A motorized universal illuminator, etc.
- The standard maximum permissible weight is 4-7 kg, which is expandable to 10 kg by adding a balancer.



LV-IM IM Module (Manual)  
MBD64080 / 4000 g

Stroke	30 mm
Coarse focusing	5.2 mm/rotation
Fine Focusing	0.1 mm/rotation
Scale	1 μm



# LV-FM FM Modules

LV-FM FM Modules enable mounting of a universal illuminator (LV-UEPI-N/LV-UEPI2/LV-UEPI2A or LV-EPILED) and a motorized nosepiece.

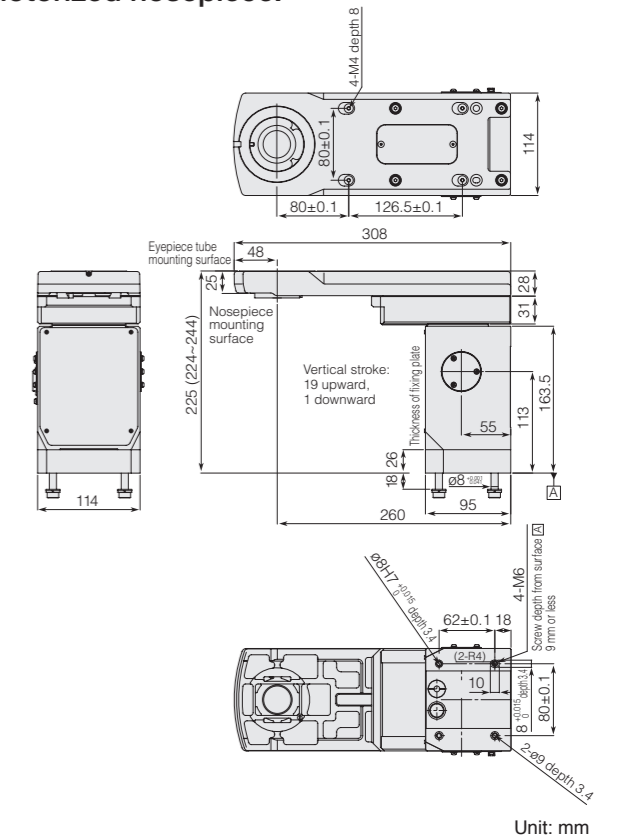
## LV-FMA FM Module A (Motorized)

- Only the bottom mounting surface is supported.
- 20 mm vertical stroke.
- Enables an enhanced system with motorized up/down mechanism when combined with the LVDIA-N DIA Base N.
- External control is possible via the LV-ECON E Controller.
- The standard maximum permissible weight is 3-6 kg, which is expandable to 9 kg by adding a balancer.



LV-FMA FM Module A (Motorized)  
MBD65040 / 5000 g

Vertical stroke	20 mm
Resolution	0.05 μm
Max. speed	2.5 mm/sec (Resolution 0.05 μm)



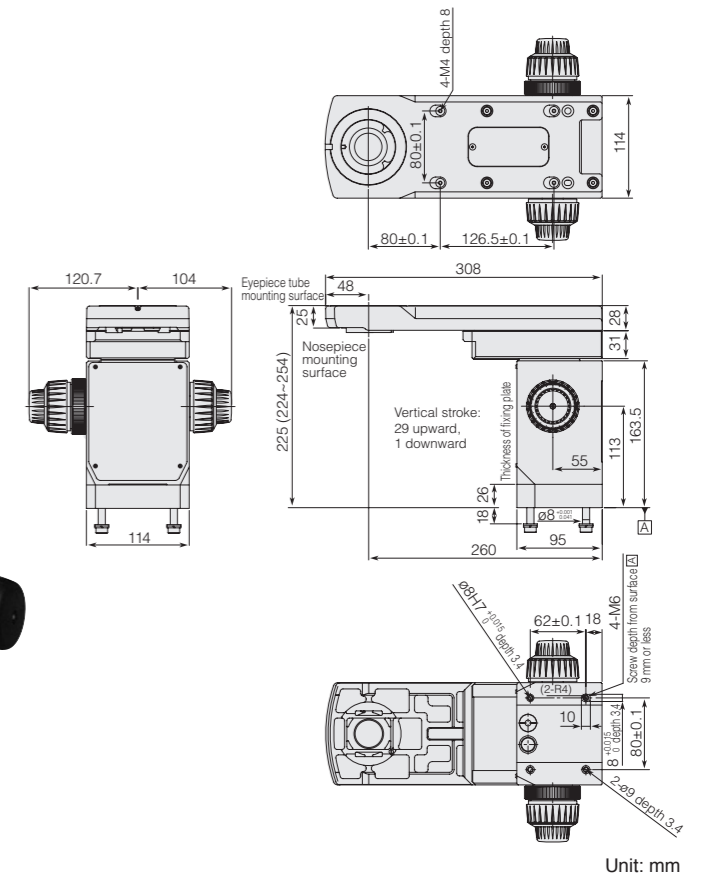
## LV-FM FM Module (Manual)

- Only the bottom mounting surface is supported.
- 30 mm vertical stroke.
- Creates a system with revolving up/down mechanism that has an ultra-long vertical stroke of 68 mm when combined with the LVDIA-N DIA Base N.
- Optimal for operations such as semiconductor probe inspections.
- The standard maximum permissible weight is 3-6 kg, which is expandable to 9 kg by adding a balancer.



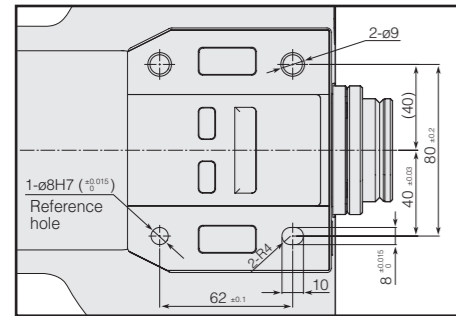
LV-FM FM Module (Manual)  
MBD65050 / 5000 g

Stroke	30 mm
Coarse focusing	5.2 mm/rotation
Fine Focusing	0.1 mm/rotation
Scale	1 μm

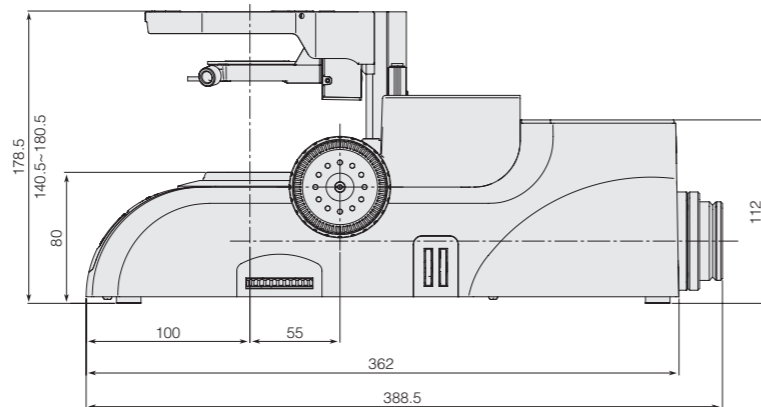
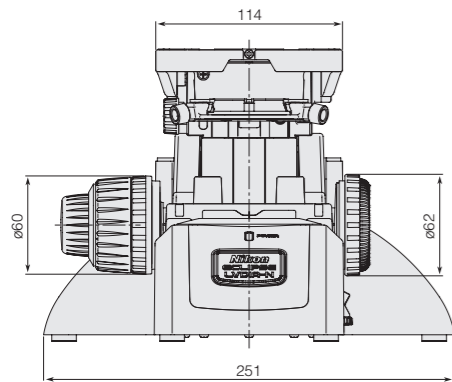
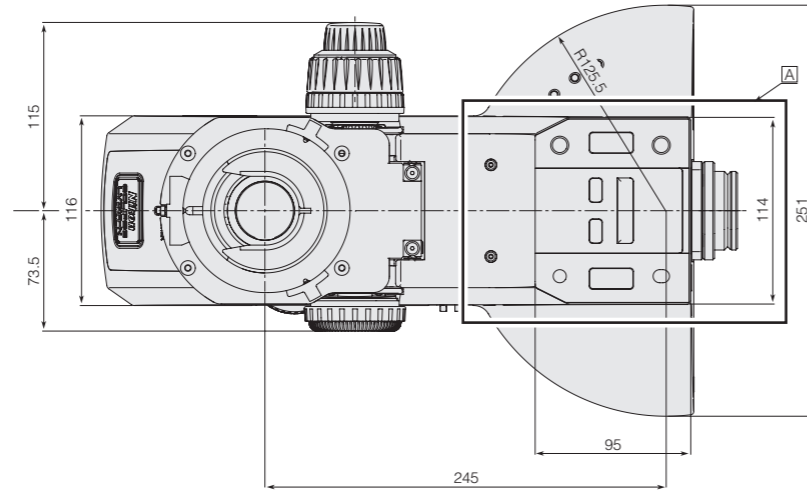


## LVDIA-N DIA Base N

This base unit is for the ECLIPSE LV series of modular microscopes. The attachment of an optional power source enables the incorporation of a transmission illuminator.



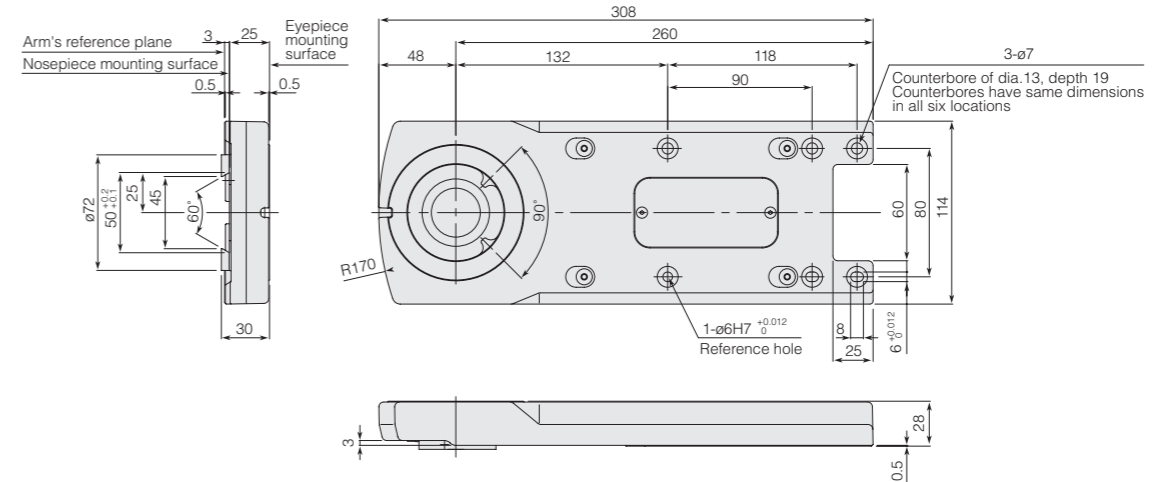
Enlarged view [A]



LVDIA-N DIA Base N MBD65015 / 5600 g  
Unit: mm

## LV-ARM Basic Arm

This arm unit is for the ECLIPSE LV series of modular microscopes.



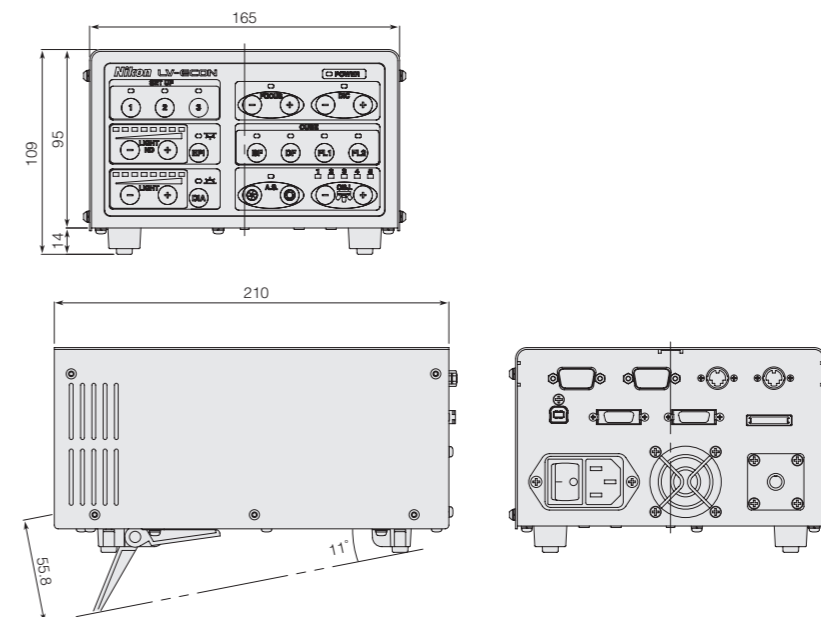
LV-ARM Basic Arm MBD65030 / 1400 g

Unit: mm

## LV-ECON E Controller

This controller enables external control of various units from a PC and other devices.

- Enables external control of motorized universal reflection illuminators and various light sources, universal motorized revolvers, and motorized focusing modules from a PC or other devices.
- Communication with PC possible via USB.
- Max. 11° inclination when using tilt (unit's feet).



LV-ECON E Controller MBF12200 / 2000 g

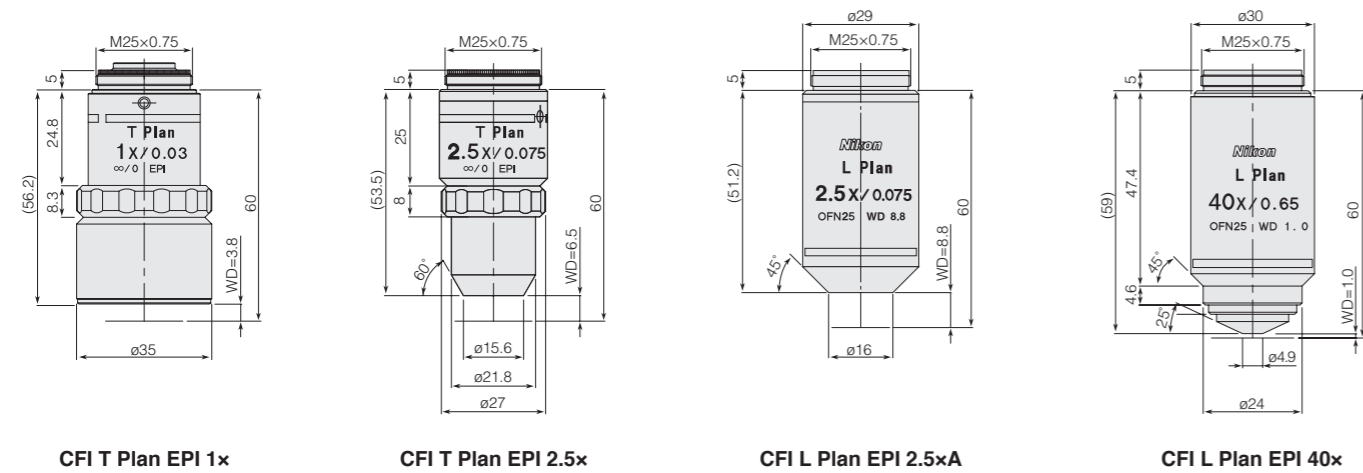
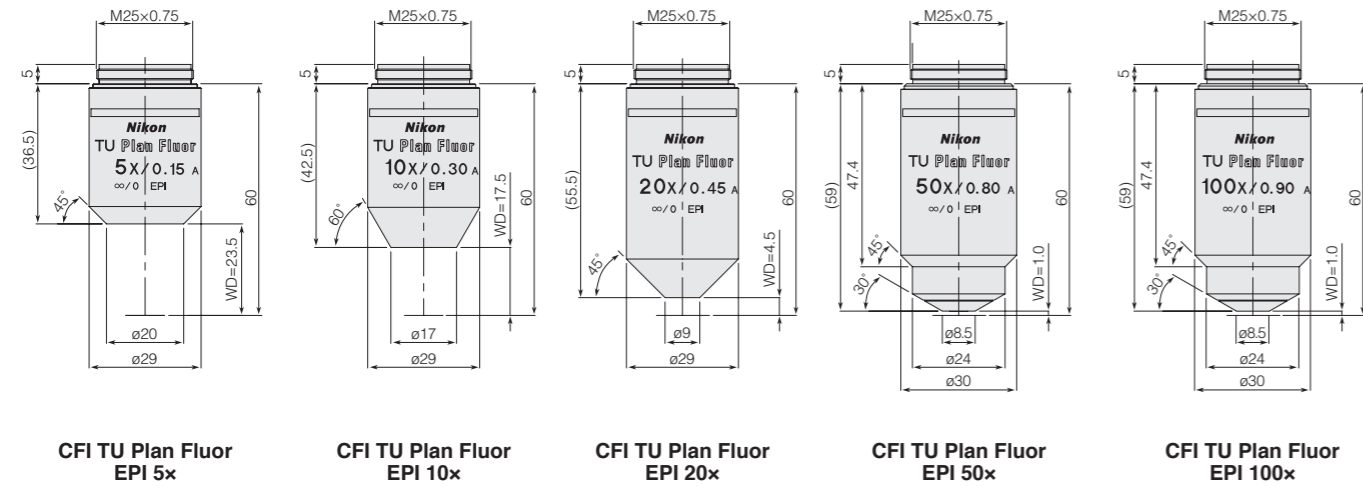
Unit: mm



# CFI T Plan EPI/CFI TU Plan Fluor EPI/CFI L Plan EPI

Brightfield Objectives

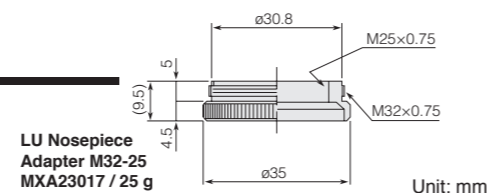
CFI<sub>60</sub>-2 / CFI<sub>60</sub> objectives for brightfield use; Nomarski DIC is also possible with the TU type.



Code No.	CFI <sub>60</sub> -2/CFI <sub>60</sub> Objectives						Widefield CFI eyepieces CFI 10x (F.N. 22)			Ultra-Widefield CFI eyepieces CFI UW10x (F.N. 25)		
	Objectives (Magnifications)	NA	WD (mm)	Focal length (mm)	Physical depth of focus (μm)	Weight (g)	Total magnification (M)	Actual field of view (mm)	Depth of focus (μm)	Total magnification (M)	Actual field of view (mm)	Depth of focus (μm)
MUE12050	CFI TU Plan Fluor EPI 5x	0.150	23.5	40	12.22	115.0	50x	4.40	31.27	50x	5.000	31.27
MUE12100	CFI TU Plan Fluor EPI 10x	0.300	17.5	20	3.06	120.0	100x	2.20	7.82	100x	2.500	7.82
MUE12200	CFI TU Plan Fluor EPI 20x	0.450	4.5	10	1.36	125.0	200x	1.10	2.95	200x	1.250	2.95
MUE12500	CFI TU Plan Fluor EPI 50x	0.800	1.0	4	0.43	150.0	500x	0.44	0.79	500x	0.500	0.79
MUE12900	CFI TU Plan Fluor EPI 100x	0.900	1.0	2	0.34	150.0	1000x	0.22	0.50	1000x	0.250	0.50
MUE12010	CFI T Plan EPI 1x	0.030	3.8	200	305.56	165.0	10x	22.00	781.75	10x	25.000	781.75
MUE12030	CFI T Plan EPI 2.5x	0.075	6.5	80	48.89	140.0	25x	8.80	125.08	25x	10.000	125.08
MUE00031	CFI L Plan EPI 2.5xA	0.075	8.8	80	48.89	167.5	25x	8.80	125.08	25x	10.000	125.08
MUE00400	CFI L Plan EPI 40x	0.650	1.0	5	0.65	200.0	400x	0.55	0.65	400x	0.625	0.65

## LU Nosepiece Adapter M32-25

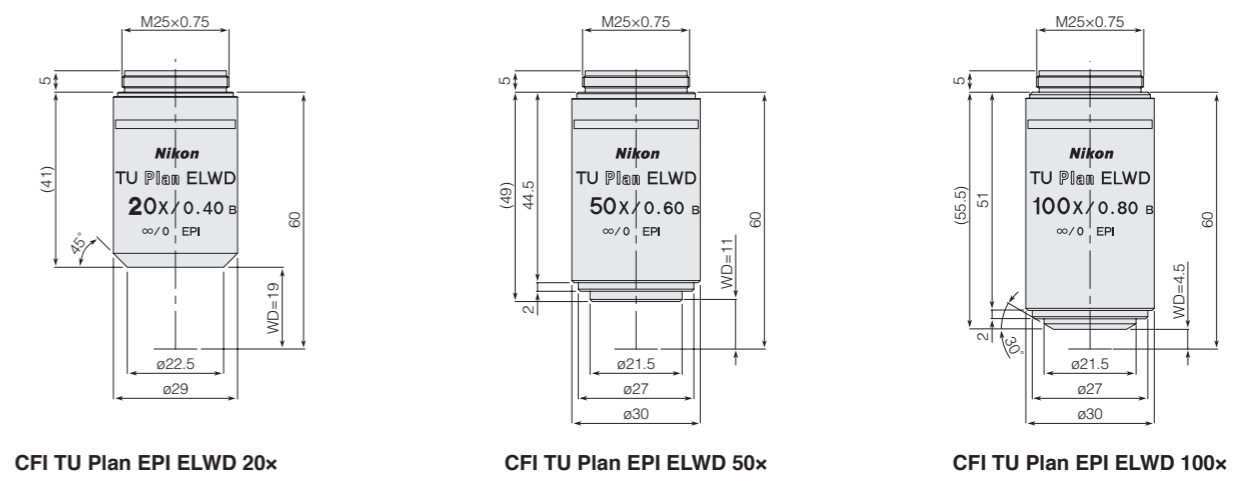
Adapter for attaching an EPI Plan objective to a brightfield nosepiece or universal nosepiece.



## CFI TU Plan EPI ELWD

Long Working Distance Objectives for Brightfield/Nomarski DIC Use

Dramatically extended working distances facilitate observations of samples having irregular surfaces. Working distances have been extended significantly.

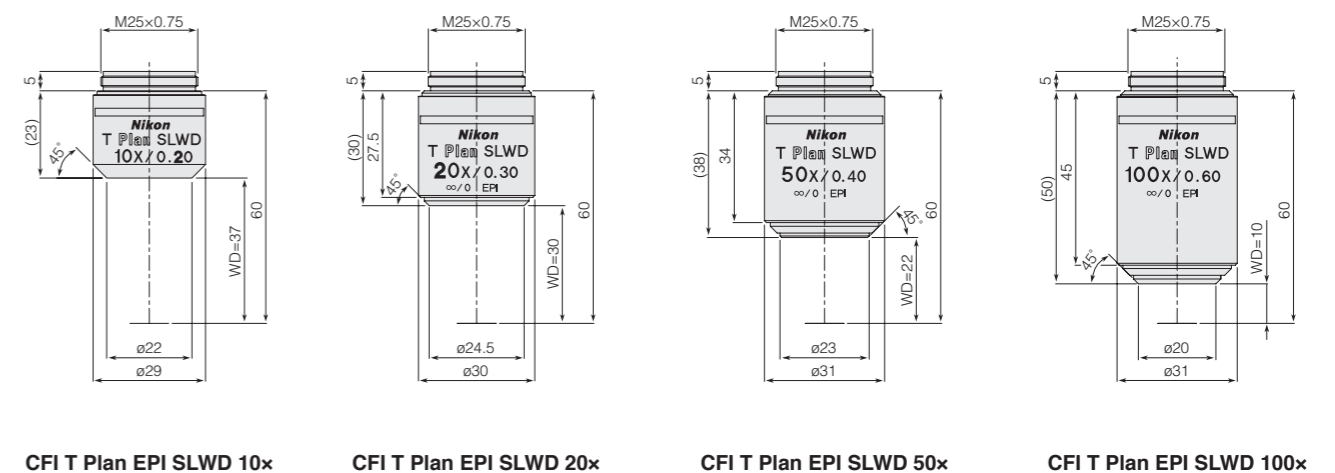


Code No.	CFI <sub>60</sub> -2/CFI <sub>60</sub> Objectives						Widefield CFI eyepieces CFI 10x (F.N. 22)			Ultra-Widefield CFI eyepieces CFI UW10x (F.N. 25)		
	Objectives (Magnifications)	NA	WD (mm)	Focal length (mm)	Physical depth of focus (μm)	Weight (g)	Total magnification (M)	Actual field of view (mm)	Depth of focus (μm)	Total magnification (M)	Actual field of view (mm)	Depth of focus (μm)
MUE21200	CFI TU Plan EPI ELWD 20x	0.4	19.0	10	1.72	135	200x	1.10	3.50	200x	1.25	3.50
MUE21500	CFI TU Plan EPI ELWD 50x	0.6	11.0	4	0.76	130	500x	0.44	1.24	500x	0.50	1.24
MUE21900	CFI TU Plan EPI ELWD 100x	0.8	4.5	2	0.43	155	1000x	0.22	0.61	1000x	0.25	0.61

## CFI T Plan EPI SLWD

Ultra-long Working Distance Objectives for Brightfield Use

Ultra-long working distances. Particularly useful when observing the bottom of a depression in the sample. Working distances have been extended significantly.

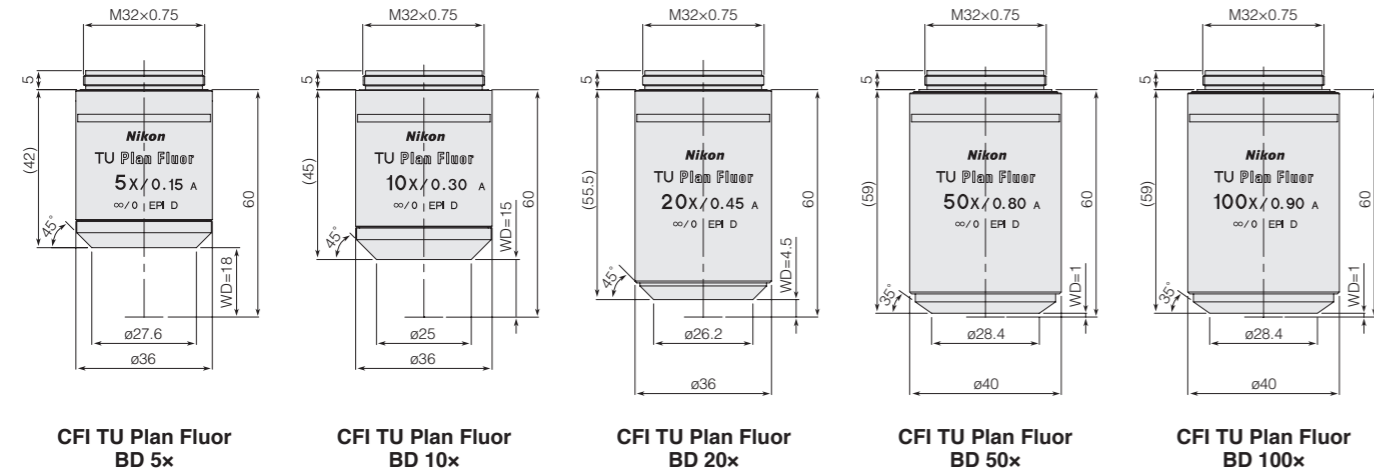


Code No.	CFI <sub>60</sub> -2/CFI <sub>60</sub> Objectives						Widefield CFI eyepieces CFI 10x (F.N. 22)			Ultra-Widefield CFI eyepieces CFI UW10x (F.N. 25)		
	Objectives (Magnifications)	NA	WD (mm)	Focal length (mm)	Physical depth of focus (μm)	Weight (g)	Total magnification (M)	Actual field of view (mm)	Depth of focus (μm)	Total magnification (M)	Actual field of view (mm)	Depth of focus (μm)
MUE31100	CFI T Plan EPI SLWD 10x	0.2	37	20	6.88	80	100x	2.20	14.02	100x	2.50	14.02
MUE31200	CFI T Plan EPI SLWD 20x	0.3	30	10	3.06	115	200x	1.10	5.44	200x	1.25	5.44
MUE31500	CFI T Plan EPI SLWD 50x	0.4	22	4	1.72	120	500x	0.44	2.43	500x	0.50	2.43
MUE31900	CFI T Plan EPI SLWD 100x	0.6	10	2	0.76	135	1000x	0.22	1.00	1000x	0.25	1.00

# CFI TU Plan Fluor BD

Brightfield/Darkfield/Nomarski DIC Objectives

Perfect for brightfield, darkfield, and Nomarski DIC observations.



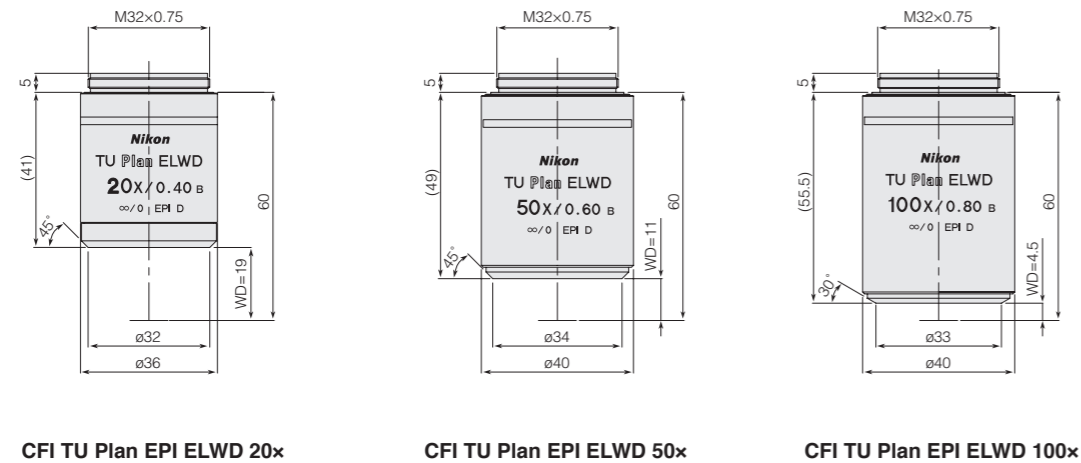
Unit: mm

Code No.	CFI60-2/CFI60 Objectives						Widefield CFI eyepieces CFI 10x (F.N. 22)			Ultra-Widefield CFI eyepieces CFI UW10x (F.N. 25)		
	Objectives (Magnifications)	NA	WD (mm)	Focal length (mm)	Physical depth of focus (μm)	Weight (g)	Total magnification (M)	Actual field of view (omm)	Depth of focus (μm)	Total magnification (M)	Actual field of view (omm)	Depth of focus (μm)
MUE42050	CFI TU Plan Fluor BD 5x	0.15	18.0	40	12.22	150	50x	4.40	31.27	50x	5.00	31.27
MUE42100	CFI TU Plan Fluor BD 10x	0.30	15.0	20	3.06	140	100x	2.20	7.82	100x	2.50	7.82
MUE42200	CFI TU Plan Fluor BD 20x	0.45	4.5	10	1.36	185	200x	1.10	2.95	200x	1.25	2.95
MUE42500	CFI TU Plan Fluor BD 50x	0.80	1.0	4	0.43	200	500x	0.44	0.79	500x	0.50	0.79
MUE42900	CFI TU Plan Fluor BD 100x	0.90	1.0	2	0.34	200	1000x	0.22	0.50	1000x	0.25	0.50

# CFI TU Plan BD ELWD

Long Working Distance Objectives for Brightfield/Darkfield/Nomarski DIC Use

Extended working distances facilitate observations of samples having irregular surfaces.



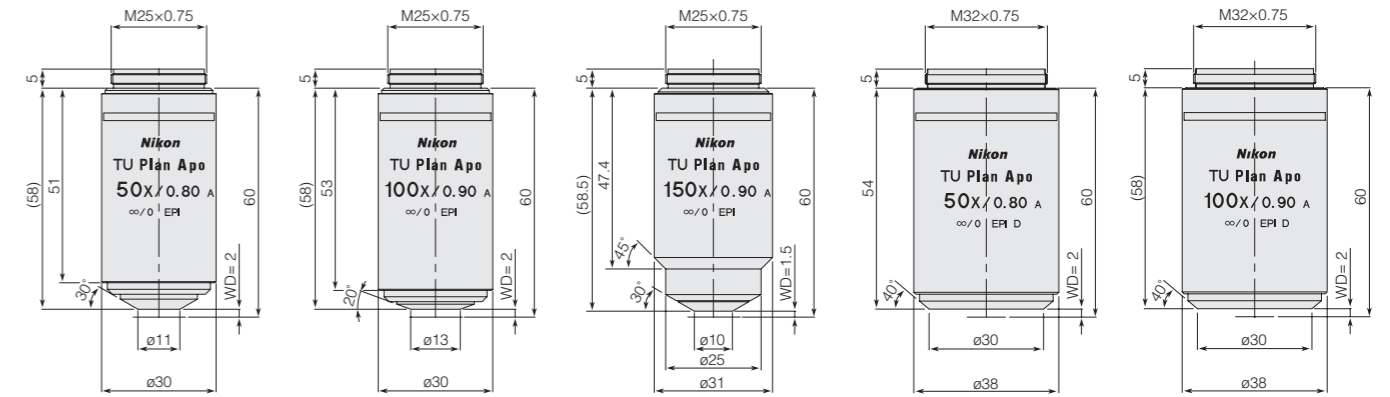
Unit: mm

Code No.	CFI60-2/CFI60 Objectives						Widefield CFI eyepieces CFI 10x (F.N. 22)			Ultra-Widefield CFI eyepieces CFI UW10x (F.N. 25)		
	Objectives (Magnifications)	NA	WD (mm)	Focal length (mm)	Physical depth of focus (μm)	Weight (g)	Total magnification (M)	Actual field of view (omm)	Depth of focus (μm)	Total magnification (M)	Actual field of view (omm)	Depth of focus (μm)
MUE61200	CFI TU Plan BD ELWD 20x	0.4	19.0	10	1.72	155	200x	1.10	3.50	200x	1.25	3.50
MUE61500	CFI TU Plan BD ELWD 50x	0.6	11.0	4	0.76	180	500x	0.44	1.24	500x	0.50	1.24
MUE61900	CFI TU Plan BD ELWD 100x	0.8	4.5	2	0.43	205	1000x	0.22	0.61	1000x	0.25	0.61

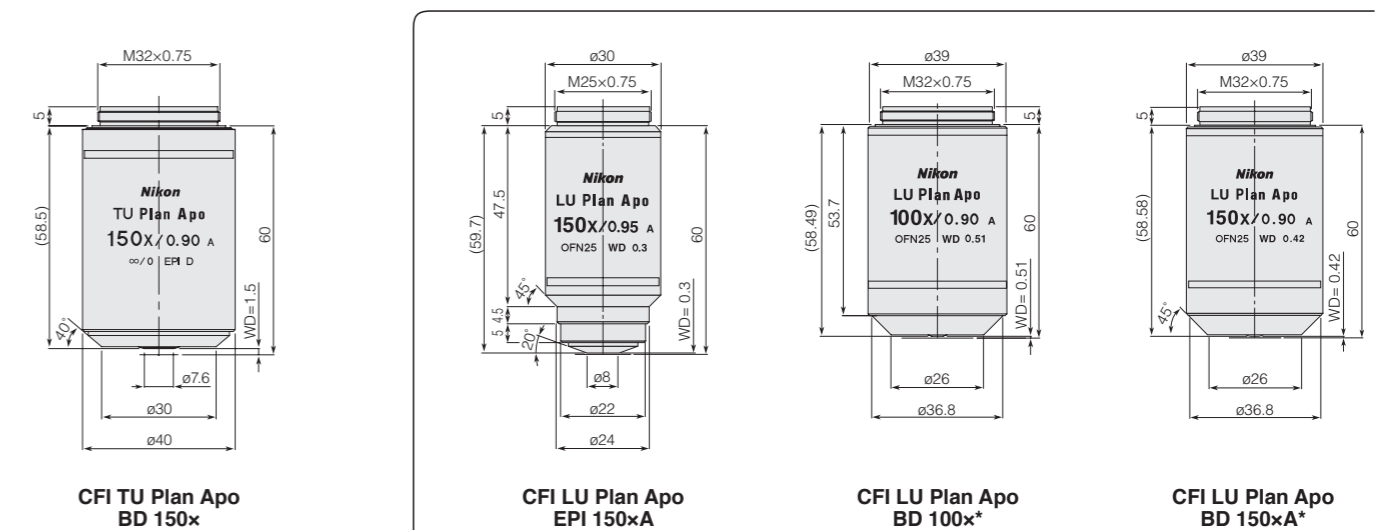
# CFI TU Plan Apo EPI/CFI TU Plan Apo BD/CFI LU Plan Apo EPI/CFI LU Plan Apo BD

High-Resolution Objectives for Brightfield or for Darkfield/Brightfield

Apochromat-type objectives virtually eliminate chromatic aberration and feature excellent resolution. Nomarski DIC is also possible with the TU/LU type.



CFI TU Plan Apo EPI 50x      CFI TU Plan Apo EPI 100x      CFI TU Plan Apo EPI 150x      CFI TU Plan Apo BD 50x      CFI TU Plan Apo BD 100x



CFI TU Plan Apo BD 150x      CFI LU Plan Apo EPI 150xA      CFI LU Plan Apo BD 100xA\*      CFI LU Plan Apo BD 150xA\*

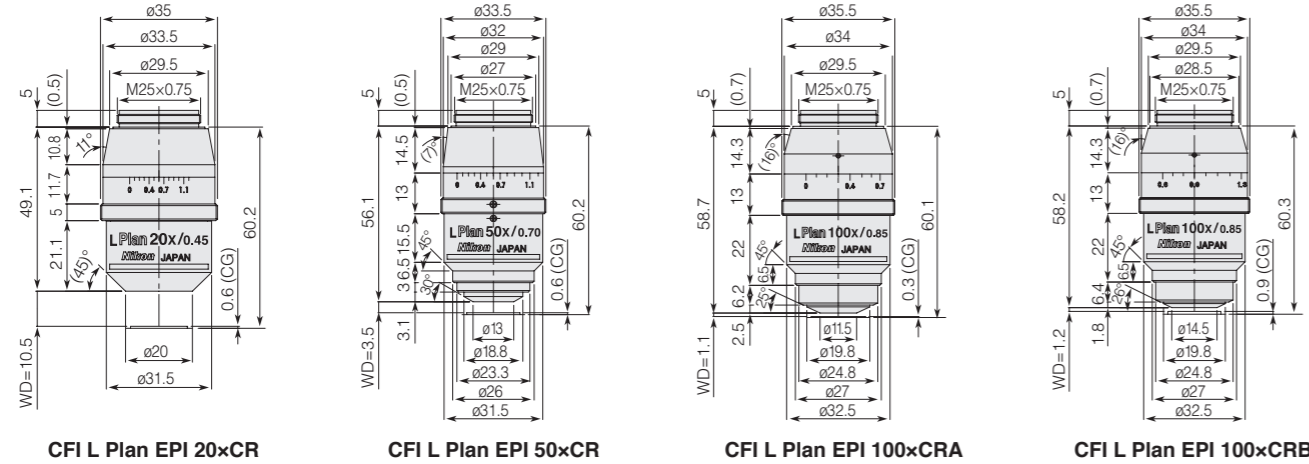
Unit: mm

Code No.	CFI60-2/CFI60 Objectives						Widefield CFI eyepieces CFI 10x (F.N. 22)			Ultra-Widefield CFI eyepieces CFI UW10x (F.N. 25)		
	Objectives (Magnifications)	NA	WD (mm)	Focal length (mm)	Physical depth of focus (μm)	Weight (g)	Total magnification (M)	Actual field of view (omm)	Depth of focus (μm)	Total magnification (M)	Actual field of view (omm)	Depth of focus (μm)
MUC11500	CFI TU Plan Apo EPI 50x	0.80	2.00	4.00	0.43	150.0	500x	0.44	0.79	500x	0.50	0.79
MUC11900	CFI TU Plan Apo EPI 100x	0.90	2.00	2.00	0.34	175.0	1000x	0.22	0.50	1000x	0.25	0.50
MUC11150	CFI TU Plan Apo EPI 150x	0.90	1.50	1.33	0.34	160.0	1500x	0.15	0.45	1500x	0.17	0.45
MUC41500	CFI TU Plan Apo BD 50x	0.80	2.00	4.00	0.43	190.0	500x	0.44	0.79	500x	0.50	0.79
MUC41900	CFI TU Plan Apo BD 100x	0.90	2.00	2.00	0.34	220.0	1000x	0.22	0.50	1000x	0.25	0.50
MUC41150	CFI TU Plan Apo BD 150x	0.90	1.50	1.33	0.34	220.0	1500x	0.15	0.45	1500x	0.17	0.45
MUC10151	CFI LU Plan Apo EPI 150xA	0.95	0.30	1.33	0.30	217.5	1500x	0.15	0.40	1500x	0.17	0.40
MUC40900*	CFI LU Plan Apo BD 100x	0.90	0.51	2.00	0.34	325.0	1000x	0.22	0.50	1000x	0.25	0.50
MUC50151*	CFI LU Plan Apo BD 150xA	0.90	0.42	1.33	0.34	305.0	1500x	0.15	0.45	1500x	0.17	0.45

\* This product have been discontinued, and only available from stock.

# CFI L Plan EPI CR Objectives for LCD Inspection

The CFI L Plan EPI CR series employs a correction system to cope with the thinner coverglass for FDP and the increased integration and mounting density of devices.



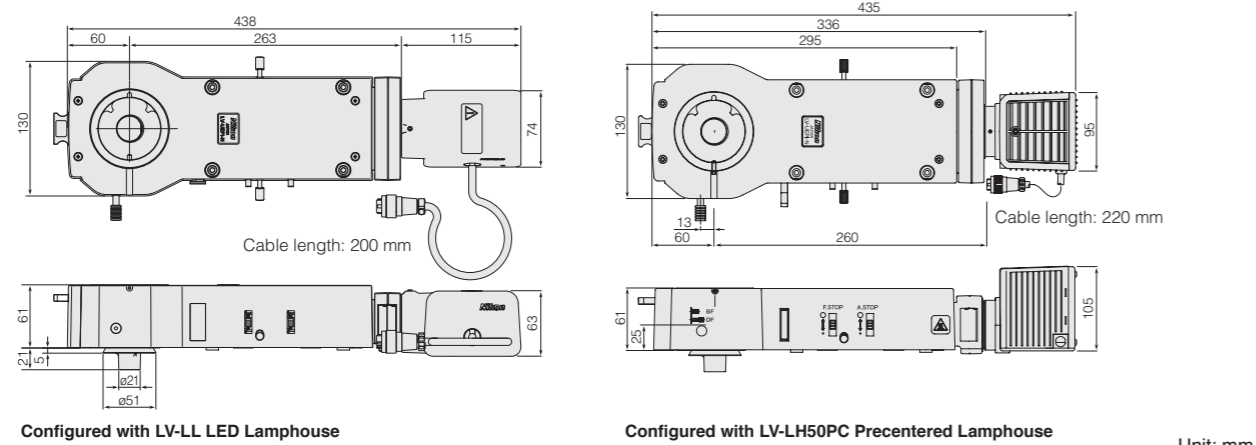
Unit: mm

Code No.	CFI60-2/CFI60 Objectives						Widefield CFI eyepieces CFI 10x (F.N. 22)			Ultra-Widefield CFI eyepieces CFI UW10x (F.N. 25)		
	Objectives (Magnifications)	NA	WD (mm)	Focal length (mm)	Physical depth of focus (μm)	Weight (g)	Total magnification (M)	Actual field of view (omm)	Depth of focus (μm)	Total magnification (M)	Actual field of view (omm)	Depth of focus (μm)
MUE35200	CFI L Plan EPI 20xCR	0.45	10.9~10.0	10.00	1.36	240	200x	1.10	2.95	200x	1.25	2.95
MUE35500	CFI L Plan EPI 50xCR	0.70	3.9~3.0	4.00	0.56	240	500x	0.44	0.97	500x	0.50	0.97
MUE35900	CFI L Plan EPI 100xCRA	0.85	1.2~0.85	2.00	0.38	260	1000x	0.22	0.55	1000x	0.25	0.55
MUE35910	CFI L Plan EPI 100xCRB	0.85	1.3~0.95	2.00	0.38	260	1000x	0.22	0.55	1000x	0.25	0.55

# Universal Epi-Illuminator LV-UEPI-N

This universal illuminator supports the CFI60-2 / CFI60 optical system.

- Enables brightfield, darkfield, simple polarizing, and DIC observation.
- When observation is switched from brightfield to darkfield, the field and aperture diaphragms automatically open.
- When observation is switched back from darkfield to brightfield, the field and aperture diaphragms return to their original positions.



Universal Epi-Illuminator LV-UEPI-N/MBE60201

Field diaphragm	Centerable and synchronized with B/D changeover
Aperture diaphragm	Synchronized with B/D changeover
Illumination	12V-50W high-intensity halogen lamp illuminator
Filter	4x ø25 mm filters (NCB11, ND4, ND16), a polarizer/analyzer, ESD supported
Weight	1,750 g

Unit: mm

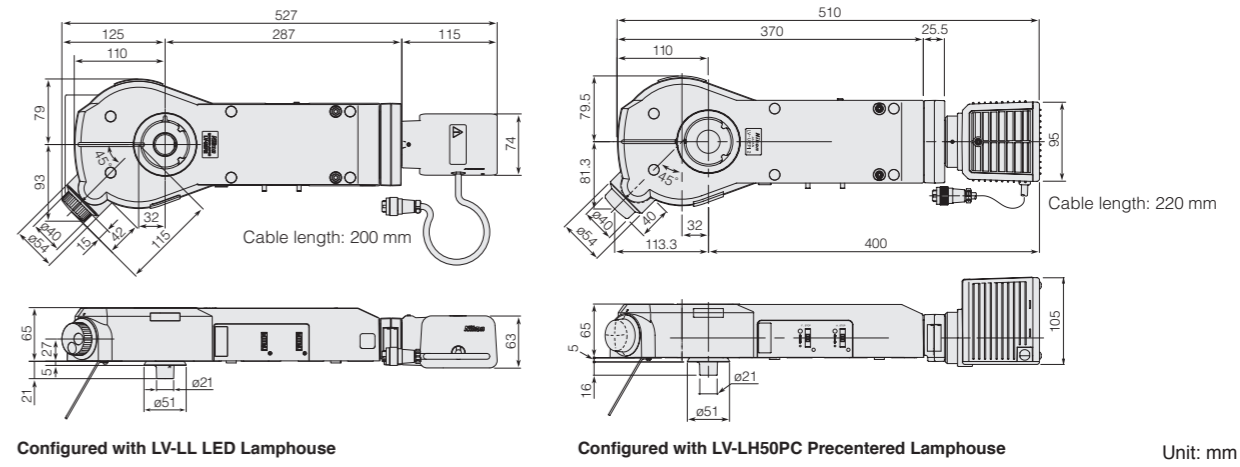
Code No.	Items	Weight (g)
MBE65700	LV-LL LED Lamphouse	600
MBE65275	LV-LH50PC Precentered Lamphouse	800
MBN66750	YM-NCB ø25 mm Filter Slider NCB11	31
MBN66760	YM-ND ø25 mm Filter Slider ND4/ND16	36
MXA23045	LV-HL50W 12V50W Halogen Lamp	7
MBN66923	LV-PO Polarizer	60
MBN66922	L-AN Analyzer	14
MBP60170	L-DIC DIC Slider	120
MBN66730	YM-GIF ø25 mm GIF Filter	25
MXA29002	YM-EPI 3-3PIN Extension Cable	100

\*Cable length: measured from lamphouse to power connector

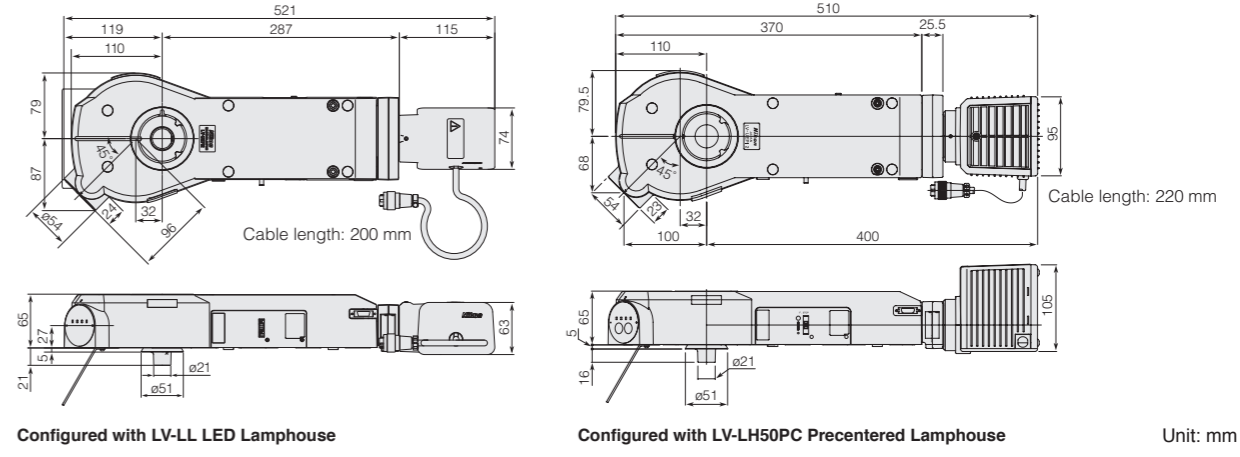
# Universal Epi-Illuminator LV-UEPI2/LV-UEPI2A

This universal illuminator supports the CFI60-2 / CFI60 optical system.

- LV-UEPI2**
- Equipped with advanced optics suitable for a wide variety of observation methods, ranging from brightfield, darkfield, simple polarizing, sharp polarizing, and DIC, to epi-Fluorescence.
  - Automatically maintains optimal illumination conditions for the field/aperture diaphragms, shutter, and UV cut filters.



- LV-UEPI2A**
- Accurate reproduction of illumination conditions enabled by the motorization of the changeover turret/aperture diaphragm and the control of the voltage.
  - Aperture diaphragm is automatically optimized with the objective lens and illumination technique. Can be changed manually depending on sample and purpose.
  - External control also possible from a PC when combined with the LV-ECON E Controller.



Universal Epi-Illuminator LV-UEPI2/MBE60300 Motorized Universal Epi-Illuminator LV-UEPI2A/MBE60310

	LV-UEPI2	LV-UEPI2A
Field diaphragm	Centerable and synchronized with B/D changeover	
Aperture diaphragm	Centerable and synchronized with B/D changeover	Centerable and synchronized with motorized brightfield/darkfield changeover (Automatic optimization according to objective lens)
Illumination	12V-50W high-intensity halogen lamp illuminator	Motorized operation/control possible for 12V-50W high-intensity halogen lamp illuminator and illumination changeover turret
Filters	4x ø25 mm filters (NCB11, ND4, ND16), 2x Fluorescence filter cubes, polarizer/analyzer, λ plate, excitation light balancer, ESD supported	
Weight	2,400 g	2,570 g

Code No.	Items	Weight (g)
MBE65275	LV-LH50PC Precentered Lamphouse	800
MBN66750	YM-NCB ø25 mm Filter Slider NCB11	31
MBN66760	YM-ND ø25 mm Filter Slider ND4/ND16	36
MXA23045	LV-HL50W 12V-50W Halogen Lamp	7
MBN66923	LV-PO Polarizer	60
MBN66925	LV-FLAN FL Analyzer	20
MBN66924	LV-LP λ Plate	15
MBE41201	C-FL UV-2A	40

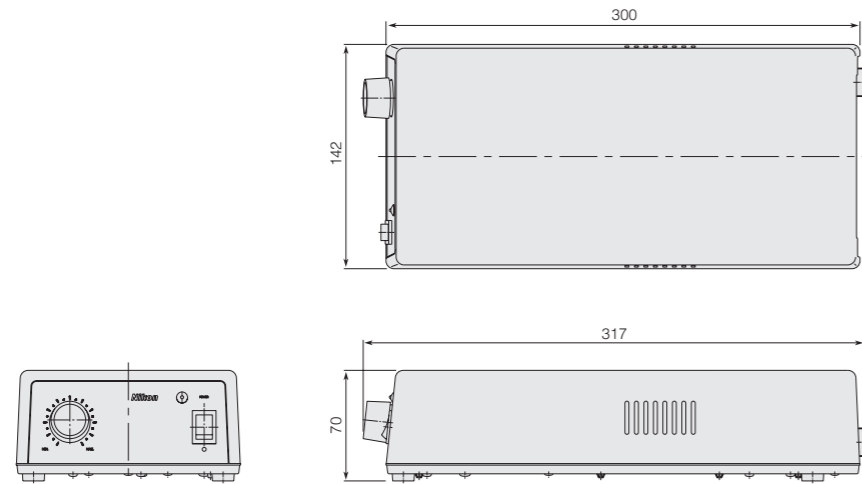
Code No.	Items	Weight (g)
MBE65700	LV-LL LED Lamphouse	600
MBE42101	C-FL V-2A Filter Cube	40
MBE43101	C-FL BV-2A Filter Cube	40
MBE44501	C-FL B-2A Filter Cube	40
MBE45501	C-FL G-2A Filter Cube	40
MBE64100	LV-PAB Polarizer/Analyzer Cube	45
MBN66730	YM-GIF ø25 mm GIF Filter	25
MXA29002	YM-EPI 3-3PIN Extension Cable	100
MBP60170	L-DIC DIC Slider	120

\*Cable length: measured from lamphouse to power connector



# TI-PS100W/A Power Supply

This transformer is for the LV-UEPI-N, LV-UEPI2, and LV-UEPI2A universal reflection illuminators.



TI-PS100W/A Power Supply MEF52251 / 2000 g

Unit: mm

Code No.	Items	Weight (g)
MBF11250	Power Cord BJ	160
MXA29002	YM-EPI 3-3PIN Extension Cable	100
MEF51001	TI-100WRC 100W Remote Cable	100

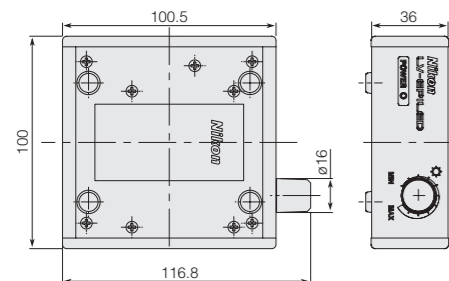
# LV-EPILED White LED Illuminator

This LED illuminator supports the CFI<sub>60-2</sub> / CFI<sub>60</sub> optical system.

- Light-weight, compact white LED illuminator developed specially for brightfield observation.
- Operated via an attached power source controller.
- Can also be externally controlled via the LV-ECON E controller.
- Includes ND4 and ND16 filters.
- Standard cable length : 2.8 m

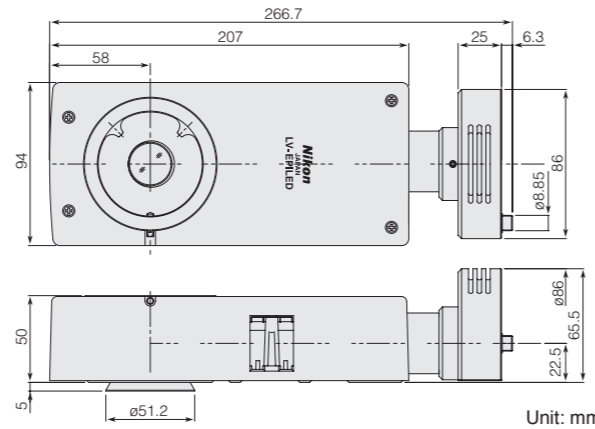


LV-EPILED White LED Illuminator MBE60500 / 1500 g



Controller

\*LV-EPILED is for sale while stock lasts.

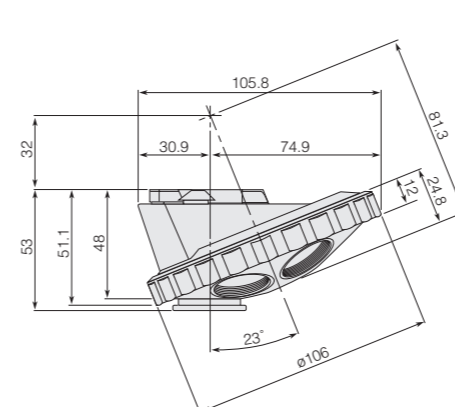


Unit: mm

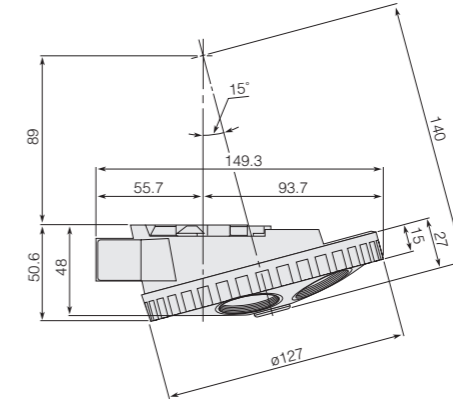
Code No.	Items	Weight (g)
MBF11250	Power Cord BJ	160
MQF52056	3-AC AC Adapter	200
MEF51001	TI-100WRC 100W Remote Cable	100

# Revolving Nosepieces

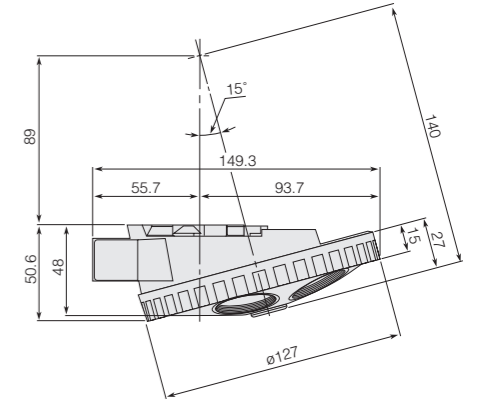
Eight types of nosepieces – either manual or motorized – are available to choose from.



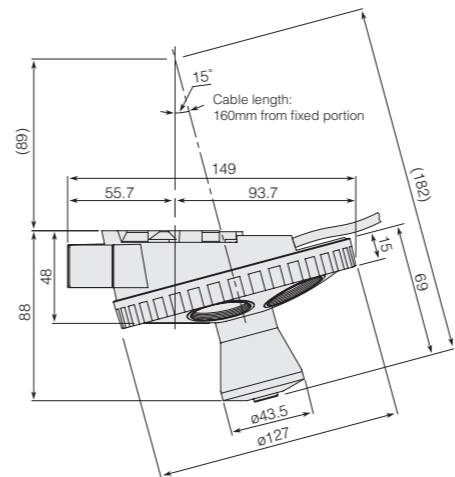
C-N6 ESD Sextuple Nosepiece  
MBP71316 / 450 g



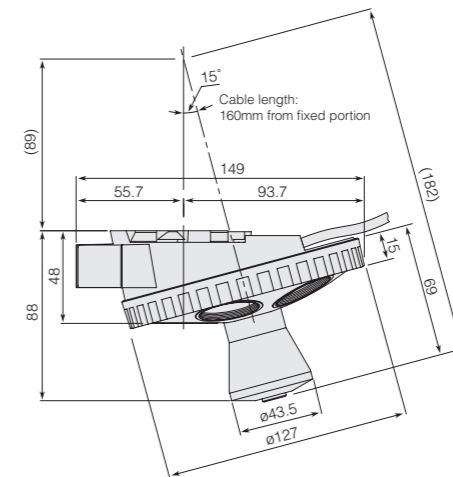
LV-NBD5 BD Quintuple Nosepiece ESD  
MBP60125 / 580 g



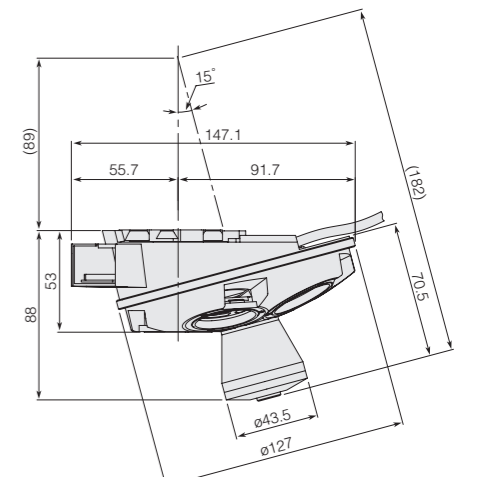
LV-NU5 Universal Quintuple Nosepiece ESD  
MBP60115 / 580 g



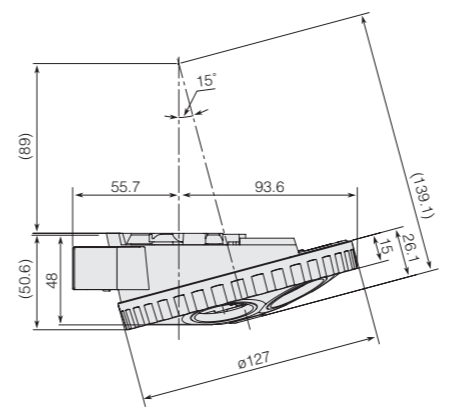
LV-NU5A Motorized Universal Quintuple Nosepiece ESD  
MBP60105 / 800 g



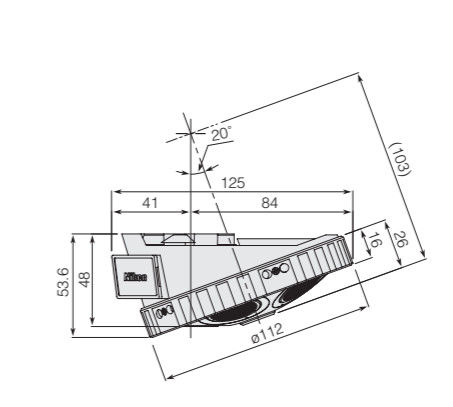
LV-NU5AC Motorized Universal Quintuple Nosepiece  
MBP60106 / 800 g



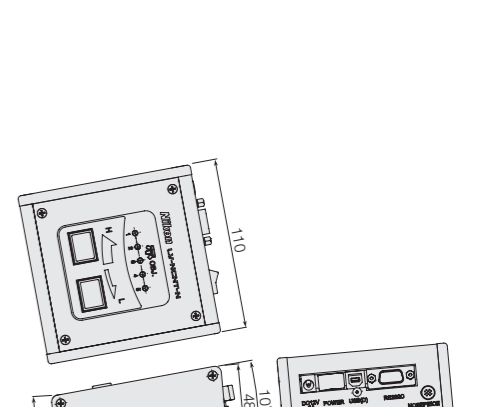
LV-NU5AI Motorized Universal Quintuple Nosepiece  
MBP60107 / 890 g



LV-NU5I Intelligent Universal Quintuple Nosepiece ESD  
MBP60108 / 600 g



P-N Centering Quintuple Nosepiece  
MDP44205 / 600 g



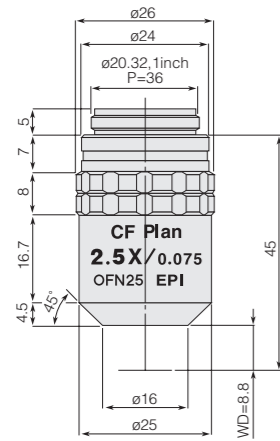
LV-NCNT-N Motorized Nosepiece Controller  
MBF65331 / 400 g  
(Standard cable length : 1.5 m)

Unit: mm

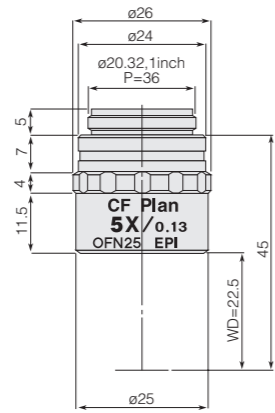
Code No.	Items	Weight (g)
MBF11250	Power Cord BJ	160
MQF52056	3-AC AC Adapter	200

## CF IC EPI Plan Brightfield Objectives

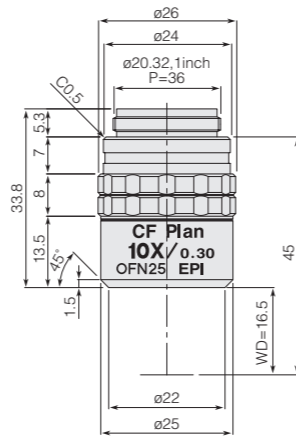
CF&IC objectives for brightfield use.



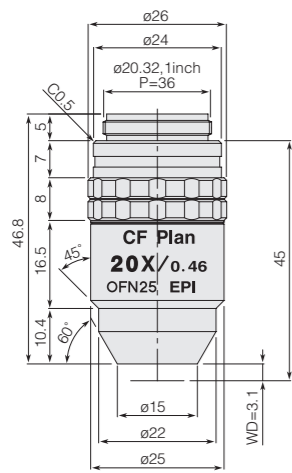
CF IC EPI Plan 2.5x



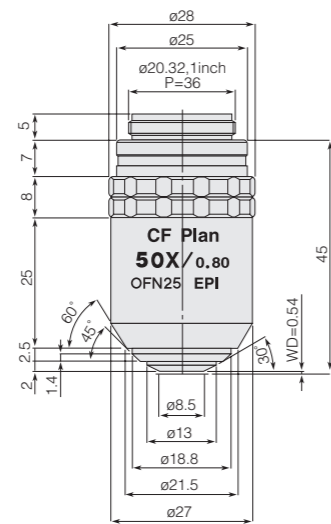
CF IC EPI Plan 5x



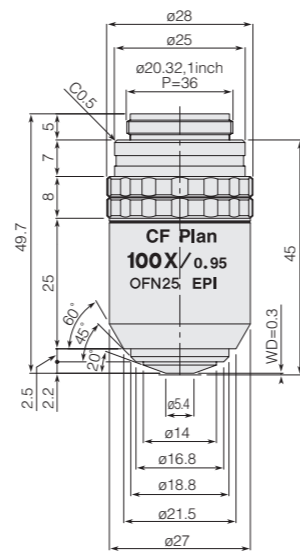
CF IC EPI Plan 10x



CF IC EPI Plan 20x



CF IC EPI Plan 50x



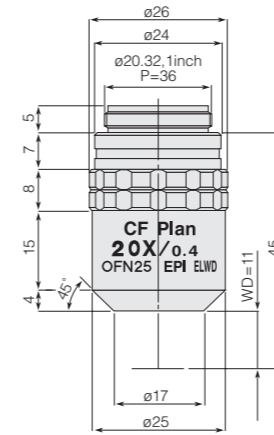
CF IC EPI Plan 100x

Unit: mm

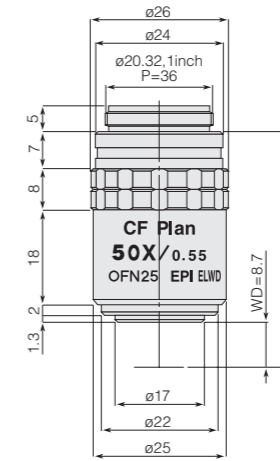
Code No.	CF IC Objectives						Widefield CF eyepieces CFWN 10x (F.N. 20)			Ultra-Widefield CFI eyepieces CFI UW10x (F.N. 25)		
	Objectives (Magnifications)	NA	WD (mm)	Focal length (mm)	Physical depth of focus (μm)	Weight (g)	Total magnification (M)	Actual field of view (omm)	Depth of focus (μm)	Total magnification (M)	Actual field of view (omm)	Depth of focus (μm)
MUL00031	CF IC EPI Plan 2.5x	0.075	8.80	80.00	48.89	108	25x	8.00	125.08	25x	10.00	125.08
MUL00051	CF IC EPI Plan 5x	0.130	22.50	40.00	16.27	65	50x	4.00	38.25	50x	5.00	38.25
MUL00101	CF IC EPI Plan 10x	0.300	16.50	20.00	3.06	90	100x	2.00	7.82	100x	2.50	7.82
MUL00201	CF IC EPI Plan 20x	0.460	3.10	10.00	1.30	120	200x	1.00	2.85	200x	1.25	2.85
MUL00501	CF IC EPI Plan 50x	0.800	0.54	4.00	0.43	145	500x	0.40	0.79	500x	0.50	0.79
MUL00901	CF IC EPI Plan 100x	0.950	0.30	2.00	0.30	140	1000x	0.20	0.46	1000x	0.25	0.46

## CF IC EPI Plan ELWD Long Working Distance Objectives for Brightfield Use

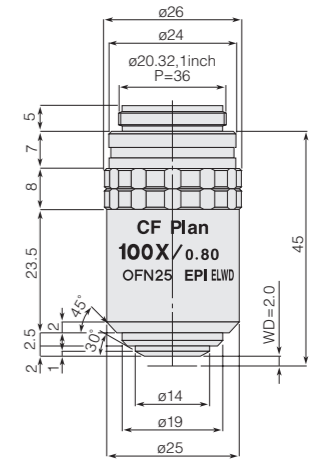
Extended working distances facilitate observations of samples with irregular surfaces.



CF IC EPI Plan ELWD 20x



CF IC EPI Plan ELWD 50x



CF IC EPI Plan ELWD 100x

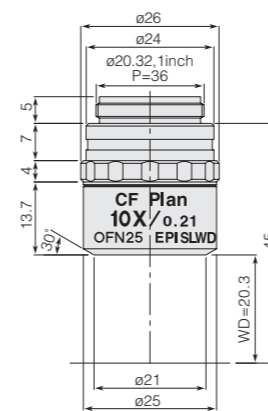
Unit: mm

Code No.	CF IC Objectives						Widefield CF eyepieces CFWN 10x (F.N. 20)			Ultra-Widefield CFI eyepieces CFI UW10x (F.N. 25)		
	Objectives (Magnifications)	NA	WD (mm)	Focal length (mm)	Physical depth of focus (μm)	Weight (g)	Total magnification (M)	Actual field of view (omm)	Depth of focus (μm)	Total magnification (M)	Actual field of view (omm)	Depth of focus (μm)
MUL03201	CF IC EPI Plan ELWD 20x	0.40	11.0	10	1.72	95	200x	1.0	3.50	200x	1.25	3.50
MUL03501	CF IC EPI Plan ELWD 50x	0.55	8.7	4	0.91	105	500x	0.4	1.43	500x	0.50	1.43
MUL03901	CF IC EPI Plan ELWD 100x	0.80	2.0	2	0.43	120	1000x	0.2	0.61	1000x	0.25	0.61

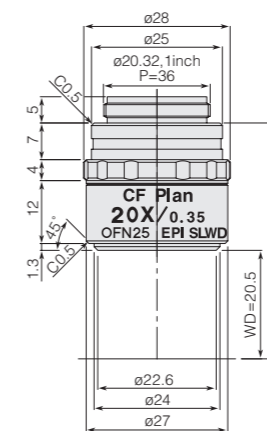
## CF IC EPI Plan SLWD Ultra-long Working Distance Objectives for Brightfield Use

Ultra-long working distances.

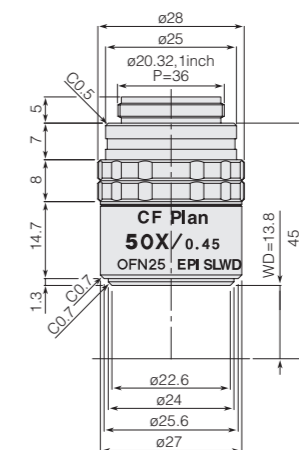
Particularly useful when observing the bottom of a depression in the sample.



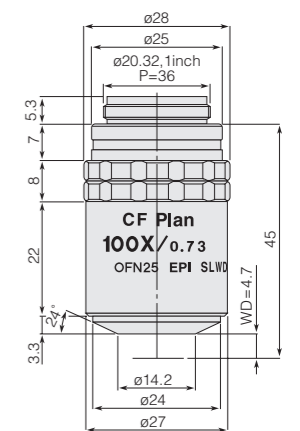
CF IC EPI Plan SLWD 10x



CF IC EPI Plan SLWD 20x



CF IC EPI Plan SLWD 50x



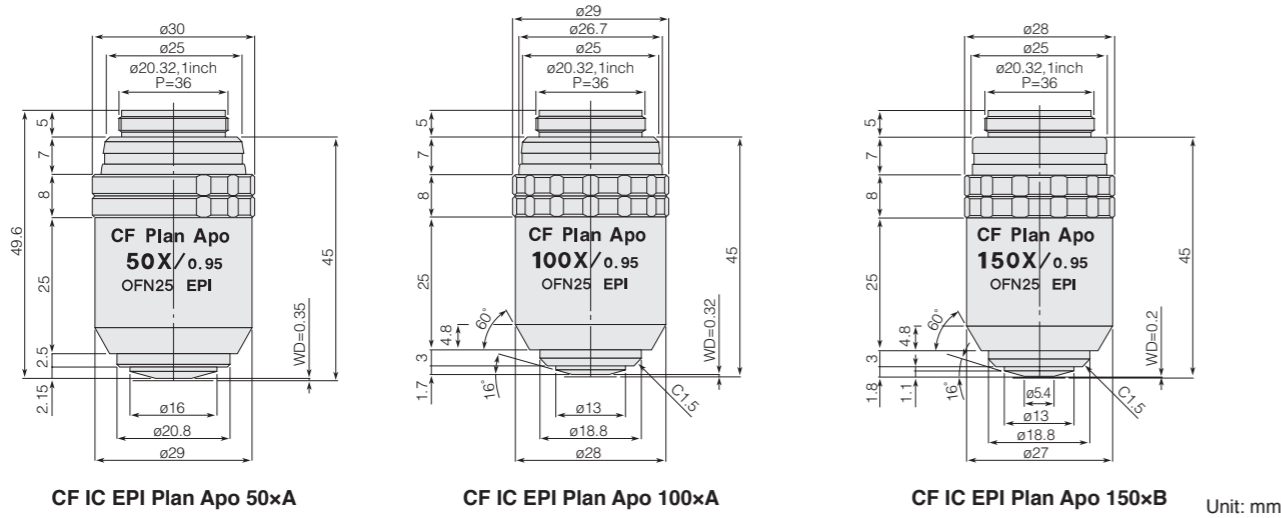
CF IC EPI Plan SLWD 100x

Unit: mm

Code No.	CF IC Objectives						Widefield CF eyepieces CFWN 10x (F.N. 20)			Ultra-Widefield CFI eyepieces CFI UW10x (F.N. 25)		
	Objectives (Magnifications)	NA	WD (mm)	Focal length (mm)	Physical depth of focus (μm)	Weight (g)	Total magnification (M)	Actual field of view (omm)	Depth of focus (μm)	Total magnification (M)	Actual field of view (omm)	Depth of focus (μm)
MUL04101	CF IC EPI Plan SLWD 10x	0.21	20.3	20	6.24	85	100x	2.0	13.04	100x	2.50	13.04
MUL04201	CF IC EPI Plan SLWD 20x	0.35	20.5	10	2.24	80	200x	1.0	4.29	200x	1.25	4.29
MUL04501	CF IC EPI Plan SLWD 50x	0.45	13.8	4	1.36	110	500x	0.4	1.99	500x	0.50	1.99
MUL04901	CF IC EPI Plan SLWD 100x	0.73	4.7	2	0.52	135	1000x	0.2	0.71	1000x	0.25	0.71

# CF IC EPI Plan Apo High-Resolution Brightfield Objectives

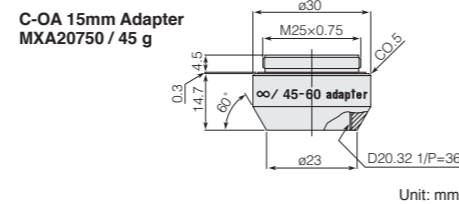
Apochromat-type objectives for brightfield use virtually eliminate chromatic aberration and feature excellent resolution.



Code No.	CF IC Objectives						Widefield CF eyepieces CFWN 10x (F.N. 20)			Ultra-Widefield CFI eyepieces CFI UW10x (F.N. 25)		
	Objectives (Magnifications)	NA	WD (mm)	Focal length (mm)	Physical depth of focus (μm)	Weight (g)	Total magnification (M)	Actual field of view (omm)	Depth of focus (μm)	Total magnification (M)	Actual field of view (omm)	Depth of focus (μm)
MUT10051	CF IC EPI Plan Apo 50xA	0.95	0.35	4.00	0.3	170	500x	0.40	0.61	500x	0.50	0.61
MUT10101	CF IC EPI Plan Apo 100xA	0.95	0.32	2.00	0.3	170	1000x	0.20	0.46	1000x	0.25	0.46
MUT10153	CF IC EPI Plan Apo 150xB	0.95	0.20	1.33	0.3	160	1500x	0.13	0.40	1500x	0.17	0.40

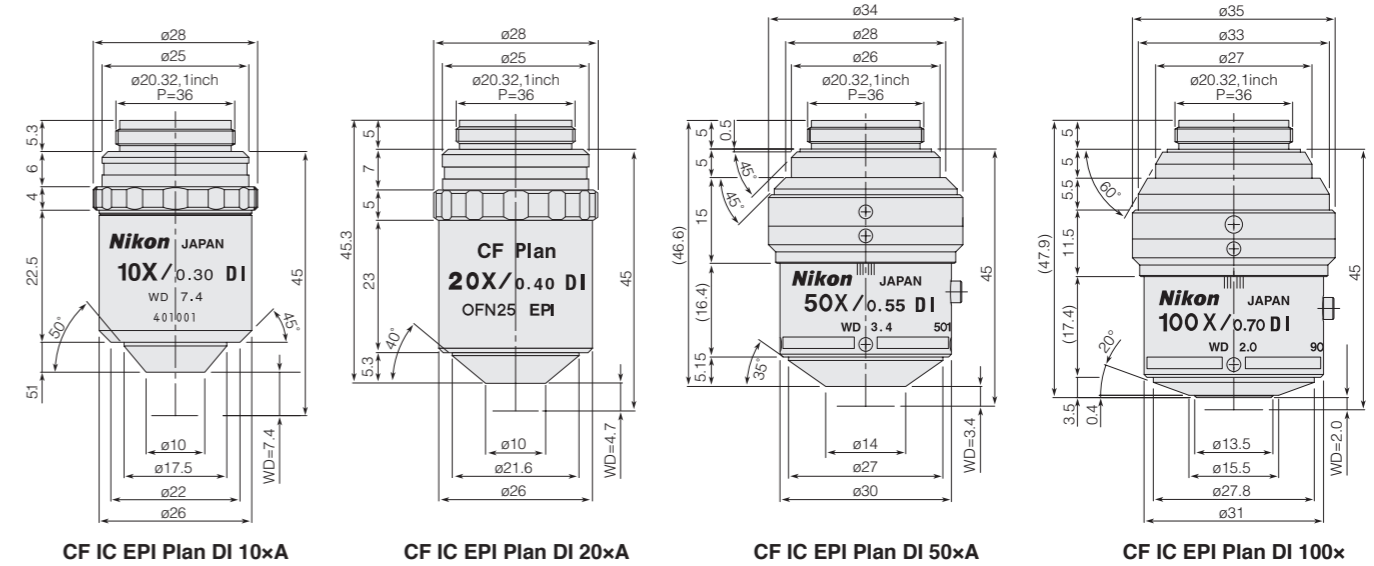
# C-OA 15 mm Adapter

An adapter for attaching CF & IC objectives to the C-N Sextuple Nosepiece (page 17) that supports the CFI optical system.



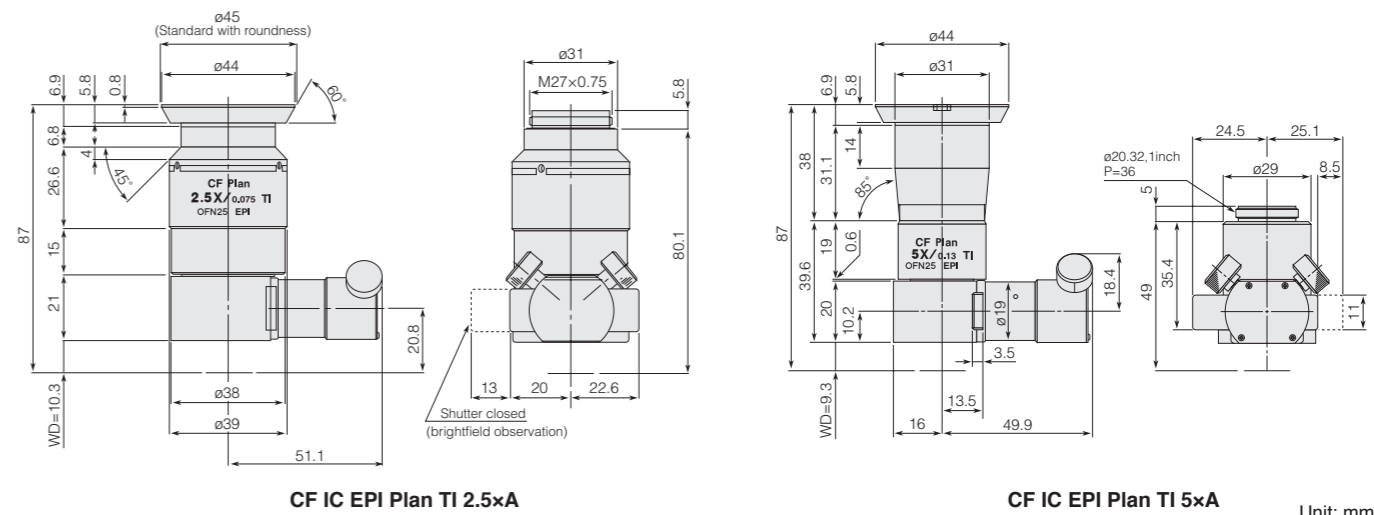
# CF IC EPI Plan DI Double Beam Interference Objectives

Double beam interference objectives that have large numerical aperture, long working distance and high optical performance.



Code No.	CF IC Objectives						Widefield CF eyepieces CFWN 10x (F.N. 20)			Ultra-Widefield CFI eyepieces CFI UW10x (F.N. 25)		
	Objectives (Magnifications)	NA	WD (mm)	Focal length (mm)	Physical depth of focus (μm)	Weight (g)	Total magnification (M)	Actual field of view (omm)	Depth of focus (μm)	Total magnification (M)	Actual field of view (omm)	Depth of focus (μm)
MUL40101	CF IC EPI Plan DI 10xA	0.30	7.4	19.78	3.06	125	100x	2.00	3.04	100x	2.50	3.04
MUL40201	CF IC EPI Plan DI 20xA	0.40	4.7	9.97	1.72	130	200x	1.00	1.71	200x	1.25	1.71
MUL40501	CF IC EPI Plan DI 50xA	0.55	3.4	4.00	0.90	200	500x	0.40	0.90	500x	0.50	0.90
MUL40900	CF IC EPI Plan DI 100x	0.70	2.2	2.00	0.56	200	1000x	0.20	0.56	1000x	0.25	0.56

# CF IC EPI Plan TI Interference Objectives



Code No.	CF IC Objectives						Widefield CF eyepieces CFWN 10x (F.N. 20)			Ultra-Widefield CFI eyepieces CFI UW10x (F.N. 25)		
	Objectives (Magnifications)	NA	WD (mm)	Focal length (mm)	Physical depth of focus (μm)	Weight (g)	Total magnification (M)	Actual field of view (omm)	Depth of focus (μm)	Total magnification (M)	Actual field of view (omm)	Depth of focus (μm)
MUL42031	CF IC EPI Plan TI 2.5xA*	0.075	10.3	80	48.5	440	25x	8.00	48.6	—	—	—
MUL42051	CF IC EPI Plan TI 5xA	0.13	9.3	40	16.2	280	50x	4.00	16.2	50x	5.00	16.2

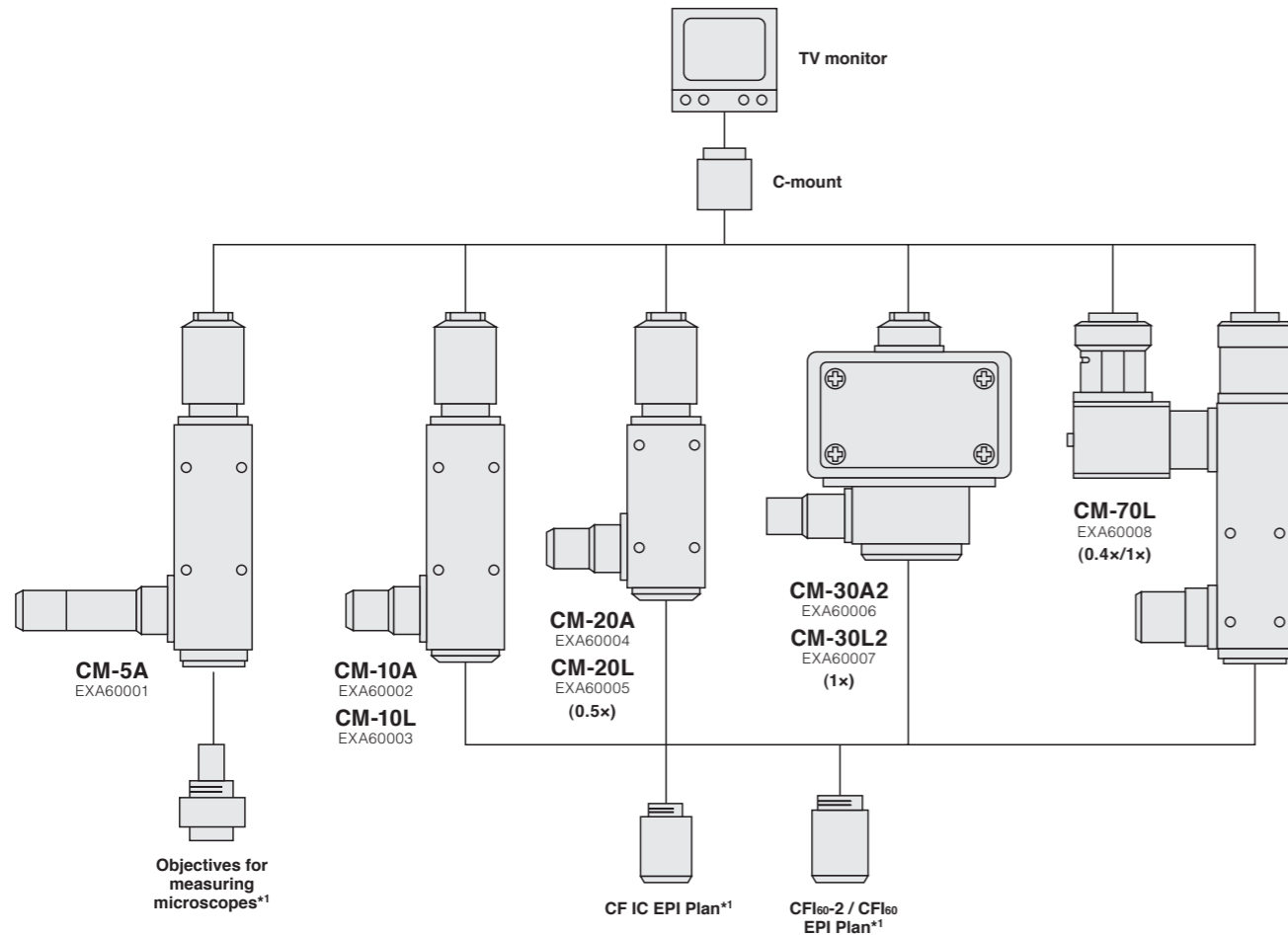
\* 2.5xA supported up to a field number of 0.22.



# CM-Series Compact Reflected Microscopes

Ultra-compact reflected microscopes designed for integration into production lines to provide on-monitor observations.

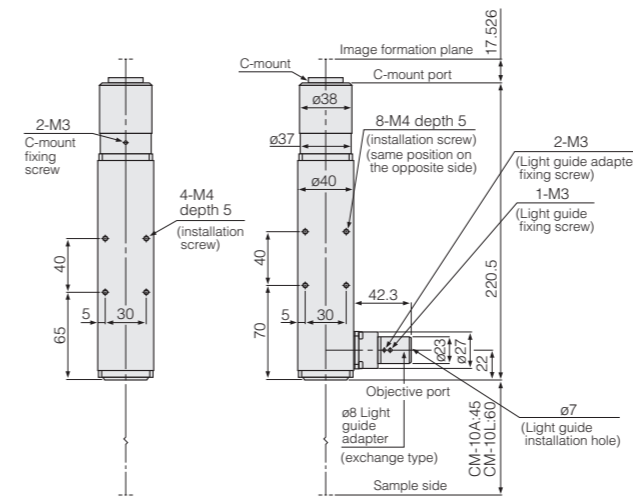
- Ultra-compact and lightweight.
- C-mount video cameras having 1/4 to 1-inch CCDs are attachable as standard.
- The Koehler Illumination Optical System offers a uniformly bright viewfield.
- Tread holes ideally located on the surface of the microscope facilitate attachment of various auxiliary equipment.



\*\*1 Use an objective for measuring microscopes on the CM-5A and a CF IC EPI Plan lens on other A series units. In addition, use an EPI Plan lens from the CFI60-2 / CFI60 series on L series units.

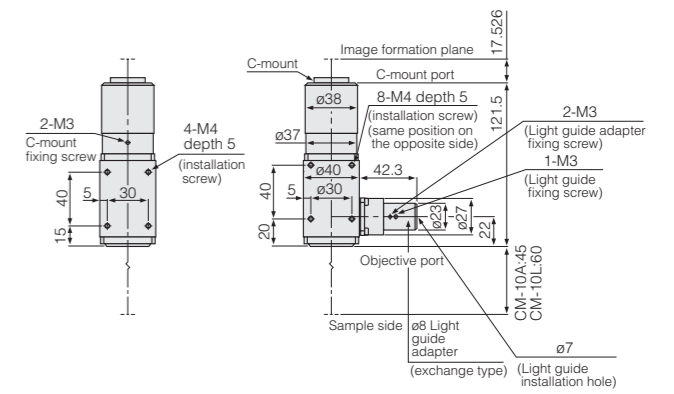
## CM-10A/CM-10L

- Basic model with a tube lens focal length of  $f/200$  mm ( $1\times$ )



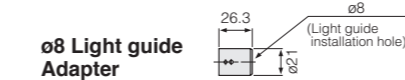
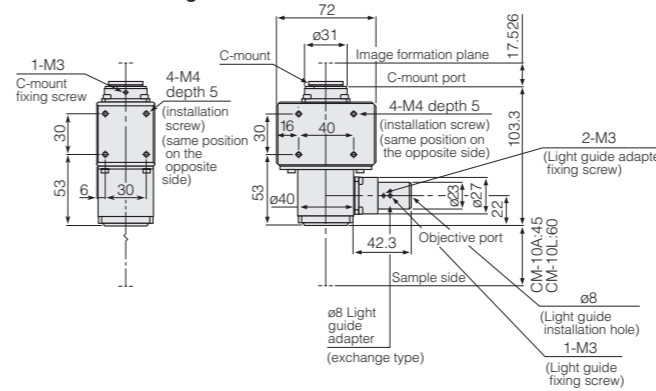
## CM-20A/CM-20L

- Features a tube shorter than the CM-10, by setting the tube lens focal length at  $f/100$  mm ( $0.5\times$ )



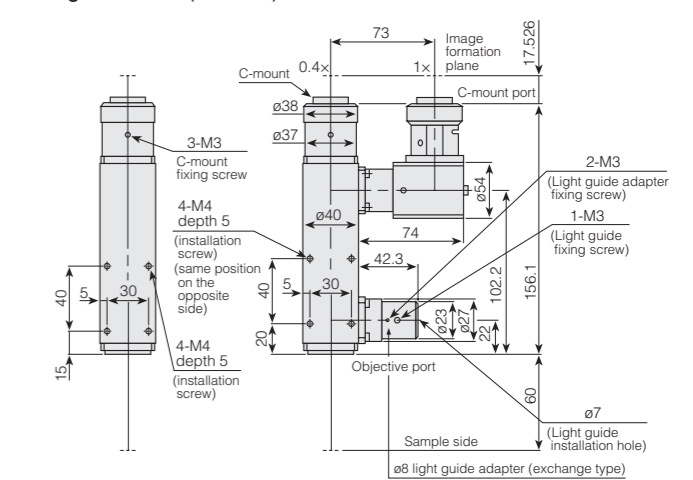
## CM-30A2/CM-30L2

- Compact model based on the CM-10 that features a short tube length.



## CM-70L

- Enables simultaneous observation at different imaging magnifications ( $1\times/0.4\times$ ). For CFI60-2 / CFI60 EPI Plan.



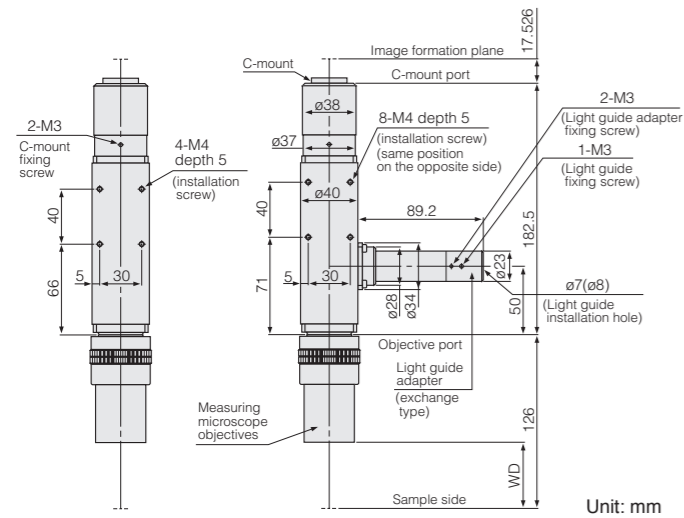
Unit: mm

	CM-10A/CM-10L	CM-20A/CM-20L	CM-30A2/CM-30L2	CM-70L
Camera mount	C-mount			
Tube lens focal length	200 mm	100 mm	200 mm	80/200 mm
Tube lens magnification	1×	0.5×	1×	0.4×/1×
Magnification on CCD surface	Same as objective magnification	Objective magnification × 0.5	Same as objective magnification	Same as objective magnification and 0.4×
Compatible objectives*	A series: CF IC EPI Plan objectives / L series: CFI60-2 / CFI60 EPI Plan objectives			
Illumination optical system	Koehler illumination (high-quality telecentric illumination)			
Attachment surfaces	3		4	
Dimensions (W×D×H); Weight (Approx.)	40 × 40 × 224.5 mm: 440 g	40 × 40 × 125.5 mm: 290 g	40 × 40 × 107.3 mm: 400 g	40 × 117 × 156.1 mm: 690 g

Manufactured by: Nikon Engineering Co., Ltd.

\* On the above-mentioned A series and L series, use CF IC EPI Plan and CFI60-2 / CFI60 series EPI Plan Objectives, respectively.

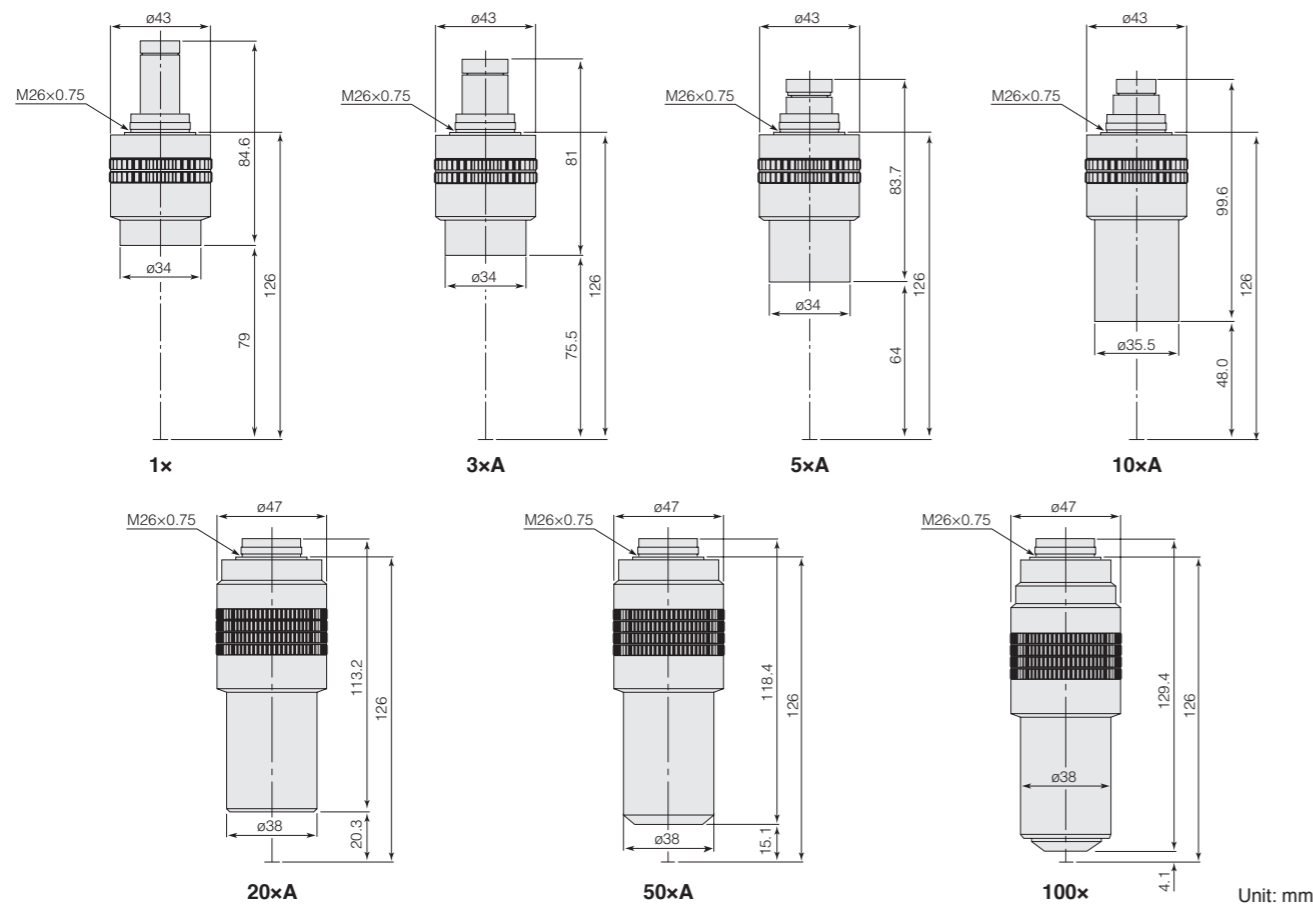
# CM-5A



CM-5A	
Camera mount	C-mount
Tube lens focal length	—
Compatible objectives	Measuring microscope objectives
Illumination optical system	Koehler illumination (high-quality telecentric illumination)
Attachment surfaces	3
Dimensions (WxDxH); Weight (Approx.)	40 x 40 x 186.5 mm ; 410 g

Manufactured by: Nikon Engineering Co., Ltd.

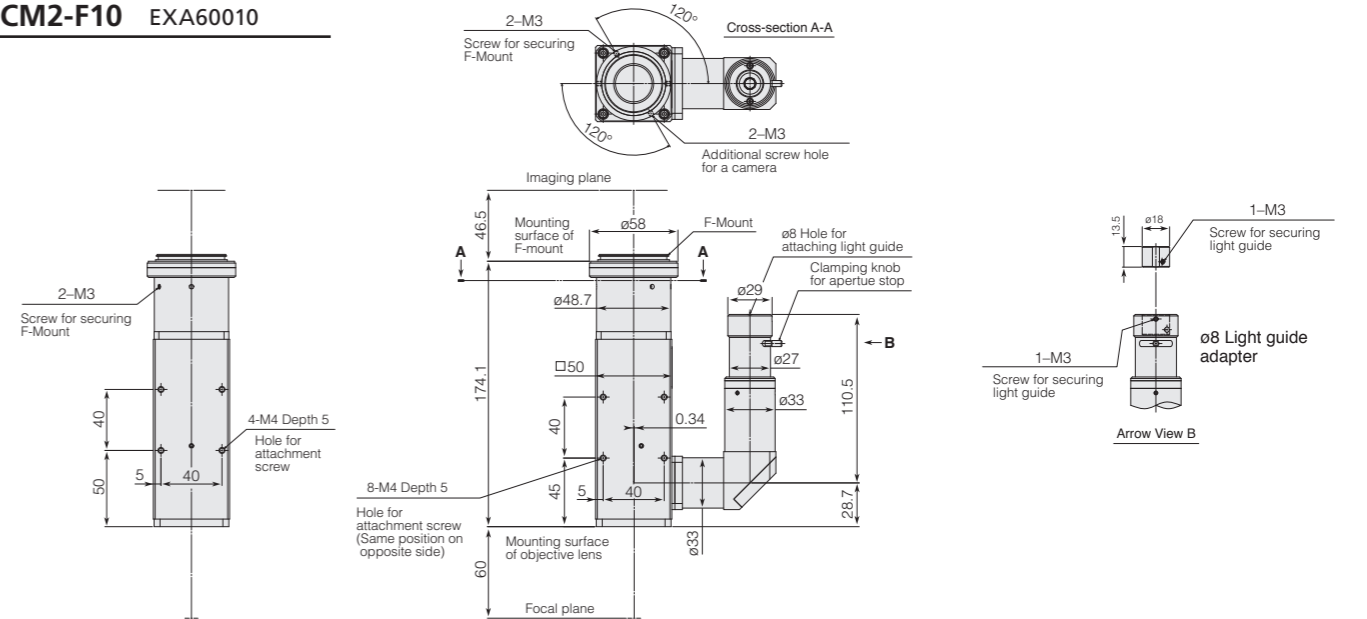
# Objectives for Measuring Microscopes



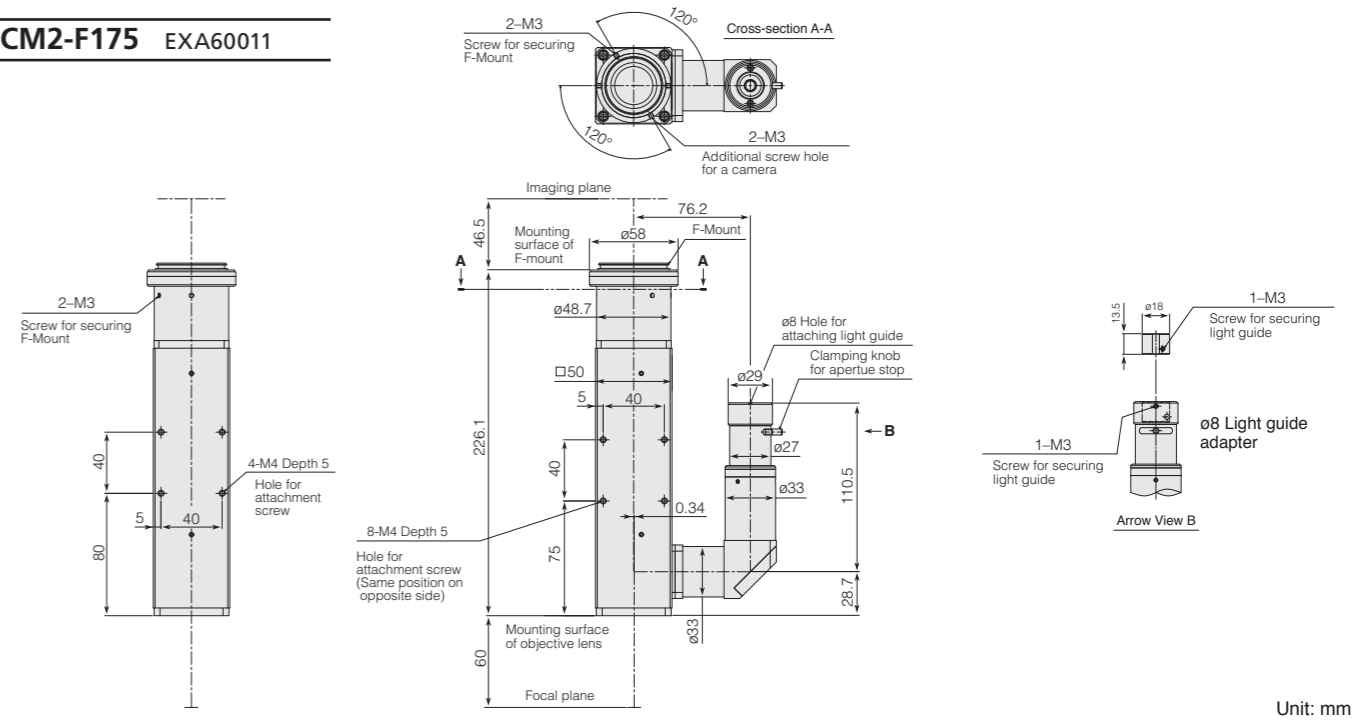
	1x	3xA	5xA	10xA	20xA	50xA	100x
Focal length (mm)	158.2	66.2	42.3	20.2	10.98	4.3	2.15
NA	0.03	0.09	0.13	0.2	0.4	0.55	0.75
WD (mm)	79	75.5	64	48	20.3	15.1	4.1
Depth of focus (μm)	322	36	17	7	1.8	1	0.5
Parfocal distance (mm)	126						
Weight (g)	120	150	150	200	650	600	550

# Built-in Type Compact Microscope CM2

## CM2-F10 EXA60010



## CM2-F175 EXA60011



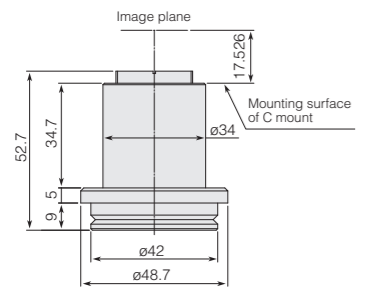
Unit: mm

	CM2-F10	CM2-F175
Magnification	1.0x	1.75x
Camera Mount	F-mount	
Suitable Camera	35 mm Full-Frame (36x24 mm)	
Image Size (When viewed with Field Number ø25 Objective Lens)	ø25 mm	ø43 mm
EPI-Illumination	Koehler Illumination (Simplified Telecentric Illumination with Adjustable Aperture Stop) Fiber Light Guide Adapter with 8 mm Bore)	
Applicable Objective Lenses (*1)	CFI TU Plan EPI Objective Lens Series (Optical Field Number: 25, Parfocal Distance: 60mm, Thread: M25 x 0.75) High Resolution Objective Lens Series HR5xA (Optical Field Number: 25, Parfocal Distance: 45mm, Thread: M27x0.75)	
Number of Attachable Surface	3 Sides (4-M4 Hole for Attachment Screw)	
Options (*2)	<ul style="list-style-type: none"> <li>Manual Nosepiece MR-5 can be Used (Equipped with Dedicated Adapters)</li> <li>C Mount Adapter (EXA60014) is also available.</li> </ul>	

\*1: Please ask us for enable/disable objective lenses and magnifications. \*2: Please ask us for customized camera mount other than F-Mount and C-Mount

## C Mount for CM2-F

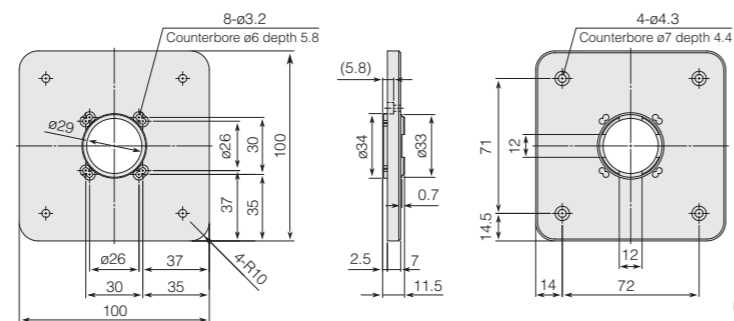
EXA60014



Unit: mm

## CM Adapter 2 EXA60023

CM Adapter 2 combines between a CM Microscope and a MR-5 manual nosepiece.



Unit: mm

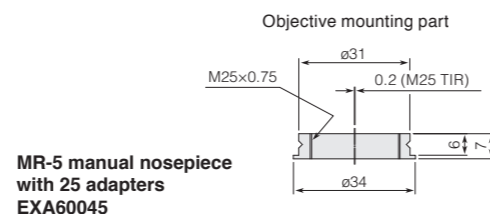
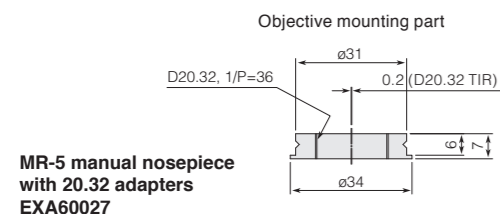
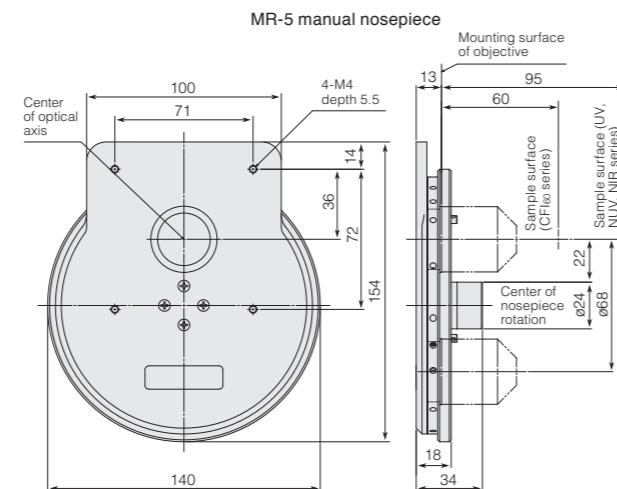
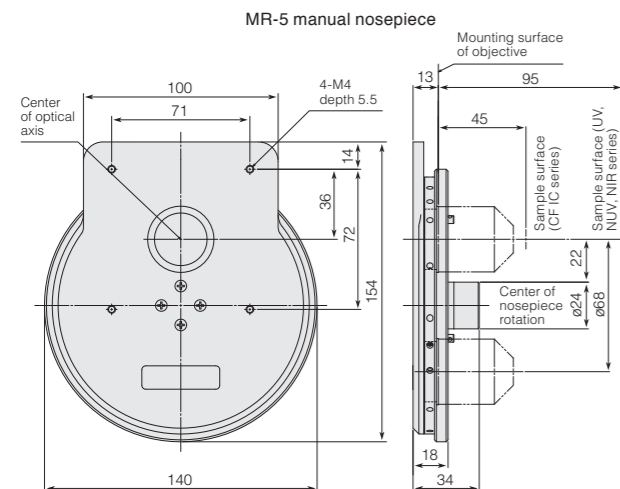
# MR-5 Manual Nosepiece

### MR-5 manual nosepiece with 20.32 adapters

MR-5 is the manual nosepiece for CM and CM2 microscopes. This item is compatible with CF&IC EPI objective lenses and CM Adapter 2 will be required to combine with a CM or a CM2 microscope.

### MR-5 manual nosepiece with 25 adapters

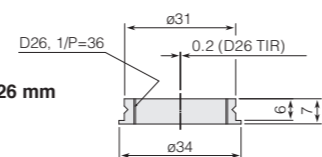
MR-5 is the manual nosepiece for CM and CM2 microscopes. This item is compatible with CF160-2 EPI objective lenses and CM Adapter 2 will be required to combine with a CM or a CM2 microscope.



### MR-5 Nosepiece Adapter 26 mm

This item is the adapter of MR-5 manual nosepiece for UV, NUV objective lenses.

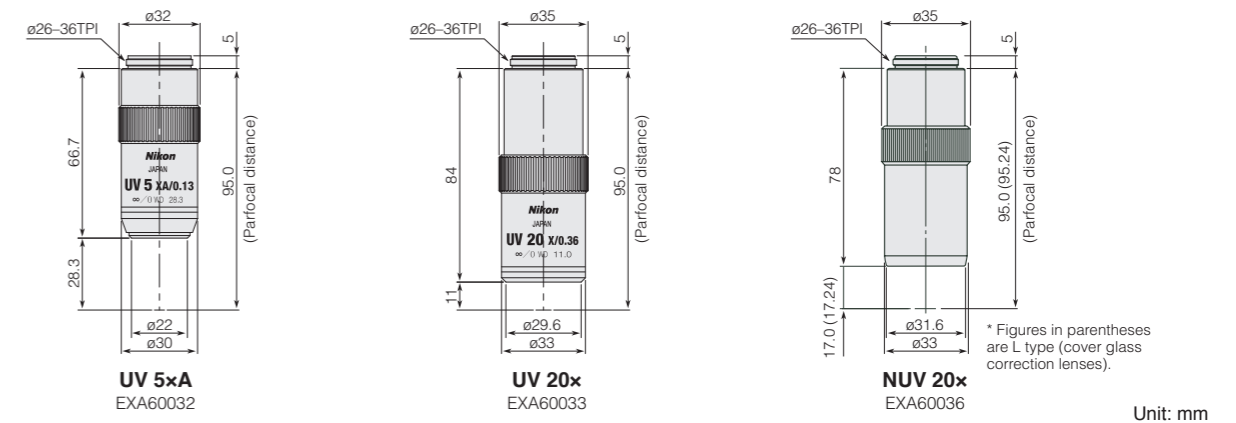
MR-5 Nosepiece Adapter 26 mm  
EXA60050



Unit: mm

# Ultra Violet/Near-ultraviolet Objective lenses

High-precision processing and observation performance, and superior laser durability.



Magnifications	NA (numerical parafocal distance aperture)	W.D. (mm)	Focal distance (mm)	Resolution* (μm)	Focal depth* (μm)	Actual field of view (mmφ)	Weight (g)	Chromatic aberration correction wavelength (nm)	Parafocal distance (mm)
UV 5xA	0.13	28.3	40.0	2.1	±16.2	5	260	266 nm to C (656.3 nm) continuous correction	95.0
UV 20x	0.36	11.0	10.0	0.76	±2.1	1.25	407	266 nm, 355 nm, 532 nm and e (546.1 nm)	
NUV 20x	0.4	17.0	10.0	0.68	±1.71	1.25	350	55, 532, 486.1(F), 587.6(d), 656.3(C)	

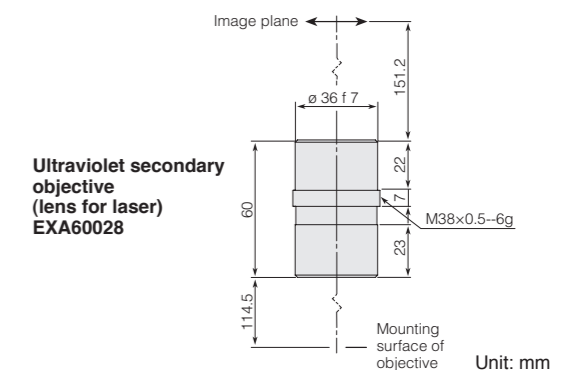
\* Resolving power and depth are calculated with a reference wavelength of 546 nm.

# Ultraviolet Secondary Objective (Lens for Laser)

Secondary objective lens for use with ultraviolet objective lens UV, near-ultraviolet objective lens NUV, and near-infrared objective lens NIR.

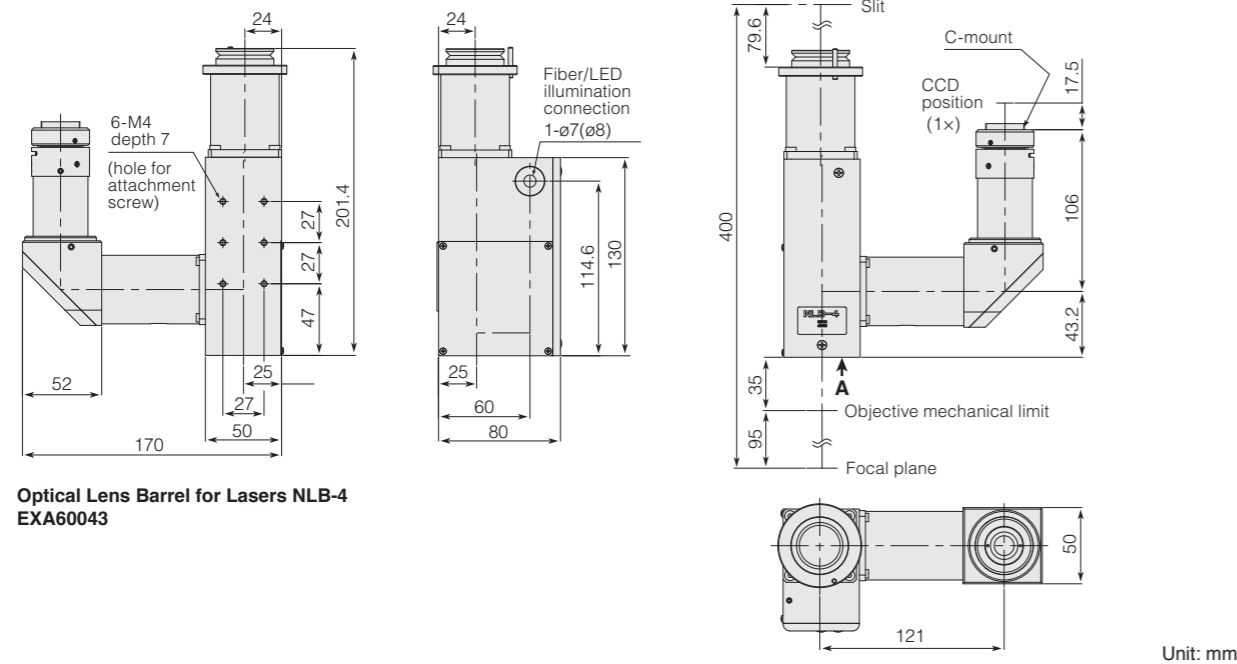
• Use in laser machining systems and as imaging lenses for visible wavelength observation optics.

Focal distance (mm)	Field number (mm)	Chromatic aberration correction wavelength (nm)
200	φ25	266 to 1064 (continuous)





# Optical Lens Barrel for Lasers NLB-4



**Optical Lens Barrel for Lasers NLB-4**  
EXA60043

Name / model		Optical Lens Barrel for Lasers / NLB-4
Lens barrel	Supported lasers	YAG 4 wavelengths (1,064, 532, 355, 266 nm)
	Secondary objective lens	1x (near-infrared, visible, near-ultraviolet, ultraviolet)
Observation area	Observation image	Brightfield / erect image
	Camera port	C Mount
	Imaging magnification	1x
	Supported image sensor	1x: Camera of 2/3 inch or less image sensor (C-mount) (0.5x: Camera of 1/2 inch or less image sensor)
Illumination		Brightfield epi-illumination
Light source		Halogen fiber (Diameter 7 / 8 mm) / LED (Diameter 8 mm)
Supported nosepieces		Manual nosepiece
Supported objective lenses	For observation	CF160 series*
	For processing	UV/NUV objective lenses, NIR objective lenses and equivalent objective lenses from other manufacturers
Standalone weight		Approximately 1.3kg

\*An adapter is available for adjusting the parfocal distance of the objective lens used for processing.

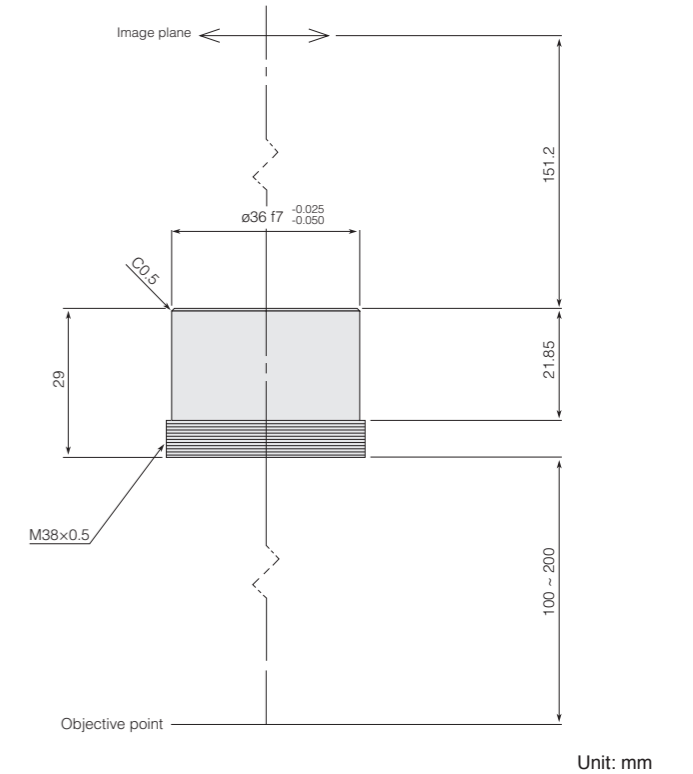
# 2nd Objective Lens Units

Used to focus parallel light beams coming through CF160-2 / CF160 objectives and CF&IC objectives onto the image plane.

## Built-in Type 2nd Objective Lens Unit

- Compatible with CF160-2, CF160 and CF&IC infinity objectives.
- Focal length: f/200 mm.
- To obtain the optimal objective performance, keep the distance between the lens unit and the objective's shoulder within 100-200 mm as shown in the diagram at right.

**Built-in Type 2nd Objective Lens Unit**  
MXA20696 / 70 g

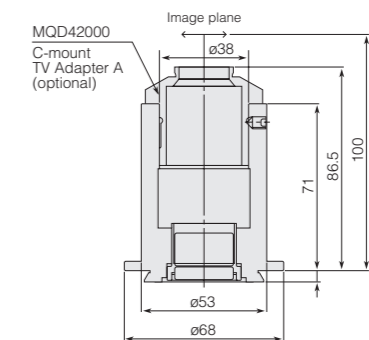


Unit: mm

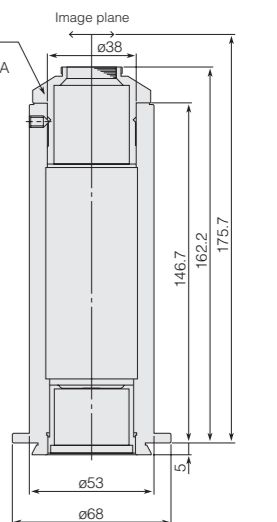
## TV-Use 2nd Objective Lens Unit 0.5x/ TV Relay Unit 1x

- Image plane magnification: 0.5x; Focal length: f/100 mm.
- Image plane magnification: 1x; Focal length: f/200 mm.
- With a field number of 11 mm, this lens unit can be used with CCD cameras smaller than 2/3-inch types.
- Distance between the lens unit and the objective's shoulder: 60-160 mm (110 mm optimum).
- Compatible with Universal Epi-Illuminators (LV-UEPI-N, LV-UEPI2, LV-UEPI2A, and LV-EPILED).

**TV-Use 2nd Objective Lens Unit 0.5x**  
MXA20714 / 100 g



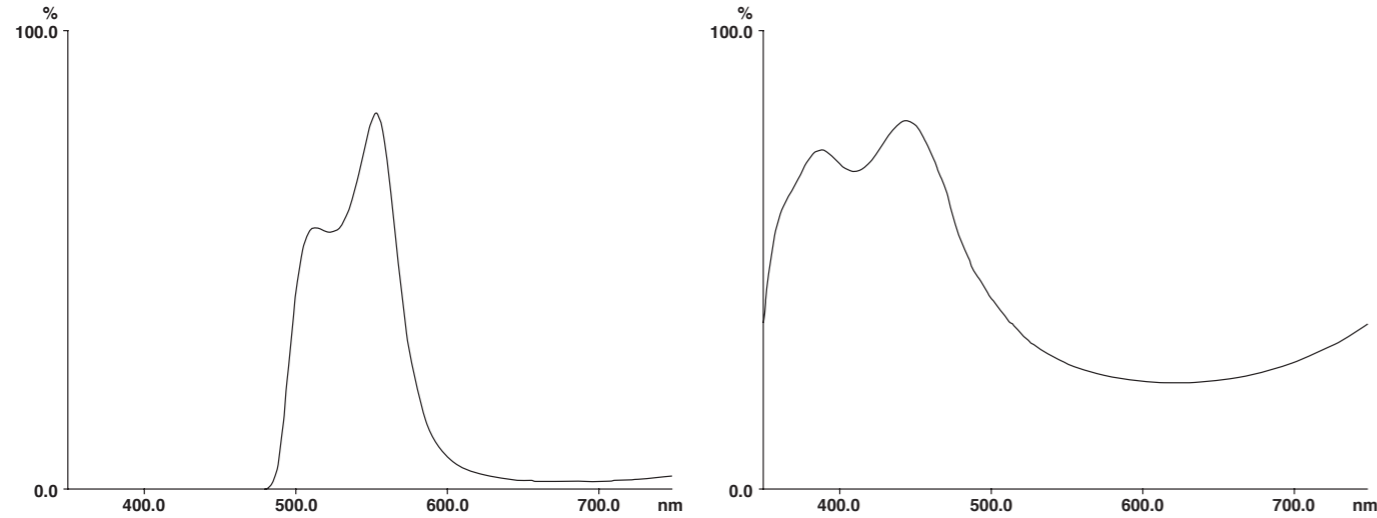
**TV Relay Unit 1x**  
MXK60147 / 500 g



Unit: mm

# Filters

A color balance compensation filter and neutral density filter are available.



**GIF Filter**

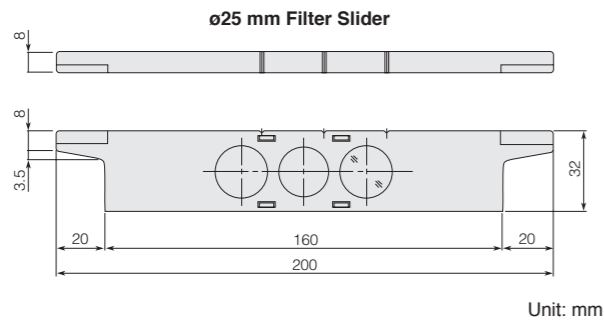
Allows only a green spectrum near the 546 nm wavelength to pass through. Effective for increasing the contrast of monochrome photographs and black-and-white TV images.

**NCB11 Filter**

This compensation filter maximizes the color reproduction of daylight-type color film, when the halogen lamp voltage of the brightfield light source is set to 9 V.

## ND Filters

This filter is for adjusting brightness during observation and photography by lowering the quantity of light without changing conditions, such as illumination light and spectral properties (color balance).



Unit: mm

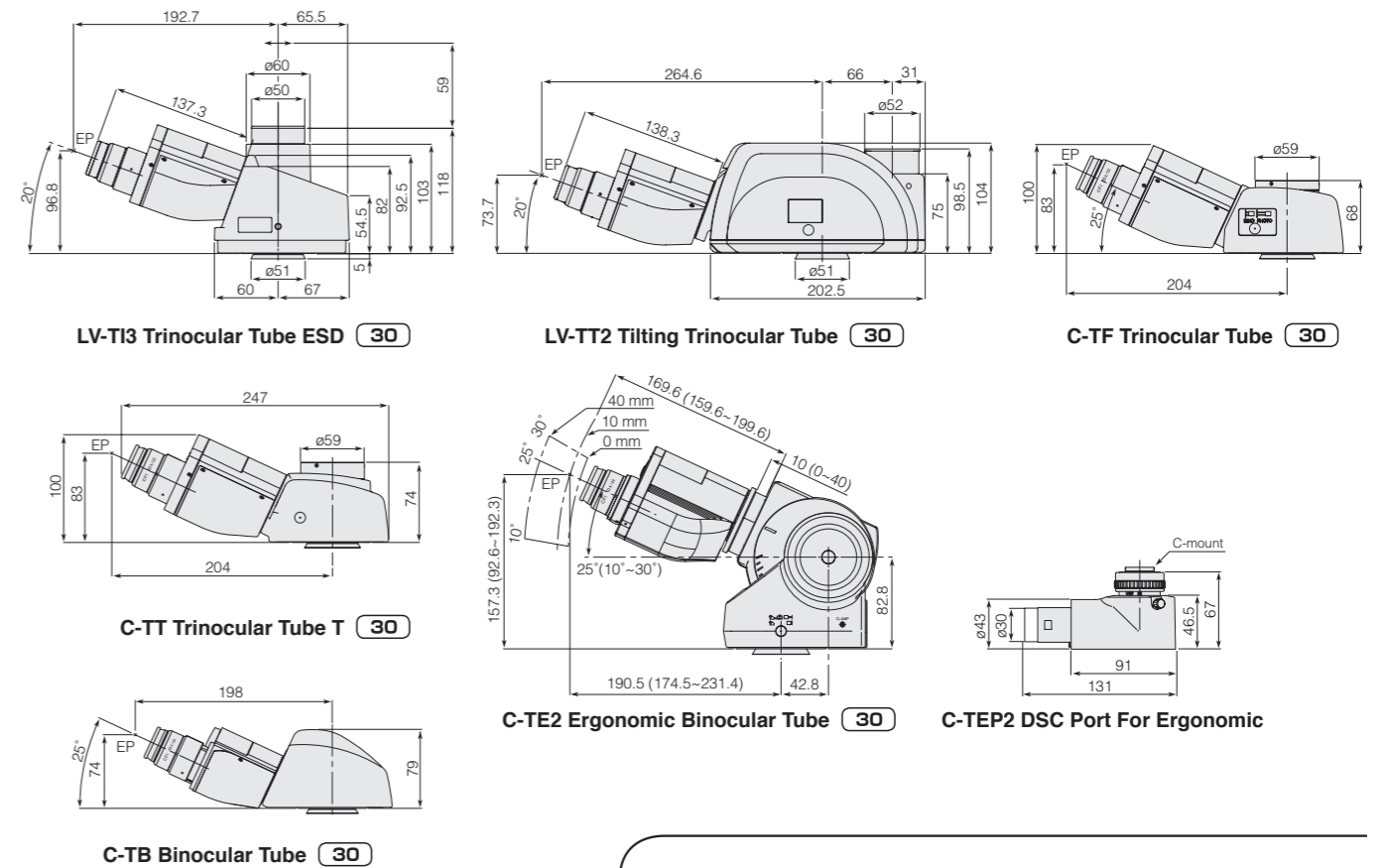
Code No.	Items	Weight (g)
MBN66750	YM-NCB ø25 mm Filter Slider NCB11	31
MBN66760	YM-ND ø25mm Filter Slider ND4/ND16	36
MBN66730	YM-GIF ø25 mm GIF Filter	25

# Eyepiece Tubes/Double Port/Straight Tubes

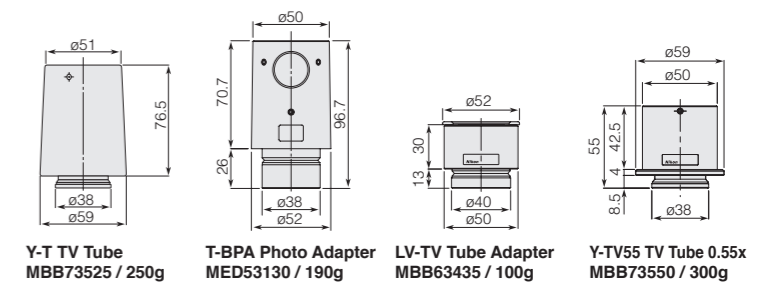
Sleeve diameter (mm) **30**

Illuminators **LV-UEPI-N** **LV-UEPI2** **LV-UEPI2A** **LV-EPILED**

These lens tubes can be combined with illuminators such as the LV-UEPI, LV-UEPI2, LV-UEPI2A and LV-EPILED. The trinocular eyepiece tube supports both ultrawide and wide fields of view with a change of the eyepiece lens.



## Straight Tubes



Used to change the format of the straight tube of a trinocular tube.

(Unit: mm)  
EP: Eyepoint

Code No.	Items	Weight (g)	Type	Image type	Field number	Tube's tilt angle	Beam split ratio (observation:photo)	Interpupillary distance
MBB63425	LV-TI3 Trinocular Tube ESD	1800	Siedentopf	Erect	22/25	20°	100:0/0:100	50~75 mm
MBB61000	LV-TT2 Tilting Trinocular Tube	2580	Siedentopf	Erect	22/25	10°~30°	100:0/20:80	50~75 mm
MBB93106	C-TF Trinocular Tube F	1850	Siedentopf	Inverted	22/25	25°	100:0/0:100	50~75 mm
MBB93115	C-TT Trinocular Tube T	2260	Siedentopf	Inverted	22/25	25°	100:0/20:80/0:100	50~75 mm
MBB93800	C-TE2 Ergonomic Binocular Tube	2100	Siedentopf	Inverted	22	10°~30°	—	50~75 mm
MBB92106	C-TB Binocular Tube	950	Siedentopf	Inverted	22	25°	—	50~75 mm

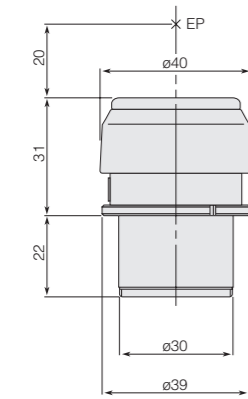
Focal distance of tube in the infinity corrected optics: 200 mm, Equipment magnification:1x, Diameter of the circular dovetail mount to the body: 51 mm.

MBB96800	C-TEP2 DSC Port For Ergonomic	350	Specially for C-TE Binocular Ergonomic Tube, Equipment magnification: 0.7x, Beamsplit ratio (binocular: port) 50:50/100:0
MBB74100	Y-IDP Double Port	1300	Equipment magnification: 1x, Beamsplit ratio (observation: photo) 55:45/100:0
MBB74105	Y-IDP Double Port 0/100	1300	Equipment magnification: 1x, Beamsplit ratio (observation: photo) 100:0/0:100

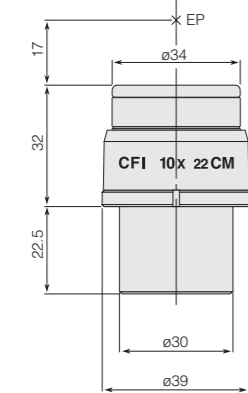
\* For attaching TV/video equipment to eyepiece tubes or Double Port, refer to the system diagram on page 3.  
\* CFI UW 10x and CFI UW 10xM are not suitable for use.

# Eyepieces Sleeve diameter (mm) 30

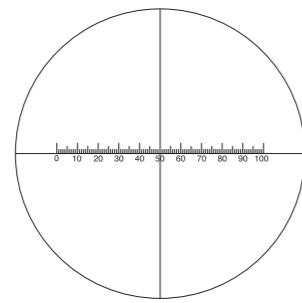
These eyepieces have a 30 mm sleeve diameter and maximize the performance of objective lenses.



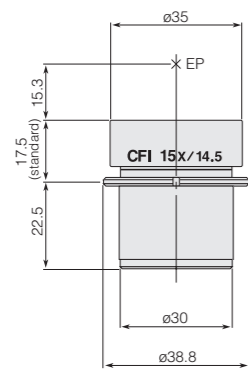
**LV-10xESD**  
30



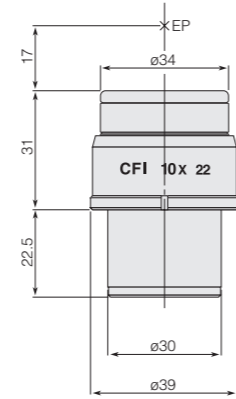
**CFI 10xCM**  
30



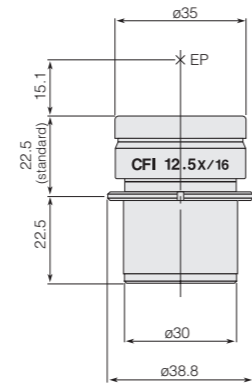
10 mm (in 100 μm increment)  
**CFI 10xCM eyepiece reticle**



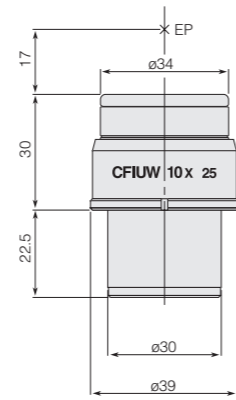
**CFI 15x**  
30



**CFI 10x**  
30



**CFI 12.5x**  
30



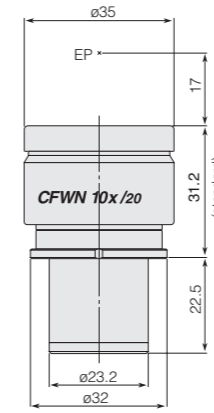
**CFI UW10x**  
30

(Unit: mm)  
EP: Eyepoint

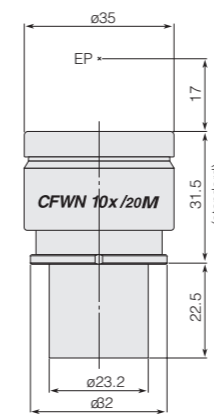
Code No.	Items (field number)	Weight (g)	Code No.	Items (field number)	Weight (g)
MBJ62105	LV-10xESD (22)	70	MAK10120	CFI 12.5x (16)	63
MAK10100	CFI 10x (22)	75	MAK10150	CFI 15x (14.5)	48
MAK12105	CFI 10xCM (22) with crosshair reticle	77	MAK30105	CFI UW10x (25)	100

# Eyepieces Sleeve diameter (mm) 23.2

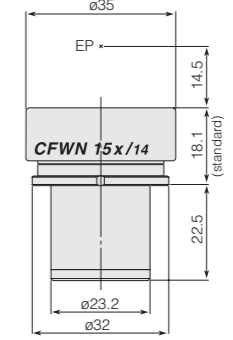
These eyepieces have a 23.2 mm sleeve diameter and maximize the performance of objective lenses.



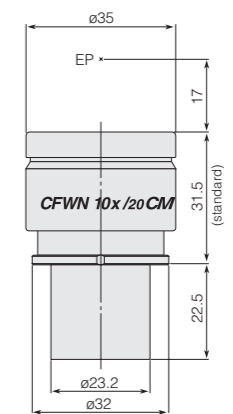
**CFWN 10x**  
23.2



**CFWN 10xM**  
23.2



**CFWN 15x**  
23.2



**CFWN 10xCM**  
23.2

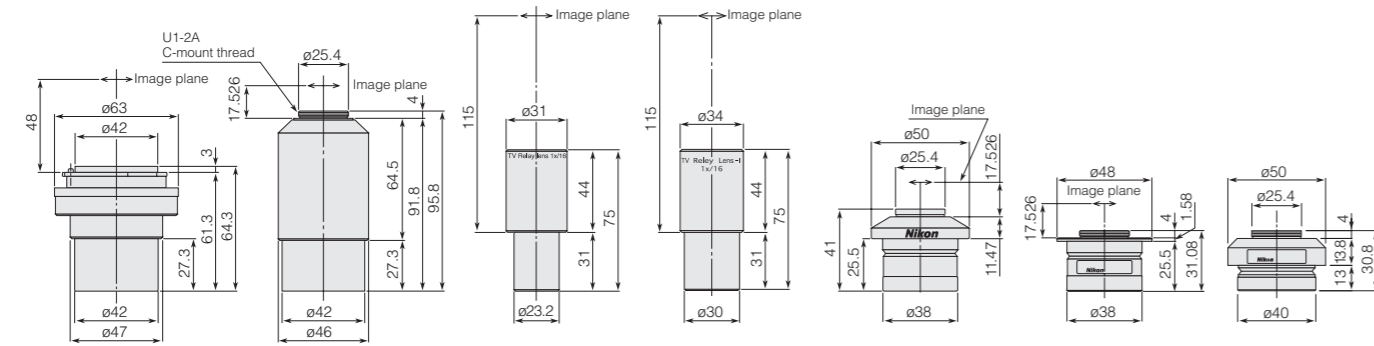
(Unit: mm)  
EP: Eyepoint

Code No.	Items (field number)	Weight (g)	Code No.	Items (field number)	Weight (g)
MBJ20105	CFWN 10x (20)	50	MBJ22100	CFWN 10xCM (20) with crosshair reticle	50
MBJ20150	CFWN 15x (14)	50	MXA23010	Adapter for CFN Filar Micrometer	40
MBJ21100	CFWN 10xM (20) with Photomask	50			

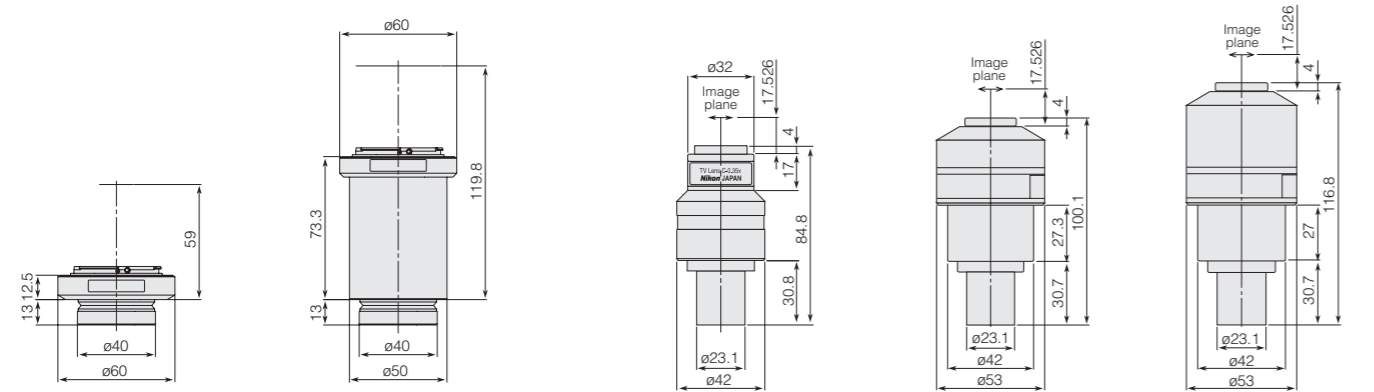


# CCTV Camera Adapters

C-mount, ENG-mount, and F mount camera adapters are available.



\*limited stock  
**ENG-mount TV Adapter** MQD12013 / 200 g  
**C-mount TV Adapter** MQD12012 / 200 g  
 \*limited stock  
**1X Relay Lens** MQD12011 / 100 g  
**Relay Lens 1x1** MQD12014 / 100 g  
**C-mount TV Adapter A** MQD42005/180g  
**C-0.7x DXM Relay Lens** MQD42075 / 155 g  
**C-0.55x DS Relay Lens** MQD42056 / 300 g  
 ENG-mount TV Adapter and C-Mount TV Adapter are used in conjunction with 1x Relay Lens.  
 1x Relay Lens is not necessary.  
 For DS-Fi3 series.



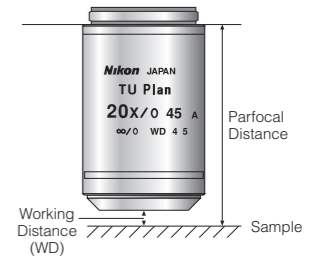
**DS-F F-mount Adapter** MQD43000 / 165 g  
**DS-F2.5 F-mount Adapter** MQD43020 / 165 g  
**C-mount Adapter 0.35x** MQD51045 / 300 g  
**C-mount Adapter 0.45x** MQD42045 / 620 g  
**C-mount Adapter 0.6x** MQD42066 / 650 g  
 C-mount adapters feature a built-in reduction relay lens, enabling areas equivalent to those seen through the eyepiece to be viewed on the monitor.  
 Adapters for 1/3-inch (0.35x), 1/2-inch (0.45x), and 2/3-inch (0.6x) CCD cameras are available.

Unit: mm

# Glossary

## Working Distance (WD) and Parfocal Distance

Working distance is the distance between the top lens of the objective and the surface of the sample (or the cover glass) when in focus. The distance between the objective's shoulder and the sample (or the cover glass) when in focus is referred to as parfocal distance. Nikon's CF infinity objectives have a parfocal distance of 45 mm, while the CF160-2 / CF160 objectives feature a parfocal distance of 60 mm.

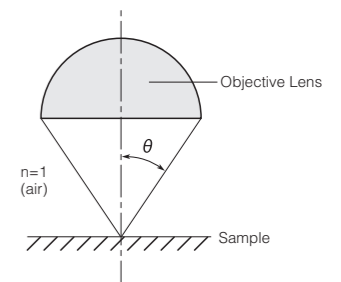


## Numerical aperture (NA)

Numerical aperture is generally indicated by the equation below.

Where,  $NA = n \times \sin \theta$   
 $n$  = Refractivity of the substance existing between the sample and the objective. (n=1 for air)  
 $\sin \theta$  = Angle that is formed by the optical axis and the light ray that passes to the extreme periphery of the objective lens.

Numerical aperture is the most important factor in judging the objective's resolving power, brightness, and depth of focus.



## Resolving Power

The closest proximity of two objects that can be seen as two distinct regions of the image. Resolving power is generally indicated by the equation below, where the larger the NA the greater the resolving power.

$$\text{Resolving Power} = 0.61 \times \frac{\lambda}{NA}$$

Where,  
 $\lambda$  = Light source's wavelength (generally 0.55  $\mu\text{m}$ )  
 NA = Numerical aperture of objective

## Depth of Focus (When observing with eyepieces)

The range in front of and behind the target plane of the sample, within which the observed structure can be sharply focused. The accommodation power of the human eye varies from person to person, so does depth of focus. Depth of focus is indicated by the equation below.

$$\text{Depth of focus} = \frac{n \times \lambda}{2 \times (NA)^2} + \frac{n}{7 \times NA \times M} \times 1000$$

$\lambda$  = Light source's wavelength (generally 0.55  $\mu\text{m}$ )  
 NA = Numerical aperture of objective  
 M = Total magnification  
 $n$  = Refractivity of the substance existing between the sample and the objective. (n=1 for air)

## Pupil Diameter

The pupil diameter of the objective lens is expressed by the following equation:

$$\text{Pupil diameter} = 2 \times f \times NA$$

$f$  = Focal distance of objective lens  
 NA = Numerical aperture of objective

Refer to this brochure for the values of f and NA for each objective lens. In addition.

## Total Magnification

### When viewed through eyepieces

Eyepiece observation magnification (M) = objective's magnification  $\times$  eyepieces magnification

### When viewed on monitors

Monitor observation magnification = objective's magnification  $\times$  TV adapter magnification  $\times$  monitor magnification

Monitor magnification varies depending on the imaging device size of the TV camera used and the monitor size. For information, see the table below.

### Imaging device size

Type	Diagonal length	Longer side	Shorter side
1/3-inch	6.0 mm	4.8 mm	3.6 mm
1/2-inch	8.0 mm	6.4 mm	4.8 mm
2/3-inch	11.0 mm	8.8 mm	6.6 mm

### Monitor magnification

Imaging device size	Monitor Size		
	9-inch	14-inch	20-inch
1/3-inch	38.1x	59.2x	84.6x
1/2-inch	28.6x	44.4x	63.5x
2/3-inch	20.8x	32.3x	46.2x

Specifications and equipment are subject to change without any notice or obligation on the part of the manufacturer. April 2024 ©2006-2024 NIKON CORPORATION  
N.B. Export of the products\* in this brochure is controlled under the Japanese Foreign Exchange and Foreign Trade Law. Appropriate export procedures shall be required in case of export from Japan.  
\*Products: Hardware and its technical information (including software)

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



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