INDUSTRIAL LENSES
Rayfact

INDUSTRIAL LENSES

Product Features

· Product lineup centers on variable magnification lenses with minimal performance variation
· Compatible with high-resolution, large line sensors and area sensors (maximum image circle: φ86.4 mm)
· Uniform optical performance from the center to the periphery of the lens
· Optical system that delivers higher performance at maximum aperture
· Equipped with floating ring lock screw and aperture ring lock screw for stable image capture

Rayfact high-performance industrial camera lenses incorporating Nikon's proprietary optical design.

Rayfact lenses feature a design optimized for machine vision applications, making the lenses ideal for inspections in a wide range of fields, including optical sheets, films, wafers, and substrates.

Drawing on its expertise gained through the development of a diverse range of optical products, Nikon strives to maintain and improve quality to meet market expectations.

In addition, Nikon meets procurement standards aimed at realizing a sustainable society and supports industrial innovation.

Nikon Quality

Nikon has established an integrated production system built to its own standards encompassing all aspects ranging from materials manufacturing to lens processing, assembly, adjustment, and quality control. This makes it possible for Nikon to offer lenses that meet the ever-diversifying needs of industry.
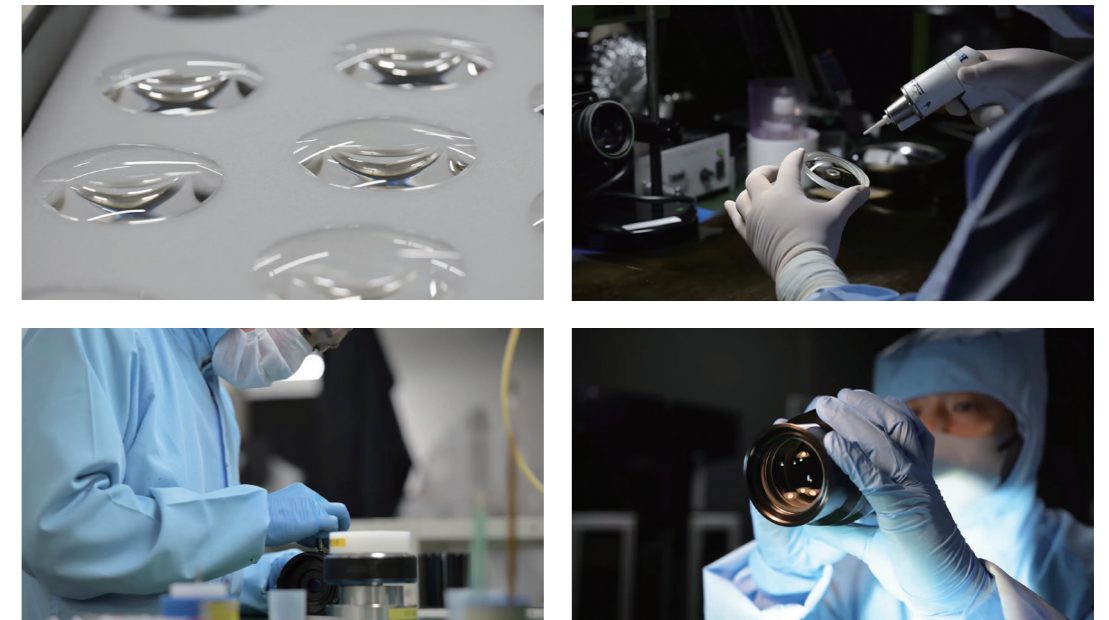
Product Lineup

Rayfact RF Variable Magnification Series

Rayfact flagship model High-performance, high-magnification, variable magnification lenses with floating function

Rayfact RF Fixed Magnification Series

High-performance, high-magnification, fixed magnification lenses

Rayfact TC Series

High-magnification telecentric lenses designed for high-resolution line sensor cameras

Rayfact VW Series

Low-magnification fixed magnification lenses designed for high-resolution line sensor cameras

Rayfact VF Series

Medium-sized lenses compatible with both variable and fixed magnification

Rayfact XG Series

Low-magnification fixed magnification lenses designed for large line sensors

Rayfact MJ Series

Low-magnification variable magnification lenses designed for large line sensors

Rayfact NR Series

High-durability lenses maintaining compatibility with AI Nikkor 35mm f/1.4S lens

Rayfact IL Series

Lenses with improved chromatic aberration correction and other performance while maintaining compatibility with EL-Nikkor 50mm F2.8N and 63mm F2.8N lenses
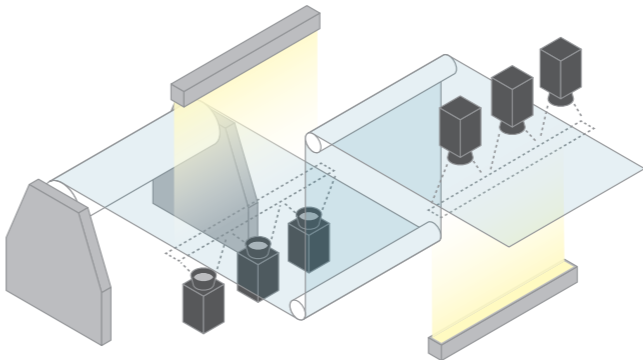
Rayfact UV Series

Lenses designed specifically for photographing in ultraviolet light
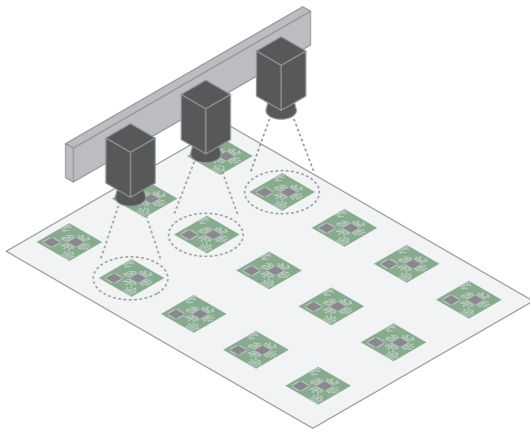
Rayfact Case Studies

Optical film inspection equipment

Wide-field, high-speed inspections of plain sheets moving continuously in roll-to-roll systems using large line sensors.

Printed circuit board inspection equipment

High-resolution, wide-field inspections of pattern work such as increasingly miniaturized wafers and substrates.

Applications

Used for flat minute defect inspections from raw materials to final products in manufacturing processes of advanced components that support next-generation technology.
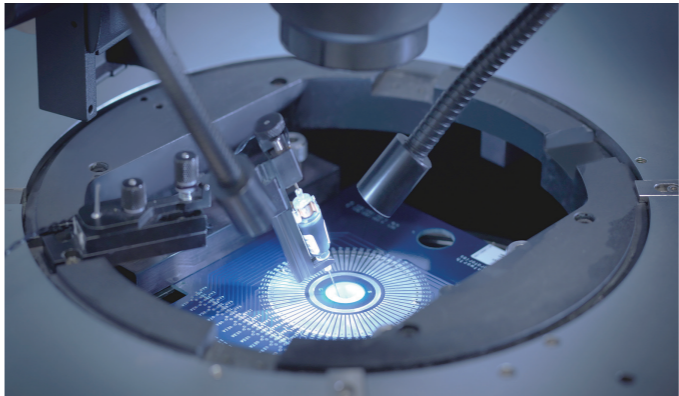
Semiconductor package substrates

Printed circuit boards

Flat panel display substrates

Optical films, sheets, and printed materials

Rayfact RF
Variable Magnification Series

Rayfact RF3-6x
BA01941

Magnification scale	Image circle	F Number
-1x – -6x	Φ82mm	F1.8
	Φ86.4mm	F2.5
		F2.8

Features

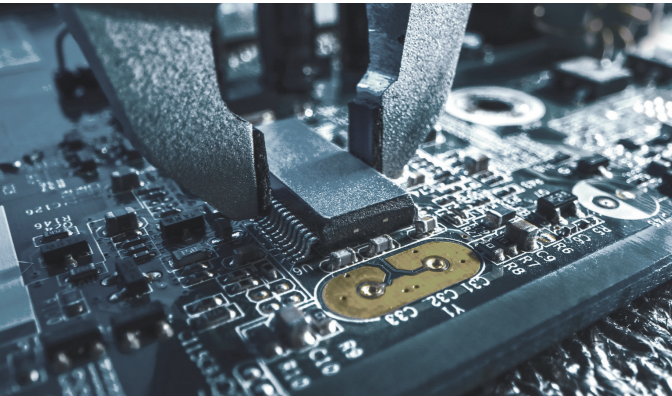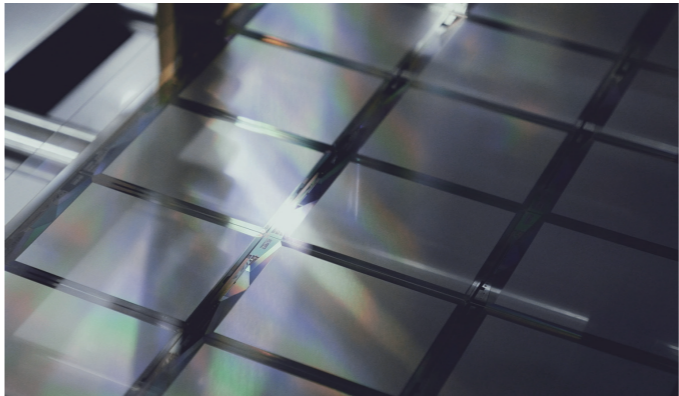· Optical design with floating mechanism to minimize performance variations across the variable magnification range
· Compatible with high-resolution large line sensor cameras (3.5µm × 23K, 5µm × 16K)
· Optimized optical system prisms designed for incident illumination on the object side
· Equipped with a rotating mechanism to align the optimal performance area with line sensors
· Optional adapter barrels available to support different camera mounts

Applications

· Defect inspections in flat panel display (FPD) manufacturing processes
· Microscopic pattern inspections of semiconductor wafers and advanced substrate RDLs (Redistribution Layers)
· Defect inspections of high-performance materials and electronic components
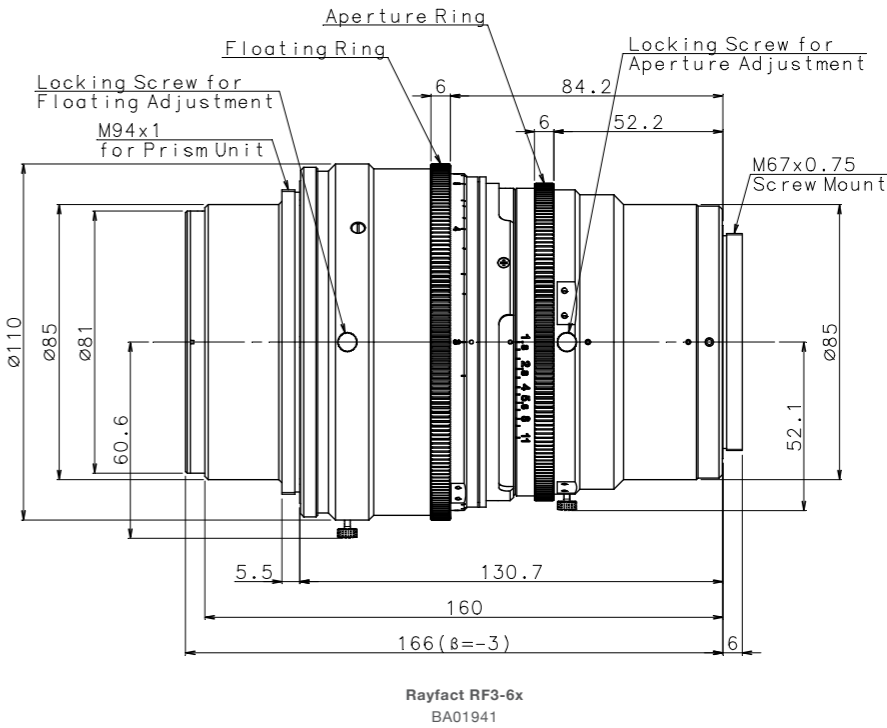
Main Specifications

Product	Rayfact RF3-6x
Model	BA01941
Focal length [mm]	108.1(-3x)
Magnification range	-3x – -6x
F Number (∞)	F1.8
Wavelength range [nm]	400 – 700
Image circle [mm]	Φ82
Mount size[3]	M67(P=0.75)
Diameter/length [mm][1]	Φ110 × 166 – 160 (from mount datum face)
Weight [g]	Approximately 2,500

Optical Specifications

Magnification	-3x	-3.5x	-4x	-4.5x	-5x	-5.5x	-6x
NA				≥0.2			
Object-to-image distance [mm]	582.3	628.6	676.5	725.3	774.7	824.6	875.0
Working distance [mm]	83.5	78.5	74.8	72.0	69.7	67.9	65.7
Flange-to-image distance [mm]	332.8	385.9	438.8	491.6	544.2	596.7	649.3
Distortion [%][2]	+0.1	+0.1	+0.1	+0.1	+0.0	+0.0	+0.0
Relative illumination [%][2]	91.6	95.1	97.3	98.5	98.9	99.1	99.2

*1: Dimensions excluding protrusions such as lock screws.
*2: Value at maximum image height (Y'= 41 mm) and F1.8.
*3: To attach to a camera, use the appropriate extension barrel and camera mount parts that fit the camera mount.

Rayfact RF3-6x Prism Type
BA01951

Rayfact RF2-5x
L-OVM50167MN
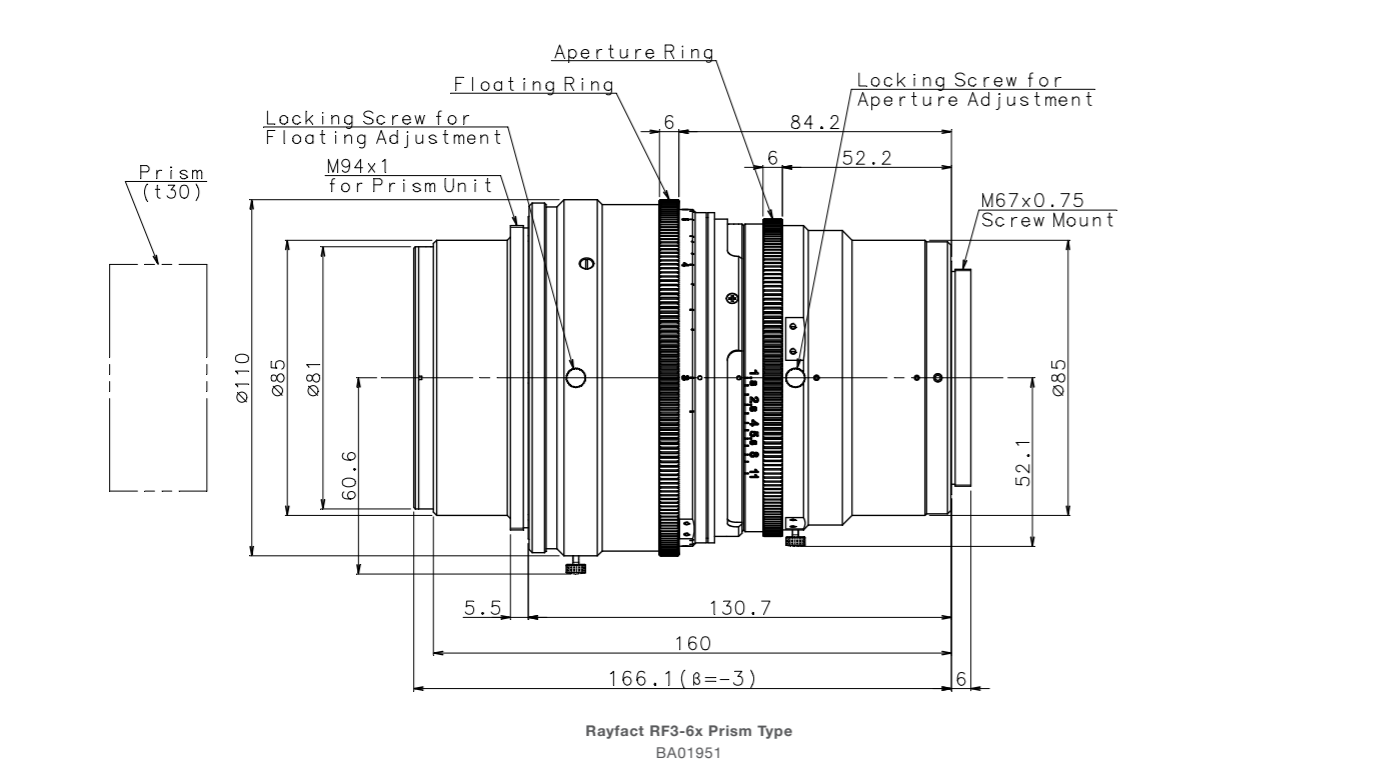
Main Specifications

Product	Rayfact RF3-6x Prism Type
Model	BA01951
Focal length [mm]	108.1 (-3x)
Magnification range	-3x – -6x
F Number (∞)	F1.8
Wavelength range [nm]	400 – 700
Image circle [mm]	Φ82
Mount size[3]	M67(P=0.75)
Diameter/length [mm][1]	Φ110 × 166.1 – 160 (from mount datum face)
Weight [g]	Approximately 2,450

Optical Specifications

Magnification	-3x	-3.5x	-4x	-4.5x	-5x	-5.5x	-6x
NA				≧0.2			
Object-to-image distance [mm]	593.3	640.1	688.3	737.5	787.3	837.5	888.3
Working distance [mm]	93.3	88.3	84.6	81.7	79.4	77.6	75.5
Flange-to-image distance [mm]	333.9	387.4	440.7	493.9	546.9	599.8	652.7
Distortion [%][2]	+0.1	+0.1	+0.1	+0.0	+0.0	+0.0	+0.0
Relative illumination [%][2]	91.7	95.2	97.4	98.5	98.9	99.0	99.2

*1: Dimensions excluding protrusions such as lock screws.
*2: Value at maximum image height (Y'= 41 mm) and F1.8.
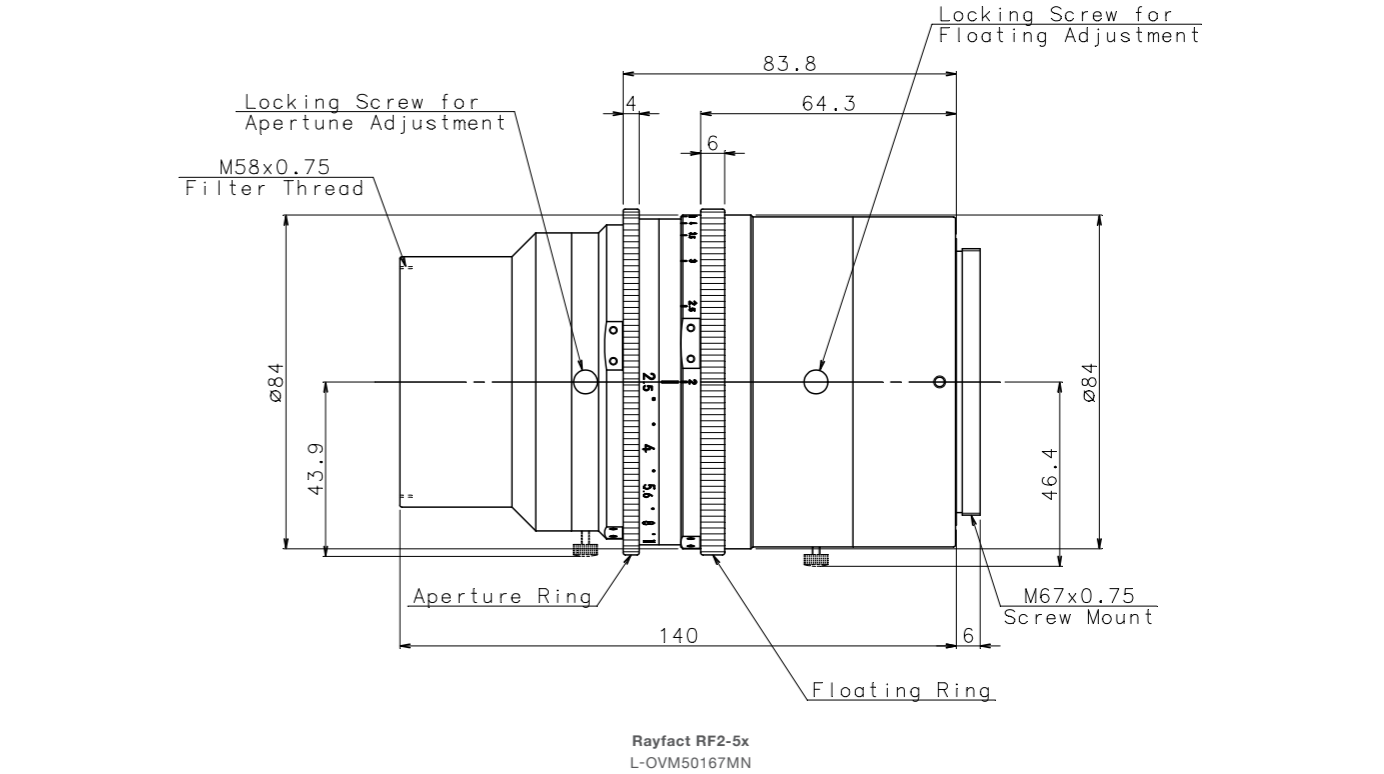*3: To attach to a camera, use the appropriate extension barrel and camera mount parts that fit the camera mount.

Main Specifications

Product	Rayfact RF2-5x
Model	L-OVM50167MN
Focal length [mm]	116.2(-2x)
Magnification range	-2x – -5x
F Number (∞)	F2.5
Wavelength range [nm]	400 – 700
Image circle [mm]	Φ86.4
Mount size[3]	M67(P=0.75)
Attachment size	M58(P=0.75)
Diameter/length [mm][1]	Φ84 × 140 (from mount datum face)
Weight [g]	Approximately 1,350

Optical Specifications

Magnification	-2x	-2.5x	-3x	-3.5x	-4x	-4.5x	-5x	(-5.2x)[4]
NA				≧0.1				
Object-to-image distance [mm]	503.6	550.4	601.0	653.8	707.9	763.0	818.7	(841.1)
Working distance [mm]	114.7	102.8	94.9	89.2	84.9	81.6	79.0	(78.1)
Flange-to-image distance [mm]	248.8	307.5	366.1	424.6	483.0	541.4	599.8	(623.1)
Distortion [%][2]	+0.1	+0.0	-0.0	-0.0	-0.0	-0.0	-0.0	(-0.0)
Relative illumination [%][2]	90.5	95.4	98.1	99.2	99.5	99.6	99.7	(99.7)

*1: Dimensions excluding protrusions such as lock screws.
*2: Value at maximum image height (Y'= 43.2 mm) and F2.5.
*3: To attach to a camera, use the appropriate extension barrel and camera mount parts that fit the camera mount.
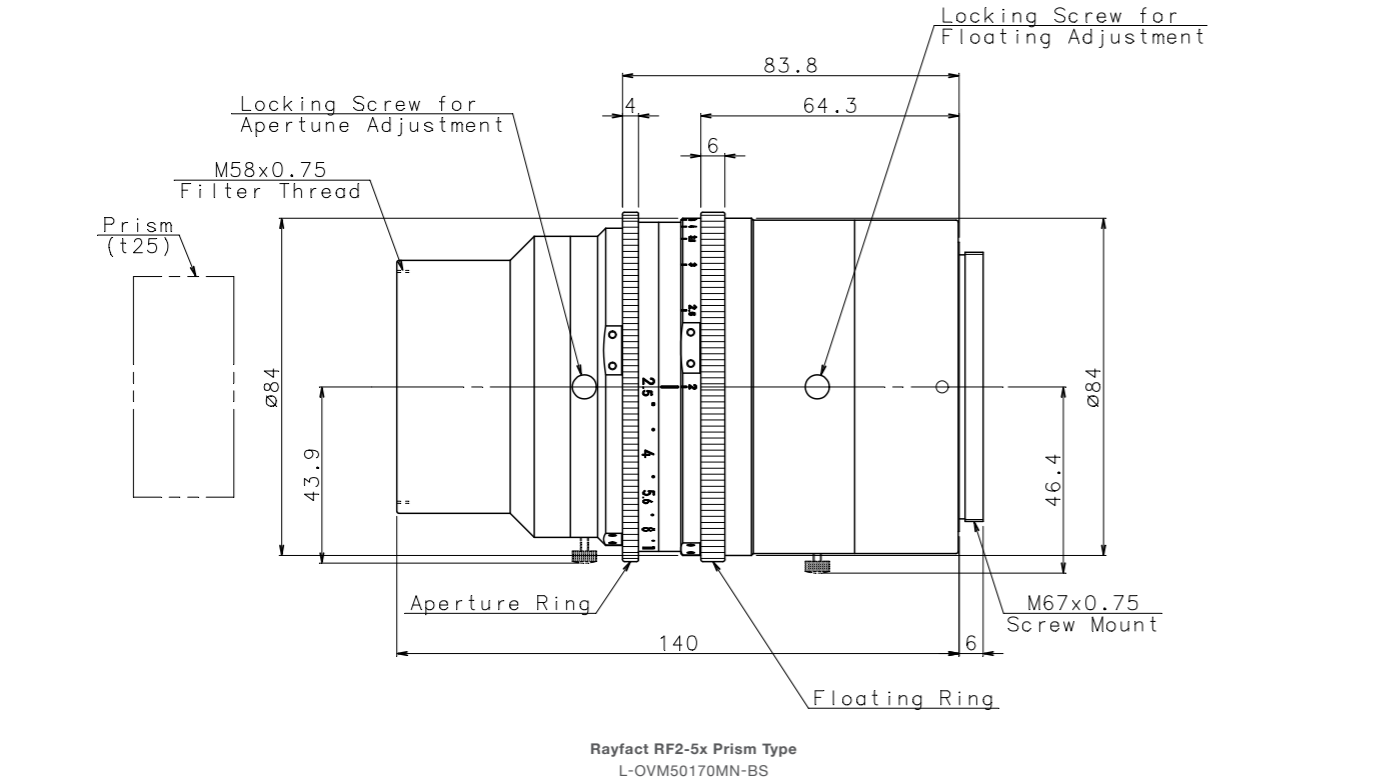*4: -5.2x is the value when the entire lens is extended with the reference set to -5x

Rayfact RF2-5x Prism Type
L-OVM50170MN-BS

Rayfact RF1-2x
L-OVM20117MN

Main Specifications

Product	Rayfact RF2-5x Prism Type
Model	L-OVM50170MN-BS
Focal length [mm]	117.3(-2x)
Magnification range	-2x – -5x
F Number (∞)	F2.5
Wavelength range [nm]	400 – 700
Image circle [mm]	Φ86.4
Mount size[3]	M67(P=0.75)
Attachment size	M58(P=0.75)
Diameter/length [mm][1]	Φ84 × 140 (from mount datum face)
Weight [g]	Approximately 1,350

Optical Specifications

Magnification	-2x	-2.5x	-3x	-3.5x	-4x	-4.5x	-5x	(-5.2x)[4]
NA	≧0.1							
Object-to-image distance [mm]	513.7	561.0	612.1	665.4	720.1	775.7	831.9	(854.5)
Working distance [mm]	119.8	107.8	99.8	94.0	89.7	86.4	83.7	(82.8)
Flange-to-image distance [mm]	253.9	313.2	372.3	431.4	490.3	549.3	608.3	(631.8)
Distortion [%][2]	+0.1	-0.0	-0.0	-0.1	-0.1	-0.1	-0.1	(-0.0)
Relative illumination [%][2]	88.2	93.3	96.2	97.5	98.1	98.6	99.0	(99.1)

*1: Dimensions excluding protrusions such as lock screws.
*2: Value at maximum image height (Y'= 43.2 mm) and F2.5.
*3: To attach to a camera, use the appropriate extension barrel and camera mount parts that fit the camera mount.
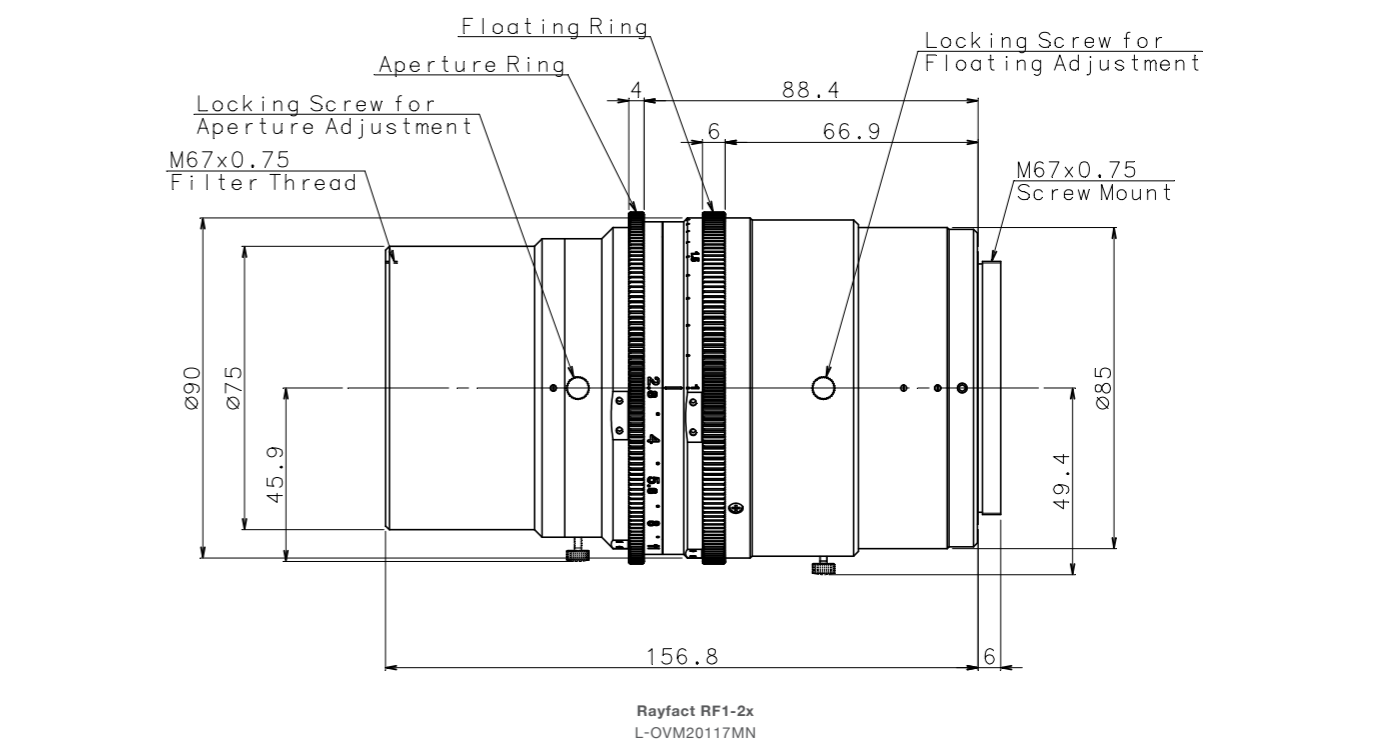*4: -5.2x is the value when the entire lens is extended with the reference set to -5x.

Main Specifications

Product	Rayfact RF1-2x
Model	L-OVM20117MN
Focal length [mm]	104.5(-1x)
Magnification range	-1x – -2x
F Number (∞)	F2.8
Wavelength range [nm]	400 – 700
Image circle [mm]	Φ86.4
Mount size[3]	M67(P=0.75)
Attachment size	M67(P=0.75)
Diameter/length [mm][1]	Φ90 × 156.8 (from mount datum face)
Weight [g]	Approximately 1,750

Optical Specifications

Magnification	-1x	-1.2x	-1.4x	-1.6x	-1.8x	-2x
NA	≧0.09					
Object-to-image distance [mm]	434.9	439.8	449.6	462.5	477.6	494.2
Working distance [mm]	172.0	154.3	141.5	131.7	124.0	117.7
Flange-to-image distance [mm]	106.2	128.7	151.3	174.0	196.8	219.7
Distortion [%][2]	+0.2	+0.1	+0.1	+0.0	-0.0	-0.0
Relative illumination [%][2]	82.9	87.4	90.6	92.8	94.1	94.8

*1: Dimensions excluding protrusions such as lock screws.
*2: Value at maximum image height (Y'= 43.2 mm) and F2.8.
*3: To attach to a camera, use the appropriate extension barrel and camera mount parts that fit the camera mount.

Rayfact RF1-2x Prism Type
L-OVM20118MN-BS

Main Specifications

Product	Rayfact RF1-2x Prism Type
Model	L-OVM20118MN-BS
Focal length [mm]	105.1(-1x)
Magnification range	-1x – -2x
F Number (∞)	F2.8
Wavelength range [nm]	400 – 700
Image circle [mm]	Φ86.4
Mount size[3]	M67(P=0.75)
Attachment size	M67(P=0.75)
Diameter/length [mm][1]	Φ90 × 156.8 (from mount datum face)
Weight [g]	Approximately 1,750

Optical Specifications

Magnification	-1x	-1.2x	-1.4x	-1.6x	-1.8x	-2x
NA			≧0.09			
Object-to-image distance [mm]	443.8	448.7	458.6	464.8	486.7	503.4
Working distance [mm]	179.8	162.1	149.2	139.3	131.6	125.3
Flange-to-image distance [mm]	107.3	129.9	152.6	175.4	198.3	221.4
Distortion [%][2]	+0.2	+0.1	+0.0	+0.0	-0.0	-0.0
Relative illumination [%][2]	82.2	86.8	90.1	92.4	93.8	94.5

*1: Dimensions excluding protrusions such as lock screws.
*2: Value at maximum image height (Y'= 43.2 mm) and F2.8.
*3: To attach to a camera, use the appropriate extension barrel and camera mount parts that fit the camera mount.

Rayfact RF
Fixed Magnification Series

Magnification scale	Image circle	F Number
-1.4x – -5x	Φ86.4mm	F2.8
		F2.5

Features

· 5 models of fixed magnification types available (-1.4x, -1.75x, -2.5x, -3.5x, -5x) in both standard and prism types
· Custom fixed magnification options are available beyond the standard lineup.
· Compatible with high-resolution large line sensor cameras (3.5μm × 23K, 5μm × 16K)
· Optimized optical system prisms designed for incident illumination on the object side
· Optional adapter barrels available to support different camera mounts

Applications

· Defect inspections in flat panel display (FPD) manufacturing processes
· Microscopic pattern inspections of semiconductor wafers and advanced substrate RDLs (Redistribution Layers)
· Defect inspections of high-performance materials and electronic components

Rayfact RF1.4x
L-OFM14105MN

Rayfact RF1.75x
L-OFM175112MN

Rayfact RF1.4x Prism Type
L-OFM14105MN-BS

Rayfact RF1.75x Prism Type
L-OFM175113MN-BS

Rayfact RF2.5x
L-OFM25143MN

Rayfact RF3.5x
L-OFM35156MN

Rayfact RF2.5x Prism Type
L-OFM25144MN-BS

Rayfact RF3.5x Prism Type
L-OFM35157MN-BS
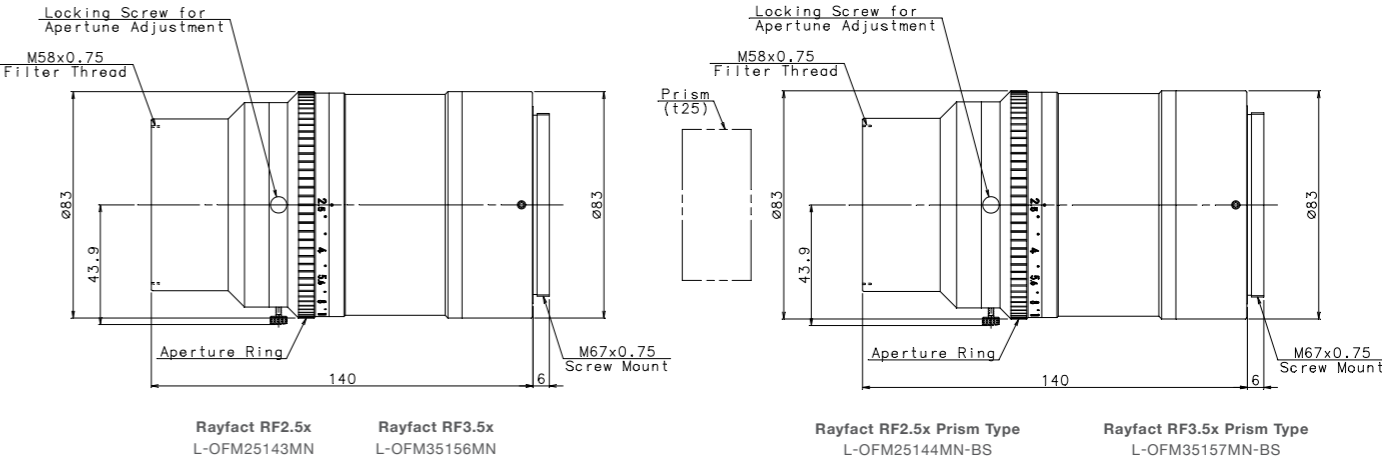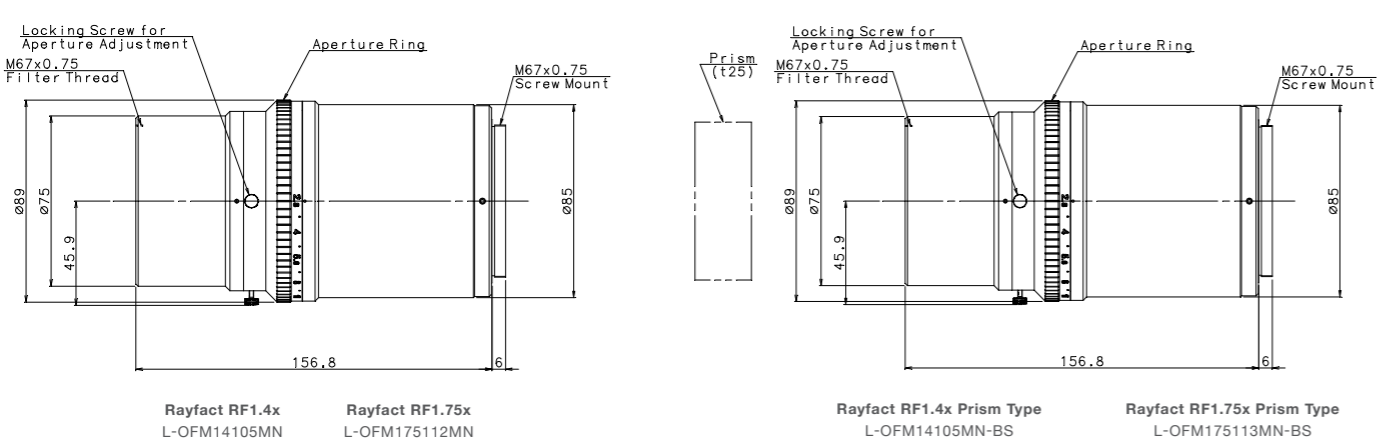
Main Specifications

Product	Rayfact RF1.4x	Rayfact RF1.4x Prism Type	Rayfact RF1.75x	Rayfact RF1.75x Prism Type
Model	L-OFM14105MN	L-OFM14105MN-BS	L-OFM175112MN	L-OFM175113MN-BS
Focal length [mm]	105.9	106.4	106.9	106.9
Magnification scale	-1.4x		-1.75x	
F Number (∞)	F2.8			
Wavelength range [nm]	400 – 700			
Image circle [mm]	Φ86.4			
Mount size[3]	M67(P=0.75)			
Attachment size	M67(P=0.75)			
Diameter/length [mm][1]	Φ89 × 156.8 (from mount datum face)			
Weight [g]	Approximately 1,450			

Optical Specifications

NA	≥0.1			
Object-to-image distance [mm]	449.6	458.6	473.7	482.8
Working distance [mm]	141.5	149.2	125.8	133.4
Flange-to-image distance [mm]	151.3	152.6	191.1	192.6
Distortion [%][2]	+0.0	+0.0	-0.0	-0.0
Relative illumination [%][2]	90.6	90.1	93.8	93.8

*1: Dimensions excluding protrusions such as lock screws.
*2: Value at maximum image height (Y'= 43.2 mm) and F2.8.
*3: To attach to a camera, use the appropriate extension barrel and camera mount parts that fit the camera mount.

Main Specifications

Product	Rayfact RF2.5x	Rayfact RF2.5x Prism Type	Rayfact RF3.5x	Rayfact RF3.5x Prism Type
Model	L-OFM25143MN	L-OFM25144MN-BS	L-OFM35156MN	L-OFM35157MN-BS
Focal length [mm]	116.3	117.4	116.3	117.5
Magnification scale	-2.5x		-3.5x	
F Number (∞)	F2.5			
Wavelength range [nm]	400 – 700			
Image circle [mm]	Φ86.4			
Mount size[3]	M67(P=0.75)			
Attachment size	M58(P=0.75)			
Diameter/length [mm][1]	Φ83 × 140 (from mount datum face)			
Weight [g]	Approximately 1,200			

Optical Specifications

NA	≥0.1			
Object-to-image distance [mm]	550.4	561.0	653.8	655.4
Working distance [mm]	102.8	107.8	89.2	94.0
Flange-to-image distance [mm]	307.5	313.2	424.6	431.4
Distortion [%][2]	+0.0	-0.0	-0.0	-0.1
Relative illumination [%][2]	95.4	93.3	99.2	97.5

*1: Dimensions excluding protrusions such as lock screws.
*2: Value at maximum image height (Y'= 43.2 mm) and F2.5.
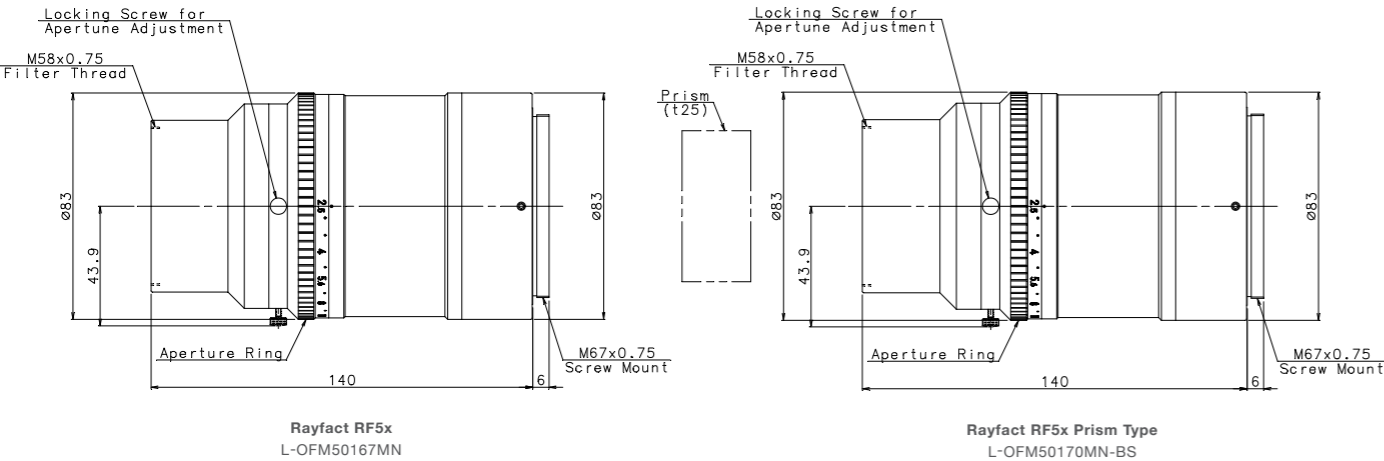*3: To attach to a camera, use the appropriate extension barrel and camera mount parts that fit the camera mount.

Rayfact RF5x
L-OFM50167MN

Rayfact RF5x Prism Type
L-OFM50170MN-BS

Rayfact TC Series

Magnification scale	Image circle
-5x − -10x	Φ82mm
	Φ64mm

Features

· Double telecentric optical system on both the object side and image side
· Compatible with high-resolution large line sensor cameras (max. 5μm × 16K, TC5-10x)
· Straight barrel unit, Köhler illumination unit (TC5-10x), and coaxial illumination unit (TC5.2x) available
· TC5-10x variable magnification lens can be customized for fixed magnification
· Optional adapter mounts available to support different camera mounts

Applications

· Defect inspections in next-generation FPD manufacturing processes
· Microscopic pattern inspections of semiconductor wafers and next-generation substrate RDLs (Redistribution Layers)
· Visual inspection of materials used in next-generation communications

Main Specifications

Product	Rayfact RF5x	Rayfact RF5x Prism Type
Model	L-OFM50167MN	L-OFM50170MN-BS
Focal length [mm]	116.4	117.5
Magnification scale	-5x	
F Number (∞)	F2.5	
Wavelength range [nm]	400 − 700	
Image circle [mm]	Φ86.4	
Mount size[3]	M67(P=0.75)	
Attachment size	M58(P=0.75)	
Diameter/length [mm][1]	Φ83 × 140 (from mount datum face)	
Weight [g]	Approximately 1,200	

Optical Specifications

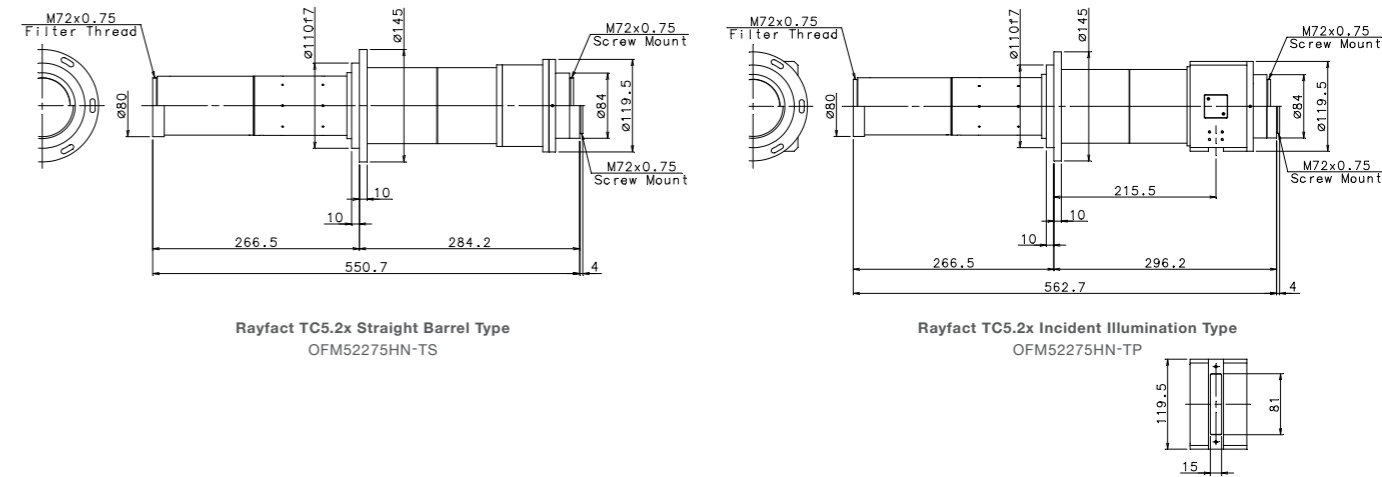| NA	≧0.1	
Object-to-image distance [mm]	818.7	831.9
Working distance [mm]	79.0	83.6
Flange-to-image distance [mm]	599.8	608.3
Distortion [%][2]	-0.0	-0.1
Relative illumination [%][2]	99.7	99.0

*1: Dimensions excluding protrusions such as lock screws.
*2: Value at maximum image height (Y'= 43.2 mm) and F2.5.
*3: To attach to a camera, use the appropriate extension barrel and camera mount parts that fit the camera mount.

Rayfact TC5-10x Straight Barrel Type

Rayfact TC5-10x Köhler Illumination Type

Rayfact TC5.2x Straight Barrel Type
OFM52275HN-TS

Rayfact TC5.2x Incident Illumination Type
OFM52275HN-TP

Main Specifications

Product	Rayfact TC5-10x Straight Barrel Type (manufactured to order)	Rayfact TC5-10x Köhler Illumination Type (manufactured to order)
Focal length [mm]	Telecentric lenses	
Magnification range	-5x – -10x	
Wavelength range [nm]	400 – 700	
Image circle [mm]	Φ82	
Mount size	M95(P=1)	
Attachment size	M67(P=0.75)	
Diameter/length [mm][*1]	Φ145 × 485.1 (from mount datum face)	213 × 120 × 502.2 (from mount datum face)
Weight [g]	Approximately 5,700	Approximately 7,700

Optical Specifications (Straight Barrel Type)

Magnification	-5x	-6x	-7x	-8x	-9x	-10x
NA	≧0.2					
Object-to-image distance [mm]	509.1	509.5	510.6	511.8	513.0	514.2
Working distance [mm]	14.6	15.1	16.1	17.3	18.5	19.7
Flange-to-image distance [mm]	9.4					
Distortion [%][*2]	+0.0	+0.0	+0.0	+0.1	+0.1	+0.1
Relative illumination [%][*2]	102.3	101.3	100.8	100.4	100.2	99.9

Optical Specifications (Köhler Illumination Type)

Magnification	-5x	-6x	-7x	-8x	-9x	-10x
NA	≧0.2					
Object-to-image distance [mm]	526.2	526.6	527.6	528.8	530.1	531.3
Working distance [mm]	14.6	15.1	16.1	17.3	18.5	19.7
Flange-to-image distance [mm]	9.4					
Distortion [%][*2]	+0.0	-0.0	+0.0	+0.1	+0.1	+0.1
Relative illumination [%][*2]	102.3	101.3	100.8	100.4	100.2	99.9

*1: Dimensions excluding protrusions such as lock screws.
*2: Value at maximum image height (Y'= 41 mm) and maximum aperture.

Main Specifications

Product	Rayfact TC5.2x Straight Barrel Type	Rayfact TC5.2x Incident Illumination Type
Model	OFM52275HN-TS	OFM52275HN-TP
Focal length [mm]	Telecentric lenses	
Magnification scale	-5.2x	
Wavelength range [nm]	510 – 590	
Image circle [mm]	Φ64	
Mount size	M72(P=0.75)	
Attachment size	M72(P=0.75)	
Diameter/length [mm][*1]	Φ145 × 550.7 (from mount datum face)	Φ145 (or 119.5 for certain models) × 562.7 (from mount datum face)
Weight [g]	Approximately 4,400	Approximately 5,900

Optical Specifications

NA	≧0.2	
Object-to-image distance [mm]	612.1	624.0
Working distance [mm]	54.8	
Flange-to-image distance [mm]	6.56	
Distortion [%][*2]	-0.0	+0.0
Relative illumination [%][*2]	101.0	

*1: Dimensions excluding protrusions such as lock screws.
*2: Value at maximum image height (Y'= 32 mm) and maximum aperture.

Rayfact VW0.14x
L-OFM014012MN

Rayfact VW0.25x
L-OFM025020MN

Rayfact VW0.35x
L-OFM035026MN

Rayfact VW Series

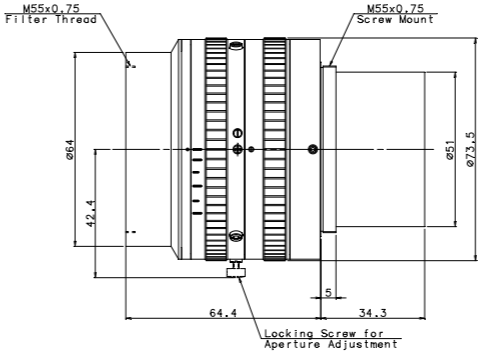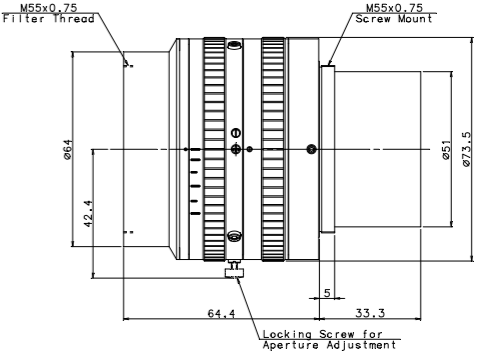| Magnification scale	Image circle	F Number
-0.14x − -0.35x	Φ62mm	F4.9

Features

· Compatible with high-resolution large line sensor cameras (3.5μm × 16K, 7μm × 8K)
· Excellent chromatic aberration correction reducing color fringing
· High performance and uniformity from the center to the periphery
· Equipped with a rotating mechanism to align the optimal performance area with line sensors
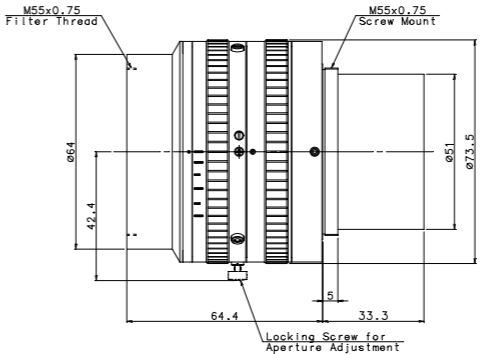· Optional adapter barrels available to support different camera mounts

Applications

· Defect and unevenness inspections of flat panel display (FPD) substrates
· Final visual inspection of printed circuit boards (PCBs)
· Defect inspections of high-performance films and sheets

Main Specifications

Product	Rayfact VW0.14x	Rayfact VW0.25x	Rayfact VW0.35x
Model	L-OFM014012MN	L-OFM025020MN	L-OFM035026MN
Focal length [mm]	125.5	124.9	125.2
Magnification scale	-0.14x	-0.25x	-0.35x
F Number (∞)	F4.9		
Wavelength range [nm]	400 − 700		
Image circle [mm]	Φ62		
Mount size[3]	M55(P=0.75)		
Attachment size	M55(P=0.75)		
Diameter/length [mm][1]	Φ73.5 × 64.4 (from mount datum face)		
Weight [g]	Approximately 740		

Optical Specifications

NA	≥0.01		
Object-to-image distance [mm]	1,144.6	761.1	631.7
Working distance [mm]	960.2	562.9	419.8
Flange-to-image distance [mm]	120.0	133.9	147.5
Distortion [%][2]	+0.0	-0.1	-0.1
Relative illumination [%][2]	90.9	93.4	94.3

*1: Dimensions excluding protrusions such as lock screws.
*2: Value at maximum image height (Y'= 31 mm) and F4.9.
*3: To attach to a camera, use the appropriate extension barrel and camera mount parts that fit the camera mount.

Rayfact VF Series

Rayfact VF Variable Magnification
L-OVM30093MN

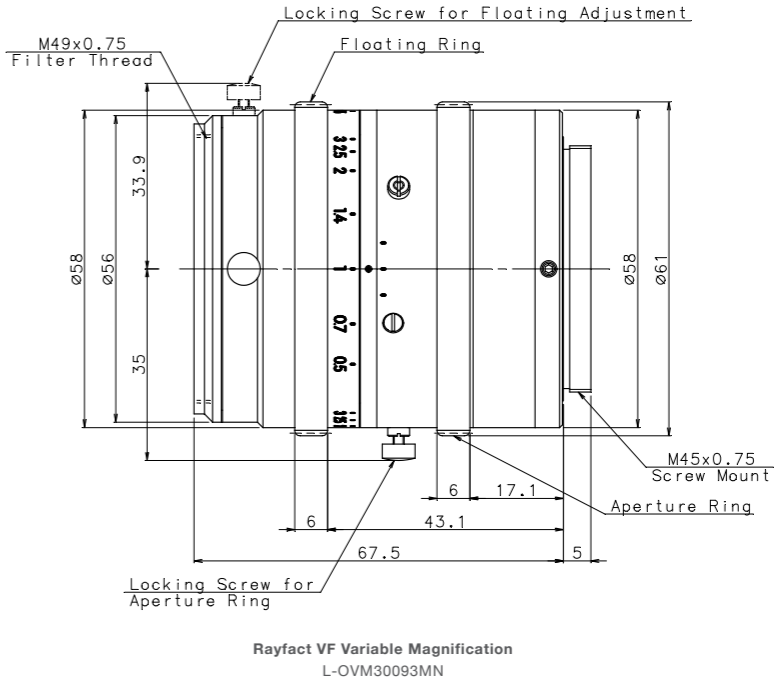| Magnification scale	Image circle	F Number
-0.5x − -3x	Φ64mm	F4
	Φ86.4mm	

Features

· Optical design with floating mechanism to minimize performance variations
  across the -0.5x to -3x variable magnification range
· 5 models of fixed magnification types available: (-1x, -1.4x, -2x, -2.5x, -3x)
· Compatible with high-resolution large line sensor cameras (7μm × 8K)
· Equipped with a rotating mechanism to align the optimal performance area with line sensors
· Optional adapter barrels available to support different camera mounts

Applications

· Defect inspections in flat panel display (FPD) manufacturing processes
· Defect inspections of printed circuit boards (PCBs) and flexible printed circuits (FPCs)
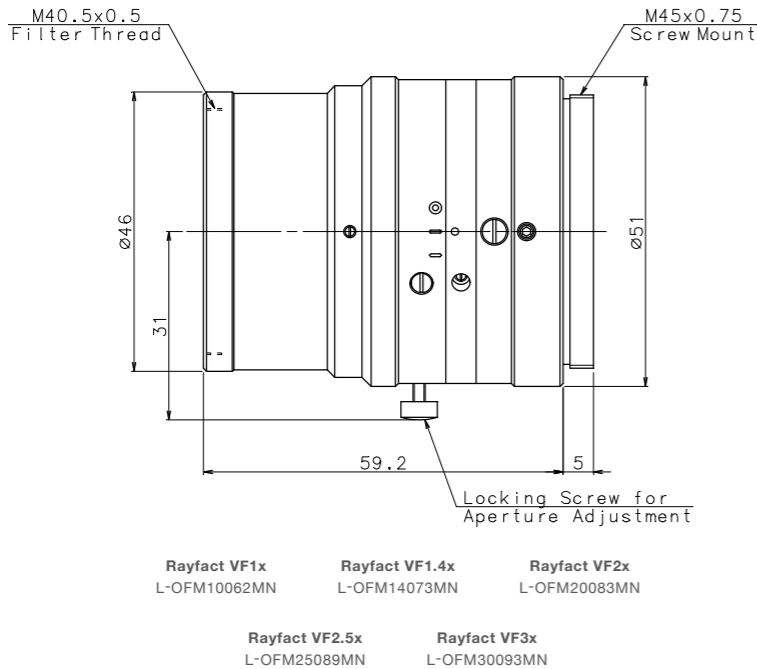· Defect inspections of high-performance films and sheets

Main Specifications

Product	Rayfact VF Variable Magnification
Model	L-OVM30093MN
Focal length [mm]	90 (nominal value)
Magnification range	-0.5x − -3x
F Number (∞)	F4
Wavelength range [nm]	400 − 700
Image circle [mm]	Φ64
Mount size[3]	M45(P=0.75)
Attachment size	M49(P=0.75)
Diameter/length [mm][1]	Φ58 × 67.5 (from mount datum face)
Weight [g]	Approximately 430

Optical Specifications

Magnification	-0.5x	-0.7x	-1x	-1.4x	-2x	-2.5x	-3x
NA				≧0.04			
Object-to-image distance [mm]	405.9	371.9	360.1	370.6	405.9	442.6	482.4
Working distance [mm]	239.6	187.2	147.8	121.5	101.6	92.4	86.3
Flange-to-image distance [mm]	98.8	117.2	144.8	181.6	236.8	282.7	328.6
Distortion [%][2]	+0.2	+0.1	+0.0	-0.0	-0.0	-0.0	-0.0
Relative illumination [%][2]	56.2	66.6	77.9	87.4	92.7	95.0	95.3

*1: Dimensions excluding protrusions such as lock screws.
*2: Value at maximum image height (Y'= 32 mm) and F4.
*3: To attach to a camera, use the appropriate extension barrel and camera mount parts that fit the camera mount.

Dimension Drawing

M40.5x0.5
Filter Thread

M45x0.75
Screw Mount

Ø46

Ø51

31

59.2

5

Locking Screw for
Aperture Adjustment

Rayfact VF1x
L-OFM10062MN

Rayfact VF1.4x
L-OFM14073MN

Rayfact VF2x
L-OFM20083MN

Rayfact VF2.5x
L-OFM25089MN

Rayfact VF3x
L-OFM30093MN

Rayfact XG Series

Magnification scale	Image circle	F Number
-0.35x − -1.4x	Φ86.4mm	F4.5

Features

· 5 models of fixed magnification types available: (-0.35x, -0.5x, -0.7x, -1x, -1.4x)
· Compatible with high-resolution large line sensor cameras (5μm × 16K)
· Good performance and uniformity from the center to the periphery
· Equipped with a rotating mechanism to align the optimal performance area with line sensors
· Optional adapter barrels available to support different camera mounts

Applications

· Defect inspections of high-performance films
· Defect inspections in flat panel display (FPD) manufacturing processes
· Defect inspections of printed materials and sheets

Main Specifications

Product	Rayfact VF1x	Rayfact VF1.4x	Rayfact VF2x	Rayfact VF2.5x	Rayfact VF3x
Model	L-OFM10062MN	L-OFM14073MN	L-OFM20083MN	L-OFM25089MN	L-OFM30093MN
Focal length [mm]	91.7	91.7	91.6	91.6	91.5
Magnification scale	-1x	-1.4x	-2x	-2.5x	-3x
F Number (∞)	F4				
Wavelength range [nm]	400 – 700				
Image circle [mm]	Φ64	Φ64	Φ86.4	Φ86.4	Φ86.4
Mount size[3]	M45(P=0.75)				
Attachment size	M40.5(P=0.5)				
Diameter/length [mm][1]	Φ51 × 59.2 (from mount datum face)				
Weight [g]	Approximately 240				

Optical Specifications

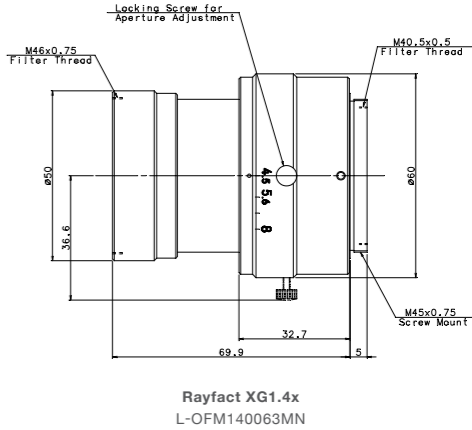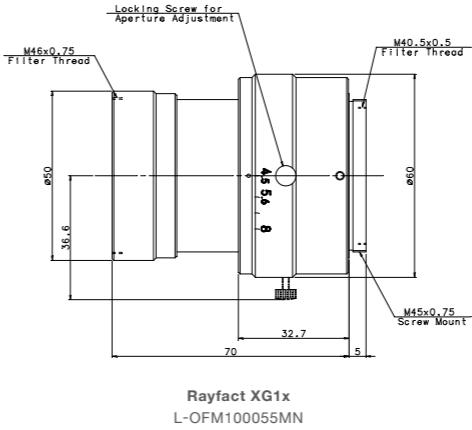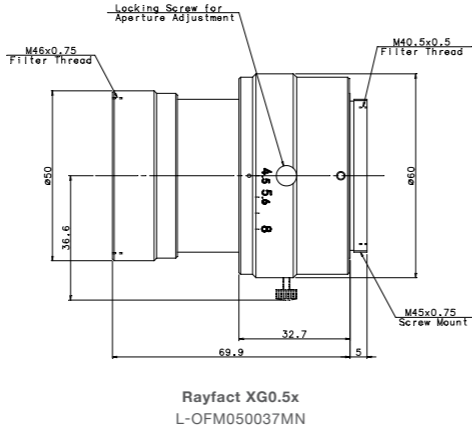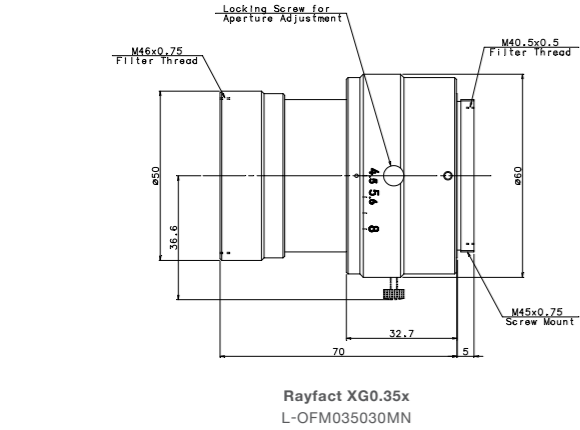| NA	≥0.06				
Object-to-image distance [mm]	360.1	370.5	405.6	442.2	481.7
Working distance [mm]	147.2	121.3	101.9	92.9	86.9
Flange-to-image distance [mm]	153.6	190.0	244.5	290.1	335.6
Distortion [%][2]	+0.0	+0.0	-0.1	-0.1	-0.1
Relative illumination [%][2]	77.9	87.4	84.9	90.1	92.8

*1: Dimensions excluding protrusions such as lock screws.
*2: Value at maximum image height (Y'= 32 mm/43.2 mm) and F4.
*3: To attach to a camera, use the appropriate extension barrel and camera mount parts that fit the camera mount.

Rayfact XG0.35x
L-OFM035030MN

Rayfact XG0.5x
L-OFM050037MN

Rayfact XG1x
L-OFM100055MN

Rayfact XG1.4x
L-OFM140063MN

Rayfact XG0.7x
L-OFM070046MN

Main Specifications

Product	Rayfact XG0.35x	Rayfact XG0.5x	Rayfact XG0.7x
Model	L-OFM035030MN	L-OFM050037MN	L-OFM070046MN
Focal length [mm]	125.3	125.4	125.5
Magnification scale	-0.35x	-0.5x	-0.7x
F Number (∞)	F4.5		
Wavelength range [nm]	400 – 700		
Image circle [mm]	Φ86.4		
Mount size[3]	M45(P=0.75)		
Attachment size	Front: M46 (P = 0.75), Rear: M40.5 (P = 0.5)		
Diameter/length [mm][1]	Φ60 × 70 (from mount datum face)	Φ60 × 69.9 (from mount datum face)	Φ60 × 70 (from mount datum face)
Weight [g]	Approximately 340		

Optical Specifications

NA	≥0.03		
Object-to-image distance [mm]	658.4	570.0	522.2
Working distance [mm]	452.3	344.7	273.0
Flange-to-image distance [mm]	136.1	155.4	179.2
Distortion [%][2]	-0.2	-0.2	+0.1
Relative illumination [%][2]	59.8	66.5	73.6

*1: Dimensions excluding protrusions such as lock screws.
*2: Value at maximum image height (Y'= 43.2 mm) and F4.5.
*3: To attach to a camera, use the appropriate extension barrel and camera mount parts that fit the camera mount.

Main Specifications

Product	Rayfact XG1x	Rayfact XG1.4x
Model	L-OFM100055MN	L-OFM140063MN
Focal length [mm]	125.7	125.9
Magnification scale	-1x	-1.4x
F Number (∞)	F4.5	
Wavelength range [nm]	400 – 700	
Image circle [mm]	Φ86.4	
Mount size[3]	M45(P=0.75)	
Attachment size	Front: M46 (P= 0.75) Rear: M40.5 (P= 0.5)	
Diameter/length [mm][1]	Φ60 × 70 (from mount datum face)	Φ60 × 69.9 (from mount datum face)
Weight [g]	Approximately 340	

Optical Specifications

NA	≥0.05	
Object-to-image distance [mm]	506.2	520.4
Working distance [mm]	219.0	182.8
Flange-to-image distance [mm]	217.2	267.7
Distortion [%][2]	+0.0	-0.0
Relative illumination [%][2]	82.2	90.0

*1: Dimensions excluding protrusions such as lock screws.
*2: Value at maximum image height (Y'= 43.2 mm) and F4.5.
*3: To attach to a camera, use the appropriate extension barrel and camera mount parts that fit the camera mount.

Rayfact MJ Series

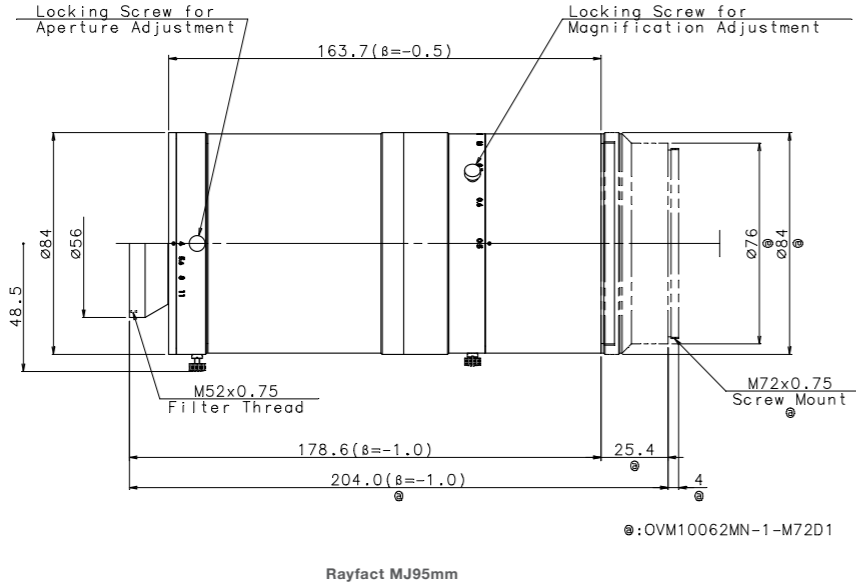| Magnification scale	Image circle	F Number
-0.05x − -1x	Φ86.4mm	F4
	Φ82mm	

Features

· Optical design with floating mechanism to minimize performance variations across the variable magnification range
· Compatible with large line sensors and area sensor cameras
· 2 models of variable magnification types available: (-0.05x - -0.5x, -0.5x - -1x)
· Equipped with aperture ring lock screw and floating ring lock screw
· Sold as a set with selectable camera mounts

Applications

· Defect inspections of high-performance films
· Defect inspections in flat panel display (FPD) manufacturing processes
· Defect inspections of printed materials and sheets

Rayfact MJ90mm

Main Specifications

Product	Rayfact MJ90mm
Model	Refer to the following table
Focal length [mm]	90(-0.1x)
Magnification range	-0.05x − -0.5x
F Number (∞)	F4
Wavelength range [nm]	400 − 700
Image circle [mm]	Φ86.4
Mount size[3]	Refer to the following table
Attachment size	M52(P=0.75)
Diameter/length [mm]	Refer to the following table
Weight [g]	Refer to the following table

Optical Specifications

Magnification	-0.05x	-0.1x	-0.2x	-0.3x	-0.4x	-0.5x
NA	≧0.006					
Object-to-image distance [mm]	1,967.3	1,069.6	634.2	496.3	432.3	397.7
Working distance [mm]	1,820.4	922.6	487.2	348.0	274.4	230.3
Flange-to-image distance [mm]	Refer to the "Camera Mount Parts List" table					
Distortion [%][2]	+0.5	+0.3	+0.1	+0.1	+0.1	+0.1
Relative illumination [%][2]	65.8	68.4	72.4	75.5	78.0	80.1

Camera Mount Parts List

Model	Camera mount (flange-to-image distance)	Diameter/length[1] (from mount datum face)	Weight
① OVM05042MN-M72D1	M72 (M.B.f 19.56 mm)	Φ84mm × 127.3mm − 147.9mm	Approximately 920 g
② OVM05042MN-M72D2	M72 (M.B.f 6.56 mm)	Φ84mm × 140.3mm − 160.9mm	Approximately 940 g
③ OVM05042MN-M72D3	M72 (M.B.f 12.0 mm)	Φ84mm × 134.9mm − 155.5mm	Approximately 930 g
④ OVM05042MN-M72N	M72 (M.B.f 31.8 mm)	Φ84mm × 115.1mm − 135.7mm	Approximately 900 g
⑤ OVM05042MN-M90D	M90 (M.B.f 12.0 mm)	Φ95mm × 134.9mm − 155.5mm	Approximately 950 g
⑥ OVM05042MN-NMT	M84.5 (M.B.f 41.0 mm)	Φ93mm × 105.9mm − 126.5mm	Approximately 890 g
⑦ OVM05042MN-FMT	F mount (M.B.f 46.5 mm)	Φ84mm × 100.4mm − 121.0mm	Approximately 880 g
⑧ OVM05042MN-M95E	M95 (M.B.f 9.4 mm)	Φ100mm × 137.5mm − 158.1mm	Approximately 960 g

*1: Dimensions excluding protrusions such as lock screws.
*2: Value at maximum image height (Y'= 43.2 mm) and F5.6.
*3: To attach to a camera, use the appropriate extension barrel and camera mount parts that fit the camera mount.

Rayfact MJ95mm

@:OVM10062MN-1-M72D1

Main Specifications

Product	Rayfact MJ95mm
Model	Refer to the following table
Focal length [mm]	93.9(-0.5x)
Magnification range	-0.5x – -1x
F Number (∞)	F4
Wavelength range [nm]	400 – 700
Image circle [mm]	Φ82
Mount size*3	Refer to the following table
Attachment size	M52(P=0.75)
Diameter/length [mm]	Refer to the following table
Weight [g]	Refer to the following table

Optical Specifications

Magnification	-0.5x	-0.6x	-0.7x	-0.8x	-0.9x	-1x
NA	≧0.04					
Object-to-image distance [mm]	408.0	386.6	374.5	368.1	365.4	365.3
Working distance [mm]	199.3	177.9	165.8	159.4	152.0	141.8
Flange-to-image distance [mm]	Refer to the "Camera Mount Parts List" table					
Distortion [%]*2	-0.2	-0.2	-0.1	-0.0	+0.0	+0.1
Relative illumination [%]*2	81.5	83.2	84.6	85.6	86.8	87.6

Camera Mount Parts List

Model	Camera mount (flange-to-image distance)	Diameter/length*1 (from mount datum face)	Weight
① OVM10062MN-1-M72D1	M72 (M.B.f 19.56 mm)	Φ84mm × 189.1mm – 204.0mm	Approximately 1,210 g
② OVM10062MN-1-M72D2	M72 (M.B.f 6.56 mm)	Φ84mm × 202.1mm – 217.0mm	Approximately 1,230 g
③ OVM10062MN-1-M72D3	M72 (M.B.f 12.0 mm)	Φ84mm × 196.7mm – 211.5mm	Approximately 1,220 g
④ OVM10062MN-1-M72N	M72 (M.B.f 31.8 mm)	Φ84mm × 176.9mm – 191.7mm	Approximately 1,190 g
⑤ OVM10062MN-1-M90D	M90 (M.B.f 12.0 mm)	Φ95mm × 196.7mm – 211.5mm	Approximately 1,240 g
⑥ OVM10062MN-1-NMT	M84.5 (M.B.f 41.0 mm)	Φ93mm × 167.7mm – 182.5mm	Approximately 1,180 g
⑦ OVM10062MN-1-FMT	F mount (M.B.f 46.5 mm)	Φ84mm × 162.2mm – 177.0mm	Approximately 1,200 g
⑧ OVM10062MN-1-M95E	M95 (M.B.f 9.4 mm)	Φ100mm × 199.3mm – 214.1mm	Approximately 1,250 g

*1: Dimensions excluding protrusions such as lock screws.
*2: Value at maximum image height (Y'= 41 mm) and F5.6.
*3: To attach to a camera, use the appropriate extension barrel and camera mount parts that fit the camera mount.

Rayfact NR Series

Magnification scale	Image circle	F Number
∞ – -0.17x	Φ43.2mm	F1.4

Features

· Maintains compatibility with AI Nikkor 35 mm f/1.4S lens
· 35 mm focal length ideal for use in confined spaces
· Fast lens with F Number 1.4
· Equipped with aperture ring lock screw and focus ring lock screw
· Uses the widely-used F mount

Applications

· Printed material inspection
· Infrastructure inspection
· Label inspection

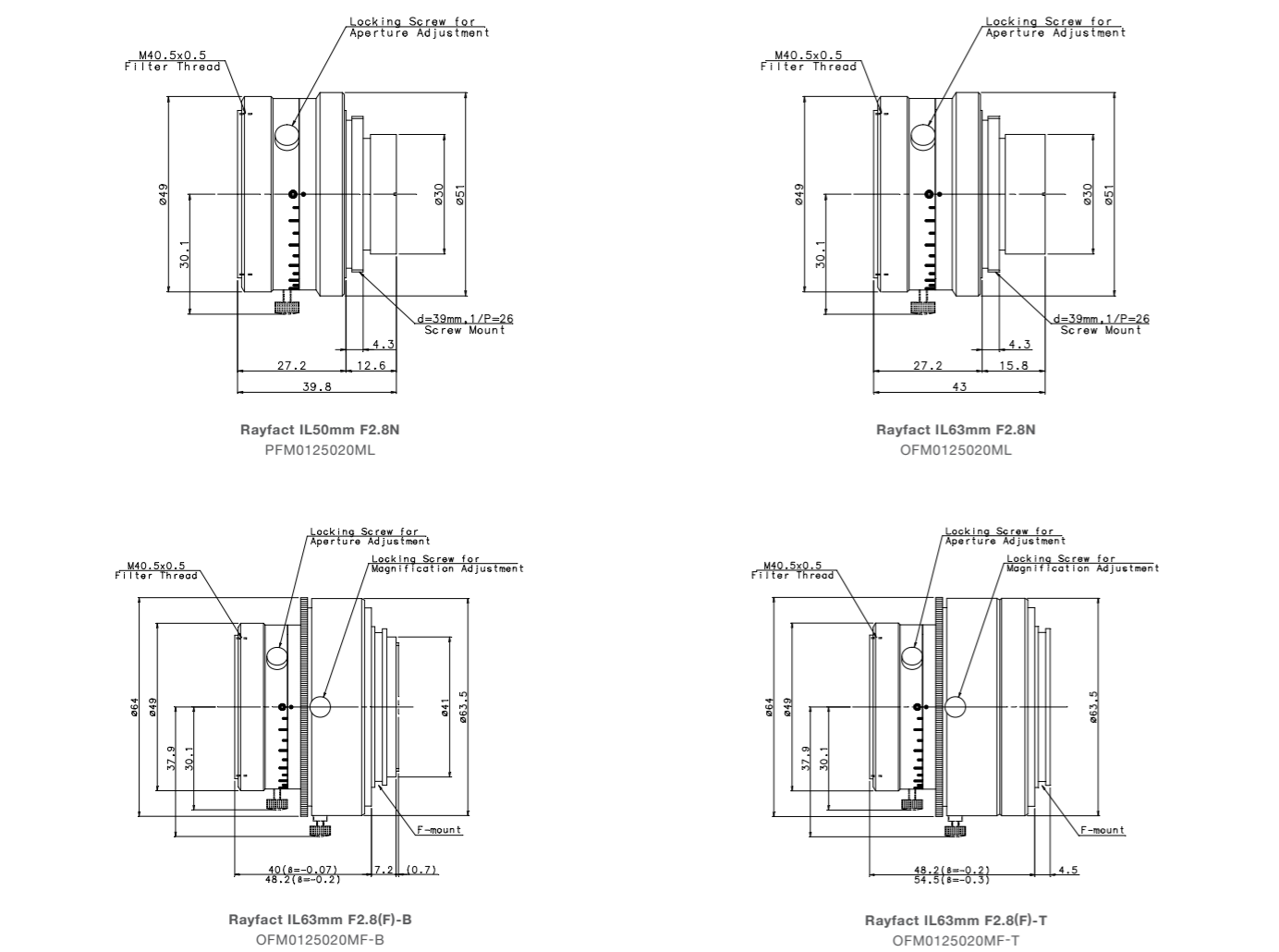* Not compatible with Nikon consumer cameras. There is a risk of damaging the camera.

Rayfact NR35mm F1.4
BA01031

Main Specifications

Product	Rayfact NR35mm F1.4
Model	BA01031
Focal length [mm]	36.1(∞)
Magnification range	∞ – -0.17x
F Number	F1.4
Wavelength range [nm]	400 – 700
Field of view [∞]	63°
Image circle [mm]	Φ43.2
Mount size	F
Attachment size	M52(P=0.75)
Diameter/length [mm]*1	Φ67.5 × 61.8 - 66.4 (from mount datum face)
Weight [g]	Approximately 430

Optical Specifications

Magnification	∞	-0.017x	-0.037x	-0.084x	-0.169x
Distance scale	∞	2	1	0.5	0.3
Object-to-image distance [mm]	-	2,142.4	1,033.6	508.1	301.5
Working distance [mm]	-	2,033.7	924.3	397.6	188.6
Flange-to-image distance [mm]			46.5		
Distortion [%]*2	-2.4	-2.7	-3.0	-3.7	-4.6
Relative illumination [%]*3	48.4	50.0	51.7	55.9	63.3

*1: Dimensions excluding protrusions such as lock screws.
*2: Value at maximum image height (Y'= 21.6 mm) and F1.4.
*3: Value at image height (Y'= 15 mm) and F1.4.

Rayfact IL Series

Magnification scale	Image circle	F Number
-0.05x – -0.5x	Φ58mm	F2.8
	Φ55.2mm	
	Φ43.2mm	

Features

· Maintains compatibility with EL-Nikkor 50mm F2.8N and 63mm F2.8N enlargement lenses·
  Sufficient chromatic aberration correction across a wide range of 380 nm to 700 nm
· Equipped with aperture ring lock screw
· Uses Leica screw mount
· Optional F mount converter ring set available

Applications

· Printed material inspection
· Electronic component inspection
· Metal defect inspection

Rayfact IL50mm F2.8N
PFM0125020ML

Rayfact IL63mm F2.8N
OFM0125020ML

Rayfact IL63mm F2.8(F)-B
OFM0125020MF-B

Rayfact IL63mm F2.8(F)-T
OFM0125020MF-T

Rayfact UV Series

Magnification scale	Image circle	F Number
∞ − -0.5x	Φ19.3mm	F2.8
	Φ43.6mm	F4.5

Features

· Allows special imaging in the ultraviolet range from 200 to 400 nm
· Designed to reduce focal shift within the usable wavelength range
· Ensures high transmission rates from ultraviolet to near-infrared
· UV25mm model is compatible with Sony ® Semiconductor Solutions IMX487 sensor (2.74 μm, 8.1 MP)
· Equipped with aperture ring lock screw

Applications

· Combustion testing
· Plasma observation
· Biological observation

Main Specifications

Product	Rayfact IL50mm F2.8N	Rayfact IL63mm F2.8N	Rayfact IL63mm F2.8(F)-B	Rayfact IL63mm F2.8(F)-T
Model	PFM0125020ML	OFM0125020ML	OFM0125020MF-B	OFM0125020MF-T
Focal length [mm]	52.1	63	63	63
Magnification range	-0.05x − -0.5x	-0.05x − -0.5x	-0.07x − -0.2x	-0.2x − -0.3x
F Number (∞)	F2.8			
Wavelength range [nm]	380 − 700			
Image circle [mm]	Φ43.2	Φ58	Φ55.2	Φ55.2
Mount size	d = 39, 1/P = 26 (Leica)	d = 39, 1/P = 26 (Leica)	F	F
Attachment size	M40.5(P=0.5)			
Diameter/length [mm]*1	Φ51 × 27.2 (from mount datum face)	Φ51 × 27.2 (from mount datum face)	Φ64 × 48.2 (from mount datum face)	Φ64 × 54.5 (from mount datum face)
Weight [g]	Approximately 135	Approximately 150	Approximately 270	Approximately 300

Optical Specifications

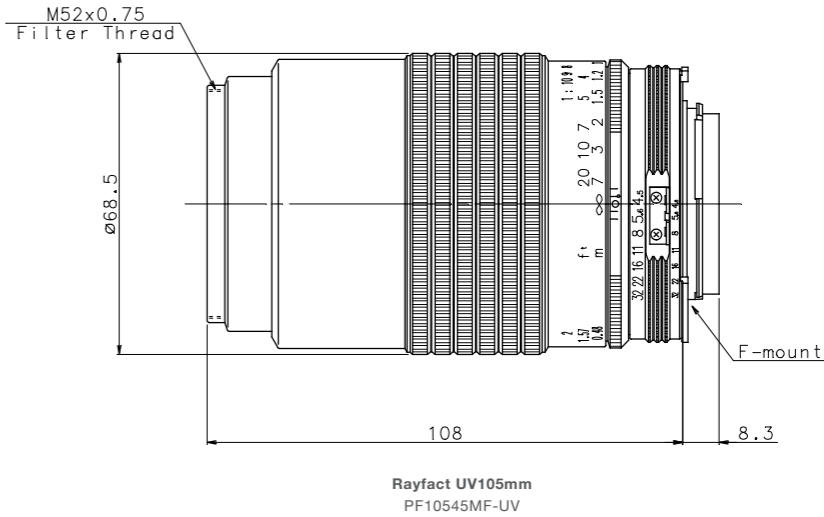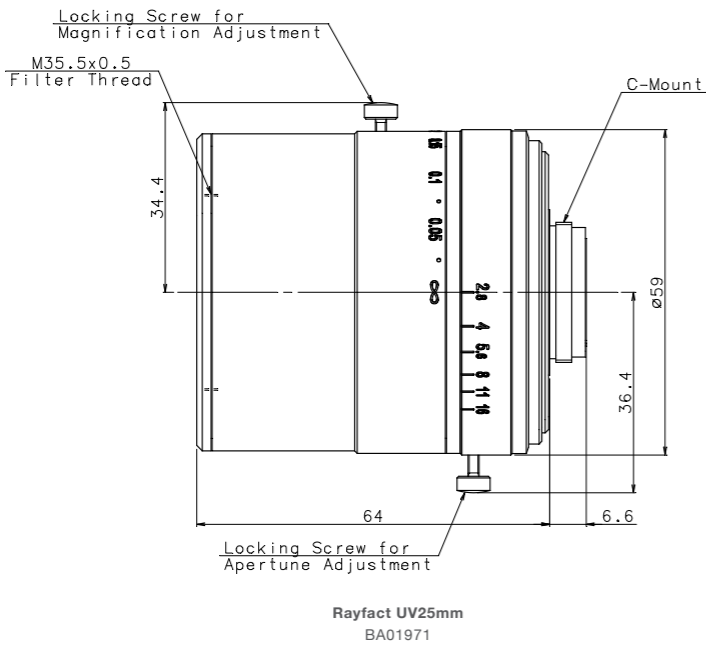|	Rayfact IL50mm F2.8N	Rayfact IL63mm F2.8N	Rayfact IL63mm F2.8(F)-B	Rayfact IL63mm F2.8(F)-T
NA	≧0.02 (-0.125x/-0.2x)			
Object-to-image distance [mm]	513.4(-0.125x)	632.8(-0.125x)	1,025.3 − 448.5	448.5 − 349.9
Working distance [mm]	473.0(-0.125x)	542.8(-0.125x)	938.8 − 353.8	353.8 − 248.9
Flange-to-image distance [mm]	49.1(-0.125x)	62.8(-0.125x)	46.5	46.5
Distortion [%]*2	-0.5(-0.125x)	+0.1(-0.125x)	+0.1(-0.125x)	-0.1(-0.2x)
Relative illumination [%]*2	47.7(-0.125x)	39.3(-0.125x)	44.1(-0.125x)	50.3(-0.2x)

*1: Dimensions excluding protrusions such as lock screws.
*2: Value at maximum image height (Y'= 21.6 mm/29 mm/27.6 mm) and F2.8.

Rayfact UV25mm
BA01971

Rayfact UV105mm
PF10545MF-UV

Main Specifications

Product	Rayfact UV25mm
Model	BA01971
Focal length [mm]	25.2(∞)
Magnification range	∞ – -0.2x
F Number	F2.8
Wavelength range [nm]	200 – 400
Field of view [∞]	42.2°
Image circle [mm]	Φ19.3 (compatible with 1.2-inch sensor)
Mount size	C
Attachment size	M35.5(P=0.5)
Diameter/length [mm][*1]	Φ59 × 64 (from mount datum face)
Weight [g]	Approximately 380

Optical Specifications[*2]

Magnification		∞	-0.05x	-0.15x	-0.2x
Object-to-image distance [mm][*4]		-	569.9	236.4	195.7
Working distance [mm]		-	488.2	154.7	114.1
Flange-to-image distance [mm]		17.526			
Distortion [%][*3]		≦0.4			
Relative illumination [%][*3]	F2.8	≧80.0			
	F4.0	≧90.0			

*1: Dimensions exclude protrusions such as lock screws.
*2: Value for the reference wavelength (i-line).
*3: Value when using the IMX487 sensor.
*4: Value including the imaging sensor cover glass (synthetic silica glass, t = 0.5 mm) on the image side.

Main Specifications

Product	Rayfact UV105mm
Model	PF10545MF-UV
Focal length [mm]	105.2(∞)
Magnification range	∞ – -0.5x
F Number	F4.5
Wavelength range [nm]	220 – 900
Field of view [∞]	23.3°
Image circle [mm]	Φ43.2
Mount size	F
Attachment size	M52(P=0.75)
Diameter/length [mm][*1]	Φ68.5 × 108 (from mount datum face)
Weight [g]	Approximately 515

Optical Specifications

Magnification	-0.5x
Object-to-image distance [mm]	∞ – 481.2
Working distance [mm]	∞ – 273.9
Flange-to-image distance [mm]	46.5
Distortion [%][*2]	≦0.25
Relative illumination [%][*2]	≧50.0

*1: Dimensions excluding protrusions such as lock screws.
*2: Value at maximum image height (Y'= 21.6 mm) and F4.5.

Series	Product	Magnification range [x]	Image circle [mm]
Rayfact RF Series*1 *3	Rayfact RF3-6x	3.0 – 6.0	>80
	Rayfact RF2-5x	2.0 – 5.0	>80
	Rayfact RF1-2x	1.0 – 2.0	>80
Rayfact TC Series	Rayfact TC5-10x*5 *6	5.0 – 10.0	>80
	Rayfact TC5.2x*2 *4	3.0	64
Rayfact VW Series	Rayfact VW0.14x	~0.5	62
	Rayfact VW0.25x	~0.5	62
	Rayfact VW0.35x	~0.5	62
Rayfact VF Series*1	Rayfact VF	~0.5 – 3.0	64, >80
Rayfact XG Series	Rayfact XG0.35x	~0.5	>80
	Rayfact XG0.5x	~0.5	>80
	Rayfact XG0.7x	0.7	>80
	Rayfact XG1.0x	1.0	>80
	Rayfact XG1.4x	1.4	>80
Rayfact MJ Series*2	Rayfact MJ90mm	0.05 – ~0.5	>80
	Rayfact MJ95mm	~0.5 – 1.0	>80
Rayfact NR Series	Rayfact NR35mm F1.4	<0.05 – ~0.5	55.2
Rayfact IL Series	Rayfact IL50mm F2.8N	0.05 – ~0.5	55.2
	Rayfact IL63mm F2.8N	0.05 – ~0.5	64
	Rayfact IL63mm F2.8N(F)*2	~0.08 – ~0.5	58
Rayfact UV Series	Rayfact UV25mm	<0.05 – ~0.5	19.3
	Rayfact UV105mm	<0.05 – ~0.5	55.2

Magnification range [x] scale: <0.05　0.05　–　0.1　–　0.7　1.0　1.4　–　2.0　–　3.0　–　5.0　–　6.0　7.0　–　10.0
Image circle [mm] values: 19.3　43.2　55.2　58　62　64　>80

*1 Fixed magnification lens available　*2 Sold with camera mount part　*3 Prism type available　*4 Straight barrel type and incident illumination type available　*5 Straight barrel type and Köhler illumination type available　*6 Manufactured to order

⚠	Safety Precautions	■ Before use, please read the Instruction Manual carefully and properly use the product.