



2023V1

C-Mount Industrial Lenses Index



MFA Series

**High Definition and Anti-seismic
Fixed Focal Length Lenses**



WWK Series

**10 Megapixels High Resolution
Telecentric Lenses**



WWH Series

**5 Megapixels High Resolution
Telecentric Lenses**

WWT Series

**High Cost-effective Positioning
Fixed Magnification Lenses**



WWL Series

**Minor-Caliber
Telecentric Lenses**



WH Series

Fixed Magnification Lenses

About VICO

VICO is dedicated to promoting the development of machine vision/computer vision/digital imaging technology. The brands we distribute include COOLENS®, Carm®, Lontry®, etc., and are still expanding. Those of the most excellent quality manufactured in China in the vision area are our focus. The products involved include lenses, smart cameras, illuminations, cables, controllers, digital image test solutions, and more.

Our focus is to provide every single component needed to solve imaging applications in the industrial automation field, especially for precision equipment manufacturing in the intelligent manufacturing and robot industry.

Over the years, our expertise in developing innovative optical systems has helped our customers solve machine vision applications, which earned us a worldwide reputation as an excellent optical solutions provider.

Standard Product

VICO supplies more than 10 series of high-resolution lenses, suitable for various industrial cameras, widely applied in the field of positioning, identification, inspection, measurement, etc.,

Customization

Customization is VICO's key to success in the machine vision field. Our professional R&D engineering team, supply chain, assembly, and testing team enable us to quickly respond to customization requirements. We not only have thousands of customized lenses but are also able to provide the whole machine vision solution.

Complete Specifications and Sample Delivery Within One Day

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12/F, Kiu Fu Commercial BLDG,
Wan Chai, Hong Kong, China

Shenzhen

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Korea

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Germany

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Germany

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WWT Series

**High Cost-effective
Positioning Industrial Lenses**

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MFA Series

C-Mount Fixed Focal Length Lenses

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WH Series

Fixed Magnification Lenses

1.2" UP TO 1.2" SENSORS

MFA121 Series, Fixed Focal Length Lenses

Focal Length 18~ 75mm	F=4.0~16	P37
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WWT121 Series, Positioning Industrial Lenses

WD 37~516mm	0.1~1x	P32
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1.1" UP TO 1.1" SENSORS

WWK Series, 10 MegaPixels Telecentric Lenses

WD 108mm	4~8x	P11
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WD 110mm	0.5~3x	P10
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WD 178mm	4~8x	P12
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WD 180mm	0.8~1x	P12
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WH Series, Fixed Magnification Lenses

WD 240~1030mm	0.11~1x	P53
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1" UP TO 1" SENSORS

WWK Series, 10 MegaPixels Telecentric Lenses

WD 108mm	0.7x	P10
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WD 220mm	0.275~0.55x	P13
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WD 250mm	0.3x	P12
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WH Series, Fixed Magnification Lenses

WD 120~1050mm	0.14~1x	P50
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2/3" UP TO 2/3" SENSORS

WWK series, 10 MegaPixels Telecentric Lenses

WD 110mm	0.3~0.5x	P10
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WD 220mm	0.22x	P13
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WWH Series, 5 Megapixel Telecentric Lenses

WD 63mm (Standard Telecentric)	0.75~10x	P16
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WD 65mm	0.75~8x	P17
WD 108mm	1~10x	P18
WD 110mm	0.3~6x	P19
WD 130-180mm	0.6~4x	P21
WD 280-510mm	0.98~2x	P23

WWT230 Series, Positioning Industrial Lenses

WD 60-554mm	0.1~0.9x	P31
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WH Series, Fixed Magnification Lenses

WD 65~1405mm	0.04~2x	P45
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1/1.7" UP TO 1/1.7" SENSORS

WH Series, Fixed Magnification Lenses

WD 200~875mm	0.09~0.7x	P44
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1/1.8" UP TO 1/1.8" SENSORS

WWH Series, 5 Megapixel Telecentric Lenses

WD 110mm	0.3x	P19
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MFA118-S Series, Fixed Focal Length Lenses

Focal Length 6-50mm	F=2.8~16	P36
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WWT118 Series, Positioning Industrial Lenses

WD 56~252mm	0.1~1x	P30
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WH Series, Fixed Magnification Lenses

WD 48~565mm	0.2~4x	P43
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1/2" UP TO 1/2" SENSORS

WWK Series, 10 Megapixel Telecentric Lenses

WD 320~330mm	0.12~0.15x	P14
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WH Series, Fixed Magnification Lenses

WD 130~650mm	0.18~2x	P41
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1/2.5"~1/2.3"

UP TO 1/2.5"~1/2.3" SENSORS

WH Series, Fixed Magnification Lenses

WD 80~900mm	0.092~2x	P39
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1/3"

UP TO 1/3" SENSORS

WWL Series, Minor-Caliber Telecentric Lenses

WD 65mm	0.6~6x	P25
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WD 110~130mm	0.5~4x	P26
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WD 150mm	0.8~4x	P27
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WD 250mm	0.5~2x	P28
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Lenses Selection Process and Tools	P75
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Working Distance Quick Guide												
Series		Sensors	WD(mm)									Page
			50-65	66-100	101-149	150-200	201-300	300-400	401-600	601-800	801-1000	
WWL	Telecentric	1/3"										P24
WH	Fixed Magnification	1/2.5"~1.1"										P39
WWT	Fixed Magnification	1/1.8"~1.2"										P29
WWH	Telecentric	1/1.8"~2/3"										P16
MFA	Fixed Focal Length	1/1.8"~1.2"										P35
WWK	Telecentric	1/2"~1.1"										P9
Selection Tips: Select the product series based on the camera CCD and working distance, and then go to the corresponding series data table according to the page number. Example: To find a telecentric lenses that supports 2/3" cameras and has a working distance of 200mm, you can search for it in the WWH and WWK series.												

Camera Sensor Size Quick Guide											
Sensors		1/3"	1/2.5"	1/2.3"	1/2"	1/1.8"	2/3"	1"	1.1"	1.2"	Page
WWL	Telecentric	0.5x~6x									P24
WH-125	Fixed Magnification	0.092x~2x									P41
WH-120	Fixed Magnification	0.18x~2x									P39
WH-118	Fixed Magnification	0.2x~4x									P43
WH-230	Fixed Magnification	0.04x~2x									P45
WH-110	Fixed Magnification	0.14x~1x									P50
WH-111	Fixed Magnification	0.11x~1x									P53
WWT-118	Fixed Magnification	0.1x~1x									P30
WWT-230	Fixed Magnification	0.1x~0.9x									P31
WWT-121	Fixed Magnification	0.1x~1x									P32
WWH	Telecentric	0.3x~10x									P15
MFA118	Fixed Focal Length	Focal length 6-50mm									P36
MFA121	Fixed Focal Length	Focal length 18~75mm									P37
WWK-120	Telecentric	0.12x~0.15x									P14
WWK-230	Telecentric	0.22x~0.5x									P10
WWK-110	Telecentric	0.275x~0.7x									P11
WWK-111	Telecentric	0.5x~8x									P9

Selection Tips: Select the product series based on the camera sensors and lenses magnification, and then go to the corresponding series data table according to the page number.

Example: If you need to find telecentric lenses that support 2/3 "camera and have a magnification of 0.5X, you can search for them in the WWH and WWK series.

Application Type Quick Reference Table							
Application Series		Positioning	Inspection	Measurement	Identification	Sorting	Page
		Visual positioning requires a machine vision system to quickly and accurately locate the tested part and confirm its position.	Whether the product has inspection, color inspection,character inspection, liquid level inspection, surface appearance inspection, etc	Extract the edge, contour and other information of the image through the vision algorithm, and carry out non-contact size measurement, position measurement and height measurement	Color recognition, OCR character recognition, dimensional code and QR code reading, character reading, etc	The application of object sorting is based on a link after identification and inspection. Combined with the use of robotic arms, food sorting and automatic sorting of parts defects are realized.	
WWL	Telecentric						P24
WWH	Telecentric						P15
WWK	Telecentric						P9
WH	Fixed Magnification						P39
WWT	Fixed Magnification						P29
MFA	Fixed Focal Length						P36
Selection tips: Measurement items please select telecentric lenses, positioning, alignment, inspection items can choose telecentric lenses and non-telecentric lenses.							

Magnification Range Quick Reference Table													
Mag.β Series		<0.1x	0.1x~0.29x	0.3x~0.39x	0.4x~0.59x	0.6x~0.79x	0.8x~1.0x	1.1x~1.5x	1.6x~2.0x	2.5x~4x	>4x	Page	
					1/3"								P24
WWL	Telecentric				1/2.5"~1.1"								P39
WH	Fixed Magnification												
WWT	Fixed Magnification		1/1.8"~1.2"									P24	
WWH	Telecentric			1/1.8"~2/3"								P15	
WWK	Telecentric		1/2"~1.1"									P9	
Selection Tips: Select the product series according to the magnification range and sensors, and then go to the corresponding series data table according to the page number.													
Example: If you need to find a 4X, 1" telecentric lenses, you can find it in the WWK series.													

WWK Series

10 MegaPixels Telecentric Lenses



Naming Rule



Features

- High-resolution telecentric lenses that supports 5M-25M pixel area scan cameras.
- A variety of low magnification designs are available for applications with a larger field of view.
- High definition, low distortion, high telecentricity, especially suitable for high-precision applications
- The long working distance specification facilitates the arrangement of lighting and machine components.
- The built-in coaxial optical specification is especially suitable for wafers, glass devices, and display devices.

WWK - WD 110mm

Support Up to 1.1" Sensor Size

25 MegaPixels Industrial Camera



Lens Model	Mag. (x)	WD (mm)	Sensor Size (Φ mm)	F/#	MTF30 (lp/mm)	DOF (mm)	Distortion (% max)	Telecentricity (° max)	Length (mm)	Mount	Coaxial Light
WWK03-110-230	0.3	110 $\pm$ 2	11.0(2/3")	5.6	>170	$\pm$ 2.5@F5.6	<0.02	<0.04	118.0	C	NO
WWK03-110C-230	0.3	110 $\pm$ 2	11.0(2/3")	5.6	>170	$\pm$ 2.5@F5.6	<0.02	<0.04	118.0	C	YES
WWK04-110-230	0.4	110 $\pm$ 2	11.0(2/3")	7	>140	$\pm$ 1.8@F7	<0.02	<0.03	140.2	C	NO
WWK04-110C-230	0.4	110 $\pm$ 2	11.0(2/3")	7	>140	$\pm$ 1.8@F7	<0.02	<0.03	140.2	C	YES
WWK05-110-230	0.5	110 $\pm$ 2	11.0(2/3")	7	>140	$\pm$ 1.1@F7	<0.03	<0.03	127.3	C	NO
WWK05-110C-230	0.5	110 $\pm$ 2	11.0(2/3")	7	>140	$\pm$ 1.1@F7	<0.03	<0.03	127.3	C	YES
WWK05-110-111V3	0.5	110 $\pm$ 2	18.0(1.1")	7	124	$\pm$ 1.1@F7	0.1	0.08	133.2	C	NO
WWK05-110C-111V3	0.5	110 $\pm$ 2	18.0(1.1")	7	124	$\pm$ 1.1@F7	0.1	0.08	133.2	C	YES
WWK063-110-111V3	0.63	110 $\pm$ 2	18.0(1.1")	7	124	$\pm$ 0.7@F7	0.1	0.05	133.2	C	NO
WWK063-110C-111V3	0.63	110 $\pm$ 2	18.0(1.1")	7	124	$\pm$ 0.7@F7	0.1	0.05	133.2	C	YES

Lens Model	Mag. (x)	WD (mm)	Sensor Size (Φmm)	F/#	MTF30 (lp/mm)	DOF (mm)	Distortion (% max)	Telecentricity (° max)	Length (mm)	Mount	Coaxial Light
WWK07-108-110	0.7	108±2	16.0(1")	7	>135	±0.6@F7	<0.02	<0.02	133.4	C	NO
WWK07-108C-110	0.7	108±2	16.0(1")	7	>135	±0.6@F7	<0.02	<0.02	133.4	C	YES
WWK08-110-111V3	0.8	110±2	18.0(1.1")	6.6	128	±0.4@F6.6	0.08	0.06	142.5	C	NO
WWK08-110CP-111V3	0.8	110±2	18.0(1.1")	6.6	128	±0.4@F6.6	0.08	0.06	152.6	C	YES
WWK10-110-111V3	1.0	110±2	18.0(1.1")	7	128	±0.3@F7	0.1	0.06	142.5	C	NO
WWK10-110CP-111V3	1.0	110±2	18.0(1.1")	7	128	±0.3@F7	0.1	0.06	152.6	C	YES
WWK15-110-111	1.5	110±2	18.0(1.1")	10	>78	±0.18@F10	<0.1	<0.1	128.8	C	NO
WWK15-110C-111	1.5	110±2	18.0(1.1")	10	>78	±0.18@F10	<0.1	<0.1	128.8	C	YES
WWK20-110-111	2	110±2	18.0(1.1")	13.5	>60	±0.14@F13.5	<0.1	<0.1	133.2	C	NO
WWK20-110C-111	2	110±2	18.0(1.1")	13.5	>60	±0.14@F13.5	<0.1	<0.1	133.2	C	YES
WWK30-110-111	3	110±2	18.0(1.1")	20.1	>40	±0.09@F20.1	<0.1	<0.1	166.1	C	NO
WWK30-110C-111	3	110±2	18.0(1.1")	20.1	>40	±0.09@F20.1	<0.1	<0.1	166.1	C	YES
WWK40-108-111V3	4.0	108±2	18.0(1.1")	20	43	±0.05@F20	0.07	0.05	162.4	C	NO
WWK40-108C-111V3	4.0	108±2	18.0(1.1")	20	43	±0.05@F20	0.07	0.05	165.5	C	YES
WWK60-108-111V3	6.0	108±2	18.0(1.1")	29.7	29	±0.035@F29.7	0.04	0.03	171.4	C	NO
WWK60-108C-111V3	6.0	108±2	18.0(1.1")	29.7	29	±0.035@F29.7	0.04	0.03	175.5	C	YES
WWK80-108-111V3	8.0	108±2	18.0(1.1")	40.4	21	±0.025@F40.4	0.08	0.02	203.9	C	NO
WWK80-108C-111V3	8.0	108±2	18.0(1.1")	40.4	21	±0.025@F40.4	0.08	0.02	207.8	C	YES

WD 110mm

WD 180mm

WD 220mm

WWK-WD 180mm

Support Up to 1.1" Sensor Size

25 MegaPixels Industrial Camera



Lens Model	Mag. (x)	WD (mm)	Sensor Size (Φmm)	F/#	MTF30 (lp/mm)	DOF (mm)	Distortion (% max)	Telecentricity (° max)	Length (mm)	Mount	Coaxial Light
WWK08-180-111V3	0.8	180±2	18.0(1.1")	8	>108	±0.5@F8	0.04	0.08	155.0	C	NO
WWK08-180C-111V3	0.8	180±2	18.0(1.1")	8	>108	±0.5@F8	0.04	0.08	155.0	C	YES
WWK10-180-111V3	1.0	180±2	18.0(1.1")	8	>107	±0.3@F8	0.01	0.08	179.1	C	NO
WWK10-180C-111V3	1.0	180±2	18.0(1.1")	8	>107	±0.3@F8	0.01	0.08	179.1	C	YES
WWK40-178-111V3	4.0	178±2	18.0(1.1")	22.2	>38	±0.06@F22.2	0.08	0.08	342.2	C	NO
WWK40-178C-111V3	4.0	178±2	18.0(1.1")	22.2	>38	±0.06@F22.2	0.08	0.08	347.2	C	YES
WWK60-178-111V3	6.0	178±2	18.0(1.1")	33.2	>27	±0.04@F33.2	0.07	0.08	345.2	C	NO
WWK60-178C-111V3	6.0	178±2	18.0(1.1")	33.2	>27	±0.04@F33.2	0.07	0.08	347.3	C	YES
WWK80-178-111V3	8.0	178±2	18.0(1.1")	43.8	>21	±0.03@F43.8	0.08	0.04	337	C	NO
WWK80-178C-111V3	8.0	178±2	18.0(1.1")	43.8	>21	±0.03@F43.8	0.08	0.04	347.2	C	YES

WWK-WD 220mm

Support Up to 1.1" Sensor Size

25 MegaPixels Industrial Camera



WD 110mm

WD 180mm

WD 220mm

Lens Model	Mag. (x)	WD (mm)	Sensor Size (Φmm)	F/#	MTF30 (lp/mm)	DOF (mm)	Distortion (% max)	Telecentricity (° max)	Length (mm)	Mount	Coaxial Light
WWK022-220-230-ALV2	0.22	220±3	11.0(2/3")	6.9	>130	±5.7@F6.9	<0.05	<0.05	190	C	NO
WWK022-220-111	0.22	220±3	18.0(1.1")	8	>110	±6.6@F8	<0.1	<0.15	232.9	C	NO
WWK023-220-111	0.23	220±3	18.0(1.1")	8	>110	±6.0@F8	<0.1	<0.18	233.0	C	NO
WWK0246-220-111	0.246	220±3	18.0(1.1")	8	>100	±5.3@F8	<0.1	<0.13	232.9	C	NO
WWK0275-220-110	0.275	220±3	16.0(1")	8	>113	±8.5@F8	<0.03	<0.1	242.6	C	NO
WWK0275-220-111	0.275	220±3	18.0(1.1")	8	>105	±4.2@F8	<0.1	<0.15	242.9	C	NO
WWK03-250-110	0.3	250±3	16.0(1")	8	>102	±3.6@F8	<0.2	<0.2	200.6	C	NO
WWK032-220-110	0.32	220±3	16.0(1")	12.1	>75	±4.7@F12.1	<0.15	<0.07	210.0	C	NO

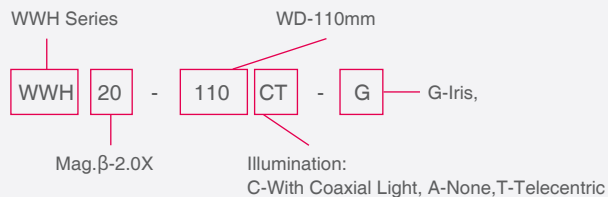
Lens Model	Mag. (x)	WD (mm)	Sensor Size (Φ mm)	F/#	MTF30 (lp/mm)	DOF (mm)	Distortion (% max)	Telecentricity (° max)	Length (mm)	Mount	Coaxial Light
WWK0345-220-111	0.345	220±3	18.0(1.1")	8	>115	±2.7@F8	<0.1	<0.1	212.2	C	NO
WWK0367-220-110	0.367	220±3	16.0(1")	8	>115	±4.7@F16	<0.1	<0.1	214.9	C	NO
WWK0367-220-111	0.367	220±3	18.0(1.1")	8	>115	±2.4@F8	<0.1	<0.1	213.1	C	NO
WWK046-220-110	0.46	220±3	16.0(1")	11.6	>80	±2.2@F11.6	<0.25	<0.1	205.2	C	NO
WWK046-220C-110	0.46	220±3	16.0(1")	11.6	>80	±2.2@F11.6	<0.25	<0.1	205.2	C	YES
WWK05-220-110	0.5	220±3	16.0(1")	8	>110	±1.3@F8	<0.1	<0.1	205.7	C	NO
WWK05-220C-110	0.5	220±3	16.0(1")	8	>110	±1.3@F8	<0.1	<0.1	205.7	C	YES
WWK05-220-111	0.5	220±3	18.0(1.1")	7	>140	±1.1@F7	<0.05	<0.02	205.4	C	NO
WWK05-220C-111	0.5	220±3	18.0(1.1")	7	>140	±1.1@F7	<0.05	<0.02	205.4	C	YES
WWK055-220-110	0.55	220±3	16.0(1")	8	>110	±1.1@F8	<0.1	<0.1	215.4	C	NO
WWK055-220-111	0.55	220±3	18.0(1.1")	10	>90	±1.3@F10.1	<0.1	<0.1	215.6	C	NO
WWK055-220C-111	0.55	220±3	18.0(1.1")	10	>90	±1.3@F10.1	<0.1	<0.1	215.6	C	YES
WWK015-320-120-AL	0.15	320±3	8(1/2")	7	>130	±12.4@F7	<0.05	<0.1	179.5	C	NO
WWK012-330-120-AL	0.12	330±3	8(1/2")	7	>135	±19.4@F7	<0.05	<0.1	192.6	C	NO

WWH-Series

5 Megapixel Telecentric Lenses



Naming Rule



Features

- A full range of object-space telecentric fixed magnification lenses, with a variety of working distances/magnifications available
- High-quality imaging, supporting industrial cameras with one MegaPixels to five MegaPixels.
- High contrast, low distortion, ultra-clear, built-in coaxial lighting
- Available with variable aperture specification, adjustable depth of field
- It can be customized quickly, and hundreds of non-standard specifications are available
- Widely used in applications such as high-precision visual positioning

WWH Series-WD 63mm

Object Side Telecentric Lenses

Support 2/3" Megapixel CCD



Lens Model	Mag.(x)	WD (mm))	Max Sensor Size (Φmm)	F/#	Telecentricity (° max)	Distortion (% max)	NA	Resolution (μm)	DOF (mm)	Length (mm)	Mount
WWH075-63ATV3	0.75	63±1	11.0(2/3")	6	0.22	0.05	0.063	5.4	0.9	96.2	C
WWH075-63CTLV3	0.75	63±1	11.0(2/3")	6	0.22	0.05	0.063	5.4	0.9	96.4	C
WWH10-63ATV3	1.0	63±1	11.0(2/3")	8	0.1	0.07	0.063	5.4	0.6	101.3	C
WWH10-63CTLV3	1.0	63±1	11.0(2/3")	8	0.1	0.07	0.063	5.4	0.6	101.3	C
WWH15-63ATV3	1.5	63±1	11.0(2/3")	7.5	0.03	0.04	0.100	3.4	0.3	111.0	C
WWH15-63CTLV3	1.5	63±1	11.0(2/3")	7.5	0.03	0.04	0.100	3.4	0.3	111.0	C
WWH20-63ATV3	2.0	63±1	11.0(2/3")	5.5	0.02	0.1	0.100	3.4	0.2	117.2	C
WWH20-63CTLV3	2.0	63±1	11.0(2/3")	5.5	0.02	0.1	0.100	3.4	0.2	117.2	C
WWH25-63ATV3	2.5	63±1	11.0(2/3")	9.9	0.05	0.03	0.125	2.7	0.1	105.8	C
WWH25-63CTLV3	2.5	63±1	11.0(2/3")	9.9	0.05	0.03	0.125	2.7	0.1	110.6	C
WWH30-63ATV3	3.0	63±1	11.0(2/3")	11.9	0.04	0.02	0.125	2.7	0.1	111.7	C
WWH30-63CTLV3	3.0	63±1	11.0(2/3")	11.9	0.04	0.02	0.125	2.7	0.1	116.4	C
WWH40-63ATV3	4.0	63±1	11.0(2/3")	15.8	0.03	0.01	0.125	2.7	0.1	124.4	C
WWH40-63CTLV3	4.0	63±1	11.0(2/3")	15.8	0.03	0.01	0.125	2.7	0.1	128.9	C
WWH60-63ATV3	6.0	63±1	11.0(2/3")	23.8	0.03	0.03	0.125	2.7	0.1	150.6	C
WWH60-63CTLV3	6.0	63±1	11.0(2/3")	23.8	0.03	0.03	0.125	2.7	0.1	154.5	C
WWH80-63ATV3	8.0	63±1	11.0(2/3")	31.3	0.02	0.01	0.125	2.7	0.04	176.2	C
WWH80-63CTLV3	8.0	63±1	11.0(2/3")	31.3	0.02	0.01	0.125	2.7	0.04	179.9	C
WWH100-63ATV3	10.0	63±1	11.0(2/3")	39.4	0.02	0.02	0.125	2.7	0.03	203.6	C
WWH100-63CTLV3	10.0	63±1	11.0(2/3")	39.4	0.02	0.02	0.125	2.7	0.03	205.7	C

WWH Series-WD 65mm

Object Side Telecentric Lenses

Support 2/3" Megapixel CCD



WD 63mm

WD 65mm

WD 108mm

WD 110mm

WD 130-180mm

Long WD

Lens Model	Mag.(x)	WD (mm)	Max Sensor Size (Φmm)	F/#	Telecentricity (° max)	Distortion (% max)	NA	Resolution (μm)	DOF (mm)	Length (mm)	Mount
WWH075-65AT	0.75	65±1	11.0(2/3")	10.6	0.006	0.15	0.035	9.5	1.51	93.2	C
WWH075-65CT	0.75	65±1	11.0(2/3")	10.6	0.006	0.15	0.035	9.5	1.51	93.2	C
WWH08-65AT	0.8	65±1	11.0(2/3")	10	<0.1	<0.1	0.040	8.4	1.25	89.7	C
WWH08-65CT	0.8	65±1	11.0(2/3")	10	<0.1	<0.1	0.040	8.4	1.25	89.7	C
WWH10-65AT	1.0	65±1	11.0(2/3")	11.1	<0.1	<0.1	0.045	7.5	0.89	79.9	C
WWH10-65CT	1.0	65±1	11.0(2/3")	11.1	<0.1	<0.1	0.045	7.5	0.89	79.9	C
WWH15-65AT	1.5	65±1	11.0(2/3")	12.5	<0.1	<0.1	0.060	5.6	0.44	74.4	C
WWH15-65CT	1.5	65±1	11.0(2/3")	12.5	<0.1	<0.1	0.060	5.6	0.44	74.4	C
WWH20-65ATV2	2.0	65±1	11.0(2/3")	13.2	<0.03	<0.05	0.076	4.4	0.3	88.2	C
WWH20-65CTV2	2.0	65±1	11.0(2/3")	13.2	<0.03	<0.05	0.076	4.4	0.3	92.5	C
WWH30-65ATV2	3.0	65±1	11.0(2/3")	15.7	<0.03	<0.1	0.095	3.5	0.1	99.7	C
WWH30-65CTV2	3.0	65±1	11.0(2/3")	15.7	<0.02	<0.1	0.095	3.5	0.1	99.7	C
WWH40-65AT	4.0	65±1	11.0(2/3")	17.9	<0.1	0.13	0.108	3.1	0.09	101.9	C
WWH40-65CT	4.0	65±1	11.0(2/3")	17.9	<0.1	0.13	0.108	3.1	0.09	106.2	C
WWH60-65AT	6.0	65±1	11.0(2/3")	24.6	<0.1	0.1	0.116	2.9	0.05	116.1	C
WWH60-65CT	6.0	65±1	11.0(2/3")	24.6	<0.1	0.1	0.116	2.9	0.05	120.4	C
WWH75-65AT	7.5	65±1	11.0(2/3")	32	0.1	0.1	0.116	2.9	0.05	128.1	C
WWH75-65CT	7.5	65±1	11.0(2/3")	32	0.1	0.1	0.116	2.9	0.05	132.4	C
WWH80-65AT	8.0	65±1	11.0(2/3")	31	<0.1	0.03	0.121	2.8	0.04	129.7	C
WWH80-65CT	8.0	65±1	11.0(2/3")	31	<0.1	0.03	0.121	2.8	0.04	134.0	C

WWH Series-WD 108mm

Object Side Telecentric Lenses

Support 2/3" Megapixel CCD



Lens Model	Mag.(x)	WD (mm)	Max Sensor Size (Φmm)	F/#	Telecentricity (° max)	Distortion (% max)	NA	Resolution (μm)	DOF (mm)	Length (mm)	Mount
WWH10-108ATV3	1.0	108±2	11.0(2/3")	7	0.05	0.04	0.071	4.7	0.6	105.1	C
WWH10-108CTLV3	1.0	108±2	11.0(2/3")	7	0.04	0.1	0.071	4.7	0.6	107.9	C
WWH15-108ATV3	1.5	108±2	11.0(2/3")	7.3	0.02	0.04	0.085	3.9	0.3	122.4	C
WWH15-108CTLV3	1.5	108±2	11.0(2/3")	7.3	0.01	0.02	0.085	4.0	0.3	126.1	C
WWH20-108ATV3	2.0	108±2	11.0(2/3")	10.5	0.04	0.02	0.095	3.5	0.2	129.9	C
WWH20-108CTLV3	2.0	108±2	11.0(2/3")	10.5	0.06	0.01	0.095	3.5	0.2	132.6	C
WWH25-108ATV3	2.5	108±2	11.0(2/3")	12.5	<0.5	<0.1	0.100	3.4	0.16	110.8	C
WWH25-108CTLV3	2.5	108±2	11.0(2/3")	12.5	<0.6	<0.1	0.100	3.4	0.16	114.4	C
WWH30-108ATV3	3.0	108±2	11.0(2/3")	15	<0.7	<0.1	0.100	3.4	0.13	117.9	C
WWH30-108CTLV3	3.0	108±2	11.0(2/3")	15	<0.8	<0.1	0.100	3.4	0.13	121.2	C
WWH40-108ATV3	4.0	108±2	11.0(2/3")	19.4	<0.9	<0.1	0.100	3.4	0.1	133.2	C
WWH40-108CTLV3	4.0	108±2	11.0(2/3")	19.4	<0.10	<0.1	0.100	3.4	0.1	135.4	C
WWH60-108ATV3	6.0	108±2	11.0(2/3")	28.7	<0.11	<0.1	0.100	3.4	0.06	165.5	C
WWH60-108CTLV3	6.0	108±2	11.0(2/3")	28.7	<0.12	<0.1	0.100	3.4	0.06	165.5	C
WWH80-108ATV3	8.0	108±2	11.0(2/3")	38.3	<0.13	<0.1	0.100	3.4	0.05	198.5	C
WWH80-108CTLV3	8.0	108±2	11.0(2/3")	38.3	<0.14	<0.1	0.100	3.4	0.05	196.6	C
WWH100-108ATV3	10.0	108±2	11.0(2/3")	48	<0.15	<0.1	0.100	3.4	0.04	231.6	C
WWH100-108CTLV3	10.0	108±2	11.0(2/3")	48	<0.16	<0.1	0.100	3.4	0.04	228.2	C

WWH Series-WD 110mm

Object Side Telecentric Lenses

Support 2/3" Megapixel CCD



WD 63mm

WD 65mm

WD 108mm

WD 110mm

WD 130-180mm

Long WD

Lens Model	Mag.(x)	WD (mm)	Max Sensor Size (Φmm)	F/#	Telecentricity (° max)	Distortion (% max)	NA	Resolution (μm)	DOF (mm)	Length (mm)	Mount
WWH03-110AT	0.3	110±2	9.0(1/1.8")	9	<0.1	<0.1	0.017	20.1	8.0	137.1	C
WWH03-110CT	0.3	110±2	9.0(1/1.8")	9	<0.1	<0.1	0.017	20.1	8.0	137.1	C
WWH05-110AT	0.5	110±2	11.0(2/3")	9.6	<0.1	<0.1	0.026	12.9	3.1	135.2	C
WWH05-110AT-G	0.5	110±2	11.0(2/3")	9.6	<0.1	<0.1	0.026	12.9	3.1	135.2	C
WWH05-110CT	0.5	110±2	11.0(2/3")	9.6	<0.1	<0.1	0.026	12.9	3.1	135.2	C
WWH05-110CT-G	0.5	110±2	11.0(2/3")	9.6	<0.1	<0.1	0.026	12.9	3.1	135.2	C
WWH08-110ATV2	0.8	110±2	11.0(2/3")	7.9	<0.1	<0.1	0.050	6.7	1.0	122.7	C
WWH08-110CTV2	0.8	110±2	11.0(2/3")	7.9	<0.1	<0.1	0.050	6.7	1.0	122.7	C
WWH10-110ATV2	1.0	110±2	11.0(2/3")	7	<0.1	<0.1	0.072	4.7	0.6	133.3	C
WWH10-110AT-G	1.0	110±2	11.0(2/3")	10.7	<0.1	<0.1	0.047	7.1	0.9	133.9	C

Lens Model	Mag.(x)	WD (mm)	Max Sensor Size (Φmm)	F/#	Telecentricity (° max)	Distortion (% max)	NA	Resolution (μm)	DOF (mm)	Length (mm)	Mount
WWH10-110CTV2	1.0	110±2	11.0(2/3")	7	<0.1	<0.1	0.072	4.7	0.6	133.3	C
WWH10-110CT-G	1.0	110±2	11.0(2/3")	10.7	<0.1	<0.1	0.047	7.1	0.9	138.2	C
WWH15-110ATV2	1.5	110±2	11.0(2/3")	10	<0.1	<0.1	0.075	4.5	0.4	128.9	C
WWH15-110CTV2	1.5	110±2	11.0(2/3")	10	<0.1	<0.1	0.075	4.5	0.4	128.9	C
WWH20-110ATV2	2.0	110±2	11.0(2/3")	12.2	<0.1	<0.1	0.082	4.1	0.2	133.5	C
WWH20-110AT-G	2.0	110±2	11.0(2/3")	18.2	<0.1	<0.1	0.054	6.3	0.4	147.4	C
WWH20-110CTV2	2.0	110±2	11.0(2/3")	12.2	<0.1	<0.1	0.082	4.1	0.2	133.5	C
WWH20-110CT-G	2.0	110±2	11.0(2/3")	18.2	<0.1	<0.1	0.054	6.3	0.4	151.7	C
WWH30-110ATV2	3.0	110±2	11.0(2/3")	18.3	<0.1	<0.1	0.083	4.1	0.2	165.7	C
WWH30-110CTV2	3.0	110±2	11.0(2/3")	18.3	<0.1	<0.1	0.083	4.1	0.2	165.7	C
WWH40-110ATV2	4.0	110±2	11.0(2/3")	20	<0.1	<0.1	0.100	3.4	0.1	124.8	C
WWH40-110CTV2	4.0	110±2	11.0(2/3")	20	<0.1	<0.1	0.100	3.4	0.1	129.1	C
WWH60-110AT	6.0	110±2	11.0(2/3")	38.9	<0.1	<0.1	0.075	4.5	0.1	152.7	C
WWH60-110CT	6.0	110±2	11.0(2/3")	38.9	<0.1	<0.1	0.075	4.5	0.1	157	C

WWH Series-WD130-180mm

Object Side Telecentric Lenses

Support 2/3" Megapixel CCD



WD	Lens Model	Mag.(x)	WD (mm)	Max Sensor Size (Φmm)	F/#	Telecentricity (° max)	Distortion (% max)	NA	Resolution (μm)	DOF (mm)	Length (mm)	Mount
130mm	WWH08-130AT	0.8	130±2	11.0(2/3")	12.6	<0.1	<0.1	0.032	10.6	1.6	117.1	C
	WWH08-130AT-G	0.8	130±2	11.0(2/3")	12.6	<0.1	<0.1	0.032	10.6	1.6	117.1	C
	WWH08-130CT	0.8	130±2	11.0(2/3")	12.6	<0.1	<0.1	0.032	10.6	1.6	121.4	C
	WWH08-130CT-G	0.8	130±2	11.0(2/3")	12.6	<0.1	<0.1	0.032	10.6	1.6	121.4	C
145mm	WWH07-145AT	0.7	145±2	11.0(2/3")	16.8	<0.1	<0.1	0.021	16.2	2.7	110.4	C
	WWH07-145AT-G	0.7	145±2	11.0(2/3")	16.8	<0.1	<0.1	0.021	16.2	2.7	110.4	C
	WWH07-145CT	0.7	145±2	11.0(2/3")	16.8	<0.1	<0.1	0.021	16.2	2.7	114.7	C

WD 63mm

WD 65mm

WD 108mm

WD 110mm

WD 130-180mm

Long WD

WD	Lens Model	Mag.(x)	WD (mm)	Max Sensor Size (Φmm)	F/#	Telecentricity (° max)	Distortion (% max)	NA	Resolution (μm)	DOF (mm)	Length (mm)	Mount
150-158mm	WWH06-150AT	0.6	150±2	11.0(2/3")	12	<0.5	0.3	0.025	13.4	2.70	102.2	C
	WWH06-150CT	0.6	150±2	11.0(2/3")	12	<0.5	0.3	0.025	13.4	2.70	102.2	C
	WWH20-150AT	2.0	150±2	11.0(2/3")	23	0.01	0.4	0.043	7.8	0.46	144.1	C
	WWH20-150CT	2.0	150±2	11.0(2/3")	23	0.01	0.4	0.043	7.8	0.46	144.1	C
	WWH40-150AT	4.0	150±2	11.0(2/3")	34	0.03	0.4	0.056	6.0	0.17	152.7	C
	WWH40-150CT	4.0	150±2	11.0(2/3")	34	0.03	0.4	0.056	6.0	0.17	152.7	C
	WWH06-158AT	0.6	158±2	11.0(2/3")	16.2	0.27	0.3	0.019	17.8	3.60	104.1	C
	WWH06-158CT	0.6	158±2	11.0(2/3")	12	0.27	0.3	0.025	13.3	2.70	104.1	C
180mm	WWH08-180AT-230	0.8	180±2	11.0(2/3")	10	0.1	0.03	0.040	8.4	1.30	128.8	C
	WWH08-180CT-230	0.8	180±2	11.0(2/3")	10	0.1	0.03	0.040	8.4	1.30	128.8	C
	WWH10-180AT-230	1	180±2	11.0(2/3")	11	<0.1	<0.1	0.045	7.4	0.90	136.6	C
	WWH10-180CT-230	1	180±2	11.0(2/3")	11	<0.1	<0.1	0.045	7.4	0.90	136.6	C

WWH Series-Long WD

Object Side Telecentric Lenses

Support 2/3" Megapixel CCD



WD	Lens Model	Mag.(x)	WD (mm)	Max Sensor Size (Φmm)	F/#	Telecentricity (° max)	Distortion (% max)	NA	Resolution (μm)	DOF (mm)	Length (mm)	Mount
280mm	WWH098-280AT-230V2	0.98	280±3	11.0(2/3")	11	0.06	0.03	0.044	7.6	0.90	189.2	C
	WWH098-280CT-230V2	0.98	280±3	11.0(2/3")	11	0.06	0.03	0.044	7.6	0.90	189.2	C
300mm	WWH10-300AT-230V2	1.0	300±3	11.0(2/3")	11	<0.1	<0.1	0.045	7.4	0.9	179.5	C
	WWH10-300CT-230V2	1.0	300±3	11.0(2/3")	11	<0.1	<0.1	0.045	7.4	0.9	179.5	C
	WWH20-300AT-230V2	2.0	300±3	11.0(2/3")	14.9	0.05	0.02	0.067	5.0	0.3	265.3	C
	WWH20-300CT-230V2	2.0	300±3	11.0(2/3")	14.9	0.05	0.02	0.067	5.0	0.3	273.4	C
410mm	WWH10-410AT	1.0	410±3	11.0(2/3")	17.9	<0.1	<0.1	0.027	12.3	1.4	178.9	C
	WWH10-410CT	1.0	410±3	11.0(2/3")	17.9	<0.1	<0.1	0.027	12.3	1.4	182.2	C
510mm	WWH05-510AT	0.5	510±3	9.0(1/1.8")	14.2	0.8	<0.1	0.017	19.3	4.5	163.5	C
	WWH05-510CT	0.5	510±3	9.0(1/1.8")	14.2	0.8	<0.1	0.017	19.3	4.5	166.3	C
	WWH10-510AT	1.0	510±3	11.0(2/3")	25.7	<0.1	<0.1	0.020	17.0	2.1	175	C
	WWH10-510CT	1.0	510±3	11.0(2/3")	25.7	<0.1	<0.1	0.020	17.0	2.1	178.5	C

WD 63mm

WD 65mm

WD 108mm

WD 110mm

WD 130-180mm

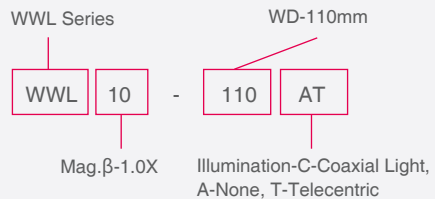
Long WD

WWL Series

Minor-Caliber Telecentric Lenses



Naming Rule

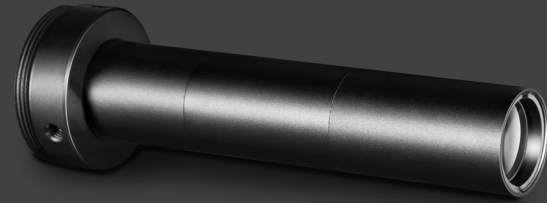


Features

- A full range of fixed magnification industrial lenses, with a variety of working distances/magnifications to choose from.
- 16mm diameter ultra-compact appearance, suitable for narrow spaces.
- Equipped with built-in coaxial light and high magnification specifications, it is compatible with various lenses in the same industry.
- Can be quickly ordered, and a large number of non-standard specifications are available.
- The cost-effectiveness is outstanding, which greatly reduces the difficulty of industry application.

WWL Series-WD 65mm

**Support 1/3" CCD,
Fixed Magnification
Object Side Telecentric**



WD 65mm

WD 110-130mm

WD 150mm

WD 250mm

Lens Model	Mag.(x)	WD (mm)	Max Sensor Size (Φmm)	F/#	NA	Resolution (μm)	MTF30 (lp/mm)	Telecentricity (° max)	Distortion (% max)	DoF(mm)	Length (mm)	Mount
WWL06-65AT	0.6	65	6.0(1/3")	8	0.037	9.0	105	0.01	0.03	1.8	97.1	C
WWL06-65CT	0.6	65	6.0(1/3")	8	0.037	9.0	105	0.01	0.03	1.8	97.1	C
WWL08-65AT	0.8	65	6.0(1/3")	11.9	0.033	10.0	75	0.01	0.1	1.5	76.0	C
WWL08-65CT	0.8	65	6.0(1/3")	11.9	0.033	10.0	75	0.01	0.1	1.5	76.0	C
WWL10-65ATN	1.0	65	6.0(1/3")	12.1	0.041	8.2	75	0.01	0.1	1.0	80.1	C
WWL10-65CTN	1.0	65	6.0(1/3")	12.1	0.041	8.2	75	0.01	0.1	1.0	80.0	C
WWL15-65AT	1.5	65	6.0(1/3")	12	0.062	5.4	75	0.2	0.3	0.4	74.6	C
WWL15-65CT	1.5	65	6.0(1/3")	12	0.062	5.4	75	0.2	0.3	0.4	74.6	C
WWL20-65AT	2.0	65	6.0(1/3")	13.7	0.072	4.7	65	0.06	0.15	0.3	80.1	C
WWL20-65CT	2.0	65	6.0(1/3")	13.7	0.072	4.7	65	0.06	0.15	0.3	80.1	C
WWL30-65A	3.0	65	6.0(1/3")	24.8	0.059	5.7	35	0.7	0.05	0.2	75.0	C
WWL30-65C	3.0	65	6.0(1/3")	24.8	0.059	5.7	35	0.7	0.05	0.2	75.0	C
WWL40-65A	4.0	65	6.0(1/3")	34.9	0.056	6.0	27	0.5	0.03	0.2	103.8	C
WWL40-65C	4.0	65	6.0(1/3")	34.9	0.056	6.0	27	0.5	0.03	0.2	103.8	C
WWL60-65AT	6.0	65	6.0(1/3")	39.2	0.073	4.6	23	0.1	0.02	0.1	118.6	C
WWL60-65CT	6.0	65	6.0(1/3")	39.2	0.073	4.6	23	0.1	0.02	0.1	118.6	C

WWL Series-WD 110/130mm

**Support 1/3" CCD,
Fixed Magnification
Object Side Telecentric**



Lens Model	Mag.(x)	WD (mm)	Max Sensor Size (Φmm)	F/#	NA	Resolution (μm)	MTF30 (lp/mm)	Telecentricity (° max)	Distortion (% max)	DoF(mm)	Length (mm)	Mount
WWL05-110AT	0.5	110	6.0(1/3")	11.6	0.021	15.7	80	0.01	0.2	3.7	106.3	C
WWL05-110CT	0.5	110	6.0(1/3")	11.6	0.021	15.7	80	0.01	0.2	3.7	106.3	C
WWL10-110AT	1.0	113	6.0(1/3")	13.7	0.037	9.2	60	0.01	0.05	1.1	109.8	C
WWL10-110CT	1.0	113	6.0(1/3")	13.7	0.037	9.2	60	0.01	0.05	1.1	109.8	C
WWL15-110AN	1.5	110	6.0(1/3")	13.6	0.055	6.1	70	1	0.05	0.5	104.2	C
WWL15-110CN	1.5	110	6.0(1/3")	13.6	0.055	6.1	70	1	0.05	0.5	104.3	C
WWL20-110ATS	2.0	110	6.0(1/3")	23.7	0.042	8.1	35	0.01	0.1	0.5	73.8	C
WWL20-110CTS	2.0	110	6.0(1/3")	23.7	0.042	8.1	35	0.01	0.1	0.5	73.8	C
WWL25-110A	2.5	110	6.0(1/3")	26.7	0.046	7.3	35	0.001	0.1	0.3	109.7	C
WWL25-110C	2.5	110	6.0(1/3")	26.7	0.046	7.3	35	0.001	0.1	0.3	109.7	C
WWL30-110AT	3.0	110	6.0(1/3")	31.2	0.046	7.3	30	0.01	0.1	0.3	117.1	C
WWL30-110CT	3.0	110	6.0(1/3")	31.2	0.046	7.3	30	0.01	0.1	0.3	117.1	C
WWL40-110A	4.0	110	6.0(1/3")	36.3	0.055	6.1	24	0.4	0.05	0.2	132.5	C
WWL40-110C	4.0	110	6.0(1/3")	36.3	0.055	6.1	24	0.4	0.05	0.2	132.5	C
WWL08-130AT	0.8	130	6.0(1/3")	15.2	0.026	12.9	55	0.01	0.1	1.9	97.1	C
WWL08-130CT	0.8	130	6.0(1/3")	15.2	0.026	12.9	55	0.01	0.1	1.9	97.1	C

WWL Series-WD 150mm

**Support 1/3" CCD,
Fixed Magnification
Object Side Telecentric**



WD 65mm

WD 110-130mm

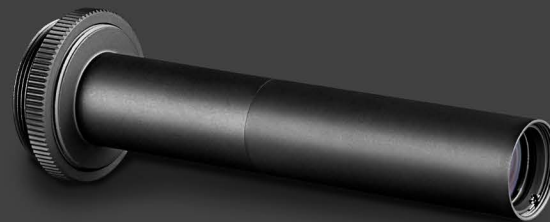
WD 150mm

WD 250mm

Lens Model	Mag.(x)	WD (mm)	Max Sensor Size (Φmm)	F/#	NA	Resolution (μm)	MTF30 (lp/mm)	Telecentricity (° max)	Distortion (% max)	DoF(mm)	Length (mm)	Mount
WWL08-150A	0.8	150	6.0(1/3")	13.6	0.029	11.5	75	0.8	0.1	1.7	80.0	C
WWL10-150AT	1.0	150	6.0(1/3")	23.5	0.021	15.8	40	0.01	0.2	1.9	90.1	C
WWL10-150CT	1.0	150	6.0(1/3")	23.5	0.021	15.8	40	0.01	0.2	1.9	90.1	C
WWL15-150AT	1.5	150	6.0(1/3")	27.1	0.028	12.1	35	0.01	0.25	1.0	90.2	C
WWL15-150CT	1.5	150	6.0(1/3")	27.1	0.028	12.1	35	0.01	0.25	1.0	90.2	C
WWL20-150AT	2.0	150	6.0(1/3")	32.4	0.031	10.8	28	0.01	0.15	0.6	102.6	C
WWL20-150CT	2.0	150	6.0(1/3")	32.4	0.031	10.8	28	0.01	0.15	0.6	102.6	C
WWL30-150AT	3.0	150	6.0(1/3")	45.5	0.033	10.1	20	0.01	0.05	0.4	128.8	C
WWL30-150CT	3.0	150	6.0(1/3")	45.5	0.033	10.1	20	0.01	0.05	0.4	128.8	C
WWL40-150A	4.0	150	6.0(1/3")	47.9	0.041	8.2	20	0.3	0.05	0.2	172.4	C
WWL40-150C	4.0	150	6.0(1/3")	47.9	0.041	8.2	20	0.3	0.05	0.2	172.4	C

WWL Series-WD 250mm

**Support 1/3" CCD,
Fixed Magnification
Object Side Telecentric**



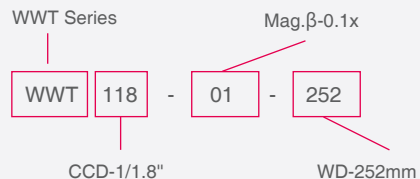
Lens Model	Mag.(x)	WD (mm)	Max Sensor Size (Φmm)	F/#	NA	Resolution (μm)	MTF30 (lp/mm)	Telecentricity (° max)	Distortion (% max)	DoF(mm)	Length (mm)	Mount
WWL05-250A	0.5	250	6.0(1/3")	15.9	0.016	21.2	60	Non Telecentric	0.05	5.1	68.5	C
WWL08-250AN	0.8	250	6.0(1/3")	17.5	0.023	14.6	53	Non Telecentric	0.2	2.2	83.5	C
WWL10-250A	1.0	250	6.0(1/3")	20	0.025	13.4	45	Non Telecentric	0.1	1.6	115.8	C
WWL10-250C	1.0	250	6.0(1/3")	20	0.025	13.4	45	Non Telecentric	0.1	1.6	115.8	C
WWL15-250A	1.5	250	6.0(1/3")	29.7	0.025	13.4	33	Non Telecentric	0.2	1.1	141.5	C
WWL15-250C	1.5	250	6.0(1/3")	29.7	0.025	13.4	33	Non Telecentric	0.2	1.1	141.5	C
WWL20-250A	2.0	250	6.0(1/3")	40	0.025	13.4	23	Non Telecentric	0.05	0.8	141.2	C
WWL20-250C	2.0	250	6.0(1/3")	40	0.025	13.4	23	Non Telecentric	0.05	0.8	141.2	C

WWT Series

High Cost-effective Positioning Industrial Lenses



Naming Rule



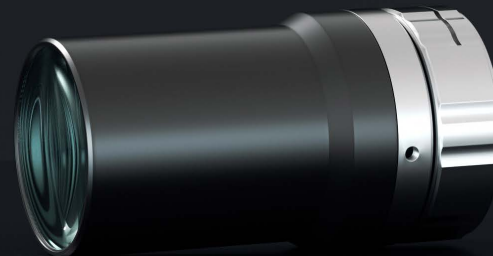
Features

·WWT series industrial lenses, improved the imaging quality of traditional FA lenses, lower cost and more stable.

WWT 118 Series

Support 1/1.8"CCD

Industrial Lenses

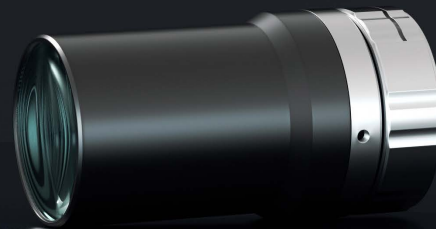


Lens Model	Mag.(x)	WD (mm)	Max Sensor Size (Φmm)	Focal Length (mm)	F/#	NA	Resolution (μm)	MTF30 (lp/mm)	Telecentricity (° max)	Length (mm)	Mount
WWT118-01-145	0.1	145	9.0(1/1.8")	15.87	6.0	0.008	40.3	139.0	-0.208%	22.5	C
WWT118-01-252	0.1	252	9.0(1/1.8")	25.04	5.6	0.009	37.5	172.0	-0.015%	31.0	C
WWT118-02-130	0.2	130	9.0(1/1.8")	24.99	5.6	0.018	18.8	152.0	-0.037%	30.0	C
WWT118-05-56	0.5	56	9.0(1/1.8")	24.89	8.0	0.031	10.8	94.0	-0.034%	37.0	C
WWT118-06-106	0.6	106	9.0(1/1.8")	45.4	7.5	0.040	8.4	140.0	0.031%	70.8	C
WWT118-09-81	0.9	81	9.0(1/1.8")	45.63	8.0	0.056	6.0	117.0	0.027%	84.5	C
WWT118-10-58	1	58	9.0(1/1.8")	45	8.5	0.058	5.7	78.0	-0.008%	72.3	C
WWT118-10-76	1	76	9.0(1/1.8")	45.71	8.5	0.059	5.7	106.0	-0.017%	89.4	C

WWT 230 Series

Support 2/3" CCD

Industrial Lenses



WWT 118 Series

WWT 230 Series

WWT 121 Series

Lens Model	Mag.(x)	WD (mm)	Max Sensor Size (Φmm)	Focal Length (mm)	F/#	NA	Resolution (μm)	MTF30 (lp/mm)	Telecentricity (° max)	Length (mm)	Mount
WWT230-01-360	0.1	360	11.0(2/3")	34.83	5.6	0.009	37.6	116.0	-0.089%	38.3	C
WWT230-01-544	0.1	544	11.0(2/3")	52.75	6.0	0.008	40.2	126.8	-0.068%	54.0	C
WWT230-02-192	0.2	192	11.0(2/3")	35.52	5.6	0.018	18.9	124.0	-0.028%	40.7	C
WWT230-02-264	0.2	264	11.0(2/3")	47.49	6.0	0.017	20.1	114.0	0.044%	54.5	C
WWT230-03-88	0.3	88	11.0(2/3")	24.99	6.5	0.023	14.6	109.0	-0.049%	33.5	C
WWT230-03-135	0.3	135	11.0(2/3")	36.61	6.0	0.025	13.5	120.0	-0.122%	45.5	C
WWT230-03-183	0.3	183	11.0(2/3")	46.28	6.5	0.023	14.5	101.0	0.026%	57.8	C
WWT230-04-68	0.4	68	11.0(2/3")	25.06	6.5	0.031	10.9	94.0	-0.068%	35.3	C
WWT230-04-106	0.4	106	11.0(2/3")	37.17	6.0	0.033	10.1	118.0	-0.021%	49.3	C
WWT230-04-144	0.4	144	11.0(2/3")	45.81	6.5	0.031	10.9	104.0	0.064%	62.3	C
WWT230-05-90	0.5	90	11.0(2/3")	38.01	7.0	0.036	9.4	118.0	0.022%	52.2	C
WWT230-05-121	0.5	121	11.0(2/3")	45.52	7.0	0.036	9.4	106.0	0.036%	66.4	C
WWT230-06-78	0.6	78	11.0(2/3")	39.32	7.0	0.043	7.8	108.0	-0.024%	57.8	C
WWT230-07-70	0.7	70	11.0(2/3")	40.45	8.0	0.047	7.7	115.0	-0.029%	61.8	C
WWT230-07-95	0.7	95	11.0(2/3")	45.48	7.5	0.047	7.2	96.0	-0.027%	75.5	C
WWT230-08-65	0.8	65	11.0(2/3")	42.1	8.0	0.050	6.7	94.0	-0.018%	65.3	C
WWT230-08-87	0.8	87	11.0(2/3")	45.47	7.5	0.053	6.3	93.0	-0.035%	79.9	C
WWT230-09-60	0.9	60	11.0(2/3")	43.39	8.5	0.053	6.3	102.0	-0.040%	69.7	C

WWT 121 Series

Support 1.2" CCD

Industrial Lenses



Lens Model	Mag.(x)	WD (mm)	Max Sensor Size (Φmm)	Focal Length (mm)	F/#	NA	Resolution (μm)	MTF30 (lp/mm)	Telecentricity (° max)	Length (mm)	Mount
WWT121-01-238	0.1	238	20.0(1.2")	25.09	6.0	0.008	40.3	120	0.32	56.4	C
WWT121-01-352	0.1	352	20.0(1.2")	34.34	6.0	0.004	80.5	150	0.03	44.0	C
WWT121-01-516	0.1	516	20.0(1.2")	50.07	5.0	0.010	33.5	186	0.1	52.1	C
WWT121-015-154	0.15	154	20.0(1.2")	25.09	6.2	0.012	27.7	116	0.36	57.7	C
WWT121-015-239	0.15	239	20.0(1.2")	36.04	6.0	0.013	26.8	158	0.01	46.1	C
WWT121-015-357	0.15	357	20.0(1.2")	51.22	5.6	0.013	25.1	150	0.01	54.5	C
WWT121-02-113	0.2	113	20.0(1.2")	25.07	6.2	0.016	20.8	112	0.39	58.8	C
WWT121-02-183	0.2	183	20.0(1.2")	36.75	6.0	0.017	20.1	150	0.01	48.3	C
WWT121-02-276	0.2	276	20.0(1.2")	52.34	5.6	0.018	18.7	168	0.05	57.5	C
WWT121-02-413	0.2	413	20.0(1.2")	76.00	5.6	0.018	19.1	124	0.05	77.0	C
WWT121-025-87	0.25	87	20.0(1.2")	25.03	6.4	0.020	17.2	100	0.42	50.1	C
WWT121-025-148	0.25	148	20.0(1.2")	37.53	6.0	0.021	16.1	144	0.02	50.5	C

Lens Model	Mag.(x)	WD (mm)	Max Sensor Size (Φmm)	Focal Length (mm)	F/#	NA	Resolution (μm)	MTF30 (lp/mm)	Telecentricity (° max)	Length (mm)	Mount
WWT121-025-229	0.25	229	20.0(1.2")	53.59	5.6	0.022	15.0	158	0.02	60.2	C
WWT121-025-338	0.25	338	20.0(1.2")	76.55	6.0	0.021	16.1	118	0.02	79.3	C
WWT121-03-70	0.3	70	20.0(1.2")	24.97	6.6	0.023	14.7	90	0.44	61.3	C
WWT121-03-125	0.3	125	20.0(1.2")	38.16	6.0	0.025	13.4	134	0.02	52.3	C
WWT121-03-197	0.3	197	20.0(1.2")	54.69	6.0	0.025	13.4	154	0.05	62.8	C
WWT121-035-58	0.35	58	20.0(1.2")	24.92	6.8	0.026	13.0	82	0.46	62.5	C
WWT121-035-109	0.35	109	20.0(1.2")	39.18	6.0	0.029	11.5	136	0.06	54.8	C
WWT121-035-174	0.35	174	20.0(1.2")	55.97	6.0	0.029	11.5	150	0.09	35.5	C
WWT121-035-254	0.35	254	20.0(1.2")	77.57	6.6	0.026	12.8	108	0.09	84.0	C
WWT121-04-49	0.4	49	20.0(1.2")	24.87	7.2	0.028	12.1	78	0.46	63.7	C
WWT121-04-98	0.4	98	20.0(1.2")	39.75	6.0	0.033	10.0	130	0.05	56.3	C
WWT121-04-157	0.4	157	20.0(1.2")	57.33	6.0	0.033	10.1	144	0.1	67.7	C
WWT121-04-227	0.4	227	20.0(1.2")	78.11	6.9	0.029	11.6	106	0.27	86.5	C
WWT121-045-143	0.45	143	20.0(1.2")	58.76	6.0	0.038	8.9	136	0.15	70.9	C

WWT 118 Series

WWT 230 Series

WWT 121 Series

Lens Model	Mag.(x)	WD (mm)	Max Sensor Size (Φmm)	Focal Length (mm)	F/#	NA	Resolution (μm)	MTF30 (lp/mm)	Telecentricity (° max)	Length (mm)	Mount
WWT121-05-37	0.5	37	20.0(1.2")	24.80	8.0	0.031	10.7	70	0.42	65.7	C
WWT121-05-80	0.5	80	20.0(1.2")	39.73	6.0	0.042	8.1	116	0.01	60.3	C
WWT121-05-133	0.5	133	20.0(1.2")	60.23	6.0	0.042	8.1	130	0.2	73.1	C
WWT121-05-190	0.5	190	20.0(1.2")	79.23	7.5	0.033	10.1	98	0.3	91.7	C
WWT121-055-124	0.55	124	20.0(1.2")	61.80	6.0	0.046	7.3	120	0.25	75.8	C
WWT121-06-117	0.6	117	20.0(1.2")	63.48	6.0	0.050	6.7	108	0.3	78.6	C
WWT121-065-110	0.65	110	20.0(1.2")	65.45	6.0	0.055	6.1	94	0.35	81.8	C
WWT121-07-106	0.7	106	20.0(1.2")	67.13	7.0	0.050	6.7	88	0.35	83.6	C
WWT121-08-98	0.8	98	20.0(1.2")	71.41	8.0	0.050	6.7	78	0.4	88.9	C
WWT121-085-94	0.85	94	20.0(1.2")	73.66	8.0	0.053	6.3	73	0.45	91.7	C
WWT121-085-130	0.85	130	20.0(1.2")	84.09	9.5	0.044	7.6	70	0.56	108.3	C
WWT121-09-91	0.9	91	20.0(1.2")	76.09	8.0	0.056	6	65	0.5	94.4	C
WWT121-09-106	0.9	106	20.0(1.2")	84.92	9.8	0.046	7.4	66	0.57	130.2	C
WWT121-095-86	0.95	86	20.0(1.2")	78.49	8.0	0.059	6	60	0.5	98.7	C
WWT121-10-86	1.0	86	20.0(1.2")	81.57	8.0	0.062	5.4	54	0.5	99.5	C

MFA Series

C-Mount Fixed Focal Length Lenses



Naming Rule



Features

- Support mainstream cameras: 5MP 2/3", 6MP 1/1.8", 20MP 1", 25MP 1.1", 24MP 1.2".
- Miniaturized design.
- High definition, high contrast, low distortion.

MFA118 Series

Supports 6 Megapixels

1/1.8"CCD

Industrial Lenses



Lens Model	Focal Length (mm)	F#	Sensor Size	Support Cameras	Min Working Distance (mm)	Filter Size	TV Distortion	Mount
MFA118-S06	6mm	F=1:2.0	1/1.8"	6M	100mm	M25.5xP0.5	<0.1%	C-Mount
MFA118-S08	8mm	F=2.8~16	1/1.8"	6M	100mm	M27xP0.5	<0.12%	C-Mount
MFA118-S12V2	12mm	F=2.8~16	1/1.8"	6M	100mm	M27xP0.5	-0.20%	C-Mount
MFA118-S16V2	16mm	F=2.8~16	1/1.8"	6M	100mm	M27xP0.5	-0.40%	C-Mount
MFA118-S25V2	25mm	F=2.8~16	1/1.8"	6M	100mm	M27xP0.5	-0.02%	C-Mount
MFA118-S35V2	35mm	F=2.8~16	1/1.8"	6M	180mm	M27xP0.5	-0.10%	C-Mount
MFA118-S50V2	50mm	F=2.8~16	1/1.8"	6M	300mm	M27xP0.5	-1.89%	C-Mount

MFA121 Series

Supports 25 Megapixels

1.2" CCD

Industrial Lenses



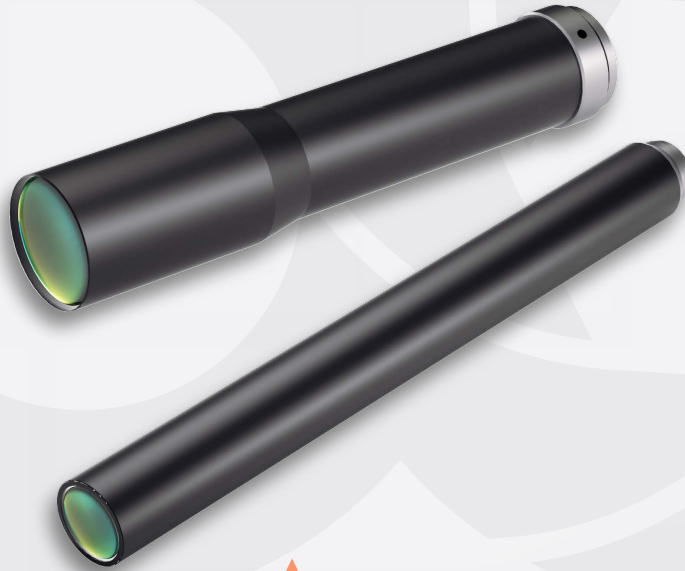
MFA118 Series

MFA121 Series

Lens Model	Focal Length (mm)	F#	Sensor Size	Support Cameras	Min Working Distance (mm)	Filter Size	TV Distortion	Mount
MFA121-U18	18mm	F=4.0~16	1.2"	25M	100mm	M35.5xP0.5	<0.5%	C-Mount
MFA121-U25	25mm	F=4.0~16	1.2"	25M	150mm	M35.5xP0.5	<0.01%	C-Mount
MFA121-U35	35mm	F=4.0~16	1.2"	25M	200mm	M35.5xP0.5	<0.01%	C-Mount
MFA121-U50	50mm	F=4.0~16	1.2"	25M	300mm	M35.5xP0.5	<0.05%	C-Mount
MFA121-U70	70mm	F=4.0~16	1.2"	25M	300mm	M35.5xP0.5	<0.06%	C-Mount
MFA121-U75	75mm	F=4.0~16	1.2"	25M	285mm	M35.5xP0.5	<0.14%	C-Mount

WH Series

Supports 1/2.3"~1/2.5" Industrial Camera



Naming Rules

WH Series WD-155mm CCD-1/1.8"



Mag.β-0.2x

A: Non Coaxial Illumination
C: With Coaxial Illumination

Features

- High resolution
- Ultra long working distance
- Quick customization

WH Series

Supports 1/2.3"~1/2.5"

Industrial Camera



Lens Model	Mag.(x)	WD (mm)	Max Sensor Size (Φmm)	F/#	Telecentricity (° max)	Distortion (% max)	NA	Resolution (μm)	DoF(mm)	Length (mm)	Mount
WH015-450A-120	0.15	450	7.9(1/2.3")	8.3	Non Telecentric	0.1	0.009	37.3	29.5	92.8	C
WH025-210A-120	0.25	210	7.9(1/2.3")	9	Non Telecentric	0.2	0.014	24.1	11.5	87.3	C
WH03-745A-120	0.3	745	7.9(1/2.3")	12	Non Telecentric	0.01	0.012	26.9	10.7	266.9	C
WH0092-330A-125	0.092	330	7.2(1/2.5")	12.2	Non Telecentric	1	0.004	89.2	115.3	40.1	C
WH0095-580A-125	0.095	580	7.2(1/2.5")	8.4	Non Telecentric	0.1	0.006	59.2	74.5	83.1	C
WH014-300A	0.14	300	7.2(1/2.5")	10	Non Telecentric	0.1	0.007	47.9	40.8	97.6	C
WH014-420A-125	0.14	420	7.2(1/2.5")	8	Non Telecentric	0.1	0.009	38.3	32.7	95.3	C
WH014-460A-125	0.14	460	7.2(1/2.5")	7	Non Telecentric	0.03	0.010	33.7	28.6	105.7	C
WH015-200A-125	0.15	200	7.2(1/2.5")	8.5	Non Telecentric	0.43	0.009	37.9	30.2	48.2	C
WH015-260A-125	0.15	260	7.2(1/2.5")	16	Non Telecentric	0.2	0.005	71.2	56.9	78.1	C
WH018-130A-125	0.18	130	7.2(1/2.5")	9	Non Telecentric	0.3	0.010	33.0	22.2	67.0	C
WH018-160A-125	0.18	160	7.2(1/2.5")	9	Non Telecentric	0.3	0.010	33.0	22.2	37.0	C
WH019-345A-125	0.19	345	7.2(1/2.5")	8.3	Non Telecentric	0.1	0.012	29.2	18.4	92.2	C
WH019-435A-125	0.19	435	7.2(1/2.5")	8.2	Non Telecentric	0.1	0.012	29.2	18.2	123.6	C

WH Series
1/2.3"~1/2.5"

WH Series
1/2"

WH Series
1/1.8"

WH Series
1/1.7"

WH Series
2/3"

WH Series
1"

WH Series
1.1"

Lens Model	Mag.(x)	WD (mm)	Max Sensor Size (Φmm)	F/#	Telecentricity (° max)	Distortion (% max)	NA	Resolution (μm)	DoF(mm)	Length (mm)	Mount
WH02-113A-125	0.2	113	7.2(1/2.5")	10	Non Telecentric	0.4	0.010	33.6	20.0	87.4	C
WH02-140A-125	0.2	140	7.2(1/2.5")	8.8	Non Telecentric	<0.1	0.012	29.2	17.6	25.3	C
WH02-150A-125	0.2	150	7.2(1/2.5")	10	Non Telecentric	0.4	0.010	33.6	20.0	47.4	C
WH022-280A-125	0.22	280	7.2(1/2.5")	13.3	Non Telecentric	0.35	0.008	40.9	22.0	73.0	C
WH022-820A-125	0.22	820	7.2(1/2.5")	10.6	Non Telecentric	0.01	0.010	32.4	17.5	221.9	C
WH026-110A-125	0.26	110	7.2(1/2.5")	8.1	Non Telecentric	0.6	0.012	27.5	9.6	55.7	C
WH028-380A-125	0.28	380	7.2(1/2.5")	8	Non Telecentric	0.01	0.018	19.2	8.2	137.9	C
WH03-560A-125	0.3	560	7.2(1/2.5")	10.8	Non Telecentric	0.01	0.014	24.1	9.6	194.1	C
WH03-650A-125	0.3	650	7.2(1/2.5")	21.2	Non Telecentric	0.2	0.007	47.9	18.8	244.9	C
WH035-330A-125	0.35	330	7.2(1/2.5")	10	Non Telecentric	0.003	0.017	19.2	6.5	152.3	C
WH0375-80A-125	0.375	80	7.2(1/2.5")	8	Non Telecentric	0.01	0.023	14.4	4.6	47.4	C
WH04-113A-125	0.4	113	7.2(1/2.5")	13.4	Non Telecentric	0.25	0.015	22.3	6.7	86.9	C
WH04-190A-125	0.4	190	7.2(1/2.5")	8.5	Non Telecentric	0.1	0.024	14.3	4.3	143.2	C
WH04-300A-125	0.4	300	7.2(1/2.5")	7	Non Telecentric	0.005	0.029	11.7	3.5	159.9	C
WH04-900A-125	0.4	900	7.2(1/2.5")	16.3	Non Telecentric	0.3	0.012	28.6	8.2	251.4	C
WH05-170A	0.5	170	7.2(1/2.5")	9.3	Non Telecentric	0.2	0.027	12.5	3.0	89.6	C
WH05-200A	0.5	200	7.2(1/2.5")	11.2	Non Telecentric	0.1	0.022	15.1	3.6	101.7	C
WH05-225A-125	0.5	225	7.2(1/2.5")	9	Non Telecentric	0.1	0.028	12.1	2.9	163.8	C
WH05-820A-125	0.5	820	7.2(1/2.5")	22.2	Non Telecentric	0.3	0.011	29.7	7.1	165.8	C
WH08-570A-125	0.8	570	7.2(1/2.5")	23.9	Non Telecentric	0.3	0.017	20.0	3.0	179.7	C
WH13-390C-125	1.3	390	7.2(1/2.5")	27.5	Non Telecentric	0.3	0.023	14.5	1.3	199.7	C
WH20-200AL-125	2	200	7.2(1/2.5")	36.5	Non Telecentric	0.4	0.027	12.6	0.7	148.0	C

WH Series

Supports 1/2"

Industrial Camera



WH Series
1/2.3" ~ 1/2.5"

WH Series
1/2"

WH Series
1/1.8"

WH Series
1/1.7"

WH Series
2/3"

WH Series
1"

WH Series
1.1"

Lens Model	Mag.(x)	WD (mm)	Max Sensor Size (Φmm)	F/#	Telecentricity (° max)	Distortion (% max)	NA	Resolution (μm)	DoF(mm)	Length (mm)	Mount
WH018-300A-120	0.18	300	8(1/2")	8.7	Non Telecentric	0.2	0.010	32.4	21.5	85.5	C
WH02-180A-120	0.2	180	8(1/2")	10.6	Non Telecentric	0.08	0.010	35.2	6.0	85.3	C
WH02-650A-120	0.2	650	8(1/2")	10	Non Telecentric	0.05	0.010	33.6	20.0	141.4	C
WH022-145A	0.22	145	8(1/2")	11.5	Non Telecentric	0.6	0.010	32.5	19.0	41.5	C
WH022-150A-120	0.22	150	8(1/2")	10	Non Telecentric	0.05	0.011	30.5	16.5	77.8	C
WH022-160A-120	0.22	160	8(1/2")	13.4	Non Telecentric	0.15	0.008	40.7	7.0	88.1	C

Lens Model	Mag.(x)	WD (mm)	Max Sensor Size (Φmm)	F/#	Telecentricity (° max)	Distortion (% max)	NA	Resolution (μm)	DoF(mm)	Length (mm)	Mount
WH025-340A-120	0.25	340	8(1/2")	9	Non Telecentric	0.02	0.014	24.3	11.5	131.9	C
WH027-220A-120	0.27	220	8(1/2")	8.3	Non Telecentric	0.1	0.016	20.6	9.1	113.7	C
WH03-130A-120	0.3	130	8(1/2")	11.3	Non Telecentric	0.3	0.013	25.2	10.0	143.8	C
WH03-180A-120	0.3	180	8(1/2")	11.3	Non Telecentric	0.3	0.013	28.3	10.0	93.8	C
WH03-240A-120	0.3	240	8(1/2")	9	Non Telecentric	0.03	0.017	20.1	8.0	111.1	C
WH03-530-123	0.3	530	8(1/2")	8	Non Telecentric	0.01	0.019	17.9	7.1	215.6	C
WH05-300CT	0.5	300	8(1/2")	25	Non Telecentric	0.13	0.010	33.6	8.0	190.9	C
WH05-330CIR	0.5	330	8(1/2")	11.9	Non Telecentric	0.1	0.021	24.7	3.8	186.2	C
WH10-250CS-120	1	250	8(1/2")	20	Non Telecentric	0.4	0.025	13.4	1.6	117.3	C
WH20-300A-120	2	300	8(1/2")	27.2	Non Telecentric	0.2	0.033	10.1	0.5	220.1	C

WH Series

Supports 1/1.8"

Industrial Camera



WH Series
1/2.3" ~ 1/2.5"

WH Series
1/2"

WH Series
1/1.8"

WH Series
1/1.7"

WH Series
2/3"

WH Series
1"

WH Series
1.1"

Lens Model	Mag.(x)	WD (mm)	Max Sensor Size (Φmm)	F/#	Telecentricity (° max)	Distortion (% max)	NA	Resolution (μm)	DoF(mm)	Length (mm)	Mount
WH02-155A-118	0.2	155	9(1/1.8")	11	Non Telecentric	0.7	0.009	36.7	22.0	39.8	C
WH025-200A-118	0.25	200	9(1/1.8")	13.7	Non Telecentric	0.3	0.009	36.6	17.5	108.4	C
WH025-285A-118	0.25	285	9(1/1.8")	9.5	Non Telecentric	0.1	0.013	25.5	12.2	106.1	C
WH025-330A-118	0.25	330	9(1/1.8")	14.4	Non Telecentric	0.1	0.009	36.8	18.4	90.4	C
WH025-400A-118	0.25	400	9(1/1.8")	9.6	Non Telecentric	0.1	0.013	25.7	12.3	127.8	C
WH025-415A-118	0.25	415	9(1/1.8")	9.9	Non Telecentric	0.1	0.013	26.4	12.7	129.9	C
WH03-113A-118	0.3	113	9(1/1.8")	13.4	Non Telecentric	0.17	0.011	31.4	11.9	87.5	C
WH03-260A-118	0.3	260	9(1/1.8")	9.2	Non Telecentric	0.02	0.016	20.5	8.2	126.7	C
WH045-48A-118	0.45	48	9(1/1.8")	11.7	Non Telecentric	0.35	0.019	17.3	4.6	101.0	C
WH05-130A	0.5	130	9(1/1.8")	21.1	Non Telecentric	0.6	0.012	28.4	6.8	109.5	C
WH05-260C-118	0.5	260	9(1/1.8")	13.1	Non Telecentric	0.05	0.019	17.6	4.2	183.3	C
WH10-565A-118	1	565	9(1/1.8")	29.8	Non Telecentric	0.3	0.017	20.0	2.4	196.2	C
WH10-565C-118	1	565	9(1/1.8")	29.8	Non Telecentric	0.6	0.017	19.9	2.4	196.2	C
WH30-250AT	3	250	9(1/1.8")	49.4	0.1	0.8	0.028	12.0	0.4	266.4	C
WH40-250C-118	4	250	9(1/1.8")	46.7	Non Telecentric	0.3	0.036	9.3	0.2	293.4	C

WH Series

Supports 1/1.7"

Industrial Camera

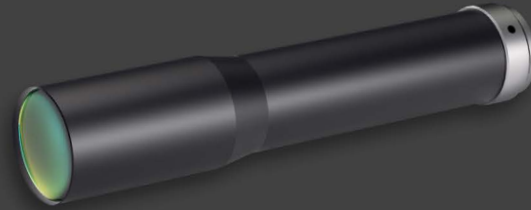


Lens Model	Mag.(x)	WD (mm)	Max Sensor Size (Φmm)	F/#	Telecentricity (° max)	Distortion (% max)	NA	Resolution (μm)	DoF(mm)	Length (mm)	Mount
WH009-660A-117	0.09	660	9.4(1/1.7")	8	Non Telecentric	0.04	0.006	59.6	79.0	91.5	C
WH01-750A-117	0.1	750	9.4(1/1.7")	9.5	Non Telecentric	0.05	0.005	63.7	76.0	103.3	C
WH0125-580A-117	0.125	580	9.4(1/1.7")	10	Non Telecentric	0.01	0.006	53.5	51.2	101.6	C
WH0126-875-117	0.126	875	9.4(1/1.7")	5	Non Telecentric	0.1	0.013	26.7	25.2	104.7	C
WH0142-630A-117	0.142	630	9.4(1/1.7")	10	Non Telecentric	0.05	0.007	47.2	39.7	107.2	C
WH02-330A-117	0.2	330	9.4(1/1.7")	9.4	Non Telecentric	0.2	0.011	31.4	18.8	89.9	C
WH03-550A-117	0.3	550	9.4(1/1.7")	12	Non Telecentric	0.005	0.012	26.9	10.7	182.9	C
WH03-640A-117	0.3	640	9.4(1/1.7")	10.8	Non Telecentric	0.005	0.014	24.3	9.6	241.3	C
WH0385-485A-117	0.385	485	9.4(1/1.7")	11.5	Non Telecentric	0.02	0.017	20.1	6.2	265.5	C
WH04-550A-117IR	0.4	550	9.4(1/1.7")	10	Non Telecentric	0.01	0.020	25.8	5.0	281.5	C
WH04-650A-117	0.4	650	9.5(1/1.7")	11.4	Non Telecentric	0.03	0.017	19.2	5.7	294.8	C
WH06-200A-117	0.6	200	9.4(1/1.7")	9	Non Telecentric	0.05	0.033	10.1	2.0	183.1	C
WH07-480A-117	0.7	480	9.4(1/1.7")	18	Non Telecentric	0.2	0.020	17.2	2.9	180.9	C

WH Series

Supports 2/3"

Industrial Camera



Lens Model	Mag.(x)	WD (mm)	Max Sensor Size (Φmm)	F/#	Telecentricity (° max)	Distortion (% max)	NA	Resolution (μm)	DoF(mm)	Length (mm)	Mount
WH004-740A-230	0.04	740	11(2/3")	11.6	Non Telecentric	0.5	0.002	192.8	580.0	34.4	C
WH01-1405A-230	0.1	1405	11(2/3")	9.6	Non Telecentric	0.05	0.005	64.0	76.8	176.7	C
WH01-290A	0.1	290	11(2/3")	11.9	Non Telecentric	0.1	0.004	75.1	95.2	38.5	C
WH011-580A	0.11	580	11(2/3")	12	Non Telecentric	0.1	0.005	73.3	79.3	100.0	C
WH011-660A	0.11	660	11(2/3")	11.2	Non Telecentric	0.18	0.005	68.6	74.0	111.7	C
WH012-455A	0.12	455	11(2/3")	12.9	Non Telecentric	0.2	0.005	71.8	71.7	81.6	C
WH012-650A-230	0.12	650	11(2/3")	8.4	Non Telecentric	0.05	0.007	47.0	46.7	109.1	C
WH0125-270A	0.125	270	11(2/3")	12.2	Non Telecentric	0.2	0.005	65.3	62.5	60.7	C
WH014-250A-230	0.14	250	11(2/3")	11	Non Telecentric	0.1	0.006	52.6	44.9	70.2	C
WH014-600A	0.14	600	11(2/3")	17	Non Telecentric	0.25	0.004	81.4	69.4	98.0	C
WH014-700A-230	0.14	700	11(2/3")	9.3	Non Telecentric	<0.1	0.008	44.7	38.0	118.2	C
WH015-205A-230	0.15	205	11(2/3")	12.5	Non Telecentric	1	0.006	55.5	44.4	41.8	C
WH015-680A-230	0.15	680	11(2/3")	10.5	Non Telecentric	0.05	0.007	46.9	37.3	122.5	C
WH016-210A	0.16	210	11(2/3")	11.4	Non Telecentric	0.1	0.007	47.8	35.6	68.1	C
WH016-360A	0.16	360	11(2/3")	10	Non Telecentric	0.2	0.008	41.9	31.3	94.3	C
WH016-525A-230	0.16	525	11(2/3")	18.3	Non Telecentric	<0.1	0.004	76.8	57.2	96.5	C
WH016-600A	0.16	600	11(2/3")	11.8	Non Telecentric	0.1	0.007	49.1	36.9	116.6	C
WH018-150A	0.18	150	11(2/3")	12.6	Non Telecentric	0.6	0.007	47.1	31.1	77.2	C

WH Series
1/2.3" ~ 1/2.5"

WH Series
1/2"

WH Series
1/1.8"

WH Series
1/1.7"

WH Series
2/3"

WH Series
1"

WH Series
1.1"

Reference Card
WWK Series
WWH-Series
WWL Series
WWT Series
MFA Series
WH Series
Featured Products
Appendix

Lens Model	Mag.(x)	WD (mm)	Max Sensor Size (Φmm)	F/#	Telecentricity (° max)	Distortion (% max)	NA	Resolution (μm)	DoF(mm)	Length (mm)	Mount
WH018-550A-230	0.18	550	11(2/3")	10	Non Telecentric	0.1	0.009	37.4	24.7	120.8	C
WH018-680A-230	0.18	680	11(2/3")	10.5	Non Telecentric	0.15	0.009	39.0	25.9	137.6	C
WH018-750A-230	0.18	750	11(2/3")	10	Non Telecentric	0.05	0.009	37.3	24.7	162.2	C
WH0185-350A-230	0.185	350	11(2/3")	9.5	Non Telecentric	0.05	0.010	34.4	22.2	154.6	C
WH0195-550AS-230	0.195	550	11(2/3")	9.2	Non Telecentric	0.1	0.011	31.7	19.4	155.0	C
WH02-140A	0.2	140	11(2/3")	14.4	Non Telecentric	0.1	0.007	47.9	28.8	25.3	C
WH02-170A	0.2	170	11(2/3")	12.6	Non Telecentric	0.13	0.008	42.2	25.2	73.1	C
WH02-180A-230	0.2	180	11(2/3")	12.5	Non Telecentric	0.1	0.008	41.7	25.0	92.9	C
WH02-300A	0.2	300	11(2/3")	9.8	Non Telecentric	0.18	0.010	33.6	19.6	100.8	C
WH02-390A	0.2	390	11(2/3")	15.6	Non Telecentric	0.1	0.006	52.3	31.2	80.1	C
WH02-620A	0.2	620	11(2/3")	13.4	Non Telecentric	0.1	0.007	45.0	26.8	138.9	C
WH02-625A	0.2	625	11(2/3")	13.5	Non Telecentric	0.1	0.007	45.3	27.0	139.4	C
WH02-1000A-230	0.2	1000	11(2/3")	10.7	Non Telecentric	0.01	0.009	36.1	21.4	242.7	C
WH021-520AIR	0.21	520	11(2/3")	14.5	Non Telecentric	1.3	0.007	72.1	26.3	82.2	C
WH022-135A-230	0.22	135	11(2/3")	11.9	Non Telecentric	0.25	0.009	36.1	19.7	66.5	C
WH022-145A-230	0.22	145	11(2/3")	11.9	Non Telecentric	0.25	0.009	36.1	19.7	56.5	C
WH022-235A	0.22	235	11(2/3")	14.1	Non Telecentric	0.4	0.008	42.8	23.3	81.5	C
WH022-275A	0.22	275	11(2/3")	11.3	Non Telecentric	0.1	0.008	41.9	18.7	108.8	C
WH022-300A	0.22	300	11(2/3")	10.4	Non Telecentric	0.1	0.011	31.8	17.2	120.6	C
WH022-580A	0.22	580	11(2/3")	12.5	Non Telecentric	0.15	0.009	38.1	20.7	142.5	C
WH024-490A	0.24	490	11(2/3")	10	Non Telecentric	0.1	0.012	28.0	13.9	142.6	C
WH025-650A-230	0.25	650	11(2/3")	9.3	Non Telecentric	0.02	0.013	24.9	11.9	217.8	C
WH025-760A-230	0.25	760	11(2/3")	10	Non Telecentric	0.02	0.013	26.8	12.8	235.7	C
WH027-120A	0.27	120	11(2/3")	14.3	Non Telecentric	0.9	0.009	35.7	15.7	43.7	C
WH028-295A-230	0.28	295	11(2/3")	8.8	Non Telecentric	0.03	0.016	21.0	9.0	133.8	C
WH03-140A-230	0.3	140	11(2/3")	11.7	Non Telecentric	0.25	0.013	25.9	10.4	128.8	C
WH03-168A-230	0.3	168	11(2/3")	9	Non Telecentric	0.3	0.017	20.1	8.0	127.9	C

Lens Model	Mag.(x)	WD (mm)	Max Sensor Size (Φmm)	F/#	Telecentricity (° max)	Distortion (% max)	NA	Resolution (μm)	DoF(mm)	Length (mm)	Mount
WH03-193A-230	0.3	190	11(2/3")	10.1	Non Telecentric	0.5	0.015	22.4	9.0	119.5	C
WH03-240A-230	0.3	240	11(2/3")	9.5	Non Telecentric	0.1	0.016	21.2	8.4	111.1	C
WH03-260AS	0.3	260	11(2/3")	13.4	Non Telecentric	0.4	0.011	30.3	11.9	75.9	C
WH03-270A-230	0.3	270	11(2/3")	7.7	Non Telecentric	0.02	0.020	17.1	6.8	132.9	C
WH03-300A	0.3	300	11(2/3")	11.3	Non Telecentric	0.15	0.013	25.1	10.0	107.7	C
WH03-300AIR	0.3	300	11(2/3")	11.3	Non Telecentric	0.15	0.013	38.4	10.0	107.5	C
WH03-420A	0.3	420	11(2/3")	13.9	Non Telecentric	0.1	0.011	31.1	12.4	152.4	C
WH03-450AIR	0.3	450	11(2/3")	9.2	Non Telecentric	0.15	0.016	31.6	8.2	155.1	C
WH03-460A-230	0.3	460	11(2/3")	11.6	Non Telecentric	0.17	0.013	25.9	10.3	156.3	C
WH03-600A-230	0.3	600	11(2/3")	16	Non Telecentric	0.6	0.009	36.0	14.2	121.1	C
WH033-490A-230	0.33	490	11(2/3")	11	Non Telecentric	0.05	0.015	22.3	8.1	194.8	C
WH033-560A-230	0.33	560	11(2/3")	24.9	Non Telecentric	0.05	0.007	51.0	18.3	101.1	C
WH033-560A-230L	0.33	560	11(2/3")	11.7	Non Telecentric	0.02	0.014	23.7	8.6	230.5	C
WH033-800A-230	0.33	800	11(2/3")	13.1	Non Telecentric	0.03	0.012	27.0	9.6	275.9	C
WH035-430A-230	0.35	430	11(2/3")	12.3	Non Telecentric	0.2	0.014	23.5	8.0	163.3	C
WH038-120A	0.38	120	11(2/3")	11.6	Non Telecentric	0.7	0.017	19.7	6.4	76.9	C
WH04-65A-230	0.4	65	11(2/3")	14.4	Non Telecentric	0.4	0.014	24.1	7.2	90.0	C
WH04-150A	0.4	150	11(2/3")	8.5	Non Telecentric	0.1	0.024	14.3	4.3	163.4	C
WH04-230A-230	0.4	230	11(2/3")	13.8	Non Telecentric	0.15	0.015	23.1	6.9	129.7	C
WH04-240AIR-230	0.4	240	11(2/3")	12.1	Non Telecentric	0.15	0.017	30.9	6.1	119.2	C
WH04-300A-230	0.4	300	11(2/3")	8.5	Non Telecentric	0.02	0.023	14.3	4.3	161.9	C
WH04-310A	0.4	310	11(2/3")	15	Non Telecentric	0.1	0.013	25.1	7.5	159.9	C
WH04-350A-230	0.4	350	11(2/3")	11	Non Telecentric	0.05	0.018	18.4	5.5	169.8	C
WH04-400A	0.4	400	11(2/3")	14.3	Non Telecentric	0.13	0.014	23.9	7.2	168.4	C
WH04-600A	0.4	600	11(2/3")	19.9	Non Telecentric	0.6	0.010	33.7	10.0	153.6	C
WH044-240A	0.44	240	11(2/3")	10	Non Telecentric	0.1	0.022	15.1	4.1	144.8	C
WH045-160A-230	0.45	160	11(2/3")	9.4	Non Telecentric	0.1	0.024	14.0	3.7	169.6	C

WH Series
1/2.3" ~ 1/2.5"

WH Series
1/2"

WH Series
1/1.8"

WH Series
1/1.7"

WH Series
2/3"

WH Series
1"

WH Series
1.1"

Reference Card
WWK Series
WWH-Series
WWL Series
WWT Series
MFA Series
WH Series
Featured Products
Appendix

Lens Model	Mag.(x)	WD (mm)	Max Sensor Size (Φmm)	F/#	Telecentricity (° max)	Distortion (% max)	NA	Resolution (μm)	DoF(mm)	Length (mm)	Mount
WH047-270A-230	0.47	270	11(2/3")	9	Non Telecentric	0.01	0.026	12.8	3.3	176.3	C
WH048-240A	0.48	240	11(2/3")	10.6	Non Telecentric	0.03	0.023	14.8	3.7	164.8	C
WH05-65A-230	0.5	65	11(2/3")	13.1	Non Telecentric	0.6	0.019	17.4	4.2	60.5	C
WH05-150A-230	0.5	150	11(2/3")	9.6	Non Telecentric	0.05	0.026	12.9	3.1	149.7	C
WH05-270AT-230	0.5	270	11(2/3")	13.2	0.05	0.1	0.019	17.7	4.2	186.7	C
WH05-300A-230	0.5	300	11(2/3")	13.7	Non Telecentric	<0.1	0.018	18.5	4.4	188.8	C
WH05-330A-230	0.5	330	11(2/3")	12.2	Non Telecentric	0.14	0.020	16.4	3.9	187.0	C
WH05-330A-230D	0.5	330	11(2/3")	9.8	Non Telecentric	<0.1	0.025	13.2	3.1	185.8	C
WH05-385A-230	0.5	385	11(2/3")	10.3	Non Telecentric	0.03	0.024	14.1	3.3	229.8	C
WH05-390A-230	0.5	390	11(2/3")	18.1	Non Telecentric	1.8	0.013	25.3	5.8	146.5	C
WH05-390A-230D	0.5	390	11(2/3")	13.7	Non Telecentric	<0.1	0.018	18.3	4.4	227.8	C
WH05-430A-230	0.5	430	11(2/3")	15.2	Non Telecentric	0.01	0.016	20.4	4.9	287.9	C
WH05-500A-230	0.5	500	11(2/3")	18	Non Telecentric	0.3	0.014	24.5	5.8	163.9	C
WH05-750A-230	0.5	750	11(2/3")	21.7	Non Telecentric	0.8	0.011	29.3	6.9	162.1	C
WH052-280A	0.52	280	11(2/3")	18	Non Telecentric	1.7	0.014	23.6	5.3	101.7	C
WH055-100A	0.55	100	11(2/3")	23.1	Non Telecentric	0.4	0.012	27.8	6.1	65.8	C
WH06-100A	0.6	100	11(2/3")	12.5	Non Telecentric	0.1	0.024	13.9	2.8	149.7	C
WH06-125A	0.6	125	11(2/3")	15	Non Telecentric	0.1	0.020	16.7	3.3	125.7	C
WH06-300A	0.6	300	11(2/3")	19.9	Non Telecentric	1.8	0.015	22.3	4.4	197.1	C
WH06-300AIR	0.6	300	11(2/3")	19.9	Non Telecentric	1.8	0.015	34.9	4.4	138.5	C
WH06-450A	0.6	450	11(2/3")	20.8	Non Telecentric	0.6	0.014	23.4	4.6	169.9	C
WH06-450A-230D	0.6	450	11(2/3")	15	Non Telecentric	0.05	0.020	16.9	3.3	344.7	C
WH06-510A-230	0.6	510	11(2/3")	23.5	Non Telecentric	0.4	0.013	26.5	5.2	170.4	C
WH06-600A-230	0.6	600	11(2/3")	27.7	Non Telecentric	0.2	0.011	31.0	6.2	177.2	C
WH067-600A-230	0.67	600	11(2/3")	20	Non Telecentric	0.05	0.017	20.0	3.6	535.7	C
WH07-100A	0.7	100	11(2/3")	18.2	Non Telecentric	0.1	0.019	17.4	3.0	145.1	C
WH07-200A	0.7	200	11(2/3")	17.4	Non Telecentric	1.8	0.020	17.0	2.8	94.0	C

Lens Model	Mag.(x)	WD (mm)	Max Sensor Size (Φmm)	F/#	Telecentricity (° max)	Distortion (% max)	NA	Resolution (μm)	DoF(mm)	Length (mm)	Mount
WH07-250A-230	0.7	250	11(2/3")	12	Non Telecentric	0.1	0.029	11.5	2.0	224.4	C
WH07-250A-230D	0.7	250	11(2/3")	10.6	Non Telecentric	0.05	0.033	10.2	1.7	224.4	C
WH07-270AL	0.7	270	11(2/3")	28.2	Non Telecentric	0.9	0.012	27.6	4.6	83.8	C
WH07-270AT-230	0.7	270	11(2/3")	11.5	0.04	0.1	0.030	11.1	1.9	218.5	C
WH07-460A	0.7	460	11(2/3")	24.5	Non Telecentric	0.4	0.014	23.9	4.0	178.1	C
WH07-460AT-230	0.7	460	11(2/3")	22.4	Non Telecentric	0.02	0.016	21.5	3.7	547.6	C
WH075-220AL-230	0.75	220	11(2/3")	15.2	Non Telecentric	0.3	0.025	13.5	2.2	110.4	C
WH075-220CL-230	0.75	220	11(2/3")	15.2	Non Telecentric	0.3	0.025	13.5	2.2	110.4	C
WH08-150AIR	0.8	150	11(2/3")	22.3	Non Telecentric	2.1	0.018	29.0	2.8	73.7	C
WH08-225A-230	0.8	225	11(2/3")	16.5	Non Telecentric	2	0.024	14.1	2.1	174.5	C
WH08-230A-230	0.8	230	11(2/3")	14.7	Non Telecentric	0.1	0.027	12.3	1.8	243.6	C
WH08-250A-230	0.8	250	11(2/3")	13.9	Non Telecentric	0.1	0.029	11.7	1.7	233.8	C
WH08-250AT	0.8	250	11(2/3")	20	0.1	0.13	0.020	16.7	2.5	230.9	C
WH08-250CT	0.8	250	11(2/3")	20	0.1	0.13	0.020	16.7	2.5	230.9	C
WH08-300A	0.8	300	11(2/3")	24	Non Telecentric	1.8	0.016	20.4	3.0	184.0	C
WH08-350AIR	0.8	350	11(2/3")	15.5	Non Telecentric	0.7	0.026	19.9	1.9	189.1	C
WH08-470A	0.8	470	11(2/3")	31.3	Non Telecentric	1.5	0.013	26.5	3.9	186.0	C
WH08-650A-230	0.8	650	11(2/3")	32.2	Non Telecentric	0.5	0.012	26.9	4.0	186.3	C
WH10-150AIR	1	150	11(2/3")	15	Non Telecentric	1.9	0.032	15.8	1.2	143.2	C
WH10-155A	1	155	11(2/3")	18	Non Telecentric	1.8	0.027	12.4	1.4	130.8	C
WH10-200A	1	200	11(2/3")	24.8	Non Telecentric	1.7	0.020	17.0	2.0	174.1	C
WH10-238A-L-230	1	238	11(2/3")	23.8	Non Telecentric	0.17	0.021	16.0	1.9	125.0	C
WH10-330AIR-230	1	330	11(2/3")	15.6	Non Telecentric	0.52	0.032	16.3	1.2	203.1	C
WH10-330CIR-230	1	330	11(2/3")	15.6	Non Telecentric	0.52	0.032	16.3	1.2	207.4	C
WH10-390A-230	1	390	11(2/3")	17.9	Non Telecentric	0.3	0.027	12.4	1.4	180.7	C
WH20-250A-230	2	250	11(2/3")	29	Non Telecentric	0.35	0.032	10.5	0.6	229.8	C
WH20-250C-230	2	250	11(2/3")	29	Non Telecentric	0.35	0.032	10.5	0.6	229.8	C

WH Series
1/2.3" ~ 1/2.5"

WH Series
1/2"

WH Series
1/1.8"

WH Series
1/1.7"

WH Series
2/3"

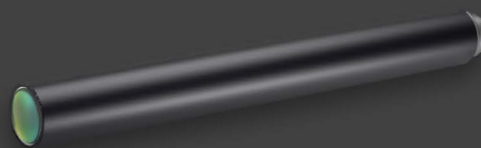
WH Series
1"

WH Series
1.1"

WH Series

Supports 1"

Industrial Camera



Lens Model	Mag.(x)	WD (mm)	Max Sensor Size (Φmm)	F/#	Telecentricity (° max)	Distortion (% max)	NA	Resolution (μm)	DoF(mm)	Length (mm)	Mount
WH014-650A-110	0.14	600	16(1")	15	Non Telecentric	0.25	0.005	71.8	61.2	109.7	C
WH014-700A-110	0.14	700	16(1")	12	Non Telecentric	0.03	0.006	57.4	49.0	118.2	C
WH016-350A-110	0.16	350	16(1")	15.5	Non Telecentric	0.2	0.005	64.8	48.4	90.8	C
WH016-696A-110	0.16	696	16(1")	5	Non Telecentric	0.04	0.016	21.0	15.6	109.5	C
WH017-1050A-110N	0.17	1050	16(1")	10.6	Non Telecentric	0.01	0.008	41.7	29.3	226.4	C
WH0175-640A-110	0.175	640	16(1")	10.9	Non Telecentric	0.2	0.008	41.9	28.5	132.3	C
WH018-330A-110	0.18	330	16(1")	18.7	Non Telecentric	0.27	0.005	69.6	46.2	101.9	C
WH018-630A-110	1.18	630	16(1")	5.6	Non Telecentric	0.02	0.016	21.0	13.8	110.9	C
WH02-550A-110	0.2	550	16(1")	13.6	Non Telecentric	0.05	0.007	45.6	27.2	133.5	C
WH02-590A-110	0.2	590	16(1")	13.5	Non Telecentric	0.1	0.007	45.2	27.0	137.9	C
WH02-750-110	0.2	750	16(1")	12	Non Telecentric	0.1	0.008	40.3	24.0	171.6	C
WH021-550A-110	0.21	550	16(1")	6.6	Non Telecentric	0.05	0.016	21.0	12.0	116.0	C

Lens Model	Mag.(x)	WD (mm)	Max Sensor Size (Φmm)	F/#	Telecentricity (° max)	Distortion (% max)	NA	Resolution (μm)	DoF(mm)	Length (mm)	Mount
WH022-380A-110	0.22	380	16(1")	12.3	Non Telecentric	0.1	0.009	37.4	20.3	189.1	C
WH022-445A-110	0.22	445	16(1")	12.3	Non Telecentric	0.1	0.009	37.4	20.3	124.1	C
WH022-530A-110	0.22	530	16(1")	10.9	Non Telecentric	0.1	0.010	33.4	18.0	139.6	C
WH024-760A-110	0.24	760	16(1")	11.2	Non Telecentric	0.05	0.011	31.4	15.6	240.0	C
WH025-465A-110	0.25	465	16(1")	10	Non Telecentric	0.1	0.012	26.9	12.8	144.2	C
WH026-186A-110	0.26	186	16(1")	9.5	Non Telecentric	0.01	0.014	24.5	11.2	141.2	C
WH027-425A-110	0.27	425	16(1")	10	Non Telecentric	0.1	0.013	24.9	11.0	143.9	C
WH028-680A-110	0.28	680	16(1")	11.8	Non Telecentric	<0.1	0.012	28.3	12.0	238.4	C
WH029-200A-110	0.29	200	16(1")	9.5	Non Telecentric	0.01	0.015	22.0	9.0	107.0	C
WH029-225A-110	0.29	225	16(1")	9.5	Non Telecentric	0.01	0.015	22.0	9.0	82.0	C
WH029-742A-110	0.29	742	16(1")	7.3	Non Telecentric	0.04	0.020	16.8	6.9	135.6	C
WH03-193A-110	0.3	190	16(1")	16.8	Non Telecentric	0.5	0.009	37.4	14.9	119.5	C
WH03-216A-110	0.3	216	16(1")	8	Non Telecentric	0.02	0.019	17.9	7.1	83.7	C
WH03-300A-110	0.3	300	16(1")	10	Non Telecentric	0.05	0.015	22.4	8.9	227.7	C
WH03-340A-110	0.3	340	16(1")	14.1	Non Telecentric	0.1	0.011	31.4	12.5	132.1	C
WH03-360A-110	0.3	360	16(1")	12.9	Non Telecentric	<0.1	0.012	28.8	11.5	140.3	C
WH03-380A-110	0.3	380	16(1")	10	Non Telecentric	0.03	0.015	22.4	8.9	147.7	C
WH03-510A-110	0.3	510	16(1")	11	Non Telecentric	0.06	0.014	24.6	9.8	188.0	C
WH036-125A-110	0.36	125	16(1")	14.9	Non Telecentric	0.4	0.012	27.4	9.2	195.1	C
WH04-136A-110	0.4	136	16(1")	14.4	Non Telecentric	0.7	0.014	24.3	7.2	129.5	C

WH Series
1/2.3" ~ 1/2.5"

WH Series
1/2"

WH Series
1/1.8"

WH Series
1/1.7"

WH Series
2/3"

WH Series
1"

WH Series
1.1"

Reference Card
WWK Series
WWH-Series
WWL Series
WWT Series
MFA Series
WH Series
Featured Products
Appendix

Lens Model	Mag.(x)	WD (mm)	Max Sensor Size (Φmm)	F/#	Telecentricity (° max)	Distortion (% max)	NA	Resolution (μm)	DoF(mm)	Length (mm)	Mount
WH04-250A-110	0.4	250	16(1")	11	Non Telecentric	0.01	0.018	18.4	5.5	177.6	C
WH04-650A-110	0.4	650	16(1")	14	Non Telecentric	0.05	0.014	23.5	7.0	294.8	C
WH05-240A-110	0.5	240	16(1")	12.5	Non Telecentric	0.1	0.020	16.7	4.0	174.4	C
WH05-375A-110	0.5	375	16(1")	11	Non Telecentric	0.05	0.023	14.8	3.5	221.2	C
WH05-500A-110	0.5	500	16(1")	14.4	Non Telecentric	0.01	0.017	19.4	4.6	316.7	C
WH05-515A-110	0.5	515	16(1")	13.9	Non Telecentric	0.02	0.018	18.7	4.4	306.6	C
WH05-660A-110	0.5	660	16(1")	32.8	Non Telecentric	0.3	0.008	44.0	10.5	138.2	C
WH05-730A-110	0.5	730	16(1")	35.8	Non Telecentric	0.3	0.007	48.2	11.5	145.9	C
WH055-140A-110	0.55	140	16(1")	19.6	Non Telecentric	0.35	0.014	23.8	5.2	177.9	C
WH055-300A-110	0.55	300	16(1")	13.9	Non Telecentric	0.25	0.020	17.0	3.7	195.8	C
WH06-195A-110	0.6	195	16(1")	14.4	Non Telecentric	0.1	0.021	16.1	3.2	176.6	C
WH06-220A-110	0.6	220	16(1")	12.9	Non Telecentric	0.1	0.023	14.4	2.9	200.0	C
WH07-135A-110	0.7	135	16(1")	15.5	Non Telecentric	0.6	0.023	14.9	2.5	100.5	C
WH071-260A-110	0.71	260	16(1")	17	Non Telecentric	0.25	0.021	16.1	2.7	219.1	C
WH08-160AT-110	0.8	160	16(1")	18.2	0.1	0.15	0.022	15.3	2.3	237.4	C
WH08-200AT-110	0.8	200	16(1")	14	0.1	0.15	0.028	11.8	1.6	254.6	C
WH09-120A-110	0.9	120	16(1")	14.8	Non Telecentric	0.1	0.031	11.0	1.5	213.0	C
WH10-220A-110	1	220	16(1")	17.9	Non Telecentric	0.2	0.028	12.1	1.4	267.3	C
WH10-270A-110D	1	270	16(1")	17.8	Non Telecentric	0.1	0.028	11.9	1.4	319.6	C
WH10-620A-110	1	620	16(1")	38.7	Non Telecentric	0.3	0.013	25.4	3.1	185.7	C

WH Series

Supports 1.1"

Industrial Camera



Lens Model	Mag.(x)	WD (mm)	Max Sensor Size (Φmm)	F/#	Telecentricity (° max)	Distortion (% max)	NA	Resolution (μm)	DoF(mm)	Length (mm)	Mount
WH011-1030A-111	0.11	1030	18(1.1")	6	Non Telecentric	0.15	0.009	36.7	39.7	100.9	C
WH02-965A-111	0.2	965	18(1.1")	11	Non Telecentric	0.04	0.009	37.2	22.2	233.7	C
WH03-400A-111	0.3	400	18(1.1")	11.3	Non Telecentric	0.1	0.013	25.3	10.0	152.8	C
WH03-650A-111	0.3	650	18(1.1")	10.5	Non Telecentric	0.002	0.013	26.5	9.3	243.9	C
WH035-560A-111	0.35	560	18(1.1")	12.5	Non Telecentric	0.02	0.014	24.0	8.2	249.6	C
WH04-320A-111	0.4	320	18(1.1")	12.4	Non Telecentric	0.1	0.016	20.7	6.2	167.4	C
WH04-550A-111	0.4	550	18(1.1")	13.2	Non Telecentric	0.01	0.015	22.2	6.6	281.1	C
WH04-582A-111	0.4	582	18(1.1")	10	Non Telecentric	0.1	0.020	16.8	5.0	144.7	C
WH047-270A-111	0.47	270	18(1.1")	13.3	Non Telecentric	0.01	0.018	19.0	4.8	176.3	C
WH047-290A-111	0.47	290	18(1.1")	13.3	Non Telecentric	0.1	0.018	19.0	4.8	181.2	C
WH047-400A-111	0.47	400	18(1.1")	12.7	Non Telecentric	0.1	0.019	18.1	4.6	281.3	C
WH07-300A-111	0.7	300	18(1.1")	17.9	Non Telecentric	0.02	0.019	17.2	2.9	245.2	C
WH078-240A-111	0.78	240	18(1.1")	17.5	Non Telecentric	0.2	0.022	15.1	2.3	236.3	C
WH10-370A-111	1	370	18(1.1")	25	Non Telecentric	0.03	0.020	16.8	2.0	447.7	C

WH Series
1/2.3" ~ 1/2.5"

WH Series
1/2"

WH Series
1/1.8"

WH Series
1/1.7"

WH Series
2/3"

WH Series
1"

WH Series
1.1"



Laser Internal Coaxial Lenses

1. Make special customization for the application scenario where the imaging optical path and the laser convergence optical path overlap
2. For different machines, optical paths, and laser wavelengths, secondary configuration is required to achieve the best results.
3. The design also takes into account the effective aperture of the laser light path with galvanometer, so that you can realize the image without vignetting.
4. There is no need for achromatic field mirror in general application, and the effect is better with achromatic field mirror.
5. It can support up to 1" camera, which meets most of the needs of the current market.
6. Can be applied to laser marking, cutting, welding, etc.

Laser Internal Coaxial Lenses - Calculation Formula

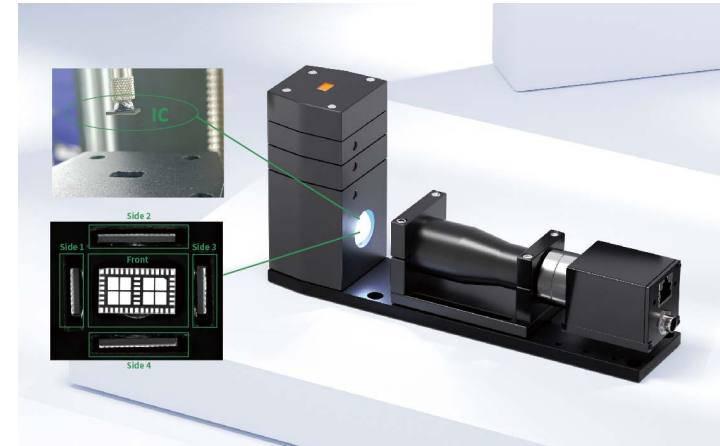
Magnification = lenses focal length/field lenses focal length

Field of view = sensor size/magnification

Parameters	LASER-75V1				LASER-75V2				LASER-127V1			
Focal Length(mm)	75				75				127			
Installation Position(mm)	150±20				150±20				/			
Maximum Field of View Angle (V °)	6				6				/			
Support Size(Φmm)	16(1")				11(2/3")				11(2/3")			
Distortion (% Max)	0.2				0.2				0.2			
MTF30(lp/mm)	120				120				120			
Relative Illumination (%)	97.8				97.8				97.8			
Mount	CS				CS				C			
Focal Length Sensor Size FOV(mm)	Focal Length				Focal Length				Focal Length			
	100mm	150mm	200mm	250mm	100mm	150mm	200mm	250mm	100mm	150mm	200mm	250mm
1"(13.13x8.76)	17.5x11.68	26.3x17.5	35.0x23.4	43.8x29.2	/	/	/	/	/	/	/	/
2/3"(8.45x7.1)	11.3x9.5	16.9x14.2	22.5x18.9	28.2x23.7	11.3x9.5	16.9x14.2	22.5x18.9	28.2x23.7	6.7x5.6	9.9x8.4	13.3x11.2	16.6x13.9
1/2"(6.4x4.8)	8.5x6.4	12.8x9.6	17.1x12.8	21.3x16	8.5x6.4	12.8x9.6	17.1x12.8	21.3x16	5.0x3.8	7.5x5.6	10.0x7.6	12.6x9.5

IC-SDM5-RBB-74V2

- Simultaneously inspect 5 faces (front and 4 sides) of IC products.
- One-time comprehensive inspection of damage, missing feet, scratches, pin warping, thickness, etc.
- By utilizing a multi-layer light source design, different monochrome light sources can be produced simultaneously for the front and side of the IC, highlighting the features required by customers in the front and side, and achieving high-definition imaging.
- Simplified design, compact size, can be applied to small space equipment.
- Modularization multi-layer design, easy disassembly and maintenance.
- Customized entry port according to IC size.
- Reduce equipment costs and improve production efficiency.



Featured Products
Laser internal coaxial lenses

Semiconductor Specific 10 MegaPixels
Level Visual Inspection Module

Product Parameters

Magnification β	0.4x	Image Side Distortion(%Max)	0.05
WD (mm)	110	Object Resolution (μm)	28.5
Maximum FOV of Object Side (mm)	20	Image Side Best MTF30 (lp/mm)	60
Support Sensor Size (Φmm)	8(1/2")	Theoretical DOF (mm)	8.5
Image Side Best F/#	17	Maximum Measurable IC Size (mm)	6.8x4x0.75
Object Side NA	0.01179	Lenses Mount	C
Features	Inspect The Five Faces of The IC Chip at One Time		

Zoom Telecentric Lenses



DTCZ111-Series

DTCZ111 series are zoom telecentric lenses, which can change the magnification without changing the working distance, while ensuring telecentricity, compact structure and flexible use. With excellent imaging quality, low distortion imaging, it is widely used in precision visual inspection.

1. Full field of view, full magnification range can achieve > 100lp/mm resolution.
2. Support up to 1.1"/ 3.45μm area scan camera.
3. The magnification change can be realized without changing the WD, which can easily adjust the detection accuracy of the system.
4. Distortion and telecentricity in the magnification range are comparable to telecentric lenses.
5. Support adjustable aperture, can adjust the depth of field according to demand.

DTCZ111-035070V2

Magnification β	0.35x	0.42x	0.49x	0.56x	0.63x	0.7x
WD(mm)	80	80	80	80	80	80
FOV(Φ mm)	52	43.3	37.1	32.5	28.9	26
Support Size(Φ mm)	18.2(1.1")	18.2(1.1")	18.2(1.1")	18.2(1.1")	18.2(1.1")	18.2(1.1")
F/#	5	5.3	5.8	6.1	6.5	6.8
N.A	0.035	0.039	0.042	0.046	0.018	0.051
Object Resolution(μ m)	9.5	8.5	7.9	7.3	17.8	6.5
Telecentricity($^{\circ}$ Max)	1.35	0.81	0.52	0.33	0.23	0.17
DoF(mm)	3.3	2.4	1.9	1.6	1.3	1.1
Distortion(% Max)	0.1	0.2	0.2	0.1	0.1	0.2
Image Side Best MTF30 (lp/mm)	146	164	154	140	126	110
Lenses Mount	C	C	C	C	C	C

90° Light Path Deflecting Device



Product Description

This prism can configure various optical path deflecting components for users.

Zoom Telecentric Lenses

90 ° Light Path Deflecting
Device

DOF Test Ruler



Product Description

1. Evaluate the DOF directly.
2. Read out the value directly without calculation.

Key Advantage

DOF test ruler can standardize optical tolerance, It can accurately determine the target offset when an unacceptable image is produced.

DOF Test Ruler

Line Scan Lenses

Product Introduction

Large target surface, large FOV, high resolution, low distortion industrial lenses, widely used in new energy, printing, roll materials and other industries.

Main Features

Support 4K 7 μ m~ 16K 3.5 μ m line scan sensor, complete specifications.



Spot Light Source

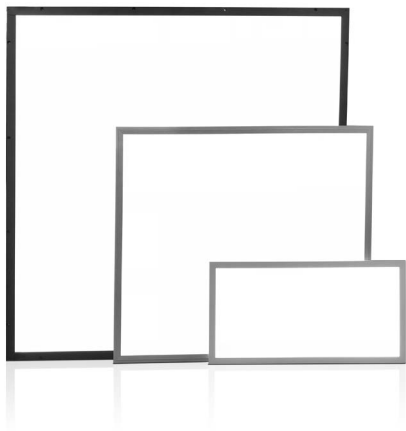


Product Features

1. High brightness, small luminous area, R/G/B/W/IR color optional.
2. Small, compact and efficient heat dissipation.
3. Matching coaxial lenses, suitable for wafer positioning and defect detection, Mark point positioning, object edge positioning detection and other applications.

Spot Light Model	Color	Voltage (V)	Power (W)	External Dimensions			Recommended Controller
				Outside Diameter (mm)	Inner Diameter (mm)	Height (mm)	
SQT-PI1mini	R/G/B/W/UV/IR	5	1	18	8	31	SQT-2AC/DC-5V350
SQT-PI2mini	R/G/B/W/UV/IR	5	1-3	22	8	55	SQT-2AC/DC-5V350, SQT-2AC/DC-5V700
SQT-PI1	R/G/B/W/UV/IR	5	1	27	8	50	SQT-2AC/DC-5V350
SQT-PI3	R/G/B/W/UV/IR	5	3	30	8	58	SQT-2AC/DC-5V700
SQT-PI5	R/G/B/W/UV/IR	5	5	36	8	60.5	SQT-2AC/DC-5V1A

Surface Light Source



Product Description

Flat diffuse light source, large format, ultra-high uniformity, up to 2.4*1.8m, used for backlighting and side lighting.

Main Features

They can be configured with dual wavelength, dual color temperature, illuminance up to 10,000 Lux, uniformity better than 90%.

Naming Rules

SQ10: series code,

FL: flat surface light source

B/C/P: backlight/side light/parallel backlight

Digital: light size

-x: optional color (R/G/B/W)

Selection Table

Product Model	Optional Color	Size (mm)	Luminous Area (mm)	Uniformity	Input Voltage
SQ10-FLB4024-x	Red/Green/Blue/White	42x26x7	40x24	>90%	DC 24V
SQ10-FLB6060-x	Red/Green/Blue/White	76x70x16	60x60	>90%	DC 24V
SQ10-FLB100100-x	Red/Green/Blue/White	108x108x15	100x100	>90%	DC 24V
SQ10-FLB12090-x	Red/Green/Blue/White	134x120x27.4	120x90	>90%	DC 24V
SQ10-FLB150150-x	Red/Green/Blue/White	185x162x20	154x154	>90%	DC 24V
SQ10-FLB18892-x	Red/Green/Blue/White	196x100x12.4	188x92	>90%	DC 24V

Product Model	Optional Color	Size (mm)	Luminous Area (mm)	Uniformity	Input Voltage
SQ10-FLB200120-x	Red/Green/Blue/White	212x152x19	200x120	>90%	DC 24V
SQ10-FLB200200-x	Red/Green/Blue/White	235x214x20	200x200	>90%	DC 24V
SQ10-FLB25535-x	Red/Green/Blue/White	270x185x20	250x35	>90%	DC 24V
SQ10-FLB250200-x	Red/Green/Blue/White	285x214x22.5	250x200	>90%	DC 24V
SQ10-FLB250250-x	Red/Green/Blue/White	267x267x20	250x250	>90%	DC 24V
SQ10-FLB300300-x	Red/Green/Blue/White	334x314x20	300x300	>90%	DC 24V
SQ10-FLB315213-x	Red/Green/Blue/White	347.5x225x20	315x213	>90%	DC 24V
SQ10-FLB320320-x	Red/Green/Blue/White	336x336x22	320x320	>90%	DC 24V
SQ10-FLP4024-x	Red/Green/Blue/White	42x26x7	40x24	>90%	DC 24V
SQ10-FLP6060-x	Red/Green/Blue/White	76x70x16	60x60	>90%	DC 24V
SQ10-FLP100100-x	Red/Green/Blue/White	108x108x15	100x100	>90%	DC 24V
SQ10-FLP12090-x	Red/Green/Blue/White	134x120x27.4	120x90	>90%	DC 24V
SQ10--FLP150150-x	Red/Green/Blue/White	185x162x20	154x154	>90%	DC 24V
SQ10-FLP18892-x	Red/Green/Blue/White	196x100x12.4	188x92	>90%	DC 24V
SQ10-FLP200120-x	Red/Green/Blue/White	212x152x19	200x120	>90%	DC 24V

Reference Card
WWK Series
WWH-Series
WWL Series
WWT Series
MFA Series
WH Series
Featured Products
Appendix

Product Model	Optional Color	Size (mm)	Luminous Area (mm)	Uniformity	Input Voltage
SQ10-FLP200200-x	Red/Green/Blue/White	235x214x20	200x200	>90%	DC 24V
SQ10-FLP25535-x	Red/Green/Blue/White	270x185x20	250x35	>90%	DC 24V
SQ10-FLP250200-x	Red/Green/Blue/White	285x214x22.5	250x200	>90%	DC 24V
SQ10-FLP250250-x	Red/Green/Blue/White	267x267x20	250x250	>90%	DC 24V
SQ10-FLP300300-x	Red/Green/Blue/White	334x314x20	300x300	>90%	DC 24V
SQ10-FLP320320-x	Red/Green/Blue/White	336x336x22	320x320	>90%	DC 24V
SQ10-FLP315213-x	Red/Green/Blue/White	347.5x225x20	315x213	>90%	DC 24V
SQ10-FLC2020-x	Red/Green/Blue/White	40x40x7	20x20	>90%	DC 24V
SQ10-FLC8080-x	Red/Green/Blue/White	120x100x8	80x80	>90%	DC 24V
SQ10-FLC242222-x	Red/Green/Blue/White	280x260x12.5	242x222	>90%	DC 24V
SQ10-FLC460420x	Red/Green/Blue/White	500x460x12	460x420	>90%	DC 24V
SQ10-FLB169106-x	Red/Green/Blue/White	176x136x19.5	169x106 (Middle Opening 108x55)	>90%	DC 24V
SQ10-FLB203202-x	Red/Green/Blue/White	235x214x20	203x202 (Middle Opening 25.4x9.7)	>90%	DC 24V
SQ10-FLB315213-x	Red/Green/Blue/White	347.5x225x20	315x213 (Middle Opening 122.5x95)	>90%	DC 24V
SQ10-FLB310310-x	Red/Green/Blue/White	330x330x25	310x310 (Middle circular hole diameter50mm)	>90%	DC 24V

Controller

Analog Light Source Controller:

1. The brightness adjustment is realized through current control, and the brightness level is continuously adjustable.
2. Simple structure and good stability.
3. With short circuit protection function.
4. With external trigger function.

Digital Controller:

1. Optional RS232, USB, Ethernet and other communication methods.
2. With memory function, the content of the previous shutdown is automatically saved and displayed when the power is turned off.
3. External trigger high/low level is optional, high-speed optocoupler isolation is adopted, and the reliability is high.
4. The operation is simple, can be adjusted by button or PC, each channel can be controlled separately, with 256 precision changes, which can accurately control the brightness of the light source.



Analog Controller Model	Digital Controller Model	Drive Mode	Input Voltage	Output Voltage (V)	Output Channel	Single Channel Output Current (mA)	Total Power (W)	Trigger Voltage (V)	Trigger Delay (ms)	Usage Environment	Storage Temperature (non-condensing)	Cooling Method	Use	Output Port
SQT-2AC-5V30	SQT-2DC-5V30	Constant Current	AC100-240V 50/60HZ	5	2	30	0.3	DC12-24	< 1 (Related to the load)	Temperature:0-40°C Humidity:20-85%RH	Temperature: -20-60°C Humidity: 20-85% RH	Free Cooling	Point Light	SMP-03V-BC (1: NC 2: output + 3: output -)
SQT-2AC-5V350	SQT-2DC-5V350	Constant Current	AC100-240V 50/60HZ	5	2	350	3.5	DC12-24	< 1 (Related to the load)	Temperature:0-40°C Humidity:20-85%RH	Temperature: -20-60°C Humidity: 20-85% RH	Free Cooling	Point Light	SMP-03V-BC (1: NC 2: output + 3: output -)
SQT-2AC-5V700	SQT-2DC-5V700	Constant Current	AC100-240V 50/60HZ	5	2	700	7	DC12-24	< 1 (Related to the load)	Temperature:0-40°C Humidity:20-85%RH	Temperature: -20-60°C Humidity: 20-85% RH	Forced Cooling	Point Light	SMP-03V-BC (1: NC 2: output + 3: output -)
SQT-2AC-5V1A	SQT-2DC-5V1A	Constant Current	AC100-240V 50/60HZ	5	2	1000	10	DC12-24	< 1 (Related to the load)	Temperature:0-40°C Humidity:20-85%RH	Temperature: -20-60°C Humidity: 20-85% RH	Forced Cooling	Point Light	SMP-03V-BC (1: NC 2: output + 3: output -)

Analog Controller Model	Digital Controller Model	Drive Mode	Input Voltage	Output Voltage (V)	Output Channel	Single Channel Output Current (mA)	Total power (W)	Trigger Voltage (V)	Trigger Delay (ms)	Usage Environment	Storage Temperature (non-condensing)	Cooling Method	Use	Output Port
SQT-2AC-24V100	SQT-2DC-24V100	Constant Current	AC100-240V 50/60HZ	24	2	100	4.8	DC12-24	< 1 (Related to the load)	Temperature:0-40°C Humidity:20-85%RH	Temperature: -20-60°C Humidity: 20-85% RH	Free Cooling	Surface Light Source	SMP-03V-BC (1: NC 2: output + 3: output -)
SQT-2AC-24V160	SQT-2DC-24V160	Constant Current	AC100-240V 50/60HZ	24	2	160	8	DC12-24	< 1 (Related to the load)	Temperature:0-40°C Humidity:20-85%RH	Temperature: -20-60°C Humidity: 20-85% RH	Free Cooling	Surface Light Source	SMP-03V-BC (1: NC 2: output + 3: output -)
SQT-2AC-24V300	SQT-2DC-24V300	Constant Current	AC100-240V 50/60HZ	24	2	300	14	DC12-24	< 1 (Related to the load)	Temperature:0-40°C Humidity:20-85%RH	Temperature: -20-60°C Humidity: 20-85% RH	Free Cooling	Surface Light Source	SMP-03V-BC (1: NC 2: output + 3: output -)
SQT-4AC-5V30	SQT-4DC-5V30	Constant Current	AC100-240V 50/60HZ	5	4	30	0.6	DC12-24	< 1 (Related to the load)	Temperature:0-40°C Humidity:20-85%RH	Temperature: -20-60°C Humidity: 20-85% RH	Free Cooling	Point Light	SMP-03V-BC (1: NC 2: output + 3: output -)
SQT-4AC-5V500	SQT-4DC-5V500	Constant Current	AC100-240V 50/60HZ	5	4	500	10	DC12-24	< 1 (Related to the load)	Temperature:0-40°C Humidity:20-85%RH	Temperature: -20-60°C Humidity: 20-85% RH	Free Cooling	Point Light	SMP-03V-BC (1: NC 2: output + 3: output -)
SQT-4AC-5V700	SQT-4DC-5V700	Constant Current	AC100-240V 50/60HZ	5	4	700	14	DC12-24	< 1 (Related to the load)	Temperature:0-40°C Humidity:20-85%RH	Temperature: -20-60°C Humidity: 20-85% RH	Forced Cooling	Point Light	SMP-03V-BC (1: NC 2: output + 3: output -)
SQT-4AC-5V1A	SQT-4DC-5V1A	Constant Current	AC100-240V 50/60HZ	5	4	1000	20	DC12-24	< 1 (Related to the load)	Temperature:0-40°C Humidity:20-85%RH	Temperature: -20-60°C Humidity: 20-85% RH	Forced Cooling	Point Light	SMP-03V-BC (1: NC 2: output + 3: output -)
SQT-4AC-24V500	SQT-4DC-24V500	Constant Current	AC100-240V 50/60HZ	24	4	500	48	DC12-24	< 1 (Related to the load)	Temperature:0-40°C Humidity:20-85%RH	Temperature: -20-60°C Humidity: 20-85% RH	Forced Cooling	Surface Light Source	SMP-03V-BC (1: NC 2: output + 3: output -)
SQT-4AC-24V700	SQT-4DC-24V700	Constant Current	AC100-240V 50/60HZ	24	4	700	66	DC12-24	< 1 (Related to the load)	Temperature:0-40°C Humidity:20-85%RH	Temperature: -20-60°C Humidity: 20-85% RH	Forced Cooling	Surface Light Source	SMP-03V-BC (1: NC 2: output + 3: output -)



Optical Magnification

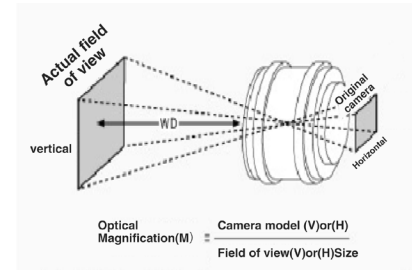
Magnification refers to the ability to change the size of the original imaging area of the subject through the adjustment of the lenses. Optical magnification: The magnification that is doubled by the optical lenses.

Magnification refers to the ratio of the imaging size to the object.

Optical Magnification = Sensor Size/FOV

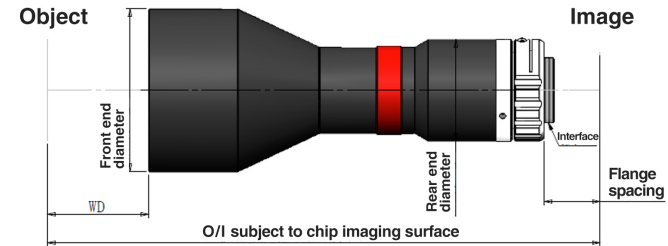
Electronic Magnification = Display Size/Sensor size

System Magnification = Electronic Magnification * Optical Magnification



Working Distance

WD (Working Distance): refers to the distance from the front end of the lenses to the object to be measured.



F# (Aperture)

Aperture is a device used to control the light flux of the lenses, usually expressed in Fno.

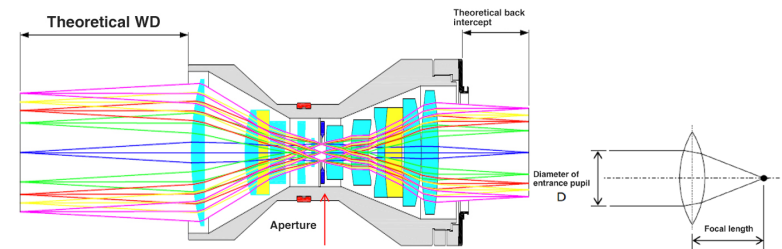
The larger the aperture, the larger the fux, ↑ The smaller the Fno. ↓

Infinitely conjugate lenses: F No. = f/D

The relationship between Fno and light

Fno	1.0	1.4	2.0	2.8	4.0	5.6
Light Transmission	1	1/2	1/4	1/8	1/16	1/32
F2.2	F1.6	F1.1	F0.8	F0.56	F0.4	F0.28

Small Aperture ← → Large aperture





Numerical Aperture (NA)

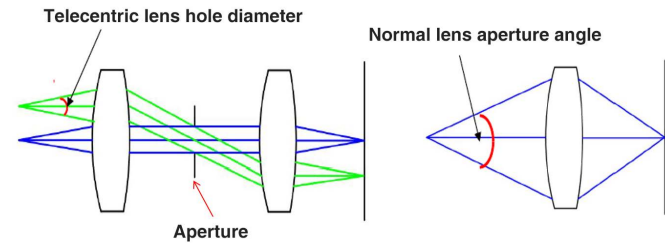
F No is usually oriented only towards the imaging side and towards the object side, which is called "numerical aperture" (NA: Numerical Aperture)

$$\text{(Numerical aperture) NA} = n * \sin \alpha$$

n , is the refractive index of the working medium of the lenses

(The refractive index of air is 1.0, the refractive index of pure water is 1.33, and the refractive index of oil can reach 1.56)

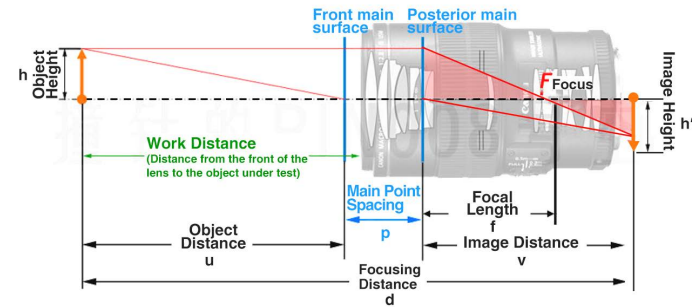
α , is half the aperture angle of the objective lenses



Focal Length (f)

Focal length (f): Concept: The conjugate point on the axis of the infinity target is the (image side) focus of the industrial lenses, and the distance from this focus to the main surface (image side) is called the focal length.

$$f = \beta * WD$$



Depth of Field (DOF)

In the object space, centered on the WD when the lenses is best focused, there is a range before and after, within which the lenses can clearly image.

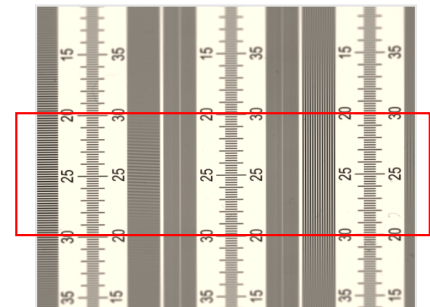
Industrial lenses depth of field can be calculated using the following formula:

$$\text{Depth of field} = \frac{2 * (\text{permissible circle of confusion} * \text{valid Fno.})}{(\text{Optical Magnification})^2}$$

Remarks: The permissible circle of confusion value is taken as 0.04

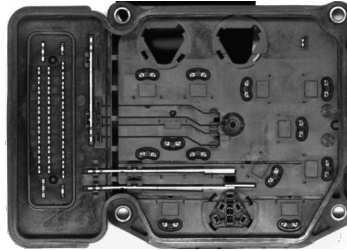
Depth of field in relation to Fno.:

The larger the aperture $\uparrow$, the larger the flux $\uparrow$, The smaller the Fno. $\downarrow$, the smaller the depth of field $\downarrow$

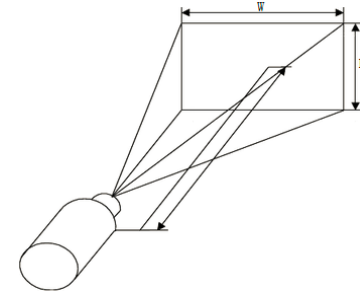
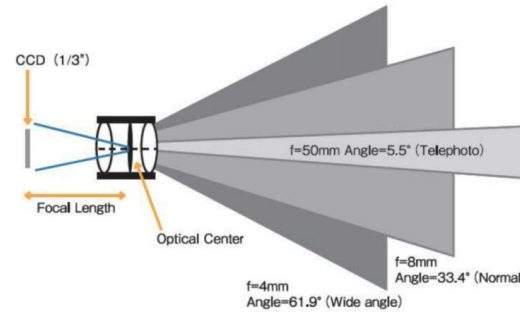


Field of View

Field of view (FOV) and field of view angle are similar concepts, they are used to measure the imaging range of industrial lenses, that is, the range that image acquisition equipment can cover, and the size of the object plane corresponding to the image



Field of view = Sensor Size/Optical Magnification



Lenses Resolution, Camera Single Pixel Accuracy

1. Lenses resolution: It represents the minimum distance between the two object points that the lenses can distinguish. It is only the parameter of a single lenses, which only reflects the analytical ability of the lenses, and has no direct relationship with the pixel accuracy of the camera.
2. Pixel accuracy: refers to the size of a pixel that can represent the object, (pixel accuracy = pixel size/magnification, or pixel accuracy = field of view/number of pixels), which is directly related to accuracy and is determined by camera resolution and field of view size.
3. Matching of lenses object-side resolution and object-side single-pixel accuracy: Under normal circumstances, the higher the resolution power of the lenses, the smaller the resolution value of the lenses object-side, the better, but in order to avoid waste of cost caused by excessive accuracy, the normal lenses object-side The matching relationship between resolution and single pixel accuracy is: lenses object-side resolution /2 = object-side single pixel accuracy, at this time the performance is best.

Note: When the lens object-side resolution /2 > object-side single-pixel accuracy, it does not mean that the lens accuracy is not satisfied and cannot be matched. The visual sub-piece captures the feature edge by identifying the canary release difference jitter of adjacent pixels through the algorithm. The larger the canary release difference jitter, the easier it is for the software to grasp. It is understood that the current market software can generally capture and grasp the canary release difference stably. The lower limit of the difference is 30, and the difference below this canary release is generally unstable. The illumination of the light source determines the overall canary release difference between the target feature area and the background area, and the resolution of the lens determines the pixel transition clarity from the target feature edge to the background area:

1. When the lenses object side resolution /2 ≤ object side single pixel accuracy.

That is, the resolution of the lenses is excessive or just matched. At this time, there is only about one pixel transition to grab the edge of the feature. The canary release difference between the target feature area and the background area played out by the lighting effect is the canary release difference that the software can directly identify the ear grab double.

2. When the lenses object side resolution $/2 >$ object side single pixel accuracy

That is, the resolution of the lenses is too low. At this time, the transition of the crawling feature edge pixels is greater than 1. The actual number of edge pixel transitions = (lenses object-side resolution $/2$)/object-side single-pixel accuracy, that is, the software can directly identify the difference of the captured canary release. It is the canary release difference of the target feature area and Yu background area that is lit and then divided by the number of edge pixel transitions. If it is lower than F30, the accuracy of grasping is unstable.

Summary: The overall visual accuracy is determined by the lighting, lenses, camera, and software algorithm. A good lighting effect requires relatively low resolution of the lenses, and a good resolution lenses requires relatively low lighting. Of course, the optimal lighting effect and the lenses with exactly matching resolution are the optimal choice, which can greatly reduce the processing difficulty of the vision software algorithm.

Example: lenses WWH10-150AT-230-D26

Precision means that a pixel can represent the size of the object, precision = pixel/magnification, that is, 3.45m.

The object resolution is 20.9um, which means that the finest space between the two objects can be distinguished by the lenses is 20.99um.

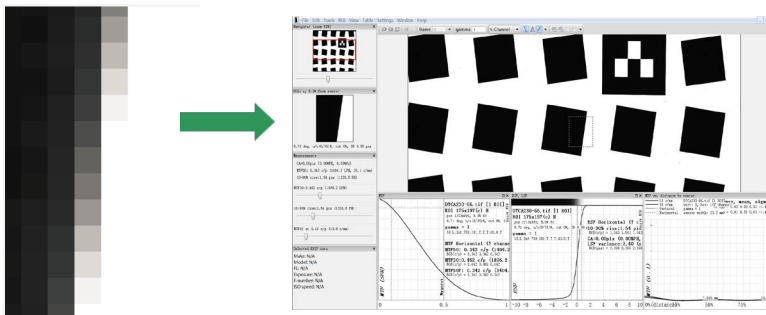
If you look at the flaw, the two flaws are separated by $19u < 20.9u$, then we can only see one flaw in the lenses, as long as the flaw is greater than 3.45um.



MTF

Image quality: refers to the imaging quality of industrial lenses, usually evaluated by MTF and distortion. Contrast attenuation factor imaging appears “blurred”, usually MTF is used to measure the quality of imaging, MTF unit is: lp/mm.

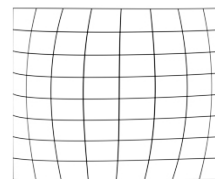
Test Methods for MTF



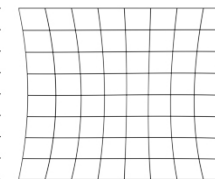
Lenses Distortion

Distortion: It is the relative deformation of the image and the real object, which is caused by the inconsistency of the magnification of different parts of the image surface. It is a magnification aberration.

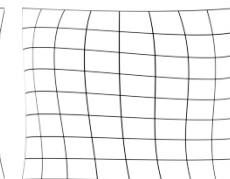
Positive Distortion = Pincushion Distortion, Negative Distortion = Barrel Distortion



Barrel Distortion

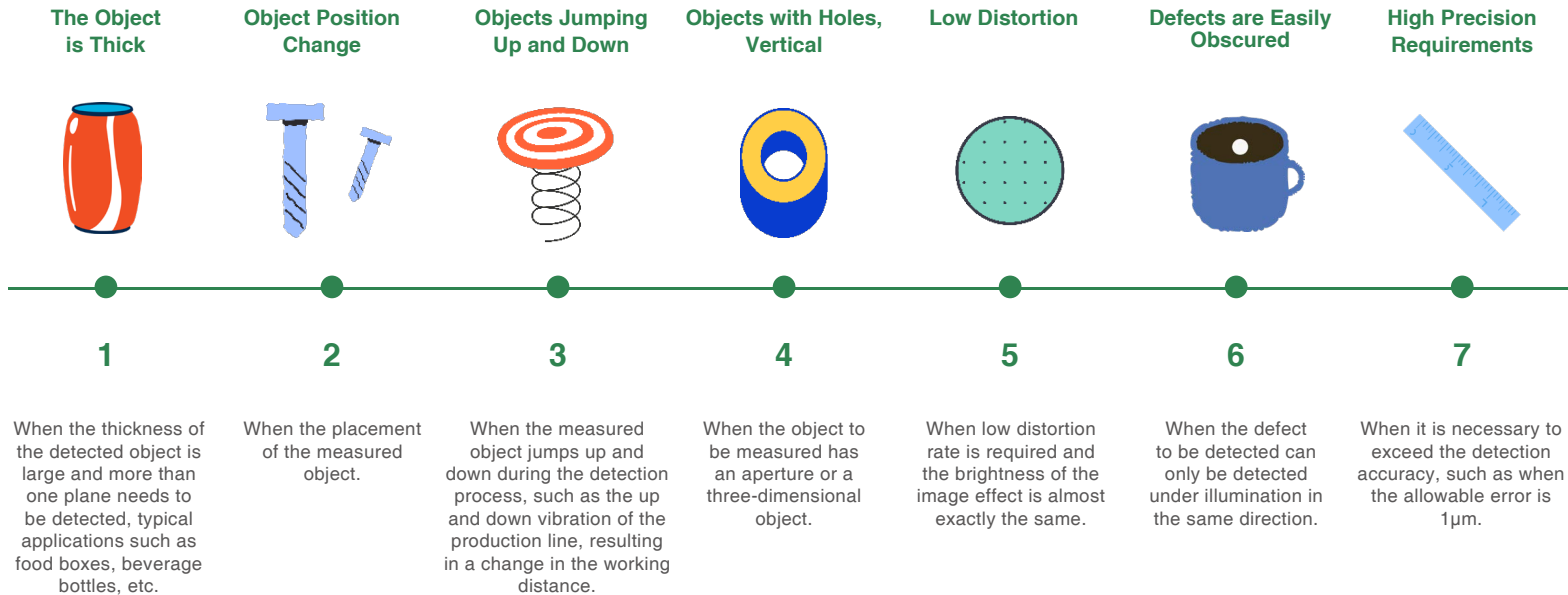


Pincushion Distortion



Beard Distortion

When do you need telecentric lenses?



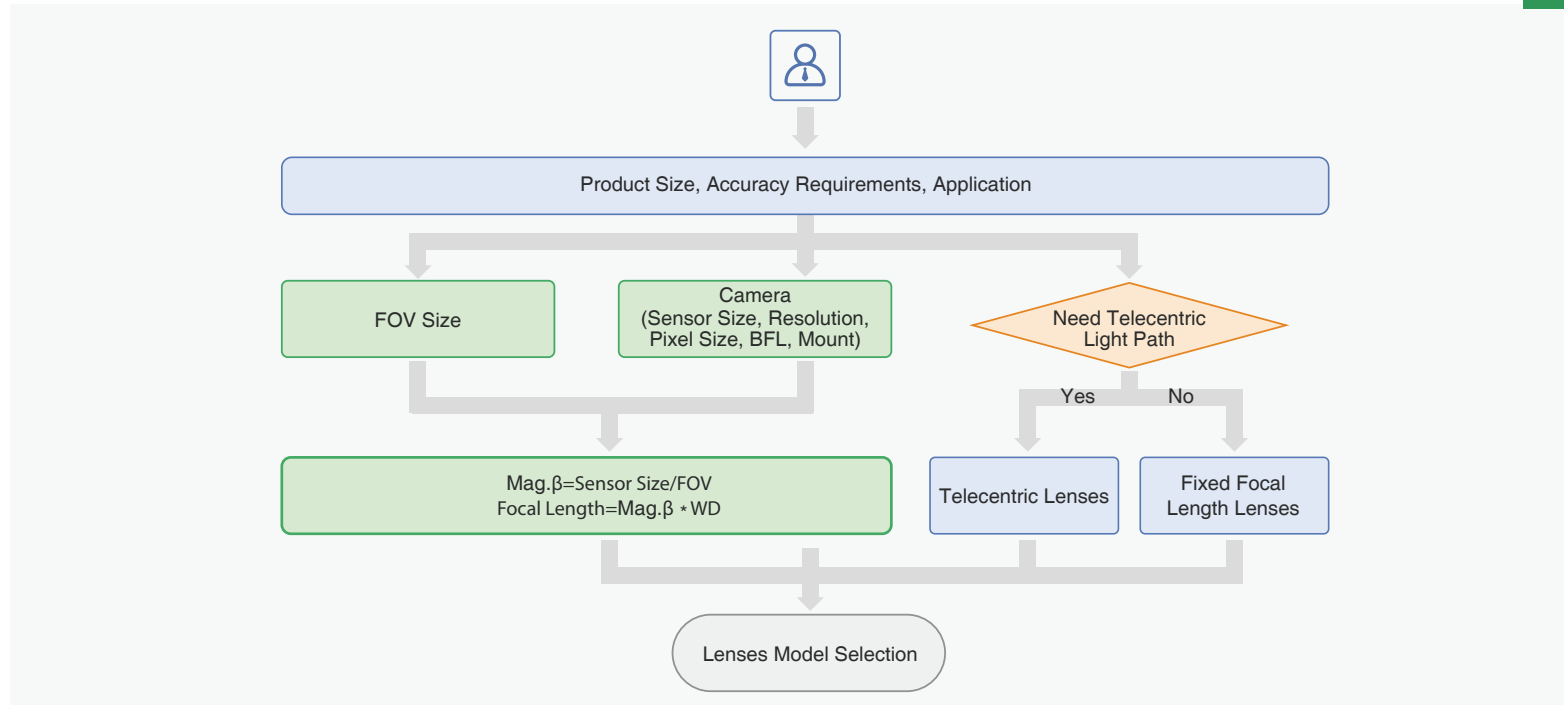
Appendix: Common Camera Sensor Parameters

Sensor Model	Nominal Size	Pixel Size (μm)	Resolution H (Pixels)	Resolution V (Pixels)	Sensor H (mm)	Sensor V (mm)	Resolution
PYTHON 300	1/4"	4.8	640	480	3.07	2.30	30,0000
PYTHON 500	1/3.6"	4.8	800	600	3.84	2.88	48,0000
MT9P031	1/3.7"	2.2	1920	1080	4.22	2.38	200,0000
IMX273/IMX296	1/2.9"	3.45	1440	1080	4.97	3.73	160,0000
IMX287/IMX297	1/2.9"	6.9	720	540	4.97	3.73	40,0000
SS (SC130GS)	1/2.7"	4	1280	1024	5.12	4.10	130,0000
MT9P031/MT9P006 /MT9P001/AR0521	1/2.5"	2.2	2592	1944	5.70	4.28	500,0000
MT9J003	1/2.3"	1.67	3856	2764	6.44	4.62	1000,0000
PYTHON 1300	1/2"	4.8	1280	1024	6.14	4.92	130,0000
IMX265/IMX252	1/1.8"	3.45	2048	1536	7.07	5.30	320,0000
IMX178	1/1.8"	2.4	3072	2048	7.43	4.90	600,0000/630,0000
IMX226	1/1.7"	1.85	4024	3036	7.44	5.62	1200,0000

Sensor Model	Nominal Size	Pixel Size (µm)	Resolution H (Pixels)	Resolution V (Pixels)	Sensor H (mm)	Sensor V (mm)	Resolution
PYTHON 2000	2/3"	4.8	1920	1200	8.64	5.76	230,0000
IMX264/IMX250	2/3"	3.45	2448	2048	8.45	7.07	500,0000
IMX174/IMX249	1/1.2"	5.86	1920	1200	11.25	7.03	230,0000
IMX183	1"	2.4	5472	3648	13.13	8.76	2000,0000
XGS12000	1"	3.2	4096	3072	13.11	9.83	1200,0000
IMX542/IMX532	1.1"	2.74	5320	3032	14.58	8.31	1600,0000
IMX541/IMX531	1.1"	2.74	4504	4504	12.34	12.34	2000,0000
IMX253/IMX304	1.1"	3.45	4096	3000	14.13	10.35	1200,0000
GMAX0505	1.1"	2.5	5120	5120	12.80	12.80	2500,0000
IMX540/IMX530	1.2"	2.74	5328	4608	14.60	12.63	2450,0000
XGS20000	1.2"	3.2	4500	4500	14.40	14.40	2000,0000
IMX342	1.75"	3.45	6464	4852	22.30	16.74	3100,0000
CMV12000	1.75"	5.5	4096	3072	22.53	16.89	1200,0000
PYTHON 25K/VITA-25K	2"	4.5	5120	5120	23.04	23.04	2500,0000
GMAX3265	37.36mm	3.2	9344	7000	29.90	22.40	6500,0000
IMX461	3.4"	3.76	11648	8740	43.80	32.86	1 Hundred Million
IMX411	4.2"	3.76	14208	10640	53.42	40.01	1.5Hundred Million

Brand	Resolution (Pixel)	Resolution H (Pixels)	Resolution V (Pixels)	Pixel Size	Sensor Size
Awaiba	2K	2048	1	7 µm	14.3 mm
Dalsa	2K	2048	1	7.04µm	14.3 mm
E2V	2K	2048	2	10.0µm	20.48mm
Dalsa	2K	2048	2	7.04µm	14.6mm
X	2K	2048	2	10.0µm	20.48mm
Dalsa	2K	2048	2	10.56µm	21.6mm
Dalsa	2K	2048	3	14.08µm	28.84mm
Dalsa	2K	2048	4	14.08µm	28.84mm
Dalsa	2K	2048	4	5µm	10.24mm
/	2K	2098	3	14.0µm	29.37mm
/	2K	2060	4	14.08µm	29mm
/	2K	2736	2	10.56µm	28.9mm
Vieworks	3K	3200	32	7 µm	22.4mm
Vieworks	3K	3200	128	7 µm	22.42mm
/	4K	4080	3	10µm	40.80mm
/	4K	4096	1	5µm	20.48mm
Awaiba	4K	4096	1	7µm	28.7mm
/	4K	4096	1	7.5µm	30.72mm
Dalsa	4K	4096	2	7.04µm	32.09mm
Dalsa	4K	4096	2	10µm	40.96.mm
Dalsa	4K	4096	2	10.56µm	43.25mm
Dalsa	4K	4096	3	10.56µm	43.3mm
/	4K	4096	3	7µm	28.7mm
/	4K	4096	3	7.5µm	30.72mm
E2V	4K	4096	4	5µm	20.48mm
Vieworks	4K	4096	64	14µm	57.35mm
Vieworks	4K	4096	128	7 µm	28.69mm
/	4K	4120	2	7.04µm	29mm

Brand	Resolution (Pixel)	Resolution H (Pixels)	Resolution V (Pixels)	Pixel Size	Sensor Size
/	4K	4120	1	7.04µm	29mm
Vieworks	4K	4640	64	5µm	23.20mm
Vieworks	4K	4640	256	5µm	23.24mm
Awaiba	6K	6144	1	7 µm	43mm
Vieworks	6K	6560	64	3.5µm	22.96mm
Vieworks	6K	6560	256	3.5µm	22.98mm
Vieworks	6K	6240	128	10µm	62.41mm
Awaiba	8K	8192	1	3.5µm	28.67mm
/	8K	8192	1	3.75µm	30.8mm
Dalsa	8K	8192	2	7.04µm	57.67mm
Dalsa	8K	8192	2	5µm	40.96mm
Dalsa	8K	8192	3	5µm	40.96mm
Dalsa	8K	8192	3	7.5µm	61.44mm
Dalsa	8K	8192	4	5µm	40.96mm
/	8K	8240	1	7.04µm	58mm
Vieworks	9K	8912	128	7 µm	62.39mm
Dalsa/E2V	11K	11008	4	5µm	55.04mm
Awaiba	12K	12288	1	3.5µm	43.01mm
/	12K	12288	1	5µm	61.44mm
Vieworks	12K	12480	256	5µm	62.41mm
Dalsa	16K	16384	1	3.52µm	57.344mm
E2V	16K	16384	1	5µm	81.92mm
E2V	16K	16384	2	5µm	81.92mm
Dalsa	16K	16384	3	5µm	81.92mm
Dalsa	16K	16384	4	5µm	81.92mm
Vieworks	16K	16384	256	5µm	81.93mm
Vieworks	18K	17824	256	3.5µm	62.39mm
Vieworks	23K	23360	256	3.5µm	81.76mm
/	24K	24000	2	3.5µm	84mm



Common Selection Calculation Formula

Field of view = sensor size (V) or (H)/lenses optical magnification

For example: optical magnification 0.5X lenses, matching 5 MegaPixels 2/3" camera (effective sensor size 8.45x7.1mm), The field of view that can be seen is: length = $8.45 / 0.5 = 16.9\text{mm}$, width = $7.1 / 0.5 = 14.2\text{mm}$

Object side resolution = $0.61 * 0.55 / \text{NA}$ (Note: 0.61 is a fixed constant, 0.55 is the design wavelength for general consideration, and NA is the numerical aperture of the lenses)

Note: resolution refers to the minimum distance that can theoretically distinguish two points.

Target surface size selection supported by the lenses: generally select the target surface size of the lenses $\geq$ the handle surface size of the camera sensor

Note: When photographing round objects or using a 360-degree lenses, you can choose according to the short side size of the sensor 2.

Focal length of FA lenses = sensor size * WD / FOV



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