

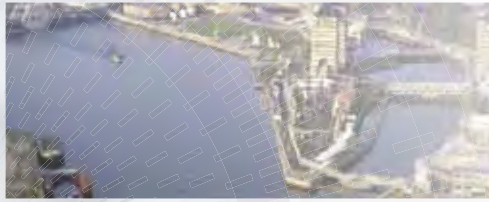
for
Security

PAIR
Varifocal Plus
Motorized Zoom Lens
Varifocal Lens



Corporate Profile

Our CCTV security lenses protect and support the public whilst they go about their daily lives in and around airports, stations, public buildings, financial institutions, shops and on highways. As the needs of society change, so too will the requirements of CCTV in sectors such as information technology, conservation and health & safety.



Since its entry to the CCTV lens market in 1961, PENTAX RICOH IMAGING COMPANY, LTD. has produced lenses with a focus on quality, performance and durability for manufacturers and customers in both Japan and around the world.

Our continuous product development has enabled us to maintain a high level of trust and customer satisfaction throughout the past and into the future.

The most important quality factor of a lens is its ability to capture clear images through a combination of resolving power and contrast. PENTAX CCTV Lenses are designed and built using modern technologies and precision manufacturing techniques. They produce high resolution images with superb contrast trusted by clients from all over the industry.

In addition to our extensive zoom lens range, PENTAX offer Day/Night Varifocal lenses engineered to produce high quality images even at night utilising near infrared light invisible to the human eye, high magnification Image Processing lenses for use with megapixel cameras for developing FA systems; and the PAIR series of high power lenses designed to reduce airborne atmospheric interference in the surveillance field. Advanced PENTAX performance continues to win domestic and global renown by solving the needs of the times.

PENTAX RICOH IMAGING COMPANY, LTD. Technology for helping people.
Keeping an eye on people in the society of the future.



History



- 1961 Cosmicar CCTV Lenses are distributed worldwide for the first time
 - 1967 COSMICAR brand name for the CCTV fixed-focus lens adopted
 - 1975 The industry's first video signal auto iris lens introduced
 - 1981 The industry's first variable photometric auto iris lens introduced
 - 1982 EX series – the world's smallest auto iris lens introduced
FX series – the industry's first CS mount lens introduced
 - 1985 ER series – the industry's first remote-controllable auto iris lens introduced
 - 1990 HS6ZME – the world's smallest CCTV motorized zoom lens introduced
 - 1991 LX series – the industry's first 1/3" auto iris lens introduced
 - 1993 PENTAX branding first used
 - 1994 ISO9001 certification obtained
 - 1995 1/3" CS mount Varifocal lens introduced
 - 1997 The industry's first 1/4" integrated Varifocal lens series introduced
ISO14001 certification obtained
 - 1998 The industry's first 1/4" CS mount lens series introduced
 - 2001 TS2V314BED – the industry's first 1/3" CS mount Day/Night Varifocal lens introduced
Line Scan Lens series introduced
M series – the industry's first Megapixel Machine Vision lenses introduced
 - 2002 H55ZME – the world's longest focal length 55X zoom lens introduced
 - 2003 H2520-UVM – the industry's first megapixel UV lens introduced
 - 2005 QD3ZMED – the industry's first pan-focus zoom lens introduced
 - 2009 TS3VP213ED – M – the industry's first Varifocal plus lens introduced
Winner of the "Best in OEM" category at ISC West 2009 in the USA
5M series – the ultra high-definition 5 megapixel lens series introduced
 - 2010 H55ZAME-F-PR01 incorporating PAIR (PENTAX Atmospheric Interference Reduction) technology introduced
Wins the "Best in Video Device" category at ISC West 2010 in the USA
 - 2011 Introduces H55ZAME-F-PR02
Wins the "Best in Public Safety Solutions" category at ISC West 2011 in the USA
 - Oct 2011 Foundation of PENTAX RICOH IMAGING COMPANY, LTD. as a member of the Ricoh Group
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PAIR

Now Available : Ultra-Telephoto Motorized Zoom Lens incorporating PAIR (PENTAX Atmospheric Interference Reduction) technology!

Winner of "Best in Video Device" category at ISC West 2010!



Winner of "Best in Public Safety Solutions" category at ISC West 2011!



Features

- Effective not only for fog and rain, but also airborne particles of sand, smoke, and snow.
- Re-introduces colour from degraded images in real time.
- Autofocus function improves the ultra-telephoto zoom lens operation
- PAIR II is equipped with the industry's first heat-haze-reduction and image stabilising functions.
- Contained within the lens, the system is suitable for any camera.
- Instantly renders clear images when switching from one image to the next in joint surveillance systems.



Vision blurred by sandstorm



PAIR



Whitened scenery in snowfall



PAIR

All PAIR series: Fog reduction

- Our unique image processing technology reduces both liquid microparticles (fog, rain etc) and solid microparticles (smoke, sand etc).
- Unlike systems using optical filters that filter the visible light wavelengths leaving a black & white image. PAIR maintains a color image thus aiding target identification.
- Systems filtering visible light suffer from a lack of intensity and brightness.
- PAIR not only allows adjustment of image brightness but also backlight compensation and enhancement of images at night.
- PAIR technology used in conjunction with the autofocus function improves focusing accuracy



Early morning backlight subject



PAIR

PAIR II: Heat haze reduction system (*an industry first - incorporated in H55ZAME-F-PR02)

- The first ever lens to come with heat-haze-reduction in one compact design.
- Heat haze reduction aids motion detection.
- Used in combination with the fog reduction function can help to eliminate atmospheric interference caused by factors like rainfall.



Before heat haze processing



PAIR II

PAIR II: Image stabiliser (*incorporated in H55ZAME-F-PR02)

- Image stabilisation is essential for viewing long distance objects
- An especially useful function for super telephoto lenses, which can become blurred easily with only minor vibration. The effects of wind on high CCTV masts creates excessive vibration to images
- The electronic image stabilisation that PAIR utilizes is more reliable than optical systems.
- The stabiliser parameters are optimized for the specific lens characteristics.



Before Image stabilisation



After Image stabilisation



H55ZAME-F-PR02

PAIR
Pentax Atmospheric Interference Reduction

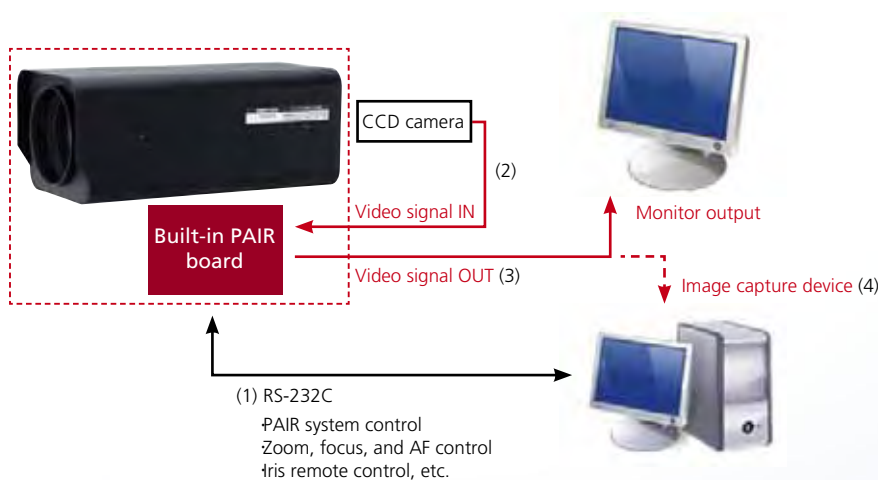
PAIR system controls and configuration

Zoom, focus, autofocus, and the PAIR system are controllable by computer via an RS-232C interface.

The on-board algorithm reduces all image interferences, for capturing a clearer, more natural picture.

All PAIR functions are controlled remotely from a PC. Instant switching between pre-processed and post-processed images is possible at the click of a button.

- (1) The zoom lens with built-in PAIR connects with a PC via an RS-232C interface.
- (2) Images captured by the CCD camera are input back into the PAIR board integrated in the zoom lens.
- (3) The Processed image is altered according to the parameters set by the software on the PC utilising the camera's output video signal. Users can select any camera, because image processing responds to the video signal produced by the selected camera.
- (4) Outputs video images to a PC with a standard video capture device.



H55ZAME-F-PR02



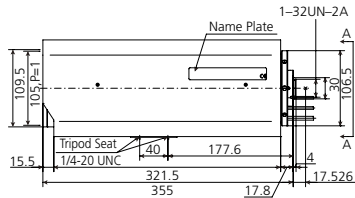
Built-in 2.5X extender

Fog reduction

Heat haze reduction

Image stabiliser

Auto Focus



Unit:mm

Format Size	1/2 *format	
Focal Length	12~660mm(30.5~1,680mm)	
Max. Aperture Ratio	1:4.0(f=12mm)~18.2(f=1,680mm)	
Iris Range	F4.0~F360	
Mount	C	
Horizontal	1/3 *format	23.2~0.4°(9.0~0.2°)
Angle of View	1/2 *format	31.6~0.6°(12.1~0.2°)
Min. Object Distance	7.0m	
Back Focal Length	80.34mm	
Filter size	105 P=1.0mm	
Dimensions	155×138×355mm	
Weight	5,790g	
Remarks	RS-232C, Preset, Auto-Iris with Manual Override (with D/A converter)	

*Figures in () are with 2.5X extender.

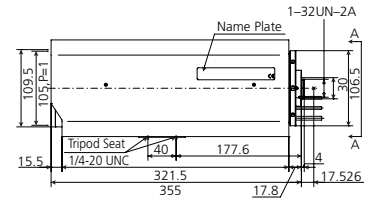
H55ZAME-F-PR01



Built-in 2.5X extender

Fog reduction

Auto Focus



Unit:mm

Format Size	1/2 *format	
Focal Length	12~660mm(30.5~1,680mm)	
Max. Aperture Ratio	1:4.0(f=12mm)~18.2(f=1,680mm)	
Iris Range	F4.0~F360	
Mount	C	
Horizontal	1/3 *format	23.2~0.4°(9.0~0.2°)
Angle of View	1/2 *format	31.6~0.6°(12.1~0.2°)
Min. Object Distance	7.0m	
Back Focal Length	80.34mm	
Filter size	105 P=1.0mm	
Dimensions	155×138×355mm	
Weight	5,780g	
Remarks	RS-232C, Preset, Auto-Iris with Manual Override (with D/A converter)	

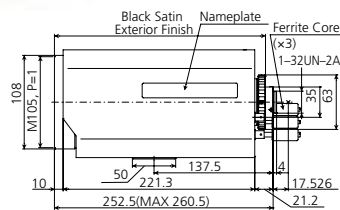
*Figures in () are with 2.5X extender.

H33ZME-P-PR01



Fog reduction

Auto Focus



Unit:mm

Format Size	1/2 *format	
Focal Length	10mm~330mm	
Max. Aperture Ratio	1:1.7~3.8	
Iris Range	F1.7~F560	
Mount	C	
Horizontal	1/3 *format	26.4°~0.9°
Angle of View	1/2 *format	35.0°~1.1°
Min. Object Distance	3.4m	
Back Focal Length	15.94mm	
Filter size	105 P=1.00mm	
Dimensions	152×126×252.5mm	
Weight	3,450g	
Remarks	RS-232C, Preset, Auto-Iris	

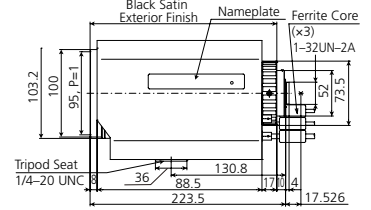
H20ZAME-F-PR01



For use with megapixel cameras

Fog reduction

Auto Focus



Unit:mm

Format Size	1/2 *format	
Focal Length	12~240mm	
Max. Aperture Ratio	1:1.6~2.8	
Iris Range	F1.6~F720	
Mount	C	
Horizontal	1/3 *format	23.0~1.2°
Angle of View	1/2 *format	30.8~1.6°
Min. Object Distance	3.2m	
Back Focal Length	19.82mm	
Filter size	95 P=1.0mm	
Dimensions	152×138×223.5mm	
Weight	3,260g	
Remarks	For use with megapixel cameras, RS-232C, Preset, Auto-Iris with Manual Override(with D/A converter)	

Varifocal Plus

The Varifocal Plus - A New Concept in Lens Technology!



Winner of the "Best in OEM" category at ISC West 2009!



Features

- New zoom mechanism combines compactness with high operability.
- Maintains focus while zooming for fast installation
- Industry first – Click stop focus adjustment for instantaneously focusing subjects.
- High-definition optics suitable for megapixel cameras.

Main uses

- Surveillance of office buildings, supermarkets, shipping storage spaces, shops, etc.
- (Works in combination with mega-pixel network cameras)

Conventional varifocal lens



Requires repeated adjustments of zoom and focus rings for correct scene composition. Composition adjustment gets tedious and tiring, since every zoom blurs the focus.

Varifocal Plus

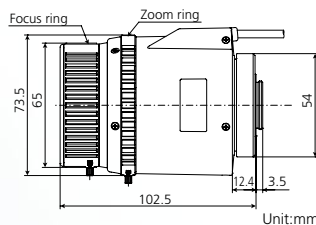


Simple focus adjustment and focus tracking whilst zooming makes for easier installation

HS5VP814ED-M



For Full HD

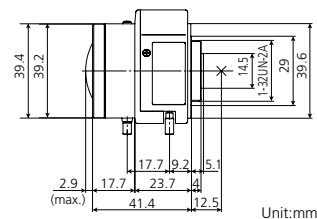


Format Size	1/2" format
Focal Length	8.0~40mm
Max. Aperture Ratio	1:1.4
Iris Range	F1.4~F250
Mount	CS
Horizontal Angle of View	1/3" format 33.0~6.8°
Vertical Angle of View	1/2" format 43.4~9.0°
Min. Object Distance	1.8m
Back Focal Length	12.62mm
Filter size	—
Dimensions	73.5×77.5×102.5mm
Iris Operation	Auto-Iris(DC)
Weight	340g
Remarks	Compatible with 3 megapixel(full HD)cameras; click stop focus

TS3VP213ED-M



For use with megapixel cameras



Format Size	1/3" format
Focal Length	2.6~8.0mm
Max. Aperture Ratio	1:1.3~2.4
Iris Range	F1.3~F200
Mount	CS
Horizontal Angle of View	1/4" format 77.8~6.8°
Vertical Angle of View	1/3" format 104.4~35.5°
Min. Object Distance	0.3m
Back Focal Length	8.02mm
Filter size	—
Dimensions	44×47.5×44.3mm
Iris Operation	Auto-Iris(DC)
Weight	65g
Remarks	Compatible with 1.3 megapixel cameras; click stop focus

Motorized Zoom Lens

This series is available in a multitude of variations, from compact low-power zooms to advanced ultrahigh-power varieties. Suitable for multiple applications, from internal surveillance at stations and factories to large area surveillance at ports and national borders.

The rugged durability and time tested reliability of our lenses compliment an extensive range of surveillance systems.

Main uses

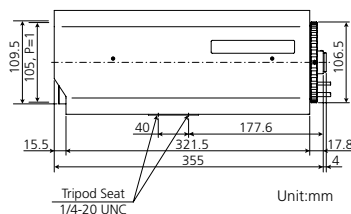
Wide field and long-range surveillance at national borders, ports, airports, etc.

H55ZAME Series



2.5X extender

55X Zoom



Type	Full specification (Preset, Auto-Iris with Manual Override)	
Model Code	H55ZAME-F	
Format Size	1/2" format	
Focal Length	12~660mm(30.5~1,680mm)	
Max. Aperture Ratio	1:4.0(f=12mm)~18.2(f=1,680mm)	
Iris Range	F4.0~F360	
Mount	C	
Horizontal Angle of View	1/3" format	23.2~0.4°(9.0~0.2°)
	1/2" format	31.6~0.6°(9.0~0.2°)
Min. Object Distance	6.0m	
Back Focal Length	80.34mm	
Filter size	105 P=1.0mm	
Dimensions	155×138×355mm	
Iris Operation	Auto-Iris with Manual Override	
Weight	5,400g	
Remarks	Manual Override with D/A converter	

*Figures in () are with 2.5X extender.

Features of the motorized zoom lens (H55ZAME)

- Ultra-Telephoto lens for long range subject recognition
- Presets for advanced surveillance systems
- Super-high resolution suitable for C-Mount 3CCD cameras
- Built-in 2.5X extender increases zoom range to 140X (included as standard)

Tokyo Tower from 1.5 miles with the H55ZAME-F



1. Wide end (12mm)



2. Mid zoom range

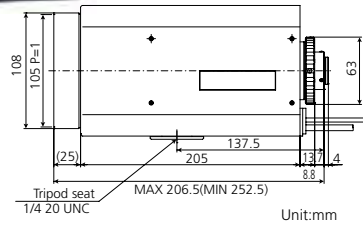


3. Telephoto end (660mm, 55X zoom)



4. Telephoto end with 2.5X extender (1,680mm, 140X zoom)

H33ZME Series



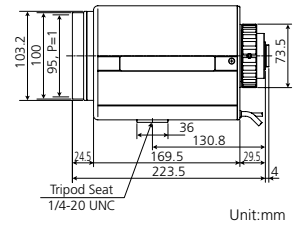
Type	Preset type	
Model Code	H33ZME-P	
Format Size	1/2" format	
Focal Length	10mm~330mm	
Max. Aperture Ratio	1:1.7~3.8	
Iris Range	F 1.7~F560	
Mount	C	
Horizontal Angle of View	1/3" format	26.4°~0.9°
Vertical Angle of View	1/2" format	35.0°~1.1°
Min. Object Distance	2.9m	
Back Focal Length	15.94mm	
Filter size	105 P=1.00mm	
Dimensions	122x125x206.5mm	
Iris Operation	Auto-Iris(Video)	
Weight	2,930g	
Remarks	Preset	

H20ZAME Series



For mega-pixel cameras

20X zoom

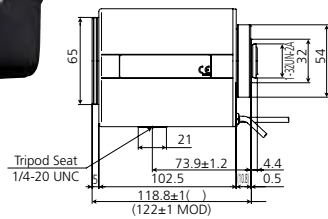


Type	Standard type	Preset type	Full specification Preset, Auto-Iris with Manual Override
Model Code	H20ZAME-M	H20ZAME-P-M	H20ZAME-F-M
Format Size	1/2" format		
Focal Length	12~240mm		
Max. Aperture Ratio	1:1.6~2.8		
Iris Range	F1.6~F720		
Mount	C		
Horizontal Angle of View	1/3" format	23.0~1.2°	
Vertical Angle of View	1/2" format	30.8~1.6°	
Min. Object Distance	2.8m		
Back Focal Length	19.82mm		
Filter size	95 P=1.0mm		
Dimensions	116x135x223.5mm		
Iris Operation	Auto-Iris [video or DC (model code: H20ZAMED- -M)]		Auto-Iris with Manual Override
Weight	2,590g	2,630g	
Remarks	—	Preset	Manual Override with DA converter also available

H16ZME Series



Industry's smallest 16X zoom

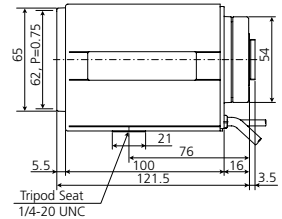


Type	Standard type	Preset type	Full specification Preset, Auto-Iris with Manual Override
Model Code	H16ZME	H16ZME-P	H16ZME-F
Format Size	1/2" format		
Focal Length	7.5~120mm		
Max. Aperture Ratio	1:1.6~2.3		
Iris Range	F1.6~F1000		
Mount	C		
Horizontal Angle of View	1/3" format	34.9~2.3°	
Vertical Angle of View	1/2" format	45.8~3.1°	
Min. Object Distance	1.5m		
Back Focal Length	14mm		
Filter size	Filter frame option (62 P=0.75mm) available		
Dimensions	77.6x85.6x118.8mm		
Iris Operation	Auto-Iris [video or DC type (model code: H16ZMED-)]		Auto-Iris with Manual Override
Weight	760g	780g	790g
Remarks	—	—	Manual override with DA converter also available

H10ZME Series



10X zoom



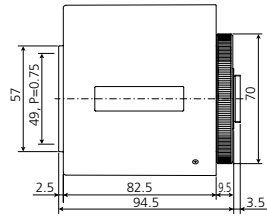
Type	Standard type	Preset type
Model Code	H10ZME	H10ZME-P
Format Size	1/2" format	
Focal Length	7.5~75mm	
Max. Aperture Ratio	1:1.2~1.5	
Iris Range	F1.2~F720	
Mount	C	
Horizontal Angle of View	1/3" format	34.9~3.8°
Vertical Angle of View	1/2" format	45.6~5.0°
Min. Object Distance	1.8m	
Back Focal Length	14.52mm	
Filter size	62 P=0.75mm	
Dimensions	70x80.5x121.5mm	
Iris Operation	Auto-Iris(Video or DC)	
Weight	715g	740g
Remarks	—	Preset

C6Z1218M3 Series



Fully motorized

6X zoom



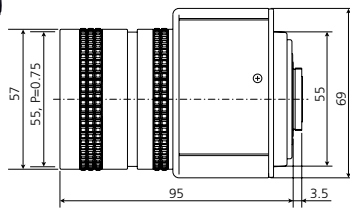
Unit:mm

Type	Standard type	
Model Code	C6Z1218M3	
Format Size	2/3" format	
Focal Length	12.5~75mm	
Max. Aperture Ratio	1:1.8	
Iris Range	F1.8~Close	
Mount	C	
Horizontal Angle of View	1/3" format	21.4~3.7°
	1/2" format	28.4~4.9°
	2/3" format	38.8~6.7°
Min. Object Distance	1.0m	
Back Focal Length	18.41mm	
Filter size	49 P=0.75mm	
Dimensions	101.5×92.2×94.5mm	
Iris Operation	Motorized(DC motor)	
Weight	635g	
Remarks	—	

H6ZBE

Manual zoom with auto iris

6X zoom



Unit:mm

Model Code	H6ZBE	
Format Size	1/2" format	
Focal Length	8~48mm	
Max. Aperture Ratio	1:1.0~1.2	
Iris Range	F1.0~F720	
Mount	C	
Horizontal Angle of View	1/3" format	33.0~5.8°
	1/2" format	43.2~7.7°
Min. Object Distance	1.2m	
Back Focal Length	13.65mm	
Filter size	55 P=0.75mm	
Dimensions	69×64×95mm	
Iris Operation	Auto-Iris(Video or DC)	
Weight	465g	
Remarks	Video or DC Iris	

Varifocal Lens

Available in a wide range of versions, from super-wide angle to telephoto types.

Zoom ratios from 2X to 12X to suit a wide range of applications.

Day/Night versions available for complex surveillance applications.

Main uses

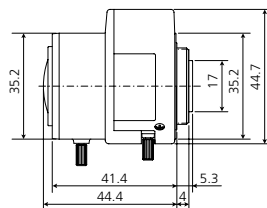
Surveillance of shops, financial institutions, office buildings, lifts, etc.

TS3V310ED



Compatible with Day/Night cameras

3X varifocal



Unit:mm

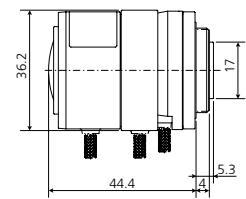
Format Size	1/3" format
Focal Length	3~8mm
Max. Aperture Ratio	1:1.0~1.7
Iris Range	F1.0~F360
Mount	CS
Horizontal Angle of View	1/4" format 69.0~26.4°
	1/3" format 93.2~35.3°
Min. Object Distance	0.3m
Back Focal Length	7.50mm
Filter size	—
Dimensions	38.3x44.7x44.4mm
Iris Operation	Auto-Iris(Video or DC)
Weight	60g
Remarks	Day/Night

TS3V310



Compatible with Day/Night cameras

3X varifocal



Unit:mm

Format Size	1/3" format
Focal Length	3~8mm
Max. Aperture Ratio	1:1.0~1.7
Iris Range	F1.0~Close
Mount	CS
Horizontal Angle of View	1/4" format 69.0~26.4°
	1/3" format 93.2~35.3°
Min. Object Distance	0.3m
Back Focal Length	7.50mm
Filter size	—
Dimensions	36.2x44.4mm
Iris Operation	Manual
Weight	47g
Remarks	Day/Night

Features of TS3V310ED

- Corrects focus shift from visible to near infrared light
- Achieves correct exposure even under high-intensity near infrared lighting
- F:1.0 aperture ideal for external monitoring systems regardless of day or night
- Wide-ranging surveillance lens

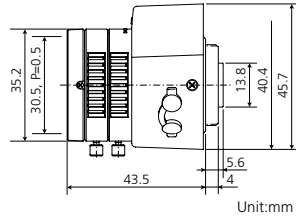
HS2V616ED



Compatible with Day/Night cameras

2X varifocal

Compatible with 1/2" format



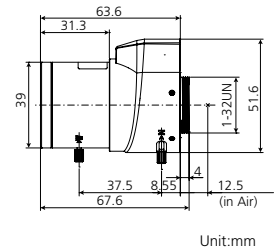
Unit:mm

Format Size	1/2" format
Focal Length	6~12mm
Max. Aperture Ratio	1:1.6~2.0
Iris Range	F1.6~F300
Mount	CS
Horizontal Angle of View	1/4" format 35.0~17.2° 1/3" format 47.4~23.0° 1/2" format 65.3~30.8°
Min. Object Distance	1.0m
Back Focal Length	7.55mm
Filter size	30.5 P=0.5mm
Dimensions	40.4x45.7x43.5mm
Iris Operation	AUto-Iris(Video or DC)
Weight	53g
Remarks	Day/Night

TS12V513ED-Q



12X varifocal



Unit:mm

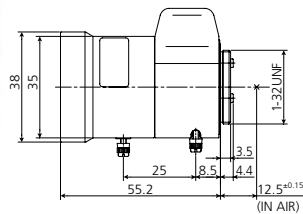
Format Size	1/3" format
Focal Length	5~60mm
Max. Aperture Ratio	1:1.3
Iris Range	F1.3~F360
Mount	CS
Horizontal Angle of View	1/4" format 44.5°~3.4° 1/3" format 54.2°~4.6°
Min. Object Distance	0.5m
Back Focal Length	11.53mm
Filter size	—
Dimensions	39x51.6x67.6mm
Iris Operation	Auto-Iris(DC)
Weight	94g
Remarks	—

TS7V714ED-Q



Compatible with Day/Night cameras

7X varifocal



Unit:mm

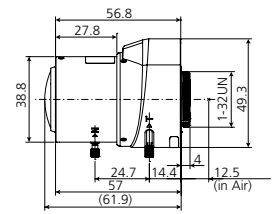
Format Size	1/3" format
Focal Length	7.5~50mm
Max. Aperture Ratio	1:1.4~1.8
Iris Range	F1.4~F360
Mount	CS
Horizontal Angle of View	1/4" format 27.4~4.3° 1/3" format 36.6~5.6°
Min. Object Distance	0.5m
Back Focal Length	9.6mm
Filter size	—
Dimensions	38x46.2x55.2mm
Iris Operation	Auto-Iris(DC)
Weight	68g
Remarks	Day/Night

TS4V213ED-DNQ



Compatible with Day/Night cameras

4X varifocal

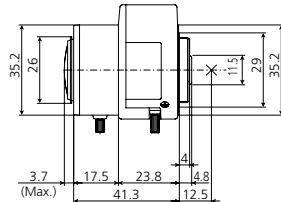


Unit:mm

Format Size	1/3" format
Focal Length	2.7~13mm
Max. Aperture Ratio	1:1.3
Iris Range	F1.3~F360
Mount	CS
Horizontal Angle of View	1/4" format 73.1°~17.1° 1/3" format 100.6°~22.3°
Min. Object Distance	0.3m
Back Focal Length	—
Filter size	—
Dimensions	43.6x49.3x61.9mm
Iris Operation	Auto-Iris(DC)
Weight	77g
Remarks	Day/Night

TS3V212ED

3X varifocal

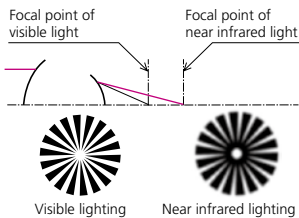
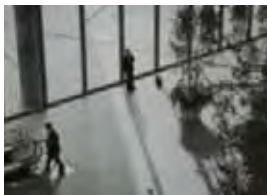


Unit:mm

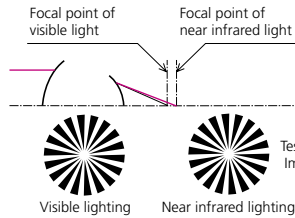
Format Size	1/3" format	
Focal Length	2.9~8.5mm	
Max. Aperture Ratio	1:1.2~2.0	
Iris Range	F1.2~F300	
Mount	CS	
Horizontal Angle of View	1/4" format	70.7~25.1°
Vertical Angle of View	1/3" format	96.2~33.4°
Min. Object Distance	0.35m	
Back Focal Length	7.95mm	
Filter size	—	
Dimensions	38.3x44.7x45mm	
Iris Operation	Auto-Iris(DC)	
Weight	50g	
Remarks	—	

Comparison between Day/Night lens and conventional lens

Conventional lens



Day/Night lens



Without correction for the near infrared light wavelengths, the conventional lens produces focus shift and the image deteriorates due to multi light wavelength transmission.

Day/Night varifocals due to their optical arrangement create no discernable focus shift across all focal lengths from visible to near infrared light wavelengths, producing clearer images during the day and at night.

Products Line Up

Zoom Lenses Equipped with PAIR (PENTAX Atmospheric Interference Reduction) System

Model Code	Format Size	Focal Length (mm)	Iris Range	Mount	Horizontal Angle of View (°)				Filter Size (mm)	Dimensions (mm)	Weight (g)
					1/4" format	1/3" format	1/2" format	2/3" format			
H55ZAME-F-PRO2	1/2	12-660	4.0-360	C	17.2-0.3	23.2-0.4	31.6-0.6	—	105 P=1.0	155x138x355	5,790
Built-in 2.5X extender used		30.5-1,680			6.8-0.1	9.0-0.2	12.1-0.2				
H55ZAME-F-PRO1	1/2	12-660	4.0-360	C	17.2-0.3	23.2-0.4	31.6-0.6	—	105 P=1.0	155x138x355	5,780
Built-in 2.5X extender used		30.5-1,680			6.8-0.1	9.0-0.2	12.1-0.2				
H33ZME-P-PRO1	1/2	10-330	1.7-560	C	—	26.4-0.9	35.0-1.1	—	105 P=1.0	152x126x252.5	3,450
H20ZAME-F-PRO1	1/2	12-240	1.6-720	C	—	23.0-1.2	30.8-1.6	—	95 P=1.0	152x138x223.5	3,260

Varifocal Plus

Model Code	Format Size	Focal Length (mm)	Iris Range	Mount	Horizontal Angle of View (°)				Filter Size (mm)	Dimensions (mm)	Weight (g)
					1/4" format	1/3" format	1/2" format	2/3" format			
H55VP814ED-M	1/2	8-40	1.4-250	CS	25.0-5.1	33.0-6.8	43.4-9.0	—	—	73.5x77.5x102.5	340
TS3VP213ED-M	1/3	2.6-8	1.3-200	CS	77.8-26.6	104.4-35.5	—	—	—	44x47.5x44.3	65

Motorized Zoom Lenses

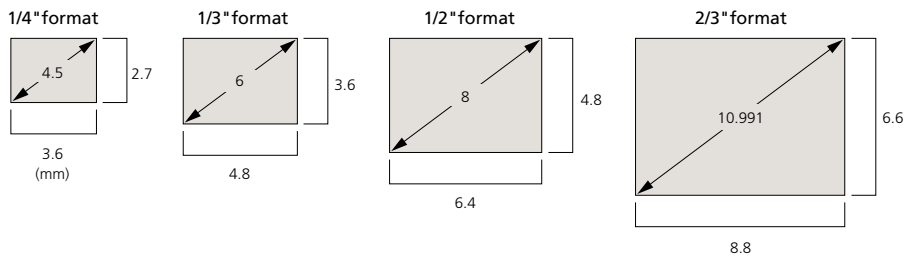
Model Code	Format Size	Focal Length (mm)	Iris Range	Mount	Horizontal Angle of View (°)				Filter Size (mm)	Dimensions (mm)	Weight (g)
					1/4" format	1/3" format	1/2" format	2/3" format			
H55ZAME-F	1/2	12-660	4.0-360	C	17.2-0.3	23.2-0.4	31.6-0.6	—	105 P=1.0	155x138x355	5,400
Built-in 2.5X extender used		30.5-1,680			6.8-0.1	9.0-0.2	12.0-0.2				
H33ZME-P	1/2	10-330	1.7-560	C	—	26.4-0.9	35.0-1.1	—	105 P=1.0	122x125x206.5	2,930
H20ZAME-3-M	1/2	12-240	1.6-720	C	17.2-0.9	23.0-1.2	30.8-1.6	—	95 P=1.0	116x135x223.5	2,590
H20ZAME-P-M	1/2	12-240	1.6-720	C	17.2-0.9	23.0-1.2	30.8-1.6	—	95 P=1.0	116x135x223.5	2,630
H20ZAME-F-M	1/2	12-240	1.6-720	C	17.2-0.9	23.0-1.2	30.8-1.6	—	95 P=1.0	116x135x223.5	2,630
H16ZME	1/2	7.5-120	1.6-1,000	C	26.4-1.8	34.9-2.3	45.8-3.1	—	62 P=0.75*	77.6 x 85.6 x 118.8	760
H16ZME-P	1/2	7.5-120	1.6-1,000	C	26.4-1.8	34.9-2.3	45.8-3.1	—	62 P=0.75*	77.6 x 85.6 x 118.8	780
H16ZME-F	1/2	7.5-120	1.6-1,000	C	26.4-1.8	34.9-2.3	45.8-3.1	—	62 P=0.75*	77.6 x 85.6 x 118.8	790
H10ZME	1/2	7.5-75	1.2-720	C	26.5-2.8	34.9-3.8	45.6-5.0	—	62 P=0.75	70x80.5x121.5	715
H10ZME-P	1/2	7.5-75	1.2-720	C	26.5-2.8	34.9-3.8	45.6-5.0	—	62 P=0.75	70x80.5x121.5	740
Manual zoom with auto iris											
H6ZBE	1/2	8-48.0	1.8-720	C	24.9-4.4	33.0-5.8	43.2-7.7	—	55 P=0.75	69x64x95	465
Fully motorized zoom											
C6Z1218M3	2/3	12.5-75	1.8-C	C	16.1-2.7	21.4-3.7	28.4-4.9	38.8-6.7	49 P=0.75	101.5x92.2x94.5	635

*Filter frame option

Varifocal Lenses

Model Code	Format Size	Focal Length (mm)	Iris Range	Mount	Horizontal Angle of View (°)				Filter Size (mm)	Dimensions (mm)	Weight (g)
					1/4" format	1/3" format	1/2" format	2/3" format			
HS2V616ED	1/2	6-12	1.6-300	CS	35.0-17.2	47.4-23.0	65.3-30.8	—	30.5 P=0.5	40.4x45.7x43.5	53
TS12V513ED-Q	1/3	5-60	1.3-360	CS	44.5-3.4	54.2-4.6	—	—	—	39x51.6x67.6	94
TS7V714ED-Q	1/3	7.5-50	1.4-360	CS	27.4-4.3	36.6-5.6	—	—	—	38x46.2x55.2	68
TS4V213ED-DNQ	1/3	2.7-13	1.3-360	CS	73.1-17.1	100.6-22.3	—	—	—	43.6x49.3x61.9	77
TS3V310ED	1/3	3-8	1.0-360	CS	69.0-26.4	93.2-35.3	—	—	—	38.3x44.7x44.4	60
TS3V310	1/3	3-8	1.0-C	CS	69.0-26.4	93.2-35.3	—	—	—	36.2x44.4	47
TS3V212ED	1/3	2.9-8.5	1.2-300	CS	70.7-25.1	96.2-33.4	—	—	—	38.3x44.7x45	50

Angle of View



Zoom Lenses Equipped with PAIR (PENTAX Atmospheric Interference Reduction) System

Model Code	1/4" Format Angle of View (°)			1/3" Format Angle of View (°)			1/2" Format Angle of View (°)			2/3" Format Angle of View (°)			
	Diagonal	Horizontal	Vertical	Diagonal	Horizontal	Vertical	Diagonal	Horizontal	Vertical	Diagonal	Horizontal	Vertical	
1/2" format	H55ZAME-F-PR02	21.7-0.4	17.2-0.3	12.8-0.2	29.5-0.5	23.2-0.4	17.2-0.3	40.8-0.7	31.6-0.6	23.2-0.4	—	—	—
	Built-in 2.5X extender used	8.5-0.2	6.8-0.1	5.1-0.1	11.3-0.2	9.0-0.2	6.8-0.1	15.1-0.3	12.1-0.2	9.0-0.2	—	—	—
	H55ZAME-F-PR01	21.7-0.4	17.2-0.3	12.8-0.2	29.5-0.5	23.2-0.4	17.2-0.3	40.8-0.7	31.6-0.6	23.2-0.4	—	—	—
	Built-in 2.5X extender used	8.5-0.2	6.8-0.1	5.1-0.1	11.3-0.2	9.0-0.2	6.8-0.1	15.1-0.3	12.1-0.2	9.0-0.2	—	—	—
H33ZME-P-PR01	—	—	—	32.9-1.1	26.4-0.9	19.9-0.6	43.3-1.4	35.0-1.1	26.4-0.9	—	—	—	
H20ZAME-F-PR01	21.5-1.1	17.2-0.9	12.9-0.7	28.8-1.5	23.0-1.2	17.2-0.9	38.9-1.9	30.8-1.6	23.0-1.2	—	—	—	

Varifocal Plus

Model Code	1/4" Format Angle of View (°)			1/3" Format Angle of View (°)			1/2" Format Angle of View (°)			2/3" Format Angle of View (°)		
	Diagonal	Horizontal	Vertical	Diagonal	Horizontal	Vertical	Diagonal	Horizontal	Vertical	Diagonal	Horizontal	Vertical
1/2" format H55VP814ED-M	31.0-6.4	25.0-5.1	18.8-3.9	40.9-8.5	33.0-6.8	25.0-5.1	53.1-11.3	43.4-9.1	33.0-6.8	—	—	—
1/3" format TS3VP213ED-M	97.7-33.3	77.8-26.6	58.1-20.0	131.1-44.3	104.4-35.5	77.8-26.6	—	—	—	—	—	—

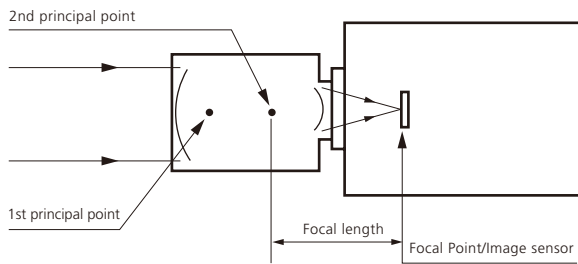
Motorized Zoom Lenses

Model Code	1/4" Format Angle of View (°)			1/3" Format Angle of View (°)			1/2" Format Angle of View (°)			2/3" Format Angle of View (°)			
	Diagonal	Horizontal	Vertical	Diagonal	Horizontal	Vertical	Diagonal	Horizontal	Vertical	Diagonal	Horizontal	Vertical	
1/2" format	H55ZAME-F	21.7-0.4	17.2-0.3	12.8-0.2	29.5-0.5	23.2-0.4	17.2-0.3	40.8-0.7	31.6-0.6	23.2-0.4	—	—	—
	Built-in 2.5X extender used	8.5-0.2	6.8-0.1	5.1-0.1	11.3-0.2	9.0-0.2	6.8-0.1	15.1-0.3	12.1-0.2	9.0-0.2	—	—	—
	H33ZME-P	—	—	—	32.9-1.1	26.4-0.9	19.9-0.6	43.3-1.4	35.0-1.1	26.4-0.9	—	—	—
	H20ZAME-3-M	21.5-1.1	17.2-0.9	12.9-0.7	28.8-1.5	23.0-1.2	17.2-0.9	38.9-1.9	30.8-1.6	23.0-1.2	—	—	—
	H20ZAME-P-M	21.5-1.1	17.2-0.9	12.9-0.7	28.8-1.5	23.0-1.2	17.2-0.9	38.9-1.9	30.8-1.6	23.0-1.2	—	—	—
	H20ZAME-F-M	21.5-1.1	17.2-0.9	12.9-0.7	28.8-1.5	23.0-1.2	17.2-0.9	38.9-1.9	30.8-1.6	23.0-1.2	—	—	—
	H16ZME	32.8-2.2	26.4-1.8	19.9-1.3	43.1-2.9	34.9-2.3	26.4-1.8	56.2-3.8	45.8-3.1	34.9-2.3	—	—	—
	H16ZME-P	32.8-2.2	26.4-1.8	19.9-1.3	43.1-2.9	34.9-2.3	26.4-1.8	56.2-3.8	45.8-3.1	34.9-2.3	—	—	—
	H16ZME-F	32.8-2.2	26.4-1.8	19.9-1.3	43.1-2.9	34.9-2.3	26.4-1.8	56.2-3.8	45.8-3.1	34.9-2.3	—	—	—
	H10ZME	32.8-3.5	26.5-2.8	19.9-2.1	43.0-4.7	34.9-3.8	26.5-2.8	55.3-6.2	45.6-5.0	34.9-3.8	—	—	—
H10ZME-P	32.8-3.5	26.5-2.8	19.9-2.1	43.0-4.7	34.9-3.8	26.5-2.8	55.3-6.2	45.6-5.0	34.9-3.8	—	—	—	
Manual zoom with auto iris													
1/2" format H6ZBE	31.0-5.5	24.9-4.4	18.8-3.3	40.7-7.2	33.0-5.8	24.9-4.4	52.7-9.5	43.2-7.7	33.0-5.8	—	—	—	
Fully motorized zoom													
2/3" format C6Z1218M3	20.1-3.4	16.1-2.7	12.1-2.1	26.7-4.6	21.4-3.7	16.1-2.7	35.3-6.1	28.4-4.9	21.4-3.7	48.0-8.3	38.8-6.7	29.3-5.0	

Varifocal Lenses

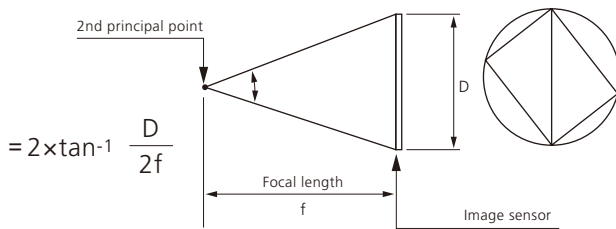
Model Code	1/4" Format Angle of View (°)			1/3" Format Angle of View (°)			1/2" Format Angle of View (°)			2/3" Format Angle of View (°)		
	Diagonal	Horizontal	Vertical	Diagonal	Horizontal	Vertical	Diagonal	Horizontal	Vertical	Diagonal	Horizontal	Vertical
1/2" format HS2V616ED	44.2-21.6	35.0-17.2	26.0-12.9	60.6-28.9	47.4-23.0	35.0-17.2	86.4-38.8	65.3-30.8	47.4-23.0	—	—	—
2/3" format	TS12V513ED-Q	51.0-4.3	44.5-3.4	30.4-2.6	67.4-5.7	54.2-4.6	40.5-3.4	—	—	—	—	—
	TS7V714ED-Q	34.2-5.3	27.4-4.3	20.4-3.2	46.2-7.0	36.6-5.6	27.4-4.3	—	—	—	—	—
	TS4V213ED-DNQ	92.0-21.5	73.1-17.1	54.6-15.8	126.6-27.8	100.6-22.3	74.8-16.7	—	—	—	—	—
	TS3V310ED	87.1-33.1	69.0-26.4	51.3-19.8	118.5-44.1	93.2-35.3	69.0-26.4	—	—	—	—	—
	TS3V310	87.1-33.1	69.0-26.4	51.3-19.8	118.5-44.1	93.2-35.3	69.0-26.4	—	—	—	—	—
	TS3V212ED	89.7-31.3	70.7-25.1	52.5-18.8	123.4-41.8	96.2-33.4	70.7-25.1	—	—	—	—	—

Focal length



Rays from infinitely distant objects are condensed internally in the lens at a common point on the optical axis. The point at which the image sensor of the CCD camera is positioned is called the focal point. By virtue of design, lenses have 2 principal points, 1st principle point and a 2nd principle point. The distance between the 2nd principle point and the focal point (image sensor) determines to focal length of the lens.

Angle of View



The angle formed by the two lines from the 2nd principle point and the edges of the sensor is called the angle of view. Therefore, the focal length of the lens is fixed regardless of the image format size of the CCTV camera. Conversely, the angle of view varies in accordance with the image size. The focal lengths in the catalogue are nominal and the angles of view calculated by the formula referring to the focal lengths are approximate.

F Number

$$\text{F number} = \frac{f}{A}$$

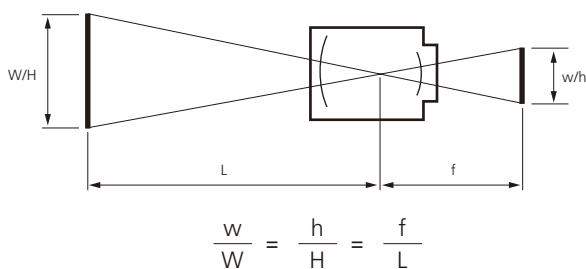
f = focal length
A = effective aperture (diameter of entrance pupil)

The F number is the index for the amount of light that passes through a lens. The smaller the number, the greater the amount of light. The F number is a ratio between the focal length and the effective aperture as follows.

Field of View

The field of view varies along with the focal length of the lens as follows.

* See page 18 for the calculation method for close-up applications.



W : width of object

H : height of object

w : width of image sensor

1" format=12.7mm, 2/3" format=8.8mm,

1/2" format=6.4mm, 1/3" format=4.8mm

h : height of image sensor

1" format=9.525mm, 2/3" format=6.6mm,

1/2" format=4.8mm, 1/3" format=3.6mm

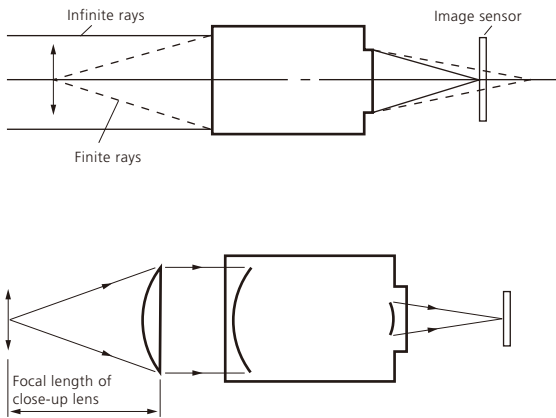
f : focal length

L : object distance

Example: To show the full image of a 2.64m high object positioned 10m away from the camera on a monitor with a 2/3 format camera

$$\frac{h}{H} = \frac{f}{L} \longrightarrow \frac{6.6}{2,640} = \frac{f}{10,000} \longrightarrow f = 25\text{mm}$$

Close-Up Application



There are two methods for imaging closer than the minimum object distance of a lens.

1) Extension Tube (Macro Ring)

When the rays originate from a finite object distance, the rays are condensed at a point further than the focal point, while the rays from infinite distance are condensed at the actual focal point. The focus adjustment moves the lens barrel toward the object to shift the focusing point at the image sensor. However, the amount of focusing adjustment is mechanically limited as set by the minimum object distance. Extension Tube (Macro Ring) is inserted in between the lens and the camera to shift

* Do not use a extension tube with a zoom lens.

2) Close-Up Lens

The close-up lens has a positive meniscus lens as a supplementary lens. Generally, 3 types of close-up lenses are available, close-up lens No. 1, 2 and 3 have focal lengths of 1,000mm (1000mm/1), 500mm (1,000mm/2), and 333mm (1,000mm/3), respectively. When an object is placed at the focal point of the close-up lens, the rays from the object are converted by the close-up lens to be parallel rays against the optical axis as seen on the right.

Depth of Field

When an object is focused, it is typically observed that the area in front and behind the object is also in focus. The range in focus is called depth of field. When the background is extended to infinity, the object distance (focusing distance) is called the hyper focal distance. Depth of field is calculated by the following formula.

$$H = \frac{f^2}{C \times F}$$

$$T1 = \frac{B(H+f)}{H+B}$$

$$T2 = \frac{B(H-f)}{H-B}$$

F = F No.

H = hyper focal distance

f = focal length

B = object distance (measured from image sensor)

T1 = near limit

T2 = far limit

C = circle of least confusion

1" format=0.04mm, 2/3" format=0.03mm,

1/2" format=0.02mm, 1/3" format=0.015mm, 1/4" format=0.011mm

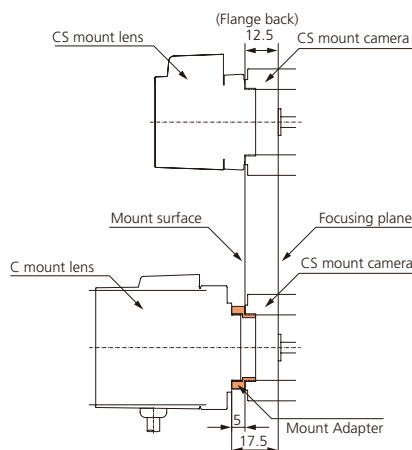
Depth of field increases when:

*Focal length is shorter

*F-number is larger

*Object distance is longer

CS and C Mount



The CS mount has been adopted because it is difficult to manufacture a compact, high-performance, and low-cost mount if the optical design requires a back focus longer than the focal length of the lens. The flange back of a CS mount is about 5mm shorter than that of a C mount, so please use CS mount lens only with a CS mount camera. Install a 5mm Mount adapter between the camera and lens when using a C mount lens with a CS mount camera.

Manual Iris Lens / Line-Scan Lens / UV Lens

Y K 5028 A □ -02
 孺

Auto-Iris Lens

B □ 2514 □ E R
 孺

Motorized Zoom Lens / Manual Zoom Lens

T S 15 Z A M E -3 F
 孺 孺

Vari-Focal Lens

T S 2 V 2 14 A E D

Board Camera Lens

Q D 2 V 22 14 B E -DN
 孺

Format Size

Sign	Detail
Y	Larger than 1" format
B	1" format
C	2/3" format
H	1/2" format
T	1/3" format
Q	1/4" format

Mount

Sign	Detail
none	C mount
S	CS mount
D	Board mount
K	K mount
F	F mount

Focal Length

Shown in integer, omit fractions
 Example: QD2V2214AE (f =2.2mm)
 QD2V2814AE (f =2.8mm)

Maximum Aperture

Omit decimal point
 Example: QD2V2214AE (maximum aperture = 1.4mm)

History of Improvements

This outlines the history of improvements of the same lens, shown with a letter in alphabetical order: A, B, C, D. The signs of □ and □ are not used *1

Focus-Iris Specification [used in combination]

Sign	Detail
X	Fixed Focus
E	Auto Iris
P	Pinhole

Zoom Ratio

Magnification is shown in integers.

Zoom Sign

Sign	Detail
Z	Zoom Lens
V	Vari-Focal Lens

Focus-Zoom-Iris [used in combination, in the order of M, E, D]

Sign	Detail
M	Motor Driven
E	Auto Iris
D	DC Iris

孺Control Voltage & Method [shown after – (hyphen)]

Sign	Detail
1	DC6V Polarity Switching Type
2	DC ± 12V Common Type
3	DC ± 6V Common Type
5	DC12V Polarity Switching Type

孺Other Features [Shown after – (hyphen). Usable in combination]*2

Sign	Detail
Numbers such as 02	Optical Magnification (Used only when there is a special need to describe it as a product feature. Decimal point omitted.)
DN	Day & Night Lens
UV	UV Lens
M	Mega-Pixel Lens
R	Iris with Manual Override
P	Preset
F	Preset & Iris Manual Override
I	IR-Coated Lens
H	High Speed Zoom/ Focus

Example

UVM: UV lens compatible with mega-pixel cameras

RI: IR-coated lens with manual override function

*1 "D" is used only with manual iris lenses in the History of Improvements.

Example : B1214D-2,C418DX,B2514D

*2 "-2" in B1214D-2 indicates the series name of the lens when it was released. It does not indicate the voltage, power supply type, or optical magnification.

MEMO

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