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# FUJINON

## CCTV LENS

for Security & Surveillance

**Authorized Fujifilm Service Agent.**

Due to a continuous process of product improvement, design and specifications are subject to change without notice.  
All photos, illustrations, drawings and other images in this brochure are intended for illustrative purpose only.

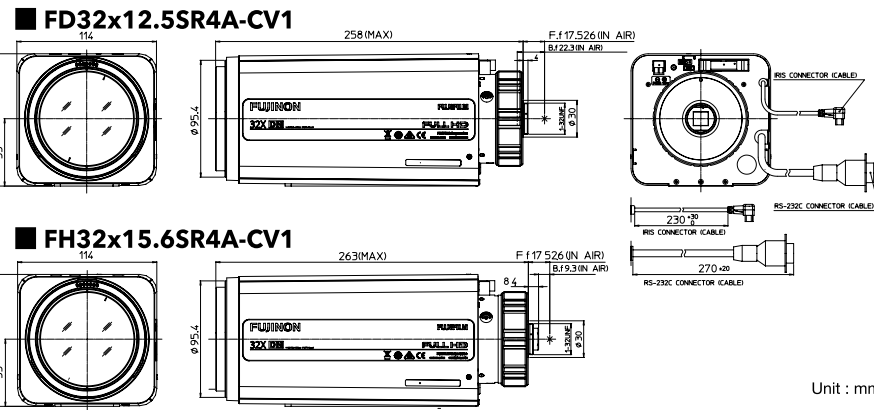
FFBX2022.05



Be certain to read the instructions for use before using any equipment.

# FD32x12.5SR4A-CV1 / FH32x15.6SR4A-CV1

Day Night **VISIBLE LIGHT CUT** **32x** **1/1.8"** **2/3"**  
 2MP FD32x12.5 FH32x15.6



Unit : mm

These are zoom lenses with long focal range, supporting large 1/1.8-inch (FD32x12.5) and 2/3-inch (FH32x15.6) sensors to deliver full-HD resolution. They are about 20% smaller in height, compared to previous models, to enable combination with wide range of housing units.

	FD32x12.5SR4A-CV1	FH32x15.6SR4A-CV1
Sensor size (max.)	1/1.8"	2/3"
Focal length (mm)	12.5 - 400	15.6 - 500
Zoom ratio	32x	
Mount	C-mount	
Iris range	F3.1 - F16	F3.9 - F16
Maximum relative aperture (W/T)	1 : 3.1 / 1:5.2	1 : 3.9 / 1:6.5
M.O.D. (m)	3	
Filter	Visible Light Cut	✓
Lens control interface	Serial + Analog	
Lens control	Zoom	Speed
	Focus	Speed
	Iris	Auto (Video) + Position / Auto (DC)
Position output	Zoom	✓
	Focus	✓
	Iris	-
Day & Night	✓	
Optical axis adjustment	Option (AA-1)	
Strengthened bottom plate	✓	
Back focal distance (in air) (mm)	22.3	9.3
Flange focal length	17.526	
Exit Pupil position (from image plane) (mm)	-99	-52
Size (HxWxL) (mm)	108 x 114 x 251(max. 258)	108 x 114 x 256(max. 263)
Weight (kg)	2.8	2.9
Filter thread (mm)	M82 x 0.75mm	
Operating temperature	-10°C - +50°C	
Wiring Diagram	P19	

## Optical Axis Adjustment Kit [AA-1] [Option]



### Individually adjustable optical axis for cameras and lenses

In some combinations of long zoom lenses and cameras using the C mount, a subject matter at the center occasionally shifts from that position when zoomed in. This is because of minor individual variations with the position of the camera's sensor and the lens's optical axis. To prevent such a situation, it is necessary to align the optical axis of camera and lens at the time of installation. The optical axis adjustment mechanism "AA-1" can be fitted to the lens side so as to fine-tune the optical axis with a screw on the mount.

### Adjustable flange focal distance in line with cameras

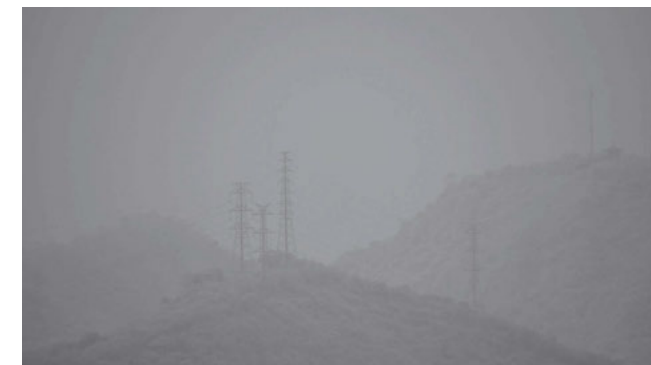
Flange focal distance must be adjusted for individual cameras and lenses in order to accurately match the focal point between a camera and its lens. The FD32x12.5 and FH32x15.6 series allow users to easily and finely adjust the flange focal distance on the lens, using readily-available hex wrenches.



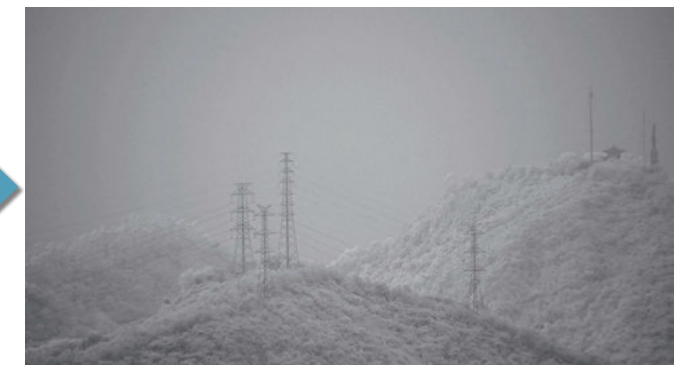
### "Visible Light Cut Filter" for de-hazing images in poor visibility due to high moisture in the air



When used in poor visibility with mist, rain, etc., this filter blocks visible light to clearly capture images only with linear near-infrared light.



Visible Light Cut Filter OFF



Visible Light Cut Filter ON

### How does the Visible Light Cut Filter de-haze images?

Visible light in short wavelengths is prone to diffusion in the presence of airborne particles. However, near-infrared light with longer wavelengths has the characteristic of penetrating air more easily to reach the subject matter. This filter blocks visible light that causes video noise, while passing near-infrared light through to obtain clear images.

### More convenient installation

These lenses are about 20% smaller in height, compared to previous models, to achieve compatibility with a greater range of security camera housings.

For enhanced stability in installation on a security camera platform, the lenses have a total of eight sockets, i.e. one for fitting a regular tripod and seven M5 sockets, at the base.



### Compatibility with various interfaces

The lenses provide both analog and serial (RS232C) interface terminals for user convenience. They support the Pelco-D and C10 (Fujifilm's own lens control system) protocols.

\*See each lens's wiring diagram for details.

### C-mount Extender Lenses [Option]

#### Specifications with Extender lenses

HE15-1

HE20-1



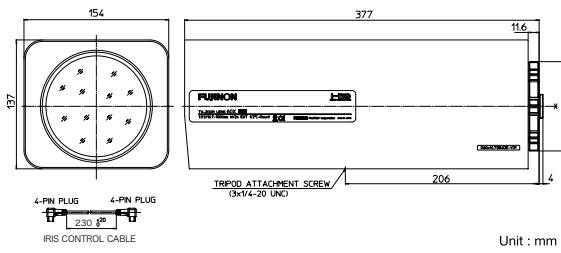
	HE15-1	HE20-1
Zoom ratio	1.5x	2x
Mount	C-mount	C-mount
F.No.	Attached lens x1.5	Attached lens x 2
Focal length	Attached lens x1.5	Attached lens x 2
M.O.D	Same as the Attached lens	Same as the Attached lens
Angle of view	Attached lens x1/1.5	Attached lens x 1/2
Field of view	Attached lens x1/1.5	Attached lens x 1/2

1. For C mount lenses only. Not applicable to CS mount lens.  
 2. Not for 3CCD cameras.  
 3. These extenders can not be used over another.



## D60x16.7SR4 Series

Day Night, VISIBLE LIGHT CUT, 60x, 1/1.8", 1,000mm, Extender 2x



### A compact and lightweight 60x zoom model featuring optical anti-vibration\*1, autofocus\*2 and compatibility with full-HD cameras

This is a 60x zoom security camera lens, equipped with the world's first optical anti-vibration function, and compatible with full-HD cameras. It supports full-HD cameras and sports a compact and lightweight body despite its focal length range reaching 1,000mm. The lens enables a compact long-range security system, ideal for the surveillance of remote locations such as ports, harbors, airports and national borders, or for monitoring dams, rivers, etc. for disaster prevention.

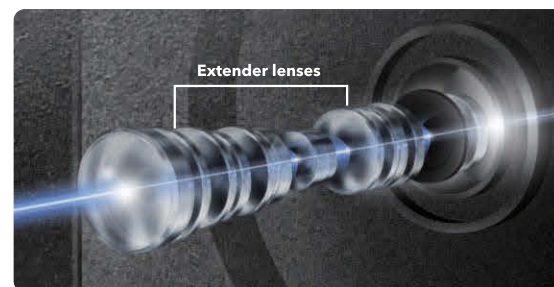
\*1: Featured in D60x16.7SR4FE-ZP3C  
\*2: Featured in D60x16.7SR4DE-ZP1A and D60x16.7SR4FE-ZP3C

	D60x16.7SR4DE-V23S	D60x16.7SR4DE-ZP1A (AF)	D60x16.7SR4FE-ZP3C (AF+Opt. Anti vibration)
Sensor size (max.)		1/1.8"	
Focal length (mm)	1x 2x	16.7 - 1000 33.4 - 2000	
Zoom ratio		60x	
Extender		2x	
Mount		C-mount	
Iris range	1x 2x	F3.5 - F16 F7.0 - F32	
Maximum relative aperture (W/T)		1:3.5 / 1:8.8	
M. O. D. (m)		5	
Filter	ND Visible light cut	1/5, 1/64	
AF	-		✓ (Applicable for analog cameras)
Optical Anti-Vibration	-		✓
Lens control interface	Analog		Serial
Lens control	Zoom Focus Iris	Speed Speed	Speed + Position Speed + Position Auto(DC)+Position
Position output	Zoom Focus Iris		✓ ✓ ✓
Day & Night			
Temperature correction mechanism		✓	
Optical axis adjustment	✓		-
Strengthened bottom plate	✓		-
Back focal distance (in air) (mm)		24.85	
Flange focal length (mm)		17.526	
Exit Pupil position (from image plane) (mm)	1x 2x	-448.80 -85.23	
Size (HxWxL) (mm)		137 x 154 x 377	
Weight (kg)	6.7	6.5	7.1
Filter thread (mm)		M 112 x 0.75mm	
Operating temperature		0°C - +50°C	
Wiring Diagram		P19	

\*1: For details on the Iris-Remote connection, see the relevant Technical Reference (Page 20).

### A built-in 2x extender for instantaneously doubling the focal length

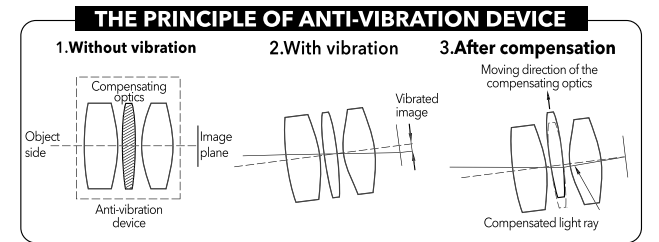
The lens is equipped with a built-in optical extender, which can instantaneously double the focal length at the touch of a button (2,000mm for D60x16.7SR4 Series and 1,500mm for D60x12.5R3DE Series). Unlike an external extender, the built-in design means the position of focus remains unchanged even when the extender is triggered.



### Optical anti-vibration function "OS-TECH"



Lenses with long focal lengths have a narrow angle of view at the telephoto end. Camera movements due to wind or because of the height of installation position cause image blur, making it difficult to capture subject matter. In order to minimize motion blur under such conditions as much as possible to keep footage stable and clear, Fujinon's CCTV lenses are fitted with Fujifilm's original optical anti-vibration function called OS-TECH. A gyro sensor within a lens detects the amount of vibrations, and passes the data to the lens's microcomputer, which uses a software program to calculate the amount of correction needed and shift the correction lens group to control image shake. The fact that the correction is applied optically with lens elements, means the function has no time lag, and provides anti-vibration effect edge-to-edge across the full-HD screen. During the development stage, special considerations have been paid to durability and reliability through the use of highly reliable bearings in anti-vibration parts.



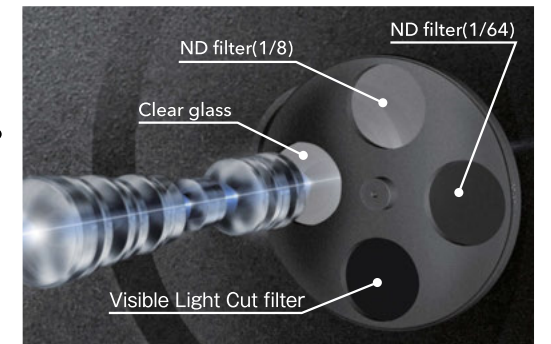
### Featuring the "Temperature Correction Mechanism" for automatically correcting temperature-induced focus shift

Security camera systems are often used in tough weather conditions. Significant temperature fluctuations could shift the focal plane, resulting in inaccurate focusing. Under such a condition, the Temperature Correction Mechanism uses data from the temperature sensor on a lens, and shifts lens elements into the optimum positions to keep the focal plane constant, thereby offering stable focusing performance even in an environment with large temperature fluctuations.

### An built-in turret with three different types of filters that can be switched over with a single command

#### Featuring two ND filters, which cuts down the amount of light in excessively bright conditions to achieve optimum light

When strong sunlight prevents the selection of a desirable f-stop value, ND filter can be used to reduce the amount of light with minimizing the decline in resolution caused by smaller aperture. The D60x16.7 series of lenses feature two ND filters in the densities of 1/8 and 1/64.



#### "Visible Light Cut Filter"

When used in poor visibility with mist, rain, etc., this filter blocks visible light which scatters in the air to clearly capture images with Near-infrared light. (See P09 "How does the Visible Light Cut filter de-haze images?")

### Delivering clear images with minimal focus shift round the clock regardless of the types of light conditions — Day & Night Lens

Security cameras capture images with visible light during the day and use a near-infrared light projector from dusk through night. The use of light with different wavelengths causes a shift in the image-forming location, resulting in blurry images. Fujinon's Day & Night Lens features special optical glass elements (Super ED and ED glass elements) to ensure that the image is formed constantly on the same plane, regardless of the change of light sources, to achieve sharpness.

#### Use of "Super ED (Extra-low Dispersion)" glass with an advanced level of chromatic aberration correction

Zoom lenses covering long focal lengths inevitably suffer from "chromatic aberration," i.e. color bleeding in images. The Super ED glass serves the role of controlling this chromatic aberration. It requires a soft glass material, making it difficult to manufacture. However, with Fujifilm's outstanding optical technology, the D60x16.7SR4 series feature two large Super ED glass elements to achieve advanced image quality.

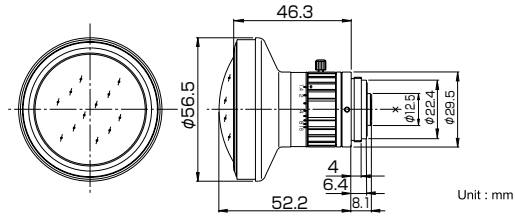


# Fish-eye

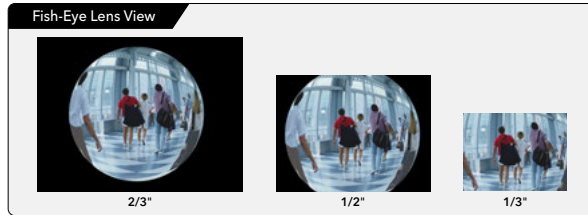
## FE185C057HA-1



2/3"



Unit : mm

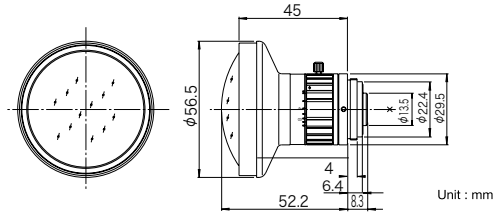


Focal Length	1.8	
Iris Range	F1.4 - F16	
Mount	C-mount	
Operation	Focus: Fixed, Iris: Manual	
Angle of View (HxV)	2/3"	185.0° x 185.0° (Ø5.7mm)
	1/2"	185.0° x 154.1°
	1/3"	154.1° x 115.4°
M.O.D. (m)	0.1	
Mass (g)	135	

## FE185C086HA-1



1"



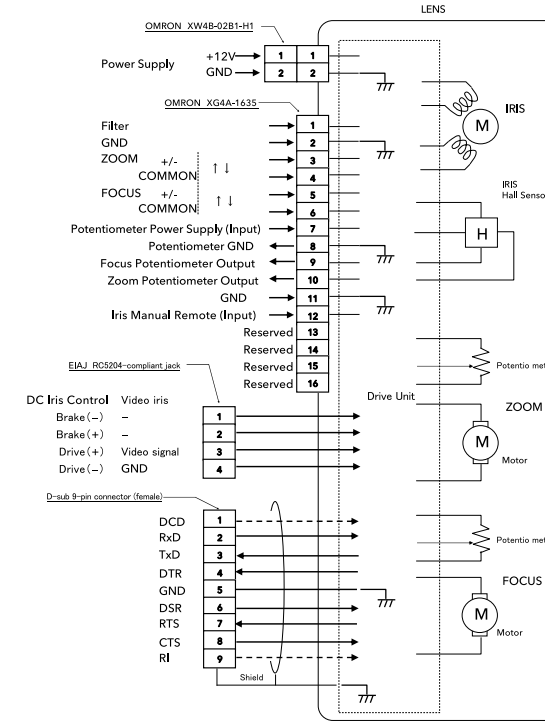
Unit : mm



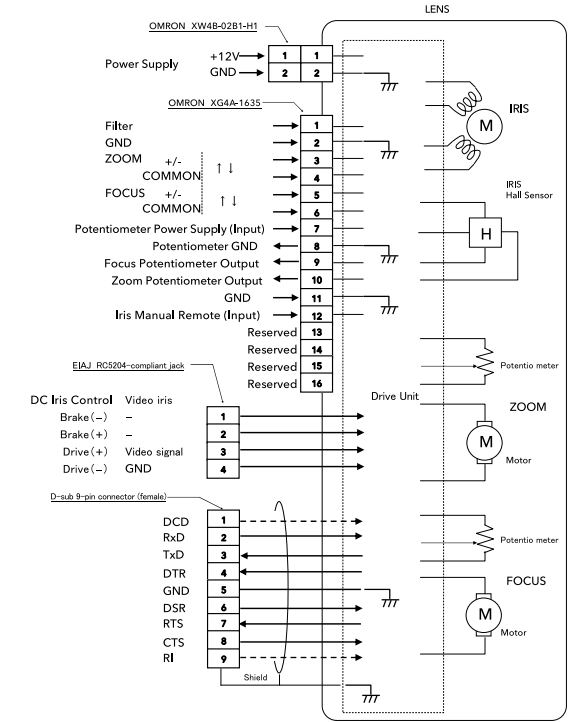
Focal Length	2.7	
Iris Range	F1.8 - F16	
Mount	C-mount	
Operation	Focus: Fixed, Iris: Manual	
Angle of View (HxV)	1"	185.0° x 185.0° (Ø8.6mm)
	2/3"	185.0° x 140.6°
	1/2"	136.3° x 102.3°
M.O.D. (m)	0.2	
Mass (g)	160	

# Zoom Lens Wiring

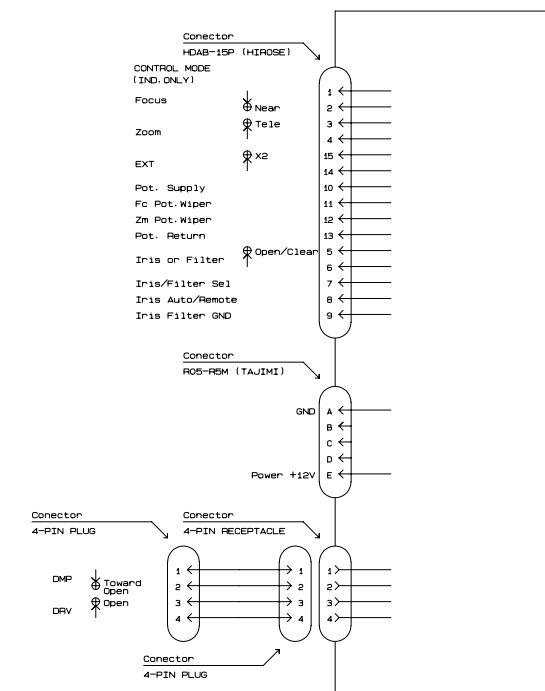
## FD32x12.5SR4A-CV1 ..... P02



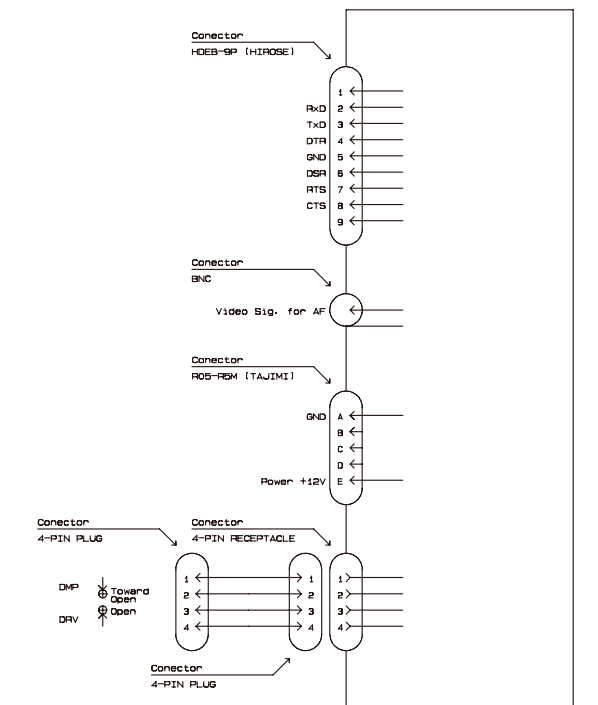
## FH32x15.6SR4A-CV1 ..... P02



## D60x16.7SR4DE-V23S ..... P04



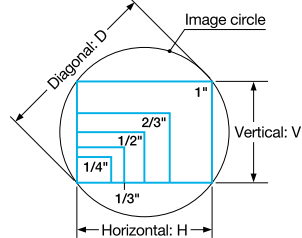
## D60x16.7SR4DE-ZP1A ..... P04 D60x16.7SR4FE-ZP3C ..... P04





### Image Sizes

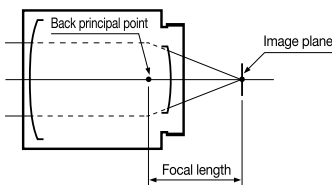
- There are several types of imaging sensors for CCTV cameras, with different image sizes.



Product symbol	Image sensor	Image size (mm)		
		Horizontal: H	Vertical: V	Diagonal: D
C	1"	12.8	9.6	16.0
H	2/3"	8.8	6.6	11.0
D, S	1/2"	6.4	4.8	8.0
Y, T	1/3"	4.8	3.6	6.0
Q	1/4"	3.6	2.7	4.5
35 mm camera lens (Reference)	35 mm film	36.0	24.0	43.3

### Focal Length

- The focal length will be the distance from the back principal point to the image plane. Lower the focal length wider the image.

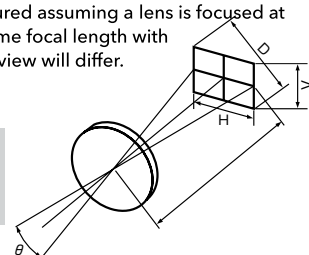


### Angle of View

- The angle of view is the object size that can be captured at a specified image size, which is represented by angular measure. Normally the angle of view is measured assuming a lens is focused at infinity. When using a lens of the same focal length with a different image size, the angle of view will differ.

$$\theta = 2 \tan^{-1} \frac{Y'}{f}$$

$\theta$  : Angle of view  
 $Y'$  : Image size  
 $f$  : Focal length



#### Example

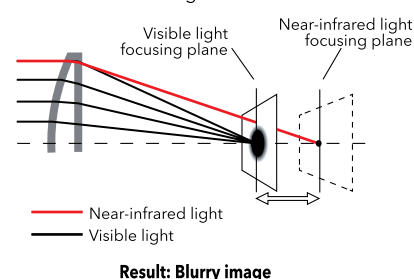
The angle of view when the sensor size of the camera is 1/2" and the focal length is 12.5 mm:

$$\theta = 2 \tan^{-1} \frac{6.4}{2 \times 12.5} = 28.72^\circ$$

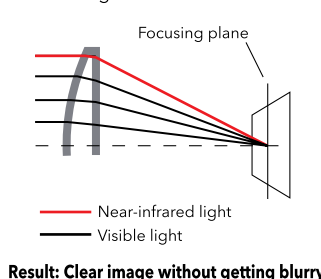
### Day & Night Lens

- The day & night lens uses an advanced optical design, special optical glass, and other state-of-the-art technologies to focus light on the same plane to prevent the focus to become blurry enabling sharp images.

A standard lens (for visible light) is mounted on a day & night camera, and used under near-infrared light.



A day & night lens is mounted on a day & night camera, and used under near-infrared light.



### C/CS-Mount

- CCTV cameras have either a C-mount or CS-mount.

Standard	C-mount	CS-mount
	Flange focal length (mm)	17.526*1
Diameter of screw thread (mm)	1-32UNF	

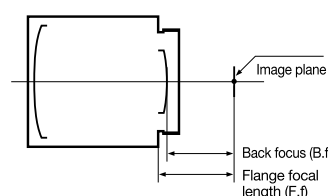
  

Interchangeability	C-mount camera	CS-mount camera
	C-mount lens	●
CS-mount lens	×	●

- \* 1 Length in air
- \* 2 Will need a C-mount adapter ring (5 mm) when fitting a C-mount lens to a CS-mount camera.

### Flange focal length and Back Focal Distance

- Flange focal length is the distance between the mechanical mount surface and image plane. Back focal distance is the distance between the rear end of the lens part and the image plane.



### Brightness of a Lens (F and T No.)

- The F No. is an indication of the brightness of lens. The smaller the value, the brighter the image produced by the lens. The F No. is inversely proportional to the effective diameter of the lens and directly proportional to the focal length. The scale on the iris ring of lens uses a ratio of 2, because the value of light incident on a lens is proportional to the cross section of luminous flux (square of diameter). In other words, the brightness decreases by half each time the F No. is increased by one F stop.
- The F No. is a value determined on the assumption that the transmittance of the lens is 100%. Virtually all lenses however, have different spectral transmittance, and thus, the same F No. can have different levels of brightness. To eliminate this inconvenience, a system has been developed to consider both F No. and spectral transmittance, the T No. The T No. and the F No. are related to each other as shown in right:

$$F \text{ No.} = \frac{f}{d} \quad f: \text{Focal length of a lens} \quad d: \text{Effective diameter of a lens}$$

$$T \text{ No.} = \frac{F \text{ No.}}{\sqrt{\text{Transmittance (\%)}}} \times 10$$

### M.O.D.

- The M.O.D. (minimum object distance) is the closest distance to the object at which an image can be taken. This is the distance from the vertex of the front lens.

### List of the angles of view for zoom models

This angle-of-view data has been calculated based on the following diagonal length (mm):  
 1" =  $\phi$  16.0, 2/3" =  $\phi$  11.0, 1/1.8" =  $\phi$  8.9, 1/2" =  $\phi$  8.0, 1/3" =  $\phi$  6.0

This angle-of-view data is for reference only. The lenses' full resolution may not be obtained depending on individual cameras in the given sensor size.

#### Standard mode (1x)

Aspect ratio 4:3	1"		2/3"		1/1.8"		1/2"		1/3"	
	WIDE	TELE	WIDE	TELE	WIDE	TELE	WIDE	TELE	WIDE	TELE
D60x16.7SR4DE-V23S										
D60x16.7SR4DE-ZP1A			23.0°x 17.7°*	0.42°x 0.31°*	23.0°x 17.6°	0.41°x 0.31°	20.9°x 15.9°	0.37°x 0.28°	15.9°x 12.1°	0.28°x 0.21°
D60x16.7SR4FE-ZP3C										
D60x12.5R3DE-V41							28.9°x 21.6°	0.50°x 0.38°	21.6°x 16.2°	0.38°x 0.28°
HC16x100R2CE-F11	7.3°x 5.5°	0.47°x 0.35°	5.0°x 3.7°	0.32°x 0.24°	4.0°x 3.0°	0.26°x 0.19°	3.6°x 2.7°	0.23°x 0.17°	2.7°x 2.0°	0.17°x 0.13°

#### Aspect ratio 16:9

Aspect ratio 16:9	1"		2/3"		1/1.8"		1/2"		1/3"	
	WIDE	TELE	WIDE	TELE	WIDE	TELE	WIDE	TELE	WIDE	TELE
D60x16.7SR4DE-V23S										
D60x16.7SR4DE-ZP1A			24.9°x 14.6°*	0.45°x 0.26°*	24.9°x 14.5°	0.45°x 0.26°	22.6°x 13.1°	0.41°x 0.23°	17.3°x 9.9°	0.31°x 0.17°
D60x16.7SR4FE-ZP3C										
D60x12.5R3DE-V41							31.5°x 17.6°	0.54°x 0.31°	23.5°x 13.2°	0.41°x 0.23°
HC16x100R2CE-F11	7.7°x 4.4°	0.50°x 0.28°	5.3°x 3.0°	0.35°x 0.20°	4.3°x 2.5°	0.28°x 0.16°	3.9°x 2.2°	0.25°x 0.14°	2.9°x 1.7°	0.19°x 0.11°

#### When built-in Extende is on

Aspect ratio 4:3	1"		2/3"		1/1.8"		1/2"		1/3"	
	WIDE	TELE	WIDE	TELE	WIDE	TELE	WIDE	TELE	WIDE	TELE
D60x16.7SR4DE-V23S										
D60x16.7SR4DE-ZP1A			11.7°x 8.9°*	0.21°x 0.16°*	11.7°x 8.9°	0.21°x 0.16°	10.6°x 8.0°	0.19°x 0.14°	8.0°x 6.0°	0.14°x 0.11°
D60x16.7SR4FE-ZP3C										
D60x12.5R3DE-V41							14.7°x 11.1°	0.26°x 0.19°	11.1°x 8.3°	0.19°x 0.15°
HC16x100R2CE-F11	3.7°x 2.8°	0.23°x 0.17°	2.5°x 1.9°	0.16°x 0.12°	2.1°x 1.6°	0.13°x 0.10°	1.9°x 1.4°	0.12°x 0.09°	1.4°x 1.0°	0.09°x 0.07°

#### Aspect ratio 16:9

Aspect ratio 16:9	1"		2/3"		1/1.8"		1/2"		1/3"	
	WIDE	TELE	WIDE	TELE	WIDE	TELE	WIDE	TELE	WIDE	TELE
D60x16.7SR4DE-V23S										
D60x16.7SR4DE-ZP1A			12.7°x 7.3°*	0.23°x 0.13°*	12.7°x 7.3°	0.23°x 0.13°	11.5°x 6.6°	0.20°x 0.11°	8.7°x 4.9°	0.15°x 0.09°
D60x16.7SR4FE-ZP3C										
D60x12.5R3DE-V41							16.1°x 9.1°	0.28°x 0.16°	12.1°x 6.8°	0.21°x 0.12°
HC16x100R2CE-F11	4.0°x 2.3°	0.26°x 0.15°	2.8°x 1.6°	0.18°x 0.10°	2.2°x 1.3°	0.15°x 0.08°	2.0°x 1.1°	0.13°x 0.07°	1.5°x 0.9°	0.10°x 0.06°

#### Standard mode (1x)

Aspect ratio 4:3	1"		2/3"		1/1.8"		1/2"		1/3"	
	WIDE	TELE	WIDE	TELE	WIDE	TELE	WIDE	TELE	WIDE	TELE
FD32x12.5SR4A-CV1					30.9°x 23.5°	1.0°x 0.77°	28.0°x 21.2°	0.92°x 0.69°	21.2°x 16.0°	0.69°x 0.52°
FH32x15.6SR4A-CV1			30.9°x 23.6°	1.0°x 0.77°	25.4°x 19.2°	0.8°x 0.63°	22.9°x 17.3°	0.75°x 0.56°	17.3°x 13.1°	0.56°x 0.42°

#### Aspect ratio 16:9

Aspect ratio 16:9	1"		2/3"		1/1.8"		1/2"		1/3"	
	WIDE	TELE	WIDE	TELE	WIDE	TELE	WIDE	TELE	WIDE	TELE
FD32x12.5SR4A-CV1					33.4°x 19.4°	1.1°x 0.63°	30.3°x 17.4°	1.0°x 0.57°	23.1°x 13.1°	0.76°x 0.43°
FH32x15.6SR4A-CV1			33.4°x 19.4°	1.1°x 0.63°	27.5°x 15.8°	0.91°x 0.51°	24.9°x 14.2°	0.82°x 0.46°	18.9°x 10.7°	0.61°x 0.35°

\* Format converter lens set