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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.

FFBX2022.02



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

FUJINON CCTV LENS



Fujifilm is a leading company in the field of optical devices.

Broad range of product categories

Fujifilm has developed a diverse range of lenses over many years. It deals with lenses in versatile applications including not only television broadcasting and cinematography, but also lenses for security cameras, interchangeable lenses for digital cameras, as well as lenses for in-car cameras and satellites.



Ever-advancing technological strength

Manufacturing high precision lenses requires advanced and refined skills. Fujifilm has accumulated advanced technologies throughout its long history.

As represented by the Fujinon brand, Fujifilm receives high acclaim as a leading company for optical devices.

1944: Fuji Photo Optical Co., Ltd. established	
1948: FUJICA-6 released	
1962: Development of TV broadcasting lenses commenced	
1965: Lenses for security cameras developed	
2002: Lenses for cinematography developed	
2013: Next-generation coating technology "HT-EBC" developed	



Emmy Awards
Fujifilm has won Emmy Awards, which considered to be the television industry's Academy Awards, from the U.S. Television Academy three times.

- 1996
- 2005
- 2009

Acquisition of ISO9001 certification on quality control
In 1998, Fujifilm acquired ISO 9001 certification, an international standard in quality control, from Germany's certification organization TÜV.

Acquisition of ISO14001 certification on the environment
In 1998, Fujifilm acquired ISO14001 certification, an international standard in environmental management, from the Japan Quality Assurance Organization. The company's commitment to "continuing to make social contributions through sound corporate activities" also applies to global environmental issues.

Global network

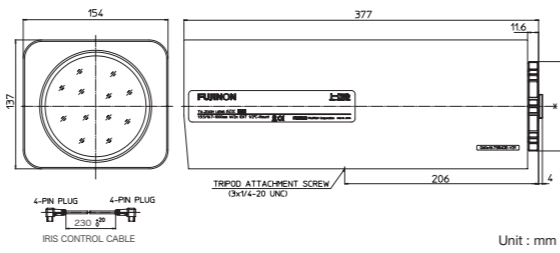
With a global network of manufacturing and sales sites, Fujifilm applies logistics marketing from a global perspective, while delivering swift and detailed local services at each of the sites.

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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.

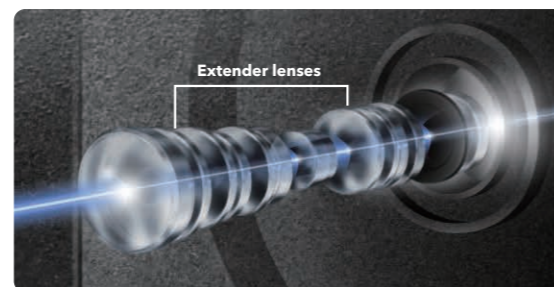
*1: Featured in D60x16.7SR4FE-ZP1C
*2: Featured in D60x16.7SR4DE-ZP1A and D60x16.7SR4FE-ZP1C

	D60x16.7SR4DE-V21	D60x16.7SR4DE-V23S	D60x16.7SR4DE-ZP1A (AF)	D60x16.7SR4FE-ZP1C (AF+Opt. Anti vibration)
Sensor size (max.)			1/1.8"	
Focal length (mm)	1x	16.7 - 1000		
	2x	33.4 - 2000		
Zoom ratio	60x			
Extender	2x			
Mount	C-mount			
Iris range	1x	F3.5 - F16		
	2x	F7.0 - F32		
Maximum relative aperture (W/T)	1:3.5 / 1:8.8			
M. O. D. (m)	5			
Filter	ND	1/5, 1/64		
	Visible light cut	✓		
AF	-	-	✓ (Applicable for analog cameras)	
Optical Anti-Vibration	-	-	-	✓
Lens control interface	Analog			Serial
Lens control	Zoom	Speed		Speed + Position
	Focus	Speed		Speed + Position
	Iris	Auto(DC)+Speed		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	-448.80		
	2x	-85.23		
Size (HxWxL) (mm)	137 x 154 x 377			
Weight (kg)	6.5	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

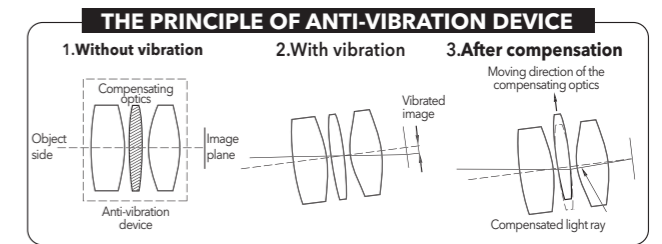
The lens is equipped with a built-in optical extender, which can instantaneously double the focal length at the touch of a button (2,000mm for D60x16.7SR4 Series and 1,500mm for D60x12.5R3DE Series). Unlike an external extender, the built-in design means the position of focus remains unchanged even when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



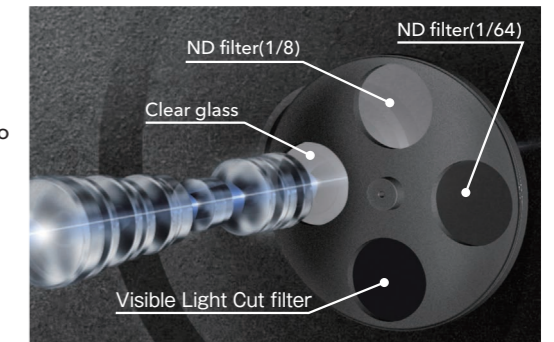
Featuring the "Temperature Correction Mechanism" for automatically correcting temperature-induced focus shift

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.

D60x16.7SR4 Series Format Converter Lens Set

Day Night **VISIBLE LIGHT CUT** **2MP** **60x** **1/1.8"** **1,200mm** **Extender 2x**



The Format Converter Lens attached to D60x16.7SR4

Main features of the D60x16.7SR4 series (Format Converter Lens Set)

<When fitted with the adapter lens>

Providing 60x optical zoom to cover the focal length range of 20mm to 1,200mm
Supporting 2/3-inch sensors, delivering full-HD image across the zoom range
When the built-in 2x extender is activated, the lens switches the telephoto-end focal length from 1,200mm to 2,400mm to clearly capture the movements of people approx. 4km away.

<When fitted / not fitted with the adapter lens>

Since this is a Day & Night series, the lens provides clear and sharply-focused images even at night or dusk, when the setting sun compromises visibility.
The Temperature Correction Mechanism uses data from a temperature sensor, and automatically corrects minor focus shift to ensure image sharpness.
When mounted on a camera that supports near-infrared light, this lens uses the built-in Visible Light Cut Filter to de-haze footage even in poor visibility conditions such as rain and mist.
The use of the built-in two-stage ND filter optimizes the amount of light when monitoring a subject in extremely bright conditions.

Lineup

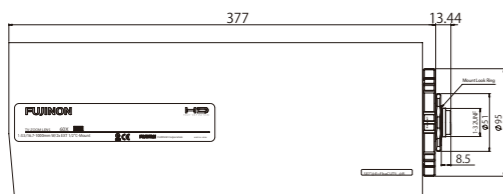
FUJINON D60x16.7SR4DE-V21 Set
(Analog control)

FUJINON D60x16.7SR4DE-V23 Set
(Analog control+Optical Axis Adjustment + Strengthened bottom plate)

FUJINON D60x16.7SR4DE-ZP1A Set
(Serial control + AF)

FUJINON D60x16.7SR4FE-ZP1C Set
(Serial control + AF+Optical Anti-Vibration)

Outline drawing with the format adapter lens



Main specifications with a 2/3" format camera

		D60x16.7SR4 Lens Set		
Resolution		Full HD 2MP*1		
Sensor size		2/3"		
Focal Length (mm)	1x	20.0 - 1200 mm		
	2x Extender	40.0 - 2400 mm		
Zoom ratio		60x		
Iris range (F No.)		F4.2 - F19.2		
M.O.D (m)		5		
Iris Type		Auto (DC) or Remote		
2/3"	4 : 3	Horizontal	WIDE	23.03°
			TELE	0.42°
		Vertical	WIDE	17.67°
	TELE	0.32°		
	Diagonal	WIDE	27.97°	
		TELE	0.52°	
16 : 9		Horizontal	WIDE	24.87°
	TELE		0.45°	
	Vertical	WIDE	14.57°	
	TELE	0.25°		
	Diagonal	WIDE	27.97°	
		TELE	0.52°	
Size (HxWxL)		137x154x382 mm		
Weight (kg)		6.6		

* Applied to a 2/3" sensor camera

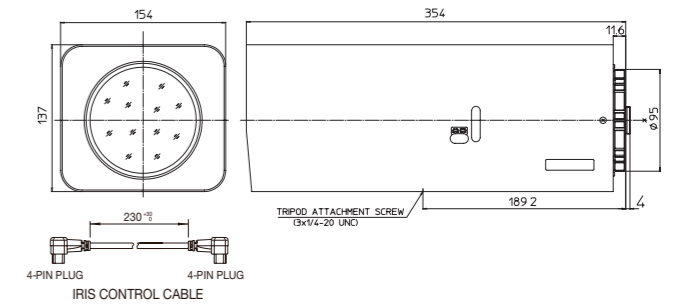
Auto-focus control on the lens side

The lens uses video signals from a camera to control its focus so as to keep monitoring images constantly in focus. This enables AF functionality in a system that uses a camera unit that does not offer AF (optional).



D60x12.5R3DE-V41

Day Night **60x** **1/2"** **750mm** **Extender 2x**



		D60x12.5R3DE-V41	
Sensor size (max.)		1/2"	
Focal length (mm)	1x	12.5 - 750	
	2x	25 - 1500	
Zoom ratio		60x	
Extender		2x	
Mount		C-mount	
Iris range	1x	F3.8 - T3000 (Equiv. to F3000)	
	2x	F7.6 - T3000 (Equiv. to F3000)	
Maximum relative aperture (W/T)		1:3.8 / 1:7.1	
M. O. D. (m)		5	
Filter	ND	✓	
	IR Cut	✓	
Lens control interface		Analog	
Lens control	Zoom	Speed	
	Focus	Speed	
	Iris	Auto(Video) + Position	
Position output	Zoom	✓	
	Focus	✓	
	Iris	-	
Day & Night		✓	
Back focal distance (in air) (mm)		53.23	
Flange focal length (mm)		17.526	
Exit Pupil position (from image plane) (mm)	1x	-77	
	2x	-38	
Size (HxWxL) (mm)		137 x 154 x 354	
Weight (kg)		5.1	
Filter thread (mm)		M 107 x 1 mm	
Operating temperature		-10°C - +50°C	
Wiring Diagram		P19	

*1: The iris automatically closes when the camera is turned off.

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

C-mount Extender Lenses [Option]

Specifications with Extender lenses

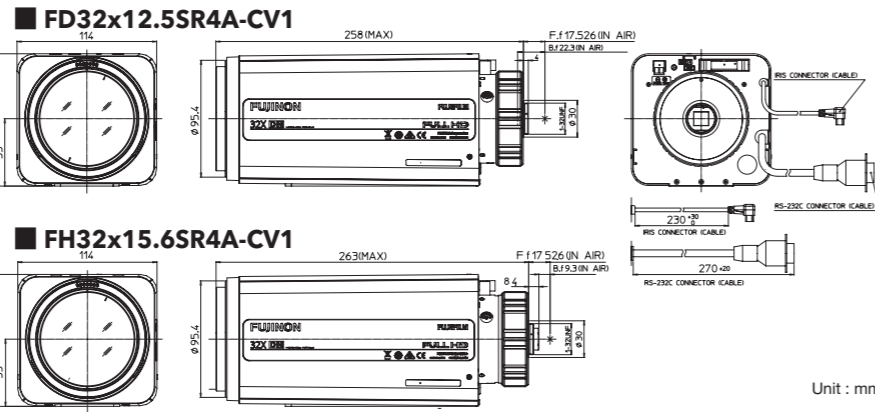


	HE15-1	HE20-1
Zoom ratio	1.5x	2x
Mount	C-mount	C-mount
F. No.	Attached lens x 1.5	Attached lens x 2
Focal length	Attached lens x 1.5	Attached lens x 2
M.O.D	Same as the Attached lens	Same as the Attached lens
Angle of view	Attached lens x 1/1.5	Attached lens x 1/2
Field of view	Attached lens x 1/1.5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

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

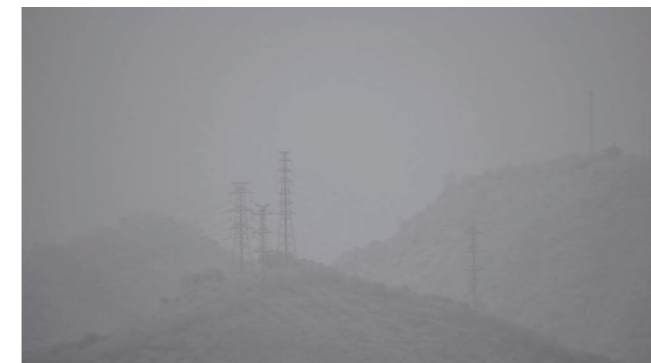
Flange focal distance must be adjusted for individual cameras and lenses in order to accurately match the focal point between a camera and its lens. The FD32x12.5 and FH32x15.6 series allow users to easily and finely adjust the flange focal distance on the lens, using readily-available hex wrenches.



■ "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

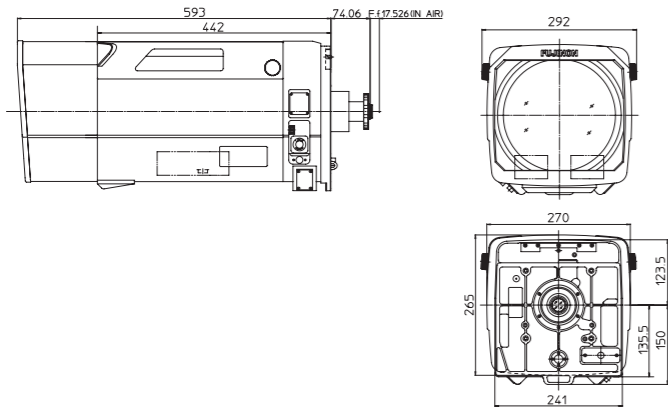
The lenses provide both analog and serial (RS232C) interface terminals for user convenience. They support the Pelco-D and C10 (Fujifilm's own lens control system) protocols.

*See each lens's wiring diagram for details.

Zoom

HC16x100R2CE-F11 [Built-to-order]

Day Night 3MP 16x 1" 1,600mm Extender 2x



HC16x100R2CE-F11			
Focal Length (mm)	1x	100 - 1600 (16x)	
	2x	200 - 3200 (16x)	
Iris Range	1x	F3.4 - F16	
	2x	F6.8 - F32	
Mount	C-mount		
Lens control interface	Serial	Analog	
	Position	Speed or Position	
Lens control	Zoom	Position	Position
	Focus	Position	Position
	Iris	Auto(Video) + Manual Position	
Position output	Zoom	✓	✓
	Focus	✓	✓
	Iris	✓	—
	Extender	2x	—
M.O.D (m)	5		
Back Focal Distance (in air) (mm)	29.38		
Back Focal Adjustment	✓		
Day & Night	✓		
Exit Pupil Position (From Image Plane) (mm)	1x	-125	
	2x	-111	
Extender	2x		
Weight (kg)	24		

* 1 : This model uses the CLH-12 lens support and two ESM-D51B servo modules (for Zoom and Focus.)

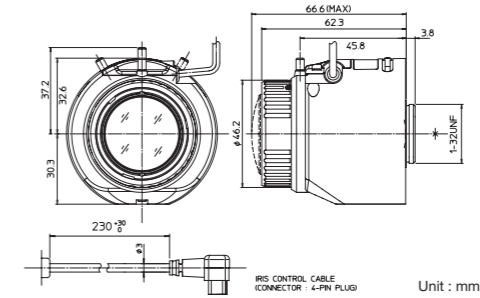
Unit : mm

Vari-Focal Day&Night Type

"-1" & "-2": Manual iris
 "-SA1" & "-SA2": DC Auto Iris with calbe 100mm
 "-SA1L" & "-SA2L": DC Auto Iris with cable 230mm

DV2.2x4.1SR4A-SA2L Outdoor wide-angle

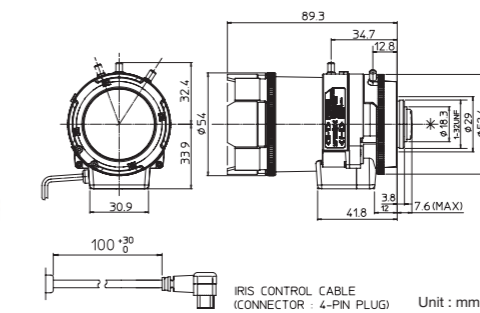
Day Night 6MP 2.2x 1/1.8"



Focal Length (mm)	4.1 - 9 (2.2x)		
Iris Range	F1.6 - T360		
Mount	C-mount		
Operation	Zoom	Manual	
	Focus	Manual	
Angle of View (H x V)	1/1.8"	WIDE 100.0° x 74.4° TELE 45.3° x 34.0°	
	1/2"	WIDE 89.6° x 66.7° TELE 40.7° x 30.6°	
Aspect Ratio 4:3	1/3"	WIDE 66.7° x 49.8° TELE 30.6° x 22.9°	
	1/4"	WIDE 49.8° x 37.3° TELE 22.9° x 17.2°	
	1/1.8"	WIDE 109.4° x 60.5° TELE 49.3° x 27.8°	
	1/2"	WIDE 97.9° x 54.3° TELE 44.3° x 25.0°	
Aspect Ratio 16:9	1/3"	WIDE 72.8° x 40.7° TELE 33.3° x 18.7°	
	1/4"	WIDE 54.3° x 30.4° TELE 25.0° x 14.1°	
	M.O.D (m)	0.3	
	Weight (g)	135	

DV4x12.5SR4A-1 / SA1 / SA1L Outdoor long-range

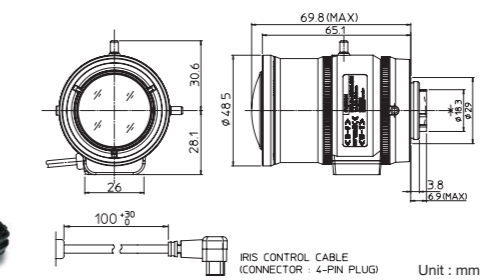
Day Night 5MP 4x 1/1.8"



Focal Length (mm)	12.5 - 50 (4x)		
Iris Range	F1.5 - T360		
Mount	C-mount		
Operation	Zoom	Manual	
	Focus	Manual	
Angle of View (H x V)	1/1.8"	WIDE 32.9° x 24.6° TELE 8.2° x 6.2°	
	1/2"	WIDE 29.5° x 22.1° TELE 7.4° x 5.6°	
Aspect Ratio 4:3	1/3"	WIDE 22.1° x 16.6° TELE 5.6° x 4.2°	
	1/4"	WIDE - TELE -	
	1/1.8"	WIDE 35.9° x 20.1° TELE 9.0° x 5.1°	
	1/2"	WIDE 32.2° x 18.1° TELE 8.1° x 4.6°	
Aspect Ratio 16:9	1/3"	WIDE 24.1° x 13.5° TELE 6.1° x 3.4°	
	1/4"	WIDE - TELE -	
	M.O.D (m)	0.8	
	Weight (g)	175	

DV3.8x4SR4A-1 / SA1 / SA1L Outdoor near-range

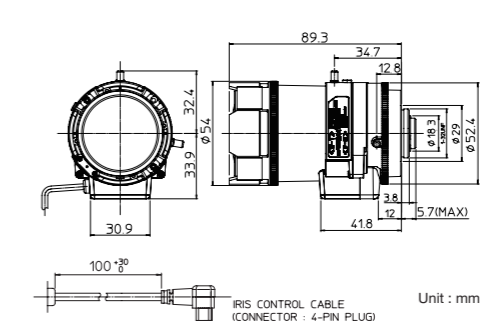
Day Night 3MP 3.8x 1/1.8"



Focal Length (mm)	4 - 15.2 (3.8x)		
Iris Range	F1.5 - T360		
Mount	C-mount		
Operation	Zoom	Manual	
	Focus	Manual	
Angle of View (H x V)	1/1.8"	WIDE 103.4° x 77.0° TELE 27.4° x 20.6°	
	1/2"	WIDE 92.7° x 69.1° TELE 24.6° x 18.5°	
Aspect Ratio 4:3	1/3"	WIDE 69.1° x 51.7° TELE 18.5° x 13.9°	
	1/4"	WIDE 51.7° x 38.7° TELE 13.9° x 10.4°	
	1/1.8"	WIDE 113.0° x 62.8° TELE 29.8° x 16.8°	
	1/2"	WIDE 101.2° x 56.3° TELE 26.8° x 15.1°	
Aspect Ratio 16:9	1/3"	WIDE 75.4° x 42.2° TELE 20.1° x 11.3°	
	1/4"	WIDE 56.3° x 31.6° TELE 15.1° x 8.5°	
	M.O.D (m)	0.3	
	Weight (g)	120	

DV10x8SR4A-1 / SA1 / SA1L Outdoor long-range

Day Night 3MP 10x 1/2"



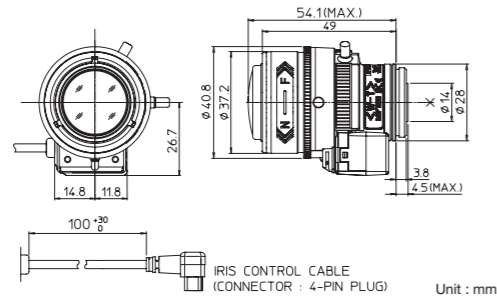
Focal Length (mm)	8 - 80 (10x)		
Iris Range	F1.6 - T360 (Equivalent to F360)		
Mount	C-mount		
Operation	Zoom	Manual	
	Focus	Manual	
Angle of View (H x V)	1/1.8"	WIDE - TELE -	
	1/2"	WIDE 44.4° x 33.7° TELE 4.7° x 3.6°	
Aspect Ratio 4:3	1/3"	WIDE 33.7° x 25.4° TELE 3.6° x 2.7°	
	1/4"	WIDE 25.4° x 19.1° TELE 2.7° x 2.0°	
	1/1.8"	WIDE - TELE -	
	1/2"	WIDE 48.1° x 27.6° TELE 5.2° x 2.9°	
Aspect Ratio 16:9	1/3"	WIDE 36.6° x 20.8° TELE 3.9° x 2.2°	
	1/4"	WIDE 27.6° x 15.6° TELE 2.9° x 1.6°	
	M.O.D (m)	1.5	
	Weight (g)	180	

*All models are while stock lasts

"-1" & "-2": Manual iris
 "-SA1" & "-SA2": DC Auto Iris with cable 100mm
 "-SA1L" & "-SA2L": DC Auto Iris with cable 230mm

YV2.8x2.8SR4A-2 / SA2 / SA2L Outdoor near-range

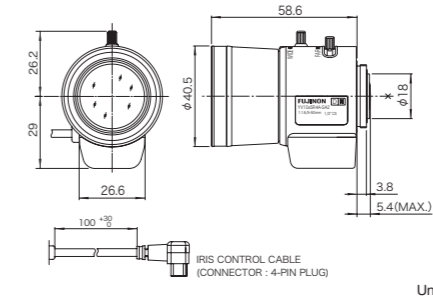
Day Night 2.8x 1/2.7" 3MP



Focal Length (mm)	2.8 - 8 (2.8x)
Iris Range	F1.3 - T360
Mount	CS-mount
Operation	Zoom: Manual, Focus: Manual, Iris: Auto (DC type)
Angle of View (H x V)	1/2.7" WIDE: 112.4° x 81.3°, TELE: 38.8° x 29.1°
Aspect Ratio	1/3" WIDE: 100.6° x 73.4°, TELE: 35.3° x 26.4°
4:3	1/4" WIDE: 73.4° x 54.3°, TELE: 26.4° x 19.8°
Angle of View (H x V)	1/2.7" WIDE: 124.9° x 65.6°, TELE: 42.3° x 23.8°
Aspect Ratio	1/3" WIDE: 111.1° x 59.3°, TELE: 38.4° x 21.6°
16:9	1/4" WIDE: 80.4° x 44.1°, TELE: 28.8° x 16.2°
M.O.D (m)	0.3
Weight (g)	60

YV10x5HR4A-SA2 / SA2L Outdoor long-range

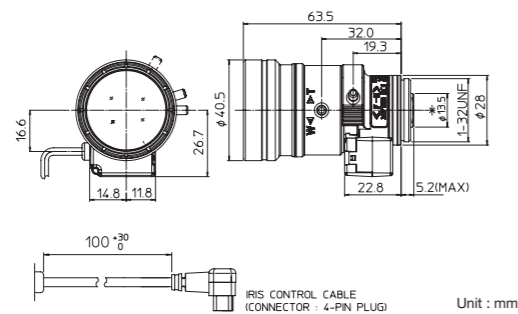
Day Night HD 10x 1/3" 1.3MP



Focal Length (mm)	5 - 50 (10x)
Iris Range	F1.6 - T360(Equivalent to F360)
Mount	CS-mount
Operation	Zoom: Manual, Focus: Manual, Iris: Auto (DC type)
Angle of View (H x V)	1/3" WIDE: 51.3° x 38.9°, TELE: 5.3° x 4.1°
Aspect Ratio	1/4" WIDE: 38.9° x 29.4°, TELE: 4.1° x 3.1°
4:3	1/3" WIDE: 55.6° x 32.0°, TELE: 5.8° x 3.3°
Angle of View (H x V)	1/4" WIDE: 42.3° x 24.1°, TELE: 4.4° x 2.5°
M.O.D (m)	0.3
Weight (g)	85

YV3.3x15SR4A-2 / SA2 / SA2L Outdoor long-range

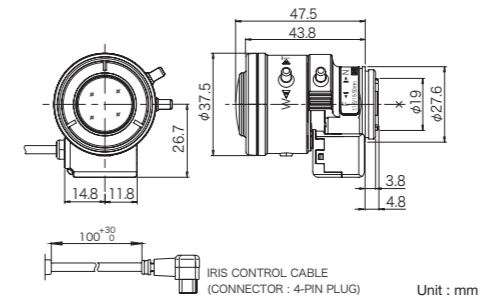
Day Night 3.3x 1/2.7" 3MP



Focal Length (mm)	15 - 50 (3.3x)
Iris Range	F1.5 - T360
Mount	CS-mount
Operation	Zoom: Manual, Focus: Manual, Iris: Auto (DC type)**
Angle of View (H x V)	1/2" WIDE: 20.0° x 15.1°, TELE: 6.2° x 4.6°
Aspect Ratio	1/3" WIDE: 18.2° x 13.7°, TELE: 5.6° x 4.2°
4:3	1/4" WIDE: 13.7° x 10.3°, TELE: 4.2° x 3.2°
Angle of View (H x V)	1/2" WIDE: 21.7° x 12.3°, TELE: 6.7° x 3.8°
Aspect Ratio	1/3" WIDE: 19.8° x 11.2°, TELE: 6.1° x 3.5°
16:9	1/4" WIDE: 14.9° x 8.4°, TELE: 4.6° x 2.6°
M.O.D (m)	1.0
Weight (g)	80

YV3.3x15HR4A-SA2 / SA2L Outdoor long-range

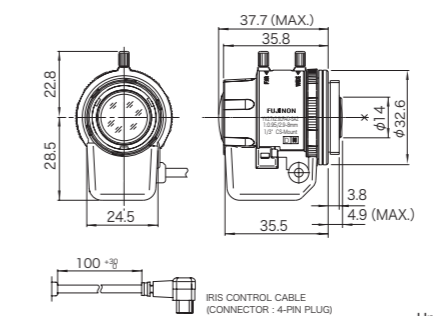
Day Night HD 3.3x 1/3" 1.3MP



Focal Length (mm)	15 - 50 (3.3x)
Iris Range	F1.5 - T360(Equivalent to F360)
Mount	CS-mount
Operation	Zoom: Manual, Focus: Manual, Iris: Auto (DC type)
Angle of View (H x V)	1/3" WIDE: 18.5° x 13.7°, TELE: 5.5° x 4.2°
Aspect Ratio	1/4" WIDE: 13.7° x 10.3°, TELE: 4.2° x 3.1°
4:3	1/3" WIDE: 20.2° x 11.2°, TELE: 6.0° x 3.4°
Angle of View (H x V)	1/4" WIDE: 15.0° x 8.4°, TELE: 4.5° x 2.6°
M.O.D (m)	0.8
Weight (g)	50

YV2.7x2.9LR4D-SA2 / SA2L Outdoor near-range

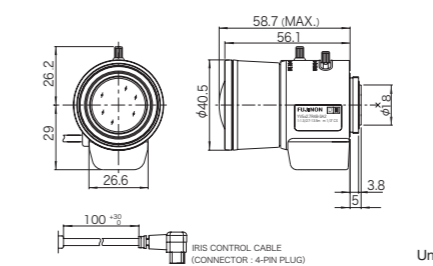
Day Night 2.7x 1/3" 1.3MP



Focal Length (mm)	2.9 - 8 (2.7x)
Iris Range	F0.95 - T360(Equivalent to F360)
Mount	CS-mount
Operation	Zoom: Manual, Focus: Manual, Iris: Auto (DC type)
Angle of View (H x V)	1/3" WIDE: 94.6° x 69.5°, TELE: 35.3° x 26.4°
Aspect Ratio	1/4" WIDE: 69.5° x 51.5°, TELE: 26.4° x 19.8°
4:3	1/4" WIDE: 26.4° x 19.8°, TELE: 26.4° x 19.8°
M.O.D (m)	0.3
Weight (g)	45

YV5x2.7R4B-SA2 / SA2L Outdoor mid-range

Day Night 5x 1/2.7" 1.3MP



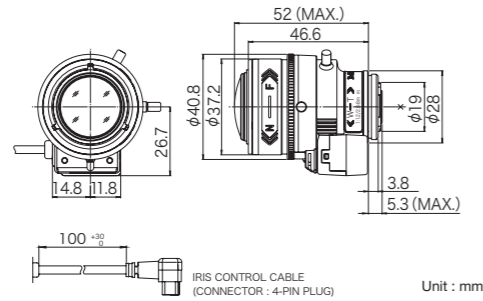
Focal Length (mm)	2.7 - 13.5(5x)
Iris Range	F1.3 - T360(Equivalent to F360)
Mount	CS-mount
Operation	Zoom: Manual, Focus: Manual, Iris: Auto (DC type)
Angle of View (H x V)	1/3" WIDE: 99.7° x 74.3°, TELE: 20.6° x 15.5°
Aspect Ratio	1/4" WIDE: 74.3° x 55.4°, TELE: 15.5° x 11.6°
4:3	1/4" WIDE: 15.5° x 11.6°, TELE: 15.5° x 11.6°
M.O.D (m)	0.3
Weight (g)	70

*All models are while stock lasts

"-1" & "-2": Manual iris
 "-SA1" & "-SA2": DC Auto Iris with calbe 100mm
 "-SA1L" & "-SA2L": DC Auto Iris with cable 230mm

YV2.8x2.8SA-2 / SA2 / SA2L Indoor near-range

2.8x 1/3" 3MP

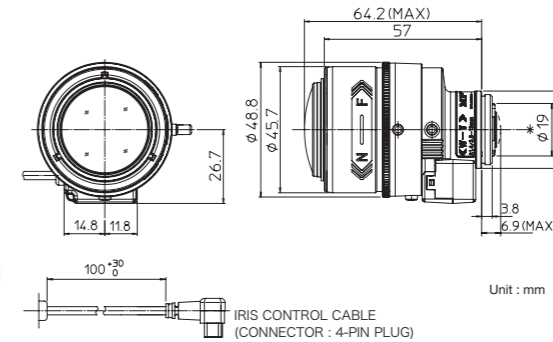


Unit : mm

Focal Length (mm)	2.8 - 8 (2.8x)	
Iris Range	F1.2 - T360 (Equivalent to F360)	
Mount	CS-mount	
Operation	Zoom	Manual
	Focus	Manual
	Iris	Auto (DC type)
Angle of View (H x V)	1/3" WIDE	100.0° x 73.7°
	TELE	35.1° x 26.3°
Aspect Ratio 4:3	1/4" WIDE	73.7° x 54.8°
	TELE	26.3° x 19.7°
Angle of View (H x V)	1/3" WIDE	109.8° x 59.9°
	TELE	38.2° x 21.5°
Aspect Ratio 16:9	1/4" WIDE	80.7° x 44.6°
	TELE	28.6° x 16.1°
M.O.D (m)	0.3	
Weight (g)	50	

DV3.4x3.8SA-1 / SA1 / SA1L Indoor near-range

3.4x 1/2" 3MP

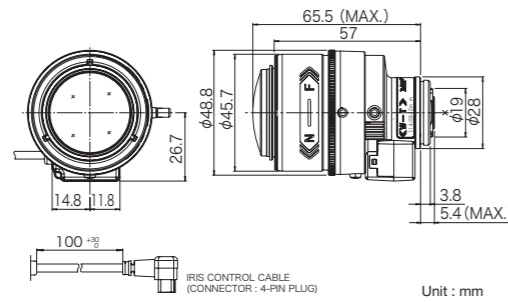


Unit : mm

Focal Length (mm)	3.8 - 13 (3.4x)	
Iris Range	F1.4 - T360 (Equivalent to F360)	
Mount	C-mount	
Operation	Zoom	Manual
	Focus	Manual
	Iris	Auto (DC type)
Angle of View (H x V)	1/2" WIDE	97.6° x 71.8°
	TELE	28.4° x 21.3°
Aspect Ratio 4:3	1/3" WIDE	71.8° x 53.2°
	TELE	21.3° x 16.0°
Angle of View (H x V)	1/4" WIDE	53.2° x 39.7°
	TELE	16.0° x 12.0°
Angle of View (H x V)	1/2" WIDE	107.2° x 58.2°
	TELE	30.9° x 17.4°
Aspect Ratio 16:9	1/3" WIDE	78.6° x 43.3°
	TELE	23.2° x 13.1°
Angle of View (H x V)	1/4" WIDE	58.2° x 32.3°
	TELE	17.4° x 9.8°
M.O.D (m)	0.3	
Weight (g)	80	

YV4.3x2.8SA-2 / SA2 / SA2L Indoor mid-range

4.3x 1/3" 3MP

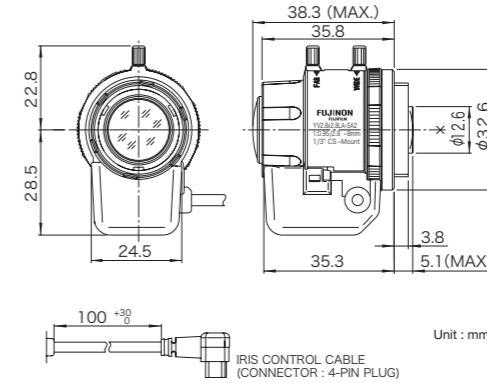


Unit : mm

Focal Length (mm)	2.8 - 12 (4.3x)	
Iris Range	F1.4 - T360 (Equivalent to F360)	
Mount	CS-mount	
Operation	Zoom	Manual
	Focus	Manual
	Iris	Auto (DC type)
Angle of View (H x V)	1/3" WIDE	100.0° x 74.0°
	TELE	23.4° x 17.6°
Aspect Ratio 4:3	1/4" WIDE	74.0° x 55.1°
	TELE	17.6° x 13.2°
Angle of View (H x V)	1/3" WIDE	109.5° x 60.1°
	TELE	25.5° x 14.4°
Aspect Ratio 16:9	1/4" WIDE	80.9° x 44.9°
	TELE	19.2° x 10.8°
M.O.D (m)	0.3	
Weight (g)	80	

YV2.8x2.8LA-SA2 / SA2L Indoor near-range

2.8x 1/3" 3MP

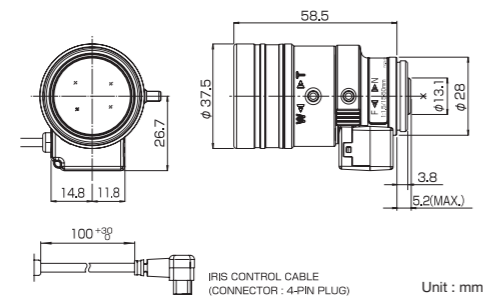


Unit : mm

Focal Length (mm)	2.8 - 8(2.8x)	
Iris Range	F0.95 - T360 (Equivalent to F360)	
Mount	CS-mount	
Operation	Zoom	Manual
	Focus	Manual
	Iris	Auto (DC type)
Angle of View (H x V)	1/2" WIDE	-
	TELE	-
Aspect Ratio 4:3	1/3" WIDE	99.9° x 73.3°
	TELE	35.2° x 26.4°
Angle of View (H x V)	1/4" WIDE	73.3° x 54.3°
	TELE	26.4° x 19.8°
M.O.D (m)	0.3	
Weight (g)	45	

YV3.3x15SA-2 / SA2 / SA2L Indoor long-range

3.3x 1/3" 3MP

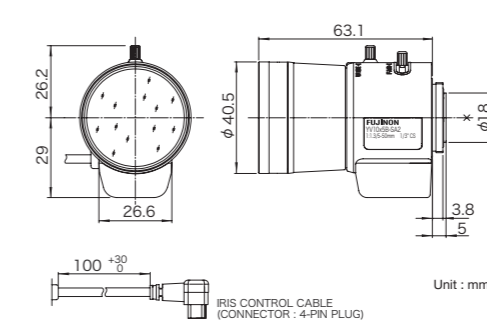


Unit : mm

Focal Length (mm)	15 - 50 (3.3x)	
Iris Range	F1.5 - T360 (Equivalent to F360)	
Mount	CS-mount	
Operation	Zoom	Manual
	Focus	Manual
	Iris	Auto (DC type)
Angle of View (H x V)	1/3" WIDE	18.1° x 13.6°
	TELE	5.6° x 4.2°
Aspect Ratio 4:3	1/4" WIDE	13.6° x 10.2°
	TELE	4.2° x 3.2°
Angle of View (H x V)	1/3" WIDE	19.8° x 11.1°
	TELE	6.1° x 3.4°
Aspect Ratio 16:9	1/4" WIDE	14.8° x 8.3°
	TELE	4.6° x 2.6°
M.O.D (m)	0.8	
Weight (g)	60	

YV10x5B-SA2 / SA2L Indoor long-range

10x 1/3" 3MP



Unit : mm

Focal Length (mm)	5 - 50(10x)	
Iris Range	F1.3 - T360 (Equivalent to F360)	
Mount	CS-mount	
Operation	Zoom	Manual
	Focus	Manual
	Iris	Auto (DC type)
Angle of View (H x V)	1/2" WIDE	-
	TELE	-
Aspect Ratio 4:3	1/3" WIDE	52.0° x 39.2°
	TELE	5.4° x 4.1°
Angle of View (H x V)	1/4" WIDE	39.2° x 29.5°
	TELE	4.1° x 3.1°
M.O.D (m)	0.3	
Weight (g)	100	

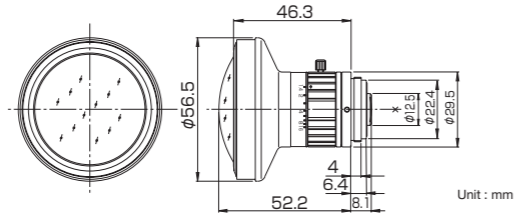
*All models are while stock lasts

Fish-eye

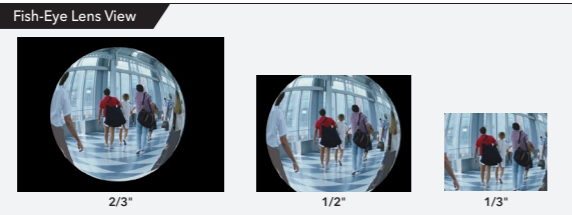
FE185C057HA-1



2/3"



Unit : mm

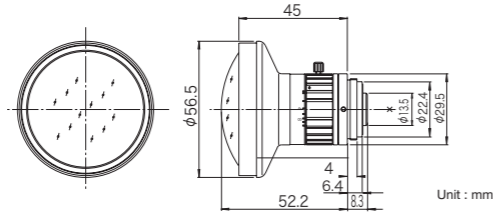


Focal Length	1.8	
Iris Range	F1.4 - F16	
Mount	C-mount	
Operation	Focus Fixed	
	Iris Manual	
Angle of View (HxV)	2/3"	185.0° x 185.0° (Ø5.7mm)
	1/2"	185.0° x 154.1°
	1/3"	154.1° x 115.4°
M.O.D. (m)	0.1	
Mass (g)	135	

FE185C086HA-1



1"



Unit : mm

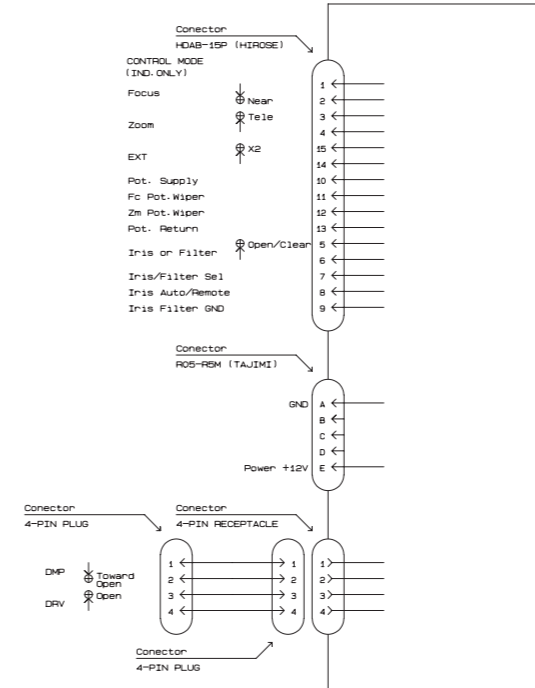


Focal Length	2.7	
Iris Range	F1.8 - F16	
Mount	C-mount	
Operation	Focus Fixed	
	Iris Manual	
Angle of View (HxV)	1"	185.0° x 185.0° (Ø8.6mm)
	2/3"	185.0° x 140.6°
	1/2"	136.3° x 102.3°
M.O.D. (m)	0.2	
Mass (g)	160	

Zoom Lens Wiring

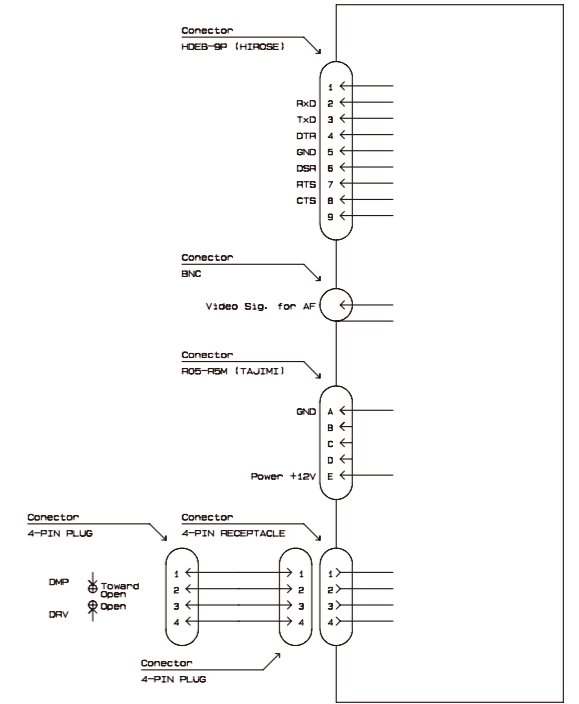
D60x16.7SR4DE-V21 P04

D60x16.7SR4DE-V23S P04

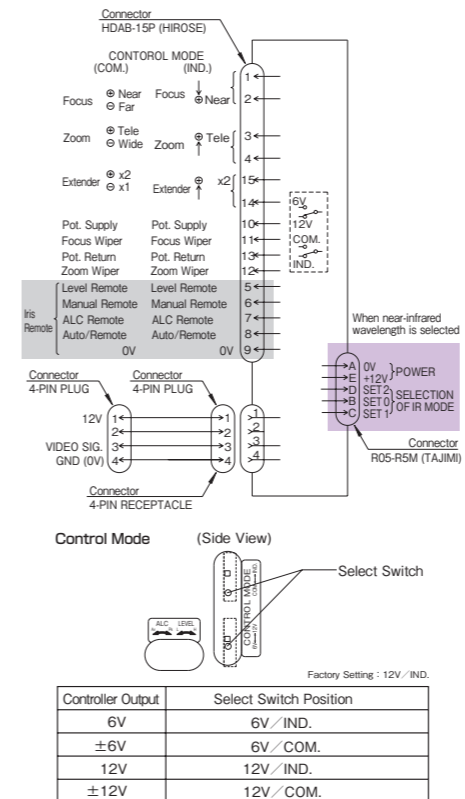


D60x16.7SR4DE-ZP1A P04

D60x16.7SR4FE-ZP1C P04



D60x12.5R3DE-V41 P07



FD32x12.5SR4A-CV1 P08

FH32x15.6SR4A-CV1 P08

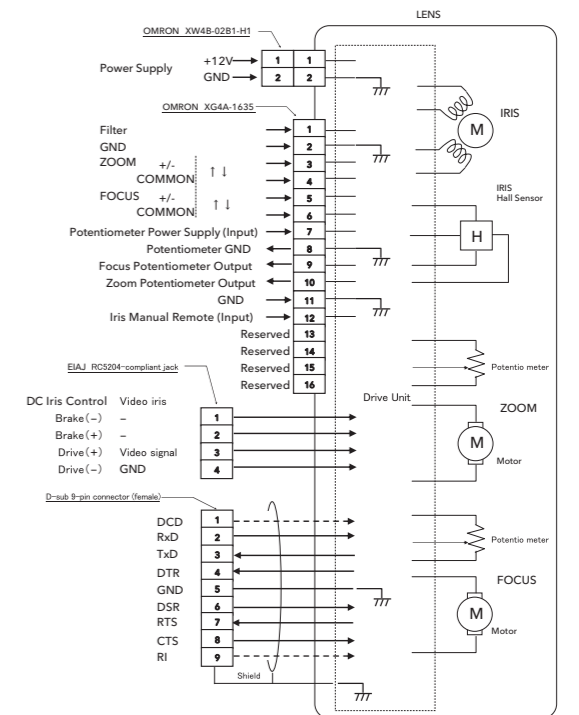
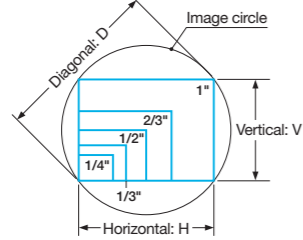


Image Sizes

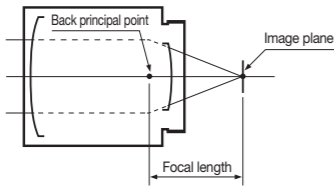
- There are several types of imaging sensors for CCTV cameras, with different image sizes.



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

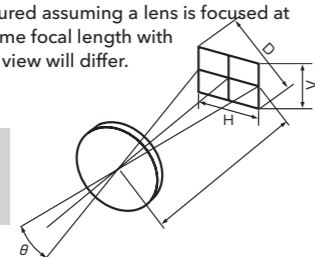
Focal Length

- 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.



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

θ : Angle of view
 Y' : Image size
 f : Focal length

Example

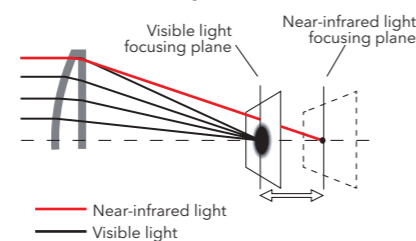
The angle of view when the sensor size of the camera is 1/2" and the focal length is 12.5 mm:

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

Day & Night Lens

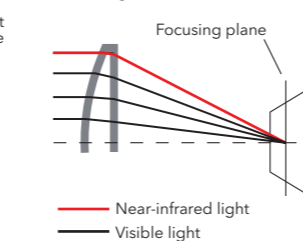
- The day & night lens uses an advanced optical design, special optical glass, and other state-of-the-art technologies to focus light on the same plane to prevent the focus to become blurry enabling sharp images.

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



Result: Blurry image

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



Result: Clear image without getting blurry

C/CS-Mount

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

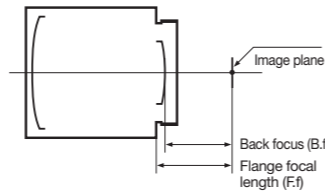
Standard	C-mount	CS-mount
	Flange focal length (mm)	17.526* ¹
Diameter of screw thread (mm)	1-32UNF	

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:

$$F \text{ No.} = \frac{f}{d}$$

f: Focal length of a lens
d: 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" = ϕ 16.0, 2/3" = ϕ 11.0, 1/1.8" = ϕ 8.9, 1/2" = ϕ 8.0, 1/3" = ϕ 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-V21			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°
D60x16.7SR4DE-V23S										
D60x16.7SR4DE-ZP1A										
D60x16.7SR4FE-ZP1C										
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

Sensor size	1"		2/3"		1/1.8"		1/2"		1/3"	
	WIDE	TELE	WIDE	TELE	WIDE	TELE	WIDE	TELE	WIDE	TELE
D60x16.7SR4DE-V21										
D60x16.7SR4DE-V23S			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°
D60x16.7SR4DE-ZP1A										
D60x16.7SR4FE-ZP1C										
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-V21										
D60x16.7SR4DE-V23S			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°
D60x16.7SR4DE-ZP1A										
D60x16.7SR4FE-ZP1C										
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

Sensor size	1"		2/3"		1/1.8"		1/2"		1/3"	
	WIDE	TELE	WIDE	TELE	WIDE	TELE	WIDE	TELE	WIDE	TELE
D60x16.7SR4DE-V21										
D60x16.7SR4DE-V23S			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°
D60x16.7SR4DE-ZP1A										
D60x16.7SR4FE-ZP1C										
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

Sensor size	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