



FUJINON

CCTV LENS

for Security & Surveillance

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.

Subsidiary company

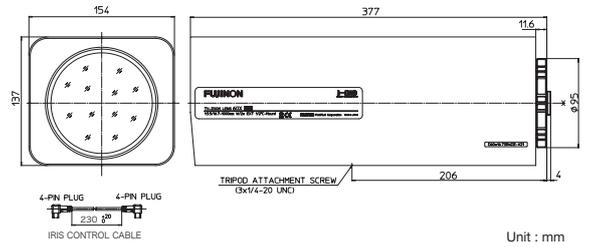


INDEX

	Page		Page
Zoom Lens	04	Fish-eye	18
Vari-Focal Lens Day&Night Type	12	Zoom Lens Wiring	19
Vari-Focal Lens Day Type	15	Technical Reference [Terminology]	21
Fixed Focal for ITS	17	Technical Reference [Angle of View]	22

D60x16.7SR4 Series

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



Unit : mm

■ 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

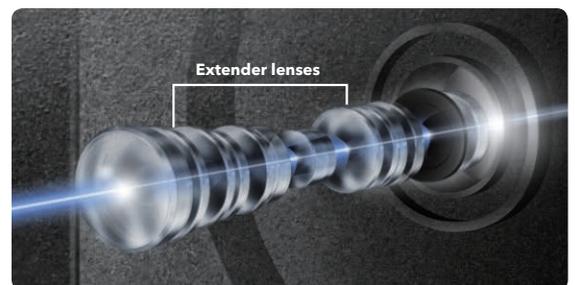
		D60x16.7SR4DE-V21	D60x16.7SR4DE-V23S (optical axis adjustment)	D60x16.7SR4DE-ZP1A (AF)	D60x16.7SR4FE-ZP1C (AF+Opt. Anti vibration)
Sensor size (max.)		1/1.8"			
Focal length (mm)	1x	16.7 - 1000			
	2x	33.4 - 2000			
Zoom ratio		60x			
Extender		2x			
Mount		C-mount			
Iris range	1x	F3.5 - F16			
	2x	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)		M112 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.

■ D60x16.7SR4GE-V21: IR Cut Filter inside



■ Optical anti-vibration function "OS-TECH"

OS-TECH
Optical Stabilized Technology

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.

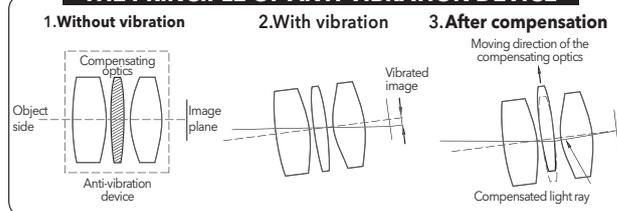


OS-TECH OFF



OS-TECH ON

THE PRINCIPLE OF ANTI-VIBRATION DEVICE



■ 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.

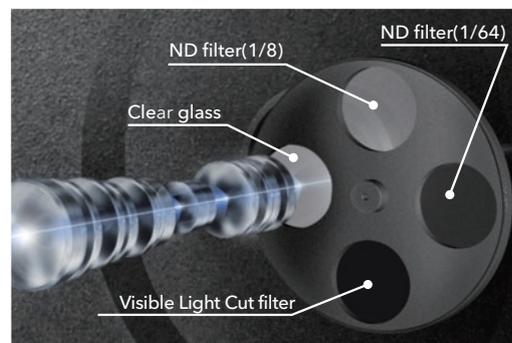
■ An built-in turret with three different types of filters that can be switched over with a single command

● 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.



Zoom

D60x16.7SR4 Series Format Converter Lens Set

Day Night **VISIBLE LIGHT CUT** **2MP** **60x** **2/3"** **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.

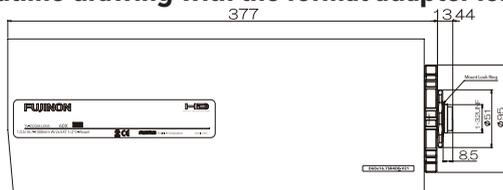
<When fitted / not fitted with the adapter lens>

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

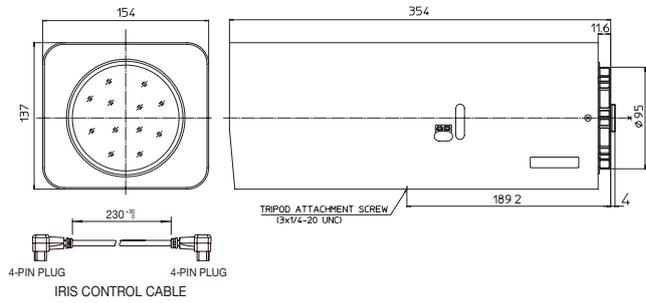
Auto-focus control on the lens side

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)		M107 x 1mm
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).

■ D60x12.5R3DE-ZP1: serial control model

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 × 1.5	Attached lens × 2
Focal length	Attached lens × 1.5	Attached lens × 2
M.O.D	Same as the Attached lens	Same as the Attached lens
Angle of view	Attached lens × 1/1.5	Attached lens × 1/2
Field of view	Attached lens × 1/1.5	Attached lens × 1/2

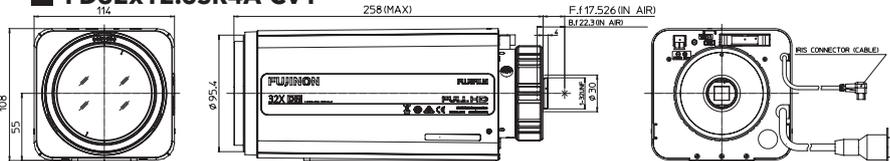
1. For C mount lenses only. Not applicable to CS mount lens.
2. Not for 3CCD cameras.
3. These extenders can not be used over another.



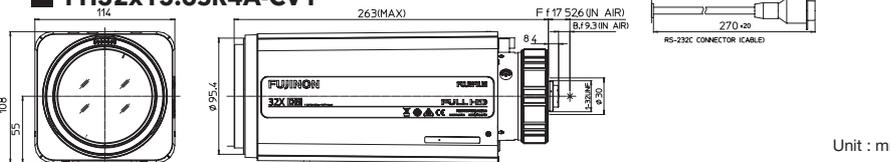
FD32x12.5SR4A-CV1 / FH32x15.6SR4A-CV1



■ FD32x12.5SR4A-CV1



■ FH32x15.6SR4A-CV1



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

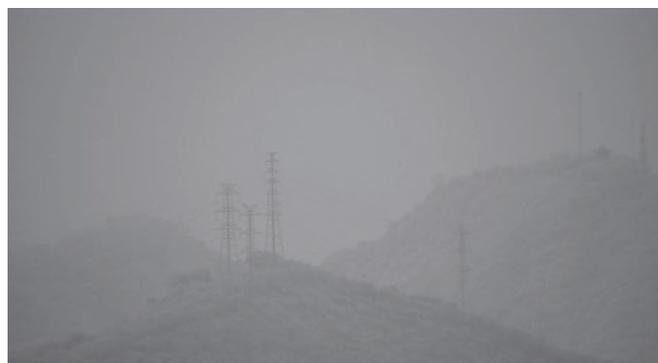
Flange focal distance must be adjusted for individual cameras and lenses in order to accurately match the focal point between a camera and its lens. The FD32x12.5 and FH32x15.6 series allow users to easily and finely adjust the flange focal distance on the lens, using readily-available hex wrenches.



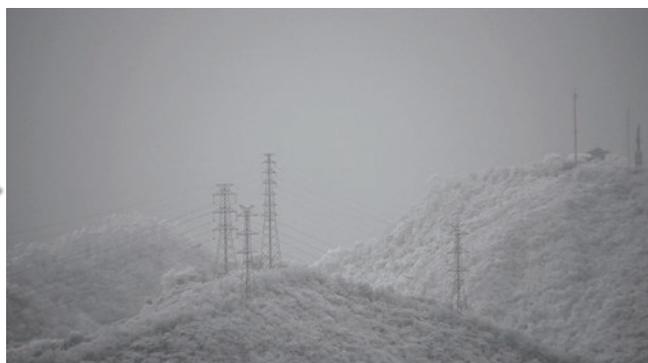
■ "Visible Light Cut Filter" for de-hazing images in poor visibility due to high moisture in the air



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.



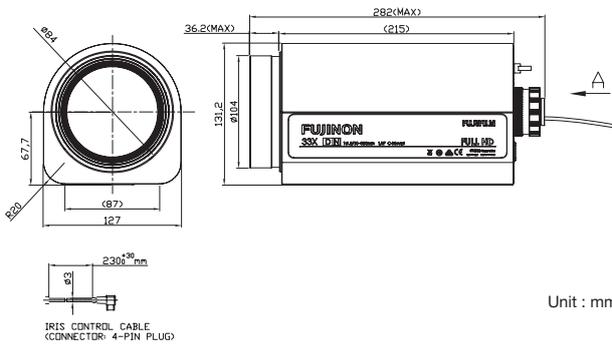
■ Compatibility with various interfaces

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.

HD33x10SR4A-YE1

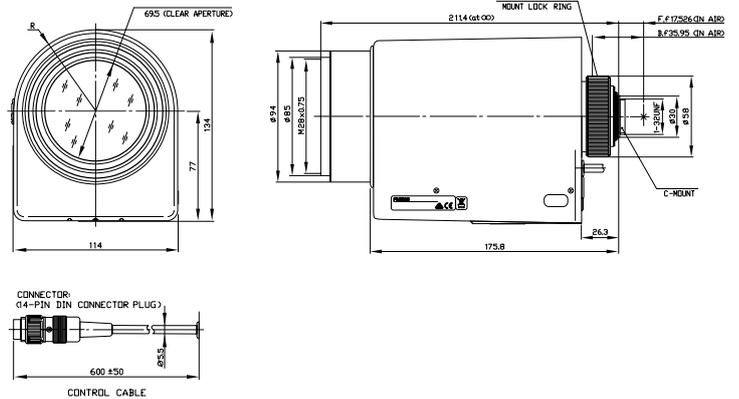
Day Night HD 33x 1/2" 1.3MP



		HD33x10SR4A-YE1
Focal Length (mm)		10 - 330
Iris Range		F1.5 - F360C
Mount		C-mount
Lens control interface		Analog
Lens control	Zoom	Speed
	Focus	Speed
	Iris	Auto(DC)
Position output	Zoom	✓
	Focus	✓
	Iris	-
M.O.D (m)		2.8
Back Focal Distance (in air) (mm)		16.64
Exit Pupil Position (From Image Plane) (mm)		-94.59
Filter Thread (mm)		-
Weight (kg)		3.4

H22x11.5A-X41

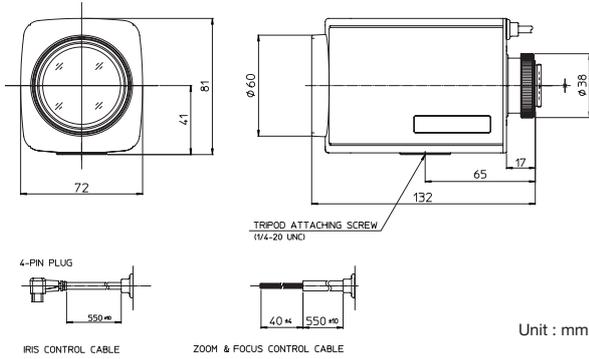
22x 2/3"



		H22x11.5A-X41
Focal Length (mm)		11.5 - 253
Iris Range		F1.6 - F22 CLOSE
Mount		C-mount
Lens control interface		Analog
Lens control	Zoom	Motor drive
	Focus	Motor drive
	Iris	Motor drive or Auto(Video)
Position output	Zoom	✓
	Focus	✓
	Iris	✓
M.O.D (m)		3
ND filter		-
Back Focal Distance (in air) (mm)		35.95
Exit Pupil Position (From Image Plane) (mm)		-103
Filter Thread (mm)		M82 × 0.75
Weight (kg)		2.3

HD17x7.5A-YN1

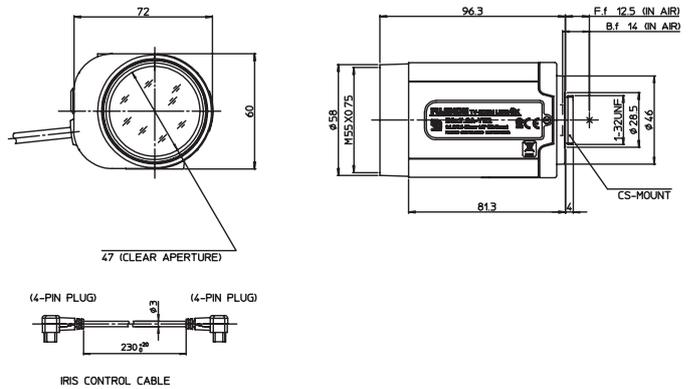
17x 1/2"



		HD17x7.5A-YN1
Focal Length (mm)		7.5 - 128
Iris Range		F1.6 - F16
Mount		C-mount
Lens control interface		Analog
Lens control	Zoom	Speed
	Focus	Speed
	Iris	Auto(DC)
Position output	Zoom	✓
	Focus	✓
	Iris	—
M.O.D (m)		1.5
Back Focal Distance (in air) (mm)		15.1
Exit Pupil Position (From Image Plane) (mm)		-80.1
Filter Thread (mm)		M58 x 0.75
Weight (g)		580

D8x7.8HA-YE2

8x 1/2"

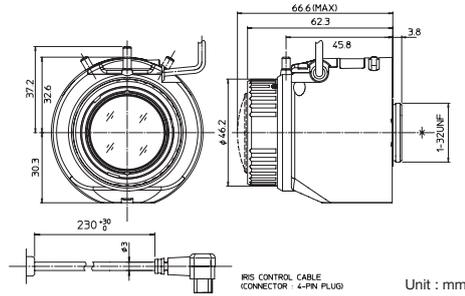


		D8x7.8HA-YE2
Focal Length (mm)		7.8 - 63
Iris Range		F1.2 - T400 (Equivalent to F400)
Mount		CS-mount
Lens control interface		Analog
Lens control	Zoom	Speed
	Focus	Speed
	Iris	Auto(DC)
Position output	Zoom	✓
	Focus	✓
	Iris	—
M.O.D (m)		3
ND filter		✓
Back Focal Length (in air) (mm)		14
Exit Pupil Position (From Image Plane) (mm)		-55
Filter Thread (mm)		M55 x 0.75
Weight (g)		400

Vari-Focal Day&Night Type

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

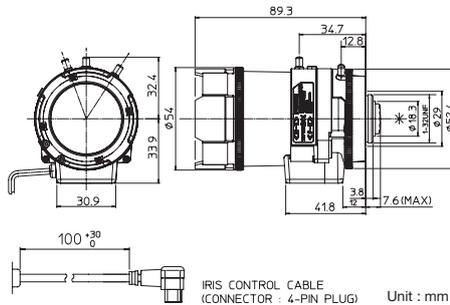
Day Night **F4.1** **2.2x** **1/1.8"**
6MP



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)	Iris	Auto (DC type)	100.0° x 74.4°
		1/1.8" WIDE	45.3° x 34.0°
		TELE	89.6° x 66.7°
		1/2" WIDE	40.7° x 30.6°
Aspect Ratio 4:3	Iris	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°
Angle of View (H x V)	Iris	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	Iris	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 / SA1L Outdoor long-range

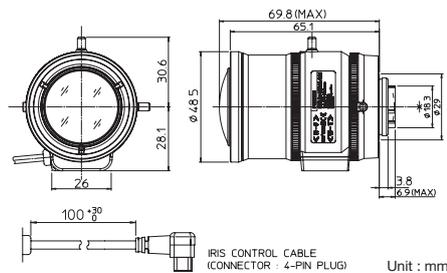
Day Night **F4.1** **4x** **1/1.8"**
5MP



Focal Length (mm)	12.5 - 50 (4x)		
Iris Range	F1.6 - T360		
Mount	C-mount		
Operation	Zoom	Manual	
	Focus	Manual	
Angle of View (H x V)	Iris	Auto (DC type)	32.9° x 24.6°
		1/1.8" WIDE	8.2° x 6.2°
		TELE	29.5° x 22.1°
		1/2" WIDE	7.4° x 5.6°
Aspect Ratio 4:3	Iris	1/3" WIDE	22.1° x 16.6°
		TELE	5.6° x 4.2°
		1/4" WIDE	-
		TELE	-
Angle of View (H x V)	Iris	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	Iris	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 / SA1L Outdoor near-range

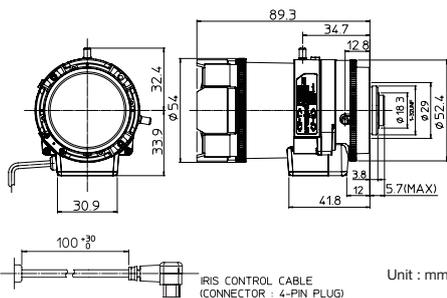
Day Night **F4.1** **3.8x** **1/1.8"**
3MP



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)	Iris	Auto (DC type)	103.4° x 77.0°
		1/1.8" WIDE	27.4° x 20.6°
		TELE	92.7° x 69.1°
		1/2" WIDE	24.6° x 18.5°
Aspect Ratio 4:3	Iris	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°
Angle of View (H x V)	Iris	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	Iris	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 / SA1L Outdoor long-range

Day Night **F4.1** **10x** **1/2"**
3MP

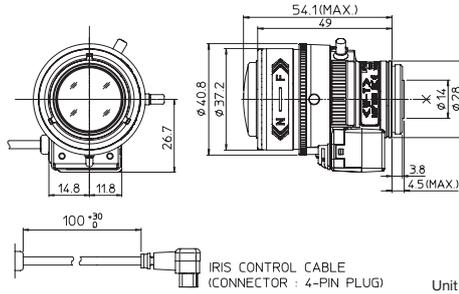


Focal Length (mm)	8 - 80 (10x)		
Iris Range	F1.6 - T360 (Equivalent to F360)		
Mount	C-mount		
Operation	Zoom	Manual	
	Focus	Manual	
Angle of View (H x V)	Iris	Auto (DC type)	-
		1/1.8" WIDE	-
		TELE	44.4° x 33.7°
		1/2" WIDE	4.7° x 3.6°
Aspect Ratio 4:3	Iris	1/3" WIDE	33.7° x 25.4°
		TELE	3.6° x 2.7°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

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

YV2.8x2.8SR4A-SA2L Outdoor near-range

Day Night **2.8x** **1/2.7"**
 3MP

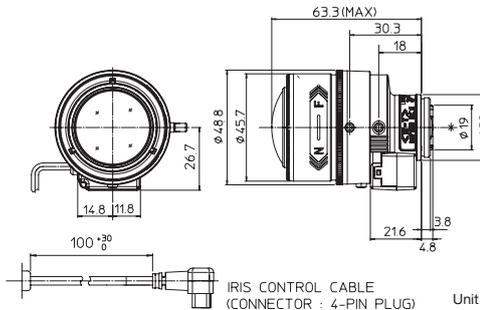


IRIS CONTROL CABLE (CONNECTOR : 4-PIN PLUG) Unit : mm

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

YV3x6SR4A-SA2L Outdoor mid-range

Day Night **3x** **1/2.7"**
 3MP

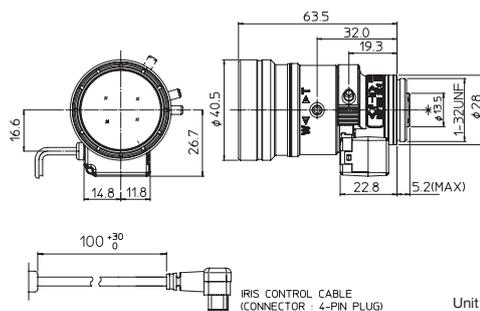


IRIS CONTROL CABLE (CONNECTOR : 4-PIN PLUG) Unit : mm

Focal Length (mm)	6 - 18 (3x)		
Iris Range	F1.4 - T360		
Mount	CS-mount		
Operation	Zoom	Manual	
	Focus	Manual	
Operation	Iris	Auto (DC type)	
		Auto (DC type)	
Angle of View (H x V)	1/2.7"	WIDE	51.1° x 37.8°
		TELE	17.0° x 12.8°
	1/3"	WIDE	46.2° x 34.3°
		TELE	15.5° x 11.6°
	1/4"	WIDE	34.3° x 25.6°
		TELE	11.6° x 8.7°
Angle of View (H x V)	1/2.7"	WIDE	56.0° x 30.8°
		TELE	18.5° x 10.4°
	1/3"	WIDE	50.6° x 27.9°
		TELE	16.8° x 9.5°
	1/4"	WIDE	37.5° x 20.9°
		TELE	12.6° x 7.1°
M.O.D (m)	0.3		
Weight (g)	95		

YV3.3x15SR4A-SA2L Outdoor long-range

Day Night **3.3x** **1/2.7"**
 3MP

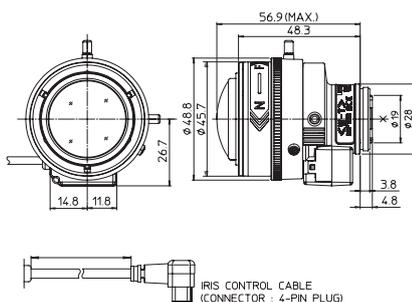


IRIS CONTROL CABLE (CONNECTOR : 4-PIN PLUG) Unit : mm

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

YV2.7x2.2SR4A-SA2L Outdoor wide-angle

Day Night **2.7x** **1/2.7"**
 3MP



IRIS CONTROL CABLE (CONNECTOR : 4-PIN PLUG) Unit : mm

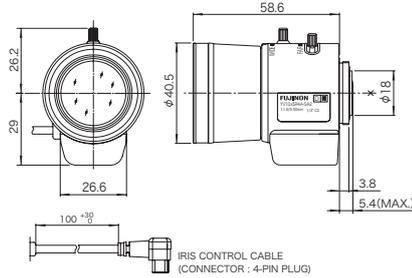
Focal Length (mm)	2.2 - 6 (2.7x)		
Iris Range	F1.3 - T360 (Equivalent to F360)		
Mount	CS-mount		
Operation	Zoom	Manual	
	Focus	Manual	
Operation	Iris	Auto (DC type)	
		Auto (DC type)	
Angle of View (H x V)	1/2.7"	WIDE	132.8° x 100.3°
		TELE	50.4° x 37.9°
	1/3"	WIDE	121.1° x 91.3°
		TELE	45.9° x 34.5°
	1/4"	WIDE	91.3° x 68.7°
		TELE	34.5° x 25.9°
Angle of View (H x V)	1/2.7"	WIDE	144.2° x 82.2°
		TELE	54.8° x 31.0°
	1/3"	WIDE	131.6° x 74.8°
		TELE	49.9° x 28.2°
	1/4"	WIDE	99.4° x 56.2°
		TELE	37.5° x 21.2°
M.O.D (m)	0.3		
Weight (g)	75		

*: While stocks last.

Vari-Focal Day&Night Type

YV10x5HR4A-SA2L Outdoor long-range

Day Night **HD** **10x** **1/3"**
1.3MP

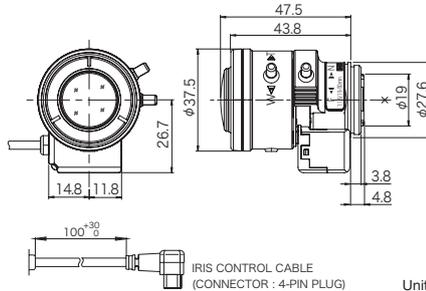


Unit : mm

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 × V)	1/3"	WIDE 51.3° × 38.9°
		TELE 5.3° × 4.1°
Aspect Ratio 4:3	1/4"	WIDE 38.9° × 29.4°
		TELE 4.1° × 3.1°
Angle of View (H × V)	1/3"	WIDE 55.6° × 32.0°
		TELE 5.8° × 3.3°
Aspect Ratio 16:9	1/4"	WIDE 42.3° × 24.1°
		TELE 4.4° × 2.5°
M.O.D (m)	0.3	
Weight (g)	85	

YV3.3x15HR4A-SA2L Outdoor long-range

Day Night **HD** **3.3x** **1/3"**
1.3MP

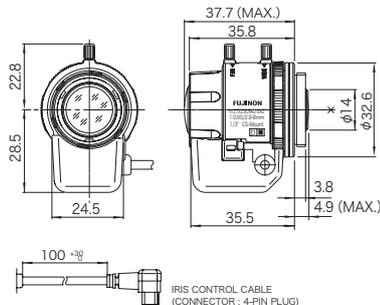


Unit : mm

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 × V)	1/3"	WIDE 18.5° × 13.7°
		TELE 5.5° × 4.2°
Aspect Ratio 4:3	1/4"	WIDE 13.7° × 10.3°
		TELE 4.2° × 3.1°
Angle of View (H × V)	1/3"	WIDE 20.2° × 11.2°
		TELE 6.0° × 3.4°
Aspect Ratio 16:9	1/4"	WIDE 15.0° × 8.4°
		TELE 4.5° × 2.6°
M.O.D (m)	0.8	
Weight (g)	50	

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

Day Night **2.7x** **1/3"**

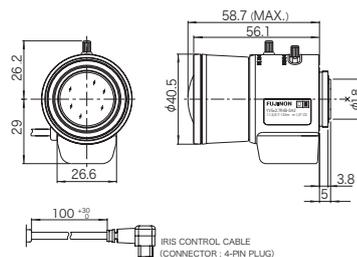


Unit : mm

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 × V)	1/3"	WIDE 94.6° × 69.5°
		TELE 35.3° × 26.4°
Aspect Ratio 4:3	1/4"	WIDE 69.5° × 51.5°
		TELE 26.4° × 19.8°
M.O.D (m)	0.3	
Weight (g)	45	

YV5x2.7R4B-SA2L Outdoor mid-range

Day Night **5x** **1/2.7"**



Unit : mm

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 × V)	1/3"	WIDE 99.7° × 74.3°
		TELE 20.6° × 15.5°
Aspect Ratio 4:3	1/4"	WIDE 74.3° × 55.4°
		TELE 15.5° × 11.6°
M.O.D (m)	0.3	
Weight (g)	70	

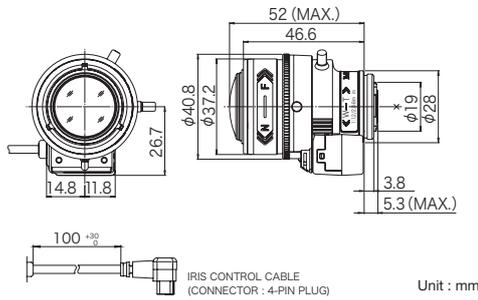
*: While stocks last.

Vari-Focal Day Type

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

YV2.8x2.8SA-SA2L Indoor near-range

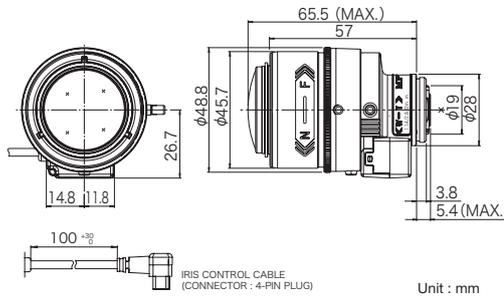
F1.2 2.8x 1/3"
3MP



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)	100.0° x 73.7°
Aspect Ratio 4:3	1/3"	WIDE 35.1° x 26.3° TELE 35.1° x 26.3°
	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°
	1/4"	WIDE 80.7° x 44.6° TELE 28.6° x 16.1°
M.O.D (m)	0.3	
Weight (g)	50	

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

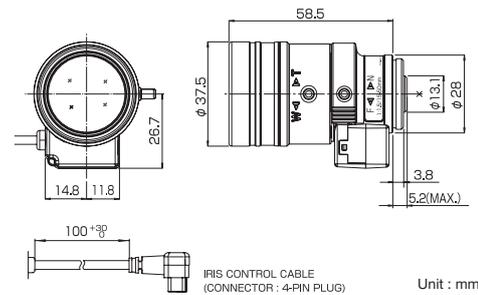
F1.4 4.3x 1/3"
3MP



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)	100.0° x 74.0°
Aspect Ratio 4:3	1/3"	WIDE 23.4° x 17.6° TELE 74.0° x 55.1°
	1/4"	WIDE 17.6° x 13.2° 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°
	1/4"	WIDE 80.9° x 44.9° TELE 19.2° x 10.8°
M.O.D (m)	0.3	
Weight (g)	80	

YV3.3x15SA-SA2L Indoor long-range

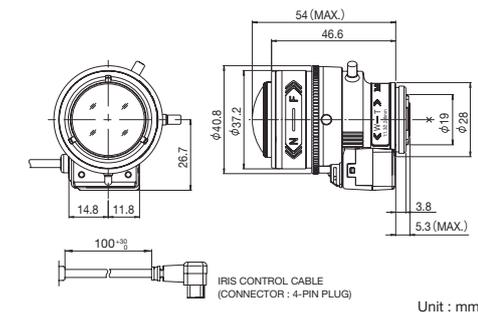
F1.5 3.3x 1/3"
3MP



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)	18.1° x 13.6°
Aspect Ratio 4:3	1/3"	WIDE 5.6° x 4.2° TELE 13.6° x 10.2°
	1/4"	WIDE 4.2° x 3.2° 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°
	1/4"	WIDE 14.8° x 8.3° TELE 4.6° x 2.6°
M.O.D (m)	0.8	
Weight (g)	60	

YV2.7x2.2SA-SA2L Indoor wide-angle

F1.3 2.7x 1/3"
3MP



Focal Length (mm)	2.2 - 6 (2.7x)	
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)	120.0° x 91.6°
Aspect Ratio 4:3	1/3"	WIDE 46.4° x 35.0° TELE 91.6° x 69.4°
	1/4"	WIDE 35.0° x 26.3° TELE 35.0° x 26.3°
Angle of View (H x V)	1/3"	WIDE 129.7° x 75.4° TELE 50.5° x 28.6°
	1/4"	WIDE 99.4° x 56.9° TELE 38.1° x 21.5°
M.O.D (m)	0.3	
Weight (g)	55	

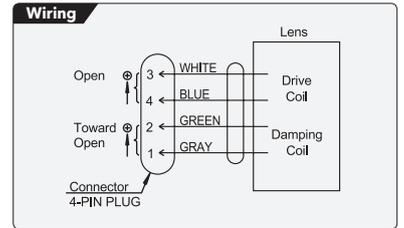
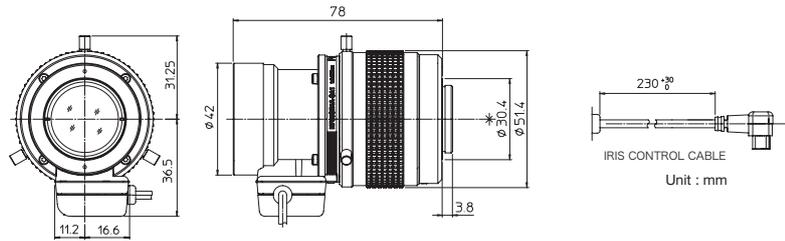
*: While stocks last.

Fixed Focal for ITS(Intelligent Transport System) Day&Night Type

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

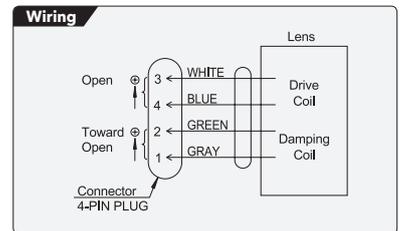
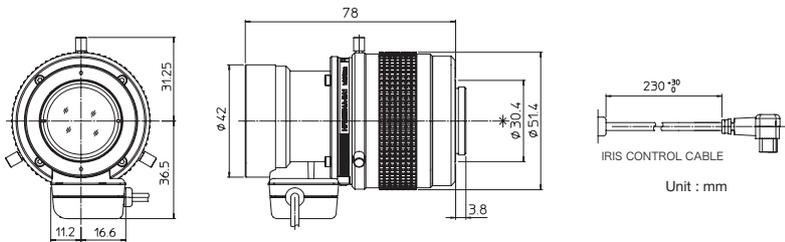
HF35SR4A-1 / SA1L*

Day Night 5MP 2/3"



HF50SR4A-1 / SA1L*

Day Night 5MP 2/3"



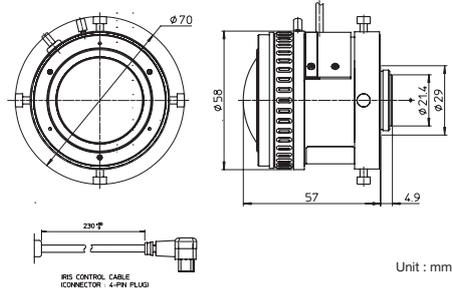
		HF35SR4A-1	HF35SR4A-SA1L	HF50SR4A-1	HF50SR4A-SA1L
Focal Length (mm)		35	35	50	50
Iris Range		F2.0 - T360	F2.0 - T360	F2.8 - T360	F2.8 - T360
Mount		C-mount			
Operation	Focus	Manual	Manual	Manual	Manual
	Iris	Manual	Auto (DC Type)	Manual	Auto (DC Type)
Angle of View (H x V) Aspect Ratio 4:3	2/3"	14.3° x 10.8°	14.3° x 10.8°	10.0° x 7.5°	10.0° x 7.5°
	1/2"	10.5° x 7.8°	10.5° x 7.8°	7.3° x 5.5°	7.3° x 5.5°
	1/3"	7.8° x 5.9°	7.8° x 5.9°	5.5° x 4.1°	5.5° x 4.1°
Angle of View (H x V) Aspect Ratio 16:9	2/3"	15.6° x 8.8°	15.6° x 8.8°	10.9° x 6.2°	10.9° x 6.2°
	1/2"	11.4° x 6.4°	11.4° x 6.4°	8.0° x 4.5°	8.0° x 4.5°
	1/3"	8.5° x 4.8°	8.5° x 4.8°	6.0° x 3.4°	6.0° x 3.4°
M.O.D. (m)		0.75	0.75	1.0	1.0
Weight (g)		270	270	260	260

*: While stocks last.

Fish-eye

DF360SR4A-SA2*

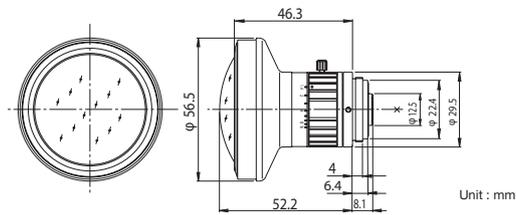
Day Night 5MP 1/2.5"



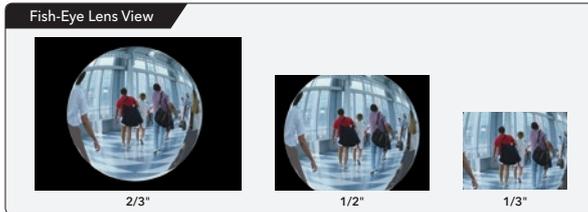
Focal Length	1.3	
Iris Range	F2.0 - Close	
Mount	CS-mount	
Operation	Focus	Manual
	Iris	Auto (DC type)*1
Angle of View (HxV)	1/2.5"	182.0° x 182.0° (5.33x3.93mm)
M.O.D. (m)	0.3	
Mass (g)	265	

FE185C057HA-1

5MP 2/3"

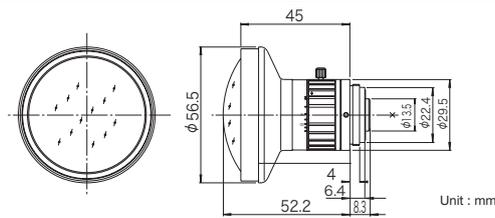


Focal Length	1.8	
Iris Range	F1.4 - F16	
Mount	C-mount	
Operation	Focus	Fixed
	Iris	Manual
Angle of View (HxV)	2/3"	185.0° x 185.0° (Ø5.7mm)
	1/2"	185.0° x 154.1°
	1/3"	154.1° x 115.4°
M.O.D. (m)	0.1	
Mass (g)	135	



FE185C086HA-1

5MP 1"



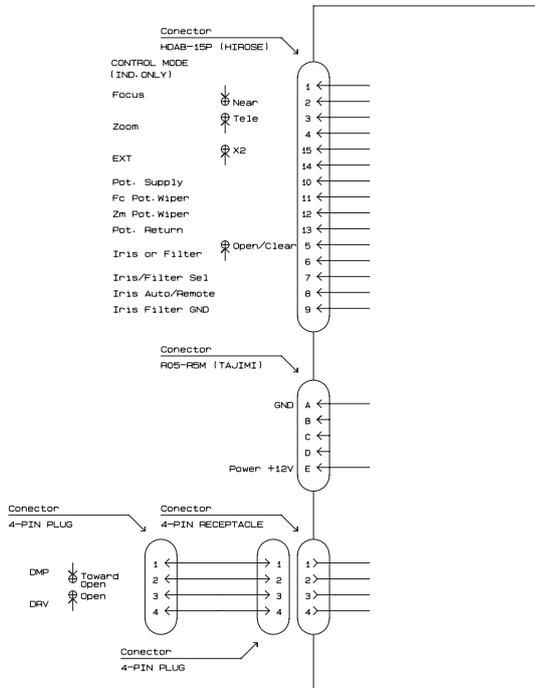
Focal Length	2.7	
Iris Range	F1.8 - F16	
Mount	C-mount	
Operation	Focus	Fixed
	Iris	Manual
Angle of View (HxV)	1"	185.0° x 185.0° (Ø8.6mm)
	2/3"	185.0° x 140.6°
	1/2"	136.3° x 102.3°
M.O.D. (m)	0.2	
Mass (g)	160	



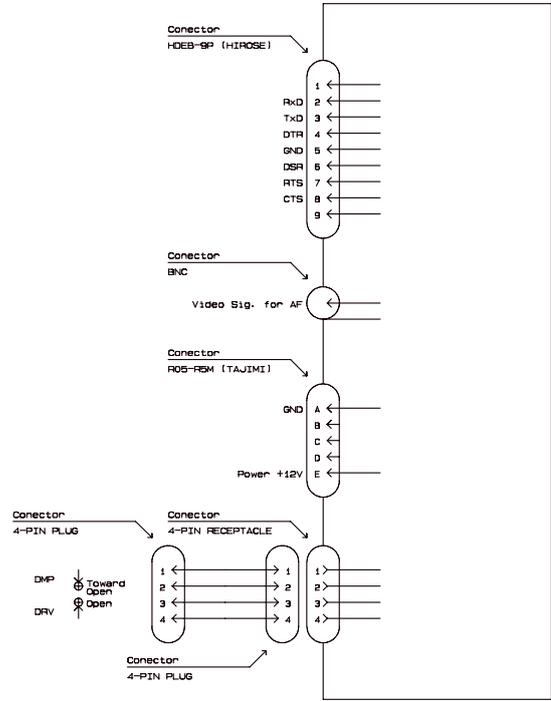
*: While stocks last.

Zoom Lens Wiring

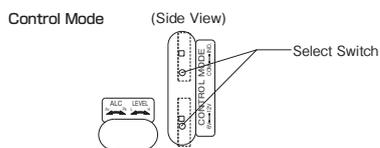
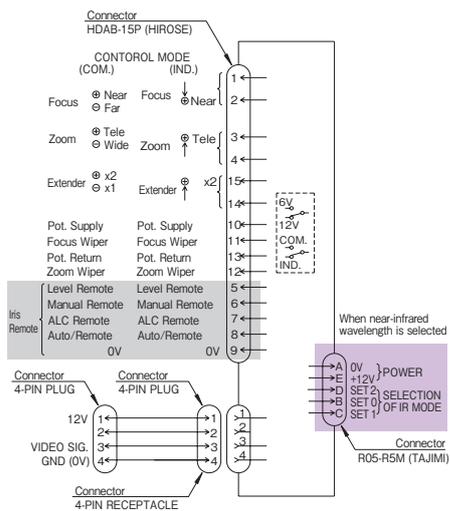
D60x16.7SR4DE-V21 P04
D60x16.7SR4DE-V23S P04



D60x16.7SR4DE-ZP1A P04
D60x16.7SR4FE-ZP1C P04

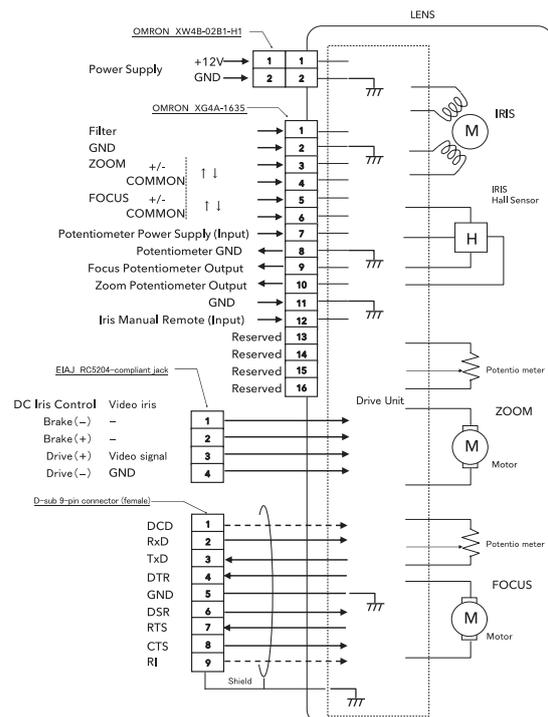


D60x12.5R3DE-V41 P07



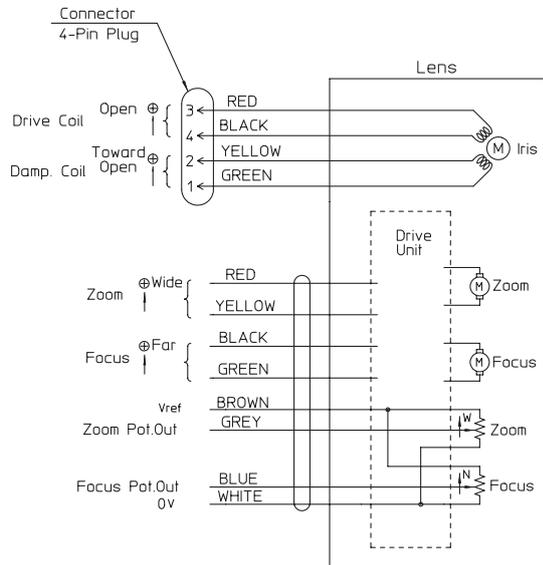
Controller Output	Select Switch Position
6V	6V / IND.
±6V	6V / COM.
12V	12V / IND.
±12V	12V / COM.

FD32x12.5SR4A-CV1 P08
FH32x15.6SR4A-CV1 P08

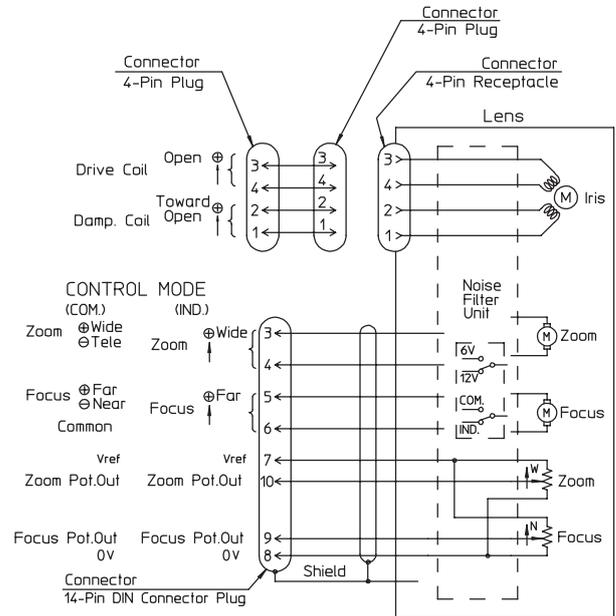


Zoom Lens Wiring

HD17x7.5A-YN1 P11



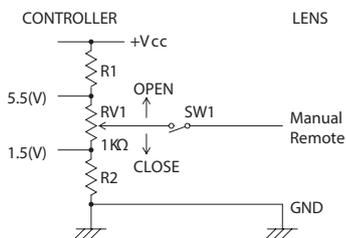
D8x7.8HA-YE2..... P11



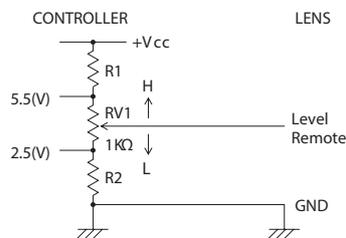
Zoom Lens Wiring

Operation System - Iris Remote

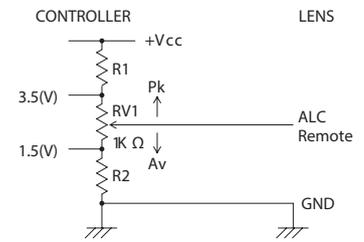
MANUAL REMOTE



LEVEL REMOTE



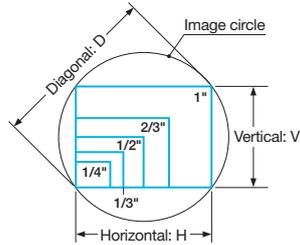
ALC REMOTE



Technical Reference

Image Sizes

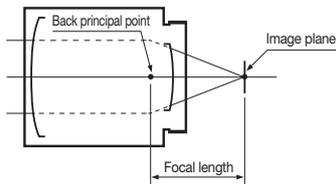
- There are several types of imaging sensors for CCTV cameras, with different image sizes.



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.

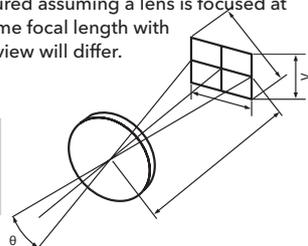


Angle of View

- 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:

$$Y' : 6.4$$

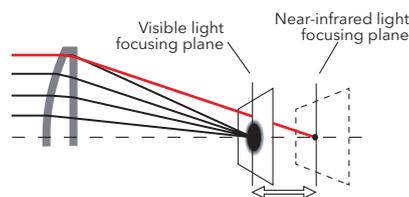
$$f : 12.5$$

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

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.

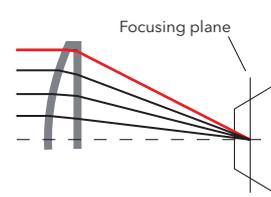
- A standard lens (for visible light) is mounted on a day & night camera, and used under near-infrared light.



— Near-infrared light
— Visible light

Result: Blurry image

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



— Near-infrared light
— Visible 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	12.5* ¹
Diameter of screw thread (mm)	1-32UNF	

Interchangeability

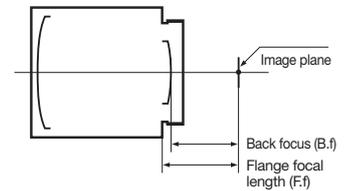
	C-mount camera	CS-mount camera
C-mount lens		* ²
CS-mount lens	x	

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 model (1x)

Aspect ratio 4:3										
Sensor size	1"		2/3"		1/1.8"		1/2"		1/3"	
Model name	WIDE	TELE	WIDE	TELE	WIDE	TELE	WIDE	TELE	WIDE	TELE
D60x16.7SR4 series			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°
D60x12.5R3 series							28.9°x 21.6°	0.50°x 0.38°	21.6°x 16.2°	0.38°x 0.28°

Aspect ratio 16:9										
Sensor size	1"		2/3"		1/1.8"		1/2"		1/3"	
Model name	WIDE	TELE	WIDE	TELE	WIDE	TELE	WIDE	TELE	WIDE	TELE
D60x16.7SR4 series			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°
D60x12.5R3 series							31.5°x 17.6°	0.54°x 0.31°	23.5°x 13.2°	0.41°x 0.23°

When built-in Extender is on

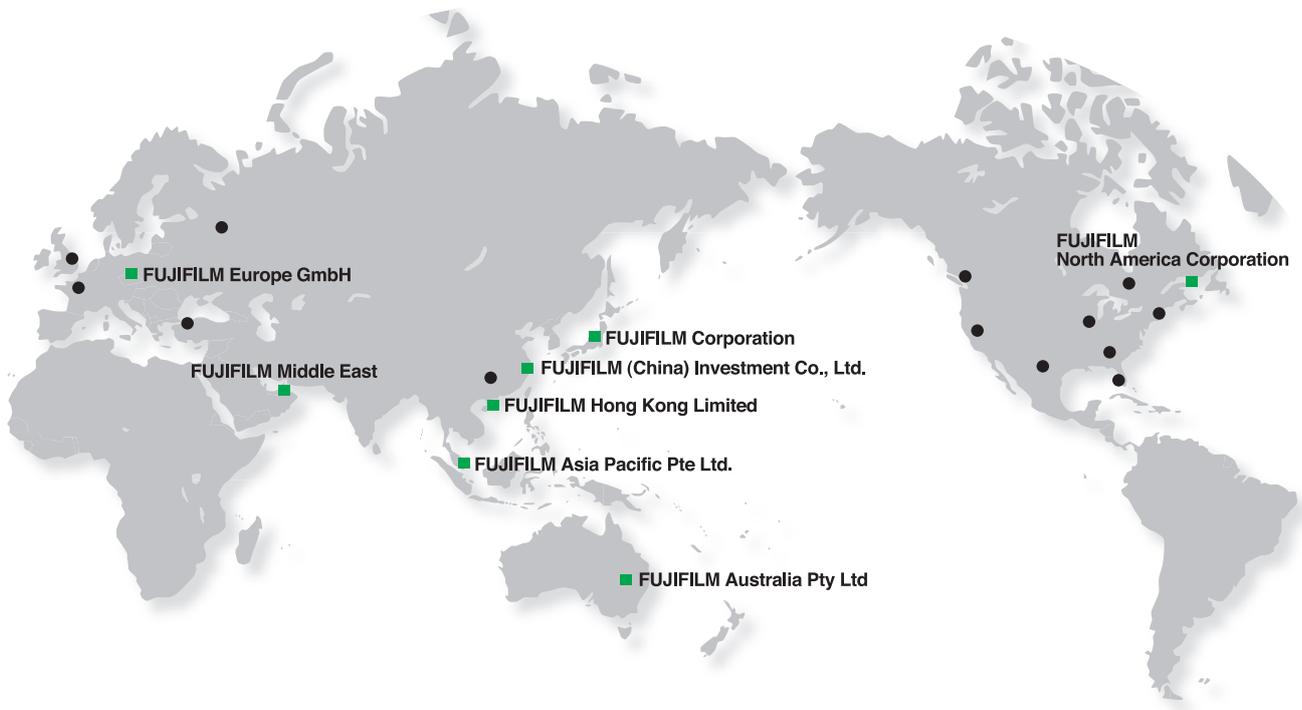
Aspect ratio 4:3										
Sensor size	1"		2/3"		1/1.8"		1/2"		1/3"	
Model name	WIDE	TELE	WIDE	TELE	WIDE	TELE	WIDE	TELE	WIDE	TELE
D60x16.7SR4 series			11.7°x 8.9°*	0.21°x 0.16°*	11.7°x 8.9°	0.21°x 0.16°	10.6°x 8.0°	0.19°x 0.14°	8.0°x 6.0°	0.14°x 0.11°
D60x12.5R3 series							14.7°x 11.1°	0.26°x 0.19°	11.1°x 8.3°	0.19°x 0.15°

Aspect ratio 16:9										
Sensor size	1"		2/3"		1/1.8"		1/2"		1/3"	
Model name	WIDE	TELE	WIDE	TELE	WIDE	TELE	WIDE	TELE	WIDE	TELE
D60x16.7SR4 series			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°
D60x12.5R3 series							16.1°x 9.1°	0.28°x 0.16°	12.1°x 6.8°	0.21°x 0.12°

Standard model (1x)

Aspect ratio 4:3										
Sensor size	1"		2/3"		1/1.8"		1/2"		1/3"	
Model name	WIDE	TELE	WIDE	TELE	WIDE	TELE	WIDE	TELE	WIDE	TELE
FD32x12.5SR4A-CV1					30.9°× 23.5°	1.0°× 0.77°	28.0°× 21.2°	0.92°× 0.69°	21.2°× 16.0°	0.69°× 0.52°
FH32x15.6SR4A-CV1			30.9°× 23.6°	1.0°× 0.77°	25.4°× 19.2°	0.8°× 0.63°	22.9°× 17.3°	0.75°× 0.56°	17.3°× 13.1°	0.56°× 0.42°
H22x11.5A-X41			41.5°× 32.0°	2.0°× 1.3°	–	–	31.1°× 23.3°	1.3°× 1.1°	23.3°× 17.5°	1.1°× 0.54°
HD17x7.5A-YN1							45.4°× 34.4°	2.5°× 2.1°	–	–
D8x7.8HA-YE2							44.4°× 34.1°	5.5°× 4.2°	34.1°× 25.6°	4.2°× 3.2°

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



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