FUJINON CCTV LENSES

FUJINON lenses have dominated the broadcasting lens market where excellent image quality is required. The technologies for those broadcasting lenses are now adopted in CCTV lens manufacturing. We offer various lenses for a wide range of purposes including large super zoom lenses suitable for long range surveillance, day and night lenses, and HD lenses. We always make great effort to produce reliable products for customers all over the world through our strictest quality control and streamlined production structure.

See what it is, not what it might be. FUJINON CCTV LENSES

**Features**

**Fish-Eye Lenses**
Fujinon’s Fish-Eye lens, with an angle of 185 degrees, is the world’s first to support 5 megapixel CCD cameras. High-quality image display in imaging software has been made simple with captured images that are sharp from edge to edge, and with the adoption of the F8 system suited for uniform displaying of images. Look no further for effective, blindspot-free wide-area surveillance, such as of subway entrances and shopping arcades.

**HD Vari-Focal Lenses**
High-resolution lenses for use in security systems for which demand has grown in recent years. These lenses boast super clear imaging from the center to the edges with superior face recognition capability. The lenses are suitable for any purpose and locale, in day and night use, from among focal lengths of 2.2 mm to 80 mm.

**Zoom Lenses**
With the adoption of high-precision TRI-CAM + INNERCAM technology, we offer an expanded lineup of products to meet ever more diversified needs. There are models with auto-focusing, optical anti-vibration, zoom and focus presetting, and also those which support the RS-232C standard that enable sophisticated zoom control by computer. We are expanding the lineup with lenses for night vision cameras and lenses with super zoom (eg: 60x), long focal length (eg: 3200 mm) or high resolution (eg: 2 megapixels) demanded for long range surveillance. Small and lightweight lenses enable compact long range surveillance systems to be built.

**Fixed Focal Length Lenses**
High cost-performance fixed focal length lenses that are compact, lightweight and of course provide high quality images for security CCTV cameras. Great lineups including day-and-night use lenses supporting 5-megapixel cameras, which are optimum for ITS in growing demand. These lenses are highly effective wherever security monitoring is required, including bank ATMs, convenience stores, offices, condominiums and transportation facilities.

**Vari-Focal Lenses**
Lenses for use in security systems for which demand has grown in recent years. These lenses allow clear imaging from the center to the edges with superior face recognition capability. They are suitable for any purpose and locale. The lenses are featured by: an AT aspheric surface, large aperture of F0.95, day and night use, miniature design for dome application or coverage for 1/2-inch sensors superior in terms of optical performance.

**Day&Night Lenses**
There is a growing need for compact, high quality lenses for 24/7 surveillance applications such as parking lots, factory premises, streets. Continuous surveillance is also required for public facilities such as airports, harbors, highways and border patrol, requiring more versatile focal lengths and higher zoom ratios.
Fujinon has developed lenses that respond to infrared illumination to capture clear, corrected images, even at 0 lux. We offer a lineup of lenses from the standard focal length of 2.9-8 mm, to the diverse focal length of 12.5-2200 mm.

At night, day & night cameras operate in the near-infrared range. For this reason, use of regular lenses causes the image to be out of focus. Using special optical glass and advanced optical designing technology, Fujinon’s day&night lenses achieve minimal axial aberration. Sharp and high quality images can be captured around-the-clock, whether in the visible range (day / color) or in the near-infrared range (night / monochrome), and at every focal distance from the wide end to the tele end.
1.4 mm
3.1 mm
10 mm
20 mm
50 mm
200 mm
500 mm
1000 mm

Focal Length

- Fish-eye Lens
- Fixed Focal Lens
- HD Vari-Focal Lens
- Vari-Focal Lens
- Zoom Lens
- Module Lens
- Board Vari-Focal Lens

Security

Surveillance

Focal length will be 2x when extender is used.
FUJINON HD Lenses

As modern industries and social infrastructures are growing rapidly, demands for surveillance systems incorporating high-definition cameras are increasing day by day. In order to fully utilize advanced complex security systems, superior lens performance for image capture is essential.

To respond to this market demand, Fujifilm offers a wide variety of high-quality lenses for HD security cameras, achieving clear images for superior face recognition capability.

Suitable for any application and condition, our lineup contains Day and Night, and other lenses ranging from 2.2 mm to 3200 mm.

Fujinon HD Vari-Focal lenses can be incorporated with the P-iris control, a precise control of the iris (by using a stepping motor) according to the situation, to produce higher quality video images. *(1)* *(2)*

Lenses supporting 1.3- to 5-megapixel HD sensors provide 2 to 4 times greater resolution, compared to traditional lenses for SD sensors. Only when used in combination with these lenses, cameras with greater pixel sizes and image quality allowed to fully exercise their performance.

*1: The P-iris is an optional feature. Contact us separately to incorporate it.
*2: P-iris lenses are only available with the cameras supporting P-iris control.
FUJINON
Chart of Focus Range for HD Vari-Focal Lenses.
**Vari-Focal Day Type**

### YV2.8x2.8SA-SA2

- **Focal Length (mm):** 2.8 - 8 (2.8x)
- **Iris Range:** F1.2 - T360 (equivalent to F360)
- **Operation:**
  - **Zoom:** Manual
  - **Focus:** Manual
  - **Iris:** Auto (DC type)**
- **Angle of View (H x V):**
  - **1/3:**
    - **WIDE:** 100° 06' x 73° 45'
    - **TELE:** 35° 09' x 26° 18'
  - **1/4:**
    - **WIDE:** 73° 45' x 54° 49'
    - **TELE:** 26° 18' x 19° 44'
- **Angle of View (H x V):**
  - **1/3:**
    - **WIDE:** 109° 50' x 59° 51'
    - **TELE:** 38° 11' x 21° 29'
  - **1/4:**
    - **WIDE:** 80° 39' x 44° 38'
    - **TELE:** 28° 39' x 16° 07'
- **Focus Range (Front of the Lens Front):** 1.3 - 1.4
- **Mass (g):** 50

### YV4.3x2.8SA-SA2

- **Focal Length (mm):** 2.8 - 12 (4.3x)
- **Iris Range:** F1.4 - T360 (equivalent to F360)
- **Operation:**
  - **Zoom:** Manual
  - **Focus:** Manual
  - **Iris:** Auto (DC type)**
- **Angle of View (H x V):**
  - **1/3:**
    - **WIDE:** 100° 02' x 74° 03'
    - **TELE:** 23° 26' x 17° 36'
  - **1/4:**
    - **WIDE:** 74° 09' x 53° 06'
    - **TELE:** 17° 36' x 13° 13'
- **Angle of View (H x V):**
  - **1/3:**
    - **WIDE:** 109° 33' x 60° 08'
    - **TELE:** 25° 31' x 14° 23'
  - **1/4:**
    - **WIDE:** 80° 50' x 44° 51'
    - **TELE:** 19° 10' x 10° 48'
- **Focus Range (Front of the Lens Front):** 1.3 - 1.4
- **Mass (g):** 80

### YV3.3x15SA-SA2

- **Focal Length (mm):** 15 - 50 (3.3x)
- **Iris Range:** F1.5 - T360 (equivalent to F360)
- **Operation:**
  - **Zoom:** Manual
  - **Focus:** Manual
  - **Iris:** Auto (DC type)**
- **Angle of View (H x V):**
  - **1/3:**
    - **WIDE:** 18° 06' x 13° 34'
    - **TELE:** 5° 35' x 4° 12'
  - **1/4:**
    - **WIDE:** 13° 34' x 10° 10'
    - **TELE:** 4° 12' x 3° 10'
- **Angle of View (H x V):**
  - **1/3:**
    - **WIDE:** 19° 48' x 11° 04'
    - **TELE:** 6° 04' x 3° 26'
  - **1/4:**
    - **WIDE:** 14° 47' x 8° 18'
    - **TELE:** 4° 34' x 2° 35'
- **Focus Range (Front of the Lens Front):** 1.3 - 1.4
- **Mass (g):** 60

### YV2.7x2.2SA-SA2

- **Focal Length (mm):** 2.2 - 6 (2.7x)
- **Iris Range:** F1.3 - T360 (equivalent to F360)
- **Operation:**
  - **Zoom:** Manual
  - **Focus:** Manual
  - **Iris:** Auto (DC type)**
- **Angle of View (H x V):**
  - **1/3:**
    - **WIDE:** 120° 00' x 91° 36'
    - **TELE:** 46° 26' x 34° 59'
  - **1/4:**
    - **WIDE:** 91° 36' x 69° 21'
    - **TELE:** 34° 18' x 26° 18'
- **Angle of View (H x V):**
  - **1/3:**
    - **WIDE:** 129° 43' x 75° 23'
    - **TELE:** 50° 39' x 28° 36'
  - **1/4:**
    - **WIDE:** 95° 23' x 56° 53'
    - **TELE:** 34° 08' x 21° 31'
- **Focus Range (Front of the Lens Front):** 1.3 - 1.4
- **Mass (g):** 55

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1. The iris automatically closes when the camera is turned off.
2. Each of the above products is also available in long cable type (230 mm).
**DV3.4x3.8SA-SA1**

<table>
<thead>
<tr>
<th>3.4 x</th>
<th>Application to 1/2</th>
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</table>

**SD**

**YV2.8x2.8LA-SA2**

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<thead>
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**YV10x5B-SA2**

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<th>Application to 1/3</th>
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For detailed specifications, see the following website: [http://www.fujifilm.com/products/optical_devices/cctv/security](http://www.fujifilm.com/products/optical_devices/cctv/security)
### Vari-Focal Wide Angle DC Auto Iris CS Mount Metal Mount ND Filter Long Cable Aspherical Lens Large Aperture Ratio RoHS Compliant

#### YV2.8x2.8SR4A-SA2

*Vari-Focal Day&Night Type*

<table>
<thead>
<tr>
<th>Operation</th>
<th>Zoom</th>
<th>Focus</th>
<th>Manual</th>
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<tbody>
<tr>
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<td>Manual</td>
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<table>
<thead>
<tr>
<th>Angle of View (H x V)</th>
<th>Field of View</th>
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<tbody>
<tr>
<td>1/2.7</td>
<td>1/3</td>
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<tr>
<td>1/2.7</td>
<td>1/3</td>
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<table>
<thead>
<tr>
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<tbody>
<tr>
<td>3.3 x</td>
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<table>
<thead>
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<tbody>
<tr>
<td>Mass (g)</td>
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*This product is also available in manual iris type.

#### YV3x6SR4A-SA2

<table>
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<th>Vari-Focal Day&amp;Night Type</th>
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<table>
<thead>
<tr>
<th>Operation</th>
<th>Zoom</th>
<th>Iris</th>
<th>Auto DC type$^a$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Iris</td>
<td>Manual</td>
<td>Manual</td>
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<table>
<thead>
<tr>
<th>Angle of View (H x V)</th>
<th>Field of View</th>
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<tr>
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<td>1/3</td>
</tr>
<tr>
<td>1/2.7</td>
<td>1/3</td>
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*This product is also available in manual iris type.

#### YV3.3x15SR4A-SA2

<table>
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<table>
<thead>
<tr>
<th>Operation</th>
<th>Iris</th>
<th>Auto DC type$^a$</th>
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<tr>
<td>Iris</td>
<td>Manual</td>
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<tr>
<td>3.3 x</td>
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<thead>
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#### YV2.7x2.2SR4A-SA2

<table>
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<th>Vari-Focal Day&amp;Night Type</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Operation</th>
<th>Iris</th>
<th>Auto DC type$^a$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Iris</td>
<td>Manual</td>
<td>Manual</td>
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<table>
<thead>
<tr>
<th>Unit: mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.7 x</td>
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</tbody>
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<table>
<thead>
<tr>
<th>Focus Range (From the Lens Front) (m)</th>
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</thead>
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<tr>
<td>Mass (g)</td>
<td>75</td>
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</table>

*1: The iris automatically closes when the camera is turned off.
* Each of the above products is also available in long cable type (230 mm).
**Day&Night Lens**

### DV2.2x4.1SR4A-SA2L

- **Applies to:** 1/1.8
- **Focal length (mm):** 4.5 – 9.2 (2x)
- **Iris Range:** F1.6 – T360
- **Operation:** Zoom: Manual, Iris: Auto (DC type)
- **Angle of View (H x V):**
  - 1/1.8: WIDE – 100.5° x 34.2°
  - 1/2: TELE – 49.1° x 17.3°
  - 1/3: TELE – 30.4° x 11.5°
- **Aspect Ratio:** 16:9
- **Focus Range:** (From the Lens Front) – 0.3m – 5m
- **Mass:** 150

### DV4x12.5SR4A-SA1

- **Applies to:** 1/1.8
- **Focal length (mm):** 12.5 – 50 (4x)
- **Iris Range:** F1.6 – T360
- **Operation:** Zoom: Manual, Iris: Auto (DC type)
- **Angle of View (H x V):**
  - 1/1.8: WIDE – 81.4° x 6.1°
  - 1/2: TELE – 23.7° x 1.7°
  - 1/3: TELE – 5.3° x 4.4°
  - 1/4: TELE – –
- **Aspect Ratio:** 16:9
- **Focus Range:** (From the Lens Front) – 0.8
- **Mass:** 175

### DV3.8x4SR4A-SA1

- **Applies to:** 1/1.8
- **Focal length (mm):** 8 – 15.2 (3.8x)
- **Iris Range:** F1.5 – T360
- **Operation:** Zoom: Manual, Iris: Auto (DC type)
- **Angle of View (H x V):**
  - 1/1.8: WIDE – 103° x 77.7°
  - 1/2: TELE – 28° x 21.2°
  - 1/3: TELE – 11° x 8.4°
  - 1/4: TELE – –
- **Aspect Ratio:** 16:9
- **Focus Range:** (From the Lens Front) – 0.3
- **Mass:** 120

### DV10x8SR4A-SA1

- **Applies to:** 1/2
- **Focal length (mm):** 8 – 80 (10x)
- **Iris Range:** F1.6 – T3600 (varies with F-value)
- **Operation:** Zoom: Manual, Iris: Auto (DC type)
- **Angle of View (H x V):**
  - 1/1.8: WIDE – –
  - 1/2: TELE – –
- **Aspect Ratio:** 16:9
- **Focus Range:** (From the Lens Front) – 1.5
- **Mass:** 160

---

*1: The iris automatically closes when the camera is turned off.  
2: Angle of view values for the 1/2.7 model.  
* Each of the above products is also available in long cable type (230 mm).
# Vari-Focal Day&Night Type

## HD

### YV10x5HR4A-SA2

<table>
<thead>
<tr>
<th>Focal Length (mm)</th>
<th>Manual (1/3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.5 - 50 (1/3)</td>
<td>3.6 - 30 (1/3)</td>
</tr>
</tbody>
</table>

### YV3.3x15HR4A-SA2

<table>
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<tr>
<th>Focal Length (mm)</th>
<th>Manual (1/3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.5 - 50 (3.3x)</td>
<td>3.6 - 30 (1/3)</td>
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## SD

### YV2.7x2.9LR4D-SA2

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<thead>
<tr>
<th>Focal Length (mm)</th>
<th>Manual (1/3)</th>
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<tbody>
<tr>
<td>2.9 - 89.7 (2.7x)</td>
<td>3.6 - 30 (1/3)</td>
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### YV5x2.7R4B-SA2

<table>
<thead>
<tr>
<th>Focal Length (mm)</th>
<th>Manual (1/3)</th>
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</thead>
<tbody>
<tr>
<td>2.7 - 15.7 (5x)</td>
<td>3.6 - 30 (1/3)</td>
</tr>
</tbody>
</table>

## Specifications

- **Focal Length (mm):**
  - HD: 10 - 50 (1/3)
  - YV10x5HR4A-SA2: 5.5 - 50 (1/3)
  - YV3.3x15HR4A-SA2: 5.5 - 50 (3.3x)
  - YV2.7x2.9LR4D-SA2: 2.9 - 89.7 (2.7x)
  - YV5x2.7R4B-SA2: 2.7 - 15.7 (5x)

- **Iris Range:**
  - F1.6 - T360 (equivalent to F360)

- **Operation:**
  - Manual

- **Iris:**
  - Auto (DC type)

- **Angle of View (H x V):**
  - 1/3: Wide 15.7 x 29.9, Tele 5.5 x 9.9
  - 1/4: Wide 15.7 x 29.9, Tele 5.5 x 9.9

- **Aspect Ratio:**
  - 16:9

- **Focus Range (mm):**
  - 0.3

- **Mass (g):**
  - HD: 85
  - SD: 50

For detailed specifications, see the following website:

**Fixed Focal**

**Day&Night Lens**

**For 3CCD**

**TF4XA-1**

- **Applicable camera models:**
  - DC Auto Iris
  - Metal Mount
  - Zoom Cable
  - RoHS Compliant

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<thead>
<tr>
<th>Feature</th>
<th>TF4XA-1</th>
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<tbody>
<tr>
<td>Focal Length (mm)</td>
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<tr>
<td>Iris Range</td>
<td>Manual</td>
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<tr>
<td>Operation</td>
<td>Focus</td>
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<tr>
<td>Angle of View (H x V)</td>
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<tr>
<td>Mass (g)</td>
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</table>

**For ITS**

**HF35SR4A-SA1L**

- **Applicable camera models:**
  - DC Auto Iris
  - Metal Mount
  - Zoom Cable
  - RoHS Compliant

**For ITS**

**HF50SR4A-SA1L**

- **Applicable camera models:**
  - DC Auto Iris
  - Metal Mount
  - Zoom Cable
  - RoHS Compliant

<table>
<thead>
<tr>
<th>Feature</th>
<th>HF50SR4A-SA1L</th>
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<tbody>
<tr>
<td>Focal Length (mm)</td>
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<tr>
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<td>Operation</td>
<td>Focus</td>
</tr>
<tr>
<td>Angle of View (H x V)</td>
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<td>Mass (g)</td>
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*1: The iris automatically closes when the camera is turned off.
* This product is also available in manual type.

**Panomorph Lens**

**DF360SR4A**

- **Applicable camera models:**
  - DC Auto Iris
  - Metal Mount
  - Zoom Cable
  - RoHS Compliant

**For detailed specifications, see the following website:**
http://www.fujifilm.com/products/optical_devices/cctv/security
**Fish-eye**

### SD YV2.2x1.4A-SA2

- **Focal Length**: 1.4 ~ 3.125mm
- **Iris Range**: F1.4 ~ F16
- **Zoom**: Manual
- **Iris**: Manual
- **Angle of View (H x V)**: 1/3 x 1/2
- **Unit**: mm
- **Mass (g)**: 80

### 5MP FE185C046HA-1

- **Focal Length**: 1.4
- **Iris Range**: F1.4 ~ F16
- **Zoom**: Fixed
- **Iris**: Manual
- **Angle of View (H x V)**: 1/3 x 1/2
- **Unit**: mm
- **Mass (g)**: 140

### 5MP FE185C057HA-1

- **Focal Length**: 1.8
- **Iris Range**: F1.4 ~ F16
- **Zoom**: Fixed
- **Iris**: Manual
- **Angle of View (H x V)**: 1/3 x 1/2
- **Unit**: mm
- **Mass (g)**: 135

### 5MP FE185C086HA-1

- **Focal Length**: 2.7
- **Iris Range**: F1.8 ~ F16
- **Zoom**: Fixed
- **Iris**: Manual
- **Angle of View (H x V)**: 1/3 x 1/2
- **Unit**: mm
- **Mass (g)**: 160

*1. The iris automatically closes when the camera is turned off.
*2. YV2.2 x 1.4A-SA2 is an SD lens and is also available in a long cable type (230 mm) or manual type.
### D60x16.7SR4DE Series / D60x16.7SR4FE

**2,000mm**

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<thead>
<tr>
<th>Model</th>
<th>Description</th>
<th>Notes</th>
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<tbody>
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<td>60x Day &amp; Night Lens</td>
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<tr>
<td>D60x16.7SR4DE-ZP1A (AF)</td>
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<td>D60x16.7SR4FE-ZP1C (AF and Anti-Vibration)</td>
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**Focal Length (mm)**

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<th>1x</th>
<th>2x</th>
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<tbody>
<tr>
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<td><strong>16.7</strong> - 1000 (60x)</td>
<td><strong>33.4</strong> - 2000</td>
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<tr>
<td>D60x16.7SR4DE-ZP1A (AF)</td>
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<td>33.4</td>
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<tr>
<td>D60x16.7SR4FE-ZP1C (AF and Anti-Vibration)</td>
<td>16.7</td>
<td>33.4</td>
</tr>
</tbody>
</table>

**Iris Range**

<table>
<thead>
<tr>
<th>Model</th>
<th>1x</th>
<th>2x</th>
</tr>
</thead>
<tbody>
<tr>
<td>D60x16.7SR4DE-V21</td>
<td>F3.5 - F16</td>
<td>F7.0 - F12</td>
</tr>
<tr>
<td>D60x16.7SR4DE-ZP1A (AF)</td>
<td>F3.5 - F16</td>
<td>F7.0 - F12</td>
</tr>
<tr>
<td>D60x16.7SR4FE-ZP1C (AF and Anti-Vibration)</td>
<td>F3.5 - F16</td>
<td>F7.0 - F12</td>
</tr>
</tbody>
</table>

**Filter**

- D60x16.7SR4DE-ZP1A (AF): Filter HD (1/8, 1/64), Visible Light Cut
- D60x16.7SR4FE-ZP1C (AF and Anti-Vibration): Auto (DC type) or Remote *

**Operation**

- Zoom: Motor Drive
- Focus: Servo Control
- Iris: Servo Control

**AF**

- N/A
- Available with analog camera

**Optical Anti-Vibration**

- N/A
- Available

**Temperature Correction Mechanism**

<table>
<thead>
<tr>
<th>Model</th>
<th>1/1.8</th>
<th>1/2</th>
</tr>
</thead>
<tbody>
<tr>
<td>D60x16.7SR4DE-V21</td>
<td>WIDE</td>
<td>WIDE</td>
</tr>
<tr>
<td>D60x16.7SR4DE-ZP1A (AF)</td>
<td>WIDE</td>
<td>WIDE</td>
</tr>
<tr>
<td>D60x16.7SR4FE-ZP1C (AF and Anti-Vibration)</td>
<td>WIDE</td>
<td>WIDE</td>
</tr>
</tbody>
</table>

**Angle of View (H x V)**

<table>
<thead>
<tr>
<th>Model</th>
<th>1/1.8</th>
<th>1/2</th>
</tr>
</thead>
<tbody>
<tr>
<td>D60x16.7SR4DE-V21</td>
<td>WIDE</td>
<td>WIDE</td>
</tr>
<tr>
<td>D60x16.7SR4DE-ZP1A (AF)</td>
<td>WIDE</td>
<td>WIDE</td>
</tr>
<tr>
<td>D60x16.7SR4FE-ZP1C (AF and Anti-Vibration)</td>
<td>WIDE</td>
<td>WIDE</td>
</tr>
</tbody>
</table>

**Focus Range (From the Lens Front) (m)**

<table>
<thead>
<tr>
<th>Model</th>
<th>1/1.8</th>
<th>1/2</th>
</tr>
</thead>
<tbody>
<tr>
<td>D60x16.7SR4DE-V21</td>
<td>WIDE</td>
<td>WIDE</td>
</tr>
<tr>
<td>D60x16.7SR4DE-ZP1A (AF)</td>
<td>WIDE</td>
<td>WIDE</td>
</tr>
<tr>
<td>D60x16.7SR4FE-ZP1C (AF and Anti-Vibration)</td>
<td>WIDE</td>
<td>WIDE</td>
</tr>
</tbody>
</table>

**Object M.O.D. (H x V) (4:3) (mm)**

<table>
<thead>
<tr>
<th>Model</th>
<th>1/1.8</th>
<th>1/2</th>
</tr>
</thead>
<tbody>
<tr>
<td>D60x16.7SR4DE-V21</td>
<td>WIDE</td>
<td>WIDE</td>
</tr>
<tr>
<td>D60x16.7SR4DE-ZP1A (AF)</td>
<td>WIDE</td>
<td>WIDE</td>
</tr>
<tr>
<td>D60x16.7SR4FE-ZP1C (AF and Anti-Vibration)</td>
<td>WIDE</td>
<td>WIDE</td>
</tr>
</tbody>
</table>

**Object M.O.D. at M.O.D. (H x V) (16:9) (mm)**

<table>
<thead>
<tr>
<th>Model</th>
<th>1/1.8</th>
<th>1/2</th>
</tr>
</thead>
<tbody>
<tr>
<td>D60x16.7SR4DE-V21</td>
<td>WIDE</td>
<td>WIDE</td>
</tr>
<tr>
<td>D60x16.7SR4DE-ZP1A (AF)</td>
<td>WIDE</td>
<td>WIDE</td>
</tr>
<tr>
<td>D60x16.7SR4FE-ZP1C (AF and Anti-Vibration)</td>
<td>WIDE</td>
<td>WIDE</td>
</tr>
</tbody>
</table>

**Back Focal Distance (In air) (mm)**

<table>
<thead>
<tr>
<th>Model</th>
<th>1x</th>
<th>2x</th>
</tr>
</thead>
<tbody>
<tr>
<td>D60x16.7SR4DE-V21</td>
<td>24.85</td>
<td>24.85</td>
</tr>
<tr>
<td>D60x16.7SR4DE-ZP1A (AF)</td>
<td>24.85</td>
<td>24.85</td>
</tr>
<tr>
<td>D60x16.7SR4FE-ZP1C (AF and Anti-Vibration)</td>
<td>24.85</td>
<td>24.85</td>
</tr>
</tbody>
</table>

**Exit Pupil Position From Image Plane (mm)**

<table>
<thead>
<tr>
<th>Model</th>
<th>1x</th>
<th>2x</th>
</tr>
</thead>
<tbody>
<tr>
<td>D60x16.7SR4DE-V21</td>
<td>0.66</td>
<td>0.66</td>
</tr>
<tr>
<td>D60x16.7SR4DE-ZP1A (AF)</td>
<td>0.66</td>
<td>0.66</td>
</tr>
<tr>
<td>D60x16.7SR4FE-ZP1C (AF and Anti-Vibration)</td>
<td>0.66</td>
<td>0.66</td>
</tr>
</tbody>
</table>

**Filter Thread (mm)**

<table>
<thead>
<tr>
<th>Model</th>
<th>1x</th>
<th>2x</th>
</tr>
</thead>
<tbody>
<tr>
<td>D60x16.7SR4DE-V21</td>
<td>M112 x 0.75</td>
<td></td>
</tr>
<tr>
<td>D60x16.7SR4DE-ZP1A (AF)</td>
<td>M112 x 0.75</td>
<td></td>
</tr>
<tr>
<td>D60x16.7SR4FE-ZP1C (AF and Anti-Vibration)</td>
<td>M112 x 0.75</td>
<td></td>
</tr>
</tbody>
</table>

**Extender**

- C
- 2x

**Mass (kg)**

<table>
<thead>
<tr>
<th>Model</th>
<th>1x</th>
<th>2x</th>
</tr>
</thead>
<tbody>
<tr>
<td>D60x16.7SR4DE-V21</td>
<td>6.5</td>
<td>7.1</td>
</tr>
<tr>
<td>D60x16.7SR4DE-ZP1A (AF)</td>
<td>6.5</td>
<td>7.1</td>
</tr>
<tr>
<td>D60x16.7SR4FE-ZP1C (AF and Anti-Vibration)</td>
<td>6.5</td>
<td>7.1</td>
</tr>
</tbody>
</table>

**Standard Accessories**

- IRIS CONTROL CABLE

**Wiring Diagram**

- P20

*For detailed specifications, see the following website: [http://www.fujifilm.com/products/optical_devices/cctv/security]().
### Zoom Position

**D60x16.7SR4DE Series**

**WIDE (16.7mm)**

**TELE (1,000mm)**

*without Extender*
**D32x10HR4D Series / D32x15.6HR4D Series**

**Applicable Camera Model**: 1/2, 1/3, 1/4

---

**D32x10HR4D-VX1**

<table>
<thead>
<tr>
<th>Focal Length (mm)</th>
<th>10 - 320 (32x)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Iris Range</td>
<td>F2.5 - T1500 (Equivalent to F1500)</td>
</tr>
</tbody>
</table>

**Zoom Operation**

- **Zoom**
  - Wide: 35° 29′ × 26° 59′
  - Tele: 1° 09′ × 0° 52′
- **Focus**
  - Wide: 26° 59′ × 20° 24′
  - Tele: 0° 52′ × 0° 39′
- **Iris**
  - Wide: 1° 14′ × 0° 42′
  - Tele: 0° 16′ × 16° 13′

**Focus Range (From the Lens Front) (m)**
- Wide: 1746 × 1310
- Tele: 57 × 43

**Object Dimensions at M.O.D. (1/3) (mm)**
- Wide: 1310 × 982
- Tele: 43 × 32

**Back Focal Distance (in air) (mm)**
- Wide: 1891 × 1087
- Tele: 47 × 26

**Exit Pupil Position (From Image Plane) (mm)**
- Wide: 62 × 35
- Tele: 47 × 26

**Filter Thread (mm)**
- Wide: M82 × 0.75
- Tele: M82 × 0.75

**Mass (kg)**
- Wide: 2.5
- Tele: 2.7

**Wiring Diagram**

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*Photograph of the D32x10HR4D model.

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For detailed specifications, see the following website: [http://www.fujifilm.com/products/optical_devices/cctv/security/](http://www.fujifilm.com/products/optical_devices/cctv/security/)

---

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 23).
D8x7.8HA Series

**Focal Length (mm)**
- D8x7.8HA-YE2: 7.8 - 63 (8x)
- D8x7.8HA-SE2: 8 - 64 (8x)

**Iris Range**
- D8x7.8HA-YE2: F1.2 - T400 (Equivalent to F400)
- D8x7.8HA-SE2: F1.2 - T400 (Equivalent to F400)

**Operation**
- Zoom: Motor Drive
- Focus: Motor Drive
- Iris: Auto/DC Type

**Angle Of View (H×V)**
- 1/2°: WIDE
  - D8x7.8HA-YE2: 44° 37′ × 34° 12′
  - D8x7.8HA-SE2: 43° 36′ × 33° 24′
- 1/2°: TELE
  - D8x7.8HA-YE2: 5° 49′ × 4° 22′

**Focusing Range**
- From Front Of The Camera: 14.00

**Object Dimensions at M.O.D. (H×V) (mm)**
- 1/2°: WIDE
  - D8x7.8HA-YE2: 944 × 708
  - D8x7.8HA-SE2: 944 × 708
- 1/2°: TELE
  - D8x7.8HA-YE2: 117 × 88

**Back Focal Distance (mm)**
- 46

**Extender (mm)**
- 400

**Filter Thread (mm)**
- M55 × 0.75

**Wiring Diagram**
- P21

*1: When power is turned off, iris will automatically close.

D12x8A Series / Y12x6A Series

**Focal Length (mm)**
- D12x8A-SE2: 8 - 96 (12x)
- D12x8A-YE2: 8 - 96 (12x)
- Y12x6A-SE2: 6 - 72 (12x)
- Y12x6A-YE2: 6 - 72 (12x)

**Iris Range**
- D12x8A-SE2: F2.0 - T400 (Equivalent to F400)
- D12x8A-YE2: F2.0 - T400 (Equivalent to F400)
- Y12x6A-SE2: F1.5 - T400 (Equivalent to F400)
- Y12x6A-YE2: F1.5 - T400 (Equivalent to F400)

**Operation**
- Zoom: Motor Drive
- Focus: Motor Drive
- Iris: Auto/DC Type

**Angle Of View (H×V)**
- 1/2°: WIDE
  - D12x8A-SE2: 3° 49′ × 2° 52′
  - D12x8A-YE2: 3° 49′ × 2° 52′
  - Y12x6A-SE2: 3° 49′ × 2° 52′
  - Y12x6A-YE2: 3° 49′ × 2° 52′
- 1/2°: TELE
  - D12x8A-SE2: 2° 52′ × 2° 09′
  - D12x8A-YE2: 2° 52′ × 2° 09′
  - Y12x6A-SE2: 2° 52′ × 2° 09′
  - Y12x6A-YE2: 2° 52′ × 2° 09′

**Focusing Range**
- From Front Of The Camera: 1.3

**Object Dimensions at M.O.D. (H×V) (mm)**
- 1/2°: WIDE
  - D12x8A-SE2: 1003 × 753
  - D12x8A-YE2: 1003 × 753
  - Y12x6A-SE2: 1003 × 753
  - Y12x6A-YE2: 1003 × 753
- 1/2°: TELE
  - D12x8A-SE2: 84 × 63
  - D12x8A-YE2: 84 × 63
  - Y12x6A-SE2: 84 × 63
  - Y12x6A-YE2: 84 × 63
- 1/3°: WIDE
  - D12x8A-SE2: 752 × 565
  - D12x8A-YE2: 752 × 565
  - Y12x6A-SE2: 752 × 565
  - Y12x6A-YE2: 752 × 565
- 1/3°: TELE
  - D12x8A-SE2: 63 × 47
  - D12x8A-YE2: 63 × 47
  - Y12x6A-SE2: 63 × 47
  - Y12x6A-YE2: 63 × 47

**Back Focal Distance (mm)**
- D12x8A-SE2: 16.22
- D12x8A-YE2: 11.69
- Y12x6A-SE2: 11.69
- Y12x6A-YE2: 11.69

**Exit Pupil Position (From Image Plane) (mm)**
- -51

**Filter Thread (mm)**
- M55 × 0.75

**Mass (g)**
- D12x8A-SE2: 330
- D12x8A-YE2: 350
- Y12x6A-SE2: 330
- Y12x6A-YE2: 350

**Coil Resistance**
- -
- Drive Coil: 180Ω
- Damping Coil: 720Ω

**Current Consumption**
- -
- 22mA (Max.) at DC 4V

**Wiring Diagram**
- P21

*1: When power is turned off, iris will automatically close.  
*2: For details on the iris-remote connection, see the relevant Technical Reference (Page 23).
## C22x23 Series

### 22 x

<table>
<thead>
<tr>
<th>Focal Length (mm)</th>
<th>C22x23R2D-V41</th>
<th>C22x23R2D-ZP1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Iris Range</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operation</td>
<td>Motor Drive</td>
<td>Servo Control</td>
</tr>
<tr>
<td>Angle Of View (H x V)</td>
<td>31° 06' x 23° 35'</td>
<td>41° 16' x 31° 32'</td>
</tr>
<tr>
<td>Focusing Range (From Front Of The Lens)</td>
<td>1' 27' x 1' 05'</td>
<td>1' 58' x 1' 28'</td>
</tr>
<tr>
<td>IRIS CONTROL CABLE</td>
<td>39.54</td>
<td>2178 x 1633</td>
</tr>
<tr>
<td>Filter Thread (mm)</td>
<td>M8 x 0.75</td>
<td>Auto (Video Type) or Remote*3</td>
</tr>
<tr>
<td>Mass (kg)</td>
<td>2.4</td>
<td>2.3</td>
</tr>
<tr>
<td>Wiring Diagram</td>
<td>P22</td>
<td>P22</td>
</tr>
</tbody>
</table>

*3 For details on the Iris-Remote connection, see the relevant Technical Reference (Page 23).

## C22x17 Series

### 22 x

<table>
<thead>
<tr>
<th>Focal Length (mm)</th>
<th>C22x17R2D-ZP1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Iris Range</td>
<td></td>
</tr>
<tr>
<td>Operation</td>
<td>Motor Drive</td>
</tr>
<tr>
<td>Angle Of View (H x V)</td>
<td>41° 16' x 31° 32'</td>
</tr>
<tr>
<td>Focusing Range (From Front Of The Lens)</td>
<td>1' 58' x 1' 28'</td>
</tr>
<tr>
<td>IRIS CONTROL CABLE</td>
<td>67.38</td>
</tr>
<tr>
<td>Filter Thread (mm)</td>
<td>M8 x 0.75</td>
</tr>
<tr>
<td>Mass (kg)</td>
<td>2.3</td>
</tr>
<tr>
<td>Wiring Diagram</td>
<td>P22</td>
</tr>
</tbody>
</table>

*3 For details on the Iris-Remote connection, see the relevant Technical Reference (Page 23).
**H22x11.5 Series**

**22 x**

Applicable to 2/3

**H22x11.5B-Y41**

| Focal Length (mm) | 11.5 - 253(22x) |
| Iris Range | P1.6 - T2000 (Equivalent to F2000) |
| Operation | Zoom: Motor Drive, Focus: Motor Drive, Iris: Auto(Video Type), or Remote
| Angle of View (H/V) | 2/3⁄120° x 32° 8' |
| Focusing Range (From Front Of The Lens) | 2' 000 x 1' 30' |
| Object Dimensions (at WCD/H/V) (mm) | 2213 x 1660 |
| Back Focal Distance (mm) | 181 x 75 |
| Exit Pupil Position (from Image Plane) (mm) | -103 |
| Filter Thread (mm) | M8 x 0.75 |
| Mass (kg) | 2.3 |

**Wiring Diagram**

---

**D22x9.1 Series**

**22 x**

Applicable to 1/2

**D22x9.1B-Y41**

| Focal Length (mm) | 9.1 - 200(22x) |
| Iris Range | F1.2 - T1500 (Equivalent to F1500) |
| Operation | Zoom: Motor Drive, Focus: Motor Drive, Iris: Auto(Video Type), or Remote
| Angle of View (H/V) | 1/2⁄120° x 29° 33' |
| Focusing Range (From Front Of The Lens) | 1' 530 x 1' 23' |
| Object Dimensions (at WCD/H/V) (mm) | 2034 x 1526 |
| Back Focal Distance (mm) | 93 x 69 |
| Exit Pupil Position (from Image Plane) (mm) | 24.05 |
| Filter Thread (mm) | M8 x 0.75 |
| Mass (kg) | 2.3 |

**Wiring Diagram**

---

1: For details on the Iris-Remote connection, see the relevant Technical Reference (Page 23).
For detailed specifications, see the following website: http://www.fujifilm.com/products/optical_devices/cctv/security/
Zoom Lens Wiring

D60x16.7SR4DE-V21

- Connector 4-PIN PLUG
- Connector 4-PIN RECEPTACLE
- Control Mode
  - Factory setting: 12V / 5V

<table>
<thead>
<tr>
<th>Controller Output</th>
<th>Select Switch Position</th>
</tr>
</thead>
<tbody>
<tr>
<td>6V</td>
<td>6V / IND.</td>
</tr>
<tr>
<td>±6V</td>
<td>6V / IND.</td>
</tr>
<tr>
<td>12V</td>
<td>12V / IND.</td>
</tr>
<tr>
<td>±12V</td>
<td>12V / COM.</td>
</tr>
</tbody>
</table>

D60x16.7SR4DE-ZP1A

- Connector 4-PIN PLUG
- Connector 4-PIN RECEPTACLE
- Control Mode
  - Factory setting: 12V / 5V

<table>
<thead>
<tr>
<th>Controller Output</th>
<th>Select Switch Position</th>
</tr>
</thead>
<tbody>
<tr>
<td>6V</td>
<td>6V / IND.</td>
</tr>
<tr>
<td>±6V</td>
<td>6V / IND.</td>
</tr>
<tr>
<td>12V</td>
<td>12V / IND.</td>
</tr>
<tr>
<td>±12V</td>
<td>12V / COM.</td>
</tr>
</tbody>
</table>

D60x16.7SR4FE-ZP1C

- Connector 4-PIN PLUG
- Connector 4-PIN RECEPTACLE
- Control Mode
  - Factory setting: 12V / 5V

<table>
<thead>
<tr>
<th>Controller Output</th>
<th>Select Switch Position</th>
</tr>
</thead>
<tbody>
<tr>
<td>6V</td>
<td>6V / IND.</td>
</tr>
<tr>
<td>±6V</td>
<td>6V / IND.</td>
</tr>
<tr>
<td>12V</td>
<td>12V / IND.</td>
</tr>
<tr>
<td>±12V</td>
<td>12V / COM.</td>
</tr>
</tbody>
</table>

D60x12.5BE-V41

- Connector 4-PIN PLUG
- Connector 4-PIN RECEPTACLE
- Control Mode
  - (Side View)
  - Select Switch

<table>
<thead>
<tr>
<th>Controller Output</th>
<th>Select Switch Position</th>
</tr>
</thead>
<tbody>
<tr>
<td>6V</td>
<td>6V / IND.</td>
</tr>
<tr>
<td>±6V</td>
<td>6V / IND.</td>
</tr>
<tr>
<td>12V</td>
<td>12V / IND.</td>
</tr>
<tr>
<td>±12V</td>
<td>12V / COM.</td>
</tr>
</tbody>
</table>

D60x12.5R3DE-V41

- Connector 4-PIN PLUG
- Connector 4-PIN RECEPTACLE
- Control Mode
  - (Side View)
  - Select Switch

<table>
<thead>
<tr>
<th>Controller Output</th>
<th>Select Switch Position</th>
</tr>
</thead>
<tbody>
<tr>
<td>6V</td>
<td>6V / IND.</td>
</tr>
<tr>
<td>±6V</td>
<td>6V / IND.</td>
</tr>
<tr>
<td>12V</td>
<td>12V / IND.</td>
</tr>
<tr>
<td>±12V</td>
<td>12V / COM.</td>
</tr>
</tbody>
</table>
**Zoom Lens Wiring**

**C22x23R2D-V41  D22x9.1R2D-V41**

<table>
<thead>
<tr>
<th>Connector</th>
<th>4PIN Plug</th>
</tr>
</thead>
<tbody>
<tr>
<td>Video Sig</td>
<td>GND</td>
</tr>
<tr>
<td>Zoom Pot</td>
<td>Out</td>
</tr>
<tr>
<td>Focus Pot</td>
<td>Out</td>
</tr>
<tr>
<td>CONTROL MODE:</td>
<td>IN</td>
</tr>
</tbody>
</table>

**C22x17R2D-ZP1  H22x11.5R2D-ZP1**

<table>
<thead>
<tr>
<th>Connector</th>
<th>4PIN Plug</th>
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</thead>
<tbody>
<tr>
<td>Video Sig</td>
<td>GND</td>
</tr>
<tr>
<td>Zoom Pot</td>
<td>Out</td>
</tr>
<tr>
<td>Focus Pot</td>
<td>Out</td>
</tr>
<tr>
<td>CONTROL MODE:</td>
<td>IN</td>
</tr>
</tbody>
</table>

**Controller Output**

<table>
<thead>
<tr>
<th>Select Switch Position</th>
</tr>
</thead>
<tbody>
<tr>
<td>6V</td>
</tr>
<tr>
<td>±6V</td>
</tr>
<tr>
<td>12V</td>
</tr>
<tr>
<td>±12V</td>
</tr>
</tbody>
</table>

**Control Mode**

- IND: 6V / COM.
- IND: 12V / COM.

---

**C22x17B-Y41  H22x11.5B-Y41  D22x9.1B-Y41**

<table>
<thead>
<tr>
<th>Connector</th>
<th>4PIN Plug</th>
</tr>
</thead>
<tbody>
<tr>
<td>Video Sig</td>
<td>GND</td>
</tr>
<tr>
<td>Zoom Pot</td>
<td>Out</td>
</tr>
<tr>
<td>Focus Pot</td>
<td>Out</td>
</tr>
<tr>
<td>CONTROL MODE:</td>
<td>IN</td>
</tr>
</tbody>
</table>

**Controller Output**

<table>
<thead>
<tr>
<th>Select Switch Position</th>
</tr>
</thead>
<tbody>
<tr>
<td>6V</td>
</tr>
<tr>
<td>±6V</td>
</tr>
<tr>
<td>12V</td>
</tr>
<tr>
<td>±12V</td>
</tr>
</tbody>
</table>

**Control Mode**

- IND: 6V / COM.
- IND: 12V / COM.

---

**Legend**

- RED: POWER LED
- GREEN: PRIMARY
- BLUE: SECONDARY
### Operation System - Iris Remote

<table>
<thead>
<tr>
<th>Manual Remote</th>
<th>Level Remote</th>
<th>ALC Remote</th>
</tr>
</thead>
<tbody>
<tr>
<td>CONTROLLER</td>
<td>CONTROLLER</td>
<td>CONTROLLER</td>
</tr>
<tr>
<td>5.5(V) OPEN</td>
<td>5.5(V) H</td>
<td>3.5(V) Pk</td>
</tr>
<tr>
<td>1.5(V) CLOSE</td>
<td>2.5(V) R</td>
<td>1.5(V) R</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LENS</td>
<td>LENS</td>
<td>LENS</td>
</tr>
<tr>
<td>Wcc</td>
<td>R1</td>
<td>+Vcc</td>
</tr>
<tr>
<td></td>
<td>RV1</td>
<td>RV1</td>
</tr>
<tr>
<td></td>
<td>SW1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Manual Remote</td>
<td>Level Remote</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ALC Remote</td>
</tr>
<tr>
<td>GND</td>
<td>R2</td>
<td>R2</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
# Technical Information

## Feature Indications

<table>
<thead>
<tr>
<th>Lens Type</th>
<th>Fixed Focal</th>
<th>Vari-Focal</th>
<th>Zoom</th>
</tr>
</thead>
<tbody>
<tr>
<td>Feature/Function</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Day &amp; Night</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Auto Focus</td>
<td>AF</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Extender</td>
<td>2x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Iris Type</td>
<td>Manual Iris</td>
<td>Remote Iris</td>
<td></td>
</tr>
<tr>
<td>Mounting Type</td>
<td>C Mount</td>
<td>CS Mount</td>
<td>Metal Mount</td>
</tr>
<tr>
<td>Large Aperture Ratio</td>
<td>F0.95</td>
<td>F1.2</td>
<td>F1.3</td>
</tr>
</tbody>
</table>

## Function Indications

- **Lens Type**
  - Fixed Focal: High-performance single focal lens for the best image quality
  - Vari-Focal: Variable magnification lens with manually controllable angle, it functions as if you have multiple fixed focal lenses
  - Zoom: Zoom lens with the high performance cam adopted, which offers high-quality smooth movements

- **Day & Night**
  - Specially designed lens supporting both visible light and near-infrared light to prevent out-of-focus of day & night cameras

- **Auto Focus**
  - Fast and sharp auto-focusing even in zooming

- **Extender**
  - Function to double the focal length by one-touch control

- **Iris Type**
  - Manual Iris: Manually-operated iris
  - Remote Iris: Motor-driven iris

- **Mounting Type**
  - C Mount: Screw-in mounting commonly used in FA lenses
  - CS Mount: Screw-in mounting commonly used in security lenses
  - Metal Mount: Metal mounting with high accuracy and durability

## Model Explanation

### Fixed Focal Length Lenses

- **Image Size**
  - 1/3”
  - 1/2”
  - 2/3”
  - 1”

### HD Vari-Focal Lenses

- **Zoom Ratio**
  - Supports HD

### Vari-Focal Lenses

- **Zoom Ratio**
  - Day & Night
  - Focal Length (focal length at the wide end)

### Zoom Lenses

- **Zoom Ratio**
  - Focal Length (focal length at the wide end)
  - Supports HD

Note: The above model explanation may not apply to some products.
Terminology

Image Sizes

- There are several types of imaging sensors for CCTV cameras, with different image sizes.
- The aspect ratio of a CCTV camera is normally 4:3 (H:V).

### Table: Image Size

<table>
<thead>
<tr>
<th>Product symbol</th>
<th>Image sensor</th>
<th>Image size (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>1&quot;</td>
<td>Horizontal: 12.8, Vertical: 9.6, Diagonal: 16.0</td>
</tr>
<tr>
<td>H</td>
<td>2/3&quot;</td>
<td>8.8, 6.6, 11.0</td>
</tr>
<tr>
<td>D, S</td>
<td>1/2&quot;</td>
<td>6.4, 4.8, 8.0</td>
</tr>
<tr>
<td>Y, T</td>
<td>1/3&quot;</td>
<td>4.8, 3.6, 6.0</td>
</tr>
<tr>
<td>Q</td>
<td>1/4&quot;</td>
<td>3.6, 2.7, 4.5</td>
</tr>
<tr>
<td>35 mm camera lens</td>
<td>35 mm film</td>
<td>36.0, 24.0, 43.3</td>
</tr>
</tbody>
</table>

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.

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:

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

Exit Pupil Position

- The exit pupil is the image (virtual image) reflected by the lens located at the back of the lens diaphragm.
- The exit pupil position is generally represented with the distance between the image plane and the exit pupil. “-” (minus) indicates closer to the object, and “+” (plus) toward the camera.

C/CS-Mount

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

<table>
<thead>
<tr>
<th></th>
<th>C-mount</th>
<th>CS-mount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flange back focal length (mm)</td>
<td>17.526*</td>
<td>12.5*</td>
</tr>
<tr>
<td>Diameter of screw thread (mm)</td>
<td>1-32 UNF</td>
<td></td>
</tr>
</tbody>
</table>

Interchangeability

- C-mount lens
  - C-mount camera
  - CS-mount camera
- CS-mount lens
  - X

Flange Back and Back Focal Distance

- Flange back will be the distance between the mechanical mount surface and image plane.
- Back focal distance will be the distance between the rear end of the lens part and the image plane.

\[
\theta = 2\tan^{-1}\left(\frac{Y}{2f}\right) \quad \theta: \text{Angle of view}
\]

Example

- The angle of view when the camera size is 1/2" and the focal length is 12.5 mm:
  
  \[
  \theta = 2\tan^{-1}\left(\frac{6.4}{2 \times 12.5}\right) = 28.72^\circ
  \]

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.
### Field of View and Focal Length

1. **How to calculate the field of view**
   
   If the distance to the object is finite, you can use the following formula to calculate the field of view.

   \[
   Y = Y' \cdot \frac{L}{f}
   \]

   **Example**
   
   A 1/3" CCD camera with an 8 mm lens is used, and the distance to the object is 3 m. The maximum horizontal width as viewed on the monitor can be calculated as follows.

   \[
   Y = 4.8 \times \frac{3000}{8} = 1800 \rightarrow \text{Horizontal width 1.8 m}
   \]

2. **How to calculate focal length**

   If the distance to the object is finite, you can use the following formula to calculate the focal length.

   \[
   f = Y' \cdot \frac{L}{Y}
   \]

   **Example**
   
   A 1/3" CCD camera is used, and the distance to the object is 3 m and the horizontal width of the object is 2 m. The focal length to capture the complete object size can be calculated as follows.

   \[
   f = 4.8 \times \frac{3000}{2000} = 7.2 \rightarrow \text{Focal length approx. 7 mm}
   \]

### Depth of Field

- When focusing on a certain area in front of and behind the deep object appears in focus. This area is called the depth of field. This is because the focus appears sharp if the focus misalignment is under a certain volume. This certain volume is called the permissible circle of confusion.

The depth of field has following properties.

1. The larger the F No. is, the wider the depth of field becomes.
2. The shorter the focal length is, the wider the depth of field becomes.
3. The longer the distance to the object is, the wider the depth of field becomes.
4. The backward depth of field is wider than the forward depth of field.

<table>
<thead>
<tr>
<th>Image sensor</th>
<th>Permissible circle of confusion</th>
</tr>
</thead>
<tbody>
<tr>
<td>1&quot;</td>
<td>0.03 mm</td>
</tr>
<tr>
<td>2/3&quot;</td>
<td>0.021 mm</td>
</tr>
<tr>
<td>1/2&quot;</td>
<td>0.015 mm</td>
</tr>
<tr>
<td>1/3&quot;</td>
<td>0.011 mm</td>
</tr>
<tr>
<td>1/4&quot;</td>
<td>0.008 mm</td>
</tr>
</tbody>
</table>

**The depth of field can be calculated by the following formula.**

- Backward depth of field \( T_r = \frac{\delta \cdot F \cdot L^2}{f^2 - \delta \cdot F \cdot L} \)
- Forward depth of field \( T_f = \frac{\delta \cdot F \cdot L^2}{f^2 + \delta \cdot F \cdot L} \)
- Depth of field \( = T_r + T_f \)
- Focal depth \( = 2\delta \cdot F \)
Distortion

- Distortion is an aberration where the geometric figure of the object is not reproduced faithfully at the image plane. It is normally represented by the level shift of an image point from its ideal position by a percentage of image height or width.

MTF (Modulation Transfer Function)

- MTF (Modulation Transfer Function) represents the declining contrast rate when shooting a chart consisted of black and white lines.

HD Lens

- Based on design techniques accumulated through our experience in production of broadcast lenses, high resolution, small and light-weight HD lenses with minimal aberrations have been realized.

The chart at the right shows the difference between an HD lens and a conventional CCTV lens. As the number of TV lines increases, the disparity in MTF becomes greater.

Three-CCD lenses

- Three-CCD cameras have thicker glass between the lens and the CCDs than that of single CCD cameras because they use three CCDs to correspond with the red, blue and green colors separated by a prism. Fujifilm’s three-CCD lenses are designed to optimally match three-CCD cameras. The chart shown at the right explains the difference in MTF when a three-CCD lens or a single CCD lens is mounted on a three-CCD camera.

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 (visible to near-infrared 400-1000 nm) on the same plane to prevent the focus to become blurry enabling sharp images.

<table>
<thead>
<tr>
<th>A standard lens (for visible light)</th>
<th>A day &amp; night lens</th>
</tr>
</thead>
<tbody>
<tr>
<td>is mounted on a day &amp; night camera, and used under near-infrared light.</td>
<td>is mounted on a day &amp; night camera, and used under near-infrared light.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Visible light focusing plane</th>
<th>Near-infrared light focusing plane</th>
</tr>
</thead>
<tbody>
<tr>
<td>Near-infrared light</td>
<td>Visible light</td>
</tr>
</tbody>
</table>

Result: Blurry image

Result: Clear image without getting blurry
Authorized Fujifilm Service Agent.

Due to a continuous process of product improvement, design and specifications are subject to change without notice.

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