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**FUJINON**  
**Machine Vision Lenses**

Authorized Fujifilm Service Agent.



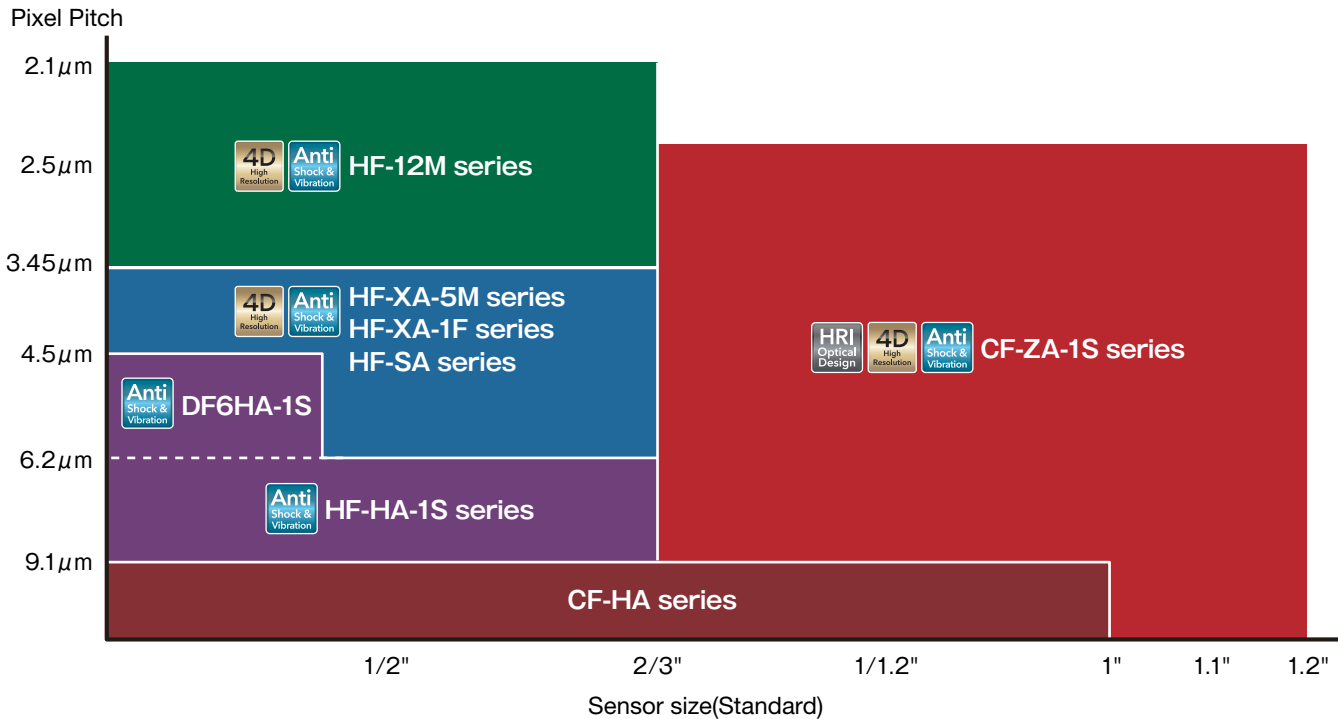
Be certain to read the instructions for use before using any equipment.

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

FFBX2022.02-K



# Product Line-up



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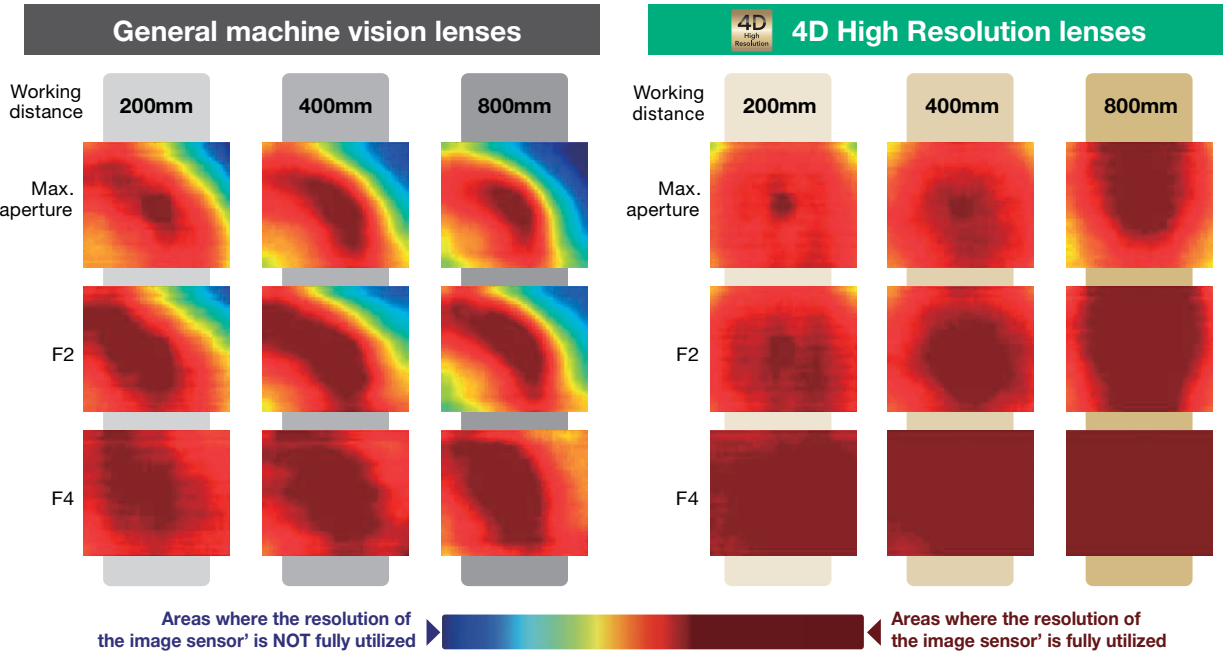
Please refer to the details on page 3 and 4.

4D High Resolution(P3)
 Anti-Shock and Vibration(P3)
 High Relative Illumination(P4)

# Technologies supporting FUJINON lenses

## 4D High Resolution performance

The “4D High Resolution” is the FUJINON lenses' unique performance. It maintains a high level of consistent image sharpness at the center as well as around the edges while mitigating resolution degradation that typically occurs when changing a working distance or aperture value. This enables the stable delivery of high-resolution images under a wide variety of installation and shooting conditions.



## Anti Shock & Vibration

### Anti-Shock : suppresses the optical axis shifts to less than 10μm.

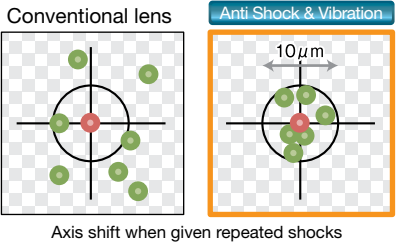
In the case of ordinary machine vision lenses, the optical axis shifts occur when the lens elements move from their initial position due to shocks. This affects the precise measurement performance of the lens. FUJINON's original\*1 Anti-Shock design suppresses the optical axis shifts to less than 10μm even when given shocks up to 10G\*2.

### Anti-Vibration : maintains high resolution

The ordinary machine vision lenses have problems of toughness under working environments with vibration. FUJINON Anti-Vibration lenses have passed severe vibration tests conforming to IEC60068-2-6 and maintain superb resolution.

### Restrain aged deterioration

The unique mechanical design minimizes the use of adhesives to withstand aged deterioration caused by humidity and heat.



\*1: Patent applied for  
\*2: Maximum impact tolerance varies by model

## Thorough quality control on individual units

Individual lens units are tested for their optical performance at the factory. Serial No information on the lens is an evidence of the complete quality management. (CF-ZA-1S series, HF-12M series and HF-XA-5M series)



CF-ZA-1S series, 1.1"-4/3"\*1, 2.74μm, 24MP

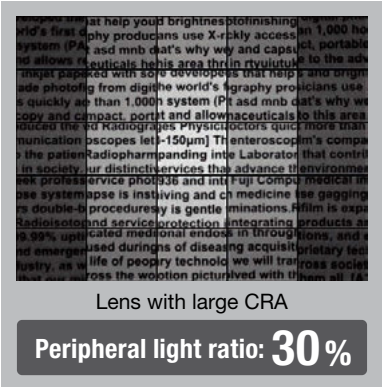
HRI  
Optical  
Design

High Relative Illumination

4D  
High  
Resolution

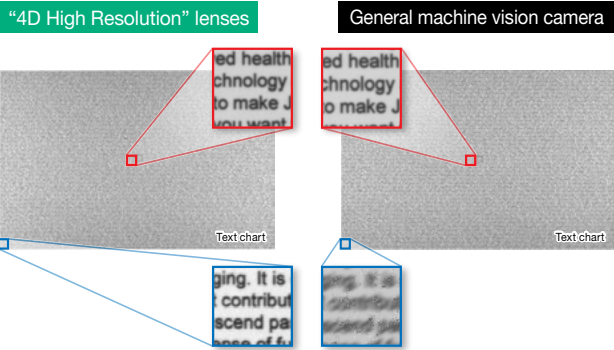
Anti  
Shock &  
Vibration

- The advancement of image sensors for Machine Vision tends to larger sensors and smaller pixels. These sensors require a strong light transmission and a small Chief Ray Angle (CRA) so that the sufficient light reaches vertically on the photodiodes of each pixel. CF-ZA-1S series adopts rear lens groups with a large diameter enabled by FUJINON's high-precision assembly technology and achieves a CRA below 5°. This guarantees a high relative illumination across the entire image without vignetting.
- This series eliminates the need for luminance correction with image processing that just amplifies the noise.



4D High Resolution performance

- Thanks to the 4D High Resolution Design, the resolving power remains consistently high from the center of the image to the edges, even at changing working distances or aperture settings.
- The CF-ZA-1S series draws out the full capability of cameras equipped with a 1.1" sensor with 3.45 μm pixel pitch (equivalent to 12 MP) across the entire frame. These lenses are the perfect choice especially for IMX253 (1.1" type sensor) and IMX225 (1" type sensor).
- The series supports next generation sensors with 1.2" optical format and 2.74μm pixel pitch (equivalent to 24 MP).



Compact size of only 39mm outer diameter

- Despite the support of sensors with large 1.2" format, all models of the CF-ZA-1S series offer a uniform diameter of only 39mm and are therefore no larger than standard machine vision cameras. Only the 8mm focal length CF8ZA-1S is slightly larger with a diameter of 54mm in the front lens.



Anti-Vibration and Shock Design

- This series maintains an advanced level of resolution before and after tough vibration tests, conducted according to JIS C 60068-2-6\*2. Even in applications that involve shocks, such as robot vision and 3D scanners, the optical axis shift remains less than 10μm for shocks of up to 10G\*3.
- The Fujifilm original mechanical design\*4 minimizes the use of adhesive to avoid aged deterioration caused by humidity and heat.

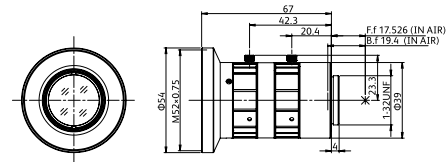
High usability and reliability

- These lenses come with knurled screws for fixing the iris and focus position. The screws can't fall out accidentally, get lost or damage sensitive manufacturing machines during installation or maintenance.

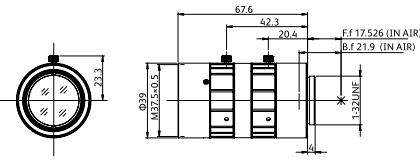


|                         | CF8ZA-1S                    | CF12ZA-1S                   | CF16ZA-1S                   | CF25ZA-1S                   | CF35ZA-1S                   | CF50ZA-1S                   |
|-------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|
| Focal length [mm]       | 8                           | 12                          | 16                          | 25                          | 35                          | 50                          |
| Iris range [F. no]      | F1.8-F16                    | F1.8-F16                    | F1.8-F16                    | F1.8-F16                    | F1.8-F16                    | F2.4-F16                    |
| Angle of view           | 85.7°×67.5°                 | 62.5°×47.8°                 | 47.3°×36.1°                 | 32.9°×24.8°                 | 23.0°×17.3°                 | 16.6°×12.5°                 |
| Working Distance*1 [mm] | ∞-100                       | ∞-100                       | ∞-100                       | ∞-100                       | ∞-200                       | ∞-200                       |
| Operation of focus      | Manual                      | Manual                      | Manual                      | Manual                      | Manual                      | Manual                      |
| Operation of iris       | Manual                      | Manual                      | Manual                      | Manual                      | Manual                      | Manual                      |
| Filter thread [mm]      | M52×0.75                    | M37.5×0.5                   | M37.5×0.5                   | M37.5×0.5                   | M37.5×0.5                   | M37.5×0.5                   |
| Mount                   | C-mount                     | C-mount                     | C-mount                     | C-mount                     | C-mount                     | C-mount                     |
| Weight (approx.) [g]    | 180                         | 180                         | 180                         | 170                         | 165                         | 155                         |
| Sensor size (std.)*2    | 1.1"(2.5μm)<br>1.2"(2.74μm) | 1.1"(2.5μm)<br>1.2"(2.74μm) | 1.1"(2.5μm)<br>1.2"(2.74μm) | 1.1"(2.5μm)<br>1.2"(2.74μm) | 1.1"(2.5μm)<br>1.2"(2.74μm) | 1.1"(2.5μm)<br>1.2"(2.74μm) |
| Sensor size (max.)*3    | -                           | -                           | -                           | 4/3"(3.45μm)                | 4/3"(3.45μm)                | 4/3"(3.45μm)                |
| CRA (Chief Ray Angle)   | 4.5                         | 4.5                         | 4.9                         | 2.7                         | 4.5                         | 4.8                         |
| TV distortion [%]       | -4.81                       | -2.82                       | -0.80                       | -0.83                       | -0.32                       | -0.17                       |
| Dimension [mm]          | ø54×67                      | ø39×67.6                    | ø39×67.6                    | ø39×67.3                    | ø39×67.3                    | ø39×68                      |

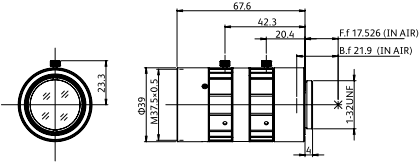
CF8ZA-1S



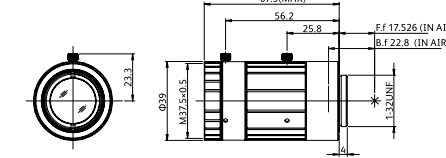
CF12ZA-1S



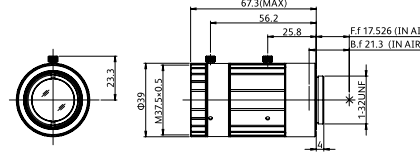
CF16ZA-1S



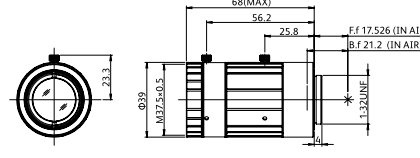
CF25ZA-1S



CF35ZA-1S



CF50ZA-1S



\*1 Sensor size(max.): Adaptable sensor size varies depending on the model. Please check the amount of light and resolution on the edges pertaining to your particular application. \*2 Compliance with JIS C 60068-2-6: Vibration frequency 10-60Hz (amplitude 0.75mm) vibration frequency 60-500Hz (acceleration 100m/S2) and 50 sweep cycles. \*3 Supported shock G value varies from model to model. \*4 FUJIFILM's patent-pending proprietary technology.

\*1 From front of lens barrel. \*2 Sensor size(std.): Ideal size to maximize the target resolution. \*3 Sensor size(max.): Adaptable sensor size varies depending on the model. Please check the amount of light and resolution on the edges pertaining to your particular application.

# HF-12M series, 2/3"-1" \*3, 2.1μm, 12MP

Maximum sensor size: 8mm/12mm=2/3", 16mm/25mm=1/1.2", 35mm=1"

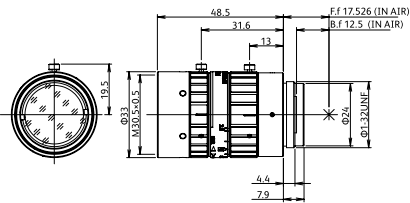


- Low distortion
- Compact design

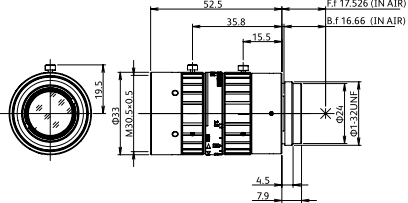


|                         | Anti Shock & Vibration<br>HF818-12M | Anti Shock & Vibration<br>HF1218-12M | Anti Shock & Vibration<br>HF1618-12M | Anti Shock & Vibration<br>HF2518-12M | Anti Shock & Vibration<br>HF3520-12M |
|-------------------------|-------------------------------------|--------------------------------------|--------------------------------------|--------------------------------------|--------------------------------------|
| Focal length [mm]       | 8                                   | 12                                   | 16                                   | 25                                   | 35                                   |
| Iris range [F. no]      | F1.8-F22                            | F1.8-F22                             | F1.8-F22                             | F1.8-F22                             | F2.0-F22                             |
| Angle of view : 2/3"    | 56.9°×43.9°                         | 39.3°×30.0°                          | 30.8°×23.3°                          | 20.0°×15.1°                          | 14.7°×11.0°                          |
| Working Distance*1 [mm] | ∞-100                               | ∞-100                                | ∞-100                                | ∞-100                                | ∞-200                                |
| Operation of focus      | Manual                              | Manual                               | Manual                               | Manual                               | Manual                               |
| Operation of iris       | Manual                              | Manual                               | Manual                               | Manual                               | Manual                               |
| Filter thread [mm]      | M30.5×0.5                           | M30.5×0.5                            | M30.5×0.5                            | M30.5×0.5                            | M30.5×0.5                            |
| Mount                   | C-mount                             | C-mount                              | C-mount                              | C-mount                              | C-mount                              |
| Weight (approx.) [g]    | 95                                  | 85                                   | 90                                   | 85                                   | 85                                   |
| Sensor size (std.)*2    | 2/3"(2.1μm)                         | 2/3"(2.1μm)                          | 2/3"(2.1μm)                          | 2/3"(2.1μm)                          | 2/3"(2.1μm)                          |
| Sensor size (max.)*3    | 2/3"(2.1μm)                         | 1/1.2"(4.5μm)                        | 1/1.2"(4.5μm)                        | 1/1.2"(4.5μm)                        | 1"(4.5μm)                            |
| TV distortion [%]       | -1.03                               | 0.18                                 | -0.03                                | 0.02                                 | 0.01                                 |
| Dimension [mm]          | ø33×48.5                            | ø33×52.5                             | ø33×52.5                             | ø33×53.1                             | ø33×53.1                             |

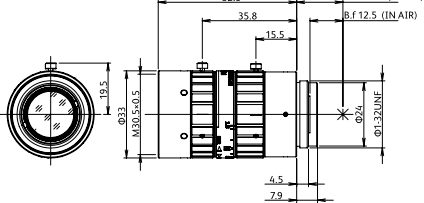
HF818-12M



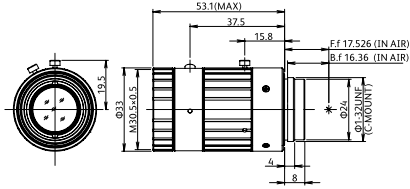
HF1218-12M



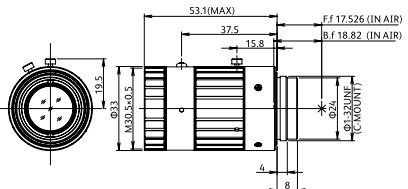
HF1618-12M



HF2518-12M



HF3520-12M



\*1 From front of lens barrel. \*2 Sensor size(std.): Ideal size to maximize the target resolution.  
\*3 Sensor size(max.): Adaptable sensor size varies depending on the model. Please check the amount of light and resolution on the edges pertaining to your particular application.

# HF-XA-5M series, 2/3"-1.1" \*3, 3.45μm, 5MP

Maximum sensor size: 6mm/8mm=2/3", 12mm/16mm/25mm/35mm=1/1.2", 50mm=1"

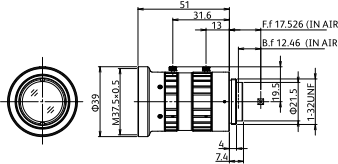


- Compact design

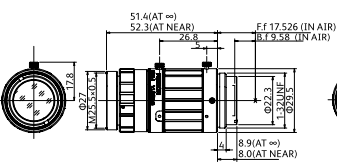


|                         | Anti Shock & Vibration<br>HF6XA-5M | HF8XA-5M     | HF12XA-5M     | HF16XA-5M     | HF25XA-5M     | HF35XA-5M     | Anti Shock & Vibration<br>HF50XA-5M |
|-------------------------|------------------------------------|--------------|---------------|---------------|---------------|---------------|-------------------------------------|
| Focal length [mm]       | 6                                  | 8            | 12            | 16            | 25            | 35            | 50                                  |
| Iris range [F. no]      | F1.9-F16                           | F1.6-F16     | F1.6-F16      | F1.6-F16      | F1.6-F16      | F1.9-F16      | F2.4-F16                            |
| Angle of view : 2/3"    | 74.7°×58.1°                        | 58.4°×44.6°  | 40.1°×30.3°   | 31.4°×23.7°   | 20.0°×15.0°   | 14.2°×10.7°   | 10.4°×7.8°                          |
| Working Distance*1 [mm] | ∞-100                              | ∞-100        | ∞-100         | ∞-100         | ∞-100         | ∞-200         | ∞-200                               |
| Operation of focus      | Manual                             | Manual       | Manual        | Manual        | Manual        | Manual        | Manual                              |
| Operation of iris       | Manual                             | Manual       | Manual        | Manual        | Manual        | Manual        | Manual                              |
| Filter thread [mm]      | M37.5×0.5                          | M25.5×0.5    | M25.5×0.5     | M25.5×0.5     | M25.5×0.5     | M25.5×0.5     | M30.5×0.5                           |
| Mount                   | C-mount                            | C-mount      | C-mount       | C-mount       | C-mount       | C-mount       | C-mount                             |
| Weight (approx.) [g]    | 100                                | 79           | 79            | 71            | 72            | 60            | 95                                  |
| Sensor size (std.)*2    | 2/3"(3.45μm)                       | 2/3"(3.45μm) | 2/3"(3.45μm)  | 2/3"(3.45μm)  | 2/3"(3.45μm)  | 2/3"(3.45μm)  | 2/3"(3.45μm)                        |
| Sensor size (max.)*3    | 2/3"(3.45μm)                       | 2/3"(3.45μm) | 1/1.2"(4.5μm) | 1/1.2"(4.5μm) | 1/1.2"(4.5μm) | 1/1.2"(4.5μm) | 1.1"(4.5μm)                         |
| TV distortion [%]       | -2.88                              | -1.99        | -1.26         | -0.60         | -0.07         | 0.10          | 0.01                                |
| Dimension [mm]          | ø39×51                             | ø29.5×51.5   | ø29.5×51.5    | ø29.5×46      | ø29.5×46.5    | ø29.5×41.5    | ø33×66.5                            |

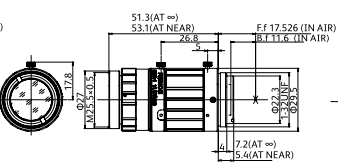
HF6XA-5M



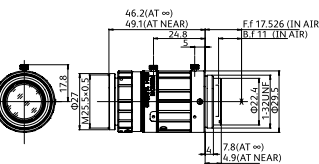
HF8XA-5M



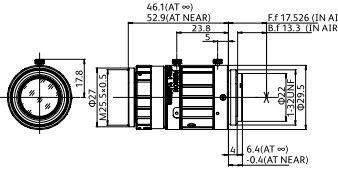
HF12XA-5M



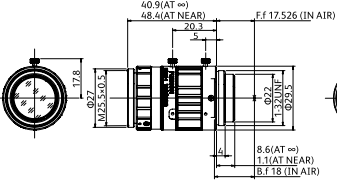
HF16XA-5M



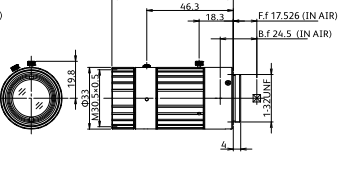
HF25XA-5M



HF35XA-5M



HF50XA-5M



\*1 From front of lens barrel. \*2 Sensor size(std.): Ideal size to maximize the target resolution.  
\*3 Sensor size(max.): Adaptable sensor size varies depending on the model. Please check the amount of light and resolution on the edges pertaining to your particular application.

HF-XA-1F series, 2/3"-1/1.2", 3.45μm, 5MP

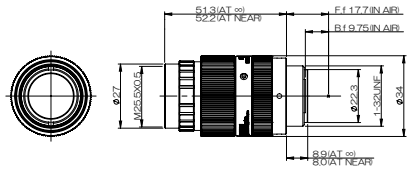


- Compact design

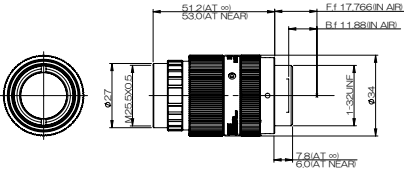


|                                         | Anti Shock & Vibration<br>HF8XA-1F | Anti Shock & Vibration<br>HF12XA-1F | Anti Shock & Vibration<br>HF16XA-1F | Anti Shock & Vibration<br>HF25XA-1F | Anti Shock & Vibration<br>HF35XA-1F |
|-----------------------------------------|------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|
| Focal length [mm]                       | 8                                  | 12                                  | 16                                  | 25                                  | 35                                  |
| Iris range [F. no]                      | F1.6, F4, F8 (Selection)           | F1.6, F4, F8 (Selection)            | F1.6, F4, F8 (Selection)            | F1.6, F4.6, F9.2 (Selection)        | F1.9, F5.2, F10.4 (Selection)       |
| Angle of view : 2/3"                    | 58.4°×44.6°                        | 40.1°×30.3°                         | 31.4°×23.7°                         | 20.0°×15.0°                         | 14.2°×10.7°                         |
| Working Distance*1 [mm]                 | ∞-100                              | ∞-100                               | ∞-100                               | ∞-150                               | ∞-300                               |
| Operation of focus                      | Fixed                              | Fixed                               | Fixed                               | Fixed                               | Fixed                               |
| Operation of iris                       | Fixed                              | Fixed                               | Fixed                               | Fixed                               | Fixed                               |
| Filter thread [mm]                      | M25.5 x 0.5                        | M25.5 x 0.5                         | M25.5 x 0.5                         | M25.5 x 0.5                         | M25.5 x 0.5                         |
| Mount                                   | C-mount                            | C-mount                             | C-mount                             | C-mount                             | C-mount                             |
| Weight (approx.) [g]                    | 97                                 | 99                                  | 94                                  | 87                                  | 75                                  |
| Sensor size (std.)*2                    | 2/3"(3.45μm)                       | 2/3"(3.45μm)                        | 2/3"(3.45μm)                        | 2/3"(3.45μm)                        | 2/3"(3.45μm)                        |
| Sensor size (max.)*3                    | 2/3"(3.45μm)                       | 1/1.2"(4.5μm)                       | 1/1.2"(4.5μm)                       | 1/1.2"(4.5μm)                       | 1/1.2"(4.5μm)                       |
| TV distortion [%]                       | -1.99                              | -1.26                               | -0.60                               | -0.07                               | 0.10                                |
| Dimension [mm]                          | ø34×60.2                           | ø34×58.7                            | ø34×54.0                            | ø34×55.4                            | ø34×50.3                            |
| Required maximum screw-in length*4 [mm] | 8.9                                | 7.8                                 | 7.8                                 | 9.2                                 | 9.2                                 |

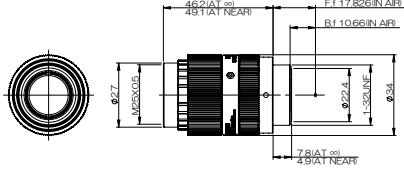
HF8XA-1F



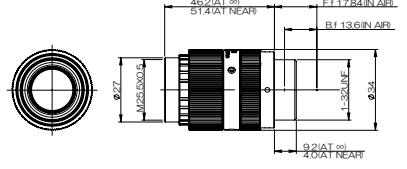
HF12XA-1F



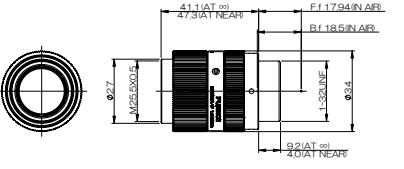
HF16XA-1F



HF25XA-1F



HF35XA-1F



HF-HA-1S series, 1/2"-2/3", 6.2μm, 1.5MP



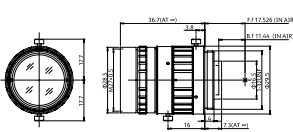
- Wide range of focal lengths with 8 models
- Compact design with an external diameter of 29.5mm\*
- Large maximum aperture
- Short Minimum Object Distance

\* HF75HA-1S has a diameter of 31.5mm

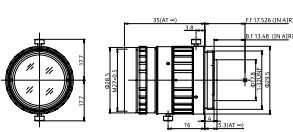


|                         | Anti Shock & Vibration<br>DF6HA-1S | Anti Shock & Vibration<br>HF9HA-1S | Anti Shock & Vibration<br>HF12.5HA-1S | Anti Shock & Vibration<br>HF16HA-1S | Anti Shock & Vibration<br>HF25HA-1S | Anti Shock & Vibration<br>HF35HA-1S | Anti Shock & Vibration<br>HF50HA-1S | Anti Shock & Vibration<br>HF75HA-1S |
|-------------------------|------------------------------------|------------------------------------|---------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|
| Focal length [mm]       | 6                                  | 9                                  | 12.5                                  | 16                                  | 25                                  | 35                                  | 50                                  | 75                                  |
| Iris range [F. no]      | F1.2-F16                           | F1.4-F16                           | F1.4-F16                              | F1.4-F16                            | F1.4-F16                            | F1.6-F22                            | F2.3-F22                            | F2.8-F22                            |
| Angle of view           | 57.3°×43.8°(1/2")                  | 53.3°×40.5°(2/3")                  | 39.2°×29.4°(2/3")                     | 30.5°×22.9°(2/3")                   | 19.4°×14.6°(2/3")                   | 14.3°×10.8°(2/3")                   | 10.1°×7.6°(2/3")                    | 6.7°×5.0°(2/3")                     |
| Working Distance*1 [mm] | ∞-10                               | ∞-40                               | ∞-20                                  | ∞-40                                | ∞-120                               | ∞-230                               | ∞-500                               | ∞-1,100                             |
| Operation of focus      | Manual                             | Manual                             | Manual                                | Manual                              | Manual                              | Manual                              | Manual                              | Manual                              |
| Operation of iris       | Manual                             | Manual                             | Manual                                | Manual                              | Manual                              | Manual                              | Manual                              | Manual                              |
| Filter thread [mm]      | M27×0.5                            | M27×0.5                            | M25.5×0.5                             | M25.5×0.5                           | M25.5×0.5                           | M25.5×0.5                           | M25.5×0.5                           | M30.5×0.5                           |
| Mount                   | C-mount                            | C-mount                            | C-mount                               | C-mount                             | C-mount                             | C-mount                             | C-mount                             | C-mount                             |
| Weight (approx.) [g]    | 50                                 | 50                                 | 40                                    | 40                                  | 40                                  | 40                                  | 40                                  | 50                                  |
| Sensor size (std.)*2    | 1/2"(4.5μm)                        | 2/3"(6.2μm)                        | 2/3"(6.2μm)                           | 2/3"(6.2μm)                         | 2/3"(6.2μm)                         | 2/3"(6.2μm)                         | 2/3"(6.2μm)                         | 2/3"(6.2μm)                         |
| Sensor size (max.)*3    | 1/2"(4.5μm)                        | 2/3"(6.2μm)                        | 2/3"(6.2μm)                           | 2/3"(6.2μm)                         | 2/3"(6.2μm)                         | 2/3"(6.2μm)                         | 2/3"(6.2μm)                         | 2/3"(6.2μm)                         |
| TV distortion [%]       | -1.84                              | -2.00                              | -1.95                                 | -0.87                               | -0.19                               | 0.10                                | 0.06                                | 0.36                                |
| Dimension [mm]          | ø29.5×36.7                         | ø29.5×35                           | ø29.5×29.5                            | ø29.5×29.5                          | ø29.5×29.5                          | ø29.5×29.5                          | ø29.5×29.5                          | ø31.5×48                            |

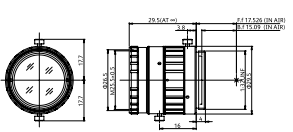
DF6HA-1S



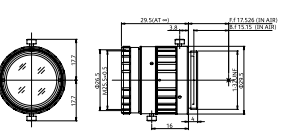
HF9HA-1S



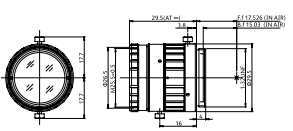
HF12.5HA-1S



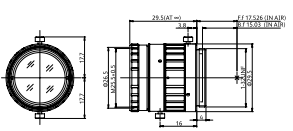
HF16HA-1S



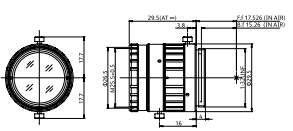
HF25HA-1S



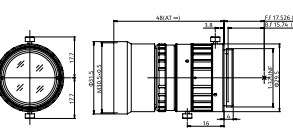
HF35HA-1S



HF50HA-1S



HF75HA-1S



\*1 From front of lens barrel. \*2 Sensor size(std.): Ideal size to maximize the target resolution.  
\*3 Sensor size(max.): Adaptable sensor size varies depending on the model. Please check the amount of light and resolution on the edges pertaining to your particular application.  
\*4 This is the maximum screw-in length required when the object distance is used with INF. Be sure to check this lens can be attached to your camera before purchase.

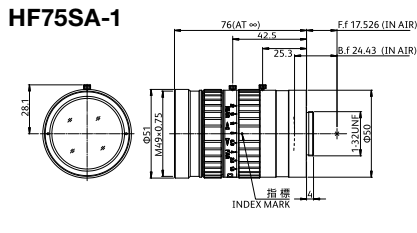
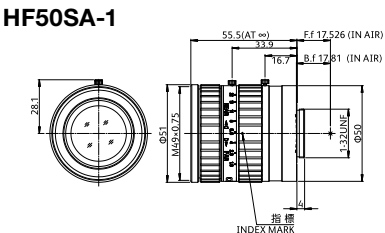
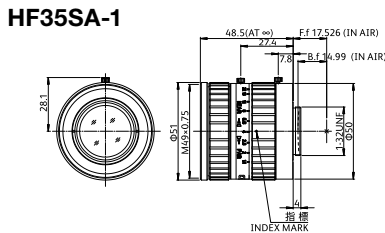
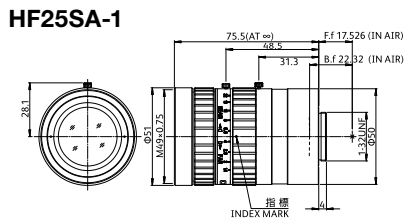
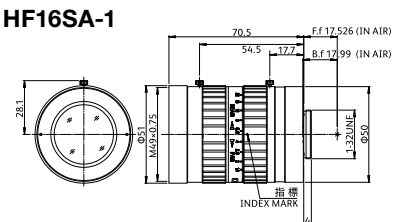
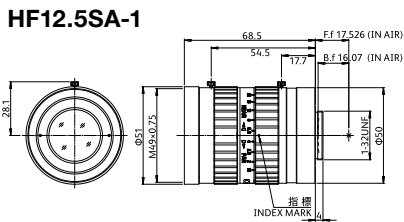
\*1 From front of lens barrel. \*2 Sensor size(std.): Ideal size to maximize the target resolution.  
\*3 Sensor size(max.): Adaptable sensor size varies depending on the model. Please check the amount of light and resolution on the edges pertaining to your particular application.

HF-SA series, 2/3", 3.45μm, 5MP

- Low distortion
- Large maximum aperture



|                         | HF12.5SA-1   | HF16SA-1     | HF25SA-1     | HF35SA-1     | HF50SA-1     | HF75SA-1     |
|-------------------------|--------------|--------------|--------------|--------------|--------------|--------------|
| Focal length [mm]       | 12.5         | 16           | 25           | 35           | 50           | 75           |
| Iris range [F. no]      | F1.4-F22     | F1.4-F22     | F1.4-F22     | F1.4-F22     | F1.8-F22     | F1.8-F22     |
| Angle of view : 2/3"    | 38.0°×29.0°  | 30.2°×22.9°  | 20.8°×15.7°  | 14.0°×10.5°  | 9.7°×7.3°    | 6.7°×5.0°    |
| Working Distance*1 [mm] | ∞-100        | ∞-100        | ∞-100        | ∞-200        | ∞-400        | ∞-900        |
| Operation of focus      | Manual       | Manual       | Manual       | Manual       | Manual       | Manual       |
| Operation of iris       | Manual       | Manual       | Manual       | Manual       | Manual       | Manual       |
| Filter thread [mm]      | M49×0.75     | M49×0.75     | M49×0.75     | M49×0.75     | M49×0.75     | M49×0.75     |
| Mount                   | C-mount      | C-mount      | C-mount      | C-mount      | C-mount      | C-mount      |
| Weight (approx.) [g]    | 295          | 285          | 315          | 185          | 240          | 305          |
| Sensor size (std.)*2    | 2/3"(3.45μm) | 2/3"(3.45μm) | 2/3"(3.45μm) | 2/3"(3.45μm) | 2/3"(3.45μm) | 2/3"(3.45μm) |
| Sensor size (max.)*3    | 2/3"(3.45μm) | 2/3"(3.45μm) | 2/3"(3.45μm) | 2/3"(3.45μm) | 2/3"(3.45μm) | 2/3"(3.45μm) |
| TV distortion [%]       | -0.08        | 0.11         | -0.06        | 0.07         | 0.08         | 0.01         |
| Dimension [mm]          | ø51×68.5     | ø51×70.5     | ø51×75.5     | ø51×48.5     | ø51×55.5     | ø51×76       |



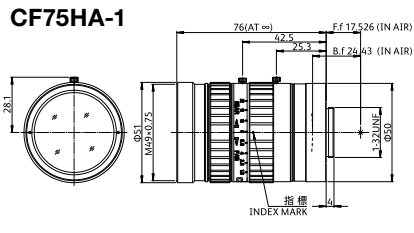
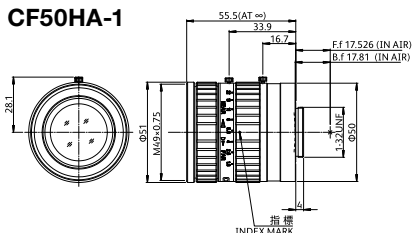
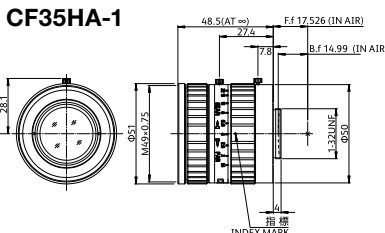
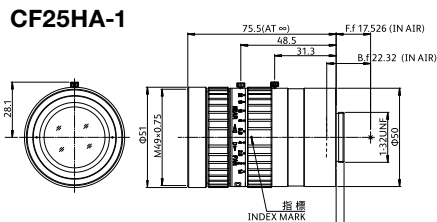
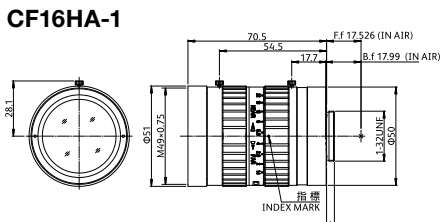
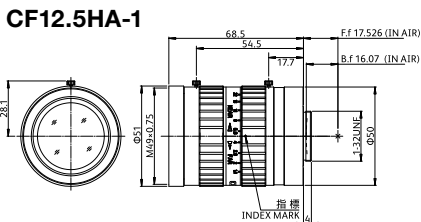
\*1 From front of lens barrel. \*2 Sensor size(std.): Ideal size to maximize the target resolution.  
\*3 Sensor size(max.): Adaptable sensor size varies depending on the model. Please check the amount of light and resolution on the edges pertaining to your particular application.

CF-HA series, 1", 9.1μm, 1.5MP

- Low distortion
- Large maximum aperture



|                         | CF12.5HA-1  | CF16HA-1    | CF25HA-1    | CF35HA-1    | CF50HA-1    | CF75HA-1  |
|-------------------------|-------------|-------------|-------------|-------------|-------------|-----------|
| Focal length [mm]       | 12.5        | 16          | 25          | 35          | 50          | 75        |
| Iris range [F. no]      | F1.4-F22    | F1.4-F22    | F1.4-F22    | F1.4-F22    | F1.8-F22    | F1.8-F22  |
| Angle of view : 1"      | 53.1°×41.2° | 42.6°×32.8° | 29.9°×22.7° | 20.3°×15.3° | 14.1°×10.6° | 9.8°×7.3° |
| Working Distance*1 [mm] | ∞-100       | ∞-100       | ∞-100       | ∞-200       | ∞-400       | ∞-900     |
| Operation of focus      | Manual      | Manual      | Manual      | Manual      | Manual      | Manual    |
| Operation of iris       | Manual      | Manual      | Manual      | Manual      | Manual      | Manual    |
| Filter thread [mm]      | M49×0.75    | M49×0.75    | M49×0.75    | M49×0.75    | M49×0.75    | M49×0.75  |
| Mount                   | C-mount     | C-mount     | C-mount     | C-mount     | C-mount     | C-mount   |
| Weight (approx.) [g]    | 290         | 280         | 310         | 180         | 235         | 300       |
| Sensor size (std.)*2    | 1"(9.1μm)   | 1"(9.1μm)   | 1"(9.1μm)   | 1"(9.1μm)   | 1"(9.1μm)   | 1"(9.1μm) |
| Sensor size (max.)*3    | 1"(9.1μm)   | 1"(9.1μm)   | 1"(9.1μm)   | 1"(9.1μm)   | 1"(9.1μm)   | 1"(9.1μm) |
| TV distortion [%]       | 0.86        | 0.79        | 0.36        | 0.18        | 0.20        | 0.01      |
| Dimension [mm]          | ø51×68.5    | ø51×70.5    | ø51×75.5    | ø51×48.5    | ø51×55.5    | ø51×76    |



\*1 From front of lens barrel. \*2 Sensor size(std.): Ideal size to maximize the target resolution.  
\*3 Sensor size(max.): Adaptable sensor size varies depending on the model. Please check the amount of light and resolution on the edges pertaining to your particular application.

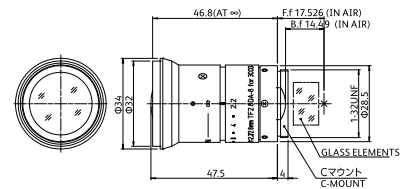
TF series 3CCD, 1/3"

- Ultra-compact, lightweight and robust design
- Supporting 2 MP sensor (TF4XA-1)

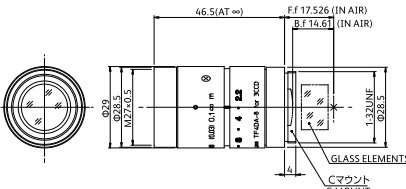


|                         | TF2.8DA-8      | TF4DA-8        | TF4XA-1 2MP                             | TF8DA-8B       | TF15DA-8       |
|-------------------------|----------------|----------------|-----------------------------------------|----------------|----------------|
| Focal length [mm]       | 2.8            | 4              | 4                                       | 8              | 15             |
| Iris range [F. no]      | F2.2-F16·Close | F2.2-F16·Close | F2.2-F16·Close                          | F2.2-F16·Close | F2.2-F16·Close |
| Angle of view : 1/3"    | 89.1°×69.3°    | 64.5°×49.0°    | 64.5°×49.1°                             | 33.4°×25.1°    | 18.0°×13.5°    |
| Working Distance*1 [mm] | ∞-100          | ∞-100          | ∞-100                                   | ∞-100          | ∞-100          |
| Operation of focus      | Manual         | Manual         | Manual                                  | Manual         | Manual         |
| Operation of iris       | Manual         | Manual         | Manual                                  | Manual         | Manual         |
| Filter thread [mm]      | -              | M27×0.5        | M27×0.5 (INSIDE)<br>M30.5×0.5 (OUTSIDE) | M25.5×0.5      | M25.5×0.5      |
| Mount                   | C-mount        | C-mount        | C-mount                                 | C-mount        | C-mount        |
| Weight (approx.) [g]    | 75             | 70             | 100                                     | 60             | 60             |
| Sensor size (std.)*2    | 1/3"(6.7μm)    | 1/3"(6.7μm)    | 1/3"(6.7μm)                             | 1/3"(6.7μm)    | 1/3"(6.7μm)    |
| Sensor size (max.)*3    | 1/3"(6.7μm)    | 1/3"(6.7μm)    | 1/3"(6.7μm)                             | 1/3"(6.7μm)    | 1/3"(6.7μm)    |
| TV distortion [%]       | -6.25          | -3.77          | -4.27                                   | -1.30          | -0.31          |
| Dimension [mm]          | ø34×47.5       | ø29×46.5       | ø30.5×44                                | ø29×39         | ø29×39         |

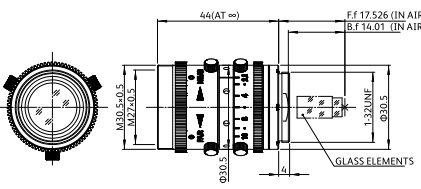
TF2.8DA-8



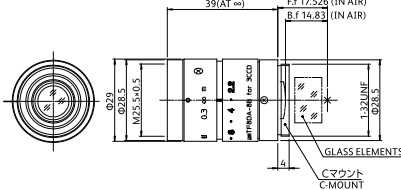
TF4DA-8



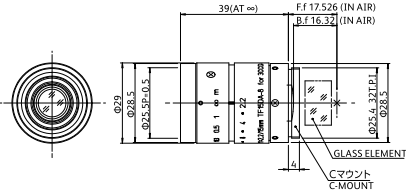
TF4XA-1 2MP



TF8DA-8B



TF15DA-8



\*1 From front of lens barrel. \*2 Sensor size(std.): Ideal size to maximize the target resolution.  
\*3 Sensor size(max.): Adaptable sensor size varies depending on the model. Please check the amount of light and resolution on the edges pertaining to your particular application.

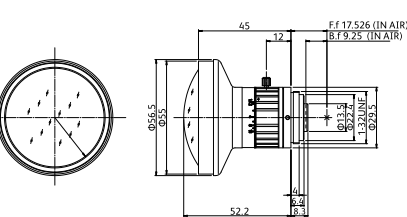
FE185 series Fisheye lens

- Super wide-angle with a 185° field of view
- 2 models for 1" and 2/3"
- Supporting 5 MP sensor

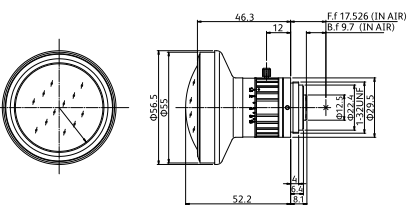


|                         | FE185C086HA-1         | FE185C057HA-1         |
|-------------------------|-----------------------|-----------------------|
| Focal length [mm]       | 2.7                   | 1.8                   |
| Iris range [F. no]      | F1.8-F16              | F1.4-F16              |
| Angle of view : 1"      | 185.0°×185.0°(ø8.6mm) | 185.0°×185.0°(ø5.7mm) |
| Angle of view : 2/3"    | 185.0°×140.6°         | 185.0°×154.1°         |
| Angle of view : 1/2"    | 136.3°×102.3°         | 154.1°×115.4°         |
| Working Distance*1 [mm] | ∞-200                 | ∞-100                 |
| Operation of focus      | Fixed                 | Fixed                 |
| Operation of iris       | Manual                | Manual                |
| Mount                   | C-mount               | C-mount               |
| Weight (approx.) [g]    | 160                   | 135                   |
| Sensor size (std.)*2    | -                     | -                     |
| Sensor size (max.)*3    | 1"(5μm)               | 2/3"(3.45μm)          |
| Dimension [mm]          | ø56.5×60.5            | ø56.5×60.3            |

FE185C086HA-1

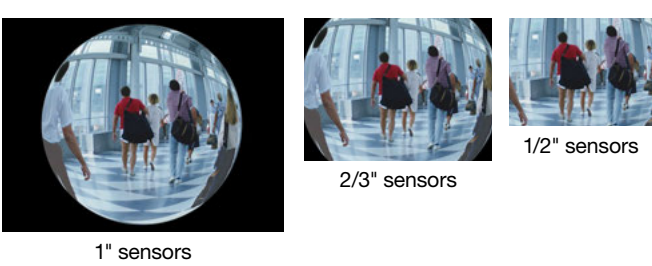


FE185C057HA-1

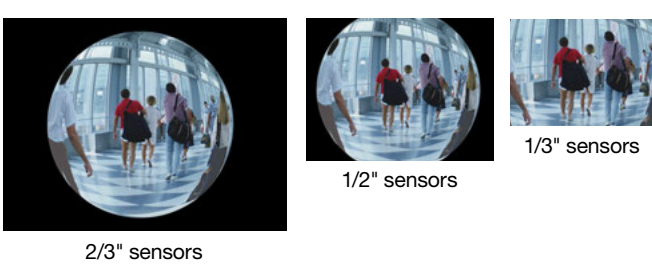


Simulation images

FE185C086HA-1



FE185C057HA-1



\*1 From front of lens. \*2 Sensor size(std.): Ideal size to maximize the target resolution.  
\*3 Sensor size(max.): Adaptable sensor size varies depending on the model. Please check the amount of light and resolution on the edges pertaining to your particular application.

# FUJINON Lens Shooting Range Chart

## ■ CF-ZA-1S series

### CF8ZA-1S

| Working Distance<br>[mm] | Optical Magnification | Extension Tube<br>[mm] | Field of View [mm] |        |        |        |        |        |        |       |
|--------------------------|-----------------------|------------------------|--------------------|--------|--------|--------|--------|--------|--------|-------|
|                          |                       |                        | 1.2°               |        | 1.1°   |        | 1°     |        | 2/3°   |       |
|                          |                       |                        | H                  | V      | H      | V      | H      | V      | H      | V     |
| 1000                     | 0.008x                | -                      | 2106.6             | 1499.9 | 1885.2 | 1355.9 | 1684.7 | 1221.8 | 1112.6 | 822.2 |
| 950                      | 0.009x                | -                      | 2002.9             | 1426   | 1792.4 | 1289.1 | 1601.8 | 1161.6 | 1057.8 | 781.7 |
| 900                      | 0.009x                | -                      | 1899.2             | 1352.2 | 1699.6 | 1222.3 | 1518.8 | 1101.4 | 1003   | 741.2 |
| 850                      | 0.010x                | -                      | 1795.5             | 1278.3 | 1606.8 | 1155.5 | 1435.9 | 1041.2 | 948.2  | 700.7 |
| 800                      | 0.010x                | -                      | 1691.8             | 1204.4 | 1514   | 1088.7 | 1352.9 | 981    | 893.4  | 660.2 |
| 750                      | 0.011x                | -                      | 1588.2             | 1130.6 | 1421.2 | 1021.9 | 1269.9 | 920.9  | 838.6  | 619.7 |
| 700                      | 0.012x                | -                      | 1484.5             | 1056.7 | 1328.4 | 955.2  | 1187   | 860.7  | 783.7  | 579.1 |
| 650                      | 0.013x                | -                      | 1380.8             | 982.8  | 1235.6 | 888.4  | 1104   | 800.5  | 728.9  | 538.6 |
| 600                      | 0.014x                | -                      | 1277.1             | 909    | 1142.7 | 821.6  | 1021.1 | 740.3  | 674.1  | 498.1 |
| 550                      | 0.015x                | -                      | 1173.4             | 835.1  | 1049.9 | 754.8  | 938.1  | 680.1  | 619.3  | 457.6 |
| 500                      | 0.016x                | -                      | 1069.7             | 761.2  | 957.1  | 688    | 855.2  | 619.9  | 564.5  | 417.1 |
| 450                      | 0.018x                | -                      | 966                | 687.4  | 864.3  | 621.3  | 772.2  | 559.8  | 509.7  | 376.6 |
| 400                      | 0.020x                | -                      | 862.3              | 613.5  | 771.5  | 554.5  | 689.2  | 499.6  | 454.9  | 336.1 |
| 350                      | 0.023x                | -                      | 758.6              | 539.6  | 678.6  | 487.7  | 606.3  | 439.4  | 400.1  | 295.6 |
| 300                      | 0.026x                | -                      | 654.9              | 465.7  | 585.8  | 420.9  | 523.3  | 379.2  | 345.2  | 255   |
| 250                      | 0.031x                | -                      | 551.2              | 391.8  | 493    | 354.1  | 440.3  | 319    | 290.4  | 214.5 |
| 200                      | 0.039x                | -                      | 447.5              | 318    | 400.2  | 287.3  | 357.3  | 258.8  | 235.6  | 174   |
| 150                      | 0.050x                | -                      | 343.8              | 244.1  | 307.3  | 220.5  | 274.4  | 198.6  | 180.8  | 133.5 |
| 100                      | 0.073x                | -                      | 240                | 170.1  | 214.4  | 153.7  | 191.3  | 138.4  | 125.9  | 92.9  |

### CF12ZA-1S

| Working Distance<br>[mm] | Optical Magnification | Extension Tube<br>[mm] | Field of View [mm] |       |        |       |        |       |       |       |
|--------------------------|-----------------------|------------------------|--------------------|-------|--------|-------|--------|-------|-------|-------|
|                          |                       |                        | 1.2°               |       | 1.1°   |       | 1°     |       | 2/3°  |       |
|                          |                       |                        | H                  | V     | H      | V     | H      | V     | H     | V     |
| 1000                     | 0.012x                | -                      | 1369.9             | 995.1 | 1236.5 | 902.4 | 1112.2 | 815.2 | 743.6 | 551.4 |
| 950                      | 0.013x                | -                      | 1302.7             | 946.2 | 1175.8 | 858.1 | 1057.6 | 775.1 | 707.1 | 524.3 |
| 900                      | 0.013x                | -                      | 1235.5             | 897.4 | 1115.2 | 813.8 | 1003   | 735.1 | 670.6 | 497.2 |
| 850                      | 0.014x                | -                      | 1168.3             | 848.5 | 1054.5 | 769.4 | 948.4  | 695.1 | 634.1 | 470.2 |
| 800                      | 0.015x                | -                      | 1101.1             | 799.7 | 993.8  | 725.1 | 893.8  | 655   | 597.5 | 443.1 |
| 750                      | 0.016x                | -                      | 1033.9             | 750.8 | 933.1  | 680.8 | 839.3  | 615   | 561   | 416   |
| 700                      | 0.017x                | -                      | 966.7              | 702   | 872.5  | 636.5 | 784.7  | 575   | 524.5 | 388.9 |
| 650                      | 0.019x                | -                      | 899.5              | 653.1 | 811.8  | 592.2 | 730.1  | 535   | 488   | 361.8 |
| 600                      | 0.020x                | -                      | 832.3              | 604.3 | 751.1  | 547.9 | 675.5  | 494.9 | 451.5 | 334.7 |
| 550                      | 0.022x                | -                      | 765.1              | 555.4 | 690.4  | 503.6 | 620.9  | 454.9 | 414.9 | 307.6 |
| 500                      | 0.024x                | -                      | 697.9              | 506.6 | 629.7  | 459.3 | 566.3  | 414.9 | 378.4 | 280.6 |
| 450                      | 0.026x                | -                      | 630.7              | 457.7 | 569.1  | 415   | 511.7  | 374.8 | 341.9 | 253.5 |
| 400                      | 0.030x                | -                      | 563.5              | 408.8 | 508.4  | 370.7 | 457.1  | 334.8 | 305.4 | 226.4 |
| 350                      | 0.034x                | -                      | 496.2              | 360   | 447.7  | 326.3 | 402.5  | 294.7 | 268.8 | 199.3 |
| 300                      | 0.039x                | -                      | 429                | 311.1 | 387    | 282   | 347.9  | 254.7 | 232.3 | 172.2 |
| 250                      | 0.046x                | -                      | 361.7              | 262.2 | 326.2  | 237.7 | 293.2  | 214.6 | 195.7 | 145.1 |
| 200                      | 0.057x                | -                      | 294.5              | 213.3 | 265.5  | 193.3 | 238.6  | 174.6 | 159.2 | 118   |
| 150                      | 0.074x                | -                      | 227.1              | 164.4 | 204.7  | 148.9 | 183.9  | 134.5 | 122.6 | 90.8  |
| 100                      | 0.105x                | -                      | 159.7              | 115.3 | 143.8  | 104.5 | 129.1  | 94.3  | 86    | 63.7  |

### CF16ZA-1S

| Working Distance<br>[mm] | Optical Magnification | Extension Tube<br>[mm] | Field of View [mm] |       |       |       |       |       |       |       |
|--------------------------|-----------------------|------------------------|--------------------|-------|-------|-------|-------|-------|-------|-------|
|                          |                       |                        | 1.2°               |       | 1.1°  |       | 1°    |       | 2/3°  |       |
|                          |                       |                        | H                  | V     | H     | V     | H     | V     | H     | V     |
| 1000                     | 0.016x                | -                      | 983.5              | 730.2 | 895.1 | 665.3 | 811   | 603.4 | 552.2 | 412.4 |
| 950                      | 0.017x                | -                      | 935.4              | 694.5 | 851.3 | 632.7 | 771.3 | 573.9 | 525.1 | 392.2 |
| 900                      | 0.018x                | -                      | 887.3              | 658.7 | 807.5 | 600.1 | 731.6 | 544.3 | 498.1 | 372   |
| 850                      | 0.019x                | -                      | 839.2              | 622.9 | 763.7 | 567.5 | 691.9 | 514.8 | 471   | 351.8 |
| 800                      | 0.020x                | -                      | 791.1              | 587.2 | 719.9 | 535   | 652.2 | 485.2 | 444   | 331.6 |
| 750                      | 0.021x                | -                      | 743                | 551.4 | 676.1 | 502.4 | 612.5 | 455.7 | 416.9 | 311.4 |
| 700                      | 0.023x                | -                      | 694.9              | 515.7 | 632.3 | 469.8 | 572.8 | 426.1 | 389.9 | 291.2 |
| 650                      | 0.025x                | -                      | 646.8              | 479.9 | 588.5 | 437.2 | 533.1 | 396.5 | 362.8 | 271   |
| 600                      | 0.026x                | -                      | 598.6              | 444.2 | 544.7 | 404.6 | 493.4 | 367   | 335.8 | 250.7 |
| 550                      | 0.029x                | -                      | 550.5              | 408.4 | 500.9 | 372   | 453.7 | 337.4 | 308.7 | 230.5 |
| 500                      | 0.032x                | -                      | 502.4              | 372.6 | 457   | 339.4 | 414   | 307.8 | 281.7 | 210.3 |
| 450                      | 0.035x                | -                      | 454.2              | 336.9 | 413.2 | 306.8 | 374.2 | 278.3 | 254.6 | 190.1 |
| 400                      | 0.039x                | -                      | 406.1              | 301.1 | 369.4 | 274.2 | 334.5 | 248.7 | 227.5 | 169.9 |
| 350                      | 0.044x                | -                      | 357.9              | 265.3 | 325.5 | 241.6 | 294.8 | 219.1 | 200.5 | 149.6 |
| 300                      | 0.051x                | -                      | 309.7              | 229.5 | 281.7 | 209   | 255   | 189.5 | 173.4 | 129.4 |
| 250                      | 0.061x                | -                      | 261.5              | 193.7 | 237.8 | 176.4 | 215.2 | 159.9 | 146.3 | 109.2 |
| 200                      | 0.075x                | -                      | 213.2              | 157.8 | 193.8 | 143.7 | 175.4 | 130.2 | 119.1 | 88.9  |
| 150                      | 0.097x                | -                      | 164.9              | 121.9 | 149.8 | 110.9 | 135.5 | 100.6 | 92    | 68.6  |
| 100                      | 0.138x                | -                      | 116.3              | 85.8  | 105.6 | 78.1  | 95.4  | 70.7  | 64.7  | 48.2  |

### CF25ZA-1S

| Working Distance<br>[mm] | Optical Magnification | Extension Tube<br>[mm] | Field of View [mm] |       |       |       |       |       |       |       |
|--------------------------|-----------------------|------------------------|--------------------|-------|-------|-------|-------|-------|-------|-------|
|                          |                       |                        | 4/3°               |       | 1.2°  |       | 1.1°  |       | 1°    |       |
|                          |                       |                        | H                  | V     | H     | V     | H     | V     | H     | V     |
| 1000                     | 0.024x                | -                      | 780.1              | 577.8 | 663.1 | 492.7 | 603.5 | 449   | 546.9 | 407.5 |
| 950                      | 0.025x                | -                      | 742                | 549.5 | 630.7 | 468.5 | 574   | 427   | 520.1 | 387.5 |
| 900                      | 0.026x                | -                      | 703.8              | 521.2 | 598.2 | 444.4 | 544.4 | 405   | 493.4 | 367.6 |
| 850                      | 0.028x                | -                      | 665.6              | 492.9 | 565.7 | 420.3 | 514.9 | 383.1 | 466.6 | 347.6 |
| 800                      | 0.030x                | -                      | 627.5              | 464.6 | 533.3 | 396.1 | 485.3 | 361.1 | 439.8 | 327.6 |
| 750                      | 0.031x                | -                      | 589.3              | 436.3 | 500.8 | 372   | 455.8 | 339.1 | 413   | 307.7 |
| 700                      | 0.034x                | -                      | 551.1              | 408   | 468.3 | 347.9 | 426.2 | 317.1 | 386.2 | 287.7 |
| 650                      | 0.036x                | -                      | 512.9              | 379.7 | 435.9 | 323.7 | 396.6 | 295.1 | 359.4 | 267.7 |
| 600                      | 0.039x                | -                      | 474.7              | 351.4 | 403.4 | 299.6 | 367.1 | 273   | 332.6 | 247.8 |
| 550                      | 0.043x                | -                      | 436.5              | 323.1 | 370.9 | 275.4 | 337.5 | 251   | 305.8 | 227.8 |
| 500                      | 0.047x                | -                      | 398.3              | 294.8 | 338.4 | 251.3 | 307.9 | 229   | 279   | 207.8 |
| 450                      | 0.052x                | -                      | 360.1              | 266.4 | 305.9 | 227.1 | 278.3 | 207   | 252.2 | 187.8 |
| 400                      | 0.058x                | -                      | 321.8              | 238.1 | 273.4 | 202.9 | 248.7 | 184.9 | 225.3 | 167.8 |
| 350                      | 0.066x                | -                      | 283.6              | 209.7 | 240.8 | 178.7 | 219.1 | 162.9 | 198.5 | 147.8 |
| 300                      | 0.076x                | -                      | 245.2              | 181.3 | 208.2 | 154.5 | 184.0 | 140.8 | 171.6 | 127.7 |
| 250                      | 0.090x                | -                      | 206.8              | 152.8 | 175.5 | 130.2 | 159.7 | 118.6 | 144.6 | 107.6 |
| 200                      | 0.111x                | -                      | 168.3              | 124.3 | 142.8 | 105.9 | 129.8 | 96.4  | 117.6 | 87.5  |
| 150                      | 0.144x                | -                      | 129.5              | 95.5  | 109.8 | 81.3  | 99.8  | 74.1  | 90.4  | 60.1  |
| 100                      | 0.208x                | -                      | 90.2               | 66.4  | 76.3  | 56.5  | 69.4  | 51.4  | 62.8  | 46.6  |

### CF35ZA-1S

| Working Distance<br>[mm] | Optical Magnification | Extension Tube<br>[mm] | Field of View [mm] |       |       |       |       |       |       |       |
|--------------------------|-----------------------|------------------------|--------------------|-------|-------|-------|-------|-------|-------|-------|
|                          |                       |                        | 4/3°               |       | 1.2°  |       | 1.1°  |       | 1°    |       |
|                          |                       |                        | H                  | V     | H     | V     | H     | V     | H     | V     |
| 1000                     | 0.034x                | -                      | 541.2              | 403.7 | 462   | 345   | 421.3 | 314.9 | 382.5 | 286   |
| 950                      | 0.036x                | -                      | 515                | 384.1 | 439.6 | 328.3 | 400.9 | 299.6 | 363.9 | 272.1 |
| 900                      | 0.038x                | -                      | 488.8              | 364.6 | 417.2 | 311.6 | 380.5 | 284.3 | 345.4 | 258.3 |
| 850                      | 0.040x                | -                      | 462.6              | 345   | 394.8 | 294.9 | 360.1 | 269.1 | 326.9 | 244.4 |
| 800                      | 0.042x                | -                      | 436.4              | 325.4 | 372.5 | 278.1 | 339.6 | 253.8 | 308.3 | 230.5 |
| 750                      | 0.045x                | -                      | 410.2              | 305.9 | 350.1 | 261.4 | 319.2 | 238.5 | 289.8 | 216.7 |
| 700                      | 0.048x                | -                      | 384                | 286.3 | 327.7 | 244.7 | 298.8 | 223.3 | 271.2 | 202.8 |
| 650                      | 0.051x                | -                      | 357.7              | 266.7 | 305.3 | 227.9 | 278.4 | 208   | 252.7 | 188.9 |
| 600                      | 0.056x                | -                      | 331.5              | 247.1 | 282.9 | 211.2 | 257.9 | 192.7 | 234.1 | 175   |
| 550                      | 0.060x                | -                      | 305.3              | 227.5 | 260.5 | 194.4 | 237.5 | 177.4 | 215.5 | 161.1 |
| 500                      | 0.066x                | -                      | 279                | 207.9 | 238   | 177.7 | 217   | 162.1 | 197   | 147.2 |
| 450                      | 0.073x                | -                      | 252.7              | 188.3 | 215.6 | 160.9 | 196.5 | 146.8 | 178.4 | 133.3 |
| 400                      | 0.082x                | -                      | 226.4              | 168.6 | 193.1 | 144.1 | 176   | 131.4 | 159.7 | 119.4 |
| 350                      | 0.093x                | -                      | 200                | 148.9 | 170.6 | 127.2 | 155.5 | 116.1 | 141.1 | 105.4 |
| 300                      | 0.107x                | -                      | 173.6              | 129.2 | 148   | 110.4 | 134.9 | 100.7 | 122.4 | 91.4  |
| 250                      | 0.127x                | -                      | 147.1              | 109.4 | 125.3 | 93.4  | 114.2 | 85.2  | 103.6 | 77.4  |
| 200                      | 0.156x                | -                      | 120.4              | 89.5  | 102.5 | 76.4  | 93.4  | 69.7  | 84.8  | 63.3  |
| 150                      | 0.201x                | 1.5                    | 93.3               | 69.3  | 79.5  | 59.2  | 72.4  | 54    | 65.7  | 49    |
| 100                      | 0.282x                | 5                      | 65.6               | 48.6  | 55.8  | 41.5  | 50.8  | 37.8  | 46    | 34.3  |

### CF50ZA-1S

| Working Distance<br> |
|----------------------|
|----------------------|

■ HF-XA-5M / HF-XA-1F series

HF6XA-5M

| Working Distance<br>[mm] | Optical Magnification | Extension Tube<br>[mm] | Field of View [mm] |        |        |       |       |       |
|--------------------------|-----------------------|------------------------|--------------------|--------|--------|-------|-------|-------|
|                          |                       |                        | 2/3"               |        | 1/2"   |       | 1/3"  |       |
|                          |                       |                        | H                  | V      | H      | V     | H     | V     |
| 1000                     | 0.006x                | -                      | 1548.2             | 1126.4 | 1089.5 | 802.1 | 802.1 | 594.9 |
| 950                      | 0.006x                | -                      | 1471.8             | 1070.9 | 1035.7 | 762.5 | 762.5 | 565.6 |
| 900                      | 0.007x                | -                      | 1395.5             | 1015.3 | 982.0  | 722.9 | 722.9 | 536.3 |
| 850                      | 0.007x                | -                      | 1319.1             | 959.8  | 928.3  | 683.4 | 683.4 | 506.9 |
| 800                      | 0.008x                | -                      | 1242.8             | 904.2  | 874.6  | 643.8 | 643.8 | 477.6 |
| 750                      | 0.008x                | -                      | 1166.5             | 848.7  | 820.8  | 604.3 | 604.3 | 448.2 |
| 700                      | 0.009x                | -                      | 1090.1             | 793.1  | 767.1  | 564.7 | 564.7 | 418.9 |
| 650                      | 0.009x                | -                      | 1013.8             | 737.6  | 713.4  | 525.2 | 525.2 | 389.6 |
| 600                      | 0.010x                | -                      | 937.4              | 682.0  | 659.6  | 485.6 | 485.6 | 360.2 |
| 550                      | 0.011x                | -                      | 861.1              | 626.5  | 605.9  | 446.1 | 446.1 | 330.9 |
| 500                      | 0.012x                | -                      | 784.8              | 570.9  | 552.2  | 406.5 | 406.5 | 301.5 |
| 450                      | 0.013x                | -                      | 708.4              | 515.4  | 498.5  | 367.0 | 367.0 | 272.2 |
| 400                      | 0.015x                | -                      | 632.1              | 459.8  | 444.7  | 327.4 | 327.4 | 242.9 |
| 350                      | 0.017x                | -                      | 555.7              | 404.3  | 391.0  | 287.8 | 287.8 | 213.5 |
| 300                      | 0.020x                | -                      | 479.4              | 348.7  | 337.3  | 248.3 | 248.3 | 184.2 |
| 250                      | 0.024x                | -                      | 403.0              | 293.2  | 283.5  | 208.7 | 208.7 | 154.8 |
| 200                      | 0.029x                | -                      | 326.7              | 237.6  | 229.8  | 169.2 | 169.2 | 125.5 |
| 150                      | 0.038x                | -                      | 250.4              | 182.1  | 176.1  | 129.6 | 129.6 | 96.2  |
| 100                      | 0.055x                | -                      | 174.0              | 126.5  | 122.4  | 90.1  | 90.1  | 66.8  |

HF12XA-5M / HF12XA-1F

| Working Distance<br>[mm] | Optical Magnification | Extension Tube<br>[mm] | Field of View [mm] |       |       |       |       |       |
|--------------------------|-----------------------|------------------------|--------------------|-------|-------|-------|-------|-------|
|                          |                       |                        | 1/1.2"             |       | 2/3"  |       | 1/2"  |       |
|                          |                       |                        | H                  | V     | H     | V     | H     | V     |
| 1000                     | 0.012x                | -                      | 913.0              | 673.6 | 740.5 | 548.9 | 531.8 | 396.2 |
| 950                      | 0.013x                | -                      | 868.0              | 640.4 | 704.0 | 521.9 | 505.6 | 376.7 |
| 900                      | 0.014x                | -                      | 823.0              | 607.2 | 667.5 | 494.8 | 479.4 | 357.2 |
| 850                      | 0.014x                | -                      | 778.0              | 574.0 | 631.0 | 467.8 | 453.2 | 337.7 |
| 800                      | 0.015x                | -                      | 733.0              | 540.8 | 594.5 | 440.7 | 427.0 | 318.1 |
| 750                      | 0.016x                | -                      | 688.0              | 507.6 | 558.0 | 413.7 | 400.8 | 298.6 |
| 700                      | 0.017x                | -                      | 643.1              | 474.5 | 521.6 | 386.6 | 374.6 | 279.1 |
| 650                      | 0.019x                | -                      | 598.1              | 441.3 | 485.1 | 359.6 | 348.3 | 259.6 |
| 600                      | 0.020x                | -                      | 553.1              | 408.1 | 448.6 | 332.5 | 322.1 | 240.0 |
| 550                      | 0.022x                | -                      | 508.1              | 374.9 | 412.1 | 305.5 | 295.9 | 220.5 |
| 500                      | 0.024x                | -                      | 463.1              | 341.7 | 375.6 | 278.4 | 269.7 | 201.0 |
| 450                      | 0.027x                | -                      | 418.2              | 308.5 | 339.1 | 251.4 | 243.5 | 181.5 |
| 400                      | 0.030x                | -                      | 373.2              | 275.3 | 302.6 | 224.3 | 217.3 | 161.9 |
| 350                      | 0.034x                | -                      | 328.2              | 242.1 | 266.2 | 197.3 | 191.1 | 142.4 |
| 300                      | 0.039x                | -                      | 283.2              | 208.9 | 229.7 | 170.2 | 164.9 | 122.9 |
| 250                      | 0.047x                | -                      | 238.2              | 175.7 | 193.2 | 143.2 | 138.7 | 103.4 |
| 200                      | 0.058x                | -                      | 193.2              | 142.5 | 156.7 | 116.1 | 112.5 | 83.8  |
| 150                      | 0.075x                | -                      | 148.3              | 109.3 | 120.2 | 89.1  | 86.3  | 64.3  |
| 100                      | 0.108x                | -                      | 103.3              | 76.1  | 83.7  | 62.0  | 60.1  | 44.8  |

HF25XA-5M / HF25XA-1F

| Working Distance<br>[mm] | Optical Magnification | Extension Tube<br>[mm] | Field of View [mm] |       |       |       |       |       |
|--------------------------|-----------------------|------------------------|--------------------|-------|-------|-------|-------|-------|
|                          |                       |                        | 1/1.2"             |       | 2/3"  |       | 1/2"  |       |
|                          |                       |                        | H                  | V     | H     | V     | H     | V     |
| 1000                     | 0.025x                | -                      | 436.0              | 326.6 | 357.6 | 267.9 | 259.8 | 194.7 |
| 950                      | 0.026x                | -                      | 414.6              | 310.5 | 340.0 | 254.7 | 247.0 | 185.1 |
| 900                      | 0.027x                | -                      | 393.1              | 294.4 | 322.4 | 241.5 | 234.2 | 175.5 |
| 850                      | 0.029x                | -                      | 371.7              | 278.4 | 304.8 | 228.4 | 221.4 | 166.0 |
| 800                      | 0.031x                | -                      | 350.3              | 262.3 | 287.2 | 215.2 | 208.6 | 156.4 |
| 750                      | 0.033x                | -                      | 328.8              | 246.2 | 269.6 | 202.0 | 195.9 | 146.8 |
| 700                      | 0.035x                | -                      | 307.4              | 230.2 | 252.0 | 188.8 | 183.1 | 137.2 |
| 650                      | 0.038x                | -                      | 285.9              | 214.1 | 234.5 | 175.6 | 170.3 | 127.6 |
| 600                      | 0.041x                | -                      | 264.5              | 198.1 | 216.9 | 162.5 | 157.5 | 118.1 |
| 550                      | 0.044x                | -                      | 243.1              | 182.0 | 199.3 | 149.3 | 144.7 | 108.5 |
| 500                      | 0.049x                | -                      | 221.6              | 165.9 | 181.7 | 136.1 | 132.0 | 98.9  |
| 450                      | 0.054x                | -                      | 200.2              | 149.9 | 164.1 | 122.9 | 119.2 | 89.3  |
| 400                      | 0.060x                | -                      | 178.8              | 133.8 | 146.5 | 109.7 | 106.4 | 79.7  |
| 350                      | 0.068x                | -                      | 157.3              | 117.7 | 128.9 | 96.6  | 93.6  | 70.2  |
| 300                      | 0.079x                | -                      | 135.9              | 101.7 | 111.4 | 83.4  | 80.8  | 60.6  |
| 250                      | 0.094x                | -                      | 114.4              | 85.6  | 93.8  | 70.2  | 68.1  | 51.0  |
| 200                      | 0.116x                | -                      | 93.0               | 69.5  | 76.2  | 57.0  | 55.3  | 41.4  |
| 150                      | 0.151x                | -                      | 71.5               | 53.5  | 58.6  | 43.8  | 42.5  | 31.8  |
| 100                      | 0.216x                | -                      | 50.1               | 37.4  | 41.0  | 30.7  | 29.7  | 22.3  |

HF50XA-5M

| Working Distance<br>[mm] | Optical Magnification | Extension Tube<br>[mm] | Field of View [mm] |       |       |       |       |      |
|--------------------------|-----------------------|------------------------|--------------------|-------|-------|-------|-------|------|
|                          |                       |                        | 1.1"               |       | 2/3"  |       | 1/2"  |      |
|                          |                       |                        | H                  | V     | H     | V     | H     | V    |
| 1000                     | 0.048x                | -                      | 293.1              | 219.7 | 183.1 | 137.3 | 133.1 | 99.8 |
| 950                      | 0.051x                | -                      | 278.6              | 208.9 | 174.0 | 130.5 | 126.5 | 94.9 |
| 900                      | 0.053x                | -                      | 264.1              | 198.0 | 164.9 | 123.7 | 119.9 | 89.9 |
| 850                      | 0.056x                | -                      | 249.6              | 187.1 | 155.9 | 116.9 | 113.3 | 85.0 |
| 800                      | 0.060x                | -                      | 235.1              | 176.2 | 146.8 | 110.1 | 106.7 | 80.0 |
| 750                      | 0.064x                | -                      | 220.6              | 165.3 | 137.7 | 103.3 | 100.1 | 75.1 |
| 700                      | 0.068x                | -                      | 206.1              | 154.4 | 128.7 | 96.5  | 93.5  | 70.1 |
| 650                      | 0.074x                | -                      | 191.5              | 143.5 | 119.6 | 89.7  | 86.9  | 65.2 |
| 600                      | 0.080x                | -                      | 177.0              | 132.7 | 110.5 | 82.9  | 80.3  | 60.2 |
| 550                      | 0.087x                | -                      | 162.5              | 121.8 | 101.4 | 76.1  | 73.7  | 55.3 |
| 500                      | 0.095x                | -                      | 148.0              | 110.9 | 92.4  | 69.2  | 67.1  | 50.4 |
| 450                      | 0.106x                | -                      | 133.5              | 100.0 | 83.3  | 62.4  | 60.5  | 45.4 |
| 400                      | 0.119x                | -                      | 118.9              | 89.1  | 74.2  | 55.6  | 54.0  | 40.5 |
| 350                      | 0.135x                | -                      | 104.4              | 78.2  | 65.1  | 48.8  | 47.4  | 35.5 |
| 300                      | 0.157x                | -                      | 89.9               | 67.3  | 56.1  | 42.0  | 40.8  | 30.6 |
| 250                      | 0.188x                | -                      | 75.4               | 56.4  | 47.0  | 35.2  | 34.2  | 25.6 |
| 200                      | 0.232x                | -                      | 60.8               | 45.5  | 37.9  | 28.4  | 27.6  | 20.7 |
| 150                      | 0.306x                | 5                      | 46.3               | 34.6  | 28.8  | 21.6  | 21.0  | 15.7 |
| 100                      | 0.447x                | 15                     | 31.7               | 23.7  | 19.7  | 14.8  | 14.3  | 10.8 |

HF8XA-5M / HF8XA-1F

| Working Distance<br>[mm] | Optical Magnification | Extension Tube<br>[mm] | Field of View [mm] |       |       |       |       |       |
|--------------------------|-----------------------|------------------------|--------------------|-------|-------|-------|-------|-------|
|                          |                       |                        | 2/3"               |       | 1/2"  |       | 1/3"  |       |
|                          |                       |                        | H                  | V     | H     | V     | H     | V     |
| 1000                     | 0.008x                | -                      | 1130.4             | 830.5 | 803.9 | 595.5 | 595.5 | 443.3 |
| 950                      | 0.009x                | -                      | 1074.6             | 789.5 | 764.2 | 566.1 | 566.1 | 421.4 |
| 900                      | 0.009x                | -                      | 1018.8             | 748.5 | 724.5 | 536.6 | 536.6 | 399.5 |
| 850                      | 0.010x                | -                      | 962.9              | 707.4 | 684.8 | 507.2 | 507.2 | 377.6 |
| 800                      | 0.010x                | -                      | 907.1              | 666.4 | 645.1 | 477.8 | 477.8 | 355.7 |
| 750                      | 0.011x                | -                      | 851.2              | 625.4 | 605.4 | 448.4 | 448.4 | 333.8 |
| 700                      | 0.012x                | -                      | 795.4              | 584.3 | 565.7 | 419.0 | 419.0 | 311.9 |
| 650                      | 0.013x                | -                      | 739.6              | 543.3 | 525.9 | 389.6 | 389.6 | 290.0 |
| 600                      | 0.014x                | -                      | 683.7              | 502.3 | 486.2 | 360.1 | 360.1 | 268.1 |
| 550                      | 0.015x                | -                      | 627.9              | 461.3 | 446.5 | 330.7 | 330.7 | 246.2 |
| 500                      | 0.016x                | -                      | 572.0              | 420.2 | 406.8 | 301.3 | 301.3 | 224.3 |
| 450                      | 0.018x                | -                      | 516.2              | 379.2 | 367.1 | 271.9 | 271.9 | 202.4 |
| 400                      | 0.020x                | -                      | 460.3              | 338.2 | 327.4 | 242.5 | 242.5 | 180.5 |
| 350                      | 0.023x                | -                      | 404.5              | 297.1 | 287.6 | 213.0 | 213.0 | 158.6 |
| 300                      | 0.027x                | -                      | 348.7              | 256.1 | 247.9 | 183.6 | 183.6 | 136.7 |
| 250                      | 0.032x                | -                      | 292.8              | 215.1 | 208.2 | 154.2 | 154.2 | 114.8 |
| 200                      | 0.039x                | -                      | 237.0              | 174.1 | 168.5 | 124.8 | 124.8 | 92.9  |
| 150                      | 0.051x                | -                      | 181.1              | 133.0 | 128.8 | 95.4  | 95.4  | 71.0  |
| 100                      | 0.074x                | -                      | 125.3              | 92.0  | 89.1  | 66.0  | 66.0  | 49.1  |

HF16XA-5M / HF16XA-1F

| Working Distance<br>[mm] | Optical Magnification | Extension Tube<br>[mm] | Field of View [mm] |       |       |       |       |       |
|--------------------------|-----------------------|------------------------|--------------------|-------|-------|-------|-------|-------|
|                          |                       |                        | 1/1.2"             |       | 2/3"  |       | 1/2"  |       |
|                          |                       |                        | H                  | V     | H     | V     | H     | V     |
| 1000                     | 0.016x                | -                      | 701.9              | 522.1 | 572.8 | 427.0 | 413.9 | 309.3 |
| 950                      | 0.016x                | -                      | 667.5              | 496.5 | 544.7 | 406.0 | 393.6 | 294.2 |
| 900                      | 0.017x                | -                      | 633.1              | 470.9 | 516.6 | 385.1 | 373.2 | 279.0 |
| 850                      | 0.018x                | -                      | 598.7              | 445.3 | 488.4 | 364.1 | 352.9 | 263.8 |
| 800                      | 0.019x                | -                      | 564.2              | 419.7 | 460.3 | 343.2 | 332.6 | 248.6 |
| 750                      | 0.021x                | -                      | 529.8              | 394.0 | 432.2 | 322.2 | 312.3 | 233.4 |
| 700                      | 0.022x                | -                      | 495.4              | 368.4 | 404.1 | 301.3 | 292.0 | 218.2 |
| 650                      | 0.024x                | -                      | 461.0              | 342.8 | 376.0 | 280.3 | 271.7 | 203.0 |
| 600                      | 0.026x                | -                      | 426.5              | 317.2 | 347.9 | 259.3 | 251.4 | 187.9 |
| 550                      | 0.028x                | -                      | 392.1              | 291.5 | 319.8 | 238.4 | 231.0 | 172.7 |
| 500                      | 0.031x                | -                      | 357.7              | 265.9 | 291.7 | 217.4 | 210.7 | 157.5 |
| 450                      | 0.034x                | -                      | 323.3              | 240.3 | 263.6 | 196.5 | 190.4 | 142.3 |
| 400                      | 0.038x                | -                      | 288.8              | 214.7 | 235.5 | 175.5 | 170.1 | 127.1 |
| 350                      | 0.043x                | -                      | 254.4              | 189.1 | 207.4 | 154.6 | 149.8 | 111.9 |
| 300                      | 0.050x                | -                      | 220.0              | 163.4 | 179.3 | 133.6 | 129.5 | 96.7  |
| 250                      | 0.059x                | -                      | 185.6              | 137.8 | 151.2 | 112.6 | 109.2 | 81.6  |
| 200                      | 0.073x                | -                      | 151.1              | 112.2 | 123.1 | 91.7  | 88.9  | 66.4  |
| 150                      | 0.094x                | -                      | 116.7              | 86.6  | 95.0  | 70.7  | 68.5  | 51.2  |
| 100                      | 0.134x                | -                      | 82.3               | 60.9  | 66.9  | 49.8  | 48.2  | 36.0  |

HF35XA-5M / HF35XA-1F

| Working Distance<br>[mm] | Optical Magnification | Extension Tube<br>[mm] | Field of View [mm] |  |  |
|--------------------------|-----------------------|------------------------|--------------------|--|--|
|--------------------------|-----------------------|------------------------|--------------------|--|--|

HF-SA series

HF12.5SA-1

| Working Distance<br>[mm] | Optical Magnification | Extension Tube<br>[mm] | Field of View [mm] |       |       |       |       |       |
|--------------------------|-----------------------|------------------------|--------------------|-------|-------|-------|-------|-------|
|                          |                       |                        | 2/3"               |       | 1/2"  |       | 1/3"  |       |
|                          |                       |                        | H                  | V     | H     | V     | H     | V     |
| 1000                     | 0.013x                | -                      | 705.4              | 528.0 | 511.9 | 383.3 | 383.3 | 287.2 |
| 950                      | 0.013x                | -                      | 670.9              | 502.2 | 486.9 | 364.6 | 364.6 | 273.2 |
| 900                      | 0.014x                | -                      | 636.4              | 476.4 | 461.8 | 345.8 | 345.8 | 259.1 |
| 850                      | 0.015x                | -                      | 601.9              | 450.5 | 436.8 | 327.1 | 327.1 | 245.1 |
| 800                      | 0.016x                | -                      | 567.5              | 424.7 | 411.8 | 308.3 | 308.3 | 231.0 |
| 750                      | 0.017x                | -                      | 533.0              | 398.9 | 386.7 | 289.6 | 289.6 | 217.0 |
| 700                      | 0.018x                | -                      | 498.5              | 373.1 | 361.7 | 270.8 | 270.8 | 202.9 |
| 650                      | 0.019x                | -                      | 464.1              | 347.3 | 336.7 | 252.1 | 252.1 | 188.9 |
| 600                      | 0.021x                | -                      | 429.6              | 321.5 | 311.7 | 233.3 | 233.3 | 174.8 |
| 550                      | 0.022x                | -                      | 395.1              | 295.6 | 286.6 | 214.6 | 214.6 | 160.8 |
| 500                      | 0.025x                | -                      | 360.6              | 269.8 | 261.6 | 195.8 | 195.8 | 146.7 |
| 450                      | 0.027x                | -                      | 326.2              | 244.0 | 236.6 | 177.1 | 177.1 | 132.7 |
| 400                      | 0.030x                | -                      | 291.7              | 218.2 | 211.5 | 158.3 | 158.3 | 118.6 |
| 350                      | 0.034x                | -                      | 257.2              | 192.4 | 186.5 | 139.6 | 139.6 | 104.6 |
| 300                      | 0.040x                | -                      | 222.8              | 166.6 | 161.5 | 120.8 | 120.8 | 90.5  |
| 250                      | 0.047x                | -                      | 188.3              | 140.7 | 136.4 | 102.1 | 102.1 | 76.5  |
| 200                      | 0.058x                | -                      | 153.8              | 114.9 | 111.4 | 83.4  | 83.4  | 62.4  |
| 150                      | 0.075x                | -                      | 119.3              | 89.1  | 86.4  | 64.6  | 64.6  | 48.4  |
| 100                      | 0.105x                | -                      | 84.9               | 63.3  | 61.3  | 45.9  | 45.9  | 34.3  |

HF25SA-1

| Working Distance<br>[mm] | Optical Magnification | Extension Tube<br>[mm] | Field of View [mm] |       |       |       |       |       |
|--------------------------|-----------------------|------------------------|--------------------|-------|-------|-------|-------|-------|
|                          |                       |                        | 2/3"               |       | 1/2"  |       | 1/3"  |       |
|                          |                       |                        | H                  | V     | H     | V     | H     | V     |
| 1000                     | 0.023x                | -                      | 378.4              | 283.4 | 274.8 | 205.9 | 205.9 | 154.4 |
| 950                      | 0.025x                | -                      | 360.0              | 269.6 | 261.4 | 195.9 | 195.9 | 146.8 |
| 900                      | 0.026x                | -                      | 341.6              | 255.9 | 248.1 | 185.9 | 185.9 | 139.3 |
| 850                      | 0.027x                | -                      | 323.2              | 242.1 | 234.7 | 175.9 | 175.9 | 131.8 |
| 800                      | 0.029x                | -                      | 304.9              | 228.3 | 221.4 | 165.9 | 165.9 | 124.3 |
| 750                      | 0.031x                | -                      | 286.5              | 214.5 | 208.0 | 155.9 | 155.9 | 116.8 |
| 700                      | 0.033x                | -                      | 268.1              | 200.8 | 194.7 | 145.8 | 145.8 | 109.3 |
| 650                      | 0.035x                | -                      | 249.7              | 187.0 | 181.3 | 135.8 | 135.8 | 101.8 |
| 600                      | 0.038x                | -                      | 231.3              | 173.2 | 167.9 | 125.8 | 125.8 | 94.3  |
| 550                      | 0.042x                | -                      | 212.9              | 159.4 | 154.6 | 115.8 | 115.8 | 86.8  |
| 500                      | 0.045x                | -                      | 194.6              | 145.7 | 141.2 | 105.8 | 105.8 | 79.3  |
| 450                      | 0.050x                | -                      | 176.2              | 131.9 | 127.9 | 95.8  | 95.8  | 71.8  |
| 400                      | 0.056x                | -                      | 157.8              | 118.1 | 114.5 | 85.8  | 85.8  | 64.3  |
| 350                      | 0.063x                | -                      | 139.4              | 104.3 | 101.1 | 75.8  | 75.8  | 56.8  |
| 300                      | 0.073x                | -                      | 121.0              | 90.5  | 87.8  | 65.7  | 65.7  | 49.3  |
| 250                      | 0.086x                | -                      | 102.6              | 76.8  | 74.4  | 55.7  | 55.7  | 41.8  |
| 200                      | 0.105x                | -                      | 84.2               | 63.0  | 61.1  | 45.7  | 45.7  | 34.3  |
| 150                      | 0.135x                | -                      | 65.9               | 49.2  | 47.7  | 35.7  | 35.7  | 26.8  |
| 100                      | 0.187x                | -                      | 47.5               | 35.4  | 34.3  | 25.7  | 25.7  | 19.2  |

HF50SA-1

| Working Distance<br>[mm] | Optical Magnification | Extension Tube<br>[mm] | Field of View [mm] |       |       |       |       |       |
|--------------------------|-----------------------|------------------------|--------------------|-------|-------|-------|-------|-------|
|                          |                       |                        | 2/3"               |       | 1/2"  |       | 1/3"  |       |
|                          |                       |                        | H                  | V     | H     | V     | H     | V     |
| 1500                     | 0.034x                | -                      | 255.5              | 191.6 | 185.8 | 139.4 | 139.4 | 104.5 |
| 1450                     | 0.036x                | -                      | 247.0              | 185.3 | 179.7 | 134.8 | 134.8 | 101.1 |
| 1400                     | 0.037x                | -                      | 238.5              | 178.9 | 173.5 | 130.1 | 130.1 | 97.6  |
| 1350                     | 0.038x                | -                      | 230.0              | 172.5 | 167.3 | 125.5 | 125.5 | 94.1  |
| 1300                     | 0.040x                | -                      | 221.5              | 166.1 | 161.1 | 120.8 | 120.8 | 90.6  |
| 1250                     | 0.041x                | -                      | 213.0              | 159.8 | 154.9 | 116.2 | 116.2 | 87.1  |
| 1200                     | 0.043x                | -                      | 204.5              | 153.4 | 148.7 | 111.6 | 111.6 | 83.7  |
| 1150                     | 0.045x                | -                      | 196.0              | 147.0 | 142.6 | 106.9 | 106.9 | 80.2  |
| 1100                     | 0.047x                | -                      | 187.5              | 140.6 | 136.4 | 102.3 | 102.3 | 76.7  |
| 1050                     | 0.049x                | -                      | 179.0              | 134.3 | 130.2 | 97.6  | 97.6  | 73.2  |
| 1000                     | 0.052x                | -                      | 170.5              | 127.9 | 124.0 | 93.0  | 93.0  | 69.7  |
| 950                      | 0.054x                | -                      | 162.0              | 121.5 | 117.8 | 88.4  | 88.4  | 66.3  |
| 900                      | 0.057x                | -                      | 153.5              | 115.1 | 111.6 | 83.7  | 83.7  | 62.8  |
| 850                      | 0.061x                | -                      | 145.0              | 108.7 | 105.4 | 79.1  | 79.1  | 59.3  |
| 800                      | 0.064x                | -                      | 136.5              | 102.4 | 99.3  | 74.4  | 74.4  | 55.8  |
| 750                      | 0.069x                | -                      | 128.0              | 96.0  | 93.1  | 69.8  | 69.8  | 52.3  |
| 700                      | 0.074x                | -                      | 119.5              | 89.6  | 86.9  | 65.2  | 65.2  | 48.9  |
| 650                      | 0.079x                | -                      | 111.0              | 83.2  | 80.7  | 60.5  | 60.5  | 45.4  |
| 600                      | 0.086x                | -                      | 102.5              | 76.9  | 74.5  | 55.9  | 55.9  | 41.9  |
| 550                      | 0.094x                | -                      | 94.0               | 70.5  | 68.3  | 51.2  | 51.2  | 38.4  |
| 500                      | 0.103x                | -                      | 85.5               | 64.1  | 62.2  | 46.6  | 46.6  | 34.9  |
| 450                      | 0.114x                | -                      | 77.0               | 57.7  | 56.0  | 42.0  | 42.0  | 31.5  |
| 400                      | 0.129x                | -                      | 68.5               | 51.3  | 49.8  | 37.3  | 37.3  | 28.0  |
| 350                      | 0.147x                | 1                      | 60.0               | 45.0  | 43.6  | 32.7  | 32.7  | 24.5  |
| 300                      | 0.171x                | 5                      | 51.5               | 38.6  | 37.4  | 28.0  | 28.0  | 21.0  |
| 250                      | 0.205x                | 5                      | 43.0               | 32.2  | 31.2  | 23.4  | 23.4  | 17.5  |
| 200                      | 0.256x                | 10                     | 34.5               | 25.8  | 25.0  | 18.8  | 18.8  | 14.1  |
| 150                      | 0.340x                | 15                     | 25.9               | 19.4  | 18.8  | 14.1  | 14.1  | 10.6  |
| 100                      | 0.507x                | 20                     | 17.4               | 13.0  | 12.6  | 9.5   | 9.5   | 7.1   |

| <Sensor size> |           |
|---------------|-----------|
| 1.1"          | 14.1X10.6 |
| 1"            | 12.8X9.6  |
| 1/1.2"        | 10.7X8.0  |
| 2/3"          | 8.8X6.6   |
| 1/2"          | 6.4X4.8   |
| 1/3"          | 4.8X3.6   |

\* This data shows simulation value.  
\* When attached with a extension tube, the optical performance of the lenses is not covered under warranty.

CF-HA series

CF12.5HA-1

| Working Distance<br>[mm] | Optical Magnification | Extension Tube<br>[mm] | Field of View [mm] |       |       |       |       |       |
|--------------------------|-----------------------|------------------------|--------------------|-------|-------|-------|-------|-------|
|                          |                       |                        | 1"                 |       | 2/3"  |       | 1/2"  |       |
|                          |                       |                        | H                  | V     | H     | V     | H     | V     |
| 1000                     | 0.013x                | -                      | 1024.8             | 769.8 | 705.4 | 528.0 | 511.9 | 383.3 |
| 950                      | 0.013x                | -                      | 974.8              | 732.2 | 670.9 | 502.2 | 486.9 | 364.6 |
| 900                      | 0.014x                | -                      | 924.8              | 694.6 | 636.4 | 476.4 | 461.8 | 345.8 |
| 850                      | 0.015x                | -                      | 874.8              | 657.0 | 601.9 | 450.5 | 436.8 | 327.1 |
| 800                      | 0.016x                | -                      | 824.8              | 619.4 | 567.5 | 424.7 | 411.8 | 308.3 |
| 750                      | 0.017x                | -                      | 774.8              | 581.8 | 533.0 | 398.9 | 386.7 | 289.6 |
| 700                      | 0.018x                | -                      | 724.8              | 544.1 | 498.5 | 373.1 | 361.7 | 270.8 |
| 650                      | 0.019x                | -                      | 674.8              | 506.5 | 464.1 | 347.3 | 336.7 | 252.1 |
| 600                      | 0.021x                | -                      | 624.8              | 468.9 | 429.6 | 321.5 | 311.7 | 233.3 |
| 550                      | 0.022x                | -                      | 574.8              | 431.3 | 395.1 | 295.6 | 286.6 | 214.6 |
| 500                      | 0.025x                | -                      | 524.8              | 393.7 | 360.6 | 269.8 | 261.6 | 195.8 |
| 450                      | 0.027x                | -                      | 474.8              | 356.1 | 326.2 | 244.0 | 236.6 | 177.1 |
| 400                      | 0.030x                | -                      | 424.8              | 318.5 | 291.7 | 218.2 | 211.5 | 158.3 |
| 350                      | 0.034x                | -                      | 374.8              | 280.9 | 257.2 | 192.4 | 186.5 | 139.6 |
| 300                      | 0.040x                | -                      | 324.8              | 243.2 | 222.8 | 166.6 | 161.5 | 120.8 |
| 250                      | 0.047x                | -                      | 274.7              | 205.6 | 188.3 | 140.7 | 136.4 | 102.1 |
| 200                      | 0.058x                | -                      | 224.7              | 168.0 | 153.8 | 114.9 | 111.4 | 83.4  |
| 150                      | 0.075x                | -                      | 174.7              | 130.4 | 119.3 | 89.1  | 86.4  | 64.6  |
| 100                      | 0.105x                | -                      | 124.7              | 92.8  | 84.9  | 63.3  | 61.3  | 45.9  |

CF25HA-1

| Working Distance<br>[mm] | Optical Magnification | Extension Tube<br>[mm] | Field of View [mm] |       |       |       |       |       |
|--------------------------|-----------------------|------------------------|--------------------|-------|-------|-------|-------|-------|
|                          |                       |                        | 1"                 |       | 2/3"  |       | 1/2"  |       |
|                          |                       |                        | H                  | V     | H     | V     | H     | V     |
| 1000                     | 0.023x                | -                      | 551.0              | 413.0 | 378.4 | 283.4 | 274.8 | 205.9 |
| 950                      | 0.025x                | -                      | 524.2              | 392.9 | 360.0 | 269.6 | 261.4 | 195.9 |
| 900                      | 0.026x                | -                      | 497.5              | 372.9 | 341.6 | 255.9 | 248.1 | 185.9 |
| 850                      | 0.027x                | -                      | 470.8              | 352.8 | 323.2 | 242.1 | 234.7 | 175.9 |
| 800                      | 0.029x                | -                      | 444.1              | 332.7 | 304.9 | 228.3 | 221.4 | 165.9 |
| 750                      | 0.031x                | -                      | 417.3              | 312.7 | 286.5 | 214.5 | 208.0 | 155.9 |
| 700                      | 0.033x                | -                      | 390.6              | 292.6 | 268.1 | 200.8 | 194.7 | 145.8 |
| 650                      | 0.035x                | -                      | 363.9              | 272.6 | 249.7 | 187.0 | 181.3 | 135.8 |
| 600                      | 0.038x                | -                      | 337.2              | 252.5 | 231.3 | 173.2 | 167.9 | 125.8 |
| 550                      | 0.042x                | -                      | 310.4              | 232.4 | 212.9 | 159.4 | 154.6 | 115.8 |
| 500                      | 0.045x                | -                      | 283.7              | 212.4 | 194.6 | 145.7 | 141.2 | 105.8 |
| 450                      | 0.050x                | -                      | 257.0              | 192.3 | 176.2 | 131.9 | 127.9 | 95.8  |
| 400                      | 0.056x                | -                      | 230.2              | 172.3 | 157.8 | 118.1 | 114.5 | 85.8  |
| 350                      | 0.063x                | -                      | 203.5              | 152.2 | 139.4 | 104.3 | 101.1 | 75.8  |
| 300                      | 0.073x                | -                      | 176.8              | 132.1 | 121.0 | 90.5  | 87.8  | 65.7  |
| 250                      | 0.086x                | -                      | 150.0              | 112.1 | 102.6 | 76.8  | 74.4  | 55.7  |
| 200                      | 0.105x                | -                      | 123.3              | 92.0  | 84.2  | 63.0  | 61.1  | 45.7  |
| 150                      | 0.135x                | -                      | 96.5               | 71.9  | 65.9  | 49.2  | 47.7  | 35.7  |
| 100                      | 0.187x                | -                      | 69.8               | 51.9  | 47.5  | 35.4  | 34.3  | 25.7  |

CF50HA-1

| Working Distance<br>[mm] | Optical Magnification | Extension Tube<br>[mm] | Field of View [mm] |       |       |       |       |       |
|--------------------------|-----------------------|------------------------|--------------------|-------|-------|-------|-------|-------|
|                          |                       |                        | 1"                 |       | 2/3"  |       | 1/2"  |       |
|                          |                       |                        | H                  | V     | H     | V     | H     | V     |
| 1500                     | 0.034x                | -                      | 371.4              | 278.7 | 255.5 | 191.6 | 185.8 | 139.4 |
| 1450                     | 0.036x                | -                      | 359.1              | 269.4 | 247.0 | 185.3 | 179.7 | 134.8 |
| 1400                     | 0.037x                | -                      | 346.8              | 260.2 | 238.5 | 178.9 | 173.5 | 130.1 |
| 1350                     | 0.038x                | -                      | 334.4              | 250.9 | 230.0 | 172.5 | 167.3 | 125.5 |
| 1300                     | 0.040x                | -                      | 322.1              | 241.6 | 221.5 | 166.1 | 161.1 | 120.8 |
| 1250                     | 0.041x                | -                      | 309.7              | 232.4 | 213.0 | 159.8 | 154.9 | 116.2 |
| 1200                     | 0.043x                | -                      | 297.4              | 223.1 | 204.5 | 153.4 | 148.7 | 111.6 |
| 1150                     | 0.045x                | -                      | 285.1              | 213.8 | 196.0 | 147.0 | 142.6 | 106.9 |
| 1100                     | 0.047x                | -                      | 272.7              | 204.6 | 187.5 | 140.6 | 136.4 | 102.3 |
| 1050                     | 0.049x                | -                      | 260.4              | 195.3 | 179.0 | 134.3 | 130.2 | 97.6  |
| 1000                     | 0.052x                | -                      | 248.0              | 186.0 | 170.5 | 127.9 | 124.0 | 93.0  |
| 950                      | 0.054x                | -                      | 235.7              | 176.7 | 162.0 | 121.5 | 117.8 | 88.4  |
| 900                      | 0.057x                | -                      | 223.4              | 167.5 | 153.5 | 115.1 | 111.6 | 83.7  |
| 850                      | 0.061x                | -                      | 211.0              | 158.2 | 145.0 | 108.7 | 105.4 | 79.1  |
| 800                      | 0.064x                | -                      | 198.7              | 148.9 | 136.5 | 102.4 | 99.3  | 74.4  |
| 750                      | 0.069x                | -                      | 186.3              | 139.7 | 128.0 | 96.0  | 93.1  | 69.8  |
| 700                      | 0.074x                | -                      | 174.0              | 130.4 | 119.5 | 89.6  | 86.9  | 65.2  |
| 650                      | 0.079x                | -                      | 161.6              | 121.1 | 111.0 | 83.2  | 80.7  | 60.5  |
| 600                      | 0.086x                | -                      | 149.3              | 111.9 | 102.5 | 76.9  | 74.5  | 55.9  |
| 550                      | 0.094x                | -                      | 136.9              | 102.6 | 94.0  | 70.5  | 68.3  | 51.2  |
| 500                      | 0.103x                | -                      | 124.6              | 93.3  | 85.5  | 64.1  | 62.2  | 46.6  |
| 450                      | 0.114x                | -                      | 112.2              | 84.0  | 77.0  | 57.7  | 56.0  | 42.0  |
| 400                      | 0.129x                | -                      | 99.8               | 74.8  | 68.5  | 51.3  | 49.8  | 37.3  |
| 350                      | 0.147x                | 1                      | 87.5               | 65.5  | 60.0  | 45.0  | 43.6  | 32.7  |
| 300                      | 0.171x                | 5                      | 75.1               | 56.2  | 51.5  | 38.6  | 37.4  | 28.0  |
| 250                      | 0.205x                | 5                      | 62.7               | 46.9  | 43.0  | 32.2  | 31.2  | 23.4  |
| 200                      | 0.256x                | 10                     | 50.3               | 37.6  | 34.5  | 25.8  | 25.0  | 18.8  |
| 150                      | 0.340x                | 15                     | 37.9               | 28.3  | 25.9  | 19.4  | 18.8  | 14.1  |
| 100                      | 0.507x                | 20                     | 25.4               | 19.0  | 17.4  | 13.0  | 12.6  | 9.5   |