

Introducing a telephoto-type of machine vision lens for inspections and measurements at production lines

## “FUJINON HF50XA-5M”

Compatible with a 2/3-inch sensor•3.45 $\mu$ m pixel pitch / MOD of 200mm with compact design  
anti-vibration and shock-resistant performance to deliver a high resolution under diverse installation conditions

October 11, 2017

FUJIFILM Corporation (President: Kenji Sukeno) has announced the release of the new “FUJINON HF50XA-5M” (“HF50XA-5M”), a machine vision lens which is used for product inspections and measurements at production lines. “HF50XA-5M”, which is scheduled for release in mid-December 2017, has the focal length of 50mm, and is compatible with a 2/3-inch sensor•3.45  $\mu$ m pixel pitch\*<sup>1</sup> (equivalent to 5 megapixels).

Despite being a telephoto lens, the “HF50XA-5M” achieves the MOD of 200mm to enable close-up shooting with a compact body measuring  $\phi$ 33mm in external diameter. In addition, the “HF50XA-5M” is equipped with anti-vibration and shock-resistant performance, which allows the lens to be used under a variety of conditions, such as installation site subject to large vibrations.



FUJINON HF50XA-5M



FUJINON HF-XA-5M series (7 models)

In recent years, there has been a growing demand for greater production efficiency and stricter quality control, and more manufacturing sites adopt a machine vision system for product inspections and measurements. In this trend, manufacturers are exploring ways of performing inspections of greater accuracy in a diverse range of installation conditions. As a result, high resolution performance and compact design are required in lenses which are the input device for imaging information.

In February 2017, Fujifilm launched the “FUJINON HF-XA-5M series” (“HF-XA-5M series”) of machine vision lenses, which is compatible with a 2/3-inch sensor•3.45  $\mu$ m pixel pitch. The “HF-XA-5M” series is characterized with compact design and Fujifilm’s unique “4D High Resolution\*<sup>2</sup>” function for mitigating resolution degradation that typically occurs when changing a working distance or aperture value. The series was launched with six models of the following focal lengths: 6mm, 8mm, 12mm, 16mm, 25mm and 35mm. They are highly appreciated at manufacturing sites for their image quality and convenience.

The new “HF50XA-5M”, which inherits the basic performance of the “HF-XA-5M series”, is a telephoto-type machine vision lens with the focal length of 50mm with the compact body measuring  $\phi$ 33mm in external diameter. The lens is compatible with the industry-mainstream 2/3-inch sensor with a 3.45  $\mu$ m pixel pitch\*<sup>3</sup> at the most frequently-used object distance of 500mm. Even in other conditions, the lens’ “4D High Resolution” function mitigates resolution degradation when changing an object distance or diaphragm value, and it maintains their high resolving power of no less than 4.4  $\mu$ m pixel pitch (equivalent to 3 megapixels) on a 2/3-inch sensor from the center to all corners of an image. This enables inspections of high accuracy even from a location away from inspection subjects.

In addition, since “HF50XA-5M” achieves the minimum object distance of 200mm, the lens is capable of close-up shooting, making it ideal for inspections requiring precision, such as inspection of fine electronic components. Furthermore, the application of Fujifilm’s unique mechanical structure delivers outstanding anti-vibration and shock-resistant performance with the optical axis displacement\*<sup>4</sup> of no more than 10 $\mu$ m\*<sup>5</sup>.

With this anti-vibration and shock-resistant performance, the lens can be mounted to the head of a mobile robotic arm to carry out product inspections.

The “HF50XA-5M” adopts the optical design compatible with the sensors of up to 1.1 inches, catering to future needs for even greater accuracy in image recognition performance. When mounted to a machine vision camera with 1.1-inch sensor, the lens delivers high resolution of 4.5µm pixel pitch (equivalent to 7 megapixels)\*6.

Fujifilm continues to meet the diverse user needs with the “HF-XA-5M” series of seven lenses, covering different focal length from wide-angle lens (focal length of 6mm) to telephoto-angle lens (focal length of 50mm).

Tapping into the optical technologies, precision processing and assembling technologies nurtured over many years, Fujifilm offers a wide range of lenses corresponding to the age of high resolution digital imaging, including broadcast lenses and security camera lenses. In the machine vision field with strong growth potential, Fujifilm is committed to delivering an extensive product lineup, perfected in pursuit of high performance, high image quality and high product quality, to cater to diverse customer needs.

- \*1: Pixel pitch is an indicator of sensor's image definition capability. The unit “µm” represents the distance between adjacent pixels. The smaller the number is (i.e. higher pixel density), the higher the image definition becomes. In the case of a 2/3-inch sensor, the pixel pitch of 3.45 µm is equivalent to 5 megapixels.
- \*2: 4D High Resolution is a term used to describe the distinctively high-resolution performance of FUJINON lenses, which retains high resolution evenly at the center as well as around the edges across the frame (2D) while also mitigating resolution degradation that typically occurs when changing a object distance or diaphragm value (2D).
- \*3: Achieving 3.45 µm pixel pitch in the central part of image frame, although the resolution drops below 3.45 µm pixel pitch at peripheral part.
- \*4: Optical axis displacement refers to an image displacement that occurs when vibration or shock moves lens elements from their initial positions. The image displacement alters the shooting frame, triggering a sensor error.
- \*5: The lens was put to a vibration test compliant with JIS C 60068-2-6, in which the lens was affixed to a vibration table and made subject to vibration frequency of 10-60Hz (amplitude of 0.75mm), vibration frequency of 60-500Hz (acceleration of 100m/S<sup>2</sup>) and sweep frequency of 50 cycles, before undergoing a 10G impact test to verify performance.
- \*6: At the object distance of 500mm

## 1. Product name, focal length, release date and price

Product name	Focal length	Release date	Price
FUJINON HF50XA-5M	50mm	Mid-December 2017	Open

## 2. Main features :

### (1) Unique “4D High Resolution” performance

- The “HF50XA-5M” is compatible with the industry-mainstream 2/3-inch sensor with a 3.45 µm pixel pitch (equivalent to 5 megapixels) at the most frequently-used object distance of 500mm. Even in other conditions, the lens’ “4D High Resolution” function mitigates resolution degradation when changing an object distance or diaphragm value, and it maintains their high resolving power of no less than 4.4 µm pixel pitch (equivalent to 3 megapixels) on a 2/3-inch sensor from the center to all corners of an image.
- The “HF50XA-5M” adopts the optical design compatible with the sensors of up to 1.1 inches, catering to future needs for even greater accuracy in image recognition performance. When mounted to a machine vision camera with 1.1-inch sensor, the lens delivers high resolution of 4.5µm pixel pitch (equivalent to 7 megapixels).

### (2) Telephoto lens with a compact body measuring ø33mm in external diameter and the minimum object distance of 200mm

- The telephoto lens with the focal length of 50mm is capable of performing inspections of high accuracy even from a location away from inspection subjects.
- The compact body measuring ø33mm in external diameter allows the lens to be used with a small inspection device with limited installation space.
- The minimum object distance of 200mm enables close-up shooting, making it ideal for inspections requiring precision, such as inspection of fine electronic components.

**(3) Outstanding anti-vibration and shock-resistant performance with the optical axis displacement of no more than 10µm**

- The application of Fujifilm's unique mechanical structure delivers outstanding anti-vibration and shock-resistant performance with the optical axis displacement of no more than 10µm. With this anti-vibration and shock-resistant performance, the lens can be used for machine vision system mounted at the head of a mobile robotic arm to carry out product inspections.

**(4) Advanced installation convenience**

- The lens is equipped with the mechanical structure that keeps its length unchanged during focusing, allowing installation based on the optimum shooting distance.
- Three screw holes each are provided on the iris ring (aperture) and focus ring on the lens barrel. Users can choose the optimum hole according to their installation conditions, providing a high level of installation convenience.

**3. Main specifications:**

Product name		FUJINON HF50XA-5M
Focal length		50mm
Aperture range (F no.)		F2.4-F16
Angle of view (H x V) * When mounted to a camera with the standard 2/3-inch sensor		10.4°x7.8°
Focus range (distance from the front lens element) (mm)		∞ - 200
Operation method	Focus	Manual
	Iris	Manual
Filter thread		M30.5x0.5
Mount		C Mount
Compatible sensor size (standard)		2/3-inch (3.45µm)
Compatible sensor size (maximum)		1.1-inch (4.5µm)
TV distortion (%) * When mounted to a camera with the standard 2/3-inch sensor		0.01
External diameter (mm)		φ33x66.5
Weight (approximate) (g)		95

\* These product specifications and external appearance are as of the time of this press release (October 11, 2017) and are subject to change without prior notice.

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Download more detailed specifications of the product from:  
<https://fm.fujifilm.jp/form/pub/cctvlens/download-j>