OMRON

A compact smart camera that simplifies inspections





Simplify multiple-device inspection systems by using a single camera

Traditional image inspections require one or more dedicated cameras to be paired with a code reader. Omron's F430-F/F420-F Series Smart Camera bundles all this functionality into a single device, dramatically simplifying application design. The single-camera solution also reduces the initial investment, cuts down on wiring work and keeps maintenance costs to a minimum.

Inspections | 01

Multiple cameras in one to enhance precision

Inspections | 02

A single camera performing powerful inspection tasks and code reading

Inspections | 03

A single camera designed for long operational lifetime



Inspections | 01

Multiple cameras in one to enhance precision



Positioning of a single camera only

A single camera can capture a wide view, eliminating the need to combine multiple cameras that require timeconsuming positioning design and fine-tuning.



Presence, color and shape detection and reading at the same time

The F430-F/F420-F Series can simultaneously perform detection tasks (presence, color, and shape) and code reading within the field of view. You can easily increase inspection points for quality enhancement.



Code Presence reading detection

Inspections | 02

A single camera performing powerful inspection tasks and code reading



Installation space and communication design are required for both the sensor and code reader.

Installation space and communication design are required for a single smart camera only.

To perform a simple inspection task - such as presence/absence detection, color detection, etc. - along with a code or character reading, a highlyfunctional sensor or a sensor combined with a code reader for each purpose would be required. The F430-F/F420-F Series successfully performs both functions, simplifying inspection tasks overall.



Wiring and installation space reduced by half

A single camera with smart camera and code reader functionalities halves the number of cables to the host device and the installation space.



Text and verification result output

The F430-F/F420-F Series can output character strings and code quality verification results, which is difficult with standard smart cameras. The output information can be used for traceability.

Example of output data

- 1. Result of inspection: OK/NG
- 2. Result of code reading: Character string
- 3. Result of verification: Quality grade of code

Inspections | 03

The long-life autofocus lens provides long operational lifetime without the need for replacement





Difference between mechanical autofocus and liquid lens autofocus

Mechanical autofocus uses a small motor as a major component. Metal fatigue and wear shorten the life of the camera, which requires replacement every year. The liquid autofocus lens can flexibly change its focal length without mechanical wear by applying voltage to change the internal oil and water shape.



* Calculated using Omron's condition below.

Limit of standard mechanical autofocus : 50,000 operations

is once every several months to several years with the

mechanical autofocus lens.

Usage condition: Focus is changed 200 times a day for 20 days a month. 200 operations x 20 days x 12 months = 48,000 operations » approximately 1 year.

Tools

12 tools are provided. The provided tools vary depending on the model. Refer to the datasheet for details.





Counts objects detected within the inspection area. (Method: Select from Blob Count and Shape Count)





Measures width or height between two edges. (Method: Select from Width Measure, Height Measure, Circle Measure, Point to Point Measure, Point to Line Measure, and Angle Measure)



Presence/Absence



Inspects the presence of objects. (Method: Select from Count Gray Pixels and Count Edge Pixels)



Color (5 Mpix camera)



Judges whether the color matches the registered one. The degree of match can be adjusted in percent. Speed can be increased by setting the precision parameter.







Reads a bar code or 2D code. The Match String function allows this smart camera to perform verification that is usually done by a PC or PLC.



Symbol Quality Verification

Symbol Contrast	A	100 %	State:	Not Calibrated
Modulation	A		Target Symbol 1 Width:	0.24
Reflectance Margin	A		Target Symbol 2 Width:	0.48
Fixed Pattern Dmg	A		Maximum Exposure:	32000
Axial NonUniformity	A	0 %	Target Rmin:	4
Grid NonUniformity	A	8 %	Target Rmax:	82
Unused Err Correction	A	100 %		

Enables simple print quality verification of codes to application standards such as ISO 15415, AIM DPM/ISO 29158, and ISO 15416. Also automatically generates reports. Note: QR codes cannot be verified. The Calibration Card is required.





ocv ocv



Just draw a square around characters to read them using its built-in dictionary. Reads capital alphabets, numbers, and multi-row text and compares them with the character string received from the host device.



Locate



Outputs the position and angle of the registered image. The inspection area of this tool can automatically be used for the processing following this tool.



Compares a human-readable character string read by OCR with data contained in the code read by CR, which is mostly done by a PC or PLC. Detects defects from measured character strings using the registered reference character string. Automatically focuses on a target character string even if its position differs. * Up to $\pm 15^{\circ}$





Outputs extracted character strings and combined two character strings, which is usually done by a PC or PLC.





Performs logical operation and compares sizes of tool results. Logical operation of "status" of each tool can be used to create individual judgment conditions instead of the overall condition.

Simple setup on a single screen AutoVISION Software

3-step easy setting

Follow the guide on the screen to start inspection in three steps: Image, Edit, and Run.



STEP 1. Image One click to optimize image

Place an object within a focal length and press the Autofocus button to optimize the focus and brightness of the inspection image.



STEP 2. Edit Just select tools and specify inspection areas

Setup can be done by simply selecting tools and specifying the inspection areas. You can check the test measurement results on this screen and adjust the inspection range and the threshold by viewing the screen.



STEP 2. Edit Allocate outputs

Select values and memory areas for each tool to allocate outputs, reducing PLC connection design time. In addition to OK/NG results, measured values, code reading results, and OCR results can be output, which is useful for data collection.

Example: Output of OCR results	Data that can be output is displayed as selections. Example: OCR
Contraction	Judgment result
Decon USES	Output character string
OCB OCH CAR C	Number of detected characters
Transition Outputs	Memory to allocate

STEP 3. Run One click to start inspection

Just press the Run button to start the inspection. Inspection results are displayed on the screen in real time.



Easy-to-see display of inspection status WebMonitor Software

Improve usability with large display

Your tablet or PC with a web browser can be used as the display, providing much better visibility than small displays of standard smart cameras. Choose a device size to suit the installation environment and inspection images. Refer to the datasheet for browser requirements.



Customizable user interface to maximize usability of large screens

The WebMonitor software facilitates customization of the user interface. Simply select from various preinstalled widgets and place the widget. No programming is required.

Example of widget layout



Select the widget

Assign the position and angle data of the Locate tool to memory in the AutoVISION software. Place a widget in the WebMonitor.

Select the parameter to display in the WebMonitor.

The selected parameter is displayed.

Reduce equipment costs by integrating monitoring of multiple cameras

Inspection status of multiple cameras can be monitored using a single device. Unlike standard smart cameras which require a display for each camera, the F430-F/F420-F Series requires only one display for all cameras, reducing not only initial and installation costs but also time to view each display.

Standard smart cameras

One display per camera

F430-F/F420-F Series

One display for all cameras



Note: The maximum number of cameras that can be simultaneously monitored on the WebMonitor varies depending on the inspection cycle time and system environment.

Web browser interface for easy integration of monitoring

The WebMonitor software pre-installed in the smart camera allows you to view inspection status simply by connecting your tablet or PC that has a web browser. When multiple smart cameras are monitored, the smart camera to display can be easily changed by entering its IP address in your web browser.



Attachments to capture clear images

Eliminate uneven lighting and halation

Polarizer and Diffuser

Attaching a polarizer or diffuser reduces halation and reflection without the need to install the camera at an angle.

Polarizer



Halation

Distortion of image

Eliminates distortion of image and cuts specular reflection





Polarizer

Diffuser

Diffuser

Not attached



Uneven lighting

Reduces uneven lighting

Protect against laser radiation

YAG Filter

When the smart camera is installed near YAG laser equipment (e.g., laser marker, laser engraver, and laser cutter), the YAG filter is used to protect image elements against laser light.



Protect against static

ESD Safe Window*

To prevent line or object problems caused by electrostatic discharge (ESD) of the smart camera, the ESD safe window is used.



Install in a confined space

Right Angle Mirror

The right angle mirror is used to install the smart camera in a space where the camera cannot face the object.





Right Angle Connector

This connector can be used when there is no wiring space behind the smart camera.



(Right angle down (photo above) and right angle up connectors are available.)

Use under insufficient light

Ring Light Model

This model can provide reliable inspection even under insufficient light conditions and maintain the shutter speed to focus on high-speed lines, which both are difficult with a standard light.



The ring light model is available with F430 1.2 Mpix Cameras.

Enhance contrast

Color Filters

The color filter is used with a monochrome camera with white light when you want to emphasize the area where the intensity of the red or blue component is high.



Inspection area



With Red Filter



With Blue Filter









Mono Camera IR LEDs

Mono Camera Mono Camera Red LEDs Blue LEDs

you want to emphasize a specific color component or

infrared ink. White, red, blue, and IR LEDs are available.



Applications

Automotive industry

Incorrect gear inspection



Orientation inspection of attached rubber

Reading lot numbers and codes on automotive body parts



OK NG







Digital industry

Presence inspection and code reading of electronic components









OK

Presence inspection of PCB mounted components



NG

Identification of electronic components







Food, beverage, and pharmaceutical industry

Label presence inspection



Inspection for absence of medicines in blister packs

Capping and label presence inspection of beverage bottles











Logistics industry

Label orientation inspection, and code and expiration date inspection





Product quantity inspection



Code print quality verification of packing boxes











OK (Grade A)







Selection Guide

Take advantage of the F430-F/F420-F Series to perform a variety of inspection tasks with less time and effort



Omron's vision sensor series

High

High-speed high-precision alignment FH Vision System

Provides high-performance inspections and measurements beyond human vision, covering from the detection of microscopic defects to the high-speed and high-precision alignment.



High-speed appearance inspection, pre-alignment FHV7 Smart Camera

The functionality and speed enabling appearance inspection, pre-alignment, and other inspection and measurements that your production site demands are packed in an all-in-one device.



Simple discrimination F430-F/F420-F Smart Camera

Brings simple inspections such as presence/absence or direction in a single compact device without hassle.

Note: V430-F/V420-F Series can be used if only code reading is necessary. Refer to the Code Reader Group Catalog (Cat. No. Q263) for details.



· Intel and Intel Core are trademarks of Intel Corporation in the U.S. and/or other countries.

- \cdot Windows is a registered trademark of Microsoft Corporation in the USA and other countries.
- · Firefox is a trademark of the Mozilla Foundation in the US and other countries.
- · iPhone, iPad and Safari are trademarks of Apple Inc., registered in the U.S. and other countries and regions.
- · Google Chrome, Android™, Google Play, and the Google Play logo are trademarks of Google LLC.
- · Microsoft product screen shot(s) used with permission from Microsoft Corporation.

Note: Do not use this document to operate the Unit.

OMRON Corporation Industrial Automation Company

Kyoto, JAPAN

Contact : www.ia.omron.com

Regional Headquarters

OMRON EUROPE B.V. Wegalaan 67-69, 2132 JD Hoofddorp The Netherlands Tel: (31) 2356-81-300 Fax: (31) 2356-81-388

OMRON ASIA PACIFIC PTE. LTD. 438B Alexandra Road, #08-01/02 Alexandra Technopark, Singapore 119968 Tel: (65) 6835-3011 Fax: (65) 6835-3011 **OMRON ELECTRONICS LLC** 2895 Greenspoint Parkway, Suite 200 Hoffman Estates, IL 60169 U.S.A. Tel: (1) 847-843-7900 Fax: (1) 847-843-7787

OMRON (CHINA) CO., LTD. Room 2211, Bank of China Tower, 200 Yin Cheng Zhong Road, PuDong New Area, Shanghai, 200120, China Tel: (86) 21-6023-0333 Fax: (86) 21-5037-2388 Authorized Distributor:

©OMRON Corporation 2020-2023 All Rights Reserved. In the interest of product improvement, specifications are subject to change without notice. CSM_3_2 Cat. No. Q272-E1-04 0623 (1219)