

Inspection systems

FH series



- Cameras for every application
- Faster machine operation
- Easy integration with software

industrial.omron.eu/fh

Versatile yet compact vision system

Designed for use in all types of object inspection, position/orientation and measurement operations, this compact camera and controller system is easily integrated into almost any machine or robot. The system is uniquely capable of providing faster, more precise work throughput – to give you more efficiency, less cost, and more competitive advantage.

A key feature of the system is its advanced new vision algorithm: Shape Search III. This advanced, intuitive program gives you higher-speed and greater precision measurement even with difficult imaging conditions such as poor lighting, out-of-focus and rotated/randomly positioned/overlapping target objects.

Specifically intended for seamless integration with PLCs, motion controllers, and robotics the FH Vision System meets the diverse needs of builders of high-speed manufacturing machinery. The system also offers the flexibility of a PC-based vision system for easy customization and HMI integration.

A complete line-up of cameras for various applications



Controllers for fast and precise inspection and measurement



Cameras for every application

With our range of cameras offering range from the speed of 70 ms to 10 ms and resolution from 0.3 Mpix to 12 Mpix. FH series is suitable from applications in automotive to pharma to FMCG.

Faster machine operation

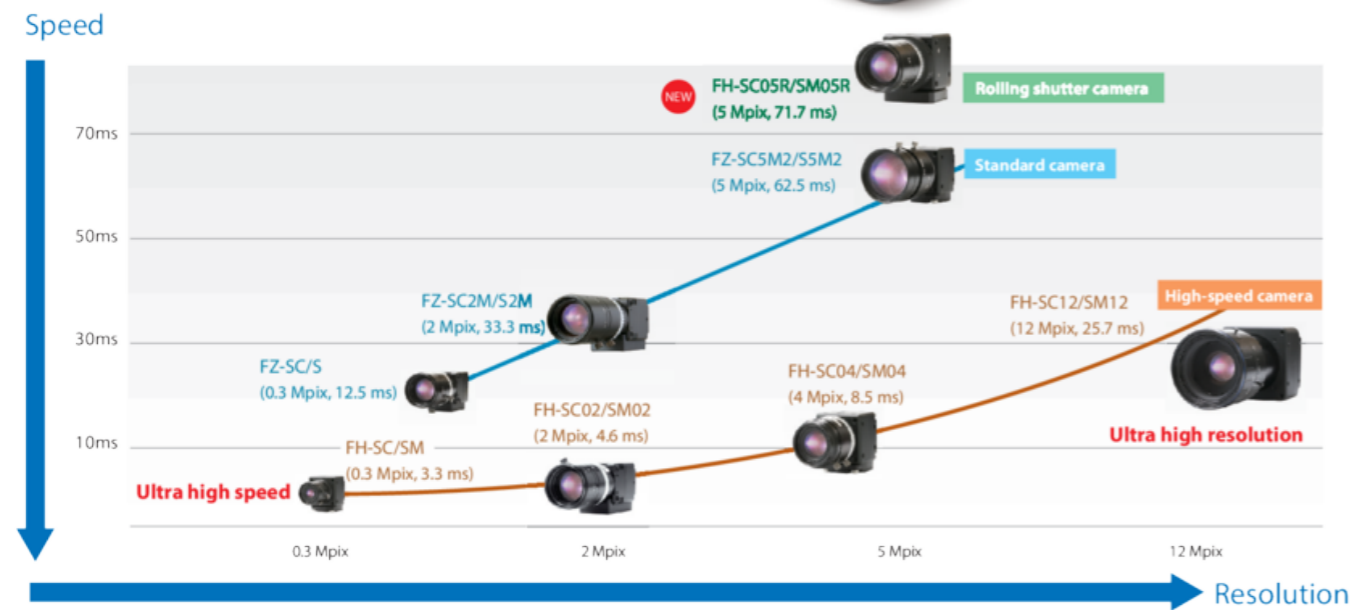
Due to lower transfer time of high-resolution images from the cameras to the controllers and ultra high speed searching. And our new search technology with new search algorithms makes the search function up to 9 times faster than before.

Easy integration with software

Our FH series comes with a software, pre-installed in the FH controller. The software is completely customizable to suit your needs as well as your application.

Cameras for every application

For applications requiring high speed and high resolution



Rolling shutter camera added to the line-up

We decided to add the function of rolling shutter cameras to our FH series. Rolling shutter allows you to scan moving objects. In addition, it provides higher quality images which lets you take informative decisions.

	Rolling shutter	Global shutter
Stationary object		
Moving object		

Easy to install into machines

Camera with built-in light

The all-in-one camera including the light and lens can be easily integrated into almost any machine. *The FQ2 Smart Cameras are also available.

High-power lighting

The sensor has a built-in high-power light capable of evenly lighting across a wide field of view. This provides sufficient lighting even when the polarizing filter is used.

Adjustable lens

The focus of the lens can be adjusted to take clear images for the specific field of view and installation distance you need.



For narrow space

Small camera

The ultra-compact lens can be installed into any limited space in a machine. Select the flat or pen type depending on the space.



with powerful controllers

You can select the best controller to suit requirements. All controllers can share the same settings, bringing flexibility to machine design.



	FH-3050 Series	FH-1050 Series	FH-L550 Series
Processing speed (CPU)	4 core High speed	2 core High speed	2 core High speed
No. of connectable cameras	2 to 8	2 to 8	2 to 4
Multi-line processing	✓	✓	—
EtherCAT	✓	✓	—
EtherNet/IP	✓	✓	✓
Connectable camera	All FH and FZ cameras		

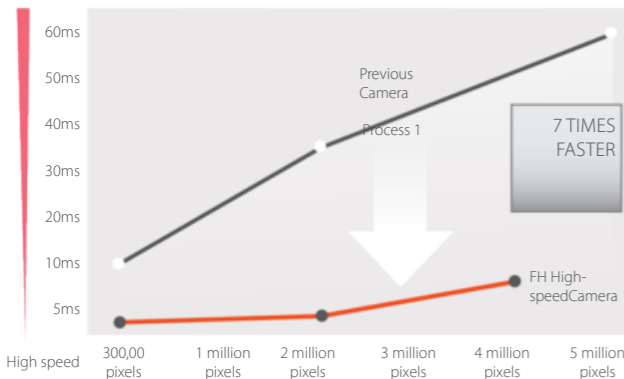
Faster machine operation



Fastest: 330 μs

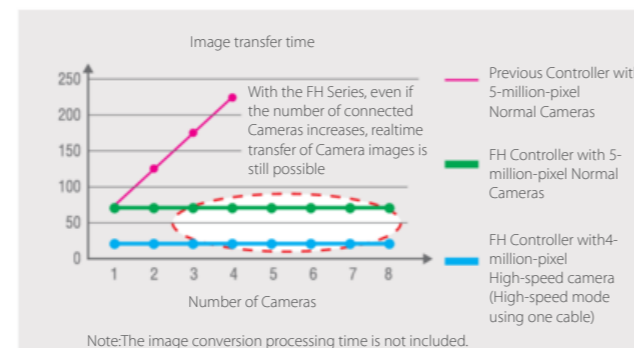
High-speed image input

Camera resolution continues to increase. That's why we've greatly reduced the input and transfer times of high-resolution images - to provide high-speed processing that matches the speed of your machine. Even with more cameras and higher resolution, high-speed image input will help increase throughput.



Real-time image transfer

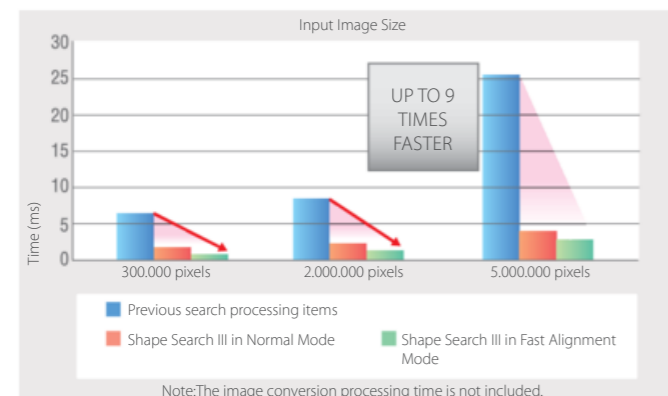
High-resolution cameras capture large amounts of data, which can cause transfer- and input-bottlenecks. That's why the FH Series Controller provides a faster, multi-line image bus to enable real-time transfer of large amounts of image data even for multiple cameras. Now you don't need to sacrifice precision to enable faster machine speed.



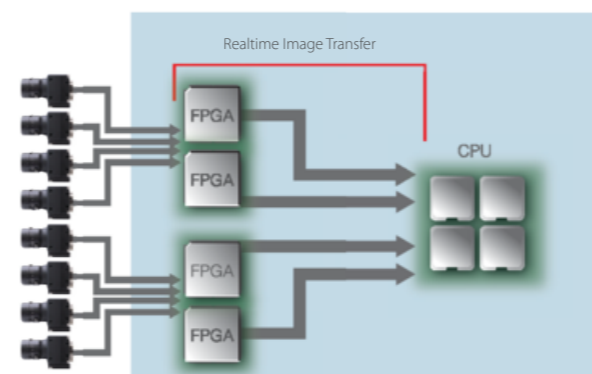
Shape Search

Ultra-high-speed Searching

New technology makes search algorithms up to nine times faster than before. Even for unstable image conditions (including light interference, overlapping shapes, gloss, and incomplete images), stable searching is now possible without reducing speed.



FH-Series

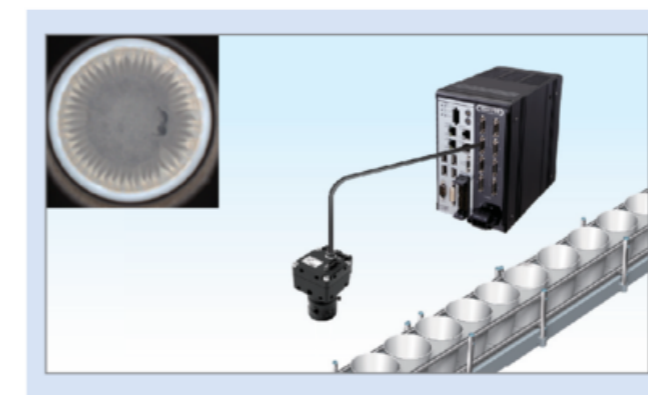


Four-core CPU* for high-speed demands on different machines

*for high-speed controllers only

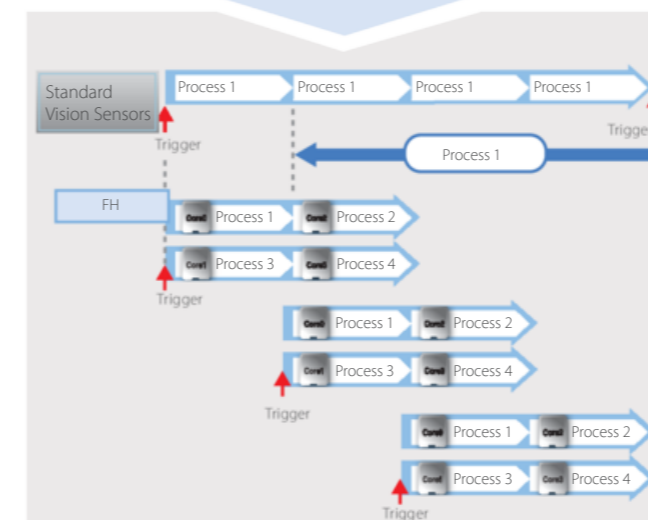
Machine cycle time reduced by 75%**

Four core process triggers, so the trigger interval can be 1/4 of previous models (in-house comparison).



Process multiple lines without waiting

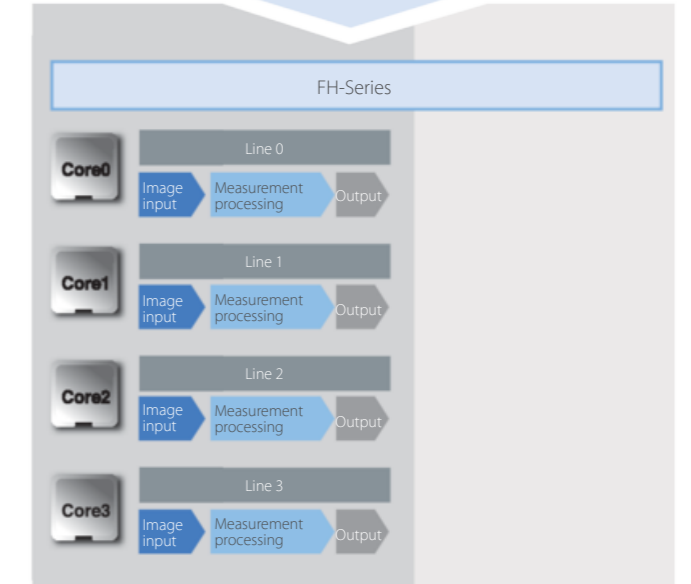
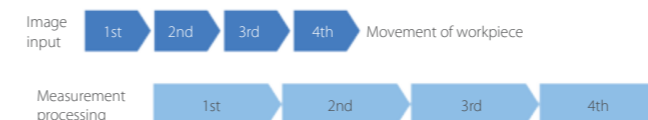
Four controllers are compressed into one without increasing the line cycle time. You can greatly reduce costs for processes that involve many lines.



Multi-input function Continuous high-speed image capture

Higher speed from advanced image capture and parallel measurements

Each camera has its own image buffer for storing image data. This is separate from the main memory that is used for measurement processing. This allows for up to 256 frames of continuous high-speed image capture even when the main memory is processing measurement data.



**The number of images that can be captured depends on the controller and the camera that is connected to it. Refer to the user's manual for details.

Easy integration with software

Optimum operation both online and offline

Connections to a network hard disk drive or network computer enables a wide range of operation possibilities. You can log measurement images long-term, or you can perform verifications and adjustments on a computer without stopping the FH Series.



New Operation Schemes through Network applications

- 1 Daily monitoring**
You can store NG image in a network HDD to check the NG images every day on a computer without reducing measurement performance. Or you can start simulation software on your computer to remeasure and analyse NG images.
- 2 Periodic adjustments and inspection adjustments**
The non-stop adjustment function lets you change Controller settings without stopping the production line. With remote operation, you can perform operations without going onsite.
- 3 Handling unstable inspections or measurement failure**
The user sends the programmer the image data, setting data, and parameter settings. The programmer can use the simulation software on the computer to check the process and change the settings with the simulation software. The altered scene data can be returned to the user and loaded to the system to complete the adjustments. This enables modifications without requiring the programmer to be on site.
- 4 Adding inspections or making changes for new models**
Based on the images to be inspected, settings are made on the simulation software on a PC running simulation software. The scene data is sent to the user to easily add the new settings.

Ideal for history management

CSV files allow you to easily understand the parameter settings. Also, you can easily change any of the settings.

1 Comparisons
If you save the basic settings, you can easily extract any differences in settings caused by changes made incorrectly.

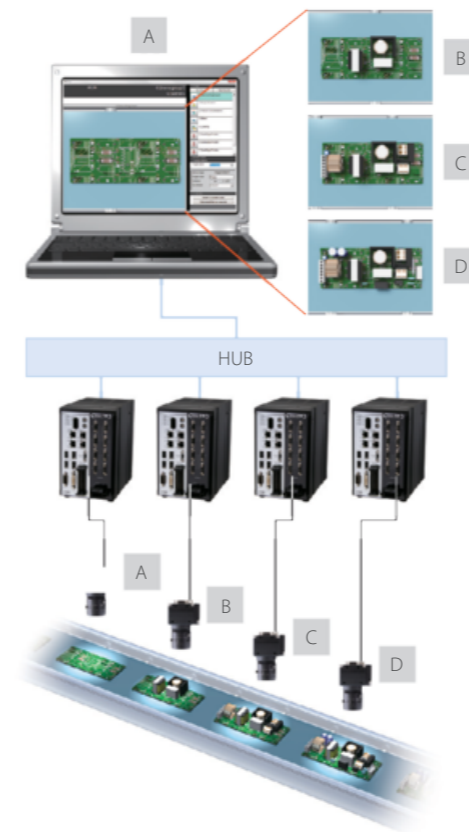
Standard settings		Current parameter settings	
General Setup	0	General Setup	0
Image Detect	4	Image Detect	4
Image Detect 2	4	Image Detect 2	4
Image Detect 3	4	Image Detect 3	4
Image Detect 4	4	Image Detect 4	4
Image Detect 5	4	Image Detect 5	4
Image Detect 6	4	Image Detect 6	4
Image Detect 7	4	Image Detect 7	4
Image Detect 8	4	Image Detect 8	4
Image Detect 9	4	Image Detect 9	4
Image Detect 10	4	Image Detect 10	4
Image Detect 11	4	Image Detect 11	4
Image Detect 12	4	Image Detect 12	4
Image Detect 13	4	Image Detect 13	4
Image Detect 14	4	Image Detect 14	4
Image Detect 15	4	Image Detect 15	4
Image Detect 16	4	Image Detect 16	4
Image Detect 17	4	Image Detect 17	4
Image Detect 18	4	Image Detect 18	4
Image Detect 19	4	Image Detect 19	4
Image Detect 20	4	Image Detect 20	4
Image Detect 21	4	Image Detect 21	4
Image Detect 22	4	Image Detect 22	4
Image Detect 23	4	Image Detect 23	4
Image Detect 24	4	Image Detect 24	4
Image Detect 25	4	Image Detect 25	4
Image Detect 26	4	Image Detect 26	4
Image Detect 27	4	Image Detect 27	4
Image Detect 28	4	Image Detect 28	4
Image Detect 29	4	Image Detect 29	4
Image Detect 30	4	Image Detect 30	4
Image Detect 31	4	Image Detect 31	4
Image Detect 32	4	Image Detect 32	4
Image Detect 33	4	Image Detect 33	4
Image Detect 34	4	Image Detect 34	4
Image Detect 35	4	Image Detect 35	4
Image Detect 36	4	Image Detect 36	4
Image Detect 37	4	Image Detect 37	4
Image Detect 38	4	Image Detect 38	4
Image Detect 39	4	Image Detect 39	4
Image Detect 40	4	Image Detect 40	4
Image Detect 41	4	Image Detect 41	4
Image Detect 42	4	Image Detect 42	4
Image Detect 43	4	Image Detect 43	4
Image Detect 44	4	Image Detect 44	4
Image Detect 45	4	Image Detect 45	4
Image Detect 46	4	Image Detect 46	4
Image Detect 47	4	Image Detect 47	4
Image Detect 48	4	Image Detect 48	4
Image Detect 49	4	Image Detect 49	4
Image Detect 50	4	Image Detect 50	4
Image Detect 51	4	Image Detect 51	4
Image Detect 52	4	Image Detect 52	4
Image Detect 53	4	Image Detect 53	4
Image Detect 54	4	Image Detect 54	4
Image Detect 55	4	Image Detect 55	4
Image Detect 56	4	Image Detect 56	4
Image Detect 57	4	Image Detect 57	4
Image Detect 58	4	Image Detect 58	4
Image Detect 59	4	Image Detect 59	4
Image Detect 60	4	Image Detect 60	4

2 Daily monitoring
You can attach CSV files to email and upload settings to the FH Series Vision System to easily make adjustments from remote locations when problems occur.

PC

Optimum operation both online and offline

Connections to a network hard disk drive or network computer enables a wide range of operation possibilities. You can log measurement images long-term, or you can perform verifications and adjustments on a computer without stopping the FH Series.



Operating several FHs from one location Application example 1

- 1** When commissioning a line, from one location you can adjust the camera images from all of the FHs located along the line. There's no need to go to and from remote controllers, and you can compare camera images under various conditions to adjust them.
- 2** If setting changes are necessary to add a new model, you can do all the required work at the same time without making trips to all of the controllers.
- 3** You can easily balance the thresholds between controllers when increasing inspection stability through testing at the production line.

Displaying images from many FHs on one monitor Application example 2

- 1** Space savings with a single monitor installation.
- 2** Single location programming for multiple controllers facilitates adjustments and reduces programmer movement.

Note: Ask your Omron representative about obtaining simulation software.

Fast output of measurement results reduces machine cycle time

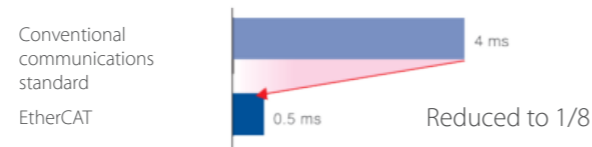
EtherCAT machine control network

EtherCAT is a high-speed open network that is ideal for machine control. You can use it to connect NJ Series machine automation controllers and motion control G5 Series Servomotors and Servo Drives to increase the control speed of everyday communications protocols from workpiece detection to starting axis motion.

Features

- Communications cycle as low as 500 μs
- Motion control that's synchronized with the communications cycle

Communications cycle



Time from trigger input to producing measurement results

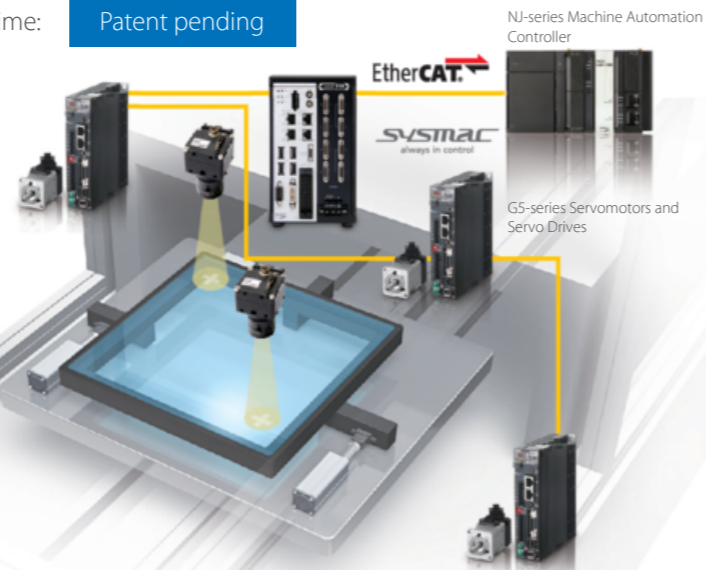


Note: The times given above are typical times. They depend on parameter settings.

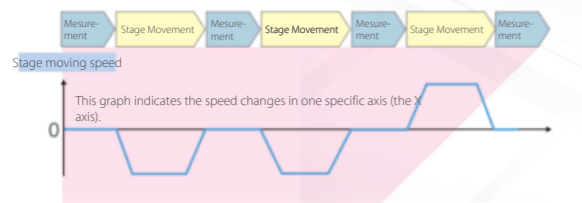
Positioning solution that eliminates workpiece dwell time:

Patent pending

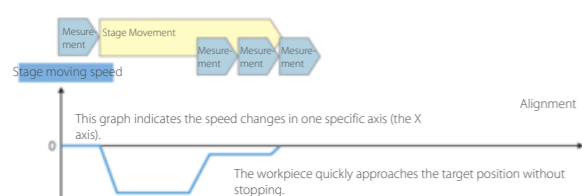
For a machine that requires micron precision, one alignment is not always enough to obtain the desired precision – multiple alignments are often necessary. But these extend the processing time. That's why we provide control methods that eliminate workpiece dwell time, which is the main cause of increased processing time. Our Sysmac Automation Platform achieves high-speed, high-precision control that continuously detects workpiece positions and successively updates the travel distance to quickly approach the target position.



Previous Vision Sensors



Sysmac



The dotted box indicates the target precision range.

The dotted box indicates the target precision range.

Note: Please ask your OMRON representative for details.

High-precision image processing required for positioning

Shape Search III

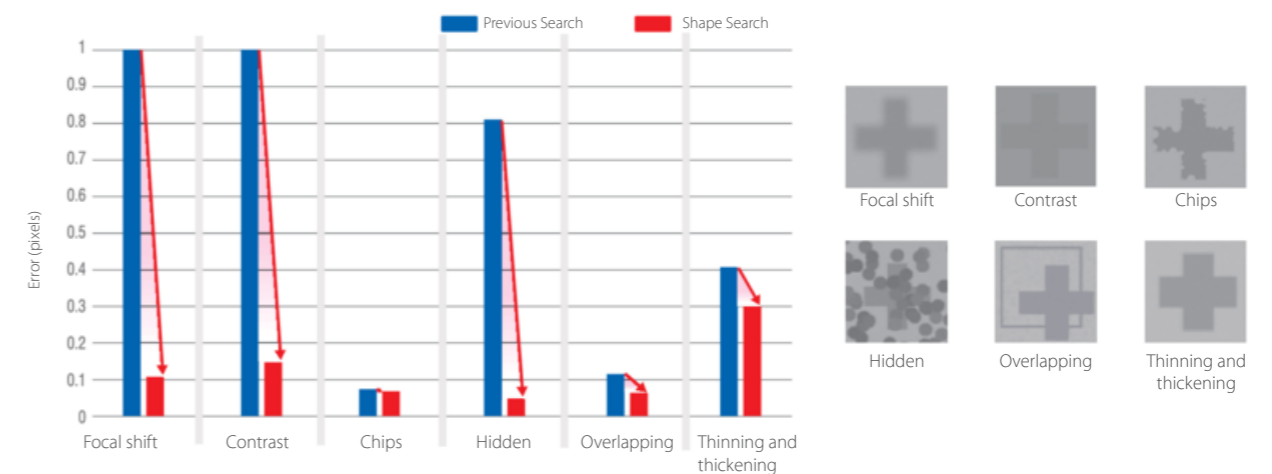


Low-error position detection even with blurry images

Over many years, we've perfected techniques to search for and match templates at high speed. This experience and expertise enables us to develop the Shape Search III vision algorithm, which provides advanced robustness and is critical on FA sites. When measuring lamination of glass or other processes where the distance to the workpiece from the camera varies, size differences and focal shifts can occur. Even in cases like this, the new Shape Search III algorithm detects positions with limited error.

Stable searching with limited error even under adverse conditions

Stable searching is possible even under the following adverse conditions, which occur far too often in actual measurement applications.

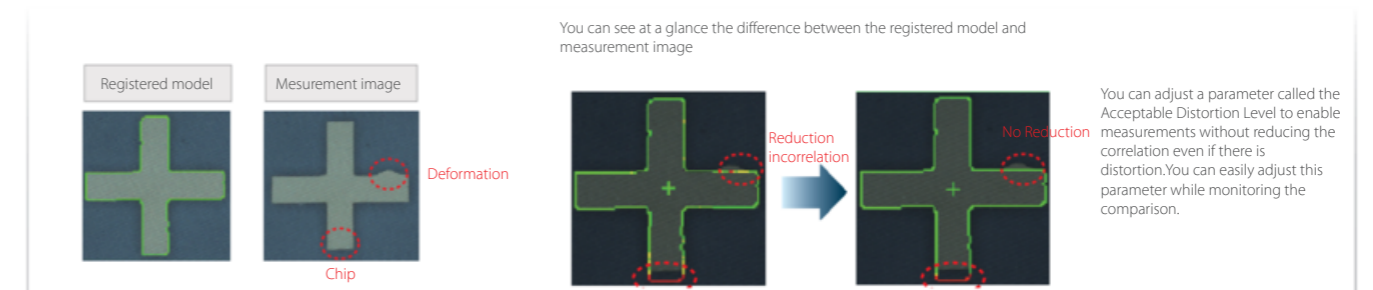


Visualisation of comparisons enables easy setup of high-precision searching

Patent pending

Advanced searching is accompanied by many parameters that must be tuned to match the application. However, it is difficult for the person making the settings to see the internal process. Normally, a lot of time and effort is required to maximize tool performance. But with Shape Search III, you can visualize comparisons between the model data and a part of the measurement object to easily see when comparisons are not optimally matched. Visualization of the

comparison level allows for parameters to be adjusted to quickly obtain the best performance.



Easy setup with program scalability

Customise original operation interfaces

Show only the buttons you need
Choose from our library of buttons and position them on screen to best support your daily operation, without "screen clutter".

Arrange the interface elements flexibly
You can flexibly change the image display composition to display entire image, enlarge part of an image, or display images from different cameras.

Move windows freely
Drag and drop windows where you want. You can also change the box size and delete.

Eight screen layout
Up to 8 screens can be stored depending on the application or user classification.

Hide unnecessary adjustment commands

With only menu operations on the controller, you can customize the setting displays in dialog boxes for processing items. For example, you can set up the interface to hide any parameters from the user.

Freely Lay Out Dialog Box Contents → **Completed**

Only a parameter required for daily operation can be displayed.

Completely different operation interfaces for designer and operator

Accounts can be used to keep completely different operation interfaces for the designer and operator. You can set up to eight levels of security for up to 50 items for each account. You can record operation logs for each account to enable smoothly isolating problems when troubleshooting.

Operating time Operating user Operation

Build measurement process with flowchart programming

Just add any of the large variety of processing items to the measurement flow to build the basic program for image processing. All processing items have menus for easy setup and adjustment. This enables you to easily build the best imaging processing for each application and to smoothly complete testing and adjustments without programming.

Flowchart
Just add processing items from the processing item list to visually edit the flow.

Processing Item List
Folders
You can group processing units into named folders. By managing related processing together and hiding lower levels, you can display even long measurement flows in a way that easily shows the overall flow.

Flowchart Output
You can save the flowchart as an image file.

Branching
You can use conditional branching to branch according to the execution results of the previous processing units or you can use branching controls with external commands through parallel I/O, PLC Links, or no-protocol communications.

Easy multi-language support: Choose any of nine languages

Display the best language for the user for applications in other countries. You can change display messages between nine different languages: English, Chinese (traditional or simplified), German, French, Italian, Spanish, Korean, and Japanese.

English

Simplified Chinese

Traditional Chinese

Korean/German

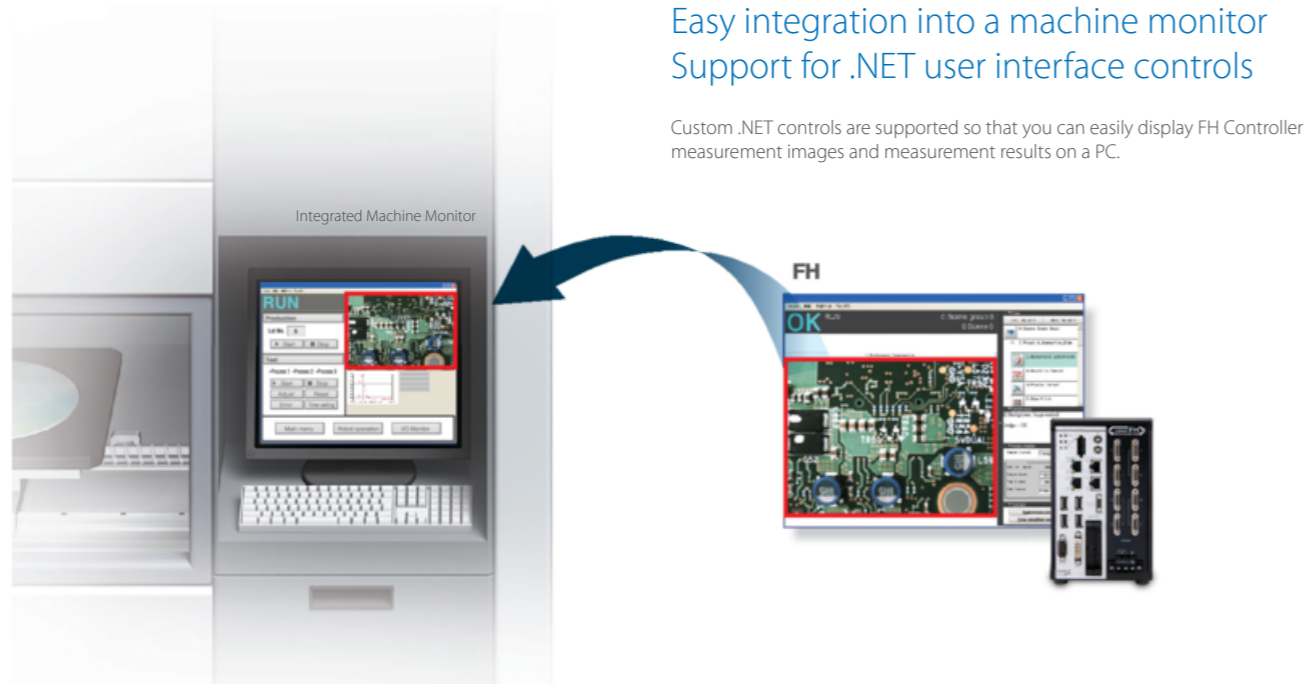
French

Italian

Spanish

Japanese

Easily connect the components that configure the machine



Easy integration into a machine monitor
Support for .NET user interface controls

Custom .NET controls are supported so that you can easily display FH Controller measurement images and measurement results on a PC.

Easy customization

- 1 Custom controls for FH measurement images and measurement results are laid out on Microsoft Visual Studio®.
- 2 Instead of writing the program code from scratch to build interfaces, you can easily build the interfaces simply by pasting custom controls.

Output to HMI or high-resolution monitor



Microsoft® Visual Studio® is a registered trademark of Microsoft Corporation.

High-precision alignment library

Four specialized types of alignment calculations are provided. You can combine these to easily execute alignment calculations on the FH Series Vision System that require complex calculations on previous sensor models or computers.

Alignment Calculations

- Movement Single Position
- Movement Multi Points
- Position Data Calculation
- Convert Position Data

Movement single position

The axis movement that is required to match the measured position angle to the reference position angle is calculated.

Movement multi points

The axis movements that are required to match the measured position angles to the corresponding reference position angles are calculated.

Convert position data

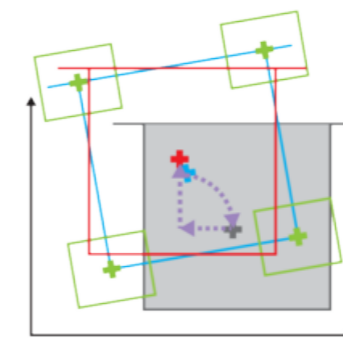
The position angle after the specified axis movement is calculated.

Position data calculation

The specified position angle is calculated from the measured position.

Available alignment methods

Position angle alignmentOffsets are suitable for aligning the positions of workpieces with different sizes. Position angle alignment allows the use of offsets to achieve flexible positioning.



- 1 The Position Data Calculation processing item is used to calculate the position and angle to use in the axis movement based on measurement results (shown in green).
- 2 The rotational movement on the θ axis is calculated as the reference angle minus the measured angle.
- 3 The measurement position is rotated by the rotational movement for the θ axis (grey).
- 4 The reference positions X and Y minus the measured positions X and Y after rotation are used as the X-axis movement and Y-axis movement.

Corresponding point alignment

The axis movements from the measured positions to the reference positions are calculated based on relational position information. This method is suitable for aligning all points within certain distances so that small deviations in the distances do not result in continuity failures, such as they can when aligning electronic substrates.

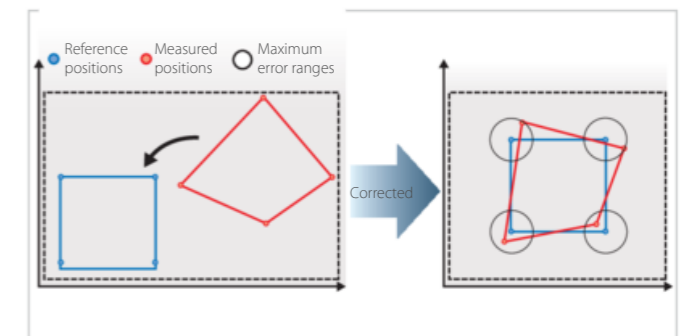
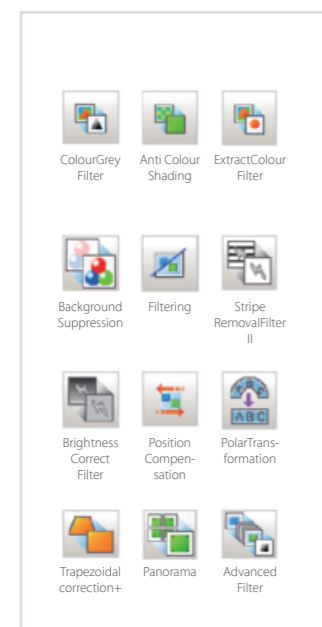


Image filter library

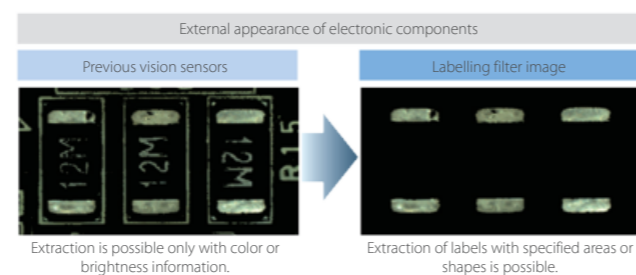
Calculations between images

You can perform arithmetic operations, bit operations, averaging, or maximum/minimum operations between two images.



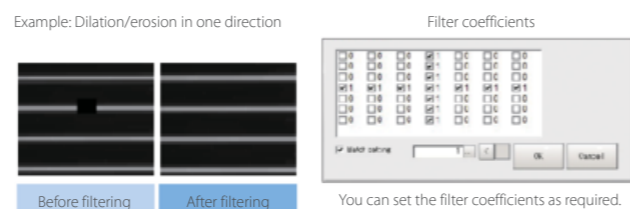
Labelling filter

This filter uses label processing to output an extracted image that contains only the specified characteristic labels.



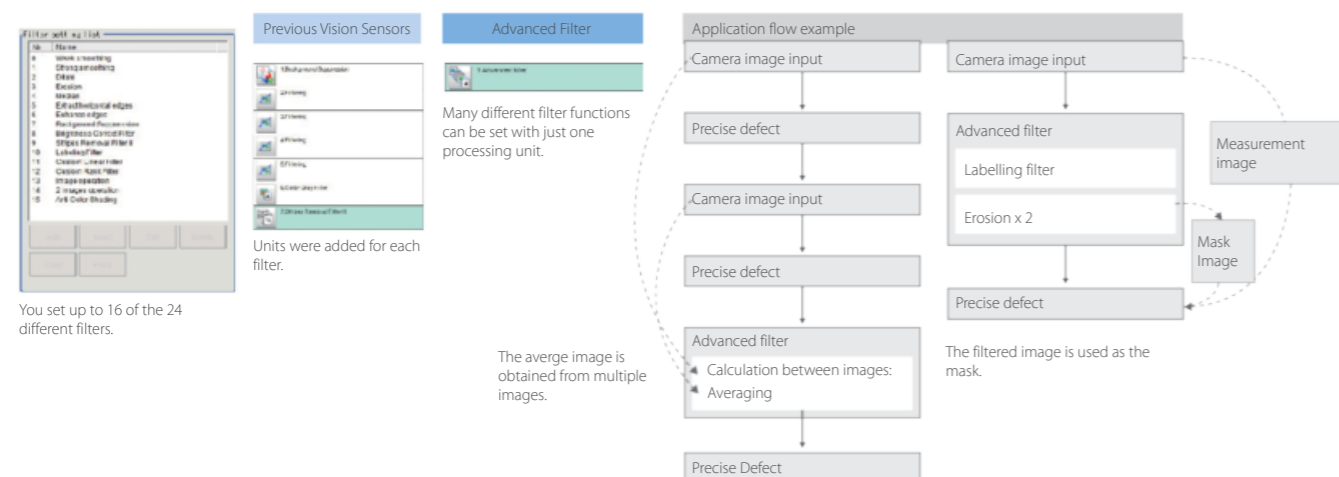
Custom filter

You can set the mask coefficients as required for these filters. The mask size can be up to 21 x 21. You can more flexibly set image smoothing, edge extractions, dilation, and erosion.

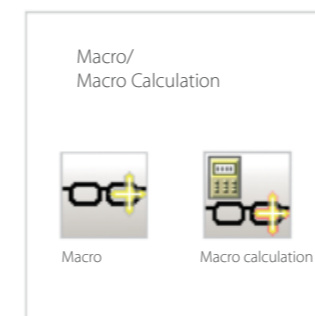


Advanced filter

The image filter library has been condensed into one processing item. This allows you to easily set complex filtering as required for external inspections.

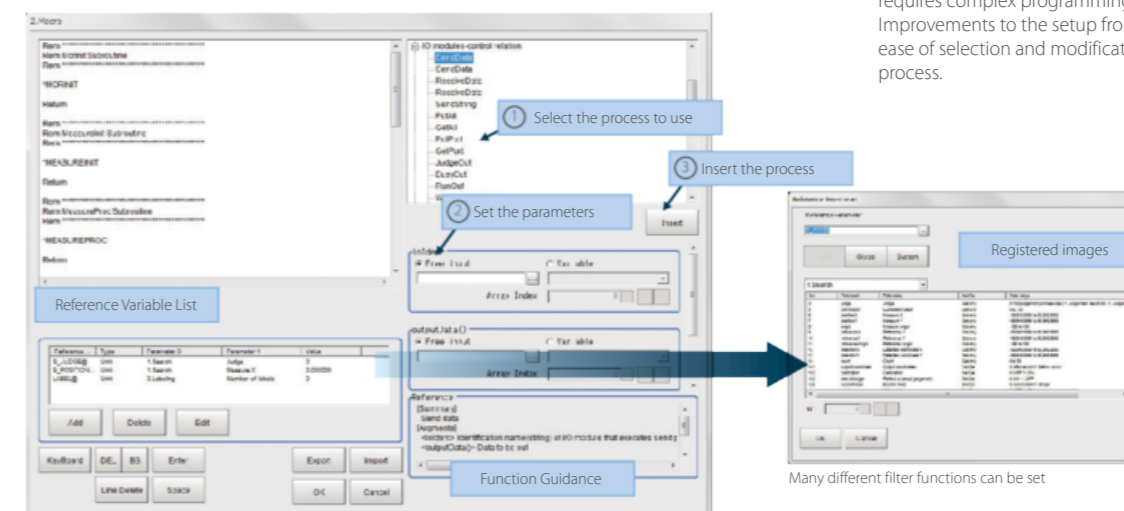


Utility library

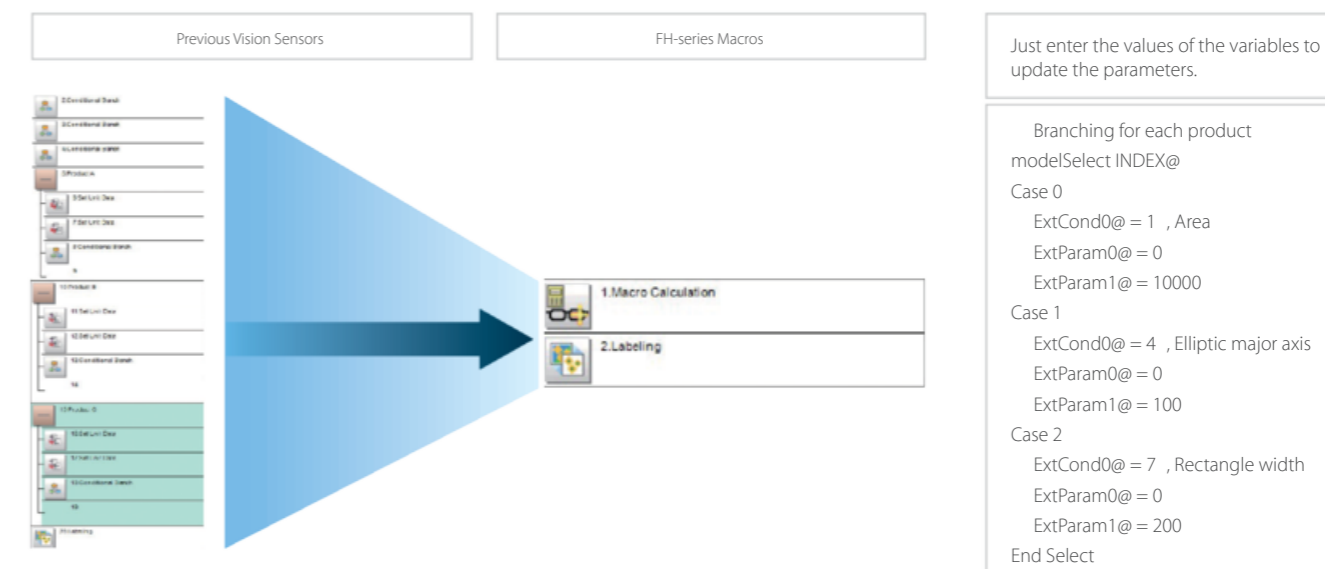


The macros

Macros let you easily achieve flow control that normally requires complex programming from the user interface. Improvements to the setup from the user interface provides ease of selection and modification of the programming process.



For example, it would previously have been long and complicated to change the set parameters of a processing item for each product model. With a Macro Calculation processing item, the flow is shorter and setting changes are easy to achieve.

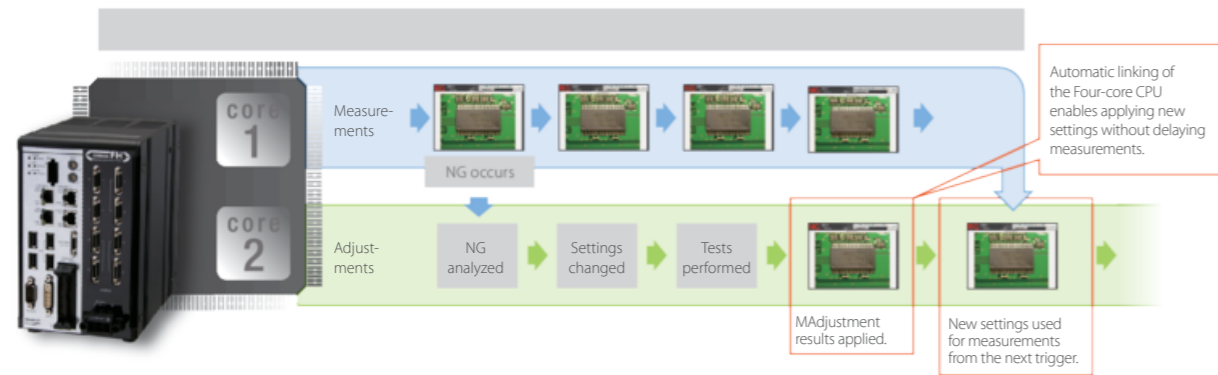


Utilities that don't stop your machines

Making confirmations and adjustments without stopping production

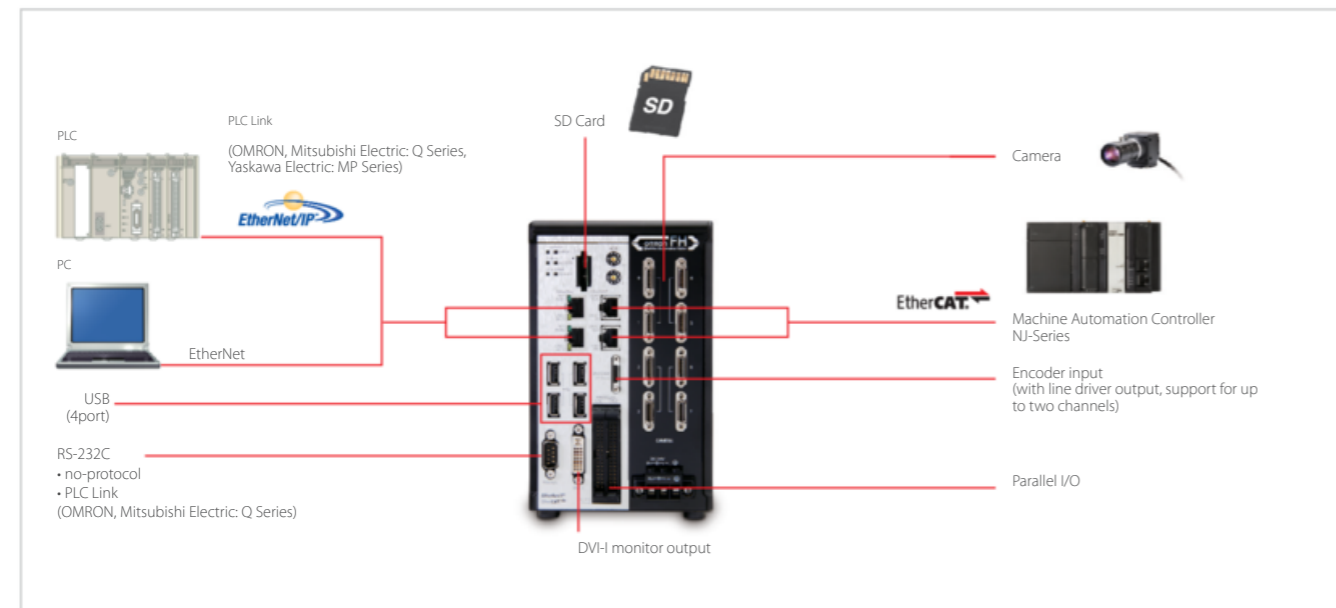
Parallel processing on Four-core CPU not only speeds up measurements, but it enables parallel processing of measurements and adjustments. Automatic distributed processing means that measurements are not delayed when adjustments are applied.

Non-stop adjustment



Seamless communications with peripheral devices

Complete interfaces for all connected devices on

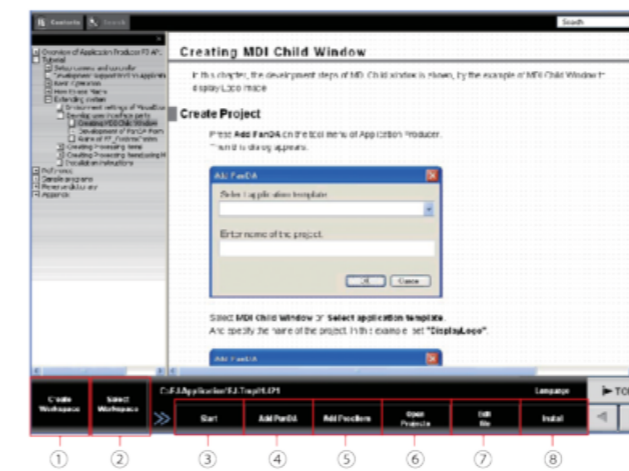


Options for more power customisation

Application producer development environment to build and simulate applications

The application producer provides a development environment that lets you further customise the standard controller features of the FH Series Vision System. It includes custom control units that you can use to develop original interfaces with Microsoft® Visual Studio®, a command reference to help you create original processing items, and more.

Application Producer Main Window



- 1 Create workspaces
- 2 Select and change between workspaces.
- 3 Start the program in the selected workspace.
- 4 Create and add GUI objects.
- 5 Create and add processing items.
- 6 Open Microsoft® Visual Studio® projects.
- 7 Open setup files.
- 8 Create installation files.

Customization Example: GUI Customization



Start add panda and select the template that will serve as a base for customization. Selecting an interface template as a base first greatly reduces the work that is required compared with programming interfaces from scratch.



The Application Producer will automatically generate a project file from the selected template so that you can open it in Microsoft® Visual Studio®. You can develop interfaces just by dragging FH Series custom controls and Windows-based controls.



Instead of writing the program code from scratch to build an interface, you can easily build the interface simply by pasting custom controls. You can immediately check and debug the operation of the GUI objects that you add.

Quick machine design

Minimise machine design, commissioning and adjustment time

Easy on-site calibration

To detect positions of workpieces carried on a conveyor and grip them with a robot hand, three different coordinate systems for the robot, conveyor, and vision must be aligned. With the FH Series, you can easily calibrate the entire system using a step-by-step wizard.

NEW Wizard calibration plate

From the Sysmac Studio you can print the Calibration Plate in various sizes, from 30 mm to 2,000 mm, according to the size of the conveyor or camera field of view.

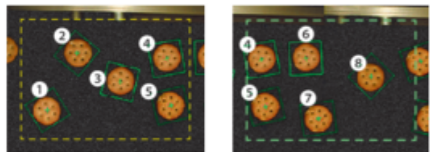


- STEP1** Start the Calibration Wizard from the Sysmac Studio, and capture the image of the Calibration Plate.
- STEP1** Move the Calibration Plate into the tracking area, and let the robot touch the target mark to automatically obtain the robot coordinates.
- STEP1** The FH Controller automatically calculates by using the data including the conveyor travel distance. Calibration between the robot and FH-series Vision System is completed.

Patent pending

Removing duplication

Workpieces that overlap within more than one field of view are segregated and only inserted in the picking line once. You can eliminate the need to create the program for the machine controller to identify the same workpiece.



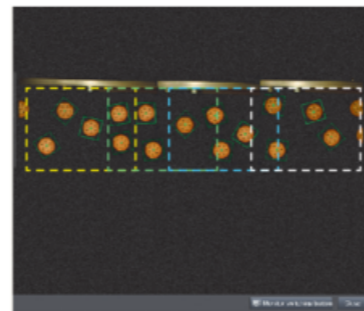
First shot
The position and orientation of workpieces 1 to 5 are detected and added to the picking line.

Next shot
Workpieces 4 to 8 are detected, but only the data of 6 to 8 is evaluated. The data of 4 and 5 is ignored because it was already added to the line.

Patented

Check ideal shooting intervals on panorama view

The Conveyor Panorama Display Tool allows you to view the measurement trigger input intervals to ensure all workpieces can be detected.



Develop Machine Control Programs with One Software: Sysmac Studio

Use the Automation Software Sysmac Studio to set up all of the slaves connected via EtherCAT. Simulate and debug motion control, logic, drives, and sensing on an integrated platform to reduce the work required for Machine design

The Sysmac Studio version 1.07 or higher supports the FH Series



Efficient preliminary verification with simulations

You can perform integrated simulations linked to motion control for robots and inspection and measurement by vision systems. The virtual environment allows to visualize the Machine motion. The simulation of the synchronisation between robots makes complex operation verification easy.

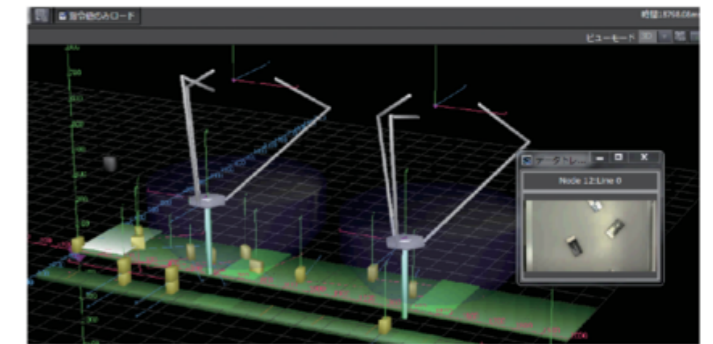
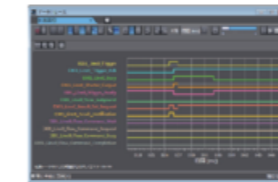
NEW 3D simulation Patent pending

Machine movement can be simulated based on measurement results of vision systems



Vision System Simulation
Inspection and measurement by vision systems can be simulated from the Sysmac Studio.

Data tracing
Inputs and outputs of vision systems can be traced as a time series.



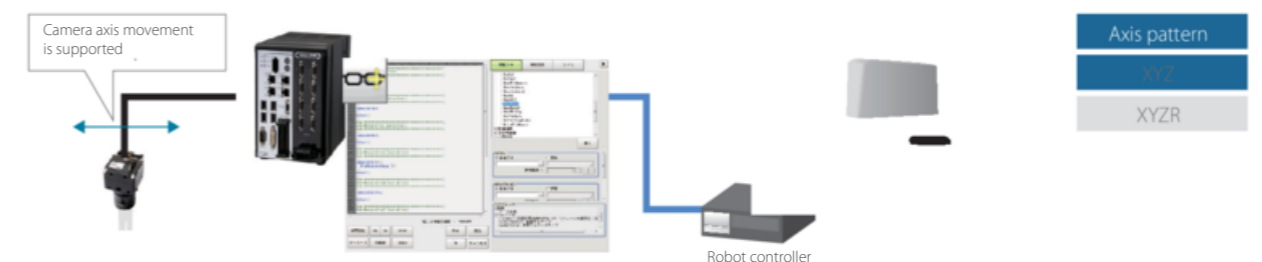
Connect directly to your existing stages and robots

FH → PLC → Servo Drives



To facilitate the control of the alignment stage, the FH Controller can calculate and output the axis movements of motors that control the stage. Calculation of the motor axis movements using a PLC is not required.

FH → Robot controller



You can connect the FH-series Vision system directly to the robot controller. The output protocol is changed according to the array of data received from the connected robot controller. This eliminates the need for programming the robot.

High immunity against ambient light



Glue bead and shape inspection application

Even workpieces with surfaces that are difficult to inspect (e.g. metal cutting surface) can be reliably inspected.

Inspection flow example



Easy to create HDR images Patent Pending

The camera image input HDR processing item can create optimized HDR images under variable ambient conditions. Normally, to create a HDR image, you must set the imaging conditions for each shooting. However with the FH Series, once you specify the area to capture on the image, the vision system automatically adjusts the shutter speed while capturing images and combines the images.

Image optimized for the specified area



Optimised for the bright part

Optimised for the entire field of view

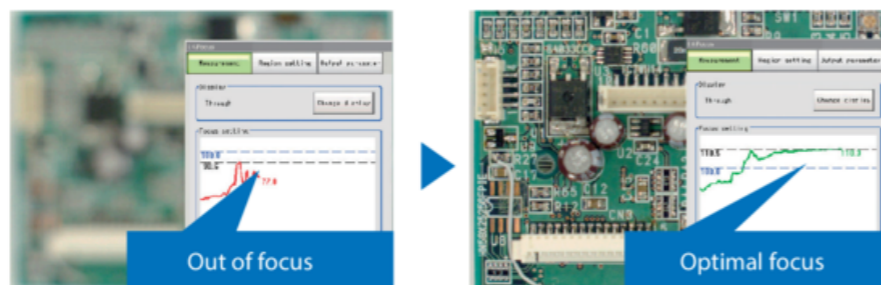
Optimised for the dark part



Optimum focus and aperture settings

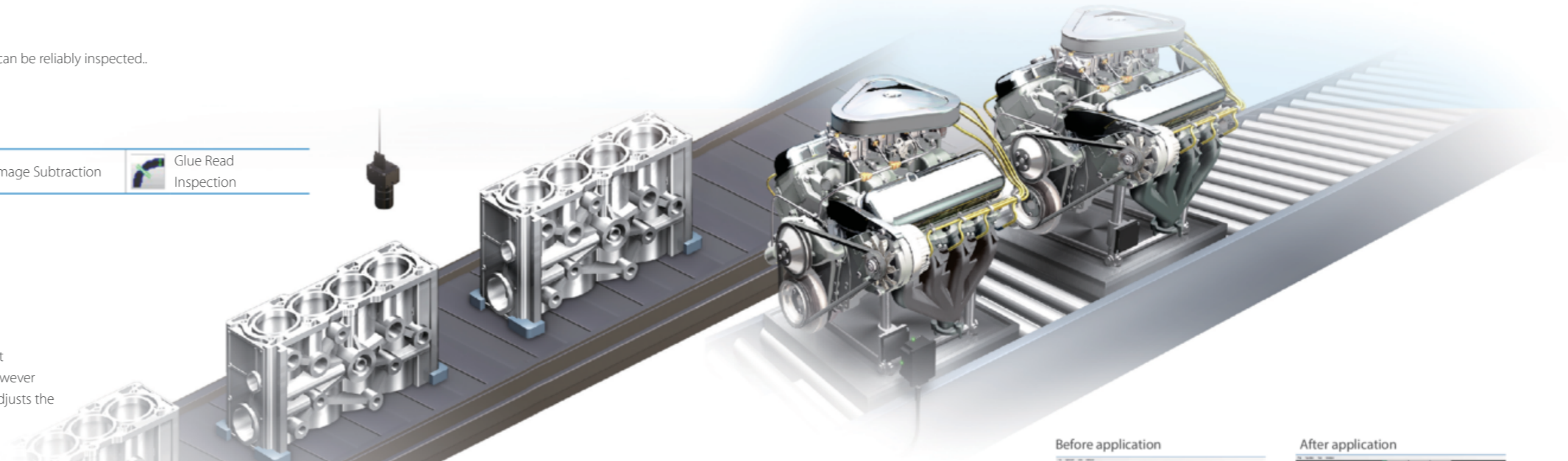
Until now, focus and brightness settings were adjusted according to experience and intuition. But now they can be evaluated numerically and visually on graphs. This allows quick verification of optimum focus and aperture settings to eliminate inconsistencies in settings caused by worker differences so that you can achieve even higher levels of measurement accuracy.

- Camera installation and setup are easy.
- Errors can be generated when the focus or aperture changes.
- You can determine the numerical values for the focus and aperture for the master workpiece so that essentially anyone can reproduce the same conditions.



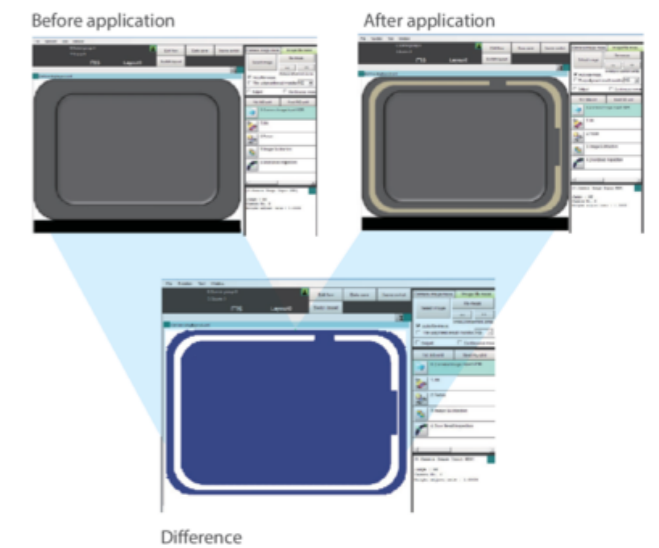
Out of focus

Optimal focus



Extraction of objects to inspect

When the complete sealing is inspected, the effects of unstable conditions can be eliminated by updating the image that is captured before applying the sealant and registered as the master. The FH Series can easily update the master image to extract the difference just by using the Image Subtraction processing item. Image Subtraction processing item.

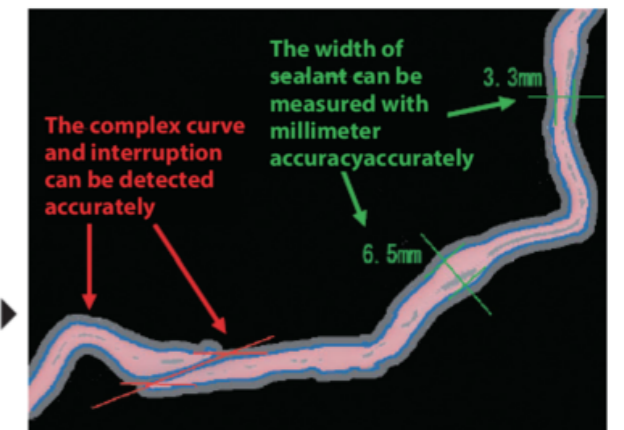
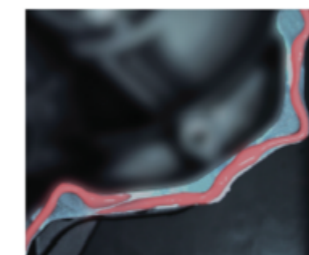


Difference



Inspection of paths and widths Patent Pending

The Glue Bead Inspection processing item evaluates sealing numerically just by defining the start and end points of the object to inspect. This minimizes inconsistencies in inspection. Even complex paths can be detected accurately. Unlike the general width inspection using edges, the profile of the object is used to inspect. This method enables accurate inspection of complex curves and interruptions.



The complex curve and interruption can be detected accurately

The width of sealant can be measured with millimeter accuracy

3.3mm

6.5mm

Versatile selection

You can select the best combination of camera and controller for your application. Software assets can be shared between controllers. This allows you to install devices with the capabilities you need, anywhere you need them.

Cameras

Choose the right camera to suit your resolution requirements. Easy-to-use cameras with built-in light are also available.

Resolution	Standard camera	High-speed camera	Rolling shutter camera	Camera with built-in light
12 Mpix	-	FH-S□12	-	-
5 Mpix/4 Mpix	FZ-S□5M	FH-S□04	Yes	-
2 Mpix	FZ-S□2M	FH-S□02	-	-
0.3 Mpix	FZ-S□	FH-S□	-	FZ-SQ□□□□

FH Controllers

Select a controller based on the required processing speed and network. All controllers can connect to any camera.

Model	Multi-line processing	No. of connectable cameras	Fieldbus
FH-3050-□□	Resolution	8 max.	EtherNet/IP, EtherCAT
FH-1050-□□	Resolution	8 max.	EtherNet/IP, EtherCAT
FH-L550-□□	Resolution	4 max.	EtherNet/IP

Application producer

This software enables you to install applications you created on the FH Series.

Description	Model
DVD for installation	FH-AP1
Software license	FH-AP1L

Touch panel monitor

The touch panel monitor is optimized for the operation of the FH Series.

Description	Model
Touch Panel Monitor 12.1 inches	FH-MT12
DVI-Analog Conversion Cable for Touch Panel Monitor	FH-VMDA □□
USB Cable for Touch Panel Monitor	FH-VUAB □□



Lights

We offer a complete line-up of lights required for image processing. The use of the camera-mount lighting controller allows you to control lighting conditions from the FH Series, making machine configuration simple.

Description	LED	High-brightness LED
Camera-mount Lighting Controller	FLV-TCC	FL-TCC
Bar Light	FLV-BR	FL-BR
Direct Ring Light	FLV-DR	FL-DR
Low Angle Ring Light	FLV-DL	-
Coaxial Light	FLV-CL	-
Shadowless Light	FLV-FR/FP/FS/FQ	-
Spot Light	FLV-EP	-
Direct Back/Edge Type Light	FLV-DB/FB	-
Dome Light	FLV-DD	-

Camera cables

The cable line-up includes bend-resistant cables and right-angle cables. Use the FZ-VSJ cable extension unit for cable extensions.

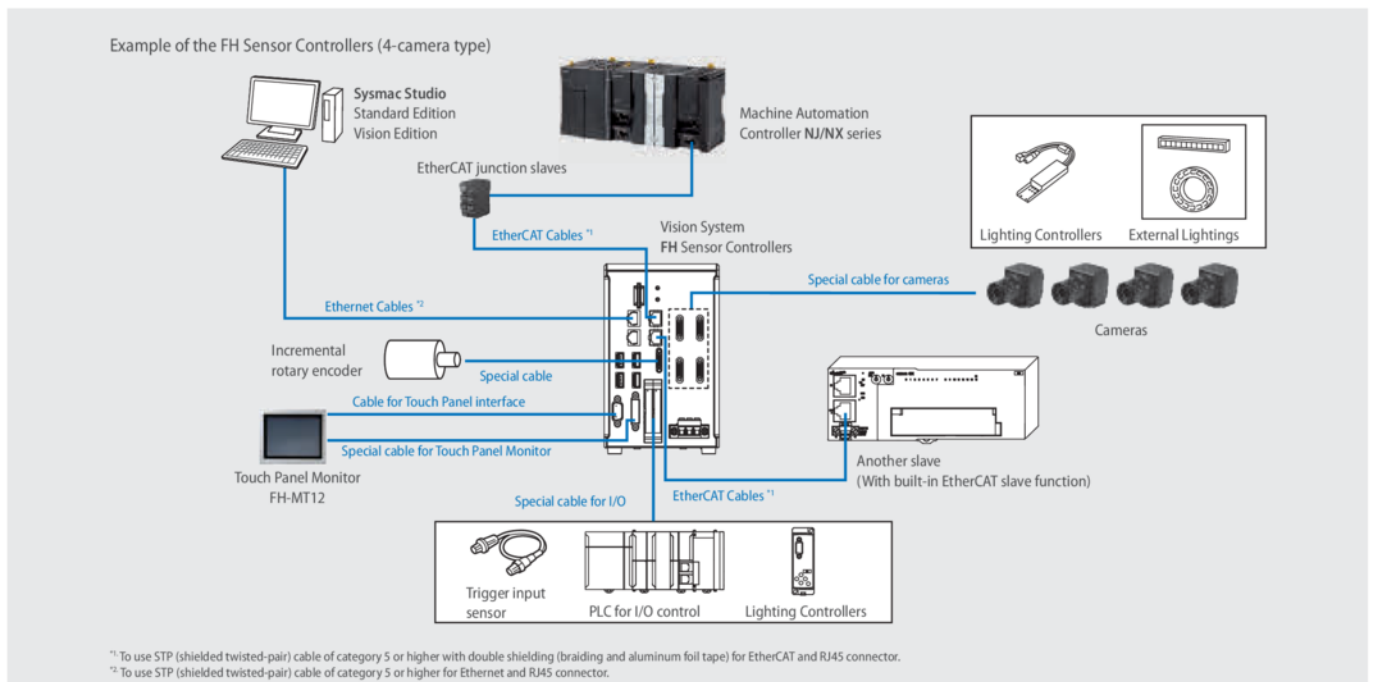
Description	Model
Camera Cable	FZ-VS3□□
Right-angle Camera Cable	FZ-VSL3□□
Bend-resistant Camera Cable	FZ-VSB3□□
Bend-resistant Right-angle Camera Cable	FZ-VSLB3□□
Cable Extension Unit	FZ-VSJ





System configuration

EtherCAT connections for FH-series



Ordering Information

FH-series sensor controllers

Item		CPU	No. of cameras	Output	Order code
	Box-type controllers	High-speed controllers (4 core)	2	NPN/PNP	FH-3050
			4	NPN/PNP	FH-3050-10
			8	NPN/PNP	FH-3050-20
		Standard controllers (2 core)	2	NPN/PNP	FH-1050
			4	NPN/PNP	FH-1050-10
			8	NPN/PNP	FH-1050-20
	Box-type controllers	Lite controllers (2 core)	2	NPN/PNP	FH-L550
			4	NPN/PNP	FH-L550-10

Cameras

Item	Descriptions	Color/ Monochrome	Image acquisition time ^{*1}	Order code
	High-speed Digital CMOS Cameras (Lens required) Up to four cameras can be connected to one Controller. Up to eight cameras other than 12 million-pixel cameras can be connected to a	Color	25.7 ms ^{*2}	FH-SC12
		Monochrome		FH-SM12
	High-speed Digital CMOS Cameras (Lens required)	Color	8.5 ms ^{*2}	FH-SC04
		Monochrome		FH-SM04
		Color	4.6 ms ^{*2}	FH-SC02
		Monochrome		FH-SM02
		Color	3.3 ms	FH-SC
		Monochrome		FH-SM
	Digital CMOS Cameras (Lens required)	Color	71.7 ms	FH-SC05R
		Monochrome		FH-SM05R
	Digital CCD Cameras (Lens required)	Color	62.5 ms	FZ-SC5M2
		Monochrome		FZ-S5M2
		Color	33.3 ms	FZ-SC2M
		Monochrome		FZ-S2M
		Color	12.5 ms	FZ-SC
		Monochrome		FZ-S
	High-speed Digital CCD Cameras (Lens required)	Color	4.9 ms	FZ-SHC
		Monochrome		FZ-SH
	Small Digital CCD Cameras (Lenses for small camera required)	Color	12.5 ms	FZ-SFC
		Monochrome		FZ-SF
		Color	12.5 ms	FZ-SPC
		Monochrome		FZ-SP
	Intelligent Compact Digital CMOS Camera (Camera + Manual Focus Lens + High power Lighting)	Color	16.7 ms	FZ-SQ010F
		Color		FZ-SQ050F
		Color		FZ-SQ100F
		Color		FZ-SQ100N

^{*1} The image acquisition time does not include the image conversion processing time of the sensor controller. The camera image input time varies depending on the sensor controller model, number of cameras, and camera settings. Check before you use the camera.
^{*2} Frame rate in high speed mode when the camera is connected using two camera cables. For other conditions, please refer to the table below.

Camera cables

Item	Descriptions	Order code ^{*1}
	Camera cable Cable length: 2 m, 3 m, 5 m, or 10 m ^{*2}	FZ-VS3_M
	Bend resistant Camera cable Cable length: 2 m, 3 m, 5 m, or 10 m ^{*2}	FZ-VSB3_M
	Right-angle Camera cable ^{*1} Cable length: 2 m, 3 m, 5 m, or 10 m ^{*2}	FZ-VSL3_M
	Bend resistant Right-angle Camera cable ^{*3} Cable length: 2 m, 3 m, 5 m, or 10 m ^{*2}	FZ-VSLB3_M
	Long-distance Camera cable Cable length: 15 m ^{*2}	FZ-VS4 15M
	Long-distance Right-angle Camera cable ^{*3} Cable length: 15 m ^{*2}	FZ-VSL4 15M
	Cable Extension Unit Up to two Extension Units and three cables can be connected. (Maximum cable length: 45 m ^{*2})	FZ-VSJ

^{*1} Insert the cables length into _ in the model number as follows: 2 m = 2, 3 m = 3, 5 m = 5, 10 m = 10
^{*2} The maximum cable length depends on the Camera being connected, and the model and length of the Cable being used. For further information, please refer to the "Cameras /cables connection table" and "Maximum extension length using cable extension units FZ-VSJ table". When a high-speed Digital CMOS camera FH-S_02/-S_04/-S_12 is used in the high speed mode of transmission speed, two camera cables are required.
^{*3} This cable has an L-shaped connector on the camera end.

Touch Panel Monitor

Item	Descriptions	Order code
	Touch Panel Monitor 12.1 inches For FH Sensor Controllers ^{*1}	FH-MT12

^{*1} FH Series Sensor Controllers version 5.32 or higher is required.

Touch Panel Monitor cables

Item	Descriptions	Order code
	DVI Analog conversion cable for Touch Panel Monitor Cable length: 2 m, 5 m or 10 m	FH-VMDA_M ^{*1}
	RS-232C cable for Touch Panel Monitor Cable length: 2 m, 5 m or 10 m	XW2Z-__PP-1 ^{*2}
	USB cable for Touch Panel Monitor Cable length: 2 m or 5 m	FH-VUAB_M ^{*1}

^{*1} Insert the cables length into _ in the model number as follows: 2 m = 2, 5 m = 5, 10 m = 10
^{*2} Insert the cables length into __ in the model number as follows: 2 m = 200, 5 m = 500, 10 m = 010

Parallel I/O cables/Encoder cable

Item	Descriptions	Order code
	Parallel I/O cable ^{*1} Cable length: 2 m, 5 m or 15 m	XW2Z-S013-_ ^{*2}
	Parallel I/O cable for connector-terminal conversion unit ^{*1} Cable length: 0.5 m, 1 m, 1.5 m, 2 m, 3 m, 5 m Connector-Terminal Block conversion units can be connected (Terminal Blocks recommended products: OMRON XW2R_34G-T)	XW2Z-__EE ^{*3}
	Connector-Terminal Block conversion units, General-purpose devices	XW2R_34GD-T ^{*4}
	Encoder cable for line-driver Cable length: 1.5 m	FH-VR 1.5M

^{*1} 2 Cables are required for all I/O signals.
^{*2} Insert the cables length into _ in the model number as follows. 2 m = 2, 5 m = 5, 15 m = 15
^{*3} Insert the cables length into __ in the model number as follows. 0.5 m = 050, 1 m = 100, 1.5 m = 150, 2 m = 200, 3 m = 300, 5 m = 500
^{*4} Insert the wiring method into _ in the model number as follows. Phillips screw = J, Slotted screw (rise up) = E, Push-in spring = P
Refer to the XW2R Series catalog (Cat. No. G077) for details.

Parallel converter cable

When you change to connect the F series, FZ5 series, or FZ5-L series to FH series Sensor Controller, you can convert by using the appropriate parallel converter cable of FH-VPX series under the usable condition.

Item	Applicable model	Usable condition	Order code
	FZ@ series	<ul style="list-style-type: none"> Do not use RESET signal.^{*1} Use with COMIN and COMUT are same power source. 	FH-VPX-FZ
	FZ@-L35x series	<ul style="list-style-type: none"> Do not use RESET signal.^{*1} 	FH-VPX-FZL
	F160 series	<ul style="list-style-type: none"> Do not use RESET signal.^{*1} Use with COMIN and COMOUT are same power source. Do not use DI5 and DI6. 	FH-VPX-F160
	F210 series	<ul style="list-style-type: none"> Do not use RESET signal.^{*1} Use with COMIN and COMOUT are same power source. Do not use DI8 and DI9. 	FH-VPX-F210
	F500 series		

^{*1} Even if RESET signal cannot be use by conversion, conversion is possible to convert satisfying other usable condition.

Note: Cannot be used for the F160-C10CP/-C10CF.

Recommended EtherCAT and EtherNet/IP communications cables

Use Straight STP (shielded twisted-pair) cable of category 5 or higher with double shielding (braiding and aluminum foil tape) for EtherCAT.
Use Straight or cross STP (shielded twisted-pair) cable of category 5 or higher for EtherNet/IP.

Item	Descriptions	Order code
	For EtherCAT Standard type cable with connectors on both ends (RJ45/RJ45) Wire gauge and number of pairs: AWG27, 4-pair cable, cable sheath material: LSZH *1, Cable color: Blue, Yellow, or Green, Cables length: 0.2 m, 0.3 m, 0.5 m, 1 m, 1.5 m, 2 m, 3 m, 5 m, 7.5 m, 10 m, 15 m, 20 m	XS6W-6LSZH85S□CM-Y *2
	Rugged type cable with connectors on both ends (RJ45/RJ45) Wire gauge and number of pairs: AWG22, 2-pair cable Cables length: 0.3 m, 0.5 m, 1 m, 2 m, 3 m, 5 m, 10 m, 15 m	XS5W-T421-□MC-K *2
	Rugged type cable with connectors on both ends (M12/RJ45) Wire gauge and number of pairs: AWG22, 2-pair cable Cables length: 0.3 m, 0.5 m, 1 m, 2 m, 3 m, 5 m, 10 m, 15 m	XS5W-T421-□MC-K *2
	Rugged type cable with connectors on both ends (M12 L/RJ45) Wire gauge and number of pairs: AWG22, 2-pair cable Cables length: 0.3 m, 0.5 m, 1 m, 2 m, 3 m, 5 m, 10 m, 15 m	XS5W-T422-□MC-K *2
-	For EtherCAT and EtherNet/IP	Wire gauge and number of pairs: AWG24, 4-pair cable
-		Cables
-		Hitachi Metals, Ltd.
-		Kuramo Electric Co.
-		SWCC Showa Cable Systems Co.
-		RJ45 connectors
-		Panduit Corporation
-		Kuramo Electric Co.
-		JMACS Japan Co.,Ltd.
-		OMRON
-	Wire gauge and number of pairs: AWG22, 2-pair cable	NETSTAR-CSE SAB 0.5 × 4P *3
-		KETH-SB *3
-		FAE-5004 *3
-		MPS588-C *3
-		KETH-PSB-OMR *4
-		PNET/B *4
-		XS6G-T421-1 *4
-	For EtherNet/IP	Wire gauge and number of pairs: 0.5 mm, 4-pair cable
-		Cables
-		Fujikura Ltd.
-		RJ45 connectors
-		Panduit Corporation
-		F-LINK-E 0.5mm × 4P *5
-		MPS588 *5

*1 The lineup features Low Smoke Zero Halogen cables for in-cabinet use and PUR cables for out-of-cabinet use.
*2 For details, refer to Cat.No.G019.
*3 We recommend you to use above cable for EtherCAT and EtherNet/IP, and RJ45 connector together.
*4 We recommend you to use above cable for EtherCAT and EtherNet/IP, and RJ45 assembly connector together.
*5 We recommend you to use above cable For EtherNet/IP and RJ45 Connectors together.

Note: Please be careful while cable processing, for EtherCAT, connectors on both ends should be shield connected and for EtherNet/IP, connectors on only one end should be shield connected.

Automation software Sysmac Studio

Please purchase a DVD and licenses the first time you purchase the Sysmac Studio. DVDs and licenses are available individually. The license does not include the DVD.

Item	Specifications	Number of licenses	Media	Order code
Sysmac Studio Standard Edition Ver.1.____	The Sysmac Studio is the software that provides an integrated environment for setting, programming, debugging and maintenance of machine automation controllers including the NJ/NX Series, EtherCat Slave, and the HMI. Sysmac Studio runs on the following OS. Windows XP (Service Pack 3 or higher, 32-bit version)/ Windows Vista (32-bit version)/Windows 7 (32-bit/64-bit version)/Windows 8 (32-bit/64-bit version)/Windows 8.1 (32-bit/64-bit version)/Windows 10 (32bit/64bit version)	– (Media only)	DVD *1	SYSMAC-SE200D
		1 license	–	SYSMAC-SE201L
		3 license	–	SYSMAC-SE203L
		10 license	–	SYSMAC-SE210L
		30 license	–	SYSMAC-SE230L
Sysmac Studio Vision Edition Ver.1.____ *2 *3	Sysmac Studio Vision Edition is a limited license that provides selected functions required for FH-series/FQ-M-series Vision Sensor settings.	1 license	–	SYSMAC-VE001L
		50 license	–	SYSMAC-SE250L
Sysmac Studio Robot Additional Option *3	Sysmac Studio Robot Additional Option is a license to enable the Vision & Robot integrated simulation.	1 license	–	SYSMAC-RA401L

*1 The same media is used for both the Standard Edition and the Vision Edition.
*2 With the Vision Edition, you can use only the setup functions for FH-series/FQ-M-series Vision Sensors.
*3 This product is a license only. You need the Sysmac Studio Standard Edition DVD media to install it.

Note 1. Site licenses are available for users who will run Sysmac Studio on multiple computers. Ask your OMRON sales representative for details.
2. Sysmac Studio version 1.07 or higher supports the FH Series. Sysmac Studio does not support the FH-L550/-L550-10.







Development environment

Please purchase a CD-ROM and licenses the first time you purchase the Application Producer. CD-ROMs and licenses are available individually. The license does not include the CD-ROM.

Product	Specifications	Number of model standards licenses	Media	Order code
Application Producer	Software components that provide a development environment to further customize the standard controller features of the FH Series. System requirements: CPU: Intel Pentium processor (SSE2 or higher) OS: Windows 7 Professional (32/64bit) or Enterprise(32/64bit) or Ultimate (32/64bit), Windows 8 Pro(32/64bit) or Enterprise(32/64bit), Windows 8.1 Pro(32/64bit) or Enterprise(32/64bit) .NET Framework: NET Framework 3.5 or higher Memory: At least 2 GB RAM Available disk space: At least 2 GB Browser: Microsoft® Internet Explorer 6.0 or later Display: XGA (1024 × 768), True Color (32-bit) or higher Optical drive: CD/DVD drive The following software is required to customize the software: Microsoft® Visual Studio® 2010 Professional or Microsoft® Visual Studio® 2008 Professional or Microsoft® Visual Studio® 2012 Professional	– (Media only)	CD-ROM	FH-AP1
		1 license	–	FH-AP1L

Accessories

Item	Descriptions	Order code
	LCD Monitor 8.4 inches	FZ-M08
	LCD Monitor cable When you connect a LCD Monitor FZ-M08 to FH sensor controller, please use it in combination with a DVI-I - RGB conversion connector FH-VMRGB.	2 m 5 m FZ-VM 2M FZ-VM 5M
	DVI-I - RGB conversion connector	FH-VMRGB
	USB Memory	2 GB 8 GB FZ-MEM2G FZ-MEM8G
	SD Card	2 GB 4 GB HMC-SD291 HMC-SD491
	Display/USB Switcher	FZ-DU
-	Mouse recommended products Driverless wired mouse (A mouse that requires the mouse driver to be installed is not supported.)	–
	EtherCAT junction slaves	3 port 6 port Power supply voltage: 20.4 to 28.8 VDC (24 VDC -15 to 20%) Current consumption: 0.08 A Current consumption: 0.17 A GX-JC03 GX-JC06
	Industrial switching hubs for EtherNet/IP and Ethernet	3 port 5 port 5 port Failure detection: None Failure detection: None Failure detection: Supported Current consumption: 0.08 A Current consumption: 0.12 A W4S1-03B W4S1-05B W4S1-05C
-	Calibration plate	FZD-CAL
	Common items related to DIN rail (for FH-L550/-L550-10)	DIN rail mounting bracket FH-XDM-L
	DIN 35 mm rail	PHOENIX CONTACT Length: 75.5/95.5/115.5/200 cm Height: 7.5mm Material: Iron Surface: Conductive NS 35/7,5 PERF
	End plate	PHOENIX CONTACT Length: 75.5/95.5/115.5/200 cm Height: 15mm Material: Iron Surface: Conductive NS 35/15 PERF
	External lighting	Need 2 pieces each sensor controller CLIPFIX 35
-		FLV Series *1 FL Series *1

Item	Descriptions		Order code
	Lighting controller (Required to control external lighting from a controller)	For FLV-Series	Camera Mount Lighting Controller FLV-TCC Series*1
			Analog Lighting Controller FLV-ATC Series*1
		For FL-Series	Camera Mount Lighting Controller FL-TCC Series*1
	For Intelligent Compact Digital CMOS Camera		Mounting Bracket FQ-XL
			Mounting Brackets FQ-XL2
			Polarizing Filter Attachment FQ-XF1
	Mounting Bracket for FZ-S□		FZ-S-XLC
	Mounting Bracket for FZ-S□2M		FZ-S2M-XLC
	Mounting Bracket for FZ-S□H		FZ-SH-XLC
	Mounting Bracket for FH-S□, FZ-S□5M2		FH-SM-XLC
	Mounting Bracket for FH-S□12		FH-SM12-XLC

*1 Refer to the Vision Accessory Catalog (Cat. No. Q198) for details.

Lenses

C-mount Lens for 1/3-inch image sensor (Recommend: FZ-S□/FZ-S□H/FH-S□)

Model	3Z4S-LE SV-03514V	3Z4S-LE SV-04514V	3Z4S-LE SV-0614V	3Z4S-LE SV-0813V	3Z4S-LE SV-1214V	3Z4S-LE SV-1614V	3Z4S-LE SV-2514V	3Z4S-LE SV-3518V	3Z4S-LE SV-5018V	3Z4S-LE SV-7527V	3Z4S-LE SV-10035V
Appearance/Dimensions (mm)											
Focal length	3.5 mm	4.5 mm	6 mm	8 mm	12 mm	16 mm	25 mm	35 mm	50 mm	75 mm	100 mm
Aperture (F No.)	1.4 to Close	1.4 to Close	1.4 to Close	1.3 to Close	1.4 to Close	1.4 to Close	1.4 to Close	1.8 to Close	1.8 to Close	2.7 to Close	3.5 to Close
Filter size	-	-	M27.0 P0.5	M25.5 P0.5	M27.0 P0.5	M27.0 P0.5	M27.0 P0.5	M27.0 P0.5	M30.5 P0.5	M30.5 P0.5	M30.5 P0.5
Maximum sensor size	1/3 inch	1/3 inch	1/3 inch	1/3 inch	1/3 inch	1/3 inch	1/3 inch	1/3 inch	1/3 inch	1/3 inch	1/3 inch
Mount	C mount										


C-mount Lens for 2/3-inch image sensor (Recommend: FZ-S□2M/FZ-S□5M2/FH-S□05R)

(3Z4S-LE SV-7525H and 3Z4S-LE SV-10028H can also be used for FH-S□02 and FH-S□04)







Model	3Z4S-LE SV-0614H	3Z4S-LE SV-0814H	3Z4S-LE SV-1214H	3Z4S-LE SV-1614H	3Z4S-LE SV-2514H	3Z4S-LE SV-3514H	3Z4S-LE SV-5014H	3Z4S-LE SV-7525H	3Z4S-LE SV-10028H
Appearance/Dimensions (mm)									
Focal length	6 mm	8 mm	12 mm	16 mm	25 mm	35 mm	50 mm	75 mm	100 mm
Aperture (F No.)	1.4 to 16	1.4 to 16	1.4 to 16	1.4 to 16	1.4 to 16	1.4 to 16	1.4 to 16	2.5 to Close	2.8 to Close
Filter size	M40.5 P0.5	M35.5 P0.5	M27.0 P0.5	M27.0 P0.5	M27.0 P0.5	M35.5 P0.5	M40.5 P0.5	M34.0 P0.5	M37.5 P0.5
Maximum sensor size	2/3 inch	2/3 inch	2/3 inch	2/3 inch	2/3 inch	2/3 inch	2/3 inch	1 inch	1 inch
Mount	C mount								

C-mount Lens for 1-inch image sensor (Recommend: FH-S□02/FH-S□04)


(3Z4S-LE SV-7525H with focal length of 75 mm and 3Z4S-LE SV-10028H with focal length of 100 mm are also available.)

Model	3Z4S-LE VS-0618H1	3Z4S-LE VS-0814H1	3Z4S-LE VS-1214H1	3Z4S-LE VS-1614H1N	3Z4S-LE VS-2514H1	3Z4S-LE VS-3514H1	3Z4S-LE VS-5018H1
Appearance/Dimensions (mm)							
Focal length	6 mm	8 mm	12 mm	16 mm	25 mm	35 mm	50 mm
Aperture (F No.)	1.8 to 16	1.4 to 16	1.4 to 16	1.4 to 16	1.4 to 16	1.4 to 16	1.8 to 16
Filter size	Can not be used a filter	M55.0 P0.75	M35.5 P0.5	M30.5 P0.5	M30.5 P0.5	M30.5 P0.5	M40.5 P0.5
Maximum sensor size	1 inch	1 inch	1 inch	1 inch	1 inch	1 inch	1 inch
Mount	C mount						

M42-mount Lens for large image sensor (Recommend: FH-S□12)

Model	3Z4S-LE VS-L1828/M42-10	3Z4S-LE VS-L2526/M42-10	3Z4S-LE VS-L3528/M42-10	3Z4S-LE VS-L5028/M42-10	3Z4S-LE VS-L8540/M42-10	3Z4S-LE VS-L10028/M42-10
Appearance/Dimensions (mm)						
Focal length	18 mm	25 mm	35 mm	50 mm	85 mm	100 mm
Aperture (F No.)	2.8 to 16	2.6 to 16	2.8 to 16	2.8 to 16	4.0 to 16	2.8 to 16
Filter size	M55.0 P0.75	M55.0 P0.75	M62.0 P0.75	M62.0 P0.75	M52.0 P0.75	M52.0 P0.75
Maximum sensor size	1.8 inch					
Mount	M42 mount					

Lenses for small camera

Model	FZ-LES3	FZ-LES6	FZ-LES16	FZ-LES30
Appearance/Dimensions (mm)				
Focal length	3 mm	6 mm	16 mm	30 mm
Aperture (F No.)	2.0 to 16	2.0 to 16	3.4 to 16	3.4 to 16

Extension tubes

Lenses	For M42 mount Lenses*1	For C mount Lenses *	For Small Digital CCD Cameras
Order code	3Z4S-LE VS-EXR/M42	3Z4S-LE SV-EXR	FZ-LESR
Contents	Set of 5 tubes (20 mm, 10 mm, 8 mm, 2 mm, and 1 mm) Maximum outer diameter: 47.5 mm dia.	Set of 7 tubes (40 mm, 20 mm, 10 mm, 5 mm, 2.0 mm, 1.0 mm, and 0.5 mm) Maximum outer diameter: 30 mm dia.	Set of 3 tubes (15 mm, 10 mm, 5 mm) Maximum outer diameter: 12 mm dia.

*1 Do not use the 0.5-mm, 1.0-mm, and 2.0-mm extension tubes attached to each other. Since these extension tubes are placed over the threaded section of the lens or other extension tube, the connection may loosen when more than one 0.5-mm, 1.0-mm or 2.0-mm extension tube are used together. Reinforcement is required to protect against vibration when extension tubes exceeding 30 mm are used. When using the extension tube, check it on the actual device before using it.

Specifications

FH sensor controllers

High-speed controllers/standard controllers

Sensor controller series		FH-3000 series			FH-1000 series		
Type		High-speed controller (4 cores)			Standard controller (2 cores)		
Sensor controller model		FH-3050	FH-3050-10	FH-3050-20	FH-1050	FH-1050-10	FH-1050-20
Controller Type		BOX type					
Parallel IO		NPN/PNP (common)					
Main functions	Operation mode	Standard	Yes				
		Double speed multi-input	Yes				
		Non-stop adjustment mode	Yes				
		Multi-line random-trigger mode	Yes (Maximum 8 lines)				
Parallel processing		Yes					
Number of connectable camera		2	4	8	2	4	8
Supported camera	FH-S series camera	All of the FH-S series cameras are connectable.		All of the FH-S series cameras are connectable.* ¹	All of the FH-S series cameras are connectable.		All of the FH-S series cameras are connectable.* ¹
	FZ-S series camera	All of the FZ-S series cameras are connectable.					
Camera I/F		OMRON I/F					
Possible number of scenes		128					
Operating on UI	USB Mouse	Yes (wired USB and driver is unnecessary type)					
	Touch Panel	Yes (RS-232C/USB connection: FH-MT12)					
Setup		Create the processing flow using Flow editing.					
Language		Japanese, English, Simplified Chinese, Traditional Chinese, Korean, German, French, Spanish, Italian					
External interface	Serial communication		RS-232C × 1				
	Ethernet communication	Protocol	Non-procedure (TCP/UDP)				
		I/F	1000BASE-T × 1	1000BASE-T × 2	1000BASE-T × 1	1000BASE-T × 2	
	EtherNet/IP communication		Ethernet port (transmission rate: 1Gbps)				
	EtherCAT communication		Yes (slave)				
	Parallel I/O		12 inputs/31 outputs: Use 1 Line. Operation mode: Except Multi-line random-trigger mode.				
			17 inputs/37 outputs: Use 2 Lines. Operation mode: Multi-line random-trigger mode.				
			14 inputs/29 outputs: Use 3 to 4 Lines. Operation mode: Multi-line random-trigger mode.				
			19 inputs/34 outputs: Use 5 to 8 Lines. Operation mode: Multi-line random-trigger mode.				
	Encoder interface		Input voltage: 5 V ± 5% Signal: RS-422A LineDriver Level Phase A/B/Z: 1 MHz				
Monitor interface		DVI-I output (Analog RGB & DVI-D single link) × 1					
USB I/F		USB2.0 host × 4 (BUS Power: Port5 V/0.5 A)					
SD Card I/F		SDHC × 1					
Indicator lamps	Main		POWER: Green ERROR: Red RUN: Green ACCESS: Yellow				
	Ethernet		NET RUN: Green NET LINK ACT: Yellow	NET RUN1: Green NET LINK ACK1: Yellow NET RUN2: Green NET LINK ACK2: Yellow	NET RUN: Green NET LINK ACT: Yellow	NET RUN1: Green NET LINK ACK1: Yellow NET RUN2: Green NET LINK ACK2: Yellow	
	SD Card		SD POWER: Green SD BUSY: Yellow				
	EtherCAT		EtherCAT RUN LED: Green EtherCAT LINK/ACT IN LED: Green EtherCAT LINK/ACT OUT LED: Green EtherCAT ERR LED: Red				
Power-supply voltage		20.4 to 26.4 VDC					

Sensor controller series			FH-3000 series			FH-1000 series		
Type			High-speed controller (4 cores)			Standard controller (2 cores)		
Sensor controller model			FH-3050	FH-3050-10	FH-3050-20	FH-1050	FH-1050-10	FH-1050-20
Current consumption	When connected to a Controller	Connected to 2 cameras	5.0 A max.	5.4 A max.	6.4 A max.	4.7 A max.	5.0 A max.	5.9 A max.
		Connected to 4 cameras	–	7.0 A max.	8.1 A max.	–	6.5 A max.	7.5 A max.
		Connected to 8 cameras	–	–	11.5 A max.	–	–	10.9 A max.
	When not connected to a controller	Connected to 2 cameras	4.1 A max.	4.2 A max.	5.2 A max.	3.6 A max.	3.7 A max.	4.5 A max.
		Connected to 4 cameras	–	4.8 A max.	5.6 A max.	–	4.3 A max.	5.0 A max.
		Connected to 8 cameras	–	–	6.8 A max.	–	–	6.2 A max.
Built-in FAN			Yes					
Usage environment	Ambient temperature range		Operating: 0 to 50°C Storage: -20 to 65°C (with no icing or condensation)					
	Ambient humidity range		Operating: 35% to 85% RH Storage: 35% to 85% RH (with no condensation)					
	Ambient atmosphere		No corrosive gases					
	Vibration tolerance		Oscillation frequency: 10 to 150 Hz Half amplitude: 0.1 mm Acceleration: 15 m/s ² Sweep time: 8 minute/count Sweep count: 10 Vibration direction: up and down/front and behind/left and right					
	Shock resistance		Impact force: 150 m/s ² Test direction: up and down/front and behind/left and right					
	Noise immunity	Fast transient burst	DC power Direct infusion: 2 kV, Pulse rising: 5 ns, Pulse width: 50 ns, Burst continuation time: 15 ms/0.75 ms, Period: 300 ms, Application time: 1 min I/O line Direct infusion: 1 kV, Pulse rising: 5 ns, Pulse width: 50 ns, Burst continuation time: 15 ms/0.75 ms, Period: 300 ms, Application time: 1 min					
			Grounding Type D grounding (100 Ω or less grounding resistance) ^{*2}					
External features	Dimensions		190 mm × 115 mm × 182.5 mm Note Height: Including the rubber feet at the base.					
	Weight		Approx. 3.2 kg	Approx. 3.4 kg	Approx. 3.4 kg	Approx. 3.2 kg	Approx. 3.4 kg	Approx. 3.4 kg
	Degree of protection		IEC60529 IP20					
	Case material		Cover: zinc-plated steel plate Side plate: aluminum (A6063)					
Accessories			Instruction sheet (Japanese and English): 1, Instruction installation manual for FH series: 1, General compliance information and instructions for EU: 1, Power source (FH-XCN): 1 (male), Ferrite core for camera cable: 2 (FH-3050, FH-1050), 4 (FH-3050-10, FH-1050-10), 8 (FH-3050-20, FH-1050-20)					

*¹ When the 12 megapixels camera: max. 4 cameras are connectable. When use except 12 megapixels cameras: max. 8 cameras are connectable.
*² Existing third class grounding

Sensor controller series		FH-L series	
Type		Lite controller	
Sensor controller model		FH-L550	FH-L550-10
Controller Type		BOX type	
Parallel IO		NPN/PNP (common)	
Main functions	Operation mode	Standard	Yes
		Double speed multi-input	Yes
		Non-stop adjustment mode	Yes
		Multi-line random-trigger mode	No
Parallel processing		NPN/PNP (common)	
Number of connectable camera		2	4
Supported Camera	FH-S series camera	All of the FH-S series cameras are connectable	
	FZ-S series camera	All of the FZ-S series cameras are connectable.	
Camera I/F		OMRON I/F	
Possible number of scenes		128	
UI operations	USB Mouse	Yes (wired USB driver-less type)	
	Touch Panel	Yes (RS-232C/USB connection: FH-MT12)	
Setup		Create the processing flow using Flow editing.	
Language		Japanese, English, Simplified Chinese, Traditional Chinese, Korean, German, French, Spanish, Italian	

Sensor controller series		FH-L series		
Type		Lite controller		
Sensor controller model		FH-L550	FH-L550-10	
External interface	Serial communication		RS-232C × 1	
	Ethernet communication	Protocol	Non-procedure (TCP/UDP)	
		I/F	1000BASE-T × 1	
	EtherNet/IP communication		Ethernet port (transmission rate: 1 Gbps)	
	EtherCAT communication		No	
	Parallel I/O		High-speed input: 1 Normal speed: 9 High-speed output: 4 Normal speed: 23	
	Encoder interface		None	
	Monitor interface		DVI-I output (Analog RGB & DVI-D single link) × 1	
	USB I/F		USB2.0 host × 1: BUS Power: Port 5 V/0.5 A USB3.0 × 1: BUS Power: Port 5 V/0.5 A	
	SD Card I/F		SDHC × 1	
Indicator lamps	Main		POWER: Green ERROR: Red RUN: Green ACCESS: Yellow	
	Ethernet		NET RUN: Green NET LINK ACT: Yellow	
	SD Card		SD POWER: Green SD BUSY: Yellow	
	EtherCAT		None	
Power-supply voltage			20.4 to 26.4 VDC	
Current consumption	When connected to a Controller	Connected to 2 cameras	3.5 A max.	
		Connected to 4 cameras	–	
		Connected to 8 cameras	–	
	When not connected to a Controller	Connected to 2 cameras	1.5 A max.	
		Connected to 4 cameras	–	
		Connected to 8 cameras	–	
Built-in FAN			No	
Usage environment	Ambient temperature range		Operating: 0 to 55°C Storage: –25 to 70°C	
	Ambient humidity range		Operating and Storage: 10% to 90% RH (with no condensation)	
	Ambient atmosphere		No corrosive gases	
	Vibration tolerance		5 to 8.4 Hz with 3.5 mm amplitude, 8.4 to 150 Hz, acceleration of 9.8 m/s ² 100 min each in X, Y, and Z directions (10 sweeps of 10 min each = 100 min total)	
	Shock resistance		Impact force: 150 m/s ² Test direction: up and down/front and behind/left and right	
	Noise immunity	Fast transient burst	DC power Direct infusion: 2 kV, Pulse rising: 5 ns, Pulse width: 50 ns, Burst continuation time: 15 ms/0.75 ms, Period: 300 ms, Application time: 1 min I/O line Direct infusion: 1 kV, Pulse rising: 5 ns, Pulse width: 50 ns, Burst continuation time: 15 ms/0.75 ms, Period: 300 ms, Application time: 1 min	
			Grounding	
	External features	Dimensions		200 mm × 80 mm × 130 mm
Weight		Approx. 1.5 kg	Approx. 1.5 kg	
Degree of protection		IEC60529 IP20		
Case materials		PC		
Accessories			Instruction sheet (Japanese and English): 1, Instruction installation manual for FH-L series: 1, General compliance information and instructions for EU:1, Power source (FH-XCN-L): 1 (male)	

*1 Existing third class grounding

Cameras

High-speed Digital CMOS cameras

Model	FH-SM	FH-SC	FH-SM02	FH-SC02	FH-SM04	FH-SC04	FH-SM12	FH-SC12
Image elements	CMOS image elements (1/3-inch equivalent)		CMOS image elements (2/3-inch equivalent)		CMOS image elements (1-inch equivalent)		CMOS image elements (1.76-inch equivalent)	
Color/Monochrome	Monochrome	Color	Monochrome	Color	Monochrome	Color	Monochrome	Color
Effective pixels	640 (H) × 480 (V)		2,040 (H) × 1,088 (V)		2,040 (H) × 2,048 (V)		4,084 (H) × 3,072 (V)	
Imaging area H x V (opposing corner)	4.8 × 3.6 (6.0 mm)		11.26 × 5.98 (12.76 mm)		11.26 × 11.26 (15.93 mm)		22.5 × 16.9 (28.14 mm)	
Pixel size	7.4 (μm) × 7.4 (μm)		5.5 (μm) × 5.5 (μm)		5.5 (μm) × 5.5 (μm)		5.5 (μm) × 5.5 (μm)	
Shutter function	Electronic shutter; Shutter speeds can be set from 20 μs to 100 ms.		Electronic shutter; Shutter speeds can be set from 25 μs to 100 ms.		Electronic shutter; Shutter speeds can be set from 60 μs to 100 ms.		Electronic shutter; Shutter speeds can be set from 60 μs to 100 ms.	

Model	FH-SM	FH-SC	FH-SM02	FH-SC02	FH-SM04	FH-SC04	FH-SM12	FH-SC12
Frame rate (Image acquisition time)	308 fps (3.3 ms)		219 fps (4.6 ms) ^{*1}		118 fps (8.5 ms) ^{*1}		38.9 fps (25.7 ms) ^{*1}	
Lens mounting	C mount						M42 mount	
Field of vision, installation distance	Selecting a lens according to the field of vision and installation distance							
Ambient temperature range	Operating: 0 to 40 °C, Storage: –25 to 65 °C (with no icing or condensation)							
Ambient humidity range	Operating and storage: 35% to 85% (with no condensation)							
Weight	Approx.105 g			Approx.110 g			Approx.320 g	
Accessories	Instruction manual							

*1 Frame rate in high speed mode when the camera is connected using two camera cables.

Digital CMOS cameras

Model	FH-SM05R	FH-SC05R
Image elements	CMOS image elements (1/2.5-inch equivalent)	
Color/Monochrome	Monochrome	Color
Effective pixels	2,592 (H) × 1,944 (V)	
Imaging area H x V (opposing corner)	5.70 × 4.28 (7.13 mm)	
Pixel size	2.2 (μm) × 2.2 (μm)	
Scan type	Progressive	
Shutter Method	Rolling shutter	
Shutter function	Electronic shutter; Shutter speeds can be set from 500 to 10,000 ms in multiples of 50 μs	
Frame rate (Image acquisition time)	14 fps (71.7 ms)	
Lens mounting	C mount	
Field of vision, Installation distance	Selecting a lens according to the field of vision and installation distance	
Ambient temperature range	Operating: 0 to 40°C Storage: –30 to 65°C (with no icing or condensation)	
Ambient humidity range	Operating: 35% to 85%RH Storage: 35% to 85% RH (with no condensation)	
Weight	Approx. 52 g	
Accessories	Instruction Sheet	

Digital CCD cameras

Model	FZ-S	FZ-SC	FZ-S2M	FZ-SC2M	FZ-S5M2	FZ-SC5M2
Image elements	Interline transfer reading all pixels, CCD image elements (1/3-inch equivalent)		Interline transfer reading all pixels, CCD image elements (1/1.8-inch equivalent)		Interline transfer reading all pixels, CCD image elements (2/3-inch equivalent)	
Color/Monochrome	Monochrome	Color	Monochrome	Color	Monochrome	Color
Effective pixels	640 (H) × 480 (V)		1,600 (H) × 1,200 (V)		2,448 (H) × 2,044 (V)	
Imaging area H x V (opposing corner)	4.8 × 3.6 (6.0mm)		7.1 × 5.4 (8.9mm)		8.4 × 7.1 (11 mm)	
Pixel size	7.4 (μm) × 7.4 (μm)		4.4 (μm) × 4.4 (μm)		3.45 (μm) × 3.45 (μm)	
Shutter function	Electronic shutter; select shutter speeds from 20 μs to 100 ms					
Partial function	12 to 480 lines		12 to 1,200 lines		12 to 2,044 lines	
Frame rate (Image acquisition time)	80 fps (12.5 ms)		30 fps (33.3 ms)		16 fps (62.5 ms)	
Lens mounting	C mount					
Field of vision, installation distance	Selecting a lens according to the field of vision and installation distance					
Ambient temperature range	Operating: 0 to 50 °C Storage: –25 to 65 °C (with no icing or condensation)			Operating: 0 to 40 °C Storage: –25 to 65 °C (with no icing or condensation)		
Ambient humidity range	Operating and storage: 35% to 85% (with no condensation)					
Weight	Approx. 55 g			Approx. 76 g		Approx.140 g
Accessories	Instruction manual					

Small CCD Digital cameras

Model	FZ-SF	FZ-SFC	FZ-SP	FZ-SPC
Image elements	Interline transfer reading all pixels, CCD image elements (1/3-inch equivalent)			
Color/Monochrome	Monochrome	Color	Monochrome	Color
Effective pixels	640 (H) × 480 (V)			
Imaging area H x V (opposing corner)	4.8 × 3.6 (6.0mm)			
Pixel size	7.4 (μm) × 7.4 (μm)			
Shutter function	Electronic shutter; select shutter speeds from 20 μs to 100 ms			
Partial function	12 to 480 lines			
Frame rate (Image acquisition time)	80 fps (12.5ms)			
Lens mounting	Special mount (M10.5 P0.5)			
Field of vision, installation distance	Selecting a lens according to the field of vision and installation distance			

Model	FZ-SF	FZ-SFC	FZ-SP	FZ-SPC
Ambient temperature range	Operating: 0 to 50 °C (camera amp) 0 to 45 °C (camera head) Storage: -25 to 65 °C (with no icing or condensation)			
Ambient humidity range	Operating and storage: 35% to 85% (with no condensation)			
Weight	Approx. 150 g			
Accessories	Instruction manual, installation bracket, Four mounting brackets (M2)		Instruction manual	

High-speed Digital CCD cameras

Model	FZ-SH	FZ-SHC
Image elements	Interline transfer reading all pixels, CCD image elements (1/3-inch equivalent)	
Color/Monochrome	Monochrome	Color
Effective pixels	640 (H) × 480 (V)	
Imaging area H x V (opposing corner)	4.8 × 3.6 (6.0mm)	
Pixel size	7.4 (μm) × 7.4 (μm)	
Shutter function	Electronic shutter; select shutter speeds from 1/10 to 1/50,000 s	
Partial function	12 to 480 lines	
Frame rate (Image acquisition time)	204 fps (4.9ms)	
Field of vision, installation distance	Selecting a lens according to the field of vision and installation distance	
Ambient temperature range	Operating: 0 to 40 °C Storage: -25 to 65 °C (with no icing or condensation)	
Ambient humidity range	Operating and storage: 35% to 85% (with no condensation)	
Weight	Approx. 105 g	
Accessories	Instruction manual	

Intelligent Compact Digital CMOS cameras

Model	FZ-SQ010F	FZ-SQ050F	FZ-SQ100F	FZ-SQ100N
Image elements	CMOS color image elements (1/3-inch equivalent)			
Color/Monochrome	Color			
Effective pixels	752 (H) × 480 (V)			
Imaging area H x V (opposing corner)	4.51 × 2.88 (5.35mm)			
Pixel size	6.0 (μm) × 6.0 (μm)			
Shutter function	1/250 to 1/32,258			
Partial function	8 to 480 lines			
Frame rate (Image acquisition time)	60 fps (16.7 ms)			
Field of vision	7.5 × 4.7 to 13 × 8.2 mm	13 × 8.2 to 53 × 33 mm	53 × 33 to 240 × 153 mm	29 × 18 to 300 × 191 mm
Installation distance	38 to 60 mm	56 to 215 mm	220 to 970 mm	32 to 380 mm
LED class ^{*1}	Risk Group 2			
Ambient temperature range	Operating: 0 to 50 °C Storage: -25 to 65 °C			
Ambient humidity range	Operating and storage: 35% to 85% (with no condensation)			
Weight	Approx. 150 g		Approx. 140 g	
Accessories	Mounting bracket (FQ-XL), polarizing filter attachment (FQ-XF1), instruction manual and warning label			

^{*1} Applicable standards: IEC62471-2

Cable, Monitor

Camera cables

Model	FZ-VS3 (2 m)	FZ-VS83 (2 m)	FZ-VSL3 (2 m)	FZ-VSLB3 (2 m)
Shock resistiveness (durability)	10 to 150 Hz single amplitude 0.15 mm 3 directions, 8 strokes, 4 times			
Ambient temperature range	Operation and storage: 0 to 65 °C (with no icing or condensation)			
Ambient humidity range	Operation and storage: 40% to 70% RH (with no condensation)			
Ambient atmosphere	No corrosive gases			
Material	Cable sheath, connector: PVC			
Minimum bending radius	69 mm	69 mm	69 mm	69 mm
Weight	Approx. 170 g	Approx. 180 g	Approx. 170 g	Approx. 180 g

Cable Extension Unit

Model	FZ-VSJ
Power supply voltage ^{*1}	11.5 to 13.5 VDC
Current consumption ^{*2}	1.5 A max.
Ambient temperature range	Operating: 0 to 50 °C; Storage: -25 to 65 °C (with no icing or condensation)
Ambient humidity range	Operating and storage: 35% to 85%

Model	FZ-VSJ
Weight	Approx. 240 g
Accessories	Instruction Sheet and 4 mounting screws

^{*1} A 12-VDC power supply must be provided to the Cable Extension Unit when connecting the Intelligent Compact Camera, or the Lighting Controller.

^{*2} The current consumption shows when connecting the Cable Extension Unit to an external power supply.

Long-distance Camera Cables

Model	FZ-VS4 (15 m)	FZ-VSL4 (15 m)
Shock resistiveness (durability)	10 to 150 Hz single amplitude 0.15 mm 3 directions, 8 strokes, 4 times	
Ambient temperature range	Operation and storage: 0 to 65 °C (with no icing or condensation)	
Ambient humidity range	Operation and storage: 40% to 70% RH (with no condensation)	
Ambient atmosphere	No corrosive gases	
Material	Cable sheath, connector: PVC	
Minimum bending radius	78 mm	
Weight	Approx. 1400 g	

Encoder Cable

Model	FH-VR
Vibration resistiveness	10 to 150 Hz single amplitude 0.1 mm 3 directions, 8 strokes, 10 times
Ambient temperature range	Operation: 0 to 50 °C; Storage: -10 to 60 °C (with no icing or condensation)
Ambient humidity range	Operation and storage: 35% to 85% RH (with no condensation)

Model	FH-VR
Ambient atmosphere	No corrosive gases
Material	Cable Jacket: Heat, oil and flame resistant PVC Connector: polycarbonate resin
Minimum bending radius	65 mm
Weight	Approx. 104 g

Touch Panel Monitor

Model	FH-MT12	
Major function	Display area	12.1 inch
	Resolution	1,024 (V) × 768 (H)
	Number of color	16,700,000 colors (8 bit/color)
	Brightness	500cd/m ² (Typ)
	Contrast ratio	600:1 (Typ)
	Viewing angle	Left and right: each 80°, upward: 80°, downward: 60°
	Backlight unit	LED, edge-light
	Backlight lifetime	About 100,000 hour
	Touch panel	4wire resistive touch screen
	External interface	Video input
Touch panel signal		USB RS-232C
Ratings	Power supply voltage	24 VDC (21.6 to 26.4 VDC)
	Current consumption	0.5A
	Insulation resistance	Between DC power supply and Touch Panel Monitor FG: 20 MΩ or higher (rated voltage 250 V)
Operating environment	Ambient temperature range	Operating: 0 to 50 °C, Storage: -20 to 65 °C (with no icing or condensation)
	Ambient humidity range	Operating and Storage: 20% to 85% RH (with no icing or condensation)
	Ambient environment	No corrosive gas
	Vibration resistance	10 to 150 Hz, one-side amplitude 0.1 mm (Max. acceleration 15 m/s ²) 10 times for 8 minutes for each three direction
	Degree of protection	Panel mounting: IP65 on the front
Operation	Touch pen	
Structure	Mounting	Panel mounting, VESA mounting
	Weight	Approx.2.6 kg
	Material	Front panel: PC/PBT, Front Sheet: PET, Rear case: SUS

Note: FH Series Sensor Controllers version 5.32 or higher is required.

Touch Panel Monitor cables

Model	FH-VMDA (2 m)	FH-VUAB (2 m)	XW2Z-200PP-1 (2 m)
Cable type	DVI-Analog conversion cable	USB Cable	RS-232C Cable
Vibration resistance	10 to 150 Hz, one-side amplitude 0.1 mm, 10 times for 8 minutes for each three direction		
Ambient temperature	Operating Condition: 0 to 50 °C, Storage Condition: -10 to 60 °C (with no icing or condensation)		
Ambient humidity	Operating Condition: 35% to 85% RH, Storage Condition: 35% to 85% RH (with no icing or condensation)		
Ambient environment	No corrosive gases		
Material	Cable outer sheath, Connector: PVC		Cable outer sheath: PVC, Connector: ABS/Ni Plating
Minimum bend radius	36 mm	25 mm	59 mm
Weight	Approx.220 g	Approx.75 g	Approx.162 g

EtherCAT Communications specifications

Item	Specifications	
Communications standard	IEC61158 Type 12	
Physical layer	100 BASE-TX (IEEE802.3)	
Modulation	Base band	
Baud rate	100 Mbps	
Topology	Depends on the specifications of the EtherCAT master.	
Transmission Media	Twisted-pair cable of category 5 or higher (double-shielded straight cable with aluminum tape and braiding)	
Transmission Distance	Distance between nodes: 100 m or less	
Node address setting	00 to 9	
External connection terminals	RJ45 × 2 (shielded) IN: EtherCAT input data, OUT: EtherCAT output data	
Send/receive PDO data sizes	Input	56 to 280 bytes/line (including input data, status, and unused areas) Up to 8 lines can be set. ^{*1}
	Output	28 bytes/line (including output data and unused areas) Up to 8 lines can be set. ^{*1}
Mailbox data size	Input	512 bytes
	Output	512 bytes
Mailbox	Emergency messages, SDO requests, and SDO information	
Refreshing methods	I/O-synchronized refreshing (DC)	

^{*1} This depends on the upper limit of the master.

Version information

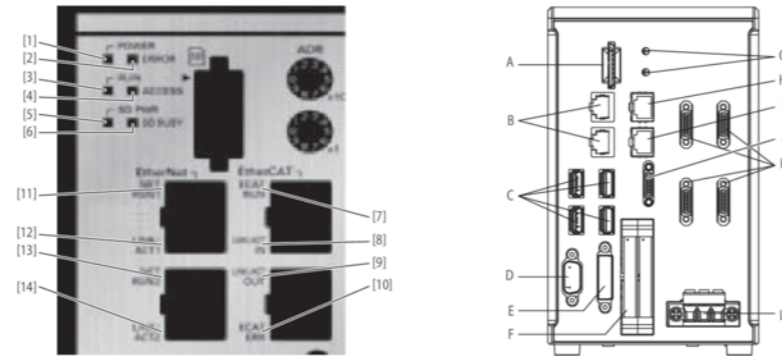
FH Series and programming devices

Use the latest version of Sysmac Studio Standard Edition/Vision Edition.

FH Series	Version of FH Series	Corresponding version of Sysmac Studio Standard Edition/Vision Edition
FH-3050 (-)	Version 5.60	Supported by version 1.15 or higher.
FH-1050 (-)	Version 5.50	Supported by version 1.14.89 or higher.
	Version 5.30	Supported by version 1.10.80 or higher.
	Version 5.20	Supported by version 1.10 or higher.
	Version 5.10	Supported by version 1.07.43 or higher.
	Version 5.00	Supported by version 1.07 or higher. Not supported by version 1.06 or lower.

Components and functions

Sensor controllers
High-speed controllers/
Standard controllers
BOX type
4-camera type

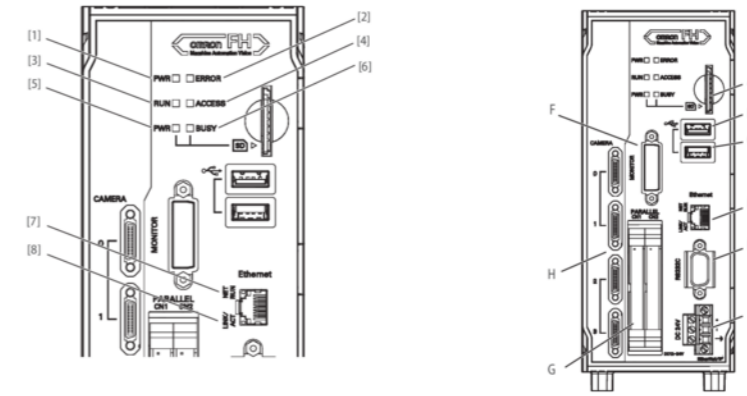


[1]	Name	Description
[1]	POWER LED	Lit while power is ON.
[2]	ERROR LED	Lit when an error has occurred.
[3]	RUN LED	Lit while the layout turned on output setting is displayed.
[4]	ACCESS LED	Blinks while the internal nonvolatile memory is accessed.
[5]	SD POWER LED	Blinks while power is supplied to the SD memory card and the card is usable.
[6]	SD BUSY LED	Blinks while the SD memory card is accessed.
[7]	EtherCAT RUN LED	Lit while EtherCAT communications are usable.
[8]	EtherCAT LINK/ACT IN LED	Lit when connected with an EtherCAT device, and blinks while performing communications.
[9]	EtherCAT LINK/ACT OUT LED	Lit when connected with an EtherCAT device, and blinks while performing communications.
[10]	EtherCAT ERR LED	Lit when EtherCAT communications have become abnormal.
[11]	EtherNet NET RUN1 LED	Lit while EtherNet communications are usable.
[12]	EtherNet NET LINK/ACK1 LED	Lit when connected with an EtherNet device, and blinks while performing communications.
[13]	EtherNet NET RUN2 LED	Lit when EtherNet communications are usable.
[14]	EtherNet NET LINK/ACK2 LED	Lit when connected with an EtherNet device, and blinks while performing communications.

A	Name	Description				
A	SD memory card installation connector	Install the SD memory card. Do not plug or unplug the SD memory card during measurement operation. Otherwise measurement time may be affected or data may be destroyed.				
B	EtherNet connector	Connect an EtherNet device. <table border="1" style="width: 100%;"> <thead> <tr> <th>Camera 2ch type</th> <th>Camera 4ch/8ch type</th> </tr> </thead> <tbody> <tr> <td>Upper port: Ethernet port and EtherNet/IP port are sharing use.</td> <td>Upper port: Ethernet port Lower port: Ethernet port and EtherNet/IP port are sharing use.</td> </tr> </tbody> </table>	Camera 2ch type	Camera 4ch/8ch type	Upper port: Ethernet port and EtherNet/IP port are sharing use.	Upper port: Ethernet port Lower port: Ethernet port and EtherNet/IP port are sharing use.
Camera 2ch type	Camera 4ch/8ch type					
Upper port: Ethernet port and EtherNet/IP port are sharing use.	Upper port: Ethernet port Lower port: Ethernet port and EtherNet/IP port are sharing use.					
C	USB connector	Connect a USB device. Do not plug or unplug it during measurement operation. Otherwise measurement time may be affected or data may be destroyed.				
D	RS-232C connector	Connect an external device such as a programmable controller.				
E	DVI-I connector	Connect a monitor.				
F	I/O connector (control lines, data lines)	Connect the controller to external devices such as a sync sensor and PLC.				
G	EtherCAT address setup volume	Used to set a node address (00 to 99) as an EtherCAT communication device.				
H	EtherCAT communication connector (IN)	Connect the opposed EtherCAT device.				
I	EtherCAT communication connector (OUT)	Connect the opposed EtherCAT device.				
J	Encoder connector	Connect an encoder.				
K	Camera connector	Connect cameras.				
L	Power supply terminal connector	Connect a DC power supply. Wire the controller independently on other devices. Wire ^{*1} the ground line. Be sure to ground the controller alone.				

*1 Use the attachment power terminal connector (male) of FH-XCN series. For details, refer to 5-3 Sensor controller installation on Vision System FH/FZ5 series Hardware setup manual (Z366).

Lite controllers
BOX type
(4-camera type)



[1]	LED name	Description
[1]	PWR LED	Lit while power is ON.
[2]	ERROR LED	Lit when an error has occurred.
[3]	RUN LED	Lit while the layout turned on output setting is displayed.
[4]	ACCESS LED	Blinks while the internal nonvolatile memory is accessed.
[5]	SD PWR LED	Lit while power is supplied to the SD memory card and the card is usable.
[6]	SD BUSY LED	Lit when access to the SD memory card.
[7]	EtherNet NET RUN LED	Lit while Ethernet communications are usable.
[8]	EtherNet NET LINK/ACT LED	Blinks when connected with an Ethernet device, and blinks while performing communications.

A	Connector name	Description
A	SD memory card installation connector	Install the SD memory card. Do not plug or unplug the SD memory card during measurement operation. Otherwise measurement time may be affected or data may be destroyed.
B	USB 2.0 connector	Connects to USB 2.0. Do not insert or remove during loading or writing of measurement or data. The measurement time can be longer or data can be damaged.
C	USB 3.0 connector	Connects to USB 3.0. Do not insert or remove during loading or writing of measurement or data. The measurement time can be longer or data can be damaged. USB 3.0 has a high ability to supply the bus power. Use the Sensor Controller by combining USB 3.0, faster transport can be realized.
D	Ethernet connector	Connect an Ethernet device. Shared Ethernet port and EtherNet/IP port.
E	RS-232C connector	Connect an external device such as a programmable controller.
F	Monitor connector	Connect a monitor.
G	Parallel connector (control lines, data lines)	Connect the controller to external devices such as a sync sensor.
H	Camera connector	Connect a camera.
I	Power supply terminal connector	Connect a DC power supply. Wire the controller independently on other devices. Wire ^{*1} the ground line. Be sure to ground the FH Sensor Controller alone.

*1 Use the attachment power terminal connector (male) of FH-XCN-L series. For details, refer to 5-3 Sensor controller installation on Vision System FH/FZ5 series Hardware setup manual(Z366).

Omron at a glance

Listed in Forbes Top 2000 largest companies of the globe
 Omron Corporation NASDAQ: OMRNY
 Top ranking in Dow Jones Sustainability Index
 Thomson Reuters Top 100 Global Innovators



200,000 products ranging Input, Logic, Output & Safety

Sensing, Control Systems, Visualisation, Drives, Robots,
 Safety, Quality Control & Inspection, Control and
 Switching Components

6%

Annual investment in Research & Development

Innovation track record of 80 years

1,200 employees dedicated to R&D
 12,500 + issued and pending patents

37,500

Employees worldwide

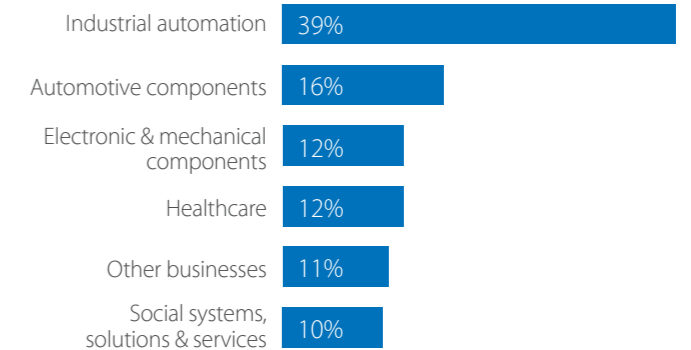
200

Locations worldwide

22

Countries in EMEA

Working for the benefit of society



Close to your needs

Technical training & seminars, technical support, Automation Technology Centers, online community (MyOmron), online catalogues and technical documentation, customer service & sales support, inter-operability labs (Tsunagi), safety services, repairs.

Would you like to know more?

OMRON UNITED KINGDOM

 +44 (0) 1908 258 258

 industrial.omron.co.uk

 [linkedin.com/company/omron](https://www.linkedin.com/company/omron)

Sales & Support Offices

Austria

Tel: +43 (0) 2236 377 800
industrial.omron.at

Belgium

Tel: +32 (0) 2 466 24 80
industrial.omron.be

Czech Republic

Tel: +420 234 602 602
industrial.omron.cz

Denmark

Tel: +45 43 44 00 11
industrial.omron.dk

Finland

Tel: +358 (0) 207 464 200
industrial.omron.fi

France

Tel: +33 (0) 1 56 63 70 00
industrial.omron.fr

Germany

Tel: +49 (0) 2173 680 00
industrial.omron.de

Hungary

Tel: +36 1 399 30 50
industrial.omron.hu

Italy

Tel: +39 02 326 81
industrial.omron.it

Netherlands

Tel: +31 (0) 23 568 11 00
industrial.omron.nl

Norway

Tel: +47 22 65 75 00
industrial.omron.no

Poland

Tel: +48 22 458 66 66
industrial.omron.pl

Portugal

Tel: +351 21 942 94 00
industrial.omron.pt

Russia

Tel: +7 495 648 94 50
industrial.omron.ru

South Africa

Tel: +27 (0)11 579 2600
industrial.omron.co.za

Spain

Tel: +34 902 100 221
industrial.omron.es

Sweden

Tel: +46 (0) 8 632 35 00
industrial.omron.se

Switzerland

Tel: +41 (0) 41 748 13 13
industrial.omron.ch

Turkey

Tel: +90 (216) 556 51 30
industrial.omron.com.tr

More Omron representatives

industrial.omron.eu