

Industrial Automation Guide 2016



Industrial Products & Systems

industrial.omron.eu

Targeted Technologies

Creating maximum output with minimum input

By identifying the many ways of innovation in specific industries we developed the 'targeted technologies' concept. It's a way of thinking about technology in a prioritized format. Prioritized according to our customers' most pressing needs. The result? A set of solutions that make immediate impact on the core of our customers' businesses. A set of solutions that hit the target every time. Take a look at the examples on our website.

industrial.omron.eu/technologies



T 170 for Machine Control
is designed for fast and
latest addition to the Synchro
the basis of Company

Welcome to our world

Our best-in-class devices for your automation system

Welcome to Omron's world of advanced industrial automation. The INDUSTRIAL AUTOMATION GUIDE is your essential tool to select best-in-class devices for your automation system. It highlights our core competences in sensing, control, visualisation, motion and panel components.

Of course, Omron offers a much larger range of products than you can find on the attached DVD. For more information on services and company competence visit our website.

Here you will find:

- Latest product news
- Technical product specifications
- 2D / 3D CAD Library
- Customer references
- Technology concepts
- Supporting product documentation
- Knowledge Base - "myOmron"
- Events Calendar
- Contact information

Find information fast!

Quick Links shortens your search. Quick Links are unique codes assigned to Omron products listed in this guide. Enter Quick Link codes in the search box on industrial.omron.eu to access detailed information on products in this guide.



Industrial Automation Guide 2016

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“To the machine the work of the machine,
to man the thrill of further creation.”

Kazuma Tateisi, founder of Omron

Omron at a glance

200.000 products ranging
input, logic and output

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

7%

Investment in Research & Development

Innovation track
record of 80 years

Top 150 global patent assignee

1.200 employees dedicated to R&D

11.000 + issued and pending patents

37.000

Employees worldwide

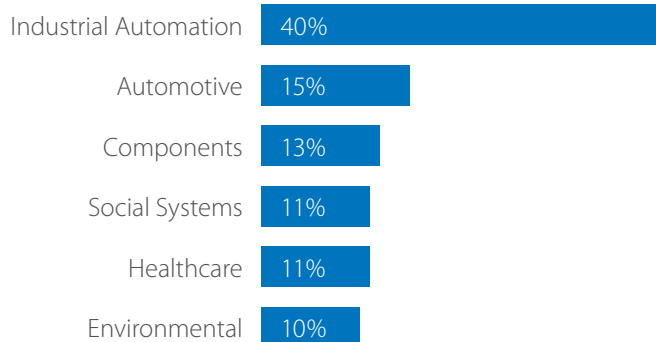
210

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.

Your needs, our focus

Solutions perfectly matching your needs

We asked ourselves: 'What do you need in sensors and components?' Well, first you need reliability. Then a variety and choice of performance levels. You may also want advanced functionality, with special features defined by you – or you may want standardized solutions, with highly competitive prices.

Whatever it is, it can all add up to a wish list that is difficult to fulfil. Until now. That's because our new 361° Approach not only provides a complete all-round offer without gaps, it also puts you at the very centre of the product selection process. It's an approach that leads to a Perfect Match – one with the extra degree of confidence that comes from choosing Omron.

361° in one view



Quality



Line-up



Application



Customization



Global availability



Specs

| | Quality | Line-up | Application | Customization | Global availability | Specs |
|---------------------------|---|---|--|--|---------------------|--|
| PRO^{plus} | Premium | Tailored | Special | Yes | Yes | Application oriented |
| PRO | Premium | Complete | Advanced | Yes | Yes | Above Standard |
| LITE | Premium | Standard | Basic | No | No | Basic |
| | 'Quality' refers to the standard of manufacturing and the materials used – this translates into reliability | 'Line-up' refers to the number of model types | 'Application' indicates the complexity of the automation | 'Customization' is the possibility to modify the product | | 'Specs' refers to the choice of performance levels |

The extra degree of advantage

Three distinct lines of sensors and components

Three distinct lines

361° Approach offers three distinct lines within each sensor or component product category. LITE products are cost-effective without any compromise in quality. PRO products represent the “install & forget” option, offering longer lifetime, higher protection, and more features. While PROplus products are designed for specific applications or customer demands.

Optimized reliability

All three lines are backed by the Omron commitment to quality, so even when you need a price-competitive advantage, you can be confident that they will never let you down.

Solutions that perfectly match your needs

The 361° Approach ensures that you can quickly and easily identify the perfect match solution to your needs – nothing more, nothing less.

Optimized costs

Your sensor and component costs are also minimized – because it eliminates over-specification.

Why an extra 1°?

The extra degree is what you get when you do business with Omron, and that means different things to different customers – all depending on their needs. For example, if you need specification advice, the extra degree is ‘service’. But ultimately, to everyone it means “an extra degree of confidence in the perfect match”.



Sysmac: A fully integrated platform

Integration and Functionality

Sysmac is an integrated automation platform dedicated to providing complete control and management of your automation plant. At the core of this platform, the Machine Controller series offers synchronous control of all machine devices and advanced functionality such as motion, robotics and database connectivity. This multidisciplinary concept allows you to simplify solution architecture, reduce programming and optimize productivity.



Machine Automation Controller

FACTORY
AUTOMATION

MACHINE
CONTROL



Motion



Filling line

- Motion Control: Integrated within the IDE, and operating in real-time
- Standard PLCopen Function Blocks plus Omron generated motion FB's
- Direct Synchronous control for Position, Speed and Torque



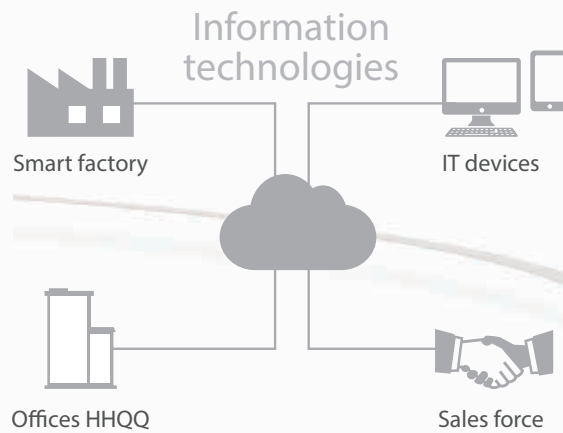
Safety



Assembly

- All safety related data is synchronized with the whole network
- Safety functions such as muting, guard locking, EDM and valve monitoring are simple to manage

- ✓ **One Integrated Development Environment software** for Configuration, Programming, Simulation and Monitoring



Information



Pills blister packing

- Sysmac communicates in real-time with Databases such as SQL
- Secure Data: In the event of a server going down or losing communications, data is automatically stored in internal memory
- Sysmac operates with Databases at high speed [1000 table element/ 100 ms] ensuring realistic Big Data Processing to improve productivity and aid predictive maintenance etc.

✓ Integrated Automation Control:

The Sysmac platform is scalable and provides the performance and functionality for a wide range of solutions from simple machines through to manufacturing cells

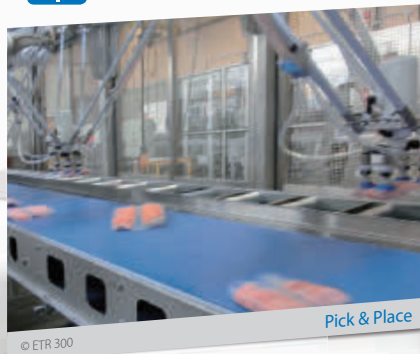
Vision



Quality inspection

- Higher resolution images available without increasing the vision processing time
- Shape search technology: Provides more stable and accurate object detection for Pick & Place projects

Robotics



Pick & Place

- Up to 8 Delta robots with one controller
- Time-based Robotic Function Blocks make programming easier

Sensing



Presence detection of the rubber seal

- Full control of the process parameter setting and predictive maintenance functions
- High precision detection and positioning data synchronized on the network

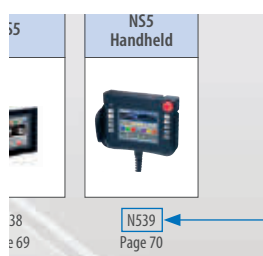
Product selection table

| | | | | |
|----------------------|---|---|--|---|
| Automation systems |  |  |  |  |
| | 12 Machine automation controller | 26 Programmable logic controllers (PLC) | 54 Remote I/O | 68 Human machine interfaces (HMI) |
| |  |  |  |  |
| | 96 Motion controllers | 112 Servo systems | 170 Robots | 202 Frequency inverters |
| Sensing |  |  |  |  |
| | 236 Photoelectric sensors | 278 Mark and Color sensors | 284 Lightcurtains and area sensors | 292 Fiber optic sensors and amplifiers |
| |  |  | | |
| | 370 Inspection & Ident systems | 426 Measurement sensors | | |
| Safety |  |  |  |  |
| | 462 Emergency stop and control devices | 472 Safety limit switches | 480 Safety door switches | 506 Safety sensors |
| |  |  |  |  |
| | 574 Temperature controllers | 596 Power supplies | 614 Uninterruptible power supplies (UPS) | 622 Timers |
| Switching components |  |  |  |  |
| | 682 Electromechanical relays | 696 Solid state relays | 706 Low voltage switchgear | 722 Monitoring products |
| |  | | | |
| | 766 Software | | | |
| Software | | | | |

Quality control & Inspection

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Quick Link

Quality control & Inspection

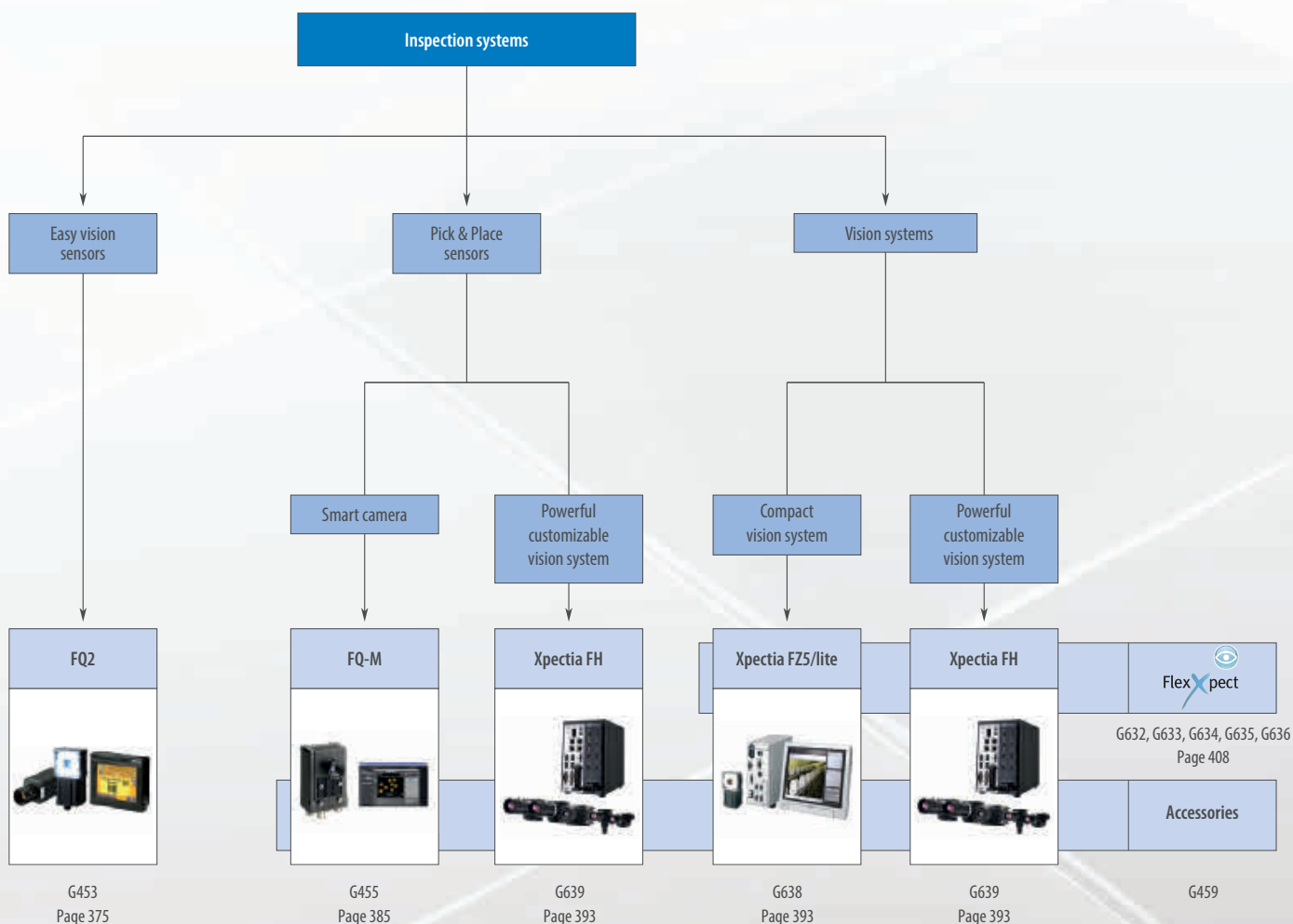
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| Inspection systems | |
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| ZX-GT | 457 |

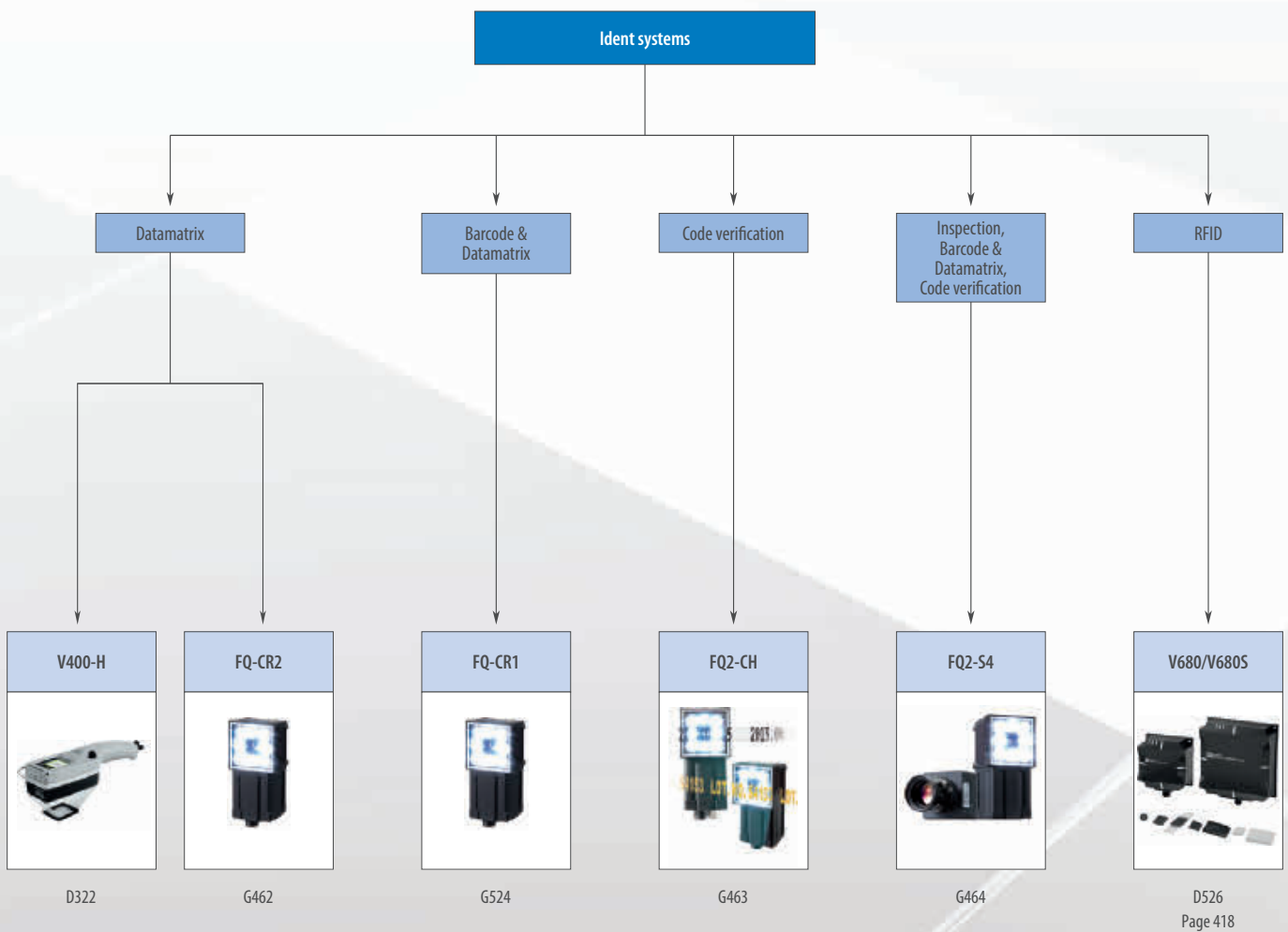
EASY VISION: TOUCH, COMMUNICATE AND GO

Built-in LCD monitor for setup and immediate image visualization






The easy vision sensor FQ2 solves the applications by an intuitive teach & go procedure. For advanced applications features such as multiple inspections, position correction, intelligent image filtering and ethernet communication are offered by the Xpectia lite. The high end is addressed by the Xpectia FJ.




- Easy vision – intuitive user interfaces
- Communication – centralized set-up & inspection via Ethernet
- High-end vision – PC-based system for challenging applications
- True color – close to human eye identification and image processing





Selection table

| | | Vision sensor | Pick & Place | Vision systems | | |
|--------------------|------------------------------------|---|---|--|--|--|
| | |  |  |  |  |  |
| Model | | FQ2 | FQ-M | Xpectia FH | Xpectia FZ5/Lite | Xpectia FH |
| Selection criteria | Number of connectable cameras | Smart camera | Smart camera | 8 | 4 | 8 |
| | Camera type | Monochrome/Color | Color | Digital color or black & white | Digital color or black & white | Digital color or black & white |
| | Resolution (usable) | 752 × 480 | 752 × 480 | from 640 × 480 to 2,040 × 2,048 | from 640 × 480 to 2,488 × 2,044 | from 640 × 480 to 2,040 × 2,048 |
| | Display dots | 928 × 828 1,280 × 1,024 | | | | |
| | Working distance mm | Min. | 8 | Depends on selected lens | Depends on selected lens | Depends on selected lens |
| | | Max. | 970 | – | – | – |
| | Field of view | Min. | 7.5 × 4.7 | Depends on selected lens | Depends on selected lens | Depends on selected lens |
| | | Max. | 300 × 268 | – | – | – |
| | Number of storable configurations | 32 | 32 | – | – | – |
| | Number of tools/configuration | 32 | 32 | limited only by memory space | limited only by memory space | limited only by memory space |
| Features | IP-Rating camera head | IP67 | IP40 | Depends on setup & tools, IP20 | Depends on setup & tools, IP20 | Depends on setup & tools, IP20 |
| | Supply voltage | 24 VDC | 24 VDC | – | – | – |
| | Image processing tools | Search, shape search II, sensitive search, area, color data, edge position, edge pitch, edge width, labeling, FQ2-S4 has additional: OCR, Bar code, 2D-code, 2D-code (DMP) and Model dictionary The types of characters and codes to be read are the same as those of FQ2-CH and FQ-CR1 & FQ-CR2 | Contour based search, labelling, edge position | App. 70 processing tools for object or defect recognition, measurements, calculations, input/output, display and more. Includes also character recognition and high precision edge code inspection tools | App. 70 processing tools for object or defect recognition, measurements, calculations, input/output, display and more. Includes also character recognition and high precision edge code inspection tools | App. 70 processing tools for object or defect recognition, measurements, calculations, input/output, display and more. Includes also character recognition and high precision edge code inspection tools |
| | Image preprocessing | High dynamic range (HDR), polarizing filter (attachment), and white balance | High dynamic range (HDR), white balance | Smoothing, edge enhancement, edge extraction, erosion, dilation, median, background suppression - multiple passes, configurable | Smoothing, edge enhancement, edge extraction, erosion, dilation, median, background suppression - multiple passes, configurable | Smoothing, edge enhancement, edge extraction, erosion, dilation, median, background suppression - multiple passes, configurable |
| | Flow programming | – | – | ■ | ■ | ■ |
| | User interface | PC-Tool or Touch Display | PC-Tool or Touch Display | ■ | ■ | ■ |
| | Optional PC configuration software | Yes | Yes | ■ | ■ | ■ |
| | Security tools | – | ■ | – | – | – |
| | RS-232C | Optional via FQ-SDU2 | – | ■ | ■ | ■ |
| | USB | – | – | ■ | ■ | ■ |
| Communication | Ethernet | Yes | ■ | ■ | ■ | ■ |
| | EtherCAT | – | Yes | Yes | – | Yes |
| | Number of digital I/O | 7 in/3 out | 9 in/5 out | 19 in/34 out | 11 in/26 out | 19 in/34 out |
| | Page/Quick Link | 375/G453 | 385/G455 | 393/G639 | 393/G638 | 393/G639 |

| | | Code reader | | | | |
|--------------------|------------------------------------|--|---|---|---|--|
| | |  |  |  |  |  |
| Model | | FQ-CR1 | FQ-CR2 | FQ2-CH | FQ2-S4 | V400-H |
| Selection criteria | Number of connectable cameras | Smart camera | Smart camera | Smart camera | Smart camera | 1 |
| | Camera type | Monochrome | Monochrome | Monochrome | Monochrome/Color | Digital black & white |
| | Resolution (usable) | 752 × 480 | 752 × 480 | 752 × 480 | 752 × 480 928 × 828 1,280 × 1,024 | – |
| | Display dots | 8 | 8 | 8 | 8 | 40 mm |
| | | | | | | |
| | Working distance mm | 970 | 970 | 970 | 970 | 40 mm |
| | | | | | | |
| | Field of view | 7.5 × 4.7 | 7.5 × 4.7 | 7.5 × 4.7 | 7.5 × 4.7 | 5 × 5 mm |
| | | | | | | |
| | Number of storable configurations | 32 | 32 | 32 | 32 | limited by SD card |
| Features | Number of tools/configuration | 32 | 32 | 32 | 32 | – |
| | IP-Rating camera head | IP67 | IP67 | IP67 | IP67 | IP64 |
| | Supply voltage | 24 VDC | 24 VDC | 24 VDC | 24 VDC | 5 VDC |
| | Image processing tools | 2D-codes: Data Matrix, QR Code, Micro QR Code, PDF417, Micro PDF417, GS1-Data Matrix Bar codes: JAN/EAN/UPC, Code39, Codabar (NW-7), IFT (interleaved2 of 5), Code93, Code128/GS1-128, GS1-DataBar, GS1-128 Composite Code, Pharmacode | 2D-codes: Data Matrix, QR Code | OCR - Alphabet A to Z - Number 0 to 9 - Symbol '·' : / Model dictionary | Search, shape search II, sensitive search, area, color data, edge position, edge pitch, edge width, labeling, OCR, Bar code, 2D-code, 2D-code (DMP) and Model dictionary The types of characters and codes to be read are the same as those of FQ2-CH and FQ-CR1 & FQ-CR2 | Data Matrix, ECC200, 10×10 to 64×64, 8×18 to 16×48, QR Code (Models 1, 2), 21×21 to 57×57 (Versions 1 to 10). |
| | Image preprocessing | High dynamic range (HDR), polarizing filter (attach- ment), and white balance | High dynamic range (HDR), polarizing filter (attach- ment), and white balance | High dynamic range (HDR), polarizing filter (attach- ment), and white balance | High dynamic range (HDR), polarizing filter (attach- ment), and white balance | – |
| | Flow programming | – | – | – | – | – |
| | User interface | PC-Tool or Touch Display | PC-Tool or Touch Display | PC-Tool or Touch Display | PC-Tool or Touch Display | – |
| | Optional PC configuration software | Yes | Yes | Yes | Yes | – |
| | Security tools | – | – | – | – | – |
| Communication | RS-232C | – | – | Optional via FQ-SDU2 | Optional via FQ-SDU2 | – |
| | USB | – | – | – | – | – |
| | Ethernet | Yes | Yes | Yes | Yes | – |
| | EtherCAT | – | – | – | – | – |
| | Number of digital I/O | 7 in/3 out | 7 in/3 out | 7 in/3 out | 7 in/3 out | – |
| Page/Quick Link | | G524 | G462 | G463 | G464 | D322 |



The new standard in image inspection and code verification

The FQ2 vision sensor family is set to redefine the vision sensor market, providing advanced inspection, code reading and verification only previously available in higher end vision systems. With over 100 camera options, the FQ2 provides users with the ultimate flexibility to solve applications, whether you need high resolution, code reading, integrated lighting, or a cost effective solution to solve a simple application, there is an FQ2 which fits your needs.

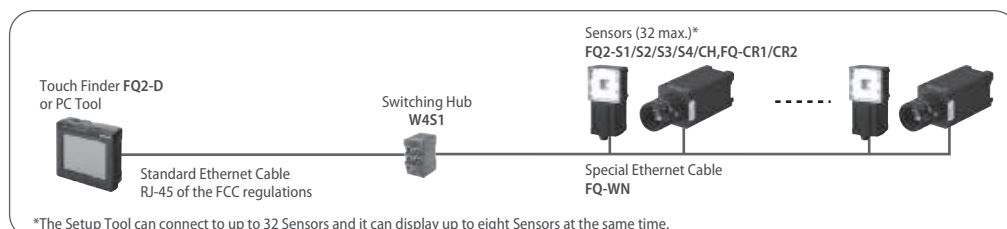
- Powerful functionality with versatile line-up
- All-in-one-housing
- Easy searching with Shape Search II
- Direct Part Marked (DPM)
- Unique OCR technology
- Code verification

System Configuration

Up to 32 Sensors can be set up and monitored from a single Touch Finder or PC Tool.

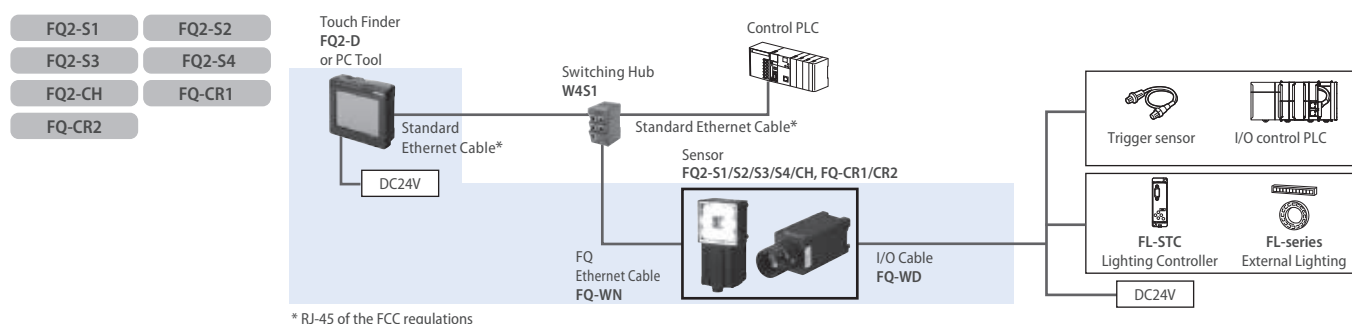
Various types of Sensors can be used at the same time.

However, I/O type and wiring method vary depending on the Sensor, so select the necessary devices.



Note: If you register as a member after purchasing a Sensor, you can download free setup software that runs on a PC and can be used in place of Touch Finder. Refer to the member registration sheet for details.

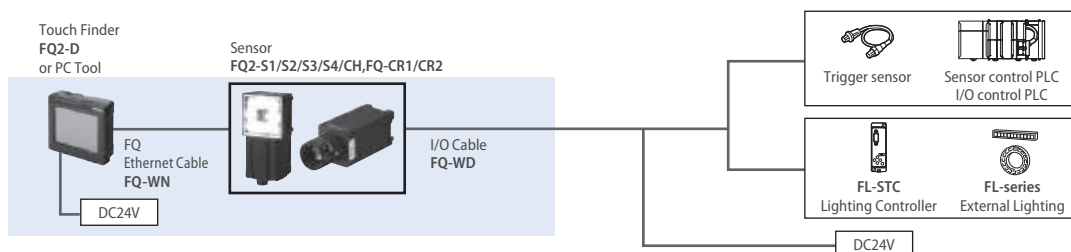
Ethernet (EtherNet/IP, No-protocol, or PLC Link) Connection



Parallel Interface Connection

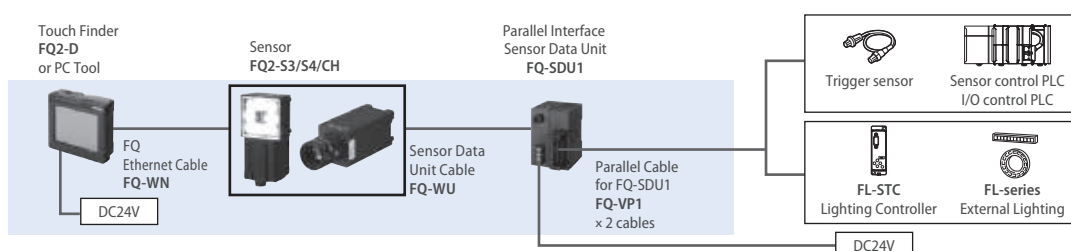
Connection with Standard Parallel Interface of the Sensor

- FQ2-S1
- FQ2-S2
- FQ2-S3
- FQ2-S4
- FQ2-CH
- FQ-CR1
- FQ-CR2

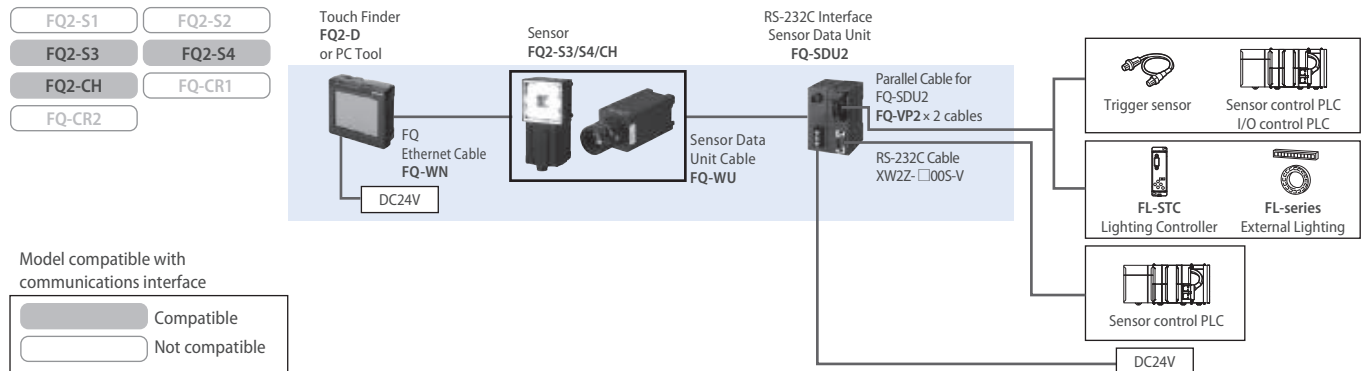


Connection through a Parallel Interface Sensor Data Unit

- FQ2-S1
- FQ2-S2
- FQ2-S3
- FQ2-S4
- FQ2-CH
- FQ-CR1
- FQ-CR2



RS-232C Serial Connection



Ordering Information

Sensor

Inspection model

FQ2-S1 Series [Single-function Type]

| Field of vision | Narrow View | Standard View | Wide View (Long-distance) | Wide View (Short-distance) |
|---------------------------------------|--------------------------------|--------------------------------|--------------------------------|--------------------------------|
| Number of pixels | 350,000 pixels | | | |
| Color | NPN | FQ2-S10010F | FQ2-S10050F | FQ2-S10100F |
| | PNP | FQ2-S15010F | FQ2-S15050F | FQ2-S15100F |
| Field of vision/Installation distance | Refer to Figure 1 on page 377. | Refer to Figure 2 on page 377. | Refer to Figure 3 on page 377. | Refer to Figure 4 on page 377. |

FQ2-S2 Series [Standard Type]

| Field of vision | Narrow View | Standard View | Wide View (Long-distance) | Wide View (Short-distance) |
|---------------------------------------|--------------------------------|--------------------------------|--------------------------------|--------------------------------|
| Number of pixels | 350,000 pixels | | | |
| Color | NPN | FQ2-S20010F | FQ2-S20050F | FQ2-S20100F |
| | PNP | FQ2-S25010F | FQ2-S25050F | FQ2-S25100F |
| Field of vision/Installation distance | Refer to Figure 1 on page 377. | Refer to Figure 2 on page 377. | Refer to Figure 3 on page 377. | Refer to Figure 4 on page 377. |

FQ2-S3 Series [High-resolution Type]

| Field of vision | Narrow View | Standard View | Wide View (Long-distance) | Wide View (Short-distance) | C-mount |
|---------------------------------------|--------------------------------|--------------------------------|--------------------------------|--------------------------------|----------------------------------|
| Number of pixels | 760,000 pixels | | | | 1.3 million pixels |
| Color | NPN | FQ2-S30010F-08 | FQ2-S30050F-08 | FQ2-S30100F-08 | FQ2-S30100N-08 |
| | PNP | FQ2-S35010F-08 | FQ2-S35050F-08 | FQ2-S35100F-08 | FQ2-S35100N-08 |
| Monochrome | NPN | FQ2-S30010F-08M | FQ2-S30050F-08M | FQ2-S30100F-08M | FQ2-S30100N-08M |
| | PNP | FQ2-S35010F-08M | FQ2-S35050F-08M | FQ2-S35100F-08M | FQ2-S35100N-08M |
| Field of vision/Installation distance | Refer to Figure 5 on page 377. | Refer to Figure 6 on page 377. | Refer to Figure 7 on page 377. | Refer to Figure 8 on page 377. | Refer to optical chart on p. 378 |

Inspection/ID model

FQ2-S4 Series [Standard Type]

| Field of vision | Narrow View | Standard View | Wide View (Long-distance) | Wide View (Short-distance) |
|---------------------------------------|--------------------------------|--------------------------------|--------------------------------|--------------------------------|
| Number of pixels | 350,000 pixels | | | |
| Color | NPN | FQ2-S40010F | FQ2-S40050F | FQ2-S40100F |
| | PNP | FQ2-S45010F | FQ2-S45050F | FQ2-S45100F |
| Monochrome | NPN | FQ2-S40010F-M | FQ2-S40050F-M | FQ2-S40100F-M |
| | PNP | FQ2-S45010F-M | FQ2-S45050F-M | FQ2-S45100F-M |
| Field of vision/Installation distance | Refer to Figure 1 on page 377. | Refer to Figure 2 on page 377. | Refer to Figure 3 on page 377. | Refer to Figure 4 on page 377. |

[High-resolution Type]

| Field of vision | Narrow View | Standard View | Wide View (Long-distance) | Wide View (Short-distance) | C-mount |
|---------------------------------------|--------------------------------|--------------------------------|--------------------------------|--------------------------------|----------------------------------|
| Number of pixels | 760,000 pixels | | | | 1.3 million pixels |
| Color | NPN | FQ2-S40010F-08 | FQ2-S40050F-08 | FQ2-S40100F-08 | FQ2-S40100N-08 |
| | PNP | FQ2-S45010F-08 | FQ2-S45050F-08 | FQ2-S45100F-08 | FQ2-S45100N-08 |
| Monochrome | NPN | FQ2-S40010F-08M | FQ2-S40050F-08M | FQ2-S40100F-08M | FQ2-S40100N-08M |
| | PNP | FQ2-S45010F-08M | FQ2-S45050F-08M | FQ2-S45100F-08M | FQ2-S45100N-08M |
| Field of vision/Installation distance | Refer to Figure 5 on page 377. | Refer to Figure 6 on page 377. | Refer to Figure 7 on page 377. | Refer to Figure 8 on page 377. | Refer to optical chart on p. 378 |

ID Model

FQ2-CH Series [Optical Character Recognition Sensor]

| Field of vision | | Narrow View | Standard View | Wide View (Long-distance) | Wide View (Short-distance) |
|---------------------------------------|-----|--------------------------------|--------------------------------|--------------------------------|--------------------------------|
| Number of pixels | | 350,000 pixels | | | |
| Monochrome | NPN | FQ2-CH10010F-M | FQ2-CH10050F-M | FQ2-CH10100F-M | FQ2-CH10100N-M |
| | PNP | FQ2-CH15010F-M | FQ2-CH15050F-M | FQ2-CH15100F-M | FQ2-CH15100N-M |
| Field of vision/Installation distance | | Refer to Figure 1 on page 377. | Refer to Figure 2 on page 377. | Refer to Figure 3 on page 377. | Refer to Figure 4 on page 377. |

FQ-CR1 Series [Multi Code Reader]





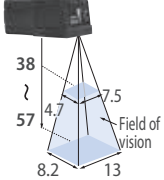
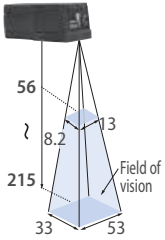
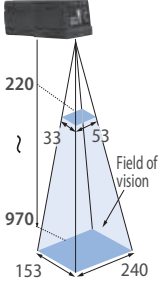
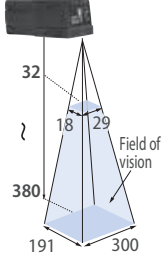
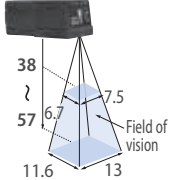
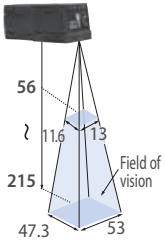
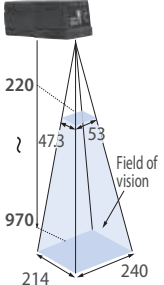
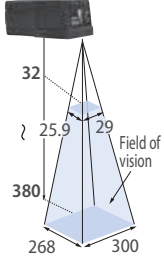
| Field of vision | | Narrow View | Standard View | Wide View (Long-distance) | Wide View (Short-distance) |
|---------------------------------------|-----|--------------------------------|--------------------------------|--------------------------------|--------------------------------|
| Number of pixels | | 350,000 pixels | | | |
| Monochrome | NPN | FQ-CR10010F-M | FQ-CR10050F-M | FQ-CR10100F-M | FQ-CR10100N-M |
| | PNP | FQ-CR15010F-M | FQ-CR15050F-M | FQ-CR15100F-M | FQ-CR15100N-M |
| Field of vision/Installation distance | | Refer to Figure 1 on page 377. | Refer to Figure 2 on page 377. | Refer to Figure 3 on page 377. | Refer to Figure 4 on page 377. |

FQ-CR2 Series [2D Code Reader]

| Field of vision | | Narrow View | Standard View | Wide View (Long-distance) | Wide View (Short-distance) |
|---------------------------------------|-----|--------------------------------|--------------------------------|--------------------------------|--------------------------------|
| Number of pixels | | 350,000 pixels | | | |
| Monochrome | NPN | FQ-CR20010F-M | FQ-CR20050F-M | FQ-CR20100F-M | FQ-CR20100N-M |
| | PNP | FQ-CR25010F-M | FQ-CR25050F-M | FQ-CR25100F-M | FQ-CR25100N-M |
| Field of vision/Installation distance | | Refer to Figure 1 on page 377. | Refer to Figure 2 on page 377. | Refer to Figure 3 on page 377. | Refer to Figure 4 on page 377. |

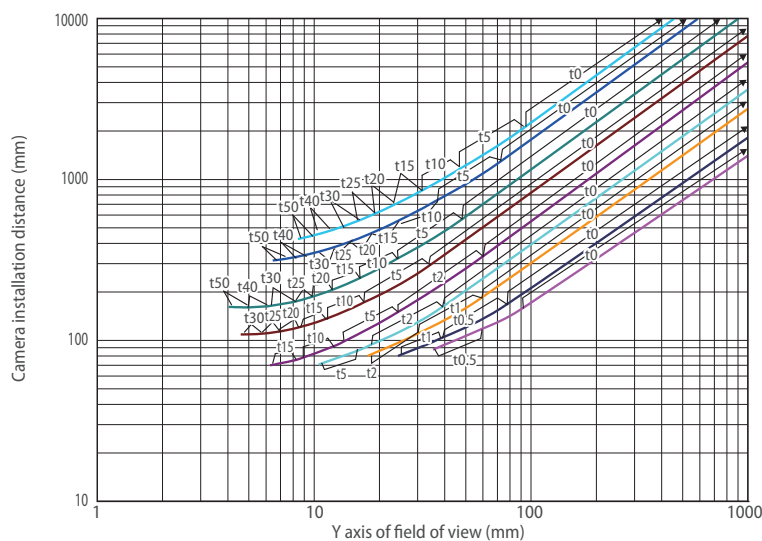
Field of vision/Installation distance

(Unit: mm)

| Field of vision | Narrow View | Standard View | Wide View (Long-distance) | Wide View (Short-distance) |
|---------------------|---|---|--|---|
| Appearance |  |  |  |  |
| 350,000 pixels type | Figure 1  | Figure 2  | Figure 3  | Figure 4  |
| 760,000 pixels type | Figure 5  | Figure 6  | Figure 7  | Figure 8  |

Optical Chart for C-mount Camera FQ2-S3□-13□/-S4□-13□

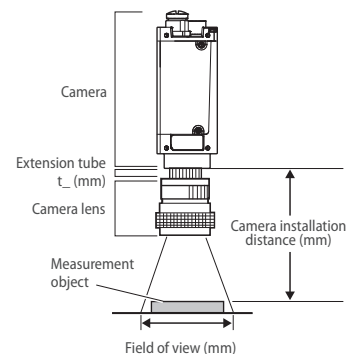
High-resolution, Low-distortion Lenses 3Z4S-LE SV-□□□□H



Meaning of Optical Chart

The X axis of the optical chart shows the field of vision (mm) (See Note.), and the Y axis of the optical chart shows the camera installation distance (mm).

Note: The lengths of the fields of vision given in the optical charts are the lengths of the Y axis.



Touch Finder

| Type | Appearance | Order code |
|-----------------|------------|------------|
| DC power supply | | FQ2-D30 |
| AC/DC/battery | | FQ2-D31 |

Cables

| Type | Appearance | Cable length | Order code |
|---|------------|--------------|------------|
| FQ Ethernet Cables (connect Sensor to Touch Finder, Sensor to PC) | | 2m | FQ-WN002 |
| | | 5m | FQ-WN005 |
| | | 10m | FQ-WN010 |
| | | 20m | FQ-WN020 |
| I/O Cables | | 2m | FQ-WD002 |
| | | 5m | FQ-WD005 |
| | | 10m | FQ-WD010 |
| | | 20m | FQ-WD020 |

Sensor Data Unit (FQ2-S3/S4/CH only)

| Type | Appearance | Output type | Order code |
|--------------------|------------|-------------|------------|
| Parallel Interface | | NPN | FQ-SDU10 |
| | | PNP | FQ-SDU15 |
| RS-232C Interface | | NPN | FQ-SDU20 |
| | | PNP | FQ-SDU25 |

Cables for Sensor Data Unit

| Type | Appearance | Cable length | Order code |
|--|------------|--------------|-------------|
| Sensor Data Unit Cable | | 2m | FQ-WU002 |
| | | 5m | FQ-WU005 |
| | | 10m | FQ-WU010 |
| | | 20m | FQ-WU020 |
| Parallel Cable for FQ-SDU1 ^{*1} | | 2m | FQ-VP1002 |
| | | 5m | FQ-VP1005 |
| | | 10m | FQ-VP1010 |
| Parallel Cable for FQ-SDU2 ^{*1} | | 2m | FQ-VP2002 |
| | | 5m | FQ-VP2005 |
| | | 10m | FQ-VP2010 |
| RS-232C Cable for FQ-SDU2 ^{*1} | | 2m | XW2Z-200S-V |
| | | 5m | XW2Z-500S-V |

^{*1} When using FQ-SDU□□, 2 cables are required for all I/O signals.

External Lighting

| Type | Model |
|------------|----------------------------------|
| FLV series | Refer to FLV series catalog Q198 |

Accessories

| Application | Appearance | Name | Order code |
|------------------|------------|---|------------|
| For Sensor | | Mounting Bracket ^{*1} | FQ-XL |
| | | Mounting Bracket | FQ-XL2 |
| | | Mounting Base for C-mount type ^{*2} | FQ-XLC |
| | | Polarizing Filter Attachment ^{*1} | FQ-XF1 |
| For Touch Finder | | Panel Mounting Adapter | FQ-XPM |
| | | AC Adapter (for AC/DC/battery model) ^{*3} | FQ-A□ |
| | | Battery (for AC/DC/battery model) | FQ-BAT1 |
| | | Touch Pen ^{*4} | FQ-XT |
| | | Strap | FQ-XH |
| | | SD CARD (4 GB) | HMC-SD491 |

^{*1} Included with Integrated Sensor.



^{*2} Included with Sensor with C-mount.

^{*3} AC Adapters for Touch Finder with DC/AC/Battery Power Supply. Select the model for the country in which the Touch Finder will be used.

| Plug Type | Voltage | Certified standards | Order code |
|-----------|------------|---------------------|------------|
| A | 125 V max. | PSE | FQ-AC1 |
| | 250 V max. | UL/CSA | FQ-AC2 |
| | | CCC mark | FQ-AC3 |
| C | 250 V max. | — | FQ-AC4 |
| BF | 250 V max. | — | FQ-AC5 |
| C | 250 V max. | — | FQ-AC6 |










^{*4} Enclosed with Touch Finder.

Industrial Switching Hubs (Recommended)

| Appearance | Number of ports | Failure detection | Current consumption | Order code |
|---|-----------------|-------------------|---------------------|------------|
|  | 3 | None | 0.22 A | W4S1-03B |
|  | 5 | None | 0.22 A | W4S1-05B |
| | | Supported | | W4S1-05C |

Lenses for C-mount Camera. Refer to optical chart on p. 378 for selection of a lens.

High-resolution, Low-distortion Lenses

| 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 |  |  |  |  |  |  |  |  |  |
| Focal length | 6 mm | 8 mm | 12 mm | 16 mm | 25 mm | 35 mm | 50 mm | 75 mm | 100 mm |
| Brightness | F1.4 | F1.4 | F1.4 | F1.4 | F1.4 | F1.4 | F1.4 | F2.5 | F2.8 |
| Filter size | M40.5 P0.5 | M35.5 P0.5 | M27 P0.5 | M27 P0.5 | M27 P0.5 | M35.5 P0.5 | M40.5 P0.5 | M34.0 P0.5 | M37.5 P0.5 |

Extension Tubes

| | |
|----------|---|
| Model | 3Z4S-LE SV-EXR |
| Contents | 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. |

Note: 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.

Note: Reinforcement is required to protect against vibration when Extension Tubes exceeding 30 mm are used.

Ratings and Performance

Sensor

Inspection Model FQ2-S1/S2/S3 Series

| Item | | Single-function type | Standard type | High-resolution type |
|-----------------------|-------------------------------------|--|---|---------------------------------------|
| Model | NPN | FQ2-S10□□□□ | FQ2-S20□□□□ | FQ2-S30□□□□-08 |
| | PNP | FQ2-S15□□□□ | FQ2-S25□□□□ | FQ2-S35□□□□-08M |
| Field of view | | Refer to Ordering Information on p.19. (Tolerance (field of vision): ±10% max.) | | |
| Installation distance | | Select a lens according to the field of vision and installation distance. Refer to optical chart on p. 378. | | |
| Main functions | Inspection items | Search, shape search II, sensitive search, area, color data, edge position, edge pitch, edge width, and labeling | | |
| | Number of simultaneous measurements | 1 | 32 | |
| | Position compensation | Supported (360° Model position compensation, Edge position compensation) | | |
| | Number of registered scenes | 8 | 32 | |
| | Calibration | Supported | | |
| Image input | Image processing method | Real color | | Monochrome |
| | Image filter | High dynamic range (HDR), image adjustment (Color Gray Filter, Weak smoothing, Strong smoothing, Dilate, Erosion, Median, Extract edges, Extract horizontal edges, Extract vertical edges, Enhance edges, Background suppression), polarizing filter (attachment), and white balance (Sensors with Color Cameras only) | | |
| | Image elements | 1/3-inch color CMOS | 1/2-inch color CMOS | 1/2-inch Monochrome CMOS |
| | Shutter | Built-in lighting ON: 1/250 to 1/50,000 Built-in lighting OFF: 1/1 to 1/50,000 | Built-in lighting ON: 1/250 to 1/60,000 Built-in lighting OFF: 1/1 to 1/60,000 | 1/1 to 1/60,000 |
| | Processing resolution | 752 × 480 | 928 × 828 | 1,280 × 1,024 |
| | Partial input function | Supported horizontally only. | | Supported horizontally and vertically |
| | Lens mounts | — | | C-mount |
| Lighting | Lighting method | Pulse | | — |
| | Lighting color | White | | — |
| Data logging | Measurement data | In Sensor: 1,000 items (If a Touch Finder is used, results can be saved up to the capacity of an SD card.) | | |
| | Images | In Sensor: 20 images (If a Touch Finder is used, images can be saved up to the capacity of an SD card.) | | |
| Auxiliary function | | Math (arithmetic, calculation functions, trigonometric functions, and logic functions) | | |
| Measurement trigger | | External trigger (single or continuous) Communications trigger (Ethernet TCP no-protocol, Ethernet UDP no-protocol, Ethernet FINS/TCP no-protocol, EtherNet/IP, PLC Link, or PROFINET) | | |

| Item | | Single-function type | Standard type | High-resolution type | | | |
|----------------------------------|--|---|---------------|--|---|---|---|
| Model | NPN | FQ2-S10□□□□ | FQ2-S20□□□□ | FQ2-S30□□□□-08 | FQ2-S30□□□□-08M | FQ2-S30-13 | FQ2-S30-13M |
| | PNP | FQ2-S15□□□□ | FQ2-S25□□□□ | FQ2-S35□□□□-08 | FQ2-S35□□□□-08M | FQ2-S35-13 | FQ2-S35-13M |
| I/O specifications | Input signals | 7 signals Single measurement input (TRIG) Control command input (IN0 to IN5) | | | | | |
| | Output signals | 3 signals Control output (BUSY) Overall judgement output (OR) Error output (ERROR) The assignments of the three output signals (OUT0 to OUT2) can be changed to the individual judgements of the inspection items, the image input ready output (READY), or the external lighting timing output (STGOUT). | | | | | |
| | Ethernet specifications | 100Base-TX/10Base-T | | | | | |
| | Communications | Ethernet TCP no-protocol, Ethernet UDP no-protocol, Ethernet FINS/TCP no-protocol, EtherNet/IP, PLC Link, or PROFINET | | | | | |
| | I/O expansion | – | – | Possible by connecting FQ-SDU1_ Sensor Data Unit. 11 inputs and 24 outputs | | | |
| | RS-232C | – | – | Possible by connecting FQ-SDU2_ Sensor Data Unit. 8 inputs and 7 outputs | | | |
| Ratings | Power supply voltage | 21.6 to 26.4 VDC (including ripple) | | | | | |
| | Current consumption | 2.4 A max. | | | | | 0.3 A max. |
| Environmental immunity | 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) | | | | | |
| | Ambient atmosphere | No corrosive gas | | | | | |
| | Vibration resistance (destruction) | 10 to 150 Hz, single amplitude: 0.35 mm, X/Y/Z directions 8 min each, 10 times | | | | | |
| | Shock resistance (destruction) | 150 m/s ² 3 times each in 6 direction (up, down, right, left, forward, and backward) | | | | | |
| | Degree of protection | IEC 60529 IP67 (Except when Polarizing Filter Attachment is mounted or connector cap is removed.) | | | | | IEC 60529 IP40 |
| | Materials | Sensor: PBT, PC, SUS Mounting Bracket: PBT Polarizing Filter Attachment: PBT, PC Ethernet connector: Oil-resistance vinyl compound I/O connector: Lead-free heat-resistant PVC | | | | | Cover: Zinc-plated steel, Thickness: 0.6 mm Case: Aluminum diecast alloy (ADC-12) Mounting base: Polycarbonate ABS |
| Weight | Narrow View/Standard View: Approx. 160 g Wide View: Approx. 150 g | | | | | Approx. 160 g without base, Approx. 185 g with base | |
| Accessories included with sensor | Mounting Bracket (FQ-XL) (1) Polarizing Filter Attachment (FQ-XF1) (1) Instruction Manual, Quick Startup Guide Member Registration Sheet, Warning Label | | | | | Mounting Base (FQ-XLC) (1) Mounting Screw (M3 × 8mm) (4) Instruction Manual, Quick Startup Guide Member Registration Sheet | |
| LED class | Class 2(Applicable standards: IEC 60825-1:1993 +A1:1997 +A2:2001, EN 60825-1:1994 +A1:2002 +A2:2001, and JIS C 6802:2005) | | | | | – | |
| Applicable standards | EN standard EN 61326 and EC Directive No.2004/104/EC | | | EN 61326-1:2006 and IEC 61010-1 | | | |

Inspection/ID Model FQ2-S4 Series

| Item | | Inspection/ID Model | | | | | |
|-----------------------|-------------------------------------|--|--------------------------|---|--------------------------|--|--------------------------|
| Model | NPN | FQ2-S40□□□□ | FQ2-S40□□□□-M | FQ2-S40□□□□-08 | FQ2-S40□□□□-08M | FQ2-S40□□□□-13 | FQ2-S40□□□□-13M |
| | PNP | FQ2-S45□□□□ | FQ2-S45□□□□-M | FQ2-S45□□□□-08 | FQ2-S45□□□□-08M | FQ2-S45□□□□-13 | FQ2-S45□□□□-13M |
| Field of view | | Refer to Ordering Information on p.19. (Tolerance (field of vision): ±10% max.) | | | | Select a lens according to the field of vision and installation distance. Refer to optical chart on p. 378. | |
| Installation distance | | | | | | | |
| Main functions | Inspection items | Search, shape search II, sensitive search, area, color data, edge position, edge pitch, edge width, labeling, OCR ^{*1} , Bar code ^{*2} , 2D-code ^{*2} , 2D-code (DMP) ^{*3} , and Model dictionary | | | | | |
| | Number of simultaneous measurements | 32 | | | | | |
| | Position compensation | Supported (360° Model position compensation, Edge position compensation) | | | | | |
| | Number of registered scenes | 32 | | | | | |
| | Calibration | Supported | | | | | |
| | Retry function | Normal retry, Exposure retry, Scene retry, Trigger retry | | | | | |
| Image input | Image processing method | Real color | Monochrome | Real color | Monochrome | Real color | Monochrome |
| | Image filter | High dynamic range (HDR), image adjustment (Color Gray Filter, Weak smoothing, Strong smoothing, Dilate, Erosion, Median, Extract edges, Extract horizontal edges, Extract vertical edges, Enhance edges, Background suppression), polarizing filter (attachment), and white balance (Sensors with Color Cameras only) | | | | | |
| | Image elements | 1/3-inch color CMOS | 1/3-inch Monochrome CMOS | 1/2-inch color CMOS | 1/2-inch Monochrome CMOS | 1/2-inch color CMOS | 1/2-inch Monochrome CMOS |
| | Shutter | Built-in lighting ON: 1/250 to 1/50,000 Built-in lighting OFF: 1/1 to 1/50,000 | | Built-in lighting ON: 1/250 to 1/60,000 Built-in lighting OFF: 1/1 to 1/60,000 | | 1/1 to 1/60,000 | |
| | Processing resolution | 752 × 480 | | 928 × 828 | | 1,280 × 1,024 | |
| | Partial input function | Supported horizontally only. | | Supported horizontally and vertically | | | |
| | Lens mounts | — | | | | C-mount | |
| Lighting | Lighting method | Pulse | | | | — | |
| | Lighting color | White | | | | — | |

| Item | | Inspection/ID Model | | | | | |
|----------------------------------|------------------------------------|---|---------------|----------------|-----------------|----------------|--|
| Model | NPN | FQ2-S40□□□□ | FQ2-S40□□□□-M | FQ2-S40□□□□-08 | FQ2-S40□□□□-08M | FQ2-S40□□□□-13 | FQ2-S40□□□□-13M |
| | PNP | FQ2-S45□□□□ | FQ2-S45□□□□-M | FQ2-S45□□□□-08 | FQ2-S45□□□□-08M | FQ2-S45□□□□-13 | FQ2-S45□□□□-13M |
| Data logging | Measurement data | In Sensor: 1,000 items (If a Touch Finder is used, results can be saved up to the capacity of an SD card.) | | | | | |
| | Images | In Sensor: 20 images (If a Touch Finder is used, images can be saved up to the capacity of an SD card.) | | | | | |
| Auxiliary function | | Math (arithmetic, calculation functions, trigonometric functions, and logic functions) | | | | | |
| Measurement trigger | | External trigger (single or continuous) Communications trigger (Ethernet TCP no-protocol, Ethernet UDP no-protocol, Ethernet FINS/TCP no-protocol, EtherNet/IP, PLC Link , or PROFINET) | | | | | |
| I/O specifications | Input signals | 7 signals Single measurement input (TRIG) Control command input (IN0 to IN5) | | | | | |
| | Output signals | 3 signals Control output (BUSY) Overall judgement output (OR) Error output (ERROR) The assignments of the three output signals (OUT0 to OUT2) can be changed to the individual judgements of the inspection items, the image input ready output (READY), or the external lighting timing output (STGOUT). | | | | | |
| | Ethernet specifications | 100Base-TX/10Base-T | | | | | |
| | Communications | Ethernet TCP no-protocol, Ethernet UDP no-protocol, Ethernet FINS/TCP no-protocol, EtherNet/IP, PLC Link, or PROFINET | | | | | |
| | I/O expansion | Possible by connecting FQ-SDU1_ Sensor Data Unit. 11 inputs and 24 outputs | | | | | |
| | RS-232C | Possible by connecting FQ-SDU2_ Sensor Data Unit. 8 inputs and 7 outputs | | | | | |
| Ratings | Power supply voltage | 21.6 to 26.4 VDC (including ripple) | | | | | |
| | Current consumption | 2.4 A max. | | | | | 0.3 A max. |
| Environmental immunity | 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) | | | | | |
| | Ambient atmosphere | No corrosive gas | | | | | |
| | Vibration resistance (destruction) | 10 to 150 Hz, single amplitude: 0.35 mm, X/Y/Z directions 8 min each, 10 times | | | | | |
| | Shock resistance (destruction) | 150 m/s ² 3 times each in 6 direction (up, down, right, left, forward, and backward) | | | | | |
| | Degree of protection | IEC 60529 IP67 (Except when Polarizing Filter Attachment is mounted or connector cap is removed.) | | | | | IEC 60529 IP40 |
| Materials | | Sensor: PBT, PC, SUS Mounting Bracket: PBT Polarizing Filter Attachment: PBT, PC Ethernet connector: Oil-resistance vinyl compound I/O connector: Lead-free heat-resistant PVC | | | | | Cover: Zinc-plated steel, Thickness: 0.6 mm Case: Aluminum diecast alloy (ADC-12) Mounting base: Polycarbonate ABS |
| Weight | | Narrow View/Standard View:Approx.160 g Wide View:Approx.150 g | | | | | Approx. 160 g without base, Approx. 185 g with base |
| Accessories included with sensor | | Mounting Bracket (FQ-XL)(1) Polarizing Filter Attachment (FQ-XF1) (1) Instruction Manual, Quick Startup Guide Member Registration Sheet, Warning Label | | | | | Mounting Base (FQ-XLC) (1) Mounting Screw (M3 × 8mm)(4) Instruction Manual, Quick Startup Guide Member Registration Sheet |
| LED class | | Class 2(Applicable standards: IEC 60825-1:1993 +A1:1997 +A2:2001, EN 60825-1:1994 +A1:2002 +A2:2001, and JIS C 6802:2005) | | | | | — |
| Applicable standards | | EN 61326-1:2006 and IEC 61010-1 | | | | | |

*1 The types of characters to be read are the same as those of FQ2-CH Optical Character Recognition Sensor.

*2 The types of codes to be read are the same as those of FQ-CR1 Multi Code Reader.

*3 The types of codes to be read are the same as those of FQ-CR2 2D Code Reader.

ID Model FQ2-CH, FQ-CR1/CR2 Series

| Item | | Optical Character Recognition Sensor | | Multi Code Reader | 2D Code Reader |
|------------------------|-------------------------------------|---|---|-------------------|---|
| Model | NPN | FQ2-CH10□□□□-M | | FQ-CR10□□□□-M | FQ-CR20□□□□-M |
| | PNP | FQ2-CH15□□□□-M | | FQ-CR15□□□□-M | FQ-CR25□□□□-M |
| Field of view | | Refer to Ordering Information on page 376. (Tolerance (field of vision): ±10% max.) | | | |
| Installation distance | | | | | |
| Main functions | Inspection items | OCR · Alphabet A to Z · Number 0 to 9 · Symbol ' - . : / Model dictionary | 2D Code (Data Matrix(EC200), QR Code, MicroQR Code, PDF417, MicroPDF417, GS1-Data Matrix) Bar Code (JAN/EAN/UPC, Code39, Codabar (NW-7), ITF (Interleaved 2 of 5), Code 93, Code128/ GS1-128, GS1 DataBar* (Truncated, Stacked, Omnidirectional, Stacked Omnidirectional, Limited, Expanded, Expanded Stacked), Pharmacode, GS1-128 Composite Code (CC-A, CC-B, CC-C)) | | 2D Code (Data Matrix(EC200), QR Code) |
| | Image filter | Weak smoothing, Strong smoothing, Dilate, Erosion, Median, Extract edges, Extract horizontal edges, Extract vertical edges, Enhance edges, Background suppression | None | | Filter function (Smooth, Dilate, Erosion, Median), Code Error Correction Position Display |
| | Verification function | Supported | Supported | | None |
| | Retry function | Normal retry, Exposure retry, Scene retry, Trigger retry | | | |
| | Number of simultaneous measurements | 32 | | | |
| | Position compensation | Supported (360° Model position compensation, Edge position compensation) | None | | |
| | Number of registered scenes | 32 | | | |
| Image input | Image processing method | Monochrome | | | |
| | Image filter | High dynamic range (HDR) and polarizing filter (attachment) | | | |
| | Image elements | 1/3-inch Monochrome CMOS | | | |
| | Shutter | Built-in lighting ON: 1/250 to 1/50,000 Built-in lighting OFF: 1/1 to 1/50,000 | 1/250 to 1/30,000 | | 1/250 to 1/32,258 |
| | Processing resolution | 752 × 480 | | | |
| | Partial input function | Supported horizontally only. | | | |
| Lighting | Lighting method | Pulse | | | |
| | Lighting color | White | | | |
| Data logging | Measurement data | In Sensor: 1,000 items (If a Touch Finder is used, results can be saved up to the capacity of an SD card.) | | | |
| | Images | In Sensor: 20 images (If a Touch Finder is used, images can be saved up to the capacity of an SD card.) | | | |
| Auxiliary function | | Math (arithmetic, calculation functions, trigonometric functions, and logic functions) | | | |
| Measurement trigger | | External trigger (single or continuous) Communications trigger (Ethernet TCP no-protocol, Ethernet UDP no-protocol, Ethernet FINS/TCP no-protocol, EtherNet/IP, PLC Link, or PROFINET) | External trigger (single or continuous) | | |
| I/O specifications | Input signals | 7 signals Single measurement input (TRIG) Control command input (IN0 to IN5) | | | |
| | Output signals | 3 signals Control output (BUSY) Overall judgement output (OR) Error output (ERROR) The assignments of the three output signals (OUT0 to OUT2) can be changed to the individual judgements of the inspection items, the image input ready output (READY), or the external lighting timing output (STGOUT). | 3 signals Control output (BUSY) Overall judgement output (OR) Error output (ERROR) Note: The three output signals can be allocated for the judgements of individual inspection items. | | |
| | Ethernet specifications | 100Base-TX/10Base-T | | | |
| | Communications | Ethernet TCP no-protocol, Ethernet UDP no-protocol, Ethernet FINS/TCP no-protocol, EtherNet/IP, PLC Link, or PROFINET | Ethernet TCP no-protocol | | |
| | I/O expansion | Possible by connecting FQ-SDU1_ Sensor Data Unit. 11 inputs and 24 outputs | — | | |
| | RS-232C | Possible by connecting FQ-SDU2_ Sensor Data Unit. 8 inputs and 7 outputs | — | | |
| | | | | | |
| Ratings | Power supply voltage | 21.6 to 26.4 VDC (including ripple) | | | |
| | Current consumption | 2.4 A max. | | | |
| Environmental immunity | Ambient temperature range | Operating: 0 to 40°C, Storage: –25 to 65°C (with no icing or condensation) | Operating: 0 to 50°C, Storage: –25 to 65°C (with no icing or condensation) | | |
| | Ambient humidity range | Operating and storage: 35% to 85% (with no condensation) | | | |
| | Ambient atmosphere | No corrosive gas | | | |
| | Vibration resistance (destruction) | 10 to 150 Hz, single amplitude: 0.35 mm, X/Y/Z directions 8 min each, 10 times | | | |
| | Shock resistance (destruction) | 150 m/s ² 3 times each in 6 direction (up, down, right, left, forward, and backward) | | | |
| | Degree of protection | IEC 60529 IP67 (Except when Polarizing Filter Attachment is mounted or connector cap is removed.) | | | |

| Item | | Optical Character Recognition Sensor | Multi Code Reader | 2D Code Reader |
|----------------------------------|-----|--|-------------------|----------------|
| Model | NPN | FQ2-CH10□□□□-M | FQ-CR10□□□□-M | FQ-CR20□□□□-M |
| | PNP | FQ2-CH15□□□□-M | FQ-CR15□□□□-M | FQ-CR25□□□□-M |
| Materials | | Sensor: PBT, PC, SUS, Mounting Bracket: PBT, Polarizing Filter Attachment: PBT, PC Ethernet connector: Oil-resistance vinyl compound, I/O connector: Lead-free heat-resistant PVC | | |
| Weight | | Narrow View/Standard View: Approx.160 g Wide View: Approx. 150 g | | |
| Accessories included with sensor | | Mounting Bracket (FQ-XL)(1), Polarizing Filter Attachment (FQ-XF1) (1), Instruction Manual, Quick Startup Guide, Member Registration Sheet, Warning Label | | |
| LED class | | Class 2(Applicable standards: IEC 60825-1:1993 +A1:1997 +A2:2001,EN 60825-1:1994 +A1:2002 +A2:2001, and JIS C 6802:2005) | | |
| Applicable standards | | EN 61326-1:2006 and IEC61010-1 | | |

Touch Finder

| Item | | Type | Model with DC power supply | Model with AC/DC/battery power supply |
|--|---|-------------------------------|---|---|
| | | Model | FQ2-D30 | FQ2-D31 |
| Number of connectable Sensor | | | Number of sensors that can be recognized (switched): 32 max. number or sensor that can displayed on monitor: 8 max. | |
| Main functions | Types of measurement displays | | Last result display, Last NG display, trend monitor, histograms | |
| | Types of display images | | Through, frozen, zoom-in, and zoom-out images | |
| | Data logging | | Measurement results, measured images | |
| | Menu language | | English, German, French, Italian, Spanish, Traditional Chinese, Simplified Chinese, Korean, Japanese | |
| Indications | LCD | Display device | 3.5-inch TFT color LCD | |
| | | Pixels | 320 × 240 | |
| | | Display colors | 16.7 million | |
| | Backlight | Life expectancy ^{*1} | 50,000 hours at 25°C | |
| | | Brightness adjustment | Provided | |
| | | Screen saver | Provided | |
| Operation interface | Touch screen | Method | Resistance film | |
| | | Life expectancy ^{*2} | 1,000,000 touch operations | |
| External interface | Ethernet | | 100BASE-TX/10BASE-T | |
| | SD card | | SDHC-compliant, Class 4 or higher recommended | |
| Ratings | Power supply voltage | | DC power connection: 21.6 to 26.4 VDC (including ripple) | DC power connection: 21.6 to 26.4 VDC (including ripple) AC adapter (manufactured by Sino-American Japan Co., Ltd) connection: 100 to 240 VAC, 50/60 Hz Battery connection: FQ-BAT1 Battery (1cell, 3.7 V) |
| | Continuous operation on Battery ^{*3} | | – | 1.5 h |
| | Power consumption | | DC power connection: 0.2 A max. | DC power connection: 0.2 A max. Charging battery: 0.4 A max. |
| Environmental immunity | Ambient temperature range | | Operating: 0 to 50°C Storage: –25 to 65°C (with no icing or condensation) | Operating: 0 to 50°C when mounted to DIN Track or panel Operation on Battery: 0 to 40°C: –25 to 65°C (with no icing or condensation) |
| | Ambient humidity range | | Operating and storage: 35% to 85% (with no condensation) | |
| | Ambient atmosphere | | No corrosive gas | |
| | Vibration resistance (destruction) | | 10 to 150 Hz, single amplitude: 0.35 mm, X/Y/Z directions 8 min each, 10 times | |
| | Shock resistance (destruction) | | 150 m/s ² 3 times each in 6 direction (up, down, right, left, forward, and backward) | |
| | Degree of protection | | IEC 60529 IP20 (when SD card cover, connector cap, or harness is attached) | |
| Weight | | | Approx. 270 g (without Battery and hand strap attached) | |
| Materials | | | Case: ABS | |
| Accessories included with Touch Finder | | | Touch Pen (FQ-XT), Instruction Manual | |

^{*1} This is a guideline for the time required for the brightness to diminish to half the initial brightness at room temperature and humidity. The life of the backlight is greatly affected by the ambient temperature and humidity and will be shorter at lower or higher temperatures.

^{*2} This value is only a guideline. No guarantee is implied. The value will be affected by operating conditions.

^{*3} This value is only a guideline. No guarantee is implied. The value will be affected by the operating environment and operating conditions.

Sensor Data Units (FQ2-S3/S4/CH only)

| Item | | | Parallel Interface | RS-232C Interface |
|--|------------------------------------|-------------|---|--|
| Model | NPN | | FQ-SDU10 | FQ-SDU20 |
| | PNP | | FQ-SDU15 | FQ-SDU25 |
| I/O specifications | Parallel I/O | Connector 1 | 16 outputs (D0 to D15) | 6 inputs (IN0 to IN5) |
| | | Connector 2 | 11 inputs (TRIG, RESET, IN0 to IN7, and DSA) 8 outputs (GATE, ACK, RUN, BUSY, OR, ERROR, STGOUT, and SHTOUT) | 2 inputs (TRIG and RESET) 7 outputs (ACK, RUN, BUSY, OR, ERROR, STGOUT, and SHTOUT) |
| | RS-232C | | – | 1 channel, 115,200 bps max. |
| | Sensor interface | | FQ2-S3 connected with FQ-WU□□□: OMRON interface *Number of connected Sensors: 1 | |
| Ratings | Power supply voltage | | 21.6 to 26.4 VDC (including ripple) | |
| | Insulation resistance | | Between all DC external terminals and case: 0.5 MΩ min (at 250 VDC) | |
| | Current consumption | | 2.5 A max.: FQ2-S□□□□□□-□□□ and FQ-SDU□□ 0.4 A max.: FQ2-S3□-□□□ and FQ-SDU□□ 0.1 A max.: FQ-SDU□□□ only | |
| Environmental immunity | Ambient temperature range | | Operating: 0 to 50°C, Storage: –20 to 65°C (with no icing or condensation) | |
| | Ambient humidity range | | Operating and storage: 35% to 85% (with no condensation) | |
| | Ambient atmosphere | | No corrosive gas | |
| | Vibration resistance (destruction) | | 10 to 150 Hz, single amplitude: 0.35 mm, X/Y/Z directions, 8 min each, 10 times | |
| | Shock resistance (destruction) | | 150 m/s ² 3 times each in 6 directions (up, down, right, left, forward, and backward) | |
| | Degree of protection | | IEC 60529 IP20 | |
| Materials | | | Case: PC + ABS, PC | |
| Weight | | | Approx. 150 g | |
| Accessories included with Sensor Data Unit | | | Instruction Manual | |

Battery

| Item/Model | FQ-BAT1 |
|-----------------------------------|--|
| Battery type | Secondary lithium ion battery |
| Nominal capacity | 1,800 mAh |
| Rated voltage | 3.7 V |
| 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) |
| Charging method | Charged in Touch Finder (FQ2-D31). AC adapter (FQ-AC□) is required. |
| Charging time* ¹ | 2 h |
| Usage time* ¹ | 1.5 h |
| Battery backup life* ² | 300 charging cycles |
| Weight | 50 g max. |

*¹ This value is only a guideline. No guarantee is implied. The value will be affected by operating conditions

*² This is a guideline for the time required for the capacity of the Battery to be reduced to 60% of the initial capacity. No guarantee is implied. The value will be affected by the operating environment and operating conditions.

System Requirements for PC tool for FQ

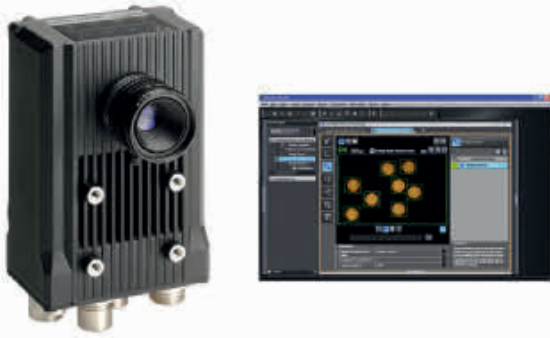
The following Personal Computer system is required to use the software.

| | |
|---------|---|
| OS | Microsoft Windows XP Home Edition/Professional SP2 or higher (32-bit version) Microsoft Windows 7 Home Premium or higher (32-bit/64-bit version) |
| CPU | Core 2 Duo 1.06 GHz or the equivalent or higher |
| RAM | 1GB min. |
| HDD | 500 MB min. available space* ¹ |
| Monitor | 1,024 × 768 dots min. |

*¹ Available space is also required separately for data logging.

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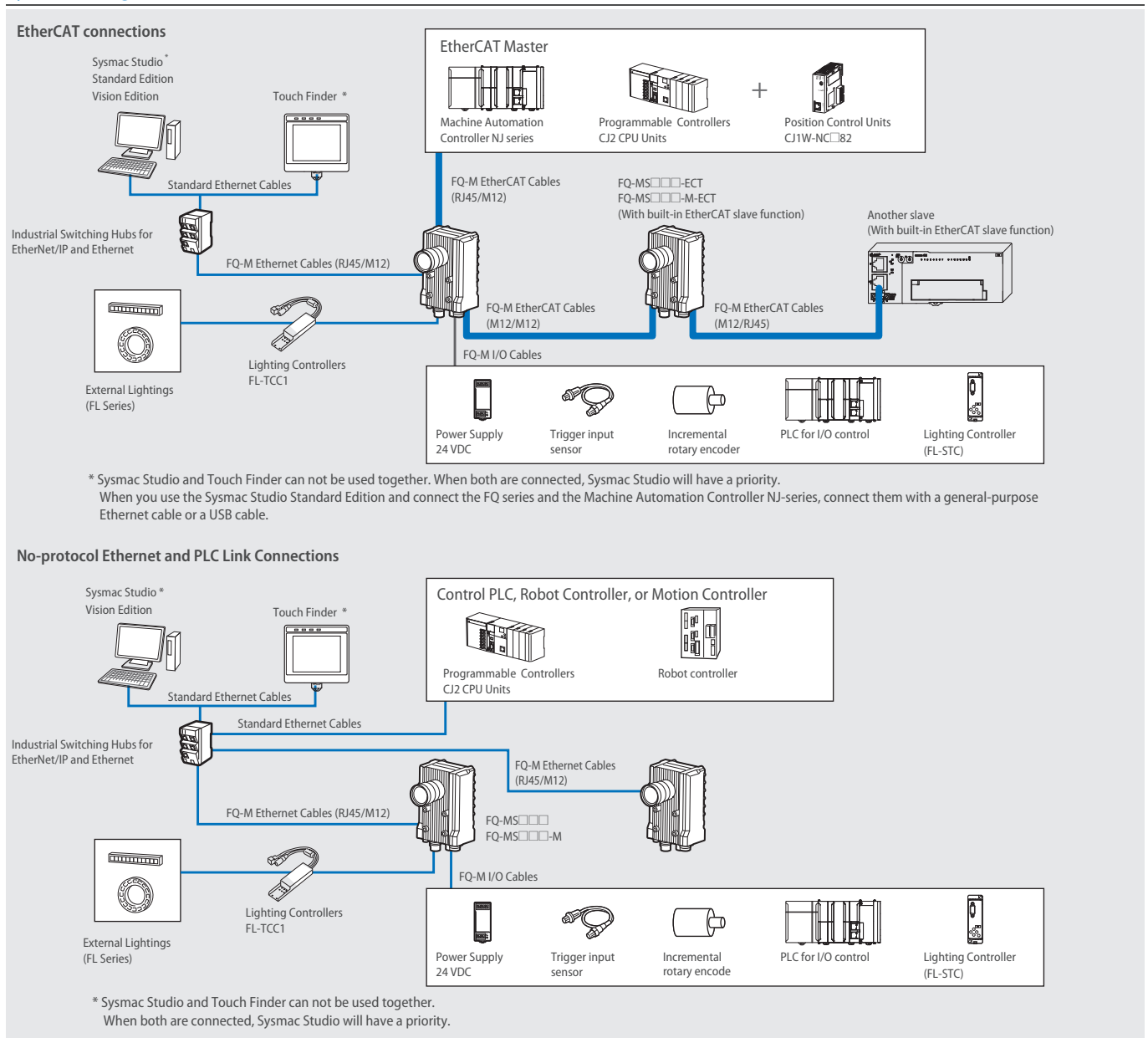
FQ-M Vision sensor

The new FQ-M series is a vision sensor designed specifically for Pick & Place applications. It comes with EtherCAT embedded and can be integrated easily into any environment. The FQ-M is compact, fast and includes an incremental encoder input for easy tracking calibration. Omron's Sysmac Studio software is the perfect tool for configuring the FQ-M and is complemented by the TouchFinder console for on-site monitoring.

Designed for motion tracking

- Made specifically for pick & place applications
- Connectivity with EtherCAT/Ethernet
- Encoder input for conveyor tracking and calibration
- Contour based object detection
- Smart calibration wizard
- Sysmac Studio software for vision system operation and setting

System configuration




Note: 1. EtherCAT and Ethernet (PLC Link) can not be used simultaneously.
2. It is not possible to configure and adjust the FQ-M via an NJ-series controller, when they are connected via an EtherCAT network. For configuration and adjustment of FQ-M, connect the FQ-M and a computer or a Touch Finder via an Ethernet network.

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EtherCAT® is registered trademark and patented technology, licensed by Beckhoff Automation GmbH, Germany.
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Ordering Information

Sensors

| Appearance | Type | | | Order code |
|---|------------|-----|--|----------------|
|  | Color | NPN | EtherCAT communication function not provided | FQ-MS120 |
| | | PNP | | FQ-MS125 |
| | Monochrome | NPN | | FQ-MS120-M |
| | | PNP | | FQ-MS125-M |
| | Color | NPN | EtherCAT communication function provided | FQ-MS120-ECT |
| | | PNP | | FQ-MS125-ECT |
| | Monochrome | NPN | | FQ-MS120-M-ECT |
| | | PNP | | FQ-MS125-M-ECT |

Automation Software Sysmac Studio


Please purchase a DVD and required number of licenses the first time you purchase the Sysmac Studio. DVDs and licenses are available individually. Each model of licenses does not include any DVD.

| Product name | Specifications | Media | | Standards | Order code |
|---|---|-------------------------|-----|-----------|---------------|
| | | Number of licenses | | | |
| Sysmac Studio Standard Edition Ver.1.□□ ^{*1} | The Sysmac Studio provides an integrated development environment to set up, program, debug, and maintain NJ-series Controllers and other Machine Automation Controllers, as well as EtherCAT slaves. Sysmac Studio runs on the following OS. Windows XP (Service Pack 3 or higher, 32-bit version) / Vista (32-bit version)/7 (32-bit/64-bit version) The Sysmac Studio Standard Edition DVD includes Support Software to set up EtherNet/IP Units, DeviceNet slaves, Serial Communications Units, and Support Software for creating screens on HMI's (CX-Designer). For details, refer to the Sysmac Integrated Catalogue (P072). | – (Media only) | DVD | – | SYSMAC-SE200D |
| | | 1 license ^{*2} | – | – | SYSMAC-SE201L |
| Sysmac Studio Vision Edition Ver.1.□□ | Sysmac Studio Vision Edition is a limited license that provides selected functions required for Vision Sensor FQ-M settings. Because this product is a license only, you need the Sysmac Studio Standard Edition DVD media to install it. | 1 license | – | – | SYSMAC-VE001L |

^{*1} The FQ-M series is supported by Sysmac Studio version 1.01 or higher.







^{*2} Multi licenses are available for the Sysmac Studio (3, 10, 30, or 50 licenses).

Touch Finder







| Appearance | Type | Order code |
|---|-----------------------------|------------|
|  | DC power supply | FQ-MD30 |
| | AC/DC/battery ^{*1} | FQ-MD31 |

^{*1} AC Adapter and Battery are sold separately.

Bend resistant Cables for FQ-M Series

| Appearance | Type | | Order code |
|---|---|--------------------|--------------------|
|  | For EtherCAT and Ethernet cable Angle: M12/ Straight: RJ45 | Cable length: 5 m | FQ-MWNL005 |
| | | Cable length: 10 m | FQ-MWNL010 |
|  | For EtherCAT and Ethernet cable Straight type (M12/RJ45) | Cable length: 5m | FQ-WN005-E |
| | | Cable length: 10 m | FQ-WN010-E |
|  | For EtherCAT cable Angle type (M12/M12) | Cable length: 5 m | FQ-MWNE005 |
| | | Cable length: 10 m | FQ-MWNE010 |
|  | For EtherCAT cable Straight type (M12/M12) | Cable length: 5m | FQ-MWNE005 |
| | | Cable length: 10 m | FQ-MWNE010 |
|  | I/O Cables | Angle type | Cable length: 5 m |
| | | | Cable length: 10 m |
|  | | Straight type | Cable length: 5 m |
| | | | Cable length: 10 m |



Accessories

| Appearance | Type | | Order code |
|---|------------------|--|------------|
|  | For Touch Finder | Panel Mounting Adapter | FQ-XPM |
|  | | AC Adapter (for models for DC/AC/Battery) | FQ-AC□*1 |
|  | | Battery (for models for DC/AC/Battery) | FQ-BAT1 |
|  | | Touch Pen (enclosed with Touch Finder) | FQ-XT |
|  | | Strap | FQ-XH |
|  | | SD Card (2 GB) | HMC-SD291 |

*1 AC Adapters for Touch Finder with DC/AC/Battery Power Supply. Select the model for the country in which the Touch Finder will be used.



| Plug type | Voltage | Certified standards | Order code |
|-----------|------------|---------------------|------------|
| A | 125 V max. | PSE | FQ-AC1 |
| | 250 V max. | UL/CSA | FQ-AC2 |
| | | CCC mark | FQ-AC3 |
| C | 250 V max. | — | FQ-AC4 |
| BF | 250 V max. | — | FQ-AC5 |
| O | 250 V max. | — | FQ-AC6 |

Industrial Switching Hubs for EtherNet/IP and Ethernet

| Appearance | Number of ports | Failure detection | Current consumption | Order code |
|---|-----------------|-------------------|---------------------|------------|
|  | 3 | None | 0.22 A | W4S1-03B |
|  | 5 | None | 0.22 A | W4S1-05B |
| | | Supported | | W4S1-05C |

Note: 1. Industrial switching hubs are cannot be used for EtherCAT.

EtherCAT junction slaves

| Appearance | Number of ports | Power supply voltage | Current consumption | Order code |
|---|-----------------|--|---------------------|------------|
|  | 3 | 20.4 to 28.8 VDC (24 VDC –15% to 20%) | 0.08 A | GX-JC03 |
|  | 6 | | 0.17 A | GX-JC06 |

Note: 1. Please do not connect EtherCAT junction slave with OMRON position control unit, Model CJ1W-NC□81/□82.
2. EtherCAT junction slaves cannot be used for EtherNet/IP and Ethernet.

Cameras peripheral devices

| Type | | | Order code |
|----------------------------|---------------|--|----------------|
| Cameras peripheral devices | CCTV Lenses | | 3Z4S-LE Series |
| External Lightings | | | FL Series |
| Lighting Controllers | For FL Series | | FL-TCC1 |

Specifications

Sensors

| Item | Type | EtherCAT communication function not provided | | EtherCAT communication function provided | |
|--|------------------------------------|---|--------------------------|--|--------------------------|
| | | Color | Monochrome | Color | Monochrome |
| Model | NPN | FQ-MS120 | FQ-MS120-M | FQ-MS120-ECT | FQ-MS120-M-ECT |
| | PNP | FQ-MS125 | FQ-MS125-M | FQ-MS125-ECT | FQ-MS125-M-ECT |
| Field of vision, Installation distance | | Selecting a lens according to the field of vision and installation distance. | | | |
| Main functions | Inspection items | Shape search, Search, Labeling, Edge position | | | |
| | Number of simultaneous inspections | 32 | | | |
| | Number of registered scenes | 32 | | | |
| Image input | Image processing method | Real color | Monochrome | Real color | Monochrome |
| | Image elements | 1/3-inch color CMOS | 1/3-inch monochrome CMOS | 1/3-inch color CMOS | 1/3-inch monochrome CMOS |
| | Image filter | High dynamic range (HDR) and white balance | High dynamic range (HDR) | High dynamic range (HDR) and white balance | High dynamic range (HDR) |
| | Shutter | Electronic shutter; select shutter speeds from 1/10 to 1/30000 (sec) | | | |
| | Processing resolution | 752 (H) × 480 (V) | | | |
| | Pixel size | 6.0 (mm) × 6.0 (mm) | | | |
| | Frame rate (image read time) | 60 fps (16.7 ms) | | | |
| External Lightings | Connecting method | Connection via a strobe light controller | | | |
| | Connectable lighting | FL series | | | |
| Data logging | Measurement data | In Sensor: Max. 32,000 items* ¹ | | | |
| | Images | In Sensor: 20 images* ¹ | | | |
| Measurement trigger | | I/O trigger, Encoder trigger, Communications trigger (Ethernet No-protocol, PLC Link, or EtherCAT) | | | |
| I/O specifications | Input signals | 9 signals Single measurement input (TRIG) Error clear input (IN0) Encoder counter reset input (IN1) Encoder input (A±, B±, Z±)* ² | | | |
| | Output signals | 5 signals* ³ OUT0 Overall judgement output (OR) OUT1 Control output (BUSY) OUT2 Error output (ERROR) OUT3 (Shutter output: SHTOUT) OUT4 (Strobe trigger output: STGOUT) | | | |
| | Ethernet specifications | 100BASE-TX/10BASE-TX | | | |
| | EtherCAT specifications | — | | Dedicated protocol for EtherCAT 100BASE-TX | |
| | Connection method | Special connector cables Power supply and I/O: 1 Special connector I/O cable Touch Finder, Computer and Ethernet:1 Ethernet cable EtherCAT: 2 EtherCAT cable | | | |
| LED display | | OR: Judgment result indicator ERR: Error indicator BUSY: BUSY indicator ETN: Ethernet communications indicator | | | |
| | EtherCAT display | — | | L/A IN (Link/Activity IN) ×1 L/A OUT (Link/Activity OUT) ×1 RUN ×1 ERR ×1 | |
| Ratings | Power supply voltage | 21.6 to 26.4 VDC (including ripple) | | | |
| | Insulation resistance | Between all lead wires and case: 0.5 MW (at 250 V) | | | |
| | Current consumption | 450mA max. (When the FL-series Strobe controller and lighting are used.) 250mA max. (When external lighting is not used.) | | | |
| Environmental immunity | Ambient temperature range | Operating: 0 to 50 °C, Storage: –20 to 65 °C (with no icing or condensation) | | | |
| | Ambient humidity range | Operating and storage: 35% to 85% (with no condensation) | | | |
| | Ambient atmosphere | No corrosive gas | | | |
| | Vibration resistance (destruction) | 10 to 150 Hz, single amplitude: 0.35 mm, X/Y/Z directions, 8 min each, 10 times | | | |
| | Shock resistance (destruction) | 150 m/s ² 3 times each in 6 direction (up, down, right, left, forward, and backward) | | | |
| | Degree of protection | IEC60529 IP40 | | | |
| Materials | | Case: aluminium die casting, Rear cover: aluminium plate | | | |
| Weight | | Approx. 390 g (Sensor only) | | Approx. 480 g (Sensor only) | |
| Accessories | | Instruction Manual | | | |

^{*1} If a Touch Finder is used, results can be saved up to the capacity of an SD card.

^{*2} Encoder input specifications.

^{*3} The five output signals can be allocated for the judgements of individual inspection items.

Pulse input Specifications (When an open collector type encoder is used.)

| Item | | Specification | | |
|--|---------------------------|--|-----------------------------------|----------------------------------|
| Input voltage | | 24 VDC \pm 10% | 12 VDC \pm 10% | 5 VDC \pm 5% |
| Input current | | 4.8 mA (at 24 VDC, typical value) | 2.4 mA (at 12 VDC, typical value) | 1.0 mA (at 5 VDC, typical value) |
| NPN | ON voltage ^{*1} | 4.8 V max. | 2.4 V max. | 1.0 V max. |
| | OFF voltage ^{*2} | 19.2 V min. | 9.6 V min. | 4.0 V min. |
| PNP | ON voltage ^{*1} | 19.2 V min. | 9.6 V min. | 4.0 V min. |
| | OFF voltage ^{*2} | 4.8 V max. | 2.4 V max. | 1.0 V max. |
| Maximum response frequency ^{*3} | | 50 kHz (I/O cable: when the FQ-MWD005 or FQ-MWDL005 cables is used.) 20 kHz (I/O cable: when the FQ-MWD010 or FQ-MWDL010 cables is used.) | | |
| Input impedance | | 5.1 kW | | |

^{*1} ON voltage: Voltage to change from OFF to ON state. The ON voltage is the difference of voltages between the GND terminal of the encoder power terminals and each input terminal.

^{*2} OFF voltage: Voltage to change from ON to OFF state. The ON voltage is the difference of voltages between the GND terminal of the encoder power terminals and each input terminal.

^{*3} Select maximum response frequency depending on length of the encoder cable and response frequency of the encoder.

Pulse input Specifications (When a line-driver output type encoder is used.)

| Item | | Specification | | |
|--|--|---|--|--|
| Input voltage | | EIA standard RS-422-A line driver level | | |
| Input impedance ^{*1} | | 120 Ω \pm 5% | | |
| Differential input voltage | | 0.2 V min. | | |
| Hysteresis voltage | | 50 mV | | |
| Maximum response frequency ^{*2} | | 200 kHz (I/O cable: when the FQ-MWD005, FQ-MWDL005, FQ-MWD010, or FQ-MWDL010 cables is used.) | | |

^{*1} When terminating resistance function is used.

^{*2} Select maximum response frequency depending on length of the encoder cable and response frequency of the encoder.

Touch Finder

| Item | | Type | Model with DC power supply | | Model with AC/DC/battery power supply | |
|-------------------------------|---|--|---|---------------------------------|---|--|
| Model | | | FQ-MD30 | | FQ-MD31 | |
| Number of connectable Sensors | | | 2 max. | | | |
| Main functions | Types of measurement displays | | Last result display, Last NG display, trend monitor, histograms | | | |
| | Types of display images | | Through, frozen, zoom-in, and zoom-out images | | | |
| | Data logging | | Measurement results, measured images | | | |
| | Menu language | | English, Japanese | | | |
| Indications | LCD | Display device | 3.5-inch TFT color LCD | | | |
| | | Pixels | 320 × 240 | | | |
| | | Display colors | 16,777,216 | | | |
| | Backlight | Life expectancy ^{*1} | 50,000 hours at 25°C | | | |
| | | Brightness adjustment | Provided | | | |
| | | Screen saver | Provided | | | |
| | Indicators | Power indicator (color: green) | POWER | | | |
| | | Error indicator (color: red) | ERROR | | | |
| | | SD card access indicator (color: yellow) | SD ACCESS | | | |
| | | Charge indicator (color: orange) | | CHARGE | | |
| Operation interface | Touch screen | Method | Resistance film | | | |
| | | Life expectancy ^{*2} | 1,000,000 operations | | | |
| External interface | Ethernet | | 100 BASE-TX/10 BASE-T | | | |
| | SD card | | Omron SD card (Model: HMC-SD291) or a SDHC card of Class4 or higher rating is recommended. | | | |
| Ratings | Power supply voltage | DC power connection | 20.4 to 26.4 VDC (including ripple) | | | |
| | | AC adapter connection | | 100 to 240 VAC, 50/60 Hz | | |
| | | Battery connection | | FQ-BAT1 Battery (1 cell, 3.7 V) | | |
| | Continuous operation on Battery ^{*3} | | | 1.5 h | | |
| | Current consumption | | DC power connection: 0.2 A | | | |
| | Insulation resistance | | Between all lead wires and case: 0.5 MW (at 250 V) | | | |
| Environmental immunity | Ambient temperature range | | Operating: 0 to 50°C Storage: −25 to 65°C (with no icing or condensation) | | Operating: 0 to 50°C when mounted to DIN Track or panel 0 to 40°C when operated on a Battery Storage: −25 to 65°C (with no icing or condensation) | |
| | Ambient humidity range | | Operating and storage: 35% to 85% (with no condensation) | | | |
| Environmental immunity | Ambient atmosphere | | No corrosive gas | | | |
| | Vibration resistance (destruction) | | 10 to 150 Hz, single amplitude: 0.35 mm, X/Y/Z directions 8 min each, 10 times | | | |
| | Shock resistance (destruction) | | 150 m/s ² 3 times each in 6 direction (up, down, right, left, forward, and backward) | | | |
| | Degree of protection | | IEC 60529 IP20 | | | |
| Dimensions | | | 95 × 85 × 33 mm | | | |
| Materials | | | Case: ABS | | | |
| Weight | | | Approx. 270 g (without Battery and hand strap) | | | |
| Accessories | | | Touch Pen (FQ-XT), Instruction Manual | | | |

^{*1} This is a guideline for the time required for the brightness to diminish to half the initial brightness at room temperature and humidity. No guarantee is implied. The life of the backlight is greatly affected by the ambient temperature and humidity. It will be shorter at lower or higher temperatures.

^{*2} This value is only a guideline. No guarantee is implied. The value will be affected by operating conditions.

^{*3} This value is only a guideline. No guarantee is implied. The value will be affected by the operating environment and operating conditions.

Battery Specifications

| Item/Model | FQ-BAT1 |
|-----------------------------------|---|
| Battery type | Secondary lithium ion battery |
| Nominal capacity | 1,800 mAh |
| Rated voltage | 3.7 V |
| Dimensions | 35.3 × 53.1 × 11.4 mm |
| 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) |
| Charging method | Charged in Touch Finder (FQ-MD31). AC adapter (FQ-AC□) is required. |
| Charging time ^{*1} | 2.0 h |
| Battery backup life ^{*2} | 300 charging cycles |
| Weight | 50 g max. |

^{*1} This value is only a guideline. No guarantee is implied. The value will be affected by operating conditions.

^{*2} This is a guideline for the time required for the capacity of the Battery to be reduced to 60% of the initial capacity. No guarantee is implied. The value will be affected by the operating environment and operating conditions.

Sysmac Studio

| Item | Requirement |
|---|---|
| Operating system (OS) ^{*1, *2} Japanese or English system | Windows XP (Service Pack 3 or higher, 32-bit version) / Vista (32-bit version) / 7 (32-bit/64-bit version) |
| CPU | Windows computers with Celeron 540 (1.8 GHz) or faster CPU. Core i5 M520 (2.4 GHz) or equivalent or faster recommended |
| Main memory | 2 GB min. |
| Hard disk | At least 1.6 GB of available space ^{*3} |
| Display | XGA 1,024 × 768, 1,600 million colors. WXGA 1,280 × 800 min. recommended |
| Disk drive | DVD-ROM drive |
| Communications ports | USB port corresponded to USB 2.0, or Ethernet port |

^{*1} Sysmac Studio Operating System Precaution:

System requirements and hard disk space may vary with the system environment.

^{*2} The following restrictions apply when Sysmac Studio is used with Microsoft Windows Vista or Windows 7.

Some Help files cannot be accessed.

The Help files can be accessed if the Help program distributed by Microsoft for Windows (WinHlp32.exe) is installed. Refer to the Microsoft homepage listed below or contact Microsoft for details on installing the file. (The download page is automatically displayed if the Help files are opened while the user is connected to the Internet.)

<http://support.microsoft.com/kb/917607/en-us>

^{*3} To use the file logging function, additional memory area to save the logging data is necessary.

FQ-M Series EtherCAT Communications Specifications

| Item | Specifications |
|-------------------------|---|
| Communications standard | IEC 61158 Type12 |
| Physical layer | 100BASE-TX (IEEE802.3) |
| Connector | M12 x2 E-CAT IN:EtherCAT (IN) E-CAT OUT:EtherCAT (OUT) |
| Communications media | Use the cables for FQ-MWN□□, or FQ-WN□□ series. |
| Communications distance | Use the communication cable within the length of FQ-MWN□□ or FQ-WN□□ series cables. |
| Process data | Variable PDO Mapping |
| Mailbox (CoE) | Emergency messages, SDO requests, SDO responses, and SDO information |
| Distributed clock | Synchronization with DC mode 1 |
| LED display | L/A IN (Link/Activity IN) × 1, L/A OUT (Link/Activity OUT) × 1, RUN × 1, ERR × 1 |

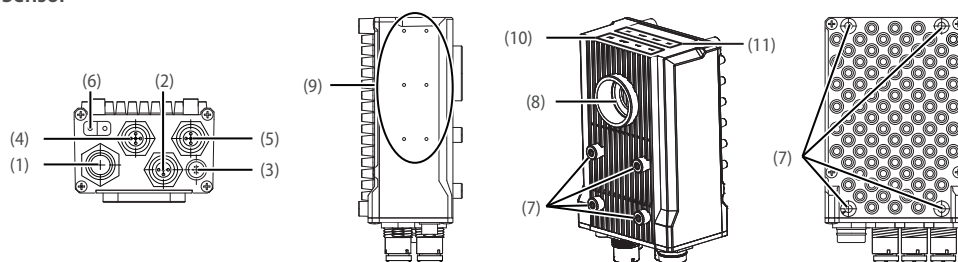
Version Information

FQ-M Series and Programming Devices

| FQ-M Series | Required Programming Device | |
|------------------|---|--------------------|
| | Sysmac Studio Standard Edition/Vision Edition | |
| | Ver.1.00 | Ver.1.01 or higher |
| FQ-MS□□□(-M) | Not supported | Supported |
| FQ-MS□□□(-M)-ECT | | |

Components and Functions

Sensor

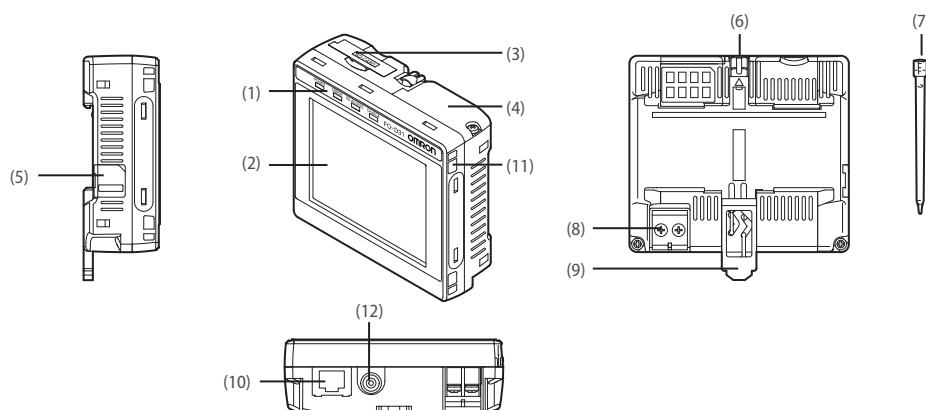


| No. | Name | Description |
|-----|--|---|
| (1) | I/O Cable connector | An I/O Cable is used to connect the Sensor to the power supply and external I/O. |
| (2) | Ethernet connector | An Ethernet cable is used to connect the Sensor to external devices such as PLCs, the Touch Finder, or computers. |
| (3) | Lighting connector | Connect an external lighting (strobe controller). |
| (4) | EtherCAT connector (IN) ^{*1} | Connect an EtherCAT compatible device. |
| (5) | EtherCAT connector (OUT) ^{*1} | Connect an EtherCAT compatible device. |
| (6) | Node address switch ^{*1} | Set the node address for EtherCAT communications. |
| (7) | Installation holes | Holes to install and secure the camera. |
| (8) | C-mount lens connection part | Install the C-mount lens in this part. Determine the field of view depending on the measurement target and select a suitable CCTV lens (C-mounting lens). |

| No. | Name | Description |
|------|--|---|
| (9) | Strobe controller connection holes | Install the strobe controller in this part. FL-TCC1 can be mounted. |
| (10) | Measurement process Operation indicators | OR |
| | | ETN |
| | | ERROR |
| | | BUSY |
| (11) | EtherCAT Operation indicators | L/A IN |
| | | L/A OUT |
| | | ECAT RUN |
| | | ECAT ERROR |
| | | |

^{*1} FQ-MS□□□-ECT and FQ-MS□□□-M-ECT only.

Touch Finder



| No. | Name | Description |
|-----|----------------------|--|
| (1) | Operation indicators | POWER |
| | | ERROR |
| | | SD ACCESS |
| | | CHARGE ^{*1} |
| (2) | LCD/touch panel | Displays the setting menu, measurement results, and images input by the camera. |
| (3) | SD card slot | An SD card can be inserted. |
| (4) | Battery cover* | The Battery is inserted behind this cover. Remove the cover when mounting or removing the Battery. |
| (5) | Power supply switch | The Battery is inserted behind this cover. Remove the cover when mounting or removing the Battery. |

| No. | Name | Description |
|------|---|---|
| (6) | Touch pen holder | The touch pen can be stored here when it is not being used. |
| (7) | Touch pen | Used to operate the touch panel. |
| (8) | DC power supply connector | Used to connect a DC power supply. |
| (9) | Slider | Used to mount the Touch Finder to a DIN Track. |
| (10) | Ethernet port | Used when connecting the Touch Finder to the Sensor with an Ethernet cable. Insert the connector until it locks in place. |
| (11) | Strap holder | This is a holder for attaching the strap. |
| (12) | AC power supply connector ^{*1} | Used to connect the AC adapter. |

^{*1} Applicable to the FQ-MD31 only.

^{*1} Applicable to the FQ-MD31 only.



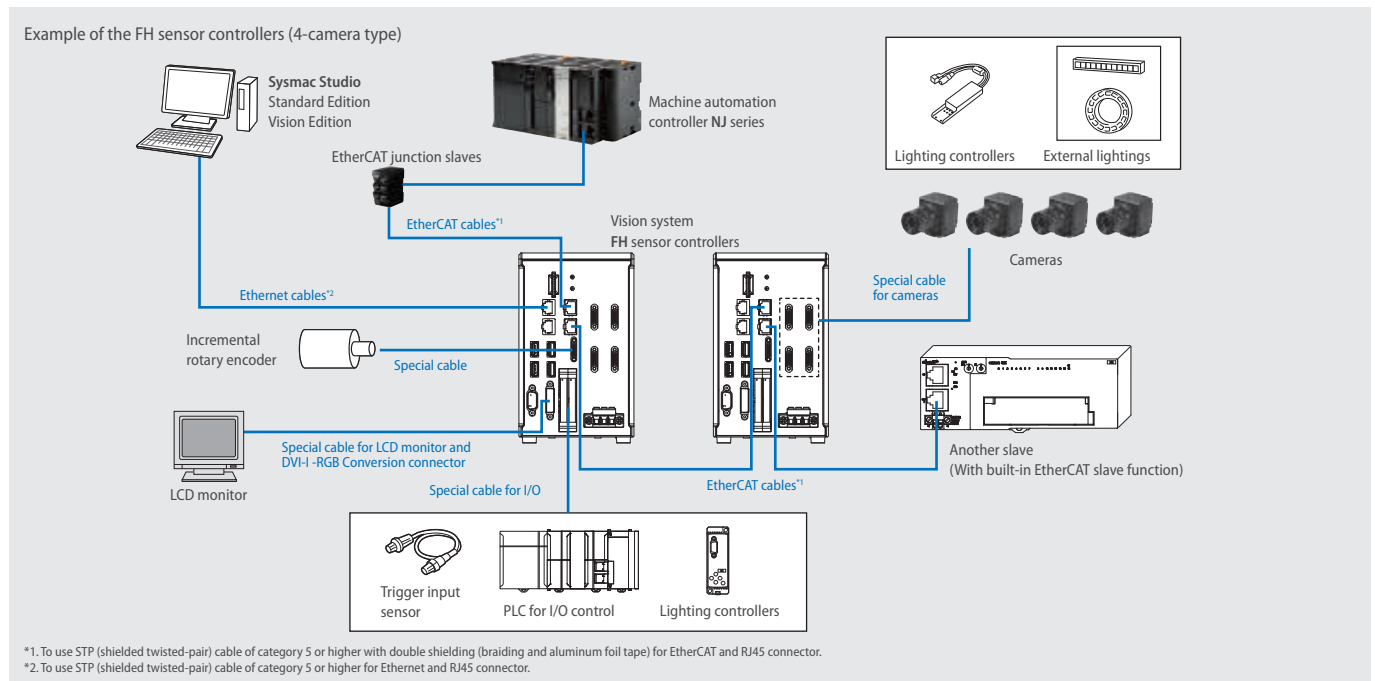
Faster machine speed and high-precision operation

The new FH vision systems are specifically intended for seamless integration with PLCs, motion controllers and robotic control systems, and are ideally suited for applications in high-speed manufacturing machines of all types. FH vision systems featuring a new and exceptionally efficient vision algorithm, high-speed image bus, four-core processing and fast EtherCAT communications. A further benefit is that FH Vision Systems are fully compatible with the Sysmac Studio Automation software.

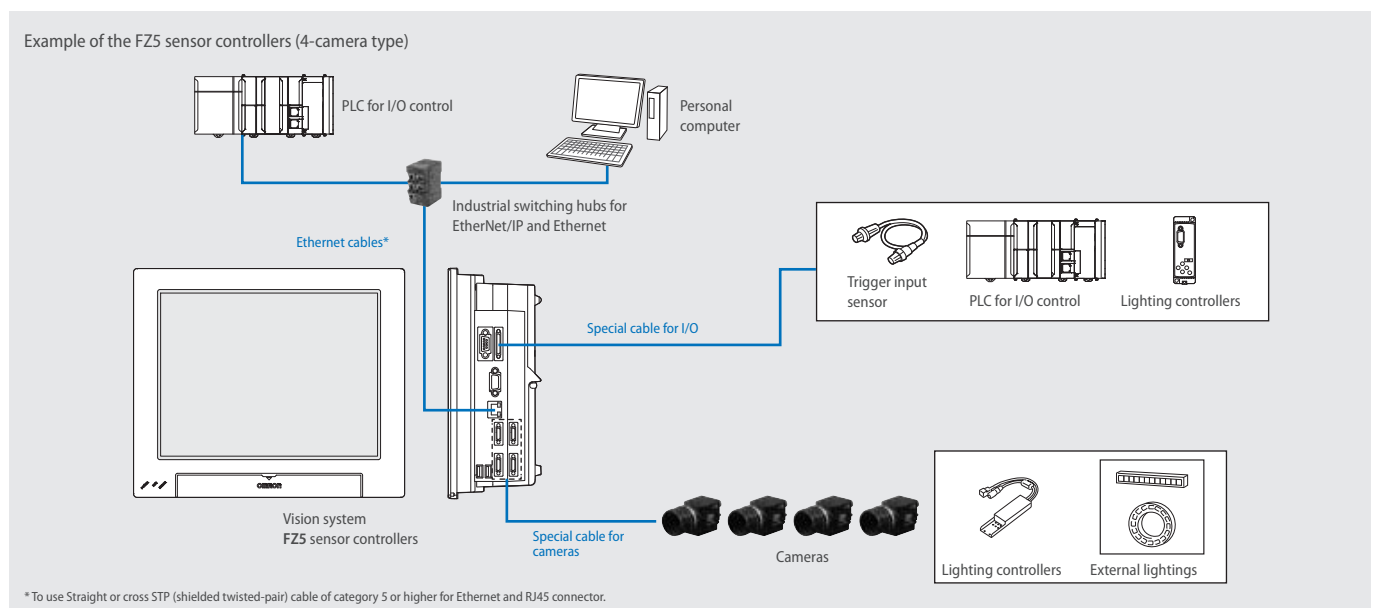
- Four-core image processing
- Fast EtherCAT communications
- Innovative Shape Search III
- Up to 8 high resolution cameras
- Supports Microsoft® .NET
- Compatible with Sysmac Studio Automation software

System configuration

EtherCAT connections for FH series




EtherNet/IP, No-protocol Ethernet and PLC Link connections for FZ5 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 |

FZ5 series sensor controllers

| Item | | CPU | No. of cameras | Output | Order code |
|---|---------------------------------|------------------------|----------------|--------|-------------|
|  | Controllers integrated with LCD | High-speed controllers | 2 | NPN | FZ5-1100 |
| | | | | PNP | FZ5-1105 |
| | | | 4 | NPN | FZ5-1100-10 |
| | | | | PNP | FZ5-1105-10 |
| | | Standard controllers | 2 | NPN | FZ5-600 |
| | | | | PNP | FZ5-605 |
| 4 | NPN | | FZ5-600-10 | | |
| | PNP | | FZ5-605-10 | | |
|  | Box-type controllers | Lite controllers | 2 | NPN | FZ5-L350 |
| | | | | PNP | FZ5-L355 |
| | | | 4 | NPN | FZ5-L350-10 |
| | | | | PNP | FZ5-L355-10 |

Cameras

| Item | | Descriptions | Color/ Monochrome | Image read time | Order code |
|---|---|---|----------------------|-----------------------|------------|
|  | High-speed CMOS Cameras (Lens required) For FH Sensor Controllers only | 12 million pixels (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 FH-3050-20 or a FH-1050-20.) | Color | 25.7 ms ^{*1} | FH-SC12 |
| | | | Monochrome | | FH-SM12 |
|  | High-speed CMOS Cameras (Lens required) For FH Sensor Controllers only | 4 million pixels | Color | 8.5 ms ^{*1} | FH-SC04 |
| | | | Monochrome | | FH-SM04 |
| | | 2 million pixels | Color | 4.6 ms ^{*1} | FH-SC02 |
| | | | Monochrome | | FH-SM02 |
|  | | 300,000 pixels | Color | 3.3 ms | FH-SC |
| | | | Monochrome | | FH-SM |
|  | Digital CCD Cameras (Lens required) | 5 million pixels (When connecting FZ5-6□ or FZ5-L35□, up to two cameras can be connected.) | Color | 62.5 ms | FZ-SC5M2 |
| | | | Monochrome | | FZ-S5M2 |
|  | | 2 million pixels | Color | 33.3 ms | FZ-SC2M |
| | | | Monochrome | | FZ-S2M |
|  | | 300,000 pixels | Color | 12.5 ms | FZ-SC |
| | | | Monochrome | | FZ-S |
|  | High-speed CCD Cameras (Lens required) | 300,000 pixels | Color | 4.9 ms | FZ-SHC |
| | | | Monochrome | | FZ-SH |
|  | Small Digital CCD Cameras (Lenses for small camera required) | 300,000-pixel flat type | Color | 12.5 ms | FZ-SFC |
| | | | Monochrome | | FZ-SF |
|  | | 300,000-pixel pen type | Color | 12.5 ms | FZ-SPC |
| | | | Monochrome | | FZ-SP |
|  | Intelligent Compact CMOS Cameras (Camera + Manual Focus Lens + High power Lighting) | Narrow view | Color | 16.7 ms | FZ-SQ010F |
| | | Standard view | | | FZ-SQ050F |
| | | Wide View (long-distance) | | | FZ-SQ100F |
| | | Wide View (short-distance) | | | FZ-SQ100N |

*1 When connected using two camera cables.

Lenses

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

| Model | 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 | 6 mm | 8 mm | 12 mm | 16 mm | 25 mm | 35 mm | 50 mm | 75 mm | 100 mm |
| Brightness | F1.4 | F1.3 | F1.4 | F1.4 | F1.4 | F1.8 | F1.8 | F2.7 | F3.5 |
| 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 |
| Mount | C-mount | | | | | | | | |

C-mount Lens for 2/3-inch image sensor (Recommend: FZ-S□2M/FZ-S□5M2/FH-S□02)

(3Z4S-LE SV-7525H and 3Z4S-LE SV-10028H can also be used for 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 |
| Brightness | F1.4 | F1.4 | F1.4 | F1.4 | F1.4 | F1.4 | F1.4 | F2.5 | F2.8 |
| 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 | | | | | |

Camera Accessories

| Item | Descriptions | | | Order code |
|---|--|----------------|---|------------------|
| — | External Lighting | | — | FLV Series*1 |
| | | | | FL Series*1 |
|  | Lighting Controller (Required to control external lighting from a Controller) | For FLV-Series | Camera Mount Lighting Controller (One channel) | FLV-TCC1*1 |
| Camera Mount Lighting Controller (Four channels) | | | FLV-TCC4*1 | |
|  | | For FL-Series | Analog Lighting Controller | FLV-ATC Series*1 |
|  | | | Camera Mount Lighting Controller | FL-TCC1*1 |
|  | For Intelligent Compact 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-SH□ | | | 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.

Cables

| Item | Descriptions | Order code |
|---|--|---------------------------|
|  | Camera Cable Cable length: 2 m, 3 m, 5m, or 10 m ^{*1} | FZ-VS3 |
|  | Bend resistant Camera Cable Cable length: 2 m, 3 m, 5m, or 10 m ^{*1} | FZ-VSB3 |
|  | Right-angle Camera Cable ^{*2} Cable length: 2 m, 3 m, 5m, or 10 m ^{*1} | FZ-VSL3 |
|  | Bend resistant Right-angle Camera Cable ^{*2} Cable length: 2 m, 3 m, 5 m, or 10 m ^{*1} | FZ-VSLB3 |
|  | Long-distance Camera Cable Cable length: 15 m ^{*1} | FZ-VS4 |
|  | Long-distance Right-angle Camera Cable ^{*2} Cable length: 15 m ^{*1} | FZ-VSL4 |
|  | Cable Extension Unit Up to two Extension Units and three Cables can be connected. (Maximum cable length: 45 m ^{*1}) | FZ-VSJ |
|  | Monitor Cable Cable length: 2 m or 5 m (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.) | FZ-VM |
|  | DVI-I -RGB Conversion Connector For FH Sensor Controllers only | FH-VMRGB |
|  | Parallel I/O Cable Cable length: 2 m or 5 m, For FZ Sensor Controllers only | FZ-VP |
|  | Parallel I/O Cable for Connector-terminal Conversion Unit Cable length: 2 m or 5 m, For FZ Sensor Controllers only Connector-Terminal Block Conversion Units can be connected (Terminal Blocks Recommended Products: OMRON XW2R-J50G-T, XW2R-E50G-T, XW2R-P50G-T) | FZ-VPX |
|  | Parallel I/O Cable ^{*3} Cable length: 2 m or 5 m, For FH Sensor Controllers only | XW2Z-S013-□ ^{*4} |
|  | Parallel I/O Cable for Connector-terminal Conversion Unit ^{*3} Cable length: 0.5 m, 1 m, 1.5 m, 2 m, 3 m, 5 m, For FH Sensor Controllers only Connector-Terminal Block Conversion Units can be connected (Terminal Blocks Recommended Products: OMRON XW2R-□34G-T) | XW2Z-□□□EE ^{*5} |
|  | Connector-Terminal Block Conversion Units, General-purpose devices | XW2R-□34G-T ^{*6} |
|  | Encoder Cable for line-driver Cable length: 1.5 m, For FH Sensor Controllers only | FH-VR |

^{*1} 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" table.
When a high-speed CMOS camera FH-S□02/-S□04/-S□12 is used in the high speed mode of transmission speed, two camera cables are required.

^{*2} This Cable has an L-shaped connector on the Camera end.

^{*3} 2 Cables are required for all I/O signals.

^{*4} Insert the cables length into □ in the model number as follows. 2 m = 2, 5 m = 5

^{*5} 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






^{*6} 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.

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 ^{*1} | Standard type cable with connectors on both ends (RJ45/RJ45) Wire gauge and number of pairs: AWG27, 4-pair cable, cable sheath material: LSZH ^{*2} , 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-6LSZH8SS□CM-Y ^{*3} | |
|  | | 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-□MD-K ^{*3} | |
|  | | 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 ^{*3} | |
|  | | 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 ^{*3} | |
| — | For EtherCAT ^{*1} and EtherNet/IP | Wire gauge and number of pairs: AWG24, 4-pair cable | Cables | Hitachi Cable, Ltd. | NETSTAR-C5E SAB 0.5 × 4P ^{*4} |
| — | | | | Kuramo Electric Co. | KETH-SB ^{*4} |
| — | | | | SWCC Showa Cable Systems Co. | FAE-5004 ^{*4} |
| — | | Wire gauge and number of pairs: AWG22, 2-pair cable | RJ45 connectors | Panduit Corporation | MP5588-C ^{*4} |
| — | | | Cables | Kuramo Electric Co. | KETH-PSB-OMR ^{*5} |
| — | | | | Nihon Electric Wire&Cable Co.,Ltd. | PNET/B ^{*5} |
|  | | | RJ45 assembly connector | OMRON | XS6G-T421-1 ^{*5} |
| — | For EtherNet/IP | Wire gauge and number of pairs: 0.5 mm, 4-pair cable | Cables | Fujikura Ltd. | F-LINK-E 0.5mm × 4P ^{*6} |
| — | | | RJ45 connectors | Panduit Corporation | MP5588 ^{*6} |

^{*1} The FH series supports the EtherCAT communication. It cannot be used in FZ series.

^{*2} The lineup features Low Smoke Zero Halogen cables for in-cabinet use and PUR cables for out-of-cabinet use.

^{*3} For details, refer to Cat.No.G019.











^{*4} We recommend you to use above cable for EtherCAT and EtherNet/IP, and RJ45 connector together.

^{*5} We recommend you to use above cable for EtherCAT and EtherNet/IP, and RJ45 assembly connector together.

^{*6} 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.

Peripheral devices

| Item | Descriptions | | | | Order code |
|---|--|--------|--|--------------------------------|------------|
|  | LCD monitor For Box-type controllers | | | | FZ-M08 |
|  | USB memory | 2 GB | | FZ-MEM2G | |
| | | 8 GB | | FZ-MEM8G | |
|  | SD card For FH Controller only | 2 GB | | HMC-SD291 | |
| | | 4 GB | | HMC-SD491 | |
|  | VESA attachment For installing the LCD integrated-type controller | | | | FZ-VESA |
|  | Desktop controller stand For installing the LCD integrated-type controller | | | | FZ-DS |
|  | 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 For FH series | 3 port | Power supply voltage: 20.4 to 28.8 VDC (24 VDC –15 to 20%) | Current consumption: 0.08 A | GX-JC03 |
|  | | 6 port | | Current consumption: 0.17 A | GX-JC06 |
|  | Industrial Switching Hubs for EtherNet/IP and Ethernet | 3 port | Failure detection: None | Current consumption: 0.22 A | W4S1-03B |
|  | | 5 port | Failure detection: None | | W4S1-05B |
| | | 5 port | Failure detection: Supported | | W4S1-05C |

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.

| Product | Specifications | Number of model standards licenses | | Media | Order code |
|--|--|------------------------------------|--|--------|---------------|
| | | | | | |
| Sysmac Studio Standard Edition Ver.1.□□ | The Sysmac Studio provides an integrated development environment to set up, program, debug, and maintain NJ-series controllers and other Machine Automation controllers, as well as EtherCAT slaves. Sysmac Studio runs on the following OS. Windows XP (Service Pack 3 or higher, 32-bit version)/Vista (32-bit version)/7 (32-bit/64-bit version) | — (Media only) | | DVD *1 | SYSMAC-SE200D |
| | | 1 license | | — | SYSMAC-SE201L |
| | | 3 license | | — | SYSMAC-SE203L |
| | | 10 license | | — | SYSMAC-SE210L |
| | | 30 license | | — | SYSMAC-SE230L |
| | | 50 license | | — | SYSMAC-SE250L |
| Sysmac Studio Vision Edition Ver.1.□□ *2 | 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 |

*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.

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 FZ5 series.

Development Environment

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.

| 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 (32bit) or Enterprise (32bit) or Ultimate (32bit) • .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 (1,024 × 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 | — (Media only) | | CD | FH-AP1 |
| | | 1 license | | — | FH-AP1L |

Specifications

FH sensor controllers

| Type | | | High-speed Controllers (4 core) | | | Standard Controllers (2 core) | | |
|--------------------|---------------------------------------|--|--|------------|---|--|------------|---|
| Model | | NPN | FH-3050 | FH-3050-10 | FH-3050-20 | FH-1050 | FH-1050-10 | FH-1050-20 |
| | | PNP | | | | | | |
| Main functions | Controller type | | Box-type controllers | | | | | |
| | No. of Cameras | | 2 | 4 | 8 | 2 | 4 | 8 |
| | Connected Camera | | Can be connected to all cameras. (FZ-S series/FH-S series) | | Can be connected to all cameras. (FZ-S series/FH-S series) (Can be connected to up to four 12 million-pixel cameras or up to eight cameras other than 12 million-pixel cameras.) | Can be connected to all cameras. (FZ-S series/FH-S series) | | Can be connected to all cameras. (FZ-S series/FH-S series) (Can be connected to up to four 12 million-pixel cameras or up to eight cameras other than 12 million-pixel cameras.) |
| | Processing resolution (FZ-S) | When connected to a intelligent compact camera | 752 (H) × 480 (V) | | | | | |
| | | When connected to a 300,000-pixel camera | 640 (H) × 480 (V) | | | | | |
| | | When connected to a 2 million-pixel camera | 1,600 (H) × 1,200 (V) | | | | | |
| | | When connected to a 5 million-pixel camera | 2,448 (H) × 2,044 (V) | | | | | |
| | Processing resolution (FH-S) | When connected to a 300,000-pixel camera | 640 (H) × 480 (V) | | | | | |
| | | When connected to a 2 million-pixel camera | 2,040 (H) × 1,088 (V) | | | | | |
| | | When connected to a 4 million-pixel camera | 2,040 (H) × 2,048 (V) | | | | | |
| | | When connected to a 12 million-pixel camera | 4,084 (H) × 3,072 (V) | | | | | |
| | No. of scenes | | 128 | | | | | |
| | Number of logged images ^{*1} | When connected to a intelligent compact camera | Connected to 1 camera(Color): 232, Connected to 2 camera(Color): 116 Connected to 3 camera(Color): 77, Connected to 4 camera(Color): 58 Connected to 5 camera(Color): 46, Connected to 6 camera(Color): 38 Connected to 7 camera(Color): 33, Connected to 8 camera(Color): 29 | | | | | |
| | | When connected to a 300,000-pixel camera (FZ-S/FH-S) | Connected to 1 camera(Color): 270, Connected to 1 camera(Monochrome): 272 Connected to 2 camera(Color): 135, Connected to 2 camera(Monochrome): 136 Connected to 3 camera(Color/Monochrome): 90 Connected to 4 camera(Color): 67, Connected to 4 camera(Monochrome): 68 Connected to 5 camera(Color/Monochrome): 54 Connected to 6 camera(Color/Monochrome): 45 Connected to 7 camera(Color/Monochrome): 38 Connected to 8 camera(Color): 33, Connected to 8 camera(Monochrome): 34 | | | | | |
| | | When connected to a 2 million-pixel camera (FH-S) | Connected to 1 camera(Color/Monochrome): 37, Connected to 2 camera(Color/Monochrome): 18 Connected to 3 camera(Color/Monochrome): 12, Connected to 4 camera(Color/Monochrome): 9 Connected to 5 camera(Color/Monochrome): 7, Connected to 6 camera(Color/Monochrome): 6 Connected to 7 camera(Color/Monochrome): 5, Connected to 8 camera(Color/Monochrome): 4 | | | | | |
| | | When connected to a 2 million-pixel camera (FZ-S) | Connected to 1 camera(Color/Monochrome): 43, Connected to 2 camera(Color/Monochrome): 21 Connected to 3 camera(Color/Monochrome): 14, Connected to 4 camera(Color/Monochrome): 10 Connected to 5 camera(Color/Monochrome): 8, Connected to 6 camera(Color/Monochrome): 7 Connected to 7 camera(Color/Monochrome): 6, Connected to 8 camera(Color/Monochrome): 5 | | | | | |
| | | When connected to a 4 million-pixel camera (FH-S) | Connected to 1 camera(Color/Monochrome): 20, Connected to 2 camera(Color/Monochrome): 10 Connected to 3 camera(Color/Monochrome): 6, Connected to 4 camera(Color/Monochrome): 5 Connected to 5 camera(Color/Monochrome): 4, Connected to 6 camera(Color/Monochrome): 3 Connected to 7 camera(Color/Monochrome): 2, Connected to 8 camera(Color/Monochrome): 2 | | | | | |
| | | When connected to a 5 million-pixel camera (FZ-S) | Connected to 1 camera(Color/Monochrome): 16, Connected to 2 camera(Color/Monochrome): 8 Connected to 3 camera(Color/Monochrome): 5, Connected to 4 camera(Color/Monochrome): 4 Connected to 5 camera(Color/Monochrome): 3, Connected to 6 camera(Color/Monochrome): 2 Connected to 7 camera(Color/Monochrome): 2, Connected to 8 camera(Color/Monochrome): 2 | | | | | |
| | | When connected to a 12 million-pixel camera (FH-S) | Connected to 1 camera(Color/Monochrome): 6, Connected to 2 camera(Color/Monochrome): 3 Connected to 3 camera(Color/Monochrome): 2, Connected to 4 camera(Color/Monochrome): 2 | | | | | |
| | | Operation | Mouse or similar device | | | | | |
| | Settings | | Create series of processing steps by editing the flowchart (Help messages provided). | | | | | |
| External interface | Serial communications | | RS-232C: 1 CH | | | | | |
| | EtherNet communications | | No-protocol (TCP/UDP) 1000BASE-T | | | | | |
| | | | 1 port | 2 port | 2 port | 1 port | 2port | 2port |
| | EtherNet/IP communications | | Ethernet port baud rate: 1 Gbps (1000 BASE-T) | | | | | |
| | EtherCAT communications | | EtherCAT protocol (100BASE-TX) | | | | | |
| | Parallel I/O | | (In the 2-line random trigger mode) 17 inputs (STEP0/ENCTRIG_Z0, STEP1/ENCTRIG_Z1, ENCTRIG_A0 to 1, ENCTRIG_B0 to 1, DSA0 to 1, DIO to 7, DI_LINE0) 37 outputs (RUN0 to 1, READY0 to 1, BUSY0 to 1, OR0 to 1, ERROR0 to 1, GATE0 to 1, STGOUT0/SHTOUT0, STGOUT1/SHTOUT1, STGOUT2 to 7, DO0 to 15, ACK) (In the 5-line to 8-line random trigger mode) 19 inputs, STEP0 to 7, DI_LINE0 to 2, DIO to 7) 34 outputs (READY0 to 7, BUSY0 to 7, OR0 to 7, ACK, ERROR, STGOUT/SHTOUT0 to 7) | | | | | |
| | Encoder interface | | RS422-A line driver level. Phase A/B: single-phase 4MHz (multiplying phase difference of 1MHz by 4 times), Phase Z: 1MHz | | | | | |
| | Monitor interface | | DVI-I (Single Link) output IF × 1ch | | | | | |
| USB interface | | 4 channels (supports USB 1.1 and 2.0) | | | | | | |
| SD card interface | | SDHC card of Class4 or higher rating is recommended. | | | | | | |

| Type | | | | High-speed Controllers (4 core) | | | Standard Controllers (2 core) | | |
|-----------------------|--------------------------------------|---|--|--|----------------------|----------------|-------------------------------|----------------|-------------|
| Model | | NPN | | FH-3050 | FH-3050-10 | FH-3050-20 | FH-1050 | FH-1050-10 | FH-1050-20 |
| | | PNP | | | | | | | |
| Ratings | Power supply voltage | | | 20.4 to 26.4 VDC | | | | | |
| | Current consumption (at 24.0 VDC) *2 | When connected to a intelligent compact camera | 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 connected to a 300,000-pixel camera, 2 million-pixel camera, 4 million-pixel camera, 5 million-pixel camera or 12 million-pixel camera | 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. |
| | Insulation resistance | | | Between DC power supply and controller FG: 20 MΩ or higher (rated voltage 250 V) | | | | | |
| Operation Environment | Noise Immunity | Fast transient burst | DC Power Supply | 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 | Cramp: 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 | | | | | |
| | Ambient temperature range | | | Operating: 0 to 50 °C Storage: –20 to 65 °C (with no icing or condensation) | | | | | |
| | Ambient humidity range | | | Operating and storage: 35% to 85% (with no condensation) | | | | | |
| | Ambient atmosphere | | | No corrosive gases | | | | | |
| | Grounding | | | Type D grounding (100Ω or less grounding resistance) Conventional type 3 grounding | | | | | |
| | Degree of protection | | | IEC60529 IP20 | | | | | |
| | Dimensions | Dimensions | | | 190 × 115 × 182.5 mm | | | | |
| 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 | |
| Case materials | | | Cover: zinc-plated steel plate, side plate: aluminum (A6063) | | | | | | |
| Accessories | | | | Controller (1)/user manual (one Japanese and one English versions)/Instruction Installation Manual (1)/Power supply terminal block connector (1)/Ferrite core (2, FH-3050 and FH-1050), 4 (FH-3050-10 and FH-1050-10), and 8 (FH-3050-20 and FH-1050-20) | | | | | |

*1 The image logging capacity changes when multiple cameras of different types are connected at the same time.

*2 The current consumption when the maximum number of cameras supported by each controller are connected. If a lighting controller model is connected to a lamp, the current consumption is as high as when an intelligent compact camera is connected.

FZ5 sensor controllers

| Type | | | High-speed controllers | | Standard controllers | | Lite controllers | |
|---|---|------------------------|---|-------------|--|------------|---|---|
| Model | | NPN | FZ5-1100 | FZ5-1100-10 | FZ5-600 | FZ5-600-10 | FZ5-L350 | FZ5-L350-10 |
| | | PNP | FZ5-1105 | FZ5-1105-10 | FZ5-605 | FZ5-605-10 | FZ5-L355 | FZ5-L355-10 |
| Controller type | | | Controllers integrated with LCD | | | | | Box-type controllers |
| High-grade processing items | | | No | | | | | |
| No. of cameras | | | 2 | 4 | 2 | 4 | 2 | 4 |
| Connected camera | | | Can be connected to FZ-S series. (Can not be connected to FH-S series.) | | Can be connected to FZ-S series. (Can not be connected to FH-S series. When connecting 5 million-pixel cameras, up to two cameras can be connected.) | | | |
| Processing resolution | When connected to a intelligent compact camera | | 752 (H) × 480 (V) | | | | | |
| | When connected to a 300,000-pixel camera | | 640 (H) × 480 (V) | | | | | |
| | When connected to a 2 million-pixel camera | | 1,600 (H) × 1,200 (V) | | | | | |
| | When connected to a 5 million-pixel camera | | 2,448 (H) × 2,044 (V) | | | | | |
| No. of scenes | | | 32 | | | | | |
| Number of logged images ^{*1} | When connected to a intelligent compact camera | Connected to 1 camera | 232 | | 214 | | | |
| | | Connected to 2 cameras | 116 | | 107 | | | |
| | | Connected to 3 cameras | 77 | | 71 | | | |
| | | Connected to 4 cameras | 58 | | 53 | | | |
| | When connected to a 300,000-pixel camera | Connected to 1 camera | Color camera: 270, Monochrome Camera: 272 | | Color camera: 250, Monochrome Camera: 252 | | | |
| | | Connected to 2 cameras | Color camera: 135, Monochrome Camera: 136 | | Color camera: 125, Monochrome Camera: 126 | | | |
| | | Connected to 3 cameras | Color camera: 90, Monochrome Camera: 90 | | Color camera: 83, Monochrome Camera: 84 | | | |
| | | Connected to 4 cameras | Color camera: 67, Monochrome Camera: 68 | | Color camera: 62, Monochrome Camera: 63 | | | |
| | When connected to a 2 million-pixel camera | Connected to 1 camera | Color camera: 43, Monochrome Camera: 43 | | Color camera: 40, Monochrome Camera: 40 | | | |
| | | Connected to 2 cameras | Color camera: 21, Monochrome Camera: 21 | | Color camera: 20, Monochrome Camera: 20 | | | |
| | | Connected to 3 cameras | Color camera: 14, Monochrome Camera: 14 | | Color camera: 13, Monochrome Camera: 13 | | | |
| | | Connected to 4 cameras | Color camera: 10, Monochrome Camera: 10 | | Color camera: 10, Monochrome Camera: 10 | | | |
| | When connected to a 5 million-pixel camera | Connected to 1 camera | Color camera: 16, Monochrome Camera: 16 | | Color camera: 11, Monochrome Camera: 11 | | | |
| | | Connected to 2 cameras | Color camera: 8, Monochrome Camera: 8 | | Color camera: 5, Monochrome Camera: 5 | | | |
| | | Connected to 3 cameras | Color camera: 5, Monochrome Camera: 5 | | — | | | |
| | | Connected to 4 cameras | Color camera: 4, Monochrome Camera: 4 | | — | | | |
| Operation | | | Touch pen, mouse, etc. | | | | | Mouse or similar device |
| Settings | | | Create series of processing steps by editing the flowchart (Help messages provided). | | | | | |
| Serial communications | | | RS-232C/422A: 1 CH | | | | | RS-232: 1CH |
| EtherNet communications | | | Ethernet 100BASE-TX/10BASE-T | | | | | Ethernet 1000BASE-T/100BASE-TX/10BASE-T |
| EtherNet/IP communications | | | Ethernet port baud rate: 100 Mbps (100Base-TX) | | | | | |
| Parallel I/O | | | (When used in Multi-line random-trigger mode) 17 inputs (RESET, STEP0/ENCTRIG_Z0, STEP1/ENCTRIG_Z1, DSA0 to 1, ENCTRIG_A0 to 1, ENCTRIG_B0 to 1, DIO to 7), 29 outputs (RUN/BUSY1, BUSY0, GATE0 to 1, OR0 to 1, READY0 to 1, ERROR, STGOUT0 to 3, DO0 to 15) (When used in other mode) 13 inputs (RESET, STEP0/ENCTRIG_Z0, DSA0, ENCTRIG_A0, ENCTRIG_B0, DIO to 7), 26 outputs (RUN, BUSY0, GATE0, OR0, READY0, ERROR, STGOUT0 to 3, DO0 to 15) STGOUT 2 to 3 only for camera 4 ch type | | 13 inputs (RESET, STEP0/ENCTRIG_Z0, DSA0, ENCTRIG_A0, ENCTRIG_B0, DIO to 7), 26 outputs (RUN, BUSY0, GATE0, OR0, READY0, ERROR, STGOUT0 to 3, DO0 to 15) STGOUT 2 to 3 only for camera 4 ch type | | 11 inputs (RESET, STEP, DSA, and DIO 0 to 7), 26 outputs (RUN, BUSY, GATE, OR, READY, ERROR, STGOUT 0 to 3, and DO 0 to 15) STGOUT 2 to 3 only for camera 4 ch type | |
| Monitor interface | | | Integrated controller and LCD 12.1 inch TFT color LCD (Resolution: XGA 1,024 × 768 dots) | | | | | Analog RGB video output, 1 channel (Resolution: XGA 1,024 × 768 dots) |
| USB interface | | | 4 channels (supports USB 1.1 and 2.0) | | | | | 2CH (supports USB1.1/2.0) |
| Power supply voltage ^{*2} | | | 20.4 to 26.4 VDC | | | | | |
| Current consumption (at 24.0 VDC) ^{*3} | When connected to a intelligent compact camera | | 5.0 A max. | 7.5 A max. | 5.0 A max. | 7.5 A max. | 4.0 A max. | 5.5 A max. |
| | When connected to a intelligent or autofocus camera | | | | | | | |
| | When connected to a 300,000-pixel camera | | 3.7 A max. | 4.9 A max. | 3.7 A max. | 4.9 A max. | 2.6 A max. | 2.9 A max. |
| | When connected to a 2 million-pixel camera | | | | | | | |
| | When connected to a 5 million-pixel camera | | | | | | | |

| Type | | High-speed controllers | | Standard controllers | | Lite controllers | |
|---------------------------|-----|--|----------------|----------------------|----------------|---|-------------|
| Model | NPN | FZ5-1100 | FZ5-1100-10 | FZ5-600 | FZ5-600-10 | FZ5-L350 | FZ5-L350-10 |
| | PNP | FZ5-1105 | FZ5-1105-10 | FZ5-605 | FZ5-605-10 | FZ5-L355 | FZ5-L355-10 |
| Ambient temperature range | | Operating: 0 to 45°C for low cooling fan speeds, 0 to 50°C for high cooling fan speeds Storage: -20 to 65°C (with no icing or condensation) | | | | Operating: 0 to 45°C, 0 to 50°C Storage: -20 to 65°C (with no icing or condensation) | |
| Ambient humidity range | | Operating and storage: 35% to 85% (with no condensation) | | | | | |
| Weight | | Approx. 3.2 kg | Approx. 3.4 kg | Approx. 3.2 kg | Approx. 3.4 kg | Approx. 1.8 kg | |
| Accessories | | Touch pen (one, inside the front panel), Instruction manual, 6 mounting brackets | | | | Instruction manual | |

*1 The image logging capacity changes when multiple cameras of different types are connected at the same time.

*2 Do not ground the positive terminal of the 24-VDC power supply to a Lite controller.

If the positive terminal is grounded, electrical shock may occur when an SG (0-V) part, such as the case of the controller or camera, is touched.

*3 The current consumption when the maximum number of cameras supported by each controller are connected.

If a strobe controller model is connected to a lamp, the current consumption is as high as when an intelligent camera is connected.

Cameras

High-speed 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 × 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. | |
| Partial function | 1 to 480 lines | 2 to 480 lines | 1 to 1,088 lines | 2 to 1,088 lines | 1 to 2,048 lines | 2 to 2,048 lines | 4 to 3,072 lines (4-line increments) | |
| Frame rate (image read 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 CCD cameras

| Model | FZ-S | FZ-SC | FZ-S2M | FZ-SC2M | FZ-S5M2 | FZ-SC5M2 |
|---|---|-------|---|---------|---|----------|
| Image elements | Interline transfer reading all pixels, 1/3-inch CCD image elements | | Interline transfer reading all pixels, 1/1.8-inch CCD image elements | | Interline transfer reading all pixels, 2/3-inch CCD image elements | |
| 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) | |
| 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 read 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, 1/3-inch CCD image elements | | | |
| Color/Monochrome | Monochrome | Color | Monochrome | Color |
| Effective pixels | 640 (H) × 480 (V) | | | |
| Pixel size | 7.4 (μm) × 7.4 (μm) | | | |
| Shutter function | Electronic shutter; select shutter speeds from 20 μm to 100 ms | | | |
| Partial function | 12 to 480 lines | | | |
| Frame rate (image read time) | 80 fps (12.5 ms) | | | |
| 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 | | | |
| 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 CCD cameras

| Model | FZ-SH | FZ-SHC |
|--|--|--------|
| Image elements | Interline transfer reading all pixels, 1/3-inch CCD image elements | |
| Color/Monochrome | Monochrome | Color |
| Effective pixels | 640 (H) × 480 (V) | |
| 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 read 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 CMOS cameras

Intelligent complete CMOS cameras

| Model | FZ-SQ010F | FZ-SQ050F | FZ-SQ100F | FZ-SQ100N |
|------------------------------|---|------------------------|-------------------------|-------------------------|
| Image elements | 1/3-inch CMOS image elements | | | |
| Color/Monochrome | Color | | | |
| Effective pixels | 752 (H) × 480 (V) | | | |
| Pixel size | 6.0 (μm) × 6.0 (μm) | | | |
| Shutter function | 1/250 to 1/32,258 | | | |
| Partial function | 8 to 752 lines | | | |
| Frame rate (image read time) | 60 fps | | | |
| 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 | Class 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

LCD Monitor

| Model | FZ-M08 |
|---------------------------|--|
| Size | 8.4 inches |
| Type | Liquid crystal Color TFT |
| Resolution | 1,024 × 768 dots |
| Input signal | Analog RGB video input, 1 channel |
| Power supply voltage | 21.6 to 26.4 VDC |
| Current consumption | Approx. 0.7 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% (with no condensation) |
| Weight | Approx. 1.2 kg |
| Accessories | Instruction sheet and 4 mounting brackets |

Camera cables

| Model | FZ-VS3 (2 m) | FZ-VSB3 (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 |

Monitor cable

| Model | FZ-VM |
|---------------------------|--|
| Vibration resistiveness | 10 to 150 Hz single amplitude 0.15 mm 3 directions, 8 strokes, 4 times |
| Ambient temperature range | Operation: 0 to 50°C; Storage: -20 to 65°C (with no icing or condensation) |
| Ambient humidity range | Operation and storage: 35% to 85%RH (with no condensation) |
| Ambient atmosphere | No corrosive gases |
| Material | Cable sheath: heat-resistant PVC, connector: PVC |
| Minimum bending radius | 75 mm |
| Weight | Approx. 170 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% (with no condensation) |
| Maximum units connectable | 2 Units per camera |
| 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 camera, the Autofocus camera, the Intelligent compact camera, the Strobe controller, 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. 1,400 g | |

Parallel cable

| Model | FZ-VP | FZ-VPX |
|---------------------------|--|---------------|
| Vibration resistiveness | 10 to 150 Hz single amplitude 0.15 mm 3 directions, 8 strokes, 4 times | |
| Ambient temperature range | Operation: 0 to 50°C; Storage: -20 to 65°C (with no icing or condensation) | |
| Ambient humidity range | Operation and storage: 35% to 85%RH (with no condensation) | |
| Ambient atmosphere | No corrosive gases | |
| Material | Cable sheath: heat-resistant PVC, Connector: resin | |
| Minimum bending radius | 75 mm | |
| Weight | Approx. 160 g | Approx. 180 g |

Note: FZ-VP/FZ-VPX is only for the FZ series. The FH series can use XW2Z-S013-2/-S013-5.

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) |
| 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 |

Cameras/Cables connection table

| Type of camera | Model | Cable length | High-speed CMOS cameras*1 | | | | | | |
|--|---------------------|--------------|---------------------------|--|--|--|--|--|--|
| | | | 300,000-pixel | 2 million-pixel | | 4 million-pixel | | 12 million-pixel | |
| | | | FH-SM/SC | FH-SM02/SC02 | | FH-SM04/SC04 | | FH-SM12/SC12 | |
| | | | – | High speed mode of transmission speed select | Standard mode of transmission speed select | High speed mode of transmission speed select | Standard mode of transmission speed select | High speed mode of transmission speed select | Standard mode of transmission speed select |
| Camera Cables Right-angle camera cables | FZ-VS3 FZ-VSL3 | 2 m | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| | | 3 m | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| | | 5 m | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| | | 10 m | Yes | No | Yes | No | Yes | No | Yes |
| Bend resistant camera cables | FZ-VSB3 FZ-VSLB3 | 2 m | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| | | 3 m | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| | | 5 m | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| | | 10 m | Yes | No | Yes | No | Yes | No | Yes |
| Long-distance camera cable Long-distance right-angle camera cable | FZ-VS4 FZ-VSL4 | 15 m | Yes | No | Yes | No | Yes | No | Yes |

*1 High-speed CMOS camera is only for the FH series.

| Type of camera | Model | Cable length | Digital CCD cameras | | | Small digital CCD cameras Pen type/flat type | High-speed CCD cameras | Intelligent compact CMOS cameras |
|--|---------------------|--------------|---------------------|-----------------|-----------------|---|------------------------|----------------------------------|
| | | | 300,000-pixel | 2 million-pixel | 5 million-pixel | | | |
| | | | FZ-S/SC | FZ-S2M/SC2M | FZ-S5M2/SC5M2 | FZ-SF/SFC FZ-SP/SPC | FZ-SH/SHC | FZ-SQ□ |
| Camera Cables Right-angle camera cables | FZ-VS3 FZ-VSL3 | 2 m | Yes | Yes | Yes | Yes | Yes | Yes |
| | | 3 m | Yes | Yes | Yes | Yes | Yes | Yes |
| | | 5 m | Yes | Yes | Yes | Yes | Yes | Yes |
| | | 10 m | Yes | Yes | No | Yes | Yes | Yes |
| Bend resistant camera cables | FZ-VSB3 FZ-VSLB3 | 2 m | Yes | Yes | Yes | Yes | Yes | Yes |
| | | 3 m | Yes | Yes | Yes | Yes | Yes | Yes |
| | | 5 m | Yes | Yes | Yes | Yes | Yes | Yes |
| | | 10 m | Yes | Yes | No | Yes | Yes | Yes |
| Long-distance camera cable Long-distance right-angle camera cable | FZ-VS4 FZ-VSL4 | 15 m | Yes | Yes | No | Yes | Yes | Yes |

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

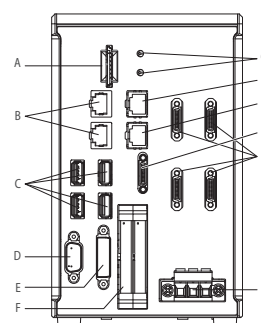
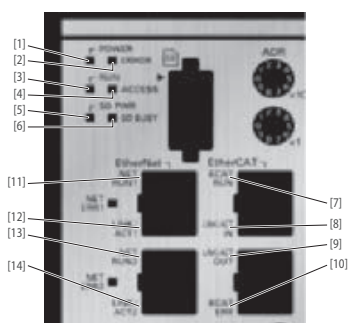
FH Series and programming devices

| FH series | Required programming device | |
|-------------|---|--------------------|
| | Sysmac Studio Standard Edition/Vision Edition | |
| | Ver.1.06 | Ver.1.07 or higher |
| FH-3050 (-) | Not supported | Supported |
| FH-1050 (-) | | |

Note: 1. The auto-update to Sysmac Studio version 1.07 will be available soon.
2. Sysmac Studio does not support the FZ5 series.

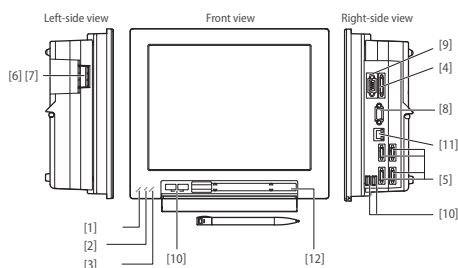
Components and functions

Example of the FH sensor controllers BOX type
(4-camera type)

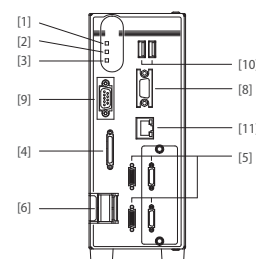


| | Name | Description |
|------|---|--|
| [1] | POWER LED | Lit while power is ON. |
| [2] | ERROR LED | Lit when an error has occurred. |
| [3] | RUN LED | Lit while the controller is in Measurement Mode. |
| [4] | ACCESS LED | Lit while the memory is accessed. |
| [5] | SD POWER LED | Lit while power is supplied to the SD 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. |
| | Name | Description |
| A | SD memory card installation connector | Install the SD memory card. Do not plug or unplug the SD card during measurement operation. Otherwise measurement time may be affected or data may be destroyed. |
| B | EtherNet connector | Connect an EtherNet device. |
| 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 the ground line. Be sure to ground the controller alone. Perform wiring using the attached power supply connector. |

Example of the FZ5 sensor controllers
LCD-integrated type
(4-camera type)



Example of the FZ5-Lite sensor controllers
LCD-integrated type
(4-camera type)



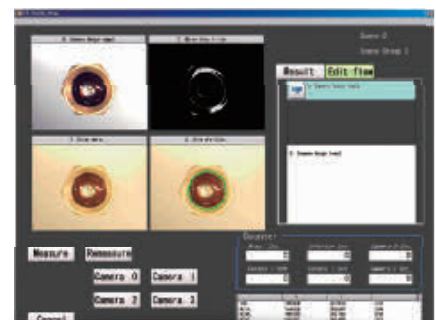
| | Name | Description |
|------|---|---|
| [1] | POWER LED | Lit while power is ON. |
| [2] | RUN LED | Lit while the controller is in Run Mode. |
| [3] | ERROR LED | Lit when an error has occurred. |
| [4] | I/O connector (control lines, data lines) | Connect the controller to external devices such as a sync sensor and PLC. |
| [5] | Camera connector | Connect cameras. |
| [6] | Power | Connect a DC power supply. Wire the power supply unit independently of other devices. After wiring, replace the terminal cover. |
| [7] | Ground terminal | Connect the ground wire. Make sure that the controller is grounded with a separate ground wire. |
| [8] | Monitor connector (analog RGB) | Connect a monitor. (Provided with Lite controller type only) |
| [9] | RS-232C/RS-422 connector | Connect an external device such as a personal computer or PLC. |
| [10] | USB connector | Connect a track ball, mouse and USB memory. A total of four USB ports are provided and any of them can be used. However, when connecting two or more USB memories, do not connect them to adjacent ports. Doing so may cause the USB memories to come into contact, resulting in malfunction or damage. |
| [11] | EtherNet connector | Connect the controller to a personal computer. |
| [12] | Touch pen (holder) | A touch pen is stored. (Provided with the LCD integrated type only) |

FlexXpect vision platform



FlexXpect is a modular Vision platform featuring industry specific functionality. In combination with the powerful Xpectia-hardware, the FlexXpect software modules take you into a new dimension of specialisation. FlexXpect is simple to use and can be customised easily, to focus on your individual needs. The combination of Xpectia's real colour sensing, high resolution and intuitive user guidance combined with the FlexXpect value added tools represents an unbeatable duo.

Depending on industry, different requirements and regulations are in place for quality inspection. Premium class add-on functionality, tailored for industry, is delivered by FlexXpect.



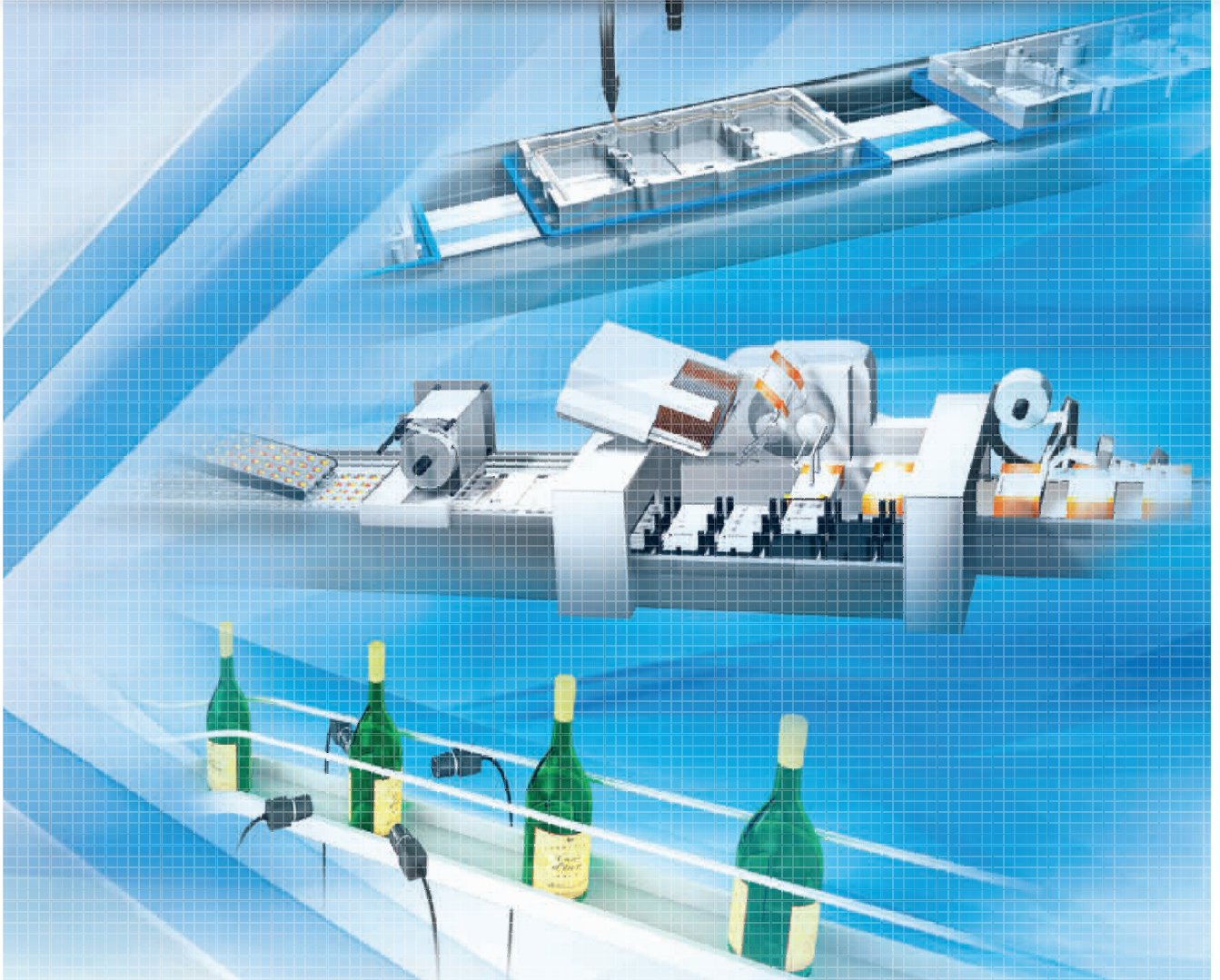
Simplicity – easy to use

FlexXpect features an easy and intuitive user interface, which allows inspection solutions to be set-up quickly and efficiently. With a built in touch screen interface and icon based menu structure, the complexity of programming the system is kept to a minimum. The Flow-Menu is an ideal tool to re-build the process sequences inside the vision platform.

Customised to your needs

The FlexXpect platform can be further customized to the needs of the individual application. Different levels of product modifications are supported. Based on the skill of the user and required functionality it offers:

- Flow programming
- GUI modifications
- Processing items & communication



Your benefits

- FlexXpect-Glue Bead: Automatic one shot seal inspection
- FlexXpect-Pharma: 21 CFR Part 11 compliant
- FlexXpect-Labelling: 360° bottle inspection
- FlexXpect-PV: alignment & inspection of wafers

FlexXpect Pharma



FlexXpect is a modular Vision platform. In combination with the powerful Xpectia-hardware, it takes you into a new dimension of specialisation. The FlexXpect-Pharma is targeting challenging inspections in the Pharmaceutical industry. It offers powerful inspection tools and all functions, necessary for the validation under the FDA 21 CFR Part 11. With the powerful code verification and OCR features, FlexXpect-Pharma is the ideal solution for Track & Trace applications.

Inspect any applications in Pharma:

- Blister pack
- Vials
- Syringes
- Label inspection

Inspect any applications in Pharma



Pill inspection in blisters



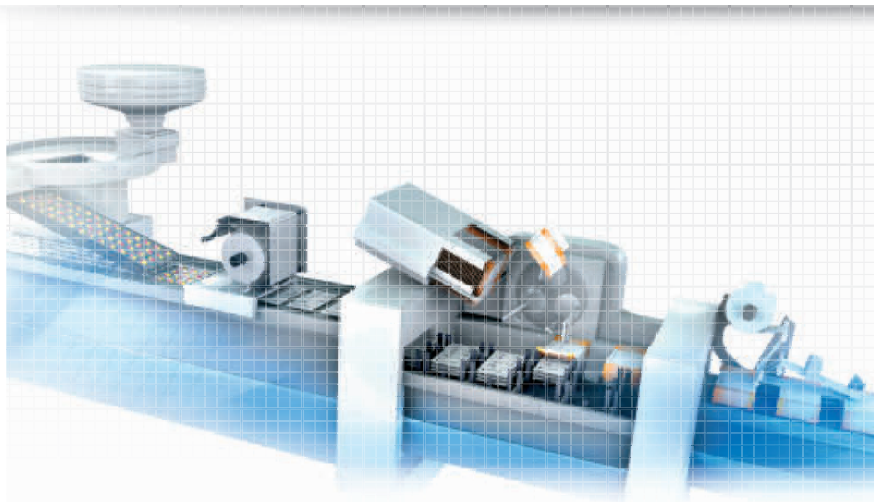
Polar transformation of round strings



Date/Batch code verification (OCR/OCV)



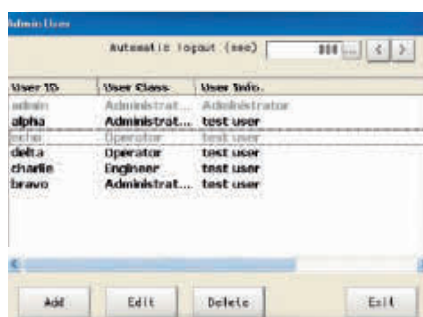
High speed code reading



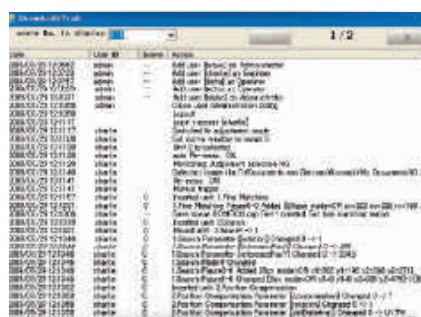
Your benefits

- Strong OCR/OCV (any font & print type)
- Barcode/Datamatrix
- Braille
- Pattern and edge tools
- Real colour inspection
- High resolution to detect minute defects

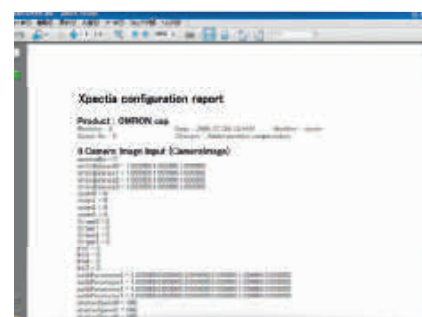
Optimize your set-up with a click



User access administration



Audit trail



Generate and export configuration data

| Item description | Order code | Quick Link |
|----------------------------------|------------------|-------------|
| FlexXpect-Pharma software module | FLEXXPECT-PHARMA | G634 |

Note: FlexXpect software modules require Xpectia/FZW hardware. This is not part of the item and needs to be ordered independently.

FlexXpect Labelling



FlexXpect is a modular Vision platform. In combination with the powerful Xpectia-hardware, it takes you into a new dimension of specialisation. FlexXpect-Labeling has been designed to deliver tailored functionality for inspection of labels and packages.

Powerful image processing tools for labelling:

- OCR/OCV
- Barcode/Datamatrix
- Pattern and edge tools
- Real colour inspection
- High resolution to detect minute defects

Label unwrapping from bottles for inspection of premium beverages:

- Acquire images from up to 4x cameras
- Compensate the distortion
- Identify the overlapping areas
- Stitch the images together

Powerful image processing tools for labelling



Strong OCR/OCV



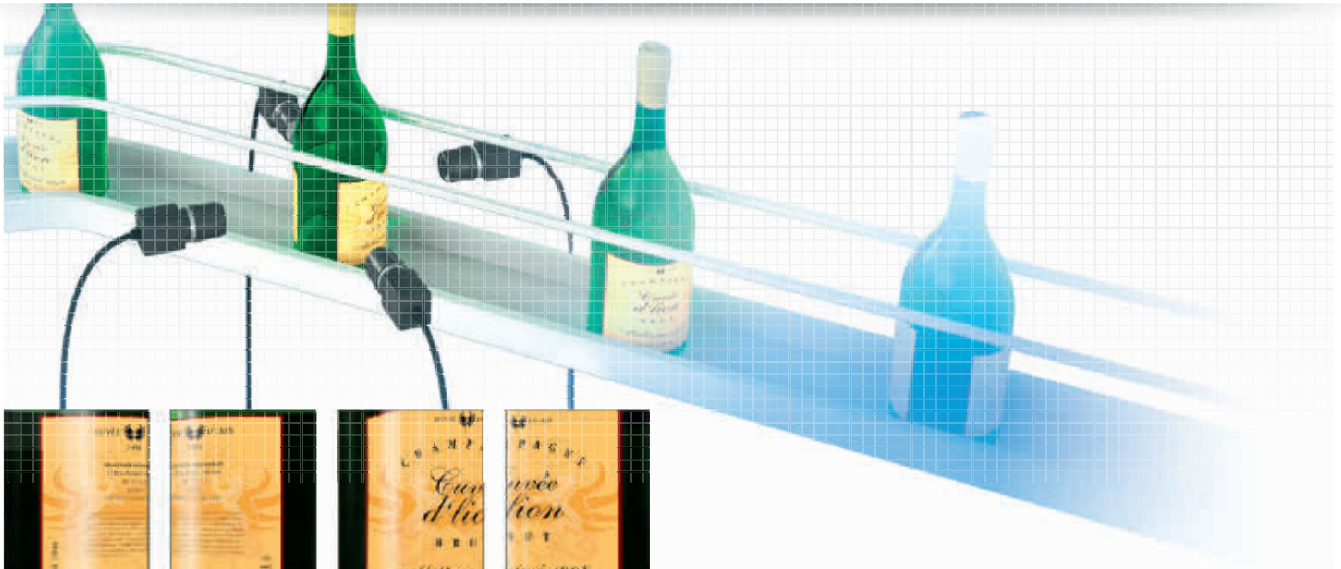
Polar transformation of round strings



Date/Batch code verification (OCR/OCV)



High speed code reading



Your benefits

- Strong OCR/OCV
- Code reading (Barcode, Datamatrix)
- 360° inspections of bottles
- Real colour processing items
- High resolution
- Easy & intuitive configuration



Position and defect inspection

Produce aesthetically perfect products is a key point. FlexXpect-Labeling offers a suite of image processing tools to inspect the label for position and defects.



Reading different codes at a time

Two or more different codes in the same field of view can be read by utilizing a high resolution camera. This function helps to reduce the inspection time.

| Item description | Order code | Quick Link |
|------------------------------------|---------------------|------------|
| FlexXpect-Labeling software module | FLEXXPECT-LABELLING | G633 |

Note: FlexXpect software modules require Xpectia/FZW hardware. This is not part of the item and needs to be ordered independently.

FlexXpect Glue Bead



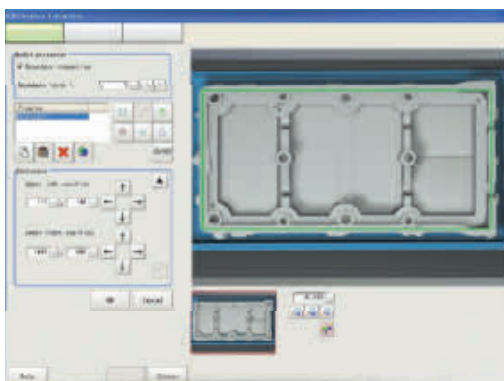
FlexXpect is a modular Vision platform. In combination with the powerful Xpectia-hardware, it takes you into a new dimension of specialisation. The FlexXpect-Glue Bead inspects the complete sealing of automotive parts in one shot. Driven by the real colour functionality, any sealing can be identified and checked, independent how visible it is. Featuring a simple set-up procedure and automatic calculation of the path, it represents a powerful and straight forward solution for any glue application.

Glue Bead inspection:

- Correct path
- Thickness
- Interrupt

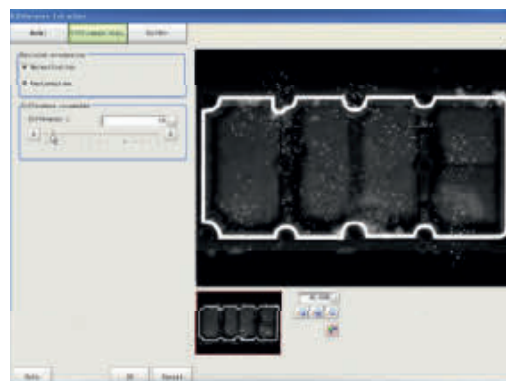
Inspect any applications in Pharma

FlexXpect-Glue Bead features an intuitive and easy set-up procedure. No expert knowledge of the user is required.



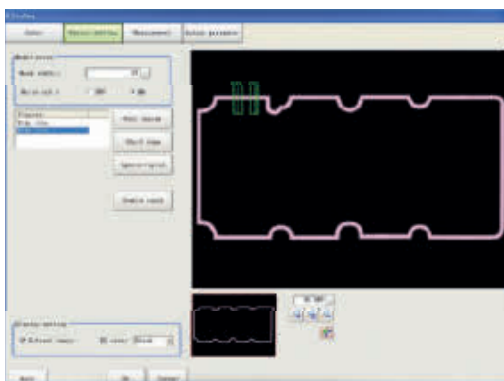
Step 1

Define inspection area.



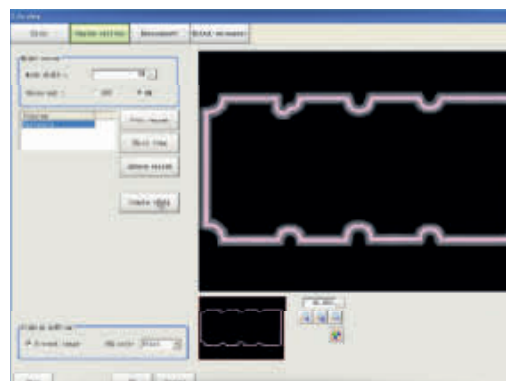
Step 2

Teach the glue.



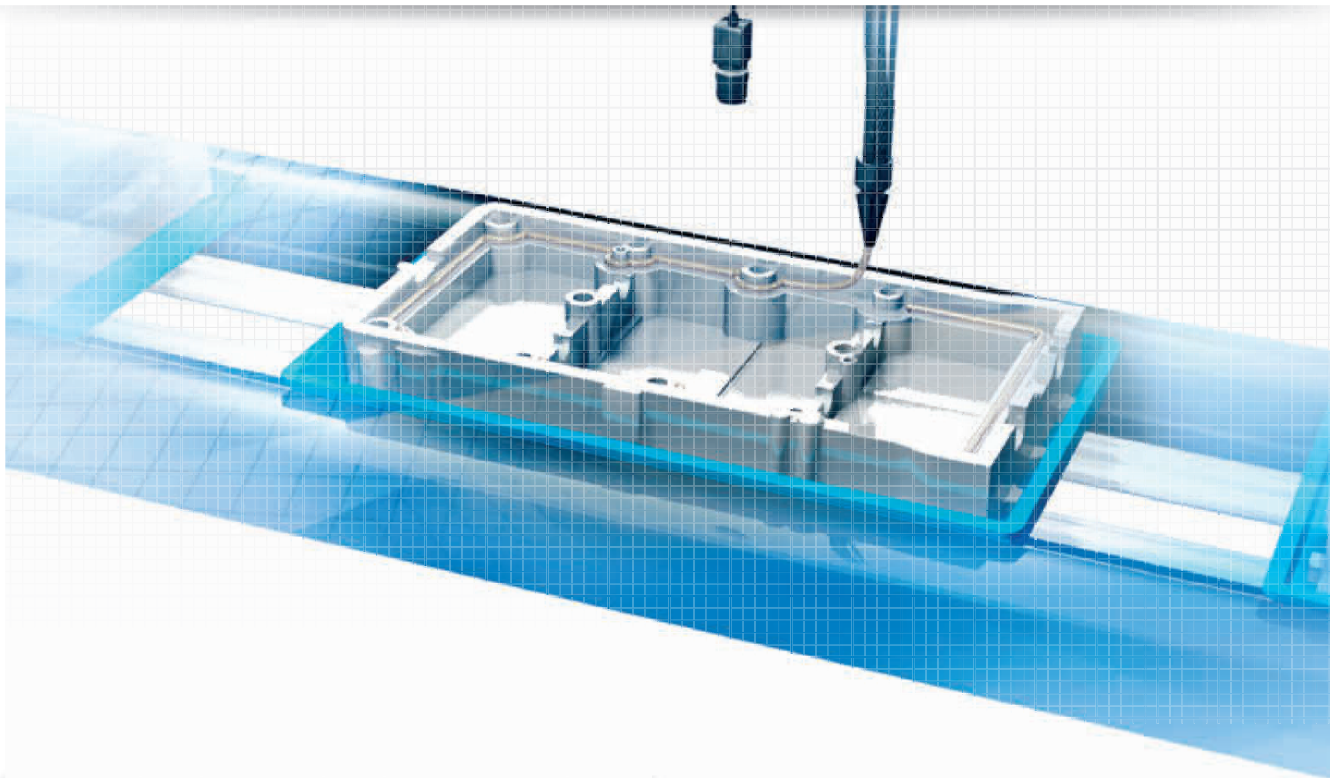
Step 3

Define start & end point of the glue.



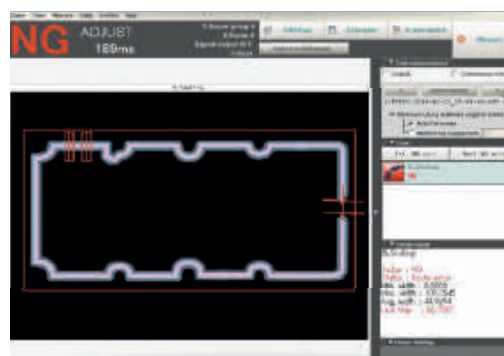
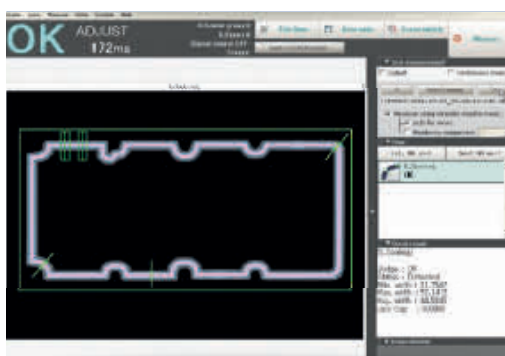
Step 4

Automatic calculation of the path of the Glue Bead.



Your benefits

- One shot inspection of the complete path
- Easy set-up
- Automatic path calculation
- Real colour glue extraction



| Item description | Order code | Quick Link |
|-------------------------------------|--------------------|------------|
| FlexXpect-Glue Bead software module | FLEXXPCT-GLUE BEAD | G632 |

Note: FlexXpect software modules require Xpectia/FZW hardware. This is not part of the item and needs to be ordered independently.

FlexXpect PV



FlexXpect is a modular Vision platform. In combination with the powerful Xpectia hardware, it takes you into a new dimension of specialisation. FlexXpect-PV delivers tailored functionality for alignment and the inspection of wafers for chips and cracks.

Features of FlexXpect-PV:

- Easy and intuitive set-up
- Automatic extraction and teaching of the PV wafer
- Precise inspections with high resolution cameras
- Automatic robot calibration
- Fade-out strings and conveyor belts

Supported PV inspections:

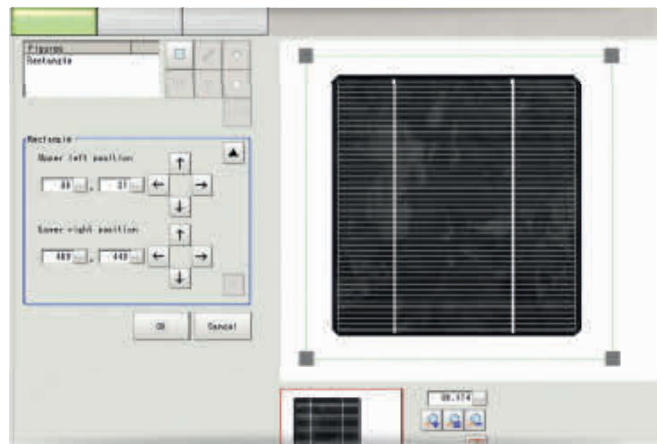
- Precise wafer and string alignment
- Accurate chamfer chip inspection
- Detection of minute edge cracks
- Bus bar alignment on the wafer

Quick set-up in simple steps:



Step 1:

Select the inspection function



Step 2:

Draw a rectangle around the wafer



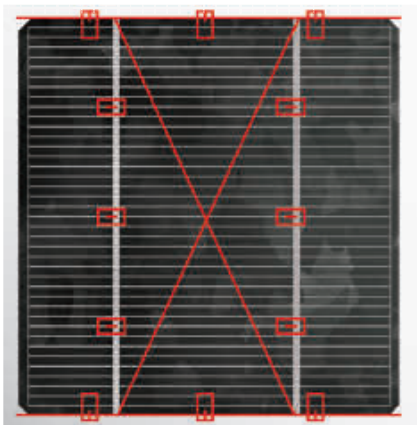
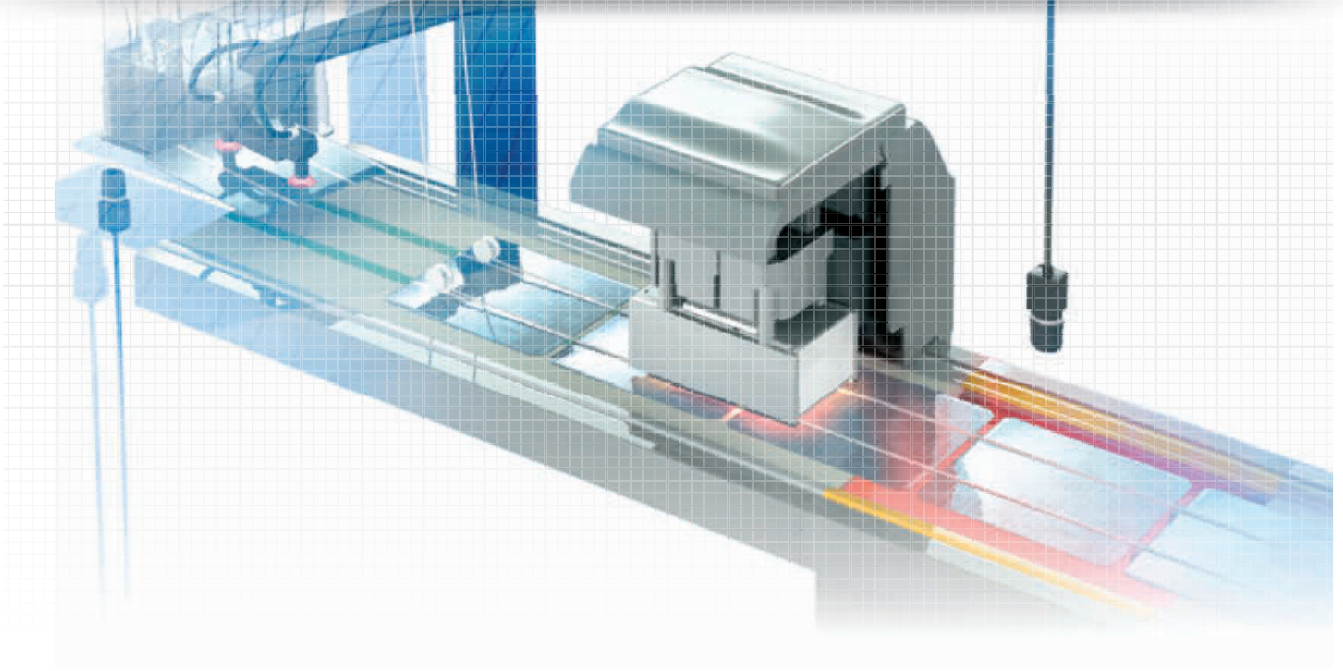
Step 3:

One step deletion of bus bars and conveyor belts (optional)

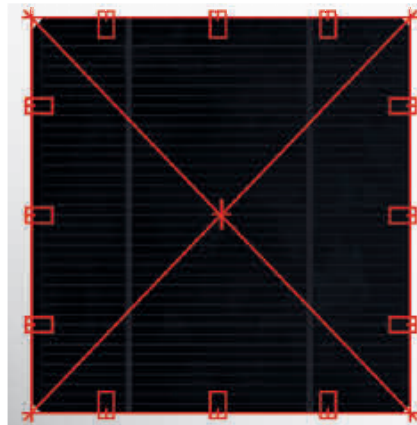


Step 4:

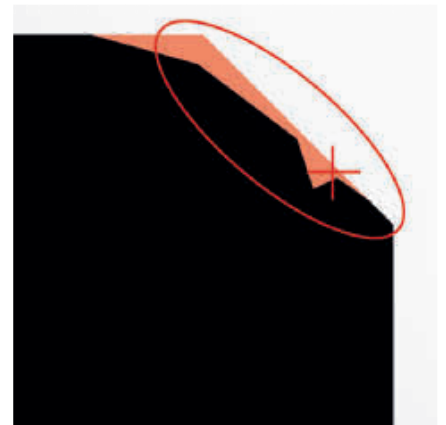
Start the inspection
Accurate chamfer chip inspection
(0.1 mm)



Bus bar alignment



Outline edge alignment



Precise detection of edge breakage

Your benefits

- One shot inspection of the complete path
- Easy set-up
- Automatic path calculation
- Real colour glue extraction

| Item description | Order code | Quick Link |
|------------------------------|--------------|------------|
| FlexXpect-PV software module | FLEXXPECT-PV | G636 |

Note: FlexXpect software modules require Xpectia/FZW hardware. This is not part of the item and needs to be ordered independently.

V680 RFID System

One for all

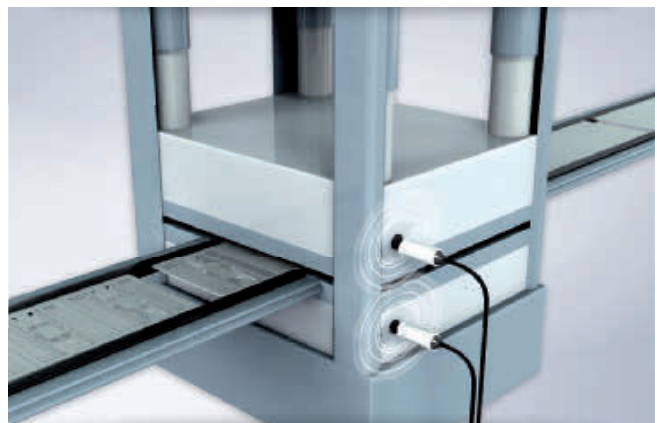
Whenever you need to have full transparency of your production process or logistic application V680 is helping you to manage your data most comfortably and reliably.

- Diagnostic functions for maintenance
- One for all: modular platform concept
- Flexible installation: long reach antennas
- Fit for speed: high turn around time
- Save time & costs: easy setup & maintenance



Production ID system for the paint shop

A RFID system is used to store the process parameters needed for the production of the car throughout the process. Harsh conditions through chemicals and high temperatures occur during the production steps. RFID is ideal for this application as it features high resistance tags for harsh conditions.



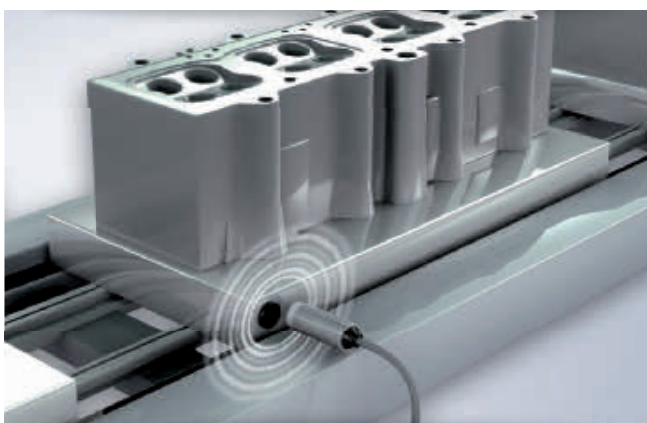
Monitoring of the moulding history

Process and maintenance related information of a moulding press can be stored by using RFID. The information can be read out permanently or on demand from a remote location and can be used to control the process.



Your benefits

- High speed air communication
- Standardized protocol (ISO 15693)
- Large memory (up to 32kByte) and very compact tags
- Long life time of tags (FERAM variants)
- All protocols for PLC communication



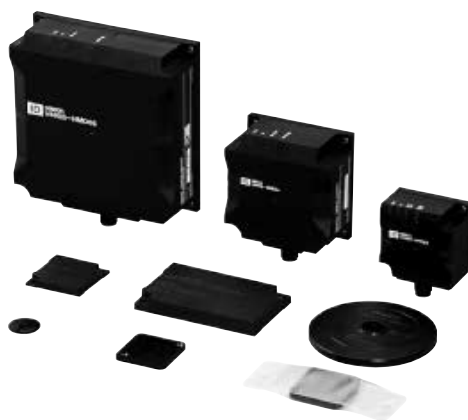
Traceability of automotive parts

Track the parts in the production process. Process related information can be stored to guarantee high quality production.



Carrier Management

For the administration and traceability of transport carriers along the whole process RFID represents a smart solution. V680 is working on the standardized universal frequency of 13.56MHz. The flexible platform with its versatile and compact design can be easily integrated into any point in the production process.



3 in 1 RFID: Antenna, amplifier & controller

- Conforms to ISO/IEC 18000-3 (15693).
- Ethernet (EtherNet/IP, PROFINET, Modbus TCP) enables easy connection with control or supervisory systems.
- Easy installation and “visualized” communications status minimize startup work and downtime.
- WEB browser can be used for setting, monitoring, and communications with RF Tags.

Ordering information

V680S-series

RF tag

| Type | Memory capacity | Appearance | Size | Installation | Order code |
|--------------|-----------------|------------|-----------------|---|-----------------------------|
| Battery-less | 2 kbytes | | 40 × 40 × 5 mm | For flush mounting on metallic surface | V680S-D2KF67M |
| | | | | For flush mounting on nonmetallic surface | V680S-D2KF67 |
| | | | 86 × 54 × 10 mm | For flush mounting on metallic surface | V680S-D2KF68M |
| | | | | For flush mounting on nonmetallic surface | V680S-D2KF68 |
| | 8 kbytes | | 40 × 40 × 5 mm | For flush mounting on metallic surface | V680S-D8KF67M ^{*1} |
| | | | | For flush mounting on nonmetallic surface | V680S-D8KF67 ^{*1} |
| | | | 86 × 54 × 10 mm | For flush mounting on metallic surface | V680S-D8KF68M ^{*1} |
| | | | | For flush mounting on nonmetallic surface | V680S-D8KF68 ^{*1} |

^{*1} V680S-D8KF6_M/V680S-D8KF6_ can be used with V680S series Reader/Writer version 2.00 or higher.







V680-series

RF tag

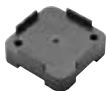


| Type | Memory capacity | Appearance | Size | Installation | Order code |
|--|-----------------|------------|--------------------|---|-----------------|
| Battery-less | 1 kbyte | | 20 dia. × 2.7 mm | For flush mounting on nonmetallic surface | V680-D1KP54T |
| | | | 34 × 34 × 3.5 mm | For flush mounting on metallic surface | V680-D1KP66MT |
| | | | | For flush mounting on nonmetallic surface | V680-D1KP66T |
| Environment-resistant type Battery-less | | | 95 × 36.5 × 6.5 mm | For flush mounting on nonmetallic surface | V680-D1KP66T-SP |
| High-temperature type Battery-less | | | 80 dia. × t10 mm | For mounting with special attachment | V680-D1KP58HTN |

Note: V680 series 8kbyte RF Tag (V680-D8KF67, V680-D8KF67M and V680-D8KF68A) can communicate with V680S series Reader/Writer. For details, refer to the User's Manual (Cat. No. Z339).



Reader/Writer

| Type | Appearance | Size | Network | Order code |
|---------------|---|-------------------|---------------------|-----------------|
| Reader/Writer |  | 50 × 50 × 30 mm | EtherNet/IP | V680S-HMD63-EIP |
| | | | PROFINET | V680S-HMD63-PNT |
| |  | 75 × 75 × 40 mm | EtherNet/IP | V680S-HMD64-EIP |
| | | | PROFINET | V680S-HMD64-PNT |
| |  | 120 × 120 × 40 mm | EtherNet/IP | V680S-HMD66-EIP |
| | | | PROFINET | V680S-HMD66-PNT |
| |  | 50 × 50 × 30 mm | Modbus TCP (TCP/IP) | V680S-HMD63-ETN |
| |  | 75 × 75 × 40 mm | | V680S-HMD64-ETN |
| |  | 120 × 120 × 40 mm | | V680S-HMD66-ETN |

RF tag attachment

| Type | Appearance | Order code |
|------------------------|---|------------|
| For the V680-D1KP66T |  | V600-A86 |
| For the V680-D1KP58HTN |  | V680-A80 |
| For the V680-D1KP54T |  | V700-A80 |

Cable




| Type | Appearance | Length | Order code |
|---------------------------------|---|--------|---------------|
| Special connector – RJ45 |  | 2 m | V680S-A41 2M |
| | | 5 m | V680S-A41 5M |
| | | 10 m | V680S-A41 10M |
| Special connector – Loose wires |  | 2 m | V680S-A42 2M |
| | | 5 m | V680S-A42 5M |
| | | 10 m | V680S-A42 10M |

Extension cable

| Type | Appearance | Length | Order code |
|---------------------------------------|---|--------|---------------|
| Special connector – Special connector |  | 10 m | V680S-A40 10M |
| | | 20 m | V680S-A40 20M |
| | | 50 m | V680S-A40 50M |

Note: The maximum extendable cable length using the cable and extension cable is 60 m. Only one extension cable can be used.

Industrial switching hubs (Recommended hubs)

| Type | Appearance | Specifications | | | Order code |
|---------------------------|---|--|--------------|-------------------|------------|
| | | Functions | No. of ports | Failure detection | |
| Industrial switching hubs |  | Quality of Service (QoS): EtherNet/IP control data priority Failure detection: Broadcast storm and LSI error detection 10/100BASE-TX, Auto-Negotiation | 3 | No | W4S1-03B |
| |  | | 5 | No | W4S1-05B |
| |  | | 5 | Yes | W4S1-05C |

Specifications

V680S-series

RF tag (2-kbyte Memory)

| Item | V680S-D2KF67 | V680S-D2KF67M | V680S-D2KF68 | V680S-D2KF68M |
|-------------------------------|--|---------------|--|---------------|
| Memory capacity | 2,000bytes (user area) | | | |
| Memory type | FRAM | | | |
| Data retention | 10 years after writing (85°C or less) | | | |
| Memory life | One trillion writes for each block (85°C or less), Access frequency ^{*1} : One trillion accesses | | | |
| Ambient operating temperature | −20 to 85°C (with no icing) | | | |
| Ambient storage temperature | −40 to 125°C (with no icing) | | | |
| Ambient operating humidity | 35% to 85% | | | |
| Degree of protection | IP68 (IEC 60529:2001), Oil resistance equivalent to IP67G (JIS C 0920:2003, Appendix 1) ^{*2} . IPX9K (DIN 40 050) | | | |
| Vibration resistance | No abnormality after application of 10 to 2,000 Hz, 1.5-mm double amplitude, acceleration: 150 m/s ² , 10 sweeps each in X, Y, and Z directions for 15 minutes each | | No abnormality after application of 10 to 500 Hz, 1.5-mm double amplitude, acceleration: 100 m/s ² , 10 sweeps each in X, Y, and Z directions for 11 minutes each | |
| Shock resistance | No abnormality after application of 500 m/s ² , 3 times each in X, Y, and Z directions (Total: 18 times) | | | |
| Dimensions (W×H×D) | 40 × 40 × 5 mm | | 86 × 54 × 10 mm | |
| Materials | Exterior: PPS resin | | | |
| Weight | Approx. 11.5 g | Approx. 12 g | Approx. 44 g | Approx. 46 g |
| Metal countermeasures | None | Provided | None | Provided |

^{*1} The number of accesses is the total number of reads and writes.

^{*2} Oil resistance has been tested using a specific oil as defined in the OMRON test method.

Note: For details, refer to the User's Manual (Cat. No. Z339).

RF Tag (8-kbyte Memory)

| Item | V680S-D8KF67 | V680S-D8KF67M | V680S-D8KF68 | V680S-D8KF68M |
|-------------------------------|--|---------------|--|---------------|
| Memory capacity | 8,192 bytes (user area) | | | |
| Memory type | FRAM | | | |
| Data retention | 10 years after writing (85°C or less) | | | |
| Memory life | One trillion writes for each block (85°C or less), Access frequency ^{*1} : One trillion accesses | | | |
| Ambient operating temperature | −20 to 85°C (with no icing) | | | |
| Ambient storage temperature | −40 to 125°C (with no icing) | | | |
| Ambient operating humidity | 35% to 85% | | | |
| Degree of protection | IP68 (IEC 60529:2001), Oil resistance equivalent to IP67G (JIS C 0920:2003, Appendix 1) ^{*2} . IPX9K (DIN 40 050) | | | |
| Vibration resistance | No abnormality after application of 10 to 2,000 Hz, 1.5-mm double amplitude, acceleration: 150 m/s ² , 10 sweeps each in X, Y, and Z directions for 15 minutes each | | No abnormality after application of 10 to 500 Hz, 1.5-mm double amplitude, acceleration: 100 m/s ² , 10 sweeps each in X, Y, and Z directions for 11 minutes each | |
| Shock resistance | No abnormality after application of 500 m/s ² , 3 times each in X, Y, and Z directions (Total: 18 times) | | | |
| Dimensions (W×H×D) | 40 × 40 × 5 mm | | 86 × 54 × 10 mm | |
| Materials | Exterior: PPS resin | | | |
| Weight | Approx. 11.5 g | Approx. 12 g | Approx. 44 g | Approx. 46 g |
| Metal countermeasures | None | Provided | None | Provided |

^{*1} The number of accesses is the total number of reads and writes.

^{*2} Oil resistance has been tested using a specific oil as defined in the OMRON test method.

Note: For details, refer to the User's Manual (Cat. No. Z339).

V680-series

RF Tag (1-kbyte Memory)

| Item | V680-D1KP54T | V680-D1KP66T | V680-D1KP66MT | V680-D1KP66T-SP |
|--|---|--|---------------|---|
| Memory capacity | 1,000 bytes (user area) | | | |
| Memory type | EEPROM | | | |
| Data retention time | 10 years after writing (85°C or less), 0.5 year after writing (85 to 125°C) Total data retention at high temperatures exceeding 125°C is 10 hours* ¹ | | | 10 years after writing (85°C or less) |
| Write endurance | 100,000 writes for each block (25°C) | | | |
| Ambient operating temperature (during transmission) | −25 to 85°C (with no icing) | | | During RF Tag communications: −25 to 70°C (with no icing) Not during RF Tag communications: −40 to 110°C (with no icing) |
| Ambient storage temperature (during data backup) | −40 to 125°C (with no icing) Heat resistance: 1,000 thermal cycles each of 30 minutes at −10°C/150°C, High temperature storage: 1,000 hours at 150°C* ² 200 thermal cycles each of 30 minutes at −10°C/180°C, High temperature storage: 200 hours at 180°C* ³ | | | −40 to 110°C (with no icing) |
| Ambient operating humidity | 35 to 95% | | | |
| Degree of protection | IP67 (IEC 60529:2001) Oil resistance equivalent to IP67G (JIS C 0920:2003, Appendix 1)* ⁴ | IP68 (IEC 60529:2001) Oil resistance equivalent to IP67G (JIS C 0920:2003, Appendix 1)* ⁴ | | IP67 |
| Vibration resistance | No abnormality after application of 10 to 2,000 Hz, 1.5-mm double amplitude, acceleration: 150 m/s ² , 10 sweeps each in X, Y, and Z directions for 15 minutes each | | | |
| Shock resistance | No abnormality after application of 500 m/s ² , 3 times each in X, Y, and Z directions (Total: 18 times) | | | |
| Appearance | 20 dia. × 2.7 mm | 34 × 34 × 3.5 mm | | 95 × 36.5 × 6.5 mm (excluding protruding parts) |
| Materials | PPS resin | | | Exterior: PFA fluororesin RF Tag filling: PPS resin |
| Weight | Approx. 2 g | Approx. 6 g | Approx. 7.5 g | Approx. 20 g |
| Metal countermeasures | None | None | Provided | None |

^{*1} After storing data at high temperatures, rewrite the data even if changes are not required. High temperatures are those exceeding 125°C up to 180°C.

^{*2} 150°C heat resistance: The heat resistance has been checked at 150°C for up to 1,000 hours, and thermal shock has been checked through testing 1,000 thermal cycles each of 30 minutes at -10/150°C. (Test samples: 22, defects: 0)

^{*3} 180°C heat resistance: The heat resistance has been checked at 180°C for up to 200 hours, and thermal shock has been checked through testing 200 thermal cycles each of 30 minutes at -10°C/180°C. (Test samples: 22, defects: 0)

^{*4} Oil resistance has been tested using a specific oil as defined in the OMRON test method.

Note: For details, refer to the User's Manual (Cat. No. Z339).

RF Tag (1-kbyte Memory with High-temperature Capability)

| Item | V680-D1KP58HTN |
|---|--|
| Memory capacity | 1,000 bytes (user area) |
| Memory type | EEPROM |
| Data retention | 10 years after writing (85°C or less), 0.5 year after writing (85 to 125°C) Total data retention at high temperatures exceeding 125°C is 10 hours ^{*1} |
| Write endurance | 100,000 writes for each block (25°C) |
| Ambient operating temperature (during transmission) | -25 to 85°C (with no icing) |
| Ambient storage temperature (during data backup) | -40 to 250°C (with no icing) (Data retention: -40 to 125°C) |
| Ambient storage humidity | No restrictions. |
| Degree of protection | IP67 (IEC 60529:2001) Oil resistance equivalent to IP67G (JIS C 0920:2003, Appendix 1) ^{*2} |
| Vibration resistance | No abnormality after application of 10 to 2,000 Hz, 1.5-mm double amplitude, acceleration: 150 m/s ² , 10 sweeps each in X, Y, and Z directions for 15 minutes each |
| Shock resistance | No abnormality after application of 500 m/s ² , 3 times each in X, Y, and Z directions (Total: 18 times) |
| Materials | Exterior: PPS resin |
| Weight | Approx. 70 g |

^{*1} After storing data at high temperatures, rewrite the data even if changes are not required. High temperatures are those exceeding 125°C up to 180°C.

^{*2} Oil resistance has been tested using a specific oil as defined in the OMRON test method.

Note: For details, refer to the User's Manual (Cat. No. Z339).

Reader/Writer

EtherNet/IP, PROFINET

| Item | V680S-HMD63-EIP V680S-HMD63-PNT | V680S-HMD64-EIP V680S-HMD64-PNT | V680S-HMD66-EIP V680S-HMD66-PNT |
|--------------------------------------|--|---|--|
| Dimensions (W×H×D) | 50 × 50 × 30 mm (excluding protruding parts and cables) | 75 × 75 × 40 mm (excluding protruding parts and cables) | 120 × 120 × 40 mm (excluding protruding parts and cables) |
| Power supply voltage | 24 VDC (−15% to 10%) | | |
| Consumption current | 0.2 A max. | | |
| Ambient operating temperature | −10 to +55°C (with no icing) | | |
| Ambient operating humidity | 25% to 85% (with no condensation) | | |
| Ambient storage temperature | −25 to 70°C (with no icing) | | |
| Ambient storage humidity | 25% to 85% (with no condensation) | | |
| Insulation resistance | 20 MΩ min. (at 500 VDC) between cable terminals and case | | |
| Dielectric strength | 1,000 VAC, 50/60 Hz for 1 min between cable terminals and case | | |
| Vibration resistance | No abnormality after application of 10 to 500 Hz, 1.5-mm double amplitude, acceleration: 100 m/s ² , 10 sweeps in each of 3 axis directions (up/down, left/right, and forward/backward) for 11 minutes each | | |
| Shock resistance | No abnormality after application of 500 m/s ² , 3 times each in 6 directions (Total: 18 times) | | |
| Degree of protection | IP67 (IEC 60529: 2001) Oil resistance equivalent to IP67F (JIS C 0920: 2003, Appendix 1)* ¹ | | |
| Materials | Case: PBT resin, Filled resin: Urethane resin | | |
| Mass | Approx. 240 g | Approx. 390 g | Approx. 760 g |
| Installation method | Reader/Writer: Two M4 screws (Use a screw of 12 mm or more in length.) Branch cable joint: One M4 screws | Four M4 screws (Use a screw of 12 mm or more in length.) | |
| Host device communications interface | Ethernet 10BASE-T/100BASE-TX | | |
| Host device communications protocol | EtherNet/IP, PROFINET | | |
| Accessories | Instruction Sheet, Description of Regulations and Standard, IP address label | | |

*¹ Oil resistance has been tested using a specific oil as defined in the OMRON test method.

Note: The 0.5 m cable with two M12 connectors is attached to the Reader/Writer. The cable cannot be removed.

Modbus TCP

| Item | V680S-HMD63-ETN | V680S-HMD64-ETN | V680S-HMD66-ETN |
|--------------------------------------|--|---|---|
| Dimensions | 50 × 50 × 30 (excluding protruding parts) | 75 × 75 × 40 (excluding protruding parts) | 120 × 120 × 40 mm (excluding protruding parts) |
| Power supply voltage | 24 VDC (−15% to 10%) | | |
| Consumption current | 0.2A max. | | |
| Ambient operating temperature | −10 to 55°C (with no icing) | | |
| Ambient operating humidity | 25% to 85% (with no condensation) | | |
| Ambient storage temperature | −25 to 70°C (with no icing) | | |
| Ambient storage humidity | 25% to 85% (with no condensation) | | |
| Insulation resistance | 20 MΩ min. (at 500 VDC) between cable terminals and case | | |
| Dielectric strength | 1,000 VAC, 50/60 Hz for 1 min between cable terminals and case | | |
| Vibration resistance | No abnormality after application of 10 to 500 Hz, 1.5-mm double amplitude, acceleration: 100 m/s ² , 10 sweeps in each of 3 axis directions (up/down, left/right, and forward/backward) for 11 minutes each | | |
| Shock resistance | No abnormality after application of 500 m/s ² , 3 times each in 6 directions (Total: 18 times) | | |
| Degree of protection | IP67 (IEC 60529: 2001) Oil resistance equivalent to IP67F (JIS C 0920: 2003, Appendix 1)* ¹ | | |
| Materials | Case: PBT resin, Filled resin: Urethane resin | | |
| Mass | Approx. 120 g | Approx. 270 g | Approx. 640 g |
| Installation method | Two M4 screws (Use a screw of 12 mm or more in length.) | Four M4 screws (Use a screw of 12 mm or more in length.) | |
| Host device communications interface | Ethernet 10BASE-T/100BASE-TX | | |
| Host device communications protocol | MODBUS TCP | | |
| Accessories | Instruction sheet, Description of Regulations and Standard, IP address label, Ferrite core* ² | | |

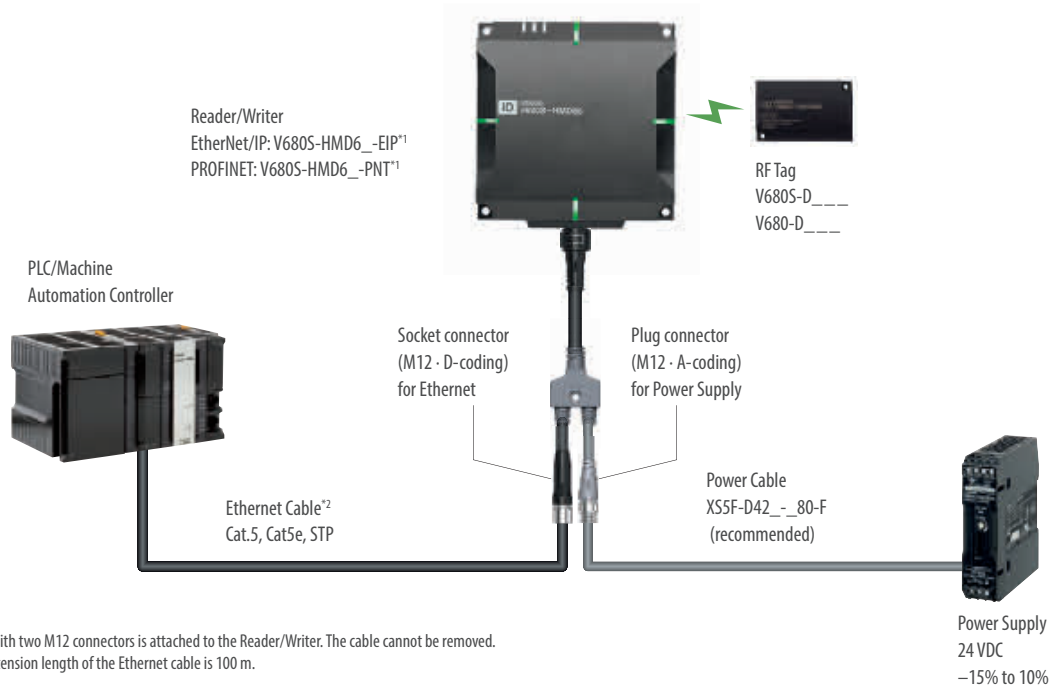
*¹ Oil resistance has been tested using a specific oil as defined in the OMRON test method.

*² Provided only with the V680S-HMD66-ETN.

System configuration

The below shows the configuration for 1 to 1 connection. Multiple Reader/Writers can be connected by using a switching hub.

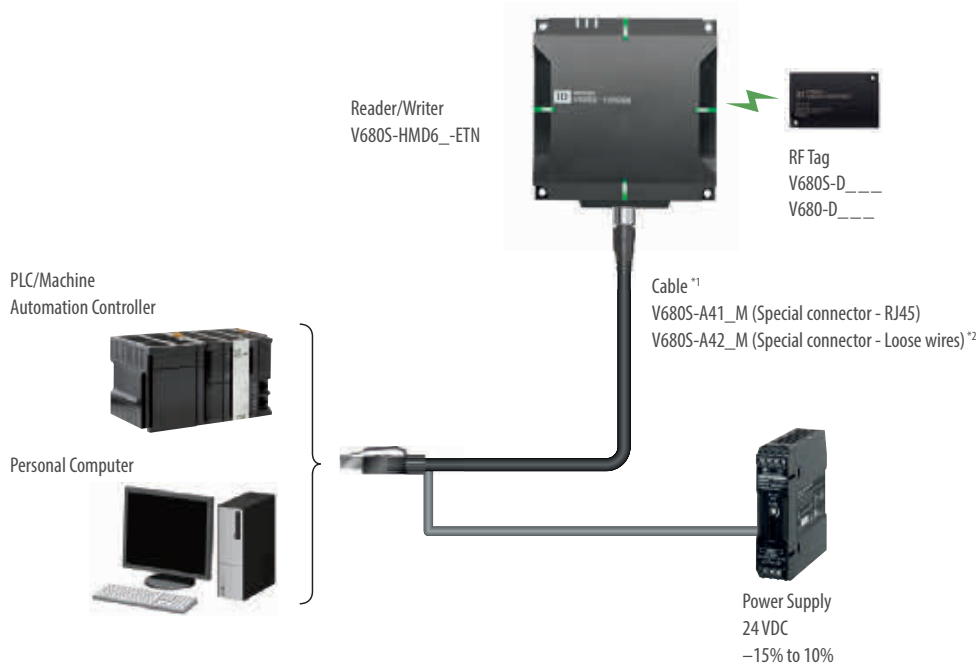
EtherNet/IP, PROFINET



^{*1} The 0.5 m cable with two M12 connectors is attached to the Reader/Writer. The cable cannot be removed.

^{*2} The maximum extension length of the Ethernet cable is 100 m.

Modbus TCP



Note: The cable can be extended up to 60 m by using the Extension Cable V680S-A40_M (cable length: 10/20/50 m).
Use the extension cable between the Reader/Writer and cable.
Only one extension cable can be used.

^{*1} The length of the Cable V680S-A41_M/-A42_M is 2, 5, or 10 m.

^{*2} The end of the cable should be prepared before connecting.