

This document provides information mainly for selecting suitable models. Please read the document SCHB-737 carefully for information that the user must understand and accept before purchase, including information on warranty, limitations of liability, and precautions.



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Authorized Distributor:

The High-performance Vision Sensor



*Innovation  
in the Solution Age*

OMRON INDUSTRIAL AUTOMATION

# HIGH PERFORMANCE MACHINE

## Operation Mode Selection

An Unending Quest for  
Faster Processing  
Combined with Years  
of Know-how



### New Functions for Improved Production Processes

High-speed processing with the world's first real-time 360° rotation search and advanced algorithms resulting from vast experience and know-how. The F270 provides application solutions such as positioning and inspections that were difficult to achieve with conventional Vision Sensors. And as a new feature, support functions have been added to enable integrating measurement data into production management. OMRON Vision Sensors have been transformed into a key component of production lines.



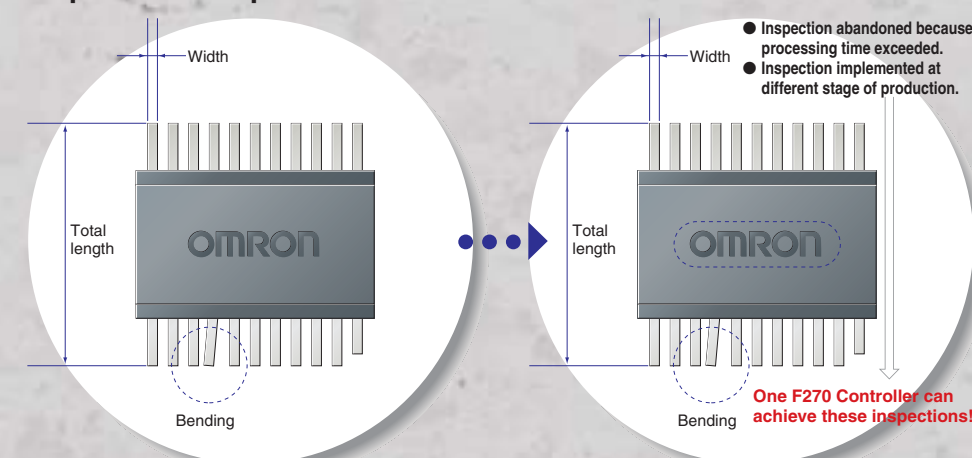
The processing speed of Vision Sensors can cause a bottleneck in the production line. Still, inspecting as many features as possible at the inspection points is necessary. Inspect at the beginning and end of the production line is also necessary, as is using two Cameras to inspect with different optical systems. Different inspection needs keep surfacing. Let OMRON solve this type of inspection need, and more, with the F270 Vision Sensor, a truly High-Performance Machine.

Select the mode for operation.

A mode for high-speed measurements or  
A mode to add more inspection items and increase measurement accuracy

### Use the One-line High-speed Mode.

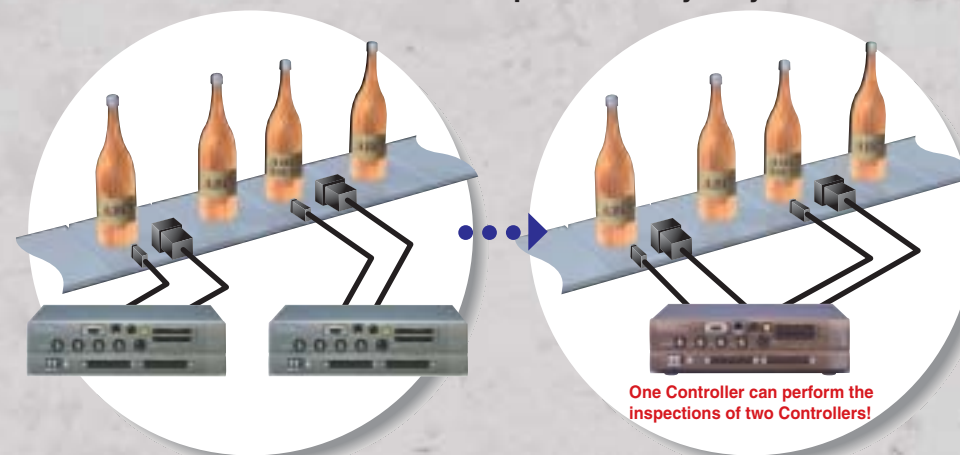
With the world's fastest processing speed, even more detailed inspections are possible.



For inspections at multiple stages of production and reduced space requirements.

### Use the Random Trigger Mode.

The work of two Controllers can be performed by only one Controller.



# F270

The High-performance Vision Sensor



HIGH  
PERFORMANCE  
MACHINE

## Insistence on Better Applications

OMRON continues in its drive to make OMRON Vision Sensors as close as possible to the human eye.

Ever-increasing demand for higher quality!

Inspection of fine defects or foreign objects on product exteriors, verification and reading of expiration dates and lot numbers, positioning of low-contrast marks, etc.

Many industry-first algorithms have been included to provide more stable inspections for every application.

Fine matching,  
EC defects,  
EC positioning,  
QUEST character verification, and much more.

Try it and see.

Those difficult application problems have now been solved.

And OMRON will continue its search for even more applications.

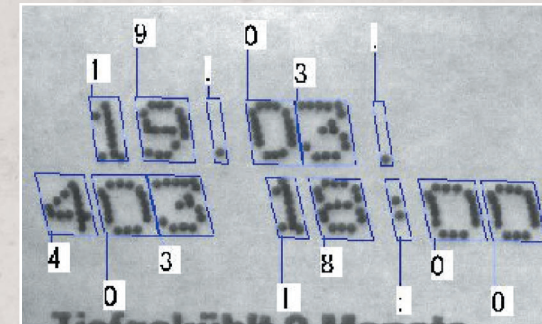
### QUEST Character and Lot Number Verification

Variation in characters reduces inspection accuracy.

The F270 saves a lot of working hours spent registering characters in dictionaries and registering models.

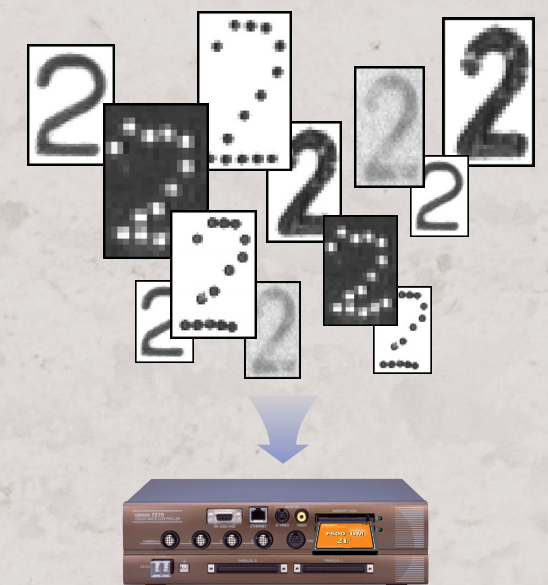
#### Advanced Character Recognition Function

The F270 can read inclined characters and those with narrow spaces between characters



#### Inspections without Registering Characters in a Dictionary

The OMRON original character recognition method recognizes a wide variety of fonts, IJP, and imprinted characters

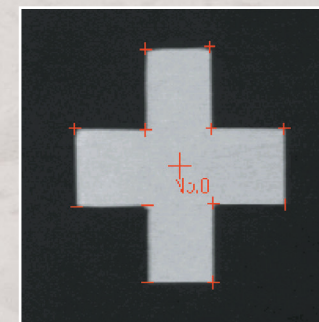


### EC Positioning

Considerably higher measurement accuracy than conventional measurement methods.

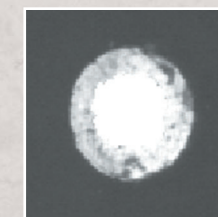
**EC positioning**  
**Repeatability: 1/20 pixel**  
(OMRON test data, see note.)

- ① Demonstrates great efficiency in production processes that require even more-precise positioning.
- ② Expanded field of vision means simpler pre-alignment.

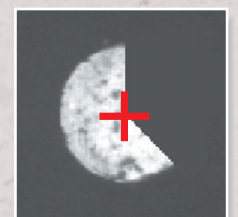


**Stable measurement of variations in shape and contrast.**

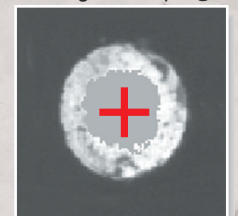
The F270 prevents drops in production line operating rates resulting from measurement mistakes and increased working hours required for resetting for different models.



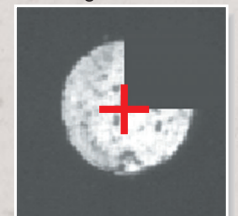
OK product



Change in shape ①



Change in contrast



Change in shape ②

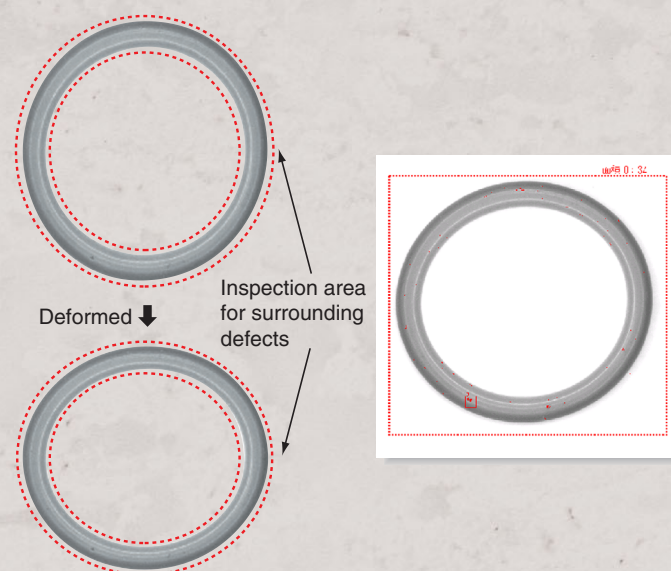
Note: The measurement accuracy will depend on the actual workpiece. Check the accuracy before using the F270.



## Inspection of Defects, Scratches, and Dirt

Conventional fixed-area inspections did not provide stable measurements.

Effective for workpieces with tolerances and workpieces with shape variations.

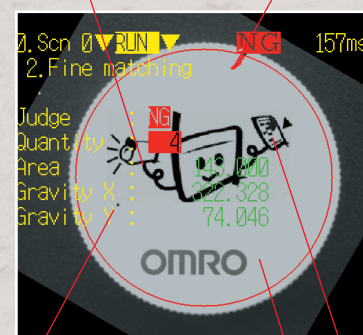


Effective for detecting minute foreign objects or dirt on complicated backgrounds.



## Fine Matching

Displays inspection results as an area value.



Fine stains Incomplete characters Stains in patterns

A new idea from OMRON.

Functions have been added to the F270 so that inspection data can be used on the production line.

Storage of image data and measurement result history,

use of this data in production and quality control for confirmation -

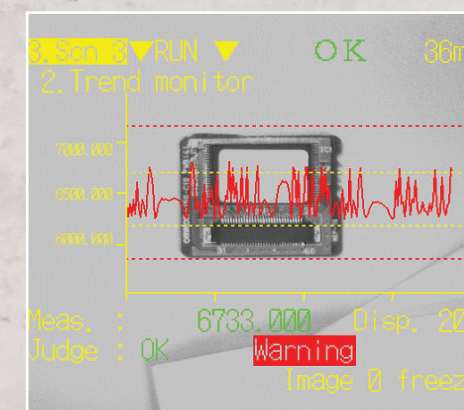
These are functions just about anyone would want.

Utilize measurement data in the production line to change your production line to one that does not overlook or even create NG products.

## Managing Measurement Histories with the F270

Confirming Measurement Results with the Trend Monitor Function

The inspection history can be checked on screen.

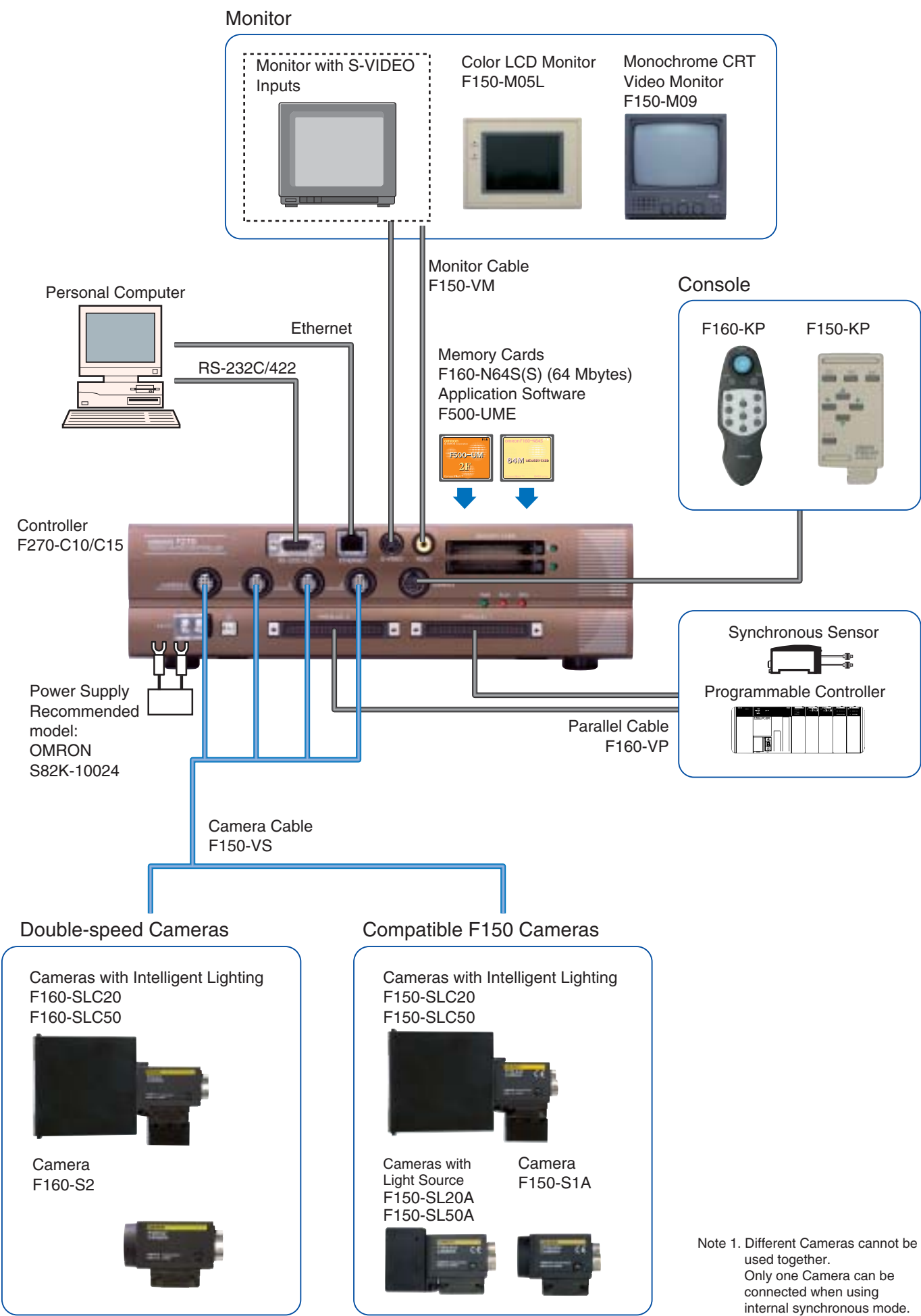


Ethernet, RS-232C/422, or Memory Cards



Personal computer





Note 1. Different Cameras cannot be used together. Only one Camera can be connected when using internal synchronous mode.

| Name                         |                                   | Model        | Remarks                                                                |
|------------------------------|-----------------------------------|--------------|------------------------------------------------------------------------|
| Controllers                  |                                   | F270-C10     | NPN input/output                                                       |
|                              |                                   | F270-C15     | PNP input/output                                                       |
| Double-speed Cameras         | Cameras with Intelligent Lighting | F160-SLC20   |                                                                        |
|                              | Camera only                       | F160-S2      | With partial function                                                  |
| Compatible F150 Cameras      | Cameras with Intelligent Lighting | F150-SLC20   |                                                                        |
|                              |                                   | F150-SLC50   |                                                                        |
|                              | Cameras with Light                | F150-SL20A   |                                                                        |
|                              |                                   | F150-SL50A   |                                                                        |
| Consoles                     | Camera only                       | F150-S1A     |                                                                        |
|                              |                                   | F160-KP      |                                                                        |
|                              |                                   | F150-KP      |                                                                        |
| Color LCD Monitor            |                                   | F150-M05L    |                                                                        |
| Monochrome CRT Video Monitor |                                   | F150-M09     |                                                                        |
| Memory Card                  |                                   | F160-N64S(S) | Memory capacity: 64 Mbytes                                             |
| Application Software         |                                   | F500-UME     |                                                                        |
| Camera Cables                |                                   | F150-VS      | For Double-speed Camera and compatible F150 Cameras. Cable length: 3 m |
| Monitor Cable                |                                   | F150-VM      | Cable length: 2 m                                                      |
| Parallel Cable               |                                   | F160-VP      | Loose-wire cable for parallel I/O connectors. Cable length: 2 m        |

■ Ratings/Functions

● Controller: F270-C10/C15

| Item                              | Specifications                                                                                                                                                                                                                                  |
|-----------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Connectable Cameras               | F150-S1A/SL20A/SL50A/SLC20/SLC50, F160-S2/SLC20/SLC50                                                                                                                                                                                           |
| Number of Cameras connectable     | 4                                                                                                                                                                                                                                               |
| Number of pixels                  | 512 × 484 (H × V)                                                                                                                                                                                                                               |
| Number of scenes                  | 32 (Expansion possible using Memory Cards)                                                                                                                                                                                                      |
| Image storage function            | Maximum of 35 images stored                                                                                                                                                                                                                     |
| Filtering                         | Smoothing (strong, weak), edge enhancement, edge extraction (horizontal, vertical, both), dilation, erosion, median, background suppression                                                                                                     |
| Operations and settings           | Installing measurement items using application software, and combining and setting measurement items by menu operations                                                                                                                         |
| Operation customization functions | Password setting, shortcut keys (The F270 does not have the menu masking function.)                                                                                                                                                             |
| Screen customization functions    | Display items: Character strings (measurement values, judgement results, times, user-specified characters, measurement region names), figures (lines, boxes, circles, cross cursors)<br>Specified parameters: Display color, position, and size |
| Trend monitor function            | Supported                                                                                                                                                                                                                                       |
| Memory card slots                 | 2                                                                                                                                                                                                                                               |
| Monitor interface                 | Composite video output: 1 channel, S-VIDEO output: 1 channel                                                                                                                                                                                    |
| Ethernet                          | 10Base-T: 1 channel                                                                                                                                                                                                                             |
| Serial communications             | RS-232C/422A: 1 channel                                                                                                                                                                                                                         |
| Parallel I/O                      | 21 inputs and 46 outputs                                                                                                                                                                                                                        |
| Strobe interface                  | 4 channels (included in parallel outputs)                                                                                                                                                                                                       |
| Power supply voltage              | 20.4 to 26.4 VDC                                                                                                                                                                                                                                |
| Current consumption               | Approx. 3.7 A (when four F160-SLC50 Cameras connected)                                                                                                                                                                                          |
| Ambient temperature               | Operating: 0 to 50°C, Storage: -25 to +65°C (with no icing or condensation)                                                                                                                                                                     |
| Ambient humidity                  | Operating and storage: 35% to 85% (with no condensation)                                                                                                                                                                                        |
| External dimensions               | 270 × 81 × 197 mm (W × H × D)                                                                                                                                                                                                                   |
| Weight                            | Approx. 3.1 kg (Controller only)                                                                                                                                                                                                                |

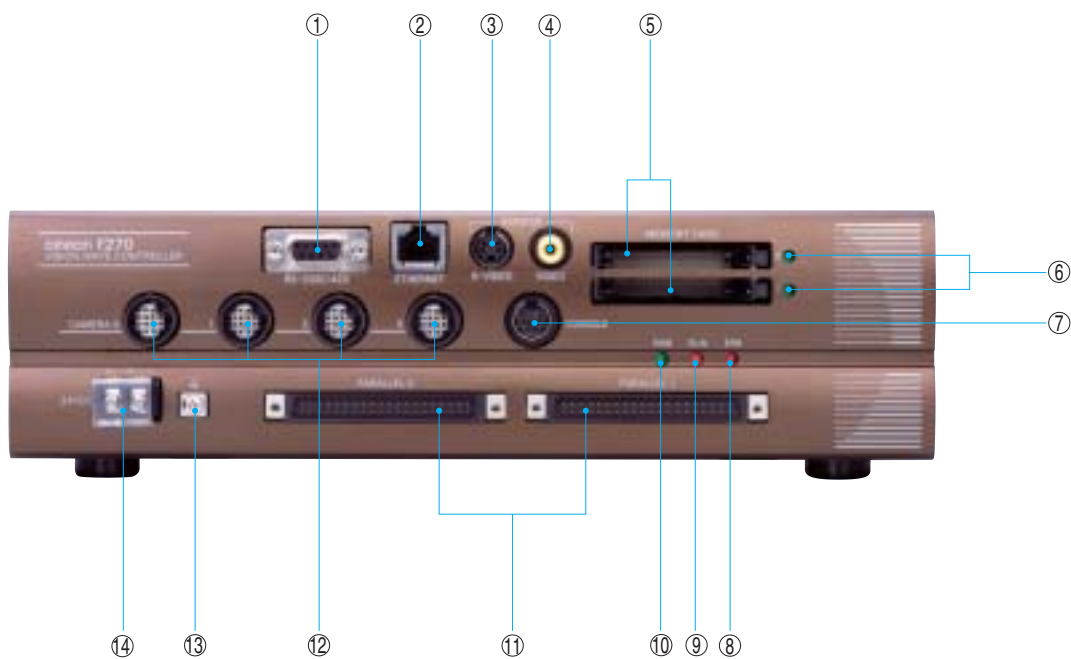
● Double-speed Camera: F160-S2

|                                  |                                                                                            |
|----------------------------------|--------------------------------------------------------------------------------------------|
| Picture element                  | 1/3" Interline CCD                                                                         |
| Effective pixels                 | 659 × 494 (H × V)                                                                          |
| Scanning method                  | 1/60-s non-interlace (frame) mode, 1/120-s 2:1 interlace (field) mode                      |
| Shutter                          | Electronic shutter; select from 8 shutter-speed settings (1/120 to 1/20,000 s) using menu. |
| Camera with Intelligent Lighting | F160-SLC20 (field of vision: 20 mm), F160-SLC50 (field of vision: 50 mm)                   |
| Ambient temperature              | Operating: 0 to 50°C, Storage: -25 to +60°C                                                |
| Ambient humidity                 | Operating and storage: 35% to 85% (with no condensation)                                   |
| External dimensions              | 31 × 40 × 54.5 (W × H × D) mm (not including connectors and other protruding parts)        |
| Weight                           | Approx. 85 g (Camera only)                                                                 |

● Monitor

| Item                  | Model number<br>Name | F150-M05L<br>Color LCD Monitor                                                    | F150-M09<br>Monochrome CRT Video Monitor                                            |
|-----------------------|----------------------|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Size                  |                      | 5.5 inches                                                                        | 9 inches                                                                            |
| Type                  |                      | Liquid crystal color TFT                                                          | CRT monochrome                                                                      |
| Resolution            |                      | 320 × 240 dots                                                                    | 800 TV lines min. (at center)                                                       |
| Input signals         |                      | NTSC composite video (1.0 V/75 Ω)                                                 |                                                                                     |
| Power supply voltage  |                      | 20.4 to 26.4 VDC                                                                  | 100 to 240 VAC (-15%, +10%)                                                         |
| Current consumption   |                      | Approx. 700 mA                                                                    | Approx. 200 mA                                                                      |
| Ambient temperature   |                      | Operating : 0 to 50°C<br>Storage : -25 to 65°C<br>(with no icing or condensation) | Operating : -10 to 50°C<br>Storage : -20 to 65°C<br>(with no icing or condensation) |
| Ambient humidity      |                      | Operating or storage: 35% to 85%<br>(with no condensation)                        | 10% to 90%<br>(with no condensation)                                                |
| Weight (Monitor only) |                      | Approx. 1 kg                                                                      | Approx. 4.5 kg                                                                      |
| Accessories           |                      | Instruction manual and 4 mounting brackets                                        | Instruction manual                                                                  |

● Controller: F270-C10/C15



- ① **RS-232C/422A Connector**  
Connects the F270 to an external device such as a personal computer or PLC.

② **Ethernet Connector (10Base-T)**  
Connects to a personal computer, etc.

③ **Monitor Connector (S-VIDEO Output)**  
Connects to the Monitor with an S-VIDEO input.

④ **Monitor Connector (Composite Video Output)**  
Connects to the Monitor.

⑤ **Memory Card Slots 0 and 1**  
Holds Memory Cards or card containing Application Software.

⑥ **Memory Card LEDs 0 and 1**  
Lit when the Memory Card is being supplied with power.
- ⑦ **Console Connector**  
Connects the F270 to the Console.

⑧ **ERROR Indicator (Red)**  
Lit when an error has occurred.

⑨ **RUN Indicator (Orange)**  
Lit while the F270 is in Run Mode.

⑩ **POWER Indicator (Green)**  
Lit while the power is ON.

⑪ **I/O Connectors 0 and 1**  
Connects the F270 to external devices such as sync sensors or PLCs.

⑫ **CAMERA 0-3 Connectors**  
Connects to Cameras.

⑬ **Grounding Terminal**  
Connects to the ground wire.

⑭ **Power Supply Terminal**  
Connects to the DC power supply.

● Processing Items

The F500-UME Application Software supports approximately 50 processing items.  
Use any combination of these items to suit the inspection application.

Input Images

- Inputting Camera images
- Switch camera
- Changing Filtering
- Filtering again

Position Compensation

- Binary Position Compensation
- Model Position Compensation
- Circle Position Compensation
- Edge Position Compensation
- EC Position Compensation
- Reset Scroll
- Scroll

Measurement

- Quest Character Verification
- Edge Position
- Binary Defect
- ECM Search
- Density Defect Inspection
- EC Positioning
- Fine matching
- Lot Number OCV1
- Pattern Insection
- Edge Pitch
- Classification
- Density Data
- EC Defect Inspection
- Labeling
- EC Circle Count Inspection
- Label Data
- Rotation Positioning

Measurement Support

- Calculation
- Get Unit Data
- Set Unit Data
- Wait
- Elapsed Time
- Trend Monitor

Branching Control

- Conditional Branching
- DI branching
- End

Results Output

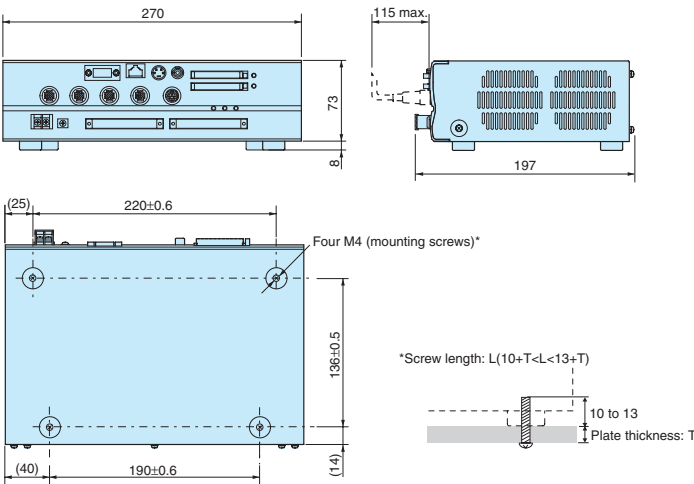
- Memory card data
- DO data output
- Host link data
- Normal data
- DO judgement output

Results Display

- Display string
- Display Measure
- Display judge
- Display Item
- Display Time
- Display Figure
- Display Line
- Display Box
- Display Circle
- Display Cussor

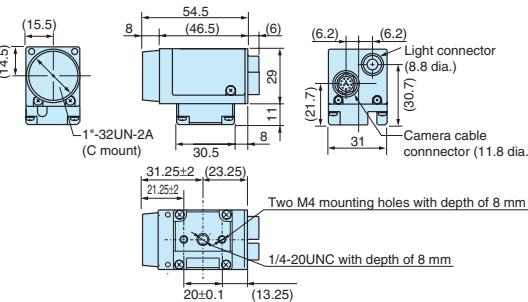
Controller

● F270-C10/C15

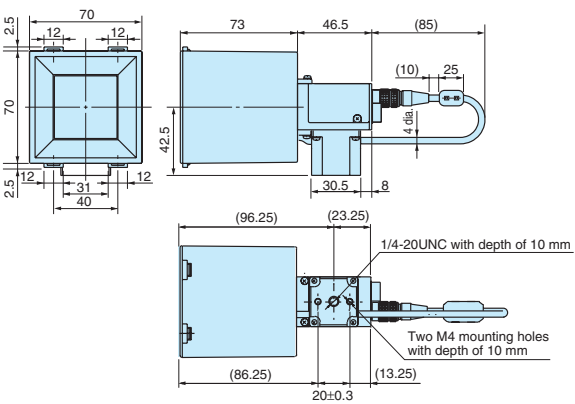


Double-speed Camera

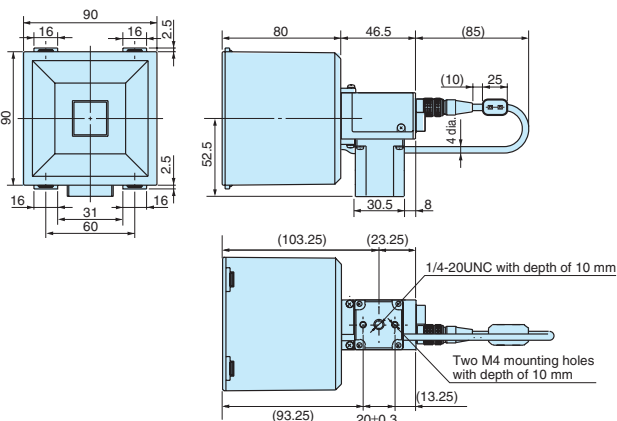
● F160-S2



● F160-SLC20

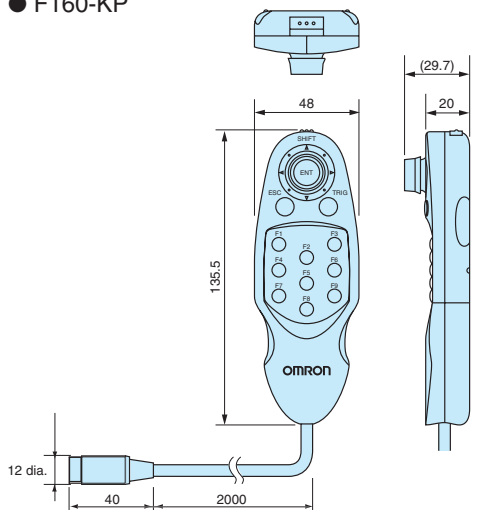


● F160-SLC50

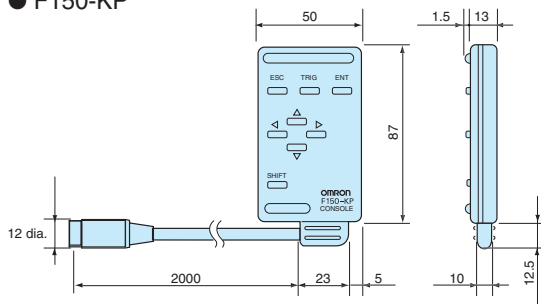


Console

● F160-KP

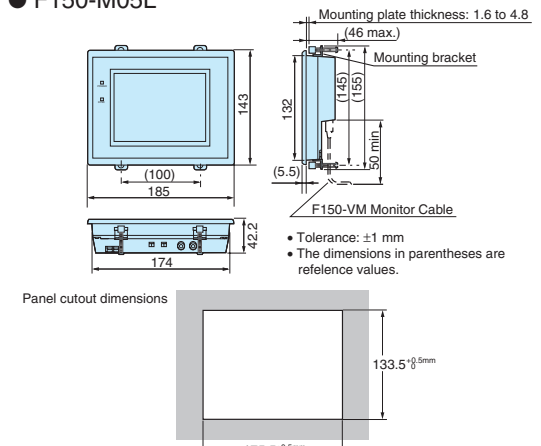


● F150-KP



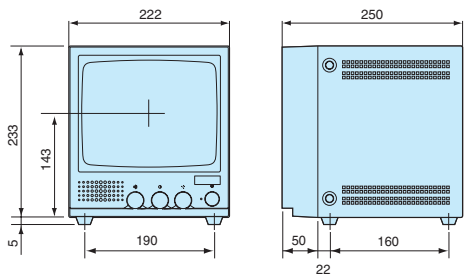
Liquid Crystal Monitor

● F150-M05L



Video Monitor

● F150-M09

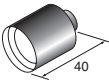
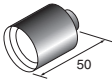
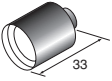
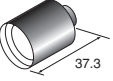
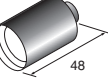
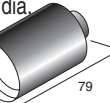




Refer to this information only when using the F160-S1 or F150-S1A.

- With reference to the optical graph below, select the lens and combination of Extension Tubes that give the required field of vision and camera distance.

CCTV Lens

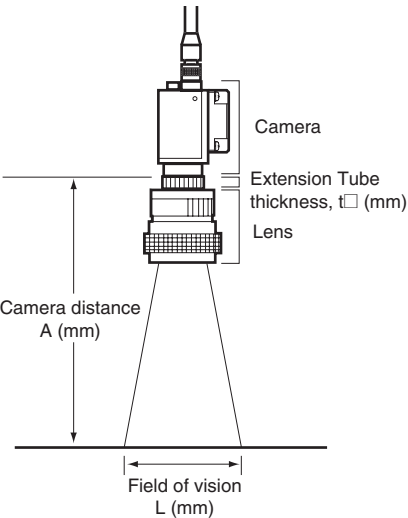
| CCTV lens         |                                                                                              |                                                                                              |                                                                                              |                                                                                               |                                                                                                |                                                                                                |
|-------------------|----------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------|
| Model             | 3Z4S-LE<br>C815B                                                                             | 3Z4S-LE<br>B1214D-2                                                                          | 3Z4S-LE<br>C1614A                                                                            | 3Z4S-LE<br>B2514D                                                                             | 3Z4S-LE<br>B5014A                                                                              | 3Z4S-LE<br>B7514C                                                                              |
| Dimensions        | 42 dia.<br> | 42 dia.<br> | 30 dia.<br> | 30 dia.<br> | 48 dia.<br> | 62 dia.<br> |
| Locking mechanism | Focus locking mechanism                                                                      |                                                                                              |                                                                                              |                                                                                               |                                                                                                | None                                                                                           |

Extension Tubes

| Model         | Content                                                                               |
|---------------|---------------------------------------------------------------------------------------|
| 3Z4S-LE EX-C6 | A set of six Extension Tubes of thicknesses 40, 20, 10, 5, 1, and 0.5 mm respectively |

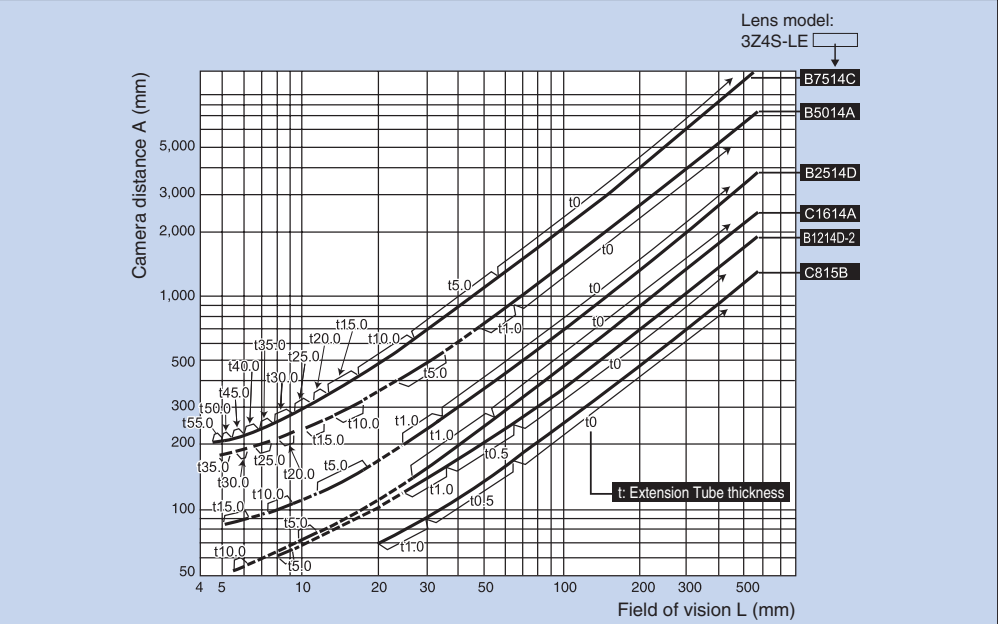
Meaning of Optical Graph

The X axis of the graph shows the field of vision L (mm), and the Y axis shows the camera distance A (mm). The curves on the graph indicate different lenses, and the "t" values indicate the lengths of the Extension Tubes.



Optical Graph

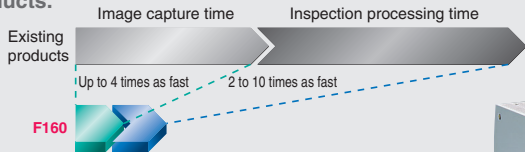
- The values given in the optical graph are only approximate values. It is recommended that the camera distance is adjusted by sliding the Camera forward or backward to get the required field of vision for actual operation.



*Faster and more powerful than anything in its class!*

Can also be easily introduced to ultra high-speed processing lines.

- Images from the F160-S1 Double-speed Camera are input up to 4 times faster than conventional OMRON products.
- Inspection functions (dark/light searches, detection of scratches, soiling, etc.) are 2 to 10 times faster than conventional OMRON products.



Equipped with a Memory Card

- Allows easy use on multi-product lines by simply increasing the number of scenes.

Customize function allows the F160 to be tailored to specific production needs.

- Shortcut keys
- Password setting
- Screen message customization on measurement screens, color displays, and much more.



**F160**  
Vision Sensor