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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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Printed in Japan

OMRON

The High-performance Vision Sensor

F270

Innovation in the Solution Age

OMRON INDUSTRIAL AUTOMATION

HIGH PERFORMANCE MACHINE

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.

Operation Mode Selection

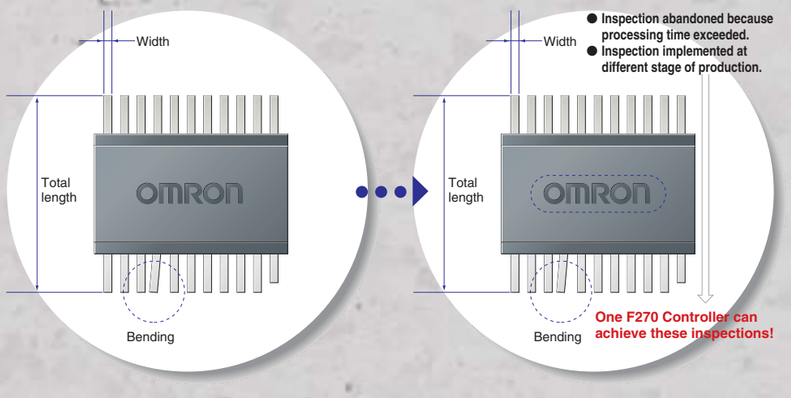
The processing speed of Vision Sensors can cause a bottleneck in the production line. Still, inspecting as many features as possible at the inspection points is necessary. Inspect at the beginning and end of the production line is also necessary, as is using two Cameras to inspect with different optical 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.

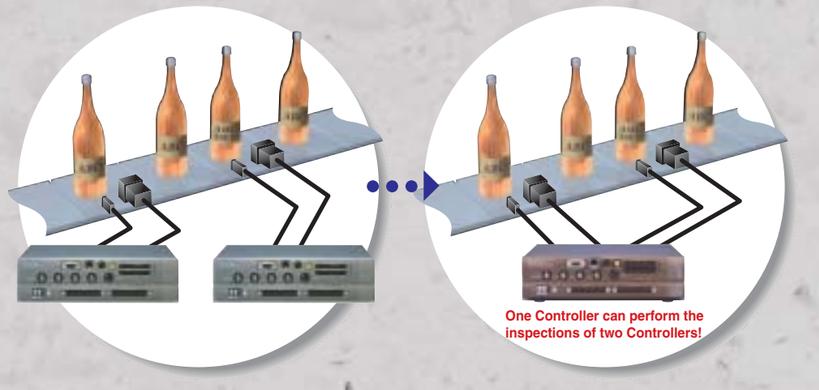
With the world's fastest processing speed, even more detailed inspections are possible.



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

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.

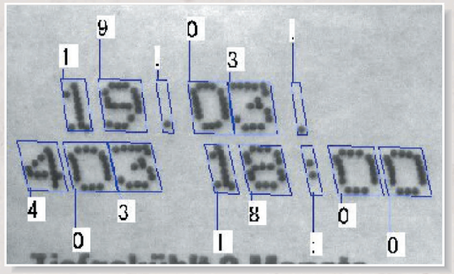
And OMRON will continue its search for even more applications.

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.

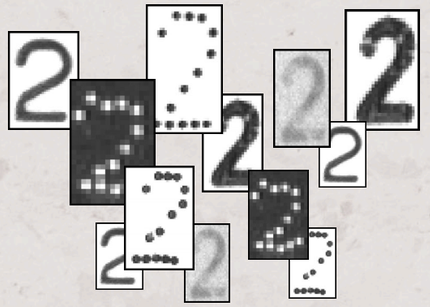
Advanced Character Recognition Function

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



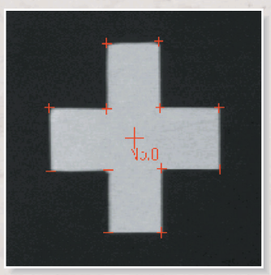
EC Positioning

Considerably higher measurement accuracy than conventional measurement methods.

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

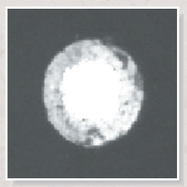
①Demonstrates great efficiency in production processes that require even more-precise positioning.

②Expanded field of vision means simpler pre-alignment.



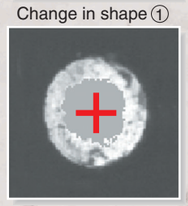
Stable measurement of variations in shape and contrast.

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

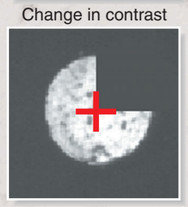


OK product

Change in shape ①



Change in contrast



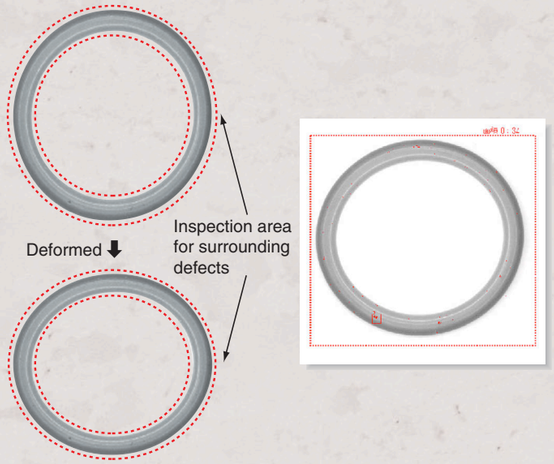
Change in shape ②

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.

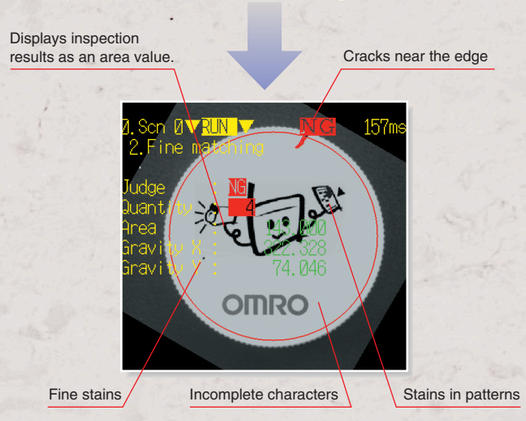


Effective for detecting minute foreign objects or dirt on complicated backgrounds.

Registered image

Inspected image

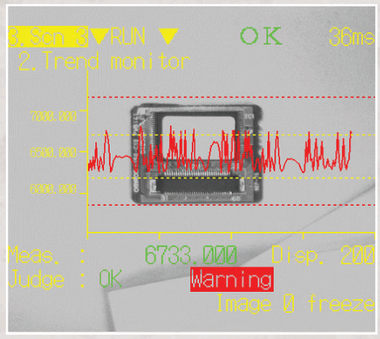
Fine Matching



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.

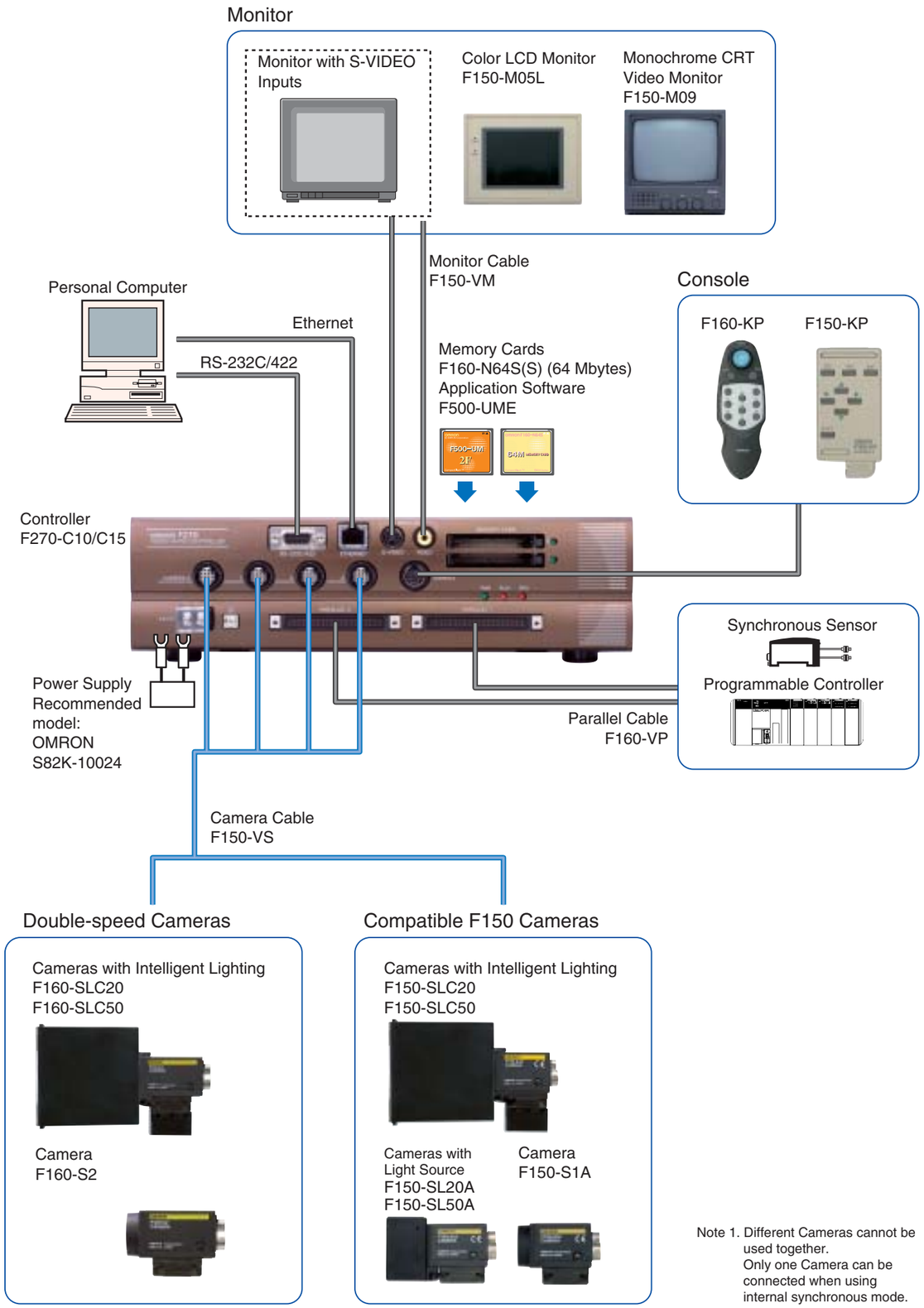
Managing Measurement Histories with the F270

Confirming Measurement Results with the Trend Monitor Function



The inspection history can be checked on screen.

System Configuration



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

Products

Name		Model	Remarks
Controllers		F270-C10	NPN input/output
		F270-C15	PNP input/output
Double-speed Cameras	Cameras with Intelligent Lighting	F160-SLC20	
		F160-SLC50	
	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	
	Camera only	F150-S1A	
Consoles		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

Specifications

■ 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) 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

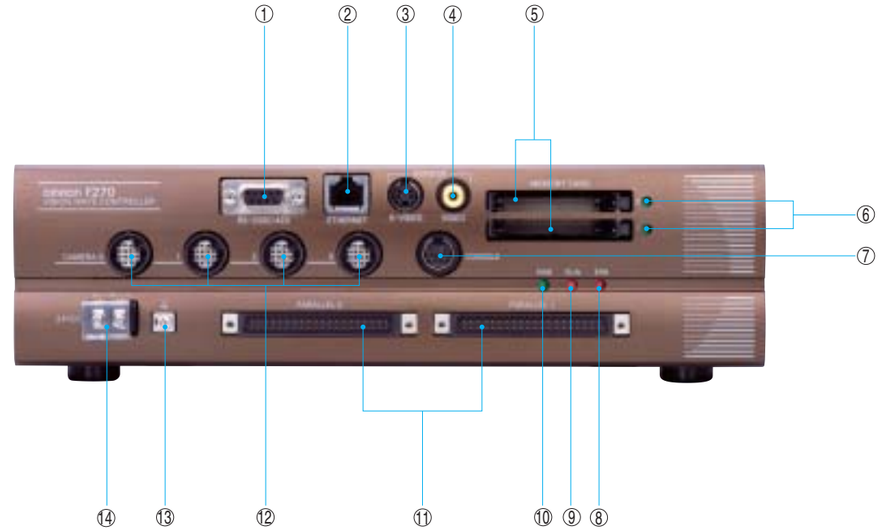
Picture element	1/3” Interline CCD
Effective pixels	659 × 494 (H × V)
Scanning method	1/60-s non-interlace (frame) mode, 1/120-s 2:1 interlace (field) mode
Shutter	Electronic shutter; select from 8 shutter-speed settings (1/120 to 1/20,000 s) using menu.
Camera with Intelligent Lighting	F160-SLC20 (field 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 / Name	F150-M05L Color LCD Monitor	F150-M09 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 Storage : –25 to 65°C (with no icing or condensation)	Operating : –10 to 50°C Storage : –20 to 65°C (with no icing or condensation)
Ambient humidity	Operating or storage: 35% to 85% (with no condensation)	10% to 90% (with no condensation)
Weight (Monitor only)	Approx. 1 kg	Approx. 4.5 kg
Accessories	Instruction manual and 4 mounting brackets	Instruction manual

Components

● 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.

Function Menus

●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 camara
- Changing Filtering
- Filtering again

Position Conpensation

- 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
- Elasped 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

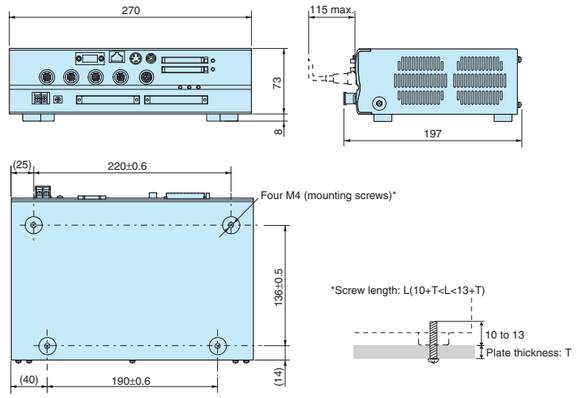
Results Display

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

Dimensions (Unit: mm)

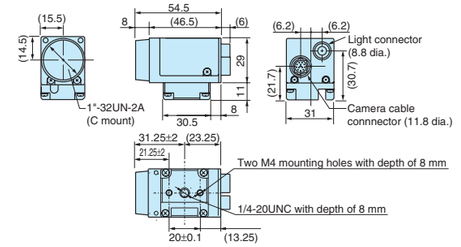
Controller

● F270-C10/C15

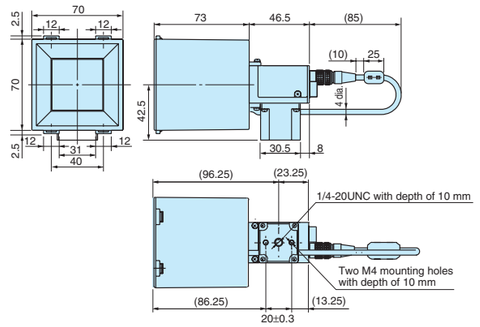


Double-speed Camera

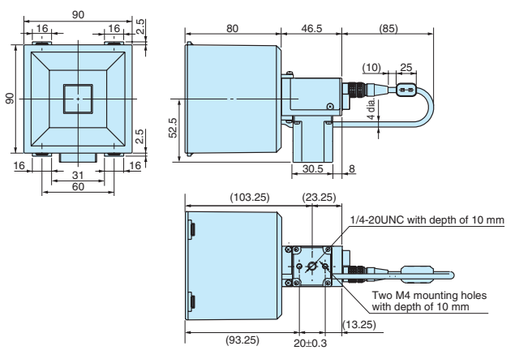
● F160-S2



● F160-SLC20

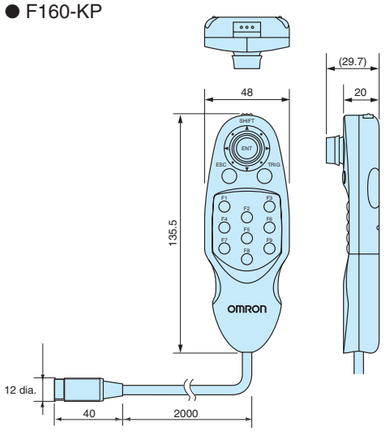


● F160-SLC50

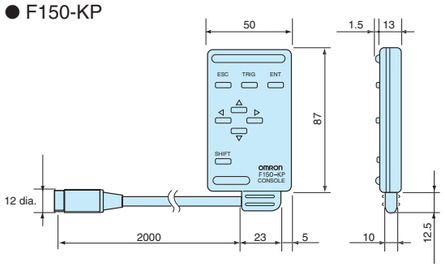


Console

● F160-KP

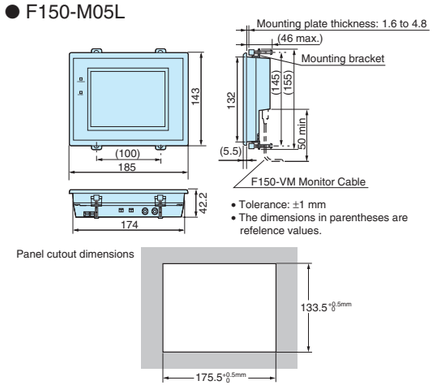


● F150-KP



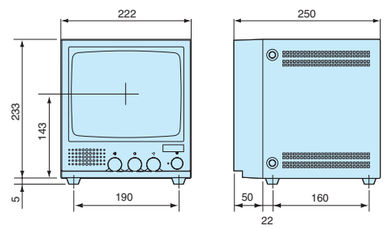
Liquid Crystal Monitor

● F150-M05L



Video Monitor

● F150-M09

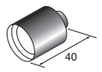
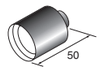
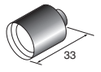
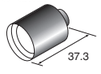
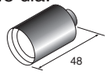
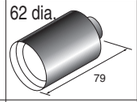


Lenses

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

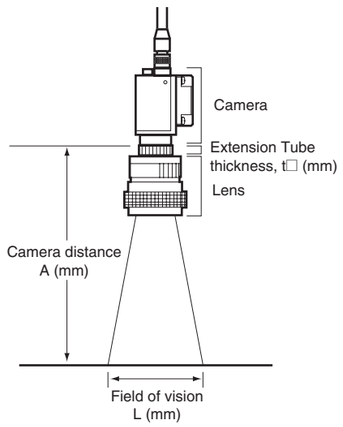
CCTV lens						
Model	3Z4S-LE C815B	3Z4S-LE B1214D-2	3Z4S-LE C1614A	3Z4S-LE B2514D	3Z4S-LE B5014A	3Z4S-LE B7514C
Dimensions	42 dia. 	42 dia. 	30 dia. 	30 dia. 	48 dia. 	62 dia. 
Locking mechanism	Focus locking mechanism					None

■ 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

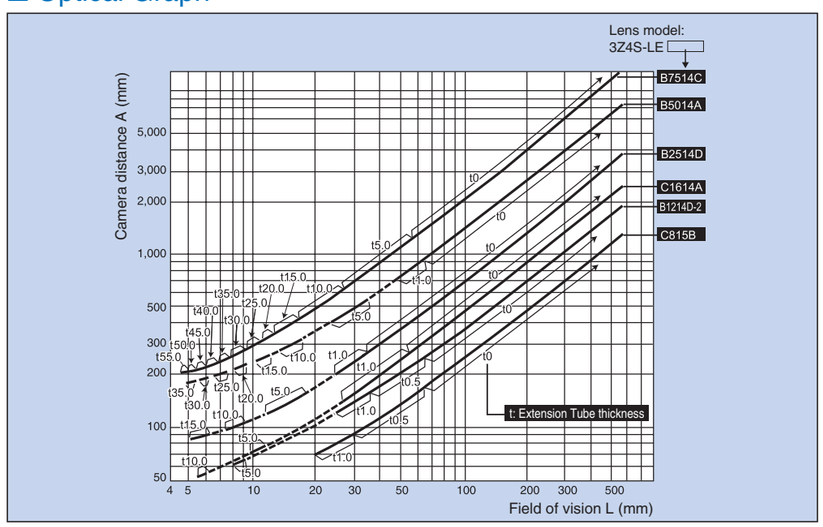
■ Meaning of Optical Graph

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

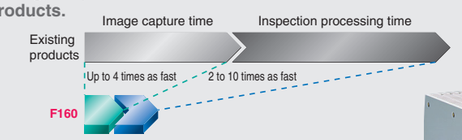
- The values given in the optical graph are only approximate values. It is recommended that the camera distance is adjusted by sliding the Camera forward or backward to get the required field of vision for actual operation.



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