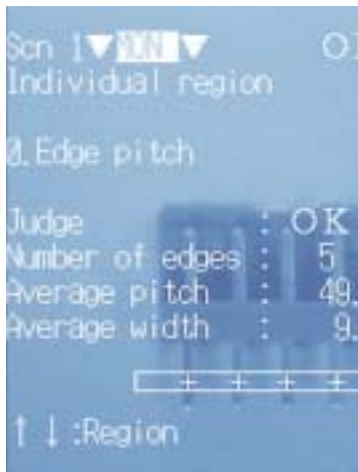
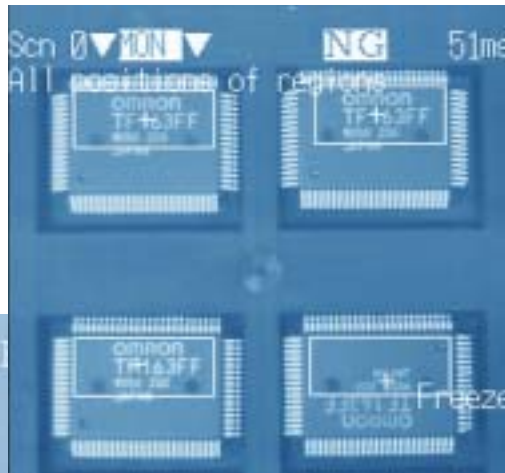


Vision Sensor

F150-3

A High Cost-performance Vision Sensor that Can Perform a Variety of Inspections



A Great Catch!

Optimum lighting and image taking for a variety of applications.

Intelligent Light Source

A variety of different lighting methods ensure stable, clear images suited to the kind of inspection required. The adoption of a dome shape means that the influence of external interference is reduced, and inspection of flaws can be performed. The combined use of both red and green light enables inspection of a wide range of workpieces.

A Variety of Lighting Methods

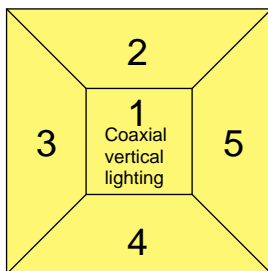
The brightness and the lighting direction can be changed. Coaxial vertical lighting is possible with the F150-SLC20.



Detection of surface defects

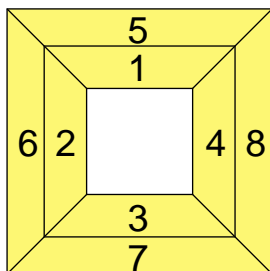
F150-SLC20 (Field of vision: 20 mm)

Light intensity can be set separately to one of 8 levels for 5 illuminated areas.



F150-SLC50 (Field of vision: 50 mm)

Light intensity can be set separately to one of 8 levels for 8 illuminated areas.



Detection of surface defects for button-type battery

Lighting Controlled from Menus

The illuminated area and light intensity can be controlled from Controller Menus. Settings can be easily changed without the need for direct contact with the light source.

Lighting positioning is stored along with other scene data. This means that lighting conditions can be easily changed to match different types of workpiece.

The Controller handles lighting settings as numeric data ensuring that lighting conditions are recreated with a high degree of accuracy.



Two-camera Unit

The Two-camera Unit allows simple, low-cost inspection in two directions on two lines.

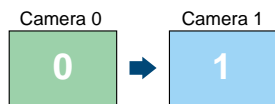


A Variety of Images

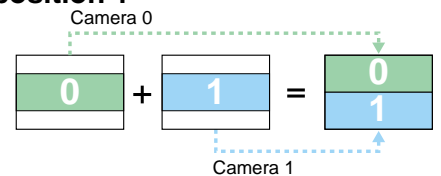
Images can be taken simultaneously with two cameras.

In addition to being able to set the order in which the cameras take images, it is also possible to combine the images taken by the two cameras at the same time to obtain one image.

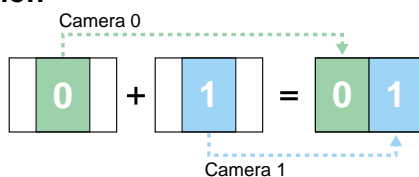
Two-camera Switching



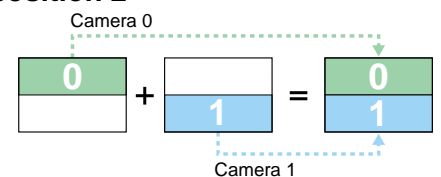
Horizontal Composition 1



Vertical Composition



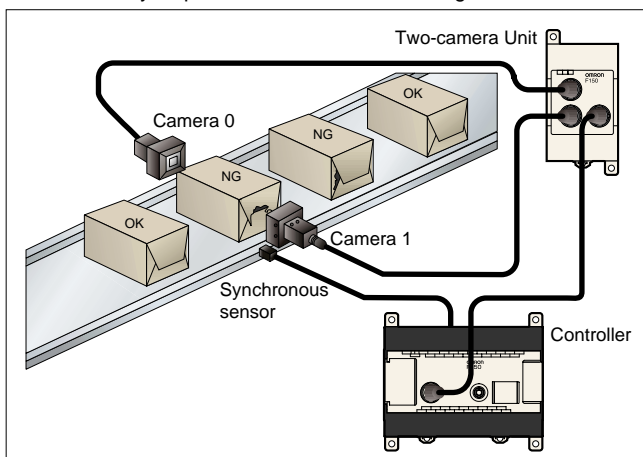
Horizontal Composition 2



Two-camera Unit Applications

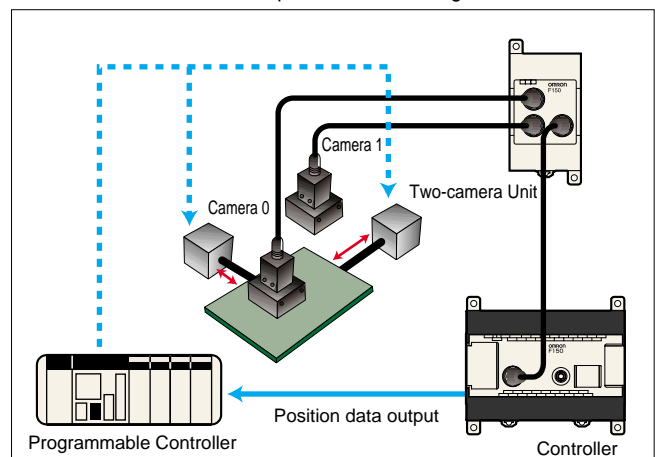
■ Inspecting Boxes from Both Sides

Simultaneously inspect both sides of a box using two Cameras.



■ PWB Positioning

Determine the coordinates of position marks using two fields of vision.



Smart Functions

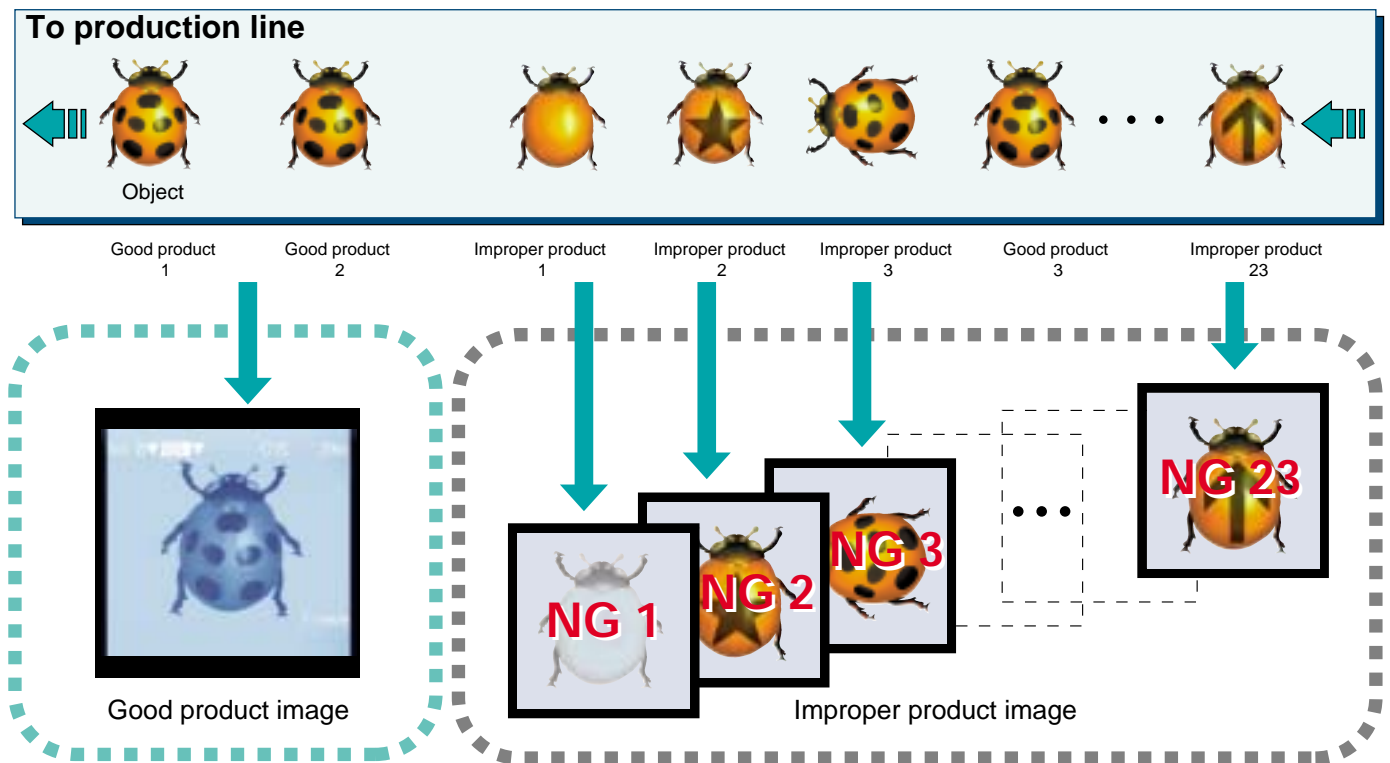
The F150-3 pursues both ease-of-use and high efficiency.

Stores images of improper objects.

F150-3 stores up to 23 images of improper objects that have been detected.

This makes it possible to check the images for the kinds of defects that have been found, thus ensuring easy feedback to the production stages.

Images are stored until the F150-3 is turned OFF.

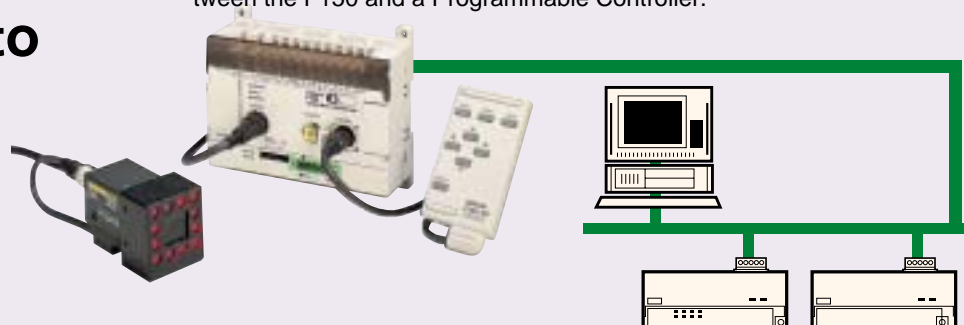


DeviceNet Model and Liquid Crystal Monitor Added to Series.

Controller: F150-C10E-3-DRT

Easy communications

Send and receive measurement conditions and results easily between the F150 and a Programmable Controller.



F150-3

Compact Frame-shutter Camera

- Compact Camera with high resolution.
- Uses full image readout and directional lattice-type CCD elements to produce clear, detailed images for efficient processing.
- Built-in electronic shutter makes the F150 ideal for high-speed production lines.
- Using the F150's menus, shutter speeds can be set according to measurement conditions (scenes). Select the speed appropriate to the production-line speed and object.



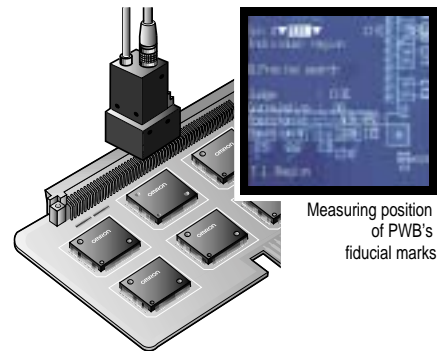
Filtering

- Filter the image for optimum measurement using smoothing, edge enhancement, edge extraction, and background suppression functions.
- Perform filtering in real time (i.e., while inputting images).



Highly Accurate Gray Search

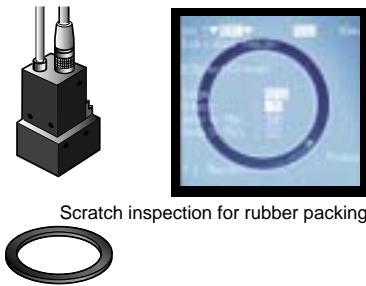
- Measure position in sub-pixels (smaller than a pixel) using 256-gradation gray search processing. Use this function in applications requiring highly accurate positioning.



Measuring position of PCB's fiducial marks

Inspection for Surface Defects

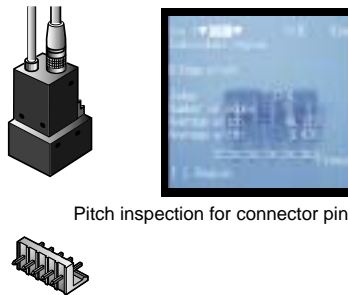
- Detect external damage such as splinters, scratches, and dirt quickly and accurately using an algorithm devised by OMRON.
- Set the F150 to inspect for defects along lines, around circumferences, or inside boxes.



Scratch inspection for rubber packing

Gray Edge Measuring

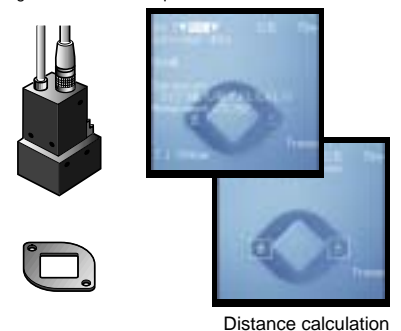
- Measure the position of edges with a high degree of accuracy (using sub-pixels). Ideal for inspecting widths or dimensions.
- The F150 is also equipped with edge count and pitch functions. Ideal for IC and connector lead detection.



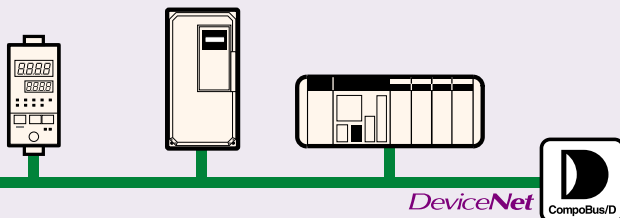
Pitch inspection for connector pins

Output Calculation Functions

- A variety of data operations (expressions) can be selected from the F150's menus. These include finding minimum and maximum values, calculating distances between points, and obtaining angles between lines.
- Set a maximum of 24 expressions, and perform judgement and data output based on the results.



Distance calculation



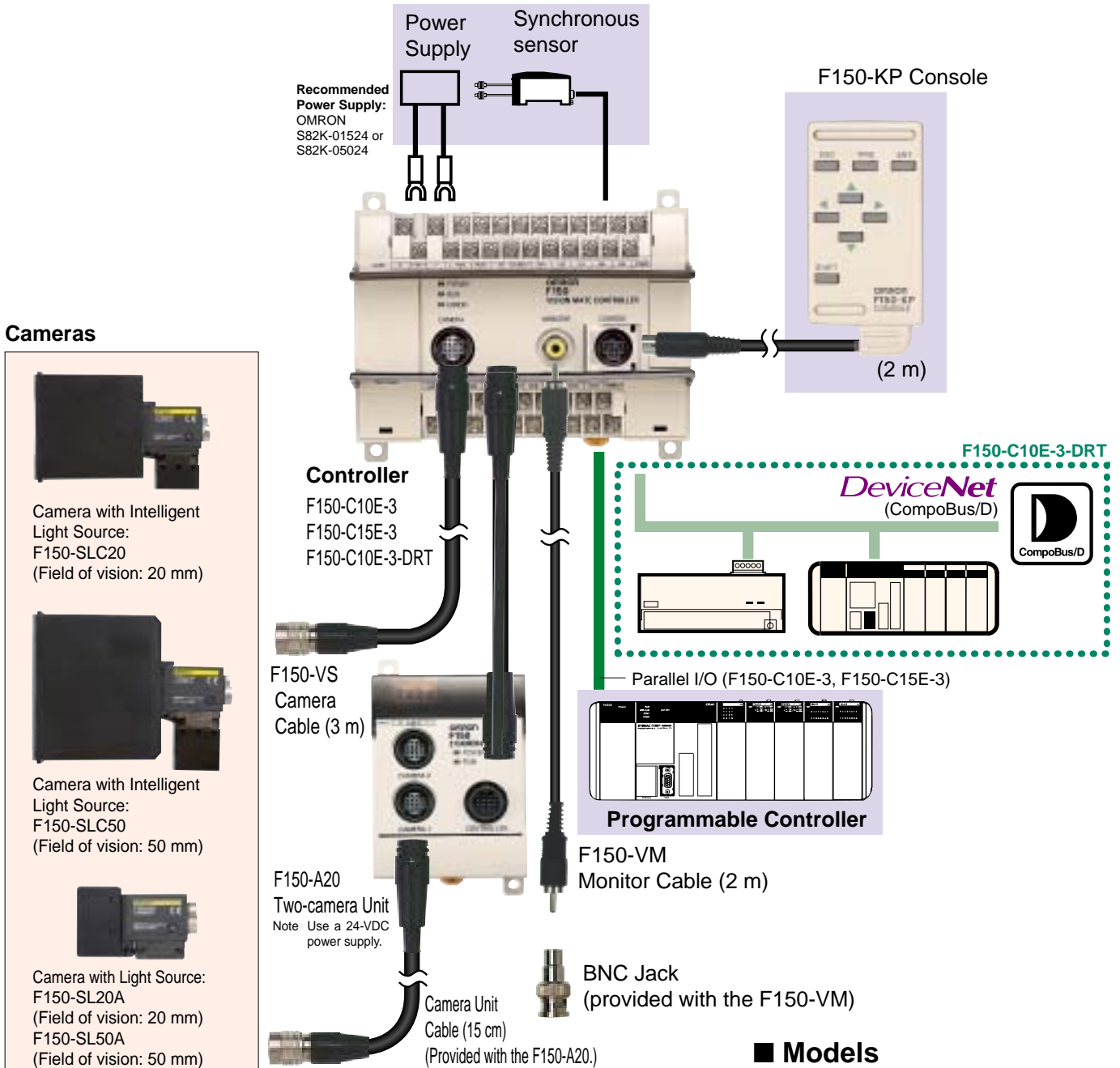
F150-M05L Liquid Crystal Monitor

- Displays clear images using 5.5-inch TFT color liquid crystals.
- Easily mounted into a panel.



System Configuration

Easy to connect and use by anyone.



Cameras



Camera with Intelligent Light Source:
F150-SLC20
(Field of vision: 20 mm)



Camera with Intelligent Light Source:
F150-SLC50
(Field of vision: 50 mm)



Camera with Light Source:
F150-SL20A
(Field of vision: 20 mm)
F150-SL50A
(Field of vision: 50 mm)



F150-S1A
Camera

Note If the object is too large for the field of vision of this Camera, a normal CCTV lens and light source can be used instead.

Monitor



F150-M05L
Liquid Crystal
Monitor



F300-M09
Video Monitor

Note:
The F300-M09 does not conform to the EMC Directive and Low-voltage Directive.

Models

Name	Model number
Controller	F150-C10E-3
	F150-C15E-3
	F150-C10E-3-DRT
Cameras with Intelligent Light Source	F150-SLC20
	F150-SLC50
	F150-SL20A
Cameras with Light Source	F150-SL20A
	F150-SL50A
Camera only	F150-S1A
Two-camera Unit	F150-A20
Console	F150-KP
Liquid Crystal Monitor	F150-M05L
Video Monitor	F300-M09
Camera Cable (3m)	F150-VS
Monitor Cable (2m)	F150-VM

Cameras with Light Sources



Cameras with Intelligent Light Sources

Models

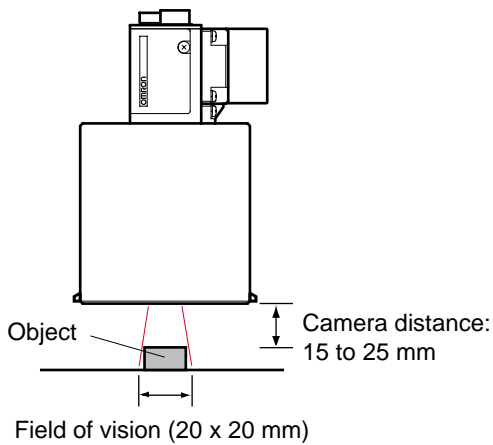
Field of vision: 20 mm	F150-SLC20
Field of vision: 50 mm	F150-SLC50

A lens and intelligent light source are mounted on the F150-S1A Camera.

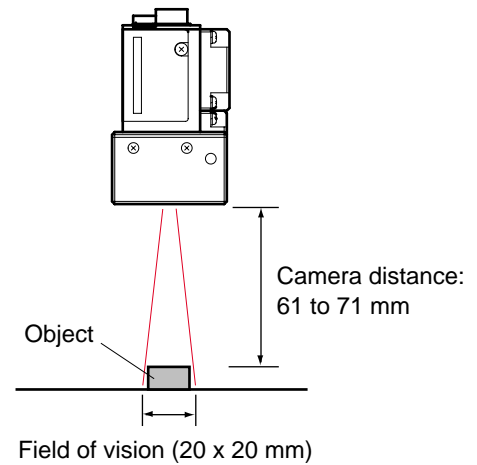
Sensing Distance and Field of Vision

Mount the Camera within the fixed sensing distance, then fix the Camera at the position where a clear image is obtained.

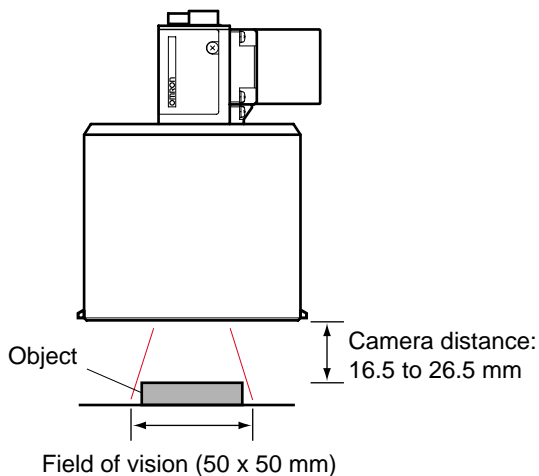
F150-SLC20



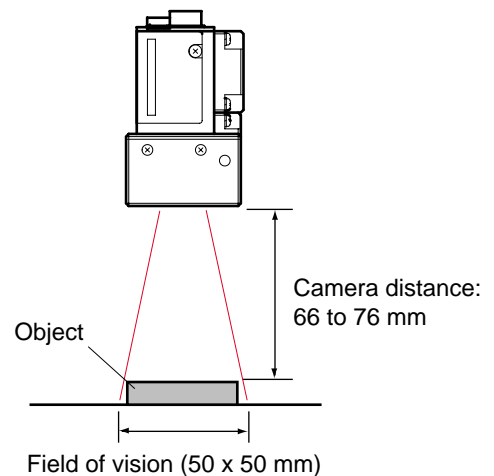
F150-SL20A



F150-SLC50



F150-SL50A



Specifications

Rating/Function

Controllers: F150-C10E-3, F150-C15E-3, F150-C10E-3-DRT

Item	Specifications	
Number of Cameras connectable	1 or 2 (when using F150-A20)	
Number of pixels	512(H) x 484(V)	
Number of scenes	16 (can be backed up to a personal computer via RS-232C)	
Image storage function	Maximum of 23 images stored	
Processing method	Gray/Binary	
Filtering	Smoothing, edge enhancement, edge extraction, background suppression	
Number of binary levels	256 levels per region	
Position displacement compensation	Compensation directions: X,Y, and θ directions Detection methods: Binary center of gravity, axis angle, midpoint, gray search (1 model or 2 models), gray edge position	
Number of measurement regions	16 regions/scene	
Measurement data	Binary center of gravity and area, axis angle, correlation value, gray search position, defect, edge position, edge pitch, density averaging, relative search	
Data operation functions (expressions)	Arithmetic calculation, distance, angle, maximum/minimum value, absolute value, etc.	
Results output	Overall judgement, judgements for measurement/expression results for each region, measurement/expression results (can be output via RS-232C in parallel)	
Monitor interface	1 channel (pin jack, compatible with over-scan monitor)	
RS-232C interface	1 channel (D-sub, 9-pin, female)	
CompoBus/D interface	F150-C10E-3, F150-C15E-3 : None F150-C10E-3-DRT: 1 channel	
Parallel I/O	11 inputs and 21 outputs including control I/O points	1 input and 5 outputs including control I/O points
	Input/Output type	NPN PNP
Power supply voltage	20.4 to 26.4 VDC (including ripple)	
Current consumption	Approx. 0.5 A	
Ambient temperature	Operating: 0 to 50°C (with no icing or condensation), Storage: -25 to +65°C (with no icing or condensation)	
Ambient humidity	Operating and storage: 35% to 85% (with no condensation)	
Weight (with packaging)	Approx. 940 g (Controller only: 390 g)	
Accessories	2 manuals and CompoBus/D connector (F150-C10E-3-DRT only)	

Cameras Cameras with Intelligent Light Sources: F150-SLC20, F150-SLC50
Cameras with Light Sources: F150-SL20A, F150-SL50A
Camera: F150-S1A

Item	Specifications	
Camera	Picture element	1/3" Interline CCD (reading all pixels)
	Effective pixels	659 x 494 (H x V)
	Shutter	Electronic frame shutter: 1/100, 1/500, 1/2,000, or 1/10,000 s
Lens	Camera distances	F150-SLC20: 15 to 25 mm, F150-SLC50: 16.5 to 26.5 mm, F150-SL20A: 61 to 71 mm, F150-SL50A: 66 to 76 mm
	Fields of vision	F150-SLC20/SL20A: 20 mm, F150-SLC50/SL50A: 50 mm
Lighting	Light sources	F150-SLC20/SCL50: Red LED and green LED, F150-SL20A/SL50A: Red LED
	Flash	Pulse flash (synchronized with camera shutter)
Ambient temperature	Operating: 0 to 50 °C; storage: -25 to 60 °C (with no icing or condensation)	
Ambient humidity	Operating or storage: 35% to 85% (with no condensation)	
Weight (Camera only)	F150-SLC20: Approx. 310 g; F150-SLC50: Approx. 425 g F150-SL20A/50A: Approx. 135 g; F150-S1A: Approx. 70 g	
Accessories	F150-SLC20/SCL50: Instructions manual (one), F150-SL20A/SL50A: Instructions manual (one)	

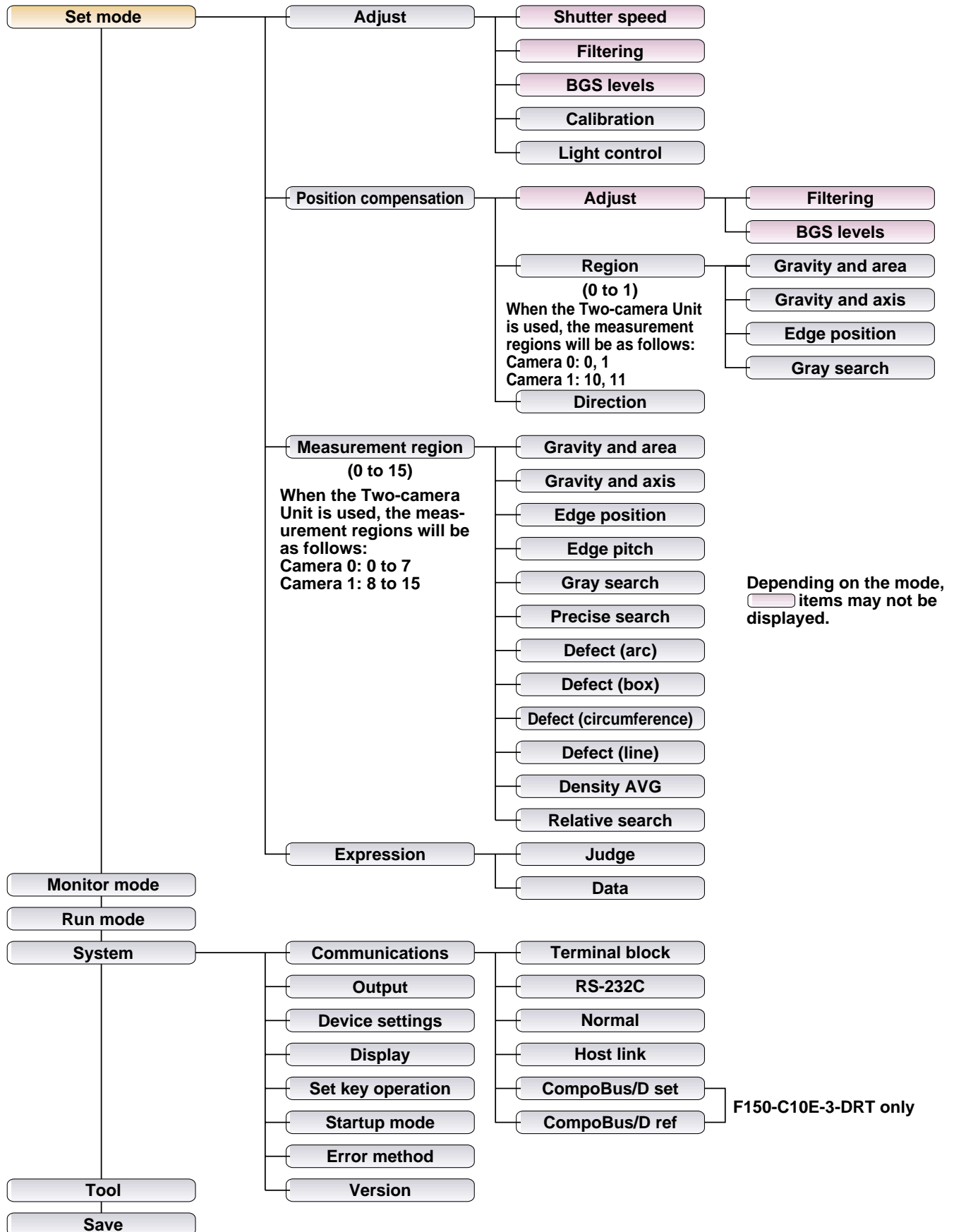
F150-A20 Two-camera Unit

Item	Specifications
Number of connectable cameras	2
Camera modes	Two-camera switching; vertical composition, horizontal composition 1 and 2; single camera (camera 0 or 1)
Power supply voltage	20.4 to 26.4 VDC
Current consumption	Approx. 0.3 A
Ambient temperature	Operating: 0 to 50 °C; storage: -25 to 65 °C (with no icing or condensation)
Ambient humidity	Operating or storage: 35% to 85% (with no condensation)
Weight (Camera only)	Approx. 220 g
Accessories	Instructions manual (one), Camera Unit Cable (one)

Monitors

Item	Model	F150-M05L Liquid Crystal Monitor	F300-M09 Video Monitor
Size		5.5 inches; 111.36 x 83.52 mm (H x V)	9 inches; 164 x 123 mm (H x V)
Type		Liquid crystal color TFT	CRT monochrome (long persistence)
Resolution		320 x 240 dots	700 TV lines min. (at center)
Input signals		NTSC composite video (1.0 V/75 Ω termination)	
Power supply voltage		20.4 to 26.4 VDC (including ripple)	90 to 110 VAC, 50/60 Hz
Current/Power consumption		Approx. 700 mA max.	Approx. 30 W
Ambient temperature		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		Operating or storage: 35% to 85% (with no condensation)	Operating or storage: 10% to 90% (with no condensation)
Weight (Monitor only)		Approx. 1 kg	Approx. 5.8 kg
Accessories		Instructions manual (one), mounting brackets (four)	Instructions manual

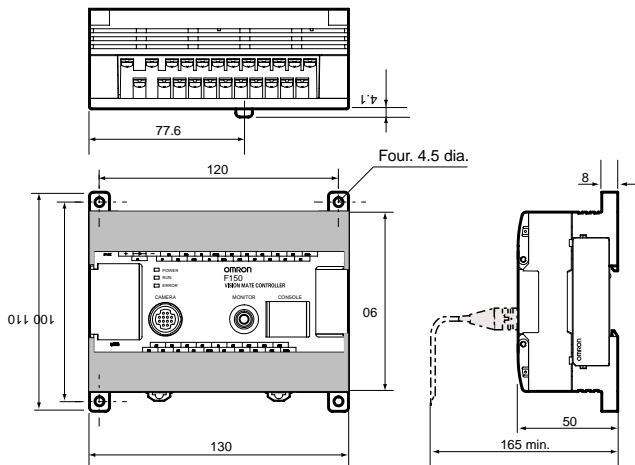
Menu Tree



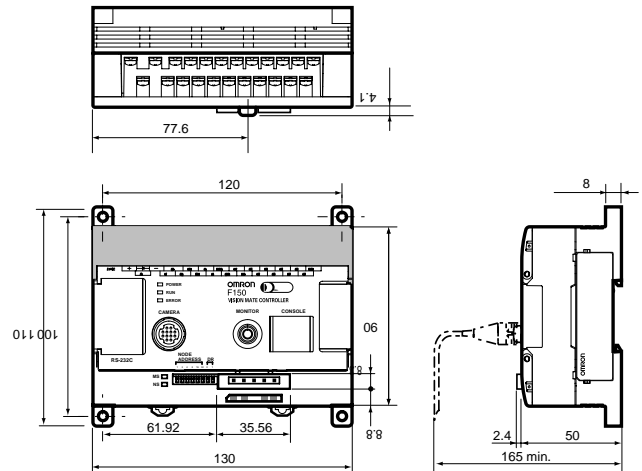
The menu configuration for Set mode will be different if the Two-Camera Unit is used.

Dimensions (Unit: mm)

Controller F150-C10E-3, F150-C15E-3

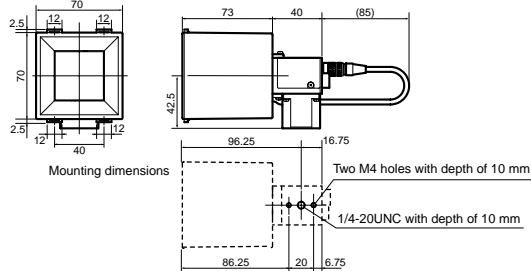


F150-C10E-3-DRT

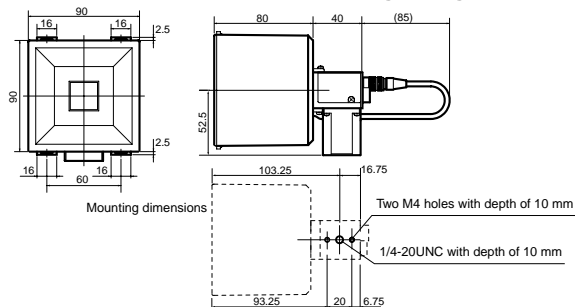


Cameras

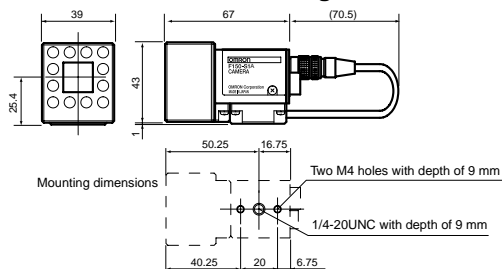
F150-SLC20 Camera with F150-LTC20 Intelligent Light Source



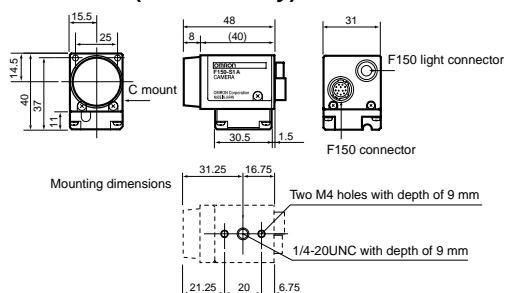
F150-SLC50 Camera with F150-LTC50 Intelligent Light Source



F150-SL20A/SL50A Camera with Light Source

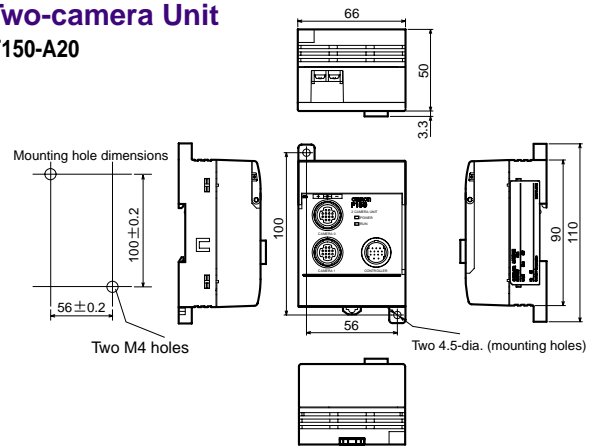


F150-S1A Camera (Camera Only)



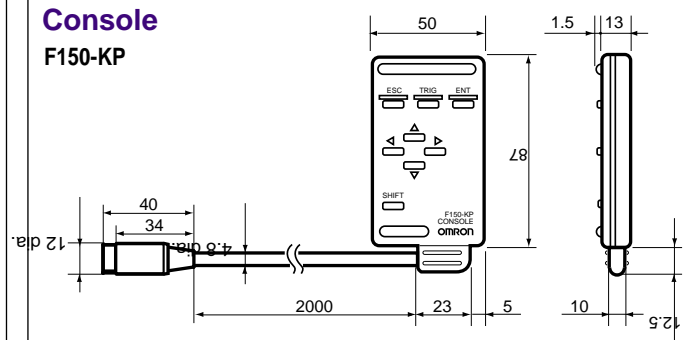
Two-camera Unit

F150-A20



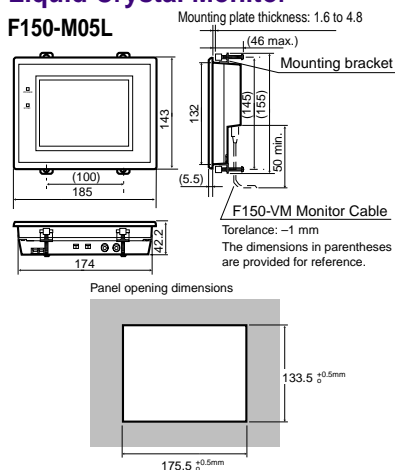
Console

F150-KP



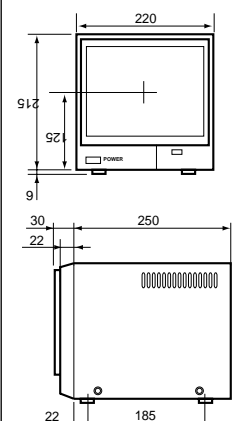
Liquid Crystal Monitor

F150-M05L



Video Monitor

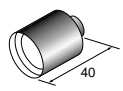
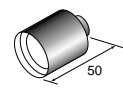
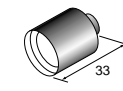
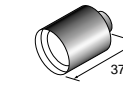
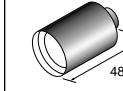
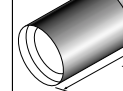
F300-M09



Lens

Refer to the following optical graph and select the field of vision, Camera distance, and Extension Tube.

CCTV Lens

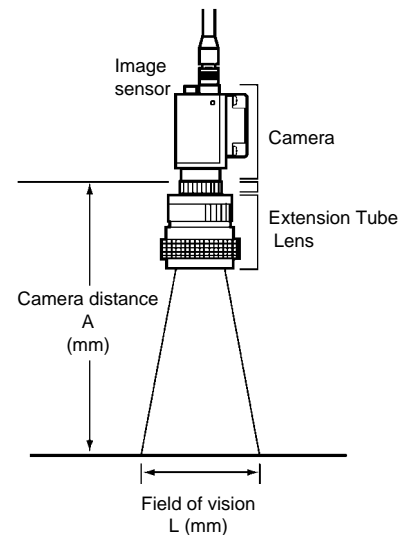
Model	3Z4S-LE C815B	3Z4S-LE B1214D-2	3Z4S-LE C1614A	3Z4S-LE B2514D	3Z4S-LE B5014A	3Z4S-LE B7514C
Dimensions	42 dia. 	42 dia. 	30 dia. 	30 dia. 	48 dia. 	62 dia. 
Locking mechanism	Focus locking mechanism					None

Extension Tubes

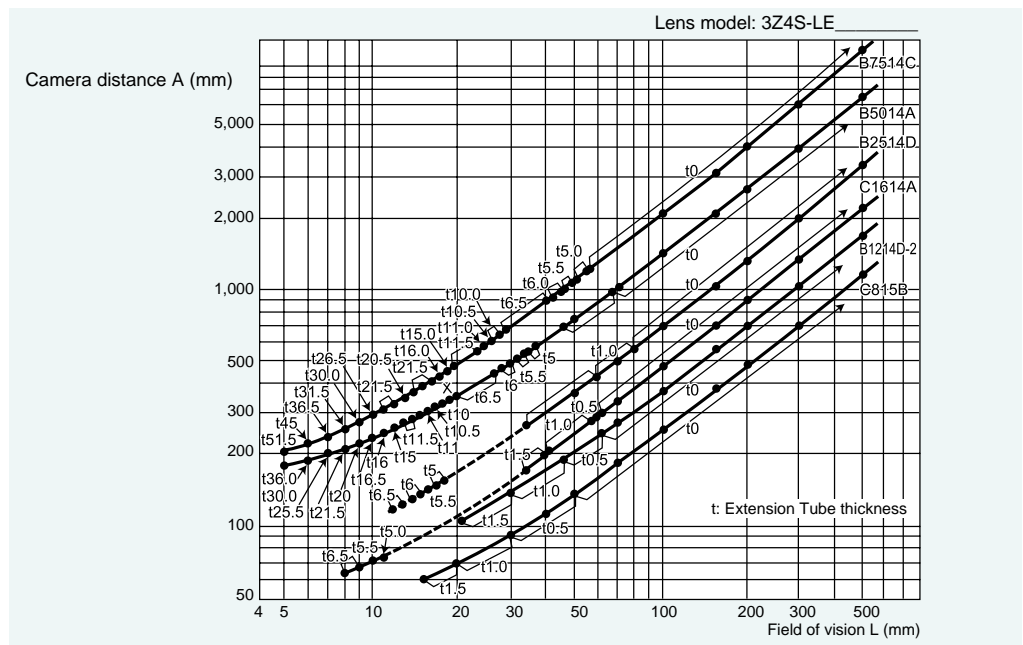
Model	Length
3Z4S-LE EX-C6	A set of six Extension Tubes that are 40, 20, 10, 5, 1, and 0.5 mm in length respectively

Meaning of Optical Graph

The X axis of the graph shows 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



All values are approximate values. It is recommended that the camera distance be adjusted by sliding the Camera forward or backward in actual operation.

Easy Operation with Visual Simplicity

Process flow suited to the application can be created in a Windows environment.

Vision Composer

Integrated Control Software for F150-3
(Cat. No. Q119)



General Precautions

The user must operate the product according to the performance specifications described in the brochure.

Before using the product under conditions which are not described in the brochure or applying the product to nuclear control systems, railroad systems, aviation systems, vehicles, combustion systems, medical equipment, amusement machines, safety equipment, and other systems, machines, and equipment that may have a serious influence on lives and property if used improperly, consult your OMRON representative.

Make sure that the ratings and performance characteristics of the product are sufficient for the systems, machines, and equipment, and be sure to provide the systems, machines, and equipment with double safety mechanisms.

The product has been produced at OMRON Ayabe which obtained ISO9001-approval for its quality system and ISO14001-approval for its environmental management system from international certification bodies.

OMRON

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