2-Dimensional Code Reader (Fixed Type)

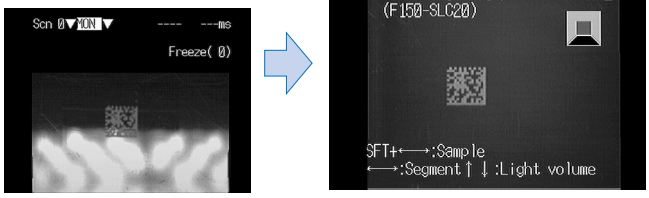
V530-R150E-3, EP-3

Intelligent Light Source and a Two-camera Unit Respond to a Wide Variety of Applications

Features

Intelligent Light Source

Versatile lighting control and a dome shape that minimizes external interference provide stable images for 2-dimensional code reading.

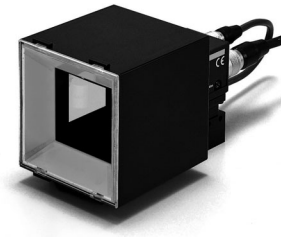


Ring lighting　　Intelligent Light Source

Reduces the background effects of metal processed parts.

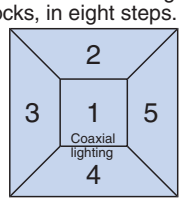
A Variety of Lighting Methods

The lighting direction and intensity can be changed. In addition, coaxial lighting is available with the F150-SLC20. Optimal lighting methods can be set for a wide variety of workpieces.



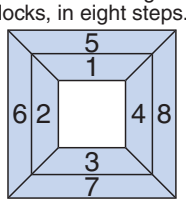
F150-SLC20
(Field of vision: 20 mm)

The light intensity can be set for each of five lighting blocks, in eight steps.



F150-SLC50
(Field of vision: 50 mm)

The light intensity can be set for each of eight lighting blocks, in eight steps.

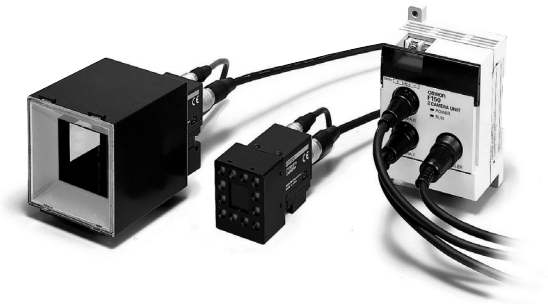


Lighting Controlled from Menus

- The lighting block and intensity can be controlled from the Controller menu. Settings can be easily changed without having to touch the light itself.
- Because light is handled as scene data, the lighting conditions can be varied to match model changes on mixed-product lines.
- The Controller manages light settings numerically, for accurate reproducibility.

Two-camera Unit

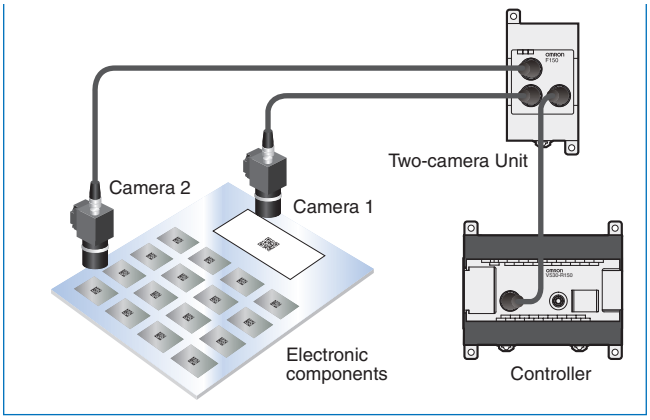
Two cameras can be switched by a single Controller.



Application Example

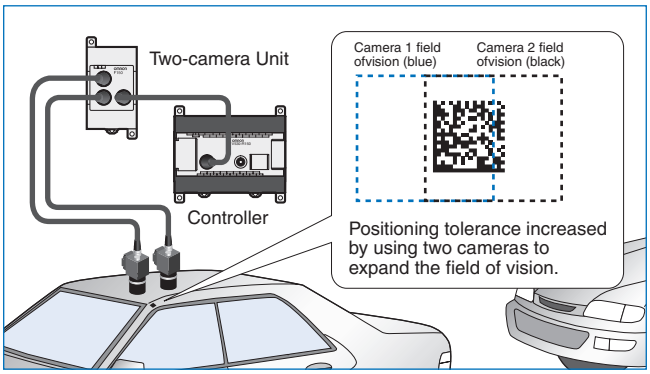
Simultaneous single-product and lot management

Single products and lots can be managed simultaneously.



Greater positioning tolerance

For applications that cannot be covered by the field of view of only one camera.



Compatible with Data Matrix Old Version

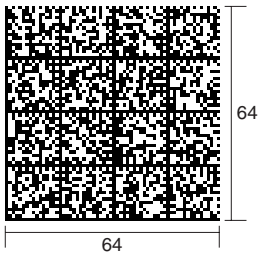
The V530-R150V3 Controller is also capable of reading the Data Matrix Old Version. (See note.)

Note: Compatible with ECC000, 050, 080, 100, and 140.

Compatible with Data Matrix ECC200, with Up to 64 × 64 Cells

To enable the use of more information, ECC200 codes with up to 64 × 64 cells (max. of 418 alphanumeric characters) can be read.

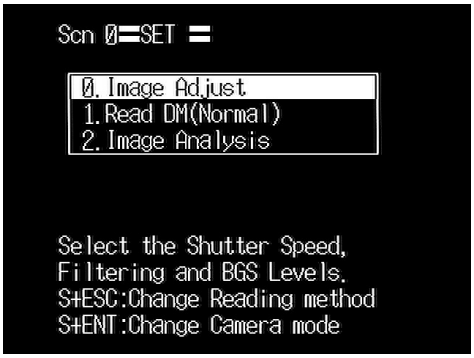
Max. of 64 alphanumeric characters.



Max. of 418 alphanumeric characters.

New Guidance Function for the Settings Display

The addition of a guidance function on the display greatly simplifies setting.



Easy-to-Read Analytical Data Format

See the reading status at a glance on the reading information display.
The finder pattern, cell recognition, reading data, etc., can all be viewed on the display.

Finder pattern (cutting symbol)

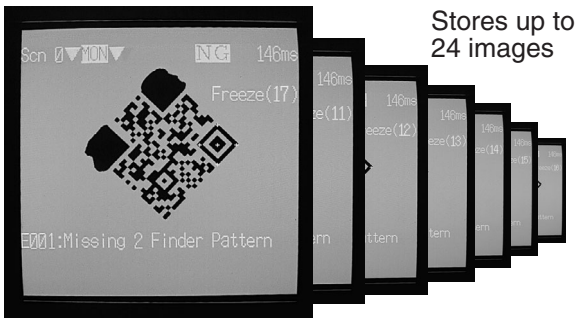
Use this pattern to detect the 2-dimensional code position. The finder pattern is different for each code.

Easy Image Analysis

The image analysis mode helps to detect the cause of marking problems.

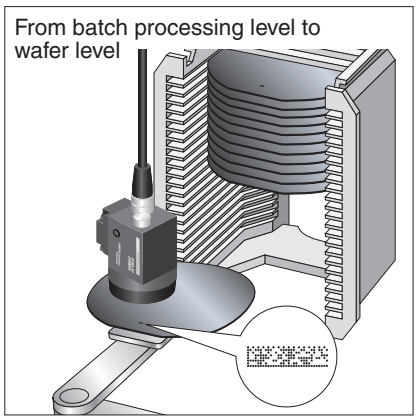
Store up to 24 Defect Images

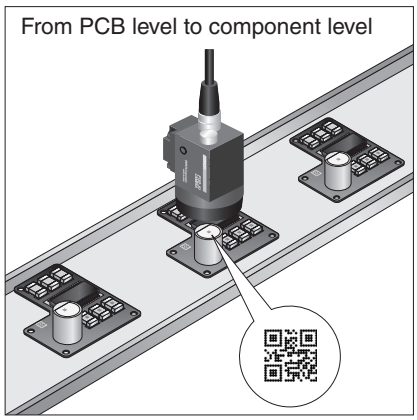
Use the stored images to confirm defect types.

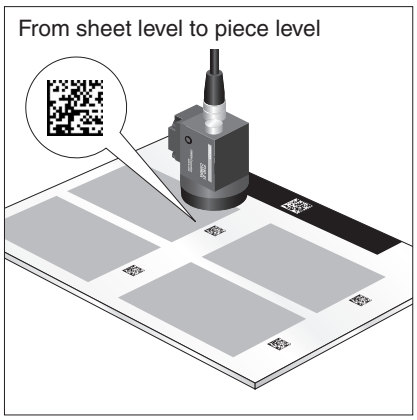


Note: Stored images are kept until the power is turned OFF.

Applications







Ordering Information

List of Models

Name	Model No.
Controller	V530-R150E-3, EP-3
Console	F150-KP
Camera	F150-S1A
Camera Cable (3 m)	F150-VS
Two-camera Unit	F150-A20
Monitor Cable (2 m)	F150-VM
Liquid Crystal Monitor	F150-M05L
Video Monitor	F150-M09

Specifications

Controller

Item	V530-R150E-3, EP-3
Readable codes	Data Matrix ECC200: 10 × 10 to 64 × 64, 8 × 18, 8 × 32,12 × 26, 12 × 36,16 × 36,16 × 48 Data Matrix Old Ver. (ECC000, 050, 080, 100, 140): 9 × 9 to 25 × 25 QR Code (Model 1, 2): 21 × 21 to 41 × 41 (Version 1 to 6)
Readable direction	360°
Number of pixels (resolution)	512 (H) × 484 (V)
Number of connectable cameras	1 (Using F150-A20: 2 max.)
Number of scenes	10
Image memory function	Maximum of 24 images stored.
Operation method	Menu selectable
Processing method	Gray
Monitor interface	1 channel (over scan monitor)
RS-232C I/F	1 channel
Parallel I/O	3 inputs and 9 outputs including control I/O points
Power supply voltage	20.4 to 26.4 VDC
Degree of protection	IEC 60529: IP 20 (panel mounted)
Current consumption	Approx. 0.5 A
Ambient temperature/humidity	0 to 50°C/35% to 85% (with no condensation)
Weight	Approx. 390 g

Camera

Item		F150-S1A
Camera	Picture element	1/3” CCD
	Effective pixels	659 (H) × 494 (V)
	Shutter function	Electronic frame shutter Shutter speed: 1/100, 1/500, 1/2000, or 1/10000 sec (menu selectable)
Lens	Mounting distance	F150-SLC20: 15 to 25 mmF150-SLC50: 16.5 to 26.5 mm F150-SL20A: 61 to 71 mmF150-SL50A: 66 to 76 mm
	Field of view	F150-SLC20/SL20A: 20 × 20 mm, F150-SLC50/SL50A: 50 × 50 mm
Light	Light source	F150-SLC20/50: Red LED/Green LED, F150-SL20A/50A: Red LED
	Lighting method	Pulse (synchronized with camera shutter)
Ambient temperature		Operating: 0 to 50°C, storage: −25 to 60°C (with no icing or condensation)
Ambient humidity		Operating/Storage: 35% to 85% (with no condensation)
Weight (camera only)		F150-ALC20: Approx. 280 g, F150-FLC50: Approx. 370 g, F150-SL20A/50A: Approx. 135 g, F150-S1A: Approx. 80 g

Two-camera Unit

Item	F150-A20
Number of connectable cameras	2
Camera mode	2-camera selectable Single, independent (camera 0/1)
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 60°C (with no icing or condensation)
Ambient humidity	Operating/Storage: 35% to 85% (with no condensation)
Weight (2-camera unit only)	Approx. 220 g

Monitor

Item	Liquid Crystal Monitor	Video Monitor
	F150-M05L	F150-M09
Size	5.5 inches	9 inches
Type	Liquid crystal color TFT	CRT monochrome
Resolution	320 × 240 dots	800 TV lines min. (at center)
Input signal	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 60°C (with no icing or condensation)	Operating: −10 to 50°C storage: −20 to 65°C (with no icing or condensation)
Ambient humidity	Operating/Storage: 35% to 85% (with no condensation)	10% to 90% (with no condensation)
Weight (monitor only)	Approx. 1 kg	Approx. 4.5 kg

System Configuration

Cameras

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

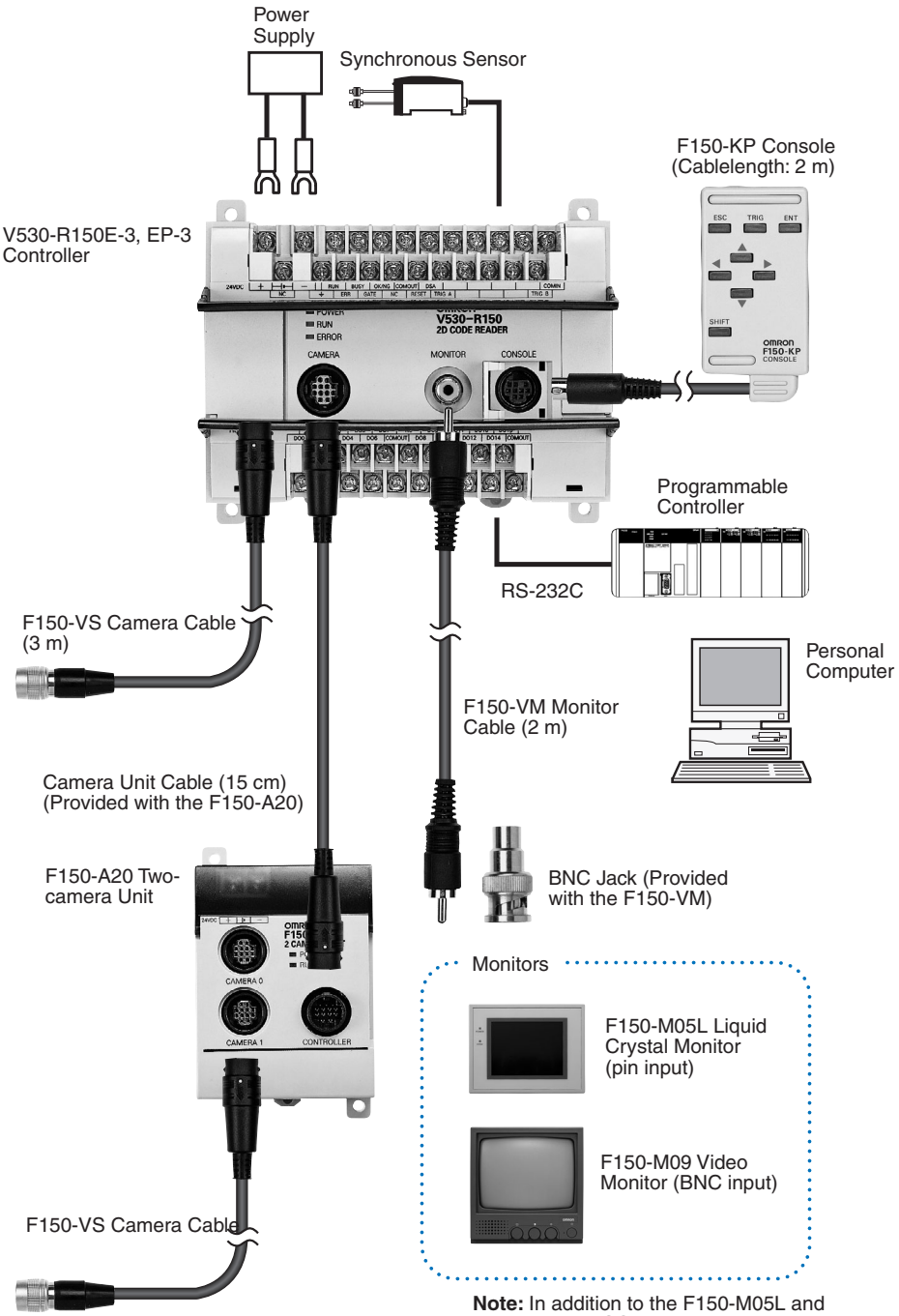
F150-SLC50 Camera with Intelligent Light Source (Field of vision: 50 mm)

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

F150-S1A Camera

Refer to page B-8 concerning the use of this camera.

Note: If the field of vision doesnot match the size of the targetobject you can use an ordinary CCTV lens and lighting.



Note: In addition to the F150-M05L and F150-M09, NTSC monitors with external video input terminals can be used.

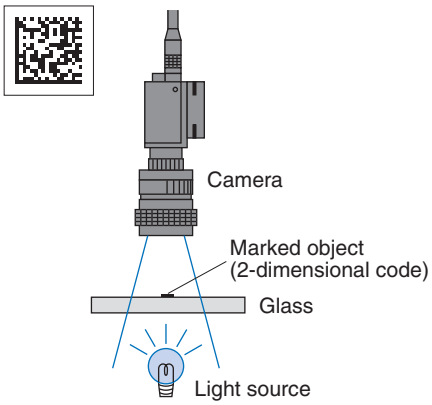
Lighting Methods

Select the appropriate lighting method for the material of the marked object.

Back Lighting

Codes on transparent objects such as glass PCBs can be read by detecting the contrast between transmitted and blocked light.

Applications: Transparent objects such as LCD glass

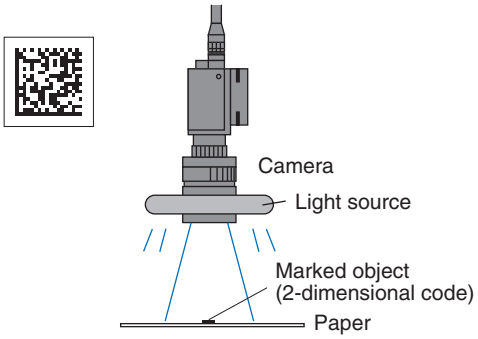


Reflected Lighting

Ring Lighting

For codes printed onto paper or other light-diffusing objects, ring lights can be used to illuminate the marked object. The difference in the reflection factors of the background and the marking enables stable detection.

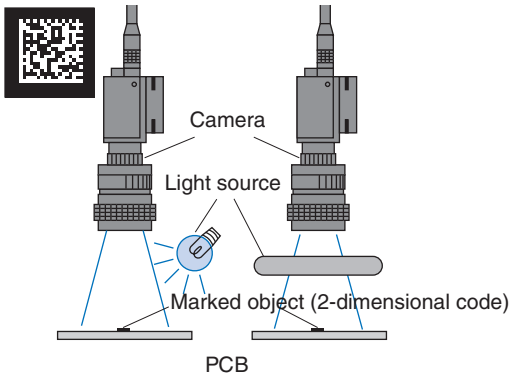
Applications: Paper labels and corrugated cardboard



Oblique Lighting
Ring lighting close to the marked object

For codes inscribed with a laser maker onto PCBs and other relatively glossy surfaces, oblique lighting provides stable detection by distinguishing between regular and diffuse reflected light.

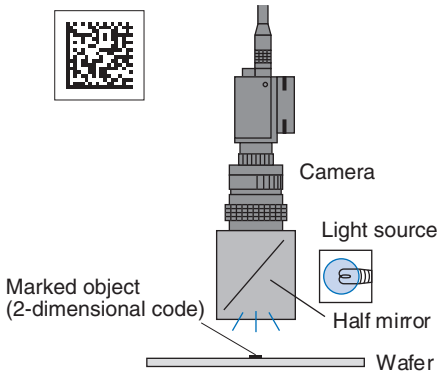
Applications: Direct marking on PCBs and electronic parts



Coaxial Lighting

For codes marked directly onto wafers and other mirror-like surfaces, a stable image with few shadows from surface irregularities can be obtained from the marked object by using coaxial lighting, because it detects only regular reflected light. (The surface of the object must be perpendicular to the optical axis.)

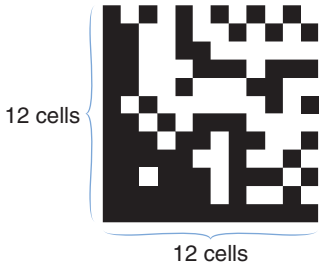
Applications: Mirror-like objects such as wafers



Data Capacity

Data Matrix ECC200

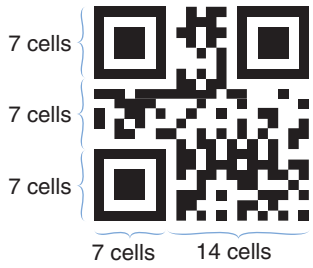
The relation between matrix size (number of cells) and data capacity is shown in the table below. In this example, the matrix size is 12 × 12 cells.



Matrix size	Maximum data capacity				
	Numbers	Alphanumeric characters	Symbols	Japanese Kanji (Shift JIS)	JIS8
10 × 10	6	3	3	---	1
12 × 12	10	6	5	1	3
14 × 14	16	10	9	3	6
16 × 16	24	16	14	5	10
18 × 18	36	25	22	8	16
20 × 20	44	31	28	10	20
22 × 22	60	43	38	14	28
24 × 24	72	52	46	17	34
26 × 26	88	64	57	21	42
32 × 32	124	91	81	30	60
36 × 36	172	127	113	42	84
40 × 40	228	169	150	56	112
44 × 44	288	214	190	71	142
48 × 48	348	259	230	86	172
52 × 52	408	304	270	101	202
64 × 64	560	418	372	139	278
8 × 18	10	6	5	1	3
8 × 32	20	13	12	4	8
12 × 26	32	22	20	7	14
12 × 36	44	31	28	10	20
16 × 36	64	46	41	15	30
16 × 48	98	72	64	23	47

QR Code Model 2

The relation between matrix size (number of cells) and data capacity is shown in the table below. In this example, the matrix size is 21 × 21 cells.



Matrix size (version)	Error correction	Maximum data capacity			
		Numbers	Alphanumeric characters (upper case only)	JIS8	Japanese Kanji (Shift JIS)
21 × 21 (version 1)	L (7%)	41	25	17	10
	M (15%)	34	20	14	8
	Q (25%)	27	16	11	7
	H (30%)	17	10	7	4
25 × 25 (version 2)	L (7%)	77	47	32	20
	M (15%)	63	38	26	16
	Q (25%)	48	29	20	12
	H (30%)	34	20	14	8
29 × 29 (version 3)	L (7%)	127	77	53	32
	M (15%)	101	61	42	26
	Q (25%)	77	47	32	20
	H (30%)	58	35	24	15
33 × 33 (version 4)	L (7%)	187	114	78	48
	M (15%)	149	90	62	38
	Q (25%)	111	67	46	28
	H (30%)	82	50	34	21
37 × 37 (version 5)	L (7%)	255	154	106	65
	M (15%)	202	122	84	52
	Q (25%)	144	87	60	37
	H (30%)	106	64	44	27
41 × 41 (version 6)	L (7%)	322	195	134	82
	M (15%)	255	154	106	65
	Q (25%)	178	108	74	45
	H (30%)	139	84	58	36

Note: **1.** Maximum Data Capacity
The maximum amount of data that can be stored in a code varies with the code size. In other words, if there is a large amount of data to be stored, then the code size must also be large. The maximum data capacity will also vary with the type of characters used. With a QR Code or Data Matrix, the numeric capacity (numbers only) is larger than the alpha numeric capacity (numbers and letters), which is in turn larger than the Japanese Kanji (Shift JIS) capacity. The order and combinations of different characters also affects the data capacity.

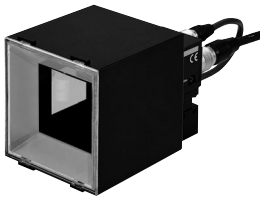
2. The matrix size of a QR Code is indicated by the version. "Version 1" indicates that a QR Code contains (the minimum) 21 cells both horizontally and vertically. The larger the version number, the larger the number of cells per side.

Cameras with Light Source

Cameras with Intelligent Light Source

20-mm field of view	F150-SLC20
50-mm field of view	F150-SLC50

Note: These models consist of an F150-S1A Camera with Lens and Intelligent Light Source.

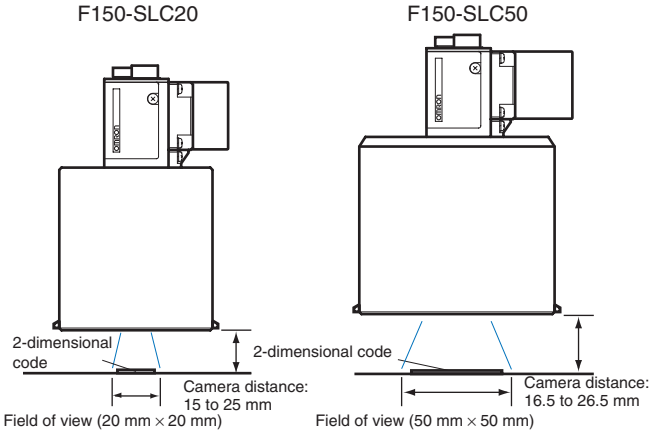


Using the Camera with Intelligent Light Source or Camera with Light Source

- The Lens has a fixed focus. Because there is a certain amount of variation in the field of view and focus of each Lens, the mounting distance must be adjusted each time the Lens or Camera is replaced.
- The camera mounting distance is approximate. Use a mounting method that allows the distance to be adjusted back and forth in the direction of the 2-dimensional code.

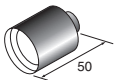
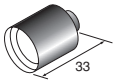
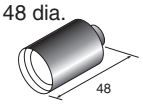
2-Dimensional Code Reader Distance vs. Field of view

Mount the Camera at a distance that will provide accurate imaging of the 2-dimensional codes.



Lenses

CCTV Lenses

CCTV Lenses				
Model	3Z4S-LEB1214D-2	3Z4S-LEC1614A	3Z4S-LEB2514D	3Z4S-LEB5014A
Dimensions	42 dia. 	30 dia. 	30 dia. 	48 dia. 
Locking mechanism	Focus/iris locking mechanism			

Note: Refer to the following optical graph to select the Lens and Extension Tube according to the field of view and camera mounting distance being used.

Extension Tubes

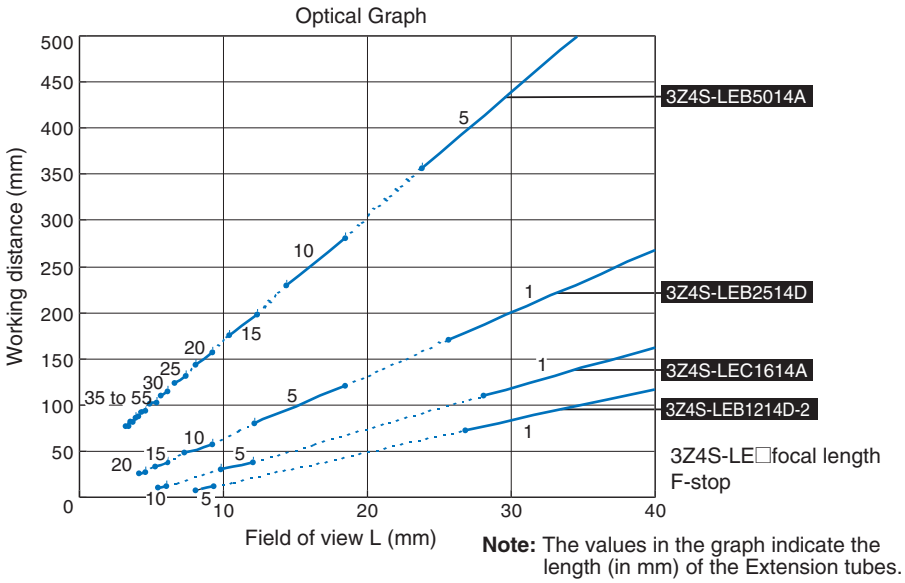
Model	3Z4S-LE EX-C6
Length	A set of six Extension Tubes that are 40, 20, 10, 5, 1, and 0.5 mm in length respectively.

Optical Graph

Point: Based on the necessary field of view and workpiece, select the Lens and Extension Tube to suit the working distance (WD).

Lengthening the Extension Tube lowers the brightness, and increasing distance WD increases the depth of field.

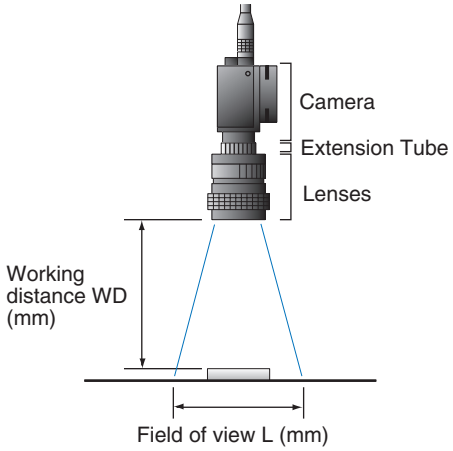
Note: Slight differences exist between cameras. When mounting the Lens, provide a means of adjusting the camera mounting distance. For example, to obtain a camera mounting distance WD of about 30 mm with a field of view of 10 mm, mount a 5-mm Extension Tube to the 3Z4S-LEC1614A.



Note: The values in the graph indicate the length (in mm) of the Extension tubes.

Reading the Optical Graph

The X axis of the graph shows field of view L in millimeters, and the Y axis shows the camera mounting distance A in millimeters. The curves on the graph indicate different Lenses, and the "t" values indicate the lengths of the Extension Tubes.

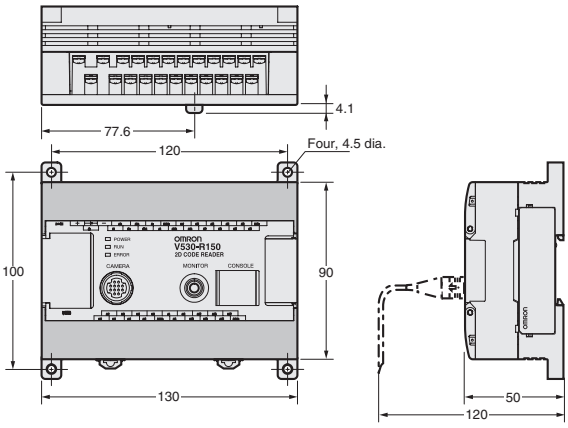


Dimensions

Note: All units are in millimeters unless otherwise indicated.

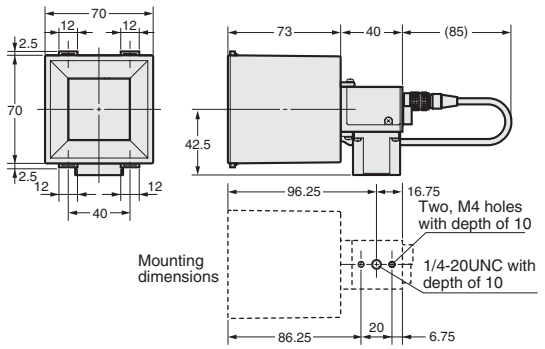
2-Dimensional Code Reader

V530-R150E-3, V530-R150EP-3

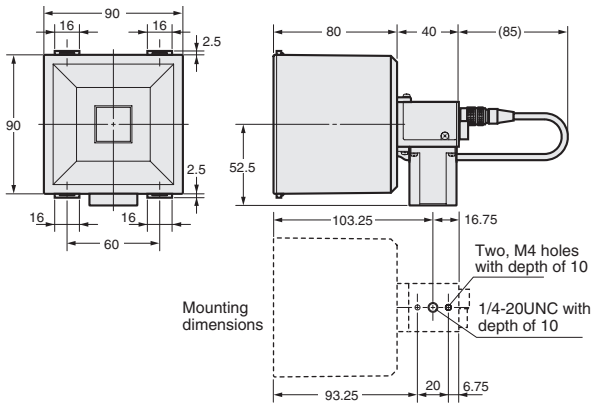


Camera

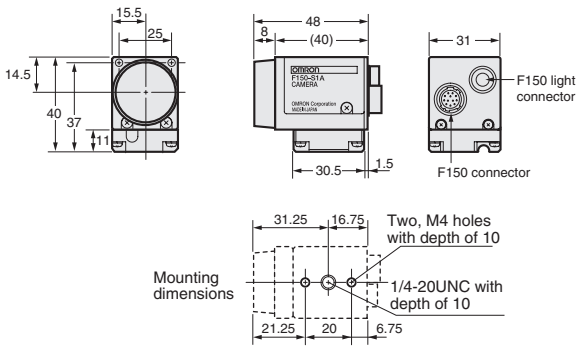
F150-SLC20
(Camera with F150-LTC20 Intelligent Light Source)



F150-SLC50
(Camera with F150-LTC50 Intelligent Light Source)

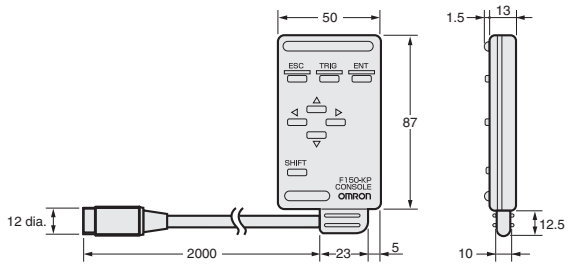


F150-S1A (Camera only)



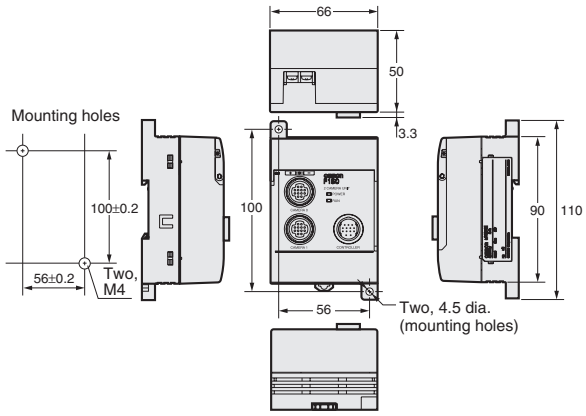
Console

F150-KP



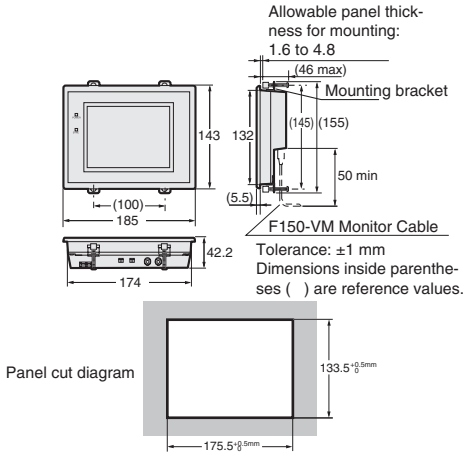
Two-camera Unit

F150-A20



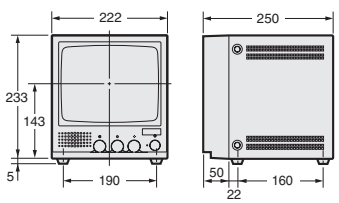
Liquid Crystal Monitor

F150-M05L



Video Monitor

F150-M09



ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

Cat. No. Q12E-EN-01