2-Dimensional Code Reader (Fixed Type)
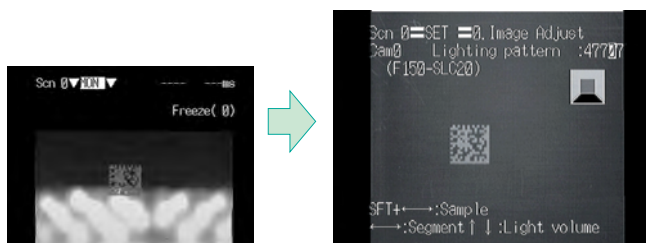# V530-R150E-3, EP-3

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.
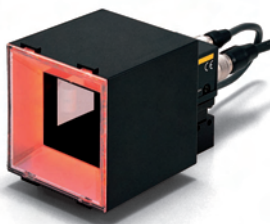

| Ring lighting | Intelligent Light Source |

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.
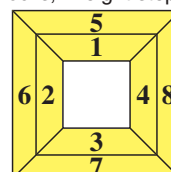

F150-SLC20
(Field of vision: 20 mm)

The light intensity can be set for each of five lighting blocks, in eight steps.
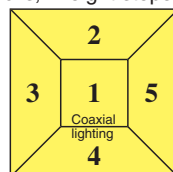
F150-SLC50
(Field of vision: 50 mm)

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.
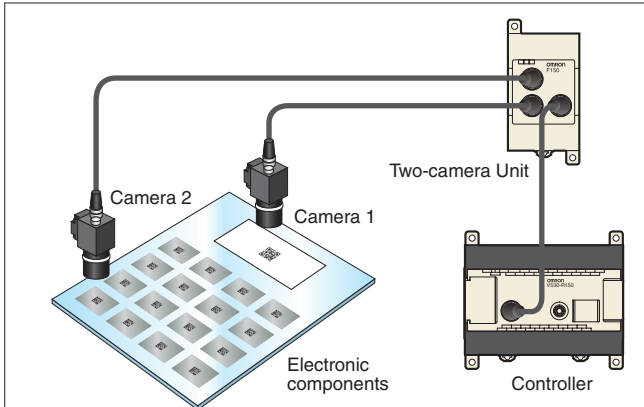
Two-camera Unit

Two cameras can be switched by a single Controller.

Application Example
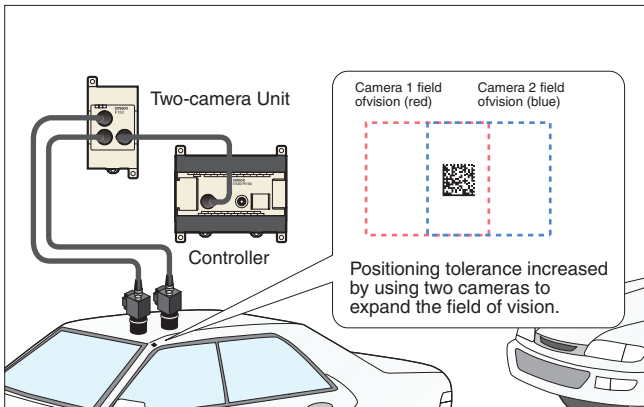
Simultaneous single-product and lot management

Single products and lots can be managed simultaneously.

Camera 2
Camera 1
Two-camera Unit
Electronic components
Controller

Greater positioning tolerance

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

Two-camera Unit

Controller

Camera 1 field ofvision (red) Camera 2 field ofvision (blue)

Positioning tolerance increased by using two cameras to expand the field of vision.

Compatible with Data Matrix Old Version

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

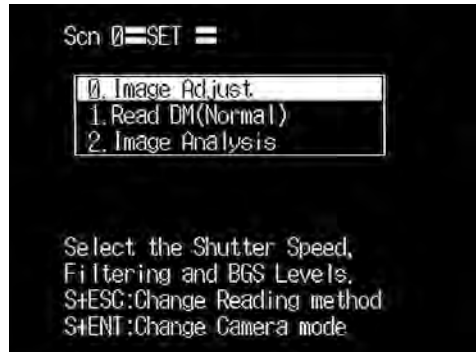**Note:** Compatible with ECC000, 050, 080, 100, and 140.

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.

26

26

Max. of 64 alphanumeric characters.

64

64

Max. of 418 alphanumeric characters.
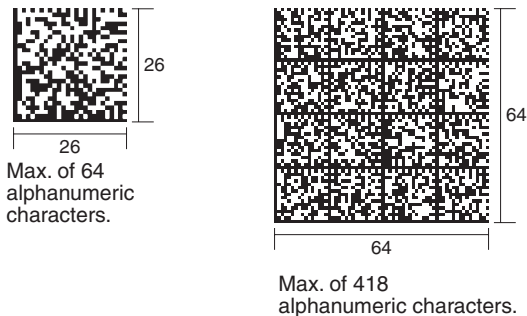
New Guidance Function for the Settings Display

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

Scn 0═SET ═

0. Image Adjust.
1. Read DM(Normal)
2. Image Analysis

Select the Shutter Speed,
Filtering and BGS Levels.
S+ESC:Change Reading method
S+ENT:Change Camera mode

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.

V530-R150 Series

Finder pattern (cutting symbol)

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

Finder pattern

Data Matrix

QR Code

Easy Image Analysis

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

Store up to 24 Defect Images

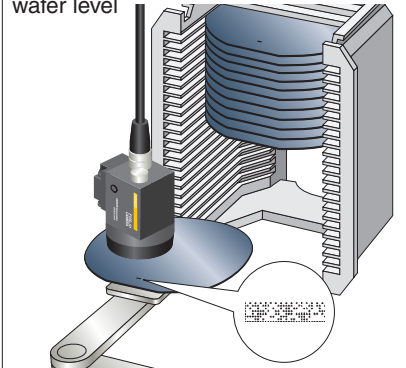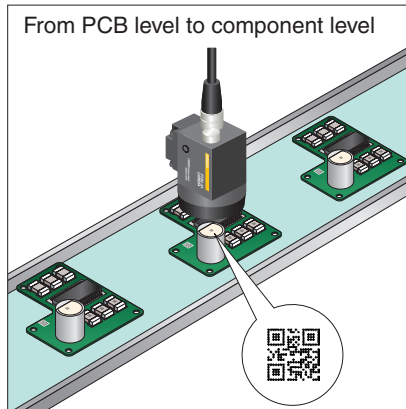Use the stored images to confirm defect types.

Stores up to 24 images

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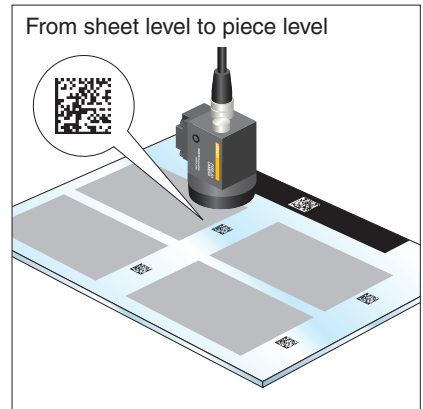
Applications

From batch processing level to wafer level

From PCB level to component level

From sheet level to piece level

Ordering Information

■ List of Models

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

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 Two-camera Unit: 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

■ Cameras

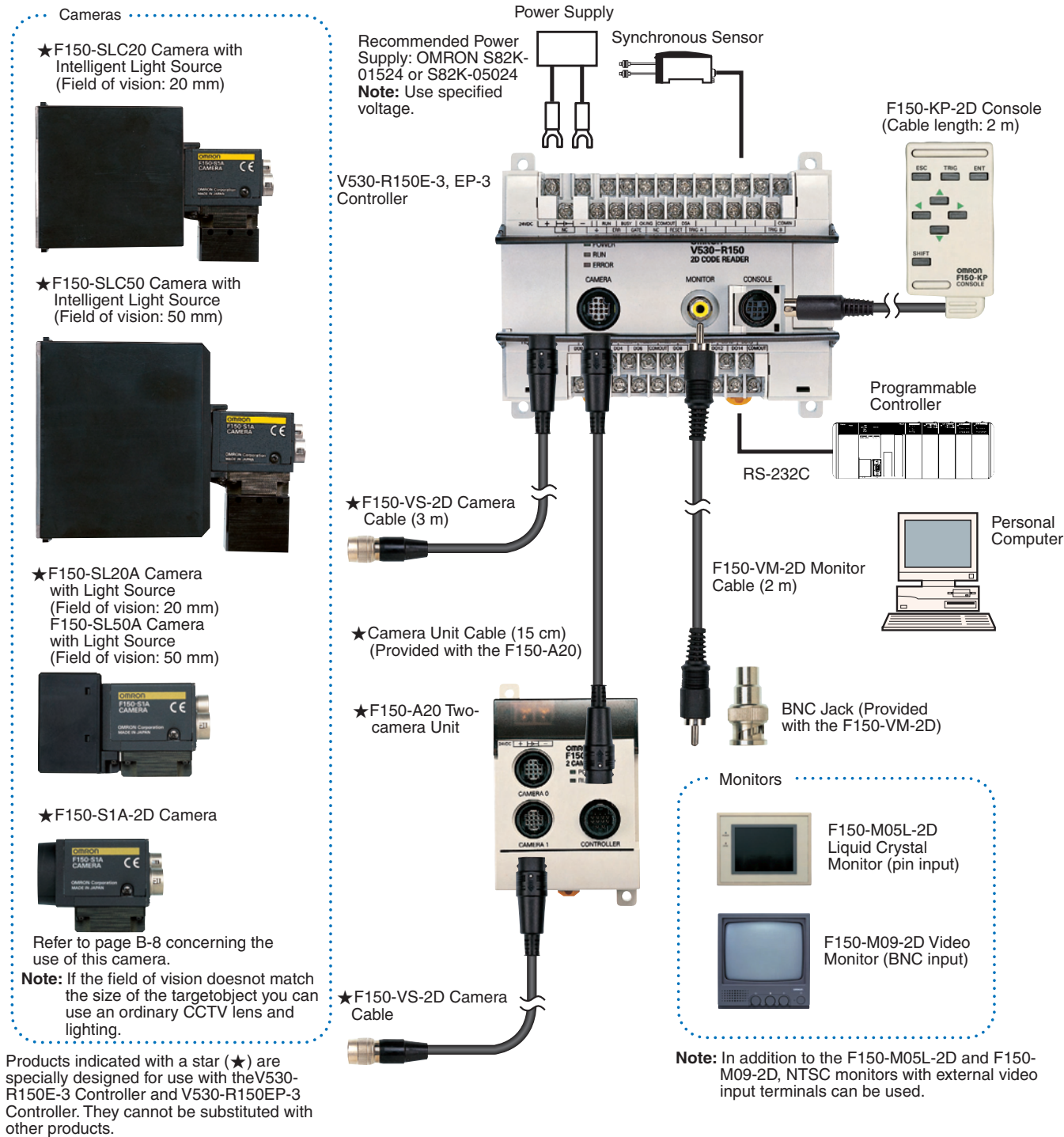| Item		F150-SLC20/50 Camera with Intelligent Light Source F150-SL20A/50A Camera with Light Source F150-S1A-2D Camera
Camera	Picture element	1/3" CCD
	Effective pixels	659 (H) × 494 (V)
	Shutter function	Electronic frame shutter Shutter speed: 1/100, 1/500, 1/2000, or 1/10000 sec (menu selectable)
Lens	Mounting distance	F150-SLC20: 15 to 25 mm F150-SLC50: 16.5 to 26.5 mm F150-SL20A: 61 to 71 mm F150-SL50A: 66 to 76 mm
	Field of vision	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-SLC20: Approx. 280 g, F150-SLC50: Approx. 370 g, F150-SL20A/50A: Approx. 135 g, F150-S1A-2D: 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 F150-M05L-2D	Video Monitor F150-M09-2D
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-2D 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.

Products indicated with a star (★) are specially designed for use with theV530-R150E-3 Controller and V530-R150EP-3 Controller. They cannot be substituted with other products.

Power Supply

Recommended Power Supply: OMRON S82K-01524 or S82K-05024 **Note:** Use specified voltage.

Synchronous Sensor

V530-R150E-3, EP-3 Controller

F150-KP-2D Console (Cable length: 2 m)

Programmable Controller

RS-232C

★F150-VS-2D Camera Cable (3 m)

Personal Computer

F150-VM-2D Monitor Cable (2 m)

★Camera Unit Cable (15 cm) (Provided with the F150-A20)

★F150-A20 Two-camera Unit

BNC Jack (Provided with the F150-VM-2D)

Monitors

F150-M05L-2D Liquid Crystal Monitor (pin input)

F150-M09-2D Video Monitor (BNC input)

★F150-VS-2D Camera Cable

Note: In addition to the F150-M05L-2D and F150-M09-2D, NTSC monitors with external video input terminals can be used.

Cameras with Light Source

Cameras with Intelligent Light Source

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

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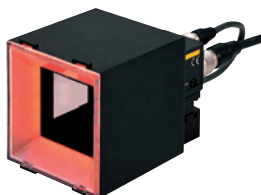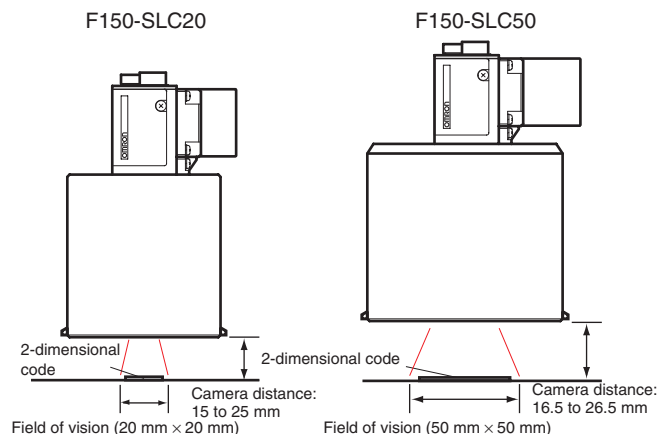
Using the Camera with Intelligent Light Source or Camera with Light Source

- The Lens has a fixed focus. Because there is a certain amount of variation in the field of vision 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 Vision

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

F150-SLC20

F150-SLC50

2-dimensional code — Camera distance: 15 to 25 mm. Field of vision (20 mm × 20 mm)

2-dimensional code — Camera distance: 16.5 to 26.5 mm. Field of vision (50 mm × 50 mm)

Dimensions

Note: All units are in millimeters unless otherwise indicated.

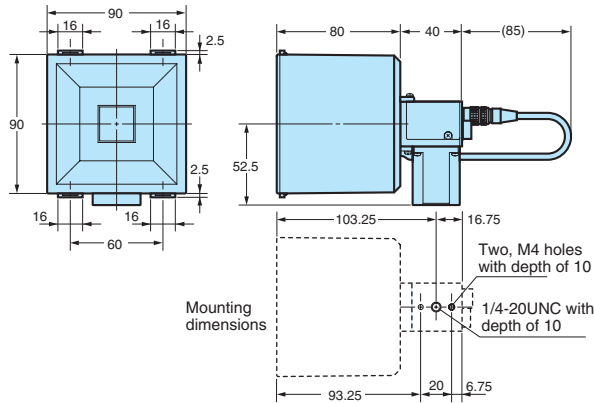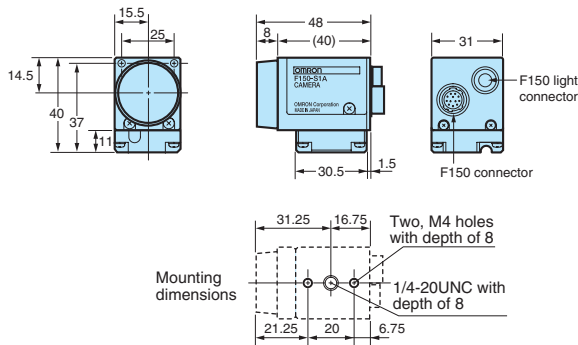## 2-Dimensional Code Reader

V530-R150E-3, V530-R150EP-3

4.1, 77.6, 120, Four, 4.5 dia., 100, 90, 130, 50, 120
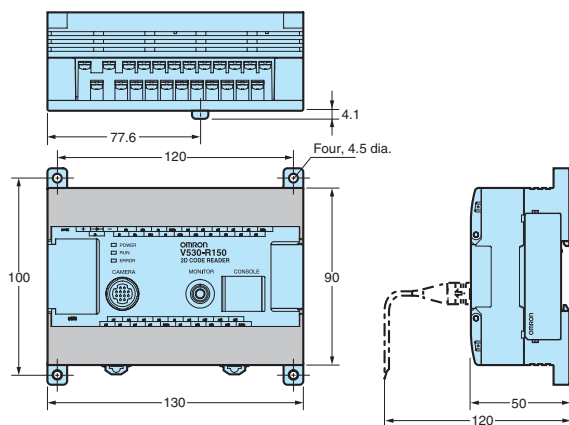
Camera

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

70, 12, 2.5, 70, 2.5, 12, 40, 73, 40, (85), 42.5, 96.25, 16.75, Two, M4 holes with depth of 10, 1/4-20UNC with depth of 10, Mounting dimensions, 86.25, 20, 6.75
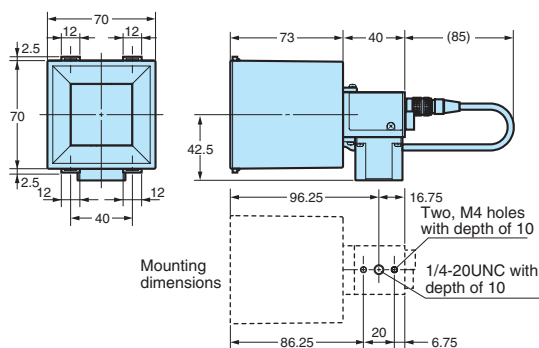
F150-SLC50
(Camera with F150-LTC50 Intelligent Light Source)

Mounting dimensions

Two, M4 holes with depth of 10

1/4-20UNC with depth of 10

F150-S1A-2D (Camera only)

F150 light connector

F150 connector

Mounting dimensions

Two, M4 holes with depth of 8

1/4-20UNC with depth of 8

Console
F150-KP-2D

Two-camera Unit
F150-A20

Mounting holes

Two, M4

Two, 4.5 dia. (mounting holes)

Liquid Crystal Monitor
F150-M05L-2D

Allowable panel thickness for mounting: 1.6 to 4.8

Mounting bracket

F150-VM-2D Monitor Cable

Tolerance: ±1 mm
Dimensions inside parentheses ( ) are reference values.

Panel cut diagram

$133.5^{+0.5}_{0}$mm

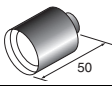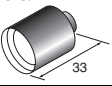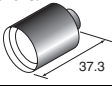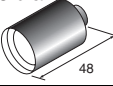$175.5^{+0.5}_{0}$mm
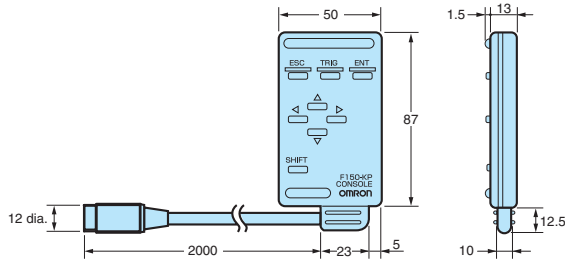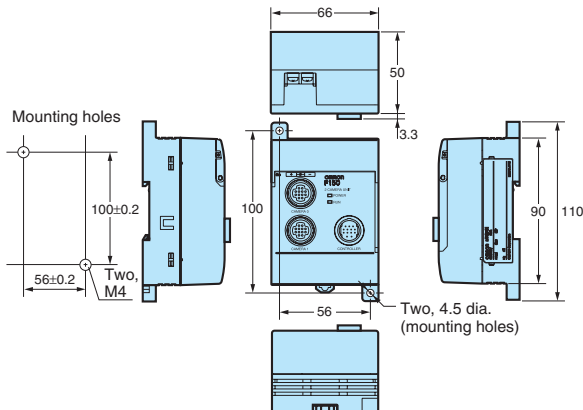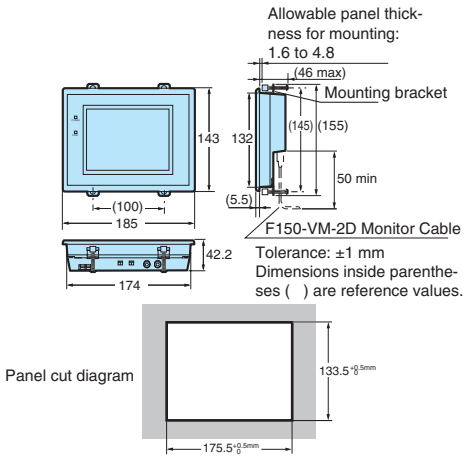
Video Monitor
F150-M09-2D
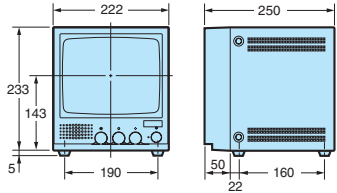
Peripheral Devices (e.g., Lenses and Lighting)

■ Lenses

Select the Lens based on the size of the workpiece, the required field of vision, and the required working distance.

CCTV Lenses

CCTV Lenses				
Model	3Z4S-LEB1214D-2	3Z4S-LEC1614A	3Z4S-LEB2514D	3Z4S-LEB5014A
Dimensions	42 dia. _50_	30 dia. _33_	30 dia. _37.3_	48 dia. _48_
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 vision 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 vision 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 working distance. For example, to obtain a Camera working distance (WD) of about 30 mm with a field of vision 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.
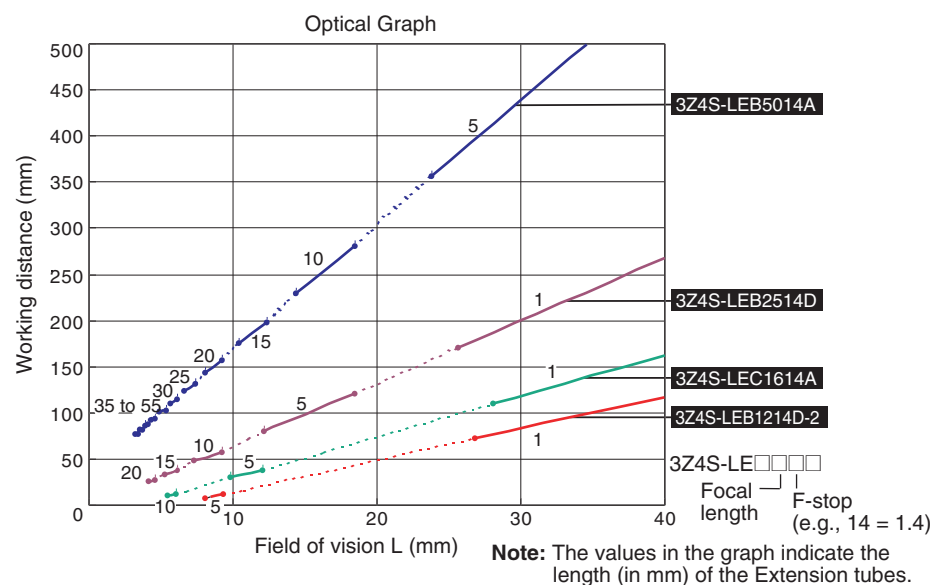
Reading the Optical Graph

The horizontal axis of the graph shows field of vision L in millimeters, and the vertical axis shows the working distance WD in millimeters. The working distance is the distance from the end of the lens to the surface of the 2-dimensional code.

The curves on the graph indicate different Lenses, and the values inside the graph indicate the lengths of the Extension Tubes.
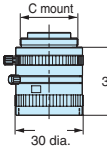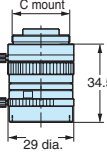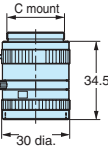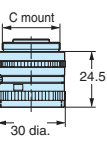
Camera

Extension Tube

Lens

Working distance WD (mm)

Field of vision L (mm)
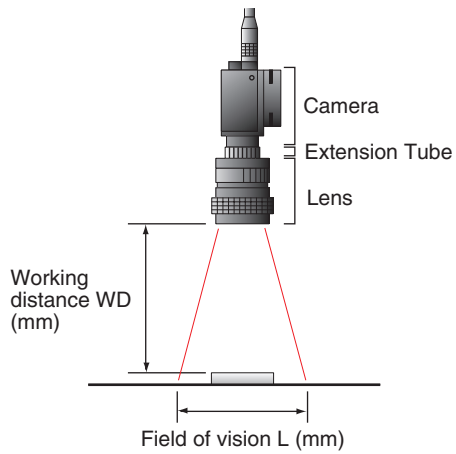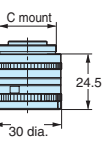
CCTV Lenses

The following Moritex lenses are recommended.

Note: Refer to the following website for details on Moritex products. http://www.moritex.com/

CCTV Lenses and Appearances

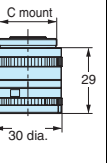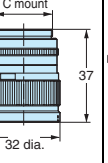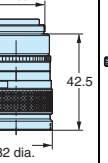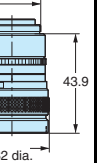|	CCTV Lenses								
Model	ML-0614	ML-0813	ML-1214	ML-1614	ML-2514	ML-3519	ML-5018	ML-7527	ML-10035
Dimensions									
Lock structure	Lock structure on focus and aperture								
Mount	C mount								

Extension Tubes

Model	Contents
ML-EXR (from Moritex)	A set of 7 extension tubes that are 0.5, 1, 2, 5, 10, 20, and 40 mm in length

Reading the Optical Chart

The optical chart provides the field of vision in millimeters and the working distance WD in millimeters when each of the tubes is mounted.
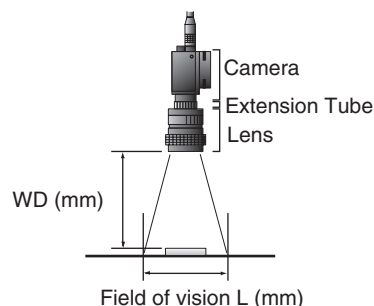
Optical Chart: Field of Vision (FOV) and Working Distances (WD) with Extension Tubes

Extension Tube (mm)	ML-0614 FOV	ML-0614 WD	ML-0813 FOV	ML-0813 WD	ML-1214 FOV	ML-1214 WD	ML-1614 FOV	ML-1614 WD	ML-2514 FOV	ML-2514 WD	ML-3519 FOV	ML-3519 WD	ML-5018 FOV	ML-5018 WD	ML-7527 FOV	ML-7527 WD	ML-10035 FOV	ML-10035 WD
0	124.0	200.0	72.0	147.7	77.0	247.7	81.8	357.8	64.9	457.7	49.1	500.0						
0.5	44.6	63.2	57.4	115.2	89.1	289.2	116.7	514.6	181.2	1270.0	251.4	2458.7						
	32.8	43.0	31.9	59.0	41.3	125.0	48.1	206.1	47.8	338.2	41.4	422.1						
1	22.3	24.8	28.7	51.8	44.6	135.9	58.4	251.8	90.6	636.5	125.7	1240.0						
	18.9	19.0	20.5	33.7	28.2	80.0	34.1	142.8	37.8	268.5	35.3	366.1						
1.5			19.1	30.6	29.7	84.9	38.9	164.2	60.4	425.3	83.8	833.8	115.1	1576.5				
			15.1	21.7	21.4	56.7	26.4	108.2	31.3	222.8	31.0	323.9	42.6	609.9				
2					22.3	59.3	29.2	120.3	45.3	319.7	62.8	630.7	86.3	1193.0	138.2	3188.9		
					17.3	42.4	21.5	86.3	26.7	190.6	27.6	290.9	37.9	547.6	32.3	776.1		
5							11.7	41.5	18.1	129.6	25.1	265.1	34.5	502.6	55.3	1421.7	71.3	2412.7
							10.2	35.4	14.2	103.1	16.6	184.8	22.9	347.0	22.6	607.0	20.5	724.2
10							5.8	15.2	9.1	66.3	12.6	143.2	17.3	272.5	27.6	832.7	35.7	1431.6
							5.4	14.0	8.0	59.6	10.0	120.6	13.8	225.7	15.1	474.7	14.6	608.6
15									6.0	45.2	8.4	102.6	11.5	195.8	18.4	636.3	23.8	1104.6
									5.5	42.7	7.2	93.0	9.8	173.5	11.4	408.4	11.3	545.7
20									4.5	34.6	6.3	82.2	8.6	157.5	13.8	538.2	17.8	941.0
									4.2	33.6	5.6	77.6	7.7	144.5	9.1	368.5	9.2	505.3
25											5.0	70.1	6.9	134.4	11.1	479.2	14.3	842.9
											4.6	67.8	6.3	126.0	7.6	341.9	7.8	478.1
30													5.8	119.1	9.2	440.0	11.9	777.5
													5.3	113.1	6.5	322.8	6.7	457.6
35													4.9	108.1	7.9	411.9	10.2	730.8
													4.6	103.7	5.7	308.5	5.9	442.6
40													4.3	99.9	6.9	390.9	8.9	695.8
													4.1	96.5	5.1	297.4	5.3	430.1
45															6.1	374.5	7.9	668.5
															4.6	288.5	4.8	420.7
50															5.5	361.4	7.1	646.7
															4.1	281.3	4.4	412.3
60																	5.9	614.0
																	3.7	400.1

Note: The values provided are computational and may vary from measured values. Use these values as guidelines only.

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 substrates

Camera

Marked object
(2-dimensional code)

Glass substrate

Light source
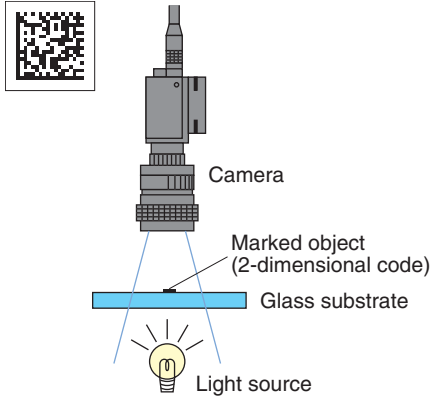
Reflected Lighting

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: Pin-stamped markings on automotive parts

Camera

Light source

Marked object
(2-dimensional code)

Paper
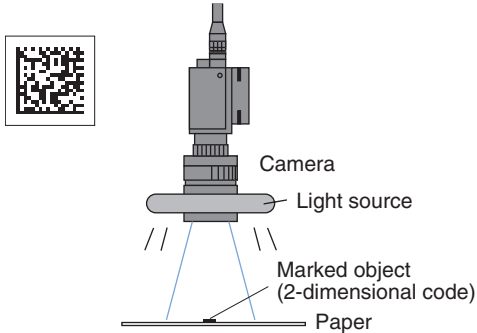
Oblique Lighting
Ring lighting close to the marked object

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

Camera

Light source

Marked object (2-dimensional code)

PCB
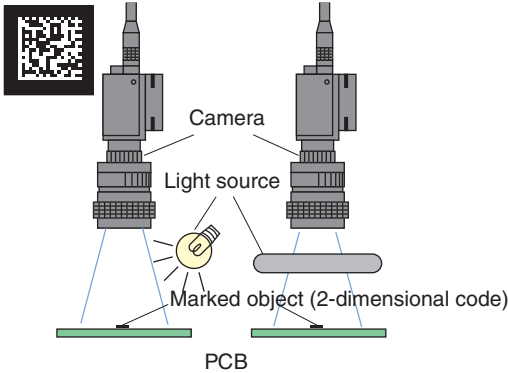
Coaxial Lighting

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

Camera

Light source

Marked object
(2-dimensional code)

Half mirror

Wafer
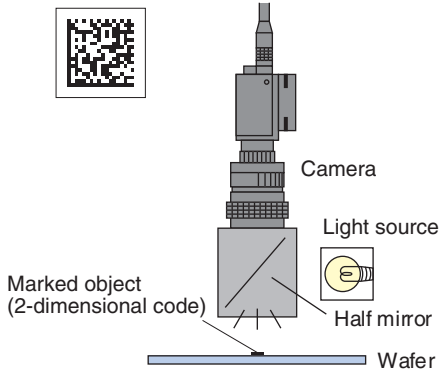
ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.

To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.