Code Readers

2-Dimensional Code Readers

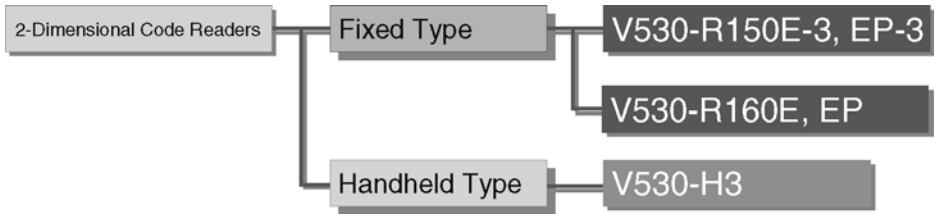
Linear Bar Code Readers

Product Variations

Bringing about a revolution in data management by linking information to the physical world.

■ 2-Dimensional Code Readers

Variations



V530-R150E-3, EP-3

- Intelligent light source and two-camera unit.
- Compatible with Data Matrix old version.
- Reads dot cell codes.
- Conforms to SEMI standard T7.

V530-R160E, EP

- Dependably read pin-stamped markings
- Dot codes read at any angle: 360° compatibility
- Dot codes read at camera angles up to 60° off of vertical from the mark.
- Dependably read markings at an Angle
- Easy setup
- Easy operation and maintenance
- Easy analysis

V530-H3

- Select from 3 different types of handheld reader to suit the marked object.
- Minimum resolution of 50 μm.
- Reads dot cell codes.

Terminology for 2-Dimensional Codes

The terminology explained below focuses on terms related to QR Codes and Data Matrix codes which are matrix-type 2-dimensional codes. There may be some parts of this glossary that do not apply to other types of 2-dimensional codes.

■ Matrix-type Codes

These are 2-dimensional codes that are represented using patterns of black and white squares. Two typical matrix-type 2-dimensional codes are shown below.

QR Code

Data Matrix

■ Stack-type Codes

These are 2-dimensional codes that consist of several 1-dimensional bar codes stacked vertically. Two typical stack-type 2-dimensional codes are shown below.

PDF 417

CODE 49

■ Data Matrix

Data Matrix codes were developed by I.D. Matrix, and are used extensively in the semiconductor and electronics industries. Data Matrix codes have a relatively large data capacity for their size. There are several different types of Data Matrix, differentiated by their error correction method. The ECC200 is the most commonly used type.

■ QR Code

The “Quick Response Code” type is a 2-dimensional code that was developed in Japan. High-speed reading is possible with QR Codes, but the code size is quite large compared to other 2-dimensional codes.

■ Finder Pattern

These are patterns used to detect the position of 2-dimensional codes. The shape of the finder patterns varies with the type of code.

QR Code

Data Matrix

■ Cell

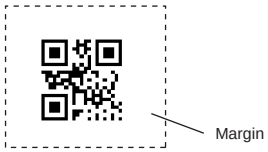
These squares are the units that make up matrix-type 2-dimensional codes. Whether these cells are black or white determines the information carried by the code.

■ Version (QR Code)

The code size of QR Codes 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.

■ Margin (Quiet Zone)

This is the empty space around 2-dimensional codes. Usually it is necessary to ensure that there is a margin around 2-dimensional codes. When the QR Code (Pattern) mode is used, a margin of 4 cells is required.



■ Error Correction

This term is used to describe the function which detects and corrects errors using a special mathematical technique (commonly known as the “Reed-Solomon” method). Using this function, reading is possible, to a certain extent, for codes with poor printing quality or that are damaged. There are, however, limits on the extent to which correction is possible, and reading may not be possible for codes if the damage is extensive. There are 2-dimensional codes for which the error correction level can be selected. (For example, with QR Codes, error correction levels of 7%, 15%, 25%, or 30% are available.)

■ 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 QR Codes and Data Matrix codes, the numeric capacity (numbers only) is larger than the alpha numeric capacity (numbers and letters).

■ Right and Left Reversal

This is the term used to describe the state that occurs when reading 2-dimensional codes marked on a transparent material or reading codes reflected in a mirror. For example, right and left reversal will occur when attempting to read a 2-dimensional code marked on a piece of glass from the reverse side.

■ Black and White Reversal

Usually, in images of 2-dimensional codes, the code itself is black and the background is white. Sometimes, however, due to the material of the reading object and the kind of lighting used, the code will appear white in the image obtained. This phenomenon is called “black and white reversal.”

QR Code in black and white reversal

■ Marking Methods

There are several marking methods that can be used. The most suitable method will depend on factors such as the material of the object onto which the code is marked. The most commonly used marking devices are listed below.

- Printer
  A printer can be used to print codes onto paper and different kinds of labels.
- Laser Marker
  A laser marker can be used to mark metal objects. A laser marker can mark very finely enabling the size of 2-dimensional codes to be reduced.
- Exposure Marking
  Using exposure marking, particles are not created (unlike laser marking) and even finer marking is possible than with laser marking. Exposure marking is used with semiconductor wafers, LCD panels, and color filters that have exposure processing.

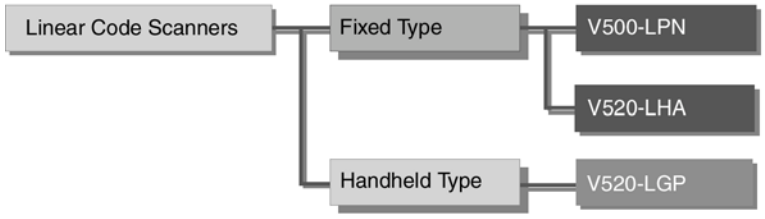
ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

Product Variations

Bringing about a revolution in data management by linking information to the physical world.

■ Linear Bar Code Readers

Variations



V500-LPN5627

- Ultra small size.
- Fully decoded and programmable.
- Easily integrated into new equipment designs.
- 500 scans per second.
- Raster version also available.
- RS-232C Interface.

V520-LHA7127

- Fast, 700 scans per second.
- 32-bit microprocessor operation.
- High performance in an ultra-small package.
- Integrates easily into new equipment.
- 100% solid state design provides performance & reliability.
- Fully programmable.
- RS-232C interface.

V520-LGP6125

- Significantly improved decode techniques.
- Highly ergonomic design and styling.
- Lightweight for continuous use.
- Low power consumption; ideal for use with portable terminals.
- 200 scans per second.
- Outstanding performance.
- RS-232C Interface.

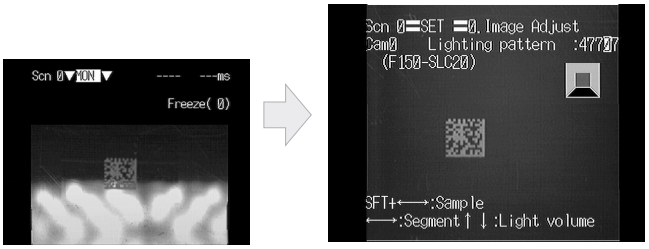
2-Dimensional Code Reader (Fixed Type)
V530-R150E-3, EP-3

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.

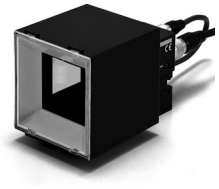


Ring lighting Intelligent Light Source

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.

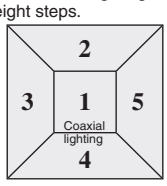


Lighting Controlled from Menus

- 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.

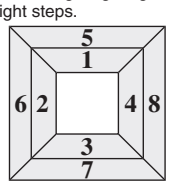
F150-SLC20
(Field of vision: 20 mm)

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



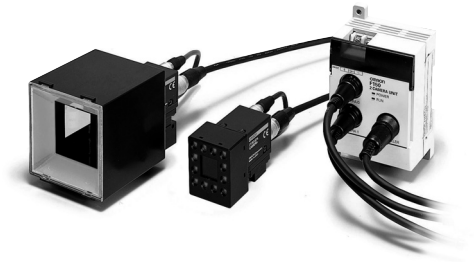
F150-SLC50
(Field of vision: 50)

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



Two-Camera Unit

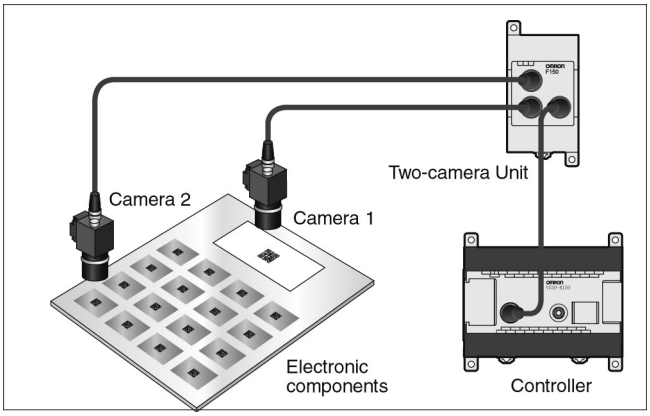
Two cameras can be switched by a single Controller.



Application Example

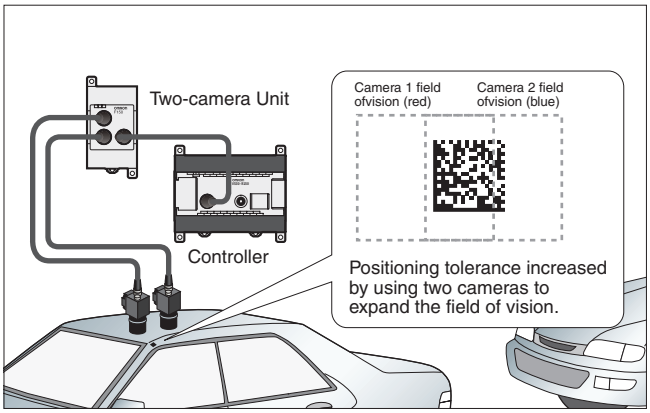
Simultaneous Single-Product and Lot Management

Single products and lots can be managed simultaneously.



Greater Positioning Tolerance

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



Compatible with Data Matrix Old Version

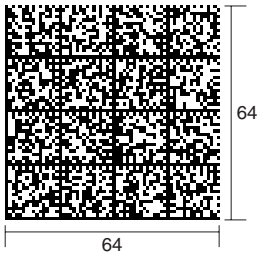
The V530-R150V3 Controller is also capable of reading the Data Matrix Old Version. (See note.)

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.

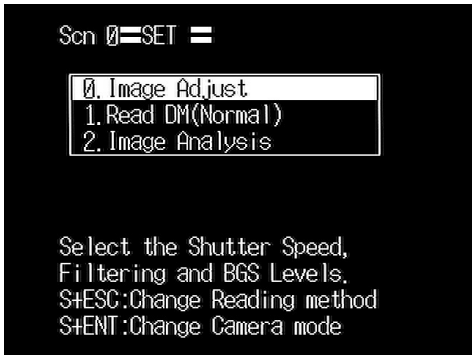
Max. of 64 alphanumeric characters.



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)

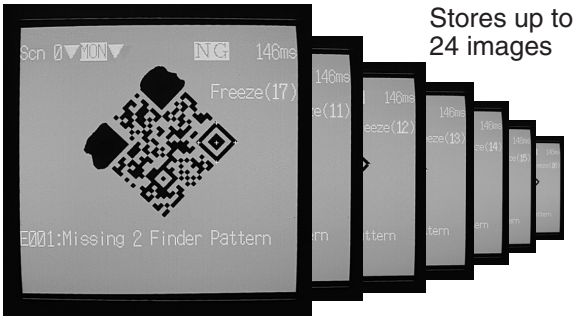
Use this pattern to detect the 2-dimensional code position. The finder pattern is different for each code.

Easy Image Analysis

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

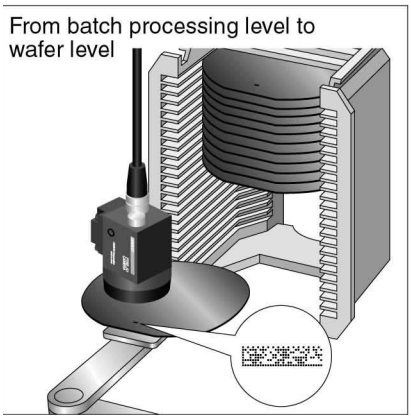
Store up to 24 Defect Images

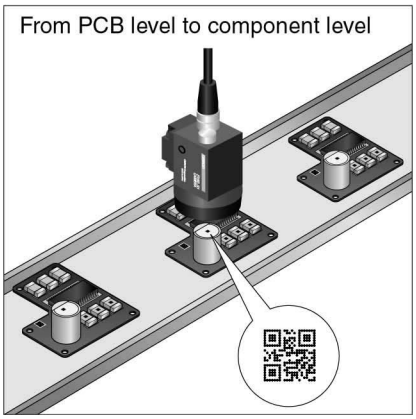
Use the stored images to confirm defect types.

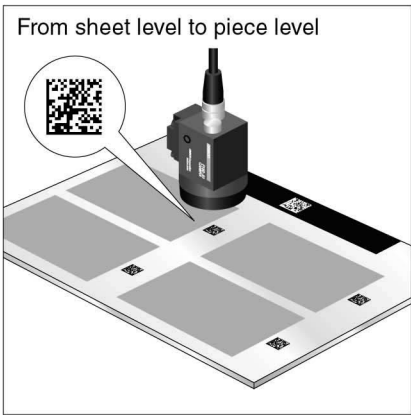


Note: Stored images are kept until the power is turned OFF.

Applications







Ordering Information

■ List of Models

Item	Model
Controller	**V530-R150E-3, EP-3**
Console	**F150-KP-2D**
Camera	**F150-S1A-2D**
Camera cable (3 m)	**F150-VS-2D**
Two-camera unit	**F150-A20**
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 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-2D
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-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-2D	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 does not match the size of the target object you can use an ordinary CCTV lens and lighting.

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

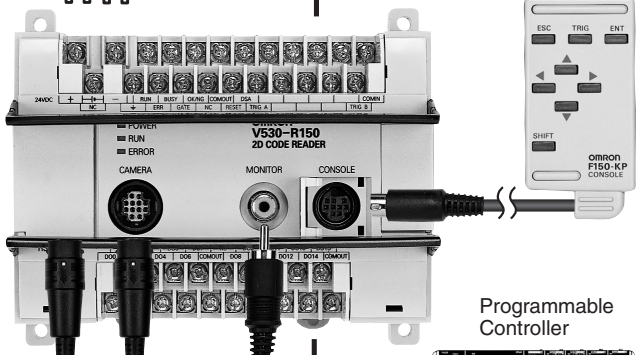
Power Supply

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

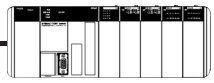
Synchronous Sensor

F150-KP-2D 2M Console Cable length: 2

V530-R150E-3, EP-3 Controller



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)

★F150-VS-2D Camera Cable

Monitors

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

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

Note: In addition to the F150-M05L-2D and F150-M09-2D, NTSC monitors with external video input terminals can be used.
F150-M09-2D does not confrom to EC Directive.

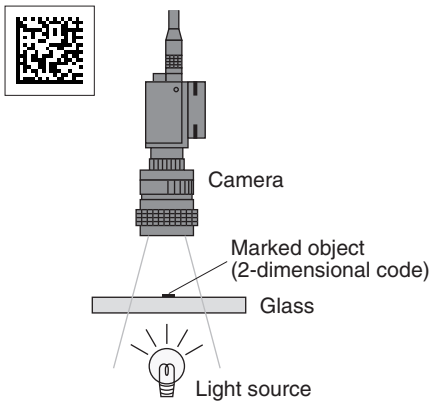
Lighting Methods

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

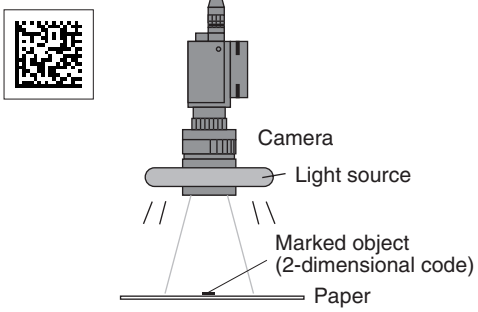


Reflected Lighting

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.

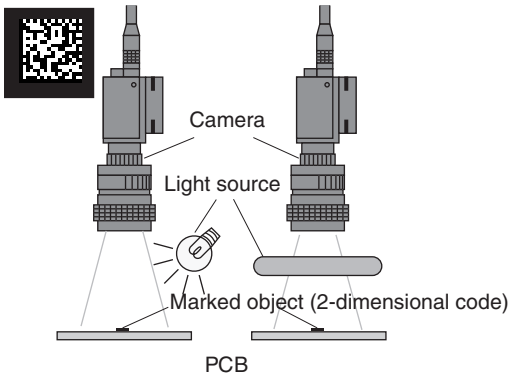
Applications: Paper labels and corrugated cardboard



Oblique Lighting
Ring Lighting Close to the Marked Object

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

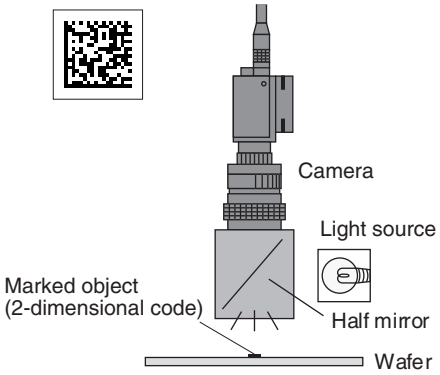
Applications: Direct marking on PCBs and electronic parts



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.)

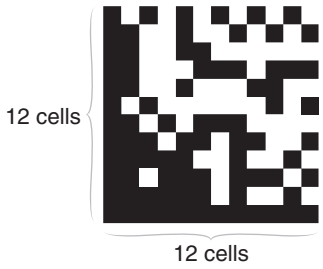
Applications: Mirror-like objects such as wafers



Data Capacity

Data Matrix ECC200

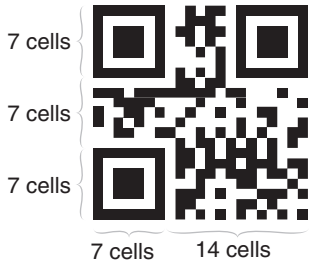
The relation between matrix size (number of cells) and data capacity is shown in the table below. In this example, the matrix size is 12 × 12 cells.



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.

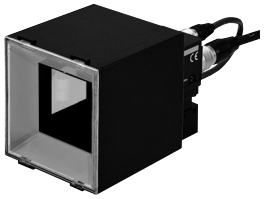
2. The matrix size of a QR Code is indicated by the version. Version 1 indicates that a QR Code contains (the minimum) 21 cells both horizontally and vertically. The larger the version number, the larger the number of cells per side.

Cameras with Light Source

Cameras with Intelligent Light Source

20-mm field of 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.

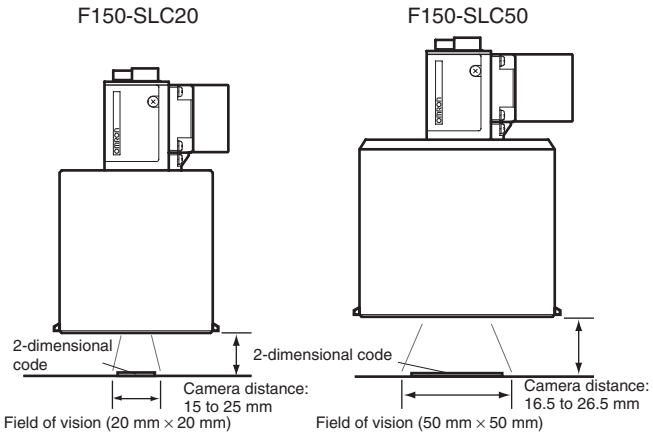


Using the Camera with Intelligent Light Source or Camera with Light Source

- 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.



Lenses

CCTV Lenses (Other lenses are available.) See chart on page 11.

Model	F150-LE20	F150-LE50
Dimensions	20 mm dia. 	50 mm dia. 

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

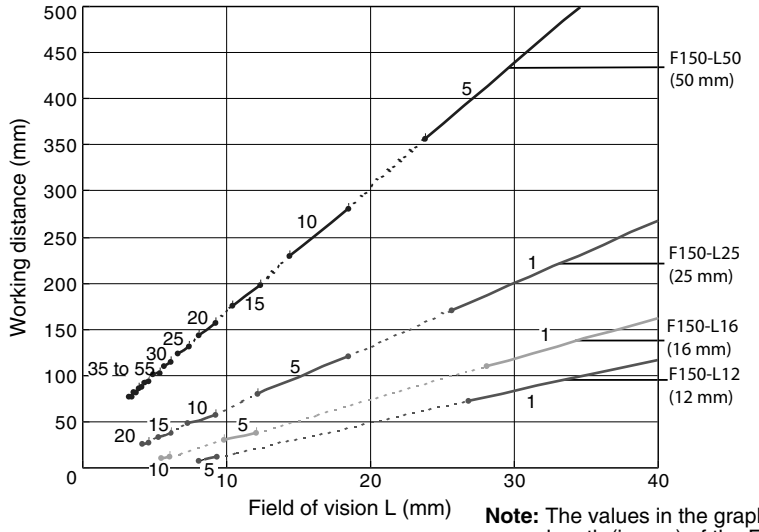
Model	F150-EXT
Length	A set of six Extension Tubes that are 40, 20, 10, 5, 1, and 0.5 mm in length respectively.

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 mounting distance.

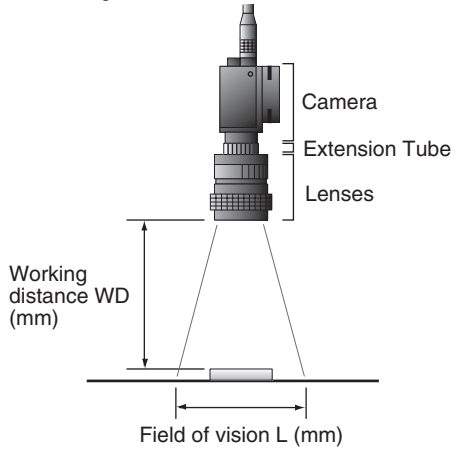
Optical Graph



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 vision 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.

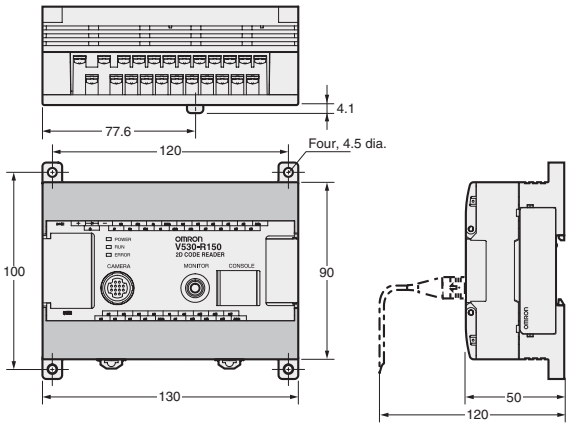


Dimensions

Note: All units are in millimeters unless otherwise indicated.

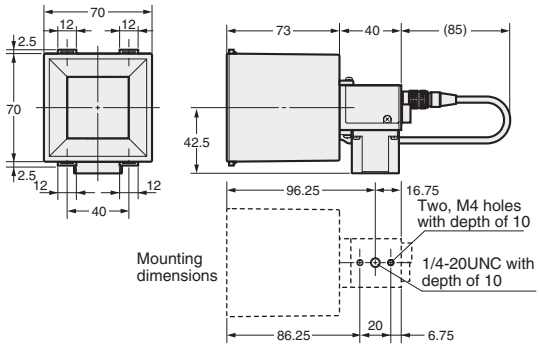
2-Dimensional Code Reader

V530-R150E-3, V530-R150EP-3

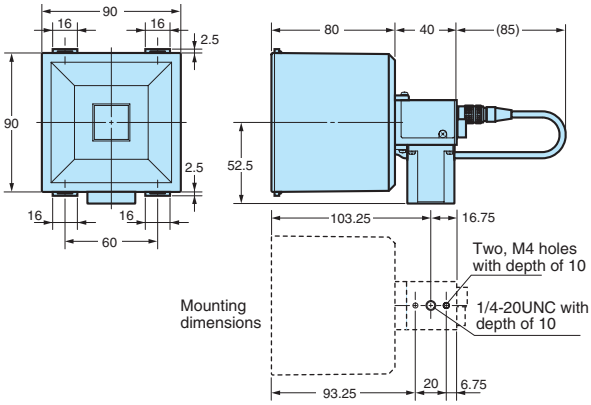


Camera

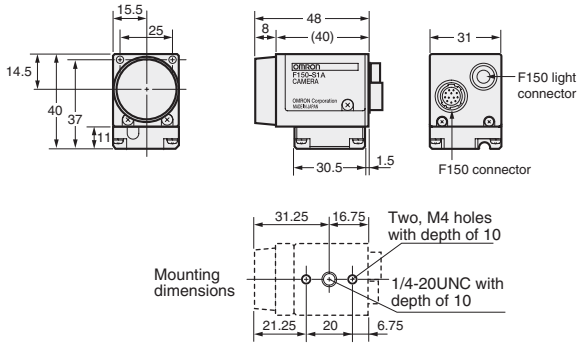
F150-SLC20
(Camera with F150-LTC20 Intelligent Light Source)



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

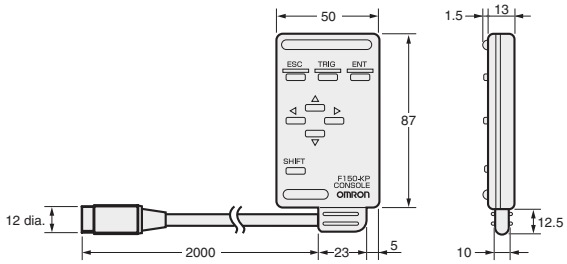


F150-S1A-2D (Camera only)



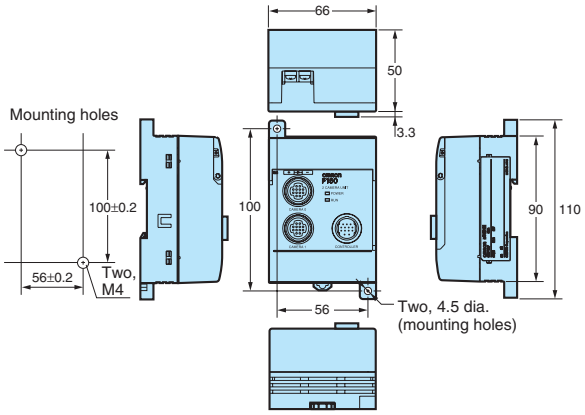
Console

F150-KP-2D



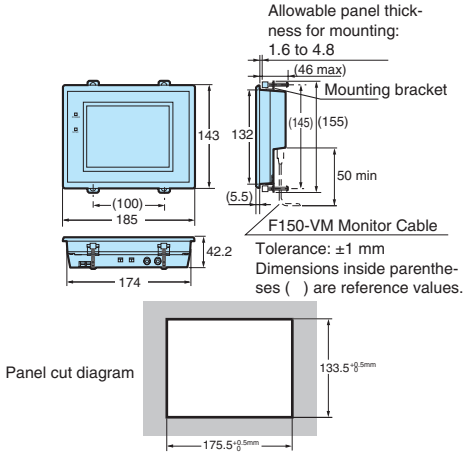
Two-Camera Unit

F150-A20



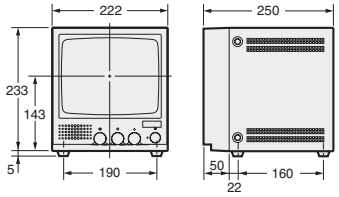
Liquid Crystal Monitor

F150-M05L-2D



Video Monitor

F150-M09-2D



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OMRON

OMRON ELECTRONICS LLC
One Commerce Drive
Schaumburg, IL 60173
847-843-7900
For US technical support or other inquiries:
800-556-6766

OMRON CANADA, INC.
885 Milner Avenue
Toronto, Ontario M1B 5V8
416-286-6465

OMRON ON-LINE
Global - http://www.omron.com
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Cat. No. GC RFID 4 5/03 Specifications subject to change without notice Printed in USA

2-Dimensional Code Reader (Fixed Type)
V530-R160E, EP

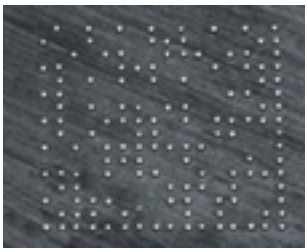
A Code Reader that Handles Pin-Stamped Markings!

Features

Dependably Read Pin-Stamped Markings

- Markings made by pin-stamping machines can be dependably read, providing the user with a wider range of selection of marking devices.
- Stable reading is possible even if the shape of cells changes because of aging in the marking device.

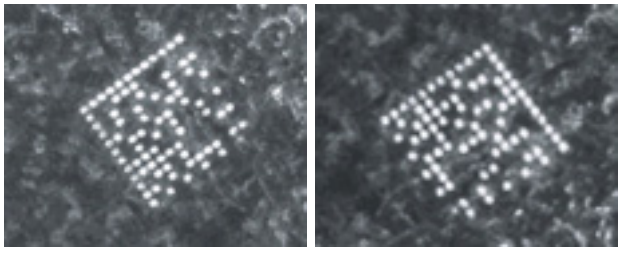
  (Reference: Samples were made using a Vector Co. pin-stamping machine)



Dot Codes* Read at Any Angle: 360° Compatibility

- Codes can be read even with rough backgrounds on the casting surface or other locations.
- Dot codes* can be read at any angle through a 360° range.

  * Dot codes are 2-dimensional codes in which dots form the cells.



Dependably Read Markings at an Angle

With dependable reading at an angle, installation is possible even on existing facilities with space limitations.

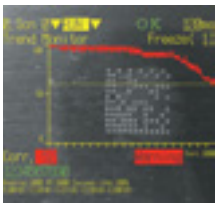
Easy Setup

Setup is easily achieved with a Memory Card (compact flash memory) slot on the V530-R160E and V530-R160EP. Just insert a card to easily copy settings or save images. There is no need to carry a personal computer and cables for process switch-overs.

Easy Operation and Maintenance

Trends can be monitored to achieve the following:

- Displaying changes in the status (correlation values) of codes or contrast changes on line graphs on a monitor.
- Setting alarm levels while monitoring graphs.
- Outputting external alarms if a value falls below the set value.



Trend monitoring can be used to set guidelines for replacing parts in lighting devices, marking devices, and other equipment.

Easy Analysis

Manage Data Histories

Histories of the number of OK and NG reads can be managed.

Save Images to Memory Cards

Save approx. 200 images in 64 MB and 400 images in 128 MB.

Check and Analyze Troubles

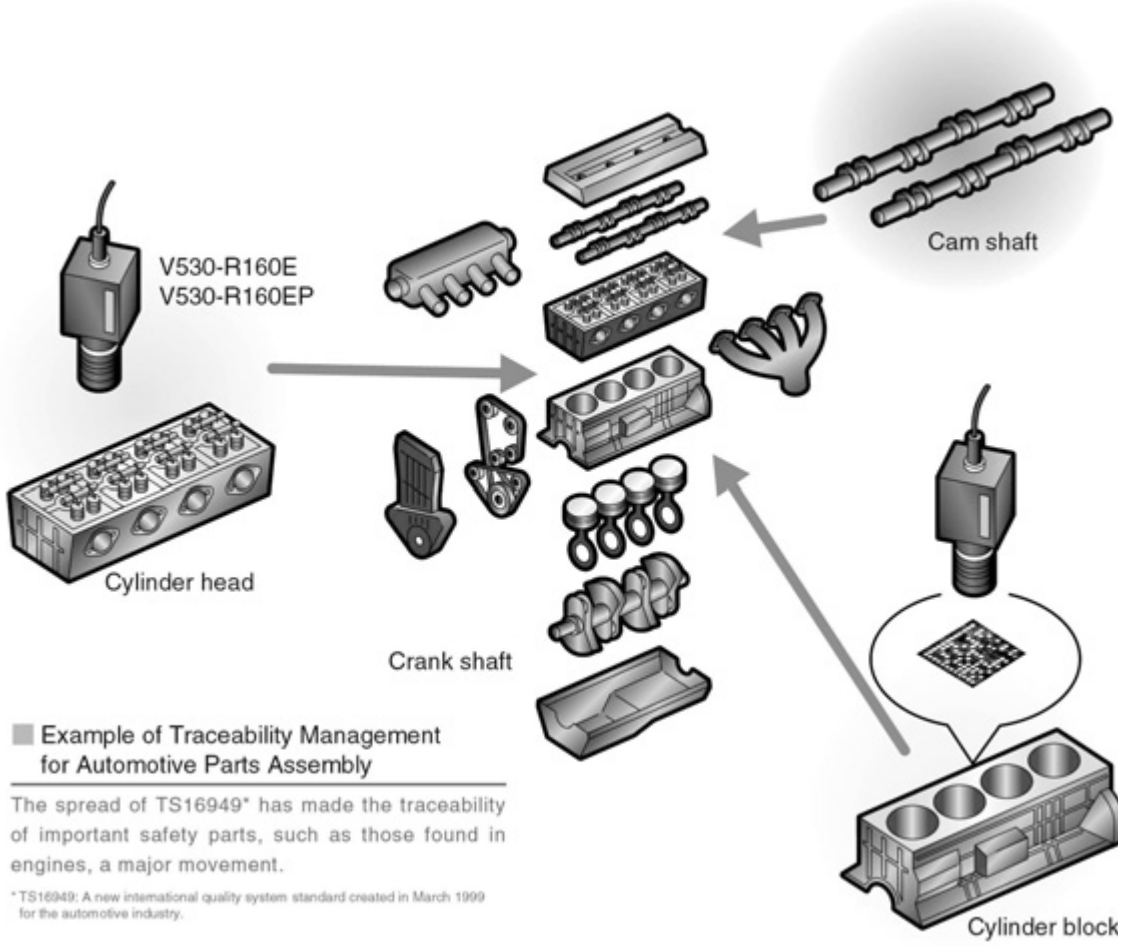
Up to 35 NG images can be saved in internal memory.

Reproduce Images

Saved NG images can be loaded to reproduce a reading.

Using time stamps on NG images with data histories enables more detailed troubleshooting.

Applications



Example of Traceability Management for Automotive Parts Assembly

The spread of TS16949* has made the traceability of important safety parts, such as those found in engines, a major movement.

*TS16949: A new international quality system standard created in March 1999 for the automotive industry.

Ordering Information

■ List of Models

Item	Description	Model
Controller	---	**V530-R160E, V530-R160EP**
Console	2-m cable	**F150-KP-2D 2M**
Camera	---	**F150-S1A-2D**
Camera Cable	3-m cable	**F150-VS-2D 3M**
Monitor Cable	2-m cable	**F150-VM-2D 2M**
Liquid Crystal Monitor	---	**F150-M05L-2D**
Video Monitor	---	**F150-M09-2D**
Parallel Cable	Cable with loose wires for Parallel I/O Connector (2-m cable)	**F160-VP**
Memory Card	Card capacity: 64 MB	**F160-N64S(S)**
	Card capacity: 128 MB	**QM300-N128S**
RS-232C Cable	For IBM PC/AT or compatible computer (2-m cable)	**XW2Z-200S-V**
	For SYSMAC PLC (2-m cable)	**XW2Z-200T**

Specifications

V530-R160E, V530-R160EP Controller

Item	Specifications	
Model	V530-R160E	V530-R160EP
Input/Output type	NPN	PNP
Applicable codes	Data Matrix ECC200: 10 × 10 to 64 × 64, 8 × 18, 8 × 32, 12 × 26, 12 × 36, 16 × 36, 16 × 48 Data Matrix ECC000, ECC050, ECC080, ECC100, ECC140: 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	2 max.	
Image memory function	Maximum of 35 images stored (internal memory in Controller).	
Operation method	Selected from menu.	
Processing method	Gray	
Memory Card slot	1	
Monitor interface	1 channel (color/monochrome)	
Serial communications	RS-232C/422A, 1 channel	
Parallel I/O	5 inputs: TRIG-A, TRIG-B, TRIG-C, TRIG-D, and RESET 6 outputs: RUN, ERROR, OK/NG, BUSY, GATE, and ALARM	
Power supply voltage	20.4 to 26.4 VDC	
Current consumption	Approx. 1.6 A max.	
Ambient temperature	Operating: 0 to 50°C, storage: −25 to 65°C (with no icing or condensation)	
Ambient humidity	35% to 85% (with no condensation)	
Weight	Approx. 570 g	

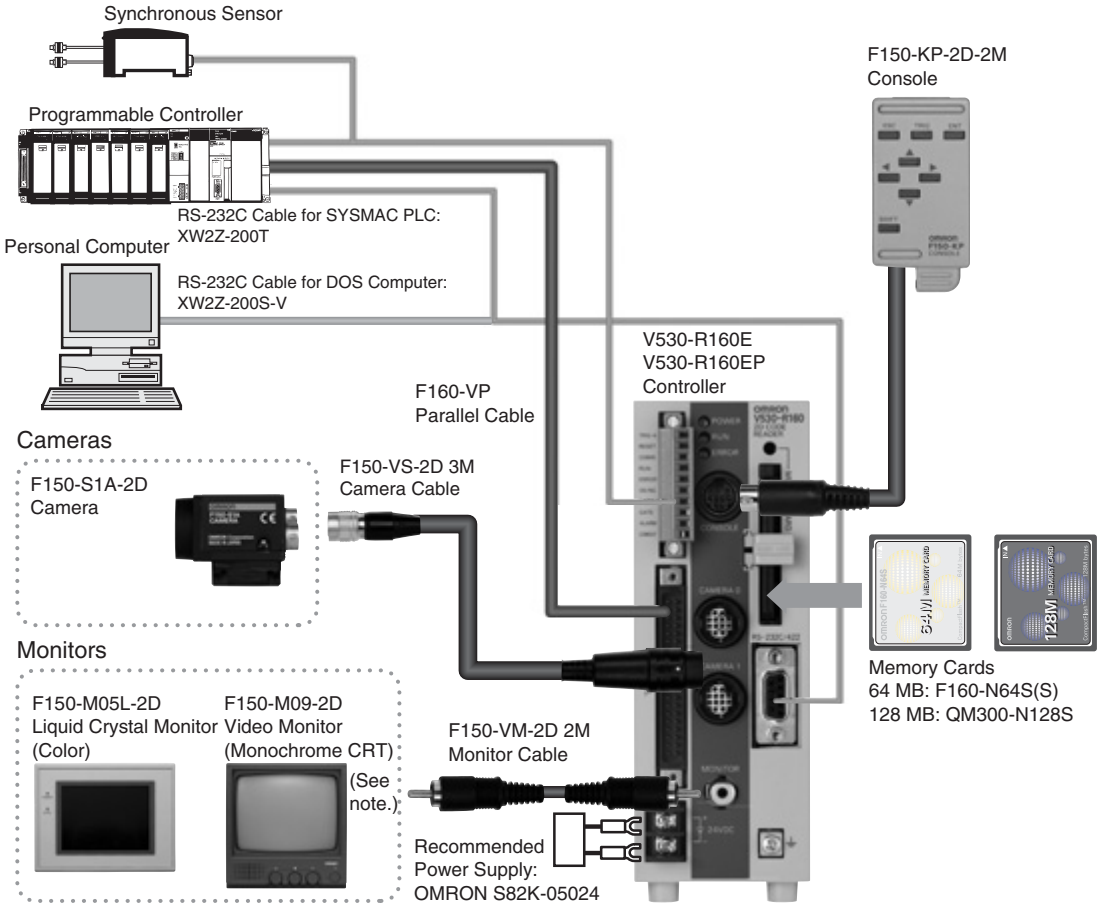
F150-S1A-2D Camera

Item	Specifications
Picture element	1/3-inch CCD
Effective pixels	659 (H) × 494 (V)
Shutter function	Electronic frame shutter Shutter speed: 1/100, 1/500, 1/2000, or 1/10000 s (menu selectable)
Ambient temperature	Operating: 0 to 50°C, storage: −25 to 60°C (with no icing or condensation)
Ambient humidity	35% to 85% (with no condensation)
Weight	Approx. 80 g

Monitor

Item Model No.	Liquid Crystal Monitor F150-M05L-2D	Video Monitor F150-M09-2D
Size	5.5 inches	9 inches
Type	Liquid crystal color TFT	Monochrome CRT
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	85 to 264 VAC
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/Storage: 35% to 85% (with no condensation)	Operating/Storage: 10% to 90% (with no condensation)
Weight (Monitor only)	Approx. 1 kg	Approx. 4.5 kg
Accessories	Operation manual, 4 mounting brackets	Operation manual

System Configuration

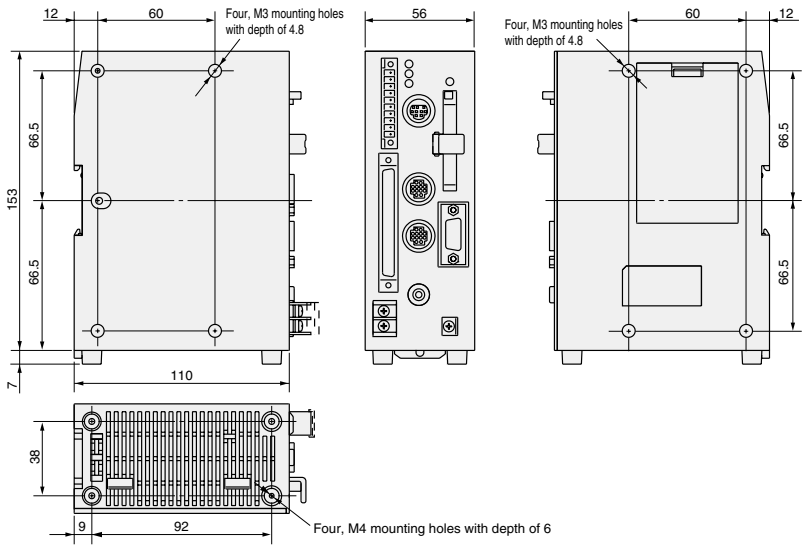


Note: F150-M09-2D does not conform to EC Directives.

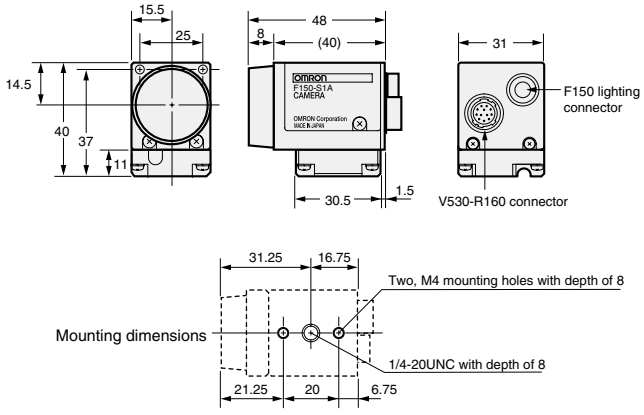
Dimensions

Note: All units are in millimeters unless otherwise indicated.

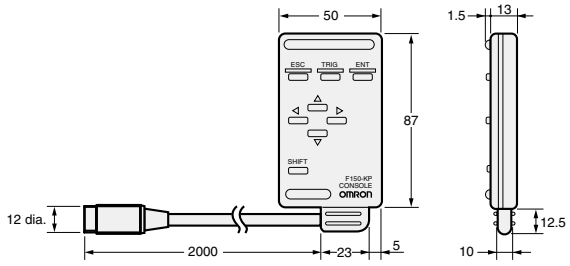
V530-R160E, V530-R160EP Controller



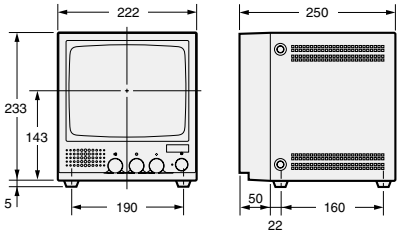
F150-S1A-2D Camera



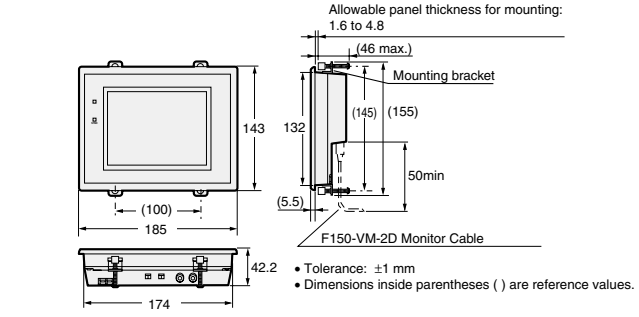
F150-KP-2D-2M Console

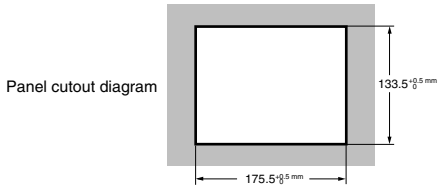


F150-M09-2D Video Monitor



F150-M05L-2D Liquid Crystal Monitor





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One Commerce Drive
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OMRON CANADA, INC.
885 Milner Avenue
Toronto, Ontario M1B 5V8
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Handheld 2-Dimensional Code Reader
V530-H3

Easy Handheld Reading of Directly Marked, Ultra-Small, 2-Dimensional Codes

Features

Reads Directly Marked 2-Dimensional Codes

In addition to 2-dimensional codes printed onto paper, this convenient handheld unit easily reads codes directly marked with a laser marker onto metal, resin, or glass. (See note.)

Note: The ability to read directly marked codes is affected by the marking method and the material which is marked. These factors must be carefully considered before selecting the Handheld 2-Dimensional Code Reader.

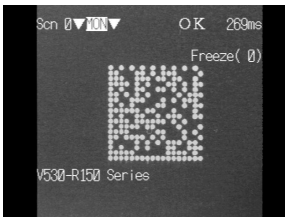
Reads Ultra-Small 2-Dimensional Codes

Ultra-high resolution of 0.05 mm (in the V530-H301 Coaxial Lighting Model) makes it possible to read the ultra-small 2-dimensional codes that are used in many of today's smaller, space-saving products and parts.

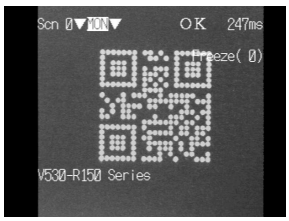
Reads Dot Cell Codes

The Handheld 2-Dimensional Code Reader can also read dot cell codes.

Data Matrix (ECC200)



QR Code



Note: The readable direction is limited for dot cell codes.

Three Models to Suit Target Objects

Three models are available to match the objects to be read, and the marking method.

For reading 2-dimensional codes marked onto polished wafer surfaces, LCD glass, and lenses.

V530-H302

For reading 2-dimensional codes marked onto printed wiring boards, electronic parts, and IC packages.

V530-H303

For reading 2-dimensional codes marked onto LCD glass substrates or color filters.

Lightweight, Compact, Handheld Design

Measuring only 175 mm in length and weighing only 100 g, the Handheld 2-Dimensional Code Reader can be used to control a variety of production information, such as the production number and lot number, on cell lines. Or, it can be used together with the V530-R150E-3/V530-R150EP-3 Fixed 2-Dimensional Code Reader as an ideal combination for automated lines.

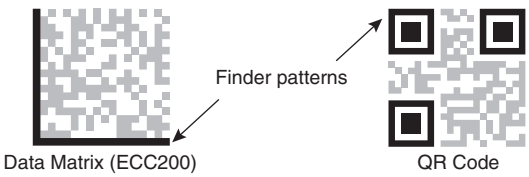
Enables Easy Problem Analysis

Using the Console and Monitor, the 2-dimensional code reading condition can be checked on-the-spot. Up to 24 NG images can also be stored in memory for use in troubleshooting reading problems.

For example, the finder pattern, cell recognition and reading data can be viewed on the Monitor.

Finder Pattern (Cutting Symbol)

The shape of this pattern, which is used to detect the position of the 2-dimensional code, differs for each type of code.

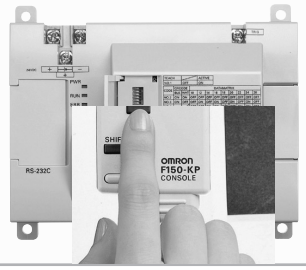


Easy Optimization

Optimal settings can be easily made by setting the DIP switch on the Controller and then reading the target 2-dimensional code. More detailed settings can be made by using the Console and Monitor.

STEP 1

Use the Controller DIP switch to select the matrix size (Data Matrix) or symbol color (QR Code).



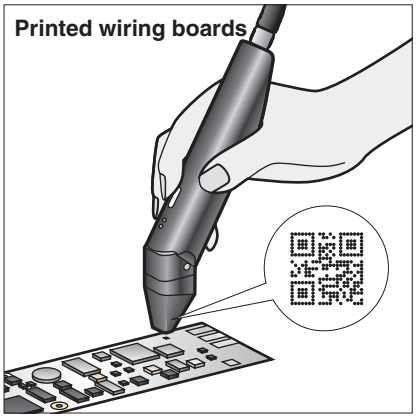
STEP 2

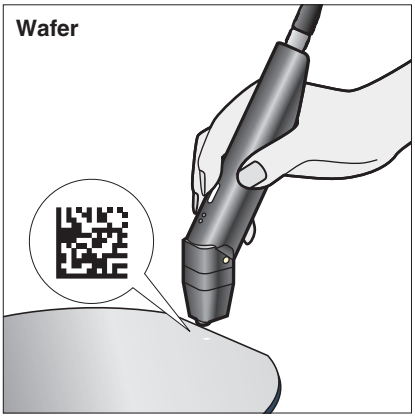
Read the target 2-dimensional code.

STEP 3

When the Reading Complete signal sounds and the green LED illuminates, the setting procedure is finished.

Applications





Ordering Information

■ List of Models

Item		Model
Handheld Reader	Coaxial Lighting Model	**V530-H301**
	Oblique Lighting Model	**V530-H302**
	Back Lighting Model	**V530-H303**
Controller		**V530-C300E**
Handheld Reader Cable (2 m)		**V530-W001**

■ Optional Models

Item	Model
Console	**F150-KP**
Monitor Cable (2 m)	**RCA/BNC video cable**
LCD Monitor	**F150-M05L**

Specifications

■ Handheld 2-Dimensional Code Reader

Item		Model		
		V530-H301	**V530-H302**	**V530-H303**
Performance specifications	**Field of vision**	3 × 3 mm	6 × 6 mm	6 × 6 mm
	Resolution	50 μm	100 μm	100 μm
	Lighting method	Coaxial lighting	Oblique lighting	Back lighting
	Reading method	Touch		
General specifications	**Ambient operating temperature**	0 to 38°C (with no icing or condensation)		
	Ambient operating humidity	35% to 85% (with no condensation)		
	Ambient operating environment	No corrosive gases		
	Storage temperature	–25 to 60°C		
Weight		Approx. 100 g (not including cable)		
Case material		ABS resin (reading section: POM)		

■ Controller

Item		V530-C300E
Performance specifications	**Readable codes**	Data Matrix (ECC200): 10 × 10 to 26 × 26 QR Code (Models 1, 2): Versions 1 to 6 (21 × 21 to 41 × 41)
	Interface	RS-232C
General specifications	**Ambient operating temperature**	0 to 50°C (with no icing or condensation)
	Ambient operating humidity	35% to 85% (with no condensation)
	Ambient operating environment	No corrosive gases
	Storage temperature	−25 to 60°C
	Power supply voltage	24 VDC (+10%, −15%)
	Current consumption	0.5 A
Number of pixels (resolution)		512 (H) × 484 (V)
Number of scenes		2
Image memory function		Maximum of 24 images stored.
Operation method		Menu selectable
Processing method		Gray
Readable direction		360°
Monitor interface		1 channel (over scan monitor)
Weight		Approx. 500 g
Case material		ABS/PC resin

■ Handheld Reader Cable

Item	V530-W001
Ambient operating temperature	0 to 50°C (with no icing or condensation)
Ambient operating humidity	35% to 85% (with no condensation)
Ambient operating environment	No corrosive gases
Storage temperature	−25 to 60°C
Length	2 m
Cover material	Polyvinyl chloride resin

System Configuration

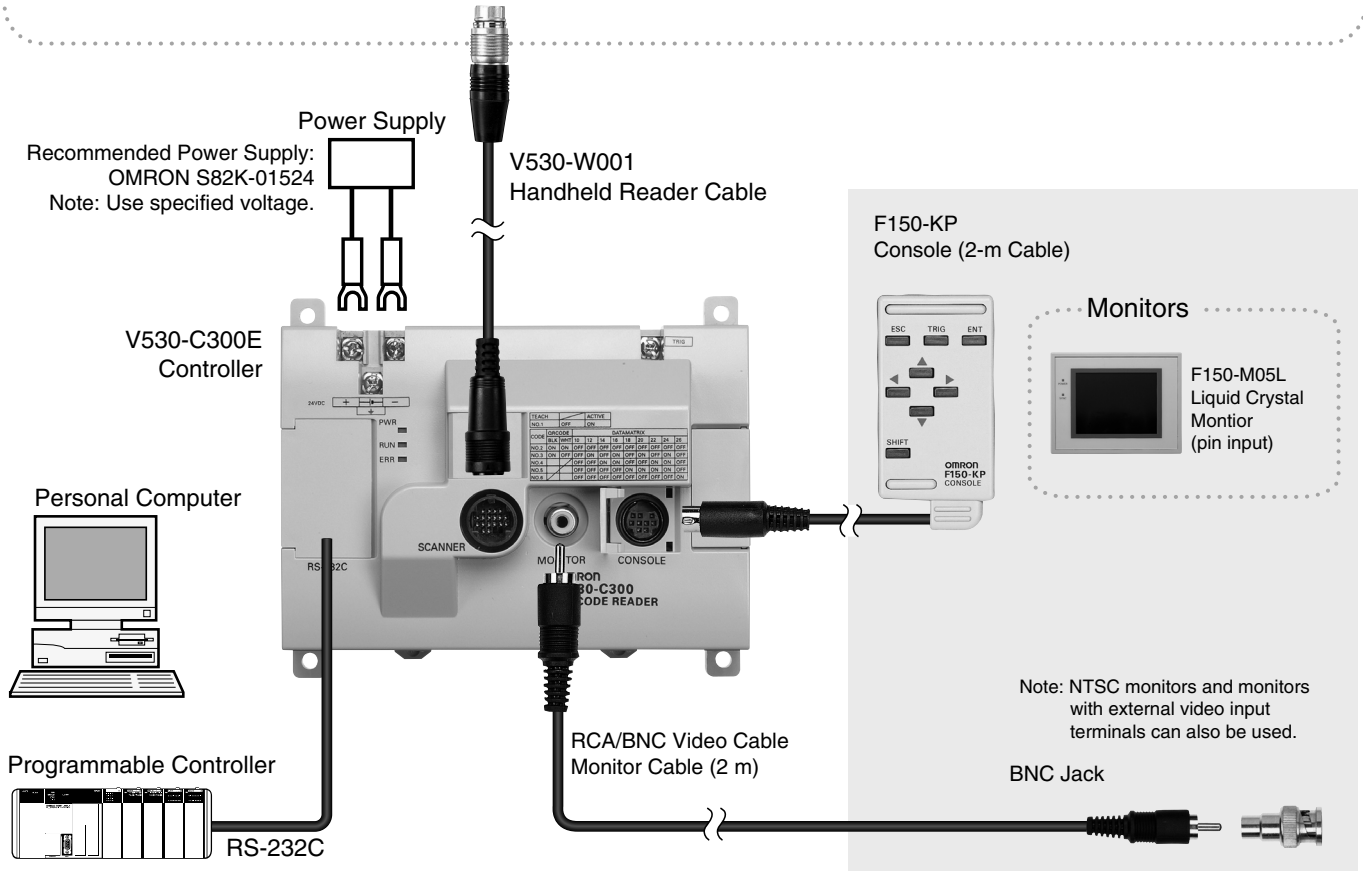
Handheld 2-Dimensional Code Readers

V530-H301

V530-H302

V530-H303

Select the model that best matches the marked material.



The products inside the green box are optional.

Note: The F150-M09-2D does not conform to EC Directives.

Model Selection

Select the Handheld Reader that best matches the marked material.

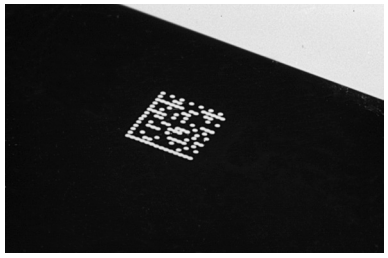
Coaxial Lighting Model V530-H301

For directly marked items with mirror-like surfaces, such as wafers, or LCD glass substrates, stable reading can be achieved with the Coaxial Lighting Model because it detects only regular reflected light.

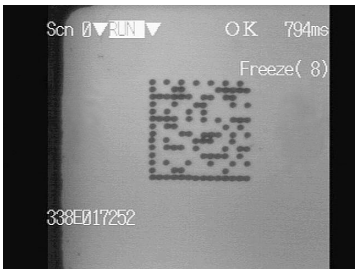
Application Examples

Codes on wafers or LCD glass substrates.

A 2-Dimensional Code on Wafer



Read Image



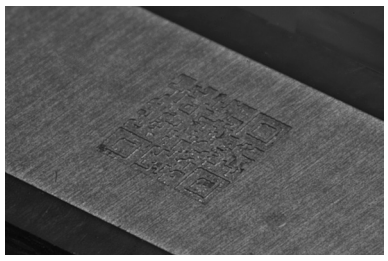
Oblique Lighting Model V530-H302

For laser-marked codes on comparatively glossy surfaces such as printed wiring boards or metal parts, or for codes printed onto highly diffusing surfaces such as paper, stable reading can be achieved with the Oblique Lighting Model.

Application Examples

Labels or directly marked printed wiring boards or electronic parts.

A 2-Dimensional Code on a Printed Wiring Board



Read Image

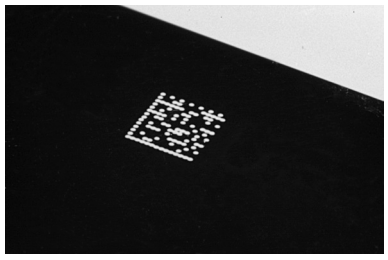
Back Lighting Model V530-H303

For transparent objects such as glass substrates and lenses, a stable, high-contrast image can be obtained by using the Back Lighting Model to detect differences between the transmitted and interrupted light.

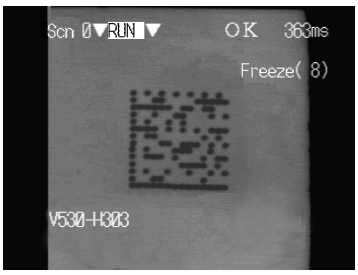
Application Examples

Codes on transparent objects such as glass substrates and lenses.

A 2-Dimensional Code on a Glass Substrate



Read Image

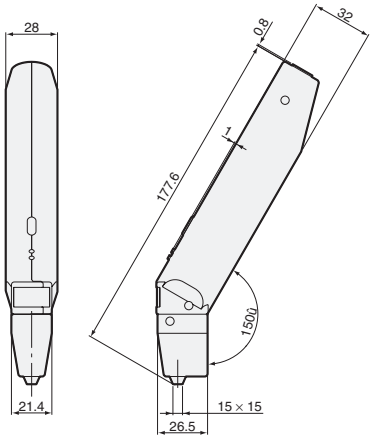


Dimensions

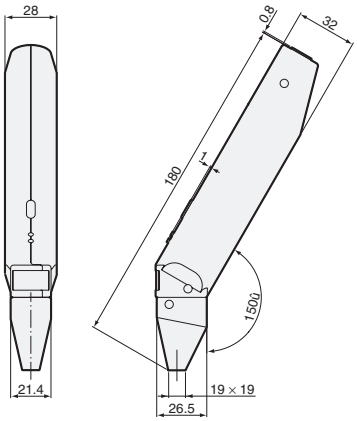
Note: All units are in millimeters unless otherwise indicated.

Handheld 2-Dimensional Code Reader

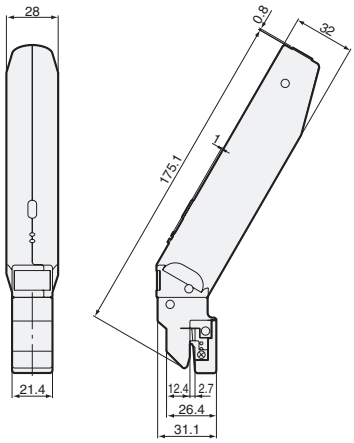
V530-H301



V530-H302

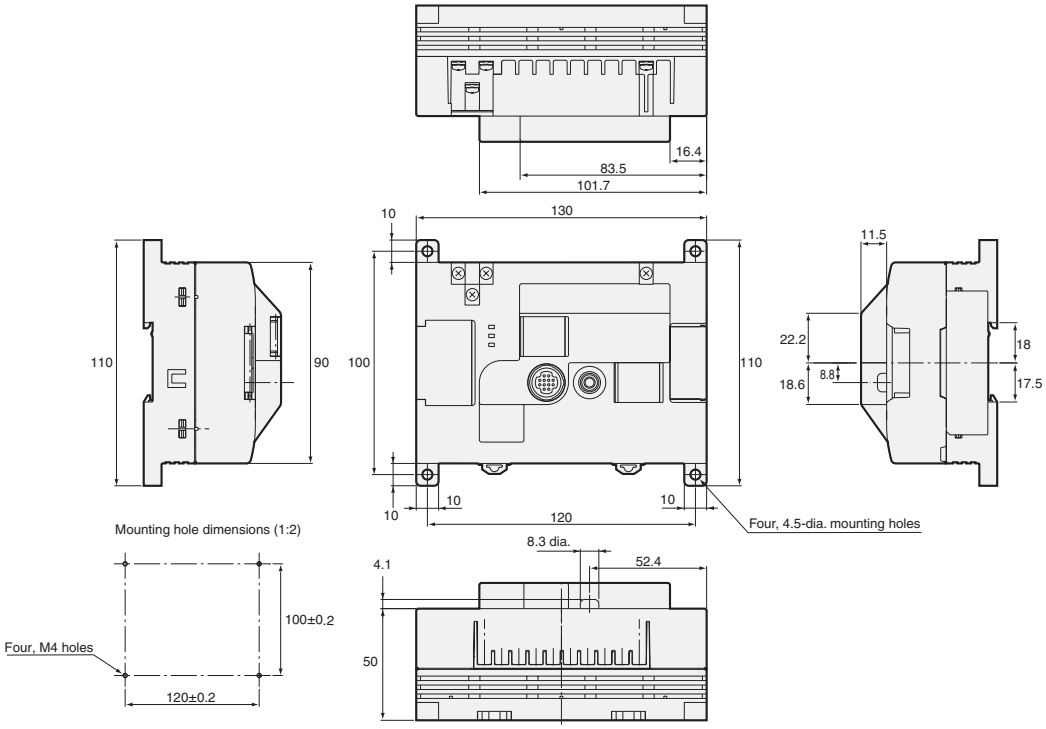


V530-H303



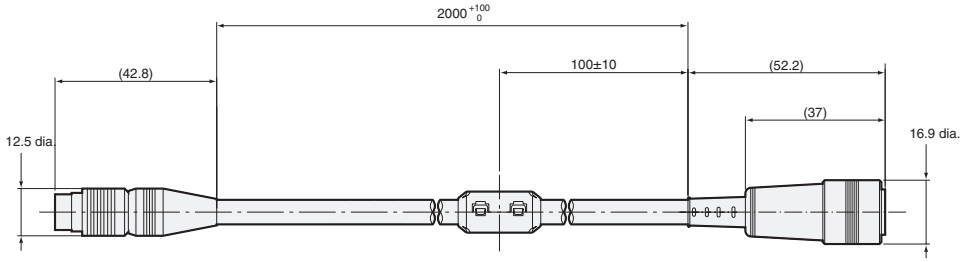
Controller

V530-C300E



Handheld Reader Cable

V530-W001



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

OMRON

OMRON ELECTRONICS LLC
One Commerce Drive
Schaumburg, IL 60173
847-843-7900
For US technical support or other inquiries:
800-556-6766

OMRON CANADA, INC.
885 Milner Avenue
Toronto, Ontario M1B 5V8
416-286-6465

OMRON ON-LINE
Global - http://www.omron.com
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OMRON

Handheld 2-Dimensional Code Reader
V530-LG2 Series

- Reads all common linear and 2-D symbologies
- Omni-directional decoding
- RS-232C or USB interface
- Rugged, lightweight and durable
- Laser-guided targeting for locating desired bar code
- Choice of configurations
  - Cordless, batch
  - Cabled for traditional scanning

Features

The LG2 is truly a revolutionary new bar code reader. Not only does it read all the common 2-dimensional and matrix bar codes, it also provides omni-directional reading of bar codes. The LG2 is great at reading both small, very-high density symbols as well as reading bar codes at extended ranges.

The technology employed to achieve this high performance is superior to most bar code readers. Dual optical paths optimize reading at both near and far distances. 400 mHz, 32 bit microprocessor operation means super-fast decoding and a 1.3 million pixel CMOS sensor assures quality, high density images.

8 MB of non-volatile on-board memory allows the LG2 to store enormous quantities of data.

The LG2 is rugged and built to last. It is designed for rough handling in tough environments and is lightweight enough for use in most industrial applications.

Either an RS-232C or USB interface cable is available. Configured for cordless, batch operation, it can be used like a portable data collector. Scanned bar codes are stored in non-volatile memory for later downloading or transmitting to the host: up to 4,000 reads can be stored from a single battery charge. That's enough memory to store an entire shift's data even in intensive scanning environments.

Ordering Information

■ List of Models

Stock Note: Shaded models are normally stocked.

Item	Model
Core 2D imager head	**V530-LG2CR**
Handle for gun style	**V530-LG2HNDL01**
6 ft. straight cable, USB	**V530-LG2U1S**
8 ft. coiled cable, RS-232C with power supply	**V530-LG2R1C**
Blank battery compartment	**V530-LG2BAT001**
Hands-free metal stand	**V530-LG2STD**
2-day battery charger with power supply	**V530-LG2CCHG01**
Lion Battery, 1300 mA	**V530-BATLION**

Specifications

■ Optical

Item		Description
Field of view		21° horizontal x 15° vertical (approx.)
Optical resolution		1024 x 1280
Bar code density		
	Linear	4.2 mil (0.11 mm) minimum
	2-D	7.5 mil (0.19 mm) minimum
Print contrast (minimum)		
	Linear	25%
	2-D	35% (PDF417)
Pitch		±60°
Skew		±60°
Rotation		±180°

■ Electrical

Item		Description
Voltage		2.5 to 5.5 VDC
Current		
	Operating	140 mA
	Standby	3 mA
	Maximum	310 mA
Interface		RS-232C, USB

■ Environmental

Item		Description
Temperature		
	Operating	0° to 40° C (32° to 104° F)
	Storage	-20° to 60° C (-4° to 140° F)
Humidity		5 to 95% non-condensing
Shock		Withstands multiple drops to concrete of 6.6 feet (2 meters)
Regulatory		FCC class B, CE certified FCC ID: QQ6-CR201
Targeting beam		Class II visible laser diode (630 nm)

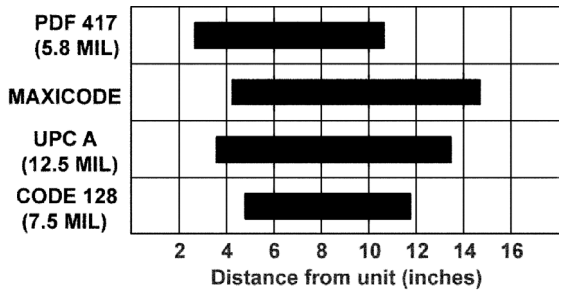
■ Physical

Item		Description
Dimension		109.22 x 45.72 x 129.54 mm (4.3 x 1.8 x 5.1 inches)
Weight		
	Cabled	144 g (5.1 oz)
	Non-cabled	190 g (6.8 oz)
Cable length		USB = 1.8 m (6 ft) RS-232C = 2.4 m (8 ft)

■ Symbologies

Item	Description
2-D bar codes	Maxicode, PDF417, Data Matrix, QR Code, MicroPDF, GoCode, UCC RSS Composite, Aztec Code
Linear bar codes	Code 39, Code 128, UPC/EAN/JAN, I 2 of 5, Codabar (NW7), Code 93, UCC RSS POSTNET, PLANET, Japanese Post, Australia Post

■ Reading Range (typical)



■ Wiring

Name	Pin number	Color
V+	1	Red
TX	2	
RX	3	
NC		
NC		
NC		
NC		
GND	5	Black
NC		
---	Shell	

Note: 5 V power pack supplied with serial cable.

■ Caution

Certain Terms and Conditions of Sale

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3. Discounts. Cash discounts, if any, will apply only on the net amount of invoices sent to Buyer after deducting transportation charges, taxes and duties, and will be allowed only if (i) the invoice is paid according to Seller's payment terms and (ii) Buyer has no past due amounts owing to Seller.
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    d. Delivery and shipping dates are estimates only.
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   (ii) Energy control systems, combustion systems, railroad systems, aviation systems, medical equipment, amusement machines, vehicles, safety equipment, and installations subject to separate industry or government regulations.
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OMRON ELECTRONICS LLC
One Commerce Drive
Schaumburg, IL 60173
847-843-7900
For US technical support or other inquiries:
800-556-6766

OMRON CANADA, INC.
885 Milner Avenue
Toronto, Ontario M1B 5V8
416-286-6465

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Global - http://www.omron.com
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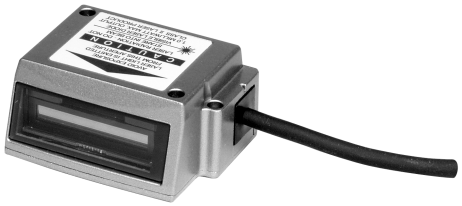
Cat. No. Q14I-E-03 5/04 Specifications subject to change without notice Printed in USA

OMRON

Laser Scanner
V500-LPN5627

- Ultra-small size.
- Fully decoded and programmable.
- Easily integrated into new equipment designs.
- 500 scans per second.
- Raster version also available.



Ordering Information

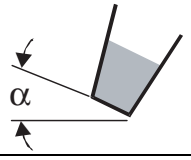
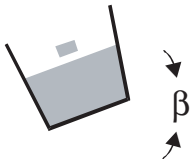
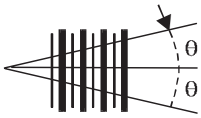
Item	Model
Single line laser for computer	**V500-LPN5627-C**
Single line laser for Omron PLC/touchscreen	**V500-LPN5627-P**
Raster laser for computer	**V500-LPR5627-C**
Raster laser for Omron PLC/touchscreen	**V500-LPR5627-P**

Specifications

■ General Specifications

Item		Description
Scan speed		500 scans/second
Light source		Visible Laser Diode, 650 nm ±10 nm, CDRH Class II
Typical reading distances (measured from front edge of scanner)		Bar Code Density: 0.50 mm (20 mil), Near distance: 2.3 in., Far distance: 10.8 in. Bar Code Density: 0.25 mm (10 mil), Near distance: 2.3 in., Far distance: 7.5 in. Bar Code Density: 0.15 mm (6 mil), Near distance: 3.5 in., Far distance: 4.7 in.
Operating voltage		5 V ±10%
Current (max)		330 mA
Idle current		150 mA
Temperature	**Operating**	0° to 45° C (32° to 113° F)
	Storage	-10° to 60° C (14° to 140° F)
Humidity (RH, non-condensing)	**Operating**	20 to 85%
	Storage	20 to 90%
Regulatory		Certified, ISO9002, CDRH
Dust/water		Designed to meet IP54
Case material		Die cast zinc
Dimensions (LxDxH)		47.4 x 37.2 x 23 mm (1.9 x 1.5 x 0.9 in)
Interfaces supported		RS-232C, Omron PLC/touchscreen

■ General Mechanical Specifications

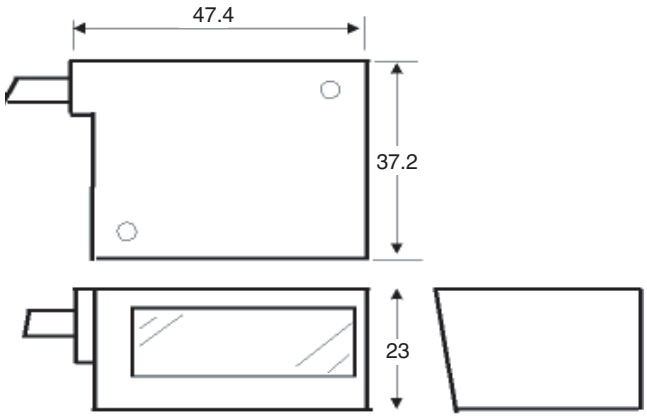
Item	Description
Skew (α) 	±25°
Pitch (β) 	±60°
Tilt (θ) 	±25°

9 Pin Male MiniDIN Connector (Omron PLC/touchscreen)

Pin	Signal	Direction
1	—	—
2	RXD	Input
3	TXD	Output
4	Connected to 5	—
5	Connected to 4	—
6	+5V	Input
7	—	—
8	—	—
9	Signal Ground	—

Dimensions

Unit: mm



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OMRON ELECTRONICS LLC
One Commerce Drive
Schaumburg, IL 60173
847-843-7900
For US technical support or other inquiries:
800-556-6766

OMRON CANADA, INC.
885 Milner Avenue
Toronto, Ontario M1B 5V8
416-286-6465

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Cat. No. Q16BAD1 4/03 Specifications subject to change without notice Printed in USA

OMRON

High Speed CCD Scanner
V520-LHA7127

- 700 scans per second.
- 32-Bit microprocessor operation.
- High performance in an ultra-small package.
- Integrates easily into new equipment.
- 100% solid state design provides performance & reliability.
- Fully programmable.
- RS-232C interface.

Ordering Information

Item	Model
High Speed CCD Scanner for computers	**V520-LHA7127-C**
High Speed CCD Scanner for PLC/touchscreens	**V520-LHA7127-P**

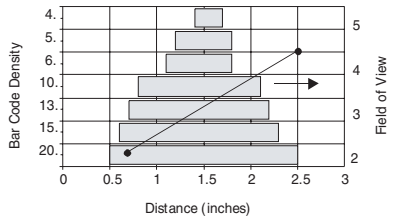
Specifications

■ General Specifications

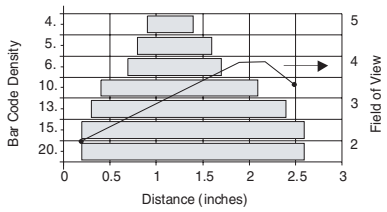
Item		Description
Scan speed		700 scans/second
Decode speed		700 decodes/second
Label speed		Ladder: 1080 ft/min, Fence: 198 ft/min (10.4 mil, UPC-A, PCS=0.9)
Light source		Red LED, λ=660 nm
Image sensor		Linear CCD
Resolution		0.13 mm at PCS 0.9
Min PCS value		0.45
Focal point		Front view: 35.4 mm (1.4 in), Side view: 30.5 mm (1.2 in)
Operating voltage		5 VDC ±10%
Current (max)		Operating: 5 VDC ±5%, Standby: 150 mA, Surge: 3 A max
Operating current		220 mA max/158 mA typical
Temperature	**Operating**	0° to 40° C (32° to 104° F)
	Storage	-10° to 60° C (14° to 140° F)
Humidity (RH, non-condensing)	**Operating**	20 to 80%
	Storage	20 to 90%
Regulatory		CE Certified, ISO9002 certified mfg.
Case material		Steel
Dimensions (LxDxH)		Front: 47 x 55 x 20 mm (1.9 x 2.2 x 0.8 in) Side: 52 x 55 x 20 mm (2.0 x 2.2 x 0.8 in)
Weight		100 g (3.5 oz)
Interfaces supported		RS-232C, Omron PLC/touchscreen

■ Depth of Field

Front View



Side View



PCS=0.9

■ Symbologies

Code 39
Code 93
Code 128
EAN-8 inc. +2, +5
EAN-13 inc. +2, +5
IATA
Industrial 2 of 5
Interleaved 2 of 5
MSI
NW-7
UPC-A inc. +2, +5
UPC-E inc. +2, +5
JAN

■ Pinouts

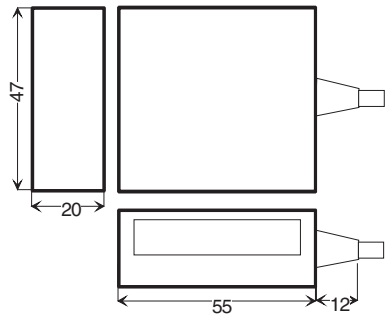
DB9 Male Connector for Omron PLC/touchscreen

Pin	Function
1	—
2	RXD
3	TXD
4	Conncected to 5
5	Connected to 4
6	+5V
7	—
8	—
9	Signal Ground

Dimensions

Unit: mm

Front View



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OMRON CANADA, INC.
885 Milner Avenue
Toronto, Ontario M1B 5V8
416-286-6465

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OMRON

Handheld CCD Scanner
V520-LGP6125

- Significantly improved decode techniques
- Highly ergonomic design and styling
- Lightweight for continuous use
- Low power consumption; ideal for use with portable terminals
- Fast, 200 scans per second
- Outstanding performance

Ordering Information

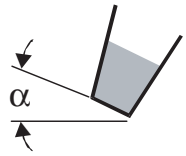
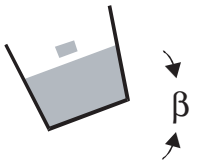
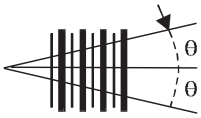
Item	Model
RS-232C Interface	**V520-LGP6125-C**
Omron PLC/Touchscreen	**V520-LGP6125-P**

Specifications

■ General Specifications

Item		Description
Scan speed		200 scans/second
Photo detector		2k element CCD
Light source		Visible LED (λ = 630 nm)
Depth of field		0 to 1.75 in (EAN13, PCS0.9, density 0.33)
Reading width		Up to 3.2 in
Resolution at PCS 0.9		5 mil
Minimum PCS value		0.45
Voltage		5 V $\pm$ 5%
Idle current		30 mA (typical)
Temperature	**Operating**	0° to 40° C (32° to 105° F)
	Storage	-20° to 60° C (-10° to 140° F)
Humidity (non-condensing)	**Operating**	Up to 80% RH
	Storage	Up to 90% RH
Case material		ABS plastic
Dimensions (LxWxH)		152 x 72 x 22 mm (6.0 x 2.8 x 0.9 in)
Weight		90 g (3.2 oz)
Cable length straight	**RS-232C**	2000 mm (6.5 ft)
Connector (std)	**RS-232C**	DB9 female (external power pack needed)
	Omron PLC/ Touchscreen	DB9 male (no power pack needed)
Trigger modes		Manual/RS-232C
Interfaces supported		RS-232C, Omron PLC/Touchscreen
Configuration		Over 300 programmable parameters

■ General Mechanical Specifications

Item	Description
Performance parameters	x = 13 mils @ 0.9 PCS, contact, flat surface
Skew (α) 	α_1 = 10º max (forward) α_2 = 30º max (reverse) β = 0º θ = 0º
Pitch (β) 	α = 0º β = ±10º max θ = 0º
Rotation (θ) 	α = 0º β = 0º θ = ±10º max

■ Symbologies

WPC: EAN (EAN 13, EAN 8), UPC (UPC-A, UPC-E), Code 39, Codabar, Standard 2 of 5, Code 128, Code 93

MSI: Plessey, Industrial 2 of 5, Interleaved 2 of 5, ISBN, ISSN Matrix 2 of 5, IATA, Trioptics, Italian Pharmaceutical

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OMRON ELECTRONICS LLC
One Commerce Drive
Schaumburg, IL 60173
847-843-7900
For US technical support or other inquiries:
800-556-6766

OMRON CANADA, INC.
885 Milner Avenue
Toronto, Ontario M1B 5V8
416-286-6465

OMRON ON-LINE
Global - http://www.omron.com
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