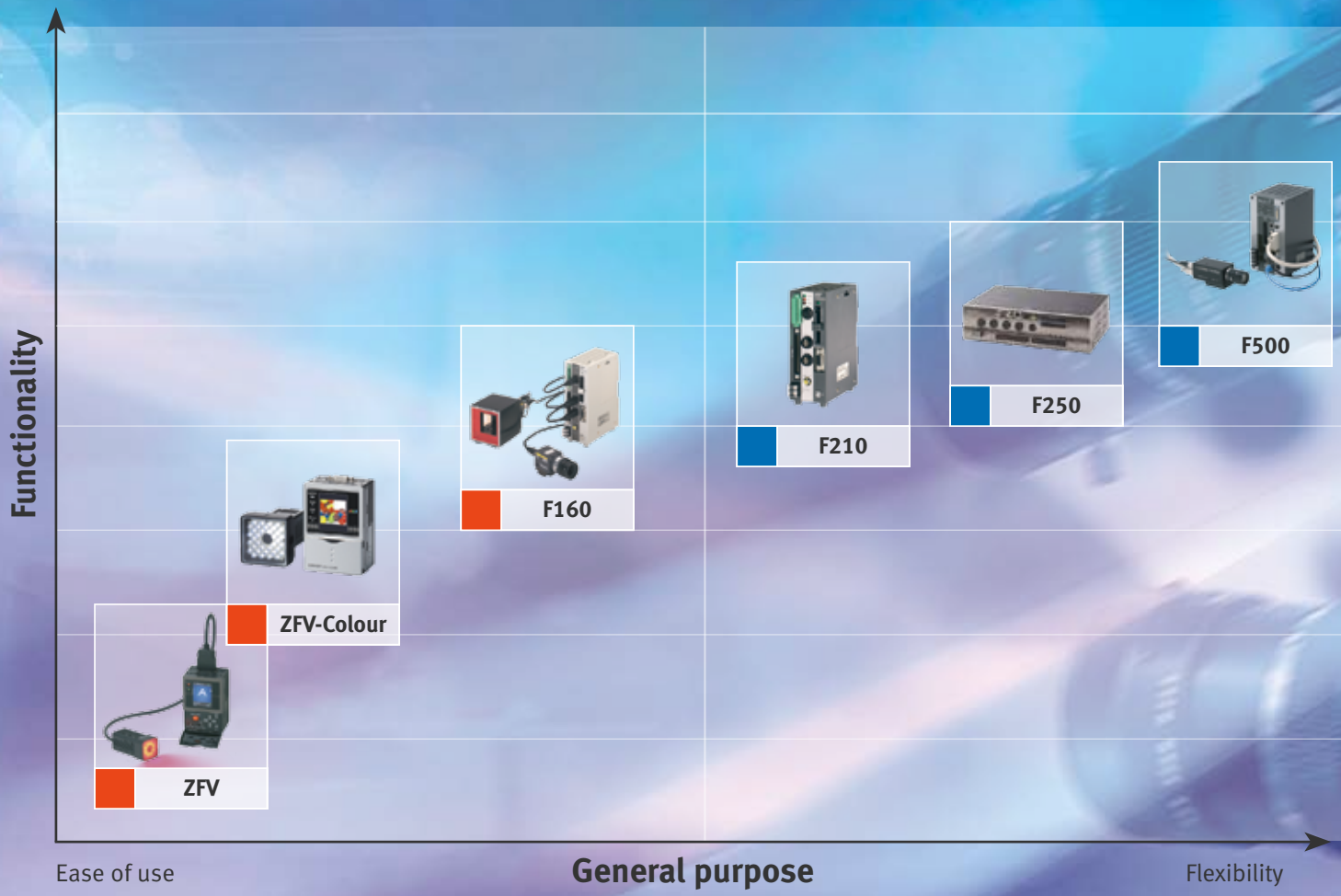
Vision systems

The eyes of your process

Smart vision sensor ZFV
Intelligent sensor F160
Mid-range vision system F210
High speed vision system F250
Network-ready vision systems F500 & F210ETN
2D code reader V400
2D code reader V530-R160

Advanced Industrial Automation

OMRON



Vision systems – The eyes of your process

INSPECTION SYSTEMS AND SOLUTIONS FOR ANY MANUFACTURING PROCESS

To provide the simplest and most cost effective image analysis, Omron is constantly reviewing the requirements of its conventional image sensors and image-processing sensors. Today Omron can offer sensor solutions tailored for process engineering with an emphasis on low investment costs and simple installation and start-up.

The new ZFV smart vision sensor, for example, offers a complete, scalable vision system in a sensor format with intuitive and quick set-up through an integrated LCD monitor. Optics and illumination are integrated in a single package.

The F- and V-series vision products offer varying degrees of intelligence to allow the most suitable solution to be selected for the application. Completing this range is the F500, a high-end, network-ready, high-resolution vision engine. These systems can be configured via an integrated graphical user interface, or, new for the

V400

V530-R160

Application specific

- Vision Sensor Family – Ease of use
- Vision System Family – Flexibility
- 2D code readers

F500/F210ETN, using an optional PC-based remote configuration and maintenance software via Ethernet. And because an inspection solution consists of more than a vision system, Omron offers a broad range of peripherals and engineering support: a variety of lighting systems, lenses and support in system design, installation, training and maintenance.

For more details please contact your Omron representative. (See back of brochure for address details).

THE SMART, SCALABLE VISION SENSOR ZFV

Easy Vision, Teach & Go – In colour and monochrome

Omron's new ZFV smart vision sensor is an image-processing system in a sensor format. It consists of two separate components, a camera head with an integrated light source and a processing unit.

Parameter settings and lighting control are available at the touch of a button. A "smart" user interface allows parameter setting using a few buttons and the built-in colour LCD monitor. During operation, the display gives direct feedback showing results and images in real time. There's no need to connect an external device for set-up and operation viewing. It's built in – there when you need it.

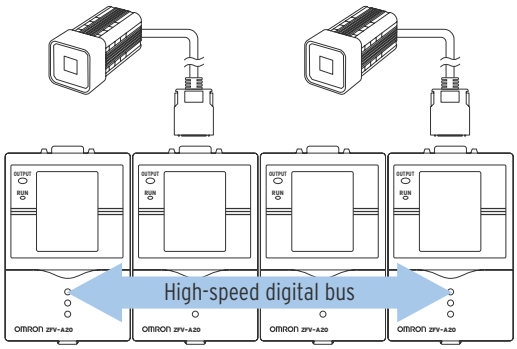
If one controller is not enough to solve your application, you can add more by connecting them side-by-side to expand the functionality. Up to 5 controllers with or without cameras can be connected together to perform multiple inspections on your workpiece.

The ZFV comes in a gray scale or colour version. In terms of inspection functionality, both offer similar features – but as the ZFV colour acquires a colour image, it uses this colour information as a "virtual 3rd dimension" – giving additional security and stability to your application.

Depending on the controller model, you can choose between up to 8 inspection tools and a range of sensor heads up to 150mm field of view.

Features ZFV family

- Smart user interface with build-in LCD
- Scalable concept
- Colour and monochrome version
- Up to 8 inspection tools (depending on version)
- 5 to 150 mm field of view (adjustable)
- 8 digital I/O for handshake, feedback and external teach
- USB port, remote configuration software (Colour only)
- Cycle time down to 4ms



▲ Need to add an inspection to your application? Scale it! Just connect up to five controllers/ cameras together.

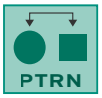
▲ Verifying the printed article information in a high-speed packaging line.

▼ Depending on your controller version, up to 8 inspection tools are built in. In the ZFV Colour, all tools include colour filter or functionality.

▲ The built-in LCD monitor allows easy set-up and instant information about your inspection status. It's smart!

Hue

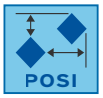
Area



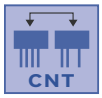
Pattern/ Search

Brightness/ defect

Character



Position



Edge count

Width

INTELLIGENT SENSOR WITH HIGH-SPEED IMAGE ACQUISITION AND PROCESSING

F160 – Including OCR/OCV detection

The intelligent sensor F160 offers all the features of the F150, including quick start-up, simple operation via a graphical interface and an excellent price/value ratio. The main difference is that both image capture and algorithm processing are accelerated many times. New algorithms include Omron's Quest OCR/OCV with built-in font libraries, Variable Box technology for self-adjusting measurement areas and a Flexible Search to find the same object even with slight variations. The F160 also allows user-customized menus in any language, and the setting of results screen information and symbol and text colours. Naturally, intelligent illumination can be used here as well.

Features F160

- Two camera connections
- High-speed image acquisition (8 ms per image min.)
- Accelerated processing algorithms for all inspection tools
- Optical character recognition/verification tool
- Configurable user interface and monitor output
- Password protection
- Compact flash slot for storage of data and images
- Internal storage of 32 configurations in non-volatile memory; more than 1000 using compact flash card
- Communication via RS232 and 35 digital I/Os

▼ In a high-speed bottling machine, the F160 checks that the bottles are rinsed properly before they are filled.

▲ The F160 checks an expiry date which is printed as a dot-matrix. Despite the high processing speed, automatic position correction ensures the box is in the correct position for reading the image. The bottom of the box is identified by stamping that is aligned by real-time correction.

HIGH-END SOFTWARE FUNCTIONALITY INCLUDING EDGE CODE AND MACRO PROGRAMMING

F210 – Compact hardware, high-end software

The F210 general-purpose vision system is designed for a wide range of quality inspection applications in automated production processes. It contains powerful algorithms that ensure the inspection performance is fast and ultra-precise. These algorithms include Edge Code technology, Fine Matching tool and QUEST OCR/OCV. A trend-monitoring feature is also available for inspection analysis.

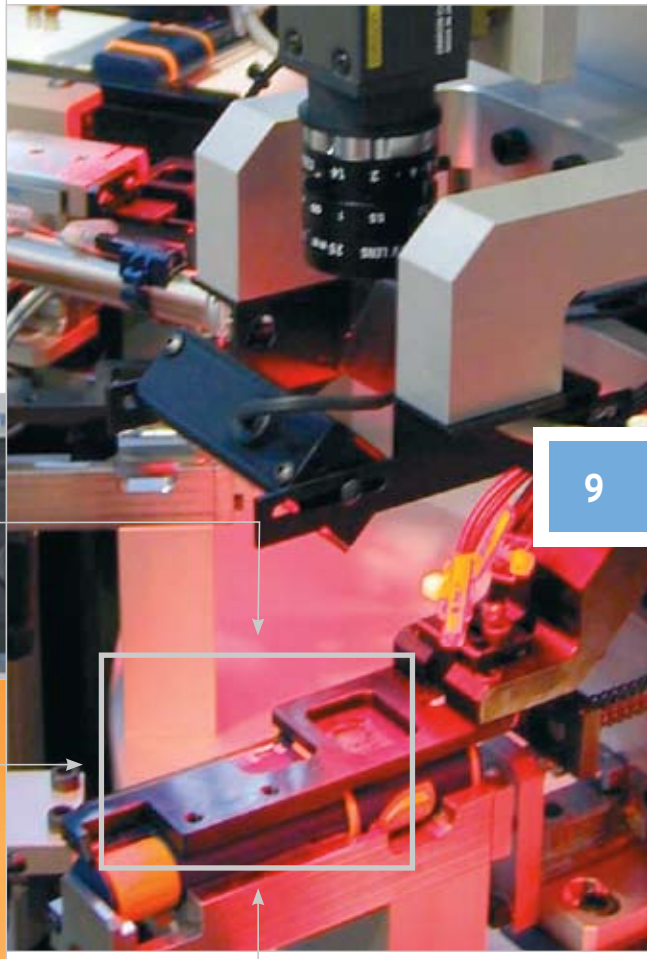
The F210's flow-menu configuration software enables standard inspection tasks to be easily configured via the user-friendly GUI. In addition, a Macro Functions software option is available for OEMs and system integrators who wish to create their own application-specific vision systems. Customized operation flows can also be created in which nearly every system function can be accessed and manipulated.

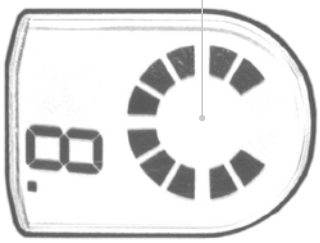
Features F210

- Enhanced flexibility of inspection process using branching and conditional operations
- Macro function programming option for customizing system operation
- Edge Code (EC) technology for high-precision inspections
- Fine Matching tool-for-print quality inspection
- High-speed Optical Character Recognition/ Verification tool
- Two camera connections
- Trend monitor for analysis of inspection process
- Compact flash slot for data and image storage
- 35 digital I/Os, RS-232C

▶ Verification of lot code using Quest OCV function.

▲ Final inspection of an insulin dosing unit.





▲ Vision system inspects function/quality of LCD display.

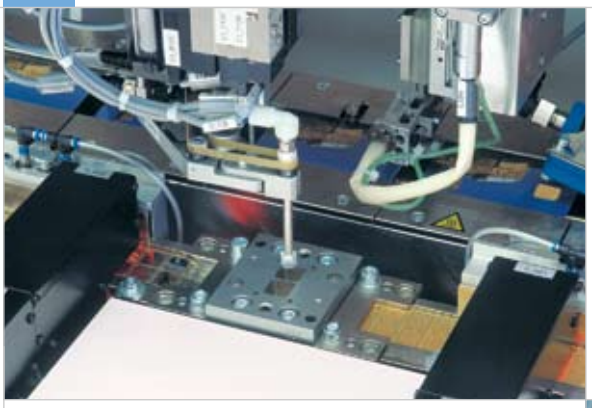
HIGH-END VISION SYSTEM WITH NEW EDGE CODE TECHNOLOGY FOR 50X RESOLUTION

F250 – Speed, flexibility, accuracy

The F250 image processing system is characterized by fast processing and simple operation. New algorithms include Omron's Edge Code Position and Defect Detection algorithms which use edges in the image for ultra-precise detection, the Fine Matching algorithm for detecting minute defects or deviations on labels and graphics, and the Quest OCR/OCV algorithm for advanced character detection and automatic lot/date code verification. The on-screen, pull-down menu uses an easy-to-understand, flow chart style set-up menu for maximum flexibility. An on-line trending function with definable limits and alarms for outputs can be used for production quality tracking. Thanks to its new fast hardware base that supports double-speed cameras, position compensation is performed in real time through translation. A Macro Functions software option is available for OEMs and system integrators who wish to create their own application-specific vision systems. Customized operation flows can also be created in which nearly every system function can be accessed and manipulated. With an Ethernet interface, the F250 can communicate with almost every company computer system.

Features F250

- Hardware accelerated inspection tools for extreme speed applications
- Real-time object location tools for position compensation or guidance tasks
- Enhanced flexibility of inspection process using branching and conditional operations
- Macro function programming option for customizing system operation
- Edge Code (EC) technology for high-precision inspections
- Fine matching tool-for-print quality inspection
- High-speed Optical Character Recognition/Verification tool
- Four camera connections
- Trend monitor for analysis of inspection process
- Two compact flash slots for data and image storage
- 67 digital I/Os, RS232
- Ethernet interface



◀ Chip-card manufacture: high-precision position monitoring of the chips before the stamping process with the F250 image processing system.

▶ A thermal printer prints variable durability dates and batch numbers onto the labels of a pharmaceutical product. The F250 intelligent sensor then examines these dates. The test station can be speedily and easily set up for other label formats.

FOR ULTIMATE VISION POWER – HIGH RESOLUTION, NETWORK-READY VISION SYSTEM

F500 & F210ETN – High-end tools, access, view and edit data via network

The F500/F210ETN are Omrons first network ready vision systems. Both feature a Ethernet port on board. High speed information transfer of Images, inspection data, up and download of parameters to and from anywhere in the customer's network will be no problem at all. To allow the documentation or later audits of your inspection results, the system provides tools for logging images and results for later analysis.

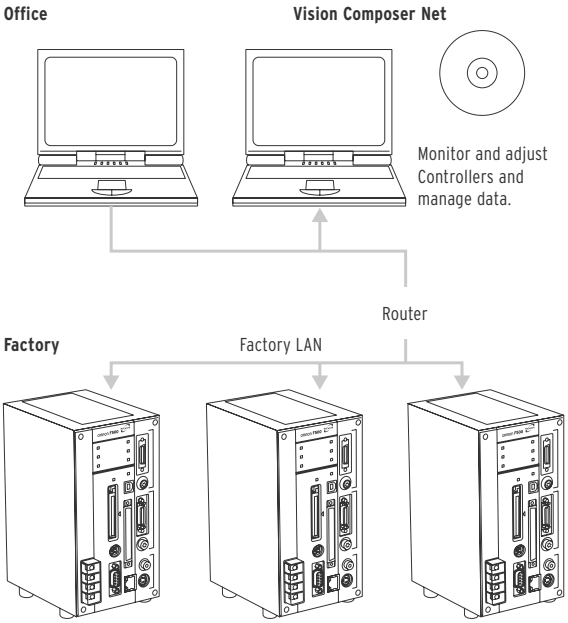
Both systems can handle two digital cameras, with the F500 even high resolution (1k x 1k), making it the perfect solution for applications where high precision is required. Like all of Omron's vision systems, the systems feature the well-known, straightforward, easy-to-use Graphical User Interface (GUI) that simplifies the system's set-up and configuration.

Omron is also introducing the optional PC-based configuration software "Vision Composer NET". Using the high-speed Ethernet connection, the user can configure and maintain a single or a network of vision systems from a central PC platform.

Advanced inspection algorithms ensure that the inspection process is fast and ultra precise. These algorithms include the unique QUEST Optical Character Recognition (OCR) tool, and the Edge Code (EC) detection tool for very precise object location.

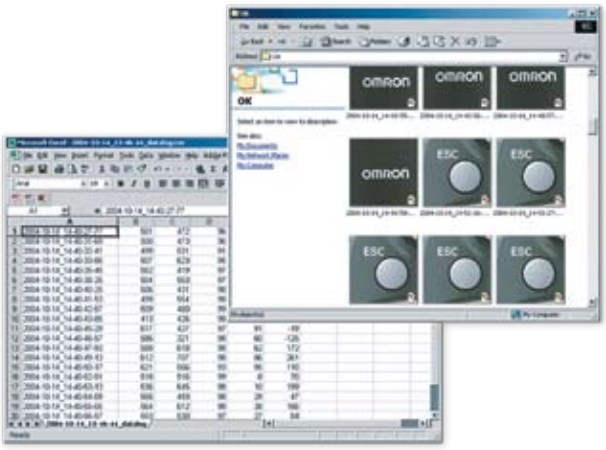
Features F500/F210ETN

- Two digital (camera link) camera ports. F500ETN: High resolution (1k x 1k)
- 10/100 Base TX Ethernet Port
- Other communication ports: USB, RS232/422, 33 digital I/O
- Built-in, easy to use GUI
- Optional Vision Composer NET GUI
- Advanced data logging and storage functions
- Advanced inspection tools, like EC tools for high-precision inspection
- Fine matching for print-quality inspection



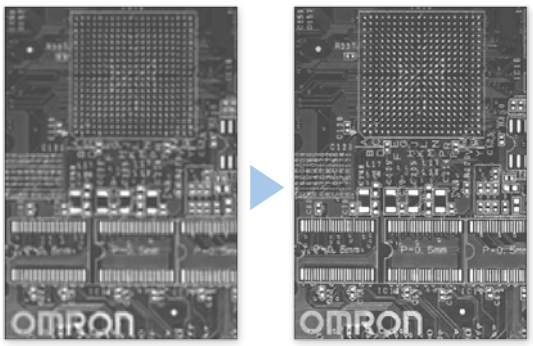
▲ Vision Composer NET allows the setup and maintenance of you vision network.

▼ Configuration and live view of your vision sensor network.



▲ Logging of accurately time stamped images and inspection results.

▼ A dramatically increased resolution and the image quality improvement resulting from the digital image transfer enables the inspection of object with fine details.



250.000 pixels (previous systems)

1 million pixels

EASY TARGETING – HANDHELD 2D CODE READER WITH BUILD IN SCREEN

V400 – Reliable reading of direct print marked codes

The V400-H is a handheld 2D code reader designed for reliable reading and comfortable use. The build in LCD screen does not only show a live image of your object for easy targeting, it also provides instant feedback of the decoded information.

Together with its advanced algorithms a variable light source automatically selects the best lighting method and direction for your object surface and code type.

This enables the reader to decode highly degraded, direct marked codes on a large variety of surfaces, like metal, glass, plastic, etc.

Data can be recorded onto a SD memory card for later evaluation or directly communicated via its build in serial interface. An adjustable zoom lever allows optimum adoption to the code size.

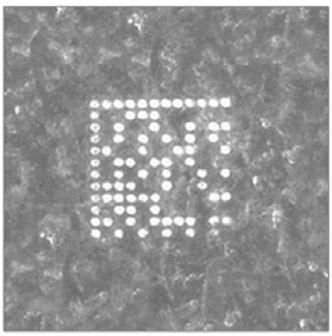
Features V400

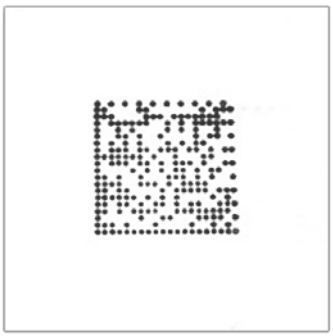
- Customisable display for easy targeting and viewing
- Reads direct marked 2D and QR codes in all orientations
- Auto selection of light to match object
- Built in SD card slot for data logging
- RS232 for data transfer to external devices
- Field of view 5 x 5 to 30 x 30 mm, adjustable
- Rugged IP65, ergonomic housing

▼ The build in LCD monitor can be used for targeting and result display.

▶ Protected SD card slot for data logging.

▼ Reads dot peened codes on shiny or inhomogeneous metal surfaces.





▲ In the automotive industry, data matrix codes are used in final assembly for unique identification of the vehicles. This coding procedure is much simpler to handle than the RFID transponder systems used previously. It is cheaper and means that codes can be read from a greater distance (up to 2 metres).

RELIABLE READING OF DIRECT MARKED 2D CODES IN PARTS TRACKING APPLICATIONS

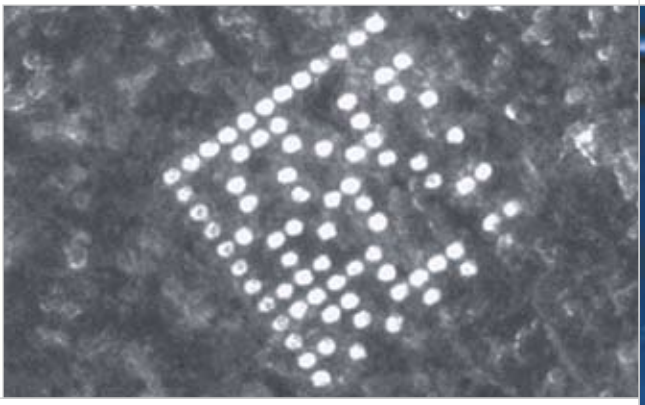
V530-R160 – Fixed type reader solution for highly degraded codes

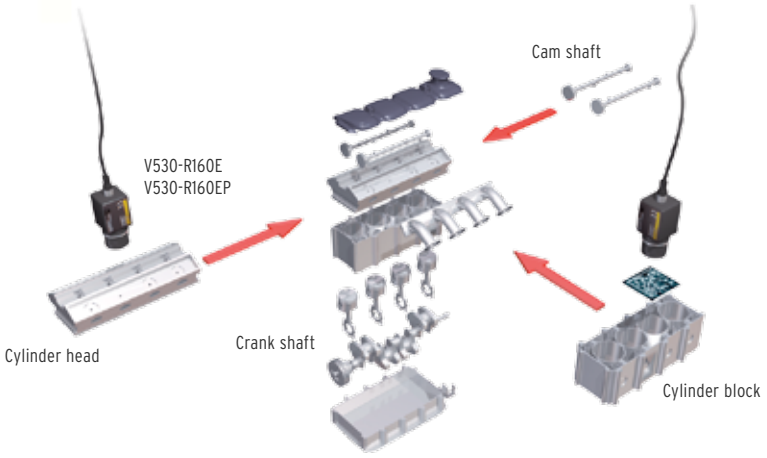
The V530-R160 2D-code reader is designed especially for reading direct marked codes on surfaces like metal, plastic and glass. Its newly developed advanced algorithms allow reliable reading of codes made from dot peened, laser edged or ink jet. The print quality of these marking methods is usually anything but perfect; a reader often has to cope with highly degraded, damaged codes in any orientation. The V530-R160 2D-code reader meets these challenges in a cost-effective way. It also provides feedback for quality analysis like trend monitoring, statistics functions and image storage functions. In addition, set-up is easy, using the well-known graphical user interface of the F-Series vision systems.

Features V530-R160

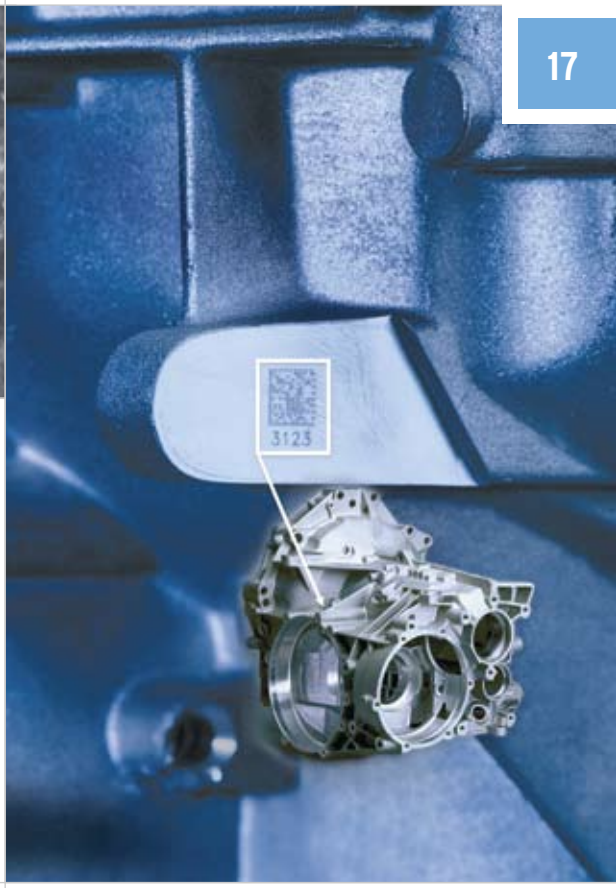
- Two camera connections
- High-speed image acquisition (8 ms per image min.)
- Reads direct marked Data Matrix and QR code
- Can read codes in all directions (360°)
- Trend monitoring, statistics functions for quality feedback
- Internal image storage of 35 images
- Compact flash slot for storage of data and images (app. 400 images max. per card)
- Internal storage of configurations in non-volatile memory, storage of more than 1,000 configurations using compact flash card
- Communication via RS232/422 and 11 digital I/Os

▼ Codes in any orientation and even on non-uniform backgrounds can be decoded.





▲ Read information directly marked onto objects as 2-dimensional codes. Traceability management of key parts is now possible with direct marking and reading even for small parts.



▲ Data Matrix code directly applied to a gearbox.

THE KEY TO SUCCESS IN VISION APPLICATIONS

The right illumination

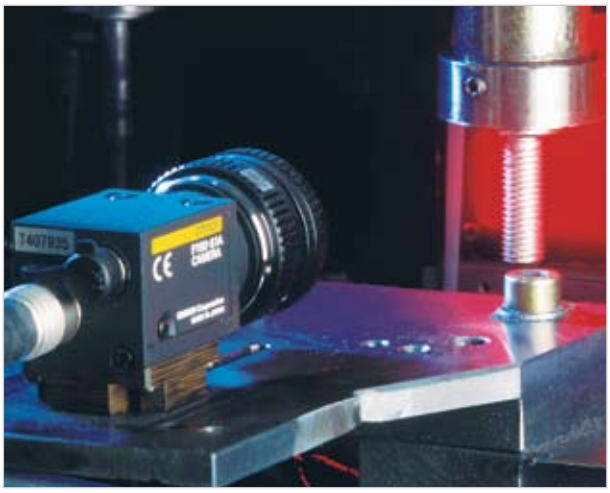
It can be a great challenge for you, as the end-user, to select the right components and create an inspection system that meets all your requirements. Omron supports customers in selecting the appropriate light source and delivers a tightly integrated inspection system. We know that there is no universal illumination system that's applicable to every vision application. That's why we offer a variety of lighting systems to meet the needs of all customers and applications.

COMPLETE OVERVIEW OF VISION SYSTEMS

	VISION SENSORS		
			
Type	**ZFV**	**ZFV Colour**	**F160**
No of tools	2 or 7 depending on controller type	8, colour	App. 50 processing tools
No of cameras	1 digital	1 digital, colour	2 progressive scan high speed
No of scenes/banks	8, expandable using DSU		32
No of tools/scene	1, scalable		32, expandable using CF card
Interface	8 digital I/O	8 digital I/O, USB/RS232	RS232, 35 digital I/O
Network	n/a		

Maximize lighting control

With an intelligent light source camera, and an appropriate light source, the F-series controller menus take all the guesswork out of proper lighting. Operators can control the illuminated area and light intensity from the controller menus. The settings are easily changed without direct adjustment of the light source. Lighting positioning is stored with other scene data so operators can change the lighting conditions to match different operating environments. Because the settings are stored as numeric data, it is possible to recreate the lighting conditions from machine to machine.



Perfect engineering and service

Besides the pure product-specific characteristics of an image-processing sensor system, service and support play a vital role. Our image processing specialists fully support you in specifying your application and will suggest suitable solutions for your project, including the optimal lighting and the integration of the system in your production process either locally or worldwide. Together with competent system partners, we are able to deliver complete turnkey solutions. Workshops and product and application-specific training are just a normal part of the complete service package that we can offer.

VISION SYSTEMS		
		
F210	**F250**	**F500/F210ETN**
App. 70 processing tools	App. 70 processing tools	App. 80 processing tools
2 progressive scan high speed	4 progressive scan high speed	2 digital camera link, F210ETN standard, F500 high resolution
32, expandable using CF card		
Limited only by memory/depending on tool		
RS232, 35 digital I/O	RS232, 67 digital I/O	USB, RS232, 33 digital I/O
n/a	Ethernet 10Base/T	Ethernet 10/100 Base T/TX, Vision Composer Net software

	2D CODE READERS	
		
Type	**V400-H Handheld**	**R160 Fixed station**
DPM capability*	Yes	
Codes	Data matrix, QR code	
No of cameras	n/a	2
Interface	RS232	11 digital I/O, RS232

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- Inspiring applications
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