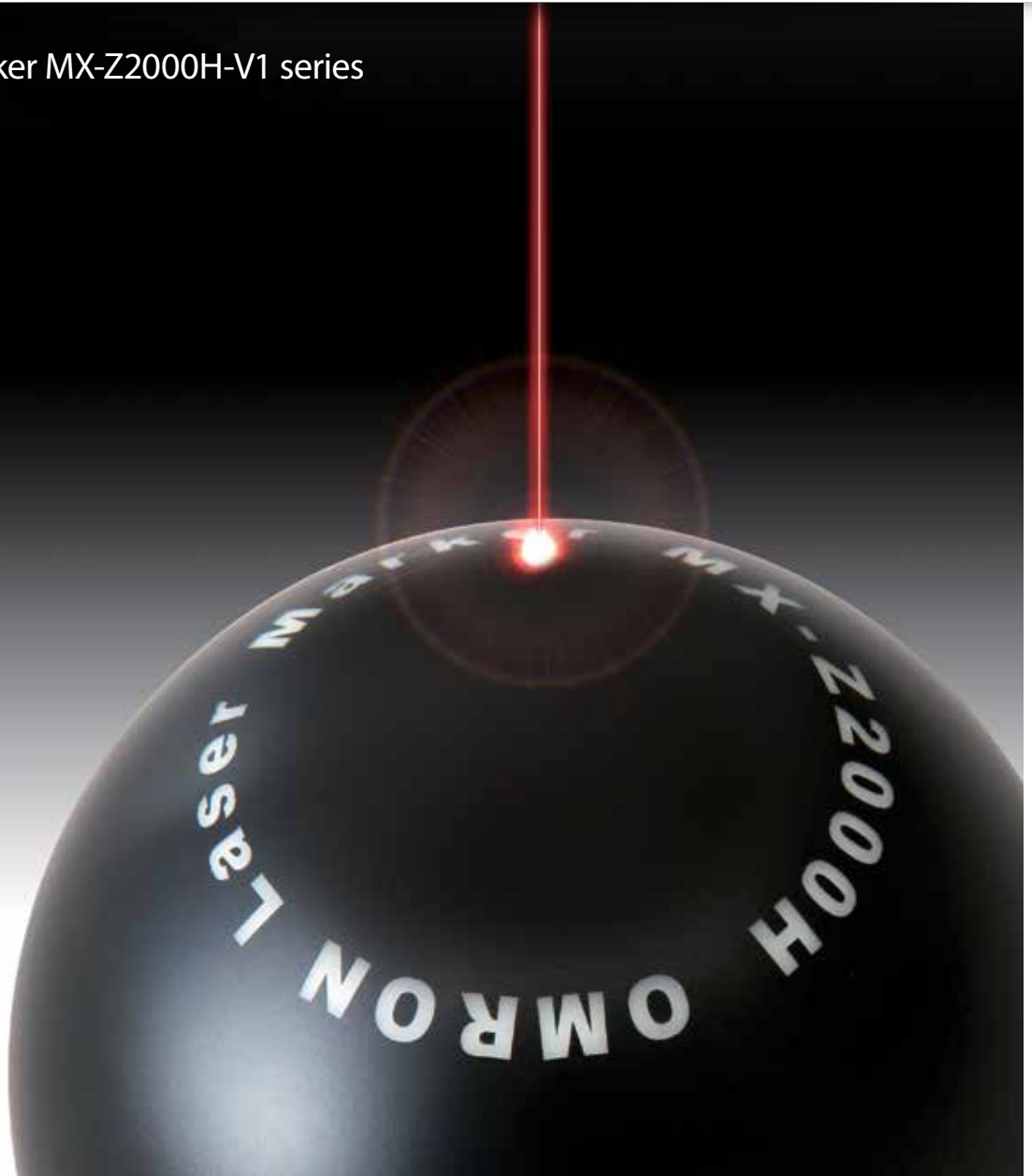# OMRON

A fast, simple and high-quality solution
Marking Flexibility

c**UL**us **FDA** C E

Fiber Laser Marker MX-Z2000H-V1 series

- Fast, permanent, high-quality marking for metals, plastics, resins and other materials
- Easy integration with vision and SQL client for a complete traceability solution
- Direct connectivity with vision for position compensation and mark inspection

Material Flexibility

Fast, high-quality marking for any application

The MX-Z2000H Series is great for either deep or shallow engraving in metals, marking on plastics/resins or plastic films, and for fine processing. Mark anything from electronic parts to automotive parts.

The MX-Z2000H series offers great benefits in many areas

Efficiently marks various materials, including:

Metals

Plastics & resins

Plastic film

- Two operating modes meet the application marking demands
- Enhanced 3D marking features
- G-DAC enables high-speed, clear marking
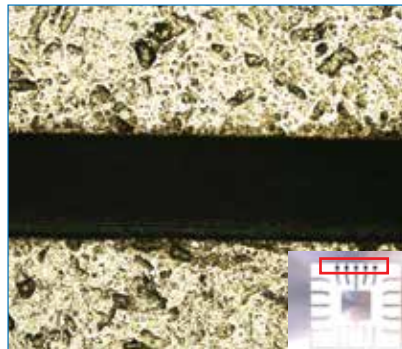
Deep engraving in metal

Shallow engraving in metal

Marking on plastics and resins

Marking on plastic films

Fine processing

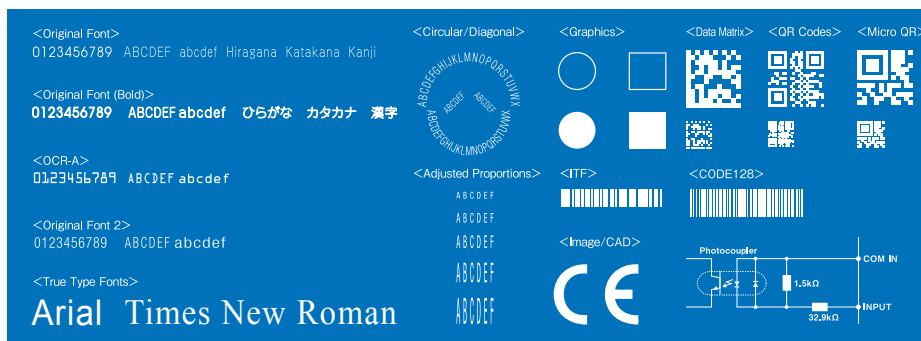Fine marking

Geometric Flexibility

Marking 3D objects is simple, even on cones and spheres

High-precision z-axis flexibility

Clean marking is now possible for 3D surfaces - including stepped, sloped, curved, conical and spherical surfaces - without the need for additional software.

Steps

Slope

Truncated cone

Truncated cone interior

Cylinder

Sphere exterior

Half-cone interior

Half-cone exterior

Laser marking samples

The focus point can be moved 170±10mm for the MX-Z2000H, and 220±10mm for the MX-Z2050H/Z2055H.

+10mm

Zero reference

-10mm

Vision Inspection Flexibility

Find the part, mark it, and inspect it in the same place

The perfect solution for applications requiring proper product orientation before marking, the inspection of markings done, like 2D code, characters, images, etc.

Typical marking process

Various devices and processes were required. Cost and labor for the design, implementation and execution were high.

Marking

Part orientation

Inspection reading the 2D code
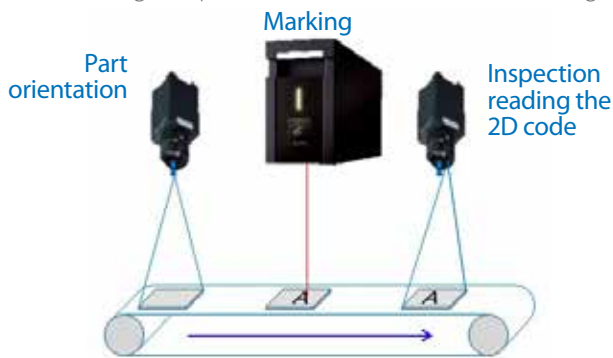
Omron's solution

All processes are consolidated in one single step. Design, implementation, and execution are greatly simplified.

Positioning + Marking + Inspection reading the 2D code
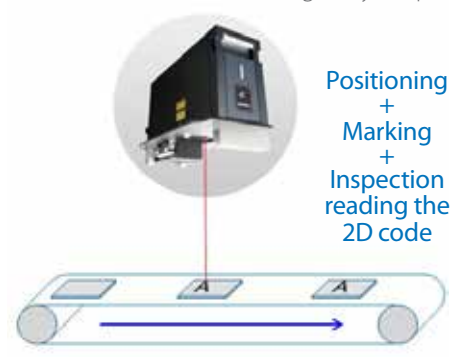
Benefits

- Reduces the number of cameras from two to one
- No positioning mechanisms required for proper part orientation
- Product indexing reduced from three steps to one

- Overall cycle time - position compensation, marking and inspecting product - reduced by a third
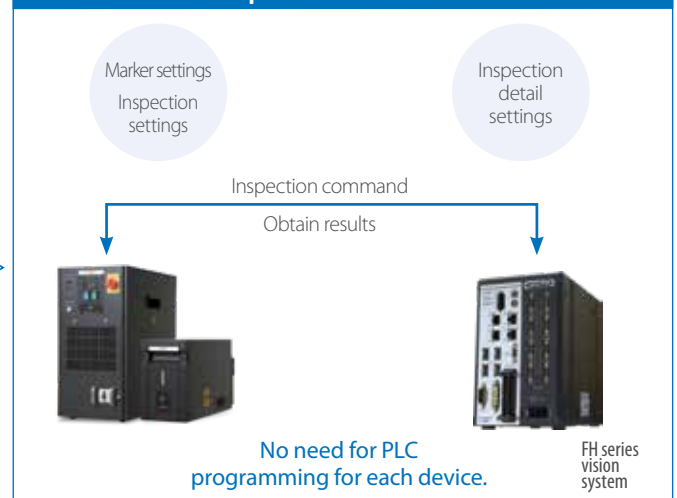- System design (electro-mechanical, software) and even hardware required is greatly reduced

Direct finder link

The MX-Z2000H series enables direct connectivity between the vision system and the laser marker that traditionally required PLC processing. This means, there is no need for a PLC to do the linking between the vision system and the laser marker.

Traditional system

Marker control program

Connection settings

FH control program

Marker settings

Inspection detail settings

Marking command
Send inspection results

Inspection command
Obtain results

FH series image processing system

Omron's unique solution

Marker settings
Inspection settings

Inspection detail settings

Inspection command

Obtain results

No need for PLC programming for each device.

FH series vision system

Fast, Reliable Quality

Two operating modes provide fine detail to deep engraving

1. Fine detail mode
#### (using the standard mode)

Our exclusive flexible pulse control (up to 1MHz, adjustable 1 - 20 pulses) enables optimum marking and processing for a variety of materials and applications, even materials or applications that require heated marking/processing, etc.

Cross section of marked area

Depth: approx. 10-20μm
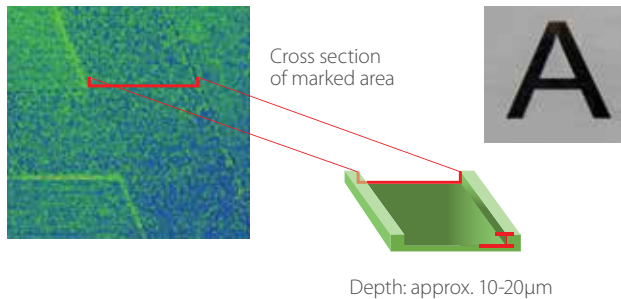
2. Deep marking mode
(using the optional Energy Enhancement - EE mode)

Deep engraving of metal, rough polishing, and other energy-intense processing becomes possible with an expanded and enhanced flexible pulse control, which provides pulse streams of up to 30 pulses.

Cross section of marked area

Depth: approx. 200μm, min.
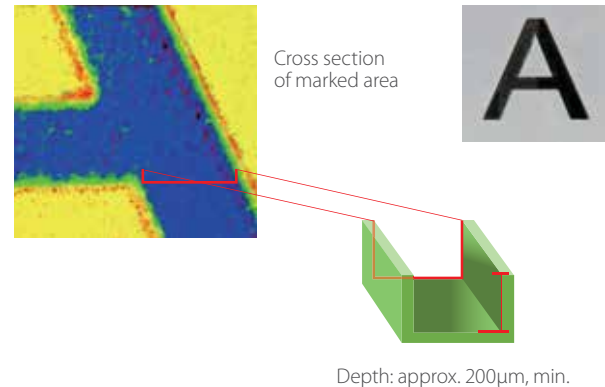
G-DAC
Mark clearly and cleanly fast!

G-DAC stands for the OMRON-developed Galvano Dynamic Acceleration Control. The G-DAC feature adjusts the laser marking speed for optimum performance, based on the marking details. This speed flexibility enables high-speed, clean marking.

Faster marking G-DAC

Workpiece: Aluminium
Letter height: 1mm

With G-DAC   54ms
Without G-DAC   116ms

Double the speed; about half the time.
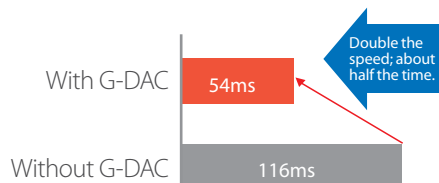
Note: Marking conditions 100kHz, 100% power; Aluminum material

High quality marking at the same speed

Without G-DAC   Improved performance   With G-DAC

Note: Laser conditions: 100kHz, 100%; Workpiece: Aluminium

Operation Flexibility
increases throughput with less effort

## Flexible integration for external control

EtherNet/IP™ compatibility

The MX-Z2000H series is compatible with various kinds of external control. Built-in I/O connections, RS-232C, Ethernet, and Ethernet/IP™ simplify programming to control the system from a PLC.

Note: Connect to any Omron or third party PLC.

Marking for short production runs with multiple products

Data can be shared with external storage
Small runs of multiple products require markings specific to each product run. The marking data is massive and it is usually saved on an Ethernet server. The MX-Z2000H series offers capability to access such marking data and apply it to the specific product being run on the specific line.

Ethernet
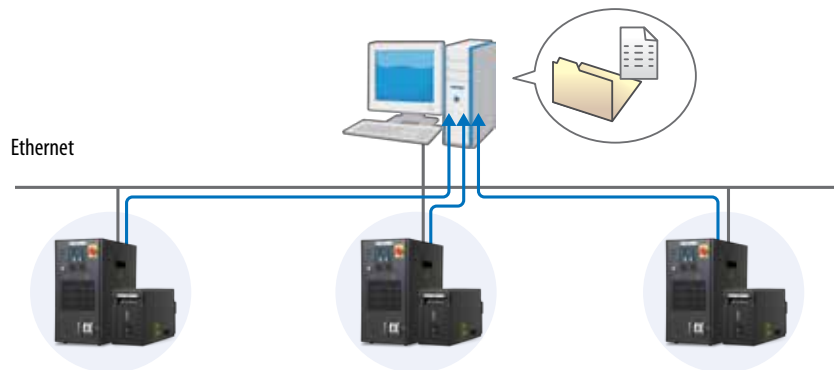
Edit marking data directly on the laser marker or using the offline software

Editing data
There is no need to buy separate editing software, or a computer to edit data. Data editing functionality is built right into the laser marker itself, simplifying the process.

Same display

Offline editing software is standard
You can also use a separate computer if you choose, to create and edit the print data, including graphics, with the same functionality as is built into the laser marker.

Editing data offline
Create and edit the marking data directly.

Editing fonts and logos
Optimize fonts, logos (graphics), and pattern data directly.

Durability and safety

Withstands severe environmental conditions and meets domestic and International Standards

Durable IP65 laser head

Stable operation even in dusty or wet environments

The laser head (where the laser light is emitted) has a double glass cover to keep dust and moisture away and ensure air-tightness.

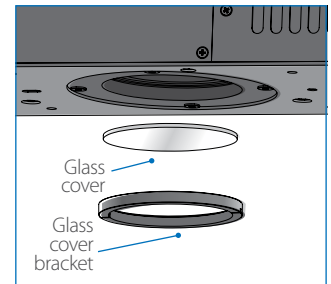IP65 means dust-proof and wash-down protected, compatible with IEC60529.

IP 6 5

Protection against water
5: Protection from water, up to water projected by a nozzle against the enclosure from any direction.

Protection against solid objects
6: Complete protection from dust.

Glass cover

Glass cover bracket

The double glass cover makes it easier and safer to change the glass.

Built-in safety relay circuit

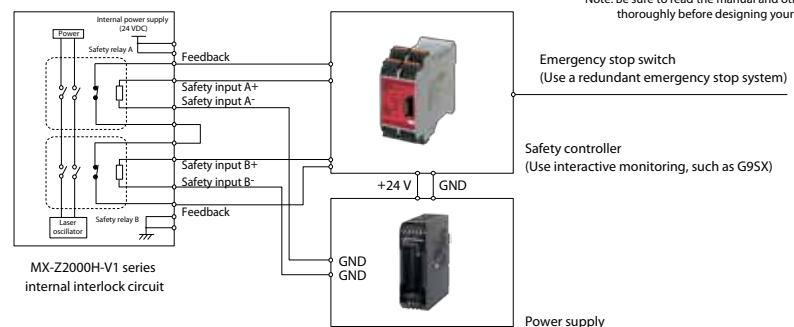### Meets safety requirements and standards

When building a product to meet the ISO 13849-1 (JIS-B9705-1) criteria, safety measures must be provided for the total complete system in which the laser marker is installed. The MX-Z2000H series provides an internal interlock circuit with 2 safety relays within the controller. When sending an emergency stop signal from an external controller to the interlock terminals will absolutely stop the power supply to the laser.

Meets domestic and international standards and regulations

In order to facilitate international trading and improving the user safety, the laser marker has been developed to meet domestic and international safety standards and regulations.

Note: For details on standards and certifications met, see specifications on page 18.

Interlock System Configuration Example

Note: Be sure to read the manual and other materials thoroughly before designing your system.

Power

Internal power supply (24 VDC)

Safety relay A

Feedback

Safety input A+
Safety input A-

Safety input B+
Safety input B-

Feedback

Laser oscillator

Safety relay B

MX-Z2000H-V1 series internal interlock circuit

+24 V   GND

Emergency stop switch
(Use a redundant emergency stop system)

Safety controller
(Use interactive monitoring, such as G9SX)

GND
GND

Power supply

Fiber Laser Technology
All-fiber lasers provide high quality, high stability, long life

## Offering a long life laser with high quality and stability

Typical solid-state lasers use mirrors to resonate and amplify the laser, and then Q-switching to output the laser. However, this approach makes it difficult to achieve a high quality and flexible laser. It also leaves something to be desired in the areas of reliability and durability. Omron's unique Master Oscillator Power Amplifier (MOPA) achieves high quality, high stability, long life and flexibility by eliminating the resonator configuration and using the MOPA approach.

Omron MOPA fiber laser
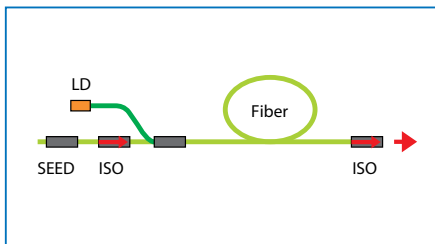
- Wide range of pulse repetition frequency settings
- High flexibility for setting the pulse width and shape
- High beam quality, high stability, long life
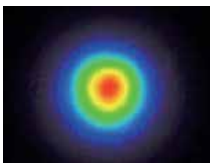
Typical solid-state laser
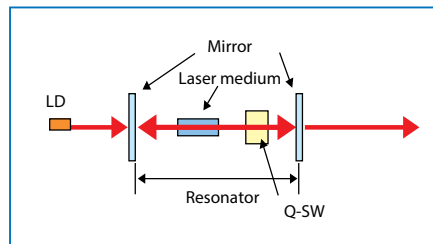
- Pulse width depends on the repetition frequency
- The laser diode is always on, accelerating deterioration
- Durability issues of the Q switch, mirrors, etc.

Typical fiber laser
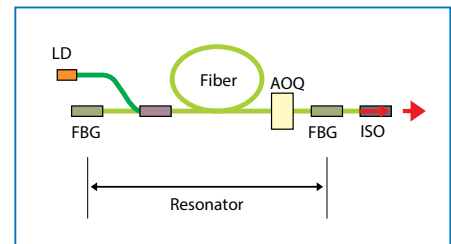
- Difficult to achieve a high peak output
- Narrow range of pulse repetition frequency settings
- Pulse width depends on frequency

High beam quality

The closer the beam is to a perfect circle, the higher the quality of the laser. Omron lasers have a very round, high quality beam, as shown to the left.

Corrects for lens distortion

Precision positioning is now possible for fine detail, and processing area distortion is minimized. Coordinate correction is provided to eliminate errors based on installation.

High position resolution

Processing area distortion control

Before correction   After correction
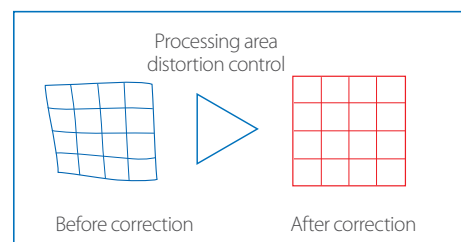
Marking a scale

Coordination correction

Processing position before correction

Processing result after correction
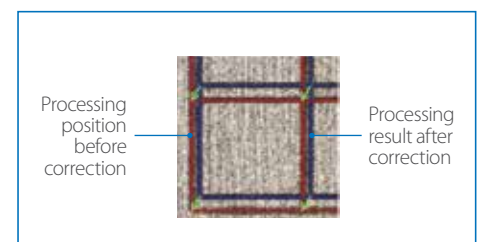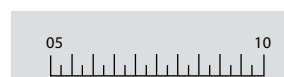
Marking of electronic parts in a tray

Flexible Vision Technology

The vision option increases the power of the MX-Z2000H series laser markers even easier to use

**The vision option solves three main concerns
before marking, during and after marking is done:**

1. Correct positioning of part before marking

2. Inspection of markings
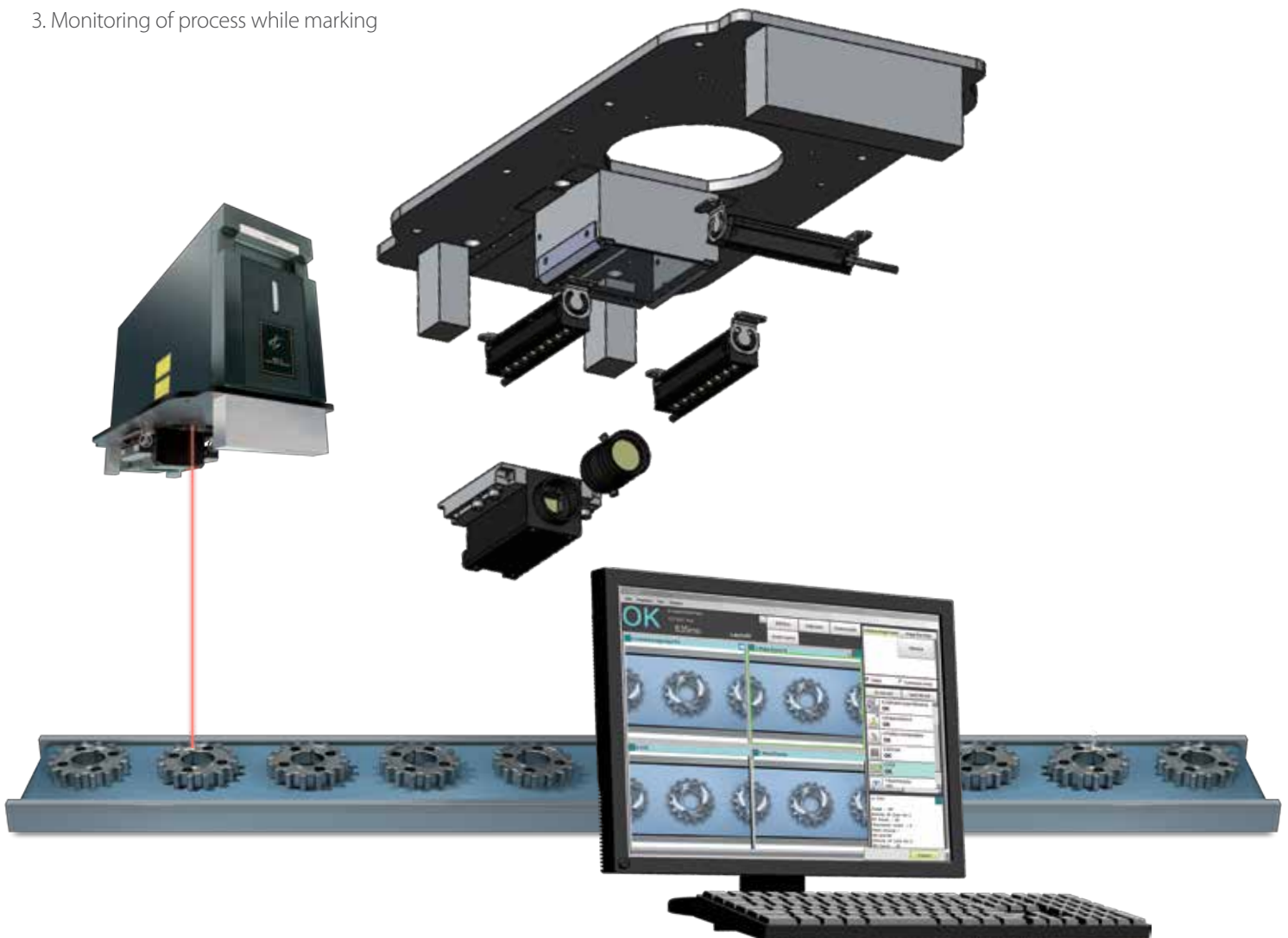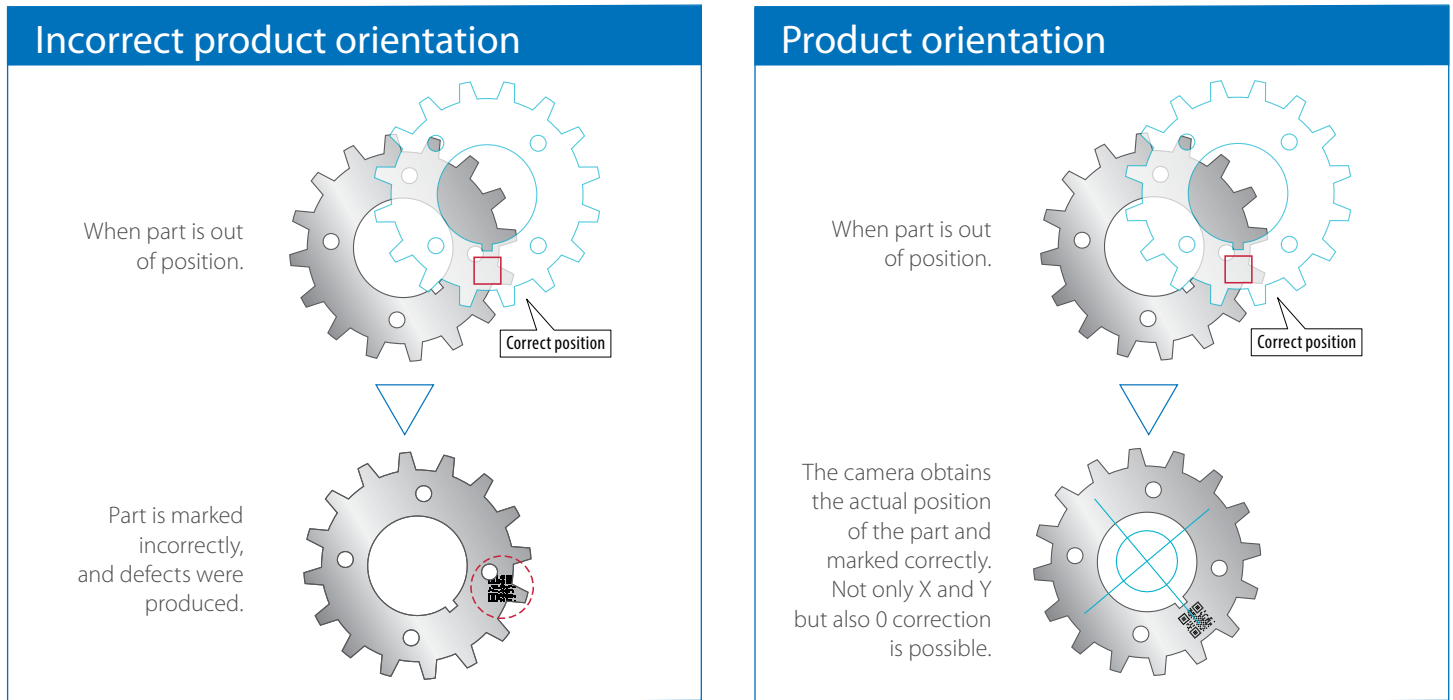
3. Monitoring of process while marking

1. Position-Compensated Marking
Complete two key tasks in a single step

Before vision systems were integrated into marking applications, it was necessary to have either a jig or a mechanism to position product properly before could be laser marked. The vision option working in conjunction with the laser marker eliminates this need.

Incorrect product orientation

When part is out of position.

Correct position

Part is marked incorrectly, and defects were produced.

Product orientation

When part is out of position.

Correct position

The camera obtains the actual position of the part and marked correctly. Not only X and Y but also 0 correction is possible.

Benefits

The camera confirming and compensating for the workpiece position makes position-compensation mechanisms unnecessary. Jigs are not required even for multiple product types. The vision option contributes to both cost reductions and system simplification.

Application example

To mark a product in the same area every time, an image processing system measures the position reference, transfers the coordinates to the laser marker. The laser marker then adjusts to etch, compensate and mark in the correct place. After the laser marking is completed, the image processing system can also read a 2D code or any other inspection of the data or images just marked on the product.

MX-Z2000H series laser marker
+
Finder option
+
FH series image processing device
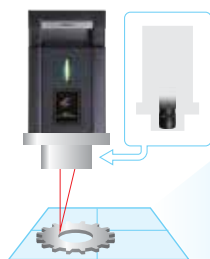
1. Use image processing to measure the position difference.
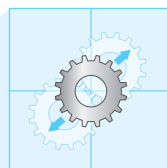
2. Compensate for position differences and mark correctly.

2. Inspection and reading 2D codes
Consolidate to a single process

After marking is completed, inspection is required to ensure the markings meet the quality standards and make system corrections. In other cases data and images of what is being marked must be saved for traceability purposes.

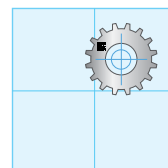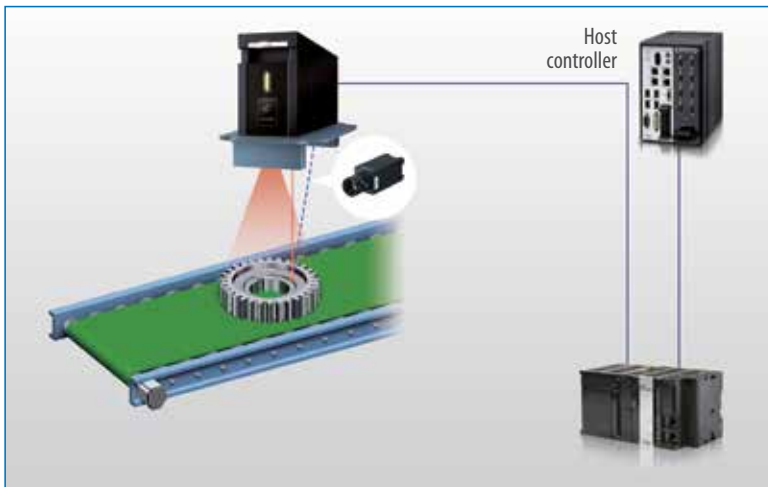Typically, the orientation marking and inspections are being done in several steps, which increase the cycle time. Omron offers a unique solution where the cycle time is dramatically decreased as the whole process (position correction, marking and inspection) is done in one step.

Application examples

2D codes marked on printed circuit boards must be inspected for proper readability before they go through the manufacturing process.

2D codes (Data Matrix) inspection on an engine block or a spark plug are required for proper traceability.

① Number of pins
④ Width measurements
③ Foreign matter
① Pitch inspections
② Incomplete characters
Chip position offset
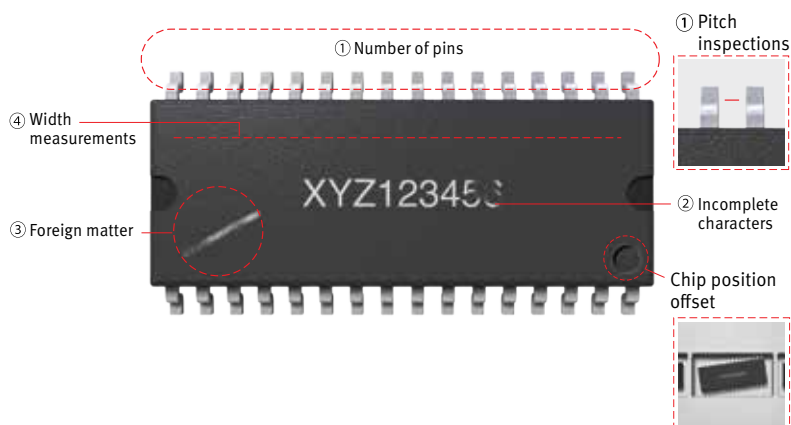
Multiple inspections can be done simultaneously. In this example, an Integrated Circuit is properly oriented, and several inspections are carried out: Counting the number pins, measurement of the distance between pins is within specifications, inspection of the marking quality and making sure the surface is clear of debris or manufacturing imperfections.

3. Display and Monitoring

A large screen simplifies marking monitoring and provides visibility of a larger area

Before Various devices and processes were required. → **Now** All processes are consolidated in one single step.

Part Orientation + Marking + Inspection, reading the 2D code

Positioning + Marking + Inspection, reading the 2D code

Cost and labor for the design, implementation and execution were high.   Design, implementation, and execution are greatly simplified.

Benefits

- Confirm the mark position easily on the monitor for easy visualization
- Flexibility to choose the lens and lighting that best fits for your application
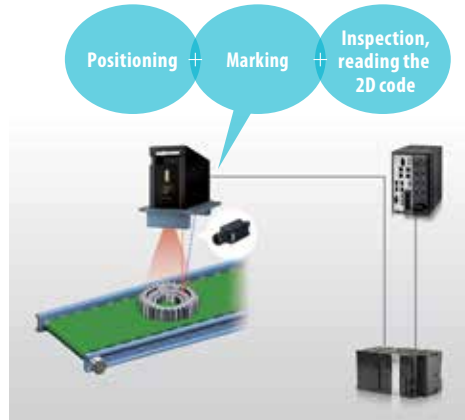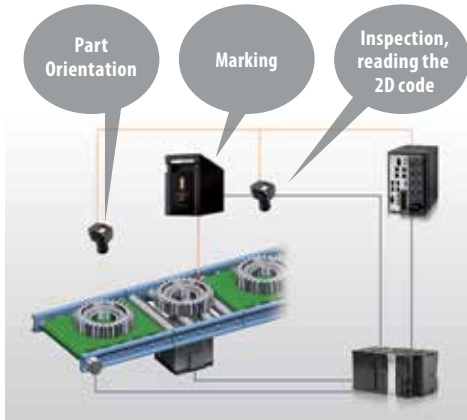
Choose the right lens for the required field of view

For example, when using the MX-9151 camera attachment, you can use the FZ-S2M camera and FH vision controller. Then, depending on the application needs select the most suitable camera lenses. The following images are illustrating a perspective viewing 15mm integrated chips using various sized lenses.

| 50mm lens | 35mm lens | 25mm lens | 16mm lens | 12mm lens | 8mm lens |

Choose the most suitable lighting for your application

Front lighting

High brightness model   Wide area model

Choose the mounting position.

Adjust the angle with the mounting brackets.
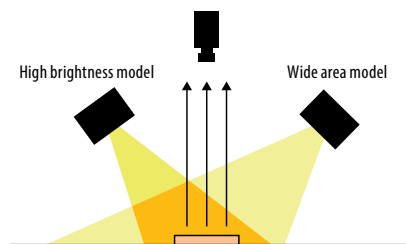
Using a high brightness bar light and a wide model. (Diffusion plates also available.)

Laser Marker Solutions

Position-correction, marking and 2D code inspection without the need of a PLC

This solution is perfect for applications, which do not require data tracking or PLC management for the laser marker and the vision system. The direct connectivity between the laser marker and the vision system allow the functionality for position correction as the laser marker requests the coordinates from the vision system. Once the laser marker obtains the product position, it begins marking and when it is done, the laser marker instructs the vision system to inspect the 2D code marking and issue an output if marking is OK or not.

Marker settings
Inspection settings

Inspection detail settings

Inspection command

Obtain results

FH series
vision system

System configuration for position-compensation and 2D inspection

MX-Z2000H series
Laser Marker

FH series
Vision System
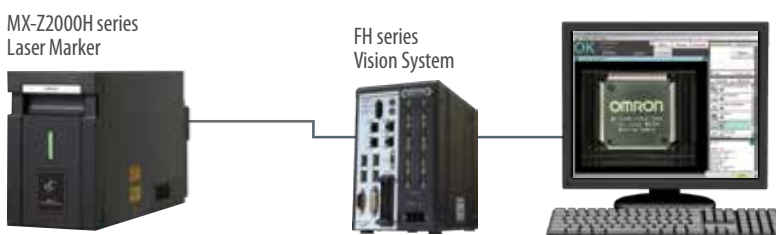
Laser Marker Solutions

Position-correction, marking and multiple inspection including 2D code reading

Ideal for applications requiring multiple vision inspection beyond 2D code reading, such as optical character recognition, shape pattern, date code, or other simple inspection at an affordable cost.

Marking

Markings inspection, including 2D code

Product inspection
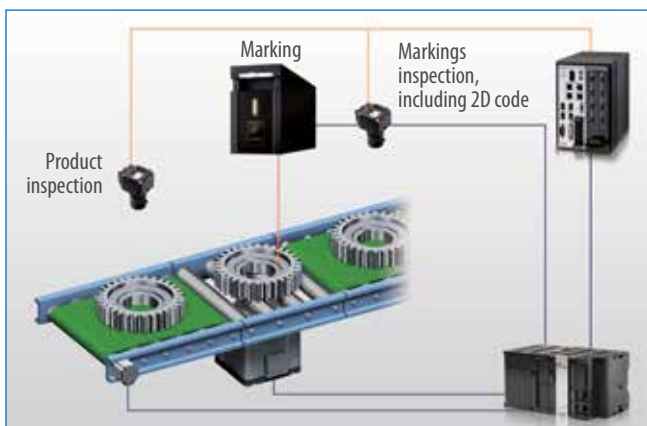
Vision system
Multiple inspections, multiple cameras, one vision controller.

Host controller
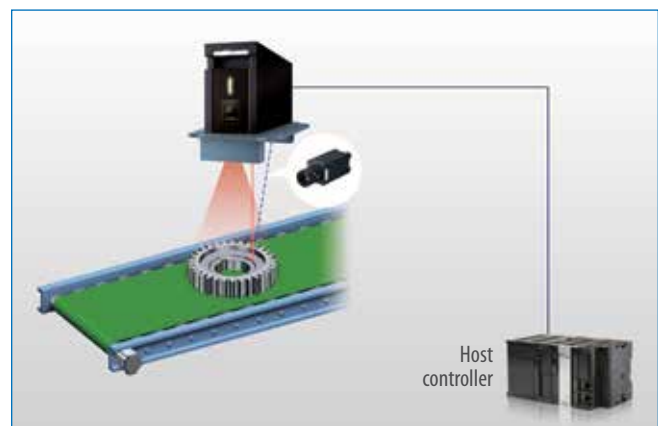
Smart cameras
Multiple inspections, one smart camera.

System configuration for position-compensation and multiple inspection (including 2D code)

FH series
Vision System

OR

FQ2 Series
Vision Sensor
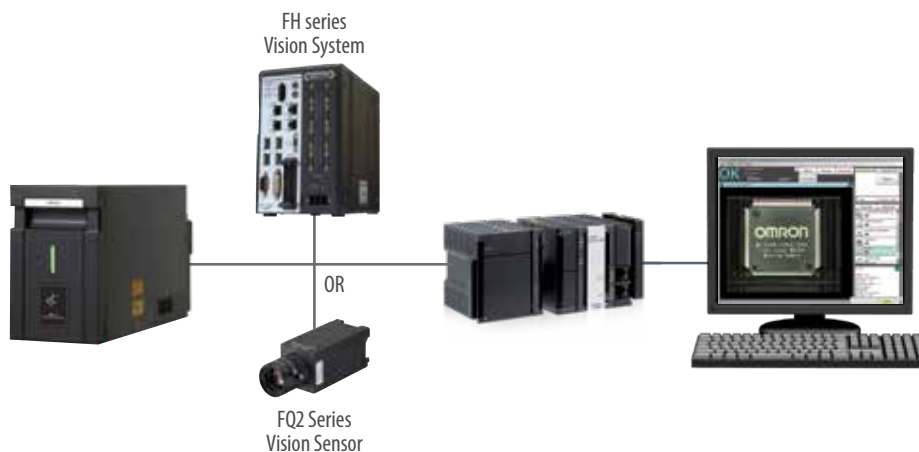
Configure your traceability system

A complete solution for position correction, marking, inspection and traceability

Store marking data, and other data to a database, etc. Simplify both traceability and preventive maintenance. The MX-Z2000H series together with a vision system can be easily networked with a machine controller equipped with an SQL server to collect inspection data and store it in a database for traceability purposes.

Database
Marking data inspection data, etc.

NJ series
database connection

Inspection image

Traceability information:
Marking data, marking time, power check results, laser operating time, etc

FH series
image processing system

Ordering Information

Laser Marker

Model	Laser class/power	Working distance	Cable Length
MX-Z2000H-V1	Class 4, 20W	170±10mm	Fiber 4.5m, Laser head control/power 5m
MX-Z2050H-V1	Class 4, 20W	220±10mm	Fiber 4.5m, Laser head control/power 5m
MX-Z2055H-V1	Class 4, 20W	220±10mm	Fiber 4.5m, Laser head control/power 5m

Vision option device configuration

MX-Z2000H

MX-9150
camera attachment

MX-Z2050H, MX-Z2055H

MX-9151
camera attachment

1. Position compensation/reading 2D codes/all inspections

Standard

FH-2050 series
vision system

High Speed

FH-5050 series
vision system

FZ-SC/FZ-S
CCD camera - 300K pixels,
color/black & white

FZ-SC2M/FZ-S2M
CCD camera - 2M pixels,
color/black & white
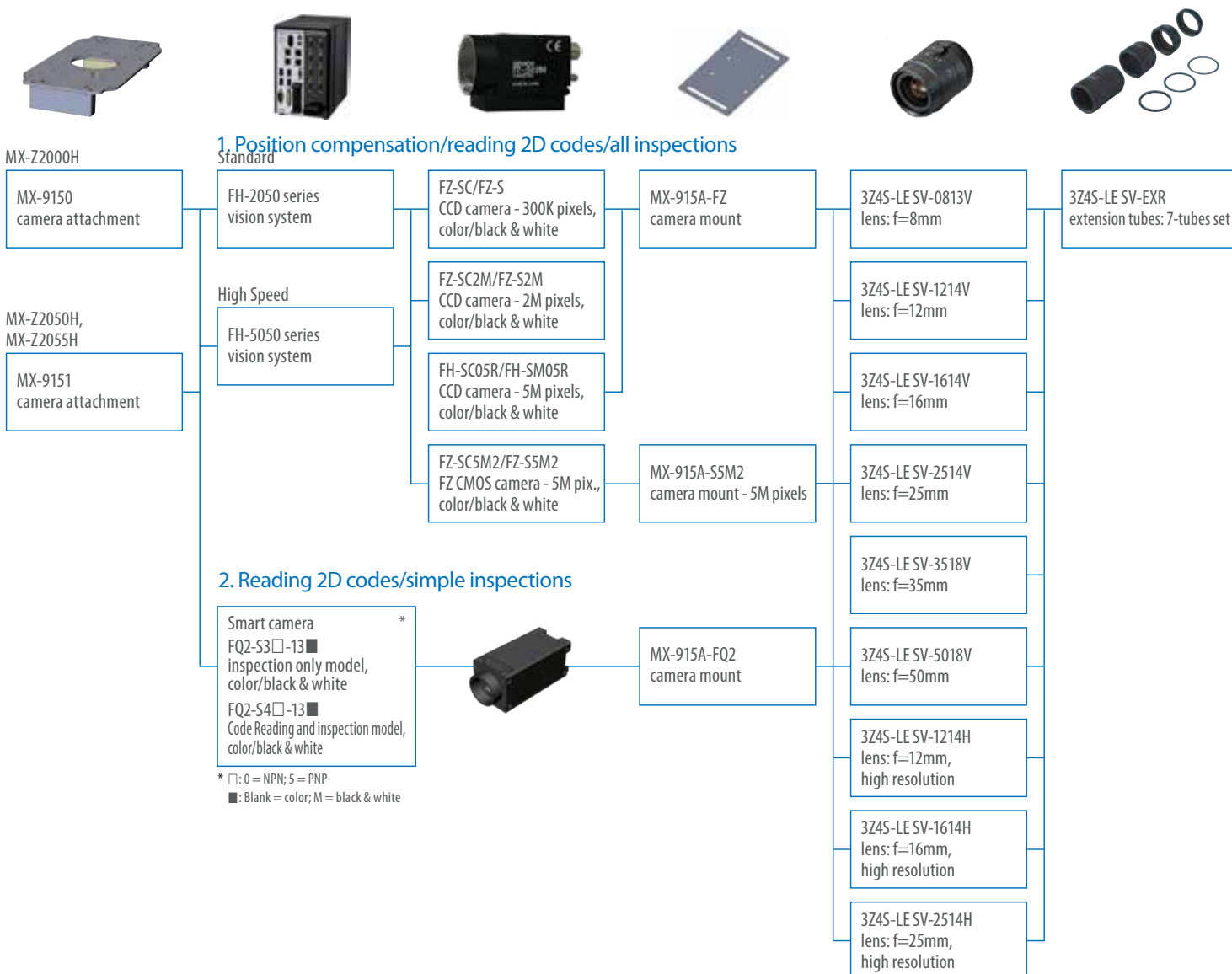
FH-SC05R/FH-SM05R
CCD camera - 5M pixels,
color/black & white

FZ-SC5M2/FZ-S5M2
FZ CMOS camera - 5M pix.,
color/black & white

MX-915A-FZ
camera mount

MX-915A-S5M2
camera mount - 5M pixels

3Z4S-LE SV-0813V
lens: f=8mm

3Z4S-LE SV-1214V
lens: f=12mm

3Z4S-LE SV-1614V
lens: f=16mm

3Z4S-LE SV-2514V
lens: f=25mm

3Z4S-LE SV-3518V
lens: f=35mm

3Z4S-LE SV-5018V
lens: f=50mm

3Z4S-LE SV-1214H
lens: f=12mm,
high resolution

3Z4S-LE SV-1614H
lens: f=16mm,
high resolution

3Z4S-LE SV-2514H
lens: f=25mm,
high resolution

3Z4S-LE SV-EXR
extension tubes: 7-tubes set

2. Reading 2D codes/simple inspections

Smart camera   *
FQ2-S3□-13■
inspection only model,
color/black & white

FQ2-S4□-13■
Code Reading and inspection model,
color/black & white

* □: 0 = NPN; 5 = PNP
  ■: Blank = color; M = black & white

MX-915A-FQ2
camera mount

Vision option accessories

Model	Description
MX-9150	Camera attachment for MX-Z2000H
MX-9151	Camera attachment for MX-Z2050H and MX-Z2055H
MX-915A-FZ	Camera mount for FZ-S/C , FZ-S/C2M, FH-SC/M05R
MX-915A-S5M2	Camera mount for FZ-S/C5M2
MX-915A-FQ2	Camera mount for FQ2-S3/S4-13

Note: For vision products, refer to system configuration.

FL-BR5020W* wide area model, front-mount bar light	FL-BR5020DF diffusion plate	FL-STC1□ * single-channel lighting controller
FL-BR5020W-H* high brightness model, front-mount bar light		* □: 0 = NPN; 5 = PNP
FL-BR9120W* wide area model, side-mount bar light	FL-BR9120DF diffusion plate	FL-STC2□ * two-channel lighting controller
FL-BR9120W-H* high brightness model, side-mount bar light		* □: 0 = NPN; 5 = PNP

* Must also purchase FL-XBK1
  mounting bracket

Other required items (sold separately)

Model	Description
MX-9301	Controller power supply cable for USA/CAN/JPN (UL, CSA, PSE)
MX-9302	Controller power supply cable for Europe (VDE, AS)
MX-9230	Energy Enhancement (EE) Mode activation key

Note: Use commercially available products for the other devices required: USB keyboard, USB mouse, and monitor (VGA 3-row 15-pin, or DVI-D input with 1,024x768 minimum resolution).

Lens selection criterion
(Distance between the camera and the workpiece)

Model	Camera installation distance*
MX-9150	Approximately 220mm
MX-9151	Approximately 270mm

1. Lens selection

When selecting a lens, follow the lens selection criterion table and the camera optical charts. Select the best camera and lens for your application based on the optical table and your vision area needs. The extension tubes may also be needed. The optical charts are included in the catalog for the camera being used.

2. Lighting

The FL-XBK1 mounting bracket is required to mount the lighting bar to the camera attachment. You may also need the FL-XC□: □ lighting extension cable (1m-25m), depending on the distance between the lighting bar and the lighting controller.

3. Power supply, misc.

A 24VDC power supply is required for the lighting and the vision system or smart camera. Select the appropriate power supply based on the power consumption of the devices. Your device configuration may also require a touch finder, LCD monitor, etc. Be sure to consider all needed devices when selecting the power supply, camera cables, Ethernet cables, and so on.

Refer to the appropriate product catalogs for details.

Laser Marker Specifications

	Item	MX-Z2000H-V1	MX-Z2050H-V1	MX-Z2055H-V1[*1]
Processing laser	Type	Fiber laser wavelength : 1,062nm		
	Laser class	IEC 60825 class 4, FDA (CDRH) part 1040.10 class IV		
	Average output	20W (Fiber laser transmitter output)		
	Laser output mode	Standard mode/EE mode[*2]		
	Repetition frequency	Standard mode 10 to 1,000kHz in 0.1-kHz steps/EE mode[*2] 10 to 100kHz in 0.1-kHz steps		
	Pulse-train width(pattern) setting	Standard mode 7.5ns~300ns (15patterns) /EE mode[*2] 150ns~450ns (3 patterns)		
Guide laser and focus pointer	Type	Semiconductor laser wavelength: 655nm		
	Laser class	IEC 60825 class 2, FDA (CDRH) part 1040.10 class II		
Optical specifications	Marking area	90×90mm	160×160mm	160×160mm
	Working distance	170±10mm	220±10mm	220±10mm
Scanning specifications	Scan speed	1~12,000mm/s		
	Marking resolution	2µm	4µm	4µm
Detail of marking	Text	original / original2 / OCR-A / OCR-B / SEMI / LM font / True Type font		
	Bar code	CODE39 / NW-7 / ITF / CODE128 / JAN GS1 Databar Omni-directional / GS1 Databar truncated/GS1 Databar limited / GS1 Databar expanded		
	2D code	QR code / Micro QR code / DataMatrix(ECC200)/ GS1 DataMatrix(ECC200)		
	shape	Fixed point / straight line / rectangle / circle /arc		
	3D shapes	Slope / step / cylinder / truncated cone / sphere		
	Image and CAD importing	BMP/JPG/PNG/DXF		
Settings	No. of data/blocks	Marking data :10,000.; blocks : 2,048		
	Text setting	0.1mm~120mm		
Cables	Fiber cable	4.5m minimum bending radius: 100mm		
	Marker head control cable	5m minimum bending radius: 100mm		
	Marker head power supply cable			
External interface	Terminal block and I/O connector	Terminal block input 20pins(NPN/PNP compatible); terminal block 14pins(NPN/PNP compatible) I/O connector 37pins(NPN/PNP compatible), interlock terminal I/O : 8pins		
	Serial communications	RS-232C/RS-422A		
	Ethernet communication	Ethernet(1000BASE-T/100BASE-TX/10BASE-T) / Ethernet/IP™		
	Power supply voltage	100 to 120VAC,50/60Hz ; 200 to 240VAC,50/60Hz		
	Over voltage category	CAT II		
	Power consumption	at 100VAC: maximum 390VA , at 200VAC : maximum 420VA		
Ambient conditions	Operating ambient temperature,humidity	0 to 40ºC, 35 to 85%RH (no condensation)		
	Storage ambient temperature[*3],humidity	-10 to 60ºC (no freezing) / 35 to 85% RH (no condensation)		
	Installation environment	Indoor, 3,000m, max		
	Certifications	cULus Recognized (File No. E200593), CB SG-MS-00316A1		
	Applicable standards	UL61010-1, CAN/CSA C22.2 No.61010-1, 47 CFR Part15 Subpart B Class A Digital Device, FDA 21 CFR1040.10. See Setup Manual for further standards.		
	Pollution degree	2		
	Protection structure (head)[*4]	IP65 (per IEC 60529 standard)		
	Cooling method	Forced air cooling		
	Weight	Marker head approx.15kg, controller approx. 25kg		
	Size	Marker head W140 × H230 × D415mm (excluding projections), controller W225 × H430 × D390mm (excluding projections)		
	Installation direction	Marker head all directions of up, down, left and right (intake vent on the left side face must not be blocked.) Controller must be installed vertically.		
	USB interface[*5]	USB memory : Controller front panel, Type A connector, keyboard/mouse: controller back panel, Type A connector		
	Accessories	Marker head control cable, marker head power supply cable, system key , removable terminals (input and output,1 each), setup manual, CD-ROM (offline editing software[*6], User's manual in PDF), Interlock release connector Terminal opener, cable tie		

*1 Large beam diameter for coarse marking
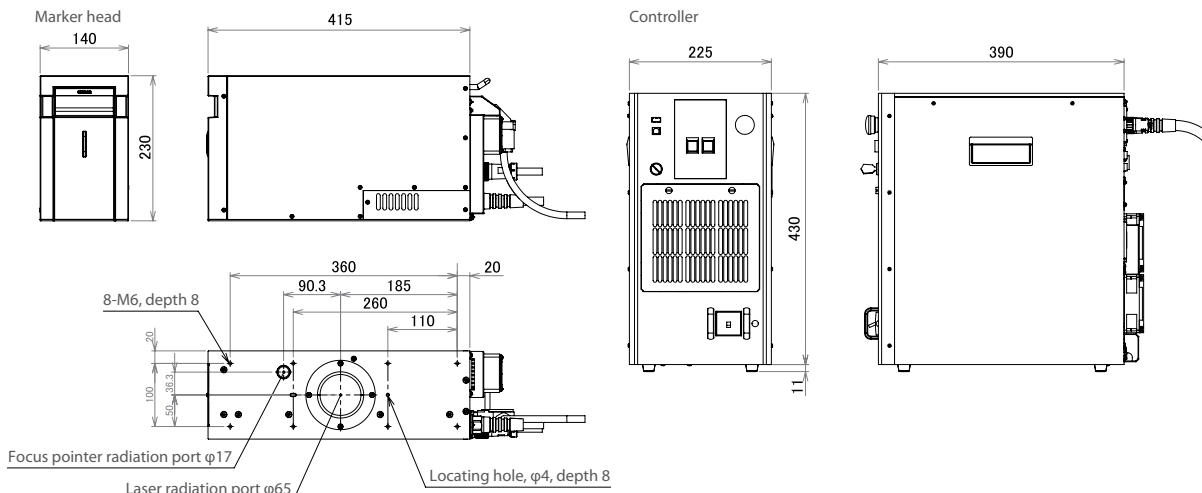*2 EE mode : Energy Enhanced mode (optional)
*3 The operating temperature may be limited due to their processing conditions. When using the laser continuously or close to continuously for laser processing,etc., please contact Omron in advance.
*4 The head of this product is constructed for environmental protection under the conditions specified in IEC 60529 (JIS C0920) , and is not guaranteed under any other conditions.
*5 Do not use the USB interfaces for anything other than ther specified applications.
*6 The following environment is required for use of the offline editing software and font logo editor
  : Computer with a USB 2.0. or 1.1 port , Microsoft Windows® 8/Windows® 7 , Available hard disk space: 1GB, min. Display resolution: 1,024×768, min.

Marker head

Controller

Focus pointer radiation port φ17

Laser radiation port φ65

Locating hole, φ4, depth 8

8-M6, depth 8

Camera Attachment Specifications

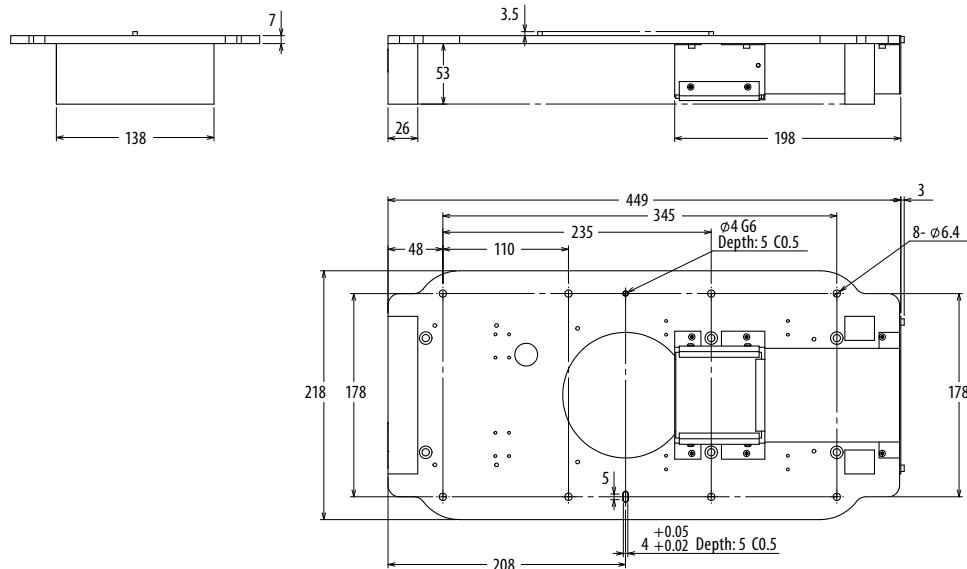| Camera attachment	MX-9150			MX-9151		
Compatible laser markers	MX-Z2000H			MX-Z2050H/MX-Z2055H		
Compatible camera mounts	MX-915A-FQ2	MX-915A-FZ	MX-915A-S5M2	MX-915A-FQ2	MX-915A-FZ	MX-915A-S5M2
Compatible cameras (C-mount)*1	FQ2-S30-13 FQ2-S35-13 FQ2-S30-13M FQ2-S35-13M FQ2-S40-13 FQ2-S45-13 FQ2-S40-13M FQ2-S45-13M	FZ-SC FZ-S FZ-SC2M FZ-S2M FH-SC05R FH-SM05R	FZ-S5M2 FZ-SC5M2	FQ2-S30-13 FQ2-S35-13 FQ2-S30-13M FQ2-S35-13M FQ2-S40-13 FQ2-S45-13 FQ2-S40-13M FQ2-S45-13M	FZ-SC FZ-S FZ-SC2M FZ-S2M FH-SC05R FH-SM05R	FZ-S5M2 FZ-SC5M2
Compatible lighting (recommended)*2			FL-BR5020W FL-BR5020W-H FL-BR9120W FL-BR9120W-H	FL-XBK1 mounting bracket FL-XC☐ extension cable FL-BR5020DF diffusion plate FL-BR-9120DF diffusion plate		
Ambient operating temperature	0-40℃					
Ambient operating humidity	35-85%RH (no condensation)					
Ambient storage temperature	-10-60℃ (no freezing)					
Ambient storage humidity	35-85%RH (no condensation)					
Dimensions	W218mm x H60mm x D449 mm (except protrusions)					
Weight	Abt. 2.5kg (camera attachment only)					

*1 Also compatible with the MX-Z2000 series and MX-Z2000G series laser markers. Consult with your sales representative for details.

*2 The image output from the camera is a mirror image. Mirror image processing must be performed by the camera controller.
The FQ2 cannot correct the mirror image, meaning that the mirror image will remain as is. The FH can correct the mirror image under the trapezoidal distortion correction heading.
The image captured by the camera will show some distortions, such as being diagonally off or off the optical axis. The marked image on the screen may therefore look distorted or off-center.

*3 Provide a separate 24VDC power supply for the lighting.

MX-9150, MX-9151

Authorized Distributor:

Controllers & I/O
• Machine Automation Controllers (MAC) • Motion Controllers
• Programmable Logic Controllers (PLC) • Temperature Controllers • Remote I/O

Robotics
• Industrial Robots • Mobile Robots

Operator Interfaces
• Human Machine Interface (HMI)

Motion & Drives
• Machine Automation Controllers (MAC) • Motion Controllers • Servo Systems
• Frequency Inverters

Vision, Measurement & Identification
• Vision Sensors & Systems • Measurement Sensors • Auto Identification Systems

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• Photoelectric Sensors • Fiber-Optic Sensors • Proximity Sensors
• Rotary Encoders • Ultrasonic Sensors

Safety
• Safety Light Curtains • Safety Laser Scanners • Programmable Safety Systems
• Safety Mats and Edges • Safety Door Switches • Emergency Stop Devices
• Safety Switches & Operator Controls • Safety Monitoring/Force-guided Relays

Control Components
• Power Supplies • Timers • Counters • Programmable Relays
• Digital Panel Meters • Monitoring Products

Switches & Relays
• Limit Switches • Pushbutton Switches • Electromechanical Relays
• Solid State Relays

Software
• Programming & Configuration • Runtime