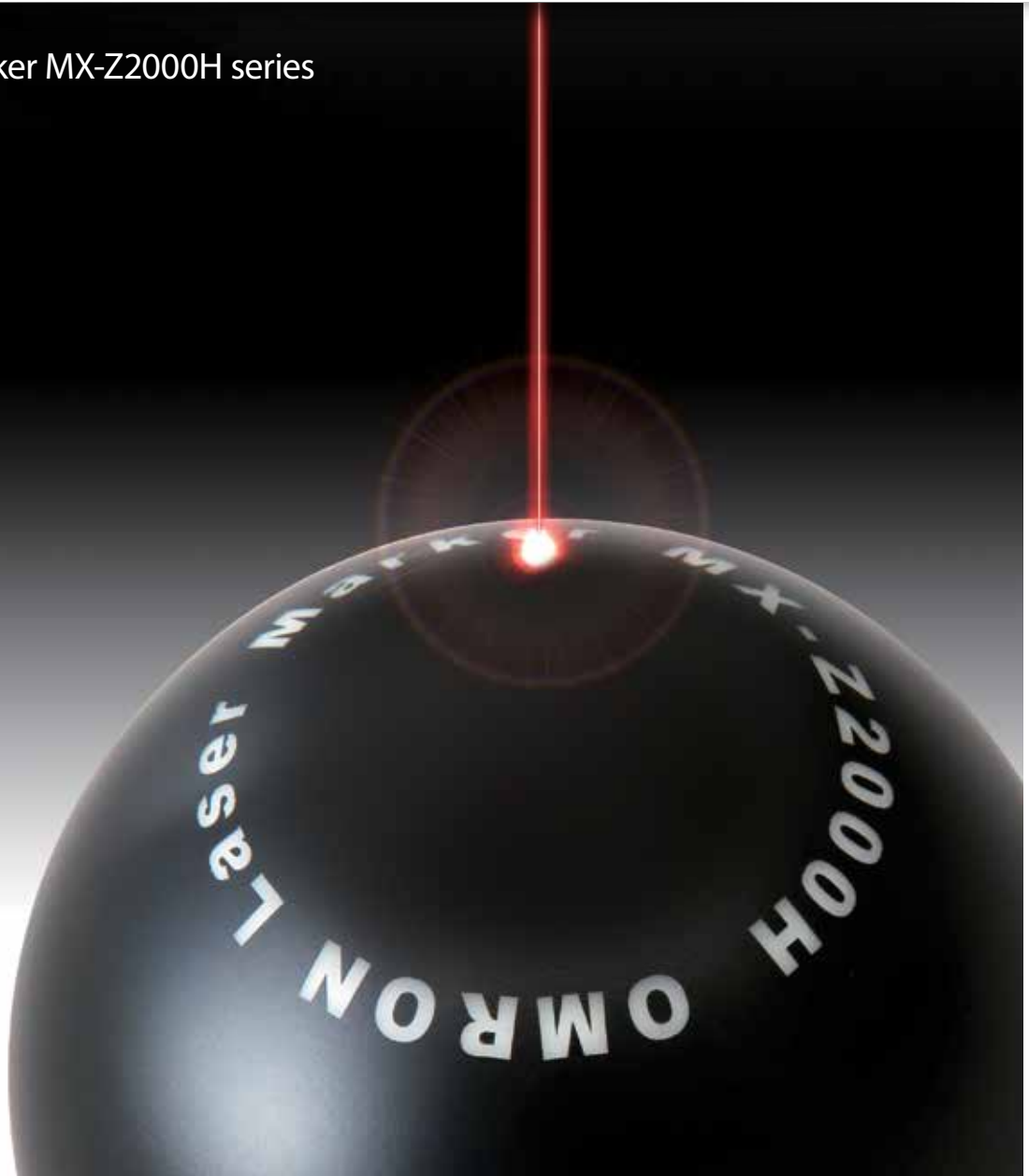


Fast, high quality, simple

## Marking flexibility



Fiber Laser Marker MX-Z2000H series



- High quality and fast, permanent marking for metals, plastics/resins and other materials
- Easy integration with vision and SQL client for a traceability system
- Direct connectivity with vision system for position compensation and inspection of markings

# Material flexibility

High speed and high quality for a wide variety of applications

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 arenas

Marking on different material types such as:



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



Deep engraving in metal



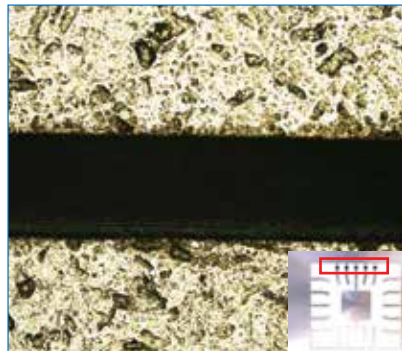
Shallow engraving in metal



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

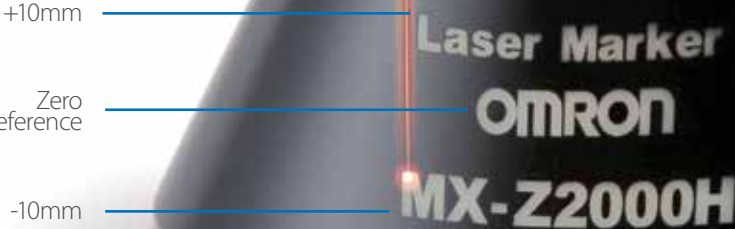
Clean marking is now possible for 3D surfaces, such as stepped, sloped, curved, conical and spherical surfaces without any additional software.



## Laser marking samples



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



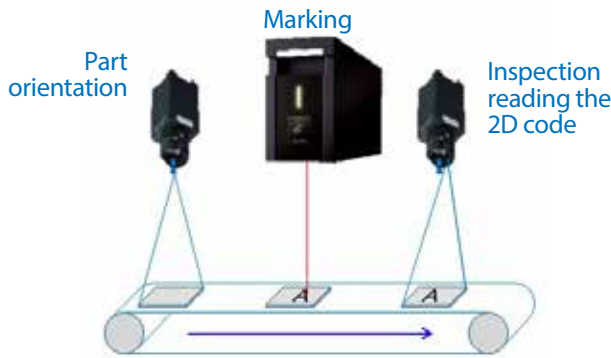
# Vision inspection flexibility

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.

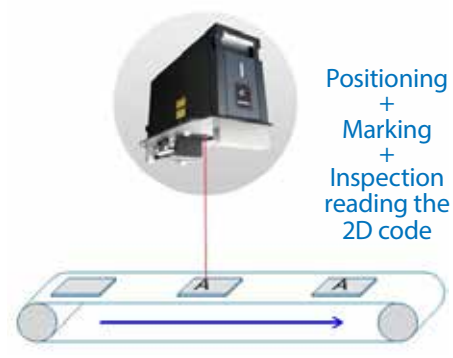
## Typical marking process

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



## Omron's solution

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



## 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



## Omron's unique solution



# Speed and quality flexibility

## 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

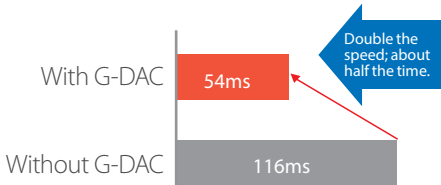
**Mark clearly and cleanly fast!**

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



Note: Marking conditions 100kHz, 100% power; Aluminum material

### High quality marking at the same speed



Without G-DAC      With G-DAC

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

# Operation flexibility

increases throughput with less effort

## Flexible integration for external control

### EtherNet/IP™

#### EtherNet/IP™ compatibility

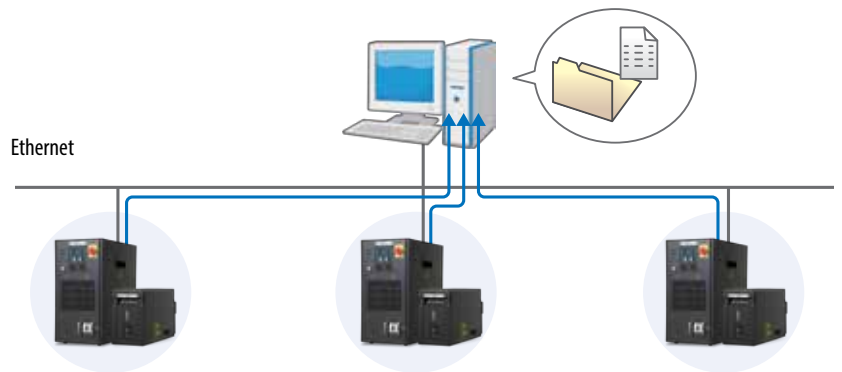
The MX-Z2000H series is compatible with various kinds of external control. Built-in I/O connections, RS-232C, Ethernet, and Ethernet/IP™ simplify programming to control the system from a PLC.

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.



## 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.



### 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

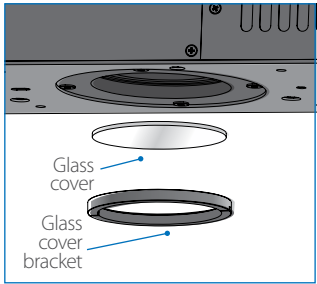
### Stable operation even in dusty or wet environments

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.

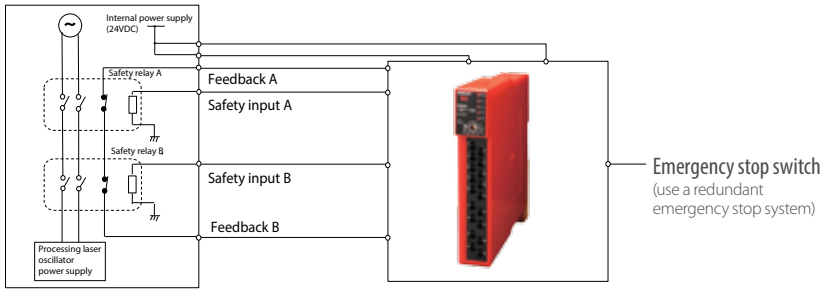


The double glass cover makes it easier and safer to change the glass.

## 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.



MX-Z2000H series internal interlock circuit

Monitor safety relay (use interactive monitoring, such as G95E)

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

### 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.

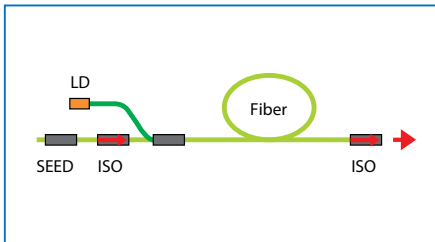
# Omron's fiber laser technology

All-fiber lasers provide high quality, high stability, long life

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

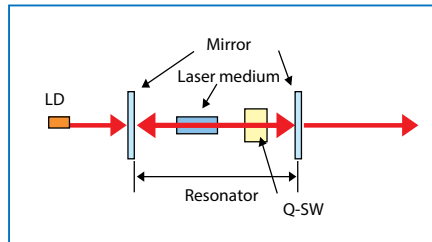
Typical solid-state lasers use mirrors to resonate and amplify the laser, and then Q-switching to output the laser. However, this approach makes it difficult to achieve a high quality and flexible laser. It also leaves something to be desired in the areas of reliability and durability. Omron's unique 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



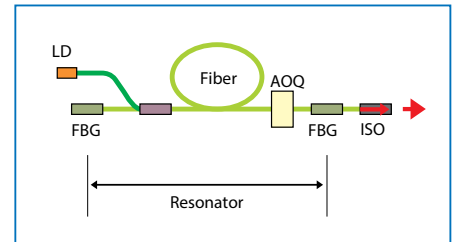
- Wide range of pulse repetition frequency settings
- High flexibility for setting the pulse width and shape
- High beam quality, high stability, long life

### Typical solid-state laser

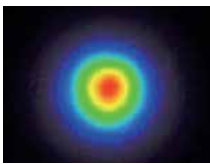


- Pulse width depends on the repetition frequency
- The laser diode is always on, accelerating deterioration
- Durability issues of the Q switch, mirrors, etc.

### Typical fiber laser



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



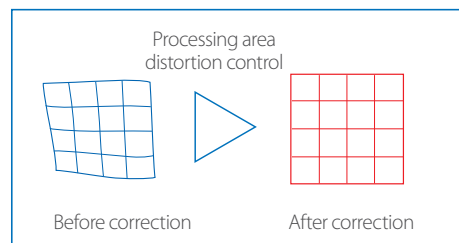
### High beam quality

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.

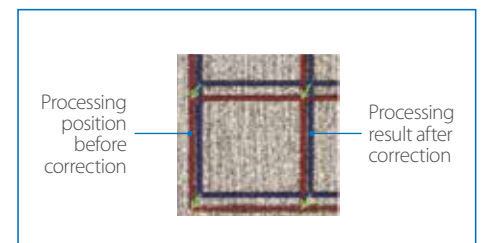
## Corrects for lens distortion

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

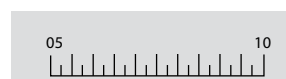
### High position resolution



### Coordination correction



Marking a scale



Marking of electronic parts in a tray

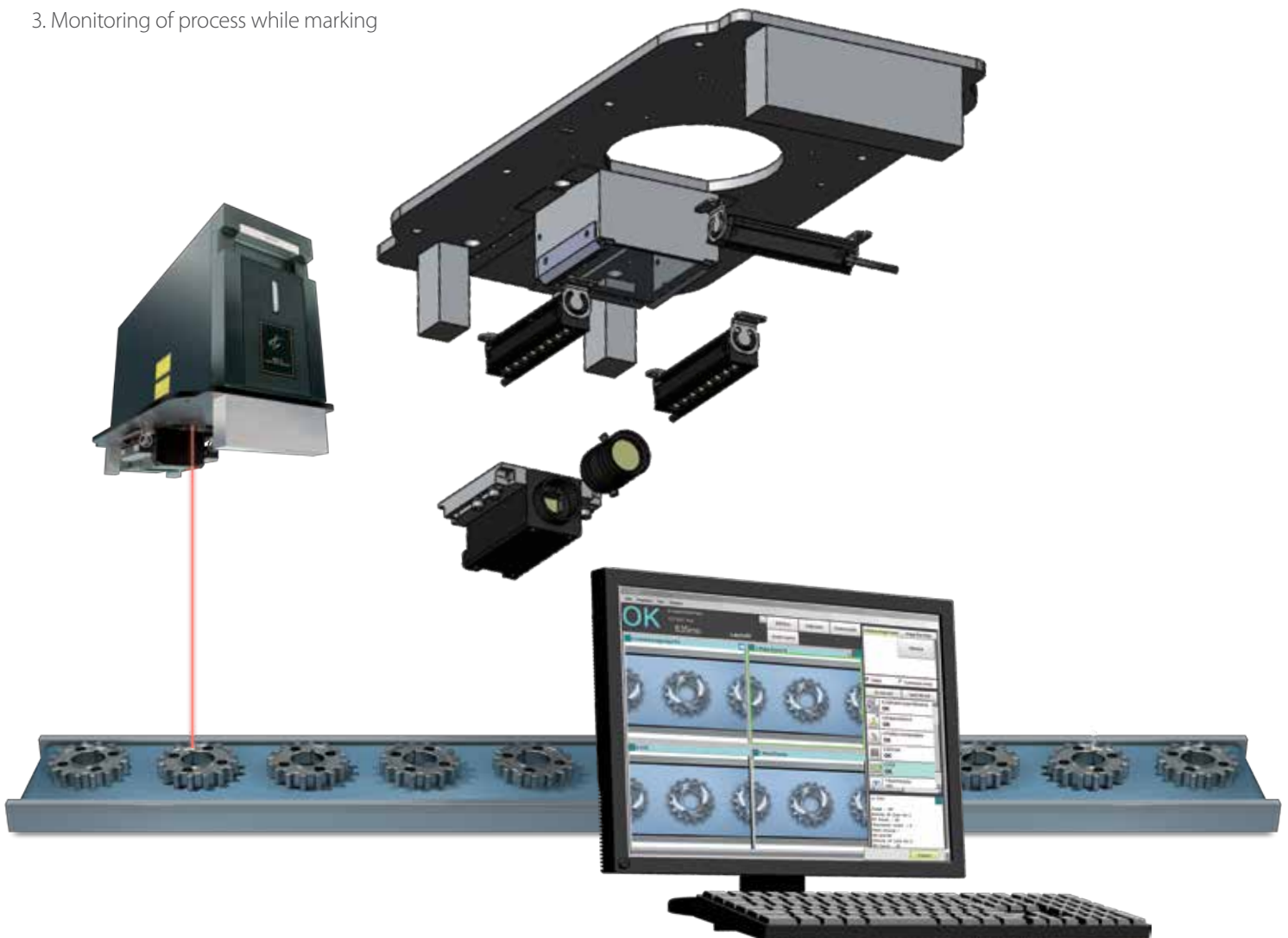


# Laser marking and vision

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:

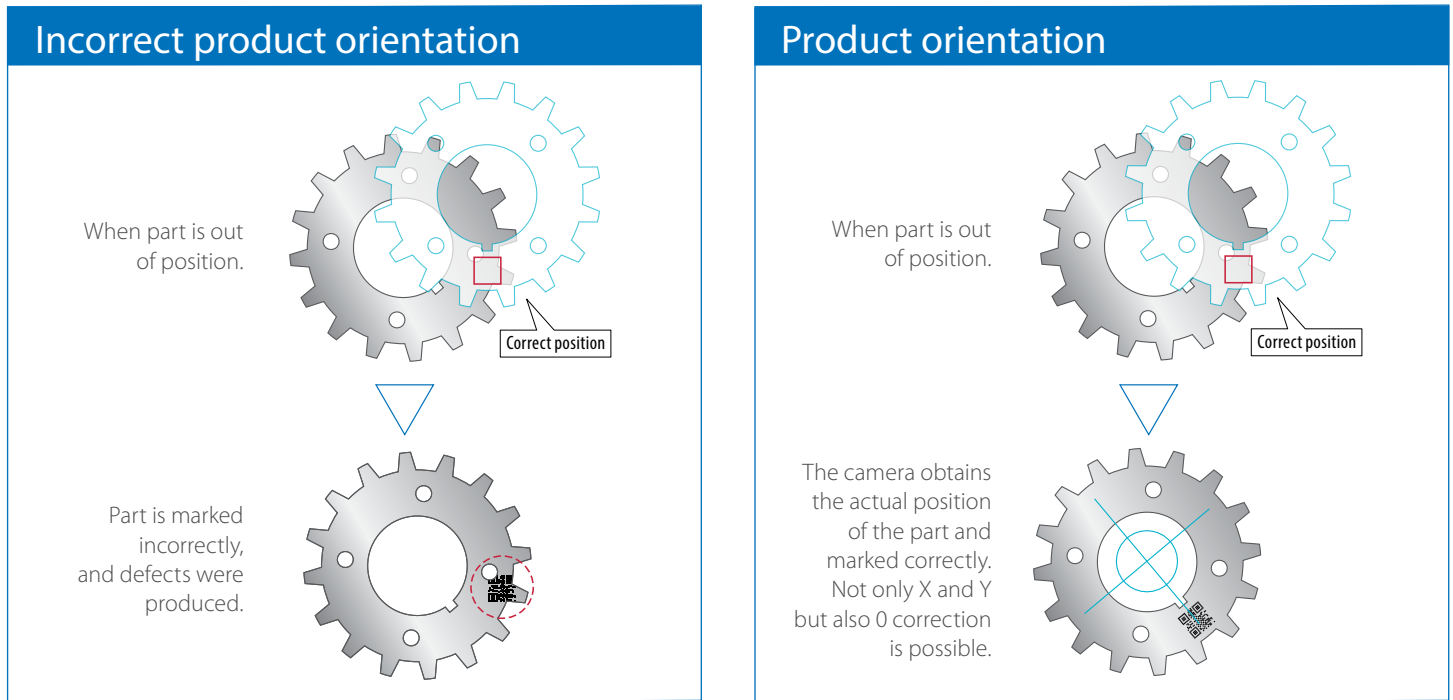
1. Correct positioning of part before marking
2. Inspection of markings
3. Monitoring of process while marking



# 1. Position-compensated marking

No mechanical position-compensation needed

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.



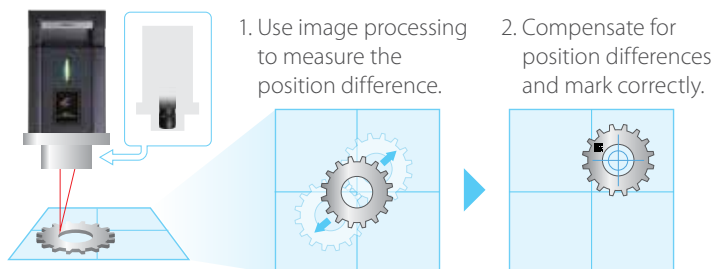
## Benefits

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

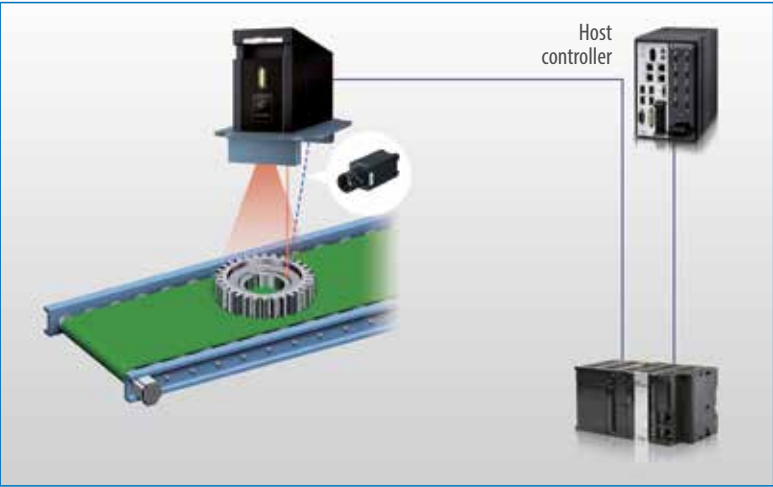
To mark a product in the same area every time, an image processing system measures the position reference, transfers the coordinates to the laser marker. The laser marker then adjusts to etch, compensate and mark in the correct place. After the laser marking is completed, the image processing system 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



# 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.

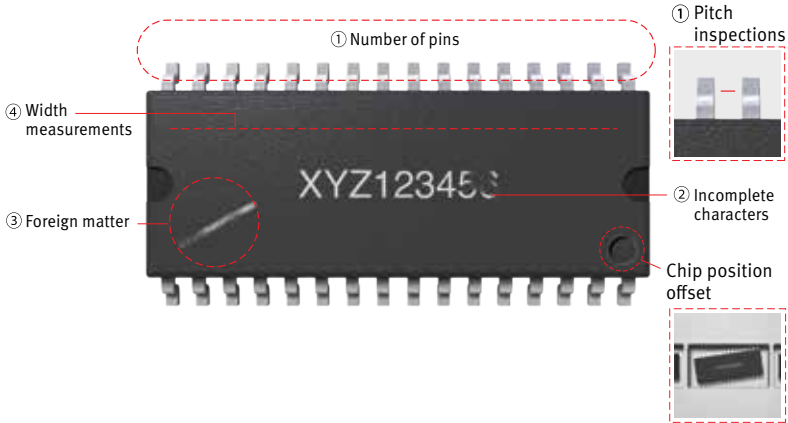
## Application examples



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



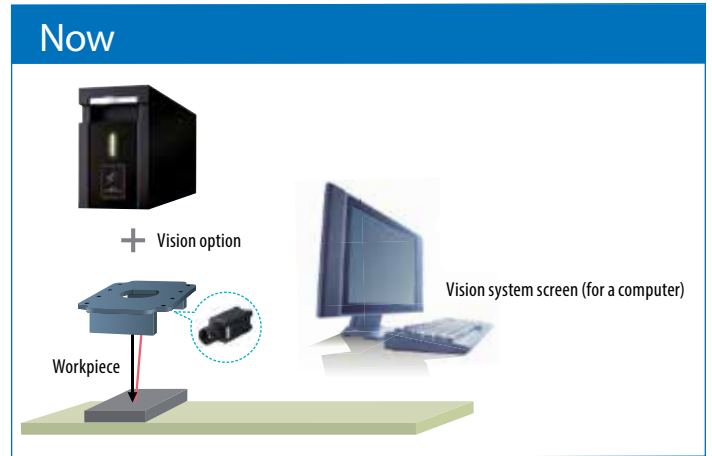
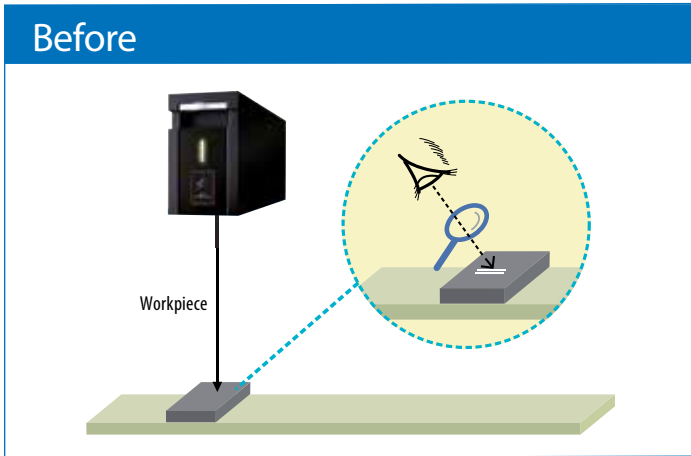
2D codes (Data Matrix) inspection on an engine block or a spark plug are required for proper traceability.



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

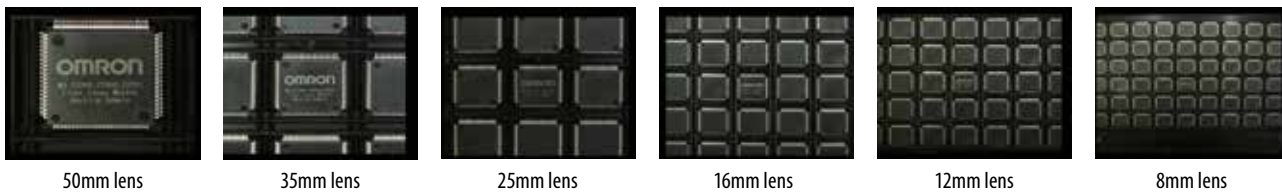


## Benefits

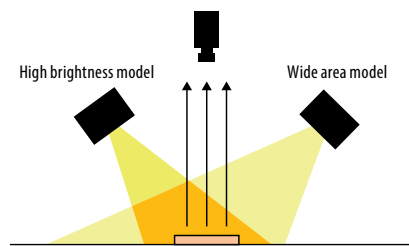
- Confirm the mark position easily on the monitor for easy visualization
- Flexibility to choose the lens and lighting that best fits for your application

## 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.



## Choose the most suitable lighting for your application



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.)

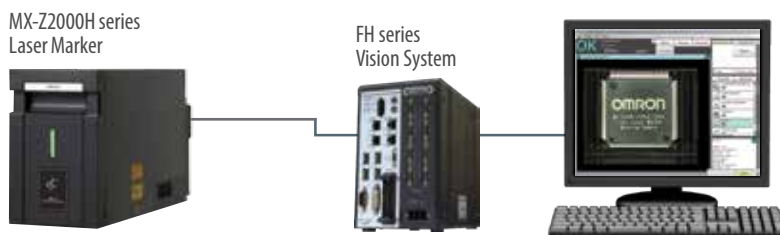
# Laser marker solutions

## 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.



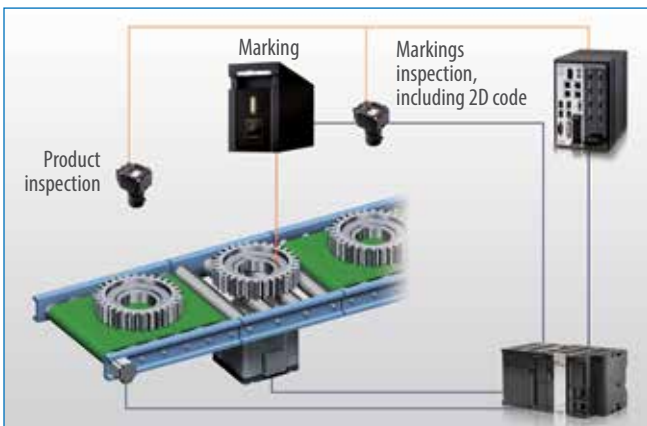
## System configuration for position-compensation and 2D inspection



# Laser marker solutions

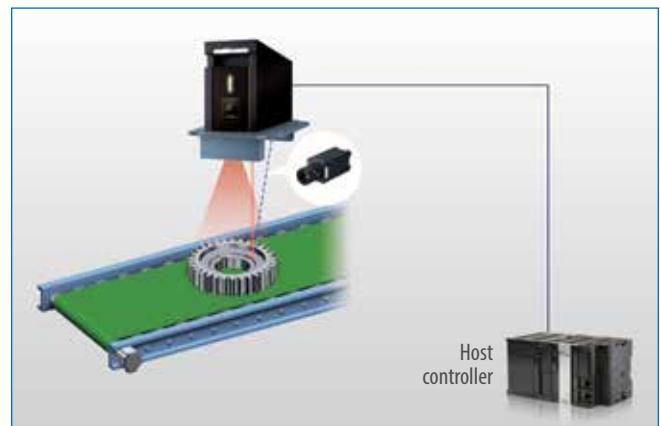
## Position-correction, marking and multiple inspection including 2D code reading

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.



### Vision system

Multiple inspections, multiple cameras, one vision controller.



### Smart cameras

Multiple inspections, one smart camera.

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



# Configure a 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.



# Ordering information

## Laser Marker

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



## Vision option device configuration

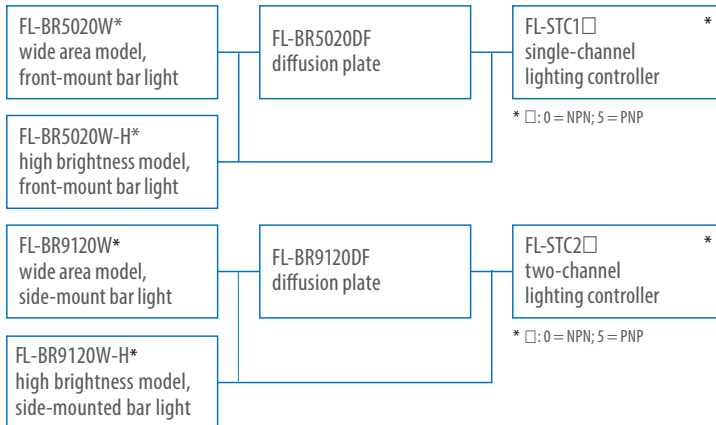




## Vision option accessories

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.



\* 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	MX-Z2050H	MX-Z2055H <sup>*1</sup>	
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	90x90mm	160x160mm	160x160mm
	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	5m minimum bending radius: 100mm		
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 40°C, 35 to 85%RH (no condensation)		
	Storage ambient temperature <sup>3</sup> , humidity	-10 to 60°C (no freezing) / 35 to 85% RH (no condensation)		
	Installation environment	Indoor, 3,000m, max		
Certifications		cULus Listed (File No. E200593), CB SG-MS-00316A1		
Applicable standards		UL 61010-1 (3rd Ed.), CAN/CSA-C22.2 No. 61010-1-12 (3rd Ed.), IEC 61010-1 (Ed. 3) IEC 60825-1, FDA (CDRH) part 1040.10, EN 61010-1:2010, EN 60825-1:2014		
Pollution degree		2		
Protection structure (head) <sup>4</sup>		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 <sup>5</sup>		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 <sup>6</sup> , 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)

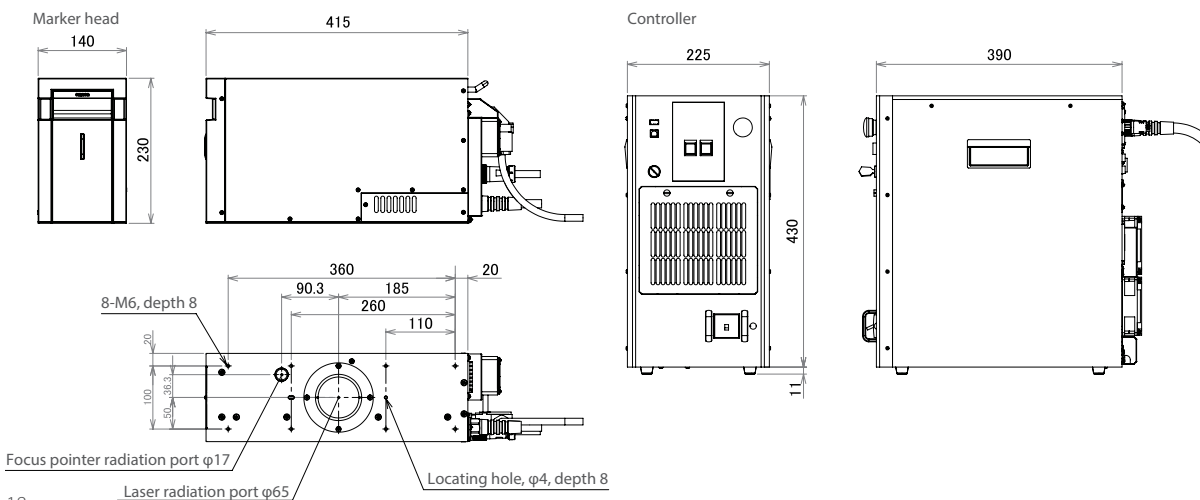
\*3 The operating temperature may be limited due to their processing conditions. When using the laser continuously or close to continuously for laser processing, etc., please contact Omron in advance.

\*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 their 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: 1,024x768, min.



# 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°C					
Ambient operating humidity	35-85%RH (no condensation)					
Ambient storage temperature	-10-60°C (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.

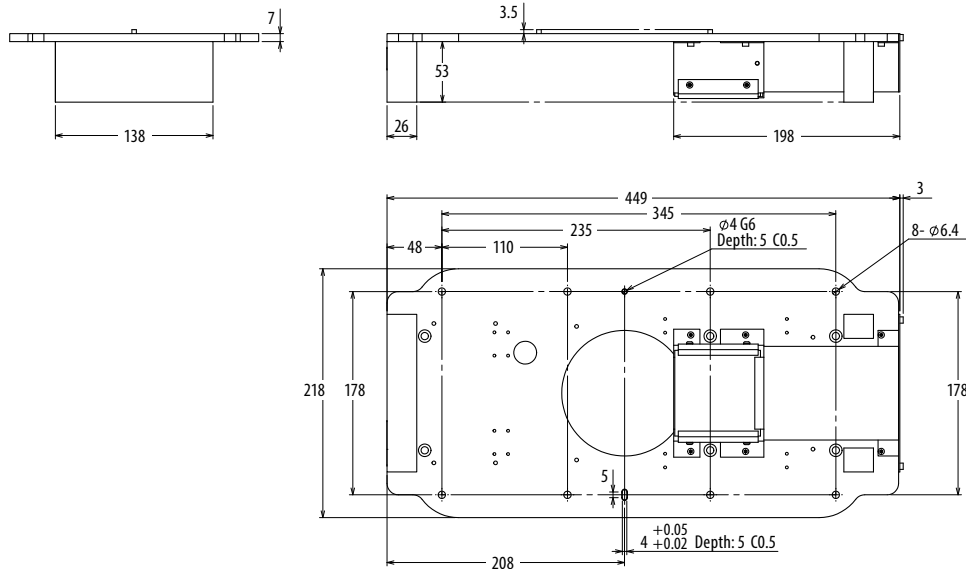
\*2 The image output from the camera is a mirror image. Mirror image processing must be performed by the camera controller.

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



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