KEYENCE

NEW 3-Axis Fiber Laser Marker
MD-F Series

50 W / 30 W High Output

Improved Environmental Resistance and Safety

MD-F Series

Continuous stable operation through high-power marking with 3D control

Combining best-in-class 50 W output and 3-Axis control, the MD-F Series greatly reduces marking and processing times as well as tooling change efforts.
In addition, incorporating environmental resistance and safety mechanisms has strengthened the laser marker's stable operation capabilities.
With consistent advanced marking and processing capabilities, the MD-F Series aims to help improve productivity.

01 HIGH POWER

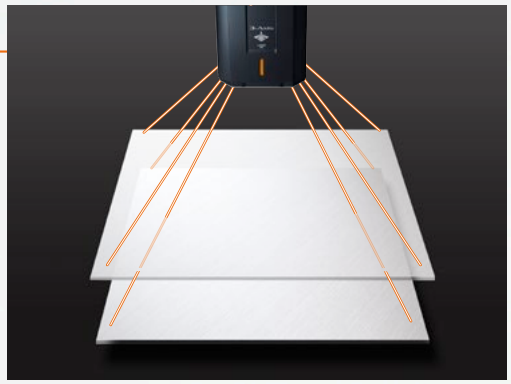
High-speed marking and deep engraving

In addition to offering high output, the MD-F Series allows users to select the optimal laser irradiation method to suit the application. This contributes greatly to improving marking quality and shortening marking times, both important factors for manufacturing.

02 WIDE & 3-AXIS

Flexible installation

The 3-axis control mechanism enables clear marking not only on flat surfaces but also on 3D shapes. This reduces the effort spent on tooling changes when changing products and marking positions.



03 TOUGH & SAFE

Stable operation and robust hardware design

In addition to an environmentally resistant design, the MD-F Series is equipped with a safety mechanism offering excellent operability. The ability to prevent trouble before it begins and to minimize the amount of time the line is stopped allows for stable operation and improved productivity.

3-Axis Fiber Laser Marker
MD-F Series

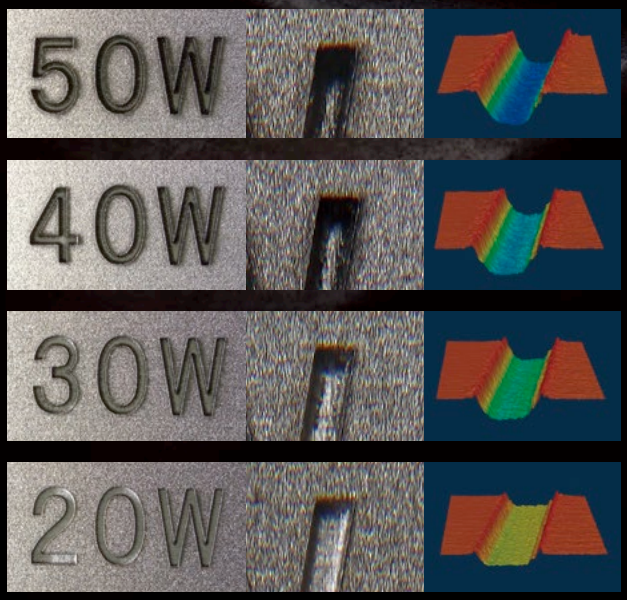
HIGH POWER

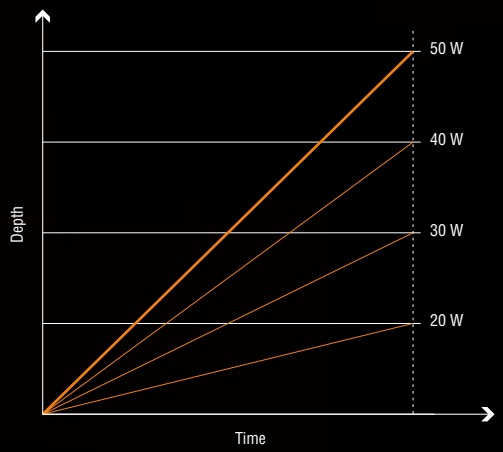
01 High-speed marking and deep engraving

Users are able to select the optimal scanner control according to the application, including deep engraving, black-annealed marking, and cutting. Taking full advantage of the fiber laser's power, the MD-F Series makes it possible to make great improvements in both processing time and quality.

50 W / 30 W High Output

In addition to the 30 W model, a 50 W model with best-in-class output has been added to our lineup. High power output lasers are capable of digging deeper into materials and improving marking times.

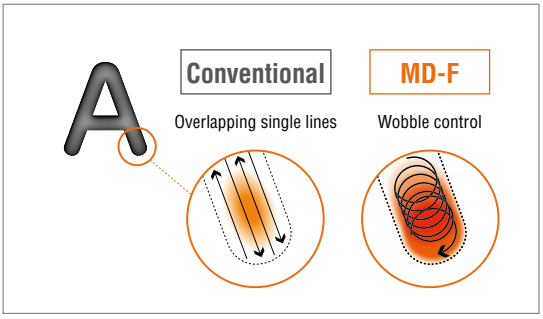




* These are representative values. They will vary depending on the material and marking conditions.

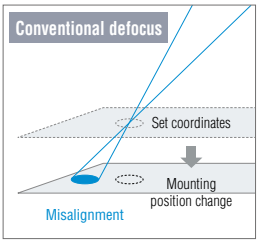
High-quality annealing

With conventional models, single lines were overlapped, and energy was lost as the laser beam moved back and forth. With Wobble control, the laser moves in a circular pattern to create a thick character and keep the energy concentrated. Increasing the heat storage effect allows black-annealed marking to be easily performed.

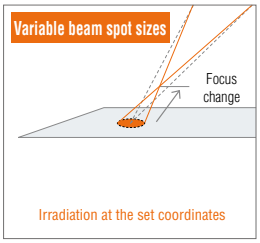


Variable beam spot and de-focusing

When creating fine marks that do not damage the surface of the target, de-focusing the laser intentionally is one technique that works very well on plastics, resins and metals. Our 3-Axis systems can internally make these adjustments with a simple software setting therefore eliminating the need to make physical adjustments and internally processing the correct X/Y/Z offset to eliminate mis-marking and distortion.



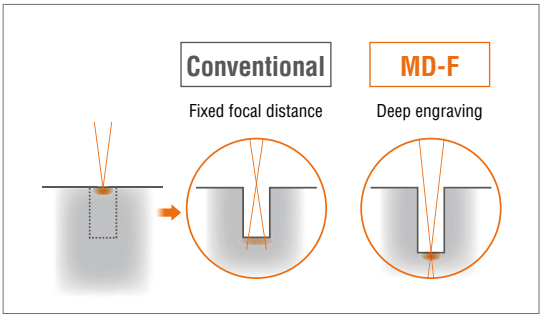
Because the mounting position is physically shifted, the irradiation position and character size are also misaligned in relation to their settings.



Only the spot size is changed by changing the focal point. Laser irradiation at the desired coordinates and with the desired spot size is possible.

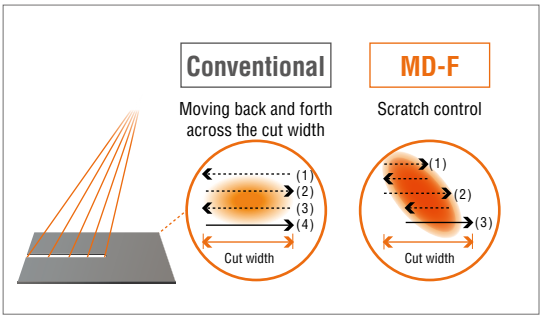
Deep engraving

Because of a fixed focal point in conventional models, as the target is engraved, the surface being processed gradually moves further away from the focal point, making it impossible to apply sufficient energy. With deep-engraving control, the focal distance is changed after each pass, allowing for processing with maximum energy density at all times.



Cutting

The conventional method of moving back and forth across the cut width makes it difficult to keep the energy concentrated. Energy loss occurs in proportion to the cut width. With Scratch control, processing is done by moving the laser beam back and forth across a shorter distance. This makes it possible to focus the energy, which leads to improvements in processing time.



WIDE & 3-AXIS

02 Flexible installation

"3-Axis Technology" was first developed by KEYENCE and installed in their marking systems in 2006. This unique technology has brought innovation to laser marking, which conventionally only had a fixed focal distance. Such innovation paved the way for clear marking over a large area without having to manually reposition the laser.

3-axis control

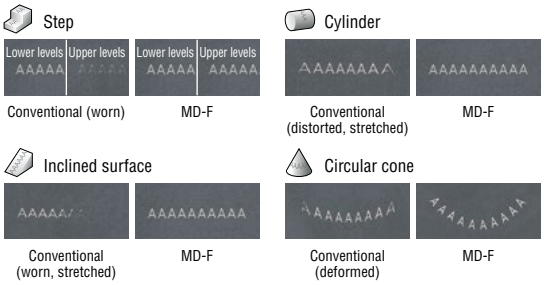
The focal point, which is normally fixed, can be changed to an arbitrary position. This allows for marking and processing in which the focal point is always perfectly focused on the target's surface.

Wide area models

High precision marking can be performed over a 300 mm × 300 mm 11.81" × 11.81" area. The MD-F Series also has a 42 mm 1.65" variable focal distance, which allows for unparalleled accuracy.

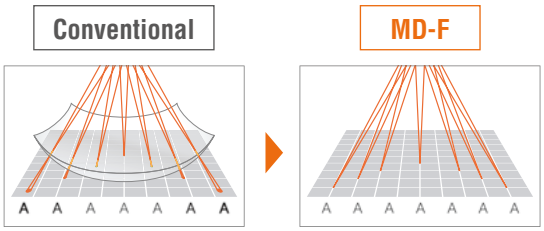
3D marking

The MD-F Series is equipped with 3-axis control, a function for controlling the beam spot to match the target shape, including stepped, inclined, cylindrical, and cone targets. Character distortion and flaws are kept to a minimum, resulting in beautiful marking that perfectly fits the 3D shape.



Area uniformity

With conventional laser markers, changes in character shape, distortion, and beam spot size variations are common, all of which are caused by the characteristics of the fθ lenses. The MD-F Series doesn't use an fθ lens, and provides high planar accuracy and beam spot uniformity over the entire area thanks to 3-axis control. This allows for reliable marking even with tasks requiring high accuracy.

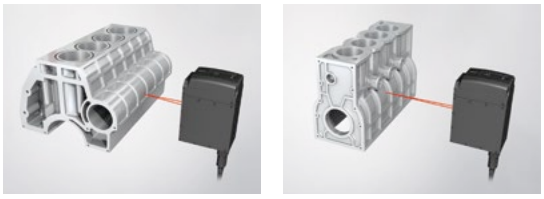


Characters become thicker and their positions are offset the closer they are to the edge of the area.

Uniform line width and high precision are maintained in the entire area.

Eliminating tooling changes with 3-axis programming

With 3-Axis technology, it is possible to register target shapes in advance in order to change focal distances, marking positions, and shapes just by changing the program. Because tooling changes can be completed without physically moving the target or the laser marker, flexible processing of multiple products can be performed on a single line.



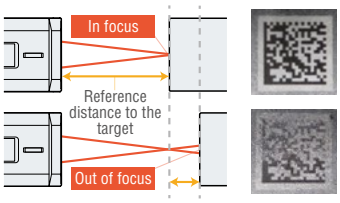
Close range

Long range

Auto-focus

Using the MD-F Series together with a displacement sensor allows for consistently focused marking. Blurred marking due to a focal deviation is prevented. In addition, marking and processing can be performed while compensating for changes in material thickness. This not only reduces production costs but also contributes to improvements in quality.

Comparison of marking results using proper/improper focal distance



TOUGH & SAFE

03 Stable operation and robust hardware design

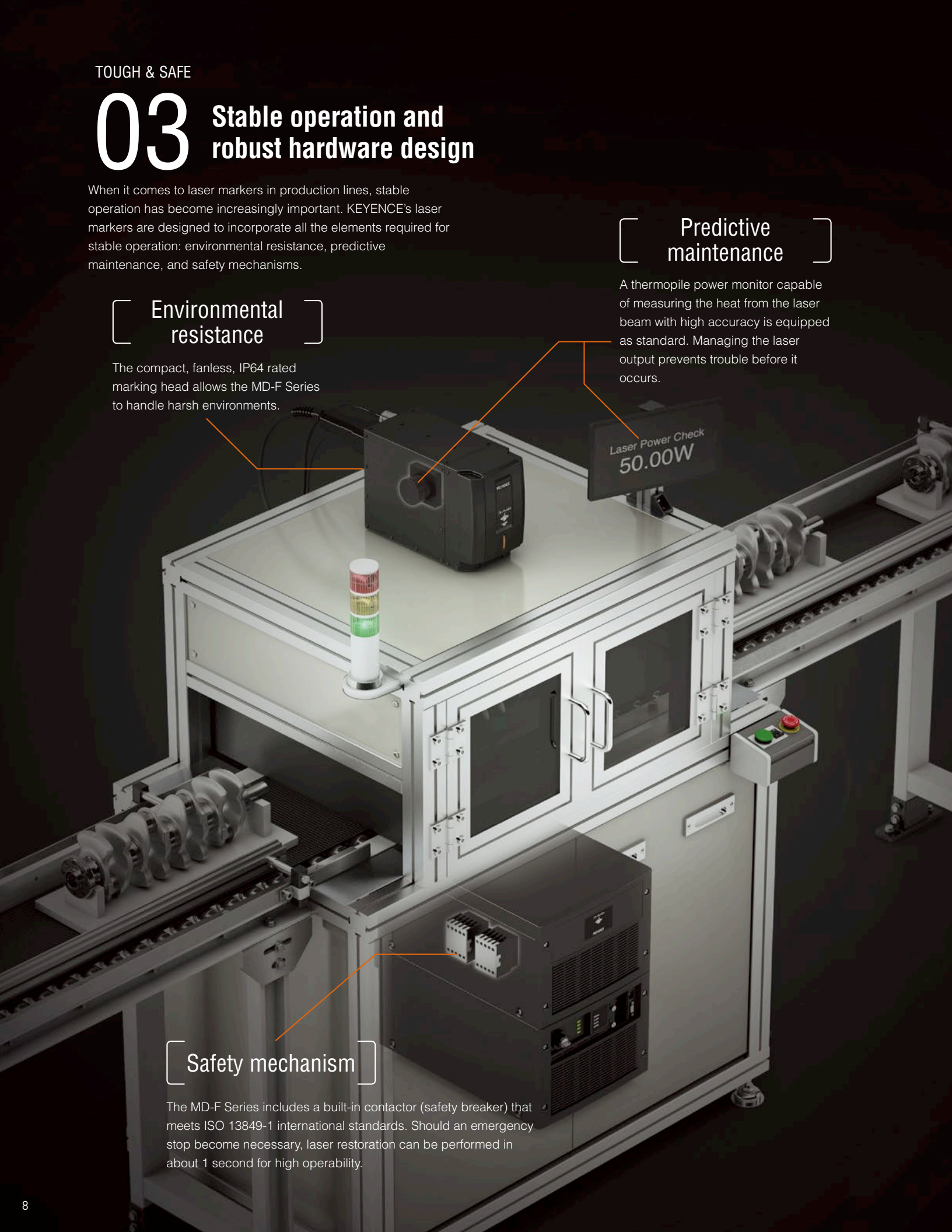
When it comes to laser markers in production lines, stable operation has become increasingly important. KEYENCE's laser markers are designed to incorporate all the elements required for stable operation: environmental resistance, predictive maintenance, and safety mechanisms.

Environmental resistance

The compact, fanless, IP64 rated marking head allows the MD-F Series to handle harsh environments.

Predictive maintenance

A thermopile power monitor capable of measuring the heat from the laser beam with high accuracy is equipped as standard. Managing the laser output prevents trouble before it occurs.

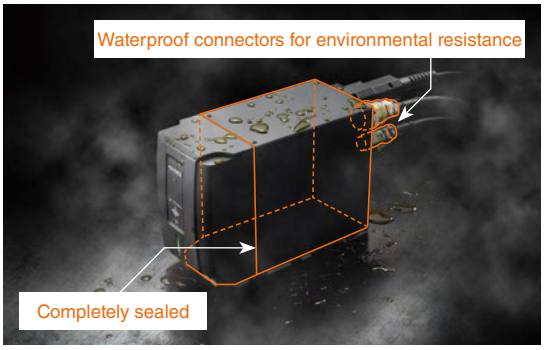


Safety mechanism

The MD-F Series includes a built-in contactor (safety breaker) that meets ISO 13849-1 international standards. Should an emergency stop become necessary, laser restoration can be performed in about 1 second for high operability.

Compact, fanless marking head with IP64 rating

The natural air cooled system offers a completely sealed, fanless structure. The internal components of the MD-F Series are not affected by hazardous elements such as dirt, dust, water, and oil mist. This gives the MD-F Series environmental resistance that allows for its use in the harshest manufacturing environments.
[Enclosure rating: IP64]

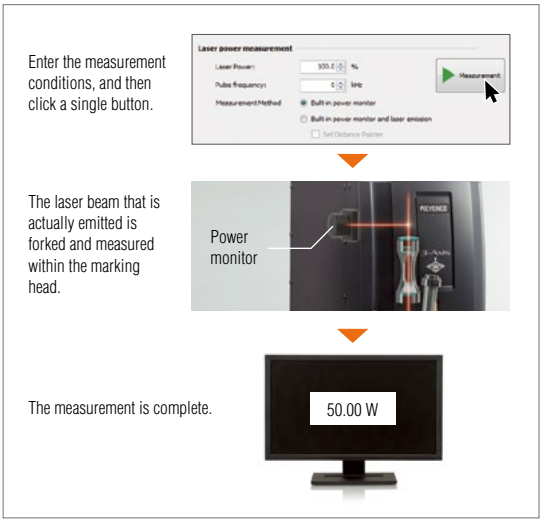


Built-in thermopile power monitor

A thermopile power monitor is standard-equipped inside the marking head. Power output management, the most important aspect of laser marker equipment maintenance, can be performed easily, accurately, and with minimal time.

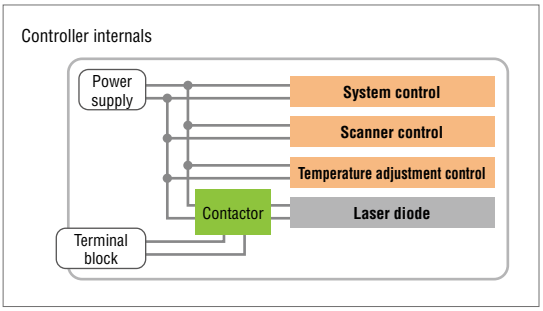
What is a thermopile power monitor?

To accurately monitor the output power of the laser, the amount of heat generated must be measured. In the case of high-power laser markers, the conventional method is to measure the amount of light generated, however this leads to inaccurate measurements because the laser beam can only be detected when it is significantly attenuated. With the thermopile method, even the output of high-power lasers can be measured with high precision.



ISO 13849-1 compliant (with built-in contactor)

To meet the international standards in ISO 13849-1, the MD-F Series is available with a built-in contactor. Thanks to two safety contactors incorporated inside the controller, power to the laser unit can be cut off as needed.
* Models with a built-in contactor are signified by the suffix “C”.



High operability with only about 1 second required for restoration

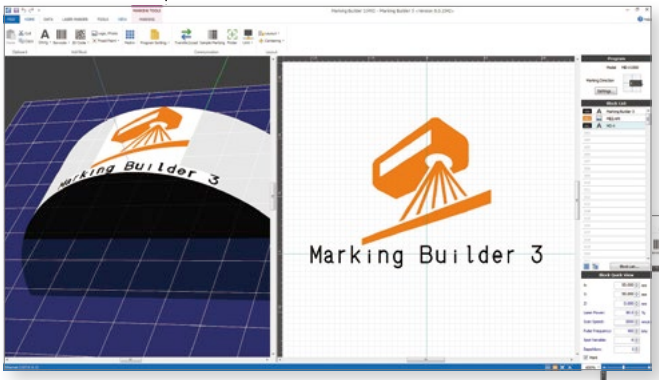
The emergency stop input for conventional models would cut power to the temperature adjustment control process in addition to the laser diode process, meaning getting back to marking ready status took a long time.
The contactor, however, blocks only the laser diode, allowing for high operability with restoration taking only about 1 second.

Marking Builder 3 OPTIONAL

The Marking Builder 3 software suite was developed to bring out the high performance of the MD-F Series in an easy to use graphical interface. Even users with no experience in laser programming can easily begin programming very complex marking setups.

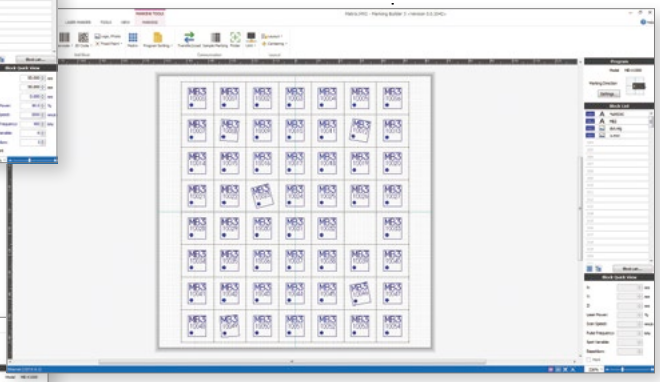
BASIC SETTINGS

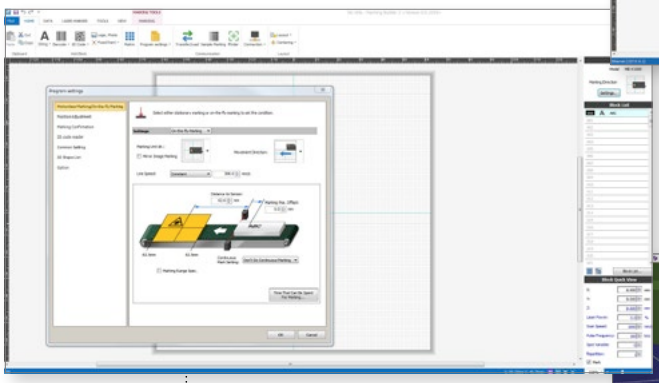
Settings for three-dimensional shapes can be configured in three steps by following the on-screen guidance. The 3D preview can be used to check alignment and view finished programs in 3D. It is also easy to import and edit logo data.



MATRIX MARKING

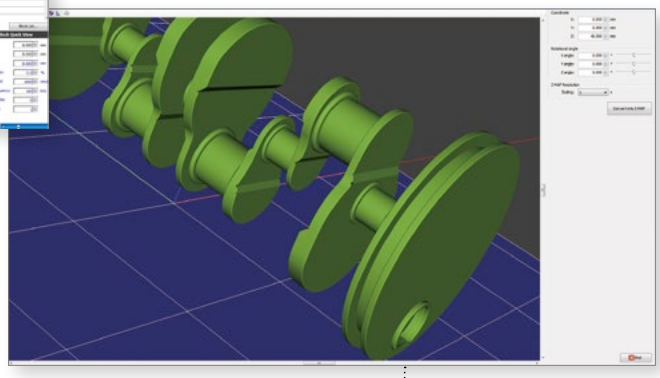
Thousands of items can be arranged in a batch marking layout for optimum marking of products in a palette. This software also links easily with a vision system in order to turn on and off individual target positions and adjust the X/Y/Theta position of individual targets.





MOVING MARKING

High quality marking is possible on flat and curved moving targets. The laser is programmed according to the installation conditions, so even first-time users can easily configure the settings.

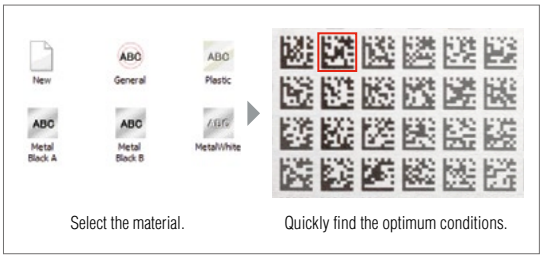


Z-MAP CREATOR

Using 3D CAD data (STL format), the actual profile of the target can be imported into Marking Builder 3 and used as the base of the layout. This enables users to configure settings and perform marking on targets that have complicated profiles that cannot be expressed with basic shapes such as cylinders and step height changes.

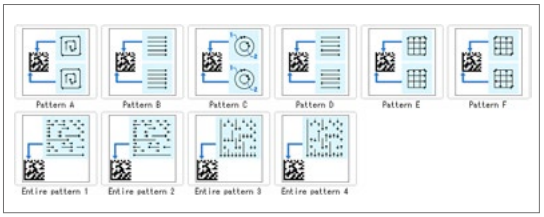
Sample marking function

The software automatically extracts the optimum marking settings when the user selects the material type. The optimum conditions can be found quickly from the list of marking results. A wealth of experience was conventionally required to set the marking conditions, but this can now be done easily and in a short length of time.



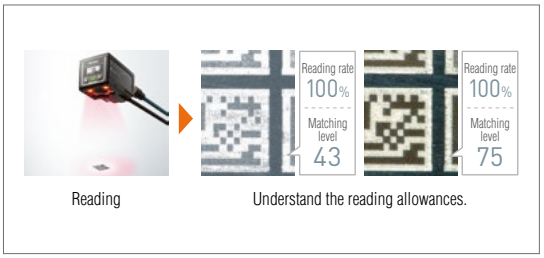
2D code pattern selection

Marking patterns can effect the way a barcode is illuminated and how well it is identified by the code reader. The Marking Builder 3 software allows for ultimate flexibility in pattern selection with more than 10 patterns to choose from and many more combinations possible.



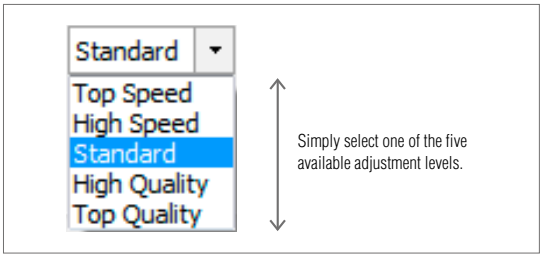
Matching level judgment function

For 2D code marking, KEYENCE's SR-1000 Series 2D code reader is able to quantify reading allowances just by reading marking results. This allows users to identify the optimal marking conditions from Sample marking based on reading stability rather than visual appearance.



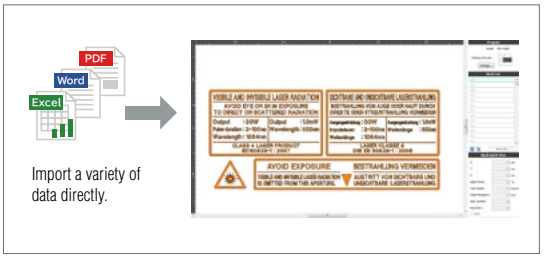
Quality adjustment level

The software automatically calculates the adjustments needed to either emphasize higher speed or higher quality by simply selecting the quality level desired. Absolutely no complicated operations are necessary, so anyone can easily make adjustments that allow for full use of the performance of the laser marker.

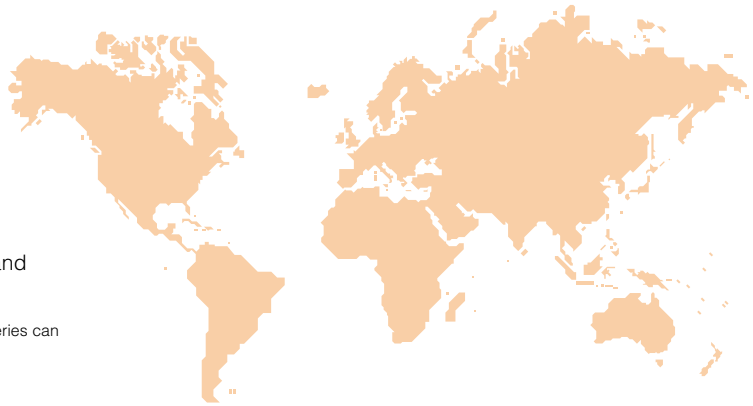


Printer driver function

A variety of data—such as Excel, Word, PDF, and bitmap files—can be imported directly into the laser marker software. There is no need to convert or edit the desired data, which makes it possible to easily perform laser marking the same way as printing a document from an office printer.



Global models



The MD-F Series supports various international standards and regulations.

*Contact KEYENCE for details on the countries and areas in which the MD-F Series can be used.

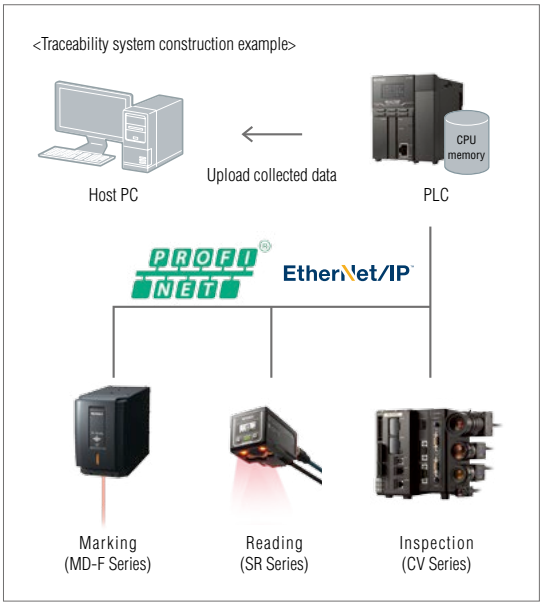
Easy connection to peripheral equipment

PROFINET, EtherNet/IP™

Peripheral equipment connectivity and networking capabilities have been improved with the addition of PROFINET and EtherNet/IP™ communication. This also makes it possible to connect to devices remotely in order to check on operations and save communication history. In addition, connection between individual devices is possible with just a single LAN cable via Ethernet.
Visualization of product information and individual equipment statuses makes creation of a traceability system easy.

Total support from KEYENCE

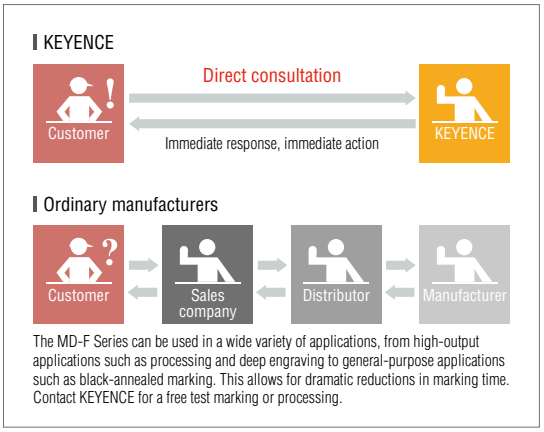
KEYENCE also offers peripheral marking process equipment. With equipment provided by the same manufacturer, cooperation between devices increases and installation and setup effort is reduced. Responding to unforeseen troubles is also quicker.



Global support system

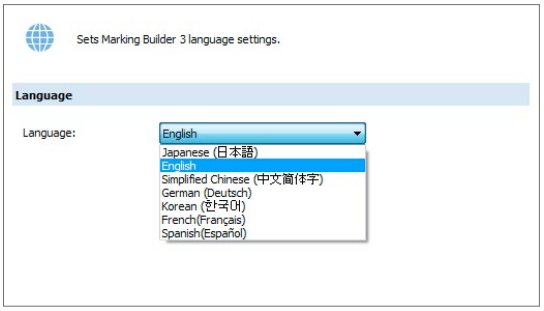
Follow-up assistance from both national and local staff

KEYENCE provides generous support from both national technical staff and local technical staff even for customers with production bases overseas. Because KEYENCE is a direct sales manufacturer, customers are able to receive responses in a very short time.
When going through a distributor, troubleshooting takes time and often is only available in the local tongue.



One-click language switching

With the Marking Builder 3 laser marker configuration software, switching languages is as easy as selecting the language from a pull-down menu. In addition, a rich lineup covering seven languages is available for trouble-free configuration of settings no matter where the software is being used or who is using it.



Power output selected based on application

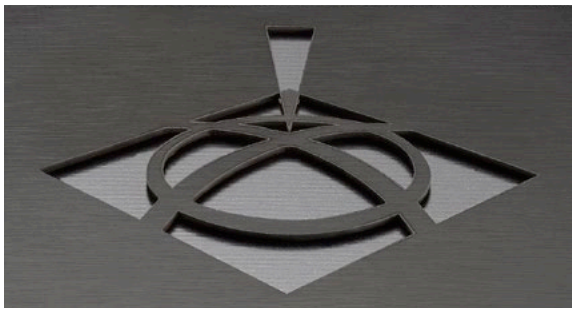
The optimum solution for marking on metals, resins, ceramics, and a variety of other materials. This laser is also commonly used for processing thin films.

MD-F Series (50 W)

ENGRAVING
(PAINTING AFTER MARKING) (Vehicle body frames)

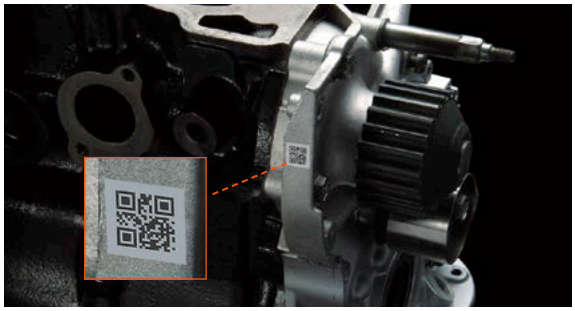
High visibility is guaranteed even if painting is performed after marking.

PROCESSING
(CUTTING) (Aluminum sheets)



Processing can be performed in less time, so target deformations due to heat are reduced.

HIGH-SPEED 2D CODE MARKING (Engine blocks)



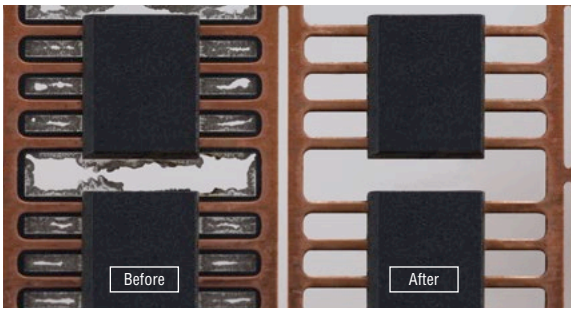
2D codes are marked at high speeds even on casted surfaces. This makes quality improvements and reductions in marking time possible.

MD-F Series (30 W)

BLACK-COLOR MARKING (Bearings)

The MD-F Series achieves distinct black-color marking without swelling or cracks.

BURR REMOVAL (Frame ICs)



Burrs can be removed with high precision and without damaging the frames.

ETCHING (Key cylinders)

Marking can be performed in which only the surface of the target is etched.

KEYENCE LASER MARKER LINEUP

The following lineup makes it possible to select a laser marker according to its desired application.
KEYENCE provides the optimum solution for any laser marker application.

3-Axis Control Laser Markers

- Variable focal distance
- Wide area models
- Marking on three-dimensional objects
- Variable beam spot sizes

3-Axis Fiber Laser Marker
MD-F Series

The optimum solution for black-color marking and engraving on metal where a high output power is required.

3-Axis UV Laser Marker
MD-U Series

The optimum solution for marking when high contrast is desired with minimal surface damage.

3-Axis Hybrid Laser Marker
MD-X Series

The most versatile, general purpose marking solution for resins, plastics, films, foils and metals.

3-Axis CO_2 Laser Marker
ML-Z Series

The optimum solution for marking materials such as resin and paper and for processing thin films.

Telecentric laser marker

- Perpendicular marking over the entire area
- ø20 µm ø0.79 Mil SHG laser
- Ultra-rigid body
- Built-in coaxial camera

Telecentric Laser Marker
MD-T

The optimum solution for micron-level marking and trimming applications in which high precision is required.

MARKING EXAMPLES

Character size (Typical examples)

0123456789
ABCDEFGHIJKLMNOPQRSTUVWXYZ

0123456789
ABCDEFGHIJKL
abcdefghijkl

Logo mark

Barcode

CODE39 ITF

2D code

Data Matrix QR

GS1 DataBar

(01) 04912345678904

bmp/jpg data

SPECIFICATIONS

		30 W		50 W	
		Standard area	Wide area	Standard area	Wide area
Model	Marking unit (Controller + Head)	**MD-F3200** **MD-F3200C**[*1]	**MD-F3220** **MD-F3220C**[*1]	**MD-F5200** **MD-F5200C**[*1]	**MD-F5220** **MD-F5220C**[*1]
	Console (sold separately)	**MC-P1**			
Marking method		XYZ 3-axis simultaneous scanning method			
Marking laser		Yb: Fiber laser (Class 4 laser product; IEC/EN60825-1, JIS C6802, FDA (CDRH) Part 1040.10[*2] , GB7247.1)			
	Wavelength	1090 nm			
	Output	30 W		50 W	
Pulse frequency		60 to 120 kHz			
Guide laser/Working distance pointer		Semiconductor laser, Wavelength: 655 nm, Output: 1.0 mW (Class 2 laser product; IEC/EN60825-1, JIS C6802, FDA (CDRH) Part 1040.10[*2] , GB7247.1)			
Marking area		125 × 125 × 42 mm 4.92" × 4.92" × 1.65"	300 × 300 × 42 mm 11.81" × 11.81" × 1.65"	125 × 125 × 42 mm 4.92" × 4.92" × 1.65"	300 × 300 × 42 mm 11.81" × 11.81" × 1.65"
Standard working distance (±variable width)		168 mm (±21 mm) 6.61" (±0.83")	300 mm (±21 mm) 11.81" (±0.83")	168 mm (±21 mm) 6.61" (±0.83")	300 mm (±21 mm) 11.81" (±0.83")
Marking resolution		2 µm 0.08 Mil	5 µm 0.20 Mil	2 µm 0.08 Mil	5 µm 0.20 Mil
Scan speed		Max. 12000 mm/s 472.44"/s	Max. 8000 mm/s 314.96"/s	Max. 12000 mm/s 472.44"/s	Max. 8000 mm/s 314.96"/s
Character type	Font	KEYENCE original font (numbers, letters, katakana, hiragana, kanji), User fonts, True Type fonts			
	Barcode	CODE39, ITF, 2of5, NW7 (CODABAR), JAN, CODE128, EAN, UPC-A, UPC-E, CODE93			
	2D code	QR code, Micro QR code/DataMatrix (ECC200/GS1 DataMatrix)			
	GS1 DataBar	GS1 DataBar, GS1 DataBar CC-A, GS1 DataBar Stacked, GS1 DataBar Stacked CC-A, GS1 DataBar Limited, GS1 DataBar Limited CC-A, GS1 DataBar Truncated, GS1 DataBar Truncated CC-A			
	Logo image	Custom character font and logo CAD data, BMP/JPEG/PNG/TIFF			
Marking conditions	Workpiece style	Stationary/moving marking (constant speed/encoder)			
	Character size (marking height/width)	0.1 to 125 mm 0.004" to 4.92"	0.1 to 300 mm 0.004" to 11.81"	0.1 to 125 mm 0.004" to 4.92"	0.1 to 300 mm 0.004" to 11.81"
	No. of registered programs	Max. 2000 programs			
	No. of program blocks	256 blocks			
I/O (Input/output)		Terminal block I/O, MIL connector I/O, Connector control I/O[*3]			
Interfaces		RS-232C, USB 2.0, Ethernet (100BASE-TX/10BASE-T)[*4]			
Head installation direction		All directions			
Head cable length		4.0 m 13.1'			
Cooling method		Controller: Forced air cooling, Head: Natural air cooling			
Rated voltage and power consumption		Single-phase 100 to 120 VAC/200 to 240 VAC ±10%, 50/60 Hz, Max. 550 VA		Single-phase 100 to 120 VAC/200 to 240 VAC ±10%, 50/60 Hz, Max. 750 VA	
Overvoltage category		II			
Pollution degree		2			
Enclosure rating (Head)		IP64			
Environmental resistance	Ambient temperature for storage	-10 to 60°C 14 to 140°F (No freezing)			
	Ambient temperature for usage	0 to 40°C 32 to 104°F			
	Ambient humidity for storage	30 to 85% RH (No condensation)			
	Ambient humidity for usage				
Weight	Controller	24.0 kg		25.0 kg	
	Head	6.7 kg			
	Console	2.0 kg			
Applicable regulations		EU directive (EMC directive, machinery directive, RoHS directive), EN standard (EN 55011, EN ISO 11553-1, EN 60204-1, EN 60825-1, EN 61000-6-2, EN 50581), CSA and UL standards (CAN/CSA C22.2 No. 61010-1-12, UL 61010-1), North America regulations (FCC Part 15B, ICES-001 Class A), China RoHS			

*1 Type equipped with contactor control terminal block
*2 The laser classification for FDA (CDRH) is implemented based on IEC60825-1 in accordance with the requirements of Laser Notice No. 50.
*3 Applicable models: MD-F3200C/F3220C, MD-F5200C/F5220C
*4 The USB port is designed for use with USB memory sticks, barcode readers, mouses (A connector), and Marking Builder 3 (ActiveX) (B connector).
The Ethernet port supports communication with Marking Builder 3 (ActiveX), TCP/IP communication, PROFINET connection, and EtherNet/IP™ connection.
• PROFINET is either a registered trademark or a trademark of PROFIBUS Nutzerorganisation e.V. • EtherNet/IP™ is either a registered trademark or a trademark of ODVA.

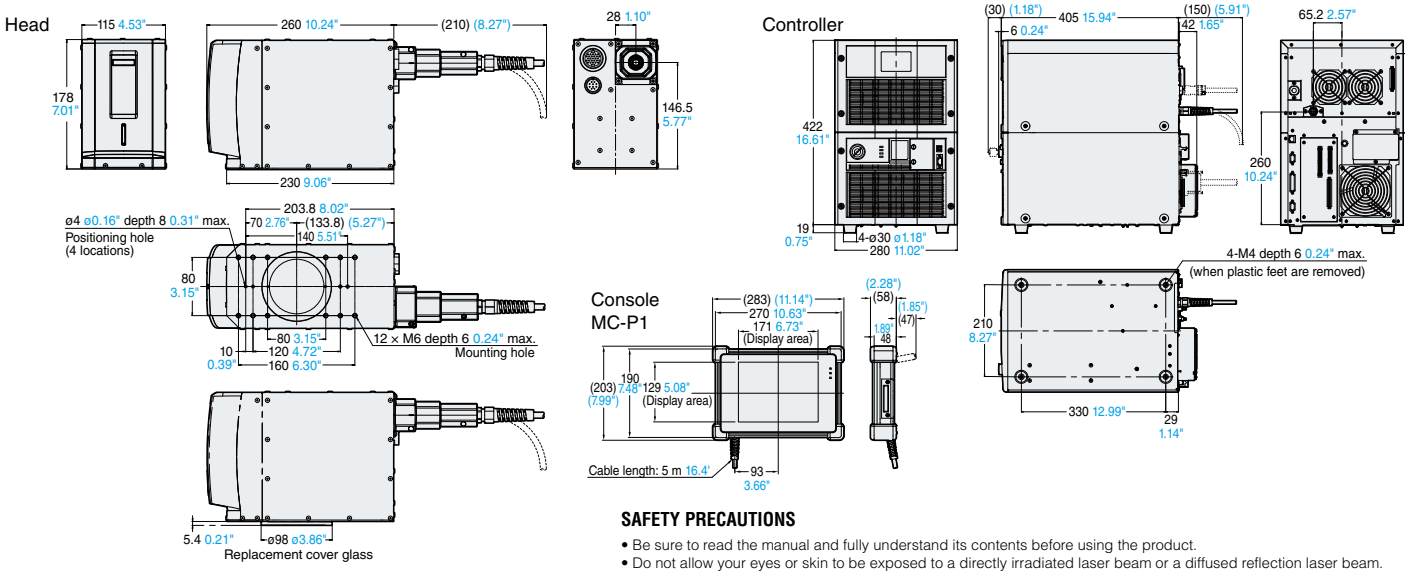
PC SOFTWARE SPECIFICATIONS (OPTIONAL)

Model	Description
MB3-H2D4-DVD	Marking Builder 3 Version 4[*1] 2D setting and editing software (focal distance, inclination correction, variable spot, distance pointer adjustment)
MB3-H3D1	3D add-in software for Marking Builder 3 (marking on plane, cylinder, cone, or sphere; Z-MAP marking)

*1 Marking Builder 3 Version 2 and Version 3, and Marking Builder 2 Version 7 are also available.
• Supported operating systems: Windows 10, 8.1, 8, 7 (SP1 or later). Supported languages: English, Japanese, Simplified Chinese, German, Korean, French, Spanish, Thai, Italian.
• Windows is either registered trademark or trademark of Microsoft Corporation in the United States and/or other countries.

DIMENSIONS

Unit: mm inch



SAFETY PRECAUTIONS

• Be sure to read the manual and fully understand its contents before using the product.
• Do not allow your eyes or skin to be exposed to a directly irradiated laser beam or a diffused reflection laser beam.

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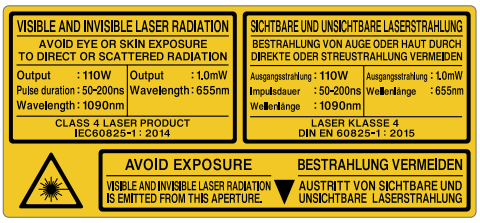

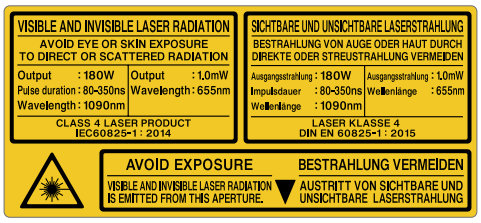

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SAFETY INFORMATION
Please read the instruction manual carefully in order to safely operate any KEYENCE product.

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