

# KEYENCE

**NEW** Environment Resistant,  
Air-cooled High Power YAG Laser Marker  
MD-H9800 Series

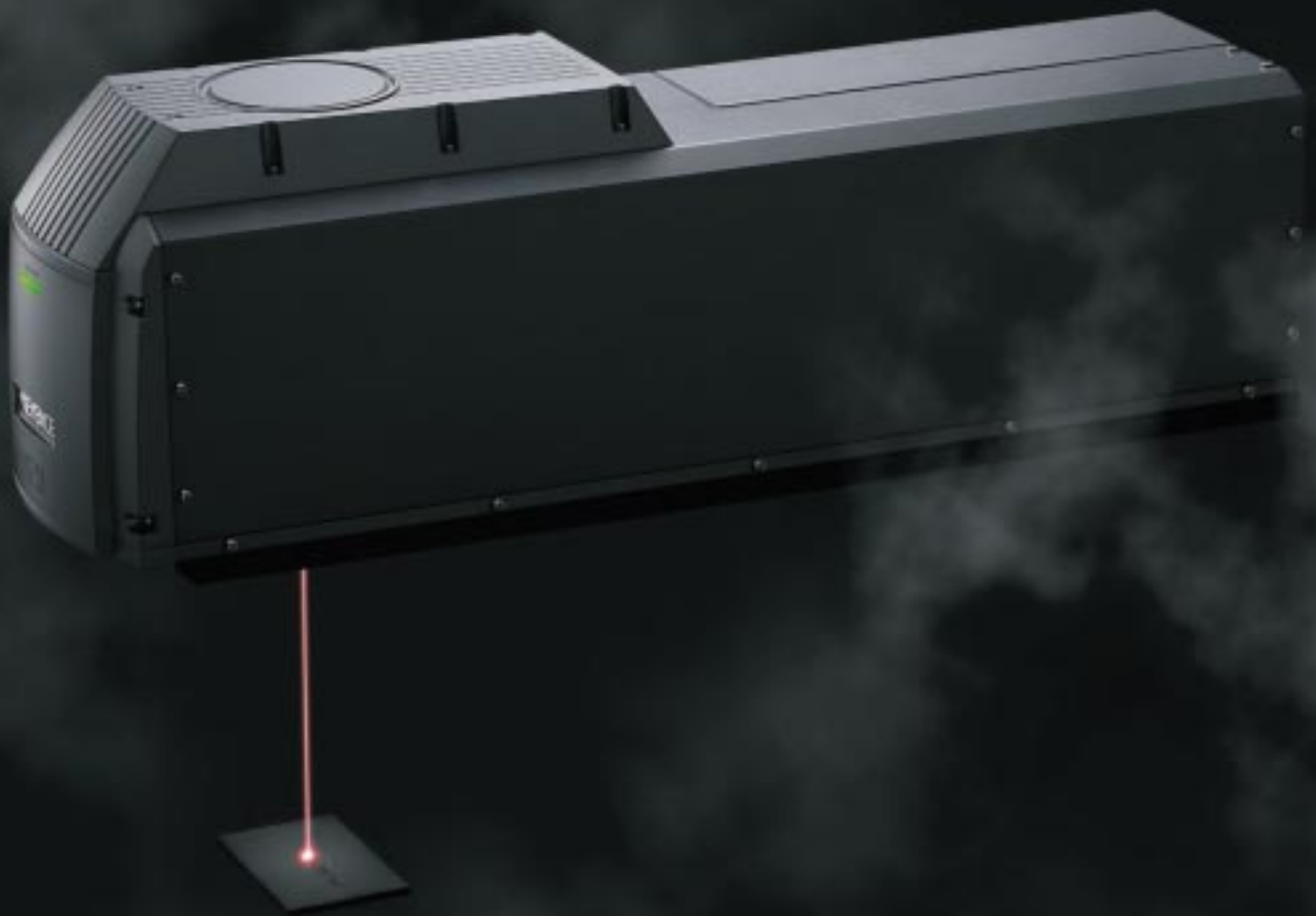


## **Air-cooled YAG Laser Marker with a Double Dust-proof Structure**

High Power and Environmental Resistance Ideal  
for Production Environments

# Reliable Technology Combines a Dust-proof Structure with an Air-cooled, High-Power Laser

KEYENCE has used its long-established, reliable technologies to create an advanced laser marker that satisfies the levels of strength and durability required in harsh production environments that conventional models failed to meet. The MD-H incorporates an advanced dust-proof structure with a high power laser which has been continually improved since the release of our first YAG system in 1993.



**No water-cooling system or consumable supplies required**

# Completely air-cooled YAG system

The MD-H does not require a water cooling system, cooling water, ion-exchange resin, filters or other consumable supplies common for conventional YAG laser markers. The air cooling system provides reduced running costs, less maintenance and a smaller installation space.

**High-quality marking equivalent to 30W water cooled system**

## World's highest output

The MD-H has reached the world's highest output level for an air-cooled system. The MD-H provides five times higher energy than conventional systems, allowing more intense marks.

**Employing a double dust-proof design and newly developed cooling mechanism**

## Environmental resistance performance

The housing of the marking head is completely sealed (1st dust-proof structure) and the inner laser light path is completely isolated (2nd dust-proof structure). In addition to the double dust-proof design, the newly employed structure of the separated cooling area completely blocks dust and oil mist, maintaining stable marking performance.

**Conforming to FDA, CE Marking, and GB standards**

## Worldwide specifications

For the first time in the industry, the MD-H Series has satisfied worldwide specifications conforming to the standards of the U.S.A. (FDA), Europe (CE Marking), and China (GB Laser Safety Standard). Ensuring reliable operation in overseas locations based in the US, Europe, and China.



Environmental resistance  
& Completely air-cooled type  
High-power YAG Laser Marker  
MD-H9800 Series

**MD-H**  
YAG LASER MARKER



# Highly durable structure based on completely innovative ideas blocks dust and oil mist.

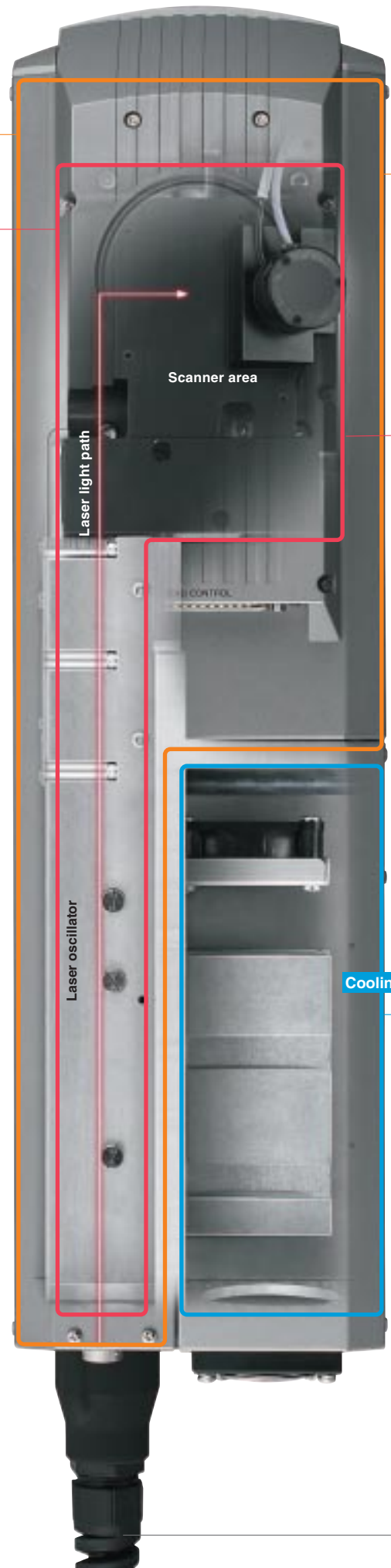
Double-walled, dust-proof structure ensuring stable marking in harsh environments



Dust, dirt, and oil mist... Tough construction for continuously ensuring reliable marking performance under harsh environments (Conceptual image)

1st dust-proof structure

2nd dust-proof structure



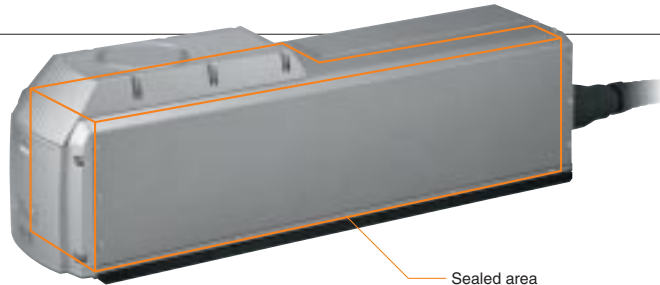
# Double Dust-proof Structure

The entire housing of the marking head is completely sealed (1st dust-proof structure); in addition, the laser light path inside the marker unit is completely isolated (2nd dust-proof structure). The double dust-proof structure with the 1st and 2nd dust-proof walls completely blocks dust and oil mist, maintaining stable marking performance.

## The 1st dust-proof structure

—Sealing of body seams—

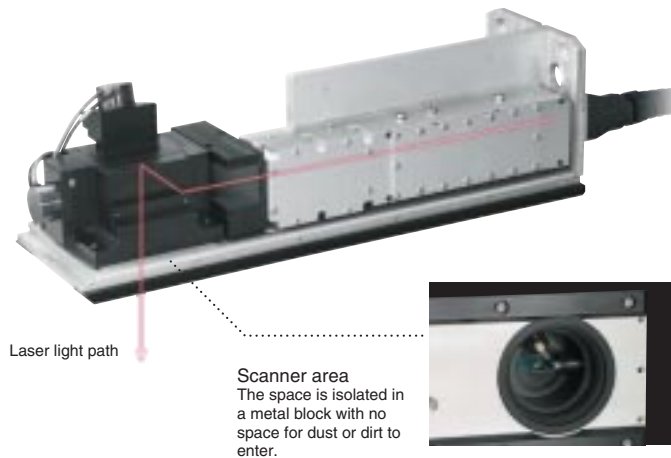
The entire surface of the marking unit is completely sealed by employing special sealing on the joint area. The inside of the marker is protected by completely blocking the unit from the external air.



## The 2nd dust-proof structure

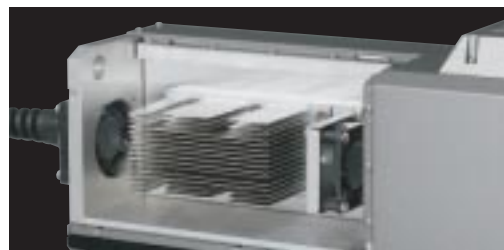
—Isolation of the laser light path—

The entire path of the laser beam from the laser oscillator in the marker unit to the scanner area is housed in a metal block to achieve complete isolation. Extreme cleanliness is maintained by employing the completely seamless all-in-one structure without exposing the laser oscillator, scanner, lens and other important optical components to impure substances.



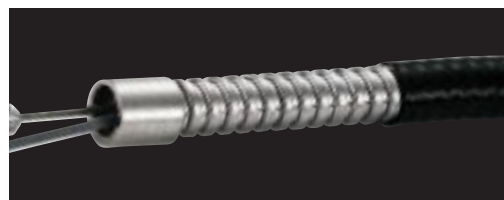
## Complete isolation of the cooling area

The new cooling structure is completely isolated from the laser oscillator. External air which enters the cooling chamber can not contaminate the laser oscillator or the scanning area with dust, dirt or oil mist. The innovative idea of completely separating these chambers provides the perfect air cooling system, unmatched by conventional YAG systems.



## Fiber cable protected by hard SUS pipe

A fiber cable conducts the laser beam from the controller to the marking head. A hard SUS shield protects this fiberoptic cable. Accidental damage to this cable during installation and operation can be prevented.





Fine marking on workpieces with surface irregularities, curves, or bumps

## Marking Performance with Outstanding Visibility

**Equivalent to a 30W water-cooled system**

### World's highest output among air-cooled YAG

Conventionally, water cooling systems have been essential for high power lasers. In order to achieve high power with air cooling, the MD-H has adopted a high power LD (laser diode) with a high efficiency optical transmission system. The laser pulse energy has been enhanced by approximately 5 times that of conventional air cooled YVO<sub>4</sub> systems. (Conventional models: 0.2 mJ → MD-H Series: 1.3 mJ) Solid and thick imprints on metal work pieces as well as high speed coloration on resin parts are possible.

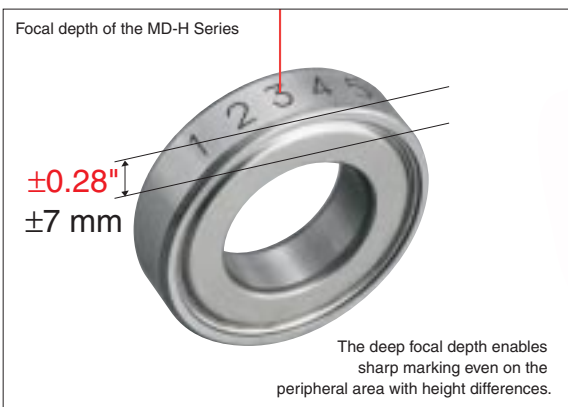


Conventional water-cooled 30W marker    MD-H Series Sharp marking equivalent to water-cooled 30W marker\*

**Best in the industry**

### The deepest focal depth\* of any air-cooled YAG type

By optimizing long established optical marking technologies, KEYENCE has succeeded in creating a YAG laser marker with a large focal depth. Even when the target distance varies, clear marks can be produced. The MD-H has the best focal depth in the industry for an air cooled YAG laser marker.



\* Varies depending on the material and surface condition.

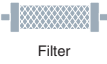





# Completely Air-cooled System Requiring No Maintenance

## Maintenance free

The completely air-cooled system eliminates the need for water-cooling equipment that has been essential for conventional YAG laser markers. Since no water is used to cool the laser oscillator, there is no need to periodically replace the ion-exchange resin, filter, or pure water. This system has reduced the running costs and man-hours for maintenance services. In addition, installation space for the equipment has been reduced. As a result, the production efficiency per unit area in the field can be improved.

**Since it is completely waterless:**

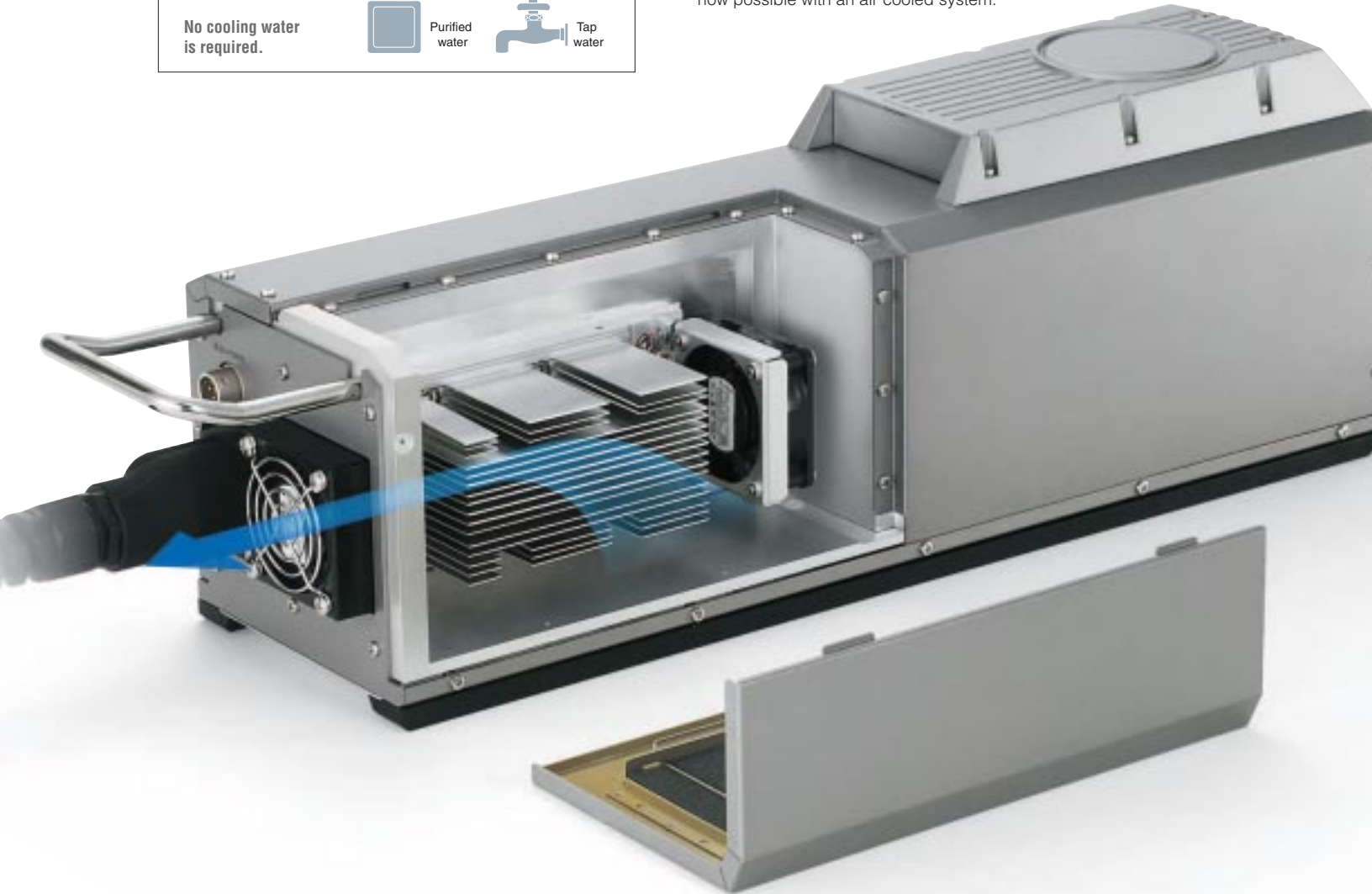
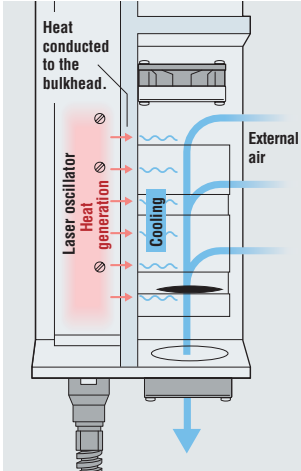
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<b>No consumable supplies are required.</b>	 Filter	 Ion-exchange resin
<b>No water-cooling facilities are required.</b>	 Cooling facilities	 Piping
<b>No cooling water is required.</b>	 Purified water	 Tap water

## Air-cooling principle

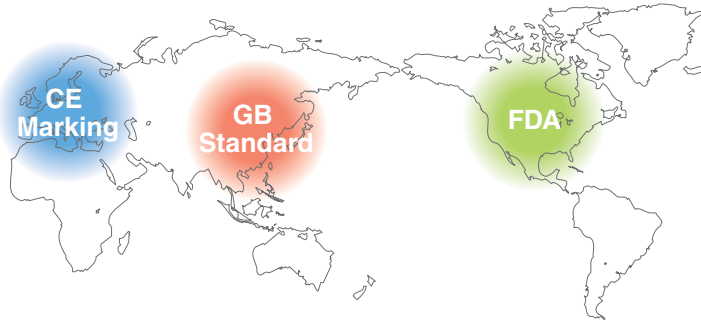
**[Marking Unit]** The heat generated from the laser oscillator is conducted through the bulkhead to the cooling chamber. While the housing absorbs the heat, cool air is forced across the conductors, dissipating the generated heat. The MD-H has been designed for maximum efficiency.

**[Controller unit]** KEYENCE has developed a high-capacity air-cooled system that enables efficient temperature control. The power fluctuations caused by temperature variations in the LD have been minimized, resulting in stable, high power output. Temperature control is now possible with an air cooled system.



# Pursuing International Standards

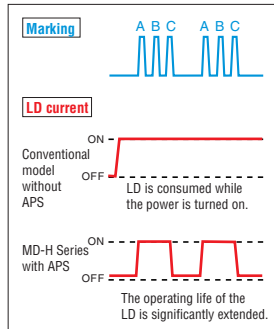
## Worldwide specifications



The MD-H Series conforms to the standards of US (FDA), Europe (CE Marking), and China (GB Laser Safety Standard).

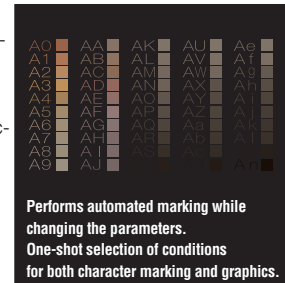
## Auto Power-Saving Mode for Longer Operating Life

The MD-H Series features the Auto Power-Saving Function (APS) to extend the operating life of the LD by automatically lowering the current level of the LD light source when not performing marking. Since the power is not completely turned off but only the current supply to the LD is lowered, the marking mode can be restored instantly as required.



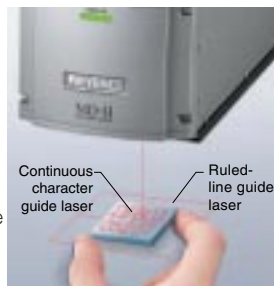
## Sample Marking

The sample marking function allows the user to easily set the optimal marking conditions that have been difficult with conventional models. The sample marking function performs automated marking while varying the three marking conditions; laser power, marking speed, and Q-switch frequency. Conditions can be selected instantly not only for marking characters but also for graphics.



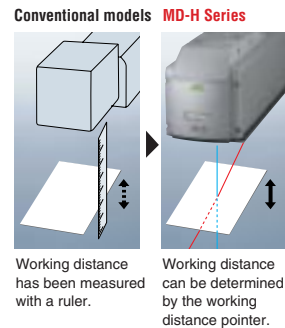
## Guide Laser

The guide laser scans a red laser beam at high speed to confirm the characters and area of marking on the actual workpiece. This function simplifies and ensures fail-free positioning even on small workpieces or targets with a complicated profile. In addition, the marking area and ruled-line guide laser will help confirm the maximum marking area or compensate for the angle.



## Working Distance Pointer

The optimal working distance can be determined quickly and accurately by visually checking the intersection of two laser beams on the target workpiece. There is no need for measuring the distance to the target at each tooling changeover.



## Selectable Variation

The MD-H Series lineup includes two variations for serving various marking areas. In addition to the standard type with a marking area of 3.54" x 3.54" (90 x 90 mm), the wide-area type with a marking area of 6.10" x 6.10" (155 x 155 mm) is available. The wide-area type supports applications with large-size workpieces or simultaneous marking on multiple targets.

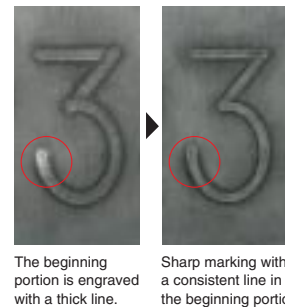


Standard type  
3.54" x 3.54"  
(90 x 90 mm)  
MD-H9810

Wide-area type  
6.10" x 6.10"  
(155 x 155 mm)  
MD-H9820

## First Pulse Suppression

The beginning of character marking has conventionally been engraved deeply by the excessive energy accumulated in the YAG crystal (the first pulse phenomenon). KEYENCE's proprietary Q-switch modulation technology has succeeded in minimizing this phenomenon. Higher quality marking results have been achieved with no inconsistency in the beginning portion.





# A collection of useful functions to enhance your marking experience

## Logo mark/image marking

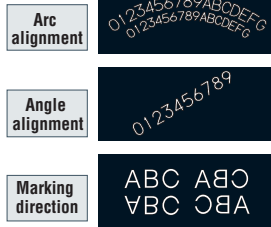
Marking of logo marks/images is enabled.



- CAD data
- PNG data
- BMP data
- TIF data
- JPG data
- PCD data

## Flexible marking alignment

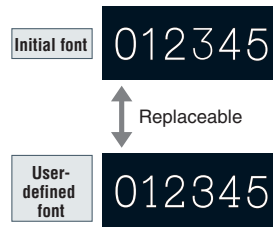
A desired character alignment can be selected according to the marking space.



## Registration of a user-defined font\*

The initial font can be replaced with up to two types of user-defined fonts.

\* Optional function



## Intersection eliminating function

This function can solve problems that may occur at intersections in characters, filling spaces between lines or scorching. Also, oblique lines and curves can be expressed uniformly.



## Common counter

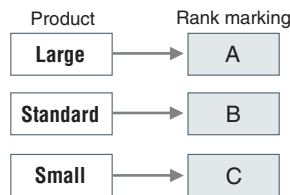
The MD-H Series provides ten counters that can be commonly used for individual settings. Various counters are provided, covering numerous applications. (Binary, base36, etc.)



Common counter

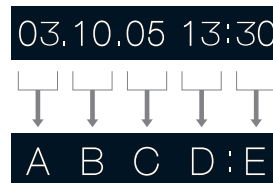
## Rank marking

The MD-H can be used to mark an object with a production quality label.



## Date code to manufacturer's code function

Date characters (year/month/day and time) can be replaced with other characters which are specified by the producer's Manufacturer's code



## Memory card\*

Important settings can be saved in a commercially available compact flash card.

\* The compact flash card is not included with this product. For information on the compatible compact flash card, contact KEYENCE.



# Useful functions for monitoring the unit status

## Laser power offset

This function can correct the laser power for all settings registered in the laser marker at one time. This function is useful for correcting laser power when several laser markers are used or when laser power attenuation occurs.

## Laser operation time

The laser marker operation time can be monitored.

## Error history management

The error history can be checked. If an error occurs in the field, the cause of the error can be determined in a short period of time.

## Terminal block monitor

This function is useful to confirm the ON/OFF status and operating condition of each I/O signal on the controller.



## Preset data can be output in a CSV file.

The MD-H Series can read and write CSV files, enabling you to check preset data in detail.

## Numerous control I/Os

The MD-H Series provides a variety of inputs and outputs to control peripheral equipment in the field.

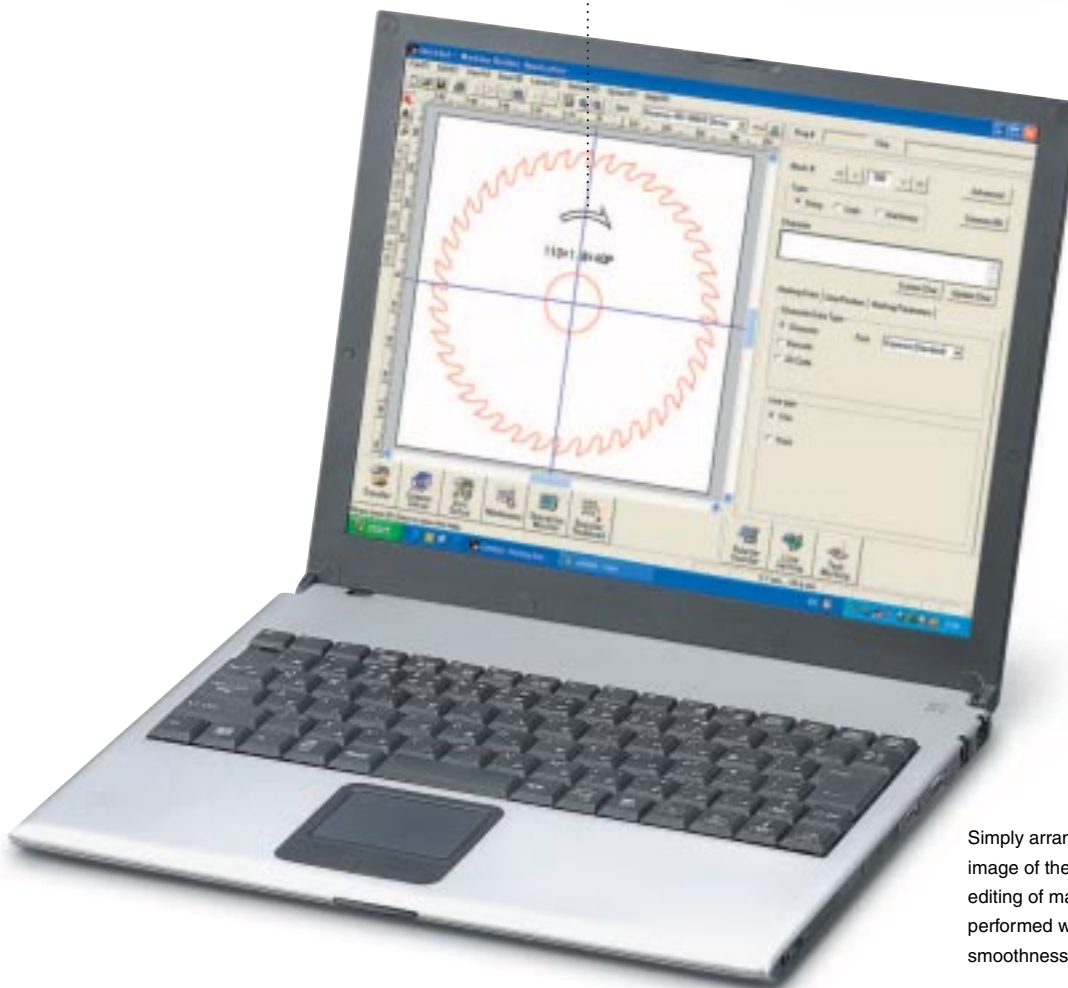
- (Output)
- Laser indicator
  - Marking complete
  - Marking
  - Ready
  - Warning
  - Error
  - 24 VDC

- (Input)
- Marking start
  - Counter reset
  - Encoder pulse
  - Count-up
  - Emergency stop
  - Count-down

# Create the Marking Image on your Personal Computer then Directly Mark it on the Target. What You See Is What You Get!

Dedicated Software with  
Ultimate Usability  
**Marking Builder**

The dedicated Marking Builder PC application software for the laser marker is included as a standard accessory. The easy to use interface simplifies setup and maximizes the performance of the MD-H Series.



Simply arrange the layout over the image of the actual workpiece. The editing of marking content can be performed with astonishing smoothness.

# The final image can be previewed before actual marking.

Image editing requires the setting of various parameters including character height, width, spacing, thickness, position, direction, angle, etc. Marking Builder simplifies this process by displaying the final mark on the screen. Editing the mark can be quickly performed using your computer's mouse. Since the editing can be done on the final image, there is no need to waste product samples while optimizing the marking appearance.

## Multiple Layout Functions

In Marking Builder, each line of characters or graphics is referred to as a data block. Layouts are easily constructed and editing made simple using the wide range of layout functions.

### Grouping

Move and copy blocks without losing layout information



Hold down the shift key to select multiple blocks. While selected, groups of blocks can be moved, copied or deleted.

### Workpiece Image Display

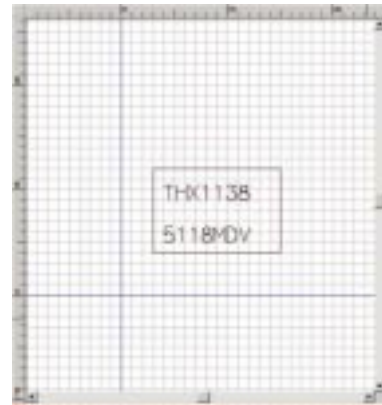
Build layouts with the work area overlaid over the actual workpiece.



With the target workpiece displayed in the background as a guide you can now build error-free layouts.

### Grid Display

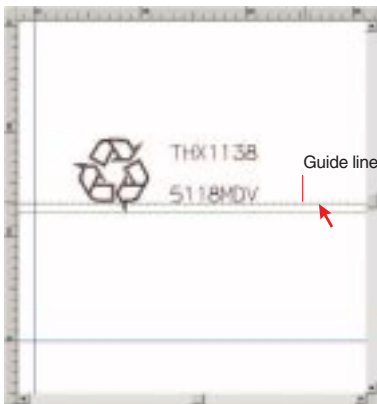
Grid lines (plotting sheet) can be displayed for accurate positioning.



Grid lines can be set in intervals from 0.04" to 3.90" (1 to 99 mm), enabling accurate positioning on the grid.

### Guide Line Display

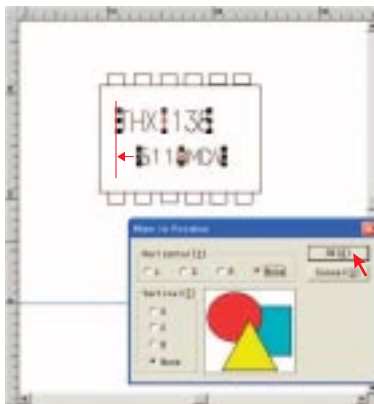
Check workpiece positioning easily and accurately.



Vertical and horizontal lines can be moved as desired, enabling a review of the layout.

### Align to Block / Align to Position

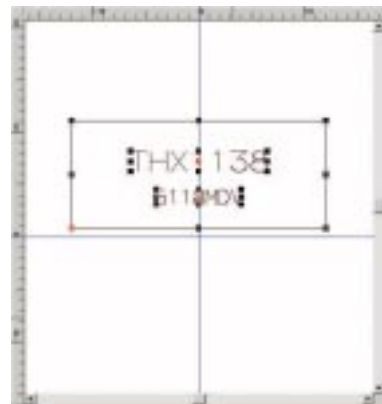
Position blocks using a selected block as a reference.



With 2 blocks selected, you can choose between aligning their left edges (Align to Block) or aligning their centers (Align to Position).

### Centering

One-click centering



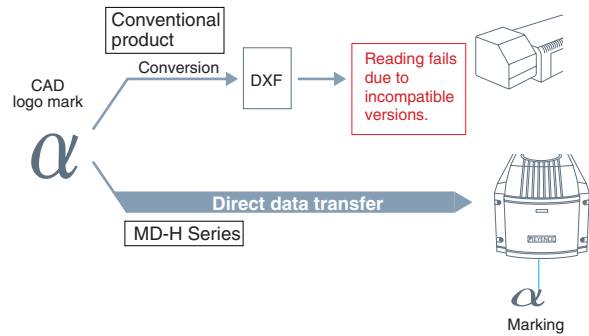
With one click you can vertically or horizontally center the entire layout in the marking area.

# Easy Capturing and Marking of Logos



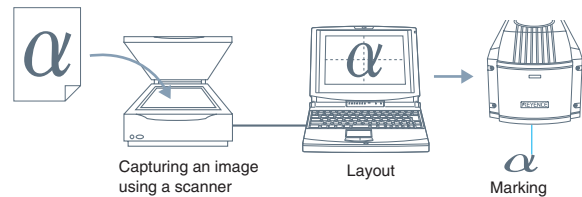
## Direct Marking of CAD Image Data

Most conventional markers cannot accept CAD data because of a difference in DXF file version or format. With the MD-H Series, data conversion is no longer necessary. Graphics stored as CAD data can now be captured directly using Marking Builder and printed with the MD-H Series.



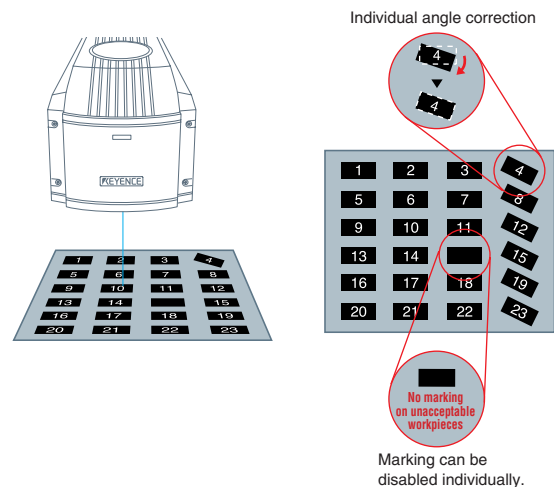
## Direct Marking of Scanner Image Data

The MD-H Series can accept TWAIN data directly from a scanner. If you have an original logo mark or design, it can be marked with the laser marker immediately.



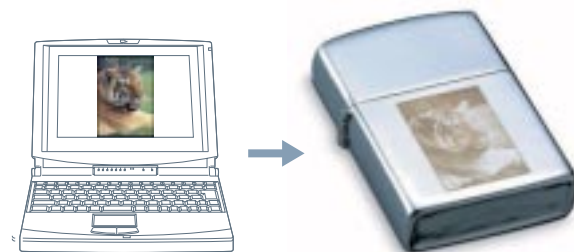
## Palette-Marking Function

This function enables the marking of identical characters and serial numbers on a batch of workpieces (e.g. electronic components) arranged in a palette-like configuration. The MD-H Series can also compensate for tilted or misaligned work pieces. Marking orientation can be adjusted or disabled depending on your settings. The MD-H Series with a full set of functions can easily handle your palette-marking needs.



## Direct Marking of Photo Image Data

Image data stored on a PC such as JPGs or BMPs can now be directly printed from the laser printer. With the MD-H Series any image captured using a digital camera can now be easily and quickly brought into the product design process.



# Color Touch Panel

For operation in environments where a PC cannot be used

## Easy-to-operate touch panel (Option)

A color touch panel is also available to support operation in on-site environments where a PC is difficult to use. An easy-to-see screen and an easy-to-use input procedure enhance the operability in the production field.

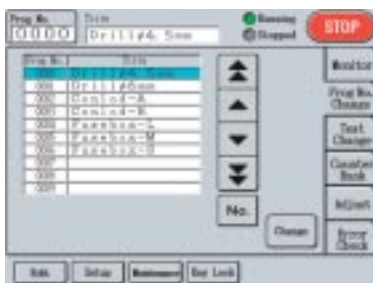


Touch panel console  
MD-HP1

\*The following screen shows a simulated image.

### Simplifies daily operations

#### Changing registration data



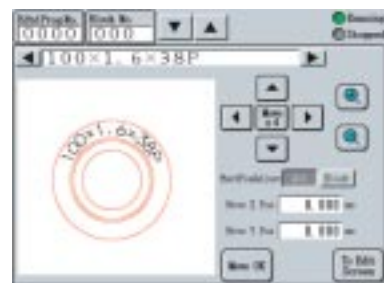
Select a title to be changed and press [Enter]. Since the touch panel displays the marking data, operation errors can be prevented.

#### Changing characters



Change characters with the user-friendly touch keys. Even inexperienced users can operate them easily.

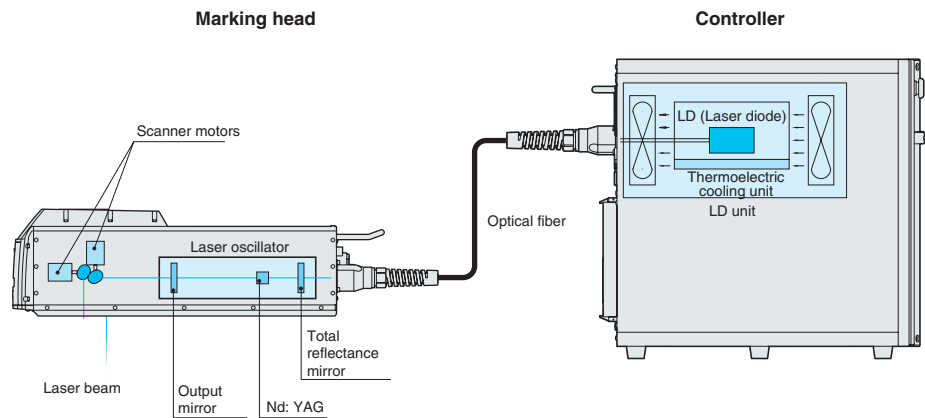
#### Marking Layout



The marking layout can be arranged in an arc, horizontal, or vertical direction or as desired while monitoring the image on the workpiece.

## Operating Principle

- 1 The excited light is emitted from the LD module to the laser unit through the fiber cable.
- 2 A laser beam is generated by radiating the excited light into the end of the YAG crystal (end-pumping method).
- 3 The laser beam amplified between the total reflectance mirror and output mirror is focused on the target surface through the fθ lens.
- 4 The spot of the collected laser beam is scanned by scanner motors in the X-axis and Y-axis to mark characters and objects on the target surface.



## Marking samples

### Character size (Typical examples)

0123456789  
ABCDEFGHIJKLMNQRSTUWXYZ

0123456789  
ABCDEFGHIJKLMNQRSTUWXYZ

0123456789  
ABCDEFGHIJKLMNQRSTUWXYZ

0123456789  
ABCDEFGHIJKLMNQRSTUWXYZ  
abcdefghijklmnopqrstuvwxy

0123456789  
ABCDEFGHIJKLMNQRSTUWXYZ  
abcdefghijklmnopqrstuvwxy

0123456789  
ABCDEFGHIJKLMNQRSTUWXYZ  
abcdefghijklmnopqrstuvwxy

### Arc/angle alignment

0123456789ABCDEF  
0123456789ABCDEF  
0123456789

### Logo mark

### 2D code

Data Matrix QR Micro QR

### Bar code

CODE128 CODE39  
2 of 5 ITF

### bmp/jpg data

## Compatibility with existing models

The mounting holes and working distance are the same as the existing MD-Y Series. Replacement can be performed without significant changes in facilities.



Existing MD-Y Series

The same  
 ● Mounting holes  
 ● Working distance

Interchangeable



MD-H Series

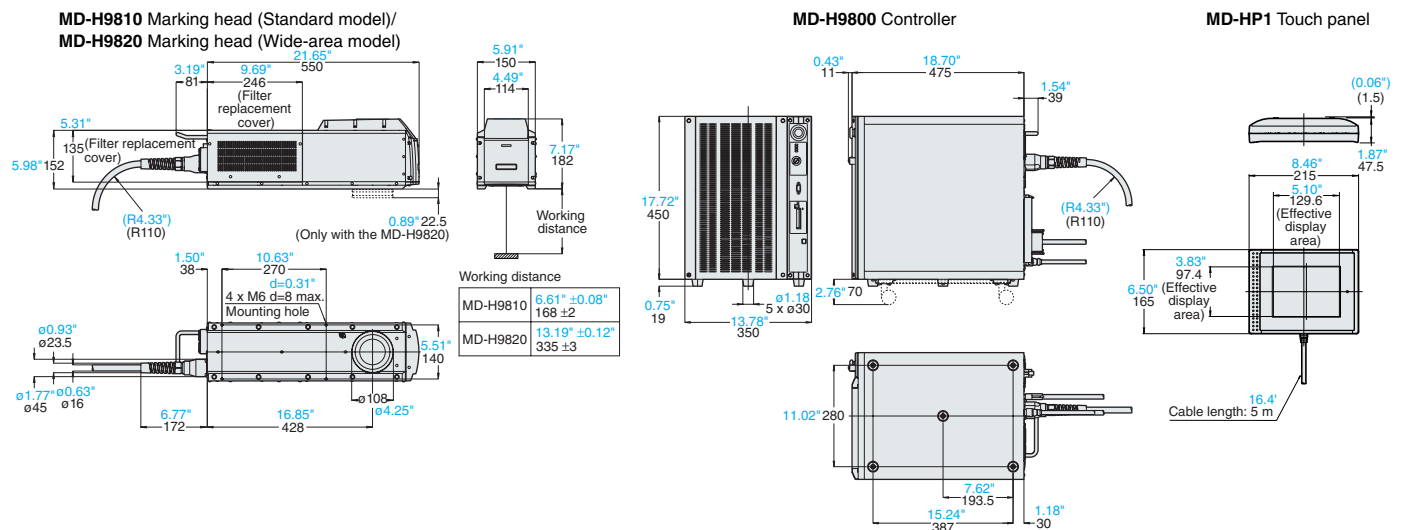
## Specifications

		Japanese Models [Overseas Models]		
		Standard model	Wide-area model	
Model	Controller	MD-H9800 [MD-H9800W]		
	Marking head	MD-H9810 [MD-H9810W]	MD-H9820 [MD-H9820W]	
	Console (Color touch panel) <sup>1</sup> :	MD-HP1 [MD-HP1W]		
Marking laser	YAG laser	FDA Class IV (wavelength: 1064 nm)		
	Average output	10 W (CW)		
	Q-switch frequency	CW, 1 to 50 KHz		
Guide laser	Semiconductor laser	FDA Class II (wavelength: 650 nm)		
Guide light		LED pointer (green)		
Marking area		3.54" x 3.54" 90 x 90 mm	6.10" x 6.10" 155 x 155 mm	
Working distance		6.61" ±0.08" 168 ±2 mm	13.19" ±0.12" 335 ±3 mm	
Marking resolution		0.08 Mil 2 μm	0.20 Mil 5 μm	
Character type	KEYENCE original font	Numerical value, alphabet, katakana, hiragana, kanji (the first and second standards of JIS), symbols		
	User font	Up to two font types can be registered. <sup>1</sup>		
	True Type font	True Type font installed in the PC		
	Update character	Automatic calendar, Automatic time limit calculation, shift code setting, automatic counter, rank marking		
	Barcode	CODE 39, ITF, 2of5, NW7 (CODABAR), JAN, CODE128		
	2D code	QR code, micro QR code, DataMatrix (ECC200)		
	Logo image	Custom font, logo (CAD) data, BMP, JPEG, PNG, TIFF, PCD		
Marking conditions	Laser cutting	Fixed point, straight line, dashed line, circle, oval		
	Character layout	Straight line, diagonal line, arc, vertical writing		
	Marking style	Stationary marking, movement marking, encoder		
	Character size	Character height	0.01" to 3.54" 0.2 to 90 mm	0.02" to 6.10" 0.5 to 155 mm
		Character width	0.01" to 3.54" 0.2 to 90 mm	0.02" to 6.10" 0.5 to 155 mm
Character size unit		Input unit: 0.00004" 0.001 mm		
Program	Registered programs	2000 settings max.		
	Number of blocks	256 blocks		
Functions		Thick line marking, skipping crossed line, common block setting, scan speed optimization, continuous marking, palette marking, sample marking, test marking, thumbnail registration, save in memory card, CSV file saving, automatic backup, laser power offset, font replacement, preset, Logo editing tool, workpiece image display, TWAIN input, communication history display, terminal block monitor simulation, check laser output, Auto power-save, direct-coupled barcode communication command feature		
Laser marker setting software (MARKING BUILDER)		Supported OS: Windows® XP/2000 Monitor display: 1024x768		
Terminal block input	Input	Error Reset, Trigger Inhibit, Laser Cutting Mode Disable, Emergency Stop, Mark-Laser control, Fix Rank Value, Laser control, Count-up, Count-down, Counter Reset, No./Value set, Fix Program No., Encoder Pulse, Trigger		
	Output	Laser Indicator, Marking Complete, Marking, READY, Warning, Error, 24 VDC power		
RS-232C/RS-422A		Dedicated for connecting external devices.		
USB port		Dedicated for connecting laser marker setting software (MARKING BUILDER).		
PC card slot		Dedicated for CF memory card.		
Marking unit installation direction		All directions		
Installation instruction	Guide laser	Character (1), character (continuous), area frame and center coordinate crisscross (continuous), workpiece image		
	Distance pointer	LED pointer + guide laser beam		
Marking unit cable length		16.4' 5 m		
Cooling method		Air-cooled method		
Supply voltage		100 to 120/200 to 240 VAC ±10% (50/60 Hz) 10A max.		
Power consumption		750 VA max. (100 to 120 VAC), 950 VA max. (200 to 240 VAC)		
Environmental resistance	Ambient temperature for storage	-50 to +140°F (-10 to +60°C), No condensation/No freezing		
	Ambient temperature for usage	32 to +104°F (0 to +40°C)		
	Ambient humidity for use	30 to 85%, No condensation		
	Oil mist and dust	0.3 mg/m <sup>3</sup> (marking head) <sup>2</sup>		
Weight	Controller	Main unit	30.8 kg (32.3 kg including casters) <sup>3</sup>	
		LD unit	19.4 kg (20.9 kg including casters) <sup>3</sup>	
	Marking head	13.6 kg	14.6 kg	
	Console	1.4 kg		

- Optional
- The environmental conditions regarding dust and dirt are defined with JEIDA-63 Class B.
- Casters are available as options.

## Dimensions

Unit: Inch mm



# Applications



Saw blade



Scissors



Drill



Pliers



Light bulb



Stainless-steel component



Bearing



Water faucet bracket



Joint

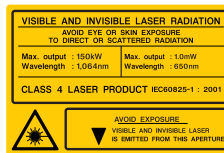
## Tips for Correct Use

### Safety precautions

- Before using the laser marker, be sure to refer to the User's Manual for thorough knowledge of the contents.
- Do not allow your eyes or skin to be exposed to a directly irradiated laser beam or a diffused reflection laser beam.

### Laser beam

The following label is affixed to the marking unit. When handling a laser marker, observe the instructions indicated on the label.



### Exports

The export regulation is applied to this product under the provision of Foreign Exchange and Foreign Trade Control Law. It is required to complete all necessary formalities for applying for exportation permission from the Japanese government upon taking the products out of Japan.

Specifications are subject to change without notice.

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