3-Axis LASER MARKER
GENERAL CATALOG
Who We Are

KEYENCE has steadily grown since 1974 to become an innovative leader in the development and manufacturing of automation equipment worldwide. Our products consist of automation sensors, measuring instruments, vision systems, laser markers, and digital microscopes.

Our innovative products not only meet current needs but also future customer requirements in many manufacturing and research industries. We strive to anticipate the market's future needs to provide tomorrow’s solution today.

At KEYENCE, we are not content to only have the best products on the market, we also strive to provide our customers with the most knowledgeable and trained sales professionals in the industry. We are dedicated to supporting our customers and working with them to achieve their goals.

KEYENCE, a blue chip company, has been named one of Business Week’s “1000 Best Valued Companies”. We are also in the top 50 of Newsweek’s electronic industry ranking and are consistently ranked in Japan’s Nikkei Newspaper’s yearly list of the “Top Ten Excellent Companies in Japan”. Today, KEYENCE serves over 100,000 customers in some 70 countries around the world, where its name stands for innovation and excellence.

Direct Approach

KEYENCE employs a large number of sales engineers throughout the world enabling invaluable direct on-site support. With this direct approach, we are able to meet the customer’s needs at every level of their business, from the design and research stage to the production line and beyond.

These highly trained sales engineers are problem solvers who can provide real solutions to our customers’ applications with existing products or potential new solutions.

Superior Technology

KEYENCE is a worldwide leader in developing and supplying cutting-edge automation and manufacturing technologies of the highest quality. New product sales consistently account for 30% of KEYENCE’s total sales, illustrating our ability to quickly respond to industry trends and add value to our customers.

Versatile Products

KEYENCE manufactures a broad range of products used in both manufacturing environments and research facilities. These products are designed with versatility in mind and can be used across all industry sectors. We know quick delivery is important, which is why our products are shipped on the same day the order is received from warehouse centers located in over 40 countries throughout the world.
Developing Industry Leading Products through Intense In-House Research and Development

KEYENCE products are designed to add value to the manufacturing and research practices of our customers. We are constantly looking to improve our product offerings to better meet and exceed customers’ expectations. Our products are engineered to be versatile, so they can be used in every industry and a wide variety of applications. KEYENCE offers the world’s best products for today and tomorrow’s application needs. At KEYENCE, terms like “World’s First,” “World’s Fastest,” “Industry First,” and “Best in Class” come standard with our products. With over 35 years of direct, on-site problem solving experience, we know the industries we serve better than other companies enabling us to provide optimal solutions.

CLEAN Energy Policy

KEYENCE recognizes that protecting our environment is of paramount importance to the entire planet. We strive to contribute to the protection and improvement of the global environment. Our value added solutions enable a wide range of industries to produce goods efficiently by minimizing waste and the impact to the environment.

RoHS

Since April 2005, KEYENCE has been progressively eliminating hazardous substances from our products and implementing the switch to RoHS compliant products.

Corporate Information

FACTS

Global Headquarters: Osaka, Japan  
Founded: May 1974

2012 Global Sales: $2,269,062,00 USD  
Worldwide Employees: 3,800

All dollar figures herein refer to U.S. dollars. Dollar amounts are converted from Japanese yen at ¥96 = $1 based on the approximate exchange rate on March 20, 2013.

AN EXCEPTIONAL COMPANY

<table>
<thead>
<tr>
<th>Newsweek Electronics Industry Ranking</th>
<th>Forbes’ “World’s Most Innovate Companies”</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 IBM</td>
<td>1 Salesforce.com</td>
</tr>
<tr>
<td>2 HP</td>
<td>2 Amazon.com</td>
</tr>
<tr>
<td>3 CANON INC.</td>
<td>3 Intuitive Surgica</td>
</tr>
<tr>
<td>4 Panasonic</td>
<td>4 Tencent Holdings</td>
</tr>
<tr>
<td>5 Apple INC.</td>
<td>5 Apple</td>
</tr>
<tr>
<td>6 ABB</td>
<td>6 Google</td>
</tr>
<tr>
<td>DELL</td>
<td>7 Google</td>
</tr>
<tr>
<td>8 Schneider Electric</td>
<td>8 FMC Technologies</td>
</tr>
<tr>
<td>9 Emerson Electric</td>
<td>9 Starbucks</td>
</tr>
<tr>
<td>10 Sony</td>
<td>10 Nintendo</td>
</tr>
</tbody>
</table>

as of 2011
The Evolution of KEYENCE Laser Marking Systems

KEYENCE has been an innovative leader in the laser marking industry since the early 1990’s. Our high speed, precision processing capabilities have evolved to include the first 3-Axis lasers and unrivaled marking quality among Fiber, YVO₄ and CO₂ laser marking systems. The newest laser marking systems from KEYENCE are built upon years of experience and hands-on application knowledge. KEYENCE is committed to introducing new cutting-edge products that go beyond the expectations of its customers.

Since 1994

**CO₂**

World’s smallest CO₂ Laser marking unit & World’s first marking on moving targets

CO₂ Laser marker ML-9000 Series

1998

**YAG**

World’s smallest YAG Laser marking unit

YAG Laser marker MY-9500 Series

2003

**YVO₄**

Completely Air-cooled & Ultra-compact

YVO₄ Laser marker MD-V9600 Series

2006

**3-Axis CO₂**

World’s first 3-Axis control Laser Marker

3-Axis CO₂ Laser marker ML-Z9500 Series
2013 and Beyond
As the laser marking market expands throughout the world, KEYENCE will use its vast experience and knowledge to continue to provide the industry with the most advanced technology available.

KEYENCE has developed each laser marker model based on unique oscillation methods. Every laser model is designed with innovative technologies such as world-first, Industry-first or world's smallest design.

Laser Marker Models Released

<table>
<thead>
<tr>
<th>Year</th>
<th>Model Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1994</td>
<td>CO₂ Laser marker ML-9000 Series</td>
</tr>
<tr>
<td>1998</td>
<td>YAG Laser marker MY-9500 Series</td>
</tr>
<tr>
<td>2001</td>
<td>YAG Laser marker MD-Y9700 Series</td>
</tr>
<tr>
<td>2003</td>
<td>CO₂ Laser marker ML-G9300 Series</td>
</tr>
<tr>
<td>2003</td>
<td>YVO₄ Laser marker MD-V9600 Series</td>
</tr>
<tr>
<td>2005</td>
<td>YAG Laser marker MD-H9800 Series</td>
</tr>
<tr>
<td>2006</td>
<td>3-Axis CO₂ Laser marker ML-Z9500 Series</td>
</tr>
<tr>
<td>2006</td>
<td>Marking Builder 2 Software Interface</td>
</tr>
<tr>
<td>2007</td>
<td>3-Axis YVO₄ Laser marker MD-V9900 Series</td>
</tr>
<tr>
<td>2008</td>
<td>3-Axis YVO₄ SHG Laser marker MD-S9900 Series</td>
</tr>
<tr>
<td>2009</td>
<td>3-Axis Fiber Laser marker MD-F3000 Series</td>
</tr>
<tr>
<td>2011</td>
<td>Telecentric Laser Marker MD-T1000 Series</td>
</tr>
<tr>
<td>2012</td>
<td>3-Axis Fiber Laser marker MD-F3100/5100 Series</td>
</tr>
</tbody>
</table>

2007 3-Axis YVO₄
World's first High-power YVO₄ with 3-Axis control
3-Axis YVO₄ Laser marker MD-V9900 Series

2009 3-Axis Fiber
World's smallest Fiber Laser marking unit
3-Axis Fiber Laser marker MD-F3000 Series
3-Axis YVO₄ Laser Marker
MD-V9900A Series

The optimum solution for general purpose marking on metals, resins and paint removal processes.

3-Axis Fiber Laser Marker
MD-F3100/5100 Series

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

3-Axis CO₂ Laser Marker
ML-Z9500 Series

The optimum solution for marking materials such as resins, labels, glass and processing thin films.
Example Laser Marking Applications

- Transistor
- Automotive switch
- 2D code on lead frame
- ABS Plastic
- Laser Diode
- Micrometer

Example Laser Marking Applications

- Vehicle body frames (PAINTING AFTER MARKING)
- Bearings
- Engine blocks (HIGH-SPEED 2D CODE MARKING)
- Thin metal sheet processing
- Key cylinders
- Frame ICs burr removal

Example Laser Marking Applications

- Film Cutting
- Surface layer removal
- IC Marking
- Motor Housing
- Gate Cutting
- Carton Printing
Selection Guide by Marking Materials

Depending on the wavelength of light produced by each laser marker type, specific results can be achieved, such as engraved marking, discoloration, or cutting. Therefore, it is important to match the desired type of mark with the appropriate laser marker.

LASER MARKER APPLICATIONS (BY TYPE)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>PLASTIC</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Polyethylene</td>
<td>Good</td>
<td>Good</td>
<td>Good</td>
</tr>
<tr>
<td>Polycarbonate</td>
<td>Good</td>
<td>Good</td>
<td>Good</td>
</tr>
<tr>
<td>Polypropylene (PP)</td>
<td>Good</td>
<td>Good</td>
<td>Good</td>
</tr>
<tr>
<td>Polycrystal (POM)</td>
<td>Good</td>
<td>Good</td>
<td>Good</td>
</tr>
<tr>
<td>Polyethylene terephthalate (PET)</td>
<td>Good</td>
<td>Excellent</td>
<td>Excellent</td>
</tr>
<tr>
<td>Polyethylene terephthalate (PET)</td>
<td>Good</td>
<td>Not Able to Mark</td>
<td>Not Able to Mark</td>
</tr>
<tr>
<td>Acrylonitrile butadiene styrene (ABS)</td>
<td>Good</td>
<td>Excellent</td>
<td>Excellent</td>
</tr>
<tr>
<td>Epoxy</td>
<td>Excellent</td>
<td>Excellent</td>
<td>Excellent</td>
</tr>
<tr>
<td>Phenol</td>
<td>Excellent</td>
<td>Excellent</td>
<td>Excellent</td>
</tr>
<tr>
<td>Urea</td>
<td>Excellent</td>
<td>Excellent</td>
<td>Excellent</td>
</tr>
<tr>
<td>Polyvinyl chloride (PVC)</td>
<td>Excellent</td>
<td>Excellent</td>
<td>Excellent</td>
</tr>
<tr>
<td>Polyamide</td>
<td>Good</td>
<td>Good</td>
<td>Good</td>
</tr>
<tr>
<td>Silicone</td>
<td>Not Able to Mark</td>
<td>Good</td>
<td>Good</td>
</tr>
<tr>
<td>METAL</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Iron</td>
<td>Not Able to Mark</td>
<td>Excellent</td>
<td>Excellent</td>
</tr>
<tr>
<td>Aluminium</td>
<td>Not Able to Mark</td>
<td>Excellent</td>
<td>Excellent</td>
</tr>
<tr>
<td>Nickel</td>
<td>Not Able to Mark</td>
<td>Excellent</td>
<td>Excellent</td>
</tr>
<tr>
<td>Stainless steel</td>
<td>Not Able to Mark</td>
<td>Excellent</td>
<td>Excellent</td>
</tr>
<tr>
<td>Copper</td>
<td>Not Able to Mark</td>
<td>Good</td>
<td>Acceptable</td>
</tr>
<tr>
<td>Gold</td>
<td>Not Able to Mark</td>
<td>Good</td>
<td>Acceptable</td>
</tr>
<tr>
<td>CERAMIC</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ceramic</td>
<td>Good</td>
<td>Good</td>
<td>Good</td>
</tr>
<tr>
<td>WOOD</td>
<td>Excellent</td>
<td>Acceptable</td>
<td>Acceptable</td>
</tr>
<tr>
<td>PAPER</td>
<td>Excellent</td>
<td>Acceptable</td>
<td>Acceptable</td>
</tr>
<tr>
<td>GLASS</td>
<td>Excellent</td>
<td>Not Able to Mark</td>
<td>Not Able to Mark</td>
</tr>
<tr>
<td>RUBBER</td>
<td>Excellent</td>
<td>Excellent</td>
<td>Excellent</td>
</tr>
</tbody>
</table>

* The suitability of each model for a specific print material depends on the object’s consistency/additives and the set conditions. This table shows typical selections.
Mechanism of the 3-Axis Control Laser Marker

A standard laser marker uses a 2-Axis X and Y scanner to scan laser light across a level surface. A 3-Axis control laser marker is equipped with a Z axis scanner in addition to the X and Y axis scanners. It achieves three-dimensional laser tracking by controlling all axes simultaneously.

“3-Axis Technology” was first developed by KEYENCE and installed in their marking systems in 2006. This unique technology makes it possible to program complex shapes and saves countless engineering hours during integration. These innovations are indispensable and allow for reliable consistency on every mark.

Additionally, it is equipped with special software that maximizes use of the 3D control function. Selecting the software according to specific requirements enables simple configuration to precisely the required settings.
### Variable focal length

The 3-Axis laser control (X, Y and Z-axes) keeps the laser in focus throughout the focal distance range. This focal length can be set to any position within a 42 mm 1.65” range without distortion across the entire marking area.

![Image of 3-Axis Laser Markers](image1.png)

**Enclosure made of resin (marking on stepped surfaces)**

### Variable spot size

Varying the spot size of the laser is helpful when trying to enhance the contrast of characters or engraving more deeply into the target surface. Typical defocus techniques may cause varying character size and position, while the 3-Axis Laser Markers can provide uniform quality of characters.

![Image of variable spot size](image2.png)

**LSI (High accuracy marking with defocusing)**
Spot diameter is kept uniform over the entire area

Traditionally, the spot size at the center and the edge of the marking area were different due to the artificial plane created by the fθ lens. 3-Axis Control Laser Markers solve this problem with X, Y and Z-axis laser control. High accuracy marking on a flat surface is guaranteed because of the uniform spot size.

A single 3-Axis Laser markers covers 7x the area of Conventional models

The 300 mm 11.81" marking area reduces installation costs by eliminating the need for multiple marking heads and mechanical index devices.

The KEYENCE advantage when marking over a wide area

Problems associated with the properties of the fθ lens of conventional systems have been eliminated, so characters stay clear and crisp over the entire marking area.

Mounting Position Correction

The dedicated software easily corrects the head inclination after integration using X, Y and Z-axes, without the need for mechanical adjustment. This feature significantly reduces the man-hours for installation.
Precise 3-Axis marking

The Software Interface (MB-H3D2) features 3-Axis control to modify the laser position according to the shape of a target, which can include steps, inclined surfaces, cylinders or circular cones and spheres. MB-H3D2 minimizes distorted, worn, or chipped characters while enabling uniform marking on three-dimensional surfaces that are considered untouchable by conventional markers.

Marking comparison

**Steps**

<table>
<thead>
<tr>
<th>Lower step</th>
<th>Upper step</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conventional model</td>
<td>Faded characters</td>
</tr>
<tr>
<td>Lower step</td>
<td>Upper step</td>
</tr>
<tr>
<td>AAAAAAA</td>
<td>AAAAAA</td>
</tr>
<tr>
<td>3-Axis</td>
<td>3-Axis</td>
</tr>
</tbody>
</table>

**Inclined surface**

<table>
<thead>
<tr>
<th>Lower step</th>
<th>Upper step</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conventional model</td>
<td>Faded and elongated characters</td>
</tr>
<tr>
<td>Lower step</td>
<td>Upper step</td>
</tr>
<tr>
<td>AAAAAA</td>
<td>AAAAAAAA</td>
</tr>
<tr>
<td>3-Axis</td>
<td>3-Axis</td>
</tr>
</tbody>
</table>

**Cylinder**

<table>
<thead>
<tr>
<th>Lower step</th>
<th>Upper step</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conventional model</td>
<td>Distorted and elongated characters</td>
</tr>
<tr>
<td>Lower step</td>
<td>Upper step</td>
</tr>
<tr>
<td>AAAAAAAA</td>
<td>AAAAAAAA</td>
</tr>
<tr>
<td>3-Axis</td>
<td>3-Axis</td>
</tr>
</tbody>
</table>

**Circular cone**

<table>
<thead>
<tr>
<th>Lower step</th>
<th>Upper step</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conventional model</td>
<td>Character deformation</td>
</tr>
<tr>
<td>Lower step</td>
<td>Upper step</td>
</tr>
<tr>
<td>AAAAAA</td>
<td>AAAAAAAA</td>
</tr>
<tr>
<td>3-Axis</td>
<td>3-Axis</td>
</tr>
</tbody>
</table>
Auto-Focus

Using the The Software Interface (MB-H3D2) together with a displacement sensor that can measure the distance of the target allows for automatic adjustment of the focal point. 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.

Example of Use for Semiconductors/Electronic Components

Autofocus marking can be used to follow the thickness of the circuit board. Removing the need for in-process replacement leads to increased marking quality. Additionally, multi-point measurement enables the curve of circuit boards or wafers to be accurately followed.
Perform marking using 3D cad files (.STL) for target profiling
Files with the .stl extension, a commonly used extension in 3D CAD, can be loaded into the KEYENCE Marking Builder software and used as a base for 3D marking. This allows for 3D marking on targets with shapes that cannot be expressed using standard figures implemented by conventional marking software.

Perfectly focused marks are able to be applied to any surface in the valid marking range. Uninterrupted marking can be performed even on different surfaces without changing fixtures or moving the part.

2D codes on sloping or uneven surfaces
At first glance this 2D code looks warped and impossible to read, but....
...when viewed from above, the code forms a perfect square and is easily read.
Logo designer <MB-HLD>

- **Logo designer functionality**
Logos can be further manipulated by adding the Logo designer software package to Marking Builder 2. It allows for easy change-over of various patterns via simple software parameters when creating a specific logos, markings and processing patterns. This helps to always create the best marking in the shortest time. Directly importing dxf data makes it possible to edit the logosettings and marking elements. Corrections can be performed easily to create an optimal mark.

**Hatching functions**
Simply select the pattern type, and change the filled marking pattern of the entire logo. This makes it possible to select the optimum marking method to the required look and feel. Fine adjustments, such as line intervals, border offsets and line angles can be changed quickly as well.

Adobe illustrator plug-in *Included with Logo designer*
A logo created with Adobe Illustrator can be directly imported into the Marker Builder 2 software using the Illustrator Plug-in. The imported logo designs can be fully edited and hatched using the Logo designer software.

* Adobe® Illustrator® is a registered trademark of Adobe Systems Incorporated
MD-V9900A Series

By employing a YVO₄ crystal as its laser medium, the MD-V Series is able to achieve super-fine, high-speed marking on metals, plastics, and more.

Single mode beam spot
The MD-V utilizes an end-pumping YVO₄ laser system that generates an ideal beam spot. Conventional systems are forced to employ a multi-mode laser, leading to fluctuations in laser power and target quality. Single mode laser's concentrate the beam to provide high quality marking on a wide range of surfaces.

High peak power & short pulse laser
With high peak power, MD-V9900 can achieve sharp, high quality marking on hardened surfaces. This high peak power is also generated with an incredibly small pulse width, reducing the possibility of thermal damage to the target surface.
Ultra-high pulse recurrence frequency 400 kHz

The MD-V9900A Series employs a Q switch frequency more than double that of previous KEYENCE lasers. The high frequency enables smooth marking of fine resolutions on high speed productions lines. Both continuous wave and pulse oscillation are available to accommodate varying surface conditions.

Power linearity

The power linearity of traditional laser systems is typically ±5%, and could be even larger at low power. The MD-V9900A achieves an incredible ±2% power stability, meaning that the mark will never chip, burn, or blur.

Automatic power-saving function

The MD-V9900A Series is equipped with an Auto Power-saving function (APS), which automatically lowers the current level of the LD light source when not marking characters. Since only the current is lowered, and the power of the LD is not turned off, the system can return to full marking capacity almost instantly.

Built-in power monitor

Along with a system to verify the output value of the laser, the MD-V9900A also employs an internal system to monitor and automatically adjust for power variations that may occur over the lifetime of the laser. This feature will help to ensure that each mark is made with the same quality and consistency, regardless of the operator or age of the marking head.

Advantages of the built-in power monitor

- Automatic power measurement and correction
- Quick measurement without additional equipment
- No variation caused by individual operators
- No change in accuracy over long-term use.
A combination of best-in-class 50 W output and 3-Axis control. Once again, KEYENCE leads the way in cutting edge laser marking technology.

Deep-Engraving

The focal distance is changed after each pass. This allows for processing with maximum energy density at all times.

High-Speed 2D Barcode Marking

Keyence lasers are optimized for high-speed 2D barcode marking. An array of various marking patterns are selectable to ensure that a permanent mark is applied directly to the products surface in the least amount of time.
Compact, fanless marking head with IP64 rating
The MD-F Series provides extremely high output power in a compact design. 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]

High-Speed Annealed Marking
Annealed marking at high-speed is achieved on tooling, instruments, medical components and other products where creating high contrast without damaging the surface is key.

Built-in 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 could only be detected when it was significantly attenuated. With the thermopile method, even the output of high-power lasers can be measured with high precision.

ADVANTAGE 1
Automatic calibration of laser power
Lasers lose power over time and need calibrated. The built in power monitor allows for automatic calibration and eliminates human error and extra maintenance costs.

ADVANTAGE 2
Marking energy check
The marking energy is measured each time the laser is fired. An error is generated if the measured value is not within the specified limits allowing for precise monitoring of marking quality.

A lens protection filter is also available as an option
The lens protection filter option fully protects the lasers output lens from contaminant buildup and scratching. This option can be easily cleaned or replaced, which eliminates downtime.
Part # OP-87077
ML-Z9500 Series

The synergy between 30 Watts of output power and an ultra-high-speed scanning system significantly improves productivity.

High-speed 30 W marking capabilities
The ML-Z9500 Series precisely marks characters on rapidly moving flat or curved surfaces. The deep focal range of the ML-Z means that there’s no need to adjust for varying product sizes, reducing overall tact time. This allows the maximum performance of the marking head to be utilized in a wide range of applications.

Guide laser function
By scanning a safe, visible red laser in the pattern of the marking area or the marking contents, positioning of the target and fixture can be adjusted quickly and easily.
9.3 μm short wavelength laser
The ML-Z9500 series are available in a 9.3 μm short wavelength version. This allows for better heat absorption for certain materials like PET and PC. The 9.3 μm short wavelength laser clearly marks characters of high visibility at shallow depths, with fewer edges, guaranteeing high quality in marking and processing.

Reasons for high quality marking and processing

<table>
<thead>
<tr>
<th>Conventional model</th>
<th>ML-Z</th>
</tr>
</thead>
<tbody>
<tr>
<td>There is a lot of damage, and the surface is inscribed roughly.</td>
<td></td>
</tr>
<tr>
<td>10.6 μm laser</td>
<td>9.3 μm laser</td>
</tr>
</tbody>
</table>

Working distance pointer
The visible red laser beams allow users to view the optimum working distance on the target without physically measuring. This also helps to quickly indicate misalignments during production use.

Barcode information check
The HR Series compares the barcode information read with the barcode information registered in the system. The detected barcode can be automatically fed into the ML-Z and either used to change program or change the data being marked.
DEDICATED TO ADDING VALUE FOR OUR CUSTOMERS

Direct Approach

Our technically trained sales engineers have extensive experience with various applications and industries. Sales engineers specialize within a certain product group to become experts in their fields. This experience and specialization allows the most efficient solution to be recommended to customers.

In some cases, the application may require the design of a new product. KEYENCE is able to quickly incorporate input from customers into our new product designs since we manufacture the products as well. More than 1,500 sales engineers around the world are prepared to participate at every level of our customers’ business, from the design and research stage to the production line and beyond.

Comprehensive Support

KEYENCE supports customers with extensive on-site manufacturing and automation knowledge. Recommending the right solutions for our customers’ applications is only the beginning of how our sales engineers assist customers.

After purchasing a product, KEYENCE sales engineers ensure the products are functioning optimally, and they are able to go on-site if needed. If a customer ever has any questions, sales engineers and our technical support team are available to answer them quickly.
EXTENSIVE NETWORK

Worldwide Direct Sales Network
More than 200 offices in 44 countries

When working with KEYENCE, you’ll not only receive the industry’s most advanced products, but you can also count on a worldwide network of highly trained support engineers to guide you through the implementation of those products. Whether you’re working in the US, or shipping a machine to Eastern Europe, Asia, Mexico, or other remote locations, KEYENCE provides support you can count on.

Fast Delivery
KEYENCE’s fast delivery system will ensure that customers get their required products when they need them. Products are shipped from warehouse centers in Japan, Singapore, Malaysia, Thailand, China, Taiwan, South Korea, U.S. (Chicago), Canada, Mexico, the U.K., Germany, France and Italy or from 200 agents in 44 countries.

KEYENCE CANADA INC.
KEYENCE CORPORATION OF AMERICA
KEYENCE FRANCE SAS
KEYENCE DEUTSCHLAND GmbH
KEYENCE UK LIMITED
KEYENCE ITALIA S.p.A.
KEYENCE INTERNATIONAL (BELGIUM) NV/SA
KEYENCE MEXICO S.A. DE C.V.
KEYENCE CORP.
KEYENCE CORPORATION
KEYENCE CANADA INC.
KEYENCE MEXICO S.A. DE C.V.
KEYENCE BRASIL
KEYENCE Corporate Offices
Distributors

USA
CANADA
MEXICO
Chicago

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### SPECIFICATIONS (MD-V9900A Series)

#### Model Overview

- **Main unit (controller + marking head):** MD-V9900FA, MD-V9910FA, MD-V9920FA
- **Console:** MC-P1

**Wavelength**
- Output of Laser Oscillator (Typical): 1,064 nm
- Q-switch frequency CW (continuous wave), 1 to 400 kHz

**Laser Cutting**
- Fixed point / straight line / dashed line / oval

**Marking Conditions**
- **Marking style:** Stationary marking / movement marking (constant speed / encoder)
- **Character size (height / width):** 0.1 to 120 mm 0.004" to 4.72" 0.1 to 300 mm 0.004" to 11.81"

**Program**
- Registered programs: 2000 settings max.
- Number of blocks: 256 blocks

**Input / Output**
- Terminal block input and output / MIL connector input and output

**Interface**
- RS-232C/RS-422A/USB2.0 *1
- CF memory card slot Dedicated for CF memory card *2

**Cooling Method**
- Forced air cooling

**Supply Voltage**
- 100 to 120 VAC, 700 VA max. 50/60 Hz
- 200 to 240 VAC, 800 VA max. 50/60 Hz

**Environmental resistance**
- Ambient temperature for storage: -10 to +60°C -50 to +140°F, No condensation
- Ambient temperature for usage: 0 to +40°C 32 to +104°F
- Relative humidity for usage: 30 to 85%. No condensation

**Weight**
- Controller: 23.0 kg 23.2 kg 23.0 kg
- Marking head unit: 11.5 kg 11.8 kg 11.5 kg
- Console: 2.0 kg

---

### PC SOFTWARE SPECIFICATIONS (OPTIONAL) *3

**Model**
- **Marking Builder 2 (2D):** MB-HD2-DVD
  - 2D setting and editing software (focal distance, tilt correction, spot variation, distance pointer adjustment)
- **Marking Builder 2 (3D):** MB-HS2
  - 3D setting and editing software (marking on plane, cylinder, cone, or sphere; Z-Axis movement marking)
- **Logo designer:** MB-HLD
  - Software tool that converts DXF files into logo or custom character files and edits them.
- **Z-MAP Creator:** MB-HZM
  - Software tool that creates Z-MAP files from 3D CAD files (STL).

---

### DIMENSIONS

#### Head

The dimensions provided are for reference purposes only and may vary slightly due to manufacturing tolerances.

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*1 The USB port is dedicated for PC software. *2 SanDisk cards are recommended. *3 Supported OS: Windows 7/Vista (SP1 or higher)/XP (SP3 or higher)
  - Supported languages: Japanese, English, Chinese (Simplified) and German (Chinese supports the simplified Chinese display, but does not support Chinese input.)
  - Windows XP, the 32 bit and 64 bit version are available. For Windows XP, only the 32 bit version is available.
  - Windows is a registered trademark of Microsoft corporation in the U.S.A.
*4 2D setting and editing software MB-HD2-DVD must be installed and the USB hardware key is required.

---

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**SPECIFICATIONS (MD-F3100/5100 Series)**

<table>
<thead>
<tr>
<th>Model</th>
<th>Standard area</th>
<th>Wide area</th>
<th>Standard area</th>
<th>Wide area</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>30 W</td>
<td>50 W</td>
<td>30 W</td>
<td>50 W</td>
</tr>
<tr>
<td>Console MC-P1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(sold separately)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Marking method</td>
<td>XYZ 3-Axis simultaneous scanning method</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Marking laser</td>
<td>Wave 1000 nm</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Output 30 W</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pulse frequency</td>
<td>60 to 120 kHz</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Working distance</td>
<td>7.01&quot;</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Standard working distance (expendable)</td>
<td>120 x 120 x 42 mm 1/2&quot; x 1/2&quot; x 1.6&quot;</td>
<td>300 x 300 x 42 mm 11.81&quot; x 11.81&quot; x 1.61&quot;</td>
<td>120 x 120 x 42 mm 1/2&quot; x 1/2&quot; x 1.6&quot;</td>
<td>300 x 300 x 42 mm 11.81&quot; x 11.81&quot; x 1.61&quot;</td>
</tr>
<tr>
<td>Standard working area</td>
<td>166 mm x 21 mm 1.07&quot; x 0.82&quot;</td>
<td>2 μm (0.00008&quot;)</td>
<td>166 mm x 21 mm 1.07&quot; x 0.82&quot;</td>
<td>2 μm (0.00008&quot;)</td>
</tr>
<tr>
<td>Marking resolution</td>
<td>0.1 to 120 mm 0.004&quot; to 4.72&quot;</td>
<td></td>
<td>0.1 to 300 mm 0.004&quot; to 11.81&quot;</td>
<td></td>
</tr>
<tr>
<td>Scan speed</td>
<td>Max. 12000 mm/s 472.44&quot;/s</td>
<td>Max. 8000 mm/s 314.96&quot;/s</td>
<td>Max. 12000 mm/s 472.44&quot;/s</td>
<td>Max. 8000 mm/s 314.96&quot;/s</td>
</tr>
<tr>
<td>Charater type</td>
<td>KEYENCE original font (numbers, letters, katakana, hiragana, kanji), User font, True Type font</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Barcode</td>
<td>CUE, DFX, 1T, 2H, RW, CCDAFXW, JAN, GAN, GPC, CUE/DFX</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GS1 Databar</td>
<td>GS1 Databar, GS1 Databar CC-A, GS1 Databar Stacked, GS1 Databar Slacked CC-A, GS1 Databar Limited, GS1 Databar Limited CC-A</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Logo image</td>
<td>Custom character font and logo CAD data (DXT), BMP, JPEG, PNG, TIFF</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Machinery operation</td>
<td>Fixed point, straight line, dashed line, circle, oval</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Workpiece style</td>
<td>Stationary marking, movement marking (constant, encoder)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Character size (marking height/width)</td>
<td>0.1 to 120 mm 0.004&quot; to 4.72&quot;</td>
<td></td>
<td>0.1 to 300 mm 0.004&quot; to 11.81&quot;</td>
<td></td>
</tr>
<tr>
<td>Prog...</td>
<td>No. of registered programs</td>
<td>Max. 2000 programs</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No. of program blocks</td>
<td>256 blocks</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I/O (input-output)</td>
<td>Terminal block (D, M, connector (D), connector (M))</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Interfaces</td>
<td>RS-232C, RS-422A, USB 2.0*, Ethernet (100BASE-TX/10BASE-T)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CF memory card slot</td>
<td>Dedicated for compact flash memory card use**</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Head installation direction</td>
<td>All directions</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Head cable length</td>
<td>4 m 13.1'</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cooling method</td>
<td>Controller, Forced air cooling, Head: Natural air cooling</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rated voltage and power consumption</td>
<td>100 to 120 VAC/200 to 240 VAC +10, 50/60 Hz, Max. 150 VA</td>
<td>100 to 120 VAC/200 to 240 VAC +10, 50/60 Hz, Max. 150 VA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Overvoltage category</td>
<td>II</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pollution degree</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Enclosure rating (Head)</td>
<td>IP64</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Environment resistance</td>
<td>Ambient temperature for storage -10 to 60°C (no humidity) 14 to 140°F</td>
<td>Ambient temperature for usage 8 to 80°C, 30 to 120°F</td>
<td>Ambient temperature for storage -10 to 60°C (no humidity) 14 to 140°F</td>
<td>Ambient temperature for usage 8 to 80°C, 30 to 120°F</td>
</tr>
<tr>
<td>Ambient humidity for storage</td>
<td>30 to 85% (no condensation)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Weight</td>
<td>Controller 27.0 kg</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Head 6.7 kg</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Console 2.0 kg</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**1** Type equipped with contactor control terminal block **2** Supported models: MD-F3100C/3100C, 3100C/3100C **3** The USB port is dedicated for PC software. **4** We recommend SanDisk cards. **5** The laser classification for FDA (CDRH) is implemented based on IEC 60825-1 in accordance with the requirements of Laser Notice No. 50.

**PC SOFTWARE SPECIFICATIONS (OPTIONAL)**

<table>
<thead>
<tr>
<th>Model</th>
<th>Overview</th>
</tr>
</thead>
<tbody>
<tr>
<td>MB-H2D3-DVD</td>
<td>3D setting and editing software (on the DVD), focal distance, tilt correction, spot variation, distance pointer adjustment</td>
</tr>
<tr>
<td>MB-H2D2</td>
<td>3D setting and editing software (marking on plane, cylinder, cone, or sphere, 2-Axis movement marking)</td>
</tr>
<tr>
<td>MB-HLD</td>
<td>Software tool that converts DXF files into logo or custom character files and edits them.</td>
</tr>
<tr>
<td>MB-HZM</td>
<td>Software tool that creates Z-MAP files from 3D CAD files (SLT).</td>
</tr>
</tbody>
</table>

**DIMENSIONS**

**Console MC-P1**

**MD-F Series 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.
**SPECIFICATIONS (ML-Z9500W Series)**

<table>
<thead>
<tr>
<th>Model</th>
<th>Standard model</th>
<th>Wide-area model</th>
<th>Thin laser beam</th>
</tr>
</thead>
<tbody>
<tr>
<td>Marker head unit</td>
<td>ML-Z9510W</td>
<td>ML-Z9510TW</td>
<td>ML-Z9550W</td>
</tr>
<tr>
<td>Controller</td>
<td>ML-Z9500W</td>
<td>ML-Z9500W</td>
<td>ML-Z9500W</td>
</tr>
<tr>
<td>Console (Color touch panel)</td>
<td>MC-P1</td>
<td>MC-P1</td>
<td>MC-P1</td>
</tr>
</tbody>
</table>

**Marking style**
- XYZ 3-Axis simultaneous scanning method

**Marking laser**
- Wavelength: 10.6 µm, 9.3 µm, 10.6 µm, 9.3 µm, 10.6 µm, 9.3 µm

**Guide laser / working distance pointer**
- Semiconductor laser, Class 2 Laser Product (IEC60825-1, FDA (CDRH) Part 1040.10, Wavelength: 655 nm, Output: 1.0 mW)

**Marking area**
- 120 x 120 x 42 mm / 4.72 x 4.72 x 1.65"
- 300 x 300 x 42 mm / 11.81 x 11.81 x 1.65"
- 50 x 50 x 4 mm / 1.97 x 1.97 x 0.16"

**Basic working distance (variation width)**
- 188 mm (+21 mm) / 7.44 (+0.87")
- 399 mm (+21 mm) / 15.71 (+8.33")
- 92 mm (+2 mm) / 3.62 (+0.08")

**Marking resolution**
- 2 µm / 0.08 Mil
- 5 µm / 0.197 Mil
- 1 µm / 0.039 Mil

**Scan speed**
- 12000 mm/s max.
- 6000 mm/s max.
- 8000 mm/s max.

**Character type**
- Font: KEYENCE original font (numerical value, alphabet, katakana, hiragana and kanji) / user font / true type font
- Barcode: CODE39 / 1/IF / 2/5 / NW/7 (CCDABAR) / JAN / CODE128
- GS1 Databar: GS1 Databar (Truncated) / GS1 Databar Stacked / GS1 Databar Limited / GS1 Databar Limited CC-A
- GS1 Databar (Truncated) / GS1 Databar Stacked / GS1 Databar Limited CC-A
- Logo image: Custom font, logo (CAD) data
- Laser cutting: Fixed point / straight line / dashed line / circle / oval

**Marking conditions**
- Character size (height x width): 0.2 to 120 mm / 0.008" to 4.72" / 0.3 to 300 mm / 0.01" to 11.81" / 0.1 to 50 mm / 0.004" to 1.97"

**Program**
- Registered programs: 2000 settings max.

**Input / Output**
- Terminal block input and output / MIL connector input and output
- CF memory card slot: Dedicated for CF memory card
- Interface: RS-232C/RS-422A/USB2.0
- Cooling method: Forced air cooling
- Supply voltage: 100 to 120 VAC / 200 to 240 VAC / 50 / 60 Hz / 1500 VA max.
- Environmental resistance:
  - Ambient temperature for storage: -50 to 80°C / 14°F to 140°F, No condensation
  - Ambient temperature for usage: 0 to 50°C / 32 to 122°F, No condensation
- Relative humidity for usage: 30 to 85%, No condensation

**Weight**
- Controller: 16.1 kg
- Marking head unit: 16.2 kg
- Console: 2.0 kg

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*1 The laser classification for FDA (CDRH) is implemented based on IEC60825-1 in accordance with the requirements of Laser Notice No.50.
*2 Laser tube monolithic output
*3 The USB port is dedicated for PC software
*4 CF card of SanDisk Corporation recommended.

---

**PC SOFTWARE SPECIFICATIONS (OPTIONAL)**

<table>
<thead>
<tr>
<th>Model</th>
<th>Overview</th>
</tr>
</thead>
<tbody>
<tr>
<td>Marking Builder 2 (2D)</td>
<td>MB-HZD3-DVD</td>
</tr>
<tr>
<td>2D setting and editing software (focal distance, tilt correction, spot variation, distance pointer adjustment)</td>
<td></td>
</tr>
<tr>
<td>Marking Builder 2 (3D)**</td>
<td>MB-HZD2</td>
</tr>
<tr>
<td>3D setting and editing software (marking on plane, cylinder, cone, or sphere; 2-Axis movement marking)</td>
<td></td>
</tr>
<tr>
<td>Logo designer**</td>
<td>MB-HLD</td>
</tr>
<tr>
<td>Software tool that converts DXF files into logo or custom character files and edits them.</td>
<td></td>
</tr>
</tbody>
</table>

---

*5 Supported OS: Windows 7/Vista (SP1 or higher)/XP (SP3 or higher)
*6 PC setting and editing software MB-HZD3-DVD must be installed and the USB hardware key is required.
Visit our expert engineering website to get the latest marking technology information and successful applications for your industry.