NEW 3-Axis Hybrid Laser Marker
MD-X1000/X1500 Series

HIGH QUALITY
HIGH POWER

3-AXIS CONTROL LASER MARKER
EQUIPPED WITH OUR NEWLY DEVELOPED
YVO₄/FIBER HYBRID OSCILLATOR
A UNIQUE HYBRID LASER MARKER
THAT COMBINES THE ADVANTAGES OF YVO₄ AND FIBER LASERS

HIGH QUALITY AND HIGH OUTPUT POWER

The MD-X Series is equipped with our newly developed laser oscillation technology that combines the characteristics of YVO₄ and fiber lasers. It delivers high quality and high power to match a wide range of production needs for every industry.

THERMOPILE POWER MONITOR
Laser output measurement

X-AXIS SCANNER
Laser position galvanometer

Y-AXIS SCANNER
Laser position galvanometer

NEWLY DEVELOPED
LASER OSCILLATOR
High quality and output laser oscillation

Z-AXIS SCANNER
Variable focal distance

MULTI-FUNCTION CAMERA
Focal distance measurement, 2D code reading and verification, print placement verification

*May not appear exactly as shown in image
The MD-X Series is equipped with a unique laser oscillation technology developed by KEYENCE that combines the characteristics of both YVO4 and FIBER lasers to deliver a fine quality, high speed mark unlike any other laser system. In addition to its unparalleled combination of high peak power and high average power, the MD-X also delivers an extremely stable, high quality beam with a long service life to match your unique marking requirements.

**HIGH PEAK POWER (200 kW) × HIGH OUTPUT (25 W)**

The MD-X Series is equipped with KEYENCE’s "3-Axis" system for simultaneous x-, y-, and z-axis laser control. The focal distance can be programmed to easily support three-dimensional shapes and wide areas. The built-in camera of the MD-X Series can also be used to measure the focal distance and automatically adjust to eliminate marking defects caused by focus misalignment.

**AUTO-FOCUS 3-AXIS CONTROL**

The built-in camera can be used to read and verify 2D codes. With our newest technology, it is possible to automatically mark and then verify the printed data for readability. In addition to pass/fail verification, MD-X Series laser markers can judge the marking quality of the 2D code after it is marked and output this value giving it comprehensive traceability functionality in a single marking device.

**YVO4 × FIBER = HYBRID**
YVO$_4 \times$ FIBER = HYBRID

20 YEARS OF EXPERIENCE DEVELOPING CUTTING EDGE LASER MARKERS

In 1994, KEYENCE released a revolutionary CO$_2$ laser marker that was the smallest in the world at the time. Since then we have continually released products that combine cutting edge technology with unique KEYENCE developed features. Our YAG/FIBER and YVO$_4$ product lines were developed independently to take advantage of their individual benefits based on their oscillation methods. Now, the MD-X Series HYBRID laser marker combines the advantages of both FIBER and YVO$_4$ laser oscillation methods in one cutting edge product.
The MD-X Series combines the advantages of YVO₄ and FIBER laser markers. Years of KEYENCE laser development in solid state and fiber oscillators has led to the invention of the HYBRID oscillator powering our new MD-X Series laser marker.

**MARKING EXAMPLE**

This laser oscillator enables optimal marking conditions for a variety of materials from subtle marking on plastics to high-power marking on metal.

**HIGH OUTPUT 25 Watt AVERAGE POWER**

The MD-X1500 Series has a 25 watt average power, which is 3 times higher than our previous models YVO₄ models. This allows for faster marking and processing thereby decreasing cycle time and increasing production throughput. Continuous wave (CW) or pulsed oscillation methods can both be used, giving the MD-X Series the flexibility to mark a wide range of applications. This flexibility is key to marking on applications ranging from plastics, metals, thin films or foils.

**HIGH PEAK POWER (200 kW) AND SHORT PULSE WIDTH**

The MD-X1500 Series achieves a peak power of 200 kW, which is 4 times the peak power of our previous YVO₄ models. The MD-X1500 Series combines a high peak power with a short pulse width (4ns) to minimize the damage caused by heat transfer to the target. This makes the MD-X1500 Series the optimal laser marker for applications where it is necessary to eliminate the effect of heat transfer such as marking on resins or plastics.

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*Solid-State Master Oscillator Power Amplifier:
A high quality YVO₄ laser is used as the master oscillator and then fed into a FIBER technology based amplifier to combine the best of both technologies. By using a single emitter laser diode, a long service life expectancy can be achieved compared to conventional technology.
The MD-X Series is equipped with a 42 mm 1.65” focal distance allowing it to automatically adjust its focus onto 3D targets such as cylinders, cones, planes and spheres or even more complex shapes imported as STL files.

3-Axis

3-AXIS CONTROL
EQUIPPED WITH AUTO-FOCUS

KEYENCE 3-Axis technology was the first of its kind to allow for focal adjustments to be made on the fly during marking. Now with Auto-Focus, the MD-X Series 3-Axis laser marker can automatically adjust for variations in focus from one part to the next and ensures ease of use and superior quality.
**AUTO-FOCUS FUNCTION**

Our built in camera makes it possible to perform automatic focusing without the use of any external devices. This is possible even when targets may not be placed at the exact same focal length from the laser and eliminating the need for external tooling. Additional production costs can be kept to a minimum while increasing efficiency and throughput.

*The built-in camera is used to monitor the focal distance using the laser pointer. Automatic focusing is performed by calculating the focal distance from the pointer position. This measurement may not be possible in some cases due to the material, shape, and surface of the workpiece.*

**HIGH-PRECISION WIDE AREA**

High-precision marking can be performed over a 330 mm × 330 mm 12.99” × 12.99” area. This area is 1.2 times larger than most conventional laser marking systems. Larger batches of parts can be marked in a single trigger by implementing a wide area, palletized marking system, greatly contributing to increased production throughput. 3-Axis control eliminates changes in character shape, distortion, and beam spot size variations, all of which are caused by the characteristics of conventional fθ lenses. Even at the edges of the area, perfectly focused marking and cutting with high accuracy is possible.

**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. With conventional laser systems, the target is placed physically out of focus with no internal adjustments to the laser. This causes incorrect character placement and also marking distortion. 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.

**MOUNTING POSITION CORRECTION**

The installation position of the marking head in relation to the target is important for accurate marking and processing. After the marking head is installed, the MD-X Series can easily correct marking head inclination along the x-, y-, and z-axis. This makes it possible to complete installation without having to rely on physical adjustments, which significantly reduces the installation cost. Because the adjustments are made in the software it is also easy to make fine adjustments or adjustments later in production if any misalignment errors have occurred.
KEYENCE manufactures both laser markers and code readers, focusing their attention on providing systems for tracking and traceability. The MD-X Series laser marker has a built in 2D code reader and verifier to accurately mark and check 2D codes without using a separate device. *The optional 2D code reader add-in is required.

MULTIPLE MARKING CONFIRMATION FUNCTIONS

MARKING VERIFICATION

Images are captured by the built-in camera before and after marking in order to verify marking. The contrast differences between the two images are compared and thresholds can be set in order to automate marking confirmation. This, in turn, prevents mis-marking.

VIEWFINDER FUNCTION

The built-in camera can be used to confirm marking position and results because of the coaxial alignment with the galvos that steer the laser beam during operation. This allows for easy alignment at setup and position checks during production to help eliminate miss marks and the output of bad parts.
ENVIROMENTALLY RESISTANT SPECIFICATIONS [MARKING HEAD ENCLOSURE RATING: IP64]

The MD-X Series uses a proprietary sealing method to securely protect optical components. This ensures that these components are not affected by factors such as dirt, dust, and water droplets, and provides environmentally resistant performance and allows for stable operation in even the harshest environments. The MD-X Series has an enclosure rating equivalent to that of the fanless marking head of our MD-F3100/F5100 Series fiber laser markers.

DEDICATED LENS PROTECTION FILTER (OPTIONAL)

The lens protection filter option fully protects the laser’s output lens from contaminant buildup and scratching. This protection filter threads onto the output lens and can be replaced very easily in the field by unscrewing and replacing with a new filter. This allows for the most up-time during maintenance procedures and eliminates costly shut downs due to lens buildup or damage. This part can be replaced without any specialized tooling and without performing any marking adjustments such as the case when replacing an \( f_0 \) lens.
Marking Builder 3  

The Marking Builder 3 software suite was developed to bring out the high performance of the MD-X 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.

**OPERATION MONITOR**

It is possible to select and display only the information required during operation such as 2D code reading results. Individual settings can be locked, allowing for only administrators to edit and eliminating human errors.
EASY SETUP IN THREE STEPS
Settings are configured in three steps: marking data, layout, and marking parameters. All the user has to do is enter information according to the instructions provided by the software, which makes it possible even for new users to create programs without difficulty.

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 period of time.

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.

TrueType FONT
TrueType fonts that are loaded onto your PC can be used as system fonts in Marking Builder 3. Variable data using TrueType fonts are now easily manipulated and changed on the fly.

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.
HARDWARE THAT IS COMPLIANT WITH A WIDE VARIETY OF SPECIFICATIONS

The MD-X Series conforms to various international standards and regulations, and can be used in any and all countries. The MD-X also has its own preventative maintenance function and can connect to external devices.

*For information on the countries and areas in which this product can be used, contact your nearest KEYENCE office.

ISO 13849-1

A dedicated model is available for use when the MD-X Series is installed into machinery that needs to meet the ISO 13849-1 standard.

*The model is equipped with a relay contactor. The suffix “C” is added to the model name. The controller is equipped with two safety relays that are used to shut off the flow of power to the laser unit.

INDUSTRIAL ETHERNET EQUIPPED (TCP/IP, PROFINET and EtherNet/IP™)

External device connectivity and networking capabilities have been improved with the addition of Ethernet communication. This makes it possible to remotely connect to devices for data communication and status checks. The MD-X Series also allows users to save the communication history without using external devices.

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.

BARCODE VERIFICATION

With the MD-X Series, it is possible to scan a barcode to switch programs or mark a character string directly from a scanned barcode. This operation can be performed by connecting a barcode reader to the USB port on the front of the controller and reading a given code.
POWER OUTPUT SELECTION BASED ON APPLICATION

The MD-X Series has a variety of models to accommodate the marking needs of every industry. From marking on resins to cast metals we have an optimal solution for your product.

**MD-X1000 Series (13 W)**
- [CONTRAST MARKING] MOLDED PACKAGES (BGA)
  Vivid coloration that does not engrave the target.

**MD-X1500 Series (25 W)**
- [HIGH-SPEED 2D CODE MARKING] METAL CASTING
  2D codes that are easily read can be marked at high speeds.

- [3D MARKING] ANODIZED HOUSINGS
  High contrast marks without distortion even on curved surfaces.

- [BLACK-ANNEALED MARKING] PRECISION TOOLS
  Vivid black-color marking is possible with no surface disruption.

- [COATING REMOVAL] ON-BOARD INSTRUMENT PANEL SWITCHES
  Finishing with high clarity and no heat transfer damage.

- [THIN FILM PROCESSING] GOLD-PLATED CONNECTORS
  Even material with high reflectivity can be processed with high precision and speed.
3-AXIS HYBRID LASER MARKER
MD-X1000/X1500 Series
The most versatile, general purpose marking solution for resins, plastics, films, foils and metals.

3-AXIS FIBER LASER MARKER
MD-F3100/F5100 Series
The optimum solution for black-color marking and engraving on metal where a high output power is required.

3-AXIS YVO4 LASER MARKER
MD-V9900A Series
The optimum solution for general-purpose marking on metals and resins and paint removal processes.

3-AXIS CO₂ LASER MARKER
ML-Z9500 Series
The optimum solution for marking materials such as resin and paper and for processing thin films.

TELECENTRIC LASER MARKER
MD-T1000
The optimum solution for micron-level marking and trimming applications in which high precision is required.

MARKING EXAMPLES

- Character size
  (typical examples)
  14

- Logo mark
- 2D code
- GS1 DataBar
- BMP/JPEG data
- Barcode
  - CODE39
  - ITF
### SPECIFICATIONS

<table>
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<td>3D add-in software for Marking Builder 3 (marking on plane, cylinder, cone, or sphere; Z-MAP marking)</td>
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1. Type equipped with a 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. The only TrueType and OpenType fonts supported are those fonts whose "Font embeddability" property is set to "Installable" or "Installable." This property can be viewed from the Properties dialog boxes of the fonts shown on the [Fonts] screen in [Control Panel].
4. Supported models: MD-X1000C, MD-X1020C, MD-X1500C, MD-X1520C

### PC SOFTWARE SPECIFICATIONS (OPTIONAL)

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- Supported operating systems: Windows 8.1, Windows 8, and Windows 7 (SP1 or later)
- Supported languages: English, Japanese, Chinese, German, Korean
- Windows is a registered trademark of Microsoft Corporation in the United States and other countries.
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.