KEYENCE

3-Axis Hybrid Laser Marker
MD-X Series

HIGH QUALITY HIGH POWER

3-AXIS CONTROL LASER MARKER
EQUIPPED WITH OUR NEWLY DEVELOPED
YVO_4/FIBRE HYBRID OSCILLATOR

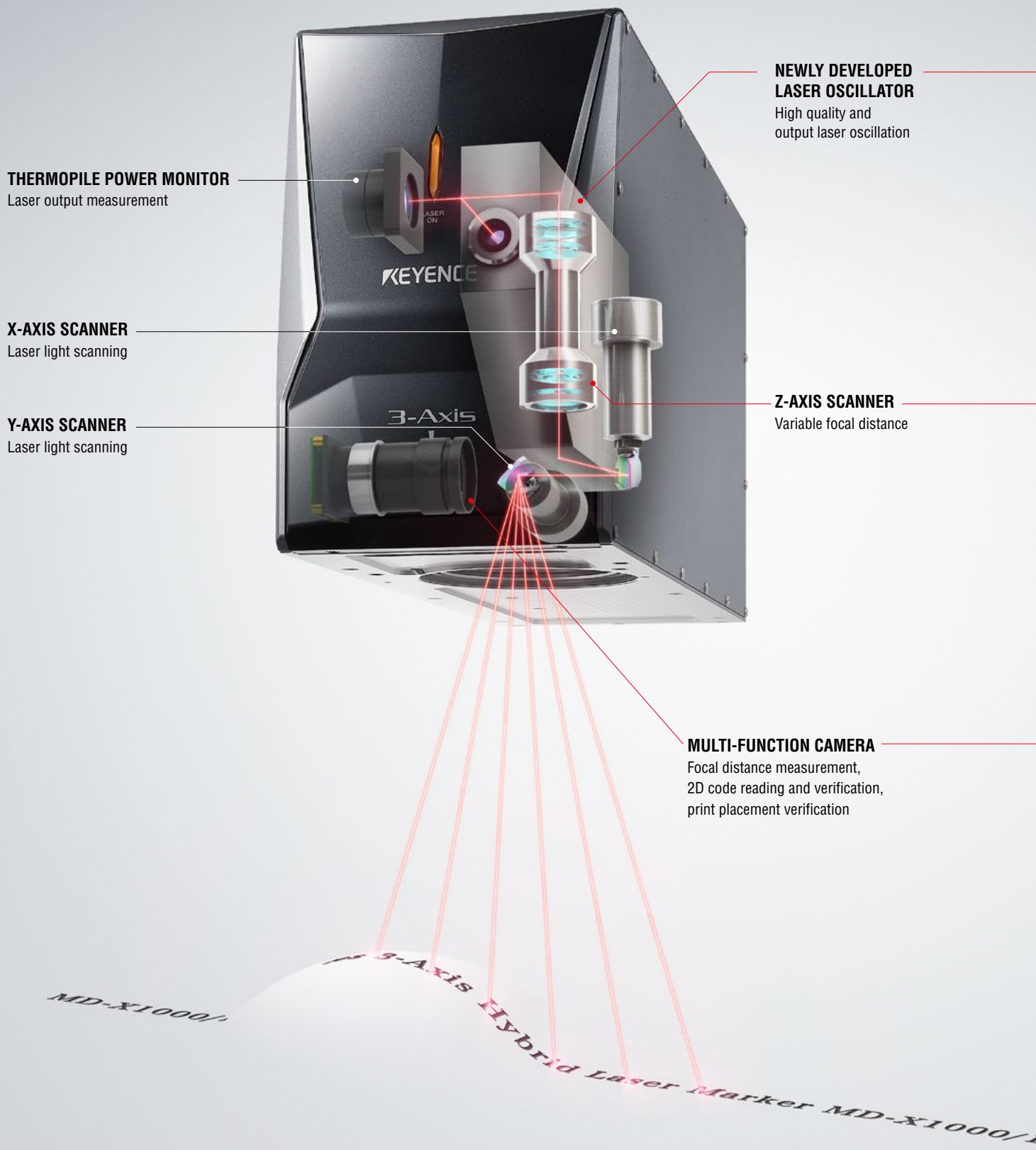
MD-X Series

A UNIQUE HYBRID LASER MARKER

THAT COMBINES THE ADVANTAGES OF YVO_4 AND FIBRE 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 YVO_4 and fibre lasers. It delivers high quality and high speed to match a wide range of production needs for every industry.



*May not appear exactly as shown in image

YVO_4 × FIBRE = HYBRID

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

The MD-X Series is equipped with a unique laser oscillation technology developed by KEYENCE that combines the characteristics of both YVO_4 and FIBRE lasers to delivery 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.

AUTO-FOCUS 3-AXIS CONTROL

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.

BUILT-IN 2D CODE READER

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.

YVO_4 × FIBRE = 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/FIBRE 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 FIBRE and YVO_4 laser oscillation methods in one cutting edge product.

1998
MY Series
Water-cooled
YAG laser marker

2001
MD-Y Series
Water-cooled
LD YAG laser marker

2003
MD-V9600 Series
Air-cooled YVO_4 laser marker

2005
MD-H Series
Air-cooled YAG laser marker

2007
MD-V9900 Series
3-Axis YVO_4 laser marker

2009
MD-F Series
3-Axis fiber laser marker

MD-X Series
3-Axis Hybrid Laser Marker

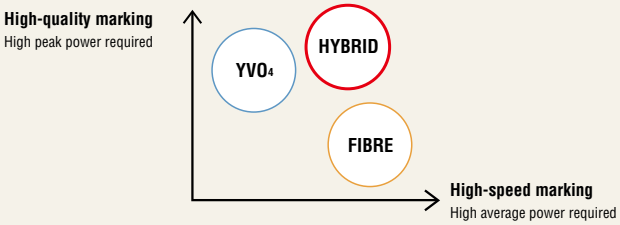
EQUIPPED WITH OUR NEWLY DEVELOPED S-MOPA* LASER OSCILLATOR

This unique laser oscillation method combines the best attributes of YVO_4 and FIBRE laser markers. Years of KEYENCE laser development in solid state and fibre oscillators has led to the invention of the HYBRID oscillator powering our new MD-X Series laser marker.

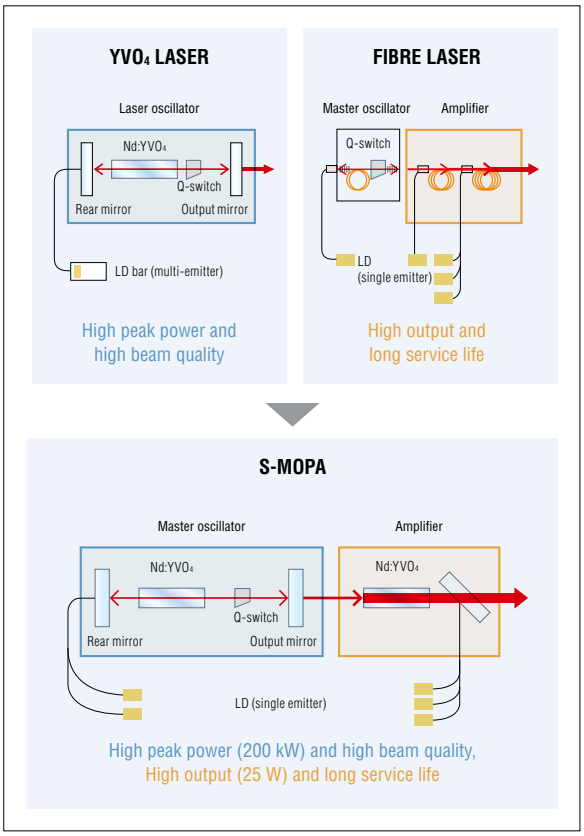
MARKING EXAMPLE

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

The MD-X Series combines the advantages of YVO_4 and FIBRE laser markers
(Compared to previous KEYENCE models)

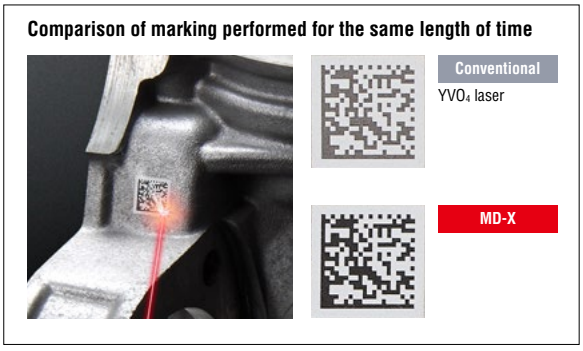


*Solid-State Master Oscillator Power Amplifier:
A high quality YVO_4 laser is used as the master oscillator and then fed into a FIBRE technology based amplifier to combine the best of both technologies. By using a single emitter laser diode, a long service life expectancy can be achieved compared to conventional technology.



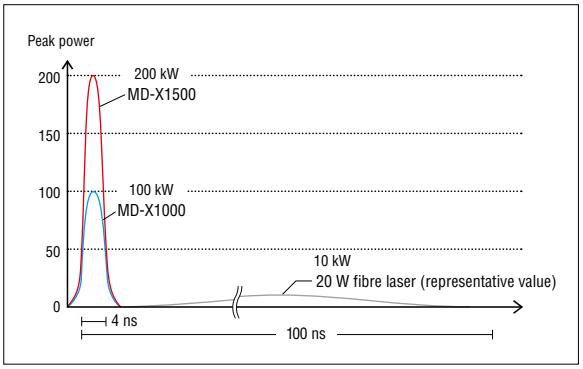
HIGH OUTPUT 25 Watt AVERAGE POWER

The MD-X1500 Series has a 25 watt average power, which is approximately twice the average power of previous YVO_4 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 approximately twice the peak power of conventional YVO_4 lasers.
The MD-X1500 Series combines a high peak power with a short pulse width (4 ns) to minimise 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.



The MD-X Series is equipped with a 42 mm 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

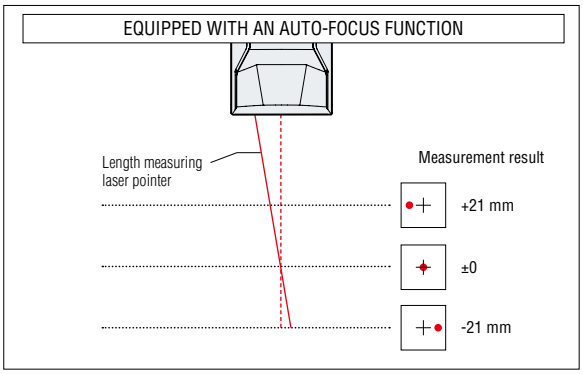
HIGH QUALITY, HIGH EFFICIENCY PRODUCTION

KEYENCE 3-Axis technology was the first of its kind to enable complex 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

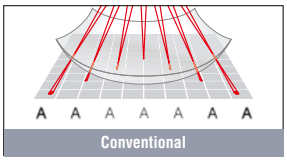
Our built in camera makes it possible to perform automatic focusing without the use of any external devices. This is possible even when targets may not be placed at the exact same focal length from the laser and eliminating the need for external tooling. Additional production costs can be kept to a minimum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

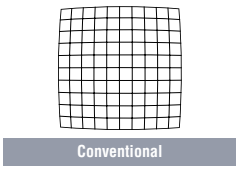


HIGH-PRECISION WIDE AREA

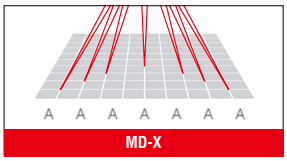
High-precision marking can be performed over a 330 mm × 330 mm area. This area is 1.2 times larger than most conventional laser marking systems. Larger batches of parts can be marked in a single trigger by implementing a wide area, palletised marking system, greatly contributing to increased production 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.



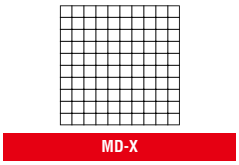
Characters become thicker and their positions are offset the closer they are to the edge of the area.



Area distortion is caused by the characteristics of the lens.



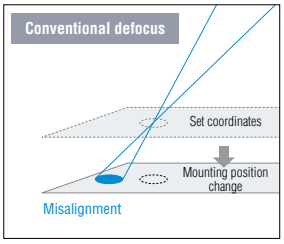
Uniform line width and high precision are maintained in the entire area.



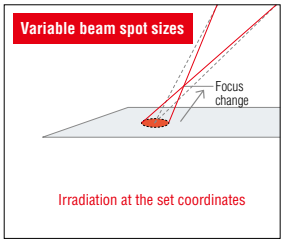
Changes in character shape and distortions have been eliminated.

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.



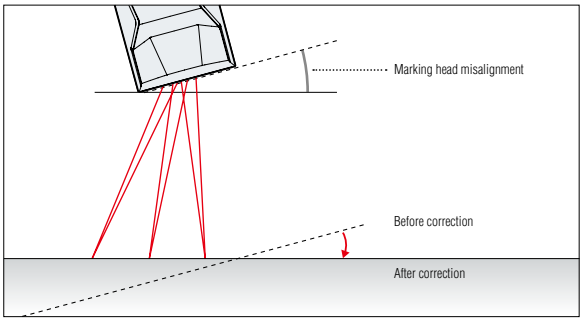
Because the mounting position is physically shifted, the irradiation position and character size are also misaligned in relation to their settings.



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.

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 mis-alignment errors have occurred.

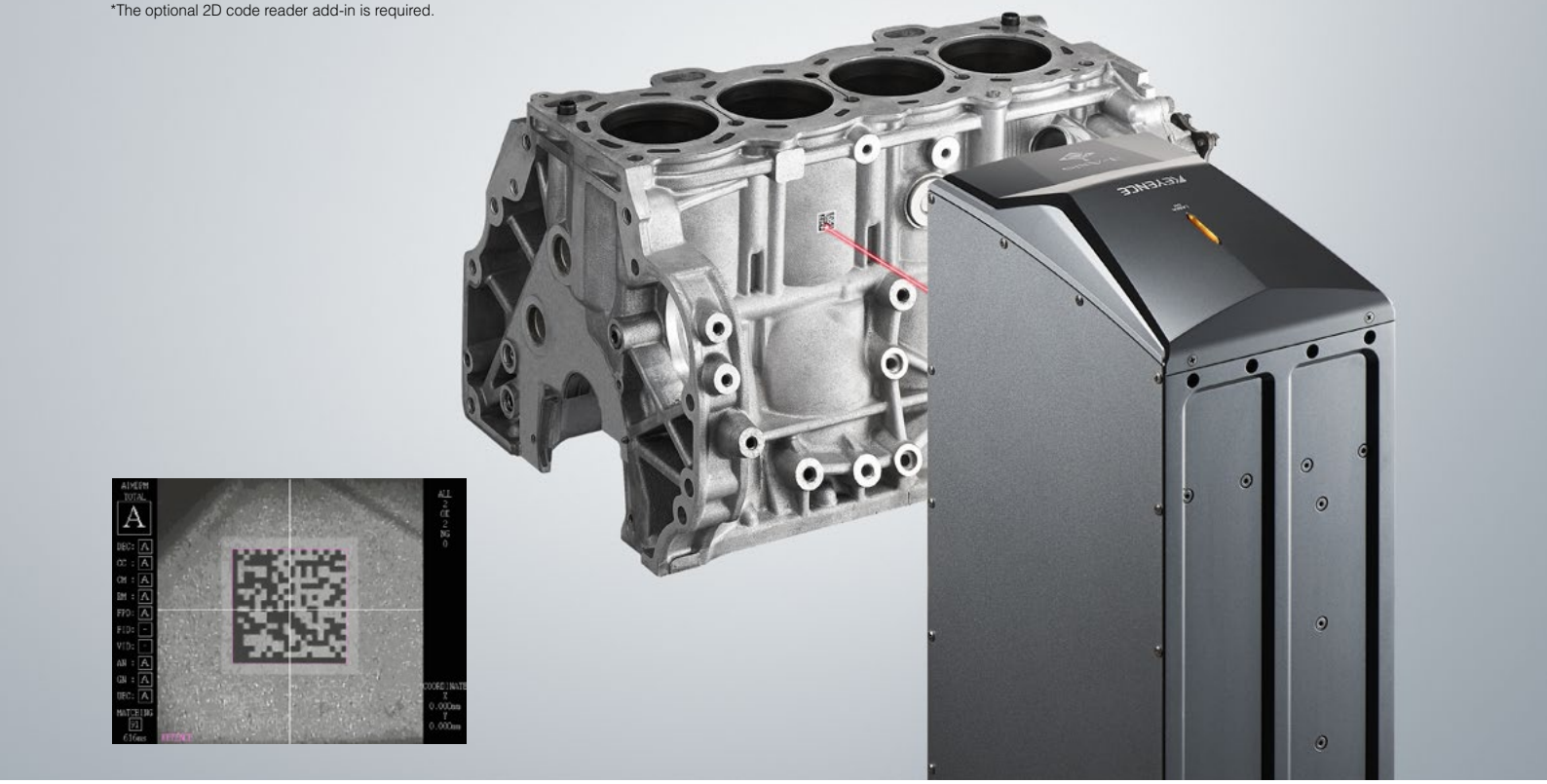


BUILT-IN MULTI-FUNCTION CAMERA

BUILT-IN 2D CODE READER

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.

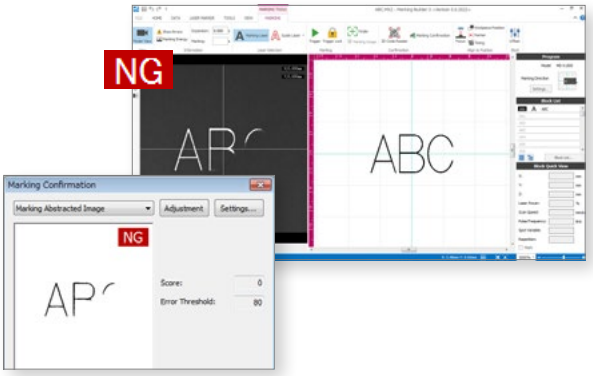
*The optional 2D code reader add-in is required.



MULTIPLE MARKING CONFIRMATION FUNCTIONS

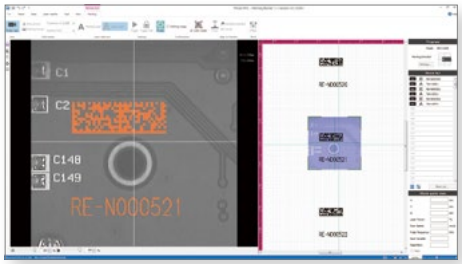
MARKING VERIFICATION

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

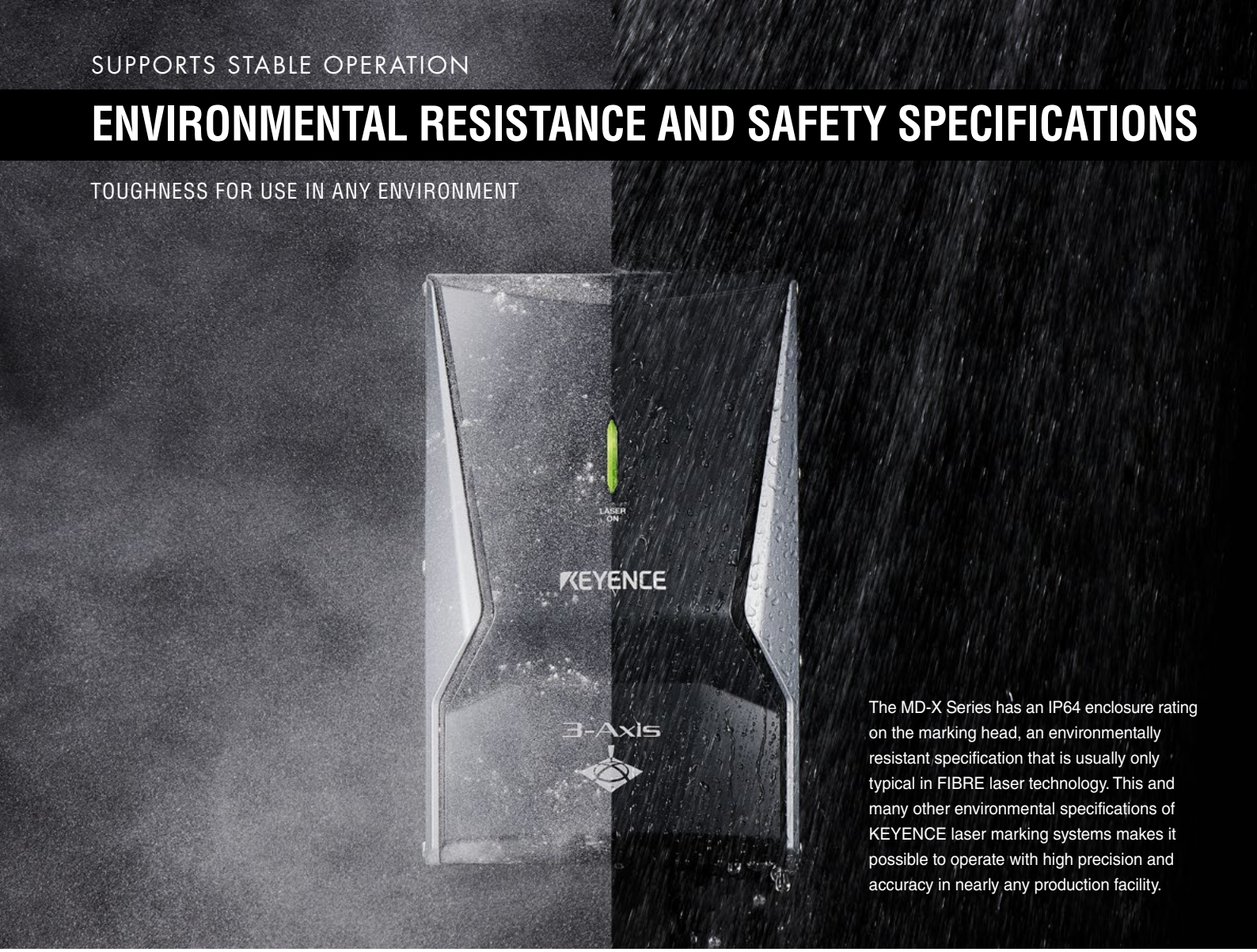
The built-in camera can be used to confirm marking position and results because of the coaxial alignment with the galvos that steer the laser beam during operation. This allows for easy alignment at setup and position checks during production to help eliminate miss marks and the output of bad parts.



SUPPORTS STABLE OPERATION

ENVIRONMENTAL RESISTANCE AND SAFETY SPECIFICATIONS

TOUGHNESS FOR USE IN ANY ENVIRONMENT



The MD-X Series has an IP64 enclosure rating on the marking head, an environmentally resistant specification that is usually only typical in FIBRE laser technology. This and many other environmental specifications of KEYENCE laser marking systems makes it possible to operate with high precision and accuracy in nearly any production facility.

ENVIRONMENTALLY 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, which 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-F3200/F5200 Series fibre laser markers.

IP64

- 6: No ingress of dust.
- 4: Water splashed against the enclosure from any direction shall have no harmful effect.

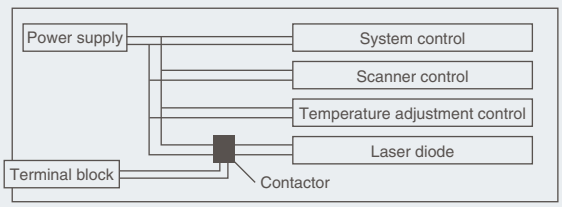
All IP tests are performed for the prescribed time and using the prescribed method. This only guarantees that operation is possible during the time limits required by the test and do not guarantee that the product can be used under the test conditions for extended periods of time.

ISO 13849-1 COMPLIANT (MODELS EQUIPPED WITH CONTACTORS)

A dedicated model with contactors is available for use when the MD-X Series is installed into machinery that needs to meet the ISO 13849-1 standard. The controller is equipped with two safety contactors that are used to shut off the flow of power to the laser unit. In addition, the short recovery time of approximately 1 second provides excellent operability.

* The suffix “C” is added to the model name.

Controller interior

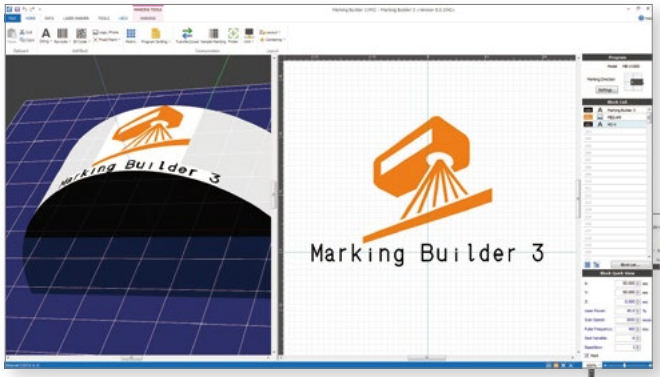


Marking Builder 3 OPTIONAL

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.

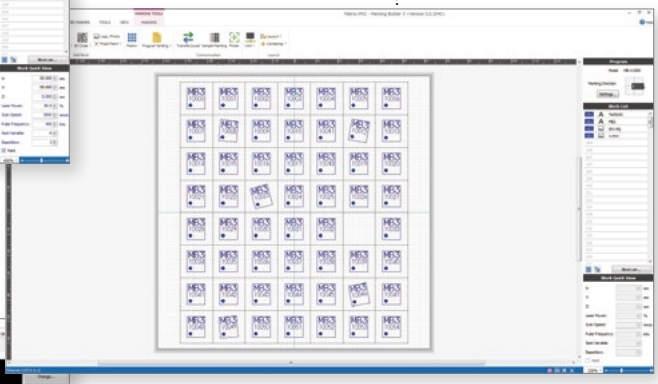
BASIC SETTINGS

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.



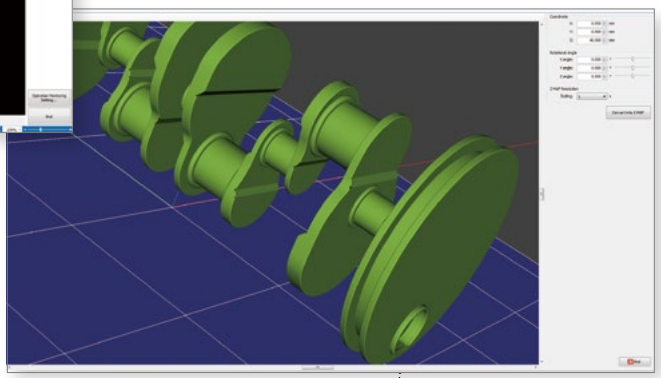
MATRIX MARKING

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.



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.

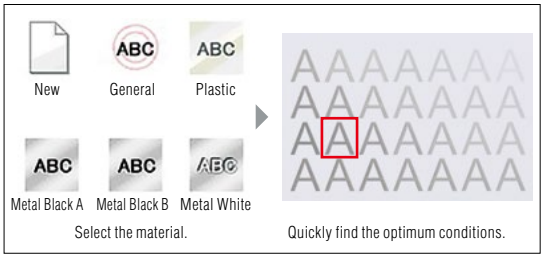


Z-MAP CREATOR

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.

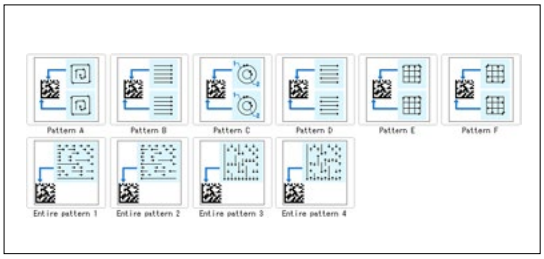
SAMPLE MARKING FUNCTION

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.



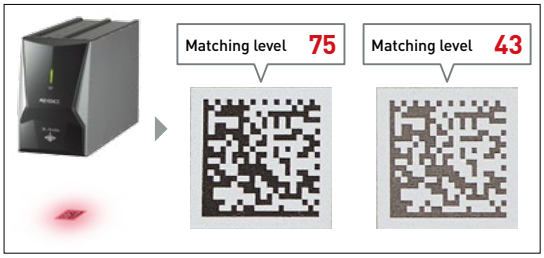
2D CODE PATTERN SELECTION

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.



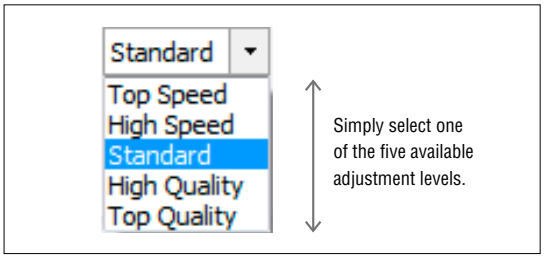
MATCHING LEVEL JUDGEMENT FUNCTION

After reading a code, the MD-X can judge the readability level and show the reading margin as a numeric value. This allows for easy quality comparison.



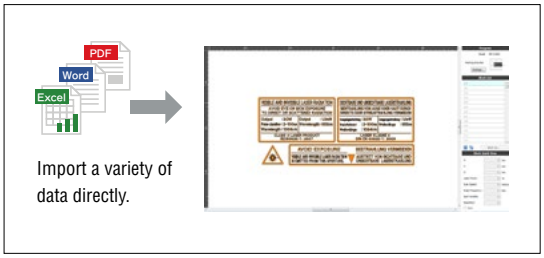
QUALITY ADJUSTMENT LEVEL

The software automatically calculates the adjustments needed to either emphasise 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.



UTILITY THAT SUPPORTS A WIDE VARIETY OF SPECIFICATIONS

The MD-X Series supports a wide variety of communication standards, which allows excellent interoperability with peripheral equipment.
It can also support a wide range of functions such as predictive maintenance and human error prevention.

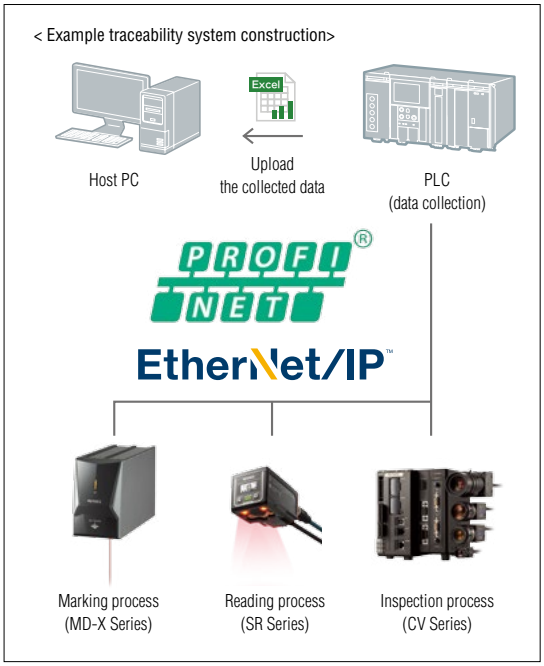
EASY CONNECTIONS TO PERIPHERAL EQUIPMENT

PROFINET and EtherNet/IP™

High-speed connections with simplified wiring to peripheral equipment are now possible. The MD-X Series also lets users operate on-site equipment remotely and save the communication history without using external devices. It is also possible to use Ethernet to connect devices to each other with a single LAN cable. This makes it possible to visualise product information and the state of each piece of equipment, allowing easy construction of traceability systems.

KEYENCE's total support

KEYENCE lineup also includes devices used in processes that can perform in conjunction with one another.
Because all these devices are made by the same manufacturer, they work together seamlessly, reducing the number of man-hours required to install and set up all the devices. KEYENCE also provides prompt support in the rare event of a problem.

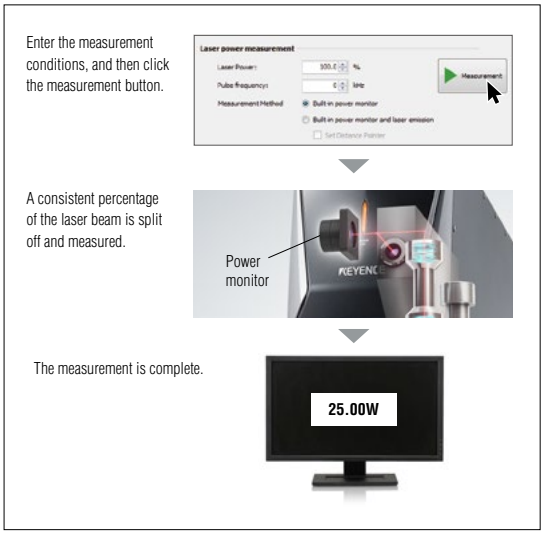


BUILT-IN THERMOPILE POWER MONITOR

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.

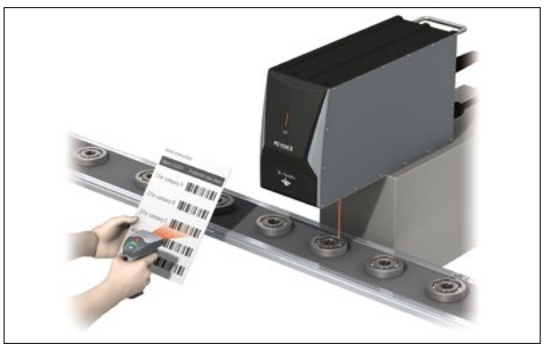
What is a thermopile power monitor?

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 (13 W)

[CONTRAST MARKING] MOULDED PACKAGES (BGA)

Vivid colouration that does not engrave the target is possible.

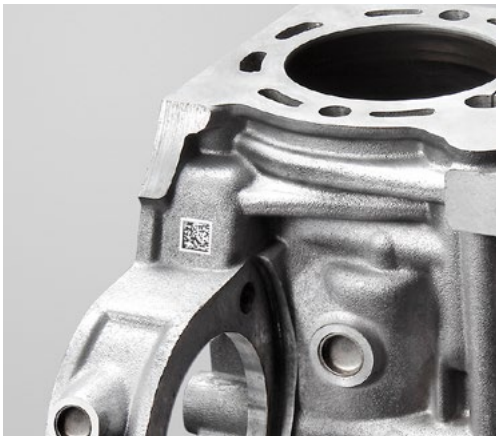
[3D MARKING] ANODISED HOUSINGS

High contrast marks without distortion even on curved surfaces.

[COATING REMOVAL] ON-BOARD INSTRUMENT PANEL SWITCHES

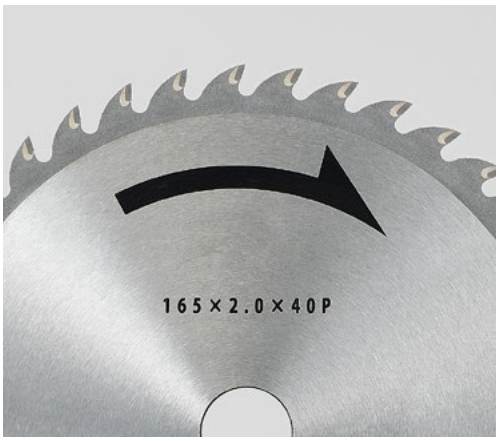
Finishing with high clarity and no heat transfer damage.

MD-X1500 (25 W)



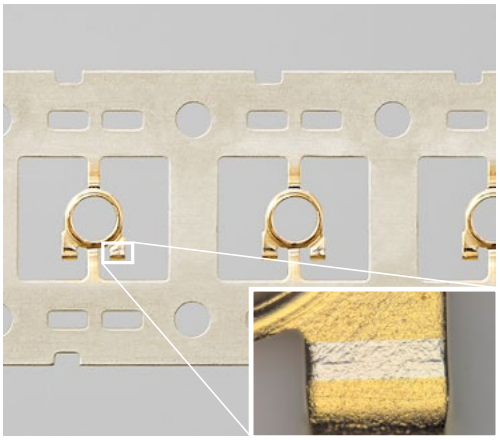
[HIGH-SPEED 2D CODE MARKING] METAL CASTING

2D codes that are easily read can be marked at high speeds.



[BLACK-ANNEALED MARKING] PRECISION TOOLS

Vivid black-colour marking is possible with no surface disruption.



[THIN FILM PROCESSING] GOLD-PLATED CONNECTORS

Even material with high reflectivity can be processed with high precision and speed.

3-AXIS CONTROL LASER MARKERS

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

3-AXIS HYBRID LASER MARKER
MD-X Series

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

3-AXIS FIBER LASER MARKER
MD-F Series

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

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.

MARKING EXAMPLES

Character size (typical examples)

0123456789
ABCDEFGHIJKLMNOPQRSTUVWXYZ

0123456789
ABCDEFGHIJKL
abcdefghijkl

Logo mark

Barcode

CODE39 ITF

2D code

Data Matrix QR

GS1 DataBar

(17) 150700 (10) ABC1234
(01) 14912345678901

BMP/JPEG data

SPECIFICATIONS

		13 W			25 W	
		Standard area	Wide area	Focused spot	Standard area	Wide area
Model	Marking unit (controller + head)	**MD-X1000** **MD-X1000C**[*1]	**MD-X1020** **MD-X1020C**[*1]	**MD-X1050**	**MD-X1500** **MD-X1500C**[*1]	**MD-X1520** **MD-X1520C**[*1]
	2D code reader add-in (sold separately)	**MD-XAD1/MD-XAD1A**				
	Console (sold separately)	**MC-P1**				
Marking method		XYZ 3-Axis simultaneous scanning method				
Marking laser		YVO_4 laser, Class 4 Laser Product (IEC/EN60825-1, JIS C6802, FDA(CDRH) Part 1040.10[*2], GB7247.1)				
	Wavelength	1064 nm				
	Output	13 W			25 W	
Q-switch frequency		CW (continuous wave), 1 to 400 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	330 × 330 × 42 mm	50 × 50 × 30 mm	125 × 125 × 42 mm	330 × 330 × 42 mm
Standard working distance (±variable width)		189 mm (±21 mm)	300 mm (±21 mm)	100 mm (±15 mm)	189 mm (±21 mm)	300 mm (±21 mm)
Marking resolution		2 µm	5 µm	1 µm	2 µm	5 µm
Scan speed		Max. 12000 mm/s	Max. 8000 mm/s	Max. 6000 mm/s	Max. 12000 mm/s	Max. 8000 mm/s
Character type	Font	KEYENCE original font (numbers, letters, katakana, hiragana, kanji), user font, TrueType font, OpenType font[*3]				
	Barcode	CODE39, ITF, 2of5, NW-7 (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 marking, Moving marking (constant, encoder)				
	Character size (height/width)	0.1 to 125 mm	0.1 to 330 mm	0.1 to 50 mm	0.1 to 125 mm	0.1 to 330 mm
	No. of registered programs	2000 max.				
	No. of program blocks	256				
Input/output		Terminal block I/O, MIL connector I/O, contactor control I/O[*4]				
Interface		RS-232C, USB 2.0, Ethernet (100BASE-TX/10BASE-T)[*5]				
Marking head installation direction		All directions				
Marking head cable length		4.3 ±0.1 m				
Cooling method		Forced air cooling				
Rated voltage and power consumption		100 to 120 VAC/200 to 240 VAC ±10%, 50/60 Hz, 650 VA max.			100 to 120 VAC/200 to 240 VAC ±10%, 50/60 Hz, 800 VA max.	
Overvoltage category		II				
Pollution degree		2				
Enclosure rating (marking head)		IP64 (IEC60529)				
Environmental resistance	Ambient temperature for storage	-10°C to 60°C (no freezing)				
	Ambient temperature for usage	0°C to 40°C				
	Ambient humidity for storage	30% to 85% (no condensation)				
	Ambient humidity for usage					
Weight	Controller	23.0 kg				
	Marking head	13.6 kg			13.9 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 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 "Editable." This property can be viewed from the Properties dialogue boxes of the fonts shown on the [Fonts] screen in [Control Panel].
*4. Supported models: MD-X1000C, MD-X1020C, MD-X1500C, MD-X1520C
*5. There are two USB ports: a Type A connector for connecting USB memory devices or a USB mouse and a Type B connector that is the dedicated port for Marking Builder 3 (ActiveX). The Ethernet port supports communication with Marking Builder 3 (ActiveX), TCP/IP communication, EtherNet/IP™ and PROFINET.

PC SOFTWARE SPECIFICATIONS (OPTIONAL)

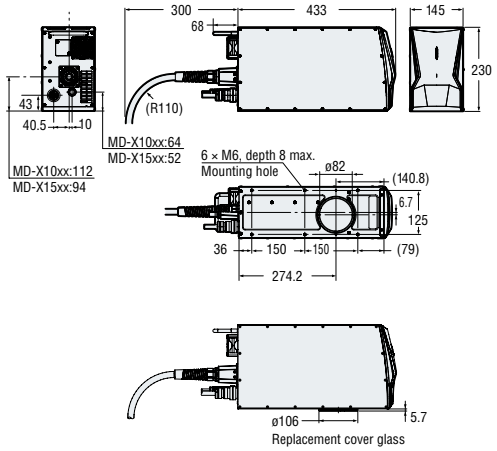
Model	Description
MB3-H2D3-DVD*	Marking Builder 3 Version 3 2D setting and editing software (focal distance, inclination correction, variable spot, distance pointer adjustment)
MB3-H3D1	3D add-in software for Marking Builder 3 (marking on plane, cylinder, cone, or sphere; Z-MAP marking)

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

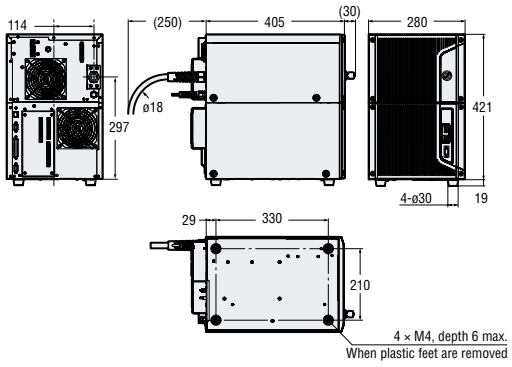
DIMENSIONS

Unit: mm

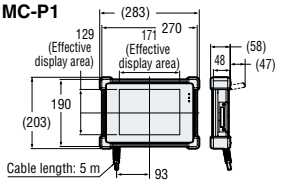
Marking head



Controller



Console
MC-P1



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.

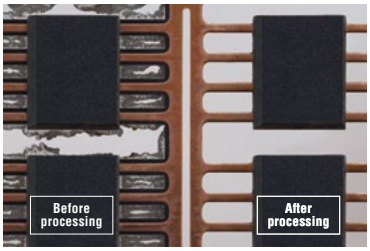
LASER MARKERS USED AROUND THE WORLD

The MD-X Series supports various international standards and regulations. Through our world-wide direct-sales network, KEYENCE provides its customers with direct support no matter what country our customers are in.

LOCAL, IN-HOUSE TESTING LABS

Our customers have access to these test services provided by our dedicated sales engineers.
To request a test, visit the KEYENCE website or contact your nearest KEYENCE office.

MARKING



PROCESSING

KEYENCE

Please visit: www.keyence.com

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

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