World's Fastest, High power CO₂ Laser Marker
ML-G9300 Series

NEW

Innovative Laser Markers Using WaveGuide Technology

Ultra-high Output

30W Laser Power

Innovative Laser Markers Using WaveGuide Technology
The Ultimate Laser Marker
Using WaveGuide Technology

Using WaveGuide (WG) Technology, high-speed permanent marking is now available. Various materials can be marked with a single unit.

World’s highest speed, high power CO₂ Laser Marker
ML-G9300 Series

A vertical marking head is available.
WaveGuide LASER MARKER

World’s highest power: 30W output
The high power 30W output offers wider marking applications.
The ML-G Series incorporates a 30W laser oscillator that uses the newly developed WaveGuide excitation method. Although the overall length of approx. 23.6” (600 mm) is the smallest in its corresponding class, the ML-G Series enables marking on stainless steel workpieces as well as on resin workpieces, offering wider marking applications.
* To print on stainless steel, please use the model that supports ultra-small character sizes.

World’s highest speed: 600 characters/second
Enables high-speed marking that cannot be achieved with conventional markers.
The world’s fastest marking scanner motor has been developed. With a high scan speed of 472.4”/sec. (12,000 mm/sec.), the ML-G Series can reduce the marking tact time (twice as fast as conventional products). Marking on fast-moving products is now possible.

Laser Power Stability within ±5% *
Beautiful, consistent marking can be achieved.
The ML-G Series provides stable laser power to maintain consistent marking quality. It can suppress irregularities in marking density and eliminate problems of missing or blurred characters. Thus, the ML-G Series ensures beautiful marking over a long period of time.
* When the output is 20% or higher

World’s longest life expectancy: 10 years *
Ultimate maintenance-free structure
The laser oscillator is equipped with a metallic hardware seal to suppress CO₂ gas leakage, offering a life expectancy approximately twice as long as conventional products. Since the laser oscillator does not need to be replaced for a long time, it provides an ultimate, maintenance-free structure.
* Performance not guaranteed.

<WaveGuide (WG) Method>
The path of the laser beam in the oscillator is guided with alumina ceramics. With the reduced electrode pitch, the WaveGuide method ensures high efficiency and stability.

Because of the wide excitation area, the efficiency is poor.
Because of the small excitation area, the efficiency is improved.
High Power and High Speed
Achieve the Impossible

The ML-G Series solves applications that have been abandoned with conventional markers.

The ML-G Series can track fast-moving products.
World’s highest power: 30W output
High output from an ultra-small body – Newly developed WaveGuide Technology

The path of the laser beam, which is generated with ultimate efficiency by WaveGuide technology, is folded in a Z shape in the oscillator. This method can reduce the oscillator length, resulting in downsizing of the unit. Also, it provides higher excitation efficiency than the conventional method.

Marking on stainless steel workpieces, film cutting and boring are possible.

The ML-G Series enables marking on various materials such as stainless steel, resin, glass, rubber and paper. With its enhanced laser power, the ML-G Series can also be used for machining purposes such as resin film cutting, boring and wire sheath cutting.

* To print on stainless steel, please use the model that supports ultra-small character sizes.

World’s fastest scanner motor
The marking tact time is reduced to 1/2.

To obtain the best performance of the WaveGuide technology, the world’s fastest marking scanner motor has been developed. When tuned to optimum conditions, the scanner motor provides the fastest marking speed of 600 characters/second, resulting in a significant reduction in marking tact time.

Tracking fast-moving lines

The ML-G Series remarkably improves marking on products traveling on high-speed lines. Conventional products have considerable limitations in such applications. The ML-G Series enables high-speed, clear marking on PET bottles, cartons, electrical wires and more.

High-definition marking resolution of 0.039 Mil (1 µm)
Adoption of a high-definition scanner driver

By developing a high-definition scanner driver, the marking resolution is significantly improved from 0.585 to 0.039 Mil (15 to 1 µm). Thus, the ML-G Series enables higher-definition, beautiful marking of fonts and logo marks. Even ultra-small characters can be expressed clearly.
Long-term Marking Quality
Retain well-defined marks forever

Well-defined characters can be retained for a long period of time.
Highest marking stability*

High-precision laser output with ±5% stability ensures stable marking.

With conventional oscillators, the laser power fluctuates slightly by approximately ±10% during the marking process. The marking quality can be diminished. However, the ML-G Series incorporates a laser oscillator using WaveGuide technology, providing a laser power stability within ±5%. Therefore, the ML-G Series can suppress irregularity in marking density to maintain constant marking quality. It ensures highly stable marking that cannot be achieved with conventional markers.

* When output is 20% or higher

A dust-proof structure and noise immunity ensure stable marking.

Super dust-proof structure
A dust-proof wall exists between the laser oscillator and the scanner to separate these units completely. With this structure, external air for cooling the oscillator will not affect the scanner. Dust contained in the external air will not adhere to the marking scanner mirror. Thus, the ML-G Series ensures stable marking without missing or blurred characters.

Noise immunity
Since the whole marking head is shielded, the ML-G Series prevents external noise from entering the scanner and control board, ensuring stable marking. A CE Marking-conformable model is also available.

World’s longest life expectancy: 10 years*

Maintenance-free structure

The laser oscillator is equipped with a metallic hardware seal to suppress CO₂ gas leakage, offering a life expectancy approximately twice as long as conventional products. This results in maintenance cost reduction. Furthermore, it can eliminate line stoppage during replacement and save the labor of troublesome replacement work.

* The life expectancy of 10 years is not a guaranteed value.
Quick and Easy Installation

The vertical marking head can be installed in minimal space.

Continuous laser guide
Using a red laser beam, you can clearly see the image of the characters to be marked.

Work area laser guide
A laser beam indicates the work area. You can determine the workpiece position easily.

The guide beam confirms the printing position and the laser beam prints the characters.
Ease of installation

A laser guide can simplify workpiece positioning.

Continuous laser guide
A high-speed scanning red laser confirms the position of marking characters on a workpiece.

Workpiece image laser guide
You can confirm the workpiece outline shape with the red laser. Using this guide laser enables accurate setup without positioning errors.

Work area laser guide
A high-speed red laser displays the work area on the target. Using this laser guide simplifies workpiece angle/position adjustment.

Focal point cross-pointer
You can quickly determine the optimum workpiece distance by checking the intersection of two laser paths. Using this laser guide enables quick and accurate setup for workpiece changeover.

Optimum marking conditions can be quickly defined.

Sample marking function
With conventional markers, it is very difficult for users to determine the optimum marking conditions for different shapes and materials of target workpieces. The sample marking function automatically marks 70 patterns, which are obtained under different combinations of laser power and marking speeds. You can select the optimum marking conditions quickly by checking the marked characters. With this function, you can determine the highest-precision marking condition easily and accurately.

Safety design

The emergency stop button stops laser oscillation immediately.

Emergency stop button
The emergency stop button is provided on the controller front panel. The operator can stop laser oscillation immediately in case of an emergency.

Laser oscillation can be stopped with an external input.

Automatic shutter
Using an external input to the controller, the operator can stop laser oscillation. Even if an abnormal condition occurs with the line, the automatic shutter will prevent laser emission.

Compliance with high-level safety standards

Conforms to FDA standards and CE Marking
In addition to the FDA standards (U.S. safety standards), the ML-G Series meets the requirements of CE Marking for EU countries, ensuring the world’s highest safety level.
Dedicated Marking Software Simplifies Setup

Even inexperienced users can set up the ML-G.
Easy to use
The integrated marking software “Marking Builder” is included.

The setup time can be greatly reduced.
Since preset data can be checked on the screen in real time, the setup time can be reduced. You can see a finished image before marking on actual products, so the marking layout check (Cut & Try process) can be simplified. This function can save both time and workpieces.

Simplified layout according to the workpiece image

Workpiece image display function
The marking layout can be determined by monitoring the target workpiece image.* You can execute coordinate movement and zoom-in/zoom-out operation simply by dragging characters. Even arc alignment, which is difficult to do with the conventional method, can be performed easily.

* An image of the target can be loaded into the Marking Builder software so as to assist in setup of the position of the mark.

The thumbnail display shows existing settings and logo marks.

Thumbnail registration/display function
Existing settings and logo marks can be checked with the thumbnail list. You can find the setting or logo mark to be called at a glance and edit the data smoothly. This function is useful to improve work efficiency and to prevent operation errors.

Editing marking data and conditions during operation enables smooth setup for workpiece changeover.

During the marking operation, you can edit the character strings and marking position. You can prepare the next marking data and conditions while the production line is in operation. As a result, you can perform marking setup for workpiece changeover without stopping the production line. This function is useful for improving work efficiency and preventing operation errors.

Setup in Offline mode
Complicated settings and logo marks can be prepared at your desk. After the setup is completed, the prepared data can be transferred to the laser marker and marked on products. This function enables accurate setup without causing stress for the operators.
Direct marking of CAD/image data

Highly-compatible software
In many cases, conventional markers cannot accept CAD data because of a difference in the DXF file version or format. However, the ML-G Series can accept CAD data directly without conversion into a DXF file.

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

Logo mark, custom character editor

Character editor tool
With the simplified CAD function, you can edit figures, logo marks and fonts loaded into the PC. With the editor tool, you can easily draw or edit an image, such as drawing an additional line or filling a logo mark. Using this tool results in a drastic reduction of the number of setup steps.

Batch marking on several products

Palette marking function
This function enables the same characters and serial numbers to be marked on several workpieces (e.g. electronic components) arranged on a palette. The ML-G Series enables accurate marking on even minute workpieces by correcting for the inclination and distortion of individual workpieces.

Automatic backup of preset conditions

Automatic backup function
The laser marker executes backup of preset conditions automatically once a day. This function lessens the risk of losing important settings.

All-in-one software integrates various functions required for marking

Numerous functions
The all-in-one software offers various functions required for marking. With this single software, the laser marker can meet all marking needs and also offer expandability in the future. You do not need to purchase additional software later.
Color Touch Panel
Easy operation without using a PC

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

*Operation screen*
Even inexperienced people can use the operation screen intuitively. With the simple input procedure, operability in the field is improved. The touch panel provides a user-friendly design, enabling marking data and preset conditions (ex. marking start position) to be changed easily on the operation screen.

*The following screen shows a simulated image.*

**Making daily operations easier**

*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 stop*
With the touch of a key, you can stop marking. This function makes you feel secure because you can stop marking immediately.
Numerous Functions Satisfy Your Needs

A collection of functions which are useful for various applications

**Automatic counters (Count-up / Count-down)**
Numeric values can be incremented or decremented. Ten independent counters are provided as a standard feature.

- **AB00012** Count-up
- **AB00013** Count-down
- **AB00012** Count-up
- **AB00011** Count-down

**Rank marking**
The ML-G can be used to mark an object with a production quality label.

- **Product**
  - Large
  - Standard
  - Small
  - **Rank marking**
  - A
  - B
  - C

**Common counter**
The ML-G Series provides ten counters that can be commonly used for individual settings. Various counters are provided, covering various applications. (Binary, base36, etc.)

- **Setting 1**
  - 001 ASE
  - 009 ASE

- **Setting 2**
  - 010 02.12.31

- **Common counter**

**Laser cutting mode**
The ML-G Series provides five types of laser cutting modes, enabling various laser cutting operations.

- **Fixed point**
- **Straight line/Broken line**
- **Oval/Oval arc**
- **Circle/Arc**

**Automatic calendar**
The current date (year/month/day) and time, and the “Sell by” date and time can be marked.

- **2003.05.05 13:30**
- **2005.05.06 13:31**

**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.

- **03.05.05 13:30**
- **A B C D : E**

**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.

**Serial port selection**
The ML-G Series provides RS-232C and RS-422A serial ports, which can be selected according to the external equipment that is connected.

**Conforming to RS-232C**
Conforming to RS-422A

**Flexible marking adjustment**

- **Intersection eliminating function**
  This function can solve problems that may occur at intersections in characters of deep inscription, filling spaces between lines or scorching. Also, oblique lines and curves can be expressed uniformly.

- **Laser ON/OFF timing adjustment**
The laser ON/OFF timing can be adjusted depending on the specified marking speed and character size. With this adjustment, the ML-G Series enables finer line expressions.

- **Various expressions of boldface fonts**
  Since the line width can be freely specified, various boldface fonts can be expressed.

- **Laser power fine adjustment**
  This function can set up laser power fine adjustment in 100 steps.
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 to the controller.

Preset data can be output in a CSV file.
The ML-G Series can read and write CSV files, enabling you to check preset data in detail.

Numerous control I/Os
The ML-G Series provides a variety of inputs and outputs to control peripheral equipment in the field.

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

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

Various expressions

Logo mark/image marking
Marking of logo marks/images is enabled.

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

Marking of various bar codes
In addition to 2D codes, the ML-G Series enables marking of various bar codes.

Marking with True Type fonts
The ML-G Series enables marking using True Type fonts.

Image data print function
Images (JPG and BMP data) loaded into a PC can be directly printed with the laser marker. The laser marker enables an image captured by a digital camera to be freely designed and printed on various workpieces.

Registration of a user-defined font
The initial font can be replaced with up to two types of user-defined fonts.* Optional function

2D codes
- Data matrix
- QR code
- Micro QR code

Bar codes
- Code128
- Code39
- ITF
- 2of5
- JAN
- Codabar

Image data captured by a digital camera can be directly printed.
### Various Industrial Applications

Numerous functions useful for all industries

#### Electronic component industry

<table>
<thead>
<tr>
<th>Marking sample</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1.png" alt="Marking sample" /></td>
</tr>
</tbody>
</table>

The ML-G Series enables batch marking on several electronic components on a pallet. The ML-G Series can perform marking position adjustment for individual products, ensuring accurate marking on even minute products. With the world’s fastest scanner motor, the ML-G Series improves production efficiency significantly.

<table>
<thead>
<tr>
<th>Advantages of the ML-G Series</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Batch marking on several products</strong></td>
</tr>
<tr>
<td>You can easily set up the batch marking conditions for several products on a pallet. Since the ML-G Series can perform marking position adjustment for individual products, marking position error can be eliminated.</td>
</tr>
<tr>
<td><strong>Ultra-small Character Model marking unit</strong></td>
</tr>
<tr>
<td>The Ultra-small Character Model enables marking of extremely small characters (minimum character height: 0.008” (0.2 mm)) that cannot be expressed with conventional markers.</td>
</tr>
<tr>
<td><strong>High-speed marking results in a shortened tact time.</strong></td>
</tr>
<tr>
<td>With the world’s fastest scanner motor, the ML-G Series enables high-speed marking of 600 characters/second.</td>
</tr>
<tr>
<td><strong>Well-defined characters can be retained for a long period of time.</strong></td>
</tr>
<tr>
<td>The ML-G Series can suppress minute fluctuations in laser power intensity, ensuring output stability within ±5%. As a result, it enables stable marking without blurred characters and without damage to delicate electronic components.</td>
</tr>
<tr>
<td><strong>A vertical marking unit is also available.</strong></td>
</tr>
<tr>
<td>The vertical model minimizes the installation space, enabling a highly efficient equipment layout.</td>
</tr>
</tbody>
</table>

#### Automotive industry

<table>
<thead>
<tr>
<th>Marking sample</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image2.png" alt="Marking sample" /></td>
</tr>
</tbody>
</table>

The ML-G Series is used for preparing automobile nameplates. It provides various marking expressions such as the company logo mark, model, standard, product name and manufacturing country. Highly environment-proof, non-erasable marking is enabled.

<table>
<thead>
<tr>
<th>Advantages of the ML-G Series</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>A variety of design marking</strong></td>
</tr>
<tr>
<td>The ML-G Series can accept CAD data and JPG data directly for marking. With the simplified CAD function, you can draw a figure or correct preset data. This enhances the capacity of marking expressions.</td>
</tr>
<tr>
<td><strong>Various fonts</strong></td>
</tr>
<tr>
<td>User-defined fonts can be used. This function is suitable for nameplate design.</td>
</tr>
<tr>
<td><strong>Large memory capacity</strong></td>
</tr>
<tr>
<td>The ML-G Series provides large memory capacity that enables registration of up to 2,000 settings. It can be applied to production lines in the future that may have increased production items.</td>
</tr>
<tr>
<td><strong>Existing settings can be reviewed from the thumbnail.</strong></td>
</tr>
<tr>
<td>With the thumbnail registration/display function, you can check preset data at a glance. As a result, you can prevent setting errors and improve editing efficiency.</td>
</tr>
</tbody>
</table>
### Electrical Industry

The ML-G Series is used to mark a 2D process control code on printed circuit boards. Based on the data read from the 2D code, chip mounting/assembly process control and inspection of finished products are performed.

### Advantages of the ML-G Series

- **Marking of 2D codes** (ex. Data Matrix, QR code) and various bar codes (Code128, Code39, 2o5, ITF, JAN and Codabar)
  
  Various bar codes can be selected according to field needs.

- **Accurate reading of bar codes**
  
  The ML-G Series enables more precise bar code marking. It also enables fine adjustment of the bar code line width on the target workpiece, resulting in an increased reading ratio.

### Food, Chemical, and Cosmetic Industries

The ML-G Series expresses characters by burning off the print of drug cartons through thermal processing so that the white base of the carton will be exposed. To ensure easy recognition of the image, the characters are expressed in boldface type. As the contrast increases between the characters and background, accurate marking recognition is enabled.

### Advantages of the ML-G Series

- **Accurate automatic character recognition**
  
  The ML-G Series can suppress minute fluctuations in laser power intensity, ensuring output stability within ±5%. As a result, it enables stable marking without missing or blurred characters, ensuring more accurate character recognition.

- **Tracking high-speed lines**
  
  To ensure a higher level of image recognition, the marking on drug cartons is generally expressed in boldface type. The world’s fastest scanner motor exhibits its power in high-speed marking of boldface types.
**Specifications**

<table>
<thead>
<tr>
<th>Type</th>
<th>English/FDA Models (Japanese Models)</th>
<th>CE model</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model</td>
<td>Controller: ML-G9300F (ML-G9300)</td>
<td>ML-G9300C</td>
</tr>
<tr>
<td></td>
<td>Marking unit: ML-G9310F (ML-G9310)</td>
<td>ML-G9310C</td>
</tr>
<tr>
<td></td>
<td>ML-G9320F (ML-G9320)</td>
<td>ML-G9311C</td>
</tr>
<tr>
<td></td>
<td>Vertical model: ML-G9311F (ML-G9311)</td>
<td>ML-G9311C</td>
</tr>
<tr>
<td></td>
<td>ML-G9321F (ML-G9321)</td>
<td>ML-G9311C</td>
</tr>
<tr>
<td></td>
<td>Console: - Color touch panel</td>
<td>LED pointer (green)</td>
</tr>
<tr>
<td></td>
<td>Co2 laser: Class 4 (wavelength: 0.413 µm 10.6 µm)</td>
<td>1.0 W</td>
</tr>
<tr>
<td></td>
<td>Average output: 20 W</td>
<td>20 W</td>
</tr>
<tr>
<td></td>
<td>Output stability: ±5%</td>
<td>±5%</td>
</tr>
<tr>
<td></td>
<td>Laser diode: Class 2 (wavelength: 650 nm)</td>
<td>400 characters/sec. max.</td>
</tr>
<tr>
<td></td>
<td>Output: 300 characters/sec. max.</td>
<td>600 characters/sec. max.</td>
</tr>
<tr>
<td></td>
<td>Guide light: LED pointer (green)</td>
<td>- LED pointer + laser guide beam</td>
</tr>
<tr>
<td></td>
<td>Marking speed: 400 characters/sec. max.</td>
<td>600 characters/sec. max.</td>
</tr>
<tr>
<td></td>
<td>Marking area: 4.33” x 110 mm</td>
<td>2.17” x 55 mm</td>
</tr>
<tr>
<td></td>
<td>Working distance: 8.19” to 208 ± 3 mm</td>
<td>4.43” to 133 ± 1 mm</td>
</tr>
<tr>
<td></td>
<td>Resolution: 0.02” to 4.33”</td>
<td>0.635” to 110 mm</td>
</tr>
<tr>
<td></td>
<td>Character width: 0.02” to 4.33”</td>
<td>0.5” to 110 mm</td>
</tr>
<tr>
<td></td>
<td>Character height: 0.02” to 4.33”</td>
<td>0.5” to 110 mm</td>
</tr>
<tr>
<td></td>
<td>Character size unit: 0.001”</td>
<td>0.001”</td>
</tr>
<tr>
<td></td>
<td>Registered Programs: 2000 settings max.</td>
<td>256 blocks</td>
</tr>
<tr>
<td></td>
<td>Number of blocks: 256 blocks</td>
<td>256 blocks</td>
</tr>
<tr>
<td></td>
<td>Positioning: 2000 settings max.</td>
<td>256 blocks</td>
</tr>
<tr>
<td></td>
<td>Terminal block: 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</td>
<td></td>
</tr>
<tr>
<td></td>
<td>USB port: Dedicated for connecting external devices</td>
<td>Dedicated for connecting external devices</td>
</tr>
<tr>
<td></td>
<td>Memory card slot: Dedicated for CF memory card</td>
<td>Dedicated for CF memory card</td>
</tr>
<tr>
<td></td>
<td>Installation direction: All directions</td>
<td>All directions</td>
</tr>
<tr>
<td></td>
<td>Laser guide installation direction: Character (1), character (continuous), area frame and center coordinate crossroad (continuous), workpiece image (continuous)</td>
<td>Character (1), character (continuous), area frame and center coordinate crossroad (continuous), workpiece image (continuous)</td>
</tr>
<tr>
<td></td>
<td>Distance pointer: LED pointer + laser guide beam</td>
<td>LED pointer + laser guide beam</td>
</tr>
<tr>
<td></td>
<td>Marking unit cable length: 16.4’ 5 m</td>
<td>16.4’ 5 m</td>
</tr>
<tr>
<td></td>
<td>Standard: Conforms to FDA standard 1</td>
<td>Conforms to CE Marking Standard 2</td>
</tr>
<tr>
<td></td>
<td>Cooling method: Forced air cooling</td>
<td>Forced air cooling</td>
</tr>
<tr>
<td></td>
<td>Power requirement: 100 to 120, 200 to 240 VAC ± 10% (50/60 Hz) 13 A max.</td>
<td>100 to 120/200 to 240 VAC ±10% (50/60 Hz) 13 A max.</td>
</tr>
<tr>
<td></td>
<td>Power consumption: 1200 VA max. (100 to 120 VAC), 1600 VA max. (200 to 240 VAC)</td>
<td>100 to 120/200 to 240 VAC ±10% (50/60 Hz) 13 A max.</td>
</tr>
<tr>
<td></td>
<td>Environmental resistance: Ambient temperature for storage -10 to +60°C (14 to 140°F), No condensation</td>
<td>Ambient temperature for storage -10 to +60°C (14 to 140°F), No condensation</td>
</tr>
<tr>
<td></td>
<td>Ambient humidity for usage: 0 to 40°C (32 to 104°F), No condensation</td>
<td>Ambient humidity for usage: 0 to 40°C (32 to 104°F), No condensation</td>
</tr>
<tr>
<td></td>
<td>Weight: Controller 9.8 kg, Marking unit 13.3 kg, Vertical model 13.6 kg, Horizontal model 13.9 kg, Console 1.4 kg</td>
<td>9.8 kg, 13.3 kg, 13.6 kg, 13.9 kg, 1.4 kg</td>
</tr>
</tbody>
</table>

1. Optional 2. Output of 20% or more
3. CF memory card (up to 256 Mbyte) by SanDisk Corporation is recommended (www.sandisk.com). The commercially available card adapter is needed.
4. Conforms to 21 CFR Part 1040.10
5. Conforms to EN60825-1 Laser Class 4
6. Only the Japanese version of Windows® 98SE is supported. Windows® 98SE English version is not supported.

**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.
Dimensions

Marking unit
ML-G9310(F)(C)/ML-G9320(F)

**Working distance**

<table>
<thead>
<tr>
<th>Dimension</th>
<th>ML-G9310(F)</th>
<th>ML-G9320(F)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Height</td>
<td>54.5 mm</td>
<td>54.5 mm</td>
</tr>
<tr>
<td>Width</td>
<td>208 mm</td>
<td>208 mm</td>
</tr>
<tr>
<td>Depth</td>
<td>113 mm</td>
<td>113 mm</td>
</tr>
</tbody>
</table>

**Mounting holes**

- 4 x M6: Depth: 12 max. (for fixing marking unit)
- 4 x M6: Depth: 6 max. (for fixation)

**Protruding surface:**

15 mm

Controller
ML-G9300(F)(C)

**Protruding surface:**

15 mm

**4 x ø21 Rubber feet:**

ø2.91 in
### Marking samples

<table>
<thead>
<tr>
<th>Material Type</th>
<th>Material Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Video tape</td>
<td>ABS resin (Inscription)</td>
</tr>
<tr>
<td>IC</td>
<td>Epoxy resin (Color-developed)</td>
</tr>
<tr>
<td>Electronic component</td>
<td>Epoxy resin (Color-developed)</td>
</tr>
<tr>
<td>CD-R</td>
<td>Polycarbonate (Inscription)</td>
</tr>
<tr>
<td>Printed circuit board</td>
<td>Epoxy glass + resist (Surface-peeled)</td>
</tr>
<tr>
<td>Harness</td>
<td>Vinyl chloride (Color-developed)</td>
</tr>
<tr>
<td>Magnetic card</td>
<td>Surface coating (Coating-peeled)</td>
</tr>
<tr>
<td>Stainless steel</td>
<td>Stainless steel (Black marking)</td>
</tr>
<tr>
<td>Filter</td>
<td>Urethane (Inscription)</td>
</tr>
<tr>
<td>Cosmetics</td>
<td>Polyethylene resin (Inscription)</td>
</tr>
<tr>
<td>PET bottle</td>
<td>PET resin (Inscription)</td>
</tr>
<tr>
<td>Frame of glasses</td>
<td>Plastic (Inscription)</td>
</tr>
</tbody>
</table>
Principle of the Laser Marker

Flow of marking operation
1. Electrical energy is applied to the CO2 gas filled in the oscillator to excite the laser.
2. While the excited laser beam moves back and forth between the reflection mirrors in the oscillator, it will be amplified and output.
3. The output laser beam is converged onto the target workpiece surface through the \( f \theta \) lens.
4. The converged, hot laser beam spot is scanned with the marking scanner motor along the X axis and Y axis individually. Through thermal processing, a character is expressed in one stroke.

Marking samples

Character size (Typical examples)

Arc/angle alignment

2D code

Bar code

Bmp/jpg data

Marking area of the Standard model
4.33" x 4.33" (110 x 110 mm)

Marking area of the Small character model
2.17" x 2.17" (55 x 55 mm)

Marking area of the Ultra-Small character model
1.18" x 1.18" (30 x 30 mm)