

Laser Marker

Operation / Maintenance Manual

LP-400 SERIES
LP-V SERIES
LP-W SERIES

Please read these instructions carefully before using this product,
and save this manual for future use.

Preface

Thank you for purchasing our product.

For full use of this product safely and properly, please read this document carefully.

This product has been strictly checked and tested prior to its delivery. However, please make sure that this product operates properly before using it. In case that the product becomes damaged or does not operate as specified in this document, contact the dealer you purchased from or our sales office.

■ General terms and conditions of this document

1. Before using this product, or before every starting operation, please confirm the correct functioning and performance of this product.
2. Contents of this document could be changed without notice.
3. This document must not be partially or totally copied or revised.
4. All efforts have been made to ensure the accuracy of all information in this document. If there are any questions, mistakes, or comments in this document, please notify us.
5. Please remind that we assume no liability for any results arising out of operations regardless of the above clauses.

■ Disclaimer

The applications described in this document are all intended for examples only. The purchase of our products described in this document shall not be regarded as granting of a license to use our products in the described applications. We do NOT warrant that we have obtained some intellectual properties, such as patent rights, with respect to such applications, or that the described application may not infringe any intellectual property rights, such as patent rights, of a third party.

■ Trademark




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Cautions in Handling




ALWAYS FOLLOW THESE IMPORTANT SAFETY PRECAUTIONS!

To reduce the risk of injury, loss of life, electric shock, fire, malfunction, and damage to equipment or property, always observe the following safety precautions.

The following symbols are used to classify and describe the level of hazard, injury, and property damage caused when the denotation is disregarded and improper use is performed.

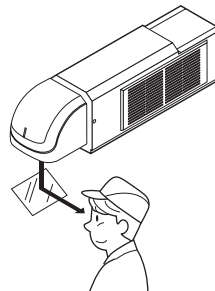
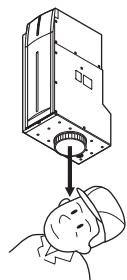
 DANGER	Denotes a potential hazard that will result in serious injury or death.
 WARNING	Denotes a potential hazard that could result in serious injury or death.
 CAUTION	Denotes a hazard that could result in minor injury.

The following symbols are used to classify and describe the type of instructions to be observed.

	This symbol is used to alert users to a specific operating procedure that must not be performed.
	This symbols is used to alert users to a specific operating procedure that must be followed in order to operate the unit safely.
	This symbols is used to alert users to a specific operating procedure that must be performed carefully.

DANGER

- Never look at laser beam directly, through lens or through any other optical components. Laser beam radiation into the eye causes blindness or serious damage to the eye. Not only the direct beam of laser, but also diffused reflected beam is harmful.



- Never touch laser beam and avoid human skin, clothing and any other flammable object from laser beam exposure directly. Burning into deep skin might result and there is a risk of fire.

WARNING



- Do not use this product anywhere where fire is strictly prohibited, near inflammable gas, objects or organic solvents such as thinner or gasoline, or in dusty place. There is a risk of fire.



- Do not use this product in wet place. In addition, never conduct wiring or maintenance work with wet hands or when the product surface is wet. Otherwise, electric shock and/or malfunction may result.



- Never disassemble the product. Doing so may cause exposure to the laser beam or electric shock.



- Do not insert hands or objects between the gaps of the exhaust port or inspiratory port. There is a risk of electrical shock or injury.



- For LP-V / LP-W series, be careful neither to give strong power to the fiber cable nor to nip it for installation. Do not install the product to the systems that give excessive load acts on the fiber cable, such as head movement unit. If the fiber cable is damaged, laser beam comes out from the cable and it may cause laser exposures.



- Take laser protection measures required to use Class 4 laser products subject to the local laws and regulations of the country or region in which this laser product is used.



- To protect the operators' eyes, make it mandatory to wear goggles against laser beam within the laser controlled area. The protective goggles can momentarily protect the eyes against the scattered beam. Never look at the direct beam or reflected beam even when you are wearing the protective goggles.



- Construct an interlock systems such as a function to stop laser radiation for the maintenance door of the protective enclosure.



- Set protective enclosure with proper reflectance, durability and thermal resistance to enclose the laser radiation area without leakage.



- Read all packaged guides and manuals thoroughly, and do not operate, install and connect the laser marker with any other methods except the instructions provided in the manuals. Inappropriate use might cause injury, electrical shock or exposure of laser beam.

⚠ WARNING

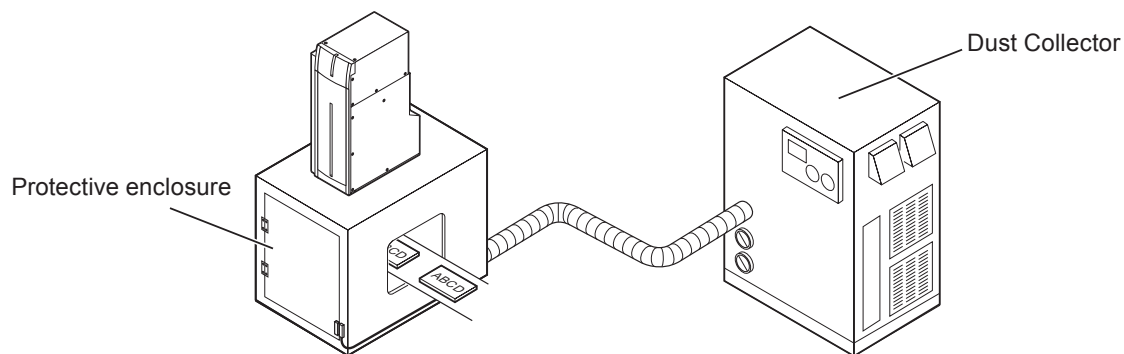


- After power supply of laser marker is turned off, laser safety manager must remove the key and keep it.



- Be sure to connect the head to the exclusive controller. It will cause exposure of laser beam and a failure if it connects with any equipment other than the exclusive controller.

- Remove the dust and/or gas which may be generated during the laser radiation with dust collector or exhauster. Use an appropriate dust collector or exhauster for dust or gas generated. Depending on the material of the objects, harmful dust and/or gas to the human body and the laser marker may be generated.



- When using the assist gas for laser processing, take safety precautions to protect operators from exposure, ignition, toxic effect, excess or lack of oxygen.



- Prior to wiring, cable connecting, and/or maintenance work, ensure that all the power switches are turned off. Otherwise, electrical shock may result.



- The wiring and maintenance must be conducted by the electrical engineers or under their supervision. Incorrect work may cause electrical shock.

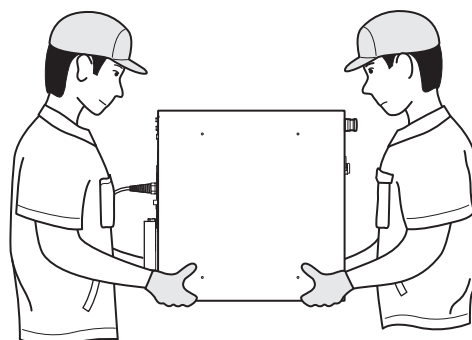
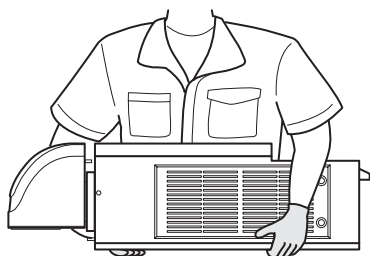


- Connect ground wire before using. A failure or electrical leakage that occurs when the unit is not properly grounded may result in electric shock.

- To carry this product, wear the non-slip gloves and safety shoes, hold the bottom of the unit as shown below figure. Carry the controller unit with two persons.
- Install this product in the stable place without vibration and shock.
- In case it falls down, it may cause injury.

Head of LP-400 series
(Standard model)

Controller



For the Proper Use of Product



- Be sure to observe the following matters to prevent a failure or a malfunction of this product and to maintain the product performance properly.

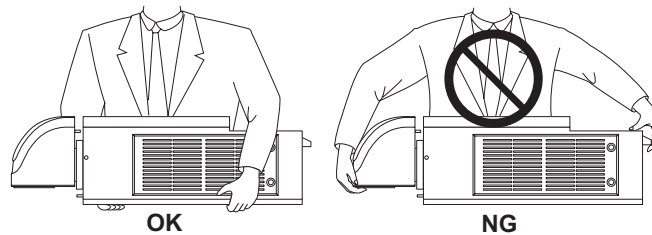
■ Usage Environment

- Do not use the product in a place with frequent vibrations or shocks. Moreover, please do not drop this product. It may affect the precision component and optical component inside, which could impair the performance or result in a failure.
- Do not use the system outdoors.
- The product is air-cooled. Please install not to bar the flow of air cooling. Avoid placing heat sources near the product.
- Be sure to use the product within the ambient temperature and humidity defined in the specifications.
- Be careful not to have water, oil, fingerprints, dust, or dirt attached to the laser emission port of the head. This could degrade the lasing performance and may result in a failure. If the laser emission port becomes dirty, use a dry soft cloth to clean the port.
- If the air filter becomes dirt, clean the filter. Failure to do so may hinder the air flow, resulting in failure of this product. Replace air filter periodically.
- Ensure that the dust or gas are removed by placing the intake duct of the dust collector or exhauster near the source of dust or gas. Any dust or gas contamination on the laser emission port may cause failure or decrease the laser marking or processing quality. In addition, when the laser beam is blocked by dust or gas, it may cause decrease in laser marking or processing quality.

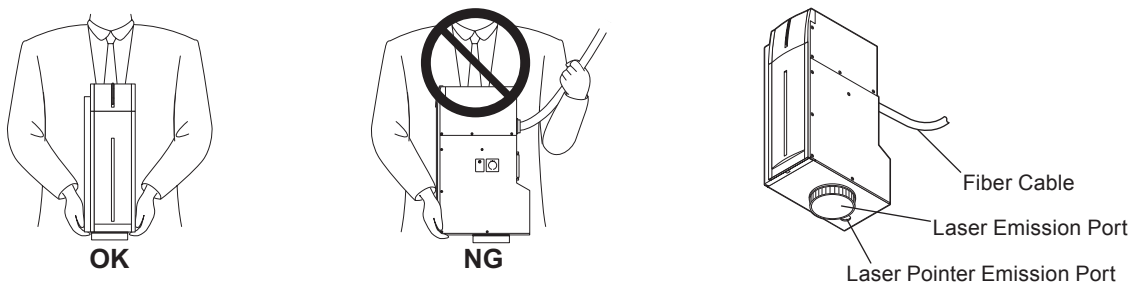
■ Installation and Mounting

- Do not hold the cables and connectors at carrying this product.
- Do not touch the laser emission port on the bottom of the head. They may affect the laser marking quality badly.
- For LP-V / LP-W series, do not grasp the fiber unit when carrying the head part.
- Carry the head as shown in the figure below.

LP-400 Series



LP-V/LP-W Series



- Do not install the product to the systems that give excessive load acts on the head and cables, such as head movement unit. Failure to do so may damage the head precision parts or disconnect the cables, resulting in a failure.
- Be careful neither to give strong power to the cables nor to nip it for installation.
- Verify the minimum bend radius of each cable and install them without excess forces being applied.
- Do not hit the device with a tool such as a hammer at the installation. Do not use excessive force while tightening the screws (nuts). It may cause a failure.
- Do not insert any objects between the gaps of the exhaust port or inspiratory port.
- Use anti-reflection material (ex. black paint for metal) for an external shutter or a protective enclosure in a path of laser beam. It may cause a failure of the components inside the laser marker head.
- If any other devices such as a sensor or a camera are installed near the laser marker, make sure that these devices are installed in the place where laser beam and its reflected beam do not damage to them.

For the Proper Use of Product



- Be sure to observe the following matters to prevent a failure or a malfunction of this product and to maintain the product performance properly.

■ Wiring

- Verify that the cables are wired correctly before powering on.
- For the connection of this product, use the dedicated cables attached to the product or the specified optional cables.
- Check the voltage fluctuations of the power supply. Do not input the power supply exceeding the rating.
- If a surge occurs in the power supplied, connect a surge absorber to a source of the surge to absorb it.
- Be sure to take measures against surge before connecting any induction load such as DC relay to the load.
- The output has no protection function for short-circuit, therefore, do not connect the power supply or capacitive load directly.
- Make sure to ground the frame ground terminal of this product.
- Install such that the controller housing and the head housing are at the same electric potential.
- Each connecting cable should not be used in the same raceway or connected in parallel to any device that generates high-tension wires, power lines, large switching surge or the like. There is a risk of malfunction caused by induction.
- USB cable should not be connected in parallel with the controller power cable or the motor power cable.
- Make the wiring as short as possible to prevent a malfunction by the noise.

■ Operation

- Do not turn off the power supply until completing the system start.
- In case of turning ON the power supply after turning OFF, leave the interval at least 5 seconds between ON and OFF.
- The following items, Date, Lot, and Expiry Date are marked based on the internal clock of the laser marker. The internal clock might be deviated due to error of the internal parts or degree of the battery drain, ambient temperature and humidity. Therefore, be sure to check the time of the internal clock before the operation without fail.
- Do not remove the USB media nor turn off the power during the data writing and reading operation.

■ Others

- Be sure to delete all registered data when transferring or discarding this product. Retained data might result in illegal read out and leaking of information by a third-party with malicious intent.

■ General Terms and Conditions

Although we are striving to improve quality and reliability of our products, failure in electric components and devices may happen with a certain probability. It is highly recommended to employ fail-safe designs, including redundant design, flame propagation prevention design, and malfunction prevention design, as well as periodical maintenance to avoid any risk of bodily injury, fire accident, or social damage due to any failure of our products.

Please read carefully and accept the following "Cautions for Safe Use" and "Warranty Policy" before using our products.

1. PRODUCT MODIFICATIONS & DISCONTINUANCE:

Panasonic Industrial Devices SUNX expressly reserves the right to modify, including the right to discontinue, any of the Products, prior to their order, from time to time without notice.

2. WARRANTIES:

- (1) Subject to the exclusions stated in 3 (EXCLUSIONS) herein below, Panasonic Industrial Devices SUNX warrants the Products to be free of defects in material and workmanship for a period of one (1) year from the date of shipment under normal usage in environments commonly found in manufacturing industry.
- (2) Any Products found to be defective must be shipped to Panasonic Industrial Devices SUNX with all shipping costs paid by Purchaser for inspection and examination. Upon examination by Panasonic Industrial Devices SUNX, Panasonic Industrial Devices SUNX will, at its sole discretion, repair or replace at no charge, or refund the purchaser price of, any Products found to be defective.

3. EXCLUSIONS:

- (1) This warranty does not apply to defects resulting from any cause:
 - (i) which was due to abuse, misuse, mishandling, improper installation, improper interfacing, or improper repair by Purchaser;
 - (ii) which was due to unauthorized modification by Purchaser, in part or in whole, whether in structure, performance or specification;
 - (iii) which was not discoverable by a person with the state-of-the-art scientific and technical knowledge at the time of manufacture;
 - (iv) which was due to an operation or use by Purchaser outside of the limits of operation or environment specified by Panasonic Industrial Devices SUNX;
 - (v) which was due to Force Majeure; and
 - (vi) which was due to any use or application expressly discouraged by Panasonic Industrial Devices SUNX in 5 (CAUTIONS FOR SAFE USE) hereunder.
- (2) This warranty extends only to the first purchaser for application, and is not transferable to any person or entity which purchased from such purchaser for application.

4. DISCLAIMERS:

- (1) Panasonic Industrial Devices SUNX's sole obligation and liability under this warranty is limited to the repair or replacement, or refund of the purchase price, of a defective Product, at Panasonic Industrial Devices SUNX's option.
- (2) THE REPAIR, REPLACEMENT, OR REFUND IS THE EXCLUSIVE REMEDY OF THE PURCHASER, AND ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING, WITHOUT LIMITATION, THE WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, AND NON-INFRINGEMENT OF PROPRIETARY RIGHTS, ARE HEREBY EXPRESSLY DISCLAIMED. IN NO EVENT SHALL PANASONIC INDUSTRIAL DEVICES SUNX AND ITS AFFILIATED ENTITIES BE LIABLE FOR DAMAGES IN EXCESS OF THE PURCHASE PRICE OF THE PRODUCTS, OR FOR ANY INDIRECT, INCIDENTAL, SPECIAL OR CONSEQUENTIAL DAMAGES OF ANY KIND, OR ANY DAMAGES RESULTING FROM LOSS OF USE, BUSINESS INTERRUPTION, LOSS OF INFORMATION, LOSS OR INACCURACY OF DATA, LOSS OF PROFITS, LOSS OF SAVINGS, THE COST OF PROCUREMENT OF SUBSTITUTED GOODS, SERVICES OR TECHNOLOGIES, OR FOR ANY MATTER ARISING OUT OF OR IN CONNECTION WITH THE USE OR INABILITY TO USE THE PRODUCTS.

5. CAUTIONS FOR SAFE USE:

- (1) It is Purchaser's sole responsibility to ascertain the fitness and suitability of the Products for any particular application, as well as to abide by Purchaser's applicable local laws and regulations, if any.
- (2) In incorporating the Products to any equipment, facilities or systems, it is highly recommended to employ fail-safe designs, including but not limited to a redundant design, flame propagation prevention design, and malfunction prevention design so as not to cause any risk of bodily injury, fire accident, or social damage due to any failure of such equipment, facilities or systems,
- (3) The Products are each intended for use only in environments commonly found in manufacturing industry, and, unless expressly allowed in the manual, specification or otherwise, shall not be used in, or incorporated into, any equipment, facilities or systems, such as those:
 - (i) which are used for the protection of human life or body parts;
 - (ii) which are used outdoors or in environments subject to any likelihood of chemical contamination or electromagnetic influence;
 - (iii) which are likely to be used beyond the limits of operations or environments specified by Panasonic Industrial Devices SUNX in this document or otherwise;
 - (iv) which may cause risk to life or property, such as nuclear energy control equipment, transportation equipment whether on rail or land, or in air or at sea, and medical equipment;
 - (v) which otherwise require a high level of safety performance similar to that required in those equipment, facilities or systems as listed in (i) through (iv) above.

6. EXPORT CONTROL LAWS:

In some jurisdictions, the Products may be subject to local export laws and regulations. If any diversion or re-export is to be made, Purchaser is advised to abide by such local export laws and regulations, if any, at its own responsibility.

7. PURCHASER'S TRANSFER OBLIGATIONS:

If Purchaser resell or deliver the Products to a third party, Purchaser must provide such third party with a copy of this document, all specifications, manuals, catalogs, leaflets and written information of any kind provided to Purchaser by Panasonic Industrial Devices SUNX or its authorized local representative from time to time regarding the Products. If Purchaser resell or deliver the Products to a third party, Purchaser must provide such third party with a copy of this document, all specifications, manuals, catalogs, leaflets and written information of any kind provided to Purchaser by Panasonic Industrial Devices SUNX or its authorized local representative from time to time regarding the Products.

Applicable Standards and Related Regulations

■ Applicable standards

This product is designed to meet the following standards according to the model.

Note that our products do not conform to the safety standards of the countries and regions not listed in the applicable standards section. When exporting the product by itself or integrated into machine or device, confirm the regulations and standards of the exporting country or region.

Model	Applicable Standards
LP-430(T)U / LP-431(T)U / LP-435(T)U / LP-420S9(T)U / LP-421S9(T)U LP-425S9(T)U / LP-410(T)U / LP-411(T)U LP-V10U / LP-V15U / LP-W052U	JIS (Japanese Industrial Standards) • JIS C 6802: 2014 “Safety of laser products”
LP-430(T)U-A / LP-431(T)U-A LP-435(T)U-A / LP-420S9(T)U-A LP-421S9(T)U-A / LP-425S9(T)U-A LP-410(T)U-A / LP-411(T)U-A LP-V10U-A / LP-V15U-A / LP-W052U-A	FDA (Food and Drug Administration) Regulations • 21 CFR1040.10 and 1040.11 except for deviations pursuant to Laser Notice No. 50 “PART 1040 PERFORMANCE STANDARDS FOR LIGHT-EMITTING PRODUCTS”
LP-430(T)U-C / LP-431(T)U-C LP-435(T)U-C / LP-420S9(T)U-C LP-421S9(T)U-C / LP-425S9(T)U-C LP-410(T)U-C / LP-411(T)U-C LP-V10U-C / LP-V15U-C	EN/IEC Standard (CE Marking) *1 • 2014/30/EU “EMC Directive” • EN55011: 2009+A1: 2010 “Industrial, scientific and medical equipment. Radio-frequency disturbance characteristics. Limits and methods of measurement” • EN61000-6-2: 2005 “Electromagnetic compatibility (EMC). Generic standards. Immunity for industrial environments” • 2014/35/EU “Low Voltage Directive” • EN60204-1: 2006+A1: 2009 “Safety of machinery. Electrical equipment of machines. General requirements” • (partially applied *2) EN61010-1: 2010 “Safety requirements for electrical equipment for measurement, control, and laboratory use. General requirements” • EN60825-1: 2014 “Safety of laser products. Equipment classification and requirements” • 2011/65/EU “RoHS Directive” • EN 50581:2012 “Technical documentation for the assessment of electrical and electronic products with respect to the restriction of hazardous substances”
	KC mark (Korea Certification) Class A Equipment (Industrial Broadcasting & Communication Equipment) This equipment is Industrial (Class A) electromagnetic wave suitability equipment and seller or user should take notice of it, and this equipment is to be used in the places except for home. A 급 기기 (업무용 방송통신기자재) 이 기기는 업무용 (A 급) 전자파적합기기로서 판매자 또는 사용자는 이 점을 주의하시기 바라며, 가정외의 지역에서 사용하는 것을 목적으로 합니다.
LP-430(T)U-CHN / LP-431(T)U-CHN LP-435(T)U-CHN / LP-420S9(T)U-CHN LP-421S9(T)U-CHN / LP-425S9(T)U-CHN LP-410(T)U-CHN / LP-411(T)U-CHN LP-V10U-CHN / LP-V15U-CHN	GB (Chinese National Standard) • GB 7247.1-2012 (idt IEC60825-1: 2007) “激光产品的安全 第1部分: 设备分类、要求”

*1 : Contact for CE:

Panasonic Marketing Europe GmbH, Panasonic Testing Center
Winsbergring 15, 22525 Hamburg, Germany

*2 : Although EN 60204-1 is applied as a harmonized standard of LVD, EN 61010-1 is partially applied to enhance the conformity with electrical safety and requirement of LVD.



• Construct a safety system before using this product as it is a class 4 laser product.

■ Implementing safety measures for the laser products

This product uses the Class 4 laser classified by the safety of laser products in JIS C6802, IEC60825-1, FDA standards 21 CFR 1040.10 and 1040.11.

Class 4 laser refers to “Laser products for which intrabeam viewing and skin exposure is hazardous and for which the viewing of diffuse reflections may be hazardous. These lasers also often represent a fire hazard.”

To avoid injuries of the workers who handle the laser equipment or who may be exposed to the laser beam, use the product safely and properly by observing the matters listed in the “For the Safety Use of Laser Product” (P.18) as well as the standards and regulations of the region where this product will be used.

■ Removing and eliminating dust or gas

Depending on the laser radiation objects, noxious dust or gas may generate by the laser radiation, which could harm human body or the environment.

Eliminate dust or gas generated using a dust collector or an exhauster according to the constituent of such dust or gas.

Dispose of the exhaust gas safely and appropriately according to the laws and regulations of the country, region, or area applicable.

■ Attention for the laser marker disposal

For disposal of this product, segregate and dispose of it appropriately according to the laws and regulations of the country, region, or area applicable.

Batteries, when disposed in the European Union, must be separately collected in accordance with the EU Battery Directive (2006/66/EC). EU Battery Directive (2006/66/EC) obliges separate collection and recycling of batteries that were used in the European Union.

Refer to “Disposal of Laser Marker” (P.285).

How to Read this Document

■ Target Laser Marker

This document is subject to the following Laser Marker models.

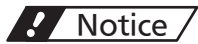
In this document, "laser marker" means this product.

If the setting contents or specifications vary by models, the target models are specified in the text. (The target models are not specified for items which are common to all models.) In the text, multiple models may be described collectively, as shown in the table below.

Note that the illustration and the screen images may vary with model.

Target Model	Description in the text			
LP-430U, LP-430TU	LP-4xx(T)U	LP-430	LP-4x0	LP-400 Series
LP-430U-A, LP-430TU-A	LP-4xx(T)U-A			
LP-430U-C, LP-430TU-C	LP-4xx(T)U-C			
LP-430U-CHN, LP-430TU-CHN	LP-4xx(T)U-CHN			
LP-420S9U, LP-420S9TU	LP-4xxS9(T)U	LP-420		
LP-420S9U-A, LP-420S9TU-A	LP-4xxS9(T)U-A			
LP-420S9U-C, LP-420S9TU-C	LP-4xxS9(T)U-C			
LP-420S9U-CHN, LP-420S9TU-CHN	LP-4xxS9(T)U-CHN			
LP-410U, LP-410TU	LP-4xx(T)U	LP-410		
LP-410U-A, LP-410TU-A	LP-4xx(T)U-A			
LP-410U-C, LP-410TU-C	LP-4xx(T)U-C			
LP-410U-CHN, LP-410TU-CHN	LP-4xx(T)U-CHN			
LP-435U, LP-435TU	LP-4xx(T)U	LP-435	LP-4x5	
LP-435U-A, LP-435TU-A	LP-4xx(T)U-A			
LP-435U-C, LP-435TU-C	LP-4xx(T)U-C			
LP-435U-CHN, LP-435TU-CHN	LP-4xx(T)U-CHN			
LP-425S9U, LP-425S9TU	LP-4xxS9(T)U	LP-425		
LP-425S9U-A, LP-425S9TU-A	LP-4xxS9(T)U-A			
LP-425S9U-C, LP-425S9TU-C	LP-4xxS9(T)U-C			
LP-425S9U-CHN, LP-425S9TU-CHN	LP-4xxS9(T)U-CHN			
LP-431U, LP-431TU	LP-4xx(T)U	LP-431	LP-4x1	
LP-431U-A, LP-431TU-A	LP-4xx(T)U-A			
LP-431U-C, LP-431TU-C	LP-4xx(T)U-C			
LP-431U-CHN, LP-431TU-CHN	LP-4xx(T)U-CHN			
LP-421S9U, LP-421S9TU	LP-4xxS9(T)U	LP-421		
LP-421S9U-A, LP-421S9TU-A	LP-4xxS9(T)U-A			
LP-421S9U-C, LP-421S9TU-C	LP-4xxS9(T)U-C			
LP-421S9U-CHN, LP-421S9TU-CHN	LP-4xxS9(T)U-CHN			
LP-411U, LP-411TU	LP-4xx(T)U	LP-411		
LP-411U-A, LP-411TU-A	LP-4xx(T)U-A			
LP-411U-C, LP-411TU-C	LP-4xx(T)U-C			
LP-411U-CHN, LP-411TU-CHN	LP-4xx(T)U-CHN			
LP-V10U	LP-VxxU	LP-V10		LP-V Series
LP-V10U-A	LP-VxxU-A			
LP-V10U-C	LP-VxxU-C			
LP-V10U-CHN	LP-VxxU-CHN			
LP-V15U	LP-VxxU	LP-V15		
LP-V15U-A	LP-VxxU-A			
LP-V15U-C	LP-VxxU-C			
LP-V15U-CHN	LP-VxxU-CHN			
LP-W052U	LP-W052U	LP-W052		LP-W Series
LP-W052U-A	LP-W052U-A			

■ Symbol Indications



- “Notice” denotes any instructions or precautions for using this product. To prevent the damage or malfunction of the product, observe these precautions fully.



- “Reference” denotes any hints for operation, detail explanations, or references.

■ Type of manuals

For this product the following manuals are prepared. Read each manual and operate this product correctly and safely. Save the manuals for future use.

Operation/Maintenance Manual

This manual describes the safety precautions and the items required for the installation, operation and maintenance of the laser marker.

- Precautions and safety measures: All users shall be required for reading this part.
- Specifications and outer dimensions
- Setup and connecting method
- How to operate the laser marker and set the marking data using touch panel console or monitor and mouse.
- Maintenance
- Troubleshooting

External Control Manual

This manual describes how to control this product externally using I/O signals and serial communication (RS-232C/Ethernet) commands.

Mainly the machine builder and system integrator shall be required for reading this manual.

- I/O control method (interfaces, signal layout, I/O rating, timing chart etc.)
- Command control method (serial communication interfaces, communication settings, command data formats etc.)

Laser Maker NAVI Operation Manual

This manual describes how to operate the laser marker and set the marking data using PC setting software “Laser Marker NAVI”.



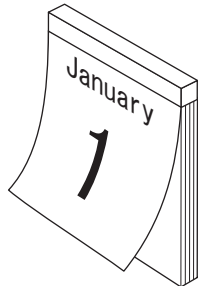
- The PDF data of each manual are included on an attached CD-ROM “Laser Marker Driver & Utility”.
- To read the PDF manual, Adobe Reader (Version 7 or later) of Adobe Systems Incorporated is required.

“Let’s Try” Contents

The user can refer to the corresponding pages in which the contents of what user “tries to do” are described using this “Let’s Try” Contents.

Mark Current Date/Time

P.89



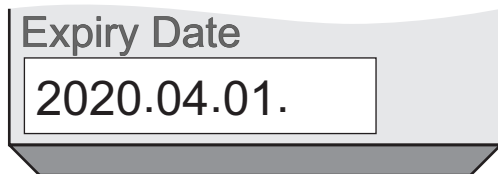
Mark Code Symbol

P.103



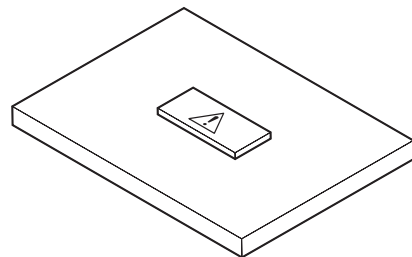
Mark Expiry Date/Time

P.92



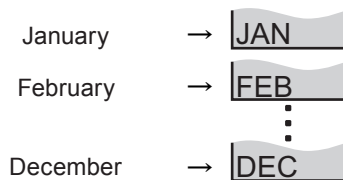
Mark Logo

P.108



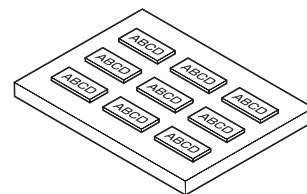
Mark Lot

P.96



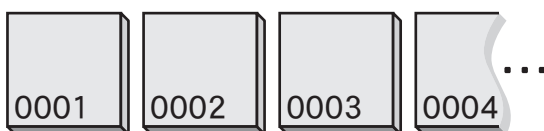
Mark Step & Repeat

P.111



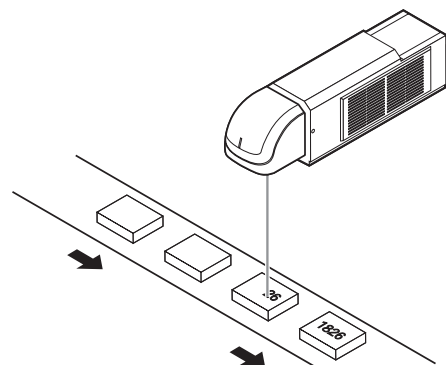
Mark Counter

P.99



Mark to Flying Object

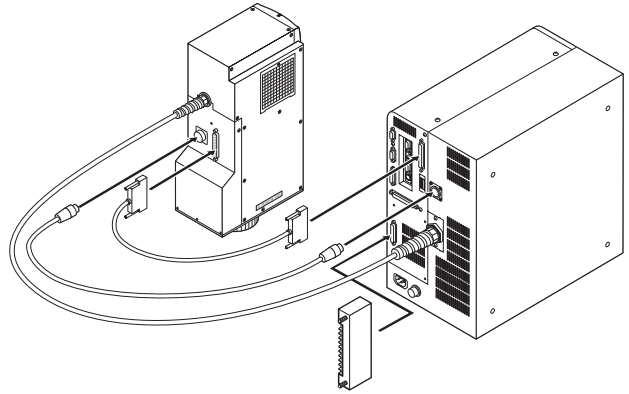
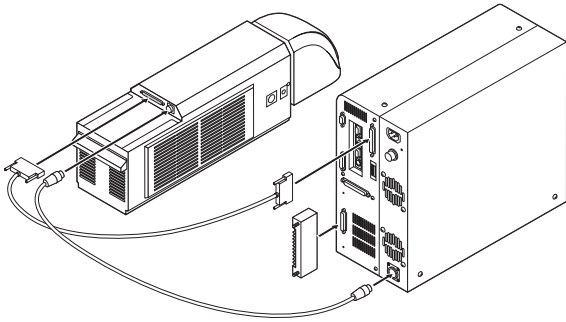
P.115



Install and Connect Laser Marker

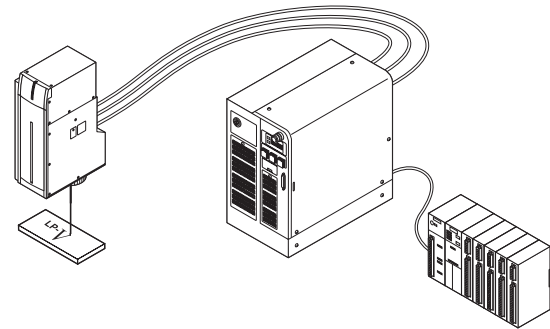
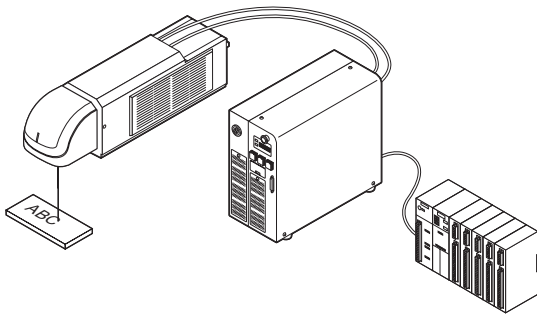
“2-1 Installation” (P.57)

“2-2 Connecting Laser Marker” (P.70)



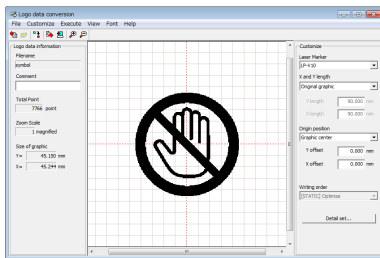
Control by I/O or RS-232C / Ethernet

External Control Manual



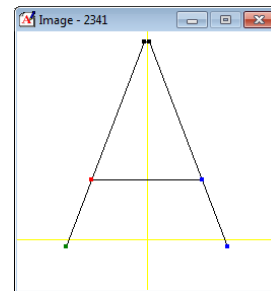
Convert or Edit Graphic Data

- Logo Data Conversion Software Operation Manual
- Logo Data Editing Software Operation Manual



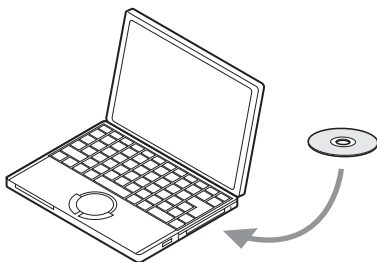
Create or Edit Making Font

Font Maker Operation Manual



Install Laser Marker NAVI

Laser Marker NAVI Operation Manual



When in Trouble...

“Troubleshooting” (P.287)



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For the Safety Use of Laser Product

This product falls into Class 4 laser (marking laser) and Class 2 laser (guide laser) based on the classifications of “Safety of laser products” IEC60825-1 and FDA standards 21 CFR 1040.10 and 1040.11. Perform the safety protection measure before using the system. Refer to “Safety Protection Measures for Users” (P.23) for details.

Radiation Information [LP-400 Series]

■ Marking Laser (Class 4)

Class 4 laser refers to “Laser products for which intrabeam viewing and skin exposure is hazardous and for which the viewing of diffuse reflections may be hazardous. These lasers also often represent a fire hazard.”

Model Name	LP-430U LP-430TU	LP-431U LP-431TU	LP-435U LP-435TU	LP-410U LP-410TU	LP-411U LP-411TU	Remarks
Wavelength	10.6 μm					Invisible beam
Laser Medium	CO ₂ Laser					—
Max. Output *1	75 W			30 W		—
Mode of Operation	CW (continuous wave)					—
Class	4					—
NOHD *2	4.9 m	3 m	6.9 m	2.5 m	1.5 m	Nominal ocular hazard distance
MPE *3	1000 W/m ²					Maximum Permissible Exposure
NHZ	NHZ represents the area where the amount of beam irradiance or radiant exposure exceeds the maximum permissible exposure to eyes. It is equal of NOHD at a maximum. NHZ varies depending on the reflectance or surface condition of works. Please calculate it based on the actual working environment.					Nominal hazard zone

Model Name	LP-420S9U LP-420S9TU	LP-421S9U LP-421S9TU	LP-425S9U LP-425S9TU	Remarks
Wavelength	9.3 μm			Invisible beam
Laser Medium	CO ₂ Laser			—
Max. Output *1	75 W			—
Mode of Operation	CW (continuous wave)			—
Class	4			—
NOHD *2	4.9 m	3 m	6.9 m	Nominal ocular hazard distance
MPE *3	1000 W/m ²			Maximum Permissible Exposure
NHZ	NHZ represents the area where the amount of beam irradiance or radiant exposure exceeds the maximum permissible exposure to eyes. It is equal of NOHD at a maximum. NHZ varies depending on the reflectance or surface condition of works. Please calculate it based on the actual working environment.			Nominal hazard zone

*1 : The maximum output power means the maximum value of output that can be output from a laser oscillator itself. Refer to “1-3 Specification” (P.34) for details of average output.

*2 : “NOHD” means the distance that the area where the amount of beam irradiance or radiant exposure becomes equal to the maximum permissible exposure to eyes.

*3 : MPE in this table is a value calculated with exposure time set to 10 seconds.

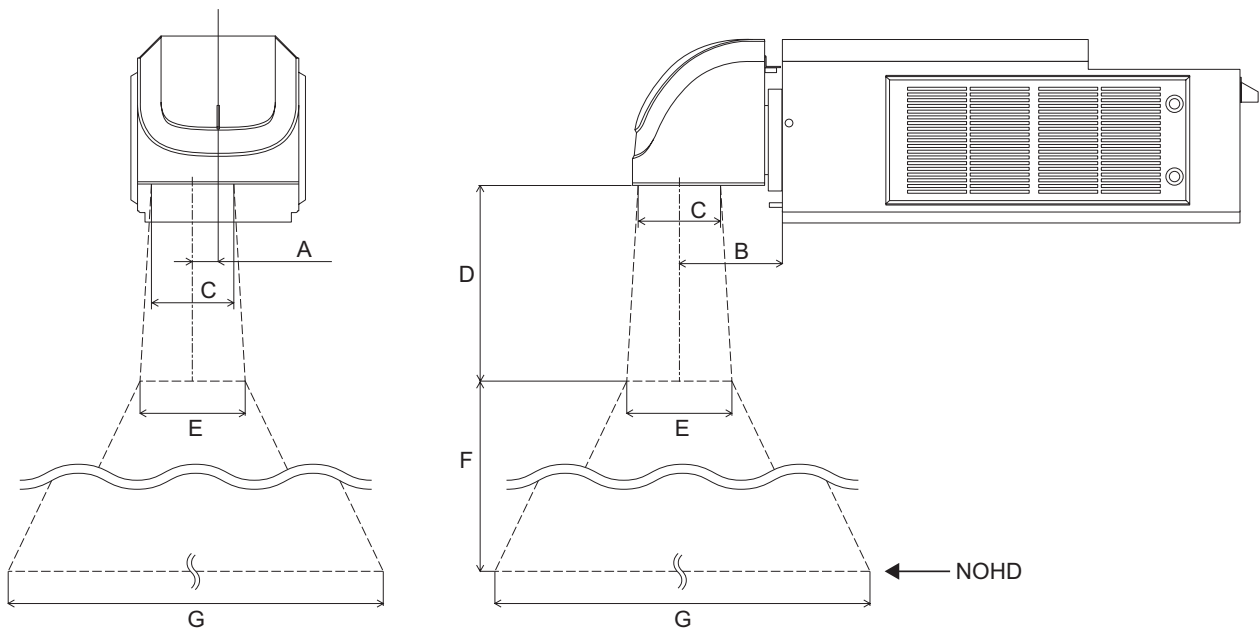
■ Guide Laser and Pointer (Class 2)

The laser classified into the Class 2 refers to “Laser products that emit visible radiation in the wavelength range from 400 nm to 700 nm that are safe for momentary exposures but can be hazardous for deliberate staring into the beam.”

Model Name	LP-400 series	Remarks
Wavelength	655nm	Visible beam
Laser Medium	Semiconductor Laser	-
Max. Output *1	1mW	-
Mode of Operation	CW (continuous wave)	-
Class	2	-

*1 : Sum of the guide laser and pointer values.

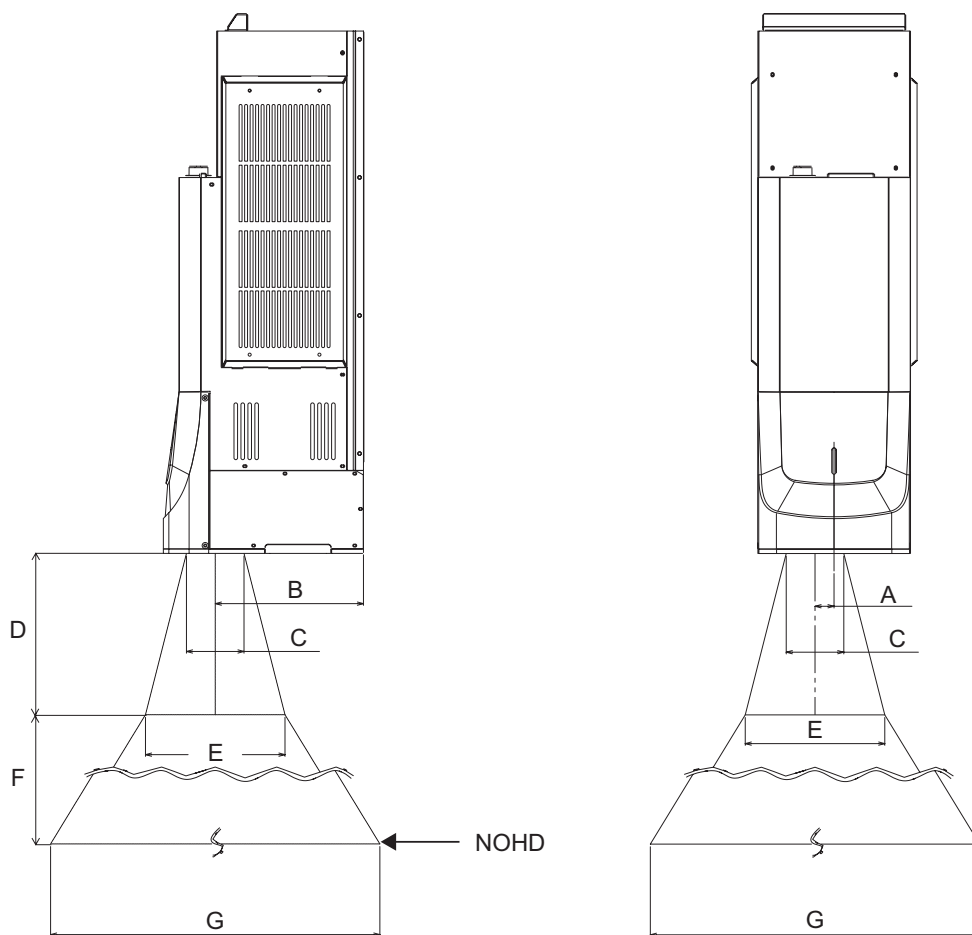
■ Radiation range of LP-400 Series Standard Head Model



Unit: mm

Specified Point	Model				
	LP-430U LP-420S9U	LP-410U	LP-431U LP-421S9U	LP-411U	LP-435U LP-425S9U
A : Center Position of Laser Emission Port	28				
B : Center Position of Laser Emission Port	113				
C : Diameter of Laser Emission Port	φ 66				
D : Working distance	185		111		262
E : Laser Radiation Range at Working distance	φ 160		φ 80		φ 230
F : NOHD	4900	2500	3000	1500	6900
G : Laser Radiation Range at NOHD	φ 3500	φ 1900	φ 1600	φ 800	φ 5300

■ Radiation range of LP-400 Series Tower Head Model



Unit: mm

Specified Point	Model				
	LP-430TU LP-420S9TU	LP-410TU	LP-431TU LP-421S9TU	LP-411TU	LP-435TU LP-425S9TU
A : Center Position of Laser Emission Port	22				
B : Center Position of Laser Emission Port	170.5				
C : Diameter of Laser Emission Port	φ 66				
D : Working distance	185		111		262
E : Laser Radiation Range at Working distance	φ 160		φ 80		φ 230
F : NOHD	4900	2500	3000	1500	6900
G : Laser Radiation Range at NOHD	φ 3500	φ 1900	φ 1600	φ 800	φ 5300

Radiation Information [LP-V/LP-W Series]

■ Marking Laser (Class 4)

Class 4 laser refers to “Laser products for which intrabeam viewing and skin exposure is hazardous and for which the viewing of diffuse reflections may be hazardous. These lasers also often represent a fire hazard.”

Model Name	LP-V10U	LP-V15U	LP-W052U	Remarks
Wavelength	1060nm			Invisible beam
Laser Medium	Yb:FIBER			—
Max. Output *1	40 W		7.5 W	—
Mode of Operation	Pulsed		CW (continuous wave)	—
Pulse Cycle	10 μs to 50 μs		—	—
Pulse Width *2	1 ns to 1000 ns		—	—
Class	4			—
NOHD *3	35.8 m	65.9 m	21 m	Nominal ocular hazard distance
MPE *4	50 W/m ²			Maximum Permissible Exposure
NHZ	NHZ represents the area where the amount of beam irradiance or radiant exposure exceeds the maximum permissible exposure to eyes. It is equal of NOHD at a maximum. NHZ varies depending on the reflectance or surface condition of works. Please calculate it based on the actual working environment.			Nominal hazard zone

*1 : The maximum output power means the maximum value of output that can be output from a laser oscillator itself. Refer to “1-3 Specification” (P.34) for details of average output.

*2 : The pulse width means the available output range from the laser oscillator itself.

*3 : “NOHD” means the distance that the area where the amount of beam irradiance or radiant exposure becomes equal to the maximum permissible exposure to eyes.

*4 : MPE in this table is a value calculated with exposure time set to 10 seconds.

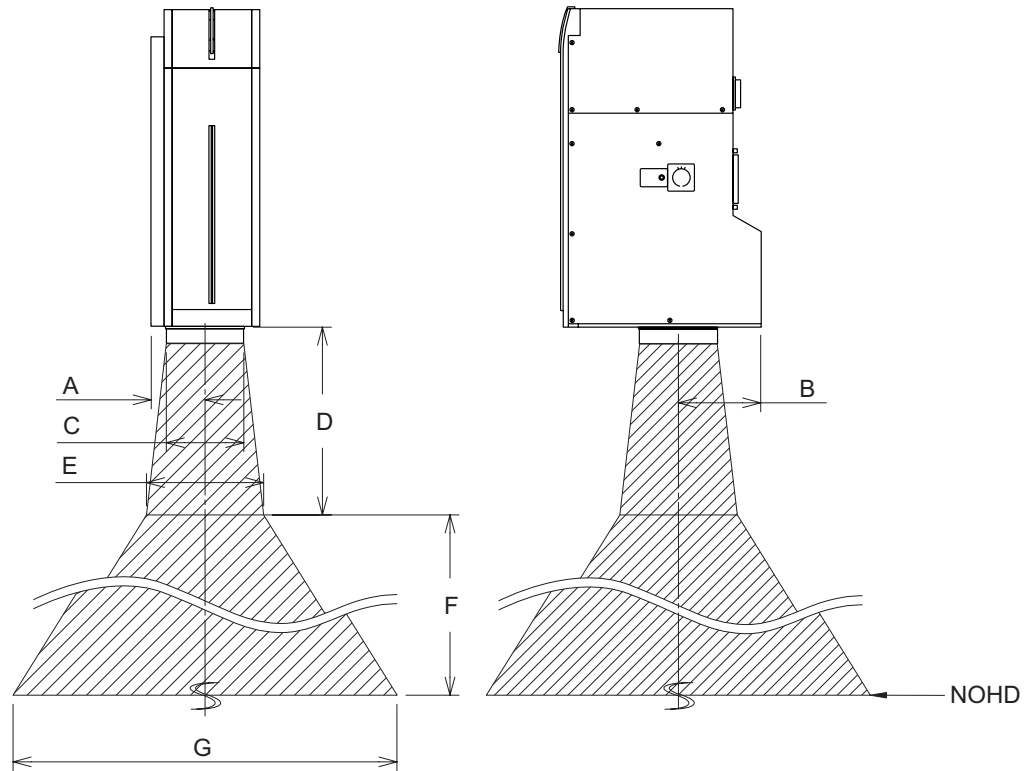
■ Guide Laser and Pointer (Class 2)

The laser classified into the Class 2 refers to “Laser products that emit visible radiation in the wavelength range from 400 nm to 700 nm that are safe for momentary exposures but can be hazardous for deliberate staring into the beam.”

Model Name	LP-V/LP-W series	Remarks
Wavelength	655nm	Visible beam
Laser Medium	Semiconductor Laser	-
Max. Output *1	1mW	-
Mode of Operation	CW (continuous wave)	-
Class	2	-

*1 : Sum of the guide laser and pointer values.

■ Radiation range of LP-V / LP-W Series



Unit: mm

Specified Point	Model		
	LP-V10U	LP-V15U	LP-W052U
A : Center Position of Laser Emission Port	60		
B : Center Position of Laser Emission Port	91		
C : Diameter of Laser Emission Port	φ 120		
D : Working distance	190	350	127
E : Laser Radiation Range at Working distance	φ 130	φ 230	φ 80
F : NOHD	35800	65900	21000
G : Laser Radiation Range at NOHD	φ 19200	φ 37700	φ 10000

Safety Protection Measures for Users

This product falls into Class 4 laser (marking laser) and Class 2 laser (guide laser) based on the classifications of the Safety of laser products by IEC60825-1 / FDA standards 21 CFR 1040.10 and 1040.11 / JIS C 6802.



Perform the safety protection measure shown below before using the system.

For more detail instruction, refer to each of the standard.

Moreover, there is a case where related regulations are set for using the laser product depending on a country and a region. When use this product, follow these regulations.

■ Construction of interlock system

For operating this product, construct the protective enclosure enclosing the range of the laser radiation for protecting the exposure caused by the reflection of the laser radiation from the marking object or the surrounding objects, and also construct the interlock system at the same time. Additionally, install the control part that is not to exposure to the laser beam. Refer to "Construction of Interlock System" (P.29) for details.

 WARNING	 • Construct a system for re-pumping the laser manually as safety protection measures after stop of the laser radiation.
--	---

■ Wearing protective goggles

For protection eyes of an operator, make it mandatory to wear goggles against laser beam in the laser control area. Use the laser protective goggles or glasses applicable for wavelength of the specific to the marking laser and appropriate to working conditions.

For this product, use the laser protective goggles or glasses which meet the following requirements.

- For LP-400 series: The goggles or glasses that have Optical Density (OD) of more than 6 at wavelength 9300 nm to 10600 nm (9.3 to 10.6 micrometers).
- For LP-V/LP-W series: The goggles or glasses that have Optical Density (OD) of more than 6 at wavelength 1060 nm to 1070 nm (1.06 to 1.07 micrometers).
- Through the goggles or glasses, the laser radiation indicator should be recognized.
- ANSI Z136 and CE certified laser safety goggles or glasses

The protective goggles can momentarily protect the eyes against the scattered beam. Never look at the direct beam or reflected beam even when the goggles are used.

■ Protective enclosure

In order to prevent exposure to laser beam accidentally reflected from the marking object or from its circumferential areas, place a protective enclosure so that it can enclose the area in the range of laser radiation.

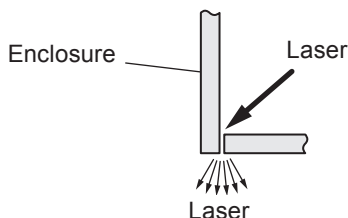
Construct the enclosure with proper reflectance, durability and thermal resistance materials that does not transmit a wavelength of the marking laser.

Recommended material for the enclosures:

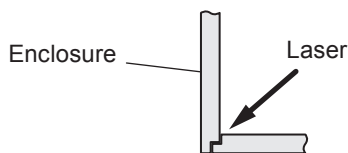
- For LP-400 series: Metals such as iron, aluminum, or stainless steel, or acrylic resins. For acrylic plate, its thickness should be more than 3mm and it is recommended to use the plate that has a color to reduce the secondary radiation beam such as spark during the lasing.
- For LP-V / LP-W series: Metals such as iron, aluminum, or stainless steel.

Design the enclosure not to leak the laser beam from the joint parts.

Example of the joint parts:





Danger of laser exposures



Example of recommended joint design

■ Key control

In order to avoid the operation of the system by the person without authorization and allowance, the laser safety manager must remove key and keep it when not in use.

 WARNING	 <ul style="list-style-type: none">• It is obligated by IEC/FDA/JIS that laser products shall incorporate a key-actuated master control. Actuation of this product is basically controlled by the key switch located on the front of the controller. However, in considering situations when the laser marker is operating as a part of a larger system, the laser marker turns on if the key switch is already in ON position, and power is supplied. In this case, be sure that the external system controls the operation of the laser marker with a key-actuated master control.
--	---

■ Power failure recovery

For power failure occurs on the laser marker, construct a laser re-pumping system by manual operation for safety.

■ Radiation direction of laser beam

To assure safety, be sure to place the protective enclosure.

Measures should be taken so that the direction of laser radiation can be seen and checked by others as well as an operator. (The warning labels are adhered to this product with shipment. Do not peel them off.)

■ Termination of laser beam

Terminate a laser beam path within the marking range by using a flame-resistant object. Do not use the specular object for the termination.

■ Path of laser beam

The laser beam path should be set avoiding the eye level of workers at both sitting and standing time.

■ Illumination

Make the area surrounding the laser marker well-lighted as much as possible.

Because the pupils are contracted in the well-lit place, it reduces the risk to the eyes.

For LP-V/LP-W series, do not expose strong beam to the laser radiation exit. Failure to do so could cause the malfunction of the power check monitor.

■ Protective clothing

Exposure of the skin to the laser beam may cause a skin burn. Exposure of the clothing to the laser beam may cause burning as well.

Wear the clothing which can minimize the exposure of the skin to the laser and which is flame-resistant.

■ Appointment of laser safety manager

By appointing a laser safety manager*, ensure that the laser product is handled safely.

Items that the laser safety manager has to manage and execute are as follows:

- Implementation of countermeasure against the prevention of disability from laser beam
- Setting and management of laser management area
- Management of laser device and system and key
- Inspection and maintenance of laser device, and storage of records
- Inspection, maintenance, and check the status of use of protective equipment
- Execution of safety education and training for users for the laser

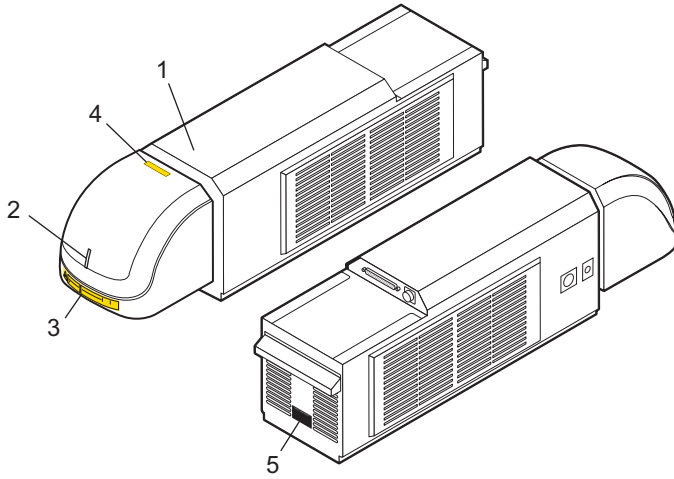
* Responsible person having adequate knowledge of laser hazard evaluation and competence in protection against laser hazards

Safety Functions on Laser Marker

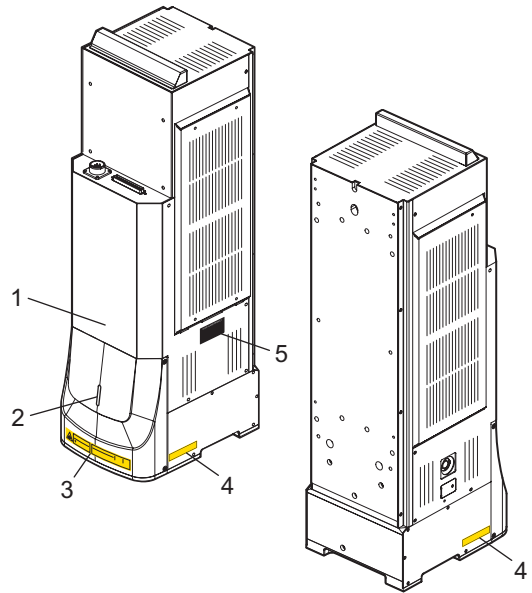
This laser marker has the functions shown below for safety measures.
Use these functions properly and operate the laser marker system safely.

Head

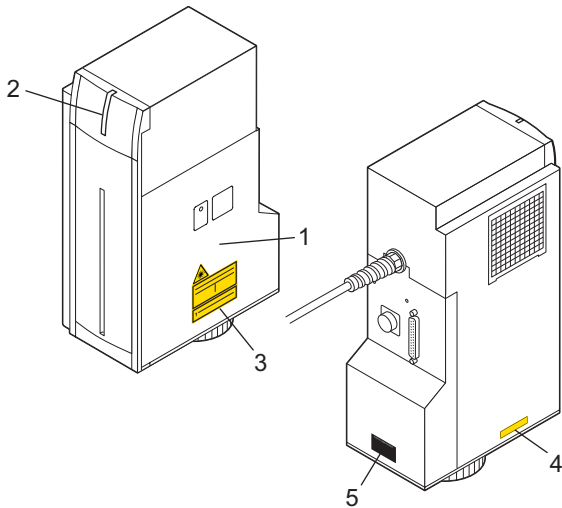
LP-400 Series Standard Head Model



LP-400 Series Tower Head Model



LP-V/LP-W series



- | | | | |
|---|---------------------------|---|---|
| 1 | Internal Shutter | : | This is a shutter inside the head. The emission of laser beam is stopped by closing the internal shutter. |
| 2 | Laser Radiation Indicator | : | The operations of the laser radiation indicator are as follows: |

Laser in non-pumped state	Lights-out
Laser pumping is in progress (uncompleted) and internal shutter closed	Blue flashing
Laser pumping is in progress (uncompleted) and internal shutter opened	Purple flashing *1
Being in laser pumped state and internal shutter closed	Blue lighted-up
Being in laser pumped state and internal shutter opened	Purple lighted-up
Being in laser emitting	Red lighted-up

*1 : This status is shown only by LP-V and LP-W series.

! WARNING








- If the laser emission indicator on the laser marker is placed out of the sight of operators, place the external indicator light or warning lamp on the immediately apparent place on the system.

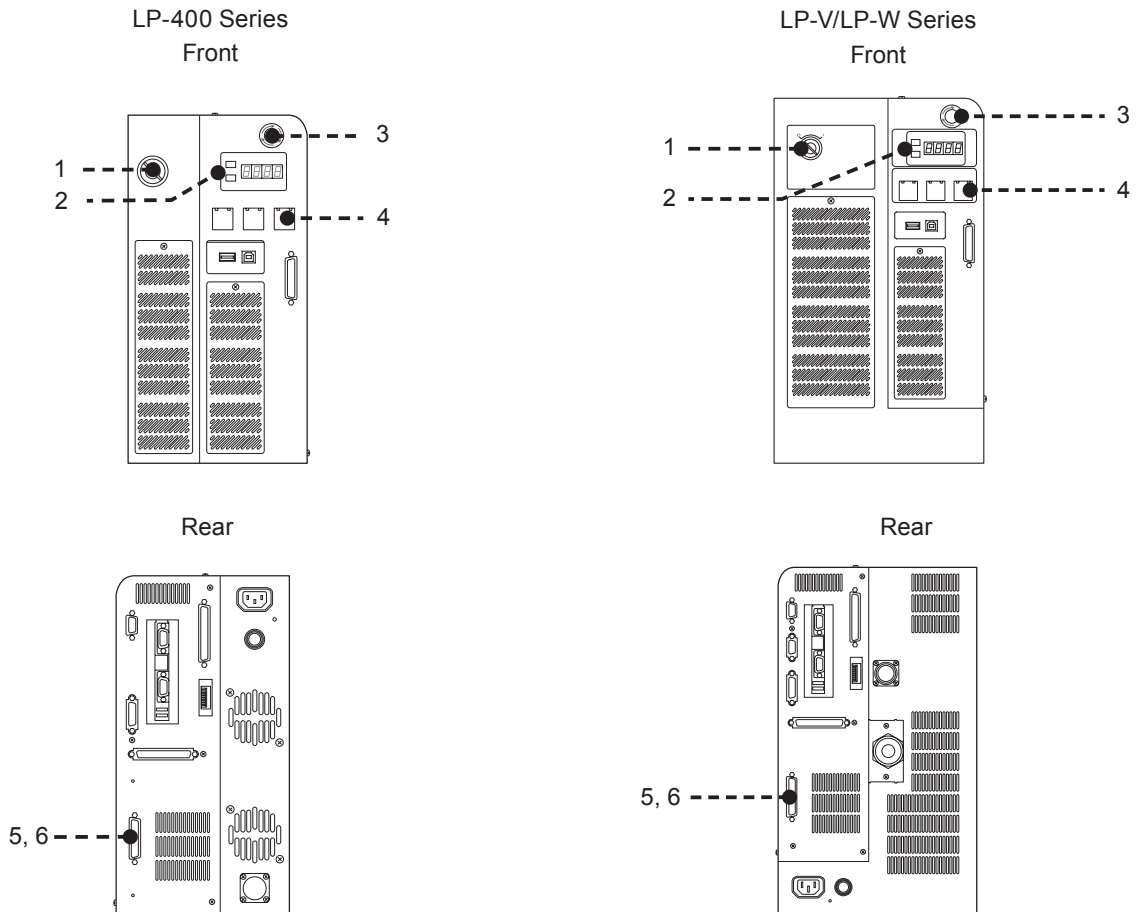
3 to 5 Labels

: The labels shown below are affixed to the laser marker.
(Contents of the labels vary depending on model.)

If the head is placed out of the sight of operators, place the attached warning label on the immediately apparent place on the system.

<p>3 Warning / Explanatory / Aperture Label</p>	
<p>LP-430(T)U-A / LP-431(T)U-A / LP-435(T)U-A / LP-430(T)U-C / LP-431(T)U-C / LP-435(T)U-C</p> <div style="display: flex; justify-content: space-around;"> <div style="border: 1px solid black; padding: 5px; text-align: center;">  <p>AVOID EXPOSURE VISIBLE AND INVISIBLE LASER RADIATION IS EMITTED FROM THIS APERTURE</p> </div> <div style="border: 1px solid black; padding: 5px;"> <p>DANGER - VISIBLE AND INVISIBLE LASER RADIATION AVOID EYE OR SKIN EXPOSURE TO DIRECT OR SCATTERED RADIATION</p> <p>λ (Wavelength): 10.6μm Po (Maximum Output): 75W CW λ (Wavelength): 655nm Po (Maximum Output): 1mW CW CLASS 4 LASER PRODUCT IEC60825-1:2014</p> </div> </div>	
<p>LP-420S9(T)U-A / LP-421S9(T)U-A / LP-425S9(T)U-A / LP-420S9(T)U-C / LP-421S9(T)U-C / LP-425S9(T)U-C</p> <div style="display: flex; justify-content: space-around;"> <div style="border: 1px solid black; padding: 5px; text-align: center;">  <p>AVOID EXPOSURE VISIBLE AND INVISIBLE LASER RADIATION IS EMITTED FROM THIS APERTURE</p> </div> <div style="border: 1px solid black; padding: 5px;"> <p>DANGER - VISIBLE AND INVISIBLE LASER RADIATION AVOID EYE OR SKIN EXPOSURE TO DIRECT OR SCATTERED RADIATION</p> <p>λ (Wavelength): 9.3μm Po (Maximum Output): 75W CW λ (Wavelength): 655nm Po (Maximum Output): 1mW CW CLASS 4 LASER PRODUCT IEC60825-1:2014</p> </div> </div>	
<p>LP-410(T)U-A / LP-411(T)U-A / LP-410(T)U-C / LP-411(T)U-C</p> <div style="display: flex; justify-content: space-around;"> <div style="border: 1px solid black; padding: 5px; text-align: center;">  <p>AVOID EXPOSURE VISIBLE AND INVISIBLE LASER RADIATION IS EMITTED FROM THIS APERTURE</p> </div> <div style="border: 1px solid black; padding: 5px;"> <p>DANGER - VISIBLE AND INVISIBLE LASER RADIATION AVOID EYE OR SKIN EXPOSURE TO DIRECT OR SCATTERED RADIATION</p> <p>λ (Wavelength): 10.6μm Po (Maximum Output): 30W CW λ (Wavelength): 655nm Po (Maximum Output): 1mW CW CLASS 4 LASER PRODUCT IEC60825-1:2014</p> </div> </div>	
<p>LP-V10U-A / LP-V15U-A / LP-V10U-C / LP-V15U-C</p> <div style="border: 1px solid black; padding: 10px;">  <p>DANGER - VISIBLE AND INVISIBLE LASER RADIATION AVOID EYE OR SKIN EXPOSURE TO DIRECT OR SCATTERED RADIATION</p> <p>λ (Wavelength): 1060nm λ (Wavelength): 655nm Po (Maximum Output): 40W Po (Maximum Output): 1mW CW Pp (Maximum Peak Power): 100kW t (Pulse Duration): 1ns-1000ns CLASS 4 LASER PRODUCT IEC60825-1:2014</p> </div> <div style="border: 1px solid black; padding: 5px; margin-top: 5px; text-align: center;"> <p>AVOID EXPOSURE VISIBLE AND INVISIBLE LASER RADIATION IS EMITTED FROM THIS APERTURE</p> </div>	<p>LP-W052U-A</p> <div style="border: 1px solid black; padding: 10px; text-align: center;"> <p>DANGER</p> <p>VISIBLE AND INVISIBLE LASER RADIATION AVOID EYE OR SKIN EXPOSURE TO DIRECT OR SCATTERED RADIATION</p> <p>Yb: Fiber Laser / Maximum Output: 7.5W / Pulse Duration: CW / Wavelength: 1060nm Semiconductor Laser / Maximum Output: 1mW / Pulse Duration: CW / Wavelength: 655nm CLASS IV LASER PRODUCT</p> <div style="display: flex; justify-content: space-around; margin-top: 5px;"> <div style="border: 1px solid black; padding: 2px;">AVOID EXPOSURE</div> <div style="border: 1px solid black; padding: 2px;">  </div> <div style="border: 1px solid black; padding: 2px;">VISIBLE AND INVISIBLE LASER RADIATION IS EMITTED FROM THIS APERTURE</div> </div> </div>
<p>4 Protective Housing Label</p> <div style="border: 1px solid black; padding: 10px; text-align: center; margin: 10px auto; width: 80%;"> <p>DANGER - CLASS 4 VISIBLE AND INVISIBLE LASER RADIATION WHEN OPEN AVOID EYE OR SKIN EXPOSURE TO DIRECT OR SCATTERED RADIATION</p> </div>	
<p>5 Certification and Identification Label for FDA compliant model</p>	
<p>LP-4xx(T)U-A / LP-4xxS9(T)U-A / LP-VxxU-A</p> <div style="border: 1px solid black; padding: 10px; background-color: #333; color: white; text-align: center;"> <p>CLASS 4 LASER PRODUCT Panasonic Industrial Devices SUNX Co., Ltd. <small>2431-1, Ushiyama-cho, Kasugai, Aichi, 486-0901, Japan</small></p> <p>MANUFACTURED ○○○ △△△△</p> <p>SERIAL NO. x x x x</p> <p><small>Complies with 21 CFR 1040.10 and 1040.11 except for deviations pursuant to Laser Notice No.50, dated June 24, 2007</small></p> </div>	<p>LP-W052U-A</p> <div style="border: 1px solid black; padding: 10px; background-color: #333; color: white; text-align: center;"> <p>CLASS IV LASER PRODUCT Complies with 21 CFR 1040.10 and 1040.11 Panasonic Industrial Devices SUNX Co., Ltd. <small>2431-1, Ushiyama-cho, Kasugai, Aichi, 486-0901, Japan</small></p> <p>MANUFACTURED ○○○ △△△△</p> <p>SERIAL NO. x x x x</p> </div>

Controller



-
- 1 Key Switch : This is the key switch for starting up the laser marker. Only when the key switch is turned OFF (in O position), the key can be pulled out. When the laser marker is not in use, the key should be in safekeeping by a laser safety manager.
-
- 2 Laser Radiation Indicator : The operations of the laser radiation indicator are as follows:
- | | |
|-------------------------|-------------------|
| Non-emitting state | Lights-out |
| Being in laser emitting | Orange lighted-up |
-
- 3 Emergency Stop Switch : This switch is used to forcibly stop the laser pumping. Push this switch at emergency or to stop the laser radiation. Turn the switch to the direction of the arrow to release it.
-
- 4 Alarm Reset Switch : This switch is used to reset the system when an alarm generates. LED lights up in blue when an alarm generates. Release the cause of alarm and press this switch. Alarm can be reset from the input/output terminal, console (optional) or monitor screen.
-
- 5 Laser Stop Input Emergency Stop Input (I/O terminal) : The I/O terminal equips Laser Stop input and Emergency Stop input. Opening either of the signals or making its voltage level Low disables the laser emission. Construct the safety system by connecting it to the door or switch of the equipment.
 Operation when Laser stop is released :
 • When laser is not radiating: Close the internal shutter.
 • When laser is radiating: Close the internal shutter and turn Laser pumping OFF.
 Operation when Emergency stop is released :
 • Close the internal shutter and turn Laser pumping OFF.
-
- 6 Input/Output Terminal : The terminal equips various signals, such as shutter input, marking output, mark end output, ready output etc. Use these signals for the purpose of controlling other external safety devices, such as an indicating lamp. Refer to the External control manual for details.
-

■ Laser Marker Operation at Inputting the Safety Functions

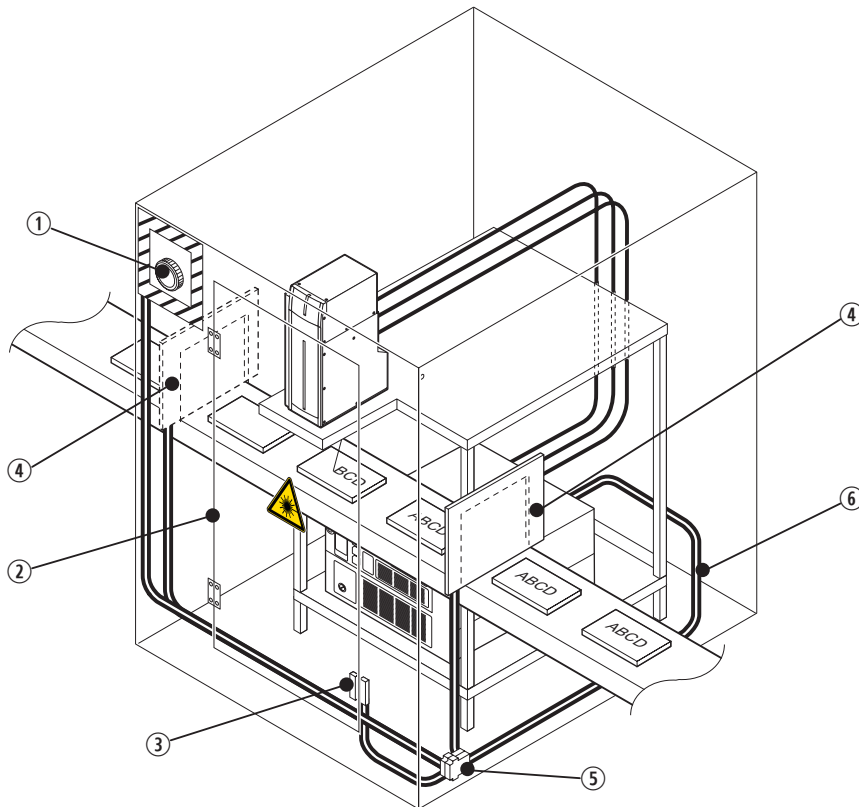
Safety Function	Laser Marker Operation	Release Method
Laser Stop in I/O terminal *1 CLOSE to OPEN	Laser stop input during laser emission <ul style="list-style-type: none"> • Laser Pumping: OFF • Internal Shutter: CLOSE • Status: Alarm E011 	Close Laser Stop and input alarm reset.
	Laser stop input at non-emitting with opened shutter <ul style="list-style-type: none"> • Laser Pumping: Hold ON • Internal Shutter: CLOSE • Status: Warning E811 	Close Laser Stop.
Emergency Stop in I/O terminal CLOSE to OPEN	<ul style="list-style-type: none"> • Laser Pumping: OFF • Internal Shutter: CLOSE • Status: Alarm E004 *2 	Close Emergency Stop and input alarm reset.
Push Emergency Stop Switch	<ul style="list-style-type: none"> • Laser Pumping: OFF • Internal Shutter: CLOSE • Status: Alarm E002 *2 	Push emergency stop switch and input alarm reset.

*1 : The operation behavior of Laser Stop varies depending on the laser emission ON / OFF status.
(Inputting Emergency Stop in I/O terminal and Emergency Stop Switch, regardless laser emission ON/OFF status, the laser is powered OFF and the shutter is closed.)

*2 : Under the non-remote mode in closing shutter status (non-emitting status), the error does not occur.

■ Construction of Interlock System

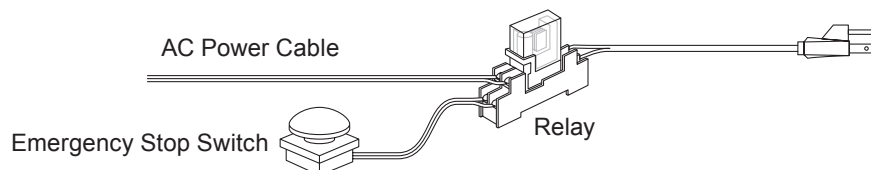
For operating this product, construct the protective enclosure enclosing the range of the laser radiation for protecting the exposure caused by the reflection of the laser radiation from the work piece or the surrounding objects, and also construct the interlock system. The following figure shows the construction sample of the interlock system.



No.	Description	Note
①	Emergency stop button	Construct a control system for shutting off the laser power when it is opened.
②	Door for the maintenance	
③	Safety switch	
④	Laser protection shutter for marking object gateway	Construct a control system which will separate (cut off) the laser beam or shut off the laser power when it is open.
⑤	Depending on the system control specification, use safety relay unit or safety PLC etc.	Connect the devices ① to ④ and I/O terminal of the laser marker. Depending on the system design, use the safety relay unit or the safety PLC.
⑥	To I/O terminal (laser stop input, emergency stop input, etc.)	

↓ Reference

- When primary AC power supply of the system is performed as a safety measure, process AC power cable to set the switch as follows.



1 Product Overview

1-1 Product Model

■ LP-400 Series

Laser marker LP-400 series have the following models.

Some of the specifications and the packaged contents vary depending on the model. For details, see “1-3 Specification” (P.34) and “1-5 Package” (P.45).

Model	Laser output / Wavelength	Marking field [mm]	Head type
LP-430U, LP-430U-A, LP-430U-C, LP-430U-CHN	30W 10.6μm	110 x 110	Standard
LP-430TU, LP-430TU-A, LP-430TU-C, LP-430TU-CHN			Tower Head
LP-431U, LP-431U-A, LP-431U-C, LP-431U-CHN		55 x 55	Standard
LP-431TU, LP-431TU-A, LP-431TU-C, LP-431TU-CHN			Tower Head
LP-435U, LP-435U-A, LP-435U-C, LP-435U-CHN		160 x 160	Standard
LP-435TU, LP-435TU-A, LP-435TU-C, LP-435TU-CHN			Tower Head
LP-420S9U, LP-420S9U-A, LP-420S9U-C, LP-420S9U-CHN	20W 9.3μm	110 x 110	Standard
LP-420S9TU, LP-420S9TU-A, LP-420S9TU-C, LP-420S9TU-CHN			Tower Head
LP-421S9U, LP-421S9U-A, LP-421S9U-C, LP-421S9U-CHN		55 x 55	Standard
LP-421S9TU, LP-421S9TU-A, LP-421S9TU-C, LP-421S9TU-CHN			Tower Head
LP-425S9U, LP-425S9U-A, LP-425S9U-C, LP-425S9U-CHN		160 x 160	Standard
LP-425S9TU, LP-425S9TU-A, LP-425S9TU-C, LP-425S9TU-CHN			Tower Head
LP-410U, LP-410U-A, LP-410U-C, LP-410U-CHN	10W 10.6μm	110 x 110	Standard
LP-410TU, LP-410TU-A, LP-410TU-C, LP-410TU-CHN			Tower Head
LP-411U, LP-411U-A, LP-411U-C, LP-411U-CHN		55 x 55	Standard
LP-411TU, LP-411TU-A, LP-411TU-C, LP-411TU-CHN			Tower Head

■ Model Name Description

$\overbrace{\text{LP-4}}^{①} \overbrace{\text{30}}^{②} \overbrace{\text{U-A}}^{③⑤⑥}$

 $\overbrace{\text{LP-4}}^{①} \overbrace{\text{25}}^{②} \overbrace{\text{S9}}^{④} \overbrace{\text{TU-C}}^{⑤⑥}$

- ① Series name of the product. LP-400 series is the CO₂ laser marker.
- ② Represents laser output power class as follows.
 - 3: Oscillator average output power 30W
 - 2: Oscillator average output power 20W
 - 1: Oscillator average output power 10W
- ③ Represents marking field class as follows.
 - 0: Marking field 110 mm x 110 mm
 - 1: Marking field 55 mm x 55 mm
 - 5: Marking field 160 mm x 160 mm
- ④ “S9” is added to the model with the laser wavelength 9.3μm.
- ⑤ Represents the type of the head unit.
 - U: Standard Head
 - TU: Tower Head
- ⑥ Added if the product has additional features or another specification from standard specification.
 - A: FDA regulations compliant model.
 - C: CE Marking compliant model.
 - CHN: GB standard compliant model. (for use in China)

■ LP-V/LP-W Series

Laser marker LP-V series and LP-W series have the following models.

Some of the specifications and the packaged contents vary depending on the model. For details, see “1-3 Specification” (P.34) and “1-5 Package” (P.45).

Model	Laser output	Oscillation mode	Marking field [mm]
LP-V10U, LP-V10U-A, LP-V10U-C, LP-V10U-CHN	12W	Pulsed	90 x 90
LP-V15U, LP-V15U-A, LP-V15U-C, LP-V15U-CHN			160 x 160
LP-W052U, LP-W052U-A	5W	CW	55 x 55

■ Model Name Description

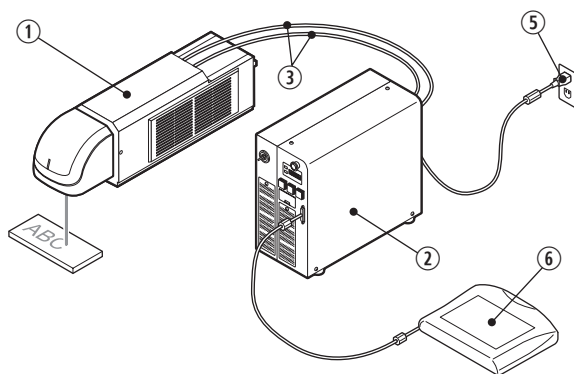
$\overbrace{\text{LP-V10U}}^{\text{①}} \underbrace{\text{-CHN}}_{\text{④}}$

 $\overbrace{\text{LP-W052U}}^{\text{①}} \underbrace{\text{-A}}_{\text{④}}$

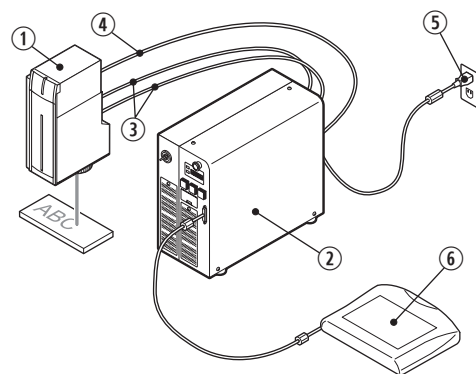
- ① Series name of the product. LP-V series and LP-W series are the fiber laser markers.
- ② Represents laser output power class as follows.
 - 1: Oscillator average output power 12W
 - 05: Oscillator average output power 5W
- ③ Represents marking field class as follows.
 - 0: Marking field 90 mm x 90 mm
 - 5: Marking field 160 mm x 160 mm
 - 2: Marking field 55 mm x 55 mm
- ④ Added if the product has additional features or another specification from standard specification.
 - A: FDA regulations compliant model.
 - C: CE Marking compliant model.
 - CHN: GB standard compliant model. (for use in China)

1-2 Product Configuration

This product is a laser marker which is designed to mark and process the object by radiating a laser beam to the target. This product consists mainly of the following units.



LP-400 Series



LP-V/LP-W Series

No.	Name	Description
①	Head	It is the unit that radiates the laser beam. The optical components and the scanner are loaded inside.
②	Controller	It is the unit that stores the setting data and controls the operation. The main power supply and connection interface with external devices are loaded.
③	Head Power Cable (Attached accessory) Head Control Cable (Attached accessory)	Cables to connect the head and controller.
④	Fiber cable (only LP-V/LP-W series)	Cable to deliver the laser beam from controller to head.
⑤	Controller power cable (Attached accessory)	Cable to supply AC power.
⑥	Touch panel console (Optional item) or Commercially available monitor and mouse (Not included in this product.)	Connect the touch panel console or monitor and mouse to the laser marker to set the marking data and other parameters. This display can be used also as a monitor during the operation. It is also possible to configure the marking data with PC by installing the attached software "Laser Marker Driver & Utility".

■ Optional items

The following optional items (sold separately) are available for this product. To purchase them and for the detailed information, please contact our sales office.

Optional Items	Model
Touch Panel Console	LP-ADP40
Air Filter (for replacement)	LP-400 Series : LP-AFT20 LP-V Series /LP-W Series : LP-AFT21
Protection Glass of Laser Emission Port (for replacement) *1	LP-V10(U) Type *2 : LP-ACV10 or LP-ACV20 or LP-ACV60 LP-V15(U) Type *2 : LP-ACV15 or LP-ACV25 LP-W052(U) Type : LP-ACV12
Head Power Cable (for replacement)	LP-ACP20-5
Head Control Cable (for replacement)	LP-ACS20-5

*1 : The protection glass of the laser emission port is available only for LP-V/LP-W series.

*2 : Depending on the manufactured period of the laser marker, the parts model of the protection glass is vary. Check the serial No. of the laser marker and contact our sales office.

1-3 Specification

LP-400 Series

Item		Model							
		LP-430U LP-430TU	LP-420S9U LP-420S9TU	LP-410U LP-410TU	LP-431U LP-431TU	LP-421S9U LP-421S9TU	LP-411U LP-411TU	LP-435U LP-435TU	LP-425S9U LP-425S9TU
Marking laser	Laser type	CO ₂ laser, Class 4 Laser							
	Wavelength	10.6μm	9.3μm	10.6μm		9.3μm	10.6μm		9.3μm
	Oscillator average output *1	30W	20W	10W	30W	20W	10W	30W	20W
	Output stability (typ.) *2	±3%		±10%	±3%		±10%	±3%	
	Mode of operation	CW							
Guide laser, laser pointer		Red Semiconductor, λ =655nm, Class 2 Laser Max. Output: 1mW							
Scanning system		Galvano Scanning Method							
Beam stop		Shutter (Equipped inside of head)							
Marking object status		Stationary object, Moving object							
Marking field (X, Y) [mm]		110 × 110			55 × 55		160 × 160		
Work distance [mm] *3		185			111		262		
Max. scan speed [mm/sec.] *4, *5		12,000			6,000		12,000		
Max. line speed [m/min.] *4		240	170	120		85	240		
Marking data	Character	Capital and small letter of alphabet, numeric, Japanese (Katakana, Hiragana, Kanji of JIS level-1 and JIS level-2), symbols, user registration character (up to 50 characters can be set)							
	Bar code	CODE39, CODE128, ITF, NW-7, EAN/UPC, GS1 DataBar (GS1 DataBar Limited, GS1 DataBar Stacked, GS1 DataBar Expanded, etc.), GS1 composite code (GS1 DataBar Limited CC-A, GS1 DataBar Stacked CC-A, GS1-128 CC-A, etc.)							
	2D code	QR Code, Micro QR Code, SQRC (Security QR Code) *6, DataMatrix, GS1 DataMatrix							
	Logo data *7	VEC, DXF, HPGL, BMP, JPEG, AI, EPS							
Character height/width [mm] *4		0.1 to 110			0.1 to 55		0.1 to 160		
Number of setting files		Max. 2,048 files							
Number of characters / file		30 characters/line, max. 60 lines							
Input/Output		I/O Terminal, I/O Connector							
Serial communication interface		EIA-RS-232C, Ethernet							
Removable storage media *8		USB Media							
Display language		English and Japanese							
Attached software		Laser Marker NAVI, Logo Data Conversion Software, Logo Data Editing Software, Font Maker, and ExportVec							

Item	Model							
	LP-430U LP-430TU	LP-420S9U LP-420S9TU	LP-410U LP-410TU	LP-431U LP-431TU	LP-421S9U LP-421S9TU	LP-411U LP-411TU	LP-435U LP-435TU	LP-425S9U LP-425S9TU
Applicable OS for PC software	Windows® 10 Pro 32bit, 64bit / Windows® 8 Pro 32bit, 64bit / Windows® 7 Professional 32bit, 64bit Windows® Vista Business 32bit / Windows® XP Professional 32bit							
Required time for system startup	Approx. 60 sec.							
Required time for laser pumping	Approx. 15 sec.							
Power voltage	90VAC to 132VAC or 180VAC to 264VAC (including ±10% voltage fluctuations) *9 Frequency: 50/60 Hz							
Power consumption *10	100VAC	1000VA or less	670VA or less	1000VA or less	670VA or less	1000VA or less	670VA or less	1000VA or less
	200VAC	1200VA or less	700VA or less	1200VA or less	700VA or less	1200VA or less	700VA or less	1200VA or less
Grounding method	Controller: Direct Earth							
Cooling method	Head: Forced air-cooling, Controller: Forced air-cooling							
Ambient temperature *11	0 °C to +40 °C							
Ambient temperature for storage *11	-10 °C to +60 °C							
Ambient humidity *11	35 to 85%RH							
Overvoltage category	II							
Pollution degree	2							
Use location	Indoor; at an altitude of 1000 m or below							
Weight	Head	Approx. 20 kg	Approx. 16 kg	Approx. 20 kg	Approx. 16 kg	Approx. 20 kg	Approx. 16 kg	Approx. 20 kg
	Controller	Approx. 12 kg	Approx. 11 kg	Approx. 12 kg	Approx. 11 kg	Approx. 12 kg	Approx. 11 kg	Approx. 12 kg
Battery (Embedded in product)	Type	Graphite Fluoride Lithium Battery						
	Model	BR-1 / 2AAC2P						
	Quantity	1 piece						
	Weight	Approx. 9.5 g						

*1 : Average output power from the laser oscillator at delivery time with the laser power setting 100.

*2 : Value of output 20% or larger, and at 10 min passed after starting-up.

*3 : Work distance has an individual error of approx.±2 mm per product.

*4 : The described values are available ranges for configuration. The marking quality may vary depending on materials of marking objects and marking conditions.

*5 : Depending on the marking data, the available scan speed might be limited in case the continuous marking more than 1 minute with high scan speed is set.

*6 : For using SQRC, an optional software is needed. SQRC marking function is available only for use in Japan.

*7 : VEC is a graphic file format dedicated for the laser marker. To use HPGL, BMP or JPEG files, convert them to VEC format with the attached "Logo Data Conversion software". To use AI or EPS files, convert them to VEC format with the attached software "ExportVEC".

*8 : Check the performance and operation before use. USB media with security features cannot be used.

*9 : The power supply voltage switches automatically.

*10 : The typical value of the inrush current at system startup is 40A. (Duration time is 10 ms or less.)

*11 : This specification is applied to both controller and head. No condensation and freezing shall be allowed. If there is a gap between the stored temperature and operating temperature, make sure to have the product get used to the operating ambient temperature gradually prior to use to prevent the dew condensation.

LP-V/LP-W Series

Item		Model		
		LP-V10U	LP-V15U	LP-W052U
Marking laser	Laser type	Yb : FIBER laser, $\lambda = 1060\text{nm}$, Class 4 Laser		
	Oscillator average output *1	12W		5W
	Mode of operation	Pulsed		CW
	Pulse cycle	10 μs to 50 μs		-
Guide laser, laser pointer		Red Semiconductor, $\lambda = 655\text{nm}$, Class 2 Laser Max. Output: 1mW		
Scanning system		Galvano Scanning Method		
Beam stop		Shutter (Equipped inside of head)		
Marking object status		Stationary object, Moving object		
Marking field (X, Y) [mm]		90 × 90	160 × 160	55 × 55
Work distance [mm] *2		190	350	127
Max. scan speed [mm/sec.] *3, *4		12,000		6,000
Max. line speed [m/min.] *3		240		120
Marking data	Character	Capital and small letter of alphabet, numeric, Japanese (Katakana, Hiragana, Kanji of JIS level-1 and JIS level-2), symbols, user registration character (up to 50 characters can be set)		
	Bar code	CODE39, CODE128, ITF, NW-7, EAN/UPC, GS1 DataBar (GS1 DataBar Limited, GS1 DataBar Stacked, GS1 DataBar Expanded, etc.), GS1 composite code (GS1 DataBar Limited CC-A, GS1 DataBar Stacked CC-A, GS1-128 CC-A, etc.)		
	2D code	QR Code, Micro QR Code, SQRC (Security QR Code) *5, DataMatrix, GS1 DataMatrix		
	Logo data *6	VEC, DXF, HPGL, BMP, JPEG, AI, EPS		
Character height/width [mm] *3		0.1 to 90	0.1 to 160	0.1 to 55
Number of setting files		Max. 2,048 files		
Number of characters / file		30 characters/line, max. 60 lines		
Input/Output		I/O Terminal, I/O Connector		
Serial communication interface		EIA-RS-232C, Ethernet		
Removable storage media *7		USB Media		
Display language		English and Japanese		
Attached software		Laser Marker NAVI, Logo Data Conversion Software, Logo Data Editing Software, Font Maker, and ExportVec		
Applicable OS for PC software		Windows® 10 Pro 32bit, 64bit / Windows® 8 Pro 32bit, 64bit / Windows® 7 Professional 32bit, 64bit Windows® Vista Business 32bit / Windows® XP Professional 32bit		
Required time for system startup		Approx. 60 sec.		

Item		Model		
		LP-V10U	LP-V15U	LP-W052U
Required time for laser pumping		Approx. 20 sec.		Approx. 15 sec.
Power voltage		90VAC to 132VAC or 180VAC to 264VAC (including $\pm 10\%$ voltage fluctuations) *8 Frequency: 50/60 Hz		
Power consumption *9	100VAC	390VA or less		310VA or less
	200VAC	420VA or less		360VA or less
Grounding method		Head: Direct Earth, Controller: Direct Earth		
Cooling method		Head: Forced air-cooling, Controller: Forced air-cooling		
Ambient temperature *10		0 °C to +40 °C		
Ambient temperature for storage *10		-10 °C to +60 °C		
Ambient humidity *10		35 to 85%RH		
Overvoltage category		II		
Pollution degree		2		
Use location		Indoor; at an altitude of 1000 m or below		
Fiber cable length		4.5 m, Minimum bent radius 60 mm		
Installation direction	Head	Omnidirectionally		
	Controller	Vertically or Horizontally		
Weight	Head	Approx. 9 kg	Approx. 10 kg	Approx. 9 kg
	Controller	Approx. 22 kg		
Battery (Embedded in product)	Type	Graphite Fluoride Lithium Battery		
	Model	BR-1 / 2AAC2P		
	Quantity	1 piece		
	Weight	Approx. 9.5 g		

*1 : Average output power from the laser oscillator at delivery time with the laser power setting 100.

*2 : Work distance has an individual error of approx. ± 2 mm per product.

*3 : The described values are available ranges for configuration. The marking quality may vary depending on materials of marking objects and marking conditions.

*4 : Depending on the marking data, the available scan speed might be limited in case the continuous marking more than 1 minute with high scan speed is set.

*5 : For using SQRC, an optional software is needed. SQRC marking function is available only for use in Japan.

*6 : VEC is a graphic file format dedicated for the laser marker. To use HPGL, BMP or JPEG files, convert them to VEC format with the attached "Logo Data Conversion software". To use AI or EPS files, convert them to VEC format with the attached software "ExportVEC".

*7 : Check the performance and operation before use. USB media with security features cannot be used.

*8 : The power supply voltage switches automatically.

*9 : The typical value of the inrush current at system startup is 40A. (Duration time is 10 ms or less.)

*10 : This specification is applied to both controller and head. No condensation and freezing shall be allowed. If there is a gap between the stored temperature and operating temperature, make sure to have the product get used to the operating ambient temperature gradually prior to use to prevent the dew condensation.

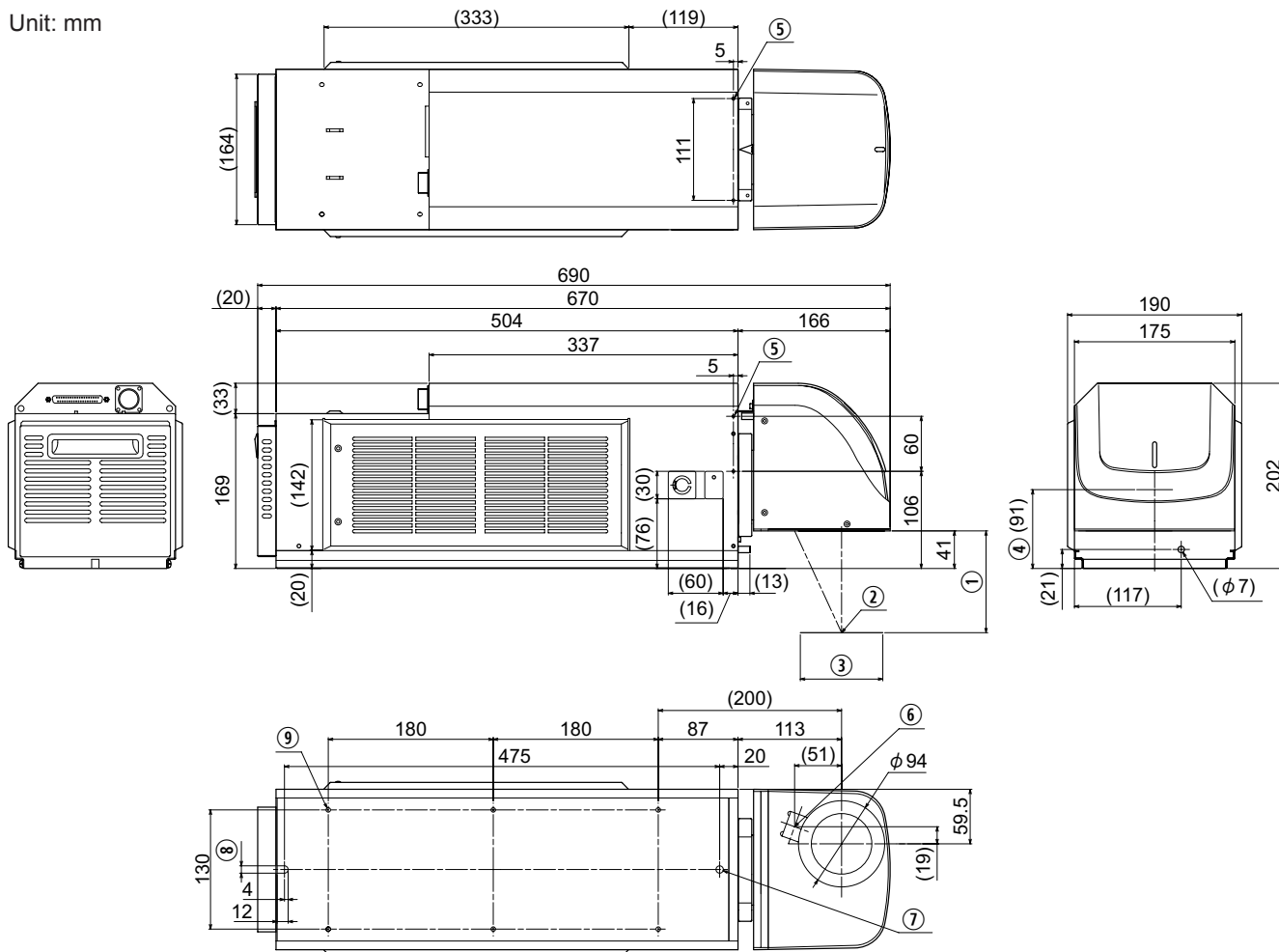
1-4 Outer Dimensional Drawing

1-4-1 LP-400 Series

■ Head (Standard Model)

LP-430U / 420S9U / 410U / 431U / 421S9U / 411U / 435U / 435S9U

Unit: mm

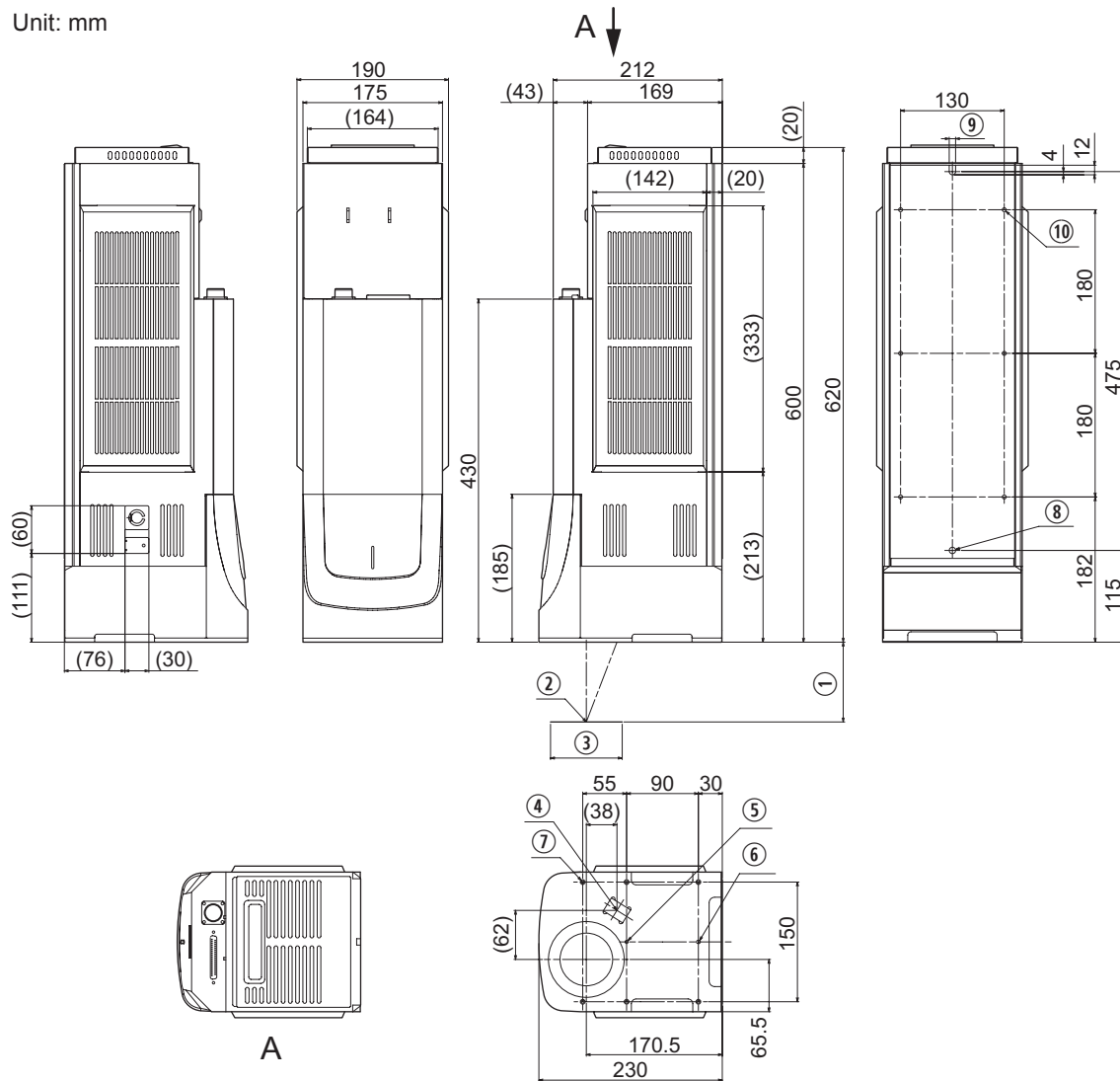


No.	Description
①	Work distance: LP-430U / LP-420S9U / LP-410U : 185mm LP-431U / LP-421S9U / LP-411U : 111mm LP-435U / LP-425S9U : 262mm
②	Center of marking field
③	Marking Field (X, Y): LP-430U / LP-420S9U / LP-410U : 110mm x 110mm LP-431U / LP-421S9U / LP-411U : 55mm x 55mm LP-435U / LP-425S9U : 160mm x 160mm
④	Center of the scanner unit rotation
⑤	Screw hole for general purpose (2 holes in each surface of top and both sides): M4 Screw, Depth 10
⑥	Laser pointer emission port: Aperture diameter: ϕ 19mm
⑦	Head positioning pin hole: ϕ 8 ^{+0.01} ₀ , Depth 4
⑧	Head positioning pin hole: ϕ 8 ^{+0.01} ₀ x 12 Elongated hole, Depth 4
⑨	Head fixing screw hole (6 holes): M6 Screw, Depth 15

■ Head (Tower Head Model)

LP-430TU / 420S9TU / 410TU / 431TU / 421S9TU / 411TU / 435TU / 435S9TU

Unit: mm

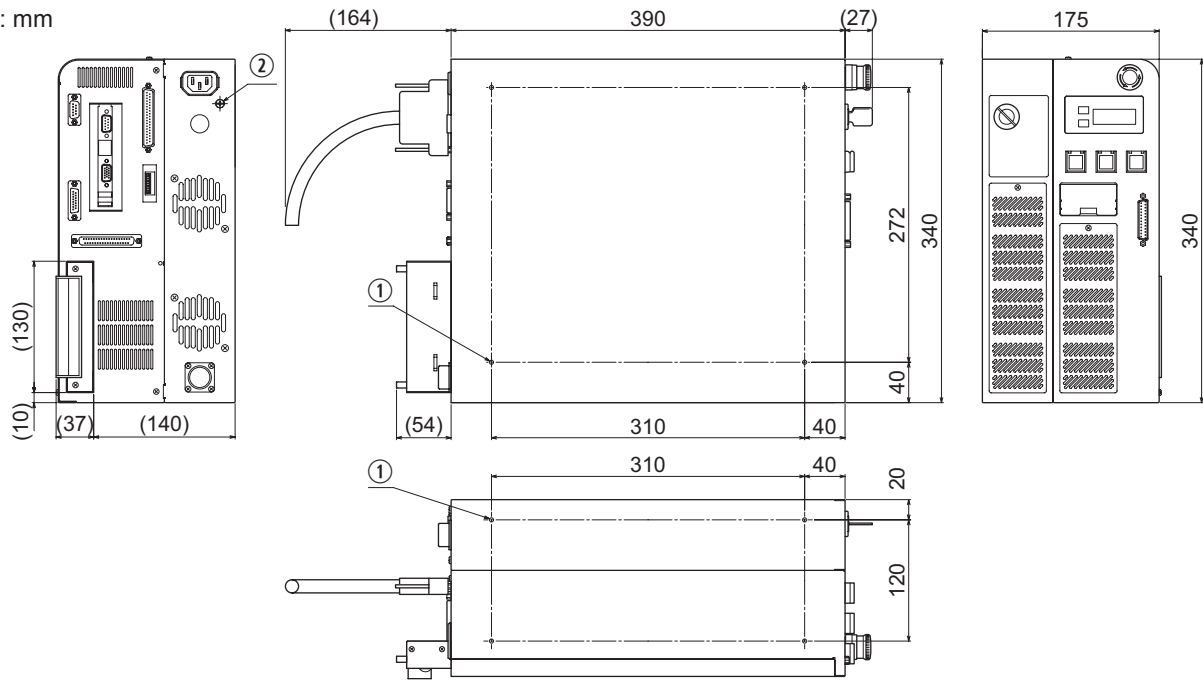


No.	Description
①	Work distance: LP-430TU / LP-420S9TU / LP-410TU : 185mm LP-431TU / LP-421S9TU / LP-411TU : 111mm LP-435TU / LP-425S9TU : 262mm
②	Center of marking field
③	Marking Field (X, Y): LP-430TU / LP-420S9TU / LP-410TU : 110mm x 110mm LP-431TU / LP-421S9TU / LP-411TU: 55mm x 55mm LP-435TU / LP-425S9TU : 160mm x 160mm
④	Laser pointer emission port: (Aperture diameter: ϕ 19mm)
⑤	Head positioning pin hole of lens side surface: ϕ 4 ^{+0.06} / _{+0.02} , Depth 6.5
⑥	Head positioning pin hole of lens side surface: ϕ 4 ^{+0.06} / _{+0.02} x 5 Elongated hole, Depth 6.5
⑦	Head fixing screw hole of lens side surface (6 holes): M6 Screw, Depth 7
⑧	Head positioning pin hole of rear side surface: ϕ 8 ^{+0.01} / ₀ , Depth 4
⑨	Head positioning pin hole of rear side surface: ϕ 8 ^{+0.01} / ₀ x 12 Elongated hole, Depth 4
⑩	Head fixing screw hole of rear side surface (6 holes): M6 Screw, Depth 15

■ Controller

LP-400 series

Unit: mm



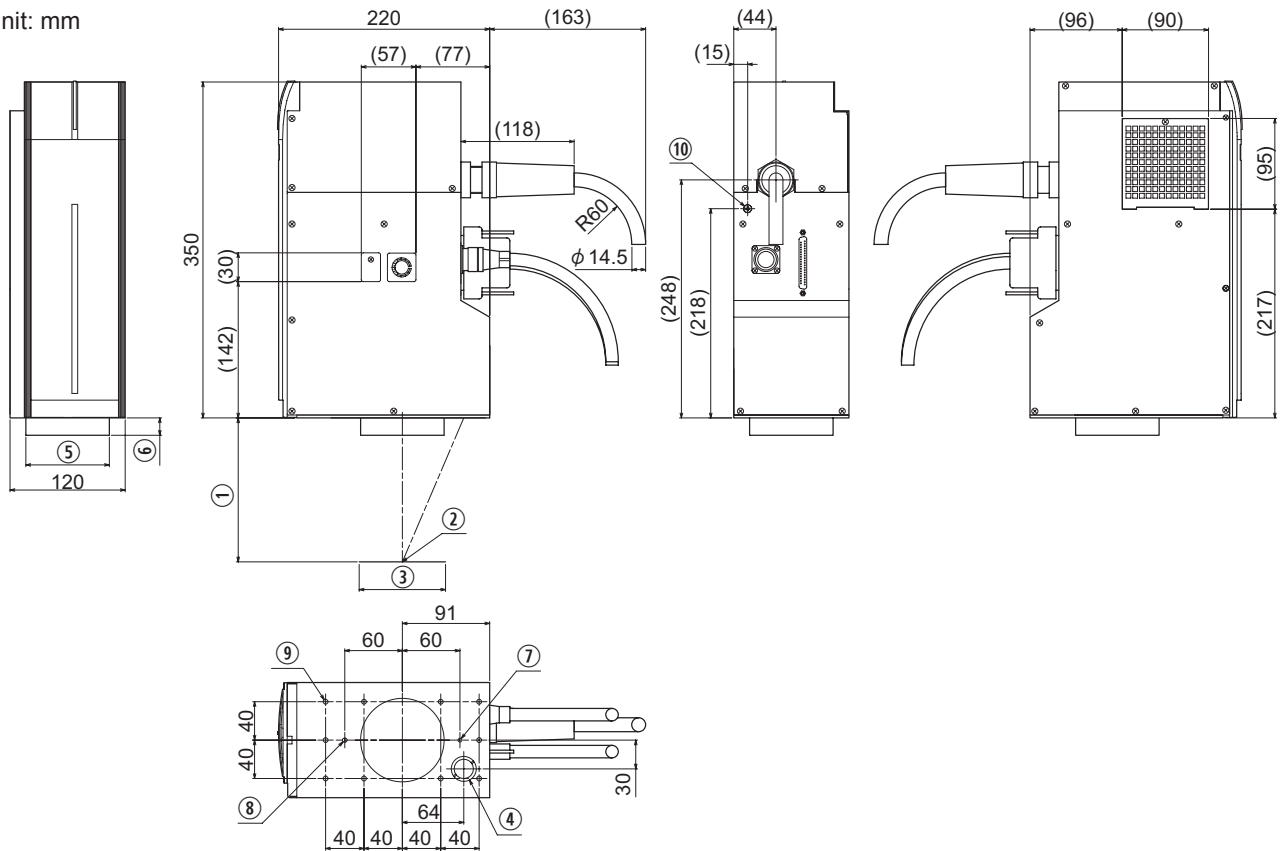
No.	Description
①	Rubber feet installation screw hole (4 holes on base and left side surface each): M5, Depth 6 The rubber feet for controller can be installed on base or side surfaces.
②	Screw for frame ground: M4, Depth 10

1-4-2 LP-V/LP-W Series

■ Head

LP-V10U / LP-V15U / LP-W052U

Unit: mm

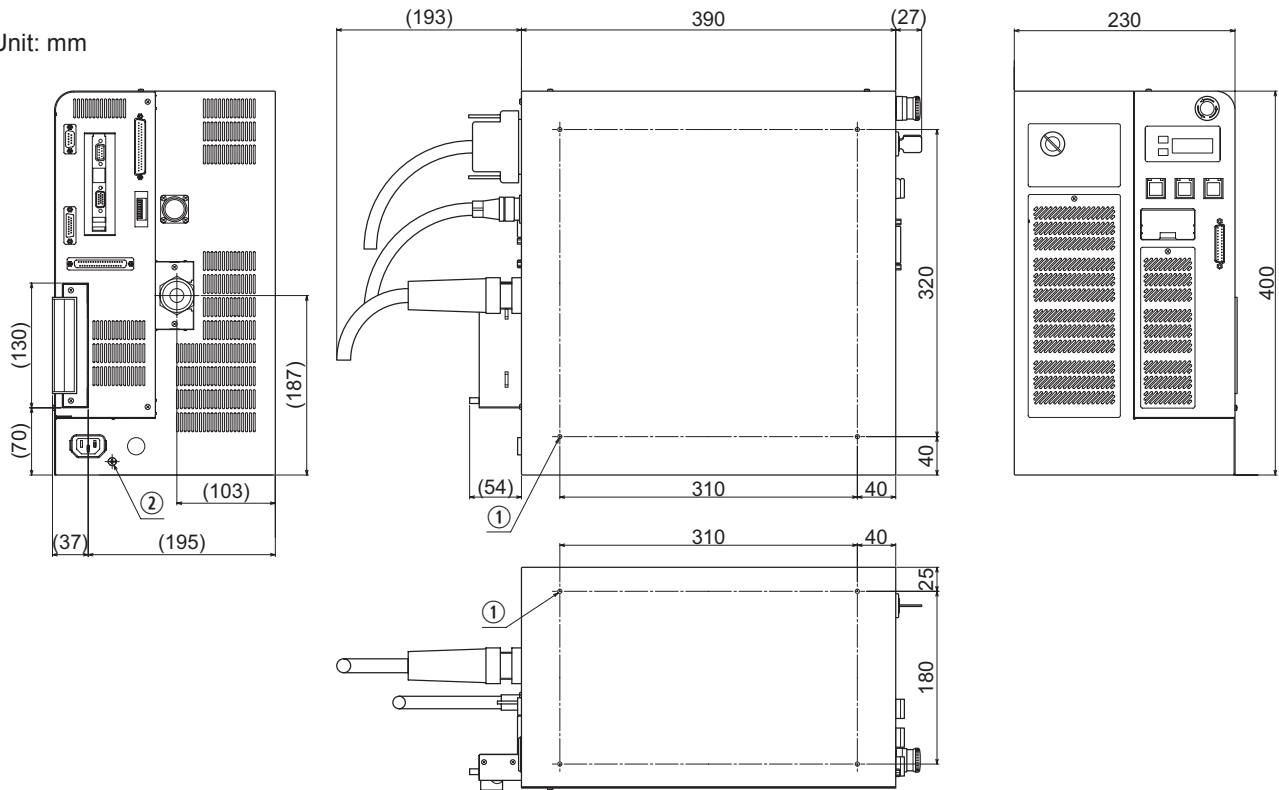


No.	Description
①	Work distance: LP-V10U : 190 mm LP-V15U : 350 mm LP-W052U : 127 mm
②	Center of marking field
③	Marking Field (X, Y): LP-V10U : 90 mm x 90 mm LP-V15U : 160 mm x 160 mm LP-W052U : 55 mm x 55 mm
④	Laser pointer emission port: ϕ 27 mm (Aperture diameter: ϕ 20 mm)
⑤	Laser emission port: LP-V10U: ϕ 87 mm LP-V15U: ϕ 106 mm LP-W052U: ϕ 87 mm
⑥	Laser emission port height: LP-V10U: (19) mm LP-V15U: (40) mm LP-W052U: (19) mm
⑦	Head positioning pin hole: ϕ 4 $^{+0.012}_0$, Depth 7
⑧	Head positioning pin hole: ϕ 4 $^{+0.1}_0$ x 5 Elongated hole, Depth 7
⑨	Head fixing screw hole (LP-V10U/LP-W052U: 10 holes, LP-V15U: 6 holes *) : M6, Depth 6 * For LP-V15U, the 4 screw holes surrounding the laser emission port are not available.
⑩	Screw for frame ground: M4, Depth 8

■ Controller

LP-V10U / LP-V15U / LP-W052U

Unit: mm



No.	Description
①	Rubber feet installation screw hole (4 holes on base and left side surface each): M5, Depth 6 The rubber feet for controller can be installed on base or side surfaces.
②	Screw for frame ground: M4, Depth 10

! Notice

- Both the head and controller are connected with fiber cable and this cable cannot be detached from the device. Forcibly detaching them might damage the product.

1-4-3 Cable

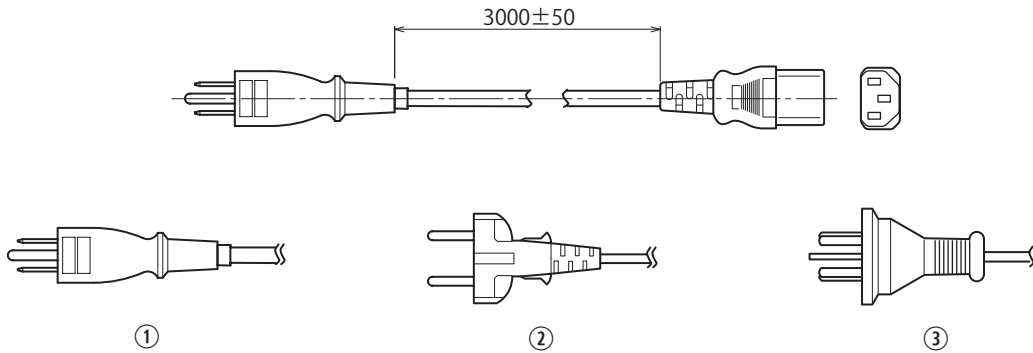
■ Controller Power Cable

Attached controller power cable varies depending on each model. Please select a cable suitable for the standards in the country or region where it is used.

- ① PSE standards, CSA/UL standards compatible cable [Rating 125V] : Attached to LP-4xx(T)U / LP-4xx(T)U-A / LP-VxxU / LP-VxxU-A / LP-W type
- ② CE marking compatible cable [Rating 250V] : Attached to LP-4xx(T)U-C / LP-VxxU-C
- ③ CCC standards compatible cable [Rating 250V, 10A] : Attached to LP-4xx(T)U-CHN / LP-VxxU-CHN type

Unit: mm

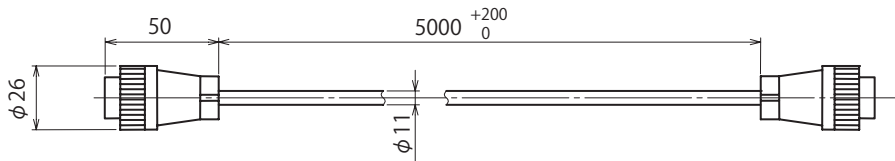
Minimum bending radius 50mm



■ Head Power Cable

Unit: mm

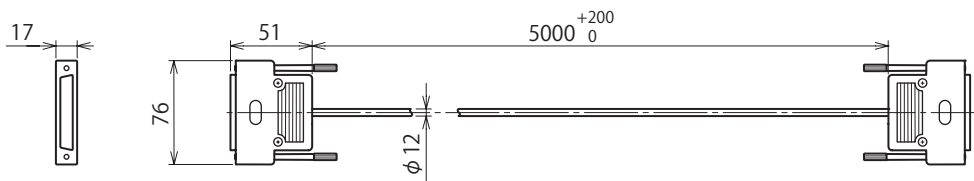
Minimum bending radius 100mm



■ Head Control Cable

Unit: mm

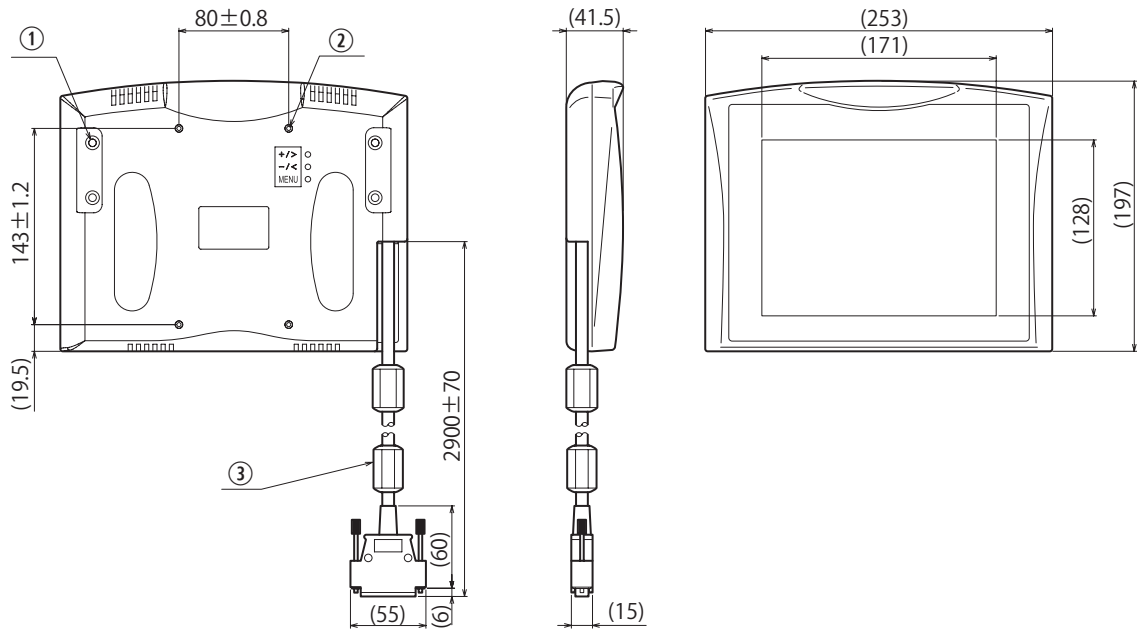
Minimum bending radius 100mm



1-4-4 Console (Option)

Model name: LP-ADP40

Unit: mm



No.	Description
①	Pen holder attaching nut M4, depth 6 (both left and right sides)
②	Fixing nut (4 positions) M4, depth 6
③	Controller Connecting Cable

1-5 Package

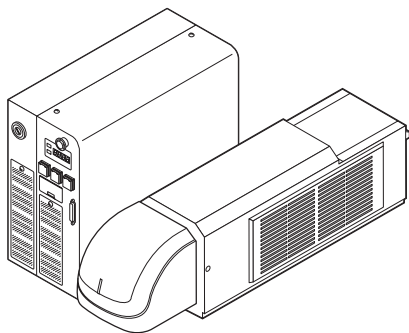
Before using this product, be sure to check the packed objects as shown below.

The product have been strictly checked and tested prior to packaging. However, please make sure that there is no damage during transportation and the product operates properly before using it.

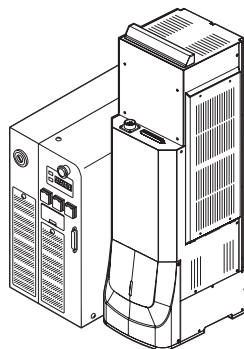
In case that the product becomes damaged or does not operate as specified in this manual, contact the dealer you purchased it or our sales office.

! Notice

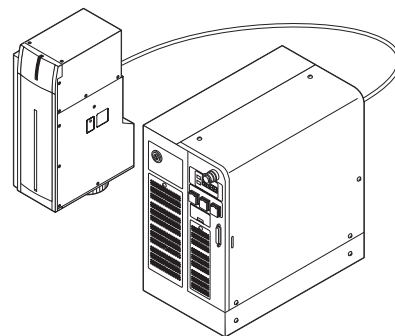
- Be sure to store the packing materials. Since this product is precision machinery, reuse the packing materials to prevent damages during transportation.
- For LP-V / LP-W series, both the head and controller are connected with fiber cable and this cable cannot be detached from the device. Forcibly detaching them might damage the product.



LP-400 Standard Head model



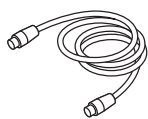
LP-400 Tower Head model



LP-V / LP-W Series

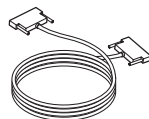
Laser Marker

1 head unit and 1 controller unit



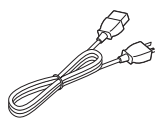
Head Power Cable

qty.: 1



Head Control Cable

qty.: 1



Controller Power Cable *1

qty.: 1



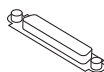
3P-2P Conversion Connector (Rating 125V) *2

qty.: 1



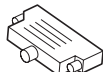
System Key

qty.:2



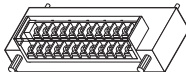
I/O Connector

qty.:1



I/O Connector Cover

qty.:1



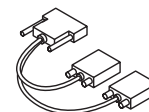
I/O Terminal Block

qty.:1



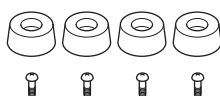
USB Cable (2m)

qty.:1



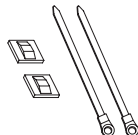
Return Harness

qty.:1



Rubber Foot for Controller (M5x15 Screw)

qty.: 4



Binding Band / Binding Base*3

2 pack-set



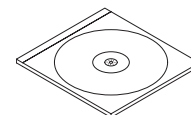
Warning / Explanatory / Aperture label (LP-400 Series) *4, *6

qty.:1



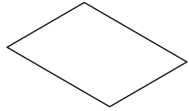
Warning / Explanatory / Aperture label (LP-V/LP-W Series) *5, *6

qty.:1



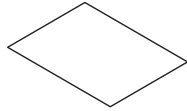
Laser Marker Driver & Utility (CD-ROM) *7

qty.:1



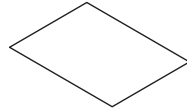
Leaflet of Safety Directions

qty.:1



Carrying Caution Leaflet *8

qty.:1



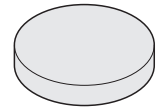
General information for safety (For EU users)

qty.:1 *10



Ground Wire *9

qty.: 1



Lens cap *5

qty.: 1

*1 : Attached controller power cable varies depending on each model. Please select a cable suitable for the standards in the country or region where it is used.

- LP-4xx(T)U / LP-4xx(T)U-A / LP-VxxU / LP-VxxU-A / LP-W : PSE standards, CSA/UL standards compatible cable [Rating 125V]
- LP-4xx(T)U-C / LP-VxxU-C : CE marking compatible cable [Rating 250V] .
- LP-4xx(T)U-CHN / LP-VxxU-CHN: CCC standards compatible cable [Rating 250V] is attached.

*2 : 3P-2P conversion connector is attached only to LP-4xx(T)U / LP-4xx(T)U-A / LP-VxxU / LP-VxxU-A / LP-W type.

*3 : Enclosed only in LP-43xTU-C / LP-42xS9TU-C / LP-43xTU-CHN / LP-42xS9TU-CHN.

*4 : Enclosed only in LP-400 series.

*5 : Enclosed only in LP-V / LP-W series.

*6 : Attached label language varies depending on each model.

- LP-4xx(T)U / LP-VxxU / LP-W052U : Japanese
- LP-4xx(T)U-A / LP-4xx(T)U-C / LP-VxxU-A / LP-VxxU-C / LP-W052U-A : English
- LP-4xx(T)U-CHN / LP-VxxU-CHN : Chinese

*7 : The following data are stored into this CD-ROM "Laser Marker Driver & Utility".

Software for PC Setting of Laser Marker	
Laser Marker NAVI	Font Maker
Logo Data Conversion Software	Export VEC
Logo Data Editing Software	

PDF Manual
LP-400/V/W series Operation/Maintenance Manual
LP-400/V/W series External Control Manual
Laser Marker NAVI Operation Manual
Logo Data Conversion Software Operation Manual
Logo Data Editing Software Operation Manual
ExportVec Operation Manual
Font Maker Operation Manual

Font Data		
Original 1 Font	Original 1 reduced-size Font	User Registration Font
Original 2 Font	Original 2 reduced-size Font	2D Code Pattern Font
Original 3 Font	Original 3 reduced-size Font	OCR1 Font
Original 4 Font	JIS Level-1 Font	
Original 5 Font	JIS Level-2 Font	

*8 : Enclosed except in Tower Head Model of LP-400 series.

*9 : Enclosed only in LP-4xx(T)U-A type.

*10 : Enclosed only in LP-4xx(T)U-C / LP-VxxU-C type.

Reference

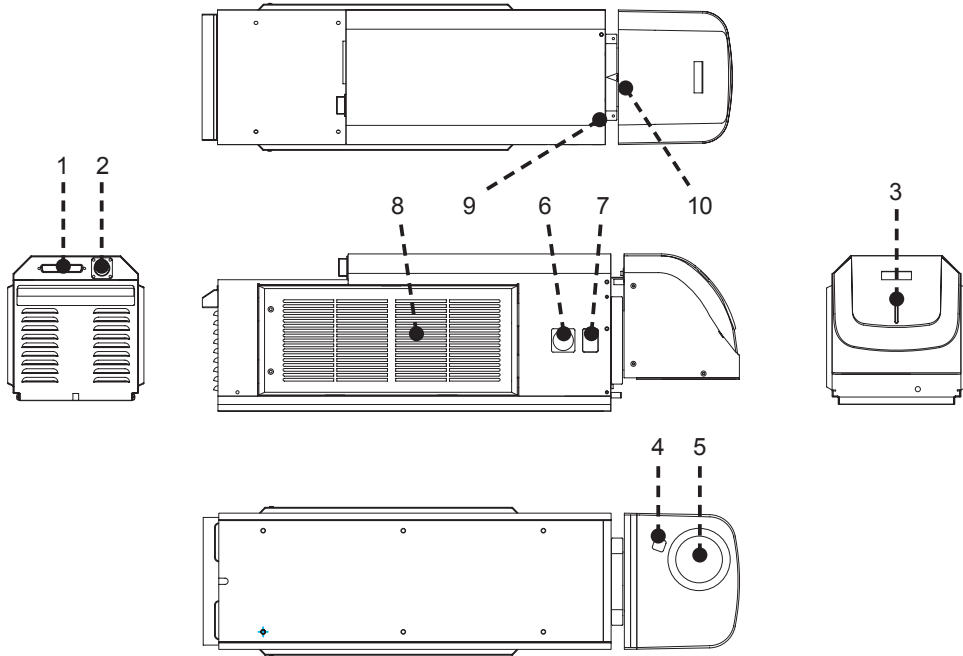
- LP-4xx(T)U-A / LP-4xx(T)U-C / LP-VxxU-A / LP-VxxU-C / LP-W052U-A types have no book form manuals. The manuals are stored in the CD-ROM in PDF format.

1-6 Name of Each Part

1-6-1 Head

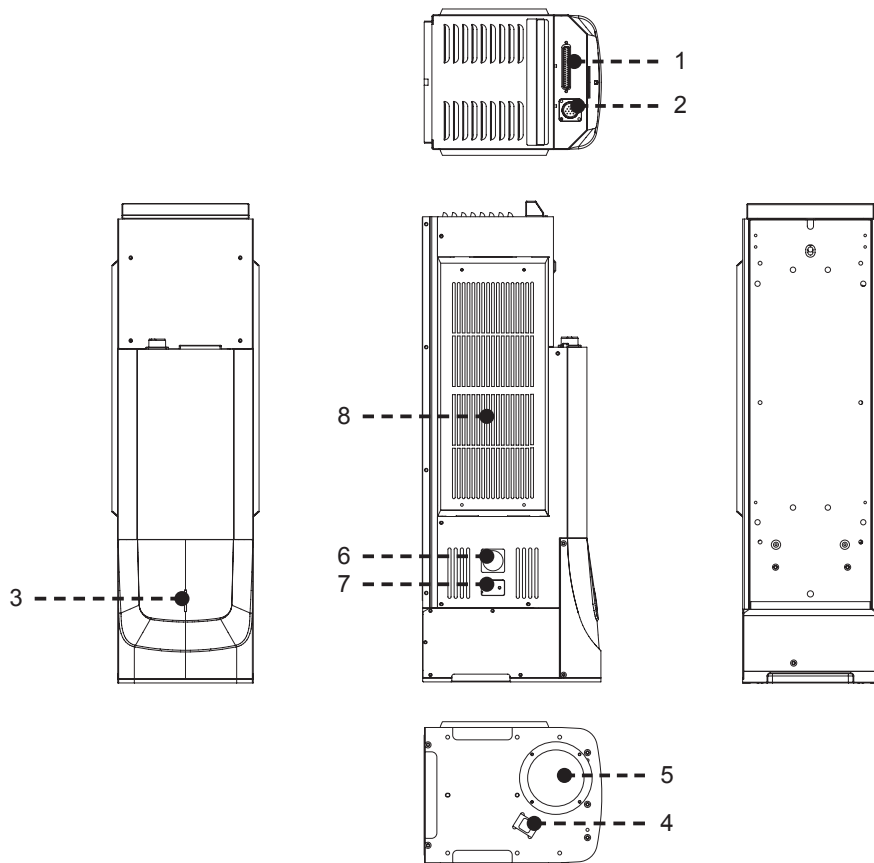
■ LP-400 Series with the Standard Head

[LP-4xxU / LP-4xxU-A / LP-4xxU-C / LP-4xxS9U / LP-4xxS9U-A / LP-4xxS9U-C]



■ LP-400 Series with the Standard Head

[LP-4xxTU / LP-4xxTU-A / LP-4xxTU-C / LP-4xxS9TU / LP-4xxS9TU-A / LP-4xxS9TU-C]



-
1. Signal Connector: SIGNAL
This is the terminal for communicating between head and controller.
Connect the attached head control cable.

 2. Power Connector: POWER
This is the connector for supplying the power to the head.
Connect the attached head power cable.

 3. Laser Radiation Indicator
This indicator indicates the laser radiation state. Refer to "Safety Functions on Laser Marker" (P.25) for the detail.

 4. Laser Pointer Emission Port
The emission port of the red laser pointer radiated when using the dual pointer function. To use the dual pointer function, do not seal the laser pointer emission port at the installation. For details, refer to "2-1-7 Lasing position check" (P.67).

 5. Laser Emission Port
This is the emission port of the laser beam.

 6. Focus Dial
This is the dial to check the focus adjusting. Refer to "2-1-8 Focus adjustment function" (P.68) for the detail.

 7. Focus Adjusting Control
The control for adjusting the distance from the work. Refer to "2-1-8 Focus adjustment function" (P.68) for the detail.

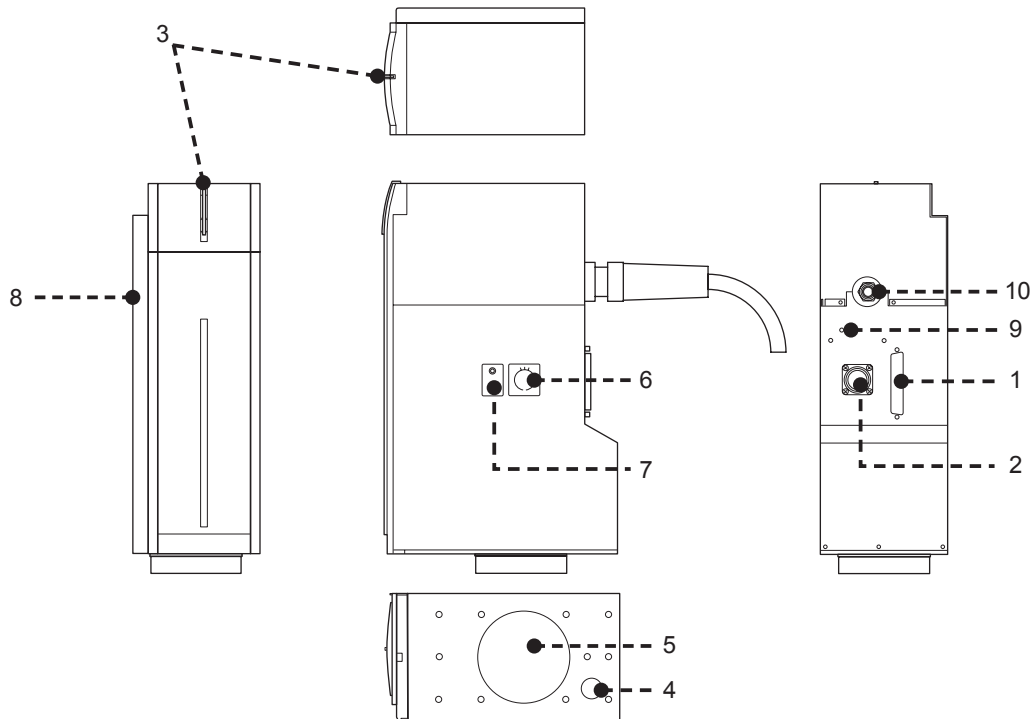
 8. Intake Vent for Air Cooling
Air inlet for cooling the head. In this vent the filter is installed.

 9. Setscrew for Scanning Angle [Only for LP-400 series with the standard head]
This is the setscrew for rotation of head scanning. Loosen this setscrew for rotating scanner.
Refer to "2-1-3 Rotation of LP-400 Standard Head Scanner" (P.62) for the detail.

 10. Arrow for Indicating Rotation Angle [Only for LP-400 series with the standard head]
This is the arrow that indicates rotation angle of the head scanner.
Refer to "2-1-3 Rotation of LP-400 Standard Head Scanner" (P.62) for the detail.
-

■ LP-V/LP-W Series

[LP-VxxU / LP-VxxU-A / LP-VxxU-C / LP-W052U / LP-W052U-A]



1. Signal Connector: SIGNAL

This is the terminal for communicating between head and controller.
Connect the attached head control cable.

2. Power Connector: POWER

This is the connector for supplying the power to the head.
Connect the attached head power cable.

3. Laser Radiation Indicator

This indicator indicates the laser radiation state. Refer to Refer to “Safety Functions on Laser Marker” (P.25) for the detail.

4. Laser Pointer Emission Port

The emission port of the red laser pointer radiated when using the dual pointer function. To use the dual pointer function, do not seal the laser pointer emission port at the installation. For details, refer to “2-1-7 Lasing position check” (P.67).

5. Laser Emission Port

This is the emission port of the laser beam.

6. Focus Dial

This is the dial to check the focus adjusting. Refer to Refer to “2-1-8 Focus adjustment function” (P.68) for the detail.

7. Focus Adjusting Control

The control for adjusting the distance from the work. Refer to Refer to “2-1-8 Focus adjustment function” (P.68) for the detail.

8. Intake Vent for Air Cooling

Air inlet for cooling the head. In this vent the filter is installed.

9. Frame Ground Terminal: F.G.

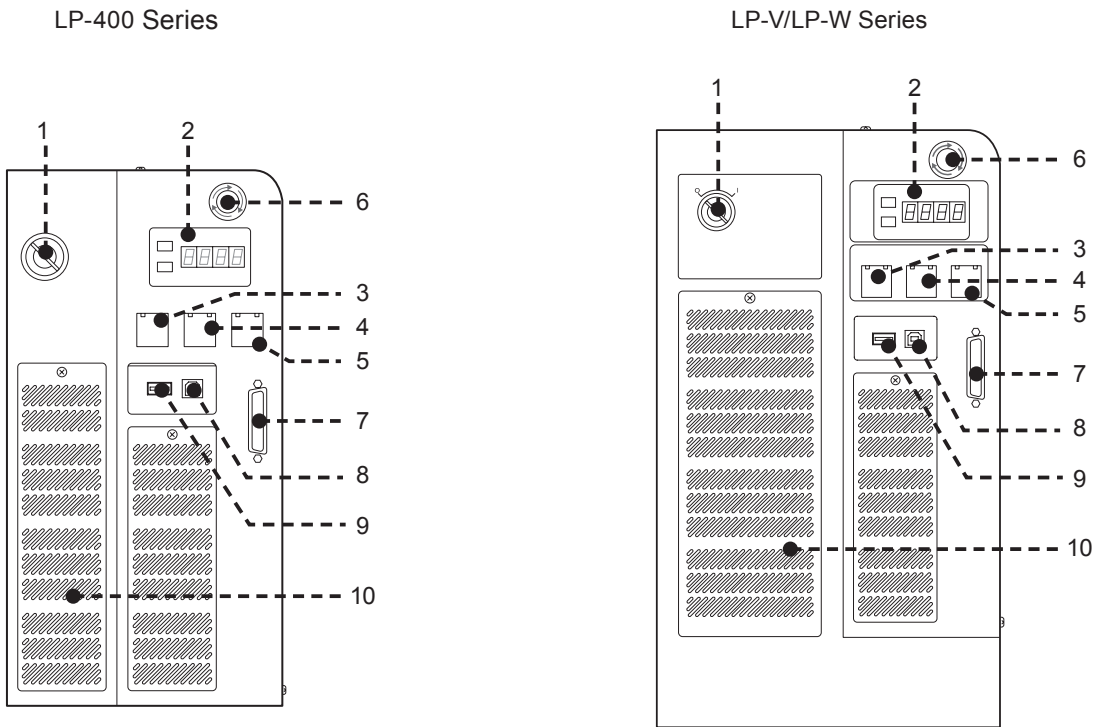
This is the terminal for ground. Be sure to connect it to earth permanently.

10. Fiber Cable

This is the cable for transmitting the laser. This cable cannot be detached from the device.

1-6-2 Controller

Front



1. Key Switch: POWER

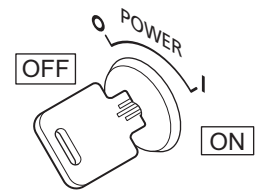
This key switch is used to start the laser marker system.

Turn ON (I) the switch to start-up the system, and turn OFF (o) the switch to shutdown the system.

When the laser marker is not used, remove the key, and the safety manager must keep it.

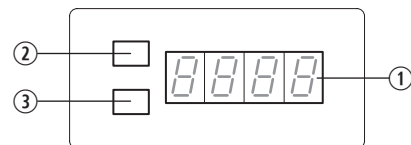
Since the ON/OFF operation of the key switch makes a load to the laser marker, leave an interval for 5 seconds or more from turning OFF the power to turning ON the power again.

Do not turn off the power supply while the system starts (during the system start indicator is flashing).



2. Controller display panel

The indicator that shows the status of laser radiation and the laser marker.



No.	Display name	Status	Indication
①	FILE No. / ERROR CODE	Normal state	Displays selected file No.
		Alarm or warning status	Displays error code No. Refer to "Error Indication" (P.297).
②	MAIN	System is powered on	Green lighted-up
		System under starting up (uncompleted)	Green flashing
③	MARKING	Being in laser emitting	Orange lighted-up

3. Laser Pumping Switch (with white LED): LASER

This is the switch for starting laser pumping.

LED flashes (LP-400 / LP-W series: approx. 15 sec., LP-V series: approx. 20 sec.) in white when the switch is pressed, and it lights up when the laser irradiation becomes enabled.

4. Remote Switch (with white LED): REMOTE

This is the switch for activating communication control and I/O control. This indicator is lighted-up by pressing this switch, and is changed into remote mode.

5. Alarm Reset Switch (with blue LED): ALARM RESET

This switch is used to reset the system when an alarm generates. LED lights up in blue when an alarm generates. Release the cause of alarm and press this switch. Alarm can be reset from the I/O terminal, console (optional) or monitor screen.

6. Emergency Stop Switch: EMERGENCY STOP

This switch is used to forcibly stop the laser pumping.

Push this switch at emergency or to stop the laser radiation. Turn the switch to the direction of the arrow to release it.

7. Console Connector: CONSOLE

This is the connector for console (optional).

8. USB Connector B: PC

This is the connector for connecting the attached USB cable. Connect with PC in using Laser Marker NAVI.

9. USB Connector A: USB MEDIA

This is the terminal for connecting the USB media or USB mouse.

For registering or saving data in the laser marker, connect a commercially available USB. USB media with security features cannot be used.

You can also connect a USB mouse when setting by using a commercially available monitor.

A USB port is also mounted at the back.

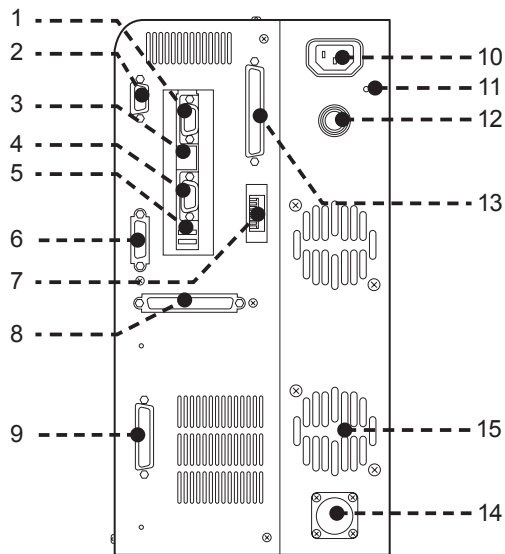
 **Notice**

- Do not connect the USB devices other than a USB media or a USB mouse.
-

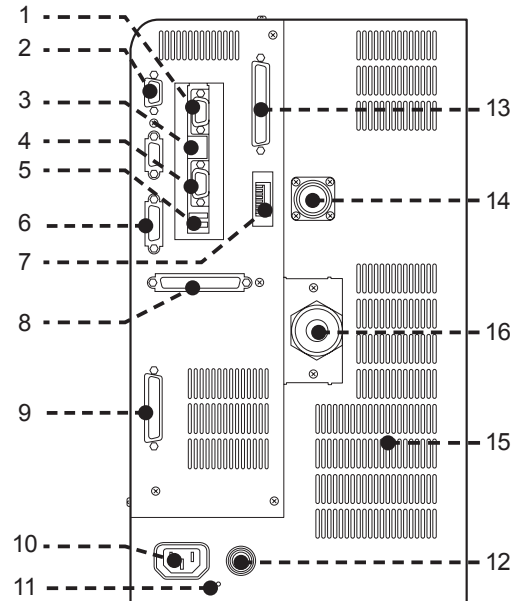
10. Intake Vent for Controller Air Cooling

Air inlet for cooling the controller. In this vent the filter is installed.

LP-400 Series



LP-V/LP-W Series



1. Return Connector: RETURN OUT
This is the connector for connecting the attached return harness for using console (option).

 2. RS-232C Connector: RS-232C
This is the connector for connecting to the external device so as to control the laser marker with RS-232C. For details, refer to External Control Manual.


 3. Ethernet Port
This is the connector for connecting to the external device to control the laser marker with Ethernet. For details, refer to External Control Manual. If Ethernet is not used for the external control, connect nothing to the Ethernet port.

 4. VGA Connector: VGA OUT
This is the connector for connecting VGA OUT monitor. When using a console (optional item), connect the attached return harness.

 5. USB Connector A (2 connectors)
This is the terminal for connecting the USB media or USB mouse. For registering or saving data in the laser marker, connect a commercially available USB. You can also connect a USB mouse when setting by using a commercially available monitor. A USB port is also mounted on the front.
- Notice**
- Do not connect the USB devices other than a USB media or a USB mouse.
-
6. Console Return Connector: (VGA+RETURN)IN
This is the connector for connecting the attached return harness for using console (option).

7. DIP Switch

Sets the operational options of the laser marker.
For details, refer to “1-6-3 DIP Switch” (P.55).

 **Notice**

- A plastic cover is installed on the DIP switch. Install this cover always to avoid the dust penetration to the controller.

8. I/O Connector: I/O

This is the terminal for connecting signal for the purpose of controlling laser marker from the external device.
Refer to External Control Manual for details.

9. Terminal Block Connector: TERMINAL

This is the connector of the terminal for connecting I/O signals to control laser marker from the external device. It is available to connect the attached terminal.
Refer to External Control Manual for details.

10. AC Power Inlet

Inlet for connecting AC power supply cable. Connect the attached controller power cable.
90 to 132 VAC or 180 to 240 VAC, 50/60 Hz (Auto-switching)
Be sure to connect the ground pin of the controller power cable to earth permanently. In case of using 3P-2P conversion connector, connect its ground wire properly to earth permanently.

11. Frame Ground Terminal: F.G.

This is the terminal for ground. Be sure to connect it to earth permanently.

12. Fuse Holder: FUSE

Rotate and remove holder for replacing the fuse on fusing. The rated ampere of the fuse varies with models.
Refer to “Replacement of fuse” (P.282) for details.

13. Signal Connector: SIGNAL

This is the terminal for communicating between head and controller. Connect the attached head control cable.

14. Power Connector: POWER

This is the connector for supplying the power to the head. Connect the attached head power cable.

15. Cooling Fan of the Controller (Exhaust port)

This is a cooling fan to release the heat from controller part.

16. Fiber Cable [Only for LP-V/LP-W series]

This is the cable for transmitting the laser light. This cable cannot be detached from the device.

1-6-3 DIP Switch

- The DIP switch is located in rear of the controller. Refer to “1-6-2 Controller” (P.51).
- The all DIP switch is set to OFF side at factory shipment.
- Switch the DIP switch with the power be shut down.
- A plastic cover is installed on the DIP switch. Install this cover always to avoid the dust penetration to the controller.

No. 1	Switch for system reservation. Keep OFF of this switch.
No. 2	<p>Selects external control method of “Laser Pumping” and “Shutter Control”.</p> <p>ON indicates “Laser Pumping”, “Shutter Control”, “Guide Laser Control”, “Laser Check Radiation”, and “Power Check” are externally controlled using serial communication. *1</p> <p>OFF indicates “Laser Pumping” and “Shutter Control” are controlled using I/O terminal.</p> <p>*1 : “Guide Laser Control”, “Laser Check Radiation”, and “Power Check” can be controlled only using serial communication in the remote mode</p>
No. 3	<p>Sets buzzer for error occurrence.</p> <p>ON This setting does not sound buzzer when occurring error.</p> <p>OFF This setting sounds buzzer when occurring error.</p>
No. 4	<p>Selects valid/invalid for password lock when shifting screen from operation to each setting one.</p> <p>ON Sets invalid for password lock.</p> <p>OFF Sets valid for password lock.</p> <p>Refer to “Password” (P.252) for the detail.</p>
No. 5	<p>Selects shifting method for the remote mode.</p> <p>ON Controls switching to the remote mode from the I/O terminal block.</p> <p>OFF In case of shifting mode into remote mode using the remote switch on the front of the controller. (To set No. 6 to ON, set No. 5 to OFF.)</p>
No. 6	<p>Selects status when the key switch is turned ON.</p> <p>ON Shifts to the remote mode by setting the key switch to ON.</p> <p>OFF Does not shift to the remote mode by turning the key switch ON. (To set No. 5 to ON, set No. 6 to OFF.)</p>



CAUTION



- If the DIP switch No. 5 or No. 6 are used while turned on, construct a system for re-pumping the laser manually as safety protection measures after the stop of the laser radiation due to an interlock or other safety functions.

No. 7 / No. 8 These switches cannot be used. Keep OFF of both No. 7 and No. 8.



2 Installation and Connection

2-1 Installation

2-1-1 Installation Environment

Use this product in the following environments.

Item	Installation environment conditions
Operating Ambient Temperature *1	0°C to +40°C
Operating Ambient Humidity *1	35 to 85%RH
Ambient Temperature for Storage *1	-10°C to +60°C *2
Use location	Indoor; at an altitude of 1000 m or below

*1 : No condensation or freezing shall be allowed.

*2 : If there is a gap between the stored temperature and operating temperature, make sure to have the product get used to the operating ambient temperature gradually prior to use to prevent the dew condensation.

! Notice

- Do not install the laser marker at a place where vibrations and shocks can be directly transmitted to it.
- Do not incorporate the laser marker in a unit where the laser head will be moved. It may cause failure.
- Do not use the laser marker at a place with a lot of oil mist and/or dust. Take measures to prevent oil contents and dust from entering into the laser marker, e.g. using a storage box.

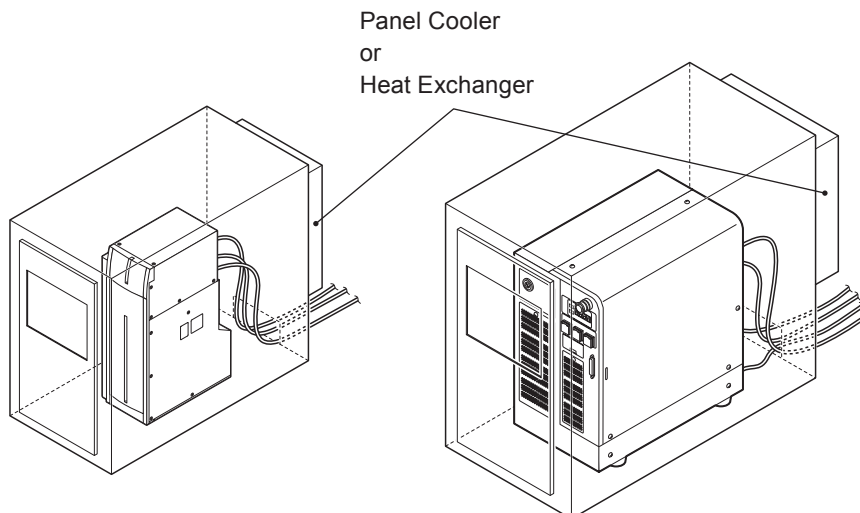
■ Installation environment for the stable operation

For the stable operation, install the laser marker with an appropriate protection measures as follows according to the usage environment.

- Protection in a dusty place
If the laser marker is installed at a dusty and/or oil-mist-laden place, it could cause malfunction of the product. Take a measures to protect the laser marker from penetration of the contamination, such as placing the head and the controller in the dust and/or oil protective enclosure.
Besides, clean or replace the filters regularly in accordance with the usage conditions.

Example of a storage box:

According to the ambient temperature, use a storage box equipped with panel cooler or heat exchanger to maintain the air-cooling performance of the laser marker.



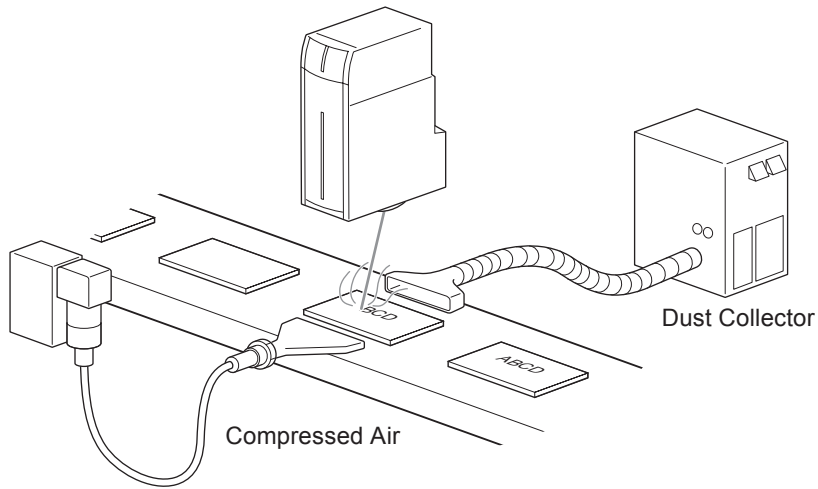
! WARNING



- If the laser emission indicator on the laser marker is placed out of the sight of operators, place the external indicator light or warning lamp on the immediately apparent place on the system.

- Removing the dust and smoke

Remove any dust and smoke from the laser emission port and laser beam path using a dust collector. For effective dust collection, put the suction port of the dust collector near the lasing part. In an environment where dust and smoke that tend to attach to the lens surface, it is recommended to create a compression air flow to ensure thorough dust collection. In such situation, clean the laser emission port regularly.



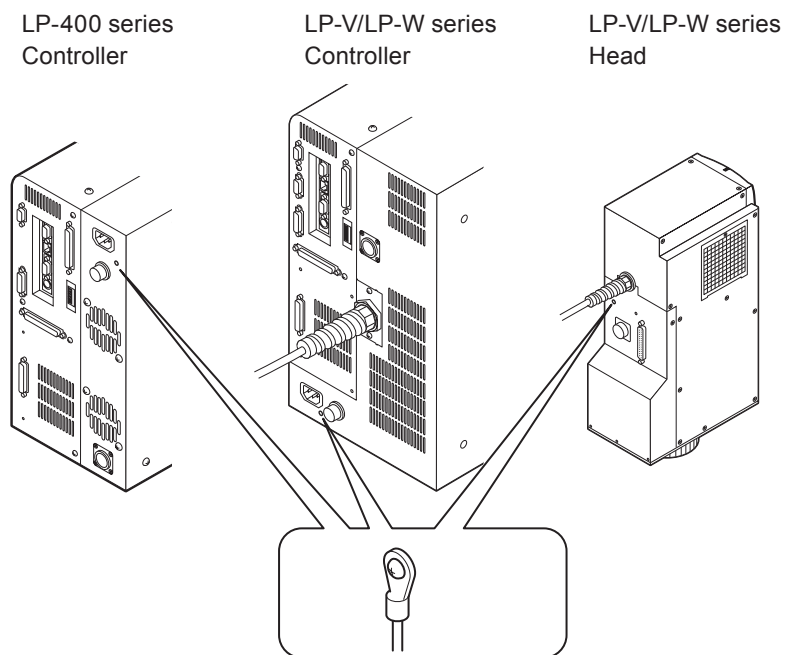
- Protection against electrical noise

If there are devices that generate electrical noise such as a motor or the objects that generate static electricity around the laser marker, the laser marker can be damaged by the noise.

Securely ground the frame ground terminal of the laser marker.

Depending on the grounding environment, use the noise cut-off transformer or uninterruptible power supply system.

Position of the frame ground terminals



2-1-2 Installation of LP-400 Series Head



WARNING

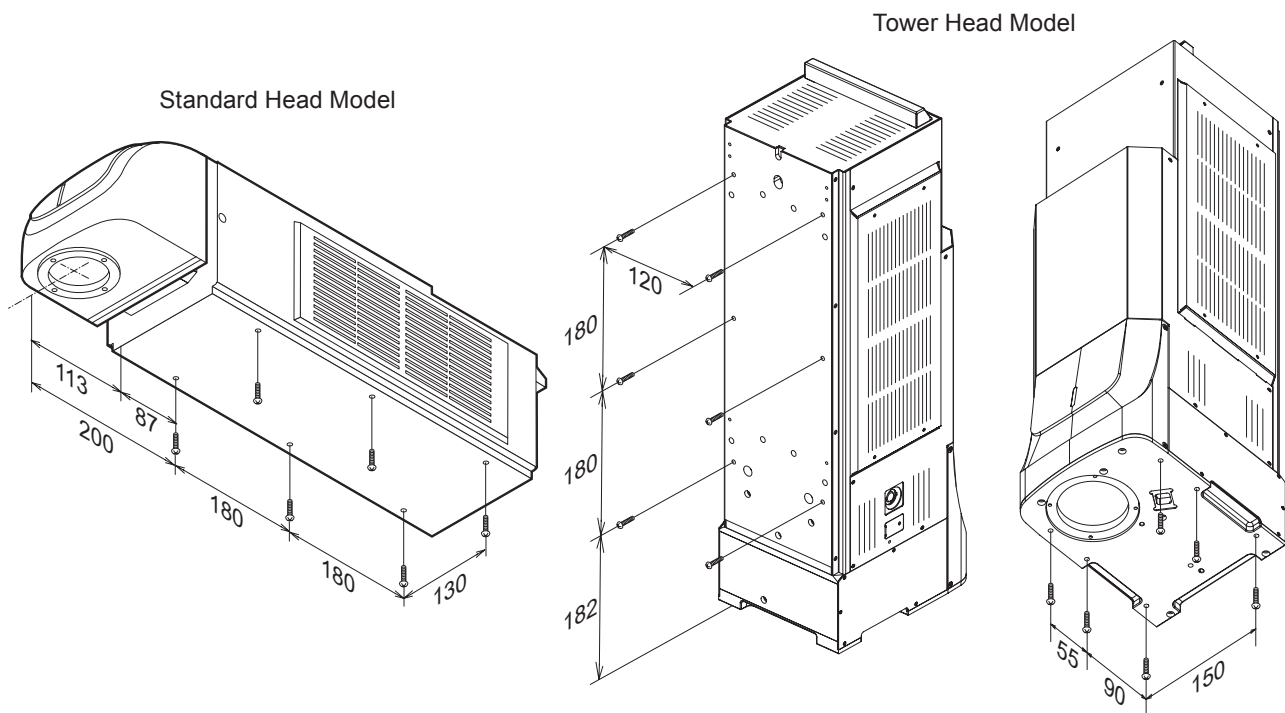
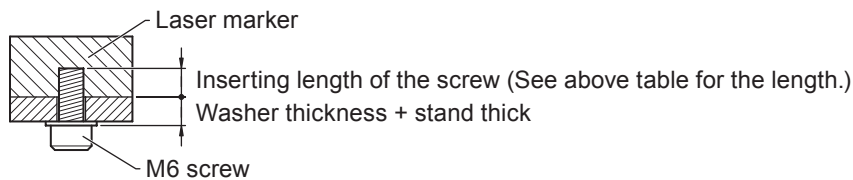


- Install the product so that the laser beam path does not cross the eye height.
- The laser beam path shall be enclosed with protective enclosure and make sure it is not exposed with direct light or reflected light.

■ Installation Method

- Install the head on a plate with a thickness of 10 mm to 15 mm which is made of aluminum or other material with radiation performance equivalent to that of aluminum.
- For the installation dimension, refer to the outer dimension in “1-4-1 LP-400 Series” (P.38).
- Fix the head with the following conditions.

Head type	Fixing position	Fixing screw	Inserting length of the screw	Tightening torque
Standard head	Bottom face	M6 screws at 6 positions	7 mm to 10 mm	3.0N · m or below
Tower head	Rear face		7 mm to 10 mm	
	Bottom face (Laser emission port side)		5 mm to 7 mm	



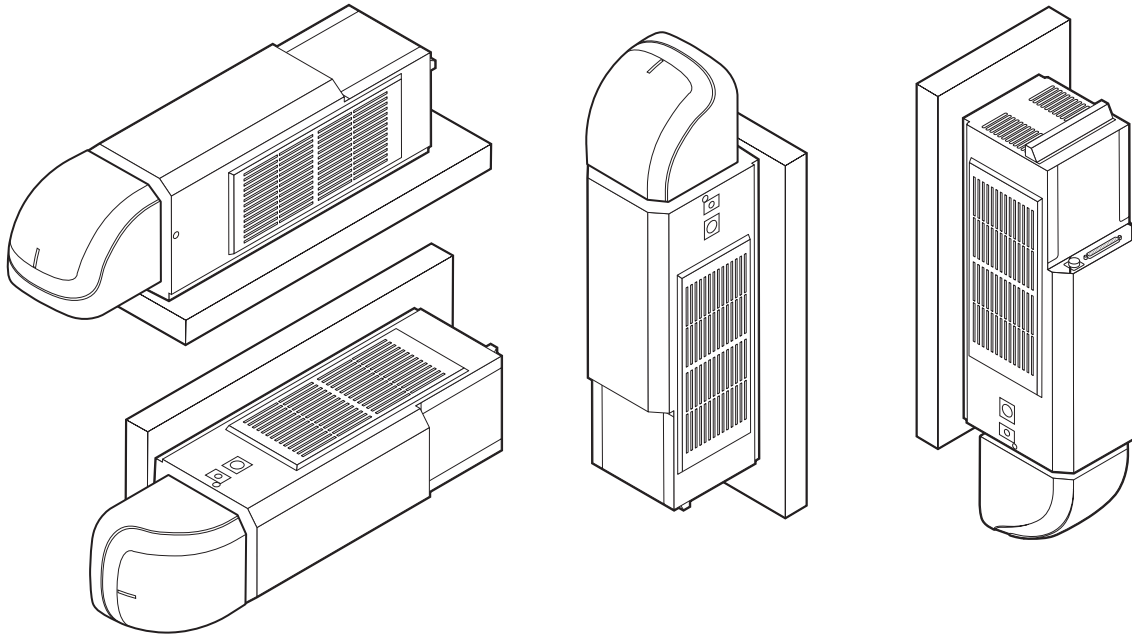
! Notice

- Check the length of the screw and install it. Using improper screws and forcibly tightening them might damage the product.

■ Installation Direction

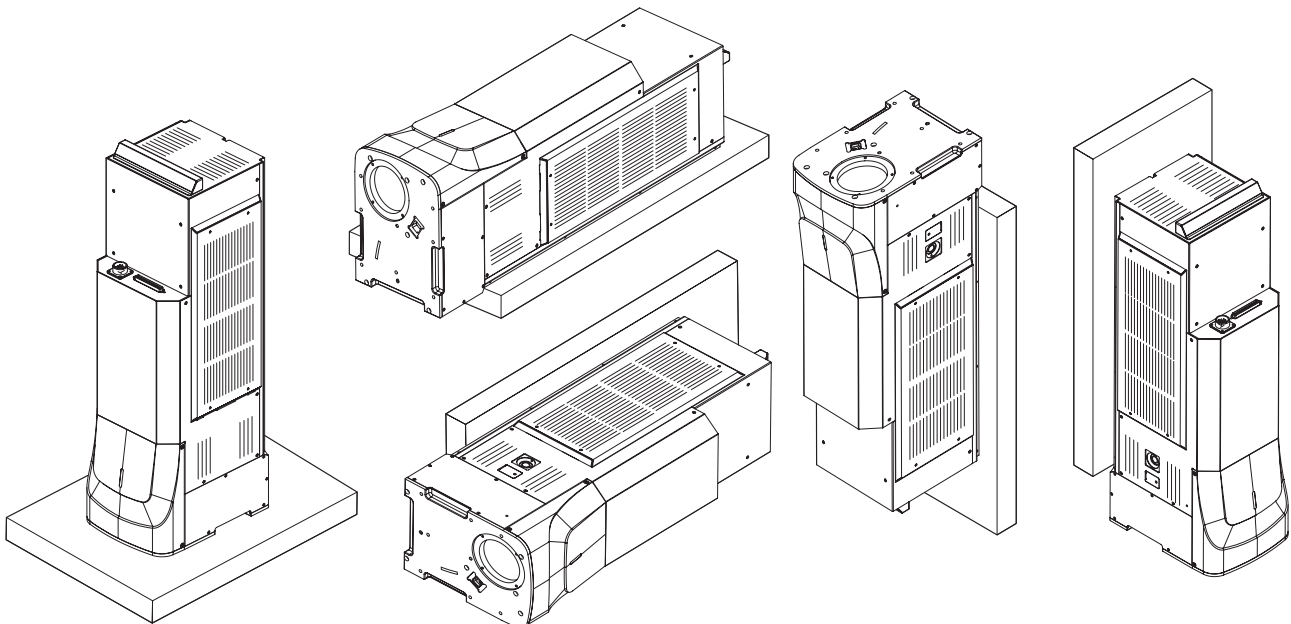
Standard Head Model

The standard head can be mounted in the following direction. After the installation, the scanner unit can be rotate. Refer to “2-1-3 Rotation of LP-400 Standard Head Scanner” (P.62).



Tower Head Model

When the mounting surface of the tower head is rear side, it can be mounted in the left, right, top and bottom direction. When the lens side is mounting surface, install the tower head always with the lens side down.



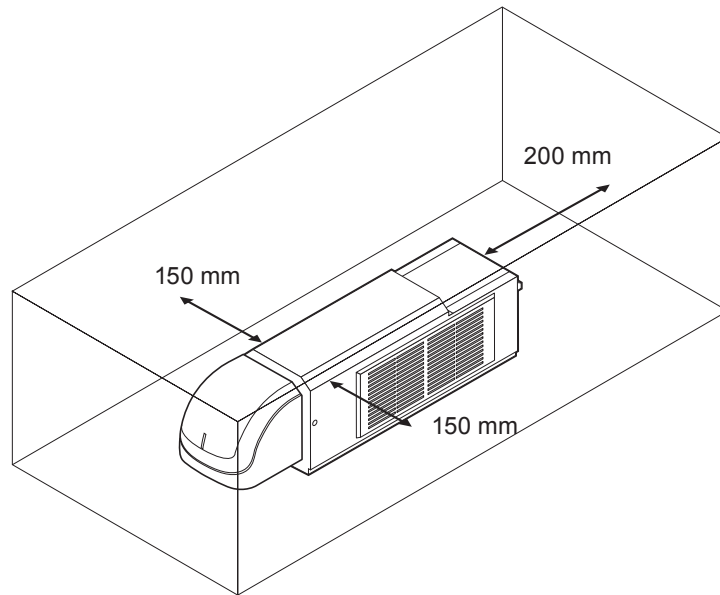
! Notice

- Do not incorporate the laser marker in a unit where the laser head will be moved. It may cause failure.
- When install the head with the lens side up, clean the laser emission port and remove the marking dust regularly.
- When the lens side of the tower head is mounting surface, never install it with other directions than described above figure.

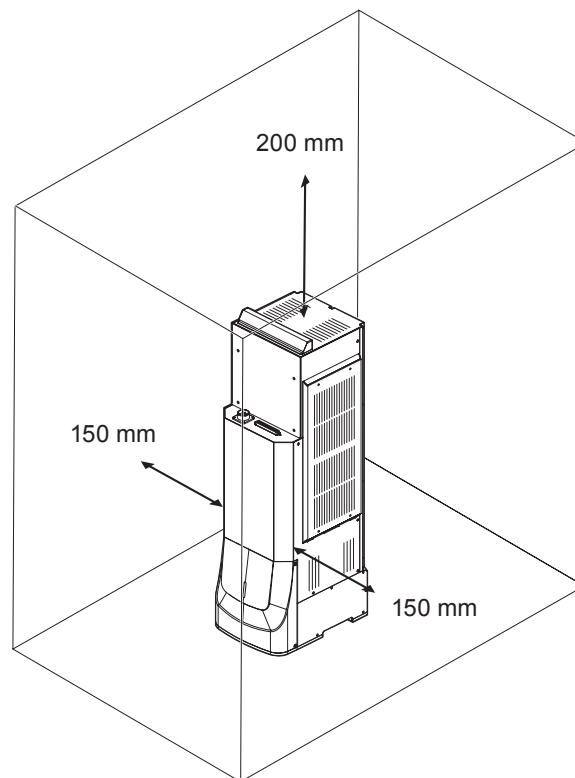
■ Installation Space

Since this laser marker has the fan and slit for cooling, provide space around the device as shown in the following figure:

Standard Head Model



Tower Head Model



! Notice

- Ensure the minimum bent radius of each cable.
- Please install not to bar the flow of air cooling.
- Installing near a heating element could be over ambient temperature and cause malfunction of the product.
- When setting more than one laser marker, install them so that a space of 300mm or more is given between the heads of each marker. Not doing so may cause malfunction. It might cause the malfunction with the laser marker.

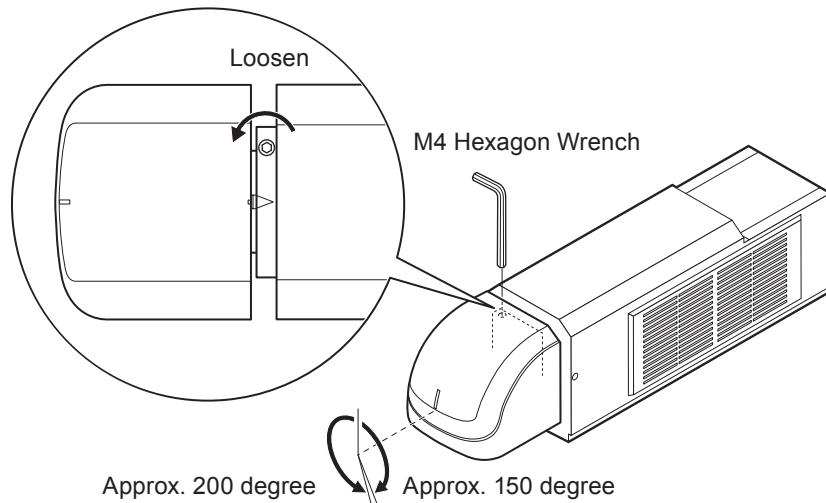
2-1-3 Rotation of LP-400 Standard Head Scanner

For the standard head models of LP-400 series (LP-430U / LP-420S9U / LP-410U / LP-431U / LP-420S9U / LP-411U / LP-435U / LP-425S9U), the angle of the head scanner unit can be set freely.

* This function is specific to the standard head model of LP-400 series. It is not equipped in the tower head model.

■ Rotation Method

- The head scanner can be rotated up to 350 degrees by loosening the hexagon socket head cap screw (M4). After rotating the scanner unit, fix it tightly.
- The tightening torque shall be 1.5N·m or less.

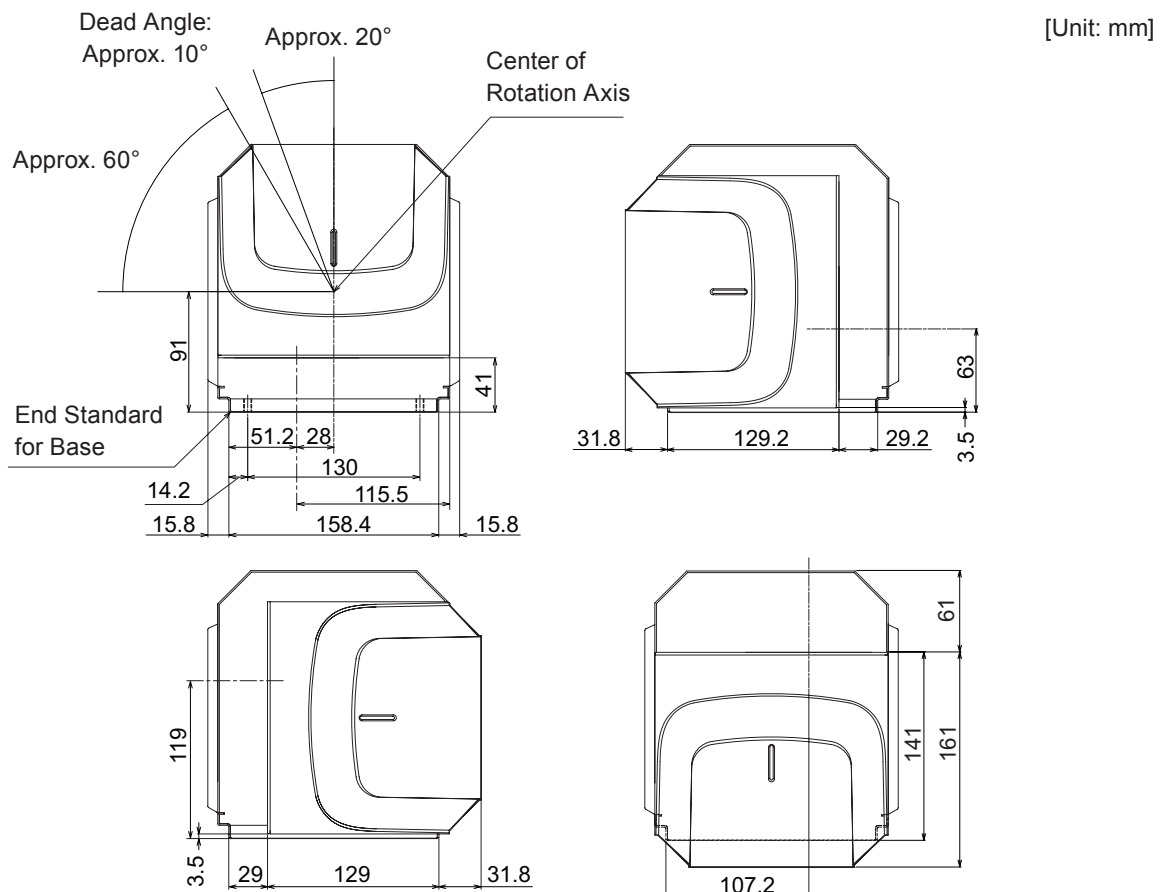


WARNING



- Never use the laser marker with the setscrew for scanner angle loosened. Failure to do so could rotate the head during the operation and cause laser emission to the dangerous direction.

■ Center of Rotation



2-1-4 Installation of LP-V / LP-W Head



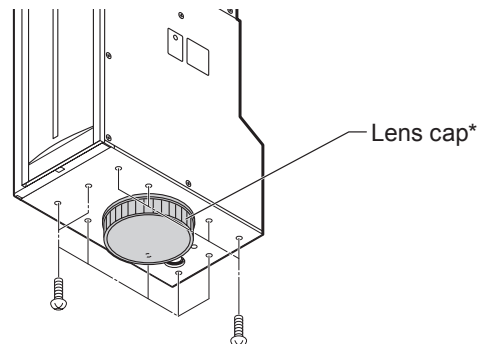
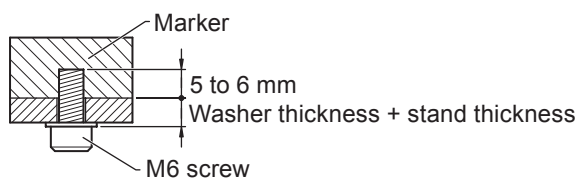
WARNING



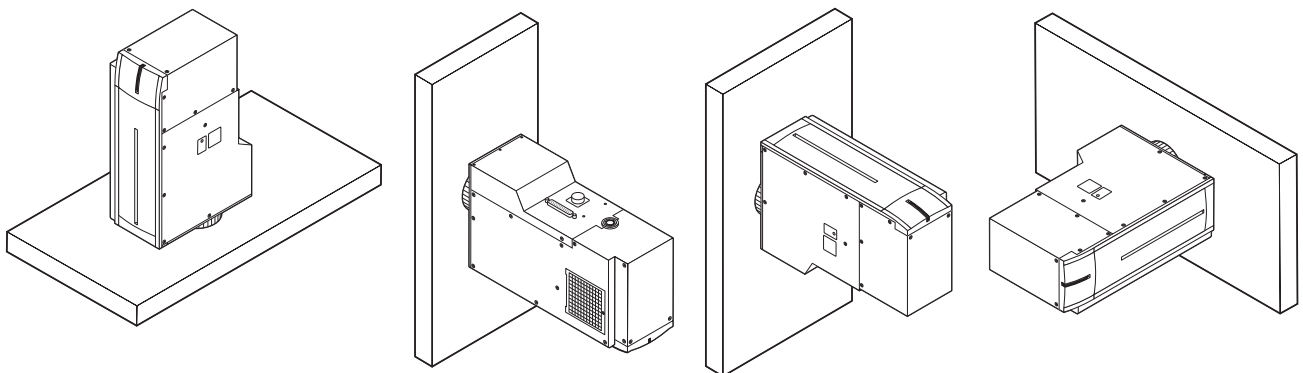
- Install the product so that the laser beam path does not cross the eye height.
- The laser beam path shall be enclosed with protective enclosure and make sure it is not exposed with direct light or reflected light.

■ Installation Method and Direction

- LP-V10U / LP-W052U: The head can be fixed from the bottom with M6 screw at 10 locations.
- LP-V15U: The head can be fixed from the bottom with M6 screw at 6 locations.
- For the installation dimension, refer to “1-4 Outer Dimensional Drawing” (P.38).
- Install the head on a plate with a thickness of 10 mm to 15 mm which is made of aluminum or other material with radiation performance equivalent to that of aluminum.
- Tightening torque: 3.0 N·m or less.
- The inserting length of the screw shall be 5 mm to 6 mm.



* For LP-V / LP-W series, the plastic lens cap is attached at shipping. Be sure to remove it before use.

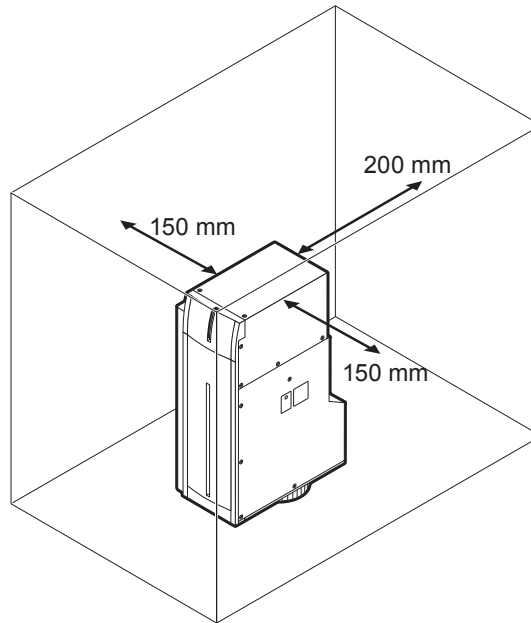


! Notice

- Do not incorporate the laser marker in a unit where the laser head will be moved. It may cause failure.
- When install the head with the lens side up, clean the laser emission port and remove the marking dust regularly.
- Check the length of the screw and install it. Using improper screws and forcibly tightening them might damage the product.

■ Installation Space

For the appropriate air cooling, provide space around the device as shown in the following figure.



! Notice

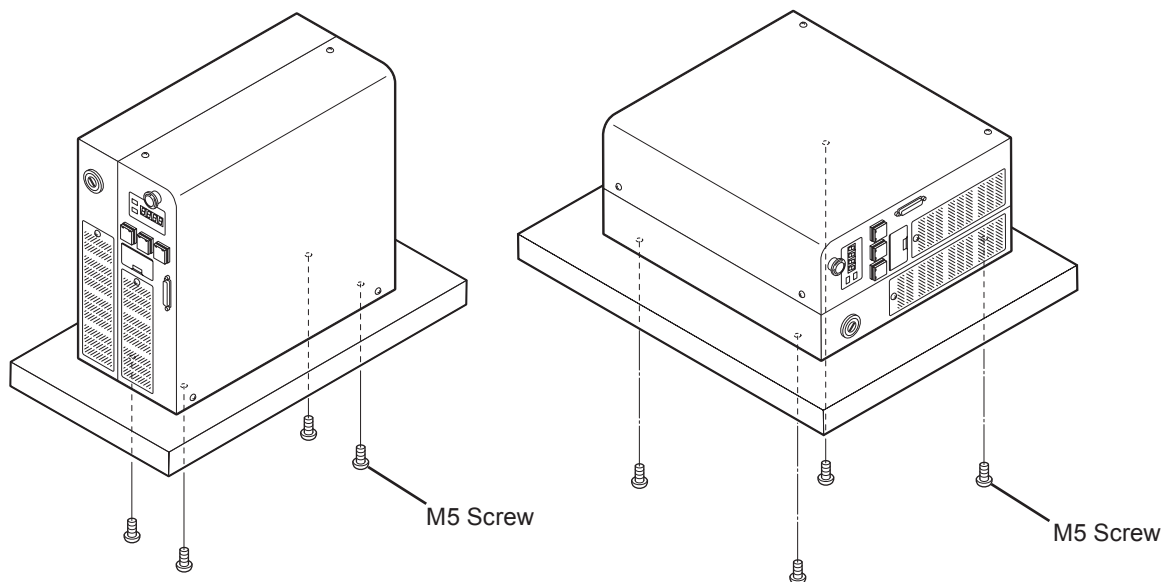
- Ensure the minimum bent radius of each cable.
- Please install not to bar the flow of air cooling.
- Installing near a heating element could be over ambient temperature and cause malfunction of the product.
- When setting more than one laser marker, install them so that a space of 300 mm or more is given between the heads of each marker. Not doing so may cause malfunction. It might cause the malfunction with the laser marker.

2-1-5 Installation of the Controller

The installation method of the controller is common to LP-400, LP-V and LP-W series.

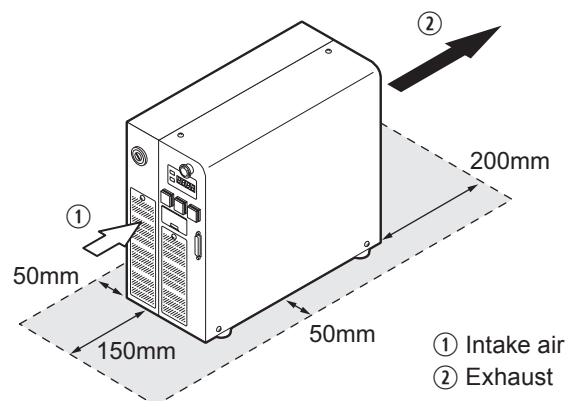
■ Installation Method and Direction

- The controller can be fixed from the bottom or side surfaces with M5 screw at four locations.
- When the side surface is the mounting surface, set the key-switch side down.
- For the installation dimension, refer to “Controller” (P.40) for LP-400series, “Controller” (P.42) for LP-V/LP-W series.
- The inserting length of the screw shall be 4 mm to 6 mm.
- Tightening torque: 2.0 N·m or less.
- The rubber feet can be mounted either on bottom or side face. For the rubber feet installation, use the attached M5 depth 15 mm screws.



■ Installation Space

For the appropriate air cooling, provide space around the device as shown in the following figure.



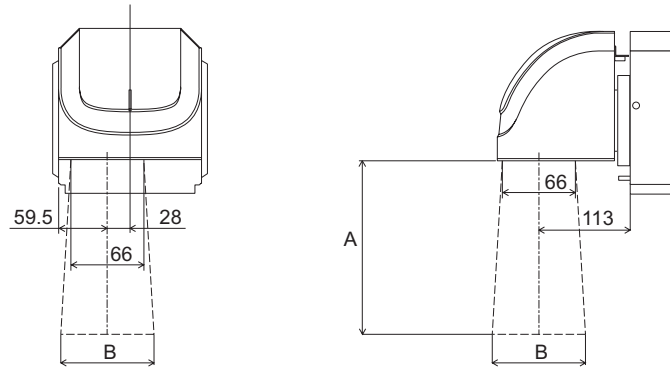
! Notice

- Ensure the minimum bent radius of each cable.
- Please install not to bar the flow of air cooling.
- Installing near a heating element could be over ambient temperature and cause malfunction of the product.
- Check the length of the screw and install it. Using improper screws and forcibly tightening them might damage the product.

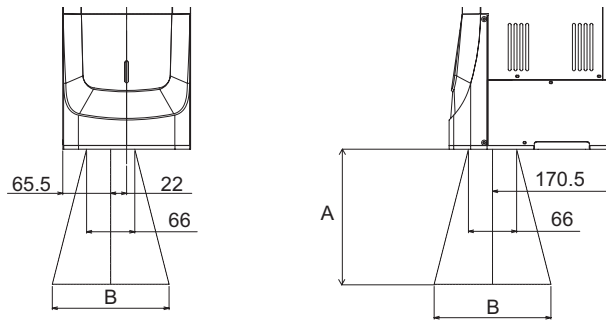
2-1-6 Marking Field and Marking Center Position

Unit: mm

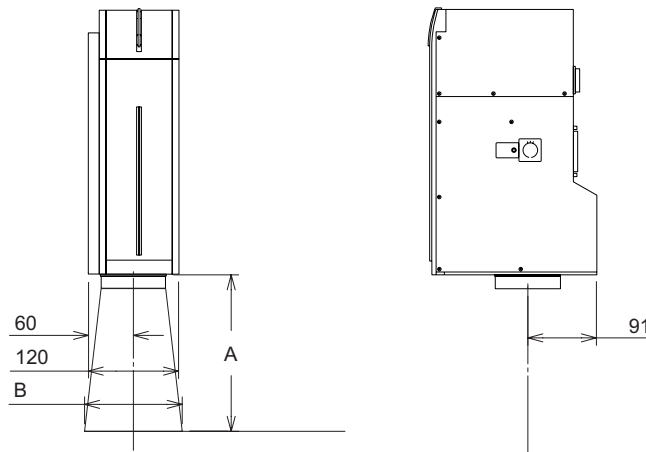
LP-400 Series Standard Head Model



LP-400 Series Tower Head Model



LP-V/LP-W Series



	LP-430(T)U LP-420S9(T)U LP-410(T)U	LP-431(T)U LP-421S9(T)U LP-411(T)U	LP-435(T)U LP-425S9(T)U	LP-V10U	LP-V15U	LP-W052U
A : Work Distance [mm]	185	111	262	190	350	127
B : Marking Field (X, Y) [mm]	110 x 110	55 x 55	160 x 160	90 x 90	160 x 160	55 x 55

! Notice

- Do not place anything in the area between the laser emission port and lasing object.
- Use anti-reflection material (ex. black paint for metal) for an external shutter or a protective enclosure in a path of laser beam. It may cause a failure of the components inside the head.
- If any other devices such as a sensor or a camera are installed near the laser marker, make sure that these devices are installed in the place where laser beam and its reflected beam do not damage to them.

2-1-7 Lasing position check

! Notice

- Use the dual pointer and guide laser only as the guideline. For obtaining the appropriate marking position and quality, fine adjust the work position and distance after marking on an actual work.

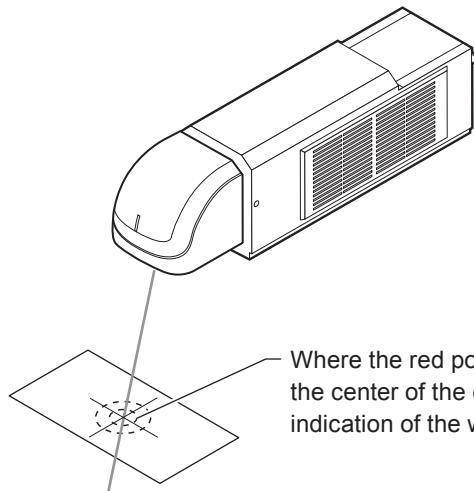
■ Dual Pointer Function

Dual pointer shows the rough indication of the work distance (distance from the head base to the marking surface). It displays the red point emitted in oblique and the red cross emitted perpendicularly from the head. The distance where the laser point is closest to the center of the cross represents the guide of the work distance.

Depending on the required marking quality or installation condition including the focus adjustment usage, the dual pointer may show not always the appropriate work distance. Confirm the marking quality with the work distance indicated by the dual pointer and adjust it accurately as appropriate.

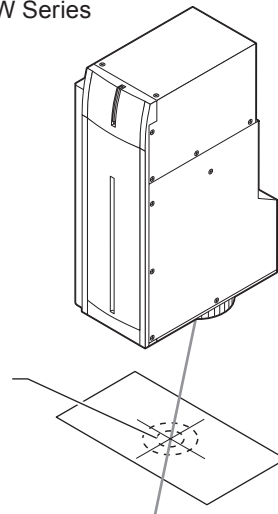
Refer to "4-6-1 Dual pointer" (P.134) for details.

LP-400 Series



Where the red point is closest to the center of the cross is the rough indication of the work distance.

LP-V/LP-W Series

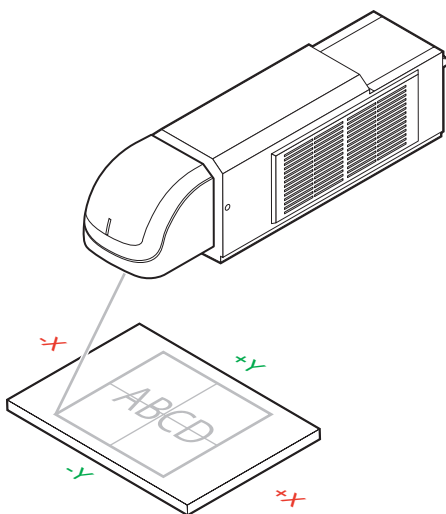


■ Guide Laser Function

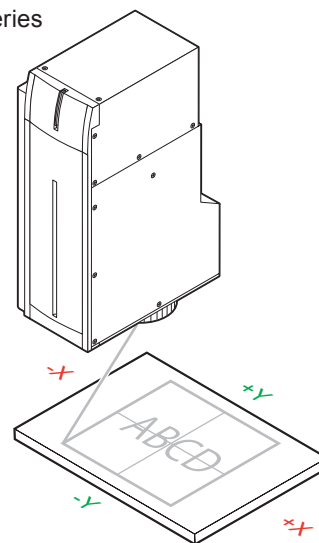
The marking contents and marking field can be traced with the red guide laser. By using the guide laser function, the position and contents of the marking can be checked visually.

Refer to "4-6-2 Guide laser" (P.135) for the using method.

LP-400 Series



LP-V/LP-W Series



↓ Reference

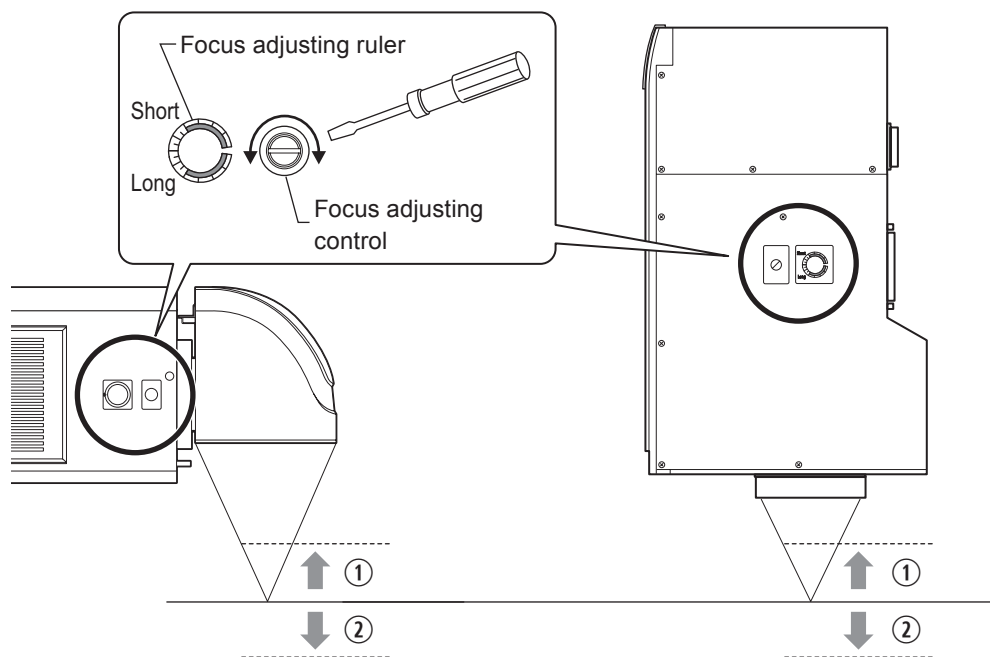
- The guide indication is stopped automatically after passing 1 minute from start-up.
- The dual pointer is adjusted according to the distance from the work defined at the factory. When the work distance is changed by the focus adjustment function, dual pointer does not move with this function, so it cannot be used as the work distance guide.

2-1-8 Focus adjustment function

With this function, the distance from work (focal length) can be adjusted without moving up/down the head. Marking energy density can be reduced by moving the focus point of the laser spot with the specified distance between the works and changing the spot diameter.

! Notice

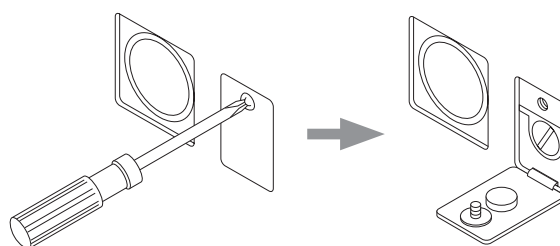
- Use the focusing ruler as an adjustment guide. Repeat the adjustment and marking test to set the most appropriate work distance.
- Always close the cover after adjusting the focus. The work distance might be changed if the cover is not closed.
- Use the focus adjusting function when the product is installed. Do not use this function for the daily use such as setup change. Excessive use of this function may cause failure of the product.



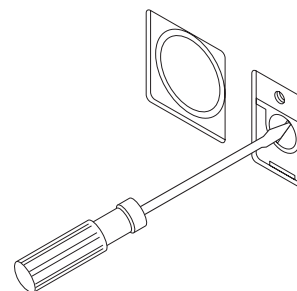
- ① Turn in the left direction (Short direction) : Makes the work distance (focal length) shorter.
② Turn in the right direction (Long direction) : Makes the work distance (focal length) longer.

1. Use a Phillips screwdriver to remove the focus adjustment cover.

Keep the cover for next use.

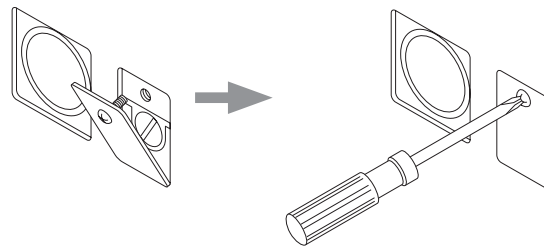


2. Turn the focus adjusting control with a flat-blade screwdriver.



3. Reinstall the focus adjustment cover.

Tightening torque for the cover should be 0.3 N • m or less.



Reference

- Focus adjustment range varies depending on models.
 - LP-430(T)U / LP-420S9(T)U / LP-410(T)U: Approx. ± 3 mm
 - LP-431(T)U / LP-421S9(T)U / LP-411(T)U / LP-V10U: Approx. ± 2 mm
 - LP-435(T)U / LP-425S9(T)U: Approx. ± 4 mm
 - LP-V15U: Approx. ± 7 mm
 - LP-W052U: Approx. ± 0.7 mm
- The ruler is set to "0" at factory.
- Adjusting focus changes the marking field and spot diameter. In addition, the amount of the spot diameter difference between the marking field center and the marking field end becomes large, which may cause uneven marking quality.
- The dual pointer is adjusted according to the distance from the work defined at the factory. When the work distance is changed by the focus adjustment function, dual pointer does not move with this function, so it cannot be used as the work distance guide. Refer to "Dual Pointer Function" (P.67).

2-2 Connecting Laser Marker



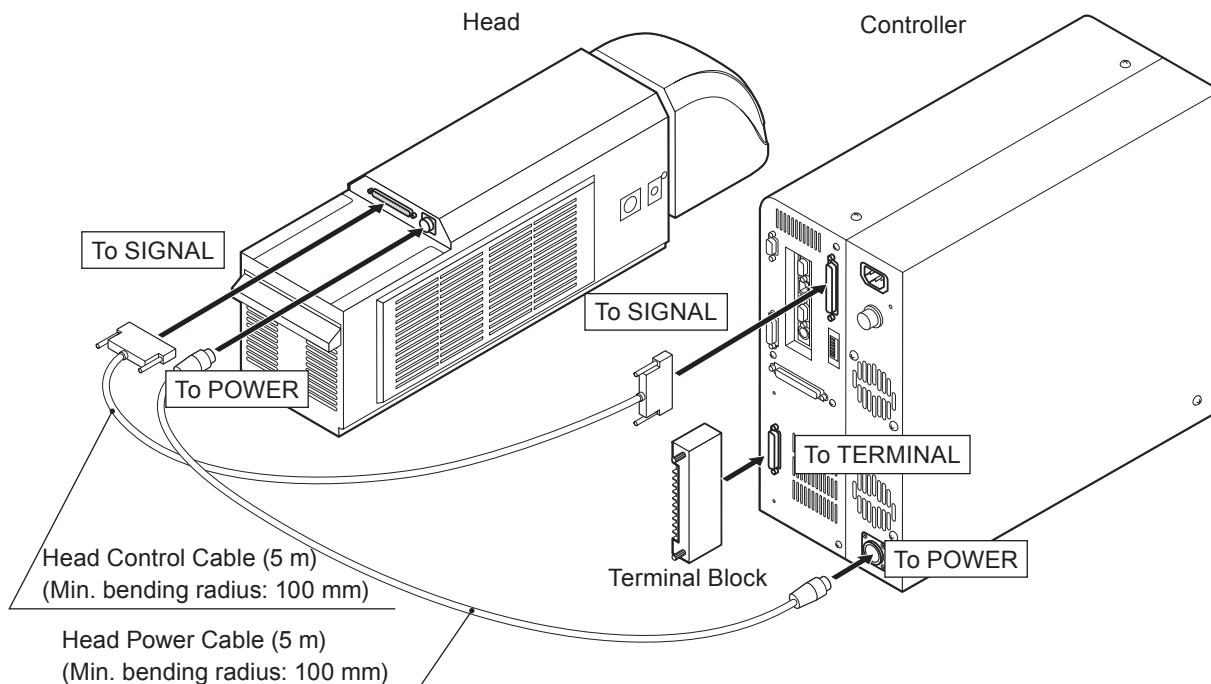
CAUTION



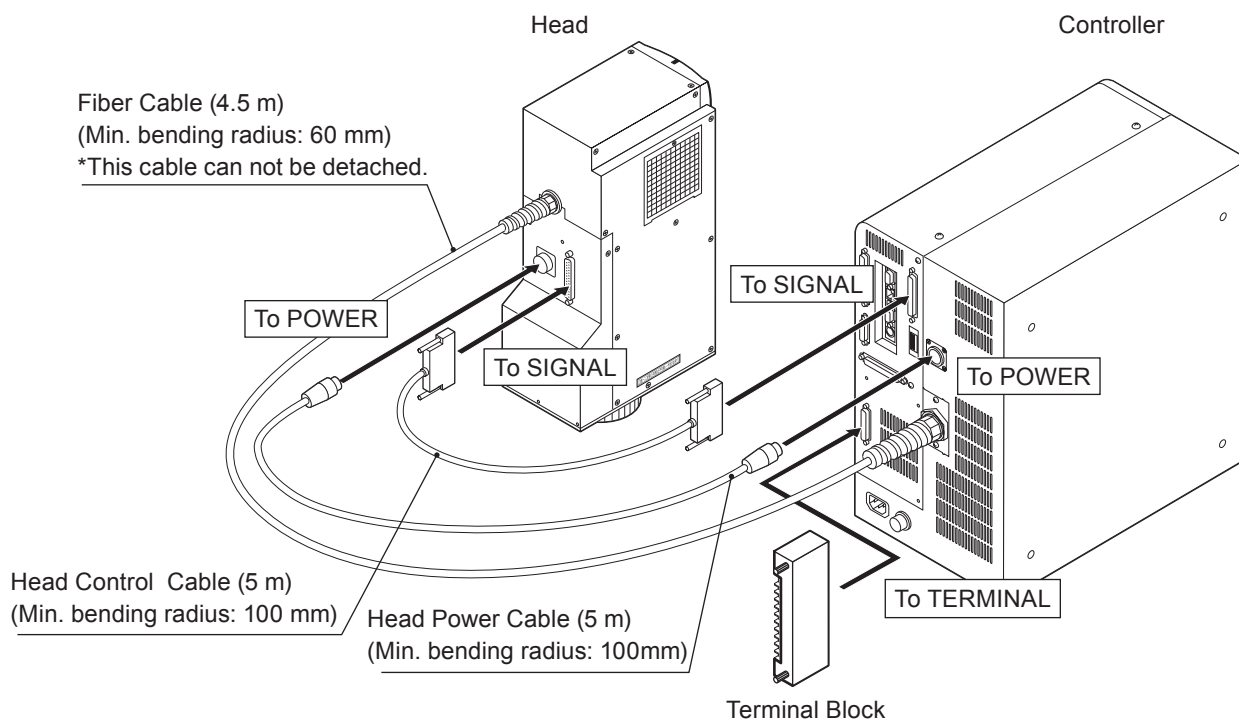
• Prior to wiring and/or cable connecting work, ensure that all the power switches are turned off. Otherwise, electrical shock may result.

2-2-1 Connecting Head, Controller, Terminal Block

■ LP-400 Series



■ LP-V Series and LP-W Series



! Notice

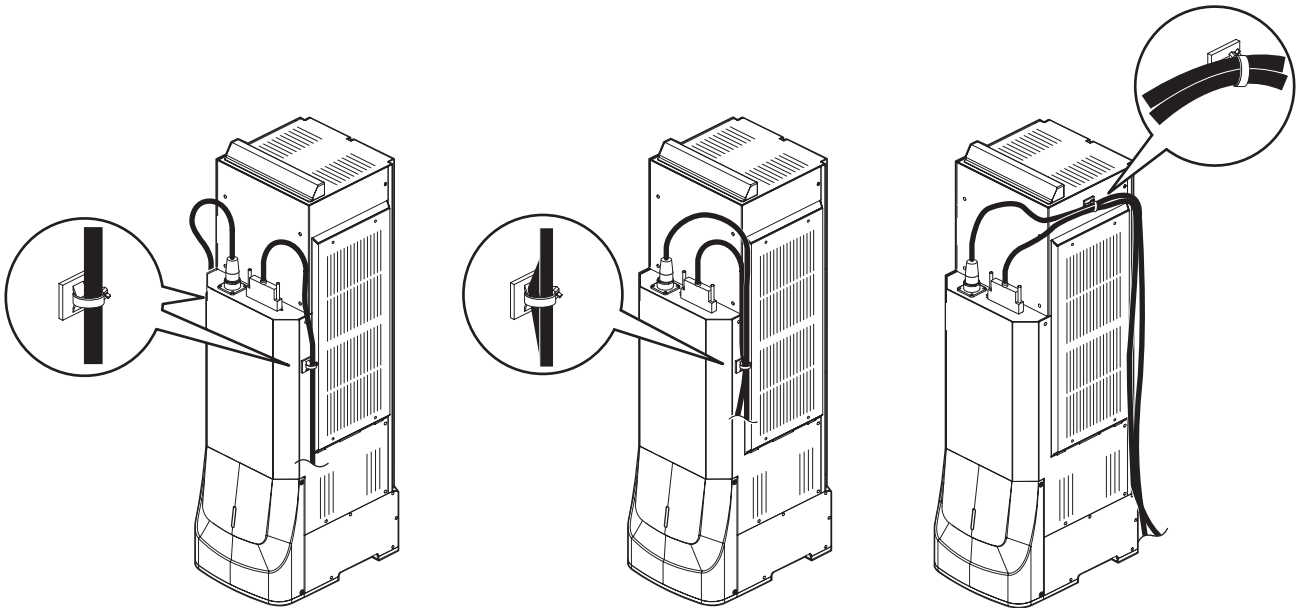
- Connect the head and controller combined for the same serial number.
- For the connection of this product, use the dedicated cables attached to the product or the specified optional cables.
- Do not connect the Head Control Cable to the I/O Connector. It may cause a failure.
- Insert the cables all the way in a straight line. Tilting and inserting the cable may cause a failure.

Reference

- Connect the terminal block wiring [IN COM.], [OUT COM], [LASER STOP +] and [EMER. +] with proper connection respectively.
The laser pumping and marking cannot start without connecting them.

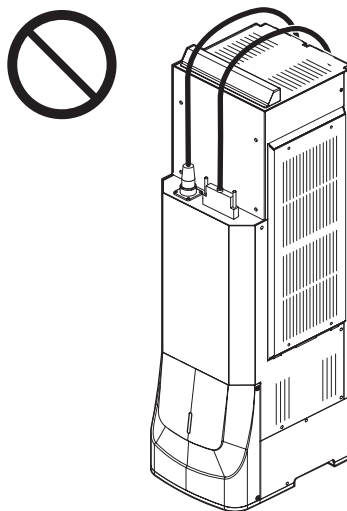
■ Cable Wiring for LP-400 series CE-marking Compliant Tower Head

For LP-43xTU-C and LP-42xS9TU-C model, connect the cables using the banding band and banding base as shown below figure.



! Notice

- Do not place the cables over the exhaust vent. It may cause the malfunction.



2-2-2 Connecting Ground and Power Supply

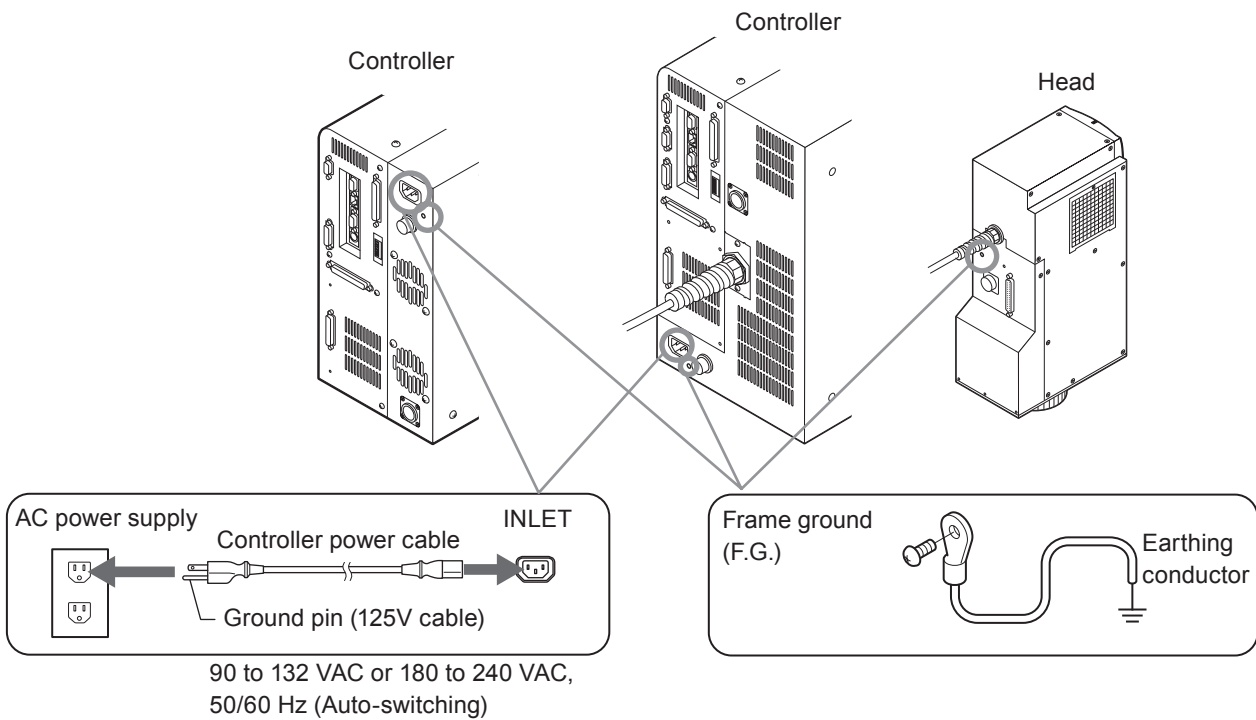
! Notice

- Before connecting power supply, ground the frame ground terminal of the laser marker permanently.
- Use the attached controller power cable for the AC power cable.
- Be sure to connect the ground pin of the controller power cable to earth permanently. In case of using 3P-2P conversion connector, connect its ground wire properly to earth permanently.
- Attached controller power cable varies depending on each model. Please select a cable suitable for the standards in the country or region where it is used. In addition, rating of the attached 3P-2P conversion connector is 125V. It is only compatible with the power supply whose power rating is 125V or less.
- Set each connecting cable away from the device that generates high voltage, power line, and large switching surge as far as possible.

If any noise is occurred on the power source, use the noise cut-off transducer.

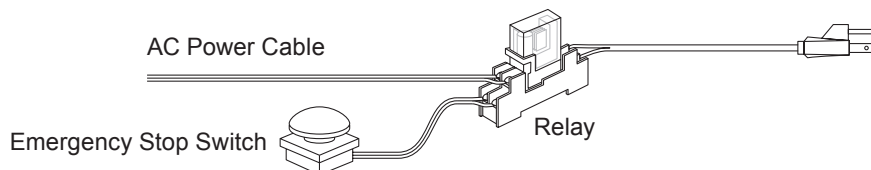
■ LP-400 series

■ LP-V/LP-W series



Reference

- When primary AC power supply of the system is performed as a safety measure, process AC power cable to set the switch as follows.

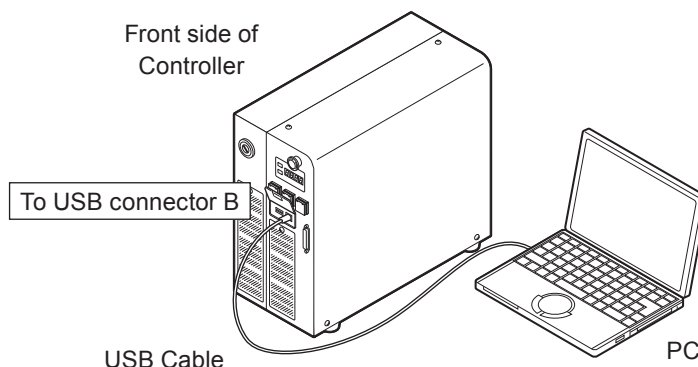


2-2-3 When Using PC

To use the PC installed the software in attached CD-R “Laser Marker Driver & Utility” with online status, connect the attached USB cable to the front side of the controller.

! Notice

- USB cable should not be connected in parallel with the controller power cable or the motor power cable.



■ Operating environment of Laser Marker NAVI

The PC setting software “Laser Marker NAVI” is stored in the attached CD-ROM “Laser Marker Driver & Utility”. To use this software, install the data in the CD-ROM to the commercially available PC in the following environment. For the installation procedures, refer to “Laser Marker NAVI Operation Manual” stored in the CD-ROM.

Item	Installation requirements
OS *1	Windows® 10 Pro 32bit, 64bit Windows® 8 Pro 32bit, 64bit Windows® 7 Professional 32bit, 64bit Windows® Vista Business 32bit Windows® XP Professional 32bit
Free area on hard disk	100MB or more
CD-ROM drive *2	1 set or more
USB port	USB1.1 and upper grade
Memory capacity	1GB or more
CPU	Pentium III, 1GHz or more
Display resolution	1024 x 768 pixels or above
Others	Pointing device such as a mouse and character input device such as a keyboard

*1 : The CPU type, memory capacity, hard-disk space, and display function required to operate each OS should be provided in accordance with the recommendation of Microsoft.

*2 : To install the software on a PC without a CD-ROM drive, copy all CD-ROM data to the PC using external storage media such as a USB flash drive before installation.

↓ Reference

- Laser Marker NAVI can be installed in English or in Japanese. It is preferred that the OS language corresponds to the installation language. If the OS language is other than English or Japanese, install Laser Marker NAVI in English.

■ Installation procedures

Set the CD-ROM “Laser Marker Driver & Utility” to the PC and the installation will start automatically.

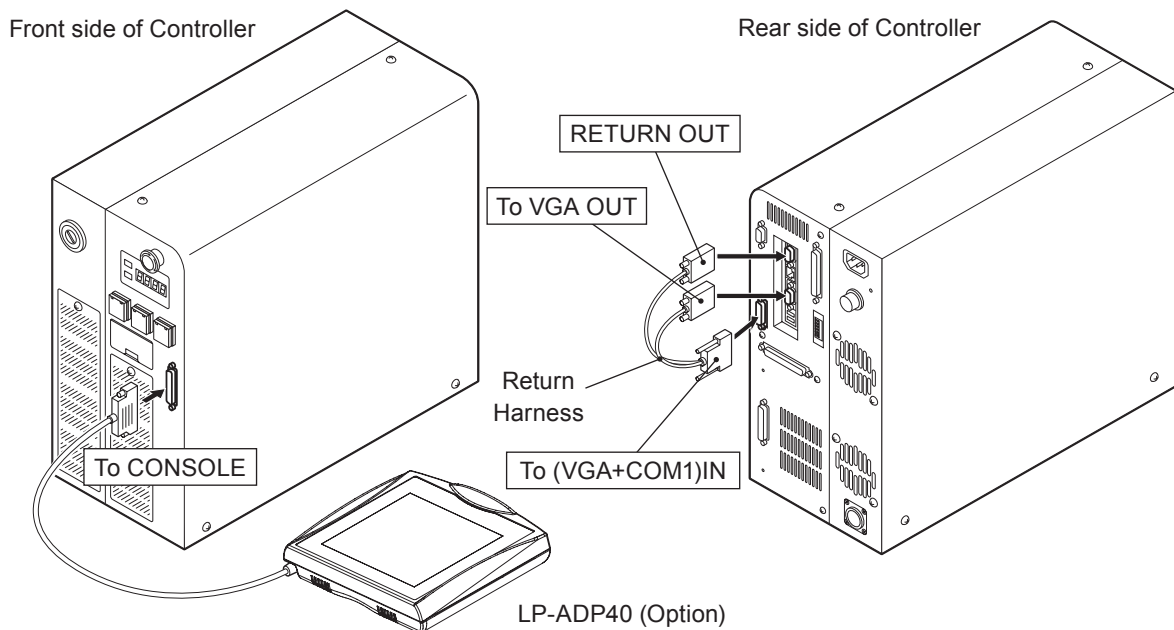
Install “Laser Marker Driver & Utility” by following the instructions shown on the screen.

If the installation screen does not appear, double-click on following file to start installation.

[CD-ROM]\Setup\LaserMarkerDriverAndUtility\setup.exe

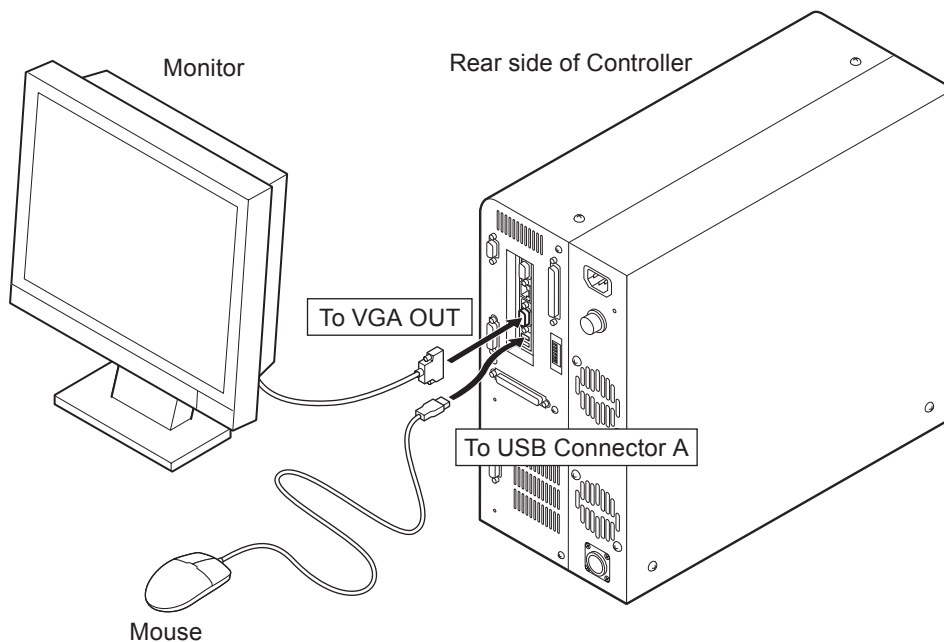
2-2-4 When Using Console (Option)

- When using the console LP-ADP40 (optional item), connect the return harness to the rear of the controller.
- Do not take out and put in the console in being powered on.



2-2-5 When Using Monitor and Mouse

- Be sure to check the operation status when using the monitor and mouse beforehand. This connection status does not warrant all operations of VGA monitor and USB mouse.
- Do not take out and put in a monitor, and a mouse in being powered on.
- When using monitor and mouse, do not connect the return harness.
- USB hub cannot be used for this product.
- There is 1 port on the front of the controller and 2 ports on the back for USB connector A. USB mouse can be connected in any of these ports.

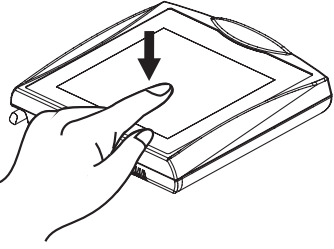
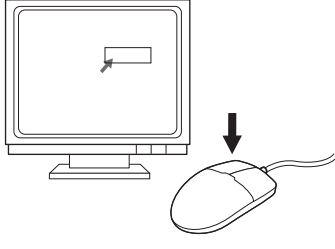


- The connectable monitor and mouse are as follows:
Monitor: VGA terminal (15-pin 3-row) (Recommended Pixel Count: 640×480 or more)
Mouse: USB mouse with Human interface device (HID) class

3 Basic Operation Procedure

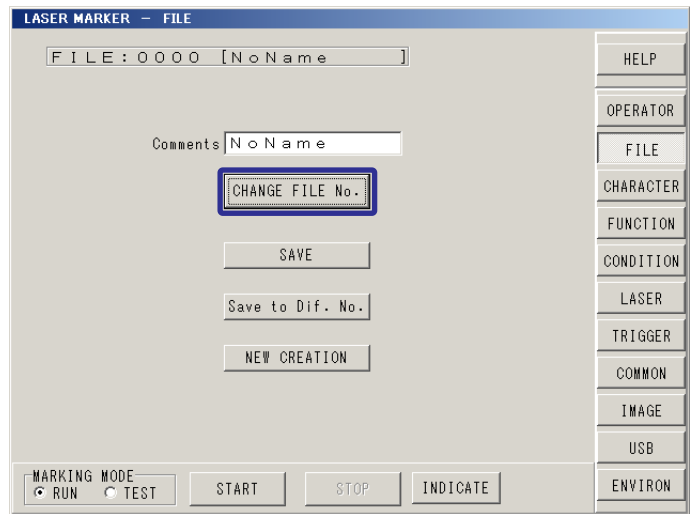
3-1 Display Operation

Here describes how to operate the screen of the touch panel or monitor.

<p>For touch panel console Tap the items to be set with a finger or a rotundate object.</p> 	<p>For monitor and mouse Click on the items to be set with the left mouse button.</p> 
---	--

■ General setting

Press the button.
According to the selected button, the screen will change.



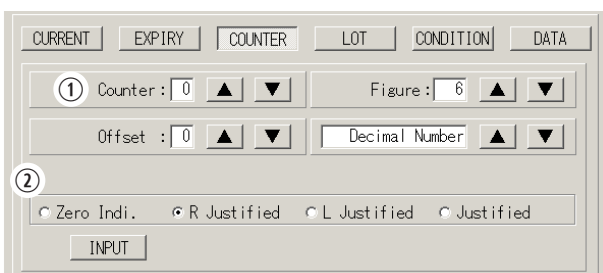
Reference

- If the touch panel responds out of the pointed position, adjust the touch panel referring to “4-16-6 Adjustment of Touch Panel” (P.265).

■ Selection of setting items

Select the setting items with the following methods.

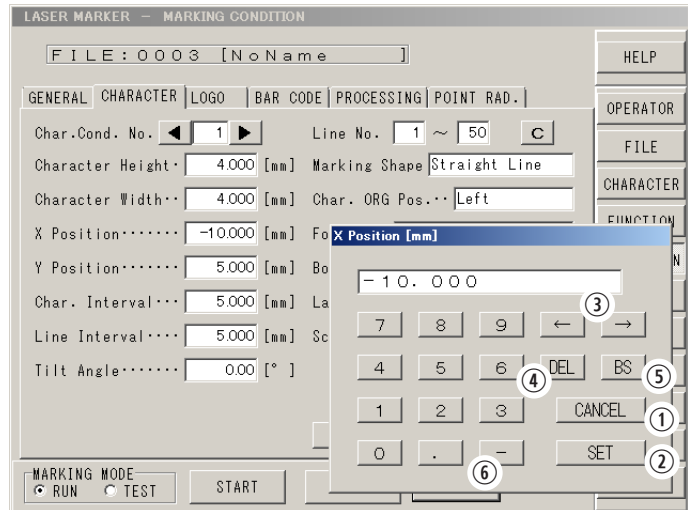
①	Press ▲▼ or ◀▶ button to switch the items.
②	Press the item to be set from the list. The item displayed with “•” is selected.
③	To activate the setting, press the item and check the box.



■ Input numbers

When press the entry field for numbers, input screen will appear.

Input the numbers and press [SET].



■ Input characters

When press the entry field for characters, character input screen will appear.

Input the characters and press [SET].



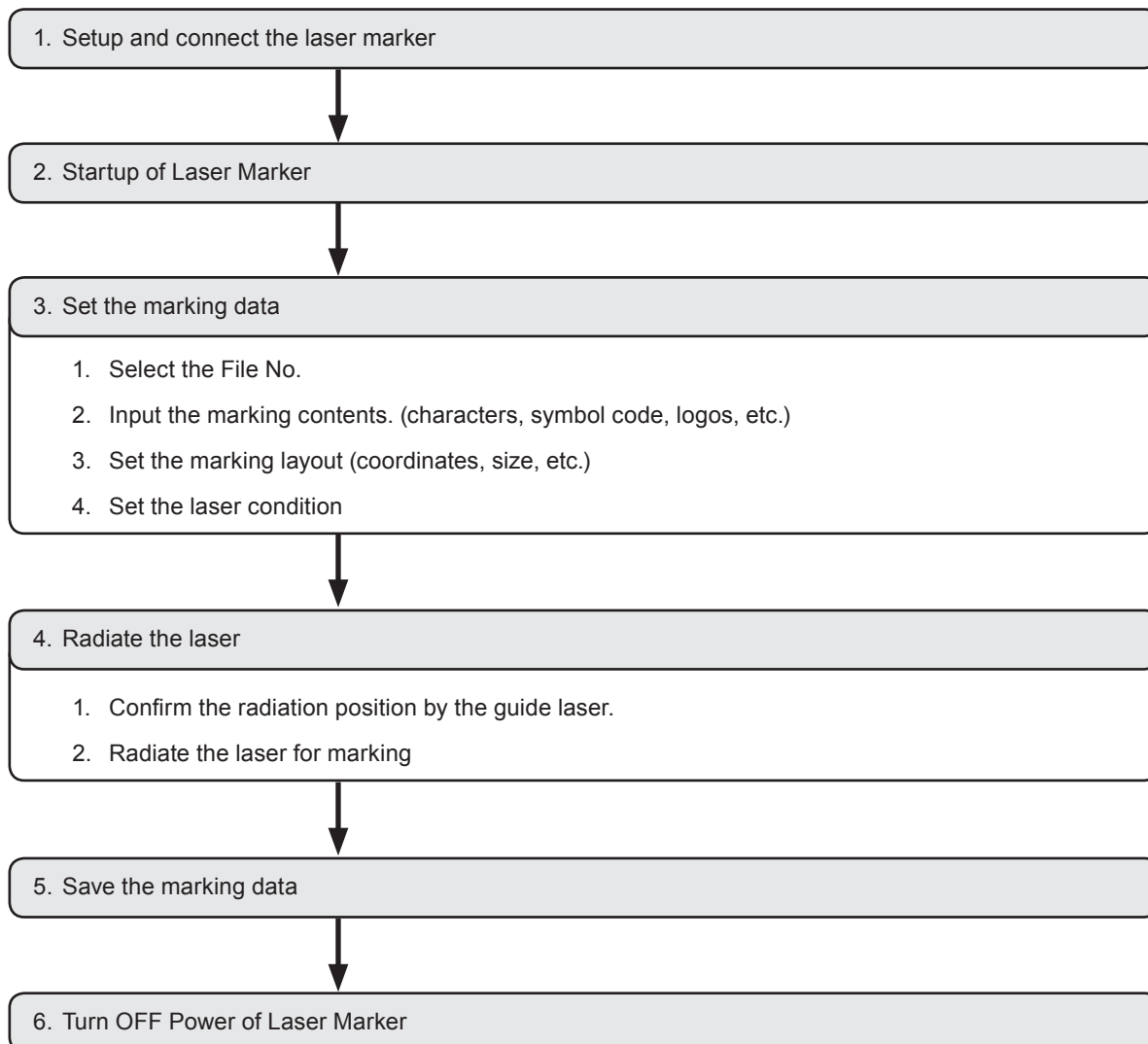
Function of the button on the entry field

①	[CANCEL] closes the entry field screen.
②	[SET] fixes the input and close the entry field screen.
③	Arrow key moves the input cursor position.
④	[DEL] deletes a character or number behind of the cursor.
⑤	[BS] removes a character or number in front of the cursor.
⑥	The decimal point and minus symbols are displayed in the numeric input window.
⑦	[SP] inserts the space for one character.

3-2 Operation Overview

This section describes the basic procedures to use laser marker from start-up to power off.

Flow:



3-2-1 Setup and connect the laser marker

Reference

- For the installation and connecting, refer to “2-1 Installation” (P.57) and “2-2 Connecting Laser Marker” (P.70).

1. Install the laser marker ensuring the following points.

- Take laser protection measures required to use Class 4 laser products.
- Please avoid vibration and install in a place without any shocks.
- For the proper cooling performance, install not to bar the flow of air.

2. Connect the head and controller of the laser marker using these cables.

- Head control cable
- Head power cable
- Fiber cable *1

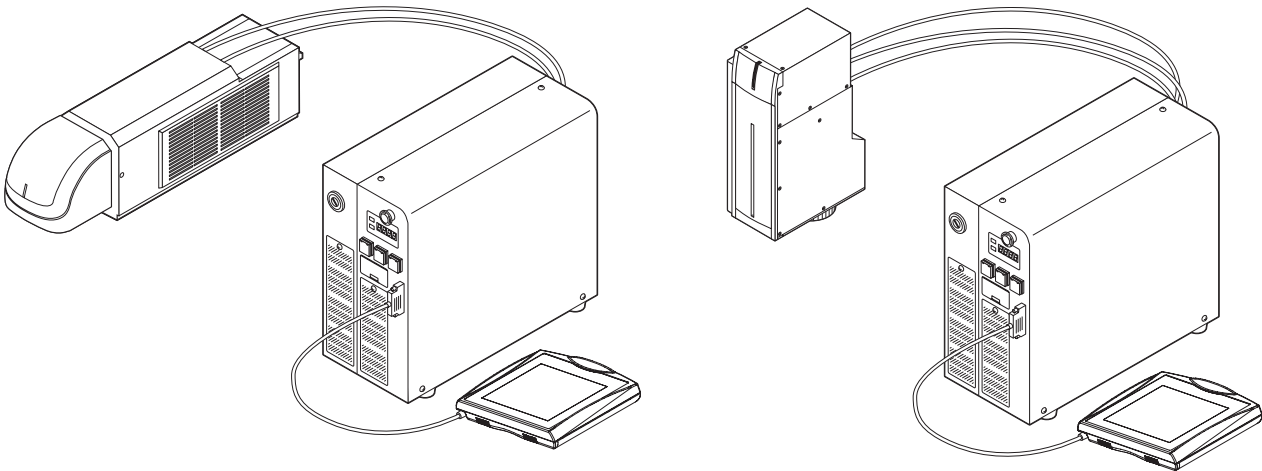
3. Connect the following devices and cables to the controller.

- Touch panel console and return harness, or monitor and mouse, or PC
- I/O terminal *2

4. Connect the controller power cable.

*1 : Only for LP-V and LP-W series. The fiber cable cannot be detached from the device.

*2 : Wire the each terminals depending on the control method.



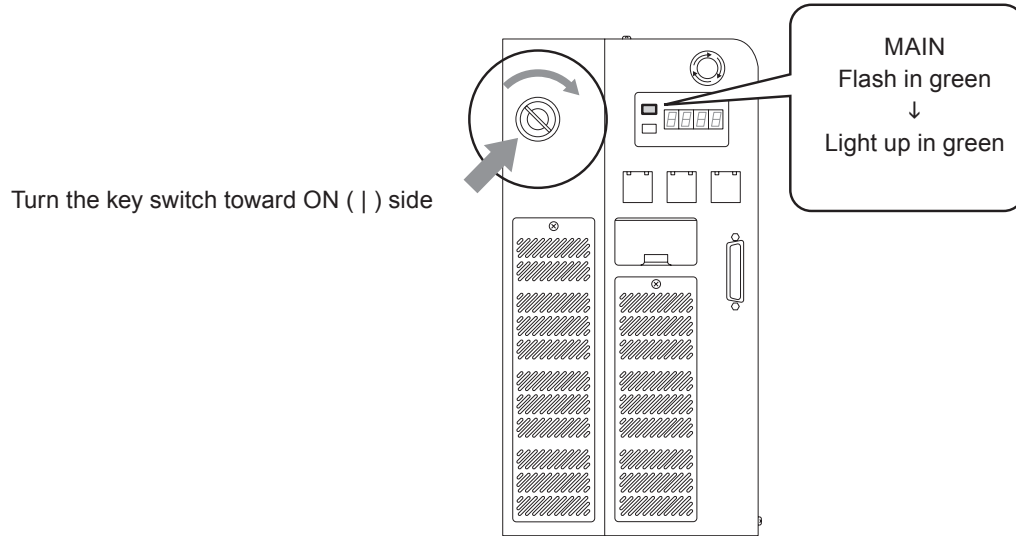
* Place a protective enclosure in the range of laser radiation for actual use.

3-2-2 Startup of Laser Marker

1. Turn ON (|) the key switch of the controller.

(Insert the key and turn it toward ON (|) side.)

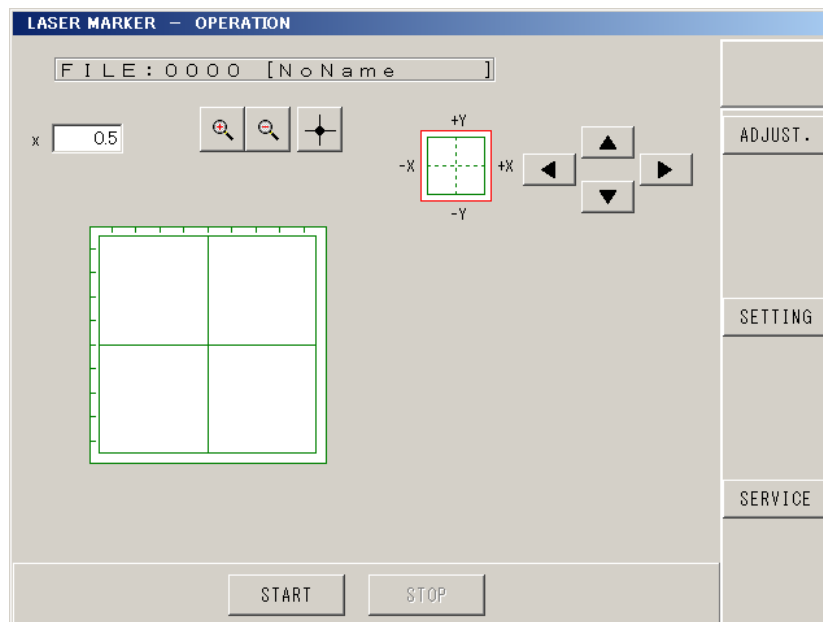
The main indicator flashes in green, and changes into lighted-up status after approx. 60 seconds.



! Notice

- Since the ON/OFF operation of the key switch puts load to laser marker, do not turn off the power supply until completing the system start.
- In case of turning ON the power supply after turning OFF, leave the interval at least 5 seconds between ON and OFF.

2. The operation screen is appeared after the system is started.



Reference

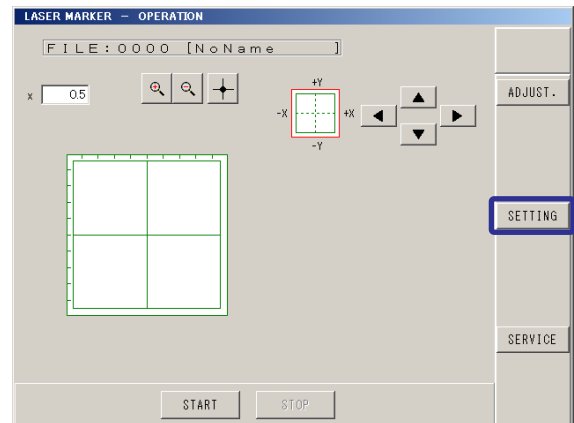
- To switch the display language, refer to "4-16-7 Language Selection" (P.266).

3-2-3 Set the marking data

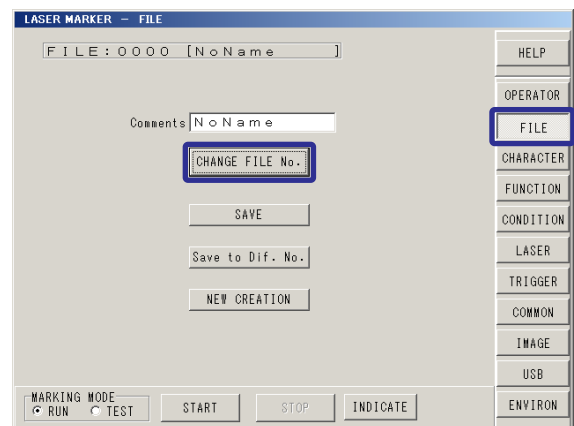
1. Select the File No.

The marking contents and layout data are stored in “file” format. Select the file No. at first to set the marking data.

1. Press [SETTING] to switch the screen mode from operation to setting mode.



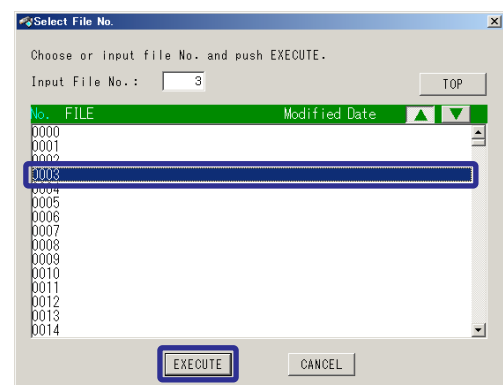
2. Press [FILE].



3. Press [CHANGE FILE No.].

The [Select File No.] window will appear.

4. Select the file number and press [EXECUTE].

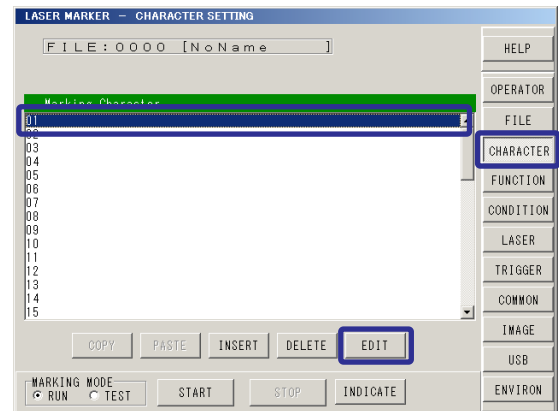


2. Input the marking contents.

Input the marking contents such as characters, code symbols, or logos. Here describes the procedure to input character data "ABCD".

1. Press [CHARACTER].

The screen is changed into the character setting one.



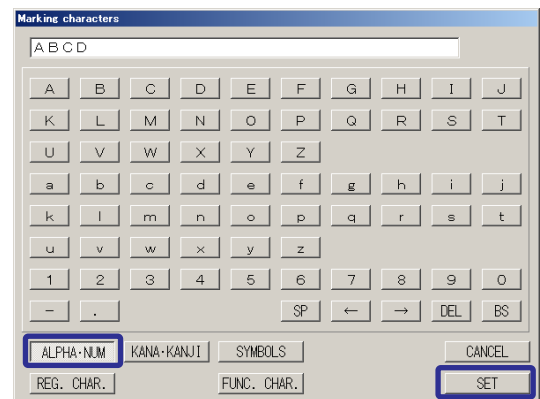
2. Place the cursor on the first line (01), and press [EDIT].

Re-adjusting the cursor to the first line (01), and then pressing (double-clicking) the same cursor performs the same operation.

3. Press [ALPHA•NUM].

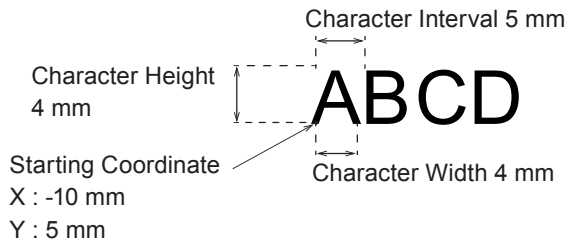
4. Input [ABCD].

5. Press [SET].



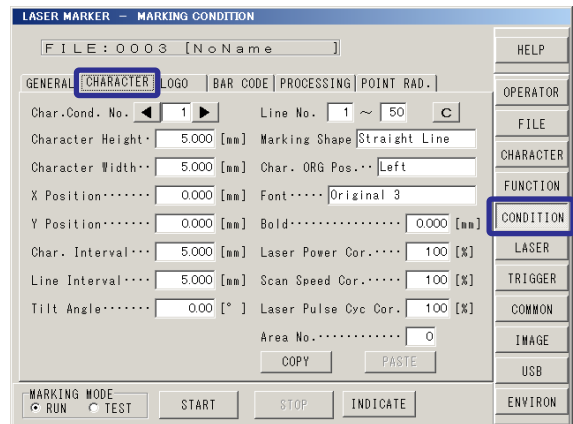
3. Set the marking layout

Set the size and coordinate for the marking contents. Here describes the procedures to set the following layout.



1. Press [CONDITION].

Then, press [CHARACTER].



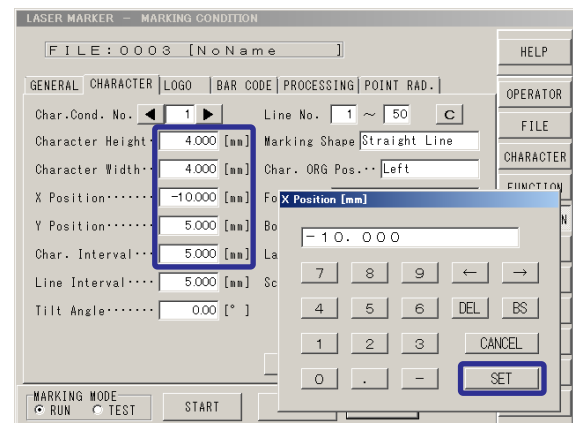
2. Set "4 mm" to [Character Height].

Set "4 mm" to [Character Width].

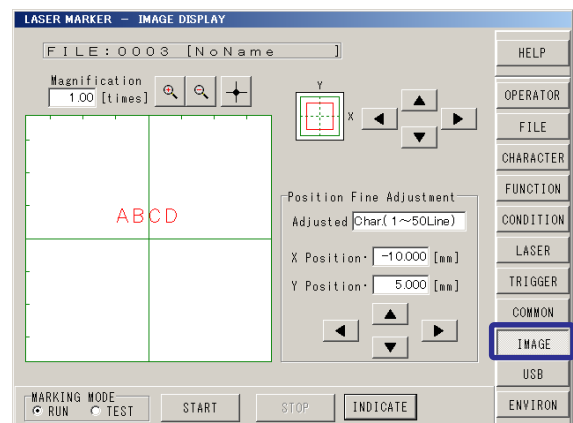
Set "-10 mm" to [X Position].

Set "5 mm" to [Y Position].

Set "5 mm" to [Char. Interval] (Character Interval).



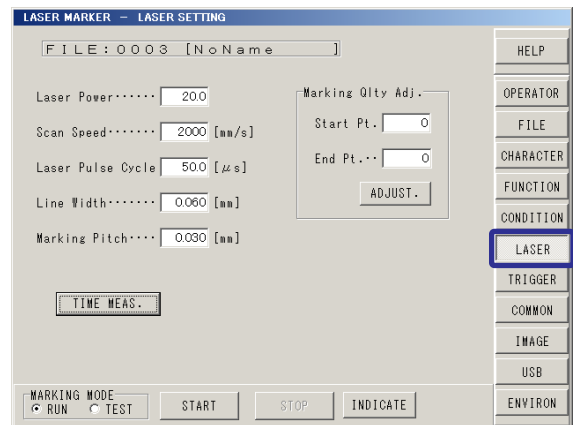
3. Press [IMAGE] to check the marking layout.



4. Set the laser condition

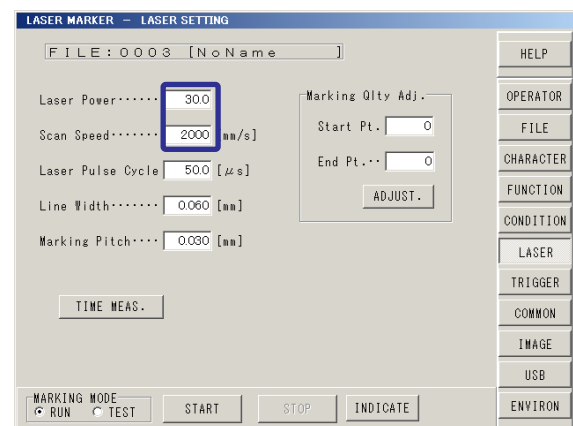
Set the laser power and scanning speed.

1. Press [LASER].



2. Set "30" to [Laser Power].

The larger value, the marking becomes darker or deeper.
To find the proper value, set here from small value and adjust it to larger value according to the marking quality.



3. Set "300 mm/s" to [Scan Speed].

The larger value, the marking becomes lighter and the marking time becomes shorter.

3-2-4 Radiate the laser

1. Confirm the radiation position by the guide laser.

1. Set the marking object, and adjust the work distance.

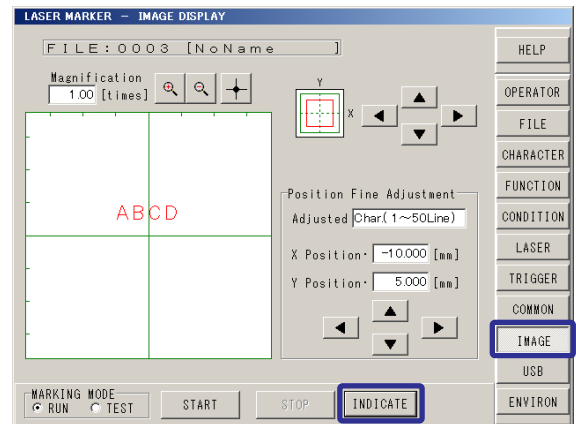
Set the distance between the laser emission port of the head and the work surface to the appropriate work distance position for each model.

For the appropriate work distance for each model, refer to “1-3 Specification” (P.34).

Reference

- The work distance can visually be confirmed using “4-6-1 Dual pointer” (P.134).

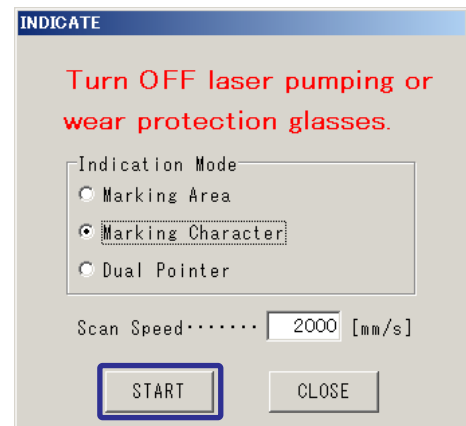
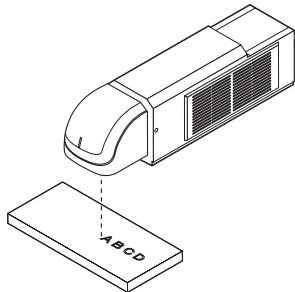
2. Press [IMAGE] to check the marking layout.



3. Press [INDICATE].

4. Select [Marking Character] and press [START].

The marking content is displayed with the red guide laser. Adjust the position of the marking object.



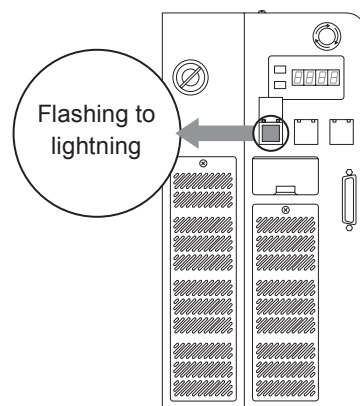
5. The guide laser is stopped by pressing [STOP].



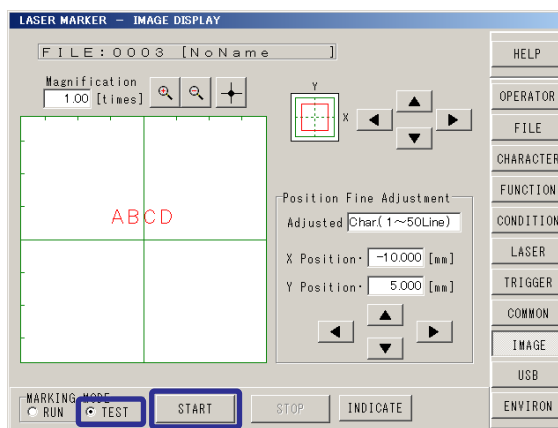
2. Radiate the laser for marking

1. Press the laser pumping switch on the controller.

The laser pumping switch will be flashing in white. When the switch is changed from flashing to lightning up, the laser marker is ready for radiation.
(Flashing time: approx. 20sec.)



2. Select [TEST] of the marking mode.



3. The marking is started by pressing [START].



WARNING

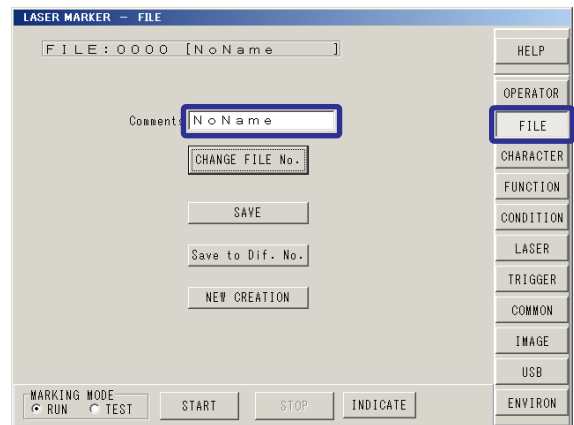


- The laser beam is emitted. Be sure to use the protective goggle and enclosure while dealing with the laser.

3-2-5 Save the marking data

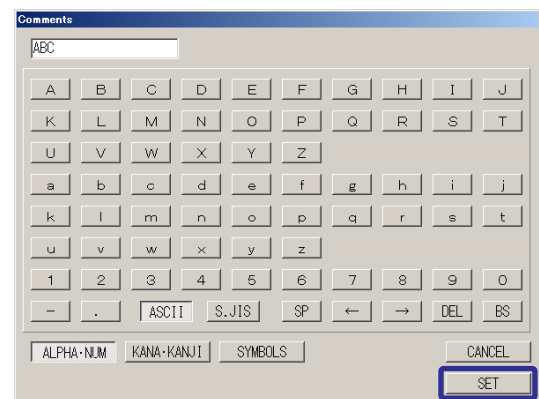
Save the marking data in laser marker. The data is stored in “file” format.

1. Press [FILE].



2. Press the character string of the Comments to set the file name.

3. Input the comment, and press [SET].

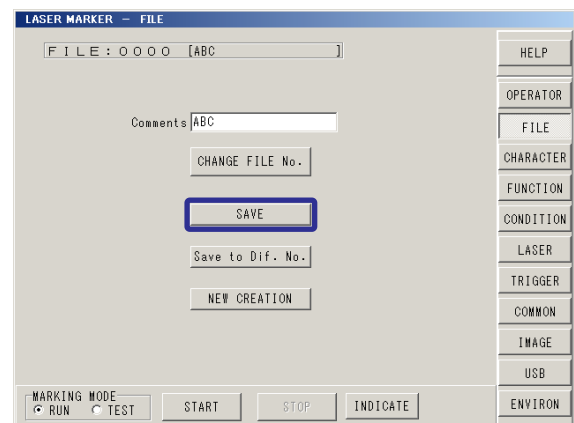


Reference

- For the file name, up to 20 characters can be input in case of inputting all single-byte letter.

4. Press [SAVE].

The file content is saved.

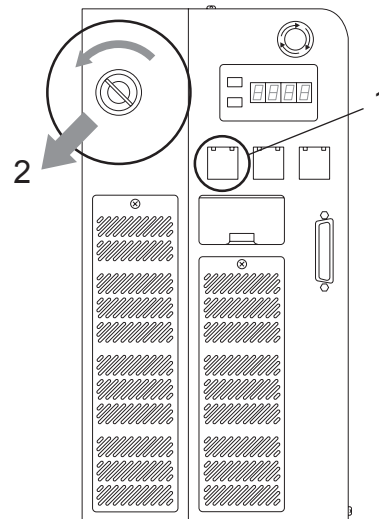


Notice

- The file is not saved only by inputting file name. For saving the file, be sure to overwrite the file.

3-2-6 Turn OFF Power of Laser Marker

1. Turn off the laser pumping switch.



2. Turn OFF the key switch.

Turn the key to OFF (O) side (to the left), and pull it out.

The main indicator is off.

The system key should be in safekeeping by a laser safety manager.

! Notice

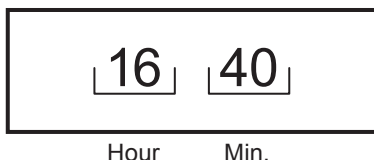
- If turning off the power of the laser marker without overwriting the file under dealing, the data is not saved. Be sure to check the file saving before turning off the power.
- Do not turn off the power during marking. Turning off the power during marking might cause the failure of the laser marker. If it needs to stop the laser radiation immediately, press the emergency stop button.

3-3 Setting Procedure for Basic Function

The setting method for function to be applied to the actual marking is described in this section using sample.

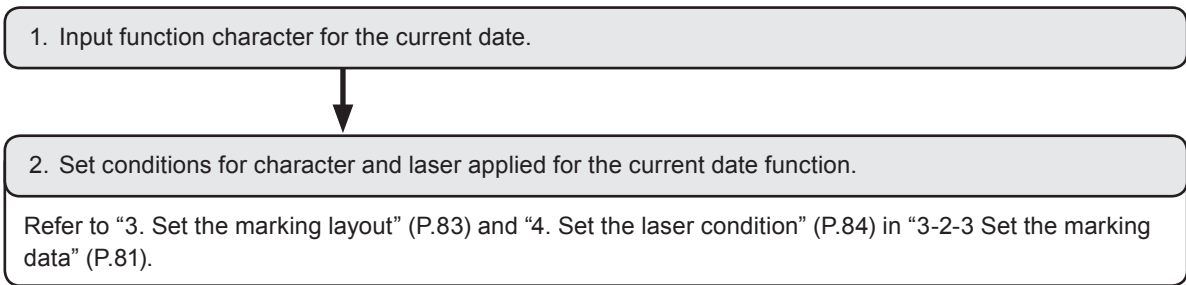
3-3-1 Mark Current Date/Time

Sample



Displayed number of digits (Figure) : 2
Display format : Hour (24)/Minute
Display leading zeros(Zero Indi.) : Enable

The procedure for marking current time is described below.



! Notice

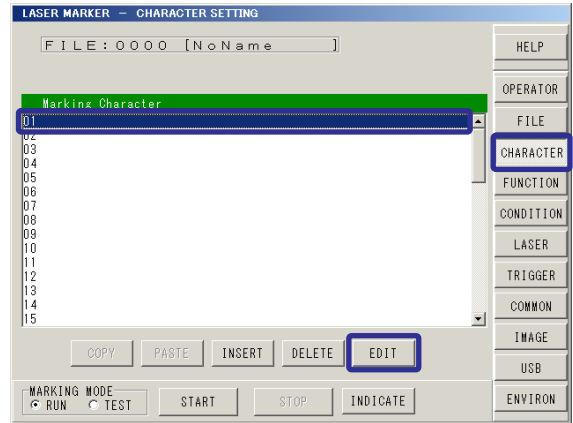
- The following items, Date, Lot, and Expiry date are marked based on the internal clock of the laser marker. The internal clock might be deviated caused by the error of the internal parts or degree of the battery drain. Therefore, be sure to check the time of the internal clock before the operation without fail.

↓ Reference

- For details on the current date function, refer to "Current Date and Expiry Date" (P.151).
- By using "Time hold" function, it is possible to mark as the same date even when the time has passed 0:00 A.M..
<Time Hold function>
The "Time Hold" function locks the marking time/date. (Refer to "External Control Manual".)
This function can be used only in "Current data marking", "Expiry date", and "Lot".

1. Input the current date function character.

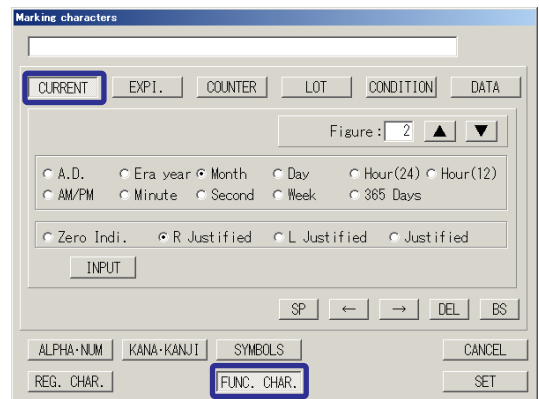
1. Press [CHARACTER].



2. Select the first line (01), and press [EDIT].

Or double-click the first line (01).

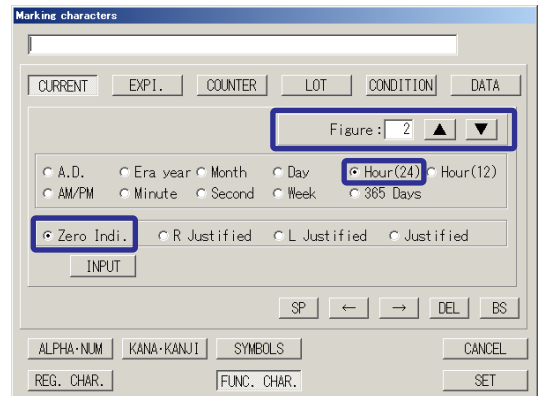
3. Press [FUNC. CHAR.] (FUNCTION CHARACTER) and press [CURRENT] (CURRENT DATE).



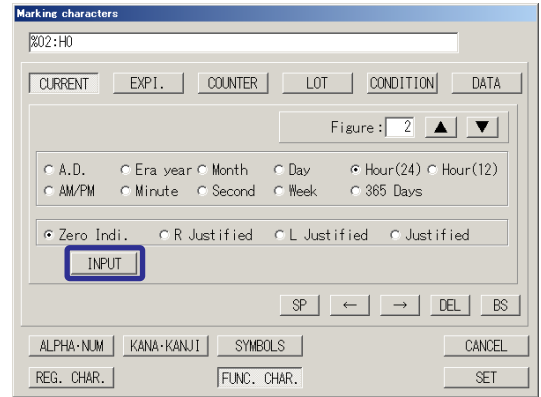
4. Set "2" to [Figure].

5. Select [Hour(24)].

6. Select [Zero Indi.].



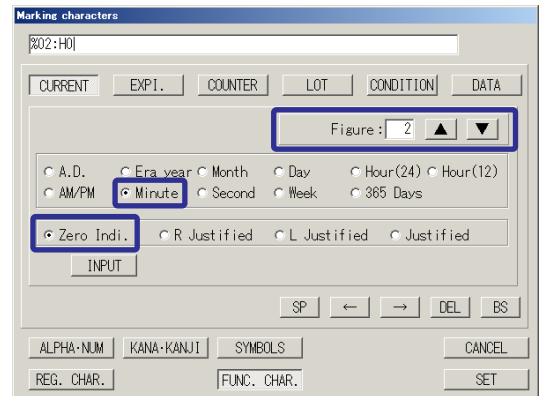
7. Press [INPUT].



8. Set "2" to [Figure] continuously.

The figure can be set from 1 to 6.

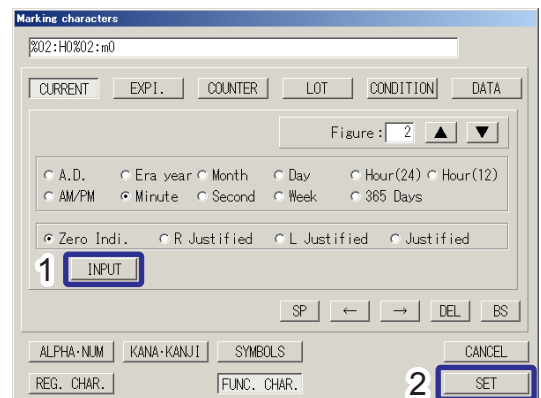
9. Select [Minute].



10. Select [Zero Indi.].

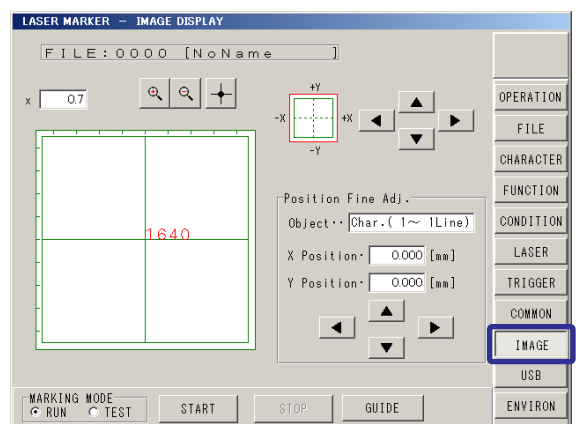
11. Press [INPUT], and then press [SET].

The "%02:H0%02:m0" is input into the first line of the marking character string.



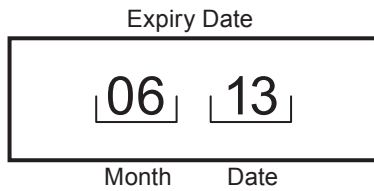
12. Press [IMAGE] to check the marking layout.

The data to be marked (current time) is displayed.



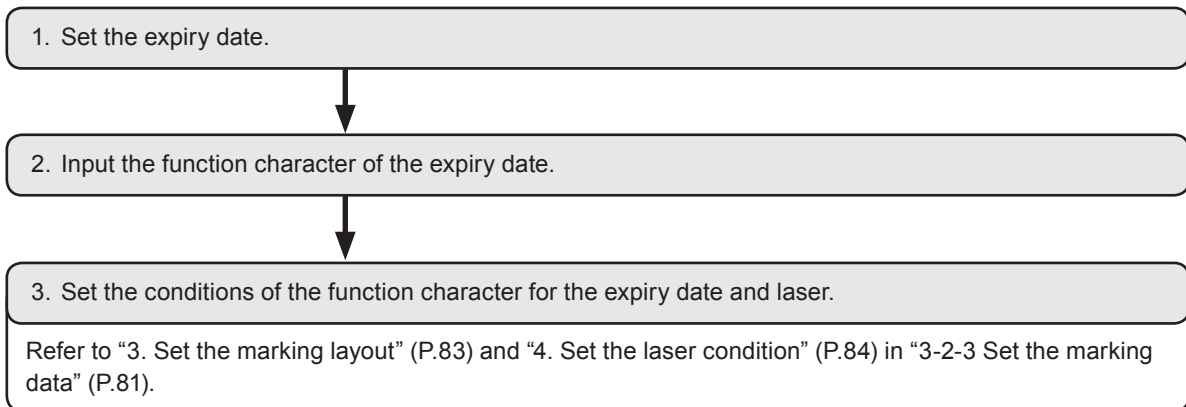
3-3-2 Mark Expiry Date/Time

Sample



Time limit (EXPIRY)	: 30 days
Displayed number of digits (Figure)	: 2
Display format	: Month/Date
Display leading zeros (Zero Indi.)	: Enable

The expiry date (30 days later) is marked.



! Notice

- The following items, Date, Lot, and Expiry date are marked based on the internal clock of the laser marker. The internal clock might be deviated caused by the error of the internal parts or degree of the battery drain. Therefore, be sure to check the time of the internal clock before the operation without fail.

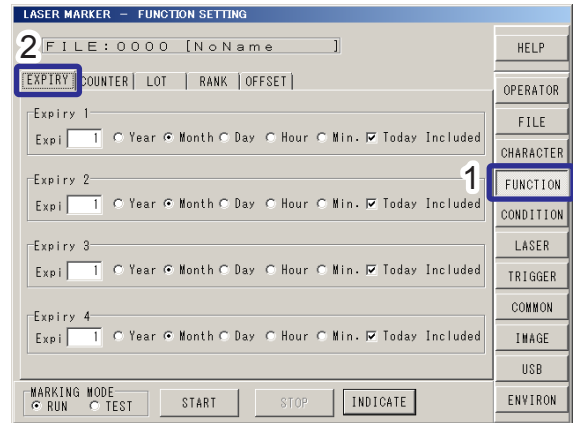
↓ Reference

- For details on the expiry date function, refer to "4-9-1 Expiry Date" (P.160).
- By using "Time hold" function, it is possible to mark as the same date even when the time has passed 0:00 A.M..
<Time Hold function>
The "Time Hold" function locks the marking time/date.
(Refer to "External Control Manual".)
This function can be used only in "Current data marking", "Expiry date", and "Lot".

1. Set the expiry date.

1. Press [FUNCTION] , and then press [EXPIRY] (Expiry Date).

Here the condition is set to expiry No. 1.

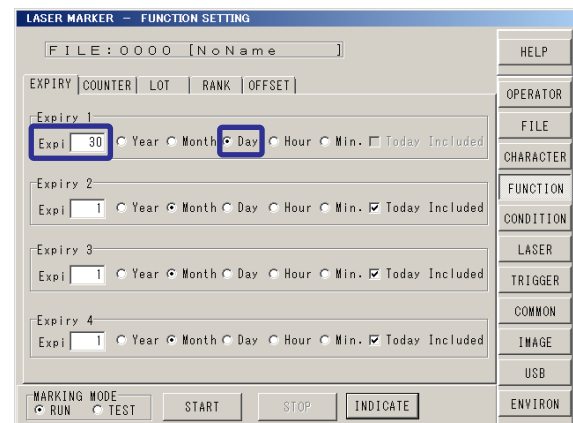


Reference

- The expiration is settable up to 4 per file (1 to 4). Other than this setting, the setting for “common counter” (5 to 8) that are common to all files are available. Refer to “4-13 Common Setting” (P.229).

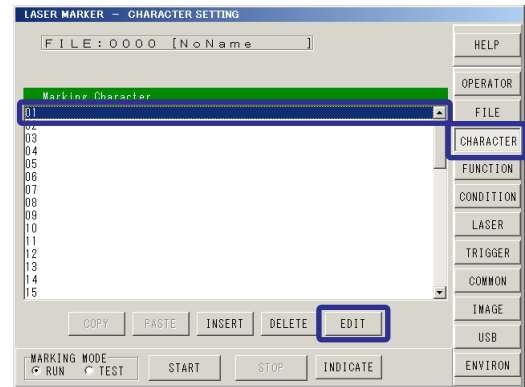
2. Set “30” to [Expi] (Expiry Date).

3. Set “Day” to Unit.



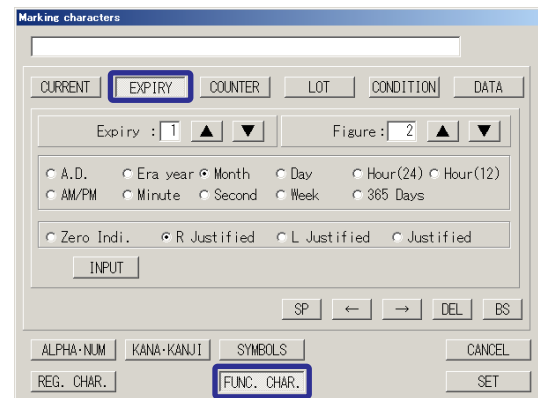
2. Input the expiry date of the function character

1. Press [CHARACTER].



2. Select the first line (01), and press [EDIT].
Or double-click the first line (01).

3. Press [FUNC. CHAR.] (FUNCTION CHARACTER),
and then press [EXPIRY] (Expiry Date).



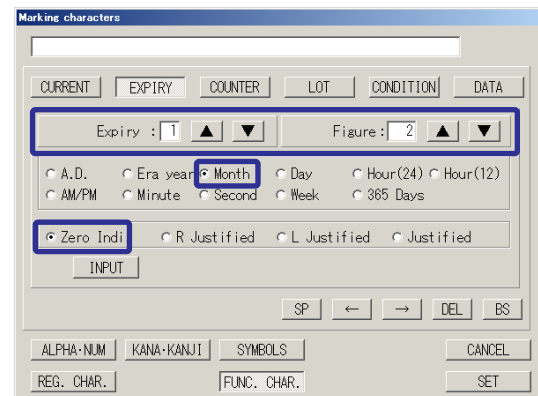
4. Enter "1" to the [EXPIRY] (Expiry No.) field.

Set "2" to [Figure].

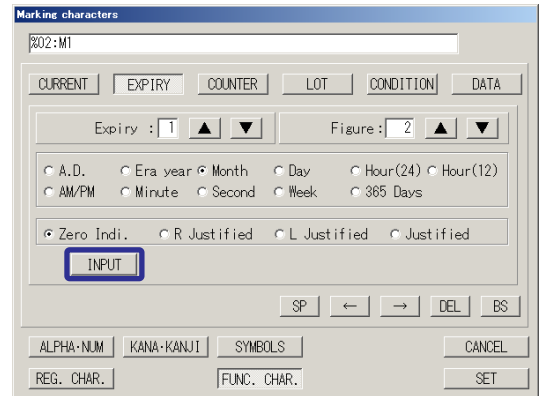
The figure can be set from 1 to 6.

5. Select [Month].

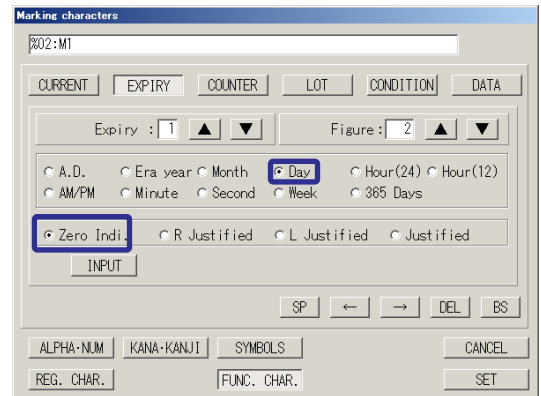
6. Select [Zero Indi.].



7. Press [INPUT].



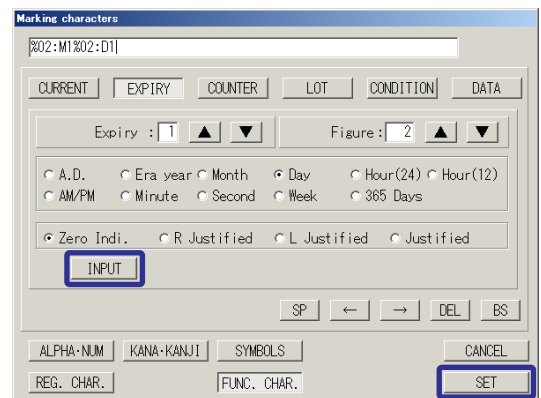
8. Select [Day] continuously.



9. Select [Zero Indi.].

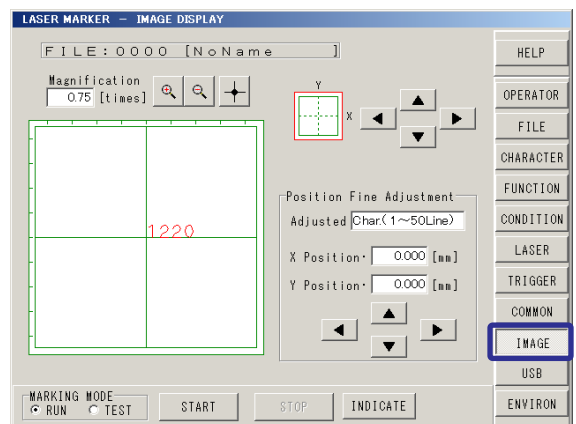
10. Press [INPUT], and then press [SET].

The "%02:M1%02:D1" is input into the 1st line of the marking character string.



11. Press [IMAGE] to check the marking layout.

The date to be marked is displayed.



3-3-3 Mark Lot No.

Sample

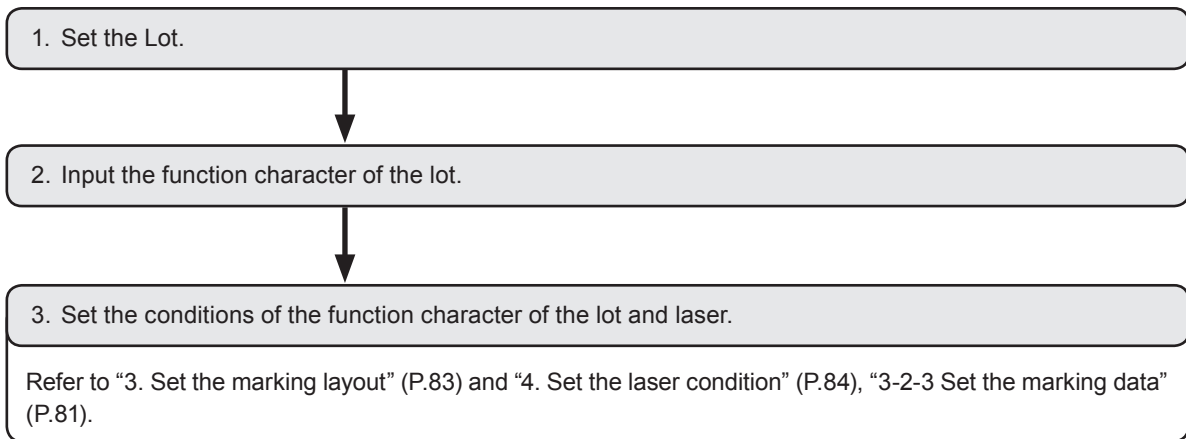
January February March ... December



Period : Current Date

Unit : Month

Set the lot No. to replace month data with the specified characters as above mentioned.



! Notice

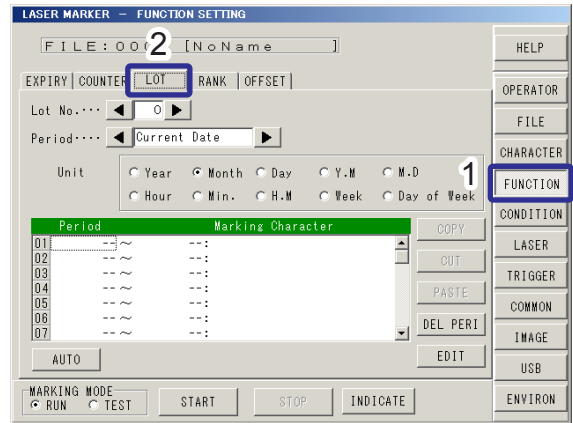
- The following items, Date, Lot, and Expiry date are marked based on the internal clock of the laser marker. The internal clock might be deviated caused by the error of the internal parts or degree of the battery drain. Therefore, be sure to check the time of the internal clock before the operation without fail.

↓ Reference

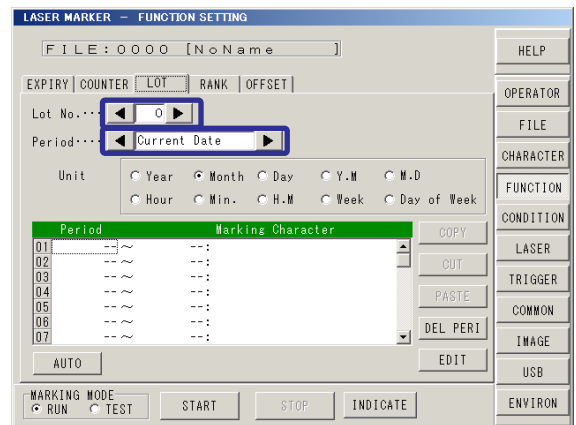
- For details on the lot function, refer to "4-9-3 Lot" (P.164).
- By using "Time hold" function, it is possible to mark as the same date even when the time has passed 0:00 A.M..
<Time Hold function>
The "Time Hold" function locks the marking time/date.
(Refer to "External Control Manual".)
This function can be used only in "Current data marking", "Expiry date", and "Lot".

1. Set the lot.

1. Press [FUNCTION] , and press [LOT].



2. Set "0" to [Lot No.].



3. Set "Current Date" to [Period].

Reference

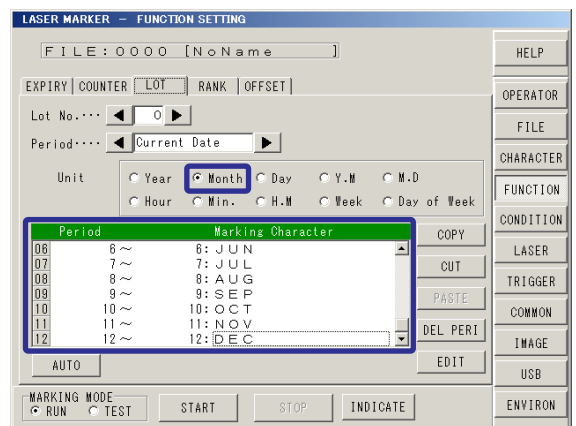
- The lot is settable up to 4 per file (0 to 3). Other than this setting, the setting for "common lot" (4 to 7) that are common to all files are available. Refer to "4-13 Common Setting" (P.229).
- The period of the lot is selectable among "Expiry 1" to "Expiry 8", "Counter 0" to "Common Counter 7" other than "Current Date". Refer to "4-9 Function Setting" (P.160).

4. Set "Month" to [Unit].

5. Define [Period] and [Marking Character].

Set the period and marking character as follows:

Period	Marking Character
1 to 1	JAN
2 to 2	FEB
3 to 3	MAR
4 to 4	APR
5 to 5	MAY
6 to 6	JUN
7 to 7	JUL
8 to 8	AUG
9 to 9	SEP
10 to 10	OCT
11 to 11	NOV
12 to 12	DEC

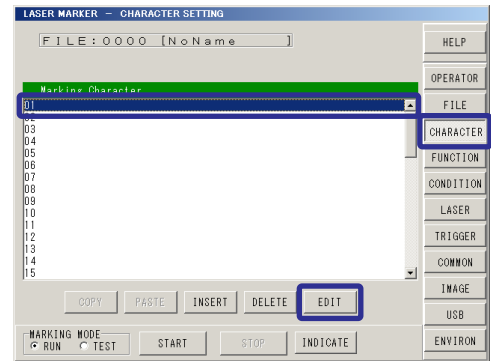


Reference

- Set the both period of start and end.

2. Input the function character of the lot.

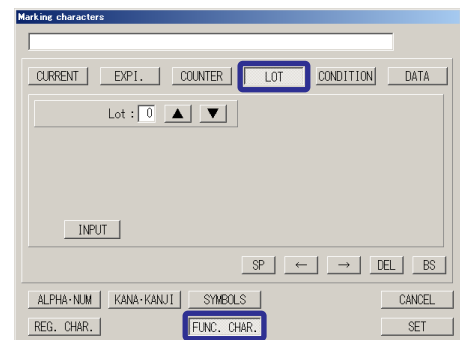
1. Press [CHARACTER].



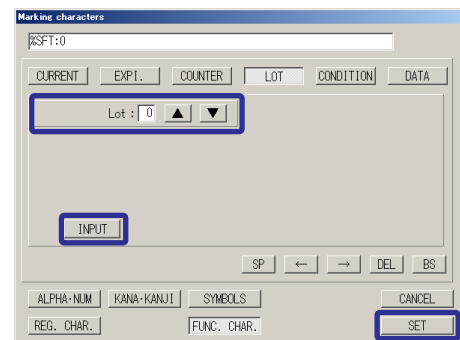
2. Select the first line (01), and press [EDIT].

Or double-click the first line (01).

3. Press [FUNC. CHAR.] (FUNCTION CHARACTER), and press [LOT].



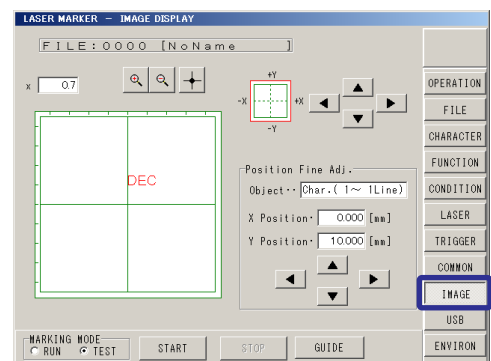
4. Set "0" to [Lot] (Lot No.).



5. Press [INPUT], and then press [SET].

The "%SFT:0" is input to first line of the marking character string.

6. Press [IMAGE] to check the marking layout.



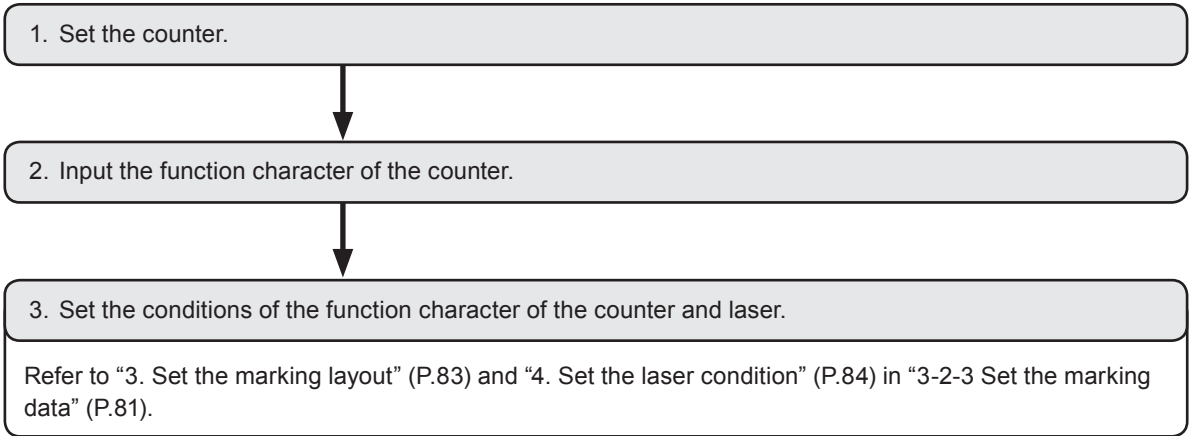
3-3-4 Mark Counter

Sample



Initial value (Init) : 1
End value (End) : 1000
Step : 1
Counter source (Source) : Trigger signal
Displayed number of digits (Figure) : 4
Display leading zeros (Zero Indi.) : Enable
Type of base number : Base-10 (Decimal) number system

Set the counters shown above.



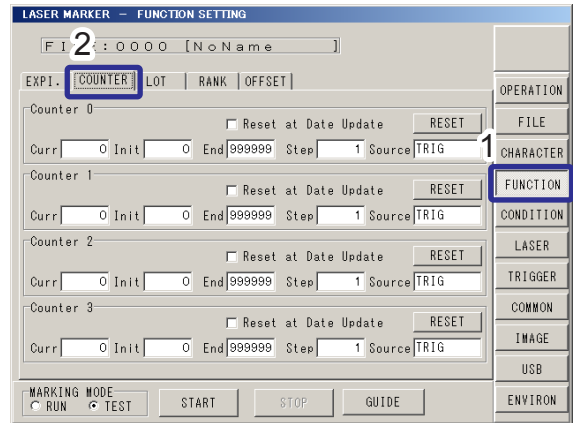
Reference

- For details on the counter function, refer to "4-9-2 Counter" (P.162).

1. Set the counter.

1. Press [FUNCTION], and press [COUNTER].

Here the condition is set to Counter No. 0.



Reference

- The counter is settable up to 4 per file (0 to 3). Other than this setting, the setting for “common counter” (4 to 7) that are common to all files are available. For details, refer to “4-13-3 Common Counter” (P.232).

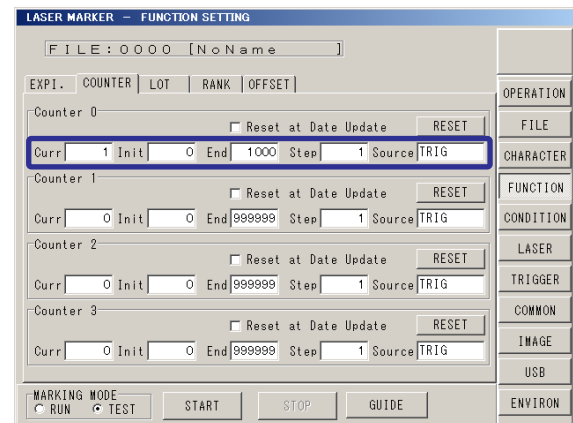
2. Set “1” to [Curr] (current value).

Set “1” to [Init] (initial value).

Set “1000” to [End] (end value).

Set “1” to [Step].

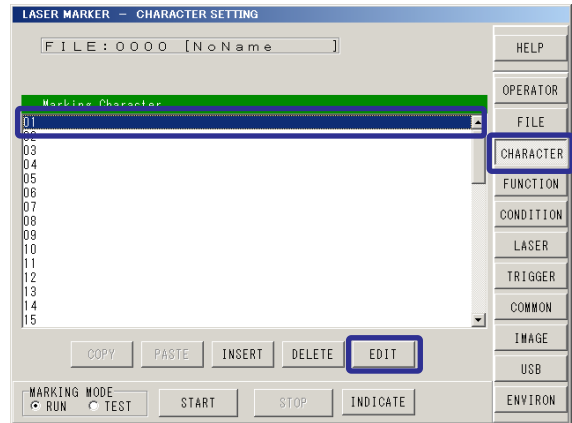
Select “TRIG” (TRIGGER) for [Source] (Count Source).



2. Input the counter function character.

1. Press [CHARACTER].

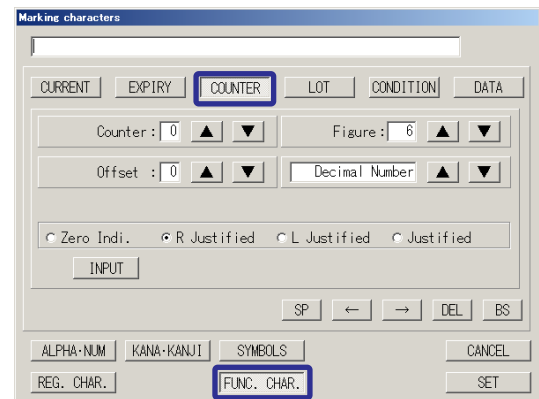
The screen changes to the character setting screen.



2. Select the first line (01), and press [EDIT].

Or double-click the first line (01).

3. Press [FUNC. CHAR.] (FUNCTION CHARACTER) and press [COUNTER].



4. Set "0" to [Counter] (Counter Number).

Set "4" to [Figure].

Set "0" to [Offset].

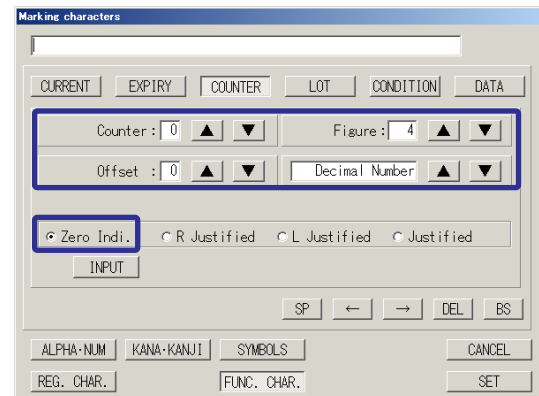
Set the number to "Decimal Number".

Select [Zero Indi.] (Zero indication).

The figure can be set from 1 to 6.

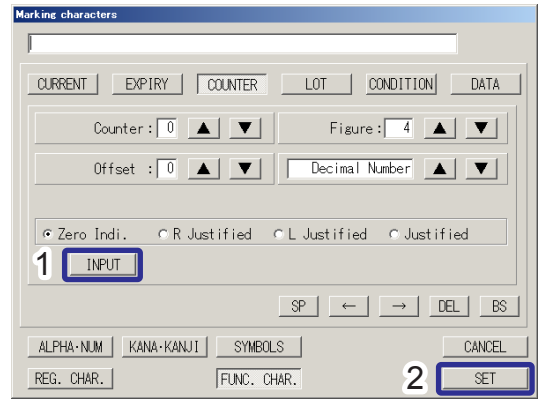
The offset can be set from 0 to 9.

The number can be set from 2 binary to 36.



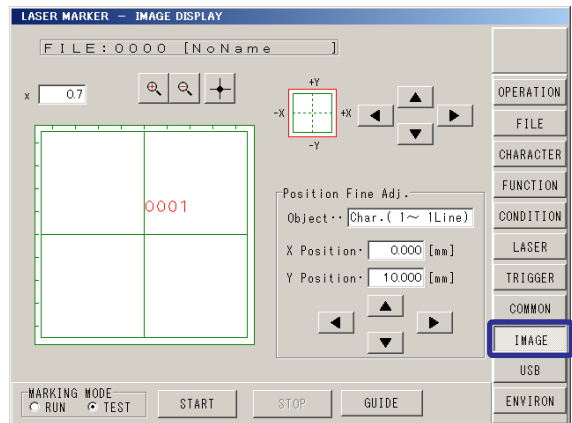
5. Press [INPUT], and then press [SET].

The "%04:C0" is input to 1st line of the marking character string.



6. Press [IMAGE] to check the marking layout.

"0001" is displayed.



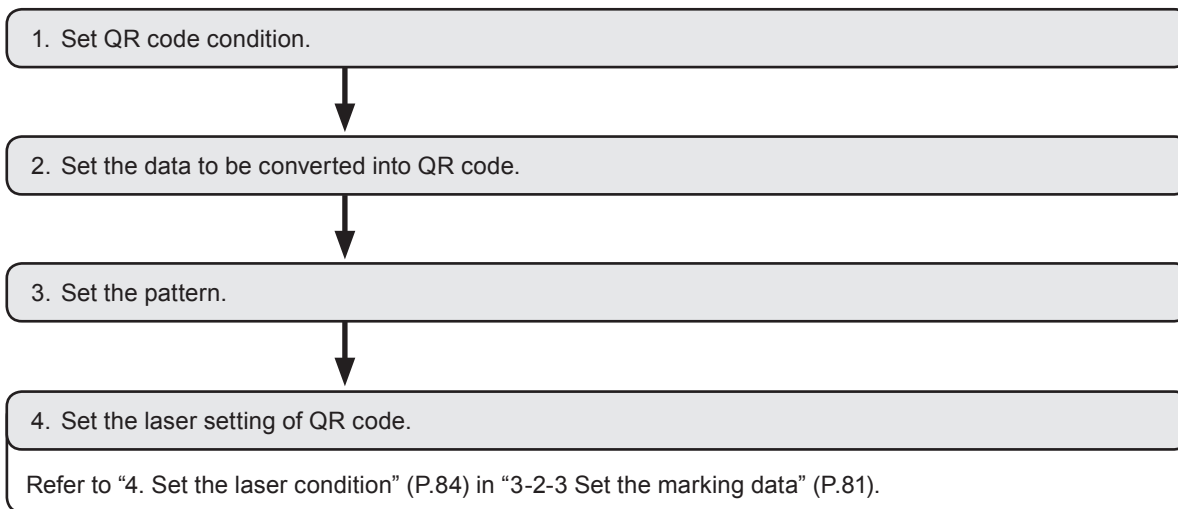
3-3-5 Mark Code Symbol

Sample



Bar Code Type	: QR Code Model 2
Version	: 0(Auto setting)
Mode	: Alphanumerical
Error correction level	: H
Module H.	: 0.500 mm
Module W.	: 0.500 mm
Data	: ABCDEFGHIJKLMN12345

The procedures to mark the above QR code at a center point with X coordinate=0 and Y coordinate=0 are described below.



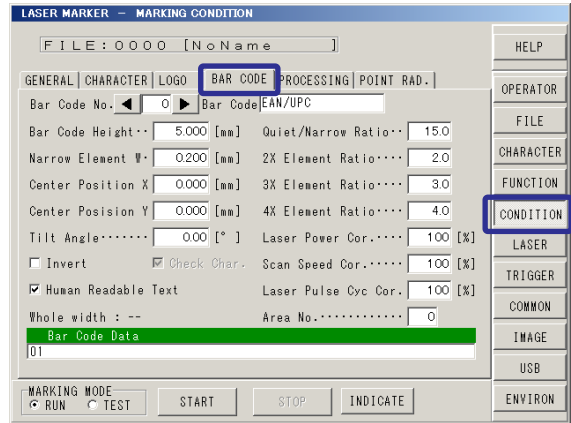
Reference

- For details on QR code marking, refer to "Setting for QR Code and Data Matrix Code" (P.196).

1. Set QR code condition.

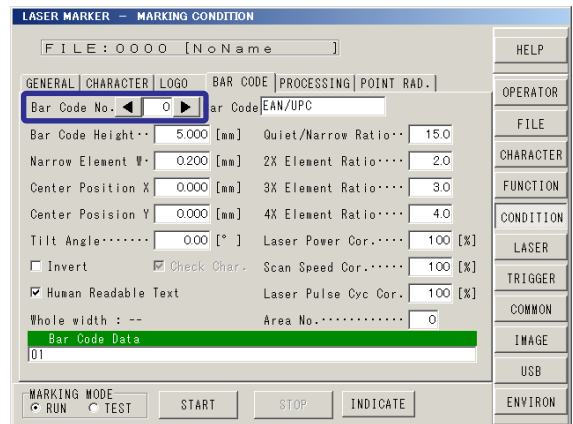
1. Press [CONDITION].

Then, press [BAR CODE].



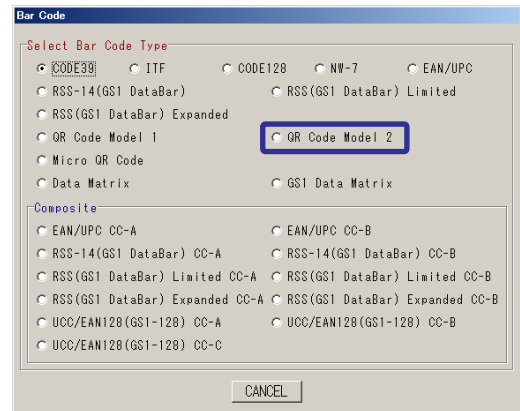
2. Set "0" to [Bar Code No.].

The bar code numbers 0 to 7 can be selected per file.

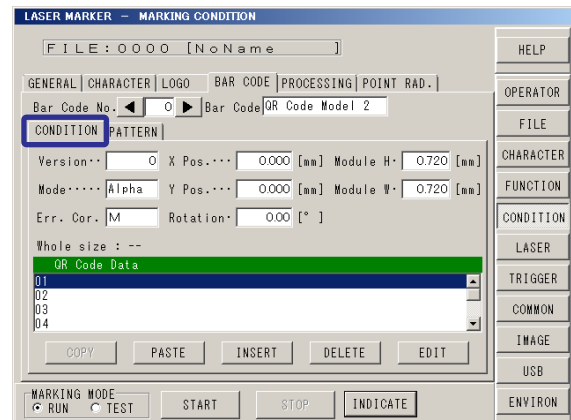


3. Set "QR Code Model 2" to Bar Code Type.

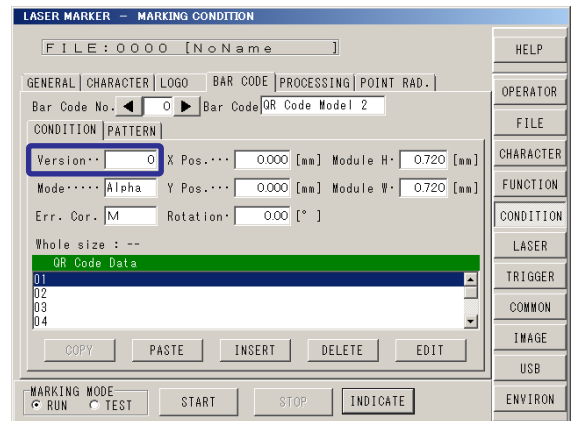
Set the bar code type from the bar code pop-up window after clicking "Type" column.



4. Press [CONDITION].



5. Set "0" (Auto) to [Version].

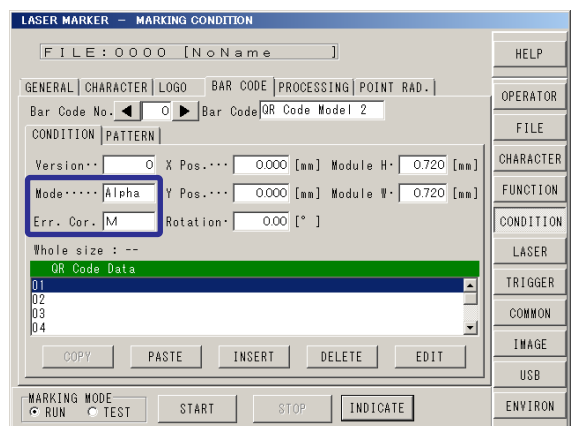


Reference

- For details on versions of QR codes, refer to "QR Code Version and Data Capacity" (P.315).

6. Set "Alpha" (Alphanumeric) to [Mode].

Press [Mode] to switch display in the order of "Alpha", "Binary", "Kanji", and "Numeric".



7. Set "H" to [Err.Cor.] (Error Correction).

Press [Err. Cor.] to switch display in the order of "M", "Q", "H", and "L".

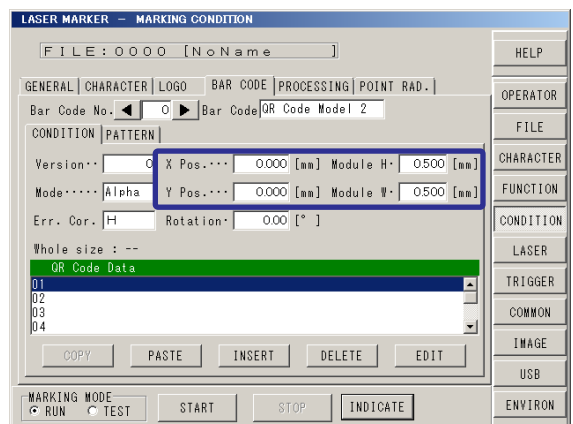
8. Set "0.500 mm" to [Module H.] (Module Height).

Set "0.500 mm" to [Module W.] (Module Width).

9. Set QR position.

Set "0.000 mm" to [X Pos.].

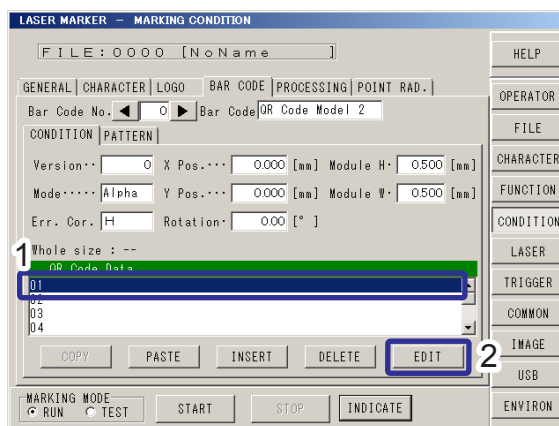
Set "0.000 mm" to [Y Pos.].



2. Set the data to be converted into QR code.

1. Select the first line (01) of the QR Code Data, and press [EDIT].

Or double-click the first line (01).



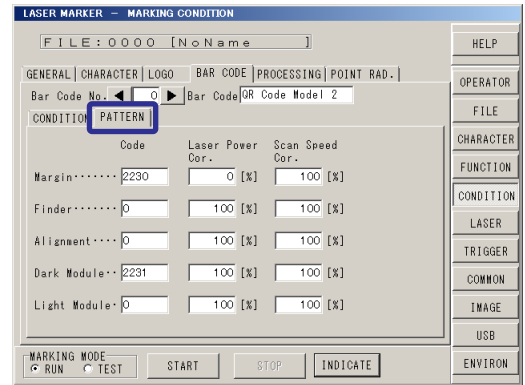
2. Press [ALPHA•NUM] and input [ABCDEFGH IJKLMN12345].

3. Press [SET].



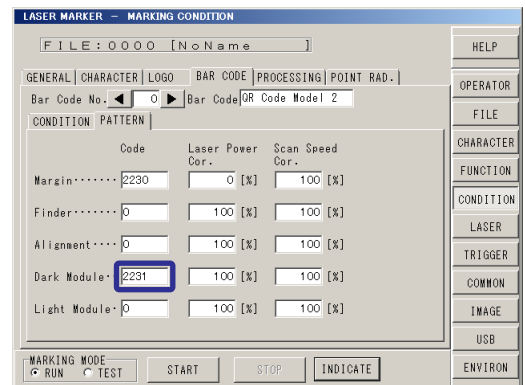
3. Set the pattern.

1. Press [PATTERN].



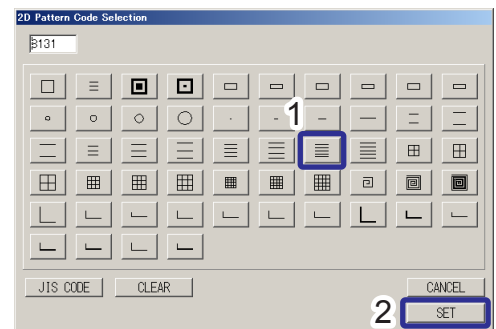
2. Set the code pattern of [Dark Module].

Press [Pattern Code] box for [Dark module].



3. Input screen of painting pattern for the modules in QR code is displayed.

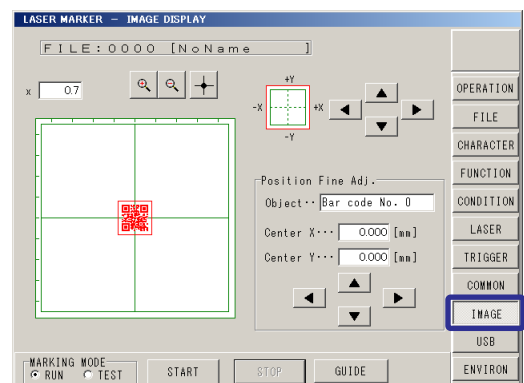
Select a pattern and press [SET].



Reference

- If a reading failure occurs with the standard pattern, use the font maker provided to create the proper pattern. Refer to "Font Maker Operation Manual" for details.
- 2D code pattern can be also set using the character code. Press [JIS Code] to open the ten-key pad, and then input the character code.

4. Press [IMAGE] to check the marking layout.

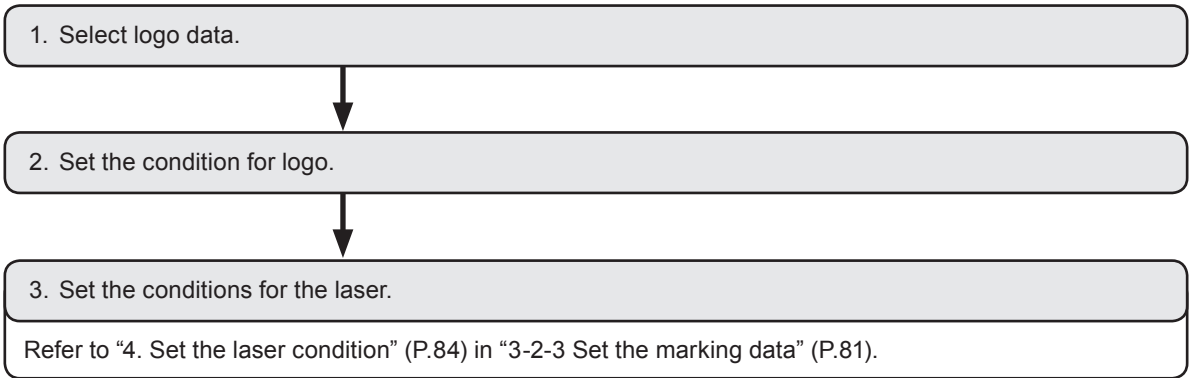


3-3-6 Mark Logo

Sample



The marking procedure for the previously defined logo like shown above is described below.

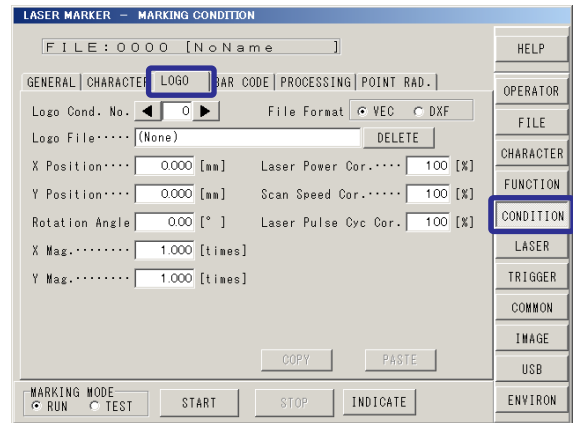


Reference

- For details on logo marking, refer to "4-10-3 Logo Condition" (P.184).

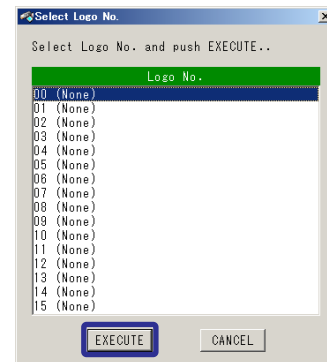
1. Select the logo data.

1. Press [CONDITION] and press [LOGO].

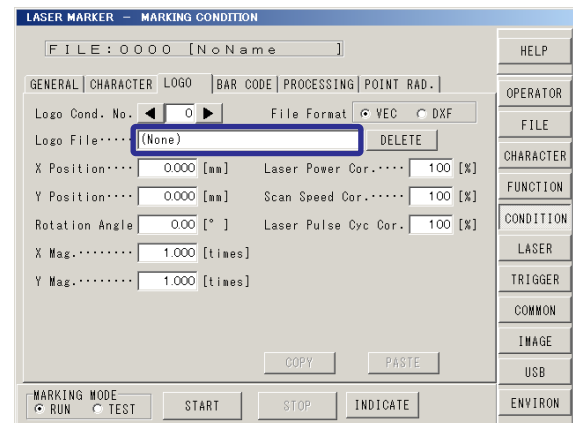


2. Select the logo No. 00, and then press [SET].

The logo No. is available to set from 0 to 15.



3. Press [Logo File].



4. Select the logo file from the list and press [SET].

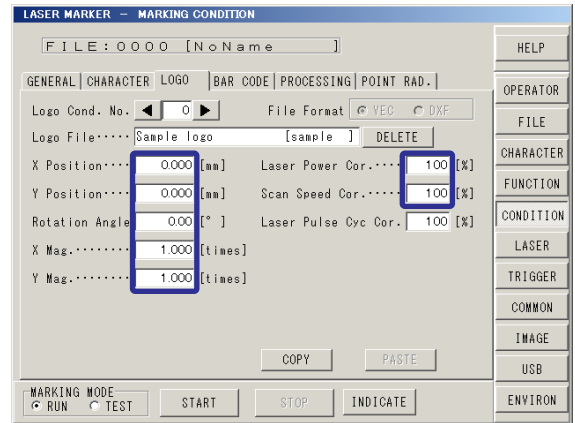


Reference

- The logo file created newly is required to register into the laser marker. Refer to “4-15 USB Media” (P.238) and “Logo Data Conversion Software Operation Manual”.
- As for the following file format data, BMP, DXF, JPEG, and HPGL, and art work made by Adobe® Illustrator® convert these data into the appropriate file format data using logo data conversion software or ExportVec, and then register the data into the laser marker. (DXF files are not required to be converted.) Refer to the “Logo Data Conversion Software Operation Manual”, “ExportVec Operation Manual” for details.

2. Set condition for logo.

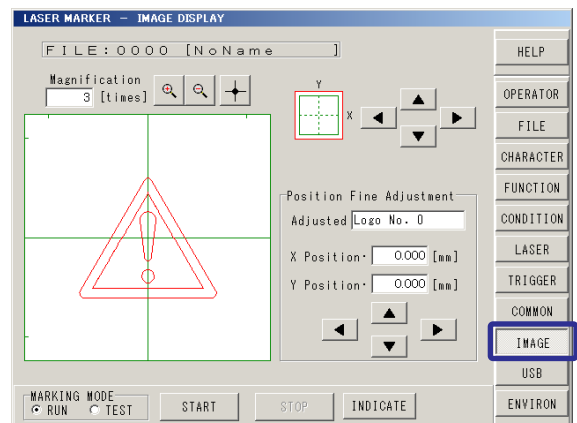
1. Set "1" to both [X Scale] and [Y Scale].
2. Set "0.000 mm" to [X Position].
Set "0.000 mm" to [Y Position].
Set "0.00 degree" to [Rotation Angle].
3. Set "100%" to [Laser Power Cor.] (Laser Power Correction).
Set "100%" to [Scan Speed Cor.] (Scan Speed Correction).



Reference

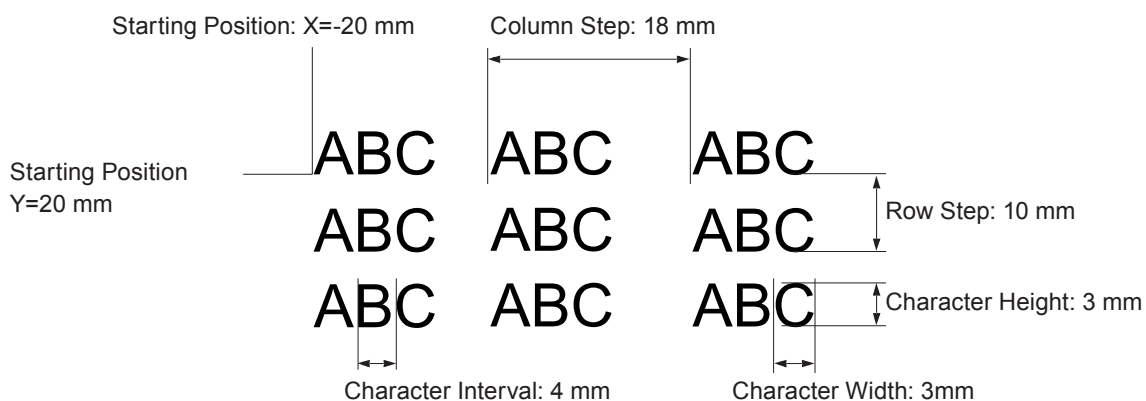
- To adjust the laser power and/or scan speed set in the laser setting screen only for the logo data, input the correction ratio in this screen. Refer to "Logo Condition" (P.184).

4. Press [IMAGE] to check the marking layout.

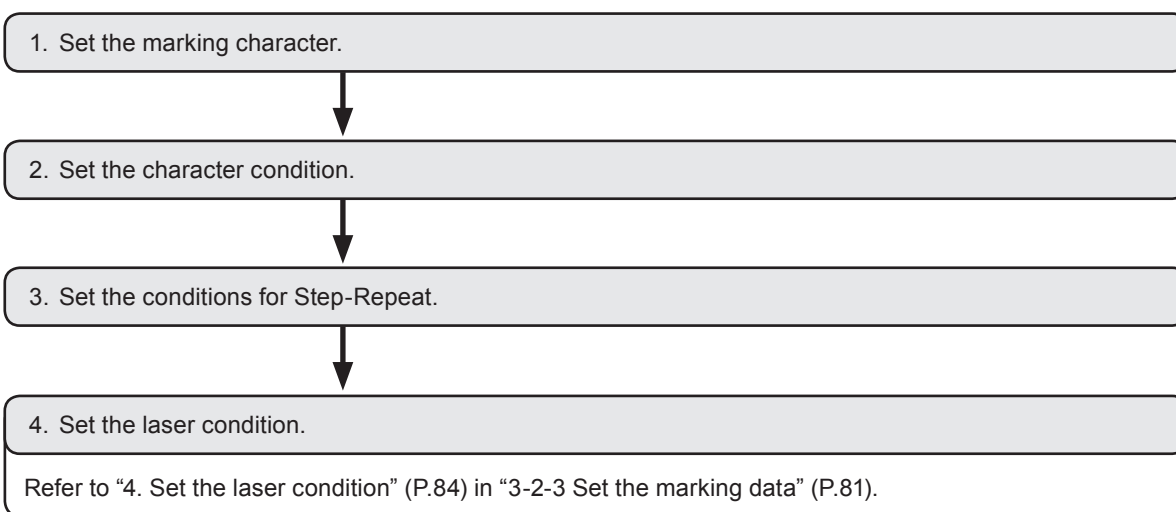


3-3-7 Mark Step & Repeat

Sample



Mark "ABC" in 3 columns and 3 rows.

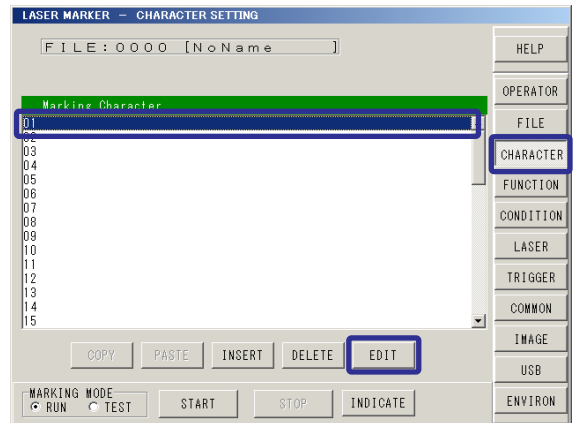


Reference

- For details, refer to "Step & Repeat" (P.173).

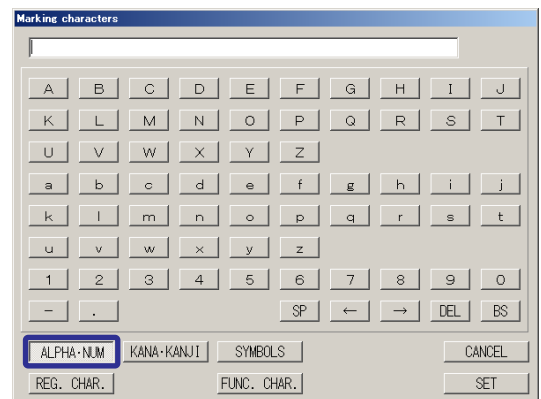
1. Set the marking character.

1. Press [CHARACTER].

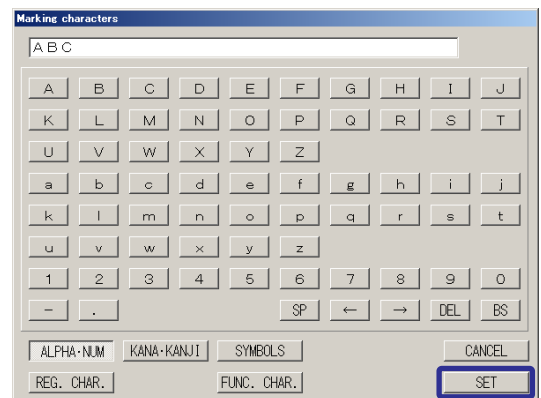


2. Select the first line (01), and press [EDIT].
Or double-click the first line (01).

3. Press [ALPHA•NUM].



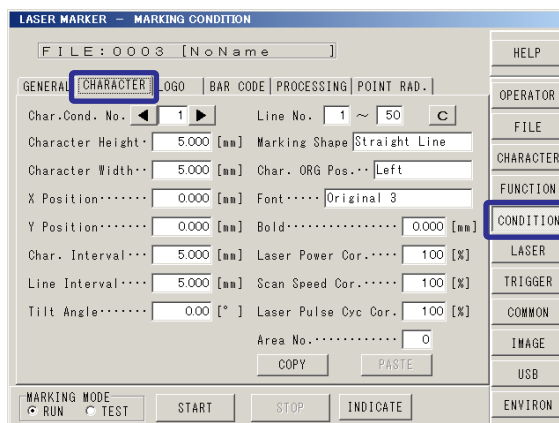
4. Input [ABC], and press [SET].



2. Set character condition.

1. Press [CONDITION].

Then, press [CHARACTER].



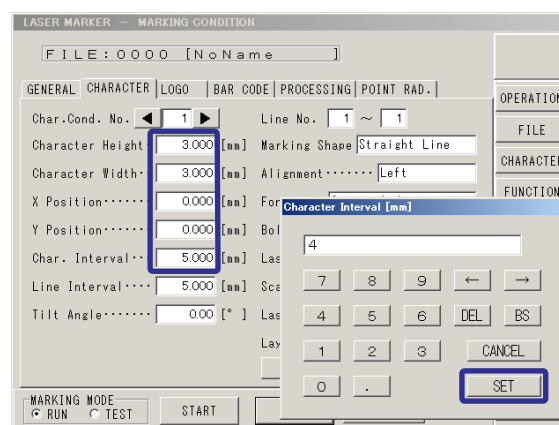
2. Set "3.000 mm" to [Character Height].

Set "3.000 mm" to [Character Width].

Set "0.000 mm" to [X Position].

Set "0.000 mm" to [Y Position].

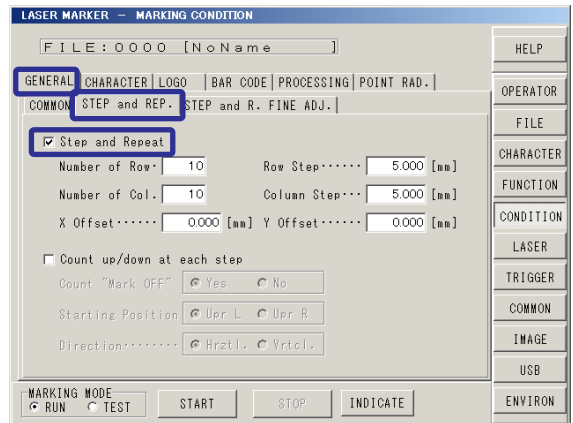
Set "4.000 mm" to [Char. Interval] (Character Interval).



3. Set the conditions for Step & Repeat.

1. Press [GENERAL].

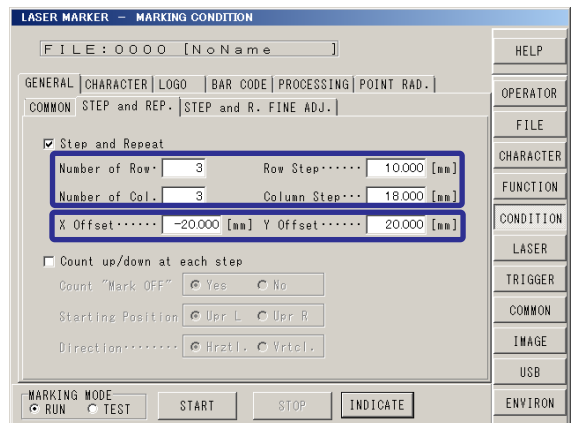
Then, press [STEP-REPEAT].



2. Check [STEP-REPEAT].

3. Set "3" to [Number of Row].

Set "3" to [Number of Col.] (Number of Column).



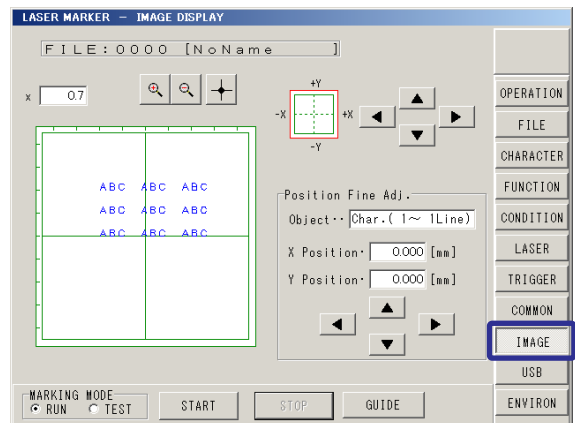
4. Set "10 mm" to [Row Step].

Set "18 mm" to [Col. Step] (Column Step).

5. Set "-20.000 mm" to [X Offset].

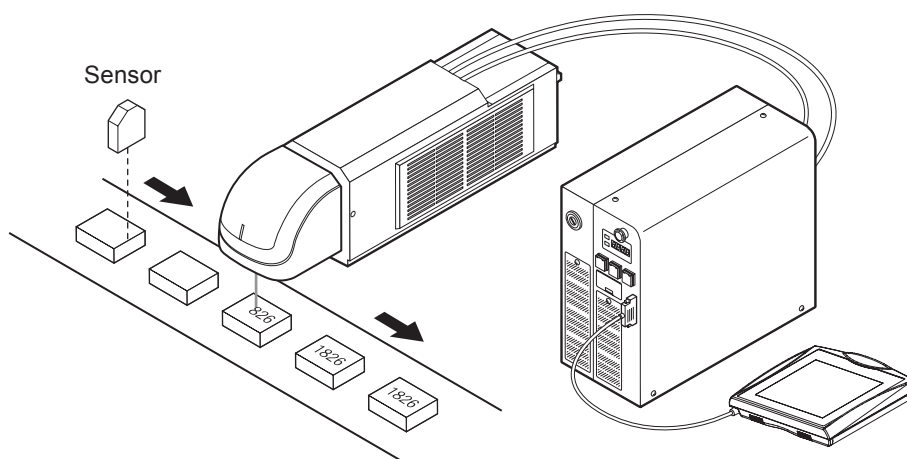
Set "20.000 mm" to [Y Offset].

6. Press [IMAGE] to check the marking layout.



3-3-8 Mark to Flying Object

Sample



The following shows the procedure for marking to flying object.

1. Input character and set the marking conditions.

Refer to "3-2-3 Set the marking data" (P.81).

2. Set the conditions of the on-the-fly marking.

The detail is described in "1. Set the conditions of the on-the-fly marking." (P.116).

3. Set the status of the laser marker into ready for receiving trigger.

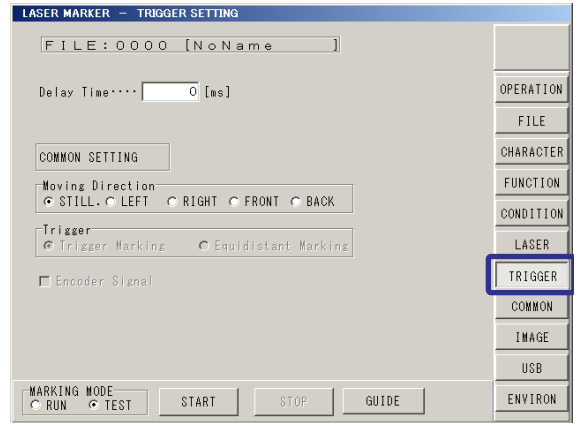
The detail is described in "2. Set the status of the laser marker into ready for receiving for trigger." (P.118).

Reference

- For details on marking on moving object, refer to "4-12-2 Marking to Flying Object" (P.217).

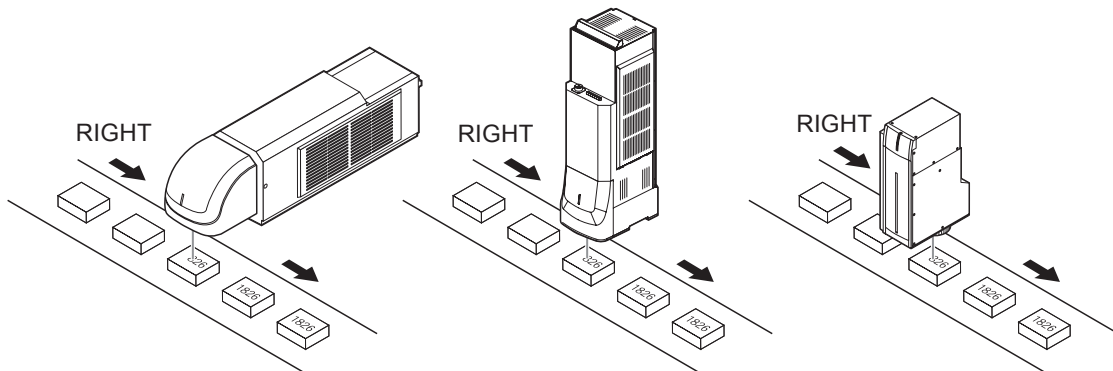
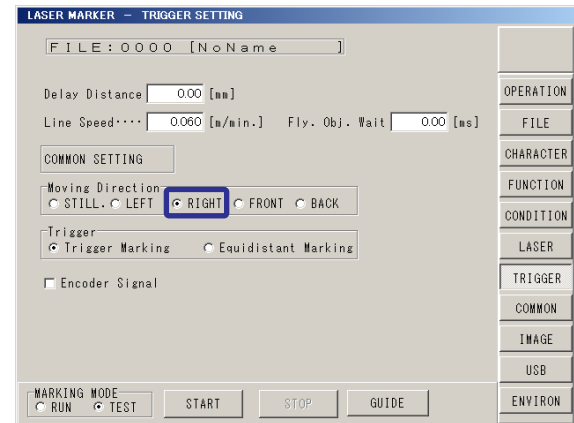
1. Set the conditions of the on-the-fly marking.

1. Press [TRIGGER].



2. Set "RIGHT" to [Moving Direction].

The work is marked to the direction shown in the following figure.



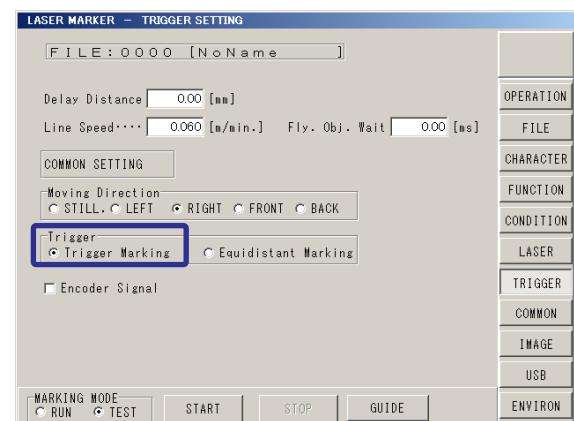
! Notice

- Set the marker head in vertical against the work flow direction.

Reference

- Refer to "4-12 Trigger Setting" (P.216) for the work moving direction.

3. Set "Trigger Marking" to [Trigger].

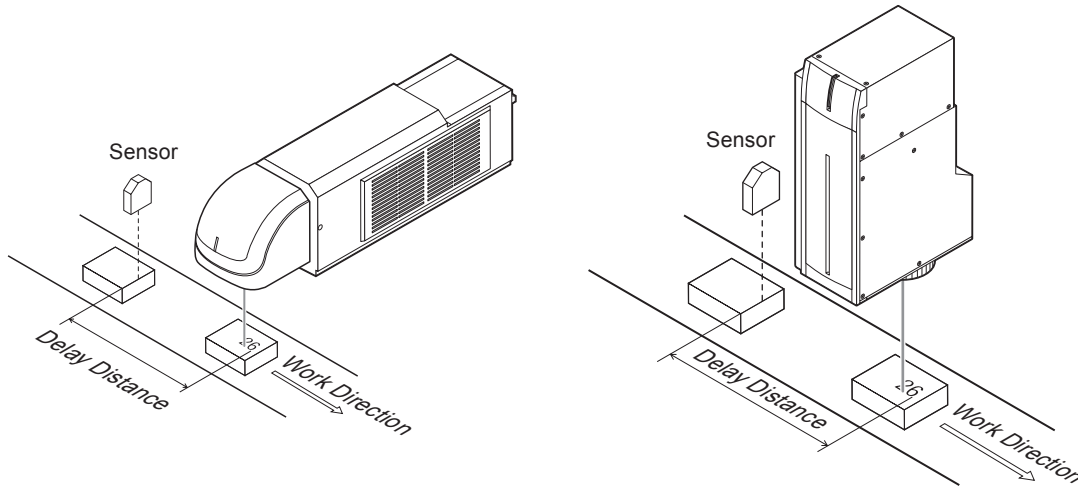
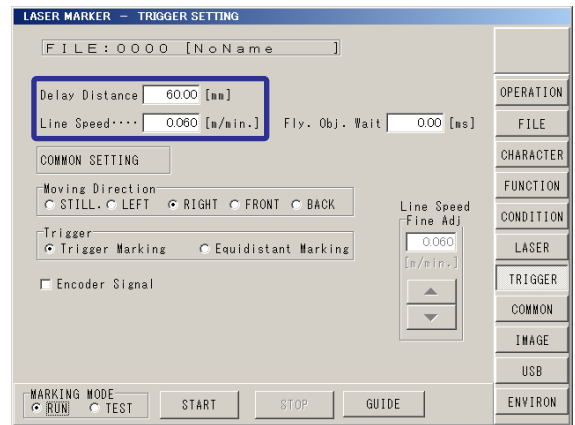


4. Set [Delay Distance].

Input the distance from sensor for trigger to the starting position of the marking using laser marker.
Here, set the distance to 60 mm.

5. Set [Line Speed].

Here, set the speed to 0.060 m/min.



! Notice

- Fine-adjust the delay distance by executing the test marking actually.

Reference

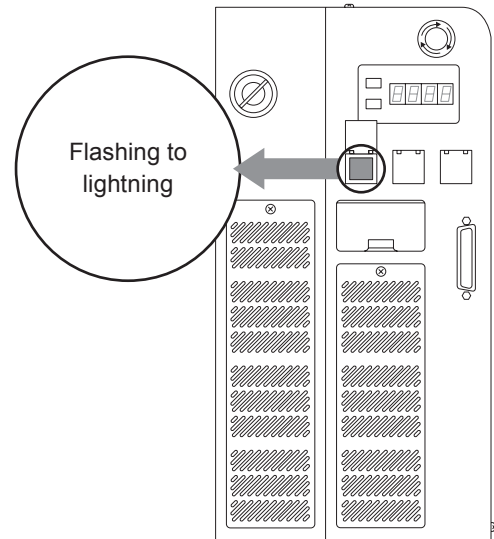
- When the line speed fluctuates, use [Encoder signal]. In such case, enter the number of encoder pulses. When the encoder is not used, marking on flying objects is executed by applying the calculation result based on the line speed already input.
For the encoder signal, refer to "Trigger Selection" (P.218).

2. Set the status of the laser marker into ready for receiving for trigger.

1. Press the laser pumping switch on the controller.

The laser pumping switch will be flashing in white. When the switch is changed from flashing to lightning up, the laser marker is ready for radiation.

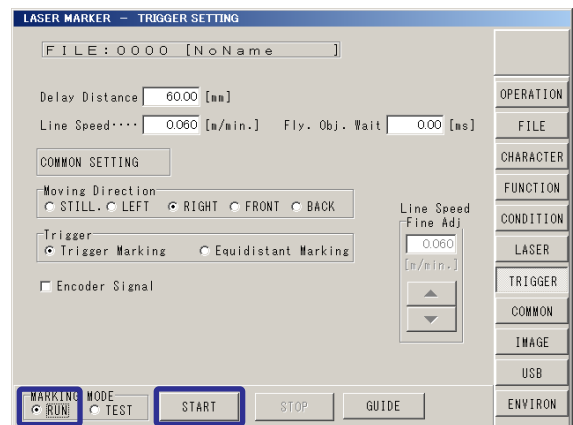
(Flashing time: approx. 20 sec.)



2. Set marking mode to [RUN].

3. Press [START].

The marking is started by inputting trigger.

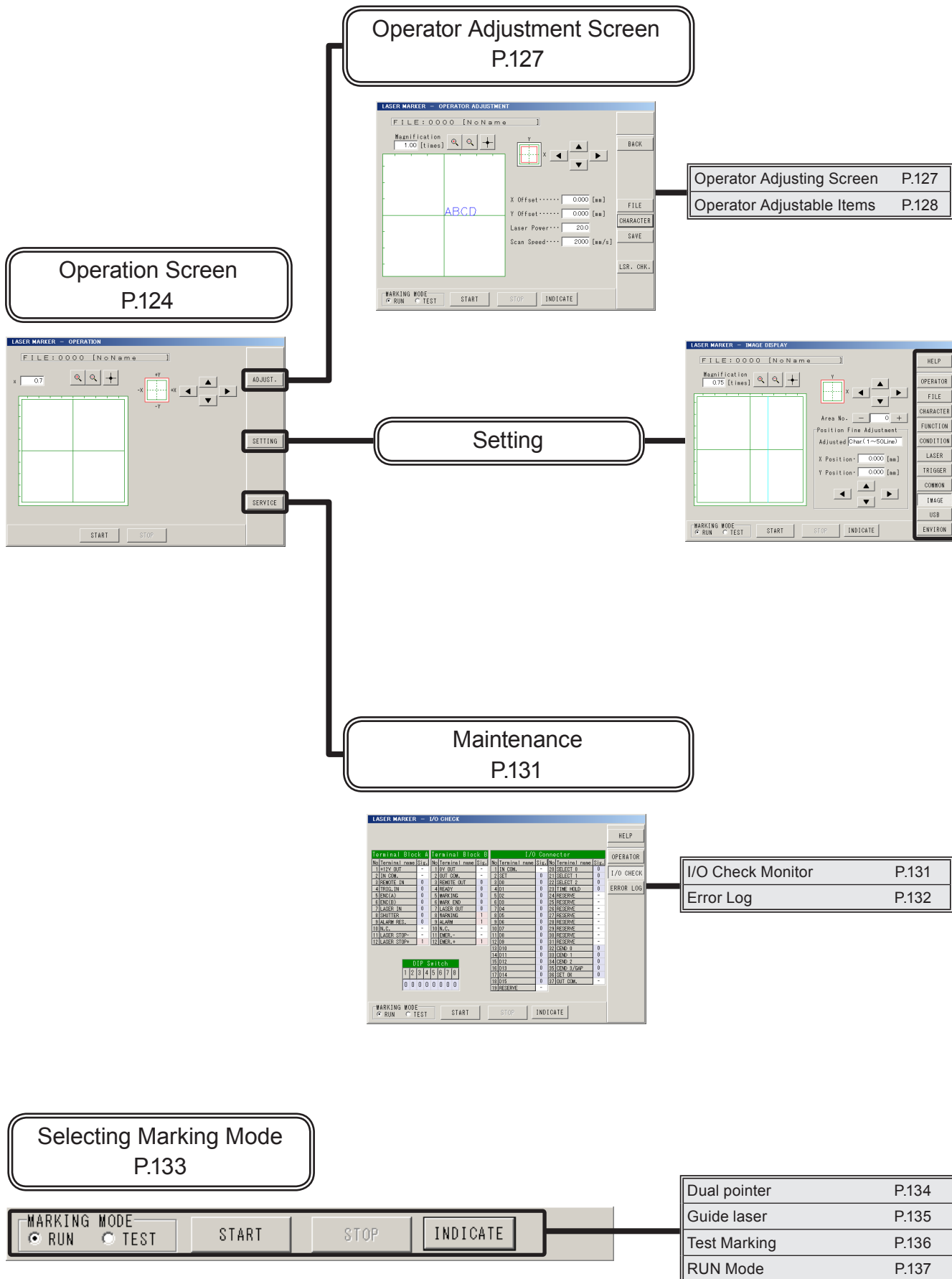


Reference

- Set the marking mode to “RUN” and press START. Then the internal shutter is opened and the laser marker is ready for receiving the trigger.
- For changing the status of the laser marker into ready for receiving trigger, set the marking mode to “REMOTE”, other than setting into “RUN” mode, and control the laser marker from the external. Refer to “External Control Manual” for details.

4 Description of Operation Screen

4-1 Screen Composition



Each button for selecting marking mode is displayed at the bottom of each screen in common. Note that the button for selecting marking mode is not displayed on the following screens, "Operation Screen", "USB media", and "Environment Setting".

<div style="border: 1px solid black; border-radius: 15px; padding: 5px; text-align: center;">FILE P.138</div> <div style="border: 1px solid black; border-radius: 15px; padding: 5px; text-align: center;">Character Setting P.143</div> <div style="border: 1px solid black; border-radius: 15px; padding: 5px; text-align: center;">Function Setting P.160</div> <div style="border: 1px solid black; border-radius: 15px; padding: 5px; text-align: center;">Marking Condition P.171</div> <div style="border: 1px solid black; border-radius: 15px; padding: 5px; text-align: center;">Laser Setting P.211</div> <div style="border: 1px solid black; border-radius: 15px; padding: 5px; text-align: center;">Trigger Setting P.216</div> <div style="border: 1px solid black; border-radius: 15px; padding: 5px; text-align: center;">Common Setting P.229</div> <div style="border: 1px solid black; border-radius: 15px; padding: 5px; text-align: center;">Image Display Screen P.236</div> <div style="border: 1px solid black; border-radius: 15px; padding: 5px; text-align: center;">USB Media P.238</div> <div style="border: 1px solid black; border-radius: 15px; padding: 5px; text-align: center;">Environment Setting P.250</div>	<table border="1"> <tr><td>Comment</td><td>P.138</td></tr> <tr><td>Change File No.</td><td>P.139</td></tr> <tr><td>Save</td><td>P.140</td></tr> <tr><td>Save to Different No.</td><td>P.141</td></tr> <tr><td>New Creation</td><td>P.142</td></tr> </table>	Comment	P.138	Change File No.	P.139	Save	P.140	Save to Different No.	P.141	New Creation	P.142			
	Comment	P.138												
	Change File No.	P.139												
	Save	P.140												
	Save to Different No.	P.141												
	New Creation	P.142												
	<table border="1"> <tr><td>Character Type</td><td>P.143</td></tr> <tr><td>Character Input</td><td>P.146</td></tr> <tr><td>Function Character</td><td>P.151</td></tr> </table>	Character Type	P.143	Character Input	P.146	Function Character	P.151							
	Character Type	P.143												
	Character Input	P.146												
	Function Character	P.151												
<table border="1"> <tr><td>Expiry Date</td><td>P.160</td></tr> <tr><td>Counter</td><td>P.162</td></tr> <tr><td>Lot</td><td>P.164</td></tr> <tr><td>Rank</td><td>P.166</td></tr> <tr><td>External Offset</td><td>P.168</td></tr> </table>	Expiry Date	P.160	Counter	P.162	Lot	P.164	Rank	P.166	External Offset	P.168				
Expiry Date	P.160													
Counter	P.162													
Lot	P.164													
Rank	P.166													
External Offset	P.168													
<table border="1"> <tr><td>General Condition</td><td>P.171</td></tr> <tr><td>Character Conditions</td><td>P.178</td></tr> <tr><td>Logo Condition</td><td>P.184</td></tr> <tr><td>Bar Code Condition</td><td>P.186</td></tr> <tr><td>Processing Condition</td><td>P.204</td></tr> <tr><td>Point Radiation Condition</td><td>P.209</td></tr> </table>	General Condition	P.171	Character Conditions	P.178	Logo Condition	P.184	Bar Code Condition	P.186	Processing Condition	P.204	Point Radiation Condition	P.209		
General Condition	P.171													
Character Conditions	P.178													
Logo Condition	P.184													
Bar Code Condition	P.186													
Processing Condition	P.204													
Point Radiation Condition	P.209													
<table border="1"> <tr><td>Setting Parameters</td><td>P.211</td></tr> <tr><td>Detail Adjustment (Laser Setting)</td><td>P.214</td></tr> </table>	Setting Parameters	P.211	Detail Adjustment (Laser Setting)	P.214										
Setting Parameters	P.211													
Detail Adjustment (Laser Setting)	P.214													
<table border="1"> <tr><td>Marking to Static Work</td><td>P.216</td></tr> <tr><td>Marking to Flying Object</td><td>P.217</td></tr> </table>	Marking to Static Work	P.216	Marking to Flying Object	P.217										
Marking to Static Work	P.216													
Marking to Flying Object	P.217													
<table border="1"> <tr><td>Common Character Setting</td><td>P.230</td></tr> <tr><td>Common Expiry Date</td><td>P.231</td></tr> <tr><td>Common Counter</td><td>P.232</td></tr> <tr><td>Common Lot</td><td>P.234</td></tr> </table>	Common Character Setting	P.230	Common Expiry Date	P.231	Common Counter	P.232	Common Lot	P.234						
Common Character Setting	P.230													
Common Expiry Date	P.231													
Common Counter	P.232													
Common Lot	P.234													
<table border="1"> <tr><td>Image Display</td><td>P.236</td></tr> <tr><td>Work Image Display</td><td>P.237</td></tr> </table>	Image Display	P.236	Work Image Display	P.237										
Image Display	P.236													
Work Image Display	P.237													
<table border="1"> <tr><td>Registration File</td><td>P.238</td></tr> <tr><td>Common File</td><td>P.239</td></tr> <tr><td>Logo File</td><td>P.240</td></tr> <tr><td>Font File</td><td>P.241</td></tr> <tr><td>Backup</td><td>P.246</td></tr> </table>	Registration File	P.238	Common File	P.239	Logo File	P.240	Font File	P.241	Backup	P.246				
Registration File	P.238													
Common File	P.239													
Logo File	P.240													
Font File	P.241													
Backup	P.246													
<table border="1"> <tr><td>Display Setting (Environment 1)</td><td>P.250</td></tr> <tr><td>System Setting (Environment 2)</td><td>P.255</td></tr> <tr><td>Communication, I/O Setting (Environment 3)</td><td>P.258</td></tr> <tr><td>Power check</td><td>P.262</td></tr> <tr><td>Output Simulation</td><td>P.264</td></tr> <tr><td>Adjustment of Touch Panel</td><td>P.265</td></tr> <tr><td>Language Selection</td><td>P.266</td></tr> </table>	Display Setting (Environment 1)	P.250	System Setting (Environment 2)	P.255	Communication, I/O Setting (Environment 3)	P.258	Power check	P.262	Output Simulation	P.264	Adjustment of Touch Panel	P.265	Language Selection	P.266
Display Setting (Environment 1)	P.250													
System Setting (Environment 2)	P.255													
Communication, I/O Setting (Environment 3)	P.258													
Power check	P.262													
Output Simulation	P.264													
Adjustment of Touch Panel	P.265													
Language Selection	P.266													

4-2 Functional Description

Functions	Outline
Marking order optimizing	This allows rearranging of marking order of characters to shorten the time required for marking.
Intersection offset	This keeps the intersection points of characters from being engraved too deeply.
Counter marking	The marking is performed sequentially according to the counter conditions you set. (Count-up/Count-down)
Current date marking	This allows marking of current date or time.
Expiry date marking	This allows marking of date or time calculated by adding the specified period/time to the current date or hour.
Lot marking	This allows marking by replacing the current (expiry) date, time, and counter value with specified character string for marking.
Time hold input	The time hold signal equipped in I/O connector keeps the time and date at the timing of its ON input. By following the holding time, the functions based on the clock, such as current date, expiry date, lot and counter reset at updating operate.
Logo data marking	This allows marking of the drawing data in DXF/HPGL/BMP/JPEG/AI/EPS form. (DXF format data may be directly imported into the laser marker. Other data needs to be converted using the attached software in advance.)
Barcode marking	Marking of various bar codes, 2D codes and composite codes is possible. Inputting character data will automatically generate a bar code.
Processing Performance function	Specify the coordinates for "Straight Line", "Circle", or "Arc", and radiate the laser.
Arbitrary Point Irradiation Function	Specify the coordinates for "Point" and exposure time, and radiate the laser.
Flying Object marking function	Marking following the moving target object is possible according to the specified line speed and encoder signal.
Step & Repeat	This allows marking of character string in matrix state by specifying the numbers of Row/Column and the Intervals.
Over-marking	Overlapping marking is done according to the specified overwriting frequency and interval.
Rank marking	A number of character strings are registered in the data table, and marking is done by switching with the I/O signals.
External offset (X/Y)	A number of marking coordinates are registered in the data table, and marking is done by switching with the I/O signals.
Serial data marking	Marking is performed, changing the marking character string using communication command.
Bold character marking	Mark a character string in bold.
Marking shape setting	This allows for selection of marking shapes: "Straight Line", "Proportional", "Justify", and "Fan like form".
Font selection	This allows for selection of registered fonts for marking character (alphanumeric). Fonts can be newly created and edited with the attached software.
Marking image display	This allows displaying of characters or graphic to be marked on the image screen.
Guide laser function *1	The marking position can be checked with the red guide laser. (Marking area, and character string to be marked)
Dual pointer function *1	The work distance can visually be confirmed using the guide laser and laser pointer.

Functions	Outline
Marking time measurement	Measures the period of marking. Marking laser is not irradiated during this operation.
Laser Setting	Laser power, scan speed and laser pulse cycle (only LP-V series) can be specified for each setting file. Corrections can be made on a marking condition basis such as characters, logos, bar codes, etc.
I/O check monitor	The I/O state of terminal and I/O connector can be monitored.
Output simulation	Turn ON/OFF the output signals of laser marker on simulation. Check for proper connection to external device.
Error history display	For up to 64 errors, details of each error, and date and time of occurrence can be displayed.
Operator adjustment	Adjustment items available to operators can be specified.
Laser power check *1, *2	Measure the current value of laser power in comparison with the default value. (The value is displayed with [%].)
Focus adjustment function *3	The focal length can be adjusted manually with the adjustment control in the head. <Adjustable width> <ul style="list-style-type: none"> • LP-430(T)U / LP-420S9(T)U / LP-410(T)U: Approx. ± 3 mm • LP-431(T)U / LP-421S9(T)U / LP-411(T)U / LP-V10U: Approx. ± 2 mm • LP-435(T)U / LP-425S9(T)U: Approx. ± 4 mm • LP-V15U: Approx. ± 7 mm • LP-W052U: Approx. ± 0.7 mm

*1 : The function should be used as the guide. They are not the completely corrected values.

*2 : Only for LP-V / LP-W series. This function is not included in LP-400 series.

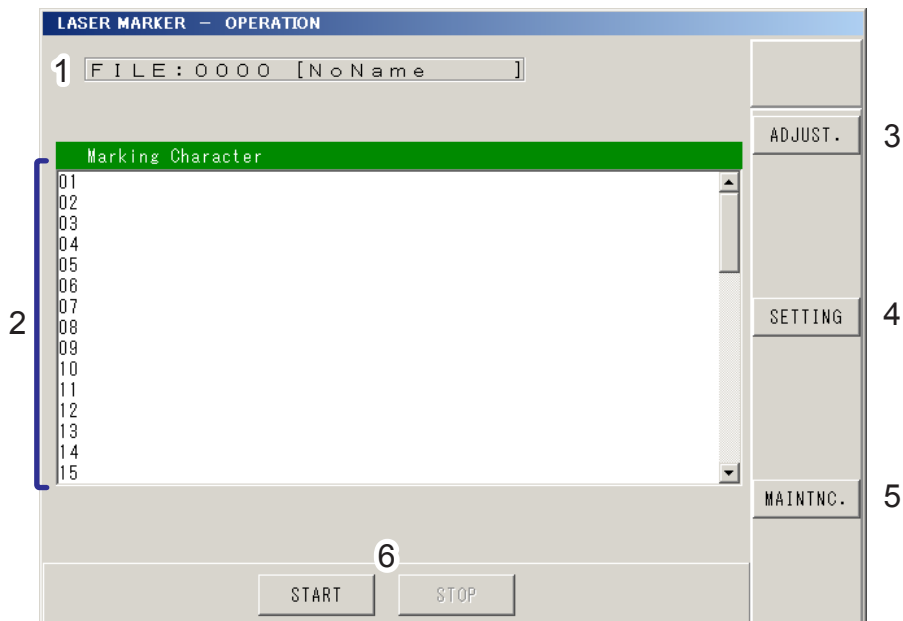
*3 : There are following precautions to use the focus adjustment function:

- Optimal marking conditions may vary depending on marking object materials and desired marking quality.
- Marking position may be deviated relative to the guide laser radiation position.

4-3 Operation Screen

On the operation screen marking contents can be confirmed under the remote control mode of run mode. Refer to “4-16-1 Display Setting (Environment 1)” (P.250) for the setting of the displayed contents in Operation screen.

4-3-1 Character Display



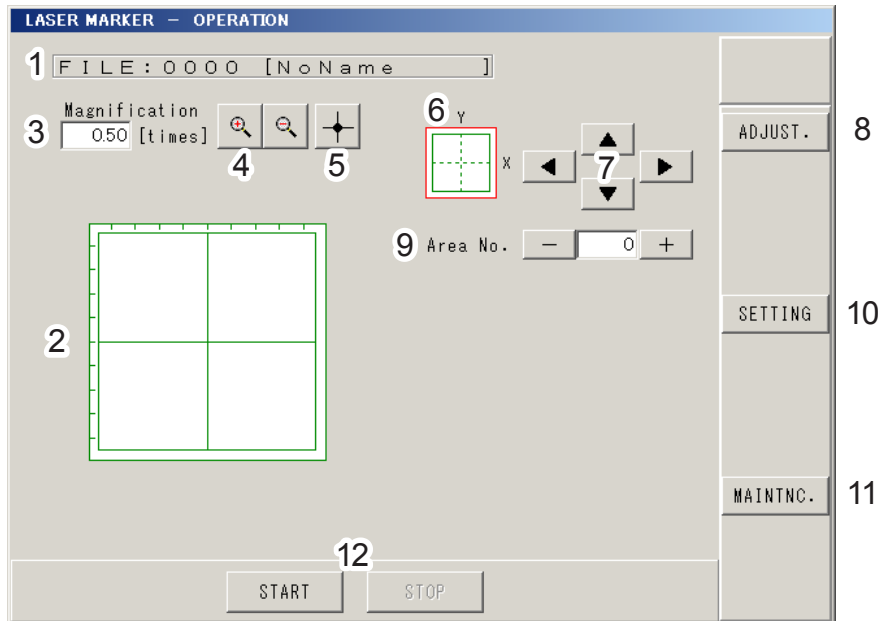
Description

- | | |
|---|---|
| 1 | FILE:
Displays selected file No. and file name. |
| 2 | Marking Character:
Displays marking character string to be marked. |
| 3 | ADJUST. (Operator Adjustment):
Shifts to operator adjustment screen. |
| 4 | SETTING:
Shifts to each setting screen. |
| 5 | MAINTNC. (Maintenance):
Shifts to Maintenance screen. |
| 6 | START/STOP
Starts or stops RUN mode.
Under RUN mode, marking (laser emission) starts by setting ON the trigger input of the I/O terminal. |

Reference

- The marking contents of the function character for date, lot, counter, etc. can be displayed with the functional characters at each marking. Refer to “4-16-1 Display Setting (Environment 1)” (P.250)” for the display setting during the operation.

4-3-2 Image Display



Description

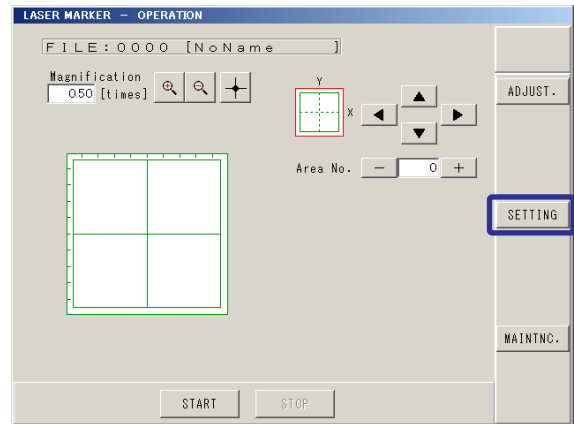
- | | |
|----|--|
| 1 | FILE:
Displays selected file No. and file name. |
| 2 | Image Display:
Displays image to be marked. |
| 3 | Magnification:
Sets the magnification ratio of the image display. The display magnification can be specified by pressing numeric. |
| 4 | Zoom-in / Zoom-out of Image Display :
Zooms in/out image display. The image can be zoomed in and out by 18 steps. |
| 5 | Center of Image Display :
Set the origin center to image display position. |
| 6 | Image Display Position :
Indicates where the current image is in the marking field. |
| 7 | Shift Display Position :
Shifts image display position up and down, left and right. Pressing arrow shifts the image display position. |
| 8 | ADJUST. (Operator Adjustment) :
Shifts to operator adjustment screen. |
| 9 | Area No.:
Displayed when marking on-the-fly is set in "Trigger setting". It indicates the order of the marking field for the concatenated marking to flying object.
Press [+] [-] for switching Area No., and then the image corresponding to Area No. is displayed. |
| 10 | SETTING :
Shifts to each setting screen. |
| 11 | MAINTNC.(Maintenance) :
Shifts to Maintenance screen. |
| 12 | START/STOP
Starts or stops RUN mode.
Under RUN mode, marking (laser emission) starts by setting ON the trigger input of the I/O terminal. |

4-3-3 Password to Open the Setting Screen

When the password is input on the environment setting screen, the password is required to open the setting screen from operation screen. This is a protection not to change the marking conditions without permission. Refer to “4-16-1 Display Setting (Environment 1)” (P.250).

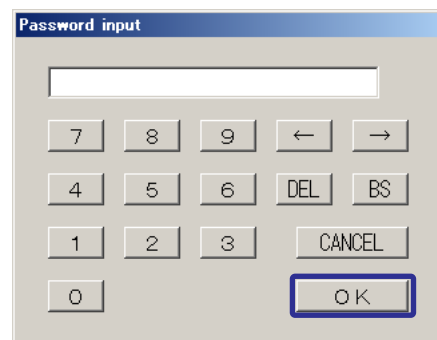
1. Press [SETTING].

The input window for password is appeared.



2. Input the password and press [OK].

The screen can be shifted to setting screen.



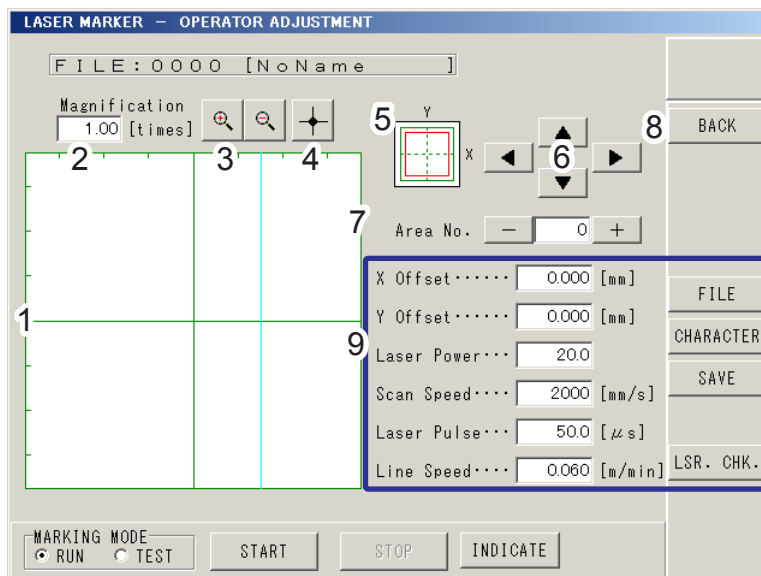
Reference

- If you forget the password, refer to “When password is forgotten” (P.253).

4-4 Operator Adjustment Screen

The operator adjustment screen is the screen that the operator can change or set only the permitted items. Set the selecting item of the marking condition to be adjusted by operator following to the procedure described in “4-16-1 Display Setting (Environment 1)” (P.250).

4-4-1 Operator Adjusting Screen



Description

- | | |
|---|--|
| 1 | Image Display:
Image-displays the marking content set previously. |
| 2 | Magnification:
Sets the magnification ratio of the image display. |
| 3 | Image Display Zoom-in/Zoom-out :
Zooms in/out image display. The image can be zoomed in and out by 18 steps. |
| 4 | Center of Image Display:
Set the origin center to image display position. |
| 5 | Image Display Position:
Indicates where the current image is in the marking field. |
| 6 | Shift Display Position:
Shifts image display position up and down, left and right. Pressing arrow shifts the image display position. |
| 7 | Area No.:
Displayed when marking on-the-fly is set in “Trigger setting”. It indicates the order of the marking field for the concatenated marking to flying object.
Press [+] [-] for switching Area No., and then the image corresponding to Area No. is displayed. |
| 8 | BACK:
Returns to operation screen. |
| 9 | Changeable Items:
The items that are permitted in “4-16-1 Display Setting (Environment 1)” (P.250) are displayed.
For the setting items, refer to “4-4-2 Operator Adjustable Items” (P.128). |

4-4-2 Operator Adjustable Items

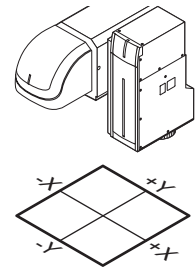
Select the items to give the permission of setting change in the environment setting screen of “4-16-1 Display Setting (Environment 1)” (P.250).

Description of Changeable Items

X/Y Offset:

Sets X and Y offset values.

Setting Range	-45.000 to +45.000 mm	(LP-V10)
	-55.000 to +55.000 mm	(LP-430 / LP-420 / LP-410)
	-80.000 to +80.000 mm	(LP-435 / LP-425 / LP-V15)
	-27.500 to +27.500 mm	(LP-431 / LP-421 / LP-411 / LP-W052)



Laser Power:

Sets the laser power.

Setting Range	0.5 to 100.0
---------------	--------------

Scan Speed:

Marks value of scan speed.

Setting Range	1 to 12000 mm/s	(LP-430 / LP-420 / LP-410 / LP-435 / LP-425 / LP-V10 / LP-V15)
	1 to 6000 mm/s	(LP-431 / LP-421 / LP-411 / LP-W052)

Pulse Cycle (Only LP-V series):

Sets the laser pulse cycle.

Setting Range	10.0 to 50.0 μ s
---------------	----------------------

Line Speed / Line Speed Fine Adjustment:

Sets the line speed for marking to flying object.

Displayed with the setting of the marking to flying object without encoder. The fine adjustment of the line speed can be set after starting the marking in run mode.

Setting Range	0.060 to 240.000 m/min	(LP-430 / LP-420 / LP-435 / LP-425 / LP-V10 / LP-V15)
	0.060 to 170.000 m/min	(LP-410)
	0.060 to 120.000 m/min	(LP-431 / LP-421 / LP-W052)
	0.060 to 85.000 m/min	(LP-411)

Encoder Fine Adjustment :

Displayed with the setting of the marking to flying object with encoder. It is available after starting the marking in run mode.

Setting Range	5.00 to 600.00 Pulse/mm
---------------	-------------------------

FILE:

Selects file No. Refer to “4-7-2 Change File No.” (P.139) for setting method.

CHARACTER :

Set the marking characters in the lines that are permitted in the environment setting. Refer to “4-8-2 Character Input” (P.146) for setting method.

SAVE:

Overwrites and registers the items changed on operator adjustment screen.

Refer to “4-7-3 Save” (P.140).



Laser Check :

Radiates the laser to the center of marking field by laser power set.

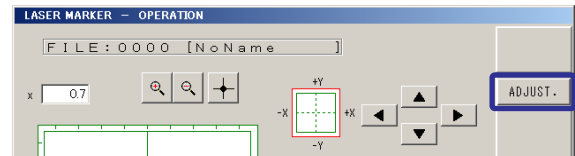
Refer to “Laser Check” (P.129)

■ Laser Check

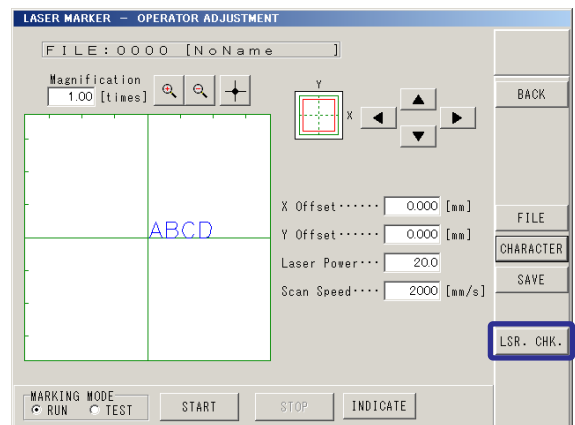
Execute the laser check when measuring the laser power to be applied for radiation using power meter.

 WARNING	 <ul style="list-style-type: none"> • Be sure to use the protective goggle and enclosure during radiating laser. • During the radiation, the laser energy is concentrated to one point. Use due caution with long period radiation, it may cause a fire or damage to the object. • Once the laser check is started, the radiation will not be interrupted until [Stop] is pressed.
--	--

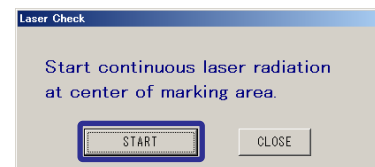
1. Press [ADJUS.] in the operation screen.



2. Press [LSR.CHK. (Laser Check)].

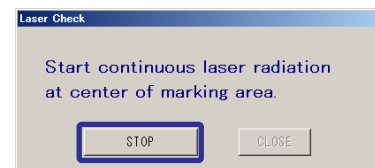


3. By pressing [START] laser will be radiated to the central of marking field.





4. The laser radiation is stopped by pressing [STOP].

Even without “stop” or “interrupt” command, the laser radiation automatically stops after about one minute and the shutter is closed.



Reference

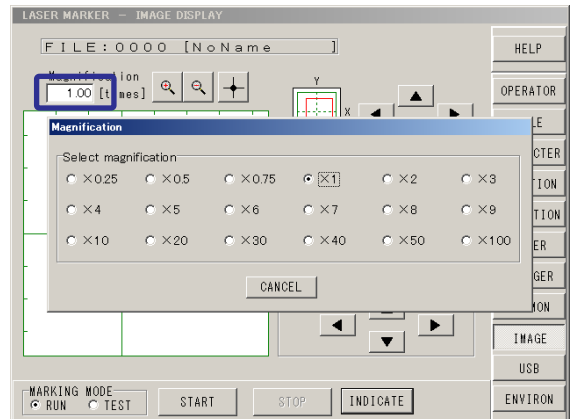
- Use the laser check function when measuring the laser power output with the commercially available laser power meter.
- When the laser it needs to radiate the laser only to one point for the purpose of the laser marker being performed as the processing device, use the arbitrary point radiation function. Refer to “4-10-6 Point Radiation Condition” (P.209).
- In laser check function, only the following settings are valid.
 - Laser power
 - Laser pulse cycle (only LP-V / LP-W series)
 - Duty cycle (only LP-W series)
 - Laser frequency (only LP-400 series)
 - Power offset in system offset setting

 CAUTION	 <ul style="list-style-type: none"> • For the laser power measurement, use a laser power meter that has the damage threshold (max. power density) of more than 10 kW/cm². • The laser detector diameter of the laser power meter should be more than 10 mm. • Place the detector of the laser power meter at the one-third to half of the specified work distance of the laser marker. Do not place the power meter detector at the focal point (specified work distance) of the laser marker. It may cause damage to the power meter.
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■ Magnification Specification of Image Screen

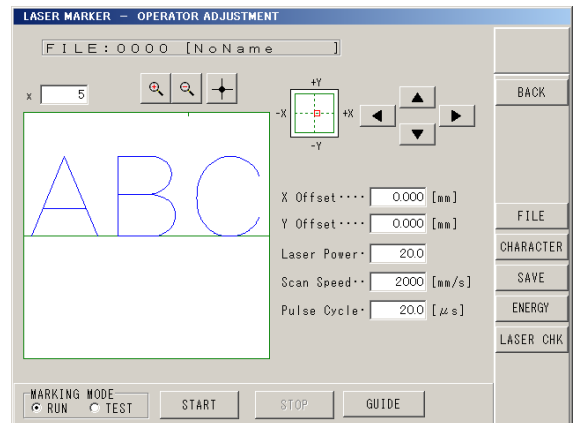
1. Press numeric of magnification.

The list of magnification is appeared.
Select the desired magnification among them.



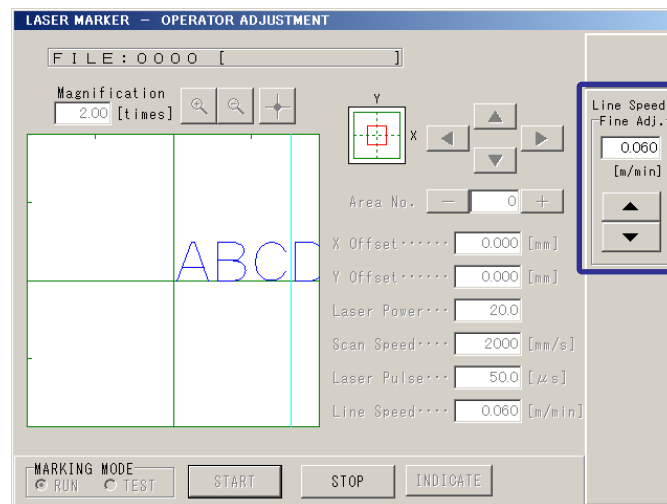
2. The image zoomed with the selected magnification is displayed.

The image display is shifted by pressing arrow for shift display position.



■ Setting Method for Fine Adjustment of Line Speed

The fine adjustment of the line speed can be set after starting the marking in run mode when selecting marking for flying object not using encoder under trigger setting ("4-12 Trigger Setting" (P.216)). With this setting, the fine adjustment of the line speed can be executed marking to flying object on the line in actual.



Description

Line Speed Fine Adj. (Fine Adjustment) :

Fine-adjusts the line speed by pressing ▼▲.

- When the character is extended, press ▲ for increasing the setting speed.
- When the character is shrunken, press ▼ for decreasing the setting speed.

4-5 Maintenance

In the Maintenance screen, the following status of the laser marker are displayed.

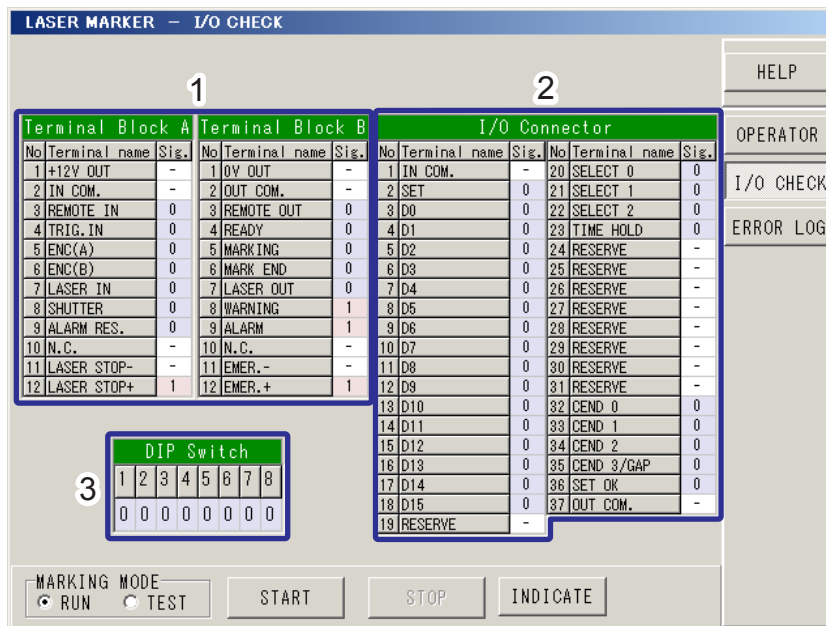
- On/off status of I/O terminals
- Error log of the laser marker

4-5-1 I/O Check Monitor

The ON / OFF status of the I/O signals and DIP switch can be confirmed on this screen.

When the signal is ON status: "1" is displayed.

When the signal is OFF status: "0" is displayed.



Description

- I/O Terminal Monitor:**
Enables to check the ON/OFF state of the input and output terminal.
- I/O Connector Monitor:**
Monitors the ON/OFF state of I/O connector.
- DIP Switch Monitor:**
Monitors the ON/OFF state of DIP switch.

Notice

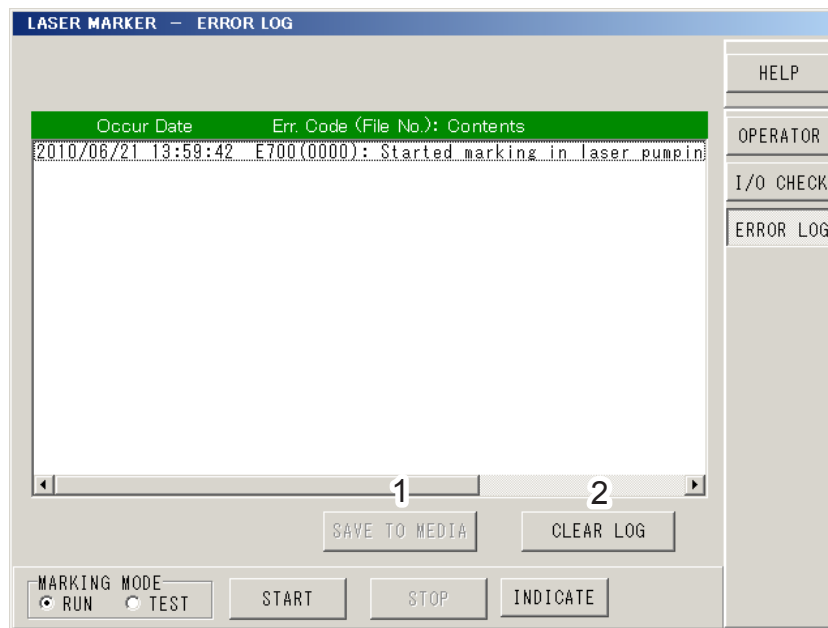
- The signals represented by "RESERVE" are prepared for "system reserved". Do not connect anything. (The status is displayed with "-".)

Reference

- The I/O monitor updates the I/O state every 20 ms. Note that the I/O monitor in remote status updates every 200 ms.
- The name of each signal may vary depending on laser marker model. Refer to "External Control Manual".
- When the setting value of the one-shot output time is short, it might not update on I/O check monitor. To check the update status of the one-shot output on the I/O check monitor, set larger value to the one-shot output time. Refer to "4-16-3 Communication, I/O Setting (Environment 3)" (P.258).

4-5-2 Error Log

The screen displays error log consisting of up to 64 latest errors and their details. The error log is displayed on that had occurred in the past (Maximum:64) .



Description

- 1 SAVE TO MEDIA:**
Press [SAVE TO MEDIA] to save the recorded error log into the USB media.
Insert the USB media into the controller, select directly and press [SAVE].
- 2 CLEAR LOG:**
Press [CLEAR LOG] to delete all error logs recorded.

Reference

- The oldest error logs is deleted sequentially to be replaced with the latest one after the log exceeds 64 records.
- Some warning errors such as E800, E811 and alarm errors caused by system problem cannot be recorded in this error log.

4-6 Selecting Marking Mode

The marking mode is set on the operation screen for the following cases; test marking mode, starting and stopping guide laser and dual pointer using.



Description

- 1 **MARKING MODE:**
Selects mode from either RUN or TEST.
In Operation screen, only RUN mode is available.
- 2 **START:**
Starts marking in the selected mode at "1".
- 3 **STOP:**
Stops marking.
- 4 **INDICATE:**
Displays the operating status of dual pointer and guide laser.
In Operation screen, Guide indication is not available.

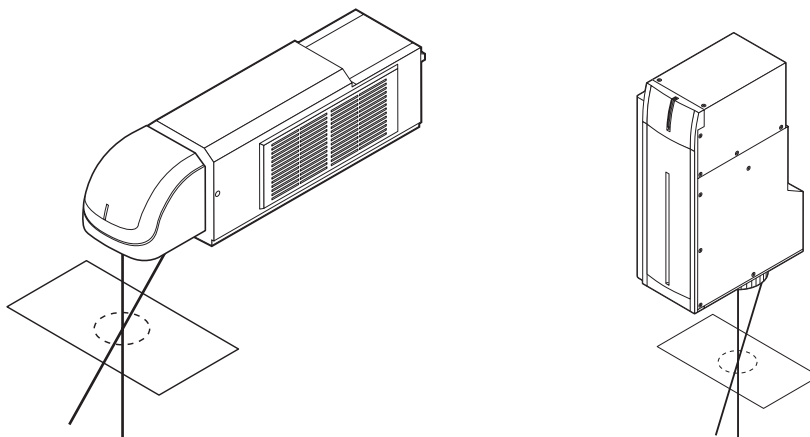
4-6-1 Dual pointer

Dual pointer shows the rough indication of the work distance (distance from the head base to the marking surface). It displays the red point emitted in oblique and the red cross emitted perpendicularly from the head. The distance where the laser point is closest to the center of the cross represents the guide of the work distance.

Depending on the required marking quality or installation condition including the focus adjustment usage, the dual pointer may show not always the appropriate work distance. Confirm the marking quality with the work distance indicated by the dual pointer and adjust it accurately as appropriate.

! Notice

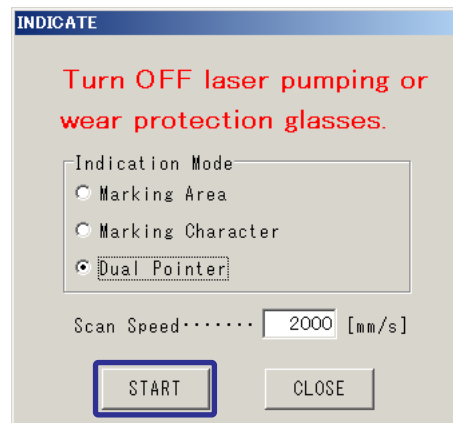
- Use the dual pointer only as the guideline. For obtaining the appropriate marking quality, fine adjust the distance from the work after marking on an actual object and referring to its marking positions.



1. Press [INDICATE].



2. Select [Dual Pointer], and press [START].



3. The dual pointer is disappeared by pressing [STOP].

The guide indication is stopped automatically after 1 minute.



Reference

- The dual pointer is adjusted according to the distance from the work defined at the factory. When the work distance is changed by the focus adjustment function, dual pointer does not move with this function, so it cannot be used as the work distance guide.

4-6-2 Guide laser

The red LD guide laser traces the marking content, marking image of the work, and marking field set previously. The position of the marking object is easy to be adjusted using the guide laser function.

Reference

- Guide laser cannot trace the marking characters for the moving object. If the marking for moving object is set, the guide laser operates same as the static marking.
- Guide laser is enabled when "LASER STOP" is input from the terminal block.

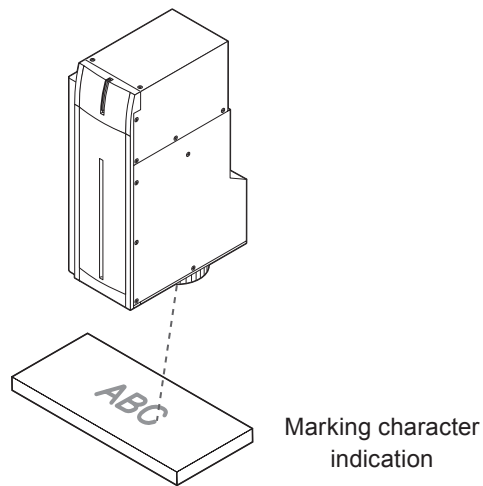
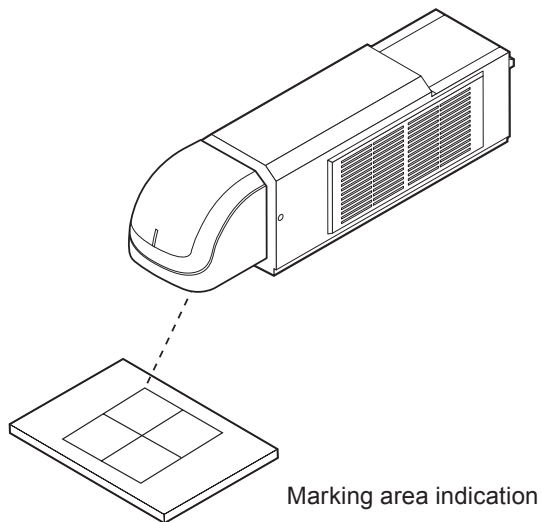
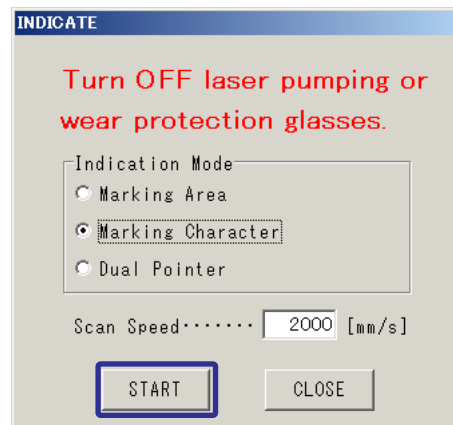
1. Press [INDICATE].



2. Select the indication mode and press [START].

- Marking area
- Marking character

The scan speed (tracing speed) of guide laser can be changed by pressing the entry field of "Scan Speed".



3. The guide laser is stopped by pressing [STOP].

The guide indication is stopped automatically after 1 minute.



4-6-3 Test Marking

The test marking is performed one time by pressing “TEST” starting button with the marking condition set previously.

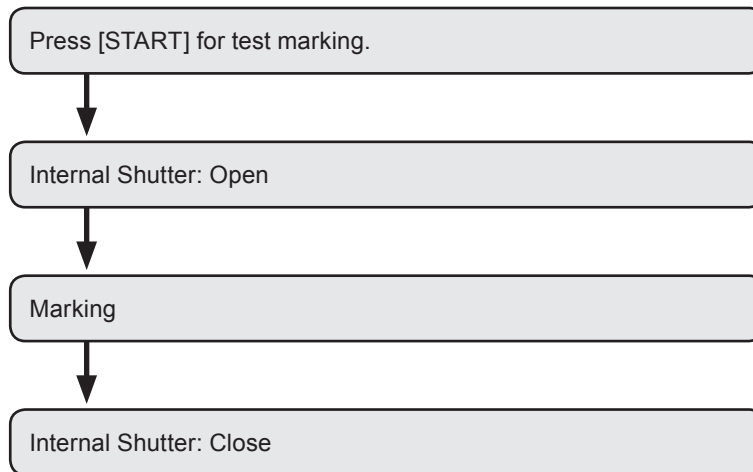
1. Press the laser pumping switch on the controller.

2. Set the marking mode into [TEST].



3. The marking is started by pressing [START].

The laser marker is performed the following procedure.



Reference

- The counter does not activate at test marking.

WARNING



- Once starting the test marking, the laser radiation cannot be stopped till the marking is finished. If the operator needs to stop the laser radiation immediately, press the emergency stop switch.

4-6-4 RUN Mode

When the laser marker is activated in RUN mode, the Internal shutter is opened, and the laser marker is ready for receiving trigger from external.

Before starting RUN mode, set the parameters in “4-12 Trigger Setting” (P.216).

1. Set the marking mode into [RUN].

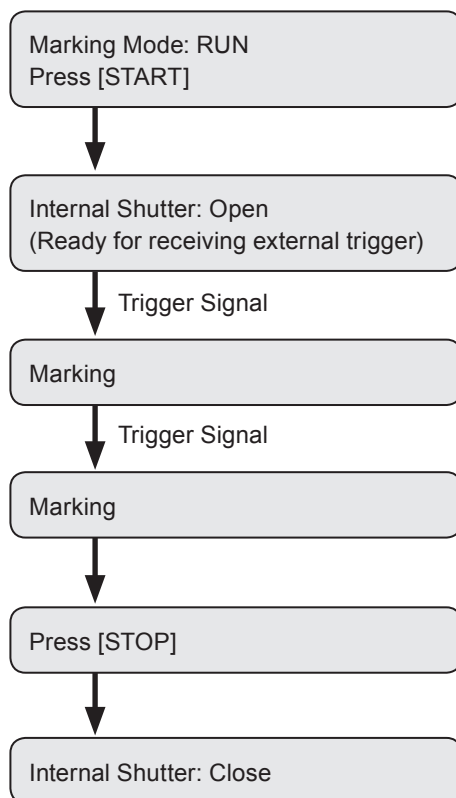


2. The internal shutter of the laser marker is opened by pressing “START”, and the laser marker is ready for receiving trigger from external.

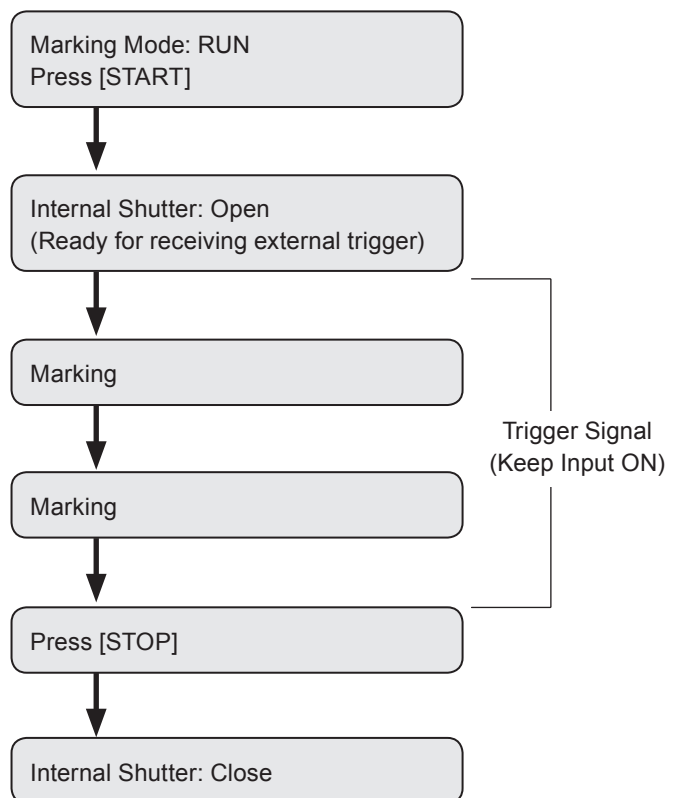
When pressing [STOP], the Internal shutter is closed, and the marking is finished.

The laser marker is performed the following procedure.

Trigger Marking to Still or Flying Object



Equidistant Marking to Flying Object



Reference

- When pressing [STOP] during marking, the internal shutter is closed after finishing marking all contents, and then RUN mode is finished.
- Before starting the run mode, turn ON the laser pumping.

4-7 FILE

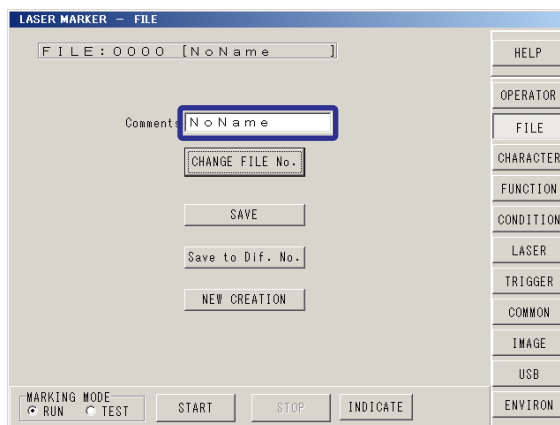
This screen is prepared for registering file into inner of laser marker and changing file No.

The file can be registered by two methods, overwriting and registering to other No. Registering in wrong method could delete the content already registered. Take care of the registering method.

4-7-1 Comment

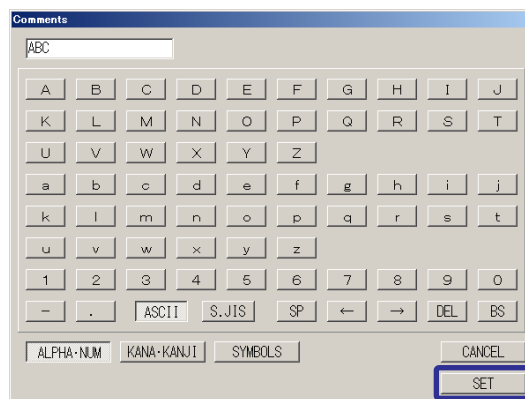
Register the file name into the laser marker with the following procedure. Each file can be registered the file name with the following procedure.

1. Press the character string of the Comments.



2. Input the comment, and press [SET].

Refer to "4-8-2 Character Input" (P.146) for setting method.



Reference

- Characters that can be used for input are as follows:
Capital and small letters of alphabet, numerics, Katakana, Hiragana, Kanji (JIS level-1 and JIS level-2), symbols.
- Up to 20 characters can be input in case of inputting all single-byte (ASCII) letter.

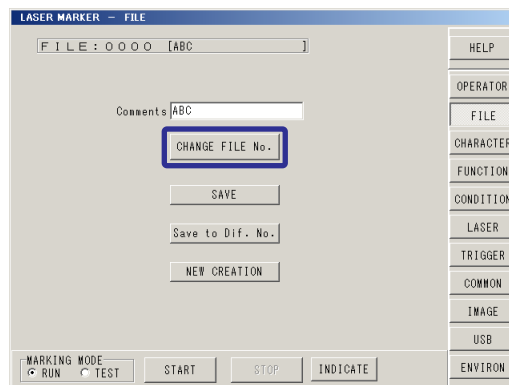
4-7-2 Change File No.

Change the file No. to be displayed with the following procedure.

1. Press [CHANGE FILE No.].

When the contents of the current opened file is changed, the check window whether to save/not save changed content is appeared. When selecting [Yes], the same procedure described in “4-7-3 Save” (P.140) is appeared.

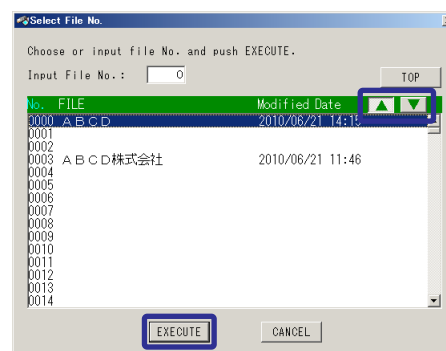
When selecting [No], the changed content is not saved.



■ When Selecting File From List

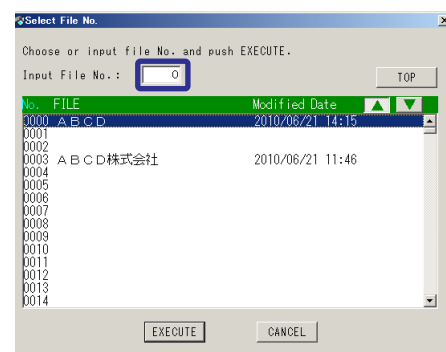
2. Pressing either “No.”, “FILE”, or “Modified Date”, and then pressing ▼▲ displays the list by selected item in ascending/descending order.

Select the file and press [EXECUTE].



■ When Selecting by Specifying File No.

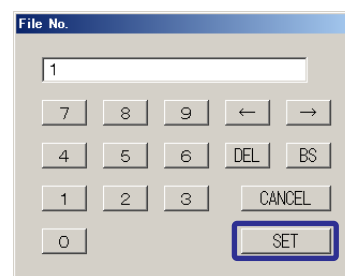
2. Press numeric column of Input File No.



3. Input file No., press [SET].

Then press [EXECUTE] in Select File No. screen.

Totally 2048 file No. can be registered from 0000 to 2047.

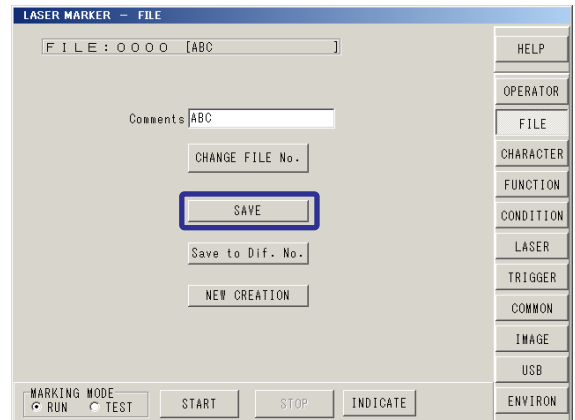


4-7-3 Save

Save the changed content by deleting previous content of the current file with the same file No.

When the power of the laser marker is turned OFF without overwriting the file, the setting/changing content is not saved.

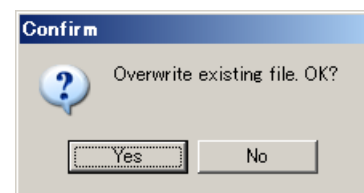
1. Press [SAVE].



2. When overwriting the file, press [Yes].

Yes: Execute overwriting.

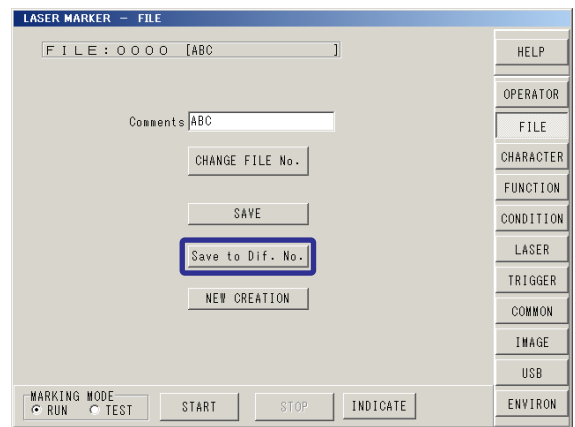
No: Not execute overwriting. Returns to the procedure 1.



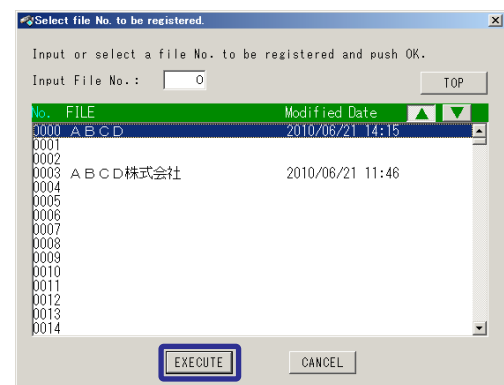
4-7-4 Save to Different No.

Save currently displayed content to the different file No.

1. When pressing [Save to Dif. No.], the selecting window for saving the file to different file No. is appeared.



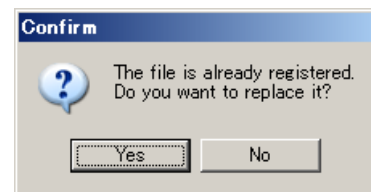
2. Specify the file No. to be saved using ▼▲ keys or inputting file No., and press [EXECUTE].



3. When the file is already saved to a different file No., the confirm window is appeared.

Yes: Execute overwriting.

No: Overwriting is not executed. Screen returns to step 1.

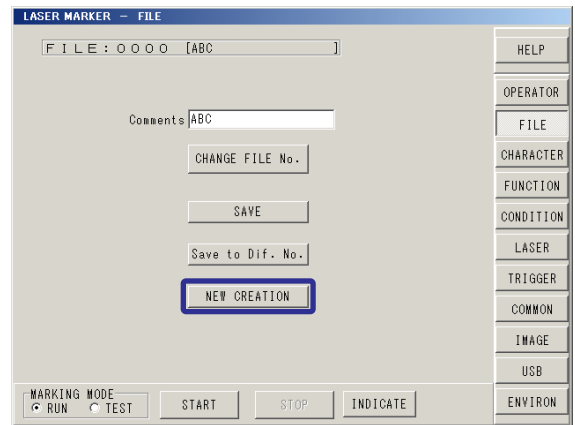


4-7-5 New Creation

Create a new file.

1. Press [NEW CREATION].

The file No. is set with “????” and each setting of its screen becomes initial one.



Reference

- In the case of overwriting the file at new creation with file No. “????”, the file is registered to other No. with the same operation of [Save to Different No.]. Also, the comments is displayed with “No Name”.

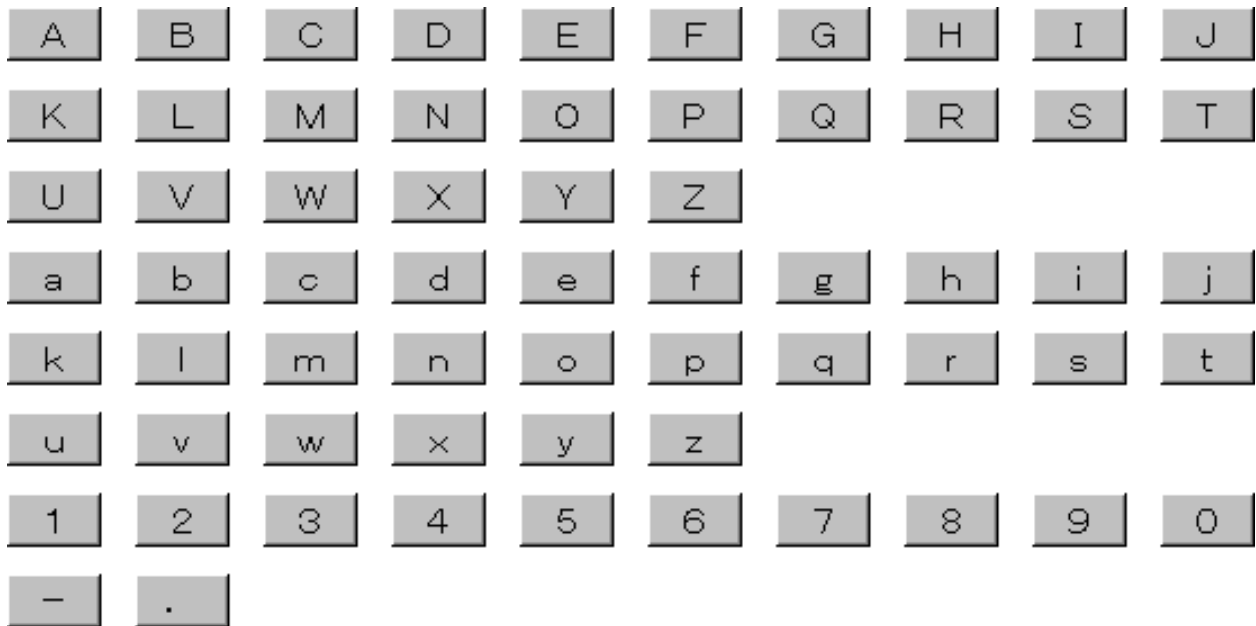
4-8 Character Setting

The character string to be marked is set in the following procedure. Set and input the function character on this screen. Characters that can be used for input are as follows:

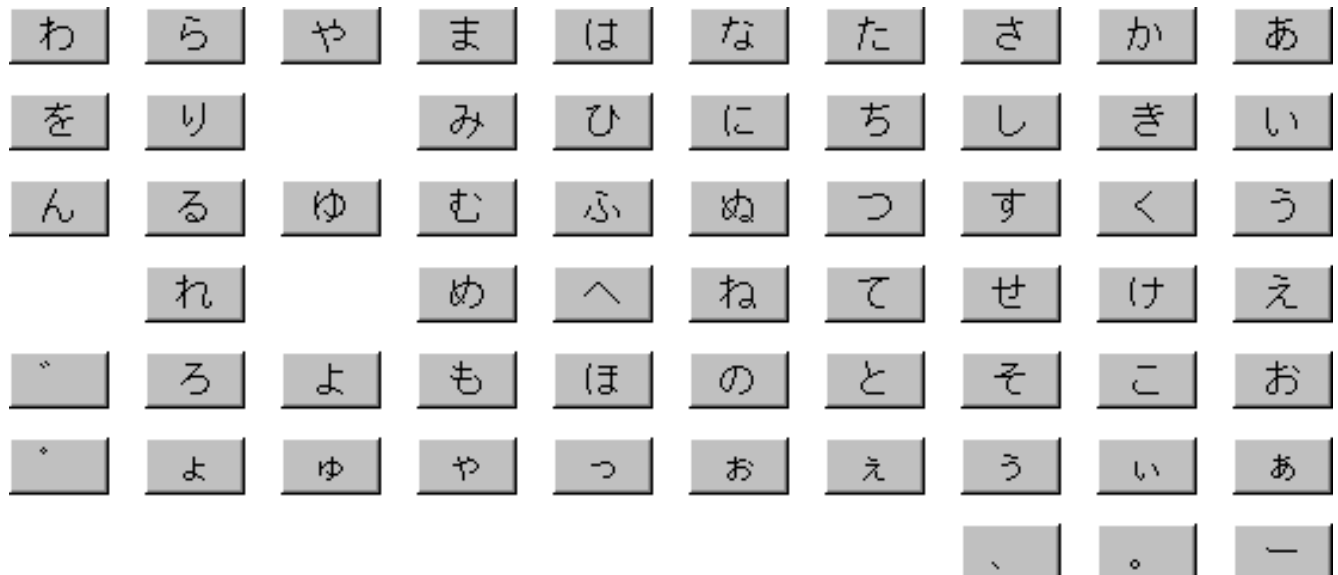
Capital and small letters of alphabet, numerics, Katakana, Hiragana, Kanji (JIS level-1 and JIS level-2), symbols, user registration characters.

4-8-1 Character Type

■ Alphanumerical



■ KANA, KANJI (Japanese character)



■ Symbol

、	。	，	．	•	：	；	？	！	“
°	´	˘	¨	^	—	—	、	∕	〉
≧	//	全	々	↗	○	—	—	-	/
／	~	∥		…	..	·	’	“	”
()	[]	[]	{	}	<	>
《	》	Г	」	『	』	【	】	+	-
±	×	÷	=	≠	<	>	≅	≐	∞
∴	♂	♀	°	’	”	°C	¥	\$	φ
£	%	#	&	*	@	§	☆	○	◎
◇	□	△	▽	※	〒	→	←	↑	↓
≡	∈	∋	⊆	⊇	⊂	⊃	∪	∩	∧
∨	¬	⇒	⇔	∀	∃	∠	⊥	∩	∂
∇	≡	≐	≪	≫	√	∞	∞	∴	§
§§	Å	‰	#	б	♪	†	‡	¶	
Α	Β	Γ	Δ	Ε	Ζ	Η	Θ	Ι	Κ
Λ	Μ	Ν	Ξ	Ο	Π	Ρ	Σ	Τ	Υ
Φ	Χ	Ψ	Ω						
α	β	γ	δ	ε	ζ	η	θ	ι	κ
λ	μ	ν	ξ	ο	π	ρ	σ	τ	υ
φ	χ	ψ	ω						
А	Б	В	Г	Д	Е	Ё	Ж	З	И
Й	К	Л	М	Н	О	П	Р	С	Т
У	Ф	Х	Ц	Ч	Ш	Щ	Ъ	Ы	Ь
Э	Ю	Я					а	б	в
г	д	е	ё	ж	з	и	й	к	л
м	н	о	п	р	с	т	у	ф	х
ц	ч	ш	щ	ъ	ы	ь	э	ю	я


■ User Reg. Character



■ Function Character



Reference

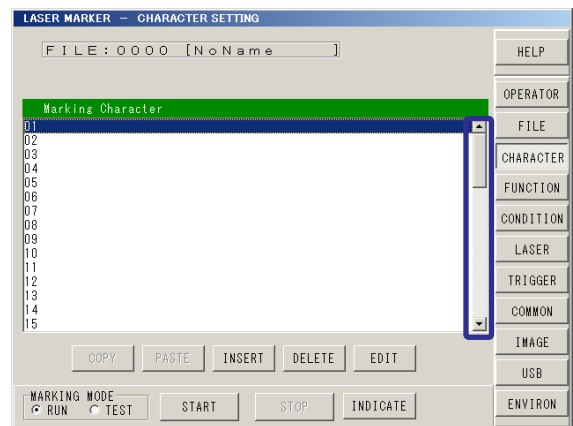
- For Kanji, refer to the Character Code Table of External Control Manual.
- The following characters are registered as the user registration font “U1” to “U9” as the factory settings:

- On the button of U1 to U50 in the user registration character input screen, the registered character images are displayed together.
- Max. 30 characters can be input in one line as the marking character.
- When the functional characters such as date, lot or counter are in the strings, both the input character digits including the functional character indicated with “%” and actual marking digit should be less than 30 digits.

4-8-2 Character Input

Input the text data to be marked as characters or code symbols with the following procedures.

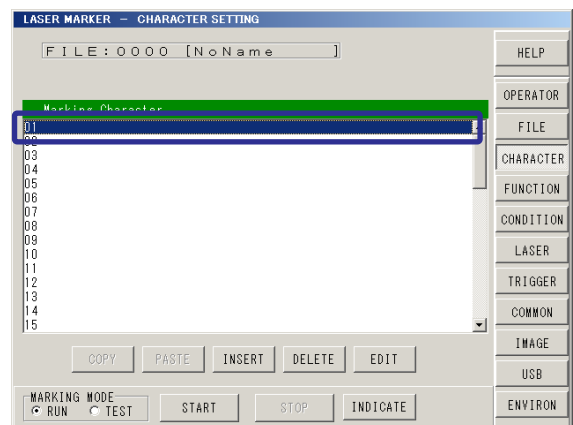
■ Display Method of Character Input Window

1. Display the line for input with the arrow on the right edge of the window.



2. Press line for input.

The input window is appeared either by pressing [EDIT] at the cursor position or re-pressing that line.

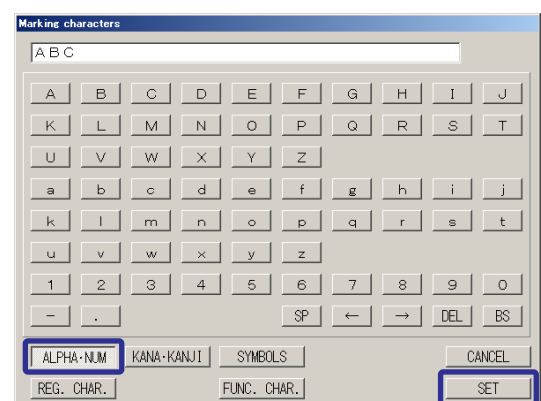


■ Input Method of Alphanumerical

1. Press [ALPHA•NUM].

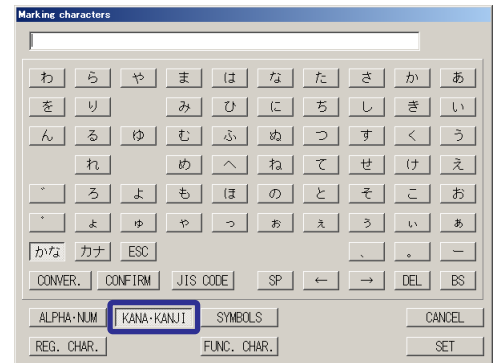
2. Press the character to be input directly for input.

The character is input by pressing [SET].



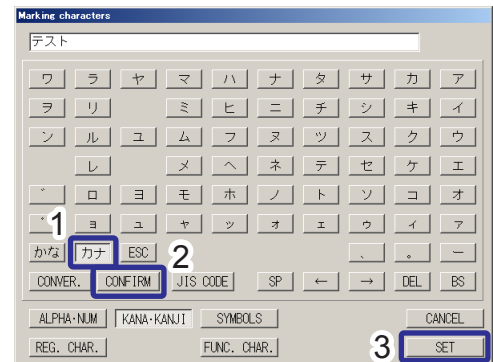
■ Input Method of Japanese, Katakana

1. Press [KANA•KANJI].



2. Press [カナ], Then press the character to be input, and press [CONFIRM].

The character is input by pressing [SET].

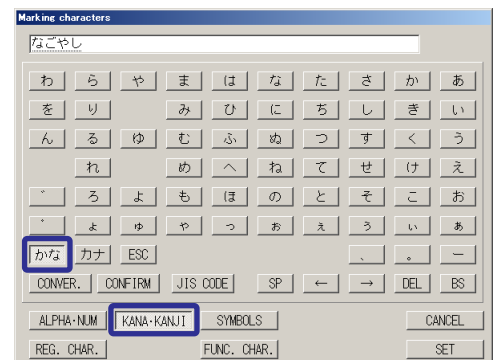


■ Input Method of Japanese, Hiragana and Kanji

1. Press [KANA•KANJI].

2. Press [かな], and select the desired character from the table to enter it.

When the desired character is Hiragana, press [CONFIRM].



3. When the desired character is Kanji, press [CONVER.] (CONVERT) until the desired Kanji is appeared, and press [CONFIRM].

The character is input by pressing [SET].

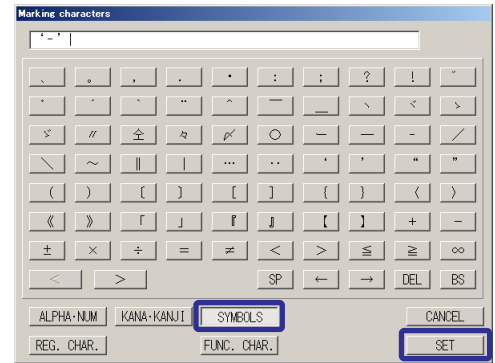


↓ Reference

- For marking kanji, the setting of the JIS font is required. Refer to “4-15-4 Font File” (P.241).
- There are some characters that are impossible to be converted into Kanji. Check the “Character Code Table” in External Control Manual.

■ Input Method of Symbols

1. Press [SYMBOLS].

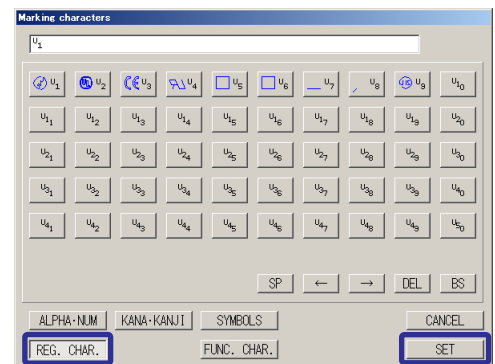


2. Press the symbol to be input directly for input.

The symbol table is changed by pressing [<] [>].
The character is input by pressing [SET].

■ Input Method of User Registration Character

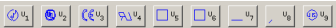
1. Press [REG. CHAR.] (REGISTRATION CHARACTER).



2. Press the symbol No. to be input directly for input.

The character is input by pressing [SET].

Reference

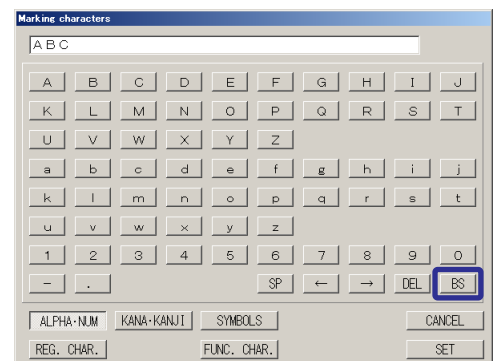
- It needs to register the font created by the user into the user registration font and, also register to laser marker. Refer to "4-15-4 Font File" (P.241).
- The following characters are registered as the user registration font "U1" to "U9" as the factory settings:

- On the button of U1 to U50 in the user registration character input screen, the registered character images are displayed together.

■ When inputting wrong character

1. Press [BS] or [DEL] to delete character.

[BS] (Back Space): Deletes one character before cursor and moves the cursor by one character simultaneously.

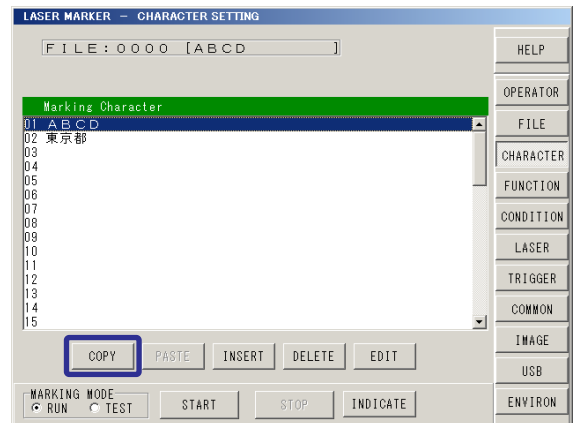
[DEL] (DELETE): Deletes one character behind the cursor.



4-8-3 Editing Character

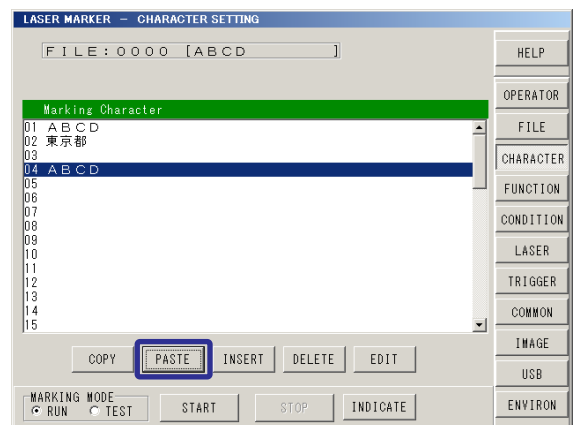
■ Copy and Paste

1. Select the character string to be copied, and press [COPY].



2. Move the cursor to the line to be pasted, and press [PASTE].

The character is pasted into the selected line.

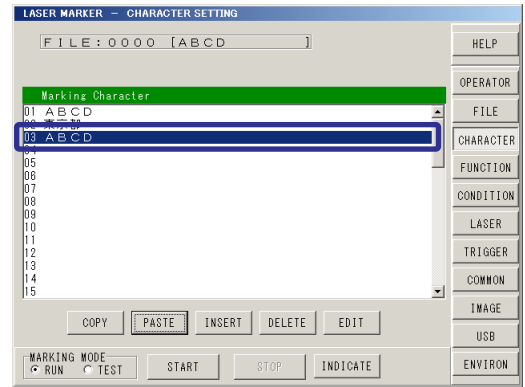


Reference

- When copying to the character string already inputted the character, the content is overwritten.
- The pasting is repeatable for any number of times.

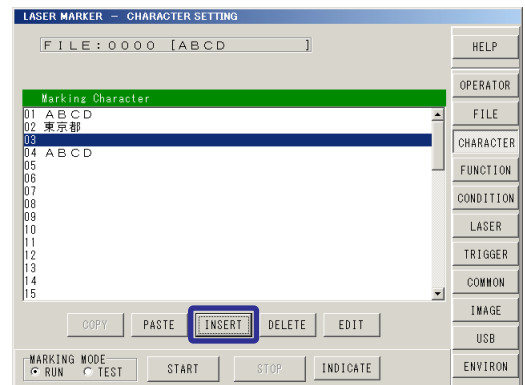
■ Insert One Line

1. Move the cursor to the line to be inserted.



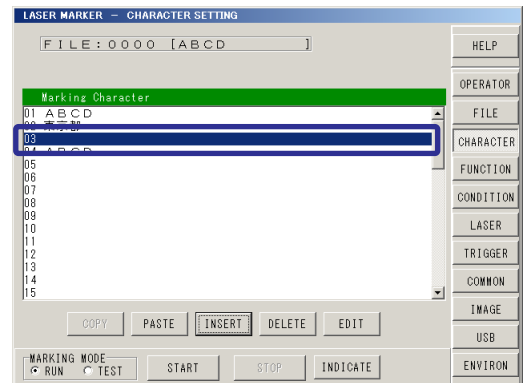
2. Press [INSERT].

After inserting one line, the line is shifted by one line.



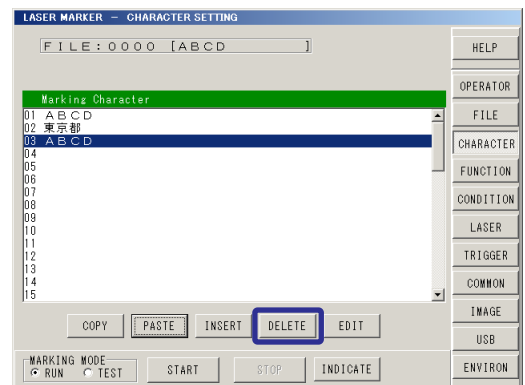
■ Delete One Line

1. Place the cursor on the line to be deleted.



2. Press [DELETE].

When a line is deleted, remaining lines are advanced by one position.



4-8-4 Function Character

■ Current Date and Expiry Date

Marks automatically updated date and time referring to the internal clock of the laser marker set in the environment setting.

- Current date/time
- Expiry date/time: adds or subtracts specified period to the current date and time

Reference

- For the internal clock, refer to “4-16-2 System Setting (Environment 2)” (P.255).
- For the setting procedures, refer to “3-3-1 Mark Current Date/Time” (P.89) and “3-3-2 Mark Expiry Date/Time” (P.92).
- Set the expiry date function “4-9-1 Expiry Date” (P.160), and set the character.

Current date

Expiry date

Description

- 1 Expiry No.:
Select the No. of the expiry condition set in the function screen.

Setting Range	Expiry No.: 1 to 4
	Common Expiry No.: 5 to 8

- 2 Figure:
Sets the digit number to show the date and time. When the number of figures of the value to be marked is larger than setting figure, the lower figure is marked as the number of figures set previously.

Setting Range	1 to 6 figures
---------------	----------------

- 3 Setting Date and Time:

Setting Items	Remarks
A.D.	Sets dominical year.
Era Year	
Month	
Day	
Hour (24)	Sets time in 24 hours. The “Hour (24)” is displayed with “0” to “23”.
Hour (12)	Sets time in 12 hours. The “Hour (12)” is displayed with “0” to “11”.
AM/PM	Sets forenoon and afternoon. From 0:00:00 a.m. to 11:59:59 a.m. are displayed with “AM”, and from 0:00:00 p.m. to 11:59:59 p.m. are displayed with “PM”.
Minute	The “minute” is displayed with “0” to “59”.
Second	The “second” is displayed with “0” to “59”.
Week	
365 Days	“1” indicates January 1, and “365” indicates December 31 (for normal year).

Description

4 Zero Indication:

Setting Range	Zero Indi. :	Marks value in right-justified, and mark "0" to the left.
	R. Justified :	Marks value in right-justified, and blanks (space) left column.
	L. Justified :	Marks value in left-justified, and blanks (space) right column.
	Justified :	Marks only value in left-justified.

! Notice

- The following items, Date, Lot, and Expiry Date are marked based on the internal clock integrated in the laser marker. The internal clock might be deviated caused by the error of the internal parts or degree of the battery drain. Therefore, be sure to check the time of the internal clock before the operation without fail.

Reference

- To update the function characters such as current date, expiry date, lot, counter, and etc. on the operation monitor, set the "Update Func. Char." in the environment setting screen referring to "4-16-1 Display Setting (Environment 1)" (P.250).
- By using "Time hold" function, it is possible to mark as the same date even when the time has passed 24:00.
<Time Hold function>
The "Time Hold" function locks the marking time/date. (Refer to "External Control Manual".)
This function can be used only in "Current data marking", "Expiry date", and "Lot".

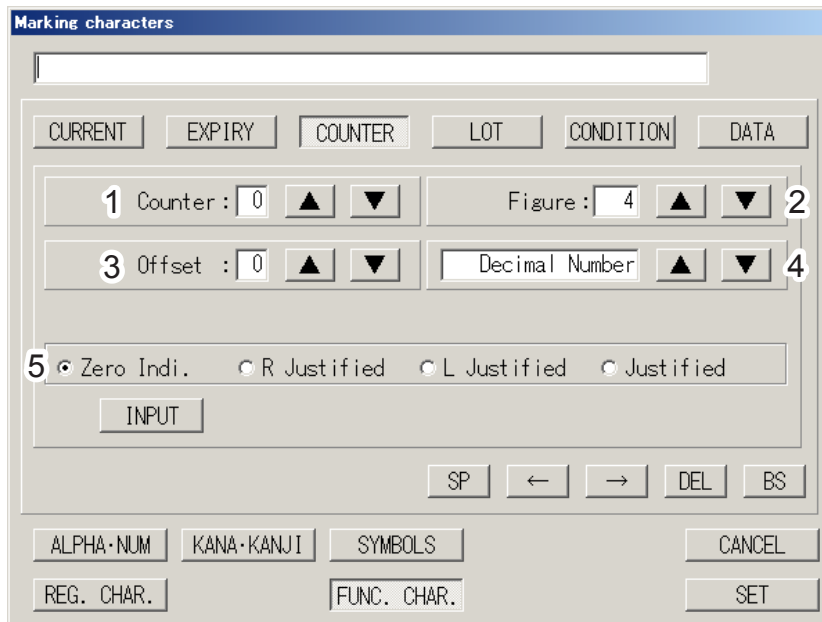
Character strings to represent the functional characters of date and time

%0N:Xn:	Date and time with Zero Fill
%_N:Xn:	Date and time without Zero Fill right stop (the underscore (_) represents a space.)
%N_ :Xn:	Date and time without Zero Fill left stop (the underscore (_) represents a space.)
%N-:Xn:	Date and time without Zero Fill stop
%APM:n:	Forenoon (AM)/Afternoon (PM)

Item	Displayed characters	Description
N	1 to 6	Represents the number of digits.
X	Represents the unit of date and time.	
	Y	A.D.
	y	Era year
	M	Month
	D	Date
	H	Hour (24-hour time)
	h	Hour (12-hour time)
	m	Minute
	s	Second
	w	Week
J	365 Days	
n	Represents the type of date and time.	
	0	Current date/time
	1 to 4	Expiry No.1 to Expiry No.4
	5 to 8	Common Expiry No.5 to Common Expiry No.8

■ Counter

When inputting counter character, the counter is marked with the condition set previously.
 Set the expiry date function “4-9-2 Counter” (P.162), and set the character.
 Refer to “3-3-4 Mark Counter” (P.99).



Description

- 1 Counter (Counter No.):
 Select the No. of the counter condition set in the function screen.

Setting Range	Counter No.: 0 to 3
	Common counter No.: 4 to 7

! Notice

- The counters 0 to 3 are commonly set per 256 file. For example, the counters 0 to 3 with file No. 0 are applied the same counter of that of 256, 512, 768, 1024, 1536 and 1792 files.

- 2 Figure:
 Sets the digit number to show the counter. When the number of figures of the value to be marked is larger than setting figure, the lower figure is marked as the number of figures set previously.

Setting Range	1 to 6 figures
---------------	----------------

- 3 Offset:
 Adds the setting value to the counter value, and marks its value.

Setting Range	0 to 9
---------------	--------

- 4 Numbers:
 Displays number.

Setting Range	Binary numbers to 36 numbers
---------------	------------------------------

- 5 Zero Indication:

Setting Range	Zero Indi.	: Marks value in right-justified, and mark “0” to the left.
	R. Justified	: Marks value in right-justified, and blanks (space) left column.
	L. Justified	: Marks value in left-justified, and blanks (space) right column.
	Justified	: Marks only value in left-justified.

Character strings to represent the functional characters of counter

- %0N:CnY/Z: Counter with Zero Fill
- %_N:CnY/Z: Counter without Zero Fill right stop (the underscore (_) represents a space.)
- %N_:CnY/Z: Counter without Zero Fill left stop (the underscore (_) represents a space.)
- %N-:CnY/Z: Counter without Zero Fill stop

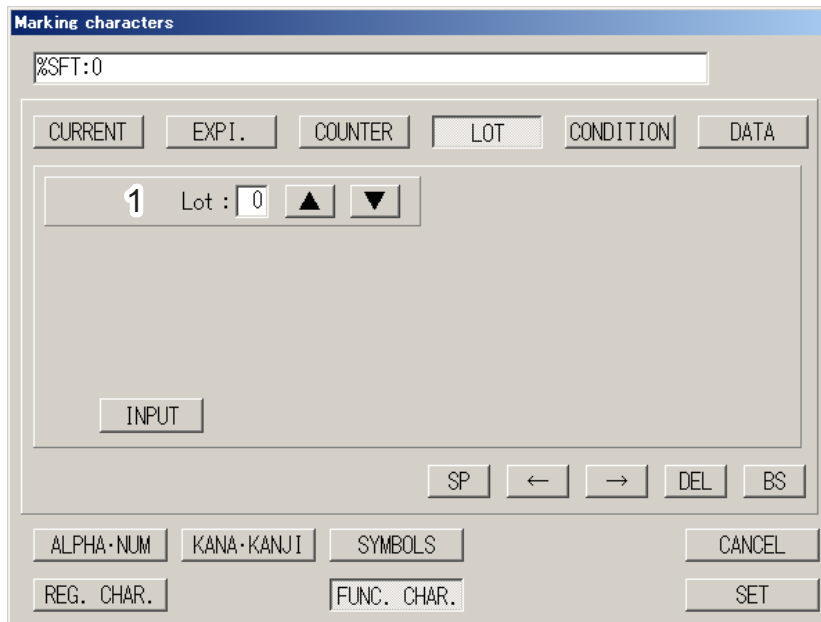
Item	Displayed characters	Description
N	1 to 6	Represents the number of digits.
n	Represents the counter number.	
	0 to 3	Counter No.0 to Counter No.3
	4 to 7	Common Counter No.4 to Common Counter No.7
Y	+1 to +9	Represents the counter offset. This character is used if the offset is not set.
Z	1 to 8, A to Z	Represents the counter numbering system with the (numbers -1) value. /Z portion is omitted for the decimal number.

Reference

- To update the function characters such as current date, expiry date, lot, counter, and etc. on the operation monitor, set the "Update Func. Char." in the environment setting screen referring to "4-16-1 Display Setting (Environment 1)" (P.250).
- The counter does not operate at test marking mode.

■ Lot

When inputting lot character, the lot is marked with the condition set previously.
Set the expiry date function “4-9-3 Lot” (P.164), and set the character.
Refer to “3-3-3 Mark Lot No.” (P.96).



Description

- 1 Lot (Lot No.):
Select the No. of the lot condition set in the function screen.

Setting Range	Lot No.: 0 to 3
	Common Lot No.: 4 to 7

! Notice

- The following items, Date, Lot, and Expire Date are marked based on the internal clock integrated in the laser marker. The internal clock might be deviated caused by the error of the internal parts or degree of the battery drain. Therefore, be sure to check the time of the internal clock before the operation without fail.

Reference

- By using “Time hold” function, it is possible to mark as the same date even when the time has passed 24:00.
<Time Hold function>
The “Time Hold” function locks the marking time/date. (Refer to “External Control Manual”.)
This function can be used only in “Current data marking”, “Expiry date”, and “Lot”.

Character strings to represent the functional characters of lot

%SFT:n : Lot character

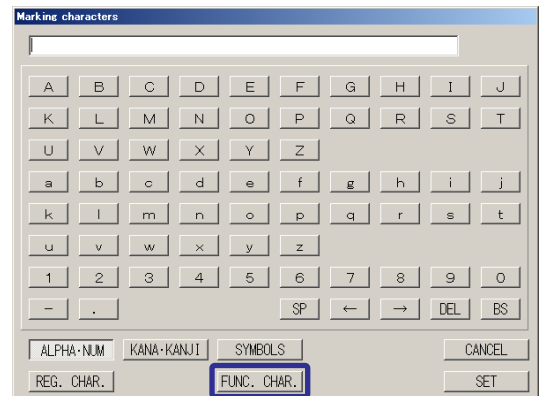
Item	Displayed characters	Description
n	Represents the lot function number.	
	0 to 3	Lot No. 0 to Lot No. 3
	4 to 7	Common Lot No. 4 to Common Lot No. 7

■ Marking Condition (Marking of Laser Settings)

When inputting the marking character, the setting values of laser marker, scan speed and laser pulse cycle are marked automatically.

Setting procedures

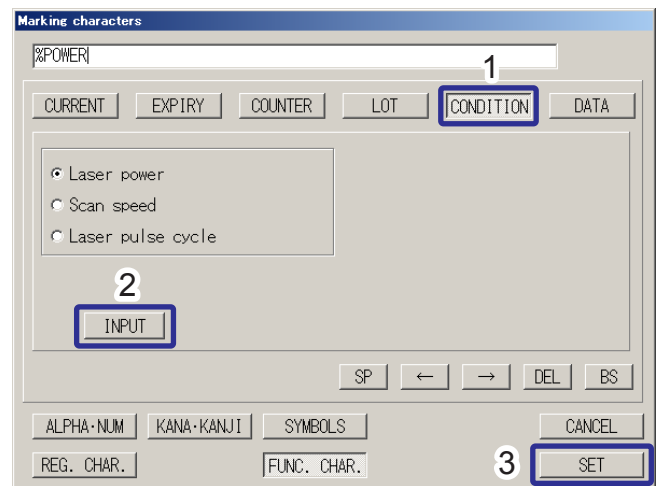
1. Press [FUNC. CHAR.] (FUNCTION CHARACTER).



2. Press [CONDITION].

Select the marking contents from the following parameters.

- Laser power
- Scan speed
- Laser pulse cycle (Only LP-V series)



3. Press [INPUT] and then, press [SET].

Character strings to represent the functional characters of marking condition

- %POWER: Laser Power
- %SPEED: Scan Speed
- %PULSE: Laser pulse cycle (Only LP-V series)

Reference

- The marking condition function character is marked in 5 Digits including decimal with right-justified.
- When marking laser power, scan speed, and laser pulse cycle at the same time, perform function input for each item.

Rank

When inputting rank character, the rank is marked with the condition set previously.

(The character can be switched by inputting I/O.)

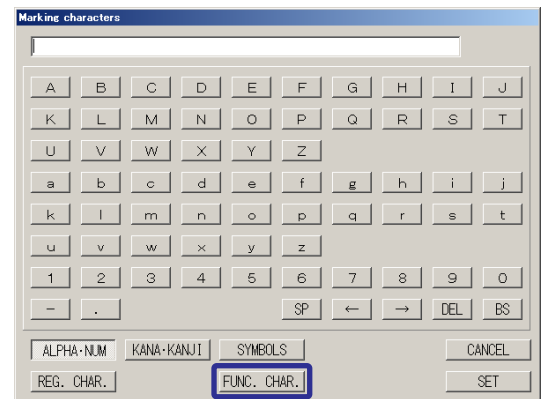
Set the expiry date function “4-9-4 Rank” (P.166), and set the character.

Reference

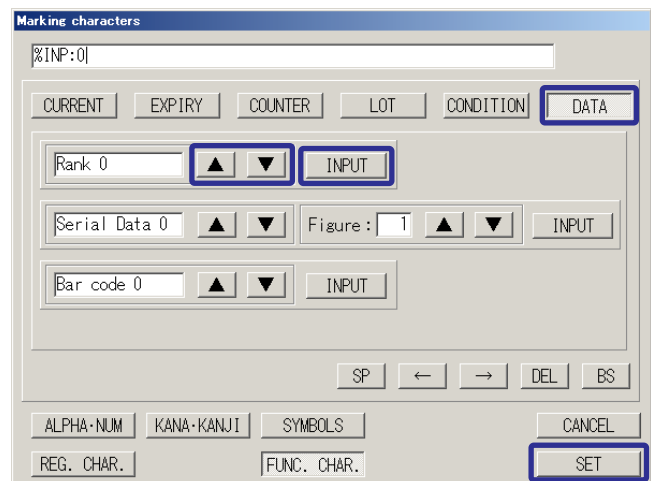
- Rank marking function cannot be used in combination with serial data marking and equidistant marking on the flying object.

Setting procedures

1. Press [FUNC. CHAR.] (FUNCTION CHARACTER).



2. Press [DATA].



3. Select the rank No. and press [INPUT].

4. Set the character by pressing [SET].

Description

Rank No.:

Select the No. of the rank condition set in the function screen.

Setting Range	When parallel input condition is 8 bit x 2: 0 to 1
	When parallel input condition is 4 bit x 4: 0 to 3

Character strings to represent the functional characters of rank character

%INP:n : Rank character

Item	Displayed characters	Description
n	Represents the rank function number.	
	0 to 3	Rank No. 0 to Rank No. 3

Serial Data

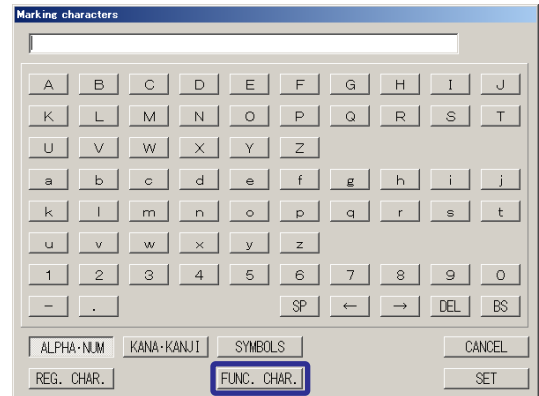
The serial data function is convenient for changing the marking character string at every marking by the Serial communication command. Set the "Serial Data No." and "Figure".

For communication command for marking character string using the serial data function, refer to External Control Manual.

Reference

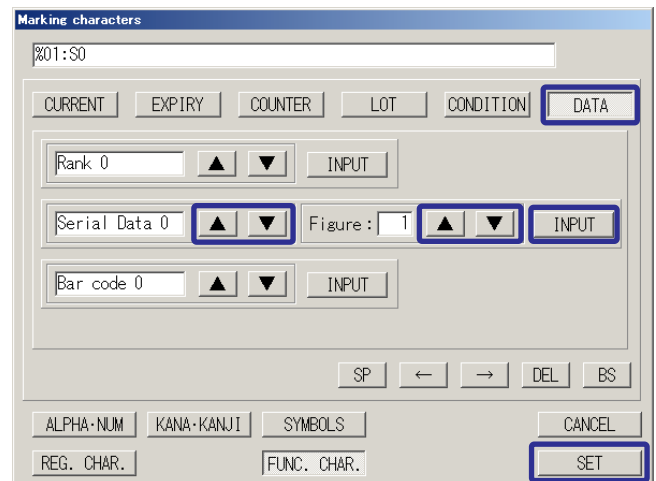
- Serial data marking function cannot be used in combination with rank marking, external offset, and equidistant marking on the flying object.

1. Press [FUNC. CHAR.] (FUNCTION CHARACTER).



2. Press [DATA].

Select the serial data No. and the display figure.



3. Press [INPUT] and then, press [SET].

When setting the serial data function, the circle symbols with the specified number of digits appear on the image display.

When it is set in the bar code or 2D code data, the code symbol is generated with the specified digits of "0" on the image display.

Description

Serial Data No.:

Setting Range	0 to 15
---------------	---------

Number of Display Figure:

Set the max. number of the characters that will be input by the serial communication.

If the specified digit number and the character digits set by the communication command are different, the communication command setting is valid for the character digits.

Setting Range	1 to 30
---------------	---------

Character strings to represent the functional characters of serial data character

%MM:Sn : Serial data character

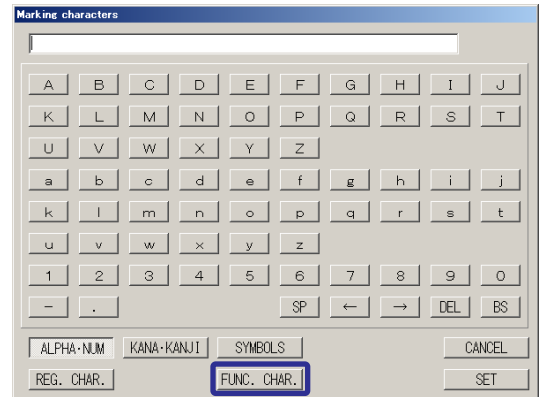
Item	Displayed characters	Description
MM	01 to 30	Represents the number of max. character digits to be input as serial data character.
n	Represents the setting number of serial data character	
	0 to 9	Serial data No. 0 to Serial data No. 9
	A to F	Serial data No. 10 to Serial data No. 15

■ Check Digit

The check digit (check character) (one letter) such as CODE39, ITF, CODE128, EAN/UPC, NW-7, RSS (GS1 DataBar), and GS1 Data Matrix codes enables to be marked by inputting the check digit character. This function character is used for setting the human readable information of the bar code.

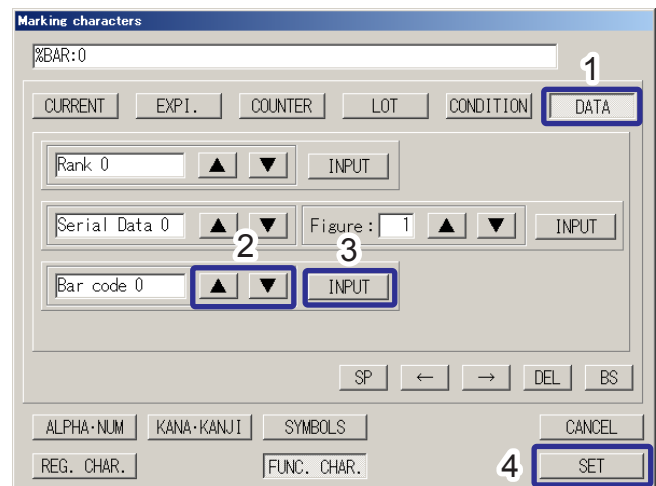
Setting procedures

1. Press [FUNC. CHAR.] (FUNCTION CHARACTER).



2. Press [DATA].

Select the bar code No. and press [INPUT].



3. Set the character by pressing [SET].

Reference

- The bar code No. is related to the bar code No. set using the "4-10-4 Bar Code Condition" (P.186).

Description

Bar Code No.:

Select the bar code No. set in the barcode condition.

The check digit in the selected barcode is marked by this function.

Setting Range	0 to 7
---------------	--------

Character strings to represent the functional characters of bar code check digit

%BAR:n : Bar code check digit

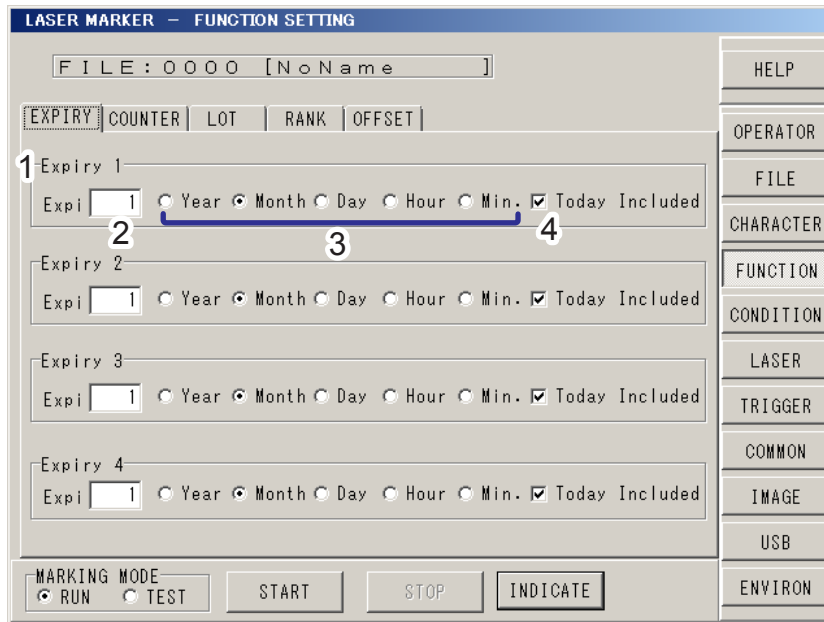
Item	Displayed characters	Description
n	Represents the bar code number.	
	0 to 7	Bar code No. 0 to bar code No. 7

4-9 Function Setting

With this screen, the functional character condition such as date-related marking and counter embedded in the laser marker is set.

4-9-1 Expiry Date

Marks the add-subtract time/date to present time set in environment setting screen of “4-16-2 System Setting (Environment 2)” (P.255).



Description

- Expiry No.:
Enables to set four types of the expiry condition from 1 to 4 per file.

Reference

- The common expiry date (common expiry No. 5 to 8) are settable for all files in common. Refer to “4-13-2 Common Expiry Date” (P.231).

- Expiry Value:
Expiry values to be used for conditions described in 3. When the expiry number is set to negative value, it represents the past date.

Setting Range	-999 to 999
---------------	-------------

- Year / Month / Day / Hour / Min.:
Sets unit of expiry.

- Today Included :
Enables to select “Today Included” or “Today Not Included” for expiry in the case of selected the expiry unit, Year or Month. When Year or Month is not selected for the unit, this setting cannot be used.

Reference

- Basically, the expiry date indicates the same year, same month, or same date. Selecting “Include today” indicates the previous day (the next day when inputting a negative value).
- Each function character already set function is input on the character setting screen. Refer to “Current Date and Expiry Date” (P.151).

Setting Sample

1. In the case of setting the expiry date after 1 month (today included/today not included):

Expi. 1
 Expi Year Month Day Hour Min. Today Included

Expi. 1
 Expi Year Month Day Hour Min. Today Included

In the case of the setting pattern above (1 month after), the date to be marked as follows:

Today	Marking Result		Today	Marking Result	
	Today included	Today not included		Today included	Today not included
January 1st	February 1st	January 31st	July 1st	August 1st	July 31st
January 31st	March 1st	February 28th *(February 29th)	July 31st	August 31st	August 30th
February 1st	March 1st	February 28th *(February 29th)	August 1st	September 1st	August 31st
February 28th	March 28th	March 27th	August 31st	October 1st	September 30th
March 1st	April 1st	March 31st	September 1st	October 1st	September 30th
March 31st	May 1st	April 30th	September 30th	October 30th	October 29th
April 1st	May 1st	April 30th	October 1st	November 1st	October 31st
April 30th	May 30th	May 29th	October 31st	December 1st	November 30th
May 1st	June 1st	May 31st	November 1st	December 1st	November 30th
May 31st	July 1st	June 30th	November 30th	December 30th	December 29th
June 1st	July 1st	June 30th	December 1st	January 1st	December 31st
June 30th	July 30th	July 29th	December 31st	January 31st	January 30th

* The dates in parentheses are used in the case of leap years.

2. In the case of setting the expiry date after 1 year and 3 months (setting to 12 months + 3 months = after 15 months):

Expi. 1
 Expi Year Month Day Hour Min. Today Included

When the date of today is "January 1st" with the above setting pattern, the date to be marked is "April 1st".

3. In the case of setting the expiry date after 1 month and 15 days (setting to 30 days + 15 days = after 45 days):

Expi. 1
 Expi Year Month Day Hour Min. Today Included

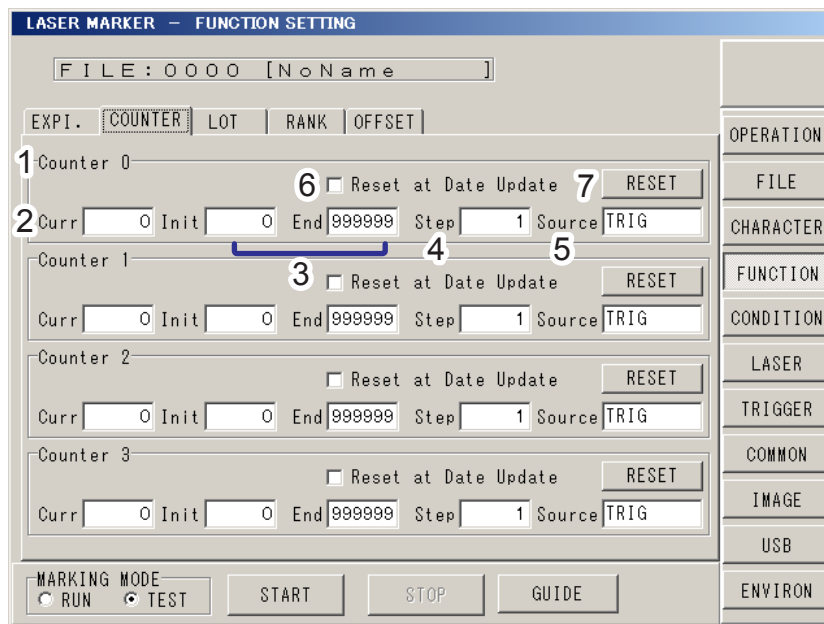
When the date of today is "January 1st" with the above setting pattern, the date to be marked is "February 15th".

! Notice

- The following items, Date, Lot, and Expiry date are marked based on the internal clock of the laser marker. The internal clock might be deviated due to the error in internal part or battery drain. Therefore, be sure to check the time of the internal clock before the operation without fail.

4-9-2 Counter

With this function, the counter is increased or decreased per setting setup number from the initial value to end value for each counter source.



Description

- Counter No.:
Enables to set 4 types of lot conditions from 0 to 3 per file.

Notice

- The counters 0 to 3 are commonly set per 256 file. For example, the counters 0 to 3 with file No. 0 are applied the same counter of that of 256, 512, 768, 1024, 1536 and 1792 files.

Reference

- The common counter (common counters 4 to 7) are settable for all files in common. Refer to "4-13-3 Common Counter" (P.232).

- Curr (Current Value):
Current counter value. The current value is subsequently marked. Set the current value within the initial value and end value.

Setting Range	0 to 999999
---------------	-------------

- Init / End (Initial Value / End Value):
The initial value and the end value of the counter.
When the initial value is smaller than the end value: Counting up
When the initial value is larger than the end value: Counting down

Setting Range	0 to 999999
---------------	-------------

Reference

- Set the different value to the initial and the end value. If the same value is set to both, the counter value does not change.

- Step (Step Value):
Sets the value to be changed per count.

Setting Range	0 to 999999
---------------	-------------

Description

- 5 Source (Count Source) :
Target for timing of counting up and counting down. The count-up or count-down is started at the timing of count source end. The count source can be switched by pressing button.

Setting Range	TRIG (Trigger)	Counts up or counts down by trigger input.
	Counter 0	Counts up or counts down when counter 0, 1, 2 or 3 ends.
	Counter 1	
	Counter 2	
	Counter 3	
	Counter 4	Counts up or counts down when common counter 4, 5, 6 or 7 ends.
	Counter 5	
	Counter 6	
Counter 7		

- 6 Reset at Data Update:
With checking on this function, the counter value is reset at the internal clock becomes "0:00".

Reference

- When the date changes during the Time Hold function is effective, the counter value is reset at the timing of releasing Time Hold (the time hold input is OFF).
- The counter reset at update cannot apply to the marking to flying object.

- 7 RESET:
Returns current value to initial value by pressing [RESET].

Notice

- When the counter is interrupted by alarm occurrence etc., check the counter value for the next marking.

Reference

- The counter does not operate at test marking.
- When the counter value reaches to the end value, the marking is started from initial value again.
- Only the counter input with the character string is available.
- The current value of the counter is saved without overwriting the file.
- Each function character already set function is input on the character setting screen. Refer to "Counter" (P.153).

Setting Example : When marking the same value in series

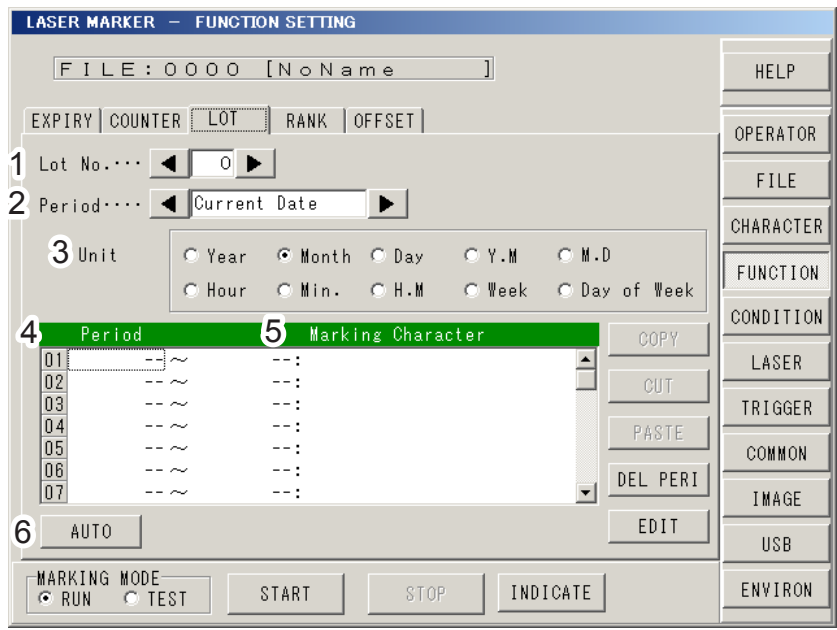
In case of marking the character like 000▶000▶000▶002▶002▶002▶004▶...



Character Setting	Function Setting Counter
01:% 03:CO	Counter 0: Initial=0, End=998, Step 2, Count Source=Counter 1
02:	Counter 1: Initial=1, End=3, Step 1, Count Source=Trigger
03:	It is not specify character string for marking to Counter 1.

4-9-3 Lot

With this function, mark the character string set previously during the divided set period.



Description

- 1 Lot No.:
Enables to set 4 types of lot conditions from 0 to 3 per file.

Setting Range	0 to 3
---------------	--------

Reference

- The common lot (common counters 4 to 7) are settable for all files common. Refer to “4-13-4 Common Lot” (P.234).

- 2 Period:
Target period of the lot function.

Setting Range	Current	: Specifies as target date set with current date.
	Expiry No. 1 to 8	: Specifies as target date set with expiry No. 1 to 8.
	Counter 0 to 7	: Specifies as target counter set with counter 0 to 7.

- 3 Unit:
Select the unit for period to be performed lot function.

Period Condition	Description	Max. Divided Numbers
Year	Period defined by year (dominical year) unit.	Max. dividable No.: 60
Month	Period defined by month unit.	Max. dividable No.: 12
Day	Period defined by date unit.	Max. dividable No.: 31
Y. M	Period defined by year and month.	Max. dividable No.: 60
M. D	Period defined by month and date.	Max. dividable No.: 60
Hour	Period defined by hour unit.	Max. dividable No.: 24
Min.	Period defined by minute unit.	Max. dividable No.: 60
H. M	Period defined by hour/minute unit.	Max. dividable No.: 60
Week	Period defined by week unit.	Max. dividable No.: 54
Day of Week	Period defined by day of week unit.	Max. dividable No.: 7

Reference

- When a lot subject is set to counter 0 to 7, setting of term condition is not necessary. In this case, max. dividing number is set to 60.
- When the period condition is “M. D”, do not input the non-existent date.

Description

- 4 Period:
Set the both period of start and end.

Reference

- If the period is spanned, for example, when setting the period from 22 o'clock to 3 o'clock of the next day, it needs to set the period by dividing into two, 22 to 23 o'clock and 0 to 3 o'clock.

- 5 Marking Character:
Set the character string to be marked. Double-click on the marking character string area, or select the input line and press [EDIT] to open the character input window.

Setting Range Up to 9 characters *

* Capital and small letters of alphabet, numerics, Katakana, Hiragana, Kanji (JIS level-1 and JIS level-2), symbols, user registration characters

- 6 AUTO:
This "AUTO" is available when the unit of the expiry date is selected among "Year", "Month", "Day", "Hour", "Min.", "Week", or "Day of Week". Pressing this button sets the start and end of the period with minimum unit automatically. Note that when the unit of the expiry date is set to "Year", the period is set automatically calculating from the current year.

Notice

- The following items, Date, Lot, and Expiry date are marked based on the internal clock of the laser marker. The internal clock might be deviated caused by the error of the internal parts or degree of the battery drain. Therefore, be sure to check the time of the internal clock before the operation without fail.

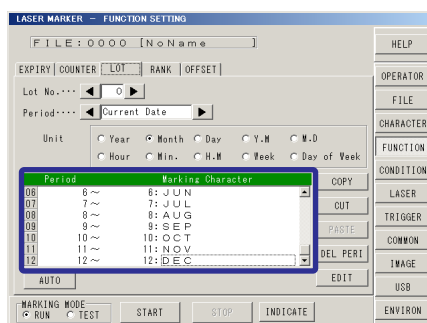
Reference

- Each function character already set function is input on the character setting screen. Refer to "Lot" (P.155).
- Saturday is defined as weekend day even whether the week renewal is set to either Monday or Sunday at "week" unit setting of "Lot" in "Function Setting" menu. For marking Monday through Friday as "Weekday" and Saturday and Sunday as "Holiday", you should set respectively at three times as following order; Sunday is set as "Holiday" (1), Monday through Friday is set as "Weekday" (2), and Saturday is set as "Holiday" (3).

Setting sample:

Setting for the lot of 3 digits character representing the month as shown in the table.

Date	Lot character
January	JAN
February	FEB
March	MAR
⋮	⋮
December	DEC



Set "Current Date" to [Period].

Set [Month] to [Unit].

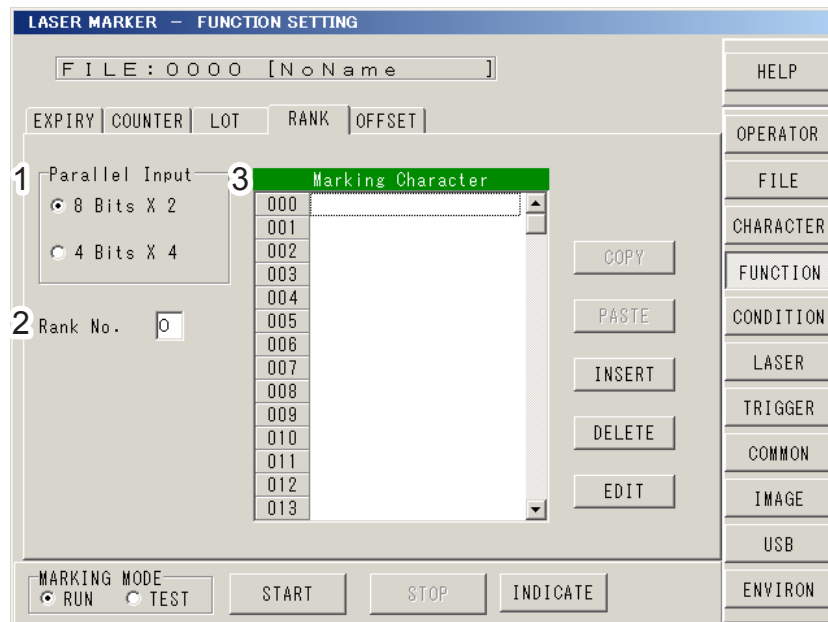
Set the "Period" and "Marking Character" as shown to the left.

4-9-4 Rank

The rank marking is the function for varying character string using I/O connector by inputting character string corresponding to I/O connector No, (D0 to D15) beforehand. Refer to “Rank Offset Marking” of “External Control Manual” for control method with I/O.

Reference

- Rank marking function cannot be used in combination with serial data marking and equidistant marking on the flying object.



Description

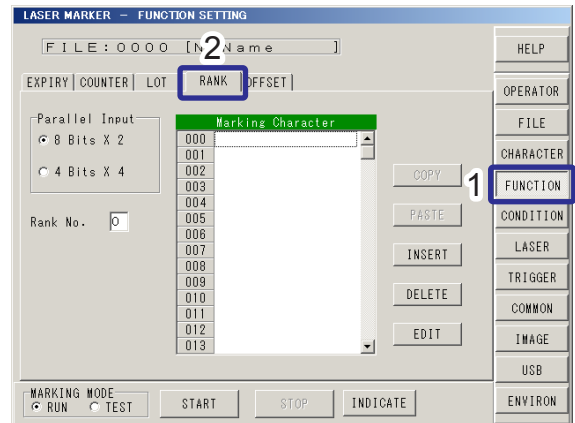
- Parallel Input:**
 Sets the input condition for the I/O connector No. (D0 to D15).
 - 8 Bits × 2:
Enables to specify 16 bit (D0 to D15) to lower digit (D0 to D7) and higher digit (D8 to D15) as 8 bit data for each, and also set two types of the marking character tables including 256 patterns from 0 to 255.
 - 4 Bits × 4:
Enables to set 16 bit into four and specify as 4 bit data, and also set four types of the marking character tables including 16 patterns from 0 to 15.
- Rank No.:**
 Select rank No.
 - In the case that the Parallel Input is 8 bit × 2:
 - 0: Marking character table corresponding to lower 8 bit (D0 to D7) for number input.
 - 1: Marking character table corresponding to higher 8 bit (D8 to D15) for number input.
 - In the case that the Parallel Input is 4 bit × 4:
 - 0: Marking character table corresponding to 4 bit (equal to 1/4) (D0 to D3) for number input.
 - 1: Marking character table corresponding to 4 bit (equal to 2/4) (D4 to D7) for number input.
 - 2: Marking character table corresponding to 4 bit (equal to 3/4) (D8 to D11) for number input.
 - 3: Marking character table corresponding to 4 bit (equal to 4/4) (D12 to D15) for number input.
- Marking Character:**
 Set the character string to be marked. Double-click on the marking character string area, or select the input line and press [EDIT] to open the character input window.

Setting Range	Up to 9 characters *
---------------	----------------------

* Capital and small letters of alphabet, numerics, Katakana, Hiragana, Kanji (JIS level-1 and JIS level-2), symbols, user registration characters

■ Setting procedure of Rank function

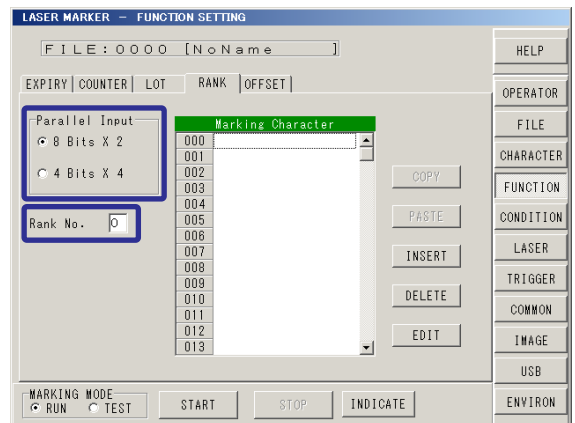
1. Press [RANK] after pressing [FUNCTION].



2. Select [Parallel Input] from either 8 bit × 2 or 4 bit × 4.

3. Select Rank No.

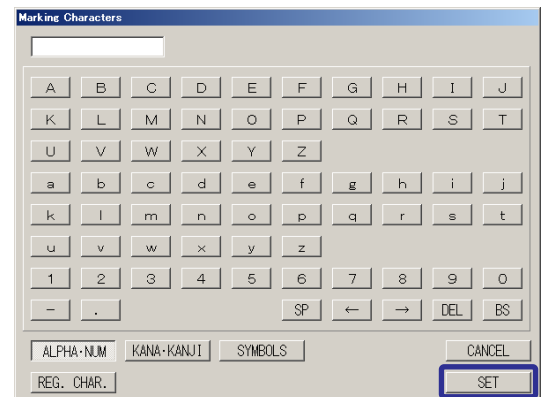
When Parallel Input is 8 bit × 2: 0 to 1
 When Parallel Input is 4 bit × 4: 0 to 3



4. The character input window is appeared by selecting marking character corresponding to I/O connector No., and pressing [EDIT].

Input the character and press [SET].

When Parallel Input is 8 bit × 2: 0 to 255
 When Parallel Input is 4 bit × 4: 0 to 15



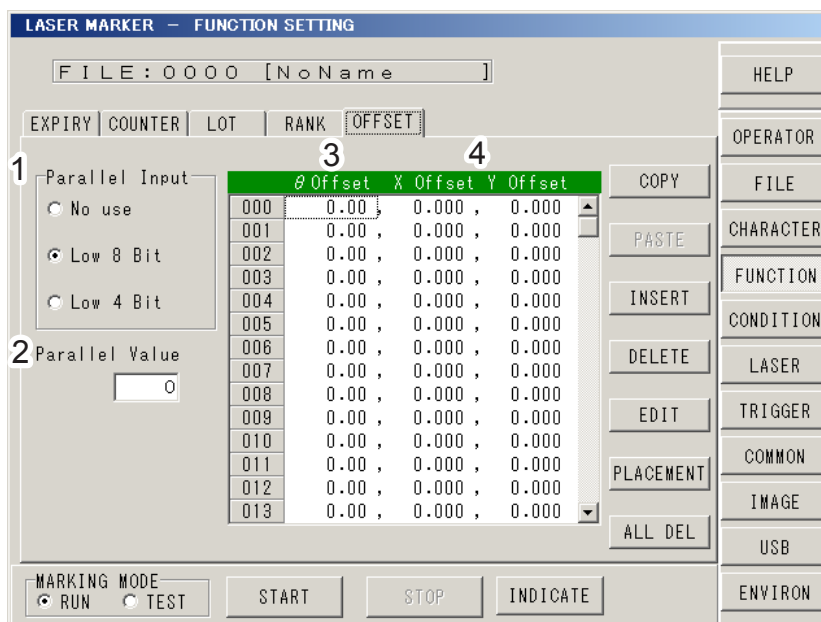
4-9-5 External Offset

The external offset is the function for varying character string using I/O control by inputting coordinate data corresponding to I/O connector No (D0 to D15) beforehand. Refer to "Rank Offset Marking" of "External Control Manual" for control method with I/O.

Reference

External offset function cannot be used in combination with the following functions.

- Serial Date Marking
- Equidistant marking to flying object



Description

- 1 Parallel Input:
Sets the input condition for the I/O connector No. (D0 to D15).

Setting Range	Not use	: If you do not use the offset function, specify these values.
	Low 8 bit	: Enables to set data for 256 offset values from 0 to 255 with the low 8 bit (D0 to D7) as the one marking coordinate table.
	Low 4 bit	: Enables to set data for 16 offset values from 0 to 15 with the low 4 bit (D0 to D3) as the one marking coordinate table.

- 2 Parallel Value (Parallel Input Value) :
Enables to check offset image of the parallel input value input beforehand. The coordinate with this parallel input value input here displays as the coordinate for check on the image display screen.

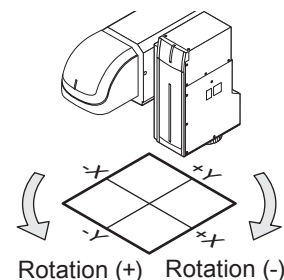
Setting Range	In the case that the external offset condition is Low 8 bit	: 0 to 255
	In the case that the external offset condition is Low 4 bit	: 0 to 15

- 3 θ Offset :
Rotates the object to the rotation direction around the original point.

Setting Range	-180.00 to +180.00 degree (0.01 degree unit)
---------------	--

- 4 X/Y Offset :
Shifts the marking position to the X/Y direction.

Setting Range	-45.000 to +45.000 mm	(LP-V10)
	-55.000 to +55.000 mm	(LP-430 / LP-420 / LP-410)
	-80.000 to +80.000 mm	(LP-435 / LP-425 / LP-V15)
	-27.500 to +27.500 mm	(LP-431 / LP-421 / LP-411 / LP-W052)



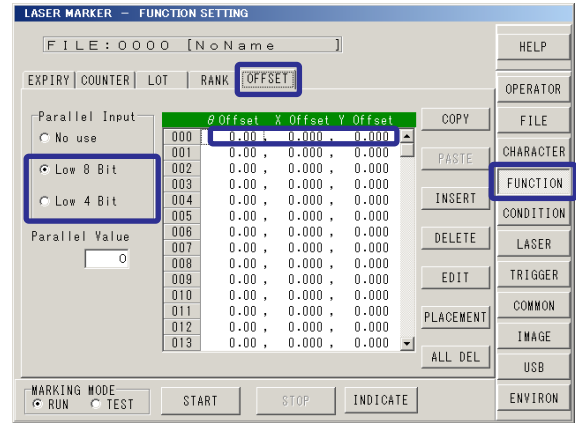
Reference

- When the rank is set beforehand, the character string with the rank setting is changed and marked.
- In the case of setting coordinate of the external offset, input the parallel input value with coordinate and display image for checking the offset. Before marking actually, it becomes convenient marking by checking offset.

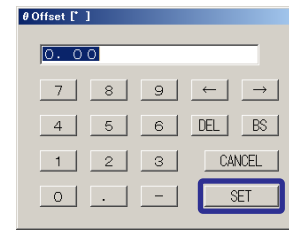
Setting procedure of External Offset function

1. Press [OFFSET] (EXTERNAL OFFSET) after pressing [FUNCTION].

2. Select the external offset condition between “Low 8 bit” and “Low 4 bit”.



3. The ten-key is appeared by pressing the input field of theta offset, X offset or Y offset. Input the value, and press [SET].



■ MATRIX PLACEMENT

With this placement function, the setting for constant offset becomes easy one.

Pressing "PLACEMENT" button displays the column and row array screen. By specifying number of column and number of row enables to set the external offset coordinate.

The screenshot shows a 'Placement' dialog box with the following fields and values:

- 1 Base Pos. X: 0.000 [mm]
- 1 Base Pos. Y: 0.000 [mm]
- 2 Direction: Row Col.
- 3 Number of Row: 16
- 3 Number of Col.: 16
- 4 Row Step: 5.000 [mm]
- 4 Column Step: 5.000 [mm]

Buttons: SET, CANCEL

Description

- 1 Base Position X / Base Position Y:
Define the coordinates corresponding to No. 0000 input for the offset marking which becomes the reference position.
- 2 Direction:
Define the preferred direction to number elements of a matrix.
- 3 Number of Row / Number of Columns:
Define the number of rows and columns of a matrix.
- 4 Row Step / Column Step:
Define the pitches along the row and column directions.

Setting Sample

Base Pos. X:	0 mm
Base Pos. Y:	0 mm
Direction.:	Col.
Number of Row:	3
Number of Col.:	3
Row Step:	3 mm
Column Step:	3 mm

0000	0001	0002
0003	0004	0005
0006	0007	0008

	X Offset	Y Offset
0000	0 mm	0 mm
0001	3 mm	0 mm
0002	6 mm	0 mm
0003	0 mm	-3 mm
0004	3 mm	-3 mm
0005	6 mm	-3 mm
0006	0 mm	-6 mm
0007	3 mm	-6 mm
0008	6 mm	-6 mm

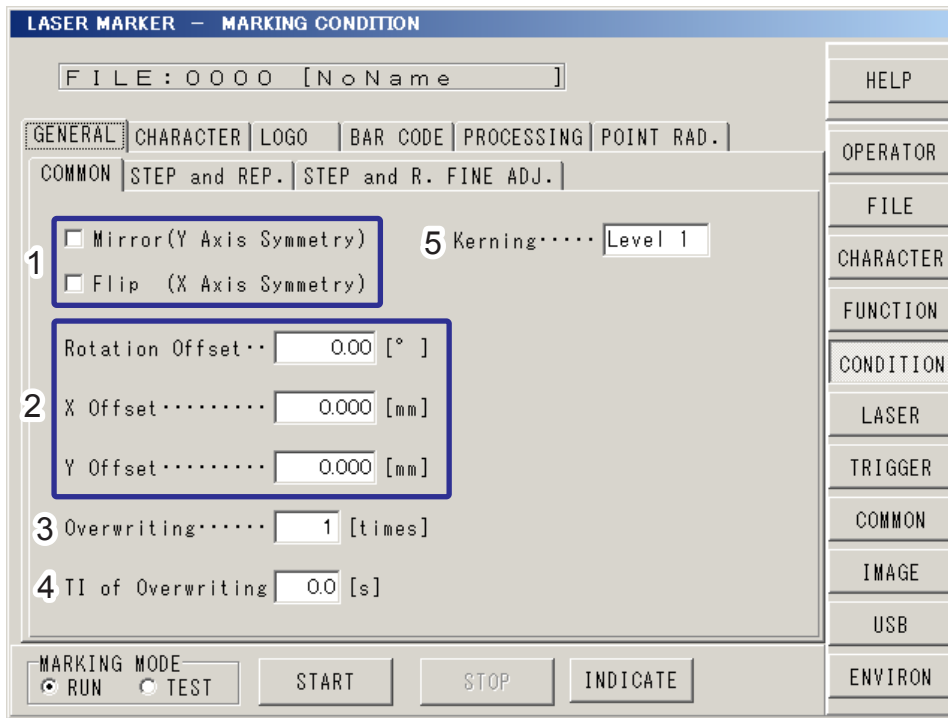
4-10 Marking Condition

This screen specifies the conditions of character to be marked. The position, size, font type of character, and laser power/scan speed correction, can be specified per setting line. It also can specify the logo condition and condition for Step & Repeat.

4-10-1 General Condition

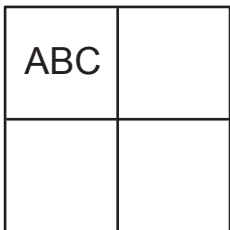
The general condition setting is applied to the all marking objects in a file.

■ Common Condition



Description

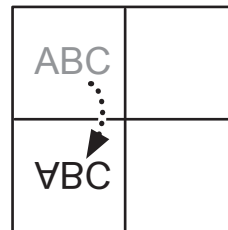
- 1 Mirror/Flip (Mirror Inversion/Flip Inversion) :
 Inversion has two types, Mirror (vertical inversion) and Flip (horizontal inversion).
 Mirror (Mirror Inversion) (Y Axis Symmetry): makes the character string symmetrical to Y axis.
 Flip (Flip Inversion) (X Axis Symmetry): makes the character string symmetrical to X axis.



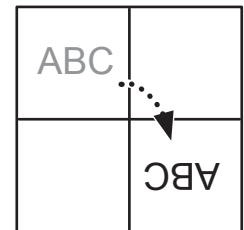
- Mirror
- Flip



- Mirror
- Flip



- Mirror
- Flip



- Mirror
- Flip

Reference

- Mirror (Y Axis Symmetry) and Flip (X Axis Symmetry) can be selected at the same time.

Description

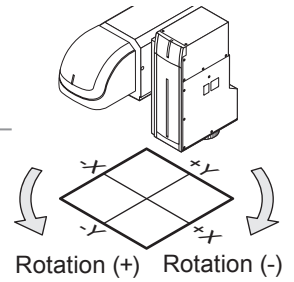
- 2 Offset:
The whole screen is offset for each file.

Rotation Offset:
Rotates the object to the rotation direction around the original point.

Setting Range	-180.00 to +180.00 degree (0.01 degree unit)
---------------	--

X/Y Offset :
Shifts the marking position to the X/Y direction.

Setting Range	-45.000 to +45.000 mm	(LP-V10)
	-55.000 to +55.000 mm	(LP-430 / LP-420 / LP-410)
	-80.000 to +80.000 mm	(LP-435 / LP-425 / LP-V15)
	-27.500 to +27.500 mm	(LP-431 / LP-421 / LP-411 / LP-W052)



- 3 Overwriting Frequency :
Number of overwriting. The number of overwriting marking is specified by one trigger input.

Setting Range	1 to 99 times
---------------	---------------

! Notice

- Overwriting marking and marking of bold character may affect the quality of marking. Check it by a trial before using these functions.
- The function of overwriting is unavailable for the marking to flying object.

- 4 Overwriting Interval :
The interval period at overwriting is set.

Setting Range	0.0 to 9.9 seconds or 0 to 60 seconds
---------------	---------------------------------------

- 5 Kerning :
Set the level of spacing between characters. The lower the value is, the smaller the spacing is. This feature is enabled when the "character spacing" is set to "proportional".

Level 1 : Minimize the origin point of the character interval with this condition. The letter-spacing of the letter "i" and "l" (small letter "L") are recognized as "0".



Level 2 : Set the origin point of the character with intermediate degree between the character interval set with Level 1 and Level 3. The character width such as "i" and "l" (small letter "L") becomes 1/4 of character width.



Level 3 : Maximize the origin point of the character interval with this condition. The character width such as "i" and "l" (small letter "L") becomes 5/8 of character width.



↓ Reference

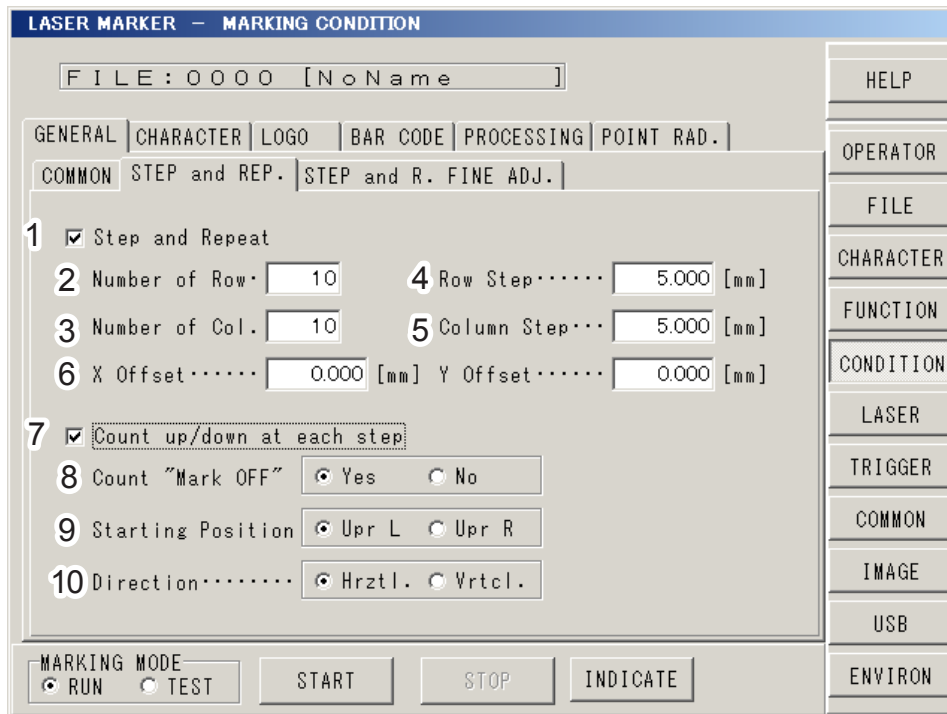
- Set the interval balance of the character by the setting of setting, and set the character interval of the character using the character condition.
- When not using the proportional function, the kerning setting is invalid.

■ Step & Repeat

This “Step & Repeat” applies for marking the same content repeatedly. It is usable for marking object laid side by side such a palletized object.

Reference

- The Step & Repeat function cannot be combined with the marking on flying object.



Description

- Step and Repeat :
Check this box to validate the Step & Repeat marking function.
- Number of Row :
- Number of Column :
The number of rows / columns where the pattern which has been set is to be marked.

Setting Range	1 to 100
---------------	----------

Reference

- The pattern is the unit of data created in Step & Repeat.
- Max. number of settable patterns is 1000.

- Row Step :
- Column Step :
The pitch between patterns in row / column direction.

Setting Range	0.000 to 90.000 mm	(LP-V10)
	0.000 to 110.000 mm	(LP-430 / LP-420 / LP-410)
	0.000 to 160.000 mm	(LP-435 / LP-425 / LP-V15)
	0.000 to 55.000 mm	(LP-431 / LP-421 / LP-411 / LP-W052)

Description

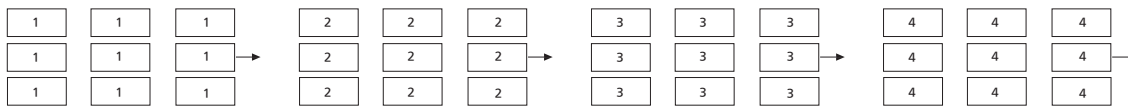
- 6 X/Y Offset :
Shifts the object to X/Y direction. This coordinate is applied to the origin of the base object.

Setting Range	-45.000 to +45.000 mm (LP-V10)
	-55.000 to +55.000 mm (LP-430 / LP-420 / LP-410)
	-80.000 to +80.000 mm (LP-435 / LP-425 / LP-V15)
	-27.500 to +27.500 mm (LP-431 / LP-421 / LP-411 / LP-W052)

- 7 Count up / down at each step :
Check this box to validate the counter updating at each marking of Step & Repeat.

Reference

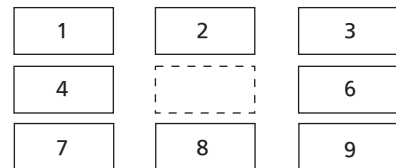
- Counter marking is impossible unless the functional character for counter has been input in the character string for marking.
- In case the counter is included in the marking character and the "Count up/down at each step" is not selected, the all counter values are the same in one Step & Repeat marking as shown in the figure below.



- 8 Count "Mark OFF" :
When the Step & Repeat counter is used and set the mark off in the specified pattern, select here whether the counter value of the marking off part is counted or skipped.
Refer to "Step & Repeat Fine-Adjustment" (P.176).

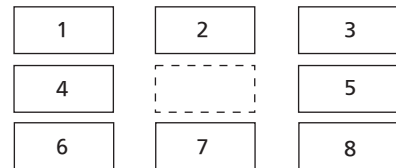
Yes : Skips counter value on the column/row which "Mark OFF".

(ex) Step-Repeat with 3 rows × 3 columns
Marking OFF: marking on the 2nd row of 2nd line
Direction: Hori.
Starting Position: Upper L



No : Not skip counter value on the column/row which "Mark OFF".

(ex) Step-Repeat with 3 rows × 3 columns
Marking OFF: marking on the 2nd row of 2nd line
Direction: Hori.
Starting Position: Upper L

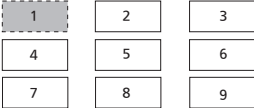
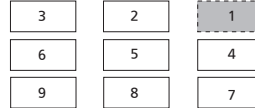
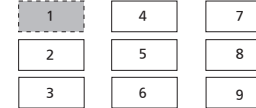
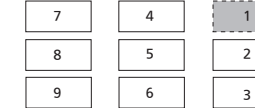


Description

- 9 Starting Position :
Specifies the start position of counter in the Step & Repeat patterns.
Select the position between [Upper L] or [Upper R].
- 10 Direction :
When the Step & Repeat counter is used, select the direction of counting between horizontal and vertical.

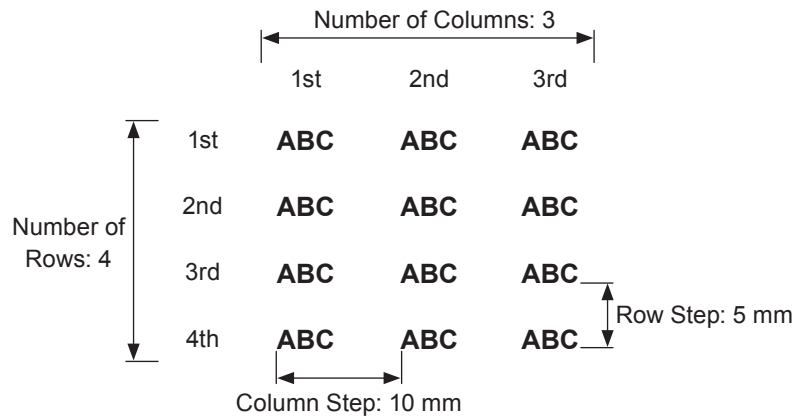
Reference

- This direction setting is applied only to the counting direction, but not to the marking order.
- If the counter function is set with Step & Repeat, the counting order becomes as follows.
Ex. Step & Repeat of 3 rows and 3 columns with counter update at each step. ("1" is the base position.) :

 <p>Starting Position: Upper L Marking Direction: horizontal</p>	 <p>Starting Position: Upper R Marking Direction: horizontal</p>	 <p>Starting Position: Upper L Marking Direction: vertical</p>	 <p>Starting Position: Upper R Marking Direction: vertical</p>
---	---	--	---

Step & Repeat setting sample

<p>Setting parameter:</p> <ul style="list-style-type: none"> Character: ABC Number of Rows: 4 Number of Columns: 3 Row Step: 5 mm Column Step: 10 mm

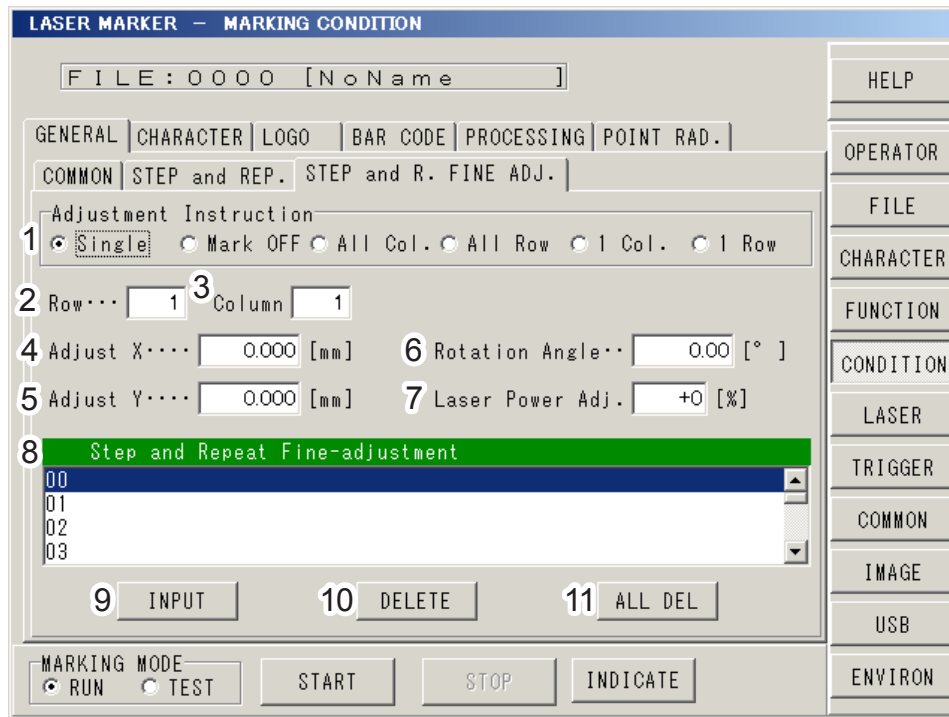


Reference

- The settings of "Common Condition" in "General Condition" are reflected after the settings in "Step & Repeat" are applied.

■ Step & Repeat Fine-Adjustment

In the Step & Repeat marking, when the marking position or power setting of some patterns are adjusted separately, set this fine-adjustment conditions.



Description

- 1 Adjustment item:
Select the adjustment target form the followings.
 - Single:
Provides adjustment to the marking position for a pattern specified by the target row and the target column.
 - Mark OFF:
Skips the marking of a pattern specified at “Row and Column”.
 - All Col. (All Column) / All Row:
Provides adjustment to all marking positions for patterns included in the columns/rows from that specified at “Column” or “Row” to the last.
 - 1 Col. (1 Column) / 1 Row:
Provides adjustment to all marking positions for patterns included in the column/row specified.

Reference

- The pattern to which “Marking OFF” is specified is not displayed on the operator adjustment screen and on the image display screen under the adjustment of character condition.

- 2 Row (Target Row):
- 3 Column (Target Column):
Specifies the intended row / column for the fine adjustment for Step & Repeat.

Setting Range	1 to 100
---------------	----------

Reference

- Max. number of settable patterns is 1000.
- The fine tuning is enabled only for the specified rows and columns.

Description

- 4 Fine Tune X:
- 5 Fine Tune Y:

Specifies the amount of adjustment for X/Y axis to the selected row or/and column.

Setting Range	-45.000 to +45.000 mm (LP-V10)
	-55.000 to +55.000 mm (LP-430 / LP-420 / LP-410)
	-80.000 to +80.000 mm (LP-435 / LP-425 / LP-V15)
	-27.500 to +27.500 mm (LP-431 / LP-421 / LP-411 / LP-W052)

- 6 Rotation Angle:

Specifies the rotation angle of the selected row or/and column. The rotation center is the origin of the each pattern which is specified in character, logo or barcode condition.

Setting Range	-180.00 to +180.00 degree
---------------	---------------------------

- 7 Laser Power Adj. (Laser Power Adjustment):

Specifies the laser power adjustment amount of the pattern which is specified in the above Fine Adj. Instruction, Row, and Column.

Setting Range	-50 to +50 %
---------------	--------------

Reference

- For the marking pattern which more than one fine adjustment is set, the laser power adjustment value is the total amount of the each settings.

In that case, the available range of the laser power adjustment is +/- 50%.

1st line : laser power adjustment +20%

1st row : laser power adjustment 10%

[Total amount of the laser power] 20%+10%=30%.

A	A	A	A	A	A	A	A	A	A
A									
A									
A									

- 8 Step and Repeat Fine-adjustment

List of fine adjustment instruction for each pattern.

Setting Range	0 to 99 (totally 100 instructions)
---------------	------------------------------------

Reference

- With selecting the fine-adjust setting in this list and open the image screen, the selected pattern is indicated in green.
- To show the settings of each pattern, select the line of the list and click it again.

- 9 INPUT:

Sets the instructing content to the selected line from the list of the fine adjustment for the Step & Repeat by pressing INPUT button. (Not pressing INPUT button does not activate the fine adjustment.)

Reference

- If some parameters are already set in the selected line, they are overwritten with clicking "INPUT". Make sure that the correct line is selected before clicking "INPUT".

- 10 DELETE:

Deletes the instruction for fine adjustment set to the list of the fine adjustment for the Step & Repeat.

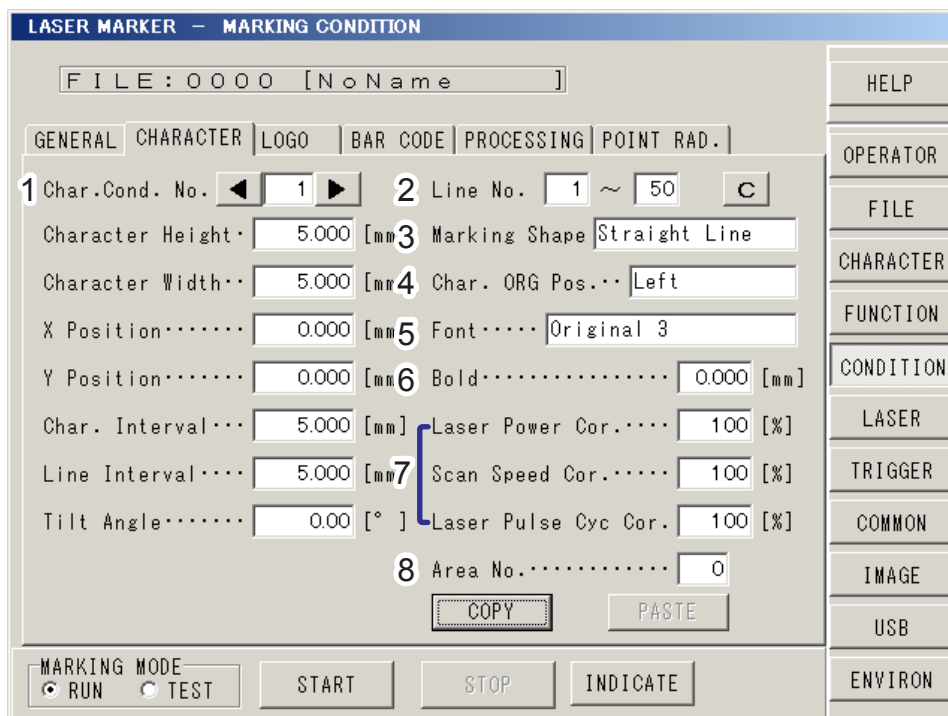
- 11 ALL DEL:

Deletes all instruction for fine adjustment set to the list of the fine adjustment for the Step & Repeat.

Reference

- The settings of "Common Condition" in "General Condition" are reflected after the settings in "Step & Repeat" are applied.

4-10-2 Character Conditions



Description

- 1 Char. Cond. No. (Character Condition No.) :
Specifies the number of condition to be set.

Setting Range	1 to 60
---------------	---------

- 2 Line No. :
Specifies the line number of character strings to be marked corresponding to the condition number.

Setting Range	1 to 60
---------------	---------

Reference

- Pressing [C] sets both start and end setting line No. with the same No. of the character condition No.
- The characters set at the common character setting correspond to the line numbers 51 to 60. If the character conditions set there are to be changed, specify the setting line to any of them to set the character conditions.

- 3 Marking Shape :
Select from “Straight Line”, “Proportional”, “Justify”, “Fan like form +”, or “Fan like form -”. The setting varies by pressing this field.

- 4 Alignment :
Select from Center, Right, or Left. The setting varies by pressing this field.

- 5 Font :
Select the font from the registered character fonts. Refer to “4-15-4 Font File” (P.241).
The font can be selected for each condition number.

Description

- 6 Bold Line Width :
Specifies the width of bold character line.

Setting Range	0.000 to 2.000 mm	(LP-V10 / LP-W052)
	0.000 to 4.000 mm	(LP-431 / LP-421 / LP-411 / LP-V15)
	0.000 to 6.000 mm	(LP-430 / LP-420 / LP-410 / LP-435 / LP-425)

Notice

- Marking of bold character may affect the quality of marking. Check it by a trial before using this function.

Reference

- At marking of bold characters, set the values so ratio of character height to character width be within 1/4 to 4.
- Set line width of bold character to quarter or below of either smaller one, character height or character width.
- When marking the bold character, set the marking pitch in the Laser Condition together. Refer to “4-11 Laser Setting” (P.211).
- The Original Font 4 may fail to mark the character in bold.

- 7 Laser Power Correction :
Scan Speed Correction :
Laser Pulse Cycle Correction (Only LP-V series) :

Correction of each character condition No. for the laser power / scan speed / laser pulse cycle set at laser setting.

Setting Range of Laser Power Correction	0 to 200%
Setting Range of Scan Speed Correction	5 to 500%
Setting Range of Laser Pulse Cycle Correction	50 to 200%

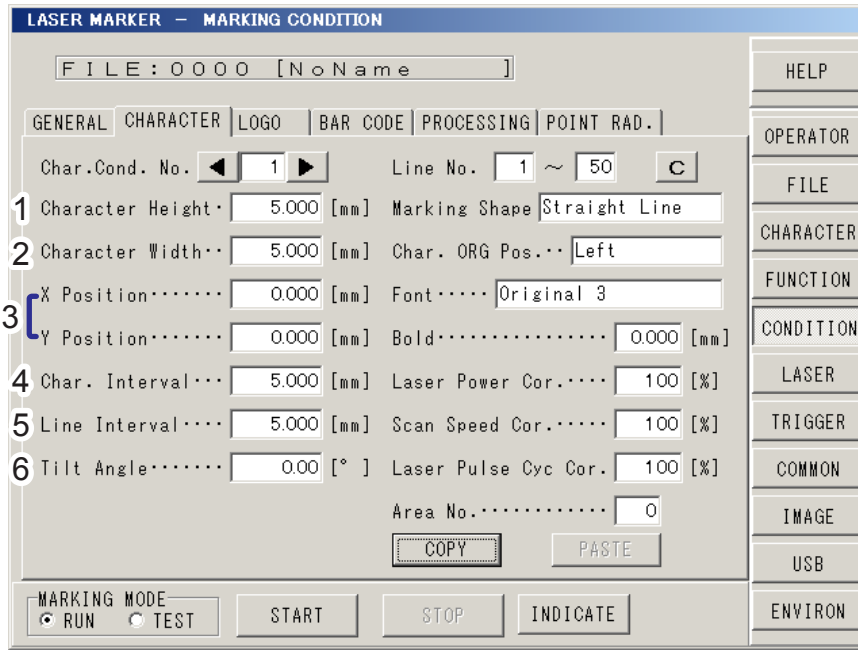
Reference

- If the value of “Laser power correction” × “laser power” is equal to or larger than 100, the setting will be “100”.
- Marking is not available when the laser power correction value is “0”.
- If the corrected value exceeds the setting limit, the upper or lower limit value of the each item is set.

- 8 Area No. :
Displayed when marking on-the-fly is set in “Trigger setting”.
It indicates the order of the marking field for the concatenated marking to flying object.

Setting Range	0 to 15
---------------	---------

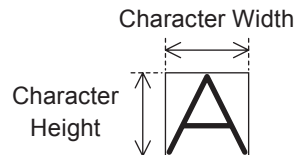
■ Marking Shape: “Straight Line”, “Proportional” and “Justify”.



Description

- 1 Character Height :
- 2 Character Width :
Specifies the height / width of character.

Setting Range	0.100 to 90.000 mm	(LP-V10)
	0.100 to 110.000 mm	(LP-430 / LP-420 / LP-410)
	0.100 to 160.000 mm	(LP-435 / LP-425 / LP-V15)
	0.100 to 55.000 mm	(LP-431 / LP-421 / LP-411 / LP-W052)



- 3 X/Y Position :
Sets the X/Y position of the origin point of the reference character.

Setting Range	-45.000 to +45.000 mm	(LP-V10)
	-55.000 to +55.000 mm	(LP-430 / LP-420 / LP-410)
	-80.000 to +80.000 mm	(LP-435 / LP-425 / LP-V15)
	-27.500 to +27.500 mm	(LP-431 / LP-421 / LP-411 / LP-W052)

Description

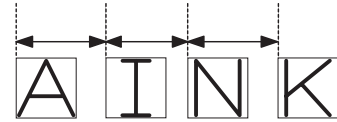
- 4 Char. Interval (Straight line/Proportional) :
 Character String Width (Justify) :
 Specifies the pitch between a character and the adjacent character.

Setting Range	0.000 to 90.000 mm (LP-V10)
	0.000 to 110.000 mm (LP-430 / LP-420 / LP-410)
	0.000 to 160.000 mm (LP-435 / LP-425 / LP-V15)
	0.000 to 55.000 mm (LP-431 / LP-421 / LP-411 / LP-W052)

According to the marking shape (Straight line/Proportional/Justify), the meaning of character interval is different as follows.

[Straight Line]

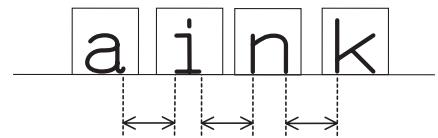
Character interval indicates the distance between origins of the characters.



[Proportional]

Character interval indicates the distance between the character edge line.

When "Proportional" setting, set Kerning in "4-10-1 General Condition" (P.171) to adjust the balance of the character interval.



[Justify]

The characters are arranged in the specified string width equally.



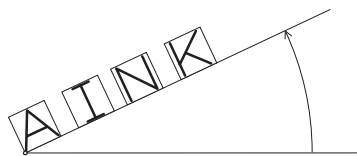
- 5 Line Interval :
 Specifies the pitch between the lines.

Setting Range	0.000 to 90.000 mm (LP-V10)
	0.000 to 110.000 mm (LP-430 / LP-420 / LP-410)
	0.000 to 160.000 mm (LP-435 / LP-425 / LP-V15)
	0.000 to 55.000 mm (LP-431 / LP-421 / LP-411 / LP-W052)



- 6 Tilt Angle :
 Angle to X axis.

Setting Range	-180.00 to +180.00 degree
---------------	---------------------------



■ Marking Shape: Fan-like Form

LASER MARKER – MARKING CONDITION

FILE: 0000 [No Name]

GENERAL CHARACTER LOGO BAR CODE PROCESSING POINT RAD.

Char.Cond. No. ◀ 1 ▶ Line No. 1 ~ 50 C

1 Character Height: 5.000 [mm] Marking Shape: Fan like form +

2 Character Width: 5.000 [mm] Char. ORG Pos.: Left

3 Center Position X: 0.000 [mm] Font: Original 3

Center Position Y: 0.000 [mm] Bold: 0.000 [mm]

4 Radius: 1.000 [mm] Laser Power Cor.: 100 [%]

5 Line Interval Rad: 5.000 [mm] Scan Speed Cor.: 100 [%]

6 Start Angle: 0.00 [°] Laser Pulse Cyc Cor.: 100 [%]

7 Char.Interval.Ang: 50.00 [°] Area No.: 0

COPY PASTE

MARKING MODE
 RUN TEST

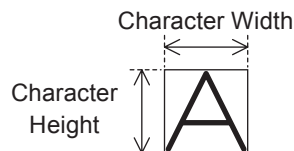
START STOP INDICATE

HELP OPERATOR FILE CHARACTER FUNCTION CONDITION LASER TRIGGER COMMON IMAGE USB ENVIRON

Description

- 1 Character Height :
- 2 Character Width :
Specifies the height / width of character.

Setting Range	0.100 to 90.000 mm	(LP-V10)
	0.100 to 110.000 mm	(LP-430 / LP-420 / LP-410)
	0.100 to 160.000 mm	(LP-435 / LP-425 / LP-V15)
	0.100 to 55.000 mm	(LP-431 / LP-421 / LP-411 / LP-W052)

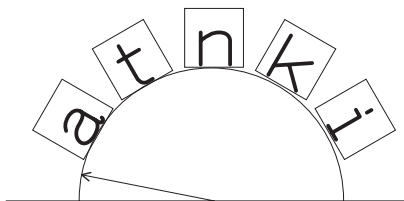


- 3 Center Position X/Y :
Sets the X/Y position of the arc center.

Setting Range	-300.000 to +300.000 mm
---------------	-------------------------

- 4 Radius :
Sets the radius of arc.

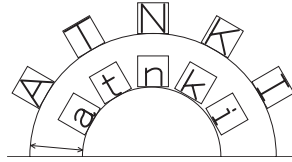
Setting Range	0 to 300.000 mm
---------------	-----------------



Description

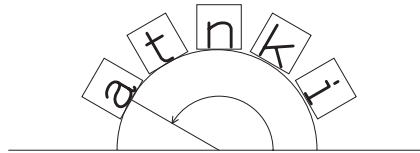
- 5 Line Interval :
Specifies the radius between the lines.

Setting Range	0.000 to 90.000 mm	(LP-V10)
	0.000 to 110.000 mm	(LP-430 / LP-420 / LP-410)
	0.000 to 160.000 mm	(LP-435 / LP-425 / LP-V15)
	0.000 to 55.000 mm	(LP-431 / LP-421 / LP-411 / LP-W052)



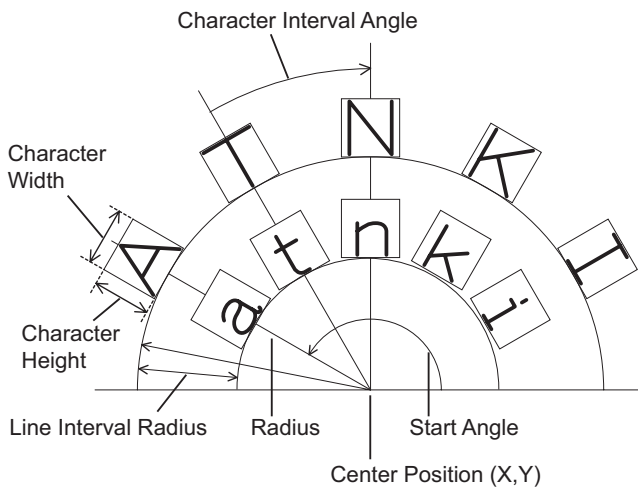
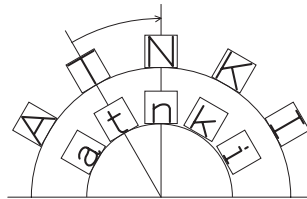
- 6 Start Angle :
The starting position of the first marking character on the first line.

Setting Range	-180.00 to +180.00 degree
---------------	---------------------------

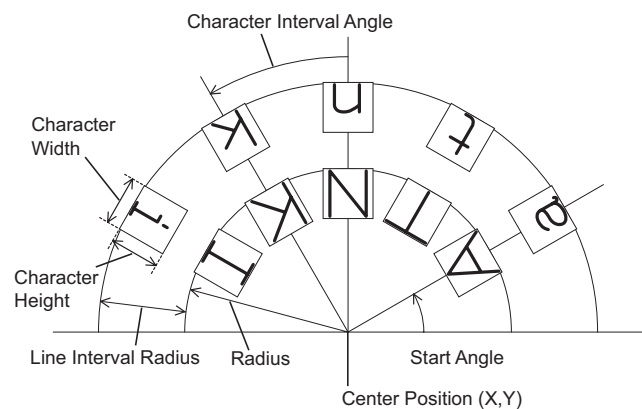


- 7 Character Interval Angle :
Angle between two adjacent characters.

Setting Range	-180.00 to +180.00 degree
---------------	---------------------------



Fan-like "+"
(Origin of character string for left justification)



Fan-like "-"
(Origin of character string for left justification)

4-10-3 Logo Condition

■ VEC File Format

■ DXF File Format

Description

- 1 Logo condition No. :
Registered No. of logo data to be marked. Max. 16 logo files are settable for per file.

Setting Range	0 to 15
---------------	---------
- 2 File Format :
Selects file format from “VEC” or “DXF”.
- 3 Logo File :
Displays the logo file set to the specified logo No. The selecting window for logo file is appeared by pressing logo file name. Select the logo file to be marked, and press [EXECUTE].

Reference

- The max. loadable coordinate is 131,072 points.
The number of coordinate points can be checked in “Logo Data Conversion Software”.
- Compared to the VEC file, the data amount of the DXF file becomes heavier and its time to be in READY for marking will be longer.
In case of registering much logo data or shortening the time for file change, convert the DXF data into the VEC data using the attached software “Logo Data Conversion Software”.

- 4 DELETE :
Press [DELETE] to delete the setting of the logo file.
If there is no logo file setting, the logo condition is not saved at file saving.
- 5 Origin (only for DXF file format) :
Specifies the coordinate of the origin point for DXF file data.
Select from center, lower left, lower right, upper left, upper right or as original graphic.
- 6 X/Y Position :
X/Y position of the reference point of the logo file data.

Setting Range	-300.000 mm to +300.000 mm
---------------	----------------------------
- 7 Rotation Angle :
Sets the rotation direction of the logo file data.

Setting Range	-180.00 to +180.00 degree
---------------	---------------------------
- 8 X/Y Mag. (only for VEC file format) :
Specifies the magnification of X/Y of the VEC file data.

Setting Range	0.100 to 10.000 times
---------------	-----------------------

Description

- 9 Size (only for DXF file format) :
 Specifies size specification method of DXF file data.
- Height · Width : Sets height and width respectively.
 - Width (Keep Height Ratio) : Sets width with height ratio fixed.
 - Height (Keep Width Ratio) : Sets height with width ratio fixed.
 - Original : Sets DXF file size as original size.

- 10 Height, Width (only for DXF file format) :
 Sets height / width of DXF file data.

Setting Range	0.100 to 90.000 mm	(LP-V10)
	0.100 to 110.000 mm	(LP-430 / LP-420 / LP-410)
	0.100 to 160.000 mm	(LP-435 / LP-425 / LP-V15)
	0.100 to 55.000 mm	(LP-431 / LP-421 / LP-411 / LP-W052)

- 11 Font (only for DXF file format):
 Specifies font type to be used for the text character in DXF file data.
 The font can be selected for each logo file.

- 12 Marking Pitch (only for DXF file format):
 Sets marking pitch of the solid hatching drawing in DXF file data.

Setting Range	0.010 to 2.000 mm
---------------	-------------------

- 13 Marking Direction (only for DXF file format) :
 Sets marking direction of the solid hatching drawing in DXF file data. Both vertical and horizontal directions are settable.

- 14 Laser Power Correction :
 Scan Speed Correction :
 Laser Pulse Cycle Correction (Only LP-V series) :

Correction of each logo No. for the laser power / scan speed / laser pulse cycle set at laser setting.

Setting Range of Laser Power Correction	0 to 200%
Setting Range of Scan Speed Correction	5 to 500%
Setting Range of Laser Pulse Cycle Correction	50 to 200%

Reference

- If the value of "Laser power correction" × "laser power" is equal to or larger than 100, the setting will be "100".
- Marking is not available when the laser power correction value is "0".
- If the corrected value exceeds the setting limit, the upper or lower limit value of the each item is set.

- 15 Area No. :
 Displayed when marking on-the-fly is set in "Trigger setting".
 It indicates the order of the marking field for the concatenated marking to flying object.

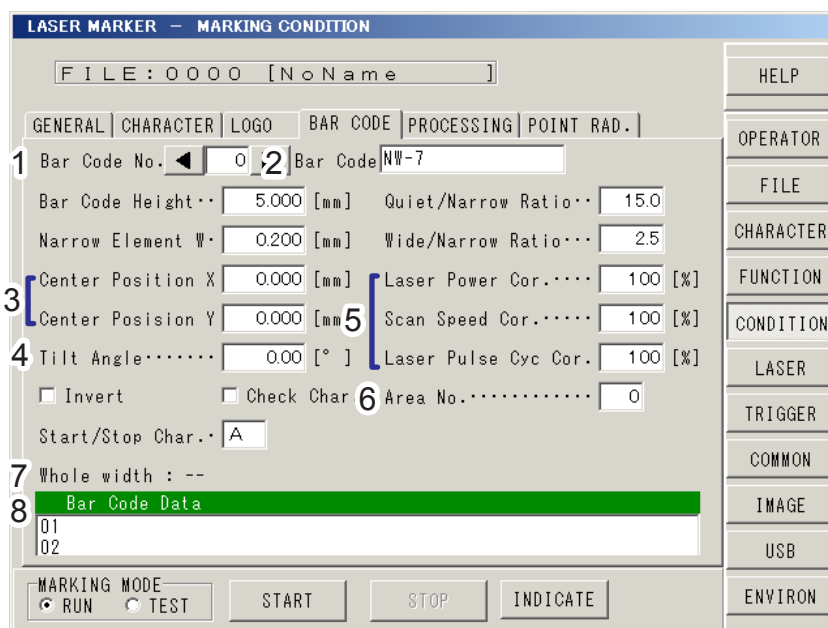
Setting Range	0 to 15
---------------	---------

4-10-4 Bar Code Condition

! Notice

- When marking bar code or 2D code, read the laser-marked code with the code reader, and check the content of the marked code that is output from the code reader is coincident with the original bar code or 2D code without fail.
- Since the marking to the flying object is affected by vibration or line speed easily, marking and reading 2D code or bar code to the flying object might become unstable. Therefore, when marking 2D code or bar code to the flying object, check the marking and reading state of the marked code on the flying object sufficiently.

■ Common setting for bar code and 2D code



Description

- 1 Bar Code No. :
Specifies up to 8 codes per one registered file.

Setting Range	0 to 7
---------------	--------

- 2 Type :
Select the code type.
Press code name to display the Bar Code selecting screen. For the selectable code type, refer to “Code Type and Code Data” (P.188).

- 3 Center Position X/Y or X/Y Position:
Specifies the center position of the code.

Setting Range	-45.000 to +45.000 mm	(LP-V10)
	-55.000 to +55.000 mm	(LP-430 / LP-420 / LP-410)
	-80.000 to +80.000 mm	(LP-435 / LP-425 / LP-V15)
	-27.500 to +27.500 mm	(LP-431 / LP-421 / LP-411 / LP-W052)

- 4 Tilt Angle or Rotation Angle:
Sets the angle of the code.

Setting Range	-180.00 to +180.00 degree
---------------	---------------------------

Description

- 5 Laser Power Correction :
Scan Speed Correction :
Laser Pulse Cycle Correction (Only LP-V series) :

Correction of each bar code No. for the laser power / scan speed / laser pulse cycle set at laser setting.

Setting Range of Laser Power Correction	0 to 200%
Setting Range of Scan Speed Correction	5 to 500%
Setting Range of Laser Pulse Cycle Correction	50 to 200%

Reference

- These settings are not applied to the human readable text of the code symbol. For the laser setting of the human readable text, refer to "Human Readable Text" (P.201).
- For the composite code, correction of the laser power, scan speed and laser pulse cycle are set separately in 1D and 2D symbols.
- If the value of "Laser power correction" × "laser power" is equal to or larger than 100, the setting will be "100".
- Marking is not available when the laser power correction value is "0".
- If the corrected value exceeds the setting limit, the upper or lower limit value of the each item is set.

-
- 6 Area No. :
Displayed when marking on-the-fly is set in "Trigger setting".
It indicates the order of the marking field for the concatenated marking to flying object.

Setting Range	0 to 15
---------------	---------

-
- 7 Whole width or Whole size:
Displays the entire size of the code, including the quiet zone corresponding to the data specified.
For the 2D code, the size with the margin or quiet zone is indicated in ().

-
- 8 Code Data :
Specifies the data to encode. Press the target line and press [EDIT] to display the data input screen.
Set the data character specified in "Code Type and Code Data" (P.188).

Reference

- Check the digit number of function characters before inputting the current date, expiry date, counter, lot, rank, and serial data function characters in the code data.
- When two or more character strings are input to the code data, they are connected as one string at the coding.

Reference

- The marking pitch of the bar code is set at "Laser Condition." Refer to "4-11 Laser Setting" (P.211). It is recommended that the marking pitch for laser setting should be specified so that it should be an integral multiple of half line width of solid line. If the space is generated on the marked object, set the marking pitch with small value.

■ Code Type and Code Data

Code Type	Available characters	number of characters
CODE39	0 to 9, A to Z, space, symbols - + / \$ % .	Max. 60 characters
ITF	0 to 9	
CODE128	<ul style="list-style-type: none"> Characters within ASCII Code 00 (HEX) to 7F (HEX): 0 to 9, A to Z, a to z, symbols and control codes Function character (FNC1) 	
NW-7	0 to 9, symbols - \$: / . +	
EAN/UPC	0 to 9 The bar code to be generated is determined based on the number of character inputted as shown below: <ul style="list-style-type: none"> EAN-13: Input by 12 figures without check digit. EAN-8: Input by 7 figures without check digit. UPC-A: Input by 11 figures without check digit. UPC-E: Input by 6 figures without check digit. 	6, 7, 11, or 12 digits
RSS-14 (GS1 DataBar)	0 to 9	13 digits
RSS (GS1 DataBar) Limited		
RSS (GS1 DataBar) Expanded	0 to 9, A to Z, a to z, symbols (! " % & ' () * + , - . / : ; < = > ? _), space, function character (FNC1)	Max. 60 characters
2D side of composite code		CC-A: Max. 56 characters CC-B: Max. 255 characters CC-C: Max. 255 characters
QR code (Model 1) QR code (Model 2) Micro QR	<ul style="list-style-type: none"> Number mode (1 byte character): 0 to 9 Alphanumeric mode (1 byte character): 0 to 9, A to Z, space, \$ % * + - . / : Binary mode: Characters within ASCII Code 00 (HEX) to 7F (HEX), consisting of 0 to 9, A to Z, a to z, symbols and control codes. Kanji mode (2 byte character): JIS level-1 and JIS level/2 within JIS code 2121 to 7426 (HEX) 	Max. 255 characters
Data Matrix (ECC200)	<ul style="list-style-type: none"> Binary mode: Characters within ASCII Code 00 (HEX) to 7F (HEX), consisting of 0 to 9, A to Z, a to z, symbols and control codes. Kanji mode :JIS level-1 and JIS level-2 within JIS code 2121 to 7426(HEX) 	
GS1 Data Matrix	0 to 9, A to Z, a to z, symbols (! " % & ' () * + , - . / : ; < = > ? _), function character (FNC1)	

Reference

[CODE128]

- Inputting the control code "FNC1" to the head of the barcode data, CODE128 changes to UCC/EAN128(GS1-128).
- In the case that "FNC1" is set at the head in CODE128 and 13-digit characters are inputted after "01", a check digit is added at 14th digit automatically.
- The start code A, B, C for CODE128 is selected automatically depending on the content of the data.

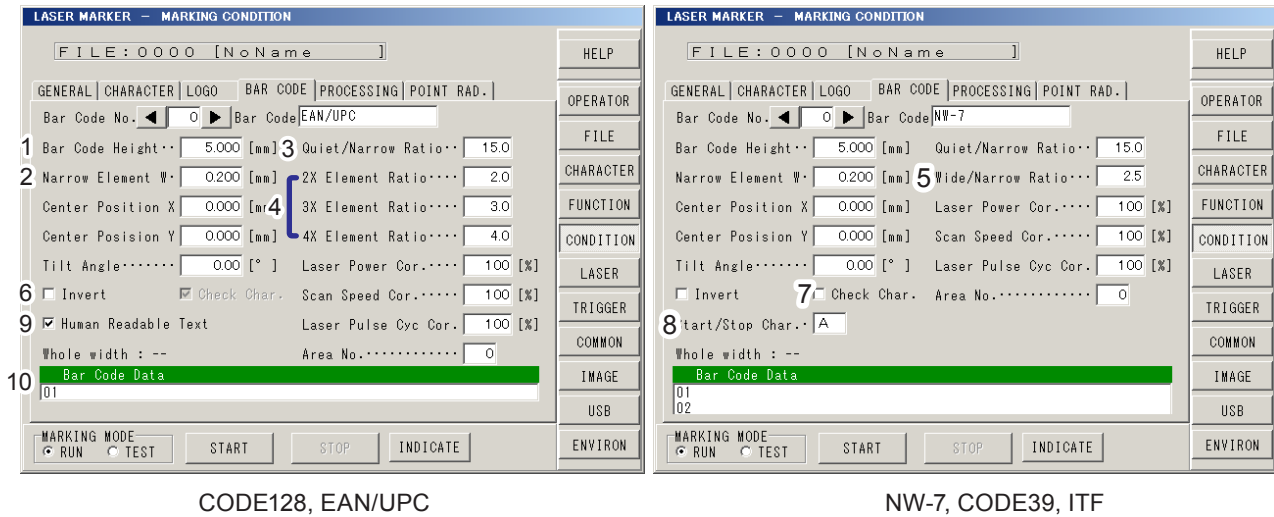
[ITF]

- Add "0" at the head of data if the number of characters inputted including the check characters is odd.

[RSS code]

- RSS code and GS1 DataBar code are the same code. In this product, it is represented as RSS code.
- The supported standard of RSS (GS1DataBar) Limited is 2011 version and 2006 version of ISO/IEC 24724.
- For RSS-14(GS1 DataBar), RSS(GS1 DataBar) Limited and those composite codes, input 13-figure numbers as the code data. In those human readable text, "01" as AI in the head of the text and the check digit (modulus10/weight 3-1) in the end of the text are indicated automatically.

■ CODE39, ITF, CODE128, NW-7, EAN/UPC



CODE128, EAN/UPC

NW-7, CODE39, ITF

Description

- 1 **Bar Code Height :**
Specifies the height of bar code. The bar code height does not include the height of the human readable character. For EAN / UPC code, the Bar Code Height does not include the height of the projected part of the guide bars and the center bar.

Setting Range	1.000 to 90.000 mm	(LP-V10)
	1.000 to 110.000 mm	(LP-430 / LP-420 / LP-410)
	1.000 to 160.000 mm	(LP-435 / LP-425 / LP-V15)
	1.000 to 55.000 mm	(LP-431 / LP-421 / LP-411 / LP-W052)

- 2 **Narrow Element Width :**
Specifies narrow element width of the bar code.
Set the larger value than 'Line width' in laser setting screen.

Setting Range	0.050 to 1.000 mm
---------------	-------------------

- 3 **Quiet Zone / Narrow Element Ratio :**
Ratio of the quiet zone to narrow element width. Specifying the number other than "0" here makes it possible to view the image of the quiet zone if the inversion marking is not performed.

Setting Range	0.0 to 20.0
---------------	-------------

- 4 **2X-4X Element Ratio (only for CODE128 / EAN / UPC) :**
The ratio of double, triple, quadruple element to narrow element width.

Setting Range (2X)	1.4 to 2.6
Setting Range (3X)	2.1 to 3.9
Setting Range (4X)	2.8 to 5.2

Reference

- This setting does not appear when EAN/UPC codes or CODE 128 are set in the 1D side of composite codes.

- 5 **Wide Element / Narrow Element Ratio (only for CODE39 / ITF / NW-7) :**
Ratio of wide element to narrow element.

Setting Range	1.8 to 3.4
---------------	------------

- 6 **Invert :**
Enable this function to mark the bar code inverted. Without inversion setting, only the bars are marked. With the inversion setting, the quiet zone and space in the symbol section are marked.

Description

- 7 Check Character :
- Setting this check character function inputs the following check character automatically.
- CODE 39: modulus 43
 - ITF: modulus 10/weight 3-1
 - NW-7: modulus 16

Reference

- For CODE 128, inputting “FNC1” and “01” at the head of the bar code data followed by 13-figure numeric automatically input one check digit (modulus10/weight 3-1).
 - For 1D of Composite whose lower bar code consists of UCC/EAN128, inputting “01” at the head of the bar code data followed by 13-figure numeric automatically input one check digit (modulus10/weight 3-1).
-

- 8 Start / Stop Character (NW-7 only) :
- Specifies the start/stop character.
Select from “A”, “B”, “C” or “D”.
-

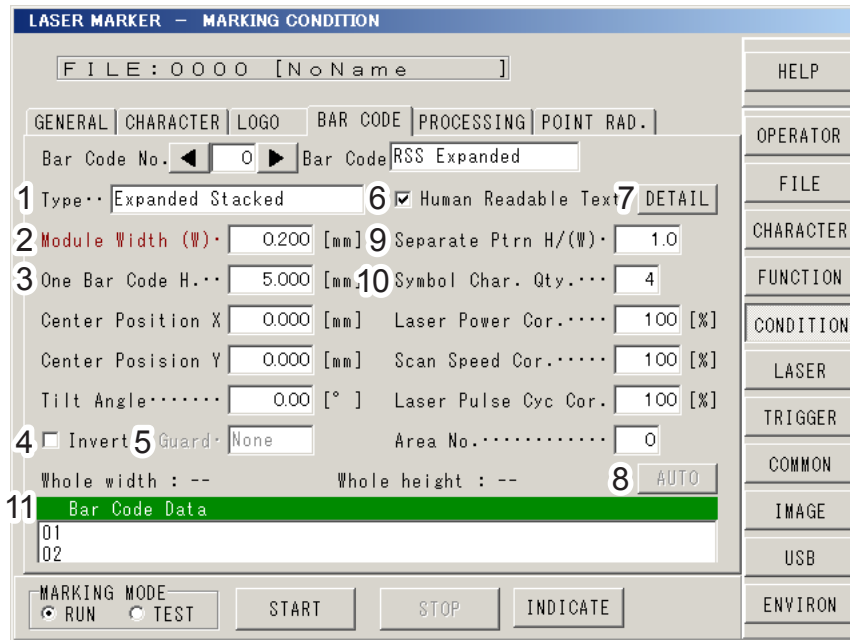
- 9 Human Readable Text (only for CODE128 / EAN / UPC) :
- Sets “Human Readable Text” marking for EAN / UPC, CODE 128 and UCC/EAN128. Check the box to enable the function.

Reference

- For the settings of the human readable text of CODE128 and UCC/EAN 128, refer to “Human Readable Text” (P.201).
 - For EAN / UPC code, the human readable text is marked with the font registered in character font 1 and with the specified text size and position according to the code standard.
 - For EAN / UPC code, if the laser power correction value of the code symbol is set 0, the human readable text is not marked.
-

- 10 Bar Code Data :
- Specifies the data to be Bar Code.
Refer to “Code Type and Code Data” (P.188) for the available characters.
-

■ Condition setting of GS1 DataBar (RSS code)



Description

- 1 Type (RSS-14) (Except RSS (GS1 DataBar) Limited) :
Specifies RSS-14 (GS1 DataBar)/RSS (GS1 DataBar) Expanded type.
RSS-14 (GS1 DataBar): Select Standard & Truncated, Stacked, or Stacked Omnidirectional.
RSS (GS1 DataBar) Expanded: Expanded or Expanded Stacked.

Reference

- When RSS (GS1 DataBar) Limited is used, select how to specify the guard pattern width in “Bar Code Setting” (P.254) in Environment setting.

- 2 Module width (W) :
Specifies the minimum width of bar or space. Set the larger value than “Line Width” set in laser setting screen.

Setting Range	0.050 to 1.000 mm
---------------	-------------------

- 3 Bar Code Height *1 :
Lower Bar Code Height *2 :
One Bar Code Height *3 :

Specifies the height of bar code / lower bar code / respective tiers on a multi-tiered bar code.
RSS-14 (GS1 DataBar) Standard&Truncated, RSS(GS1 DataBar) Limited, or RSS (GS1 DataBar) Expanded only
RSS-14 (GS1 DataBar) Stacked only
RSS (GS1 DataBar) Expanded Stacked or RSS (GS1 DataBar) Stacked Omnidirectional only

Setting Range	1.000 to 90.000 mm	(LP-V10)
	1.000 to 110.000 mm	(LP-430 / LP-420 / LP-410)
	1.000 to 160.000 mm	(LP-435 / LP-425 / LP-V15)
	1.000 to 55.000 mm	(LP-431 / LP-421 / LP-411 / LP-W052)

- 4 Invert :
To invert the marking lines of the code symbol, check the box.
With inversion setting bars are not marked, but spaces and guard pattern in the code symbol are marked by laser.

Description

- 5 Guard :
Select whether the guard pattern is expanded with a certain width.
To improve the read rates of the code symbols, enable this setting.
The guard pattern indicates the spaces outside of the code symbol where is marked when the code is inverted.

Reference

- When GS1 DataBar Limited is set and this “Guard” setting is enabled, the guard pattern is expanded with the certain width in addition to the setting width in “Bar Code Setting” (P.254).

-
- 6 Human Readable Text :
Check the box to enable the function.

-
- 7 Detail :
Click this button to display the Human Readable Text Setting screen. Refer to “Human Readable Text” (P.201).

-
- 8 Auto :
This function button sub serves the code configuration By inputting the “Module Width” and “Bar Code Data”, this function is available. Pressing AUTO button displays the confirmation dialog box. On this screen, clicking “Yes” sets both the bar code condition and laser condition automatically, and clicking “No” sets only the bar code condition automatically. This AUTO setting becomes invalid by pressing “Cancel”.
Refer to “Setting Value for AUTO Set” (P.320) for detail.

-
- 9 Separator Height/(W) :
Specifies the height of the separator between a multi-tiered bar code. Usually it is the same as the width of a module.

Setting Range	0.0 to 10.0
---------------	-------------

-
- 10 Symbol Character in Row (RSS (GS1 DataBar) Expanded Stacked only) :
Specifies the number of column for overlapping the bar code.

Setting Range	2 to 20 (For primary composite : 4 to 20.)
---------------	--

-
- 11 Bar Code Data :
Refer to “Code Type and Code Data” (P.188) for input characters.

Reference

- For RSS-14(GS1 DataBar), RSS(GS1 DataBar) Limited and those composite codes, input 13-figure numbers as the code data. In those human readable text, “01” as AI in the head of the text and the check digit (modulus10/weight 3-1) in the end of the text are indicated automatically.
-

■ Settings for Composite Codes

The composite code is a code symbol that combines bar code (EAN/UPC/EAN128/GS1 DataBar) and 2D code (CC-A, CC-B, CC-C). For composite code, set 1D side code and 2D side code respectively.

1D Condition Setting Screen

The above screen is used for 1D setting for the composite. Set items are basically the same in the case for bar code to be used alone. Please refer to the corresponding of the bar code for details on bar code setting screen. Please refer to the screen of CODE128 for UCC/EAN128 (GS1-128).

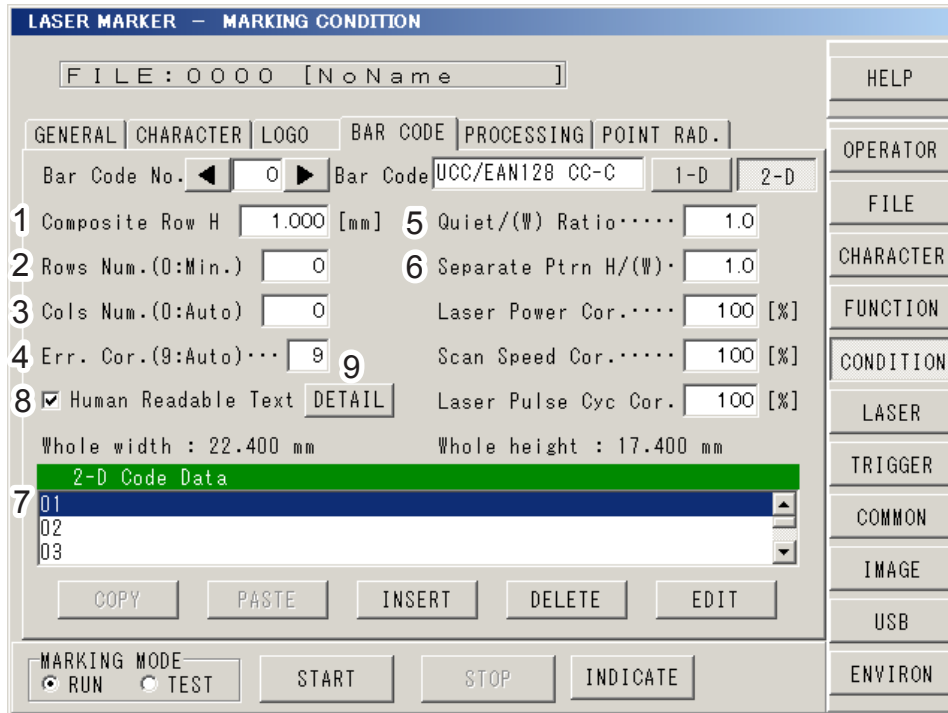
Description

- 1 1D/2D Selection :
Selects the setting object.
(2D button become effective when any characters are input in the bar code data column.)

- 2 Bar Code Data :
Data to be encoded in bar code.
The data that can be input are the same as the case for bar code to be used alone.

- 3 Whole Width/Height :
Whole size of bar code including 1D and 2D. (Quiet Zone is included.)

2D Condition Setting Screen



Description

- 1 Composite Row Height :
Specifies the height of one column of 2D code. Input larger value than "line width" specified by laser setting.
- | | |
|---------------|-------------------|
| Setting Range | 0.050 to 9.999 mm |
|---------------|-------------------|
-
- 2 Rows Number :
Specifies the number of row of 2D code. The minimum number of row is generated in case of setting 0.
The value that can be input is different according to the combination of 1D and 2D codes. If an invalid combination is input, it becomes a generation error.
-
- 3 Columns Number (CC-C only) :
Specifies the number of column (width in horizontal).
Adjusts the width as close as that of linear bar code by the automatic operation in case of setting 0.
Note that the maximum number of column × rows is 928.
- | | |
|---------------|---------|
| Setting Range | 0 to 30 |
|---------------|---------|
-
- 4 Error Correction Level (CC-C only) :
Specifies the error correction level. There are 9 levels (0 to 8) for the error correction level.
When "9" is selected, the recommended value specified in the specification is selected.
- | | |
|---------------|--------|
| Setting Range | 0 to 9 |
|---------------|--------|
-
- 5 Quiet / (W) Ratio :
Sets the size of 2D Quiet zone in the ratio to width of a basic module*.
* Basic module: fine element width (basic module width) set on the condition setting screen of 1D.
- | | |
|---------------|-------------|
| Setting Range | 0.0 to 20.0 |
|---------------|-------------|
-
- 6 Separator Height/(W) :
Specifies the height of the separation pattern between 1D and 2D symbols in the ratio to width of a basic module.
- | | |
|---------------|-------------|
| Setting Range | 0.0 to 10.0 |
|---------------|-------------|

Description

- 7 2D Code Data :
Specifies the data to be coded. Refer to “Code Type and Code Data” (P.188) for the available characters.

Reference

- In the code data, the number of character to be input is 30 on nine lines. When two or more character strings are input to the code data, they are connected as one string at the coding.

- 8 Human Readable Text :
Check the box to enable the function.

- 9 DETAIL :
Click this button to display the Human Readable Text Setting screen.
Refer to “Human Readable Text” (P.201) for the detail.

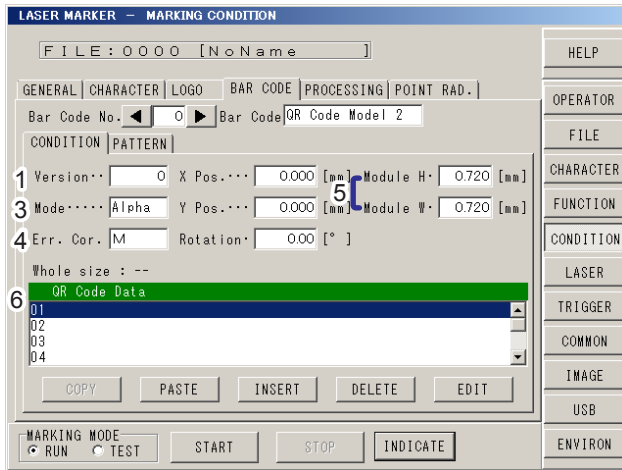
Relationship between combination of 1D and 2D codes and the number of row

Bar Code Type	The Rows Number Available in CC-A	The Rows Number Available in CC-B
UPC-E RSS-14 (GS1 DataBar) Stacked (Omnidirectional)	5, 6, 7, 8, 9, 10, 12 [column]	8, 11, 14, 17, 20, 23, 26 [column]
EAN-8 RSS (GS1 DataBar) Limited	4, 5, 6, 7, 8 [column]	6, 8, 10, 12, 15, 20, 26, 32, 38, 44 [column]
EAN-13/UPC-A/EAN128 RSS-14 (GS1 DataBar) (Standard/Truncated) RSS (GS1 DataBar) Expanded Standard/Stacked	3, 4, 5, 6, 7 [column]	4, 6, 8, 10, 12, 15, 20, 26, 32, 38, 44 [column]

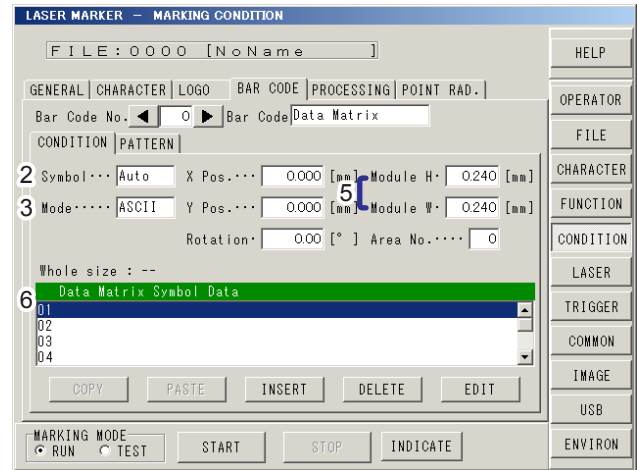
Reference

- For the composite code, correction of the laser power, scan speed and laser pulse cycle are set separately in 1D and 2D symbols.

■ Setting for QR Code and Data Matrix Code



QR Code



Data Matrix Code

Description

- 1 Version (QR code only):
Specifies the symbol size of QR code and micro QR code.
When “0” is selected, the size is specified to be the minimum automatically. In this case, the symbol size may change depending on the input code data.
Refer to “QR Code Version and Data Capacity” (P.315) for detail.

Setting Range	When QR code model 1 is set	: 0 to 14
	When QR code model 2 is set	: 0 to 22
	When micro QR code is set	: 0 to 4

- 2 Symbol (Data Matrix code only):
Specifies the symbol size (module unit) of data matrix code. Select “Auto” or “Manual”. When “Auto” is selected, the size is specified to be the minimum.
Refer to “Symbol Size and Data Capacity” (P.318) for detail.

Square : 10×10, 12×12, 14×14, 16×16, 18×18, 20×20, 22×22, 24×24, 26×26, 32×32, 36×36, 40×40, 44×44, 48×48, 52×52, 64×64, 72×72, 80×80, 88×88

Rectangle : 8×18, 8×32, 12×26, 12×36, 16×36, 16×48

- 3 Mode :
Input mode for the code data. Depending on the mode, available characters vary. Refer to “Code Type and Code Data” (P.188).
- For QR code, select the mode from “Number”, “Alpha”, “Binary” or “Kanji”.
 - For Data Matrix code, select the mode from “ASCII” or “Kanji”.
 - For GS1 Data Matrix code, data input mode is fixed to binary mode.

- 4 Err. Cor. (Error Correction) (QR code only):
Specifies the error correction level of QR code.
Select from “L (7%)”, “M (15%)”, “Q (25%)” or “H (30%)”.

Description

- 5 Module H/W (Module Height/Width) :
Specifies the height and width of module which compose a symbol.

Setting Range	QR code: 0.050 to 1.000 mm
	Data Matrix code: 0.001 to 1.000mm

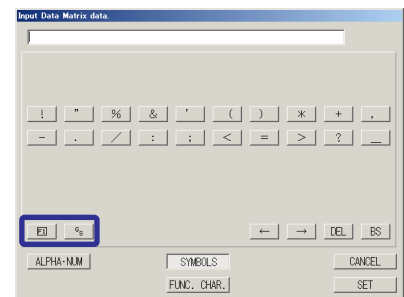
Reference

- If the size of module is same as or very smaller than that specified at “4-11 Laser Setting” (P.211), the module inside the encode area may not be marked uniformly. In this case, enlarge the size of the module or narrow the line.

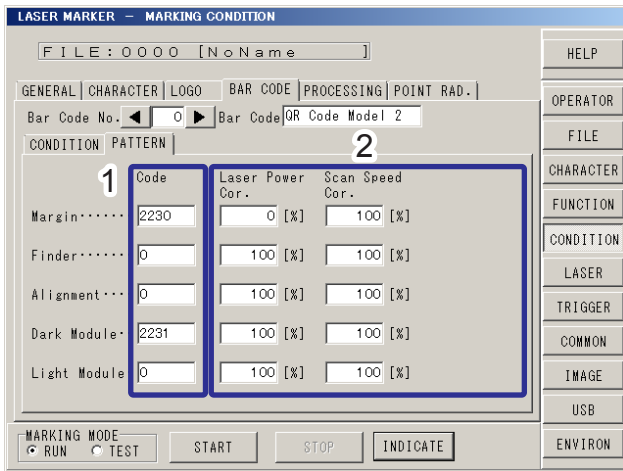
- 6 Code Data :
Specifies the data to be coded. When two or more character strings are input to the code data, they are connected as one string at the coding.
For input characters, refer to “Code Type and Code Data” (P.188).

Reference

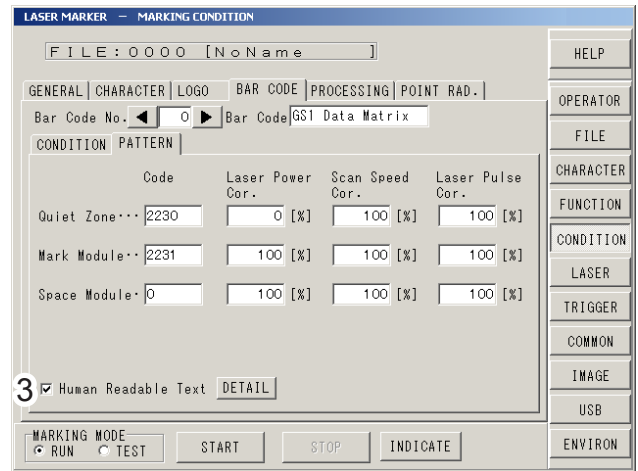
- For GS1 Data Matrix, the control code “FNC1” is automatically inputted at the head of the code data. When inputting AI “01” followed by 13-digit numerical character, the check digit (modulus10/weight 3-1) is inputted automatically at the next digit.
- For Data Matrix, group separator (FNC1 or GS) of variable length AI data is not inputted automatically.
Press the Symbol button on the Data Input screen and then press FNC1 or GS on the Symbol Input screen.
In the standard, it is recommended to use FNC1 as the separator of variable length AI data.
- When the code data is set by the serial communication (RS-232C/Ethernet) command “BCS”, select “GS” or “FNC1” as the separator of variable length AI data beforehand in “4-16-3 Communication, I/O Setting (Environment 3)” (P.258).



■ Pattern Setting for QR code and Data Matrix code



QR Code



Data Matrix Code

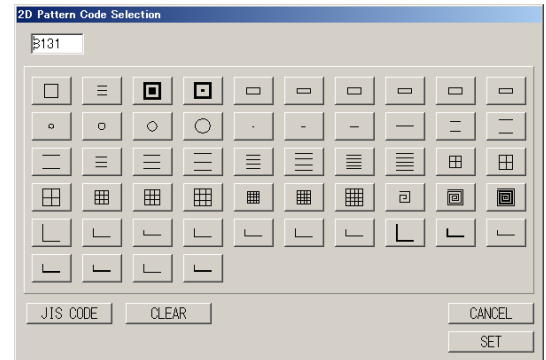
Specify the drawing pattern of the 2D code for the each code component.

Description

- 1 Pattern code:
Specify the drawing pattern of the 2D code for the each code component.
Press the pattern code field and select the drawing pattern.
Press "CLEAR" to set "0" in the pattern code.

For setting a inverted (Black/White) code, set the pattern code as follows;

- For QR code, select the drawing pattern to the light module. Specify "0" to margin, finder, alignment and dark module.
- For Data Matrix code, select the drawing pattern to the space module. Specify "0" to quiet zone and mark module.



Reference

- For QR code, when the pattern code is set to "0" in finder or alignment, these patterns are marked using the settings for dark or light module.
- On the pattern code input screen, the pattern image registered into 2D code font (2230(HEX) to 2239(HEX) and 8121(HEX) to 8152(HEX)) is displayed.
- Pressing pattern code displays the pattern code input screen. On the pattern code input screen, the image of the pattern code can be selected. In case of setting the pattern code using the character code, press [JIS CODE] for displaying the ten key, and then input the character code.

- 2 Laser Power Correction :
Scan Speed Correction :
Laser Pulse Cycle Correction (Only LP-V series) :
Correction of each code pattern for the laser power / scan speed / laser pulse cycle set at laser setting.

Setting Range of Laser Power Correction	0 to 200%
Setting Range of Scan Speed Correction	5 to 500%
Setting Range of Laser Pulse Cycle Correction	50 to 200%

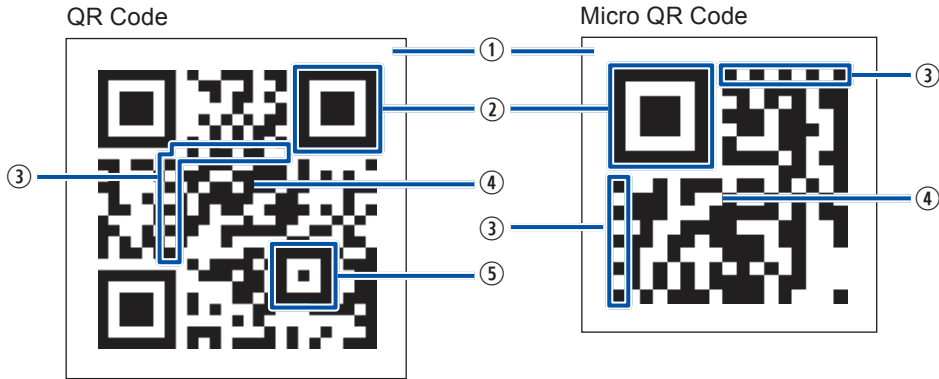
Reference

- If the value of "Laser power correction" × "laser power" is equal to or larger than 100, the setting will be "100".
- Marking is not available when the laser power correction value is "0".
- If the corrected value exceeds the setting limit, the upper or lower limit value of the each item is set.

Description

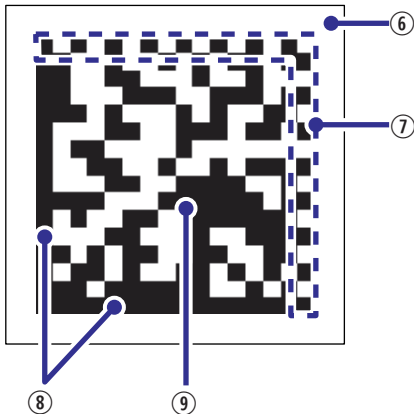
- 3 Human Readable Text (GS1 Data Matrix) :
 Specifies whether marking of "Human Readable Text" is enabled or not. Insert a checkmark in the box to enable the function.

Composition of QR code and Data Matrix



No.	Name	Remarks
①	Margin	<ul style="list-style-type: none"> QR code: More than 4 modules around Micro QR code: More than 2 modules around
②	Finder Pattern	
③	Timing Pattern	
④	Black: Dark module White: Light module	Data Area
⑤	Alignment Pattern	

Data Matrix code



No.	Name	Remarks
⑥	Quiet Zone	More than 1 module around
⑦	Timing Module	
⑧	Border	
⑨	Black: Mark module White: Space module	Data Area

■ 2D Code Pattern Font

The 2D code pattern font shown below have been previously registered to the font installed in the CD-ROM. Refer to “4-15-4 Font File” (P.241) to register the pattern fonts on the laser marker.

Font image								
Character code	2230(HEX)	2231(HEX)	2232(HEX)	2233(HEX)	2234(HEX)	2235(HEX)	2236(HEX)	2237(HEX)
Pattern type	Quiet zone	Module	Finder pattern	Alignment	Quiet zone			

Font image								
Character code	2238(HEX)	2239(HEX)	8121(HEX)	8122(HEX)	8123(HEX)	8124(HEX)	8125(HEX)	8126(HEX)
Pattern type	Quiet zone		Module					

Font image								
Character code	8127(HEX)	8128(HEX)	8129(HEX)	812A(HEX)	812B(HEX)	812C(HEX)	812D(HEX)	812E(HEX)
Pattern type	Module							

Font image								
Character code	812F(HEX)	8130(HEX)	8131(HEX)	8132(HEX)	8133(HEX)	8134(HEX)	8135(HEX)	8136(HEX)
Pattern type	Module							

Font image								
Character code	8137(HEX)	8138(HEX)	8139(HEX)	813A(HEX)	813B(HEX)	813C(HEX)	813D(HEX)	813E(HEX)
Pattern type	Module							

Font image								
Character code	813F(HEX)	8140(HEX)	8141(HEX)	8142(HEX)	8143(HEX)	8144(HEX)	8145(HEX)	8146(HEX)
Pattern type	Border pattern							

Font image						
Character code	8147(HEX)	8148(HEX)	8149(HEX)	814A(HEX)	814B(HEX)	814C(HEX)
Pattern type	Border pattern					

Reference

- For 2D pattern font, a total of 60 fonts can be registered in any code from 2230(HEX) to 2239(HEX), or from 8121(HEX) to 8152(HEX). When a new pattern font is created and registered, overwrite the font pattern registered in any code from 2230(HEX) to 2239(HEX), or from 8121(HEX) to 814C(HEX), or register it on any code from 814D(HEX) to 8152(HEX). Do not use other character code.
- If a reading failure occurs with the standard pattern shown above (2DCODE.FON), use the font maker provided to create the proper pattern. Refer to “Font Maker Operation Manual” for details.

■ Human Readable Text

Specifies the human readable text settings of the following code symbols.

- CODE128
- RSS-14 (GS1 DataBar), RSS (GS1 DataBar) Limited, RSS (GS1 DataBar) Expanded
- GS1 Data Matrix
- Composite codes

Reference

- “FNC1” and control codes are not shown in the human readable text at the marking.
- For EAN / UPC code, the human readable text is marked with the font registered in character font 1 and with the specified text size and position according to the code standard. To laser power, scan speed and pulse cycle (only for LP-V series) for the human readable text of EAN / UPC code, the setting parameters in Laser Setting screen are applied.

Description

- 1 Relative X Position, Relative Y Position :
Specifies relative coordinate of X/Y position of Human Readable Text when the center of the code is defined as the origin point.

Setting Range	-45.000 to +45.000 mm	(LP-V10)
	-55.000 to +55.000 mm	(LP-430 / LP-420 / LP-410)
	-80.000 to +80.000 mm	(LP-435 / LP-425 / LP-V15)
	-27.500 to +27.500 mm	(LP-431 / LP-421 / LP-411 / LP-W052)

- 2 Character Height, Character Width :
Specifies the character height / width of Human Readable Text.

Setting Range	0.100 to 90.000 mm	(LP-V10)
	0.100 to 110.000 mm	(LP-430 / LP-420 / LP-410)
	0.100 to 160.000 mm	(LP-435 / LP-425 / LP-V15)
	0.100 to 55.000 mm	(LP-431 / LP-421 / LP-411 / LP-W052)

- 3 Character Interval :
Specifies the character interval of Human Readable Text.

Setting Range	0.000 to 90.000 mm	(LP-V10)
	0.000 to 110.000 mm	(LP-430 / LP-420 / LP-410)
	0.000 to 160.000 mm	(LP-435 / LP-425 / LP-V15)
	0.000 to 55.000 mm	(LP-431 / LP-421 / LP-411 / LP-W052)

- 4 New Line (Only for 2D side of composite code / GS1 data matrix code) :
Selects “Do” for marking Human Readable Text per 2D code data with line feed. If marking one character string without line feed, select “Don’t”.

Description

- 5 Line Interval :
When "line feed" is set ON, specifies the line interval of Human Readable Text.

Setting Range	0.000 to 90.000 mm	(LP-V10)
	0.000 to 110.000 mm	(LP-430 / LP-420 / LP-410)
	0.000 to 160.000 mm	(LP-435 / LP-425 / LP-V15)
	0.000 to 55.000 mm	(LP-431 / LP-421 / LP-411 / LP-W052)

- 6 Font :
Select font type of Human Readable Text from the registered font.

- 7 Laser Power Correction :
Scan Speed Correction :
Laser Pulse Cycle Correction (Only LP-V series) :

Correction of each human readable characters for the laser power / scan speed / laser pulse cycle set at laser setting.

Setting Range of Laser Power Correction	0 to 200%
Setting Range of Scan Speed Correction	5 to 500%
Setting Range of Laser Pulse Cycle Correction	50 to 200%

Reference

- If the value of "Laser power correction" × "laser power" is equal to or larger than 100, the setting will be "100".
- Marking is not available when the laser power correction value is "0".
- If the corrected value exceeds the setting limit, the upper or lower limit value of the each item is set.

- 8 AUTO :
Pressing AUTO button automatically aligns the Human Readable Text at its optimal position.

Reference

- When "X" is set to the narrow element width, the marking characters are automatically aligned at its center position on the center of the code 3X distance from bottom of the code (for 2D side of composite codes from the top), character width: 5X, character height 6X, character interval 4.5X.

- 9 CENTERING:
Pressing CENTERING button aligns the Human Readable Text to the center of the code.

- 10 SET:
Sets and conform the setting condition of Human Readable Text.

- 11 CANCEL:
Cancel the setting condition and close the Human Readable Text Setting screen.
-

■ Description of AI (Application Identifier)

For the following codes, inputting the below AI and specified code data, AI in the human readable text is input automatically in bracket ().

- CODE128, UCC/EAN128(GS1-128) (CODE128 with the control code “FNC1” at the head of the barcode data)
- 1D side of Composite code whose lower barcode consists of UCC/EAN128 (GS1-128)
- GS1 Data Matrix
- 2D of Composite code
- GS1 DataBar (RSS code) and 1D side of its composite code

AI	Setting Data Set After AI	Indication of AI
01 *1	14-digits numeric *4	Product Code
10	Variable length; 20-digits or less alphanumeric +FNC1(GS) *3	Batch/lot No.
11	6-digits numeric	Manufactured Date
13	6-digits numeric	Packed Date
15	6-digits numeric	Guarantee Date
17	6-digits numeric	Expiry Date
21	Variable length; 20-digits or less alphanumeric +FNC1(GS) *3	Serial No.
30	Variable length ; 8-digits or less numeric + FNC1(GS) *3	Quantity
310X *2	6-digits numeric	Net. Weight (kg)
320X *2	6-digits numeric	Net. Weight (pounds)
392X *2	Variable length ; 15-digits or less numeric + FNC1(GS) *3	Price
393X *2	Variable length ; 3 digits numeric + 15-digits or less numeric + FNC1(GS) *3	Price
7003	10-digits numeric + FNC1(GS) *3	Expiry Date

*1 : When “01” is used, set it to the head of the code data. (When CODE128 is set as UCC/EAN128 (GS1-128), set “01” right after “FNC1” at the head.)

*2 : ‘X’ means one digit numeric.

*3 : When input setting data for AI “10”, AI “21”, AI “30”, AI “392X”, AI “393X” or AI “7003”, input of “FNC1” (in the case of GS1 Data Matrix, “FNC1” or “GS”) at the end of the setting data is not necessary.

*4 : For the following codes, a check digit is added at 14th digit automatically by this laser marker. Therefore, 13-digit characters are inputted after “01”.

- GS1 data matrix code
- CODE128, UCC/EAN128 (GS1-128) (the code for which “FNC1” is set at the head in CODE128)
- 1D side of Composite code whose lower barcode consists of UCC/EAN128 (GS1-128)
- GS1 DataBar and 1D side of its composite code

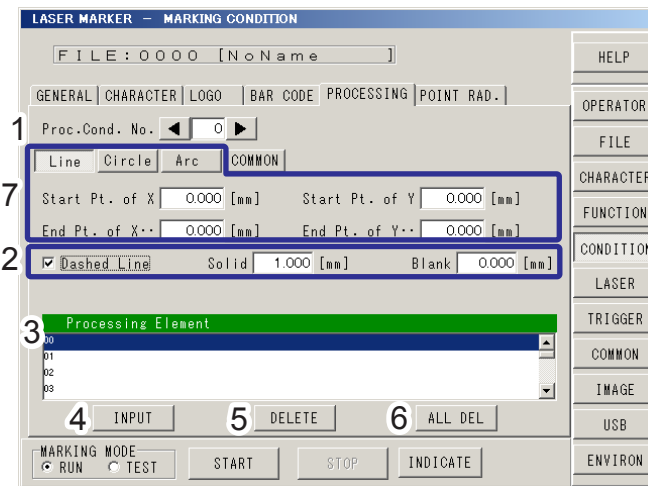
Example:

- 2D of UCC/EAN128 (GS1-128) CC-A
In case that the code setting data is “17201231300010”, Human Readable Text is “(17) 201231 (30) 0010”.
- RSS (GS1 DataBar) Limited CC-A on 1D side
In case that the code setting data is “1234567890123”, Human Readable Text is “(01) 12345678901231”.
- RSS (GS1 DataBar) Limited CC-A on 2D side
In case that the code setting data is “1720123130123456 [F1] 10123456”, Human Readable Text is “(17) 201231 (30) 123456 (10) 123456”.
- GS1 Data Matrix
In case that the code setting data is “011234567890123”, Human Readable Text is “(01)12345678901231”.

Reference

- To set the code data in more than two lines using AI (Application Identifier), set AI at the head of the bar code data.

4-10-5 Processing Condition



Description

- 1 Proc. Cond. No. (Processing Condition No.) :
Specifies up to 8 processing condition per one registered file.

Setting Range	0 to 7
---------------	--------

- 2 Dashed Line :
To input the dashed line, enable this function. Clearing the check box marks the setting data with solid line.

Solid (part of dashed line) :

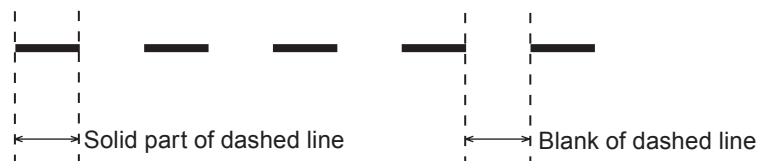
When dashed line is set, input the length of the solid part of the dashed line.

Setting Range	0.010 to 90.000 mm	(LP-V10)
	0.010 to 110.000 mm	(LP-430 / LP-420 / LP-410)
	0.010 to 160.000 mm	(LP-435 / LP-425 / LP-V15)
	0.010 to 55.000 mm	(LP-431 / LP-421 / LP-411 / LP-W052)

Blank (of dashed line) :

When dashed line is set, input the length of the blank of the dashed line.

Setting Range	0.000 to 90.000 mm	(LP-V10)
	0.000 to 110.000 mm	(LP-430 / LP-420 / LP-410)
	0.000 to 160.000 mm	(LP-435 / LP-425 / LP-V15)
	0.000 to 55.000 mm	(LP-431 / LP-421 / LP-411 / LP-W052)



- 3 Processing Element :
Indicates the processing condition set at the laser setting.
Up to 32 processing elements can be set per one number of processing condition.

- 4 INPUT :
Pressing INPUT button establishes the specified conditions.

- 5 DELETE :
Pressing DELETE button deletes the selected processing condition.

- 6 ALL DEL :
Pressing ALL DEL button deletes processing condition.

- 7 Type of the processing element:
Specifies the line type, its position and size.

■ Straight Line

Line	Circle	Arc	COMMON		
Start Pt. of X	<input type="text" value="0.000"/>	[mm]	Start Pt. of Y	<input type="text" value="0.000"/>	[mm]
End Pt. of X	<input type="text" value="0.000"/>	[mm]	End Pt. of Y	<input type="text" value="0.000"/>	[mm]

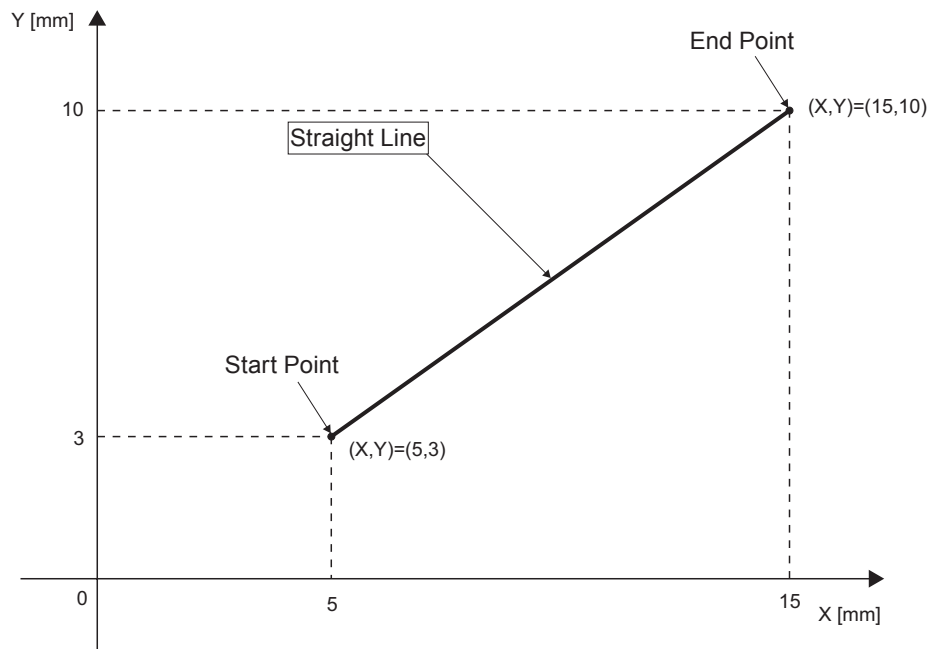
Description

Start Point of X/Y :

End Point of X/Y :

Specifies the starting / ending point of the straight line.

Setting Range	-45.000 to +45.000 mm	(LP-V10)
	-55.000 to +55.000 mm	(LP-430 / LP-420 / LP-410)
	-80.000 to +80.000 mm	(LP-435 / LP-425 / LP-V15)
	-27.500 to +27.500 mm	(LP-431 / LP-421 / LP-411 / LP-W052)



■ Circle

	Line	Circle	Arc	COMMON
1	Center of X...	0.000 [mm]	Center of Y...	0.000 [mm]
2	Radius.....	1.000 [mm]		

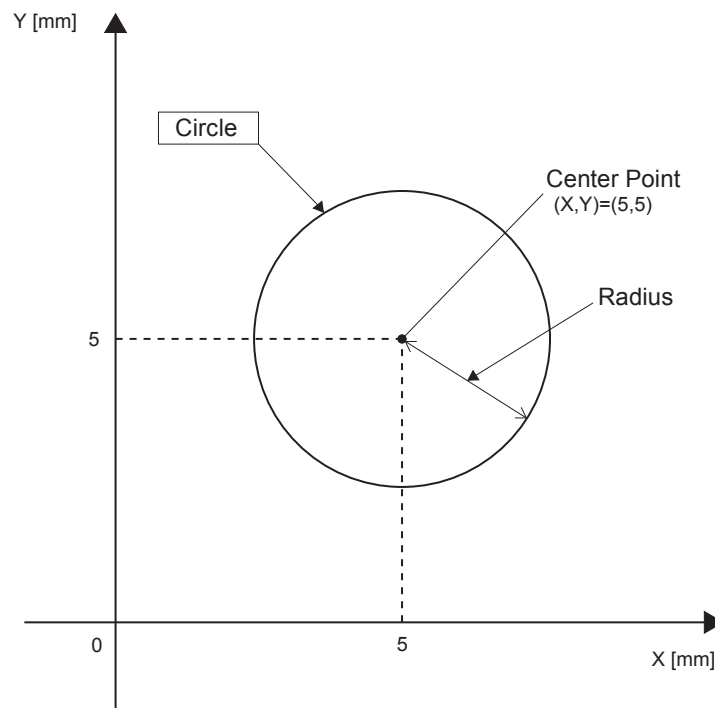
Description

- 1 Center of X/Y (Center Point X/Y):
Specifies the Center point of the circle.

Setting Range	-45.000 to +45.000 mm	(LP-V10)
	-55.000 to +55.000 mm	(LP-430 / LP-420 / LP-410)
	-80.000 to +80.000 mm	(LP-435 / LP-425 / LP-V15)
	-27.500 to +27.500 mm	(LP-431 / LP-421 / LP-411 / LP-W052)

- 2 Radius
Specifies the radius of the circle.

Setting Range	0.010 to 45.000 mm	(LP-V10)
	0.010 to 55.000 mm	(LP-430 / LP-420 / LP-410)
	0.010 to 80.000 mm	(LP-435 / LP-425 / LP-V15)
	0.010 to 27.500 mm	(LP-431 / LP-421 / LP-411 / LP-W052)



■ Arc

Line	Circle	Arc	COMMON
Start Pt.: X		0.000 [mm]	Y 0.000 [mm] Radius 1.000 [mm]
End Pt.: X		0.000 [mm]	Y 0.000 [mm]
Direction		<input checked="" type="radio"/> CCW <input type="radio"/> CW	Open Ang. 180° <input checked="" type="radio"/> Under <input type="radio"/> Over

Description

- 1 Start Point X/Y :
End Point X/Y :
Specifies the starting / ending point of arc.

Setting Range	-45.000 to +45.000 mm	(LP-V10)
	-55.000 to +55.000 mm	(LP-430 / LP-420 / LP-410)
	-80.000 to +80.000 mm	(LP-435 / LP-425 / LP-V15)
	-27.500 to +27.500 mm	(LP-431 / LP-421 / LP-411 / LP-W052)

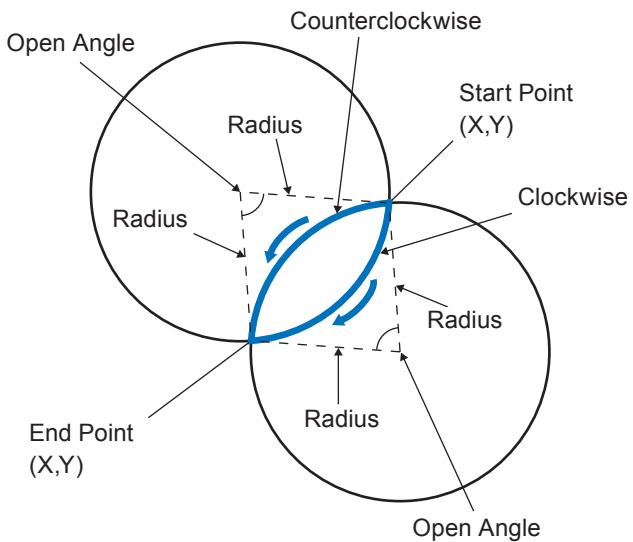
- 2 Radius:
Inputs the radius of arc.

Setting Range	0.010 to 300.000 mm
---------------	---------------------

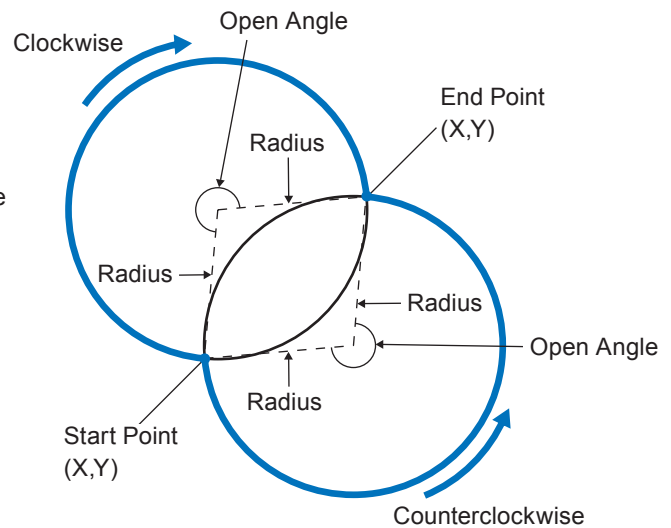
- 3 Direction:
For the arc in counterclockwise direction, select [CCW] and in clockwise direction, select [CW].

- 4 Open Ang. (Open Angle):
Select the open angle of the arc from "under" or "over" 180 degree.

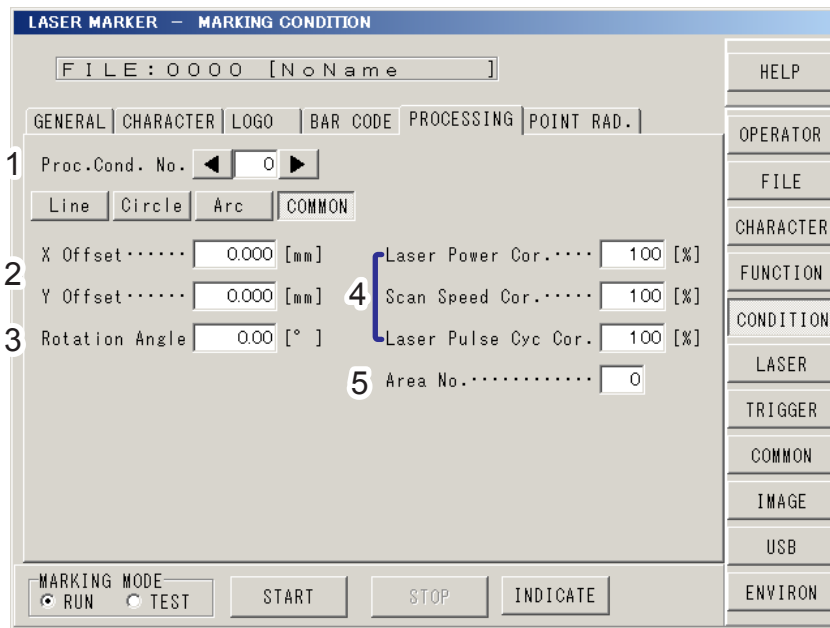
- Open Angle: under 180 degree



- Open Angle: 180 degree or more



Common



Common Setting Item

- 1 Proc. Cond. No. (Processing Condition No.) :
Specifies up to 8 processing condition per one registered file.

Setting Range	0 to 7
---------------	--------

- 2 X/Y Offset :
Shifts the marking position to the X or Y direction.

Setting Range	-45.000 to +45.000 mm (LP-V10)
	-55.000 to +55.000 mm (LP-430 / LP-420 / LP-410)
	-80.000 to +80.000 mm (LP-435 / LP-425 / LP-V15)
	-27.500 to +27.500 mm (LP-431 / LP-421 / LP-411 / LP-W052)

- 3 Rotation Angle :
Rotates the object to the rotation direction around the origin.

Setting Range	-180.00 to +180.00 degree
---------------	---------------------------

- 4 Laser Power Correction :
Scan Speed Correction :
Laser Pulse Cycle Correction (Only LP-V series) :
Correction of the processing elements in the selected processing condition No. for the laser power / scan speed / laser pulse cycle set at laser setting.
If the correction rate is set to 0%, the marking image is displayed in gray and marking is not executed.

Setting Range of Laser Power Correction	0 to 200%
Setting Range of Scan Speed Correction	5 to 500%
Setting Range of Laser Pulse Cycle Correction	50 to 200%

- 5 Area No. :
Displayed when marking on-the-fly is set in "Trigger setting".
It indicates the order of the marking field for the concatenated marking to flying object.

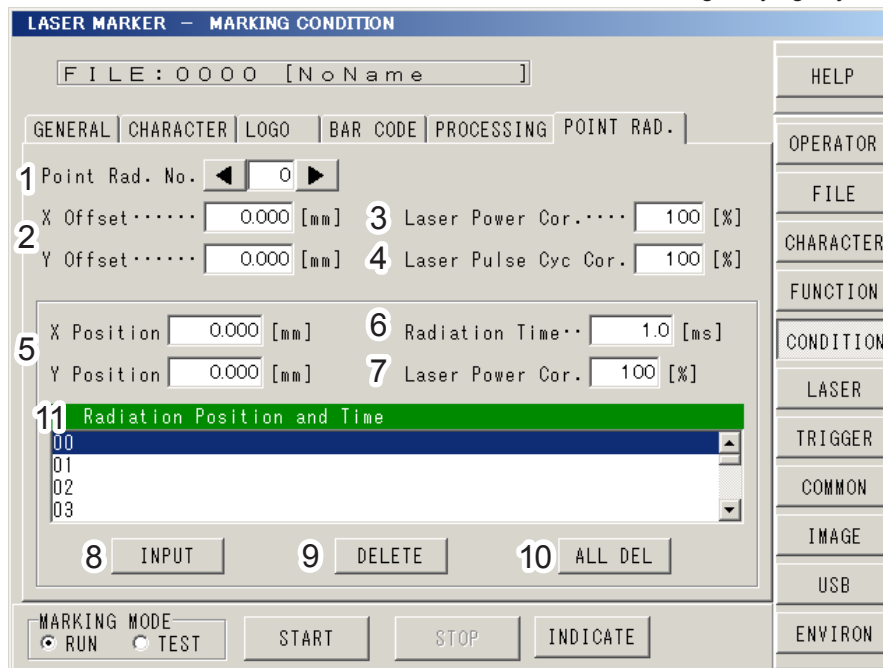
Setting Range	0 to 15
---------------	---------

4-10-6 Point Radiation Condition

Laser radiates in the specified coordinate for the setting time.

Reference

- Point radiation function can not be used in combination with the function of marking to flying object.



Description

- 1 Point Rad. No. (Point Radiation No.) :
Specifies up to 16 point radiation condition per one registered file.

Setting Range	0 to 15
---------------	---------

- 2 X/Y Offset :
Shifts the object to X/Y direction for all radiation points in the selected point radiation No.

Setting Range	-45.000 to +45.000 mm	(LP-V10)
	-55.000 to +55.000 mm	(LP-430 / LP-420 / LP-410)
	-80.000 to +80.000 mm	(LP-435 / LP-425 / LP-V15)
	-27.500 to +27.500 mm	(LP-431 / LP-421 / LP-411 / LP-W052)

- 3 Laser Power Correction :
4 Laser Pulse Cycle Correction (Only LP-V series) :
Correction of all radiation points in the selected condition No. for the laser power / laser pulse cycle set at laser setting.
If the correction rate is set to 0%, the marking image is displayed in gray and marking is not executed.

Setting Range of Laser Power Correction	0 to 200%
Setting Range of Laser Pulse Cycle Correction	50 to 200%

- 5 X/Y Position :
Shifts the object to X/Y direction for each radiation point.

Setting Range	-45.000 to +45.000 mm	(LP-V10)
	-55.000 to +55.000 mm	(LP-430 / LP-420 / LP-410)
	-80.000 to +80.000 mm	(LP-435 / LP-425 / LP-V15)
	-27.500 to +27.500 mm	(LP-431 / LP-421 / LP-411 / LP-W052)

Description

- 6 Radiation Time :
Specifies the laser radiation time.

Setting Range	0.1 to 99999.9 ms
---------------	-------------------

- 7 Laser Power Correction :
Correction of each radiation point for the laser power set at laser setting.
If the correction rate is set to 0%, the marking image is displayed in gray and marking is not executed.

Setting Range	0 to 200%
---------------	-----------

- 8 INPUT :
Pressing INPUT button establishes the specified radiation position and time.

- 9 DELETE :
Pressing DELETE button deletes the selected radiation position and time.

- 10 ALL DEL :
Pressing ALL DEL button deletes all radiation position and time in the table.

- 11 List of Point Radiation Conditions :
Displays the setting condition radiation position and time. Up to 50 radiation points can be set in one condition list.

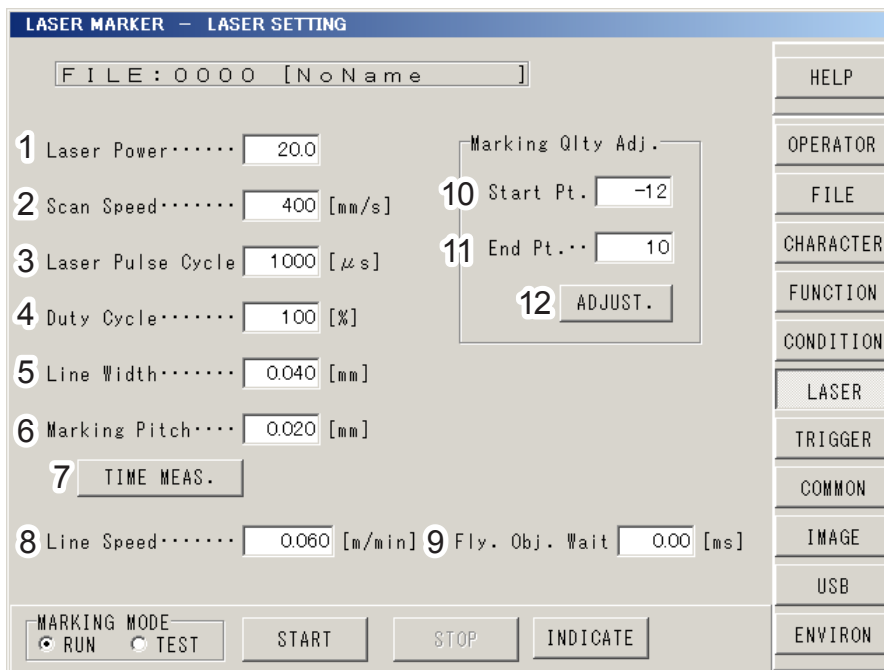


- Since the arbitrary point radiation function carries on radiating the laser onto the one point, it will provide high energy density.
It may flame up or burn depending on the material to be used for processing or processing condition.

4-11 Laser Setting

The laser setting screen specifies the adjustment for laser marker, such as the setting of laser power and scan speed, and marking quality control.

4-11-1 Setting Parameters



Description

- 1 Laser Power :
Sets the output level of laser power.

Setting Range	0.5 to 100.0
---------------	--------------

Reference

- Set the laser power in increments of 0.5.
- The laser power gradually decreases due to the degradation of laser. Do not use it with the initial value of 100.

- 2 Scan Speed :
Specifies the traveling speed of laser on the marking surface.

Setting Range	1 to 12000 mm/s (LP-430 / LP-420 / LP-410 / LP-435 / LP-425 / LP-V10 / LP-V15)
	1 to 6000 mm/s (LP-431 / LP-421 / LP-411 / LP-W052)



CAUTION



- If too high laser power is set or too slow scan speed is set, it may flame up or burn depending on the material to be used for the marking. At test marking, radiate the laser by setting rather low laser power and rather fast scan speed, check the marking quality, and adjust the setting value gradually.

- 3 Laser Pulse Cycle (Only LP-V / LP-W series) :
- LP-V Series : Adjusts the interval of pulse pumping of the laser. When setting larger value for the pulse cycle, the peak power becomes higher. Note that when setting larger value for the pulse cycle, the line tends to be marked in dot line after scanning with high speed.
 - LP-W Series : It is valid when duty is set to other than 100%.The time which laser is radiation is ON/OFF during one laser pulse cycle.

Setting Range	10.0 to 50.0μs (LP-V10 / LP-V15)
	50 to 1000μs (LP-W052)

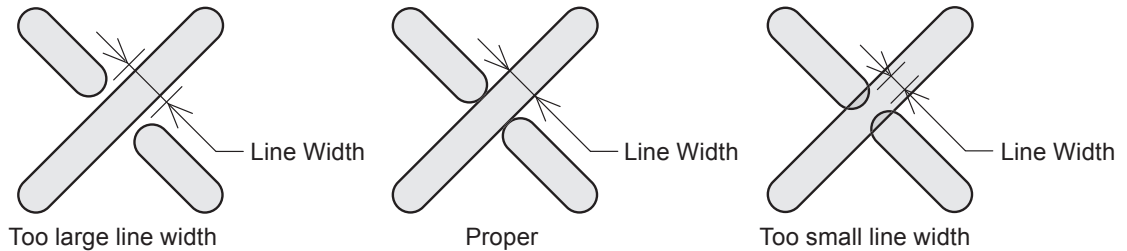
Description

- 4 Duty Cycle (Only LP-W series) :
This is the ratio of laser ON time in the setting pulse cycle time.

Setting Range	50 to 100%
Initial Value	100%

- 5 Line Width :
Specifies the interval between lines at the intersection point in a character when they are crossed.
If there is a space at the intersection point of the character or it is marked too deeply, adjust this value.

Setting Range	0.010 to 2.000 mm with the increment of 0.001 mm.
---------------	---



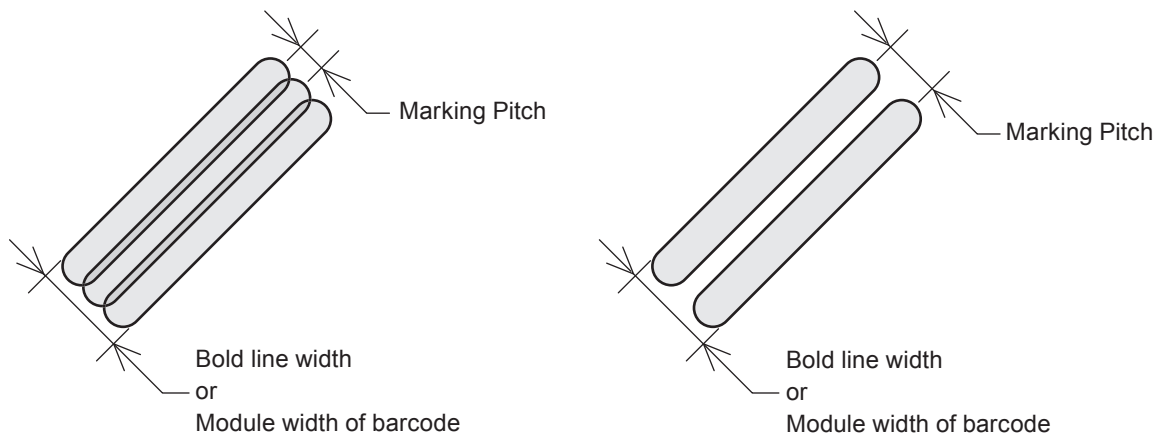
Reference

- This correction is invalid for some user-registration characters.
- This correction is not effective for the logo data.
- When requiring the thicken the actual marking width, set the line width for bold character at character condition. Refer to “4-10-2 Character Conditions” (P.178).
- The time for marking may be long if the setting value of the line width is smaller.
- The initial value of the line width is set depending on the model as follows;

LP-430/LP-420/LP-410 : 0.18mm	LP-431/LP-421/LP-411 : 0.11mm	LP-435/LP-425 : 0.26mm
LP-V10 : 0.06mm	LP-V15 : 0.10mm	LP-W052 : 0.04mm

- 6 Marking Pitch :
This item sets the density of the marking of the bold character and bar code.

Setting Range	0.010 to 2.000 mm
---------------	-------------------

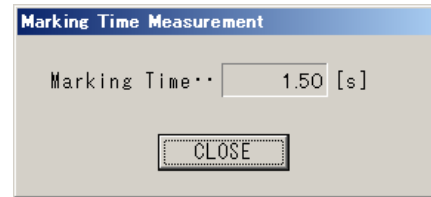


Reference

- The width of bold line changes when the setting value in the “Line Width” is different from that marked with laser.
- This correction is not effective for the logo data.
- It is recommended that the marking pitch is specified so that it is an integral multiple of half of the marking line width.

Description

- 7 Marking Time Measurement :
Indicates the period of marking.
Press [MARKING TIME MEASUREMENT].



Reference

- If a variable character such as counter is included in the character marked, the measurement of period is performed with the current value.
- In case the actual marking period is shorter than the one-shot output duration, the result of measurement is same as the one-shot output time. Refer to "4-16-3 Communication, I/O Setting (Environment 3)" (P.258) for the detail of the one-shot time setting.

- 8 Line Speed :
Used at measurement of marking period.
It is indicated when the moving direction in the trigger setting is set to other than "still".
Measure the line speed in consideration of the line speed of the flying object.

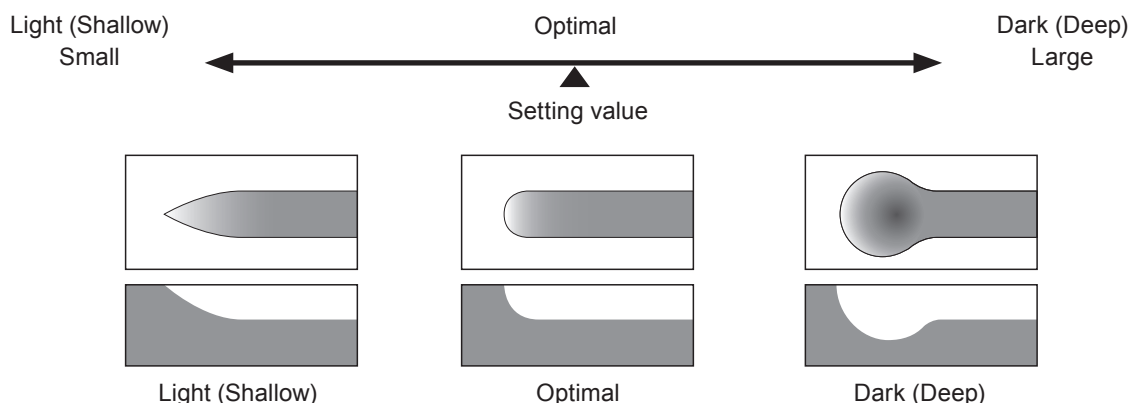
Setting Range	0.060 to 240.000 m/min (LP-430 / LP-420 / LP-435 / LP-425 / LP-V10 / LP-V15)
	0.060 to 170.000 m/min (LP-410)
	0.060 to 120.000 m/min (LP-431 / LP-421 / LP-W052)
	0.060 to 85.000 m/min (LP-411)

- 9 Fly. Obj. Wait (Flying Object Wait)
Used at measurement of marking period.
Waiting period for marking corresponding to the line speed for flying object marking.
It is indicated when the moving direction in the trigger setting is set to other than "still".

Setting Range	0.00 to 500.00ms
---------------	------------------

- 10 Start Point :
11 End Point :
With this function, the timing for turning on the laser at the starting or ending point is adjusted.
The smaller the value is, the darker (deeper) the marked character at the starting or ending point is.

Setting Range	-100 to 100
Initial Value	0

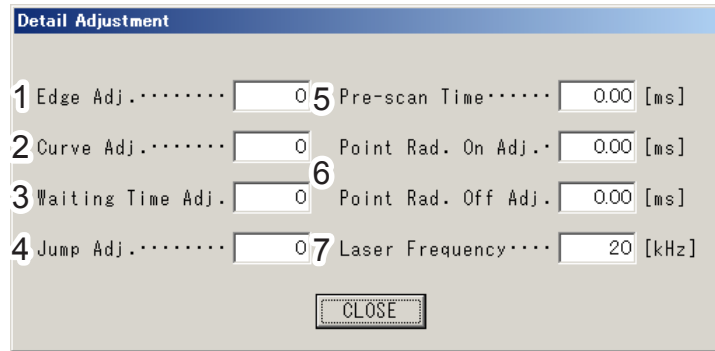


Notice

- Too small value for the adjustment of start/end point may be the cause of chipped character.

- 12 ADJUST. :
They will provide fine adjustment of marking quality.
For details of setting item, refer to "4-11-2 Detail Adjustment (Laser Setting)" (P.214).

4-11-2 Detail Adjustment (Laser Setting)



The following fine adjustments are allowed.

Description

- 1 Edge (Edge Adjustment) :
Adjust the edge of line in the character to be marked.
Though setting a small value here can shorten the marking time, the line edge becomes dull.
Setting large value makes the edge thick.

Setting Range	0 to 100
Initial Value	0



Round Edge



Proper



Dark (Deep) Edge

Small ←————→ Large

- 2 Curve (Curve Adjustment) :
The shape of curve line in the character to be marked is adjusted.
Though setting a small value here can shorten the marking time, the curve line is distorted.
Setting large value makes the edge thick.

Setting Range	0 to 100
Initial Value	0



Curve Line Distorted



Proper



Dark (Deep) Line

Small ←————→ Large

- 3 Waiting Time (Waiting Time Adjustment) :
Adjusts the waiting time for starting radiation at the start point of each line.
Apply to all line segment.
Setting a large value improves the marking disorder.
Too large value, however, makes the marking time longer.
Setting large value makes the edge thick.

Setting Range	0 to 100
Initial Value	0

Description

- 4 Jump (Jump adjustment) :
Adjusts the waiting time for starting radiation at the start point of the line.
It is applied only to the lines which distance to the next line is long.
Setting a large value improves the disordered lines at the start points.
Setting a larger value makes the marking time longer.

Setting Range	0 to 100
Initial Value	0

- 5 Pre-scan Time :
The pre-scan time adjusts the start-up and fall times of the laser beam at the start/end points. Setting the scanning period improves the too thick marking at the start/end points.
Setting larger value makes the marking time longer.

Setting Range	0.00 to 10.00 ms
Initial Value	0.00 ms

- 6 Point Rad. On/Off (Point Radiation ON/OFF Adjustment) :
Adjusts the on/off timing of the radiation for "4-10-6 Point Radiation Condition" (P.209).
On time specifies the waiting time for starting radiation.
Off time specifies the waiting time for moving to the next radiation points.
Setting a larger value makes the marking time longer.

Setting Range	0.00 to 9.99 ms
Initial Value	0.00 ms

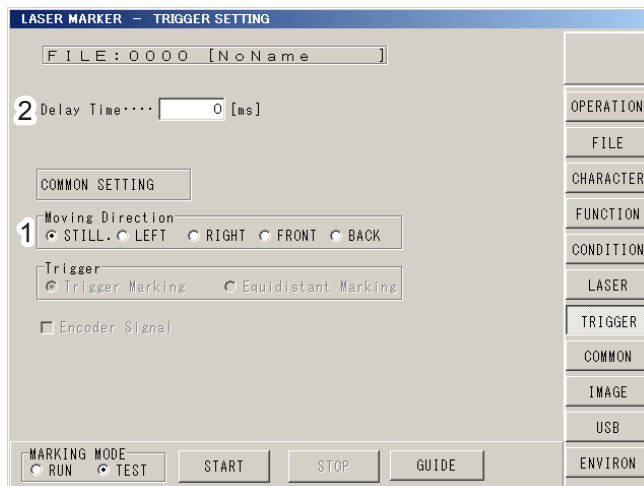
- 7 Laser Frequency (LP-400 series only) :
Selects the frequency of laser from 5, 10 or 20 kHz. Setting a small value is likely to make the line dotted at the high-speed scanning.

Setting Range	5kHz,10kHz,20kHz
Initial Value	20kHz

4-12 Trigger Setting

This function is used for setting of marking for the moving object (on-the-fly marking) and marking timing. The trigger setting is specified on this screen, depending on the status of work to be marked (flying or still). The screen also sets the timing of starting marking after input of trigger signal.

4-12-1 Marking to Static Work



Description

- 1 Moving Direction
Selects "STILL." for the moving direction.
- 2 Delay Time :
Sets the time difference from the input of trigger signal to marking start.

Setting Range	0 to 5000 ms
---------------	--------------

Reference

- Set a delay time shorter than a input interval of trigger signal.
- When the next trigger signal is inputted during delay, warning (E800) occurs. (Only if "Detect TRIG. Warning during Marking" in Environment Setting is valid.)

4-12-2 Marking to Flying Object

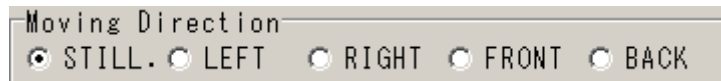
The trigger conditions at marking to flying object are set.

■ Moving Direction

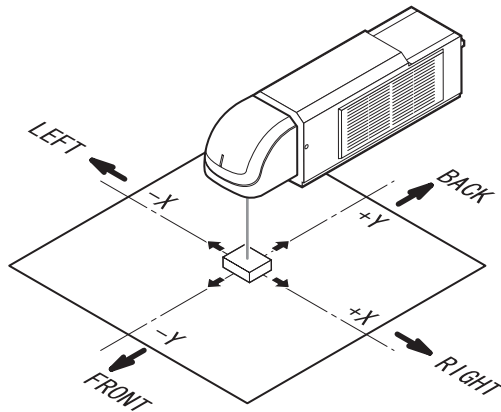
The moving direction of line at marking to flying object is set

Reference

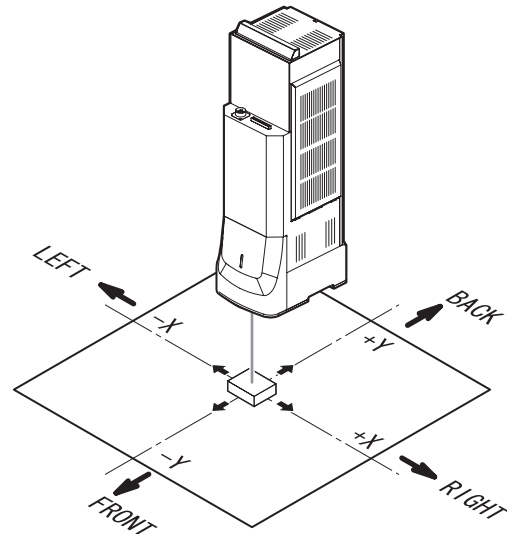
- The moving direction is common in the all files.



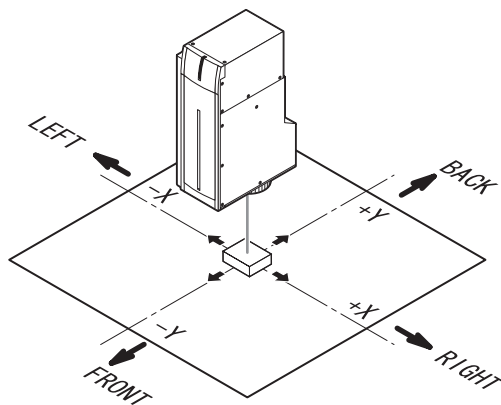
LP-400 Standard model



LP-400 Towerhead model



LP-V/LP-W Series



! Notice

- Overlapping marking, Step & Repeat marking, point radiation, or Reset at date update functions cannot be used with the marking to flying object.
- Equidistant marking on the flying object cannot be used in combination with rank marking, external offset, and serial data marking function.
- In the case of using the function of marking bold character, there might be the possibility that the marking quality is affected. Therefore, operate the laser marker after performing the marking test using the function of marking bold character.
- Since the marking to the flying object is affected by vibration or line speed easily, marking and reading 2D code or bar code to the flying object might become unstable. Therefore, when marking 2D code or bar code to the flying object, check the marking and reading state of the marked code on the flying object sufficiently.
- If the rank, external offset, or serial data marking functions are used with the marking to the flying object (excluding the equidistant marking), make sure that the marking interval time is enough to the required period to input the marking data and to confirm the marking ready output.

■ Trigger Selection

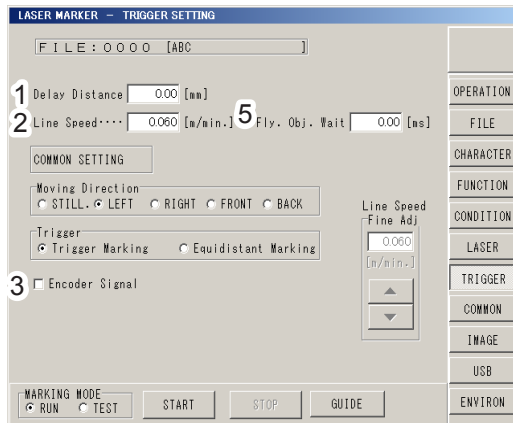
Sets the timing of marking start.

- Trigger Marking : Starts the marking per marking trigger.
- Equidistant Marking : Repeats marking with the interval specified while the marking trigger is turned to ON.

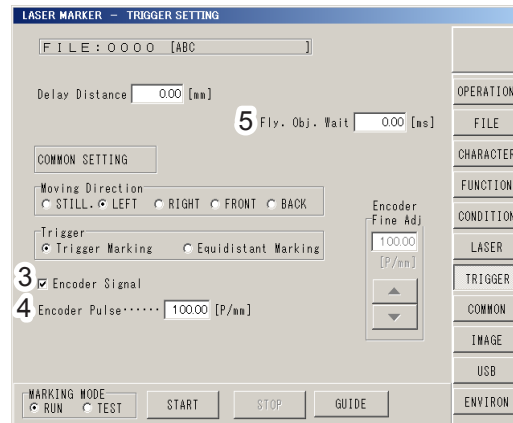
(1) Trigger Marking

Starts marking to flying object per marking trigger. Setting parameters vary depending on whether the encoder is used or not.

When the encoder is not used
(Encoder signal: invalid)



When the encoder is used
(Encoder signal: valid)



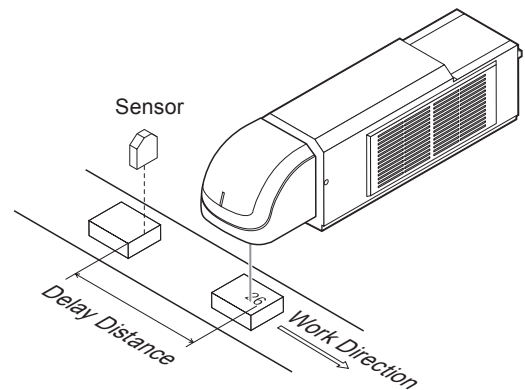
Description

- 1 Delay Distance
Inputs the moving distance of line from trigger input to the start of marking.

Setting Range	0 to 500.00 mm
---------------	----------------

Reference

- Set a delay distance shorter than the distance between the workpieces.
- When the next trigger signal is inputted during delay, warning (E800) occurs. (Only if “Detect TRIG. Warning during Marking” in Environment Setting is valid.)



- 2 Line Speed
Inputs the line speed. Available when encoder setting is disabled.

Setting Range	0.060 to 240.000 m/min	(LP-430 / LP-420 / LP-435 / LP-425 / LP-V10 / LP-V15)
	0.060 to 170.000 m/min	(LP-410)
	0.060 to 120.000 m/min	(LP-431 / LP-421 / LP-W052)
	0.060 to 85.000 m/min	(LP-411)

- 3 Encoder Signal
Enable this function when using the encoder. The setting parameter for the line speed is disappeared from the screen and the parameter for encoder pulse number appears instead when pressing the box.

When the encoder is not used : Performs marking to flying object by applying the calculated line speed already input.

When the encoder is used : Performs marking to flying object by applying the calculated line speed which is derived from the pulse sent from the encoder input to the input terminal.

Description

- 4 Encoder Pulse
Inputs the resolution of encoder provided in the line.

Setting Range	5.00 to 600.00 P/mm
---------------	---------------------

Calculation of encoder pulse number (5.00 to 600.00 P/mm)

$$\boxed{\text{Encoder Pulse}} = \boxed{\text{Pulse number of one rotation of encoder}} \div \boxed{\text{Line distance advanced during one rotation of encoder}} \times \boxed{4 \text{ or } 2^*}$$

- * When using A and B phase: 4
- When using either A or B phase: 2



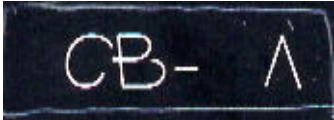
Reference

- Up to 100kHz per one phase is possible to be input to the encoder input on the input terminal block.
- Use only "A" phase (ENC(A)) of the input terminal block input and connect "B" phase (ENC(B)) to input common if either of these encoders is used.
- If the setting value for the encoder pulse is too small, the marking quality might be deteriorate. (Depending on the marking condition, the recommendation setting value for the encoder pulse is 25.00 P/mm or more.)

- 5 Fly. Obj. Wait. (Flying Object Wait)
Waiting period for marking corresponding to the line speed for flying object marking.

Setting Range	0.00 to 500.00 ms
---------------	-------------------

Adjust the waiting time of the marking for flying object so that the width of the character string is as shorten as possible shown below when performing the test marking remaining the setting of the marking for flying object.

Too Narrow	Proper	Too Wide
		

If the error occurs during the marking to flying object, adjust the following settings.

ERROR CODE	Description	Setting Position	Scan Speed	Line Speed	Flying Object Wait
E620	The marking is performed after the work is moved to outside of marking field.	Shift to moving direction	Up	Down	Down
E621	The marking is performed before the work is entered into the marking field.	Shift to opposite direction of moving direction	Down	Up	Up
E622	The marking is not finished until the work is passed through the marking field.	—	Up	Down	Down

Reference

- There might be the case that the marking is impossible even though adjusting the waiting time of the marking of the flying object if there are a lot of marking data.
- When the pulse output from the encoder and actual motion of the line is not matched, the marking may not performed properly.

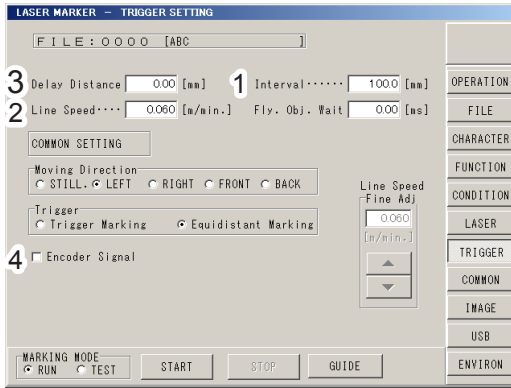
(2) Equidistant Marking

Marking is repeated every time the line moves with the interval set in equidistant marking. Equidistant marking is performed while the marking trigger is turned to ON.

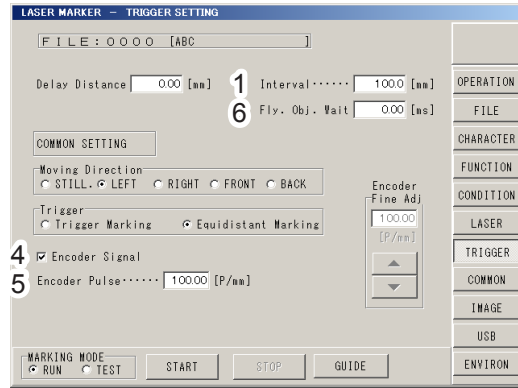
Reference

- Equidistant marking on the flying object cannot be used in combination with rank marking, external offset, and serial data marking function.

When the encoder is not used
(Encoder signal: invalid)



When the encoder is used
(Encoder signal: valid)



Description

- 1 Interval (Marking Interval)
Inputs the moving distance of the line for marking start.

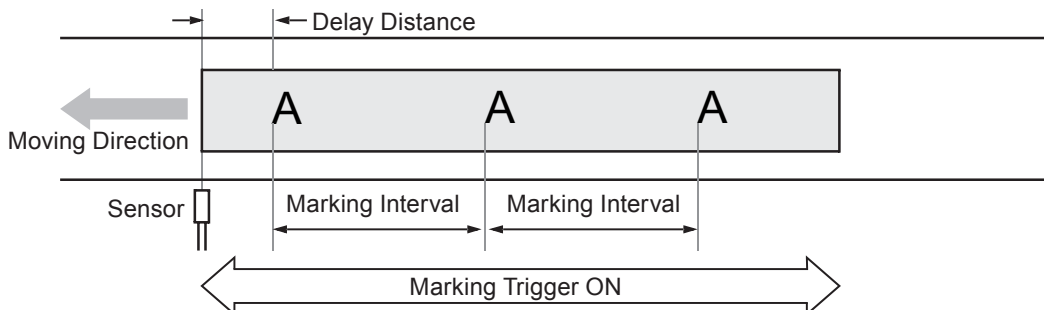
Setting Range	0 to 3000.0mm
---------------	---------------

- 2 Line Speed
Inputs the line speed. Available when encoder setting is disabled.

Setting Range	0.060 to 240.000 m/min	(LP-430 / LP-420 / LP-435 / LP-425 / LP-V10 / LP-V15)
	0.060 to 170.000 m/min	(LP-410)
	0.060 to 120.000 m/min	(LP-431 / LP-421 / LP-W052)
	0.060 to 85.000 m/min	(LP-411)

- 3 Delay Distance
Inputs the moving distance of line from trigger input to the start of marking.

Setting Range	0 to 500.00mm
---------------	---------------



Reference

- Set a delay distance shorter than a marking interval.

Description

4 Encoder Signal

Enable this function when using the encoder. The setting parameter for the line speed is disappeared from the screen and the parameter for encoder pulse number appears instead when pressing the box.

When the encoder is not used : Performs marking to flying object by applying the calculated line speed already input.

When the encoder is used : Performs marking to flying object by applying the calculated line speed which is derived from the pulse sent from the encoder input to the input terminal.

5 Encoder Pulse

Inputs the resolution of encoder provided in the line.

Setting Range	5.00 to 600.00P/mm
---------------	--------------------

Calculation of encoder pulse number (5.00 to 600.00P/mm)

$$\boxed{\text{Encoder Pulse}} = \boxed{\text{Pulse number of one rotation of encoder}} \div \boxed{\text{Line distance advanced during one rotation of encoder}} \times \boxed{4 \text{ or } 2^*}$$

* When using A and B phase: 4

When using either A or B phase: 2

Reference

- Up to 100kHz per one phase is possible to be input to the encoder input on the input terminal block.
- Use only "A" phase (ENC(A)) of the input terminal block input and connect "B" phase (ENC(B)) to input common if either of these encoders is used.
- If the setting value for the encoder pulse is too small, the marking quality might be deteriorate. (Depending on the marking condition, the recommendation setting value for the encoder pulse is 25.00P/mm or more.)

6 Fly. Obj. Wait. (Flying Object Wait)

Waiting period for marking corresponding to the line speed for flying object marking.

Setting Range	0.00 to 500.00ms
---------------	------------------

Adjust the waiting time of the marking for flying object so that the width of the character string is as shorten as possible shown below when performing the test marking remaining the setting of the marking for flying object.

Too Narrow	Proper	Too Wide
		

If the error occurs during the marking to flying object, adjust the following settings.

ERROR CODE	Description	Setting Position	Scan Speed	Line Speed	Flying Object Wait
E620	The marking is performed after the work is moved to outside of marking field.	Shift to moving direction	Up	Down	Down
E621	The marking is performed before the work is entered into the marking field.	Shift to opposite direction of moving direction	Down	Up	Up
E622	The marking is not finished until the work is passed through the marking field.	—	Up	Down	Down

Reference

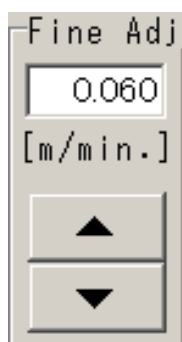
- There might be the case that the marking is impossible even though adjusting the waiting time of the marking of the flying object if there are a lot of marking data.
- When the pulse output from the encoder and actual motion of the line is not matched, the marking may not performed properly.

(3) Fine Adjustment for Line Speed, Encode

Performs fine adjustment for line speed and encoder is possible to be performed while marking to the flying object in RUN mode.

Fine Adj. (Line Speed Fine Adjustment) :

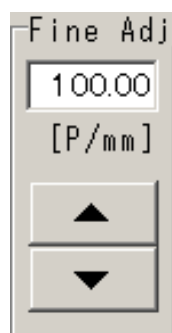
Performs fine adjustment when the encoder is not used.



- When the character is extended, press ▲ for increasing the setting speed.
 - When the character is shrunken, press ▼ for decreasing the setting speed.
-

Fine Adj. (Encoder Fine Adjustment) :

Performs fine adjustment when the encoder is used.

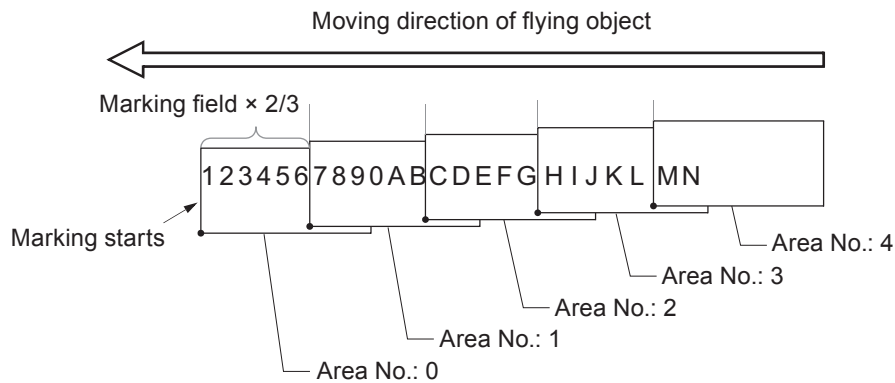


■ Concatenated Marking Setting

The setting method for marking the character to the work whose length exceeds the marking field is described here.

Setting Method

If the length of the character string to be marked to a flying object exceeds the marking field, divide the characters into the length "marking field \times 2/3", and allocate them to each marking field as shown in the figure below.



Character Setting

- Set the characters "1 to 6" to the first line.
- Set the characters "7 to B" to the second line.
- Set the characters "C to G" to the third line.
- Set the characters "H to L" to the fourth line.
- Set the characters "M and N" to the fifth line.

Marking condition

- Condition No.1: Area No. 0. Set the marking condition of "1 to 6".
- Condition No.2: Area No. 1. Set the marking condition of "7 to B".
- Condition No.3: Area No. 2. Set the marking condition of "C to G".
- Condition No.4: Area No. 3. Set the marking condition of "H to L".
- Condition No.5: Area No. 4. Set the marking condition of "M and N".

Reference

- At the marking to flying object with an encoder, the marking stops for each area when the line stops and then enters the wait state of the encoder pulse input.
- 16 marking fields (Area No. 0 to 15) can be used.
- Specify the character setting so that the last character in the character string should match with or go over the projection line on the marking image screen. The projection line on the marking image screen indicates \times 2/3 of marking field (starting of the next marking field). (There may be the cases that the characters set outside of the guide line (the characters in the upstream of moving direction) cannot be marked during low-speed operation.)

■ In case of marking continuous character string:

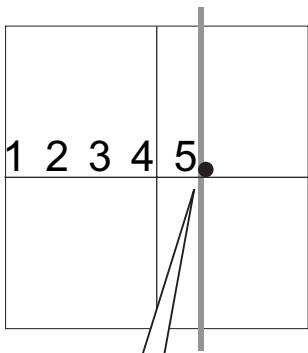
The sample here explains the procedures for the concatenated marking of the character string as shown below to a flying object on the condition of the character height: 12mm, character width: 12mm, and character interval: 14mm. (In this example, Y position is stable. The origin of the character string is set to be "Left", and the flying direction is set to be "LEFT".)

● Mark "1234567890" with LP-V10U (Marking field: 90mm×90mm)

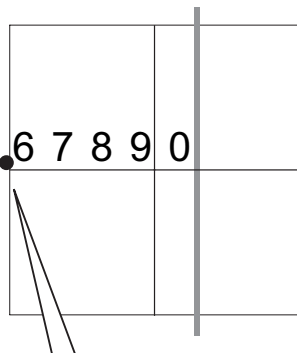
At first, set the character string to be marked on the character setting screen. Set the character string with its width of the character string per one line should be around 60mm, except the last area number

- 1st line: 12345 (character string width: 60mm)
- 2nd line: 67890 (character string width: 60mm)

Next, set the marking condition of each line on the marking condition setting screen. Next, set the character string on the 1st line as "Condition No. 1, Area No. 0", set the character string on the 2nd line as "Condition No. 2, Area No. 1".



Make sure that the width of the character string should match with or go over the projection line on the marking image screen.



Calculate the start position of "6", which is the head character of Area No. 1 on the X coordinate using the following formula:
 Formula: $-45 + (\text{character string width on the 1st line} - 90\text{mm} \times 2/3)$
 In this sample, the formula below is established because the character string width on the 1st line is 60mm.
 Starting position of the head character on the X coordinate = $-45 + (60 - 90 \times 2/3) = -45$

Character condition of "12345" on the 1st line

Character condition No. 1			
Character Height	: 12	X Position	: -45
Character Width	: 12	Y Position	: 0
Character Interval	: 14	Area No.	: 0

Character condition of "67890" on the 2nd line

Character condition No. 2			
Character Height	: 12	X Position	: -45
Character Width	: 12	Y Position	: 0
Character Interval	: 14	Area No.	: 1

↓ Reference

- Specify the character setting so that the last character in the character string should match with or go over the projection line on the marking image screen. The projection line on the marking image screen indicates $\times 2/3$ of marking field (starting of the next marking field). (There may be the cases that the characters set outside of the guide line the characters in the upstream of moving direction) cannot be marked during low-speed operation.)

● Mark "1234567890" with LP-430/LP-420/LP-410 (Marking field: 110mm×110mm)

At first, set the character string to be marked on the character setting screen.

Set the character string with its width of the character string per one line should be around 74mm, except the last area number

1st line: 12345 (character string width: 75mm)

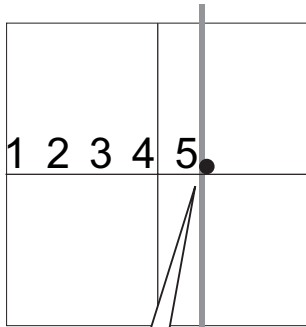
2nd line: 67890 (character string width: 75mm)

Next, set the marking condition of each line on the marking condition setting screen. Next,

set the character string on the 1st line as "Condition No. 1, Area No. 0",

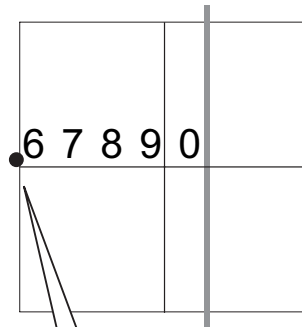
set the character string on the 2nd line as "Condition No. 2, Area No. 1".

Downstream ← Moving direction: LEFT Upstream



Make sure that the width of the character string should match with or go over the projection line on the marking image screen.

Downstream ← Moving direction: LEFT Upstream



Calculate the start position of "6", which is the head character of Area No. 1 on the X coordinate using the following formula:
 Formula: $-55 + (\text{character string width on the 1st line} - 110\text{m} \times 2/3)$
 In this sample, the formula below is established because the character string width on the 1st line is 75mm.
 Starting position of the head character on the X coordinate = $-55 + (75 - 110 \times 2/3) \approx -53$

Character condition of "12345" on the 1st line

Character condition No. 1			
Character Height	: 12	X Position	: -55
Character Width	: 12	Y Position	: 0
Character Interval	: 14	Area No.	: 0

Character condition of "67890" on the 2nd line

Character condition No. 2			
Character Height	: 12	X Position	: -53
Character Width	: 12	Y Position	: 0
Character Interval	: 14	Area No.	: 1

Reference

- Specify the character setting so that the last character in the character string should match with or go over the projection line on the marking image screen. The projection line on the marking image screen indicates $\times 2/3$ of marking field (starting of the next marking field). (There may be the cases that the characters set outside of the guide line the characters in the upstream of moving direction) cannot be marked during low-speed operation.)

● Mark "123456" with LP-431/LP-421/LP-411/LP-W052 (Marking field: 55mm x 55mm)

First, set the character string to be marked on the character setting screen.

Set the character string with its width of the character string per one line should be around 36mm. (except the last area number)

1st line: 123 (character string width: 42mm)

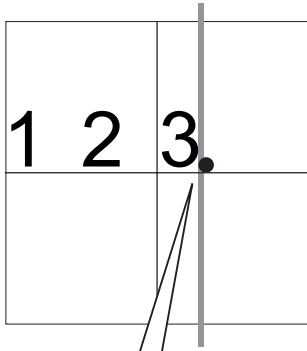
2nd line: 456 (character string width: 42mm)

Next, set the marking condition of each line on the marking condition setting screen. The setting should be:

"Condition No. 1, Area No. 0" for the 1st line

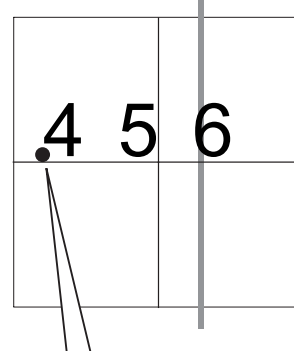
"Condition No. 2, Area No. 1" for the 2nd line

Downstream ← Moving direction: LEFT Upstream



Make sure that the width of the character string should match with or go over the projection line on the marking image screen.

Downstream ← Moving direction: LEFT Upstream



Calculate the start position of "4", which is the head character of Area No. 1 on the X coordinate using the following formula:
 Formula: $-27.5 + (\text{character string width on the 1st line} - 55\text{mm} \times 2/3)$
 In this sample, the character string width on the 1st line is 42mm, and therefore the calculation will be:
 Starting position of the head character on the X coordinate
 $= -27.5 + (42 - 55 \times 2/3) \approx -22$

Character condition of "123" on the 1st line

Character condition No. 1			
Character Height	: 12	X Position	: -27.5
Character Width	: 12	Y Position	: 0
Character Interval	: 14	Area No.	: 0

Character condition of "456" on the 2nd line

Character condition No. 2			
Character Height	: 12	X Position	: -22
Character Width	: 12	Y Position	: 0
Character Interval	: 14	Area No.	: 1

Reference

- Specify the character setting so that the last character in the character string should match with or go over the projection line on the marking image screen. The projection line on the marking image screen indicates $\times 2/3$ of marking field (starting of the next marking field). (There may be the cases that the characters set outside of the guide line the characters in the upstream of moving direction) cannot be marked during low-speed operation.)

- Mark "1234567890ABCDEF" with LP-435/LP-425/LP-V15 (Marking field: 160mm x 160mm)

First, set the character string to be marked on the character setting screen.

Set the character string with its width of the character string per one line should be around 106mm. (except the last area number)

1st line: 12345678 (character string width: 112mm)

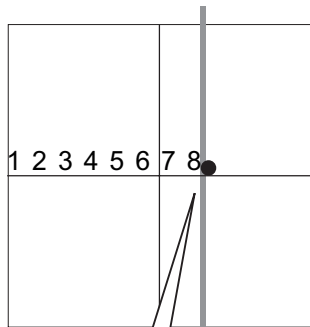
2nd line: 90ABCDEF (character string width: 112mm)

Next, set the marking condition of each line on the marking condition setting screen. The setting should be:

"Condition No. 1, Area No. 0" for the 1st line

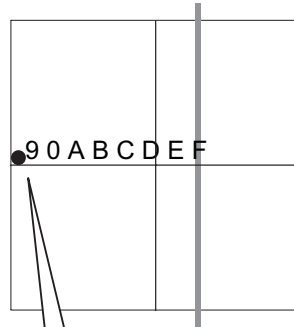
"Condition No. 2, Area No. 1" for the 2nd line

Downstream ← Upstream
Moving direction: LEFT



Make sure that the width of the character string should match with or go over the projection line on the marking image screen.

Downstream ← Upstream
Moving direction: LEFT



Calculate the start position of "9", which is the head character of Area No. 1 on the X coordinate using the following formula:
Formula: $-80 + (\text{character string width on the 1st line} - 160\text{mm} \times 2/3)$
In this sample, the character string width on the 1st line is 112mm, and therefore the calculation will be:
Starting position of the head character on the X coordinate = $-80 + (112 - 160 \times 2/3) \approx -75$

Character condition of "12345" on the 1st line

Character condition No. 1			
Character Height	: 12	X Position	: -80
Character Width	: 12	Y Position	: 0
Character Interval	: 14	Area No.	: 0

Character condition of "67890" on the 2nd line

Character condition No. 2			
Character Height	: 12	X Position	: -75
Character Width	: 12	Y Position	: 0
Character Interval	: 14	Area No.	: 1

↓ Reference

- Specify the character setting so that the last character in the character string should match with or go over the projection line on the marking image screen. The projection line on the marking image screen indicates x 2/3 of marking field (starting of the next marking field). (There may be the cases that the characters set outside of the guide line (the characters in the upstream of moving direction) cannot be marked during low-speed operation.)

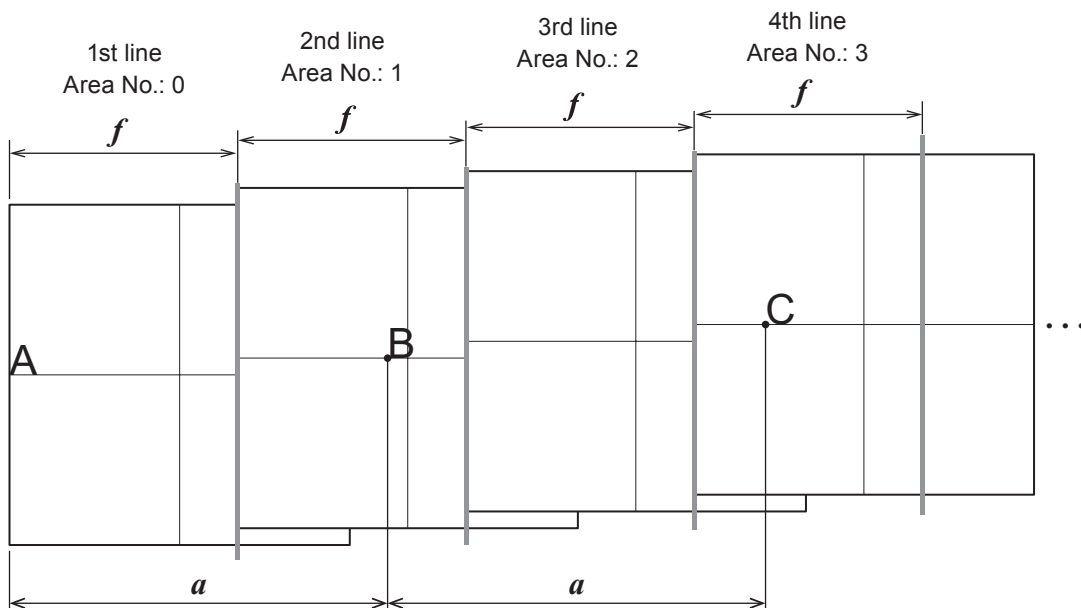
■ In case of marking studded character string:

Setting example:

Mark the characters at 100mm intervals with LP-V10U by using the concatenated marking function to the flying object. (In this example, Y position is stable. The origin of the character string is set to be “Left”, and the flying direction is set to be “LEFT”.)

Two-thirds of the marking field are concatenated with maximum 16 fields. Set the marking layout in these fields as shown below figure.

- f = Two-thirds of the marking field width
For LP-V10U (marking field width is 90mm), $f = 60$
- a = Spacing of the marking characters
When the distance between the characters is 100mm, $a = 100$



Specify the marking condition of each line on the marking condition setting screen.

In this case, the character string on the 1st line is specified as “Condition No. 1, Area No. 0” and that on the 2nd line is specified as “Condition No. 2, Area No. 1”, and that on the 4th line is specified as “Condition No.4, Area No.3”.

Set the X-position of each condition number (Area number) so that the characters are placed at regular intervals in the row of two-third width of the marking field.

Setting Condition

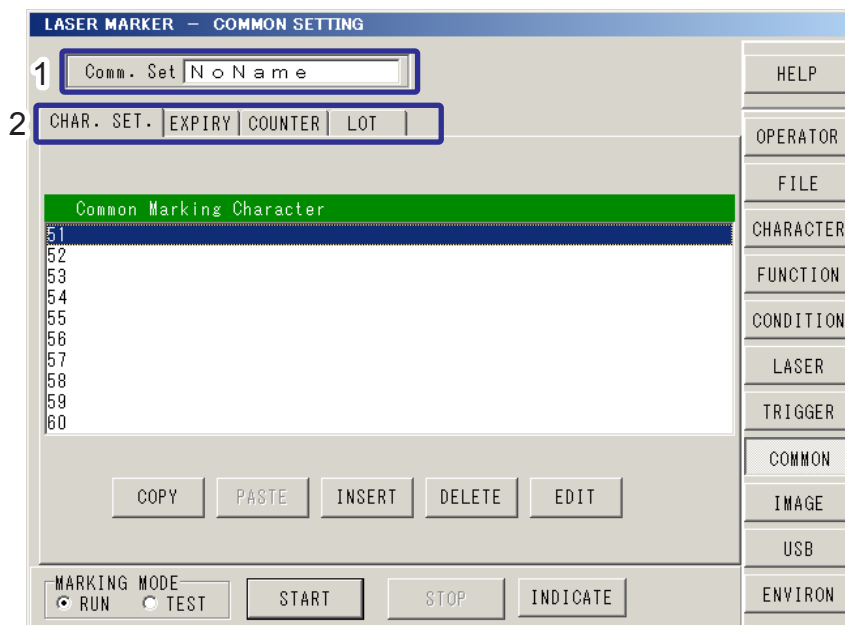
Item	1	2	3	4
Character condition No.	1	2	3	4
X Position	-45	-5	No character input	-25
Y Position	0	0	No character input	0
Area No.	0	1	2	3

4-13 Common Setting

Marking condition set on common setting screen can be used reflecting to respective file number. This section describes common characters, the common counter setting, common lot setting, and common export date setting which can be set on the common setting screen.

Reference

- The contents set on the common setting screen are simultaneously saved when a file is saved on the file screen.

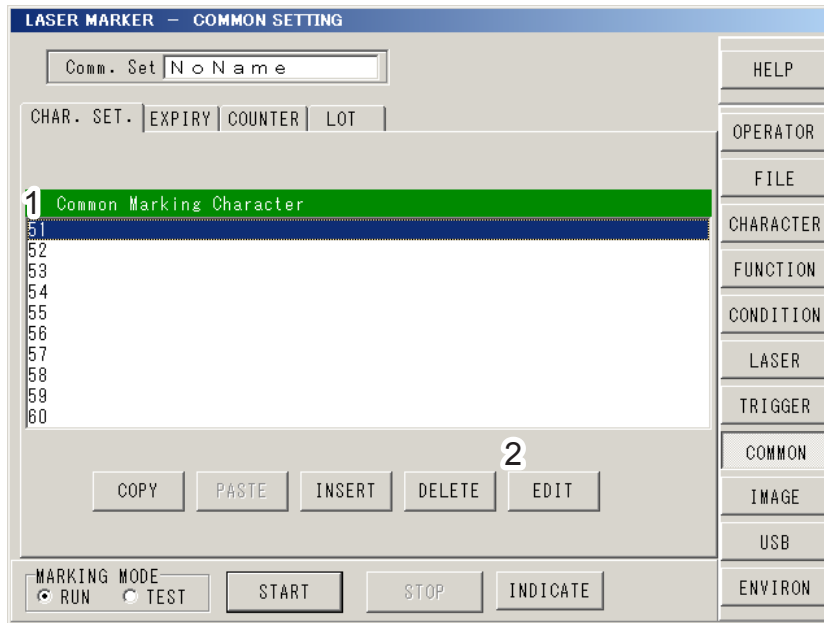


Description

- Registration name:**
Input the common file name.
Only one common file can be registered in the laser marker.
As a file name, both alphabet including capital and small letters and numeric can switch between single- and double byte. Up to 20 characters can be input in case of inputting all single byte letter.
- Common setting of functions:**
Set the following functions used commonly in several files.
 - Common character
 - Common expiry date
 - Common counter
 - Common lot

4-13-1 Common Character Setting

This paragraph explains the common character setting which can be set in common for all files. The contents of the set characters are reflected to all files.



Description

- 1 Common Marking Character:
Setting of ten lines is possible.

Setting Range	51 to 60
---------------	----------

- 2 EDIT:
Press this button for executing copy, paste, line insertion, line deletion, and edit.
Input and edit methods are the same as that of the character setting screen. Input a marking character with reference to "4-8-2 Character Input" (P.146) of a character.

Reference

- The conditions (character size etc.) of the character set by common marking character setting are set on the character conditions of each file. Since there are 51 to 60 common setting lines, specify a line in each file and set the character conditions. Refer to "4-10-2 Character Conditions" (P.178).

4-13-2 Common Expiry Date

This paragraph explains the setting of common expiry date which can be used for all files.

This function allows to mark the add-subtract time/date to present time set in environment setting screen of “4-16-2 System Setting (Environment 2)” (P.255).

Description

- 1 Common Expi No. (Common Expiry No.) :
4 expiry conditions can be set in 5 to 8 for all files.

- 2 Expi (Expiry Value) :
Expiry values to be used for conditions described in “3” as unit.
When the expiry number is set to negative value, it represents the past date.

Setting Range	-999 to 999
---------------	-------------

- 3 Year/Month/Day/Hour/Min. :
Sets unit of expiry.
Ex) Mark the expiry date of 3 months.
Set 3 to “Expi” and select Month for “Expiry unit”.

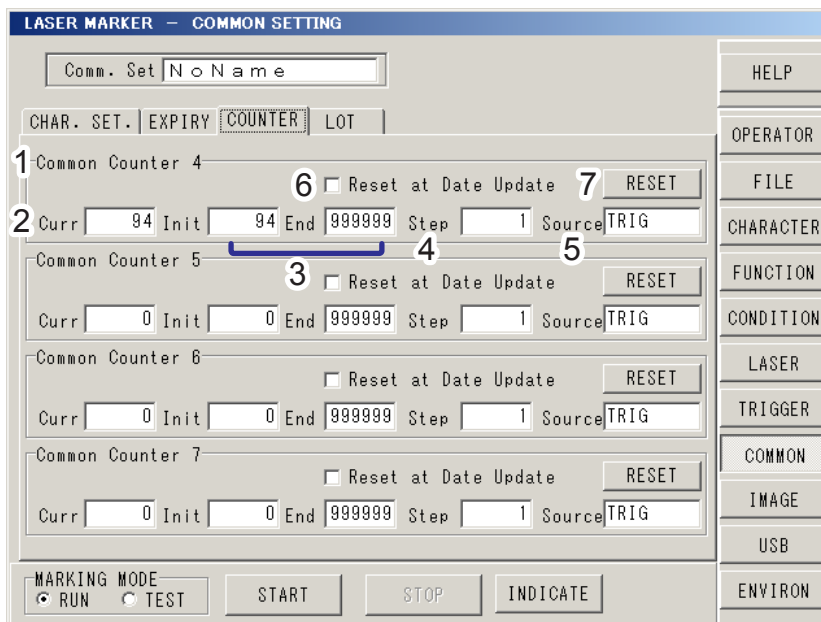
- 4 Today Included :
Enables to select “Today Included” or “Today Not Included” for expiry in the case of selected the expiry unit, Year or Month. When Year or Month is not selected for the unit, this setting cannot be used.

Reference

- Basically, the expiry date indicates the same year, same month, or same date. When setting “Today”, the expiry is displayed with the previous date (when the expiry value is set with negative value, the expiry is displayed with the next date).

4-13-3 Common Counter

Common counter is a counter which can be set in common for all files. This counter can be counted up/down by sequential number even if the file No. is changed.



Description

- 1 Common Counter No.
4 counter conditions can be set in 4 to 7 for all files.
- 2 Curr (Current Value):
Current counter value. The current value is subsequently marked. Set the current value within the initial value and end value.

Setting Range	0 to 999999
---------------	-------------

- 3 Init / End (Initial Value / End Value):
The initial value and the end value of the counter.
When the initial value is smaller than the end value: Counting up
When the initial value is larger than the end value: Counting down

Setting Range	0 to 999999
---------------	-------------

Reference

- Set the different value to the initial and the end value. If the same value is set to both, the counter value does not change.

- 4 Step (Step Value):
Sets the value to be changed per count.

Setting Range	0 to 999999
---------------	-------------

Description

- 5 Source (Count Source) :
Target for timing of counting up and counting down. The count-up or count-down is started at the timing of count source end. The count source can be switched by pressing button.

Setting Range	TRIG (Trigger)	Counts up or counts down by trigger input.
	Counter 0	Counts up or counts down when counter 0, 1, 2 or 3 ends.
	Counter 1	
	Counter 2	
	Counter 3	
	Counter 4	Counts up or counts down when common counter 4, 5, 6 or 7 ends.
	Counter 5	
	Counter 6	
Counter 7		

-
- 6 Reset at Data Update:
With checking on this function, the counter value is reset at the internal clock becomes "0:00".

Reference

- When the date changes during the Time Hold function is effective, the counter value is reset at the timing of releasing Time Hold (the time hold input is OFF).
- The counter reset at update cannot apply to the marking to flying object.

-
- 7 RESET:
Returns current value to initial value by pressing [RESET].
-

Notice

- When the counter is interrupted by alarm occurrence etc., check the counter value for the next marking.

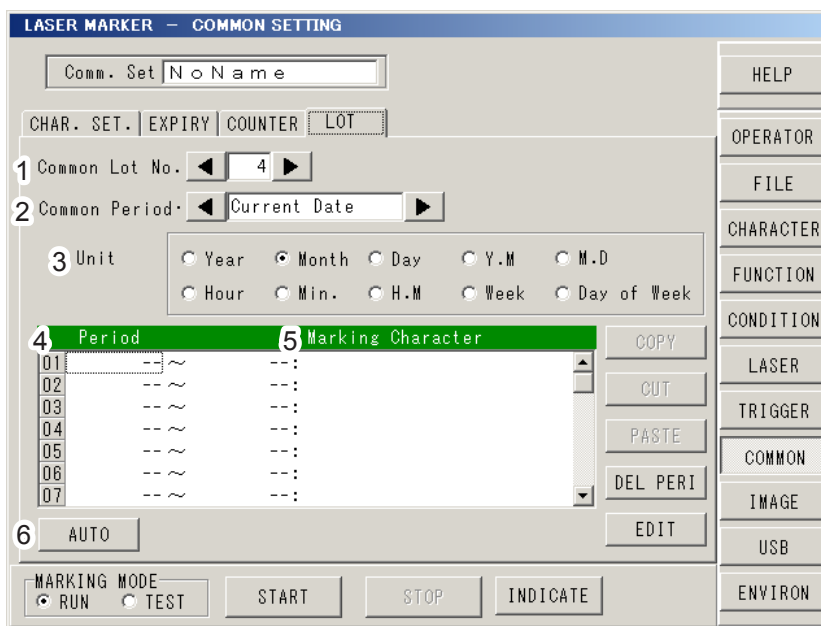
Reference

- The counter does not operate at test marking.
- When the counter value reaches to the end value, the marking is started from initial value again.
- Only the counter input with the character string is available.
- The current value of the counter is saved without overwriting the file.

4-13-4 Common Lot

This clause explaining the setting of lot function which can be used in common for all files.

This function divides the subject set in term by each term, and marks each term in the set character string.



Description

- 1 Common Lot No.:
4 lot conditions can be set in 4 to 7 for all files.

Setting Range	4 to 7
---------------	--------

- 2 Common Period:
Target period of the lot function.

Setting Range	Current	: Specifies as target date set with current date.
	Expiry No. 1 to 8	: Specifies as target date set with expiry No. 1 to 8.
	Counter 0 to 7	: Specifies as target counter set with counter 0 to 7.

- 3 Unit:
Select the unit for period to be performed lot function.

Period Condition	Description	Max. Divided Numbers
Year	Period defined by year (dominical year) unit.	Max. dividable No.: 60
Month	Period defined by month unit.	Max. dividable No.: 12
Day	Period defined by date unit.	Max. dividable No.: 31
Y. M	Period defined by year and month.	Max. dividable No.: 60
M. D	Period defined by month and date.	Max. dividable No.: 60
Hour	Period defined by hour unit.	Max. dividable No.: 24
Min.	Period defined by minute unit.	Max. dividable No.: 60
H. M	Period defined by hour/minute unit.	Max. dividable No.: 60
Week	Period defined by week unit.	Max. dividable No.: 54
Day of Week	Period defined by day of week unit.	Max. dividable No.: 7

Reference

- When a lot subject is set to counter 0 to 7, setting of term condition is not necessary. In this case, max. dividing number is set to 60.
- When the period condition is “Y. M”, do not input the non-existent date.

Description

- 4 Period:
Set the both period of start and end.

Reference

- If the period is spanned, for example, when setting the period from 22 o'clock to 3 o'clock of the next day, it needs to set the period by dividing into two, 22 to 23 o'clock and 0 to 3 o'clock.

- 5 Marking Character:
Set the character string to be marked. Double-click on the marking character string area, or select the input line and press [EDIT] to open the character input window.

Setting Range	Up to 9 characters *
---------------	----------------------

* Capital and small letters of alphabet, numerics, Katakana, Hiragana, Kanji (JIS level-1 and JIS level-2), symbols, user registration characters

- 6 AUTO:
This "AUTO" is available when the unit of the expiry date is selected among "Year", "Month", "Day", "Hour", "Min.", "Week", or "Day of Week". Pressing this button sets the start and end of the period with minimum unit automatically. Note that when the unit of the expiry date is set to "Year", the period is set automatically calculating from the current year.

Notice

- The following items, Date, Lot, and Expiry date are marked based on the internal clock of the laser marker. The internal clock might be deviated caused by the error of the internal parts or degree of the battery drain. Therefore, be sure to check the time of the internal clock before the operation without fail.

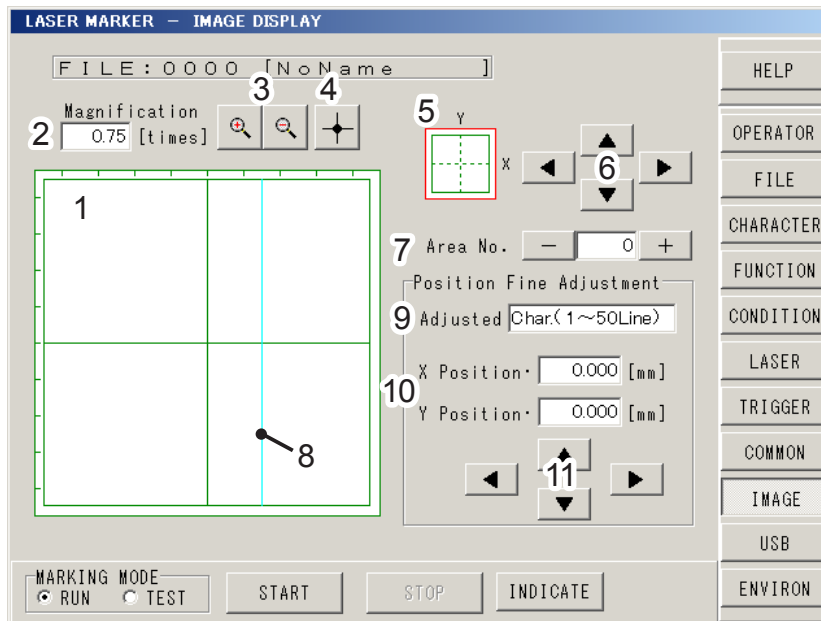
Reference

- Each function character already set function is input on the character setting screen. Refer to "Lot" (P.155).
- Saturday is defined as weekend day even whether the week renewal is set to either Monday or Sunday at "week" unit setting of "Lot" in "Function Setting" menu. For marking Monday through Friday as "Weekday" and Saturday and Sunday as "Holiday", you should set respectively at three times as following order; Sunday is set as "Holiday" (1), Monday through Friday is set as "Weekday" (2), and Saturday is set as "Holiday" (3).

4-14 Image Display Screen

This is a screen for checking the image of character string/logo set in the character setting or condition setting. Image checking before marking is effective to reduce any errors. Position adjustment is also possible on this screen. Adequate position can be set by checking the image.

4-14-1 Image Display



Description

- 1 Image Screen :
Image-displays the marking content set previously.
- 2 Magnification :
Sets the magnification ratio of the image display.
Press the numeric part of the magnification to set the arbitrary magnification on the screen.
- 3 Image Display Zoom-in/Zoom-out :
The image can be zoomed in and out by 18 steps.
- 4 Center of Image Display :
Set the origin center to image display position.
- 5 Image Display Position :
Indicates where the current image is in the marking field.
- 6 Shift Display Position :
Shifts image display part up and down, left and right. Pressing arrow shifts the image display part.
- 7 Area No. *1 :
Displayed when marking on-the-fly is set in "Trigger setting".
It indicates the order of the marking field for the concatenated marking to flying object.
Press [+] or [-] to select the desired area number. The image corresponding to the selected Area No. is displayed.
Refer to "Concatenated Marking Setting" (P.223).
- 8 Auxiliary Line *1 :
Auxiliary line used for setting marking to flying object.
Refer to "Concatenated Marking Setting" (P.223).
- 9 Object (Adjustment Object) :
Select the object to be fine adjusted.
The data which shows in red character or image on the window is the selected object.

Description

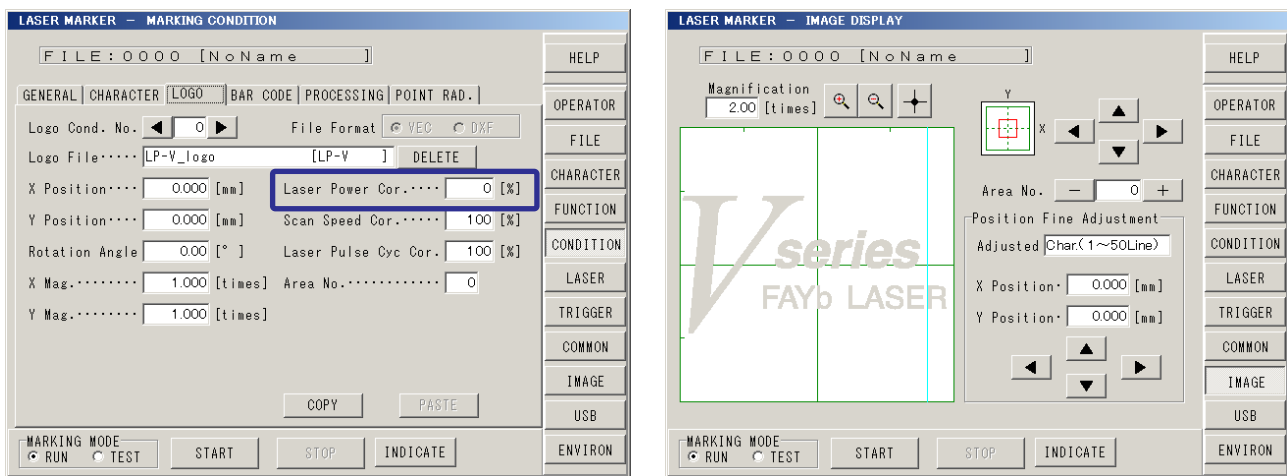
- 10 X/Y Position :
Inputs the coordinate value of X or Y axis. Press the numerical value to display a ten-key pad.
- 11 X/Y Position Fine Adjustment :
Fine-adjusts the target marking contents to up/down or right/left direction. (in 0.001mm pitch)

*1 : Displayed only with the setting for marking of flying object.

4-14-2 Work Image Display

In case there are data which you will see on the image display, but not be marked, such as the outline data of the marking object or characters, setting 0% to "Laser Power Correction". Then, the data are showed with gray figure on the image display.

The marking data which are set to 0% for "Laser Power Correction" are not marked. They do not affected the marking time etc. as well.



Reference

- When "Laser Power Cor." is set to 0%, these character, logo, barcode or processing data are not traced with the guide laser "Marking Character" mode.

4-15 USB Media

On this screen, data saved in the laser marker such as setting files, log and font files can be exported and deleted. It is also possible to import externally saved data to the laser marker.

To import and export the data, use a USB media.

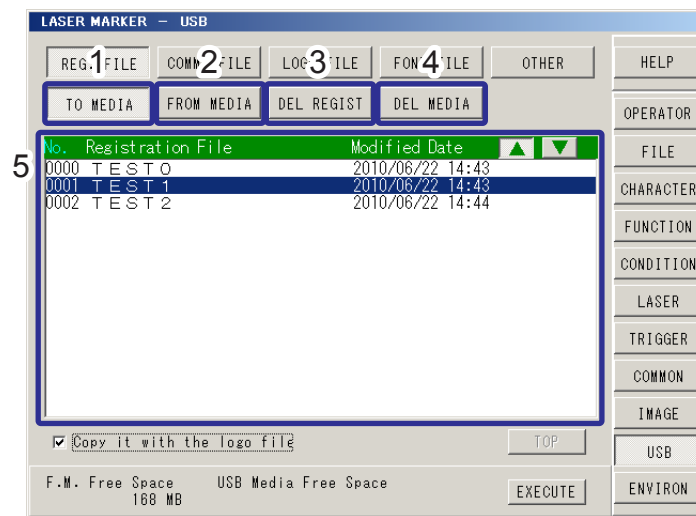
! Notice

- Do not remove the USB media from USB connector during data write/read.
In addition, do not turn off the power supply of the main unit of laser marker during data write/read.
Any losses or failures of data might be caused. Please note that we shall not be liable for any losses incurred due to loss or failure of data arising from use of this product.
- Do not insert/remove the USB media into/from the USB connector during marking, guide laser scanning or remote control. The laser marker may get unstable or stop.
- Do not start the laser marker with the USB media being connected into the USB connector. The laser marker may not start normally. Connect the USB media to the connector after the start-up is completed.
- Do not connect any other USB products for the purpose of data writing or reading than USB media and USB mouse to USB connector. Performance of the laser marker might be failed. Before using a USB media, check it for compatibility with the laser marker. We shall not be responsible for performance of all kinds of USB media.
- USB media with security features cannot be used.
- USB hub cannot be used for this product. Use USB media directly connecting to the laser marker.

4-15-1 Registration File

Registration files contain the marking data and conditions in one file number.

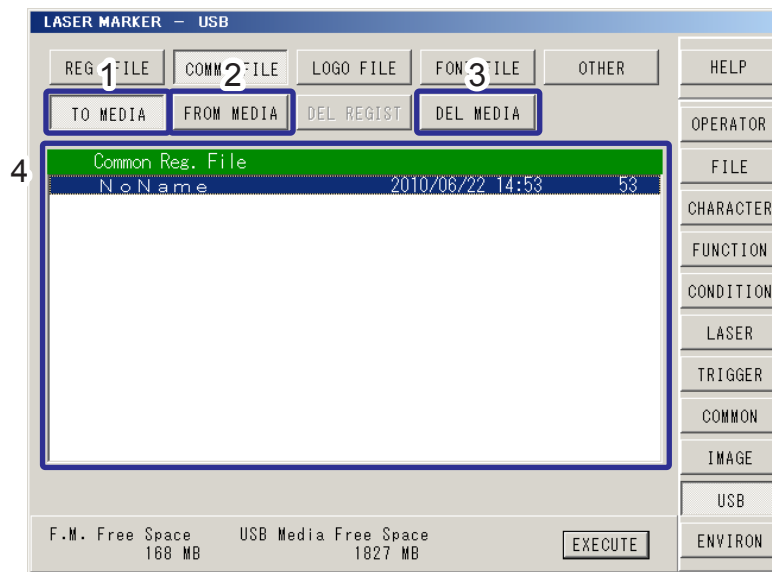
Up to 2048 registration files can be saved in a laser marker.



Item	Description
1 TO MEDIA	Copies the selected file stored in the laser marker to the USB media.
2 FROM MEDIA	Registers the selected file stored in the USB media to the laser marker. Files in the backup data can also registered individually to the laser marker.
3 DEL REGIST	Deletes the selected file from the laser marker. Select the file to delete and click "EXECUTE".
4 DEL MEDIA	Deletes the selected file from the USB media. Select the file to delete and click "EXECUTE".
5 File list	Displays the all files stored in the laser marker. Clicking the title line of the list, the files are sorted in ascending or descending order by the following categories. <ul style="list-style-type: none"> • No. • Registration File • Modified Date

4-15-2 Common File

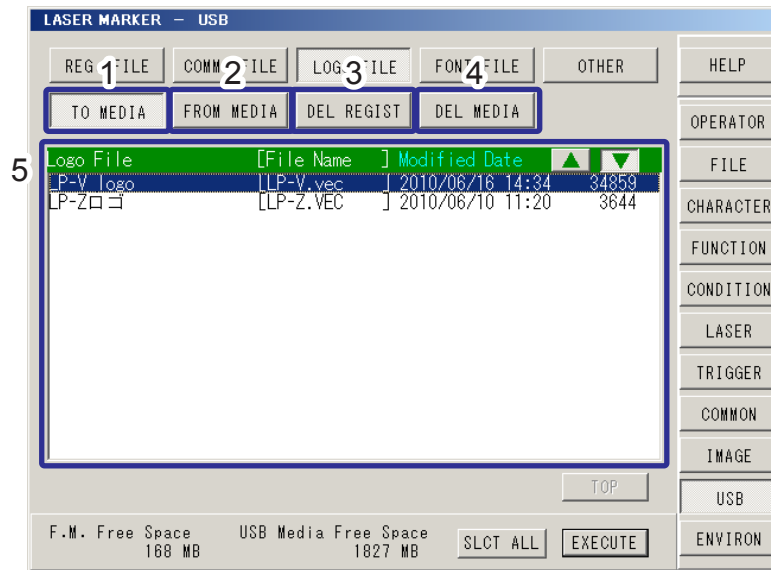
Common file contains the setting data for the functions such as expiry date, counter or lot using in several files. One common file can be saved in a laser marker.



Item	Description
1 TO MEDIA	Copies the selected common file stored in the laser marker to the USB media.
2 FROM MEDIA	Registers the selected common file stored in the USB media to the laser marker.
3 DEL MEDIA	Deletes the selected common file from the USB media. Select the file to delete and click "EXECUTE".
4 Common file list	Displays the common file stored in the laser marker.

4-15-3 Logo File

Logo files contain the graphic data for the marking in VEC or DXF format.



Item	Description
1 TO MEDIA	Copies the selected logo file stored in the laser marker to the USB media.
2 FROM MEDIA	Registers the selected logo file stored in the USB media to the laser marker.
3 DEL REGIST	Deletes the selected logo file from the laser marker. Select the file to delete and click "EXECUTE".
4 DEL MEDIA	Deletes the selected logo file from the USB media. Select the file to delete and click "EXECUTE".
5 Logo file list	Displays the all logo files stored in the laser marker. Clicking the title line of the list, the files are sorted in ascending or descending order by the following categories. <ul style="list-style-type: none"> • Logo File • File Name • Modified Date

Reference

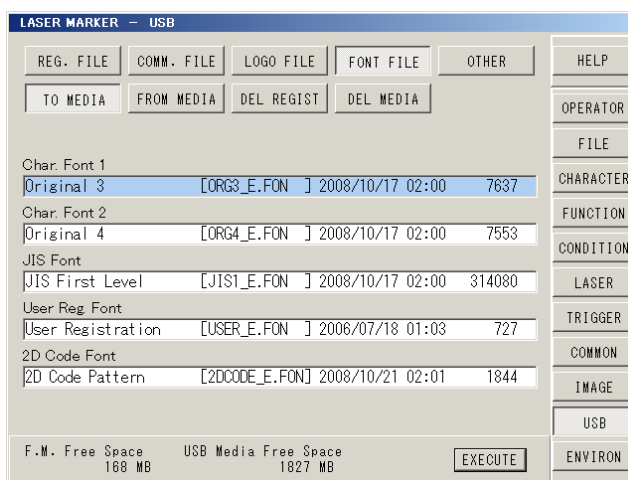
- Up to 2048 logo file can be registered into the laser marker.
- Up to 1,445,376 byte logo file can be registered into the laser marker.

4-15-4 Font File

Font files contain the font data for marking.

Font File Registration

Registration of the font file to the laser marker is necessary when marking is executed with the laser marker.



Register the fonts to the suitable font registration field as follows.

In case the font type does not match the font registration field, some characters cannot be input properly.

Font reg. field	Initial registered file (.FON)	Font Type
Character Font 1	LP-4x0/4x5 type: ORG1 LP-4x1 type: ORG2 LP-V/LP-W series: ORG3	Font for the alphanumeric and symbols (called Original font in the laser marker): 0 to 9, A to Z, a to z and some symbols
Character Font 2	LP-400/V series: ORG4 LP-W series: ORG5	
JIS Font	JIS1	JIS Level 1 font: Hiragana, Katakana and Kanji characters for Japanese, special characters for Grecian and Russian
User Registration Font	USER	User Registration Character Font (newly created character by user) or JIS Level 2 font: Kanji characters for Japanese
2D Code Font	2DCODE	Drawing pattern font for 2D code modules

Reference

- In case of using both JIS First Level font and JIS Second Level font at the same time, register JIS1.FON to the JIS font registration field and register JIS2.FON to the user registration characters registration field.

Installed Font

The attached "Laser Marker Driver & Utility (CD-ROM)" contains the following font files.

(For Font: [CD-ROM]\Font)

Save the files into a USB media when registering it to the laser marker.

Character font

Alphanumeric and signal font of original for laser marker. (Original Font)

(Refer to the Character Code Table of External Control Manual for the character kind and character code.)

For Japanese Font	For English Font	Description
ORG1.FON	ORG1_E.FON	font suitable for multipurpose letter marking.
ORG2.FON	ORG2_E.FON	font suitable for lower-case letter marking.
ORG3.FON	ORG3_E.FON	font suitable for nameplate marking etc.
ORG4.FON	ORG4_E.FON	font for high-speed marking.
ORG5.FON	ORG5_E.FON	font suitable for micro lower-case letter.
OCR1.FON	OCR1_E.FON	font suitable for confirming the processed image.

For only Japanese Font	
ORG1S.FON	80% reduced-size font of Original1.
ORG2S.FON	80% reduced-size font of Original2.
ORG3S.FON	80% reduced-size font of Original3.

Reference

- Original 4 font contains some characters that can not be bold.
- By using reduced size font, arrange a proper balance of character line when Kanji and alphanumeric characters are used in the same character line.

JIS font

Font file of Hiragana, Katakana, Grecian, Russian, and Kanji.

(Refer to the Character Code Table of External Control Manual for the character kind and character code.)

For Japanese Font	For English Font
JIS1.FON	JIS1_E.FON
JIS2.FON	JIS2_E.FON

User Registration Character Font

The font file in which the user registers the font newly created with the font maker (refer to Font Maker Operation Manual.)

* The following character fonts are previously registered at 8121(HEX) to 8129(HEX) in the character font by user registration installed in the CD-ROM.

	Shift JIS	JIS	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
User Registration Character	F13F	8120		㊦	㊧	㊨	㊩	㊪	㊫	㊬	㊭	㊮	㊯					
	F14F	8130																
	F15F	8140																
	F16F	8150																

For Japanese Font	For English Font
USER.FON	USER_E.FON

2D Code Pattern Font

Pattern font for 2D code allocated to codes 2230(HEX) to 2239(HEX) and 8121(HEX) to 8152(HEX).

* The pattern font for 2D code installed into CD-ROM is already registered the pattern font for 2D code allocated to codes 2230(HEX) to 2239(HEX) and 8121(HEX) to 8152(HEX).

(Refer to "2D Code Pattern Font" (P.200) for the kind and code of character.)

For Japanese Font	For English Font
2DCODE.FON	2DCODE_E.FON

4-15-5 File Management

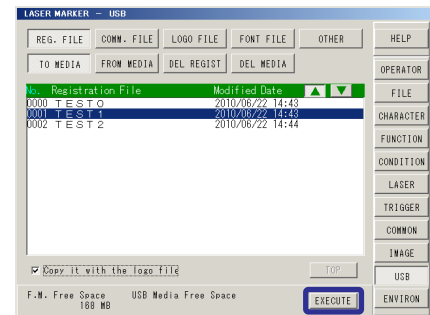
■ Copy to Media

The file data registered in the laser marker is copied to USB media.

1 Select the file from the list and press [EXECUTE].

For registration files, check the box of "Copy it with the logo file" to copy the logo files in the selected files.

For logo files and font files, when pressing [ALL], the all files in the list are selected.



↓ Reference

- For registration files and logo files, selecting the category title in the list and pressing [▲] [▼] displays the list by selected item in ascending/descending order.

2 Select the copy destination directory, and press [Copy].

For the registration file and common file, input the file name to be saved on USB media. Then press [SET] and [COPY].

Input possible with 8 characters of English capital letters or numeric letters, or 4 characters of Hiragana, Katakana, and Kanji.



↓ Reference

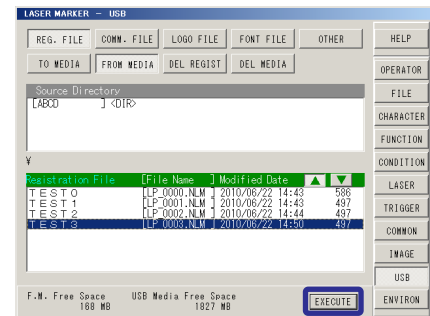
- For the registration file and common file, following names can not be used as a file name.
CLOCK\$, CON, AUX, NUL, PRNCOM1 to COM9, LPT1 to LPT9

■ Register to Inside

The file data saved in USB media is registered to laser marker.

- 1 Select the file in the USB media after selecting directory, and press [EXECUTE].

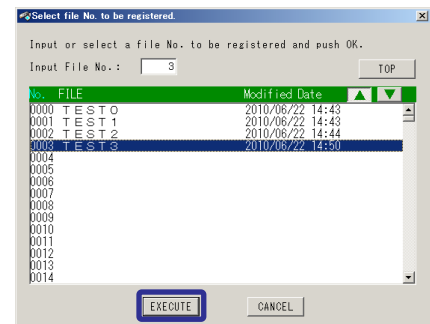
For logo files, when pressing [ALL], the all logo files are selected.



Reference

- Selecting the category title in the list and pressing [▲] [▼] displays the list by selected item in ascending/descending order.
- By selecting the directory in which the backup data is saved, it is possible to import an individual file from the backup data.

- 2 For registration files and font files, select the file number to be registered, and press [EXECUTE].



Reference

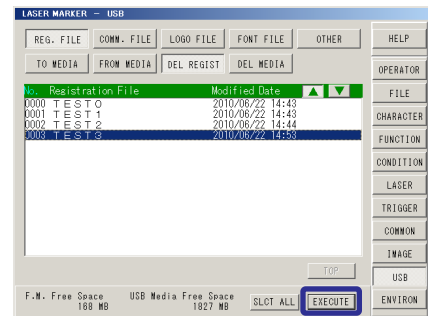
- When copying the registration file in that a logo file is used, register the logo file to the laser marker, too.
- In case of transferring the registered file in the new version controller to the old version controller, settings of new functions (of the new version controller) are not available (registered).
- In case of transferring the registered file in the old version controller to the new version controller, settings of new functions (of the new version controller) are set as default value.
- Up to 2048 logo file can be registered into the laser marker.
- Up to 1,445,376 byte logo file can be registered into the laser marker.

■ Delete Registration

The selected file data registered in the laser marker is deleted.

- 1 Select the file to be delete from the file list and then press [EXECUTE].

For registration files and logo files, pressing [SLCT ALL], the all files are selected.

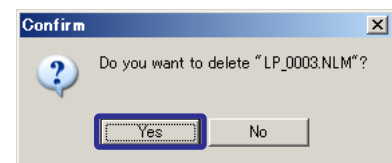


Reference

- For registration files and logo files, selecting the category title in the list and pressing [▲] [▼] displays the list by selected item in ascending/descending order.

- 2 Check the file and press [Yes].

Pressing [No] does not delete the file and returns to Step 1.



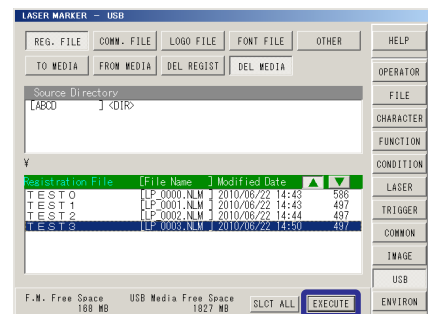
- 3 The file is deleted from the laser marker.

■ Delete Media

The file data saved in USB media is deleted.

- 1 Select the file to be deleted from the file list after selecting directory, and then press [EXECUTE].

When pressing [SLCT ALL], the all files are selected.

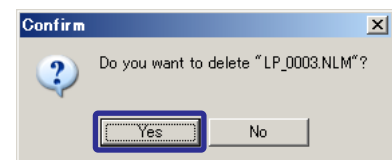


Reference

- Selecting the category title in the list and pressing [▲] [▼] displays the list by selected item in ascending/descending order.

- 2 Check the file and press [Yes].

Pressing [No] does not delete the file and returns to Step 1.



- 3 The file is deleted from the USB media.

4-15-6 Backup

In the menu of "OTHER", the marking data stored in the laser marker can be saved as a backup file or a text file.

■ Backup

Executes the exporting the backup data of the laser marker to USB media.

The backup consists of the following data.

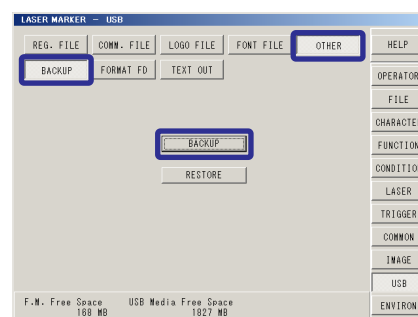
- Setting files, Common files (The current value of the counter function is not included in backup data.)
- Logo files
- Font files
- Environment settings ("Present time" and "Console" settings are not included in backup data.)

1 Insert the USB media into the USB port of the controller.

Reference

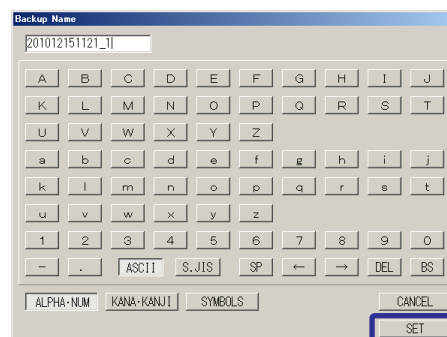
- Use the formatted empty FD (1.44MB) when using the USB compatible FDD (floppy disk drive).
- If it needs to back up the data to the FD, more than two disks may be needed depending on the amount of data registered.

2 Press [OTHER] and select [BACKUP].

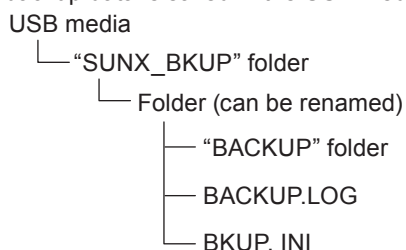


3 Press [BACKUP].

4 Input the file name and press [SET].
This file name is displayed when selecting the backup data for restoring.



5 The backup data is saved in the USB media with the following folder structure.



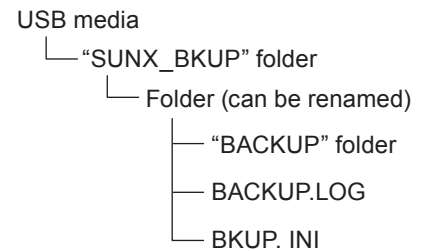
! Notice

- Do not change the folder structure of the backup data. Changing or deleting data in the backup might be a cause of the reading error.

■ Restore

Restore (Overwrite) the file data (setting files, logo files, font files and environment settings) in the laser marker with the externally saved backup data by the following procedures.

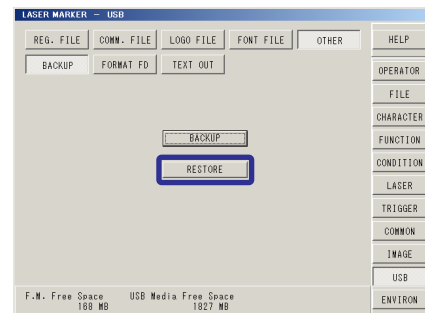
- 1 Insert the USB media with the back up data into the USB port of the controller.
The following folder structure of backup data can be read.



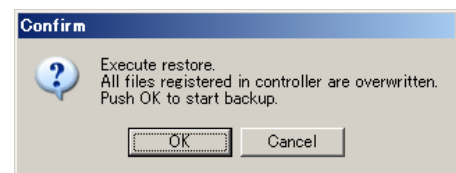
↓ Reference

- Store "SUNX_BKUP" folder in the root directory of the USB media.

- 2 Press [RESTORE]. and the folders in "SUNX_BKUP" directory are displayed.
Select the folder in which the importing backup data is stored and press [CONFIRM].



- 3 Confirm screen is displayed. To execute restore press [OK].



- 4 Restore is conducted.

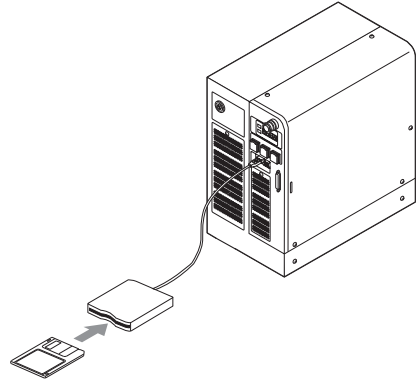
↓ Reference

- When the restore is executed, the following files are not deleted and remains in the laser marker.
 - Marking files saved in the file numbers in which no marking files are existed in the backup data
 - Logo files whose file name (.vec or .dxf) is not existed in the backup data
- The following parameters are not restored at the importing of the backup data. For them the laser marker keeps the original setting.
 - Present time of internal clock (Environment setting)
 - Console setting (Environment setting)
 - Current value of counter function
 - Display language
 - Error log
 - System information
- If Ethernet is used, check the IP address, etc after the importing of the backup data. When the backup data is imported to the laser marker, communication parameter settings are overwritten with the backup data.
- In the case of restoring backup data from the other model, setting value beyond the setting range indicated in red. In such case, laser marker operates at its upper or lower limit, or an error of the setting warning is occurred at the marking. Correct those value within the setting range according to the model.
- In case of restoring the backup file in the new version controller to the old version controller, settings of new functions are not available (restored).
- It is impossible to restore the backup file including DXF file to the laser marker whose controller version is 2.20 or previous version.
- It is possible to import an individual file from the backup data to the laser marker. Refer to "Register to Inside" (P.244).

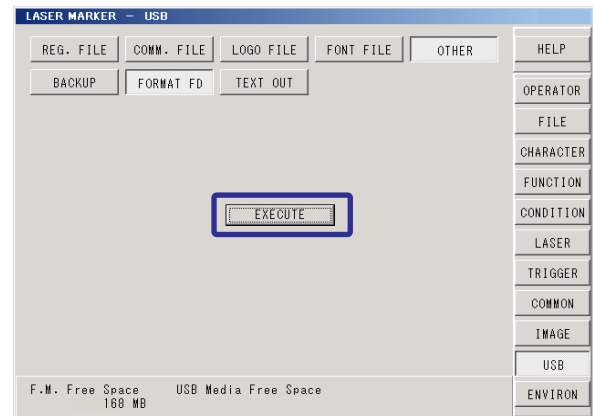
■ FD Format

Follow the procedures below to format FD (1.44MB) using FDD (floppy disk driver) that support USB.

- 1 Set the cable of FDD that supports USB to the USB media connector on the controller and insert a FD.

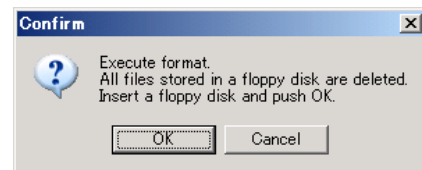


- 2 Press [EXECUTE].



- 3 Check the execution of formatting and then press [OK].

Pressing [Cancel] does not format USB media and returns to Step 1.

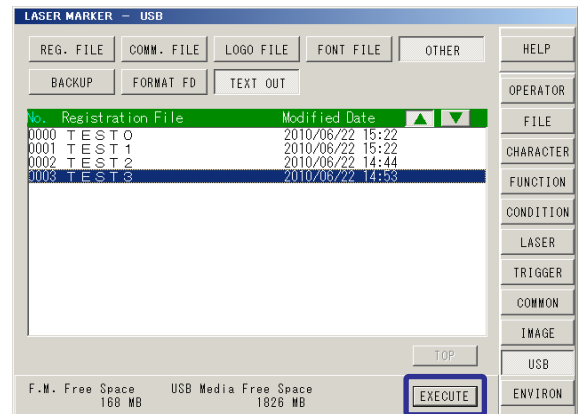


- 4 Formatting is executed.

■ Text Output

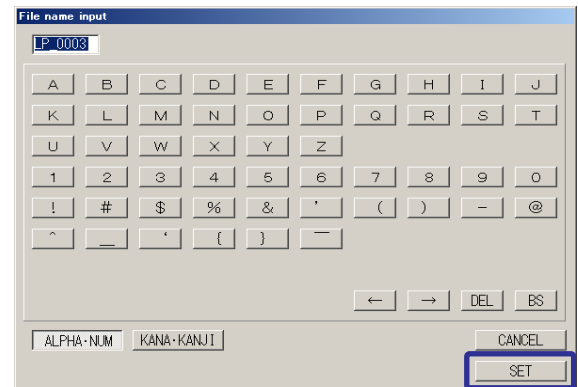
The selected file data is copied to USB media with text format.

- 1 Select the file to be text outputted from the file list, and press [EXECUTE].



- 2 Select the directory to be copied the file, and press the file name input column. After that, input the file name to be saved into USB media, and press [SET]. and then press [SAVE].

Input possible with 8 characters of English capital letters or numeric letters, or 4 characters of Hiragana, Katakana, and Kanji.



- 3 The file data will be output to USB media in the text format.

Reference

- The data output into text format can be opened and read with "Notepad", etc. of "Windows".
- The following names have been already reserved by system and can not be used as a file name.
CLOCK\$, CON, AUX, NUL, PRN
COM1 to COM9, LPT1 to LPT9

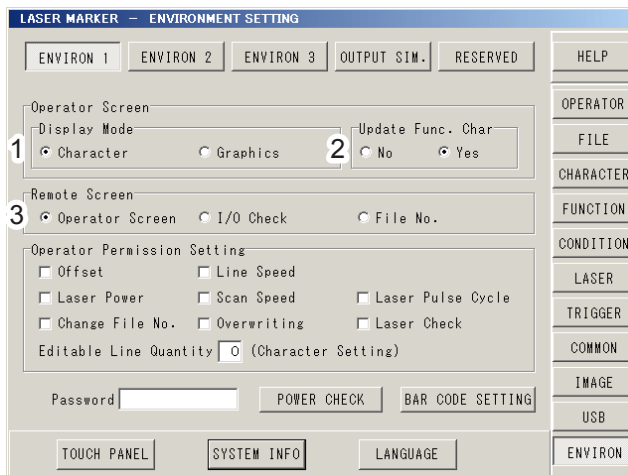
4-16 Environment Setting

This function is used for environment setting of laser marker and checks the status of system. The setting parameters on this screen affect the settings on the other screens, operation or marking of character. The settings here should be previously checked, or changed if necessary.

4-16-1 Display Setting (Environment 1)

Reference

- Setting of Environment 1 is saved without overwriting.



Operation Screen and Remote Screen

Description

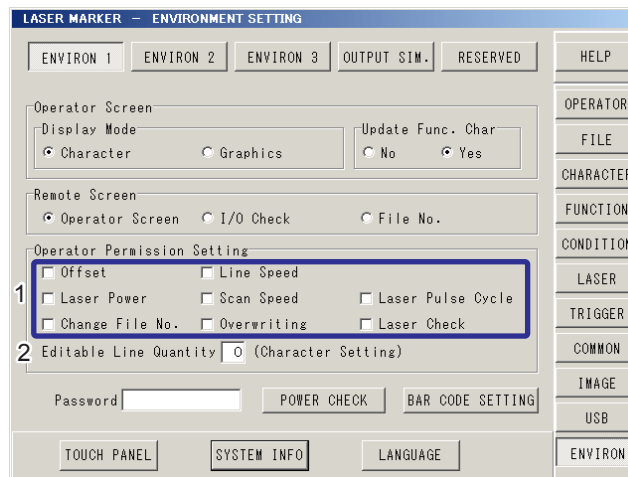
- 1 Display mode :**
Select the display of the operation screen between marking characters and marking image.
 - Character: Refer to "4-3-1 Character Display" (P.124).
 - Image: Refer to "4-3-2 Image Display" (P.125).
- 2 Update Function Character :**
Select the updating on (Yes) / off (No) in the operation screen for the function character such as date, lot, counter.
- 3 Remote Screen :**
Select the display of the operation screen under the remote control mode.
 - Operation Screen: Refer to "4-3 Operation Screen" (P.124).
 - I/O Check Monitor: Refer to "4-5-1 I/O Check Monitor" (P.131).
 - File No.

Reference

- When selecting "Image" for the operation screen and displaying the operation screen in the remote control mode, the waiting time for the turning on the marking ready might become longer after editing the marking data or changing file No.
- When selecting "Yes" for the update of the function character, the idling time from the ending of the marking after inputting trigger until the timing of the starting of the next marking might become longer.

■ Operator Adjustment Screen/Adjustment Accepted Parameters

The setting parameters that can be set on the operator's adjustment screen are selected. Refer to "4-4 Operator Adjustment Screen" (P.127).



Description

- 1 Setting permission:
Check the respective boxes to make the adjustment on the operator's adjustment screen possible.
 - Offset
 - Line Speed
 - Laser Power
 - Scan Speed
 - Laser Pulse Cycle (Only LP-V series)
 - Change File No.
 - Overwriting
 - Laser Check
- 2 Editable Lines:
Sets the number of line possible to be edited at the edition of character setting on the operator's adjustment screen.

Setting Range	0 to 50 lines
---------------	---------------

Reference

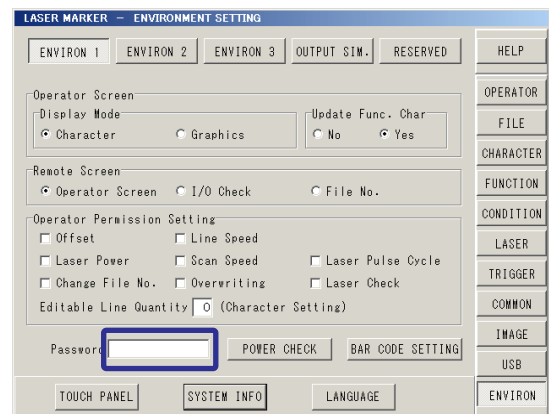
- Setting of password is useful to avoid unintentional change of setting by operator. Setting of parameters only the specified operators can change is possible, too. Refer to "4-16-1 Display Setting (Environment 1)" (P.250) or "4-3-3 Password to Open the Setting Screen" (P.126) for the setting of password.

■ Password

The function of password is used to avoid the unintentional change to the setting screens from operation screen. The password is required to change the screen from operation screen to the other setting screens.

Setting procedures

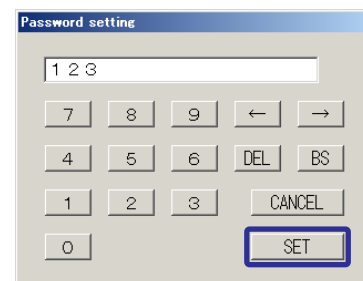
- 1 Press the password.



- 2 Input the password, and press [SET].

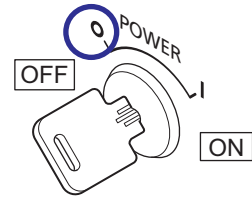
A password consists of figures of maximum fifteen digits.

To disable the password protection, delete all characters and press [SET].

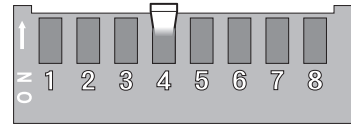


When password is forgotten

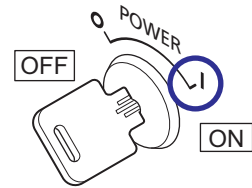
- 1 Turn the key switch on the controller to OFF.



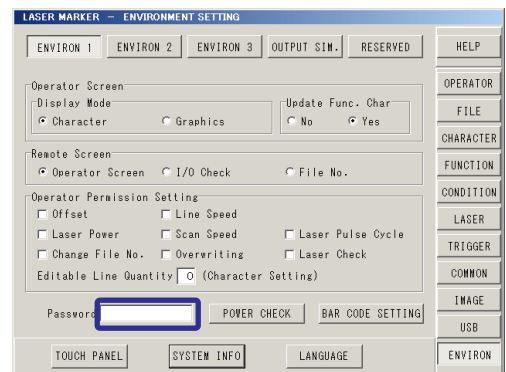
- 2 Turn the No.4 DIP switch on the rear of controller to ON.



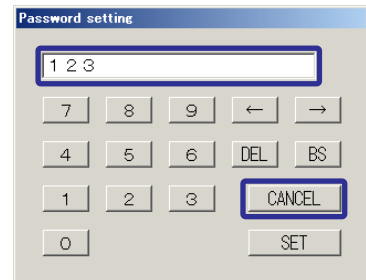
- 3 Turn the key switch on the controller to ON.



- 4 Press on the password in the "ENVIRON1" on the environment setting screen.



- 5 The figures displayed on the setting of password indicate the currently registered password.

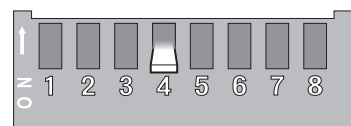
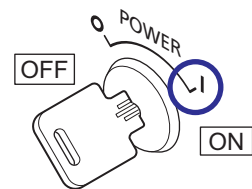


- 6 Check the password, and press [CANCEL].

- 7 Turn off the key switch on the controller and turn off DIP switch No.4 to make the password valid.

Reference

- The setting is not changed if the DIP switch is turned to ON while the key switch is in the ON position. Turn the DIP switch to ON after turning off the power.

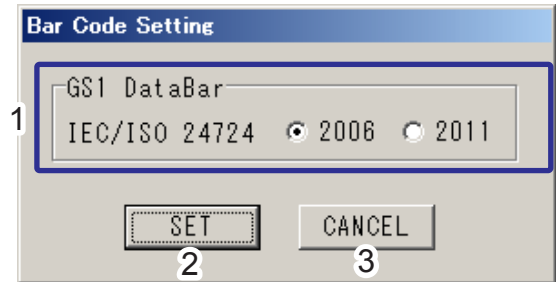
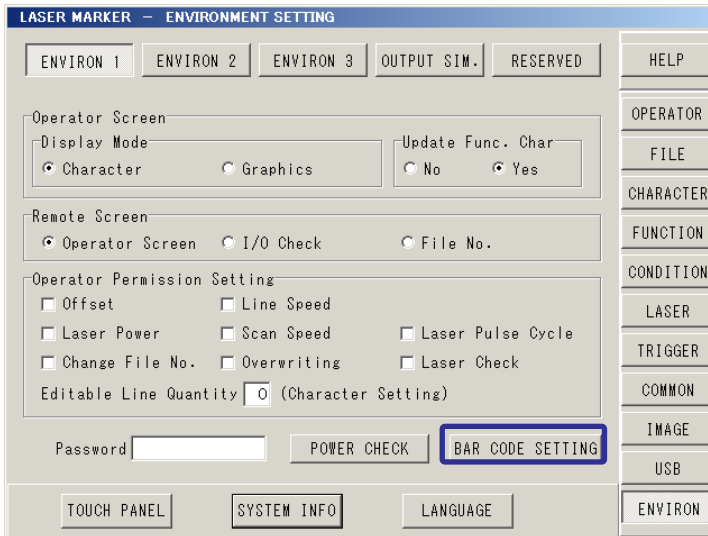


■ Bar Code Setting

When RSS (GS1 DataBar) Limited or its composite code is selected as bar code type in bar code condition setting, specifies the ratio of guard pattern width to module width.

The guard pattern indicates the spaces outside of the code symbol where is marked when the code is inverted.

For the code symbol details, refer to “RSS (GS1 DataBar) Limited” (P.312).



Item	Description
1	Guard pattern specified method : Select how to specify the ratio of guard pattern width to module width. <ul style="list-style-type: none"> • 2006: Auto setting according to the ratio defined by ISO/IEC 24724 2006. • 2011: Auto setting according to the ratio defined by ISO/IEC 24724 2011.
2	SET : Applies and saves the barcode setting to the laser marker and closes the window.
3	CANCEL : Closes the window without applying the change.

Reference

- For better bar code reading quality, in this laser marker, the rightmost space of the right guard pattern consists of six modules, adding one extra module to that of the standard when it is set to ISO/IEC 24724 2011.
- When “Guard” in “Condition setting of GS1 DataBar (RSS code)” (P.191) is enabled, the guard pattern is expanded with the certain width in addition to this setting.

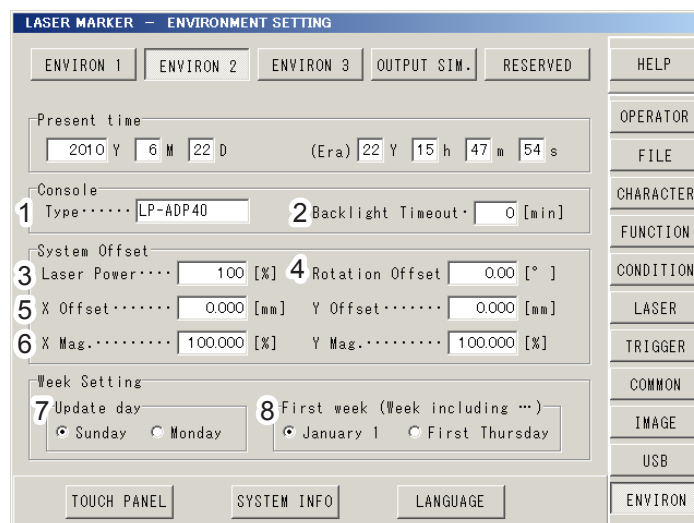
Reference

- When the guard pattern specified method is changed, it changes the center position of the code symbols, too. Confirm the marking position after this setting.

4-16-2 System Setting (Environment 2)

Reference

- Setting of Environment 2 is saved without overwriting.



Present time

The setting of internal clock provided to the laser marker. The dominical year, month, date, era year, hour, minute and second can be set. The internal clock is used to mark the current date and expiry date set as the function character.

Notice

- The following items, Date, Lot, and Expire Date are marked based on the internal clock integrated in the laser marker. The internal clock might be deviated caused by the error of the internal parts or degree of the battery drain. Therefore, be sure to check the time of the internal clock before the operation without fail.

Console

The console connected to the laser marker is specified.

Item	Description		
1 Type	: Specifies the type of console connected to the laser marker. LP-ADP20 → LP-ADP40 → 15" Monitor → 17" Monitor The setting varies by pressing the setting field.		
2 Backlight Timeout	: Sets the period till the automatic back light OFF. The light is always turned on when "0" is specified here. The setting is possible for the specified console. ("LP-ADP20" or "LP-ADP40") <table border="1" style="margin-left: 40px;"> <tr> <td>Setting Range</td> <td>0 to 60 min.</td> </tr> </table>	Setting Range	0 to 60 min.
Setting Range	0 to 60 min.		

■ System Offset

This screen specifies the offset of marking position and laser power to the all registered files.

The functions are applicable to adjust the difference of laser power or displacement between laser marker and works in case multiple production lines are used.

Item and Description

- 3 Laser Power :
Laser power offset. Offset the value of laser power set in each file.

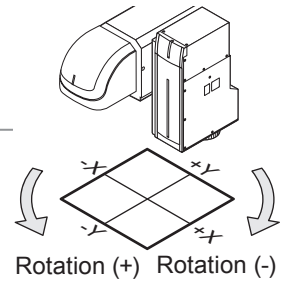
Setting Range	50 to 200%
---------------	------------

↓ Reference

- “100” is specified if the value of “laser power (system offset)” × “laser power (laser setting)” is 100 or more.

- 4 Rotation Offset :
Rotates the object to the rotation direction around the original point.

Setting Range	-180.00 to +180.00 degree
---------------	---------------------------



- 5 X/Y Offset :
Shifts the marking position to the X/Y direction.

Setting Range	-45.000 to +45.000 mm	(LP-V10)
	-55.000 to +55.000 mm	(LP-430 / LP-420 / LP-410)
	-80.000 to +80.000 mm	(LP-435 / LP-425 / LP-V15)
	-27.500 to +27.500 mm	(LP-431 / LP-421 / LP-411 / LP-W052)

- 6 X/Y Scale :
Sets the offset scale of marking field (X and Y). Area is corrected by inputting magnification.

Setting Range	70.000 to 130.000%
---------------	--------------------

↓ Reference

- System offset is not offset on the image display.
- When marking data is inside of marking field on image display screen and the error “Existed marking data outside of marking field” is displayed. Check the setting value in system offset.

■ Week Setting

To use the current date, expiry date or lot function in “week” period, the counting rule of the week is set in this screen. The-first-day-of-the-week setting and the-first-week-of-the-year can be specified.

Item	Description
7 Update day	Specifies the week renewal timing “the-first-day-of-the-week”. <ul style="list-style-type: none"> • Sunday: Renews at 0:00 a.m. of Sunday. • Monday: Renews at 0:00 a.m. of Monday.
8 First Week	Specifies the-first-week-of-the-year. <ul style="list-style-type: none"> • January 1: Specifies the first week which contains January 1. The week which contains December 31 is the last week of the year. • First Thursday: Specifies the first week which contains the first Thursday of the year. This may cause that the date December 31 is in the first week of the year and the date January 1 is in the last week of the year.

Example: When January 1 is Sunday, week setting is as follows:

Setting	The first week	Remarks
<ul style="list-style-type: none"> • Update Day : Monday • First week : January 1 	January 1. (Sun.) only	The second week is from January 2. (Mon.) to January 8. (Sun.)
<ul style="list-style-type: none"> • Update Day : Monday • First week : First Thursday 	From January 2. (Mon.) to January 8. (Sun.) which includes the first Thursday of January 5.	January 1. (Sun.) is in the last week of the last year.

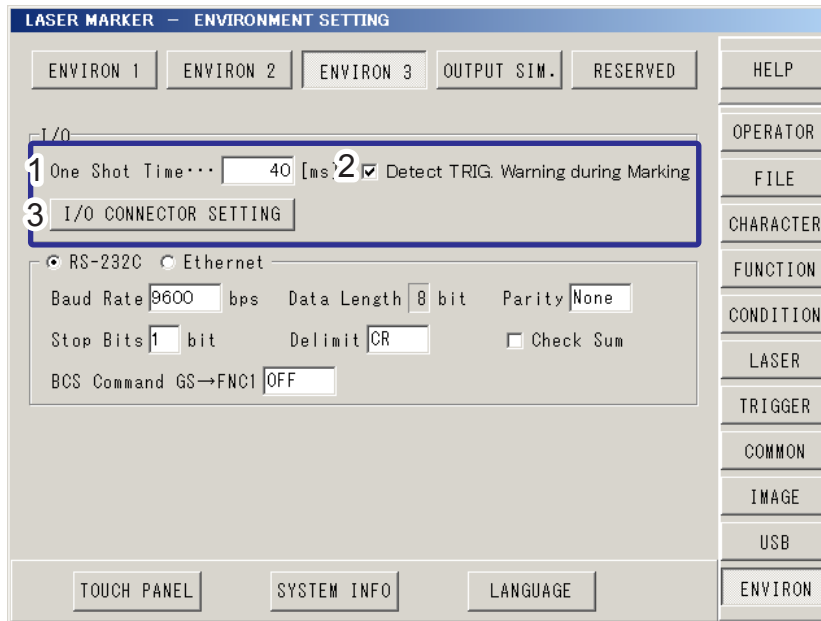
⬇ Reference

- Saturday is defined as weekend day even whether the week renewal is set to either Monday or Sunday at “week” unit setting of “Lot” in “Function Setting” menu. For marking Monday through Friday as “Weekday” and Saturday and Sunday as “Holiday”, you should set respectively at three times as following order; Sunday is set as “Holiday” (1), Monday through Friday is set as “Weekday” (2), and Saturday is set as “Holiday” (3).

4-16-3 Communication, I/O Setting (Environment 3)

Reference

- Setting of Environment 3 is saved without overwriting.



Input/Output

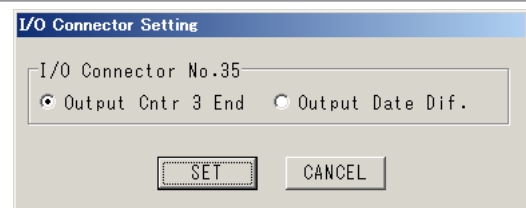
This screen specifies the settings related to the signals on the output terminal and I/O connector.

Item	Description		
1 One-shot time	<p>Sets the output duration for the following signals.</p> <p>There is a margin of error between the setting value and actual output time.</p> <ul style="list-style-type: none"> MARK END OUT SET OK OUT TRIG. WARNING of E800 <table border="1" style="width: 100%;"> <tr> <td>Setting Range</td> <td>2 to 510ms</td> </tr> </table>	Setting Range	2 to 510ms
Setting Range	2 to 510ms		

Reference

- In case the marking time is shorter than the set one-shot output time, the marking output remains ON until the one-shot output time ends.
- “E623 Too narrow marking interval for proportioned flying object” is generated at equidistant marking to flying object when the setting of one-shot time is longer than the period in which the line moves the distance specified at “Interval”.

2 Detect TRIG. Warning during Marking	<p>Enabling this setting, the warning (E800) to show that the trigger cannot be accepted is output in case the trigger is input while the shutter is opened.</p> <p>If the invalid trigger is detected, the warning E800 occurs for the setting one-shot time.</p> <p>When this function is disabled, the warning does not occur if there is an invalid trigger input.</p>
3 I/O Connector Setting	<p>Select the operation of I/O connector signal No. 35 from “Output Cntr 3 End” or “Output Date Dif.”. Pressing this button the following screen will appear.</p> <p>For the detailed description of each signal, refer to External Control Manual.</p>



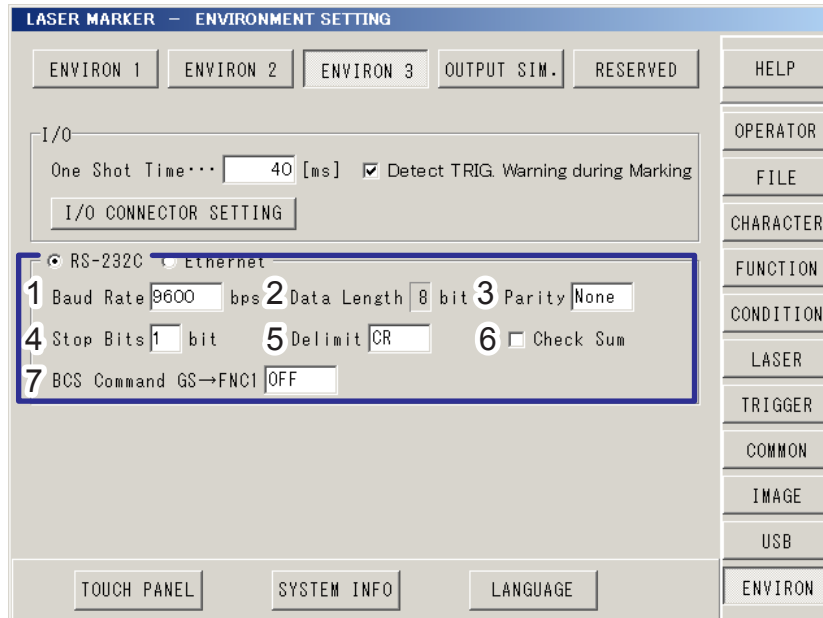
Output Cntr 3 End	“Output Cntr 3 End” for the I/O connector No.35.
Output Date Dif.	“Output Date Dif.” for the I/O connector No.35.

■ RS-232C

This screen specifies the environmental setting of the RS-232C. To perform RS-232C communication, use the [RS-232C] tab and set the following items:

Reference

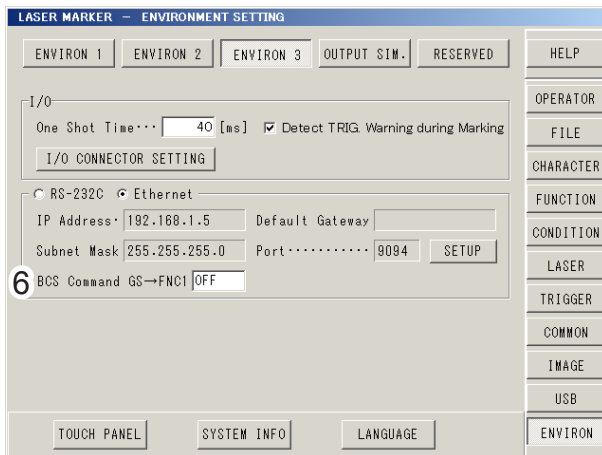
- For communication with external devices, select either RS-232C or Ethernet port. They cannot be used at the same time, or switched.



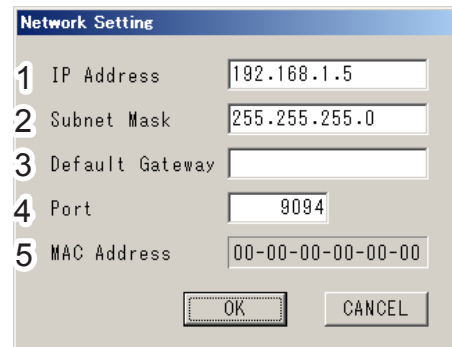
Item	Description				
1 Baud Rate	: Specifies the baud rate. <table border="1"> <tr> <td>Setting entry</td> <td>1200, 2400, 4800, 9600, 19200, 38400 [bps]</td> </tr> <tr> <td>Initial setting</td> <td>9600 bps</td> </tr> </table>	Setting entry	1200, 2400, 4800, 9600, 19200, 38400 [bps]	Initial setting	9600 bps
Setting entry	1200, 2400, 4800, 9600, 19200, 38400 [bps]				
Initial setting	9600 bps				
2 Data Length	: Indicates the data length. 8-bit fixed.				
3 Parity	: Specifies the parity. <table border="1"> <tr> <td>Setting entry</td> <td>None, Odd, Even</td> </tr> <tr> <td>Initial setting</td> <td>None</td> </tr> </table>	Setting entry	None, Odd, Even	Initial setting	None
Setting entry	None, Odd, Even				
Initial setting	None				
4 Stop Bits	: Specifies the stop bit. <table border="1"> <tr> <td>Setting entry</td> <td>1bit, 2bit</td> </tr> <tr> <td>Initial setting</td> <td>1 bit</td> </tr> </table>	Setting entry	1bit, 2bit	Initial setting	1 bit
Setting entry	1bit, 2bit				
Initial setting	1 bit				
5 Delimit	: Sets the delimiter (code to identify the end of telegraphic message). <table border="1"> <tr> <td>Setting entry</td> <td>CR, CR+LF</td> </tr> <tr> <td>Initial setting</td> <td>CR</td> </tr> </table>	Setting entry	CR, CR+LF	Initial setting	CR
Setting entry	CR, CR+LF				
Initial setting	CR				
6 Check Sum	: Specify ON/OFF of check sum (error detection information). Enable this function when using the check sum. Check Sum indicates the lower 1-byte of adding result of value (binary) from the start code to the last data by converting it to two characters for ASCII code.				
7 BCS Command GS → FNC1	: This setting is available only when the barcode “GS1 Data Matrix” is used. To set the barcode character by using serial communication command “BCS”, select either “GS” (OFF) or “FNC1” (ON) as the separator of AI data with the variable length. <table border="1"> <tr> <td rowspan="2">Setting Range</td> <td>ON: the separator of variable length AI data is “FNC1”.</td> </tr> <tr> <td>OFF: the separator of variable length AI data is “GS”.</td> </tr> </table>	Setting Range	ON: the separator of variable length AI data is “FNC1”.	OFF: the separator of variable length AI data is “GS”.	
Setting Range	ON: the separator of variable length AI data is “FNC1”.				
	OFF: the separator of variable length AI data is “GS”.				

Ethernet

This screen specifies the Ethernet communication setting. Set this to perform Ethernet communication. Select the [Ethernet] and press [SETUP] button to show the Network Setting Screen. Press [OK] to save the settings. (Press [Cancel] to discard the changes.)



Environment 3 Screen



Network Setting Screen

Item	Description				
1	<p>IP Address : Sets the IP address.</p> <table border="1"> <tr> <td>Setting Range</td> <td>1.0.0.0 to 223.255.255.255 (except 127 in the 1st octet)</td> </tr> <tr> <td>Initial setting</td> <td>192.168.1.5</td> </tr> </table>	Setting Range	1.0.0.0 to 223.255.255.255 (except 127 in the 1st octet)	Initial setting	192.168.1.5
Setting Range	1.0.0.0 to 223.255.255.255 (except 127 in the 1st octet)				
Initial setting	192.168.1.5				
2	<p>Subnet Mask : Sets the subnet mask.</p> <table border="1"> <tr> <td>Setting Range</td> <td>128.0.0.0 to 255.255.255.254</td> </tr> <tr> <td>Initial setting</td> <td>255.255.255.0</td> </tr> </table>	Setting Range	128.0.0.0 to 255.255.255.254	Initial setting	255.255.255.0
Setting Range	128.0.0.0 to 255.255.255.254				
Initial setting	255.255.255.0				
3	<p>Default Gateway : Sets the default gateway.</p> <table border="1"> <tr> <td>Setting Range</td> <td>1.0.0.0 to 223.255.255.255(except 127 in the 1st octet)</td> </tr> <tr> <td>Initial setting</td> <td>None (blank)</td> </tr> </table>	Setting Range	1.0.0.0 to 223.255.255.255(except 127 in the 1st octet)	Initial setting	None (blank)
Setting Range	1.0.0.0 to 223.255.255.255(except 127 in the 1st octet)				
Initial setting	None (blank)				
4	<p>Port : Sets the port.</p> <table border="1"> <tr> <td>Setting Range</td> <td>5001 to 65534 [except 9090 and 9091]</td> </tr> <tr> <td>Initial setting</td> <td>9094</td> </tr> </table>	Setting Range	5001 to 65534 [except 9090 and 9091]	Initial setting	9094
Setting Range	5001 to 65534 [except 9090 and 9091]				
Initial setting	9094				
5	<p>MAC Address : Displays currently set MAC Address.</p>				
6	<p>BCS Command GS → FNC1 : This setting is available only when the barcode “GS1 Data Matrix” is used. To set the barcode character by using serial communication command “BCS”, select either “GS” (OFF) or “FNC1” (ON) as the separator of AI data with the variable length.</p> <table border="1"> <tr> <td rowspan="2">Setting Range</td> <td>ON: the separator of variable length AI data is “FNC1”.</td> </tr> <tr> <td>OFF: the separator of variable length AI data is “GS”.</td> </tr> </table>	Setting Range	ON: the separator of variable length AI data is “FNC1”.	OFF: the separator of variable length AI data is “GS”.	
Setting Range	ON: the separator of variable length AI data is “FNC1”.				
	OFF: the separator of variable length AI data is “GS”.				

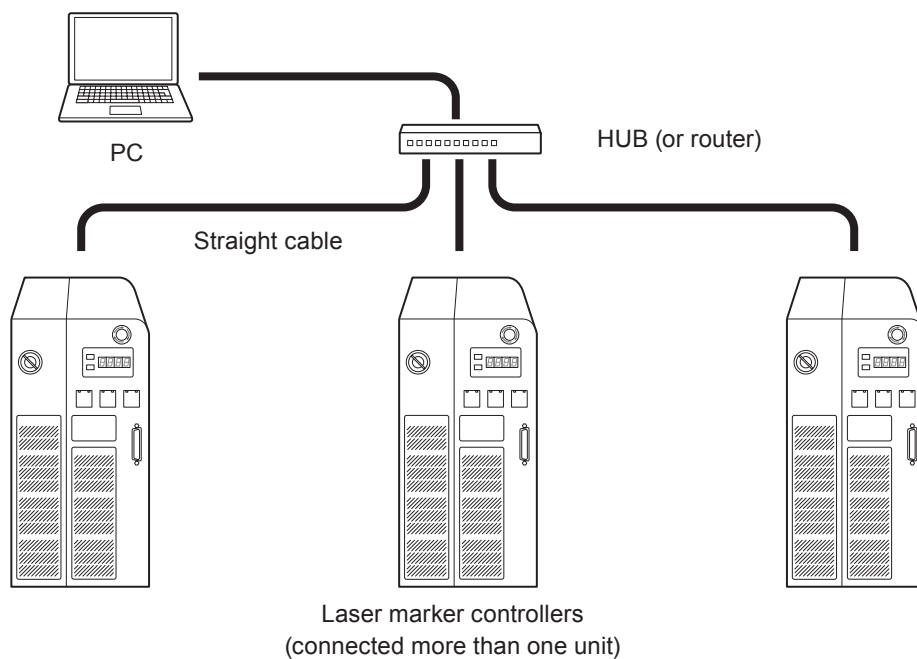
Notice

- The communication control of the laser marker through the Ethernet should be performed in a secure network environment.

Reference

- “Octet” is a 3-figure value delimited by dots. From the beginning, it is called the “1st octet”, “2nd octet”, and so forth.
- Depending on the combination, there are cases where IP Address and Subnet Mask values cannot be set even if they are within the setting range.
- Make sure that the IP address for the laser marker on the network is not overlapping the IP address for the PC.
- When the backup data is restored to the laser marker, communication parameter settings are overwritten with the backup data. After restoring, confirm the IP address and other parameters.

<Example of Ethernet connection>



Example of communication environment setting:

Make sure that the IP address for the laser marker on the network is not overlapping the IP address for the PC.

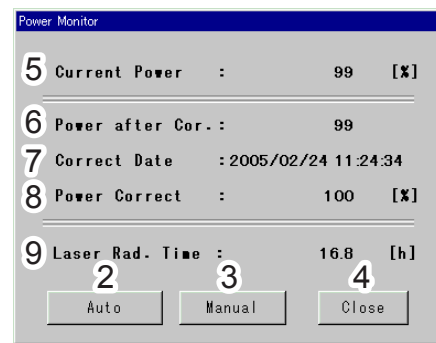
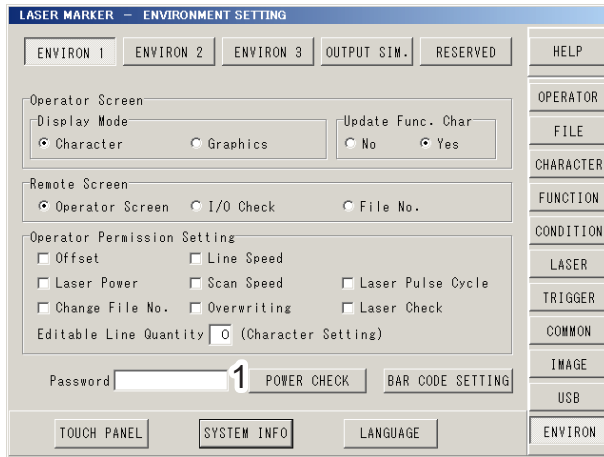
	PC	Laser Marker A	Laser Marker B	Laser Marker C	Laser Marker D
IP Address	192.168.1.10	192.168.1.5	192.168.1.6	192.168.1.7	192.168.1.8
Subnet Mask	255.255.255.0				
Default Gateway	None				
Port	-	9094	9094	9094	9094

4-16-4 Power check

[Function specific to LP-V / LP-W series]

* This function is not implemented in the LP-400 series.

The current power of the laser marker against the output of the laser marker at shipping is possible to be checked. If the laser power decreases from the delivery state, the power setting value can be adjusted.



Measurement result window

Item	Description
1	Power Check : By pressing the button, Power Check Start screen will appear, and after executing the power check, the measurement result screen above will be displayed.
2	Auto Correction : If the laser power decreases from the delivery state, adjust the power setting value based on the auto calculated ratio.
3	Manual Correction : The power correction rate can be set arbitrarily.
4	Close : Returns to the environment setting screen.
5	Current Power : The current laser power ratio [%] relative to initial power is displayed. If this value is less than 100, correct the laser power.
6	Power after Correction : The laser power ratio [%] after power correction is displayed. Make correction so that the value is as close to 100 as possible.
7	Correct Date : It denotes the date and time when the power is corrected.
8	Power Correct : It shows power correction ratio. Set the ratio so that the current power × power correction ratio = 100.
9	Laser Rad. Time (Laser Radiation Time) : Displays the total time of the laser radiation.

To use this function

- Power correction refers to the function to correct not the max. laser power [W] value but the laser power setting value. Power correction does not change the actual max. output power relative to initial power.
- The measurement results might have +/-5% difference with normal temperature (20 to 30 Celsius degree).
- The +/-10% difference might occur under the high/low temperature. Correcting power under normal temperature (20 to 30 Celsius degree) is recommended.
- The values shown in “Current Power” and “Corrected Power” fields are the relative value expressed as a percentage to the initial power of the laser oscillator.
- Power check function is available when laser pumping is completed and the internal shutter is closed.

Laser Power Correction

After the power check if the power decays lower than the delivery status, correct the laser power setting value.

Select the correction mode from “Auto” or “Manual”.

- Auto: Sets the power correction ratio with the auto-calculated value so as to set the power to the power output at shipping.
- Manual: Corrects the power setting with the given value [%].

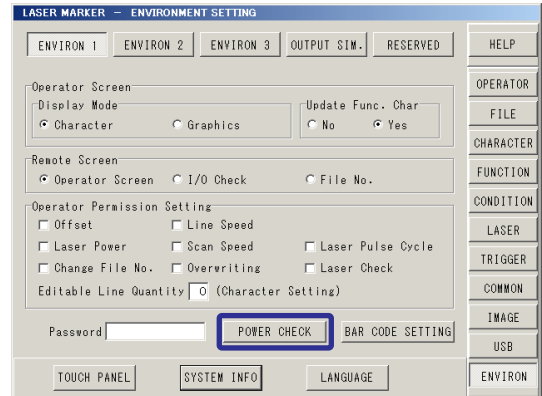


WARNING



- Laser is radiated with the internal shutter closed. Be sure to use the protective goggle and enclosure in case of laser leakage. Also, do not place any objects around the radiating area.

- 1 Press [POWER CHECK].

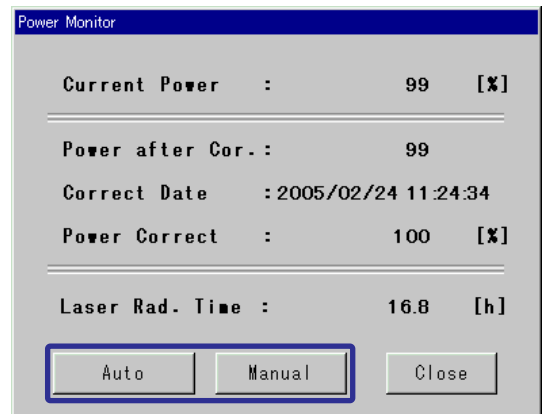


- 2 The Confirm screen is displayed.
Press [START].

The current laser marker power is measured.



- 3 The Power Monitor screen is displayed.
For the auto correction, Press “AUTO”.
For the manual correction, press “MANUAL” and input power correction value, then press [SET].
Setting range: 50 to 200[%]



- 4 Press [START].

The correction ratio after power correction and correction date are updated.



4-16-5 Output Simulation

With the output simulation you can check the output signals of the laser marker without an actual operation. Use this function to confirm the operation of the external devices connected with the laser marker.



Item	Description
1	I/O Terminal : In the table, the status “0” indicates output OFF and “1” indicates output ON.
2	I/O Connector : During the output simulation, the status display of the terminal changes to yellow.
3	Output ON/OFF : Click the output terminal name to simulate, then the output status of the laser marker changes.
4	STOP OUTPUT : Terminates the simulation mode and reset the ON/OFF status of the output signals. This button appears when output simulation is started. During the output simulation, other operation and settings are disabled.

Reference

- For the name of each signal, refer to “External Control Manual”.

4-16-6 Adjustment of Touch Panel

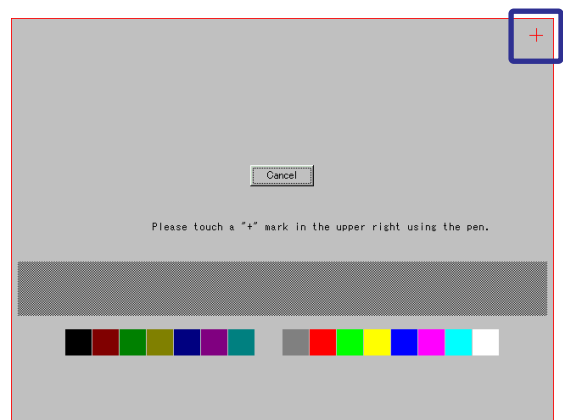
Long time use of the touch panel may cause misalignment (of touch panel buttons) due to stress. This section describes how to calibrate the touch panel.

- 1 Use a pen to touch the center of the cross at the lower left corner.



- 2 Use a pen to touch the center of the cross at the upper right corner.

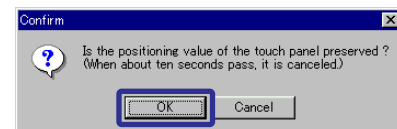
A message will appear asking you if you want to save the calibration result.



! Notice

- Lightly touch the center of the cross with a pen whose tip radius is approx. 0.5. An excessive force applied to the touch panel may damage the panel.

- 3 Press [OK].
Pressing [Cancel] or doing nothing for 10 seconds will cancel the calibration result.



Reference

- Out of synchronous on console is considered if the displacement of display position on the screen or bleeding of display occurs.
Adjust the synchronous in accordance with the method described in the instruction manual of console.

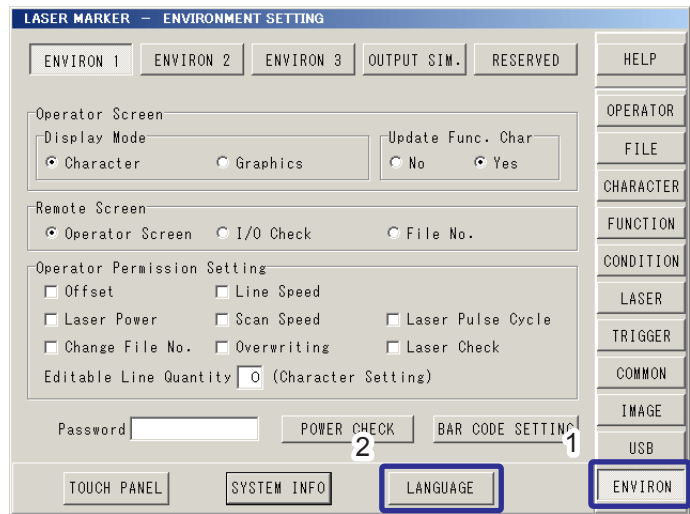
4-16-7 Language Selection

Display language can be selected between English and Japanese.

! Notice

- When the display language is changed, the unregistered setting data under editing is cleared. Save the file data before changing the language.

- 1 Press [ENVIRON] and press [LANGUAGE] on the bottom edge of the screen. Language selection screen will appear.

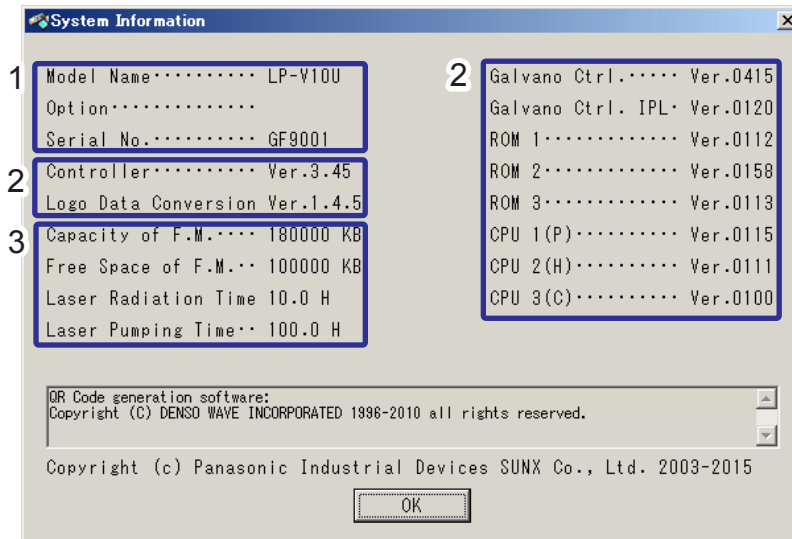


- 2 Select the language and press [SET].



4-16-8 System Information

Displays the identification and operating information about the laser marker. Confirm them for the maintenance.



Description

- 1 Laser marker model information :
 - Model Name
 - Option (If customized specifications are installed, the custom software name is displayed.)
 - Serial No.
- 2 Version information of the internal software :
 - Controller
 - Logo data conversion
 - Galvano Controller
 - Galvano Controller IPL
 - ROM 1 to ROM 3
 - CPU 1 to CPU 3
- 3 Running information :
 - Capacity of Flash Memory
 - Free Space of Flash Memory
 - Total Laser Radiation Time
 - Total Laser Pumping Time

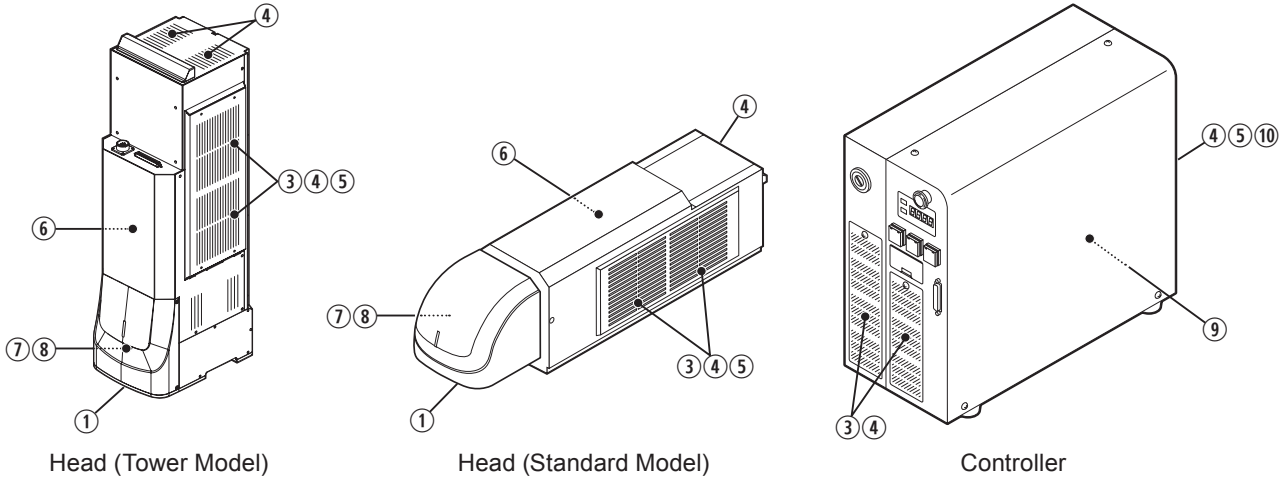
Maintenance

Maintenance Items

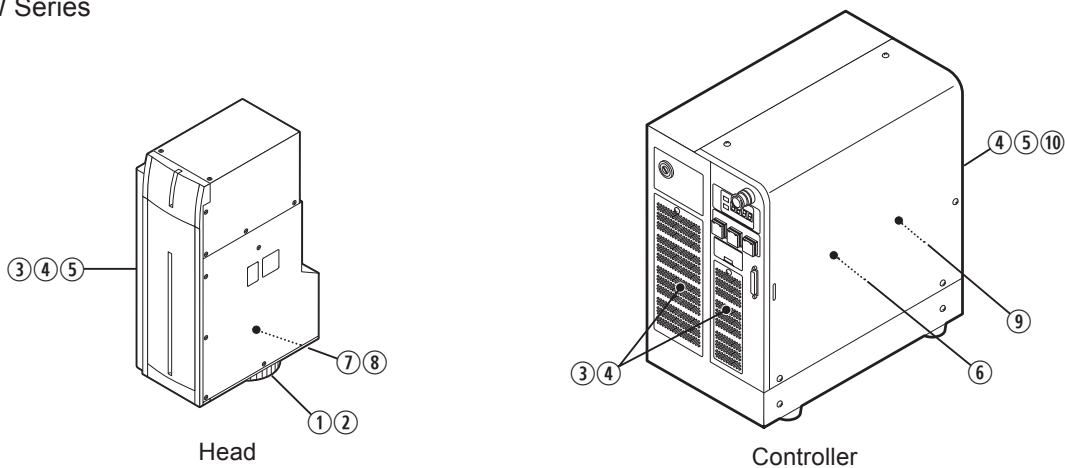
Listed below are typical parts that require cleaning or replacement depending on the usage environment or duration of service of the laser marker. Some parts are maintainable by the customer, and other parts are required to be repaired or replaced by our service representative, depending on the types of parts and the defects.

For purchasing replacement parts or requesting our service representative to repair or replace parts, contact our sales agency.

LP-400 Series



LP-V/LP-W Series




No.	Parts name	Main cause for degradation	Daily maintenance	Replacement when degraded or defective
①	Laser emission port (f θ lens)	Contamination	Cleaning	Replacement at our service department
②	Protection glass of the laser emission port *1	Contamination	Cleaning	Customer-replaceable
③	Intake/exhaust vent	Contamination	Cleaning	—
④	Air filter	Contamination	Cleaning	Customer-replaceable
⑤	Air-cooling fan	Contamination	—	Replacement at our service department
⑥	Laser oscillator	Aging	Check output	Replacement at our service department
⑦	Galvano scanner	Aging	—	Replacement at our service department
⑧	Internal shutter	Aging	—	Replacement at our service department
⑨	Battery inside the controller	Aging	—	Replacement at our service department
⑩	Fuse	Blown	—	Customer-replaceable
⑪	Cable	Broken	—	Customer-replaceable

*1 : The protection glass of the laser emission port is available only for LP-V/LP-W series.

Notice

- Be sure to use our specified replacement parts. If the user applies any other fuses than the specified one, failure might result.

Maintenance Details of Parts

 WARNING	<ul style="list-style-type: none">• Maintenance work must be conducted with the power to the laser marker turned OFF, and the controller power cable disconnected. Doing so may cause exposure to the laser beam or electrical shock.• Do not insert your hands or objects to the exhaust port of each unit or the gaps between units during the maintenance work. This may result in injuries, electrical shock, or failure of the laser marker.
--	--

Laser emission port (f θ lens)

An f θ lens is mounted at the laser emission port of the head section. The f θ lens condenses laser irradiated from the oscillator at the position of the work distance. On the lens surface, AR (anti-reflection) coating is applied in order to maintain appropriate transmittance.

For LP-V/LP-W series, the protection glass of the laser emission port is attached to the laser aperture. It protects the f θ lens from dirt or damage. AR (anti-reflection) coating is applied to the glass surface.

■ Effect from deterioration

Lens (for LP-V/LP-W series, protection glass) surface may become contaminated or receive dust generated during marking. Using laser marker with the lens contaminated may cause the lens to get burned in. This may also scratch the lens surface, or even peel off the surface coating depending on how it is used or cleaned.

Operations under these conditions will degrade transmittance of laser, which may lead to deterioration in quality of marking and processing.

■ Replacement interval

- Deterioration in quality of marking or processing (density reduction, incomplete marking or processing) is observed.
- There is contamination or scratch that cannot be removed by cleaning.

■ Replacement method

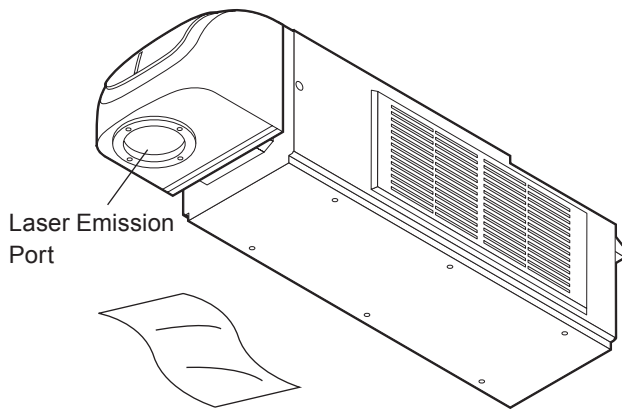
- For LP-400 series: Replaced at our service department. Contact our sales office.
- For LP-V/LP-W series: Refer to “Cleaning / Replacement of Laser Emission Port” (P.272) for the replacement of the protection glass of the laser emission port.

■ Cleaning steps for laser emission port (Daily maintenance)

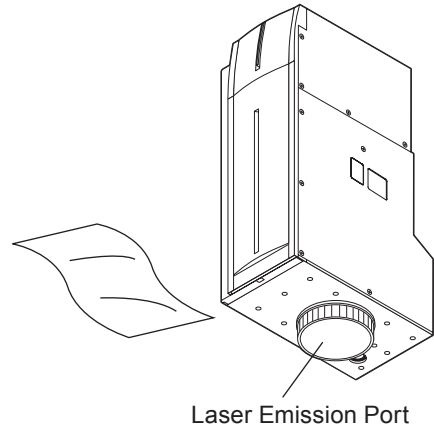
In order to maintain stable marking quality, the laser emission port needs to be cleaned regularly according to the usage environment.

1. Turn OFF the key switch of the controller, and disconnect the controller power cable.
2. Clean the laser emission port with an air duster for optics, and wipe it lightly with a soft cloth. If a contamination is severe, use a soft cloth immersed in ethanol to wipe it.

• LP-400 Series



• LP-V / LP-W Series



! Notice

- Do not wipe the laser emission port strongly, or touch it with a sharp pointed object. Laser marker might become faulty.



WARNING



- Never use an inflammable air duster. The laser beam may ignite the gas, resulting in fire.

Cleaning / Replacement of Laser Emission Port

[Specific to LP-V / LP-W series]

* This procedures are not applicable for LP-400 series.

For LP-V/LP-W series, Protection glass of the laser emission port is attached to the laser aperture of this product.

Clean the protection glass at regular intervals according to the using environment.

In case that any contamination that cannot be cleaned adhering to the laser emission port or any damage on the glass surface, replace the protection glass. (The protection glass for the replacement is optional.)

■ Models of replacement parts

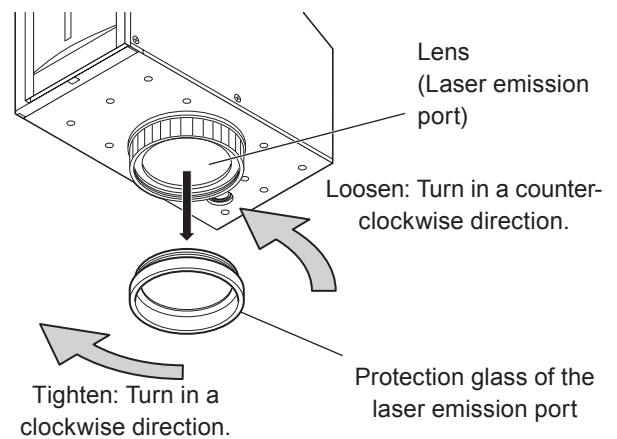
Depending on the manufactured period of the laser marker, the parts model of the protection glass is vary. Check the serial No. of the laser marker and contact our sales office.

Applicable laser marker	Parts Names (Model)
LP-V10U Series	LP-ACV60 or LP-ACV20 or LP-ACV10
LP-V15U Series	LP-ACV25 or LP-ACV15
LP-W Series	LP-ACV12

1. Remove the protection glass of the laser emission port.

! Notice

- Do not touch the lens and the glass surface of the laser emission port and the protection glass at installing or removing.
- If the cover is difficult to be loosened, use a commercially available belt wrench. In that case, avoid scratching the glass surface of the laser emission port.

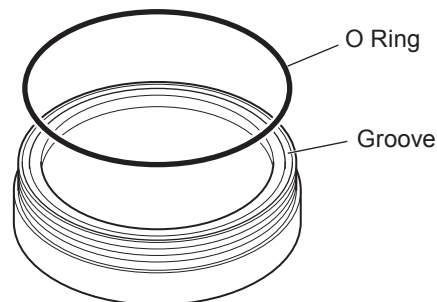


2. Remove any dust and dirt on the glass with an air duster for optics.

! WARNING • Never use an inflammable air duster. The laser beam may ignite the gas, resulting in fire.

3. When the protection glass is LP-ACV60, remove the O-ring installed in the inside groove of the protection glass.

LP-ACV60



! Notice

- If it is difficult to remove the O-ring, use tweezers. In that case, avoid scratching the glass surface and the O-ring.
- When the protection glass is removed, check that the O-ring is not left in the scanner unit.

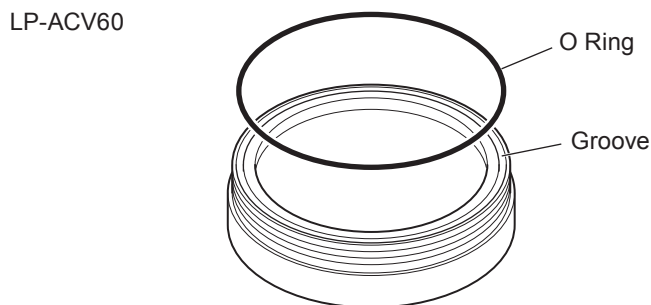
- Rinse the protection glass and remove any oil stain with neutral detergent. Fully wash out detergent with running water and then air-dry it.

AR (anti-reflection) coating is applied to the surface of the protection glass. To prevent peeling of the coating, do not use sponge or the like and softly wash it with balls of your fingers.

! Notice

- Do not wipe the glass strongly, or wipe it with an object with sharp tip. The marking performance might be faulty.

- When the protection glass is LP-ACV60, install a new O-ring (L) in the inside groove of the protection glass.

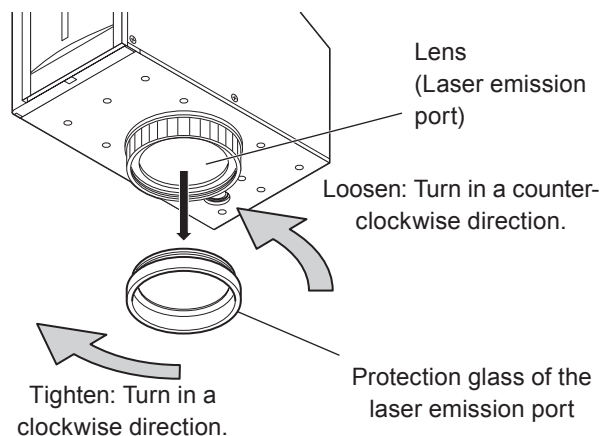


! Notice

- The O-ring cannot be reused. Be sure to use new one. Replacement O-rings are attached with the replacement protection glass of LP-ACV60.
- Be sure to fit an O-ring in the inside groove of the protection glass without twisting it.

- Install the protection glass to the laser emission port.

Tighten the protection glass turning in a following direction. When the protection glass is LP-ACV60, tighten it until a resistance is felt. From that point, tighten the 10 to 20 mm (circumference). Be sure to tighten the glass properly and without looseness.



Laser Marker Model	Protection Glass Model	Protection Glass Model
LP-V10U	LP-ACV60	9N • m or less
	LP-ACV20	5N • m or less
	LP-ACV10	
LP-ACV25		
LP-V15U	LP-ACV15	5N • m or less
	LP-ACV12	
LP-W052U		

! Notice

- Do not touch the lens and the glass surface of the laser emission port and the protection glass at installing or removing.
- Tighten the protection glass slowly with the equal tightness.
- If the cover is difficult to be tightened, use a commercially available belt wrench. In that case, avoid scratching the glass surface of the laser emission port.

Intake/exhaust vent

Air-cooling system is used in the laser marker, thus the cooling effect will drop if dust or oil is adhered to the intake or exhaust vent and it may result in the failure of the laser marker. Clean them regularly according to the usage environment.

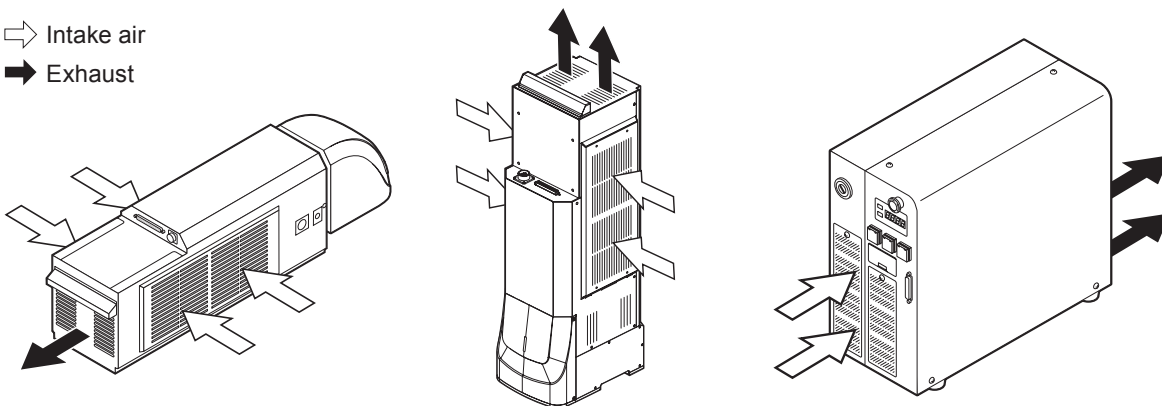
■ Cleaning of the intake/exhaust vent (Daily maintenance)

1. Turn OFF the key switch of the controller, and disconnect the controller power cable.

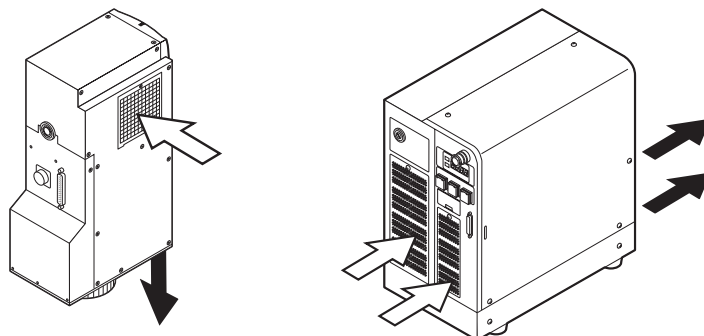
2. Vacuum the intake/exhaust vent and remove the dust.

LP-400 series

- ⇨ Intake air
➡ Exhaust



LP-V/LP-W series



! Notice

- Do not blow air to the intake/exhaust vent. If the dust penetrates in the laser marker, it may result in failure.
-

3. Wipe the vent with a dried cloth. If a contamination is severe, use a cloth wrung out with neutral detergent to wipe it. Then, remove the detergent with a cloth wrung out of water.

! Notice

- Keep water from entering the laser marker inside.

Air filter

Air filters are placed in the air-cooling areas each of the head and the controller.

■ Effect from deterioration

The air filter soiled with dust may reduce the cooling effect of the air-cooling fan. This may cause the marking performance to degrade, or failure of the laser marker.

■ Replacement interval

- There is a broken part, or contamination that cannot be removed by cleaning.

■ Models of replacement parts

For details of purchasing air filters, please contact our sales agency.

Applicable laser marker	Model	Filter type and quantity
LP-400 series	LP-AFT20	<ul style="list-style-type: none"> • For the head: 2 large-size filters • For the controller: 1 middle-size filter and 1 small-size filter
LP-V series LP-W series	LP-AFT21	<ul style="list-style-type: none"> • For the head: 1 small-size filter • For the controller: 1 large-size filter and 1 middle-size filter

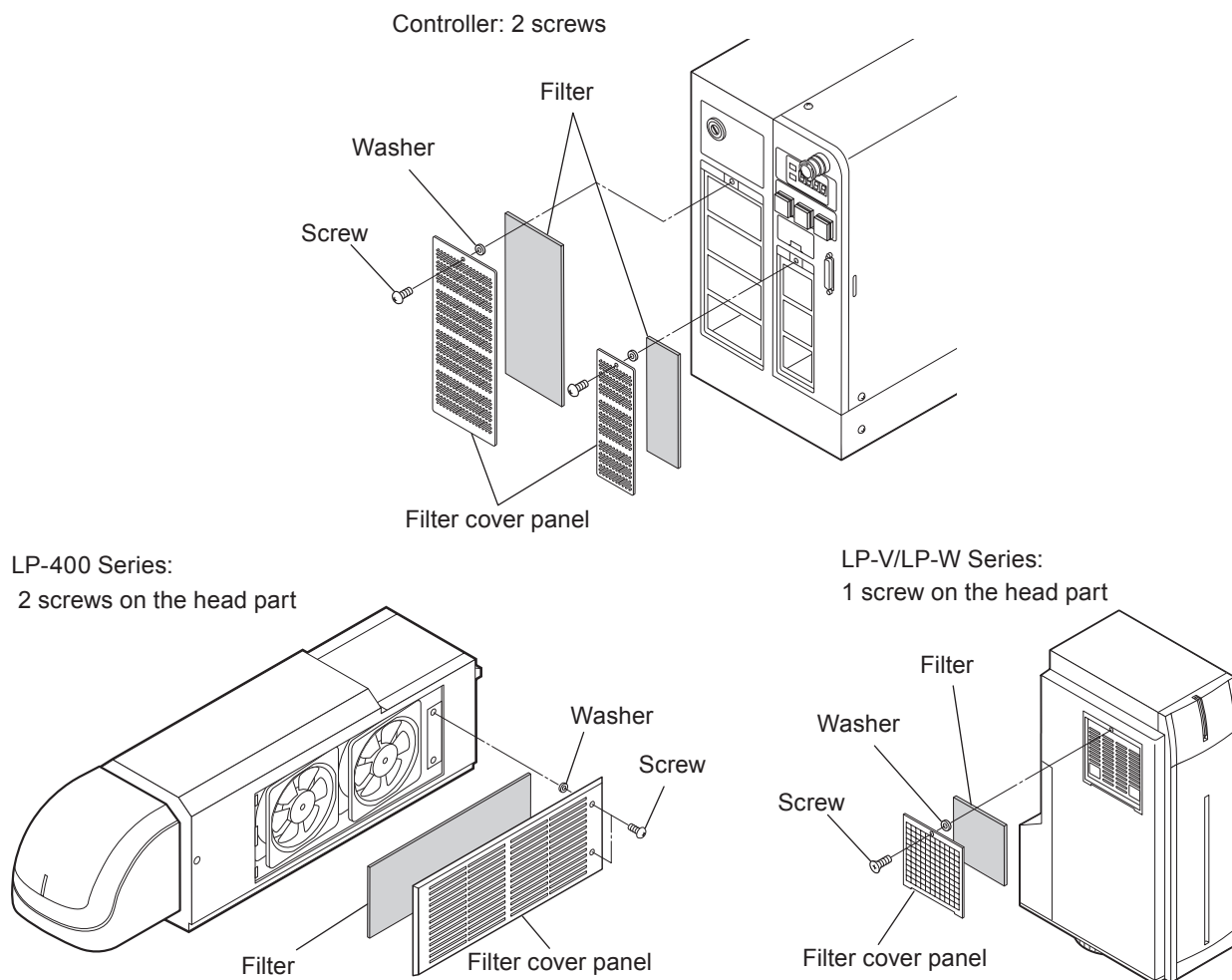
■ Steps for cleaning (Daily maintenance) and replacement of air filter

Clean air filters regularly according to the usage environment.

1. Turn OFF the key switch of the controller, and disconnect the controller power cable.

2. Loosen the screws of the filter cover panel and remove the panel and filter.

Be aware of keeping the washers attached behind the panel.



3. Clean the filter with neutral detergent and air-dry it.

4. Set the dried air filter. Place the resin washers at the tip of the screws and tighten the filter cover panel.

! Notice

- Do not attach the filter when it is wet. This may cause the cooling capacity to degrade, or failure of the laser marker.

Air-cooling fan

The air-cooling fan cools the laser oscillator and internal power circuit. The fans are installed in the head and the controller part respectively.

■ Effect from deterioration

Depending on the usage environment, any dust or oil adhered onto the fan may impair air flow rate of the fan or even stop the rotation of the fan. When the cool performance decreases, the temperature in the electric circuit or laser oscillator will go up, which may cause an error or stoppage of laser radiation. Also, a temperature rise in the housing will foster deterioration in the internal parts, which may cause the marking performance to degrade, or failure of the equipment.

■ Replacement interval

- The fan does not rotate, or the rotating speed is low.
- There is contamination on the fan.
- Abnormal noise is generated from the fan.

■ Replacement method

Our service representative handles the maintenance and replacement. Contact our sales office.

Laser oscillator

The following type of the laser oscillator is installed in the laser marker. The laser beam output from the oscillator is scanned and focused to mark or process the target materials.

- LP-400 series: A CO₂ (carbon dioxide) laser oscillator is installed in the head.
- LP-V/LP-W series: A fiber laser oscillator is installed in the controller and the laser beam is delivered to the head through the fiber cable.

■ Effect from deterioration

Laser output characteristics such as laser power will deteriorate over time due to aging of oscillator. As the laser output characteristics deteriorate, symptoms such as ununiform marking density, chipped characters, or unstable processing quality, etc. may occur.

Also, as cooling efficiency of the oscillator decreases because of the usage environment, the electronic parts in the oscillator may become defective and unable to irradiate the laser.

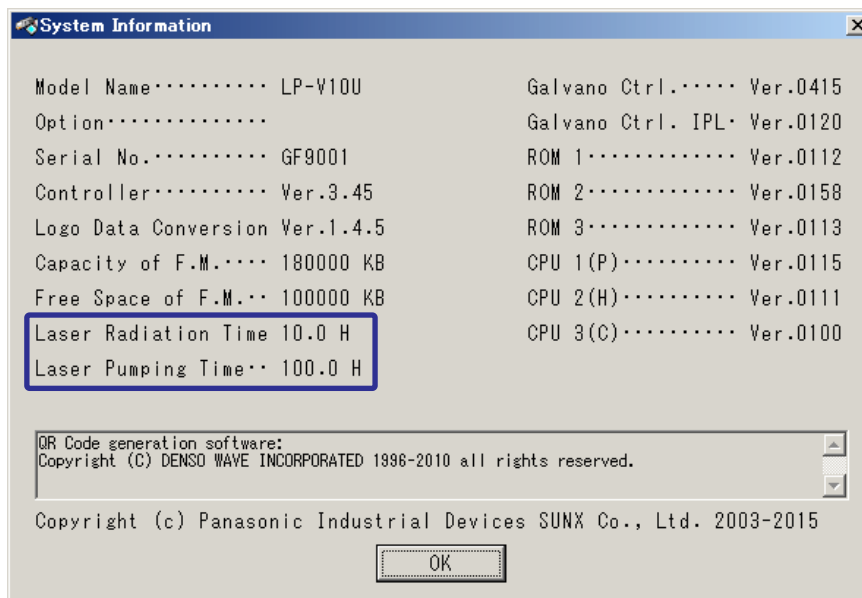
■ Replacement interval

- Deterioration in quality of marking or processing (density reduction, incomplete marking or processing) is observed.
- Setting a large value for the laser power is not reflected in the quality of marking or processing.
- The laser power measured with a commercial power meter has decreased by 20%, compared to the delivery status.
- LP-400 series: Three to five years have passed since the date of delivery, or the total operating time of laser pumping has exceeded 12,000 hours.*
- LP-V/LP-W series: The total radiation time of laser has exceeded 30,000 hours.*
- Alarm for laser error occurred.

* The replacement interval may differ depending on the usage environment and marking conditions.

■ How to confirm operating hours

Display the “System information” on the “Environment setting” screen and check the total laser pumping time and radiation time.



■ Replacement method

Our service representative handles the maintenance and replacement. Contact our sales office.

■ Confirm laser output (Daily inspection)

Confirm the laser output regularly in order to maintain consistent marking quality.

The laser output should be measured with a commercially available meter using the following steps:

Reference

- For LP-V/LP-W series, the current power ratio in comparison with the power at the delivery state can be checked by using “power check” function. Refer to Operation/Maintenance Manual “4-16-4 Power check” (P.262).

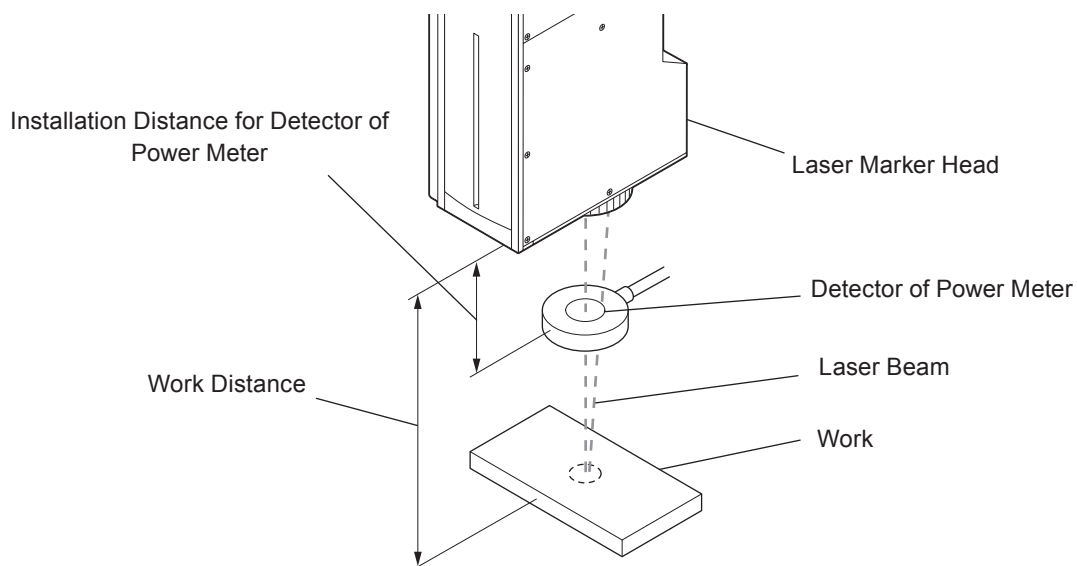
1. Prepare a commercially available power meter.

Notice

- Be sure to use the calibrated power meter.
- The power meter with the detector having the damage threshold (maximum average power density) of more than 10kW/cm² should be used.
- Also the size of the detector should be more than ϕ 10mm.
- A difference may arise under the high/low temperature. Measuring power with normal temperature (20 to 30 Celsius degree) is recommended.
- Before measuring the laser power, make sure there is no contamination in the laser emission port. If the laser emission port is contaminated or damaged, an error may result in the measurement of the laser power.

2. Install the power meter.

Put the detector of the laser power meter vertically down from the center of the laser emission port and place it at the one-third to half of the specified work distance of the laser marker.

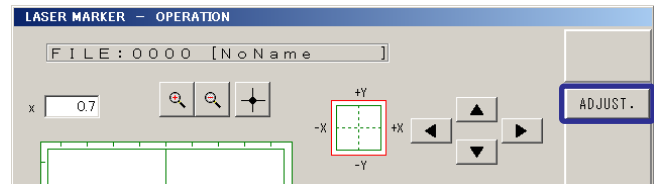


Notice

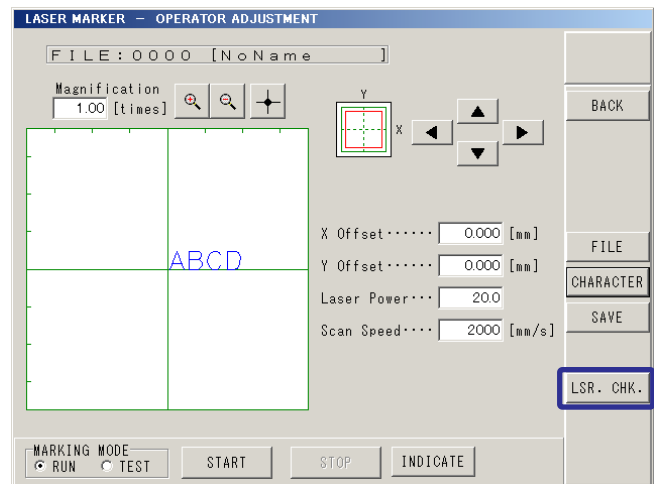
- Do not install the power meter within the focal length (specified work distance) of the laser marker. This may cause destruction of the power meter.

- Use “dual pointer” of the guide laser function to confirm the setting position of the power meter detector. Set the detector so that the cross indication of the dual pointer radiates on the center of the detector. (Do not set it to the position where the dot indication and cross indication overlap.)

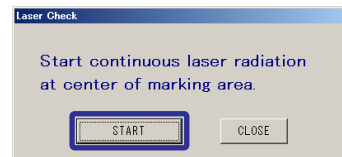
- Press “ADJUST.” in the operation screen.



- Press “LSR. CHK.”.



Press “START” in the laser radiation confirmation dialog to irradiate the laser.



Reference

- The power setting in the selected file is applied to the laser check radiation.

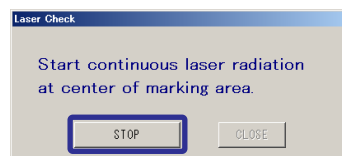
WARNING



- Be sure to wear protective goggles.
- During the radiation, the laser energy is concentrated to one point. Use due caution with long period radiation, it may cause a fire or damage to the object.

- Press “Stop” to stop laser radiation.

Without “stop”, the laser radiation automatically stops after about one minute.



- Check the measurement results of the power meter. If the power decays lower than the default status, correct the laser power setting value using the “System Offset” of the “ENVIRON.” screen.

Setting range of laser power correction: 50 to 200 [%]

Reference

- If the value of “Laser power correction” × “laser power” is equal to or larger than 100, the setting will be “100”.

The screenshot shows the 'ENVIRONMENT SETTING' screen for a laser marker. The 'System Offset' section is highlighted with a blue box, indicating the 'Laser Power' is set to 100 [%]. Other parameters include 'Rotation Offset' (0.00 [°]), 'X Offset' (0.000 [mm]), 'Y Offset' (0.000 [mm]), 'X Mag.' (100.000 [%]), and 'Y Mag.' (100.000 [%]). The 'Week Setting' section shows 'Update day' as Sunday and 'First week' as January 1.

Notice

- If the power decays more than 20%, compared to the default setting, the laser oscillator needs maintenance. Contact our sales office or representatives.

Galvano scanner

Galvano scanner is a scanner for radiating the laser beam along the coordinates of marking data.

The galvano scanner scans the setting data by controlling the angle of galvano mirror mounted onto the axis of rotation of motor with two axes to create characters and graphics for marking and processing.

Effect from deterioration

Uneven wear may occur on the bearing inside the galvano scanner depending upon marking frequency and conditions. If uneven wear develops, accurate reproducing may become difficult, resulting in skewness or misalignment of marking lines.

Replacement interval

- Deterioration in quality of marking and processing (Characters crushed, streaking and density reduction of the marking, incomplete processing) is observed.
- Alarm for galvanometer error occurred.
- Galvano scanner has been used for almost five years.*

* The replacement interval may differ depending on the usage environment and marking conditions.

Replacement method

Our service representative handles the maintenance and replacement. Contact our sales office.

Internal shutter

The internal shutter is opened and closed by the rotary solenoid to shut off the path of laser beam.

■ Effect from deterioration

When the rotation torque of the rotary solenoid declines, the opening/closing speed of the internal shutter is decreased or the shutter may not work. In this case, an error “Internal shutter failure” occurs in the laser marker and marking cannot be performed.

■ Replacement interval

- Total number of opening/closing operations has exceeded two million.
- Alarm for the shutter error occurred.

■ Replacement method

Our service representative handles the maintenance and replacement. Contact our sales office.

Battery inside the controller

A lithium primary battery is contained inside the controller as battery for clock or calendar of the laser marker. Functional characters such as the current date/time, expiry date/time, and lot date/time are marked based on the time of this clock.

■ Effect from deterioration

When the battery inside the controller runs out due to aging, the date and time of the internal clock may be out of synchronization when the laser marker is turned OFF. If you start the laser marker in such a condition, warning “E251” for the decrease in clock battery voltage may occur, and the date and time setting is required. The warning is temporarily released by resetting the date and time, however, once the power supply of the laser marker is turned to off, the warning will reoccur or the internal clock will show the wrong time.

In some case, the laser marker system cannot start up due to the battery error.

■ Replacement interval

- Warning “E251” for the decrease in clock battery voltage occurred.
- Almost five years have passed since delivery.

■ Replacement method

Our service representative handles the maintenance and replacement. Contact our sales office.

Replacement of fuse

Replace fuse of the controller when blowing.

The power of the laser marker cannot be turned on if the fuse is blown.

■ Models of replacement parts

Depending on the manufactured period of the laser marker, the available parts model of the fuse is vary. Check the ampere rating printed on the fuse holder part of the controller rear side and select the appropriate model form this table. If the user applies any other fuses than the specified one, failure might result.

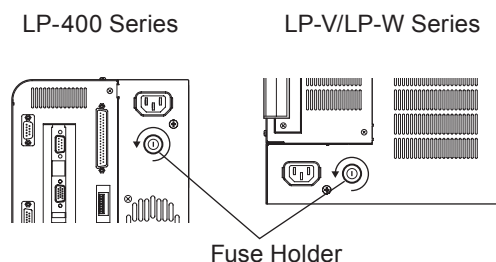
Applicable laser marker	Type	Model
LP-400 series	Time Lag Fuse (Rating: 250V 10A)	0215010 (made by Littelfuse)
	Type A of PSE (Rating: 250V 15A)	GAB 250V 15 (made by Daito Communication Apparatus Co., Ltd)
LP-V series	Time Lag Fuse (Rating: 250V 6.3A)	021506.3MXP (made by Littelfuse)
LP-W series	B Type Brown Glass Fuse (Rating: 250V 15A)	FGBO 250V15APBF (made by FUJI TERMINAL INDUSTRIES Co., LTD)

■ Steps for replacement

1. Remove causes for fuse blowing.
2. Turn OFF the key switch of the controller, and disconnect the controller power cable.
3. Turn the fuse holder on the back side, and remove the fuse.

4. Replace it with new one.

5. Turn the fuse holder, and install the fuse.



Replacement of cable

If the cable connecting the head and controller is broken because of the usage conditions and installation environment, it needs to be replaced.

■ Models of replacement parts

For details of purchasing cables, contact our sales office.

Type	Model
Head Power Cable	LP-ACP20-5
Head Control Cable	LP-ACS20-5

■ Steps for replacement

Refer to Operation/Maintenance Manual "2-2 Connecting Laser Marker" (P.70), and connect cables.

Obtaining Backup Data

Obtain and keep a backup of data registered in the laser marker periodically in case of replacing laser markers for repairing and maintaining purposes.

Obtain and keep a backup of data registered in the laser marker periodically using the Laser Marker NAVI smart in case of replacing laser markers for repairing and maintaining purposes.

■ Steps for obtaining backup data (daily maintenance)

1. Start up the laser marker and press "SETTING" - "USB".

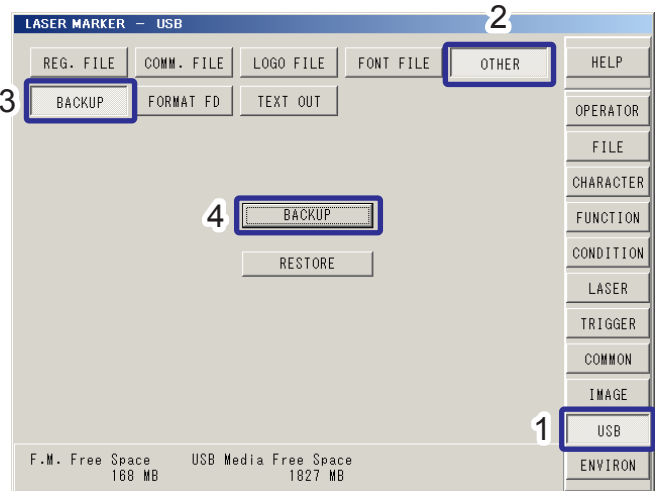
Reference

- If the laser marker has a floppy disk drive instead of the USB port, press "FD".

2. Press "OTHER" - "BACKUP".

3. Insert USB memory device into the USB port on the controller.

4. Press "BACKUP".



5. Specify the name and storage destination for a backup file.

Reference

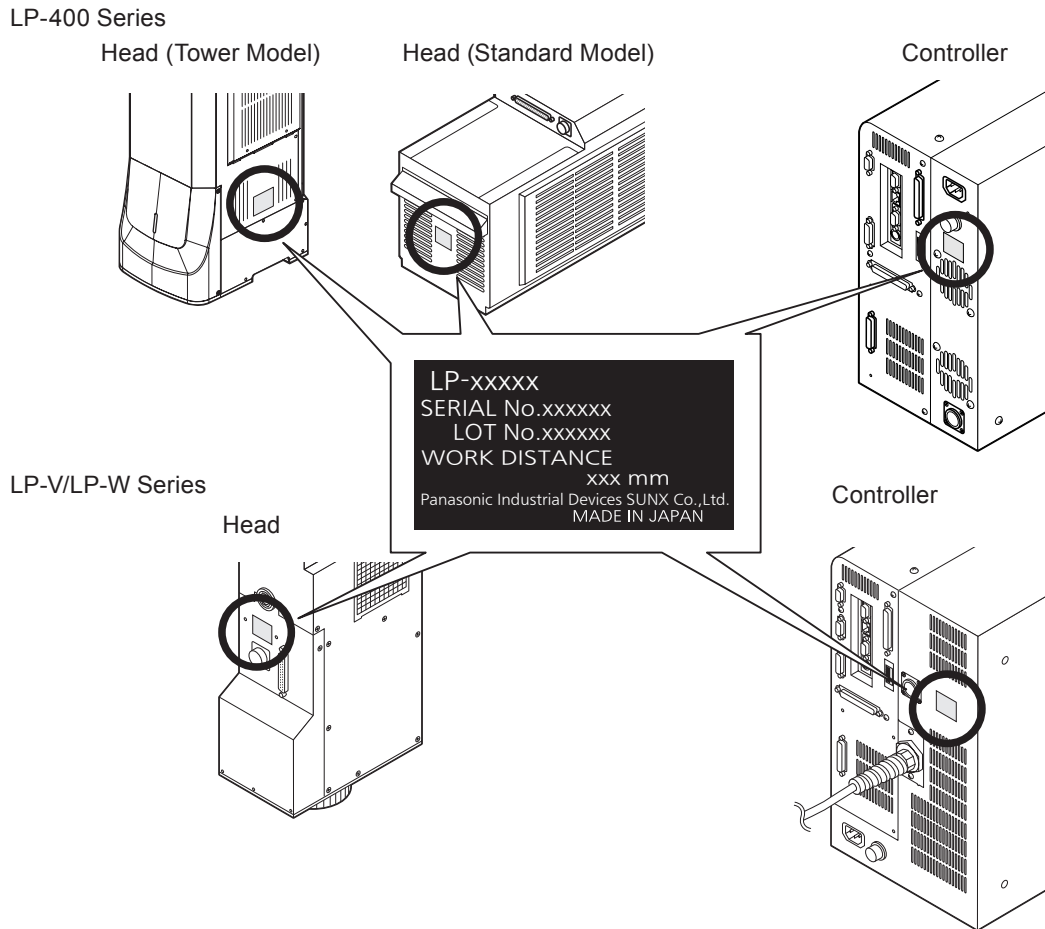
- For the backup and restoring operation, refer to Operation/Maintenance Manual "4-15-6 Backup" (P.246).

Serial No. Checking Method

Notify our sales office or representatives of the laser marker serial No. for inspection or repair.
The head and controller is delivered with the same serial numbers.

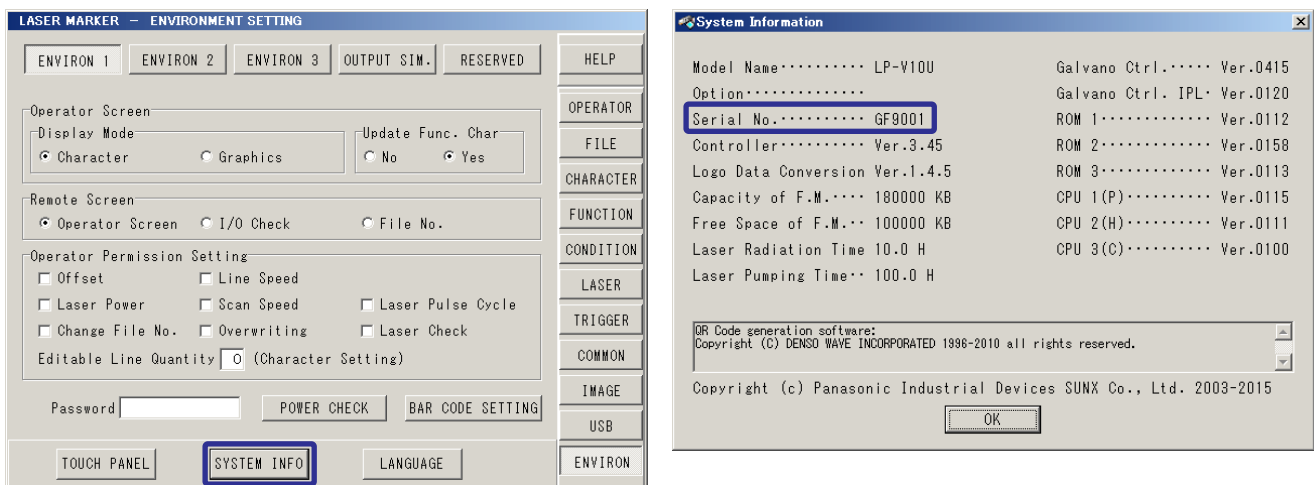
■ Check it on laser marker main unit

The serial No. of the laser marker is written on the area marked by a circle in the figure below.



■ Check it on screen

Start up the laser marker and press "SYSTEM INFO" on the "Environment Setting" screen.
The serial number is displayed on the system information window.



Disposal of Laser Marker

To dispose of the laser marker, in accordance with the regional regulation, please request the industrial waste disposer. Dispose of the laser marker as industrial waste, and never discard it with regular trash.

! Notice

- Be sure to delete all registered data when transferring or discarding the laser marker. Retained data might result in illegal read out and leaking of information by a third-party with malicious intent.

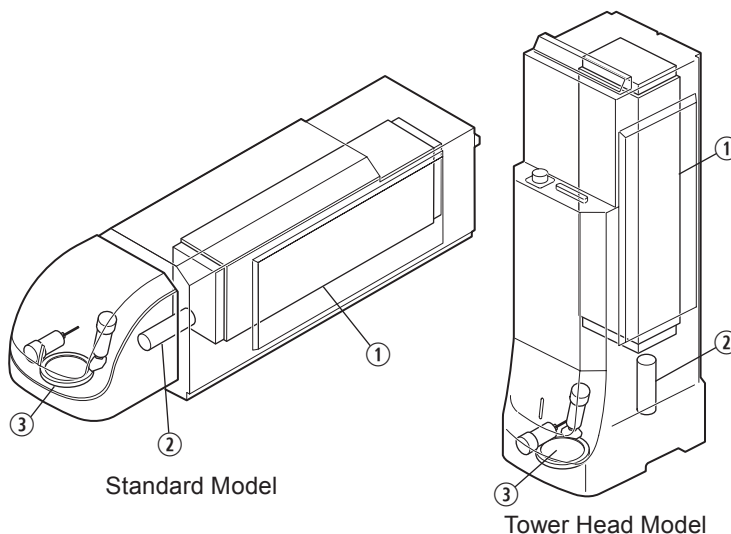
Cautions for separate disposal of head of LP-400 series

LP-400 series have some parts containing Zinc selenide and other chemicals of concern for disposal.

When you request the industrial waste disposer to dispose of this product, inform them that the following chemicals are used in the head, and segregate and dispose them appropriately.

In some countries and regions these chemicals are designated as hazardous substance in some countries and regions.

For the correct method of disposal, in accordance with the regional regulation, please contact your local municipality, waste disposal services, or the point of sale where you purchased the products.



Standard Model

Tower Head Model

Internal parts to be concerned for disposal

No.	Name	Containing materials
①	CO ₂ laser oscillator	ZnSe (zinc selenide)
②	Lens in beam expander	
③	Laser emission port (f θ lens)	

! WARNING • When the lens is broken, wear gloves, a mask, and protective goggles to prevent swallowing or inhaling broken pieces/dust or the adherence to the skin.

Cautions for separate disposal of batteries

The lithium battery in accordance with the separate collection symbol shown in the figure is included in the controller of this product. A chemical symbol such as Cd (Cadmium), Hg (Mercury), and Pb (Lead) might be indicated below the separate collection symbol.

When discarding, please follow the below notes.



- If you wish to dispose used batteries, please comply with its regional regulation. For the correct method of disposal, please contact your local municipality, waste disposal services, or the point of sale where you purchased the batteries.
- Never discard it with regular trash.
- Penalties may be applicable for incorrect disposal of this waste, in accordance with national legislation.
- Batteries, when disposed in the European Union, must be separately collected in accordance with the EU Battery Directive (2006/66/EC). EU Battery Directive (2006/66/EC) obliges separate collection and recycling of batteries that were used in the European Union.

■ Detaching Method of Batteries

In case of disposal of laser marker in the European Union, remove the battery with the following procedures and segregate it properly in accordance with the EU Battery Directive (2006/66/EC).



WARNING



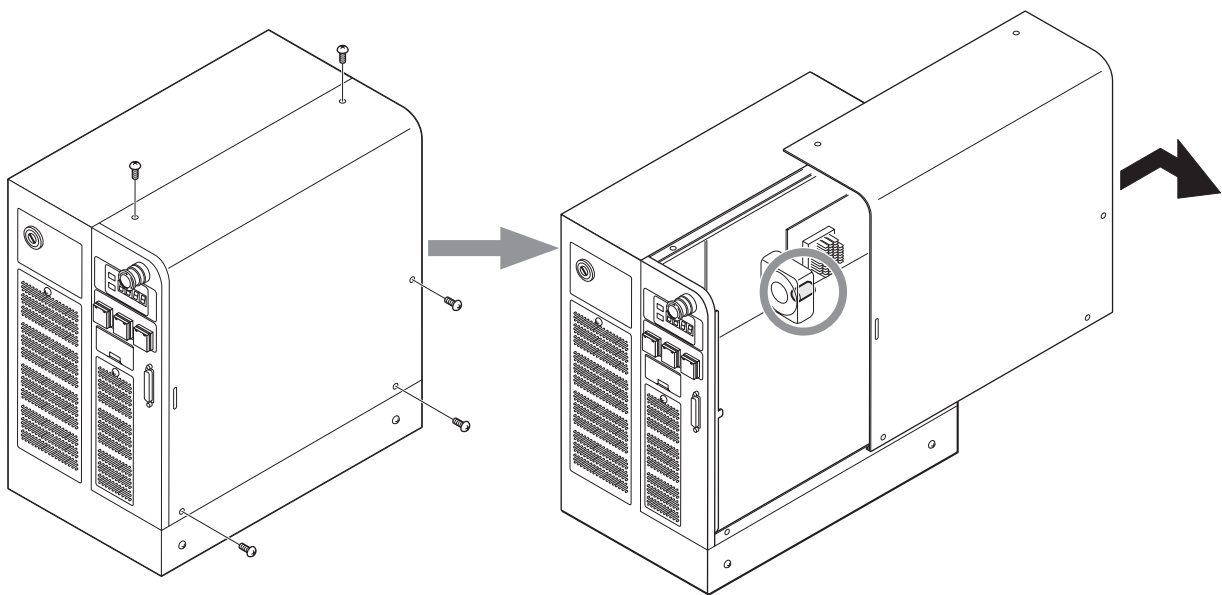
- When detaching the exhausted battery, be sure to disconnect the controller power cable so that the power cannot be supplied to the device. There is a risk of electrical shock.

! Notice

- This method is never described with the replacing method of the battery. The customer should call our service representative to replace the battery.

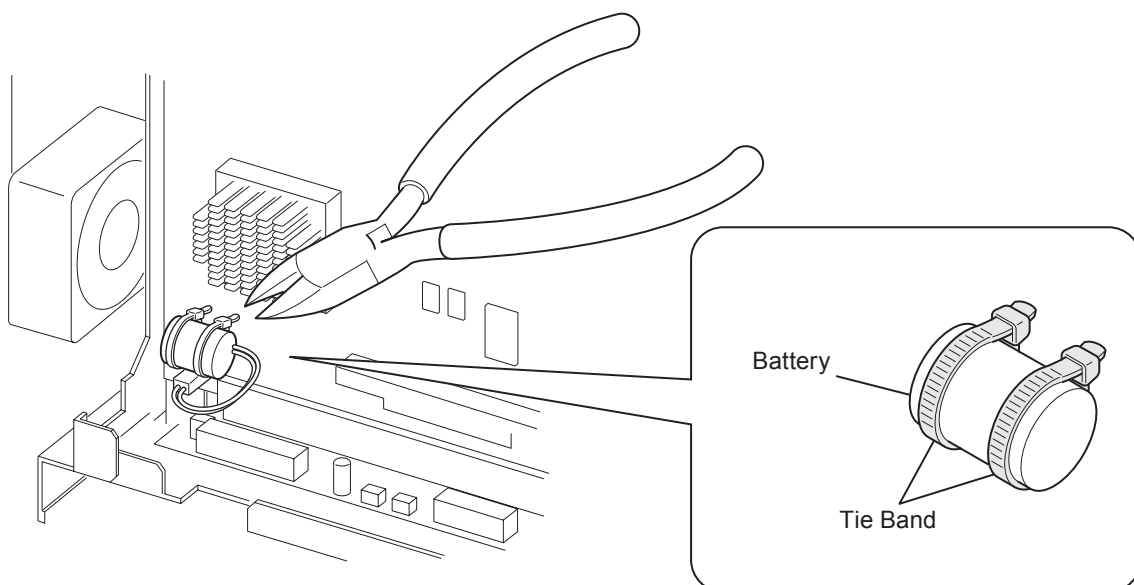
1. Remove the side cover of the controller.

Remove 6 screws of the side cover as shown in the figure below, and then slide the cover backward. After removing the cover, the battery is installed in the position as shown in the right figure below (surrounded with circle).



2. Remove the used battery as shown in the figure below.

Cut 2 banding bands by using the nipper. Then, remove the connector of the battery, and remove the battery from the board.



Troubleshooting

Troubleshooting

If any operation errors occur, check items below.

When the problems cannot be resolved, please contact our sales office.

■ Start-up

Troubles	Causes	Measures
<ul style="list-style-type: none"> Power supply is not turned on. The unit does not start up. 	Power cable is not connected.	Connect the power supply cable.
	Key switch is not turned on.	Turn on the key switch.
	Power is not supplied.	Check the power supply.
	Fuse is blown.	Replace the fuse by following the procedures in Operation/Maintenance Manual.

■ Laser Pumping

Troubles	Causes	Measures
Laser is not pumped.	Emergency stop switch is pressed.	Reset emergency stop switches located on the head and controller.
	[IN COM.] [OUT COM.] of I/O terminal is not connected to the power supply.	Connect [IN COM.] and [OUT COM.] in I/O Terminal to internal power supply or supply power from outside.
	Emergency stop input on I/O terminal is in OPEN status, or safety equipment such as door and switch connected to the Emergency stop input on I/O terminal is in OPEN status.	<ul style="list-style-type: none"> Check the connection of [EMER.+] and [EMER.-] (for PNP type model, [OUT COM]) of I/O terminal. Restore the original condition of the safety equipment connected to the Emergency stop input.
Laser is not pumped in remote mode.	Laser pumping ON signals from the external control equipment are not input or not accepted in remote mode.	<ul style="list-style-type: none"> Check connections with external equipment for mis-connection, disconnection or contact failure due to any loose connector. When controlling the laser pumping by I/O signal, turn off DIP switch No. 2 and turn on [LASER IN]. When controlling the laser pumping by serial communication, turn on DIP switch No. 2 and transmit the laser pumping command (LSR). To change the DIP setting, the switch of the laser marker should be set at power OFF state.

■ Display

Troubles	Causes	Measures
Touch panel console shows nothing.	Laser marker has not be started.	See remedial action against “Laser marker fails to start up”.
	Power cable of console is not connected.	Check that console cable is securely connected to connector [CONSOLE] on front of controller.
	Return harness is not connected.	Connect return harness ([RETURN OUT] [VGA OUT] [(VGA+RETURN) IN]) on the rear of the controller.
Touch panel console does not respond to screen tap.	Return harness is not connected.	Connect return harness ([RETURN OUT] [VGA OUT] [(VGA+RETURN) IN]) on the rear of the controller.
Monitor shows nothing.	Monitor is not turned on.	Check power to monitor.
	Monitor cable is not connected.	Check that monitor cable is securely connected to connector [VGA OUT] on back of controller.
	VGA-compatible monitor is not connected.	Connect a VGA-compatible monitor.
Mouse does not work. (When the controller is the PS/2 mouse supported type)	Mouse relay cable is not connected. (A mouse is plugged directly into mouse connector on back of controller.)	Use mouse adaptor cable for the PS/2 type mouse.
Mouse does not work. (When the controller is the USB mouse supported type)	The mouse is connected to the USB hub.	Connect the USB mouse to the laser marker controller directly without USB hub.
	The mouse type is not supported by this product.	Use the USB mouse with Human interface device (HID) class.

■ Marking

Troubles	Causes	Measures
Marking cannot be done. (Even though the laser radiation indicator changes to the marking status, nothing marked on the object.)	Obstacle hinders laser beam.	Remove obstacle between head of laser marker and object.
	For LP-V / LP-W series: Lens cap has not been removed.	Remove lens cap.
	Distance to object is not appropriate.	Adjust distance between bottom surface of laser maker and target surface of object as specified.
	Object is not in place.	Correct position of object. Guide indication feature may be helpful for this purpose.
	The laser marker is set for the marking on flying objects despite the static object.	Set "Moving direction" to "STILL." on the Trigger Setting screen.
	Laser power is insufficient.	<ul style="list-style-type: none"> • Increase laser power (including correction factor). • Decrease scan speed (including correction factor).
Laser wavelength is not appropriate for material of objects.	Materials on which can be marked differ depending on wavelength and output power of laser marker. Applicable marking object is as follows; <ul style="list-style-type: none"> • FAYb laser marker (LP-V/LP-W series) : Metal, resin (excluding transparent and translucent types) • CO₂ laser marker (LP-400 series) : Resin (including transparent and translucent types) and paper. 	
Marking cannot be done. (The laser radiation indicator does not change to the marking status.)	When the marking mode is TEST: The marking mode is "RUN".	Select [TEST] of the marking mode.
	When the marking mode is RUN: The run mode is not started or the marking trigger is not input.	Set the marking mode into [RUN] and press [Start]. Then, input the marking trigger from [TRIG. IN] signal on the I/O terminal.
	When the laser marker is under the remote mode or run mode: Marking trigger signal is not input.	Check connections with external equipment for mis-connection, disconnection or contact failure due to any loose connector. When the marking trigger is input from the I/O terminal, check if marking trigger signal meets write conditions. <ul style="list-style-type: none"> • For Trigger Marking: Check if one-shot signal of 10 ms or longer is provided per marking cycle. • For Equidistant Marking: Check if status of the signal remains on during marking.

Troubles	Causes	Measures
Marking cannot be done. (The laser radiation indicator does not change to the marking status.)	When the laser marker is under the remote mode or run mode: Next marking trigger signal is entered before completion of current marking cycle. (E800 occurs.)	Enter next marking trigger signal after making sure that READY output is on.
	When the laser marker is under the remote mode: Marking trigger is input when the READY output is OFF status.	Refer to "READY signal is not turned to ON" in the External Control Troubleshooting.

■ Marking Quality

Troubles	Causes	Measures
Marking fades entirely/ partially.	Laser emission port is not clean.	Refer to Operation/Maintenance Manual and clean contaminants off the laser emission port. If contaminants persist, replace lens and/or laser emission port protection glass (for LP-V/LP-W series only). Contact our sales office.
	Fumes occurring during marking hinder laser beam.	Install dust collector.
		Check that dust collector works well.
	Distance to object is not appropriate.	Adjust distance between bottom surface of laser maker and target surface of object.
	Target surface of object is inclined.	Make adjustment so that bottom surface of laser marker head and target surface of object are parallel with each other.
	There are variations in properties of objects. <ul style="list-style-type: none"> • Object thickness • Distance to object • Object surface condition (including roughness, gloss level, etc.) • Object material (including chemical composition ratio) 	Adjust marking conditions according to variations found.
	Object feeder is not stable.	Adjust object feeder so that position of objects become stable.
Performance of laser oscillator deteriorates due to aging.	<ul style="list-style-type: none"> • Increase laser power setting. • Decrease scan speed. If initial marking quality cannot be reached even if laser power is set to the upper limit, laser oscillator must be replaced. Contact our sales office.	

Troubles	Causes	Measures
Character is partially chipped.	Obstacle hinders laser beam.	Remove obstacle between head of laser marker and object.
	Laser emission port is not clean.	Refer to Operation/Maintenance Manual and clean contaminants off the laser emission port. If contaminants persist, replace lens and/or protection glass of laser emission port (for LP-V/ LP-W series only). Contact our sales office.
Marking is dotted.	For LP-V series: Setting of laser pulse cycle and scan speed are inadequate.	Decrease scan speed or marking pulse interval.
Marking line runs over the intended start or end points.	The setting in marking quality adjustment parameter does not match the other marking conditions.	Input the suitable adjustment value in marking quality parameters such as start point, end point, or wait value in laser setting screen.
Marking disorder (Characters crushed, unreadable)	The Fixing strength of the laser marker head is insufficient.	<ul style="list-style-type: none"> Fix the head part tightly with the specified torque value. Improve the strength of the stand on that the head is installed.
	There are continuous vibrations coming from surrounding equipment such as motor and press.	Perform vibration prevention measures.
	There are irregular vibrations coming from surrounding equipment such as air cylinder and forklift.	
	Start and/or stop timing of feeder does not match with marking operation. (Marking is disturbed at beginning/end of marking.)	<ul style="list-style-type: none"> When disturbed at the beginning of marking: Marking trigger signal is likely to be entered before object is fully stopped. Marking may be disturbed due to remaining vibration even if object is in full stop. Use delay timer etc. so that marking trigger signal turns on after vibrations are completely damped. When disturbed at the end of marking: Object is likely to start moving before completion of marking. Delay start timing of feeder or decrease scan speed so that marking is finished before object starts moving.
	There are noises coming from surrounding equipment.	Protect laser marker against noises as follows: <ul style="list-style-type: none"> Securely ground frame ground (FG) of laser marker or surrounding equipment. Isolate power and signal lines from each other if they have been routed in parallel. Shield signal line. Isolate power supply for laser marker from other equipment. Use noise cut transformer to absorb noises from power supply.

■ Moving objects

Troubles	Causes	Measures
Marking cannot be done.	Encoder signal is off.	Check for proper connection to encoder.
Marking is sometimes skipped. (E800 occurs.)	Marking trigger signal is entered before current marking is finished.	<ul style="list-style-type: none"> • Increase scan speed setting of laser marker. • Decrease delay distance setting of laser marker. • Reduce feeder speed. • Increase marking interval (interval between objects on feeder).
Characters unreadable	Feed direction is not correct.	Match feed direction with laser marker operation.
	Speed changes at conveyor junction.	If conveyors are coupled, avoid marking near conveyor junction.
	Actual speed and preset speed for feeding objects are different due to slippage of objects.	Remove cause of object slippage.
	Pulse setting of encoder is not correct.	Measure the number of encoder pulses and adjust "Number of encoder pulses".
	Encoder is out of order.	Check encoder for proper function.
Marking position is unstable.	Positional misalignment is likely to occur due to meandering motion of conveyor.	Secure objects to prevent misalignment.
Marking character pitch is unstable.	The line speed at the marking position is different from the speed at the installation site of the encoder.	Place the encoder as close as possible to the marking position.
		Decrease the encoder resolution to block the effect of the line speed fluctuation. Note that the minimum value of the encoder pulse should be 10 P/mm.
Character is partially chipped.	Obstacle hinders laser beam.	Remove obstacle between head of laser marker and object.
Actual spacing between characters is larger or small than setting.	Pulse setting of encoder is not correct.	Check setting to be sure that: <ul style="list-style-type: none"> • When using A phase only: Number encoder pulses = Number of pulses/mm x 2 • When using A and B phases: Number encoder pulses = Number of pulses/mm x 4
	Either A or B phase signal is refused. (A and B phase used)	Check that signal is applied to A and B phase terminals of encoder.
	Measured number of encoder pulses differs from calculated one.	Increase or decrease values in "Encoder fine adjustment" field as appropriate. <ul style="list-style-type: none"> • When the character interval is wide: Increase the setting. • When the character interval is narrow: Decrease the setting.

■ External control

Troubles	Causes	Measures
Laser marker cannot be controlled by the external signal.	Laser marker is not in remote mode.	Press Remote switch on front of controller or enter remote mode in a manner described in External Control Manual.
	The wiring between the laser marker and the external control devices is incorrect.	Check connections with external equipment for mis-connection, disconnection or contact failure due to any loose connector. Check for continuity using tester or the like.
	There are noises coming from surrounding equipment.	Protect laser marker against noises as follows: <ul style="list-style-type: none"> Securely ground frame ground (FG) of laser marker or surrounding equipment. Isolate power and signal lines from each other if they have been routed in parallel. Shield signal line. Isolate power supply for laser marker from other equipment. Use noise cut transformer to absorb noises from power supply.
Serial communication control fails	Selected communication port is inappropriate.	For communication with external devices, select either RS-232C or Ethernet port. (They cannot be used at the same time, or switched.) The port selected in the environment setting screen indicates the valid communication port. RS-232C is selected at factory shipment.
	Type of connection cable used is inappropriate.	For RS-232C, use a commercially available cross cable. (A straight cable cannot be used.) Laser marker has three-wire connection. (Only pins Nos. 2, 3 and 5 of RS-232C connector are used.) For Ethernet, check the followings: <ul style="list-style-type: none"> To use an external device and the laser marker one to one, connect them with a commercially available cross cable (STP cross cable of the Category 5e or higher is recommended). To use an external device and the laser markers one to many, prepare a hub or router compliant to 1000BASE-T, 100BASE-TX, or 10BASE-T and connect them with a commercially available straight cable (STP cross cable of the Category 5e or higher is recommended).
	Communication parameter settings are incorrect.	Match communication parameter settings to external equipment. Communication parameter settings of laser marker can be checked in the environment setting screen.

Troubles	Causes	Measures
Serial communication control fails	The RS-232C cable is connected to the wrong connector (RETURN OUT).	Connect the RS-232C cable to "RS-232C" connector on the rear of the controller.
	Communication parameter settings are changed when the backup data is restored to the laser marker.	Check the communication parameter settings. If Ethernet is used, confirm the IP address and other parameters. When the backup data is restored to the laser marker, communication parameter settings are overwritten with the backup data.
	Command data is not received from external equipment.	Using commercially available line monitor or protocol analyzer, check if external equipment transmits data.
	Communication data format is incorrect.	Check if format of communication data command transmitted from external equipment is correct. <ul style="list-style-type: none"> • Check if start code STX (02: HEX) is placed at beginning of transmitted data. • Check if the delimiter is added to the end of the transmission data. ([CR] (0D:HEX) or [CR+LF] (0D:HEX 0A:HEX) for RS-232C, [CR] (0D:HEX) for Ethernet)
READY signal is not turned to ON.	Alarm or error occurs.	Release the alarm or warning referring to the measures for the corresponding error code.
	Laser has not been pumped.	Refer to "The laser is not pumped".
	Internal shutter is closed.	Open the internal shutter. <ul style="list-style-type: none"> • When controlling the shutter by I/O signal, turn off DIP switch No. 2 and turn on terminal SHUTTER in terminal block. • When controlling the shutter by serial communication, turn on DIP switch No. 2 and send shutter command (SHT). * To change the DIP setting, the switch of the laser marker should be set at power OFF state..
	The changing operation of the file data is unfinished.	It takes from tens of msec. to several seconds to complete the changing file data. During that time, READY output is in OFF status. Enter marking trigger signal after making sure that [READY] output is on if you want to change file to another one.
	Marking data is not sent to the laser marker from the external devices, in case of using Rank Function, External Offset Function, or Serial Data Input Function.	If rank, external offset and serial data functions are enabled while marking conditions are not yet specified, enter respective data per marking cycle. Enter marking trigger signal after making sure that [READY] output is on or checking status of READY using status request command.
Under serial communication control: Mark trigger signal is ON while the command reception permission (MKM command) is set to "Reception mode ON".	Set "reception mode OFF" for command reception permission (MKM command). Before entering marking trigger signal, use status request command [STS] to make sure that READY is on.	

Troubles	Causes	Measures
The sending command is not accepted by the laser marker. (NAK response)	DIP switch No. 2 on back of laser marker is off.	To control the following commands with the serial communication, turn ON DIP switch No. 2. <ul style="list-style-type: none"> • Laser Control [LSR] • Shutter Control [SHT] • Laser Check Radiation [SPT] • Guide LD Indication [GID] • Power Check [PWR]
	“Reception mode ON” is not set for command reception permission (MKM command)	The laser marker does not accept commands except the following unless it is in the “reception mode ON” status. For command transmission, set “reception mode ON” for “command reception permission (MKM command)”. <ul style="list-style-type: none"> • File Change (No. Specified) [FNO] • File Change (Comment Specified) [FNN] • Shutter Control [SHT] • Command Reception Permission [MKM] • Laser Control [LSR] • Counter Reset [CTR] • Status Request [STS] • Marking Trigger [MRK] • Serial Data Input [SIN]
	Alarm or error occurs.	All commands except the following are refused while alarm or error is active. <ul style="list-style-type: none"> • When alarm occurred: <ul style="list-style-type: none"> • Status Request [STS] • When warning occurred: <ul style="list-style-type: none"> • Status Request [STS] • Shutter control [SHT] (for closing motion only) • Command Reception Permission [MKM] (Only for reception mode ON and reception mode readout)
	Two or more command data are transmitted at the same time.	After sending the command, confirm the response data from the laser marker. Do not send the next command before receiving the response.

■ Others

Troubles	Causes	Measures
Laser is emitted at unintended timing.	Photoelectric sensor for marking trigger signal malfunctions.	Fumes may cause malfunction of photoelectric sensor for marking trigger signal. <ul style="list-style-type: none"> • Install dust collector. • Check that dust collector works well.
Date is reset.	Internal battery has run out.	Contact failure may also be a cause of this symptom. When laser marker have been in use for five years or more, internal battery is easy to run out. Contact our sales office for replacement of internal battery.

Error Indication

When an error occurs, an error code appears on the front panel of the laser marker controller.

Errors are categorized into alarm and warning depending on their details.

This chapter describes the details and measures of errors.

Alarm

Errors that occur when highly emergent safety function is activated or there is any abnormality in laser marker are output as alarm.

When an alarm occurs, the laser pumping is turned OFF, and the laser radiation is stopped if during lasing.

Release Method of Alarm

- 1) Remove a cause of alarm. Note that any alarms due to hardware's problem cannot be released.
- 2) If the error E002, E004 or E011 occurs, push the alarm reset switch on the front of the controller, or input the alarm reset signal on the I/O terminal.
For other errors, reboot the laser marker.
- 3) If the alarm occurs during the marking operation of the files in which the counter function is set, check if the counter value is correct before restart the marking operation.

ERROR CODE	Error details	Measures
E002	Emergency stop button of controller is pushed.	Release emergency stop button of controller by turning it in arrow direction.
E004	Emergency stop occurred on external terminal.	<ul style="list-style-type: none">• Check the connection of EMERGENCY STOP or LASER STOP terminal on the I/O terminal.• Check the status of the safety equipment connected to the EMERGENCY STOP or LASER STOP terminals.• Confirm operation logic of the connected devices.• Connect the internal or external power supply to IN COM. and OUT COM. in the I/O terminal respectively.
E011	Laser stop has occurred on external terminal.	
E020 *1	Cover of scanning section in head unit is opened.	Contact to our sales office.
E210 to E213	Galvanometer error.	<ul style="list-style-type: none">• Check and correct the power status.• Check if the AC power line is effected by noise.• Connect head control cable or head power cable properly, and restart with key switch.• If there is a marking line scanned for 1 minute or more at once, decrease the scan speed.• When not recovered, contact our sales office.
E220	Automatic shutter error.	<ul style="list-style-type: none">• Connect head control cable properly, and restart with key switch.• Contact to our sales office.

*1: Error that may occur for LP-V / LP-W series only.

ERROR CODE	Error details	Measures
E230 to E233	<p>Laser error.</p> <ul style="list-style-type: none"> • Temperature in the laser oscillator exceeds the limit. • Instantaneous interruption of laser power supply is detected. • Head control cable is not connected properly. • Fiber cable is broken. (only for LP-V/LP-W series) • Failure of laser oscillator is detected. • There might be occurred the malfunction of the internal shutter. 	<p>Turn the key switch to the OFF position and check the followings: Cool the laser oscillator thoroughly before restarting the controller.</p> <ul style="list-style-type: none"> • Check that the ambient temperature is in the specified operating temperature. • Check the air filter, the air intake / exhaust port and the fan of the cooling part for clogging. • Check and correct the power status. • Check if the AC power line is effected by noise. • Connect head control cable and head power cable properly, and restart with key switch. • When not recovered, contact our sales office.
E235 *2	There is a short line segment that cannot be marked.	<p>Check and delete if there is an unnecessary short line segment in logo files.</p> <hr/> <p>Set scan speed smaller, or "0" to "Pre-Scan time" on Laser Setting.</p>
E240 E241	The temperature of the laser has reached its limit.	<ul style="list-style-type: none"> • Check that the ambient temperature is in the specified operating temperature. • Make sure cooling fan operates. • When not recovered, contact our sales office.
E250	Detected a decrease in power supply voltage.	<ul style="list-style-type: none"> • Check and correct the power status. • Check if the AC power line is effected by noise. • Connect head power cable properly, and restart with key switch. • When not recovered, contact our sales office.
E300	A head is not connected. Shut off a power and connect a head.	Connect head control cable properly, and restart with key switch.
E310	Unsupported head. Change either head or controller.	<ul style="list-style-type: none"> • Connect head control cable properly, and restart with key switch.
E311	<p>System error.</p> <ul style="list-style-type: none"> • Head control cable is not connected properly. • Wrong head has been connected to controller. 	<ul style="list-style-type: none"> • Check if head with correct model has been connected. If it is wrong, replace head or controller with correct one.
E312	System error.	Restart the laser marker. When not recovered, contact to our sales office.

*2 : Error that may occur for LP-400 series only.

ERROR CODE	Error details	Measures
E320	Unit combination is incorrect.	<ul style="list-style-type: none"> • Connect head control cable properly, and restart with key switch. • Check if head with correct model has been connected. If it is wrong, replace head or controller with correct one.
E410 to E443 E990 to E999	System error.	Restart the laser marker. When not recovered, contact to our sales office.
E450 to E456	Memory error.	
E700	The laser pumping turned OFF while marking.	<ul style="list-style-type: none"> • Change timing so that the marking trigger is input after the laser pumping has completed. • Check wiring and control procedure for the I/O terminal block, wiring to communication port, and the procedure of the communication command.

Reference

- When other error not listed in this section was occurred, restart the laser marker.
- If the symptom persists after restart, contact our sales office.

Warning

Errors that notify of that the setting data are incorrect or laser radiation conditions are not met are output as warnings. Marking operation cannot be started while any warning is active. Laser pumping maintains the state before the warning.

Release Method of Warning

- 1) Remove a cause of warning. If the warning cause is the wrong setting, correct the file data.
- 2) When the laser marker is under the remote mode, close the shutter by I/O or serial communication control.
In case of the following warning, the shutter control is unnecessary.
 - E800: the warning occurs only while the specified one-shot output time and it is released automatically.
 - E811: the warning occurs only during the laser stop is opened, and then it is released automatically when the laser stop is closed.
- 3) If the warning occurs during the marking operation of the files in which the counter function is set, check if the counter value is correct before restart the marking operation.
- 4) In case that marking is executed again, make sure that the warning output is turned on, and then open the internal shutter.

ERROR CODE	Error details	Measures
E251	Detected a decrease in clock battery voltage. Reset present time.	Contact to our sales office. While laser Marker power is on, reset "Present Time" in Environment Setting. When the power is off, reset "Present Time".
E500	There is not enough free space. The file cannot be registered.	Delete registered file and logo file.
E501	Cannot register setting because of memory error.	<ul style="list-style-type: none"> • Restart with key switch. • When not recovered, contact our sales office.
E502 E503	Invalid file format of font or logo file.	<ul style="list-style-type: none"> • Register the logo or font file again on the USB screen. • For the logo file, convert the logo data to VEC format again with Logo data conversion software.
E600	No setting file.	Set the marking data such as character, barcode and logo.
E601	No font file.	<ul style="list-style-type: none"> • Register font file. • Set a registered font to the font in character condition.
E602	Lack of font memory.	Make font file smaller, or delete unnecessary font file.
E603	No logo file.	Register logo file.
E604	Included character not registered into font file.	Change characters. Or set the font file containing the setting characters.
E605	Exceed valid number of characters. (Max. 30 characters/line.)	Make numbers of characters smaller.

ERROR CODE	Error details	Measures
E606	Existed marking data outside of marking area.	Contain marking data within marking area. <ul style="list-style-type: none"> • Change marking position. • Make characters smaller. • Narrow character interval. * If there is no data out of the marking field in the image display, check the “system offset” in the environment setting. “System offset” value is not shown in the image display.
E607	Cannot create bolded character.	<ul style="list-style-type: none"> • Set any standard font without original 4 font. • Use Font Maker provided to create the proper pattern font. • Set line width of bold character to quarter or below of character height and width. • When marking the bold character, set the comparison ratio between character height and width become 1/4 to 4. • Check the line width of bold character not exceed the specified value.
E610 E612	Lack of marking memory. <ul style="list-style-type: none"> • Marking data is too large. • The line length is too long. (spiral, etc.) 	<ul style="list-style-type: none"> • Reduce numbers of characters and logo data. • Reduce numbers of step & repeat. • Reduce numbers of a start point and a end point of characters or logo data. • Separate the long segment into short data.
E620 E621	Flying object area over. (Can not follow line speed of flying object marking.)	<ul style="list-style-type: none"> • Shorten marking time with the following methods. <ul style="list-style-type: none"> • Speed up scan speed. • Narrow character interval. • Make characters smaller. • Reduce numbers of characters. • Change setting of curve/edge. • Reduce numbers of character lines. • Displace a start point of marking, etc. • Adjust the line speed of the flying object. • Adjust the waiting time of the flying object. • Set the coordinate of the marking data close to the center of the marking field.
E622	Flying object time over. (Can not follow line speed of flying object marking.)	
E623	Too narrow marking interval for proportioned flying object.	Increase setting value of marking spacing. Shorten marking time with the following methods. <ul style="list-style-type: none"> • Speed up scan speed. • Narrow character interval. • Make characters smaller. • Reduce numbers of characters. • Change setting of curve/edge. • Reduce numbers of character lines. • Set smaller value to the one-shot output time, etc.
E630	Too much quantity of Step and Repeat marking.	Reduce numbers of characters to be marked. (Max.: 1000)

ERROR CODE	Error details	Measures
E640	Invalid function for combining with flying object.	<ul style="list-style-type: none"> • With the marking to flying object, do not use the following functions. <ul style="list-style-type: none"> • Step & Repeat • Reset at date update function • Arbitrary point radiation • Overwrite function • With the equidistant marking to flying object, do not use the following functions. <ul style="list-style-type: none"> • Rank • External offset • Serial data marking • Release flying object marking function with trigger setting.
E650	Invalid setting of processing element.	Set the distance between start and end points of the arc smaller than double of radius.
E651	Too short line segment of processing element.	Set the larger value to the length of the line than width of the line.
E660	Cannot convert dxf file.	<ul style="list-style-type: none"> • Save the DXF file with DXF-R12J, R13J or R14 format. • Delete the entities which are not supported by laser marker in the DXF file. • Read the DXF file again to the laser marker.
E690	Cannot finish measurement during specified time.	<ul style="list-style-type: none"> • Reduce marking contents and measure marking time. • Speed up scan speed.
E700	Started marking in laser pumping OFF state.	Turn ON the laser pumping and check that the laser pumping has completed, and then start marking.
E701 *1	Started laser power check in laser pumping OFF state.	Turn ON the laser pumping and check that the laser pumping has completed, and then start power check.
E800	----- (no message : Invalid input of marking trigger while Ready is OFF.)	<ul style="list-style-type: none"> • Change marking timing so that trigger input is performed after marking ready output is turned on. • Check wiring and control procedure for I/O terminal, wiring to communication port, and the procedure of the communication command.
E811	Occurred laser stop from external terminal.	<ul style="list-style-type: none"> • Check the wiring of the laser stop input terminal and contact of the switch. • Confirm operation logic of connection device.
E900	Existed invalid function character for simultaneous use. The following combination of the functions are not available in one file. <ul style="list-style-type: none"> • Serial data marking function and rank function • Serial data marking function and external offset function 	Delete any one of these functions from the file.
E901	Existed invalid character for converting into 2D code.	Set the character that can be converted into 2D code.
E902	Cannot create 2D code.	Use the condition where 2D code can be created.

*1: Error that may occur for LP-V / LP-W series only.

ERROR CODE	Error details	Measures
E903	No specified 2D code pattern.	Specify 2D pattern code which has been already registered.
E910	Existed invalid character for converting into bar code.	Set the character that can be bar coded.
E911	Cannot create bar code.	Use the condition where a barcode can be created.
E912	Too small dimension of narrow element/basic module width for bar code.	Specify the setting value for the width of the narrow element/basic module larger than that of the line width of the laser.
E913	No quiet zone in bar code.	Set the proper value for "Quiet/Narrow Ratio". With the inversion setting, set always quiet zone.
E914	Too small separate pattern or composite row height.	<ul style="list-style-type: none"> Adjust the height of one step bar code. Specify the proper value for "Separation Ptrn H/W" so that the "Separation Pattern Height" becomes "0" or "Marking Width" is larger than "Separation Pattern Width".

Reference

- When other error not listed in this section was occurred, restart the laser marker.
- If the symptom persists after restart, contact our sales office.

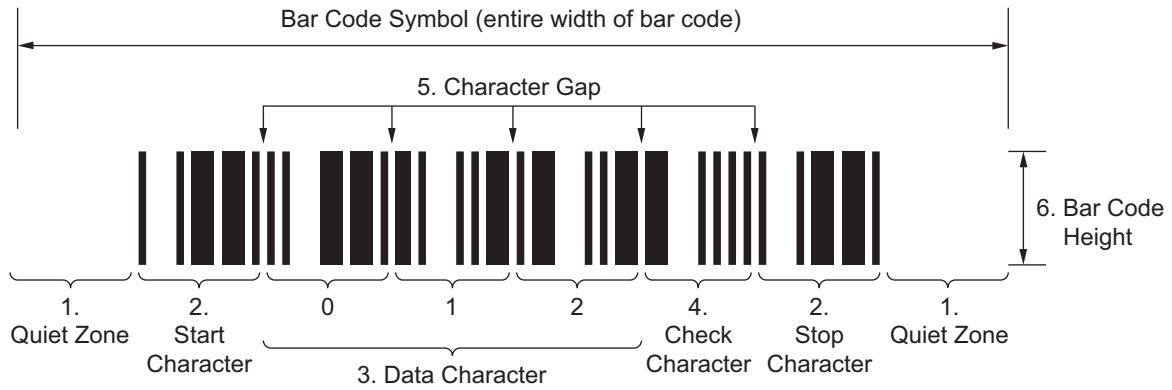
Appendix

Description of Code Symbols

Reference

- For the details of each code symbol, refer to the corresponding ISO/IEC or JIS standards.

CODE39

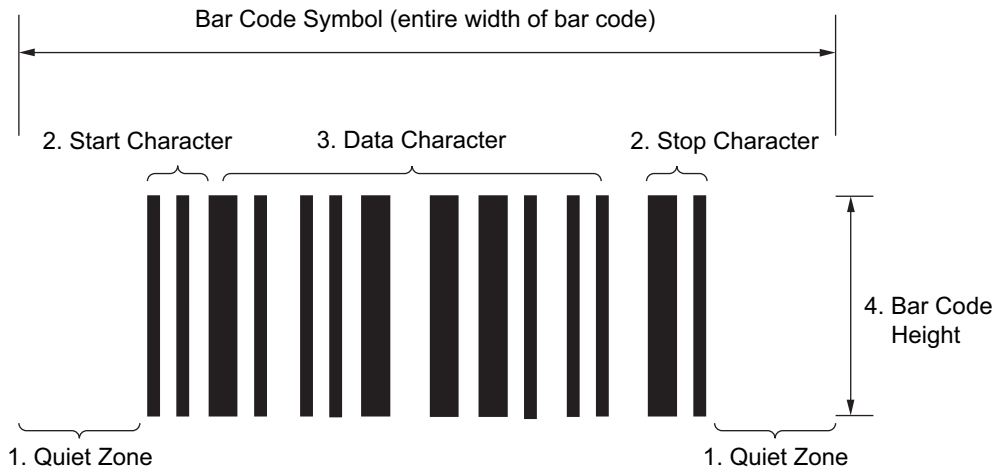


Name	Description
1 Quiet Zone	Certain spacing is necessary for the back and forth to scan the barcode.
2 Start/Stop Character	The particular characters to indicate the start and end of the bar code.
3 Data Character	A bar or space on a bar code is called an "element". On CODE39, a character consists of nine elements; five bars and four spaces (three wide elements and six narrow elements).
4 Check Character	Used to check if the read data is correct or not by putting the value calculated with the certain formula (modulus 43) on just before the stop character for re-calculation.
5 Character Gap	The space between two adjacent characters. In this laser marker, it has the same width as the narrow element.
6 Bar Code Height	Usually 5 mm or 15% of the symbol width excluding the quiet zone, whichever is greater.

Content of code data

- The CODE39 bar code can indicate all 36 alphanumerical characters (A to Z and 0 to 9) and fixed characters (-, ., , \$, /, +, %).

■ ITF

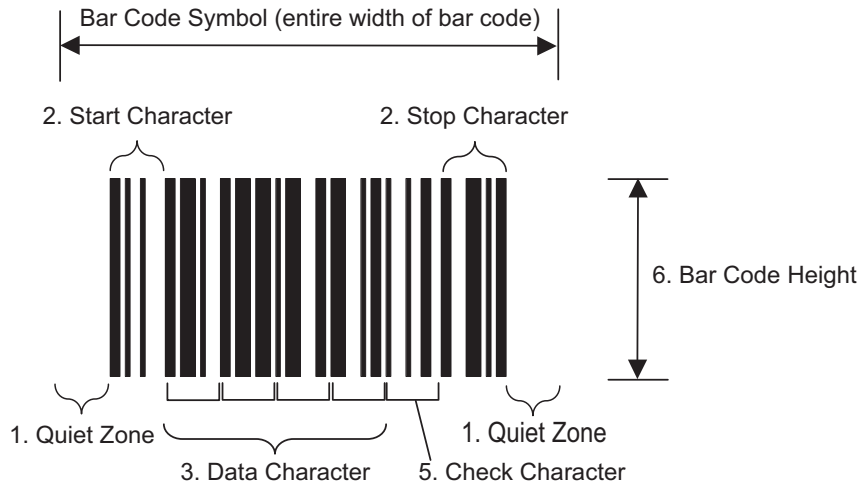


Name	Description
1 Quiet Zone	Certain spacing is necessary for the back and forth to scan the barcode.
2 Start/Stop Character	The particular characters to indicate the start and end of the bar code.
3 Data Character	The first character is indicated by 5 bars and the second character by 5 spaces in those pairs. In these 5 elements (bars or spaces), two elements have the wide width. In case the number of data character is odd, "0" is added at the head to make it even number.
4 Bar Code Height	Usually 5 mm or 15% of the symbol width excluding the quiet zone, whichever is greater.
Check Character	Used to check if the read data is correct or not by putting the value calculated with the certain formula (modulus 10/ weight 3-1) on just before the stop character for re-calculation.

Content of code data

- The ITF bar code can indicate only numerical characters (0 to 9).
- The start character is "0000" and stop character is "100". "0" is indicated with narrow bars or spaces. "1" is indicated with wide bars or spaces.

■ CODE128

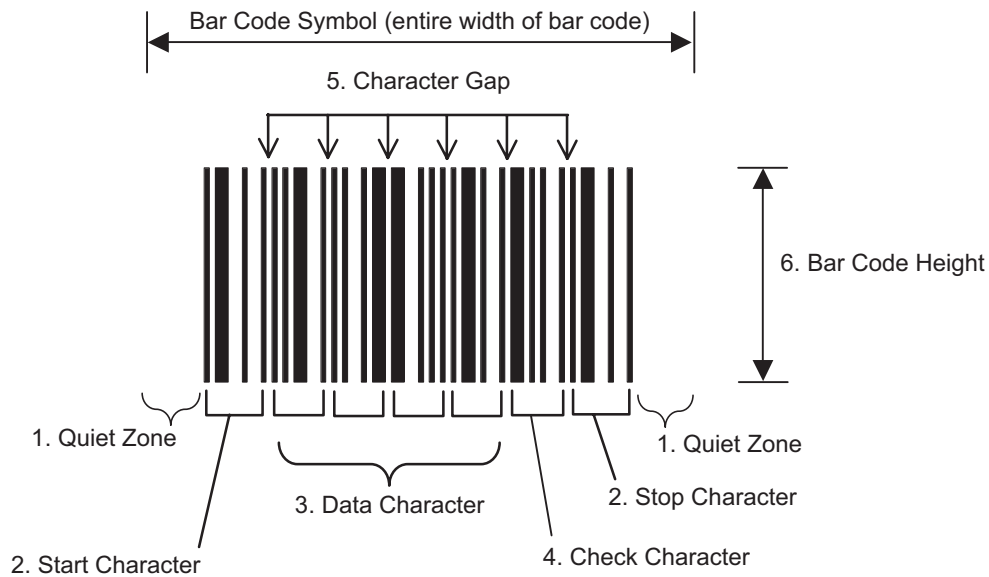


Name	Description
1 Quiet Zone	Certain spacing is necessary for the back and forth to scan the barcode.
2 Start/Stop Character	The particular characters to indicate the start and end of the bar code. CODE128 has three types of start code (A, B, and C) and one stop code. Depending on the start character, the character code set is defined as "Code A", "Code B" or "Code C". The code set is determined by data character contents. The laser marker automatically selects the code set according to the input data.
3 Data Character	On CODE128 bar code, a character consists of 11 modules (minimum unit consisting of bars and spaces). It has four types of element width from 1 to 4 modules.
4 Function Character	Entering "FNC1" just before the data characters indicates that the code is UCC/EAN128 (GS1-128).
5 Check Character	Used to check if the read data is correct or not by putting the value calculated with the certain formula (modulus 103) on just before the stop character for re-calculation.
6 Bar Code Height	Usually 5 mm or 15% of the symbol width excluding the quiet zone, whichever is greater.

Content of code data

- The CODE128 bar code can indicate 128 characters of ASCII code consisting of numerical characters, alphanumerical characters (capitals and small letters), symbols and control code.

■ NW-7

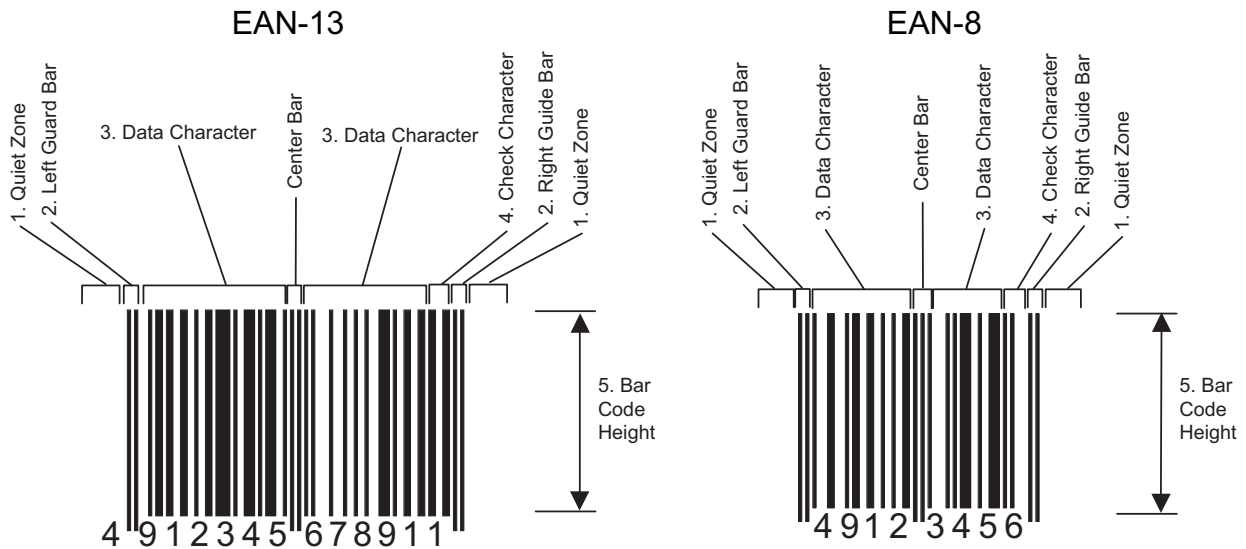


Name	Description
1 Quiet Zone	Certain spacing is necessary for the back and forth to scan the barcode.
2 Start/Stop Character	The particular characters to indicate the start and end of the bar code. It has four types of start/stop characters (A, B, C, D). This product uses the same character for both start and stop characters.
3 Data Character	On NW-7 bar code, a character consists of seven "Narrow" and "Wide" elements; four bars and three spaces.
4 Check Character	Used to check if the read data is correct or not by putting the value calculated with the certain formula (modulus 16) on just before the stop character for re-calculation.
5 Character Gap	The space between two adjacent characters. In this laser marker, it has the same width as the narrow element.
6 Bar Code Height	Usually 5 mm or 15% of the symbol width excluding the quiet zone, whichever is greater.

Content of code data

- The NW-7 bar code can indicate numerical characters (0 to 9) and symbols (-, \$, :, /, ., +).

■ EAN

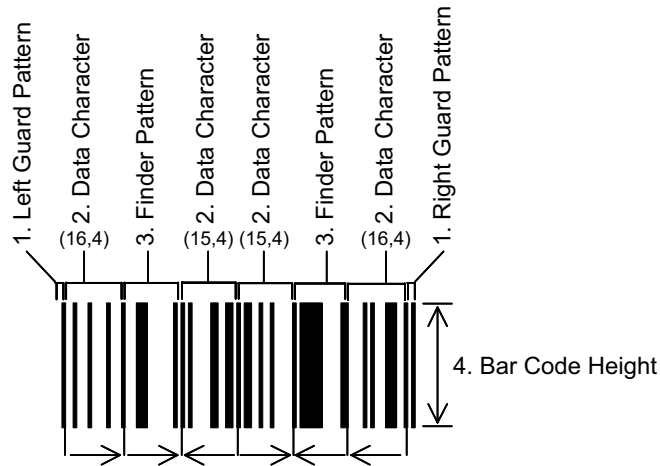


Name	Description
1 Quiet Zone	Certain spacing is necessary for the back and forth to scan the barcode.
2 Left/Right Guard Bar	Identify the start and end of a bar code.
3 Data Character	On EAN code, a character consists of 7 modules (minimum unit consisting of bars and spaces). A data character consists of two bars and two spaces. It has four types of element width from 1 to 4 modules. The data characters are displayed on either side of center bar.
4 Check Character	Used to check if the read data is correct or not by putting the value calculated with the certain formula (modulus 10 / weight 3-1) on just before the stop character for re-calculation.
5 Bar Code Height	The nominal bar height is specified as follows: <ul style="list-style-type: none"> • EAN-13, UPC-A and UPC-E symbols: 22.85 mm • EAN-8 symbols: 18.23 mm

Contents of EAN

	Standard version (EAN-13)	Abbreviated version (EAN-8)
Usable Data Characters	Numerical characters 0 to 9	
Digit number of Data Character, (including Check Character)	13-figure (6 digits for left/5 digits for right)	8-figure (4 digits for left/3 digits for right)
Quiet Zone	11 modules or more on the left side 7 modules or more on the right side	7 modules or more on respective sides
Left/Right Guard Bar	"101"	
Center Bar	"01010"	

■ RSS-14 (GS1 DataBar)



Name	Description
1 Left/Right Guard Pattern	Provides the bar code area. It consists of bars and spaces of one module (minimum unit consisting on bars and spaces).
2 Data Character	Has the (n, k) structure. “n” indicates the number of modules and “k” indicates that of bars and spaces that make up the character. As shown in the figure above, the data character is arranged so as to facing to the adjacent finder pattern (toward the arrow direction).
3 Finder Pattern	Functions as a check character or segment identifier, too, which makes symbols to be easily recognized. It consists of five elements having 15 modules.
4 Bar Code Height	In the standard case, the minimum value of bar code height is 33 times as high as the module width. For Truncated, Stacked, and Stacked Omnidirectional, it is 13, 13 and 69 times respectively.

The RSS-14 (GS1 DataBar) symbols has the three type of version as shown below, in addition standard.

RSS-14 (GS1 DataBar) Truncated

The RSS-14 (GS1 DataBar) Truncated lowers the bar code height of RSS-14 (GS1 DataBar) to meet the elongated marking field. The minimum value of bar code height is 13 times as high as the module width.



RSS-14 (GS1 DataBar) Stacked

The RSS-14 (GS1 DataBar) Stacked is the two-tiered symbol consisting of halves of RSS-14 (GS1 DataBar) Truncated divided into two to meet the products with extremely narrow marking field. The upper tier consists of left half of RSS-14 (GS1 DataBar) Truncated. A guard pattern is added at its right end. The bottom tier consists of right half of RSS-14 (GS1 DataBar) Truncated. A guard pattern is added at its left end. The separator of one module height is inserted between tiers. The minimum value of bar code height is 13 times as high as the module width.



RSS-14 (GS1 DataBar) Stacked Omnidirectional

The RSS-14 (GS1 DataBar) Stacked Omnidirectional is the two-tiered symbol consisting of halves of RSS-14 divided into two. The three-tiered separator of one module high or more is inserted between tiers. The minimum value of bar code height is 69 times as high as the module width.



Content of code data

- On RSS-14 (GS1 DataBar) bar code, one-digit package indicator is added before the 13-digit common product code “EAN”. The 14-digit product code is called as “GTIN (Global Trade Item Number)”.
- It can indicate numerical characters (0 to 9).
- The data consists of application identifier “01” and 13-figure numerical characters.
- The application identifier indicates the content of data and automatically added.

■ RSS (GS1 DataBar) Limited

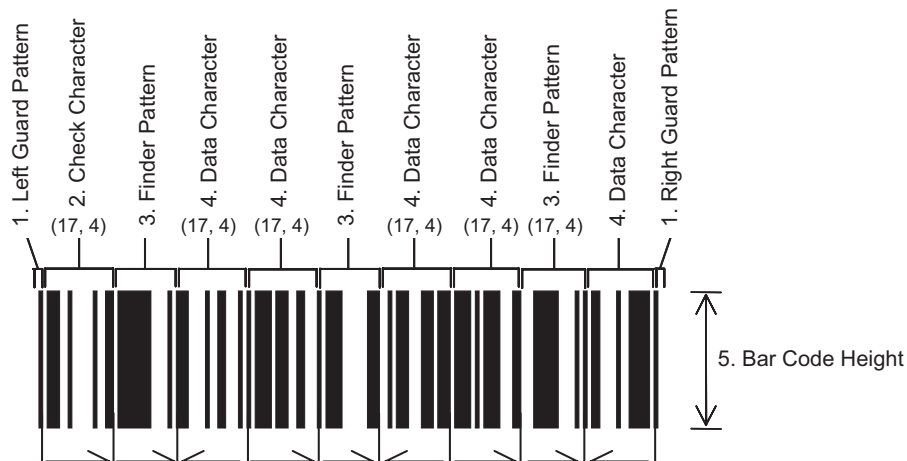


Name	Description
1 Left Guard Pattern	Provides the bar code area of the left side. It consists of bars and spaces of one module (minimum unit consisting of bars and spaces).
2 Right Guard Pattern	Provides the bar code area of the right side. ISO/IEC 24724 standard specifies it as follows. (The number in parentheses indicates the number of modules.) ISO/IEC 24724 2011: combination of (1) space, (1) bar, and (5) space ISO/IEC 24724 2006: combination of (1) space and (1) bar
Reference	
	<ul style="list-style-type: none"> For better bar code reading quality, in this laser marker, the rightmost space of the right guard pattern consists of six modules, adding one extra module to that of the standard when it is set to ISO/IEC 24724 2011.
3 Data Character	Has the (n, k) structure. “n” indicates the number of modules and “k” indicates that of bars and spaces that make up the character. This data character is composed with 7 bars and spaces consisting with 26 modules. The element is arranged from left to right as shown in the figure above.
4 Check Character	This check character is composed with 7 bars and spaces consisting with 18 modules, and it is set between 2 data characters. It is used to check if the read data is correct or not by putting the value calculated with the certain formula on just before the stop character for re-calculation.
5 Bar Code Height	The minimum value of bar code height is 10 times as high as the module width.

Content of code data

- The RSS Limited indicates the numerical (0 to 9).
- The data consists of application identifier “01” and 13-figure numerical characters.
- The application identifier indicates the content of data and automatically added.
- The data that can be bar-coded is “000000000000” to “199999999999”. The data “200000000000” or more cannot be bar-coded.

■ RSS (GS1 DataBar) Expanded



Name	Description
1 Left/Right Guard Pattern	Provides the bar code area. It consists of bars and spaces of one module (minimum unit consisting on bars and spaces).
2 Check Character	This check character is composed with 7 bars and spaces consisting with 18 modules, and it is set between 2 data characters. It is used to check if the read data is correct or not by putting the value calculated with the certain formula on just before the stop character for re-calculation.
3 Finder Pattern	Functions as a check character or segment identifier, too, which makes symbols to be easily recognized. It consists of five elements having 15 modules.
4 Data Character	Has the (n, k) structure. “n” indicates the number of modules and “k” indicates that of bars and spaces that make up the character. As shown in the figure above, the data character is arranged so as to facing to the adjacent finder pattern (toward the arrow direction).
5 Bar Code Height	The minimum value of bar code height is 34 times as high as the module width. For RSS Expanded Stacked, the minimum value of one step of bar code is 34 times as high as the module width.

The RSS (GS1 DataBar) Expanded barcode has the additional version show below.

RSS (GS1 DataBar) Expanded Stacked

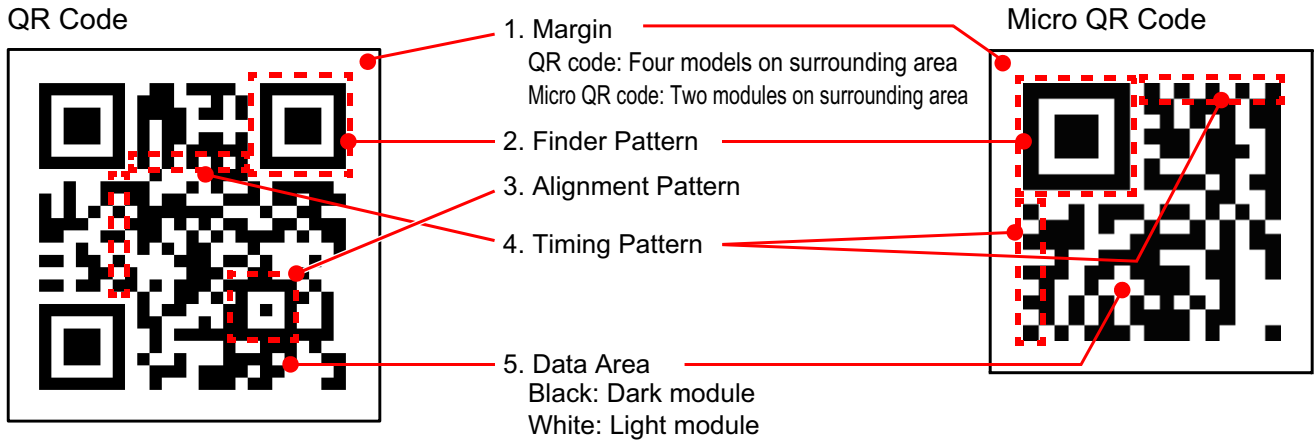
The RSS (GS1 DataBar) Expanded Stacked is the multi-tier symbol consisting of RSS (GS1 DataBar) Expanded content to meet the products with the narrow marking field. Up to 11 tiers can be piled up.



Content of code data

- The RSS (GS1 DataBar) Expanded bar code can indicate 0 to 9, A to Z, symbols (! " % & ' () * + , - . / : ; < = > ? _), space and function character (FNC1). Up to 60-figure of numerical characters or 40 alphabetical characters can be bar-coded.

■ QR Code



Name	Description
1 Margin (Quiet Zone)	The space necessary to read the code. For QR code, four modules on surrounding area are needed and two modules are needed for Micro QR code.
2 Finder Pattern	The pattern to detect the location of symbol. It allows high-speed scanning of code. It allows high-speed scanning of code. It has the size of 7×7 modules. The ratio of module width is 1:1:3:1:1 (see the figure below). When a finder pattern is created with the Font Maker, the entire character image is the finder pattern area of QR code.
3 Alignment Pattern	The pattern to correct the strain of symbol.
4 Timing Pattern	The pattern used to acquire the data density.
5 Data Area	The area where data are coded. The black unit module (the minimum unit of code) is called as "dark module" and white as "light module". When creating dark/light module patterns with the Font Maker, the entire character image is the module pattern area of QR code.

Content of code data

- It can include alphanumeric character, Kanji, Katakana, Hiragana, symbol, binary and control code.

QR Code Version and Data Capacity

The relation versions and data capacity (the maximum number of character) is shown below.

- Model 1 : Primary specification of QR code.
- Model 2 : Enhanced version which improves the function of location correction, possible to deal with large volume data.
- Error Correction : Performs detection and recovery when the code gets dirty or damaged partially. For example, on Level H, the data can be recovered even if about 30% of code area is corrupted.
L (approx. 7%), M (15%), Q (25%) or H (30%) is selectable for QR code.
For Micro QR code, only error correction can be performed on Version M1. The rate of corruption recoverable can be selected from 7% or 15% for M2 and M3, and 7%, 15%, or 25% for M4.

Reference

For the available character details of each mode, refer to “Code Type and Code Data” (P.188).

Micro QR Code

Version	Numerical mode				Alphanumeric mode				Binary mode				Kanji mode			
	L	M	Q	H	L	M	Q	H	L	M	Q	H	L	M	Q	H
M1 (11 × 11)	5	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
M2 (13 × 13)	10	8	—	—	6	5	—	—	—	—	—	—	—	—	—	—
M3 (15 × 15)	23	18	—	—	14	11	—	—	9	7	—	—	6	4	—	—
M4 (17 × 17)	35	30	21	—	21	18	13	—	15	13	9	—	9	8	5	—

QR Code Model 1

Version	Error Correct. Level	Maximum data amount				Version	Error Correct. Level	Maximum data amount			
		Numerical	Alpha-numerical	Binary	Kanji			Numerical	Alpha-numerical	Binary	Kanji
1 (21 × 21)	L	40	24	17	10	8 (49 × 49)	L	255 *	255 *	206	126
	M	33	20	14	8		M		229	158	97
	Q	25	15	11	6		Q		183	126	77
	H	16	10	7	4		H		203	123	85
2 (25 × 25)	L	81	49	34	20	9 (53 × 53)	L	255 *	255 *	244	150
	M	66	40	28	17		M			184	113
	Q	52	31	22	13		Q		223	154	94
	H	33	20	14	8		H		239	145	100
3 (29 × 29)	L	131	79	55	33	10 (57 × 57)	L	255 *	255 *	255 *	177
	M	100	60	42	25		M			219	135
	Q	81	49	34	20		Q		180	111	
	H	52	31	22	13		H		176	121	74
4 (33 × 33)	L	186	113	78	48	11 (61 × 61)	L	255 *	255 *	255 *	205
	M	138	84	58	35		M			253	156
	Q	114	69	48	29		Q		205	126	
	H	76	46	32	19		H		142	87	
5 (37 × 37)	L	253	154	106	65	12 (65 × 65)	L	255 *	255 *	255 *	234
	M	191	116	80	49		M			178	
	Q	157	95	66	40		Q		241	148	
	H	105	63	44	27		H		162	100	
6 (41 × 41)	L	255 *	194	134	82	13 (69 × 69)	L	255 *	255 *	255 *	255 *
	M	249	151	104	64		M			202	
	Q	201	122	84	51		Q		168		
	H	133	81	56	34		H		189	116	
7 (45 × 45)	L	255 *	244	168	103	14 (73 × 73)	L	255 *	255 *	255 *	255 *
	M		188	130	80		M			225	
	Q	253	154	106	65		Q		189		
	H	167	101	70	43		H		207	127	

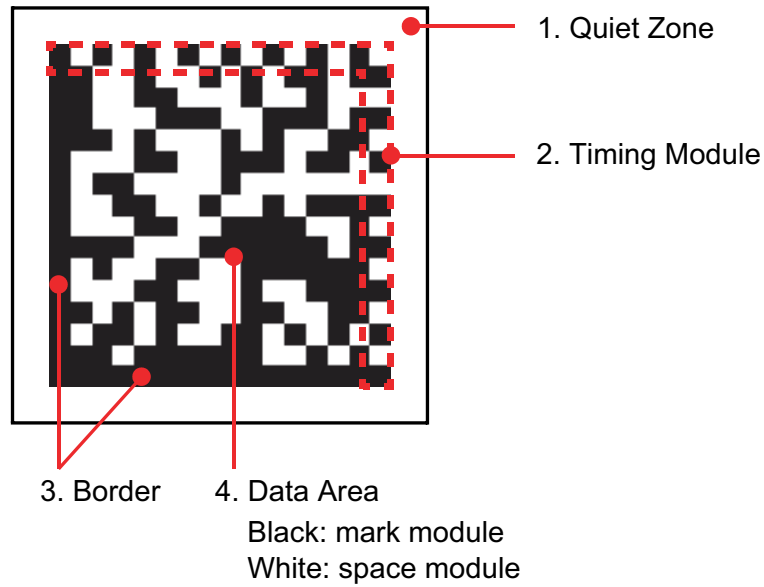
* : Though the codes indicated with “255 *” can contain more than 255 digits based on their standard, in the laser marker 255 digits are the max. amount of the code data to be input.

QR Code Model 2

Version	Error Correct. Level	Maximum data amount				Version	Error Correct. Level	Maximum data amount			
		Numerical	Alpha-numerical	Binary	Kanji			Numerical	Alpha-numerical	Binary	Kanji
1 (21 x 21)	L	41	25	17	10	12 (65 x 65)	L	255 *	255 *	255 *	226
	M	34	20	14	8		M			177	
	Q	27	16	11	7		Q			203	125
	H	17	10	7	4		H			227	155
2 (25 x 25)	L	77	47	32	20	13 (69 x 69)	L	255 *	255 *	255 *	255 *
	M	63	38	26	16		M			204	
	Q	48	29	20	12		Q			241	149
	H	34	20	14	8		H			177	109
3 (29 x 29)	L	127	77	53	32	14 (73 x 73)	L	255 *	255 *	255 *	255 *
	M	101	61	42	26		M			223	
	Q	77	47	32	20		Q			159	
	H	58	35	24	15		H			194	120
4 (33 x 33)	L	187	114	78	48	15 (77 x 77)	L	255 *	255 *	255 *	255 *
	M	149	90	62	38		M			254	
	Q	111	67	46	28		Q			180	
	H	82	50	34	21		H			220	136
5 (37 x 37)	L	255	154	106	65	16 (81 x 81)	L	255 *	255 *	255 *	255 *
	M	202	122	84	52		M			198	
	Q	144	87	60	37		Q			250	154
	H	106	64	44	27		H				
6 (41 x 41)	L	255 *	195	134	82	17 (85 x 85)	L	255 *	255 *	255 *	255 *
	M	255	154	106	65		M			224	
	Q	178	108	74	45		Q			173	
	H	139	84	58	36		H				
7 (45 x 45)	L	255 *	224	154	95	18 (89 x 89)	L	255 *	255 *	255 *	255 *
	M		178	122	75		M			243	
	Q	207	125	86	53		Q			191	
	H	154	93	64	39		H				
8 (49 x 49)	L	255 *	255 *	192	118	19 (93 x 93)	L	255 *	255 *	255 *	255 *
	M		221	152	93		M			208	
	Q	157	108	66	Q						
	H	202	122	84	52		H				
9 (53 x 53)	L	255 *	255 *	230	141	20 (97 x 97)	L	255 *	255 *	255 *	255
	M		180	111	M		235				
	Q	189	130	80	Q						
	H	235	143	98	60		H				
10 (57 x 57)	L	255 *	255 *	255 *	167	21 (101 x 101)	L	255 *	255 *	255 *	255 *
	M		213	131	M		248				
	Q	221	151	93	Q						
	H	174	119	74	H						
11 (61 x 61)	L	255 *	255 *	255 *	198	22 (105 x 105)	L	255 *	255 *	255 *	255 *
	M		251	155	M						
	Q	177	109	Q							
	H	200	137	85	H						

* : Though the codes indicated with “255 *” can contain more than 255 digits based on their standard, in the laser marker 255 digits are the max. amount of the code data to be input.

■ Data Matrix Code



Name	Description
1 Quiet Zone	Quiet zone is necessary to scan the code. The data matrix needs one module surrounding the code.
2 Timing Module	Has the alignment pattern with black and white modules. It provides easy recognition of data modules.
3 Border	The orientation of data matrix can be detected by the alignment pattern with L-shaped lines.
4 Data Area	The area where data are coded. The black unit module (the minimum unit of code) is called as "mark module" and white as "space module". When creating mark/space module patterns with the Font Maker, the entire character image is the module pattern area of data matrix code.

Symbol Size and Data Capacity

The relation between symbol size and data capacity (the maximum number of character) of Data Matrix code is shown below.

Symbol Size	Numeric 0 to 9 (single byte)	Alphanumeric *2 (single byte)	Kanji						
10 x 10	6	3	0						
12 x 12	10	6	1						
14 x 14	16	10	3						
16 x 16	24	16	5						
18 x 18	36	25	8						
20 x 20	44	31	10						
22 x 22	60	43	14						
24 x 24	72	52	17						
26 x 26	88	64	21						
32 x 32	124	91	30						
36 x 36	172	127	42						
40 x 40	228	169	56						
44 x 44	255 *	214	71						
48 x 48		255 *	86						
52 x 52			255 *	101					
64 x 64				255 *	139				
72 x 72					255 *	183			
80 x 80						255 *	227		
88 x 88							255 *	255 *	
8 x 18								10	6
8 x 32	20							13	4
12 x 26	32	22						7	
12 x 36	44	31	10						
16 x 36	64	46	15						
16 x 48	98	72	23						

*1 : Though the codes indicated with "255 *" can contain more than 255 digits based on their standard, in the laser marker 255 digits are the max. amount of the code data to be input.

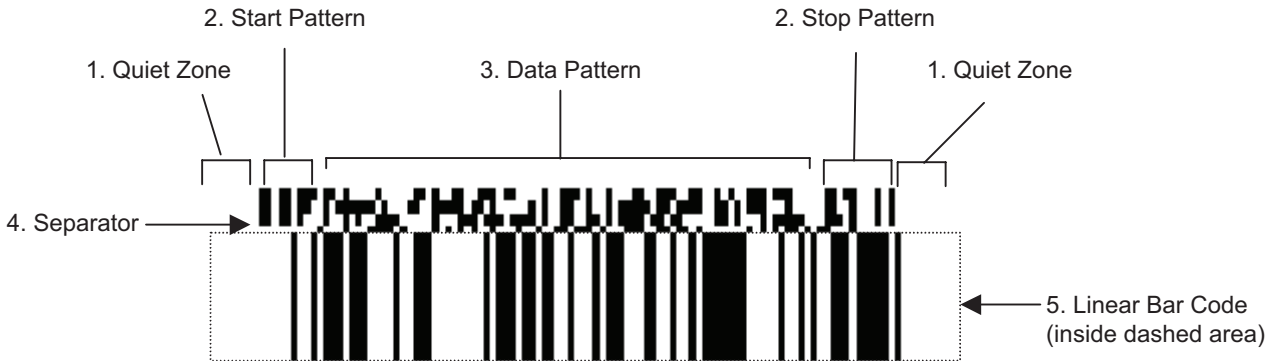
*2 : The code data consists of space, number (0 to 9) or capital alphabet (A to Z) is in "Alphanumeric" mode. In Alphanumeric, according to the number and alphabet combination, there is a case that the max. digits of the input data can exceed the number shown above list.

■ Composite

Composite is a symbol that combines a linear bar code with 2D code as its meaning.

[EAN-13, EAN-8, UPC-A, UPC-E, RSS (GS1 DataBar) series, and UCC/EAN-128 (GS1-128)] can be used for a linear bar code, and it's the composition shall be conformed to each standard. Three kinds [CC-A, CC-B, and CC-C] can be used for 2D code, and there is a difference in the volume of data etc. that can be encoded. CC-C is combined only with UCC/EAN-128 (GS1-128) though the combination of a linear bar code and 2D code is basically free.

The following figure shows the typical example of [RSS-14 (GS1 DataBar) CC-A] to explain the configuration of the symbol.



Name	Description
1 Quiet Zone	Blank area necessary when reading bar code. Quiet zone for one module is necessary for the back and forth. (It is also necessary for the upper side in addition for CC-C.)
2 Start/Stop Pattern	This pattern shows the start and end of the bar code.
3 Data Pattern	This pattern has the characters contained in bar code and data for error correction.
4 Separator	Pattern between a linear bar code and 2D code.
5 Linear Bar Code	Size of quiet zone and the number of characters to be encoded, etc. are the same in case of using each bar code alone.

Content of code data

- 0 to 9, A to Z, a to z, symbols (! " % & ' () * + , - . / : ; < = > ? _), space and function character (FNC1) can be encoded. It differs according to the encoded character. It differs according to the encoded character. Examples of numeric, CC-A: Max. 56 characters, CC-B: Max. 338 characters, and CC-C: Max. 2361 characters.
- The directions for encoding the basic information like the commodity identification number for the linear bar code, and directions for encoding supplementary information like the expiration date and the lot number, etc. are designed. Please refer to EAN.UCC Composite Symbology of International Symbology Specification for details of the standard.

■ Setting Value for AUTO Set

When pressing “AUTO” button after setting bar code and referential module width for the following code symbols, RSS-14 (GS1 DataBar), RSS-14 (GS1 DataBar) Truncated, RSS-14 (GS1 DataBar) Stacked, RSS-14 (GS1 DataBar) Stacked Omnidirectional, RSS (GS1 DataBar) Limited, RSS (GS1 DataBar) Expanded, RSS (GS1 DataBar) Expanded Stacked, the following setting value is set automatically with each “W” (Width) be used as the reference for calculating the setting value.

Setting Screen	Setting Item	RSS-14 (GS1 DataBar)/RSS-14 (GS1 DataBar) Truncated
Bar Code Condition	Bar Code Height	33W
	Separator Pattern Height/(W) Ratio *	1
	Quiet/(W) Ratio *	1
	Inversion	Inversion
	Guard	Available
	Human Readable Text	Available (Character Height: 6W, Character Width: 5W, Character Interval: 4.5W, Line Feed: None *, Line Interval: 7.5W *)
	Composite Row Height *	2W
	Rows Number *	0 (minimization)
Laser Setting	Line Width	LP-400 series: half of the “Module width” LP-V/LP-W series: half of the “line width” initial value
	Marking Pitch	LP-400 series: half of the “Module width” LP-V/LP-W series: same value with the “line width” initial value
	Marking Quality Adjustment -Wait Adjustment	10

* This setting item is set automatically when selecting RSS-14 (GS1 DataBar) CC-A, CC-B.

Setting Screen	Setting Item	RSS-14 (GS1 DataBar) Stacked	RSS-14 (GS1 DataBar) Stacked Omnidirectional
Bar Code Condition	Bar Code Height	7W	33W
	Separator Pattern Height/(W) Ratio *	—	1
	Quiet/(W) Ratio *	1	
	Inversion	Inversion	
	Guard	Available	
	Human Readable Text	Available (Character Height: 6W, Character Width: 5W, Character Interval: 4.5W, Line Feed: None *, Line Interval: 7.5W *)	
	Composite Row Height *	2W	
	Rows Number *	0 (minimization)	
Laser Setting	Line Width	LP-400 series: half of the “Module width” LP-V/LP-W series: half of the “line width” initial value	
	Marking Pitch	LP-400 series: half of the “Module width” LP-V/LP-W series: same value with the “line width” initial value	
	Marking Quality Adjustment -Wait Adjustment	10	

* This setting item is set automatically when selecting RSS-14 (GS1 DataBar) CC-A, CC-B.

Setting Screen	Setting Item	RSS (GS1 DataBar) Limited
Bar Code Condition	Bar Code Height	10W
	Separator Pattern Height/(W) Ratio *	1
	Quiet/(W) Ratio *	1
	Inversion	Inversion
	Guard	Available
	Human Readable Text	Available (Character Height: 6W, Character Width: 5W, Character Interval: 4.5W, Line Feed: None *, Line Interval: 7.5W *)
	Composite Row Height *	2W
	Rows Number *	0 (minimization)
Laser Setting	Line Width	LP-400 series: half of the "Module width" LP-V/LP-W series: half of the "line width" initial value
	Marking Pitch	LP-400 series: half of the "Module width" LP-V/LP-W series: same value with the "line width" initial value
	Marking Quality Adjustment -Wait Adjustment	10

* This setting item is set automatically when selecting RSS-14 (GS1 DataBar) Limited CC-A, CC-B.

Setting Screen	Setting Item	RSS (GS1 DataBar) Expanded	RSS (GS1 DataBar) Expanded Stacked
Bar Code Condition	Bar Code Height	34W	
	Separator Pattern Height/(W) Ratio *	1	
	Quiet/(W) Ratio *	1	
	Inversion	Inversion	
	Symbol Character Quantity	—	4
	Guard	Available	
	Human Readable Text	Available (Character Height: 6W, Character Width: 5W, Character Interval: 4.5W, Line Feed: None *, Line Interval: 7.5W *)	
	Composite Row Height *	2W	
	Rows Number *	0 (minimization)	
Laser Setting	Line Width	half of the "line width" initial value	
	Marking Pitch	same value with the "line width" initial value	
	Marking Quality Adjustment -Wait Adjustment	10	

* This setting item is set automatically when selecting RSS-14 (GS1 DataBar) Expanded CC-A, CC-B.

* This setting item is set automatically when selecting RSS-14 (GS1 DataBar) Expanded Stacked CC-A, CC-B.

Readable DXF File

This laser marker can read the DXF format file described below.

- DXF-R12J, R13, R14 format

The data created either by AutoCADLT (AutoCAD are produced by Autodesk, Inc.) is recommended to apply as the DXF format file data to be read. Followings are how to create DXF format file using AutoCADLT.

- DXF-R12J, R13, R14 format

The DXF-R12J, R13J, R14J format file to be created by AutoCADLT can be prepared using the “Writing” function in “File” menu of AutoCADLT.

At this time, select “AutoCADLT R2/R12J/R13J/R14DXF” from “File Format” in “Data Writing” dialog, and then click [Save] button.

Refer to “Operation Method” that is appeared on the screen by searching the reference pages on the online help of AutoCADLT using the keyword such as “Writing”.

■ Graphic Applied on AutoCADLT and Corresponding Table for Marking Object using Laser Marker

DXF Version	Entity Name	Graphic Name	Applica- bility*	Remarks
R12J	3DFACE	3D face	N	
	3DLINE	3D line	N	
	ARC	Arc	Y	Converted into segment and output.
	ATTDEF	Attribute definition	N	
	ATTRIB	Attribute	N	
	CIRCLE	Circle	Y	Converted into segment and output.
	DIMENSION	Dimension	N	
	INSERT	Insert graphic	Y	Converted into each graphic element and output.
	LINE	Segment	Y	Output with segment.
	POINT	Point	N	
	POLYLINE	2D Polyline	Y	Converted arc into segment and output. Bold line is not supported.
		3D Polyline	N	
	SEQEND	Close	Y	Applicable only for reproducing polyline.
	SHAPE	Shape	N	
	SOLID	2D paint	Y	Output outline into segment and output internal into horizontal/vertical segment.
	TEXT	Character	Y	Converted character with specified font into segment and output.
	TRACE	Bold line	N	
VERTEX	Top	Y	Applicable only for reproducing polyline.	
VIEWPORT	View port	N		

DXF Version	Entity Name	Graphic Name	Applica- bility*	Remarks
R13J, R14	3DSOLID	3D paint	N	
	ACAD_PROXY_ENTITY	Proxy graphic	N	
	BODY	body	N	
	ELLIPSE	Ellipse	Y	Converted into segment and output.
	HATCH	Hatching	Y	Target graphic: segment, arc, ellipse only. Hatching pattern is reproduced for all painting.
	IMAGE	Image	N	
	LEADER	Lead line	N	
	LWPOLYLINE	Light Weight polyline	Y	Converted arc into segment and output. Bold line is not correspondable.
	MLINE	Multi-line	N	
	MTEXT	Multi-text	Y	Converted character with specified font into segment and output.
	OLEFRAME	OLE frame	N	
	OLE2FRAME	OLE2 frame	N	
	RAY	Radiation (half line)	Y	Output with segment.
	REGION	Region	N	
	SPLINE	Free curve	Y	Converted into segment and output.
TOLERANCE	Geometric tolerance	N		
XLINE	Line (straight line)	Y	Output with segment.	
R14 (Used Express Tools)	ARCALIGNEDTEXT	Character string on arc	N	
	RTEXT	Reference character string	N	
	WIPEOUT	Masking graphic	N	

* For the applicability of the function, "Y" means "applicable" and "N" means "not applicable for this laser marker".

Reference

- The DXF file including entity not applicable to the laser marker cannot mark.
- In the case of setting CAD marking magnification for laser marker to "under 1X", the graphic including curve is not marked as just the preset marking image.
- In the case of marking the CAD data created/output by AutoCADLT after converting by the logo data conversion software, all graphics might not be marked as just the preset marking images.

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Panasonic Industrial Devices SUNX Co., Ltd.

■ Overseas Sales Division (Head Office): 2431-1 Ushiyama-cho, Kasugai-shi, Aichi, 486-0901, Japan

■ Telephone: +81-568-33-7861 ■ Facsimile: +81-568-33-8591

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