

CO<sub>2</sub> Laser Marker

LP-400 SERIES

Operation Manual

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# Preface

Thank you for purchasing Laser Marker "LP-400 Series".

For full use of this laser marker safely and properly, please read this manual 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 manual, contact the shop you bought it or our sales office.

## ■ Symbol Indications

This manual uses a variety of symbols to explain safety precautions, instructions, and references for operating personnel.

Before reading this manual, fully understand the contents of these indications.

 <b>DANGER</b>	"DANGER" denotes hazards that could result in serious personnel injury or death when handling error occurs, and emergency precautions (urgency level) when any dangerous situation causes.
 <b>WARNING</b>	"WARNING" denotes hazards that could result in serious personnel injury or death when handling error occurs.
 <b>CAUTION</b>	"CAUTION" denotes that any damages on personnels or objects could result in when handling error occurs.
	This symbol denotes the possibility of fire.
	This symbol denotes a general prohibition notice.
	This symbol denotes the prohibition of disassembling the product.
	This symbol denotes the prohibition of touching the specified place.
	This symbol denotes a general action which operators must take.
 <b>CHECK</b>	"CHECK" denotes any instructions or precautions for using this product.
 <b>REFERENCE</b>	"REFERENCE" denotes any hints for operation, detail explanations, or references.

## ■ Note

1. This manual is subject to LP-400 Series. This manual uses illustrations and screens of LP-400 Series standard model type. Note that the illustrations shown in these manuals might be different.
2. Contents of this manual will be changed without notice. This manual and software must not be partially or totally copied or revised.
3. If there are any questions, mistakes, or comments in this manual, please notify us.
4. Please remind that we have not responsibility of any results of operations in regardless of the above 3 clause.

## ■ General Terms and Conditions

Please read this document carefully with respect to our product warranty policy before using our Panasonic Industrial Devices SUNX products ("Products"). If you have any questions or comments regarding do's and don'ts of the Products, please consult your local Panasonic Industrial Devices SUNX authorized dealer for the correct use and application of the 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 or offered to Panasonic Industrial Devices SUNX 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 this 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 manual 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.

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## ■ Applicable Standards and Product Model

This product is applied the following standards. When the system is exported as a single unit or a part mounted on other machines or equipment, prior to exporting, make sure that the system may meet the requirement of the standards in countries or regions where the system is to be exported.

Model	Type	Applicable Standards
<ul style="list-style-type: none"> <li>● LP-430U/ 430TU/431U/ 431TU/435U/ 435TU/ 420S9U/ 420S9TU/ 421S9U/ 421S9TU/ 425S9U/ 425S9TU/ 410U/410TU/ 411U/411TU</li> </ul>	JIS (Japanese Industrial Standards) compliant type	JIS C 6802: 2011 "Safety of laser products"
<ul style="list-style-type: none"> <li>● LP-430U-A/ 430TU-A/ 431U-A/ 431TU-A/ 435U-A/ 435TU-A/ 420S9U-A/ 420S9TU-A/ 421S9U-A/ 421S9TU-A/ 425S9U-A/ 425S9TU-A/ 410U-A/ 410TU-A/411U-A/411TU-A</li> </ul>	FDA (Food and Drug Administration) regulations compliant type	21 CFR1040.10 and 1040.11 except for deviations pursuant to Laser Notice No. 50 "PART 1040 PERFORMANCE STANDARDS FOR LIGHT-EMITTING PRODUCTS"
<ul style="list-style-type: none"> <li>● LP-430U-C/ 430TU-C/ 431U-C/ 431TU-C/ 435U-C/ 435TU-C/ 420S9U-C/ 420S9TU-C/ 421S9U-C/ 421S9TU-C/ 425S9U-C/ 425S9TU-C/ 410U-C/ 410TU-C/ 411U-C/411TU-C</li> </ul>	EN/IEC (International Electrotechnical Commission) standards compliant type (CE Marking compliant type)	<ul style="list-style-type: none"> <li>● 2004/108/EC "EMC order"</li> <li>● 2006/95/EC "Low voltage order"</li> <li>● EN55011: 2009+A1: 2010 "Radio Disturbance Characteristics of Industrial, Scientific and Medical (ISM) Radio-frequency Equipment"</li> <li>● EN55022: 2010 "Information technology equipment - Radio disturbance characteristics - Limits and methods of measurement"</li> <li>● EN60204-1: 2006+A1: 2009 "Safety of Machinery - Mechanical electric device"</li> <li>● EN60825-1: 2007 "Safety of laser products"</li> <li>● EN61000-6-2: 2005 "Electromagnetic Compatibility (EMC)"</li> <li>● EN61010-1: 2001 "Safety requirements for electrical equipment for measurement, control and laboratory use"</li> </ul>

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# Caution in Handling Laser Beam

The product uses the laser beam of Class 4 (marking laser) and Class 2 (guide laser) classified by "Safety of laser products" (JIS C 6802), US standard (FDA 21 CFR 1040.10 and 1040.11), and international standard (IEC60825-1).

Perform the safety protection measure before using the system. Refer to "Safety Protection Measures" (P.9) for details.

This product refers to "a product which may cause injury to a human if exposed to its directly radiated light, even it is reflecting light and diffused reflecting light, or which may produce a risk of a fire".

## Radiation information

Item	Specification								Remarks
	LP-430U LP-430TU	LP-410U LP-410TU	LP-420S9U LP-420S9TU	LP-431U LP-431TU	LP-411U LP-411TU	LP-421S9U LP-421S9TU	LP-435U LP-435TU	LP-425S9U LP-425S9TU	
Wave length	10.6μm		9.3μm	10.6μm		9.3μm	10.6μm	9.3μm	Invisible beam
Laser Medium	CO <sub>2</sub>								—
Max. Output	75W	40W	75W		40W	75W			—
Oscillation Frequency	5 kHz, 10kHz, 20kHz								—
Class	4								—
NOHD	Approx. 4.5m	Approx. 3.5m	Approx. 4.5m	Approx. 2.5m	Approx. 2.0m	Approx. 2.5m	Approx. 6.0m		Nominal ocular hazard distance
MPE*	1000W/m <sup>2</sup>								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 to the value 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

\*MPE means the assumed exposure duration for determination of the value. The value calculated on 10 seconds.

The "CLASS 4 LASER PRODUCT" refers to

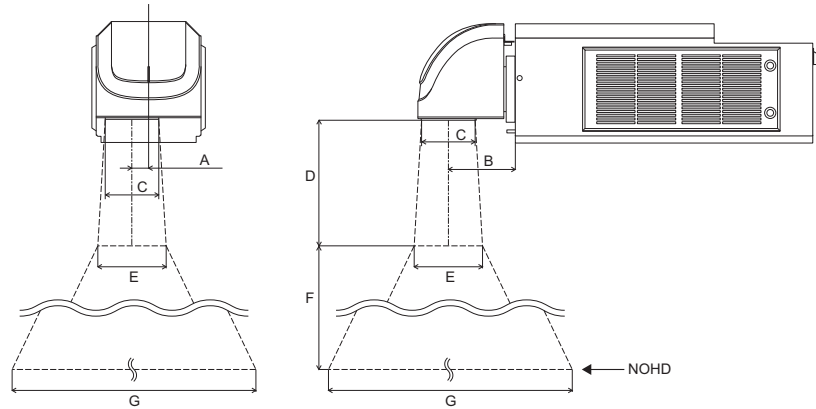
"a product which may cause injury to a human if exposed to its directly radiated light, even it is reflecting light and diffused reflecting light, or which may produce a risk of a fire.

Perform the safety prevention measure before using the system. Refer to "Safety Protection Measures" (P.9) for details.

# ■ Laser Radiation Range

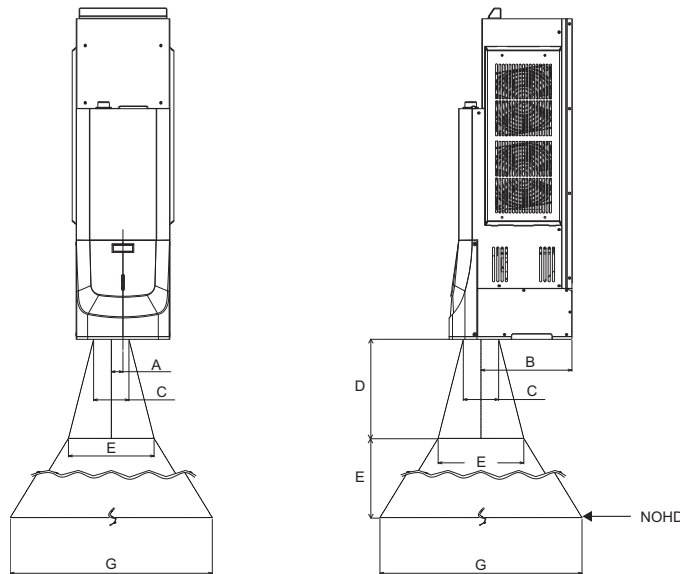
LP-4xxU / LP-42XS9U (Standard head type)

[Unit: mm]



LP-4xxTU / LP-42XS9TU (Tower head type)

[Unit: mm]



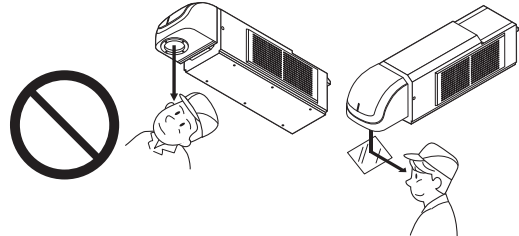
[Unit: mm]

Specified Point	Model									
	LP-431U LP-421S9U	LP-431TU LP-421S9TU	LP-430U LP-420S9U	LP-430TU LP-420S9TU	LP-435U LP-425S9U	LP-435TU LP-425S9TU	LP-410U	LP-410TU	LP-411U	LP-411TU
A: Center Position of Laser Emission Port	28	22	28	22	28	22	28	22	28	22
B: Center Position of Laser Emission Port	113	170.5	113	170.5	113	170.5	113	170.5	113	170.5
C: Diameter of Laser Emission Port	φ 66		φ 66		φ 66		φ 66		φ 66	
D: Focal distance	111		185		262		185		111	
E: Laser Radiation Range at Focal distance	φ 80		φ 160		φ 230		φ 160		φ 80	
F: NOHD	2500		4500		6000		3500		2000	
G: Laser Radiation Range at NOHD	φ 3400		φ 5700		φ 7100		φ 4500		φ 2800	



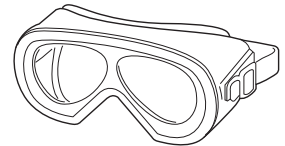
## DANGER

Never look at laser beam directly or through lens. Diffused reflected beam is also harmful.  
 CO<sub>2</sub> laser does not enter into eye's retina, however, if it exposed to the eyes, it can inflict severe corneal injuries.

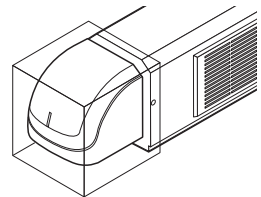


## WARNING

Wear laser protective goggles for operator's eyes. The goggles should be used against scattered beam, so avoid to direct beam or reflection beam. (Do not look laser beam during guide indication even when laser pumping switch is turned off.)

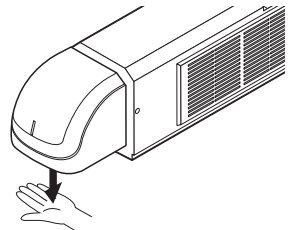


In order to prevent unexpected exposures from object to be marked or its peripherals, set protective enclosure which is made of acrylic resin, glass, or metal to enclose the laser radiation area.



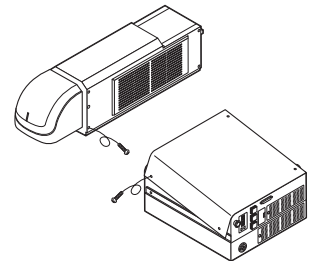
Never touch laser beam.  
 Avoid human skin exposure directly to laser beam. Burning into deep skin might result. Be careful not to touch laser beam with clothing as well.

When using the system, do not touch laser beam with human body, papers, or clothing, etc.



Never disassemble the product.

Exposure of laser beam or electric shock might occur. In the event a failure occurs in the system, contact us..



Read this manual thoroughly, and do not operate any other methods except the instructions provided in this manual.

Exposure of laser beam might occur.





# Safety Protection Measures

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 (JIS C 6802) / FDA standards 21 CFR 1040.10 and 1040.11/IEC60825-1. Perform the safety protection measure shown below before using the system.  
For more detail instruction, refer to each of the standard.

## 1. Interlock system

In order to prevent exposure to laser beam accidentally reflected from the substrate to be marked or from its circumferential areas, place a protective enclosure so that it can enclose the area in the range of laser radiation, and construct the interlock mechanism in the system.

Additionally, install the control part that is not to exposure to the laser beam. Refer to "Construction of Interlock System"(P.16).



For laser pumping is shut-off by interlock system, construct a laser re-pumping system by manual operation for safety.

## 2. Wearing protective goggles

For protection eyes of an operator, make it mandatory to wear goggles against laser beam.

Purchase the proper type of the protective goggles in consideration of the wave length (Refer to " Caution in Handling Laser Beam" (P.6), working environment, etc.

## 3. Protective enclosure

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

i.e., please made from acrylic resins, glass, metals, etc.

It is, however, recommended that the thickness of an acrylic or glass plate is more than 3 mm and that the plate has a color to prevent secondary radiation beam.

## 4. 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.



It is obligated by IEC/FDA/JIS that laser products shall incorporate a key-actuated master control. Actuation of Our laser marker is basically controlled by the key switch located on the front of the controller box. 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.

## 5. Power failure recovery

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

## 6. 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. (Labels of cautions, instructions, and open indication are adhered to the system at delivery from the plant. Do not peel them off.)

## 7. Termination of laser beam

High output laser is used for marking taking into consideration a case where there is no substrate in a laser path, terminate a laser beam path within the marking range by using a flame-resistant object. Do not use the laser for the end edge of the specular reflexion.

## 8. Path of laser beam

It is recommended that laser beam passes through the position being either lower than eye-level at the time of human's sitting or being higher than eye-level at the time of human's standing.

## 9. Illumination

Make the area surrounding the laser marker well-lighted as much as possible. Because the pupils are contracted in the well-lit place, your eyes can be well protected.

Do not expose strong beam to the laser radiation exit. Failure to do so could cause the malfunction of the power check monitor.

## 10. 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.

## 11. Appointment of laser safety manager

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

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

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



REFERENCE

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