Panasonic

Laser Marker

Laser Marker NAVI smart Operation Manual

LP-GS series
LP-RC series
LP-RF series
LP-RV series

ME-NAVIS-OP-9

2020. 1 | panasonic.net/id/pidsx/global

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.

The English version of this document is the original version. All other languages are translations that are based on the original documentation.

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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

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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.

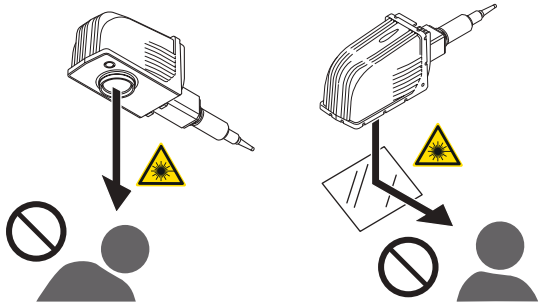
⚠ **DANGER**	Denotes a potential hazard that will result in serious injury or death.
⚠ **WARNING**	Denotes a potential hazard that could result in serious injury or death.
⚠ **CAUTION**	Denotes a hazard that could result in minor injury.

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

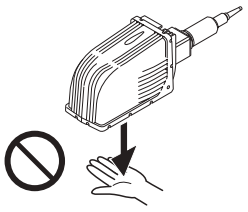
	This symbol is used to alert users to a specific operating procedure that must not be performed.
	This symbols is used to alert users to a specific operating procedure that must be followed in order to operate the unit safely.
	This symbols is used to alert users to a specific operating procedure that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



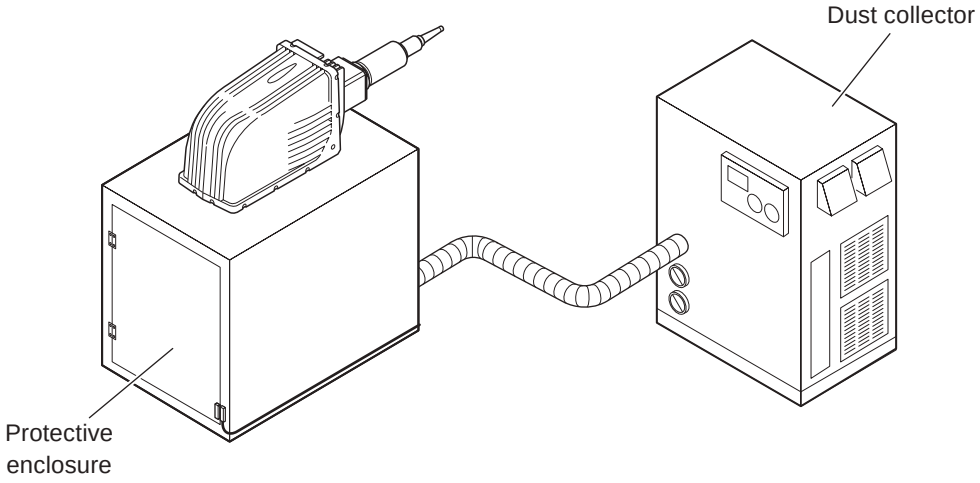
⚠ WARNING

- 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 except for water-resistant part 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 intake port. There is a risk of electrical shock or injury.
- 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.

- Set protective enclosure with proper reflectance, durability and thermal resistance to enclose the laser radiation area without leakage.
- Construct an interlock systems such as a function to stop laser radiation for the maintenance door of the protective enclosure.
- 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 and controller (for LP-RV series, the head, controller and oscillator unit) of the laser marker which have the same model number. Otherwise there is a risk of exposure to laser radiation or failure.
- 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. If the product is used in a manner not specified by the instruction, the safety protection and functions provided by the device may be impaired and may cause injury, electrical shock or exposure of laser beam.
- 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.
- For LP-RF/LP-RV 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, it may cause laser exposures.

⚠ WARNING

- 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.

- To carry this product, wear the non-slip gloves and safety shoes. Hold the product with both hands. Do not hold the cables or connectors at carrying.
- For LP-RC/LP-RF/LP-RV series, carry the controller unit with two persons. Lifting or carrying without assistance may cause of injury.
- Install this product in the stable place without vibration and shock.
- In case it falls down, it may cause injury.

⚠ CAUTION

- Do not touch the head surface of LP-RF/LP-RV series during and right after the operation. It becomes hot and may cause burn injury.

How to Read this Document

■ Symbol description

Notice	“Notice” denotes any instructions or precautions for using this product. To prevent the damage or malfunction of the product, observe these precautions fully.
Reference	“Reference” denotes any hints for operation, detail explanations, or references.

■ Target model

This manual is subject to the following Laser Marker models.
In this manual, this product is called “laser marker”.
If the setting contents or specifications vary by models, the target models are specified in the text.
In the text, multiple models may be described collectively, as shown in the table below.
Please remind that the illustration and the screen image may vary with the model.

<table>
<tr><th colspan="4">Target model</th><th colspan="3">Description in the text</th></tr>
<tr><td>LP-GS051</td><td colspan="2">LP-GS051-E</td><td rowspan="2">LP-GS051</td><td rowspan="4">LP-GS051(-L)</td><td rowspan="6">LP-GS series</td></tr>
<tr><td>LP-GS051-F</td><td>LP-GS051-FE</td><td>LP-GS051-FN</td></tr>
<tr><td>LP-GS051-L</td><td colspan="2">LP-GS051-LE</td><td rowspan="2">LP-GS051-L</td></tr>
<tr><td>LP-GS051-LF</td><td>LP-GS051-LFE</td><td>LP-GS051-LFN</td></tr>
<tr><td>LP-GS052</td><td colspan="2">LP-GS052-E</td><td colspan="2" rowspan="2">LP-GS052</td></tr>
<tr><td>LP-GS052-F</td><td>LP-GS052-FE</td><td>LP-GS052-FN</td></tr>
<tr><td colspan="4">LP-RC350S</td><td colspan="2">LP-RC350S</td><td>LP-RC series</td></tr>
<tr><td colspan="4">LP-RF200P</td><td colspan="2">LP-RF200P</td><td>LP-RF series</td></tr>
<tr><td colspan="4">LP-RV200P</td><td colspan="2">LP-RV200P</td><td>LP-RV series</td></tr>
</table>

■ Type of manuals

For this product, the following manuals are prepared. Read each manuals and operate this product correctly and safely. Also, save the manuals for future use.

Laser Safety Guide

This manual describes the items required for using this product correctly and safely. All users shall be required for reading this manual.

Setup/Maintenance Guide

This manual describes the items required for introduction and installation of this product as well as for the maintenance work.

- Product specifications, external dimensions
- Installation and connection method
- Signal details, I/O rating, and timing chart when I/O is used for control
- Maintenance details

Laser Marker NAVI smart Operation Manual

Instruction manual for the laser marker configuration software “Laser Marker NAVI smart”. This manual describes the procedure and method to operate the laser marker, and the screen operations to set marking contents.
Mainly the users that operate this laser marker for actual marking procedure shall be required for reading this manual.

Serial Communication Command Guide

This manual describes the communication commands to control this product externally using the serial communication (RS-232C/Ethernet). It describes the communication settings, communication data formats, communication commands, and the control samples.
Mainly the machine builder and system integrator shall be required for reading this manual.

Serial Communication Command Guide: LP-400/V compatible mode

This manual describes the communication commands to control this product externally using the compatible command format with the previous models of LP-400/LP-V series.
Mainly the machine builder and system integrator shall be required for reading this manual.

Reference

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

Contents

1 Installation / Uninstallation

1-1 Software Configuration

1-1-1 Stored data in Laser Marker Smart Utility

The CD-ROM “Laser Marker Smart Utility” attached to laser marker product contains the following data.

■ PC configuration software

Software Name	Description
Laser Marker NAVI smart	Sets the marking data and operates the laser marker.
Logo Data Editing Software	Creates and edits the graphic data (.vec) for laser marking.
ExportVec Software	Plug-in software for Adobe® Illustrator®. It converts the graphic data in AI/EPS formats to the laser marker special format “VEC”.
Font Maker Software	Creates and edits the font data (.fon) for laser marking.

Reference

- Installing Laser Marker Smart Utility to the PC makes the following software available.
  - Laser Marker NAVI smart
  - Logo Data Editing Software
  - Font Maker Software
- For the installation procedures of ExportVec, refer to ExportVec Operation Manual.

■ PDF manuals

[CD-ROM]\Document

Manual Name
Laser Safety Guide (LP-GS/LP-RC/LP-RF/LP-RV series)
Setup/Maintenance Guide (LP-GS/LP-RC/LP-RF/LP-RV series)
Serial Communication Command Guide
Serial Communication Command Guide: LP-400/V compatible mode
Laser Marker NAVI smart Operation Manual
Logo Data Editing Software Operation Manual
ExportVec Operation Manual
Font Maker Operation Manual

■ Font data for marking characters

[CD-ROM]\Font

Font Name		
Original 1 font	Original 1 (small) font	GB 2312 level-1 font
Original 2 font	Original 2 (small) font	GB 2312 level-2 font
Original 3 font	Original 3 (small) font	User defined font
Original 4 font	JIS level-1 font	2D code pattern font
Original 5 font	JIS level-2 font	OCR1 font

Reference

- The all font data listed above are already installed in laser marker and Laser Marker NAVI smart at the delivery state.

■ Sample of the setting files

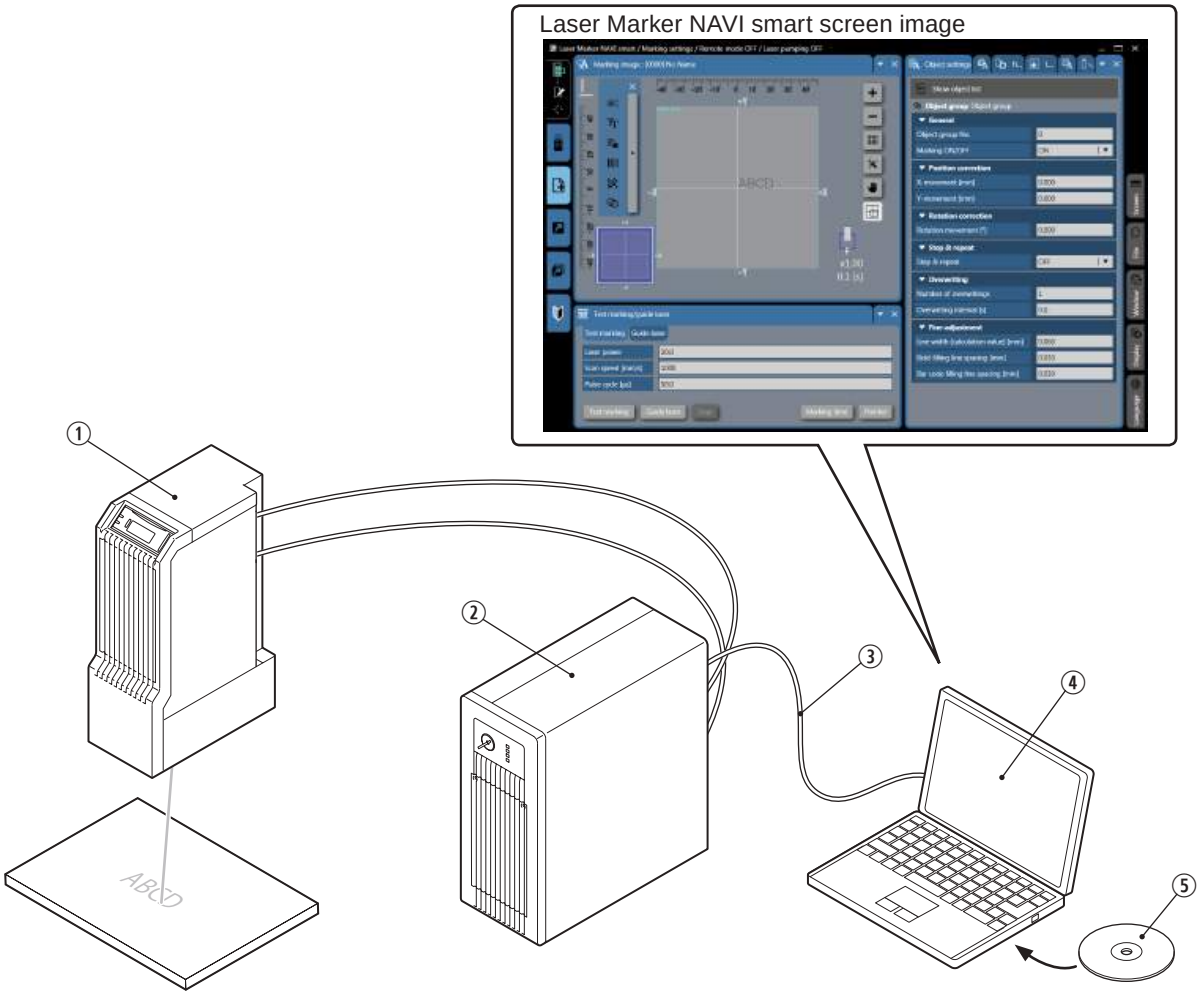
[CD-ROM]\Sample

For the reference files, the backup files (.lmb), marking files (.lms) and graphic files (.vec/.dxf) of each laser marker models are included.

1-1-2 Outline of Laser Marker NAVI smart

Laser Marker NAVI smart, stored in the attached CD-ROM “Laser Marker Smart Utility”, is a configuration software for the laser marker.
Using Laser Marker NAVI smart, set and operate the laser marker as follows:

- Create and edit the marking data (Online/offline)
- Operate and control the laser marker (Online)
- Monitor the running status of the laser marker (Online)



No.	Name	Description
①	Head *	It is the unit that radiates the laser beam. The devices such as the optical components and the scanner are loaded inside.
②	Controller *	It is the unit that generates the marking data. The main power supply of the laser marker and connection interface with external devices are loaded.
③	USB Cable (Accessory)	It is the cable to connect the laser marker and the PC.
④	Commercially Available PC (Not included in this product.)	Install the attached software “Laser Marker Smart Utility” onto a PC and set the marking data of the laser marker. You can use this PC as a monitor during the operation.
⑤	Laser Marker Smart Utility Software (Accessory)	This software contains the laser marker configuration software “Laser Marker NAVI smart” and various manual data.

* The illustrational figures and product configuration may vary among the models.

1-2 Operating environment

Notice

- The software license agreement is displayed on the screen during installation. You have to accept this agreement, to use the software.

Reference

- This software can be installed on a computer and more than one person may, under the supervision of the end-user, use this software installed on one computer.
- If the software user is limited to the end-user, this software can be installed on more than one computer on the condition that the software is not used simultaneously.

■ Operating environment

Install the Laser Marker NAVI smart in the following environment.

Item	Installation requirements
OS *1	Microsoft® Windows® 10 Pro 32bit, 64bit Microsoft® Windows® 8.1 Pro 32bit, 64bit Microsoft® Windows® 7 Professional SP1 32bit, 64bit
Free area on hard disk	512MB or more
CD-ROM drive *2	1 set or more
USB port	USB 2.0
LAN *3	10BASE-T or 100BASE-TX
Bluetooth® *4	Version 2.0 / 2.1 / 3.0
Memory capacity	2GB or more
CPU	Equivalent to or higher than Intel Core i3
Display resolution	1366 x 768 pixels or above
Display size	10.6 inch or above
Others	Pointing device such as a mouse, character input device such as a keyboard, or a touch interface *5

*1 : OS versions of which Microsoft has ended support are excluded. 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. Laser Marker NAVI smart can be installed in English, Simplified Chinese, German or Japanese. It is preferred that the OS language corresponds to the installation language. If the OS language is other than these supported languages, install Laser Marker NAVI smart in English.

*2 : To install “Laser Marker Smart Utility” 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.

*3 : Specifications to be observed for Ethernet connection.

*4 : Specifications to be observed for wireless Bluetooth connection. Bluetooth is available with the following models.
- LP-GS051 / LP-GS051-E / LP-GS051-L / LP-GS051-LE
- LP-GS052 / LP-GS052-E

*5 : To use a touch interface, Windows 8.1 Pro or Windows 10 Pro is required.

1-3 Installation

Install Laser Marker Smart Utility with the following steps.

1. Install the attached CD-ROM software “Laser Marker Smart Utility” to the PC.

   Refer to “1-3-1 Installation of Laser Marker Smart Utility” (P.17).

2. Connect Laser Marker and PC with attached USB cable.

   Refer to “Setup/Maintenance Guide” for the wiring.

3. Install USB driver.

   Refer to “1-3-2 Installation of USB driver” (P.22).

4. Start up Laser Marker NAVI smart.

   Refer to “Start-up” (P.24).

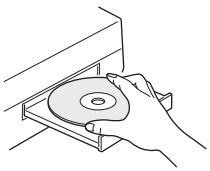
Reference

- When install the Laser Marker Utility into the PC, the private character font data (EUDC.TTE/EUDC.EDF) is overwritten. If the private character font is used in other applications, do not install the Laser Maker Smart Utility into the PC.
- The displayed screen during the installation may vary depending on OS versions.

1-3-1 Installation of Laser Marker Smart Utility

1. Start up the personal computer.

2. Insert the attached CD-ROM “Laser Marker Smart Utility” into the CD-ROM drive. The installation will begin automatically.



Reference

- To install “Laser Marker Smart Utility” 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.
- If the installation screen does not appears, double-click on following file to start installation. [CD-ROM]\Setup\LaserMarkerSmartUtility\setup.exe

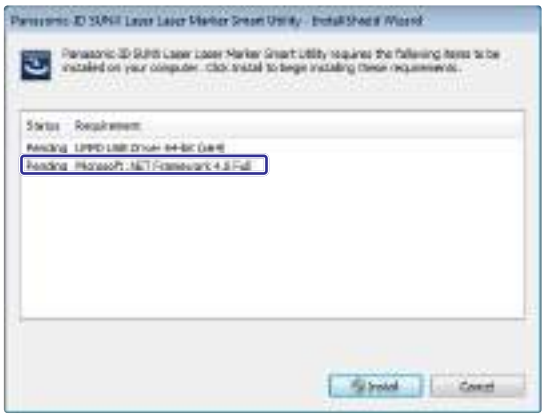
3. Select the language for the software display, and click “OK”.

Reference

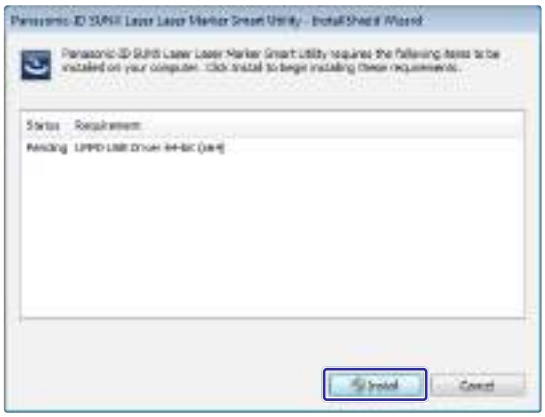
- The display language of Laser Marker NAVI smart can be switched later on Laser Marker NAVI smart screen. Refer to “2-2-4 Language selection” (P.33).

4. If it is the first time to install “Laser Marker Smart Utility” to the PC, install the “Laser Marker USB Driver” following the below procedures.

If Microsoft .NET Framework 4.0 is not installed in the PC, installation screen will appear.
Install it following the screen instruction.



4-1 Click “Install” to start installation of Laser Marker USB Driver.
If this screen dose not appear, skip this No.4 and see the procedure from No.5.



4-2 Select the language to display the procedures of USB driver installation, and click “OK”.

4-3 Click “Next”.

4-4 The software license agreement appears. Read the license agreement and select “I accept the terms in the license agreement” if you agree it, then, click “Next”.

4-5 Click “Install” to start the installation of USB driver for the laser marker.

4-6 “Windows Security” screen will appear. Click “Install”.

4-7 Click “Finish”.
“Laser Marker Smart Utility-InstallShield Wizard” screen as the next procedure appears automatically.

5. The installation screen appears. Click “Next” to install Laser Marker Smart Utility.

6. The software license agreement appears. Read the license agreement and select “I accept the terms in the license agreement” if you agree it, then, click “Next”.

7. Input the customer information.
Click “Next”.

8. Select the destination folder of installation and click “Next”.

Reference

- The following folder is selected in the default settig:
  C:\Program Files\Panasonic-ID SUNX Laser\LaserMarker Utility
  or
  C:\Program Files (x86)\Panasonic-ID SUNX Laser\LaserMarker Utility

9. Click “Install” to start installation Laser Marker Smart Utility.

10. “InstallShield Wizard Completed” screen appears. Click “Finish”.

1-3-2 Installation of USB driver

This section describes the installation procedure of USB driver, which is required to connect the PC and laser marker.

Reference

- Before connecting the PC and laser marker, complete the installation of “Laser Marker Smart Utility”.

1. When connecting Laser Marker and the PC with USB cable, starts automatically installation USB driver software.

Reference

- The above screen appears when connecting Laser Marker and the PC with USB cable for the first time.
- For all laser markers to be connected with PC, this procedure is required.

1-4 Uninstallation

The uninstallation procedures of Laser Marker Smart Utility are explained as follows.

1. Start up the PC.

2. Open the “Control Panel” of Windows and Start up “Uninstall a program”.

3. Select “Panasonic-ID SUNX Laser LaserMarker Utility” from the list, then click “Uninstall”.

4. Click “Yes” to uninstall the Laser Marker Smart Utility.

Reference

- If the laser marker is not configurated or controlled through the PC anymore, uninstall “Panasonic-ID SUNX Laser LaserMarker USB Driver” in “Programs” in “Control Panel” as the same procedures above.

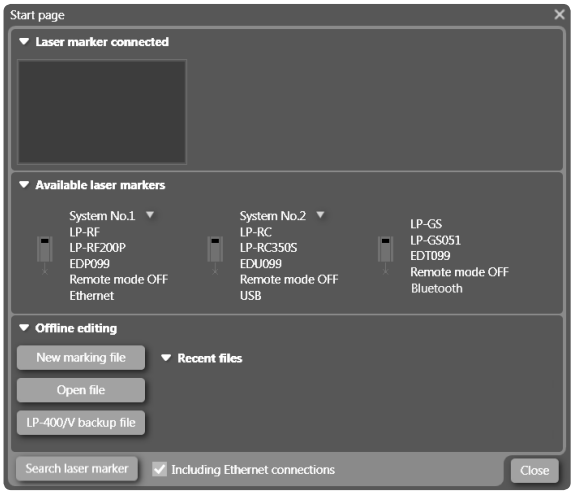
1-5 Start-up & Termination

■ Start-up

1. Depending on your Windows operating system version, do one of the following.

- In Windows 10, open the start menu and select “Panasonic-ID SUNX Laser” - “Laser Marker NAVI smart”.
- In Windows 8.1, open the start menu and select “All Apps” - “Panasonic-ID SUNX Laser” - “Laser Marker NAVI smart”.
- In Windows 7, select “Start” - “All programs” - “Panasonic-ID SUNX Laser” - “Laser Marker Smart Utility” - “Laser Marker NAVI smart”.

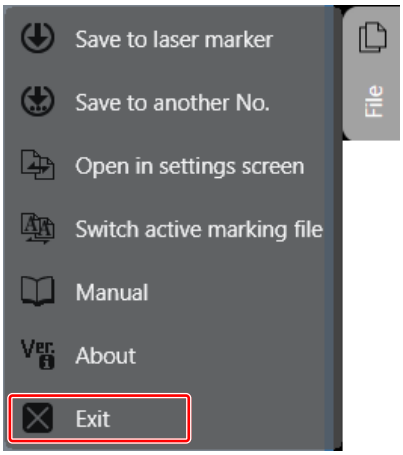
2. The start-up screen of the laser marker selection appears.



■ Termination

3. Click “Exit” from “File” menu.

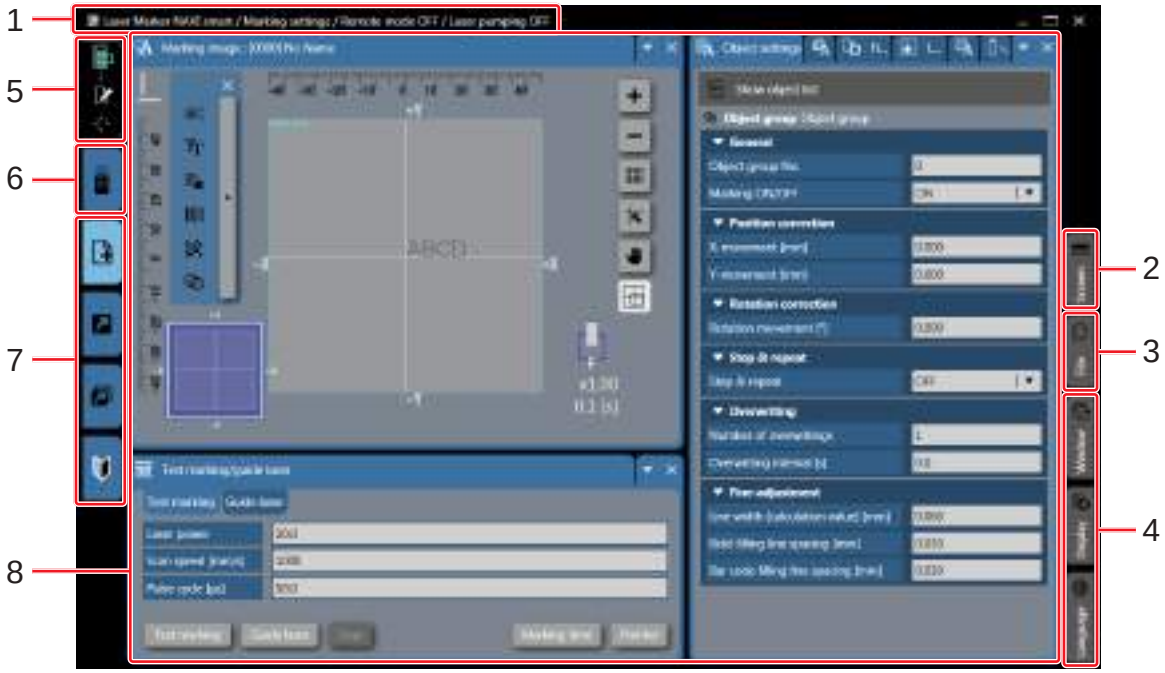
Or Click ✕ in the upper right screen.



2 Basic Operation

2-1 Screen Layout and Basic Operation

2-1-1 Screen layout



	Menu and Tool buttons	Description
1	Status information	Shows the status of Laser Marker NAVI smart and online connected laser marker with the following information. • Under online mode: screen name / remote mode status / laser pumping status / laser marker name • Under the offline editing: screen name / editing file name

Reference

- For the laser marker name, refer to “8-1-5 Naming of laser marker” (P.233).

2	Screen selection	Screen selection menu switches the application window among “Operation monitor”, “Operator settings (restricted)”, “Maintenance”, “Setting”, “Data Management” and “System settings”.
3	File	File menu executes file handling and Laser Marker NAVI smart management as follows: • Saving and changing files. • Show the manual and version of Laser Marker NAVI smart • Exit Laser Marker NAVI smart
4	Display settings	Sets the display preferences for Laser Marker NAVI smart. Refer to “2-2 Display Settings” (P.29). • Window • Screen layout • Language
5	Laser marker selection / Status indication	Laser marker selection controls online/offline connection with laser marker. The icons here indicate the laser marker status.
6	Laser marker operation	Control the laser marker operation such as laser pumping, turning to remote mode, and etc.
7	Editing tools	Create and modify the marking data using these editing tools. Available only in the marking settings screen.
8	Setting or monitoring window	The display contents vary according to the screen view type.

2-1-2 Basic operation of the screen

■ How to input characters

Input characters by using the keyboard in the PC.

Reference

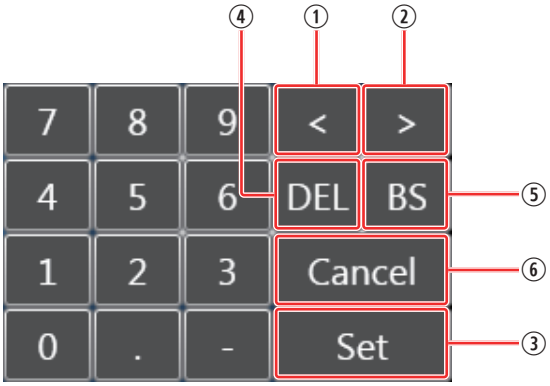
- To determine the input character, click “OK” button on the panel. Enter-key is used for the linefeed.

■ How to input numerical value

1. Press the text box for the item to set.

2. Using the ten-key in PC keyboard or panel appears on the screen, input the numerical value.

■ Pop-up ten-key arrangement

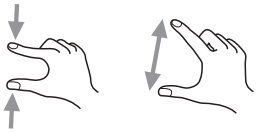
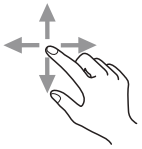


No	Description
①	Moves the cursor to the left.
②	Moves the cursor to the right.
③	Applies the settings.
④	Deletes a digit behind the cursor or the selected part.
⑤	Deletes a digit in front of the cursor or the selected part.
⑥	Closes the pop-up ten-key window.

2-1-3 Touch operation

This section describes the operation methods with the touch interface.

■ Basic operation

Operation	Description	
Tap	Specifies an item. It operates in the same manner as clicking the mouse.	
Pinch	Zoom-in or zoom-out an image view.	
Slide	Shifts a screen up and down, left and right. It operates in the same manner as the scroll bar.	

■ How to show the touch keyboard of Windows

1. Tap the “keyboard” icon on the desktop.

Or display the Windows charm bar on the right end of the screen and tap “Settings”.
Tap “Keyboard” and select “Touch keyboard and handwriting panel”.

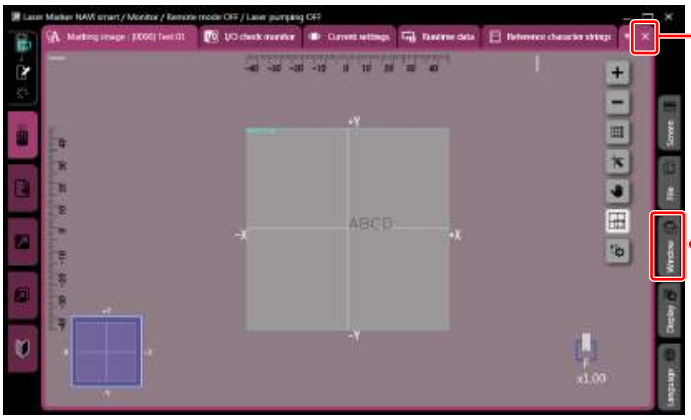
2. Tap “&123” on the keyboard to display the ten-key.

2-2 Display Settings

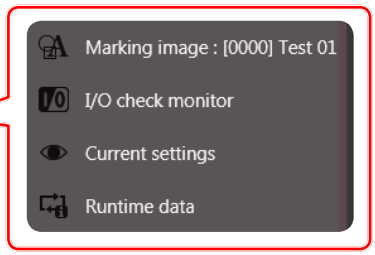
Using “Window”, “Display” and “Language” menu on the right side of screen, set the display preferences for Laser Marker NAVI smart.

2-2-1 Window

“Window” of the right menu shows the list of the setting or display windows in each screen view mode.
Select the window and it comes to the front of the screen.
If the window is hidden, it is redisplayed.



Clicking “Close” icon hides the selected window.



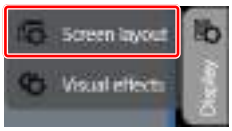
Selecting the window redisplays the hidden window.

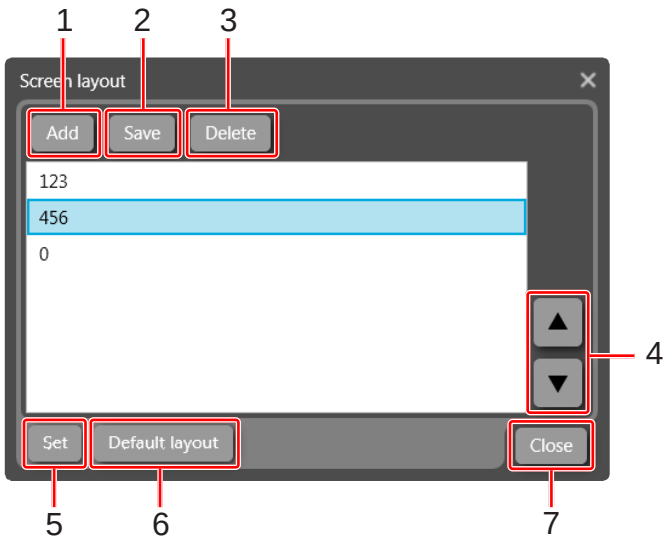
Reference

- When “Test marking/Guide laser” window in marking settings screen and operator settings screen is closed, redisplay it by using laser marker operation tool in the left menu.

2-2-2 Screen layout

Screen layout saves the currently displayed layout of Laser Marker NAVI smart and applies it to the subsequent usage.
If the screen layout is customized with “2-2-5 Docking window” (P.34) function, use this setting to save it.
Screen layout is in “Display” on the right menu.

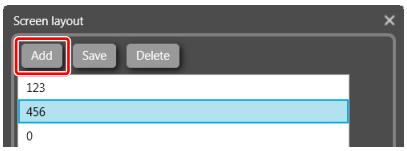




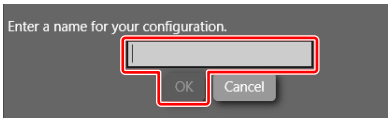
	Item	Description
1	Add	Saves the currently displayed layout of Laser Marker NAVI smart as a new setting.
2	Save	Overwrites the selected setting with the currently displayed screen layout.
3	Delete	Deletes the selected screen layout.
4	Up/down	Changes the display order in the screen layout list.
5	Set	Applies the selected setting to the screen layout. This setting is also applied to the subsequent usage.
6	Default layout	Restores the screen layout to the initial setting.
7	Close	Closes the screen layout window.

■ Add the screen layout

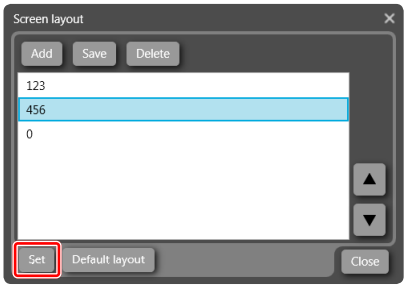
1. Click “Add”.



2. Input the setting name and click “OK”.

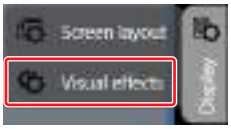


3. To use this layout setting, select the setting and click “Set”.

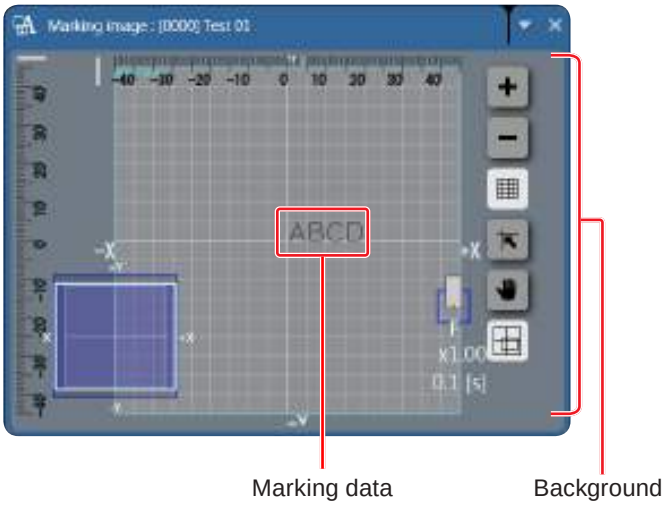


2-2-3 Visual effects

Set the visual characters on the marking image display.
Visual effects setting is in “Display” on the right menu.



Applicable window of the visual effects



	Item	Description
1	Marking data	Set the colors for the following items on the marking image display. • Marking objects • Selected objects • Masked objects • Masked guide laser objects *1 • Step & repeat objects

	Item	Description
2	Background	Set the visual characters for the following elements on the marking image display. • Grid line spacing [mm] Setting range: 0.1 to 999.9 mm • Color of grid lines • Grid line type Setting range: —— (solid line), – – – (dashed line), • • • • (dotted line) • Color of center lines • Center line type Setting range: —— (solid line), – – – (dashed line), • • • • (dotted line) • Font color for X-/Y-axis • Background color of marking field • Color of workpiece reference boundary *2 • Type of workpiece reference boundary *2 Setting range: —— (solid line), – – – (dashed line), • • • • (dotted line) • Font color of magnification • Font color of estimated marking time • Colors of error messages • Color of rulers • Cursor color of rulers
3	Set	Applies the setting to the image display. This setting is also applied to the subsequent usage.
4	Reset to default	Restores the visual settings to the initial setting.
5	Close	Closes the visual effects setting window.

*1 : Available with LP-GS051(-L) type, LP-RC350S, LP-RF series and LP-RV series.
*2 : Available with LP-RC series, LP-RF series and LP-RV series.

2-2-4 Language selection

■ Change the display language of Laser Marker NAVI smart

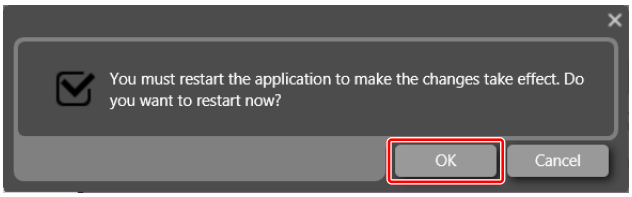
1. Click “Language” tab.

2. Select the display language from the list.

- Deutsch (German)
- English
- Japanese
- Korean
- Simplified Chinese
- Traditional Chinese

3. Confirmation dialog appears. Click “OK” to restart Laser Marker NAVI smart.

After restarting, the screen will be displayed in the selected language.



Reference

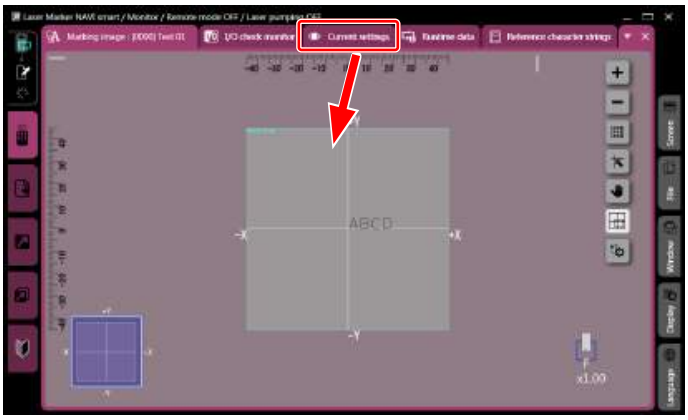
- The language setting of Laser Marker NAVI smart is not applied to the other software “Logo Data Editing Software”, “Logo Data Conversion Software” and “Font Maker Software”. The screens of “Logo Data Editing Software” and “Font Maker Software” are displayed in the language selected at the installation of “Laser Marker Smart Utility”.

2-2-5 Docking window

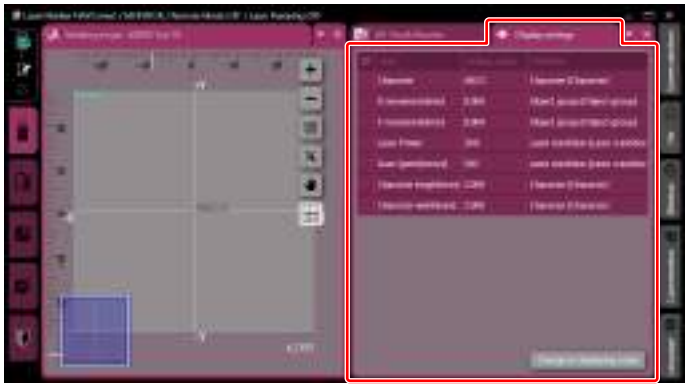
The windows in Laser Marker NAVI smart can freely be allocated using the docking window function.

■ How to use the docking window

1. Select the window tab and drag it, the arrow for allocating the docking window appears.



2. Move the cursor to the arrow for the position where you want to allocate the window. Then drop it to dock the window.



Reference

- The customized screen can be saved by “2-2-2 Screen layout” (P.30).

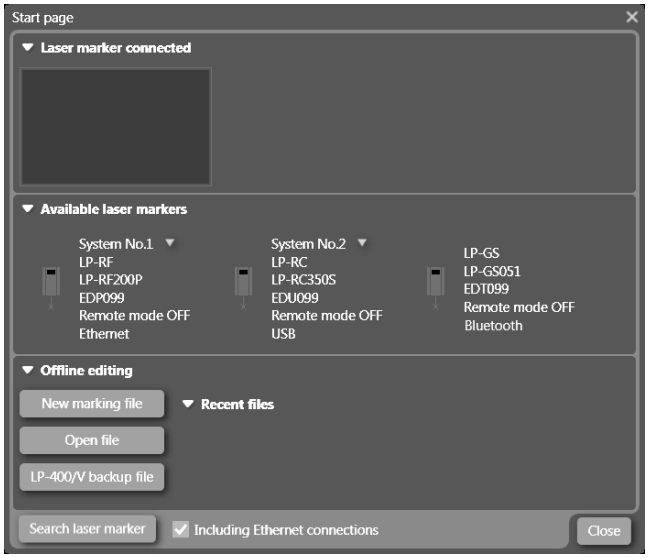
2-3 Mode of Screen

2-3-1 Screen types

Laser Marker NAVI smart has the different screen mode depending on the settings and operation contents.

■ Startup screen

The Select Laser Marker screen appears when you start up Laser Marker NAVI smart.
Select online operation/offline editing on this screen.

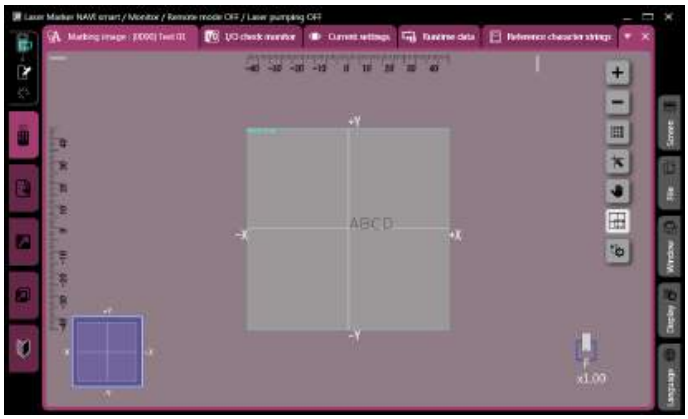


■ Operation monitor

This is the screen where you verify the operation status of the laser marker with the remote mode control or during the RUN Mode.

Main usages:

- Check the marking image.
- Check the settings.
- Check the ON/OFF state of I/O.

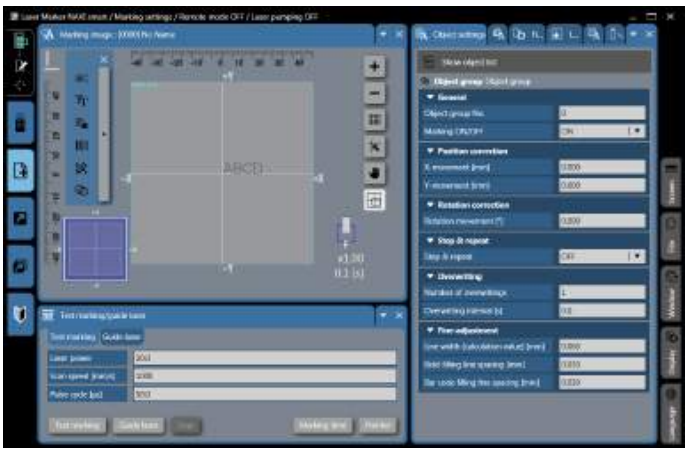


■ Marking settings

This is the screen where you configure and edit the marking data (file).

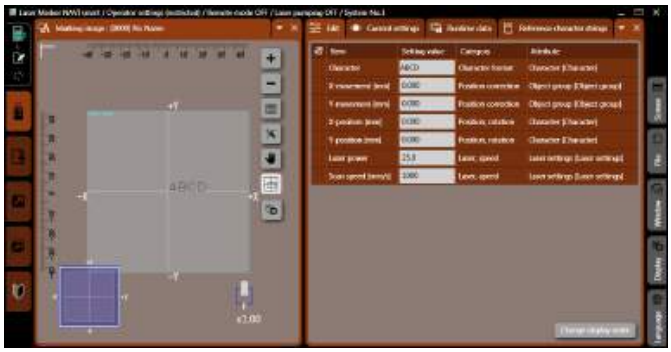
Main usages:

- Create new marking data.
- Edit the marking data (individual files or backup file) saved in external device or local folder. (offline)
- Edit the marking data registered to the laser marker (online).
- Execute the test marking. (online)



■ Operator settings (restricted)

This is the screen where you can edit and operate the enabled items only. Configure the enabled items for editing and operation on the system settings screen in advance.

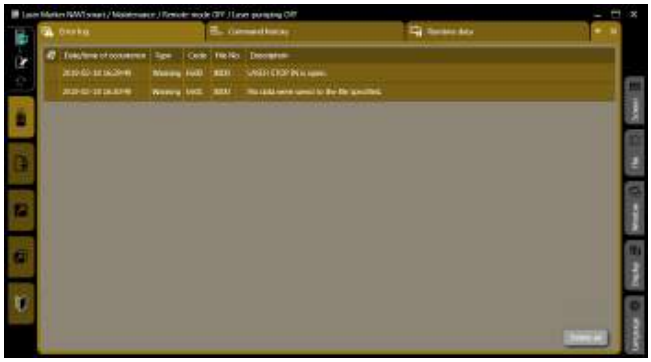


Main usages:

- Change the specific items only.
- Execute the specific actions only.

■ Maintenance

This is the screen used for the maintenance of the laser marker.



Main usages:

- Check the runtime data.
- Irradiate the laser for measurement. *
- Simulate ON/OFF operation of the output signals
- Confirm the communication command history.

* To measure the laser output, you need a power meter available in stores.

■ Data management

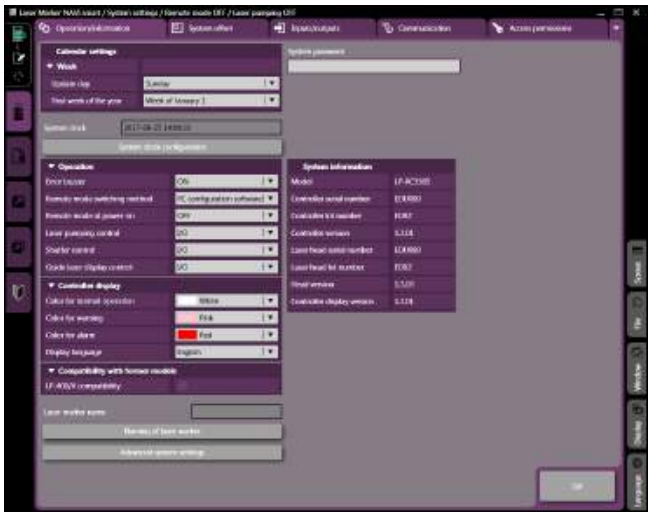
This is the screen where you back up, add, or delete data saved in the laser marker.

Main usages:

- Add/delete a marking file, graphic data, or font.
- Acquire the backup of data saved in the laser marker.
- Restore the backup data to the laser marker.

■ System settings

This is the screen where you configure the laser marker operation settings, system clock, and communication conditions, etc.



Main usages:

- Change the time of the system clock.
- Configure the input to and output from the external device and the communication conditions.
- Configure the setting items and password for the operator setting screen.
- Configure the laser power and offset value of the marking position for all the data in the laser marker.

2-3-2 Screen selection

Switch the screen mode in the screen selection menu.

Reference

- If you have configured the password on the system settings screen, you are required to enter the password when you switch from “Operation monitor”, “Operator Settings” or “Maintenance” screen to “Setting”, “Data Management”, or “System settings” screen. For the password, refer to “8-5-4 Password at screen switching” (P.263).
- The screen lock function by the password is disabled in offline editing.
- The following screens are available in offline editing.
  - Marking settings
  - Data Management
  - Maintenance (under the backup file editing mode only)
  - System settings (under the backup file editing mode only)
- Only monitor screen is available with the remote mode and RUN mode ON.

2-3-3 Configuration of Laser Marker NAVI smart

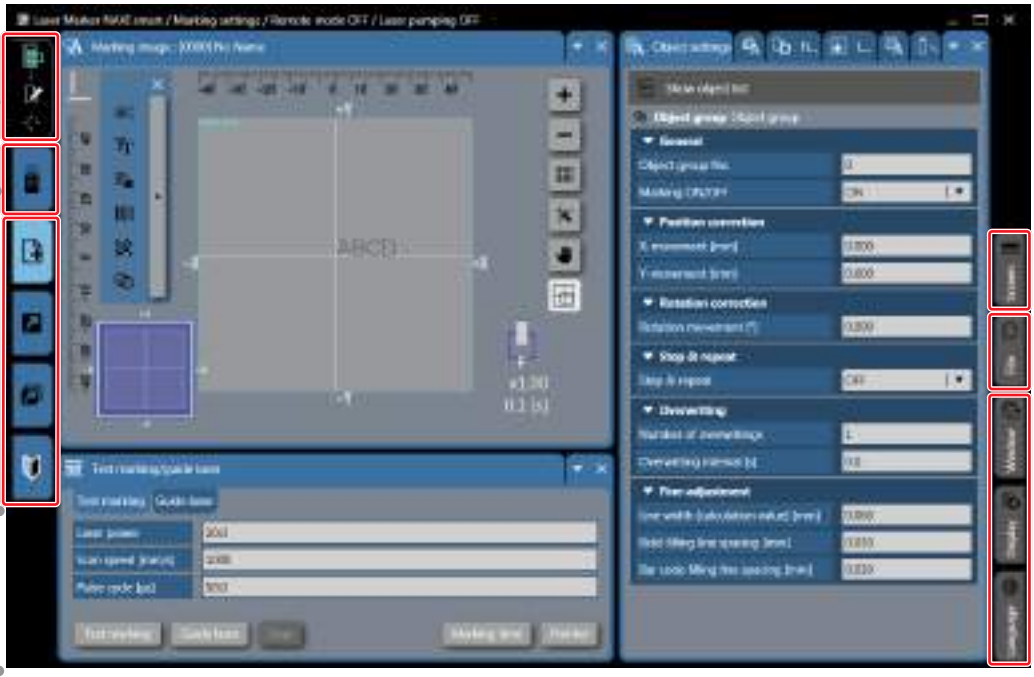
This section describes the screen elements of Laser Marker NAVI smart.

Laser marker selection	P.41
Laser marker status indication	P.47

File

Save the file	P.51
Switch active marking file	P.52
Open in settings screen	P.53
Manual	P.50
About	P.50
Exit	P.24

Screen selection	P.37



Editing tools	P.71

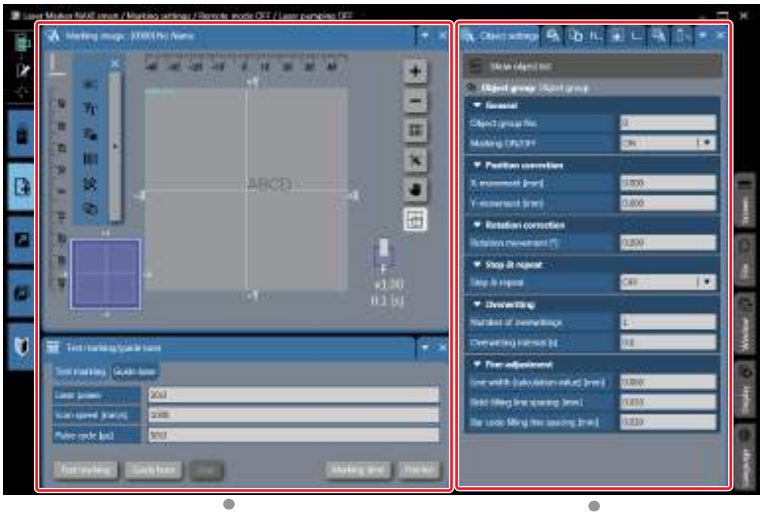
Laser marker operation	P.59

Display Settings

Window	P.29
Screen layout	P.30
Visual effects	P.31
Language selection	P.33

■ Configuration of each screen

Marking settings screen



Configuration of Marking Settings Screen	P.55

Marking Image

Composition of marking image field	P.56
Editing objects on marking image field	P.57

Laser Marker Operation

Laser pumping	P.60
Remote mode settings	P.61
Run mode	P.63
Stop laser button	P.65

Test Marking / Guide Laser

Test marking	P.66
Guide laser	P.67
Marking time measurement	P.70

Editing Tools

Add and edit objects	P.71
Smart settings	P.73

Marking Object

Object type	P.76
Object list	P.76
Character Object	P.79
TrueType Object	P.97
Graphic Object	P.104
Point Radiation Object	P.112
Bar Code / 2D Code Object	P.115

Object Group

Object group settings	P.149
Step & repeat	P.152

File settings

Offset and character settings	P.156
Trigger settings	P.158
Image checking before/after marking	P.160
Compatibility with former models	P.162

Functional Characters

Expiry date and time / Global expiry date and time	P.163
Counter / Global counter	P.165
Lot / Global lot	P.167
Registered characters (via I/O)	P.169
External offset	P.171

Laser Settings

Laser and speed setting	P.173
Fine-adjustment	P.175

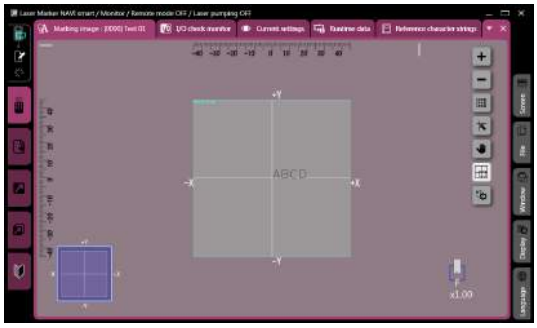
On-the-fly Marking

Motion settings	P.178
Setting procedures of on-the-fly marking	P.185

Reference character strings

Reference character strings list	P.96

Monitor Screen

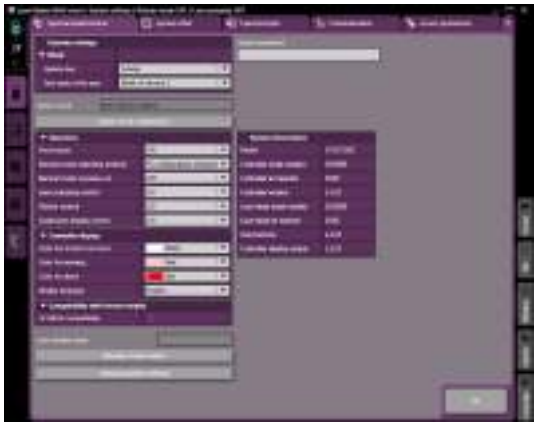


Operator Settings Screen

Maintenance Screen

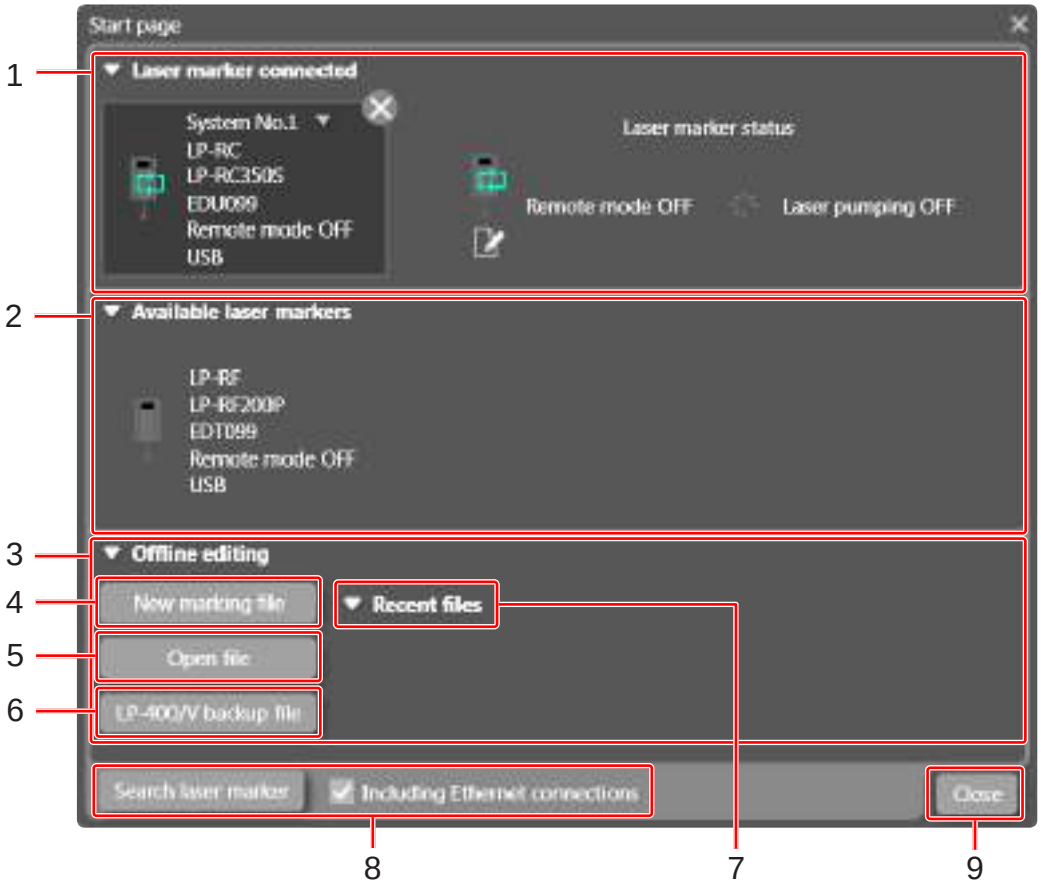
Data Management Screen

System Settings Screen

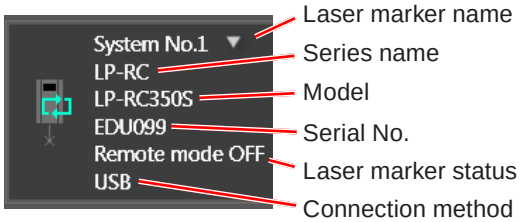


2-4 Laser Marker Selection

In this screen select the online or offline mode for Laser Marker NAVI smart operation. With the online mode, select the laser marker to connect.



	Item	Description
1	Laser marker connected	Displays the laser marker that is currently connected online.
2	Available laser markers	Displays the laser markers that can be connected online.



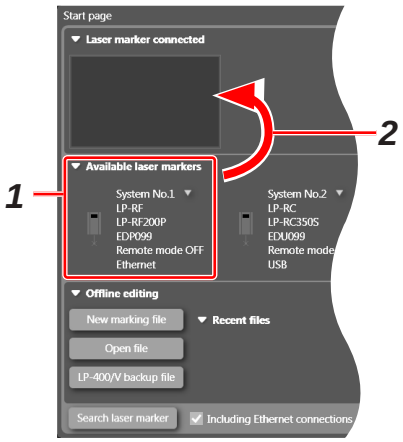
3	Offline editing	Edits the marking file locally without connection to a laser marker.
4	New marking file	Creates a new file. (Offline editing)
5	Open file	Opens a marking file or backup file saved externally. (Offline editing) You can select the following files. • Marking file (.lms) • Backup file (.lmb) • LP-400/V file (.nlm)
6	LP-400/V backup file	Converts the backup data of LP-400/LP-V series, the former laser marker models, to the backup file (.lmb) for LP-GS, LP-RC, LP-RF or LP-RV series, which is editable by Laser Marker NAVI smart.
7	Recent files	Displays a list of files used recently. Pressing a file name will start reading the file. (Offline editing)
8	Search laser marker	Searches laser markers that can be connected online. Checking “Including Ethernet connections” will search laser markers including those connected via Ethernet.
9	Close	Closes the “Select Laser Marker” window.

2-4-1 Connect to laser marker

In online mode, the laser marker can be controlled by Laser Marker NAVI smart. Set the online connection by following procedures.

1. Select the laser marker that you want to use online from “Available laser markers”.

When a laser marker is connected via Ethernet, check the “Including Ethernet” box and click “Search laser marker”.



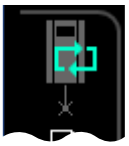
Reference

- Before connecting the laser marker by using the Ethernet or the Bluetooth, the communication settings in system settings screen are required. Refer to Setup/Maintenance guide.

2. Select and hold the laser marker icon and then drop it to “Laser marker connected” or double-click the laser marker.

3. The laser marker is now online.

In online mode, the laser marker status area will be as shown right.



Notice

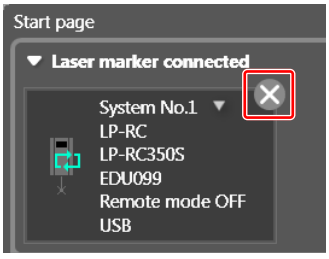
- Do not remove the USB cable or LAN cable while the online connection with the laser marker is active.
- Do not turn the laser marker power OFF while being connected to online.

Reference

- If PC goes into “Sleep” when the laser marker and PC are connected online, the online connection between them is disabled. If PC goes into sleep state in the REMOTE mode or RUN mode, the PC is disconnected but the operation state of the laser marker (REMOTE mode or RUN mode state) are maintained.
- To maintain the online connection, disable the sleep setting of the PC.
- If the version of using Laser Marker NAVI smart does not support the connecting laser marker model, some functions and operations cannot be set or executed online.

2-4-2 Disconnect laser marker

1. Click “X” located on the upper right corner of the laser marker icon at “Laser marker connected”.

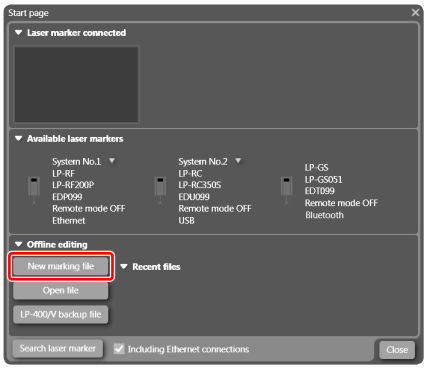


2. The laser marker is now offline.

In offline mode, the laser marker status area will be as shown right.

2-4-3 Create a new file (offline editing)

1. Click “New marking file”.



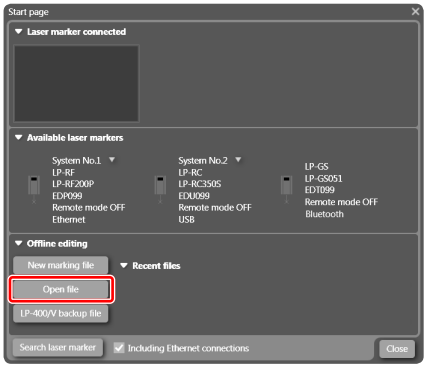
2. The “Model selection” window appears.

Click the laser marker model to be used.

3. The marking settings screen for a new file appears.

2-4-4 Open a file (offline editing)

1. Click “Open file”.



2. The file selection dialog appears.

Select the file and click “Open”.

The following type of the files can be opened.

- Marking file (individual file) (.lms)
- Backup file (.lmb)
- LP-400/V file (.nlm)

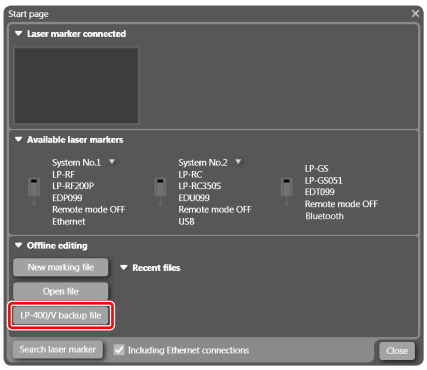
When LP-400/V file (.nlm), a marking file of the former laser marker of LP-400/LP-V series, is selected, select the laser marker models of the conversion source and destination.

3. The selected file appears on the marking settings screen.

2-4-5 Convert LP-400/V backup file

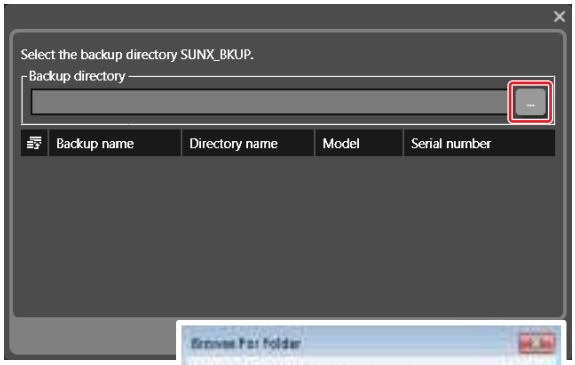
Converts the backup data of LP-400/LP-V series, the former laser marker models, to the backup file (.lmb) for LP-GS, LP-RC, LP-RF or LP-RV series, which is editable by Laser Marker NAVI smart.

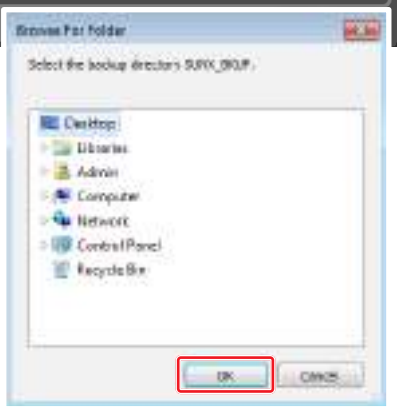
1. Click “LP-400/V backup”.



2. The file selection dialog appears. Select the backup data of LP-400/LP-V series to convert. To click “...” shows the folder list.

3. Select the backup directory for LP-400/LP-V series “SUNX_BKUP” and click “OK”.



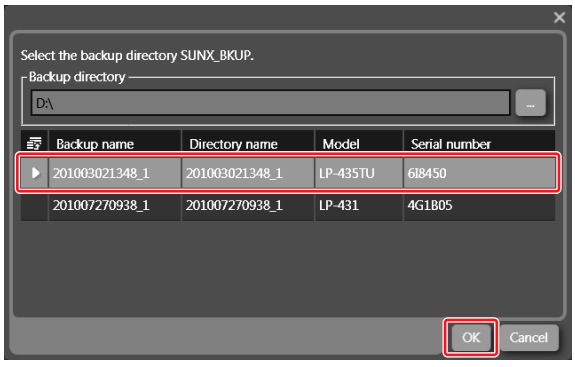


Reference

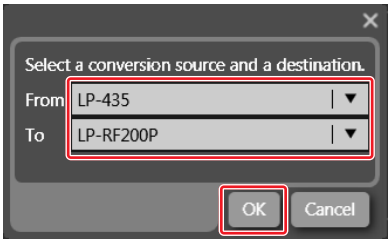
- The backup data of LP-400/LP-V series has the following structure. If there are any changes in the backup data, it might be a cause of the reading error.

“SUNX_BACKUP” folder
└ Folder (can be renamed)
  ├ “BACKUP” folder
  ├ BACKUP.LOG
  └ BKUP.INI

4. Select the backup data and click “OK”.

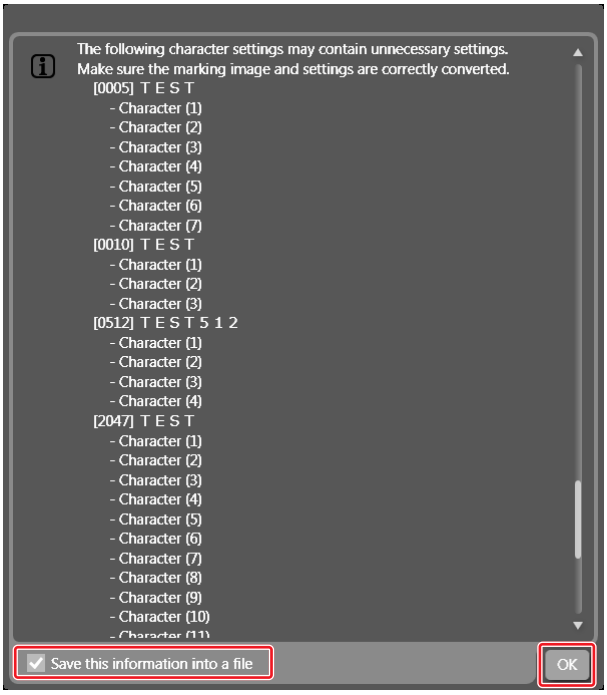


5. Select the laser marker models of the conversion source and destination, then click “OK”.



6. The conversion results describing the conversion errors and replaced parameters are shown. To save this conversion log, enable “Save this information into a file”.

After confirming the conversion results, click “OK”.



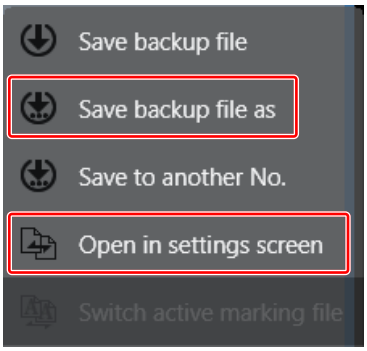
Reference

- Some functions and settings of LP-400/LP-V series are not supported by LP-GS/LP-RC/LP-RF/LP-RV series. These data cannot be converted.

7. If you save the conversion log, enter the file name and click “Save”.

8. The converted file appears in the settings screen with the backup file editing mode.

To save this backup file (.lmb), open “File” tab in the right menu and click “Save backup file as”.



9. Open “File” tab in the right menu and click “Open in settings screen”. Confirm the marking settings of each file and correct them as necessary.

Refer to “7-4-2 Editing the backup file” (P.223).

When “!” icon is displayed in the object list of the settings screen, correct the setting errors.

10. Restore the modified backup file in the laser marker.

Refer to “7-4-3 Restore laser marker data from backup file” (P.225).

■ General rules of LP-400/LP-V file conversion

The following rules are applied to convert the marking files of LP-400/LP-V series to the applicable files with LP-GS/LP-RC/LP-RF/LP-RV series.

Marking data:

The settings of LP-400/LP-V series are converted to the items in the following setting category of Laser Marker NAVI smart.

Setting category of LP-400/LP-V series	Converted setting category in Laser Marker NAVI smart
Marking character	Reference character strings
Character condition	Character object settings
Bar code condition	Bar code object settings
	2D code object settings
Logo condition	Graphic object settings
Processing condition	— (Unable to convert)
Point radiation condition	Point radiation object settings
General condition	File settings
	Object group settings
Function setting	Functional characters
Common setting	Global functional characters
	Reference character strings for all files
Laser setting	Laser Settings
	Object group settings
Trigger setting	On-the-fly marking
	File settings

Reference

- In the converted files, the setting items of “Compatibility with former models” in file settings are set according to the source settings. Refer to “3-13-4 Compatibility with former models” (P.162).

Object number and object group number:

The object number of each marking data is set to the following numbers, which can be used with LP-400/V compatible command mode.
The marking data converted from LP-400/V files and the data set by LP-400/V compatible command mode belong to the object group No. 1000.
If any other object number or object group number is set, these marking data cannot be controlled by the LP-400/V compatible communication commands.

Object type	Object No.
Character object (reference list type)	1001 to 1060
Bar code object, 2D code object	1100 to 1107
Graphic object	1200 to 1215
Point radiation object	1400 to 1415
Object group	1000

System settings:

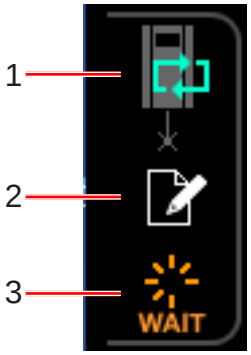
In the converted backup file, the “LP-400/V compatibility” setting in “Operation/information” tab in the system settings screen is enabled.
The LP-400/V compatible communication commands are available only when this “LP-400/V compatibility” is enabled.
Refer to “8-1-4 Compatibility with former models (LP-400/LP-V)” (P.232).

Reference

- If the “LP-400/V compatibility” in system settings screen is disabled, the setting items of “Compatibility with former models” in file settings are not available.

2-5 Laser Marker Status Indication

Laser marker status indication tool shows laser marker's status of online/offline connection, operating mode, and laser pumping on/off.



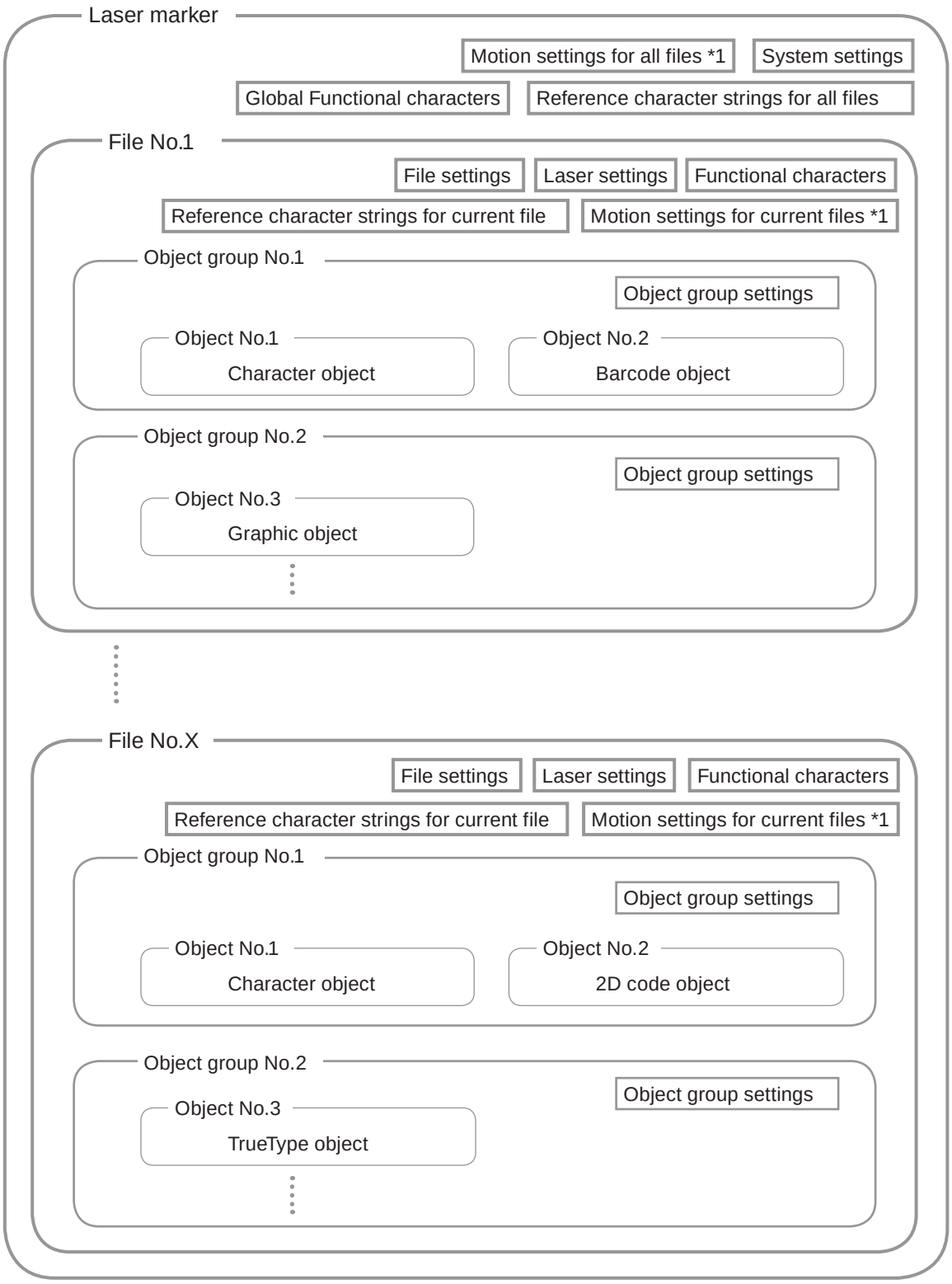
	Item	Icon	Status	Remarks
1	Laser marker connection status		Offline	Indicates that Laser Marker NAVI smart is not connected to the laser marker. Under the offline mode, externally saved files can be edited.
			Online	Indicates that Laser Marker NAVI smart is online connected to the laser marker. Under the online mode, the laser marker can be controlled and files in the laser marker can be edited.
2	Operation mode		Remote mode ON	Under the remote mode ON status, the laser marker is controlled by the external devices such as a PLC.
			Remote mode OFF	Under the remote mode OFF status, the laser marker can be controlled by Laser Marker NAVI smart.
			Run mode ON	The RUN mode is a marking method of radiating the laser by external control or by the marking start signal from Laser Marker NAVI smart.
3	Laser pumping status		Laser pumping ON	
			Laser pumping in progress	
			Laser pumping OFF	

2-6 Data Component

2-6-1 Data component in a laser marker

In the laser marker the marking data is set and saved in a “file” format.
A file is composed of one or more marking objects and the all data in one file is marked with one trigger.
Up to 10,000 files are stored in one laser marker.

■ Data composition image



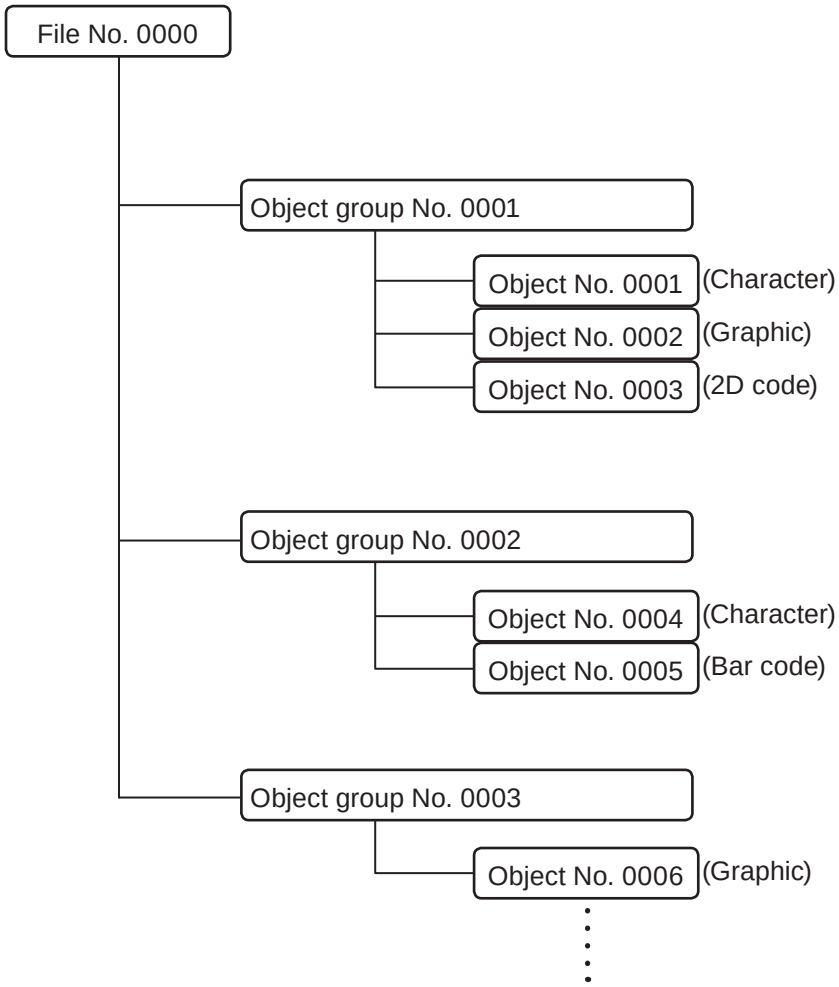
*1 : Available with LP-RC series, LP-RF series and LP-RV series.

2-6-2 File data composition

■ Data unit and number of settings

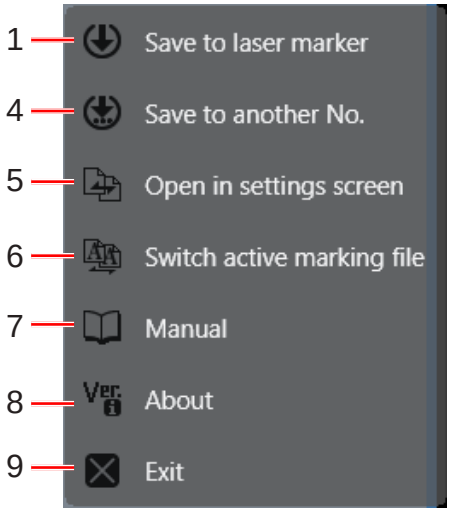
Data unit	Description	Number of settable items
Marking file	A file is composed of one or more marking objects and the all data in one file is marked with one trigger. Up to 10,000 files are stored in one laser marker.	Up to 10,000 marking files in one laser marker
Object group	A data unit composed of one or more objects. To apply a common settings to the several objects, make a group.	Up to 2,000 object groups in one marking file
Object	The smallest data unit, such as characters, graphics and 2D codes, set in a group.	Up to 2,000 objects in one marking file

■ Image of the file data configuration

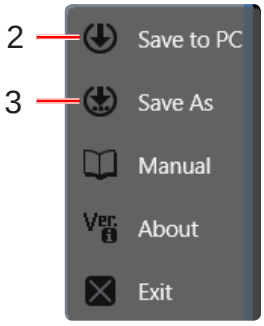


2-7 File

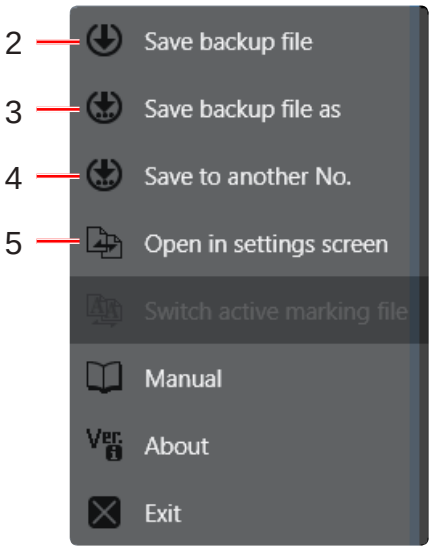
This section describes how to switch a file to edit and how to save a file.



Online mode



Offline editing:
individual file



Offline editing:
Backup file

	Item	Description
1	Save to laser marker *1	Overwrites the file (.lms) to the online connected laser marker.
2	Save to PC Save backup file	Overwrites the file (.lms) or the backup file (.lmb) to the external memory such as PC under the offline editing mode. For the editing of the backup file, refer to “7-4-2 Editing the backup file” (P.223).
3	Save as Save backup file as	Saves the file (.lms) or the backup file (.lmb) as a new file to the external memory such as PC. For the editing of the backup file, refer to “7-4 Backup” (P.222).
4	Save to another No. *2	Saves the current file (.lms) as a new file to the specified file number in the laser marker or in the backup file (.lmb).

Reference

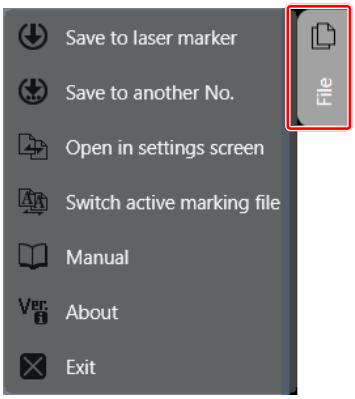
- After “Save to another No.” is executed, the file shown in the settings screen will be switched to the file with the specified number.
- When you use “Save to another No.” for the backup file, click “Save backup file” before you terminate the backup file editing.

5	Open in settings screen *2	Selects a file to edit. This file is displayed on the marking settings screen view.
6	Switch active marking file *1	Changes the file selected in the online connected laser marker. This file is marked by trigger input and displayed on the operation monitor view and operator settings view.
7	Manual	Displays the operation manual (PDF format) of Laser Marker NAVI smart.
8	About	Displays the version information of Laser Marker NAVI smart.
9	Exit	Exits Laser Marker NAVI smart.

*1 : Available only on the operator settings screen and the marking settings screen
*2 : Available only on the marking settings screen

2-7-1 Save the file

You can select the following kind of file saving by using the “File” tab on the right menu.



At the online mode:

- To overwrite the current file to the laser marker, click “Save to laser marker”.
- To save the current file newly to another file number in the laser marker, click “Save to another No.”.

At the offline editing:

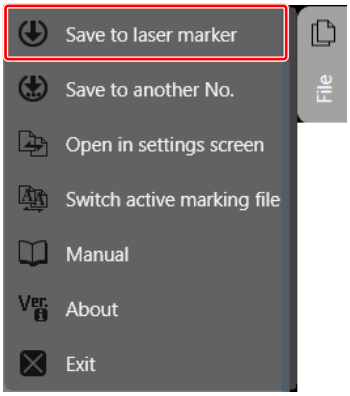
- To save the file (.lms) to the external memory such as PC, click “Save to PC” or “Save as”.

At the backup file editing:

- To save the current file (.lms) newly to another file number in the backup data, click “Save to another No.”.
- To save the whole backup data (.lmb) to the external memory such as PC, click “Save backup file” or “Save backup file as”.

■ Save the file to laser marker

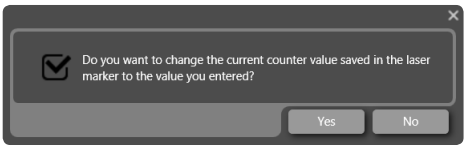
1. Click “Save to laser marker” on the “File” tab of the Operator settings screen or the Marking settings screen.



Reference

- To save the file on the operator settings screen, set the restrictions in the system settings to allow “overwrite file” operation.

2. When setting up the counter, a dialog box for confirming whether the current value should be reflected or not will appear. Click “Yes” to reflect, otherwise click “No”.



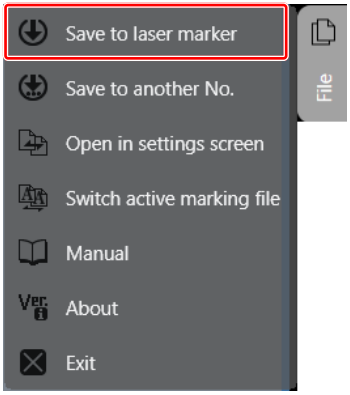
The file is stored or overwritten in the laser marker.

Reference

- The system settings are not saved with this operation. They are saved to the laser marker by clicking “Set” button in the system settings screen.

■ Save the file to another number

1. Click “Save to another No.” on the “File” tab of the Marking settings screen.



Reference

- “Save to another No.” is not available on the operator settings screen.

2. Select the destination file to save and click “Select”.

The file is stored in the selected number.

After “Save to another No.” is executed, the file shown in the settings screen will be switched to the file with the specified number.

Reference

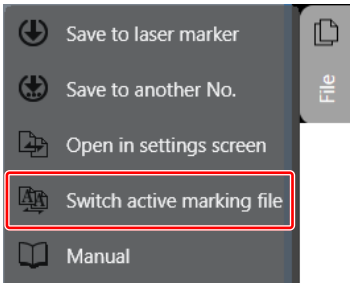
- If any settings already exist in the selected file number, they will be overwritten with the current file.
- When you use “Save to another No.” for the backup file, click “Save backup file” before you terminate the backup file editing.

2-7-2 Switch the file in laser marker

Select the file to be marked by trigger input under the remote and run mode.
The selected file is displayed on the operation monitor view and operator settings view.

1. Connect the laser marker and Laser Marker NAVI smart online.

2. Click “Switch active marking file” on the “File” tab of the operator settings screen or the marking settings screen.



Reference

- To save the file on the operator settings screen, set the restrictions in the system settings to allow “switch marking file” operation.

3. Select a file to switch.

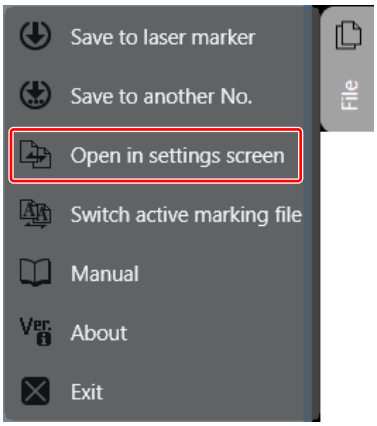
4. Click “Select”.

The file of the online connected laser marker changes.

2-7-3 Select a file to edit

The selected file is displayed on the marking settings screen view and marked by test marking.
This operation does not change the selected file in the laser marker.

1. Open “File” tab of the marking settings screen and click “Open in settings screen”.



2. Select a file to edit.

3. Click “Select”.

The selected file is displayed on the marking settings screen.

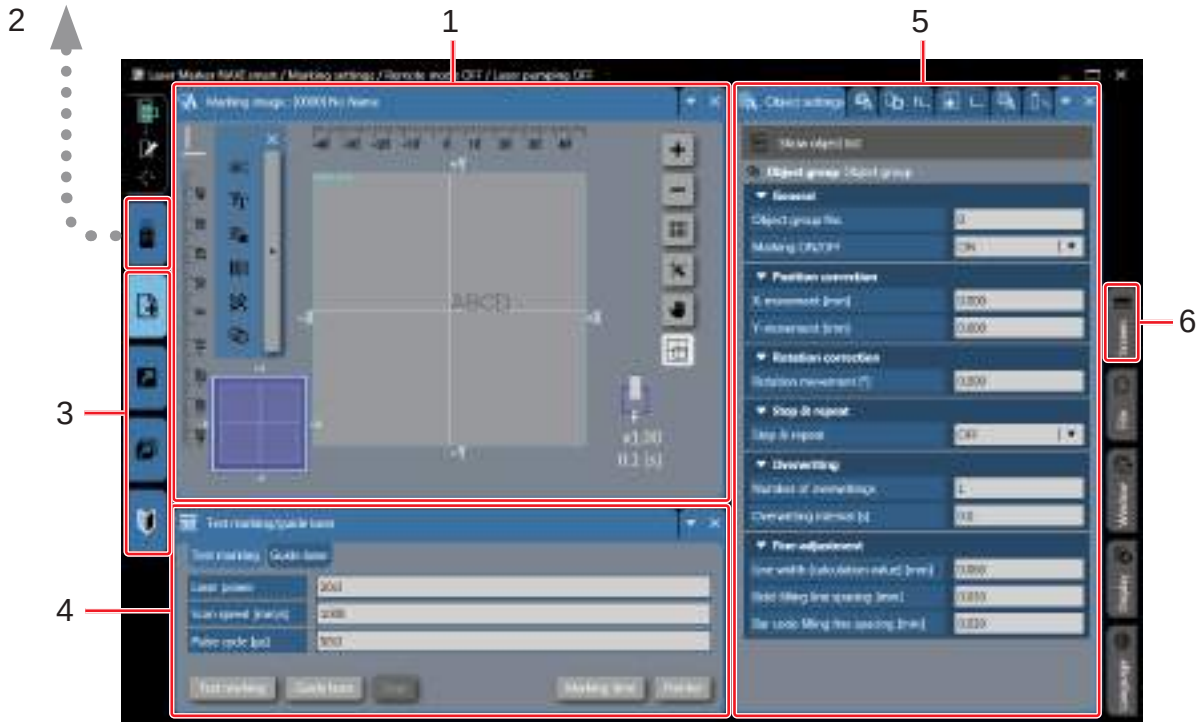
Reference

- In the file selection window, you can search the file with name or number. Refer to “7-3-1 Search file” (P.217).
- When creating a new file referring to the existed file, copy and paste the file and modify the data. Refer to “7-3-5 Copy and paste data” (P.221).

3 Marking Settings Screen

3-1 Configuration of Marking Settings Screen

On the marking settings screen, creation/edition of the marking data such as characters, graphics and code symbols and saving the file can be performed.



	Panel name	Description
1	Marking image	Displays the image of the set marking data. Refer to “3-2 Marking Image” (P.56) for details on how to operate the image display.
2	Laser marker operation tool	Operates the online connected laser marker. Refer to “3-3 Laser Marker Operation” (P.59).
3	Editing tool	Using these tools, create and edit the marking data. Refer to “3-5 Editing Tools” (P.71).
4	Test marking/guide laser *1	Performs the test marking and the guide laser operation. Refer to “3-4 Test Marking / Guide Laser” (P.66).
5	Marking data settings	Set the marking data in the following windows. • Object list / Object settings • File settings • Functional characters • Global functional characters • Laser settings • On-the-fly marking *2
6	File	Selects the file to edit or mark and saves the edited files. Refer to “2-7 File” (P.50).

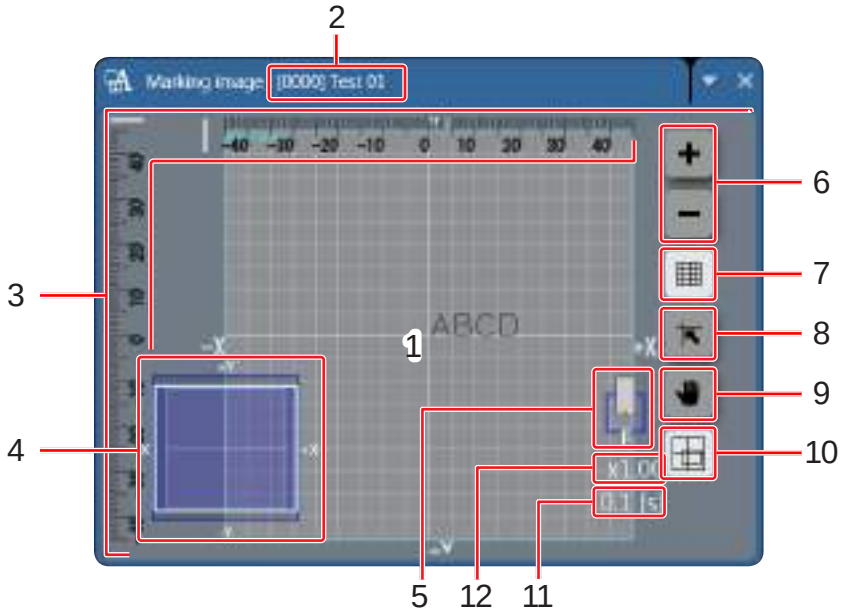
*1 : The guide laser display is available with LP-GS051(-L) type, LP-RC350S, LP-RF series and LP-RV series. With LP-GS052 only the guide pointer is available.

*2 : Available with LP-RC series, LP-RF series and LP-RV series.

3-2 Marking Image

3-2-1 Composition of marking image field

With marking image, the set data is displayed by image and the size of characters and graphics, and the position can be checked. The marking image can be used on the operation monitor screen, the operator settings screen, and the marking settings screen.



	Item	Description
1	Image display	Displays the image of the set marking data.
2	File No./Name	Displays the file number and name currently being set.
3	Ruler	Tick marks for the marking field.
4	Marking field overview	Indicates which part of the marking field is displayed. At on-the-fly marking, the moving direction and position on the line are indicated.
5	Head direction	Indicates the head direction to X- and Y-axis. “F” indicates the front of the head. This configuration is in system settings screen.
6	Zoom-in / zoom-out	Zoom-in or Zoom-out the image display by clicking “+” or “-” icon. Scale: x0.01 to x100
7	Grid	Switches display/not display of the grid line on the image display. The detail of the grid line can be set in “2-2-3 Visual effects” (P.31).
8	Snap to Grid *1	Allocates the selected object along the grid line.
9	Palm	Moves the display position of the marking image field. Click-hold the image field with the palm and drag and drop it in the desired position.
10	Marking field overview ON/OFF	Switches on/off of the marking field overview display.
11	Estimated marking time *1	Displays the calculated marking time of the file in accordance with the input data and conditions. To confirm more accurate marking time, execute “3-4-3 Marking time measurement” (P.70).
12	Display magnification	Indicates the scale of the display.

*1 : This function cannot be used at on-the-fly marking.

Reference

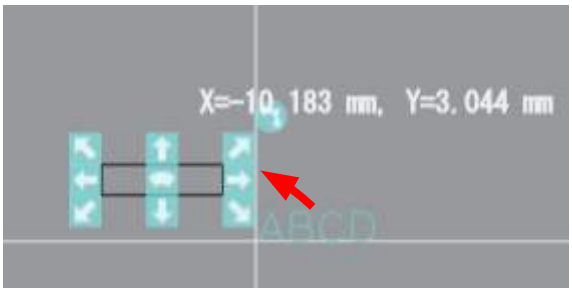
- The display of the marking image field can be customized. Refer to “2-2-3 Visual effects” (P.31).

3-2-2 Editing objects on marking image field

In the marking settings screen, the layout of the marking objects can be modified on the marking image field.

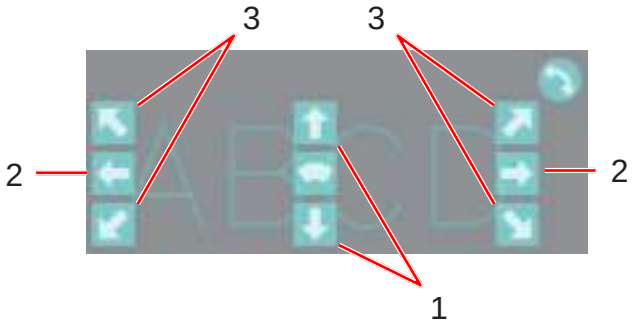
■ Move the object

Select the object and drag and drop it anywhere on the image field to change the object position (coordinate).



■ Change the object size

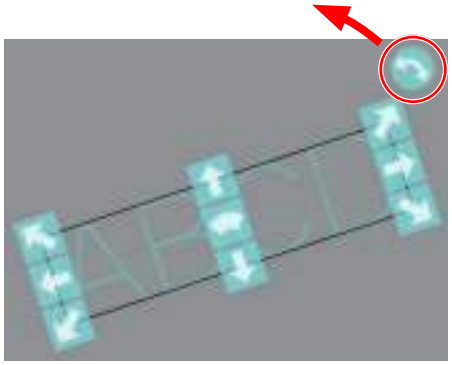
Click-hold the arrow symbol indicated around the object and drag it to be a desired length.

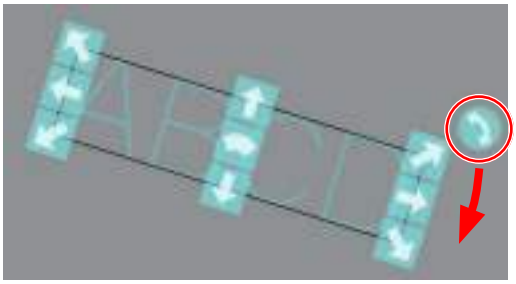


	Description
1	The height of the object can be increased or decreased.
2	The width of the object can be increased or decreased.
3	The height and width of the object can be increased or decreased.

■ Rotate the object

Click-hold the arrow symbol indicated around the object and drag it to be a desired angle. The rotating center of the graphic object is in the center of the graphic and for the other objects, it is the original point of the object.

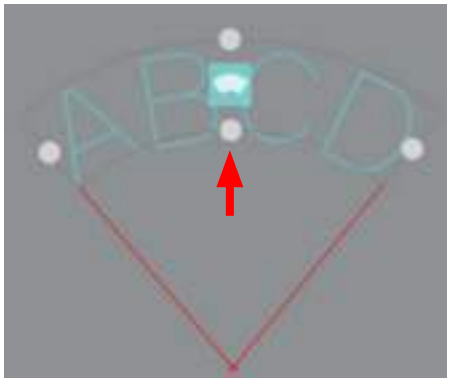




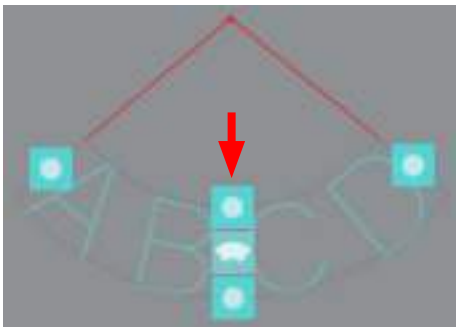
■ Make the shape of the character string an arc

Click-hold the arc symbol indicated in the center of the character object and drag it to be a desired shape.

Arc outside



Arc inside



Reference

- TrueType objects cannot be changed the string shape to the arc on the marking image field.

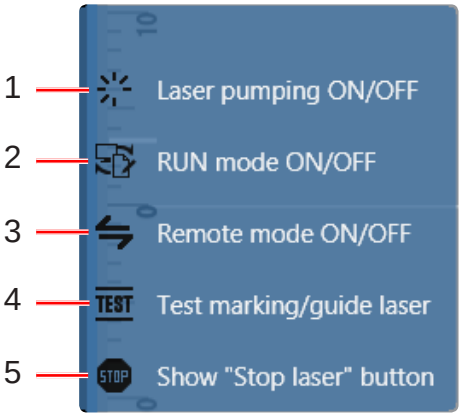
■ Editing objects with the keyboard shortcut

The object can be edited on the marking image field by using the following keyboard shortcut tools.

Operation	Keyboard shortcut
Copy the object	Ctrl+C
Cut the object	Ctrl+X
Paste the copied/cut object	Ctrl+V
Undo	Ctrl+Z
Redo	Ctrl+Y
Delete the object	DEL

3-3 Laser Marker Operation

Control the online connected laser marker by using “Laser marker operation tool” in the left side menu.



	Item	Description	Operable screens
1	Laser pumping ON/OFF	Controls the laser pumping ON/OFF. To enable the lasing, turn on the laser pumping. The laser pumping is completed after approx. 8 to 15 seconds.	• Operation monitor • Operator settings • Maintenance • Marking settings • System settings
2	RUN mode ON/OFF	Controls the Run mode ON/OFF.	• Operation monitor • Operator settings • Marking settings
3	Remote mode ON/OFF	Controls the remote mode ON/OFF. Shifting to the remote mode will start automatic operation by external input. Confirm the safety before performing this operation.	• Operation monitor • Operator settings • Marking settings
4	Test marking/guide laser *1	Displays control window of the test marking and guide laser.	• Operator settings • Marking settings
5	Show “Stop laser” button	Displays the stop button for laser operation.	• Operation monitor • Operator settings • Maintenance • Marking settings • Data Management • System settings

*1 : The guide laser display is available with LP-GS051(-L) type, LP-RC350S, LP-RF series and LP-RV series. With LP-GS052 only the guide pointer is available.

3-3-1 Laser pumping

To enable the lasing, turn on the laser pumping.

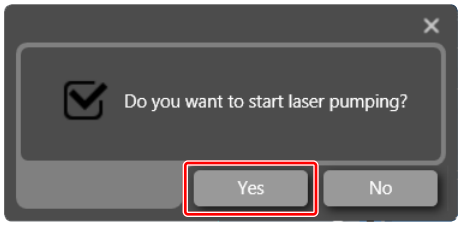
■ Laser pumping procedures

1. Click “Laser pumping ON/OFF” in “Laser marker operation” tab.

2. The confirmation window will appear. To start laser pumping, click “Yes”.

The following time is required for the completion of the laser pumping.

- LP-GS series: approx. 8 to 15 seconds
- LP-RC series: approx. 10 seconds
- LP-RF series: approx. 7 seconds
- LP-RV series: approx. 1 second



3. After laser pumping is completed, the icon of laser marker status indicates as shown here.

3-3-2 Remote mode settings

To control the laser marker externally using I/O or communication commands, set the operation mode to the remote mode with one of the following methods.
Select the method to switch to the remote mode on the system settings screen of Laser Marker NAVI smart.

Remote mode switching by Laser Marker NAVI smart

Click the “Laser Marker Operation” tool of Laser Marker NAVI smart. Then, click “Remote mode ON/OFF”. Click “Yes” on the confirmation screen to switch the laser marker to the remote mode.

Reference

- The “Remote mode ON/OFF” button is available when the following screens are selected with the online connection established.
  - Marking settings screen
  - Operator settings (restricted) screen
  - Monitor screen

Start the laser marker in the remote mode (Laser Marker NAVI smart can switch the remote mode)

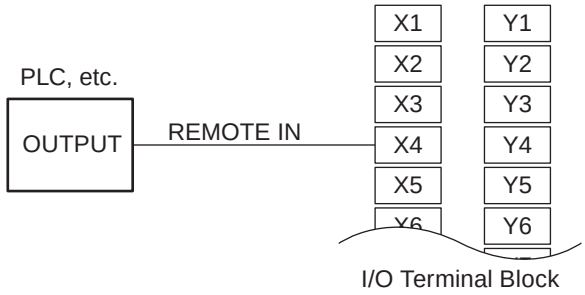
When you turn ON the key switch of the laser marker, the system starts in the remote mode. Use the remote mode switch button of Laser Marker NAVI smart for releasing and resetting the remote mode.

Reference

- If you want to start up the laser marker in the remote mode, you need to configure the settings on the system settings screen of Laser Marker NAVI smart in advance.
- If you have configured the laser marker to start up in the remote mode, you cannot switch the remote mode from I/O.

Remote mode switching using I/O

Turn ON REMOTE IN (X4) of the I/O terminal block on the controller.



Reference

- To enable switching to the remote mode by the remote mode input terminal on the I/O terminal block, you need to configure the settings on the system settings screen of Laser Marker NAVI smart in advance.
- If you have configured the remote mode switching method to the I/O terminal block, you cannot switch the remote mode from the Laser Marker NAVI smart screen.

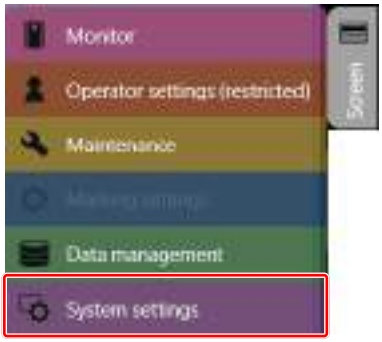
⚠ WARNING	• If the laser marker is set to enter the remote mode at startup or by I/O control, construct a manual resetting system to re-pump the laser when the laser pumping is turned to off due to an emergency stop or an interlock.

■ Remote mode switching method selection procedure

Set the remote mode switching method on the system settings screen of Laser Marker NAVI smart.

1. Connect the laser marker and Laser Marker NAVI smart online.

2. Select “System settings” by clicking the screen selection menu.



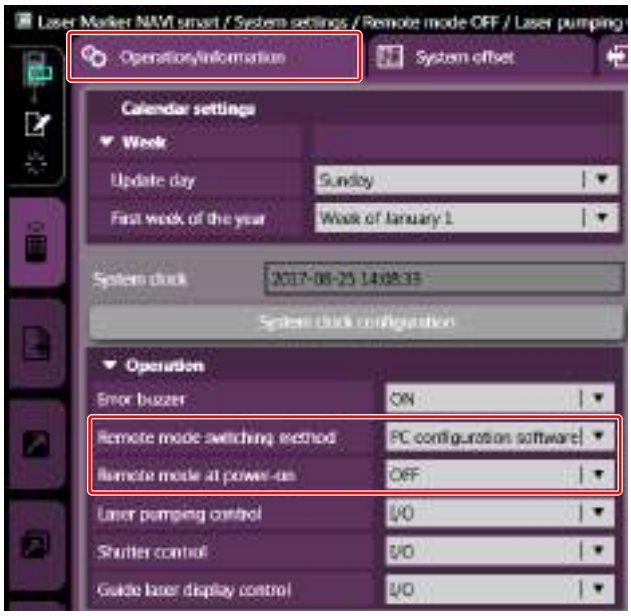
3. Select the “Operation/Information” tab.

4. Select the switching method of the remote mode.

- PC configuration software (initial setting)
- I/O

5. When PC configuration software is selected, select the remote mode status at power-on.

- Remote mode ON
- Remote mode OFF (initial setting)



6. Click “Set” on the lower right corner of the screen.

7. Disconnect the laser marker and Laser Marker NAVI smart from online.

8. Turn the laser marker power OFF and wait for at least five seconds, and then turn it ON.

The configured items on the system settings will be reflected to the laser marker.

3-3-3 Run mode

The RUN mode is a marking method of radiating the laser by external control or by the marking start signal from Laser Marker NAVI smart.

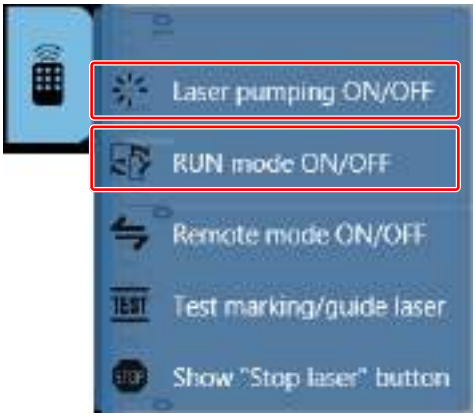
■ RUN mode procedure

1. Select any of the following screens:

- Marking settings
- Operator settings
- Monitor

2. Click “Laser pumping ON/OFF” of the “Laser Marker Operation” tab.

3. Click “RUN mode ON/OFF” of the “Laser Marker Operation” tab.



Reference

- With LP-RC series, the RUN mode can be ON after the laser pumping turns ON.

4. When turning ON the RUN mode, Laser Marker NAVI smart screen is switched to Operation monitor view.

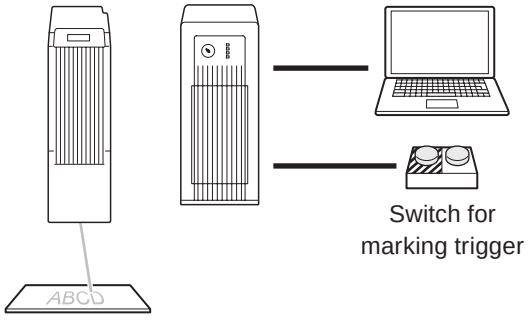
Reference

- When shifting to the RUN mode while editing in the marking settings screen, a file saving confirmation message appears. After saving the file, the screen shifts to the Operation monitor view.

5. Under the RUN mode, the laser marker accept the marking start signal.

Enter the marking start signal (marking trigger) in any of the following methods to irradiate the laser beam.

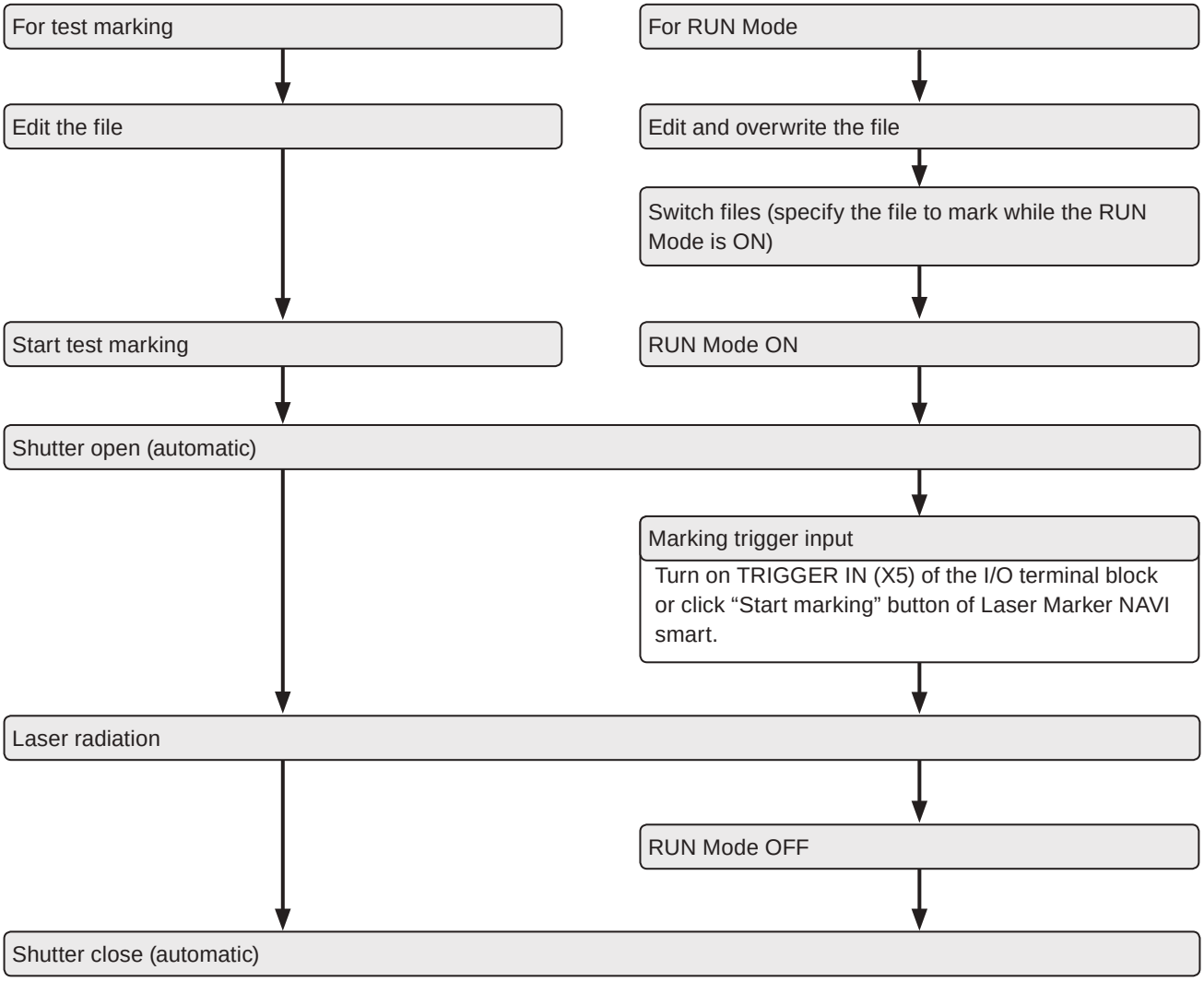
- Switches or sensors connected to the marking trigger input terminal on the I/O terminal block
- Laser Marker NAVI smart screen operations



Reference

- When the RUN mode is turned OFF during marking operation, the RUN mode will be turned OFF after finishing the running marking operation.

■ Operation flow for test marking and RUN mode



3-3-4 Stop laser button

Use this button to stop the laser radiation or disable the laser radiation temporarily.
When clicking “Stop laser” button, the laser marker operates as follows.

- Turns laser pumping OFF
- Closes internal shutter
- Activates an alarm

Reference

- “Stop laser” button shuts off the power of the laser oscillator by the software operation via internal circuits. To shut off the laser by the hardware operation, use the interlock input equipped on I/O terminal.
- Stop laser button can be used in all screen mode.

3-4 Test Marking / Guide Laser

3-4-1 Test marking

When start the test marking, editing file data is scanned and marked.

■ Test marking procedures

1. Select any of the following screens:

- Marking settings
- Operator settings (when test marking is enabled in the system settings)

2. Click “Laser pumping ON/OFF” of the “Laser Marker Operation” tool.

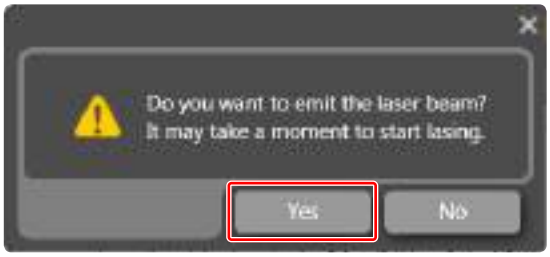
3. Set the laser settings such as laser power and scan speed.

4. Click “Test marking” on the test marking/guide laser panel.

Reference

- If you do not see the test marking/guide laser panel on the screen, click “Test marking/guide laser” of the “Laser Marker Operation” tool and display the panel.

5. A confirmation dialog box of the laser radiation appears. Click “Yes” to start radiating the laser.



Reference

- With LP-RC series, for the first test marking after the laser pumping on, warning E640 may occur in case the laser pumping has been off for more than several days. In this case, retry the test marking.

⚠WARNING

- Take laser protection measures such as wearing protective goggles or using protective enclosures during laser radiation.

6. To stop lasing before finishing the test marking, click “Stop”.

Reference

- The counter value is not updated under the test marking.
- When the setting value of the laser power, the scan speed, the pulse cycle (LP-RF/LP-RV series only) or the pulse duration (LP-RV series only) is changed in the test marking window, these settings in the laser settings window change together. Refer to “3-15 Laser Settings” (P.173).
- When the trigger mode is set to continuous trigger, the setting value of “minimum number of scans” are used to the test marking operation.

3-4-2 Guide laser

Supported model: LP-GS051(-L) / LP-RC350S / LP-RF series / LP-RV series

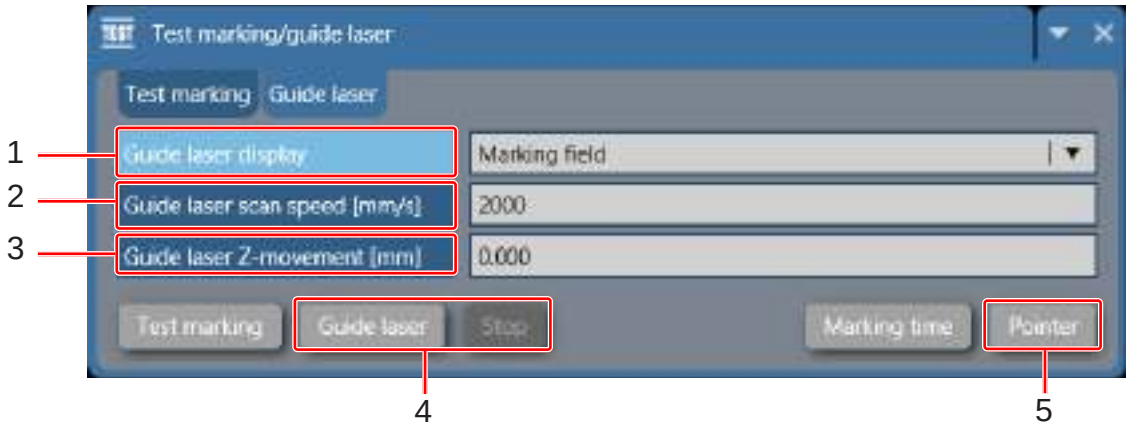
The marking position can be checked visually by using the guide function with the red laser beam.

Notice

- Use the guide laser function only as the guideline. For the appropriate marking quality, fine adjust the work distance and setting position of the target object by checking the actual marking results.

Reference

- The guide laser display is available with LP-GS051(-L) type, LP-RC350S, LP-RF series and LP-RV series. With LP-GS052 only the guide pointer is available.
- The guide laser radiation is possible even when any of LASER STOP IN or INTERLOCK terminals of the I/O terminal block are open.



	Item	Description
1	Guide laser display	Select the indication contents by the guide laser from the followings.
	Marking field	Displays the marking field frame and center lines with the guide laser.
	Marking image	Displays the setting data in the file. The object data with marking off setting is not displayed.

Reference

- When on-the-fly marking is set for LP-RC/LP-RF/LP-RV series, the guide laser of the marking image and the masked objects operates with the on-the-fly behavior.

Masked objects	Displays only the data set to Marking off and enabled guide indication.
Work distance	The guide laser shows the rough indication of the work distance (distance from the head base to the marking surface). The red point emitted in oblique and the red cross emitted perpendicularly from the head are displayed. The distance where the laser point is closest to the center of the cross represents the guide of the work distance.

Reference

- The center of the cross indication indicates the marking field center guide if the work distance is set in the reference position.
- For LP-GS051 type (except LP-GS051-L), a position where the pointer overlaps with the cross indication varies depending on the setting value for the guide laser Z-movement.

	Item	Description
2	Guide laser scan speed [mm/s]	Sets the scanning speed of the guide laser. This setting is independent from the scanning speed value set in laser settings. Setting range: 1 to 3000 mm/s (LP-GS051); 1 to 2000 mm/s (LP-GS051-L); 1 to 6000 mm/s (LP-RC350S / LP-RF200P / LP-RV200P)

Reference

- When on-the-fly marking is set for LP-RC/LP-RF/LP-RV series, this setting is not applied to the guide laser of the marking image and the masked objects. To them the on-the-fly speed is applied.
- The setting of guide laser scan speed is common in all files.

3	Guide laser Z-movement [mm] *1	Specifies the work distance of the guide laser when the work distance is not in the reference position. This setting is enabled only when the guide laser display is set to marking field or work distance. When the guide laser display is set to “Work distance”, at this distance the laser pointer overlaps with the center of the cross. Setting range: -3.000 to +3.000mm (LP-GS051)

Reference

- The setting of guide laser Z-movement is common in all files.

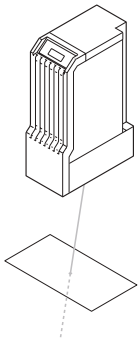
4	Guide laser / Stop	Clicking “Guide laser” radiates guide laser. Clicking “Stop” ends the guide lasing operation. Guide laser radiates for max. 1 minute until clicking “Stop”.
5	Pointer / Stop pointer	Clicking “Pointer” radiates the red laser pointer in oblique direction. This guide pointer indicates the center of the marking field when the work distance of the laser marker is set to the specified reference position. During the guide pointer radiation, this “Pointer” button changes “Stop pointer”. Guide pointer radiates for max. 30 minutes until clicking “Stop pointer” button.

Reference

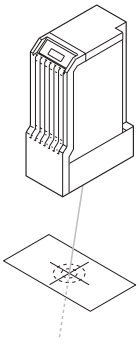
- When the work distance is set out of the specified reference position or with LP-GS051 the Z-position value is other than 0 mm, guide pointer does not indicate the center of the marking field and it cannot be used as a reference.
- Guide pointer stops when remote mode or run mode is on.
- When the test marking starts under the guide pointer ON condition, the guide pointer turns off during the test marking. After the test marking, the pointer turns on again automatically.

*1 : Available only with LP-GS051 type (except LP-GS051-L).

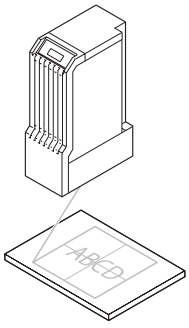
Guide pointer



Work distance indication



Marking image indication
Marking field indication

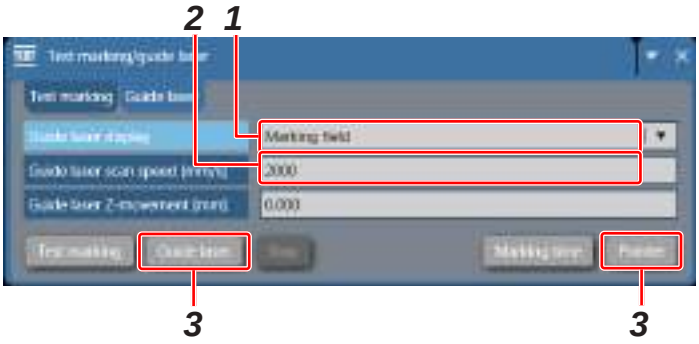


Where the red point is closest to the center of the cross is the rough indication of the work distance.

■ Guide lasing procedures

1. Select the guide display mode.

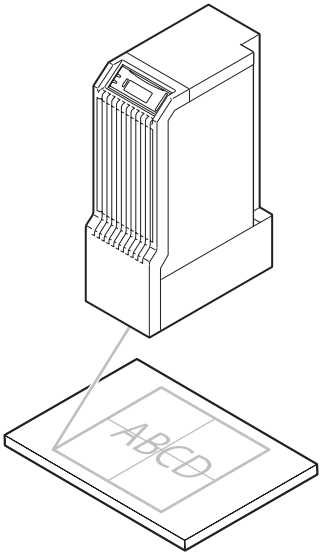
- Marking image
- Marking field
- Masked objects
- Work distance



2. Set the scanning speed of the guide laser with an easily viewable speed.

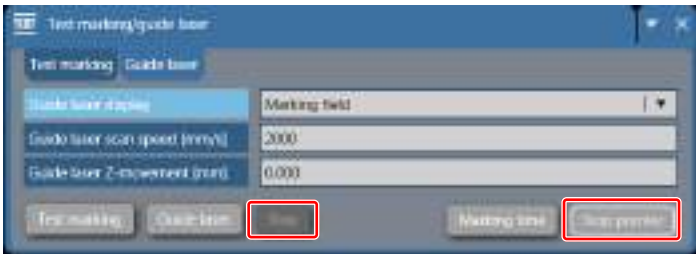
3. Click “Guide laser” to start radiating the guide laser.

To radiate the guide pointer, click “pointer”.



4. Click “Stop” to stop radiating the guide laser.

To stop the guide pointer, click “Stop pointer”.



Reference

- The radiation of the guide laser stops automatically after one minute has passed from the startup.
- Guide pointer radiates for max. 30 minutes until clicking “Stop pointer” button.

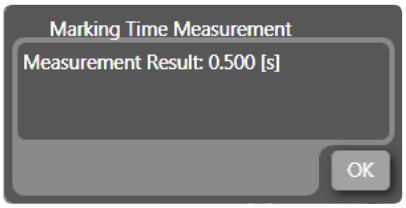
3-4-3 Marking time measurement

This function simulates the marking operation of the laser marker and displays the marking time for the setting data.
The measurement is executed without laser emission.

1. Click “Marking time” in the “Test marking/ guide laser” panel.

2. Marking time is displayed.

Click “Cancel” to stop the measurement in the middle of operation.



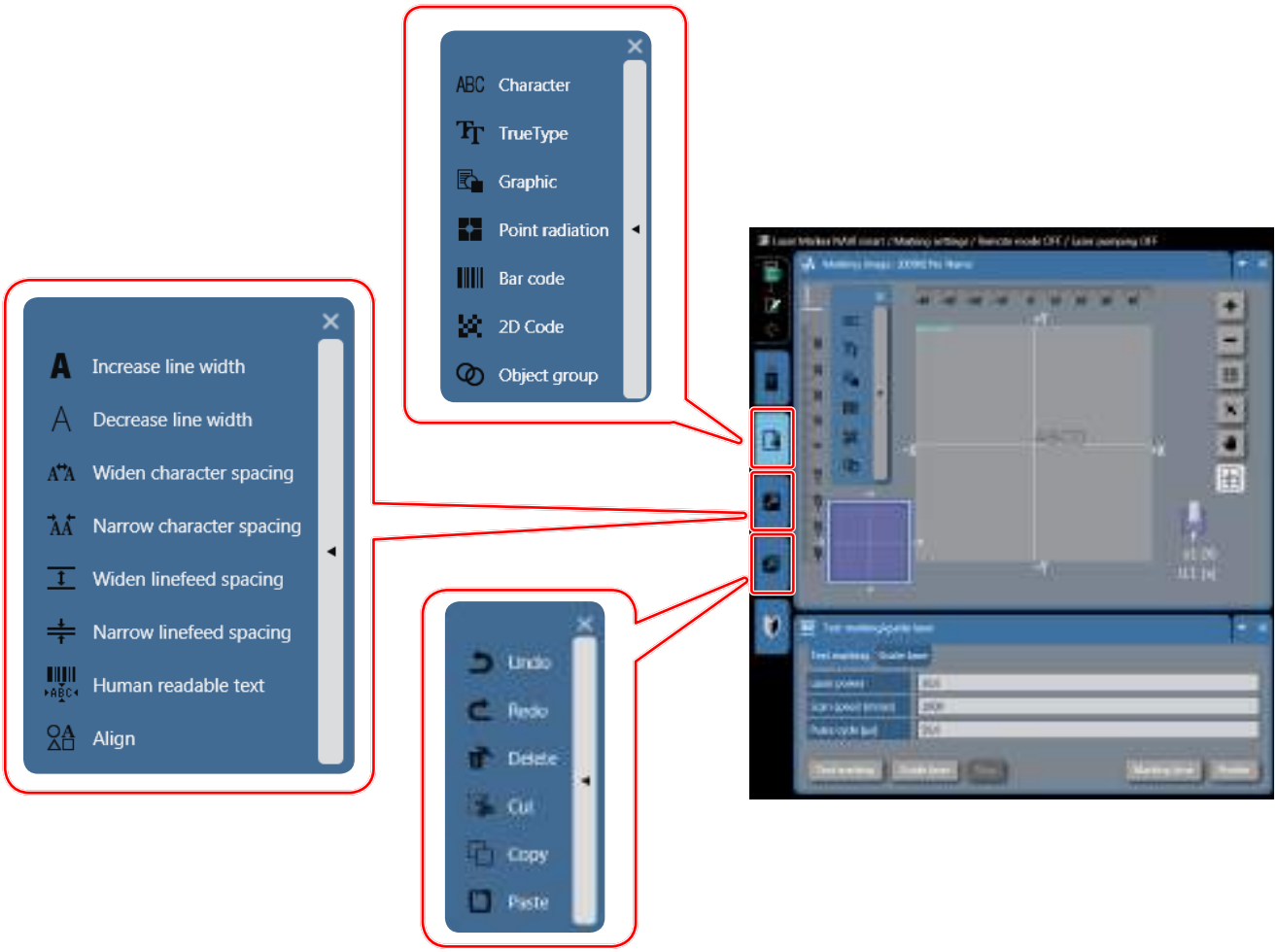
Reference

- If the functional character such as counter is included , the marking time is measured with the current value.
- In case the actual marking period is shorter than the one-shot pulse duration of output, the result of measurement is same as the output of one-shot pulse duration. Refer to “8-3 Input/Output Setting” (P.245) for setting method.
- If the marking time is too long to proceed the on-the-fly marking at regular intervals, the error message will appear with the measurement results.
- At on-the-fly marking, the marking time measurement result contains the time from when the marking start signal (trigger) is input until when the workpiece comes to the preset marking position in addition to the lasing time.

3-5 Editing Tools

In marking settings screen, use the following tools and create the marking data.

3-5-1 Add and edit objects



■ Add marking object

Clicking the icon representing the object type creates a new object of the marking data.

Icon	Name	Description
	Character	Adds objects of characters including the functional characters and reference list characters.
	TrueType	Adds characters written with TrueType fonts stored in the PC.
	Graphic	Adds graphic objects in VEC/DXF/BMP/JPEG/HPGL format.
	Point radiation	Adds point radiation objects. Point radiation is a function to lase at the specified coordinate.
	Barcode	Adds bar code objects such as CODE39, CODE128, EAN/UPC/JAN and GS1 DataBar.
	2D code	Adds 2D code objects such as QR codes, Data Matrix codes, PDF417.
	Object group	Creates an object group. The object group can contain one or more objects and the common marking settings are applied to them.

■ Layout

Clicking the following icons for the layout edition adjusts the layout of the selected object.

Icon	Name	Description
	Increase line width *1	Makes the selected character object bold.
	Decrease line width *1	When the selected character object is a bold face, makes its line width narrower.
	Widen character spacing *1	Widens the character spacing of the selected character object.
	Narrow character spacing *1	Narrows the character spacing of the selected character object.
	Widen linefeed spacing *1	Widens the linefeed spacing of the selected character object.
	Narrow linefeed spacing *1	Narrows the linefeed spacing of the selected character object.
	Human readable text	Available for the barcode or 2D code object with the human readable text. Aligns the position of the human readable text by selecting “Base position” or “Central position X”.
	Align	When selecting two or more objects, aligns those position as follows. • Align Left • Align horizontally • Align vertically • Align Top • Distribute horizontally • Distribute vertically • Align center

*1 : Available only for character object, not available for TrueType object.

■ General operation

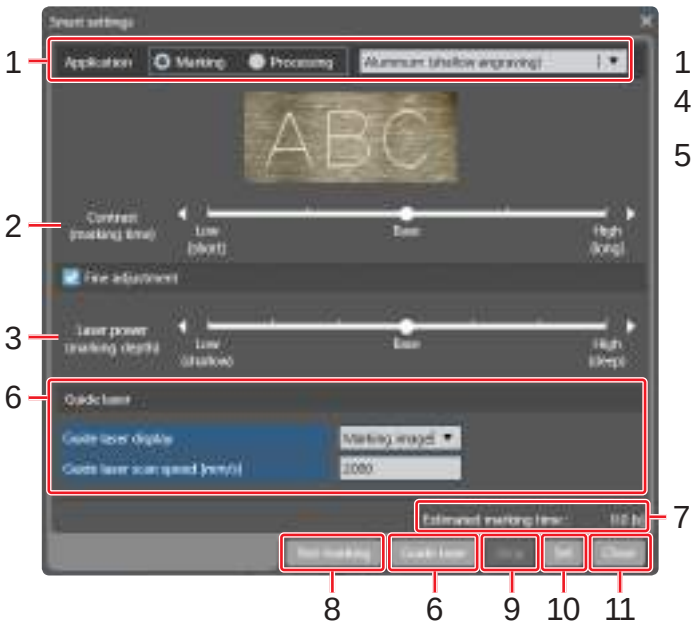
Icon	Name	Description	Keyboard shortcut
	Undo	Cancels and reverses the most recent editing operations.	Ctrl+Z
	Redo	Reverses a previous “Undo” command.	Ctrl+Y
	Delete	Deletes the selected objects.	DEL
	Cut	Cuts the selected objects. The cut objects can be pasted using “Paste” command.	Ctrl+X
	Copy	Copies the selected objects. The copied objects can be pasted using “Paste” command.	Ctrl+C
	Paste	Pastes the “Cut” or “Copy” objects.	Ctrl+V

3-5-2 Smart settings

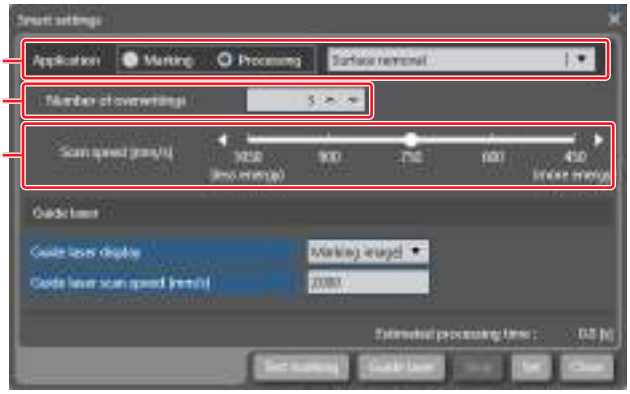
In Smart settings, you can easily set the laser power and scan speed that are suitable for the application by selecting the usage.

Click the smart settings tab and open the setting window.

Marking application



Processing application (LP-RF/LP-RV series only)



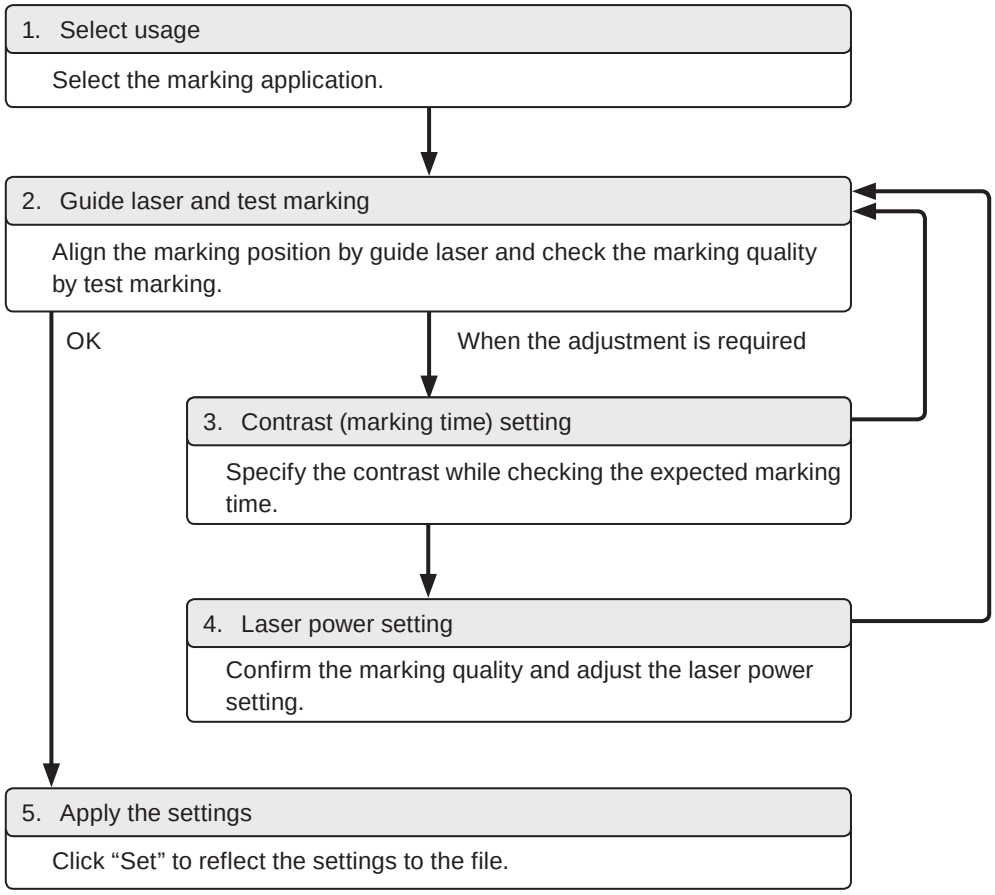
	Setting elements	Description
1	Application	Selects a marking usage.

LP-GS series (Marking)	• PCB (Faint marking) • PCB (Deep marking) (only LP-GS051(-L) type) • Epoxy coated component • Resin (Black) • Paper (layer removal) • Paper (dark marking) (only LP-GS051(-L) type)
LP-RC series (Marking)	• Paper (layer removal)
LP-RF series (Marking)	• Aluminum (shallow engraving) / (deep engraving) • Iron/Stainless steel (shallow engraving) / (deep engraving) • Acrylonitrile butadiene styrene (Black) / (White) • Polybutylene terephthalate (Black) / (White) • Polyoxymethylene (Black) / (White) • Polypropylene (Black) / (White) • Polycarbonate (Black) / (White)
LP-RF series (Processing)	• Surface removal • Cutting of cable shield

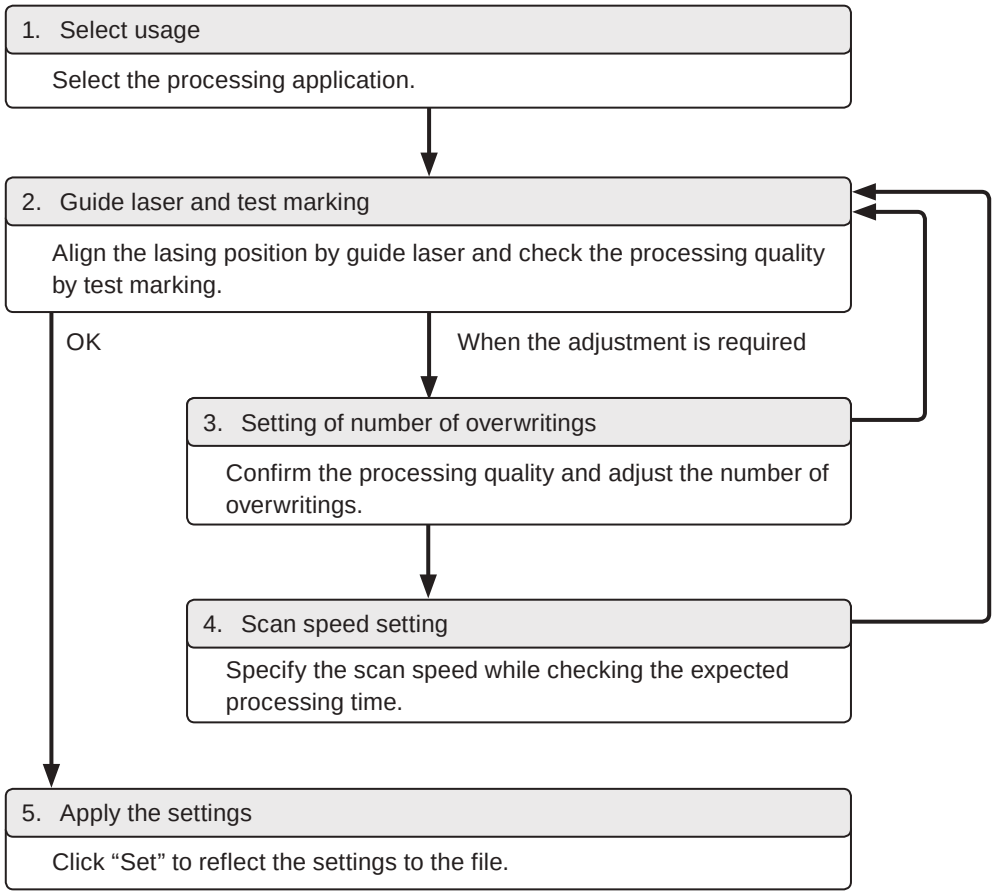
	Setting elements	Description
		LP-RV series (Marking): • Aluminum (shallow engraving) / (deep engraving) • Iron/Stainless steel (shallow engraving) / (deep engraving) • Acrylonitrile butadiene styrene (Black) / (White) • Polybutylene terephthalate (Black) / (White) • Polyoxymethylene (Black) / (White) • Polypropylene (Black) / (White) • Polycarbonate (Black) / (White) • Epoxy coated component LP-RV series (Processing): • Surface removal • Cutting of cable shield
2	Contrast *1	Sets the contrast of marking. Setting the contrast lower than the base (to the left) will shorten the marking time. Setting the contrast higher than the base (to the right) will lengthen the marking time.
3	Laser power *1	Sets the laser power level. Setting the power higher than the base (to the right) will increase the marking depth. Setting the power lower than the base (to the left) will decrease the marking depth.
4	Number of overwritings *2	Sets how many times the setting data is scanned with one trigger input. Setting the number more will increase the energy and the processing time will be longer. Setting range: 1 to 9999
5	Scan speed [mm/s] *2	Sets the scan speed. Setting the speed higher than the base (to the left) will decrease the energy and the processing time will be shorter. Setting the speed lower than the base (to the right) will increase the energy and the processing time will be longer.
6	Guide laser *3	Executes guide laser display. Refer to “3-4-2 Guide laser” (P.67) for details.
7	Estimated marking time / Estimated processing time	Displays the calculated marking or processing time of the file in accordance with the input data and conditions. To confirm more accurate time, execute “3-4-3 Marking time measurement” (P.70).
8	Test marking	Starts the test marking. Refer to “3-4-1 Test marking” (P.66).
9	Stop	Stops the test marking and guide laser.
10	Set	Applies the settings configured in Smart settings to the following settings in the file. • Laser settings - Laser power • Laser settings - Scan speed • Laser settings - Laser frequency (LP-GS series only) • Laser settings - Pulse cycle (LP-RF/LP-RV series only) • Laser settings - Pulse duration (LP-RV series only) • Object group settings - Number of overwritings (for the processing application of LP-RF/LP-RV series)
11	Close	Closes the window. Without clicking “Set", the laser settings do not change.

*1 : Available with the marking application.
*2 : Available with the processing application. (LP-RF/LP-RV series only)
*3 : Available with LP-GS051(-L) type, LP-RC350S, LP-RF series and LP-RV series.

■ Smart settings flow (Marking)



■ Smart settings flow (Processing)



3-6 Marking Object

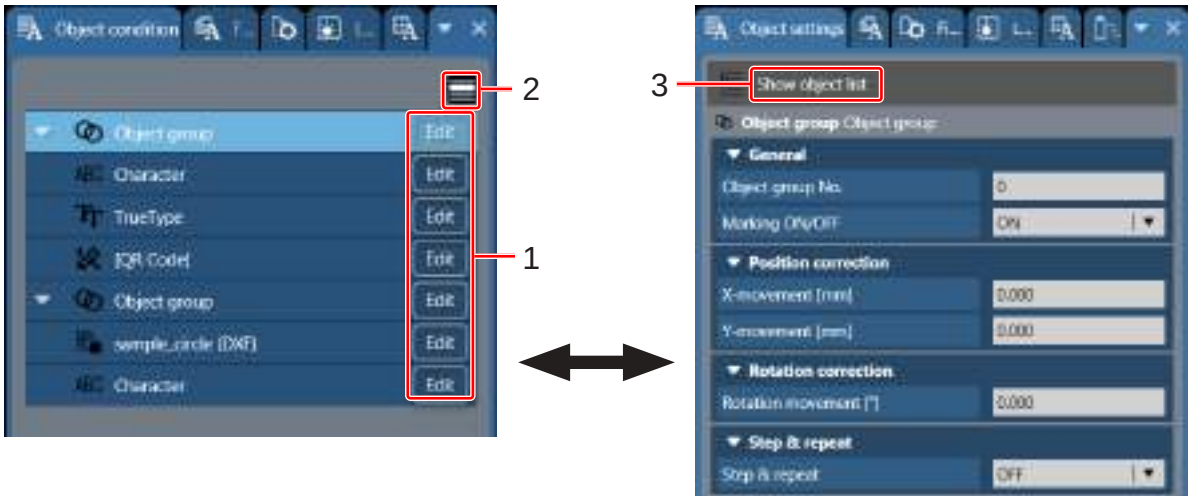
3-6-1 Object type

“Object” is the smallest data unit of the marking data in the marking file.
The following types of the object can be set in the marking file.

Icon	Object type	Setting data
	Character	Characters or functional characters
	TrueType	Characters written with TrueType fonts stored in the PC
	Graphic	Graphic in VEC/DXF/BMP/JPEG/HPGL format
	Point radiation	Lasing at the specified coordinate
	Barcode	Barcode symbols such as CODE39, CODE128, EAN/UPC/JAN, GS1 DataBar and Composite codes
	2D code	2D code symbols such as QR codes, Data Matrix codes and PDF417
	Object group	The object group can contain one or more objects and the common marking settings are applied to them.

3-6-2 Object list

List of the object groups and objects set in the file is displayed.



	Item	Description
1	Edit	Displays the condition setting window of the selected object.
2	Multiple objects selection button	To select two or more objects in the list, click this button. Use this button to move or delete multiple objects at once in the image display.

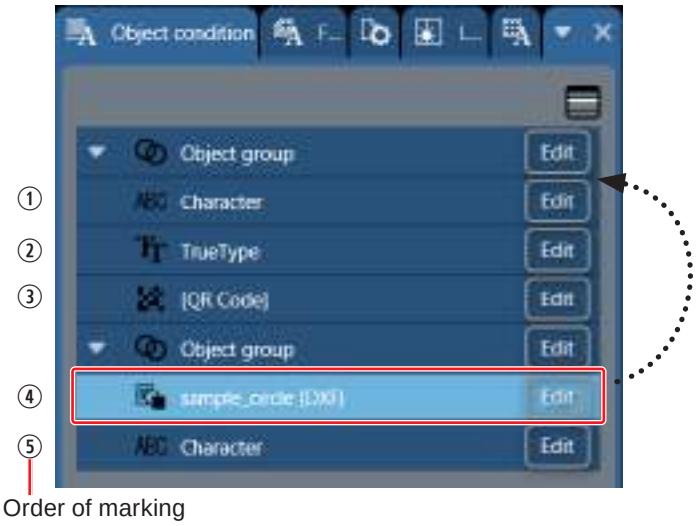
Reference

- Multiple objects can also be selected by selecting objects while pressing the “shift key” in the image display.

3	Show object list	Switches the condition setting view to the object list.

■ Change the order of marking

The display order in the object list indicates the marking order.
The object in the top of the list is marked at first.
To change the marking order, move the object position in the list by drag-and-drop operation.

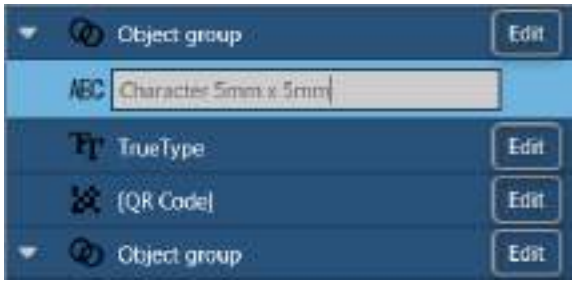


Reference

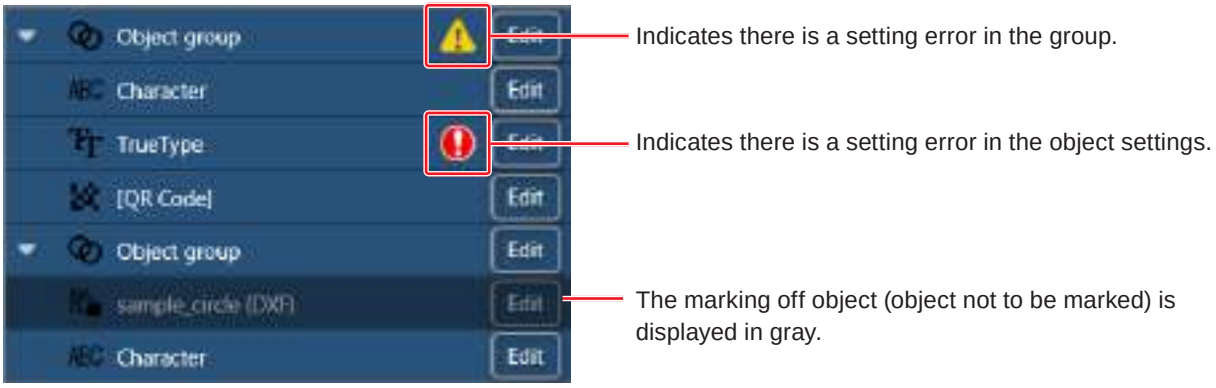
- This setting is not applied to the on-the-fly marking. At the on-the-fly marking, the marking order is optimized according to the moving direction.

■ Object name

Each object and object group can be named in the object list.
Click the object category name on the list and rename it with the desired text.

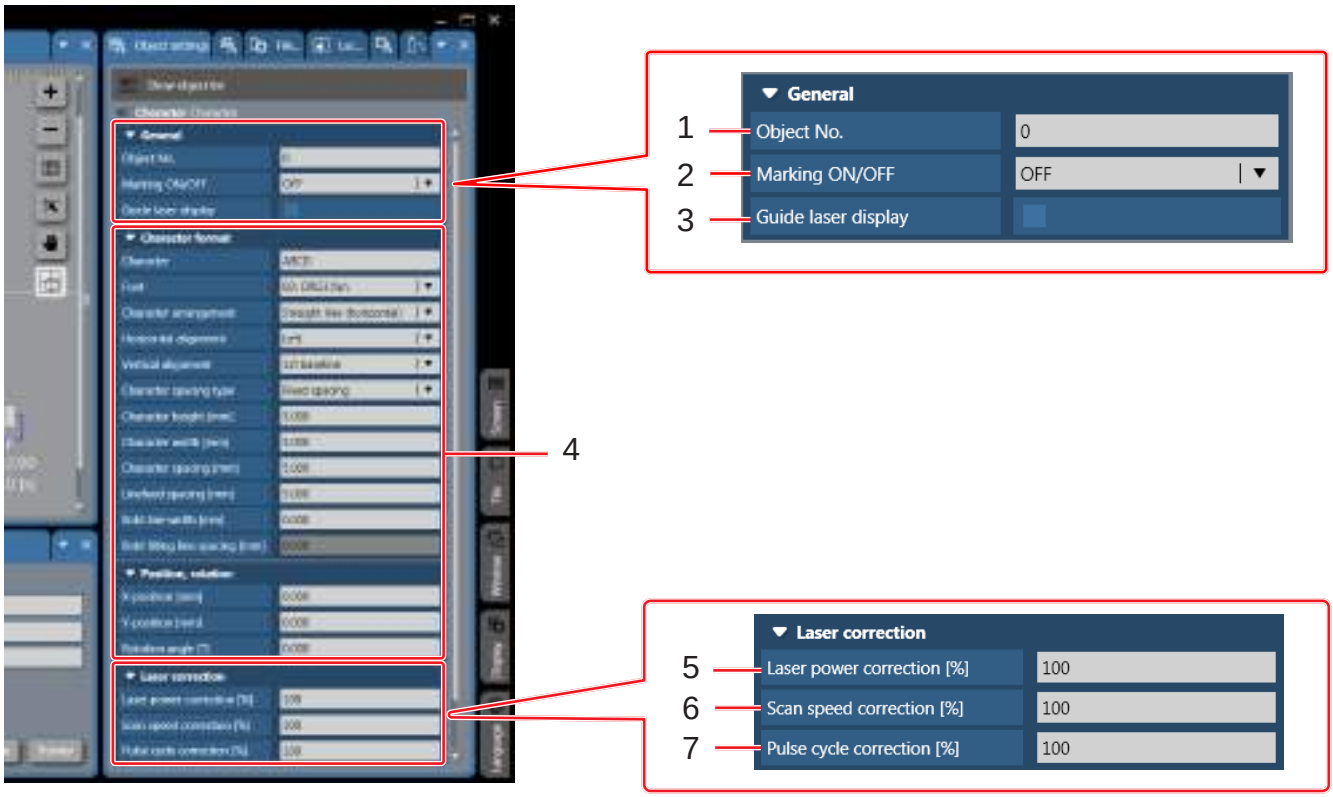


■ Display in object list



3-6-3 Object settings

For each object and object group, marking details and layout can be set in the marking data settings window.



	Item	Description
1	Object No. or Object group No.	The number is assigned by the order of the object creation. It is possible to change this number to the arbitrary one. This number is used for the communication command control. Setting range: 0 to 1999
2	Marking ON/OFF	Set the marking ON/OFF of the object. When marking OFF is set, the object is only shown in the image field, but not marked by laser. Setting entry: ON, OFF
3	Guide laser display *1	Available when Marking OFF is set. Set the guide laser ON/OFF of the marking OFF object. Check this box to display the marking OFF object by guide laser.
4	Layout and detailed parameters	Depending on the object type, the setting parameters vary. Refer to the description of the each objet condition.
5	Laser power correction [%]	Corrects the laser power, scan speed or pulse cycle of the selected object. The correction ratio is calculated using the value set at the laser settings as 100%.
6	Scan speed correction [%]	Setting range: Laser power correction 0 to 999 %; Scan speed correction 1 to 999 %; Pulse cycle correction 1 to 999 %
7	Pulse cycle correction [%] *2	

Reference

- If the corrected value exceeds the setting limit, marking is executed with the upper or lower limit value.
- Marking is not available when the laser power correction value is “0”.

*1 : Available with LP-GS051(-L) type, LP-RC350S, LP-RF series and LP-RV series.
*2 : Available with LP-RF series and LP-RV series.

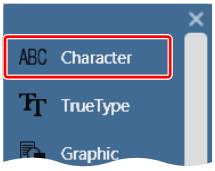
3-7 Character Object

This section describes how to set a character object.
There are two methods to input characters “direct input” and “reference list”.

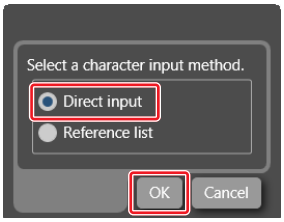
3-7-1 Set character object (direct input)

For the direct input type of the character objects, input the marking strings with the following procedures.

1. Open the editing tool tab and click “Character”.



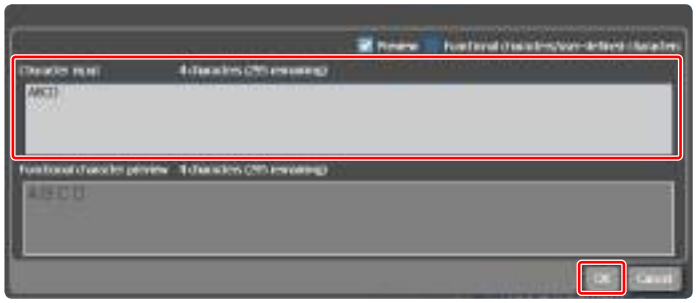
2. Select “Direct input” to the input method and click “OK”.



Reference

- When you will use certain strings in several objects or files commonly, use “Reference list” for the character input method. Refer to “3-7-2 Set character object (reference list)” (P.80) for the details.

3. The character input window appears. Input text and click “OK”.



Reference

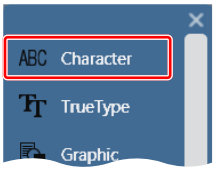
- To set the functional characters such as counter and date for the automatic updating, refer to “3-7-4 Set functional characters” (P.83).
- To set “%” as a character, input “%%”.
- To use Japanese or Simplified Chinese characters, set “East Asian characters” in file settings. Refer to “3-13-1 Offset and character settings” (P.156).

4. The character object is set and displayed in the marking image field.

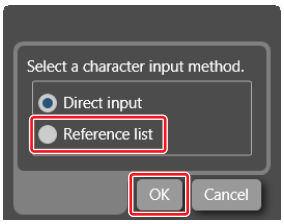
3-7-2 Set character object (reference list)

When you will use certain strings in several objects or files commonly, use “Reference list” for the character input method to select the strings from the list.

1. Open the editing tool tab and click “Character”.

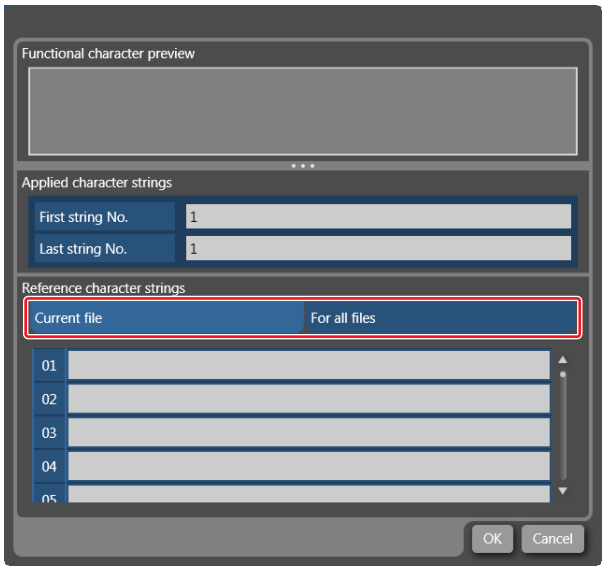


2. Select “Reference list” to the input method and click “OK”.



3. The setting window of the reference list character appears. Select “Current file” or “For all files” tab depending on the range of the strings application.

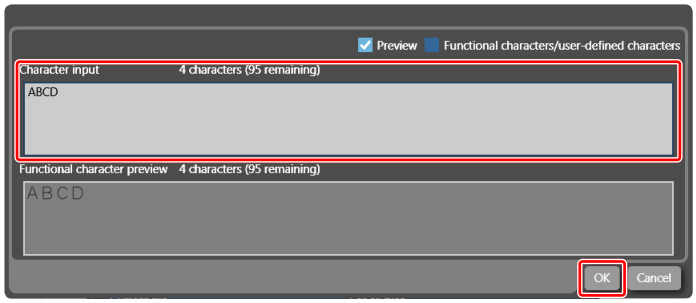
In the “Current file” reference list, set the strings you can use only in the selected file. In the “For all files” reference list, set the strings you can use in all files.



Reference

- The reference character strings for all files can be set under the online mode or the backup file editing mode only.

4. If there are no character strings in the list yet, click the row to input. The character input window appears. Input text and click “OK”.



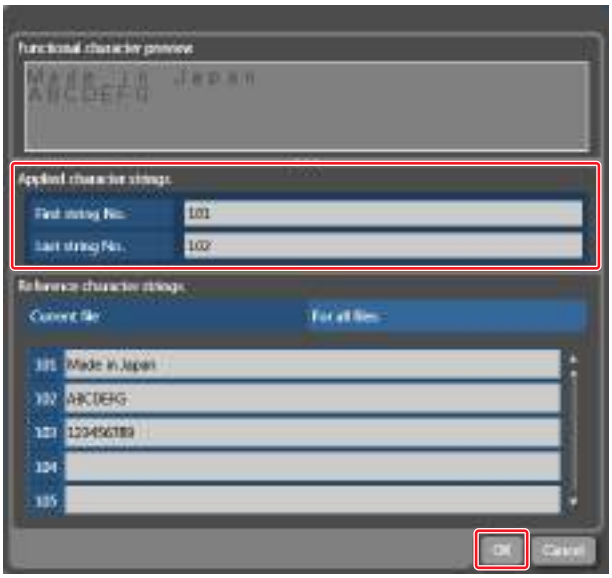
Reference

- To set the functional characters such as counter and date for the automatic updating, refer to “3-7-4 Set functional characters” (P.83).
- To set “%” as a character, input “%%”.
- To use Japanese or Simplified Chinese characters, set “East Asian characters” in file settings. Refer to “3-13-1 Offset and character settings” (P.156).

5. Set the row number to use this character object to the “Fist string No.” and “Last string No.”, then click “OK”.

The all strings from the first string No. to the last string No. are used to the specified object.

To use only one string, set the same string No. to the first and the last No.



6. The character object was set and shown in the marking image field.

Reference

- The setting characters are shown in the list of reference character strings by clicking “Reference character strings” tab in the settings screen. You can also edit the strings in this list. Refer to “3-7-7 Reference character strings list” (P.96).

3-7-3 Set user-defined characters

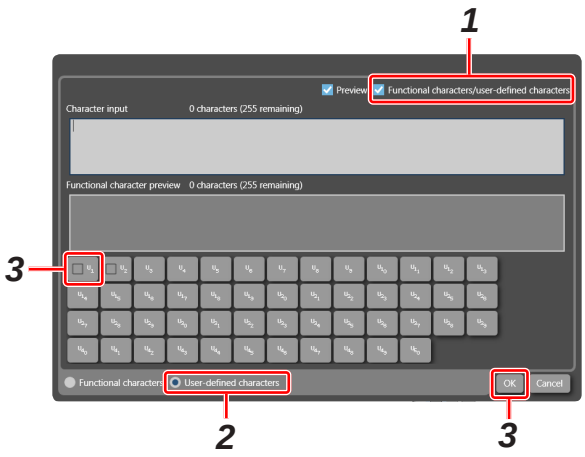
You can create the new character or symbol by using the attached software Font maker. Save it to the user-defined character font (USER1.FON) and you can use it in the laser marker.

■ Input procedures for user-defined characters

1. Check the “Functional characters/user-defined characters” in the character input window.

2. Select “User-defined characters”.

3. Select the character and click “OK”.



Reference

- Refer to “Font Maker Operation Manual” for adding the new characters to the user-defined characters font.
- Refer to “7-3-2 Add data” (P.218) to import the modified font files to the laser marker.
- The following characters are registered in the user registration font U1 to U2 as the initial setting.

- The marking image of the user registration font is displayed on the each button.

3-7-4 Set functional characters

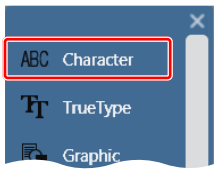
This section describes how to set functional characters such as the data and time, the counter and the lot.

1. Set the condition of the functional characters.

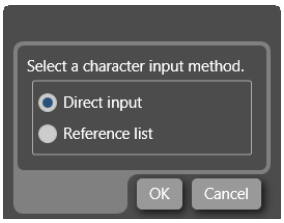
For details, refer to the following pages:

- “3-14-1 Expiry date and time / Global expiry date and time” (P.163)
- “3-14-2 Counter / Global counter” (P.165)
- “3-14-3 Lot / Global lot” (P.167)
- “3-14-4 Registered characters (via I/O)” (P.169)

2. Click the “Character” icon in the editing tool.



3. Select the character input method.



Reference

- When you will use certain strings in several objects or files commonly, use “Reference list” for the character input method. Refer to “3-7-2 Set character object (reference list)” (P.80) for the details.

4. The input window for character setting appears.

Check “Functional characters/user-defined characters”.

5. Open the tab for the functional characters to use, and then set each item.

Refer to “3-7-5 Functional character setting” (P.84).

6. Click “Input functional character”.

7. Click “OK”.

The functional characters are set with the strings started with “%”.

8. To change the input characters, double-click the character object on the marking image field.

Or click the character input field in the character format settings.

The input window for character setting appears.

Reference

- To delete the functional character, delete all digits following “%”.
- To set “+” or “/” as a marking character after the counter character, input “%+” or “%/”.

3-7-5 Functional character setting

■ Date and time

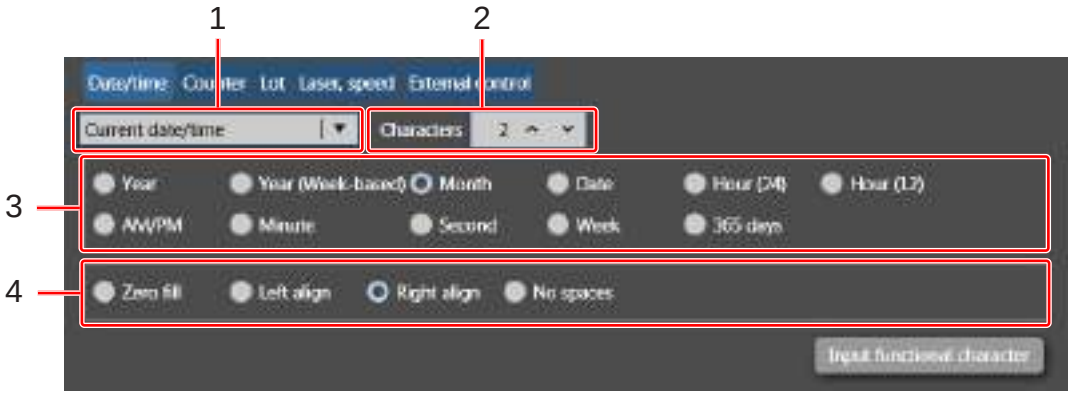
Marks automatically updated date and time referring to the system clock of the laser marker set in the system settings.

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

For the system clock, refer to “8-1-1 Calender and clock setting” (P.229).

Reference

- Refer to “3-14-1 Expiry date and time / Global expiry date and time” (P.163) to set the expiry condition.



	Setting elements	Description
1	Date and time type	Select current or expiry date/time. For the expiry date/time, select the No. set in the functional character settings.

Setting range	Current date/time
	Expiry date/time No. 1 to 16
	Global expiry date/time No. 17 to 32

2	Max. digits	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 9 digits

3	Date and time unit	Sets the period type to show the date and time.

Period type	Remarks
Year	Dominical year (standard)
Year (Week-based)	Dominical year based on the week number. According to the week number, the date of the end or start of the year may belong to the last or next year.
Month	
Date	
Hour (24)	Time in 24 hours to be displayed with 0 to 23.
Hour (12)	Time in 12 hours to be displayed with 0 to 11.
AM / PM	Time in 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	
Second	
Week	
365 days	“1” indicates January 1, and “365” indicates December 31 (for normal year).

	Setting elements	Description
4	Zero indication	Sets date and time indication method with or without zero.

Zero indication	Description
Zero fill	Marks value in right-justified, and mark “0” to the left.
Left align	Marks value in right-justified, and blanks (space) left column.
Right align	Marks value in left-justified, and blanks (space) right column.
No spaces	Marks only value in left-justified.

Notice

- The functional characters such as data/time and lot are marked based on the system clock of the laser marker. The system clock might be deviated due to the error in internal part or battery drain. Therefore, be sure to check the time of the system clock before the operation.

Reference

- By using “TIME HOLD IN” signal of the I/O connector pin No. 22, the functional characters such as date/time and lot do not update and the laser marker marks the time and date at the point when the input was turned ON. For the TIME HOLD IN function, refer to “Setup/Maintenance Guide”.
- When week or year (week-based) is used for the date marking, set the update day and first week of the year in system settings screen beforehand. Refer to “8-1-1 Calender and clock setting” (P.229).

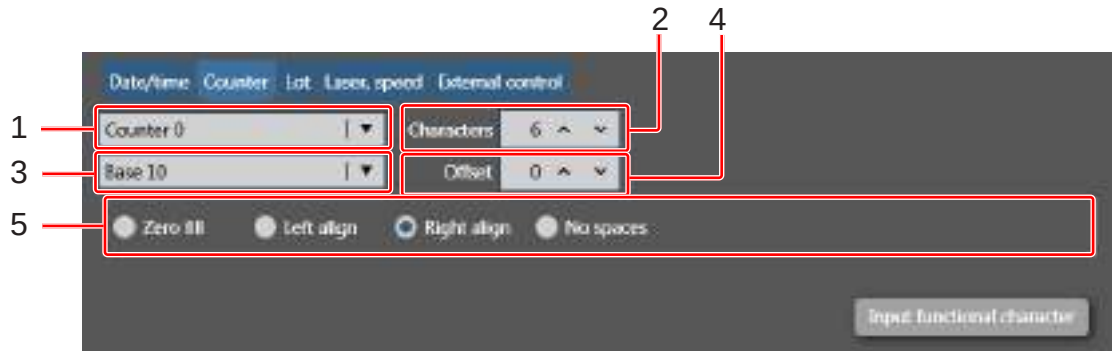
Character strings to represent the functional characters of date and time

%0N:Xn : Date and time with Zero fill
%_N:Xn : Date and time without Zero fill, right align (the underscore (_) represents a space.)
%N_:Xn : Date and time without Zero fill, left align (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 9	Represents the number of digits.
X	Represents the unit of date and time.	
	Y	Year
	i	Year (Week-based)
	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 9	Expiry time No. 1 to Expiry time No. 9
	A to G	Expiry time No. 10 to Expiry time No. 16
	H to W	Global expiry time No. 17 to Global expiry time No. 32

■ Counter

Counter is a function to mark consecutive numbers according to the specified count-up or count-down conditions.
Refer to “3-14-2 Counter / Global counter” (P.165) to set the counter condition.



	Setting elements	Description
1	Counter No.	Select the counter condition No. set in functional character settings. Setting range: Counter No. 0 to 15 / Global counter No. 16 to 31
2	Max. digits	Sets the digit number to show the counter value. 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 9 digits
3	Counting base	Select the display notation from binary to 36 base number. Setting range: 2 to 36 base number expression
4	Offset	Adds the setting value to the counter value, and marks its value. Setting range: 0 to 9
5	Zero indication	Sets counter value indication method with or without zero.

Zero indication	Description
Zero fill	Marks value in right-justified, and mark “0” to the left.
Left align	Marks value in right-justified, and blanks (space) left column.
Right align	Marks value in left-justified, and blanks (space) right column.
No spaces	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 align (the underscore (_) represents a space.)
%N_:CnY/Z : Counter without Zero fill, left align (the underscore (_) represents a space.)
%N-:CnY/Z : Counter without Zero fill stop

Item	Displayed characters	Description
N	1 to 9	Represents the number of digits.
n	Represents the counter number.	
	0 to 9	Counter No. 0 to Counter No. 9
	A to F	Counter No. 10 to Counter No. 15
	G to V	Global Counter No. 16 to Global Counter No. 31
Y	+1 to +9	Represents the counter offset. This character is used if the offset is not set.
Z	1 to 9, A to Z	Represents the counter numbering system with the (numbers -1) value. “/Z” is omitted for the decimal number.

■ Lot

Lot is a function to replace the marking character of the time, date or counter value to the arbitrary text.
Refer to “3-14-3 Lot / Global lot” (P.167) to set the lot details.

	Setting elements	Description
1	Lot No.	Select the lot setting No. set in functional character settings. Setting range: Lot No. 0 to 15; Global lot No. 16 to 31

Notice

- The functional characters such as data/time and lot are marked based on the system clock of the laser marker. The system clock might be deviated due to the error in internal part or battery drain. Therefore, be sure to check the time of the system clock before the operation.

Reference

- By using “TIME HOLD IN” signal of the I/O connector pin No. 22, the functional characters such as date/time and lot do not update and the laser marker marks the time and date at the point when the input was turned ON. For the TIME HOLD IN function, refer to “Setup/Maintenance Guide”.

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 9	Lot No. 0 to Lot No. 9
	A to F	Lot No. 10 to Lot No. 15
	G to V	Global Lot No. 16 to Global Lot No. 31

■ Laser, speed (marking of laser settings)

With this function, the setting value of the laser settings such as laser power and scan speed is marked.
To check the marking quality with several laser settings, use this function.

	Setting elements	Description
1	Laser power	Marks laser power setting value in laser settings panel. If the laser power is corrected for the object, the calculated result value is marked.
2	Scan speed	Marks scan speed setting value in laser settings panel. If the scan speed is corrected for the object, the calculated result value is marked.
3	Pulse cycle *1	Marks pulse cycle setting value in laser settings panel. If the pulse cycle is corrected for the object, the calculated result value is marked.

*1 : Available with LP-RF series and LP-RV series.

Character strings to represent the functional characters of laser settings

%POWER : Laser power
%SPEED : Scan speed
%PULSE : Pulse cycle

Reference

- The functional characters of the laser settings are displayed in 5 digits including decimal point with right-justified.
- To mark both laser power and scan speed at the same time, input each function of functional characters.
- It is not possible to set the functional characters of the laser settings to bar code and 2D code objects.

■ External input

The functional character of the external input is the function that specifies the marking characters by using I/O or communication command.
According to the external control method, there are two types of the characters.

- Registered characters (via I/O connector)
- Characters specified by SIN command

Reference

- Refer to “3-14-4 Registered characters (via I/O)” (P.169) to set the detail of the registered characters via I/O.
- For Characters specified by SIN command, refer to “Serial Communication Command Guide”.
- Characters specified by SIN command and registered characters via I/O cannot be set together in one file.
- Characters specified by SIN command and external offset function by I/O cannot be set together in one file.
- When on-the-fly marking at regular intervals or with multiple triggers are set, characters specified by SIN command and registered characters via I/O cannot be used.

	Setting elements	Description
1	Registered characters	Select the registered character table No. set in functional character settings. The registered character is a function that switches marking characters using the input terminal D0 to D15. The character patterns are configured to the data number corresponding to D0 to D15 in advance and the marking character is selected with I/O from D0 to D15. Setting range: When I/O input format is 8 bit x 2: 0 to 1 When I/O input format is 4 bit x 4: 0 to 3
2	Characters specified by SIN command	Select the character string No. that is specified in the communication command data. When “Characters specified by SIN command” is set for character objects or barcode/2D code objects, input characters with SIN command. Send this command per each marking. Setting range: String No. 0 to 15
3	Max. digits	Specifies the number of max. character digits to be input as characters specified by SIN command. This number is used only for the display in the marking image field. Setting range: 0 to 99

Character strings to represent the functional characters of registered characters via I/O

%INP:n : Registered characters via I/O

Item	Displayed characters	Description
n	Represents the registered characters table number.	
	0 to 3	Registered character table No. 0 to Registered character table No. 3

Character strings to represent the functional characters of command specified character

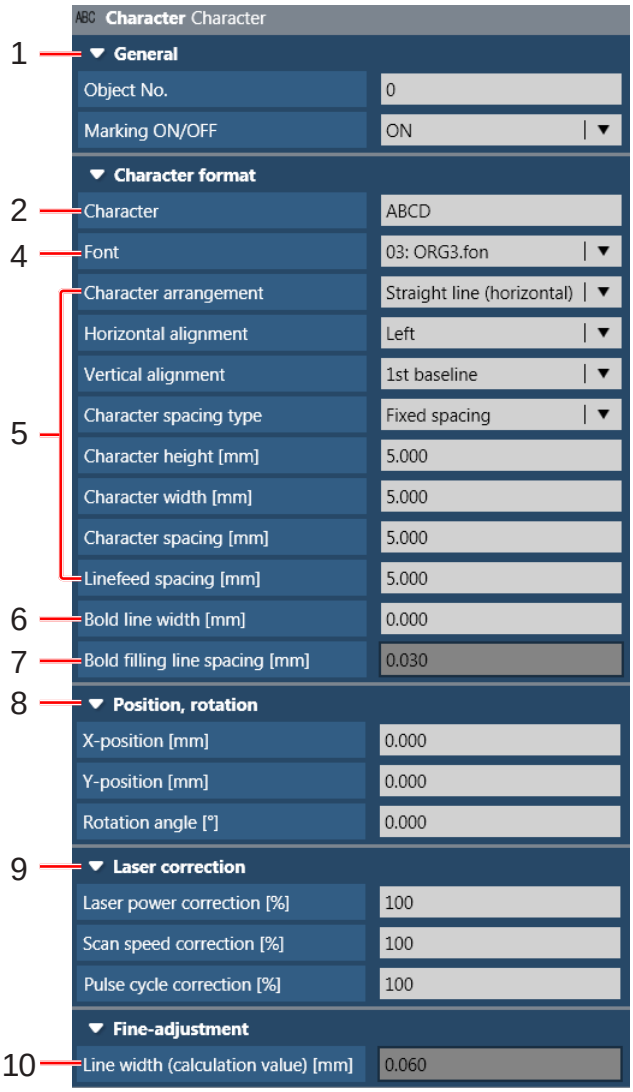
%MM:Sn : Characters specified by SIN command

Item	Displayed characters	Description
MM	00 to 99	Represents the number of max. character digits to be input as characters specified by SIN command.
n	Represents the character number of characters specified by SIN command	
	0 to 9	String No. 0 to String No. 9
	A to F	String No. 10 to String No. 15

3-7-6 Character object format

Set the layout and marking parameters of the character object.

Direct input type



Reference list type

	Setting elements	Description
1	General setting	Refer to “3-6-3 Object settings” (P.78).
2	Character *1	For the direct input character objects, input the text to be marked. (Max. 299 digits)
3	Applied character strings *2	For the reference list character objects, select the row number in the reference list to use for this object. Refer to “3-7-2 Set character object (reference list)” (P.80) and “3-7-7 Reference character strings list” (P.96).
4	Font	Select the font type for the alphanumeric. Refer to “7-2-4 Font file” (P.215).
5	Layout properties	Refer to “Character layout setting” (P.92).
6	Bold line width [mm]	Specifies the line width of bold character. Setting range: 0.000 to 6.000 mm

Reference

- At marking of bold characters, set the values so ratio of character height to character width be within 1/10 to 10.
- Set bold line width to half or below of either smaller one, character height or character width.
- For some characters with Original 4 font are not available to make bold characters.

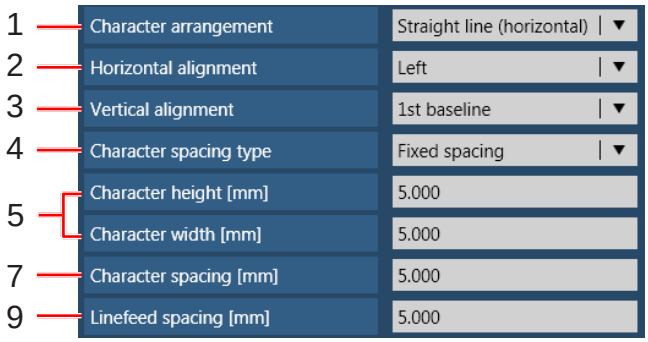
	Setting elements	Description
7	Bold filling line spacing [mm]	Displays setting value in object group settings panel. When marking the bold character, set the bold filling line spacing in object group settings together. Refer to “Bold filling line spacing” (P.151).
8	Position, rotation	Sets the character object position in the marking field. Refer to “Position and rotation” (P.95).
9	Laser correction	Refer to “3-6-3 Object settings” (P.78).
10	Line width (calculation value) [mm]	Displays setting value in object group settings panel. Refer to “3-12-1 Object group settings” (P.149).

*1 : Available when the character input method is direct input.

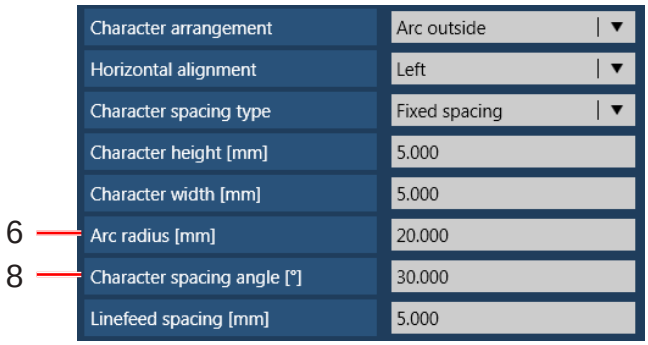
*2 : Available when the character input method is reference list.

■ Character layout setting

Character arrangement: straight line



Character arrangement: arc



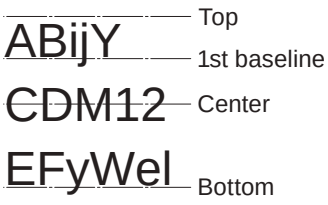
	Setting elements	Description
1	Character arrangement	Select the layout shape of the character strings.

Straight line (horizontal)	Arc outside	Arc inside
ABijY	ABijY	ABijY

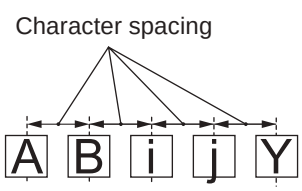
2 3	Horizontal alignment / Vertical alignment *1	Specifies the origin point of the character strings. The coordinate of the origin is specified in “Position and rotation” (P.95). • Horizontal alignment: Select the origin in horizontal direction.

Left	Center	Right
ABijY CDM12	ABijY CDM12	ABijY CDM12

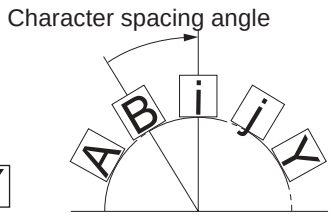
• Vertical alignment: Select the origin in vertical direction.



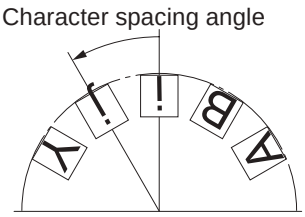
	Setting elements	Description
4	Character spacing type	Select the character spacing type. The definition of the distance or angle of the character spacing varies depending on this setting.
	• Fixed spacing	Regardless the width of the letters, each letter is aligned at the equal intervals. With this setting, character spacing represents the distance between center of the characters.



Straight line, Fixed spacing

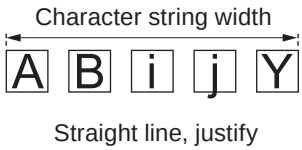


Arc outside, Fixed spacing

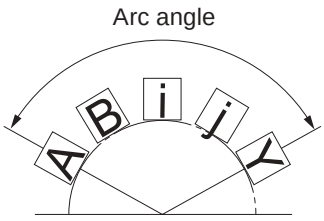


Arc inside, Fixed spacing

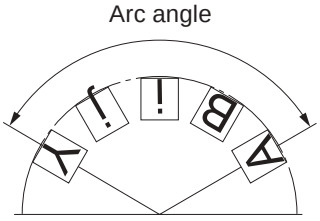
	• Justify	The characters are arranged in the specified string width equally. If the character string width is smaller than “character width x letter digits” for the straight line, the character width becomes narrower automatically.



Straight line, justify

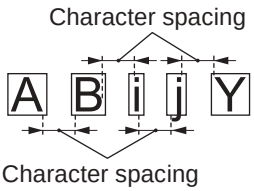


Arc outside, justify

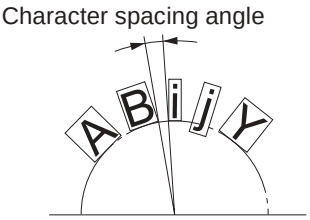


Arc inside, justify

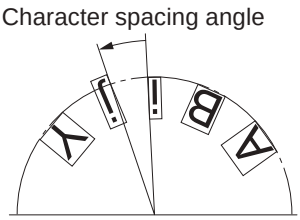
	• Proportional	Depending on the width of the letters, the letter-spacing is adjusted. To close the character pitches for such as “i” or “l”, select proportional. With this setting, character spacing represents the distance between the edge line of the characters. Select the level of spacing from proportional 1 to 3. The lower the number is, the smaller the spacing is. • Proportional 1: Minimize the character spacing. The letter-spacing of the letter “i” and “l” (small letter “L”) are defined as “0”. • Proportional 2: The character width such as “i” and “l” (small letter “L”) is defined 1/4 of the character width such as “W”. • Proportional 3: The character width such as “i” and “l” (small letter “L”) is defined 5/8 of the character width such as “W”.



Straight line, proportional



Arc outside, proportional



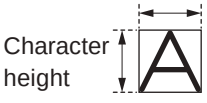
Arc inside, proportional

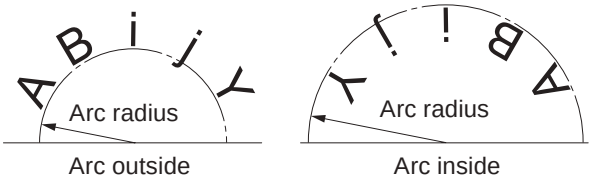
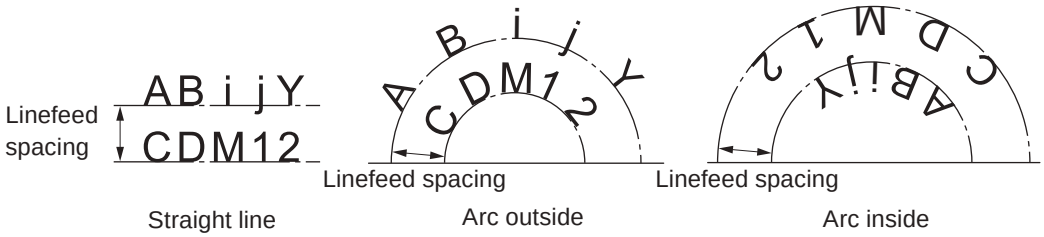
Reference

- When “LP-400/V compatibility” in the system settings screen is enabled, set the proportional type not in the character object settings, but in the file settings. Refer to “3-13-4 Compatibility with former models” (P.162).

5	Character height [mm] Character width [mm]	Specifies the height / width of character.

Setting range	0.100 to 55.000 mm (LP-GS051)
	0.060 to 30.000 mm (LP-GS052)
	0.100 to 85.000 mm (LP-RC350S)
	0.100 to 90.000 mm (LP-RF200P / LP-RV200P)



	Setting elements	Description
6	Arc radius [mm] *2	Specifies the radius of arc. Setting range: 0 to 999.999 mm 
7	Character spacing [mm] *1 or Character string width [mm] *1	Specifies the pitch between a character and the adjacent character. • With “fixed spacing” or “proportional” character spacing style, set the distance between each character. • With “justify” character spacing style, set the string width. The characters are arranged in the specified string width equally. Setting range: 0.000 to 55.000 mm (LP-GS051) 0.000 to 30.000 mm (LP-GS052) 0.000 to 85.000 mm (LP-RC350S) 0.000 to 90.000 mm (LP-RF200P / LP-RV200P)
8	Character spacing angle [°] *2 or Arc angle [°] *2	Specifies the interval angle between a character and the adjacent character. • With “fixed spacing” or “proportional” character spacing style, set the character spacing angle. • With “justify” character spacing style, set the arc angle. The characters are arranged in the specified angle equally. Setting range: Character spacing Angle : -180.000 to +180.000° Arc angle : -360.000 to +360.000°
9	Linefeed spacing [mm]	Specifies the distance between each text line. (linefeed width) Setting range: 0.000 to 55.000 mm (LP-GS051) 0.000 to 30.000 mm (LP-GS052) 0.000 to 85.000 mm (LP-RC350S) 0.000 to 90.000 mm (LP-RF200P / LP-RV200P) 

Reference

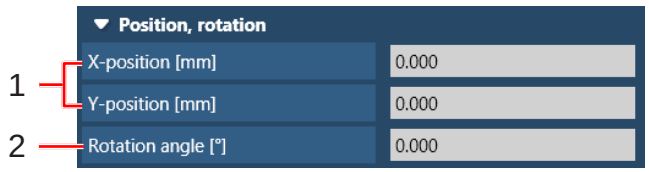
- For the arc arrangement with the linefeed, the arc radius of the second or the subsequent text lines is increased or decreased with the linefeed spacing length.

*1 : Available when the character arrangement is straight line.
*2 : Available when the character arrangement is arc.

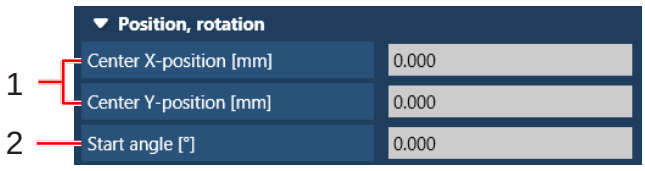
■ Position and rotation

Sets the character object position in the marking field.

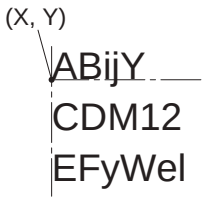
Character arrangement: straight line



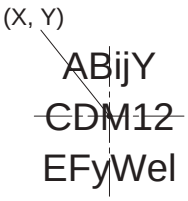
Character arrangement: arc



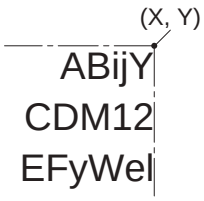
	Setting elements	Description
1	X-position [mm] *1 Y-position [mm] *1 or Center X-position [mm] *2 Center Y-position [mm] *2	Sets the X-/Y-position of the origin point of the character object. • When the character arrangement style is straight line, the origin point is specified with “Horizontal alignment” and “Vertical alignment”. • When the character arrangement style is arc, the origin point is the center of the circle. Setting range: -999.999 to +999.999 mm



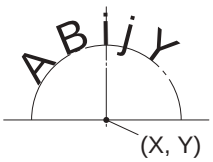
Horizontal alignment: left
Vertical alignment: 1st baseline



Horizontal alignment: center
Vertical alignment: center



Horizontal alignment: right
Vertical alignment: top

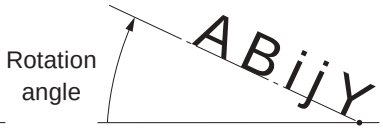


Arc outside

2	Rotation angle [°] *1 or Start angle [°] *2	Rotates the character object at the input angle. It rotates in clockwise direction with minus angle, and in counterclockwise with plus angle. Setting range: -180.000 to +180.000°

• When the character arrangement style is straight line, set the rotation angle. The rotation center is the specified X-/Y-position.

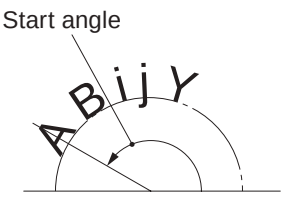
Straight line, left alignment



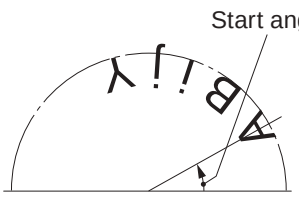
Straight line, right alignment

Straight line, center alignment

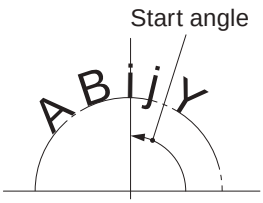
• When the character arrangement style is arc, set the start angle for the horizontal alignment position. The rotation center is the specified center X-/Y-position.



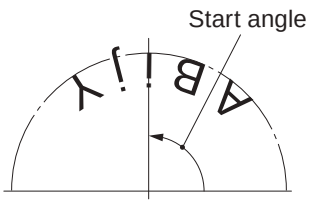
Arc outside,
left alignment



Arc inside,
left alignment



Arc outside,
center alignment

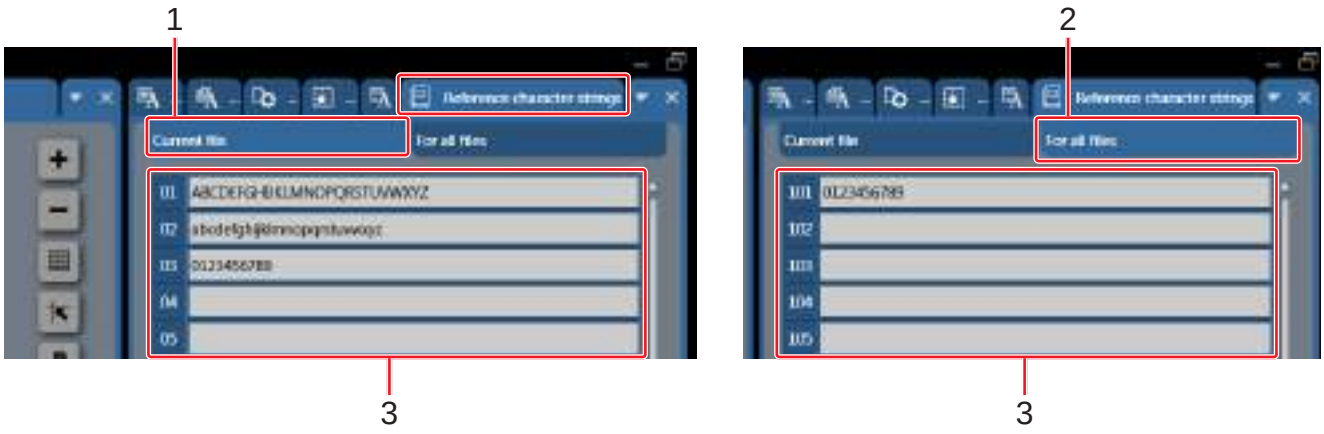


Arc inside,
center alignment

*1 : Available when the character arrangement is straight line.
*2 : Available when the character arrangement is arc.

3-7-7 Reference character strings list

When the character object of the reference list type is set, the setting strings are displayed by clicking “Reference character strings” tab in the settings screen.
For the settings of the reference list character object, refer to “3-7-2 Set character object (reference list)” (P.80).



	Item	Description
1	Current file	The setting strings which you can use only in the selected file are displayed. String No. | 1 to 100
2	For all files	The setting strings which you can use in all files are displayed. String No. | 101 to 200
3	Reference character strings	The setting characters are displayed. To edit the text, click the string row. Max. 99 characters can be set in one string No.

Reference

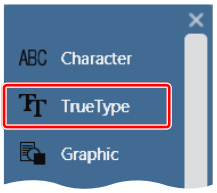
- To use the strings in this list for the marking data, set the strings No. to “Applied character strings” in the character object settings. Refer to “3-7-6 Character object format” (P.90).

3-8 TrueType Object

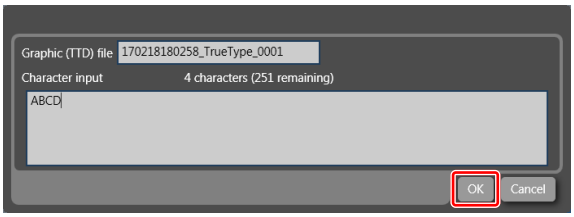
Create the marking characters using the TrueType font installed in the PC with Laser Marker NAVI smart.

3-8-1 Set TrueType object

1. Open the editing tool tab and click “TrueType”.



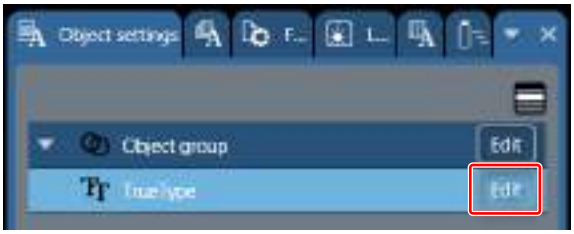
2. Input text and click “OK”.



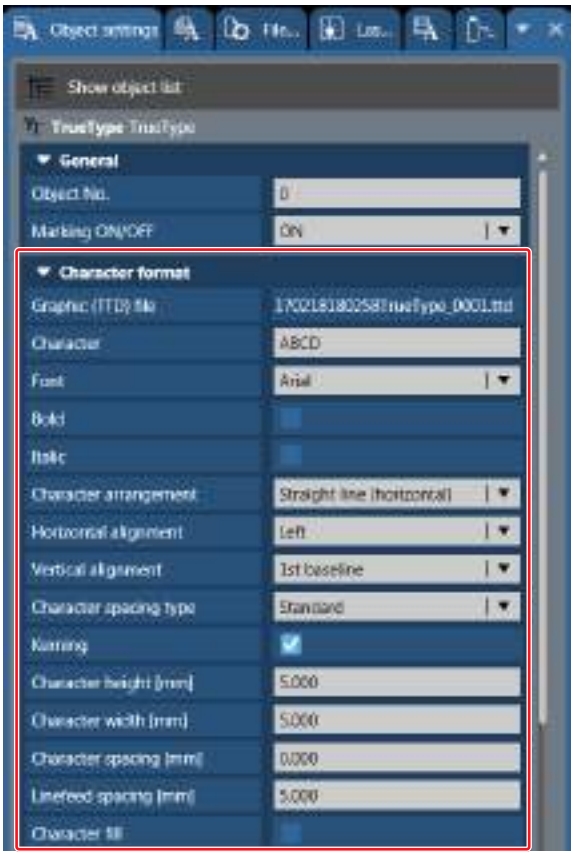
Reference

- TrueType object is saved as the graphic file with “.ttd” format.

3. Select the TrueType object in the object list and click “Edit”.



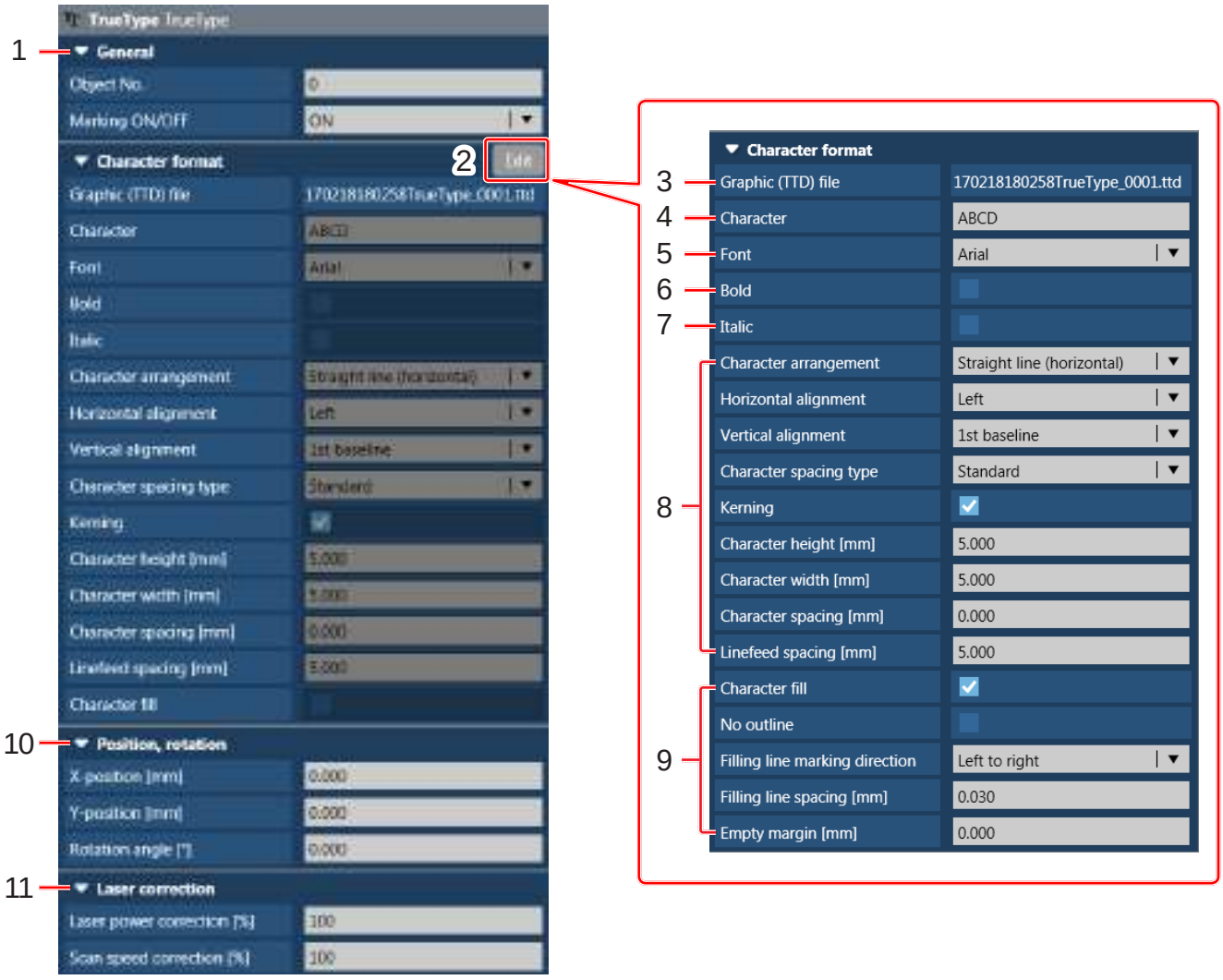
4. Specify the font type, character size, character fill and etc.



Reference

- To change the determined TrueType object settings, click “Edit” button in the condition setting window.

3-8-2 TrueType object settings



	Setting elements	Description
1	General setting	Refer to “3-6-3 Object settings” (P.78).
2	Edit	To change the TrueType object settings, click this button.
3	Graphic (TTD) file	Displays the file name of the TrueType object. TrueType object is saved as the graphic file with “.ttd” format.
4	Character	Input the text to be marked with the TrueType font.
5	Font	Select the TrueType font. The TrueType fonts installed in the PC are shown in the list.

Reference

- Characters written from right to left such as Arabic or Hebrew, characters based on ligature such as Indian languages are not supported by this laser marker.
- If there are characters that are not supported by the selected font, their font are replaced to other font (fallback font) specified in the font properties. If they have no replacement font, these characters cannot be used with the selected font.
- For some font types, you have to select the bold or italic type style, to be able to create a TrueType object.

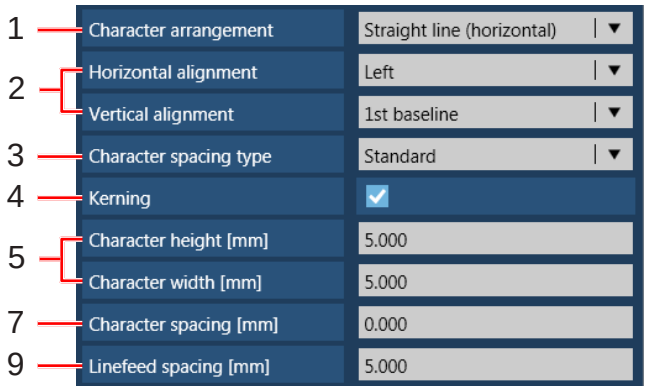
6	Bold	To make the character outline width wider, enable this field.

	Setting elements	Description
7	Italic	To make the character italic face, enable this field.
8	Layout properties	Refer to “Layout setting of TrueType text” (P.99).
9	Character fill	Refer to “Character filling of TrueType character” (P.102).
10	Position, rotation	Sets the TrueType object position in the marking field. Refer to “Position, Rotation” (P.103).
11	Laser correction	Refer to “3-6-3 Object settings” (P.78).

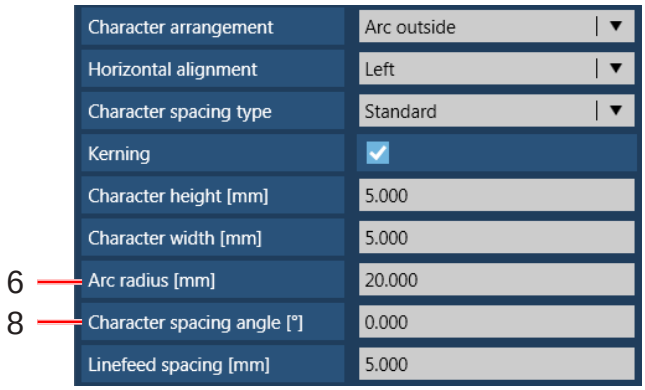
■ Layout setting of TrueType text

Set the layout of the TrueType text.

Character arrangement: straight line



Character arrangement: arc



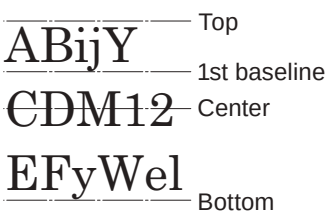
	Setting elements	Description
1	Character arrangement	Select the layout shape of the character strings.

Straight line (horizontal)	Arc outside	Arc inside
ABCijY		

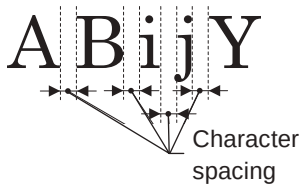
2	Horizontal alignment / Vertical alignment *1	Specifies the origin point of the character strings. The coordinate of the origin is specified in “Position, Rotation” (P.103). • Horizontal alignment: Select the origin in horizontal direction.

Left	Center	Right
ABijY CDM12	ABijY CDM12	ABijY CDM12

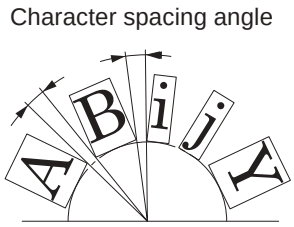
• Vertical alignment: Select the origin in vertical direction.



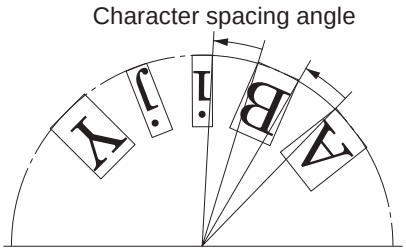
	Setting elements	Description
3	Character spacing type	Select the character spacing type. The definition of the distance or angle of the character spacing varies depending on this setting.
	• Standard	Depending on the width of the letters, the letter-spacing is adjusted by following each True Type font standard. To close the character pitches for such as “i” or “l”, select this setting. With this setting, character spacing represents the distance between the edge line of the characters.
	• Fixed spacing	Regardless the width of the letters, each letter is aligned at the equal intervals. For the straight line style, character spacing represents the distance between the left edge of the characters. For the arc style, character spacing represents the angle between center of the characters.
	• Justify	The characters are arranged in the specified string width or arc angle equally. If the character string width is smaller than “character width x letter digits” for the straight line, the character width becomes narrower automatically.
4	Kerning	Available when the character spacing type is set to “standard”. This is a function to adjust the space enclosed by the specific combination of two letters, called “Kerning pairs”. Kerning pairs are defined by the each True Type font rule.
5	Character height [mm] Character width [mm]	Specifies the height / width of character. This size includes the white space defined by each True Type font rules and the input height and width do not match the length of the letter. To specify the character size accurately, measure the actual marking character size and adjust the setting value.



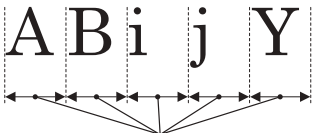
Straight line, standard



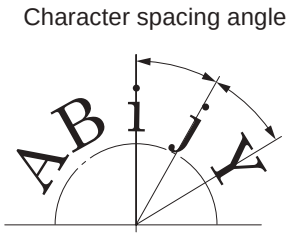
Arc outside, standard



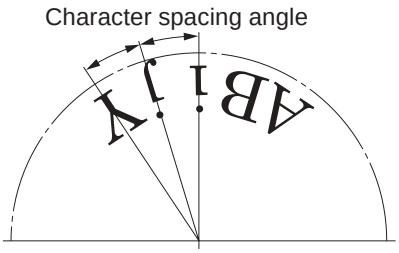
Arc inside, standard



Straight line, fixed spacing

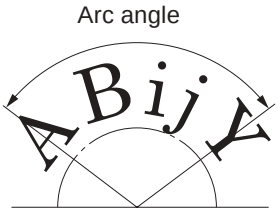


Arc outside, fixed spacing

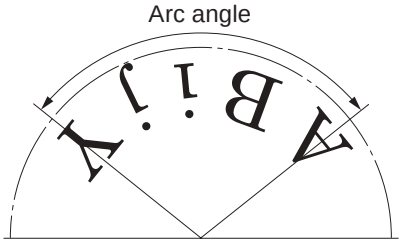


Arc inside, fixed spacing

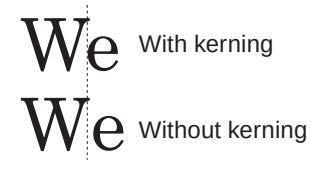
Straight line, justify



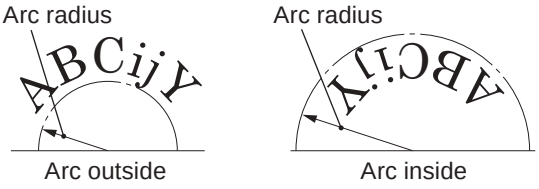
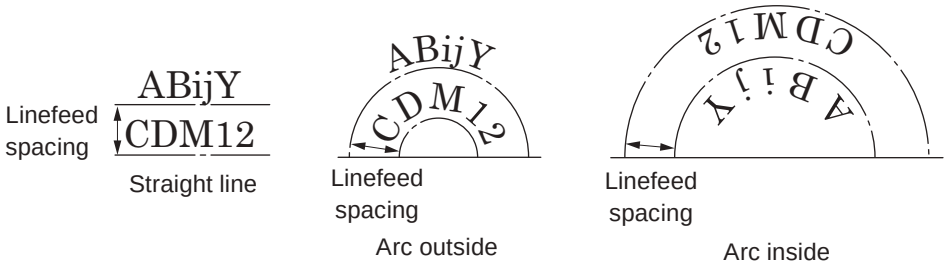
Arc outside, justify



Arc inside, justify



Setting range	0.100 to 55.000 mm (LP-GS051)
	0.060 to 30.000 mm (LP-GS052)
	0.100 to 85.000 mm (LP-RC350S)
	0.100 to 90.000 mm (LP-RF200P / LP-RV200P)

	Setting elements	Description
6	Arc radius [mm] *2	Specifies the radius of arc. Setting range: 0 to 999.999 mm 
7	Character spacing [mm] *1 or Character string width [mm] *1	Specifies the pitch between a character and the adjacent character. • With “standard” or “fixed spacing” character spacing style, set the distance between each character. • With “justify” character spacing style, set the string width. The characters are arranged in the specified string width equally. Setting range: 0.000 to 55.000 mm (LP-GS051) 0.000 to 30.000 mm (LP-GS052) 0.000 to 85.000 mm (LP-RC350S) 0.000 to 90.000 mm (LP-RF200P / LP-RV200P)
8	Character spacing angle [°] *2 or Arc angle [°] *2	Specifies the interval angle between a character and the adjacent character. • With “standard” or “fixed spacing” character spacing style, set the character spacing angle. • With “justify” character spacing style, set the arc angle. The characters are arranged in the specified angle equally. Setting range: -180.000 to +180.000°
9	Linefeed spacing [mm]	Specifies the distance between each text line. (linefeed width) Setting range: 0.000 to 55.000 mm (LP-GS051) 0.000 to 30.000 mm (LP-GS052) 0.000 to 85.000 mm (LP-RC350S) 0.000 to 90.000 mm (LP-RF200P / LP-RV200P) 

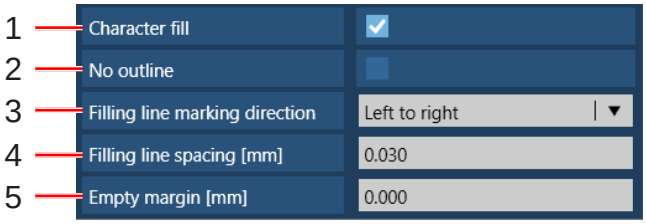
Reference

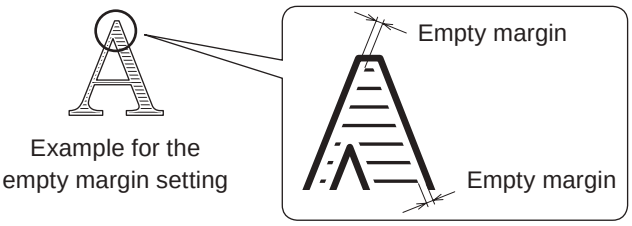
- For the arc arrangement with the linefeed, the arc radius of the second or the subsequent text lines is increased or decreased with the linefeed spacing length.

*1 : Available when the character arrangement is straight line.
*2 : Available when the character arrangement is arc.

■ Character filling of TrueType character

The TrueType characters are created with the outline.
To draw the inside of the outline, enable the character filling in the TrueType object settings.



	Setting elements	Description
1	Character fill	To draw the inside of the outline, check on here.  Without character fill  With character fill (horizontal)
2	No outline	To mark the TrueType character only with filling lines without outline, check on here.  With outline  Without outline
3	Filling line marking direction	Select the direction and marking order of the filling line. • For the horizontal filling: Left to right, Right to left, Right-left alternatively • For the vertical filling: Top to bottom, Bottom to top, Up-down alternatively
4	Filling line spacing [mm]	Specifies the line spacing of the filling line. Setting range: 0.010 to 10.000 mm
5	Empty margin [mm]	Specifies the distance between the filling line and outline. With the minus value, the filling line runs over the outline. Setting range: -10.000 to +10.000 mm  Example for the empty margin setting

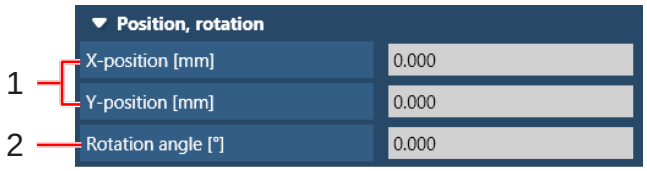
Reference

- The alternate direction setting makes the marking time shorter than the one direction setting.

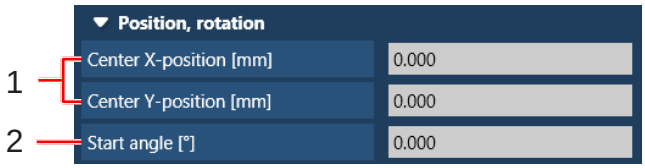
■ Position, Rotation

Sets the TrueType object position in the marking field.

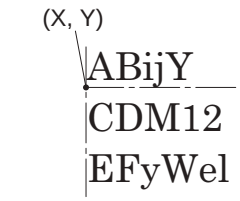
Character arrangement: straight line



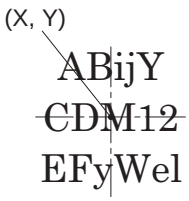
Character arrangement: arc



	Setting elements	Description
1	X-position [mm] *1 Y-position [mm] *1 or Center X-position [mm] *2 Center Y-position [mm] *2	Sets the X-/Y-position of the origin point of the TrueType object. • When the character arrangement style is straight line, the origin point is specified with “Horizontal alignment” and “Vertical alignment”. • When the character arrangement style is arc, the origin point is the center of the circle. Setting range: -999.999 to +999.999 mm

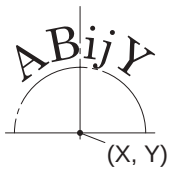


Horizontal alignment: left
Vertical alignment: 1st baseline



Horizontal alignment: center
Vertical alignment: center

Horizontal alignment: right
Vertical alignment: top



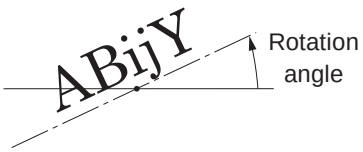
Arc outside

2	Rotation angle [°] *1 or Start angle [°] *2	Rotates the TrueType object at the input angle. It rotates in clockwise direction with minus angle, and in counterclockwise with plus angle. Setting range: -180.000 to +180.000°

• When the character arrangement style is straight line, set the rotation angle. The rotation center is the specified X-/Y-position.

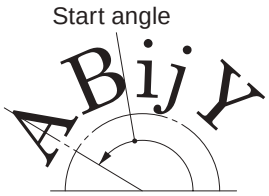
Straight line, left alignment

Straight line, right alignment

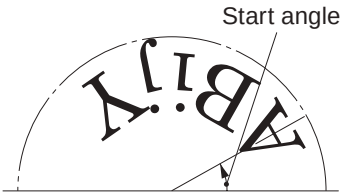


Straight line, center alignment

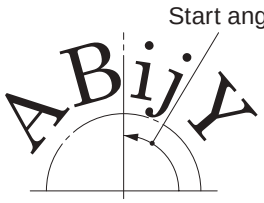
• When the character arrangement style is arc, set the start angle for the horizontal alignment position. The rotation center is the specified center X-/Y-position.



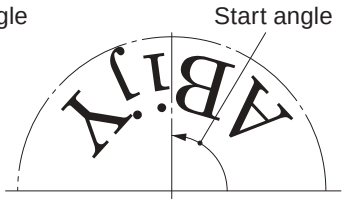
Arc outside,
left alignment



Arc inside,
left alignment



Arc outside,
center alignment



Arc inside,
center alignment

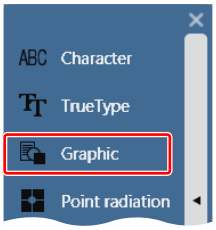
*1 : Available when the character arrangement is straight line.
*2 : Available when the character arrangement is arc.

3-9 Graphic Object

Set the selected graphic file (VEC/DXF/BMP/JPEG/HPGL) to the marking data.

3-9-1 Import graphic data

1. Open the editing tool tab and click “Graphic”.



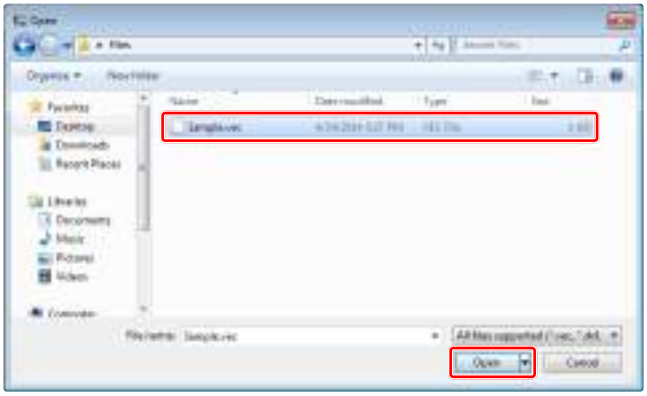
2. Graphic management panel will appear.

Click “Add”.

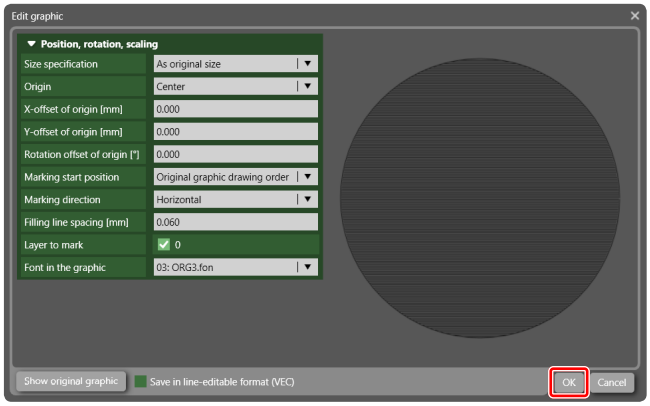
3. Select the graphic file and click “Open”.

Available file type:

- VEC file
- DXF file
- BMP file
- JPEG file
- HPGL file



4. When the file type is DXF, BMP, JPEG or HPGL, set the graphic size, location of the origin and other conditions and click “OK”.

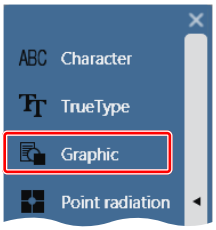


Reference

- With enabling “Save in line-editable format (VEC)” and click “OK”, the DXF/BMP/JPEG/HPGL file is converted to VEC format. With VEC file format you can edit the drawings such as adding or deleting the lines by using Logo editing software.

3-9-2 Set graphic object

1. Open the editing tool tab and click “Graphic”.

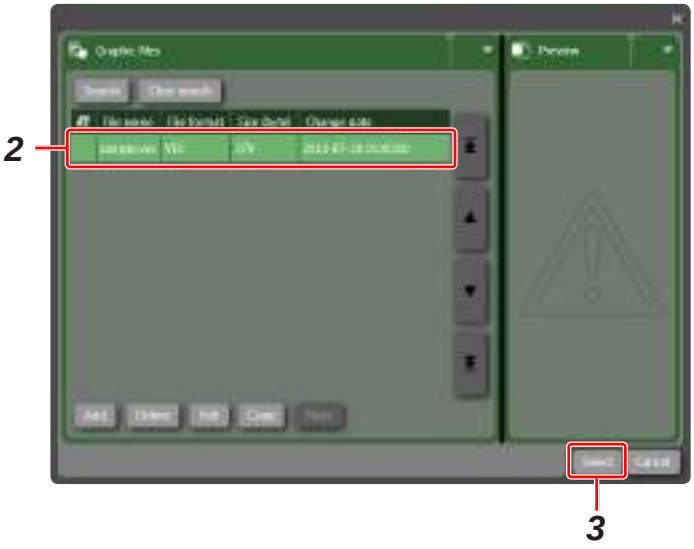


2. The graphic files registered in the laser marker are listed.

Reference

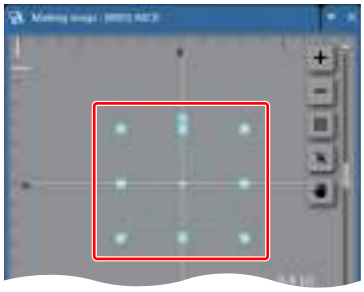
- For the adding or deleting graphics, refer to “7-2-3 Graphic file” (P.214).

3. Select the graphic file to be marked and click “Select”.



4. The graphic data is set in the marking image field.

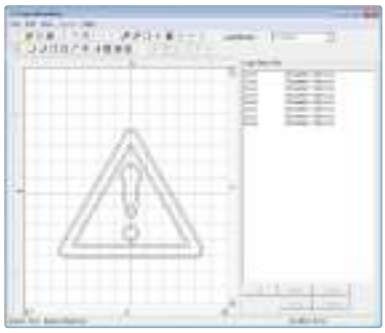
5. To change the graphic properties, double click the graphic object on the marking image field.



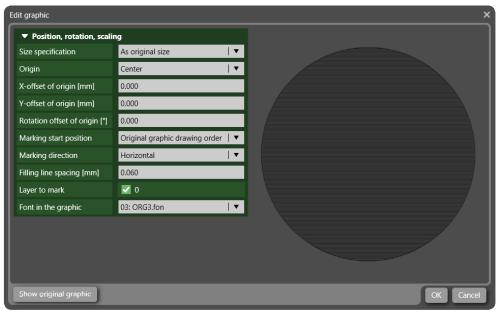
6. The graphic editing window appears.

- For VEC file, Logo data editing software starts up.
- For DXF/BMP/JPEG/HPGL file, the setting window of the graphic condition appears.

Editing of VEC file



Editing of DXF/BMP/JPEG/HPGL file

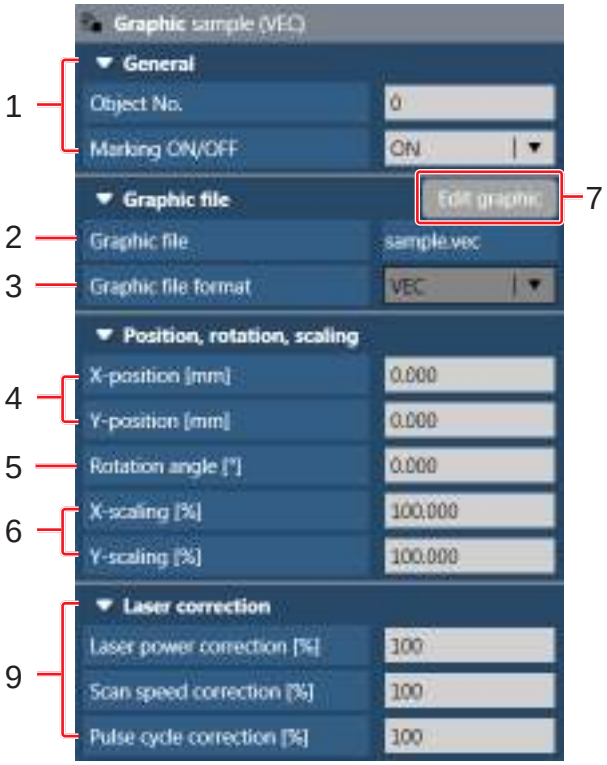


Reference

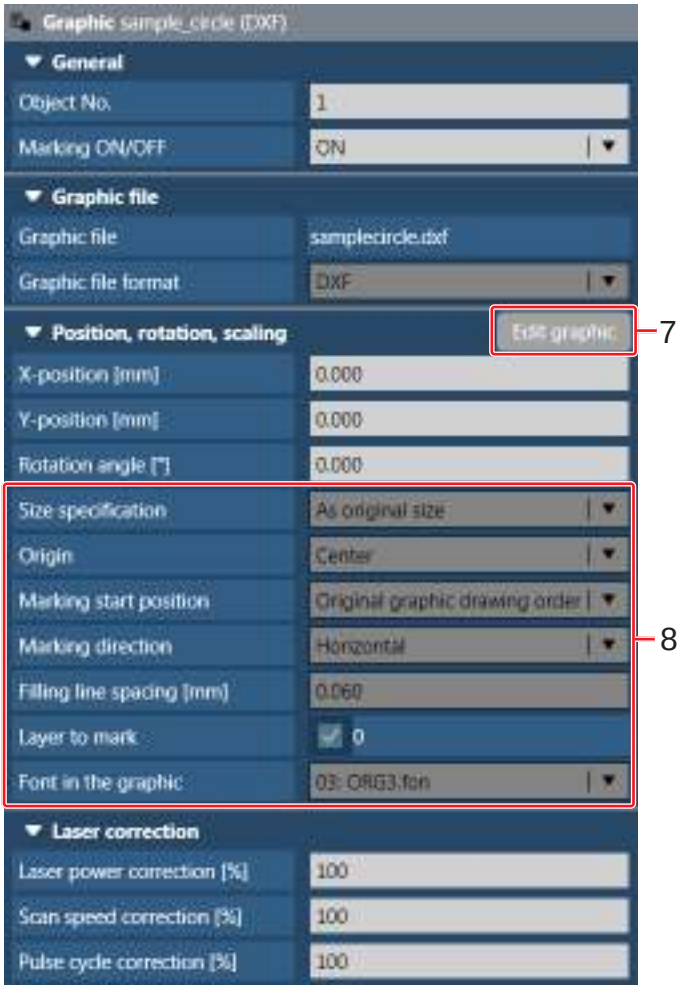
- For the operation of the logo data editing software, refer to “Logo data editing operation manual”.

3-9-3 Graphic object settings

VEC file



DXF/BMP/JPEG/HPGL file



	Setting elements	Description
1	General setting	Refer to “3-6-3 Object settings” (P.78).
2	Graphic file	Displays the selected graphic name.
3	Graphic file format	Displays the graphic file format (VEC, DXF, BMP, JPEG or HPGL).
4	X-position [mm] Y-position [mm]	Specifies X/Y coordinate of the original point of the graphic data. Setting range: -999.999 to +999.999 mm
5	Rotation angle [°]	Rotates the graphic at the input angle. The rotation center is the original point of the graphic. It rotates in clockwise direction with minus angle, and in counterclockwise with plus angle. Setting range: -180.000 to +180.000 °
6	X-scaling [%] *1 Y-scaling [%] *1	Specifies the magnification to enlarge or reduce the size of VEC graphic. Setting range: 1.000 to 1000.000 %
7	Edit graphic	Changes the graphic details. • For VEC format file, logo data editing software starts up. • For DXF/BMP/JPEG/HPGL format file, the setting window of the graphic properties appears.

Reference

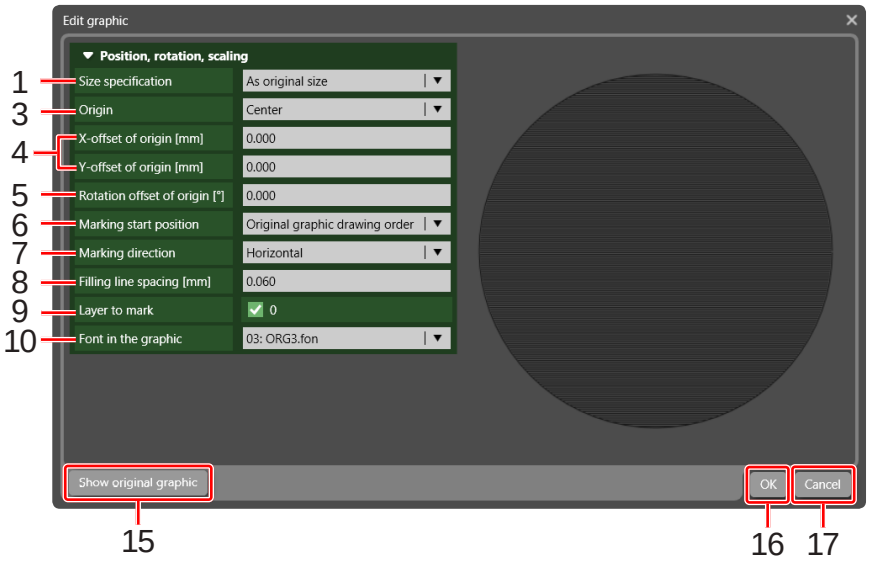
- For the operation of the logo data editing software, refer to “Logo data editing operation manual”.

	Setting elements	Description
8	Graphic properties *2	Displays graphic properties of DXF, BMP, JPEG or HPGL file. To change here, click “Edit graphic”.
9	Laser correction	Refer to “3-6-3 Object settings” (P.78).

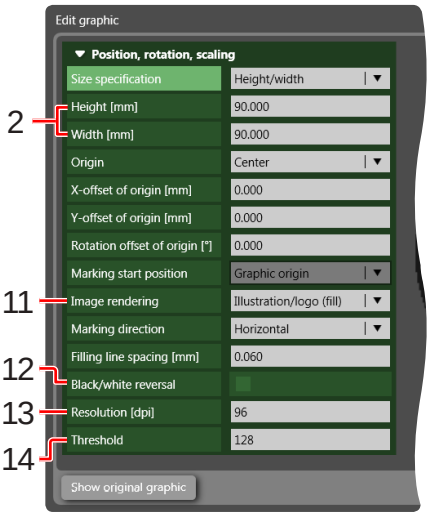
*1 : Available when the graphic format is VEC.
*2 : Available when the graphic format is DXF, BMP, JPEG or HPGL.

■ Edit graphic (DXF/BMP/JPEG/HPGL file)

DXF file



BMP/JPEG file



	Item	Description
1	Size specification	Select how to specify the graphic size. • Height/width: specifies the both length. • Width (aspect ratio fixed): specifies width. The height changes keeping the original aspect ratio. • Height (aspect ratio fixed): specifies height. The width changes keeping the original aspect ratio. • As original size: keeps original size.
2	Height [mm] Width [mm]	Specifies graphic length according to the size specification setting. Setting range: 0.000 to 55.000 mm (LP-GS051); 0.000 to 30.000 mm (LP-GS052); 0.000 to 85.000 mm (LP-RC350S); 0.000 to 90.000 mm (LP-RF200P / LP-RV200P)
3	Origin	Specifies where is the original point in the graphic. • Center • Bottom left • Bottom right • Top left • Top right • As original graphic

	Item	Description
4	X-offset of origin [mm] Y-offset of origin [mm]	Moves the original point of the graphic to X or Y direction. Setting range: -999.999 to +999.999 mm
5	Rotation offset of origin [°]	Rotates the graphic at the input angle. The rotation center is the original point of the graphic. It rotates in clockwise direction with minus angle, and in counterclockwise with plus angle. Setting range: -180.000 to +180.000°
6	Marking start position *1, *2	Specifies the first line of the graphic as the marking order. • Original graphic drawing order • Graphic origin • Right of graphic • Left of graphic • Top of graphic • Bottom of graphic
7	Marking direction *1, *3	Select the direction of the filling lines. • Horizontal • Vertical
8	Filling line spacing [mm] *1, *3	Specifies the line pitch of the filling lines. Setting range: 0.010 to 2.000 mm
9	Layer to mark *1	Displays layers in the DXF data. If there is a layer to set marking off, remove the check mark of that layer.
10	Font in the graphic *1	If the DXF data contains the text data, its font is replaced to the laser marker font. Select the font of the alphanumeric from the list. Refer to “7-2-4 Font file” (P.215).
11	Image rendering *3, *4	Select the data type of BMP/JPEG file and its reading condition. • Illustration/logo (fill): Draws dark parts of the image. • Illustration/logo (outline): Draws the outline of the image. • Photo (dither): According to the color density of the image, adjusts the marking data with the dither method. • Photo (error diffusion): According to the color density of the image, adjusts the marking data with the error diffusion method.
12	Black/white reversal *3	To invert the black/white of the marking data, check the box.
	Line smoothing *4	To make the outline smooth, check on here.
13	Resolution [dpi] *3, *4	Specifies the level of the graphic information to draw by the laser marker. It is recommended to input the same resolution of the original graphic. Setting range: 60 to 2400 dpi
14	Threshold *3, *4	Specifies the segmentation level to create the black/white image. Inputting the larger value creates the image with more black part. Setting range: 0 to 255
15	Show original graphic	Displays the original graphic image. Clicking this button again shows the marking image of the graphic.

	Item	Description
16	OK	Applies the setting and saves the graphic file.
17	Cancel	Closes the graphic editing window.

*1 : Available when the graphic format is DXF.
*2 : Available when the graphic format is HPGL.
*3 : Available when the graphic format is BMP or JEPG and its Image rendering setting is “illustration/logo (fill)” or “Photo”.
*4 : Available when the graphic format is BMP or JEPG and its Image rendering setting is “illustration/logo (outline)”.

■ 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 R13J R14	3DFACE	3D face	N	
	3DLINE	3D line	N	
	ARC	Arc	Y	
	ATTDEF	Attribute definition	N	
	ATTRIB	Attribute	N	
	CIRCLE	Circle	Y	
	DIMENSION	Dimension	N	
	INSERT	Insert graphic	Y	
	LINE	Segment	Y	
	POINT	Point	N	
	POLYLINE	2D Polyline	Y	Bold line is not supported.
		3D Polyline	N	
	SEQEND	Close	Y	SEQEND in combination with POLYLINE element is available.
	SHAPE	Shape	N	
	SOLID	2D paint	Y	The SOLID element is converted to the outline and filling lines in the marking data. The filling lines are either of vertical or horizontal lines.
	TEXT	Character	Y	The font of the TEXT element is replaced to the laser marker font and then disassembled to the lines in the marking data. You cannot treat it as a character object.
	TRACE	Bold line	N	
	VERTEX	Top	Y	VERTEX in combination with POLYLINE element is available.
	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	
	IMAGE	Image	N	
	LEADER	Lead line	N	
	LWPOLYLINE	Light Weight polyline	Y	Bold line is not supported.
	MLINE	Multi-line	N	
	MTEXT	Multi-text	Y	The font of the MTEXT element is replaced to the laser marker font and then disassembled to the lines in the marking data. You cannot treat it as a character object.
	OLEFRAME	OLE frame	N	
	OLE2FRAME	OLE2 frame	N	
	RAY	Radiation (half line)	Y	
	REGION	Region	N	
	SPLINE	Free curve	Y	
	TOLERANCE	Geometric tolerance	N	
	XLINE	Line (straight line)	Y	
R14	HATCH	Hatching	Y	Graphics which contain POLYLINE or SPLINE are not supported. The HATCH element is converted to the outline and filling lines in the marking data. The filling lines are either of vertical or horizontal lines.
	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

- If the graphic data which contains filling lines cannot be converted properly to the marking data, change the file format of the DXF file.
- 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.
- Depending on the drawing procedures and methods of the DXF data, there might be a minor conversion error and some graphics might not be drawn by the laser marker as just the original images.

3-10 Point Radiation Object

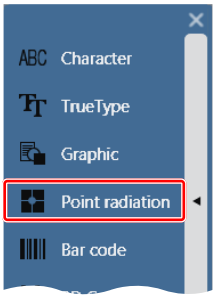
Point radiation is a function lasing at a point of the specified coordinate with the setting time and laser power.

⚠WARNING

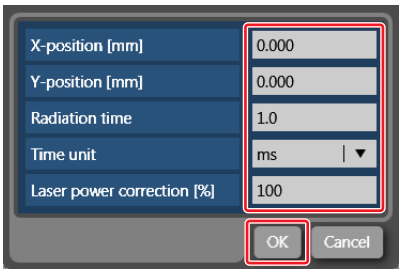
- During the radiation, the laser energy is concentrated to one point. Use due caution with long period radiation, it may cause a fire or damage to the object.

3-10-1 Set point radiation object

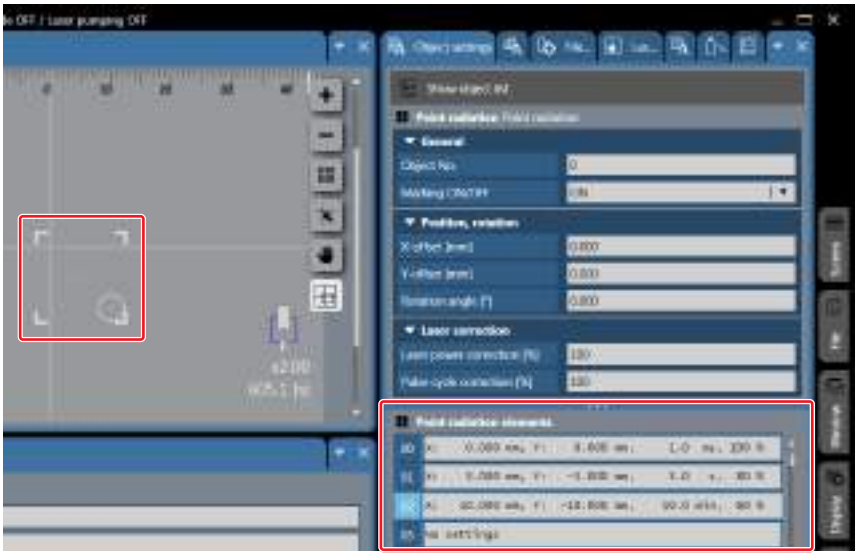
1. Open the editing tool tab and click “Point radiation”.



2. The setting window of the point appears. Input the position, radiation time and laser power correction value, then click “OK”.



3. The point is set and shown as “+” in the marking image field.

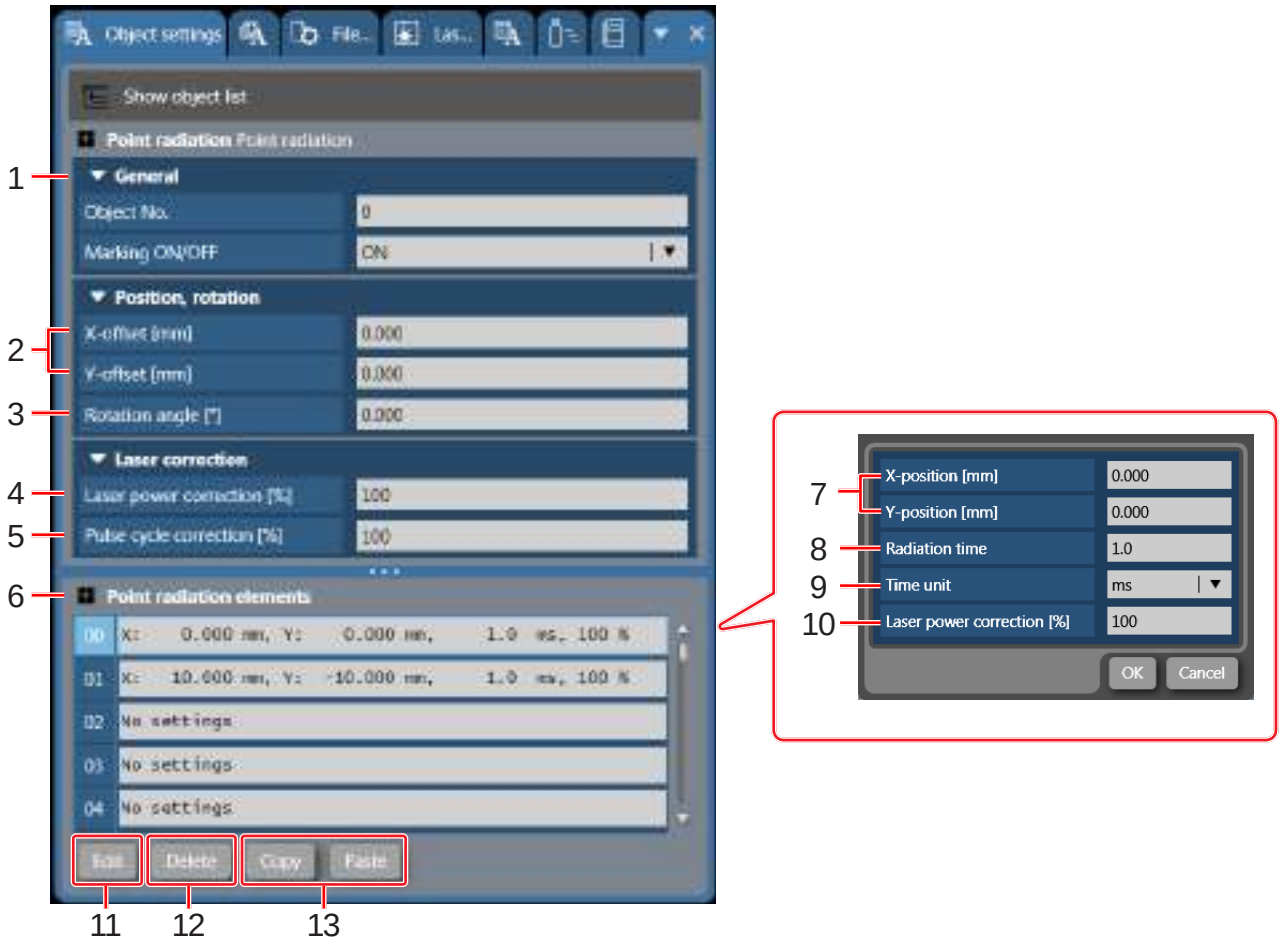


4. To add or edit the point, select the setting row in “Point radiation elements” and change the settings. Or double-click the “+” in the marking image field.

Reference

- Max. 50 points can be set in one object No.

3-10-2 Point radiation settings



	Item	Description
1	General setting	Refer to “3-6-3 Object settings” (P.78).
2	X-offset [mm] Y-offset [mm]	Moves the all points set in the selected object No. from currently set position. Setting range: -999.999 to +999.999 mm
3	Rotation angle [°]	Rotates the whole points in the selected object No. The rotation center is the center of the marking field. It rotates in clockwise direction with minus angle, and in counterclockwise with plus angle. Setting range: -180.000 to +180.000 °
4	Laser power correction [%]	Corrects the laser power and pulse cycle of the all points in the selected object No. The laser power is set by multiplying this ratio and the laser power correction ratio set at each point element by the laser power set at the laser settings. When Laser power correction is 0%, the all points set in this object No. are not scanned at lasing. Setting range: Laser power correction: 0 to 999 %; Pulse cycle correction: 1 to 999 %
5	Pulse cycle correction [%] *1	

Reference

- If the corrected value exceeds the setting limit, marking is executed with the upper or lower limit value.
- Marking is not available when the laser power correction value is “0”.

	Item	Description
6	Point radiation elements	Sets the position, time and laser power correction ratio of each point. Max. 50 points can be set in one object No. To change the settings, select the setting row and click “Edit”, or double-click the setting row.
7	X-position [mm] Y-position [mm]	Specifies the position of each point. Setting range: -999.999 to +999.999 mm
8	Radiation time	Specifies the period of the laser radiation. The setting range varies depending on the selected time unit (millisecond, second, minute or hour). Setting range: 0.1 to 99999.9 [ms], [s] 0.1 to 2880.0 [min] 0.1 to 48.0 [h]
9	Time unit	
10	Laser power correction [%]	Corrects the laser power of the selected point. The laser power is set by multiplying this ratio by the laser power set at the laser settings. When Laser power correction is 0%, the selected point is not scanned at lasing. Setting range: 0 to 999 %
11	Edit	Opens the input window of the position, radiation time and laser power correction value of the selected point element.
12	Delete	Deletes the selected point element.
13	Copy, Paste	Copies the selected point element and paste it to the specified place in the list.

*1 : Available with LP-RF series and LP-RV series.

3-11 Bar Code / 2D Code Object

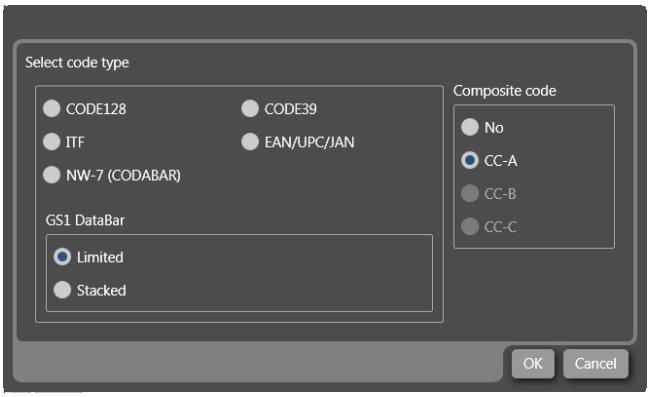
Setting the barcode or 2D code object creates the code symbol by inputting the text data.

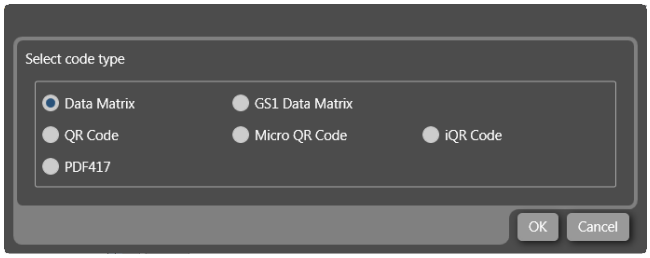
Notice

- When marking bar code or 2D code, read the laser-marked code with the code scanner, and check the content of the marked code corresponds to the input data.
- Since the marking to the flying object is affected by vibration or line speed change easily, marking quality of 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 results of the marked code sufficiently.

■ Code type

The following code symbols can be marked with this laser marker.





Type of bar codes

- CODE128 (GS1-128)
- CODE39
- CODE93
- ITF
- EAN/UPC/JAN
- NW-7
- GS1 DataBar Limited
- GS1 DataBar Stacked
- GS1 DataBar Limited CC-A
- GS1 DataBar Stacked CC-A

Type of 2D codes

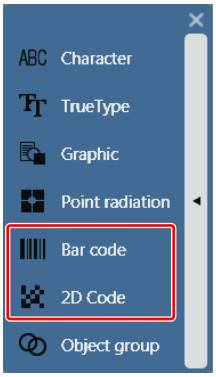
- Data matrix code (ECC200)
- GS1 Data matrix code
- QR code (Model 1 and Model 2)
- Micro QR code
- iQR code
- PDF417

Reference

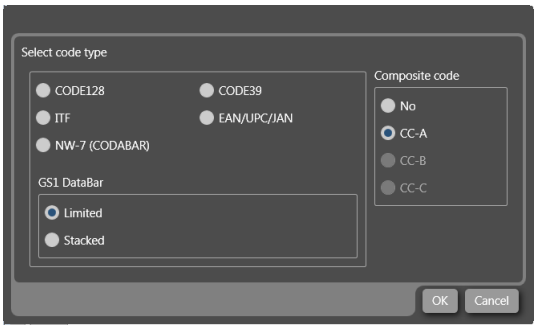
- The composite codes of the bar code object is available when the code type is GS1 DataBar.

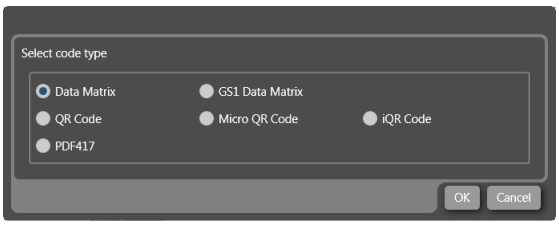
3-11-1 Set code symbol

1. Open the editing tool tab and click “Bar code” or “2D code”.



2. Select the code symbol type from the list and click “OK”.

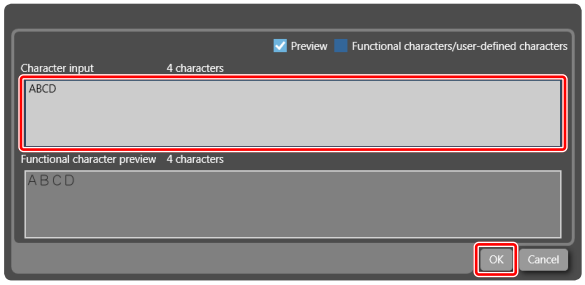




3. Input character window appears.

Input the text to be coded and click “OK”.

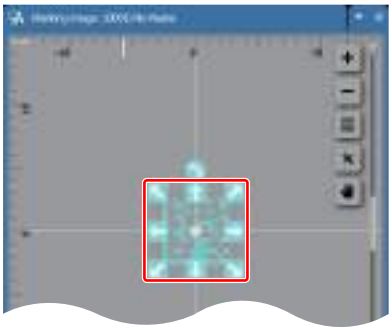
For the input character details, refer to the each code description.



Reference

- To input “FNC1” or other control characters in the code data, check “Functional characters/user-defined characters” on the upper right of the input screen and show these characters.
- The code data are automatically converted to the one-byte or two-byte characters depending on the applicable character type of the selected code type regardless the input character type.
- When the code data is set in the several strings, they are connected together without linefeed to create the code data. This linefeed can be applied only to the human readable text.

4. The code symbol is set in the marking image field.

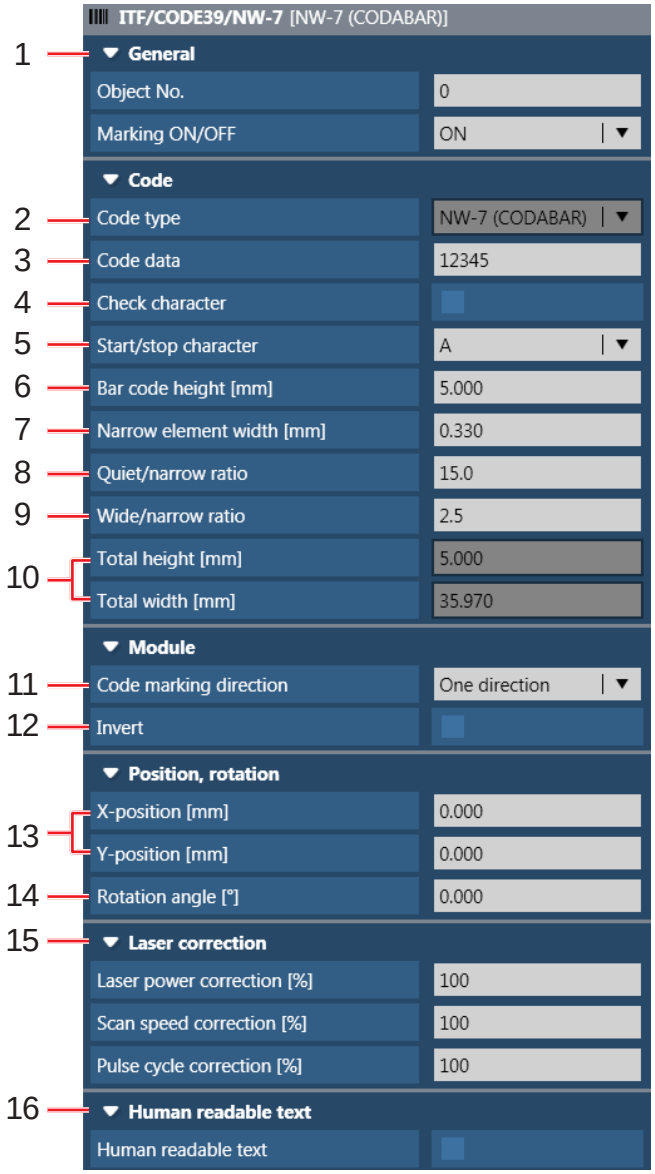


5. To change the input text, double-click the barcode or 2D code object on the marking image field. Or click the code data input field in the code settings.

The character input window appears.

3-11-2 CODE39, ITF, NW-7 settings

When the code type is CODE39, ITF or NW-7, set the following parameters.



	Setting elements	Description
1	General setting	Refer to “3-6-3 Object settings” (P.78).
2	Code type	Displays code type.
3	Code data	Input the text to be coded. (Max. 62 digits)

Code type	Available characters
CODE39	0 to 9, A to Z, space, symbols - + / $ % .
ITF	0 to 9
NW-7	0 to 9, symbols - $: / . +

Reference

- For ITF code, if the input digits number including the check character is odd, “0” is automatically added at the head of the code data.
- When inputting functional character such as date and time, counter, lot, etc. to code data, check the digit number of the character not to exceed the limited digits.

	Setting elements	Description
4	Check character	Enabling this check character function adds the following check character to the end of the code data automatically. • CODE 39: modulus 43 • ITF: modulus 10/weight 3-1 • NW-7: modulus 16
5	Start/stop character *1	Specifies the start/stop character for NW-7. Setting entry: A, B, C, D
6	Bar code height [mm]	Specifies the height of bar code. Setting range: 0.050 to 55.000 mm (LP-GS051) 0.050 to 30.000 mm (LP-GS052) 0.050 to 85.000 mm (LP-RC350S) 0.050 to 90.000 mm (LP-RF200P / LP-RV200P)
7	Narrow element width [mm]	Specifies narrow element width of the bar code. Set the larger value than “Line width” in object group settings panel. Setting range: 0.050 to 1.000 mm
8	Quiet/narrow ratio	Ratio of the quiet zone to narrow element width. Setting range: 0.0 to 20.0
9	Wide/narrow ratio	Ratio of wide element to narrow element width. Setting range: 1.8 to 3.4
10	Total height [mm] Total width [mm]	Displays the entire width and height of the bar code, including the quiet zone.
11	Code marking direction	Select the marking direction of the bars. Setting: One direction / Alternate Marking direction image: 
12	Invert	To invert the code marking, check the box. With inversion setting bars are not marked, but spaces and quiet zone are marked.
13	X-position [mm] Y-position [mm]	Specifies center position of the code symbol. Setting range: -999.999 to +999.999 mm
14	Rotation angle [°]	Rotates the code at the input angle. The rotation center is the center of the code. It rotates in clockwise direction with minus angle, and in counterclockwise with plus angle. Setting range: -180.000 to +180.000 °

Reference

- The bar code height does not include the height of the human readable character.

Reference

- The alternate direction setting makes the marking time shorter than the one direction setting.
- When marking bar code, set the bar code filling line spacing in object group settings. Refer to “Bold filling line spacing” (P.151).

	Setting elements	Description
15	Laser correction	Refer to “3-6-3 Object settings” (P.78).

Reference

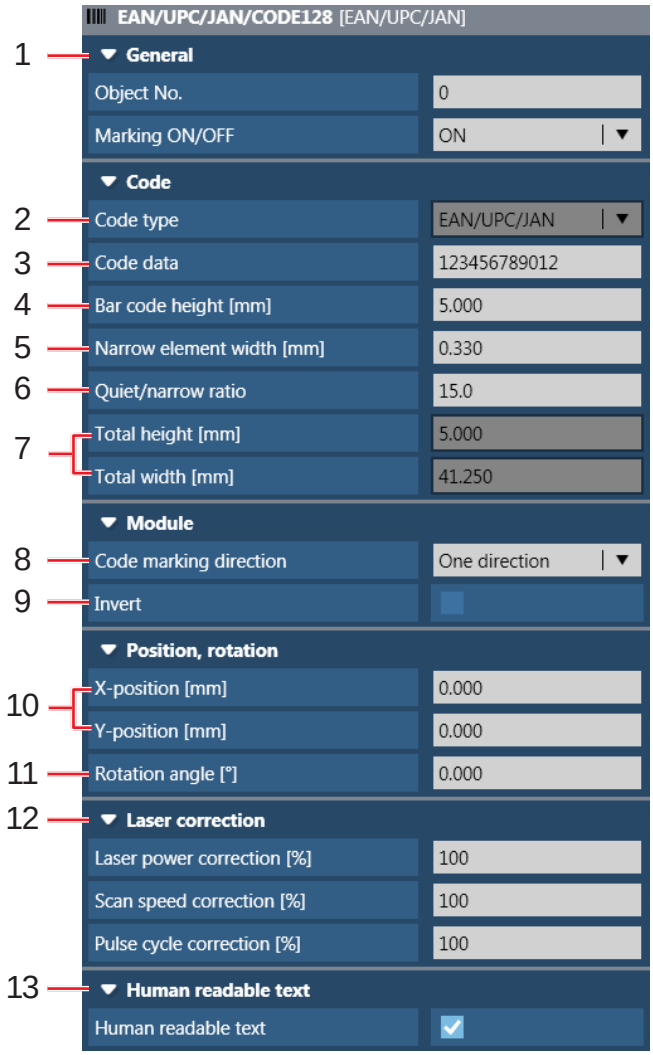
- If you will change the starting and ending points of the barcode/2D code objects only, use “Customize staring/ending point by object”. Refer to “3-15-2 Fine-adjustment” (P.175).

16	Human readable text	Check the box to mark the human readable text. Refer to “3-11-7 Human readable text” (P.145).

*1 : Available when the code type is NW-7.

3-11-3 EAN/UPC/JAN, CODE128, CODE93 settings

When the code type is EAN/UPC/JAN, CODE128 (GS1-128) or CODE93, set the following parameters.



	Setting elements	Description
1	General setting	Refer to “3-6-3 Object settings” (P.78).
2	Code type	Displays code type.

Reference

- For EAN/UPC/JAN code, the code type is determined based on the number of character inputted as shown below:
  - EAN/JAN-13 : Input 12 digits numeric characters except for check digit.
  - EAN/JAN-8 : Input 7 digits numeric characters except for check digit.
  - UPC-A : Input 11 digits numeric characters except for check digit.
  - UPC-E : Input 6 digits numeric characters except for check digit.

	Setting elements	Description
3	Code data	Input the text to be coded.

Code type	Available characters	Number of characters
CODE128	• 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)	Max. 62 digits
CODE93	Characters within ASCII Code 00 (HEX) to 7F (HEX): 0 to 9, A to Z, a to z, symbols and control codes	Max. 62 digits
EAN/UPC/JAN	0 to 9	6, 7, 11, or 12 digits

Reference

- For EAN/UPC/JAN code, the check character is added automatically to the end of the code data.
- CODE128 can set as UCC/EAN128 (GS1-128). CODE128 changes to UCC/EAN128 (GS1-128) by inputting the control code “FNC1” to the head of the code data.
- 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).
- The start code A, B, C for CODE128 is selected automatically depending on the content of the data.
- To set UCC/EAN 128 (GS1-128) with the application identifier (AI), refer to “Description of AI (Application Identifier)” (P.147).
- For ITF code, if the input digits number including the check character is odd, “0” is automatically added at the head of the code data.
- 1-digit of the check character for CODE128 and 2-digits for CODE93 are added automatically to the end of the code data. These check characters are not included in the human readable characters.
- When inputting functional character such as date and time, counter, lot, etc. to code data, check the digit number of the character not to exceed the limited digits.

4	Bar code height [mm]	Specifies the height of bar code.

Setting range	0.050 to 55.000 mm (LP-GS051)
	0.050 to 30.000 mm (LP-GS052)
	0.050 to 85.000 mm (LP-RC350S)
	0.050 to 90.000 mm (LP-RF200P / LP-RV200P)

Reference

- The bar code height does not include the height of the human readable character.
- For EAN/UPC/JAN code, the extended part of some bars are not included in the code height.

5	Narrow element width [mm]	Specifies narrow element width of the bar code. Set the larger value than “Line width” in object group settings panel.

Setting range	0.050 to 1.000 mm

6	Quiet/narrow ratio	Ratio of the quiet zone to narrow element width.

Setting range	0.0 to 20.0

7	Total height [mm] Total width [mm]	Displays the entire width and height of the bar code, including the quiet zone.

	Setting elements	Description
8	Code marking direction	Select the marking direction of the bars.

Setting	One direction	Alternate
Marking direction image		

Reference

- The alternate direction setting makes the marking time shorter than the one direction setting.
- When marking bar code, set the bar code filling line spacing in object group settings. Refer to “Bold filling line spacing” (P.151).

9	Invert	To invert the code marking, check the box. With inversion setting bars are not marked, but spaces and quiet zone are marked.
10	X-position [mm] Y-position [mm]	Specifies center position of the code symbol. Setting range: -999.999 to +999.999 mm
11	Rotation angle [°]	Rotates the code at the input angle. The rotation center is the center of the code. It rotates in clockwise direction with minus angle, and in counterclockwise with plus angle. Setting range: -180.000 to +180.000 °
12	Laser correction	Refer to “3-6-3 Object settings” (P.78).

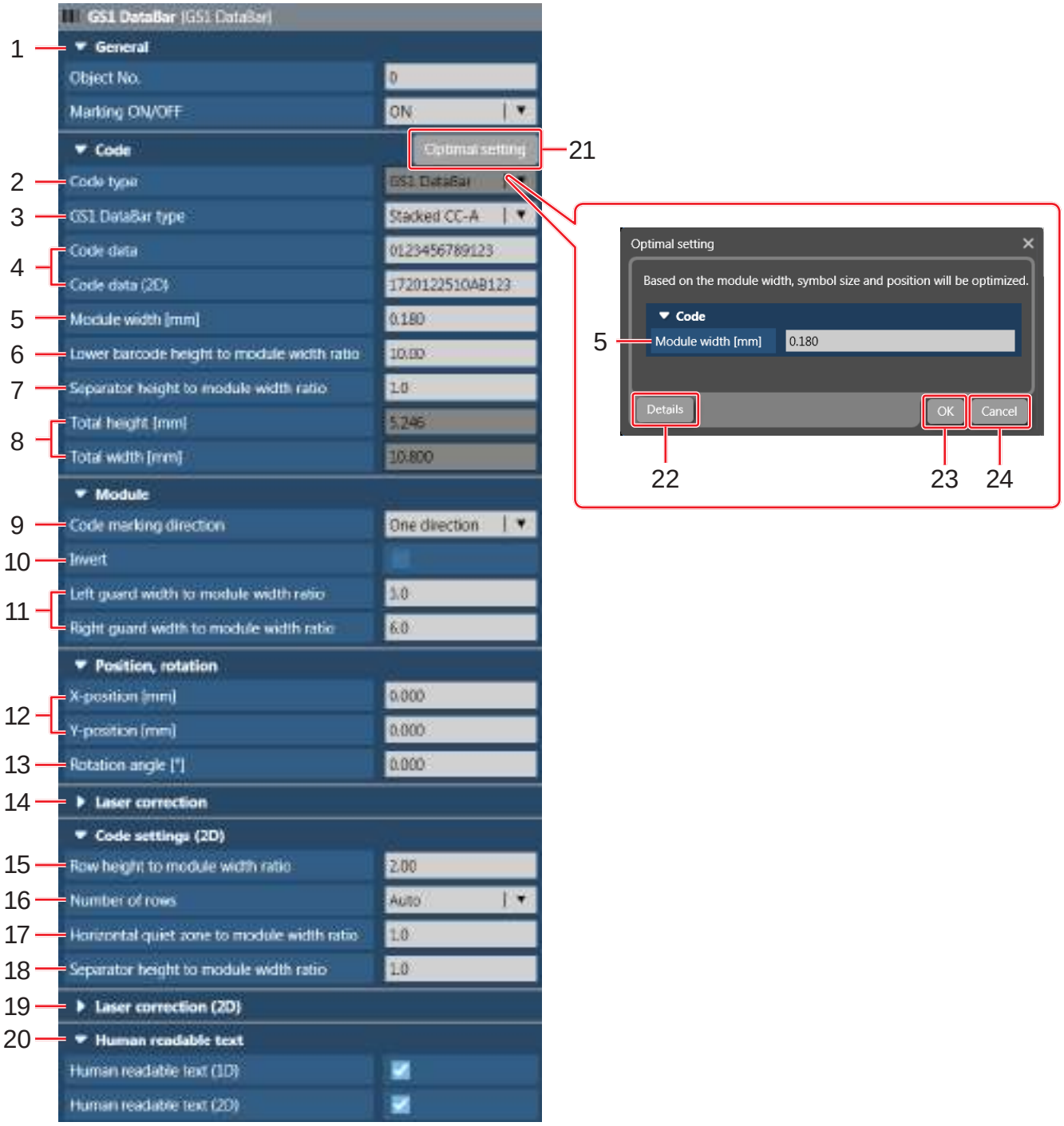
Reference

- If you will change the starting and ending points of the barcode/2D code objects only, use “Customize staring/ending point by object”. Refer to “3-15-2 Fine-adjustment” (P.175).

13	Human readable text	Check the box to mark the human readable text. Refer to “3-11-7 Human readable text” (P.145).

3-11-4 GS1 DataBar settings

When the code type is GS1 DataBar or its composite codes, set the following parameters.



	Setting elements	Description
1	General	Refer to “3-6-3 Object settings” (P.78).
2	Code type	Displays code type.

	Setting elements	Description
3	GS1 DataBar type	Select the code type of GS1 DataBar from the following codes. • GS1 DataBar Limited • GS1 DataBar Stacked • GS1 DataBar Limited CC-A • GS1 DataBar Stacked CC-A

Reference

- The supported standard of GS1 DataBar Limited is ISO/IEC 24724:2011.

4	Code data Code data (2D) *3	Input the text to be coded. For the composite codes (GS1 DataBar Limited CC-A, GS1 DataBar Stacked CC-A), input the both code data of 1D and 2D side.

Code type	Available characters	Number of characters
GS1 DataBar Limited GS1 DataBar Stacked	0 to 9	13 digits
GS1 DataBar Limited CC-A (2D side) GS1 DataBar Stacked CC-A (2D side)	0 to 9, A to Z, a to z, symbols (! " % & ' ( ) * + , - . / : ; < = > ? _), space, function character (FNC1)	Max. 56 digits

Reference

- For GS1 DataBar Stacked, 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 added automatically.
- To set GS1 DataBar Limited CC-A or GS1 DataBar Stacked CC-A with the application identifier (AI), refer to “Description of AI (Application Identifier)” (P.147).
- When inputting functional character such as date and time, counter, lot, etc. to code data, check the digit number of the character not to exceed the limited digits.
- When the code data is set in the several strings, they are connected together without linefeed to create the code data. This linefeed can be applied only to the human readable text.

5	Module width [mm]	Specifies module width as the smallest element of the code. Set the larger value than “Line width” in object group settings. Setting range: 0.050 to 1.000mm

Reference

- By clicking “Optimal setting” button, the following parameters are set automatically with the optimal value based on the setting module width.

6	Barcode height to module width ratio *1 or Lower barcode height to module width ratio *2	Specifies the ratio of the code height to module width. For GS1 DataBar Stacked (CC-A), it specifies the height ratio of the lower side. Setting range: 1.00 to 100.00
7	Separator height to module width ratio *2	Specifies the ratio of GS1 DataBar Stacked separator to module width. Setting range: 0.0 to 10.0
8	Total height [mm] Total width [mm]	Displays the entire width and height of the bar code, including the guard pattern and the quiet zone.

	Setting elements	Description
9	Code marking direction	Select the marking direction of the bars.

Setting	One direction	Alternate
Marking direction image		

Reference

- The alternate direction setting makes the marking time shorter than the one direction setting.
- When marking bar code, set the bar code filling line spacing in object group settings. Refer to “3-12-1 Object group settings” (P.149).

10	Invert	To invert the code marking, check the box. With inversion setting bars are not marked, but spaces and quiet zone are marked.
11	Left guard width to module width ratio / Right guard width to module width ratio	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.

Setting range	1.0 to 20.0

Reference

- This setting is applied only when the code is inverted.
- The right guard width ratio should be more than 5.0 according to ISO/IEC 24724:2011.

12	X-position [mm] Y-position [mm]	Specifies center position of the code symbol.

Setting range	-999.999 to +999.999 mm

13	Rotation angle [°]	Rotates the code at the input angle. The rotation center is the center of the code. It rotates in clockwise direction with minus angle, and in counterclockwise with plus angle.

Setting range	-180.000 to +180.000 °

14	Laser correction	Corrects the laser settings of the code symbol. For GS1 DataBar Limited CC-A and GS1 DataBar Stacked CC-A, specifies the correction value to the 1D side. Refer to “3-6-3 Object settings” (P.78).

Reference

- For GS1 DataBar Stacked (CC-A), correct the laser settings to the separator and the other parts respectively.
- If you will change the starting and ending points of the barcode/2D code objects only, use “Customize staring/ending point by object”. Refer to “3-15-2 Fine-adjustment” (P.175).

15	Row height to module width ratio *3	Specifies the height for one row of the 2D side. Specifies the ratio to the module width of 1D side.

Setting range	1.00 to 10.00

16	Number of rows *3	Specifies the number of rows for 2D side modules. “Auto” sets the minimum value depending on the code data settings.

Setting range	GS1 DataBar Stacked CC-A	: Auto, 5 to 10 or 12 rows
	GS1 DataBar Limited CC-A	: Auto, 4 to 8 rows

17	Horizontal quiet zone to module width ratio *3	Specifies the quiet zone width of the 2D side. Specifies the ratio to the module width of 1D side.

Setting range	0.0 to 20.0

	Setting elements	Description
18	Separator height to module width ratio *3	Specifies the height of the separator placed between 1D and 2D. Specifies the ratio to the module width of 1D side. Setting range: 0.0 to 10.0
19	Laser correction (2D) *3	Corrects the laser settings to the 2D side of the composite codes and to the separator placed between 1D and 2D respectively. Refer to “3-6-3 Object settings” (P.78).

Reference

- If you will change the starting and ending points of the barcode/2D code objects only, use “Customize staring/ending point by object”. Refer to “3-15-2 Fine-adjustment” (P.175).

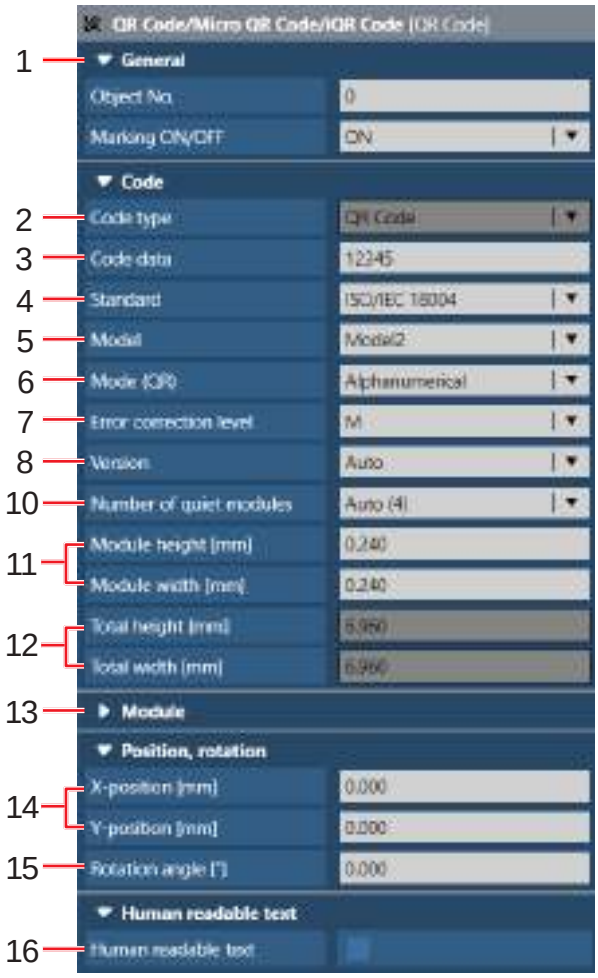
20	Human readable text	Check the box to mark the human readable text. Refer to “3-11-7 Human readable text” (P.145).
21	Optimal setting	Clicking “Optimal setting” button opens the optimal setting window of the bar code parameters.
22	Details	Clicking this button displays the target parameters of the optimal settings.
23	OK	Clicking this button applies the optimal values to the bar code settings and human readable text settings based on the setting module width.
24	Cancel	Closes the optimal setting window.

*1 : Available when the code type is GS1 DataBar Limited or GS1 DataBar Limited CC-A.
*2 : Available when the code type is GS1 DataBar Stacked or GS1 DataBar Stacked CC-A.
*3 : Available when the code type is GS1 DataBar Limited CC-A or GS1 DataBar Stacked CC-A.

3-11-5 QR code, Data matrix code settings

When the code type is QR code or Data Matrix, set the following parameters.

QR code



Data Matrix

	Setting elements	Description
1	General setting	Refer to “3-6-3 Object settings” (P.78).
2	Code type	Displays code type.

	Setting elements	Description
3	Code data	Input the text to be coded. (Max. 299 digits)

Code type	Mode	Available characters
QR code Micro QR code *4	Numerical	0 to 9
	Alphanumerical	0 to 9, A to Z, space, symbols $ % * + - . / :
	8-bit byte	(*1) 0 to 9, A to Z, a to z, symbols, control codes
	Kanji (ISO/IEC 18004)	(*2) alphanumerical, symbols, Hiragana, Katakana, Kanji
	Kanji (GB/T 18284)	(*3) alphanumerical, symbols, Simplified Chinese characters
	Auto (ISO/IEC 18004)	(*1, *2) 0 to 9, A to Z, a to z, symbols, control codes, Hiragana, Katakana, Kanji
	Auto (GB/T 18284)	(*1, *3) 0 to 9, A to Z, a to z, symbols, control codes, Simplified Chinese characters
iQR code	Numerical	0 to 9
	Text	0 to 9, A to Z, a to z, space, symbols ! " # $ % & ' ( ) * , + - . / : ; < = > ? @ [\ ] ^ _ ` { | } ~, control codes: NUL, STX, ETX, EOT, HT, LF, CR, FS, GS, RS, US, DEL
	8-bit byte	(*1) 0 to 9, A to Z, a to z, symbols, control codes
	Kanji	(*2) alphanumerical, symbols, Hiragana, Katakana, Kanji
Data matrix code	Single-byte	(*1) 0 to 9, A to Z, a to z, symbols, control codes
	Kanji	(*2) alphanumerical, symbols, Hiragana, Katakana, Kanji
GS1 Data matrix code	—	0 to 9, A to Z, a to z, symbols ! " % & ' ( ) * + , - . / : ; < = > ? _, function character (FNC1)

*1 : Characters within the ASCII code 00 (HEX) to 7F (HEX) are available.
*2 : JIS level-1 and level-2 characters within the JIS code 2121 (HEX) to 7426 (HEX) are available.
*3 : GB 2312 level-1 and level-2 characters within the GB 2312 code A1A1 (HEX) to F7FE (HEX) are available.
*4 : For micro QR codes, Kanji and auto mode with GB/T 18284 are not available.

Reference

- This product supports Format 05 and Format 06 of ISO15434 for DataMatrix macro 05 and 06.
- For GS1 Data Matrix, the control code “FNC1” is automatically inserted 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 added automatically at the next digit.
- For Data Matrix, the separator “FNC1” of variable length AI data is not inserted automatically.
  To input the separator “FNC1”, click the symbol button on the data input panel and select “FNC1”.
- To set GS1 data matrix code with the application identifier (AI), refer to “Description of AI (Application Identifier)” (P.147).
- When the code data is set in the several strings, they are connected together without linefeed to create the code data. This linefeed can be applied only to the human readable text.

4	Standard *1	Select the standard for the QR code. This setting is not applied to the micro QR code and iQR code.

Setting entry	ISO/IEC 18004, GB/T 18284 (Chinese National Standard)

Reference

- When the code data contains the simplified Chinese characters, select GB/T 18284.

	Setting elements	Description
5	Model *1	Select the model of the QR code. This setting is not applied to the micro QR code and iQR code. Setting entry: Model1, Model2

Reference

- Select Model 2 usually.
- When the standard of QR code is set to GB/T 18284, the model type is always Model 2 and this setting is not be shown.

6	Mode	Select the input mode of the code data. (except GS1 Data matrix code)

QR code, Micro QR code	Auto, Numerical, Alphanumerical, 8-bit byte, Kanji
iQR code	Numerical, Text, 8-bit byte, Kanji
Data Matrix	Single-byte, Kanji

Reference

- When “Auto” is set, the mode is selected automatically according to the input code data. If the different kind of characters are in the code data, the code symbol is encoded with the mixed data mode.
- The mode setting of GS1 Data matrix code is fixed with single-byte.

7	Error correction level *1	Select the error correction level of QR code. • QR code: L, M, Q or H • micro QR code: L, M or Q • iQR code: L, M, Q, H or S
8	Version *1	Specifies the symbol size of QR code. Refer to “QR code version and data capacity” (P.138). • Auto: The version is specified to be the minimum automatically. In this case, the symbol size may change depending on the input code data. • QR code: 1 to 22 (Model 2), 1 to 14 (Model 1) • Micro QR code: M1 to M4 • iQR code: 1 to 31 (Square form), R1 to R15 (Rectangle form)
9	Symbol size *2	Specifies the symbol size (module number) of Data Matrix. Refer to “Symbol size and data capacity for Data Matrix code” (P.140).

Auto	The module number is specified to be the minimum automatically. In this case, the symbol size may change depending on the input code data.
Square	10x10, 12x12, 14x14, 16x16, 18x18, 20x20, 22x22, 24x24, 26x26, 32x32, 36x36, 40x40, 44x44, 48x48, 52x52, 64x64, 72x72, 80x80, 88x88
Rectangle	8x18, 8x32, 12x26, 12x36, 16x36, 16x48

10	Number of quiet modules	Specifies how many modules are in one side as the quiet module.

Auto (n)	Depending on the each code symbol standard, the quiet zone or the margin width are set automatically with the following module number. (n) indicates the number of the module. • QR code: 4 modules • Micro QR code: 2 modules • iQR code: 1 module • DataMatrix: 1 module
1 to 9	Input the arbitrary module numbers from 1 to 9 for the quiet zone or the margin width.

11	Module height [mm] Module width [mm]	Specifies the height and width of module as the smallest unit of the code symbol composition. Setting range: 0.001 to 9.999 mm

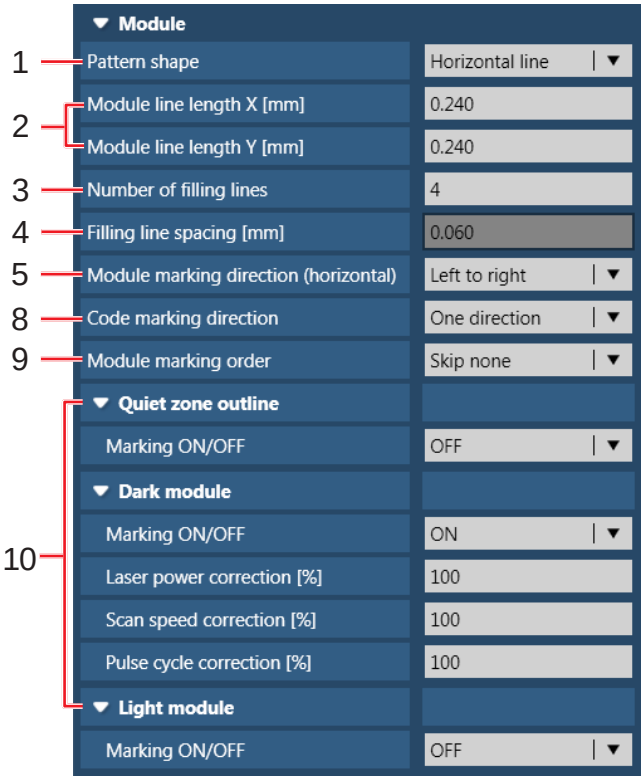
	Setting elements	Description
12	Total height [mm] Total width [mm]	Displays the entire width and height of the code, including the quiet zone.
13	Module	Specifies the drawing details of the 2D code symbol. Refer to “Module filling of QR code and Data Matrix code” (P.131)
14	X-position [mm] Y-position [mm]	Specifies center position of the code symbol. Setting range: -999.999 to +999.999 mm
15	Rotation angle [°]	Rotates the code at the input angle. The rotation center is the center of the code. It rotates in clockwise direction with minus angle, and in counterclockwise with plus angle. Setting range: -180.000 to +180.000 °
16	Human readable text	Check the box to mark the human readable text. Refer to “3-11-7 Human readable text” (P.145).

*1 : Available when the code type is QR code, microQR code or iQR code.
*2 : Available when the code type is Data Matrix or GS1 Data Matrix.

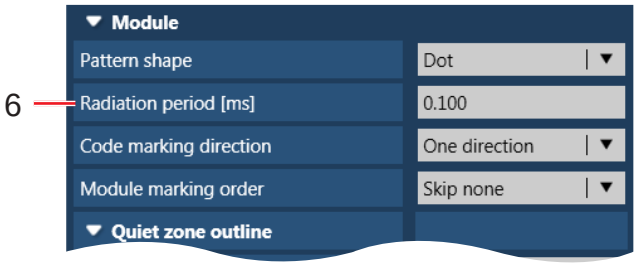
■ Module filling of QR code and Data Matrix code

Specifies the drawing pattern of the 2D codes (QR codes, Data matrix codes).

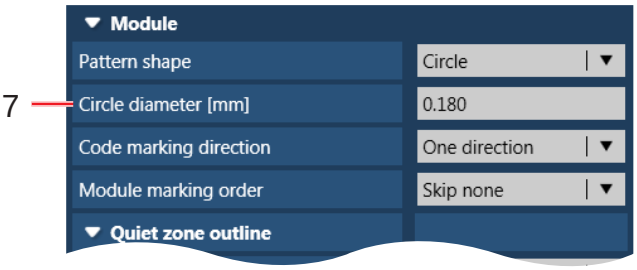
Horizontal line, Vertical line,
Horizontal raster, Vertical raster



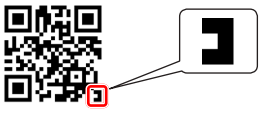
Dot



Circle



	Setting elements	Description
1	Pattern shape	Specifies the drawing style of the code pattern.



To mark this part for example, pattern shape is as follows.

Pattern shape	Image	Remarks
Horizontal line		
Vertical line		
Horizontal raster		When the modules lie next to each other, marks these modules at once.
Vertical raster		
Dot		Marks with one-shot of the laser.
Circle		
Font	Depending on setting	With the font pattern, select the drawing image from the 2D code pattern font. Refer to “2D code pattern font” (P.141).

	Setting elements	Description
2	Module line length X [mm] *1 Module line length Y [mm] *1	Set the length of the pattern line. From the input line length, “Line width” set in the object group settings is subtracted for the marking line. Setting range: 0.001 to 9.999 mm
3	Number of filling lines *1	Set the line numbers in one module. Setting range: 1 to 99
4	Filling line spacing [mm] *1	Displays the calculated filling line spacing based on the settings of the number of filling lines and module line length.
5	Module marking direction *1	Set the marking direction of the lines. • Horizontal line: Left to right, Right to left, Alternate • Vertical line: Top to bottom, Bottom to top, Alternate
6	Radiation period [ms] *2	Set the marking time of the dot. Setting range: 0.001 to 999.999 ms

Reference

- Depending on the radiation time of the dot, the 2D code marking quality may vary. Check the marking quality and readability of the code after changing this parameter.

7	Circle diameter [mm] *3	Set the diameter of the module circle. Setting range: 0.001 to 9.999 mm
8	Code marking direction	Specifies the marking direction of the code.

Setting	One direction	Alternate
Marking direction image		

Reference

- The alternate direction setting makes the marking time shorter than the one direction setting.

9	Module marking order	Specifies the marking order of the 2D code. To reduce the heat effect by laser in the drawing modules of the code, valid this function.

Setting	No skip	Skip one	Skip two
Marking order image	1 2 3 4 5 6 7 8 9 10 11 12	1 7 2 8 9 3 10 4 5 11 6 12	1 5 9 2 6 10 3 7 11 4 8 12

Reference

- When on-the-fly marking is set, set always “No skip”.

10	Marking settings per code element	Specifies the inversion of the black/white and the laser settings for each element of the 2D code. When the pattern shape is font, select the character code for each element here. Refer to “Marking setting by code elements” (P.133).

*1 : Available when the pattern shape is horizontal line, vertical line, horizontal raster, or vertical raster.
*2 : Available when the pattern shape is dot.
*3 : Available when the pattern shape is circle.

■ Marking setting by code elements

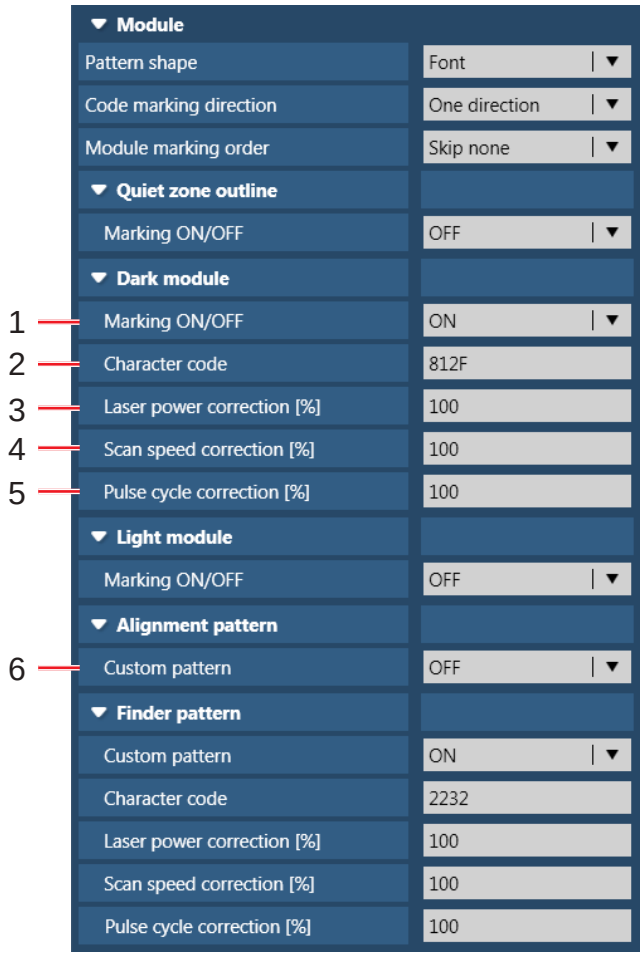
Specify the inversion of the black/white and the laser settings for each element of the 2D code.
When the pattern shape is font, select the character code for each element here.

QR code composition elements	Data Matrix composition elements
• Quiet zone outline • Dark module • Light module • Alignment *1 • Finder pattern *1	• Quiet zone outline • Dark module • Light module • Border *1

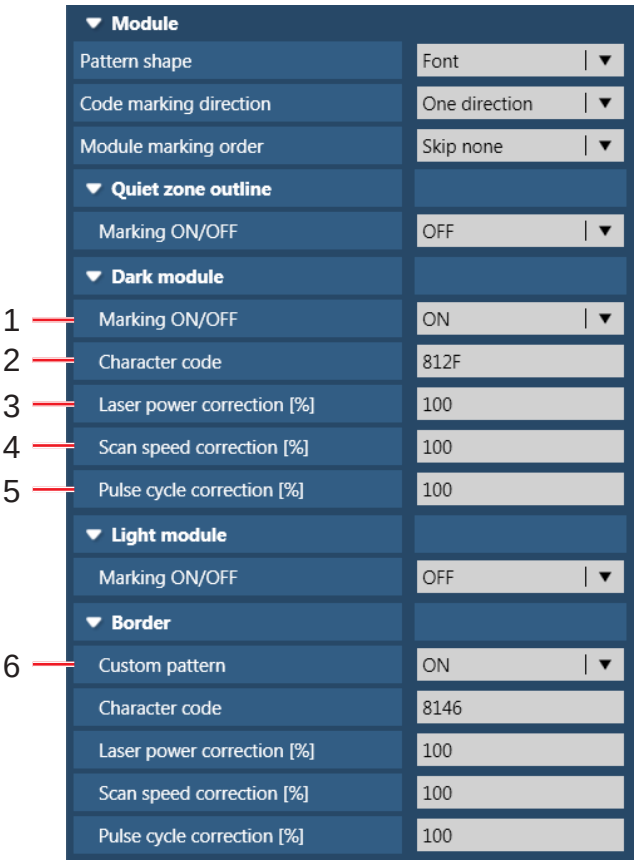
*1 : Available when the pattern shape is font.

For the code composition, refer to “Composition of QR code and Data Matrix” (P.137).

QR code
Pattern shape: font



Data Matrix
Pattern shape: font



	Setting elements	Description
1	Marking ON/OFF	Specifies marking on/off of the selected element in the 2D code. With this setting, the inversion of black and white for the 2D code marking is specified. Switching the on/off setting of the dark and light module inverts black and white for the marking.

Reference

- By setting ON to Light module, the quiet zone fill setting is available. Refer to “Quiet zone filling” (P.135).

	Setting elements	Description
2	Character code *1	Specifies the character code of the font used as a drawing pattern. Clicking the entry field shows the window of the 2D code pattern selection.

Reference

- When the character code is set to “0”, the 2D code is encoded with blank for the specified part.
- On the pattern code input panel, the pattern image registered in 2D code font are displayed.

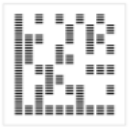
3	Laser power correction [%]	Available when the setting of marking on/off or custom pattern is “ON”. Corrects the laser power and scan speed of the selected element of the code symbol. The correction ratio is calculated using the value set at the laser settings as 100%.
4	Scan speed correction [%]	
5	Pulse cycle correction [%] *2	

Setting range	Laser power correction	0 to 999 %
	Scan speed correction	1 to 999 %
	Pulse cycle correction	1 to 999 %

Reference

- If the corrected value exceeds the setting limit, marking is executed with the upper or lower limit value.
- Marking is not available when the laser power correction value is “0”.
- If you will change the starting and ending points of the barcode/2D code objects only, use “Customize staring/ending point by object”. Refer to “3-15-2 Fine-adjustment” (P.175).

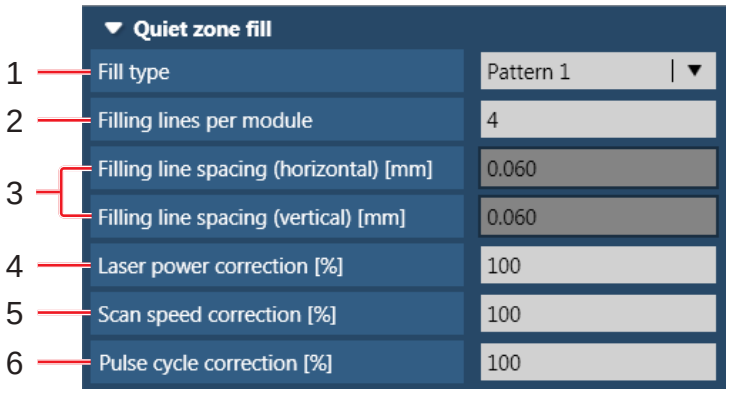
6	Custom pattern *1	If Alignment / Finder pattern / Border are marked using the other custom pattern than the module, set “ON” here. • When the alignment/finder pattern of QR code is set to “Custom pattern OFF”, marking is performed using the dark/light module. • When the border pattern of data matrix is set to “Custom pattern OFF”, marking is performed using the dark module/light module pattern. Setting image: Custom pattern ON/OFF example for the border in Data Matrix code

Custom pattern OFF	Custom pattern ON
	

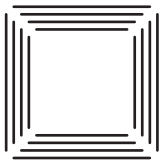
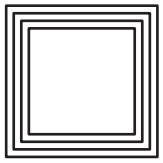
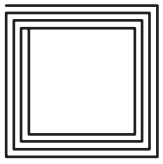
*1 : Available when the pattern shape is font.
*2 : Available with LP-RF series and LP-RV series.

■ Quiet zone filling

Specifies the quiet zone filling method of 2D codes (QR codes and Data matrix codes).
The quiet zone filling is used when the code symbol is inverted.



	Item	Description
1	Fill type	Select the optimal filling method of the quiet zone by checking the marking time and marking quality of the corners.

Pattern shape	Marking image	Remarks
Marking OFF		No marking to the quiet zone.
Light module	Depending on the light module settings.	Fills the quiet module by using the same filling settings with the light module. Refer to “Module filling of QR code and Data Matrix code” (P.131).
Pattern 1		Fills the quiet zone with several squares. The each square consists of 4 lines.
Pattern 2		Fills the quiet zone with several squares. The each square consists of one unicursal line.
Pattern3		Fills the quiet zone with one spiral line.

2	Filling lines per module *1	Specifies with how many lines in one module the quiet zone is filled. The total filling lines are the results of multiplying the number of quiet modules by the filling lines per module.

Setting range	1 to 99

3	Filling line spacing (horizontal) [mm] *1 Filling line spacing (vertical) [mm] *1	Displays the calculated filling line spacing based on the settings of the filling lines per module and module line length.

<table>
<tr><th></th><th>Item</th><th>Description</th></tr>
<tr><td>4</td><td>Laser power correction [%] *1</td><td rowspan="3">Corrects the laser power and scan speed of the quiet zone of the code symbol.
The correction ratio is calculated using the value set at the laser settings as 100%.
<table><tr><td rowspan="3">Setting range</td><td>Laser power correction</td><td>0 to 999 %</td></tr><tr><td>Scan speed correction</td><td>1 to 999 %</td></tr><tr><td>Pulse cycle correction</td><td>1 to 999 %</td></tr></table></td></tr>
<tr><td>5</td><td>Scan speed correction [%] *1</td></tr>
<tr><td>6</td><td>Pulse cycle correction [%] *1, *2</td></tr>
</table>

Reference

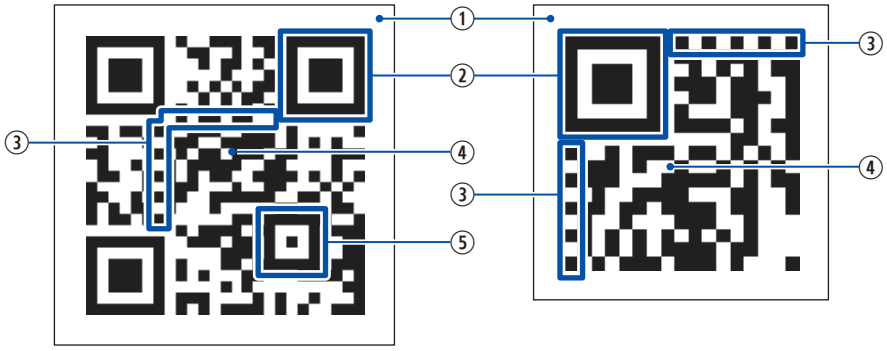
- If the corrected value exceeds the setting limit, marking is executed with the upper or lower limit value.
- Marking is not available when the laser power correction value is “0”.
- If you will change the starting and ending points of the barcode/2D code objects only, use “Customize staring/ending point by object”. Refer to “3-15-2 Fine-adjustment” (P.175).

*1 : Available when the fill type is set to pattern 1 to pattern 3.
*2 : Available with LP-RF series and LP-RV series.

■ Composition of QR code and Data Matrix

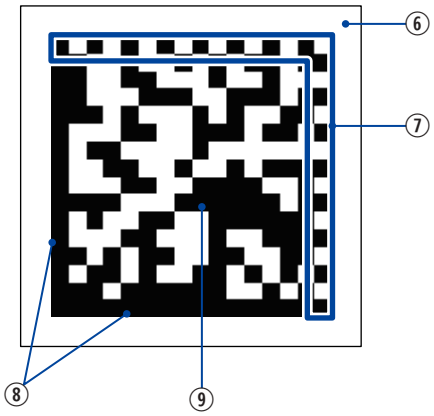
QR Code

Micro QR Code



No.	Name	Remarks
①	Quiet zone	• QR code: More than 4 modules around • Micro QR code: More than 2 modules around • iQR code: More than 1 module around
②	Finder pattern	
③	Timing pattern	
④	Data area	Black: Dark module White: Light module
⑤	Alignment pattern	

Data Matrix Code



No.	Name	Remarks
⑥	Quiet zone	More than 1 module around
⑦	Timing module	
⑧	Border	
⑨	Black: Dark module White: Light module	Data area

■ QR code version and data capacity

The relation versions and data capacity (the maximum number of character) is shown below.

Micro QR Code

Version	Error Correct. Level	Mode			
		Numerical	Alphanumerical	8-bit byte	Kanji
M1 (11×11)	−	5	−	−	−
M2 (13×13)	L	10	6	−	−
	M	8	5	−	−
M3 (15×15)	L	23	14	9	6
	M	18	11	7	4
M4 (17×17)	L	35	21	15	9
	M	30	18	13	8
	Q	21	13	9	5

QR Code Model 1

Version	Error Correct. Level	Mode			
		Numerical	Alpha-numerical	8-bit byte	Kanji
1 (21×21)	L	40	24	17	10
	M	33	20	14	8
	Q	25	15	11	6
	H	16	10	7	4
2 (25×25)	L	81	49	34	20
	M	66	40	28	17
	Q	52	31	22	13
	H	33	20	14	8
3 (29×29)	L	131	79	55	33
	M	100	60	42	25
	Q	81	49	34	20
	H	52	31	22	13
4 (33×33)	L	186	113	78	48
	M	138	84	58	35
	Q	114	69	48	29
	H	76	46	32	19
5 (37×37)	L	253	154	106	65
	M	191	116	80	49
	Q	157	95	66	40
	H	105	63	44	27
6 (41×41)	L	299 *	194	134	82
	M	249	151	104	64
	Q	201	122	84	51
	H	133	81	56	34
7 (45×45)	L	299 *	244	168	103
	M		188	130	80
	Q		253	154	106	65
	H		167	101	70	43

Version	Error Correct. Level	Mode			
		Numerical	Alpha-numerical	8-bit byte	Kanji
8 (49×49)	L	299 *	299	206	126
	M		229	158	97
	Q		183	126	77
	H	203	123	85	52
9 (53×53)	L	299 *	299 *	244	150
	M		267	184	113
	Q		223	154	94
	H	239	145	100	61
10 (57×57)	L	299 *	299 *	287	177
	M			219	135
	Q		262	180	111
	H	291	176	121	74
11 (61×61)	L	299 *	299 *	299 *	205
	M			253	156
	Q		299	205	126
	H		207	142	87
12 (65×65)	L	299 *	299 *	299 *	234
	M			289	178
	Q			241	148
	H		236	162	100
13 (69×69)	L	299 *	299 *	299 *	264
	M				202
	Q			273	168
	H		275	189	116
14 (73×73)	L	299 *	299 *	299 *	299
	M				225
	Q				189
	H			207	127

* : Though the codes indicated with “299 *” can contain more than 299 digits based on their standard, in the laser marker 299 digits are the max. amount of the code data to be input.

QR Code Model 2

Version	Error Correct. Level	Mode			
		Numerical	Alpha-numerical	8-bit byte	Kanji
1 (21×21)	L	41	25	17	10
	M	34	20	14	8
	Q	27	16	11	7
	H	17	10	7	4
2 (25×25)	L	77	47	32	20
	M	63	38	26	16
	Q	48	29	20	12
	H	34	20	14	8
3 (29×29)	L	127	77	53	32
	M	101	61	42	26
	Q	77	47	32	20
	H	58	35	24	15
4 (33×33)	L	187	114	78	48
	M	149	90	62	38
	Q	111	67	46	28
	H	82	50	34	21
5 (37×37)	L	255	154	106	65
	M	202	122	84	52
	Q	144	87	60	37
	H	106	64	44	27
6 (41×41)	L	299 *	195	134	82
	M	255	154	106	65
	Q	178	108	74	45
	H	139	84	58	36
7 (45×45)	L	299 *	224	154	95
	M	293	178	122	75
	Q	207	125	86	53
	H	154	93	64	39
8 (49×49)	L	299 *	279	192	118
	M		221	152	93
	Q	259	157	108	66
	H	202	122	84	52
9 (53×53)	L	299 *	299 *	230	141
	M		262	180	111
	Q		189	130	80
	H	235	143	98	60
10 (57×57)	L	299 *	299 *	271	167
	M			213	131
	Q		221	151	93
	H	288	174	119	74
11 (61×61)	L	299 *	299 *	299 *	198
	M			251	155
	Q		259	177	109
	H		200	137	85

Version	Error Correct. Level	Mode			
		Numerical	Alpha-numerical	8-bit byte	Kanji
12 (65×65)	L	299 *	299 *	299 *	226
	M			287	177
	Q		296	203	125
	H		227	155	96
13 (69×69)	L	299 *	299 *	299 *	262
	M				204
	Q			241	149
	H		259	177	109
14 (73×73)	L	299 *	299 *	299 *	282
	M				223
	Q			258	159
	H		283	194	120
15 (77×77)	L	299 *	299 *	299 *	299 *
	M				254
	Q			292	180
	H			220	136
16 (81×81)	L	299 *	299 *	299 *	299 *
	M				277
	Q				198
	H			250	154
17 (85×85)	L	299 *	299 *	299 *	299 *
	M				
	Q				224
	H			280	173
18 (89×89)	L	299 *	299 *	299 *	299 *
	M				
	Q				243
	H				191
19 (93×93)	L	299 *	299 *	299 *	299 *
	M				
	Q				272
	H				208
20 (97×97)	L	299 *	299 *	299 *	299 *
	M				
	Q				297
	H				235
21 (101×101)	L	299 *	299 *	299 *	299 *
	M				
	Q				
	H				248
22 (105×105)	L	299 *	299 *	299 *	299 *
	M				
	Q				
	H				270

* : Though the codes indicated with “299 *” can contain more than 299 digits based on their standard, in the laser marker 299 digits are the max. amount of the code data to be input.

■ Symbol size and data capacity for Data Matrix code

The relation between symbol size and data capacity (the maximum number of character) of Data Matrix code is shown below.

Symbol Size	Character type			Error correction overhead [%]
	Numeric: 0 to 9 (single byte)	Alphanumeric: 0 to 9, A to Z, space (single byte) *2	Kanji	
10×10	6	3	0	62.5
12×12	10	6	1	58.3
14×14	16	10	3	55.6
16×16	24	16	5	50
18×18	36	25	8	43.8
20×20	44	31	10	45
22×22	60	43	14	40
24×24	72	52	17	40
26×26	88	64	21	38.9
32×32	124	91	30	36.7
36×36	172	127	42	32.8
40×40	228	169	56	29.6
44×44	288	214	71	28
48×48	299 *	259	86	28.1
52×52		299 *	101	29.2
64×64			138	28.6
72×72			182	28.1
80×80			226	29.6
88×88			286	28
8×18	10	6	1	58.3
8×32	20	13	4	52.4
12×26	32	22	7	46.7
12×36	44	31	10	45
16×36	64	46	15	42.9
16×48	98	72	23	36.4

*1 : Though the codes indicated with “299 *” can contain more than 299 digits based on their standard, in the laser marker 299 digits are the max. amount of the code data to be input.

*2 : In Alphanumeric, according to the number (0 to 9) and capital alphabet (A to Z) combination, there is a case that the max. digits of the input data can exceed the number shown above list. If the code data includes lower-case characters, symbols or control codes, the available data capacity may be smaller than the above specified number.

■ 2D code pattern font

The 2D code drawing patterns shown below are registered to the initial setting font of “2DCODE.FON”.
Refer to “7-2-4 Font file” (P.215) 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 pattern	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							

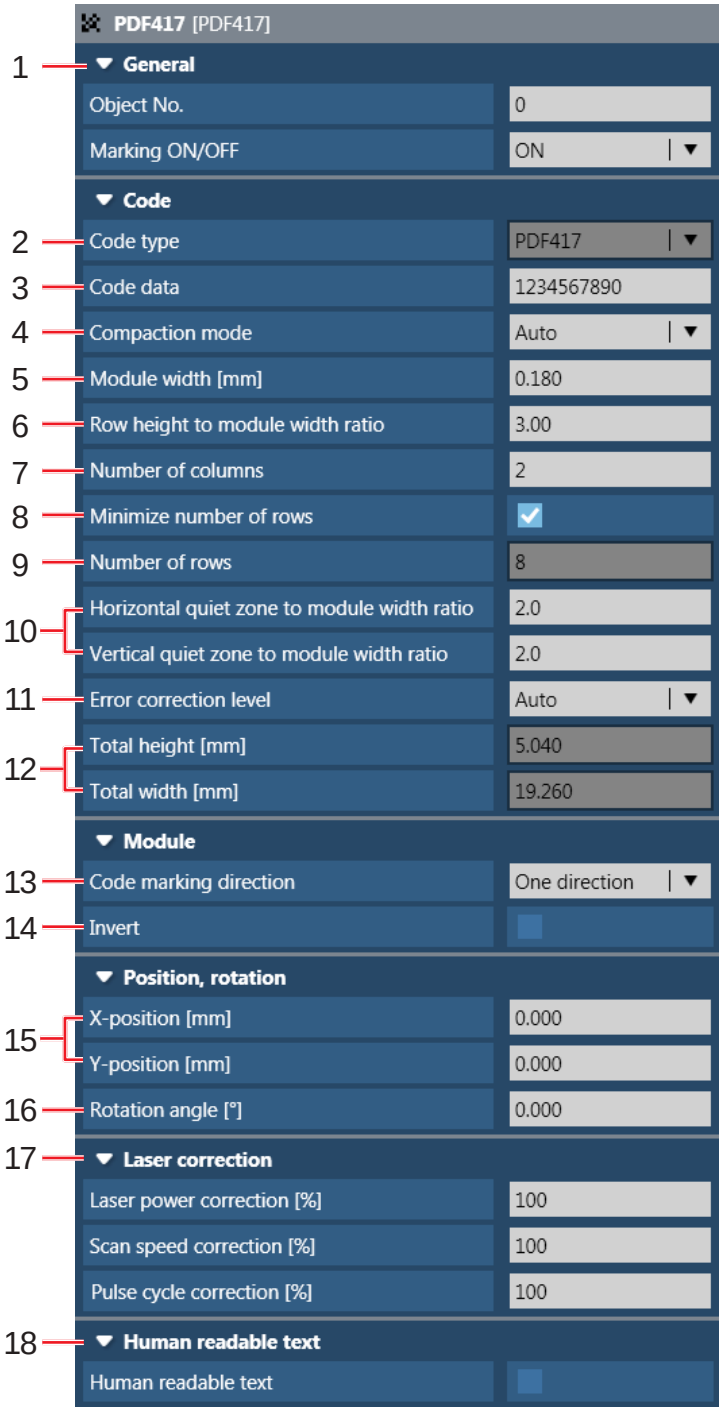
Font image						
Character code	8147(HEX)	8148(HEX)	8149(HEX)	814A(HEX)	814B(HEX)	814C(HEX)
Pattern type	Border pattern					

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.

3-11-6 PDF417 settings

When the code type is PDF417, set the following parameters.



	Item	Description
1	General	Refer to “3-6-3 Object settings” (P.78).
2	Code type	Displays code type.

	Item	Description
3	Code data	Input the text to be coded. The available characters vary depending on the compaction mode.

Reference

- The available number of characters varies depending on the combination of the error correction level, number of columns and rows.
- Max. 299 digits can be input.
- When the code data is set in the several strings, they are connected together without linefeed to create the code data. This linefeed can be applied only to the human readable text.

4	Compaction mode	Select the mode according to the character type in the code data. • Auto: Sets the mode automatically depending on the input code data. • Text: Characters within ASCII Code 20 (HEX) to 7E (HEX), consisting of 0 to 9, A to Z, a to z, symbols and part of control codes (HT, LF, CR). • Byte: Characters within ASCII Code 00 (HEX) to 7F (HEX), consisting of 0 to 9, A to Z, a to z, symbols and control codes. • Numeric: 0 to 9
5	Module width [mm]	Specifies module width as the smallest element of the code. Set the larger value than “Line width” in object group settings. Setting range: 0.050 to 1.000 mm
6	Row height to module width ratio	Specifies the ratio of the height for one row to module width. Setting range: 1.00 to 10.00
7	Number of columns	Specifies the column number of the modules in code symbol. Setting range: 1 to 30

Reference

- This column number is only for the data codewords and dose not include the start pattern, stop pattern, right and left row indicators.
- Do not exceed 928 as the results of multiplying columns by rows.

8	Minimize number of rows	Enabling this setting sets the minimum value automatically depending on the code data and column number settings.
9	Number of rows	Specifies the row number of the modules in code symbol. When enabling the minimize setting, the auto setting row number is displayed. Setting range: 3 to 90
10	Horizontal quite zone to module width ratio / Vertical quite zone to module width ratio	Specifies the ratio of the quiet zone to module width. Vertical setting refers the height and horizontal setting refers the width. Setting range: 0.0 to 20.0
11	Error correction level	Select the error correction level. “Auto” sets the recommended correction level depending on the code data and the compaction mode settings. Setting range: Auto, 0 to 8
12	Total height [mm] Total width [mm]	Displays the entire width and height of the bar code, including the quiet zone.

	Item	Description
13	Code marking direction	Select the marking direction of the bars.

Setting	One direction	Alternate
Marking direction image		

Reference

- The alternate direction setting makes the marking time shorter than the one direction setting.
- Set the filling line spacing of PDF417 modules in object group settings. Refer to “Bold filling line spacing” (P.151).

14	Invert	To invert the code marking, check the box. With inversion setting bars are not marked, but spaces and quiet zone are marked.
15	X-position [mm] Y-position [mm]	Specifies center position of the code symbol. Setting range: -999.999 to +999.999 mm
16	Rotation angle [°]	Rotates the code at the input angle. The rotation center is the center of the code. It rotates in clockwise direction with minus angle, and in counterclockwise with plus angle. Setting range: -180.000 to +180.000 °
17	Laser correction	Refer to “3-6-3 Object settings” (P.78).

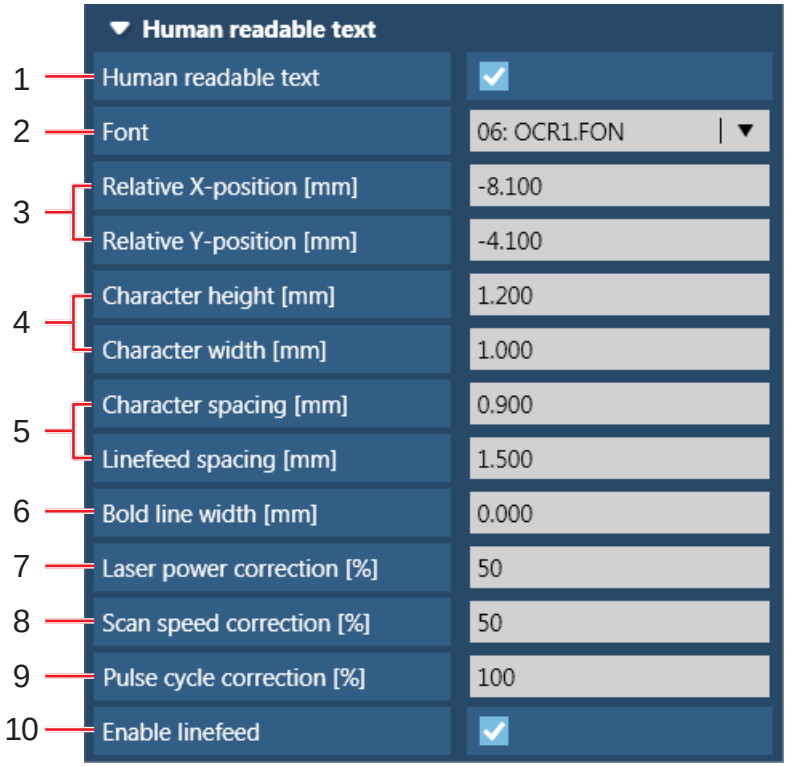
Reference

- If you will change the starting and ending points of the barcode/2D code objects only, use “Customize staring/ending point by object”. Refer to “3-15-2 Fine-adjustment” (P.175).

18	Human readable text	Check the box to mark the human readable text. Refer to “3-11-7 Human readable text” (P.145).

3-11-7 Human readable text

With this setting, the human readable text representing the code data is added to the code symbol.



	Setting elements	Description
1	Human readable text	Check the box to mark the human readable text. For the composite code, set to 1D side and 2D side respectively.
2	Font	Select the font type for the alphanumeric in the human readable text. Refer to “7-2-4 Font file” (P.215).

Reference

- To use Japanese or Simplified Chinese characters in the human readable text, set “East Asian characters” in file settings. Refer to “3-13-1 Offset and character settings” (P.156).

3	Relative X-position [mm] *1 Relative Y-position [mm] *1	Specifies the position of the human readable text relative to the center of the code. For the composite code, set to 1D side and 2D side respectively. Setting range: -999.999 to +999.999 mm

Reference

- The position of the human readable text can be adjusted automatically by using “3-5 Editing Tools” (P.71).

4	Character height [mm] *1 Character width [mm] *1	Specifies the character height / width of Human Readable Text. Setting range: 0.100 to 55.000 mm (LP-GS051) 0.060 to 30.000 mm (LP-GS052) 0.100 to 85.000 mm (LP-RC350S) 0.100 to 90.000 mm (LP-RF200P / LP-RV200P)

<table>
<tr><th></th><th>Setting elements</th><th>Description</th></tr>
<tr><td>5</td><td>Character spacing [mm] *1
Linefeed spacing [mm] *1, *3</td><td>Specifies the character / linefeed spacing of Human Readable Text.
The linefeed spacing is used only when the human readable text has a linefeed.
<table><tr><td rowspan="4">Setting range</td><td>0.000 to 55.000 mm (LP-GS051)</td></tr><tr><td>0.000 to 30.000 mm (LP-GS052)</td></tr><tr><td>0.000 to 85.000 mm (LP-RC350S)</td></tr><tr><td>0.000 to 90.000 mm (LP-RF200P / LP-RV200P)</td></tr></table></td></tr>
<tr><td>6</td><td>Bold line width [mm]</td><td>Specifies the line width of bold character.
<table><tr><td>Setting range</td><td>0.000 to 6.000 mm</td></tr></table></td></tr>
<tr><td>7</td><td>Laser power correction [%]</td><td rowspan="3">Corrects the laser power and scan speed of the human readable text. The correction ratio is calculated using the value set at the laser settings as 100%.
<table><tr><td rowspan="3">Setting range</td><td>Laser power correction</td><td>0 to 999 %</td></tr><tr><td>Scan speed correction</td><td>1 to 999 %</td></tr><tr><td>Pulse cycle correction</td><td>1 to 999 %</td></tr></table></td></tr>
<tr><td>8</td><td>Scan speed correction [%]</td></tr>
<tr><td>9</td><td>Pulse cycle correction [%] *2</td></tr>
</table>

Reference

- If the corrected value exceeds the setting limit, marking is executed with the upper or lower limit value.
- Marking is not available when the laser power correction value is “0”.

10	Enable linefeed *3	When the code data is set in the several strings, set whether the linefeed is applied to the human readable text or not. This setting is applied only to the human readable text, but not to the code data.

*1 : Not available when the code type is EAN/UPC/JAN. When code type is GS1 DataBar, these parameters can be configured automatically by using “Optimal setting”.
*2 : Available with LP-RF series and LP-RV series.
*3 : Available with the 2D code and 2D side of the composite code only.

Reference

- For the composite codes, the settings other than “Relative X-position” and “Relative Y-position” are applied to both 1D and 2D side commonly.
- The control codes are not shown in the human readable text.
- The start and stop characters of CODE39 and NW-7 are included in the human readable text. For CODE39, the start and stop characters are indicated with “*”.
- The check character or check digit of the following code symbols is included in the human readable text.
  - EAN/UPC/JAN
  - CODE39
  - ITF
  - NW-7
- The check digit in the Application Identifier “01” of the following code symbols is included in the human readable text.
  - GS1 DataMatrix
  - GS1-128 (UCC/EAN128) (CODE128 with the control code “FNC1” at the head of the barcode data)
  - GS1 DataBar Limited, 1D side of GS1 DataBar Limited CC-A
  - GS1 DataBar Stacked, 1D side of GS1 DataBar Stacked CC-A

■ 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 ( ).

- UCC/EAN128(GS1-128) (CODE128 with the control code “FNC1” at the head of the barcode data)
- GS1 DataBar Limited, GS1 DataBar Stacked (only “01”)
- GS1 DataBar Limited CC-A, GS1 DataBar Stacked CC-A
- GS1 Data Matrix

AI	Data format set after AI	Data content
00	18-digits numeric	Serial Shipping Container Code (SSCC)
01 *1	14-digits numeric *3	Global Trade Item Number (GTIN)
10	max. 20-digits alphanumeric, symbols +FNC1 *4	Batch or lot No.
11	6-digits numeric	Production date
13	6-digits numeric	Packaging date
15	6-digits numeric	Best before date
17	6-digits numeric	Expiration date
21	max. 20-digits alphanumeric, symbols +FNC1 *4	Serial No.
30	max. 8-digits numeric + FNC1 *4	Variable count of items
310X *2	6-digits numeric	Net. Weight (kg)
320X *2	6-digits numeric	Net. Weight (pounds)
392X *2	max. 15-digits numeric + FNC1 *4	Applicable amount payable, single monetary area
393X *2	3 digits numeric + max. 15-digits numeric + FNC1 *4	Applicable amount payable with ISO currency
7003	10-digits numeric + FNC1 *4	Expiration date and time
710	max. 20-digits alphanumeric, symbols + FNC1 *4	National Healthcare Reimbursement No. - Germany
711		National Healthcare Reimbursement No. - France
712		National Healthcare Reimbursement No. - Spain
713		National Healthcare Reimbursement No. - Brasil
714		National Healthcare Reimbursement No. - Portugal
8004	max. 30-digits alphanumeric, symbols + FNC1 *4	Global Individual Asset Identifier (GIAI)
8008	8- to 12-digits numeric + FNC1 *4	Date and time of production
90	max. 30-digits alphanumeric, symbols + FNC1 *4	Information mutually agreed between trading partners
91 to 99	max. 90-digits alphanumeric, symbols + FNC1 *4	Company internal information

*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” indicates the number of decimal places.

*3 : 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
- UCC/EAN128 (GS1-128) (the code for which “FNC1” is set at the head in CODE128)
- GS1 DataBar Limited / GS1 DataBar Stacked

*4 : When inputting another AI elements after these settings, “FNC1” as the separator character is required. If the setting data is at the end of the data, “FNC1” is not necessary.

Example:

- GS1 DataBar Limited CC-A on 1D side
  In case that the code setting data is “1234567890123”, Human Readable Text is “(01) 12345678901231”.
- 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

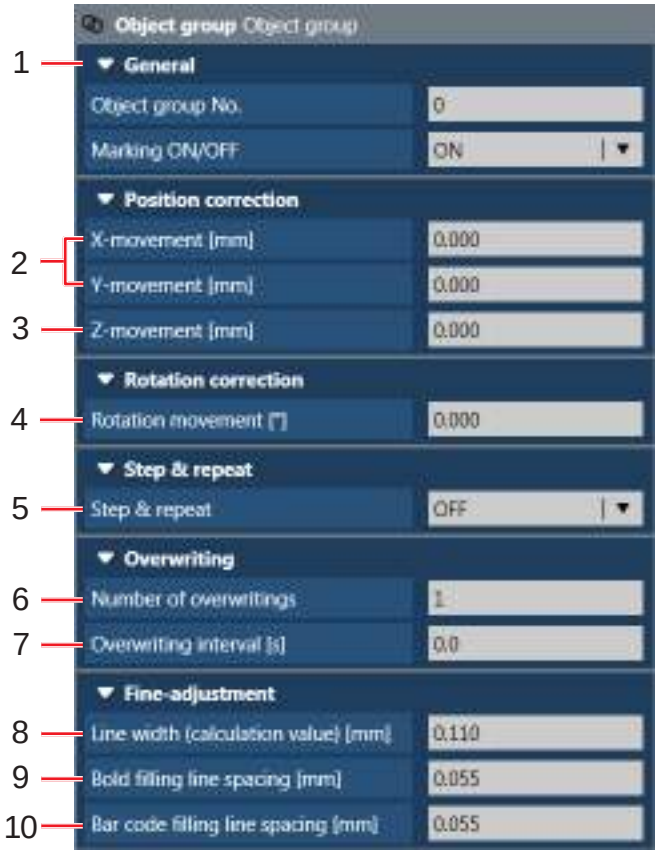
- To set the code data with AI (Application Identifier) by using line-feeds, set AI at the head of the each line of the code data.
- To input “FNC1” as the separator for the variable-length AI data using the communication commands (STR or SIN commands), you can use “GS” in the ASCII code 1D (HEX) as “FNC1”. Refer to “8-4-6 Laser marker control command” (P.255).

3-12 Object Group

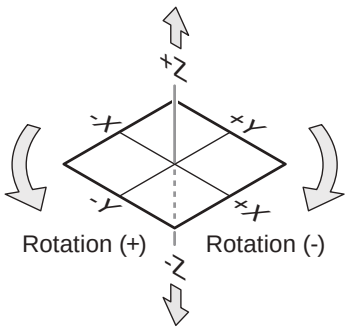
Object group settings is a common setting to the all objects categorized into the same group on “3-6-2 Object list” (P.76).
In the object group settings, the following settings are activated to the all objects in a group.

- Moving the marking position
- Marking on/off for the object group
- Step & repeat
- Overwriting
- Filling line spacing for bold characters and barcodes

3-12-1 Object group settings



	Setting elements	Description
1	General setting	Refer to “3-6-3 Object settings” (P.78).
2	X-movement [mm] Y-movement [mm]	Moves the marking position of the object group to X/Y direction. Setting range: -999.999 to +999.999 mm
3	Z-movement [mm] *1	Moves the marking position of the object group to Z direction. Setting range: -3.000 to +3.000 mm (LP-GS051); -1.500 to +1.500 mm (LP-GS052)
4	Rotation movement [°]	Sets the angle of the object group. The rotation origin is at the center of the marking field. Setting range: -180.000 to +180.000 °



Reference

- The directions of the X-axis and Y-axis are defined by the head direction setting. Refer to “8-2-2 Head direction setting” (P.237).

	Setting elements	Description
5	Step & repeat	Set ON to use Step & repeat function. Refer to “3-12-2 Step & repeat” (P.152). Setting entry: ON, OFF
6	Number of overwritings	Sets how many times the object group is marked with one marking trigger input. Setting range: 1 to 9999
7	Overwriting interval [s]	The interval period at overwriting. Setting range: 0.0 to 60.0 sec.

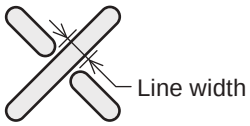
Reference

- When on-the-fly marking is set, set always 0 second to overwriting interval.

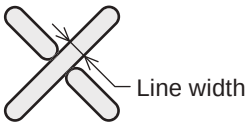
8 Line width (calculation value) [mm]

The line width is defined as the laser line width for the calculation. It specifies the pitch between lines at the intersection point in a character, the starting point of the filling lines, and etc.
It is recommended to measure the line width for one line scanned by laser marker and input this value here. The initial value of the line width is set to the calculated value of the spot size for each model.

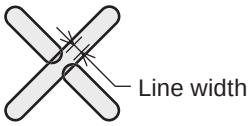
Setting range	0.010 to 2.000 mm
Initial setting	0.110 mm (LP-GS051)
	0.060 mm (LP-GS052)
	0.245 mm (LP-RC350S)
	0.060 mm (LP-RF200P)
	0.050 mm (LP-RV200P)



Too large line width



Proper



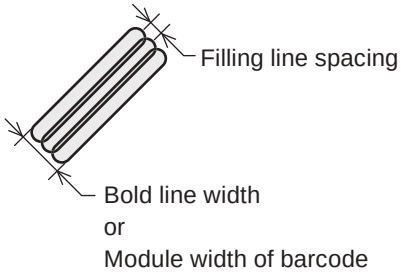
Too small line width

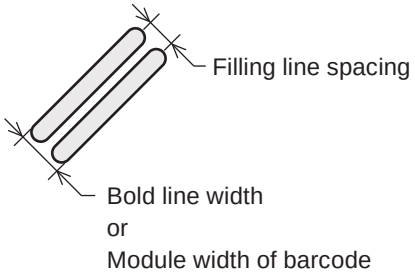
Reference

- For the character objects, the correction to the intersection point is valid only for the characters with the line property “1” or “2” set by Font Maker software or Logo Data Editing software.
- For the True type objects and graphic objects except VEC files, the line width setting is applied to the closing point of the drawing frames.
- For the graphic objects of the VEC files, the correction to the intersection point is valid only for the lines with property “1” or “2” set by Logo Data Editing software.
- Changing the line width does not change the actual marking line width.
  To make the bold line, set “Bold line width” (P.90) in the character object settings.
- The time for marking may be longer if the setting value of the line width is smaller.

	Setting elements	Description
9 10	Bold filling line spacing [mm] Bar code filling line spacing [mm]	Specifies the pitch of the marking lines for the bold character and for the bar code objects and PDF417 code.

Setting range	0.010 to 2.000 mm
Initial setting	0.055 mm (LP-GS051)
	0.030 mm (LP-GS052)
	0.122 mm (LP-RC350S)
	0.030 mm (LP-RF200P)
	0.025 mm (LP-RV200P)





Reference

- It is recommended that the filling line spacing is specified so that it should be an integral multiple of half line width of the actual marking line width. If the space is generated on the marked object, set the filling line spacing with smaller value.

*1 : Available with LP-GS series (except LP-GS051-L).

3-12-2 Step & repeat

Step & repeat makes multiple copies of the original data and arranges them in rows in one file. It is usable for the multiple objects laid side by side on a tray.

	Setting elements	Description
1	Step & repeat	Set ON to use Step & repeat function. Setting entry: ON, OFF
2	Number of rows Number of columns	The number of the copied data unit in vertical and horizontal direction. Setting range: 1 to 400

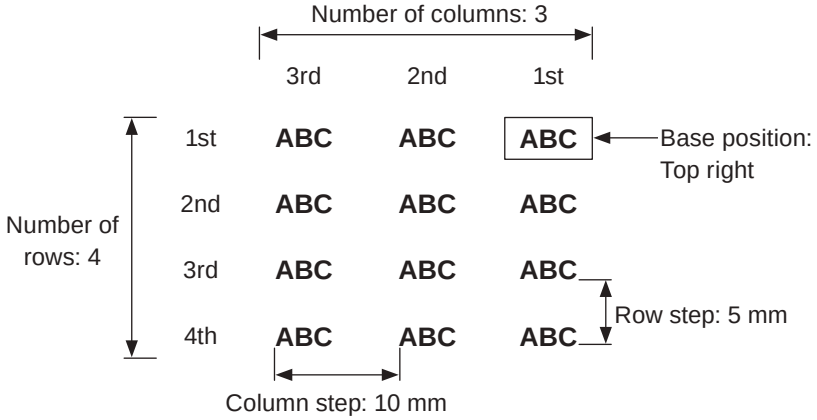
Reference

- Up to 10,000 units of the copied data by Step & repeat can be set in one object group setting.

3	Row step [mm] Column step [mm]	The pitch between the copied data in row / column direction. Setting range: 0.000 to 55.000 mm (LP-GS051) 0.000 to 30.000 mm (LP-GS052) 0.000 to 85.000 mm (LP-RC350S) 0.000 to 90.000 mm (LP-RF200P / LP-RV200P)
4	Base position	Select the position of the original data unit in Step & repeat data. The specified base position is defined as the 1st row and 1st column for Step & repeat. Setting entry: Top left, Top right, Bottom left, Bottom right

Step & repeat setting example

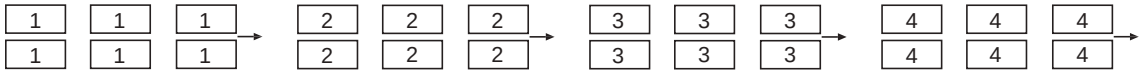
Setting parameter:
- Character: ABC
- Number of rows: 4
- Number of columns: 3
- Row step: 5 mm
- Column step: 10 mm
- Base position: Top right



	Setting elements	Description
5	Count individually	Check this box to allow the updating of the counter value at each data unit in Step & repeat. This setting is applied to the counters used in the selecting object group.

Reference

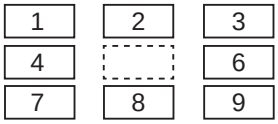
- To use the counter, set the counter settings in functional characters and input the functional character of the counter in the text for the marking object.
- Without “count individually” setting, the all counter values are the same in one Step & repeat marking as shown in the figure below.



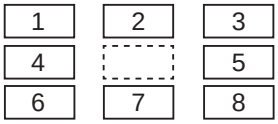
6	Count “Marking OFF”	When the count individually is set in Step & repeat and set the marking off in the specified data unit, select here whether the counter value of the marking off part is counted or skipped. For the marking off setting, refer to “Step & repeat fine-adjustment” (P.154).

Setting entry	• ON: Skips the counter value on the column/row which is set “Marking OFF”. • OFF: Does not skip the counter value on the column/row which is set “Marking OFF”.

(ex)
- Step & repeat with 3 rows × 3 columns
- Marking OFF: skip the marking of the 2nd row of 2nd line
- Counter starting position: Top left
- Count direction: Horizontal



ON



OFF (Do not count)

7	Counter starting position	When “Count individually” is enabled, specify the start position of the counting.

Setting entry	Base position, Top left, Top right, Bottom left, Bottom right

8	Count direction	When the count individually is set in Step & repeat, select the direction of counting order.

Setting entry	Horizontal, Vertical

Reference

- The settings of the counter starting position and the count direction also specify the marking order.
- In case the counter is included in the text of the marking object and “count individually” is set, the counter order is determined as follows depending on the counter starting position and count direction.
(ex) when the counter is set to Step & repeat marking which includes 3 rows and 3 columns. (“1” indicates the counter starting position.)

	1 2 3 4 5 6 7 8 9	3 2 1 6 5 4 9 8 7	7 8 9 4 5 6 1 2 3	9 8 7 6 5 4 3 2 1
Counter starting position	Top left	Top right	Bottom left	Bottom right
Counter Direction	horizontal	horizontal	horizontal	horizontal

9	Step & repeat fine-adjustment	Clicking [...] button, input panel of Step & repeat fine adjustment will appear. Refer to “Step & repeat fine-adjustment” (P.154).

■ Step & repeat fine-adjustment

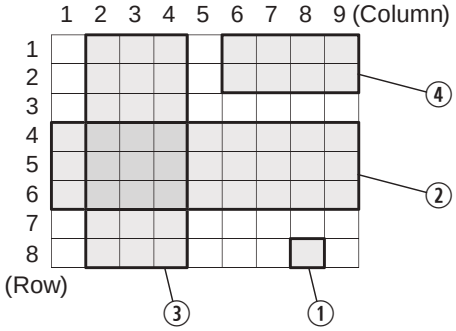
	Setting elements	Description
1	Adjustment No.	Displays the condition No. of the fine-adjustment list. This number is used for the settings with the communication command. Up to 1000 conditions (condition No. 0 to 999) can be set for fine-adjustment in one file.
2	Item	Select the adjustment subject. • Position/Power: Corrects the marking position or laser power for the specified data unit in Step & repeat. • Marking OFF: Does not mark the specified data unit in Step & repeat.

Reference

- The data unit with “Marking OFF” is not displayed on the image display panel.

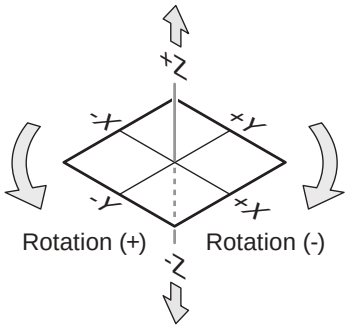
3	Object	Specifies the adjustment target in Step & repeat. • Single step: Adjusts one object in Step & repeat. • Row, Column: Adjusts all objects in the specified rows or columns in Step & repeat. • Rectangle range: Adjusts the objects in the specified range of Step & repeat.
4	Start row Start column Last row Last column	Specifies the adjustment target with the line and column order. The base position set in Step & repeat condition is counted as the 1st line and 1st column. Setting range: 1 to 400

Setting sample for Step & repeat fine-adjustment:
When the base position is upper left and the data range shown in the figure are the adjustment target, set the start/end object as shown in the table below.



No.	Adjustment object	Start row	Start column	Last row	Last column
①	Single step	8	8	-	-
②	Row	4	-	6	-
③	Column	-	2	-	4
④	Rectangle range	1	6	2	9

	Setting elements	Description
5	X-movement [mm] Y-movement [mm]	Displacement value of the selected data unit in Step & repeat. Setting range: -999.999 to +999.999 mm
6	Z-movement [mm] *1	Displacement value of the selected data unit in Step & repeat. Setting range: -3.000 to +3.000 mm (LP-GS051) -1.500 to +1.500 mm (LP-GS052)
7	Rotation movement [°]	Displacement angle of the selected data unit in Step & repeat. The rotation center is in the origin of the original data unit. Setting range: -180.000 to +180.000 °
8	Laser power correction [+/-%]	Adjusts the laser power of the specified data unit. While the laser power for Step & repeat object is defined 100%, specify its corrective rate within +/- 50 %. Example: • laser power for Step & repeat object = 50 • laser power correction = +20% In that case, the laser power is corrected to 60 with the following calculation; 50 × 120% = 60 Setting range: -50.0 to +50.0 %

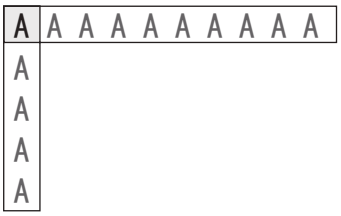


Reference

- For the marking pattern which more than one fine adjustment is set, the laser power correction value is the total amount of the each settings.

Setting example:
- Base position : Upper left
- 1st line : Laser power correction is +20%
- 1st column : Laser power correction is +10%

In that case, the laser power correction rate at 1st line and 1st column is calculated as follows;
100 + 20 + 10 = 130 [%]



9	Add	Adds the setting condition in Step & repeat fine-adjustment list.
10	Delete	Deletes the selected line of Step & repeat fine-adjustment list.
11	Upward / Downward	Moves the adjustment No. of the selected line in Step & repeat fine-adjustment list.
12	Close	Closes Step & repeat fine-adjustment window.

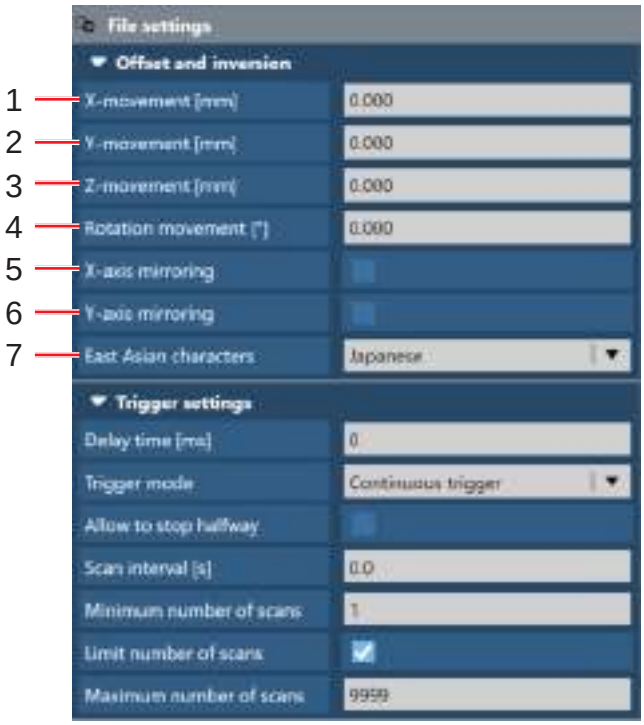
*1 : Available with LP-GS series (except LP-GS051-L).

3-13 File settings

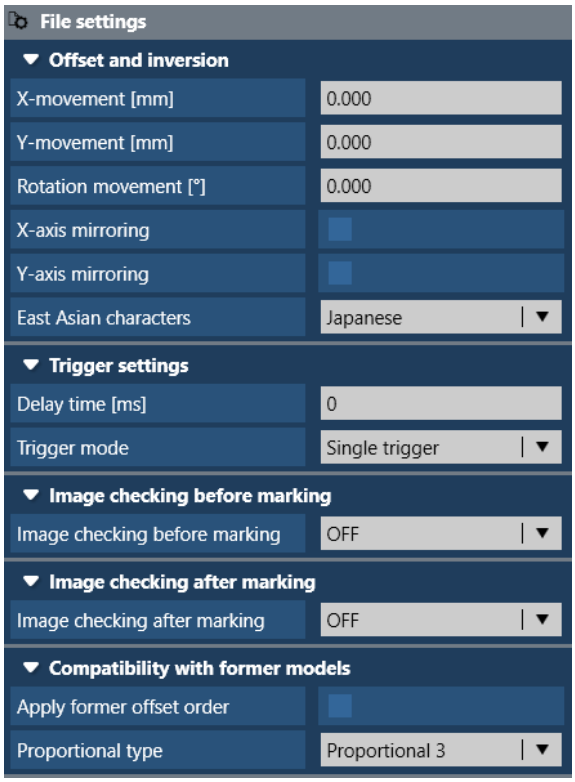
In file settings the following items are set. This setting is valid for all objects in a file.

- Displacement of the marking position, inversion of the marking position
- Delay time setting for the marking start trigger, trigger mode setting
- Linkage setting with image checker such as marking position correction, checking codes or characters

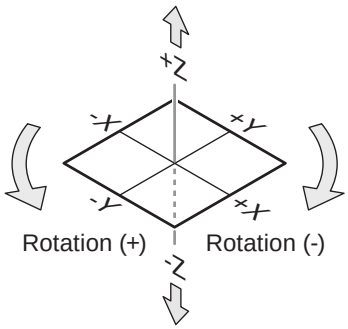
3-13-1 Offset and character settings



When “LP-400/V compatibility” is enabled



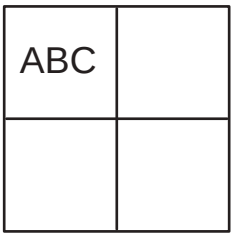
	Setting elements	Description
1 2	X-movement [mm] Y-movement [mm]	Moves marking position of the whole marking data in a file. Setting range: -999.999 to +999.999 mm
3	Z-movement [mm] *1	Displacement value in Z direction for the whole marking data in a file. Setting range: -3.000 to +3.000 mm (LP-GS051); -1.500 to +1.500 mm (LP-GS052)
4	Rotation movement [°]	Rotates the whole marking data in a file. The rotation center is the center of the marking field. Setting range: -180.000 to +180.000 °



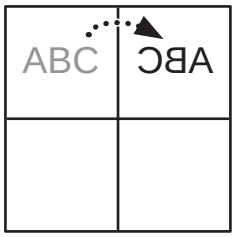
Reference

- The directions of the X-axis and Y-axis are defined by the head direction setting. Refer to “8-2-2 Head direction setting” (P.237).

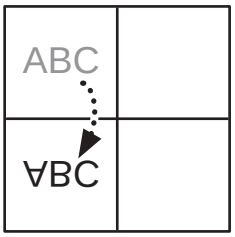
	Setting elements	Description
5 6	X-axis mirroring Y-axis mirroring	Inverts the whole marking data in a file.



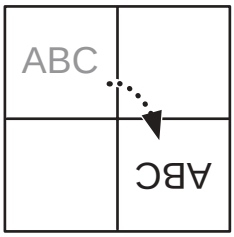
☐ X-axis mirroring
☐ Y-axis mirroring



☐ X-axis mirroring
☑ Y-axis mirroring



☑ X-axis mirroring
☐ Y-axis mirroring



☑ X-axis mirroring
☑ Y-axis mirroring

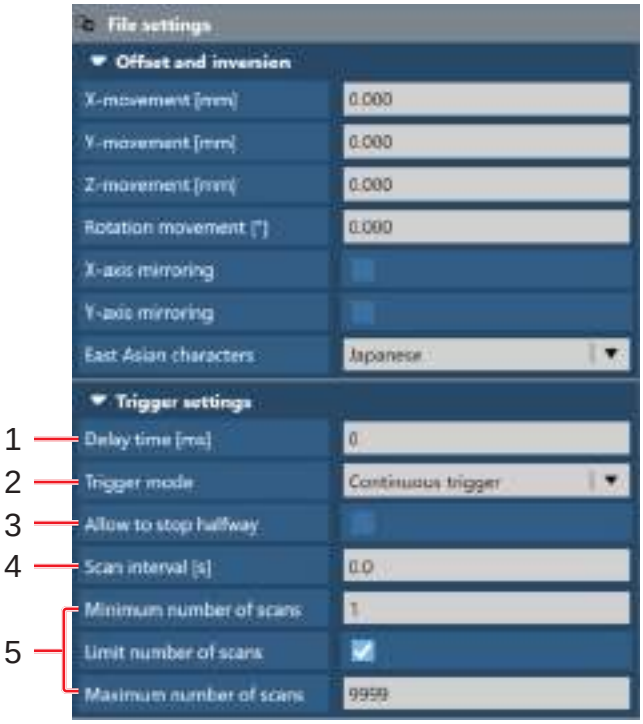
7	East Asian characters	Select the non-alphanumeric character type from Chinese or Japanese which can be used in the character objects and barcode/2D code objects. Setting entry: Japanese, Simplified Chinese

Reference

- When Japanese is selected, JIS fonts saved in J1 and J2 on the font list are used for the non-alphanumeric characters. When Simplified Chinese is selected, GB fonts saved in GB1 and GB2 are used. For the detail of the font, refer to “7-2-4 Font file” (P.215).
- This item is set to Japanese by default. If you want to change the default settings, change “Default setting for East Asian characters” in system settings screen. Refer to “8-1-6 Advanced system settings” (P.234).
- Japanese and Simplified Chinese can not be used together in one file.

*1 : Available with LP-GS series (except LP-GS051-L).

3-13-2 Trigger settings



	Setting elements	Description
1	Delay time [ms]	Sets the delay time from trigger input to starting trigger processing (lasing) operation. Trigger delay setting is applied to only the selected file. Setting range: 0 to 9999 ms

Reference

- Trigger delay setting is applied to only the selected file. When you use several files, set the trigger delay for each file.
- When in the selected file the link control with an image checker is set, the link control starts after the trigger delay time. There is no delay time before TIMING IN.
- The delay time cannot be set while the on-the-fly marking is set to ON.

2	Trigger mode	Select the control method of TRIGGER IN (marking start signal) at the remote control mode or run mode. According to this setting, the behavior of TRIGGER IN signal in I/O terminal is defined. This setting is applied when the on-the-fly marking is OFF. • Single trigger: One lasing operation is executed by the edge of turning on of TRIGGER IN signal. • Continuous trigger: Lasing operation is repeated while TRIGGER IN signal is on.

Reference

- The default setting of the trigger mode is “single trigger”.
- The trigger mode setting in the file settings is applied to only the selected file. When using several files, set the trigger mode for each file.
- The trigger mode setting in the file settings is not applied to on-the-fly marking. Set the trigger mode of on-the-fly marking in the motion settings for all files. Refer to “3-16-1 Motion settings” (P.178).
- For the control details of TRIGGER IN signal at each trigger mode, refer to Setup/Maintenance Guide.
- When the trigger mode is set to “continuous trigger”, MRK command (marking trigger) of the communication command is not available.
- When the trigger mode is set to “continuous trigger”, the start marking button of the run mode is not available.
- When the trigger mode is set to “continuous trigger” and you want to repeat the marking of a closed figure, you can use “Seamless loop” function. Refer to “3-15-2 Fine-adjustment” (P.175).

	Setting elements	Description
3	Allow to stop halfway *1	Specifies the timing of the lasing end at the continuous trigger. Without “allow to stop halfway” setting if TRIGGER IN turns OFF when the lasing operation is running, the lasing operation is terminated after finishing the running operation. With “allow to stop halfway” setting, the lasing operation is terminated immediately when TRIGGER IN turns OFF.
4	Scanning interval [s] *1	Sets the interval period at overwriting when the trigger mode is set to continuous trigger. Setting range: 0.0 to 60.0 sec.

Reference

- Even though 0 second is set to the scanning interval, there is a certain interval between each lasing operation. (around 10ms)

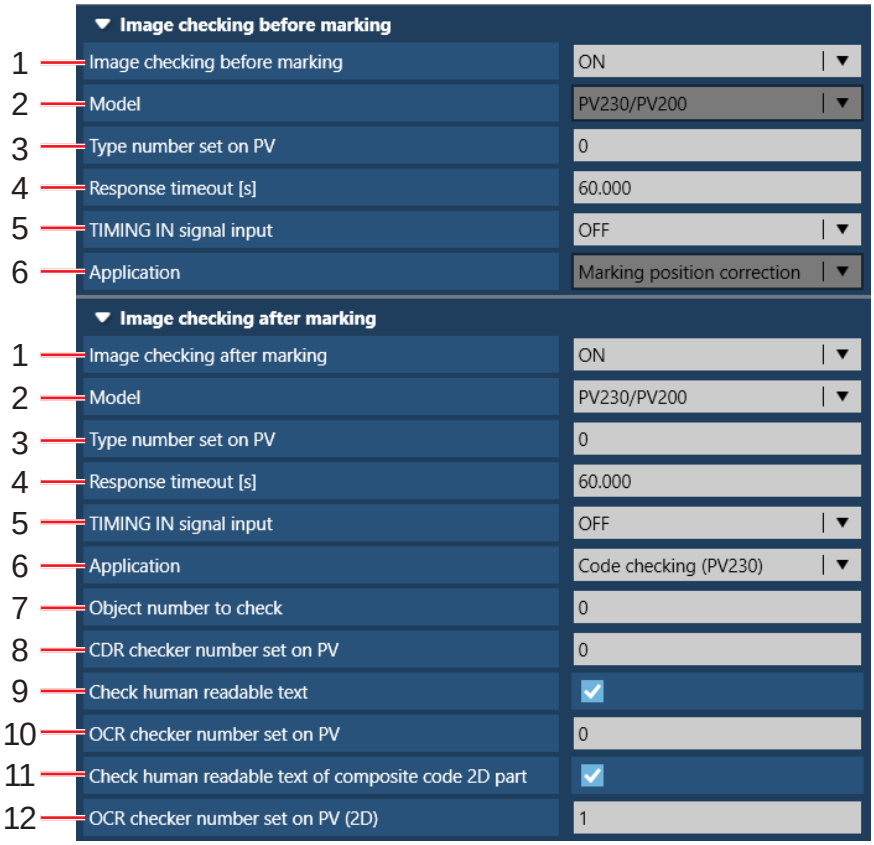
5	Minimum number of scans [times] *1 Limit number of scans *1 Maximum number of scans [times] *1	Sets the limitation to the range of number of scans when the trigger mode is set to “continuous trigger”. If the executed repeated times of lasing operation are less than the specified minimum number of scans, warning E630 occurs. If TRIGGER IN signal remains on though the executed repeated times of lasing operation reaches the specified maximum number of scans, warning E631 occurs and the subsequent lasing is canceled. Setting range: 1 to 9999 times Minimum number of scans should be less than or equal to maximum number of scans.

Reference

- When the trigger mode is set to continuous trigger, the test marking is executed with minimum number of scans.

*1 : Available when the trigger mode is set to continuous trigger.

3-13-3 Image checking before/after marking



	Setting elements	Description
1	Image checking before marking / Image checking after marking	When using the linkage control function with an image checker, turn ON the functions to use. Setting entry: ON, OFF

Reference

- For the detail of the combination setting with image checker, refer to “Setup / Maintenance Guide”.
- The link control with an image checker is not available at on-the-fly marking.
- The link control with an image checker is not available when the trigger mode is “continuous trigger”.

2	Model	Specifies the image checker model to use. Setting entry: Image checking before marking: PV230/PV200 (fixed) Image checking after marking: PV230/PV200, DataMan, LP-ABR
3	Type number set on PV *1	This setting is required when you select PV230/PV200 to the model of the image checker. Set this number, so that the setting values are same with the settings in PV230/PV200. Setting range: 0 to 255
4	Response timeout [s]	Specifies the timeout period for the response from the image checker. If you want to have a limit for the reading time of the image checker, set here. Setting range: 1.000 to 60.000 sec. Initial setting: 60.000 sec.
5	TIMING IN signal input	TIMING IN signal is used when the laser marker operation trigger and image checker/ code reader operation trigger is input separately, e.g. when the camera (code reader) field of view is away from the laser marker marking position. Setting entry: ON, OFF

	Setting elements	Description
6	Application	Select the application of the linkage control with an image checker. Setting entry: Image checking before marking: Marking position correction (fixed) Image checking after marking: Code checking, Character checking, Image capturing and inspection

Reference

- If you use DataMan or LP-ABR for the image checking after marking, the application is fixed to “Code checking”.
- If you use PV200 for the image checking after marking, the application is fixed to “Image capturing and inspection”.
- If you use PV230 for code checking, the human readable text can be also checked with a code symbol.

7	Object number to check	This setting is available when the application is set to “Code checking” or “Character checking” at the image checking after marking. It specifies the target setting that is referred at the checking with an image checker. Set the same number with the object number you set in barcode/2D code settings or character settings. Setting range: 0 to 1999
8	CDR checker number set on PV *1	This setting is available when the application is set to “Code checking” at the image checking after marking. Input the same value with the “Checker No.” for the code reader set in PV230. Setting range: 0 to 999
9	Check human readable text *1	This setting is available when the application is set to “Code checking” at the image checking after marking. If you want to check the code symbol and human readable text of the barcode or 2D code at the same time, activate this setting.
10	OCR checker number set on PV *1	This setting is available when the application is set to “Code checking” or “Character checking” at the image checking after marking. Input the same value with the “Checker No.” for the optical character recognition set in PV230. Setting range: 0 to 999

Reference

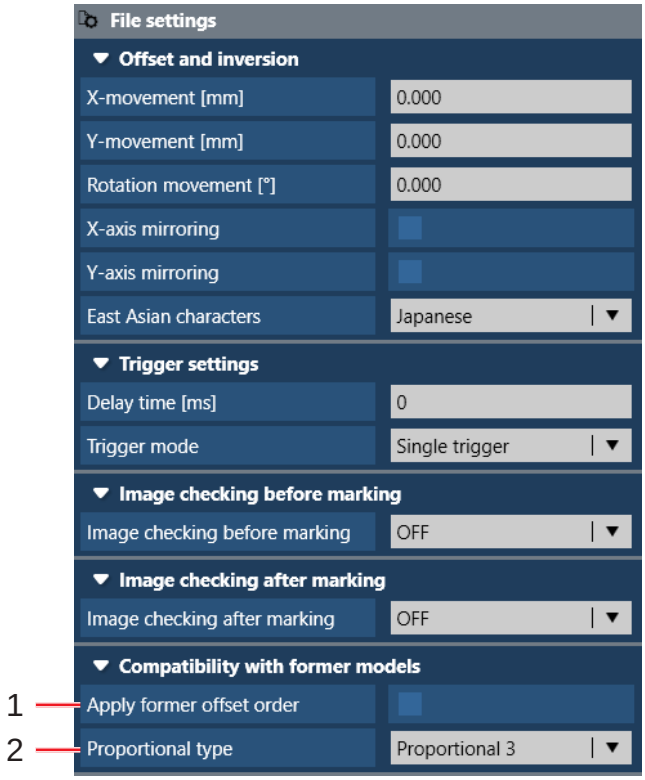
- When the application is set to code checking and if you want to check the code symbol and human readable text at the same time, set CDR checker number for the code symbol and OCR checker number for the human readable text.

11	Check human readable text of composite code 2D part *1	This setting is available when the application is set to “Code checking” and “Check human readable text” is activated. When the code symbol is the composite code and you want to check the 2D-side of the human readable text by an image checker, activate this setting.
12	OCR checker number set on PV (2D) *1	This setting is available when you set “Check human readable text of composite code 2D part”. Input the same value with the “Checker No.” for the optical character recognition set in PV230. Setting range: 0 to 999

*1 : Available when the model of the image checker is PV230/PV200.

3-13-4 Compatibility with former models

These setting are available when “LP-400/V compatibility” is enabled in the system settings screen. Refer to “8-1-4 Compatibility with former models (LP-400/LP-V)” (P.232).



	Setting elements	Description
1	Apply former offset order	When the positional offset functions of both the file settings and external offset are used, select the offset order. Enabling this setting allows to use the same offset order with LP-400/LP-V series instead of the standard offset order.

Offset order	Former offset order (ON)	Standard offset order (OFF)
1	Rotation movement (External offset)	Mirroring (File settings)
2	X/Y-movement (External offset)	Rotation movement (External offset)
3	Mirroring (File settings)	Rotation movement (File settings)
4	Rotation movement (File settings)	X/Y-movement (External offset)
5	X/Y-movement (File settings)	X/Y-movement (File settings)

Reference

- When the external offset function is not used, this settings are not necessary.

2	Proportional type	When “proportional” is set to the character spacing type in the character object settings, select the level of spacing. The lower the number is, the smaller the spacing is. Refer to “Character layout setting” (P.92). When “LP-400/V compatibility” in the system settings screen is enabled, this setting is applied to the all character objects in the file.

Setting range	• Proportional 1 • Proportional 2 • Proportional 3

Reference

- When “LP-400/V compatibility” in the system settings screen is enabled, the proportional type can not be set in the character object settings.

3-14 Functional Characters

In the functional characters, set the details of the functional characters such as date/time, counter and etc.

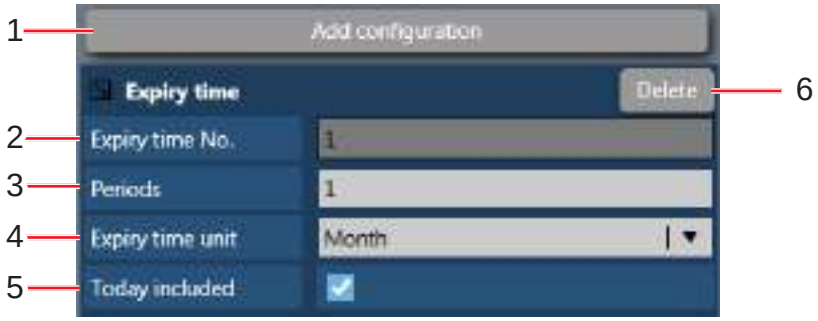
	Panel name	Description
1	Functional characters	Setting panel for the functional character details. This setting is valid in one file.
2	Global functional characters	Setting panel for the functional character details. This setting is valid in all files.

3-14-1 Expiry date and time / Global expiry date and time

The expiry date or time is used to mark the date with a specified period added or subtracted to/from the current date set in the system settings.
After setting expiry date/time condition here, input the functional character of expiry date/time as the character object. Refer to “3-7-4 Set functional characters” (P.83).

Notice

- The functional characters such as data/time and lot are marked based on the system clock of the laser marker. The system clock might be deviated due to the error in internal part or battery drain. Therefore, be sure to check the time of the system clock before the operation.



	Setting elements	Description
1	Add configuration	To open the expiry date/time condition input panel, click here.
2	Expiry time No.	Displays the expiry time No. The global expiry time No. can be used for all files. Setting range: Expiry time No. 1 to 16 / Global expiry time No. 17 to 32
3	Periods	Specifies the period added or subtracted to/from the current date and time. When the negative value is input, it represents the past date and time. Setting example: With “45 days” expiry setting, when today is January 1st, the marking date is “February 15th”. Setting range: -999 to 999

	Setting elements	Description
4	Expiry time unit	Specifies the period unit of the expiry date and time.

Setting entry	Year, Month, Date, Hour, Minute

Reference

- With the expiry time unit setting “Year” or “Month” if the calculated expiry date does not exist, the marking date will be adjusted as follows.

Non-existent date	Marking date	Remarks
January 0th	December 31st of the last year	
X Month of 0th	The last date of (X-1) Month	X=2 to 12
X Month of 31st	The last date of (X-1) Month	X=4, 6, 9, 11
February 29th to February 31st	The last date of February	

5	Today included	Specifies whether or not to include today in the base date for addition or subtraction. It is valid when the expiry unit is year or month.

Reference

- Basically, the expiry date indicates the same date of the year or the month. Enabling “Today included” indicates the previous day (or the next day when inputting a negative value).
  Setting example: With “+1 month” expiry setting, the marking date will be as follows.

Today	Marking date	
	Today included	Today not included
January 1st	February 1st	January 31st
January 29th	February 28th*	February 28th
January 30th	February 28th*	February 28th*
January 31st	February 28th*	February 28th*
February 1st	March 1st	February 28th*
February 28th	March 28th	March 27th
March 1st	April 1st	March 31st
March 31st	April 30th	April 30th
April 1st	May 1st	April 30th
April 30th	May 30th	May 29th
May 1st	June 1st	May 31st
May 31st	June 30th	June 30th
June 1st	July 1st	June 30th
June 30th	July 30th	July 29th

Today	Marking date	
	Today included	Today not included
July 1st	August 1st	July 31st
July 31st	August 31st	August 30th
August 1st	September 1st	August 31st
August 31st	September 30th	September 30th
September 1st	October 1st	September 30th
September 30th	October 30th	October 29th
October 1st	November 1st	October 31st
October 31st	November 30th	November 30th
November 1st	December 1st	November 30th
November 30th	December 30th	December 29th
December 1st	January 1st	December 31st
December 31st	January 31st	January 30th

* In the case of leap years, the marking date is “February 29th”.

6	Delete	Deletes the expiry date/time condition.

3-14-2 Counter / Global counter

Counter is used to mark the consecutive numbers according to the setting count-up or count-down conditions.
After setting counter condition here, input the functional character of counter as the character object. Refer to “Counter” (P.86).

	Setting elements	Description
1	Add configuration	To open the counter condition input panel, click here.
2	Counter No.	Displays the counter condition No. The global counter condition No. can be used for all files. Setting range: Counter No. 0 to 15; Global counter No. 16 to 31
3	Current value	Current counter value. The current value is subsequently marked. Set the current value within the starting value and end value. Setting range: 0 to 999999999
4 5	Starting value End value	The starting value and the end value of the counter. When the counter value reaches to the end value, the marking is started from starting value again. When the starting value is smaller than the end value: Counting up When the starting value is larger than the end value: Counting down Setting range: 0 to 999999999
6	Step value	Sets the value to be changed per count. Setting range: 0 to 999999999

	Setting elements	Description
7	Count timing	Select the updating timing of the counter value.

Trigger signal	Counts up or counts down by trigger input. When on-the-fly marking at regular intervals is set, the counter value is updated at each marking. When you use the counter in Step & repeat function and activate “Count individually”, the counter value is updated at each marking in Step & repeat.
Counter 0 to 15	Counts up or counts down when the selected counter value reaches at end value.
Counter (Global) 16 to 31	

Reference

- If you want to mark the same counter value in two or more marking cycles, specify the another counter No. to “count timing”.

Example:

Marking cycle	Marking counter value
1	000
2	000
3	001
4	001
5	002
6	002
⋮	⋮

In this case, set two counter conditions as follows;

- Counter No. 0 (used in character object): Initial=0, End=999, Step=1, Count Timing=Counter 1
- Counter No. 1 (not used in character object): Initial=1, End=2, Step=1, Count Timing=Trigger

8	Reset at date change	When enabling this function, the counter value is reset at the system clock becomes “0:00”.

Reference

- When the date changes while the Time Hold function (“TIME HOLD IN” on I/O connector no. 22) is effective, the counter value is reset at the timing of releasing Time Hold (the time hold input is OFF).
- The counter reset at date change cannot be used with on-the-fly marking at regular intervals or on-the-fly marking with multiple triggers.
- If the counter is reset at date change during on-the-fly marking operation (single trigger mode), the marking trigger ready status turns off momentary and there is a case that the next marking could not be executed due to Warning E751.

9	Delete	Deletes the counter condition.

Notice

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

Reference

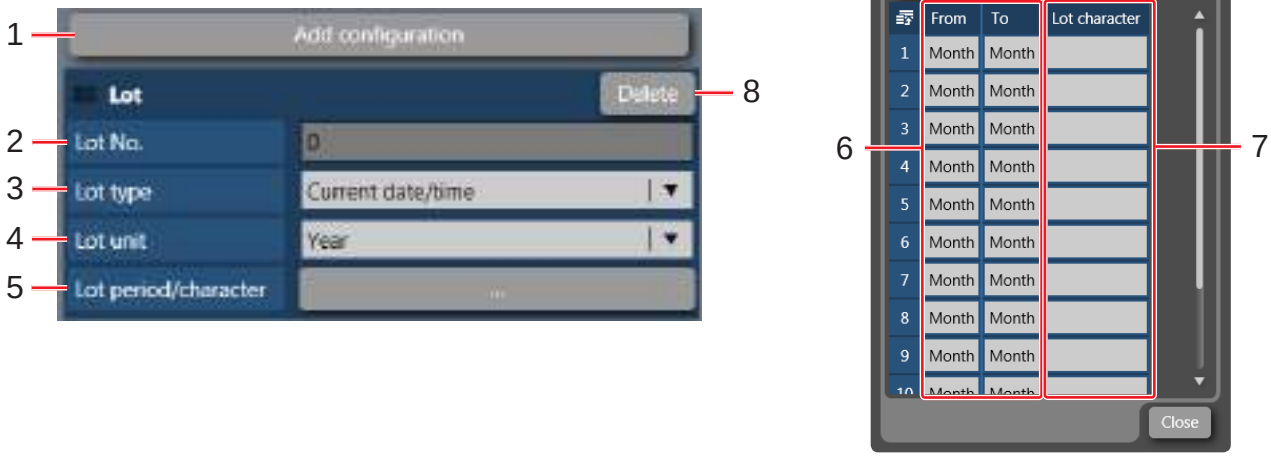
- The counter value is not updated under the test marking.
- Unless the functional character for counter is input as a character object, the counter is not marked.
- If the counter value is updated under the remote mode or run mode, the current value of the counter is saved without overwriting the file.

3-14-3 Lot / Global lot

To use lot function, the marking characters is replaced to previously set characters depending on the date/time or counter values. After setting of lot details here, input the functional character of lot as the character object. Refer to “3-7-4 Set functional characters” (P.83).

Notice

- The functional characters such as data/time and lot are marked based on the system clock of the laser marker. The system 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 system clock before the operation.



	Setting elements	Description
1	Add configuration	To open the lot details input panel, click here.
2	Lot No.	Displays the lot setting No. The global lot setting No. can be used for all files. Setting range: Lot No. 0 to 15; Global lot No. 16 to 31
3	Lot type	Select the referring period of the lot. Setting range: Current date/time; Expiry date/time 1 to 32; Counter 0 to 31
4	Lot unit	Select the unit for the lot period.

Lot unit	Max. period number
Year, Year (Week-based)	60
Month	12
Date	31
Year/month	60
Month/day	60
Day of week	7
Hour	24
Minute	60
Hour/minute	60
Week	54

Reference

- When the lot type is counter, max. 60 types of lot characters can be set.
- When week or year (week-based) is used for the lot unit, set the update day and first week of the year in system settings screen beforehand. Refer to “8-1-1 Calender and clock setting” (P.229)

	Setting elements	Description
5	Lot period / character	Input panel for lot period and character will appear clicking [...] button.
6	Period	Sets the start and end of the period.

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 diving into two, 22 to 23 o'clock and 0 to 3 o'clock.
- 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 "Functional characters" 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).

7	Lot character	Set the characters for the lot in each period.

Setting range	Up to 9 characters of alphanumeric, symbols, user defined characters, and Japanese or Simplified Chinese

Reference

- You cannot use the functional characters such as date/time, counter and etc. in the lot character strings.
- To use Japanese or Simplified Chinese characters, set "East Asian characters" in file settings. Refer to "3-13-1 Offset and character settings" (P.156).

8	Delete	Deletes the lot settings.

■ 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

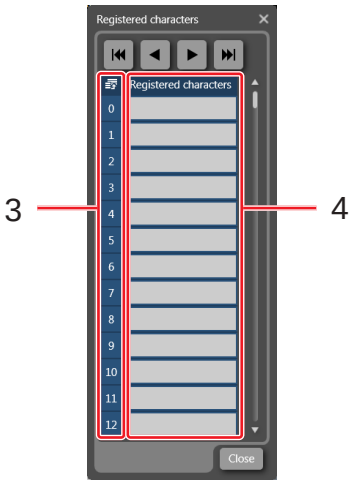
Set "Current date/time" to lot type.
Set "Month" to lot unit.
Input the period and lot characters as shown to the left.

3-14-4 Registered characters (via I/O)

The Registered characters (via I/O) are the function that switches marking characters using the input terminal D0 to D15. The character patterns are configured to the data number corresponding to D0 to D15 in advance and the marking character is selected with I/O from D0 to D15. Refer to “Setup / Maintenance Guide” for control method with I/O.

Reference

- Registered characters via I/O cannot be set together with the following functions in one file.
  - Characters specified by SIN command
  - External offset function with “Using SEO command”
  - On-the-fly marking at regular intervals
  - On-the-fly marking with multiple triggers



	Setting elements	Description
1	I/O Input format	Specifies the assignation method of the data number for I/O terminal (D0 to D15).

I/O input format	
8-bit x 2	Creates 2 tables for the registered characters list. 16bit from D0 to D15 are divided in two groups, D0 to D7 and D8 to D15. Each group can contain max. 256 pattern of the registered characters in data no. 0 to 255.
4-bit x 4	Creates 4 tables for the registered characters list. 16bit from D0 to D15 are divided in four groups, D0 to D3, D4 to D7, D8 to D11 and D12 to D15. Each group can contain max. 16 pattern of the registered characters in data no. 0 to 15.

2	Registered characters	Input panel for registered characters will appear clicking ... button. Input registered characters corresponding to the I/O data No.

When I/O input format is 8-bit x 2

Registered character table No.	Corresponding I/O No.
0	Lower 8 bit (D0 to D7)
1	Higher 8 bit (D8 to D15)

When I/O input format is 4-bit x 4

Registered character table No.	Corresponding I/O No.
0	4 bit (D0 to D3)
1	4 bit (D4 to D7)
2	4 bit (D8 to D11)
3	4 bit (D12 to D15)

3	Data number	Data No. corresponds to I/O data No. To switch the registered characters input this data No. by I/O control.

	Setting elements	Description
4	Registered characters	Set the characters in each registration field. Setting range: Up to 9 characters of alphanumeric, symbols, user defined characters, and Japanese or Simplified Chinese

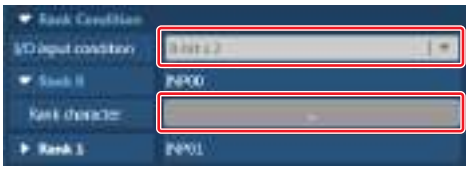
Reference

- You cannot use the functional characters such as date/time, counter and etc. in the registered character strings.
- To use Japanese or Simplified Chinese characters, set “East Asian characters” in file settings. Refer to “3-13-1 Offset and character settings” (P.156).

■ Setting procedures

1. Select the I/O input format.

- 8-bit x 2
- 4-bit x 4

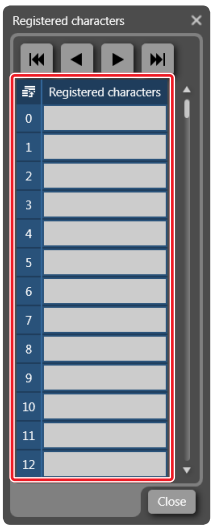


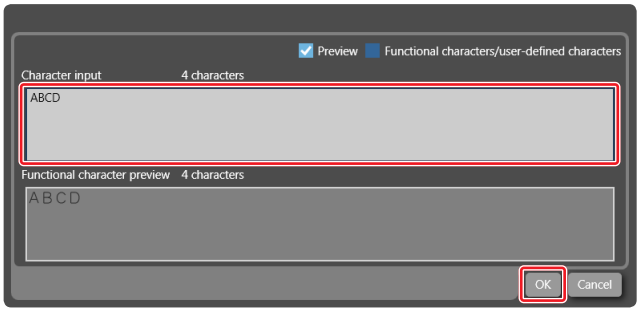
2. Select registered character table No. and click [...] button to open the registered characters input window.

3. Click the text input field corresponding to the I/O data No. The character input panel will appear.
Input characters and click “OK”.

Available I/O data No. is as follows:

- When I/O input format is 8-bit x 2: 0 to 255
- When I/O input format is 4-bit x 4: 0 to 15



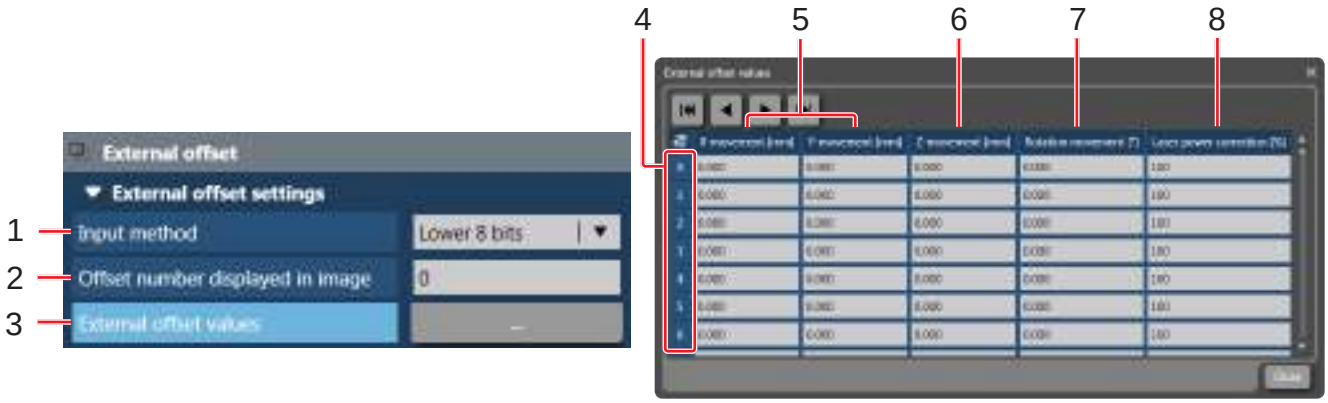


3-14-5 External offset

The external offset function is a function that switches the marking position using the input terminal D0 to D15 or communication command “SEO”.
To use I/O, configure the coordinate patterns to the data number corresponding to D0 to D15 in advance. Specify which pattern you will mark from D0 to D15. For details of the I/O control, refer to “Setup / Maintenance Guide”.

Reference

- Registered characters via I/O and “Using SEO command” setting in external offset function cannot be set together in one file.
- Characters specified by SIN command and external offset function with I/O cannot be set together in one file.
- External offset function cannot be used with on-the-fly marking at regular intervals or on-the-fly marking with multiple triggers.



	Setting elements	Description
1	Input method	Specifies which interface is used for the offset.

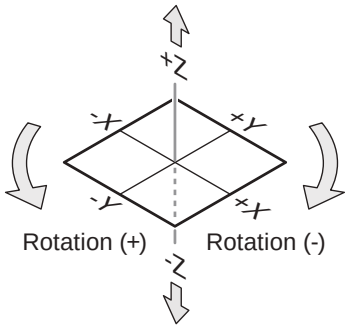
Setting	Description
OFF	Disables external offset function.
Low 10 bits	Enables to set data for 1024 offset values from 0 to 1023 with the low 10 bits (D0 to D9) as the one marking coordinate table.
Low 8 bits	Enables to set data for 256 offset values from 0 to 255 with the low 8 bits (D0 to D7) as the one marking coordinate table.
Low 4 bits	Enables to set data for 16 offset values from 0 to 15 with the low 8 bit (D0 to D7) as the one marking coordinate table.
Using SEO command	Specifies the offset value by using communication command “SEO”. Refer to “Serial Communication Command Guide”. Send SEO command per each marking.

2	Offset number displayed in image	In the image display panel, the marking object is placed at the coordinate set in this number of the offset list.

Setting range	When offset method is Low 10 bits: 0 to 1023
	When offset method is Low 8 bits: 0 to 255
	When offset method is Low 4 bits: 0 to 15

3	External offset values	Opens the input panel of external offset list by clicking [...] button. Input the external offset value of X-/Y-/Z-movement, rotation movement, and laser power correction to each data number.
4	Data number	This data number is corresponding to the input number of the I/O connector.

	Setting elements	Description
5	X-/Y-movement [mm]	Moves all marking objects in a file to the X/Y direction. Setting range: -999.999 to +999.999 mm
6	Z-movement [mm] *1	Moves all marking objects in a file to Z direction. Setting range: -3.000 to +3.000 mm (LP-GS051) -1.500 to +1.500 mm (LP-GS052)
7	Rotation movement [°]	Displacement angle of the all marking objects in a file. The rotation center is in the center of the marking field. Setting range: -180.000 to +180.000 °
8	Laser power correction [%]	Corrects the laser power of all marking object in a file. The correction ratio is calculated using the value set at the laser settings as 100%. Setting range: 0 to 999 %

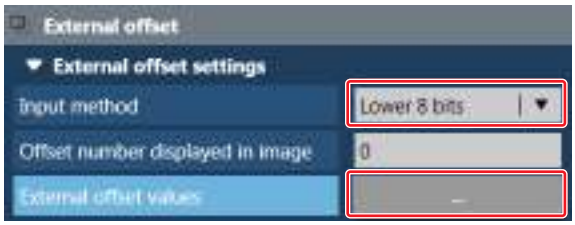


*1 : Available with LP-GS series (except LP-GS051-L).

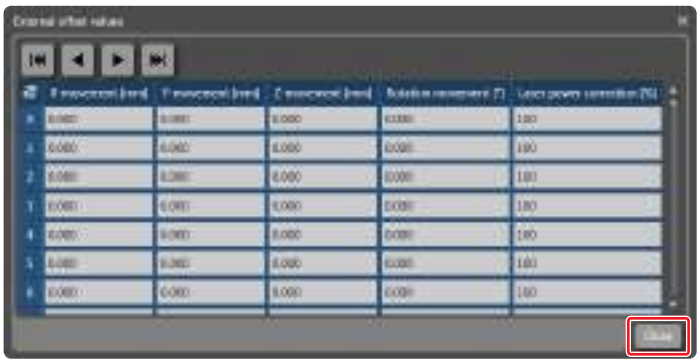
■ Setting procedures

1. Select the input method.

2. When I/O (low 10 bits, low 8 bits or low 4 bits) is used for the offset method, open the external offset input panel clicking on [...] button.



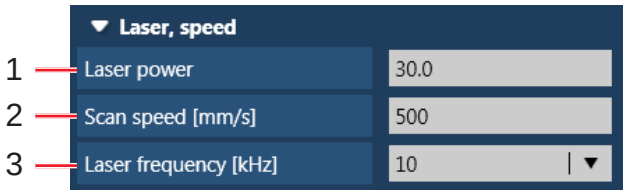
3. Input the offset value of each field and click “Close”.



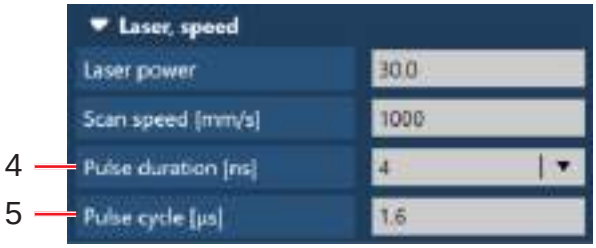
3-15 Laser Settings

In laser settings panel, set the laser power, scanning speed and other parameters related to the marking quality.
The laser settings set here affects all objects in the file.

3-15-1 Laser and speed setting



LP-GS series / LP-RC series



LP-RF / LP-RV series

	Setting elements	Description
1	Laser power	Sets the output level of laser power. Setting range: 0.1 to 100.0 (LP-GS series / LP-RC series); 12.0 to 100.0 (LP-RF series / LP-RV series)

Reference

- The laser power gradually decreases due to the degradation of laser source. For the future adjustment, it is recommended not to use it with the initial value of 100.

2	Scan speed [mm/s]	Specifies the scanning speed of laser on the marking object's surface. Setting range: 1 to 3000 mm/s (LP-GS051 / LP-GS052); 1 to 2000 mm/s (LP-GS051-L); 1 to 12000mm/s (LP-RC350S / LP-RF200P / LP-RV200P)

⚠ CAUTION

- If too high laser power is set or too low 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 frequency [kHz] *1	Adjusts the laser output frequency. Note that when setting smaller value, the line tends to be marked in dot line under the high speed scanning. Setting range: 5, 10, 20 kHz (LP-GS series); 40kHz (LP-RC series)

	Setting elements	Description
4	Pulse duration [ns] *2	Select the laser pulse duration. (7-step switching) If you set the shorter value to the pulse duration, the heat influence to the marking workpiece tends to decrease. Adjust the pulse duration according to your desired marking quality and the material of the workpiece. The reference settings of the pulse duration are as follows. Plastics: 4ns or 8ns Metals: 16ns or 30ns Shallow marking on metals: 120ns or 200ns Setting range: 1ns, 4ns, 8ns, 16ns, 30ns, 120ns, 200ns (LP-RV series)

Reference

- The pulse duration is a common setting to the all marking objects in the selected file.
- The setting range of the pulse cycle varies depending on the setting of the pulse duration. If you change the pulse duration, re-adjust the pulse cycle according to your desired marking quality.

5 Pulse cycle [µs] *3

Adjusts the interval of pulse cycle.

- For LP-RF series
  If you set the longer value to the pulse cycle, the interval to the next laser pulse becomes longer and the pulse energy becomes larger.
  If you set the shorter value to the pulse cycle, the interval to the next laser pulse becomes shorter and the pulse energy becomes lower.

Setting range	5.0 to 50.0 µs (LP-RF series)

- For LP-RV series
  For LP-RV series, the setting range and optimal value of the pulse cycle varies depending on the setting of the pulse duration as follows. The optimal value of the pulse cycle refers to the setting with that you have the largest average output power and the largest pulse energy at the selected pulse duration.
  If you set the longer value to the pulse cycle than the optimal value, the interval to the next laser pulse becomes longer and the average output power becomes lower.
  If you set the shorter value to the pulse cycle than the optimal value, the interval to the next laser pulse becomes shorter and the pulse energy becomes lower.

Pulse duration	Pulse cycle (LP-RV series)	
	Setting range	Optimal value
1ns	0.5 to 5.0 µs	0.5 µs
4ns	0.5 to 16.6 µs	1.6 µs
8ns	0.5 to 33.3 µs	3.3 µs
16ns	0.7 to 62.5 µs	6.2 µs
30ns	1.2 to 111.1 µs	11.3 µs
120ns	3.0 to 333.3 µs	29.4 µs
200ns	5.0 to 500.0 µs	50 µs

Reference

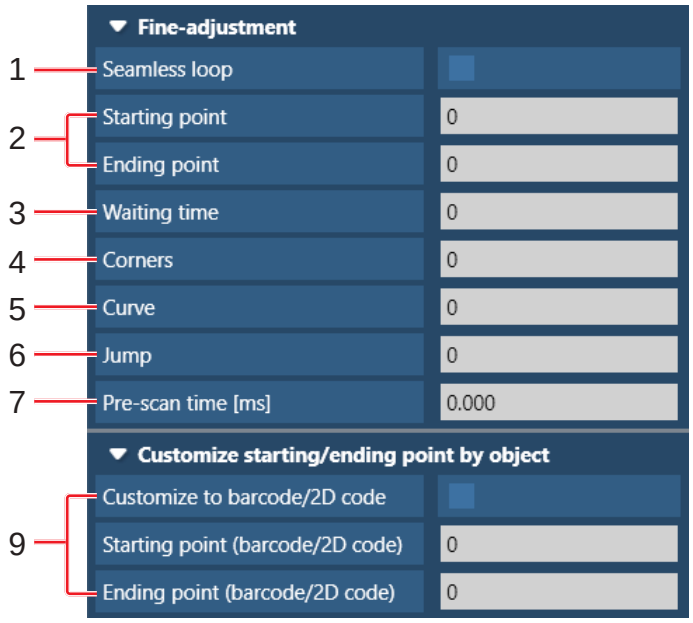
- When you set a larger value for the pulse cycle, the line tends to be marked in dot line after scanning with high speed.
- When you change the pulse duration of LP-RV series with Laser Marker NAVI smart, the setting value of the pulse cycle is automatically changed to the optimal value. The optimal value of the pulse cycle refers to the setting with that you have the largest average output power and the largest pulse energy at the selected pulse duration.

*1 : Available with LP-GS series and LP-RC series.
*2 : Available with LP-RV series.
*3 : Available with LP-RF series and LP-RV series.

Reference

- When the setting value of the laser power, the scan speed, the pulse cycle or the pulse duration is changed in the laser settings window, these settings in the test marking window change together. Refer to “3-4 Test Marking / Guide Laser” (P.66).

3-15-2 Fine-adjustment



For the fine tuning of the marking quality, adjust the following parameters.

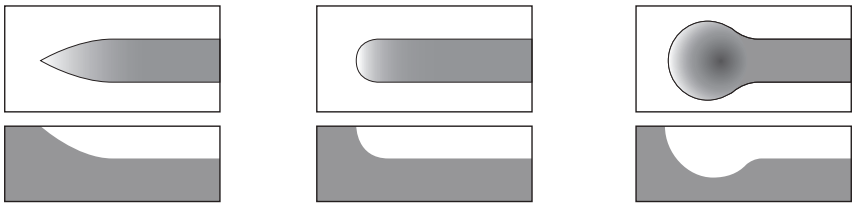
	Setting elements	Description
1	Seamless loop	This setting appears when the trigger mode is set to “continuous trigger” in the file settings. To improve the marking quality at the intersection point of the starting and ending points, activate this function. It allows to radiate laser continuously without any break by joining start and end points of an enclosed figure. The seamless loop function is available for one object setting with the closed line by setting the start and end points in the same position.

Reference

- When the seamless loop is activated, the settings of starting and ending points and the pre-scan time in the laser settings are not used.
- The following settings cannot be used with the seamless loop.
  - Multiple objects
  - Object consisting of unclosed line(s)
  - Point radiation
  - Object group settings - Step and repeat
  - File settings - Trigger settings - Scanning interval
  - Functional character settings - External offset - Z-movement (Only with LP-GS series, except LP-GS051-L)

	Setting elements	Description
2	Starting point Ending point	The timing for turning on the laser at the starting or ending point is adjusted. The larger 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.

Reference

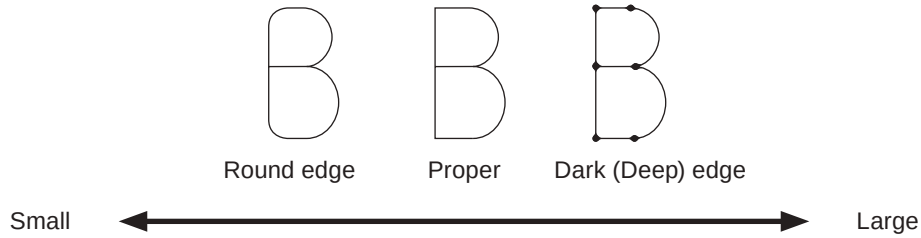
- These settings are applied to the all objects in the marking file. If you will change the starting and ending points of the barcode/2D code objects only, use “Customize staring/ending point by object”.

3	Waiting time	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 quality of marking (Improves the marking disorder). Too large value, however, makes the marking time longer.

Setting range	0 to 100
Initial value	0

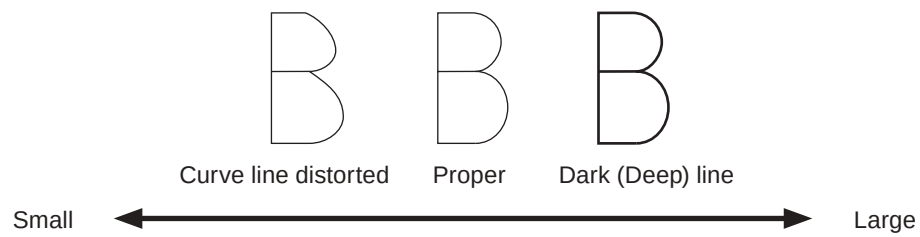
4	Corners	Adjust the edge of line in the character to be marked. Though setting a small value here can shorten the marking time, the line edge becomes dull. Setting larger value makes the edge thicker.

Setting range	0 to 100
Initial value	0

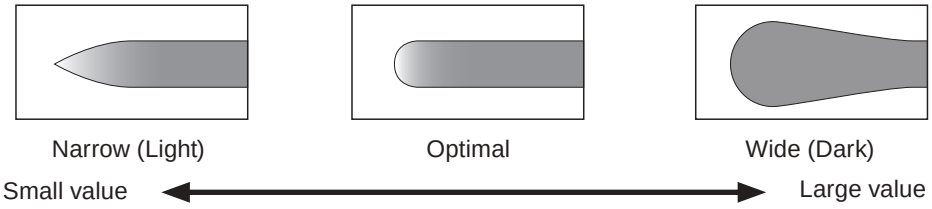


5	Curve	The shape of curve line in the character to be marked is adjusted. Though setting a small value here can shorten the marking time, the curve line is distorted. Setting larger value makes the line darker.

Setting range	0 to 100
Initial value	0



	Setting elements	Description
6	Jump	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 quality of marking (Improves the marking disorder). Too large value, however, makes the marking time longer. Setting range: 0 to 100 Initial value: 0
7	Pre-scan time [ms]	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. Too large value, however, makes the marking time longer. Setting range: 0.000 to 10.000 ms Initial value: 0.000 ms
8	First shot tuning *1	Adjusts the laser power at the starting point. The larger value makes the marking line at the start point wider or darker. Setting range: -100 to +100 Initial value: 0



Notice

- Too small value for the first shot tuning may be the cause of chipped character at short lines.

9	Customize to barcode/2D code	Adjusts the starting and ending points of the barcode/2D code objects only. Enable this setting when you want to use the different settings of the starting/ending points to the code symbols and characters.
	Starting point (barcode/2D code) Ending point (barcode/2D code)	The timing for turning on the laser at the starting or ending point is adjusted. The smaller the value is, the darker (deeper) the marking at the starting or ending point is. Setting range: -100 to +100 Initial value: 0

Reference

- This setting is applied only to the code symbol, but not applied to the human readable text.

*1 : Available with LP-RC series.

3-16 On-the-fly Marking

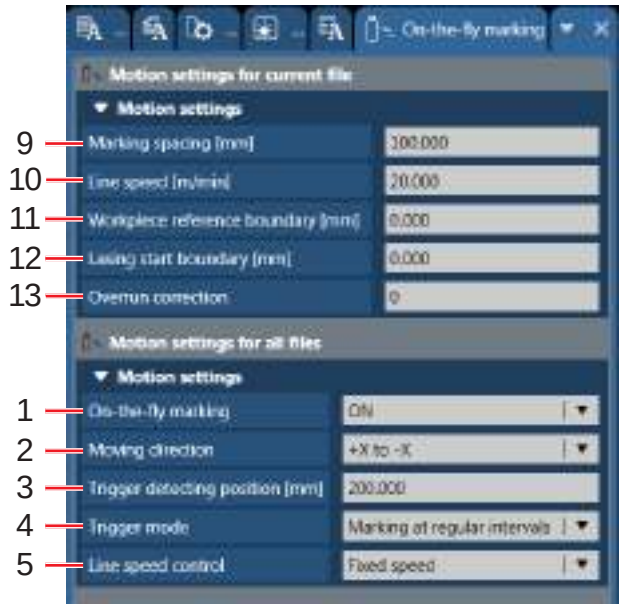
Supported model: LP-RC series / LP-RF series / LP-RV series

Settings for the marking to the moving object.

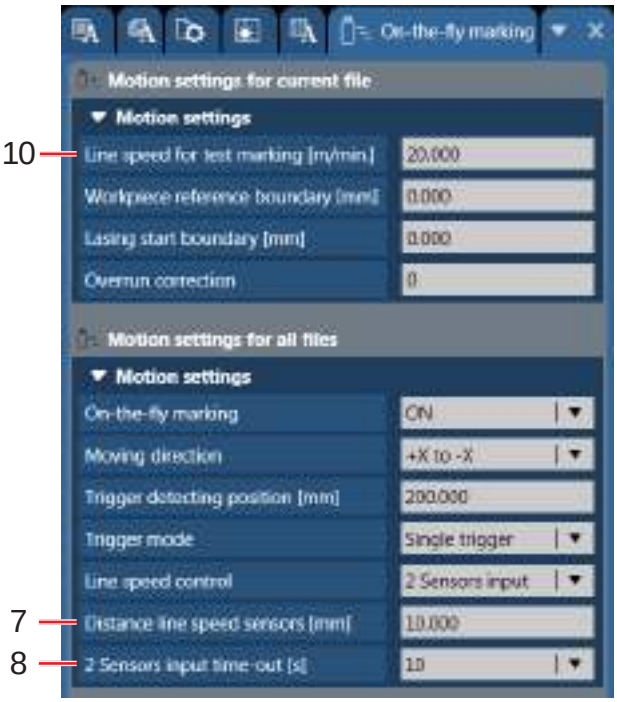
3-16-1 Motion settings

Notice

- Since the marking to the flying object is affected by vibration or line speed change easily, marking quality of 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 results of the marked code sufficiently.



Marking at regular intervals, fixed speed



Single trigger, 2 sensors input

■ Motion settings for all files

Sets the basic configuration of the on-the-fly marking, such as moving direction and etc. The settings are applied to all marking files.

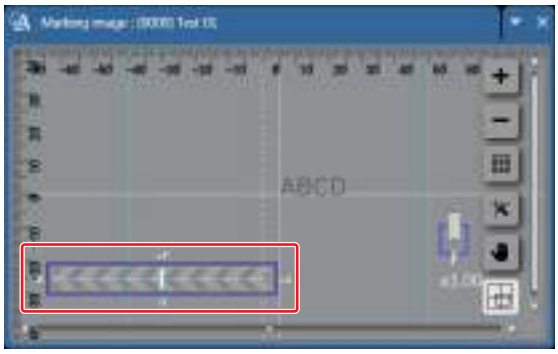
	Item	Description
1	On-the-fly marking	Set ON to enable on-the-fly marking. When this setting is OFF, the following settings are not displayed. Setting entry: ON, OFF

Reference

- Any of the following functions that are not available with on-the-fly marking are configured.
  - Link control with external image checkers
  - Overwriting interval
  - Skip marking of 2D code (module marking order)

	Item	Description
2	Moving direction	Select the moving direction of the conveyor. The directions of the X-axis and Y-axis are defined by the head direction setting. Refer to “8-2-2 Head direction setting” (P.237). Enabling the on-the-fly marking, the moving direction and position on the line are indicated in the marking image display.

Setting entry	• +X to -X • -X to +X • +Y to -Y • -Y to +Y



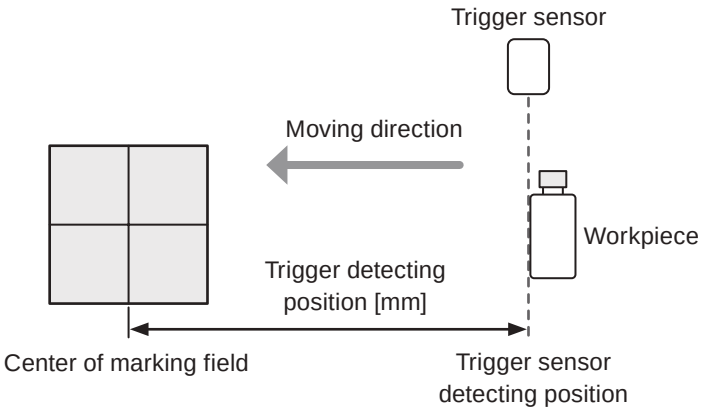
Reference

- At the on-the-fly marking, the marking order is optimized according to the moving direction.

3 Trigger detecting position [mm]

Specifies the distance from the center of the marking field to the detecting position of the trigger sensor.

Setting range	0.000 to 1000.000 mm



4 Trigger mode

Select the input method of the marking trigger. Refer to “Trigger mode details” (P.183) for each setting.

Setting entry	• Single trigger • Marking at regular intervals • Multiple triggers

Reference

- When the trigger mode is set to Marking at regular intervals or Multiple triggers, those functions are also not available.
  - Registered characters (via I/O)
  - External Offset including SEO command
  - Characters specified by SIN command
  - Counter reset at date change

	Item	Description
5	Line speed control	Select the input method of the line speed. When the line speed is fluctuant, select Encoder input or 2 sensors input and detect the speed by using the external encoder or sensors. Setting entry: • Fixed speed • Encoder input • 2 sensors input

Reference

- When Line speed control is set to encoder or 2 sensors input, connect the encoder or sensors to ENCODER A IN and ENCODER B IN of I/O terminal. For the details, refer to Setup/Maintenance Guide.
- For the 2 sensors input, refer to “2 sensors input details” (P.184).

6	Encoder resolution *1	Specifies the encoder resolution when line speed control is set to “encoder input”. • When using A and B phases: Encoder resolution = Number of pulses per 1mm x 4 • When using A phase only: Encoder resolution = Number of pulses per 1mm x 2 Setting range: 5.000 to 600.000 pulse/mm

Reference

- When only one phase of the encoder is used, connect the encoder signal to ENCODER A IN and connect ENCODER B IN to IN COM. 1.
- Do not exceed the input of 100kHz to ENCODER A IN and ENCODER B IN respectively.
- In some cases, it may reduce the influence of the ups and downs of the line speed to decrease the encoder resolution. However, it is recommended to set more than 25 pulses/mm to Encoder resolution.
- Adjust the setting value of Encoder resolution by checking the marking quality.
  - When the character spacing is too wide: Increase the setting.
  - When the character spacing is too narrow: Decrease the setting.

7	Distance line speed sensors *2	Specifies the distance between the sensors which detect the line speed. Refer to “2 sensors input details” (P.184). Setting range: 1.000 to 999.999 mm

Reference

- Set the distance line speed sensors so that the downward sensor (ENCODER B IN) turns on within 10 seconds from the input of upward sensor (ENCODER A IN).

8	2 Sensors input time-out *2	It is possible to specify the time-out time from turning on the downward sensor (ENCODER B IN) to input TRIGGER IN. If TRIGGER IN does not turn on within the setting period from turning on the downward sensor (ENCODER B IN), the warning E607 occurs. If you select “None”, the warning E607 is not detected. Setting range: None, 1 to 10 sec.

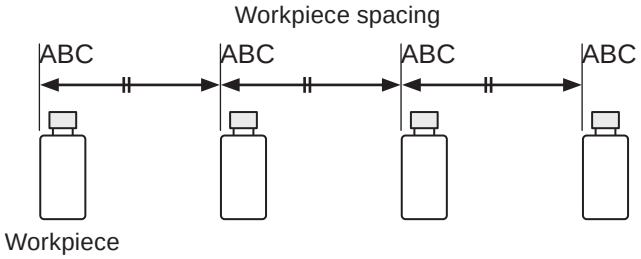
Reference

- For the the control procedures and timing chart of the 2 sensors input, refer to Setup/Maintenance Guide.

*1 : Available when line speed control is set to “encoder input”.
*2 : Available when line speed control is set to “2 sensors input”.

■ Motion settings for current file

Sets the detailed parameters of on-the-fly marking for the selected marking file, such as the line speed, lasing start boundary and etc.

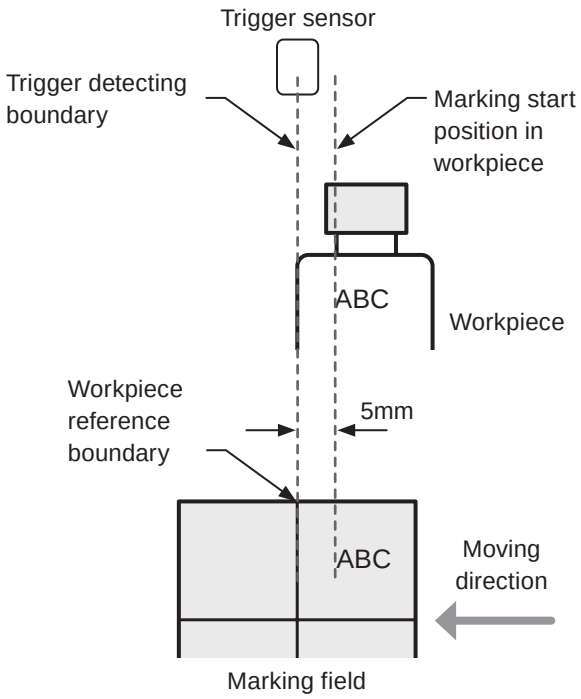
	Item	Description
9	Workpiece spacing [mm] *1	Specifies the distance to the next marking data (next workpiece) for the marking at regular intervals. Setting range: 0.000 to 4000.000 mm 
10	Line speed [m/min] *2 Line speed for test marking [m/min] *3	When the line speed control is set to “fixed speed”, specify the moving speed of the line. When the line speed control is set to “encoder input” or “2 sensors input”, specify the reference line speed used for the test marking. Setting range: 0.060 to 240.000 m/min.

Reference

- When the line speed control is set to “encoder input” or “2 sensors input”, the current line speed calculated based on the input signals from the encoder or the sensors can be confirmed in Monitor and Operator settings screen. Refer to “4-2-3 Runtime data” (P.192).
- Adjust the setting value of the line speed by checking the marking quality.
  - When the character spacing is too wide: Increase the setting.
  - When the character spacing is too narrow: Decrease the setting.

11	Workpiece reference boundary [mm]	The workpiece reference boundary is used as the guide to specify the position of the marking data. The distance between the workpiece reference boundary and the marking data defines the marking position in the workpiece. Set the workpiece reference boundary as the detecting boundary of the trigger sensor and place the marking data. Setting range: -2000.000 to +2000.000 mm

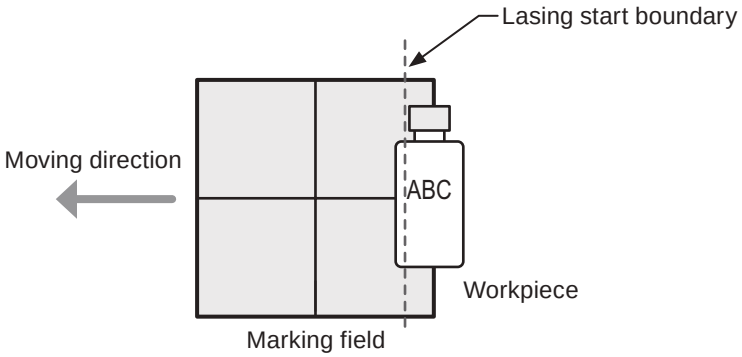
Setting example:
When the marking start position is placed 5mm behind the trigger detecting position (the edge of the workpiece).



Reference

- The workpiece reference boundary is displayed on the marking image field and it is set to the center of the marking field as default.
- The workpiece reference boundary can be set out of the marking field.
- To adjust the marking position, move the workpiece reference boundary or move the marking data.
  - To correct the marking start position backward, move the workpiece reference boundary to downward direction.
  - To correct the marking start position forward, move the workpiece reference boundary to upward direction.

	Item	Description
12	Lasing start boundary [mm]	Specifies the boundary position in the marking field. When the workpiece reaches this boundary, the lasing starts. The plus value indicates the upstream of the moving direction and the negative value indicates the downstream side. If the on-the-fly marking error occurs because of too much marking data relative to the setting moving speed, set Lasing start boundary to the upward of the moving direction. Setting range: -42.500 to +42.500 mm (LP-RC350S) -45.000 to +45.000 mm (LP-RF200P / LP-RV200P)



Reference

- It is not needed to conform the lasing start boundary to the position of the marking data in the marking field.
- It is recommended to set the lasing start boundary to the center of the marking field (default value) unless the on-the-fly marking error occurs.
- Set the lasing start boundary downstream of the moving direction from the trigger detecting position.

13	Overrun correction	If the start position of the character are distorted, set the larger value. The larger the setting value result in the longer marking time. Setting range: -100 to +100

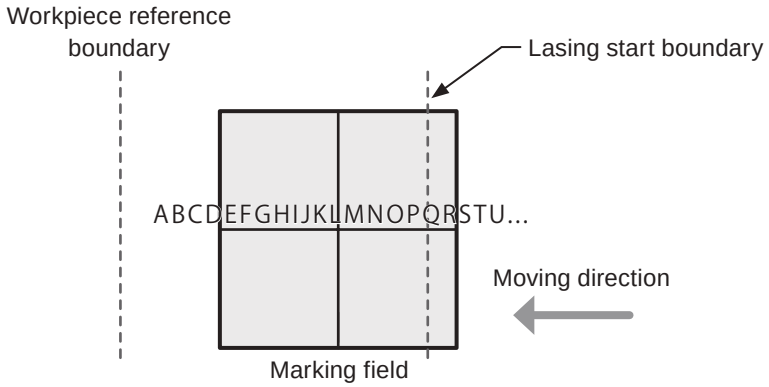
*1 : Available when trigger mode is set to “Marking at regular intervals”.

*2 : Available when line speed control is set to “fixed speed”.

*3 : Available when line speed control is set to “encoder input” or “2 sensors input”.

Reference

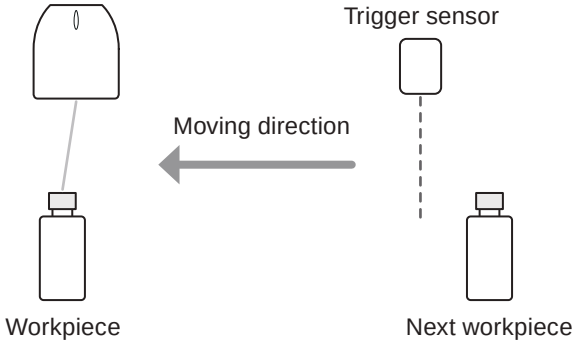
- On-the-fly marking allows to mark the data exceeding the marking field.
  Setting image



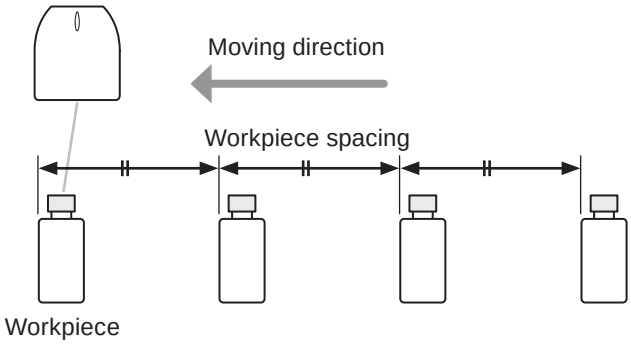
■ Trigger mode details

Select the trigger input method of the on-the-fly marking from the followings.

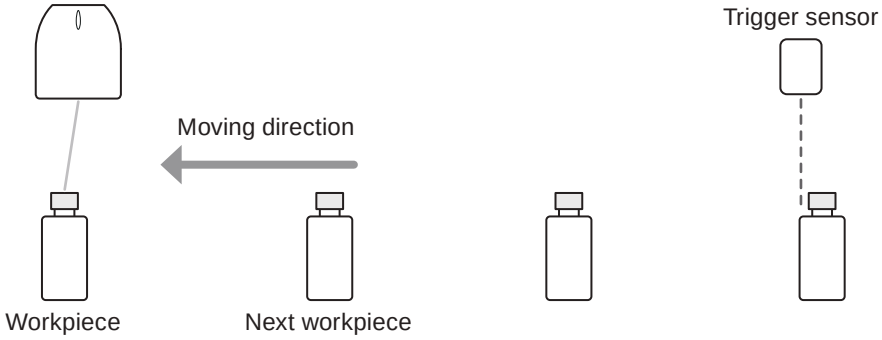
- Single trigger
  Input the marking trigger by each marking operation. The next trigger can be accepted after the current marking operation is finished.



- Marking at regular intervals
  When on-the-fly marking at regular intervals is set, marking operation is executed at regular intervals while TRIGGER IN is ON.
  This setting is used when the workpieces are arranged at equal spaces.
  For the on-the-fly marking at regular intervals, the marking trigger is the marking start signal for the first workpiece and the marking operation is repeated at regular intervals afterward.

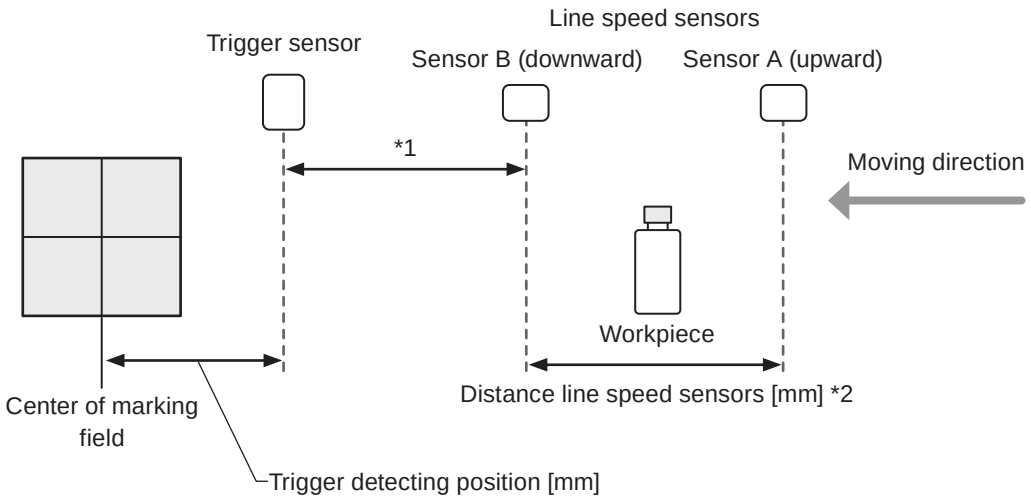


- Multiple triggers
  It allows to accept the multiple marking triggers in advance.
  When trigger mode is set to Multiple triggers at on-the-fly marking, max. 16 triggers can be accepted while PROCESSING OUT is ON.
  This setting is used when the trigger detecting position is distant from the marking position and you need to input the next marking trigger during the previous marking operation.



■ 2 sensors input details

When Line speed control is set to 2 sensors input, connect the upward sensor to ENCODER A IN, and connect the downward sensor to ENCODER B IN of I/O terminal.
The line speed is calculated based on the time difference of these inputs.



*1 : It is possible to specify the time-out time from turning on sensor B (ENCODER B IN) to input TRIGGER IN.
*2 : Set the distance line speed sensors so that the sensor B (ENCODER B IN) turns on within 10 seconds from the input of sensor A (ENCODER A IN).

3-16-2 Setting procedures of on-the-fly marking

1. Configure the marking layout.

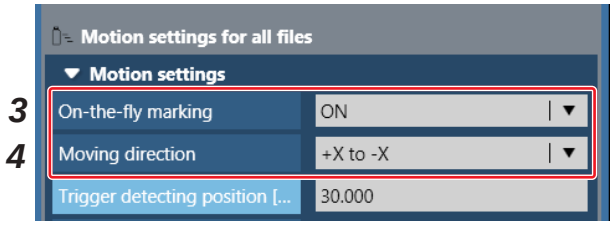
You do not need to consider the position of the marking data at this moment. It will be determined after the on-the-fly settings.

2. Specify the laser settings such as the laser power and scan speed with on-the-fly marking “OFF”.

Confirm that the marking time is short enough to perform the marking with the required cycle.

3. Set “ON” to the on-the-fly marking.

4. Select the moving direction.



Reference

- Before set the moving direction, confirm the head direction setting in System settings. Refer to “8-2-2 Head direction setting” (P.237).

Moving direction Head direction setting

5. Select the trigger mode.

Refer to “Trigger mode details” (P.183).

6. Select the line speed control (input method of the line speed).

- When the line speed is fixed: Fixed speed
- When the line speed is fluctuant: Encoder input or 2 sensors input

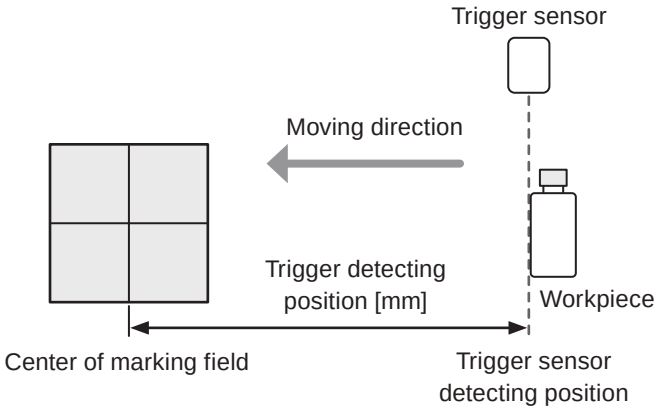
7. According to the selected line speed control mode, set the following parameters.

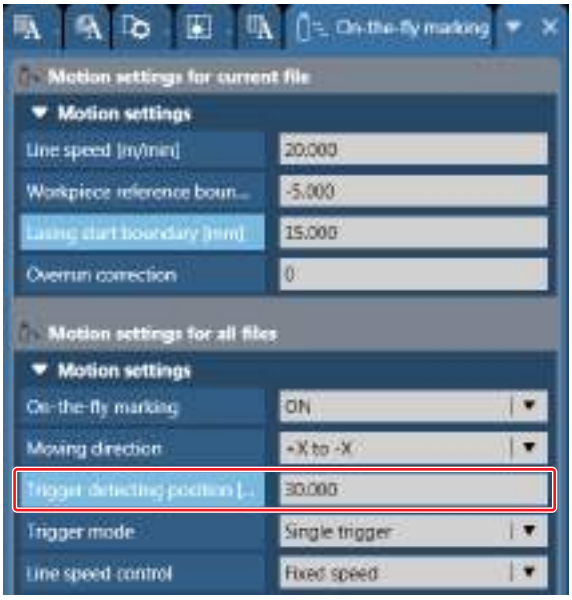
- Fixed speed: Line speed
- Encoder input: Encoder resolution
- 2 sensors input: Distance line speed sensors, 2 Sensors input time-out

Reference

- When the line speed control is set to “encoder input” or “2 sensors input”, the current line speed calculated based on the input signals from the encoder or the sensors can be confirmed in Monitor and Operator settings screen. Refer to “4-2-3 Runtime data” (P.192).

8. Measure the distance from the detecting position of the trigger sensor to the center of the marking field and input it to “trigger detecting position”.

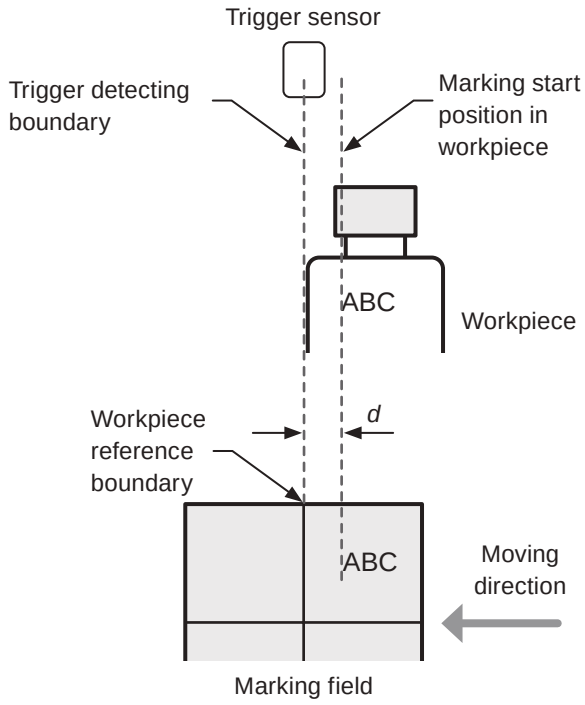




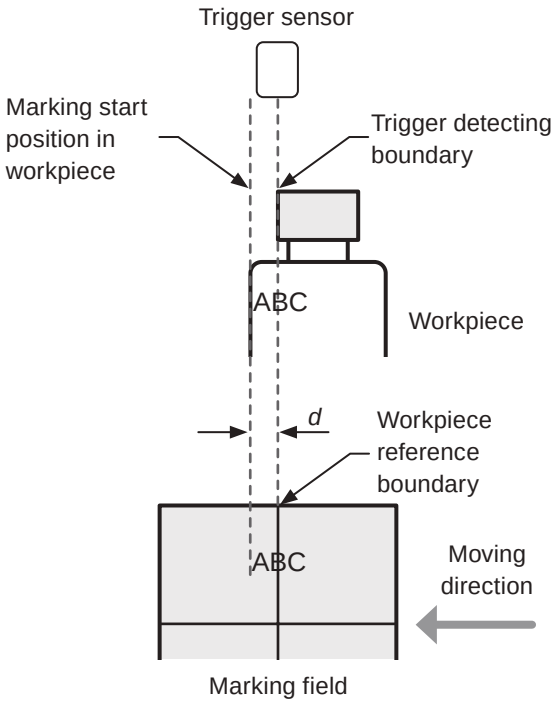
9. Measure the distance (=*d*) from the trigger detecting boundary to the start position of the marking data in the workpiece.

Adjust the position of the workpiece reference boundary or the marking data in the marking field so that the distance between them is the same as *d*.

Setting example 1:
When the trigger detecting boundary is in front of the marking start position



Setting example 2:
When the trigger detecting boundary is behind of the marking start position

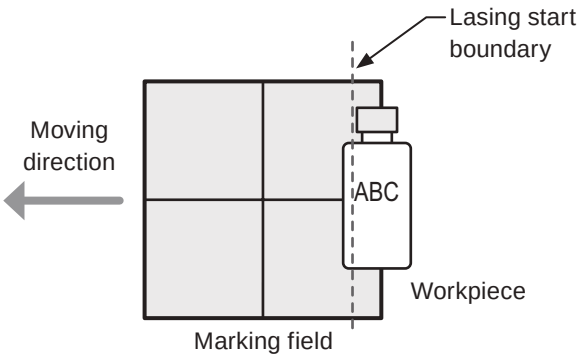


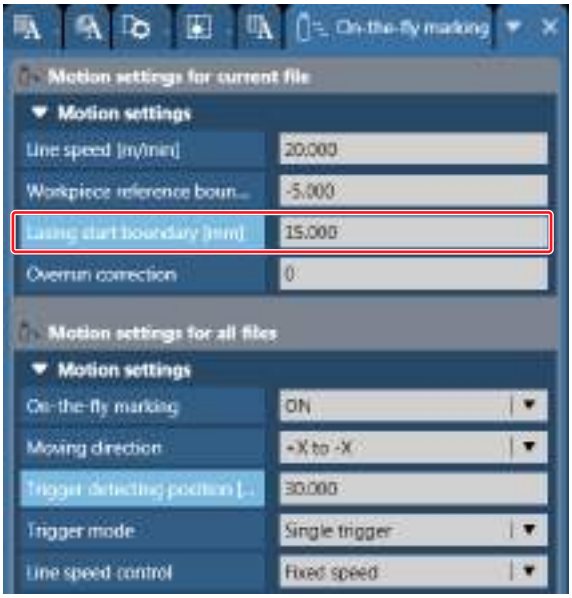
10. Measure the marking time and confirm no error of on-the-fly marking occurs.

Reference

- At on-the-fly marking, the marking time measurement result contains the time from when the marking start signal (trigger) is input until when the workpiece comes to the preset marking position in addition to the lasing time.
- When the line speed control is set to “encoder input” or “2 sensors input”, set the approximate speed to the line speed for test marking and measure the marking time.
- If the marking characters may change, confirm the marking time with the characters consist of many lines or curves such as “8”.

11. If the on-the-fly marking error occurs because of too much marking data relative to the setting moving speed, set Lasing start boundary to the upward of the moving direction.





Reference

- It is not needed to conform the lasing start boundary to the position of the marking data in the marking field.
- It is recommended to set the lasing start boundary to the center of the marking field (default value) unless the on-the-fly marking error occurs.

12. In case the on-the-fly marking error cannot be solved, adjust the line speed or the marking time with the following measures.

- Reduce the marking time. (Increase the scan speed, reduce the character size, or etc.)
- Decrease the line speed.
- Increase the spacing to the next workpiece.

13. Execute the on-the-fly marking and confirm the marking quality.

Open the Monitor screen and turn on the RUN mode.

On-the-fly marking starts with the trigger input.

14. If any problem of the marking quality is observed, correct the following settings.

When the spacing between the characters is incorrect:

- When line speed control is set to “fixed speed”, adjust the line speed.
- When line speed control is set to “encoder input”, adjust the encoder resolution.
- When line speed control is set to “2 sensors input”, adjust the distance line speed sensors.

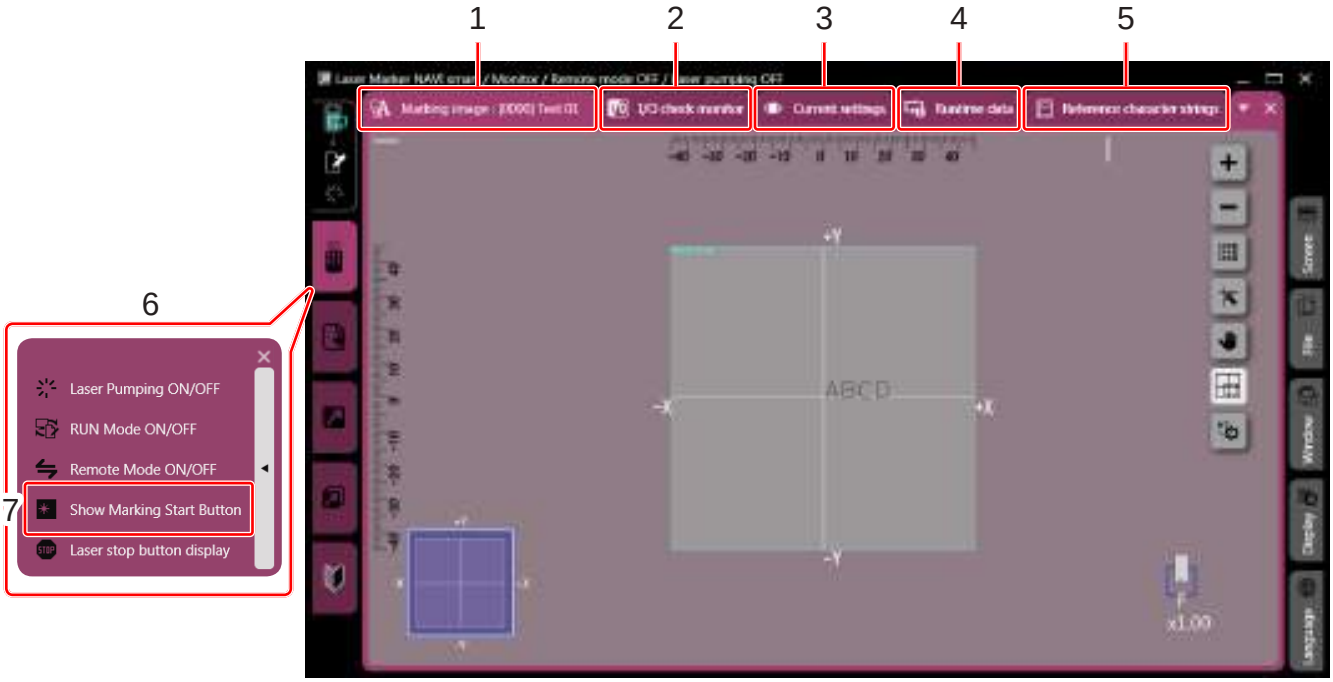
When the marking start position is deviated from the expected position:

- To correct the marking start position backward, move the workpiece reference boundary to downward direction.
- To correct the marking start position forward, move the workpiece reference boundary to upward direction.

4 Monitor Screen

4-1 Configuration of the Monitor Screen

Operation monitor view displays the laser marker operation status during the remote control mode or run mode.



	Item	Description
1	Marking image	Displays the image of the file selected by the laser marker. Functional characters such as counter, date and time are displayed with the updated marking characters. Refer to “3-2 Marking Image” (P.56) for details.
2	I/O check monitor	Displays ON/OFF status of the I/O signals in the laser marker.
3	Current settings	Displays the settings of the file in operation. It displays only an item whose check box for display permission in the system settings is checked.
4	Runtime data *1	Displays the following operating information. • ON/OFF state of on-the-fly marking • Current line speed at on-the-fly marking
5	Reference character strings	When the character object of the reference list type is set, the setting strings are displayed.
6	Laser marker operation tool	Operates the online connected laser marker. Refer to “3-3 Laser Marker Operation” (P.59).
7	Show “Start marking” button	Available while run mode is ON. The marking start button can be used as a trigger for lasing.

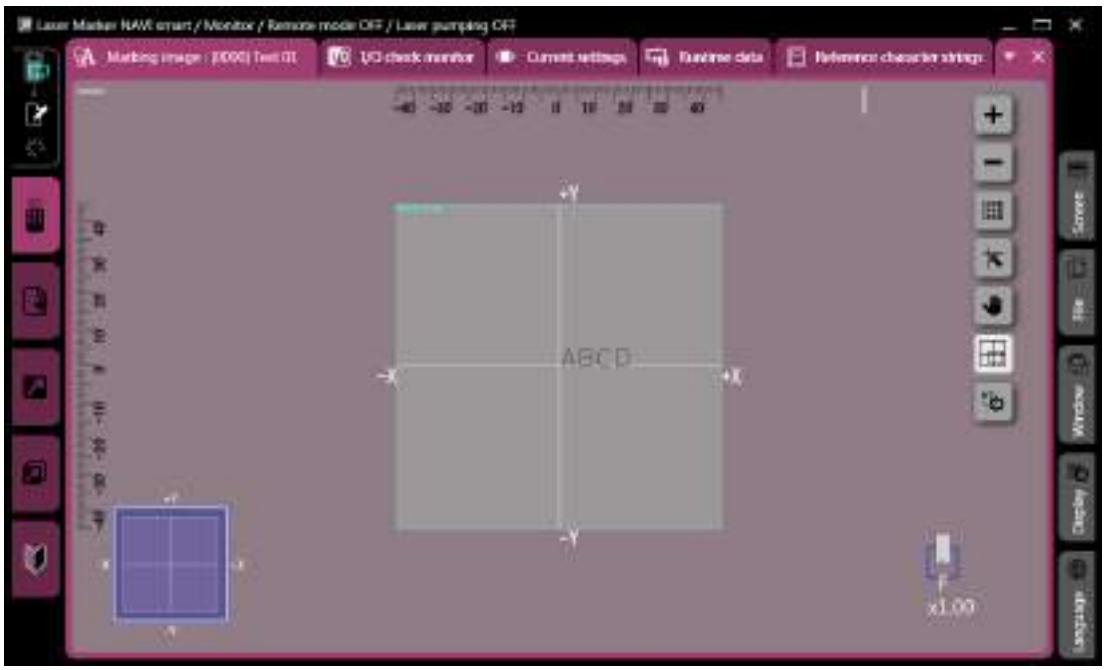
*1 : Available with LP-RC series, LP-RF series and LP-RV series.

4-2 Monitor the File Contents in Operation

Under the remote mode or run mode, the file selected in the laser marker is displayed on the Operation monitor screen.

4-2-1 Marking image display

Marking file selected on marking settings screen or operator settings screen is displayed.
When the file is switched by using I/O or communication command, the displayed file is also switched.



Reference

- If the selected file has large setting data and it takes long time to display the screen, change the refresh interval of the screen. Refer to “4-2-5 Screen refresh during the operation” (P.194).

4-2-2 Display contents

The settings of the file in operation can be displayed and checked.
For setting items to display, set them in “8-5 Settings/Display Restrictions” (P.259).

	Item	Description
1	Setting parameter list	Displays the setting item. The setting item to display needs to be set in advance in “8-5 Settings/Display Restrictions” (P.259).
2	Change display order	Open the window for the display order of the setting items.
3	Upward/downward	Changes the display order of the selected item.
4	Save	Applies the setting order and saves it to the online connected laser marker.
5	Close	Closes the window for the display order.

Reference

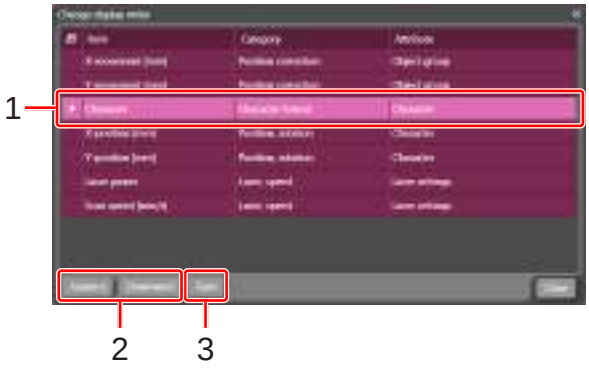
- The display order setting is saved to the online connected laser marker. If two or more laser markers are used, set the display parameters and its order for each laser marker.
- The display order setting in the operation monitor screen and the operator settings screen changes together.

■ Procedures for changing display order

1. Select the item to change the display order.

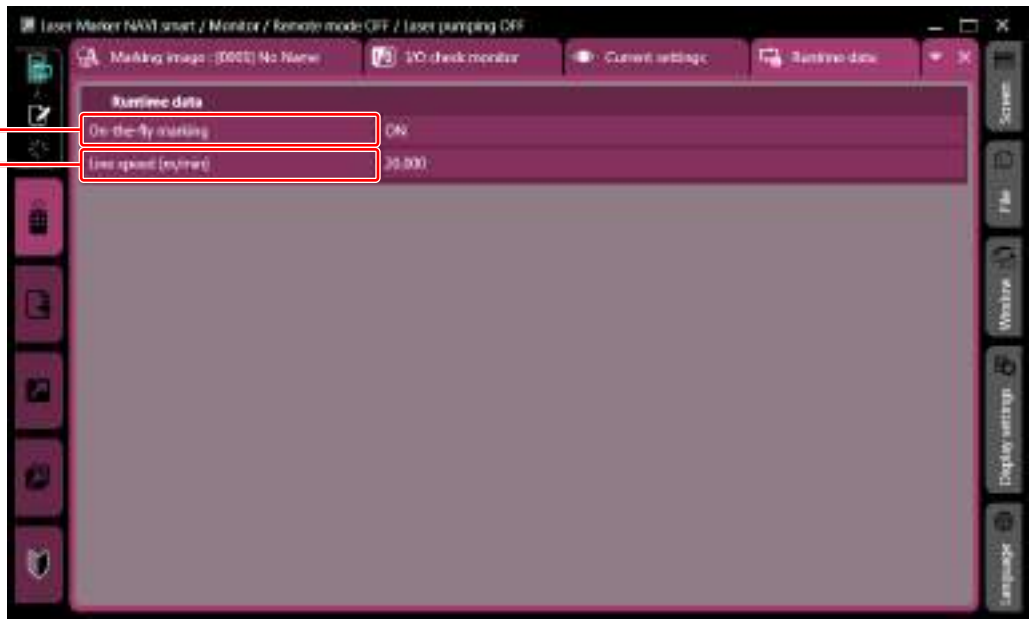
2. Click “Upward” or “Downward” and move the position.

3. Click “Save”.



4-2-3 Runtime data

Displays the operating information of on-the-fly marking.



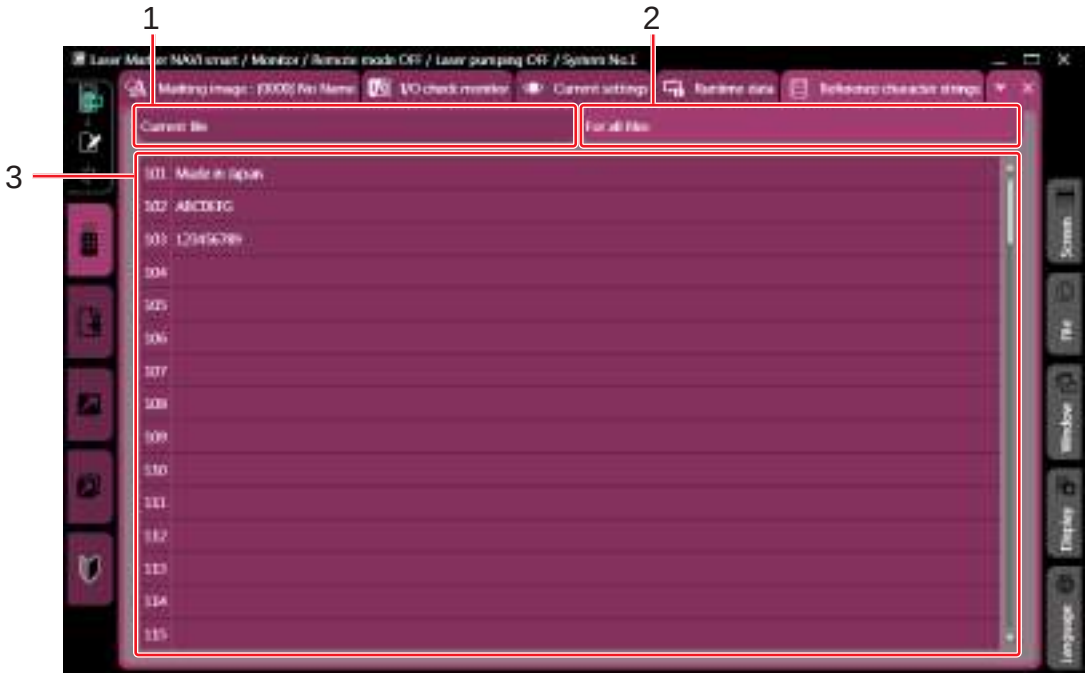
	Item	Description
1	On-the-fly marking	Displays ON/OFF state of the on-the-fly marking setting.
2	Line speed [m/min]	When on-the-fly making is set ON, the current line speed is displayed. With the line speed control “Fixed speed”, the setting value is displayed. With the line speed control “Encoder input” or “2 sensors input”, the current value calculated based on the input signals from the encoder or the sensors.

Reference

- The line speed display is updated every 500ms.
- When on-the-fly making is set OFF or the line speed cannot be detected, the line speed value is shown as “-”.

4-2-4 Reference character strings

When the character object of the reference list type is set, the setting strings are displayed.
For the settings of the reference list character object, refer to “3-7-2 Set character object (reference list)” (P.80).
This screen is available when the display permission is set to the reference character strings in system settings. Refer to “8-5-3 Display/edit permission range (reference character)” (P.262).



	Item	Description
1	Current file	The setting strings which you can use only in the selected file are displayed.
2	For all files	The setting strings which you can use in all files are displayed.
3	Reference character strings	Only the permitted setting No. of the strings at the system settings are displayed. Refer to “8-5-3 Display/edit permission range (reference character)” (P.262).

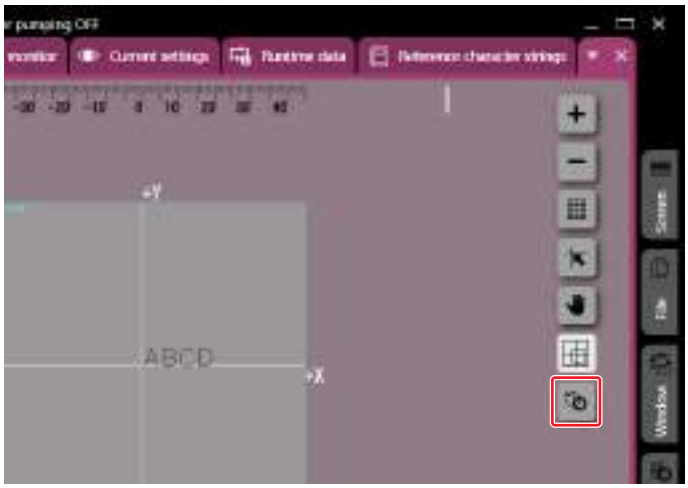
Reference

- Which strings are used in the file can be shown in the screen of the “current settings” tab.

4-2-5 Screen refresh during the operation

If the selected file has large setting data and it takes long time to display the screen, change the refresh interval of the screen by the following procedures.

1. On the operation monitor screen or operator settings screen, click “Screen refresh setting” icon next to the image display.



2. Select the method of the screen refresh.

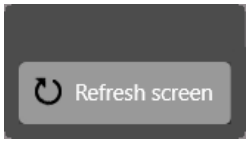
- Auto: Updates the screen automatically with your specified interval.
- Button “Refresh screen”: Updates the screen when you click “Refresh screen” button.

3. If you selected “Auto”, set the interval of the screen refresh.

Setting range	0.5 to 60.0 sec. (adjustable at 0.5 sec.)
Initial setting	0.5 sec.

4. Click “Set” and the setting window closes.

5. If you selected Button “Refresh screen”, the “Refresh screen” button appears on the screen.

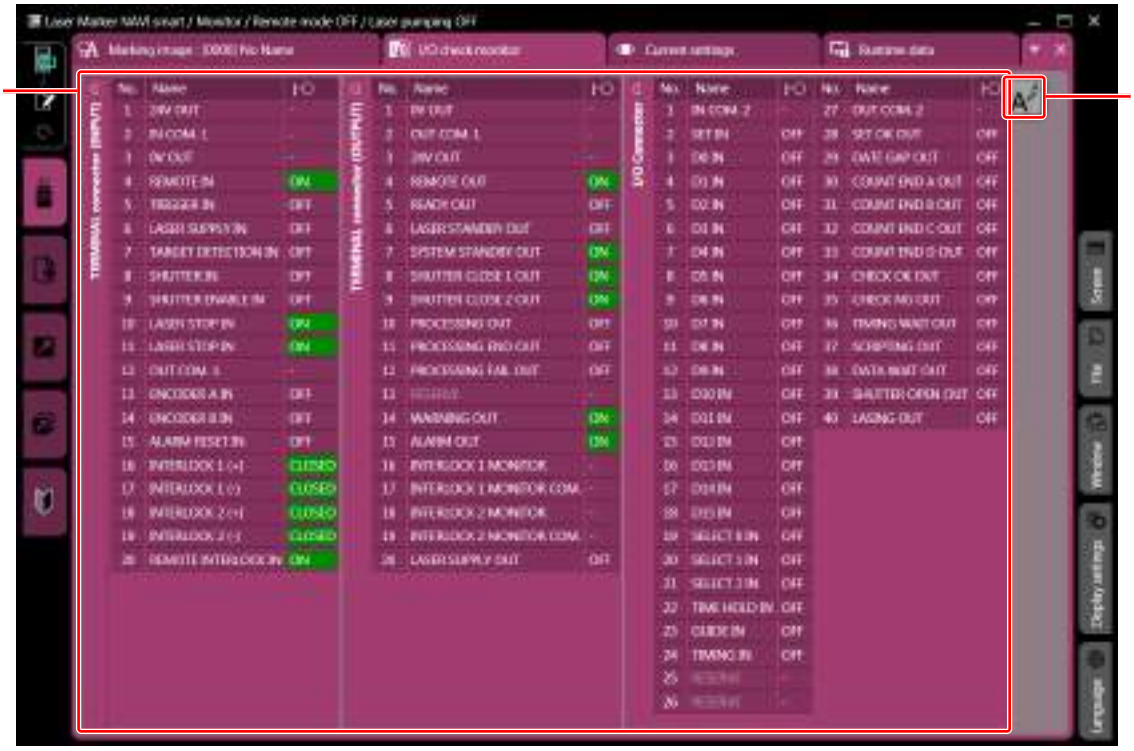


Reference

- The screen refresh setting is applied to the displays of “Marking image”, “Current settings”, and “Reference character strings”.
- The screen refresh setting is a common setting to the all files.

4-3 I/O Check Monitor

I/O check monitor indicates ON/OFF status of the I/O terminals on the laser marker.



	Item	Description
1	I/O terminal list	Displays the ON/OFF state of the I/O terminals. The terminal with the ON state is indicated in green. The terminal represented with “-” cannot be monitored on the list.
2	Text size	Switches the text size in the terminal list among the following types. • Zoom-out: small text size to show all terminals • Zoom-in: large text size

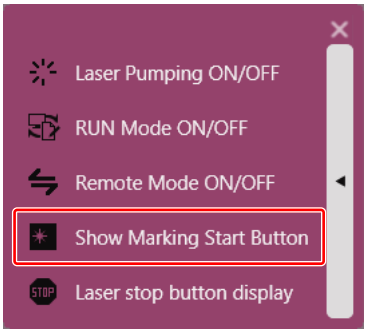
Reference

- The ON/OFF status of the I/O check monitor is updated every 500 ms.
- There is a margin of error between the actual input/output time and the ON/OFF time displayed on the screen.
- For the details of I/O terminals, refer to “Setup/Maintenance Guide”.
- In the I/O check monitor you can also confirm the I/O status controlled via optional network unit (EtherNet/IP or PROFINET).

4-4 Show start marking button

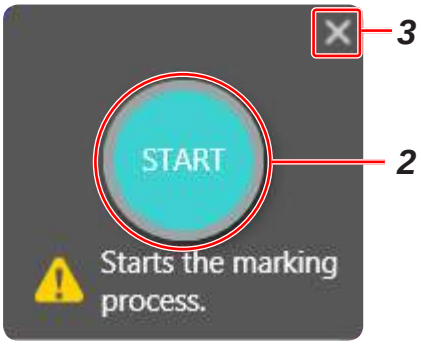
Under the RUN mode ON, the laser marker is in the marking start signal standby state.
To input the start signal by Laser Marker NAVI smart, use this button.

1. On the operation monitor screen with the RUN mode ON, click “Show “Start marking” button” of the “Laser Marker Operation” tab.



2. The marking start button will appear. Click “START” to start laser radiation (marking).

3. Click “X” located on the upper right corner of the dialog box to close the button.



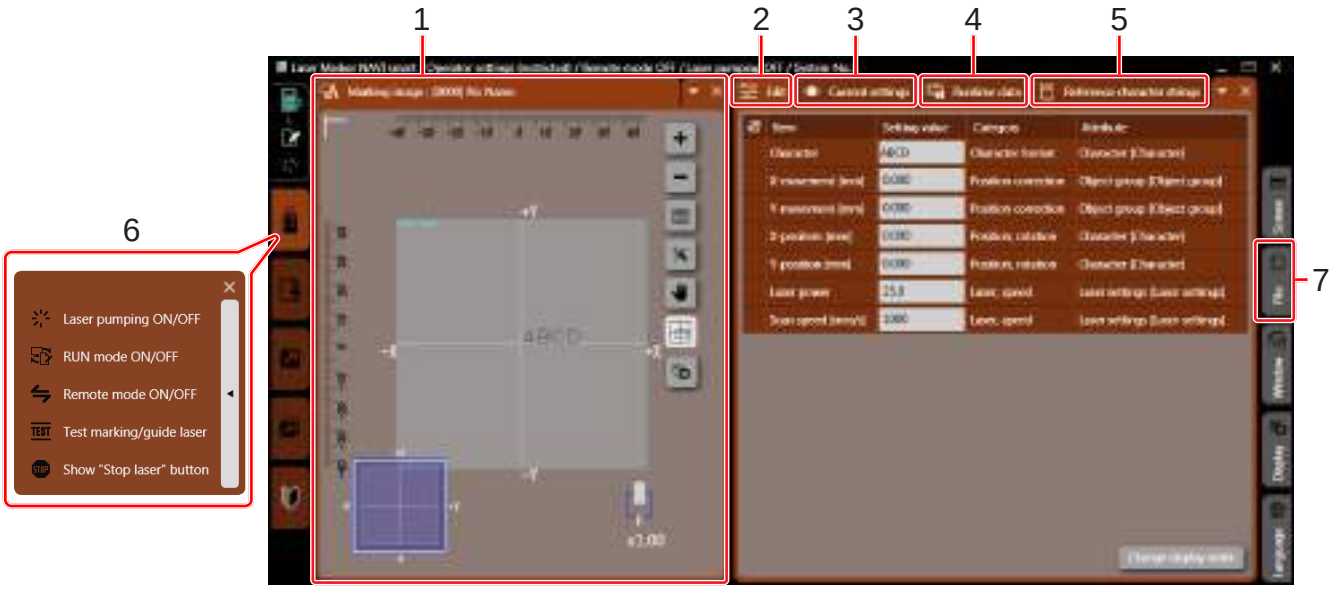
Reference

- “Start marking” button can be used when the laser pumping is ON.
- When the RUN mode is ON, the trigger input of the I/O terminal block and the marking trigger from “Start marking” button are accepted.
- The start marking button is not available when the trigger mode is set to continuous trigger.
- The start marking button is not available at on-the-fly marking.

5 Operator Settings Screen

5-1 Configuration of the Operator Settings Screen

On the operator settings screen, the permitted items can be displayed, edited and executed.
For selection of the items to display, edit and execute, set them in “8-5 Settings/Display Restrictions” (P.259).



	Item	Description
1	Marking image	Displays the image of the file selected by the laser marker. Functional characters such as counter, date, and time are displayed with the updated marking characters. Refer to “3-2 Marking Image” (P.56).
2	Edit	Displays and enables to edit the setting parameters. The items given permission in the system settings are displayed.
3	Current settings	Displays the setting parameters. The items given permission in the system settings are displayed.
4	Runtime data *1	Displays the following operating information. • ON/OFF state of on-the-fly marking • Current line speed at on-the-fly marking Refer to “4-2-3 Runtime data” (P.192).
5	Reference character strings	When the character object of the reference list type is set, the setting strings are displayed. Refer to “4-2-4 Reference character strings” (P.193).
6	Laser marker operation tool	Operates the online connected laser marker. Refer to “3-3 Laser Marker Operation” (P.59). The following operations can be executed when they are permitted in the system settings. • Test marking • Guide laser *2 • Guide pointer
7	File	Saves the file edited in the operator settings screen or changes the file to display. Refer to “2-7 File” (P.50). The following actions are possible when they are permitted in the system settings. • Overwrite file: saves the file to the laser marker edited in the operator settings screen. • Switch file: changes the file to mark and display on the operator settings screen.

*1 : Available with LP-RC series, LP-RF series and LP-RV series.
*2 : Available with LP-GS051(-L) type, LP-RC350S, LP-RF series and LP-RV series.

5-2 Check and Edit the File Contents

Contents of the file can be checked and edited.
The display and editing items are selected in “8-5 Settings/Display Restrictions” (P.259).

List for editable items | List for items to display | Reference character strings

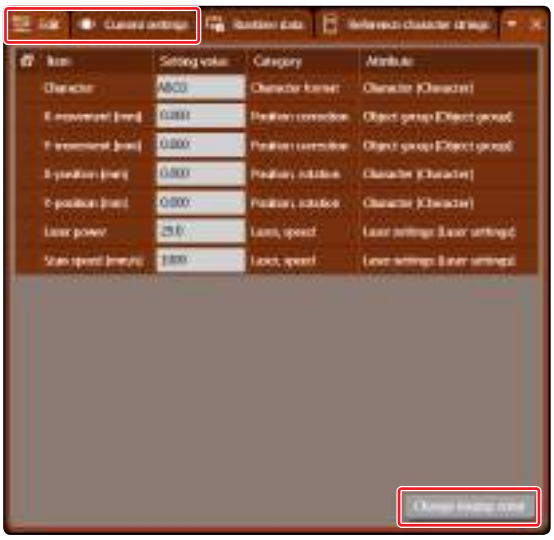
	Item	Description
1	Setting parameter list	Displays the allowed items in the system settings to display or to edit. In the editing list, click the value to change the setting parameters. In the reference character list, click the strings to edit the text. The display item needs to be set in advance in “8-5 Settings/Display Restrictions” (P.259).
2	Change display order	Open the window for the display order of the setting items. Refer to “Procedures for changing display order” (P.200).

Reference

- The display order setting is saved to the online connected laser marker. If two or more laser markers are used, set the display parameters and its order for each laser marker.
- The display order setting in the operation monitor screen and the operator settings screen changes together.
- If the selected file has large setting data and it takes long time to display the screen, change the refresh interval of the screen. Refer to “4-2-5 Screen refresh during the operation” (P.194).

■ Procedures for changing display order

1. On operator settings screen, open “Edit” or “Current settings” tab and click “Change display order”.

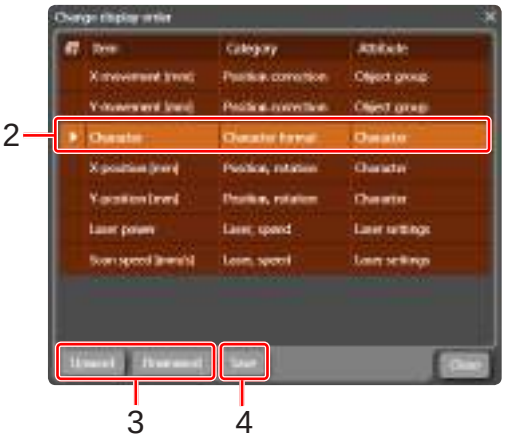


2. Select the item to change the display order.

3. Click “Upward” or “Downward” and move the position.

4. Click “Save”.

The setting order is applied and saved to the online connected laser marker.



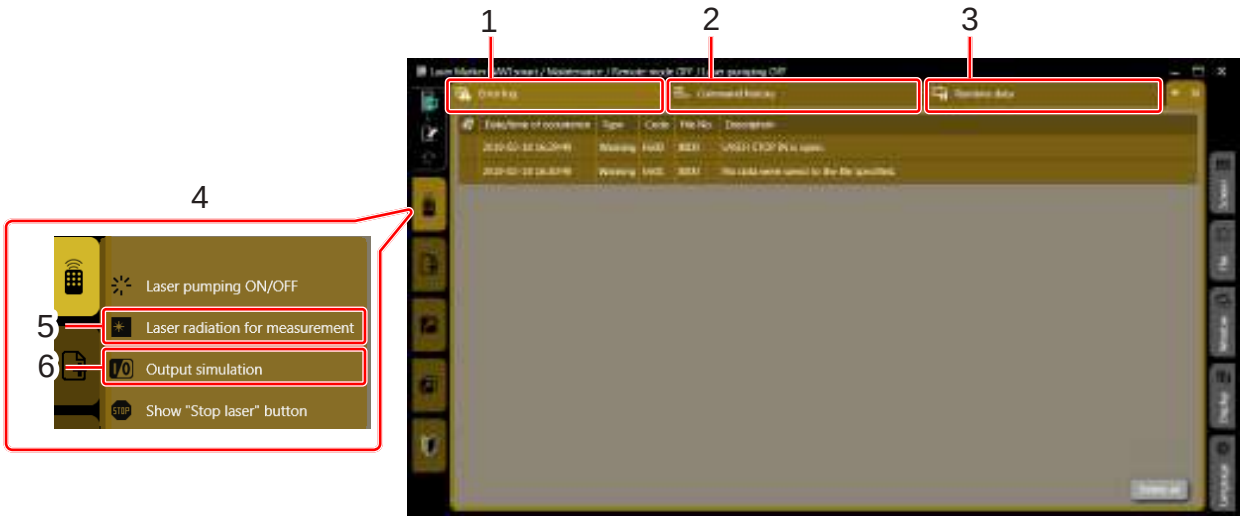
6 Maintenance Screen

6-1 Configuration of the Maintenance Screen

The maintenance screen is used for the maintenance and checking of the system operation capabilities.
This screen is applicable when the laser marker and Laser Marker NAVI smart are connected online. Under the offline editing of the backup file, the error log, command history, and runtime data can be confirmed.

Reference

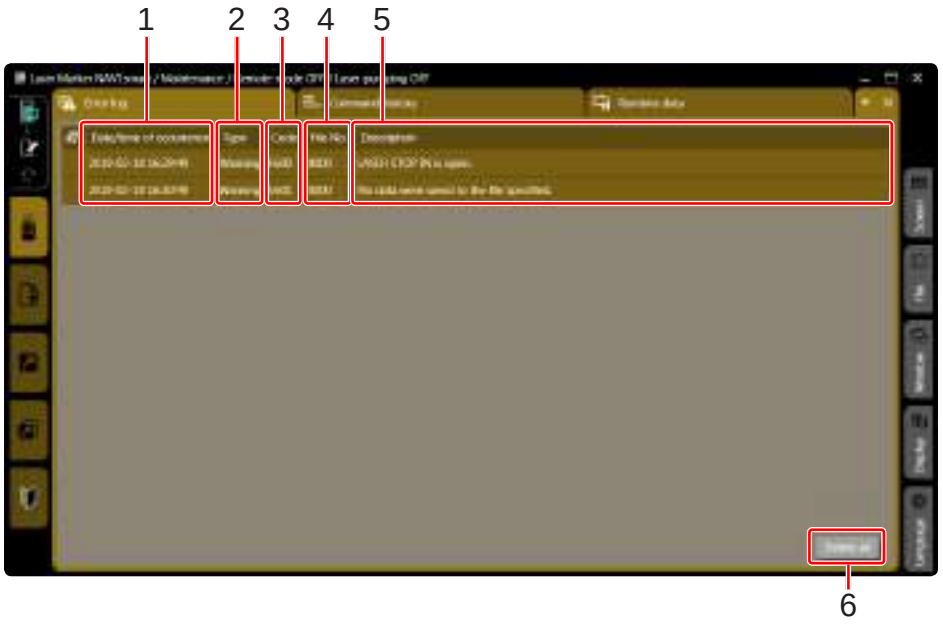
- The maintenance screen is not available while the laser marker is in the remote control mode or run mode.



	Item	Description
1	Error Log	Displays the error records of the online connected laser marker.
2	Command history	Displays the communication commands transmitted and received by the online connected laser marker.
3	Runtime data	Displays the total operating time and cycles of the main parts for the online connected laser marker.
4	Laser marker operation tool	Operates the laser marker connected online. Refer to “3-3 Laser Marker Operation” (P.59).
5	Laser radiation for measurement	Performs the laser radiation to measure the laser output using a commercially available power meter. The laser radiates to the center of the marking field. Refer to “6-5 Laser Radiation for Measurement” (P.206).
6	Output simulation	Simulates ON/OFF operation of output signals on the laser marker without an actual operation. Refer to “6-6 Output Simulation” (P.209).

6-2 Error Log

Displays the error records of the online connected laser marker.
Under the offline editing of the backup file, it displays the log at the backup timing.



	Item	Description
1	Date/time of occurrence	Displays when the error occurred with YYYY-MM-DD hh:mm:ss.
2	Type	Indicates the error type either Warning or Alarm.
3	Code	Displays the error code. Refer to “Error Indication” (P.280).
4	File No.	Displays the file number selected when the error occurred.
5	Description	Displays the error details.
6	Delete all	Deletes the all errors recorded. Under the offline editing of the backup file, this function is disabled.

Reference

- The oldest error log is deleted when the log exceeds 100 records.

6-3 Command history

Displays the communication commands transmitted and received by the online connected laser marker.
Under the offline editing of the backup file, it displays the log at the backup timing.

	Item	Description
1	Display format	Select the display format of the command messages from Text or Hexadecimal. • Text: The command messages are displayed in text form. If the 2-byte characters are included, they are shown with the selected characters at “Encoding for 2-byte characters” in system settings. Refer to “8-4-6 Laser marker control command” (P.255). The control codes used for the command format such as STX and CR are represented with [ ], like [STX] and [CR]. • Hexadecimal: The command messages are displayed in hexadecimal notation. The messages are separated at each byte with a space.
2	Date/time	Displays when the command is transmitted or received with YYYY-MM-DD hh:mm:ss.fff.
3	Port	Indicates either of the following communication ports: RS-232C, Ethernet, PROFINET *1, EtherNet/IP *1
4	PLC ⇔ LM	Displays the communication direction. “->” indicates that the laser marker received the command from the external control device such as a PLC. “<-” indicates that the laser marker transmitted the command to the external control device such as a PLC.
5	File No.	Displays the file number selected when the command is transmitted or received.
6	Command message	Displays the command messages transmitted and received by the laser marker. The recordable message length is up to 64-bytes per one command. If the message length is longer than 64-bytes, the middle part of the message is not displayed and (...xx byte) is shown at the unrecorded part.
7	Create TSV file	Saves the command history in TSV (Tab-separated values) format.
8	Delete all	Deletes the all command logs. Under the offline editing of the backup file, this function is disabled.

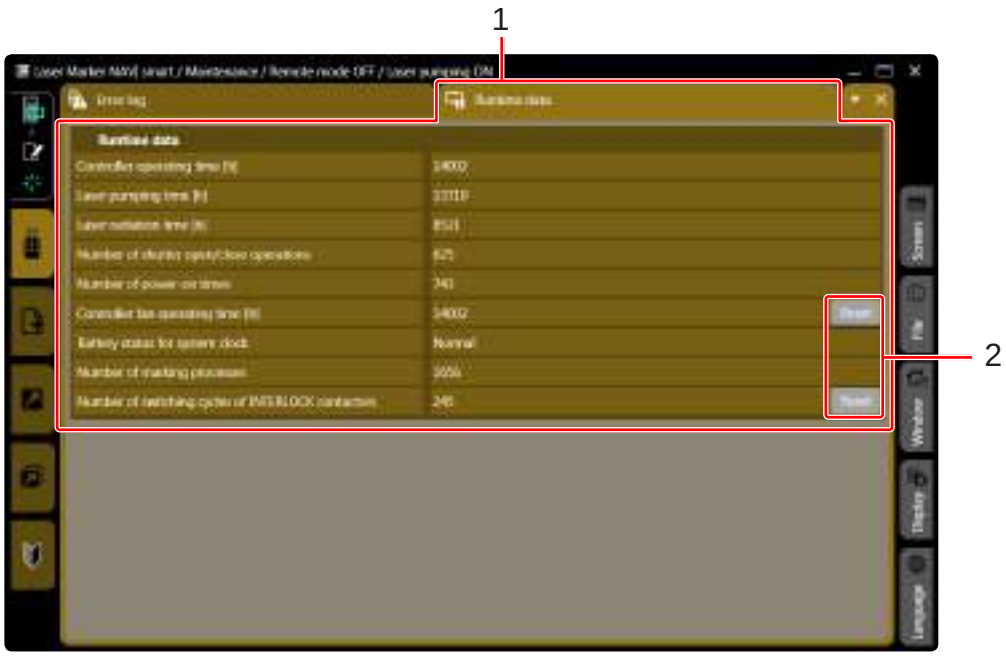
*1 : Available for LP-RF/LP-RV series when the optional network unit is installed to the controller.

Reference

- Up to 100 commands can be displayed. The oldest command log is deleted when the log exceeds 100 records.
- When a code reader is connected to the RS-232C port of the laser marker, the transmitted and received data with the code reader is not recorded in the command history.
- If the transferred message cannot be recognized as a command because of the wrong start code or end code, it is not recorded in the command history.

6-4 Runtime data

The total operating time and total number of operation of the main parts for the laser marker are displayed.



	Item	Description
1	Runtime data	Displays total operating time or cycles for the following parts of the laser marker connected online. Under the backup file editing, the runtime data at the point of backup is displayed. • Controller operating time [h] • Laser pumping time [h] • Laser radiation time [h] • Number of shutter open/close operations • Number of power-on times • Head fan operating time [h] • Controller fan operating time [h] *1, *2 • Battery status for system clock (Normal/Abnormal) • Number of marking processes • Number of switching cycles of INTERLOCK relays *1 • Number of switching cycles of INTERLOCK contactors *2, *3
2	Reset	Reset the runtime data of the online connected laser marker. The following items can be reset. • Head fan operating time *1, *2 • Controller fan operating time • Number of switching cycles of INTERLOCK contactors *2, *3 After the replacement of the parts, click this button and reset the runtime to 0.

*1 : Available with LP-GS series.
*2 : Available with LP-RC series.
*3 : Available with LP-RF/LP-RV series.

Reference

- For the details of the laser marker maintenance, refer to “Setup/Maintenance guide”.

6-5 Laser Radiation for Measurement

Perform the laser radiation to measure the laser output using an off-the-shelf power meter with this function and confirm the output power regularly in order to maintain consistent marking quality. To specify whether to perform the laser radiation for measurement or not in the Maintenance screen, set it in “8-5-2 Editable range” (P.261) for the system settings.

Reference

- If you want to radiate the laser to the arbitrary points, use “Point radiation” function instead of this function. Refer to “3-10 Point Radiation Object” (P.112).

■ Laser measurement procedures

The laser output should be measured with a commercially available meter using the following steps:

1. Prepare a commercially available power meter.

Notice

- Be sure to use the calibrated power meter.
- Use the power meter which meets the following specifications.

Laser marker	Maximum average power density of detector	Detector size
LP-GS series	1kW/cm^2 or more	more than ϕ 20 mm
LP-RC series	10kW/cm^2 or more	
LP-RF series		more than ϕ 10 mm
LP-RV series		

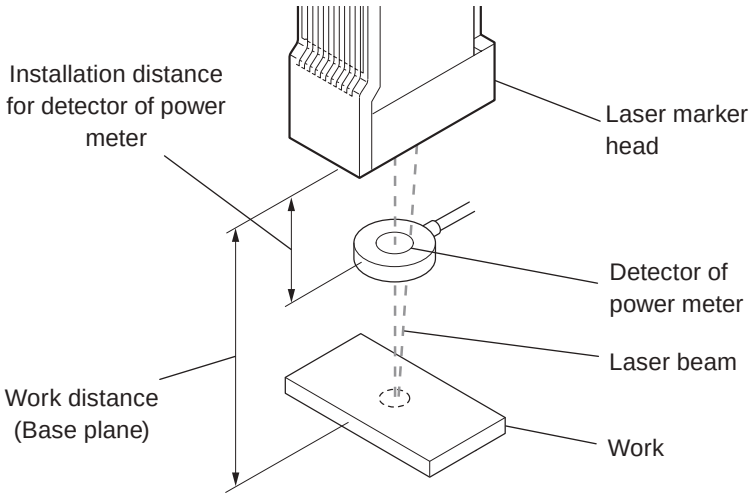
- A difference may arise under the high/low temperature. Measuring power with normal temperature (20 to 30 Celsius degree) is recommended.
- Before measuring the laser power, make sure there is no contamination in the laser emission port. If the laser emission port is contaminated or damaged, an error 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 following distance, i.e. one-third to half of the focal length (specified work distance) of the laser marker.

Laser marker model	Installation distance for detector of power meter *
LP-GS051 (-L)	Approx. 45 mm
LP-GS052	Approx. 35 mm
LP-RC350S	Approx. 50 mm
LP-RF200P	Approx. 90 mm
LP-RV200P	Approx. 90 mm

* The values represent the recommended values for the case where the damage threshold (maximum average power density) of the detector of power meter is 1kW/cm^2.



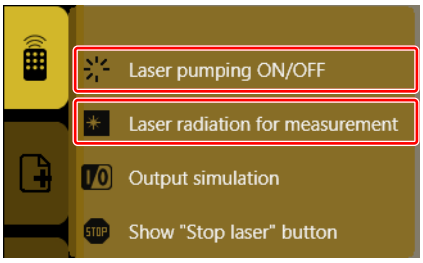
Notice

- Do not install the power meter within the focal length of the laser marker. This may cause destruction of the power meter.
- Do not use “guide pointer" function to confirm the setting position of the power meter detector. Since the guide pointer is emitted obliquely, with the above described installation distance, guide pointer does not indicate the center of the marking field and you cannot use it as a reference.

3. Connect the laser marker and Laser Marker NAVI smart online, and select “Maintenance” from the screen selection menu.

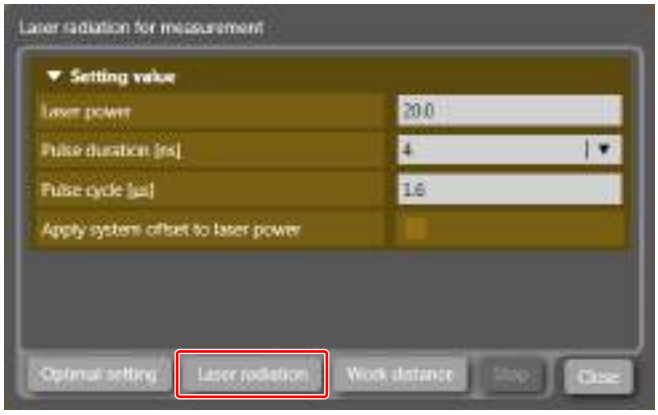
4. Click the “Laser pumping ON/OFF” of the “Laser Marker Operation” tool to pump laser.

5. Click “Laser radiation for measurement” of the “Laser Marker Operation” tool.



6. Enter the power and other laser settings, and click “Laser Radiation”.

Click “Yes” in the laser radiation confirmation dialog to irradiate the laser.



Reference

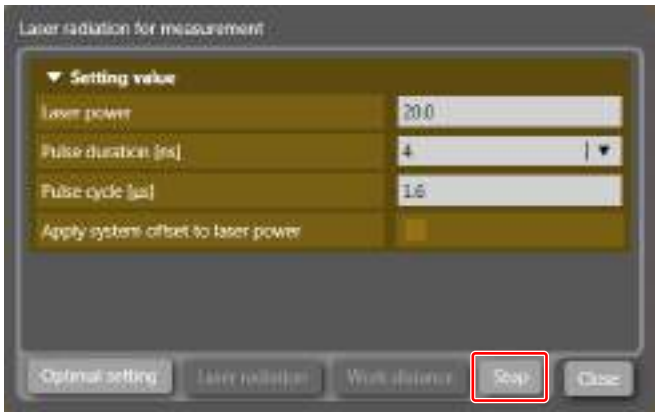
- For LP-GS051(-L) type, LP-RC350S, LP-RF series or LP-RV series, use “Work distance” indication of the guide laser to confirm the setting position of the power meter detector. Set the detector so that the cross indication is on the center of the detector. (Do not set it to the position where the dot indication and cross indication overlap.)
- For stable measurement results, it is recommended to obtain the average output value by measuring the output after about 30 seconds from the start of laser radiation for 10 to 30 seconds.
- The settings of laser radiation for measurement are common in all files.
- The laser output power of LP-RV series changes depending on the settings of the pulse duration and pulse cycle. The recommended settings of the pulse duration and pulse cycle for measurement are set automatically by clicking “Optimal settings”. (4ns to pulse duration and 1.6µs to pulse cycle)

⚠WARNING

- Be sure to wear protective goggles.
- During the radiation, the laser energy is concentrated to one point. Use due caution since some objects can catch fire.

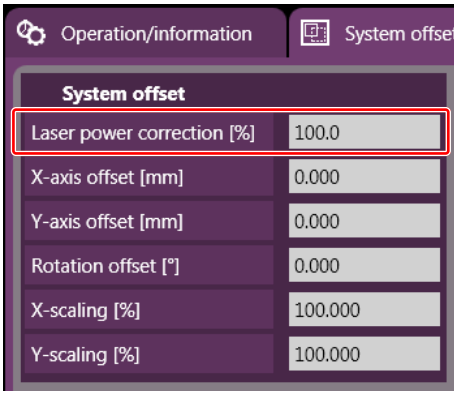
7. Click “Stop” to stop laser radiation.

The laser radiation for measurement will automatically stop after about one minute even without clicking “Stop”.



8. Check the measurement results of the power meter. If the power decays lower than the default setting, correct the laser power setting value using the “System offset” panel of the “System settings” screen.

Setting range of laser power correction: 50 to 200 [%]



Reference

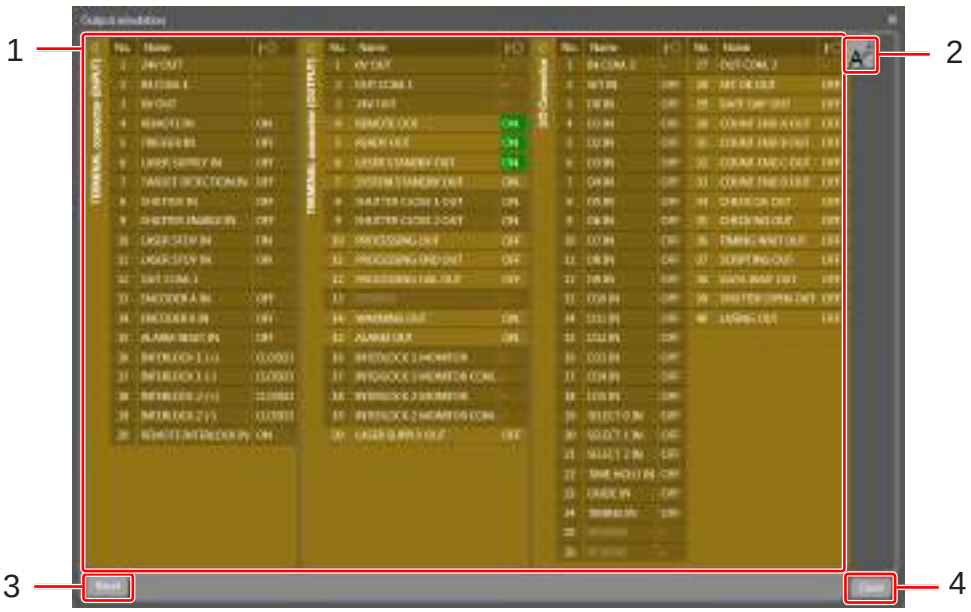
- Laser power correction refers to the function to correct not the maximum laser power [W] value but the laser power setting value.

Notice

- If the power decays more than 20%, compared to the default setting, the laser oscillator needs maintenance. Contact our sales office or representatives.

6-6 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	Simulation terminals	Clicking on the output signal name to switch the on/off state. During the output simulation, the status display is in green. The terminals in gray cannot be simulated.
2	Text size	Switches the text size in the terminal list among the following types. • Zoom-out: small text size to show all terminals • Zoom-in: large text size
3	Reset	Terminates the simulation mode and reset the ON/OFF status of the output signals.
4	Close	Terminates the simulation mode and closes the window.

Reference

- During the output simulation, other operation and settings are disabled.
- For the details of I/O terminals, refer to “Setup/Maintenance Guide”.
- You can use the output simulation also for the control via optional network unit (EtherNet/IP or PROFINET).

7 Data Management Screen

7-1 Configuration of the Data Management Screen

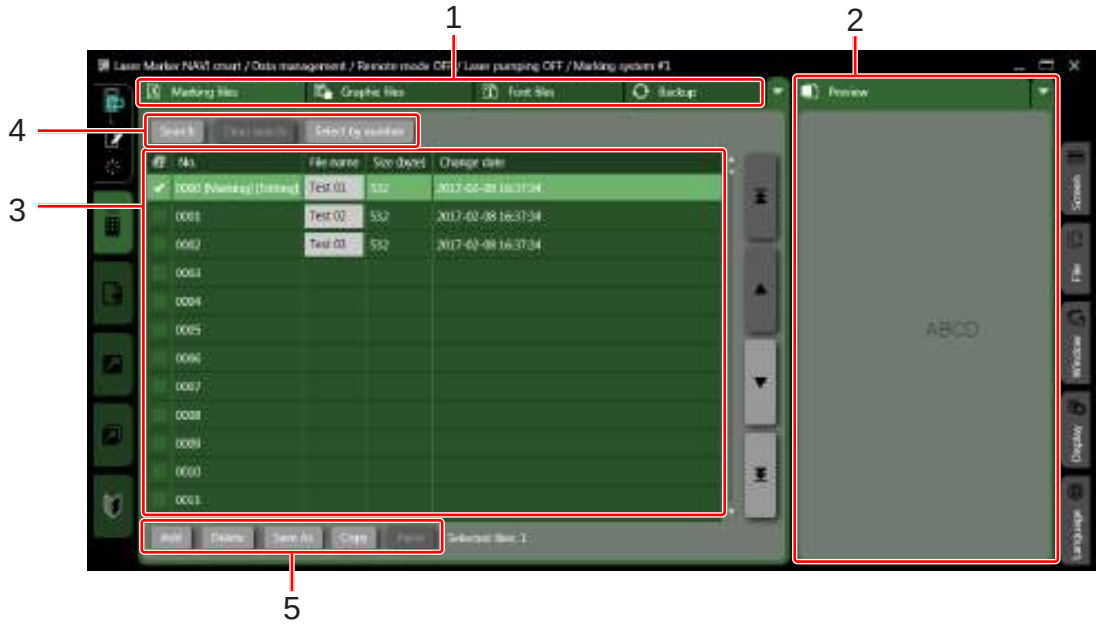
On the data management screen, the data saved in a laser marker or a backup file such as marking file, graphic and font can be organized.

Data management under the online connection with a laser marker:

- adding the externally saved data to the laser marker
- deleting or externally saving the data in the laser marker
- saving the backup file of the laser marker and restoring the backup file

Data management under the offline editing of the backup file:

- adding the externally saved data to the backup file
- deleting or externally saving the data in the backup file



	Item	Description
1	Management file type	Select the managing file type. • Marking files • Graphic files • Font files • Backup
2	Preview	Displays the preview of the selected marking data.
3	File list	Lists up the data registered in the laser marker or in the backup file.
4	Search	Searches the file to select.
5	File management	Executes the file managing such as adding or deleting files. Refer to “7-3 Data management” (P.217).

Reference

- When new file creation under the offline mode, the data management screen is available only for the management of graphic and font files.

7-2 Files for the Laser Marker

7-2-1 File format

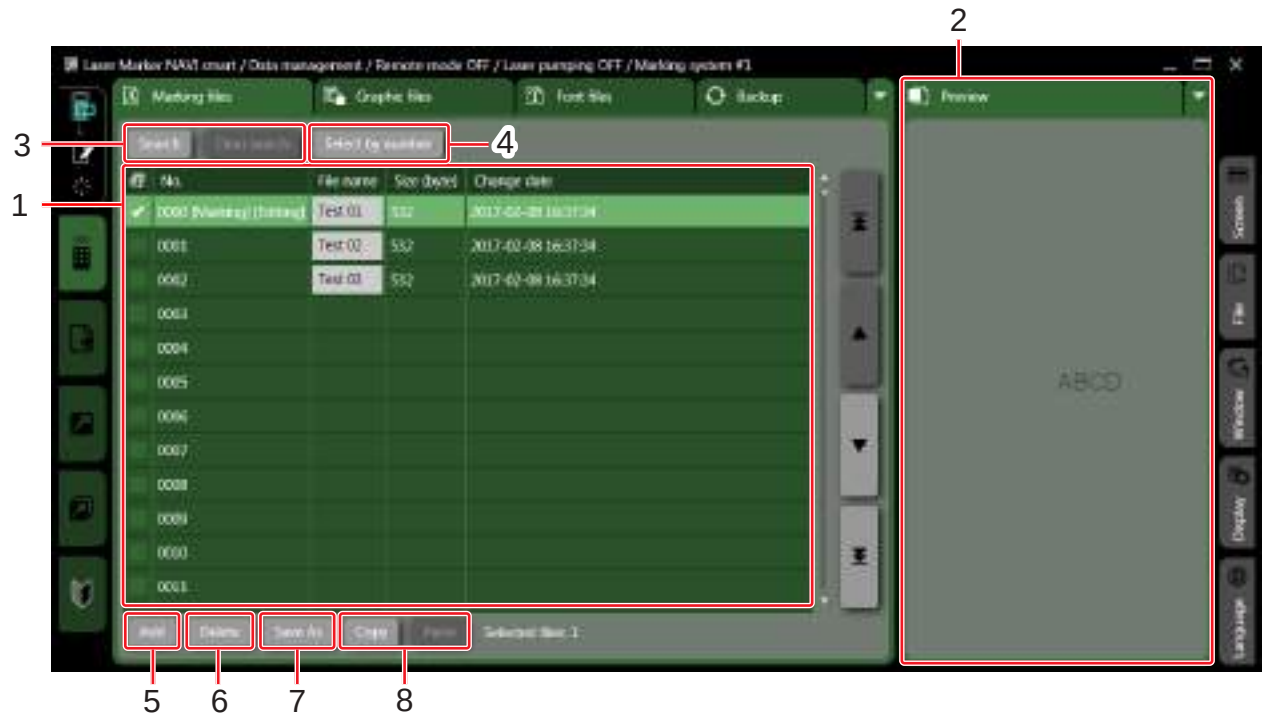
Name	Extension	Description
Marking file	.lms	The marking data and conditions set in a selected file. The marking file contains the graphic file (VEC/DXF/BMP/JPEG/HPGL/TTD file) used in a file.
Backup file	.lmb	As a backup file, the following data in a laser marker is saved. • Marking file • Graphic file • Font file • Global functional characters • System settings (partly not restored) • Error Log (not restored) • Command history (not restored) • Runtime data (not restored) • Current value of the counter function (not restored)
Graphic file	.vec	The special graphic format for the laser marker. With VEC file format you can edit the drawings such as adding or deleting the lines by using Logo editing software.
	.dxf	Graphic file in DXF format.
	.bmp	Graphic file in BMP format.
	.jpg / .jpeg / .jpe / .jfif	Graphic file in JPEG format.
	.pgl / .hgl / .plt	Graphic file in HPGL format.
	.ttd	Image data for the TrueType object. This file format is for exclusively use for the laser marker.
Font file	.fon	Font data for the marking characters by the laser marker. This file format is for exclusively use for the laser marker.

Reference

- TrueType object is saved as the graphic file with ".ttd" format. TrueType fonts used in Windows cannot be used as a laser marker font file of ".fon" format.
- To use LP-400/V backup data, convert it to ".lmb" format at offline editing mode beforehand. Refer to "2-4-5 Convert LP-400/V backup file" (P.44).

7-2-2 Marking file

The marking data including the scanning contents and marking conditions and etc. is set and saved in a marking file.
Up to 10,000 marking files are stored in one laser marker.



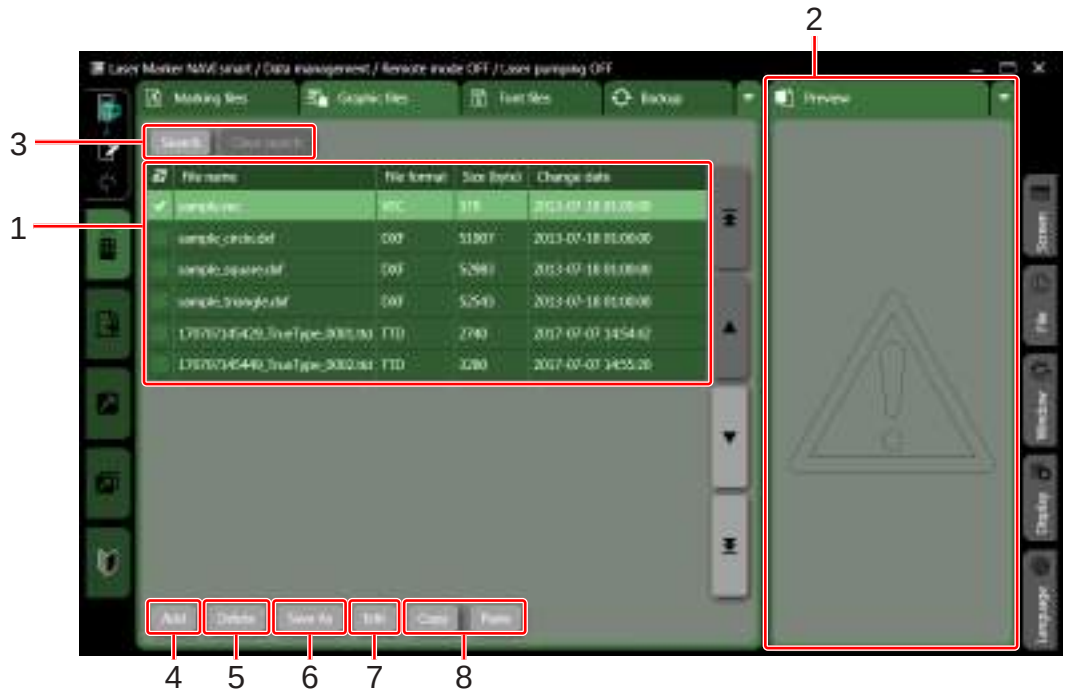
	Item	Description
1	File list	Displays the all files stored in the laser marker or the backup file. Clicking the title line of the list, the files are sorted in ascending or descending order by the following categories. • File No. • File name • File size • Change date
2	Preview	Displays the marking image of the selected file.
3	Search	Searches the file to select. Clicking “Clear searching” resets the search result.
4	Select by number	Searches the file by inputting the file number.
5	Add	Registers the externally saved marking file to a laser marker or a backup file.
6	Delete	Deletes the selected file.
7	Save As	Saves the selected file to a PC or an external memory.
8	Copy, Paste	Copies the selected file and paste it to the specified place in the list.

Reference

- The marking file (.lms) contains the graphic file (VEC/DXF/BMP/JPEG/HPGL/TTD file) used in a file.

7-2-3 Graphic file

Organizes the graphic data to be scanned by the laser marker.

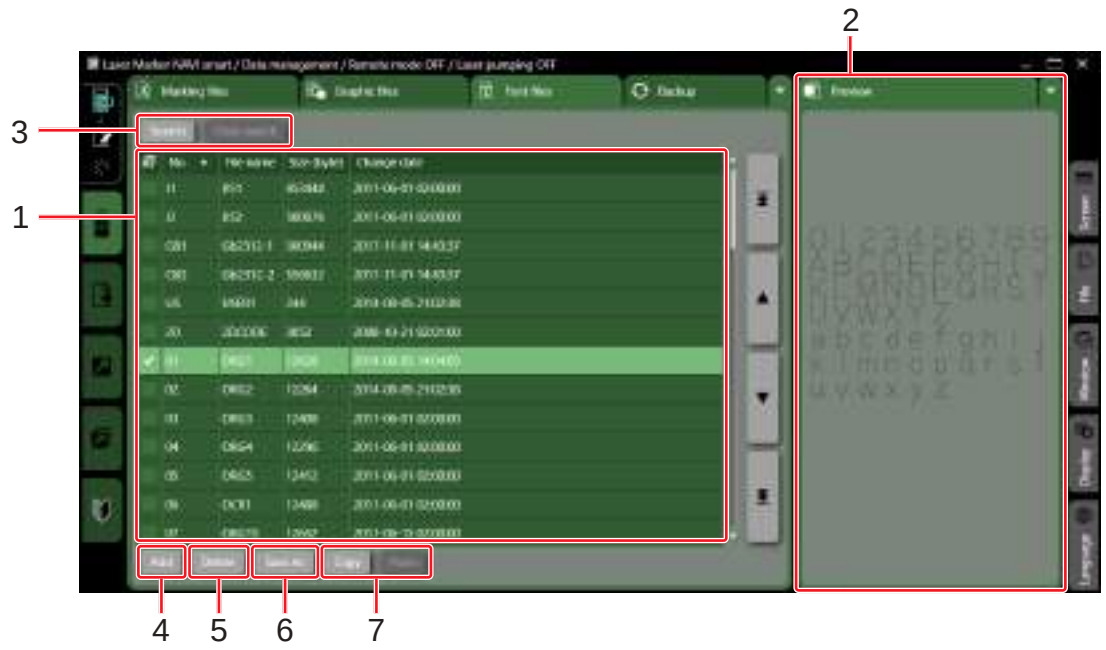


	Item	Description
1	File list	Displays the all graphic files stored in the laser marker or the backup file. Clicking the title line of the list, the files are sorted in ascending or descending order by the following categories. • File name • File format (VEC, DXF, BMP, JPEG, HPGL, TTD) • File size • Change date
2	Preview	Displays the marking image of the selected file.
3	Search	Searches the file to select. Clicking “Clear searching” resets the search result.
4	Add *1	Registers the graphic file to a laser marker or a backup file. Reference • If adding the graphic file (.VEC) used in other laser markers, its size may change from the original size.
5	Delete	Deletes the selected file.
6	Save As *1	Saves the selected file to a PC or an external memory.
7	Edit *1	Changes the graphic conditions. For VEC format file, logo data editing software starts up. For DXF/BMP/JPEG/HPGL format file, the setting window of the graphic condition appears.
8	Copy, Paste *1	Copies the selected file and paste it to the list.

*1 : Not available for TTD format files (TrueType object data).

7-2-4 Font file

Organizes the font data to be scanned by the laser marker.



	Item	Description
1	File list	Displays the all font files stored in the laser marker or the backup file. Clicking the title line of the list, the files are sorted in ascending or descending order by the following categories. • File No. • File name • File size • Change date
2	Preview	Displays the marking image of the selected font.

Reference

- When a font file saved in No. 01 to 50 is selected, alpha-numeric characters are previewed, but the symbols are not displayed.
- When a font file for the non-alphanumeric characters is selected, only the first 100 characters are previewed.

3	Search	Searches the file to select. Clicking “Clear searching” resets the search result.
4	Add	Registers the font file to a laser marker or a backup file.
5	Delete	Deletes the selected file.
6	Save As	Saves the selected file to a PC or an external memory.
7	Copy, Paste	Copies the selected file and paste it to the specified place in the list.

■ Font type and registration destination

Register the fonts to the suitable font no. as follows.
In case the font type does not match the font no., some characters cannot be input properly.

Font No.	Font Type	Initial registered file (.FON)
J1	JIS Level 1 font: Hiragana, Katakana and Kanji characters for Japanese, special characters for Grecian and Russian	JIS1
J2	JIS Level 2 font: Kanji characters for Japanese	JIS2
GB1	Simplified Chinese font: GB 2312 level-1 characters	GB2312-1
GB2	Simplified Chinese font: GB 2312 level-2 characters	GB2312-2
US	User-defined characters Font (newly created character by user)	USER1 *1
2D	Drawing pattern font for 2D code modules	2DCODE *2
01 to 50	Font for the alphanumeric and symbols: 0 to 9, A to Z, a to z and some symbols	01 to 05: ORG1 to ORG5 *3 06: OCR1 *4 07 to 09: ORG1S to ORG3S *5

*1 : The following characters are initially registered at 8121(HEX) and 8122(HEX) in the user-defined characters font.

*2 : 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.141) for the registerd pattern.

*3 : The letter form of the alphanumeric in ORG1 to ORG5 are different. Check the characters in the preview panel by font selection. Each font has the following features.
- To mark the small sized characters, use ORG2 or ORG5 font.
- To shorten the marking time, use ORG4 font.
- To make characters in bold, do not use ORG4 font. ORG4 font contains the characters that cannot make bold characters.

*4 : OCR1 is the alphanumeric font suitable for the image recognition.

*5 : The alphanumeric in ORG1S to ORG5S have the smaller character size by 80% of ORG1 to ORG5 respectively. With these fonts, the character size of alphanumeric and Japanese characters such as Hiragana, Kanji and etc. are in the same level.

Reference

- Refer to “Character Code Table” in “Serial Communication Command Guide” for the detail of the applicable characters.
- To modify or add the characters in the font file, use the attached software “Font Maker”. Refer to “Font Maker Operation Manual”.
- For the Simplified Chinese fonts (GB2312-1 and GB2312-2), Font Maker software is not available.
- The True Type font (.fon) installed in Windows cannot be used as the font file for the laser marker.
- J1/J2 fonts (Japanese) and GB1/GB2 fonts (Simplified Chinese) can not be used together in one file. Set the character type to use in each file by referring to “3-13-1 Offset and character settings” (P.156).

7-3 Data management

7-3-1 Search file

Searches the marking file, graphic file or font file by keyword retrieval.

1. Click “Search”.

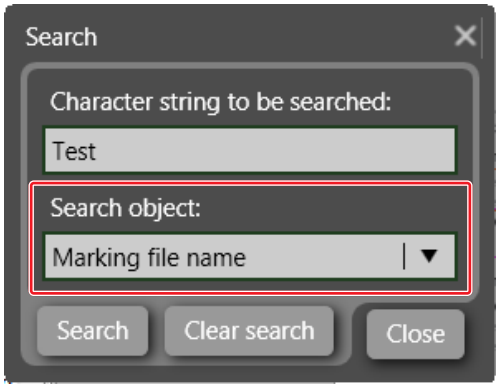
2. Select the search object and enter the word to search.

Search object when searching the marking file:

- Marking file name
- Marking file number
- Name of contained graphic file
- Name of contained font file

Search object when searching the graphic or font file:

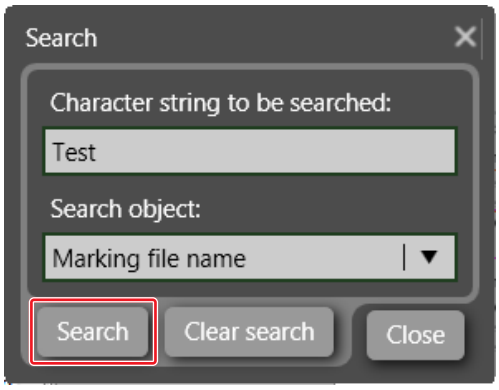
- Graphic file name / Font file name
- Name of corresponding marking file
- Number of corresponding marking file



Reference

- The files including the search keyword are displayed as the result.
- By searching, one-byte and two-byte characters are distinguished.
- Searching with “AND”, “OR” or “NOT” are non-usable.

3. Click “Search”.



4. The files including the search keyword are displayed in the list.

Clicking “Clear searching” resets the search result.

7-3-2 Add data

Add the externally saved files (marking file, graphic file and font file) to the laser marker or the backup file with the procedures as follows.

1. Select the tab of the file type for the data adding.

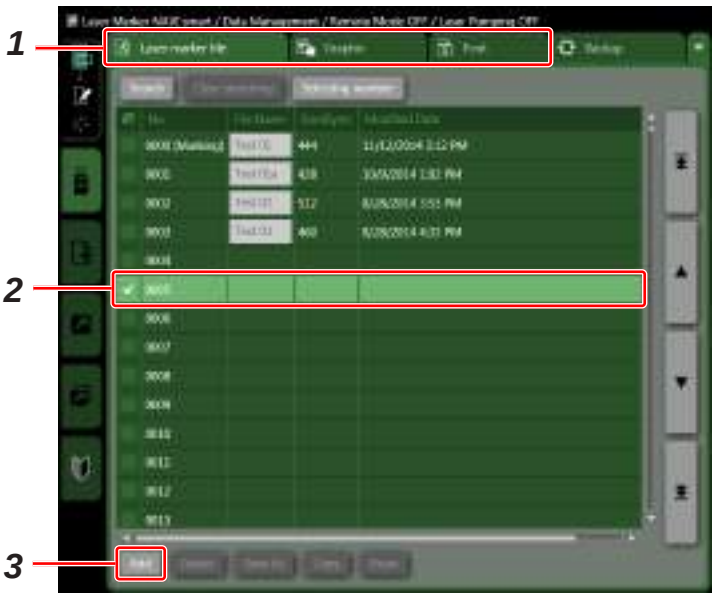
- Marking file
- Graphic file
- Font file

2. For the marking file and font file, select the destination to which the data is added.

3. Click “Add”.

If the data is already registered, the confirmation dialog box appears.

Click “OK” to overwrite.



4. Select the data to be added and then click “Open”.

Addable file format is shown as the follows:

- Marking file (.lms)
- Graphic file (VEC/DXF/BMP/JPEG/HPGL file)
- Font file (.fon)

Reference

- You can also select the file of the former model LP-400/LP-V series (.nlm). This file is converted to “.lms” format automatically.

5. The data is added.

Reference

- If the added marking file contains the function that cannot be used in the current laser marker, that setting is deleted from the file.
- When the added marking file contains the graphic files (VEC/DXF/BMP/JPEG/HPGL/TTD files), they are added in the graphic file list in the data management screen at the same time.

7-3-3 Save data to external memory

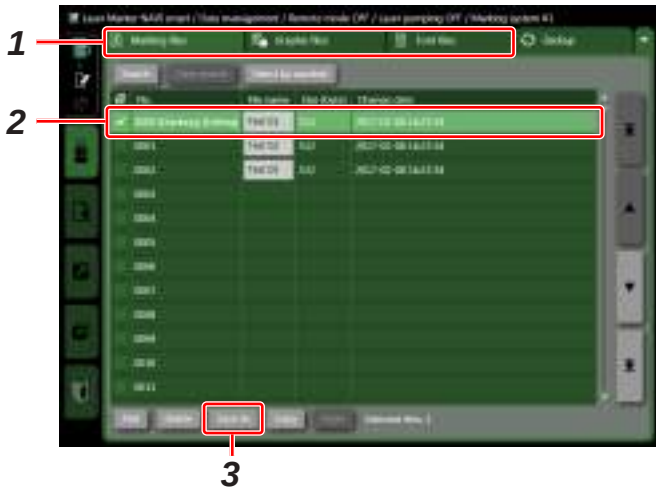
Save the marking file, graphic file or font file to the external memory with the procedures as follows.

1. Select the tab of the file type for the data saving.

- Marking file
- Graphic file
- Font file

2. Select the file to save.

3. Click “Save As”.



4. Select the destination to save, such as PC or an external memory, enter the file name, and then click “Save”.

Reference

- When the marking file is saved, the graphic files (VEC/DXF/BMP/JPEG/HPGL/TTD files) used in the file are contained the data in the marking file (.lms).
- The graphic file in TTD format (TrueType object data) cannot be saved singularly.

7-3-4 Delete data

Delete the marking file, graphic file or font file in the laser marker or the backup file with the procedures as follows.

1. Select the tab of the file type for the data deleting.

- Marking file
- Graphic file
- Font file

2. Select the file No. of the data to delete.

To select the two or more files, check the boxes on the left.

3. Click “Delete”.

4. The confirmation dialog box appears.

Click “OK” to delete.

Reference

- When the marking file (.lms) is deleted, the graphic files (VEC/DXF/BMP/JPEG/HPGL/TTD files) used in the file remain in the laser marker or the backup file. To clear them, select the graphic file and delete them separately.

7-3-5 Copy and paste data

Copy the file and paste it to the selected part in the file list with the procedures as follows.

1. Select the tab of the file type for the data copying.

- Marking file
- Graphic file
- Font file

2. Select the data to copy.

To select the two or more files, check the boxes on the left.

3. Click “Copy”.

4. For the marking file and font file, select the destination file No. to paste the data.

Reference

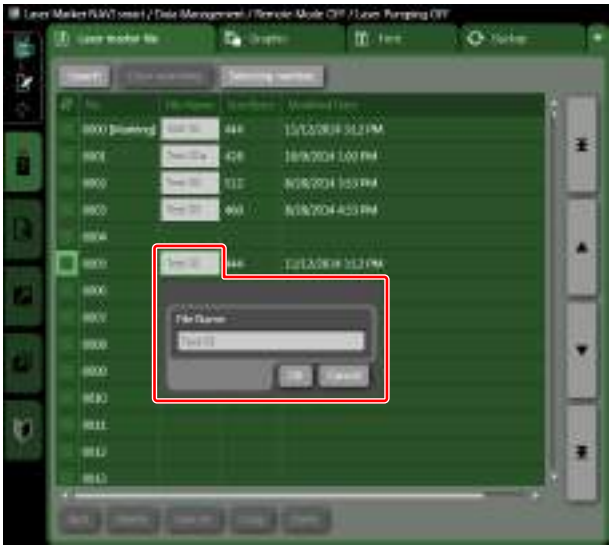
- When the several files are selected, these files are pasted from the selected number.

5. Click “Paste”.

6. Enter the file name and click “OK”.

Reference

- The copy & paste operation is not available for the graphic file in TTD format (TrueType object data).
- As the file name up to 127 characters can be input.
- The control characters can not be used in the file name.
- The under bar symbol “_” can not be used at the first digit of the file name.



7-4 Backup

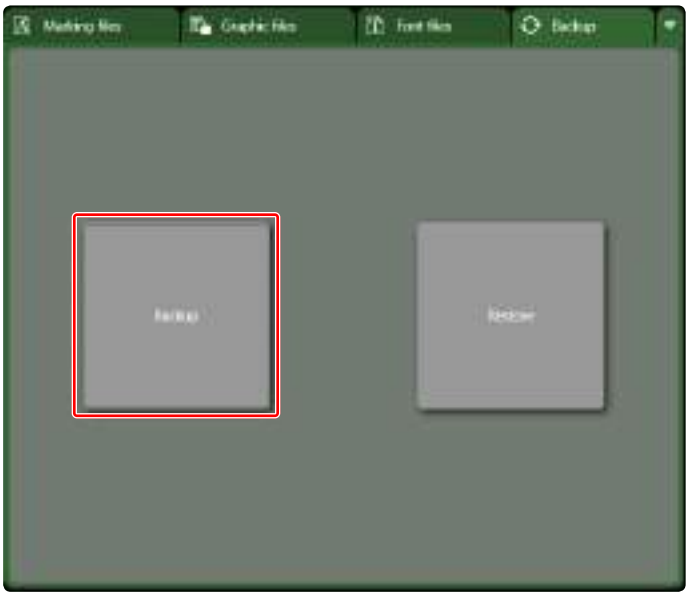
Executes the storing the backup data of the laser marker and restoring the backup.
This operation is available when the laser marker and Laser Marker NAVI smart are connected online.

7-4-1 Export a backup file

As a backup file, the following data in a laser marker are saved.

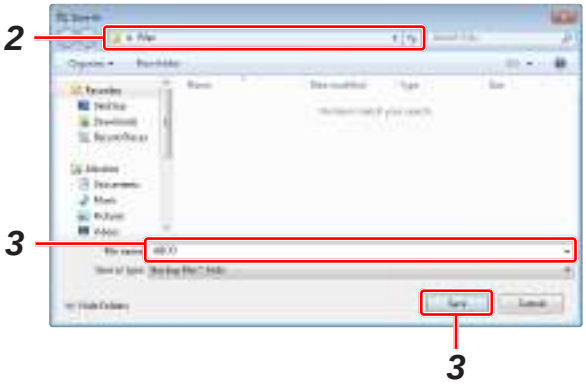
- Marking file
- Graphic file
- Font file
- Global functional characters
- System settings (partly not restored)
- Error Log (not restored)
- Command history (not restored)
- Runtime data (not restored)
- Current value of the counter function (not restored)

1. Select the “Backup” tab, and then click “Backup”.



2. Select the destination to save the backup file.

3. Input the backup file name, and then click “Save”.



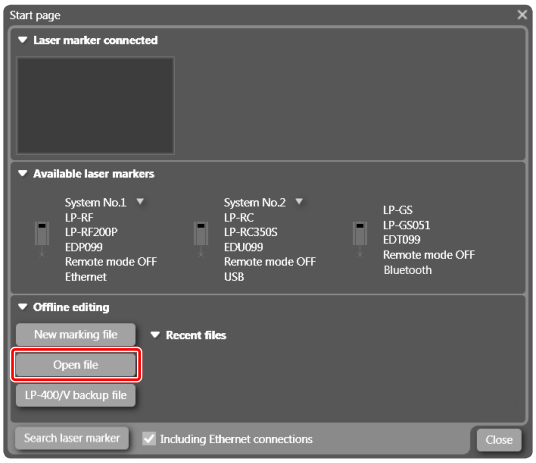
Reference

- The backup file is saved in “.lmb” format.

7-4-2 Editing the backup file

■ How to edit the backup file

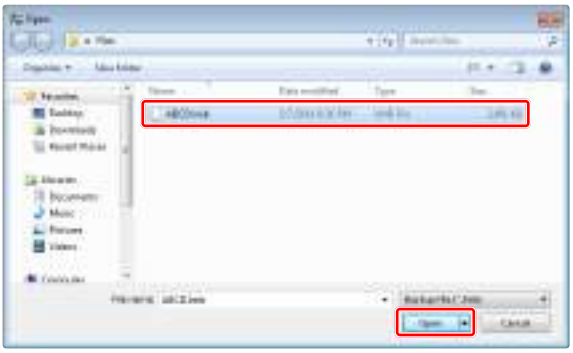
1. Open the laser marker selection window and click “Open file” under “Offline editing”.



2. Select the backup file (.lmb).

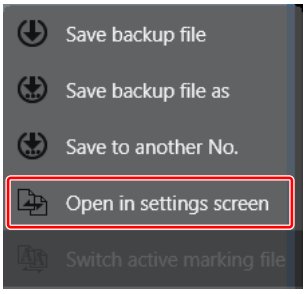
Reference

- To use LP-400/V backup data, convert it to “.lmb” format at offline editing mode beforehand. Refer to “2-4-5 Convert LP-400/V backup file” (P.44).



3. The marking settings screen with the smallest file no. in the backup data is displayed.

To change the editing file, open “File” tab in the right menu and click “Open in settings screen”.

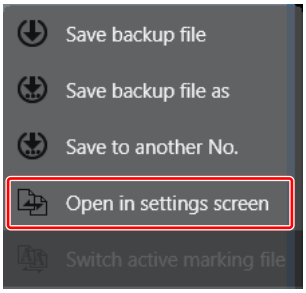


4. Select a file to edit and click “Select”.

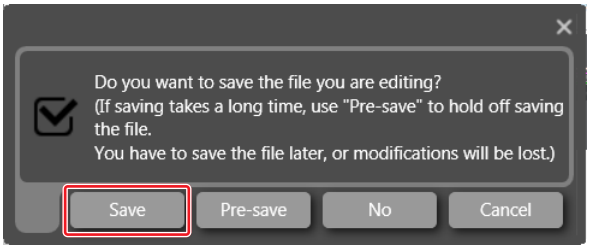
Reference

- When creating a new file referring to the existed file, copy and paste the file and modify the data. Refer to “7-3-5 Copy and paste data” (P.221).

5. Edit the file. When you edit another file continuously, open “File” tab in the right menu and click “Open in settings screen”.



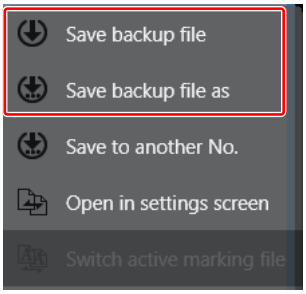
6. When any setting has been changed, confirmation dialog appears. To save the changes, click “Save”.



Reference

- If you edit the several files and want to save the processing time for saving operation, you can use “Pre-save” button in the middle of the editing and click “Save” at last. With “Pre-save” the setting files are hold temporarily, but not saved until “Save” is clicked.

7. To save the changing in the backup file, open “File” tab in the right menu and click “Save backup file” or “Save backup file as”.



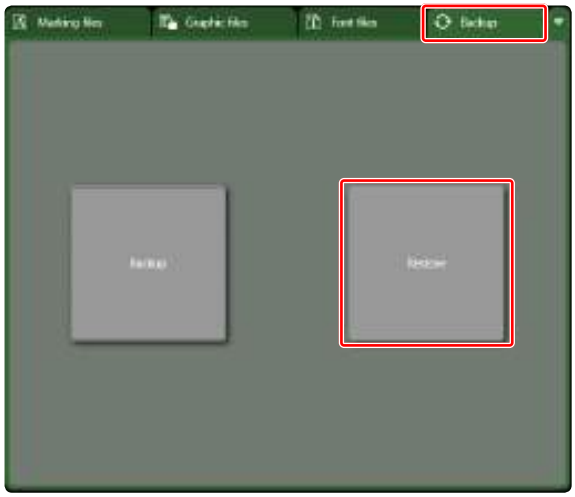
Reference

- For the procedures to overwrite the laser marker with the backup file, refer to “7-4-3 Restore laser marker data from backup file” (P.225).

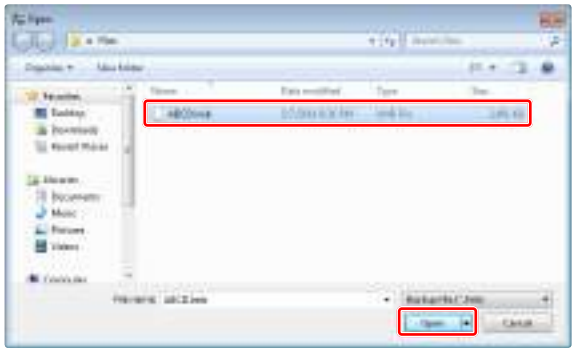
7-4-3 Restore laser marker data from backup file

Restore (Overwrite) the file data (marking files, graphic files, font files, global functional characters and System settings) in the laser marker with the externally saved backup file by the following procedures.

1. Select the “Backup” tab, and then click “Restore”.



2. Select the backup file (.lmb) to be restored from PC or an external memory, and then click “Open”.

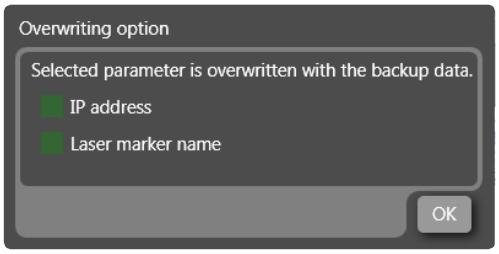


Reference

- To use LP-400/V backup data, convert it to “.lmb” format at offline editing mode and then restore this .lmb file. Refer to “2-4-5 Convert LP-400/V backup file” (P.44).

3. The dialog box appears to confirm whether to restore the following settings. To overwrite these settings with the backup data, check them and click “OK”.

- IP address (Ethernet)
- IP address (EtherNet/IP) (when the optional network unit is installed.)
- Laser marker name



Reference

- Set a separate IP address not to overlap between the laser marker and PC on the network.

4. After the restoration is complete, restart the laser marker to apply the backup file setting.

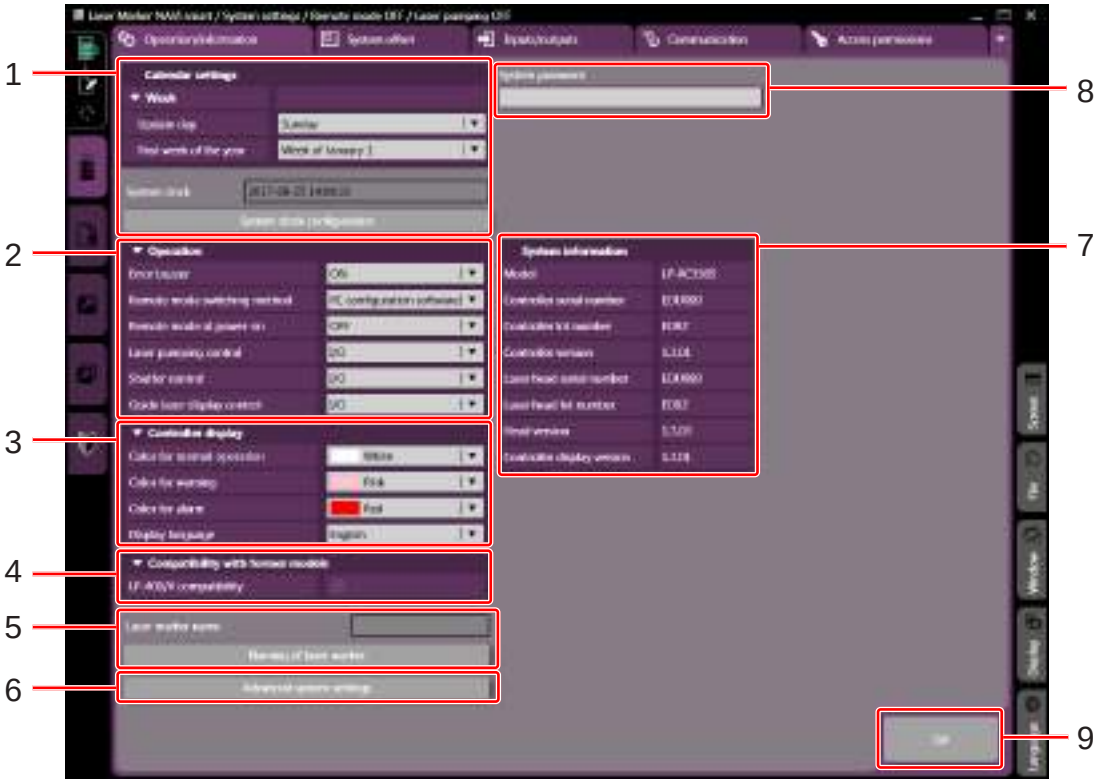
Reference

- All contents which are registered in the laser marker are overwritten with the backup data.
- Do not disconnect with the laser marker while restoring.
- The following parameters are not restored. For them the laser marker keeps the original setting.
  - Current value of the counter function
  - Time and data of system clock
  - Setting of the power optimization by marking position
  - Setting of valid or invalid for the optional software
  - Error log
  - Command history
  - Runtime data

8 System Settings Screen

8-1 Laser Marker Setting/Information

On this screen set the system properties of the laser marker.
If changes are required, configure the settings before operation.



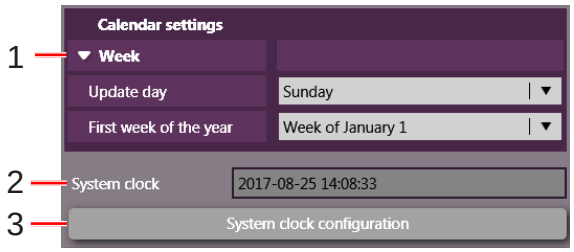
	Setting elements	Description
1	Calender setting	Sets the clock and calender information in the online connected laser marker.
2	Operation setting	Sets on/off of the error buzzer and the operating condition under the remote control mode.
3	Controller display *1	Sets the backlight color and language of the display panel on the controller.
4	Compatibility with former models	To reuse the marking data and communication command format which are used with the former laser marker of LP-400/LP-V series, enable this setting.
5	Laser marker name	Sets the nickname to the specified laser marker.
6	Advanced system settings	Specifies the enabling or disabling the cache of the graphic data and the default font.
7	System information	Displays the following information of the online connected laser marker. • Model • Controller serial number • Controller lot number • Controller version • Laser head serial number • Laser head lot number • Laser head version • Oscillator unit serial number *2 • Oscillator unit lot number *2 • Oscillator unit version *2 • Controller display version *1 • Optional network *3

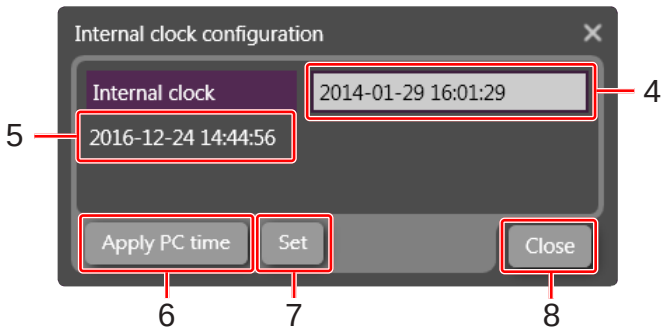
	Setting elements	Description
8	System reservation password	System reserved for the authorized staffs. Do not use this field.
9	Set	Clicking on this button transfers the setting to the laser marker. When changing “Operation setting” or “Compatibility with former models” parameters, reboot the laser marker after clicking this button.

*1 : Available with LP-RC series, LP-RF series and LP-RV series.
*2 : Available with LP-RV series.
*3 : Available with LP-RF/LP-RV series. Displays whether the optional network unit is installed or not.

8-1-1 Calender and clock setting

Displays the clock and calender information of the laser marker.





	Item	Description
1	Week	Specifies the first day of the week and the first week of the year for the functional characters using week and week-based year in the current date, the expiry date, or the lot.

Update day: Specifies the week renewal timing, i.e., the first day of the week.

Sunday	Renews the week at 0:00 a.m. of Sunday.
Monday	Renews the week at 0:00 a.m. of Monday.

First week of the year: Specifies the definition of the first week of the year.

Week of January 1	The week which contains January 1 is the-first-week-of-the-year after January 1. The week which contains December 31 is the last week of the year.
Week of 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 next year and the date January 1 is in the last week of the previous year.

Example: When January 1 is Sunday, week setting is as follows:

Setting	First week of the year	Remarks
• Update Day : Monday • First week : January 1	January 1.(Sun.) only	The second week is from January 2.(Mon.) to January 8.(Sun.)
• 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.

2	System clock	Displays the current date and time of the laser marker with YYYY-MM-DD hh:mm:ss. This clock is used for the functional characters such as data/time and lot. The system clock does not support the time zone service and daylight-saving time. Before using the laser marker, check the system clock and set the correct date and time.

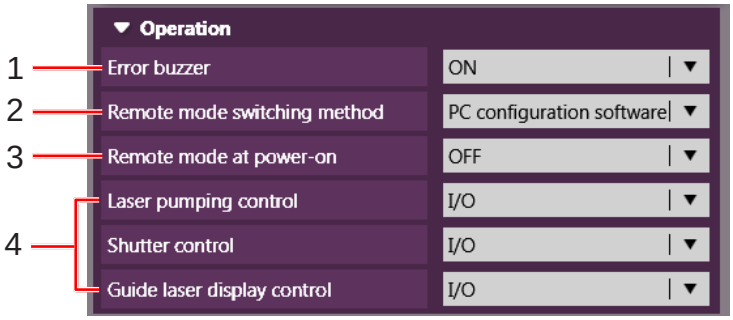
Reference

- The system clock might be deviated due to error of the internal parts or degree of the battery drain. Therefore, be sure to check the time of the system clock before the operation.

3	System clock setting	Opens the setting window of the system clock.
4	System clock	Displays the time of the laser marker with YYYY-MM-DD hh:mm:ss. To change the time setting, click here and input the time and date.
5	PC clock	Displays the clock of the PC with YYYY-MM-DD hh:mm:ss.
6	Apply PC time	Applies the PC time to the system clock of the laser marker.
7	Set	Applies the changing of the time and date to the laser marker.
8	Close	Closes the system clock setting window.

8-1-2 Operation setting

Set on/off of the error buzzer and the operating condition under the remote control mode.



	Item	Description
1	Error buzzer	Sets the error buzzer on/off for error occurrence. Setting entry: ON, OFF Initial setting: ON
2	Remote mode switching method	Specifies the shifting method to the remote mode. Refer to “3-3-2 Remote mode settings” (P.61). Setting entry: PC configuration software, I/O Initial setting: PC configuration software
3	Remote mode at power-on	Selects the remote mode status when the key switch is turned ON. This setting is available when the remote mode shifting method is set to “PC configuration software”. Setting entry: OFF, ON Initial setting: OFF
4	Control method under the remote mode	Specifies the external control method for the following operations under the remote mode. • Laser pumping control • Shutter control • Guide laser display control *1 Setting entry: Communication command, I/O Initial setting: I/O

Reference

- For LP-RF/LP-RV series if you want to control the remote mode via optional network unit (EtherNet/IP or PROFINET), select “I/O” here.

Reference

- For LP-RF/LP-RV series if you want to control these I/O operations via optional network unit (EtherNet/IP or PROFINET), select “I/O” here.

*1 : Available with LP-GS051(-L) type, LP-RC350S, LP-RF series and LP-RV series.

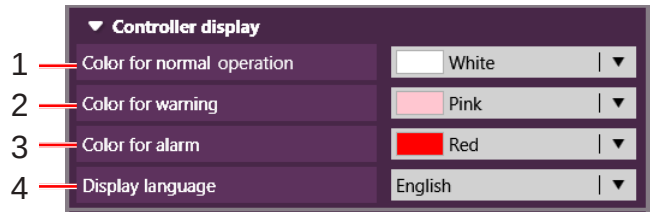
Reference

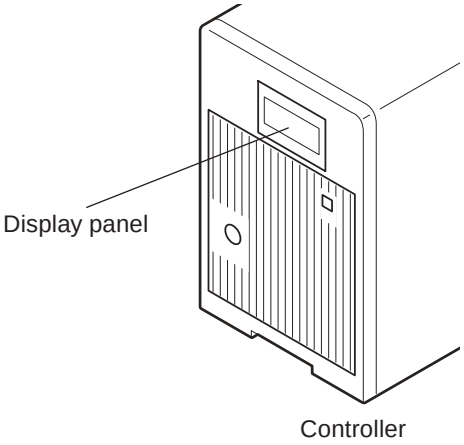
- When changing the above items, click on the “Set” button and restart the laser marker. After rebooting, the setting is activated.

8-1-3 Controller display

Supported model: LP-RC series / LP-RF series / LP-RV series

Sets the backlight color and language of the display panel on the controller which indicates the laser marker status.





	Item	Description
1	Color for normal operation	Select the display panel color at the normal status. Setting entry: White, pink, red Initial setting: White
2	Color for warning	Select the display panel color at the error (warning) status. Setting entry: White, pink, red Initial setting: Pink
3	Color for alarm	Select the display panel color at the error (alarm) status. Setting entry: White, pink, red Initial setting: Red

Reference

- When an alarm of error No. E000 to E199 occurs, the display color always becomes red regardless of this setting.

4	Display language	Select the display language of the controller panel. The error information is displayed in the selected language. Setting entry: • English • Japanese • Simplified Chinese Initial setting: Japanese

Reference

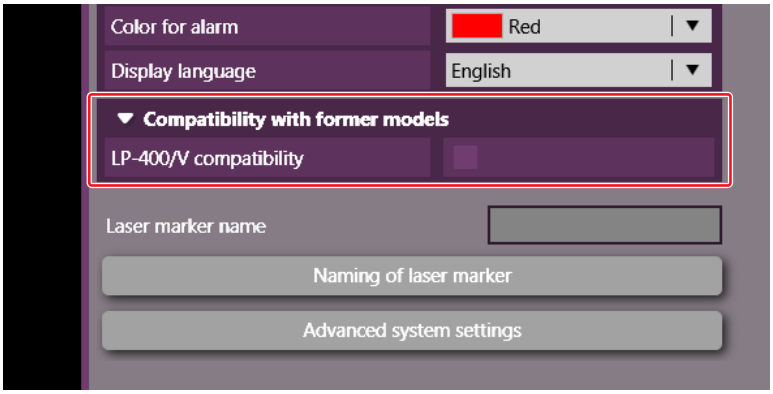
- The display language can be changed also with the controller panel directly.

Reference

- When changing the above items, click on the “Set” button on the lower right corner of the screen.

8-1-4 Compatibility with former models (LP-400/LP-V)

To reuse the marking data and communication command format which are used with the former laser marker of LP-400/LP-V series, enable this setting.



By enabling “LP-400/V compatibility”, the following settings are changed from the standard settings.

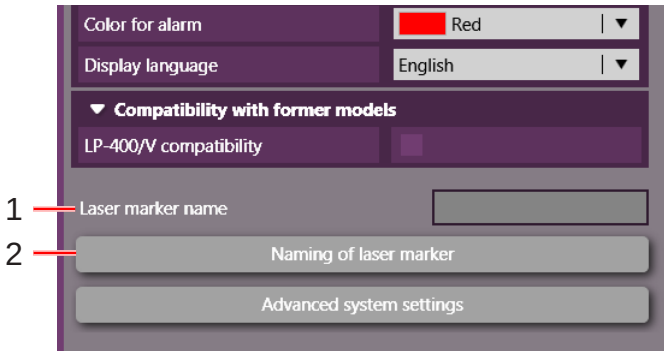
- Communication commands:
  The communication command mode is changed from the standard mode to “LP-400/V command mode”. In this mode you can use the same commands of LP-400/LP-V series to LP-GS/LP-RC/LP-RF/LP-RV series.
- File settings:
  The setting items of “Compatibility with former models” in file settings of the settings screen are available.
  Refer to “3-13-4 Compatibility with former models” (P.162).

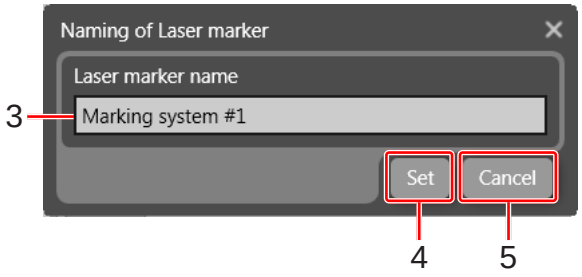
Reference

- When changing the setting of “Compatibility with former models”, click on the “Set” button and restart the laser marker. After rebooting, the setting is activated.
- In the converted files from LP-400/LP-V series, “LP-400/V compatibility” is enabled at the default settings.
- For the details of the compatible command mode with the previous models of LP-400/LP-V series, refer to the “Serial Communication Command Guide: LP-400/V compatible mode”.
- The communication command “RSM” to switch the command mode is available only when “LP-400/V compatibility” is enabled in system settings.
- When “LP-400/V compatibility” is enabled in system settings, the command mode is always “LP-400/V command mode” at the time of starting the remote control mode. To use standard command mode, always send this command at first or disable “LP-400/V compatibility” in system settings.
- For LP-RF/LP-RV series if you use the optional network unit (EtherNet/IP or PROFINET) for the command control, deactivate “LP-400/V compatibility” here. You cannot use the command format in LP-400/V compatible mode via EtherNet/IP or PROFINET.

8-1-5 Naming of laser marker

Sets the nickname to the specified laser marker.
When you use multiple laser markers, it is used to identify them.
The laser marker name is always displayed in the status bar of Laser Marker NAVI smart. It is also displayed when selecting the online connecting laser marker.

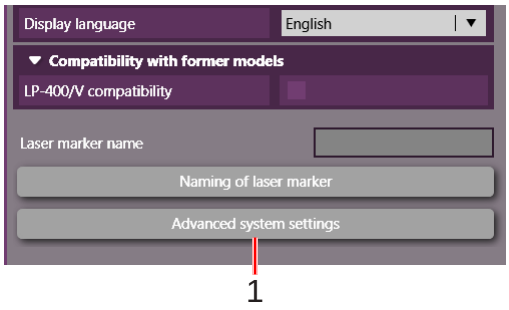


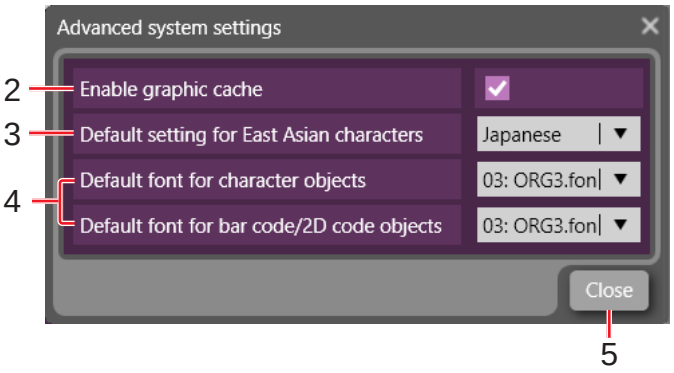


	Item	Description
1	Laser marker name	Displays the name of the online connected laser marker. Under the offline editing of the backup file, it displays the laser marker name of the backup source.
2	Naming of Laser marker	Opens the setting window of the laser marker name.
3	Laser marker name	Input the arbitrary name. Up to 128 characters are accepted.
4	Set	Applies the changing of the name to the laser marker.
5	Cancel	Closes the input window without applying the change.

8-1-6 Advanced system settings

Specifies the enabling or disabling the cache of the graphic data and the default font.





	Item	Description
1	Advanced system settings	Opens the setting window of the advanced system.
2	Enable graphic cache	With the setting of “Enable graphic cache”, the marking time of the file including graphic object settings becomes shorter. If you use graphic objects, set ON always. Setting entry: ON, OFF Initial setting: ON
3	Default setting for East Asian characters	Select the non-alphanumeric character type from Chinese or Japanese which can be used in the character objects and barcode/2D code objects. This setting is applied to the default setting of “East Asian characters” in the file settings. Refer to “3-13-1 Offset and character settings” (P.156). Setting entry: Japanese, Simplified Chinese
4	Default font	Select the default font of the character object and the human readable text of the bar code/2D code object respectively. Refer to “7-2-4 Font file” (P.215) for the available font type.
5	Close	Closes the window of the advanced system settings.

Reference

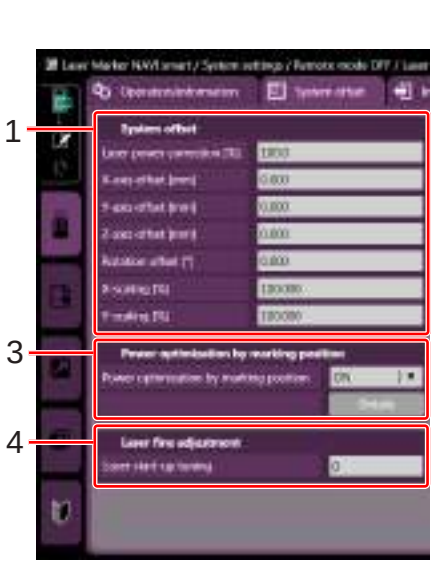
- When Japanese is selected, JIS fonts saved in J1 and J2 on the font list are used for the non-alphanumeric characters. When Simplified Chinese is selected, GB fonts saved in GB1 and GB2 are used. For the detail of the font, refer to “7-2-4 Font file” (P.215).

Reference

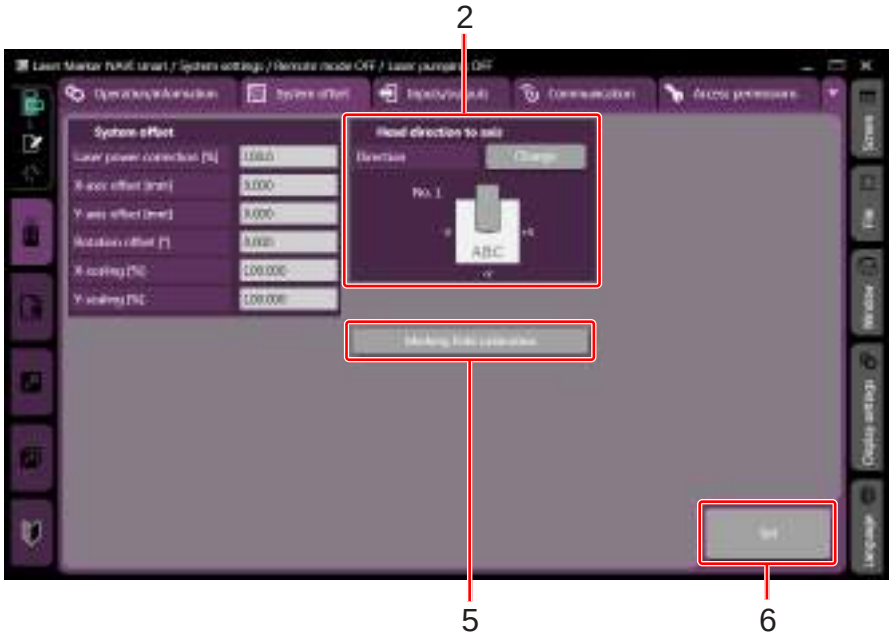
- When changing the above items, click on the “Set” button on the lower right corner of the screen.

8-2 System offset

System offset corrects the marking field and laser power of the laser marker.
This setting applies to all files in the laser marker.



LP-GS/LP-RC series



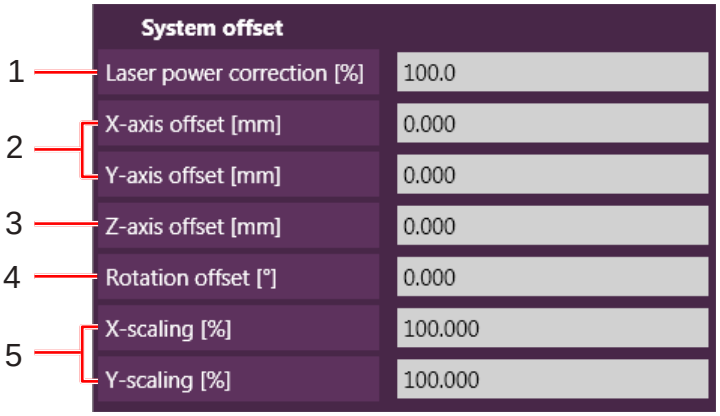
LP-RF series / LP-RV series

	Setting elements	Description
1	System offset	Corrects the marking field and laser power of the laser marker.
2	Head direction to axis	Specifies the head direction to X-/Y-axis in the marking field.
3	Power optimization by marking position *1	If there is a difference in the marking density by the marking position, corrects the laser power setting to reduce the difference in the center and the edge of the marking field.
4	Laser fine adjustment *2	Adjusts the start-up of the laser power, i.e. marking quality of the beginning part.
5	Marking field calibration *3	When the fiber unit is removed and re-installed, the lasing position might be misaligned. To align the lasing position, calibrate the marking field with this function.
6	Set	Clicking on this button transfers the setting to the laser marker and activates the changes.

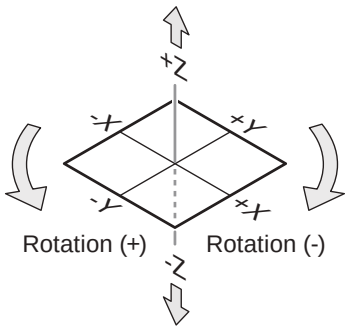
*1 : Available with LP-GS series and LP-RC series.
*2 : Available with LP-GS series.
*3 : Available with LP-RF series and LP-RV series.

8-2-1 System offset

Corrects the marking position and the laser power to all files in the laser marker.
This function is used to adjust the installation position or individual difference when the multiple laser markers are used.



	Setting elements	Description
1	Laser power correction [%]	Offsets the laser power setting. With this setting, the laser power in all files is changed. Setting range: 50.000 to 200.000%
2	X-/Y-axis offset [mm]	Shifts the marking field to X/Y direction. Setting range: -999.999 to +999.999 mm
3	Z-axis offset [mm] *1	Shifts the marking field to Z direction. Setting range: -3.000 to +3.000 mm (LP-GS051); -1.500 to +1.500 mm (LP-GS052)
4	Rotation offset [°]	Rotates the marking field. The rotation center is the center of the marking field. Setting range: -180.000 to +180.000°
5	X-/Y-scaling [%]	Enlarges or reduces the marking field size. The scaling origin is at the center of the marking field. Setting range: 70.000 to 130.000%



*1 : Available with LP-GS series (except LP-GS051-L).

Reference

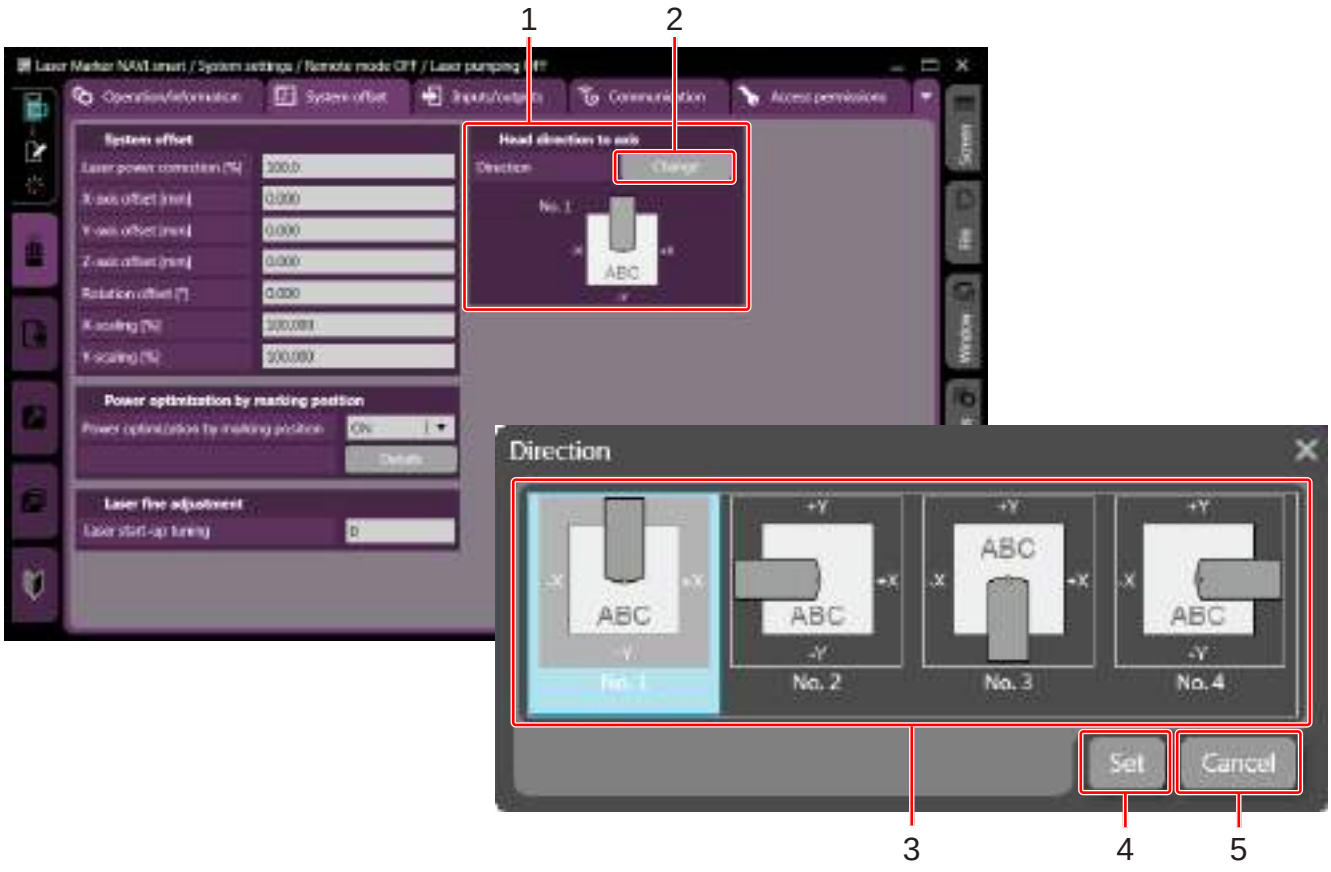
- Laser power correction refers to the function to correct not the maximum laser power [W] value but the laser power setting value.
- If the corrected value exceeds 100, marking is executed with the laser power setting value 100.

Reference

- Before changing the system offset value, confirm the head direction setting. After the head direction is changed, confirm if the system offset values are applied to the marking as expected.
- The system offset settings are not reflected in the image display.
- If the system offset value exceeds the marking field size, only the range in the specified marking field can be used.

8-2-2 Head direction setting

Specifies the head direction to X-/Y-axis in the marking field.



	Setting elements	Description
1	Head direction to axis	Displays the current setting of the head direction.
2	Change	Opens the setting window of the head direction.
3	No. 1 to No. 4	Select the head direction to X-/Y-axis by clicking the image.
4	Set	Applies the changing of the head direction to the laser marker.
5	Cancel	Closes the input window without applying the change.

Reference

- The head direction can be confirmed in the marking image view. Refer to “3-2-1 Composition of marking image field” (P.56).
- Since the power optimization by marking position and the marking field calibration are executed always based on the X-/Y-axis of head direction No.1, set the head direction to No.1 before using these functions.
- When the head direction is changed, confirm if the system offset values are applied to the marking as expected.

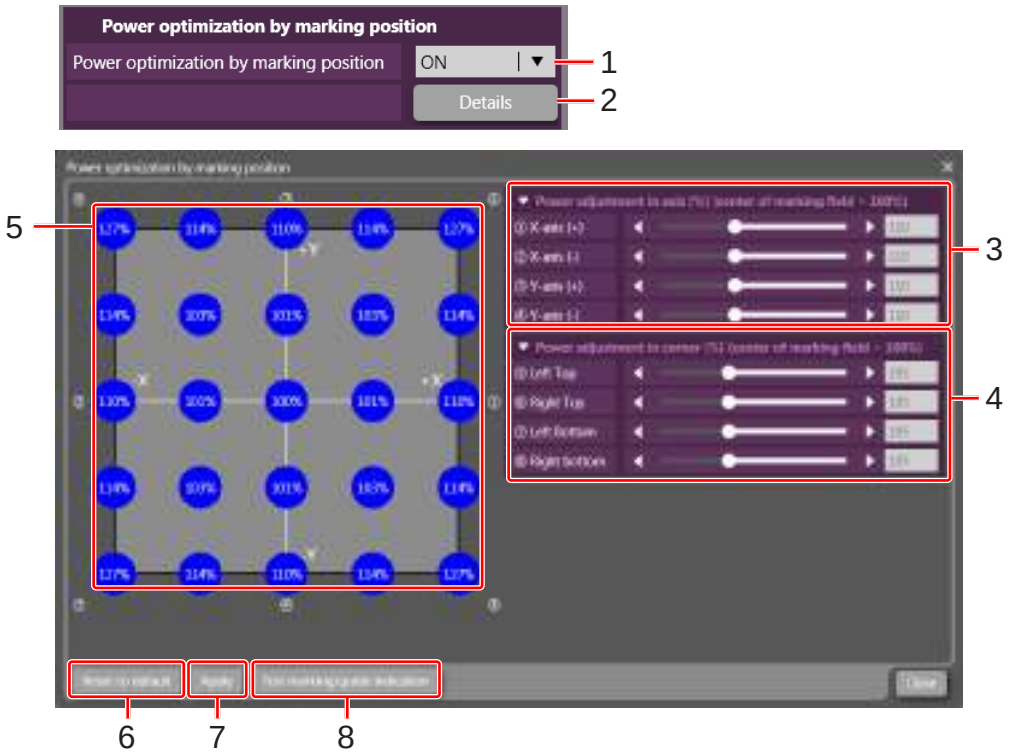
8-2-3 Power optimization by marking position

Supported model: LP-GS series / LP-RC series

Power optimization by marking position is the function to correct the laser power setting internally according to the marking field position.
If there is a difference in the marking density by the marking position, corrects the laser power setting to reduce the difference in the center and the edge of the marking field.
This setting applies to all files in the laser marker.

Notice

- After changing this setting, check the marking quality with the actual marking target.
- Since the power optimization by marking position is executed always based on the X-/Y-axis of head direction No.1, set the head direction to No.1 before the power optimization. Refer to “8-2-2 Head direction setting” (P.237).



	Setting elements	Description
1	Power optimization by marking position	If the marking density in the center and the edge of the marking field are different, set “ON” here. Setting entry: ON, OFF Initial setting: LP-GS series: OFF; LP-RC series: ON
2	Detail	Applicable when the power optimization by marking position is set ON. To change the correction value from the initial setting, click “Detail” to open the setting window.
3	Power adjustment on axis [%]	While the laser power at the center of the marking field is 100%, specify the power corrective rate in each position. By inputting the adjustment value here, the display value in the optimized power image view changes. Setting range: 50 to 200%
4	Power adjustment at corner [%]	

Reference

- To find out the proper correction value effectively, input the power adjustment on axis at first. After check the marking quality by test marking, fix the axis value. Then fine-tune the marking quality with inputting the corner adjustment.

	Setting elements	Description
5	Optimized power image	Displays the laser power corrective rate in each marking position in according to the input adjustment value. For the corner of the marking field, the corrective rate is calculated as follows; Power adjustment rate in the upper left of the marking field = adjustment in corner ⑤ x adjustment in axis ② x adjustment in axis ③ [%]
6	Reset to default	Resets the correction value to the initial setting.
7	Set	Clicking on this button transfers the setting to the laser marker and activates the changes.
8	Test marking/Guide laser *1	By using the applied setting, test marking is executed with the file selected in marking settings screen. Refer to “3-4 Test Marking / Guide Laser” (P.66).

*1 ： Available with LP-GS051(-L) type and LP-RC350S.

Reference

- Power optimization refers to the function to correct not the max. laser power [W] value but the laser power setting value. Power optimization does not change the actual max. output power relative to initial power.
- If the laser power setting exceeds 100 with the optimization, the laser power is set as 100.

8-2-4 Laser fine adjustment

Supported model: LP-GS series

Adjusts the start-up of the laser power, i.e. marking quality of the beginning part.

	Setting elements	Description
1	Laser start-up tuning	Adjusts the laser power at the starting part of the marking. The larger value makes the marking at the starting part wider or darker. Setting range: -100 to +100 Initial value: 0

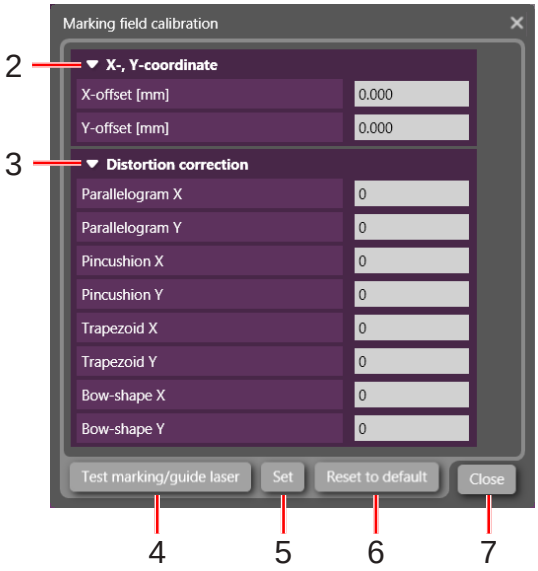
8-2-5 Marking field calibration

Supported model: LP-RF series / LP-RV series

The fiber unit of this product can be removed from the head at the installation temporarily.
When the fiber unit is removed and re-installed, the lasing position might be misaligned. To align the lasing position, calibrate the marking field with this function.

Notice

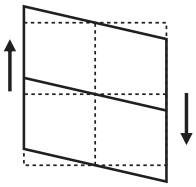
- Since the marking field calibration is executed always based on the X-/Y-axis of head direction No.1, set the head direction to No.1 before the marking field calibration. Refer to “8-2-2 Head direction setting” (P.237).



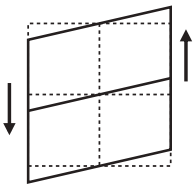
	Item	Description
1	Marking field calibration	Opens the setting window of the calibration.
2	X-offset [mm] Y-offset [mm]	Moves the center position of the marking field to X or Y direction. Setting range: -2.000 to +2.000 mm
3	Distortion correction	Fine tunes the marking field with the following parameters. Refer to “Distortion correction image” (P.241). • Parallelogram X/Y • Pincushion X/Y • Trapezoid X/Y • Bow-shape X/Y Setting range: -10000 to +10000
4	Test marking/guide laser	Executes test marking or guide laser radiation to confirm the lasing position at the calibration. Refer to “Calibration procedures of marking field” (P.242).
5	Set	Applies the setting of the marking field calibration to the laser marker.
6	Reset to default	Reset the setting of the marking field calibration to the default value.
7	Close	Applies the calibration setting to the laser marker and closes the window.

■ Distortion correction image

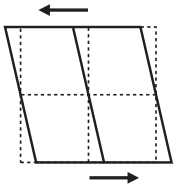
Parallelogram



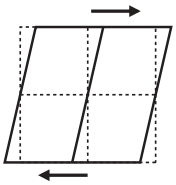
When making the X value smaller



When making the X value bigger

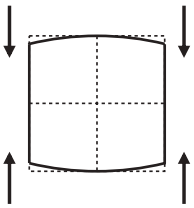


When making the Y value smaller

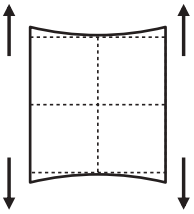


When making the Y value bigger

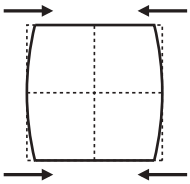
Pincushion



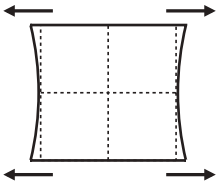
When making the X value smaller



When making the X value bigger

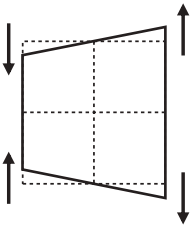


When making the Y value smaller

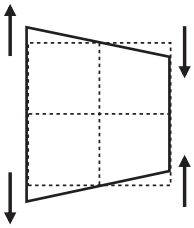


When making the Y value bigger

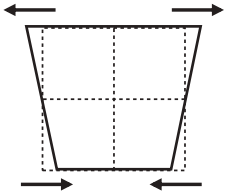
Trapezoid



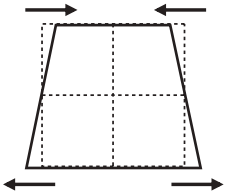
When making the X value smaller



When making the X value bigger

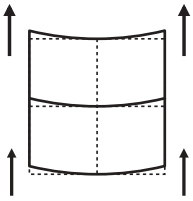


When making the Y value smaller

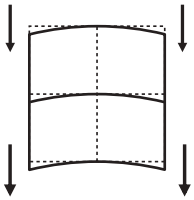


When making the Y value bigger

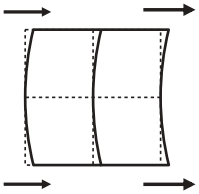
Bow-shape



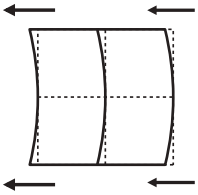
When making the X value smaller



When making the X value bigger



When making the Y value smaller



When making the Y value bigger

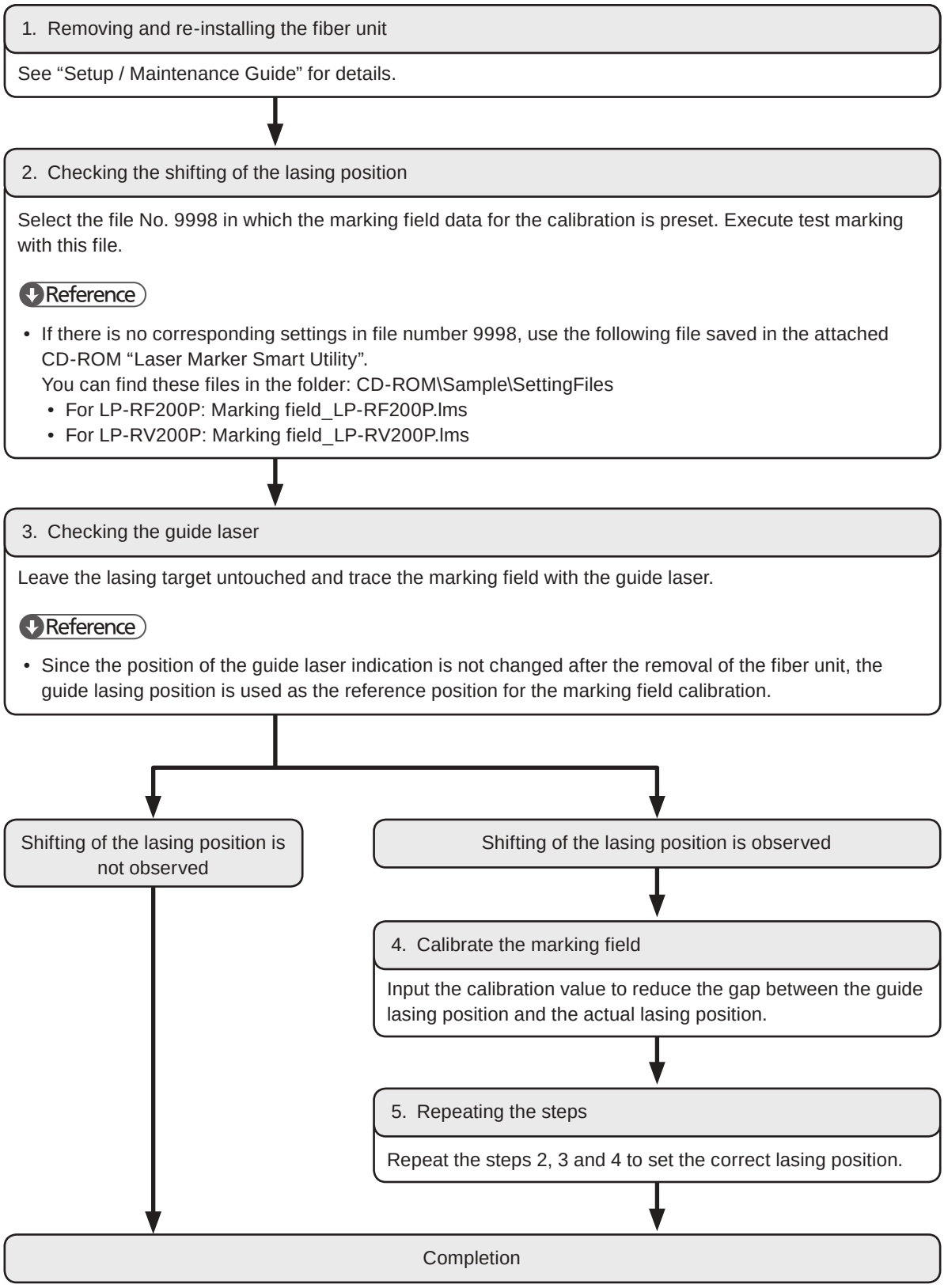
Shows the original marking field.

Shows the change of the marking field when each value is input.

■ Calibration procedures of marking field

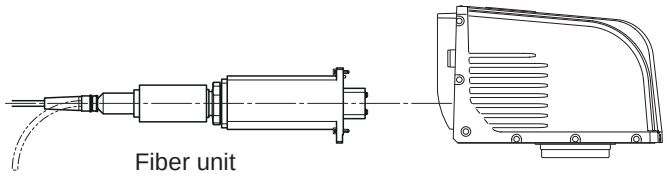
Reference

- Calibration of marking field is required when the fiber unit is removed and re-installed. If the fiber unit is not removed, the calibration is not needed.



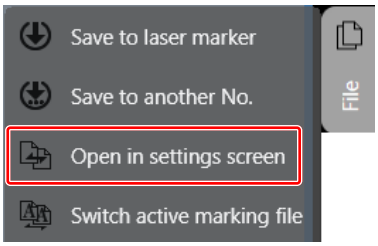
1. Mount the fiber unit to the head of the laser marker properly.

For the mounting procedures, refer to Setup/Maintenance Guide.



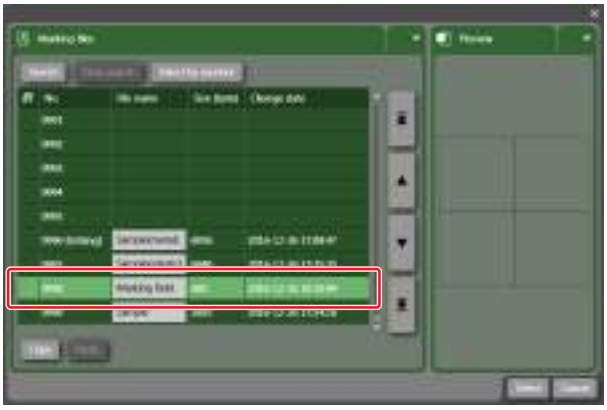
2. Connect the laser marker and Laser Marker NAVI smart online, and select “Marking settings” from the screen selection menu.

3. Open “File” tab in the right menu and click “Open in settings screen”.



4. Select file No. 9998.

In file No. 9998 “Marking field” the marking field data (Field90x90.vec) for the calibration is preset. Execute test marking with this file to draw the marking field frame and center lines by the actual laser.



Reference

- During the calibration of the marking field, set the default value to all settings other than laser power, scan speed, pulse cycle and pulse duration.
- If there is no corresponding settings in file number 9998, use the following file saved in the attached CD-ROM “Laser Marker Smart Utility”. You can find these files in the folder: CD-ROM\Sample\SettingFiles
  - For LP-RF200P: Marking field_LP-RF200P.lms
  - For LP-RV200P: Marking field_LP-RV200P.lms

5. Select “System settings” from the screen selection menu.

6. Click “System offset” tab and set the following system offset parameters to the default. Click on the “Set” button on the lower right corner of the screen.

- Head direction setting: No. 1
- X-axis offset, Y-axis offset = 0 mm
- Rotation offset = 0 degree
- X-scaling, Y-scaling = 100%

Reference

- After the calibration is finished, set the system offset parameters as before.

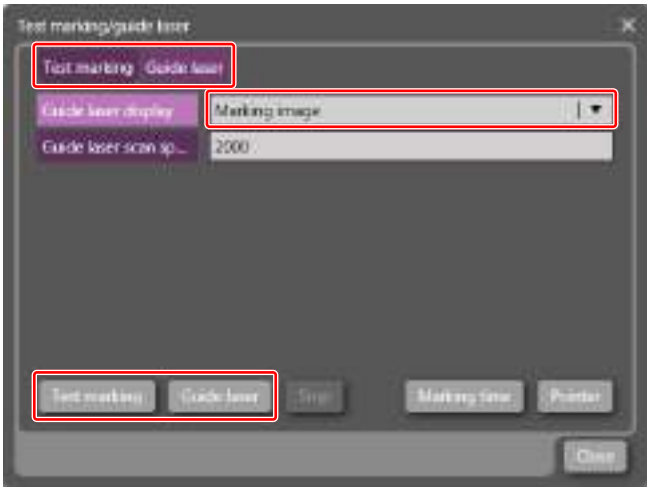
7. Click “Marking field calibration”.

8. Click “Test marking/guide laser” in the marking field calibration settings.

9. Click “Test marking” tab and set the suitable value to the power and other laser settings for the target application.

10. Click “Guide laser” tab. Select the guide laser display to “Marking object” and click “Guide laser”. Confirm the lasing position and place the lasing target.

Place the lasing target at the work distance (190mm).

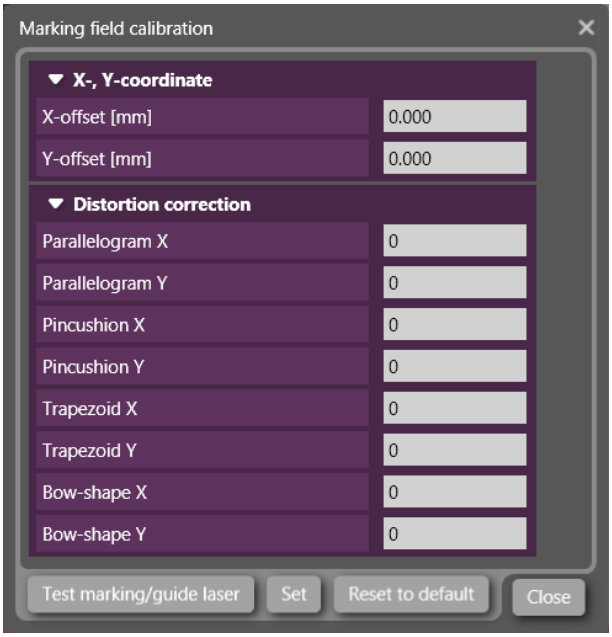


11. Click “Test marking” and start lasing.

12. Leave the lasing target untouched and select the guide laser display to “Marking field” and click “Guide laser”.

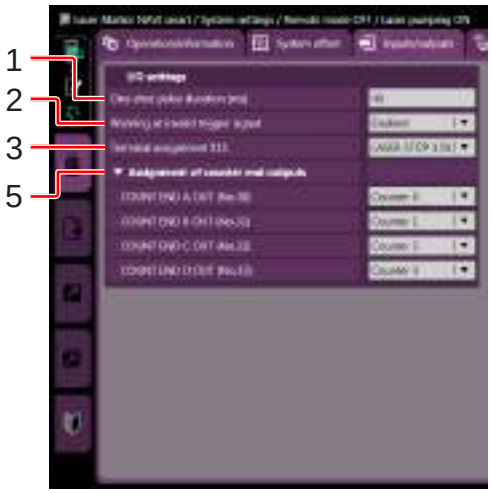
13. Check the gap between the guide lasing position and the actual lasing position. If they do not overlap, input the calibration value.

14. Repeat the steps 10 to 13 until the marking field indication of the guide laser overlaps with the actual lasing position.

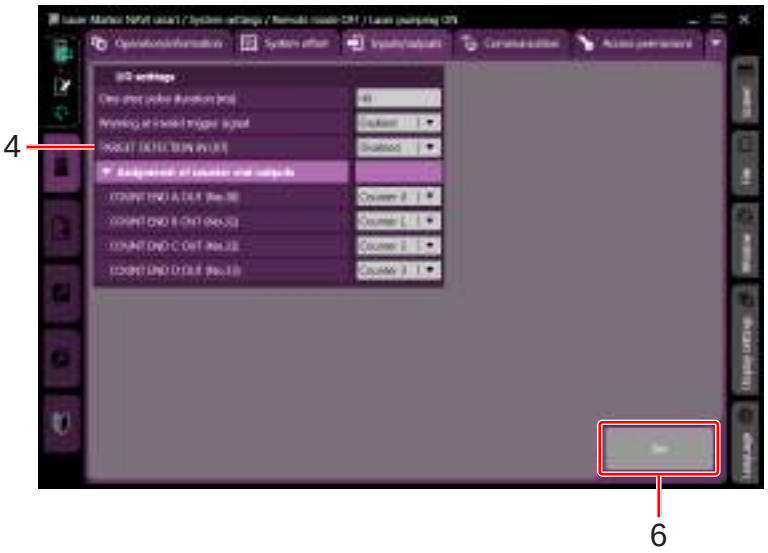


8-3 Input/Output Setting

The I/O settings of the laser marker are configured.



LP-GS series



LP-RC series / LP-RF series / LP-RV series

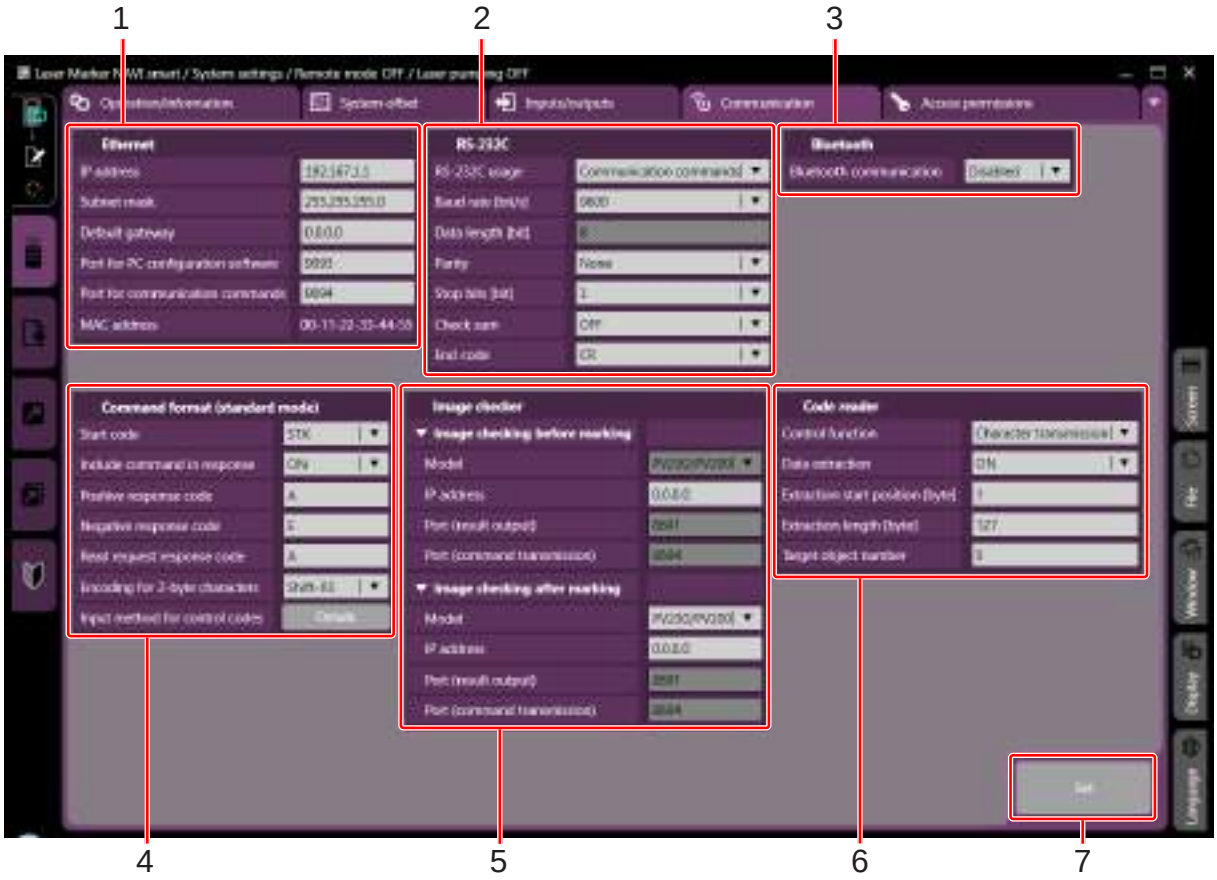
	Item	Description
1	One-shot pulse duration [ms]	Specifies the output duration time for the one-shot output signal such as PROCESSING END OUT. The output duration of the one-shot setting has a margin of error. One-shot output terminals: • PROCESSING END OUT (Y11) • PROCESSING FAIL OUT (Y12) • SET OK OUT (No. 28) • CHECK OK OUT (No. 34) • CHECK NG OUT (No. 35) Setting range: 2 to 510 ms Initial setting: 40 ms
2	Warning at invalid trigger signal	Select the ON/OFF of the warning to show that the invalid trigger signal is input during the trigger processing. With ON setting, the warning E750 occurs for 3 seconds if there is an invalid trigger input. Setting range: ON, OFF Initial setting: ON
3	Terminal assignment X11 *1	Select the behavior of the input signal X11 on I/O terminal from LASER STOP 1 IN or LASER STOP 2 IN. For the operation details of LASER STOP, refer to “Setup/Maintenance Guide”. Setting entry: LASER STOP 1 IN, LASER STOP 2 IN Initial setting: LASER STOP 2 IN
4	TARGET DETECTION IN (X7) *2	Select whether or not to use X7:TARGET DETECTION IN on I/O terminal. When enabling this terminal, connect a sensor which detect the work piece is in position for lasing. Setting entry: Enabled, Disabled Initial setting: Disabled

	Item	Description
5	Assignment of counter end outputs	Assign the counter No. to COUNT END A OUT to COUNT END D OUT (I/O pin No. 30 to 33). As the default setting, counter No. 0 to 3 are assigned to COUNT END A OUT to COUNT END D OUT respectively. Setting range: Counter 0 to Counter 31
6	Set	Clicking on this button transfers the setting to the laser marker. After rebooting the laser marker, the setting is activated.

*1 : Available with LP-GS series.
*2 : Available with LP-RC series, LP-RF series and LP-RV series.

8-4 Communication Settings

Sets the communication conditions to connect the laser marker with an external devices.



	Setting elements	Description
1	Ethernet	Sets the Ethernet conditions to control the laser marker.
2	RS-232C	Sets the RS-232C conditions to control the laser marker.
3	Settings of optional device	If you installed the optional communication unit, either of the following settings is displayed. • Bluetooth *1 • EtherNet/IP *2 • PROFINET *2
4	Command format	Sets the command format to control the laser marker by the communication command.
5	Image checker	When the image checker link control function is used, set the communication condition here.
6	Code reader	When the code reader linkage control function is used, set the control condition here.
7	Set	Clicking on this button transfers the setting to the laser marker. After rebooting the laser marker, the setting is activated.

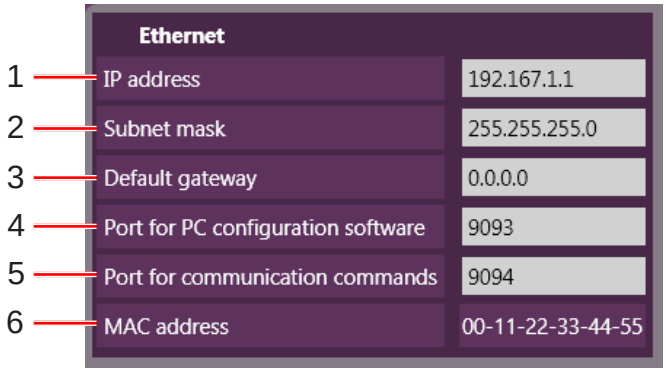
*1 : Bluetooth is available with the following models.
- LP-GS051 / LP-GS051-E / LP-GS051-L / LP-GS051-LE
- LP-GS052 / LP-GS052-E

*2 : Available for LP-RF/LP-RV series when the optional network unit is installed to the controller.

8-4-1 Ethernet

Sets the Ethernet condition of the laser marker to connect one of the following devices.

- The PC with Laser Marker NAVI smart installed
- PLC or PC for control: Externally controls the laser marker using the communication commands.
- Specified external devices: Interfaces the specified external device (image reading equipment) with the laser marker and controls their operations.



	Item	Description
1	IP address	Setting range: 1.0.0.0 to 223.255.255.255 (For the first octet, exclude 127) Initial value: 192.168.1.5

Reference

- Even the IP address and subnet mask values are within the configurable range, they may not be available depending on the combination.

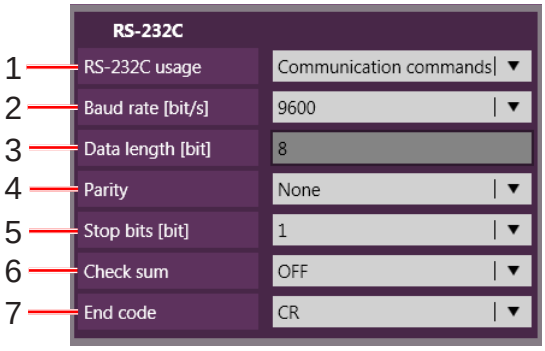
2	Subnet mask	Setting range: 128.0.0.0 to 255.255.255.254 Initial value: 255.255.255.0
3	Default gateway	Setting range: 0.0.0.0 to 223.255.255.255 (For the first octet, exclude 127) Initial value: 0.0.0.0
4	Port for PC configuration software	Sets the PC configuration software port. Setting range: 1025 to 65534 (exclude 9090) Initial value: 9093
5	Port for communication commands	Set the port for command communication. Setting range: 1025 to 65534 (exclude 9090) Initial value: 9094
6	MAC address	Displays the MAC address.

Notice

- The communication control of the laser marker through the Ethernet should be performed in a secure network environment.

8-4-2 RS-232C

Sets the RS-232C conditions to control the laser marker by using the communication command.



	Setting elements	Description
1	RS-232C usage	Specifies the usage of RS-232C port. Setting entry: Communication commands, Code reader
2	Baud rate [bps]	Specifies the baud rate. The setting value varies as shown below every time the setting area is pressed. Setting entry: 1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200 [bps] Initial setting: 9600 bps
3	Data length [bit]	Indicates the data length. 8-bit fixed.
4	Parity	Specifies the parity. Setting entry: None, Odd, Even Initial setting: None
5	Stop bits [bit]	Specifies the stop bit. Setting entry: 1bit, 2bit Initial setting: 1bit
6	Check sum	Specifies ON/OFF of check sum (error detection information). Setting entry: ON, OFF Initial setting: OFF Check Sum indicates the lower 1-byte of adding result of values (binary) from the start code to the last data by converting it to two characters for ASCII.
7	End code	Sets the end code to identify the end of telegraphic message (Delimiter). Setting entry: CR, CR+LF Initial setting: CR

Reference

- The communication conditions of RS-232C must match the settings of the external control device. If the settings are different, communication will fail.

8-4-3 Bluetooth

Supported model: LP-GS series

When the laser marker and PC are the Bluetooth supported model, it is possible to connect the laser marker and Laser Marker NAVI smart online by Bluetooth with this setting.

	Item	Description
1	Bluetooth communication	To connect the laser marker and Laser Marker NAIV smart by Bluetooth, set ON here. Setting entry: Enabled, Disabled

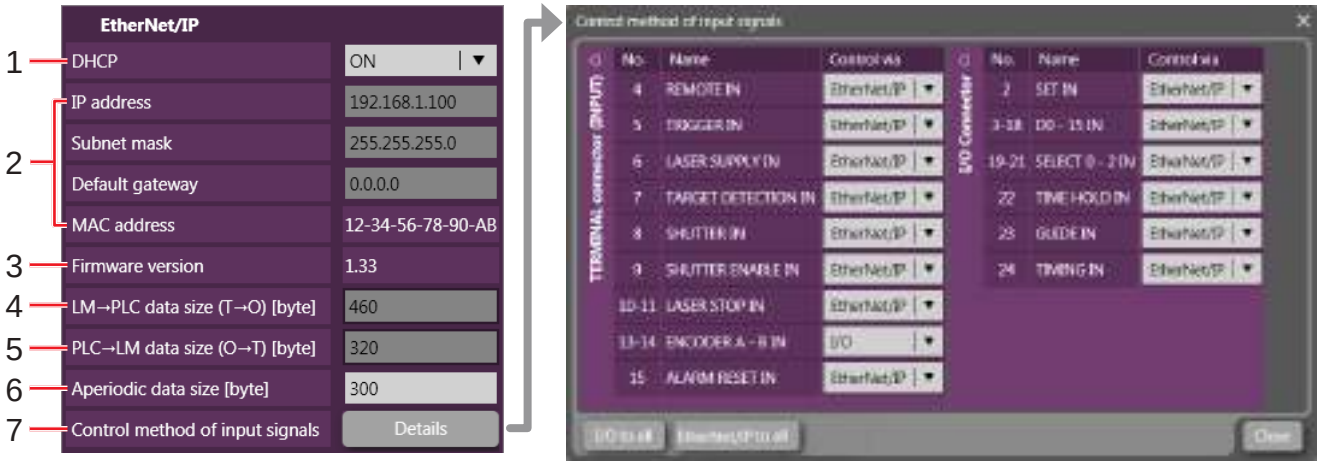
Reference

- Bluetooth is available with the following models.
  LP-GS051 / LP-GS051-E / LP-GS051-L / LP-GS051-LE
  LP-GS052 / LP-GS052-E
- Some Bluetooth device on the PC side may not connect with the laser marker.
- For details of the Bluetooth connection, refer to “Setup/Maintenance Guide”.

8-4-4 EtherNet/IP

Supported model: LP-RF series / LP-RV series

Sets the communication settings of the optional network unit EtherNet/IP™.
When changing these settings, click on the “Set” button and restart the laser marker. After rebooting, the settings are activated.



	Item	Description
1	DHCP	Turning DHCP to “ON”, the settings of IP address, subnet mask, and default gateway are automatically imported from the DHCP server. If you want to specify certain values to IP address, subnet mask, and default gateway, set “OFF” here. Setting entry: ON, OFF Initial setting: ON
2	Network settings	With DHCP “ON”, imported values of IP address, subnet mask, and default gateway are displayed. With DHCP “OFF”, specify the value to IP address, subnet mask, and default gateway. • IP address Setting range: 0.0.0.0 to 223.255.255.255 (For the first octet, exclude 127) Initial value: 0.0.0.0 • Subnet mask Setting range: 0.0.0.0 to 255.255.255.254 Initial value: 0.0.0.0 • Default gateway Setting range: 0.0.0.0 to 223.255.255.255 (For the first octet, exclude 127) Initial value: 0.0.0.0 • MAC address

Reference

- If the network settings such as IP address are not updated with DHCP ON, check the connecting status of the DHCP server.

Reference

- Even the settings of subnet mask is within the configurable range, it may not be available depending on the combination of the numbers.

	Item	Description
3	Firmware version	Displays the version of the installed EtherNet/IP unit.
4	LM → PLC data size (T → O) [byte]	Displays the maximum data size to input from laser marker to your PLC. Fixed with 460 byte.
5	PLC → LM data size (T → O) [byte]	Displays the maximum data size to input from your PLC to laser marker. Fixed with 320 byte.
6	Aperiodic data size [byte]	Specifies the maximum size of the aperiodic data. Check the specification of your PLC and set the value that can be accepted by the PLC. Setting range: 64 to 1448 byte Initial value: 300 byte
7	Control method of input signals	Selecting “Details” button opens the setting dialog. Select either “I/O” or “EtherNet/IP” to the control method of each input signal on the I/O terminal and I/O connector. Setting entry: I/O, EtherNet/IP Initial setting: I/O With “I/O to all” or “EtherNet/IP to all” buttons, all settings are changed at once. For the following input signals, settings here are activated when the control method is set to “I/O” under “Operation/information” tab in System settings screen. Refer to “8-1-2 Operation setting” (P.230) for details. • REMOTE IN (Remote mode switching method) • LASER SUPPLY IN (Laser pumping control) • SHUTTER IN, SHUTTER ENABLE IN (Shutter control) • GUIDE IN (Guide laser display control)

Reference

- The input signals of REMOTE INTERLOCK IN, INTERLOCK 1, and INTERLOCK 2 cannot be controlled via EtherNet/IP.

Notice

- The communication control of the laser marker through EtherNet/IP should be performed in a secure network environment.

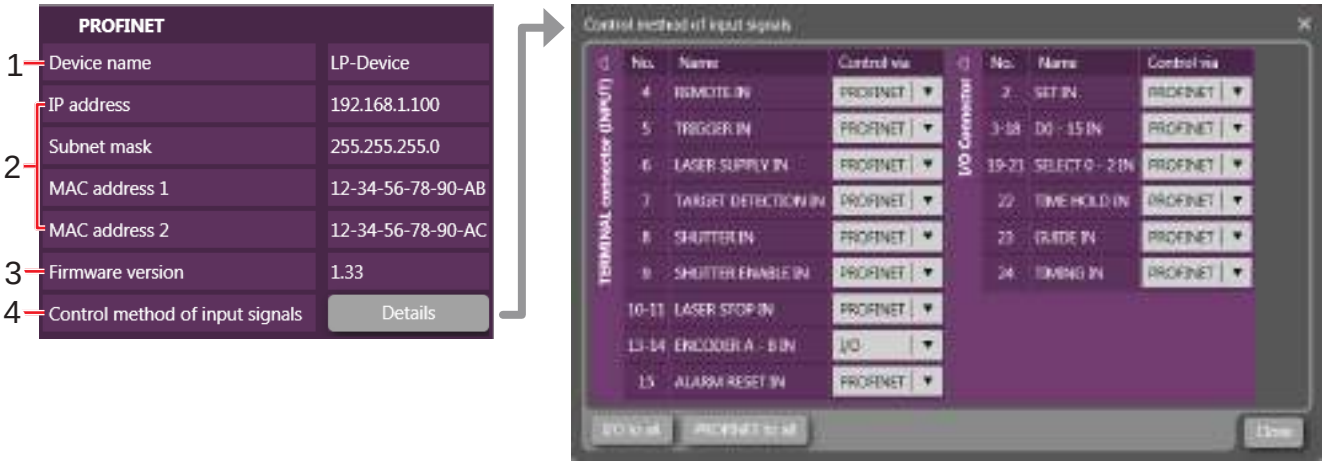
Reference

- For the details of EtherNet/IP configuration, refer to “EtherNet/IP Communication Guide”.

8-4-5 PROFINET

Supported model: LP-RF series / LP-RV series

Sets the communication settings of the optional network unit PROFINET.
When changing these settings, click on the “Set” button and restart the laser marker. After rebooting, the settings are activated.



	Item	Description
1	Device name	Displays the device name of PROFINET. The name can be changed via PROFINET with your controlling device such as a PLC. For the naming rules, follow the specifications of PROFINET communication. Initial setting: LP-Device
2	Network settings	Displays the current settings of the network. IP address and subnet mask can be changed via PROFINET with your controlling device such as a PLC. • IP address Display range: 0.0.0.0 to 223.255.255.255 • Subnet mask Display range: 128.0.0.0 to 255.255.255.254 • MAC address 1 • MAC address 2
3	Firmware version	Displays the version of the installed PROFINET unit.

	Item	Description
4	Control method of input signals	Selecting “Details” button opens the setting dialog. Select either “I/O” or “PROFINET” to the control method of each input signal on the I/O terminal and I/O connector. Setting entry: I/O, PROFINET Initial setting: I/O With “I/O to all” or “PROFINET to all” buttons, all settings are changed at once. For the following input signals, settings here are activated when the control method is set to “I/O” under “Operation/information” tab in System settings screen. Refer to “8-1-2 Operation setting” (P.230) for details. • REMOTE IN (Remote mode switching method) • LASER SUPPLY IN (Laser pumping control) • SHUTTER IN, SHUTTER ENABLE IN (Shutter control) • GUIDE IN (Guide laser display control)

Reference

- The input signals of REMOTE INTERLOCK IN, INTERLOCK 1, and INTERLOCK 2 cannot be controlled via PROFINET.

Notice

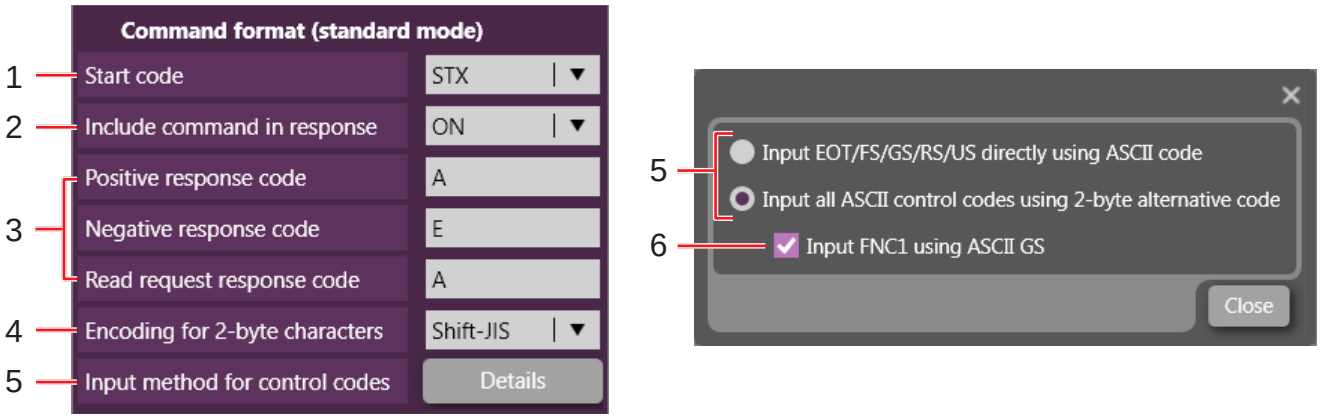
- The communication control of the laser marker through PROFINET should be performed in a secure network environment.

Reference

- For the details of PROFINET configuration, refer to “PROFINET Communication Guide”.

8-4-6 Laser marker control command

Set the command format to control the laser marker by the communication command here.



	Item	Description
1	Start code	Specifies the start code for communication command. Setting entry: STX, None Initial setting: STX
2	Include command in response	Specifies the format for the response data of the communication command. Setting entry: ON, OFF Initial setting: ON
3	Response code	Specifies the sub-command for the response. Setting range: Any single byte character of ASCII code from 01(HEX) to 7F(HEX) can be specified. Initial setting: • Positive response code: A • Negative response code: E • Read request response code: A
4	Encoding for 2-byte characters	This setting is used for the Japanese and Chinese characters which cannot be specified by the ASCII codes. To use Japanese, set “Shift-JIS” and for simplified Chinese, set “GB 2312”. Setting entry: Shift-JIS, GB2312 Initial setting: Shift-JIS
5	Input method for control codes	If you input the control codes in the barcode/2D code strings using the communication commands (STR or SIN commands), click “Details” and select the input method. This setting is applied also to the response data for the readout. Setting entry: • Input EOT/FS/GS/RS/US directly using ASCII code • Input all ASCII control codes using 2-byte alternative code Initial setting: Input all ASCII control codes using 2-byte alternative code

Reference

- For the details of the alternative code, refer to “Serial Communication Command Guide”.
- This setting is used only for the control codes in the barcode/2D code strings, but not for the general control codes used for the command format such as STX and CR.

	Item	Description
6	Input FNC1 by ASCII GS	When you select “Input all ASCII control codes using 2-byte alternative code” at the input method for control codes, set this option. If you use “FNC1” in the barcode/2D code strings using the communication commands (STR or SIN commands), select the input method of “FNC1”.

Setting entry	• ON: “GS” in the ASCII code 1D (HEX) can be used as “FNC1”. • OFF: Input 2-byte alternative code for “FNC1”.
Initial setting	ON

Reference

- “FNC1” is used mainly as the separator for the variable-length AI data in the code data of GS1 DataMatrix, GS1 DataBar codes and EAN-128 (CODE 128).
- For the details of the alternative code, refer to “Serial Communication Command Guide”.
- When you select “Input EOT/FS/GS/RS/US directly using ASCII code” at the input method for control codes, “FNC1” should be input with 2-byte alternative code.

Reference

- For the communication command format, refer to “Serial Communication Command Guide”.
- The command format settings here are applied to the standard communication format and not applied to LP-400/LP-V compatible format. For the details of the compatible mode with the previous models of LP-400/LP-V series, refer to the “Serial Communication Command Guide: LP-400/V compatible mode”.

8-4-7 Image checker

When the image checker link control function is used, set the communication condition here.

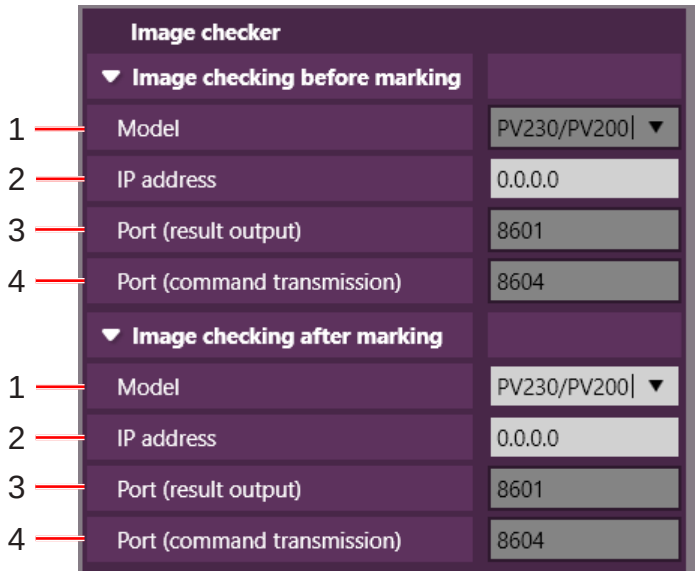


Image checking before marking

	Setting elements	Description
1	Model	Indicates the model to be used for marking position correction before marking. Only PV230/PV200 is available.
2	IP address	Input the IP address of the connecting image checker (PV230/PV200). Setting range: 0.0.0.0 to 255.255.255.255 (For the first octet, exclude 127) Initial value: 0.0.0.0
3	Port (result output)	Sets the port for data communication. Only 8601 is available.
4	Port (command transmission)	Sets the port for control. Only 8604 is available.

Image checking after marking

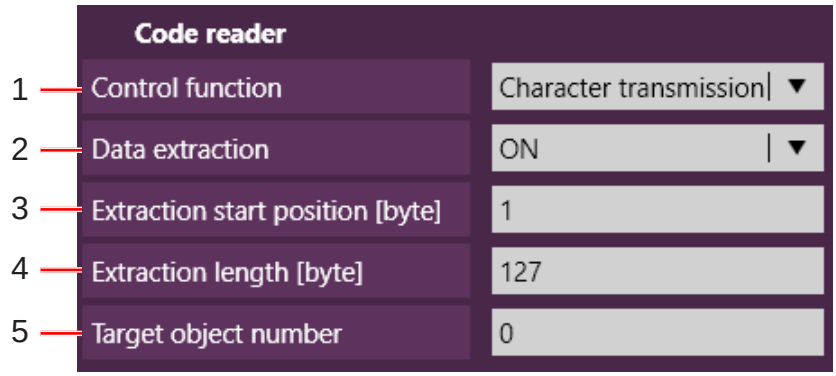
	Setting elements	Description
1	Model	Specifies the model to be used for the image checking after marking. Setting entry: PV230/PV200, DataMan, LP-ABR
2	IP address	Input the IP address of the connecting image checker. Setting range: 0.0.0.0 to 255.255.255.255 (For the first octet, exclude 127) Initial value: 0.0.0.0
3	Port (result output)	Sets the port for data communication. Only 8601 is available. This setting is displayed only for PV230/PV200.
4	Port (command transmission)	Sets the port for control. Setting range: 1 to 65535 Initial value: • PV230/PV200: 8604 (fixed) • DataMan: 23 • LP-ABR: 27110

Reference

- For details of the image check, refer to “Setup/Maintenance Guide”.
- When you use the link control with an image checker,on-the-fly marking and TARGET DETECTION IN (X7) are not available.

8-4-8 Code reader

When the code reader linkage control function is used, set the control condition here.



	Control Contents	Description
1	Control function	Specifies the control contents. Setting entry: • File switching by name • File switching by number • Character transmission
2	Data extraction	To transfer a part of the code string read, set the clipping area. If “OFF” is selected, the read string is transmitted as is. Setting entry: ON, OFF
3	Extraction start position [byte]	When the data extraction is set to ON, specify the start position of code data extraction in bytes. Setting range: 1 to 299 byte
4	Extraction length [byte]	When the data extraction is set to ON, specify the data length for the extraction. Setting range: • Character transmission: 1 to 299 byte • File switching by name: 1 to 299 byte • File switching by number: 4 byte (fixed)
5	Target object number	When the control contents are set to character transmission, specify the object number of destination. Setting range: 0 to 1999

Reference

- If the sending data is a variable-length data, you cannot use the data extraction function.

Reference

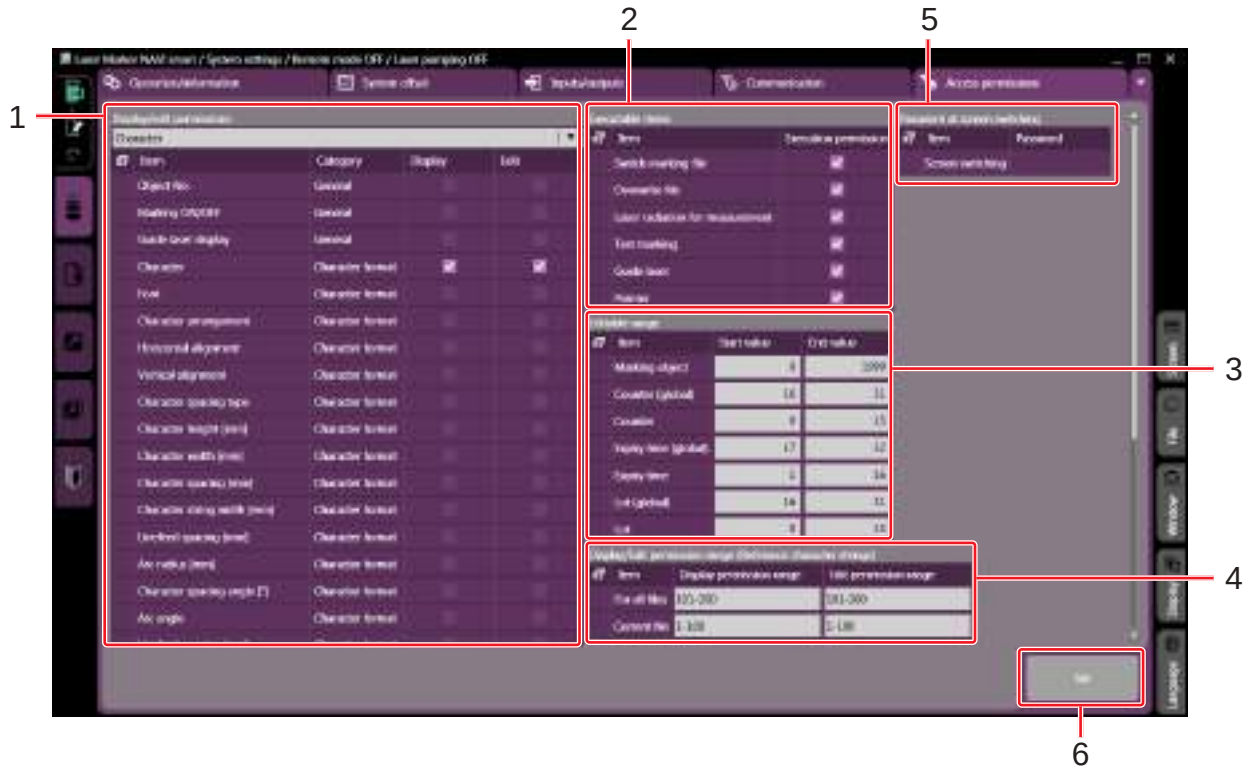
- Count one single byte character as one byte.
- The data extraction position setting applies to all data read by this function.
- If the read data length is shorter than the string to extract, the code is not read.

Reference

- For details of the code reader linkage, refer to “Setup/Maintenance Guide”.

8-5 Settings/Display Restrictions

The display, editing, and execution restrictions on the Operation monitor screen, the Operator settings screen, and the Maintenance screen are set.

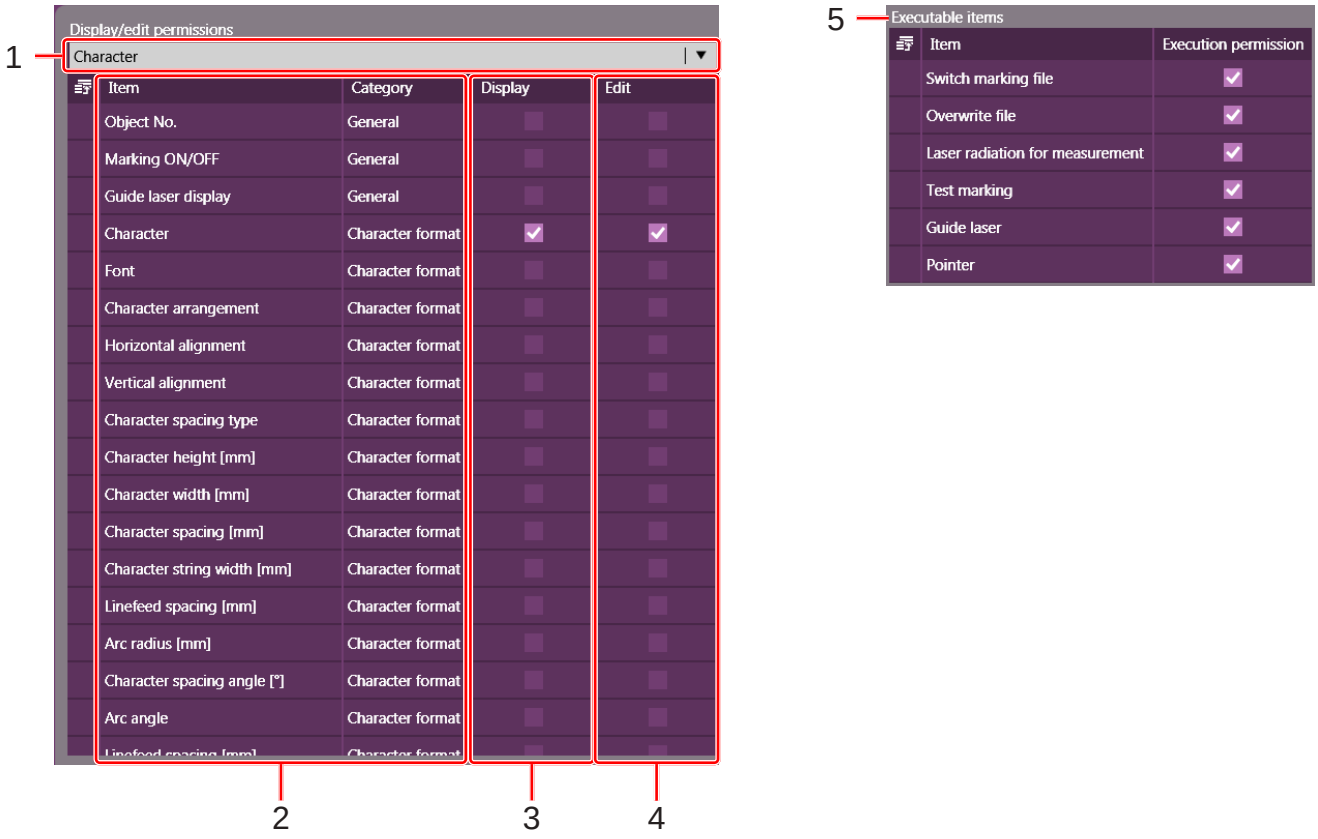


	Setting elements	Description
1	Display/edit enabled items	Select the items to allow to display or set in the following screens. • Operator settings screen (Display, edition and operation permission) • Operation monitor screen (Display permission) • Maintenance screen (Operation permission)
2	Executable items	
3	Editable range	Specifies the setting range to be allowed to edit in the operator settings screen.
4	Display/edit permission range (reference character strings)	Select the strings of the reference list type character object to allow to display or edit in the following screens. • Operator settings screen (Display and edition permission) • Operation monitor screen (Display permission)
5	Password at screen switching	Sets the password to show “setting”, “data management” and “system settings” screens.
6	Set	Clicking on this button transfers the setting to the laser marker.

8-5-1 Display/edit enabled items

Select the items to allow to display or set in the following screens.

- Operator settings screen (Display, edition and operation permission)
- Operation monitor screen (Display permission)
- Maintenance screen (Permission of laser radiation for measurement)



	Item	Description
1	Target settings	Selects the settings type that contains the item you want to give permission from the following. • Object group settings • Laser settings • File settings • Functional characters: Counter, Expiry date and time, Lot, Register, External offset • Character object settings and marking text • TrueType character object settings • Graphic object settings • Barcode object settings: EAN/UPC/JAN, CODE128, CODE93, ITF, CODE39, NW-7, GS1 DataBar • 2D code object settings: DataMatrix, QR code, PDF417 • Point radiation object settings

Reference

- The on-the-fly settings cannot be edit in the operator settings screen.

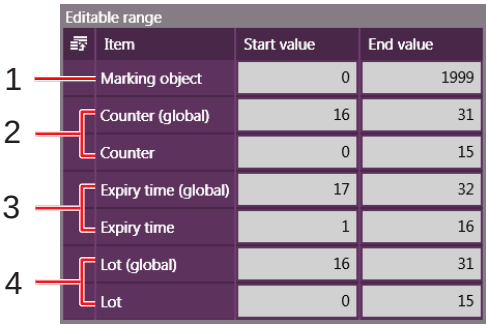
	Item	Description
2	Permission item selection list	Selects the items you want to display on the Operation monitor screen and the Operator settings screen, and the items you want to edit on the Operator settings screen (edit enabled items).
3	Display Permission	Selects the display enabled item. Check the check box to enable it.
4	Edition Permission	Selects the edit enabled item. Check the check box to enable it.
5	Executable items	The enabled operation with a check mark can be used in the following screen.

Executable items	Screen
File switching	Operator settings screen
Overwrite file (Save to the laser marker)	
Test marking	
Guide laser *1	
Guide pointer	
Laser radiation for measurement	Maintenance screen

*1 ： Available with LP-GS051(-L) type, LP-RC350S, LP-RF series and LP-RV series.

8-5-2 Editable range

Specifies the setting range to be allowed to edit in the operator settings screen.



	Item	Description
1	Marking object	Specifies the marking object numbers that can be edited on the Operator settings screen.

Setting range	0 to 1999

2	Counter	Specifies the counter numbers that can be edited on the Operator settings screen.

Setting range	Global counter: 16 to 31 Counter: 0 to 15

3	Expiry Date/Time	Specifies the expiry numbers that can be edited on the Operator settings screen.

Setting range	Global expiry date/time: 17 to 32 Expiry date/time: 1 to 16

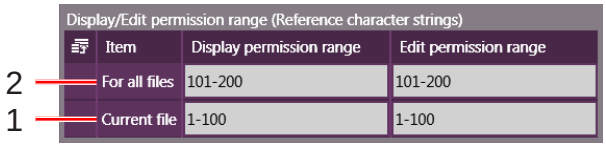
4	Lot	Specifies the lot numbers that can be edited on the Operator settings screen.

Setting range	Global lot: 16 to 31 Lot: 0 to 15

8-5-3 Display/edit permission range (reference character)

Select the strings of the reference list type character object to allow to display or edit in the following screens.

- Operator settings screen (Display and edition permission)
- Operation monitor screen (Display permission)



	Item	Description
1	Current file	Set the strings No. to give the permission to edit and display. This setting is for the strings which you can use only in the selected file. Usable string No. : 1 to 100
2	For all files	Set the strings No. to give the permission to edit and display. This setting is for the strings which you can use in all files. Usable string No. : 101 to 200

Reference

- To set the several strings, use “,” or “;” for the separator and “-” for the range.
  Setting example: 1-50,60;100
  With this setting, the string No. from 1 to 50, No. 60 and No. 100 are allowed.

8-5-4 Password at screen switching

With the password setting, the password is required to switch the screen view from “Operation monitor”, “Operator settings” or “Maintenance” to “Setting”, “Data Management”, or “System settings”.

■ Setting of the password

1. Click the input field of password.

Input less than 15 digits alphanumeric character.

2. Click “Set” in the bottom of the screen.

■ When password is forgotten

If you have forgotten the password, delete the password according to the following procedure:

1. If the laser marker is in the remote mode, turn the remote mode OFF.

Notice

- Do not delete the password with the remote mode ON.

2. Exit the Laser Marker NAVI smart when it is started up.

3. Double-click and execute “ClearPassword.exe” included in the attached CD-ROM “Laser Marker Smart Utility”.

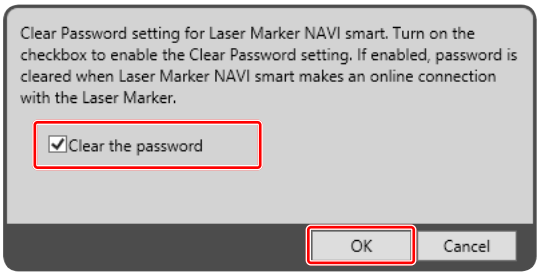
You can find “ClearPassword.exe” at the following location of the CD-ROM.

CD-ROM\Tools\ClearPassword.exe

Reference

- During the “ClearPassword.exe” running, it does not matter whether the laser marker and PC are connected or not.

4. Check the box next to “Clear the password” on the screen displayed, and then, click “OK”.

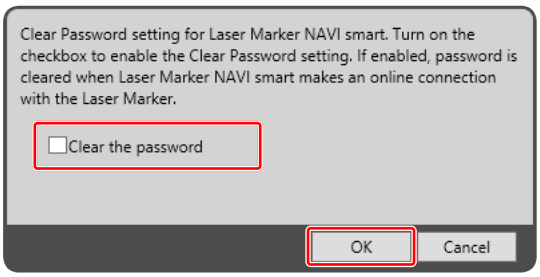


5. Start Laser Marker NAVI smart and establish an online connection with the laser marker of which password setting you want to delete.

This deletes the password, and the password lock in switching the screens is released.

6. Exit from the Laser Marker NAVI smart.

7. Execute ClearPassword.exe again. If “Clear the password” remains enabled, then, click “OK”.



Notice

- If “Clear the password” remains enabled, the password will be deleted when connected to online even without executing ClearPassword.exe. Make sure to uncheck the box next to “Clear the password”.

8. To reconfigure the password, start Laser Marker NAVI smart and select “System settings” on the screen selection menu. Display the “Settings/display restrictions” panel and enter “Password at screen switching”.

9. Click “Set” on the lower right corner of the screen.

The password setting will become enabled.

Troubleshooting

Troubleshooting

If any operation errors occur, check items below.
When the problems cannot be resolved, please contact our sales office or representatives.

■ Start-up

Troubles	Causes	Measures
• Power supply is not turned on. • The system 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.
	For LP-GS series: Fuse is blown.	Replace the fuse by following the procedures described in the “Setup/Maintenance Guide”.
	For LP-RC/LP-RF/LP-RV series: Circuit protector is OFF.	Turn on the circuit protector by following the procedures described in the “Setup/Maintenance Guide”.

■ Laser pumping

Troubles	Causes	Measures
Laser pumping does not start.	The connection of the following I/O terminals is released. • INTERLOCK 1(+) - INTERLOCK 1(-) (X16 - X17) • INTERLOCK 2(+) - INTERLOCK 2(-) (X18 - X19) • For LP-GS series: LASER STOP 2 IN (X11) - OUT COM. 1 • For LP-RC/LP-RF/LP-RV series: REMOTE INTERLOCK IN (X20) - OUT COM. 1	• Check the connection of each terminal on the I/O terminal block. • If the safety equipment such as door and switch is in released status, restore the original condition.
	The stop laser button of the Laser Marker NAVI smart is pressed.	Release the stop laser button of Laser Marker NAVI smart and press the error dialog check button.
	Power is not supplied to the common terminal of the I/O terminal block.	Connect the internal or external power supply to IN COM.1 and OUT COM.1 in the I/O terminal respectively.
Laser pumping does not start in remote mode.	Signals from the external control device are refused.	Refer to “External Control” in Troubleshooting.
	The setting of a laser pumping control method in the system settings screen is not consistent with the actual control method.	• Check if the laser pumping control method set in the system settings screen (I/O or communication command) and the actual control method are consistent. • If the laser pumping method is changed in the system settings screen, restart the laser marker.

■ Connection with Laser Marker NAVI smart

Troubles	Causes	Measures
Online connection fails. (The laser marker is not indicated as an available laser marker.)	Laser marker has not been started.	Refer to “Start-up” in Troubleshooting.
	PC and laser marker are not connected.	Connect them with a USB cable or a LAN cable.
	USB driver is not installed properly.	Refer to the “Laser Marker NAVI smart Operation Manual” to install the USB driver to all the laser markers to connect.
Online connection is disconnected.	PC is in the sleep or hibernate state.	To maintain the online connection, disable the sleep setting of the PC.
	The PC stayed no communication state with the laser marker for a certain period of time with the high load (high CPU usage).	To maintain the online connection, terminate the high CPU usage application.
Ethernet online connection fails.	Ethernet communication settings are incorrect.	Establish the USB online connection and confirm the Ethernet communication settings in the system settings. Then, restart the laser marker.
	Ethernet is not listed as an available laser marker search condition.	In the laser marker selection screen, select the “Including Ethernet” checkbox and search for laser markers.
	The connecting port of the LAN cable to the PC is wrong. (Connected to EtherNet/IP or PROFINET port by mistake.)	Connect the cable to the port marked “LAN” on the rear of the controller.
For LP-GS series: Bluetooth online connection fails.	A laser marker of the model not compatible with Bluetooth is used.	Bluetooth function is available for the following laser markers. LP-GS051 / LP-GS051-E / LP-GS051-L / LP-GS051-LE / LP-GS052 / LP-GS052-E
	Bluetooth communication setting is disabled.	Establish the USB online connection and enable the Bluetooth communication in the system settings. Then, restart the laser marker.
	PC's Bluetooth module is apart from the head of the laser marker.	Operate the product with the laser marker head within 5m from the PC.
	The ambient environment is not suited for Bluetooth communication. • Wireless LAN or other wireless device is used around. • There is an obstacle between the laser marker head and the PC. • The environment is subject to weaker radio wave signals.	Establish Bluetooth communication in an environment suited for stable wireless connection.

■ Lasing operation

Troubles	Causes	Measures
Marking cannot be done. (The laser emission indicator blinks but marking is not performed on the work piece.)	Obstacle hinders laser beam.	• Remove obstacle between laser emission port of laser marker head and work piece. • For LP-RF/LP-RV series, remove the protection cap of the laser emission port.
	Distance to work piece is not appropriate.	Adjust distance between bottom surface of laser marker head and the work piece surface as specified.
	For LP-GS series: The set Z-position does not match the height of the actual target object. (The LP-GSxxx-L type is excluded.)	Set the Z-position according to the work piece height.
	The work piece is not in place.	• Check the marking position using the guide laser or guide pointer to check if the work piece is out of the specified position. • For LP-RC/LP-RF/LP-RV series: Connecting a sensor to TARGET DETECTION IN (X7) of I/O terminal block, you can check the presence of the work piece during laser radiation.
	Laser power is insufficient.	• Increase laser power (including correction factor). • Decrease scan speed (including correction factor).
	Laser type (wavelength, output power, etc.) is not appropriate for material of the work piece.	Materials can be marked differ depending on wavelength and output power of laser marker. • LP-GS/LP-RC is not suitable for metal material. • LP-RF/LP-RV is not suitable for transparent material.
Marking is not performed in RUN/REMOTE mode. (The laser emission indicator does not light.)	In RUN mode: The RUN Mode is not active or the marking start signal is not input.	Turn the RUN mode ON, and then input a signal to TRIGGER IN of the I/O terminal block.
	The marking trigger signal of the I/O terminal block is not input.	Check connections with external equipment for mis-connection, disconnection or contact failure due to any loose connector.
		Confirm that TRIGGER IN is input by one-shot signal of more than 2ms per marking cycle.
	The marking trigger is entered while the marking ready is OFF.	Refer to “External Control” in Troubleshooting.
Sometimes laser is emitted unintentionally.	Fumes causes malfunction of photoelectric sensor for marking trigger signal.	• Install a dust collector to eliminate the fume (gas) generated during lasing. • Check that dust collector works well.

Troubles	Causes	Measures
Marking position is deviated from the expected setting position.	• The setting of the laser head direction is not consistent with the actual install direction. • System offset values are input on the system settings screen.	Check the setting direction of the laser head, X-axis/ Y-axis offset or rotation offset setting of the system settings screen.

■ Marking quality

Troubles	Causes	Measures
Marking is totally faded/ Marking is partially faded.	Laser emission port is not clean.	• Clean contaminants off the laser emission port by following the procedures described in “Setup/Maintenance Guide”. • For LP-RF/LP-RV series: If contaminants persist, replace the protection glass of the laser emission port.
	Fumes occurring during lasing hinder laser beam.	• Install dust collector. • Check that dust collector works well.
	Distance to the work piece is not appropriate.	Adjust distance between bottom surface of laser marker head and marking surface of the work piece.
	For LP-GS series: The set Z-position does not match the height of the actual target work piece. (The LP-GSxxx-L type is excluded.)	Set the Z-position according to the work piece height.
	Marking surface of work piece is inclined.	Make adjustment so that bottom surface of laser marker head and marking surface of the work piece are parallel with each other.
	There are variations in properties of the work pieces. • Thickness varies. • Surface roughness varies (including those in gloss). • Material varies (including those in chemical composition).	Adjust the marking conditions and work distance according to respective work pieces.
	Work piece feeder is not stable.	Adjust work piece feeder so that work piece position becomes stable.
	Performance of laser oscillator deteriorates due to aging.	• Increase setting value of laser power. • Decrease scan speed. If it is not possible to get the same marking quality as before even with the max. value of the laser power setting, laser oscillator must be replaced. Contact our sales office.
	For LP-RV series: The setting value of the pulse duration is not appropriate.	Adjust the pulse duration according to the material of the work piece. For plastic work pieces the pulse duration 4ns or 8ns is a common setting, and for metal, 16ns or 30ns is often selected.

Troubles	Causes	Measures
The marking around edge of the marking field is faded or chipped.	Decrease of the laser energy density in the edge of marking field may affect the marking quality.	• For LP-GS/LP-RC series: Set “Power optimization by marking position” in “System offset” in System settings screen. • For LP-RF/LP-RV series: Set the power correction to the marking objects in the edge of the marking field.
Character is partially chipped.	Obstacle hinders laser beam.	Remove obstacle between laser emission port and work piece.
	Laser emission port is not clean.	• Clean contaminants off the laser emission port by following the procedures described in “Setup/Maintenance Guide”. • For LP-RF/LP-RV series: If contaminants persist, replace the protection glass of the laser emission port.
Marking is disorder. (Characters lose shape or not formed.)	Head lacks fixation strength.	• Fix head with the specified torque. • Improve strength of head mounting.
	Constant vibration from surrounding equipment (motor and press, etc.) influences.	Perform vibration prevention measures.
	There are irregular vibrations coming from surrounding equipment (air cylinder and forklift, etc.). (Marking is disturbed at irregular intervals.)	
	Start and/or stop timing of feeder does not match with marking operation.	Disturbed at the beginning of marking: Marking trigger signal is likely to be input before work piece is fully stopped. Marking may disturbed due to remaining vibration even if work piece is in full stop.Turn the marking trigger signal ON after vibrations are completely damped.
		Disturbed at the end of marking: Work piece is likely to start moving before completion of marking. Delay start timing of feeder or speed up scan speed so that marking is finished before work piece starts moving.
	There are noises coming from surrounding equipment.	Protect laser marker against noises as follows: • Securely ground the frame ground terminal 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.
Marking line runs over the intended start or end points.	The setting in lasing quality parameters does not match the other settings.	Adjustment the lasing quality parameters such as starting point, ending point or wait value in laser settings.

Troubles	Causes	Measures
When the character size is small, the marking characters are not readable.	The setting conditions or font are inadequate for the character size.	• Use “Original 2” or “Original 5” font for the small size characters. • Adjust the laser power or scan speed.
Marking is dotted.	• For LP-GS series: Setting of laser frequency and scan speed is inadequate.	Decrease scan speed or increase laser frequency.
	• For LP-RF/LP-RV series: Setting of pulse cycle and scan speed is inadequate.	Decrease scan speed or pulse cycle.

■ Moving objects

Reference

- The on-the-fly marking is not available to LP-GS series.

Troubles	Causes	Measures
Marking is sometimes skipped. (E750 occurs.)	Marking trigger signal is entered before current marking is finished.	• Set the trigger mode to Multiple triggers if you want to input next triggers while the trigger processing operation. • Place the trigger sensor closer to the laser marker and set the smaller value to Trigger detecting position. • Reduce the marking time with the measures such as increasing the scan speed and etc. • Reduce feeder speed. • Increase marking interval (interval between objects on feeder).
The start lines of the characters are distorted.	The timing of lasing does not match with the line speed.	Input larger value to Overrun correction.
Characters are distorted. Character pitch is unstable.	The setting of the moving direction is wrong.	• Match feed direction with laser marker operation. • Check the setting direction of the laser head of the system settings screen.
	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.
	Positional misalignment is likely to occur due to meandering motion of conveyor.	Secure objects to prevent misalignment.
	The moving speed of the conveyor is not stable.	• Check the conveyor and remove the cause of the speed change. • To keep up the conveyor speed, use encoder to feedback the change of the speed.
	When Line speed control is set to Fixed speed: The setting speed is not consistent with the actual line speed.	Adjust the setting value of the line speed by checking the marking quality. • When the Character Spacing is too wide: Increase the setting. • When the character spacing is too narrow: Decrease the setting.

Troubles	Causes	Measures

Characters are distorted.
Character pitch is unstable.
	When Line speed control is set to Encoder input:
	The line speed could not be measured correctly by the encoder.
		• Make sure that the encoder operates properly.
		• Make sure that the setting value of Encoder resolution is correct.
		  • When using A phase only:
		  Encoder resolution = Number of pulses/mm x 2
		  • When using A and B phases:
		  Encoder resolution = Number of pulses/mm x 4
		• When only one phase of the encoder is used, connect the encoder signal to ENCODER A IN (X13) and connect ENCODER B IN (X14) to IN COM. 1 (X2).

	When Line speed control is set to Encoder input:
	The input speed of the encoder is not consistent with the actual line speed at marking.
		• Place the encoder closer to the trigger sensor.
		• Adjust the setting value of Encoder resolution by checking the marking quality.
		  • When the character spacing is too wide:
		  Increase the setting.
		  • When the character spacing is too narrow:
		  Decrease the setting.
		• In some cases, it may reduce the influence of the ups and downs of the line speed to decrease the encoder resolution. However, it is recommended to set more than 25pulses/mm to Encoder resolution.

	When Line speed control is set to 2 sensors input: The line speed could not be measured correctly by the two sensors.	• Check the setting value of Distance line speed sensors. • Confirm the sensors for line speed detection operate properly.

	When Line speed control is set to 2 sensors input:
	The input speed of the 2 sensors is not consistent with the actual line speed at marking.
		• Place the trigger sensor closer to the line speed detection sensors so that the difference of the speed at detection and at marking may reduce.
		• Adjust the setting value of Distance line speed sensors by checking the marking quality.
		  • When the character spacing is too wide:
		  Increase the setting.
		  • When the character spacing is too narrow:
		  Decrease the setting.

■ External control

Troubles	Causes	Measures
Communication with the external device cannot start.	Laser marker is not in remote mode.	• Select the remote mode by following the procedure indicated in “Setup/Maintenance Guide”. • Check if the entering method of the remote mode set in the system settings screen (I/O or PC software) and the actual control method are consistent. • If the entering method of the remote mode is changed in the system settings screen, restart the laser marker.
	The connection with external devices is inadequate.	• 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. • For RS-232C connection, confirm the wiring of the external device including the loop back connection.
	Communication parameter settings are incorrect.	• Match communication parameter settings to external equipment. • If any of the communication settings (Ethernet settings, EtherNet/IP settings, or RS-232C usage) in System settings screen are changed, restart the laser marker. • If you use DHCP of EtherNet/IP settings, confirm the connection of the DHCP server of your network. • When using RS-232C, specify the “Flow control” to “None” at the communication port settings of the external control device.
	The communication setting was changed at the time of backup file restoration.	Check the communication setting. If Ethernet or EtherNet/IP is used, check the IP address, etc. When the backup file is restored, the communication setting is overwritten by the backup data.
	There are noises coming from surrounding equipment.	Protect laser marker against noises as follows: • Securely ground the frame ground terminal 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.
Control by I/O fails.	The settings in the system settings screen are not consistent with the actual control method.	• Check the settings of the control method under “Operation/information” tab in System settings screen. If “command” is selected to the corresponding operation, change it to “I/O”. • Check the I/O settings under “Inputs/outputs” tab in System settings screen. • If you use EtherNet/IP or PROFINET, check the “Control method of input signals” under “Communication” tab in System settings screen. • If any of the above settings are changed in the system settings screen, restart the laser marker.
Control by communication command fails.	Command data is not received from external equipment.	Using commercially available line monitor or protocol analyzer, check if the external equipment transmits data.

Troubles	Causes	Measures
Control by communication command fails.	Communication data format (start code) is inadequate.	• Check if the start code specified in laser marker system settings screen and start code of the transmitted data are consistent. • If you use EtherNet/IP or PROFINET, do not contain the start code in the command data.
	Communication data format (end code) is inadequate.	• Check if an end code is placed at the end of the transmitted data. • For RS-232C, check if the end code is the value specified in the laser marker system settings screen. • If you use EtherNet/IP or PROFINET, do not contain the end code in the command data.
	Command mode (LP-400/V compatibility setting) is wrong.	• If you want to use the same command format with the former models of LP-400/LP-V series, enable “LP-400/V compatibility” in system settings of Laser Marker NAVI smart. • If you want to use the standard command format, switch the mode by RSM command or disable “LP-400/V compatibility” in system settings of Laser Marker NAVI smart. • If you use EtherNet/IP or PROFINET, deactivate “LP-400/V compatibility” in System settings screen. You cannot use the command format in LP-400/V compatible mode via EtherNet/IP or PROFINET.
Marking ready does not turn ON.	An error occurs.	Check the error code and cancel the alarm or warning.
	Marking trigger is in progress.	• Do not input the next marking trigger until the trigger processing is completed. • When trigger mode is set to Multiple triggers at on-the-fly marking, max. 16 triggers can be accepted while the trigger processing operation.
	Laser pumping is turned OFF.	Turn ON the laser pumping. If the laser pumping fails, refer to “Laser pumping” in Troubleshooting.
	Internal shutter is closed.	• Open the internal shutter. • Check if the shutter open/close control method set in the system settings screen (I/O or communication command) and the actual control method are consistent. • If the shutter open/close method is changed in the system settings screen, restart the laser marker.
	File switching is not complete.	If the file number is changed, the marking ready is turned OFF for dozens of ms or seconds to create marking data. Input marking trigger signal after making sure that READY output is ON if you changed the file.
	Either of registered characters via I/O, external offset function or characters specified by SIN command are used and marking data is not input from the external control device.	• If “Registered characters via I/O”, “External offset function” or “Characters specified by SIN command” are used, input respective data at every marking. • For LP-RC/LP-RF/LP-RV series: Using DATA WAIT OUT (No.38) of I/O connector, you can confirm the laser marker becomes waiting status of input.

Troubles	Causes	Measures
Marking ready does not turn ON.	For communication command control: “reception mode ON” is set for command reception permission (MKM command).	Set “reception mode OFF” for command reception permission (MKM command).
	For LP-RC/LP-RF/LP-RV series: Counter has been reset during On-the-fly marking operation.	Once the counter is reset during On-the-fly marking operation, READY OUT becomes OFF temporarily and may not accept the trigger. Please check the counter reset timing.
The sending command is not accepted and negative response is returned.	The requested operation can be controlled only by I/O with the current system settings.	To use the following commands, specify the control method to the communication command in Laser Marker NAVI smart system settings and restart the laser marker. • Laser pumping (LSR) • Shutter open/close (SHT) • Guide Laser (GID) (except LP-GS052 type)
		The following commands are available only when the shutter open/close control method is set to communication command. • Laser radiation for measurement (SPT)
	“Reception mode ON” is not set for command reception permission (MKM command).	Except the following commands *, the laser marker cannot accept the command unless it is in the “reception mode ON” status. For command transmission, set “reception mode ON” by MKM command. • File selection by number (FNO) • File selection by name (FNN) • Shutter open/close (SHT) • Command reception permission (MKM) • Laser pumping (LSR) • Counter reset (CTR) • Status checking (STS) • Marking trigger (MRK) • Character entry per trigger (SIN) • Marking position and laser power adjustment per trigger (SEO) • Runtime data (RTD)
	Alarm or Warning occurred.	All commands except the following commands * cannot be accepted while alarm or error is active. When alarm occurred: • Status checking (STS) • Runtime data (RTD) • Alarm reset (ARS) • Error code (ENO) When warning occurred: • Status checking (STS) • Runtime data (RTD) • Alarm reset (ARS) • Error code (ENO) • Shutter open/close (SHT) (Only closing and readout request) • Command reception permission (MKM) (readout only)
	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.

Troubles	Causes	Measures
The sending command is not accepted and negative response is returned.	Command mode (LP-400/V compatibility setting) is wrong.	• If you want to use the same command format with the former models of LP-400/LP-V series, enable “LP-400/V compatibility” in system settings of Laser Marker NAVI smart. • If you want to use the standard command format, switch the mode by RSM command or disable “LP-400/V compatibility” in system settings of Laser Marker NAVI smart.

* These commands are applicable with the standard command mode. For the LP-400/V compatible mode, refer to the “Serial Communication Command Guide: LP-400/V compatible mode”.

■ Link control with external devices

Troubles	Causes	Measures
Link control with image checker and code reader fails.	The connections with the image checker or code reader are inadequate.	• Refer to “Setup/Maintenance Guide” for the wiring and communication settings. • If the Ethernet communication settings or RS-232C usage are changed, restart the laser marker.
	Communication settings are inadequate.	
	The connecting port of the LAN cable to the image checker is wrong. (Connected to EtherNet/IP or PROFINET port by mistake.)	Connect the cable to the port marked “LAN” on the rear of the controller.
Marking cannot be done in an appropriate position when the function of position correction is used.	The coordinates of the image checker are not consistent with the marking position of the laser marker.	Set the calibration of the image checker and match the coordinate origin of the image checker to the center point of the marking field of the laser marker.
	Settings of the image checker are inadequate.	Confirm the following settings of PV230/PV200. • Setting of Ethernet with the protocol General communication • Calibration • Settings of the positional correction • Expression of the numeric calculation
	The setting order of the expression table of PV230/ PV200 is inadequate.	The results of the numerical calculation should output to the laser marker in the order of X, Y, and theta.
The results of the code or character checking is NG.	Testing conditions of image checker are inadequate.	Set appropriate testing conditions of the image checker according to marked code type or character settings.
	Unnecessary objects are included in the captured image.	Do not place the code symbols or characters other than the image checking target in the imaging range.
	When PV230 is used: Settings of the total judgement are inadequate.	• For code checking, confirm the settings of the code reader checker of PV230. • For character checking, confirm the settings of the OCR checker of PV230. • Cofirm the expression of the numeric calculation in the total judgement.
	When PV230 is used: No settings in the character dictionary of PV230.	To use the character recognition function, set the dictionary of PV230 for each marking character beforehand.
	Ghost image of fumes (smoke) occurring during marking is taken in the shooting range.	• Install a dust collector to get rid of fumes (smoke). • Check that the dust collector works well.

Troubles	Causes	Measures
Marking disorder.	Since the work feeding and marking start/end timing are inadequate when TIMING IN signal is used, the vibration affects marking.	Turn TIMING IN signal ON after work piece is fully stopped.
		To feed works after marking, check that TIMING WAIT OUT is turned ON and start feeding works.

Error Indication

When an error occurs, an error code appears on the display panel of the laser marker.
Errors are categorized into alarm and warning depending on their details.
This chapter describes the details and measures of errors.

Alarm: E001 - E599

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 supply (laser pumping) is turned OFF, and the laser radiation is stopped if during the lasing process.

■ Release method of alarm

1. Remove a cause of alarm and confirm the safety. (Any alarms due to hardware's problem cannot be released.)
2. For error codes E400 to E599, use any of the following means to input the alarm reset.
   - Click the confirmation button in the error dialog on the configuration software Laser Marker NAVI smart screen.
   - Turn ON ALARM RESET IN (X15) on the I/O terminal block.
   - Transmit the communication command for the alarm reset (ARS).

   For the alarms you are unable to reset such as the ones caused by hardware or system error, restart the laser marker.
3. If any alarm occurs during marking of files that use the counter, check the counter value before resuming marking.

ERROR CODE	Description	Measures *1
E001 - E038 E045 - E094 E101 - E138 E145 - E158 E160 - E194 E202 E208 - E214 E223 - E224 E230 E245 - E248 E300 - E380	An error has occurred to the internal system of the laser marker.	Check the connection of the cable and various signal lines, and then restart the laser marker.
E039 E044 E139 E144	• Incorrect model combination of laser marking system. • Incorrect connection of signal cable or unit power cable.	• For LP-GS/RC/RF series, make sure the correct model numbers of laser head and controller have been connected. • For LP-RV series, make sure the correct model numbers of laser head, oscillator unit and controller have been connected. Connect the oscillator unit correctly to the laser head and controller. • Check the connection of the cable and various signal lines, and then restart the laser marker.
E040 - E043 E140 - E143 E221 - E222 E240 - E243	• Incorrect connection of signal cable or unit power cable. • An error has occurred to the internal system of the laser marker.	• Check the connection of the cable and various signal lines, and then restart the laser marker. For LP-GS/RC/RF series, check the connection between laser head and controller. For LP-RV series, check the connection between laser head and oscillator unit and between oscillator unit and controller. • Replace the cable.

ERROR CODE	Description	Measures *1
E159 *4 E231 - E236 *4	Network unit error.	Check if the optional network unit is installed to the controller correctly.
E200 - E201 *2	INTERLOCK safety relay is out of order.	Contact our sales office or representatives.
E205 - E207	• Abnormality occurs on the internal shutter. • Signal cable is not connected properly.	Check the connection of the cable and various signal lines, and then restart the laser marker.
E220	Laser head housing is open.	Contact our sales office or representatives.
E225 *4	Fiber unit is detached.	Install the fiber unit properly by following the procedures described in the “Setup/Maintenance Guide”.
E250 - E252 E260 - E261 E264 - E265	• An error has occurred to the laser oscillator. • A power supply voltage error was detected in the laser oscillator. • Incorrect connection of signal cable or unit power cable.	• Check and correct the power status. • Check if the AC power line is effected by noise. • Check the connection of the cable and various signal lines, and then restart the laser marker. • For LP-RC series: Check if the ambient temperature of the laser marker is not exceeding the range of its specification.
E262 *4	Temperature error in laser oscillator.	• Check if the ambient temperature of the laser marker is not exceeding the range of its specification. • Make sure air-cooling fan operates. • Remove the dust and contamination in the air intake and exhaust port, and clean the air-cooling part such as fan and filter. • When not recovered, contact our sales office or representatives.
E263 *4	Detected unintended-irradiation.	Contact our sales office or representatives.
E270 - E275 E277 E280 - E285 E287	• An error has occurred to the galvano scanner of the head. • Incorrect connection of signal cable or unit power cable.	• Check and correct the power status. • Check if the AC power line is effected by noise. • Check the connection of the cable and various signal lines, and then restart the laser marker.
E276 *2, *3 E286 *2, *3	Marking data are too detailed for the scan speed configured.	Decrease the scan speed.
E290 - E292 *2	An error has occurred to the Z-axis adjustment module.	Check the connection of the cable and various signal lines, and then restart the laser marker.

ERROR CODE	Description	Measures *1
E400	INTERLOCK 1 of the I/O terminal block was released.	• Connect INTERLOCK terminals on the I/O terminal block. • Check the status of the safety equipment connected to INTERLOCK terminal. • Confirm operation logic of connection device. • For LP-RC/LP-RF/LP-RV series: If the error cannot be solved even with the proper connection of INTERLOCK terminals, replace the contactor for INTERLOCK by following the procedures described in the “Setup/Maintenance Guide”.
E401	INTERLOCK 2 of the I/O terminal block was released.	
E402 E403 E501	LASER STOP IN of the I/O terminal block was released.	• Connect the LASER STOP IN terminals of the I/O terminal block. • Check the status of the safety equipment connected to the LASER STOP IN terminals. • Confirm operation logic of connection device. • Connect the internal or external power supply to IN COM.1 and OUT COM.1 in the I/O terminal respectively.
E404 E502	The stop laser button of the Laser Marker NAVI smart was pressed.	Press the stop laser button of Laser Marker NAVI smart to release.
E405 *3, *4 E503 *3, *4	REMOTE INTERLOCK IN is open.	• Connect REMOTE INTERLOCK IN of the I/O terminal block. • Check the status of the safety equipment connected to REMOTE INTERLOCK IN terminal. • Confirm operation logic of connection device. • Connect the internal or external power supply to IN COM.1 and OUT COM.1 in the I/O terminal respectively.
E410	Laser pumping was stopped during the marking process.	• Start marking after laser pumping has completed. • Check the procedures and operation logic of laser pumping and trigger input control. • Check wiring of I/O or communication port to the external control devices. • Check the switch or the sensor connected to TRIGGER IN of I/O terminal operates properly without chattering.
E411 E500	The marking trigger signal or “Start marking” button was entered in the “laser pumping OFF” status.	
E450 - E453	• The date and time of the system clock may be out of synchronization. • The system clock battery power in the controller died. • Abnormality has occurred on the system clock in the controller.	• Check the system clock time and set it again. • Replace the internal battery by following the “Replacement of Internal Controller Battery” in the “Setup/Maintenance Guide”. • While laser marker power is on, you can use it after setting the system clock on the system settings screen. When the power is off, set the system clock again.

ERROR CODE	Description	Measures *1
E460 *2	Temperature error in laser oscillator.	• Check if the ambient temperature of the laser marker is not exceeding the range of its specification. • Make sure air-cooling fan operates. • Remove the dust and contamination in the air intake and exhaust port, and clean the air-cooling part such as fan and filter. • When not recovered, contact our sales office or representatives.
E505 - E509 E550 - E560 E572	Safety functions (INTERLOCK, LASER STOP, etc.) were activated during marking preparation.	• Reset the alarm for LASER STOP IN or INTERLOCK of the I/O terminal block or Stop laser button of Laser Marker NAVI smart software. • Check if the signal lines are effected by noise.
E520 - E522 E570	File data or system data were not saved successfully, because the laser marker was turned off while saving data. Unable to read the file data.	• Overwrite the data again to the selected file number. • Do not turn off the laser marker while saving the settings.
E530 - E542 E571		• Restore the backup file saved before to the laser marker. • Do not turn off the laser marker while saving the settings.

*1 : If the error persists after restart of the laser marker, contact our sales office or representatives.
*2 : Error that may occur for LP-GS series only.
*3 : Error that may occur for LP-RC series only.
*4 : Error that may occur for LP-RF series and LP-RV series only.

Warning: E600 - E799

Errors that notify of that the setting data are incorrect or laser radiation conditions are not met are output as warnings. Marking cannot be started while any warning of E600 to E699 is active. Laser pumping maintains the state before the warning.

■ Release method of warning

1. Remove a cause of warning. If the setting is wrong, correct it.
2. In Remote mode, close the inner shutter or input the alarm reset.
   As the special case, the following errors will be released automatically.
   - E600: The warning is only output while the connection between the LASER STOP IN and OUT COM. 1 is opened and the warning is released when it is closed.
   - E710 - E711: The warning is output during marking and guide laser radiation (except guide pointer operation) and it is released when these operations are finished.
   - E715: The warning is output while the cause of error occurs and it is released automatically when the cause is solved.
   - E750 - E782: After output of the warning for 3 seconds, the warning is released.
3. If any warning occurs during marking of files that use the counter, check the counter value before resuming marking.
4. To restart the laser marker operation, make sure that the warning output is turned on, and then open the internal shutter.

ERROR CODE	Description	Measures *1
E600	LASER STOP IN of the I/O terminal block was released.	• Connect the LASER STOP IN terminals of the I/O terminal block. • Check the status of the safety equipment connected to the LASER STOP IN terminals. • Confirm operation logic of connection device.
E601	No marking data were registered to the file specified.	Set marking data in the file and overwrite.
E603	No data for laser radiation available.	It is not possible to input TRIGGER IN for the file without valid marking data. Set “marking on” to more than one object and set its laser power correction other than 0%.
E604	No data for guide laser radiation available.	To show the masked objects by the guide laser, enable Guide laser display of the object settings.
E605 E606	The combination of Laser Marker NAVI smart's version and the laser marker model or version is wrong. The function set with Laser Marker NAVI smart cannot be used for this type of the laser marker.	Use the right version of Laser Marker NAVI smart corresponding to the laser marker model or version in use.
E607 *3, *4	Unable to detect the line speed. Input of 2 sensors for line speed detection was wrong.	• Make sure the first sensor in moving direction is connected to ENCODER A IN and the second sensor is connected to ENCODER B IN of the I/O terminal. • Turn on ENCODER B IN within 10 seconds from the input of ENCODER A IN. • Input TRIGGER IN after turning on ENCODER B IN within the setting time before time-out error occurs.

ERROR CODE	Description	Measures *1
E608 E720	The counter value was reset to that prior to marking because the power was cut off during data marking including the counter.	• Check the current value of counter. • Do not turn off the power during marking.
E609 E721	The laser marker is turned off during saving of file data and setting. The marking data were not saved successfully.	• Check the file and the setting values. • Overwrite the file data. • Do not turn off the laser marker while aving the settings.
E610 - E613 E650	Marking data are out of range.	• Check the image display screen and adjust the data position and size located outside of the marking field. • Adjust the X-/Y-axis offset value of the system offset (system settings screen). (When the data located outside of the marking field is not displayed on the image display screen.)
E614 - E615 *2 E651 *2	Existed marking data with its Z-position outside of marking field. (The LP-GSxxx-L type is excluded.)	• Adjust the Z-movement of the object group settings. • Adjust the Z-movement of the file settings. • Adjust the Z-axis offset value of the system offset (system settings screen).
E616 *3, *4	Unable to detect the line speed. Input of the encoder for line speed detection was wrong.	• Confirm the correct input from the encoder to ENCODER A IN and ENCODER B IN of I/O terminal. • When only one phase of the encoder is used, connect the encoder signal to ENCODER A IN (X13) and connect ENCODER B IN (X14) to IN COM. 1 (X2). • Confirm the encoder input is less than 100kHz per phase.

E617 *3, *4	Unable to follow the line speed.	• Decrease the line speed.
		• Set Lasing start boundary to the upward of the moving direction.
		• Reduce the marking time with the following measures.
		  • Increase the scan speed.
		  • Reduce the spacing between the characters.
		  • Reduce the character size, etc.

ERROR CODE	Description	Measures *1

E618 *3, *4	The marking spacing is too small.	• When Trigger mode is set to Marking at regular intervals, set the larger value to Marking spacing.
		• When Trigger mode is set to Multiple triggers, take more time for the trigger input intervals.
		• Decrease the line speed.
		• Set Lasing start boundary to the upward of the moving direction.
		• When Trigger mode is set to Multiple triggers, check the switch or the sensor connected to TRIGGER IN of I/O terminal operates properly without chattering.
		• Reduce the marking time with the following measures.
		  • Increase the scan speed.
		  • Reduce the spacing between the characters.
		  • Reduce the character size.
		  • Set smaller value to the one-shot pulse duration of the I/O settings, etc.

E619 *3, *4	On-the-fly marking is not possible with this trigger detecting position or lasing start boundary.	• Place the lasing start boundary downstream of the trigger detecting position. • Check the setting value of Workpiece reference boundary is correct.
E620 - E621	The link control between the laser marker and image checker has failed due to the error of the laser marker. Trigger processing terminated abnormally.	Check the connection of the cable and various signal lines, and then restart the laser marker.
E622	I/O connector TIMING IN was not input within the time specified using the link function with external devices. Trigger processing terminated abnormally.	• Input this to TIMING IN terminal within 60 seconds after the I/O connector timing waiting output (TIMING WAIT OUT) is turned ON. • Check the connection of TIMING IN terminal of I/O connector. • Check the connection with the external device. • Check the control procedure of the external control.
E623	Timing input is invalid. When the linkage function with external devices is used, TIMING IN terminal was input while the timing standby output (TIMING WAIT OUT) was OFF.	
E624	Unable to communicate with an image checker. Trigger processing terminated abnormally.	• Check the status of connection with the laser marker and the Ethernet ports of external devices. • Check the IP address, port number, connecting status of the laser marking system and image checker. • Check the status of the laser marker and external devices in link control. • Confirm if you set the type of the image checker correctly in the system settings screen and file settings of the settings screen of the laser marker. • While the laser marker and LP-ABR series are connected for the linkage control, do not start-up Configurator LP-ABR software.

ERROR CODE	Description	Measures *1
E625	No response from the image checker. Trigger processing terminated abnormally.	• Check the connecting status of the laser marking system and image checker. • Check if the reading process of the image checker was successful. • If you use PV230/PV200, set the total judgement.
E626	Settings mismatch between image checker and laser marking system. Trigger processing terminated abnormally.	• Check the settings of application, type number, and checker number. • Check the conformity of the Ethernet settings with the General communication of PV230/PV200 protocol.
E627	The link control between the laser marker and image checker has failed. No settings for code or character checking available.	• Verify “Object number to check” in file settings, and confirm if the number is the same with the object number you set in barcode/2D code settings or character settings. • For the code checking, confirm the code type and settings of barcode/2D code object in the marking data are consistent with the settings of the code reader. • For the character checking, check if the character type and number of characters in the marking data are supported by the image checker.

E628	Code reading failed when the code reading function is used for the link control with external devices.	• Check the status of external devices.
		• Improve the marking quality of the code.
		• To send the marking strings or to switch the files by using code reader, confirm the followings:
		  • Confirm no unavailable characters are in the code data.
		  • When using the data extraction function, confirm the data length in the code data matches the extraction settings.
		  • When you do not use the data extraction function, set the code data less than 299 digits.

E629	File switching by code reader has failed.	• Confirm the specified file number or name exactly corresponded to the settings in the laser marker. • To switch the file by the number, specify the number always with 4-digits in the code data. • If no settings in the specified file, set the marking data and save that file to the laser marker.
E630	TRIGGER IN turned off before the minimum number of scans was reached.	• Confirm the on/off control of the TRIGGER IN on the I/O terminal. • If TRIGGER IN turns on/off properly, change the setting value of Minimum number of scans of Trigger mode in File settings.
E631	Lasing stopped because the maximum number of scans was reached.	• Confirm the on/off control of the TRIGGER IN on the I/O terminal. • If TRIGGER IN turns on/off properly, change the setting value of Maximum number of scans of Trigger mode in File settings.

ERROR CODE	Description	Measures *1
E640 *3 E641 *3	Lasing operation/shutter open operation was cancelled due to a timeout after the laser start-up check. Try again. (Details: For the first operation of opening shutter or lasing after the laser pumping on, warning E640/E641 may occur and the requested operation is canceled in case the laser pumping has been off for more than several days and time for laser start-up check (maximum 30 seconds) is needed.)	• When operating with Laser Marker NAVI smart, retry to start test marking/laser radiation for measurement/run mode operation. • When operating in remote mode, close the shutter or input the alarm reset to recover from the warning status, and then retry opening the shutter or laser radiation for measurement.
E652	Font file data are incorrect. Unable to read the font file.	• Re-register font data on the data management screen. • Check the font data file format.
E653	Graphic file data are incorrect. Unable to read the graphic file.	• Re-register graphic data on the data management screen. • Check the graphic data file format.
E654	Font file is not registered to the font No. specified.	• Register the font file on the data management screen. • Using the character conditions, specify the font No. in which the font file is registered.
E655	Insufficient font memory. Font file data capacity is too large.	• Reduce the number of characters registered in the font file. • Delete unnecessary font files.
E656	The specified graphic data are not registered.	Register the graphic file in the data management screen.
E657	No font corresponding to set characters were found.	• Change characters, or add the font data in use. • To use Japanese or Simplified Chinese characters, set “East Asian characters” in file settings.
E658	Too large number of characters.	• Decrease the number of characters. • Set the characters by separating them into several objects.
E659	Existed invalid character for bolding with setting.	• Original4 font cannot be displayed in bold. Select another font. • Use Font Maker software provided to create the proper pattern font.
E660	Bold characters cannot be created due to the combination of set bold line width, character height, and character width.	• Set the bold line width to half or less of the character height or the character width, whichever is smaller. • When marking the bold character, set the comparison ratio between character height and width at 1/10 to 10.

ERROR CODE	Description	Measures *1
E661	Insufficient marking memory. Marking data in the file are too large.	• Reduce the number of characters and segments in the graphic data. • Reduce the number of characters and start/end points of the graphic data. • Reduce the number of markings for Step & repeat. • Separate the long segment into short data.
E662	The number of Step & repeat marking exceeds the upper limit.	Reduce objects to be marked to 10000 or less.
E664	One or more functions that cannot be used together are set. The following combination of the functions are not available in one file. • Characters specified by SIN command and registered characters via I/O • Characters specified by SIN command and external offset function with I/O • Registered characters via I/O and external offset function with “Using SEO command” • Link control with an image checker and “continuous trigger” of trigger mode • For LP-RC/LP-RF/LP-RV series: Link control with an image checker and TARGET DETECTION IN	Delete any one of these functions from the file.
E665	It contains character(s) that cannot be converted to 2D code.	• Set the character that can be converted into 2D code. • Change the mode of the code settings.
E666	• Unable to generate 2D code in the condition specified. • The number of 2D code characters is too large relative to the set conditions.	Check the code settings and the number of characters.
E667	The specified 2D code filling pattern is not registered for the 2D code font (font number: 2D).	• Change the 2D code filling pattern. • Add the font data of the pattern used in the data management screen.
E668	The data includes a character that cannot be bar coded.	Set characters that can be bar-coded depending on the code type.
E669	• Unable to generate bar code in the condition specified. • The number of bar code characters is incorrect relative to the set conditions.	Check the code settings and the number of characters.
E670	The dimensions of the narrow element or the module width for the bar code are too small.	Specify the setting value for the narrow element or the module width larger than that of the “line width (calculation value)” specified in the object group settings.
E671	The quiet zone is not configured correctly at the bar code inversion mode settings.	Set the proper value for “Quiet/Narrow Ratio”.

ERROR CODE	Description	Measures *1
E672	The settings for separator height ratio or row height ratio are too small.	• Correct the separator height ratio or the barcode height ratio so that the height is larger than the “line width (calculation value)” specified in the object group settings. • If you want to remove the separator, set 0 to the separator height ratio.
E673	Cannot create bar code due to the invalid number of characters for EAN/UPC/JAN code or GS1 DataBar.	Enter the prescribed number of characters according to the code type.
E674	The string containing “%” is not properly set.	• If the functional characters such as a counter and date/time are input, delete and re-enter characters after “%”. • To enter “%” as a character to mark, enter “%%”. • To enter “+” or “/” as a character to mark after the counter, enter “%+” or “%/”.
E678	The string No. specified by the SIN command is not acceptable because the No. has not been set in Laser Marker NAVI smart.	Specify the same No. set in “characters specified by SIN command” setting in Laser Marker NAVI smart to the string No. in SIN command data.
E679 *2, *3	Communication was interrupted. The adjustment value of power optimization by marking position could not apply to the laser marker.	• Set the adjustment value of power optimization by marking position and apply it to the laser marker again. • Do not turn off the power during the application processing. • Do not turn on the remote mode during the application processing.
E680	Any of the following functions that are not available with the RUN mode ON are configured. • Registered characters via I/O • External offset (via I/O and SEO command) • Characters specified by SIN command • Link control with external image checkers	• To execute marking in the RUN mode, delete these functions from the marking data. • When you use these functions, control the laser marker in the remote mode.
E682 *3, *4	Any of the following functions that are not available with on-the-fly marking are configured. • Link control with external image checkers • Overwriting interval • Skip marking of 2D code (module marking order) When the trigger mode is set to Marking at regular intervals or Multiple triggers, those functions are also not available. • Registered characters via I/O • External offset (via I/O and SEO command) • Characters specified by SIN command • Counter reset at date change	• To use on-the-fly marking, delete these functions from the marking file. • Some functions are available when Trigger mode of the on-the-fly settings is set to Single trigger.

ERROR CODE	Description	Measures *1
E686	Any of the following functions that are not available with the seamless loop setting are configured. • Multiple objects • Object consisting of unclosed line(s) • Point radiation object • Step & repeat function	• Deactivate the seamless loop in the laser settings. • If you want to radiate laser continuously without any break, set the closed line by setting the start and end points in the same position.
E699	Some setting fields contain an improper value.	• Overwrite the data again to the selected file number. • If the problem persists, save the backup file and contact our sales office or representatives.
E710 - E711 *2, *3	The head air-cooling fan has stopped.	• Refer to “Setup/Maintenance Guide” and clean the fan. • Check the connection status of the fan connector. • Replace the fan. • For LP-RC series, confirm the side covers of the head are installed properly.
E715 *3	The temperature of the laser oscillator is high.	• Check if the ambient temperature of the laser marker is not exceeding the range of its specification. • Make sure air-cooling fan operates. • Remove the dust and contamination in the air intake and exhaust port, and clean the air-cooling part such as fan and filter.
E750	Invalid trigger signal. TRIGGER IN was input during trigger processing.	• Turn ON TRIGGER IN after confirming READY OUT is ON. • Do not input the marking trigger while PROCESSING OUT is ON. • Check the switch or the sensor connected to TRIGGER IN of I/O terminal operates properly without chattering. • Check wiring of I/O or communication port to the external control devices.
E751	Invalid trigger signal. TRIGGER IN was input while READY OUT is OFF.	
E752 *3, *4	TARGET DETECTION IN did not turn ON during the lasing process.	• Check the marking results before and after the error. • Check the connection and control method of the work detection sensor. • Set the work detection sensor position so that the sensor turns ON more than 1ms during marking. • When you do not use this function, set “Disable” at X7: TARGET DETECTION IN with Laser Marker NAVI smart system settings.
E760	• I/O connector terminal No. input was not set successfully. • Before setting completion (SET OK OUT) was output, the set input (SET IN) was input at least twice.	• Keep SET IN turned ON until SET OK OUT turns ON. • To input the No. input again, close the shutter and reset the previous data. • Check the connection with the external controller. • Check the control procedure of the external control.

ERROR CODE	Description	Measures *1
E770	The connection between laser marker and your PC is disconnected. Unable to communicate with Laser Marker NAVI smart.	• Check the Ethernet or USB connection status. • For Bluetooth communication, check for any obstacles and distance between that and the laser marker. • Save files onto your PC local folder, and overwrite and save them when the connection gets back online.
E775	Unable to transmit the response data of MST command.	• When the marking interval is too short for transmission time of MST command, MST command is not available. In such case, check the marking completion by I/O. • Check the control procedure of the external control.
E780	Serial number mismatch.	• Make sure the connected laser marker components have the correct serial numbers. • For LP-GS/RC/RF series, it is recommended to connect the head and controller that have the same serial numbers. • For LP-RV series, it is recommended to connect the head, oscillator unit, and controller that have the same serial numbers.
E781	• Model number mismatch. • Incorrect connection of signal cable or unit power cable.	• Make sure the connected laser marker components have the correct model numbers. • For LP-GS series, it is recommended to connect the head and controller that have the same model numbers. If you combine the different models, the model number of the laser head is applied to the laser marking system. • Check the connection of the cable and various signal lines, and then restart the laser marker.
E782 *4	GSD file version error.	To use PROFINET, download the GSD file (.XML file) corresponding to the controller version of your laser marking system. If the GSD file version is incorrect, settings by your PLC cannot be imported to the laser marking system correctly.

*1 : If the error persists after restart of the laser marker, contact our sales office or representatives.
*2 : Error that may occur for LP-GS series only.
*3 : Error that may occur for LP-RC series only.
*4 : Error that may occur for LP-RF series and LP-RV series only.

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