96M15110

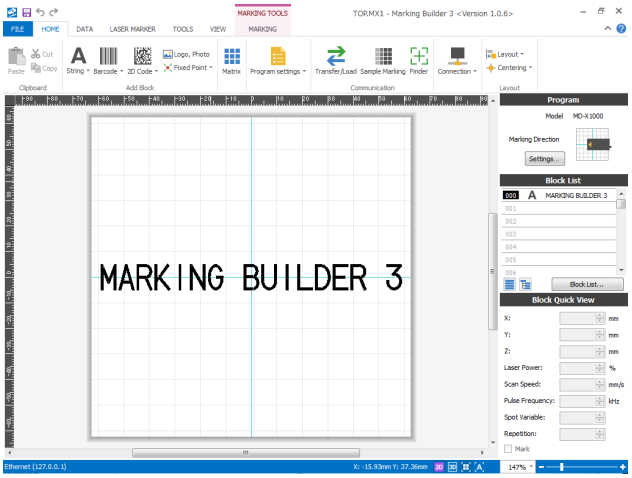
KEYENCE

Laser Marker Setting Software

Marking Builder 3 User's Manual

(MB3-H2D4/H3D1)

for MD-X1000/1500 series
MD-F3200/5200 series
MD-U1000 series
ML-Z9600 series



Read this manual before using the product in order to achieve maximum performance.
Keep this manual in a safe place after reading it so that it can be at any time.

Symbols

The following symbols alert you to important messages. Be sure to read these messages carefully.

DANGER	**It indicates a hazardous situation which, if not avoided, will result in death or serious injury.**
WARNING	**It indicates a hazardous situation which, if not avoided, could result in death or serious injury.**
CAUTION	**It indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.**
NOTICE	**It indicates a situation which, if not avoided, could result in product damage as well as property damage.**

Important **It indicates cautions and limitations that must be followed during operation.**

Point **It indicates additional information on proper operation.**

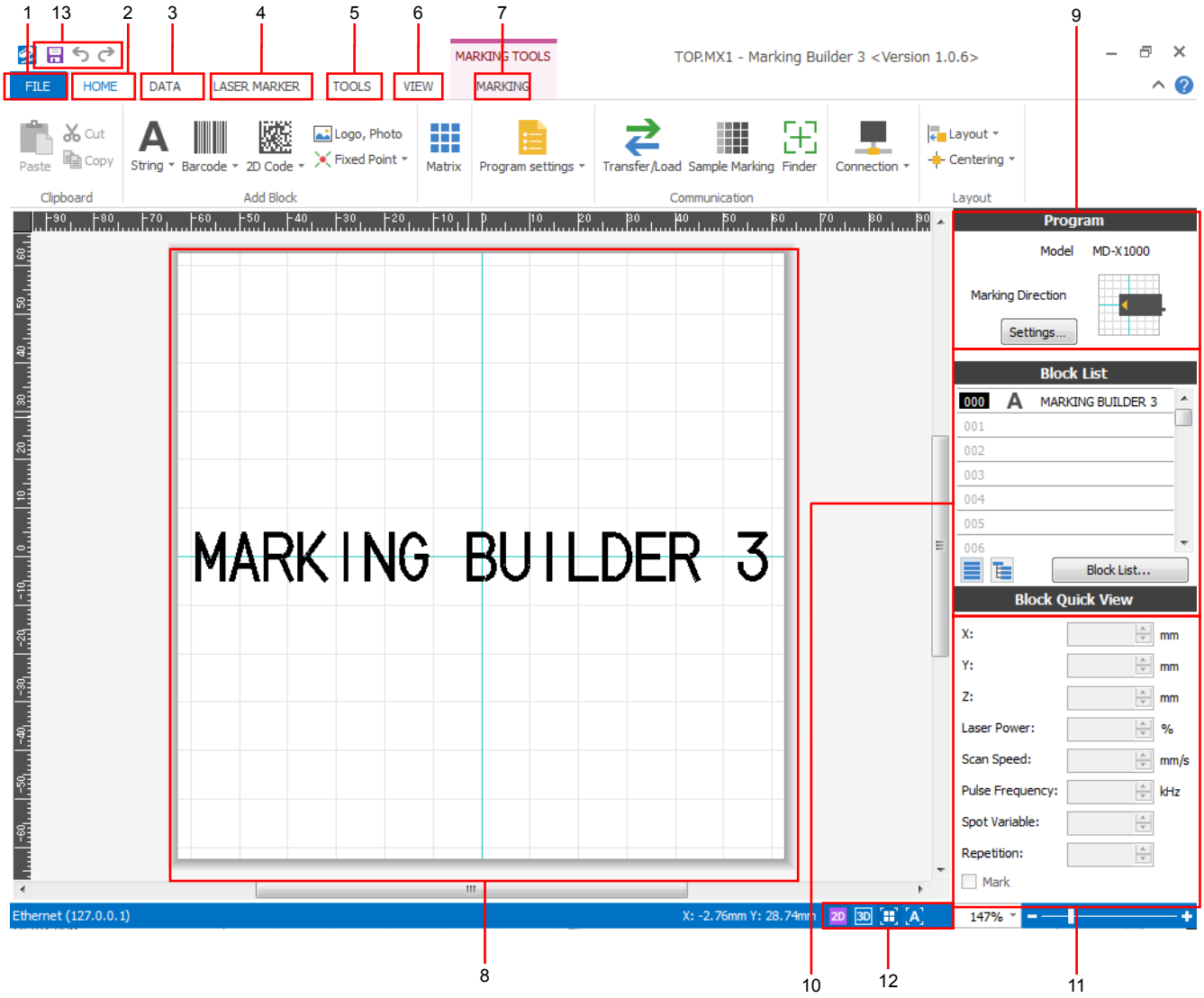
Reference **It indicates tips for better understanding or useful information.**

It indicates the reference pages and items in this manual.

Table of Contents

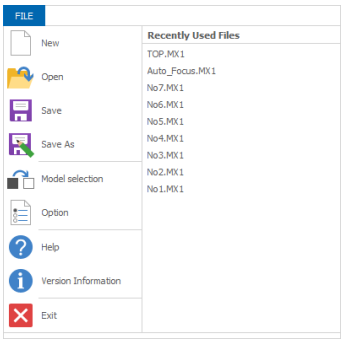
MEMO

Main Screen



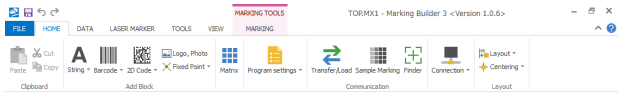
1. File

Perform operations such as creating a new program, saving, converting models, displaying the help and ending programs.
“File Menu” (Page 150)



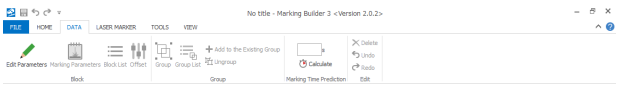
2. Home

Perform operations such as creating the marking data, program setting, sample marking, finder function, and changing the unit.
“Home Menu” (Page 16)



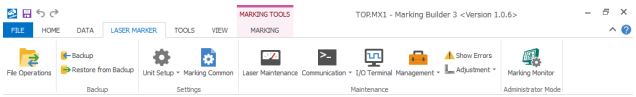
3. Data

Perform operations such as displaying the block parameters/marking conditions/offset screens and grouping.
“Data Menu” (Page 92)



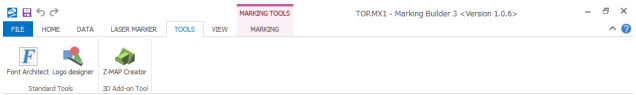
4. Laser marker

Perform operations such as file operations to and from the laser marker, changing the unit setup/marking common setup, and the maintenance function.
“Laser Marker Menu” (Page 96)



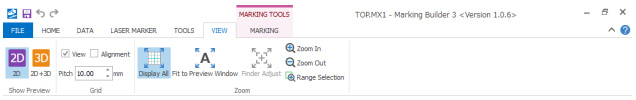
5. Tool

Launch Font Architect, Logo designer, and Z-MAP Creator.
“Tool Menu” (Page 118)



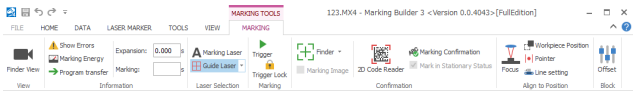
6. View

Perform operations such as switching between 2D/3D views, setting the grid, and the zoom function.
"View Menu" (Page 140)



7. Marking

Perform operations such as performing marking from the PC, the finder function and the focus function.
This ribbon menu only appears when blocks exist.
"Marking Menu" (Page 142)



8. Preview

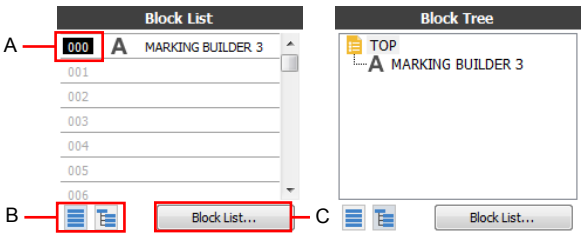
Display the marking data.

9. Program

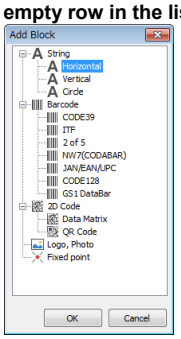
Display the model and marking direction. The program setting can be viewed using the [Settings] button.
"Program Setting" (Page 74)

10. Block list/Block tree

Display the list of currently set blocks.



Reference
- **The block editing screen will appear when you double-click a block.**
- **The block adding screen will appear when you double-click an empty row in the list.**

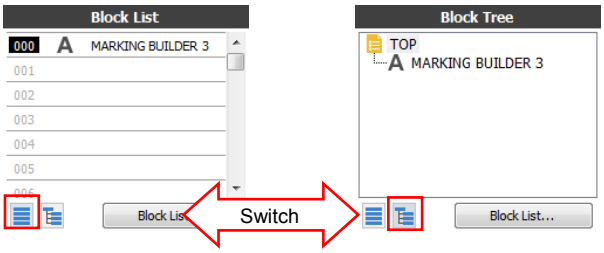


A. Block No.

The screen for changing the display color in the preview will appear when you double-click a block No.

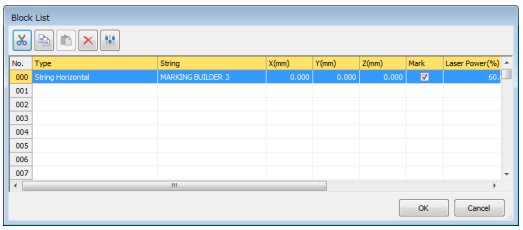
B. Switch List/Tree view

Switch the between the list/tree views.



C. Block List view

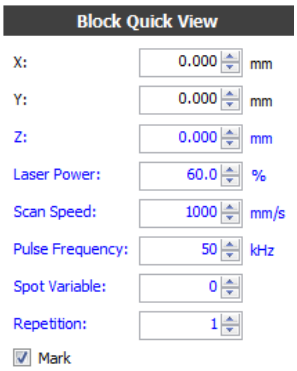
Opens the detailed Block List screen. You can edit the layout and marking conditions.



Reference
- **You can copy, cut, paste and delete items in the list.**
- **Refer to "Offset Adjustment" (Page 93) for more information on the offset adjustment function.**
- **Parameters shown in blue text are referencing the common parameters for blocks.**
  "Common for blocks" (Page 80)

11. Block Quick view

You can view/edit the parameters of the currently selected block.



Reference
- **If multiple blocks are selected, only the parameters containing the same conditions will be displayed.**
- **Parameters shown in blue text are referencing the common parameters for blocks.**
  "Common for blocks" (Page 80)

12. Status Bar

You can execute the [2D View/2D+3D View/Display All/Fit to Preview Window/Finder Adjust] display functions.
"View Menu" (Page 140)

13. Quick Access Tool Bar

The shortcut of the function displayed in ribbon can be created.

A. Quick access tool

Display the registered quick access tool.
- **Registering method**
  Right click the ribbon menu icon, and select "Add to quick access tool bar (QAT)".
- **Deleting method**
  Right click the quick access rule bar icon, and select "Remove from quick access tool bar (QAT)".

B. Display settings for quick access tool bar and ribbon

Change the display position of quick access tool bar and minimize the ribbon.

1 Software

1-1 Operating Environment

Supported operating systems	Windows 7 / 8 / 8.1 / 10
Supported languages	Japanese, English, Simplified Chinese, German, Korean, French, Spanish, Thail, Italy
CPU	1GHz or higher
Memory capacity	1 GB or more
Display resolution	1280 x 768 pixels or higher
Free disk space	500 MB or more

- Windows is a registered trademark of Microsoft Corporation (USA) in the United States and other countries.

Important

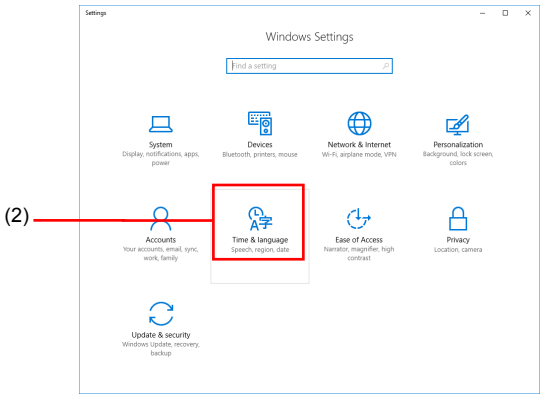
- **.NET Framework 4.0 or 4.5 is required.**
- **Administrator privileges are required on the PC during the installation.**
- **To use the 3D extensions, a graphic card supporting DirectX 9.0 or higher is required.**

Reference

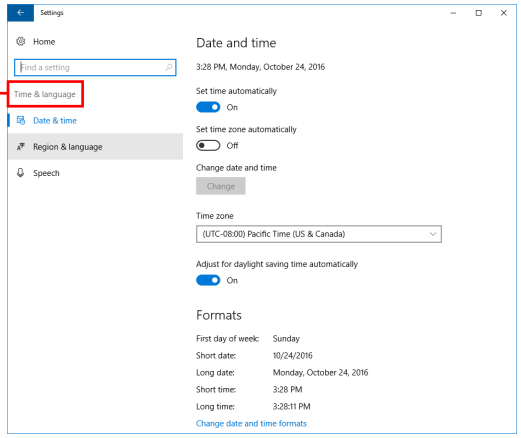
When Windows 10 is used, if the settings for OS language is different from the settings for Marking Builder 3 language, part of the layout may change because the font to be used does not exist. Follow the procedures below to install the font.

(1) Open the settings from Windows Start menu

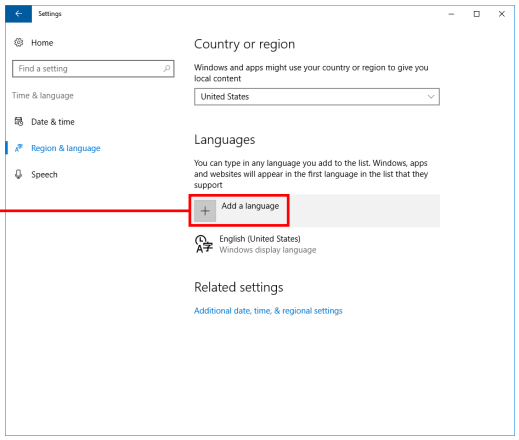
(2) Select "Time and language"



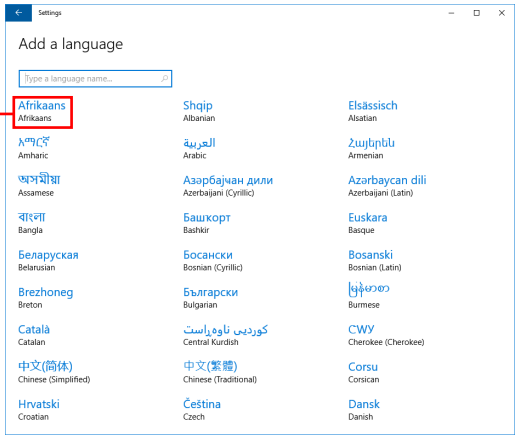
(3) Select "Region and language"



(4) Select "Add a language"

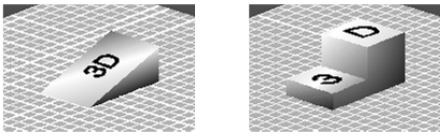
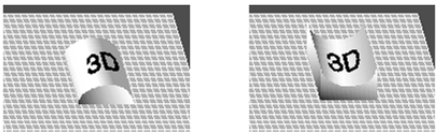
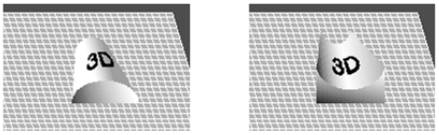
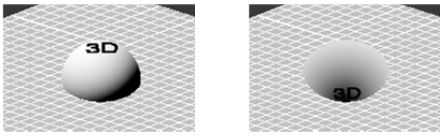
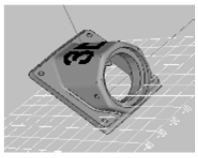


(5) Select a language to install



1-2 Software Type

Marking Builder 3 consists of the following software:

MB3-H2D4	Install the basic functions of Marking Builder 3. This software enables you to configure 2D settings.
MB3-H3D1	Enables the 3D editing function. ■ **Extensions List** ・ **Distance measurement and auto focus** ・ **Marking on slopes and uneven surfaces**  ・ **Marking on the outer/inner surfaces of a cylinder**  ・ **Marking on the outer/inner surfaces of a cone**  ・ **Marking on the outer/inner surfaces of a sphere**  ・ **Marking along 3D shapes** **3D-CAD file (STL) data is required.** 

1-3 Package Contents

■ MB3-H2D4 package contents

- DVD (containing Marking Builder 3 and PDF manual) x 1
- Marking Builder 3 activation main serial code x 1
- Marking Builder 3 activation reserve serial code x 1

■ MB3-H3D1 package contents

- CD (containing the 3D extensions software) x 1

■ MD-XAD1(A) package contents

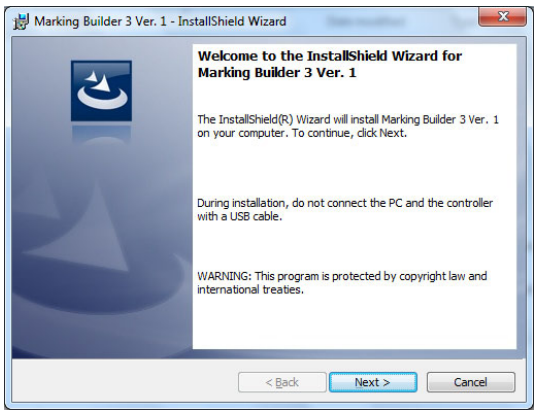
- 2D code reader activation serial code ... x 1

1-4 Installation Procedure

This section explains the installation procedure for Marking Builder 3.

(1) Insert the "MB3-H2D4" DVD-ROM into the drive.
The installer will start automatically.

(2) Install the software by following the install wizard.



Reference ・ **If NET Framework 4.0 is not already installed, the installation of NET Framework 4.0 will start first.**

(3) When the installation completes, a shortcut for “Marking Builder 3” will appear on the desktop.

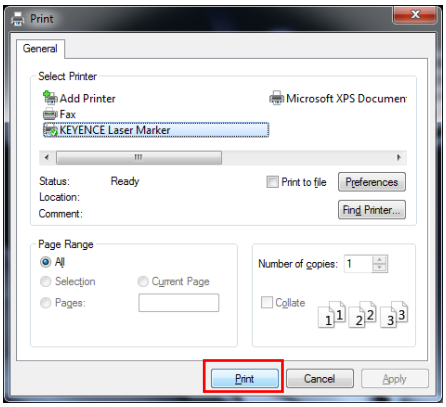
Important ・ **3D editing functions are available in trial mode during the period described below:**
"Within 60 days from installing MB3-H2D4" or "From installing MB3-H2D4 until the activation of MB3-H2D4 is completed", whichever is sooner.
MB3-H3D1 needs to be installed in order to continue using the 3D functions.

Reference ・ **When you install Marking Builder 3, the operation monitoring software “Marking Monitor” will be installed at the same time. The software can also be launched using the shortcut on the desktop.**

1-5 Printer driver

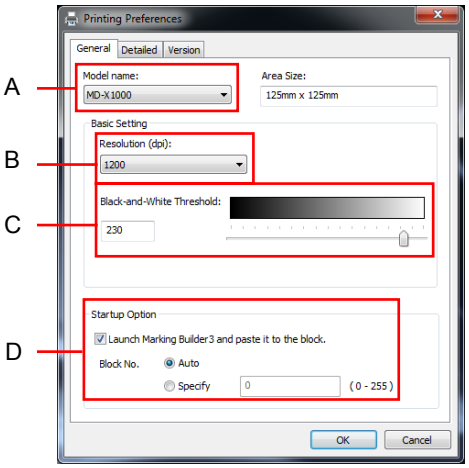
With Marking Builder 3, printable files such as PDF or Excel files can be printed as the logo marked by laser marker. If Marking Builder 3 is installed, the printer driver functions will also be installed.
"Installation Procedure" (Page 7)

After installing Marking Builder 3, "KEYENCE Laser Marker" can be selected as printer when printing a file. Press the print button to print the logo on the printing conditions set in advanced settings.



■ Advanced settings

1. General



A. Model selection

Select the model of the laser marker to be output.

B. Resolution

Select logo resolution from [600/1200/2400/4800].

Reference
- **If you select a wide area model, resolution of 4800 cannot be specified.**
- **If the data amount is large, it may take time to convert, or the conversion may not complete. In that case, reduce the resolution and output the logo data.**

C. Bitonal threshold value

Set the density for the output color as laser marker logo. The threshold value is determined from 1 to 255 (black to white), so if you select 1, any color than black will not be printed.

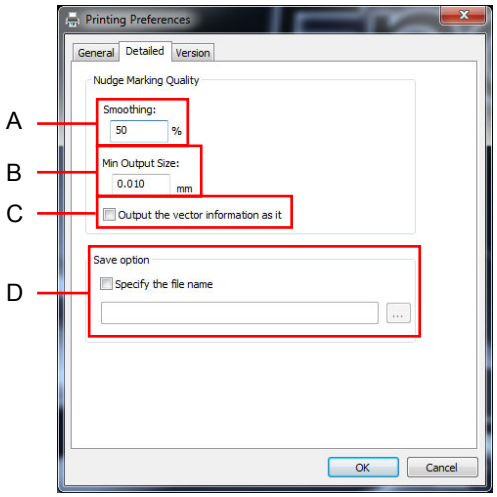
D. Booting option

After outputting the logo file, set whether to open Marking Builder 3. If [Start Marking Builder 3 and put it on block]is ticked, you can select from [Auto/Custom]. If not, the save window of the output logo is displayed.

- **Auto**
  Logo data is registered to the vacant number.
- **Specified**
  Logo data is registered to the specified number.

Reference
- **If Marking Builder3 has been activated, the logo for the block of the settings opened currently will be registered.**
- **If the block has been already registered to the specified block number, overwrite with the output logo.**

2. Details



A. Smoothing

If the value is increased, the logo is formed so that the original figure can be drawn smoothly. Therefore, although the number of the total elements becomes less, deviation from the original figure will increase.

B. Minimum output size

Set the minimum size for fill element. Delete the element which is less than the set value.

C. Output vector information as it is

If [Output vector information as it is] is ticked, a figure that has vector information will be output as it is. If it does not have vector information, or if the vector information is not output, it is output in raster format.

D. Save option

Tick [Specify a file name], and the hatch logo file will be saved in the output destination if a folder has been specified in advance.

1-6 Activating Marking Builder 3

The activation screen will appear when you launch Marking Builder 3. Activate the software by following the procedure described below.

Important

- **Internet connection is required during the activation. If no Internet connection is available on the PC on which Marking Builder 3 was installed, you can access the activation page from another device.**
- **Administrator privileges are required on the PC during the activation. When the activation completes, all users on the PC will be able to use the software.**
- **User registration to the KEYENCE website must be completed in advance.**

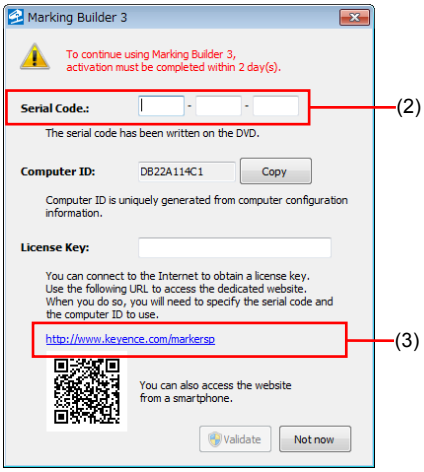
(1) Launch “Marking Builder 3”.
The activation screen will appear.

Reference

- **This screen will not appear if the software activation has already been completed.**

(2) Enter the “Serial Code” supplied with MB3-H2D4-DVD.

(3) Click the link to the activation page.



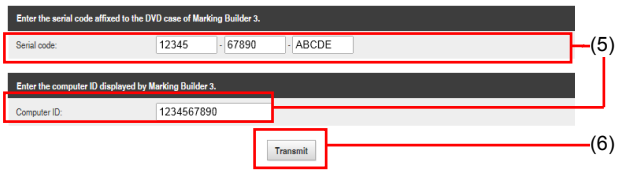
(4) Press [Issue Marking Builder 3 license key].

Important

- **You must be logged into the KEYENCE website to access the activation page.**

(5) Enter “Serial Code” and “Computer ID” for MB3-H2D4-DVD on the activation page.

(6) Press the [Transmit] button.

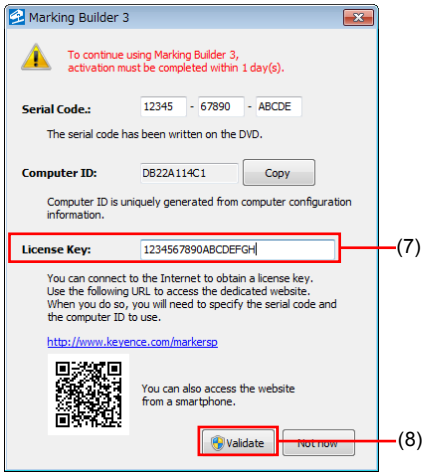


Reference

- **The computer ID can be copied to the clipboard using the [Copy] button.**

(7) Enter the license key displayed into the [License key] field on the activation screen.

(8) Press the [Validate] button.



The software activation is now complete.

Important

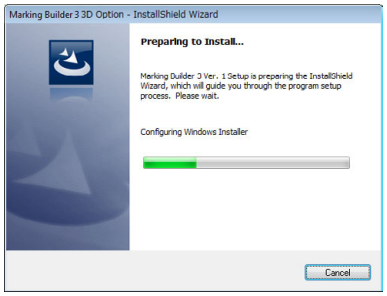
- **If the software is not activated within 60 days after the installation, the editing functions will be disabled.**

1-7 Installing the 3D Extensions Software

“MB3-H3D1” needs to be installed in order to use the 3D functions of Marking Builder 3.
This section explains the installation procedure for “MB3-H3D1”.

(1) Insert the "MB3-H3D1" CD-ROM into the drive.
The installer will start automatically.

(2) Install the software by following the install wizard.



1-8 Activating the 2D Code Reader Functions

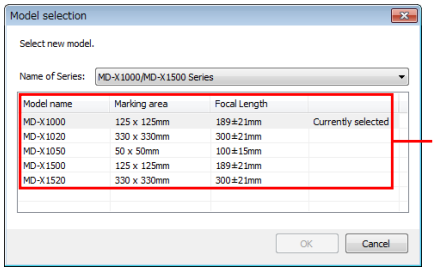
Activation using a serial code is required in order to enable the 2D code reader function of the laser marker. The activation code is supplied with the separately sold “MD-XAD1(A)”.
“2D code reader validation” (Page 113)

1-9 Launching Marking Builder 3

This section explains how to launch Marking Builder 3.

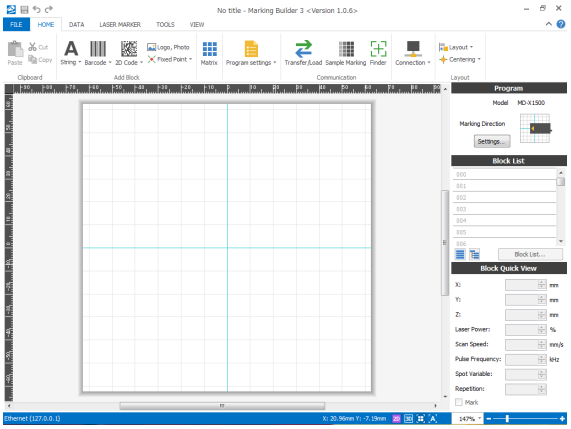
(1) Execute the shortcut of “Marking Builder 3”.

(2) Select the model to be connected.



Reference
- **This screen only appears when you launch the software for the first time after installation.**

(3) Marking Builder 3 will start.

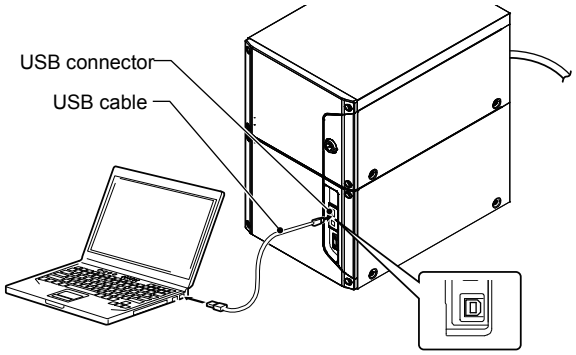


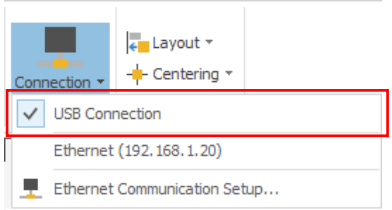
1-10 Connecting the PC and Laser Maker

The following two connection methods are available when transferring a program created in Marking Builder 3 to the laser marker or reading the laser marker settings.

■ Connecting with a USB Cable

As shown below, connect the PC and laser marker using a USB cable and select [USB Connection] from [Unit] in the Home menu.
“Unit” (Page 90)



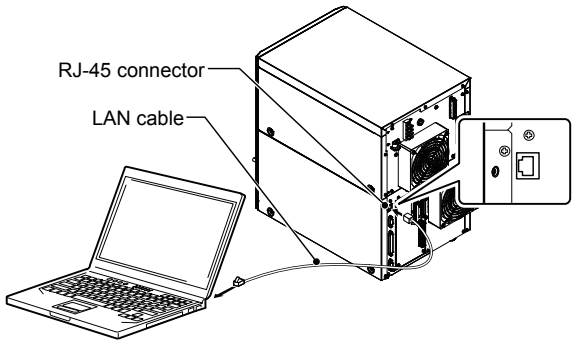


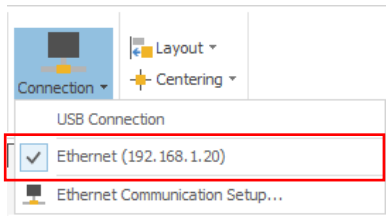
Important
- **If connected via USB, the function for importing finder images into Marking Builder 3 will not be available.**

Reference
- **The USB driver will be installed automatically when you connect the laser marker via USB for the first time.**
- **Optional USB cable (OP-66844) is sold separately.**

■ Connecting with a LAN Cable (Ethernet)

As shown below, connect the PC and laser marker using a LAN (Ethernet) cable and select [Ethernet Connection] from [Unit] in the Home menu.
“Unit” (Page 90)





Reference
- **Optional LAN cross cable (OP-66843) is sold separately.**
- **Both straight and cross cables may be used as the laser marker automatically recognizes the unit’s port type (AutoMDI/MDI-X).**

MEMO

2 Basic Operations

2-1 Program and Block Configurations

Up to 2,000 programs can be saved in a laser marker.
Each program consists of 256 blocks; and you can configure the marking string and parameter for each block.

Program No.0001	Block No. 000	String Marking conditions
Program No.0002	Block No. 001	String marking conditions
Program No.0003		
	Block No. 254	String marking conditions
Program No.1998	Block No. 255	String marking conditions
Program No.1999		

Reference

- **You can configure up to 510 characters per block.**

2-2 Marking Procedure

When you launch Marking Builder 3, the screen for creating new programs will appear. The following describes the basic flow for creating new programs.

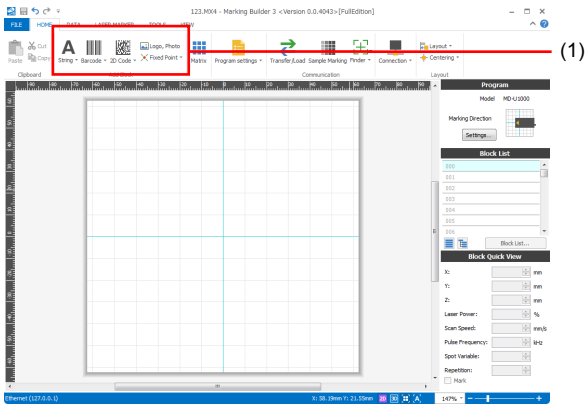
1. Adding a block

Add a block from the Home Menu and configure the block parameters.

(1) Select the desired type of block (string/barcode/2D code/logo, photo/fixed point) to be added.
A string block is added in the example described below.
“Add Block” (Page 17)

Reference

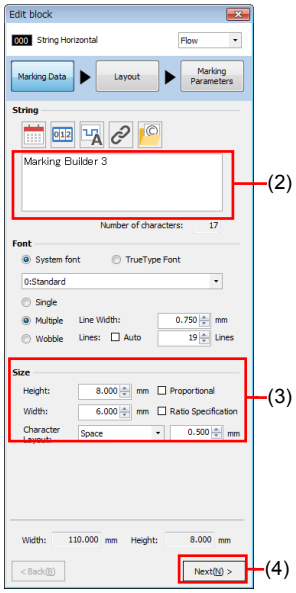
- **The block editing screen will appear when you add a block.**



(2) Enter the marking string.

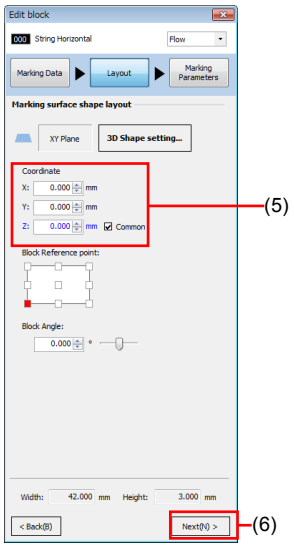
(3) Set the character height/width/layout.
“Edit block marking data” (Page 19)

(4) Press the [Next] button.
The layout screen will open.



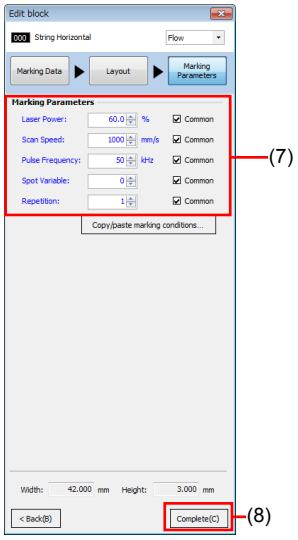
(5) Enter the X/Y/Z coordinates of the marking block.

(6) Press the [Next] button.



(7) Set the marking conditions.
"Edit Block Marking Conditions" (Page 30)

(8) Press the [Complete] button.



Reference
- **The sample marking function allows you to find the optimal marking conditions.**
  "Sample Marking" (Page 82)
- **To add more blocks, repeat steps (1) to (8).**

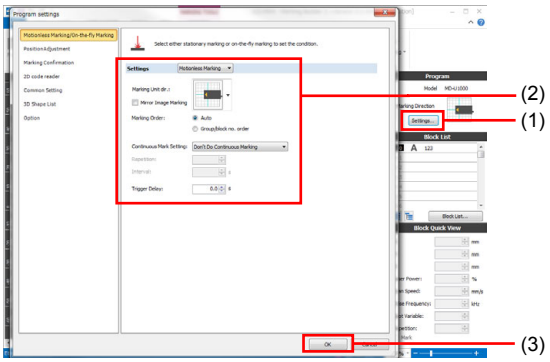
2. Entering the program setting

Set the marking direction.

(1) Press the [Settings] button.

(2) Enter the marking unit direction.
"Marking Unit dir." (Page 75)

(3) Press the [OK] button.

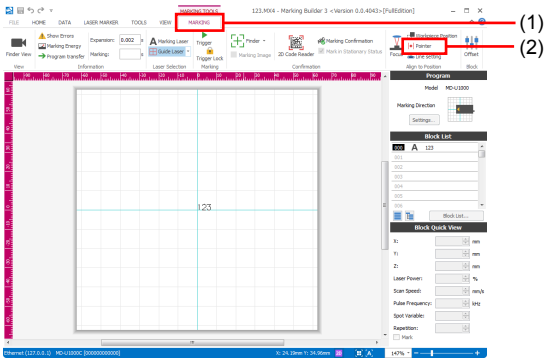


3. Performing a marking confirmation

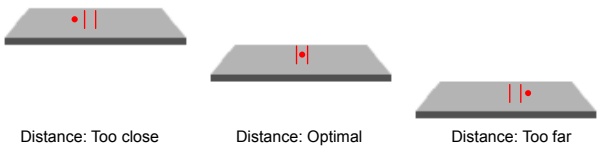
Mark the set block to the workpiece and check the marking result. Perform marking after adjusting the focus distance and marking position.

(1) Press the [Marking] tab.
"Marking Menu" (Page 142)

(2) Press the [Pointer] button.
A pointer will appear at the point of origin.



(3) Adjust the focus distance.
Adjust the installation height of the workpiece such that the red dot comes to the center of the two red lines. The following shows the relationship between the head and pointer viewed from the front.

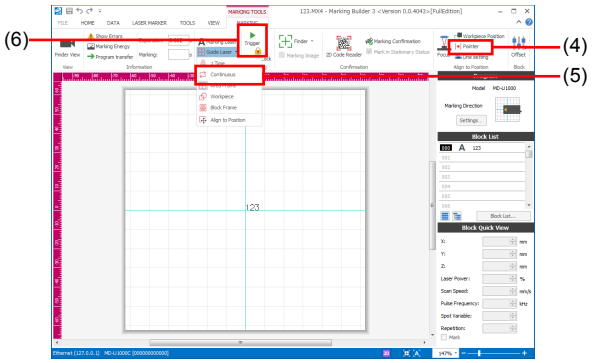


Reference
- **The optimal focus distance of each model is as described below.**
  MD-X1000/1500 series: 189mm
  MD-X1020/1520 series: 300mm
  MD-X1050 series: 100mm
  MD-F3200/5200 series: 168mm
  MD-F3220/5220 series: 300mm
  MD-U1000 series: 189 mm
  MD-U1020 series: 300 mm
  ML-Z9610 series: 189mm
  ML-Z9620 series: 300 mm
  ML-Z9650 series: 92 mm

(4) Press the [Pointer] button.
The pointer will disappear.

(5) Press the [Continuous] button of the guide laser.

(6) Press the [Trigger] button.
Adjust the position of the workpiece using the guide laser.



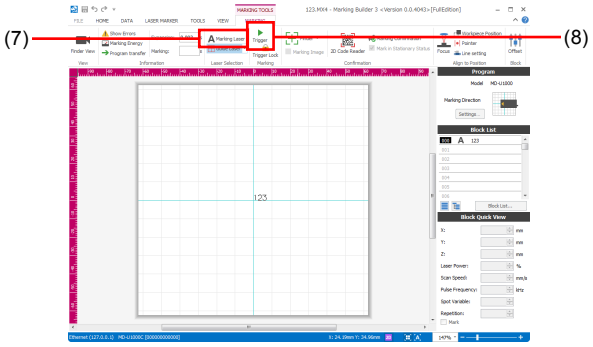
(7) Press the [Marking Laser] button.

(8) Press the [Trigger] button.
Marking will start.

WARNING	**・Laser emission will start when you press the [Trigger] button. Make sure to emit the laser after confirming the safety of the surrounding area.**

Important **・Distance adjustment is required if the focus distance has not yet been adjusted.**

Reference **・The [Marking] tab only appears when one or more blocks are present.**



(9) Check the marking state.
If the marking state is not adequate, review the marking conditions and repeat steps (1) to (8).

4. Transferring a program to the laser marker

Transfer the completed program to the laser marker.

(1) Press the [Home] button.

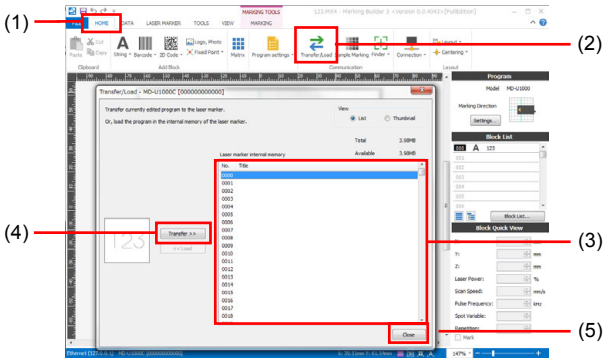
(2) Press the [Transfer/Load] button.
"Transfer/Load" (Page 82)

(3) Select the program No. of the unit.

(4) Press the [Transfer] button.
The program will be transferred to the controller.

(5) Press the [Close] button.

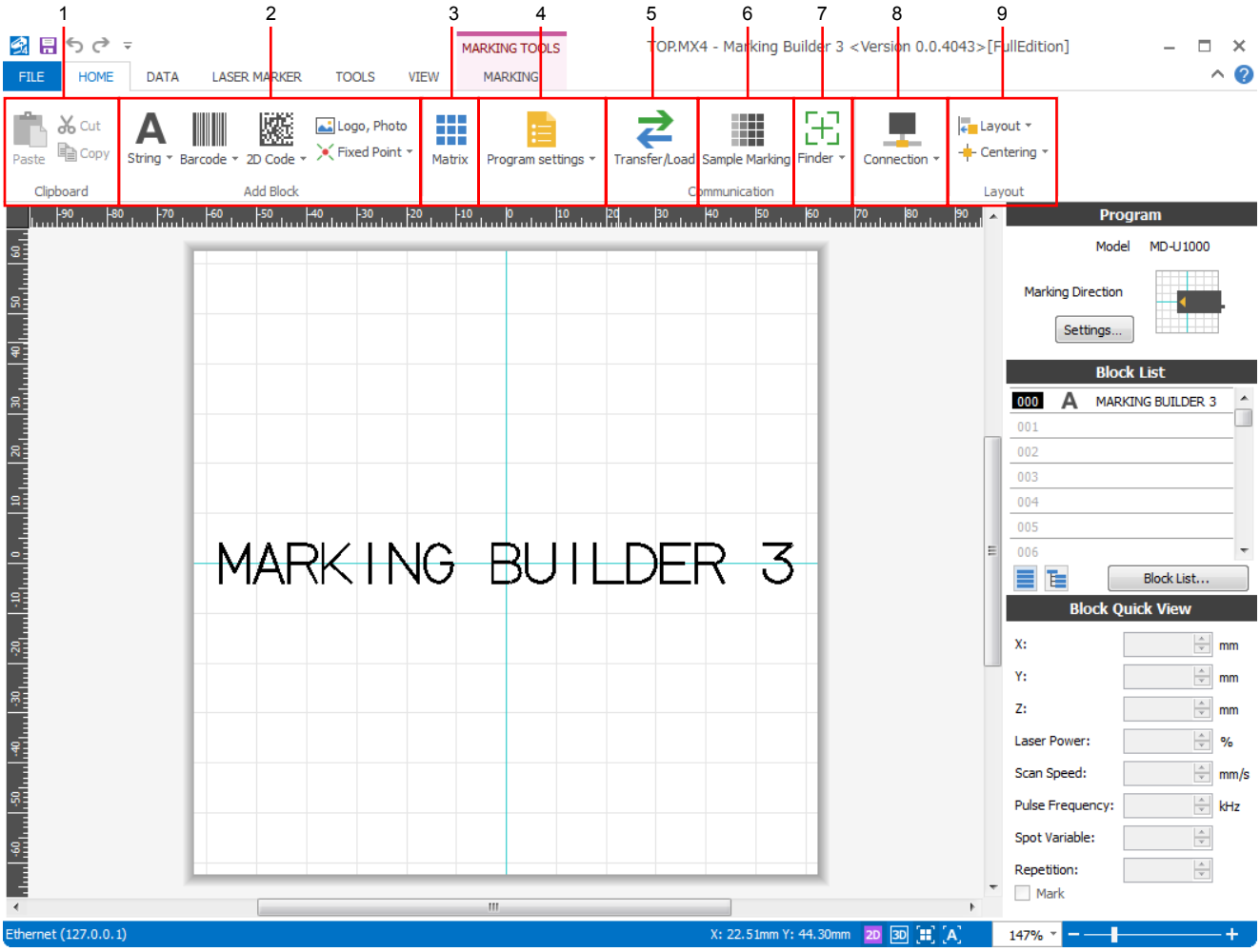
Reference **・Programs that have been transferred to the laser marker can be marked without Marking Builder 3, using a trigger input on the terminal block or a marking start command.**



The above explained the basic flow of creating and transferring programs.
Refer to the subsequent sections of the manual for information on the other functions.

MEMO

3 Home Menu



1. Clipboard

Copy, cut, or past a block.
“Clipboard” (Page 17)

2. Add Block

Add a new marking block.
“Add Block” (Page 17)

3. Matrix

Add a marking block into the matrix.
“Matrix” (Page 71)

4. Program setting

Set the program-related functions.
“Program Settings” (Page 74)

5. Transfer/Load

Sends/receives data between the laser marker and PC.
“Transfer/Load” (Page 82)

6. Sample Marking

Perform marking with different marking conditions.
“Sample Marking” (Page 82)

7. Finder

Checks and aligns the marking position using the built-in camera.
“Finder” (Page 89)

8. Unit

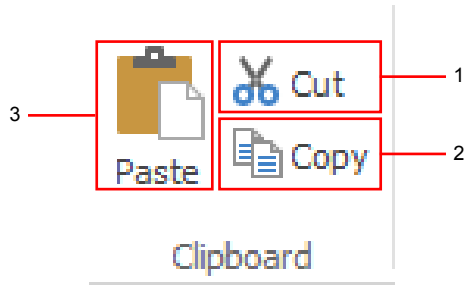
Changes the unit and connection method.
“Unit” (Page 90)

9. Layout

Perform the block layout function.
“Layout” (Page 91)

3-1 Clipboard

Copy, cut, or paste a block.



1. **Cut**
   Cut the currently selected block.

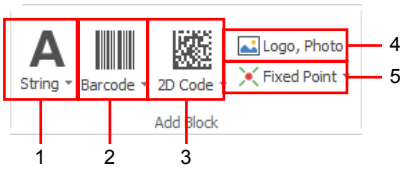
2. **Copy**
   Copy the currently selected block.

3. **Paste**
   Paste the copied or cut block to the preview screen.

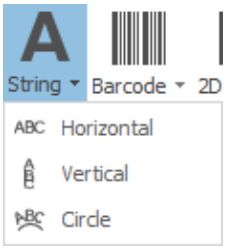
Reference
- **The block is pasted in the same coordinates as the original block.**

3-2 Add Block

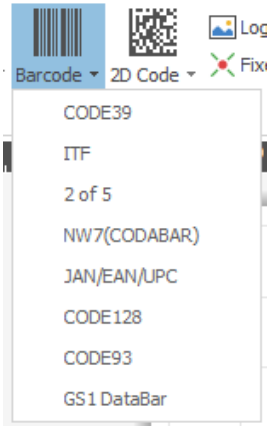
Add a marking data block (string/barcode/2D code/logo, photo/fixed point marking). A block editing screen based on the added block type will appear when you add a block.



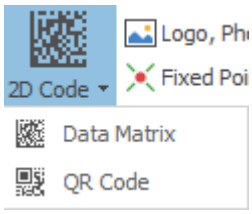
1. **String**
   Add a horizontal, vertical or circle string block.



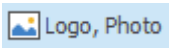
2. **Barcode**
   Add a CODE39, ITF, 2of5, NW7, JAN/EAN/UPC, CODE128, GS1 or DataBar barcode block.



3. **2D Code**
   Add a DataMatrix (DataMatrix (ECC200/GS1 DataMatrix) or QR code (Model 1/Model 2/Micro QR)) 2D code block.

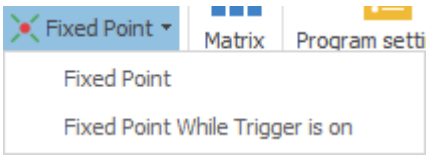


4. **Logo, Photo**
   Add a logo file (DXF, MLG, MHL, MWI) or photo file (MZU, MZM, MZX, BMP, JPG, PNG, TIF) block.



Reference
- **A logo file needs to be created in advance using "Logo designer"**
  "Logo designer" (Page 122)
- **Photo files can be created in advance using "Photo file conversion".**
  "Photo file conversion" (Page 69)
- **Only 1/8/24 bit BMP files are supported.**
- **LZW compression and unique TAG are not supported for TIFF files.**

5. **Fixed point**
   Add a fixed point (time-specific) or a fixed point block with trigger on.



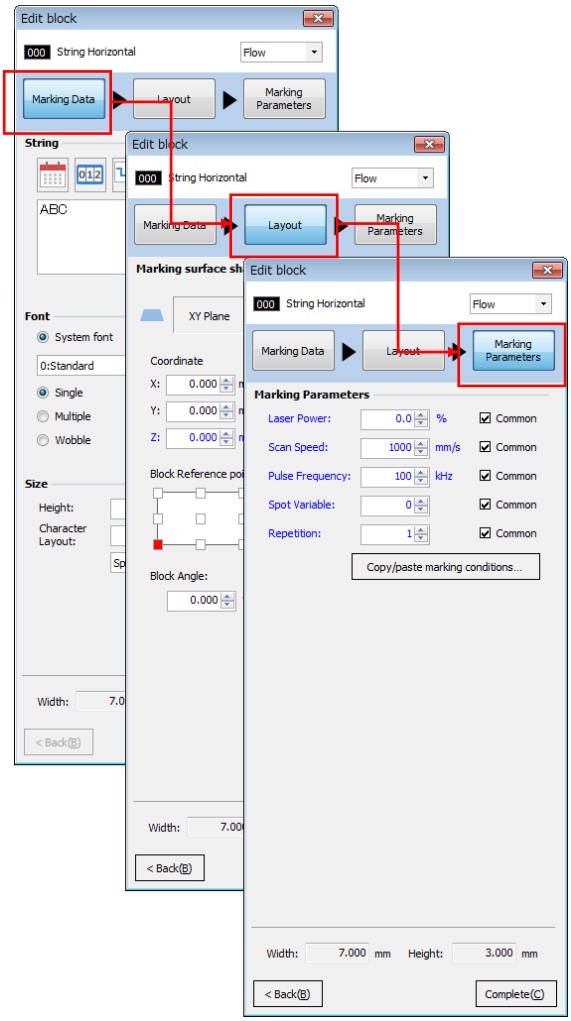
Reference
- **A fixed point block with trigger cannot be mixed with another block.**
  No blocks cannot be added if continuous marking has been set.

3-3 Edit block

The block editing screen will appear when you add a block. Set the mark data, layout and marking conditions on this screen. There are two types of views available: [Flow] and [List].

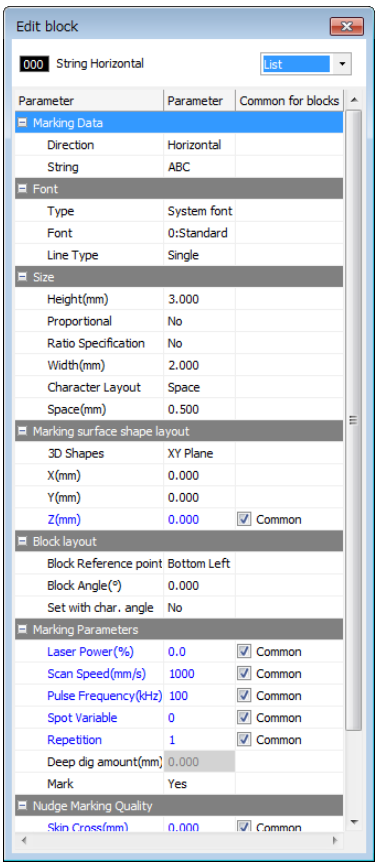
■ Flow View

In this view mode, the parameters are configured in the order of [Marking Data] > [Layout] > [marking conditions].



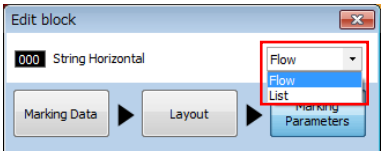
■ List View

In this view mode, all parameters are displayed and configured in a list view.

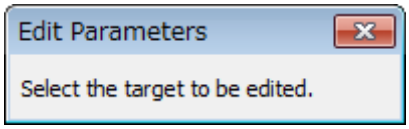


Reference

- **You can switch between the Flow view and List view from below.**



- **The block editing screen will minimize automatically if no block is selected.**



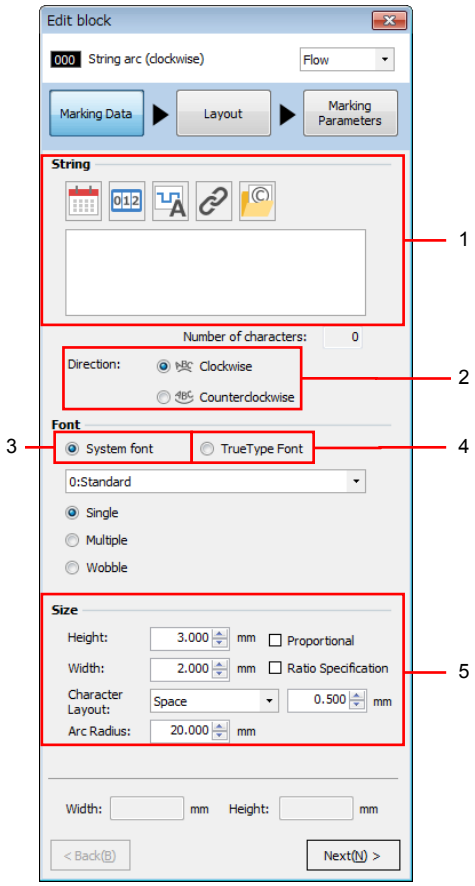
- **If you close the block editing screen, the screen will not reappear even if you select or add a block. To show the screen again, double-click a block or press the [Edit Parameters] button in the Data Menu.**
- **When you select two or more blocks, the view mode will switch automatically to the List view, in which multiple blocks can be configured at the same time.**
- **Some of the marking conditions can only be edited in the List view.**
  “Edit block list view” (Page 56)

3-4 Edit Block Marking Data

Different contents are displayed for the edit block marking data depending on the type of the block that is added. Explanations corresponding to different block contents are provided below.

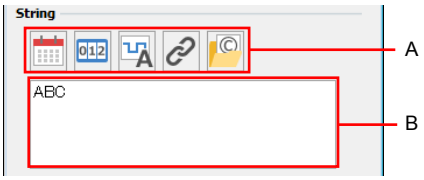
Character Block Marking Data

The following explains the setting screen for the string, direction, font and size.



1. String

Set the string mark data.



A. Inserting updated characters

Insert updated characters (calendar, counter, I/O encoded character, link) into the text box.

"Update character and code settings" (Page 60)

B. Entering a string

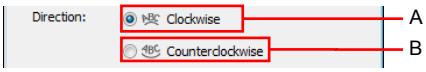
Enter a string marking data into the text box.

Reference

- **Up to 510 characters may be entered.**

2. Direction

Set the direction for circle string blocks only.

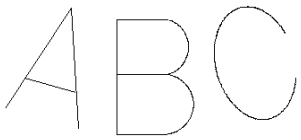


A. Clockwise

Place the string such that it is readable in clockwise direction.

B. Counterclockwise

Place the string such that it is readable in counterclockwise direction.

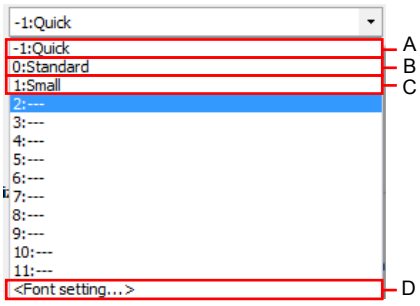


3. System font

Select a system font type and set line type.

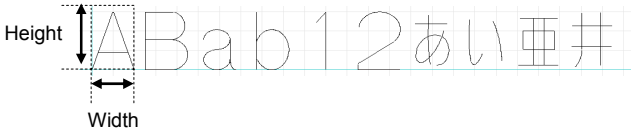
■ **Select Font**

Select the font from the below.



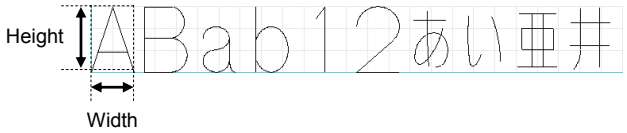
A. -1: Quick

An alphanumeric is marked in shorter time compared to the Standard.



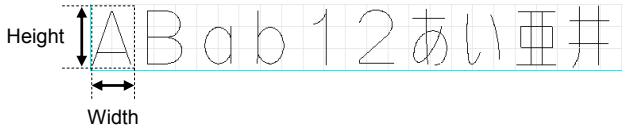
B. 0: Standard

Marks alphanumerics using the specified height and width.



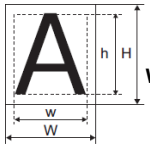
C. 1: Small

Mark with a 10% margin at the top, bottom, left and right of the alphanumerics.



Reference

- **The Quick font is displayed on MD-U1000 series only.**
- **For Hiragana, Katakana and Kanji characters, marking is performed with margins at the top, bottom, left and right in both Standard/Small/Quick.**



H : h = 5: 4
W : w = 5: 4

D. <Font setting....>

Reference the system font created in Font Architect.

"Font" (Page 106)

Reference

- **All assigned fonts will become selectable in the font list.**

■ **Line Type**

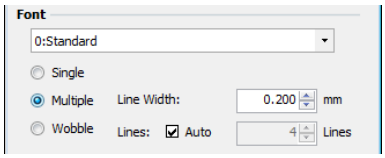
Select the line type from the below.

A. Single

Mark the string in a single line.

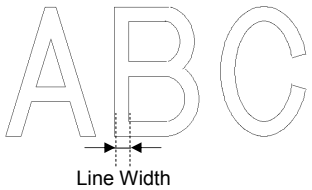
B. Multiple

Mark the string in multiple lines.



- **Line Width**

  Set the width of the multiple lines.



Reference

- **The maximum line width is 20% of the height or width, whichever is lesser.**
- **Converting a custom character to multiple may result in missing elements. Change the multiple line width in such an event.**
- **Custom character files with more than 255 elements cannot be thickened.**

- **Lines**

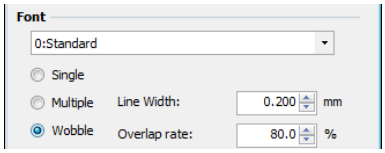
  Set the number of lines in multiple lines. If the [Auto] check box is ON, an adequate number of lines will be set automatically.

Reference

- **In general, marking should be performed with an automatically set number of lines; and the number of lines should be increased only if the gaps are highly visible in the marking result.**

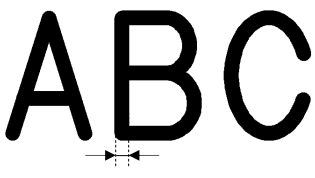
C. Wobble

Mark multiple lines while drawing a circle.



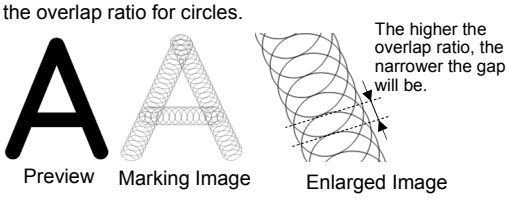
- **Line Width**

  Set the Wobble width.



- **Overlap rate**

  Set the overlap ratio for circles.



Important

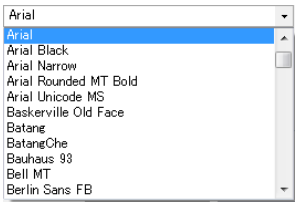
- **In the Wobble settings, set the scan speed to 3000mm/s or slower.**

4. True Type Font (Open Type Font)

Select True Type font type and set multiple and italic type.

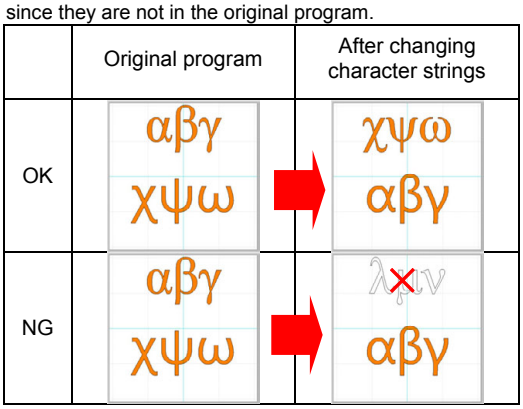
■ **Selecting True Type font**

Select a marking font type from the True Type font installed in Windows.



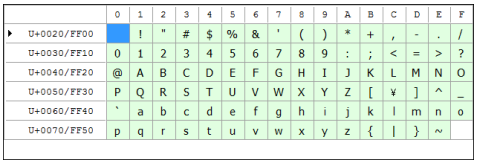
Important

- **Only support the TrueType font that the font can be installed or edited in the file.**
- **When the character strings of TrueType font are changed via communication, the post changed character strings are only changeable to the character strings as per the examples shown below.**
  - Can be changed to the fixed characters used inside the program. In the following example, the changeable character strings are [α,β,γ,χ,ψ,ω]. [λ,μ,ν] cannot be used since they are not in the original program.



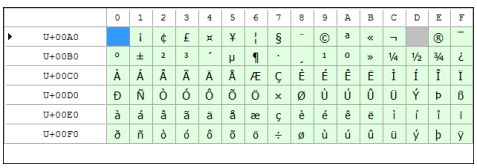
  - The following characters can be changed to Latin chatacters.

U+0021 to U+007E



	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
U+0020/FF00		!	"	#	$	%	&	'	(	)	*	+	,	-	.	/
U+0030/FF10	0	1	2	3	4	5	6	7	8	9	:	;	<	=	>	?
U+0040/FF20	@	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
U+0050/FF30	P	Q	R	S	T	U	V	W	X	Y	Z	[	¥	]	^	_
U+0060/FF40	`	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o
U+0070/FF50	p	q	r	s	t	u	v	w	x	y	z	{	|	}	~	

U+00A1 to U+00FF (excluding U+00AD)



	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
U+00A0		¡	¢	£	¤	¥	¦	§	¨	©	ª	«	¬		®	¯
U+00B0	°	±	²	³	´	µ	¶	·	¸	¹	º	»	¼	½	¾	¿
U+00C0	À	Á	Â	Ã	Ä	Å	Æ	Ç	È	É	Ê	Ë	Ì	Í	Î	Ï
U+00D0	Ð	Ñ	Ò	Ó	Ô	Õ	Ö	×	Ø	Ù	Ú	Û	Ü	Ý	Þ	ß
U+00E0	à	á	â	ã	ä	å	æ	ç	è	é	ê	ë	ì	í	î	ï
U+00F0	ð	ñ	ò	ó	ô	õ	ö	÷	ø	ù	ú	û	ü	ý	þ	ÿ

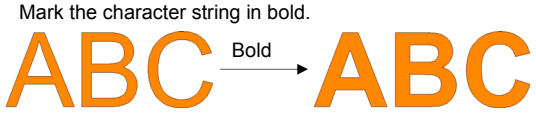
  - Can be changed to the character strings registered in replacement characters.

■ **Line Type**

Depending on the font type, select line type from the following.

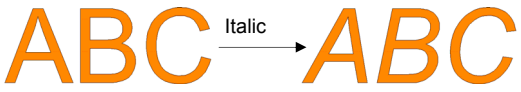
A. Bold

Mark the character string in bold.



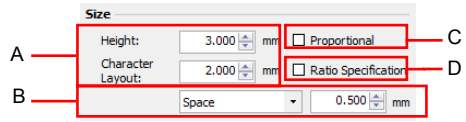
B. Italic

Mark the character string in italic.



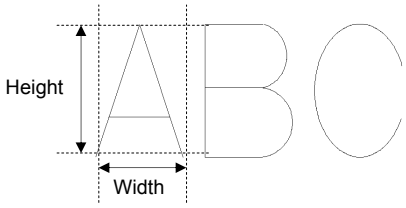
5. Size

Set the height, width and layout for the marking string.



A. Height/Width

Set the string height and width.

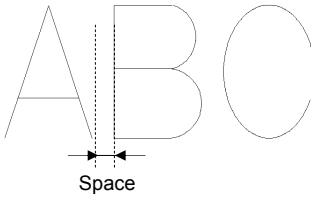


B. Character Layout

Set the string layout method from the below.

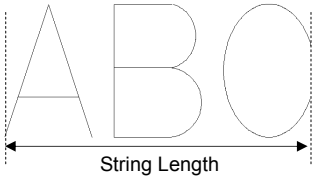
- **Space**

  Set the character layout with the space between characters.



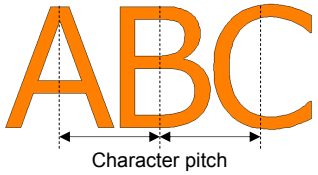
- **Distribute**

  Set the character layout by specifying the length of the entire string.



- **Character pitch**

  Set the distance between the centers of characters.

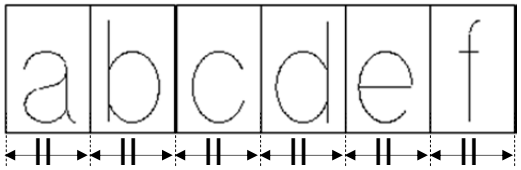


参考 ・ **The character pitch can set only for True Type font.**

C. Proportional

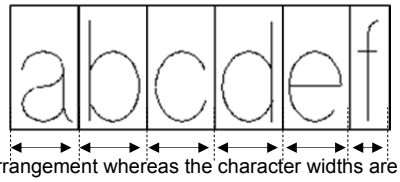
If "Proportional" is ticked, align the widths of each character and arrange the character strings.

- No proportional



Certain width of each character

- Proportional

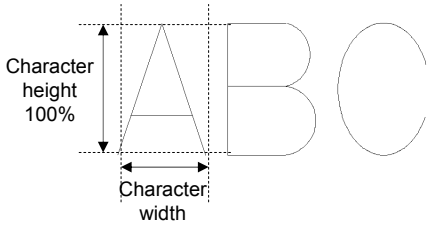


Arrangement whereas the character widths are aligned.

Reference
- **The character width is specified by ratio.**
  “Ratio spececification” (Page 21)
- **Minimum character width can be set for narrow width characters such as English letter “i” and “l”.**
  “Minimum character width” (Page 56)

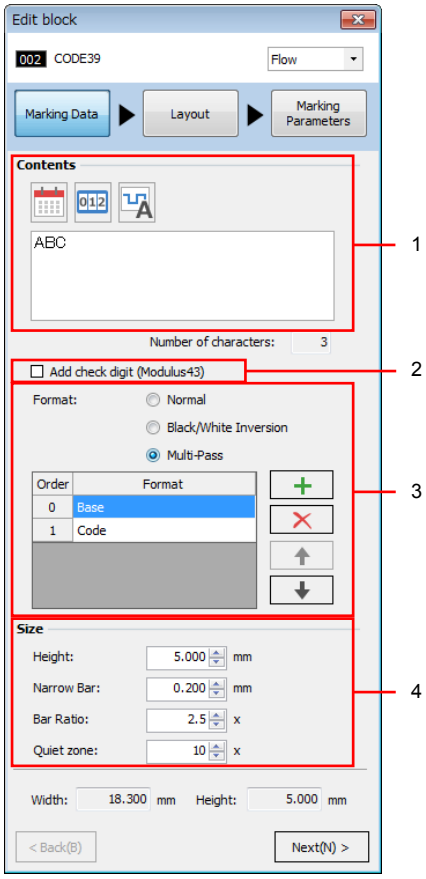
D. Ratio specification

Set the character witdth via ratio in relation to character height.



Barcode Block Marking Data

Set the barcode content, add check digit, format, and size.



1. Contents

Set the encoded string for the barcode.

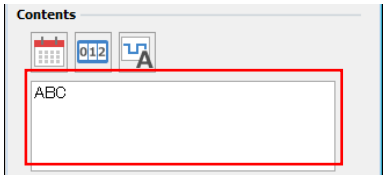
■ Inserting Updated Characters/Control Codes

Pressing the buttons below enables you to insert update characters (calendar, counter, I/O encoded character/control codes) into the text box.

“Update Character and Code Settings” (Page 60)

■ Entering the Barcode Contents

Enter the encoded string for the barcode into the text box.



Reference

- **The following explains the input rule for each barcode.**

CODE39
The accepted characters are numbers (0 to 9), alphabets (A to Z) and symbols (- . SPACE $ / + %). Start-stop characters (*) will be added automatically.

ITF
The accepted characters are numbers (0 to 9). The number of digits of the string is entered in an even number.

2of5
The accepted characters are numbers (0 to 9).

NW7
The accepted characters are numbers (0 to 9), symbols (－. $ / + :) , and start-stop characters (A to D, a to d). Start-stop characters (*) will be added to the beginning and end of the encoded string.

JAN/EAN
The accepted characters are numbers (0 to 9). The number of input characters is 13 digits for the standard type and 8 digits for the abbreviated type. The check digit will be added automatically.

UPC
The accepted characters are numbers (0 to 9). The number of input characters is 12 digits for UPC-A (one check digit is added automatically) or 8 digits for UPC-E (two check digits are added automatically).

CODE128
The accepted characters are 128 ASCII characters (numbers, uppercase/lowercase alphabets, symbols and control codes).

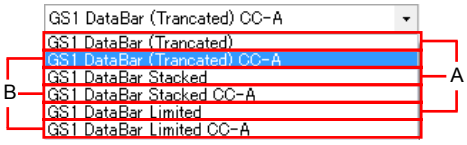
CODE93
The accepted characters are 128 ASCII characters (numbers, uppercase/lowercase alphabets, symbols and control codes). Check digit (Modulus47) will be added automatically.

GS1 DataBar
The accepted characters are numbers (0 to 9). GS1 DataBar is set with application identifier (01) + GTIN 14 digits (one check digit is added automatically). The check digit will be added automatically.

- **To enter the symbol "%" in the marking data, enter "%%" into the textbox.**

■ GS1 DataBar Type Selection

The type selection list box only appears for GS1 DataBar.



A. GS1 DataBar (Truncated / Stacked / Limited)

Mark linear codes only.

B. GS1 DataBar (Truncated / Stacked / Limited) CC-A

Mark linear codes and 2D codes (MicroPDF417). A separator is required between linear code and 2D code.

"Separate" (Page 68)

Reference

- **The following explains the input rules for GS1 DataBar.**

Linear code part

The accepted characters are numbers (0 to 9). The linear code part is set with application identifier (01) + GTIN 14 digits. (The check digit will be added automatically.)

MicroPDF417 part

The accepted characters are numbers (0 to 9), alphabets (A to Z, a to z), space (single-byte) and 20 symbols (! " % & ' ( ) * + , - . / : ; < = > ? _), function characters (FNC1) and symbol separator characters. The maximum character number for input is 56 characters(number) in the case of Truncated, whereas 47 characters (number) in the case of Stacked/Limited.

- **To enter the symbol "%" in the marking data, enter "%%" into the text box.**

2. Add check digit

Set whether to add a check digit to the barcode. When you add a check digit, a single check digit will be added on the end of the barcode.

Reference

- **This option only appears when CODE39, ITF, or NW7 has been set.**

3. Format

Set the black/white inversion and overprinting of barcodes.

■ **Normal**

Mark the normal barcodes. This option is selected in the case when the laser marking part becomes the reading code part.

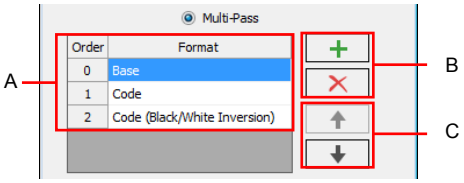
■ **Black/White Inversion**

Mark the black/white inverted barcodes. This option is selected in the case when the laser marking part becomes the background.

■ **Overprinting**

This option is selected when simultaneously marking the barcode and base. Set the marking conditions for each format when overprinting.

"Overprinting marking conditions" (Page 31)



Reference

- **This option does not appear for JAN/EAN/UPC and GS1 DataBar.**

A. Order/Format

Display the marking order and format.

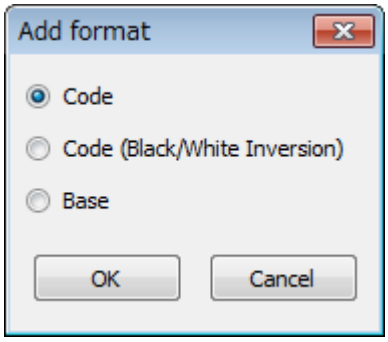
- **Base**
  Fills the range including the quiet zone of the barcode. This option is used in cases such as when the workpiece surface is rough.
- **Code**
  Mark the barcodes.
- **Code (Black/White Inversion)**
  Mark the black/white inverted barcodes.

Reference

- **You can edit a format by double-clicking on it.**

B. Add/Delete

Add/delete a base, code or code (black/white inverted) to/from the Format column.



C. Switch order key

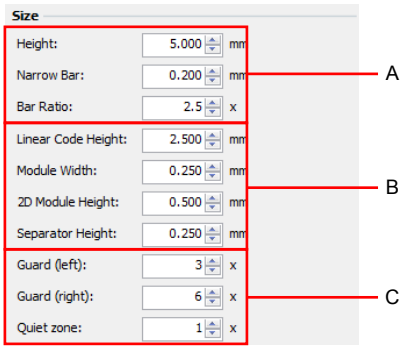
Switch the marking order. Marking is performed in order starting from 0.

Reference

- **The base is marked first in most cases.**
- **Marking in wrong order will significantly affect the marking result.**

4. Size

Set the barcode height, narrow bar, bar ratio and GS1 DataBar module width, linear code height, separator height, and 2D module height.



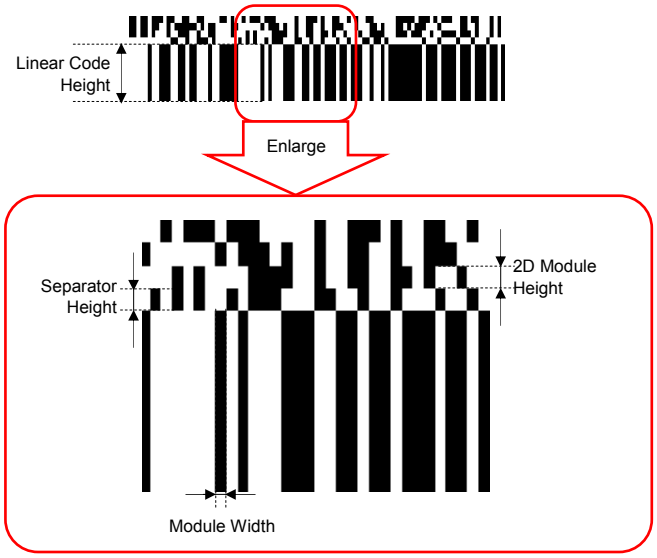
A. Narrow Bar/Height/Bar Ratio

Set the narrow bar, height and bar ratio of the barcode. The bar ratio represents the "ratio of wide bars against narrow bars".

Reference ・ **The bar ratio only appears for CODE39, ITF and 2of5.**

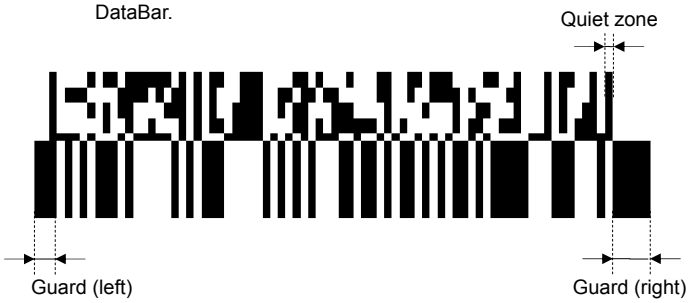
B. Module Width, Linear Code/Separator/2D Module Height

Set the GS1 DataBar module width, linear code height, separator height, and 2D module height.



C. Guard (left)/guard (right)/Quiet zone

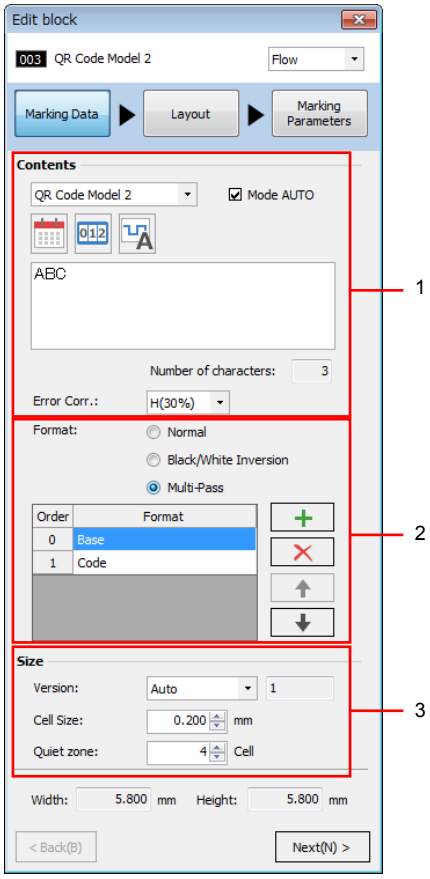
Set the guard width of right/left and quiet zone of the GS1 DataBar.



Reference ・ **Only the GS1 DataBar Limited and GS1 DataBar Limited CC-A can set the guard width of right/left guard individually.**

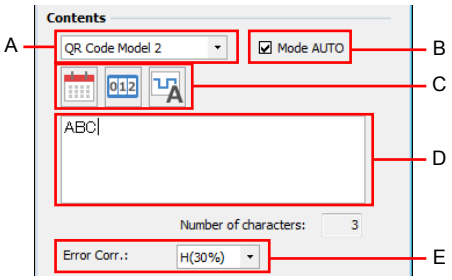
2D Code Marking Data

Set the barcode content, add check digit, format, and size.



1. Contents

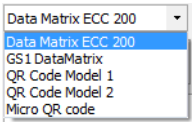
Set the 2D code type, encoded string, etc.

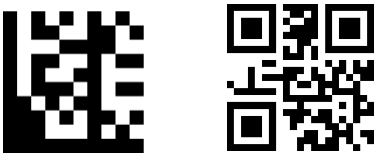


A. 2D code type selection

Select the type for DataMatrix and QR codes.

Select from Data Matrix ECC 200, GS1 DataMatrix, QR Code Model 1/2, and Micro QR code.





B. Mode AUTO

The [Mode AUTO] checkbox appears only when you select QR Code Model 1/2. If you wish to uncheck the box, you need to fix the encoding mode by inserting a mode change control code. When entering lowercase alphabets, check the [Mode AUTO] checkbox.

“Change Modes” (Page 69)

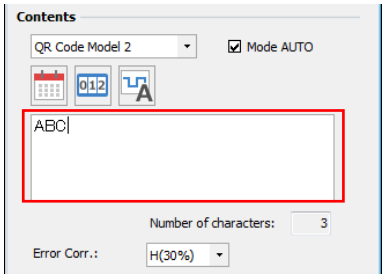
C. Inserting updated characters/control codes

Pressing the buttons below enables you to insert update characters (calendar, counter, I/O encoded character) and various control codes into the text box.

“Update Character and Code Settings” (Page 60)

D. Entering the 2D code contents

Set the encoded string into the text box.



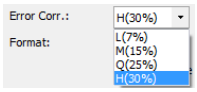
Reference

This section explains the input rules for each 2D code.

- **DataMatrix ECC200**
  The accepted characters are alphanumerics, double-byte characters (Shift-JIS) and control characters (ASCII 00h to 1Fh). The maximum number of input characters is 510 bytes.
- **GS1 DataMatrix**
  The input rules for GS1 DataMatrix have been set by GS1, an international standardizing organization in the field of logistics systems. GS1 DataMatrix is therefore entered with a combination of "AI (Application Identifier) + String". The leading FNC1 will be added automatically. If (FNC1) has been added to the "FNC1 Required" field in the AI (Application Identifier) list, insert FNC1 after the AI + code. However, FNC1 is not required on the end of the string. The accepted characters are numbers, uppercase/lowercase alphabets, symbols (! “%&’()*+,-./: ;<=>? _).
  “AI (Application Identifier) list” (Page 157)
- **QR Code Model 1/2**
  The accepted characters are alphanumerics, symbols and double-byte characters (Shift-JIS). The maximum number of input characters is 510 bytes.
- **Micro QR code**
  The accepted characters are alphanumerics, symbols and double-byte characters (Shift-JIS). A control code is entered for [Change Modes] according to the input content.
  “Change Modes” (Page 69)
- **To enter the symbol "%" in the mark data, enter "%%" into the textbox.**

E. Error Corr.

[Error Corr.] is set for QR codes only. The higher the value of [Error Corr.], the more stable the reading of 2D codes will become. However, the maximum number of input characters will be reduced.



Reference

- **You can recover data from partially damaged QR codes using the error correction function. The following four error correction options are available:**
  H (30%): 30% of code area is recoverable (Not displayed for Micro QR)
  Q (25%): 25% of code area is recoverable
  M (15%): 15% of code area is recoverable
  L (7%): 7% of code area is recoverable

2. Format

Select how to draw 2D codes from [Normal/Black/White Inversion/Overprinting].

■ **Normal**

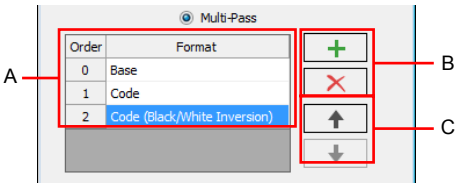
Mark the normal 2D codes. This option is selected in the case when the laser marking part becomes the reading code part.

■ **Black/White Inversion**

Mark the black/white inverted 2D codes. This option is selected in the case when the laser marking part becomes the background.

■ **Overprinting**

This option is selected when simultaneously marking 2D code and the base. When overprinting, add the desired formats and set the marking conditions for each format.



A. Order/Format

Display the marking order and format.

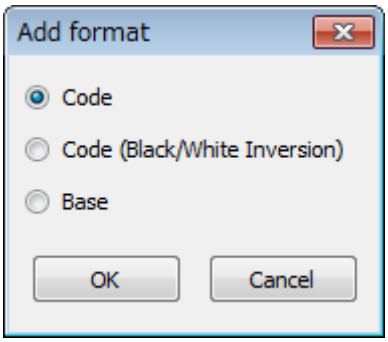
- **Base**
  Fills the range including the 2D code quiet zone.
  This option is used in cases such as when the workpiece surface is rough.
- **Code**
  Mark the 2D codes.
- **Code (Black/White Inversion)**
  Mark the black/white inverted 2D codes.

Reference

- **You can edit a format by double-clicking on it.**

B. Add/Delete

Add/delete a base, code or code (black/white inverted) to/from the Format column.



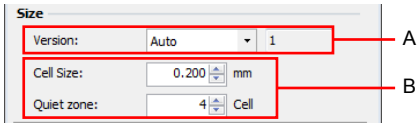
C. Switch order key

Switch the marking order. Marking is performed in order starting from 0.

Reference
- **The base is marked first in most cases.**
- **Marking in wrong order will significantly affect the marking result.**

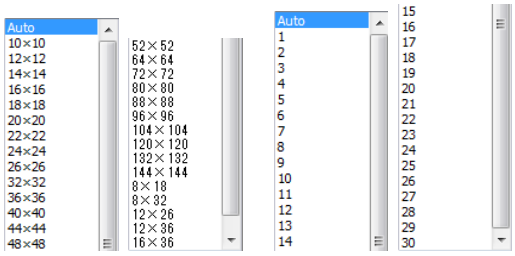
3. Size

Set the symbol size, cell size and quiet zone of the 2D code.



A. Symbol Size/Version

Display the size of the 2D code.

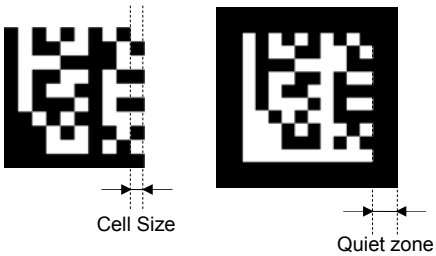


For DataMatrix For QR codes

Reference
- **If [Auto] is selected, the optimal symbol size will be set automatically from the encoded string.**
- **For the maximum number of input characters for each symbol size and version, refer to "Maximum Input Characters for 2D Code" (Page 156).**

B. Cell Size/Quiet Zone

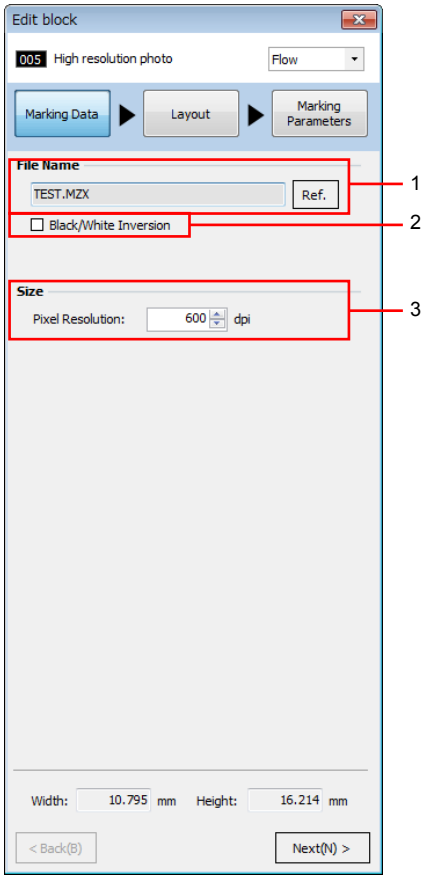
Set the cell size and quiet zone of the 2D code.



Reference
- **The quiet zone only appears when the format is [Black/White Inversion] or [Overprinting].**
- **For stable reading of 2D codes, set the quiet zone width to 4 cells or greater.**

Logo and Photo Mark Data

The following explains the setting screen for the logo block and photo block files and sizes.



1. File Name

Display the file name of the referenced logo or photo.

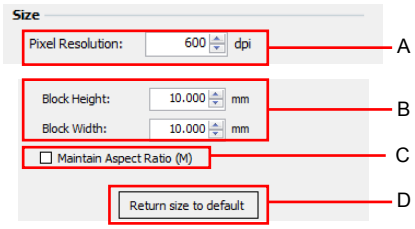
2. Black/White Inversion

Invert the black/white contrast. This option only appears when a photo file is being referenced.

Black/White Inversion: OFF Black/White Inversion: ON

3. Size

Set the size of the logo/hatch logo/workpiece image file or photo file being referenced. The photo file size is set using pixel resolution, and logo/hatch logo/workpiece image file sizes are set using height and width.



A. Pixel Resolution

Adjust the photo file size. The greater the setting value, the smaller the marking size and finer the image quality will become. On the other hand, the smaller the setting value, the greater the marking size and coarser the image quality will become.

Pixel Resolution: 150dpi

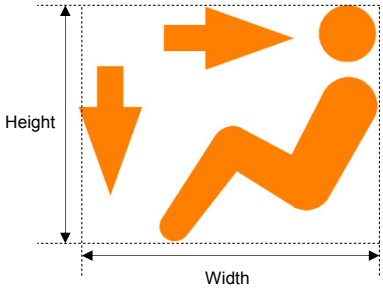
Pixel Resolution: 100dpi

Reference

- **You can calculate the marking size using the formula below.**
  Marking size = Image resolution / Pixel resolution x 25.4 (mm)
- **Adjusting the marking size using pixel resolution may result in coarse image quality and/or the dot spacing may become too small. To alter the marking size, change the resolution of the original image.**
- **The range of image resolution that can be imported is 10 to 3464 dpi.**

B. Height/Width

Set the size of the logo/hatch logo/workpiece image file.



C. Remain the aspect ratio

Enlarger or reduce based on the initial size ratio when the logo was created.

Reference

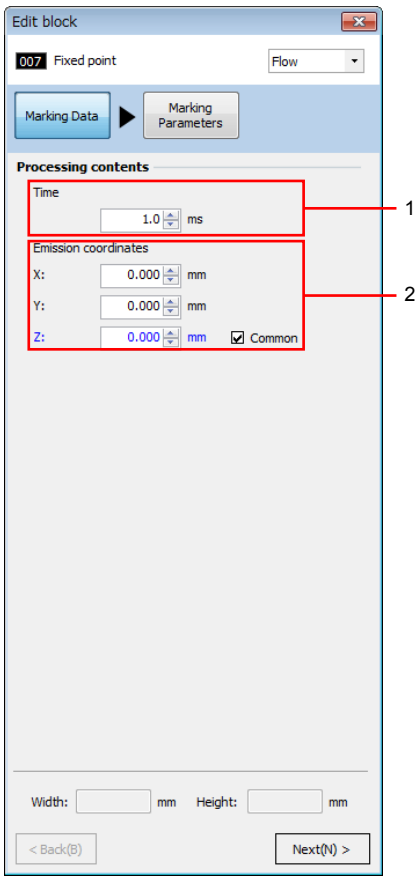
- **When the fill pattern is contour, the aspect ratio will be certainly remained.**

D. Return size to default

Revert the height and width of the logo/hatch logo/workpiece image file to the size created originally in Logo designer.

Fixed Point Marking Data

The following explains the setting screen for the emission time and coordinates of fixed point blocks and fixed point blocks with trigger on.



1. Time

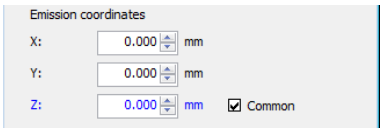
Set the fixed point laser emission time.

Reference

- **Use a fixed point blocks with trigger on if you wish to set the emission time to 65000ms or longer.**

2. Emission coordinates

Set the laser emission coordinates.

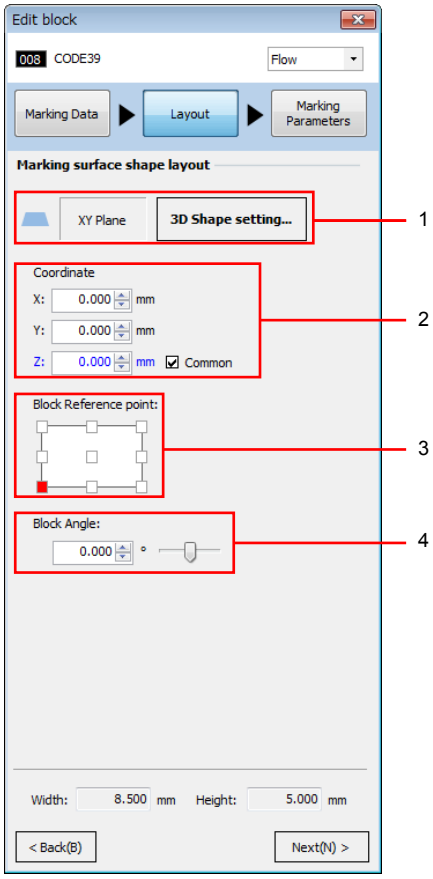


Reference

- **The values shown in blue reference the common parameters for blocks.**
  "Common for blocks" (Page 80)

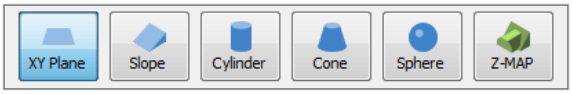
3-5 Edit Block Layouts

The following explains the setting screen for the block's 3D shape settings, coordinates, block reference point and block angle.



1. 3D Shape Settings

Select the block layout shape from [XY Plane/Slope/Cylinder/Cone/Sphere/Z-MAP].
“3D Shape Settings” (Page 37)



Important

- **This function is only available when the 3D extensions software "MB3-H3D1" is installed.**

2. Coordinate

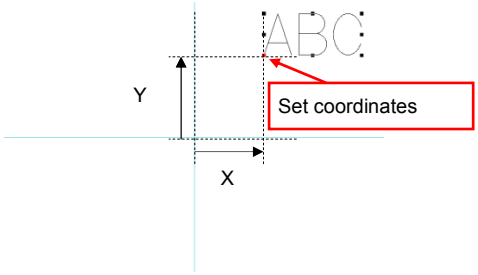
Set the X/Y/Z coordinates to be used as reference for the laser emission.

Reference

- **The values shown in blue reference the common parameters for blocks.**
“Common for blocks” (Page 80)

A. X/Y Coordinates

Set the X/Y coordinates on the XY plane.

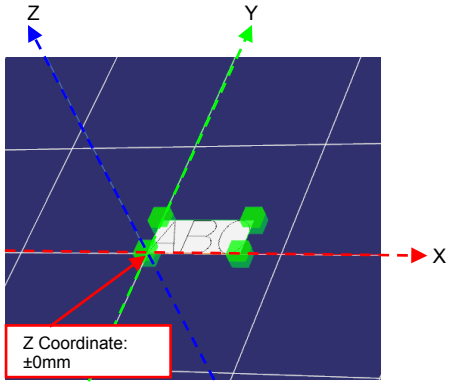


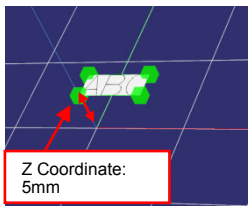
Reference

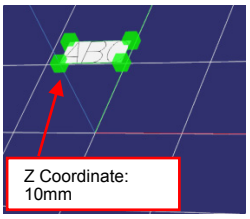
- **The marking area for each model is as shown below.**
  MD-X1000/1500 series: 125mm square
  MD-X1020/1520 series: 330 mm square
  MD-X1050 series: 50 mm square
  MD-F3200/5200 series: 125 mm square
  MD-F3220/5220 series: 300 mm square
  MD-U1000 series: 125 mm square
  MD-U1020 series: 330 mm square
  ML-Z9610 series: 120 mm square
  ML-Z9620 series: 300 mm square
  ML-Z9650 series: 50 mm square

B. Z Coordinate

Set the height direction coordinate.

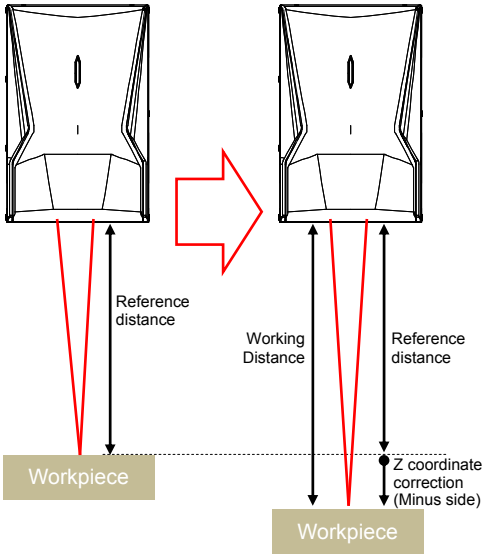






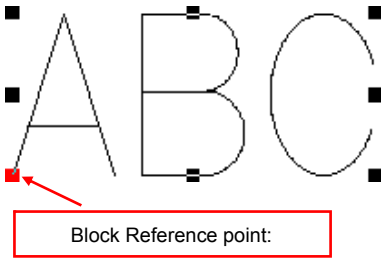
Reference

- **The reference distance for each model is as shown below.**
  MD-X1000/1500 series: 189mm
  MD-X1020/1520 series: 300 mm
  MD-X1050 series: 100mm
  MD-F3200/5200 series: 168 mm
  MD-F3220/5220 series: 300 mm
  MD-U1000 series: 189 mm
  MD-U1020 series: 300 mm
  ML-Z9610 series: 189 mm
  ML-Z9620 series: 300 mm
  ML-Z9650 series: 92 mm
- **The Z coordinate is set when the distance between the marker head and workpiece is not the reference distance.**
  If the workpiece distance < reference distance: Adjust by entering a value in the positive direction for the Z coordinate.
  If the workpiece distance > reference distance: Adjust by entering a value in the negative direction for the Z coordinate.

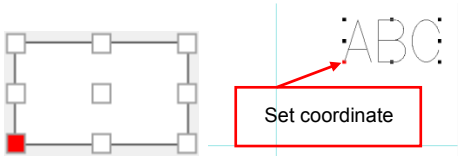


3. Block Reference point

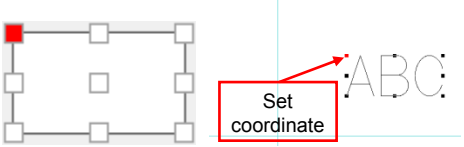
The points set in [Block Reference point] will overlap with the X/Y coordinates. The block reference point appears as red dots in the preview.



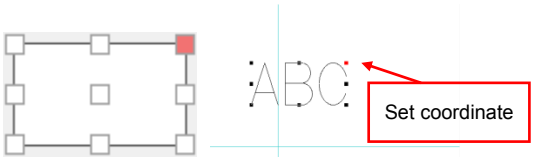
■ **Block Reference point: Lower left**



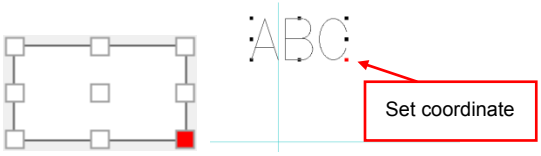
■ **Block Reference point: Upper left**



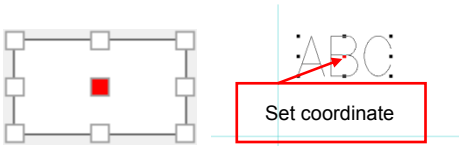
■ **Block Reference point: Upper right**



■ **Block Reference point: Lower right**

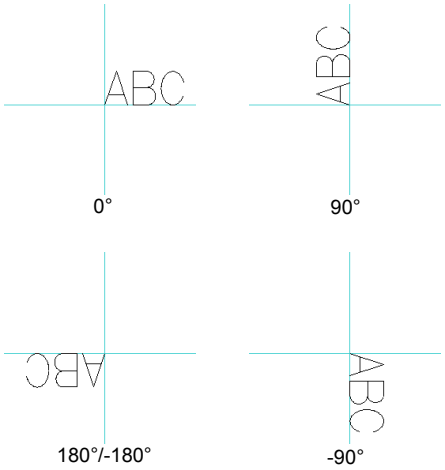


■ **Block Reference point: Cent.**



4. Block Angle

Set the block marking angle. The angle is rotated with reference to the block reference point.

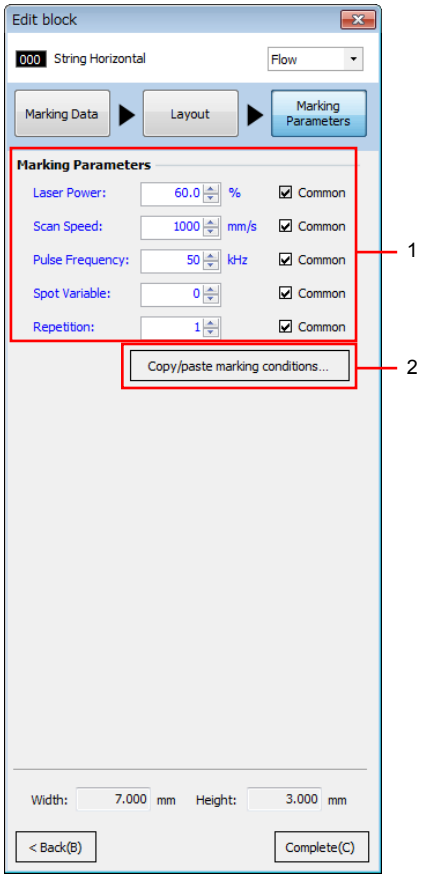


3-6 Edit block marking conditions

The marking and fill conditions of the block are displayed. The displayed content will vary for each block. This section provides explanations in the order of marking conditions, barcode fill conditions, 2D code fill conditions followed by hatch logo fill conditions.

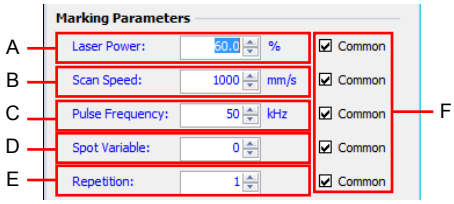
Marking conditions

Set the conditions for the laser emission.



1. Marking conditions

Set the conditions for the laser emission.



A. Laser Power

Set the laser emission output.

Reference
- **When performing the high resolution photo marking on MD-U1000 series, set the laser power to 60.0% or more.**

B. Scan Speed

Set the movement speed of the laser spot.

Reference
- **The faster the scan speed gets, the thinner (shallower in processing) the marking density will get, and the marking time will get shorter.**

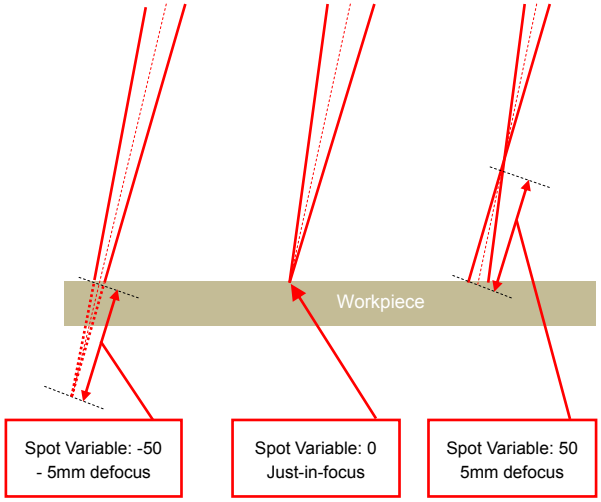
C. Pulse frequency

Set the laser oscillation frequency.

Reference
- **The pulse frequency cannot be set on ML-Z9600 series.**
- **The higher the pulse frequency, the lower the energy per pulse will become.**
- **The oscillation will become continuous at 0kHz. (Pulse will not be emitted.)**
- **A gap will occur between laser pulses of the scan speed is high but the pulse frequency is low. In such a case, adjust either by lowering the scan speed or increasing the pulse frequency.**

D. Spot Variable

Change (defocus) the spot diameter using the Z-axis scanner.



Reference
- **You can adjust the processing line width and the dig amount on the workpiece surface using spot variable.**
- **When the spot variable changes by "1", the light path will be defocused by 0.1mm.**

E. Repetition

Set the block marking count.

Reference
- **If you set a marking count of "3 times" for a string block containing the mark data "ABC", the block will be marked in the order shown below.**
  A => A => A => B => B => B => C => C => C

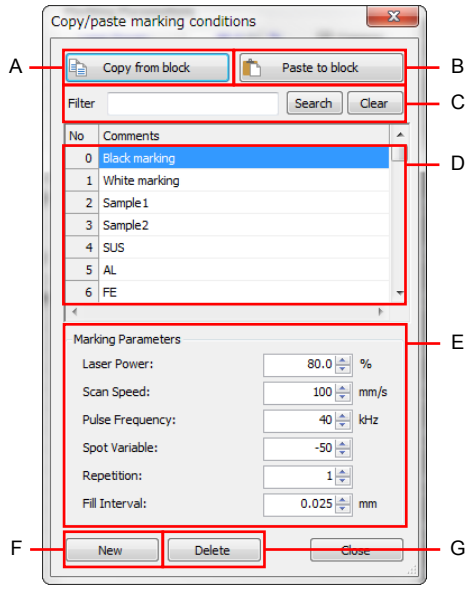
F. System Pattern

If the [System Pattern] check box is ON, the marking conditions of the common parameters for blocks will be applied.
"Common for blocks" (Page 80)

Reference
- **If the marking conditions are modified with the [System Pattern] checkbox in ON state, they will be applied to the marking conditions under "Common for blocks". The changes will also be applied to other blocks with the [System Pattern] checkbox in ON state.**

2. Copy/paste marking conditions

This option is used when copying marking conditions from another block or when referencing the marking conditions created in sample marking.



A. Copy from block

Add the marking conditions of the currently selected block to the list.

Reference

- **The Comment field will contain the copied block No. and the marking string (or file name).**

B. Paste to block

Paste the marking conditions currently selected in the marking conditions list to the currently selected block.

C. Filter

Marking parameters can be searched by inputting strings in the text box.

D. Marking conditions list

Display the list of saved marking conditions.

E. Marking conditions

Display the marking conditions of the No. currently selected in the marking conditions list.

Reference

- **The fill interval can only be copied and pasted for barcode, 2D code and hatch logo blocks.**

F. New

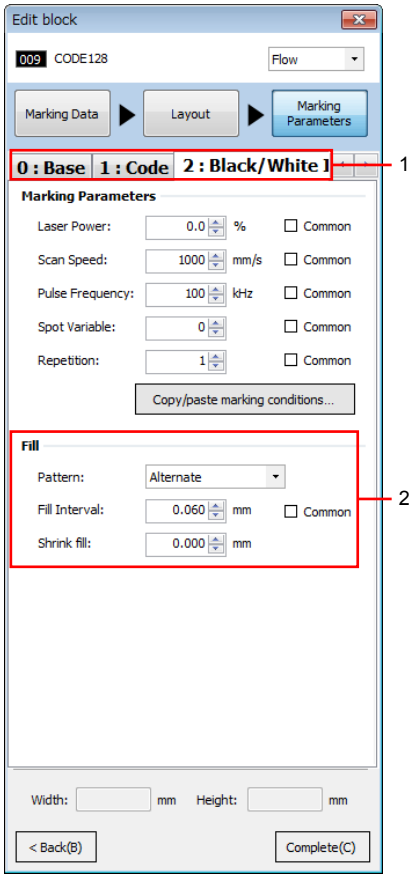
Create new marking conditions in the marking conditions list.

G. Delete

Delete the marking condition currently selected in the marking conditions list.

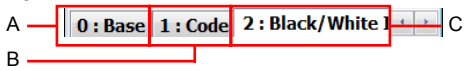
Barcode fill conditions

Set the barcode fill conditions.



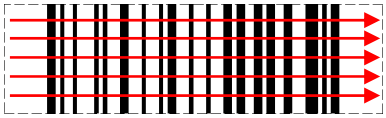
1. Overprinting marking conditions

When you set [Overprinting] as the marking data format, separate tabs will be displayed for each of the overprinting settings. The marking and fill conditions need to be set for each tab.



A. Base

Set the marking condition for [Base] which horizontally fills the entire barcode including the quiet zone.



B. Code

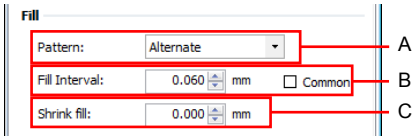
Set the marking condition for [Code] which vertically fills the code part of the barcode.

C. Black/White Inversion

Set the marking condition for [Black/White Inversion] which vertically fills the inverted code part of the barcode.

2. Fill the barcode

Set the fill pattern, fill interval and shrink fill.



A. Pattern

Select the fill from [Alternate/Unidirectional].

- Alternate

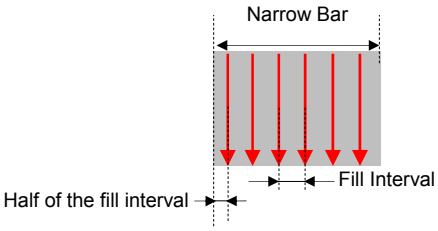
- Unidirectional

Reference

- **For the base, either vertical or horizontal fill can be selected.**

B. Fill interval

Set the fill interval.

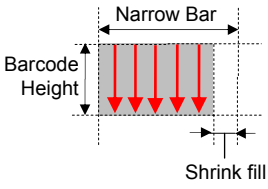


Reference

- **If the [System Pattern] check box is ON, the Others parameters of the "Common for blocks" parameters will be applied.**
  "Common for blocks" (Page 80)
- **If the marking conditions are modified with [System Pattern] in ON state, they will be applied to "Other parameters" under "Common for blocks". The parameter changes will also be applied to other blocks with [System Pattern] in ON state.**

C. Shrink fill

Shrink (expand) the closed space.

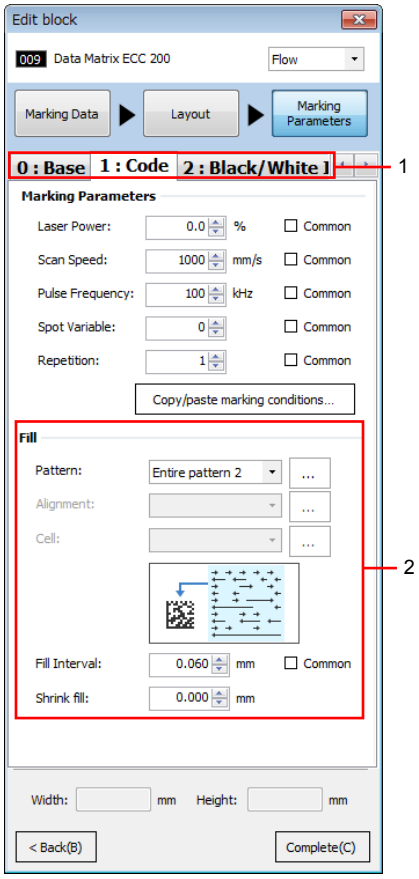


Reference

- **Entering a negative value in [Shrink fill] expands the closed space.**

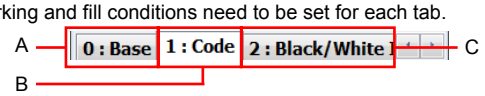
2D Code Fill Conditions

Set the 2D code fill conditions.



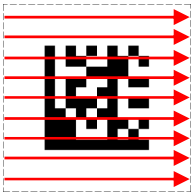
1. Overprinting marking conditions

When you set [Overprinting] as the marking data format, separate tabs will be displayed for each of the overprinting settings. The marking and fill conditions need to be set for each tab.



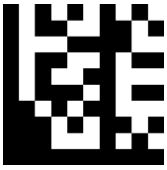
A. Base

Set the marking condition for [Base] which horizontally fills the entire 2D code including the quiet zone.



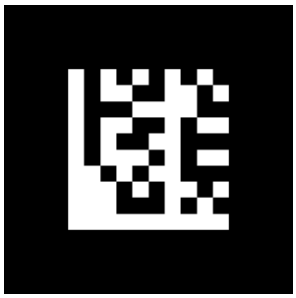
B. Code

Set the marking condition for [Code] that vertically fills the code part of the 2D code.



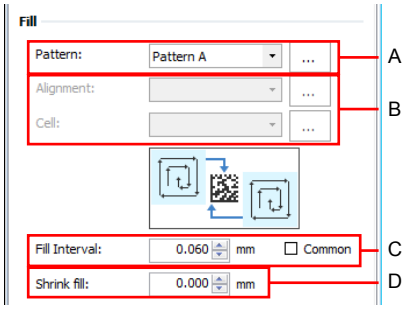
C. Black/White Inversion

Set the marking condition for [Black/White Inversion] which vertically fills the inverted code part of the 2D code.



2. Fill the 2D code

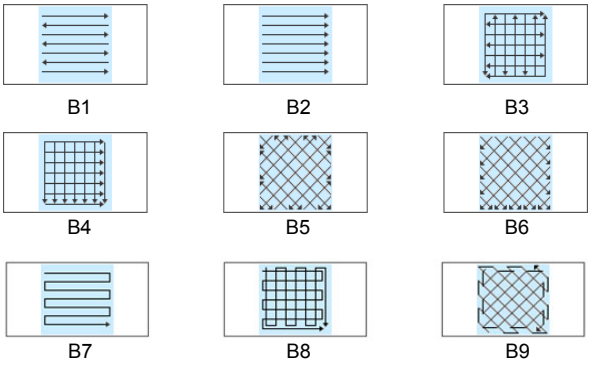
Set the fill pattern, finder, alignment, cells, fill interval and shrink fill.



A. Pattern

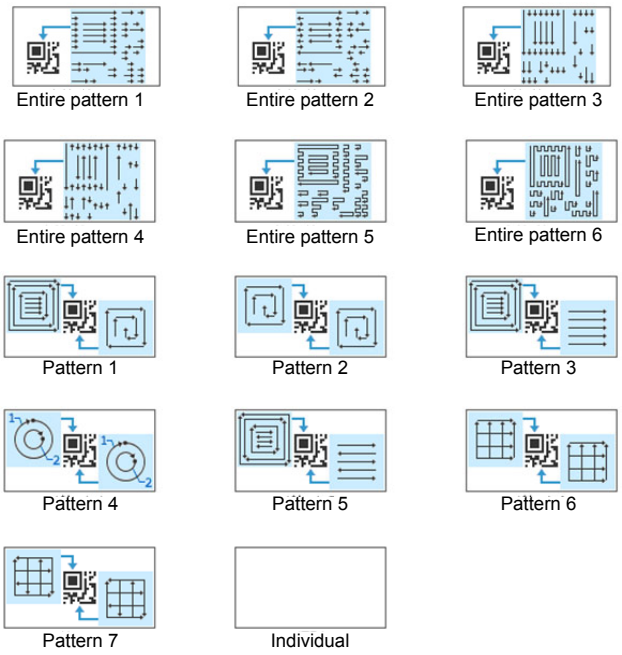
Select how to fill according to the type and format of the 2D code.

- **Base pattern**
  Select how to fill the base of DataMatrix and QR code from below.



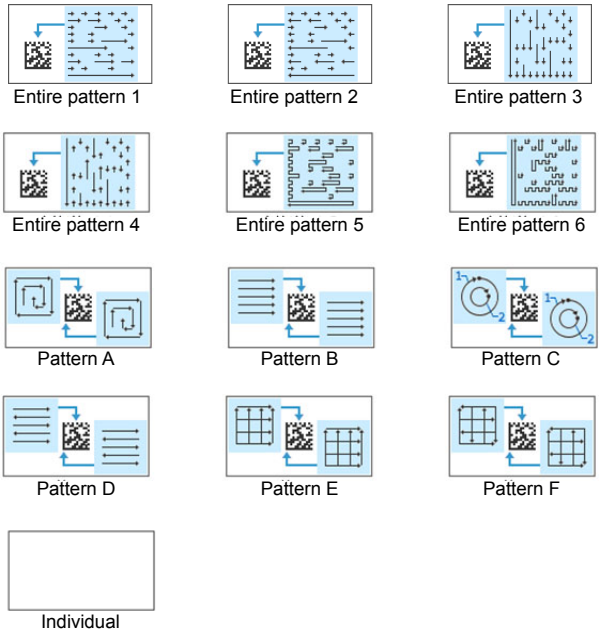
Reference
- **B7, B8, and B9 are displayed on MD-U1000 series only.**

- **QR code patterns**
  Select how to fill the code part of the QR code from below.



Reference
- **If [Individual] has been selected, set the fill method for the finder and cells separately.**
- **Entire patterns 1 to 6 can mark between continuous cells without interruption, enabling higher marking quality and reduced marking time.**
- **The entire pattern 5 and 6 are displayed on MD-U1000 series only.**

- **DataMatrix patterns**
  Select how to fill the code part of DataMatrix from below.

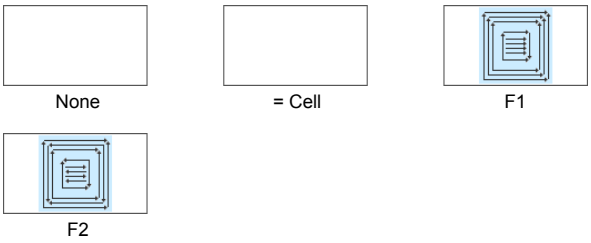


Reference
- **If [Individual] has been selected, you can set the fill method for alignments and cells separately.**
- **Entire patterns 1 to 6 can mark between continuous cells without interruption, enabling higher marking quality and reduced marking time.**
- **The entire pattern 5 and 6 are displayed on MD-U1000 series only.**

B. Finder/alignment and cells

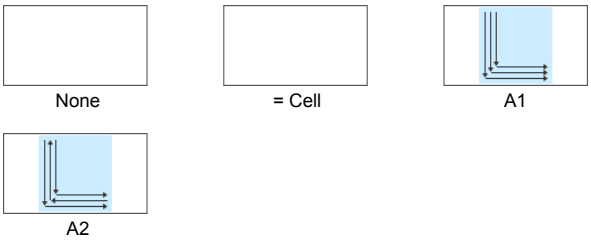
If [Individual] has been selected as the code fill method, you can set the fill method for the alignment/finder and cells separately.

- **QR code finder**
  Select how to fill the finder part of the QR code from below.



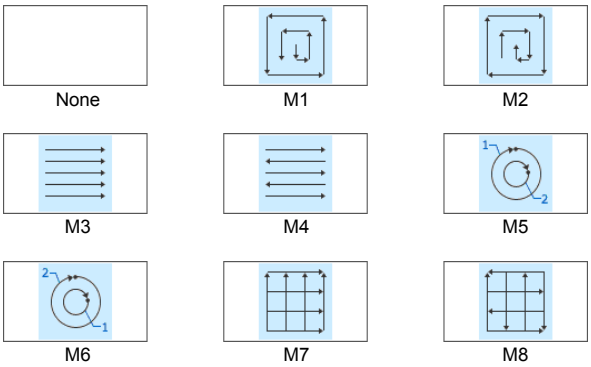
Reference
- **No marking will be performed if set to [None].**
- **If set to [=Cell], the same fill method as for the cells will be used.**

- **DataMatrix alignment**
  Select how to fill the alignment part of DataMatrix from below.



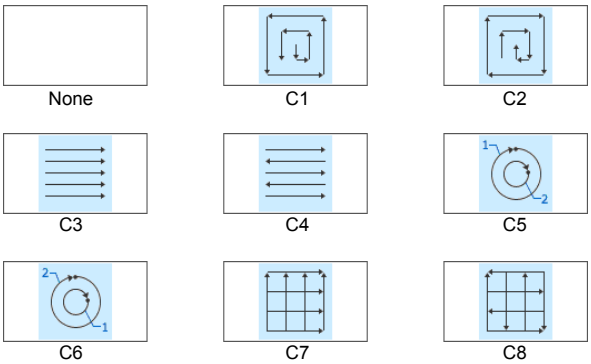
Reference
- **No marking will be performed if set to [None].**
- **If set to [=Cell], the same fill method as for the cells will be used.**

- **QR code cells**
  Select how to fill the cell part of the QR code from below.



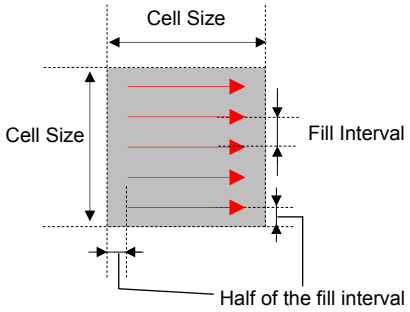
Reference
- **No marking will be performed if set to [None].**

- **DataMatrix cells**
  Select how to fill the cell part of DataMatrix from below.



C. Fill interval

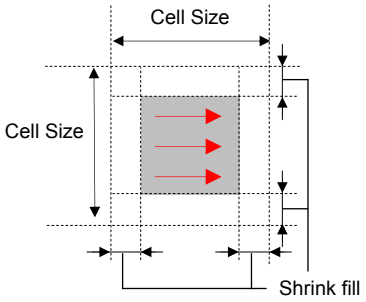
Set the fill interval.



Reference
- **If the [System Pattern] check box is ON, the Others parameters of the common parameters for blocks will be applied.**
  “Common for blocks” (Page 80)
- **If the marking conditions are modified with [System Pattern] in ON state, they will be applied to "Other parameters" under "Common for blocks". The parameter changes will also be applied to other blocks with [System Pattern] in ON state.**
- **In the case of the entire pattern 5 and 6, the [Fill Line Interval] is adjusted automatically so that the number of fill lines becomes an even number.**

D. Shrink fill

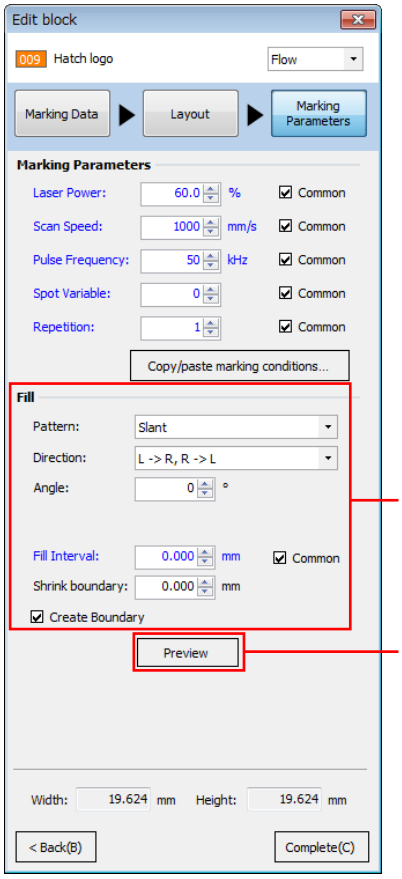
Shrink (expand) the closed space.



Reference
- **Entering a negative value in [Shrink fill] expands the closed space.**
- **In the case of the entire pattern 5 and 6, the [Shrink Fill] is acted only on the direction of the fill.**

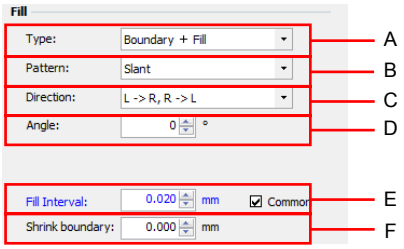
Fill Conditions for Hatch Logo and TrueType Font

Set fill conditions for hatch logo and TrueType font.



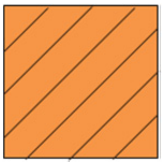
1. Filling the hatch logo and TrueType font

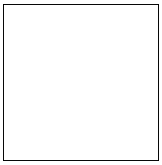
Set the fill pattern, direction, angle, fill interval and shrink boundary.



A. Type

Select hatch logo and TrueType font type from [Boundary line + Fill / Boundary line / Fill].


Boundary line + Fill


Boundary line

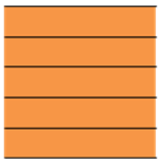

Fill

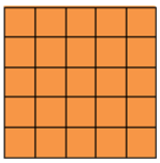
Reference

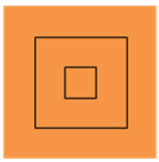
- **When the pattern setting is slant or crossing, the fill line and the boundary line may overlap. In that case, set [Shrink fill] from the block editing list, and separate the boundary line and the fill line.**

B. Patterns

Select how to fill the hatch logo and TrueType font from [Slant/ Cross /Contour].


Slant

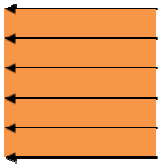

Cross

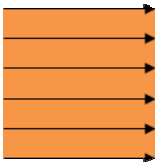

Contour

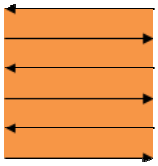
C. Direction

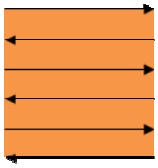
Select the drawing order.

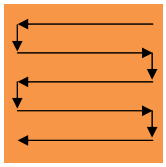
- Slant

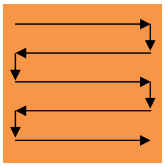

R -> L


L -> R


L -> R, R -> L


R -> L, L -> R

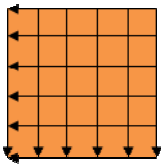

L -> R, R -> L (High Speed)

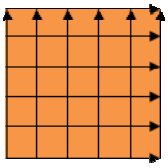

R -> L, L -> R (High Speed)

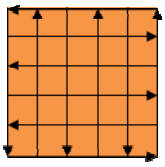
Reference

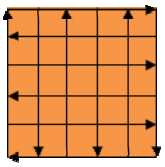
- **The high speed is displayed on MD-U1000 series only.**
- **At the high speed, the boundary can be protruded depending on the fill interval or shaped size.**

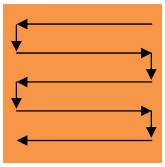
- Cross

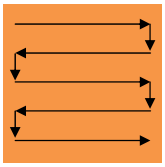

R -> L


L -> R


L -> R, R -> L


R -> L, L -> R

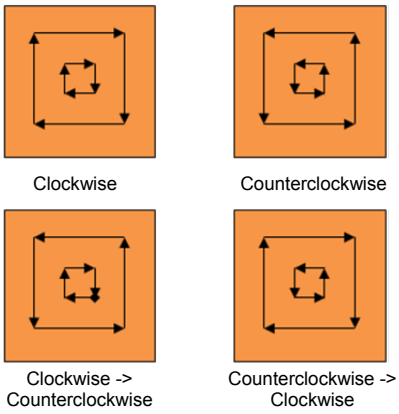

L -> R, R -> L (High Speed)


R -> L, L -> R (High Speed)

Reference

- **The high speed is displayed on MD-U1000 series only.**
- **At the high speed, the boundary can be protruded depending on the fill interval or shaped size.**

・ Contour



Reference
- **From the edit block list view, you can select the drawing start position from [Inner/Outer].**
- **The above shows the drawing order when the drawing start position is [Inner].**

D. Angle

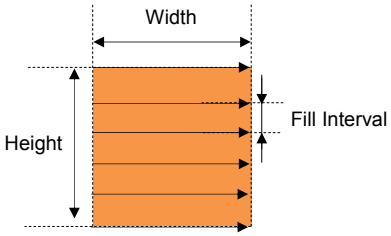
Set the fill interval angle. This option is set only when the pattern is [Slant] or [Cross].

・ Slant

・ Cross

E. Fill Interval

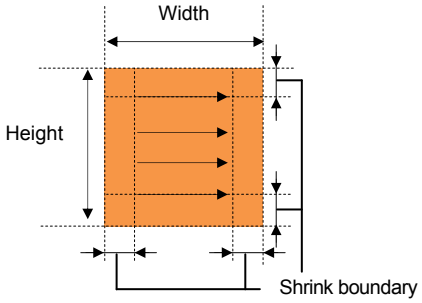
Set the fill line interval.



Reference
- **If the [System Pattern] check box is ON, the Others parameters of the common parameters for blocks will be applied.**
  “Common for blocks” (Page 80)
- **If the marking conditions are modified with [System Pattern] in ON state, they will be applied to "Other parameters" under "Common for blocks". The parameter changes will also be applied to other blocks with [System Pattern] in ON state.**

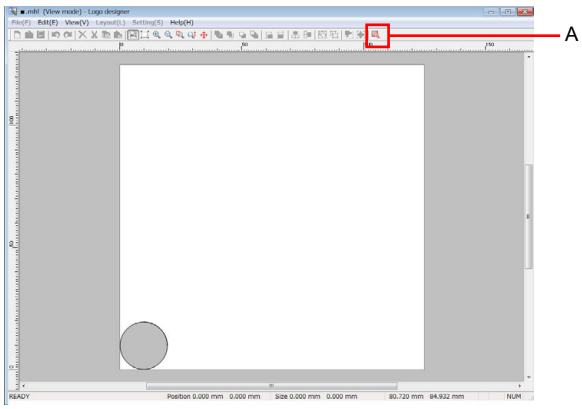
F. Shrink boundary

Shrink the closed space.



2. Preview

Preview and check the line from the set fill conditions.



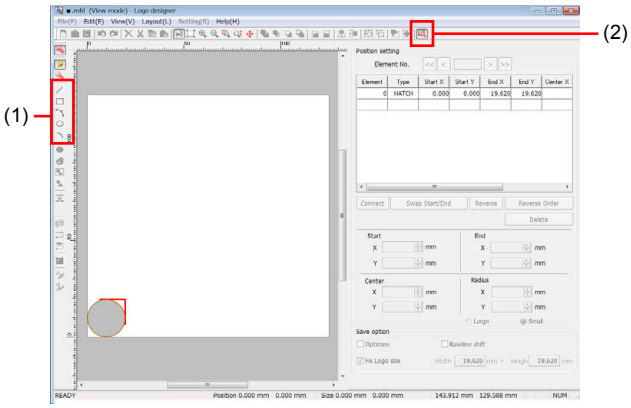
Reference
- **Preview function is not supported in True Type font.**

A. Add Element

You can add elements to the gaps in the fill preview of the hatch logo.
Elements are added using the procedure described below.

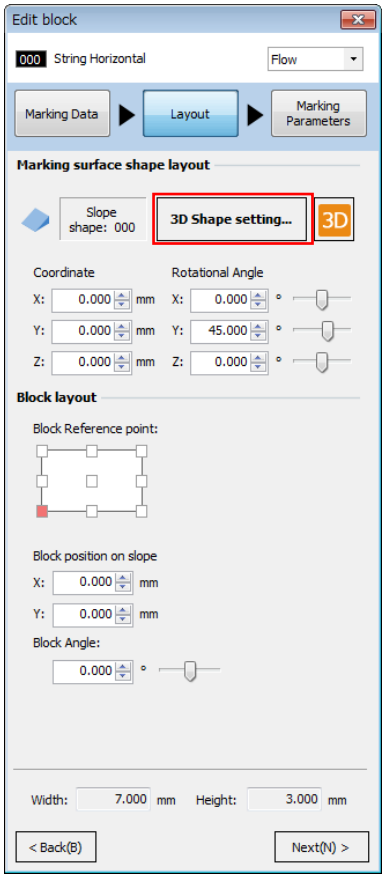
(1) Insert the desired element (Line, Rectangle, Arc, Circle, Oval arc).

(2) Finish editing by pressing the [Add Element] button.
Addition of the element is now complete.



3-7 3D Shape Settings

When you install MB3-H3D1, the [3D Shape Settings] button will appear on the edit block layout screen. You can perform 3D marking by selecting the shape from [Slope/Cylinder/Cone/Sphere/Z-MAP].



Important

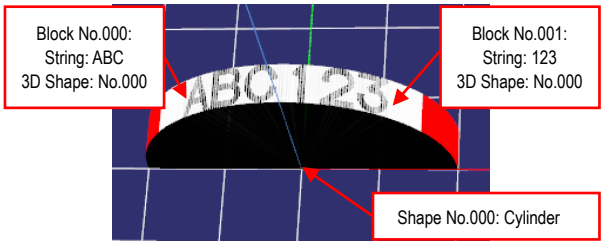
- **This function is only available when the 3D extensions software "MB3-H3D1" is installed.**

Relationship between Blocks and 3D Shape Settings

You can create up to 255 3D shape settings in each program. Once you have created a 3D shape setting, you can add other blocks to the existing 3D shape setting.

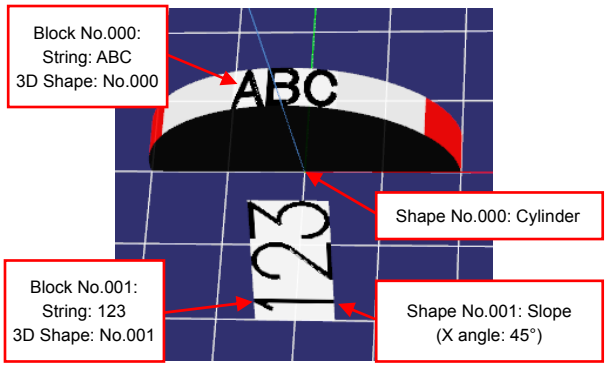
■ When Creating Two or More Blocks on a Single Cylinder

Create a 3D shape setting for the cylinder, and then create all blocks using the same 3D shape setting.



■ When Creating a Block on the Cylinder and Slope Separately

Create separate 3D shape settings for the cylinder and slope.

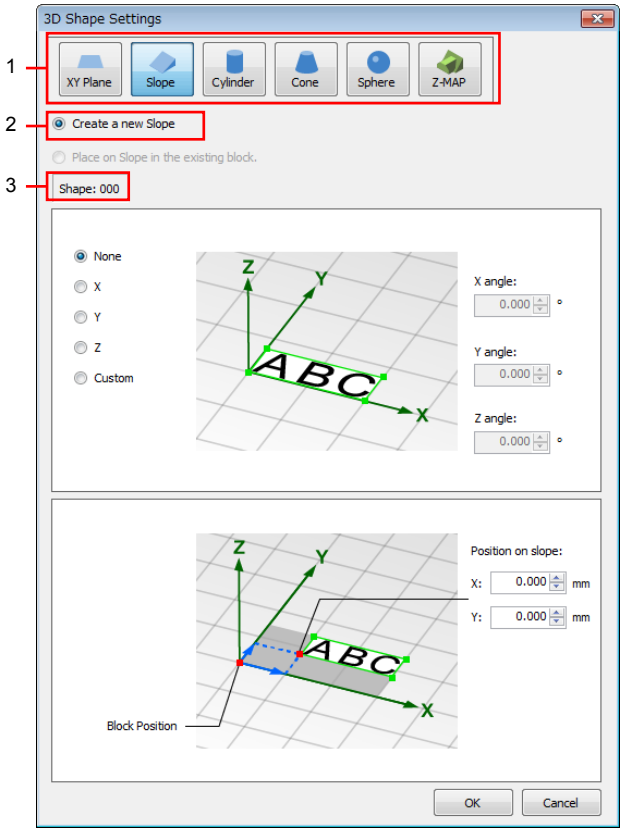


Reference

- **Configuring the 3D shape setting as collectively as possible will make it easier to make position changes, etc.**

Creating a New 3D Shape Setting

Pressing the [3D Shape Settings] button will bring up the 3D shapes setting screen.



1. 3D Shape Settings List

Select the 3D shape setting to be added from [Slope/Cylinder/Cone/Sphere/Z-MAP].

Reference

- **The Z-MAP 3D shape setting requires a Z-MAP file to be created in Z-MAP Creator in advance.**

2. Create a new slope (3D shape)

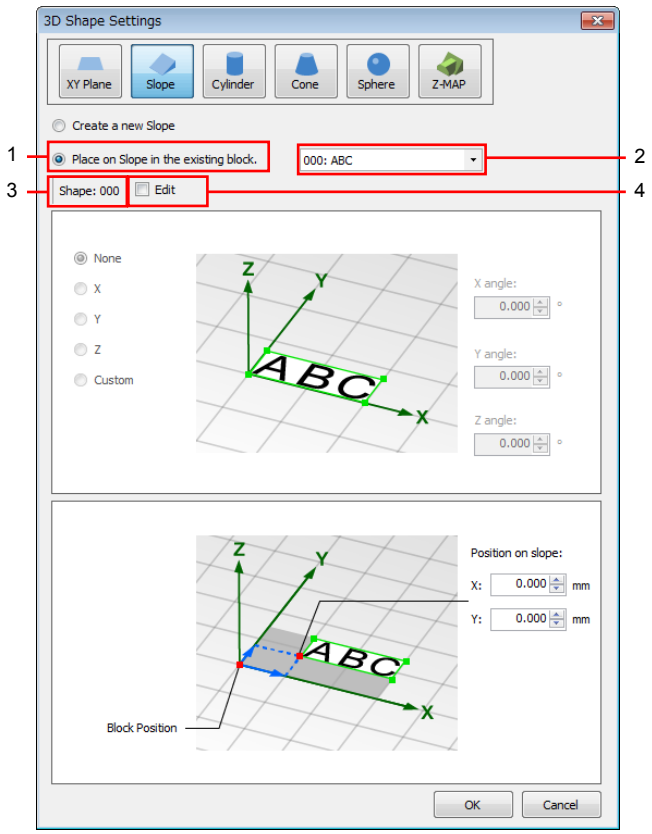
This option is selected when adding a new 3D shape.

3. Shape No.

Display the shape setting No. to be saved.

Adding a Block to the Existing 3D Shape Setting

This section explains how to add a block to the existing 3D shape setting.



1. Place on slope in the existing block

This option is selected when placing a block on an existing 3D shape.

2. Block No.

Select the block No. that will reference the 3D shape. Only the block No. with the same 3D shape can be selected.

3. Shape No

Display the reference 3D shape setting No.

4. Edit shape parameters

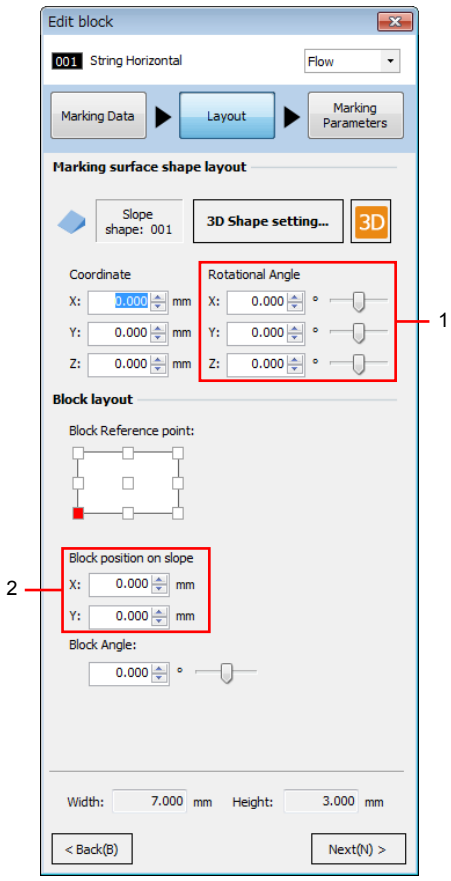
Edits the parameters of the referenced 3D shape setting.

Important

- **When you add a block to an existing 3D shape setting, the blocks will overlap with each other. In such a case, adjust the position by changing the block position on the shape, not the block coordinates.**

3D Shape Settings Layout

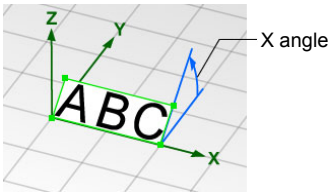
When you select a 3D shape setting, you can configure the rotational angle and the block position on the 3D shape.



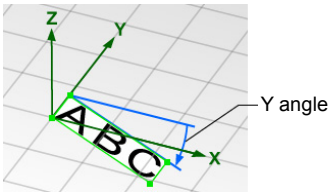
1. Rotational Angle

Rotate the 3D shape.

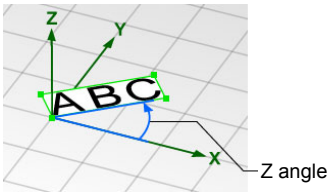
■ **X angle**



■ **Y angle**



■ **Z angle**

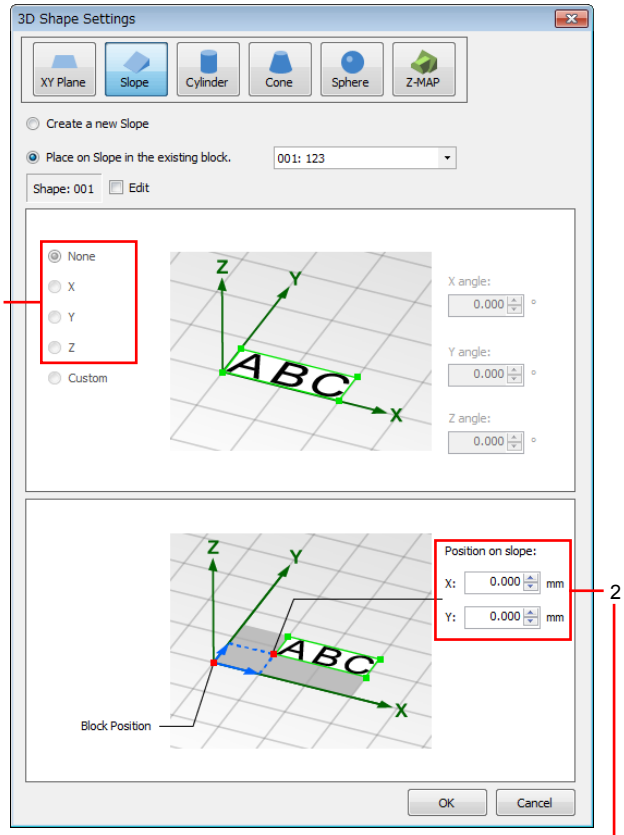


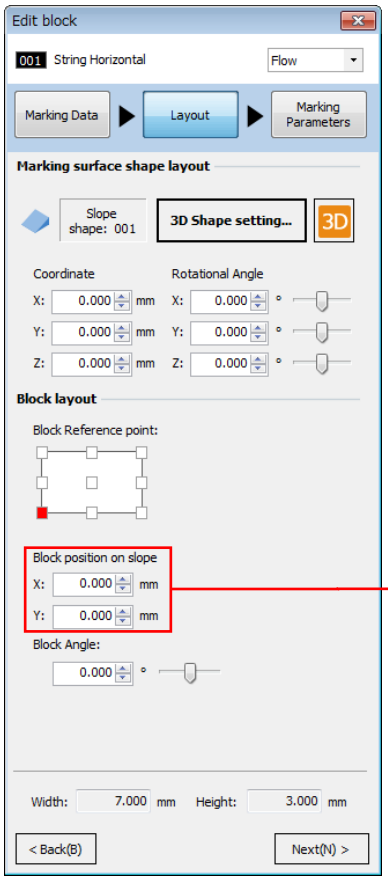
2. Block position on the 3D shape

Set the block position on the currently set 3D shape setting. Different explanations are provided for each 3D shape. Refer to the next and subsequent pages for detail.

Slope Settings

This section describes the 3D shape setting for a slope.



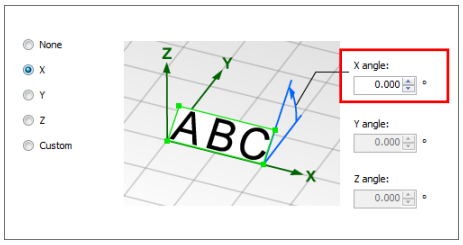


1. Slope Rotation Axis

Set the rotation axis of a slope.

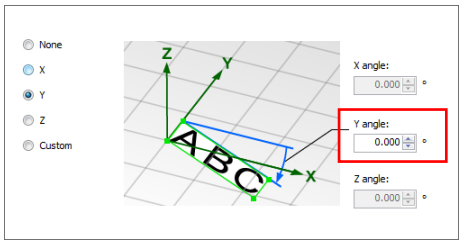
■ X Rotation Axis

The slope will rotate as set in [X angle], with reference to the X axis.



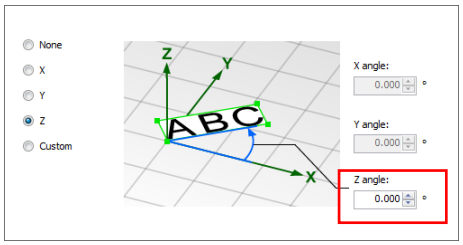
■ Y Rotation Axis

The slope will rotate as set in [Y angle], with reference to the Y axis.



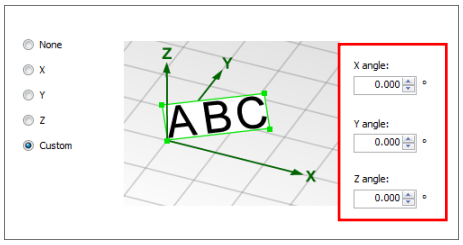
■ Z Rotation Axis

The slope will rotate as set in [Z angle], with reference to the Z axis.



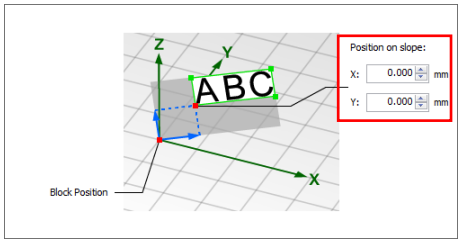
■ Custom

Set X/Y/Z angles to the desired angles.



2. Position on slope (X/Y)

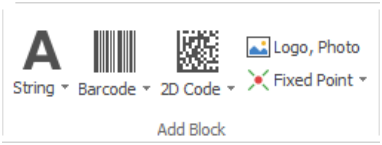
When you place two or more blocks on the slope surface, their marking positions will overlap with each other. In such a case, adjust the block position on the slope surface. You can adjust the block position using the rotated slope surface as a plane.



■ A Setting Procedure Example for a Slope

This section explains the procedure for setting and marking two blocks on the slope.

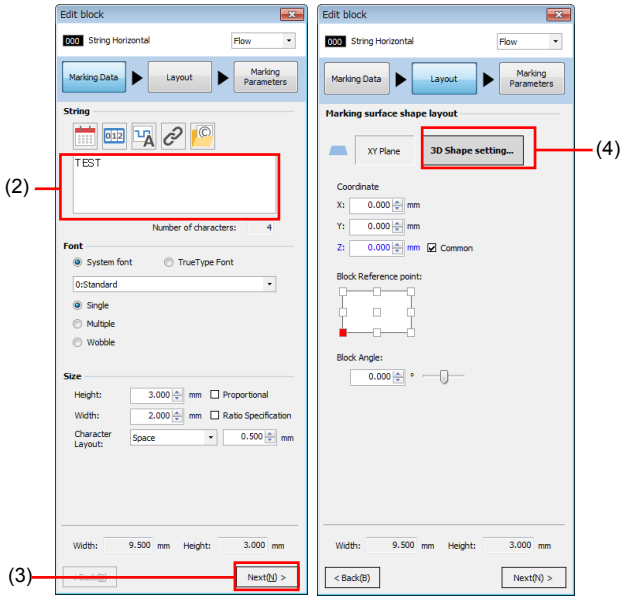
(1) Add the first block.
A string block is added here.



(2) Enter the desired string.
(Example uses "TEST").

(3) Press the [Next] button.

(4) Press the [3D Shape Setting] button.

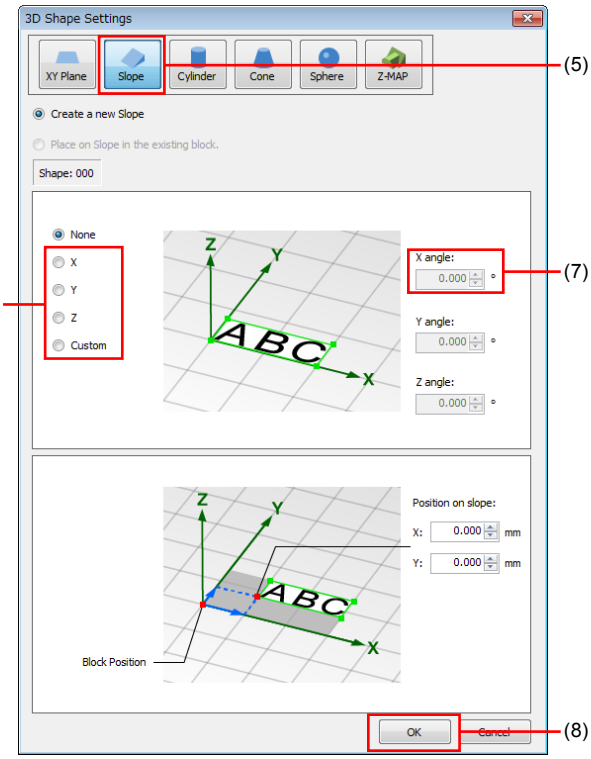


(5) Press the [Slope] button.

(6) Select the rotation axis.
[X] is selected here.

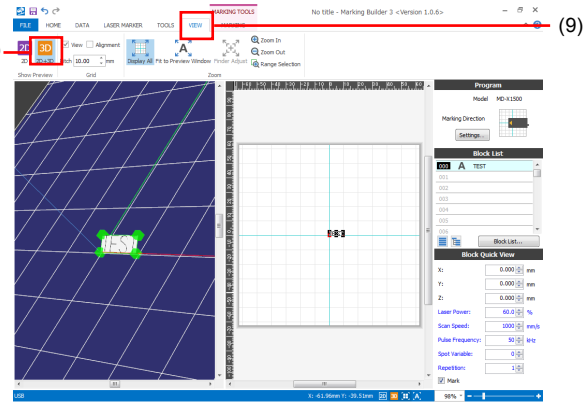
(7) Set the rotational angle.
[30°] is selected here.

(8) Press the [OK] button.

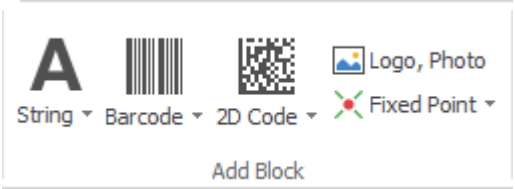


(9) Press the [View] menu.

(10) Press the [2D+3D] button.
Check the status in the preview.



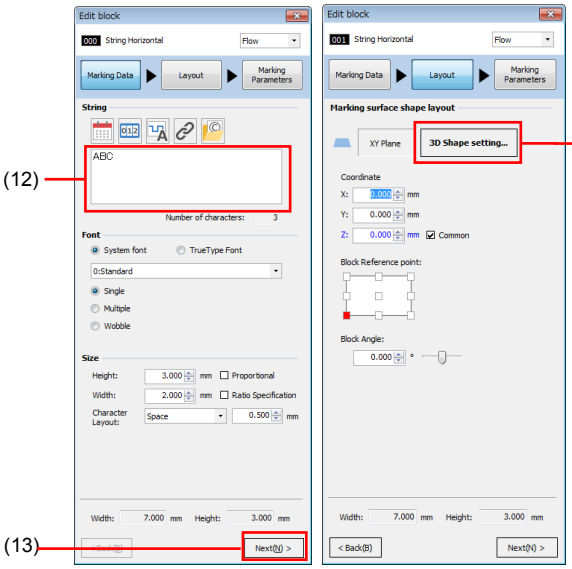
(11) Add the second block.
A string block is added here.



(12) Set the desired string.
“ABC” is entered here.

(13) Press the [Next] button.

(14) Press the [3D Shape Setting] button.

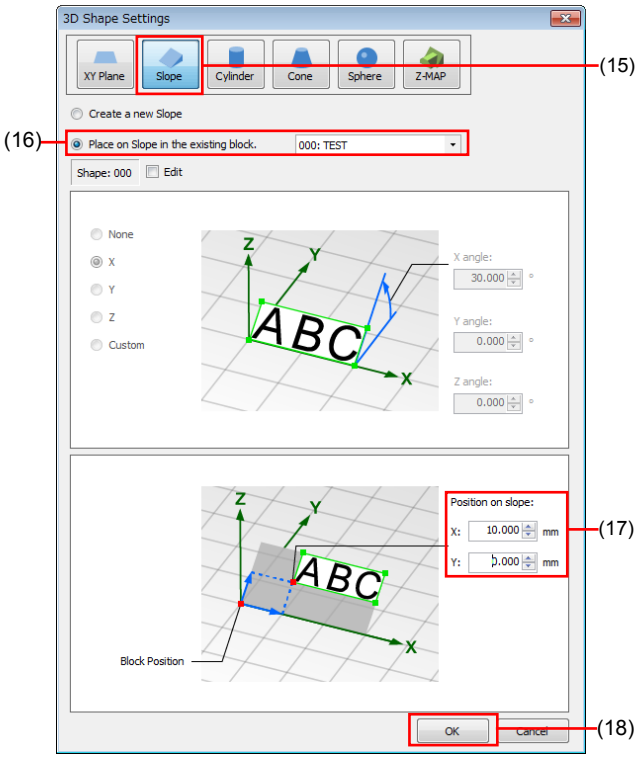


(15) Press the [Slope] button.

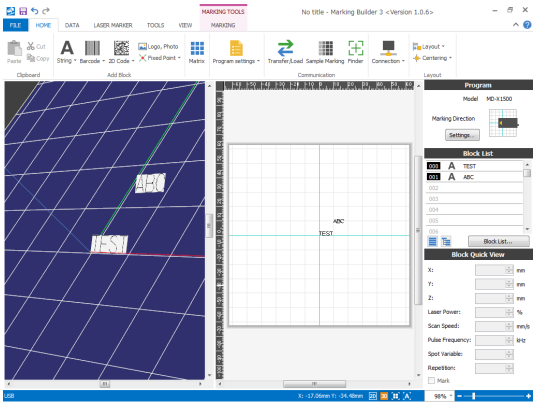
(16) Select [Place on slope in the existing block].
The 3D shape setting of block 000 will be loaded.

(17) Change the position on the slope.
“X: 10mm, Y : 10mm” is set here.

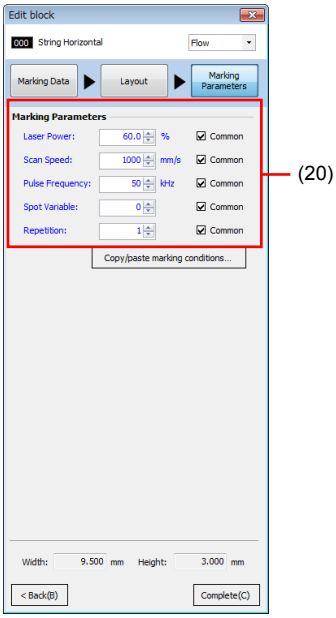
(18) Press the [OK] button.



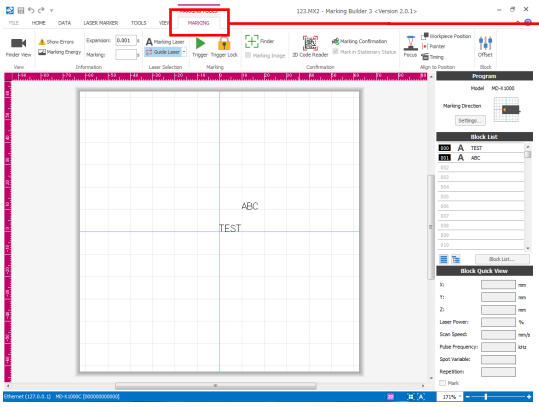
(19) Check the status in the preview.



(20) Set the marking conditions for each block.

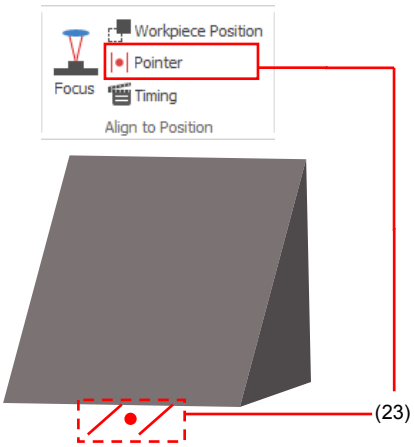


(21) Select the Marking menu.

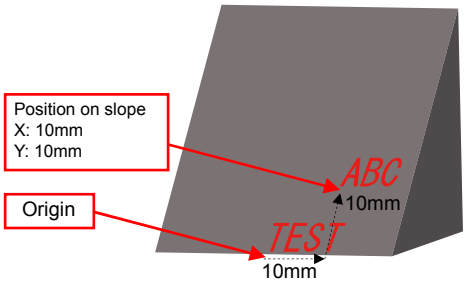


(22) Install the workpiece.

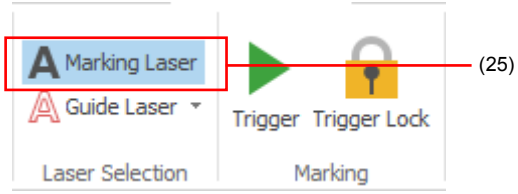
(23) Adjust the focus position using the pointer.
Here, the focus is adjusted on the plane on which the workpiece is placed.



(24) Check the marking position using the guide laser.

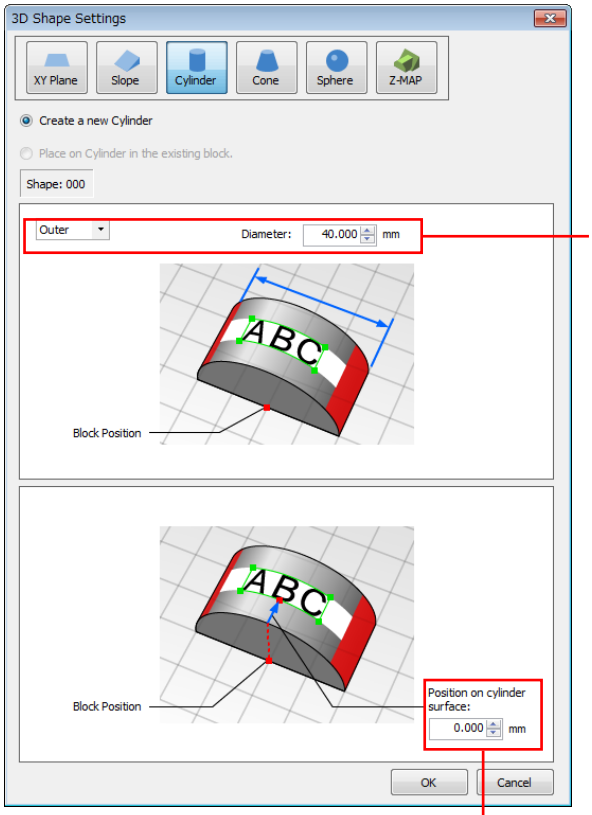


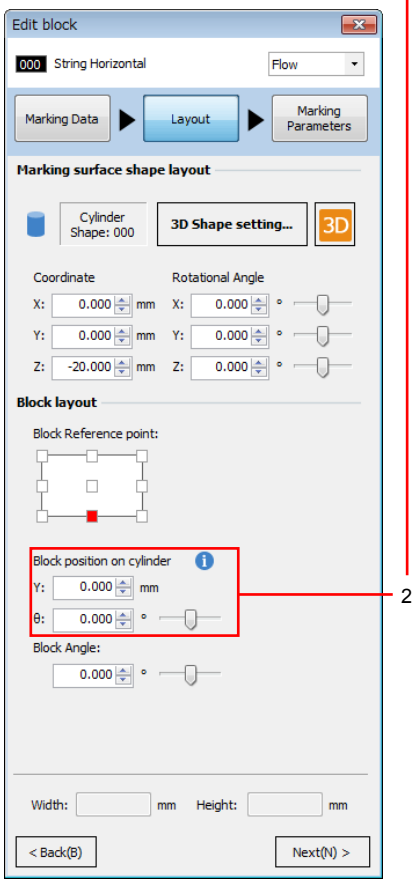
(25) Mark



Cylinder Settings

This section describes the 3D shape setting for a cylinder.





Reference

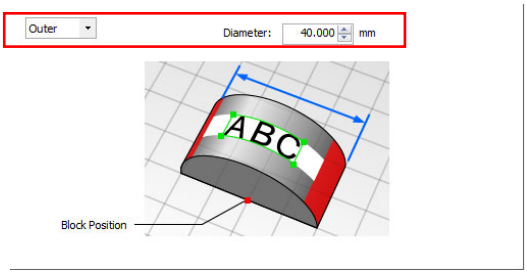
- **Detailed description of the function will appear when you place the mouse cursor over the information icon.**

1. Marking surface (Outer/Inner) and diameter

Select whether to print the outer or inner surface of the cylinder, and set the cylinder diameter.

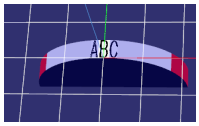
■ **Outer Surface**

Set the cylinder diameter and mark along the outer circumference.



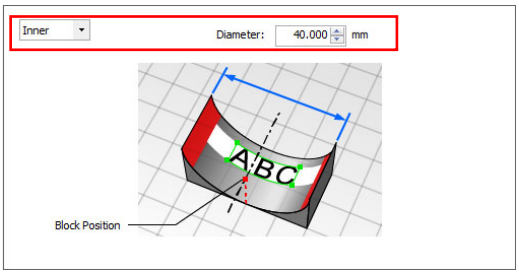
Reference

- **When setting the outer surface of the cylinder, you can select whether to input automatically the value for the minus radius as the Z coordinate, such that the peak part will match the reference surface.**



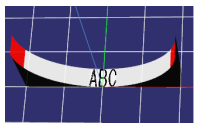
■ **Inner Surface**

Set the cylinder diameter and mark along the inner circumference.



Reference

- **When setting the inner surface of the cylinder, you can select whether to input automatically the value for the radius as the Z coordinate, such that the base part will match the reference surface.**

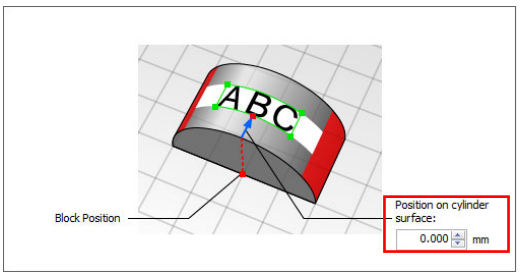


2. Block position on cylinder

When you place two or more blocks on the cylinder surface, their marking positions will overlap with each other. In such a case, adjust the block position on the cylinder surface.

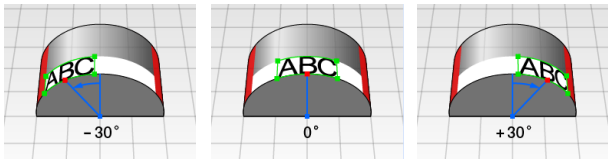
■ **Adjust Y Direction**

Adjust the block position in the Y direction on the cylinder.



■ **Adjust θ Direction**

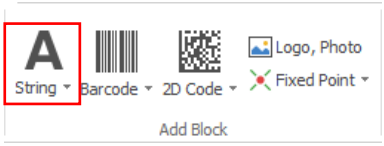
Adjust the block position in the diameter direction on the cylinder.



■ A Setting Procedure Example for a Cylinder

This section explains the procedure for setting and marking two blocks on the cylinder.

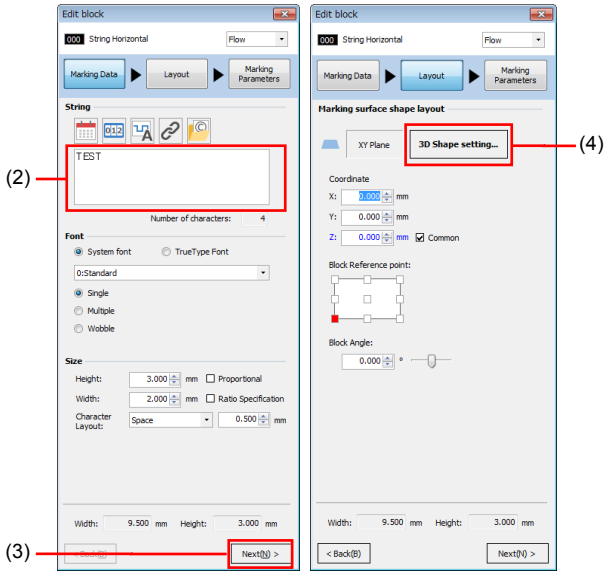
(1) Add the first block.
A string block is added here.



(2) Set the desired string.
"TEST" is entered here.

(3) Press the [Next] button.

(4) Press the [3D Shape Setting] button.

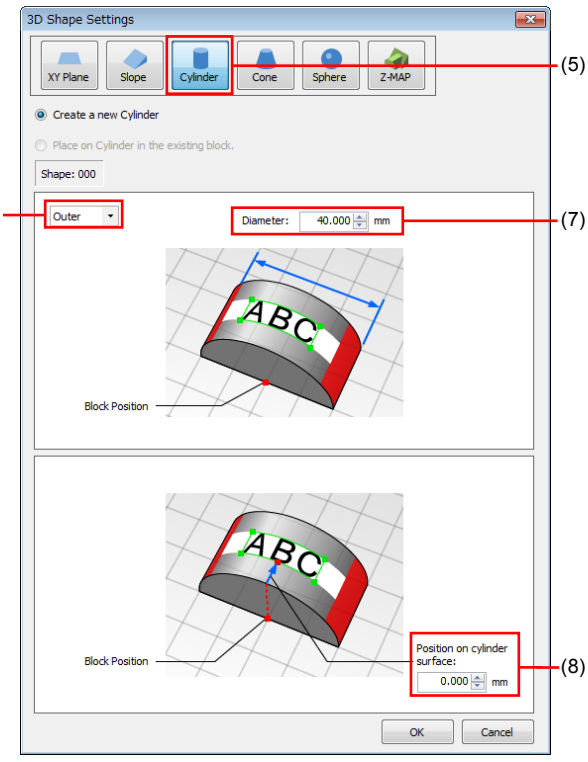


(5) Press the [Cylinder] button.

(6) Select the marking surface.
[Outer] is selected here.

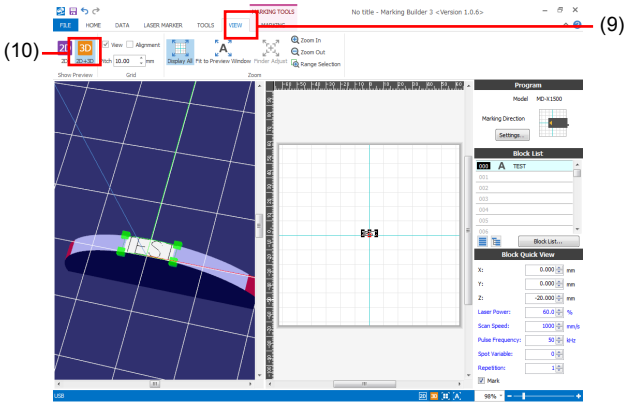
(7) Set [Diameter].
[40mm] is set here.

(8) Press the [OK] button.

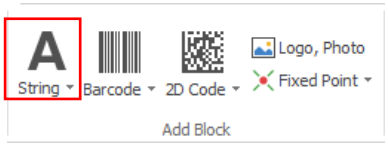


(9) Press the [View] menu.

(10) Press the [2D+3D] button.
Check the status in the preview.



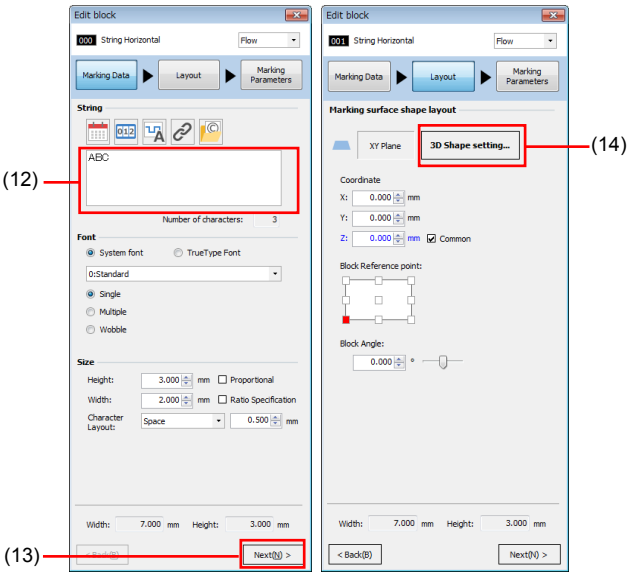
(11) Adding the second block
A string block is added here.



(12) Set the desired string.
"ABC" is entered here.

(13) Press the [Next] button.

(14) Press the [3D Shape Setting] button.

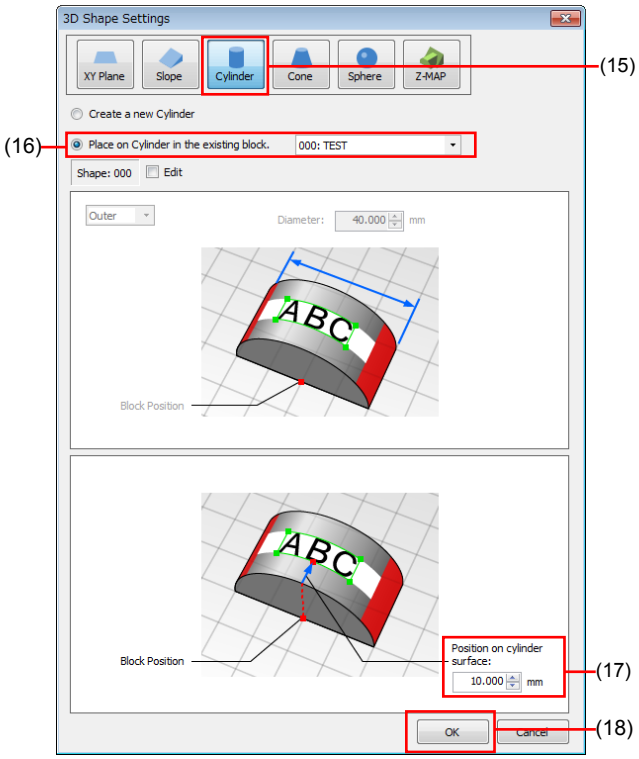


(15) Press the [Cylinder] button.

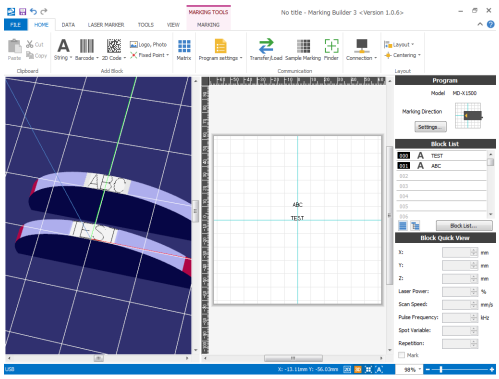
(16) Select [Place on cylinder in the existing block].
The 3D shape setting of block 000 will be loaded.

(17) Change the position on the cylinder surface.
[10mm] is selected here.

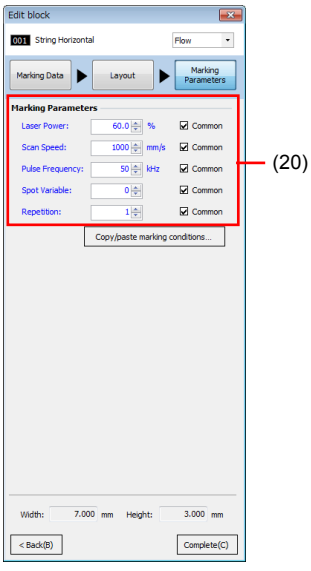
(18) Press the [OK] button.



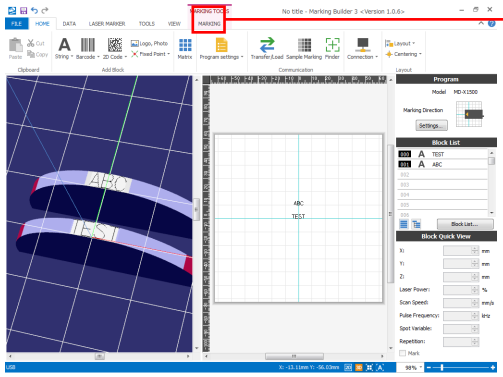
(19) Check the status in the preview.



(20) Set the marking conditions for each block.

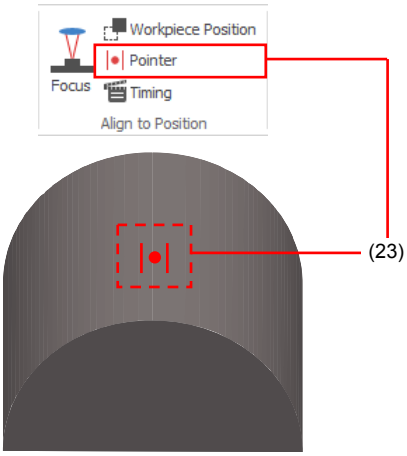


(21) Select the Marking menu.

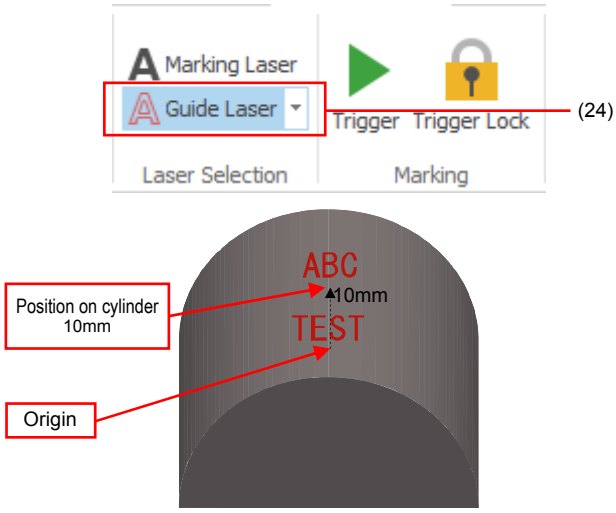


(22) Install the workpiece.

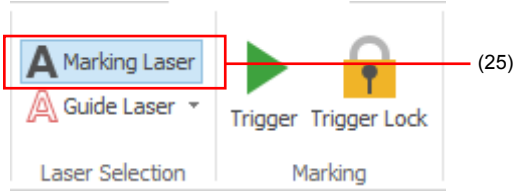
(23) Adjust the focus position using the pointer.
The focus is adjusted at the peak of the workpiece here.



(24) Adjust the marking position using a guide laser.

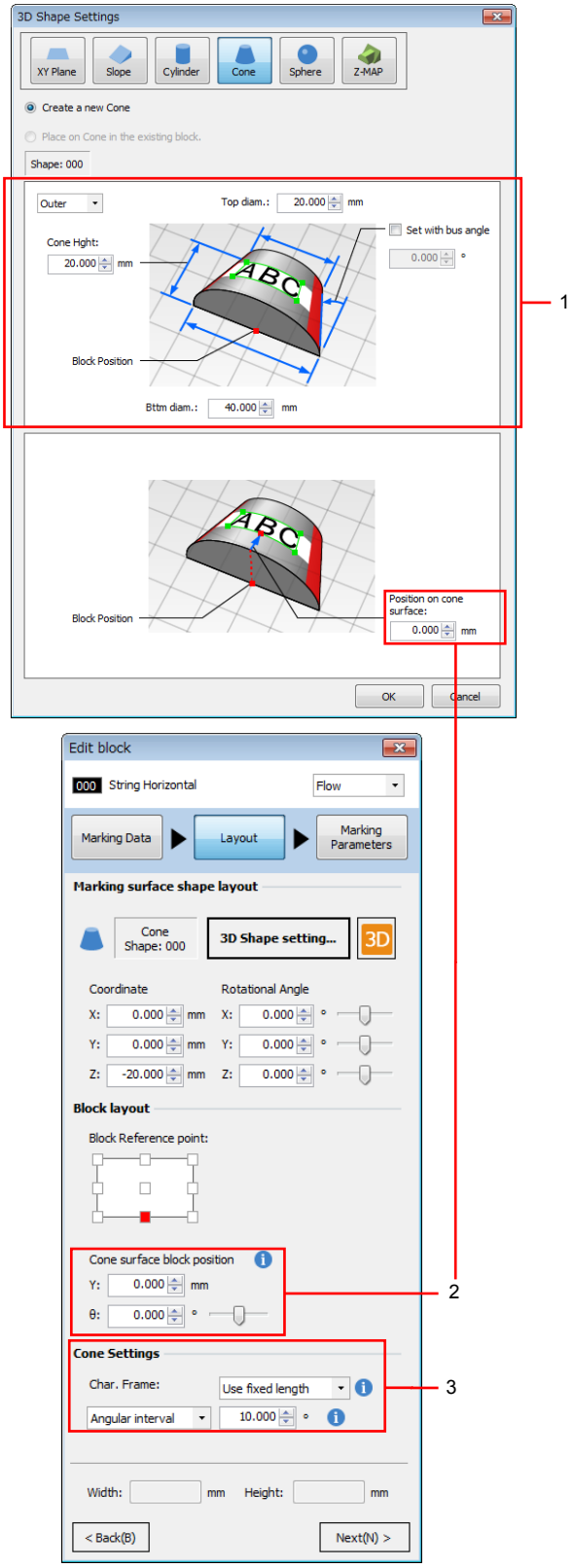


(25) Mark



Cone Settings

This section describes the 3D shape setting for a cone.



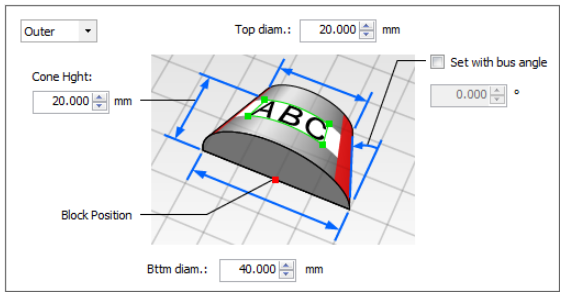
Reference

- **Detailed description of the function will appear when you place the mouse cursor over the information icon.**

1. Marking surface (Outer/Inner) and cone size

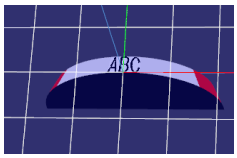
Select whether to print the outer or inner surface of the cone and set the cone size.

■ Outer

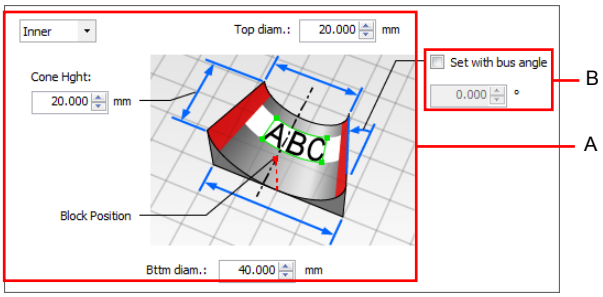


Reference

- **When setting the outer surface of the cone, you can select whether to input the value for the minus radius of the base part of the corn as the Z coordinate, such that the peak part of the cone will match the reference surface.**

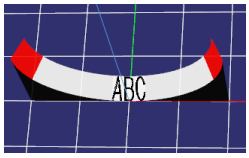


■ Inner



Reference

- **When setting the inner surface of the cone, you can select whether to input automatically the value for the radius of the base part of the corn as the Z coordinate, such that the base part of the cone will match the reference surface.**



A. Cone Size

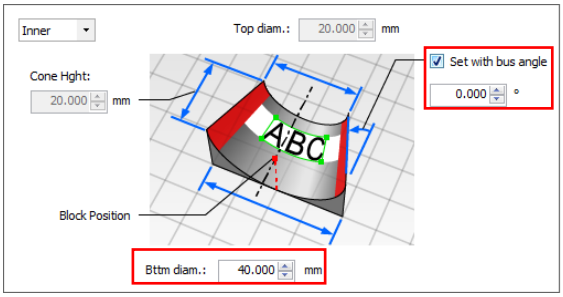
Set the top diameter, bottom diameter and cone height.

Reference

- **You may also set values that will result in [Bttm diam.] < [Top diam.].**

B. Setting with bus angle

Set the cone size with the base diameter and bus angle.

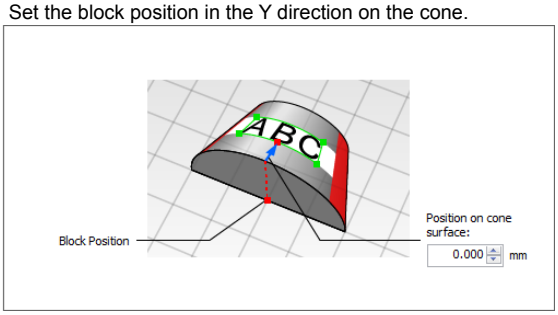


2. Block position on cone

When you set two or more blocks on a 3D shape setting, their marking positions will overlap with each other. In such a case, adjust the block position on the cone surface.

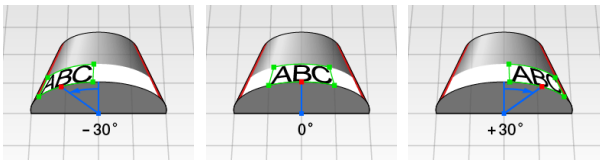
■ Adjust Y Direction

Set the block position in the Y direction on the cone.



■ Adjust θ Direction

Set the block position in the diameter direction on the cone.

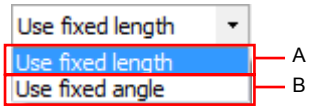


3. Cone Settings

When setting the cone shape, set the [Character Layout] option under [Cone Settings], not under [Marking Data].

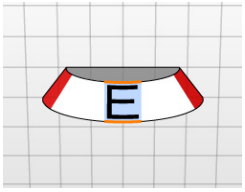
■ Char. Frame

Set how to paste the characters.



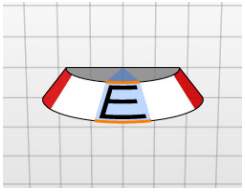
A. Use fixed length

Aligns the width at the top and bottom surfaces of the cone.



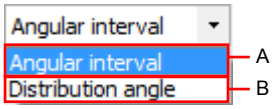
B. Use fixed angle

Aligns the angle to be occupied by the character width in the center, top and bottom surfaces of the cone.



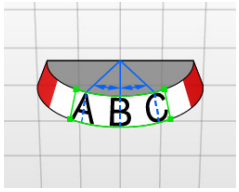
4. Space settings

Set the space setting method and the space.



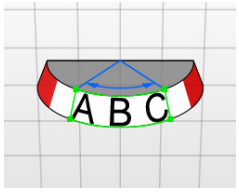
A. Angular interval

Set the space between characters using an angle.



B. Distribute angle

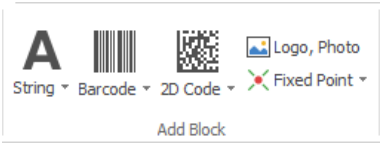
Set the distributed angle using the open angle of the entire string.



■ A Setting Procedure Example for a Cone

This section explains the procedure for setting and marking two blocks on the cone.

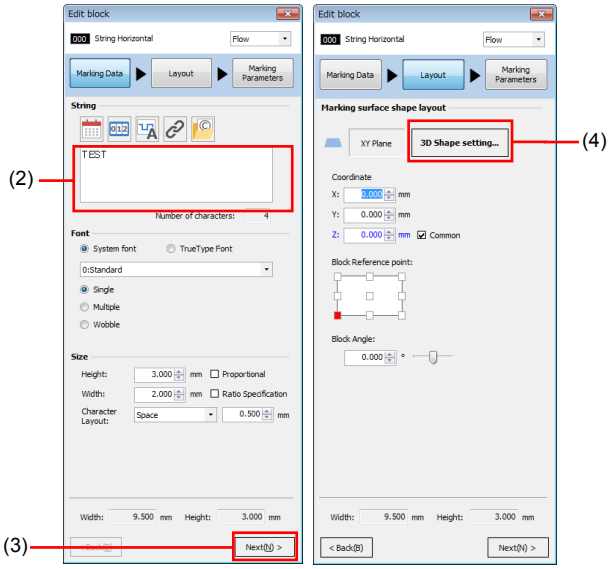
(1) Add the first block.
A string block is added here.



(2) Set the desired string.
"TEST" is entered here.

(3) Press the [Next] button.

(4) Press the [3D Shape Setting] button.

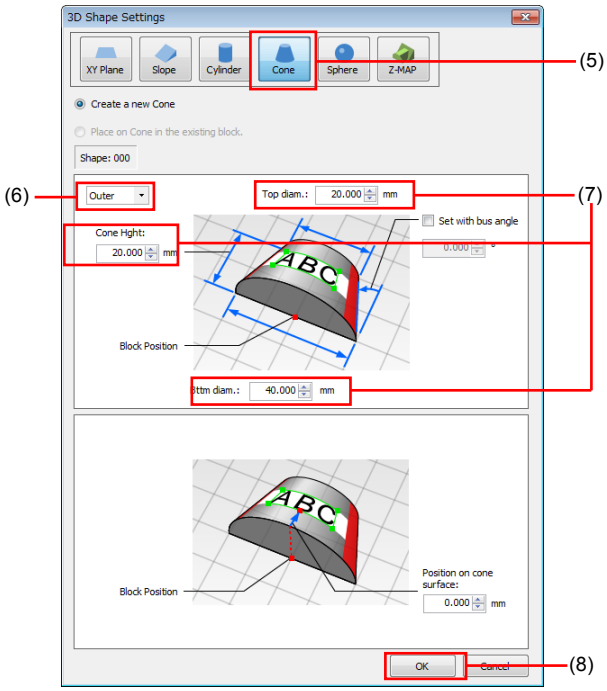


(5) Press the [Cone] button.

(6) Select the marking surface.
[Outer] is selected here.

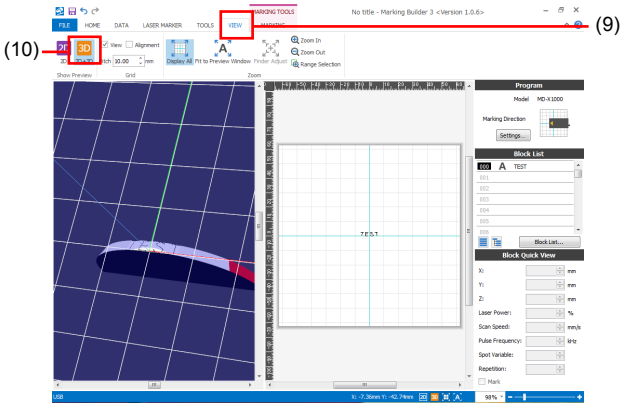
(7) Set the top diameter, cone height and base diameter.
"Top diam.: 20mm, Cone Hght: 20mm, Bttm diam.: 40mm" is selected here.

(8) Press the [OK] button.

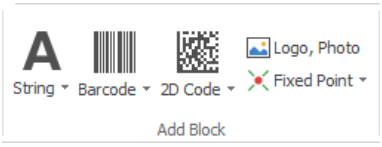


(9) Press the [View] menu.

(10) Press the [2D+3D] button.
Check the status in the preview.



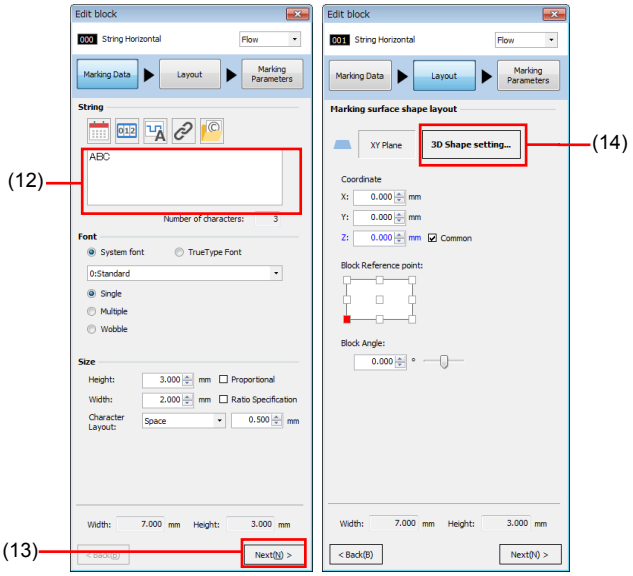
(11) Adding the second block
A string block is added here.



(12) Set the desired string.
"ABC" is entered here.

(13) Press the [Next] button.

(14) Press the [3D Shape Setting] button.

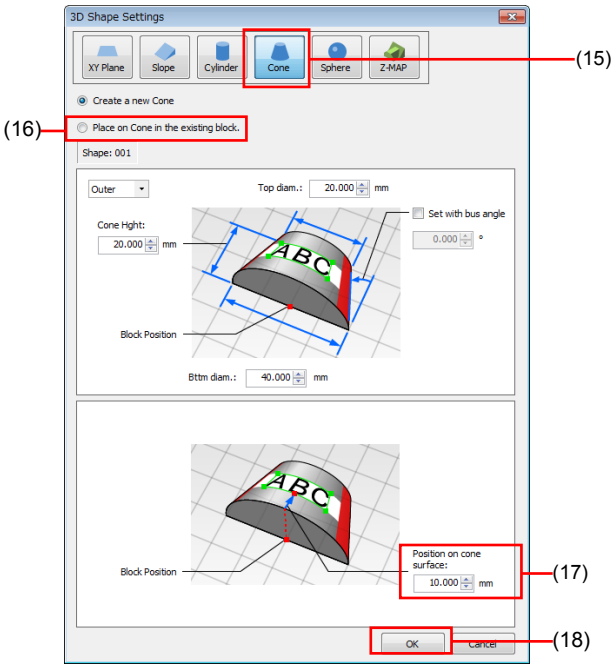


(15) Press the [Cone] button.

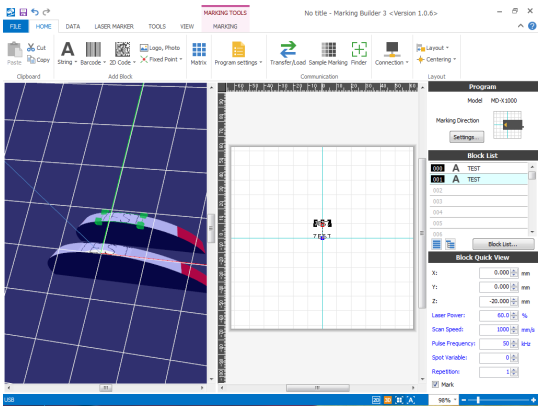
(16) Select [Place on cone in the existing block].
The 3D shape setting of block 000 will be loaded.

(17) Change the position on the cylinder surface.
[10mm] is selected here.

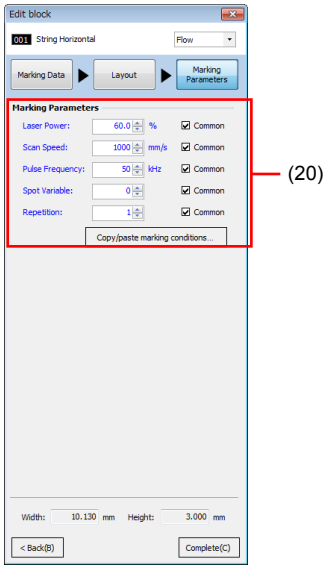
(18) Press the [OK] button.



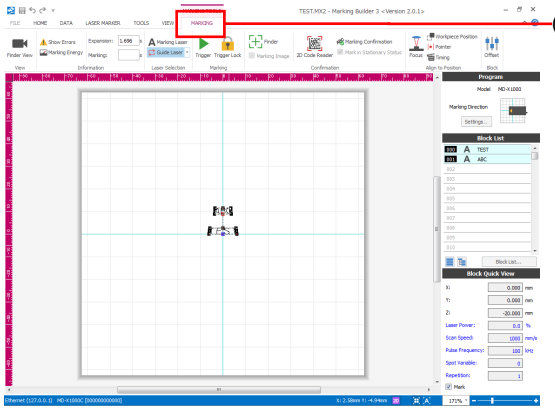
(19) Check the status in the preview.



(20) Set the marking conditions for each block.

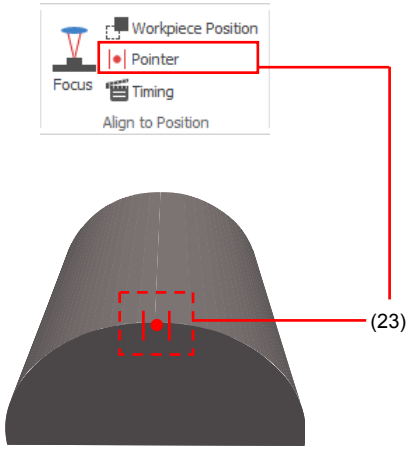


(21) Select the Marking menu.

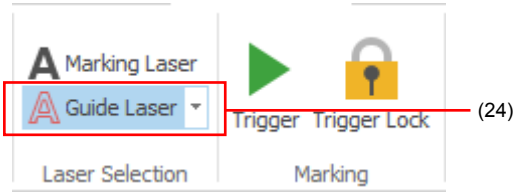


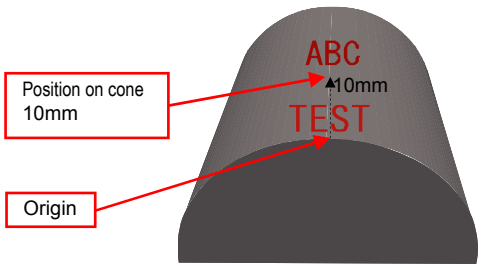
(22) Install the workpiece.

(23) Adjust the focus position using the pointer.
The focus is adjusted at the peak of the workpiece here.

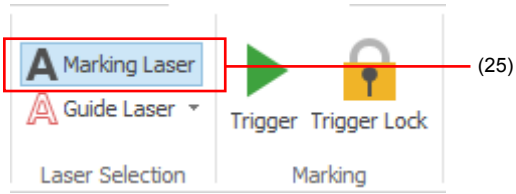


(24) Adjust the marking position using a guide laser.



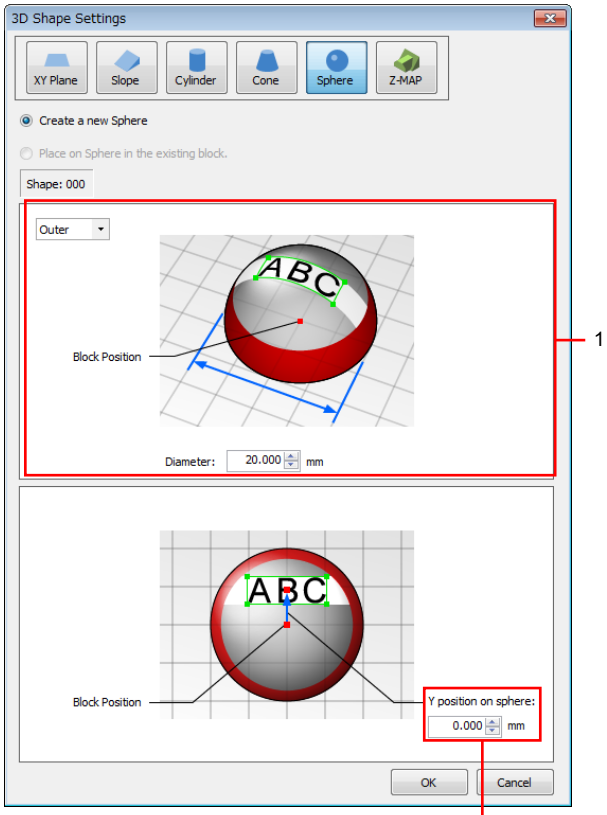


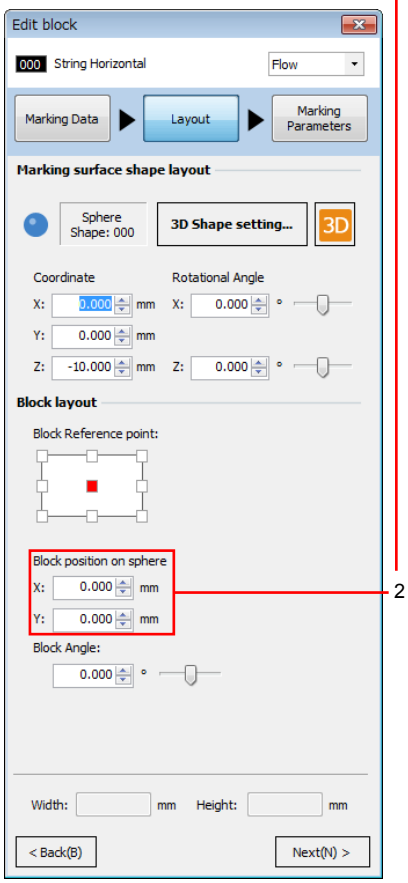
(25) Mark



Sphere Settings

This section explains the creation of 3D shape settings for the sphere.

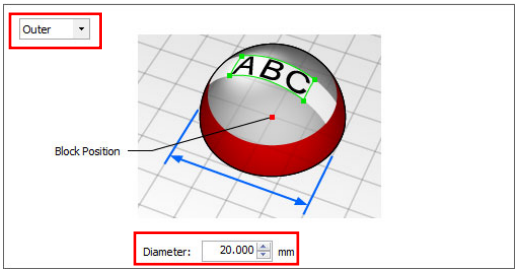




1. Marking surface (Outer/Inner) and diameter

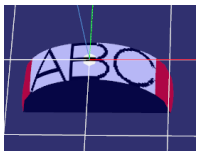
Select whether to print the outer or inner surface of the sphere and set the sphere diameter.

■ **Outer Surface and Diameter**

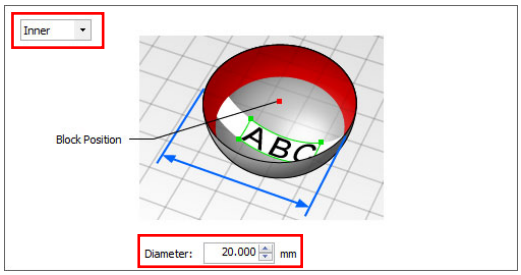


Reference

- **When setting the outer surface of the sphere, you can select whether to input the value for the minus radius as the Z coordinate, such that the peak part will match the reference surface.**

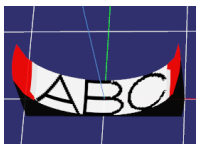


■ **Inner Surface and Diameter**



Reference

- **When setting the [Inner Surface] of the sphere, you can select whether to input automatically the value for the radius of the sphere as the [Z coordinate], such that the base part will match the reference surface.**

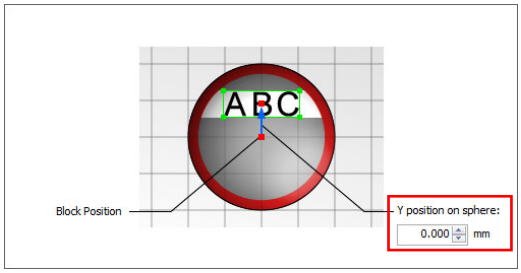


2. Block position on sphere

When you set two or more blocks on a 3D shape setting, their marking positions will overlap with each other. In such a case, adjust the block position on the sphere surface.

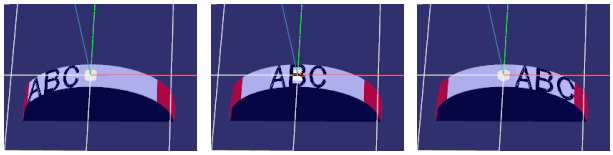
■ **Adjust Y Direction**

Adjust the block position in the Y axis direction on the sphere surface.



■ **Adjust X Direction**

Adjust the block position in the X axis direction on the sphere surface.

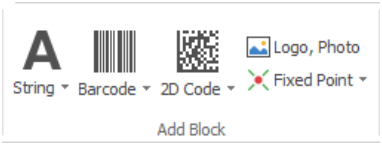


X: Minus direction X: 0mm X: Plus direction

■ A Setting Procedure Example for a Sphere

This section explains the procedure for setting and marking two blocks on the sphere.

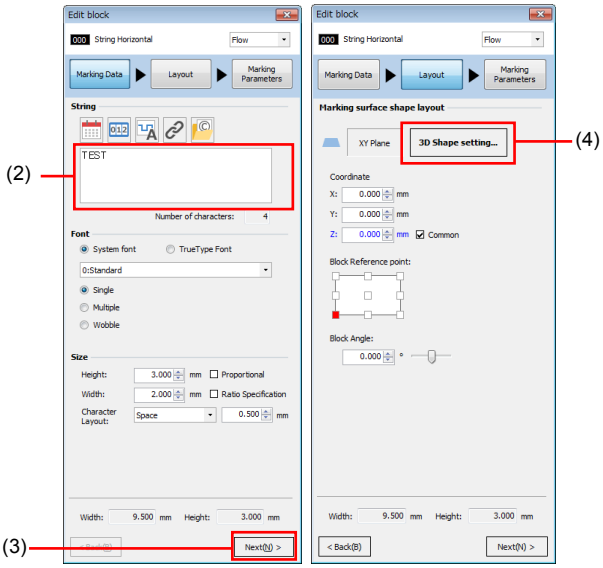
(1) Add the first block.
A string block is added here.



(2) Set the desired string.
"TEST" is entered here.

(3) Press the [Next] button.

(4) Press the [3D Shape Setting] button.

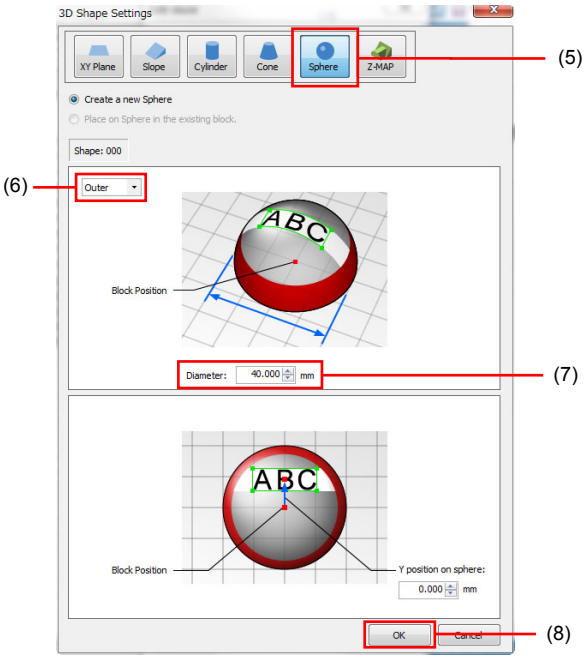


(5) Press the [Sphere] button.

(6) Select the marking surface.
[Outer] is selected here.

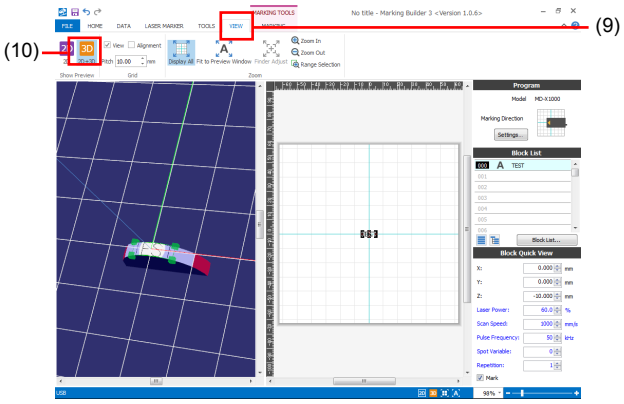
(7) Set [Diameter].
[40mm] is set here.

(8) Press the [OK] button.

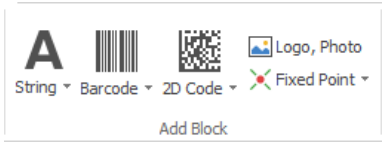


(9) Press the [View] menu.

(10) Press the [2D+3D] button.
Check the status in the preview.



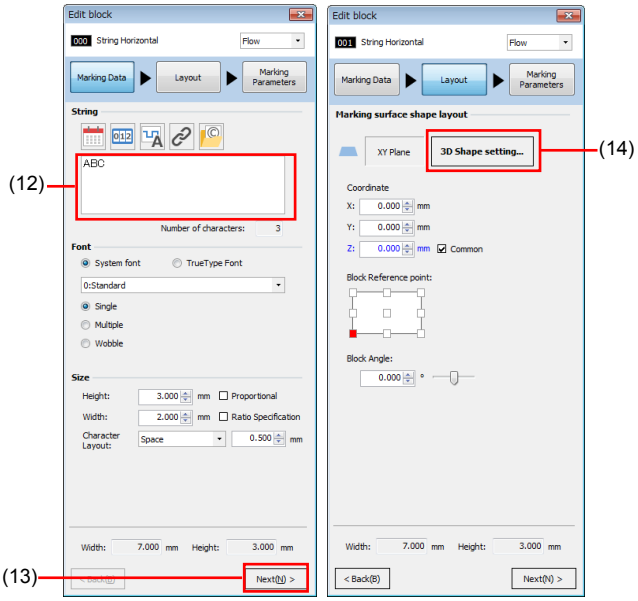
(11) Adding the second block
A string block is added here.



(12) Set the desired string.
"ABC" is entered here.

(13) Press the [Next] button.

(14) Press the [3D Shape Setting] button.

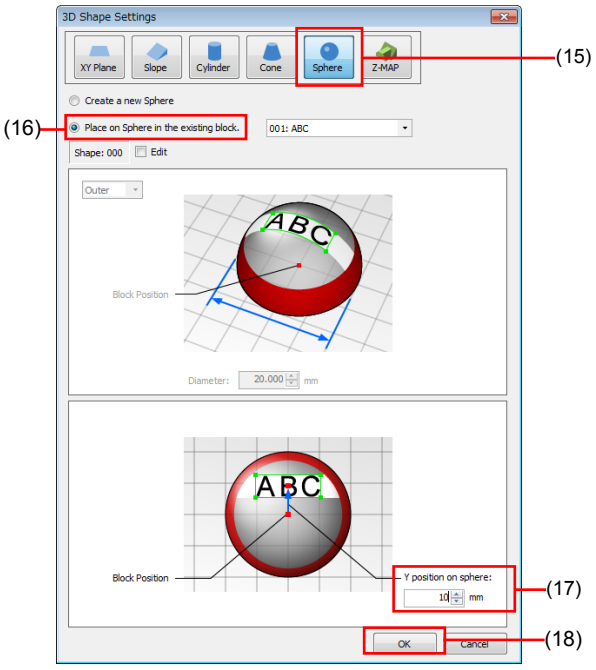


(15) Press the [Sphere] button.

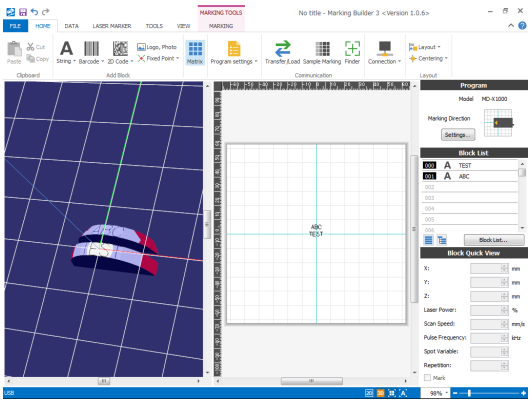
(16) Select [Place on sphere in the existing block].
The 3D shape setting of block 000 will be loaded.

(17) Changing the position on the sphere
[10mm] is selected here.

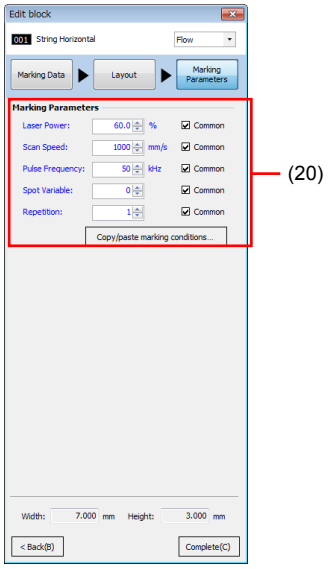
(18) Press the [OK] button.



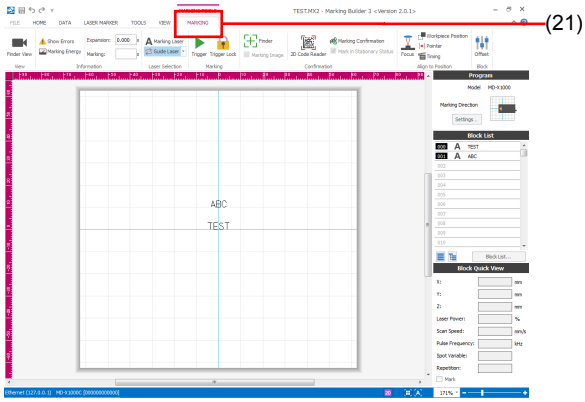
(19) Check the status in the preview.



(20) Set the marking conditions for each block.

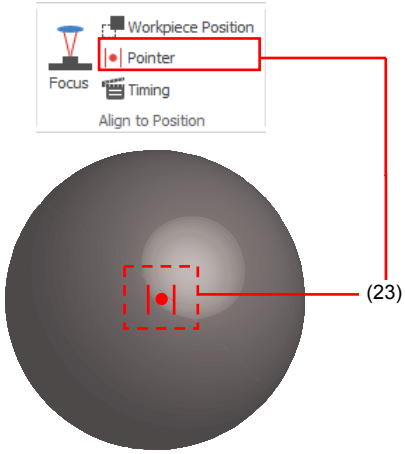


(21) Select the Marking menu.

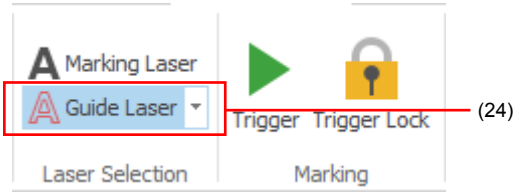


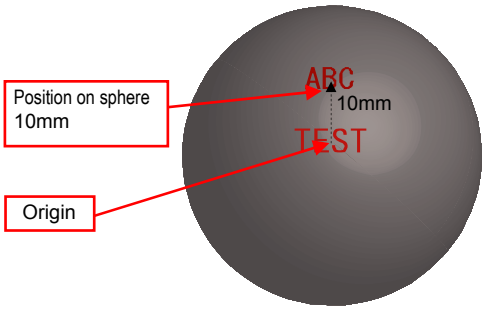
(22) Install the workpiece.

(23) Adjust the focus position using the pointer.
The focus is adjusted at the peak of the workpiece here.

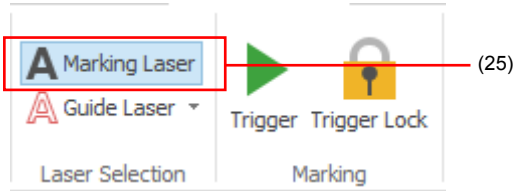


(24) Adjust the marking position using a guide laser.



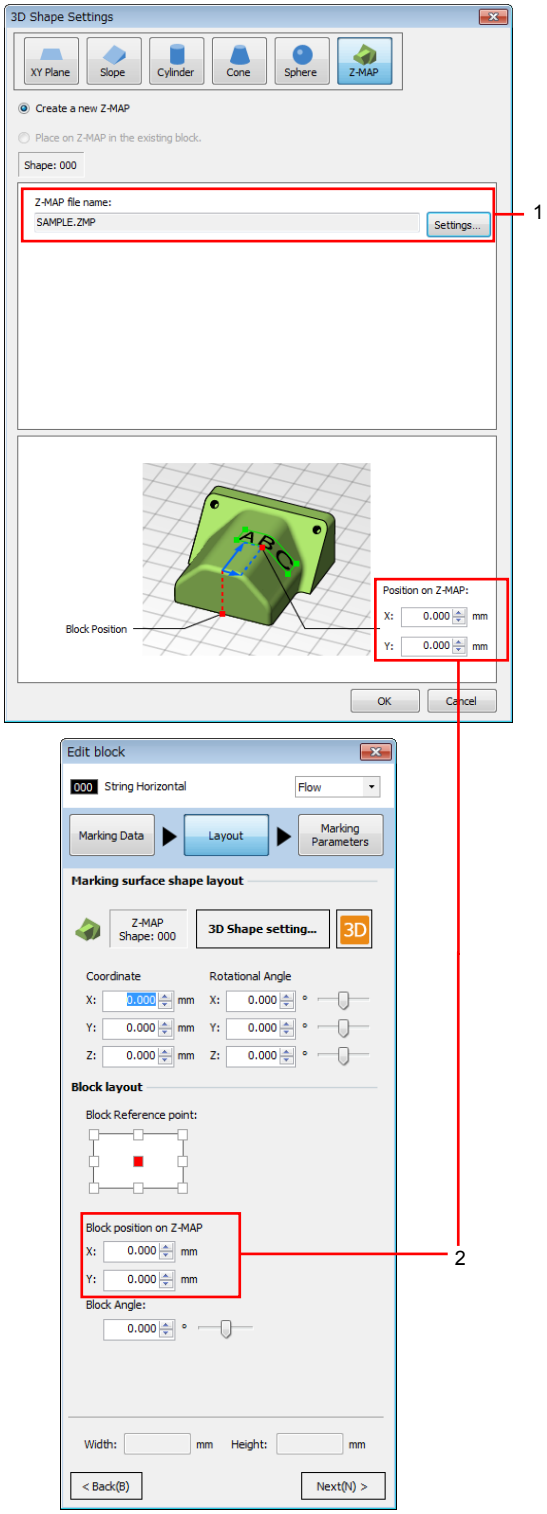


(25) Mark



Z-MAP Settings

This section explains the creation of 3D shape settings for Z-MAP.



1. Referencing a Z-MAP File

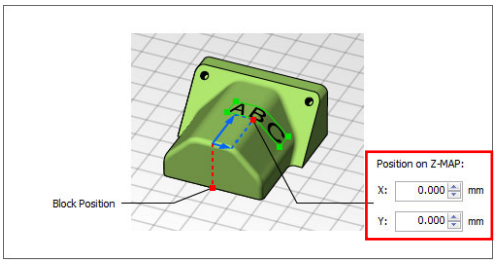
Reference the Z-MAP file to which the block will be pasted.

Reference

- **To set a Z-MAP in the 3D shape settings, you need to create a Z-MAP file in Z-MAP Creator in advance. A 3D-CAD STL file is required in order to create a Z-MAP file.**
  “Z-MAP Creator” (Page 137)
- **Each program can only reference a single type of Z-MAP file.**

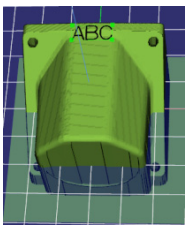
2. Block position on Z-MAP

When you set two or more blocks on a 3D shape setting, their marking positions will overlap with each other. In such a case, make the necessary adjustment in [Block position on Z-MAP].

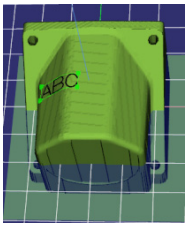


■ Adjust X/Y

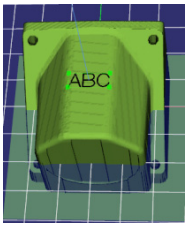
Adjust the block position on Z-MAP.



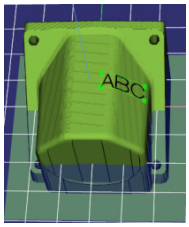
Y : Plus direction



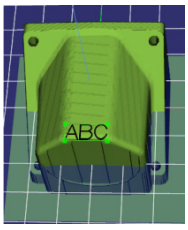
X: Minus direction



X/Y Coordinate: 0mm



X: Plus direction

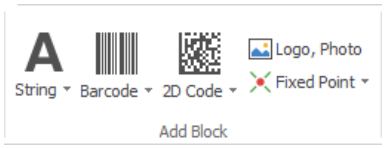


Y : Minus direction

■ A Setting Procedure Example for Z-MAP

This section explains the procedure for setting and marking two blocks on the Z-MAP.

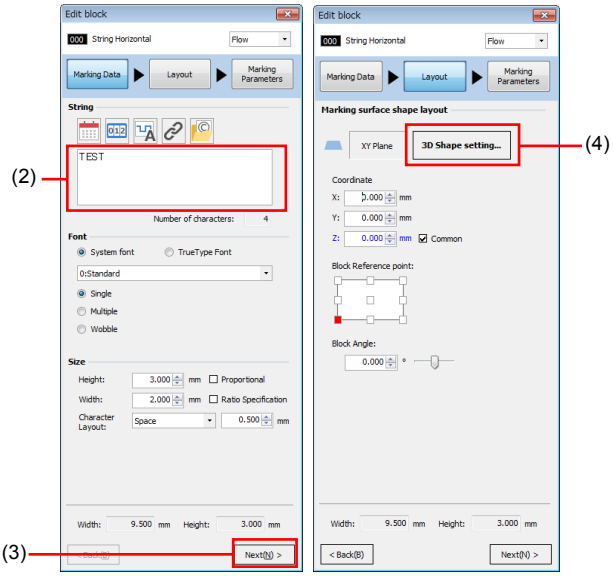
(1) Add the first block.
A string block is added here.



(2) Set the desired string.
“TEST” is entered here.

(3) Press the [Next] button.

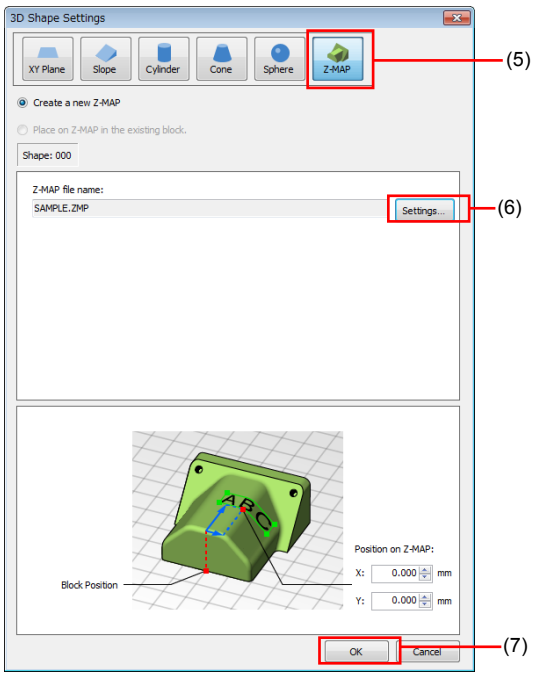
(4) Press the [3D Shape Setting] button.



(5) Press the [Z-MAP] button.

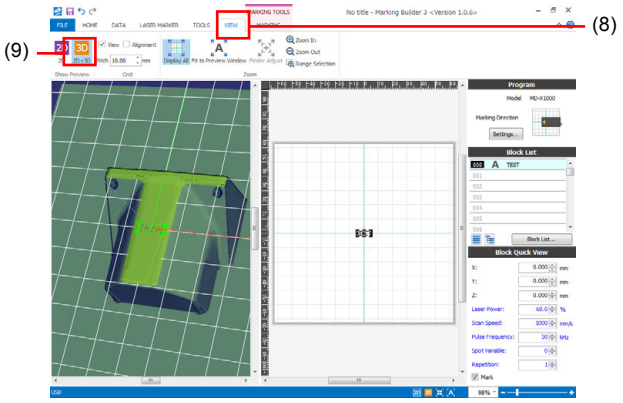
(6) Press the [Settings] button.
Reference the desired Z-MAP file.

(7) Press the [OK] button.

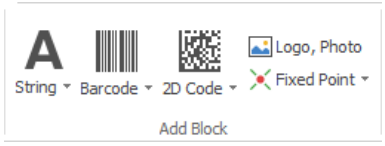


(8) Press the [View] menu.

(9) Press the [2D+3D] button.
Check the status in the preview.



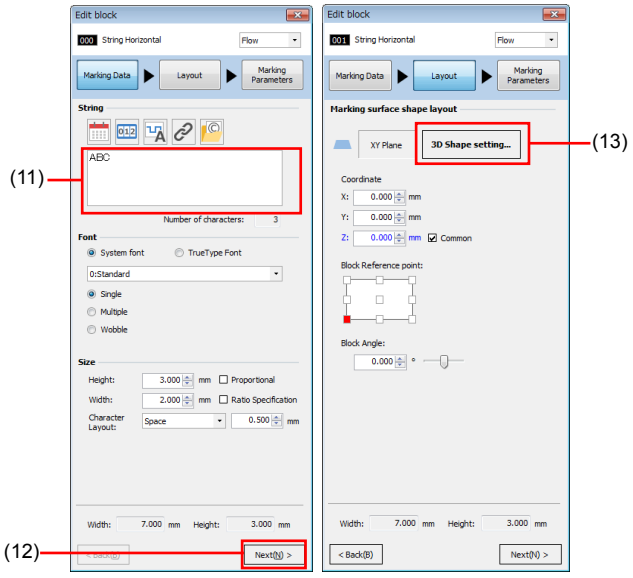
(10) Add the second block.
A string block is added here.



(11) Set the desired string.
"ABC" is entered here.

(12) Press the [Next] button.

(13) Press the [3D Shape Setting] button.

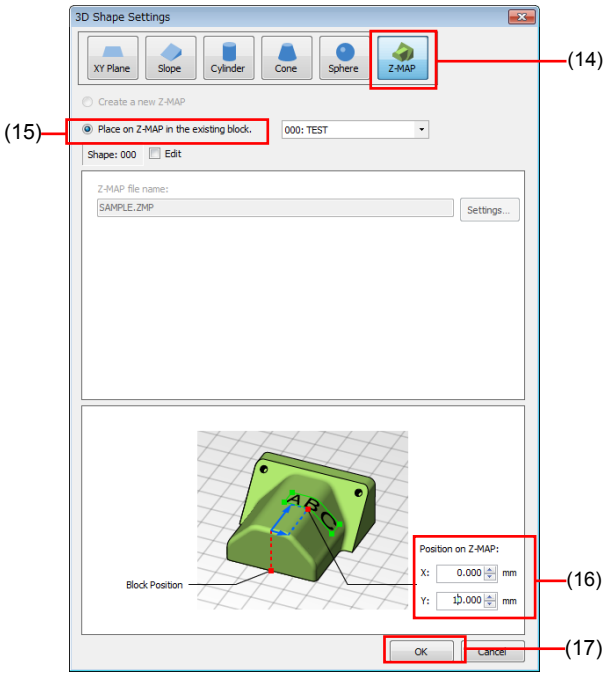


(14) Press the [Z-MAP] button.

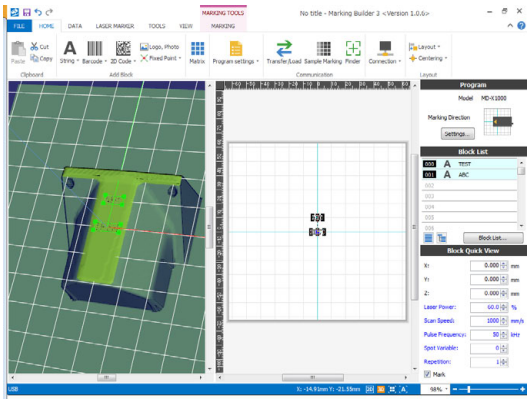
(15) Select [Place on Z-MAP in the existing block].
The 3D shape setting of block 000 will be loaded.

(16) Change the position on Z-MAP.
"X: 0mm, Y : 18mm" is selected here.

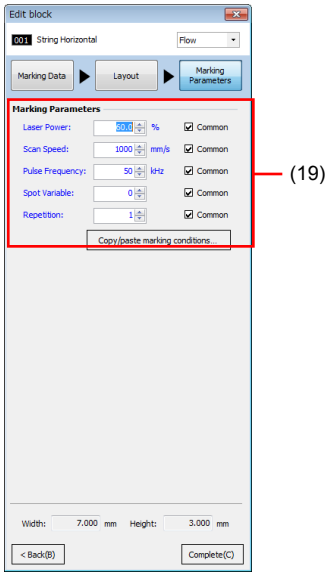
(17) Press the [OK] button.



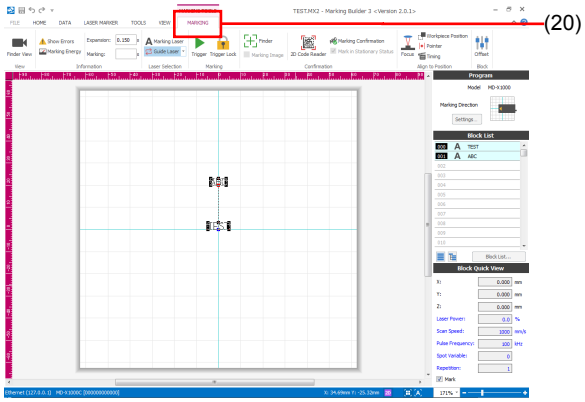
(18) Check the status in the preview.



(19) Set the marking conditions for each block.

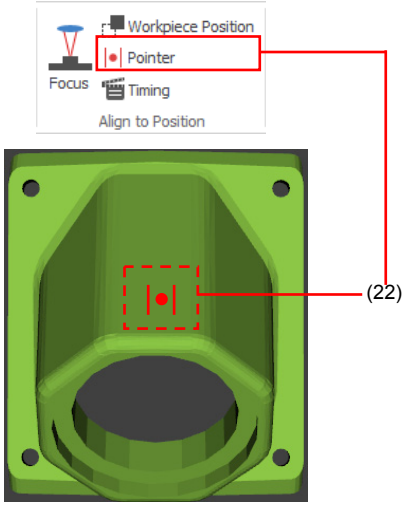


(20) Select the Marking menu.

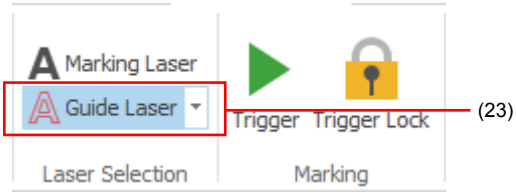


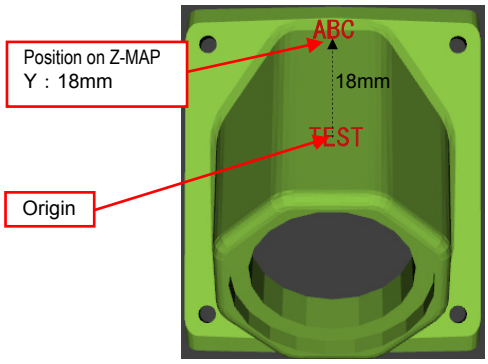
(21) Install the workpiece.

(22) Adjust the focus position using the pointer.
Adjust the focus using the plane on which the Z coordinate of Z-MAP becomes "0 mm". A Z-MAP file with the origin of Z = 0mm is used here.

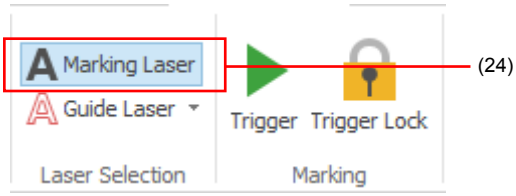


(23) Adjust the marking position using a guide laser.



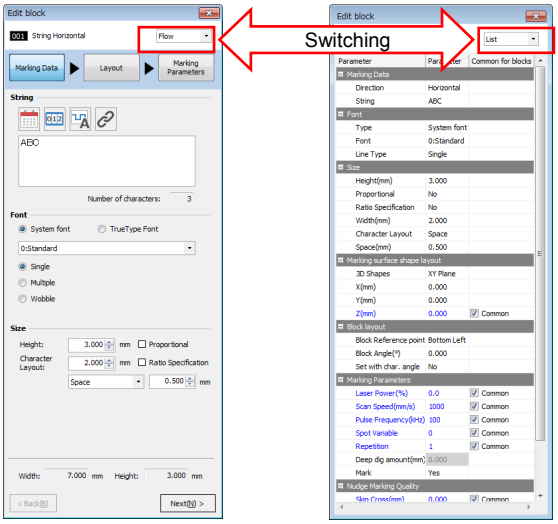


(24) Mark



3-8 Edit Block List View

There are two types of edit block views available: [Flow] and [List]. This section explains the parameters that are only displayed in the List view.

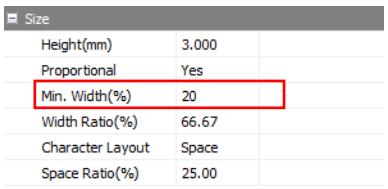


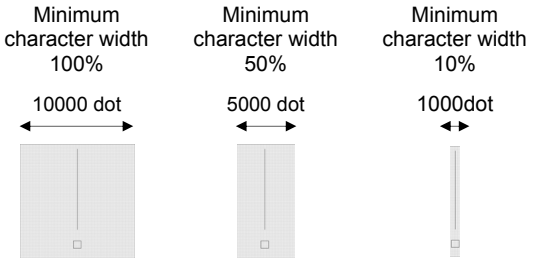
Mark Data List View

This section explains the parameters among the edit block marking data that are only displayed in the list.

■ Minimum character width

Displays only when the system font has been set proportional. Specify the minimum ratio for character width.



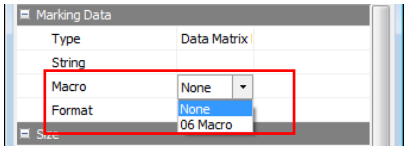


Reference

- **Set the minimum character width ratio smaller, and if the original character size width is lower, then the original size will be maintained.**

■ 06Macro

This option only appears when a 2D code DataMatrix has been set. You can set a DataMatrix that supports 06Macro. A specific control code for 06Macro will be added to the beginning of the encoded string.

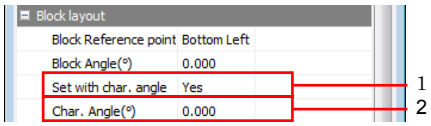


Layout List View

This section explains the parameters among the edit block layout that are only displayed in the list.

■ Char. Angle (°)

This option only appears when a string has been set. You can set the character angle.



1. Specify character angle

Select whether to set the character angle from [Enable/Disable].

2. Char. Angle (°)

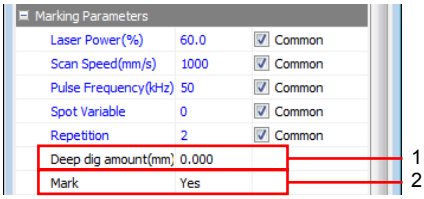
Set the character angle.

Marking Conditions List View

This section explains the parameters among the edit block marking conditions that are only displayed in the list.

■ Marking conditions

Set the deep dig amount and marking flag.



1. Deep dig amount (mm)

Marks by shifting the focus position to the negative direction of the spot variable. The amount shifted at a time can be calculated by "Deep dig amount" / "Marking count -1". This option can only be set when the setting value of [Repetition] or [Fill Line Repetition] is "2" or greater.

Reference

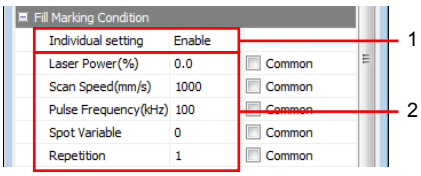
- **The part that is lower than -21 mm (-2 mm for ML-Z9650) after the deep dig amount is subtracted from the Z coordinate will not be reflected to the marking.**

2. Mark

Select whether or not to perform the marking.

■ Fill Marking Condition

Set the fill marking conditions for the hatch logo separately from the boundary marking conditions.



1. Fill Marking Conditions

Select [Set individually/Do not set individually] to specify whether to set the fill marking conditions for the hatch logo independently from the boundary marking conditions.

Reference

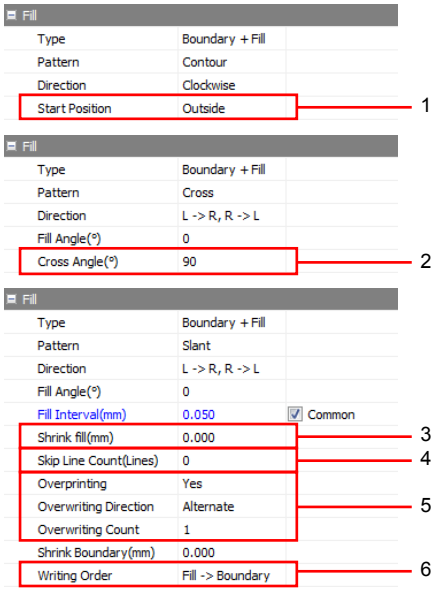
- **This option is set when the marking states of the fill and boundary are different.**

2. Various Fill Marking Conditions

Set the fill laser power, scan speed, pulse frequency, spot variable and repetition individually for the hatch logo.

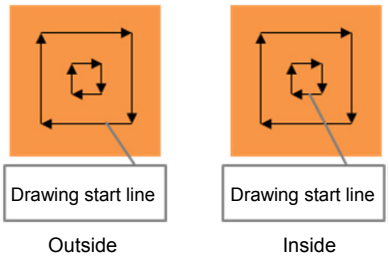
■ Fill

Set the hatch logo start position, cross angle, shrink fill, skip line count, overprinting, overwriting direction, overwriting count and writing order.



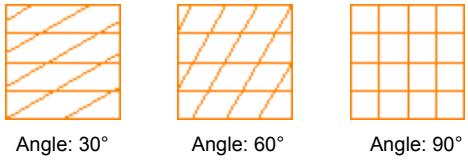
1. Drawing Start Position

Select the contour drawing start position for the hatch logo from [Outer/Inner].



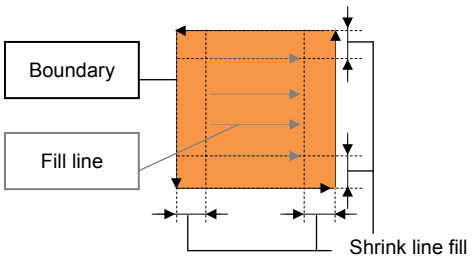
2. Cross Angle

Set the angle at which the fill lines intersect with each other using the [Cross] option of the hatch logo.



3. Shrink fill

Shrink the fill area to create a gap between the boundary and fill line.

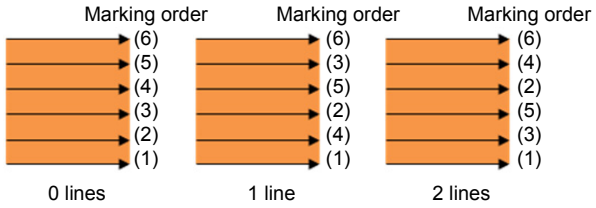


Reference

- **This option is set when the marking is too dense (too deep) due to the boundary and fill lines overlapping with each other.**

4. Skip Line Count (Lines)

Mark the fill lines skipping the specified number of lines. Marking will be performed to the end by moving to-and-fro for the skipped lines.

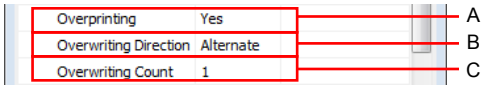


Reference

- **This option is set to reduce the thermal effect caused by the fill.**

5. Overprinting

Set the overprinting of the fill lines.

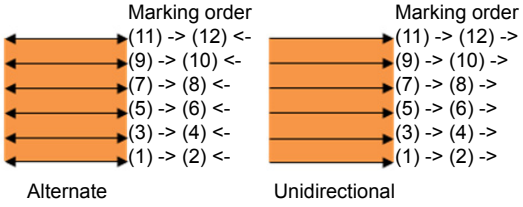


A. Overprinting

Select whether to perform overprinting of the fill lines from [Enable/Disable].

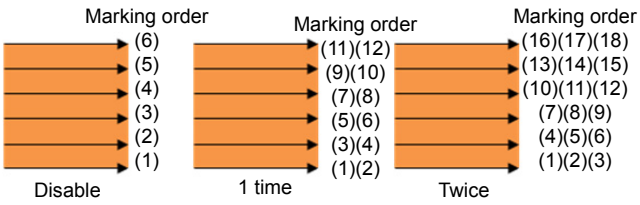
B. Overprinting Direction

Select the marking direction of the overprinting lines from [Alternate/Unidirectional]. The following is an example of the marking order when [Overwriting Count] is set to Twice and [Fill Direction] is set to L -> R.



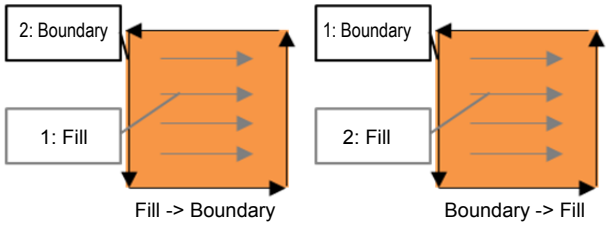
C. Overwriting Count

Set the overwriting count for the fill lines.



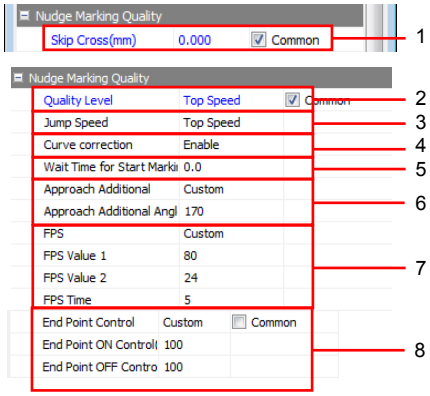
6. Writing Order

Select the marking order of the boundary and fill lines from [Fill -> Boundary/Boundary -> Fill].



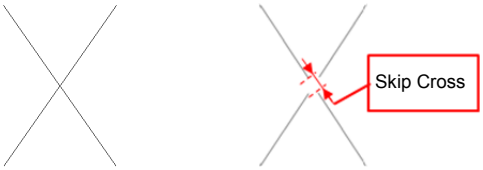
■ Nudge Marking Quality

Set the detailed marking conditions that affect the marking quality.



1. Skip Cross

Skip crosses the string to reduce the marking from becoming denser (deeper) in the intersecting part. Set the width to be skip crossed.

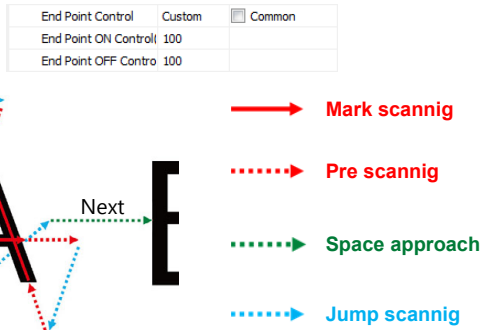


Reference

- **There are portions where the skip cross is not set by the Quick font.**
- **If the skip cross is too large for the size of the element to be marked, some lines may become missing and/or the "Skip cross error" may occur.**

2. Quality Level

Select the marking (processing) quality from [Top Speed 2/Top Speed/High Speed/Standard/High Quality/Top Quality/Customize]. If "Customize" is selected, "Approach" and "Space approach" can be input. Adjust them when you want to shorten the marking time.



Reference

- **Marking quality goes up in medium speed, marking time becomes shorter with the highest speed.**
- **If the approach is longer, the marking quality will be improved and the marking time will be increased. If the approach is shorter, the marking quality will drop and the marking time will be decreased.**
- **[Top Speed 2] is not displayed on MD-F3200/5200 series, MD-U1000 series, and ML-Z9600 series.**

3. Jump scanning speed

Select the jump scanning speed which is used to connect the pre-scannings from [Highest speed/High speed/Medium speed].

Reference

- **Marking quality goes up in medium speed, marking time becomes shorter with the highest speed.**
- **When Customize is selected for Quality level, Jump speed cannot be set.**

4. Curve correction

Select [Enable/Disable] for curve correction. If it is enabled, correct the scan speed and laser power so that the marking result is the same as the straight portion.

Reference

- **This function is not displayed on MD-F3200/5200 series.**

5. Wait Time for Start Marking (ms)

Set a wait time before starting the block marking.

Reference
- **This option is set when the lines are not stable at the start of block writing.**

6. Approach Additional

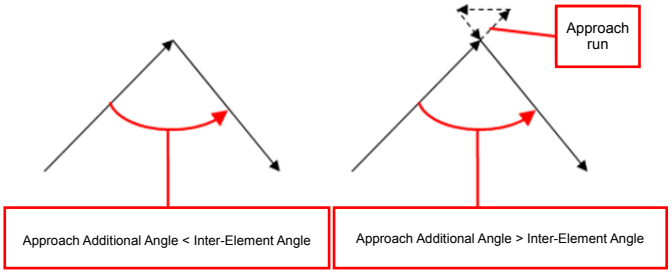
Set the threshold for adding an approach between the line segments in the logo/hatch logo.

A. Approach Additional

Select whether to set the threshold for adding an approach between the line segments in the logo/hatch logo from [Custom/Optimal].

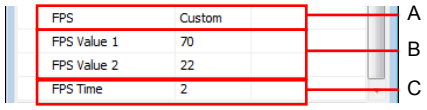
B. Approach Additional Angle (°)

Set the threshold for adding an approach. Add an approach when the angle formed by the continuous marking elements is below the set parameter.



7. FPS

This option is set when the first pulse at the start of writing is highly visible.



Reference
- **This function is not displayed on MD-F3200/5200 series, MD-U1000 series, and ML-Z9600 series.**

A. FPS

Select the FPS (first pulse control) adjustment method from [Optimal/Custom].

Reference
- **Normally use [Optimize] and change the option only if you wish to improve the marking state.**
- **Reducing the first pulse too much may cause it to become too faint at the start of writing.**

B. FPS Value 1/2

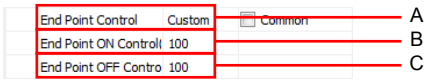
This option is set only when [Custom] is selected for the FPS. The longer the value, the less significant the first pulse will become.

C. FPS Time

This option is set only when [Custom] is selected for the FPS. The longer the time, the less significant the first pulse will become.

8. End point control

It is set when the part of the writing starts and writing ends of the marking line becomes thin or thick.



Reference
- **This function is not displayed on MD-X1000/1500 series, and MD-U1000 series.**

A. End Point Control

Select the adjustment method of the end point control from [Optimize/Custom].

B. End Point ON Control

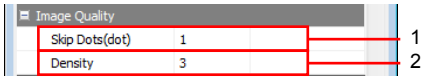
It is set only when the end point control is made to be "Custom." Adjust the strength of the writing starts of the marking line.

C. End Point OFF Control

It is set only when the end point control is made to be "Custom." Adjust the strength of the writing ends of the marking line.

■ Image Quality

Set the detailed marking conditions for the grayscale photo files.



Reference
- **[Grayscale] is not displayed on MD-F3200/5200 series, MD-U1000 series, and ML-Z9600 series.**

1. Skip Dots (dot)

Mark by thinning the gaps between dots.

Pulse order	Pulse order	Pulse order
(1)(2)(3)(4)(5)(6) (7)(8)(9)(10)(11)(12) (13)(14)(15)(16)(17)	(1)(10)(2)(11)(3)(12) (4)(13)(5)(14)(6)(15) (7)(16)(8)(17)(9)(18)	(1)(7)(13)(2)(8)(14) (3)(9)(15)(4)(10)(16) (5)(11)(17)(6)(12)(18)
1dot	2dot	3dot

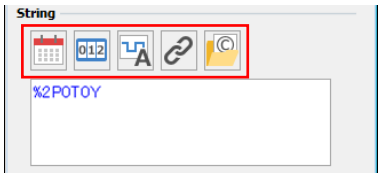
Reference
- **Thinning the dots enables marking with reduced thermal effects.**

2. Density

Changes the energy for each pulse. The greater the parameter, the greater the energy will become, resulting in denser marking.

3-9 Update Character and Code Settings

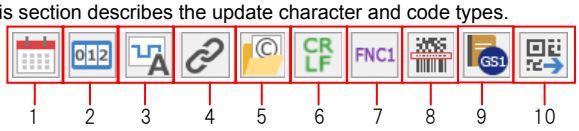
This section describes the update character and code settings.



Reference ・ **You can enter up to 510 characters.**

Update character and code types

This section describes the update character and code types.



1. Calendar

Inserts a date, day of week, etc. based on the internal clock of the controller.
“Calendar” (Page 61)

2. Counter

Inserts a string (Base 2 to 36) that counts up/down after each marking.
“Counter” (Page 63)

3. I/O encoded character

Inserts a string that changes rapidly by the value setting of the terminal block. The string can change rapidly in approximately 1ms.
“I/O encoded character” (Page 65)

4. Link

Inserts a string that references the string of another block.
“Link” (Page 66)

5. External character file

Inserts a external character file.
“External character file” (Page 67)

6. Control code

Inserts a control code into CODE128 or DataMatrix ECC200.
“Control code” (Page 67)

7. FNC1

Inserts a "FNC1" control code.
“FNC1” (Page 68)

8. Separate

Inserts a separator code for GS1 DataBar & CC.
“Separate” (Page 68)

9. GS1 Code

This is the input supporting function for GS1 DataMatrix. You can perform settings based on "AI" of GS1 DataMatrix.
“GS1 Code” (Page 68)

10. Change Modes

The encode mode of QR Code Model 1/2 or Micro QR code can be fixed. This option only appears when the [Mode AUTO] checkbox is OFF.
“Change Modes” (Page 69)

Description on the input codes

This section describes the update character and code display methods.

■ Displaying the Calendar and I/O Encoded Characters

Type	Encoding	Without zero suppression		With zero suppression	
		Without expiration	With expiration	Without expiration	With expiration
Year 4 digits	None	%4Y	%4T■Y	-	-
Year 2 digits	None	%2Y	%2T■Y	-	-
	Enable	%2P●Y	%2P●T■Y		
Year 1 digits	None	%1Y	%1T■Y	-	-
	Enable	%1P●Y	%1P●T■Y		
Month	None	%02M	%02T■M	Right align %2M Left align %-2M	Right align %2T■M Left align %-2T■M
	Enable	%2P●M	%2P●T■M	-	-
Day	None	%02D	%02T■D	Right align %2D Left align %-2D	Right align %2T■D Left align %-2T■D
	Enable	%2P●D	%2P●T■D	-	-
Hour	None	%02h	%02T■h	Right align %2h Left align %-2h	Right align %2T■h Left align %-2T■h
	Enable	%2P●h	%2P●T■h	-	-
Minute	None	%02m	%02T■m	Right align %2m Left align %-2m	Right align %2T■m Left align %-2T■m
	Enable	%2P●m	%2P●T■m	-	-
Second	None	%02s	-	Right align %2s Left align %-2s	
365-day	None	%03X	%03T■X	Right align %3X Left align %-3X	Right align %3T■X Left align %-3T■X
	Enable	%3P●X	%3P●T■X	-	-
Day of Week	None	%1B	%1T■B	-	-
	Enable	%1P●B	%1P●T■B	-	-
Week	Enable	%2P●W	%2P●T■W	-	-
Shift Code	Enable	%P●S	-	-	-
I/O encoded character	None	%1R	-	-	-
	Enable	%1P●R	-	-	-

Reference ・ **● is the encoding No. (0 to 9) and ■ is the expiration No. (0 to 9).**

■ Displaying the Counter

Type	Zero suppression	Padding	Alignment	Encoding	
				Enable	None
Counter	None	-	-	%0▲P●C■C	%0▲C■C
	Enable	Auto	-	%P●C■C	%C■C
		Specify Digits	Right align	%▲P●C■C	%▲C■C
			Left align	%-▲P●C■C	%-▲C■C

Reference ・ **● is the encoding No. (0 to 9), ■ is the counter No. (0 to 9, A to J), and ▲ is the No. of digits (1 to 10).**

■ Show Link

Reference	Reference conditions	Display code
GS1 DataBar & CC-A	GS1 DataBar	%H<●●●1>
	CC-A	%H<●●●2>
Barcode	Add check digit	%H<●●●C>
	Add start-stop character	%H<●●●*>
	Add check digit & Add start-stop character	%H<●●●C*>
GS1 DataMatrix	Entire encoded string	%H<●●●00A>
	Specify AI number (AI added)	%H<●●●▲▲A>
	Specify AI number (AI not added)	%H<●●●▲▲>
Other blocks	-	%H<●●●>

Reference
- **●●● is the block No. (000 to 255) and ▲▲ is the referenced AI number (Nth AI).**
- **The range specification options add the following before the ">" symbol.**
  "×××L×××": S is set with the start position, L is set with the number of reference characters, and XXX is set with the number of characters (001 to 510).

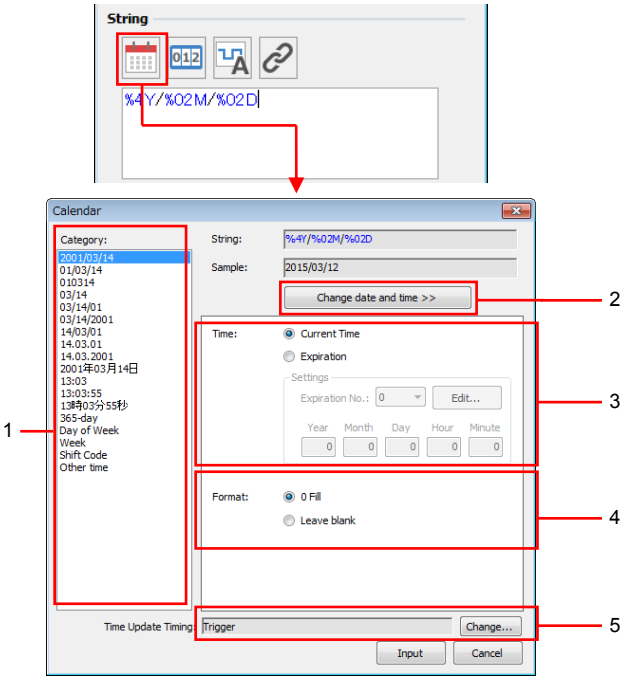
Calendar

This section provides explanation on the calendar that marks the date and time based on the current time.

Reference
- **It only appears when the block type is [String], [Barcode] or [2D Code].**

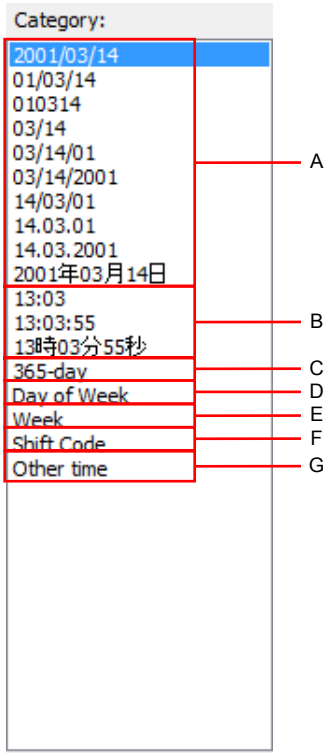
■ Inserting a Calendar

Insert a calendar using the icon below.



1. Category

Display the list of calendar update characters.



A. Year/Month/Day

Insert the year/month/day in the selected number of digits using the selected separator.

Reference
- **Use [Other time] if there is no suitable combination in the categories.**

B. Hour/Minute/Second

Insert the hour/minute/second in the selected number of digits using the selected separator.

C. 365-day

Insert the elapsed number of days starting from Jan. 1.

Reference
- **The number of days will be 366 for leap years.**

D. Day of Week

Insert the date.

E. Week

Insert a week (1 year is divided into 1 to 54 weeks).

Reference
- **Use [Other time] if there is no suitable combination in the categories.**

F. Shift Code

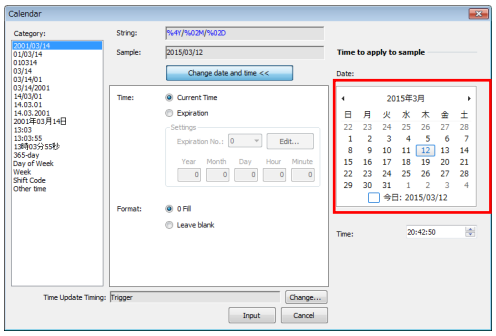
Insert a shift code (1 day is divided into 24)

G. Other time

You can insert all calendars (Year, Month, Day, Hour, Minute, Second, Week, Day of Week, Shift Code, and 365-day) in the desired order.

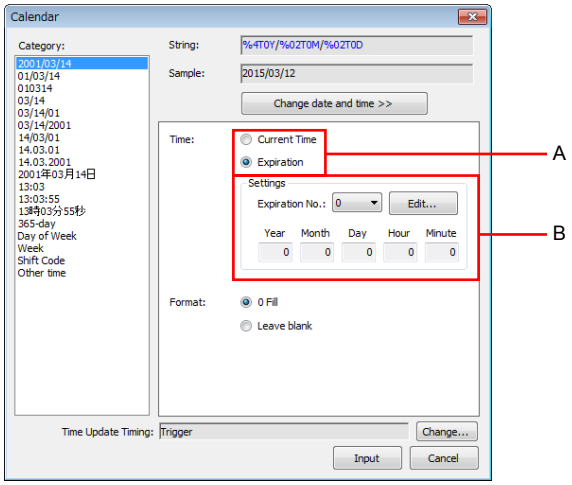
2. Changing and confirming the time

You can check the mark data using a specific date. A preview of the mark data will be displayed in the Sample field when you specify the time.



3. Time

Set whether to mark the current time or the time resulting from offsetting the expiration from the current time.



A. Time

Select the mark data from [Current Time/Expiration]. Set the expiration number if you have selected [Expiration].

B. Expiration Number:

Set the expiration No. to be referenced (0 to 9). If no expiration setting has been configured, it can be created using the [Edit] button.

“Expiration” (Page 106)

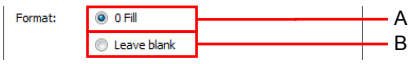
Reference ・ **Expiration cannot be set if the category is [Shift Code].**

4. Format

Set the marking format and encoding. Displayed information will vary depending on the input calendar contents.

■ **For Year, Month, Day, Hour, Minute, Second, 365-Day**

Select the date format from [0 Fill/Leave blank].



A. 0 Fill

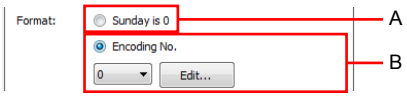
"0" is not omitted even when the second and subsequent digits of [Year: 2 digits/Month/Hour/Minute/Second/365-day] become "0".

B. Leave blank

Set the second and subsequent digits to "blank (space)" when the second and subsequent digits of [Year: 2 digits/Month/Hour/Minute/Second/365-day] become "0".

■ **Day of Week**

Select the format for the day of week from [Sunday is 0/Encoding].



A. Sunday is 0

Set the day of week from Sunday to Saturday as "0" to "6".

B. Encoding

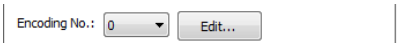
Set the encoding No. to be referenced (0 to 9). If no encoding setting has been configured, a encoding setting can be created using the [Edit] button.

“Encoding” (Page 105)

■ **For [Week], [Shift Code]**

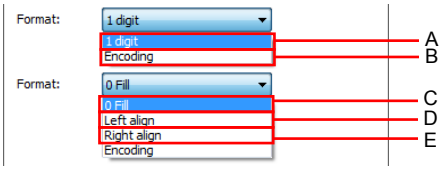
Set the encoding No. to be referenced (0 to 9). If no encoding setting has been configured, a encoding setting can be created using the [Edit] button.

“Encoding” (Page 105)



■ **For [Other time]**

Different contents are displayed for the format depending on the selected type.



A. Specify Digits

This option only appears for [Year: 1 digit/Year: 2 digits/Year: 4 digits]. Set it to the desired number of digits.

B. Encoding

Set the encoding No. to be referenced (0 to 9). If no encoding setting has been configured, a encoding setting can be created using the [Edit] button.

“Encoding” (Page 105)

Reference ・ **This option does not appear for [Year: 4 digits/Shift Code/Second].**

C. 0 Fill

"0" is not omitted even if all digits of [Month/Hour/Minute/Second/365-day] become "0".

D. Left align

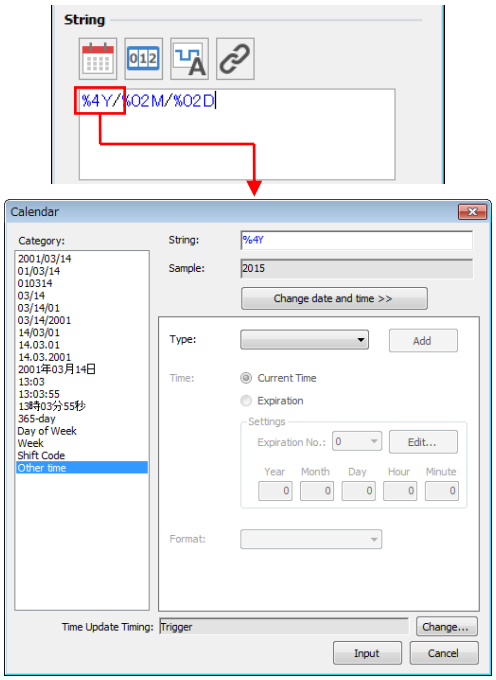
Align the characters to the left when the second and subsequent digits of [Month/Hour/Minute/Second/365-day] become "0".

E. Right align

Align the characters to the right when the second and subsequent digits of [Month/Hour/Minute/Second/365-day] become "0".

■ Editing a Calendar

This section explains how to edit the inserted calendar. The calendar will be displayed in blue text in the text box. The calendar editing screen will appear when you double-click the characters in blue.



Reference
- **When you re-edit the calendar, the [Other time] editing screen will be displayed.**

5. Time update timing

Displays the time acquirement timing of calendar marking. Press the change button to open the program setting option and edit the update character settings.

“Update of font settings” (Page 81)

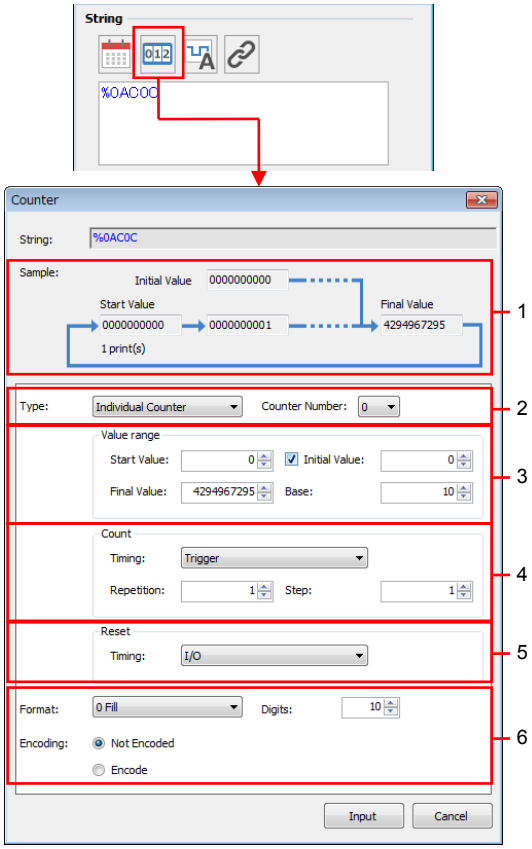
Counter

This section explains the counter that counts up/down after each marking.

Reference
- **It only appears when the block type is [String], [Barcode] or [2D Code].**

■ Inserting a Counter

Insert a counter using the icon below.



1. Sample

Display a marking sample based on the current settings.

2. Type

Select the counter type from [Individual Counter/Common Counter] and set the counter No.

■ Individual Counter (0 to 9)

Hold a counter current value for each setting No.

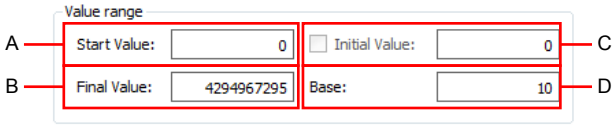
■ Common Counter (A to J)

Share the current value among the setting No.

Reference
- **The current values of “Setting No. 1 Individual counter 1" and “Setting No. 2 Individual counter 1" are retained independently.**
- **If you have selected [Common Counter], edit the counter contents in the Common Counter option in the Marking Common Setup. You can launch the editing window from below.**

3. Value range

Set the counter range and base.



A. Start Value

Set the counter value to be marked first. The counter will return to this value when reset.

Reference

- **If the [Defaults] checkbox is ON, the default value will be restored when the counter is reset.**

B. Final Value

Set the counter value to be marked last. The counter will return to the start value after marking the final value.

Reference

- **If the final value is smaller than the start value, marking will be performed by counting down the value.**

C. Defaults

Mark only the first week of the counter from a value different from the start value. If the [Defaults] checkbox is ON, the marking will use the values from [Defaults] in the first week but will use the values from [Start Value] in the second and subsequent weeks.

D. Base

Set the number base up to which the counting should be performed.

4. Count

Set the count timing, repetition and step.

A. Timing

Select the count timing from [Trigger] or [Each matrix cell/group/marking].

- **Trigger**
  Count up once for every marking start signal.
- **Each matrix cell/group/marking**
  Count up per matrix cell, per group setting or per continuous marking.

B. Repetition

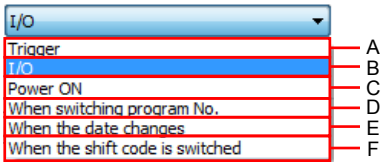
Specify whether to repeatedly mark the same counter value.

C. Step

Set the value change per count.

5. Reset

Select the counter reset timing from below.



A. Trigger

Reset when the marking start signal becomes ON.

B. I/O

This is reset when the counter reset of the terminal block input is set to ON.

C. Power ON

Reset when the main unit is restarted.

D. When switching program No.

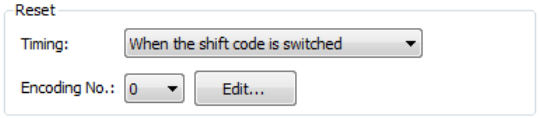
Reset when the marking program No. is switched.

E. When the date changes

Reset when the date changes.

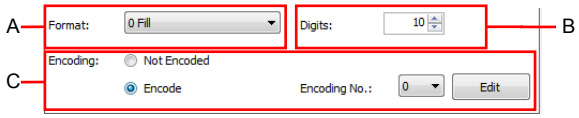
F. When the shift code is switched

Reset when the calendar's shift code is switched. Specify the "Encoding No." of the shift code to be referenced.



6. Format/Encoding

Set the format, number of digits and encoding.



A. Format

Select the format from below.

- **0 Fill**
  Marks without omitting "0".
- **Left align**
  Omit "0" and aligns to the left.
- **Right align**
  Omit "0" and aligns to the right.
- **Truncated**
  Omit "0" to shorten the number of digits.

B. Digits

Set the number of digits of the counter.

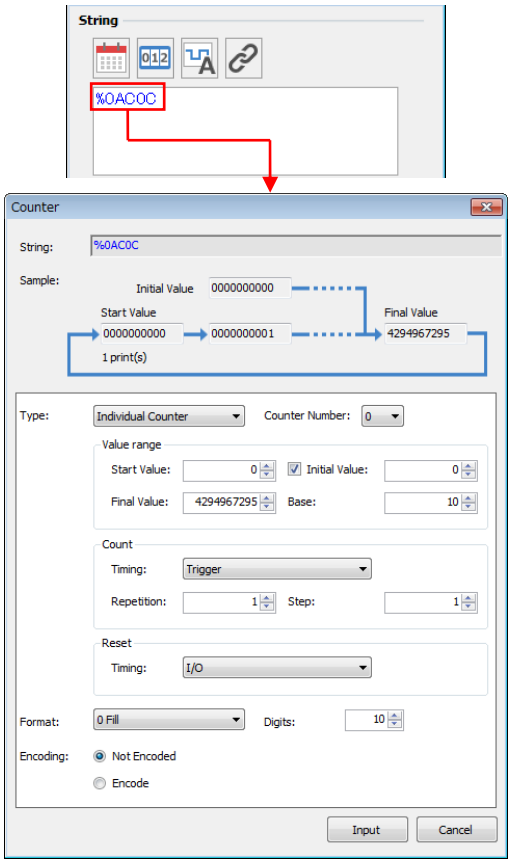
C. Encoding

Set whether to encode the mark data of the counter. You can set a separate encoding setting for each character. If no encoding setting has been configured, a encoding setting can be created using the [Edit] button.

"Encoding" (Page 105)

■ Editing a Counter

This section explains how to edit the inserted counters. The counter will be displayed in blue text in the text box. The counter editing screen will appear when you double-click the text in blue.



I/O encoded character

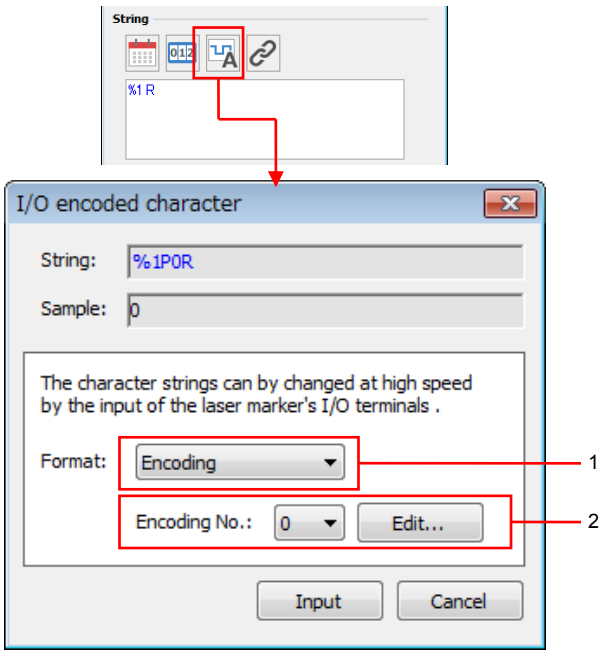
This section explains the I/O encoded character that allows the string to be changed from the I/O encoded character fixation input (Terminal block 49) of the terminal block input.

Reference

- **It only appears when the block type is [String], [Barcode] or [2D Code].**
- **High-speed character editing of 1ms or faster is supported.**

■ Inserting I/O Encoded Characters

You can insert an I/O encoded character using the icon below.



1. Format

Select the format for the I/O encoded character from below.

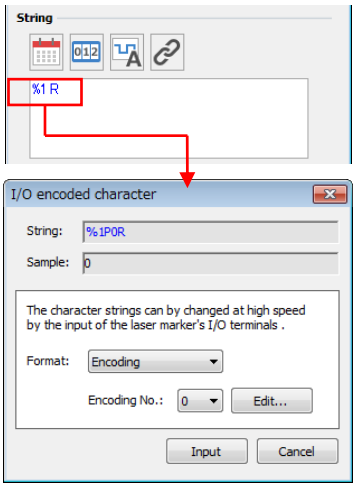
- **Base 36**
  Mark the value specified by the value setting of the terminal block directly.
- **Encoding**
  Encode and mark the mark data of the I/O encoded character. The encoding No. needs to be selected.

2. Encoding No.

Set the encoding No. when [Encoding] was selected as the format. If no encoding setting has been configured, a encoding setting can be created using the [Edit] button.
“Encoding” (Page 105)

■ Editing I/O Encoded Characters

This section explains how to edit the inserted I/O encoded characters. The I/O encoded characters appear in blue in the text box. The I/O encoded character editing screen will appear when you double-click the text in blue.



■ How to Operate the Terminal Block for I/O Encoded Characters

The string of the I/O encoded character can be switched by setting the I/O encoded character fixation input (Terminal block 49) to ON after setting the desired No./value setting (Terminal block 53/55/57/59/61/63/65/67/69/71/73) to ON.

The following describes the procedure of switching the I/O encoded character to “12”.

(1) SET 67 (2 to the power of 3) and 69 (2 to the power of 2) of the No./value setting terminal to ON.

(2) Switch ON the I/O encoded character fixation input (Terminal block 49).

Switching of I/O encoded characters is now complete.

Reference

- **The No./value setting and I/O encoded character fixation inputs should be entered at intervals of at least 1ms.**

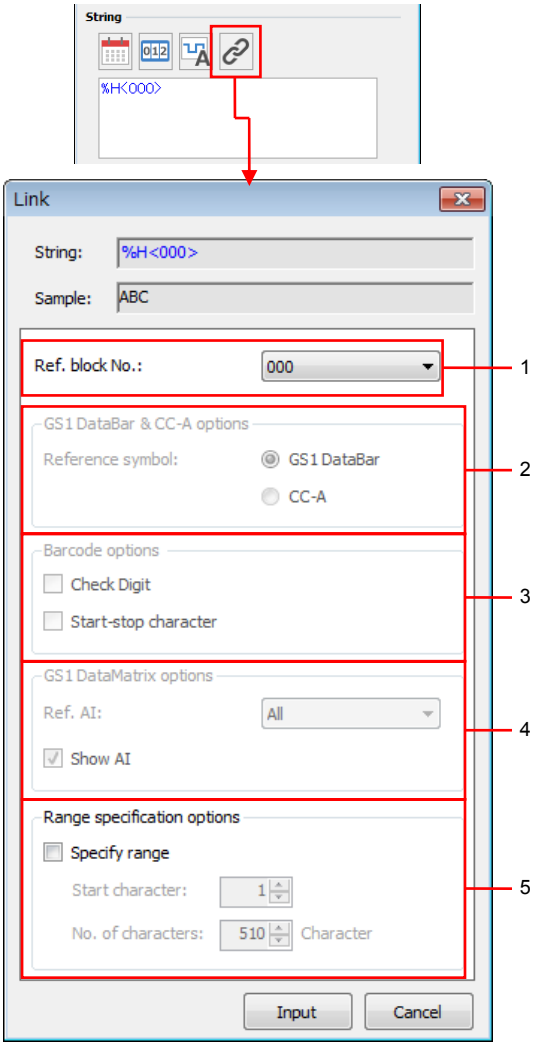
Link

This section explains the link that references and mark the mark data of another block.

Reference ・ **A link cannot be mixed with another string or update character.**

■ Insert Link

Insert a link using the icon below.



1. Ref. block No.

Set the reference block No.

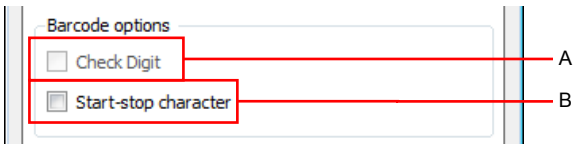
Reference ・ **If the linked block is referenced, a correct strings cannot acquired.**

2. GS1 DataBar & CC-A options

The referenced string can be selected from either GS1DataBar (linear code) part or CC-A (2D code) part only when the reference block type is GS1 DataBar & CC-A.

3. Barcode options

Set the reference range for when the reference is a barcode block.



A. Check Digit

The reference block is a barcode type which can add a check digit, and this option can only be set when the check digit has been added.

B. Start-stop character

It can be set when the reference block is NW7 or CODE39. If this checkbox is ON, the reference block will be referenced including the start-stop character (*) that is added to the beginning and end of NW7 or CODE39.

4. GS1 DataMatrix options

You can specify the referenced string in AI unit only when the reference block type is GS1 DataMatrix. The entire string will be referenced if [All] is selected.

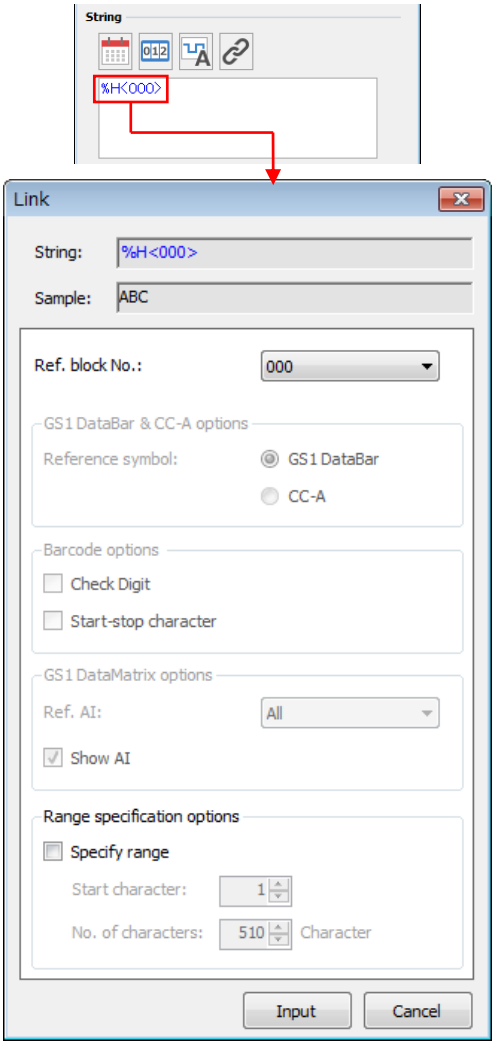
Reference ・ **You can show/hide the string in the AI part by toggling the [Show AI] checkbox ON/OFF.**

5. Range specification options

You can set the referenced string range by setting this checkbox to ON.

■ Edit Link

This section explains how to edit the inserted links. The link appears in blue in the text box. The link editing screen will appear when you double-click the text in blue.



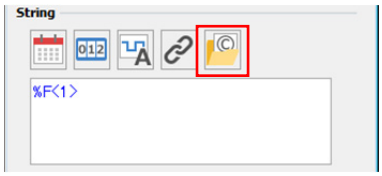
External character file

The method of inserting the custom character file is explained.

Reference
- **It only appears when the block type is [String].**

■ Inserting External Character File

Insert a external character file using the icon below.



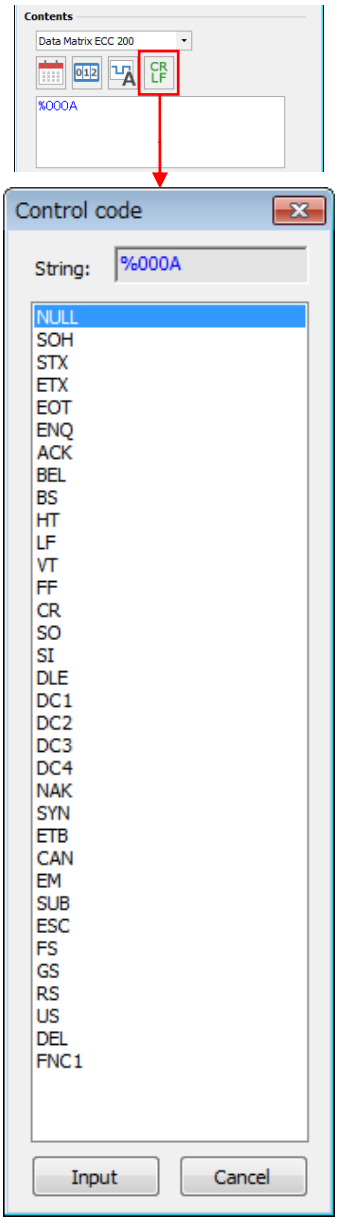
Control code

This section explains how to insert and edit control codes such as NULL and CR.

Reference
- **This option only appears for CODE128, Data Matrix ECC200 and QR Code Model 1/2 (at mode auto enabled) blocks.**

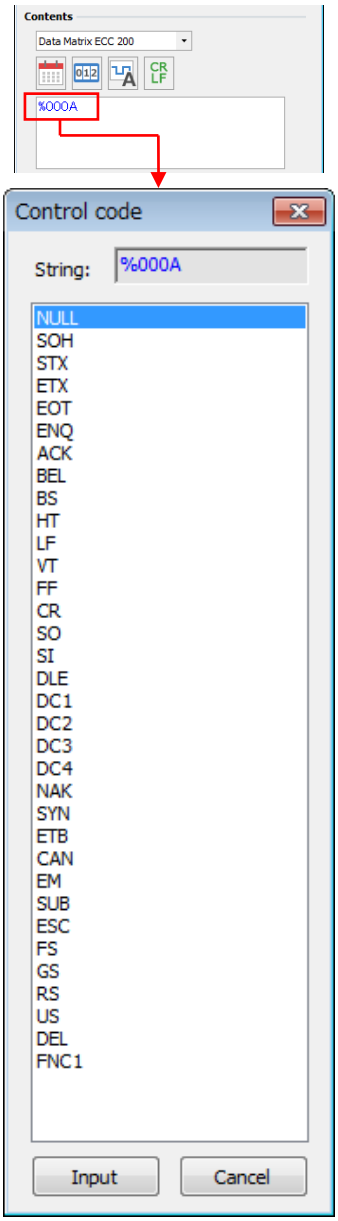
■ Inserting Control Codes

Insert a control code using the icon below.



■ Editing Control Codes

This section explains how to edit the inserted control codes. The control code appears in blue in the text box. The control code editing screen will appear when you double-click the text in blue.



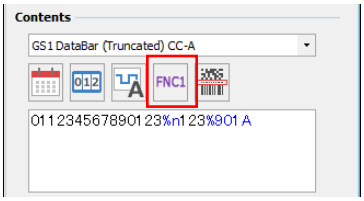
FNC1

The following explains how to insert FNC1.

Reference
- **This option only appears for GS1 DataBar CC-A blocks.**

■ Inserting FNC1

Insert FNC1 using the icon below.



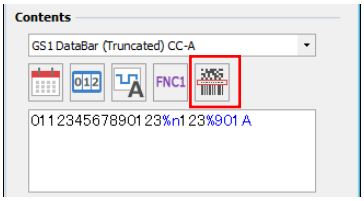
Separate

This section explains how to insert separators.

Reference
- **This option only appears for the GS1 DataBar CC-A block and is entered as the separator for the linear code and 2D code parts.**

■ Insert Separator

Insert a separator using the icon below.

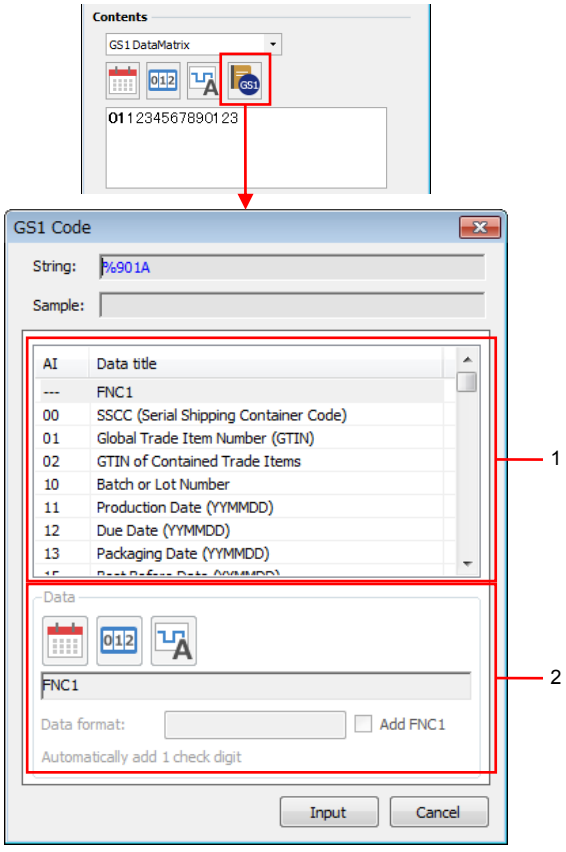


GS1 Code

This is the input supporting function for GS1 DataMatrix. You can insert a string according to the input rule based on the GS1 specifications.

■ Inserting a GS1 Code

Insert a GS1 code using the icon below.

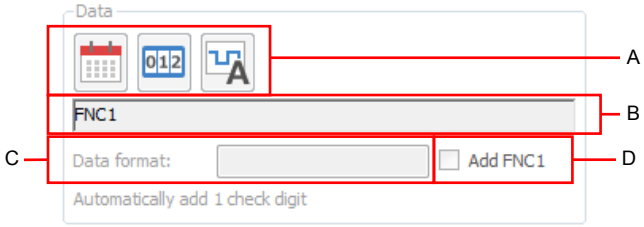


1. Selecting the AI (Application Identifier)

Select the AI (Application Identifier) to be input.
"AI (Application Identifier) list" (Page 157)

2. Data

Set the string according to the specified AI (Application Identifier).



A. Inserting updated characters

You can insert a calendar, counter or I/O encoded character.

B. Input data

Enter the string to be appended after the AI (Application Identifier).

Reference
- **The string will appear in red if it is inconsistent with the data format.**

C. Data format

Show the format of the input data. Refer to the examples below for data formats.

- N6 : Enter fixed-length data of 6 digits containing only numbers.
- N1+N5+N4 : Enter fixed-length data of 10 digits (1+5+4) containing only numbers.
- X.30: Enter variable-length data of up to 30 characters containing numbers, uppercase letters of the alphabet and symbols.

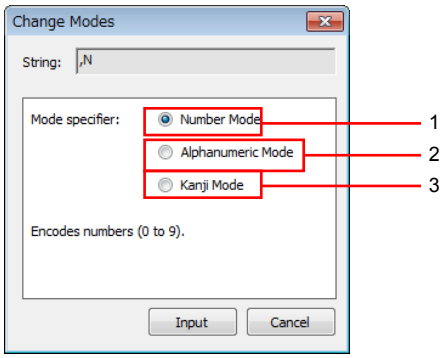
D. Add FNC1

Add FNC1 on the end of the data format.

Reference
- **The [Add FNC1] should be set to ON only when it will be followed by AI (Application Identifier).**
- **This option is grayed out for AI (application identifier) that does not require the addition of FNC1.**

Change Modes

Change the encoding mode for QR Code Model 1/2 and Micro QR codes.



Reference
- **QR Code Model 1/2 only appears when the [Mode AUTO] checkbox is OFF.**

1. Number Mode

Enter ",N" into the textbox that changes the encoding mode to Number. You can only enter numbers (0 to 9) after ",N".

2. Alphanumeric Mode

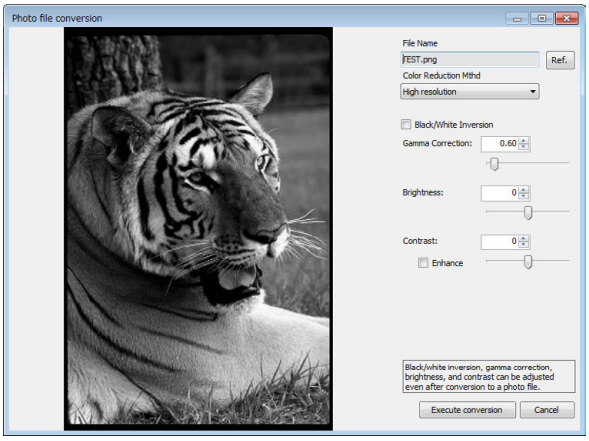
Enter ",A" into the textbox that changes the encoding mode to Alphanumeric. You can enter numbers (0 to 9), uppercase letters of the alphabet (A to Z), and symbols (space, $%*+-./:) after “,A”.

3. Kanji Mode

Enter ",K" into the textbox that changes the encoding mode to Kanji. You can enter double-byte characters in Shift_JIS code after ",K".

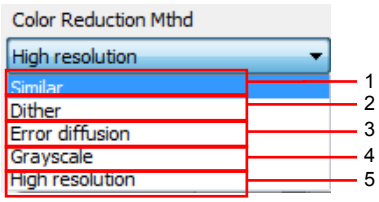
3-10 Photo file conversion

The Photo file conversion screen will appear when you reference an image file using the [Logo, Photo] button in the Add Block screen.



Color Reduction Mthd

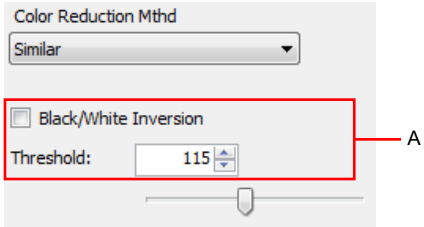
Set the color reduction method for image files. The parameters to be adjusted will vary depending on the color reduction method.



Reference
- **Setting the [Black/White Inversion] checkbox to ON will invert the contrast.**
- **[Grayscale] is not displayed on MD-F3200/5200 series, MD-U1000 series, and ML-Z9600 series.**
- **[High resolition] is not displayed on MD-F3200/5200 series and ML-Z9600 series.**

1. Similar

Binarize the image using the threshold setting.



A. Threshold

Adjust the binarization threshold. Increasing the value will increase the black ratio and decreasing it will increase the white ratio.

Threshold: 60 Threshold: 100 Threshold: 140

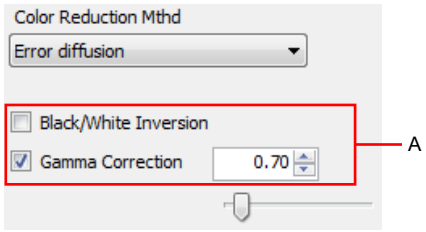
Reference
- **This color reduction method is suitable for monochrome images.**

2. Dither

Express the shades of a color (brightness) that cannot be expressed in a single pixel using a combination of several pixels (tile pattern)

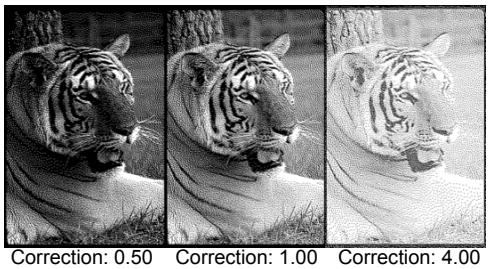
3. Error diffusion

Convert the ratio of black pixels according to the brightness. This function diffuses the error generated in the pixel processing to the surrounding pixels to minimize the overall error.



A. Gamma Correction

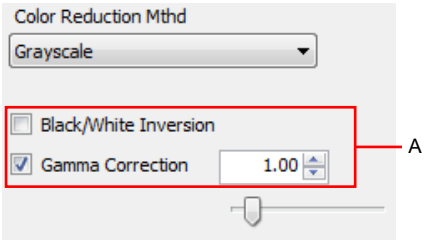
The greater the value, the brighter the image will become (and vise versa).



Correction: 0.50 Correction: 1.00 Correction: 4.00

4. Grayscale

Mark with 256-step pulse intensity.



A. Gamma Correction

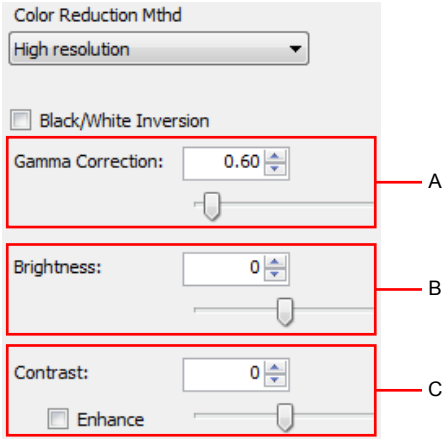
The greater the value, the brighter the image will become (and vise versa).

Correction: 0.50 Correction: 1.00 Correction: 4.00

Reference · **This color reduction method is suitable when marking a color image onto metal.**

5. High resolution

Mark by altering the pulse intensity for each dot. Smaller dot size can be achieved as the thermal effect on each dot will be reduced during marking.



A. Gamma Correction

The greater the value, the brighter the image will become (and vise versa).

Correction: 0.50 Correction: 1.00 Correction: 4.00

B. Brightness

The greater the value, the brighter the image will become (and vise versa).

Brightness: -100 Brightness: 0 Brightness: 100

C. Contrast

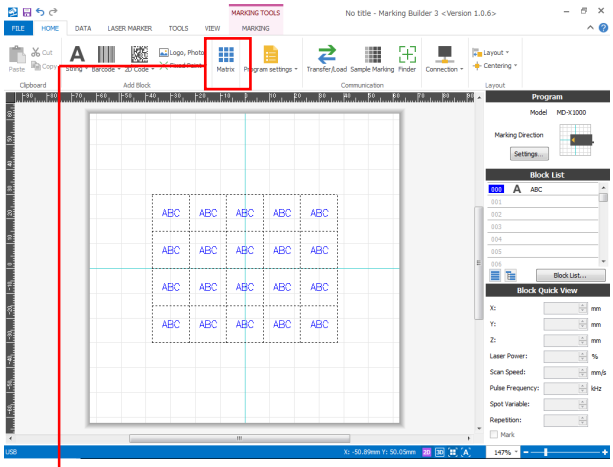
The greater the value, the stronger the black/white contrast will become (and vise versa).

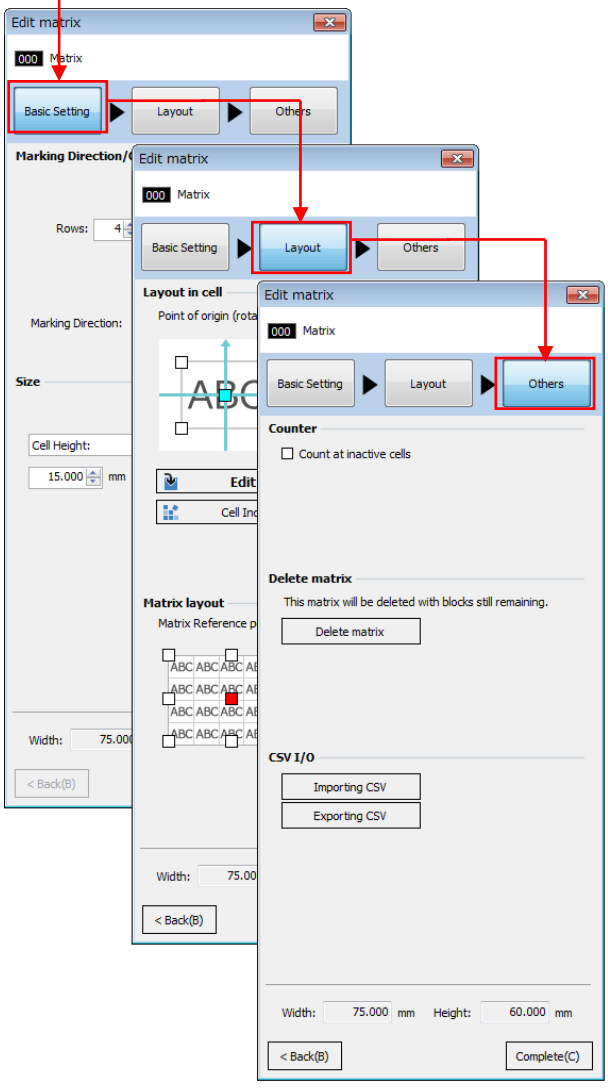
Contrast: -100 Contrast: 0 Contrast: 100

Reference · **This color reduction method is suitable when marking a color image onto plastic.**

3-11 Matrix

Place the set block on the matrix. A matrix is configured in the order of [Basic Setting], [Layout], followed by [Others].





Reference

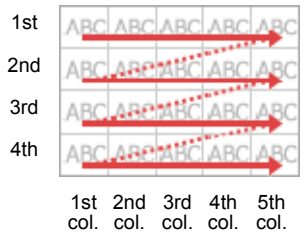
- **The grouping function cannot be used in programs in which a matrix has been set.**
- **A Matrix cannot be used in the On-the-fly Marking settings.**

Edit Matrix Basic Setting

Set the number of rows/columns, marking direction and size of the matrix.

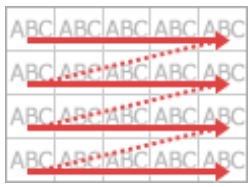
1. Number of Rows/Number of Columns

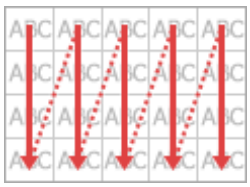
Set the number of rows and columns of the matrix.

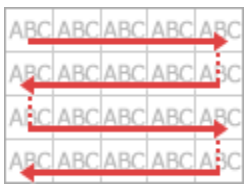


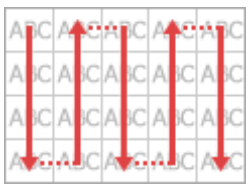
2. Marking Direction

Select the marking direction of the matrix from one of the following 4 types or [Specify Order]. If [Specify Order] is selected, you can specify the marking order in [Cell Individual Setting] of the layout.


Horizontal


Vertical


Horizontal (Alternate)

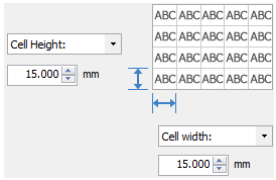

Vertical (Alternate)

3. Size

Set how to specify the matrix size and then specify the matrix size.

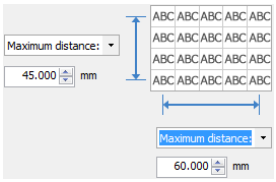
■ **Setting with Cell Height**

Set the matrix size with height and width per cell.



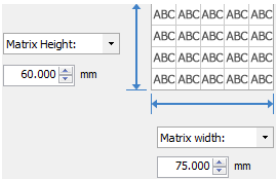
■ **Set at maximum distance**

Set the matrix size at maximum distance with reference to the cell center.



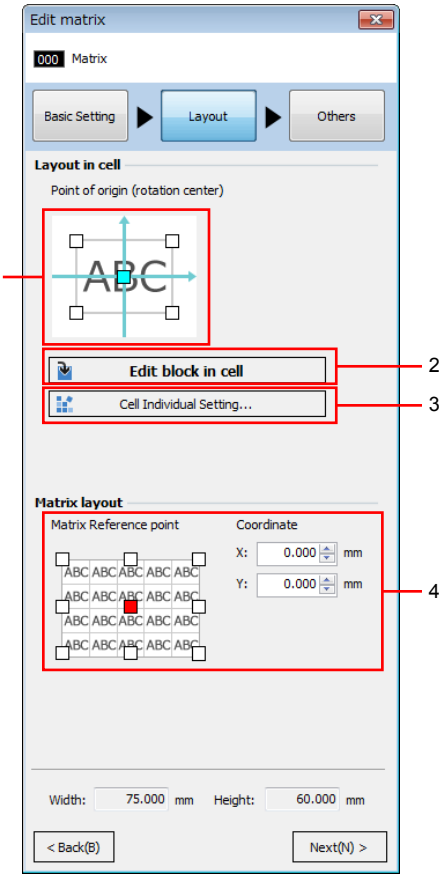
■ **Setting with Matrix Height and Width**

Set the height and width of the matrix directly.



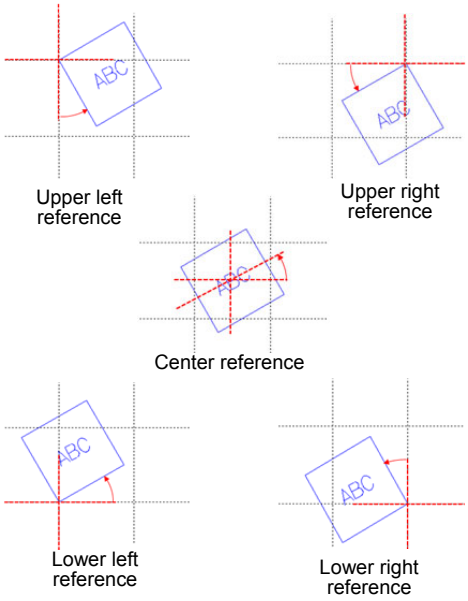
Edit matrix layout

This section explains the edit matrix layout setting.



1. Point of origin (rotation center)

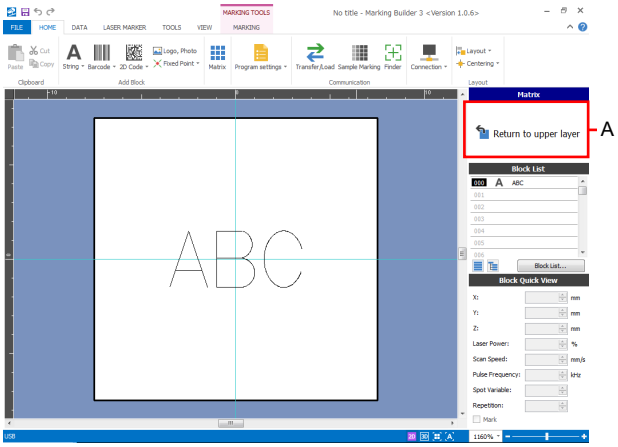
Set the rotation center when setting the θ correction in [Cell Individual Setting].



2. Edit block in cell

Display the screen for adding blocks into a cell. The entire screen will show the preview of a single cell.

Reference ・ **The block editing screen will also appear when you double-click on a matrix.**



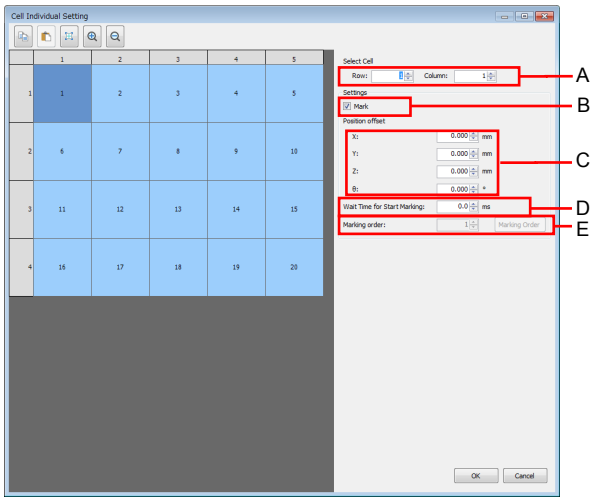
A. Return to upper layer

Return from the [Edit block in cell] screen to the overall editing screen.

Reference ・ **You can also return to the overall editing screen by double-clicking the dark blue section of the preview area.**

3. Cell Individual Setting

Set the marking flag, X/Y/Z coordinates, angle correction, wait time for marking and marking order for each cell.



A. Select Cell

Specify the cell to be set individually.

Reference

- **You can also specify a cell by directly clicking on the cell list on the left side of the screen. Multiple selections using Ctrl and Shift keys are also supported.**

B. Mark

Set the marking flag of each cell.

C. Position offset

Offset the X/Y/Z coordinates of each cell.

D. Wait Time for Start Marking

Set the wait time before starting the marking for each cell.

Reference

- **Use this option only when the cells are not stable at the start of writing.**

E. Marking order

Set the marking order for the cells. By clicking the [Marking Order] button, you can set the marking order from the cell list on the left of the screen.

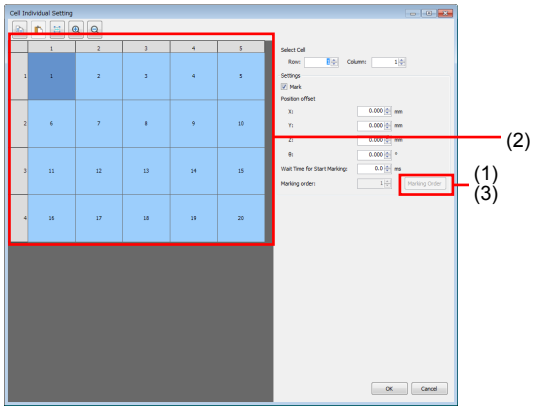
Reference

- **You can only set the marking order if you have selected [Specify Order] for the matrix marking direction.**
- The following explains how to specify the marking order.

(1) Press the [Marking Order] button.

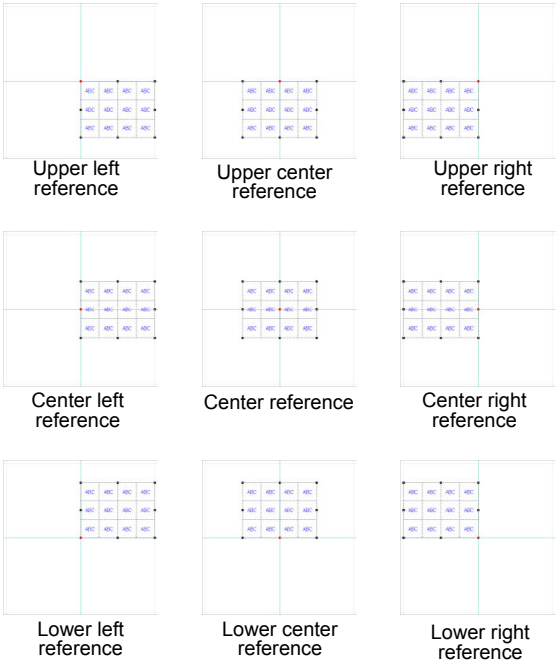
(2) Click the cells in the desired marking order.
As you click on the cells, the marking order will be set starting from 1 and the cell color will change.

(3) Press the [Marking Order] button again at the desired marking order.
The setting is now complete.



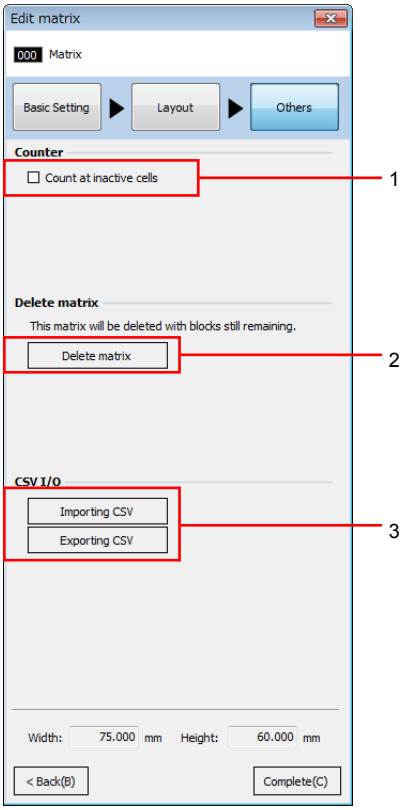
4. Matrix layout

Set the reference point and coordinates of the matrix. The figure below shows a layout example when the matrix layout coordinates are (X,Y)=(0,0).



Others in Edit Matrix

Set how to count up the counter when placing a matrix, delete the matrix, or import/export the matrix conditions in CSV format.



1. Count using invalid marking cells

If this checkbox is ON, the counter will also count up for cells that are set to [Do not mark] in [Cell Individual Setting].

2. Delete matrix

Delete the currently set matrix and restores the individual blocks.

3. CSV I/O

You can manage the matrix settings in a CSV file.

- Importing CSV: Import the output CSV file.
- Exporting CSV: Export the current matrix settings to a CSV file.

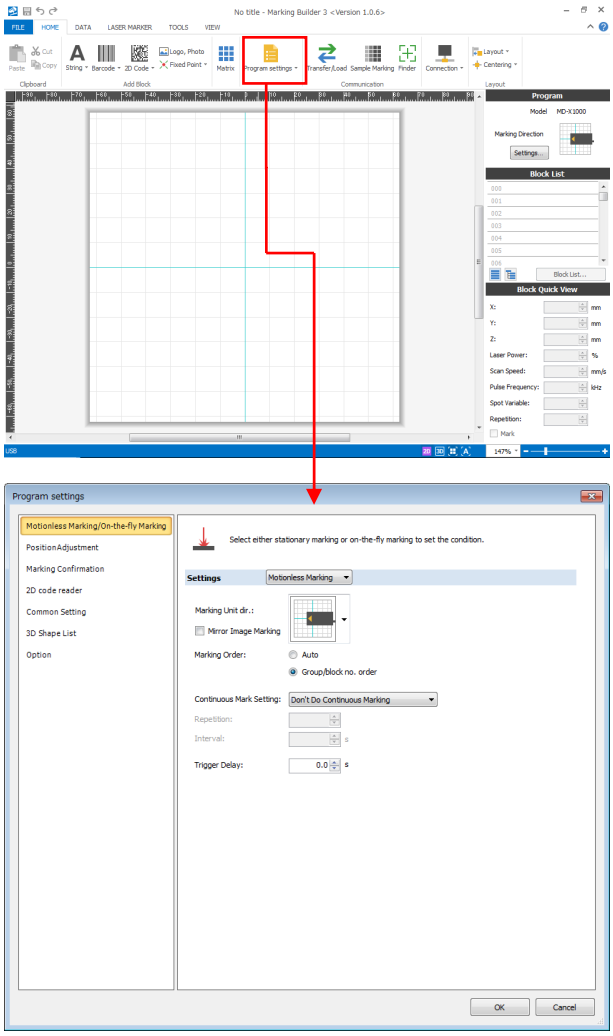
Reference

- **The output CSV format is as described below.**

Matrix Marking Direction	**1. Horizontal, 2. Vertical, 3. Specify Order, 4. Horizontal (Alternate), 5. Vertical (Alternate)**
Ref. point in cell	**2. Center, 3. Lower left, 4. Lower right, 5. Upper left, 6. Upper right**
Matrix Reference point	**0. Center left, 1. Center right, 2. Center, 3. Lower left, 4. Lower right, 5. Upper left, 6. Upper right, 7. Upper center, 8. Lower center**
Count using invalid marking cells	**0. Do not count, 1. Count**
Mark	**0. Do not mark, 1. Mark**
Row/Column settings	**0. Cell Height, 2. Maximum distance, 3. Matrix Height**

3-12 Program setting

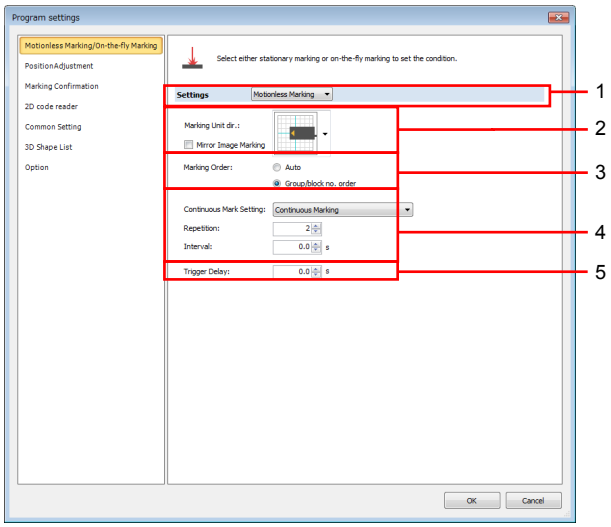
This section explains the basic settings, marking control, workpiece position adjustment, 2D code reader, common setting, 3D shape list, and options for programs.



Motionless Marking/On-the-fly Marking

Set the Motionless Marking and the On-the-fly Marking.

■ Motionless Marking

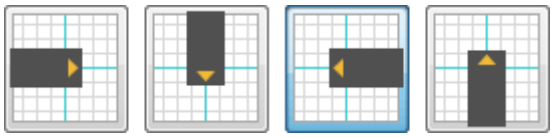


1. Setting

Select "Motionless Marking" or "On-the-fly Marking".

2. Marking Unit dir.

Select the marking unit direction from below.



Reference

- **Set the orientation of the installed head with reference to the marking preview.**

■ Mirror Image

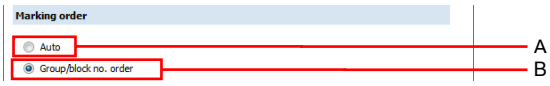
Mark a mirror image (rotated 180° on the Y axis) when this checkbox is set to ON.

Reference

- **Set this option when printing from the underside of the workpiece, etc.**
- **3D shapes cannot be used when mirror image is ON.**

3. Marking order

Select the block marking order from [Auto] or [Group/block no. order].



A. Auto

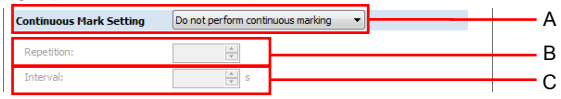
The laser marker automatically sets the optimal marking order.

B. Group/block no. order

Mark in the order of group and block No.

4. Continuous Mark Setting

Select whether to perform continuous marking and, if continuous marking is performed, sets the repetition and interval.



A. Continuous Mark Setting

Select whether to enable continuous marking from [Continuous Marking/Do not perform continuous marking].

B. Repetition

Set the continuous repetition.

C. Interval

Set the marking and marking intervals.

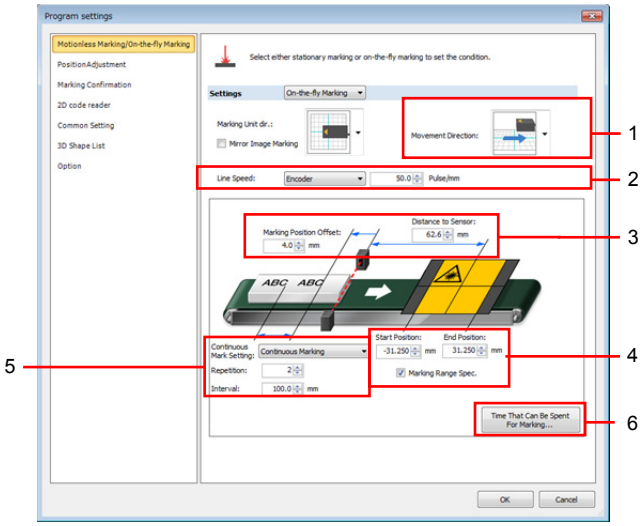
Reference

- **The marking complete output will be output for the number of repetitions. However, if the interval is 0s, the output will be OFF at approximately 1ms (excluding the final output).**
- **You can choose to update the time update character after each trigger, or update it after each matrix cell/group/marking. Configure the settting in "Update Character Setting".**
  “Update Character Setting” (Page 81)
- **The READY output will not become ON until the marking is complete.**

5. Trigger Delay

Set how many seconds after trigger ON the marking is to be started.

■ On-the-fly Marking

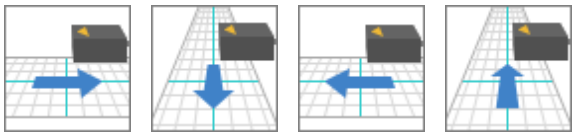


Important

- **If On-the-fly Marking is set, the tracking function will be enabled.**
  The tracking function is a function which stocks up to five timing signals of the marking start input.
  Design devices so that more than six workpieces are not stored in the marking area from the sensor.

1. Movement direction

Select the line moving direction from the below in relation to the head direction selected in “Marking Unit dir.”.



2. Line speed

Select the line movement condition from [Constant speed/encoder], and set the line speed or pulse interval.

■ Constant speed

Select it when the line speed is fixed, and input the line speed.

■ Encoder

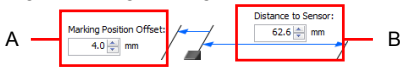
Select it when the line speed is variable, then set the pulse interval of encoder.

Important

- **Select the encoder and pulley so that the pulse interval is 30 pulse/mm or more. If it is lower than 30 pulse/mm, marking quality may get unstable.**

3. Adjust marking position

Set the timing for starting marking.



A. Marking position offset

Set the distance from the sensor to the place where marking begins.

B. Distance to the sensor

Set the distance from the sensor to the center of the marking area.

Reference

- **Set the total distance between marking position offset and sensor so that it is outside of the marking area range.**

4. Marking range specification

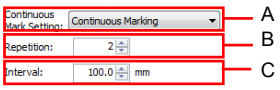
Specify a range which is used as a marking area.

Reference

- **When there is any obstruction inside the marking area, it can be avoided to perform marking.**
- **When marking a rotator, limit the marking range to somewhere close to the origin so that the rotating marking can be performed.**

5. Continuous marking setting

Select whether to perform continuous marking and, if continuous marking is performed, sets the repetition and interval.



A. Continuous marking setting

Select whether to enable continuous marking from [Continuous Marking/Do not perform continuous marking/During trigger ON].

B. Repetition

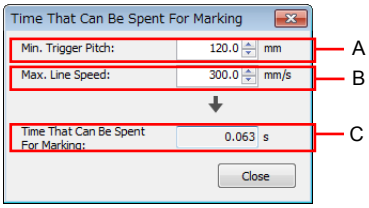
Set the continuous marking count.

C. Interval

Set the interval between markings.

6. Time That Can Be Spent For Marking:

Value input window appears, and the time required for marking is calculated via the current settings.



A. Minimum trigger interval

Set the minimum distance from one workpiece to another.

B. Maximum line speed

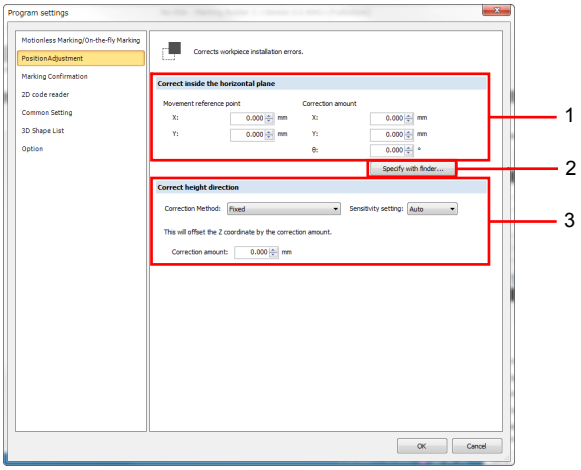
Set the maximum line speed of encoder marking.

C. Time That Can Be Spent For Marking

The time spent on marking for once is displayed. Set the marking time so that it becomes lower than the value.

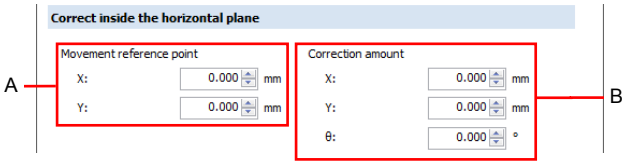
Workpiece position adjustment

Corrects the program coordinates based on the workpiece position.



1. Correct inside the horizontal plane

Correct the coordinates on the X/Y planes.



A. Movement reference point

Set the rotation center X/Y coordinates for the θ correction.

B. Correction amount

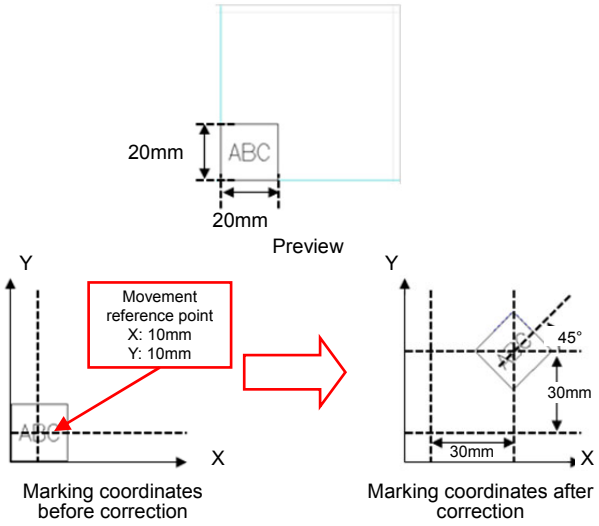
Set the correction amount for the X/Y coordinate and θ angle of the program.

Reference

- **This setting will not be reflected on the preview and only affects the marking.**
- **Workpiece position adjustment cannot be set to On-the-fly Marking settings.**

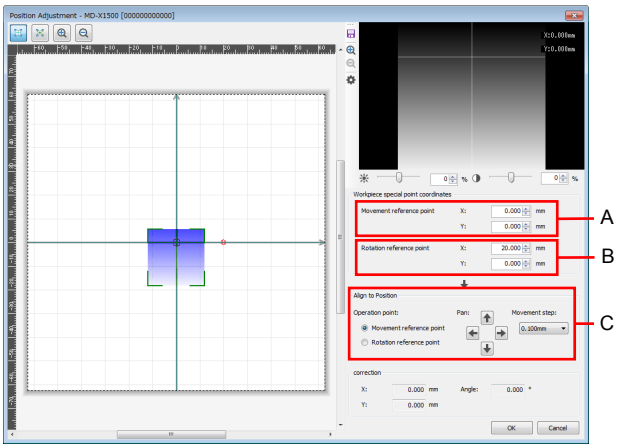
Example

- **This section explains an operation example when the following preview settings are entered.**
  [Movement reference point] X 10mm / Y 10mm
  [Correction amount:]: X coordinate 30mm / Y coordinate 30mm / θ angle 45°



2. Specify with finder

Set the adjustment volume while viewing the workpiece using the finder function.



Reference

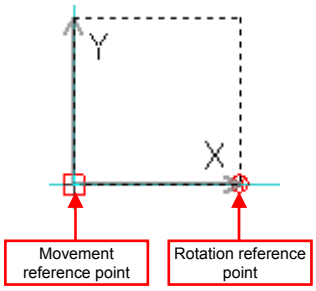
- **This function is not available for MD-X1000L/1500L series, MD-F3200/5200 series, and ML-Z9600 series.**

A. Movement reference point

Set the rotation center X/Y coordinates for the θ correction.

B. Rotation reference point

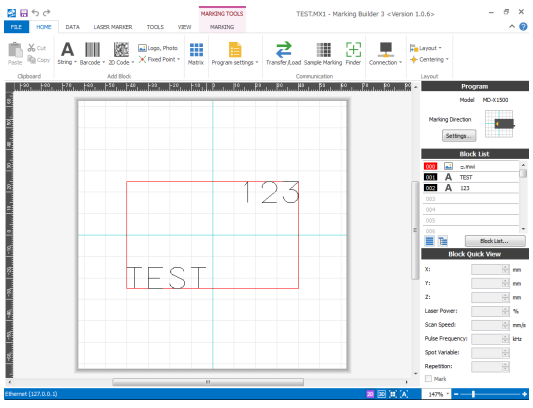
Set the coordinates for the finder operation.



C. Align to Position

Switch the operation point and fine-tune the position of the finder.

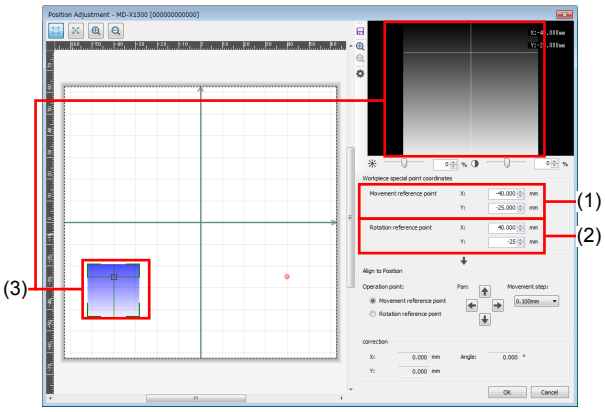
- **This section explains the operational procedure for [Specify with finder].**
  The following explains the option using the procedure of adjusting the marking setting below to a workpiece (a 50 x 80mm iron plate) as an example.



(1) Set the movement reference point for the marking setting.
In this case, it is set to (X, Y)=(-40, -25) at the bottom left of the workpiece.

(2) Set the rotation reference point to be used as reference when setting the θ angle correction.
In this case, it is set to (X, Y)=(40, -25) at the bottom right of the workpiece.

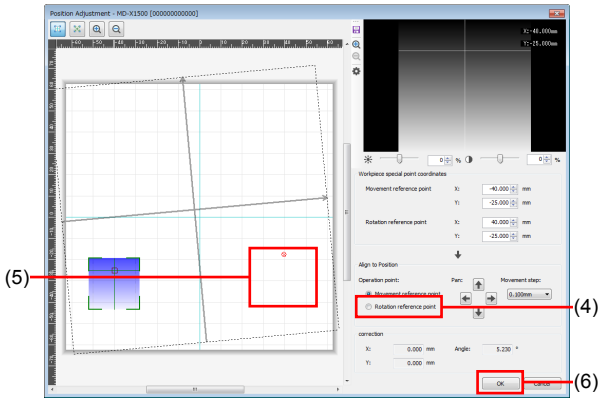
(3) Move the movement reference point in the preview and match the cross line on the finder with the reference point of the workpiece (lower left).



(4) Select the rotation reference point.

(5) Move the rotation reference point in the preview and match the cross line on the finder with the reference point of the workpiece (lower right).

(6) Press the [OK] button.
The correction result will be reflected to the correction amount.



The operation of [Specify with finder] is now complete.

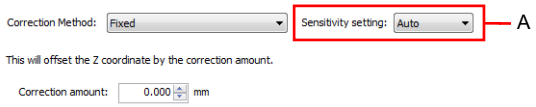
3. Correct height direction

Set the height correction method.

Reference
- **The height correction is always applied vertically against the head. The position correction X/Y angles will not be affected.**

■ **Fixed**

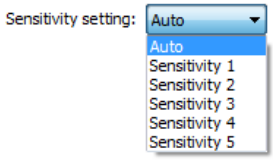
Set the correction amount to a fixed value. The Z coordinate of the program will be offset by the set value.



Reference
- **The distance pointer will set the focus according to the height specified here.**

A. Sensitivity settings

Adjust the sensitivity of the working distance measurement.



- Auto
Set the sensitivity automatically.
Adjust it with "sensitivity 1 to 5" only when it cannot work automatically.
- Sensitivity 1 to 5
Increase the sensitivity when the external light is lighter from the material with low reflectivity.
Set it with the value that is the most stable while confirming the actual measurement value.

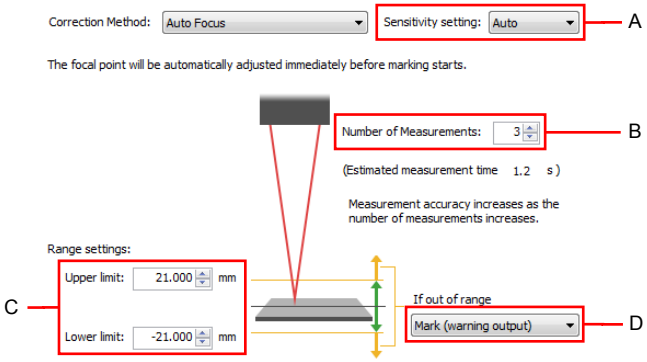
Important
- **This function is displayed on MD-U1000 series only.**

■ **Auto Focus**

Measure the distance at the origin position before marking and mark after correcting the Z coordinate with the deviation amount from the reference distance.

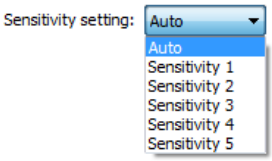
Reference
- **Auto focus function cannot be used in On-the-fly Marking settings.**

Important
- **This function only appears when the 3D extensions software "MB3-H3D1" is installed.**
- **This function is not available for MD-X1000L/1500L series, MD-F3200/5200 series and ML-Z9600 series.**
- **Measurement may fail if the lighting is too bright near the point of origin.**
- **Reading may be unstable depending on an object. In this case, stop using this function.**
- **When using this function auto focus adjustment is required at starting up the equipment, after reinstalling the equipment, or when environmental temperature has changed.**
“Auto Focus Adjustment” (Page 115)



A. Sensitivity settings

Adjust the sensitivity of the working distance measurement.



- Auto
Set the sensitivity automatically.
Adjust it with "sensitivity 1 to 5" only when it cannot work automatically.
- Sensitivity 1 to 5
Increase the sensitivity when the external light is lighter from the material with low reflectivity.
Set it with the value that is the most stable while confirming the actual measurement value.

Important
- **This function is displayed on MD-U1000 series only.**

B. Number of Measurements

Set the number of distance measurements. Average value will be applied for the Z coordinate correction.

Reference

- **Increasing the number of measurements will increase the stability, but the time required for measurements will also be longer.**

C. Tolerance settings

Set the tolerance range of the Z coordinate correction.

D. If out of range

Select the action when becoming the Z coordinate calibrate value out of range of tolerance setting.

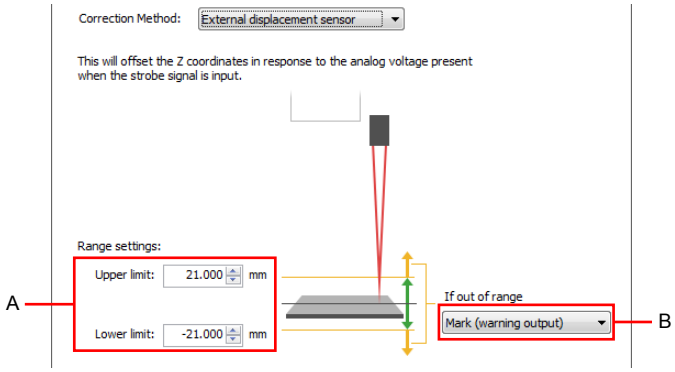
- Mark (warning output)
- Do not mark (error output)

■ External Displacement Sensor

This function connects an external displacement sensor with analog voltage output terminal to the Z scanner position control input (No. 47) of the terminal block and adjusts the focus. Enter the focus timing using the Z-axis position fixation input (No. 43) of the terminal block.

Important

- **This function only appears when the 3D extensions software "MB3-H3D1" is installed.**



A. Tolerance settings

Set the tolerance range of the Z coordinate correction.

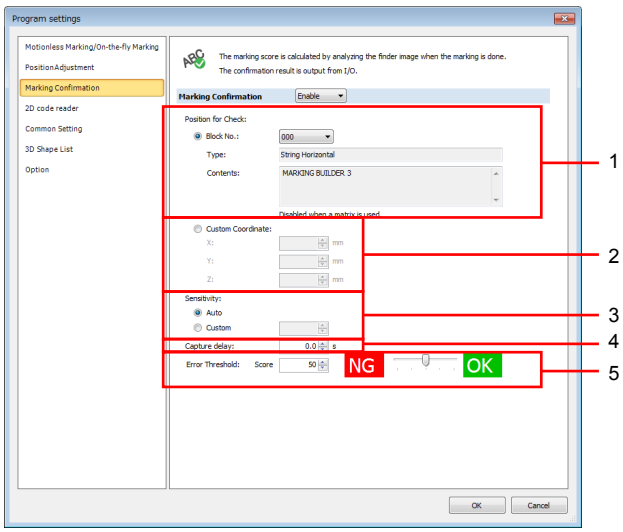
B. If out of range

Select the operation for when the Z coordinate correction exceeds the tolerance setting range.

- Mark (warning output)
- Do not mark (error output)

Mark confirmation

Capture the image in front and behind the mark via built-in camera, and confirm the marking state.



Reference

- **Through this function the marking contents of the program and the image states of both before and after marking are compared, and then the matching portion will be displayed via score. It cannot be used when the marking state cannot be seen via finder image.**
- **Mark confirmation function cannot be used in On-the-fly Marking settings.**
- **Mark confirmation function and 2D code reader cannot be used at the same time.**
- **This function is not displayed on MD-X1000L/1500L series, MD-F3200/5200 series, and ML-Z9600 series.**

Important

- **External lights are necessary for mark confirmation function. Adjust the brightness/contrast in [Adjust finder view] and confirm the image in front and behind the mark.**

1. Block No./Type/Contents

Specify a position as a confirmation target by block number. Display the type and contents of the selected block number.

Reference

- **This function can not use in the matrix setting.**
- **If the block number is specified, the marking is confirmed centering around the block reference point.**

2. Custom coordinate

Specify the position to confirm marking by X/Y/Z coordinates.

3. Sensitivity

Select the binarized threshold of the difference images of both before and after marking from [Auto/ Custom]. Create the marking extraction image based on the threshold.

■ Auto

Set binarized threshold of the difference images automatically.

■ Custom

Set binarized threshold of the difference images arbitrarily. Set it while confirming the image after being binarized from test marking function.

“Test Marking” (Page 145)

4. Imaging delay

Set the time until the reading starts after the marking is completed.

Reference

- **Set this option when the reading is affected by the smoke and dust generated by the laser emission.**

5. Error threshold

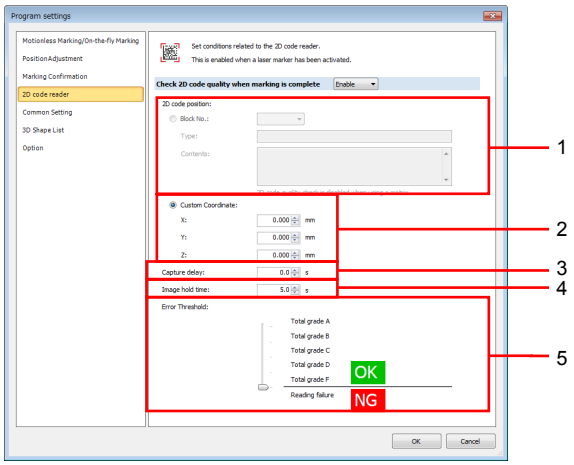
Set the threshold for marking confirmation result. When falling short of the threshold, [Mark./2D Code Check NG Output (No. 21)] will turn on, and when exceeding the threshold, [Mark./2D Code Check OK Output (No. 19)] will turn ON.

Reference

- **When the score is not stable because of the smoke after marking, set [Capture Delay] and start capturing after a while.**

2D code reader

Read the 2D code marked after the 2D code marking. The reading result will be output to the terminal block.



Reference
- **2D code reader function can not be used in On-the-fly Marking settings.**
- **Marking confirmation function and 2D code reader cannot be used at the same time.**
- **This function is not displayed on MD-X1000L/1500L series, MD-F3200/5200 series, and ML-Z9600 series.**

Important
- **This function in only available when the "2D code reader function" has been activated.**
  “2D code reader validation” (Page 113)
- **Lighting for illuminating the area is required for the 2D code quality check. Adjust the brightness/contrast in [Adjust finder view] and check the 2D code capture image.**

1. Block No./Type/Contents

Specify the position of the reading target 2D code in block No. Display the 2D code type and contents of the selected block No.

Reference
- **This function cannot be used if the setting contains a matrix.**
- **The numbers can be only designated to the plane blocks.**

2. Custom Coordinate

Specify the position of the reading target 2D code in X/Y/Z coordinates.

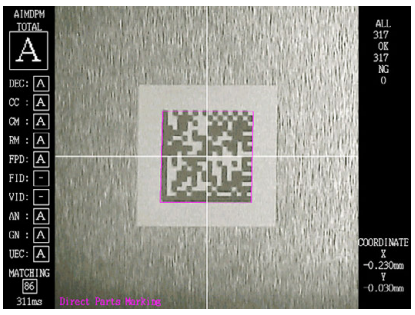
3. Capture Delay

Set the time from the completion of marking to the start of reading.

Reference
- **Set this option when the reading is affected by the smoke and dust generated by the laser emission.**

4. Image Hold Function

Set how many seconds the reading result should be displayed in the console or external monitor after the marking has completed.



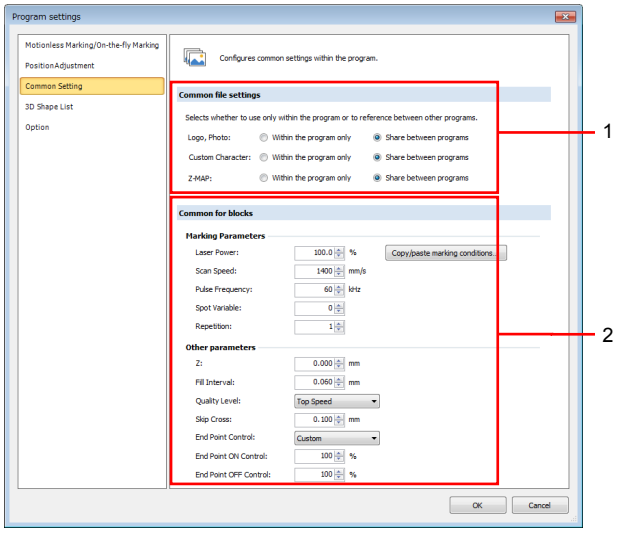
5. Error Threshold

Set the threshold for the 2D code reading result. When falling short of the threshold, [Mark./2D Code Check NG Output (No. 21)] will turn on, and when exceeding the threshold, [Mark./2D Code Check OK Output (No. 19)] will turn ON.

Reference
- **When reading by specifying the block No., the NG output will also become ON if the set and read strings do not match.**

Common Setting

Set the function to be used commonly in the programs.



1. File common settings

Set whether to share the logo/photo, custom character and Z-MAP file among different programs.

Reference
- **This function is only used when referencing the files of another program using external communication.**

■ Within the program only

If a program has been transferred to the laser marker, the files in this program cannot be referenced from another program. You can perform marking using different files with the same name in each program.

■ Share between programs

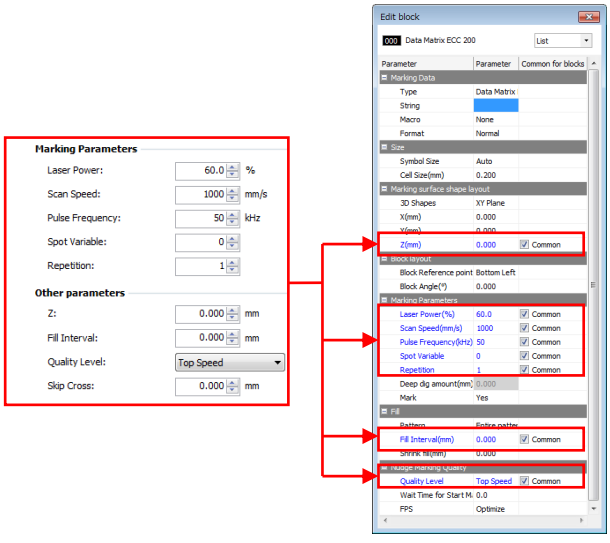
If a program has been transferred to the laser marker, this option allows you to reference the files in this program from another program. Set this option to replace the logo file, etc. using external communication. Moreover, by updating the file, you can simultaneously update the files of all programs with [Share between programs] enabled.

2. Common for blocks

Select the marking parameters to be used among the blocks.

■ Marking conditions/Other parameters

If the common check box is set to ON in the block editing screen, the common parameters for blocks will be applied.

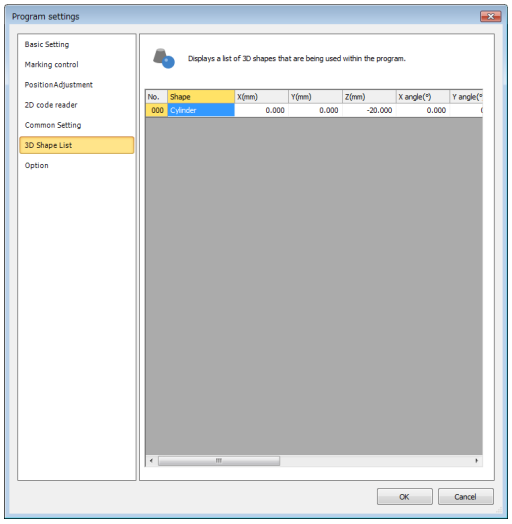


■ Copy/paste marking conditions

This option is used when copying and using the marking conditions registered in the marking conditions clipboard.
“Copy/paste marking conditions” (Page 31)

3D Shape List

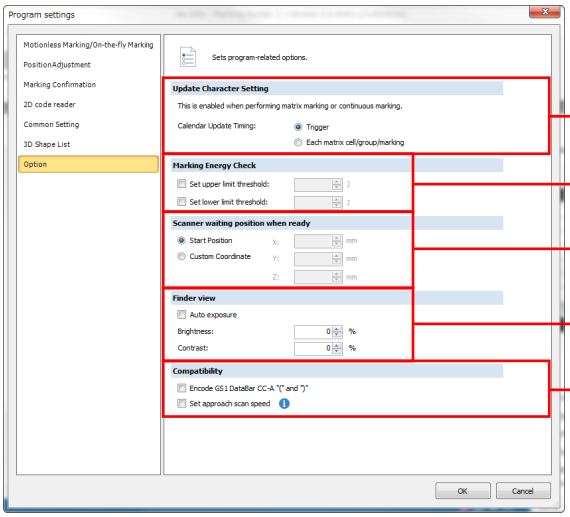
Display the list of 3D shapes set in the program.



Reference
- **You can edit parameters from the list.**

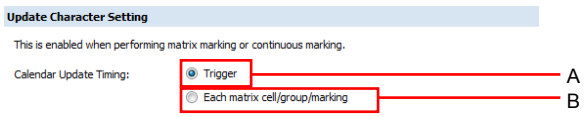
Option

Set the marking energy check, scanner waiting position when READY, and other compatibility settings.



1. Update Character Setting

Select the time acquirement timing for calendar marking.



A. Trigger

Mark the calendar based on the time up to the marking start input turns on.

B. Matrix cell/Gropu/ Each Marking

Reacquire the time for each matrix cell, each group and each marking of continuous marking, and mark the calendar.

2. Marking Energy Check

Check the energy used for the laser emission after the marking has completed. When the upper/lower limit range of the set threshold is exceeded, the "Insufficient/Excess marking energy alarm" will occur and the warning output (No. A4) of the terminal block will become ON.

Reference
- **Measurement of the marking energy takes 2 seconds from the completion of the laser emission. Marking energy check will be canceled when the next trigger is accepted within 2 seconds.**
- **This function is not reflected for the MD-X1000L/1500L series, and ML-Z9600 series.**

3. Scanner waiting coordinate when READY

You can set the scanner waiting position when READY.

■ **Start Position**

The scanner will wait near the start block.

■ **Custom Coordinate**

The scanner will wait at the specified X/Y/Z coordinates.

Reference
- **Use custom coordinates only when the marking is not stable at the start of writing.**

4. Finder view

■ **Auto exposure**

Set the auto exposure ON/OFF of the finder image.

Reference
- **This function is displayed on MD-U1000 series only.**

■ **Brightness**

Adjust the brightness of the finder image.

■ **Contrast**

Adjust the contrast of the finder image.

5. Compatibility

Set data compatibility.

■ **GS1 DataBar**

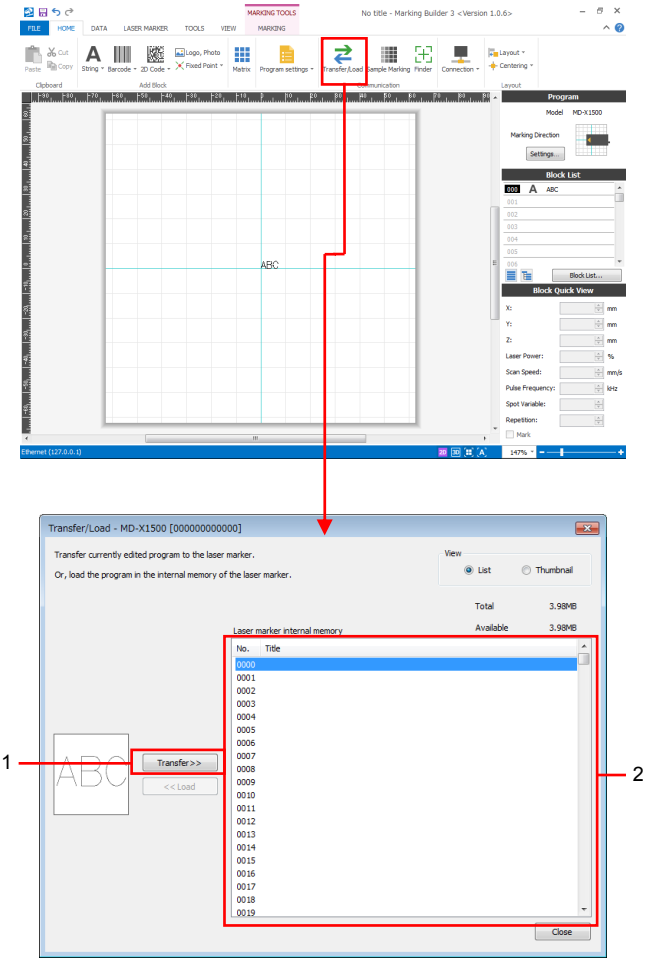
When this checkbox is set to ON, "(" and")"of GS1 DataBar CC-A will be encoded. This option should be set only if you wish to display "(" and ")" in the reading result when reading using the barcode reader.

■ **Approach scan speed**

If the checkbox is ON, when Customize is selected for quality adjustment, approach scan speed can be set. Set it when adjusting marking time and marking quality.

3-13 Transfer/Load

Transfer the currently editing program to or load programs from the internal memory of the laser marker.



1. **Transfer/Load**

   Transfer a program to or imports a program from the setting No. selected in the Laser marker internal memory list.

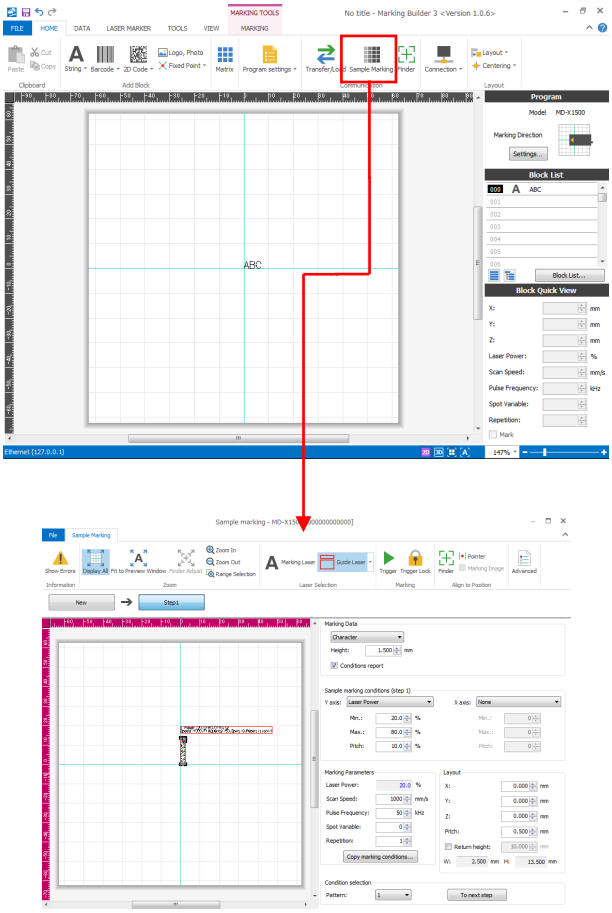
2. **Laser marker internal memory**

   Display the list of programs in the laser marker. Select the program No. you wish to transfer or import.

3-14 Sample Marking

The marking state will vary significantly depending on the laser marker settings including laser power, pulse frequency and scan speed. Sample marking is a function for finding the optimal marking conditions by gradually changing the marking conditions.

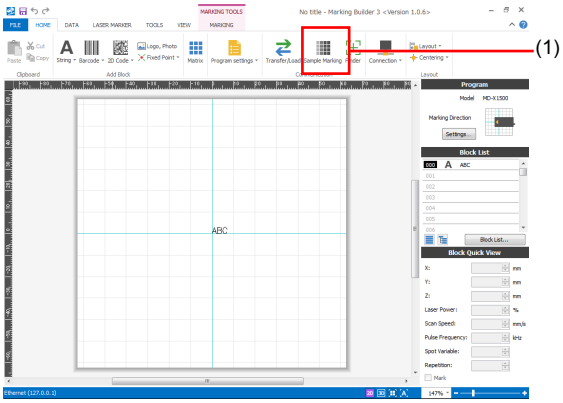
WARNING	・ **This function emits laser beams. Make sure to check the precautions on laser safety management before use.**



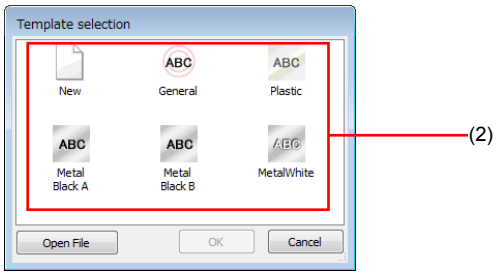
Sample Marking Flow

The following explains the basic flow of the sample marking operation.

(1) Press the [Sample Marking] button.
The template selection screen will appear.

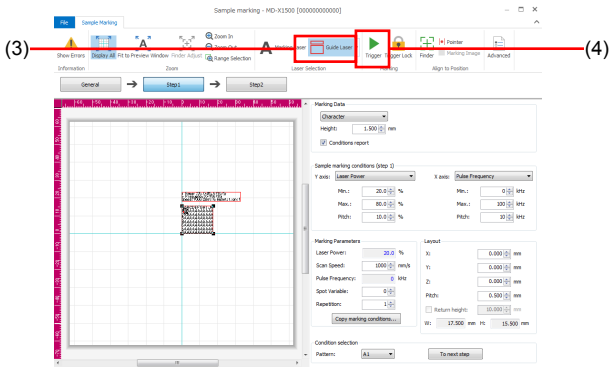


(2) Select a template file according to the marking workpiece.
When you select a template matching the marking workpiece and mark data, sample marking conditions will be set automatically. If no purpose-specific template is available, select a general-purpose template.



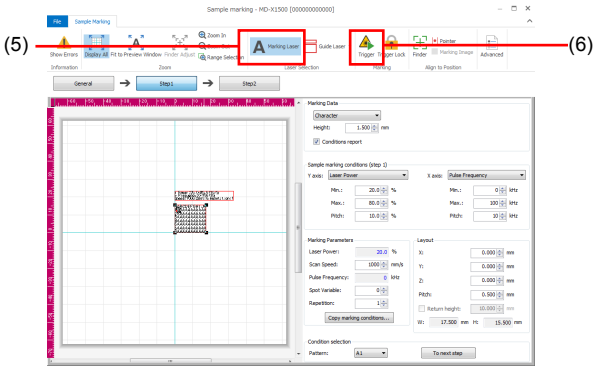
(3) Press the [Guide Laser] button.

(4) Press the [Trigger] button.
Align the workpiece position using the guide laser.



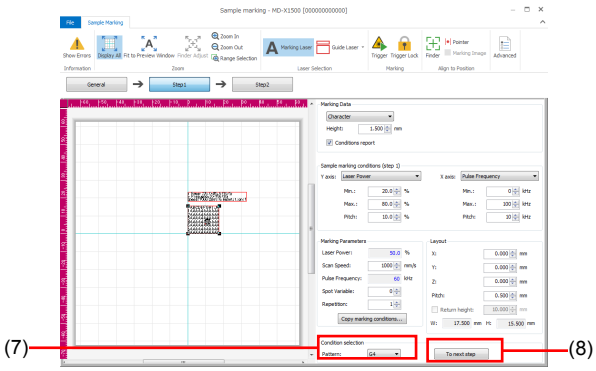
(5) Press the [Marking Laser] button.

(6) Press the [Trigger] button.
Emit the laser on the workpiece.



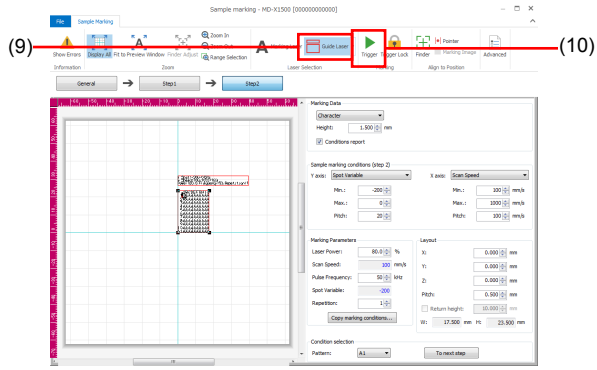
(7) Select an optimal pattern from the marking result.
You can also select it from the mark data in the preview.

(8) Press the [To next step] button.
The sample marking conditions of the selected pattern will be applied to the fixed marking conditions, replacing the sample marking conditions with different parameters.



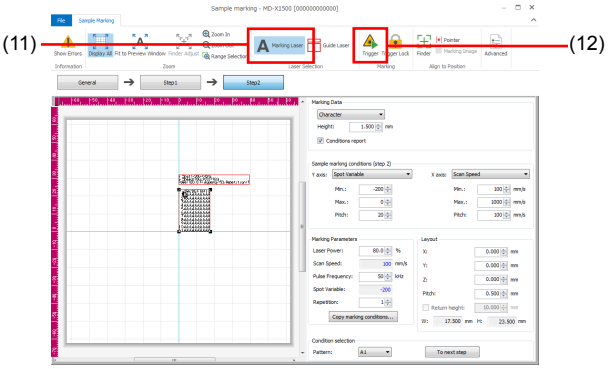
(9) Press the [Guide Laser] button.

(10) Press the [Trigger] button.
Align the workpiece position using the guide laser.

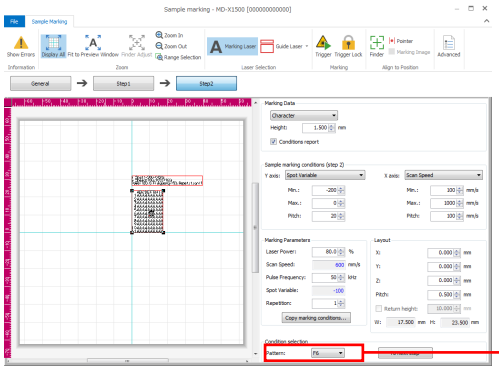


(11) Press the [Marking Laser] button.

(12) Press the [Trigger] button.
Emit the laser on the workpiece.



(13) Select an optimal pattern from the marking result.
You can also select it from the mark data in the preview.

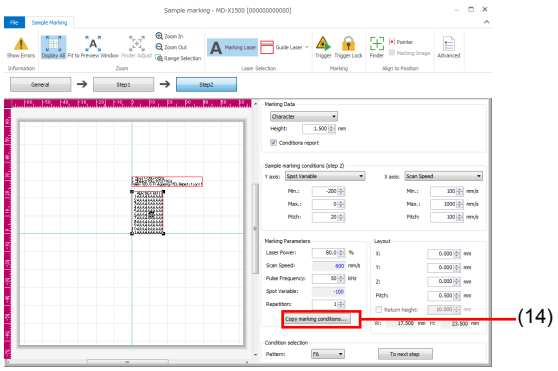


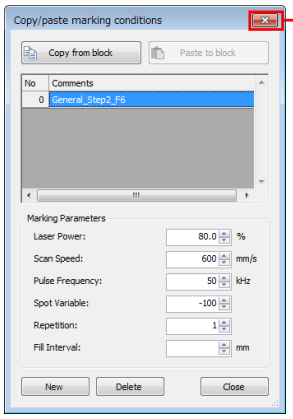
Reference

- **If there are subsequent steps, repeat step 8 to 13 until the final step is reached.**
- **If optimal marking conditions cannot be found, either return to step 1 and repeat the procedure or set the sample marking conditions manually.**

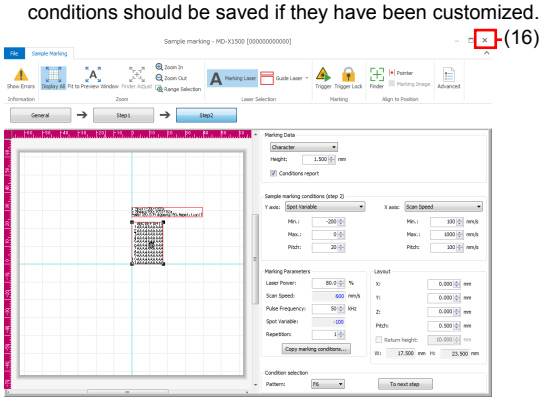
(14) Press the [Copy marking conditions] button.
Display the [Copy/paste marking conditions] screen of the marking conditions.

(15) Close the [Copy/paste marking conditions] dialog.



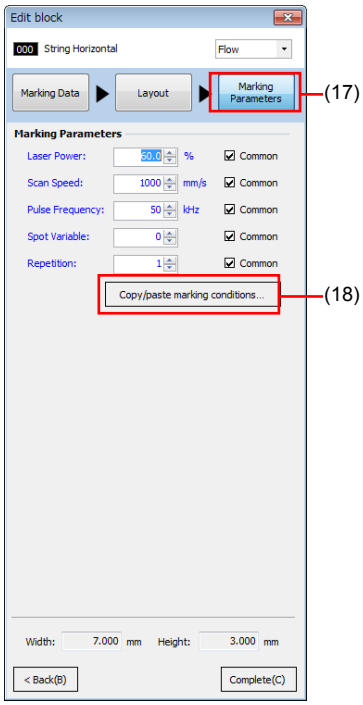


(16) Close the Sample Marking screen.
A dialog asking whether to save the sample marking conditions as a template will appear. The sample marking conditions should be saved if they have been customized.



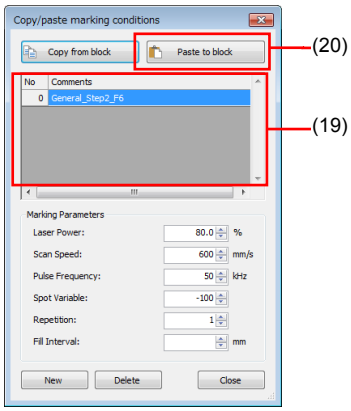
(17) Display the marking conditions screen of the block to which you wish to paste marking conditions.

(18) Press the [Copy/paste marking conditions] button.



(19) Select the marking conditions to be pasted.

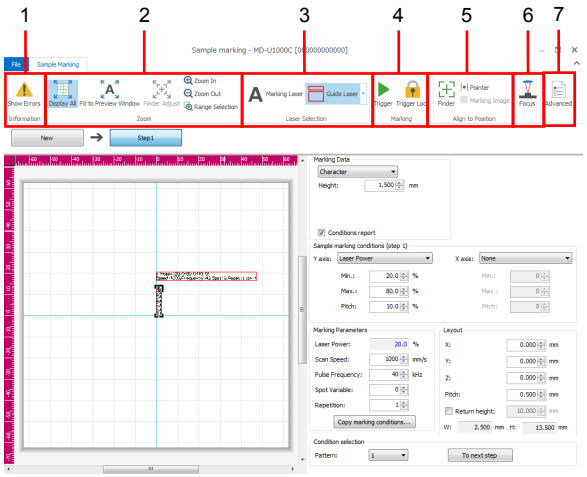
(20) Press [Paste to block].
The marking condition will be applied to the block.



The sample marking procedure is now complete.

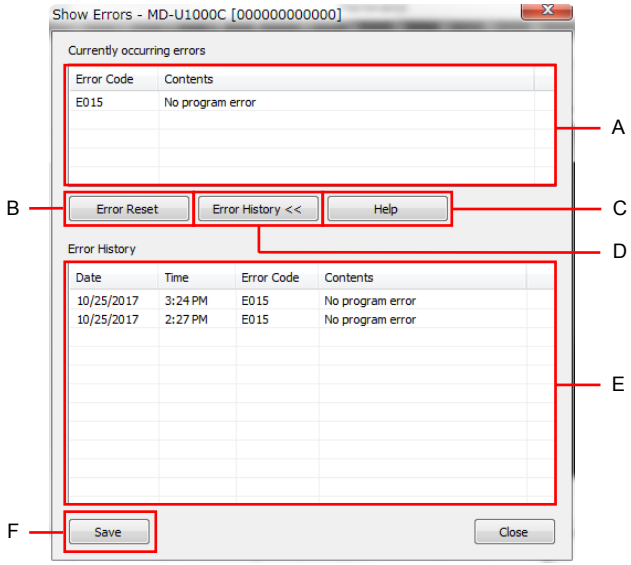
Sample Marking Ribbon Menu

This section explains the sample marking ribbon menu.



1. Show Errors

You can display the currently occurring errors, reset errors and display the error history.



A. Currently occurring errors

Display the currently occurring errors.

B. Error Reset

Reset the error.

C. Error History View

Show/hide the error history.

D. Help

Start the "Help for Showing Errors" window, and display the state of the error and method to solve the problem.

E. Error History

Display the error history.

Reference

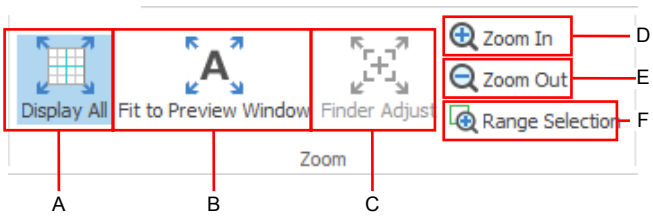
- **Up to 100 entries are saved in the history; and entries are overwritten starting from the oldest.**

F. Save

Save the error history in csv format.

2. Zoom

This section explains the zoom in/out functions in the preview display.



A. Display all

Display the entire area in the preview.

B. Fit to Preview Window

Fit the outermost shell of the mark data in the view area.

C. Finder Adjust View

Fit the finder's view angle in the view area.

D. Zoom In

Zooms in using the mouse click point in the view area as the center.

E. Zoom Out

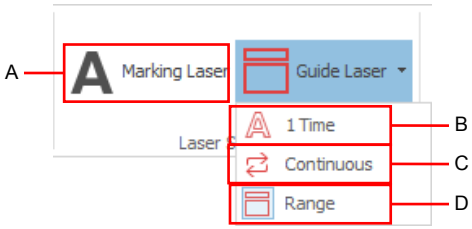
Zooms out using the mouse click point in the view area as the center.

F. Range selection

Fit the dragged area in the view area.

3. Laser selection

Select the marking laser and guide laser.



A. Marking Laser

Switch to the marking laser emission mode.

B. Guide Laser (One time)

Switch to the mode that emits the mark data once with the guide laser.

C. Guide Laser (Continuous)

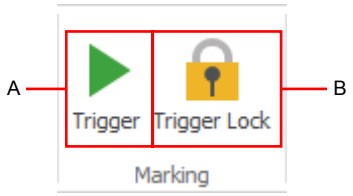
Switch to the mode that emits the mark data continuously with the guide laser.

D. Guide Laser (Area)

Switch to the mode that emits the outermost shell of the marking data with the guide laser.

4. Marking

Execute or lock the trigger.



A. Trigger

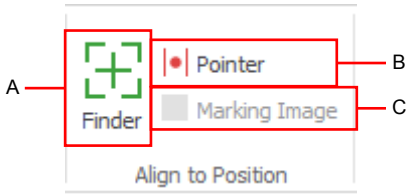
Start the laser emission according to the mode selected in [Laser selection].

B. Trigger lock

Lock the trigger.

5. Align to Position

Perform the position adjustment function using the finder or the focus adjustment function using the pointer.



A. Finder

Switch to the finder mode and splits the screen into the finder and preview display areas.

Reference

- **This function is not displayed on MD-X1000L/1500L series, MD-F3200/5200 series, and ML-Z9600 series.**

B. Pointer

A distance pointer will be emitted to the point of origin of the marking area. Adjust the installation height of the workpiece such that the red dot comes to the center of the red double line.

C. Marking Image

Project the mark data on the finder display unit.

Reference

- **This setting can only be changed in finder mode.**

6. Focus

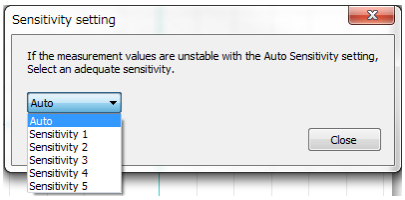
Display the correction information about height direction.

A. Sensitivity

Set the sensitivity of the working distance measurement by auto/sensitivity 1 to 5.

Reference

- **This function is displayed on MD-U1000 series only. This function is not displayed on MD-X1000L/1500L series, MD-F3200/5200 series, and ML-Z9600 series.**



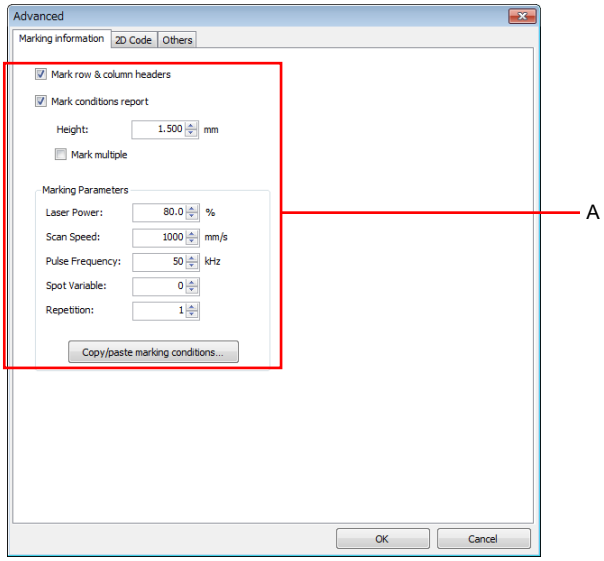
- Auto
  Set the sensitivity automatically.
  Adjust it with "sensitivity 1 to 5" only when it cannot work automatically.
- Sensitivity 1 to 5
  Increase the sensitivity when the external light is lighter from the material with low reflectivity.
  Set it with the value that is the most stable while confirming the actual measurement value.

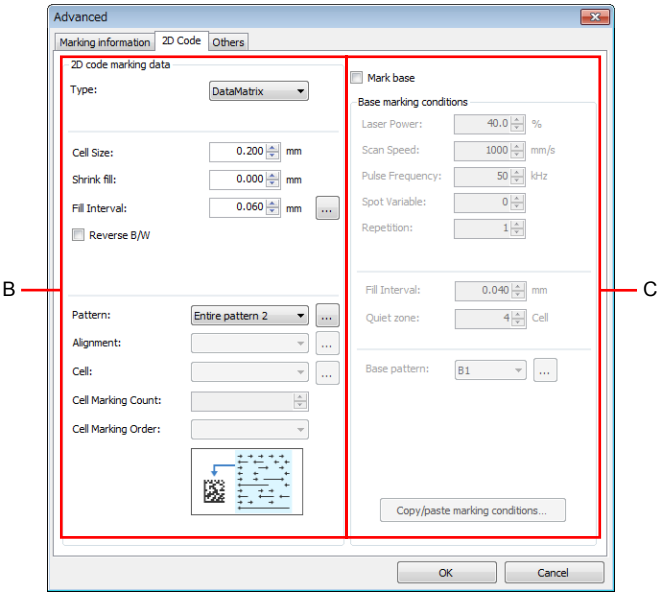
B. Correcting

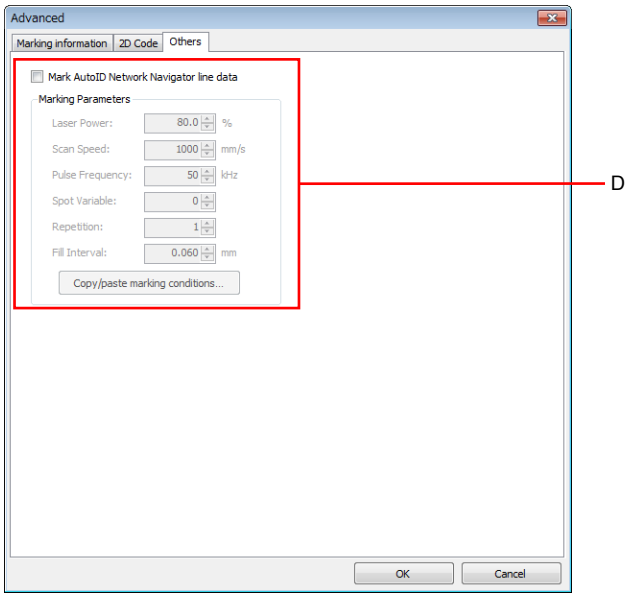
When pressing this button, input the correction amount automatically to calibrate.

7. Advanced

Set the detailed contents of the sample marking function.



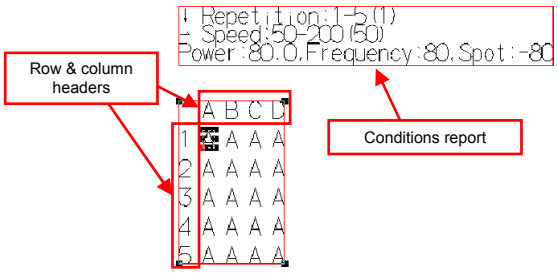




A. Marking information

Set the row & column headers and conditions report.

- Mark row & column headers/Mark conditions report
  Select whether to mark the row & column headers and conditions report.
- Height/Mark multiple
  Set the height for the conditions report and select whether to mark the conditions report and conditions No. in multiple lines.
- Marking conditions
  Set the row & column headers and marking conditions for a conditions report.



Reference

- **Change the character size and marking conditions when characters in the conditions report and row & column headers are difficult to read.**
- **The row & column header character height is set using the marking data character height.**

B. 2D code marking data

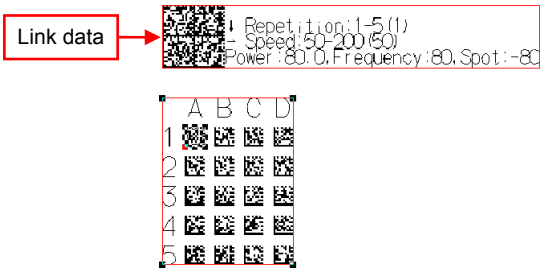
Set the 2D code type, size and pattern when 2D code has been selected as the marking data.
"2D code marking data" (Page 24)
"2D Code Fill Conditions" (Page 32)

C. Base marking conditions

Set whether to mark the base simultaneously when 2D code has been selected as the marking data.
"2D Code Fill Conditions" (Page 32)

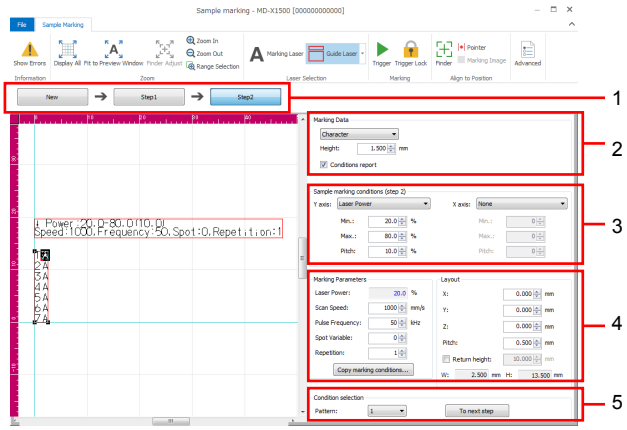
D. Mark AutoID Network Navigator link data

Set whether to mark the AutoID Network Navigator link data in the case when [2D Code] was selected in [Marking Data]. Set this option only when using the marking optimization function of AutoID Network Navigator. When you read this code, the data will be imported into the marking information of the marking optimization function. Refer to the section on the marking optimization function in the "SR-D100 User's Manual".



Sample Marking Functions

This section explains the sample marking functions.



1. Template/Step

Display the template name and step number.

Reference

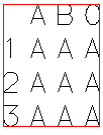
- **You can reselect the template by clicking on the template name on the left.**
- **You can move to any desired step number by clicking on it.**

2. Marking Data

Select the sample marking data from below.

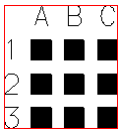
■ **Character**

Compare the sample markings using the alphabet character A. You can set the height.



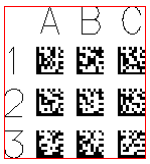
■ **Fill**

Compare the sample markings using rectangle fill. You can set the height, fill interval and fill direction.



■ **2D Code**

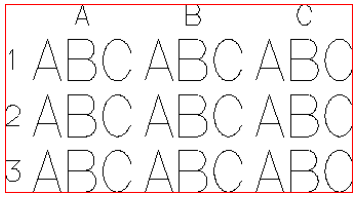
Compare the sample markings using 2D code. You can set the 2D code type, cell size and fill interval.



Reference
- **You can set more detailed settings in the [2D Code] tab in [Advanced].**

■ **Block**

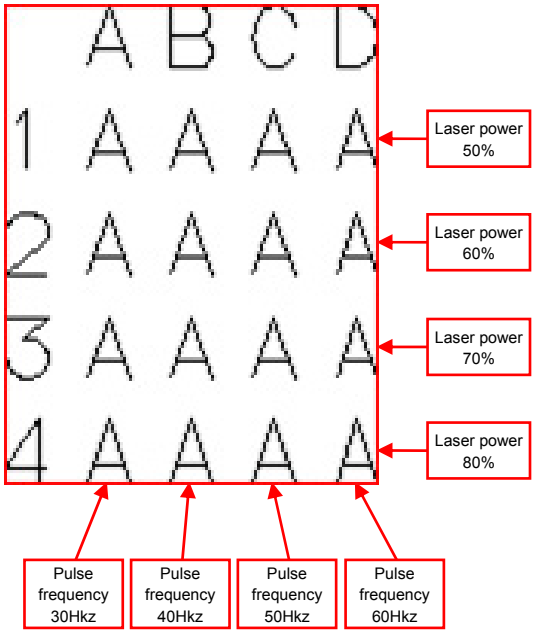
Compare the sample markings using the desired block set in the program. Select the block No. to be referenced.



3. Sample marking conditions

Select the variable marking conditions from [Laser Power/Scan Speed/Pulse Frequency/Spot Variable/Repetition] and set the variable width.

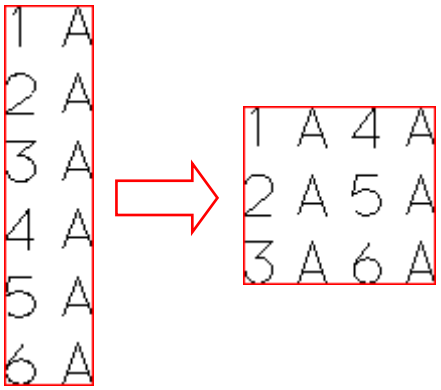
Example
- **The following shows an example of sample marking conditions.**
  Y Axis Laser Power: Min. 50%/Max. 80%/Interval 10%
  X axis pulse frequency: Min. 30kHz/Max. 60kHz/Interval 10kHz



4. Marking Conditions/Layout

Set the marking conditions not set in the sample marking conditions and the marking position layout.

Reference
- **The marking conditions selected in a pattern will be grayed out.**
- **You can set [Return height] only when [None] is selected in the X axis sample marking conditions. If the total height of the sample marking exceeds the return height, the marking will be returned.**

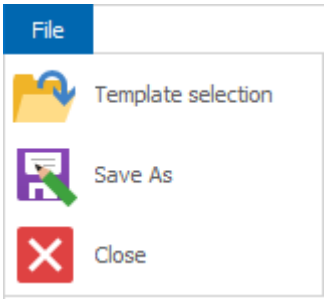


5. Condition selection

Select the optimal pattern for the marking conditions. Proceed to the next step using the marking conditions of the pattern selected here.

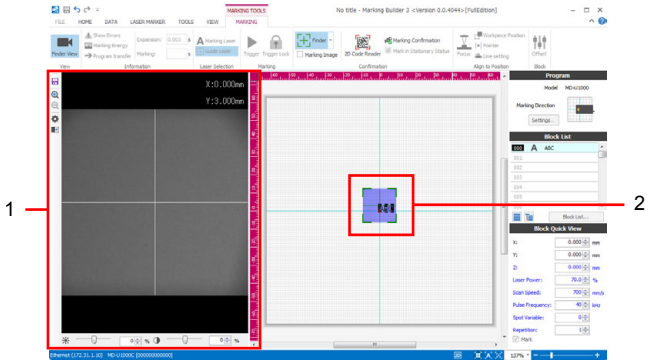
Sample Marking File Menu

You can reselect/save the template and end the sample marking function.



3-15 Finder

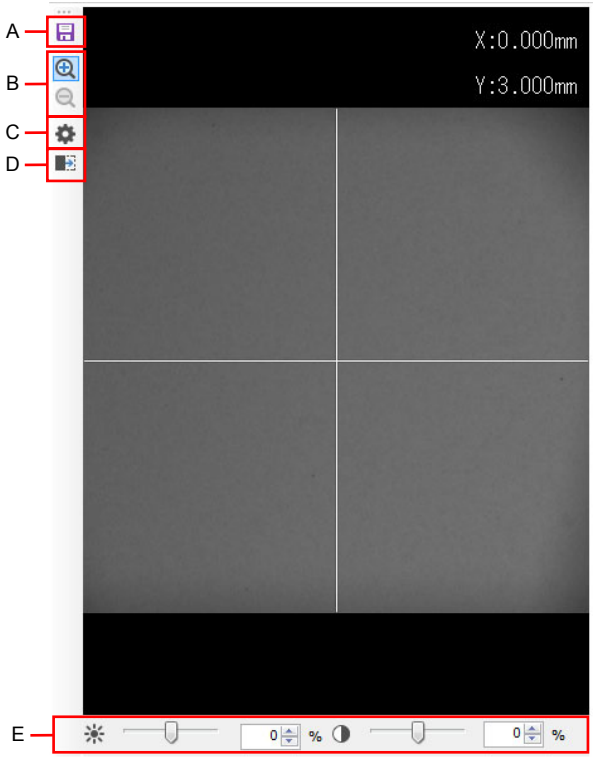
Project the finder image in the preview by splitting the view area into finder image and preview display areas. "Finder" and "Grouping and Finder" can be selected.



Reference
- **This function is not displayed on MD-X1000L/1500L series, MD-F3200/5200 series, and ML-Z9600 series.**
- **"Grouping and Finder" cannot be performed in the following settings:**
  - **In the settings of "On-the-fly Marking" or "Continuous Mark"**
  - **In the block settings of "Fixed Point while Trigger is On"**
  - **In the settings of "Group" or "Matrix"**

1. Finder image

Display the finder capture image.



Reference
- **The finder's view angles are as described below.**
  MD-X1000/1020/1500/1520 series: approximately 25 mm square
  MD-X1050 series: approximately 13.5 mm square
  MD-U1000 series: approximately 19 mm square
  MD-U1020 series: approximately 25 mm square
- **The finder image is updated by following the marking direction.**

A. Save image

Save the currently displayed image in BMP format.

Reference
- **You can select the file type from [Finder view images/Finder view images and figures].**

B. Zoom In/Zoom Out

You can zoom in/out the finder image.

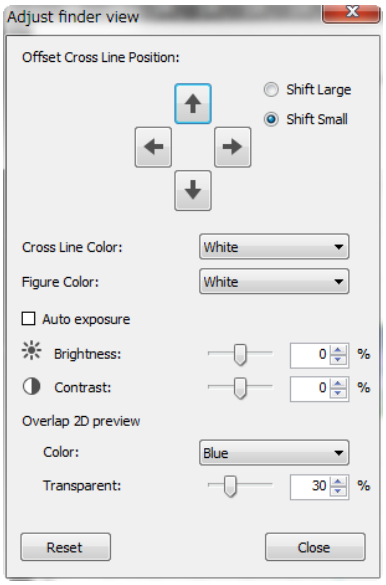
C. Adjust finder view

Adjusts/sets the finder view screen display.

- **Offset Cross Line Position**
  Adjust the position of the cross line.
- **Cross Line Color**
  Select the cross line display color from [White/Black/Light green/Light blue/Orange].
- **Figure Color**
  Select the display color of the figure (area frame and marking image) from [White/Black/Light green/Light blue/Orange].
- **Auto exposure**
  Set the auto exposure ON/OFF of the finder image.

Reference
- **This is the function for MD-U1000 series only.**

- **Brightness/Contrast**
  Adjust the brightness and contrast of the finder image.
- **Overlap 2D preview**
  Set the color and transparency for when the finder image is project onto the preview.



D. Full screen

Display the finder capture image in full screen.

E. Brightness/Contrast

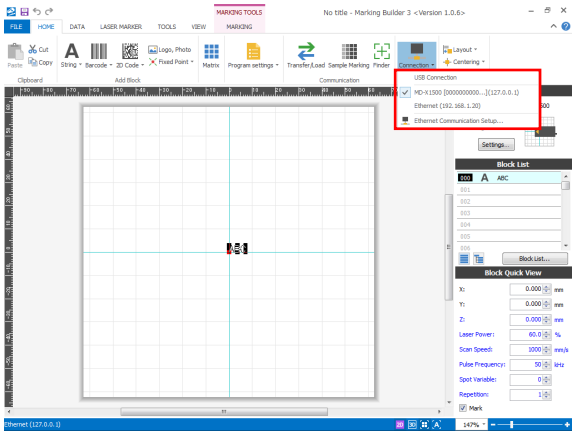
Adjust the brightness and contrast of the finder image.

2. Finder

Project the finder image on the preview display.
You can change the finder's capture position by dragging the mouse.

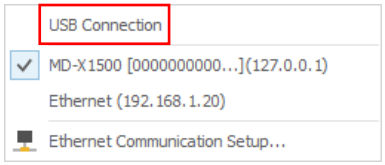
3-16 Unit

Set the method of connection with the laser marker and the connection unit.



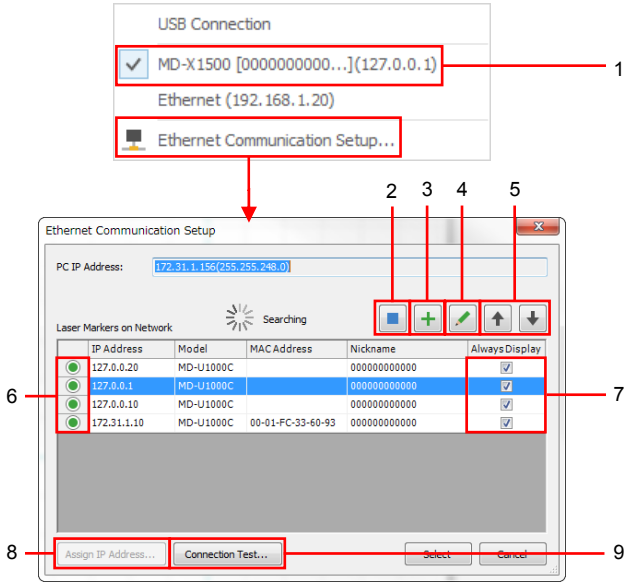
USB Connection

This option is selected when the laser marker and PC are connected using a USB cable.



Ethernet Communication Setup

This option is selected when the laser marker and PC are connected using a Ethernet cable.



Reference
- **The "Windows Security Alert" dialog may appear when you use this function. Configure Marking Builder 3 such that it can operate on the network.**

1. Unit List

Display the laser markers with the [Always display] checkbox ON in [Ethernet Communication Setup].

2. Search on network

Search the laser markers in the local area network.

Reference
- **Perform a search for 10 second for each network card. The process will take longer if there are two or more network cards.**

3. Add Laser Marker

Add a laser marker specifying its IP address.

4. Edit IP address

Edit the IP address of the selected laser marker.

5. Switch Display Order

Change the list display order.

6. Search results

Display the search result on the network.
- **: Connection is possible.**
- **: IP address needs to be set. (BOOTP Settings)**
- **: Not found on the network.**

7. Always display

Display the laser markers with the checkbox ON in the connected unit list.

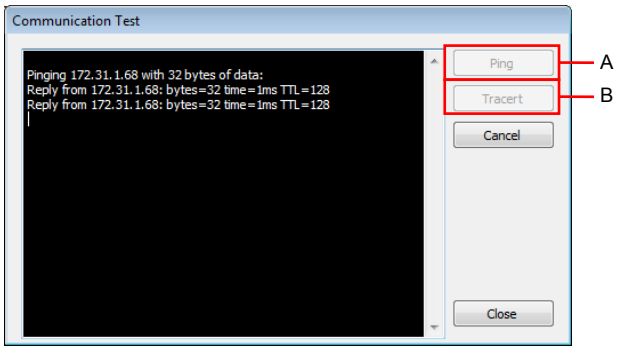
8. Assign IP address

Assign an IP address to a laser maker with [Not assigned] displayed in its IP address field.

Reference
- **The assigned IP address is enabled until the laser marker is switched OFF. To use the same IP address after the next (and subsequent) startup, set a unique IP address in [Unit Setup].**
"Ethernet" (Page 100)

9. Connection test

Execute a communication test on a laser marker in the network.



A. Ping

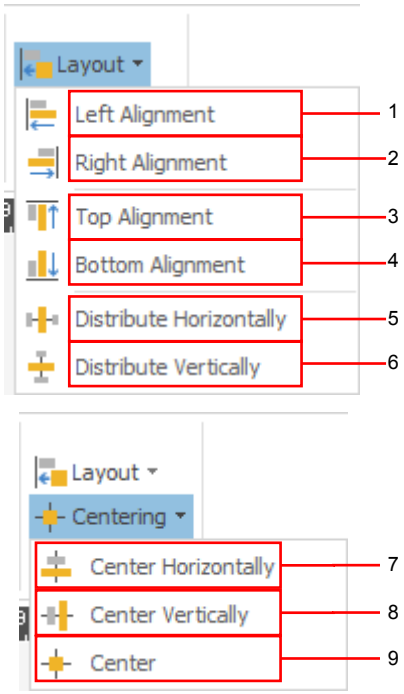
Send a Ping to the laser marker.

B. Tracert

Trace the route to the laser marker.

3-17 Layout

Align the block layout.



1. **Left Alignment**
   Align with the left edge of the leftmost block among the selected blocks.

2. **Right Alignment**
   Align with the right edge of the rightmost block among the selected blocks.

3. **Top Alignment**
   Align with the top edge of the topmost block among the selected blocks.

4. **Bottom Alignment**
   Align with the bottom edge of the lowermost block among the selected blocks.

5. **Distribute Horizontally**
   Place the selected block evenly in left and right directions.

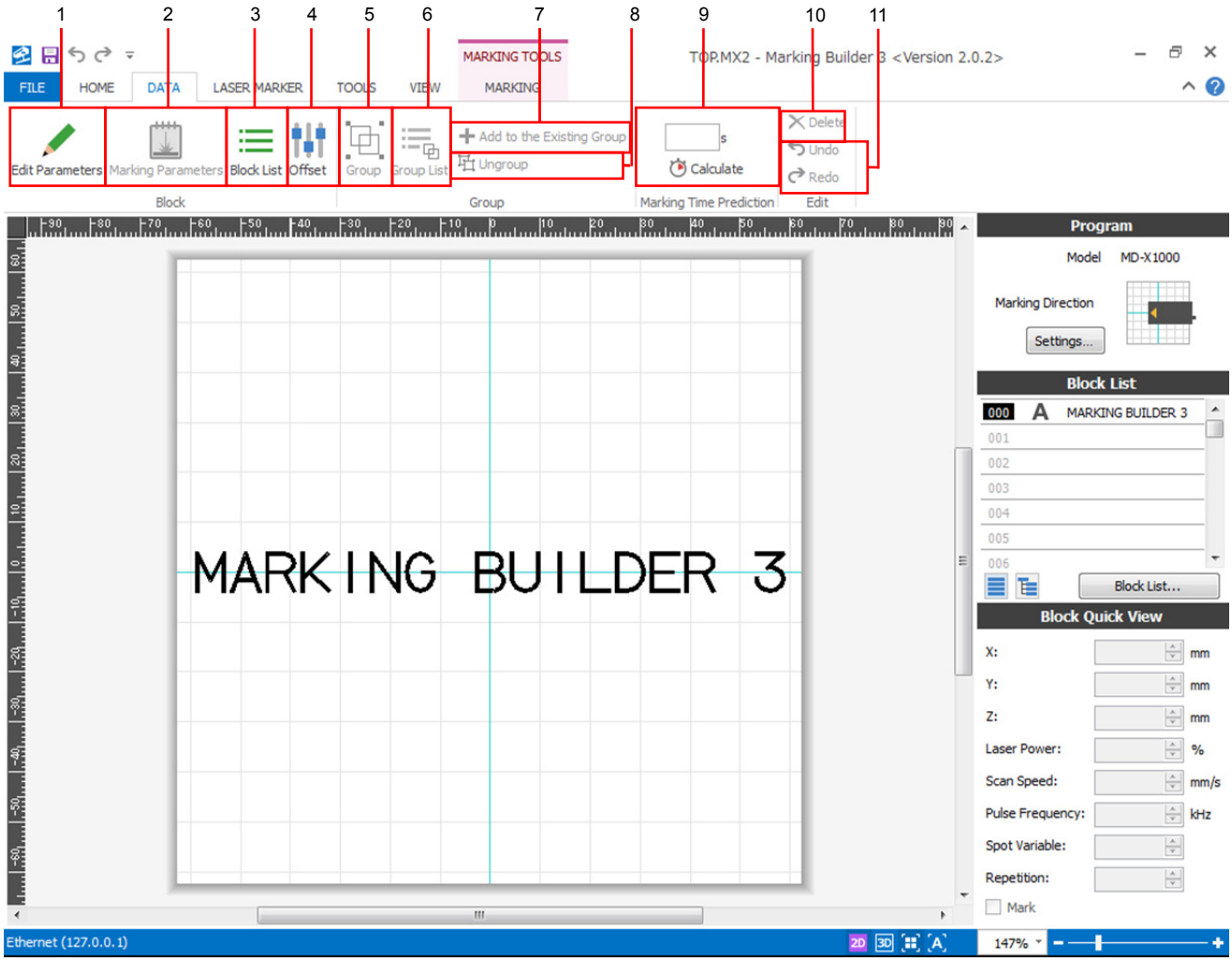
6. **Distribute Vertically**
   Place the selected block evenly distributed in vertical directions.

7. **Center horizontally**
   Center the selected block on the Y axis.

8. **Center vertically**
   Center the selected block on the X axis.

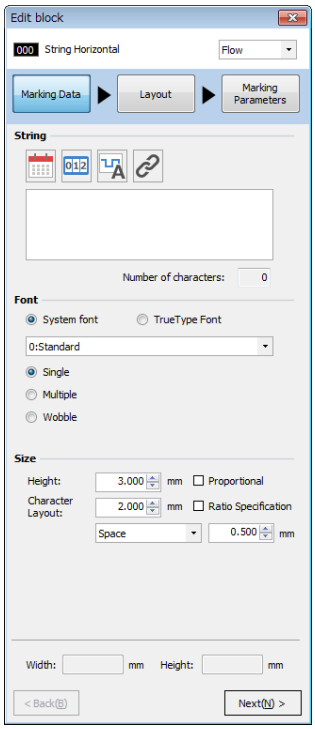
9. **Center**
   Center the selected block to the area center.

4 Data Menu



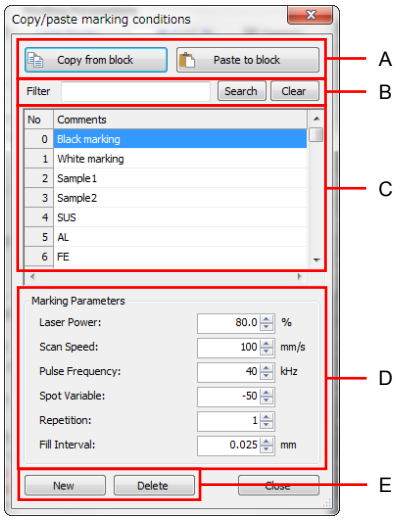
1. Edit Parameters

Display the Edit block/Edit matrix/Edit group screen. You can set the string, font and size.



2. Marking conditions

Display the marking conditions clipboard. You can copy, paste, configure, create or delete marking conditions.



A. Copy from block/Paste to block

Copy the marking conditions of the currently selected block or pastes the marking conditions in the marking conditions clipboard to a block.

B. Filter

Marking parameters can be searched by inputting strings in the text box.

C. Marking Conditions List

Display the list of saved marking conditions.

D. Marking conditions

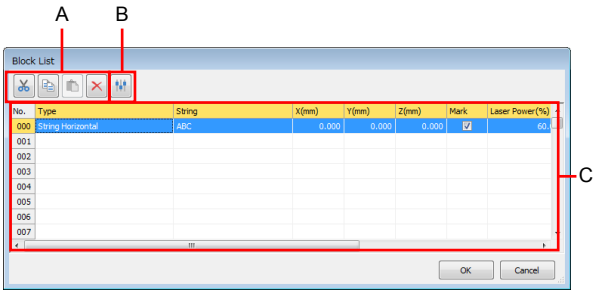
Display the marking conditions in the currently selected clipboard.

E. New/Delete

Add new marking conditions to the marking conditions list or deletes the clipboard content.

3. Block List

Display the block list. You can change the string or coordinates in the list.

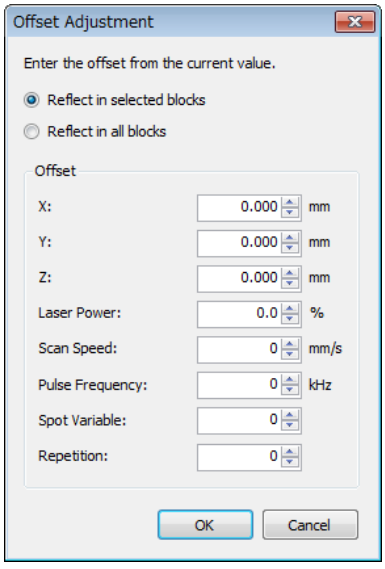


A. Cut/Copy/Paste/Delete

Cut, copy, paste or delete a block.

B. Offset Adjustment

You can adjust the offset of the parameters of the currently selected block or all blocks in the list.

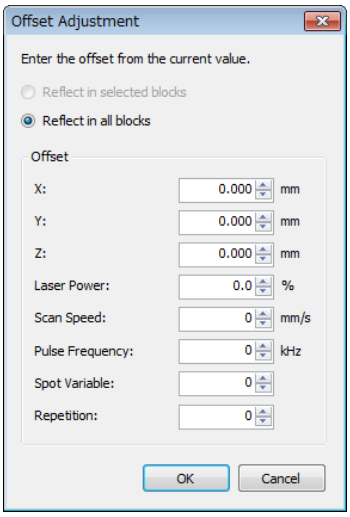


C. Block List View

Display the block list.

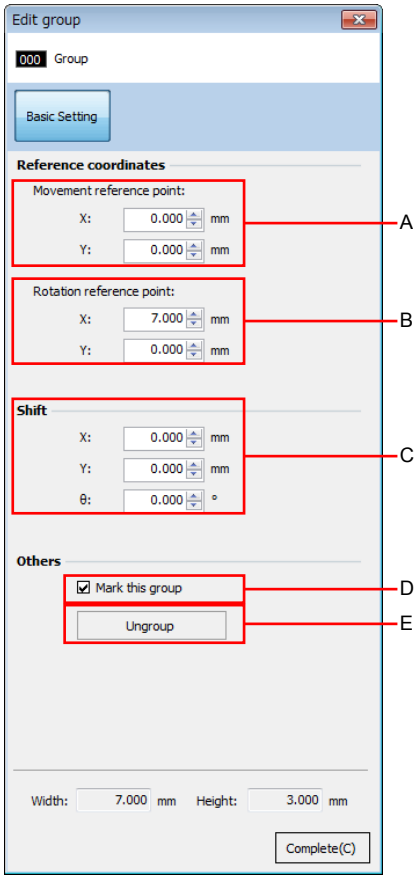
4. Offset Adjustment

You can adjust the offset of the parameters of the currently selected block(s) or all blocks.



5. Grouping

Group the currently selected blocks. Grouping of blocks will enable you to perform group editing as well as move the blocks with their positional relationship intact.



Reference

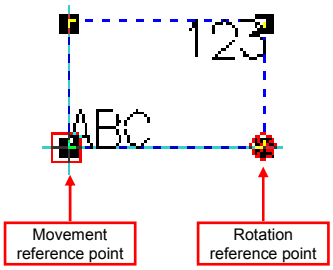
- **The matrix setting is not available for settings in which grouping is used.**

A. Movement reference point

Set the rotation center coordinates for the θ correction.

B. Rotation reference point

Set the coordinates for group operation.



C. Shift

Set the X/Y coordinates and θ angle correction amount of the group.

D. Mark this group

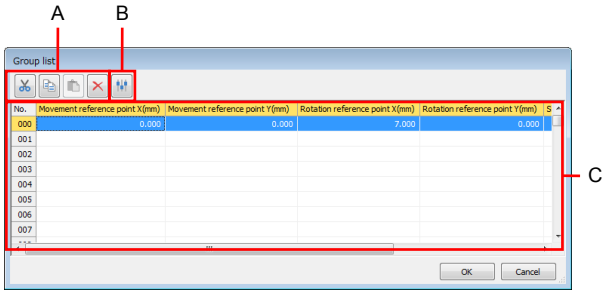
Set the marking flag for each group.

E. Ungroup

Cancel a group. The group correction amount will be released and the blocks will return to their layout before the grouping.

6. Group list

Display the group list.

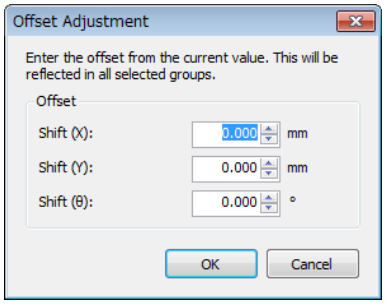


A. Cut/Copy/Paste/Delete

Cut, copy, paste or delete a group.

B. Offset Adjustment

Adjust the offset of the shift of the selected group or all groups in the list.



C. Display Group List

Display the group list.

7. Add to the existing group

Add blocks to the existing group. This option is only enabled when the blocks and group are being selected at the same time.

Reference

- **You cannot add a group to another group.**

8. Ungroup

Cancel a group. This option is only enabled when a group is being selected.

9. Marking Time Prediction

Predict the required time for the program marking being edited currently.

Reference

- **The time is a predicted result which is based on the calculation. Confirm the marking time via test marking function when you want to confirm the correct time since an error between the real marking time may occur.**
- **For programs which includes photo block, the marking time prediction error may become bigger.**

10. Delete

Delete the currently selected block or group.

11. Undo/Redo

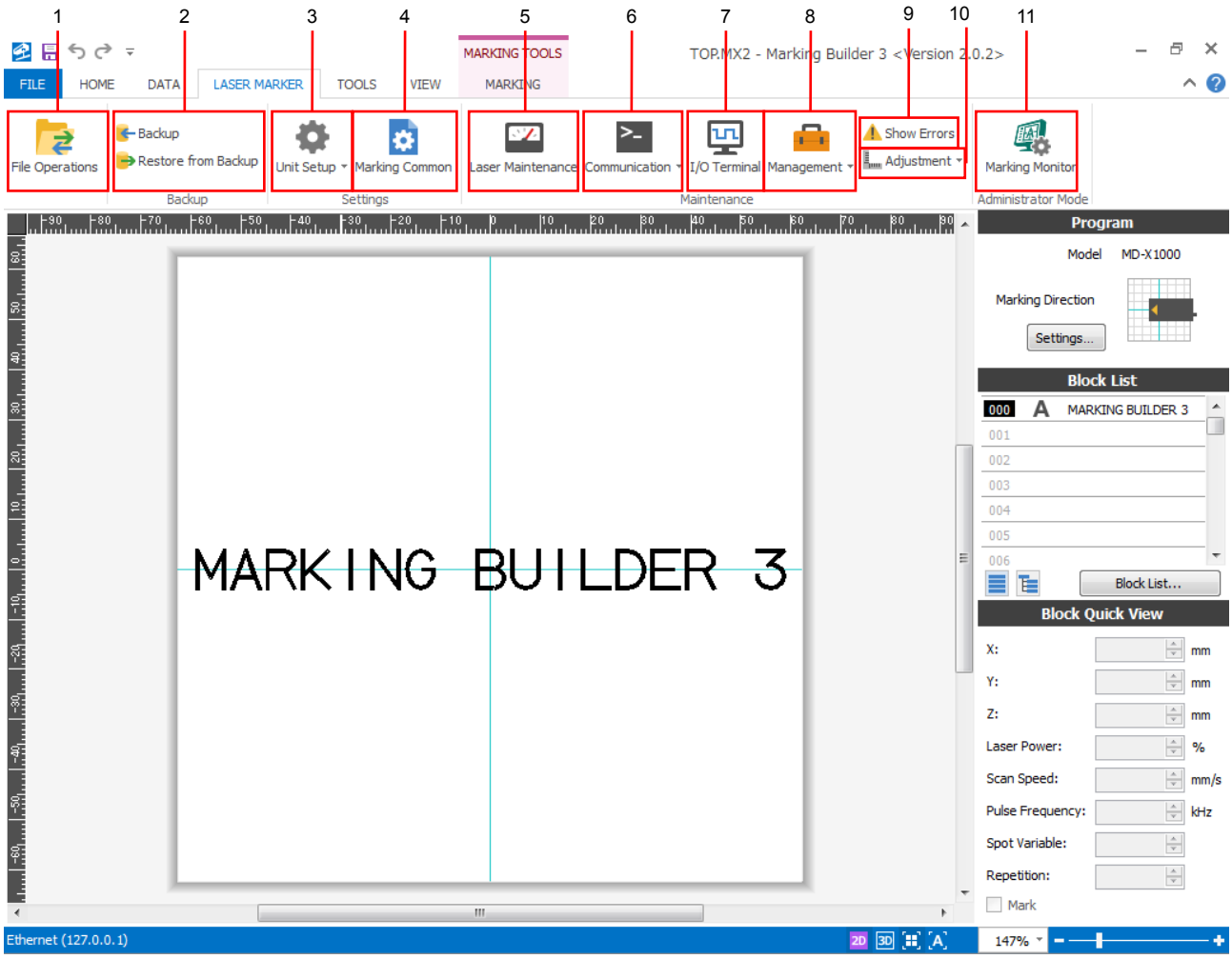
Operations can be undone/redone.

Reference

- **You can undo up to 100 operations.**

MEMO

5 Laser Marker Menu



1. File Operations

Transfer/load files between the laser marker and PC.
"File Operations" (Page 97)

2. Backup

Save and restore the backup data of the laser marker.
"Backup" (Page 98)

3. Unit Setup

Set the basic setting, communication setup, expansion processing, I/O setting, finder, and options for the laser marker.
"Unit Setup" (Page 98)

4. Marking Common Setup

Set the encoding setting, expiration setting, common counter, font, character scaling and character skip cross.
"Marking Common Setup" (Page 105)

5. Laser Maintenance

Execute the laser calibration and power measurement.
"Laser Maintenance" (Page 108)

6. Communication

Check the send command function and the communication history.
"Communication" (Page 110)

7. I/O terminal

Perform monitoring or simulation of the I/O terminal block.
"I/O terminal" (Page 111)

8. Management

Check the version and operation information and enables the 2D code reader function.
"Management" (Page 111)

9. Show Errors

Display the error information.
"Show Errors" (Page 114)

10. Adjustment

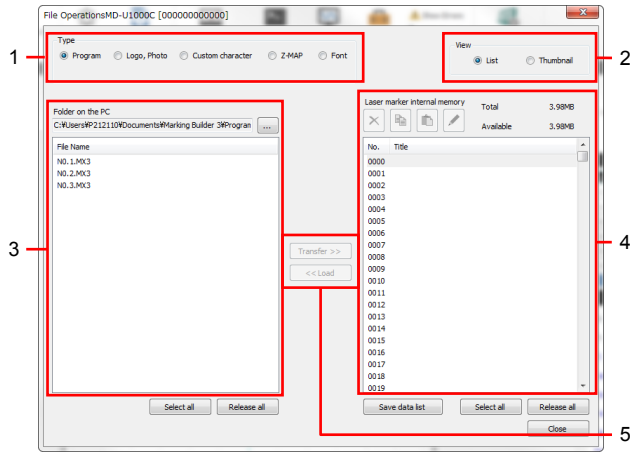
Adjust the power monitor and/or auto focus function.
"Adjustment" (Page 114)

11. Marking Monitor

Execute the operation monitoring function.
"Marking Monitor" (Page 115)

5-1 File Operations

Transfer/load files between the laser marker and PC.

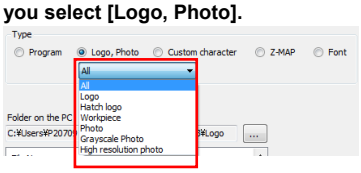


1. Type

Select the file type to be transferred from [Program/Logo, Photo/Custom Character/Z-MAP/Font].

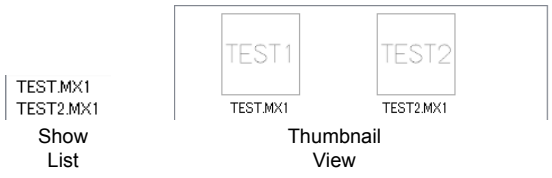
Reference

- **The sort functions for each file type appear when you select [Logo, Photo].**



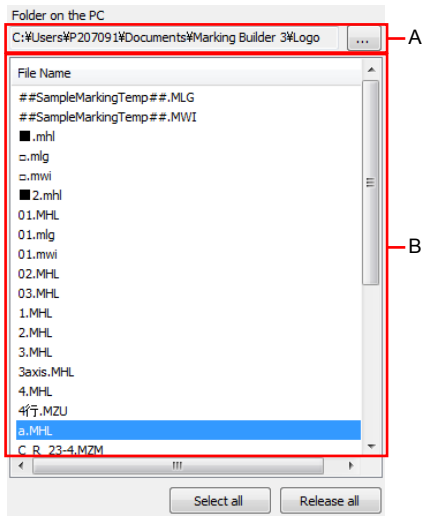
2. View

Select how to display the files in the PC folder and internal memory of the laser marker from [List/Thumbnail].



3. Folder on the PC

Display the files stored in a folder on the PC.



A. Folder reference

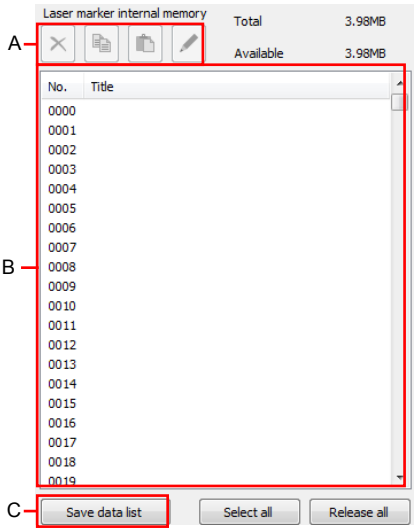
Display the reference folder. Any desired location can be specified as the reference folder.

B. Show files in PC folder

Display the list of files in the folder.

4. Laser marker internal memory

Display the files saved in the internal memory of the laser marker.



A. Delete/Copy/Paste/Change Title

Delete/copy/paste/rename the title of the currently selected program.

B. Show files in the internal memory of laser marker

Display the list of files in the laser marker internal memory.

C. Save Data List

Output the list of data titles saved in the internal memory of the laser marker in csv format.

5. Transfer/Load

Transfer/load files between the laser marker and PC.

- **Transfer**

  Transfer the files selected in the PC folder to the internal memory of the laser marker.

Reference

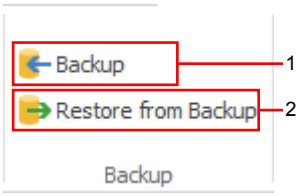
- **Multiple files can be transferred simultaneously. Transfer the files in order starting with the selected program No.**
- **Program files can be transferred one another only between different series of MD-X1000/1500 and MD-U1000.**

- **Load**

  Read the files in the laser marker internal memory to the PC.

5-2 Backup

Back up the files saved in the laser marker or restore files from a backup file.

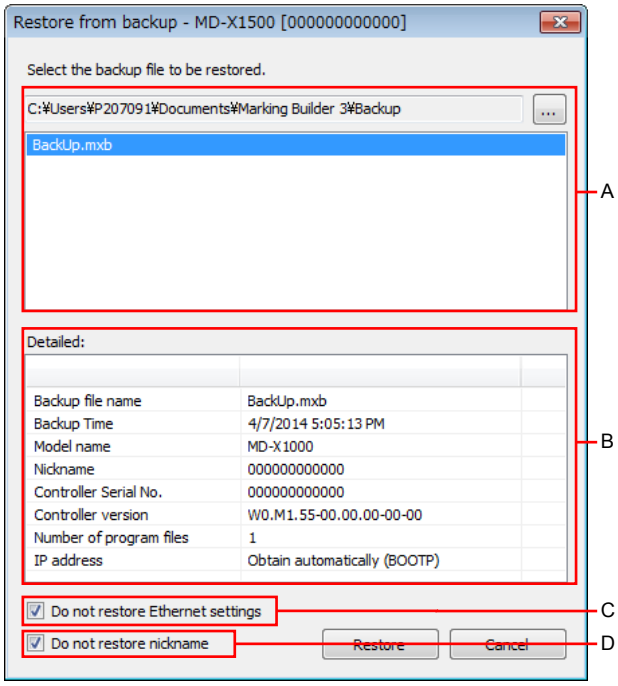


1. Backup

Back up all files saved on the laser marker.

2. Restore from backup

Recover data from a saved backup file.



A. Backup file list

Display the list of backup files stored in the specified folder.

B. Backup file details

Display the detailed contents of the selected backup file.

C. Do not restore Ethernet settings

This option should be checked if you wish to retain the current Ethernet setting.

D. Do not restore nickname

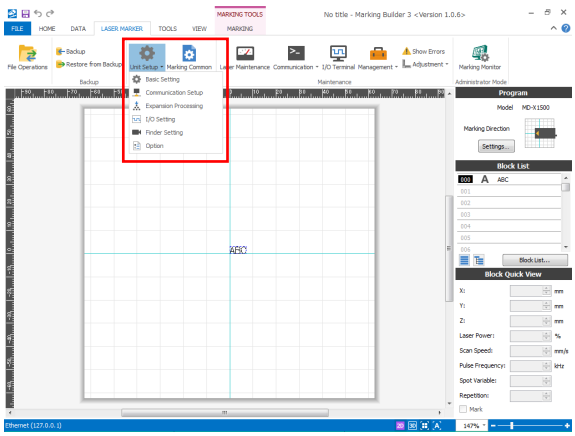
This option should be checked if you wish to retain the current nickname setting.

Reference

- **Restore from backup can be performed one another only between different series of MD-X1000/1500 and MD-U1000.**

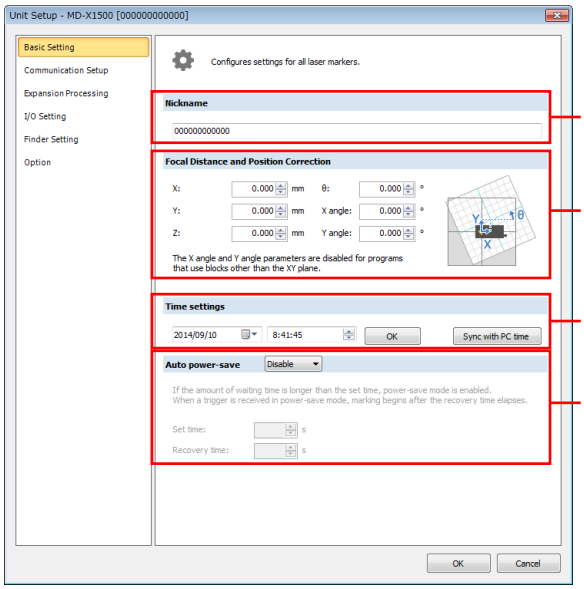
5-3 Unit Setup

Set the basic setting, communication setup, expansion processing, I/O setting, finder setting and options for the laser marker.



Basic Setting

Set the nickname, position correction, time settings, and auto power-save for the laser marker.

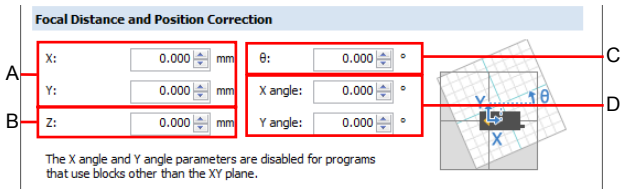


1. Nickname

Set the nickname for the laser marker to be displayed in the connected unit list.

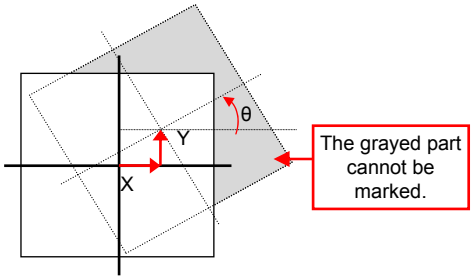
2. Position Correction

Set the coordinate correction to be reflected to the entire program. This option is used in cases such as when the position of the marker head has been changed.



Important

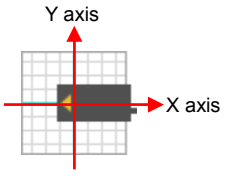
- **The mark data extending beyond the marking area cannot be marked. An over-area error will occur if the mark data is extending beyond the marking area.**



- **For settings of on-the-fly marking, the upper limit of correction value for θ angle is ±2°. Also, "The coordinate correction with the same axis on the movement direction" and "The rotation correction with the same axis on the movement direction" will become disabled.**

A. X/Y Coordinates

Correct the X/Y coordinates. The coordinate axis will be set with reference to the head facing the direction in the figure below.



B. Z

Correct the Z coordinate.

C. θ Angle

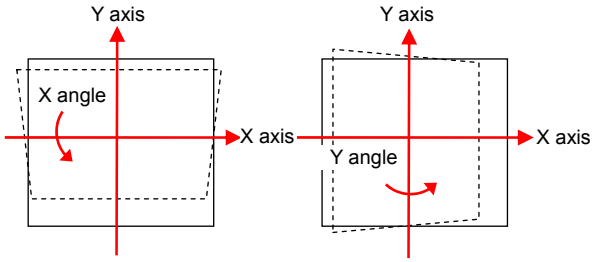
Correct the θ angle.

Reference

- **The rotation is made using the origin after X/Y coordinate correction as the center.**

D. X/Y angles

Set the counterclockwise direction against the X/Y axis as the plus direction.



Important

- **This will not be reflected to programs in which 3D shape settings are used.**

3. Time settings

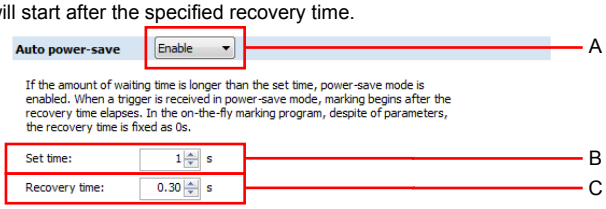
Set the internal clock of the laser marker. Mark the update character based on this date.

Reference

- **Pressing the [Sync with PC time] button will synchronize the date/time with the connected PC.**

4. Auto power-save

Set the laser excitation to OFF if marking is not performed within the specified time. When the next marking start signal comes in, marking will start after the specified recovery time.



Important

- **Set a longer recovery time if the marking is too faint at the start or writing.**

Reference

- **The auto power-save function can "save power" and "extend the life of the LD".**
- **This function is not available on MD-F3200/5200 series and ML-Z9600 series.**

A. Auto power-save

Select whether to enable the auto power-save function.

B. Set time

Set the wait time before entering the power-save state.

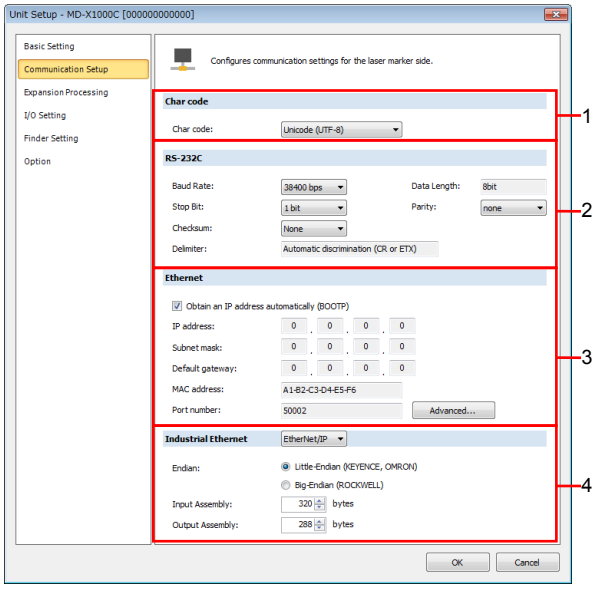
C. Recovery time

When the marking start signal comes in during power-save, marking will start after waiting the specified recovery time.

Communication Setup

WARNING	• **Read the "Chapter 2 Safety Information" in the user's manual for the applicable model to perform operation in the state that the safety is secured by using security function even when the network failure occurs.** • **Confirm the safe operation by considering the communication delay due to the communication time or network overload state.**

Set the character code, RS-232C, Ethernet and industrial Ethernet communication settings.



1. Char code

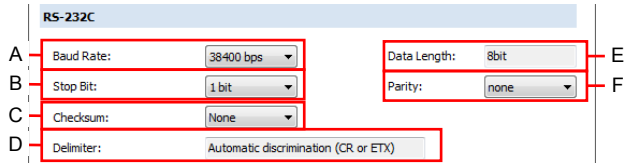
Select the character code for the communication from [Unicode(UTF-8)/Shift_JIS/Latin-1]. Select the character code to be used for strings and file names.

Reference
- **ASCII can be received by any character codes.**

2. RS-232C

Set the communication conditions for the RS-232C port.

Reference
- **The RS-232C communication conditions should be identical between the external device and laser marker.**



A. Baud Rate

Select the baud rate from [115200/57600/38400/19200/9600/4800/2400/1200]bps.

B. Stop Bit

Select the stop bit from [1/2]bit.

C. Checksum

Select whether to add a checksum from [None/Enable].

Reference
- **A checksum is a method of detecting errors in data. XOR (Exclusive OR) of the transmitted data will be converted into two hexadecimal characters and used as checksum data.**

D. Delimiter

The header and delimiter control codes are automatically detected from [None/CR] or [STX/ETX] according to the command from the external device.

E. Data Length

The data length will be fixed at 8 bits.

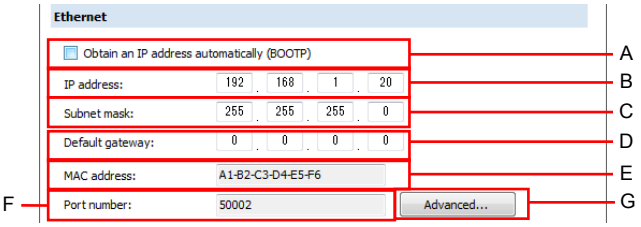
F. Parity

Select the parity check setting from [none/odd/even].

WARNING	• **RS-232C is the protocol that may occur the destruction of the part of data (data corruption or failure) due to some noise or poor contacting. Be sure to use the parity or checksum to construct the communication environment with advanced reliability.**

3. Ethernet

Set the Ethernet communication conditions.



Reference
- **Set the communication conditions for the Ethernet communication port as instructed by the network administrator.**

A. Automatically acquire IP address (BOOTP)

Acquire the IP address automatically from the BOOTP server in the network.

Reference
- **A BOOTP server is required on the network.**

B. IP address

Set the IP address of the laser marker.

C. Subnet mask

Set the subnet mask of the local area network.

D. Default gateway

Enter the IP address of the default gateway device (router, server, etc.) in the local area network.

E. MAC address

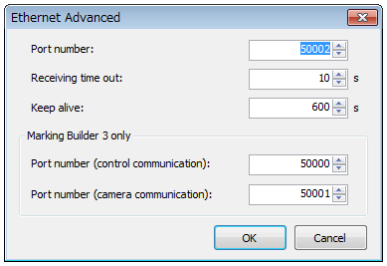
Display the unique MAC address of the laser marker.

F. Port number

Display the port number of the TCP communication.

G. Advanced

Set the detailed settings of the Ethernet communication.

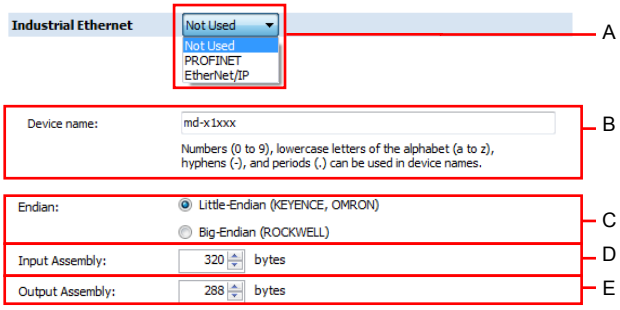


- Port number
  Set the port number of the TCP communication.
- Receiving time out
  Set the tolerated communication interruption time on the laser marker side.
- Keep alive
  Check the connection state with the external device at specified time intervals.
- Port number (control communication)
  Set the communication port number between Marking Builder 3 and the laser marker.
- Port number (camera communication)
  Set the communication port number between Marking Builder 3 and the finder function of the laser marker.

Reference
- **You do not need to change the port number unless there is a security issue.**
- **You do not need to change the receiving time out or keep alive unless a problem occurs in the communication.**
- **When the command is received from multiple external equipment via TCP/IP communication, the command is saved to the buffer (queue) by received order, and the next command is processed after sending out the response.**

4. Industrial Ethernet

Set the PROFINET and EtherNet/IP.



A. Industrial Ethernet

Select from [Not use/PROFINET/EtherNet/IP].

B. Device name

Displays when a PROFINET is selected. Set the device name of laser marker.

Important

- **When PROFINET function is used, it is necessary to specify the IP address via Ethernet communication condition.**
- **When PROFINET function is set, or when the device name is changed, it is required to restart the controller.**

Reference

- **This function can not use in MD-X1000L/1500L series.**
- **Numbers (0 to 9), alphabets in small letters (a to z) and period (.) can be used in device name.**

C. Endian

Displays when EtherNet/IP is selected. Select a layout method for multi byte data from [Little endian/Big endian].

Reference

- **The data layout methods may differ depending on the PLC manufactures. Set it based on the PLC in use.**
- **When connecting to KEYENCE PLC KV series, select Little endian.**

D. Input Assembly

Displays when EtherNet/IP is selected. Set the receiving data size in PLC via EtherNet/IP communication.

E. Output Assembly

Displays when EtherNet/IP is selected. Set the sending data size in PLC via EtherNet/IP communication.

Important

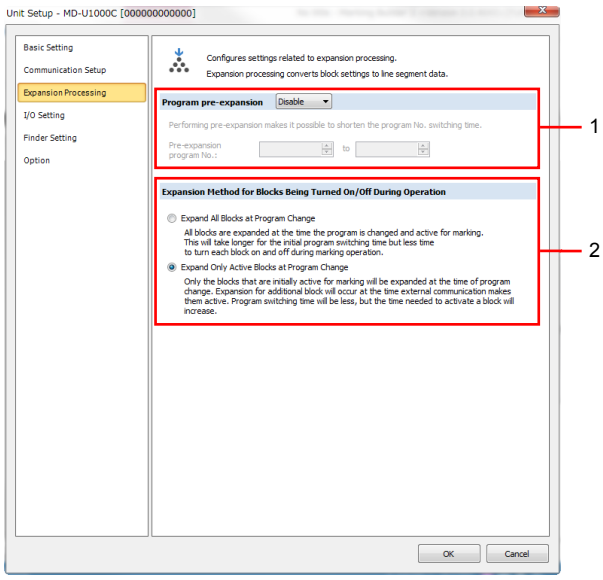
- **When EtherNet/IP function is used, it is necessary to specify the IP address via EtherNet/Ip communication.**
- **When EtherNet/IP funtion is set, or when endian or Assembly size is changed, it is required to restart the controller.**

Reference

- **This function can not use in MD-X1000L/1500L series.**
- **The assembly size for the Input is 2 to 320 byte and for the Output is 2 to 288 byte.**

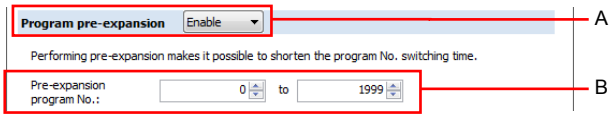
Expansion processing

Set the program pre-expansion processing and the expansion method during the marking flag operation.



1. Program pre-expansion

Set whether to pre-expand the program immediately after startup and the program No. range to be pre-expanded.



A. Program pre-expansion

Select whether to enable the program pre-expansion function.

B. Pre-expansion program No.

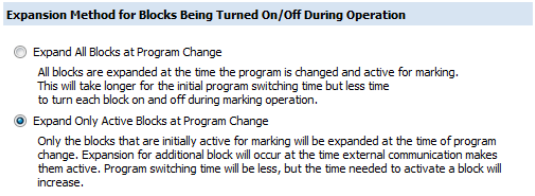
Set the program No. range to be pre-expanded.

Reference

- **All programs (No.0 to No.1999) should be targeted in general. Set a specific range if the expansion memory-full error occurs or if the expansion processing time immediately after startup is too long.**
- **Marking cannot be performed until the expansion is complete.**

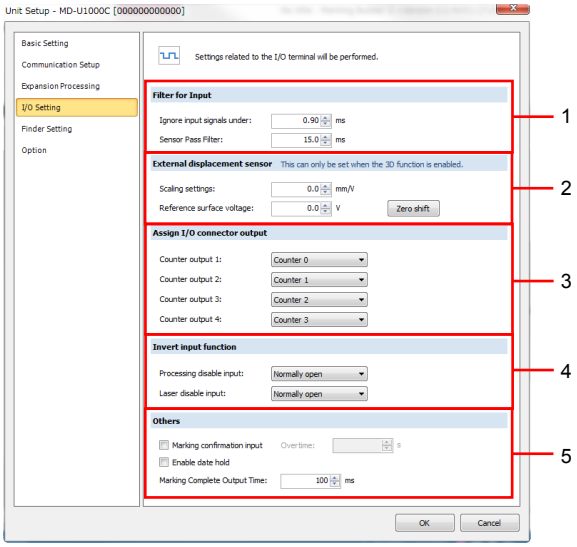
2. Expansion with marking flag

Select the block expansion method from below when switching the program No. or operating the marking flag via external communication.



I/O setting

Set the I/O (terminal block) related functions.



1. Input filter

Set the process in relation to the input signal in I/O terminal.

■ Ignore input signals under

Set the ON delay at input circuit. A signal of setting time or less is not accepted.

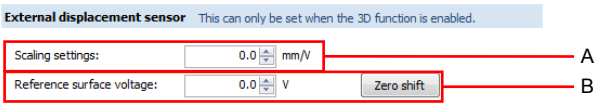
Reference
- **This function effects to the chattering of relay output and the filtering of the noise signal.**

■ Sensor pass filter

After the marking start input turns on, it keeps on within the time that has been set. The misoperations such as chattering will be prevented.

2. External displacement sensor

Set the Z axis scaling on the input voltage from the external displacement sensor and the reference surface voltage.



Important
- **This function is only available when the 3D extensions software "MB3-H3D1" is installed.**

A. Scaling settings

Set the analog voltage input and the scaling for the Z coordinate correction amount.

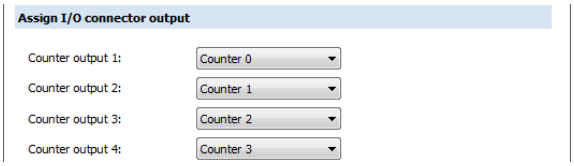
Reference
- **Set how the amount of Z coordinate correction (in mm) when the voltage input from external source changes by 1V.**

B. Reference Surface Voltage

Set the input voltage for when the marking workpiece is installed on the reference plane. The reference surface voltage will be set automatically when you press the [Zero shift] button with the workpiece distance adjusted to the reference distance.

3. Assign I/O connector output

Set the counter number corresponding to Counter output 1 to 4 (No. 56/54/52/50). Date deviation output can also be selected for counter output 4 (No. 50).



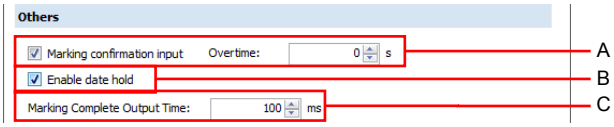
Reference
- **The counter output signal becomes ON when the final value of the set counter is marked.**
- **Date deviation output becomes ON when the date changes during date hold input. It will also become OFF when the date hold input (No. 68) is released.**

4. Invert input function

Select the operating condition for the processing disable input (No. 30) and laser disable input (No. 32) from [Normal open/Normal close].

5. Others

Validate the marking confirmation input and date hold input and set the maximum output time of marking complete output.



A. Marking confirmation input

Set whether to enable marking confirmation input (No. 11). If you enable this option, a marking loss detection error will occur if the marking confirmation input does not become ON before between "Marking start" and "Marking complete + Overtime".

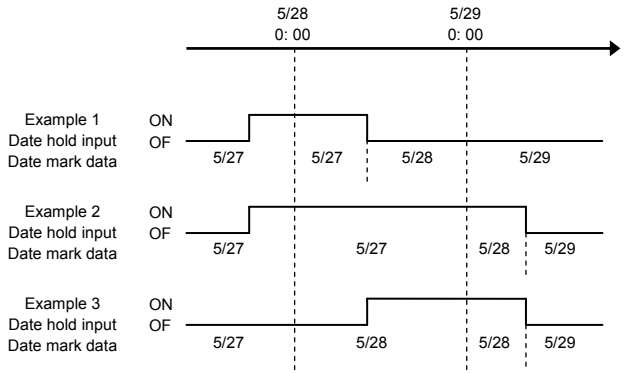
Reference
- **Detect the laser emission using an external device such as a sensor, and connect the output signal of the external device to the marking confirmation input.**

B. Enable date hold

Set whether to enable the date input hold (No. 68). If this option is enabled, the date of the previous day will be marked when the date is crossed during date hold input. The date deviation output (No. 50) becomes ON while date hold is enabled.

Reference
- **If the date is crossed twice or more with the date hold enabled, 1 day is added to the date from the second time and onward.**

Example
- **The following describes the date hold input state and the marking state of the date update characters.**



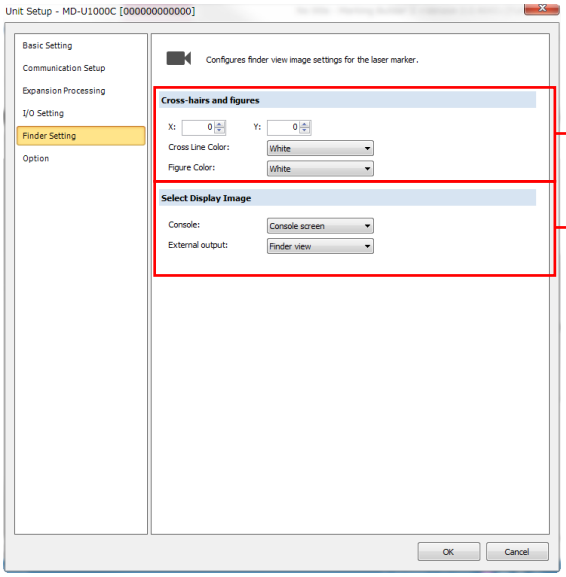
C. Marking Complete Output Time

Sets the maximum output time of the marking complete output (No. A7, No. 27 only for ML-Z9600 series).

Reference
- **If the marking start signal becomes ON during the marking complete output, the marking complete output will become OFF in the same timing.**

Finder setting

Set the screen for the finder images to be displayed in the preview, console and external monitor.



Reference ・ **This function is not displayed on MD-X1000L/1500L, MD-F3200/5200 series, and ML-Z9600 series.**

1. Cross-hairs and figures

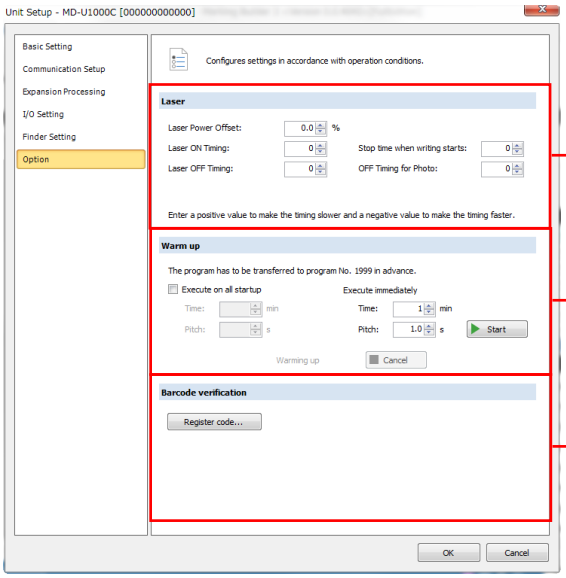
Set the display position and color of the cross line in the finder view and the figure (area frame and marking image) color.

2. Select Display Image

Select the image to be displayed in the console and external output (monitor) from [Console screen/Finder view].

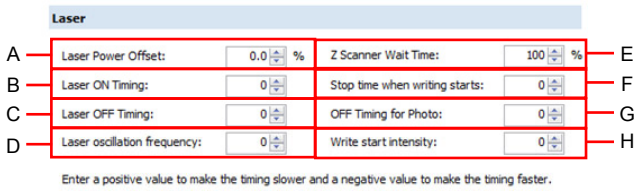
Option

Set the optional functions of the laser including the power offset, ON/OFF timing and warm up function.



1. Laser

Adjust the power offset and the ON/OFF/stop timings of the laser.



Reference ・ **Timing adjustment is unnecessary in general. Adjust these options only when the ON/OFF timing is not correct, such as when the scan speed is high.**

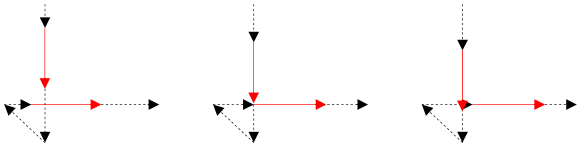
A. Laser Power Offset

Set a power offset for all laser marker programs.

Reference ・ **This option will be fixed at 100% if the sum of the laser power setting value of the block and the power offset value exceeds 100%.**

B. Laser ON Timing

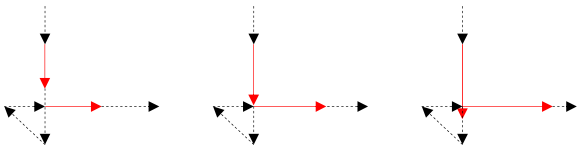
Adjust the writing start timing of the laser emission. The writing will start sooner if you enter a negative value (or later if you enter a positive value).



ON Timing: -10 ON Timing: 0 ON Timing: 10

C. Laser OFF Timing

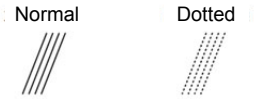
Adjust the writing end timing of the laser emission. Entering a negative value makes the line segment shorter; and entering a positive value makes it longer.



OFF Timing: -10 OFF Timing: 0 OFF Timing: 10

D. Laser oscillation frequency

When performing dot marking, the laser oscillation frequency can be adjusted between 5 and 25 kHz. Offset is performed by value which is entered from the initial value of 25 kHz.



Reference ・ **This function is displayed on ML-Z9600 series only.**
・ **Fix it to "0" in the normal usage.**

E. Z Scanner Wait Time

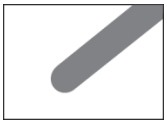
Adjust the wait time according to the scanner shift on the Z direction. It is enabled when the writing starts is out of focus.

Reference ・ **This function is displayed on MD-F3200/5200 series only.**

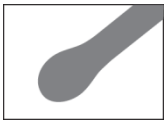
F. Stop time when writing starts

Stop the scanner while emitting the laser at the start of writing. Set this option when the marking is too thin (narrow) at the start or writing.

Stop time: Small



Stop time: Optimal



Stop time: Large

Reference
- **This function is not available on MD-F3200/5200 series.**

G. OFF Timing for Photo

Set the OFF timing for the laser dedicated for photo files. Photo files are drawn in dots, and the dot length may fluctuate at some scan speeds resulting in inconsistencies in density. In such cases, you can set the OFF timing to adjust the density. As the value gets larger, the dot length will become longer resulting in denser marking.

H. Intensity at the start of writing

Set the intensity at the start of writing by 5 steps when the start of writing of the line segment is marked strongly and deeply in the case of marking film and thin sheet material. The initial value is set to "0," and the lager the setting value is, the stronger the start of writing becomes.

Strong at start writing

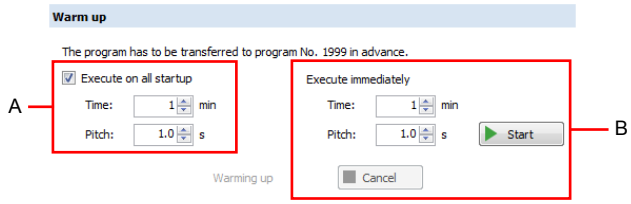
Weak at start writing

Reference
- **This function is displayed on ML-Z9600 series only.**
- **Fix it to "0" in the normal usage.**

2. Warm up

Set the warm up function that performs blank marking (marking without laser emission) on program No. 1999 for the specified period of time.

Reference
- **The internal temperate of the laser marker will be in equilibrium state when you run the warm up function for approximately 30 minutes, reducing the initial drift caused by the operational heat.**
- **The "Warm up incorrect operation error" occurs when a program using a group, matrix, fixed point while trigger is on, updated characters, On-the-fly Marking, marking confirmation function, or 2D code reader function is set to program No.1999.**



A. Execute on all startup

Warms up the laser marker automatically for the set time period when it is started. “Blank marking => Stand by for interval time => Blank marking => Stand by for interval time => ..." will be repeated during warm up.

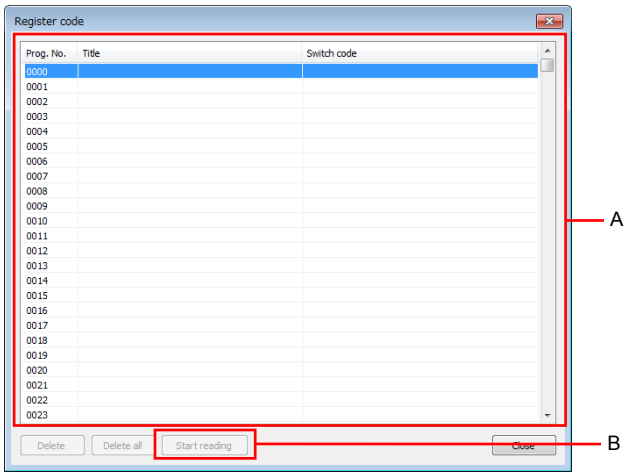
B. Execute immediately

Perform a warm up for the set period. “Blank marking => Stand by for interval time => Blank marking => Stand by for interval time => ..." will be repeated during warm up.

3. Barcode verification

Switch the program No. by registering a barcode or 2D code with a linked program No. and then reading the code.

Important
- **Advance preparation of the barcode reader is required in order to use this function. Add "BR," to the header of the barcode reader.**
- **You can register up to 20 characters as a linked code.**



A. Program List

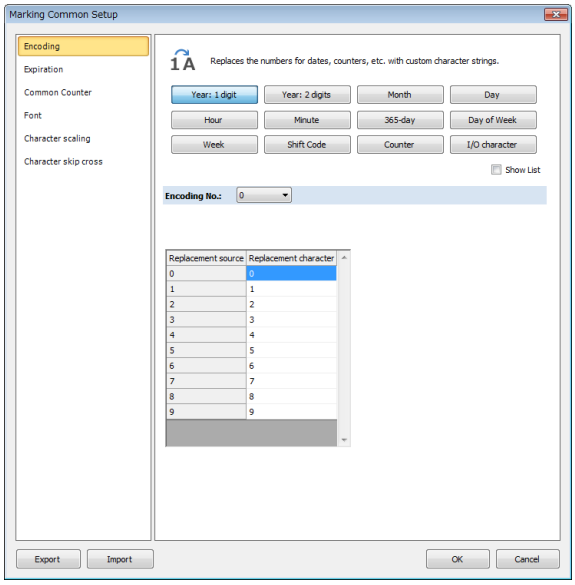
Display the list of programs registered for the laser marker. Display the contents of the code linked with the [Switch code] column.

B. Start reading

Registers a code to the selected program No. Read the barcode after pressing the button.

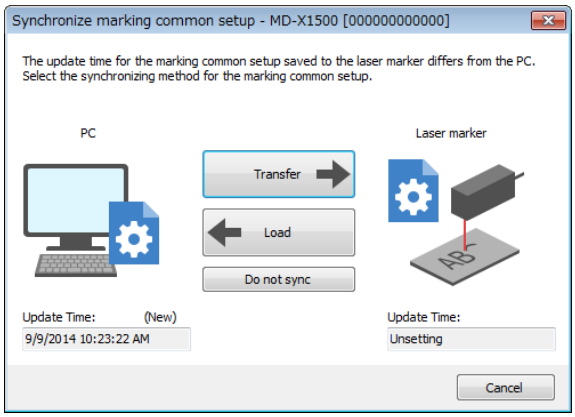
5-4 Marking Common Setup

Set the encoding, expiration, common counter, font, character scaling and character skip cross.



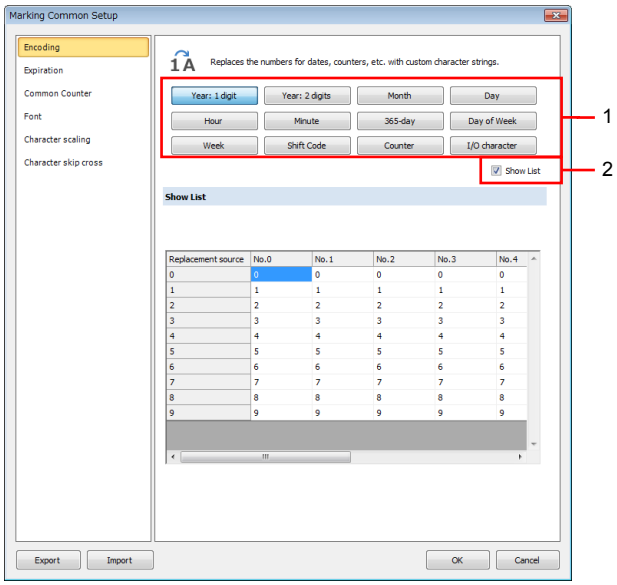
Reference

- **You can save or import the common marking settings using the [Export/Import] buttons.**
- **- The following screen will appear when there are differences between the marking common setup of Marking Builder 3 and the laser marker. Select the data that you wish to edit first.**



Encoding

Encoding is a function for encoding update characters such as the year/month/day and counter with the desired string. This section describes the encoding settings.



1. Encoding Functions List

Create a encoding setting for each update character.

Reference

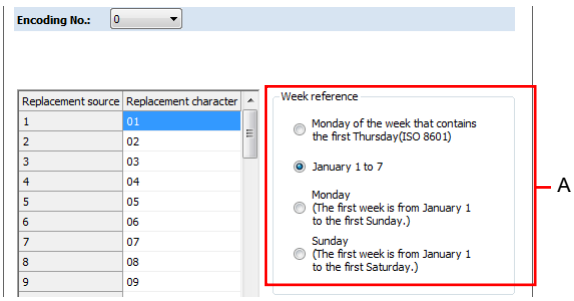
- **You can set up to 4 characters for the string after encoding.**

■ **Year: 1 digit, Year: 2 digits, Month, Day, Hour, Minute, Day of Week, I/O Encoded Character**

You can encode each update character to the desired string. Up to 10 types of encoding settings can be created.

■ **Week**

You can encode the update character for [Week] with the desired string. Up to 10 types of encoding settings can be created.



A. Week reference

Select the reference for the start of week from below.

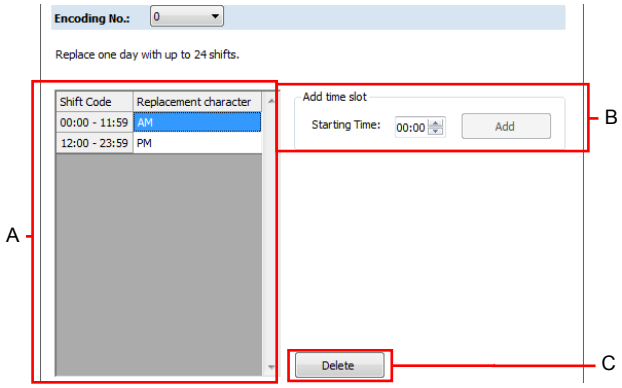
- Monday of the week containing the first Thursday
- Jan. 1 to Jan. 7
- Mon.
- Sun.

■ **365-day**

You can encode the update character for 365-day with the desired string. Up to four types of encoding settings can be created.

■ **Shift Code**

You can encode the update character for [Shift Code] with the desired string. You can divide the day into (up to) 24 and encode the string in hour segments.



A. Shift Code List

Set a separator and replacement string to the shift code.

B. Add time slot

Set and add a separator time to the shift code.

C. Delete time slot

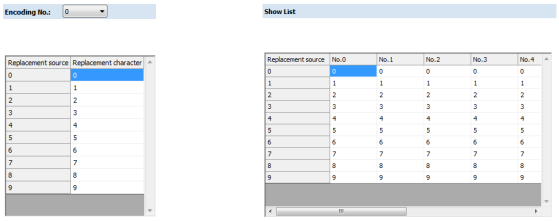
You can select and delete a shift code.

■ **Counter**

Encode the counter update character with the desired character. You can set a encoding setting for each character. Up to 10 types of encoding settings can be created.

2. Show List

Switch between Individual and List views.

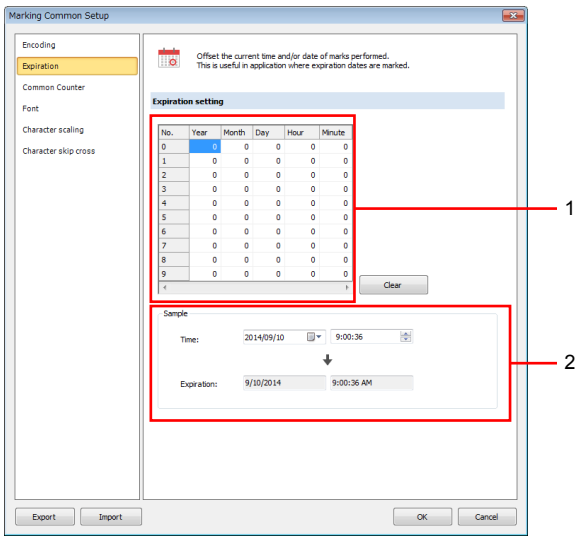


Individual view　　Show List

Reference ・ **For the Individual view, you can select the encoding No. from the list menu.**

Expiration

Mark by offsetting the [Time] update character from the current time.



1. Expiration setting

Set the offset amount for year, month, day, hour and minute. Up to 10 types of expiration settings can be created.

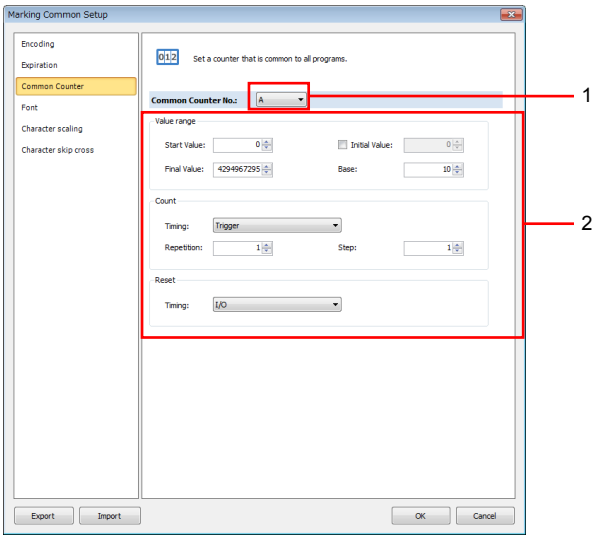
Reference ・ **Expiration is processed in the order of year, month and day. When you set "Month: +1, Days: -1" on Aug. 1, 2014, the marked date will be Sep. 29, 2014.**

2. Sample

Display the expiration to be marked based on the selected expiration setting and time.

Common Counter

Set a common counter that can be used by all programs. The current value of the common counter is managed collectively for all programs.



1. Common Counter No.

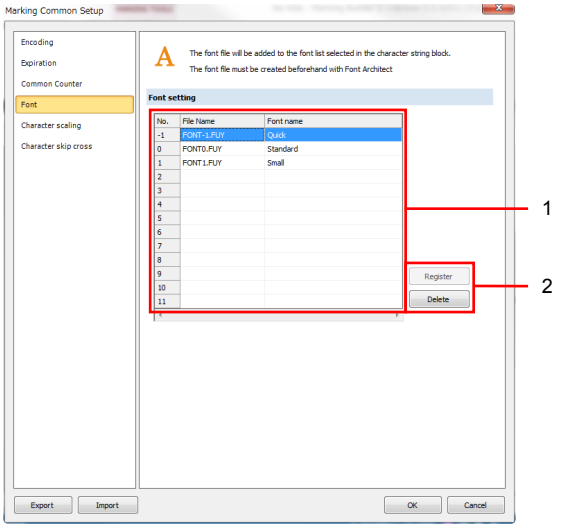
Select the common counter No. (A to J) to be edited.

2. Counter Settings

Set the contents of the common counter.
"Counter" (Page 63)

Font

You can assign the font to which the string font will be added. A font file must be created beforehand using Font Architect.



1. Font List

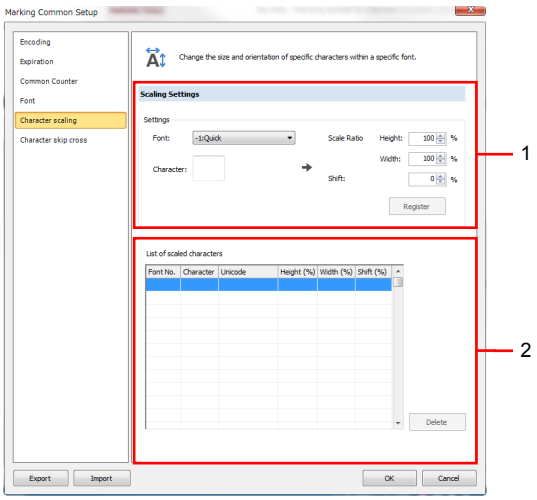
Display the list of registered fonts.

2. Register/Delete

Select whether to register a font file to the font No. currently selected in the font list or delete the currently selected font No.

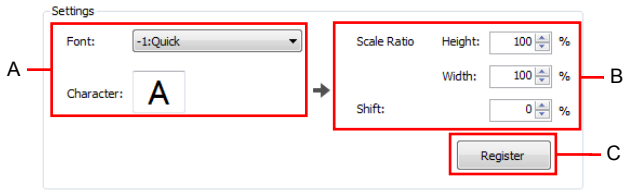
Character scaling

Scale the character size. You can set the height, width and vertical shift by specifying the font No. and character.



1. Scaling Settings

Set the font, character, scale ratio and shift.



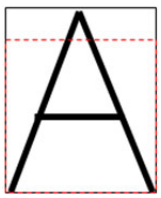
A. Font/Character

Specify the font and characters to be scaled.

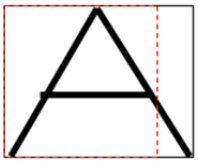
B. Scale Ratio/Shift

Set the height/width scale ratios and the shift in the height direction.

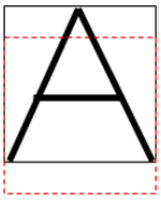
Scaling Settings: None



Scaling Settings: Height plus



Scaling Settings: Width plus



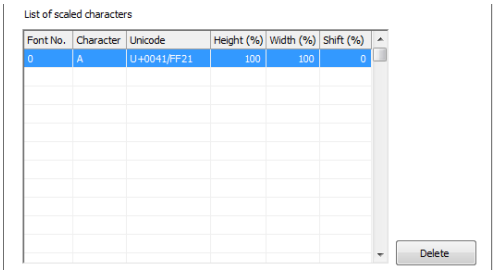
Scaling Settings: Shift plus

C. Register

Register the scaling setting to the scaling target character list.

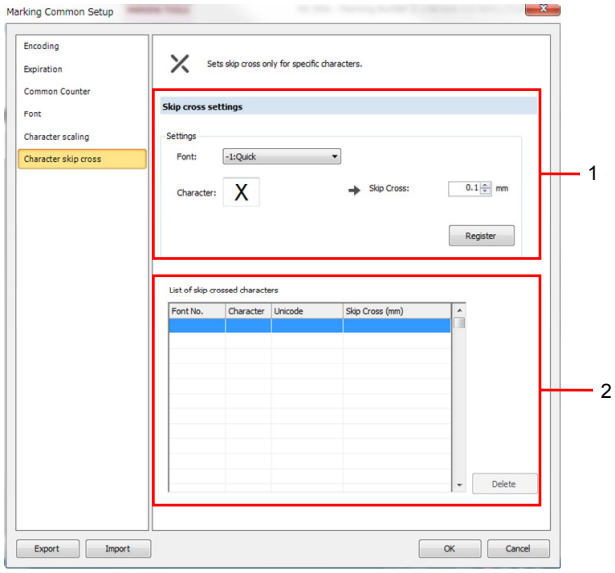
2. List of scaled characters

Display the list of scaled characters.



Character skip cross

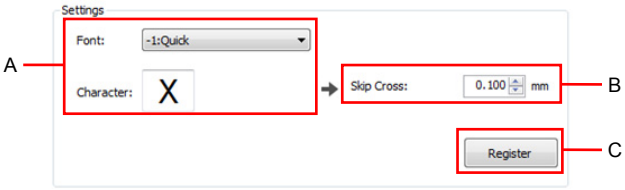
You can set a skip cross individually for each character of the font.



Reference
- **The value set here will have priority over the skip cross width of the block.**

1. Skip cross settings

Set the skip cross width by specifying the font No. and character.



A. Font/Character

Specify the font and characters to be skip crossed.

B. Skip Cross

Set the width to be skip crossed.

Reference
- **There are portions where the skip cross is not set by the Quick font.**

C. Register

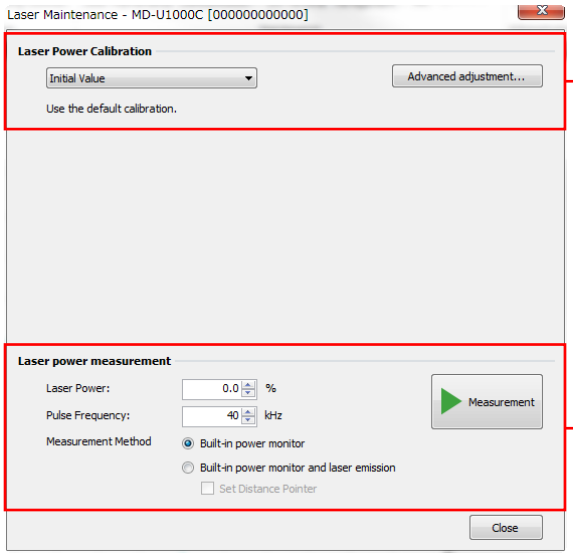
Register the skip cross setting to the skip cross target list.

2. List of skip crossed characters

Display the list of skip crossed characters.

5-5 Laser Maintenance

Perform the laser power calibration and laser power measurement.



1. Laser Power Calibration

Set the auto correction method for the laser power.

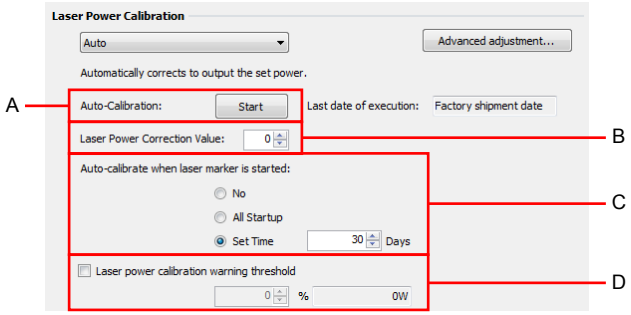
Reference
- **This function is not available for the MD-X1000L/1500L series and ML-Z9600 series.**

■ **Defaults**

Use the laser with the factory default adjustment values, without performing a laser power calibration.

■ **Auto**

Automatically calibrates the laser power such that the 100% output will be recovered to the same level of output as the factory default state.



Reference
- **A laser power auto-calibration error will occur when the correction limit is reached. You need to increase the laser power of the program or repair this device.**

A. Start Auto-Calibration

Start the auto-calibration.

B. Laser Power Correction Value

You can fine-tune the output after calibration.

C. Auto-calibrate when laser marker is started

Perform calibration automatically or selects from the options below.

- **No**
  Calibration is not performed automatically.
- **All Startup**
  Perform auto-calibration on startup after the specified period.
- **Set Time**
  Execute auto-calibration on startup after the specified period.

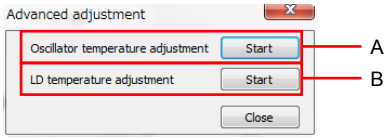
D. Laser Power Calibration Warning Threshold

Set the threshold for warning when performing the auto-calibration. The warning will occur when only confirming the output that is not more than the set value.

Reference
- **This function is used on MD-U1000 series only.**

■ **Advanced adjustment**

Perform the laser oscillator temperature adjustment and LD temperature adjustment.



Reference
- **This function is used on MD-U1000 series only.**

A. Laser Oscillator Temperature Adjustment

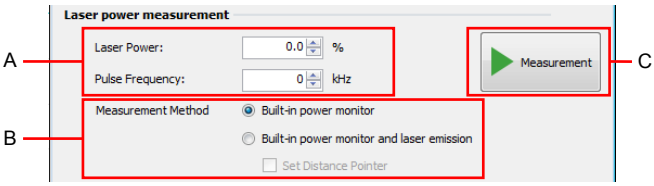
Perform the temperature adjustment of the laser oscillator.

B. LD Temperature Adjustment

Perform the temperature adjustment of LD (laser diode).

2. Laser power measurement

Measure the laser power.



Reference
- **The internal power monitor function is not available for the MD-X1000L/1500L series and ML-Z9600 series. Only external laser emission is supported.**

A. Laser Power/Pulse Frequency

Set the output and pulse frequency during laser power measurement.

Reference
- **When measuring the laser power, use the following pulse frequency because the best pulse frequency is different by model.**
  MD-X1000/1500 series: 0 kHz
  MD-F3200/5200 series: 100 kHz
  MD-U1000 series: 40 kHz

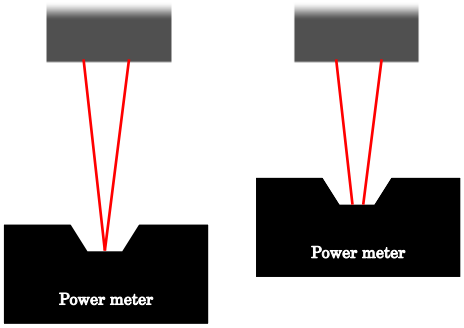
B. Measurement Method

Select the laser power measurement method from below.

- **Built-in power monitor**
  Measure the output using the internal power monitor only. Laser will not be emitted externally.
- **Built-in power monitor and laser emission**
  Measure the output using the built-in power monitor while emitting laser on the point of origin. Set the power meter to the origin using the distance pointer lighting function.

NOTICE

- **Use a power meter that matches the wavelength and output; and install it such that it will not be in focus on the thermopile part.**



Installation status: NG　　Installation status: OK

C. Measurement

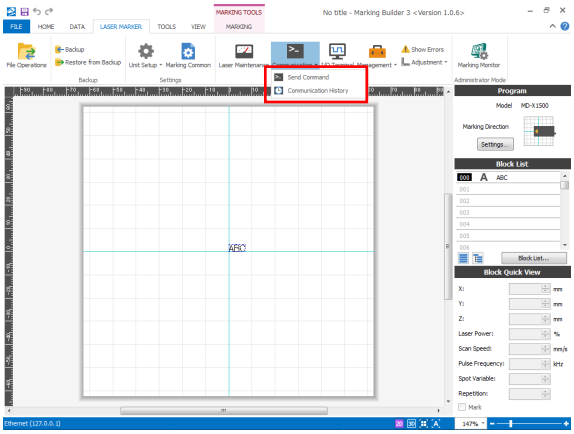
Start the measurement.

WARNING

- **Laser emission will start when you press the [Measurement] button. Make sure to emit the laser after confirming the safety of the surrounding area.**

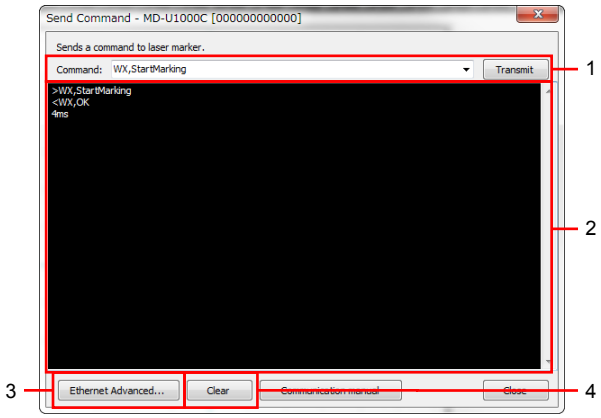
5-6 Communication

Execute the send command function and displays the communication history.



Send Command

Send a communication command to the laser marker.



1. Command

Enter the command to be sent to the laser marker. The entered command will be sent when you press the [Transmit] button.

2. Send Command History

Displays the send command history and communication time.

3. Advanced

Set the tolerated communication interruption time on the send command side.

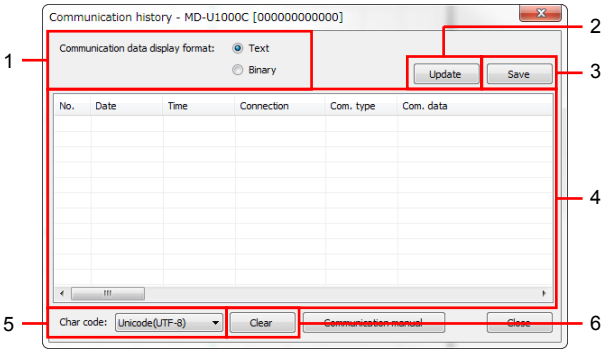
4. Clear

Clears the send command history. Closing the screen will also clear the history data.

Reference ・ **The manual can be referenced using the [Communication manual] button.**

Communication history

Display the RS-232C and Ethernet communication history.



Reference ・ **Each communication history entry has a capacity of up to 400KB; and up to 2000 transmission entries are saved.**

1. Communication data display format

Select the display format of the [Com. data] column from below.

■ **Text**

Display the communication data in text (ASCII) format.

■ **Binary**

Display the communication data in binary (Base 16) format.

2. Update

Update the communication history and displays the latest state.

3. Save

Save the communication history in CSV data format.

4. Communication history

Display the communication history in chronological order.
A communication pathway is displayed in connection item.

Connection	Contents
RS-232C	Displayed during RS-232C communication.
IP address	Displayed during Ethernet communication. IP address of the device to be connected is displayed as "xxx,xxx,xxx,xxx".
Barcode reader	Displayed when using the barcode reader from the USB at the front to communicate.
PROFINET	Displayed during PROFINET communication.
EtherNet/IP	Displayed during EtherNet/IP communication.

5. Char code

Set the character code for the communication data.

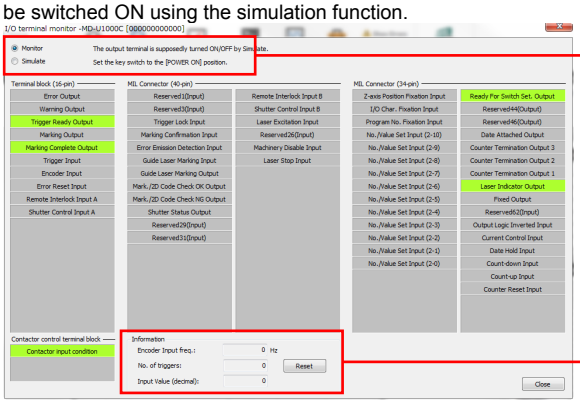
6. Clear

Clears the communication history.

Reference ・ **The manual can be referenced using the [Communication manual] button.**

5-7 I/O Terminals

Display the input/output state of the I/O terminal. The output circuit can be switched ON using the simulation function.



1. Monitor/Simulate

Switch between the Monitor and Simulate modes.

■ Monitor

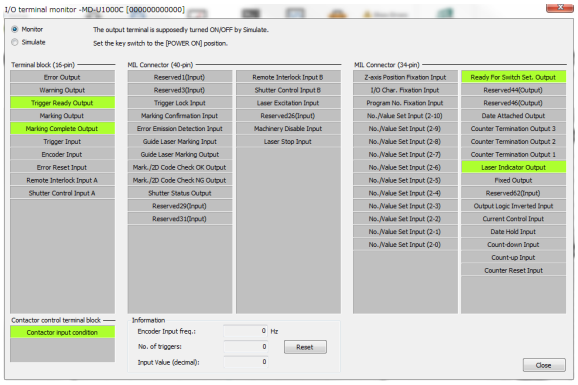
Display the input/output state of the I/O terminal.

Reference

- **The monitor refreshes at intervals of 0.5s. Signals with short output time may not be displayed.**
- **The contactor input condition may not link with the monitor display.**

■ Simulate

You can set the desired output of the I/O terminal to ON. The output terminal becomes ON when you select the desired output and press the [Set] button.

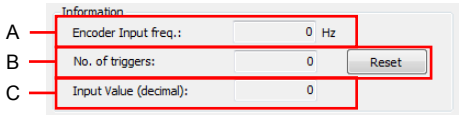


Important

- **The simulation function is only available when the key switch is set to [POWER ON].**

2. Information

Moniter the input information of Encoder Input Frequency for I/O terminal block.



A. Encoder Input Frequency

Moniter the [Input Frequency] of encoder pulse and display it.

B. No. of Trigger Input:

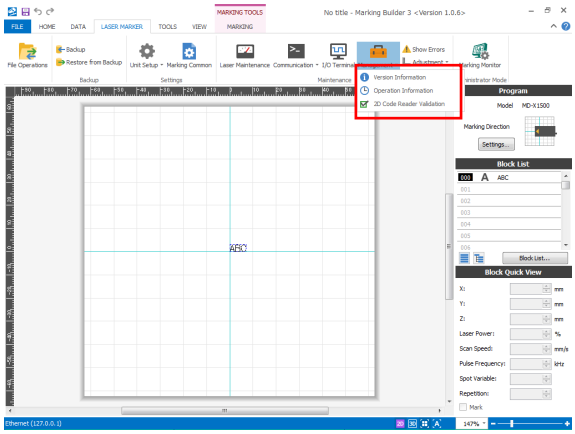
Display the trigger times input from the terminal block. Press the reset button to initialize the trigger input times.

C. No./Numeric Specification (Dec)

Convert the specified number to base 10 via No./value setting terminal of I/O input and display it.

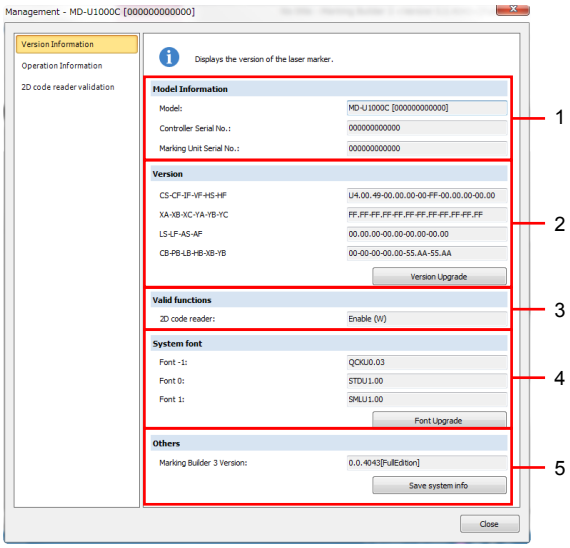
5-8 Management

Check the version and operation information and enables the 2D code reader function.



Version Information

Display information on the laser marker.

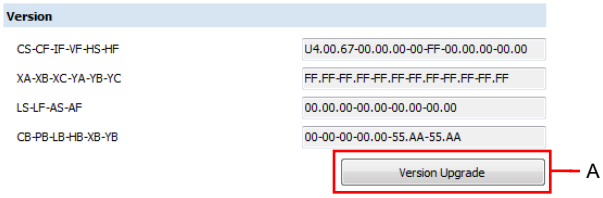


1. Model information

Display the model, the controller serial number and the head serial number.

2. Version

Display the version information and performs version upgrades.



A. Version upgrade

Upgrades the version of the laser marker.

Important

- **Never switch off the power while version upgrade is in progress. If you do so, it may result in the loss of all data and/or the laser marker may fail to start.**

Reference

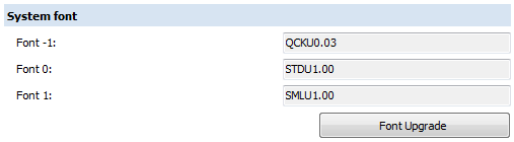
- **When performing the version upgrade, the current backup file will be saved to the Backup folder before the version upgrade.**
  (e.g.: the file name when the backup is performed on 2018/01/16 16:28:22: 20180116162822.mxb)
- **The version upgrade required up to 20 minutes. The LED lamp on the front panel of the controller flashes in red while version upgrade is in progress. When the version upgrade is completed, READY LED will turn off and the buzzer will be sounded.**

3. Valid functions

Display whether the 2D code reader functions are enabled.

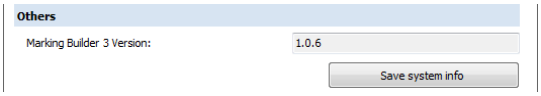
4. System font

Display the font version and performs font version upgrades. The system font can be upgraded using the [Font Upgrade] button.



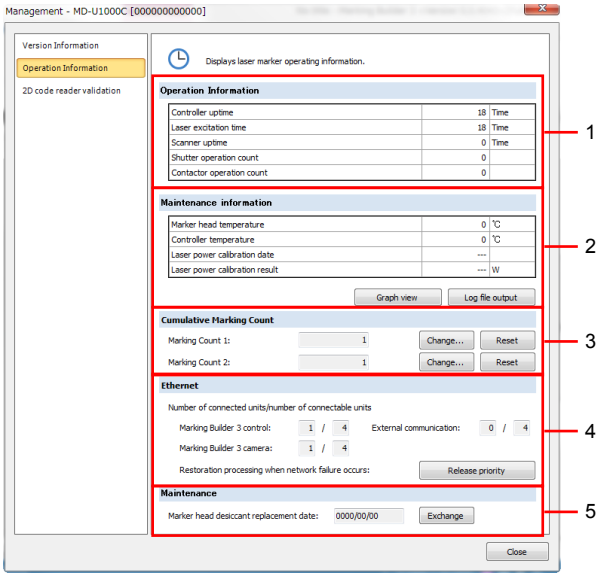
5. Others

You can display the version of Marking Builder 3 and save the PC system information. You can save the system information of the PC in text format using the [Save system info] button.



Operation information

Display information on the laser marker.



1. Operation information

Display laser marker operating information.

2. Maintenance Information

Display the maintenance information of laser marker. Output of chart display and log files are available.

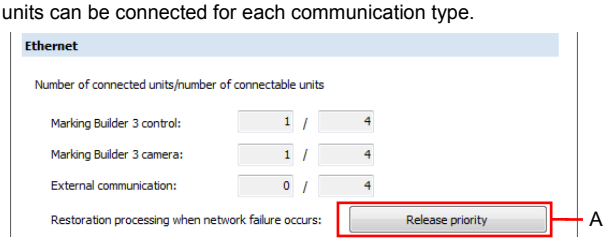
Reference
- The maintenance information is displayed only on MD-U1000 series and ML-Z9600 series. Output of chart display and log files are available only on MD-U1000 series.

3. Cumulative Marking Count

Cumulative marking count 1/2 are displayed. You can change or reset it.

4. Ethernet

Display the number of devices connected via Ethernet. Up to four units can be connected for each communication type.



A. Open Priority

Force the release of all Ethernet connections.

5. Maintenance

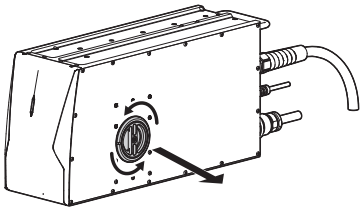
Display the replacing expiration of the dry agent for the head that is used currently.
Replace the dry agent for the head once a year.

WARNING	• **It is dangerous if the laser beam is irradiated mistakenly during replacement. Be sure to turn off the power when replacing the dry agent.**
CAUTION	• **Replace it quickly in a clean environment to minimalize entering dust or dirt into the space for the dry agent of the head. Also, check that dirt does not stick to the dry agent.**
NOTICE	• **The expiry date for use of the dry agent is one year after unsealing the package (five years of storage limitation with unopened state). When starting the laser marker with the expired state, "Warning for replacing the dry agent of the head" will occur.**

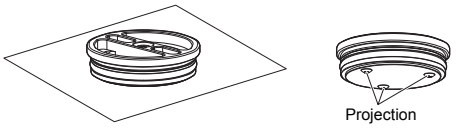
Reference
- **Are displayed on MD-U1000 series only.**

(1) Turn the key switch of the controller to the position of [OFF] to switch off the power.

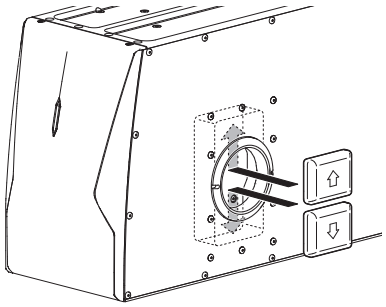
(2) Turn the cap on the side of the head to remove it.



CAUTION	• **The cap should be opened/closed only when replacing the dry agent.** • **Place the removed cap on the clean place with the side having a projection downward.**

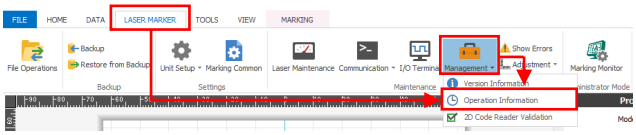


(3) Replace the dry agent. Insert it along with the direction of the arrow described on the dry agent.

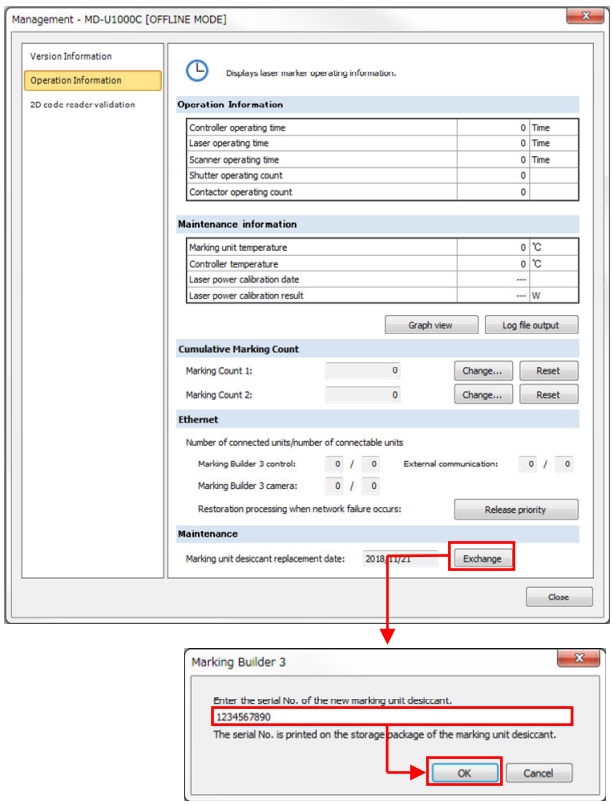


(4) Fit the cap with the reverse procedure of (2). Tighten the cap until it does not turn more. Also, check that it does not engage the dry agent.

(5) Start Marking Builder 3, and select "Laser Marker > Management > Operation Information."

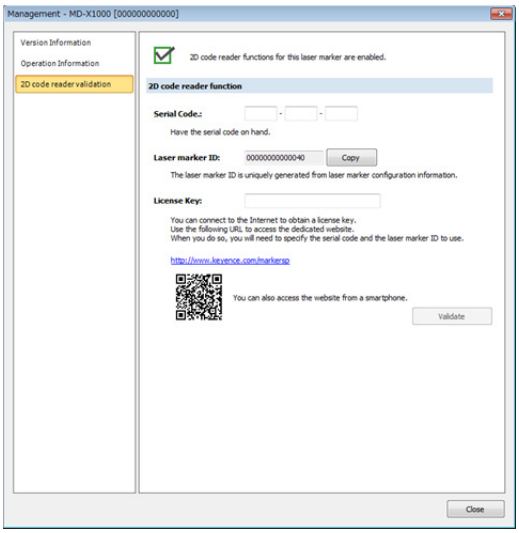


(6) Press the "Replace" button, input the serial number and press "OK."
The serial number is described on the storage package of the dry agent.



2D code reader validation

Perform the activation for validating the 2D code reader function in the program settings.



Important

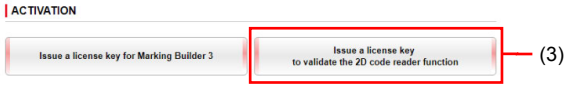
- **Internet connection is required during the activation. If no Internet connection is available on the PC on which the software was installed, you can access the activation page from another device.**
- **This function is not available for MD-X1000L/1500L series, MD-F3200/5200 series, and ML-Z9600 series.**

■ How to activate the 2D code reader

(1) Enter the “Serial Code” supplied with MD-XAD1(A).

(2) Click the link to the activation page.

(3) Select the use country on the Laser Marker support site, then press the [Enable 2D code reader function] button.

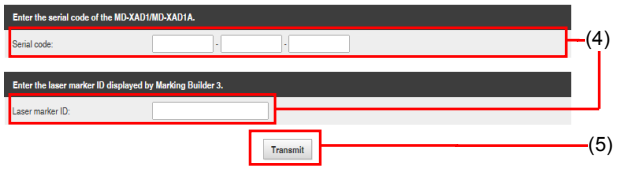


Important

- **You must be logged into the KEYENCE website to access the activation page.**

(4) Enter the "serial code" and "laser marker ID" on the activation page.

(5) Press the [Send] button.



Reference

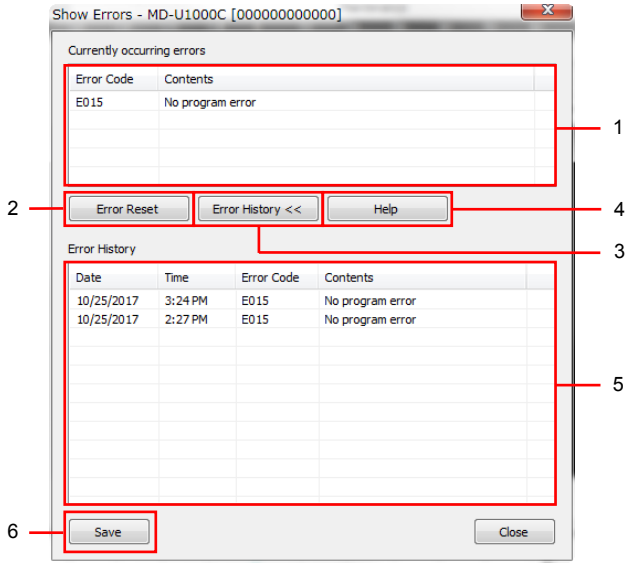
- The laser marker ID can be copied to the clipboard using the [Copy] button.

(6) Enter the license key displayed into the [License key] field on the activation screen.

(7) Press the [Validate] button.

5-9 Show Errors

Display the error state/history and resets errors.



1. Error Status

Display the currently occurring errors.

2. Error Reset

Reset the error.

3. Show/Hide Error History

Show/hide the error history.

4. Help

Start the "Help for Showing Errors" window, and the state of the error and method to solve the problem can be confirmed.

5. Error History

Display the error history.

Reference

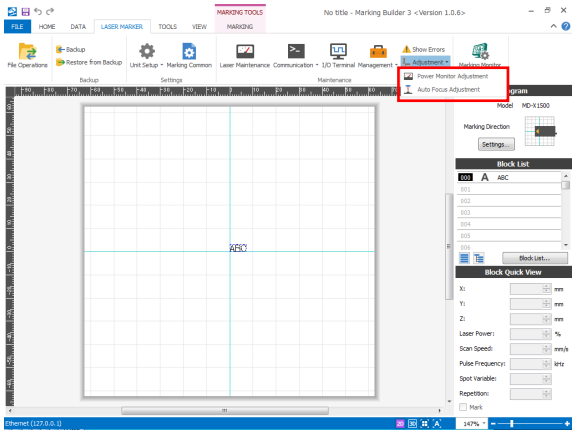
- **Up to 100 entries are saved in the history; and entries are overwritten starting from the oldest.**

6. Save

Save the error history in csv format.

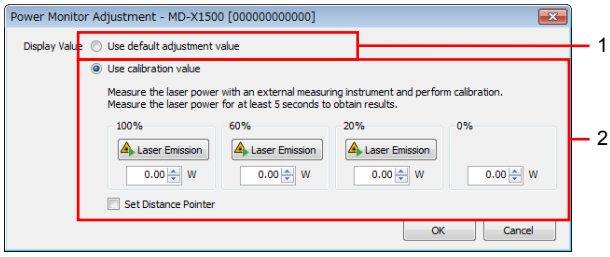
5-10 Adjustment

Adjust the power monitor and/or auto focus functions.



Power Monitor Adjustment

Calibrates the built-in power monitor using an external power meter.



Reference

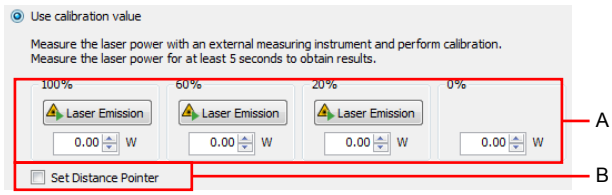
- **This function is not available on MD-X1000L/1500L series and ML-Z9600 series.**

1. Use default adjustment value

Display the internal power monitor value using the factory default adjustment value.

2. Use calibration value

Calibrate to match the display value of the external power meter with that of the internal power monitor. You can calibrate the entire power monitor by entering 100/60/20/0% laser output values.



A. Laser Emission

Laser will be emitted to the point of origin when the [Laser Emission] button is pressed. Enter the display value of the external power meter in each of the 100/60/20/0% input boxes.

WARNING	
	• **Laser emission to the point of origin will start when the [Laser Emission] button is pressed. Make sure to emit the laser after confirming the safety of the surrounding area.**

B. Set Distance Pointer

Light up the distance pointer for position adjustment of the external power meter.

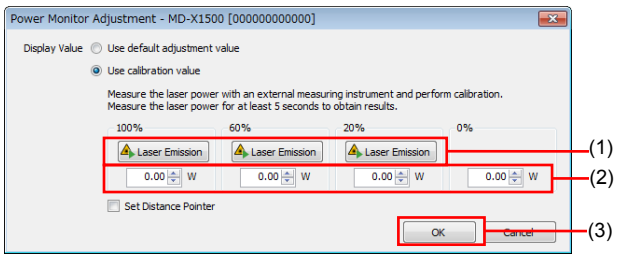
■ Calibration Procedure for the Internal Power Monitor

Perform a calibration by following the procedure described below.

(1) Measure the power for 100/60/20/0% laser power using an external power meter.

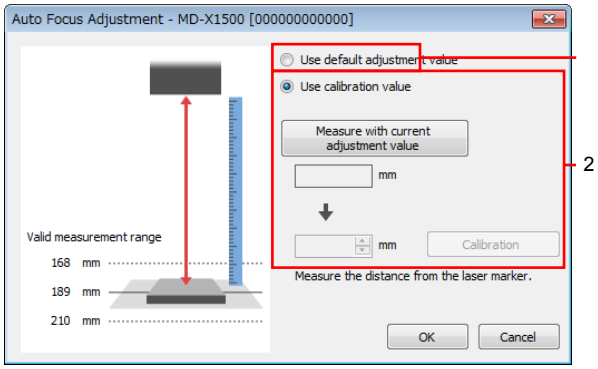
(2) Enter the power for 100/60/20/0% laser power.
Enter a value in each of the input boxes.

(3) Press the [OK] button.



Auto Focus Adjustment

Calibrate the distance measurement function of the auto focus.



Reference ・ **This function is not available for MD-X1000L/1500L series, MD-F3200/5200 series and ML-Z9600 series.**

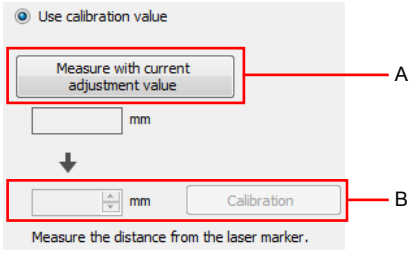
1. Use default adjustment value

Display the auto focus distance measurement value using the factory default adjustment value.

2. Use calibration value

Correct the deviation the auto focus distance measurement value and the actual measured workpiece distance.

Important ・ **The distance measurement value may deviate due to changes in the ambient temperature.**



A. Measure with current adjustment value

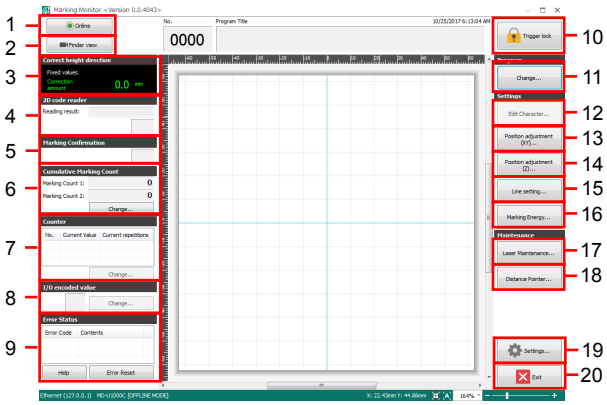
Measure the distance in the current calibration state.

B. Calibration

Measure the actual distance between the head and workpiece using a scale or slide gauge. Enter the result into the input box and press the [Calibration] button. The deviation amount of the distance measurement value will be corrected.

5-11 Marking Monitor

Launch the operation monitoring function for the administrator.



1. Online/Offline

Display the state of connection with the laser marker.

2. Finder view

Display the finder view in the view display area.

Reference ・ **This function is not available on MD-X1000L/1500L series, MD-F3200/5200 series, and ML-Z9600 series.**

3. Correct height direction

Display the correction amount about correcting height direction. Display the fixed values when the correction method is [Fixed]. The correction value will be updated every time when performing marking if the correction method is [Auto Focus], and when performing Z scanner position fixation input if it is [External Displacement Sensor].

4. 2D code reader

Display the 2D code reading result and AIM DPM total grade when the 2D code reader function is [Enable].

Reference ・ **This function is not displayed on MD-X1000L/1500L series, MD-F3200/5200 series, and ML-Z9600 series.**

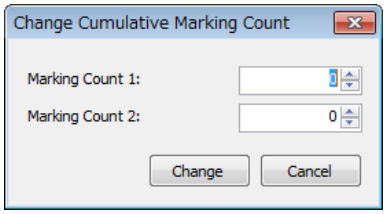
5. Marking confirmation

When the marking confirmation function is set to [Enable], display the result of marking confirmation.

Reference ・ **This function is not displayed on MD-X1000L/1500L series, MD-F3200/5200 series, and ML-Z9600 series.**

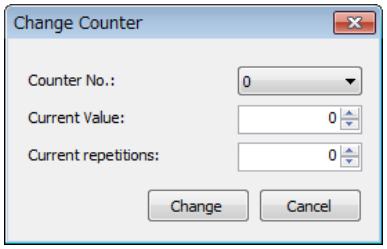
6. Cumulative Marking Count

Display cumulative marking count 1 and 2. Pressing the [Change] button will bring up the [Change Cumulative Marking Count] dialog.



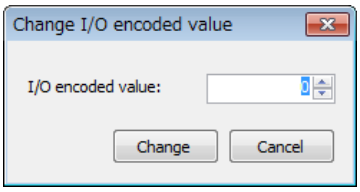
7. Counter

Display the current value and current repetitions of the counter. Pressing the [Change] button will bring up a dialog for the current value and current repetitions.



8. I/O encoded value

Display the currently selected number in I/O encoded character. Pressing the [Change] button will bring up a dialog for changing the I/O encoded character.



9. Error Status

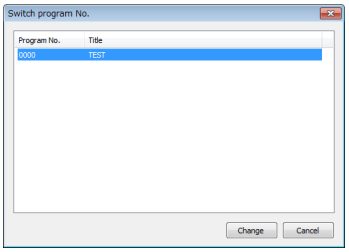
Display the currently occurring errors. You can reset the error by pressing the [Error Reset] button. The [Help for Showing Errors] window starts with the [Help] button, and the state of the error and method to solve the problem can be confirmed.

10. Trigger lock

Lock the trigger from accepting marking start signals.

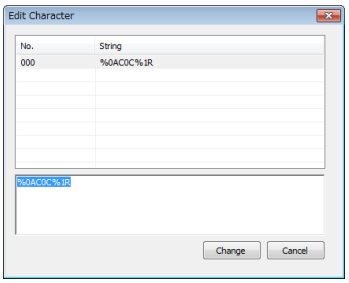
11. Change Program

Change the marking program.



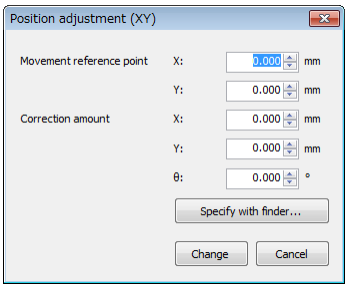
12. Edit Character

Change the string by specifying the block number.



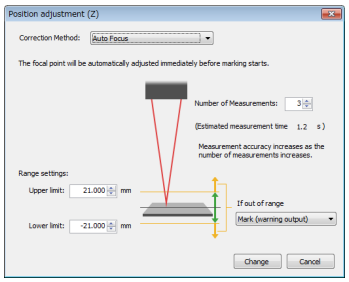
13. Workpiece position adjustment (X/Y)

Change the workpiece position adjustment.
"Correct inside the horizontal plane" (Page 77)



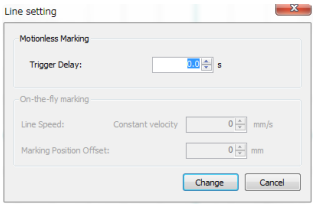
14. Workpiece position adjustment (Z)

Change the height direction correction method.
"Correct height direction" (Page 78)



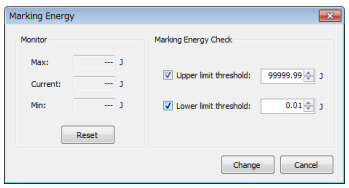
15. Line Settings

Change the trigger delay time.
"Trigger Delay" (Page 75)



16. Marking Energy

Change the marking energy check settings.
"Marking Energy" (Page 81)

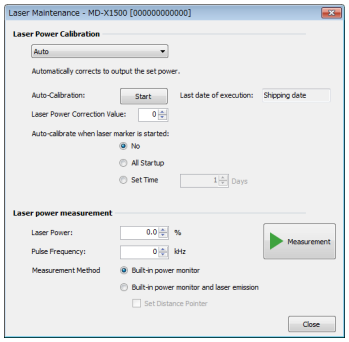


Reference

- **This function is not displayed for the MD-X1000L/1500L series and ML-Z9600 series.**

17. Laser Maintenance

Perform the laser maintenance.
"Laser Maintenance" (Page 108)

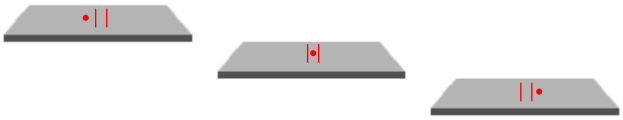


Reference

- **Some features of this function are not available for the MD-X1000L/1500L series and ML-Z9600 series.**

18. Distance Pointer

A distance pointer will be emitted to the point of origin of the marking area. Adjust the installation height of the workpiece such that the red dot comes to the center of the two red lines. The following shows the relationship between the head and pointer viewed from the front.



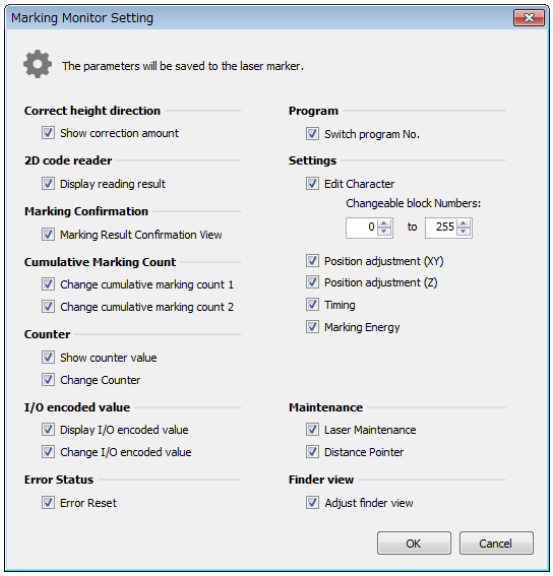
Distance: Too close　　Distance: Optimal　　Distance: Too far

Reference

- **The optimal focus distance of each model is as described below.**
  MD-X1000/1500 series: 189mm
  MD-X1020/1520 series: 300 mm
  MD-X1050 series: 100mm
  MD-F3200/5200 series: 168mm
  MD-F3220/5220 series: 300 mm
  MD-U1000 series: 189 mm
  MD-U1020 series: 300 mm
  ML-Z9610 series: 189 mm
  ML-Z9620 series: 300 mm
  ML-Z9650 series: 92 mm

19. Operation Monitoring Setting

Set the items to be displayed in the operation monitoring screen.



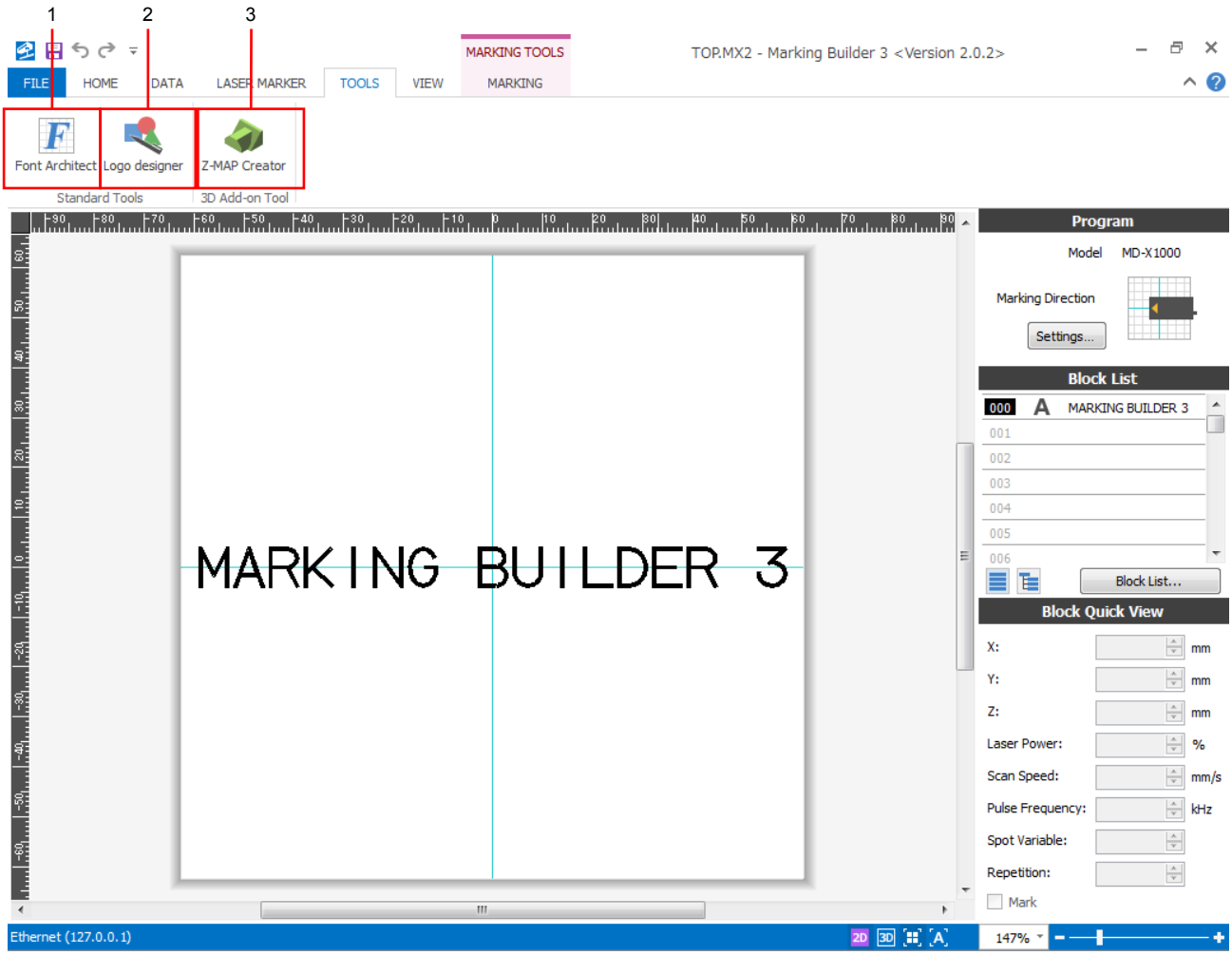
Reference

- **You can also launch the Marking Monitor directly without using Marking Builder 3. The operation monitoring function for the operator can be launched by either executing the "Marking Monitor" shortcut on the desktop or "Marking Monitor" from All Programs. “Marking Monitr Setting” will not appear if operation monitoring is launched directly.**

20. Close

Close the operation monitoring screen.

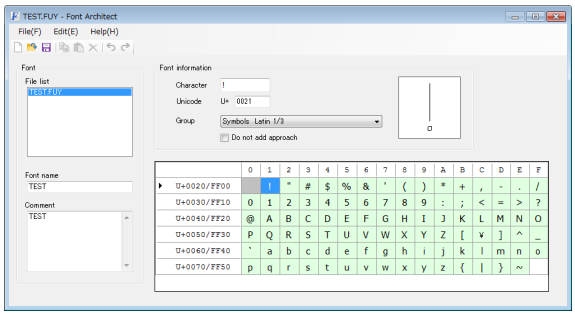
6 Tools Menu



1. Font Architect

Create a font file.

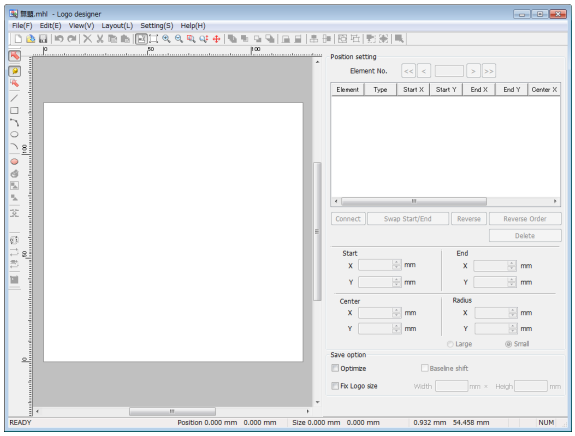
“Font Architect” (Page 119)



2. Logo designer

You can create a logo/hatch logo/work image logo/custom character file.

“Logo designer” (Page 122)



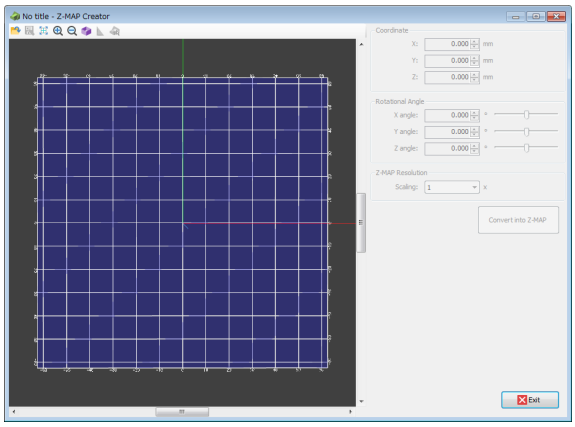
Reference

- **You can launch Logo designer by double-clicking a logo file in the preview area.**

3. Z-MAP Creator

Create a Z-MAP file.

“Z-MAP Creator” (Page 137)

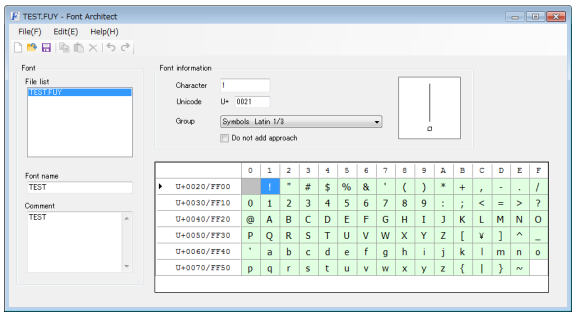


Important

- **Z-MAP Creator is only available when the 3D extensions software "MB3-H3D1" is installed.**

6-1 Font Architect

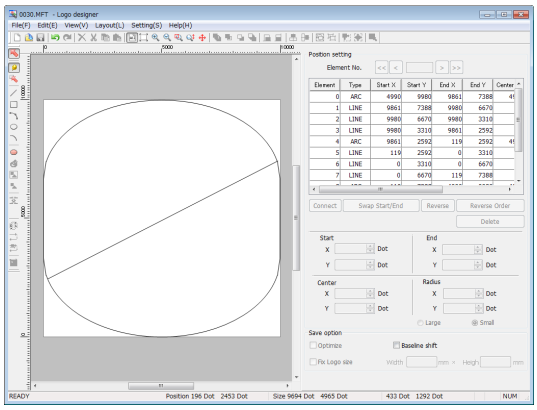
Font Architect is a font creation software for character strings. The custom character to be used needs to be created in advance using Logo designer.



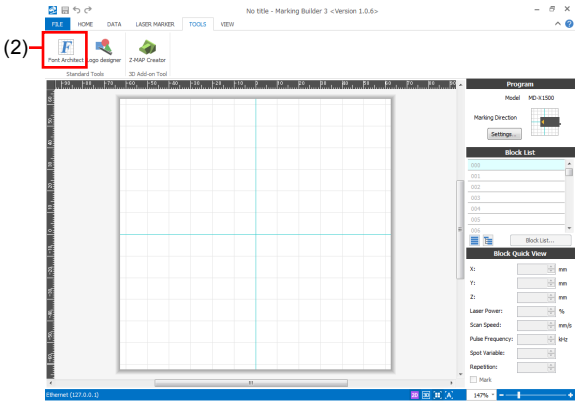
■ Procedure for Creating and Using a Font in a String

The following explains the basic steps for creating and using a font in a string.

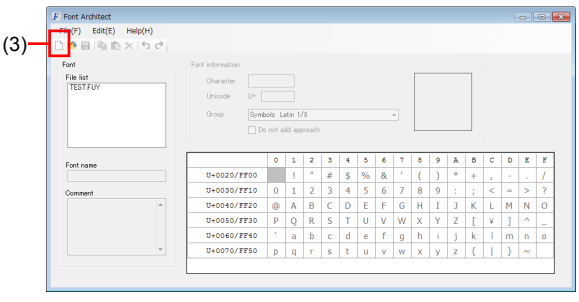
(1) Prepare a custom character file (.MFT).
You can create a custom character file using Logo designer. In most cases, a customer character file is created by converting a DXF file into a customer character file.
“Logo designer” (Page 122)



(2) Launch Font Architect.

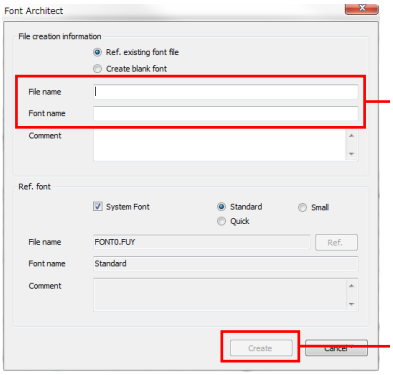


(3) Press the [New] button.
The font creation screen will appear.

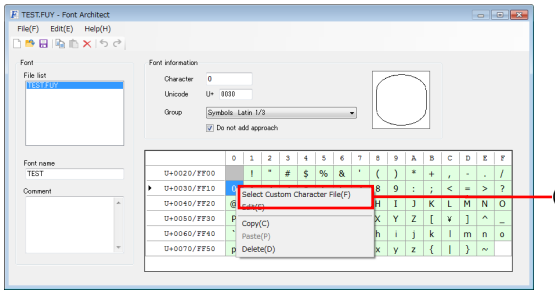


(4) Enter the file name and font name.
Enter the desired name.

(5) Press the [Create] button.

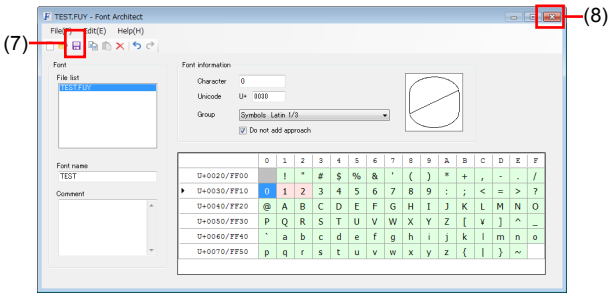


(6) Assign a custom character file to the font you wish to change.
Right-clicking the character list will bring up the [Select Custom Character File] button. Reference the desired custom character file. Repeat this procedure if there are more than one characters you wish to change.

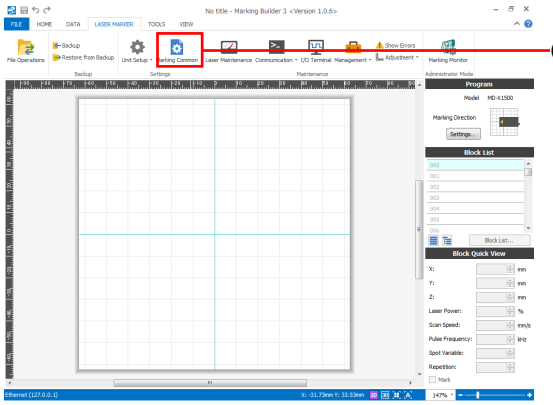


(7) Save the font.

(8) Close the Font Architect screen.



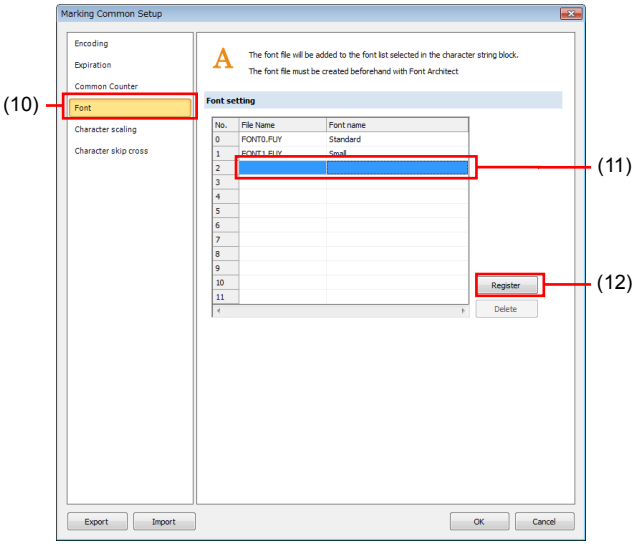
(9) Press the [Marking Common Setup] button in the laser marker menu.



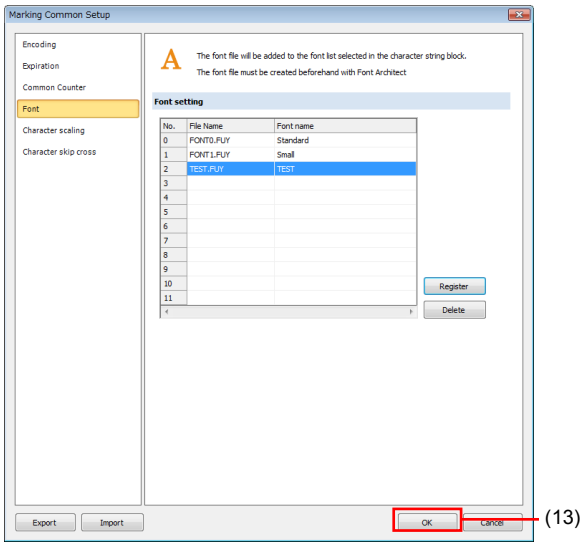
(10) Press the [Font] button.

(11) Select a blank font.

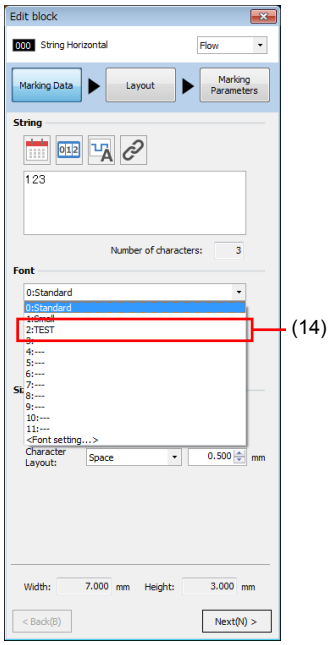
(12) Press the [Register] button.
The font reference screen will appear. In this screen, select the font that you have created.



(13) Press the [OK] button.

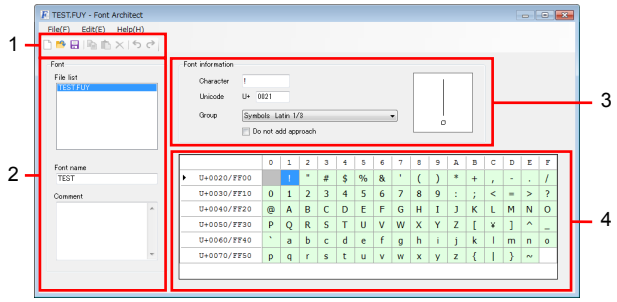


(14) Use the font.
You can select from block editing fonts.



Screen Configuration of Font Architect

This section explains the screen configuration of Font Architect.



1. Menu icons

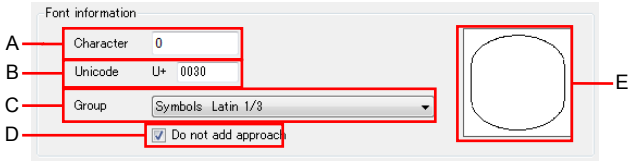
Perform operations such as create new/open/save file, copy/paste characters/delete, and undo/redo operations.

2. Font Information

Display the font list, file names and comments on the PC.

3. Character Information

Display the information of the character currently selected in the character list.



A. Character

Display the currently selected character. If you directly enter characters into this box, the entered characters will become selected.

B. Unicode View

Display the Unicode of the currently selected character. When you enter a 4-digit, base 16 number into this box, the character corresponding to the entered code will become selected.

C. Code Type

Display the code type of the currently selected character. When you change the code type list, the character list will also change according to the code category.

D. Do not add approach

Set whether to add an approach to the currently selected character.

E. Character shape

Display the shape of the currently selected character.

4. Character list

Display the list of characters selected in [Code Type].

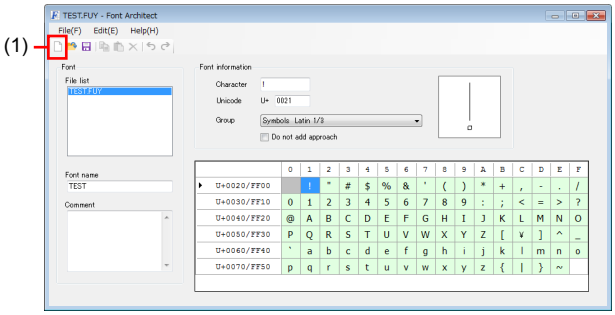
Reference

- **There are following differences depending on the character background color.**
  Green: A character has been registered.
  Red: The character shape has been changed (returns to green when you save the file).
  Gray: Characters have not been registered.

Creating a New Font

This section explains how to create new font files in Font Architect. The procedure is explained below.

(1) Press the [New] button.



(2) Select whether to reference an existing font file.
- **Reference a font file**
  Create a new font by referencing the existing fonts.
- **Create a blank font**
  Create a new font containing no fonts.

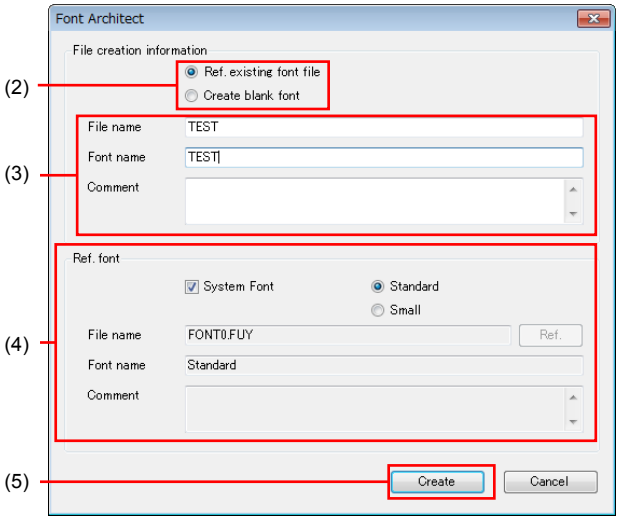
Reference

- **A font file is normally referenced. If the controller built-in memory full error occurs, create from a blank font to reduce the font capacity.**

(3) Set the file name, font name and comment.
The file name will be the name displayed on the PC; and the font name will be the display name in the font list. Set the desired comment.

(4) Select the reference font.
To reference a system font, check the system font checkbox, and select either [Standard], [Small] or [Quick]. To reference other fonts, uncheck the [System font] checkbox and select the reference font using the [Ref.] button.

(5) Press the [Create] button.
A new font file will be created.

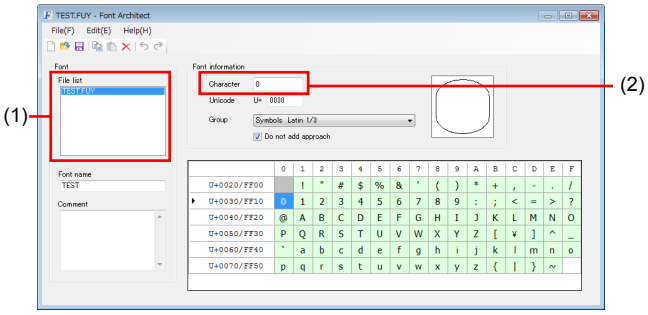


Edit Font

This section explains how to edit font files in Font Architect.
The procedure is explained below.

(1) Select the font file to be edited.

(2) Enter the replacement character.

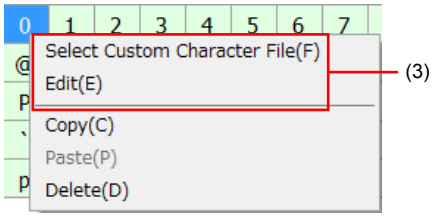


(3) Edit the character.
Right-click a character and select the editing method.

- **Select Custom Character File**
  Change the character by referencing a custom character file.
- **Edit**
  Launch Logo designer and edit the character.

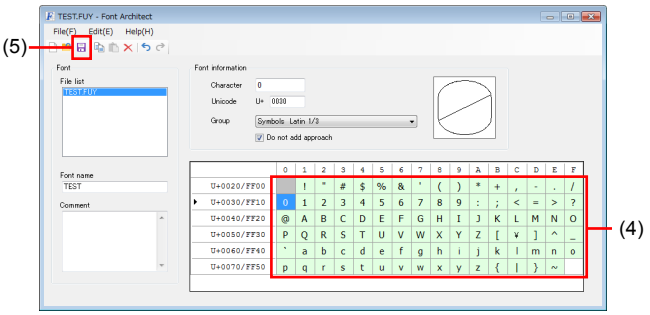
Reference

- **You can also edit the character by double-clicking on it.**



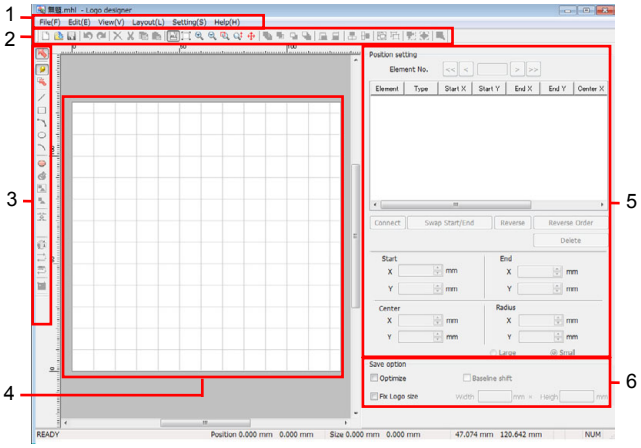
(4) Edit the required number of characters.
Repeat step 2 to 3 to edit the font file characters.

(5) Save the font file.



6-2 Logo designer

Logo designer is a software for creating a logo/hatch logo/workpiece image logo/custom character file.



Reference

- **This section explains each of the file formats.**
  Logo: The figure is marked with line and arc elements.
  Hatch logo: The figure is marked with line, arc and fill elements.
  Workpiece Logo: The logo used for aligning the position.
  Custom character: A character file for creating a font file.

1. Menu Bar

Display the file operations, edit file, screen display, layout, setup and help menus.
"Menu Bars" (Page123)

2. Main Toolbar

This toolbar shows the icons of functions such as create new file, zoom in/out and adjust layout.
"Standard toolbar" (Page 129)

3. Edit Toolbar

This toolbar shows the icons of frequently used functions such as add element, add/delete/combine/cancel fill, change element No., Wobble conversion, and Scratch conversion.
"Edit toolbar" (Page 130)

4. Preview area

You can design logo and edit layouts in this screen.

5. Position setting view

Display the list of elements in the preview area. You can select an element from the list.
"Position setting view" (Page 133)

6. Save options

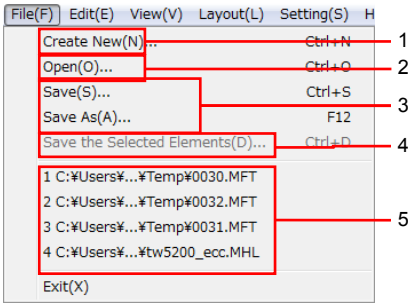
Set the optional functions during file save.
"Save options" (Page 133)

Menu Bar

This section explains the functions of the menu bar.

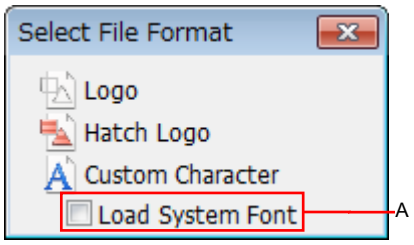
■ File Menu Functions

You can perform operations such as create new file, open file, save, save as, and save the selected elements.



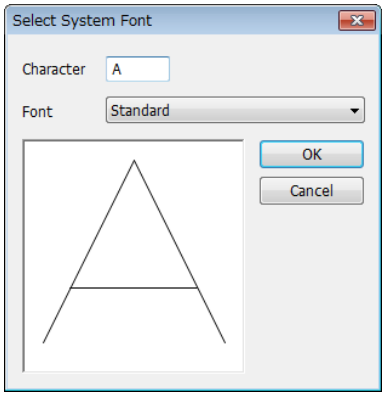
1. New

Create a new logo/hatch logo/custom character file. The file format selection dialog will appear. Select the desired file format in this dialog.



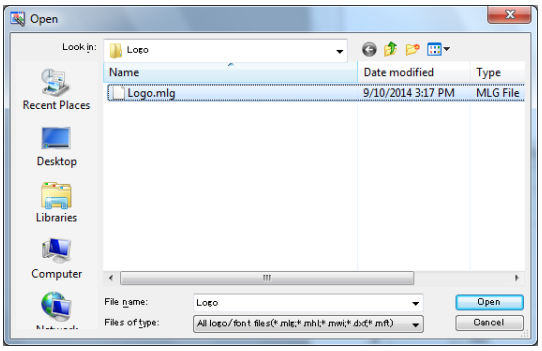
A. Refer to System Font

You can create a new custom character file by referencing an existing system font. Specify the character and font you wish to change and then reference an existing font.



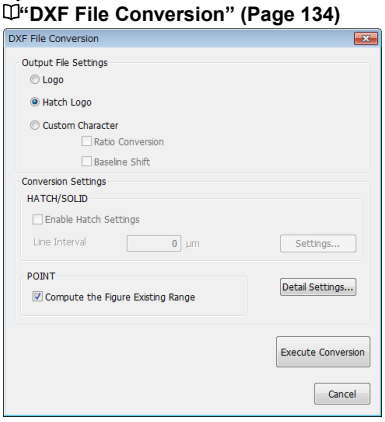
2. Open

Open the existing logo/hatch logo/custom character/workpiece image logo/DXF files. Select the desired file format from the [File Type] list and then select a file.



Important

- **The DXF File Conversion dialog appears when you open a DXF format file.**
  "DXF File Conversion" (Page 134)

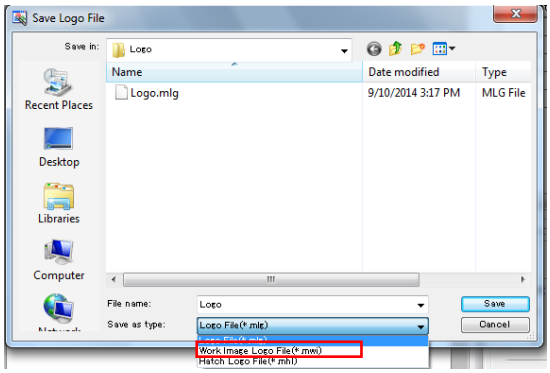


3. Save/Save As

Overwrites or save the currently editing file with a different name.

Reference

- **When saving as a file, you can create a workpiece image logo file by selecting [Work Image Logo File] as the file type.**



4. Save the Selected Elements

Save only the currently selected elements to a separate file.

Reference

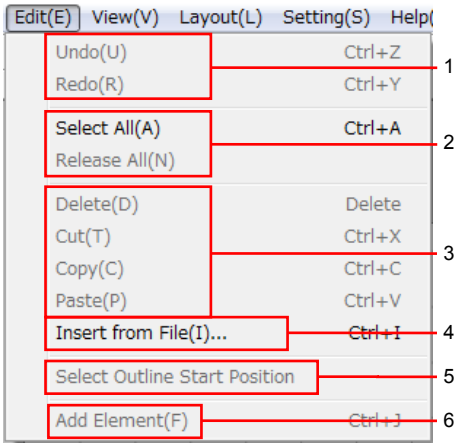
- **When you save the selected element, it will be saved at the bottom left of the preview area. To retain the original position in the saved file, select [Hatch logo] as the file type and check the [Fix Logo size] checkbox in [Save option].**

5. Recently used files

Display the list of recently used files.

■ View Menu Functions

This section explains the functions of the Edit menu.



1. Undo/Redo

You can undo/redo operations.

Reference
- **The number of undo operations can be set to a maximum of 16 times in [Number of Undo] in the Setup.**

2. Select All/Release All

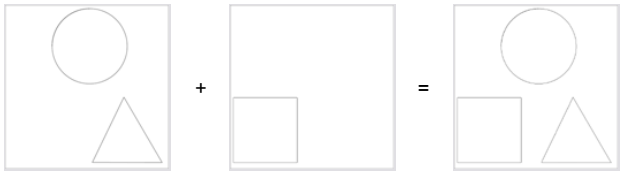
You can select or deselect all elements.

3. Delete/Cut/Copy/Paste

You can delete, cut, copy and paste elements.

4. Insert from File

Inserts an element from another file into the currently editing file.



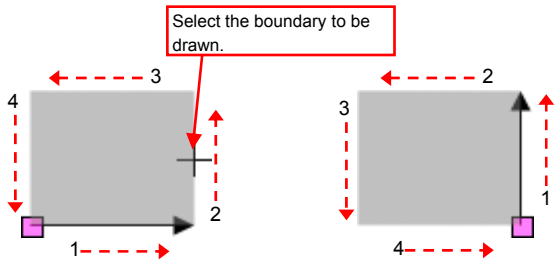
Editing element | Element inserted from a file | Result of [Insert from File]

Reference
- **Wobble-converted and Scratch-converted logo files can only be inserted into logo files.**
- **The insertable file format will vary depending on the currently editing file format.**

Editing format	Formats that can be inserted
Logo file	Logo/Workpiece logo files
Hatch logo file	Logo/Hatch logo/Workpiece logo files
Workpiece image logo file	Logo/Workpiece logo files
Custom Character File	Custom Character File

5. Select Outline Start Position

You can change the boundary drawing start position of the currently selected HATCH element.



Before changing the outline start position | After changing the outline start position

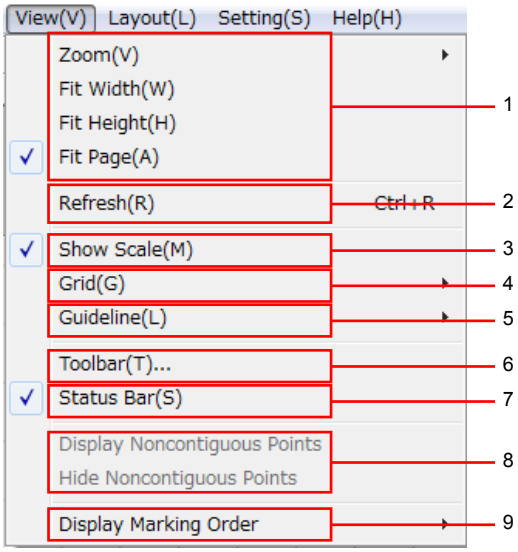
Reference
- **The drawing order is fixed to counterclockwise.**

6. Add Element

Add an element while checking the fill preview of the hatch logo. This function is only enabled during a preview of the hatch logo.
"Add Element" (Page 36)

■ View Menu Functions

Change the zoom, refresh the screen, set the scale/grid/guideline, set the toolbar/status bar, display/hide noncontiguous points, and display the marking order.



1. Change Scaling

Select the zoom ratio of the preview area from [100/200/400/500/1000/2000/5000 /10000/50000%] and [Maximum View/Fit Width/Fit Height/Fit Page].

2. Refresh

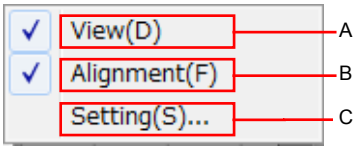
Refresh the marking in the preview area.

3. Show Scale

Display the scale (unit: mm) at the left edge/top edge of the preview area.

4. Grid

Display grids (squares) in the preview area.



A. View

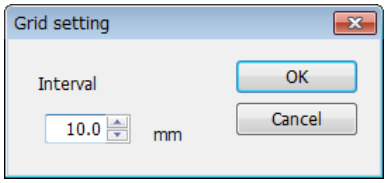
Switch the grid display ON/OFF.

B. Alignment

Switch whether to align the end points and outer shell of elements with the grid.

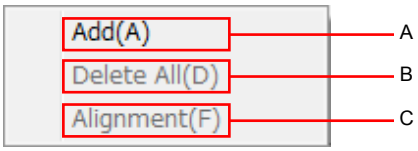
C. Settings

Set the grid interval.



5. Guideline

Insert a guide line with sticking function into the preview area.



A. Add

Add a guideline on the X/Y axes in the preview area. You can move the added guideline using the mouse.

B. Delete All

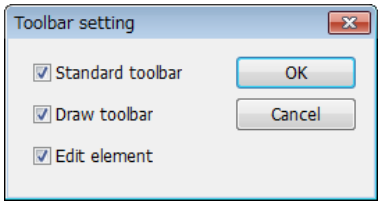
Delete all guidelines in the preview area.

C. Alignment

Switch whether to align the end points and outer shell of elements with the guideline.

6. Toolbar

Set whether to show the Standard toolbar, Edit toolbar and [Edit Element] on the screen.



7. Status bar

You can select whether to display a status bar at the bottom of the screen.

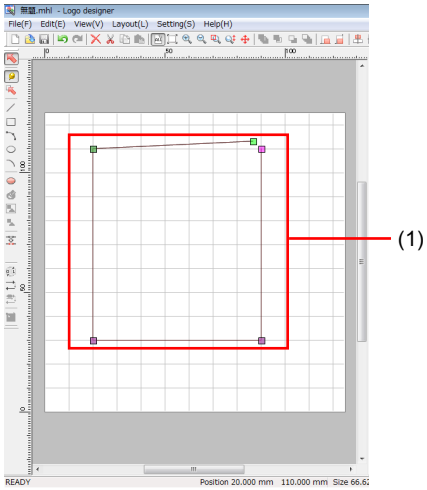
8. Display Noncontiguous Points/Hide Noncontiguous Points

Display the noncontiguous points of the selected element.

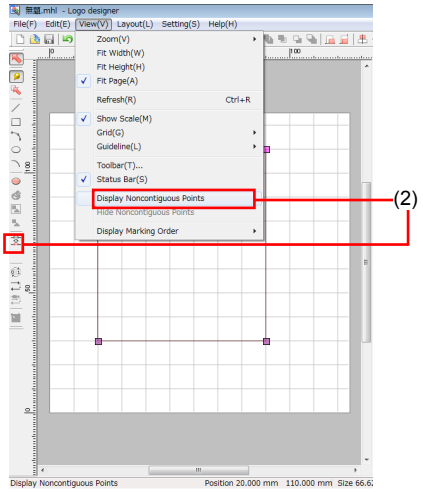
■ **How to Display and Connect Noncontiguous Points**

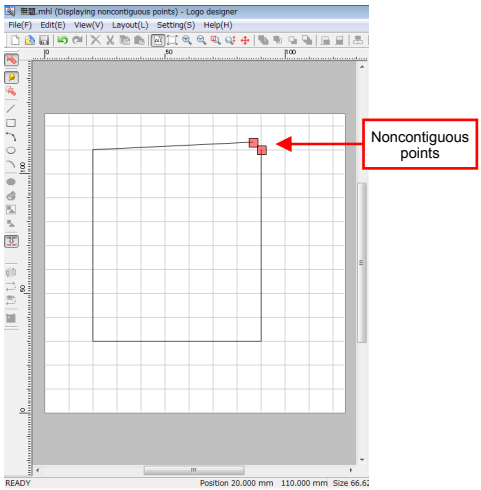
This section explains the procedure for displaying and connection noncontiguous points.

(1) Select the target figure.



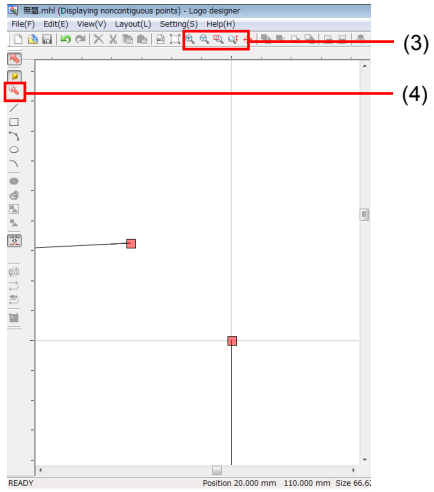
(2) Press the [Show Noncontiguous Points] button. Noncontiguous points will be marked in red.



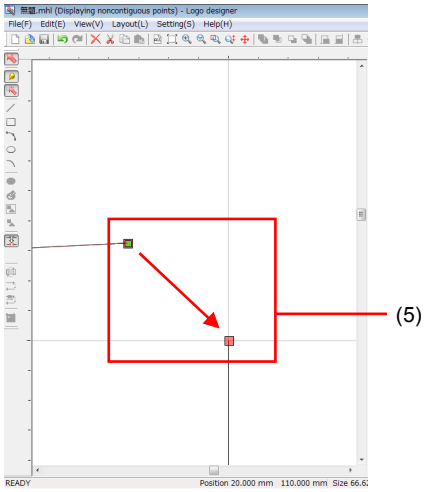


(3) Zoom into the noncontiguous points.
Various zoom-in tools can be used.

(4) Enable the [Snap] icon.
The snap function is used to align with the end points of an element.

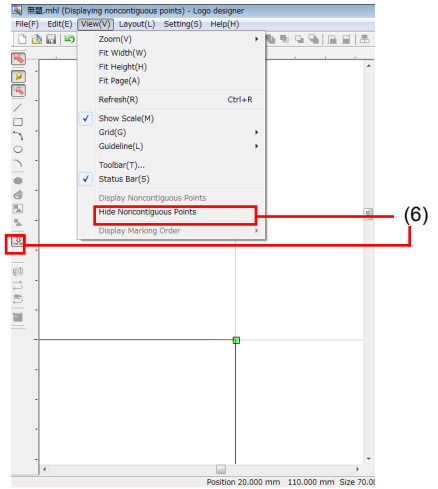


(5) Connect the noncontiguous points.
Move one end point on to the other end point. You can connect the points when the mouse icon changes to .



Reference **The points may not connect correctly when moving the end points of an arc (ARC). In such a case, join the two points with a line (LINE).**

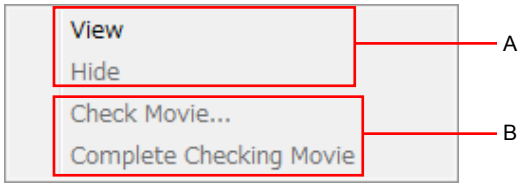
(6) Press the [Hide Contiguous Points] button.



Connection the noncontiguous points is now complete.

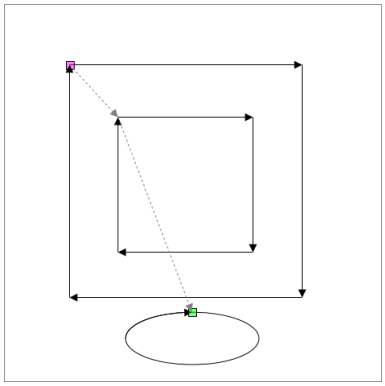
9. Display Marking Order

Display the drawing order of the currently selected element.



A. Show/Hide

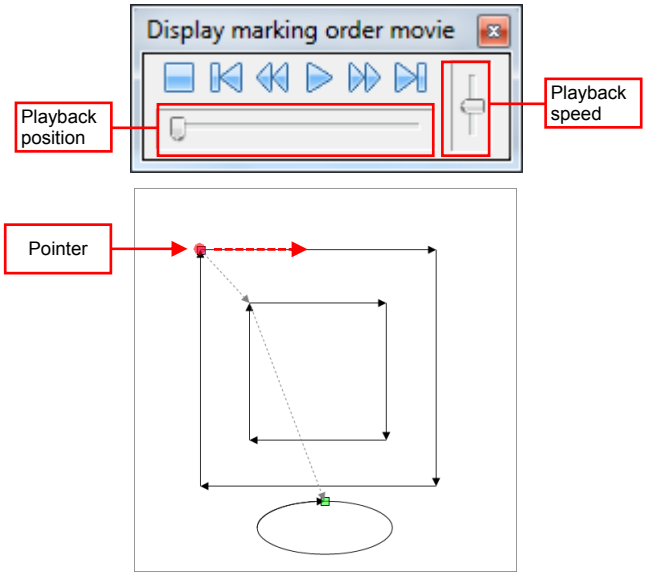
Show/hide the drawing order of the currently selected element using an arrow.



B. Check Movie/Complete Checking Movie

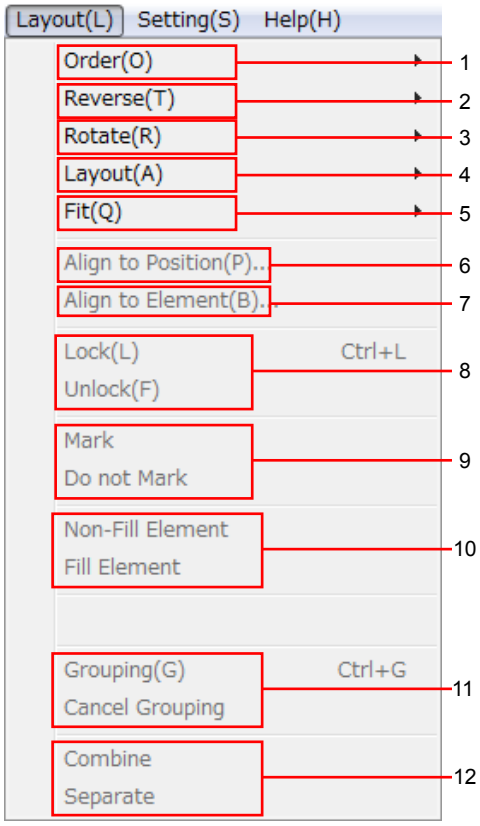
A red pointer will move on the element, allowing you to check the drawing order in movie format.

Reference ・ **This function is only enabled while the drawing order is being displayed.**



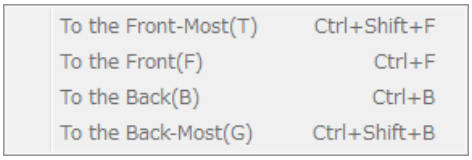
■ Layout Menu Functions

Change the order, edit the element layout, etc.



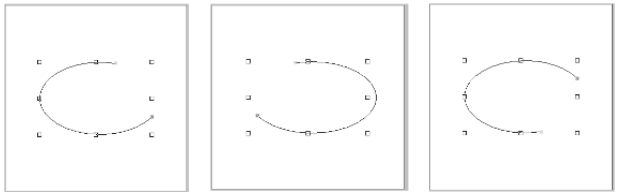
1. Order

Change the order of the currently selected elements. Use this option when the desired element is overlapped and cannot be selected.



2. Invert

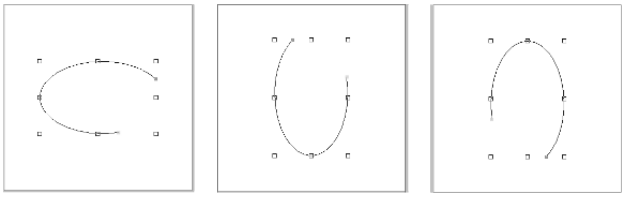
Invert the currently selected element horizontally/vertically.



Before invert | After horizontal inversion | After vertical inversion

3. Rotate

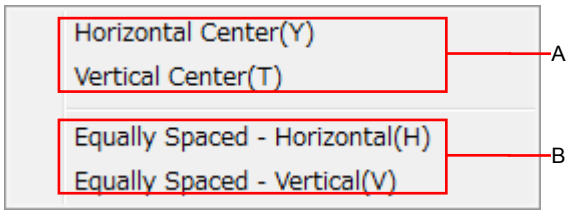
Rotate the currently selected element 90° to the right/left.



Before rotation | Left 90° | Right 90°

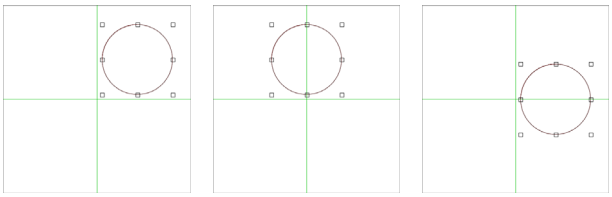
4. Layout

Select the element layout method from [Horizontal Center/Vertical Center/Equally Spaced - Horizontal/Equally Spaced - Vertical].



A. Horizontal Center/Vertical Center

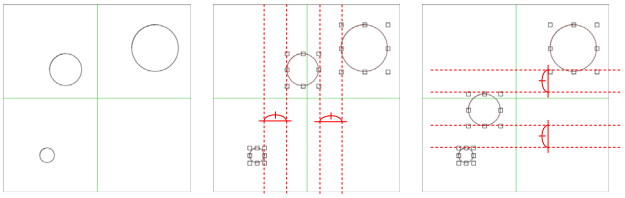
Move the center of the selected element to the X or Y axis.



Before movement | Horizontal Center | Vertical Center

B. Equally Spaced - Horizontal/Equally Spaced - Vertical

Moves the elements such that the gap between 3 or more elements will be uniform.



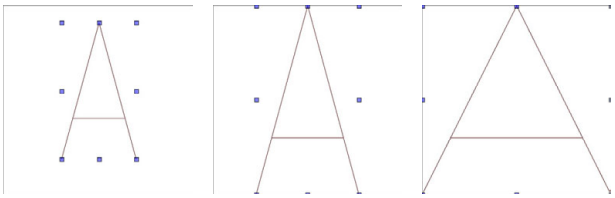
Before movement | Equally Spaced - Horizontal | Equally Spaced - Vertical

Important

- **Elements whose positional relationship you wish to retain should be grouped together in advance.**

5. Fit

Fit the custom character file currently being created to the outermost shell. The available options are [Fixed Ratio], which fits with a fixed aspect ratio, and [Variable Ratio], which fits to the outermost shell vertically and horizontally.



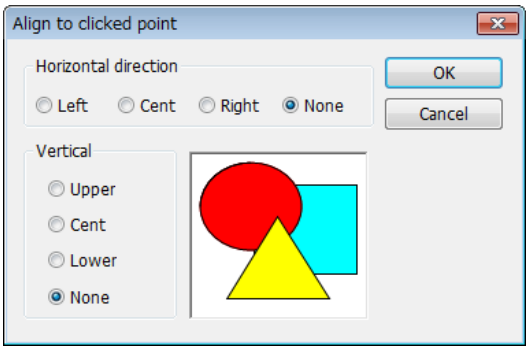
Before fitting | Fixed Ratio | Variable Ratio

Important

- **Group all elements in advance.**

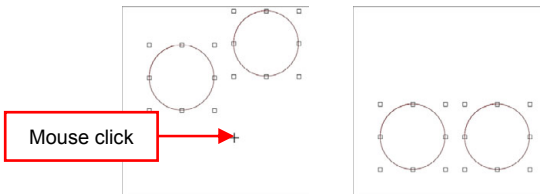
6. Align to Position

Move the currently selected element according to the click position. Select the horizontal and vertical alignment positions.



Reference

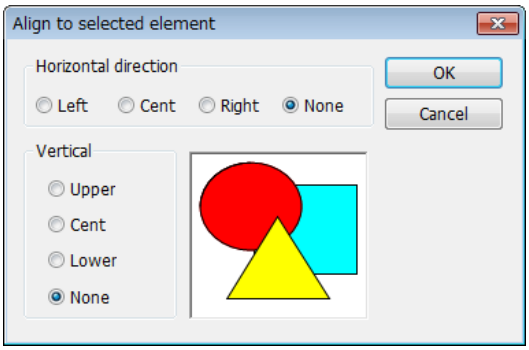
- **The selected two elements will be aligned to the specified position in the vertical center.**



Before position alignment After position alignment

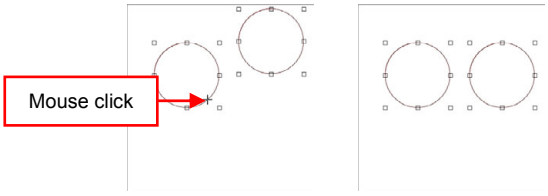
7. Align to Element

Move the currently selected element according to the clicked element. Select the horizontal and vertical alignment positions.



Reference

- **The selected two elements will be aligned to the clicked element in the vertical center.**



Before element alignment After element alignment

8. Lock/Unlock

Lock the currently selected element from being edited. The element can be unlocked using the [Unlock] button.

9. Mark/Do not mark

Prevent the currently selected element from being marked. The element set to [Do not Mark] will appear in red; and not laser emission will be performed. You can restore the original setting by pressing the [Mark] button.

10. Fill Element/Non-Fill Element

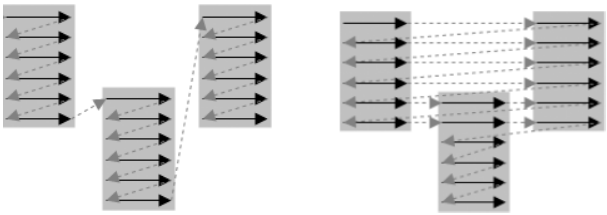
Change the currently selected element to a fill element. The fill element will be shown in orange; and the fill marking conditions will be applied to it. This operation can be undone using the [Non-Fill Element] button.

11. Grouping/Cancel Grouping

Group the currently selected elements. Grouped elements are treated as a single figure that can be moved or zoomed in/out. Grouping can be undone using the [Cancel Grouping] button.

12. Combine/Separate

Combine and convert the currently selected HATCH elements into MHATCH element. It can be undone using [Separate]. The drawing order of HATCH and MHATCH elements differ as described below.



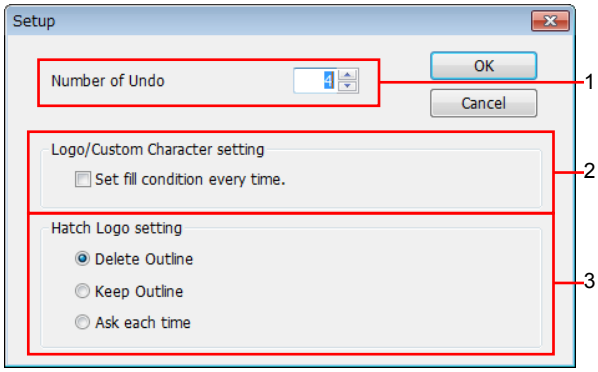
HATCH element MHATCH element

Reference

- **The marking state of the entire logo will stabilize as local heat accumulation is less likely to occur in MHATCH element. However, the marking time tends to become longer.**
- **You cannot combine overlapping HATCH elements.**

■ Settings Menu Functions

Set the environmental settings of Logo designer.



1. Number of Undo

Set the effective number of [Undo/Redo] operations.

2. Logo/Custom Character setting

Set whether to show the setting dialog every time [Fill the Closed Space] is executed while editing a logo or custom character file.

3. Hatch Logo setting

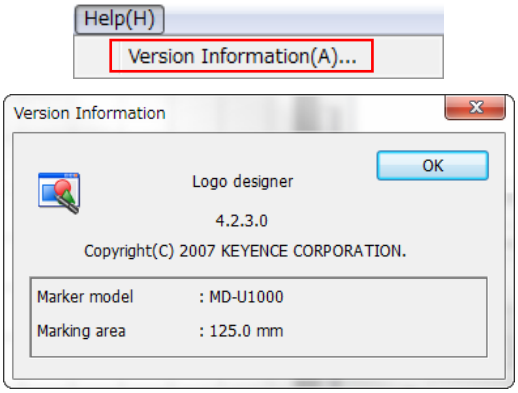
Select how to process the boundary when [Fill the close space] is executed.

Reference

- **The boundary should be deleted in Logo designer as Marking Builder 3 can be set to generate a boundary for hatch logo files.**

■ Help Menu Functions

Display the version information.



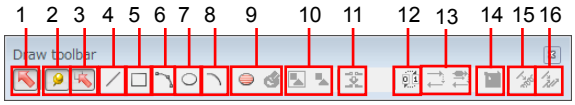
Main Toolbar

This toolbar shows the icons of functions such as create new file, zoom in/out and adjust layout.

Icon	Function name	Contents
	New File	Create a new logo/hatch logo/custom character file.
	Open	Open the existing logo/hatch logo/custom character/workpiece image logo/DXF files.
	Save	Overwrite the currently editing file.
	Undo Redo	Operations can be undone/redone.
	Delete	Delete the element.
	Cut Copy Paste	Cut, copy or paste an element.
	Display all	Show the entire view. Shortcut: Ctrl+0
	Fit to Preview Window	Fit the outermost shell of all elements in the view area. Shortcut: Ctrl+H
	Enlarge Zoom Out	Zoom in/out using the mouse click point as the center.
	Enlarge Range	Zoom in on the mouse-dragged range.
	Zoom In/Out	Zoom in/out by dragging operation in the vertical direction.
	Move	Move the view area by dragging operation. Shortcut: Space
	To the Front-Most To the Front To the Back To the Back-Most	Change the overlapping order of elements. This option is used when the desired element is overlapped and cannot be selected.
	Align to Position	Move the element to the click position.
	Align to selected element	Move the element to the same position as another element.
	Horizontal Center Vertical Center	Center the element horizontally/vertically.
	Grouping Ungroup	Group or ungroup multiple elements.
	Fixed Ratio	Fit the custom character element to the outermost shell maintaining its aspect ratio.
	Variable Ratio	Fit the custom character element to the outermost shell.
	Add Element	You can add an element from the fill preview function.

Edit Toolbar

This toolbar shows the icons of frequently used functions such as add element, add/delete/combine/cancel fill, change element No., Wobble conversion, and Scratch conversion.

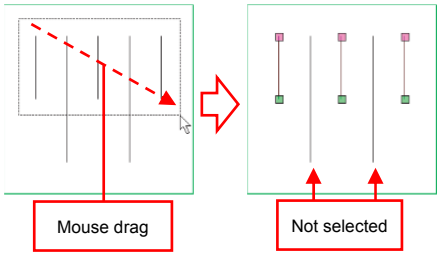


1. Edit Element

Shape elements will become selectable. The selection state will change according to the dragging direction.

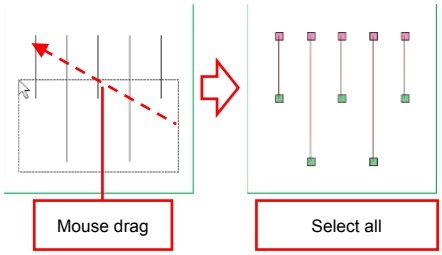
■ When dragged from above

Only select elements that fit entirely inside the mouse-dragged range.



■ When dragged from below

Select elements that fit partially or entirely inside the mouse-dragged range.



2. Switch continuous operations

If you press down the [Switch continuous operations] button, you can execute functions such as the Add Element and Zoom In/Zoom Out continuously.

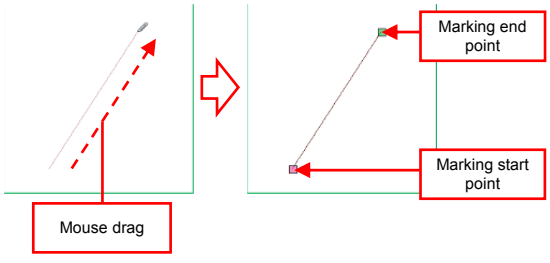
Reference
- **You can return to the element editing mode by right-clicking the preview area during continuous operation.**

3. Switch Snap ON/OFF

If you hold down the [Switch Snap ON/OFF] button while editing elements, the mouse-dragged range will fit the end points of the elements (placed at the same coordinates). You can check whether the snap function works by checking whether the mouse cursor changes as shown below.

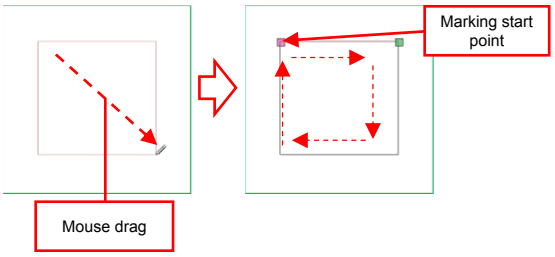
4. Line

Switch to the line marking mode. Drag from the marking start point to the marking end point.



5. Rectangle

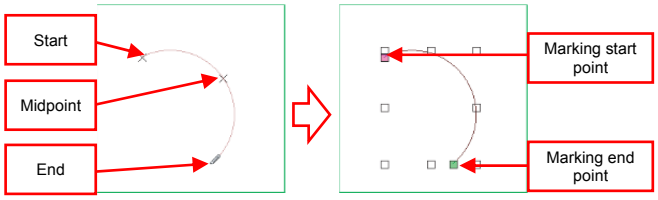
Switch to the rectangle marking mode. Specify the rectangle diagonals by dragging the mouse. The marking start point will be upper left and the drawing order will be clockwise at all times.



Reference
- **You can draw a perfect square by dragging while pressing down the Shift key.**

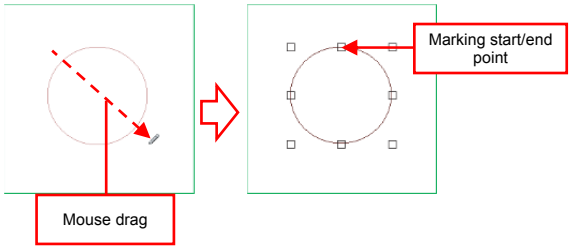
6. Arc

Switch to the arc marking mode. Specify the start, midpoint and end points of an arc.



7. Oval

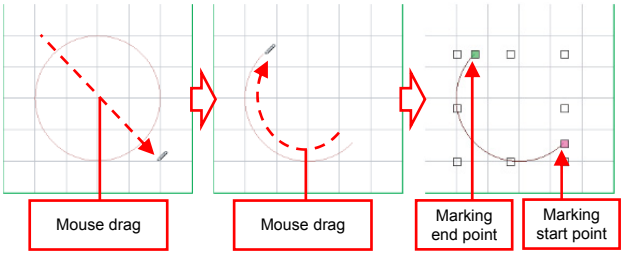
Switch to the circle/oval marking mode. When you specify the rectangle diagonals by dragging the mouse, an oval (perfect circle) circumscribing the rectangle will be drawn. Marking start/end points will always be the upper end points.



Reference
- **You can draw a perfect circle by dragging while pressing down the Shift key.**

8. Oval arc

Switch to the arc/oval arc marking mode. When you specify the rectangle diagonals by dragging the mouse, an oval (perfect circle) circumscribing the rectangle will be drawn. Specify the marking start point and marking end point by dragging the mouse. The drawing order is always clockwise.



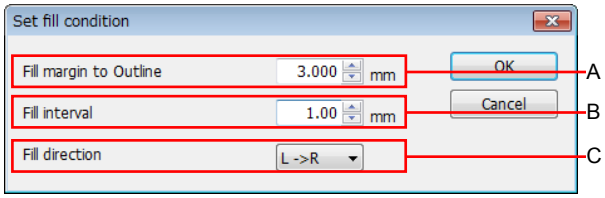
9. Fill the Closed Space/Delete the Filled Area

Switch to the closed space fill mode. The fill method will vary depending on the file format. Only the hatch logo fill can be undone using the [Delete the Filled Area] button.

Reference
- **This function cannot be used if the preview zoom factor is high.**
- **An error will appear if the specified space is not a closed space.**

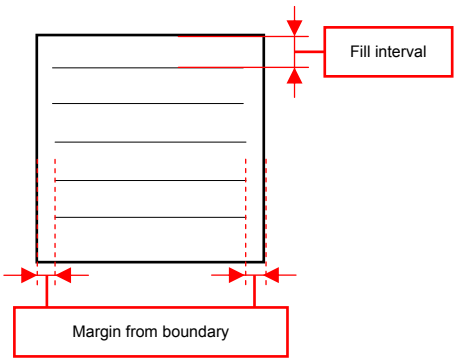
■ **Filling the Closed Space of Logo/Custom Character Files**

The following dialog appears when you press the [Fill the Closed Space] button. A fill line will be created when you specify a closed space after setting the fill condition.



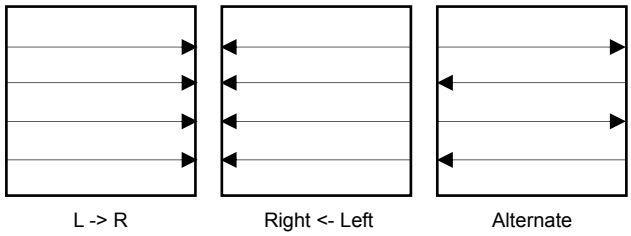
A. Margin from Boundary/Fill Interval

Set the margin between the boundary and fill line and the fill line intervals.



B. Fill direction

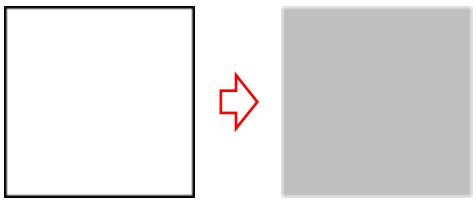
Select the fill direction from [L -> R/R <- L/Alternate].



Reference
- **All fills are created using LINE elements.**
- **If [Set fill condition every time] is not checked in the Setup, this setting will be omitted and the same value as last time will be applied.**

■ **Filling the Closed Space of a Hatch Logo File**

When you specify a closed space after pressing the [Fill the Closed Space] button, the close space will be converted into HATCH element. Set the fill setting of the hatch logo in the marking conditions.



Reference
- **Delete the boundary when setting the fill setting of the hatch logo. Since HATCH elements contain the boundary and fill information, the boundary can be created later on.**
- **If you restore the HATCH element to its original state using the [Delete the Filled Area] button, only those elements on the HATCH boundary will be restored. The area extending off the boundary will not be restored.**

10. Combine/Separate

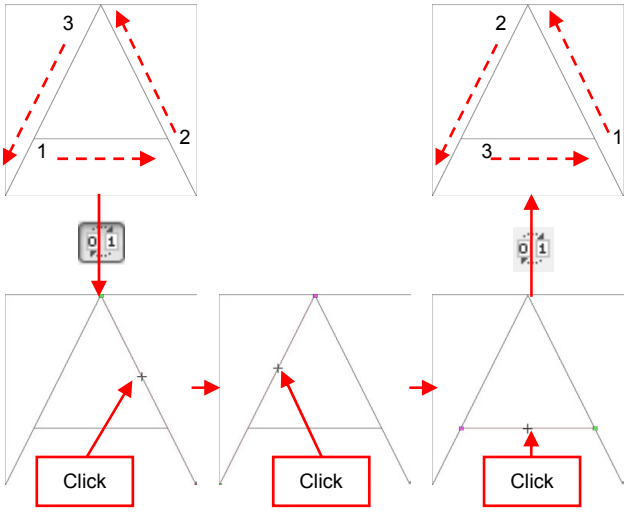
Combine and convert the currently selected HATCH elements into MHATCH element. It can be undone using [Separate].
"Combine/Separate" (128)

11. Display Noncontiguous Points/Hide Noncontiguous Points

Display the noncontiguous points of the selected element.
"Show/Hide Noncontiguous Points" (Page 125)

12. Change Element No.

Specify the element marking order with a mouse. The elements will be marked in the order they were clicked after pressing the [Change Element No.] button.



Important
- **[Change Element No.] will not change the marking direction. To change the marking direction, use the [Swap Start/End] button in [Position setting].**

Reference
- **If you wish to change the element No. from the middle of multiple elements, select the first element to be changed while holding down the Shift key. Since the element No. of elements selected while holding down the Shift key remains unchanged, you can change the marking order from a desired element in the middle.**

13. Display Marking Order/Check Marking Order Movie

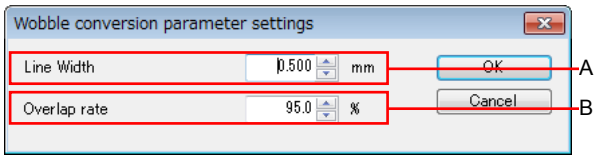
Display the drawing order of the currently selected element.
"Display Drawing Order" (Page 126)

14. Select Outline Start Position

Change the drawing start position of the boundary of the HATCH element.
"Select Outline Start Position" (Page 124)

15. Wobble Conversion

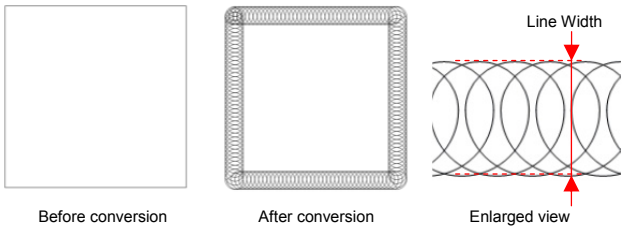
Convert all line segment (LINE, ARC) elements in the logo file format into multiple (arc element). The following screen appears when you press the [Wobble Conversion] button.



Reference
- **Wobble conversion can only be performed once on a logo.**
- **Non-marked elements will not be converted.**
- **Scratch-converted logos cannot be converted.**
- **The scan speed for a Wobble-converted logo should be set to 3000mm/s or slower.**
- **The logo will be fitted to the bottom left of the area after conversion.**

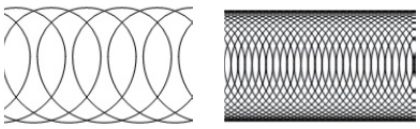
A. Line Width

Set the width of the multiple lines.



B. Overlap rate

Set the overlap ratio with the adjacent arc element.



Reference

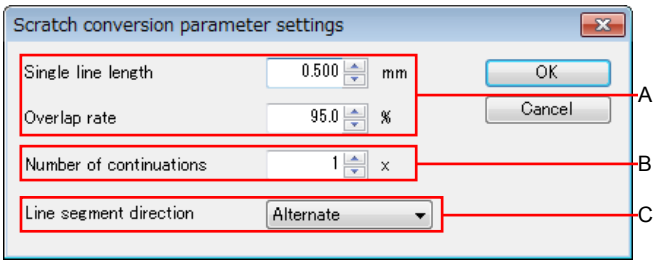
- **The higher the overlap ratio, the denser the marking will be. However, higher overlap ratio will also result in longer marking time.**

16. Scratch Conversion

Convert all line segment (LINE, ARC) elements in the logo file format into multiple line segments. The following screen appears when you press the [Scratch Conversion] button.

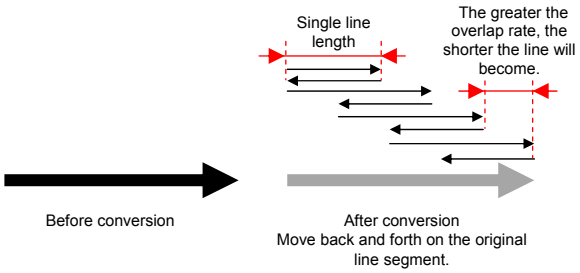
Reference

- **Scratch conversion can only be performed once on a logo.**
- **Non-marked elements will not be converted.**
- **Wobble converted logos cannot be converted.**
- **The scan speed for a Scratch-converted logo should be set to 3000mm/s or slower.**
- **The logo will be fitted to the bottom left of the area after conversion.**



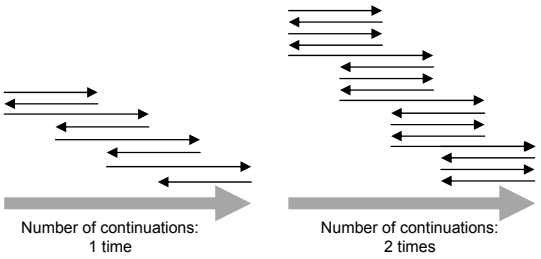
A. Single Line Length/Overlap Rate

Set the per-line length and the overlap ratio of multiple line segments.



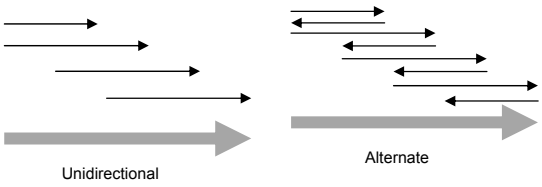
B. Number of continuations

Set the to-and-fro count for the line segment.



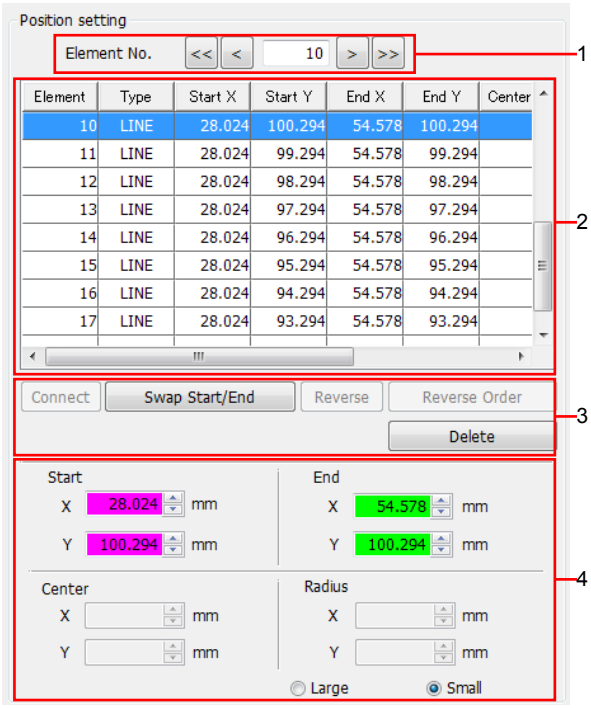
C. Line segment direction

Select the writing direction from [Unidirectional/Alternate].



Position setting view

In [Position setting view], you can perform operations such as selecting the element No., displaying the element list, editing elements and displaying the element coordinates.



1. Element No.

Display and select the element No.
: Move the element No. by one unit.
: Move to the maximum/minimum element No.

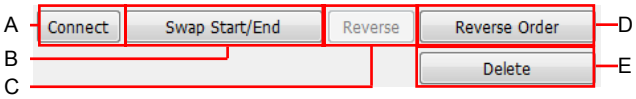
2. Show Element List

Display the type, start point X/Y, end point X/Y, center X/Y and radius X/Y of all elements.

Reference
- **There are the four kinds of classification, LINE, ARC, HATCH, and MHATCH.**
- **You can change the element No. by dragging the mouse.**

3. Edit Element Function

You can edit and/or delete elements.



A. Connection

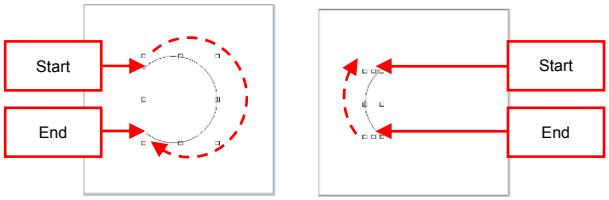
Connect the start and end points of two desired elements. The start point of the latter selected element will move and connect to the end point of the former selected element.

B. Swap Start/End

Change the drawing order by switching the start/end points of the element.

C. Reverse

Reverses the drawing order of an arc/oval arc. Arc/oval arc will be marked as arc from the start point to end point in the clockwise direction, but the arc can be inverted using this function.



Before conversion (Clockwise) | After conversion (Counterclockwise)

D. Reverse Order

Reverses the order of the currently selected multiple elements.

E. Delete

Delete the currently selected element.

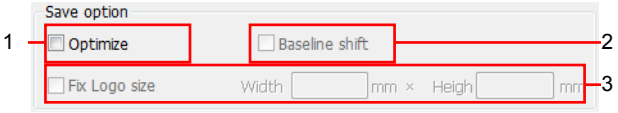
4. Start Point/End Point/Center/Radius

Display the start/end points of an element. The center and radius will also be displayed when the type is ARC.

Reference
- **You can edit directly from the input box.**

Save option

Select the save options.



1. Optimize

If the [Optimize] checkbox is set to ON, files will be saved with the optimal element drawing order.

Reference
- **This function cannot be used for custom character files.**

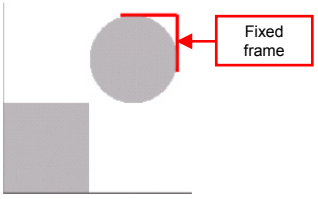
2. Baseline shift

Save with the baseline shift function of the custom character file enabled if the [Baseline shift] checkbox is set to ON.

Reference
- **Baseline shift is a function for marking characters such as lowercase 'g' and 'q' slightly lower than the other characters.**

3. Fix Logo size

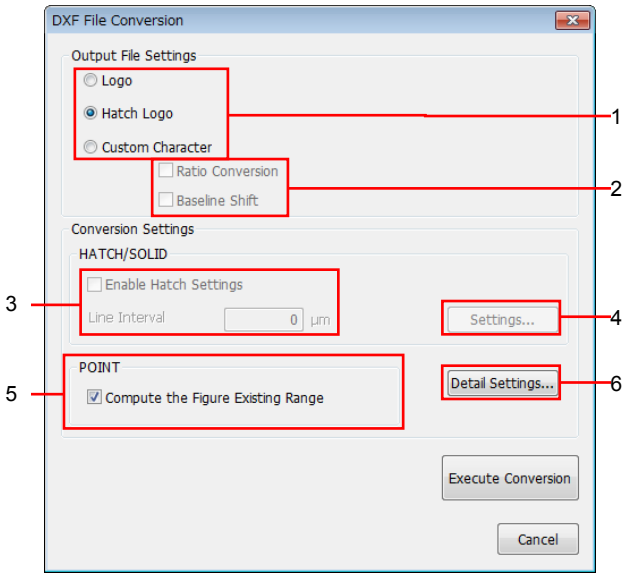
This function fixes the size of the hatch logo file.



Reference
- **By fixing the size, you can create a hatch logo of the desired size.**

DXF File Conversion

The DXF File Conversion dialog appears when you open a DXF file. Select the conversion method and press the [Execute Conversion] to convert the file.



Reference

- **DXF files should be created in actual size.**
- **The maximum DXF file name length that can be imported is 26 bytes or longer.**
- **DXF files support up to AutoCAD 2006 and also support the following line segment elements. LINE, POINT, CIRCLE, ARC, SOLID/HATCH (Fill part is converted into HATCH element), INSERT, POLYLINE, 3DFACE, 3DLINE, ELLIPSE (Tilted oval is partitioned into line segment and converted), SPLINE (Partitioned into line segment and converted), LWPOLYLINE (Converted into line, circle or arc)**
- **The maximum capacity of the logo, hatch logo or workpiece image file after conversion is 1MB.**

1. Conversion File Format

Select the file format after conversion from [Logo/Hatch Logo/Custom Character].

■ **Logo, Hatch Logo**

Importable DXF data sizes are as described below.

Model	DXF data size
MD-X1020/1520, MD-U1020	327 mm square
MD-F3220/5220, ML-Z9620	300 mm square
MD-X1000/1500, MD-F3200/5200, MD-U1000	125 mm square
ML-Z9610	120 mm square
MD-X1050, ML-Z9650	50 mm square

■ **Custom Character**

Importable DXF data sizes are as described below.

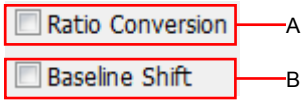
Model	DXF data size
MD-X1020/1520, MD-F3220/5220, MD-U1020, ML-Z9620	50 mm square
MD-X1000/1500, MD-F3200/5200, MD-U1000, ML-Z9610	20mm square
MD-X1050, ML-Z9650	10mm square

Reference

- **Create a custom character file with reference to the CAD origin. You cannot import data that has not been created with reference to the point of origin.**
- **If the [Ratio Conversion] checkbox is ON, custom character files can be imported with the custom character size fitted to the area.**

2. Ratio Conversion/Baseline Shift

In the custom character conversion options, select whether to set the ratio conversion and the baseline shift function.



A. Ratio Conversion

Import the DXF data such that it fits to the outermost shell of the area, regardless of the DXF data size.

Ratio Conversion OFF　　Ratio Conversion ON

B. Baseline Shift

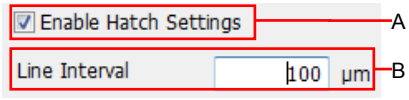
Enable the baseline shift function for custom character files.

Reference

- **Baseline shift is a function for marking characters such as lowercase 'g' and 'q' slightly lower than the other characters.**

3. Fill Conversion Settings

Set whether to apply a fill to HATCH/SOLID element of the DXF file.



A. Enable Hatch Settings

Generate a fill line in HATCH/SOLID of the DXF file.

Reference

- **Hatch logo files are automatically converted into HATCH elements.**

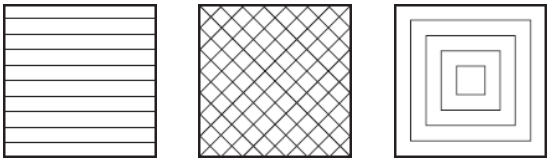
B. Line Interval

Set the fill line interval.

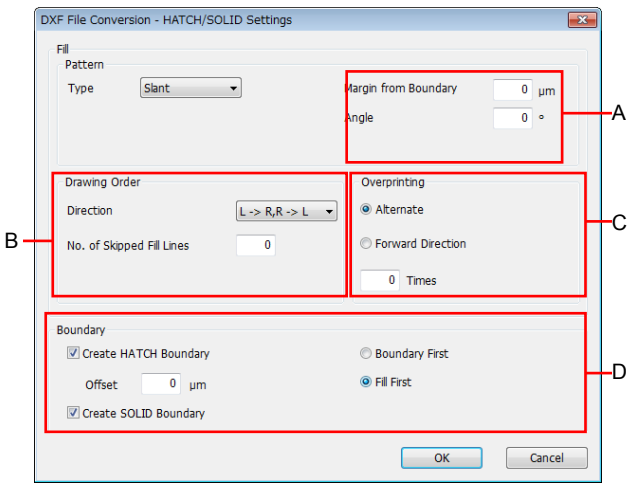
4. Conversion Settings

Set the detailed contents of the logo and custom character fill lines. Separate explanations are provided for each pattern type.

■ **When the Type is Slant/Tolerance/Contour**



Slant　　Cross　　Contour



Reference
- **The SOLID element is automatically converted with a horizontal line (0° slant).**

A. Margin from Boundary/Angle/Cross Angle

- **Margin from Boundary**
  Set the margin between the boundary and the fill.
  “Margin from Boundary/Fill Interval” (Page 131)
- **Angle**
  Set the fill interval angle.
  “Angle” (Page 36)
- **Cross Angle**
  Set the angle formed by the crossing fill lines.
  “Cross Angle” (Page 57)

Reference
- **The cross angle will only be displayed when the type is [Cross].**
- **This item is not displayed for a contour.**
- **In the case of a contour, the [Join Intersection Points] option will appear under [Type].**
  The [Join Intersection Points] option sets whether to draw a line between the intersecting points when contours intersect with each other near the figure center. When you set [Join Intersection Points] to ON, the points of intersection of the contours will be joined with a line.

Join Intersection Points ON

Join Intersection Points OFF

B. Drawing Order

Set the drawing order of the fill lines.

- **Direction**
  Set the marking order for the fill lines.
  “Direction” (Page 35)
- **Skip Line Count**
  Mark the fill lines skipping the specified number of lines. Marking will be performed to the end by moving to-and-fro for the skipped lines.
  “Skip Line Count” (Page 57)

Reference
- **The drawing start position will only be displayed for a contour.**

C. Overprinting

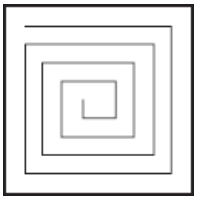
Set the overwriting direction and overwriting count.
“Line Overprinting” (Page 58)

D. Boundary

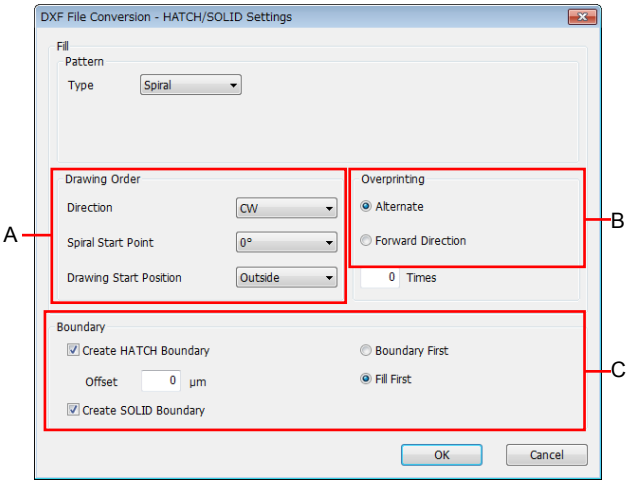
Set the boundary.

- **Set whether to create a HATCH/SOLID boundary figure.**
  “Create Boundary” (Page 36)
- **Offset**
  Set the boundary offset.
  “Shrink boundary” (Page 36)

■ **For [Spiral] Type**



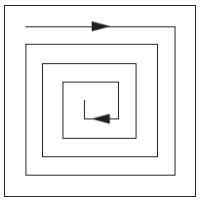
Spiral



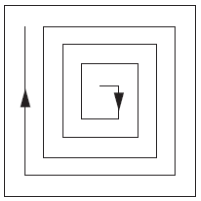
A. Drawing Order

Set the direction of the spiral drawing order, the spiral start position and the drawing start position.

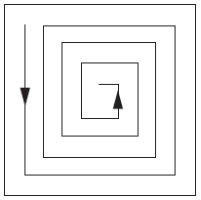
- Relationship between directions and start positions



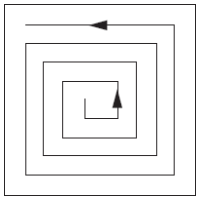
Direction: CW
Start Position: Outside



Direction: CW
Start Position: Inside

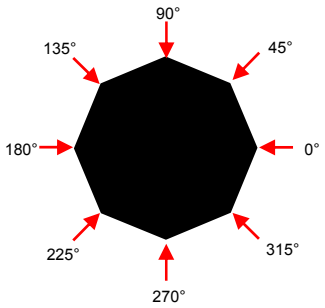


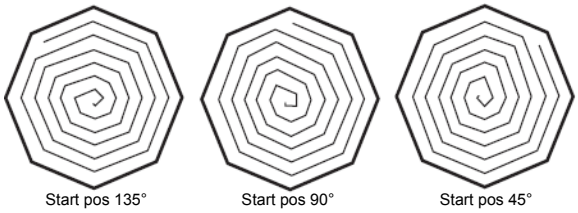
Direction: CCW
Start Position: Outside



Direction: CCW
Start Position: Inside

- Spiral start position
  Select the spiral start position from [0/45/90/135/180/225/270/315°] when filling a polygon.





B. Overprinting

Set the overwriting direction and count.
"Line Overprinting" (Page 58)

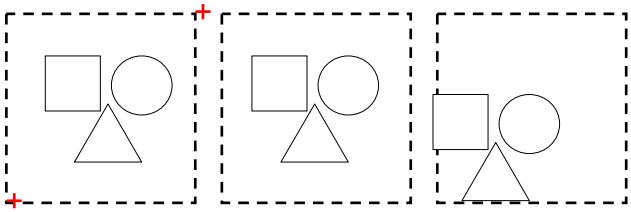
C. Boundary

Set the boundary.

- **Set whether to create a HATCH/SOLID boundary figure.**
  "Create Boundary" (Page 36)
- **Offset**
  Set the boundary offset.
  "Shrink boundary" (Page 36)

5. POINT

You can set the logo size freely by treating the POINT element on the DXF data as a figure existing range.

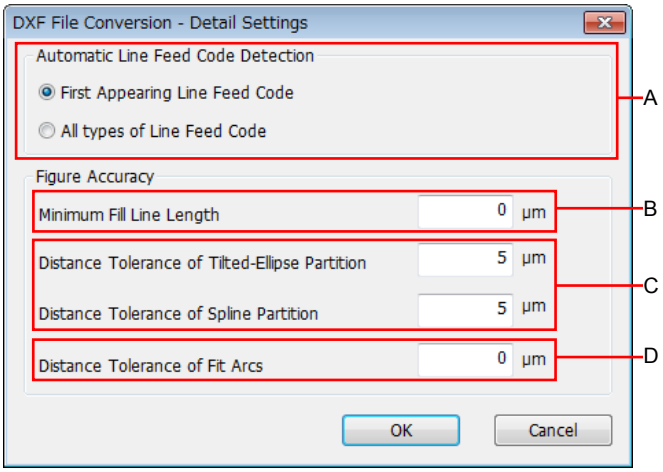


Reference

- **When POINT is output as a figure existing range, a non-marking line will be drawn from the point of origin to the opposing corners of the logo.**

6. Advanced

Set how to read line feed codes and the figure precision.



A. Automatic Line Feed Code Detection

Select how to read the line feed codes in the DXF file.

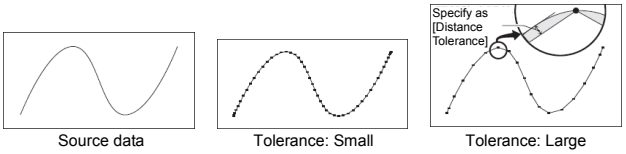
- First Appearing Line Feed Code
  Only the line feed code that appears first (DOS/Windows format, UNIX format or Mac format) for the DXF file will be used. If any line feed code appears, it will be treated as a hidden character.
- Treat all as line feed codes
  Any DXF line feed code that appears (DOS/Windows format, UNIX format or Mac format) will be treated as a line feed code. This option is only used for DXF files containing mixed line feed codes.

B. Minimum Fill Line Length

Set the minimum line segment length when a fill line segment is created for HATCH/SOLID element.

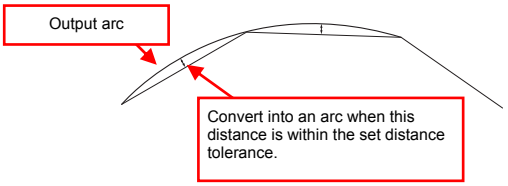
C. Distance Tolerance of Tilted-Ellipse/Spline Partition

The oval (ELLIPSE) elements of the DXF file with inclined axis and spline (SPLINE) elements are split into fine line segments. To convert, specify the distance from the partitioned line segment (chord) to the furthest point among the curved points along the line segment as [Distance Tolerance].



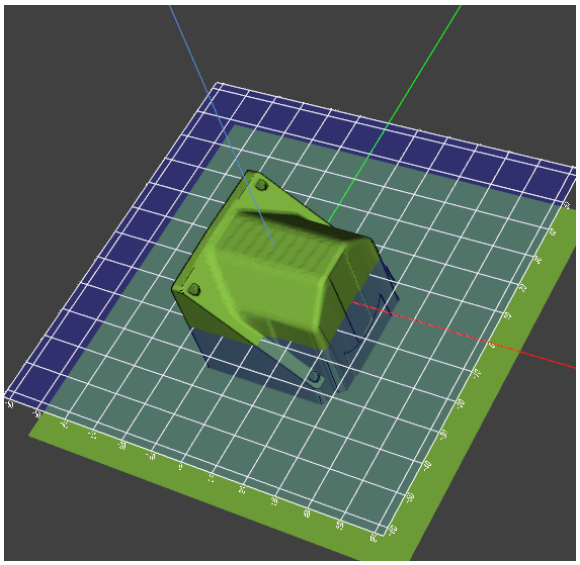
D. Distance Tolerance of Fit Arcs

When the fill pattern is spiral or contour, the number of output elements can be reduced by converting a shape consisting of a fine line segment into a similar arc. The line segment is converted into an arc when the longest distance between the approximating arc and line segment is within the set distance tolerance.



6-3 Z-MAP Creator

Z-MAP Creator is a software that creates Z-MAP files from 3D_CAD (STL format) files. By using a Z-MAP file, you can mark on complex 3D shapes such as below.

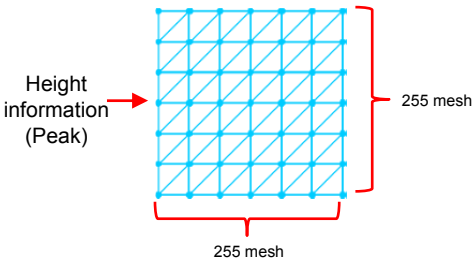


Important

- **This function only appears when the 3D extensions software "MB3-H3D1" is installed.**

Reference

- **Z-MAP Creator converts imported STL files into 255 x 255 mesh-split Z-MAP files. Z-MAP files contain height information at the peak of each mesh.**



Flow of Operations for Z-MAP File Conversion

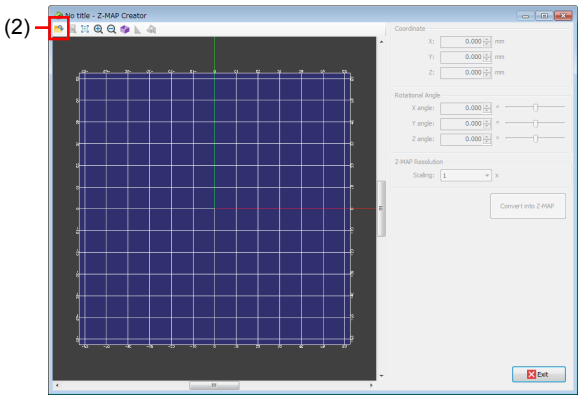
The following explains the basic flow of operations to convert a STL file into a Z-MAP file.

(1) Prepare an STL file.

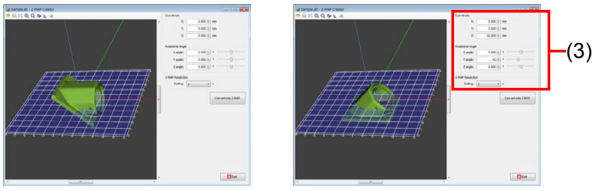
Reference

- **STL is one of the 3D_CAD file formats.**
- **STL files in ASCII and binary formats are supported.**

(2) Open STL File
Reference the desired STL file.



(3) Set the desired coordinates, rotational angles and resolution in Z-MAP Creator.

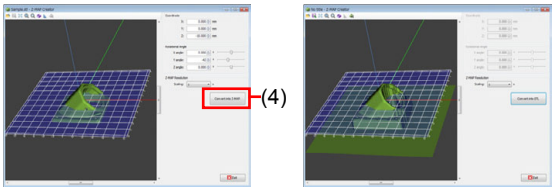


Before setting　　After setting

Reference

- **The area extending off the preview and height ±21mm will not be converted into Z-MAP file.**

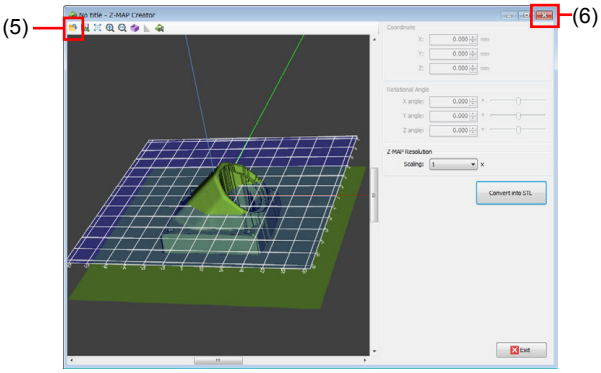
(4) Convert into Z-MAP file.



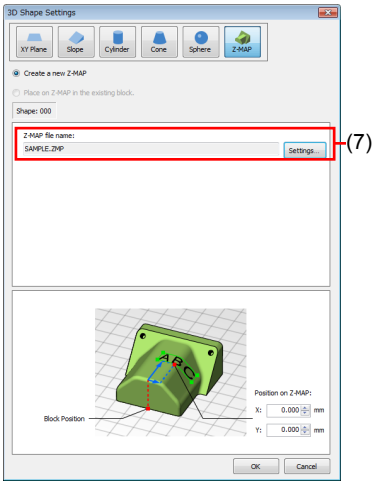
Before conversion　　After conversion

(5) Save the Z-MAP file.
Save with the desired file name.

(6) Close Z-MAP Creator.



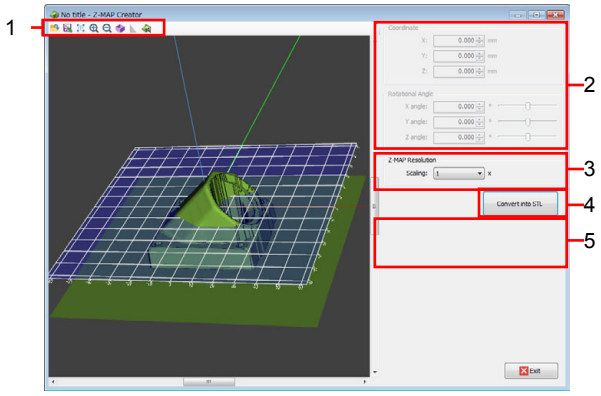
(7) Reference the Z-MAP file created in Z-MAP in the 3D shape settings.



The basic flow of operations is now complete.

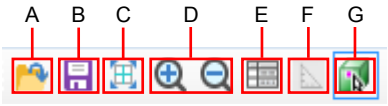
Screen Description

This section explains the Z-MAP Creator screen.



1. Toolbar

You can perform file operations, zoom in/out, set the units and check the heights.



A. Open File

Open a STL file or Z-MAP file.

B. Save As

Save the Z-MAP file after Z-MAP conversion.

C. Display all

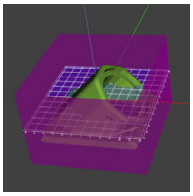
Switch the preview screen to the [Display all] mode.

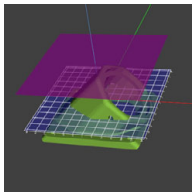
D. Zoom In/Zoom Out

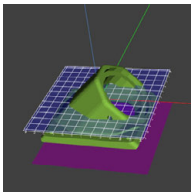
You can zoom in/out the preview screen.

E. Display Setting

Set whether to display the marking space (Ambient/Front/Back) in the preview screen.


Marking space: Ambient


Marking space: Front


Marking space: Back

F. Unit Setting

Select the unit for the STL file to be imported from [mm/cm/m/inch/ft/yd]. The selected unit can be converted into the mm unit in Z-MAP Creator.

Reference

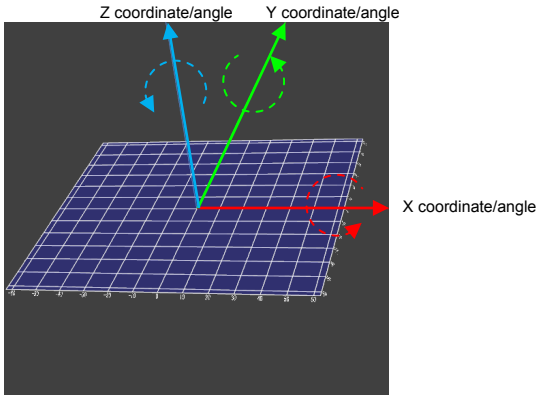
- **This setting is only enabled while editing a STL file.**
- **Changing the unit setting will affect the size of the figure displayed in the preview screen.**

G. Z-map data ref.

Display the Z-MAP data reference.
"Z-map data ref." (Page 139)

2. Coordinate/Rotational Angle

Set the position and angle of the imported figure before converting it into a Z-MAP file. Adjust the X/Y/Z coordinates and X/Y/Z angles such that the marking surface will not go off the preview area.



Reference

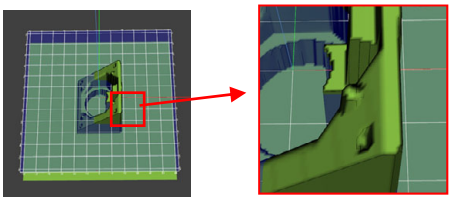
- **This setting is only enabled while editing a STL file.**
- **The area extending off the preview will not be converted.**
- **You can also change the X/Y/Z angles using the slider.**

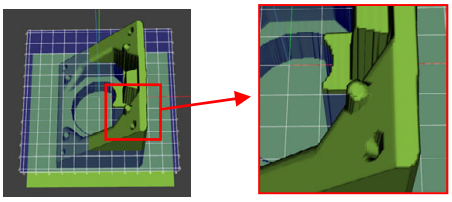
3. Z-MAP Resolution

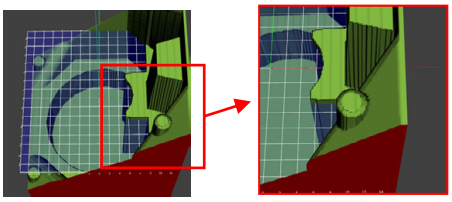
Select the Z-MAP resolution from [1/2/4/8/16]. Increasing the resolution will result in a smaller Z-MAP file area but will allow you to create a higher resolution Z-MAP file.

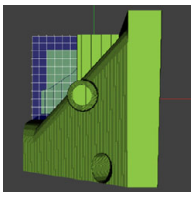
Reference

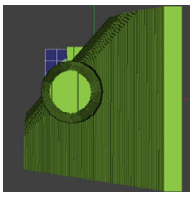
- **The following shows a variation when the Z-MAP resolution is changed in the standard area (125mm square).**


Z-Map Resolution: x 1
Area size: 125mm square
Mesh Resolution: 512µm


Z-Map Resolution: x 2
Area size: Approx. 63mm square
Mesh Resolution: 256µm


Z-Map Resolution: x 4
Area size: Approx. 31.5mm square
Mesh Resolution: 128µm


Z-Map Resolution: x 8
Area size: Approx. 15mm square
Mesh Resolution: 64µm


Z-Map Resolution: x 16
Area size: Approx. 7.5 mm square
Mesh Resolution: 32µm

4. Convert into Z-MAP/Convert into STL

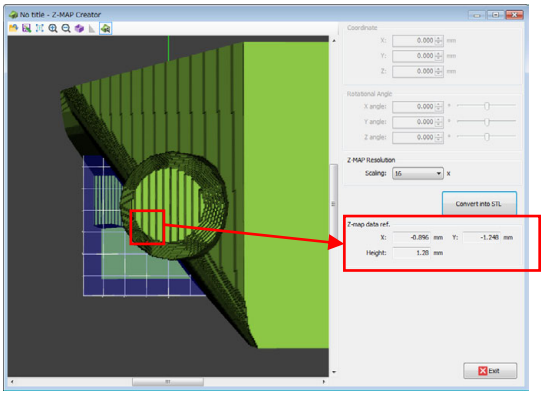
Perform file conversions from STL to Z-MAP and from Z-MAP to STL. Perform Z-MAP conversion after setting the coordinate, rotational angle and Z-MAP resolution.

Reference

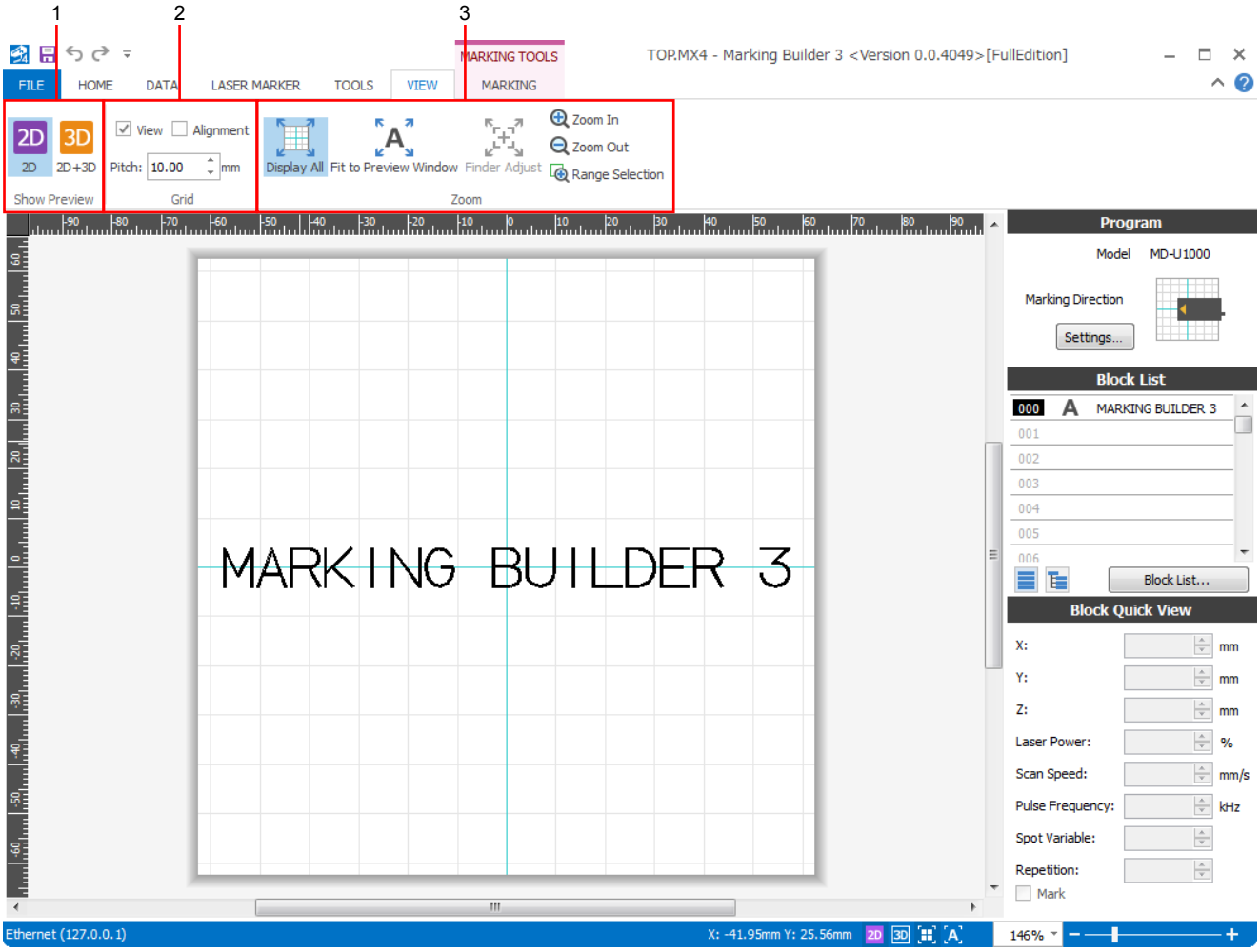
- **If a Z-MAP file is imported, it cannot be converted into STL.**

5. Z-map data ref.

Display the X/Y coordinates and height of the point clicked in the Z-MAP preview area. This option only appears while pressing the [Z-map data ref.] button in the toolbar.

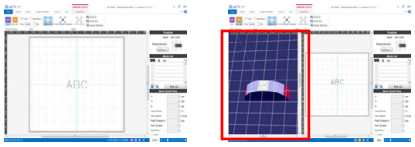


7 View Menu



1. Show preview

Select the display state of the preview area from [2D/2D+3D].



2D View　　2D+3D View

Reference

- **This function only appears when the 3D extensions software "MB3-H3D1" is installed.**
- **It can also be changed from the quick access buttons at the bottom right of the screen.**

2. Grid

Set the grid on the preview area.

A. View

Set whether to display the grid.

B. Alignment

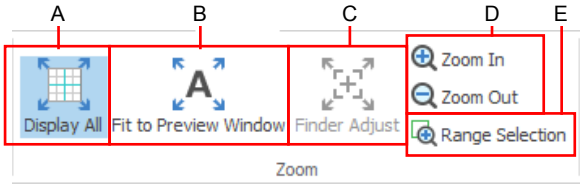
Set whether to align the end points and outermost shell of the block with the grid intersection.

C. Pitch

Set the grid interval.

3. Zoom

Perform various display functions.



A. Display all

Display the entire area in the preview.

Reference ・ **It can also be changed from the quick access buttons at the bottom right of the screen.**

B. Fit to Preview Window

Fit the outermost shell of the mark data in the view area.

Reference ・ **It can also be changed from the quick access buttons at the bottom right of the screen.**

C. Finder Adjust View

Fit the finder's view angle in the view area.

Reference ・ **It can also be changed from the quick access buttons at the bottom right of the screen.**

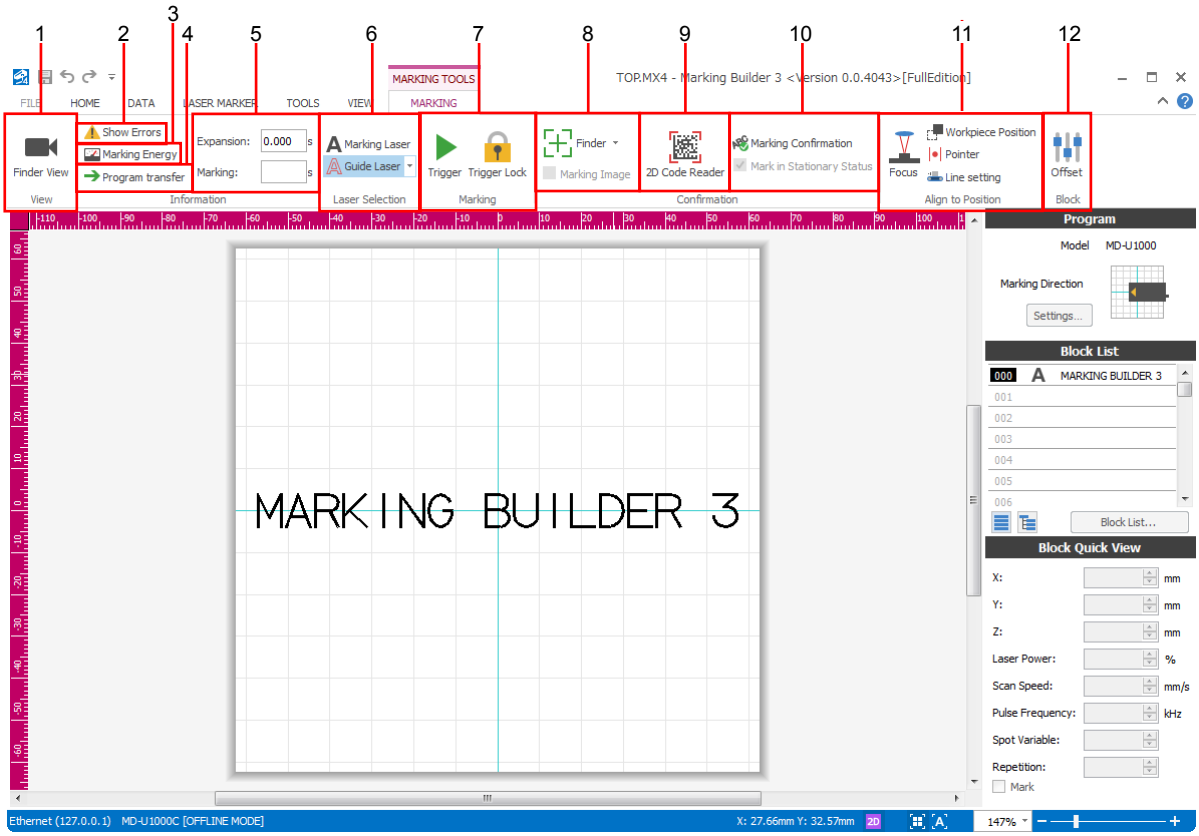
D. Zoom In/Zoom Out

Zoom in/out using the mouse click point in the view area as the center.

E. Range selection

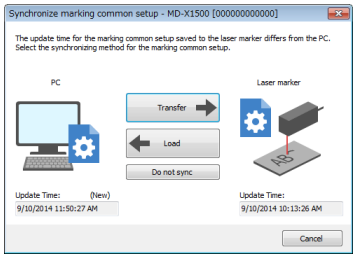
Zoom in on the specified range by mouse operations.

8 Marking Menu



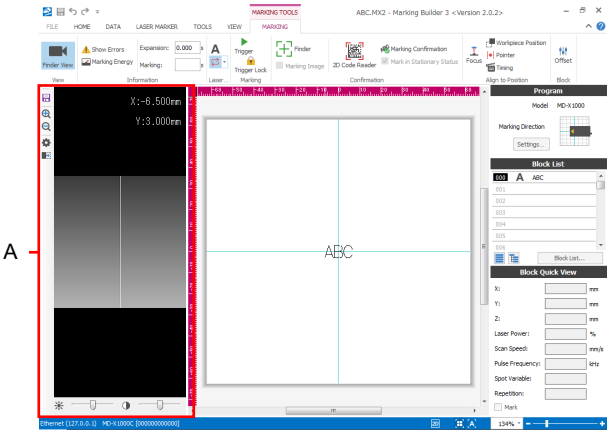
Reference

- **The following screen will appear when there are differences between the marking common setup of Marking Builder 3 and the laser marker. Select either the data to be used or to perform the operation without data transfer.**



1. Finder view

Display the finder capture image by splitting the view area into finder image area and preview area.



Reference

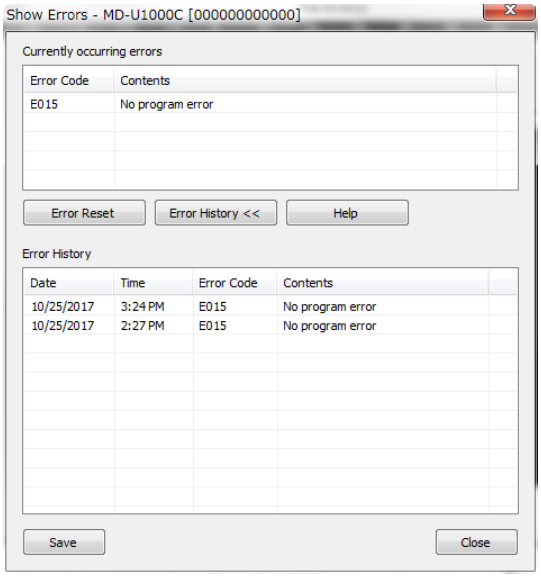
- **This function is not displayed on MD-X1000L/1500L series, MD-F3200/5200 series, and ML-Z9600 series.**

A. Show Finder Images

Set the finder image display and the display screen.
"Finder image" (Page 89)

2. Show Errors

Display the error state/history and resets errors.
"Show Errors" (Page 85)

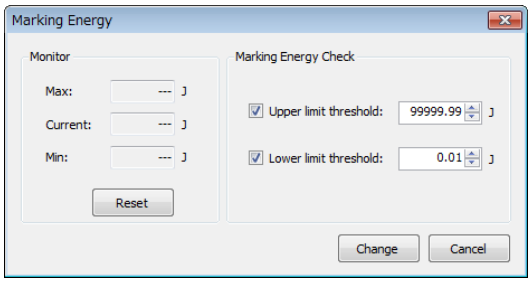


3. Program Transfer

Transfer the currently editing settings to the controller.

4. Marking Energy

Check the energy used for the laser emission after the marking has completed. When the upper/lower limit of the set threshold is exceeded, the "Excess/Insufficient Marking Energy Alarm " will occur and the warning output (No. A4) of the terminal block will become ON.



Reference

- **This function is not displayed for the MD-X1000L/1500L series and ML-Z9600 series.**
- **For the marking energy measurement, set the threshold taking into account the error due to changes in the ambient environment.**
- **Marking energy indicates the total heat of the emitted laser. (Marking Energy (J) = Laser Power (W) x Marking Time (s))**

5. Expansion time/Marking time

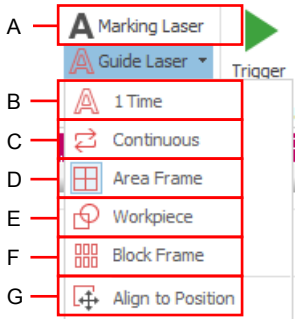
Display the expansion processing time and marking time of the program.

Reference

- **The program expansion processing time and the program No. switching time will be the same.**
- **Marking time includes the trigger delay and auto power-save recovery time.**

6. Laser selection

Select the marking laser or one of the 5 types of guide lasers.



A. Marking Laser

Switch to the marking laser emission mode.

B. Guide Laser: 1 time

Switch to the mode that emits the mark data once with the guide laser.

C. Guide Laser: Continuous

Switch to the mode that emits the mark data continuously with the guide laser.

D. Guide Laser: Area Frame

Switch to the mode that continuously emits a lattice frame that passes through the outermost shell of the area and the point of origin.

E. Guide Laser: Workpiece Image

Switch to the mode that only emits the workpiece image file continuously with the guide laser.

F. Guide Laser: Block frame

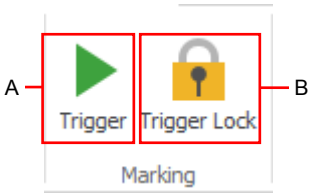
Switch to the mode that only emits the boundary of each block continuously with the guide laser.

G. Guide Laser: Align to Position

Switch to the mode that displays the outer-most of all the currently selecting block by guide laser. The align to position is available by shifting the block.

7. Marking

Execute or lock the trigger.



A. Trigger

Start emitting the marking laser or guide laser according to the mode selected in [Laser selection].

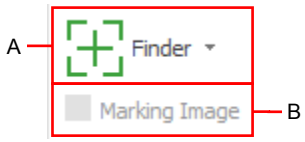
WARNING	**• This function emits laser beams. Make sure to check the precautions on laser safety management before use.**

B. Trigger lock

Disables the [Trigger] button.

8. Finder/Marking Image

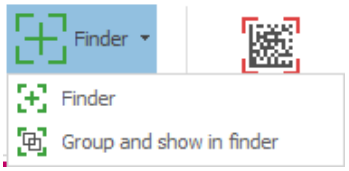
Execute the finder function.

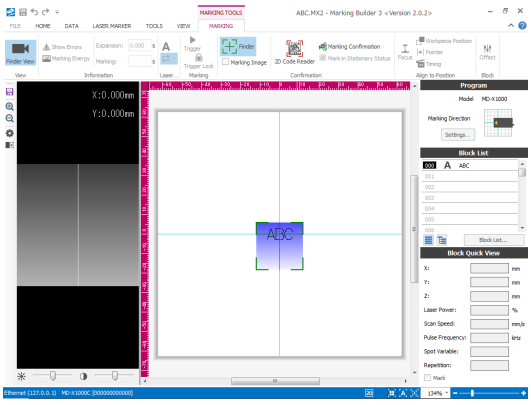


Reference
- **This function is not displayed on MD-X1000L/1500L series, MD-F3200/5200 series, and ML-Z9600 series.**

A. Finder

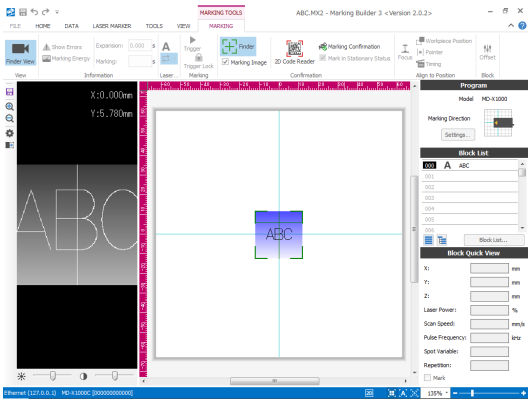
Project the finder image in the preview area. "Finder" and "Grouping and Finder" can be selected.





B. Marking image

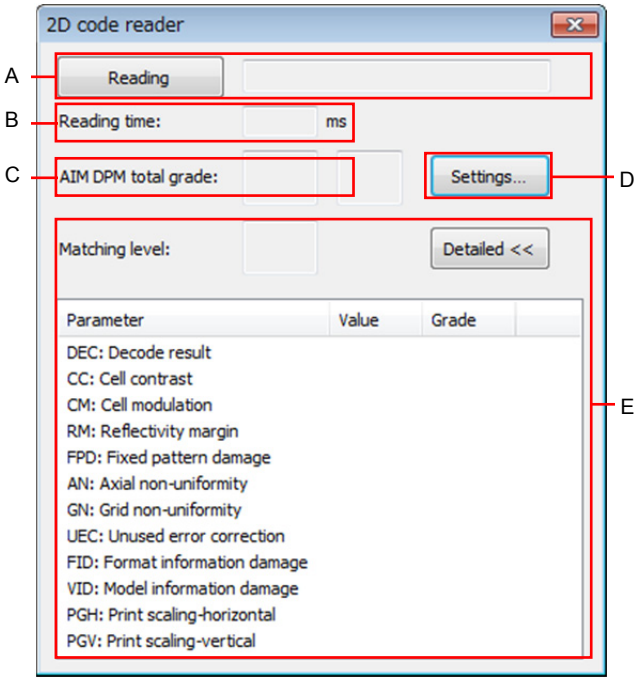
Project the mark data on the finder view.



Reference
- **The marking image is displayed in the position where the block Z coordinate is "0mm".**

9. 2D code reader

Display the 2D code reading result.



Important
- **This function in only available when the "2D code reader function" has been activated.**
  "2D code reader validation" (Page 113)
- **Matching level/Detailed/Reading time will only appear if you have validated the 2D code reader using a serial code for MD-XAD1.**
- **When setting the error threshold to OK other than reading failure, only the contents and result of the reading will be displayed.**

Reference
- **This function is not displayed on MD-X1000L/1500L series, MD-F3200/5200 series, and ML-Z9600 series.**

A. Reading/Reading result

Read the 2D code in the finder view area. The reading result will be displayed next to the button.

B. Reading time

Display the reading time.

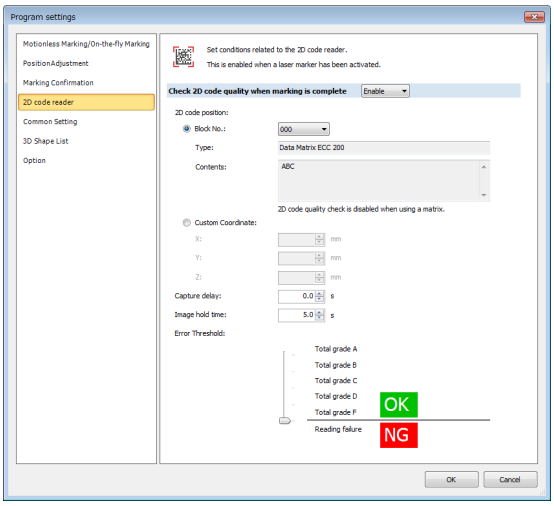
C. AIM DPM total grade

Display the AIM DPM total grade of the 2D code that has been read.

Reference
- **If the AIM-DPM total grade is poor, check the items below.**
  - **Check if there is sufficient contrast in the image.**
  - **Check if the image brightness is optimal.**
  - **Check if the cell size is 0.25 mm or greater (0.13 mm or greater for narrow spot units).**
  - **Check if the quiet zone is 4 cells or greater for QR (Model 1/2), 2 cells or greater for Micro QR, and 1 cell or greater for DataMatrix.**
  - **Check if the workpiece is slanted.**

D. Settings

Display the 2D coder reader screen in the program settings.
“2D code reader” (Page 80)

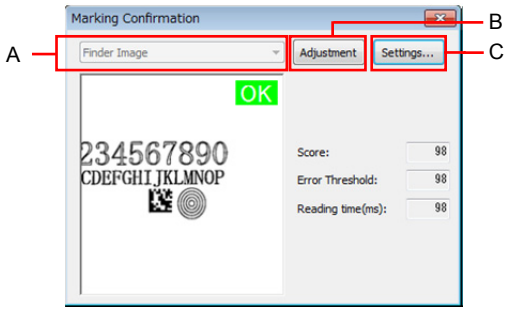


E. Matching level/Detailed/Reading time

Display the matching level. The AIM DPM grades and the reading time will be displayed when you press the [Detailed] button.

10. Marking confirmation

Capture the images of both before and after marking by built-in camera and confirm the marking state.



Reference

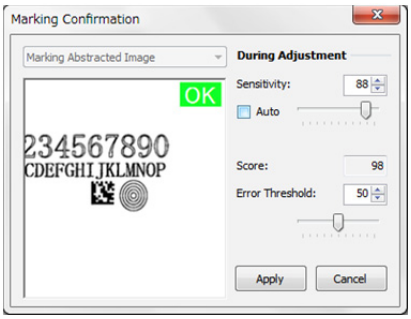
- **This function is not displayed on MD-X1000L/1500L series, MD-F3200/5200 series, and ML-Z9600 series.**

A. Finder image/Marking extracted image

Select an image displayed on monitor.

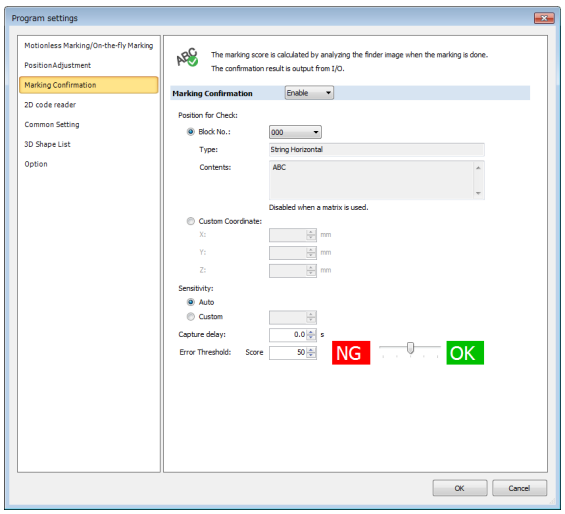
B. Adjustment

The selection/adjustment of the sensitivity [Auto/Custom], and the error threshold settings are switched to possible display.
“Mark confirmation” (Page 79)



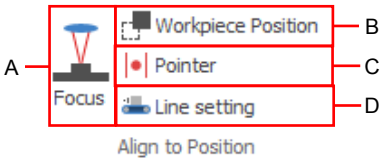
C. Setting

Displays the marking confirmation screen of Program settings.
“Mark confirmation” (Page 79)



11. Align to Position

Display the correction information for height direction, display the workpiece position correction screen and light up the distance pointer.

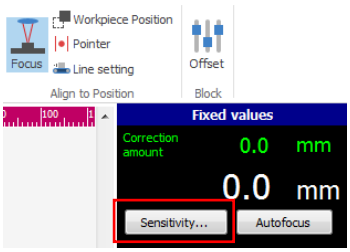


A. Focus

Display the height direction correction information in the program information display area.

Reference

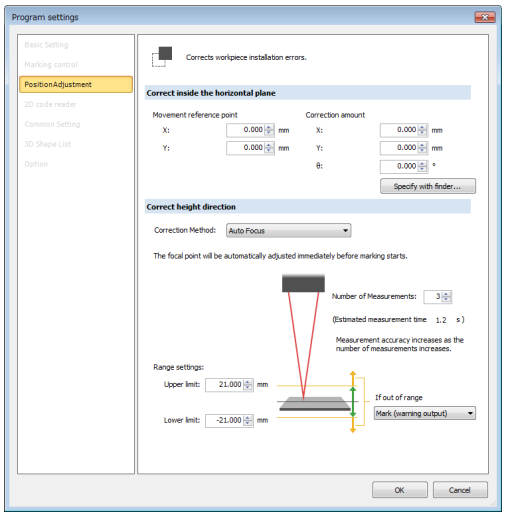
- **This function is not displayed when the correction method is [Fixed] on MD-X1000L/1500L series, MD-F3200/5200 series, and ML-Z9600 series.**
- If the correction method is set to [Fixed]: Display the fixed value and automatically enter and correct the correction amount when the [Correcting] button is pressed. Press [Sensitivity] to adjust the sensitivity of the working distance measurement.
- When the correction method is [Auto Focus]: Update the correction value after each marking. Press [Sensitivity] to adjust the sensitivity of the working distance measurement.
- If the correction method is [External displacement sensor]: Display the current set correction amount and is updated to the latest correction amount when the [Strobe] button is pressed.



B. Workpiece position

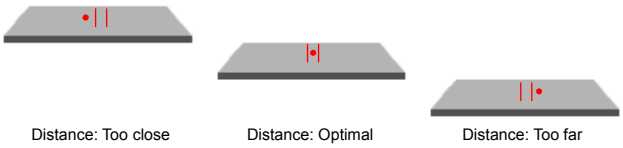
Display the workpiece position adjustment screen in the program settings.

"Workpiece position adjustment" (Page 77)



C. Pointer

A distance pointer will be emitted to the point of origin of the marking area. Adjust the installation height of the workpiece such that the red dot comes to the center of the two red lines. The following shows the relationship between the head and pointer viewed from the front.

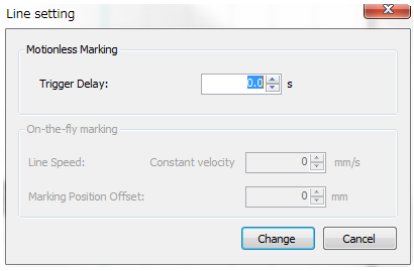


Reference

- **The optimal focus distance of each model is as described below.**
  MD-X1000/1500 series: 189 mm
  MD-X1020/1520 series: 300 mm
  MD-X1050 series: 100 mm
  MD-F3200/5200 series: 168 mm
  MD-F3220/5220 series: 300 mm
  MD-U1000 series: 189 mm
  MD-U1020 series: 300 mm
  ML-Z9610 series: 189 mm
  ML-Z9620 series: 300 mm
  ML-Z9650 series: 92 mm

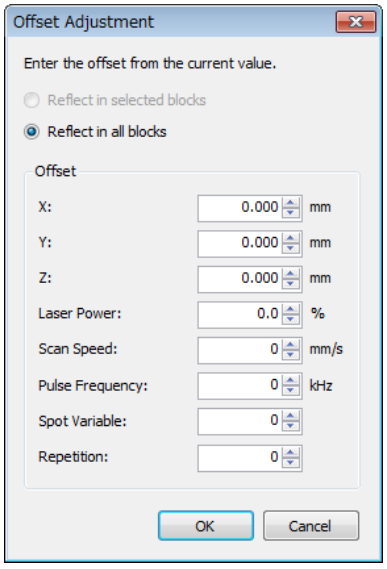
D. Line Settings

For stationary marking settings, the trigger delay is displayed; for On-the-fly Marking settings, the input dialog of the line speed and marking position offset is displayed.



12. Offset Adjustment

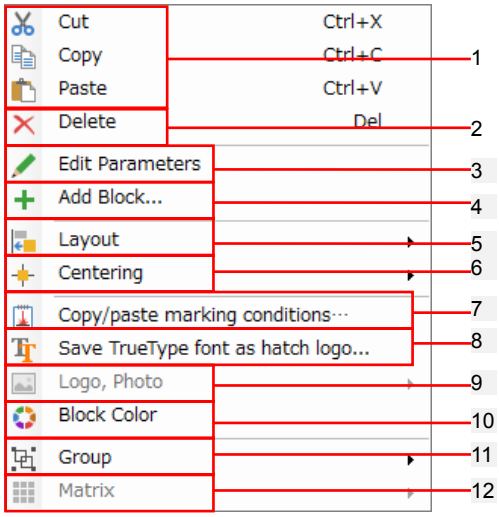
You can adjust the offset of the parameters of the currently selected block(s) or all blocks in the list.



MEMO

9 Other Operations

9-1 Right-Click Operations on the Preview



Right-clicking on a block will bring up the dedicated context menu for block editing.

1. Cut/Copy/Paste

Cut, copy or paste a block.

2. Delete

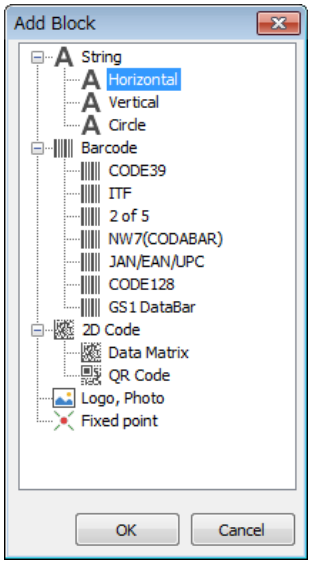
Delete a block.

3. Edit Parameters

Display the Edit Parameters (Edit block/Edit matrix/Edit group) screen.

4. Add Block

The block adding screen will appear.



5. Layout

Align the block layout.
"Layout" (Page 91)

6. Centering

Align the block layout with [Center horizontally/Center vertically/Center].
"Layout" (Page 91)

7. Copy/paste marking conditions

This option is used when copying marking conditions from another block or when referencing the marking conditions created in sample marking.
"Copy/paste marking conditions" (Page 31)

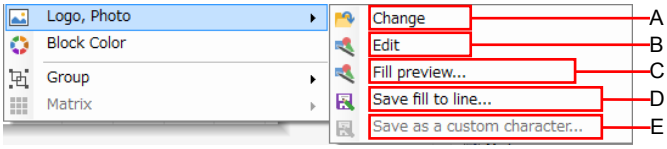
8. Save TrueType font as hatch logo

Save the selected TrueType font after converting it to hatch logo.

Reference
- **"Save TrueType font as hatch logo" cannot be performed when the fill direction is "L -> R, R -> L (High Speed)" or "R -> L, L -> R (High Speed)."**

9. Logo, Photo

Edit, preview or save the logo, hatch logo, workpiece image and custom character file.



A. Change

Change the referenced logo/photo only, without changing the size and marking conditions.

B. Edit

Open the selecting logo, hatch logo, and workpiece image with Logo designer.

Reference
- **Double-click the logo, hatch logo, or workpiece image on preview to be open with Logo designer.**

C. Fill preview

Preview and check the line from the set fill conditions.
"Preview" (Page 36)

D. Save fill to line

Convert a HATCH element into a LINE element using the set fill conditions. The preview will not change, but the LINE fill element will be displayed in orange when edited.

Reference
- **"Save TrueType font as hatch logo" cannot be performed when the fill direction is "L -> R, R -> L (High Speed)" or "R -> L, L -> R (High Speed)."**

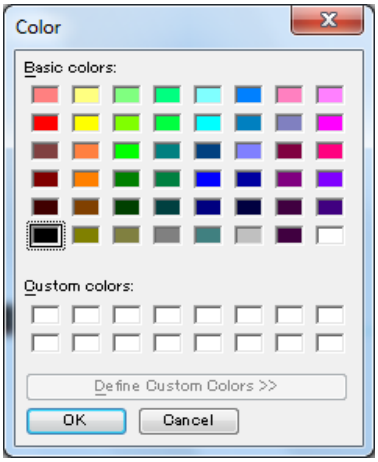
E. Save as a custom character

Convert a logo file to a custom character file.

Reference
- **Files other than logo files cannot be converted.**

10. Block Color

Change the block display color in the preview.

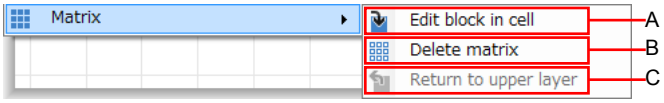


11. Group

Perform operations such as grouping currently selected blocks or groups, adding them to an existing group, and ungrouping.
“Grouping” (Page 93)

12. Matrix

Perform operations such as [Edit block in cell], [Delete matrix], or [Return to upper layer] on the matrix.



A. Edit block in cell

The “Edit block in cell” mode will open.

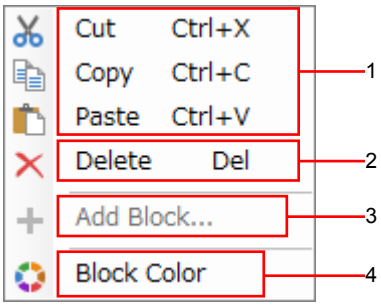
B. Delete matrix

Delete the set matrix.

C. Return to upper layer

Return from the “Edit block in cell” mode to the original screen.

9-2 Right-Clicking on the Block List



Right-clicking on a block list will bring up the dedicated context menu for list editing.

1. Cut/Copy/Paste

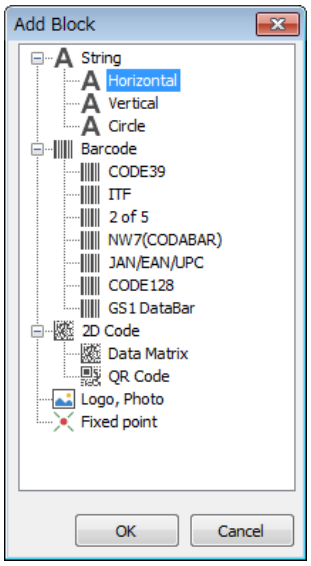
Cut, copy or paste a block.

2. Delete

Delete a block.

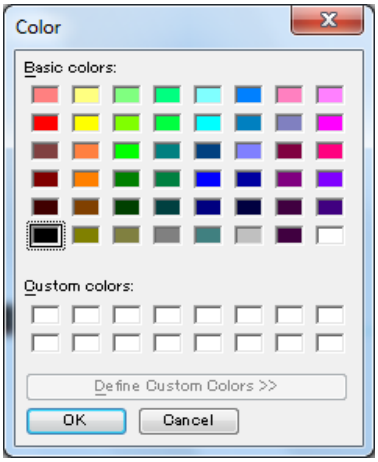
3. Add Block

The block adding screen will appear.

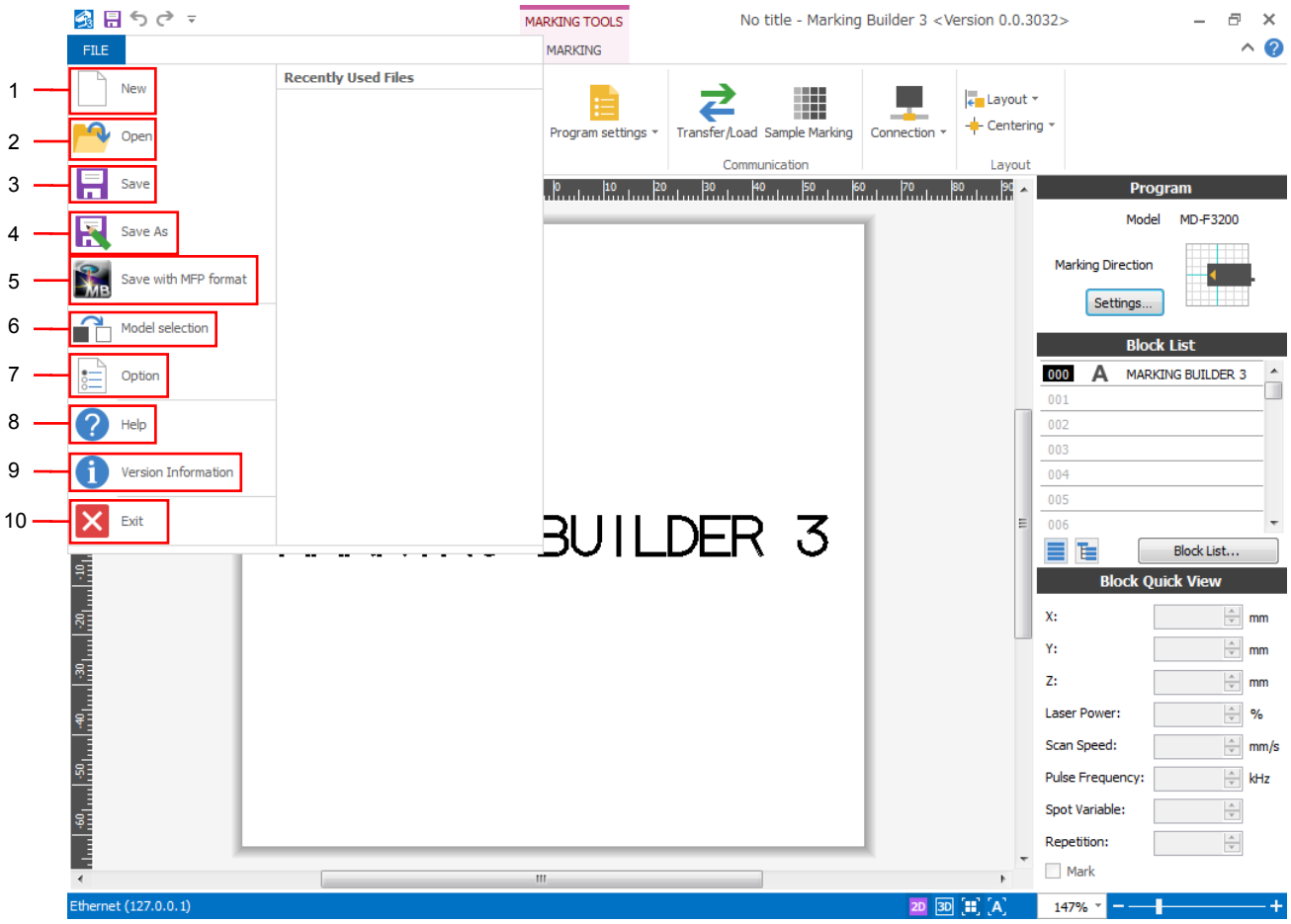


4. Block Color

Change the block display color in the preview.



10 File Menu

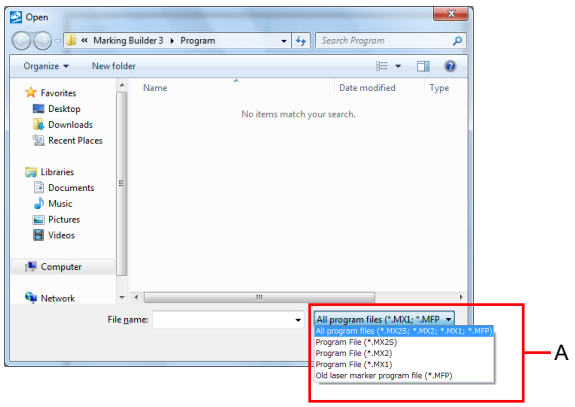


1. New

Create a new program file.

2. Open

Open existing program files or old laser marker files.



A. File type

Select the file type from [Program File (MX4, MX2S, MX2, .MX1)/Old laser marker program file].

Reference

- **The setting file of MD-X1500/1000 series, MD-F3200/5200 series, MD-U1000 series, and ML-Z9600 series are MX*. * is the version of Marking Builder3. The settings created with new version cannot be opened on the marking builder of an old version. If the program file is saved with an old version, the functions coming with the new version may be deleted.**
- **Old laser marker program files are program files with the .MFP extension that are saved in the controller of the ML-Z9500/MD-V9900/MD-S9900/MD-F3000/MD-F3100 /MD-F5100/MD-T1000 series.**
- **A conversion log will appear if you open a MFP file. Use it after checking the conversion log.**

3. Save

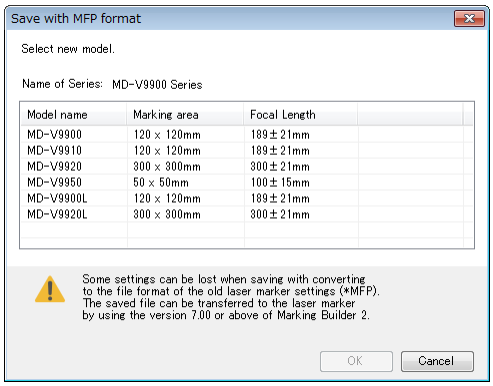
Overwrite the currently editing program file to the same file.

4. Save As

Save the program file with a different name.

5. Save with MFP format

Save the program file being currently edited in the old laser marker file.

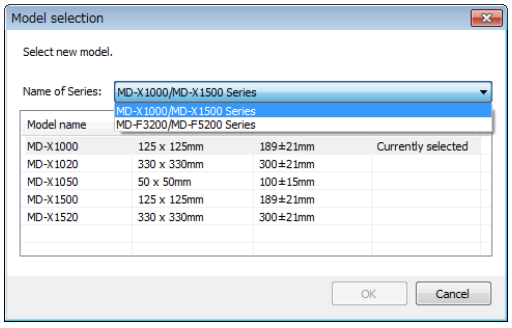


Reference
- **If the program file was edited on the MD-X1000/1500 series, it is converted to a file compatible with the MD-V9900 series.**
- **If the program file was edited on the MD-F3200/5200 series, it is converted to a file compatible with the MD-F3000/3100/5100 series.**
- **If the program file was edited on the ML-Z9600 series, it is converted to a file compatible with the ML-Z9500 series.**
- **After the file is converted, it can be transferred to the laser marker with Marking Builder 2 Ver. 7.0 or later.**

Important
- **If the file is converted to an old laser marker setting file format (MFP) and saved, some settings may be lost.**

6. Model selection

Converts the information of the model in use in the program file currently being edited.



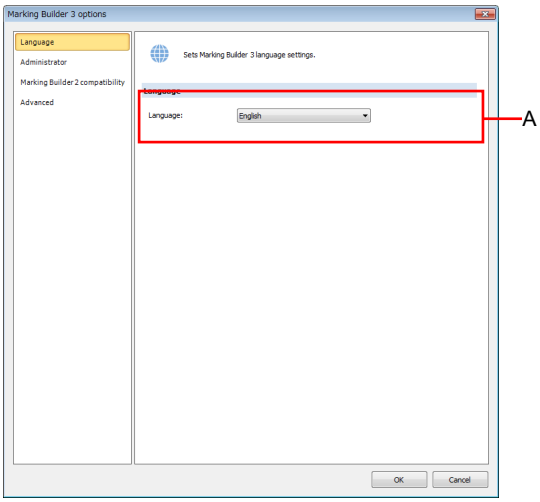
Reference
- **Even if the marking area changes, the coordinates of the existing block are kept.**

7. Option

Set the options information of Marking Builder 3.

■ Language

Switch the language setting.



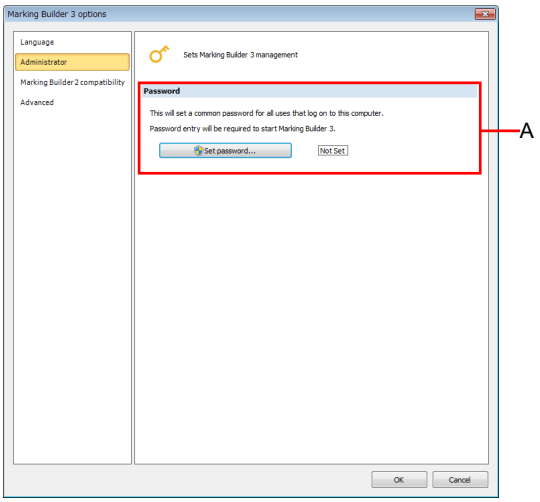
A. Language

Select the language setting from [Japanese/English/Simplified Chinese/German/Korean/French/Spanish/Italy/Thai].

Important
- **The language setting changes will take effect after restarting Marking Builder 3.**
- **When French or Spanish is selected, if a Marking Builder earlier than Ver. 2.2 has been started, it will be displayed in English.**
- **When Italy or Thai is selected, if a Marking Builder earlier than Ver. 4.0 has been started, it will be displayed in English.**

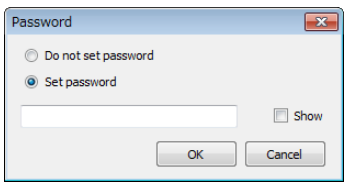
■ Administrator

Set the management functions of Marking Builder 3.



A. Password

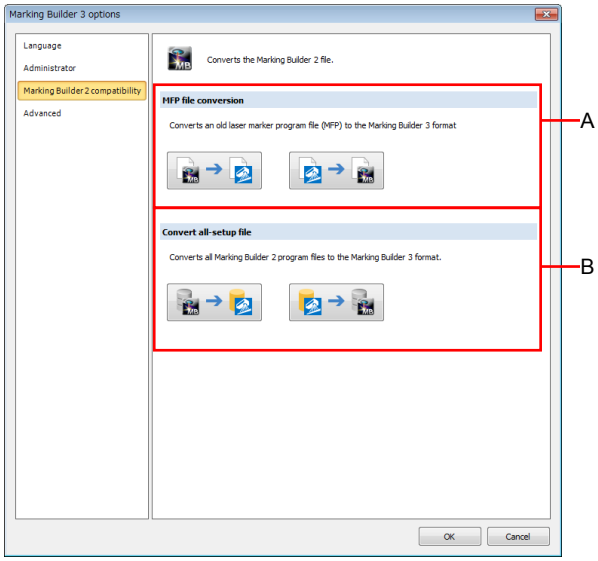
Set the password that is required to launch Marking Builder 3.



Important
- **Set a password for all users on the PC. Administrative privileges are required.**

■ Marking Builder 2 compatibility

Converts the Marking Builder 2/3 setting file to a compatible format.



A. MFP file conversion

Converts the old laser marker setting file (MFP) to a Marking Builder 3 program file. Marking Builder 3 program files can also be converted to old laser marker setting files (MFP).

- **MFP ⇒ MX* file conversion**

Press the button in the above diagram and refer to the optional MFP file. The converted program file will be saved in the program file save folder.

- **MX* ⇒ MFP file conversion**

Press the button in the above diagram and refer to the optional MX* file. The converted program file will be saved in the old laser marker program file save folder.

Reference

- **The program file created with MD-U1000 series cannot perform MX* to MFP file conversion.**
- **Multiple files can be converted in a batch.**
- **The old laser marker setting file is a setting file saved in the ML-Z9500/MD-V9900/MD-S9900/MD-F3000/ MD-F3100/MD-F5100/MD-T1000 series controller that has an MFP file extension.**
- **After conversion is complete, a conversion log appears. Check the conversion log before using it.**
- **The conversion log is saved in the program file save folder.**

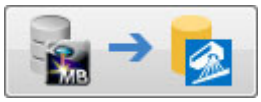
B. Convert all-setup file

Converts all Marking Builder 2 program files to the Marking Builder 3 format. Marking Builder 3 backup files can also be converted to a Marking Builder 2 all-setup file.

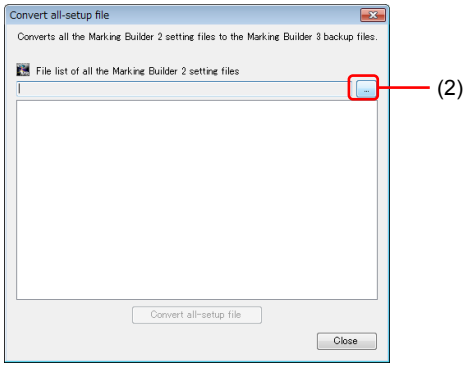
- **MB2 all-setup file ⇒ MB3 all-setup file**

Follow the procedure below to convert the all-setup file:

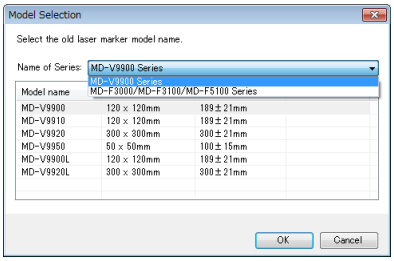
(1) Press the Convert button



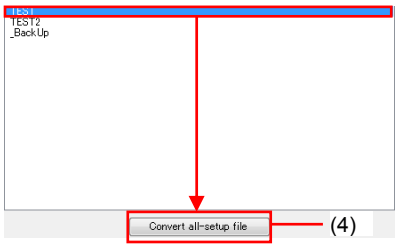
(2) The all-setup file conversion screen will appear. Press the Select Model button



(3) Select the target model



(4) After selecting the all-setup file, press the "Convert all-setup file" button
The converted all-setup file is saved in the Backup folder.



Reference

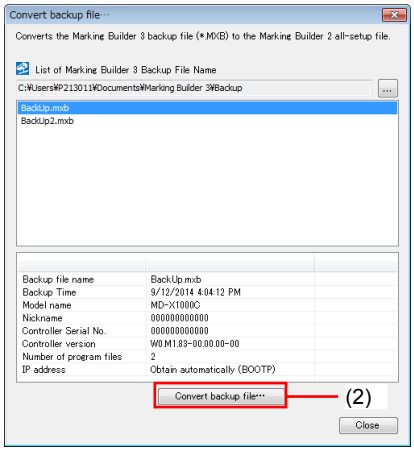
- **Save the Marking Builder 2 all-setup file to be converted in the <C:\Users\"Username"\Documents\ MarkingFiles\Keyence [Model_Name]\0\all> folder.**
- **After conversion is complete, a conversion log appears. Check the conversion log before using it.**
- **The conversion log is saved in the program file save folder.**

- **MB3 all-setup file ⇒ MB2 all-setup file**

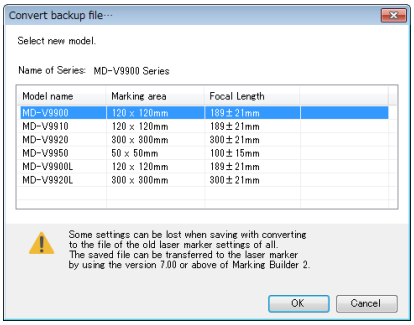
Follow the procedure below to convert the all-setup file:

(1) Press the Convert button

(2) Select the backup file that you want to convert and press the "Convert Backup File" button



(3) Select the target model

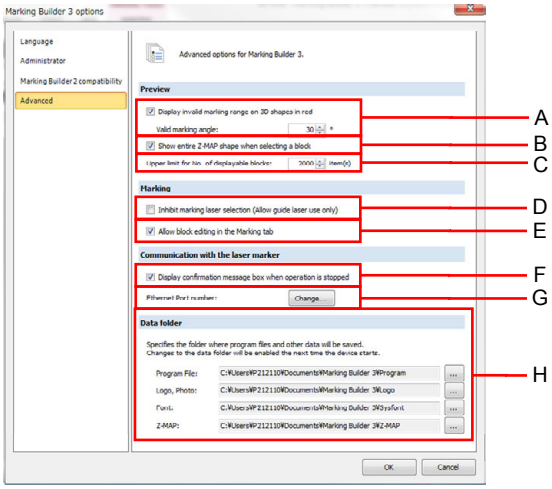


Reference

- **An MD-X1000/1500 series all-setup file is converted to an MD-V9900 series all-setup file.**
- **An MD-F3200/5200 series all-setup file is converted to an MD-F3000/3100/5100 series all-setup file.**
- **An ML-Z9600 series all-setup file is converted to an ML-Z9500 series all-setup file.**
- **After the file is converted, it can be transferred to the laser marker with Marking Builder 2 Ver. 7.0 or later.**
- **The converted Marking Builder 2 all-setup file is saved in the <C:\Users\"Username"\Documents\MarkingFiles\Keyence [Model_Name]\0\all> folder.**
- **The conversion log is also saved in the above save folder. Check the conversion log before using it.**

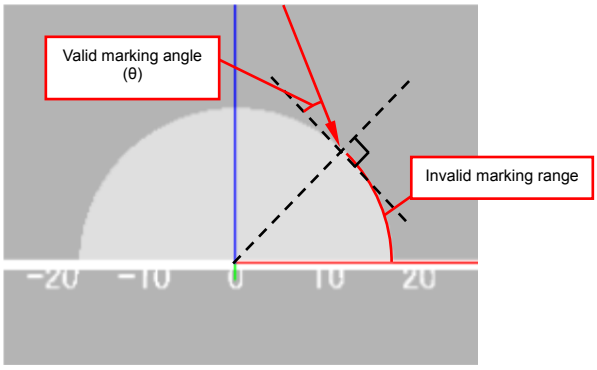
■ Advanced

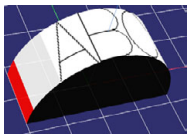
Set the advanced options of Marking Builder 3.

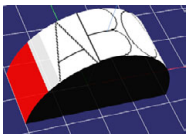


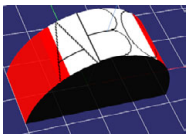
A. Display invalid marking range on the 3D shape in red/Valid marking angle

You can enter the valid laser angle and display the valid marking range when marking on a curved surface or slope of a 3D shape. The valid marking angle is set using the angle of incidence (θ) between the laser light path and workpiece surface. The larger the setting value, the narrower the valid marking range will be displayed.




Valid marking angle: 10°


Valid marking angle: 30°

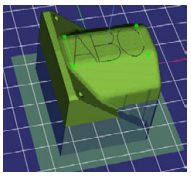

Valid marking angle: 50°

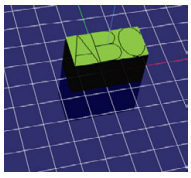
Reference

- **Laser will also be emitted onto the area shown in red. Whether or not marking is possible depends on the marking conditions, material and surface state.**

B. Show entire Z-MAP shape when selecting a block

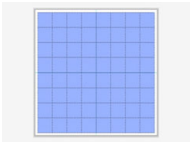
Display the entire Z-MAP when a Z-MAP file block is selected by the 3D shape setting.


Show


Do not show

C. Upper limit for No. of displayable blocks

Set the maximum number of blocks to be displayed in the preview area. The preview will switch to simple view if the maximum number of blocks is exceeded.



Simple view

Detailed view

Reference

- **The Simple view will automatically switch back to Detailed view when the number of displayed blocks falls below the upper limit by zooming in on the preview area.**

D. Inhibit the marking laser selection

Set whether to inhibit the marking laser selection (i.e. allow the use of guide lasers only). This option is enabled in marking and sample marking modes.

E. Allow block edit within the marking tab

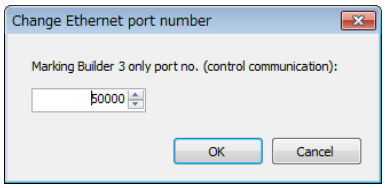
Set whether to enable the block edit within the marking tab.

F. Display confirmation message box when operation is stopped

Set whether to display a confirmation message box when moving to the Marking, Sample Marking or Laser Maintenance mode.

G. Ethernet Port Number

Set the port number on the laser marker side when connecting Marking Builder 3 and the laser marker via Ethernet.



Reference

- **This setting does not need to be changed in general. Change this setting if you are only able to use a specific port number due to network security reasons.**
- **You need to configure the settings on the laser marker at the same time. Set the same port number in the Unit Setup.**

H. Data folder

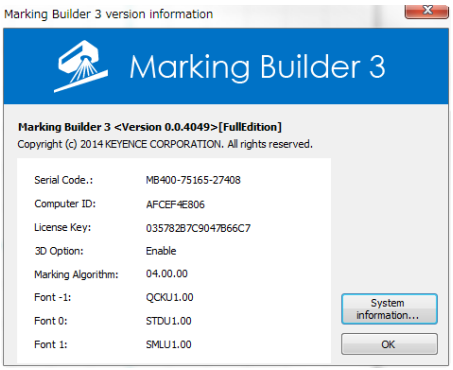
Set the folders for storing the Marking Builder 3 program files, logo/photo files, font files and Z-MAP files.

8. Help

Open the Marking Builder 3 User's Manual.

9. Version Information

Display the Marking Builder 3 version, Marking Builder 3 serial code, 3D option enabled/disabled state, MB3ActiveX version and font version. You can check the system information of the PC using the [System information] button.



10. Exit

Exits Marking Builder 3.

MEMO

Appendix

A-1 Maximum Number of Input Characters for 2D Code

The maximum number of input characters for 2D code is limited depending the symbol size and version. The following describes the maximum number of input characters for each 2D code.

Reference

- **If uppercase and lowercase letters of the alphabet are mixed, set the number of characters using the 8-bit bytes field as reference.**
- **Double-byte alphanumerics will be treated as Kanji characters.**
- **When the [Mode AUTO] checkbox is checked, lowercase alphabets can be input in QR Code.**
- **Lowercase alphabets cannot be input in Micro QR Code.**
- **For update characters, the actual marked number of characters will be the number of data.**

■ Maximum Number of Input Characters of DataMatrix

Code size	Data capacity				
	Number	Alphanumerics	Alphanumerics and symbols	8-bit byte characters	Kanji
10 x 10	6	3	3	1	-
12 x 12	10	6	5	3	1
14 x 14	16	10	9	6	3
16 x 16	24	16	14	10	5
18 x 18	36	25	22	16	8
20 x 20	44	31	28	20	10
22 x 22	60	43	38	28	14
24 x 24	72	52	46	34	17
26 x 26	88	64	57	42	21
32 x 32	124	91	81	60	30
36 x 36	172	127	113	84	42
40 x 40	228	169	150	112	56
44 x 44	255	214	190	142	71
48 x 48	255	255	230	172	86
52 x 52	408	304	270	202	101
64 x 64	510	418	372	277	138
72 x 72	510	510	489	365	182
80 x 80	510	510	510	453	226
88 x 88	510	510	510	510	286
96 x 96	510	510	510	510	346
104 x 104	510	510	510	510	406
120 x 120	510	510	510	510	510
132 x 132	510	510	510	510	510
144 x 144	510	510	510	510	510
8 x 18	10	6	5	3	1
8 x 32	20	13	12	8	4
12 x 26	32	22	20	14	7
12 x 36	44	31	28	20	10
16 x 36	64	46	41	30	15
16 x 48	98	72	64	47	23

■ Maximum Number of Input Characters of QR Code Model 1

Version (No. of cells)	Number				Alphanumerics				8-bit bytes				Kanji			
	L	M	Q	H	L	M	Q	H	L	M	Q	H	L	M	Q	H
1(21)	40	33	25	16	24	20	15	10	17	14	11	7	10	8	6	4
2(25)	81	66	52	33	49	40	31	20	34	28	22	14	20	17	13	8
3 (29)	131	100	81	52	79	60	49	31	55	42	34	22	33	25	20	13
4 (33)	186	138	114	76	113	84	69	46	78	58	48	32	48	35	29	19
5 (37)	253	191	157	105	154	116	95	63	106	80	66	44	65	49	40	27
6	321	249	201	133	194	151	122	81	134	104	84	56	82	64	51	34
7	402	311	253	167	244	188	154	101	168	130	106	70	103	80	65	43
8	493	378	301	203	299	229	183	123	206	158	126	85	126	97	77	52
9	510	441	369	239	354	267	223	145	244	184	154	100	150	113	94	61
10	510	510	433	291	418	319	262	176	287	219	180	121	177	135	111	74
11	510	510	493	342	485	368	299	207	333	253	205	142	205	156	126	87
12	510	510	510	390	510	421	351	236	381	289	241	162	234	178	148	100
13	510	510	510	454	510	479	398	275	429	329	273	189	264	202	168	116
14	510	510	510	498	510	510	447	302	486	365	307	207	299	225	189	127

■ Maximum Number of Input Characters of QR Code Model 2

Version (No. of cells)	Number				Alphanumerics				8-bit bytes				Kanji			
	L	M	Q	H	L	M	Q	H	L	M	Q	H	L	M	Q	H
1(21)	41	34	27	17	25	20	16	10	17	14	11	7	10	8	7	4
2(25)	77	63	48	34	47	38	29	20	32	26	20	14	20	16	12	8
3 (29)	127	101	77	58	77	61	47	35	53	42	32	24	32	26	20	15
4 (33)	187	149	111	82	114	90	67	50	78	62	46	34	48	38	28	21
5 (37)	255	202	144	106	154	122	87	64	106	84	60	44	65	52	37	27
6(41)	322	255	178	139	195	154	108	84	134	106	74	58	82	65	45	36
7(45)	370	293	207	154	224	178	125	93	154	122	86	64	95	75	53	39
8(49)	461	365	259	202	279	221	157	122	192	152	108	84	118	93	66	52
9(53)	510	432	312	235	335	262	189	143	230	180	130	98	141	111	80	60
10(57)	510	510	364	288	395	311	221	174	271	213	151	119	167	131	93	74
11(61)	510	510	427	331	468	366	259	200	321	251	177	137	198	155	109	85
12(65)	510	510	489	374	510	419	296	227	367	287	203	155	226	177	125	96
13(69)	510	510	510	427	510	483	352	259	425	331	241	177	262	204	149	109
14(73)	510	510	510	468	510	510	376	283	458	362	258	194	282	223	159	120
15(77)	510	510	510	510	510	510	426	321	510	412	292	220	320	254	180	136
16(81)	510	510	510	510	510	510	470	365	510	450	322	250	361	277	198	154
17(85)	510	510	510	510	510	510	510	408	510	504	364	280	397	310	224	173
18(89)	510	510	510	510	510	510	510	452	510	510	394	310	442	345	243	191
19(93)	510	510	510	510	510	510	510	493	510	510	442	338	488	384	272	208
20(97)	510	510	510	510	510	510	510	510	510	510	482	382	510	410	297	235
21(101)	510	510	510	510	510	510	510	510	510	510	509	403	510	438	314	248
22(105)	510	510	510	510	510	510	510	510	510	510	510	439	510	480	348	270
23(109)	510	510	510	510	510	510	510	510	510	510	510	461	510	510	376	284
24(113)	510	510	510	510	510	510	510	510	510	510	510	510	510	510	407	315
25(117)	510	510	510	510	510	510	510	510	510	510	510	510	510	510	440	330
26(121)	510	510	510	510	510	510	510	510	510	510	510	510	510	510	462	365
27(125)	510	510	510	510	510	510	510	510	510	510	510	510	510	510	496	385
28(129)	510	510	510	510	510	510	510	510	510	510	510	510	510	510	510	405
29(133)	510	510	510	510	510	510	510	510	510	510	510	510	510	510	510	430
30(137)	510	510	510	510	510	510	510	510	510	510	510	510	510	510	510	457

■ Maximum Number of Input Characters for Micro QR Code

Version	Error correction	Number	Alphanumerics	8-bit bytes	Kanji
M1(11)	Error detection	5	-	-	-
M2(13)	L	10	6	-	-
	M	8	5	-	-
M3(15)	L	23	14	9	6
	M	18	11	7	4
M4(17)	L	35	21	15	9
	M	30	18	13	8
	Q	21	13	9	5

A-2 Folder structure

This section describes the folder structure of Marking Builder 3.

■ **Marking Builder 3 Installation Folder**

The Marking Builder 3 software will be saved <C:\Program Files(x86)\keyence\MarkingBuilder3>

■ **Folder Structure and Save Data List**

Files created in Marking Builder 3 are saved to the folder below. <C: \Users\"User name"\Documents\Marking Builder 3>

Folder name	Contents
Program	Save a program file (.MX1) and marking common setting file (.MC1).
Logo	Save a logo file (.MLG/.MHL/.MWI) or photo file (.MZU/.MZM/.MZX).
Font	Save a custom character file (.MFT).
Sysfont	Save a font file (.FUY).
Z-MAP	Save a Z-MAP file (.ZMP).
Backup	Save a backup (.MXB) file.
Sample Marking	Save a sample marking template file (.MSDX).
CSV	Save various CSV files.

Reference

- **If [Within project only] is selected in [File common settings] under [Program setting], the logo/font/Z-MAP files will not be saved to individual folders.**

A-3 AI (Application Identifier) list

The following shows the list of AIs for GS1 DataMatrix.

AI	Data Content	Format	FNC1 Required	Data Title
00	SSCC (Serial Shipping Container Code)	N2+N18		SSCC
01	Global Trade Item Number (GTIN)	N2+N14		GTIN
02	GTIN of Contained Trade Items	N2+N14		CONTENT
10	Batch or Lot Number	N2+X..20	(FNC1)	BATCH/LOT
11 (**)	Production Date (YYMMDD)	N2+N6		PROD DATE
12 (**)	Due Date (YYMMDD)	N2+N6		DUE DATE
13 (**)	Packaging Date (YYMMDD)	N2+N6		PACK DATE
15 (**)	Best Before Date (YYMMDD)	N2+N6		BEST BEFORE or SELL BY
17 (**)	Expiration Date (YYMMDD)	N2+N6		USE BY OR EXPIRY
20	Variant Number	N2+N2		VARIANT
21	Serial Number	N2+X..20	(FNC1)	SERIAL
240	Additional Item Identification	N3+X..30	(FNC1)	ADDITIONAL ID
241	Customer Part Number	N3+X..30	(FNC1)	CUST. PART NO.
242	Made-to-Order Variation Number	N3+N..6	(FNC1)	MTO VARIANT
243	Packaging Component Number	N3+X..20	(FNC1)	PCN
250	MTO VARIANT	N3+X..30	(FNC1)	SECONDARY SERIAL
251	Reference to Source Entity	N3+X..30	(FNC1)	REF. TO SOURCE
253	Global Document Type Identifier (GDTI)	N3+N13+N..17	(FNC1)	GDTI
254	GLN Extension Component	N3+X..20	(FNC1)	GLN EXTENSION
255	Global Coupon Number (GCN)	N3+N13+N..12	(FNC1)	GCN
30	Count of Items (Variable Measure Trade Item)	N2+N..8	(FNC1)	VAR. COUNT
310(***)	Net weight, kilograms (Variable Measure Trade Item)	N4+N6		NET WEIGHT (kg)
311(***)	Length or first dimension, meters (Variable Measure Trade Item)	N4+N6		LENGTH (m)
312(***)	Width, diameter, or second dimension, meters (Variable Measure Trade Item)	N4+N6		WIDTH (m)
313(***)	Depth, thickness, height, or third dimension, meters (Variable Measure Trade Item)	N4+N6		HEIGHT (m)
314(***)	Area, square meters (Variable Measure Trade Item)	N4+N6		AREA (m2)
315(***)	Net volume, liters (Variable Measure Trade Item)	N4+N6		NET VOLUME (l)
316(***)	Net volume, cubic meters (Variable Measure Trade Item)	N4+N6		NET VOLUME (m3)
320(***)	Net weight, pounds (Variable Measure Trade Item)	N4+N6		NET WEIGHT (lb)
321(***)	Length or first dimension, inches (Variable Measure Trade Item)	N4+N6		LENGTH (i)
322(***)	Length or first dimension, feet (Variable Measure Trade Item)	N4+N6		LENGTH (f)
323(***)	Length or first dimension, yards (Variable Measure Trade Item)	N4+N6		LENGTH (y)
324(***)	Width, diameter, or second dimension, inches (Variable Measure Trade Item)	N4+N6		WIDTH (i)
325(***)	Width, diameter, or second dimension, feet (Variable Measure Trade Item)	N4+N6		WIDTH (f)
326(***)	Width, diameter, or second dimension, yards (Variable Measure Trade Item	N4+N6		WIDTH (y)
327(***)	Depth, thickness, height, or third dimension, inches (Variable Measure Trade Item)	N4+N6		HEIGHT (i)
328(***)	Depth, thickness, height, or third dimension, feet (Variable Measure Trade Item)	N4+N6		HEIGHT (f)
329(***)	Depth, thickness, height, or third dimension, yards (Variable Measure Trade Item)	N4+N6		HEIGHT (y)
330(***)	Logistic weight, kilograms	N4+N6		GROSS WEIGHT (kg)
331(***)	Length or first dimension, meters	N4+N6		LENGTH (m), log
332(***)	Width, diameter, or second dimension, meters	N4+N6		WIDTH (m), log
333(***)	Depth, thickness, height, or third dimension, meters	N4+N6		HEIGHT (m), log
334(***)	Area, square metresN4	N4+N6		AREA (m2), log
335(***)	Logistic volume, liters	N4+N6		VOLUME (l), log
336(***)	Logistic volume, cubic meters	N4+N6		VOLUME (m3), log
337(***)	Kilograms per square meter	N4+N6		KG PER m2
340(***)	Logistic weight, pounds	N4+N6		GROSS WEIGHT (lb)
341(***)	Length or first dimension, inches	N4+N6		LENGTH (i), log
342(***)	Length or first dimension, feet	N4+N6		LENGTH (f), log
343(***)	Length or first dimension, yards	N4+N6		LENGTH (y), log
344(***)	Width, diameter, or second dimension, inches	N4+N6		WIDTH (i), log
345(***)	Width, diameter, or second dimension, feet	N4+N6		WIDTH (f), log
346(***)	Width, diameter, or second dimension, yard	N4+N6		WIDTH (y), log
347(***)	Depth, thickness, height, or third dimension, inches	N4+N6		HEIGHT (i), log
348(***)	Depth, thickness, height, or third dimension, feet	N4+N6		HEIGHT (f), log
349(***)	Depth, thickness, height, or third dimension, yards	N4+N6		HEIGHT (y), log
350(***)	Area, square inches (Variable Measure Trade Item)	N4+N6		AREA (i2)
351(***)	Area, square feet (Variable Measure Trade Item)	N4+N6		AREA (f2)
352(***)	Area, square yards (Variable Measure Trade Item)	N4+N6		AREA (y2)
353(***)	Area, square inches	N4+N6		AREA (i2), log
354(***)	Area, square feet	N4+N6		AREA (f2), log
355(***)	Area, square yards	N4+N6		AREA (y2), log
356(***)	Net weight, troy ounces (Variable Measure Trade Item)	N4+N6		NET WEIGHT (t)
357(***)	Net weight (or volume), ounces (Variable Measure Trade Item)	N4+N6		NET VOLUME (oz)
360(***)	Net volume, quarts (Variable Measure Trade Item)	N4+N6		NET VOLUME (q)
361(***)	Net volume, gallons U.S. (Variable Measure Trade Item)	N4+N6		NET VOLUME (g)
362(***)	Logistic volume, quarts	N4+N6		VOLUME (q), log
363(***)	Logistic volume, gallons U.S.	N4+N6		VOLUME (g), log
364(***)	Net volume, cubic inches (Variable Measure Trade Item)	N4+N6		VOLUME (i3)
365(***)	Net volume, cubic feet (Variable Measure Trade Item)	N4+N6		VOLUME (f3)
366(***)	Net volume, cubic yards (Variable Measure Trade Item)	N4+N6		VOLUME (y3)

AI	Data Content	Format	FNC1 Required	Data Title
367(***)	Logistic volume, cubic inches	N4+N6		VOLUME (i3), log
368(***)	Logistic volume, cubic feet	N4+N6		VOLUME (f3), log
369(***)	Logistic volume, cubic yards	N4+N6		VOLUME (y3), log
37	Count of Trade Items	N2+N..8	(FNC1)	COUNT
390(***)	Applicable Amount Payable, local currency	N4+N..15	(FNC1)	AMOUNT
391(***)	Applicable Amount Payable with ISO Currency Code	N4+N3+N..15	(FNC1)	AMOUNT
392(***)	Applicable Amount Payable, single monetary area (Variable Measure Trade Item)	N4+N..15	(FNC1)	PRICE
393(***)	Applicable Amount Payable with ISO Currency Code (Variable Measure Trade Item)	N4+N3+N..15	(FNC1)	PRICE
400	Customer's Purchase Order Number	N3+X..30	(FNC1)	ORDER NUMBER
401	Global Identification Number for Consignment (GINC)	N3+X..30	(FNC1)	GINC
402	Global Shipment Identification Number (GSIN)	N3+N17	(FNC1)	GSIN
403	Routing Code	N3+X..30	(FNC1)	ROUTE
410	Ship to - Deliver to Global Location Number	N3+N13		SHIP TO LOC
411	Bill to - Invoice to Global Location Number	N3+N13		BILL TO
412	Purchased from Global Location Number	N3+N13		PURCHASE FROM
413	Ship for - Deliver for - Forward to Global Location Number	N3+N13		SHIP FOR LOC
414	Identification of a Physical Location - Global Location Number	N3+N13		LOC No
415	Global Location Number of the Invoicing Party	N3+N13		PAY TO
420	Ship to - Deliver to Postal Code Within a Single Postal Authority	N3+X..20	(FNC1)	SHIP TO POST
421	Ship to - Deliver to Postal Code with ISO Country Code	N3+N3+X..9	(FNC1)	SHIP TO POST
422	Country of Origin of a Trade Item	N3+N3	(FNC1)	ORIGIN
423	Country of Initial Processing	N3+N3+N..12	(FNC1)	COUNTRY - INITIAL PROCESS.
424	Country of Processing	N3+N3	(FNC1)	COUNTRY - PROCESS.
425	Country of Disassembly	N3+N3	(FNC1)	COUNTRY - DISASSEMBLY
426	Country Covering full Process Chain	N3+N3	(FNC1)	COUNTRY - FULL PROCESS
427	Country Subdivision og Origin	N3+X..3	(FNC1)	ORIGIN SUBDIVISION
7001	NATO Stock Number (NSN)	N4+N13	(FNC1)	NSN
7002	UN/ECE Meat Carcasses and Cuts Classification	N4+X..30	(FNC1)	MEAT CUT
7003	Expiration Date and Time	N4+N10	(FNC1)	EXPIRY TIME
7004	Active Potency	N4+N..4	(FNC1)	ACTIVE POTENCY
703s	Approval Number of Processor with ISO Country Code	N4+N3+X..27	(FNC1)	PROCESSOR # s
710	National Healthcare Reimbursement Number(NHRN) - Germany PZN	N3+X..20	(FNC1)	NHRN PZN
711	National Healthcare Reimbursement Number(NHRN) - France CIP	N3+X..20	(FNC1)	NHRN CIP
712	National Healthcare Reimbursement Number(NHRN) - Spain CN	N3+X..20	(FNC1)	NHRN CN
nnn*	National Healthcare Reimbursement Number(NHRN) - Country “A” NHRN	N3+X..20	(FNC1)	NHRN XXX
8001	Roll Products (Width, Length, Core Diameter, Direction, Splices)	N4+N14	(FNC1)	DIMENSIONS
8002	Cellular Mobile Telephone Identifier	N4+X..20	(FNC1)	CMT No
8003	Global Returnable Asset Identifier (GRAI)	N4+N14+X..16	(FNC1)	GRAI
8004	Global Individual Asset Identifier (GIAI)	N4+X..30	(FNC1)	GIAI
8005	Price Per Unit of Measure	N4+N6	(FNC1)	PRICE PER UNIT
8006	Identification of the Components of a Trade Item	N4+N14+N2+N2	(FNC1)	GCTIN
8007	International Bank Account Number (IBAN)	N4+X..30	(FNC1)	IBAN
8008	Date and Time of Production	N4+N8+N..4	(FNC1)	PROD TIME
8010	Component / Part Identifier (CPID)	N4+X..30	(FNC1)	CPID
8011	Component / Part Identifier Serial Number (CPID SERIAL)	N4+N..12	(FNC1)	CPID SERIAL
8017	Global Service Relation Number to identify the relationship between an organization offering services and the provider of services	N4+N18	(FNC1)	GSRN - PROVIDER
8018	Global Service Relation Number (GSRN)	N4+N18	(FNC1)	GSRN
8019	Service Relation Instance Number (SRIN)	N4+N..10	(FNC1)	SRIN
8020	Payment Slip Reference Number	N4+X..25	(FNC1)	REF No
8100	GS1-128 Coupon Extended Code	N4+N6	(FNC1)	-
8101	GS1-128 Coupon Extended Code	N4+N1+N5+N4	(FNC1)	-
8102	GS1-128 Coupon Extended Code	N4+N1+N1	(FNC1)	-
8110	Coupon Code Identification for Use in North America	N4+X..30	(FNC1)	-
8200	Extended Packaging URL	N4+X..70	(FNC1)	PRODUCT URL
90	Information Mutually Agreed Between Trading Partners	N2+X..30	(FNC1)	INTERNAL
91 to 99	Company Internal Information	N2+X..30	(FNC1)	INTERNAL

A-4 Shortcut list

The following shortcuts are available in the marking menu and sample marking.

Function	Shortcut	Test Marking	Sample Marking
Switch marking laser -> Trigger	Ctrl + Alt+1	○	○
Switch guide laser (One time) -> Trigger	Ctrl + Alt+ 3	○	○
Switch guide laser (Continuous) -> Trigger	Ctrl + Alt+ 4	○	○
Switch guide laser (area frame) -> Trigger	Ctrl + Alt+ 5	○	-
Switch guide laser (workpiece image/range) -> Trigger	Ctrl + Alt+ 6	○	○
Switch the guide laser (block frame) -> Trigger	Ctrl + Alt+ 7	○	-
Switch the guide laser (Align to Position) -> Trigger	Ctrl + Alt+ 9	○	-

A-5 Error List

When an error occurs in the laser marker, reset the error by following the remedies described below.

Error No.	Error name	Remedy
S000	Program incorrect error	Check whether the parameter is within the input range. Create the program again if no corrupt location can be found.
S001	Program memory full error	Remove the unwanted programs in the controller.
S002	Built-in memory card full error	Remove the unwanted logos, fonts, and Z-MAP data in the controller.
S003	USB flash drive full error	Remove any unwanted data from the USB flash drive.
S004	USB flash drive not inserted error	Perform the operation after inserting a USB flash drive.
S005	USB flash drive cannot be recognized error	Format the USB flash drive in FAT** format and try again. Try using a different USB flash drive if the error reoccurs.
S006	Priority error	The console and/or external communication has acquired communication priority. Check if the other devices are in test marking or finder mode, and perform the operation after exiting from these modes.
S008	No-File Error	Perform the communication again using an existing file as the target.
S009	Busy Error	Perform the operation while READY is in ON state.
S010	No marking block error	Set the marking flag to ON for one or more target blocks (palettes).
S011	Logos/custom characters over error	Reduce the number of files.
S012	Illegal optimization error	Reduce the line speed or adjust the character size, etc.
S013	Scan Optimize unexecutable error	Set the quality level of all blocks to [Customize].

Error No.	Error name	Remedy
S014	Program operation during execution error	A currently running program cannot be deleted.
S015	Logo/custom character file operation error	First remove the program that is using the logo or custom character you wish to delete.
S016	Test Mark Unexecutable Error	Start test marking after the device has gone into READY state.
S017	Fixed point marking parameter error	Modify the program to make sure that the fixed point and 3D shape blocks are not mixed.
S018	Barcode/2D code illegal setting error	Please enter an encoding string.
S019	All-setup restoration error	Make sure to use the backup data from the same model.
S020	Data Length Error	Noise may be entering the external communication cable if the error occurs in a sporadic manner.
S021	Program No. unregistration error	Transfer the program to the controller by following the procedure below. Select [LASER MARKER] - [File Operations] in the ribbon menu, and then transfer the program settings to the controller.
S022	Block# no registration error	Transfer the program to the controller by following the procedure below. Select [LASER MARKER] - [File Operations] in the ribbon menu, and then transfer the program settings to the controller.
S023	Status error	Reset the error and try marking again.
S024	Illegal Command Error	Acquire the communication history and check the parameter input range and block type.
S025	Checksum Error	Check if the checksum settings for the laser marker and external devices (PLC, etc.) are both ON. If there is no problem in the above, check if the checksum calculation method of the PLC is set to horizontal parity (Exclusive OR). Noise may be entering the external communication cable if the error occurs in a sporadic manner.
S026	Format error	Acquire the communication history and check the command details. If a comma (,) is used in the string, change it to "%044A" (special code representing a comma) before sending it.
S027	Command Unrecognizable Error	Acquire the communication history and check the command details.
S028	Response data length error	Modify the request command to reduce the response data length.
S029	Mark data request error	Send the command after the marking has completed.
S030	Group number unregistered error	Group the blocks in the program using MarkingBuilder 3. You can group blocks by following the procedure below. Select and right-click on a block to open the context menu, and then select [Grouping].
S050	Quick change of character setup error	Check the following when using the high speed character edit command. • Check if the block you wish to change is subject to high speed string editing. • Check that the string to be sent is registered as the character type that supports high speed string editing.
S051	Sample Marking Unexecutable Error	Commence sample marking in READY state.
S052	Laser inspection unexecutable error	Commence inspection laser in READY state.
S060	Block type incorrect setting error	Create the program again.
S061	Block assignment incorrect setting error	Create the program again.
S062	Character size incorrect setting error	Modify the blocks whose character aspect ratio is greater than 1:5 or 5:1.

Error No.	Error name	Remedy
S063	Character assignment incorrect setting error	Create the program again.
S064	Character advanced incorrect setting error	Create the program again.
S065	Marking condition incorrect setting error	Create the program again.
S066	Barcode/2D code illegal setting error	Create the program again.
S067	Continuous marking incorrect setting error	Create the program again.
S068	Movement/marking direction incorrect setting error	Create the program again.
S069	Program incorrect setting error	Create the program again.
S070	Matrix information incorrect setting error	Create the program again.
S071	Matrix cell information incorrect setting error	Create the program again.
S072	Character string incorrect setting error	Create the program again.
S073	Individual counter incorrect setting error	Create the program again.
S074	Common counter incorrect setting error	Configure the common counter settings again by following the procedure below. You can configure it by selecting [LASER MARKER] - [Marking Common] in the ribbon menu, followed by [Common Counter].
S075	Encoding information incorrect setting error	Configure the encoding setting again. You can configure it by selecting [LASER MARKER] - [Marking Common] in the ribbon menu, followed by [Encoding].
S076	System information incorrect setting error	Create the program again.
S077	Font replacement information incorrect setting error	Create the program again.
S078	Font scaling information incorrect setting error	Configure the character scaling settings again. You can configure it by selecting [LASER MARKER] - [Marking Common] in the ribbon menu, followed by [Character scaling].
S079	Font skip cross width information incorrect setting error	Configure the character skip cross settings again. You can configure it by selecting [LASER MARKER] - [Marking Common] in the ribbon menu, followed by [Character skip cross].
S080	Logo/custom character buffer information incorrect setting error	Create the program again.
S081	Current value incorrect setting error	Create the program again.
S082	3D system information incorrect setting error	Create the program again.
S083	3D information incorrect setting error	Create the program again.
S084	Operation limitation error	Delete the program that is using the [2D code reader function], or activate the [2D code reader function].
S085	Version of data outside support	The loaded program has been created in a higher version than the currently running MarkingBuilder 3. Upgrade the currently running Marking Builder 3 to the latest version, or downgrade the version of the loaded program.
S086	Wobble Incorrect Setting Error	Check if the marking line width, overlap rate and scan speed settings are within range.
S087	2D code reading error	Modify the program so that it is readable in test marking, and then run the program again.

Error No.	Error name	Remedy
S088	Working distance measurement error	Height measurement may be impossible in the following cases: • Distance measuring light cannot be detected correctly because of the surface condition of the workpiece. • Distance measuring light cannot be detected because the lighting in the rack is too bright.
S089	Working distance measurement limitation error	Measure the work distance in READY state.
S090	Registered barcode error	Change the barcode verification string.
S091	Barcode/2D code link setting error	Please check the following: • Check if the 2D code overprinting setting is enabled for the target block. • Check if the target overprinting No. exists.
S092	Barcode illegal registration state error	Configure it in either MarkingBuilder 3 or the console.
S093	Marking Confirmation Function Error	Check if the mark data exist in the field of view of the confirmation coordinates.
S094	TrueType font file size error	Reduce the number of TrueType font types being used.
S095	Model limitation error	Cannot be used.
S096	Open priority error	Restart the device.
S097	File Access Error	File may be read-only. Check the file attribute and try again.
S098	Serial No. error	Enter the correct serial No.
S099	Duplicate Serial No.	The serial code of the desiccant can only be used once. Purchase and replace with a new desiccant.

A-6 Model-Specific Input Value List

Category	Parameter	Unit	MD-X1000/1500 series			MD-F3200/5200 series		MD-U1000 series		ML-Z9600 series		
			Standard area	Wide area	Small spot	Standard area	Wide area	Standard area	Wide area	Standard area	Wide area	Small spot
			MD-X1000 /1500	MD-X1020 /1520	MD-X1050	MD-F3200 /5200	MD-F3220 /5220	MD-U1000	MD-U1020	ML-Z9610	ML-Z9620	ML-Z9650
Edit block	Line Width	mm	0.010 to 5.000	0.010 to 7.500	0.010 to 2.500	0.010 to 5.000	0.010 to 7.500	0.010 to 5.000	0.010 to 7.500	0.010 to 5.000	0.010 to 7.500	0.010 to 2.500
	Number of multiples for marking	Lines	2 to 100									
	Overlap rate	%	75.0 to 98.0									
	Pixel resolution	dpi	50 to 800			50 to 800		50 to 2400		50 to 800		
	Height	mm	0.100 to 125.000	0.100 to 330.000	0.001 to 50.000	0.100 to 125.000	0.100 to 300.000	0.010 to 125.000	0.010 to 330.000	0.100 to 125.000	0.100 to 300.000	0.100 to 50.000
	Block height/width	mm	0.002 to 125.000	0.005 to 330.000	0.001 to 50.000	0.002 to 125.000	0.002 to 300.000	0.002 to 125.000	0.005 to 330.000	0.002 to 120.000	0.005 to 300.000	0.001 to 50.000
	Minimum character width	%	0 to 100									
	Arc radius	mm	0.001 to 9999.999									
	Space	mm	-180.000 to 180.000	-450.000 to 450.000	-75.000 to 75.000	-180.000 to 180.000	-450.000 to 450.000	-180.000 to 180.000	-450.000 to 450.000	-180.000 to 180.000	-450.000 to 450.000	-75.000 to 75.000
	Character full width/full height	mm	0.100 to 180.000	0.100 to 450.000	0.100 to 75.000	0.100 to 180.000	0.100 to 450.000	0.010 to 180.000	0.010 to 450.000	0.100 to 180.000	0.100 to 450.000	0.100 to 75.000
	Char. angle space (Other than cone)	°	0.000 to 359.999									
	Char. angle space (Cone)	°	0.000 to 180.000									
	Open angle (Other than cone)	°	0.000 to 359.999									
	Open angle (Cone)	°	0.000 to 180.000									
	Barcode height	mm	0.200 to 125.000	0.300 to 330.000	0.100 to 50.000	0.200 to 125.000	0.300 to 300.000	0.200 to 125.000	0.300 to 330.000	0.200 to 120.000	0.300 to 300.000	0.100 to 50.000
	Cell Size	mm	0.010 to 5.000									
	Narrow bar	mm	0.010 to 10.000									
	Bar ratio	x	2.0 to 4.0									
	Module width	mm	0.010 to 10.000									
	Linear code height	mm	0.200 to 125.000	0.500 to 330.000	0.100 to 50.000	0.200 to 125.000	0.500 to 300.000	0.200 to 125.000	0.500 to 330.000	0.200 to 120.000	0.500 to 300.000	0.100 to 50.000
	Separator height	mm	0.010 to 5.000									
	2D module height	mm	0.010 to 5.000									
	X	mm	-62.500 to 62.500	-165.000 to 165.000	-25.000 to 25.000	-62.500 to 62.500	-150.000 to 150.000	-62.500 to 62.500	-165.000 to 165.000	-60.000 to 60.000	-150.000 to 150.000	-25.000 to 25.000
	Y *For Circle: -9999.999 to 9999.999	mm	-62.500 to 62.500	-165.000 to 165.000	-25.000 to 25.000	-62.500 to 62.500	-150.000 to 150.000	-62.500 to 62.500	-165.000 to 165.000	-60.000 to 60.000	-150.000 to 150.000	-25.000 to 25.000
	Z	mm	-21.000 to 21.000	-21.000 to 21.000	-15.000 to 15.000	-21.000 to 21.000	-21.000 to 21.000	-21.000 to 21.000	-21.000 to 21.000	-21.000 to 21.000	-21.000 to 21.000	-2.000 to 2.000
	X/Y/Z angles	°	-180.000 to 180.000									
	Sphere diameter	mm	0.200 to 480.000	0.200 to 1200.000	0.200 to 200.000	0.200 to 480.000	0.200 to 1200.000	0.200 to 480.000	0.200 to 1200.000	0.200 to 480.000	0.200 to 1200.000	0.200 to 200.000
	Bottom diameter of cone	mm	0.200 to 480.000	0.200 to 1200.000	0.200 to 200.000	0.200 to 480.000	0.200 to 1200.000	0.200 to 480.000	0.200 to 1200.000	0.200 to 480.000	0.200 to 1200.000	0.200 to 200.000
	Top diameter of cone	mm	0.200 to 480.000	0.200 to 1200.000	0.200 to 200.000	0.200 to 480.000	0.200 to 1200.000	0.200 to 480.000	0.200 to 1200.000	0.200 to 480.000	0.200 to 1200.000	0.200 to 200.000
	Cone height	mm	0.100 to 125.000	0.100 to 330.000	0.100 to 50.000	0.100 to 125.000	0.100 to 300.000	0.100 to 125.000	0.100 to 330.000	0.100 to 120.000	0.100 to 300.000	0.100 to 50.000
	Bus angle of cone	°	-85.000 to 85.000									
	Block angle	°	-180.000 to 180.000									
	Start angle	°	-180.000 to 180.000									
	Char. angle	°	-180.000 to 180.000									
	Time	ms	0.1 to 65000.0									
	Laser power	%	0.0 to 100.0									
	Scan speed	mm/s	1 to 12000	1 to 8000	1 to 6000	1 to 12000	1 to 8000	1 to 12000	1 to 8000	1 to 12000	1 to 8000	1 to 6000
	Pulse frequency	k Hz	0 to 400			60 to 120		0, 40 to 400		-		
	Spot variable	-	-210 to 210	-210 to 210	-150 to 150	-210 to 210	-210 to 210	-210 to 210	-210 to 210	-210 to 210	-210 to 210	-20 to 20
	Repetition	Times	1 to 100									
	Deep dig amount	mm	0 to 42.000	0 to 42.000	0 to 30.000	0 to 42.000		0 to 42.000		0 to 42.000	0 to 42.000	0 to 4.000
	Fill angle	°	0 to 359									
	Cross angle	°	0 to 359									
	Fill interval	mm	0.010 to 1.000									
	Shrink line fill	mm	0.000 to 10.000									
	Skip line count	Lines	0 to 255									
	Overwriting count	Times	0 to 255									
	Shrink boundary	mm	0.000 to 10.000									
	Shrink fill (Barcode)	mm	-5.000 to 5.000									
	Shrink fill (2D Code)	mm	-2.500 to 2.500									
	Skip cross	mm	0.000 to 10.000									
	Wait time for start marking	ms	0.0 to 65000.0									
	Approach additional angle	°	1 to 180									

Category	Parameter	Unit	MD-X1000/1500 series			MD-F3200/5200 series		MD-U1000 series		ML-Z9600 series		
			Standard area	Wide area	Small spot	Standard area	Wide area	Standard area	Wide area	Standard area	Wide area	Small spot
			MD-X1000 /1500	MD-X1020 /1520	MD-X1050	MD-F3200 /5200	MD-F3220 /5220	MD-U1000	MD-U1020	ML-Z9610	ML-Z9620	ML-Z9650
Edit block	FPS value 1	-	1 to 99			-		-		-		
	FPS value 2	-	1 to 99			-		-		-		
	FPS time	-	1 to 99			-		-		-		
	Fill line approach (mm)	mm	0.000 to 5.000	0.000 to 5.000	0.000 to 2.500	0.000 to 5.000	0.000 to 5.000	0.000 to 5.000	0.000 to 5.000	0.000 to 5.000	0.000 to 5.000	0.000 to 2.500
	Gamma correction	-	0.01 to 9.99									
	Threshold	-	0 to 255									
	Contrast	-	-128 to 127			-		-128 to 127		-		
	Brightness	-	-128 to 127			-		-128 to 127		-		
	Skip dots	dot	1 to 8			-		1 to 8		-		
	Density	-	1 to 8			-		1 to 8		-		
Edit matrix	Number of columns	Column	1 to 255									
	Number of rows	Row	1 to 255									
	Height/Width	mm	0.000 to 125.000	0.000 to 330.000	0.000 to 50.000	0.000 to 125.000	0.000 to 300.000	0.000 to 125.000	0.000 to 330.000	0.000 to 120.000	0.000 to 300.000	0.000 to 50.000
	X/Y coordinates	mm	-125.000 to 125.000	-330.000 to 330.000	-25.000 to 25.000	-125.000 to 125.000	-300.000 to 300.000	-125.000 to 125.000	-330.000 to 330.000	-120.000 to 120.000	-300.000 to 300.000	-25.000 to 25.000
	Z	mm	-42.000 to 42.000	-42.000 to 42.000	-30.000 to 30.000	-42.000 to 42.000	-42.000 to 42.000	-42.000 to 42.000	-42.000 to 42.000	-42.000 to 42.000	-42.000 to 42.000	-4.000 to 4.000
	Rotational angle	°	-180.000 to 180.000									
Edit group	Offset X/Y	mm	-125.000 to 125.000	-330.000 to 330.000	-50.000 to 50.000	-125.000 to 125.000	-300.000 to 300.000	-125.000 to 125.000	-330.000 to 330.000	-120.000 to 120.000	-300.000 to 300.000	-50.000 to 50.000
	Offset θ	°	-180.000 to 180.000									
	Movement reference point X/Y coordinates (Group Information)	mm	-125.000 to 125.000	-330.000 to 330.000	-50.000 to 50.00	-125.000 to 125.000	-300.000 to 300.000	-125.000 to 125.000	-330.000 to 330.000	-120.000 to 120.000	-300.000 to 300.000	-50.000 to 50.00
	Rotation reference point X/Y coordinates (Group Information)	mm	-125.000 to 125.000	-330.000 to 330.000	-50.000 to 50.00	-125.000 to 125.000	-300.000 to 300.000	-125.000 to 125.000	-330.000 to 330.000	-120.000 to 120.000	-300.000 to 300.000	-50.000 to 50.00
	Height/Width	mm	0.000 to 125.000	0.000 to 330.000	0.000 to 50.000	0.000 to 125.000	0.000 to 300.000	0.000 to 125.000	0.000 to 330.000	0.000 to 120.000	0.000 to 300.000	0.000 to 50.000
Program setting	Trigger delay	s	0.0 to 9.9									
	Constant	mm/s	0.1 to 4000.0	0.1 to 2000.0	0.1 to 2000.0	0.1 to 4000.0	0.1 to 2000.0	0.1 to 4000.0	0.1 to 2000.0	0.1 to 4000.0	0.1 to 2000.0	0.1 to 2000.0
	Encoder	pulse/ mm	1.0 to 200.0									
	Marking Pos. Offset	mm	-1200.0 to 1200.0									
	Distance to sensor:	mm	0.0 to 1200.0									
	Start Position	mm	0.000 to 62.500	0.000 to 165.000	0.000 to 25.000	0.000 to 60.000	0.000 to 150.000	0.000 to 62.500	0.000 to 165.000	0.000 to 60.000	0.000 to 150.000	0.000 to 25.000
	End Position	mm	-62.500 to 0.000	-165.000 to 0.000	-25.000 to 0.000	-60.000 to 0.000	-150.000 to 0.000	-62.500 to 0.000	-165.000 to 0.000	-60.000 to 0.000	-150.000 to 0.000	-25.000 to 0.000
	Continuous repetition	Times	2 to 65535									
	Continuous interval	s	0.0 to 9.9									
	Z correction amount	mm	-42.000 to 42.000	-42.000 to 42.000	-30.000 to 30.000	-42.000 to 42.000	-42.000 to 42.000	-42.000 to 42.000	-42.000 to 42.000	-42.000 to 42.000	-42.000 to 42.000	-4.000 to 4.000
	Number of auto focus measurements	Times	1 to 9			-		1 to 9		-		
	Auto focus (external displacement sensor) upper and lower range limit	mm	-42.000 to 42.000	-42.000 to 42.000	-30.000 to 30.000	-42.000 to 42.000	-42.000 to 42.000	-42.000 to 42.000	-42.000 to 42.000	-42.000 to 42.000	-42.000 to 42.000	-4.000 to 4.000
	Marking energy upper/lower limit	J	0.01 to 99999.99							-		
	Movement reference point X/Y coordinates (Correct inside the horizontal plane)	mm	-62.500 to 62.500	-165.000 to 165.000	-25.000 to 25.000	-60.000 to 60.000	-150.000 to 150.000	-62.500 to 62.500	-165.000 to 165.000	-60.000 to 60.000	-150.000 to 150.000	-25.000 to 25.000
	Rotation reference point X/Y coordinates (Correct inside the horizontal plane)	mm	-62.500 to 62.500	-165.000 to 165.000	-25.000 to 25.000	-60.000 to 60.000	-150.000 to 150.000	-62.500 to 62.500	-165.000 to 165.000	-60.000 to 60.000	-150.000 to 150.000	-25.000 to 25.000
	Correction amount X/Y (Correct inside the horizontal plane)	mm	-125.000 to 125.000	-330.000 to 330.000	-50.000 to 50.00	-125.000 to 125.000	-300.000 to 300.000	-125.000 to 125.000	-330.000 to 330.000	-120.000 to 120.000	-300.000 to 300.000	-50.000 to 50.00
	Correction amount θ	°	-180.000 to 180.000									
	Scanner waiting X/Y coordinates when READY	mm	-62.500 to 62.500	-165.000 to 165.000	-25.000 to 25.000	-62.500 to 62.500	-150.000 to 150.000	-62.500 to 62.500	-165.000 to 165.000	-60.000 to 60.000	-150.000 to 150.000	-25.000 to 25.000
	Scanner waiting Z coordinate when READY	mm	-21.000 to 21.000	-21.000 to 21.000	-15.000 to 15.000	-21.000 to 21.000	-21.000 to 21.000	-21.000 to 21.000	-21.000 to 21.000	-21.000 to 21.000	-21.000 to 21.000	-2.000 to 2.000
	Capture delay	s	0.0 to 9.9									
	Image hold time	s	0.0 to 9.9									

Category	Parameter	Unit	MD-X1000/1500 series			MD-F3200/5200 series		MD-U1000 series		ML-Z9600 series		
			Standard area	Wide area	Small spot	Standard area	Wide area	Standard area	Wide area	Standard area	Wide area	Small spot
			MD-X1000 /1500	MD-X1020 /1520	MD-X1050	MD-F3200 /5200	MD-F3220 /5220	MD-U1000	MD-U1020	ML-Z9610	ML-Z9620	ML-Z9650
Marking common setup	Expiration (Year/Month/Hour/Minute/Second)	-	-99 to 99									
	Expiration (Day)	-	-999 to 999									
	Step	-	0 to 10000									
	Counter defaults/Start value/ Final value/Repetition	-	0 to 4294967295									
	Counter base	-	2 to 36									
	Scaling of height/width of character scaling	%	50 to 200									
	Shift of character scaling	%	-100 to 100									
	Character skip cross width	mm	0.001 to 10.000									
Unit Setup	Position correction X/Y coordinates	mm	-62.500 to 62.500	-165.000 to 165.000	-25.000 to 25.000	-62.500 to 62.500	-150.000 to 150.000	-62.500 to 62.500	-165.000 to 165.000	-60.000 to 60.000	-150.000 to 150.000	-25.000 to 25.000
	Position correction: Z	mm	-21.000 to 21.000	-21.000 to 21.000	-15.000 to 15.000	-21.000 to 21.000	-21.000 to 21.000	-21.000 to 21.000	-21.000 to 21.000	-21.000 to 21.000	-21.000 to 21.000	-2.000 to 2.000
	Position correction: θ angle	°	-180.000 to 180.000									
	Position correction X/Y angles	°	-90.000 to 90.000									
	Auto power-save setting time	s	1 to 300			-		1 to 300		-		
	Auto power-save recovery time	s	0.00 to 2.55			-		0.00 to 2.55		-		
	Port number	-	0 to 65535									
	Receiving time out	s	10 to 59									
	Keep alive	s	0 to 65535									
	Ignore input signals under	ms	0.00 to 10.00									
	Voltage output of Z-axis analog control	mm/V	-100.0 to 100.0									
	Reference voltage of Z-axis analog control	V	-10.0 to 10.0									
	Overtime for marking confirmation input	s	0 to 255									
	Sensor Out Time	s	0 to 99									
	Marking complete output time	ms	1 to 1000									
	Cross line X/Y in the camera settings	-	-128 to 127			-		-128 to 127		-		
	Brightness/contrast in camera settings	-	0 to 255			-		0 to 255		-		
	Laser power offset	%	-100.0 to 100.0									
	Laser ON/OFF timing	-	-128 to 127									
	Laser stop timing	-	0 to 63									
	OFF timing for photo	-	-128 to 127									
	Warm up time	m	1 to 120									
	Warm up interval	s	0.0 to 9.9									
Operation monitoring	Rank value	-	0 to 35									
	Cumulative marking count 1/2	Times	0 to 4294967295									
	Current counter value	-	0 to 4294967295									
	Current repetitions of the counter	Times	0 to 4294967295									
	Auto-calibration correction value	-	-10 to 10									
	Valid marking angle	°	0 to 89									
	Trigger delay	s	0.0 to 9.9									
Z-MAP Creator	X/Y/Z coordinates	mm	-100000.000 to 100000.000									
	X/Y/Z coordinates	°	-180.000 to 180.000									

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Revision History

Date of printing	Version	Revision contents
September 2014	Official release (Ver1)	
April 2015	Revised 1st edition (Ver2)	Add a main quick access tool bar.
		Chapter 3 Add the TrueTypeFont
		Extend the version of QR Code Model 1/Model 2
		Add the remaining aspect ratio function
		Add the proportional function.
		Add the minimum character width settings.
		Add the Idle scanning speed function
		Add the On-the-fly Marking function
		Add the marking confirmation function
		Chapter 4 Add the Marking Time Prediction function
		Chapter 5 Add the Industrial Ethernet (EtherNet/IP function)
		Add the sensor pass filter function
		Add the Duty Ratio setting function
		Chapter 8 Add the marking confirmation function in test marking
September 2015	Revised 2nd edition (Ver2.2)	Chapter 3 Add CODE93 to barcode
		Add Customize to Nudge Marking Quality
		Chapter 5 Add connection unit items to Communication history
		Chapter 10 Add French and Spanish
March 2016	Revised 3rd edition	Correction
December 2016	2nd revision 1st edition	Add MD-F3200/5200
		Chapter 1 Add printer drivers
		Chapter 10 Add Marking Builder 2 Compatibility
January 2018	3rd revision 1st edition	Add MD-U1000, ML-Z9600 series
June 2018	4th revision 1st edition	Add the counter reset timing.

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A4WW1-MAN-1038

 15109E 1068-1 96M15110 Printed in Japan

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