

Laser Marker

External Control Manual

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

Preface

Thank you for purchasing our product.

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

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

■ General terms and conditions of this document

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3. This document must not be partially or totally copied or revised.
4. All efforts have been made to ensure the accuracy of all information in this document. If there are any questions, mistakes, or comments in this document, please notify us.
5. Please remind that we assume no liability for any results arising out of operations regardless of the above clauses.

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Cautions in Handling




ALWAYS FOLLOW THESE IMPORTANT SAFETY PRECAUTIONS!

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

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

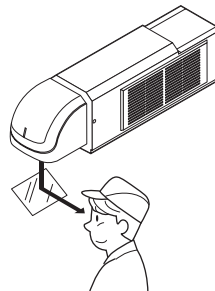
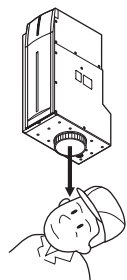
 DANGER	Denotes a potential hazard that will result in serious injury or death.
 WARNING	Denotes a potential hazard that could result in serious injury or death.
 CAUTION	Denotes a hazard that could result in minor injury.

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

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

DANGER

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



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

WARNING



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



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



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



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



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



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



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



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



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



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

⚠ WARNING

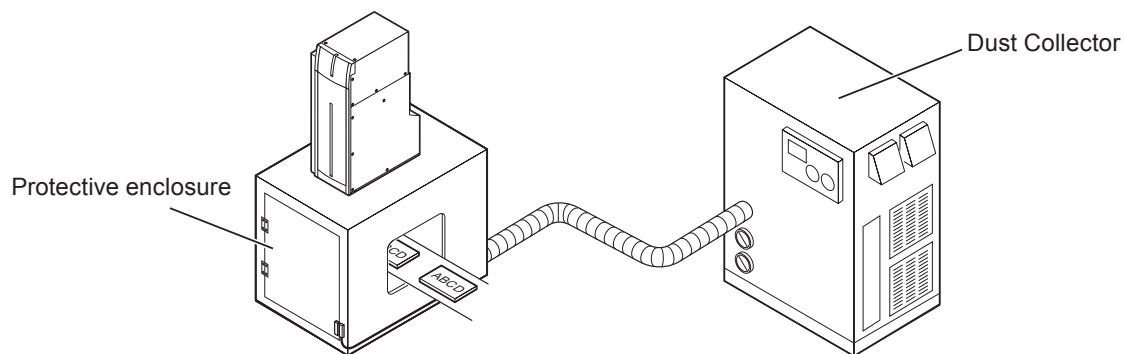


- After power supply of laser marker is turned off, laser safety manager must remove the key and keep it.



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

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



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



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



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

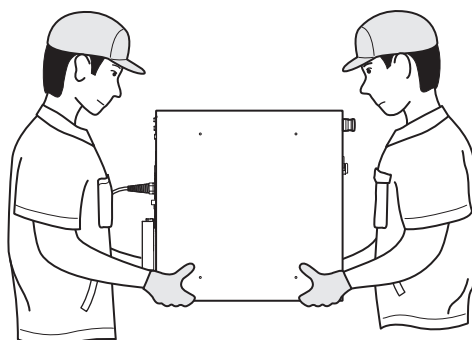
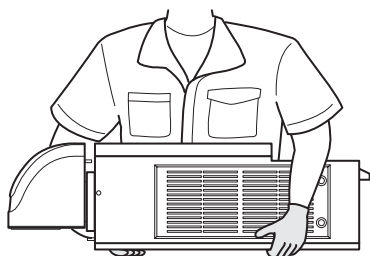


- Connect ground wire before using. A failure or electrical leakage that occurs when the unit is not properly grounded may result in electric shock.

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

Head of LP-400 series
(Standard model)

Controller



For the Proper Use of Product



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

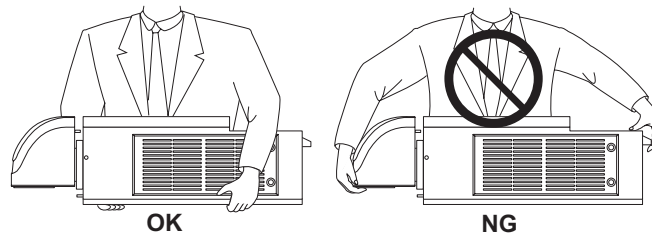
■ Usage Environment

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

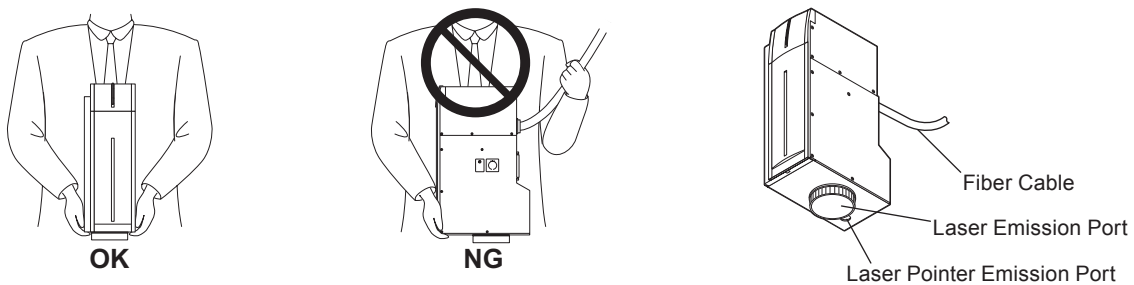
■ Installation and Mounting

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

LP-400 Series



LP-V/LP-W Series



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

For the Proper Use of Product



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

■ Wiring

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

■ Operation

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

■ Others

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

How to Read this Document

■ Target Laser Marker

This document is subject to the following Laser Marker models.

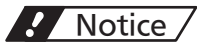
In this document, "laser marker" means this product.

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

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

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

■ Symbol Indications



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



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

■ Type of manuals

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

Operation/Maintenance Manual

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

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

External Control Manual

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

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

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

Laser Maker NAVI Operation Manual

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



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

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1 Before External Control

1-1 Operation Method for Laser Marker

CAUTION



- It is obligated by IEC/FDA/JIS that laser products shall incorporate a key-actuated master control. Actuation of this product is basically controlled by the key switch located on the front of the controller. However, in considering situations when the laser marker is operating as a part of a larger system, the laser marker turns on if the key switch is already in ON position, and power is supplied. In this case, be sure that the external system controls the operation of the laser marker with a key-actuated master control.

The laser marker can be controlled by the following method:

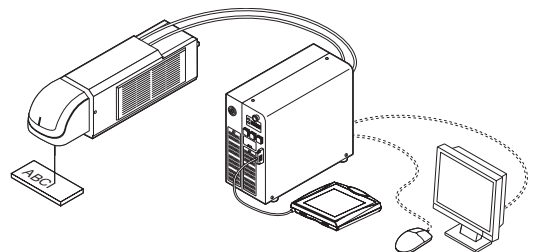
Control by the manually screen operation

To irradiate the laser by the screen operation, select the control methods from the followings:

- Test marking

Test marking executes the laser radiation manually with the selected file.

Use Test marking when you want to check the marking results while changing the setting parameters, such as during the testing to find the appropriate parameters or the maintenance work.

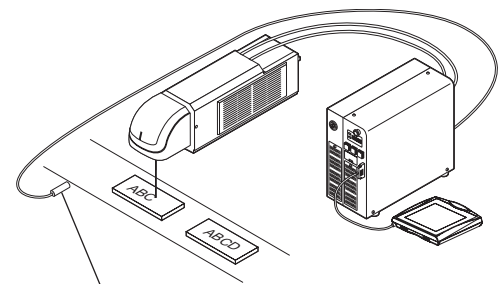


Touch panel console or monitor and mouse

- Run mode operation

Run mode is an operation method to configure the settings of the laser marker by manual screen operation and to control the marking start signal from the external devices such as switches or sensors connected to I/O terminal.

Use this operation mode to configure the laser marker without using the external control devices as PLC.



Sensor for the marking trigger

Reference

- Refer to "1-1-2 Test marking and Run mode operation" (P.14).
- For the setting details, refer to Operation/Maintenance manual.

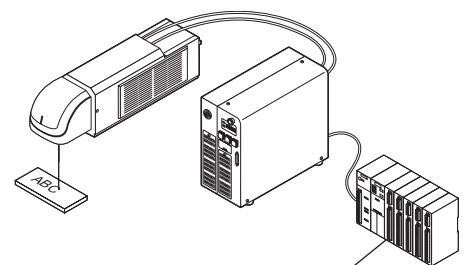
Control by external devices (remote control mode)

The operation method for automatic control.

I/O or communication commands control the operations such as laser pumping and marking by connecting the laser marker to the external control device as PLC.

The following external control methods are available. These controls can be combined.

- I/O control
- Communication command control (RS-232C/Ethernet)



External control device such as PLC

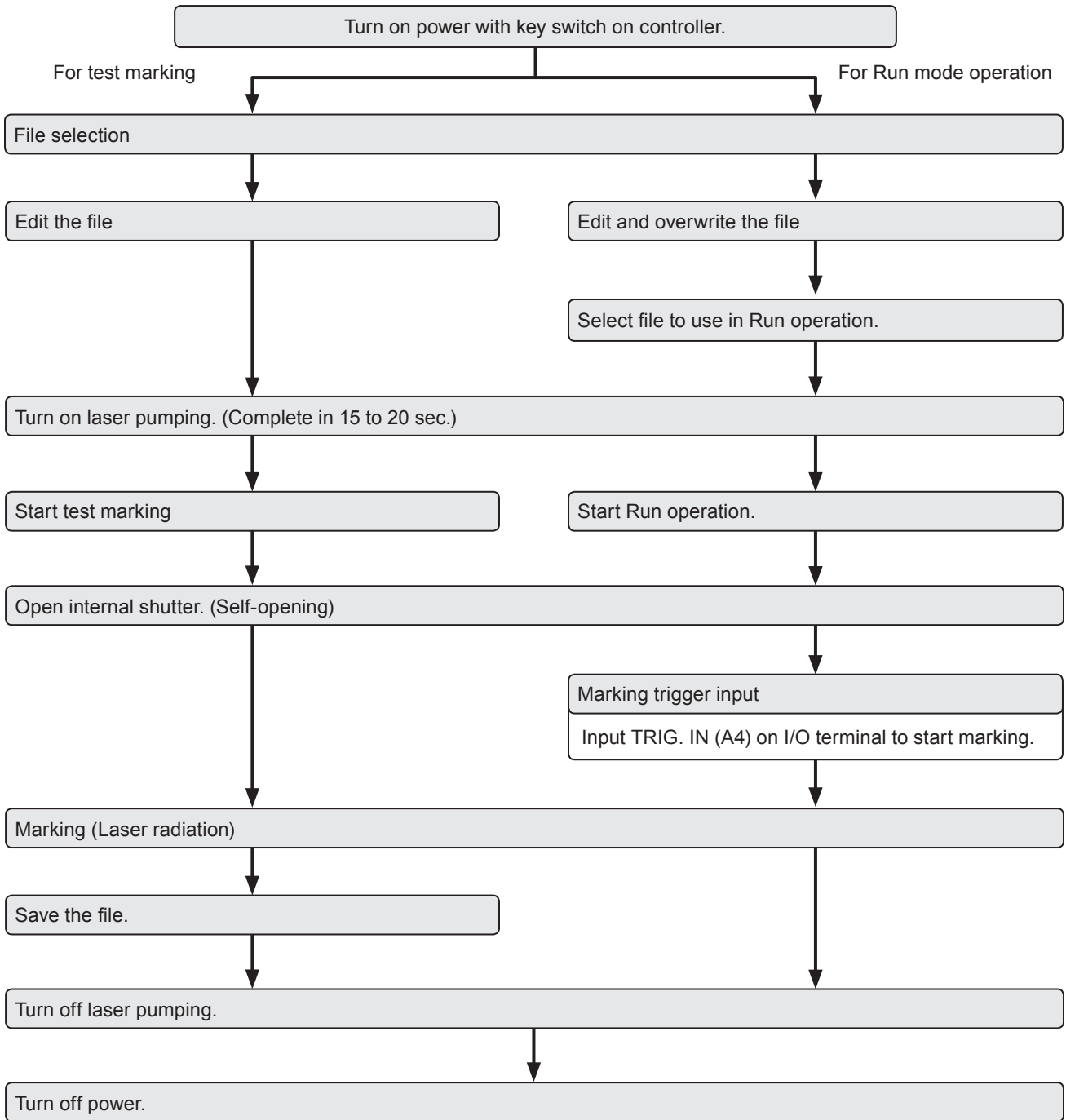
Reference

- For details on the external control, refer to "1-2 Operation by External Devices" (P.15).

1-1-1 Operation Procedure of Test Marking and Run mode

This section describes the basic operation procedures with the display operation connected to the controller.

Flow Chart



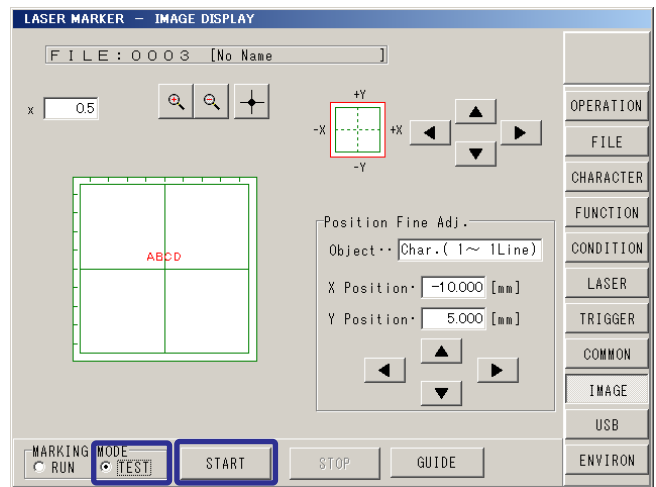
1-1-2 Test marking and Run mode operation

To irradiate the laser by the screen operation, operate the laser marker in test marking or run mode operation.

■ Test marking procedure

Test marking executes the laser radiation manually with the selected file.

1. Select “TEST” of the marking mode in the lower part of the screen.
2. Turn ON the laser pumping switch on the controller to start laser pumping.
3. To start marking, click “START”.



■ RUN mode procedure

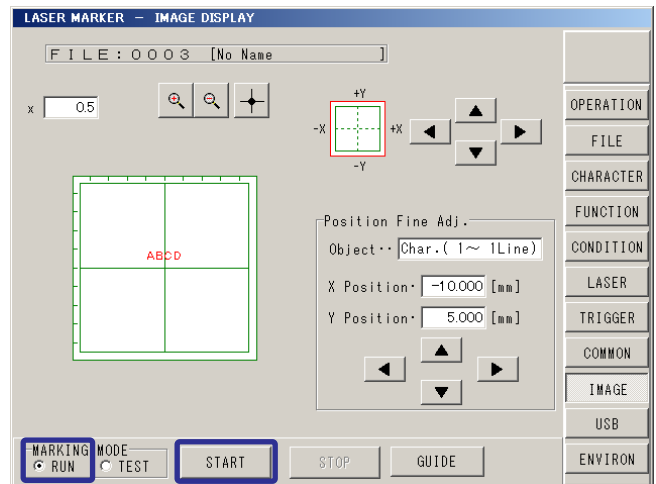
Run mode is an operation method to configure the settings of the laser marker by manual screen operation and to control the marking start signal from the external devices such as switches or sensors connected to I/O terminal.

1. Set the marking mode to “Run”.

2. Turn ON the laser pumping switch on the controller to start laser pumping.

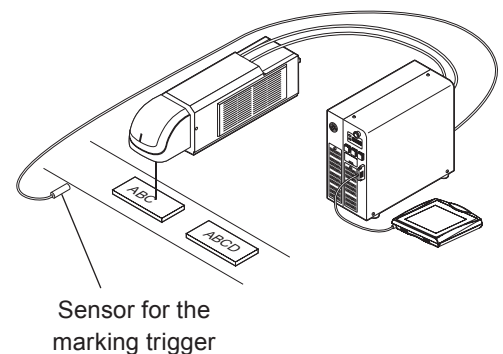
3. Click “START”.

Under the RUN mode operation, the laser marker is in the standby status for the marking start signal from I/O terminal A4: TRIG. IN.



4. Laser radiation starts by inputting the marking trigger on the I/O terminal.

Connect a switch or sensor to A4: TRIG. IN. on the I/O terminal as the input method of the marking start signal (trigger).



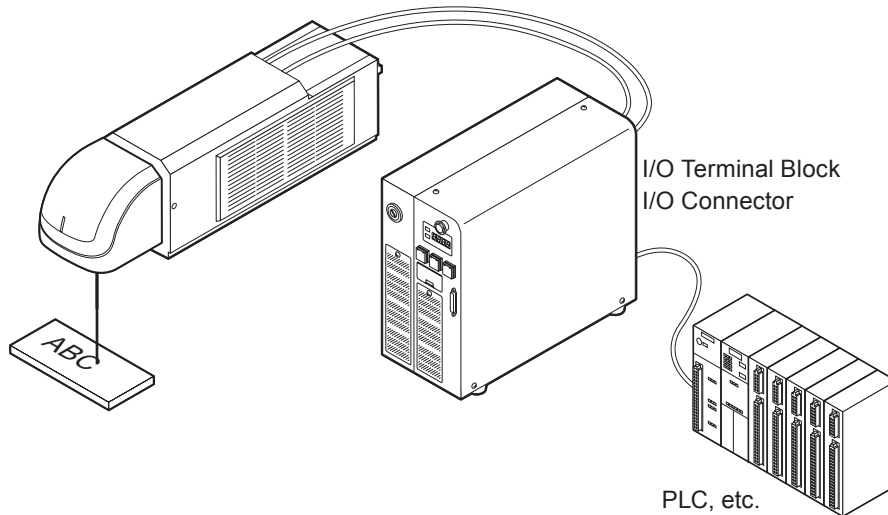
1-2 Operation by External Devices

1-2-1 Operation method using external control device

To control the laser marker VL-W1 series with the external control device, the following connecting methods are applicable:

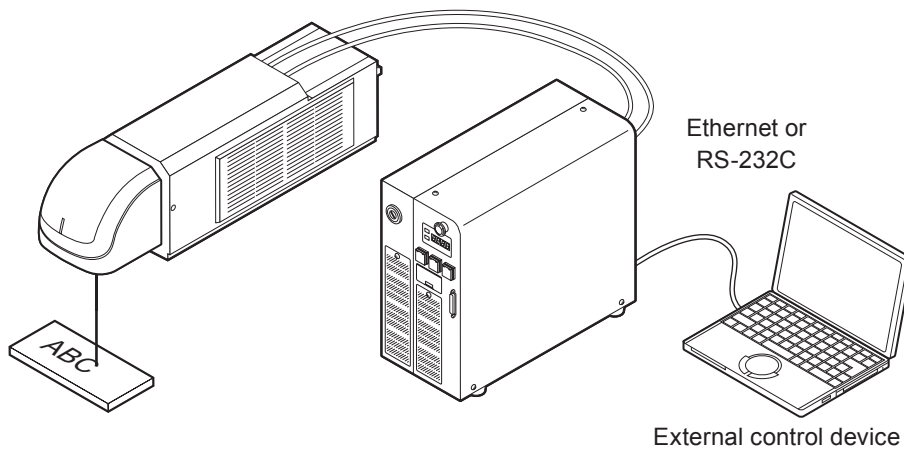
External control using I/O : Remote mode operation

Controls the laser marker from external devices such as PLC using various I/O signals loaded into the laser marker. For details, refer to “2 Control by I/O” (P.23).



External control by serial communication commands (RS-232C/Ethernet) : Remote mode operation

Controls the laser marker from external devices such as PLC using communication commands via RS-232C or Ethernet. For details, refer to “3 Control by Serial Communication (RS-232/Ethernet)” (P.55).

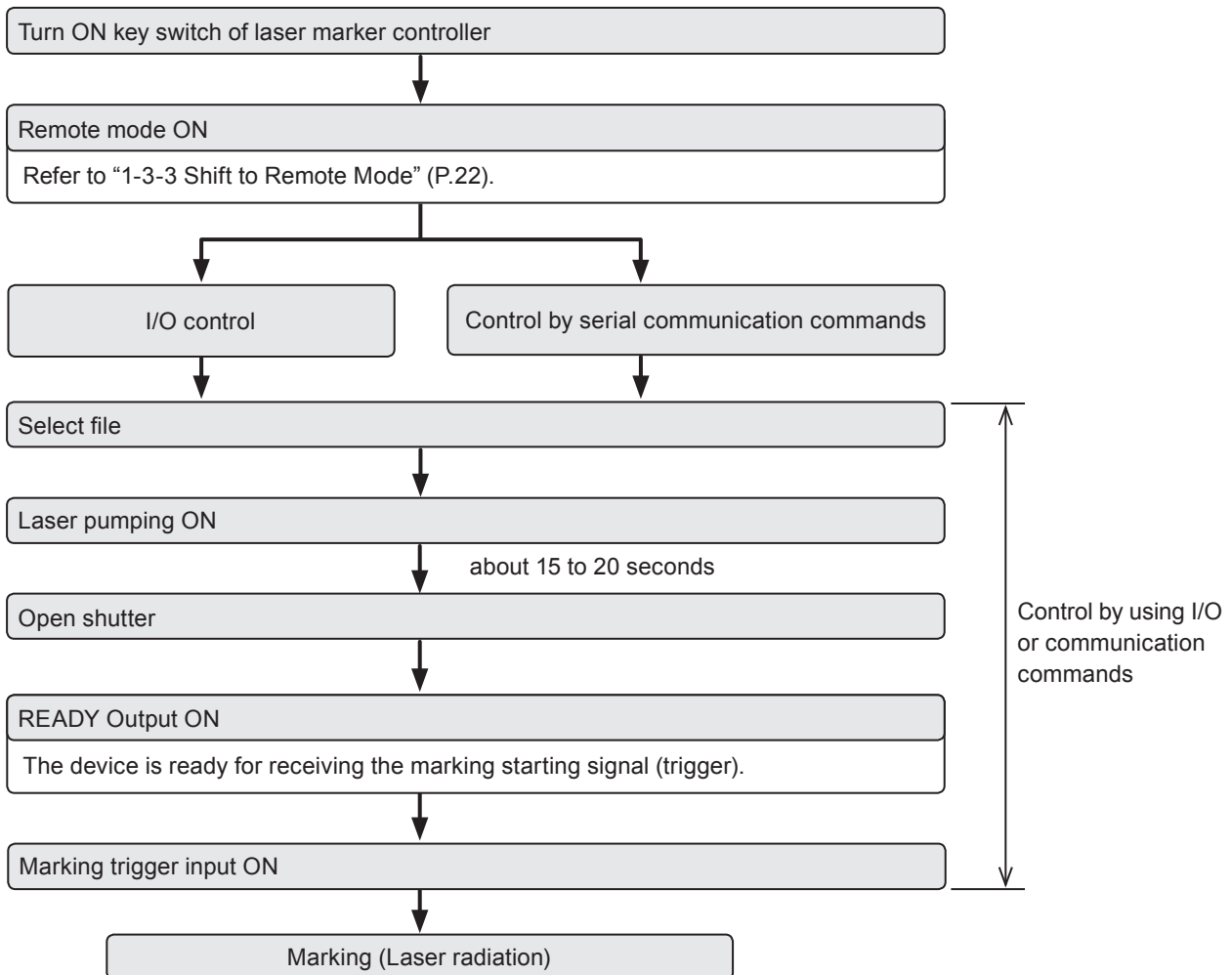


Reference

- It is available to the external control combining I/O, and serial communication commands.
- To input marking trigger with I/O and configure other settings with a screen operation manually, use Run mode. For details, refer to “1-1-2 Test marking and Run mode operation” (P.14).

1-2-2 Operation procedure with external control

- Operation example when controlling the laser marker from external control devices such as PLC



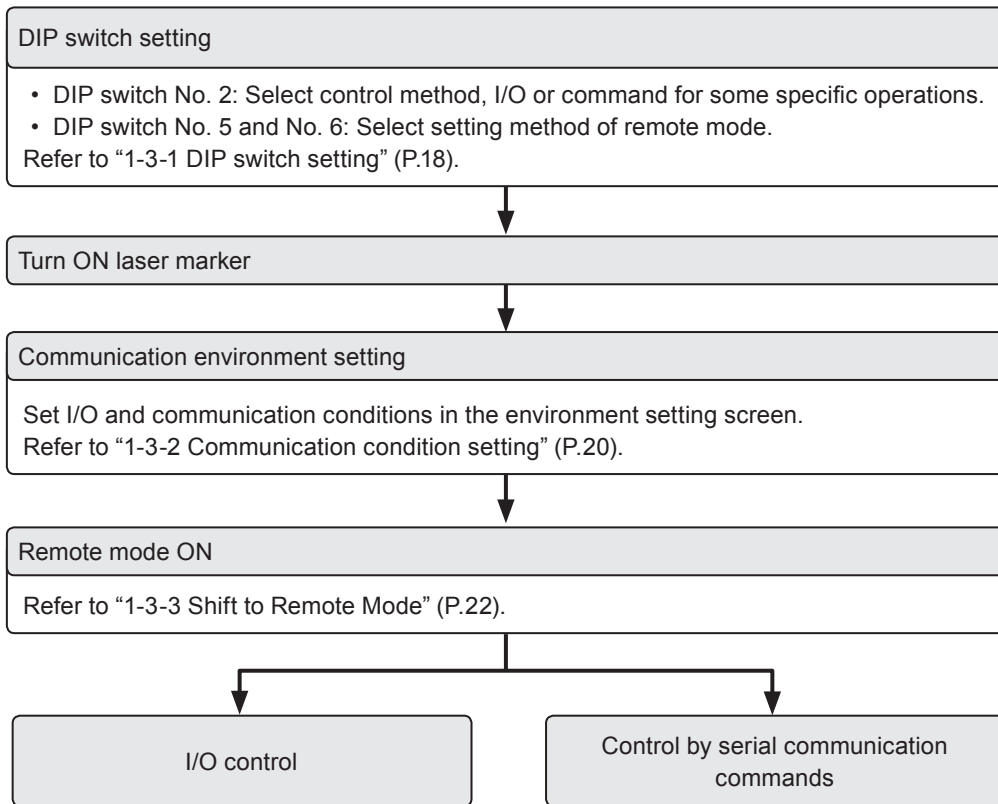
Reference

- It is available to the external control combining I/O, and serial communication commands.
- Configure the environment setting on the I/O communication in advance before using external control. Refer to "1-3 Before External Control" (P.17).

1-3 Before External Control

The following settings are required before the external control by using I/O or communication commands.

■ Setting flow to start external control



Reference

- For the installation and the setup of the laser marker, refer to Operation/Maintenance manual.

1-3-1 DIP switch setting

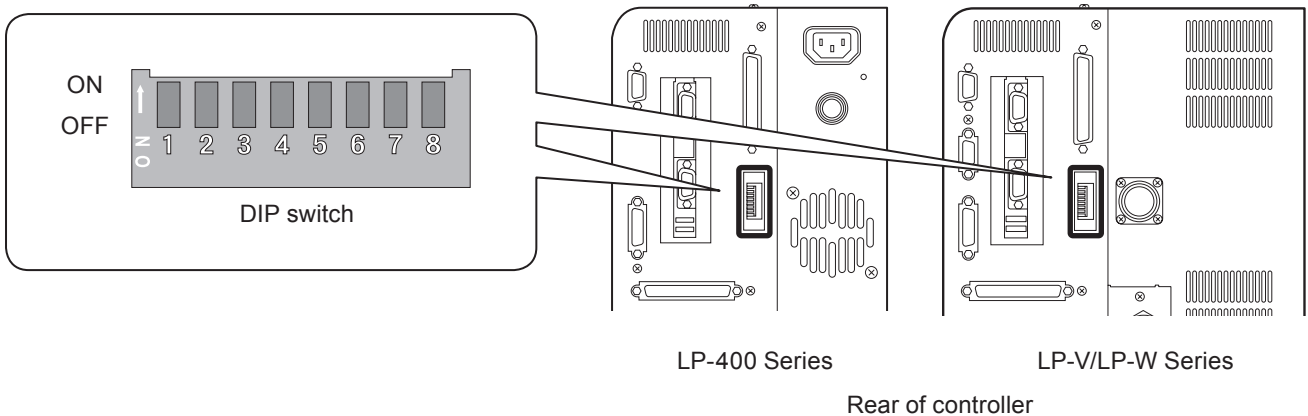
Set the operational options for the external control with the DIP switch equipped on the controller rear side.

Reference

- The initial setting of all DIP switches is OFF.
- Turn OFF the power at DIP switch setting.
- For the details on DIP switch, refer to Operation/Maintenance manual.

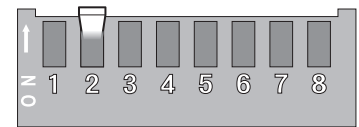
1. Turn OFF the power of laser marker.

2. Remove the DIP switch cover on the rear of the controller.



3. With DIP switch No. 2, select the control method, I/O or command for some specific operations.

DIP switch No. 2	Control method for specific operations
ON	Control by serial communication commands for the following operations <ul style="list-style-type: none"> • Laser pumping (LSR) • Shutter control (SHT) • Guide laser (GID) • Laser check radiation (SPT) • Power check (PWR) (LP-V/LP-W series only)
OFF (initial setting)	Control by I/O for the following operations <ul style="list-style-type: none"> • Laser pumping • Shutter control

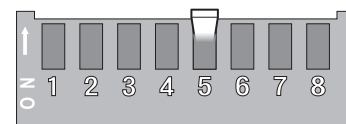


Reference

- “Guide Laser Control”, “Laser Check Radiation” and “Power Check” cannot be controlled by I/O. They can be controlled only by using serial communication in the remote mode.

4. With DIP switch No. 5, select the setting method of the remote mode.

DIP switch No. 5	Setting method of remote mode
ON	Use the input signal of REMOTE IN (A3) on I/O terminal.
OFF(initial setting)	Use the remote switch on the front of the controller.

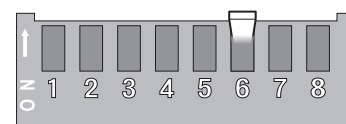


Reference

- When DIP switch No. 5 is ON, the remote switch on the controller is not available.

5. When DIP switch No. 5 is OFF, select the remote mode state at powered ON with DIP switch No. 6.

DIP switch No. 6	Remote mode state at powered ON
ON	Starts up with remote mode ON
OFF (initial setting)	Starts up with remote mode OFF



Reference

- When DIP switch No. 5 is ON, keep DIP switch No. 6 OFF.
- When DIP switch No. 6 is ON, "X5: Remote In" signal on I/O terminal is not available.



CAUTION



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

6. Install the DIP switch cover to the controller.

Notice

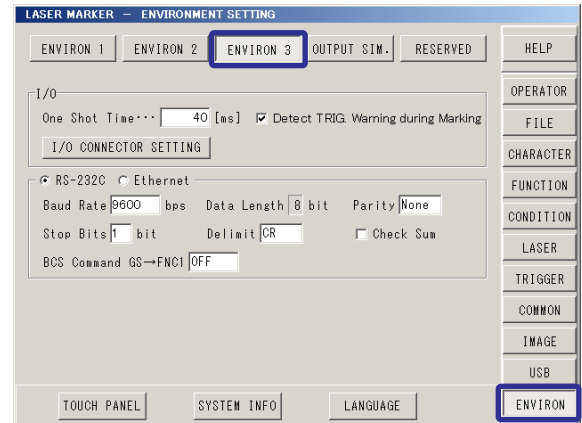
- A plastic cover is installed on the DIP switch. Install this cover always to avoid the dust penetration to the controller.

7. Turn ON the power of laser marker.

1-3-2 Communication condition setting

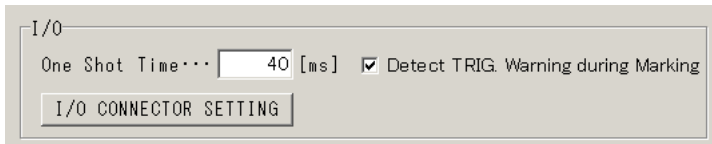
To control the laser marker by using I/O or communication commands, configure the following items in advance on the environment setting screen.

1. Select "ENVIRON" on the right menu.

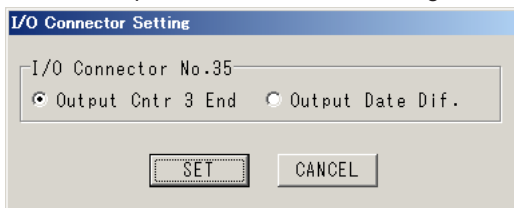


2. Select "ENVIRON 3".

3. To use I/O signals, configure the following output conditions:



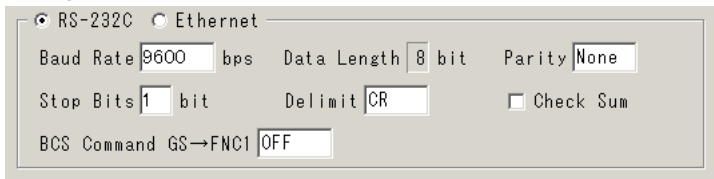
- One-shot time:
Sets the output duration for some signals such as MARK END OUT and SET OK OUT.
Setting range: 2 ms to 510 ms (initial value is 40 ms)
- Detect TRIG. Warning during Marking
Configure if you will output (ON) or will not output (OFF) the warning for the invalid trigger. With enabling this setting, the warning is output when the marking trigger that cannot be accepted was input while the shutter is opened.
- I/O Connector Setting
Select the operation of I/O connector signal No. 35 from "Counter 3 end output" or "Date gap output".



4. To use the serial communication commands, set communication conditions for Ethernet or RS-232C.

- For RS-232C:

Configure the communication conditions of the laser marker corresponding to the external control device.



RS-232C Ethernet

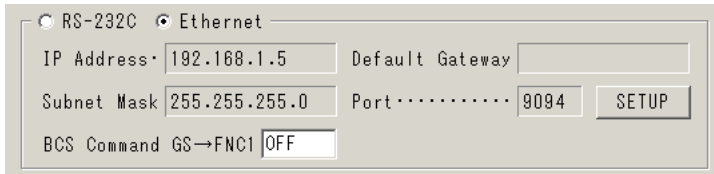
Baud Rate 9600 bps Data Length 8 bit Parity None

Stop Bits 1 bit Delimit CR Check Sum

BCS Command GS→FNC1 OFF

- For Ethernet:

Configure the communication conditions according to the network environment.



RS-232C Ethernet

IP Address 192.168.1.5 Default Gateway

Subnet Mask 255.255.255.0 Port 9094 SETUP

BCS Command GS→FNC1 OFF

- BCS Command GS to FNC1

This setting is available only when the barcode “GS1 Data Matrix” is used. To set the barcode character by using serial communication command “BCS”, select either “GS” (OFF) or “FNC1” (ON) as the separator of AI data with the variable length.

Reference

- The laser marker can be controlled by I/O and communication commands combined.
- RS-232C and Ethernet cannot be used at the same time.
- The parameters on the environment setting screen are applied to the laser marker directly without saving.

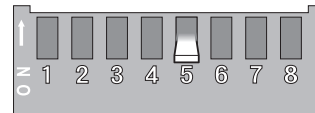
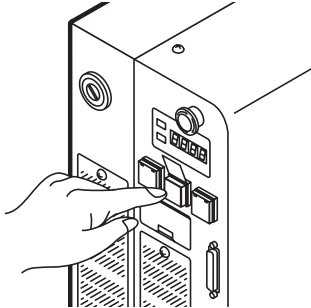
1-3-3 Shift to Remote Mode

To control the laser marker externally using I/O or serial communication commands, set the operation mode to the remote mode in one of the following methods.

Select the method to switch to the remote mode by setting the DIP switch on the rear side of the controller.

Use the remote switch on the front of the controller.

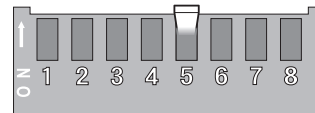
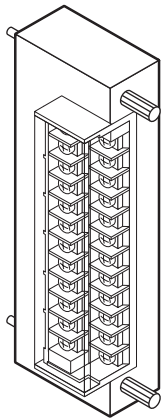
Turn ON the remote mode switch on the front of the controller.



Check that DIP switch No. 5 is OFF.
Refer to “1-3-1 DIP switch setting” (P.18).

Use input signal of X5 “REMOTE IN” on I/O terminal.

Turn ON the REMOTE IN (A3) of the I/O terminal on the rear of the controller.



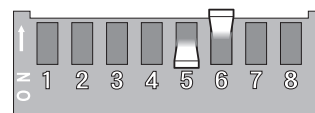
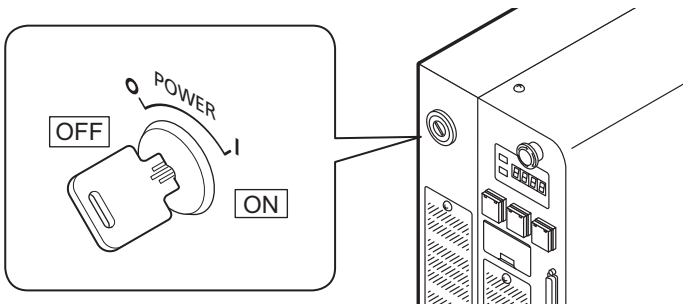
Check that DIP switch No. 5 is ON.
Refer to “1-3-1 DIP switch setting” (P.18).

Reference

- When DIP switch No. 5 is ON, the remote switch on the controller is not available.

Start the laser marker in the remote mode.

The laser marker starts up always in the remote mode state. Use the remote mode switch button of the controller for releasing and resetting the remote mode.



Check that DIP switch No. 5 is OFF, and No. 6 is ON.
Refer to “1-3-1 DIP switch setting” (P.18).

Reference

- When DIP switch No. 6 is ON, “X5: Remote In” signal on I/O terminal is not available.
- The remote switch on the controller is available when DIP switch No. 6 is ON.

2 Control by I/O

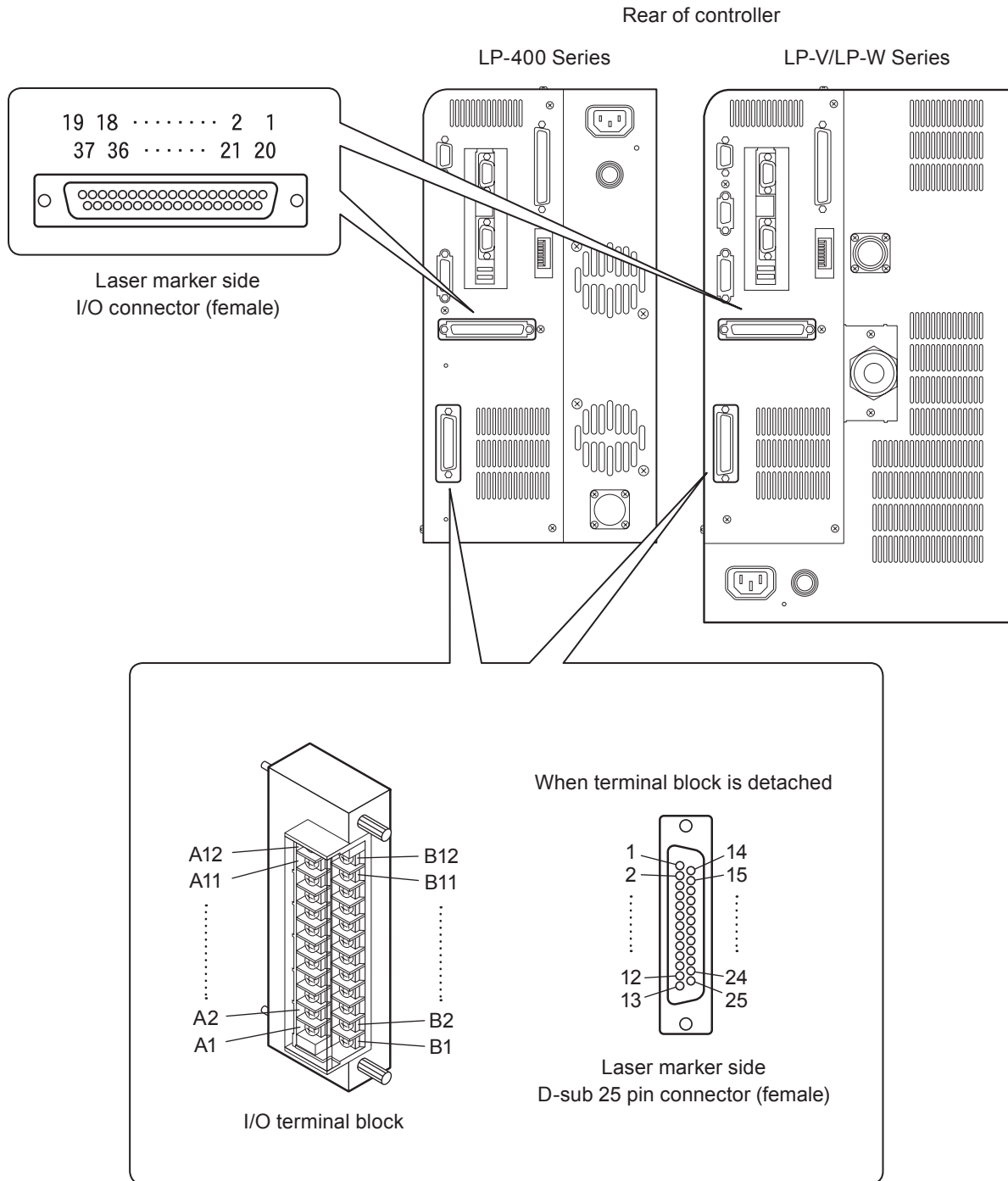
2-1 I/O Interface Specification

The I/O terminal block and the I/O connector are available as the external control I/O interface of this product.

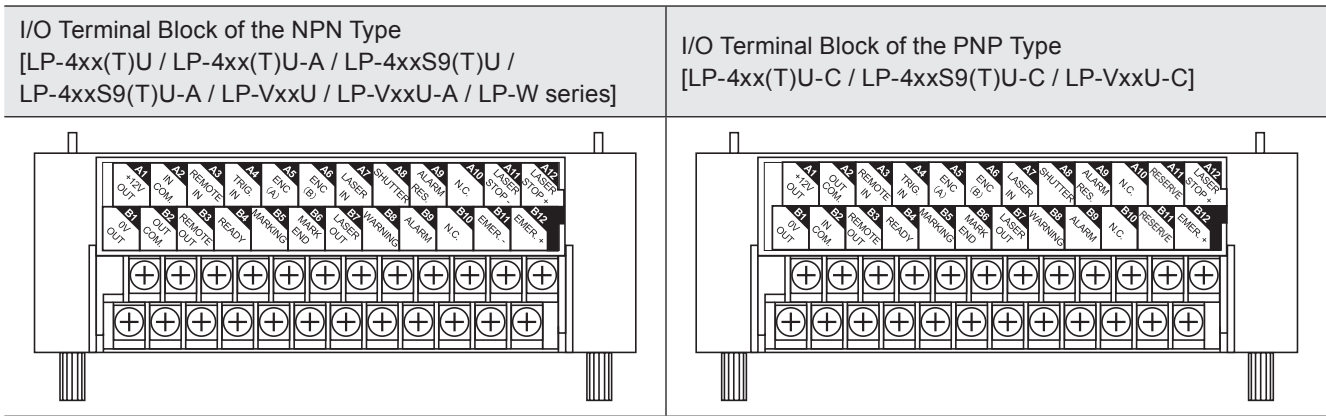
- I/O terminal block: Loaded with the basic input/output to control the laser marker.
- I/O connector: Loaded with the input/output for data configuration such as selecting a file number and the input/output for the specific functions.

Reference

- Before using I/O, configure the DIP switch and the environment settings. Refer to “1-3 Before External Control” (P.17).
- I/O terminal block is removable from the controller at the wiring.



2-1-1 I/O Terminal Block

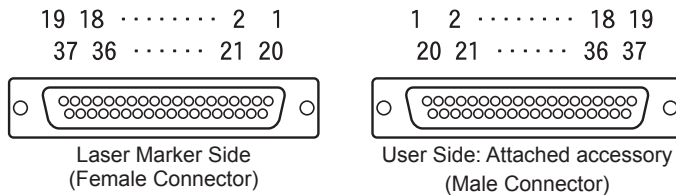


Reference

- A2, A11, B2 and B11 on the I/O terminal block have different signals depending on the controller type of NPN or PNP.
- The connector type of I/O Terminal Block is as follows. (When the terminal block is removed.)

Laser Marker Side Connector Type	Female D-sub 25 pin (Screw type: M2.6, female)
User Side Connector Type	Male D-sub 25 pin (Screw type: M2.6, male)

2-1-2 I/O Connector



* This view is facing the connecting surface.

Laser Marker Side Connector Type	Female D-sub 37 pin (Screw type: M2.6, female)
User Side Connector Type	Male D-sub 37 pin (Screw type: M2.6, male)
[Attached item] User Side Connector	HDCB-37PF (05) — Hirose Electric Co., Ltd.
[Attached item] User Side Connector Cover	HDC-CTH1 (10)

2-1-3 Signals and Details of I/O Terminal Block

The I/O terminal block is loaded with the basic input/output to control the laser marker.

■ Signals in I/O Terminal

No. *1	Signal name	No. *1	Signal name
A1 (12)	+12V OUT I/O power supply +12VDC (Max. 300mA)	B1 (25)	0V OUT I/O power supply 0V
A2 (11)	<ul style="list-style-type: none"> For NPN models *2 IN COM. Input common For PNP models (-C) *2 OUT COM. Output common 	B2 (24)	<ul style="list-style-type: none"> For NPN models *2 OUT COM. Output common For PNP models (-C) *2 IN COM. Input common
A3 (12)	REMOTE IN Remote control input	B3 (23)	REMOTE OUT Remote control output
A4 (9)	TRIG. IN Marking trigger input	B4 (22)	READY Marking ready output
A5 (8)	ENC. A Encoder A-phase input	B5 (21)	MARKING Marking output
A6 (7)	ENC. B Encoder B-phase input	B6 (20)	MARK END Marking end output
A7 (6)	LASER IN Laser pumping input	B7 (19)	LASER OUT Laser pumping completion output
A8 (5)	SHUTTER Shutter control input	B8 (18)	WARNING Warning output
A9 (4)	ALARM RES. Alarm reset input	B9 (17)	ALARM Alarm output
A10 (3)	N.C. No connection	B10 (16)	N.C. No connection
A11 (2)	<ul style="list-style-type: none"> For NPN models *2 LASER STOP- Output common for laser stop For PNP models (-C) *2 RESERVE System reservation 	B11 (15)	<ul style="list-style-type: none"> For NPN models *2 EMER.- Output common for emergency stop For PNP models (-C) *2 RESERVE System reservation
A12 (1)	LASER STOP + Laser stop input	B12 (14)	EMER.+ Emergency stop input

*1 : The numbers in () indicates the pin No. of the D-Sub connector when the terminal block is removed.

*2 : Signals of A2, A11, B2 and B11 are different depending on the controller type of NPN or PNP.

- NPN models: LP-4xx(T)U / LP-4xx(T)U-A / LP-4xxS9(T)U / LP-4xxS9(T)U-A / LP-VxxU / LP-VxxU-A / LP-W series
- PNP models (with "-C" in the end of the model name): LP-4xx(T)U-C / LP-4xxS9(T)U-C / LP-VxxU-C

Notice

- Use the internal power (A1, B1) as the power supply for the I/O signals when operating the laser marker without external power supply. Do not connect anything when using the external power supply.
- Do not connect anything to RESERVE terminals.
- Do not mix the connecting pattern for NPN and PNP.

■ Operation of Input Signal on I/O Terminal Block

Reference

- The ON/OFF listed in this section refers to the ON/OFF operations. It does not refer to the voltage level (High/Low).

No.	Name / Description
A1	<p>+12V OUT: Internal power supply + 12VDC (max. output current 300mA) Use this terminal as the power supply for the I/O signals when operating laser marker without external power supply. This terminal can be also used as the power supply for external devices such as a sensor or an encoder.</p>

Notice

- Make sure to use B1 (0V OUT) for the 0V of the internal power A1 (+12V OUT). Do not mix the connecting pattern for using external and internal power supply.
- Do not connect anything to this when using the external power supply for I/O control.
- When using the internal power supply (A1, B1), the total current of the power supply for the external device and the consumption current for the I/O control should be less than 300mA.

A2	<ul style="list-style-type: none"> • For NPN models *1 IN COM.: Input common The common terminal for each input of the I/O terminal and I/O connector. This A2 and No. 1 of I/O connector are the common terminals connected internally. For NPN models, this terminal is connected to the “+ (plus)” side of power which is used for control. • For PNP models (“-C” in the end of the model name) *1 OUT COM.: Output common The common terminal for each output of the I/O terminal and I/O connector. This A2 and No. 1 of I/O connector are the common terminals connected internally. For PNP models, this terminal is connected to the “+ (plus)” side of power which is used for control.
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Notice

- Do not invert the power wiring of I/O terminal and I/O connector. It may cause a failure. When this terminal is connected to the power supply, it is not necessary to supply the power to the other IN COM. or OUT COM. on I/O connector.
- At the factory shipments, IN COM. and OUT COM. of I/O terminals are connected to the power supply terminals by short bars respectively. When using the external power supply or connecting to any external devices, remove the short bars from the terminals to be used.
- Short-circuiting IN COM. and OUT COM. in supplying power might cause the short out and also cause the failure with the laser marker. Be sure to check the wiring before starting the laser marker.

Reference

- Connect IN COM. and OUT COM. to the power supply respectively.

NPN Type of Laser Marker:	A2[IN COM.]	—	+V,	B2[OUT COM.]	—	GND
PNP Type of Laser Marker:	B2[IN COM.]	—	GND,	A2[OUT COM.]	—	+V

- For the connecting details, refer to “2-3 Connecting I/O Terminal Block” (P.41).

A3	<p>REMOTE IN: Remote control input While this input is turned on, the laser marker operates in the remote mode which can be controlled externally by I/O and serial communication commands. To transit to the remote mode using this terminal, turn ON the DIP switch No. 5 in advance. Refer to “1-3-3 Shift to Remote Mode” (P.22).</p>
A4	<p>TRIG. IN: Marking trigger input Marking start signal. This signal can be accepted while READY OUT (B4) is turned ON. Starts marking (laser radiation) by edge of input ON. At equidistant marking to the flying object, marking is performed while this input is ON.</p>

No.	Name / Description
A5	ENC. A: Encoder A-phase input
A6	ENC. B: Encoder B-phase input Encoder input at marking to the flying object. Input up to 100kHz is possible for A and B phases respectively. If either inputs of A and B phases are used, connect only ENC.A (A5) with the encoder and connect ENC.B (A6) to IN COM.
A7	LASER IN: Laser pumping input While this input is turned on, the laser is pumped to enable the radiation. It takes approximately 15 to 20 seconds from turning on LASER IN (A7) to completion of laser pumping. This terminal is available when the DIP switch No. 2 is turned OFF.
A8	SHUTTER: Shutter control input While this input is turned on, the internal shutter opens. There is a delay time of around 200ms to max. 1 second from turning ON/OFF of SHUTTER (A8) for the actual shutter open / close operation time. This terminal is available when the DIP switch No. 2 is turned OFF.

Reference

- For LP-400 series, the shutter cannot open until the laser pumping is completed.



CAUTION



- Do not use SHUTTER (A8) input as the emergency stop or the interlock. If SHUTTER (A8) input becomes ON during laser emission, the shutter is closed after the marking operation has been finished.

A9	ALARM RES.: Alarm reset input The reset input for restoring the system from the alarm status. Make sure to verify the safety by eliminating the alarm causes before turning this input ON. For the alarms you are unable to reset such as the ones caused by hardware or system error, restart the laser marker.
A10	N.C.: No connection Do not use this terminal.
A11	<ul style="list-style-type: none"> For NPN models *1 LASER STOP-: Output common for laser stop This terminal is connected to OUT COM. (B2) internally. Connect A11 with LASER STOP+ (A12) to release the laser stop warning or alarm and change the status of the laser marker into valid for laser emitting. The function relating to safety must be shut off mechanically. Therefore, it is recommended to wire these terminals at no-voltage contact (dry contact). For PNP models ("-C" in the end of the model name) *1 RESERVE: System reservation Do not connect externally.

Notice

- A11 and B11 on the I/O terminal block are available only for NPN type of laser marker. For PNP type, do not use these terminals.

A12	LASER STOP+: Laser stop input Use this terminal to stop the laser radiation or disable the laser radiation temporarily by connecting with the safety devices such as a door or a switch. When between LASER STOP+ (A12) and OUT COM. (for NPN models; A11 or B2, for PNP models; A2) are disconnected, the laser radiation will be disabled. Opening this terminal, changes the status of the laser marker as follows. <ul style="list-style-type: none"> When laser is not emitted: The internal shutter is closed. During laser emission: The internal shutter is closed and laser pumping turns off. The function relating to safety must be shut off mechanically. Therefore, it is recommended to wire these terminals at no-voltage contact (dry contact).
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*1 : Signals of A2, A11, B2 and B11 are different depending on the controller type of NPN or PNP.

- NPN models: LP-4xx(T)U / LP-4xx(T)U-A / LP-4xxS9(T)U / LP-4xxS9(T)U-A / LP-VxxU / LP-VxxU-A / LP-W series
- PNP models (with "-C" in the end of the model name): LP-4xx(T)U-C / LP-4xxS9(T)U-C / LP-VxxU-C

■ Operation of Output Signal on I/O Terminal Block

Reference

- The ON/OFF listed in this section refers to the ON/OFF operations. It does not refer to the voltage level (High/Low).

Terminal No.	Name/Description
B1	<p>0V OUT: Internal power supply 0V</p> <p>Use this terminal as the power supply for the I/O signals when operating laser marker without external power supply.</p> <p>This terminal can be also used as the power supply for external devices such as a sensor or an encoder.</p>

Notice

- Make sure to use +12V OUT (A1) for the internal power supply with this 0V OUT (B1). Do not mix the connecting pattern for using external and internal power supply.
- Do not connect anything to this when using the external power supply for I/O control.
- When using the internal power supply (A1, B1), the total current of the power supply for the external device and the consumption current for the I/O control should be less than 300mA.

B2	<ul style="list-style-type: none"> For NPN models *1 OUT COM.: Output common The common terminal for each output of the I/O terminal and I/O connector. This B2, A11, B11 and No. 37 of I/O connector are the common terminals connected internally. For NPN models, this terminal is connected to the “- (minus)” side of power which is used for control. For PNP models (“-C” in the end of the model name) *1 IN COM.: Input common The common terminal for each input of the I/O terminal and I/O connector. This B2 and No. 37 of I/O connector are the common terminals connected internally. For PNP models, this terminal is connected to the “- (minus)” side of power which is used for control.
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Notice

- Do not invert the power wiring of I/O terminal and I/O connector. It may cause a failure. When this terminal is connected to the power supply, it is not necessary to supply the power to the other IN COM. or OUT COM. on I/O connector.
- At the factory shipments, IN COM. and OUT COM. of I/O terminals are connected to the power supply terminals by short bars respectively. When using the external power supply or connecting to any external devices, remove the short bars from the terminals to be used.
- Short-circuiting IN COM. and OUT COM. in supplying power might cause the short out and also cause the failure with the laser marker. Be sure to check the wiring before starting the laser marker.

Reference

- Connect IN COM. and OUT COM. to the power supply respectively.

NPN Type of Laser Marker:	A2[IN COM.]	—	+V,	B2[OUT COM.]	—	GND
PNP Type of Laser Marker:	B2[IN COM.]	—	GND,	A2[OUT COM.]	—	+V

- For the connecting details, refer to “2-3 Connecting I/O Terminal Block” (P.41).

B3	<p>REMOTE OUT: Remote control output</p> <p>This output turns ON while the laser marker is in the remote mode.</p> <p>Make sure that this terminal is turned ON and start the external control by I/O or serial communication commands.</p>
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Terminal No.	Name/Description
B4	<p>READY OUT: Trigger ready output</p> <p>When TRIG. IN (A4) becomes acceptable (the laser radiation becomes ready), this output turns ON.</p> <p>To turn on READY OUT, the following conditions are required:</p> <ul style="list-style-type: none"> • No error has occurred • Laser pumping has completed • Internal shutter is open • The file number switching process has completed • With the file using “rank function” or “external offset function”, the data number and SET of I/O signals have been input. • When the file with the setting to use SIN command is selected, SIN command is transmitted by every trigger input. • When the serial communication control uses the command reception permission (MKM command), the reception permission state is turned OFF.
B5	<p>MARKING: Marking output</p> <p>Output ON during marking (laser radiation).</p> <p>If the marking time is shorter than the specified one-shot output time, MARKING OUT remains ON until the one-shot output time ends.</p>
B6	<p>MARKING END: Marking end output</p> <p>Output ON when the marking operation ended.</p> <p>Even when the marking operation is interrupted due to the alarm, this MARK END turns ON.</p> <p>This is one-shot output.</p>
<p>Reference</p> <ul style="list-style-type: none"> • READY OUT (B4) is output even during one-shot output of marking end output. • MARK END (B6) is output even when marking is interrupted by the Emergency stop switch or laser stop input during marking. • Set the output time of the one-shot duration on the environment setting screen. The setting range is 2 to 510 ms. The initial setting value is 40 ms. One-shot output time has a small margin of error for the setting value. 	
B7	<p>LASER OUT: Laser pumping completion output</p> <p>LASER OUT turns ON for the duration from the completion of the laser pumping until turning OFF the laser pumping.</p> <p>The output turns ON approximately 15 to 20 seconds after the laser pumping started.</p>
B8	<p>WARNING: Warning output</p> <p>Output OFF at warning occurrence.</p> <p>Contents of warning are indicated by codes in controller file No./error code indicator.</p> <p>For contents of warning, refer to “Error Indication” (P.149).</p>
B9	<p>ALARM: Alarm output</p> <p>Output OFF at alarm occurrence. When an alarm occurs, laser pumping turns OFF.</p> <p>Contents of alarm are indicated by codes in controller file No./error code indicator.</p> <p>For contents of alarm, refer to “Error Indication” (P.149).</p>
B10	<p>N.C.: No connection</p> <p>Do not connect externally.</p>

Terminal No.	Name/Description
B11	<ul style="list-style-type: none"> • For NPN models *1 EMER.-: Output common for emergency stop This terminal is connected to OUT COM. (B2) internally. Connect this B11 with EMER.+ (B12) to release the emergency stop alarm. The function relating to safety must be shut off mechanically. Therefore, it is recommended to wire these terminals at no-voltage contact (dry contact). • For PNP models (“-C” in the end of the model name) *1 RESERVE: System reservation Do not connect externally.

Notice

- A11 and B11 on the I/O terminal block are available only for NPN type of laser marker. For PNP type, do not use these terminals.

B12	<p>EMER. +: Emergency stop input</p> <p>Use this terminal to stop the laser radiation or disable the laser radiation by connecting with the safety devices such as a door or a switch.</p> <p>When between EMER.+ (B12) and OUT COM. (for NPN models; B11 or B2, for PNP models; A2) are disconnected, the laser pumping is turned off and the laser radiation will be disabled.</p> <p>The function relating to safety must be shut off mechanically. Therefore, it is recommended to wire these terminals at no-voltage contact (dry contact).</p>
-----	--

*1 : Signals of A2, A11, B2 and B11 are different depending on the controller type of NPN or PNP.

- NPN models: LP-4xx(T)U / LP-4xx(T)U-A / LP-4xxS9(T)U / LP-4xxS9(T)U-A / LP-VxxU / LP-VxxU-A / LP-W series
- PNP models (with “-C” in the end of the model name): LP-4xx(T)U-C / LP-4xxS9(T)U-C / LP-VxxU-C

2-1-4 Signals and Details of I/O Connector

The I/O connector is loaded with the input/output for data setting such as selecting a number and the input/output for the specific functions.

■ Signals in I/O Connector

No.	Signal name	No.	Signal name
1	<ul style="list-style-type: none"> For NPN models *1 IN COM. Input common For PNP models (-C) *1 OUT COM. Output common 	20	SELECT 0 IN
2	SET IN	21	SELECT 1 IN
3	D0	22	SELECT 2 IN
4	D1	23	TIME HOLD IN
5	D2	24	RESERVE
6	D3	25	System reservation
7	D4	26	
8	D5	27	
9	D6	28	
10	D7	29	
11	D8	30	
12	D9	31	
13	D10	32	CEND 0 Counter 0 end output
14	D11	33	CEND 1 Counter 1 end output
15	D12	34	CEND 2 Counter 2 end output
16	D13	35	CEND 3 / GAP OUT Counter 3 end output / Date gap output
17	D14	36	SET OK Setting completion output
18	D15	37	<ul style="list-style-type: none"> For NPN models *1 OUT COM. Output common For PNP models (-C) *1 IN COM. Input common
19	RESERVE System reservation		

*1 : Signals of No. 1 and No. 37 are different depending on the controller type of NPN or PNP.

- NPN models: LP-4xx(T)U / LP-4xx(T)U-A / LP-4xxS9(T)U / LP-4xxS9(T)U-A / LP-VxxU / LP-VxxU-A / LP-W series
- PNP models (with "-C" in the end of the model name): LP-4xx(T)U-C / LP-4xxS9(T)U-C / LP-VxxU-C

Notice

- Do not invert the power wiring of I/O terminal and I/O connector. It may cause a failure. Common terminals (IN COM. or OUT COM.) on the I/O connector and the I/O terminal block are connected internally. When IN COM. and OUT COM. in the I/O terminal are connected to the power supply, it is not necessary to supply the power to IN COM. or OUT COM. in I/O connector.

■ Operation of Input Signal on I/O Connector

Reference

- The ON/OFF listed in this section refers to the ON/OFF operations. It does not refer to the voltage level (High/Low).

Terminal No.	Name / Description
1	<ul style="list-style-type: none">• For NPN models *1 IN COM.: Input common The common terminal for each input of the I/O terminal and I/O connector. This No. 1 and A2 of I/O terminal are the common terminals connected internally. For NPN models, this terminal is connected to the “+ (plus)” side of power which is used for control.• For PNP models (“-C” in the end of the model name) *1 OUT COM.: Output common The common terminal for each output of the I/O terminal and I/O connector. This No. 1 and A2 of I/O terminal are the common terminals connected internally. For PNP models, this terminal is connected to the “+ (plus)” side of power which is used for control.

! Notice

- Do not invert the power wiring of I/O terminal and I/O connector. It may cause a failure. When IN COM. and OUT COM. in the I/O terminal are connected to the power supply, it is not necessary to supply the power to IN COM. or OUT COM. in I/O connector.

2	SET IN Turn on this signal when executing the input of D0 to D15 and SELECT 0 to SELECT 2. Turn on SET IN with maintaining the input status of D0 to D15 and SELECT 0 to SELECT 2. The input operation is executed at the timing of the edge of turning on. SET IN is required to control the following operations by I/O. <ul style="list-style-type: none">• File No. selection• Correct the count-up/count-down value of the counter function• Reset the count value of the counter function• Switch marking characters of the rank function• Switch marking coordinates of the external offset function
3 to 18	D0 to D15 : Number input Set the number for one of the following targets selected at SELECT 0 to SELECT 2. For the detail of SELECT 0 to SELECT 2, refer to the description of terminal No. 20 to 22. <ol style="list-style-type: none">1) File No.2) Count-up value correction3) Count-down value correction4) Counter No. to reset5) Data number for Rank /External offset function

Terminal No.	Name / Description
--------------	--------------------

1) File No. (SELECT 0 to SELECT 2: All OFF)

Input when changing the file number of 0 to 2047.

Specify the file number in the binary system as D0 to D15 and turn on SET IN.

Indicate values in the binary system as ON/OFF of D0 to D15 with D0 being the lowest digit value.

Example: When selecting the file No. 618

Select "0000 0010 0110 1010", which represents 618 in a 16-bit binary system, by specifying ON/OFF of D0 to D15 as shown in the below table.

Terminal	File No.(Binary)	INPUT	Terminal	File No.(Binary)	INPUT
D0	0	OFF	D8	0	OFF
D1	1	ON	D9	1	ON
D2	0	OFF	D10	0	OFF
D3	1	ON	D11	0	OFF
D4	0	OFF	D12	0	OFF
D5	1	ON	D13	0	OFF
D6	1	ON	D14	0	OFF
D7	0	OFF	D15	0	OFF

2) Count-up value correction (SELECT 1: ON)

3) Count-down value correction (SELECT 0 and SELECT 1: ON)

Input this number when you change the next marking value of the counter function. The counter value is specified by the step times of count-up or count-down. The step value indicates a value to increase or decrease per one counting-up or counting-down.

Specify the count-up/count-down with SELECT 0 to 2 input.

Specify the target counter No. with D0 to D7 and specify the step times with D8 to D15. Then, turn on SET IN.

- To select the counter No., specify D0 to D7. The counter No. 0 to 7 is assigned at D0 to D7 respectively.

In case two or more counter numbers are specified, step values of all the specified counter numbers are changed.

- To specify the step times of the count-up/count-down, specify a value with D8 to D15 in the binary system. Indicate values in the binary system as ON/OFF of D8 to D15 with D8 being the lowest digit value.

Example: Count up or count down the counter No. 3 by two steps

- Turn ON D3 which represents the counter No. 3.
- Select "0000 0010", which represents the step times 2 in a 8-bit binary system, by specifying ON/OFF of D8 to D15 as shown in the below table.

D0 to D7: Counter No. 0 to 7

Terminal	Counter No.	INPUT
D0	0	OFF
D1	1	OFF
D2	2	OFF
D3	3	ON
D4	4	OFF
D5	5	OFF
D6	6	OFF
D7	7	OFF

D8 to D15: Step times

Terminal	Step times (Binary)	INPUT
D8	0	OFF
D9	1	ON
D10	0	OFF
D11	0	OFF
D12	0	OFF
D13	0	OFF
D14	0	OFF
D15	0	OFF

Terminal No.	Name / Description
--------------	--------------------

4) Counter No. to reset (SELECT 2: ON)

Resets the counter value to the initial value when the counter function is used in the selected file.
Set D0 to D7 to specify the counter No. to reset and turn ON SET IN.

In case two or more counter numbers are specified, all counters specified are reset.

Example: When the counter No. 0 to 3 are reset.

Turn ON D0, D1, D2, and D3 which represent the counter No. 0, 1, 2, and 3.

D0 to D7: Counter No. 0 to 7

Terminal	Counter No.	INPUT
D0	0	ON
D1	1	ON
D2	2	ON
D3	3	ON
D4	4	OFF
D5	5	OFF
D6	6	OFF
D7	7	OFF

5) Data number for Rank /External offset function (SELECT 0: ON)

The rank/external offset function allows to switch the marking characters (rank) or the coordinates (external offset) using the input terminal D0 to D15. Configure the character or coordinate patterns to the data number corresponding to D0 to D15 in advance. Specify which pattern you will mark from D0 to D15. Specify the data number in the binary system as D0 to D15 and turn on SET IN (No. 2).

The data numbers corresponding to D0 to D15 are defined as follows according to the settings.

I/O input condition settings *	Terminal	Data number target	Data number
Rank: 4-bit × 4	D0 to D3	Rank 0	0 to 15
	D4 to D7	Rank 1	0 to 15
	D8 to D11	Rank 2	0 to 15
	D12 to D15	Rank 3	0 to 15
Rank: 8-bit × 2	D0 to D7	Rank 0	0 to 255
	D8 to D15	Rank 1	0 to 255
External offset: Lower 4 bits	D0 to D3	External Offset	0 to 15
External offset: Lower 8 bits	D0 to D7	External Offset	0 to 255

* You can also use the rank function together with the external offset function. If you use the same terminal for both the rank and external offset at this time, the input status will be reflected to the data number of both functions.

Example: Specify data number 15 when using lower 8 bits

Select "0000 1111", which represents 15 in a 8-bit binary system, by specifying ON/OFF of D0 to D7 as shown in the below table. (D0 is the lowest digit number.)

D0 to D7: Data number (the lower 8 bits are used)

Terminal	Data No. (Binary)	INPUT
D0	1	ON
D1	1	ON
D2	1	ON
D3	1	ON
D4	0	OFF
D5	0	OFF
D6	0	OFF
D7	0	OFF

19 RESERVE: System reservation
Do not connect externally.

Terminal No.	Name / Description
--------------	--------------------

- 20 SELECT 0
- 21 SELECT 1
- 22 SELECT 2

With SELECT 0 to SELECT 2, the setting target of D0 to D15 are specified as shown in the table below. While maintaining the input status of SELECT 0 to SELECT 2 and D0 to D15, turn on SET IN.

Number input target	SELECT 0	SELECT 1	SELECT 2
File No.	OFF	OFF	OFF
Count-up value correction	OFF	ON	OFF
Count-down value correction	ON	ON	OFF
Counter No. to reset	OFF	OFF	ON
Data number for Rank/External offset	ON	OFF	OFF

* The select input (SELECT 0 to SELECT 2) is not necessary to be switched to ON when specifying the file number.

- 23 TIME HOLD: Time hold input
 Performs marking of date and lot, reflecting the time when the input TIME HOLD (No. 23) is turned ON. While this input is turned on, the laser marker retains the time and date of the internal clock at the point when the input was turned ON, and the functional characters such as current date, expiry date, and lot are marked with this time.
 If the input TIME HOLD (No. 23) is turned ON when powering on the laser marker, it retains the system startup time.

- 24 to 29 RESERVE: System reservation
 Do not connect externally.

*1 : Signals of No. 1 and No. 37 are different depending on the controller type of NPN or PNP.

- NPN models: LP-4xx(T)U / LP-4xx(T)U-A / LP-4xxS9(T)U / LP-4xxS9(T)U-A / LP-VxxU / LP-VxxU-A / LP-W series
- PNP models (with "-C" in the end of the model name): LP-4xx(T)U-C / LP-4xxS9(T)U-C / LP-VxxU-C

■ Operation of Output Signal on I/O Connector

Reference

- The ON/OFF listed in this section refers to the ON/OFF operations. It does not refer to the voltage level (High/Low).

Terminal No.	Name/Description
30 to 31	RESERVE: System reservation Do not connect externally.
32	CEND 0: Counter 0 end output
33	CEND 1: Counter 1 end output
34	CEND 2: Counter 2 end output
35	CEND 3: Counter 3 end output / GAP OUT: Date gap output Each output turns ON when the counting value of the corresponding counter No. has reached to the end value. The counter end output remains turned ON with the shutter open until the next marking trigger is input. When you close the shutter, the counter end output turns OFF. For the terminal No. 35, select its operation from "Counter 3 end output" or "Date gap output" in the environment settings. The default setting is "Counter 3 end output". When "Date gap output" is selected for terminal No. 35, this terminal turns ON when the date of the internal clock has changed (passed the midnight) while the input TIME HOLD (No. 23) is ON. This is the output to notify you that the laser marker is marking the different date from that of the internal clock while TIME HOLD (No. 23) is turned ON.

Reference

- Common Counter 4 to 7 have no counter end output function.
- The counter does not operate at test marking.
- Counting is activated from the initial value again when the counter reaches to the end value.
- Only the counter input with the character string is available.
- When "Step & Repeat counter at each step" function is set, counter end output is invalid.

36	SET OK: Set OK output The output turns ON when the setting has completed by the input of SET IN (No. 2). Output ON when number inputs such as file No. and counter reset are set. This is one-shot output.
----	--

Reference

- SET OK is a response to SET IN. To verify if the laser marker has entered into the marking ready state (trigger input acceptance state), check by READY (B4).
- Set the output time of the one-shot duration on the environment setting screen. The setting range is 2 to 510 ms. The initial setting value is 40 ms. One-shot output time has a small margin of error for the setting value.

Terminal No.	Name/Description
37	<ul style="list-style-type: none"> • For NPN models *1 OUT COM.: Output common The common terminal for each output of the I/O terminal and I/O connector. This No. 37 and B2, A11 and B11 of I/O terminal are the common terminals connected internally. For NPN models, this terminal is connected to the “- (minus)” side of power which is used for control. • For PNP models (“-C” in the end of the model name) *1 IN COM.: Input common The common terminal for each input of the I/O terminal and I/O connector. This No. 37 and B2 of I/O terminal are the common terminals connected internally. For PNP models, this terminal is connected to the “- (minus)” side of power which is used for control.

! Notice

- Do not invert the power wiring of I/O terminal and I/O connector. It may cause a failure. When IN COM. and OUT COM. in the I/O terminal are connected to the power supply, it is not necessary to supply the power to IN COM. or OUT COM. in I/O connector.

*1 : Signals of No. 1 and No. 37 are different depending on the controller type of NPN or PNP.

- NPN models: LP-4xx(T)U / LP-4xx(T)U-A / LP-4xxS9(T)U / LP-4xxS9(T)U-A / LP-VxxU / LP-VxxU-A / LP-W series
- PNP models (with “-C” in the end of the model name): LP-4xx(T)U-C / LP-4xxS9(T)U-C / LP-VxxU-C

2-2 Input/Output Rating

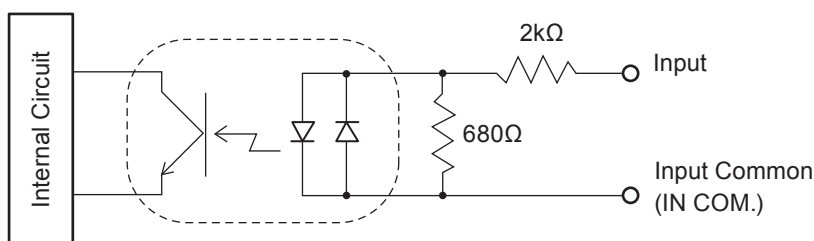
2-2-1 Input Rating and Input Circuit

The input rating and input circuit for the I/O terminal and I/O connector are shown as follows:

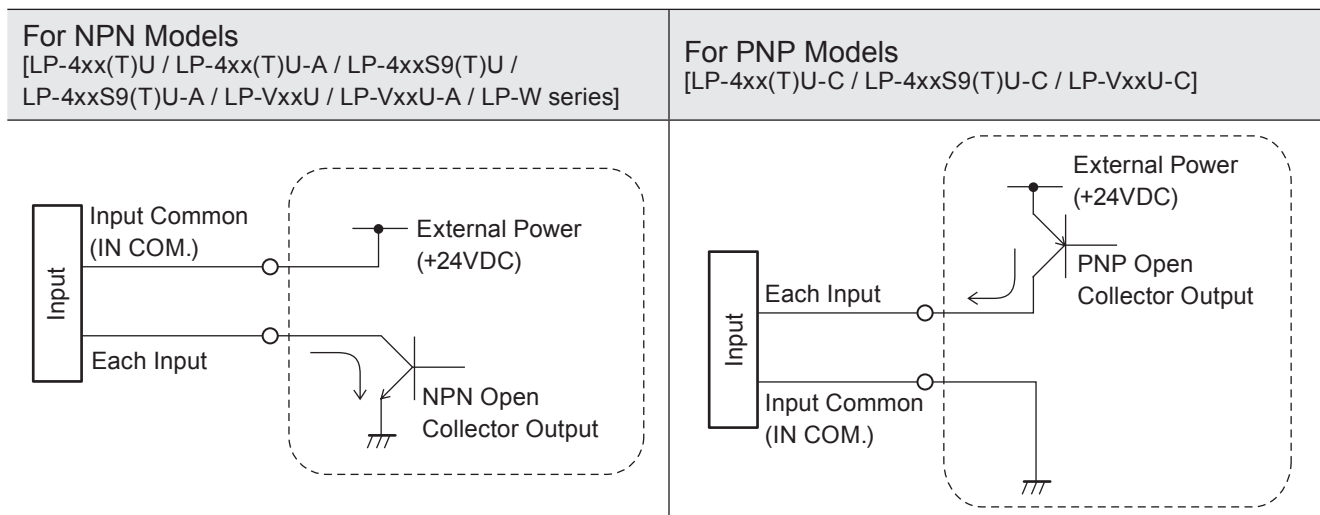
■ Input Rating

Item	Input on I/O Terminal Block and I/O Connector
Input Form	Bidirectional photo-coupler (insulated input)
Input ON Voltage	Difference of voltages between input and input common: 8V or more
Input OFF Voltage	Difference of voltages between input and input common: 4V or less
Rated Input Voltage	+12V DC to +24V DC

■ Input Circuit



■ Connecting Image



! Notice

- This product has NPN type and PNP type depending on the laser marker models. Make sure the model name and connect correctly. (PNP type has “-C” in the end of the laser marker model name.)
- Do not short-circuit input common (IN COM.) and output common (OUT COM.). It might cause the failure of the laser marker.

Reference

- Respective inputs are bidirectional photo-coupler inputs. The regulation for input ON is based on the ON status of photo-coupler.
- IN COM. terminals on the I/O terminal block and on the I/O connector are the common terminals connected internally.
- Connect the power supply to IN COM. and OUT COM. by using either I/O terminal block or I/O connector.
- DC 2-wire sensor cannot be connected to any input.

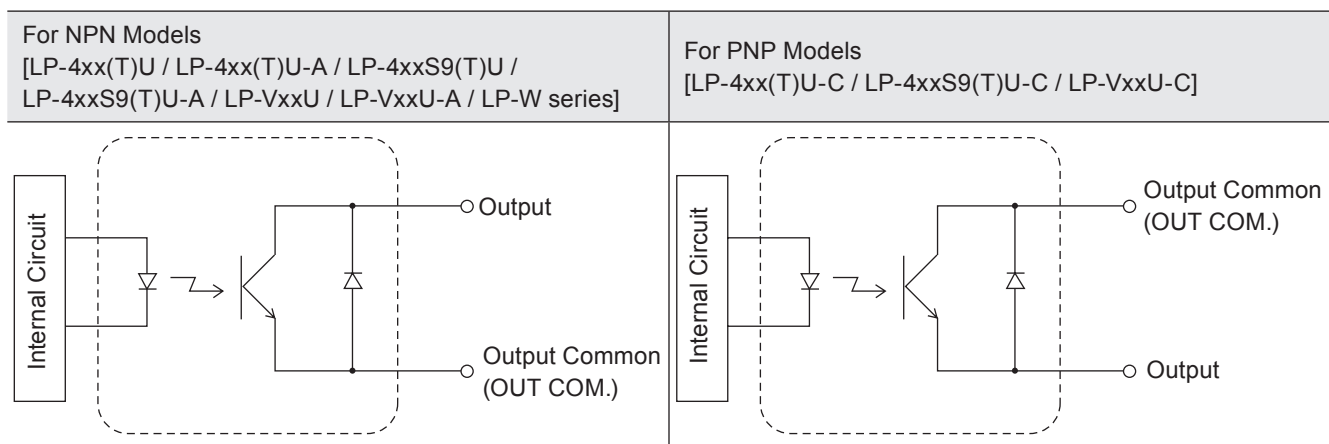
2-2-2 Output Rating and Output Circuit

The output rating and output circuit for the I/O terminal block and I/O connector are shown as follows:

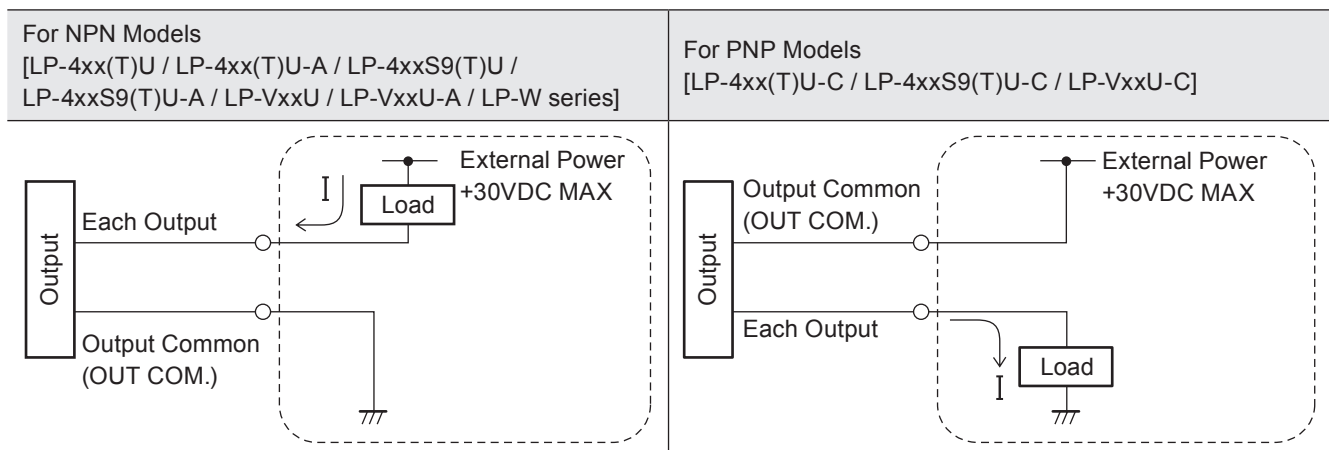
■ Output Rating

Item	Output on I/O Terminal Block	Output on I/O Connector
Output Form	Photo-coupler (insulated output)	
Protection function for short-circuit	None	
Max. Output Current	50mA	20mA
Max. Applied Voltage	+30V DC	
Residual Voltage	+2.0V DC or less	

■ Output Circuit



■ Connecting Image



I: Terminal Block Output MAX 50 mA, I/O Connector Output MAX 20 mA

⚠ Notice

- This product has NPN type and PNP type depending on the laser marker models. Make sure the model name and connect correctly. (PNP type has “-C” in the end of the laser marker model name.)
- Do not short-circuit input common (IN COM.) and output common (OUT COM). It might cause the failure of the laser marker.

↓ Reference

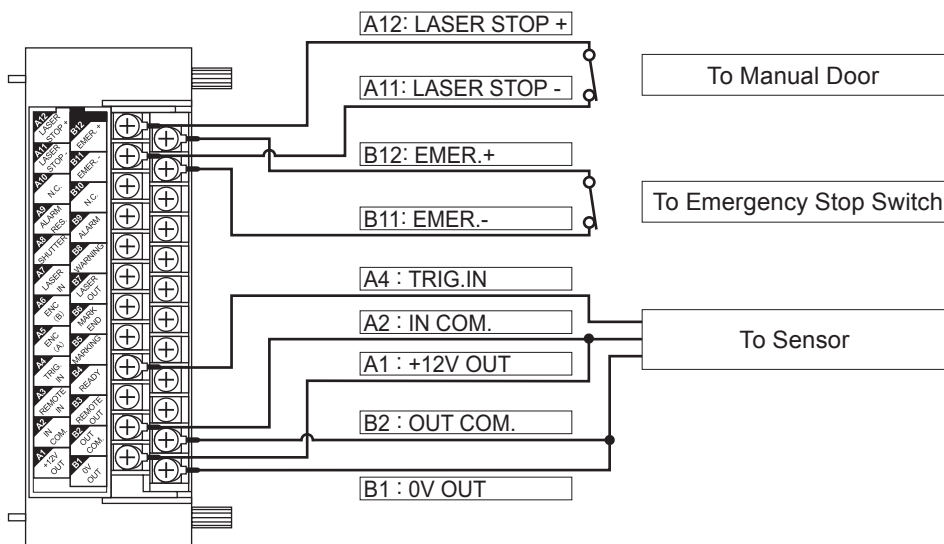
- Respective outputs are photo-coupler outputs. The regulation for output ON is based on the ON status of photo-coupler.
- OUT COM. terminals on the I/O terminal block and on the I/O connector are the common terminals connected internally.
- Connect the power supply to IN COM. and OUT COM. by using either I/O terminal block or I/O connector.

2-3 Connecting I/O Terminal Block

2-3-1 Connecting Samples (Independent Operation of Laser Marker)

■ Connecting Sample for NPN Models

[LP-4xx(T)U / LP-4xx(T)U-A / LP-4xxS9(T)U / LP-4xxS9(T)U-A / LP-VxxU / LP-VxxU-A / LP-W series]



- Connect A1[+12V OUT] and A2[IN COM.], B1[0V OUT] and B2[OUT COM.] as I/O power supply for marking.
- Connect B12[EMER.+] and B11[EMER.-] to release the emergency stop function. (Opening between B12 - B11 turns off the laser pumping and marking is disabled.)
- Connect A12[LASER STOP+] and A11[LASER STOP-] to release the laser stop function. (Opening between A12 - A11 closes the internal shutter, and changes the status of the device into invalid for marking.)
- The following terminals are short-circuited by a short bar at factory shipment.

A1 [+12V OUT]	—	A2 [IN COM.]
B1 [0V OUT]	—	B2 [OUT COM.]
B12 [EMER.+]	—	B11 [EMER.-]
A12 [LASER STOP+]	—	A11 [LASER STOP-]

! Notice

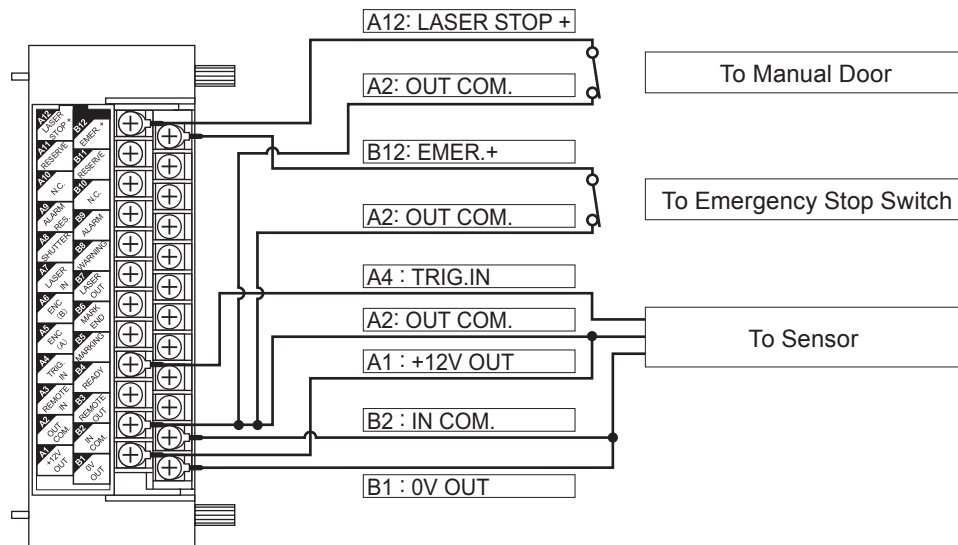
- Short-circuiting IN COM. and OUT COM. in supplying power might cause the short out and also cause the trouble with the laser marker.
- [IN COM.] and [OUT COM.] on the I/O terminal block are connected with [IN COM.] and [OUT COM.] on the I/O connector respectively and internally. Therefore, inverting the power supply wiring for the I/O terminal block and the I/O connector might cause a short circuit, resulting in the failure of the laser marker.
- Please make sure to check the power wiring before running the laser marker.
- When the laser marker is to be controlled by external power such as PLC, connect + side of the external power to A2 [IN COM.] and - side to B2 [OUT COM.]. In this case, do not connect externally to A1[+12V OUT] and B1[0V OUT] of I/O terminal block. (If a short bar is installed, remove it.) For details, refer to “2-3-2 Connecting Sample with External Devices” (P.43).

Reference

- “Output simulation” and “I/O check monitor” can simulate ON/OFF state on each connector. Please use these functions in checking the wiring. (Refer to the Operation/Maintenance Manual.)

■ Connecting Sample for PNP Models

[LP-4xx(T)U-C / LP-4xxS9(T)U-C / LP-VxxU-C]



- Connect A1[+12V OUT] and A2[OUT COM.] , B1[0V OUT] and B2[IN COM.] as I/O power supply for marking.
- Connect B12[EMER.+] and A2[OUT COM.] to release the emergency stop function.
(Opening between B12 - A2 turns off the laser pumping and marking is disabled.)
- Connect A12[LASER STOP+] and A2[OUT COM.] to release the laser stop function.
(Opening between A12 - A2 closes the auto-shutter, and changes the status of the device into invalid for marking.)
- The following terminals are short-circuited by a short bar at factory shipment.

A1 [+12V OUT]	—	A2 [OUT COM.]
B1 [0V OUT]	—	B2 [IN COM.]

! Notice

- Short-circuiting IN COM. and OUT COM. in supplying power might cause the short out and also cause the trouble with the laser marker.
- [IN COM.] and [OUT COM.] on the I/O terminal block are connected with [IN COM.] and [OUT COM.] on the I/O connector respectively and internally. Therefore, inverting the power supply wiring for the I/O terminal block and the I/O connector might cause a short circuit, resulting in the failure of the laser marker.
- Please make sure to check the power wiring before running the laser marker.
- When the laser marker is to be controlled by external power such as PLC, connect - side of the external power to B2 [IN COM.] and + side to A2 [OUT COM.]. In this case, do not connect externally to A1[+12V OUT] and B1[0V OUT] of I/O terminal block. (If a short bar is installed, remove it.) For details, refer to “2-3-2 Connecting Sample with External Devices” (P.43).

Reference

- “Output simulation” and “I/O check monitor” can simulate ON/OFF state on each connector. Please use these functions in checking the wiring. (Refer to the Operation/Maintenance Manual.)

2-3-2 Connecting Sample with External Devices

This paragraph exemplifies a basic interface sample with external device such as a PLC.



CAUTION



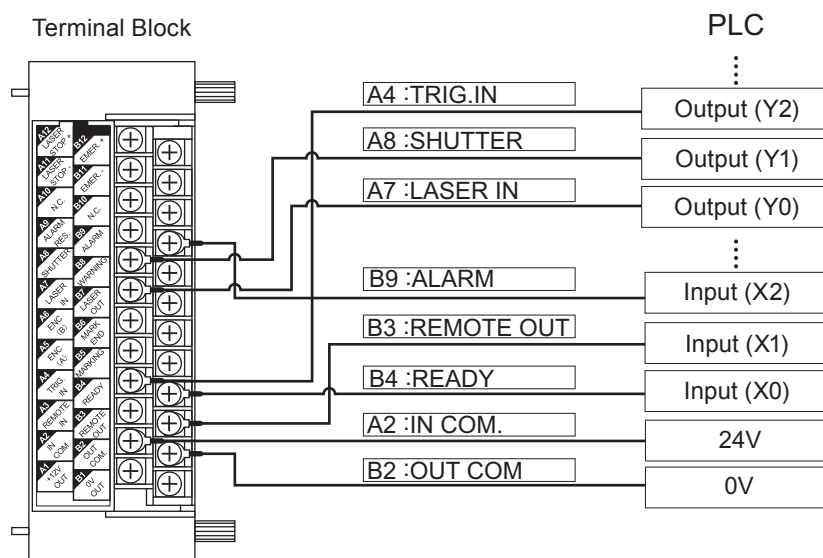
- Make sure that the power is turned OFF at wiring.

Notice

- Short-circuiting IN COM. and OUT COM. in supplying power might cause the short out and also cause the failure of the laser marker. Please make sure to check the power wiring before running the laser marker.
- IN COM. and OUT COM. on the I/O connector are connected with IN COM. and OUT COM. on the Input/Output terminal respectively and internally. Therefore, inverting the power supply wiring might cause a short circuit, resulting in the failure of the laser marker.
- Do not apply the voltage exceeding the maximum applied voltage, or devices may be broken.
- Do not apply the electric current for input (output) terminal exceeding the maximum output current, or devices may be broken.
- When the terminal block is connected with the external power supply, do not use A1[+12V OUT] and B1[0V OUT] of I/O terminal block. If a short bar is installed, remove it.

■ Connecting Sample for NPN Models (Controlled by External Devices)

[LP-4xx(T)U / LP-4xx(T)U-A / LP-4xxS9(T)U / LP-4xxS9(T)U-A / LP-VxxU / LP-VxxU-A / LP-W series]



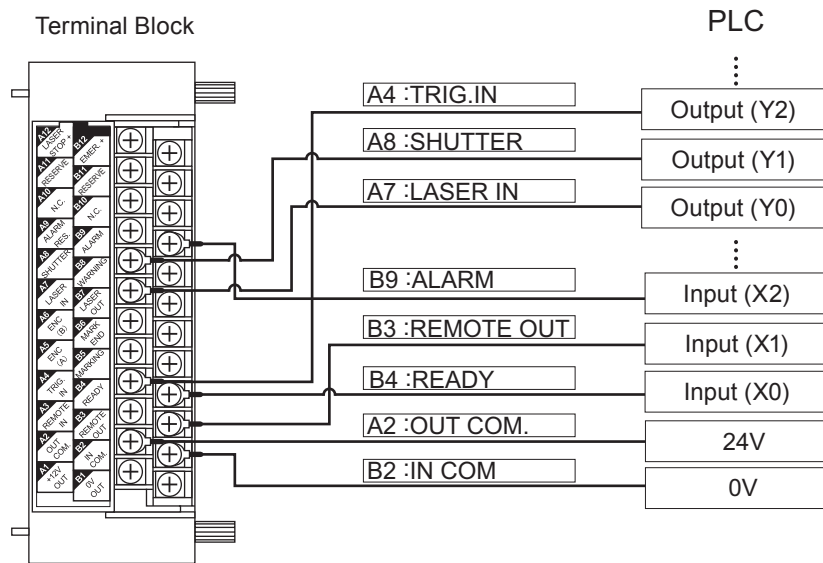
- When laser marker is controlled by the external device such as PLC, connect A2[IN COM.] to the external power (+), and B2[OUT COM.] to the external power (-) for NPN type laser marker.
- Connect B12[EMER.+] to B11[EMER.-] to release the emergency stop function. (Opening between B12 - B11 turns off the laser pumping and marking is disabled.)
- Connect A12[LASER STOP +] to A11[LASER STOP -] to release laser stop function. (Opening between A12 - A11 closes the auto-shutter, and changes the status of the device into invalid for marking.)
- At the factory shipments, the following terminals are already short-circuited by short bars. When connecting to any external devices, remove the short bar(s) from the terminals to be used, to connect the devices.

A1 [+12V OUT]	—	A2 [IN COM.]
B1 [0V OUT]	—	B2 [OUT COM.]
B12 [EMER. +]	—	B11 [EMER. -]
A12 [LASER STOP +]	—	A11 [LASER STOP -]

- “Output simulation” and “I/O check monitor” can simulate ON/OFF state on each connector. Please use these functions in checking the wiring. Refer to the Operation/Maintenance Manual.

■ Connecting Sample for PNP Models (Controlled by External Devices)

[LP-4xx(T)U-C / LP-4xxS9(T)U-C / LP-VxxU-C]



- When laser marker is controlled by the external device such as PLC, connect B2[IN COM.] to the external power (-), and A2[OUT COM.] to the external power (+) for NPN type laser marker.
- Connect B12[EMER.+] to A2[OUT COM.] to release the emergency stop function. (Opening between B12 - A2 turns off the laser pumping and marking is disabled.)
- Connect A12[LASER STOP +] to A2[OUT COM.] to release the laser stop function. (Opening between A12 - A2 closes the auto-shutter, and changes the status of the device into invalid for marking.)
- At the factory shipments, the following terminals are already short-circuited by short bars. When connecting to any external devices, remove the short bar(s) from the terminals to be used, to connect the devices.

A1 [+12V OUT]	—	B2 [IN COM.]
B1 [0V OUT]	—	A2 [OUT COM.]

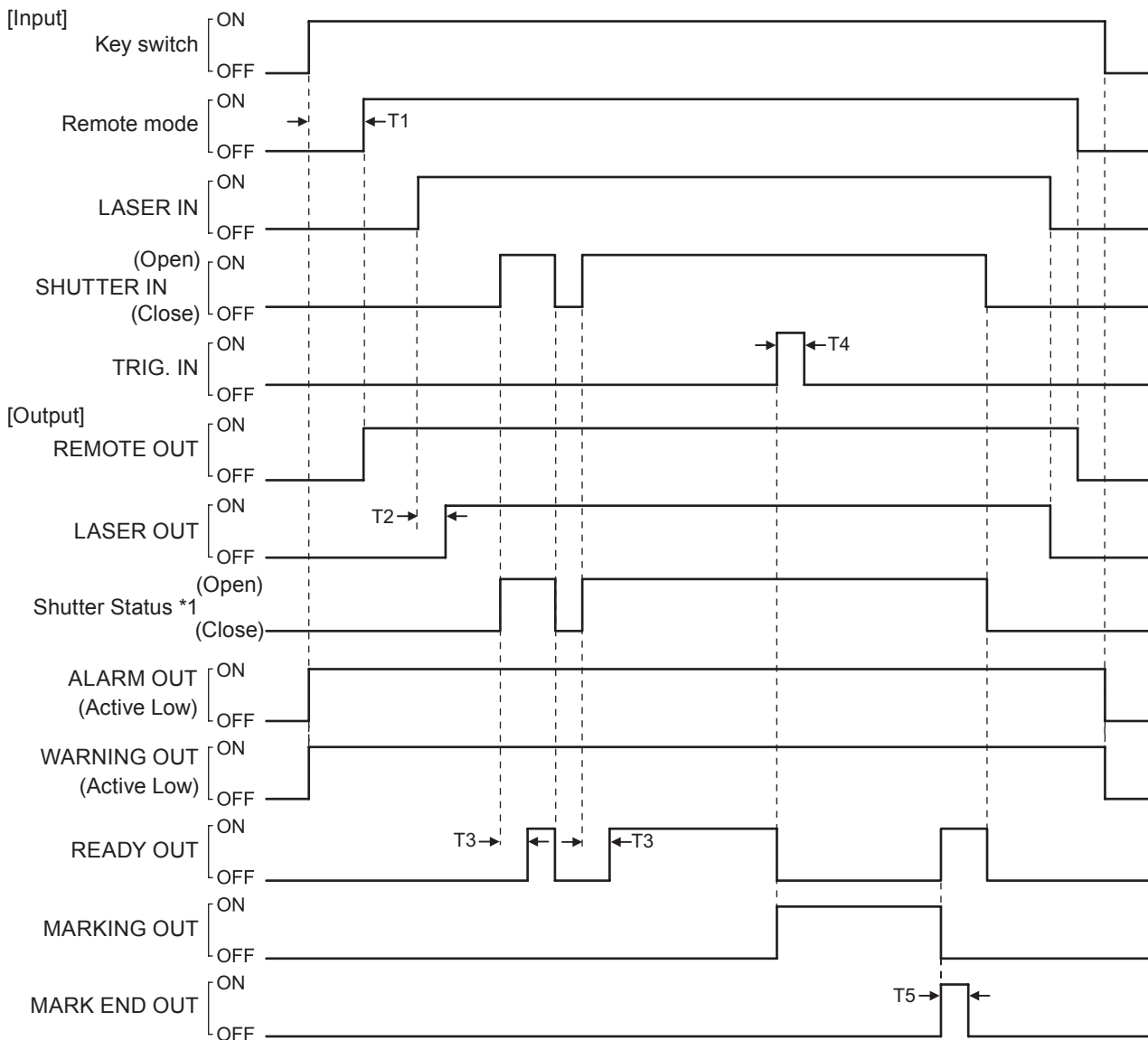
- “Output simulation” and “I/O check monitor” can simulate ON/OFF state on each connector. Please use these functions in checking the wiring. Refer to the Operation/Maintenance Manual.

2-4 Timing Chart

Reference

- ON/OFF on the timing chart refers to ON/OFF operations. It does not refer to the voltage level (High/Low).
- In the following timing charts, the timing of output operation corresponding to the each input has a small delay of 0ms or more.

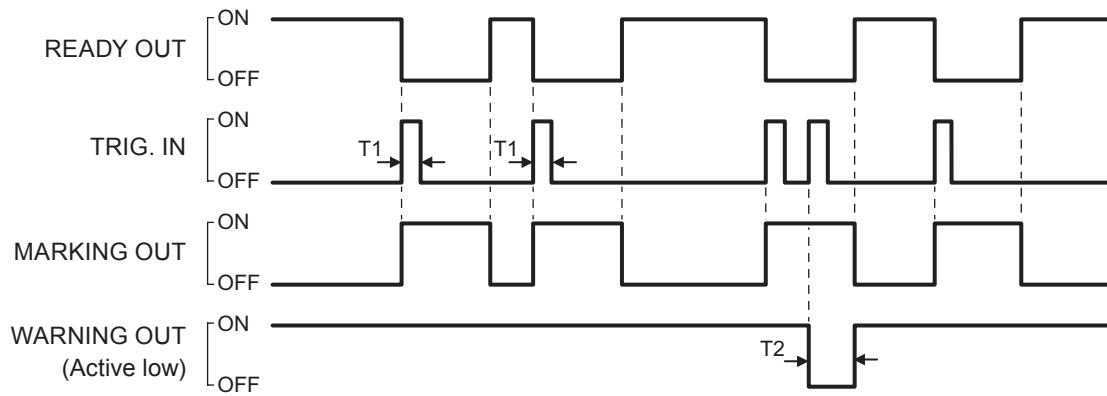
2-4-1 Basic Input/Output



*1 : There is no output signal for shutter operation. There is delay time of around 200ms to max. 1 second before the shutter actually opens/closes after inputting ON/OFF of the shutter control input.

Item	Time	Remarks
T1	approx. 60 sec.	System Starting Time. Change to the remote mode after system start-up.
T2	about 20 seconds/about 15 seconds	The time from turning ON the pumping input to completion of pumping. LP-V series: about 20 seconds, LP-400/LP-W series: about 15 seconds
T3	—	<ul style="list-style-type: none"> • When laser pumping is completed Period for creating marking data. It varies depending on the quantity of data to be marked. • When laser pumping is not completed Period for creating marking data or period until the laser pumping is completed. The longer one of the two above is employed.
T4	10ms or more	Keep the ON status for 10ms or more.
T5	2 to 510ms	One-shot output. Set the output time on the environment setting screen. There is a small margin of error for the setting value.

2-4-2 Marking Trigger Input

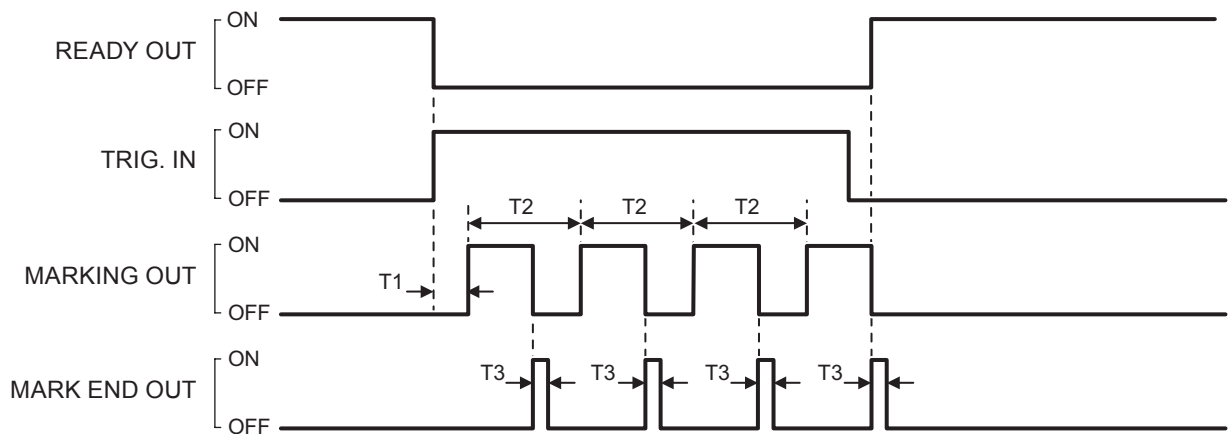


Item	Time	Remarks
T1	10ms or more	Keep the ON status for 10ms or more.
T2	2 to 510ms	It outputs a warning to notify that an invalid trigger was input when a marking trigger was input during the marking operation. This is One-shot output. You can turn this warning off by the settings.

Reference

- The marking is started when TRIG. IN is turned to ON while either the delay time or delay distance is 0.

2-4-3 Equidistant Marking (Flying Object Marking)

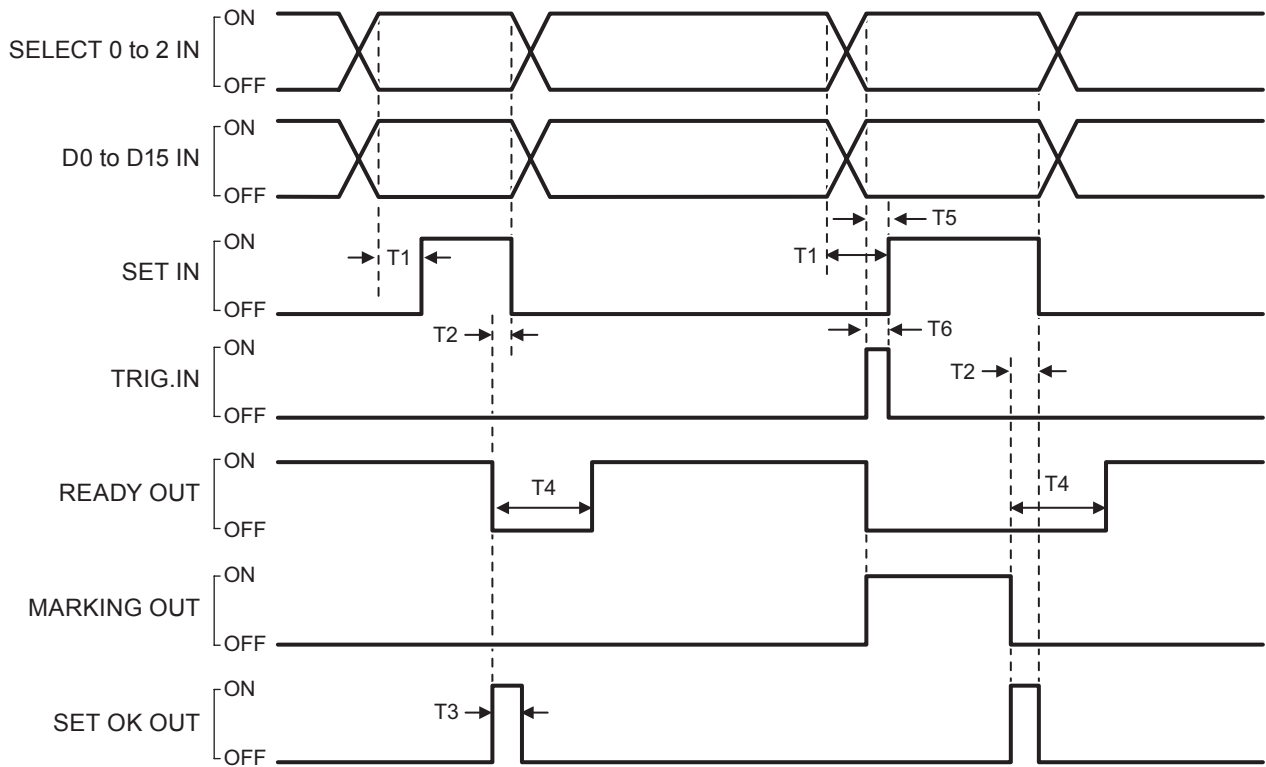


Item	Time	Remarks
T1	—	The time when the work travels the distance set in the “trigger delay”.
T2	—	The time when the work travels the distance set in the “interval” of the moving object.
T3	2 to 510ms	One-shot output. Set the output time on the environment setting screen. There is a small margin of error for the setting value.

Reference

- Equidistant marking is performed while TRIG. IN is ON.
- The laser marker stops after marking is completed if TRIG. IN is turned to OFF during marking.
- Equidistant marking is performed after travels the distance that is set in the “trigger ready”.

2-4-4 Select File



Item	Time	Remarks
T1	0.5ms or more	Setup time for file No. input to the SET.
T2	0ms or more	Keep the input until the SET OK is turned to ON.
T3	2 to 510ms	One-shot output. Set the output time on the environment setting screen. There is a margin for the setting value.
T4	—	<ul style="list-style-type: none"> When laser pumping is completed Period for creating marking data. It varies depending on the quantity of data to be marked. When laser pumping is not completed Period for creating marking data or period until the laser pumping is completed. The longer one of the two above is employed.
T5	0ms or more	Detect the MARKING before inputting SET when changing of file No. and TRIG. IN input are performed at the same time.
T6	10ms or more	Keep the ON status for 10ms or more.

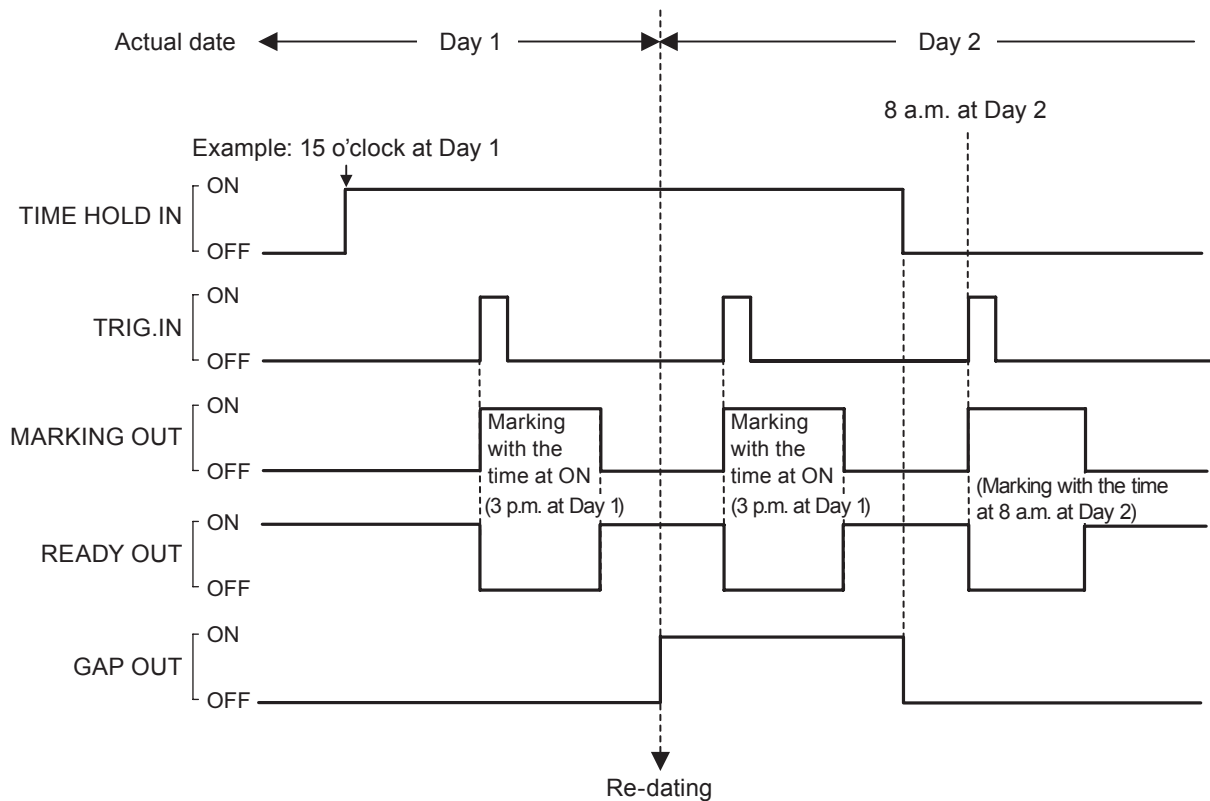
Input SELECT 0 to 2 as the table below.

Number input target	SELECT 0 (No. 20)	SELECT 1 (No. 21)	SELECT 2 (No. 22)
File No.	OFF	OFF	OFF

Reference

- If marking is still being performed at the time SET input is turned to ON, the file will be changed after marking is completed.
- TRIG.IN is acceptable while the READY is turned to ON.
- When changing the file No. per each marking, input the number in parallel with the mark trigger input and then input SET after 0.5ms has passed to achieve the minimum period for changing.

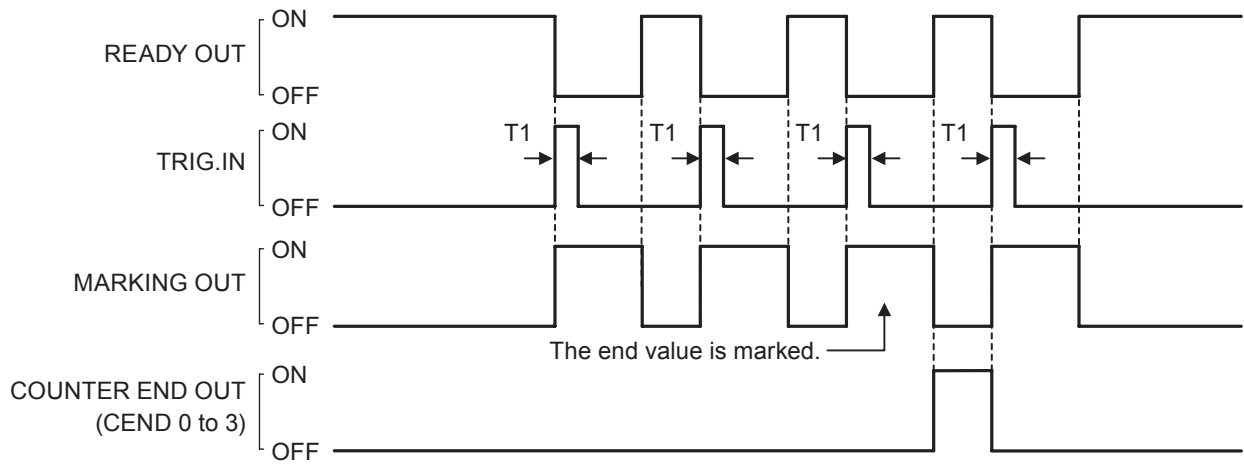
2-4-5 Time Hold



Reference

- The time at system startup is held when the laser marker is turned to on with the TIME HOLD ON.
- If the TIME HOLD is set ON, the time is held in spite of switching the file No..
- If the TIME HOLD ON/OFF is switched in short time, each ON/OFF hold time should be more than 2 seconds.

2-4-6 Counter End

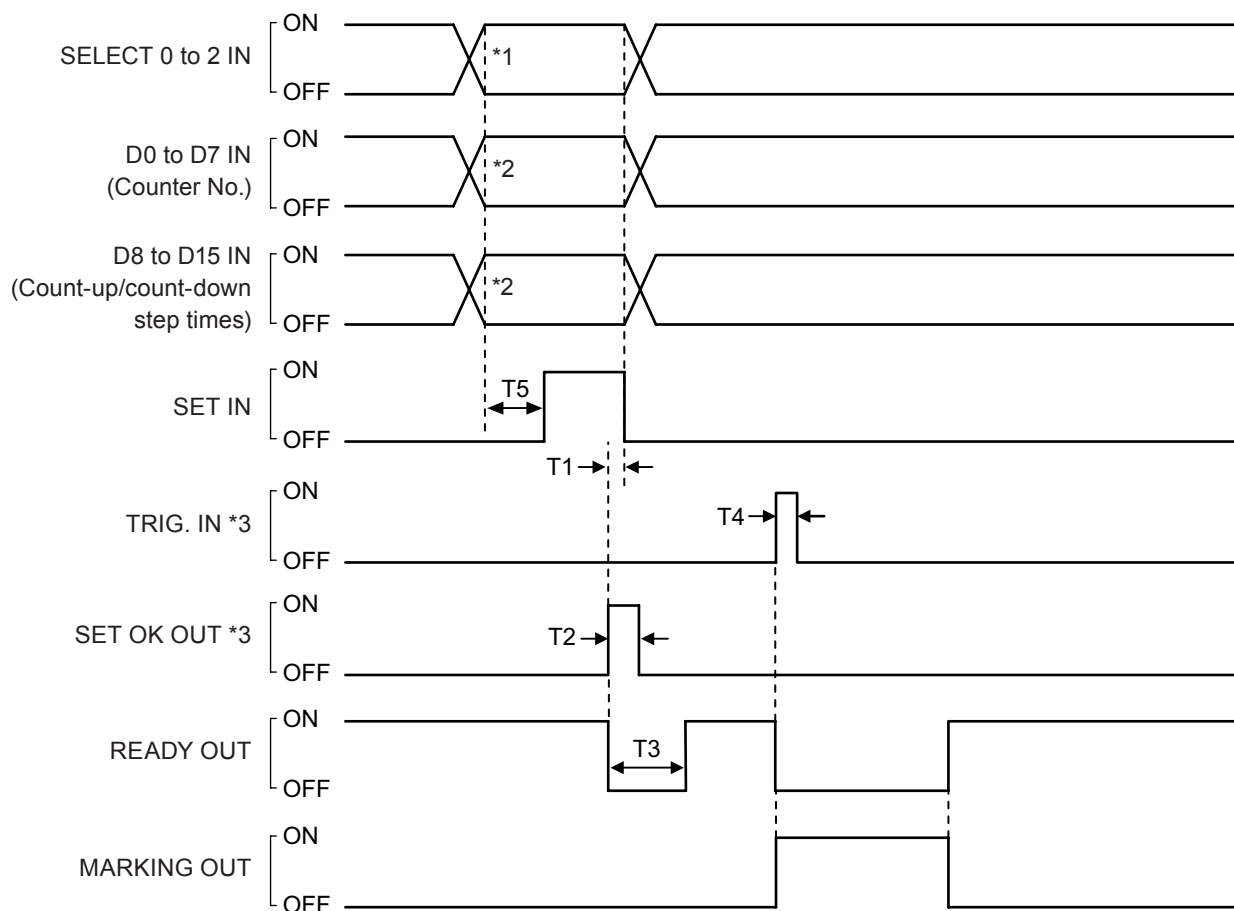


Item	Time	Remarks
T1	10ms or more	Keep the ON status for 10ms or more.

Reference

- Counter End outputs are kept till the next start of marking.
- Counter End output becomes OFF when shutter is closed.
- Common Counter 4 to 7 have no counter end output function.
- When "Step & Repeat counter at each step" function is set, counter end output is invalid.

2-4-7 Count-up/Count-down value correction



Item	Time	Remarks
T1	0ms or more	Keep the input until the SET OK is turned to ON.
T2	2 to 510ms	One-shot output. Set the output time on the environment setting screen. There is a margin for the setting value.
T3	—	<ul style="list-style-type: none"> When laser pumping is completed Period for creating marking data. It varies depending on the quantity of data to be marked. When laser pumping is not completed Period for creating marking data or period until the laser pumping is completed. The longer one of the two above is employed.
T4	10ms or more	Keep the ON status for 10ms or more.
T5	0.5ms or more	Setup time for number input to the SET.

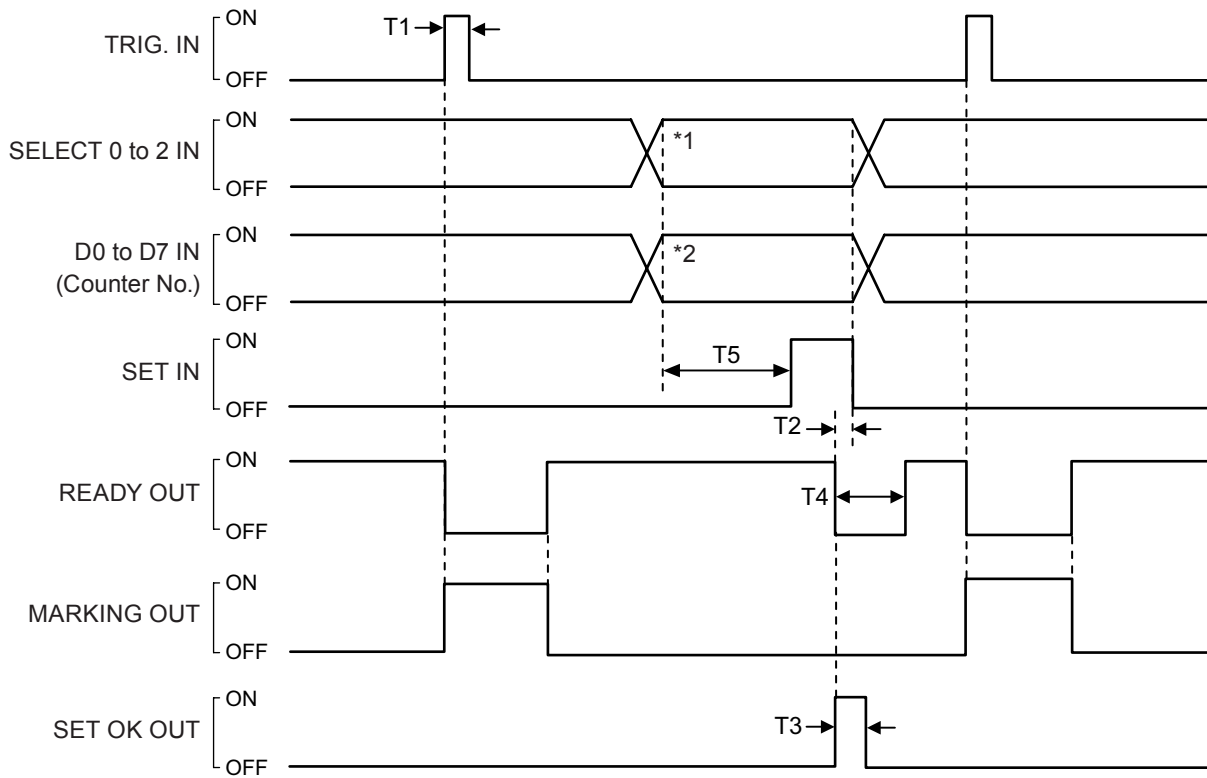
*1 : Input SELECT 0 to 2 as the table below.

Number input target	SELECT 0 (No. 20)	SELECT 1 (No. 21)	SELECT 2 (No. 22)
Count-up value correction	OFF	ON	OFF
Count-down value correction	ON	ON	OFF

*2 : Select a value from D0 to D7 for the counter number to correct the count-up/count-down value. Specify a value in D8 to D15 for the step times of count-up or count-down in the binary system. Refer to "Operation of Input Signal on I/O Connector" (P.33) for the detail.

*3 : To input "SET" signal during the marking operation as a next counter data, do not input "SET" until "MARKING" output is turned ON.

2-4-8 Counter Reset



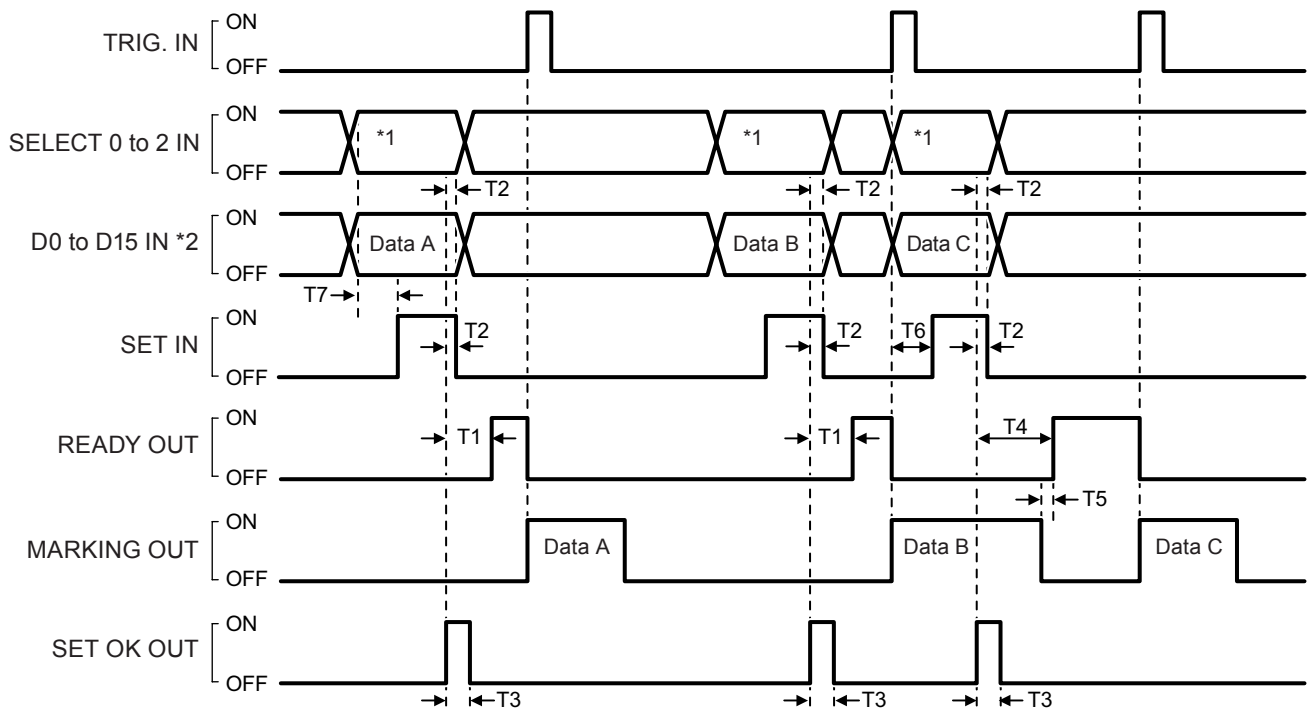
Item	Time	Remarks
T1	10ms or more	Keep the ON status for 10ms or more.
T2	0ms or more	Keep the input until the SET OK is turned to ON.
T3	2 to 510ms	One-shot output. Set the output time on the environment setting screen. There is a margin for the setting value.
T4	—	<ul style="list-style-type: none"> When laser pumping is completed Period for creating marking data. It varies depending on the quantity of data to be marked. When laser pumping is not completed Period for creating marking data or period until the laser pumping is completed. The longer one of the two above is employed.
T5	0.5ms or more	Setup time for number input to the SET.

*1 : To reset the counter, set SELECT 0 to 2 as follows.

Number input target	SELECT 0 (No. 20)	SELECT 1 (No. 21)	SELECT 2 (No. 22)
Counter Reset No.	OFF	OFF	ON

*2 : Specify the counter No. to be reset at D0 to D7. Refer to "Operation of Input Signal on I/O Connector" (P.33) for the detail.

2-4-9 Rank/Offset Marking



Item	Time	Remarks
T1	—	Period for creating marking data. It varies depending on the quantity of data to be marked.
T2	0ms or more	Keep the input until the SET OK is turned to ON.
T3	2 to 510ms	One-shot output. Set the output time on the environment setting screen. There is a margin for the setting value.
T4	—	When $T5 < T1$: $T4 = T1 - T5$ When $T5 > T1$: T4 is 1ms or less.
T6	0ms or more	Turn ON the SET after MARKING is turned to ON.
T7	0.5ms or more	Setup time for data No. input to the SET.

*1 : Input SELECT 0 to 2 as the table below.

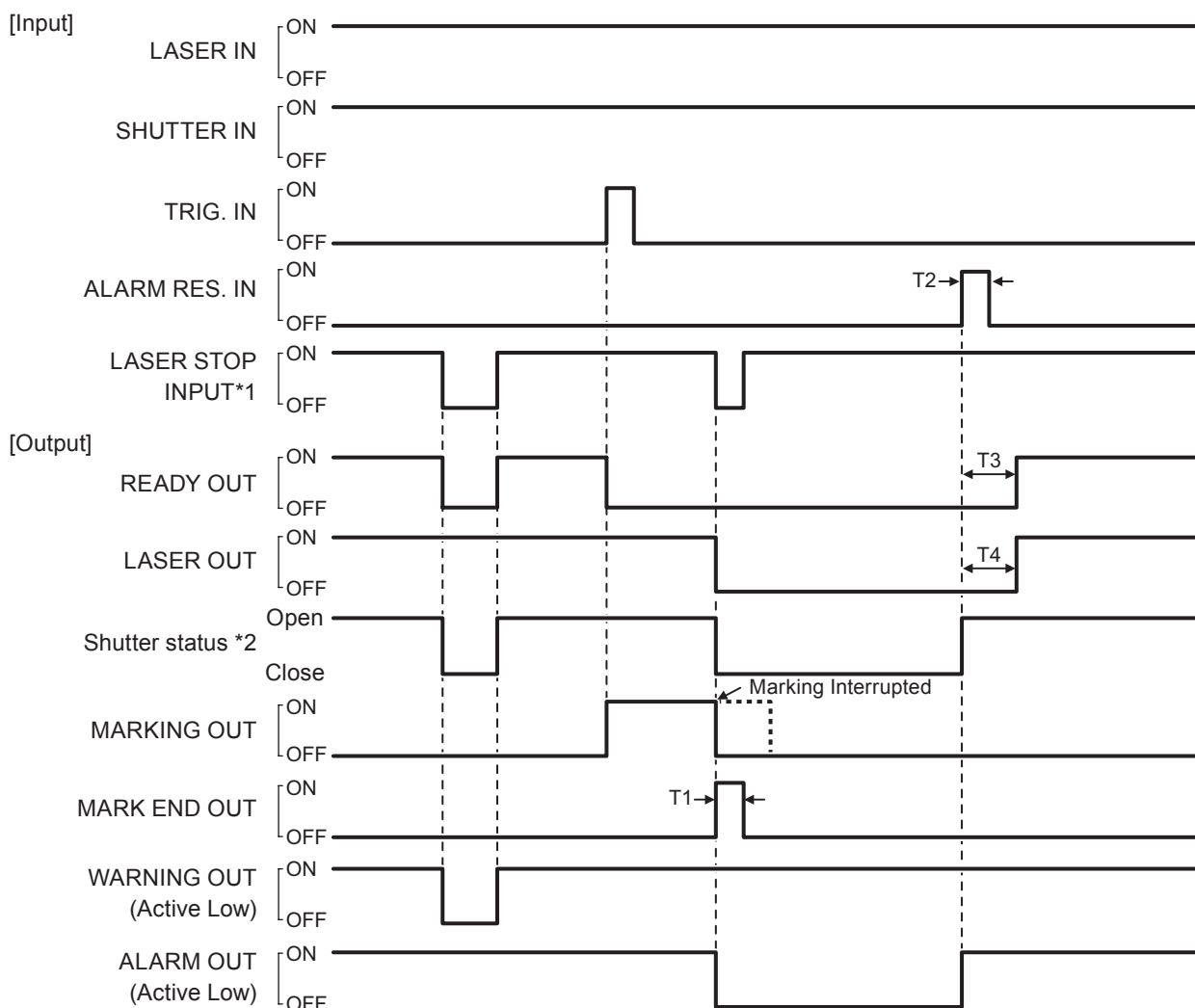
Number input target	SELECT 0 (No. 20)	SELECT 1 (No. 21)	SELECT 2 (No. 22)
Data No. of rank/external offset	ON	OFF	OFF

*2 : Specify the data number of rank/external offset function by using D0 to D15. Refer to "Operation of Input Signal on I/O Connector" (P.33).

Reference

- Input SET IN for the rank/offset data when the laser pumping is completed, and the internal shutter opens.
- When the rank/external offset function is used, READY will not be output until the data number and SET IN are input.
- Enter the data number input and SET IN every time for each marking trigger even there is no change to the marking data.
- Close the shutter if you want to reset the data number already set.
- Do not input SET IN for the next data until MARKING output turns on by inputting the marking trigger after inputting SET IN.
- READY will be output even when the marking data is not configured to the data number input.
- If the rank or external offset functions are used with the marking to the flying object, make sure that the marking interval time is enough to the required period to input the marking data and to confirm the marking ready output.

2-4-10 Laser Stop Input



*1 : For NPN Type of the laser marker, "Laser Stop Input OFF" specifies disconnecting status between [LASER STOP+] and [LASER STOP -].

For PNP Type of the laser marker, "Laser Stop Input OFF" specifies disconnecting status between [LASER STOP+] and [OUT COM.]. (PNP type has "-C" in the end of the laser marker model name.)

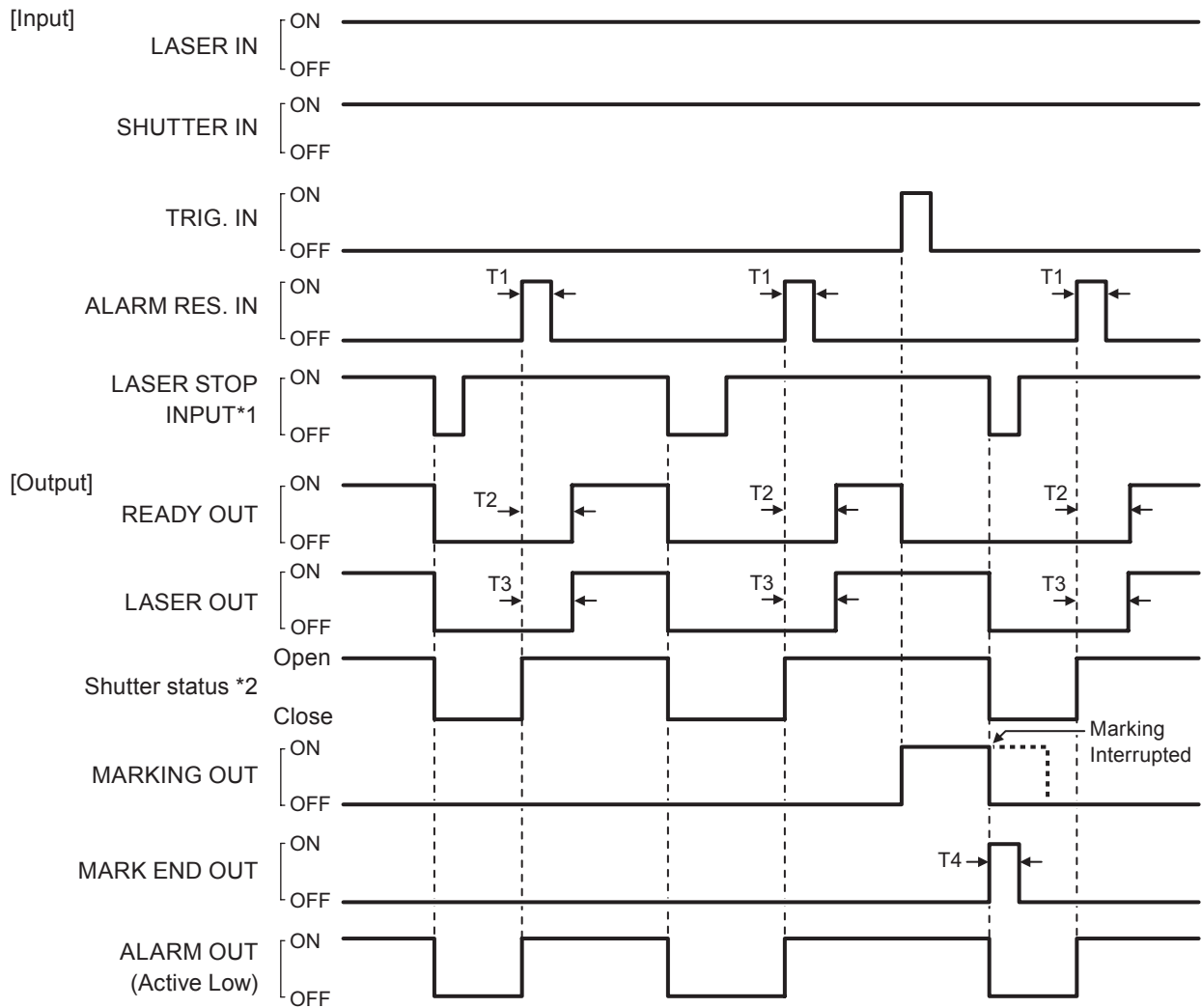
*2 : There is no output signal for shutter operation. There is delay time of around 200ms to max. 1 second before the shutter actually opens/closes after inputting ON/OFF of the shutter control input.

Item	Time	Remarks
T1	2 to 510ms	Even when the marking is interrupted due to the laser stop input, the mark end outputs. This signal is a one-shot output. Set the output time on the environment setting screen. There is a margin for the setting value.
T2	100ms or more	Keep the ON status for 100ms or more.
T3	—	Period until the laser pumping is completed or period for creating marking data. The longer one of the two above is employed.
T4	approx. 20 or 15 sec.	The time from turning ON the pumping input to completion of pumping. LP-V series: about 20 seconds, LP-400/LP-W series: about 15 seconds

Reference

- Inputting LASER STOP during laser is not emitted, the power supply of the laser is held ON status and the shutter is closed. (Warning status)
- Inputting LASER STOP during laser emission, the laser is powered OFF and the shutter is closed. (Alarm status)
- For release method of alarm and warning, refer to "Release Method of Alarm" (P.149) and "Release Method of Alarm" (P.149), respectively.

2-4-11 Emergency Stop Input



*1 : For NPN Type of the laser marker, "Emergency Stop Input OFF" specifies disconnecting status between [EMER. +] and [EMER. -].

For PNP Type of the laser marker, "Emergency Stop Input OFF" specifies disconnecting status between [EMER. +] and [OUT COM.]. (PNP type has "-C" in the end of the laser marker model name.)

*2 : There is no output signal for shutter operation. There is delay time of around 200ms to max. 1 second before the shutter actually opens/closes after inputting ON/OFF of the shutter control input.

Item	Time	Remarks
T1	100ms or more	Keep the ON status for 100ms or more.
T2	—	Period until the laser pumping is completed or period for creating marking data. The longer one of the two above is employed.
T3	approx. 20 or 15 sec.	The time from turning ON the pumping input to completion of pumping. LP-V series: about 20 seconds, LP-400/LP-W series: about 15 seconds
T4	2 to 510ms	Even when the marking is interrupted due to the laser stop input, the mark end outputs. This signal is a one-shot output. Set the output time on the environment setting screen. There is a margin for the setting value.

Reference

- Inputting EMERGENCY STOP regardless laser emission ON/OFF status, the laser is powered OFF and the shutter is closed. (Alarm status)
- For release method of alarm and warning, refer to "Release Method of Warning" (P.152) and "Release Method of Alarm" (P.149), respectively.

■ Operation of laser marker when Emergency stop switch, Laser stop input and Emergency stop input are operated.

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

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

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

⏴ Reference

- Laser pumping can not be started if Emergency stop switch is pushed or Emergency Stop Input on I/O terminal is opened.

3 Control by Serial Communication (RS-232/Ethernet)

3-1 Preparation of Command Control

This product has RS-232C port and Ethernet port as the serial communication interfaces on the rear side of the controller. Before using serial communication control, configure the DIP switch and the environment settings. Refer to "1-3 Before External Control" (P.17).

Reference

- For communication with external devices, select either RS-232C or Ethernet port. (They cannot be used at the same time, or switched.) The tab selected in the environment setting screen indicates the valid communication port.
- If Ethernet is not used for the external control, connect nothing to the Ethernet port.

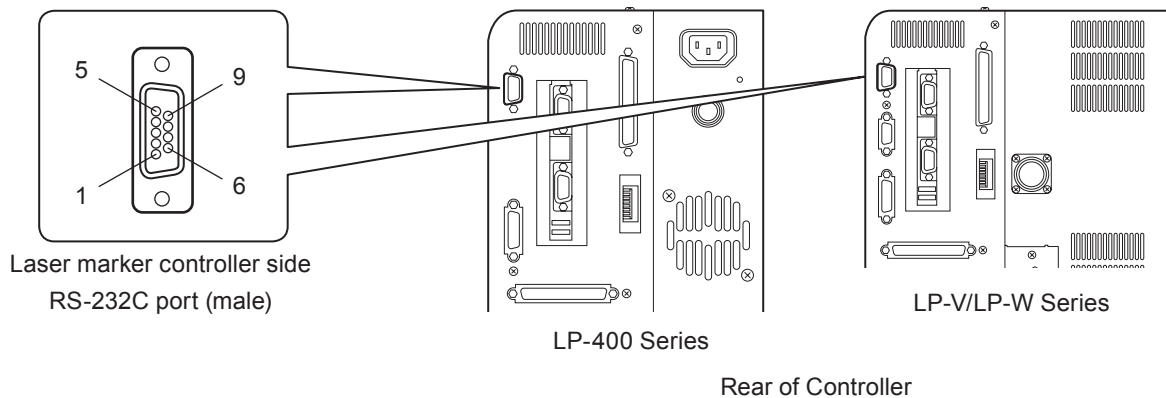
Combined Control by Serial Communication and I/O

- The control method for "Laser Control" and "Shutter Control" should be selected from either the serial communication or I/O. Turn the No. 2 DIP switch on the back surface of controller before turning on the power to select the control (serial communication or I/O).
- Those commands can be used only when the DIP switch No. 2 is set to ON:
Laser pumping (LSR), Shutter (SHT), Guide laser control (GID), Laser check radiation (SPT) and Power check (PWR)

3-1-1 RS-232C

Interface specifications and connection

To control laser marker by communication command with RS-232C, connect the RS-232C port on the rear of the controller to the external control device.



Connector position	Connector specifications	Model	Manufacturer name
On the laser marker side	D-sub 9-pin, male Screw type: No. 4-40UNC inch screw, female	-	-
User side	D-sub 9-pin, female Screw type: No. 4-40UNC inch screw, male	Recommended connector 17JE-13090-02(D1)A Recommended connector cover 17JE-09H-1C4-CF or 17JE-09H-1C-CF	DDK Ltd.

■ Signals of RS-232C connector

Terminal No.	Signal	Function
1	Reserve	Do not use this terminal.
2	RxD (RD)	Receiving data: Connect TxD (SD) of the external control device.
3	TxD (SD)	Transmission data: Connect RxD (RD) of the external control device.
4	Reserve	Do not use this terminal.
5	GND (SG)	Signal ground: Connect GND (SG) of the external control device.
6	Reserve	Do not use this terminal.
7		
8		
9		

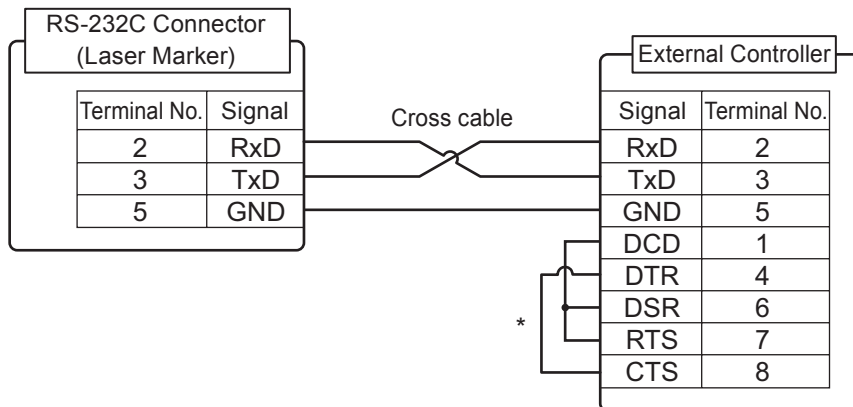
Reference

- The signal "GND" of RS-232C connector is common to the body of the laser marker.

■ Connecting to external control devices

- To connect the laser marker to the PC for control, use a commercially available RS-232C cross cable (9-pin).
- In case of connecting to PLC, a type of the cable (straight or cross) differs depending on a manufacturer or a model. Please follow the PLC manual.
- To connect RS-232C terminal without using a commercially available RS-232C cable, connect only 3 signals of RxD, TxD and GND and do not use other signals on the laser marker side.
- The external controller may need a signal line connection (loop back line) other than RxD, TxD, or GND on the external control device side depending on the specifications of the external control device. Read the instruction manual of the external control device and connect it to the laser marker appropriately.

Connection example



- * The loop back wiring on the external control device side shown in the above figure is just an example. The wiring method varies depending on the specifications of each external control device. Read the instruction manual of the external control device and connect it to the laser marker appropriately.

■ RS-232C Communication conditions

Item	RS-232C communication conditions
Synchro system	Start-stop method
Communication	Full-duplex transmission
Baud Rate	1200 / 2400 / 4800 / 9600 / 19200 / 38400 bps (initial setting: 9600 bps)
Data Length	8-bit fixed
Parity	None / Even / Odd (initial setting: None)
Stop Bits	1-bit / 2-bit (initial setting: 1-bit)
Check Sum	OFF / ON (initial setting: OFF)
Delimiter	CR / CR + LF (initial setting: CR)
Start Code	<ul style="list-style-type: none">• Setting request, Reading request, Reading response: STX• Normal response: ACK• Abnormal response: NAK
Reception timer	Timeout monitoring ON (10 sec.)

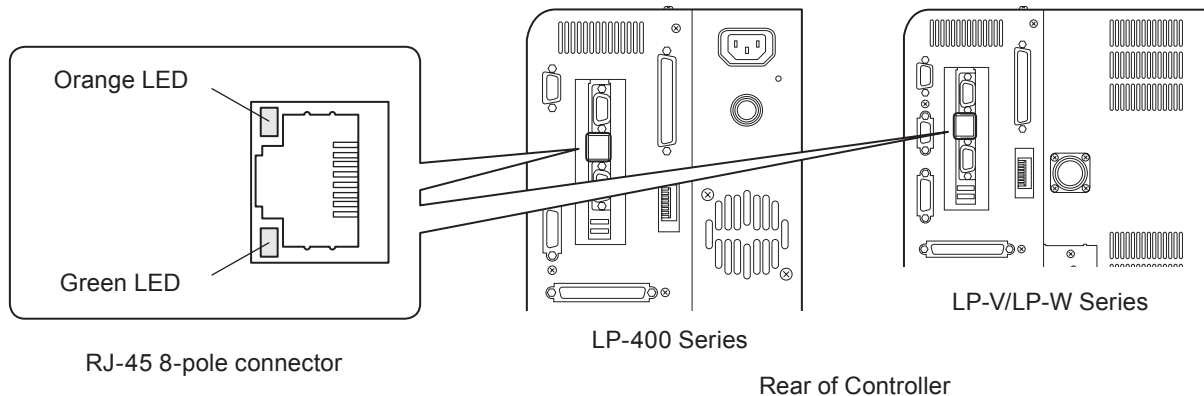
Reference

- For the details of the setting method of communication conditions, refer to “1-3-2 Communication condition setting” (P.20).

3-1-2 Ethernet

■ Port specifications

When Ethernet perform communication control of the laser marker, use an Ethernet port.



Light color	Description
Green	The indicator lights up while connected normally. It blinks during communication.
Orange	The indicator lights up only when baud rate is 1,000 megabits (1 gigabit) per second.

■ Ethernet Communication conditions

Item	Ethernet communication conditions
Communication protocol	TCP/IP
Standards	IEEE802.3ab (1000BASE-T) / IEEE802.3u (100BASE-TX) / IEEE802.3 (10BASE-T)
Applicable cable	Category 5e or higher <ul style="list-style-type: none"> To connect an external device and one laser marker: Cross cable To connect an external device and two or more laser markers through a HUB or a router: Straight cable
Applicable HUB (or router)	1000BASE-T / 100BASE-TX / 10BASE-T compatible
IP Address	1.0.0.0 to 223.255.255.255 *1 / Initial value : 192.168.1.5
Subnet Mask	128.0.0.0 to 255.255.255.254 / Initial value : 255.255.255.0
Default Gateway	1.0.0.0 to 223.255.255.255 *1 / Initial value : Unspecified
Port	5001 to 65534, except 9090, 9091 / Initial value: 9094
Start Code	<ul style="list-style-type: none"> Setting request, Reading request, Reading response: STX Normal response: ACK Abnormal response: NAK
Check Sum	OFF
Delimiter	CR fixed
Reception timer	Timeout monitoring ON (10 sec.)

*1 : Do not use "127" in the first octet.

Reference

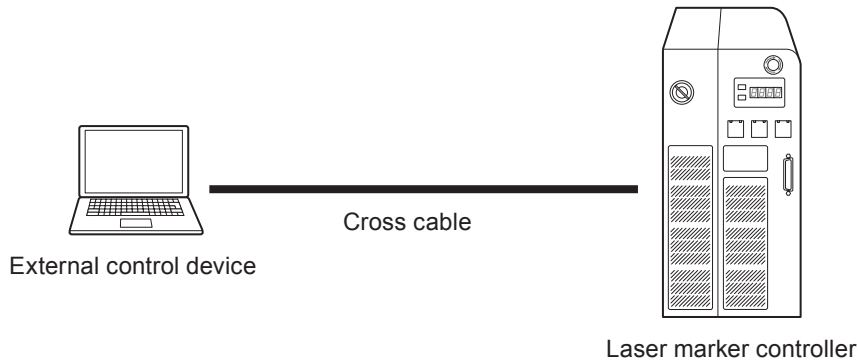
- Although the cable length between the devices is specified as 100 m at maximum in the Ethernet standard, use of cable length below 10 m is recommended to avoid communication failure caused by noise and device malfunction.
- The communication control of the laser marker through the Ethernet should be performed in a secure network environment.
- Depending on the combination, there are cases where IP Address and Subnet Mask values cannot be set even if they are within the setting range.
- For the details of the setting method of communication conditions, refer to "1-3-2 Communication condition setting" (P.20).
- If Ethernet is not used for the external control, connect nothing to the Ethernet port.

■ Connecting to external control devices

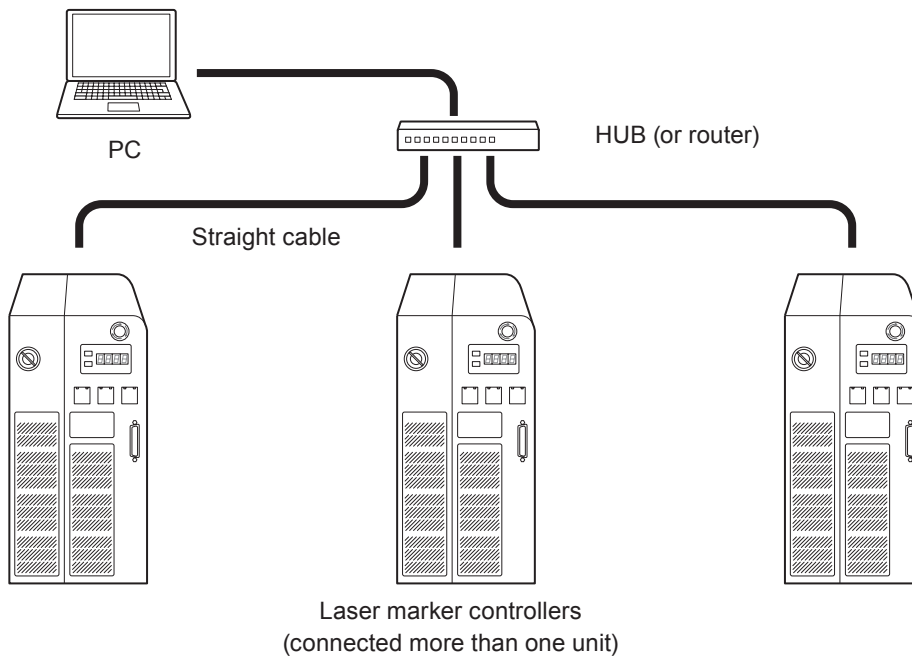
- To connect an external device and the laser marker directly one to one:
Use a Category 5e or higher cross cable for connection.

Reference

- If the external control device has the AutoMDI/MDI-X function, either a straight cable or a crossed cable can be connected to the laser marker.



- To connect an external device and the laser marker one to many through a HUB or a router:
Use a HUB (or a router) that supports 1000BASE-T/100BASE-TX/10BASE-T and Category 5e or higher straight cables for connection.



Example of communication environment setting:

Make sure that the IP address for the laser marker on the network is not overlapping the IP address for the PC.

	PC	Laser Marker A	Laser Marker B	Laser Marker C	Laser Marker D
IP Address	192.168.1.10	192.168.1.5	192.168.1.6	192.168.1.7	192.168.1.8
Subnet Mask	255.255.255.0				
Default Gateway	None				
Port	-	9094	9094	9094	9094

3-2 Command Reception Condition

■ Command Reception Permission

When transmitting the communication command including an action to update the laser marker data, commands are refused in the marking ready ON status or the shutter open. If "reception mode ON" is set for "command reception permission (MKM command)" before transmitting a command, marking ready is set to OFF and commands get acceptable. Set "reception mode OFF" for "command reception permission (MKM command)" to set marking ready ON before marking.

Reference

- Commands are acceptable by closing the shutter instead of "command reception permission (MKM command)". However, it is recommended to use the "command reception permission (MKM command)" when the number of open and close of the shutter is a lot.
- The command reception permission (MKM command) does not include actual opening/closing operation of the shutter.

■ Commands that do not need the Command Reception Permission (MKM Command)

The following commands can be transmitted while the shutter is opened.

(There is no need to set "reception mode ON" for "command reception permission (MKM command)".)

- File change (specified with a number) (FNO)
- File change (specified with a comment) (FNN)
- Shutter (close only) (SHT)
- Command reception permission (MKM)
- Laser pumping (LSR)
- Counter reset (CTR)
- Status request (STS)
- Marking trigger (MRK)
- Serial data input (SIN)

■ Commands acceptable only with Shutter Closed

(Unacceptable commands when "reception mode ON" is set for command reception permission (MKM command))

- Power check (PWR) (only for LP-V/LP-W series)

■ Commands acceptable during warning/alarm occurrence

The laser marker accepts only the following commands while an alarm or warning occurs.

Alarm

Status request (STS)

Warning

Status request (STS)

Shutter (close only) (SHT)

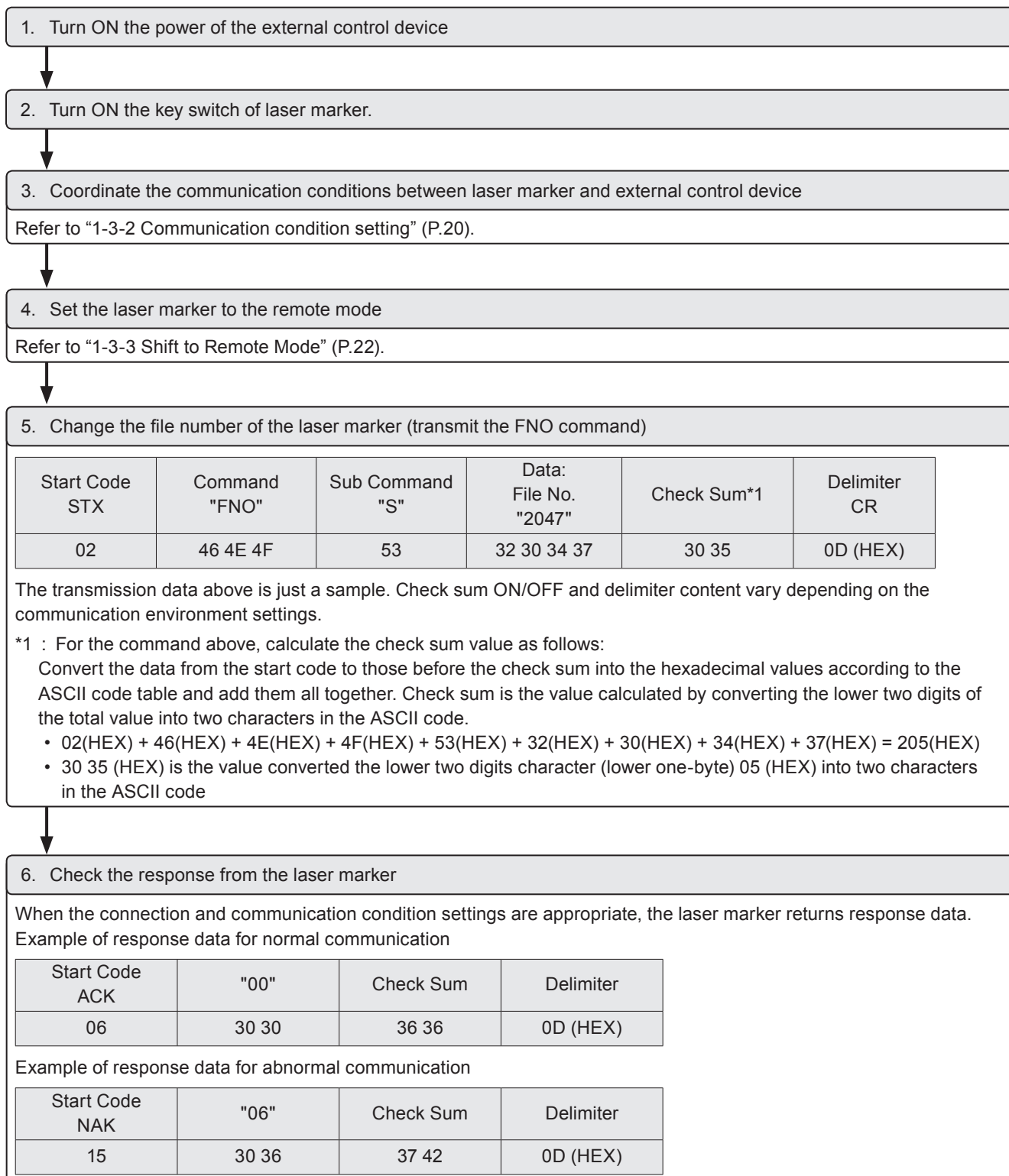
Command reception permission (MKM) (reception mode ON and reception mode readout)

Reference

- The laser marker should be in the remote status when controlling it by serial communication.
- The Shutter (SHT) command is not acceptable when the No.2 DIP switch on the back surface of controller is turned to OFF.
- To release the warning (except error codes E800 to E811) by serial communication control, close the internal shutter by Shutter (SHT) command or set the "command reception mode ON" by Command reception permission (MKM) command, and remove the cause of warning.
- An alarm can not be released by serial communication control.

3-3 Connection Check

Verify if the communications between the laser marker and external control device have been established properly in the following procedure:

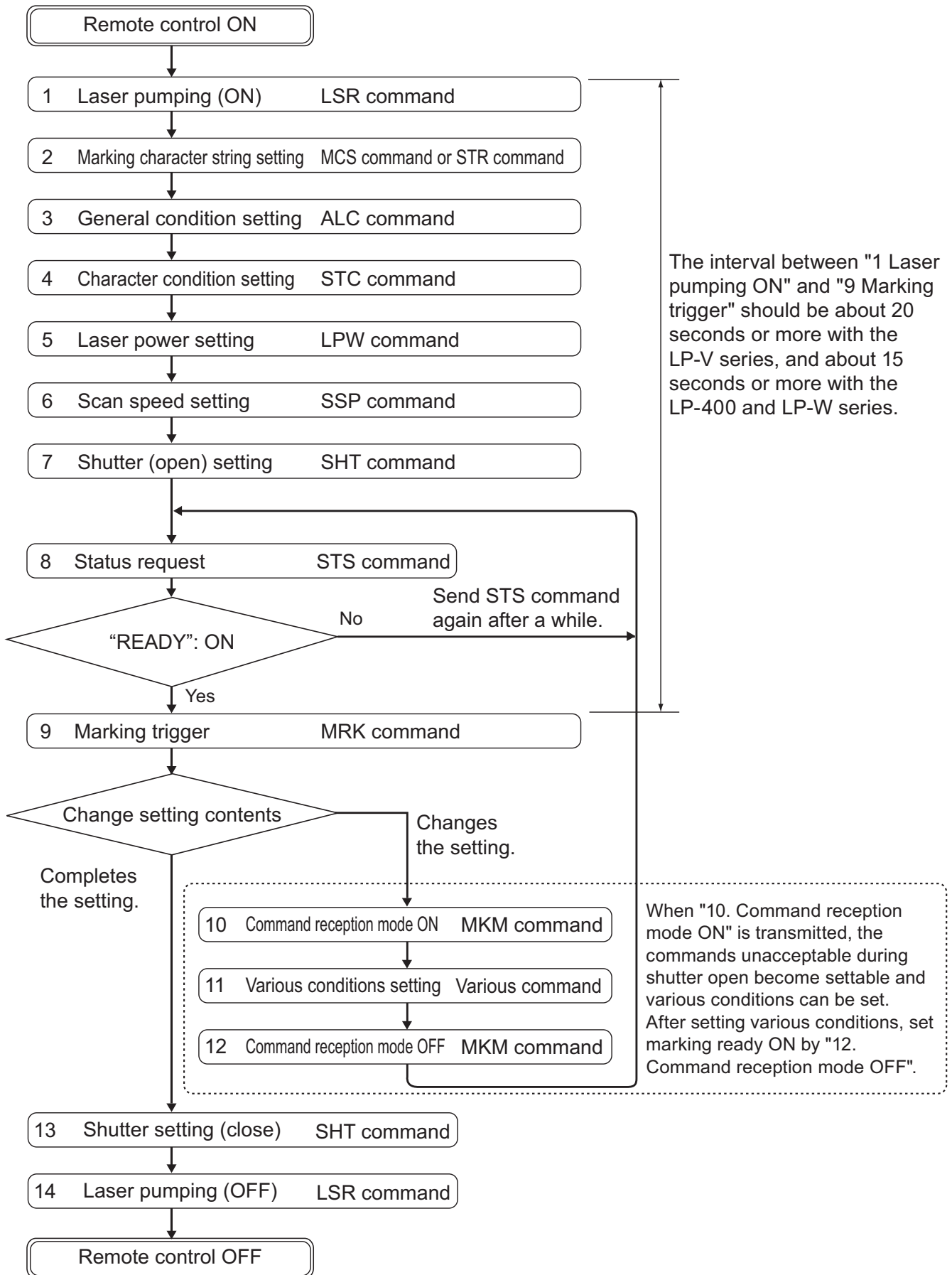


Reference

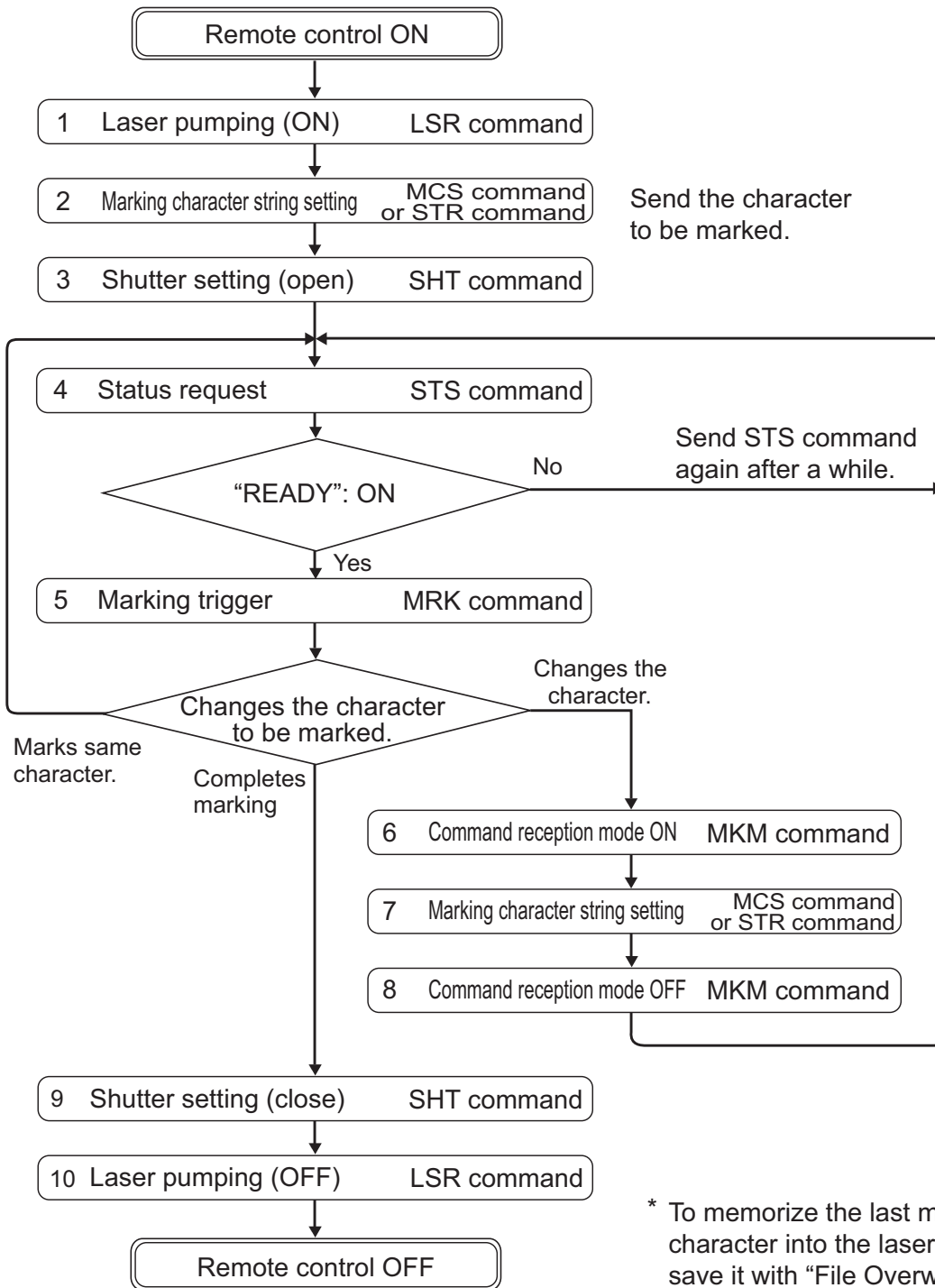
- To use Ethernet, the delimiter is [CR] fixed. To use RS-232C, select either [CR] or [CR][LF].
- Check sum cannot be added with Ethernet communication.

3-4 Control Sample

This paragraph gives the sample of flow chart for control of laser marker by serial communication.



■ Control Sample 1-1: Changing the marking characters

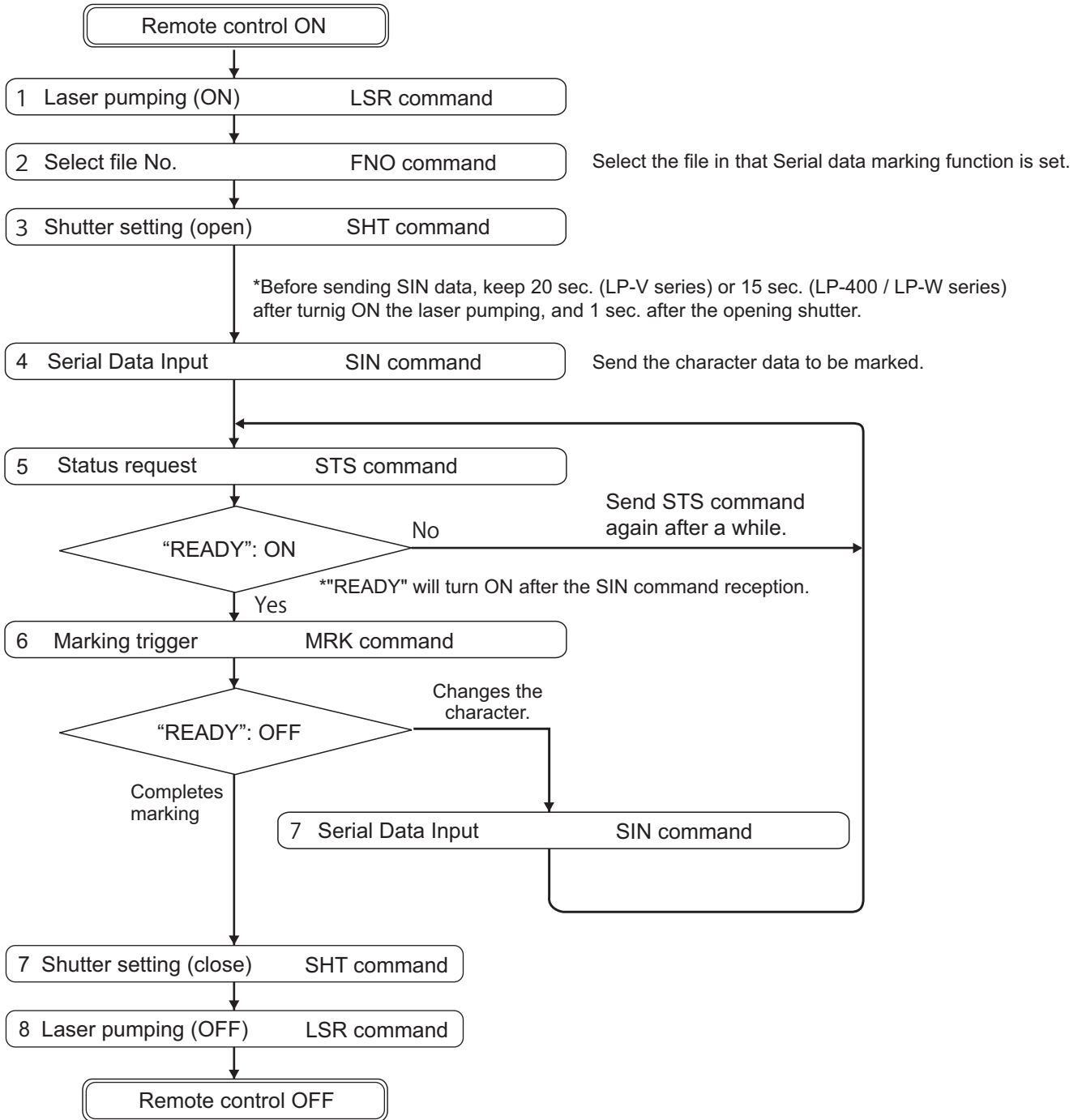


* To memorize the last marked character into the laser marker, save it with "File Overwriting Registration (FOR)".

Reference

- Other than STR and MCS command, SIN command can be used for changing character of marking command. SIN command is recommended to use in case faster processing is required.

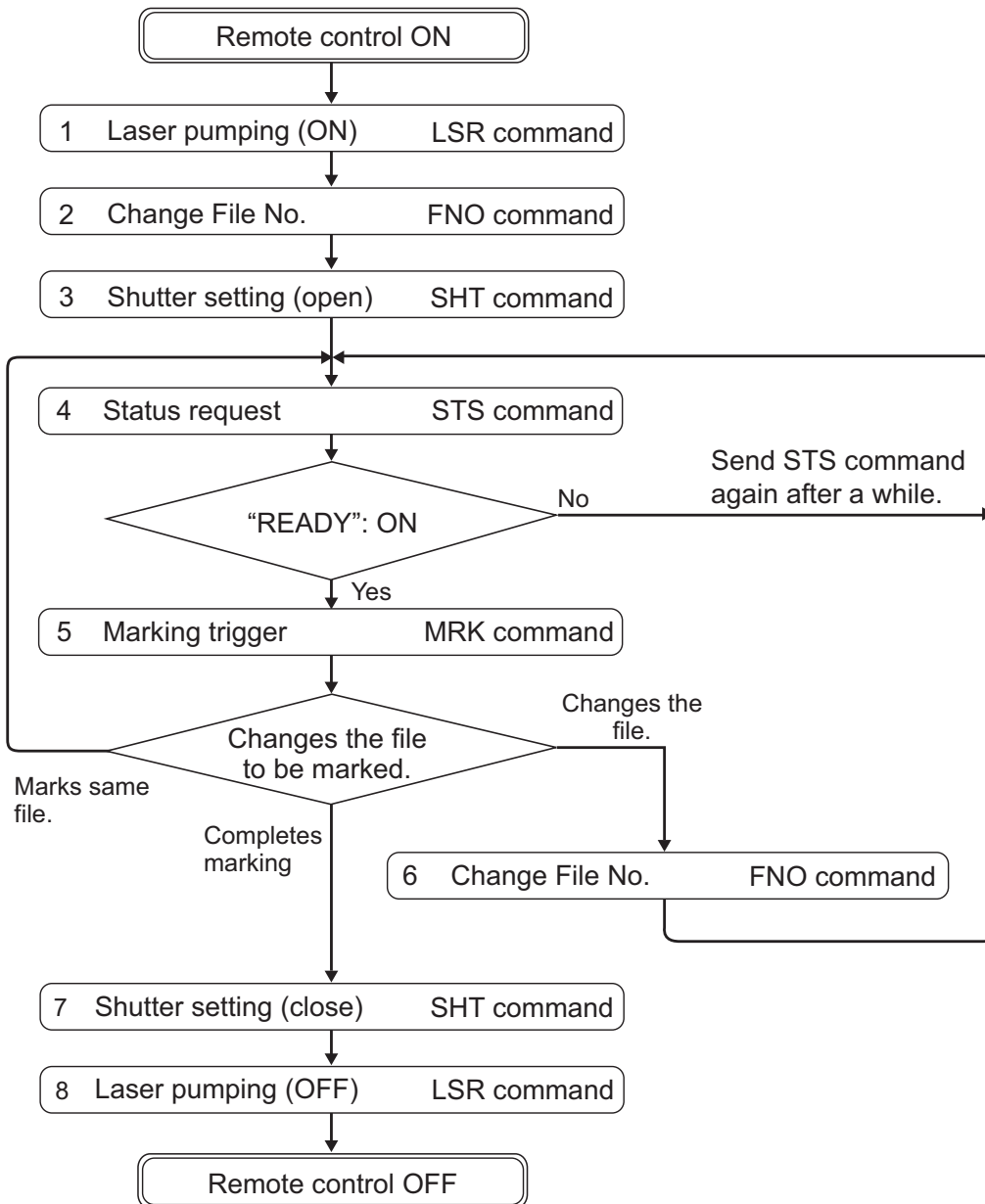
■ Control Sample 1-2: Changing the marking characters for each marking



↓ Reference

- For using this command, set "serial data" of function characters at setting screen beforehand.
- When using this function (serial data), transmit this command by every marking. Otherwise it does not become marking ready condition, and marking is not available.
- Only when the internal shutter is opened during the remote control, the serial data can be transmitted to the laser marker.
- When transmit this command without any data, marking ready become ON, then nothing to be marked with serial data input.
- For resetting the data, set the "reception mode ON" for command reception permission (MKM command) or close the shutter.

■ Control Sample 2: Changing the marking files



3-5 Communication Data Format

Use the ASCII code basically and the shift JIS code partially as characters for communication when controlling the laser marker by external device.

The characters (or character strings) enclosed with double quotation marks (" ") in the description below indicates that they uses the ASCII code.

When using the shift JIS code, it is described in each case.

3-5-1 Command Data

The word "command" means the instruction which is sent to the laser marker from external device. Command data is created with the specified format. Remote control of laser marker or execution of specified procedures are possible by sending the command data to laser marker.

■ Command data format

Start Code Single Character	Command Three Characters	Sub Command Single Character	Data Variable length	Check Sum Two Characters	Delimiter Two Characters/ Single Character
Head				End	

Code	Description
Start Code	A start code is a code to identify the data head. STX (code: 02(HEX)) fixed.
Command	A command is specified with three characters. Refer to "3-6 Communication Command List" (P.73).
Sub Command	A sub command is an instruction of setting/readout complementary added to a command. Specifies one of the characters below. "S": Data setting or operation (Set) "R": Readout of setting data (Read) (Note) "S" or "R" cannot be selected for some commands.
Data	Data specified per command The content to be specified varies per command. Refer to "3-7 Command Description" (P.77).
Check Sum *1	Check sum indicates the lower 1-byte of adding result of value (binary) from the start code to the last data by converting it to two characters by ASCII code. where the command is "ABC", sub command is "S" and data is "000" 02(HEX)+41(HEX)+42(HEX)+43(HEX)+53(HEX)+30(HEX)+30(HEX)+30(HEX)=1AB(HEX) AB(HEX), the lower 1-byte of 1AB(HEX) is converted to 41(HEX)+42(HEX) to two characters by ASCII code. ON/OFF of check sum can be selected on the environment setting of laser marker. Refer to the Operation/Maintenance Manual for the details.
Delimiter *2	Delimiter is a code to identify the end of data. CR+LF (0D(HEX) 0A(HEX)) or CR(0D(HEX)). Selects CR+LF or CR on the console. Refer to the Operation/Maintenance Manual for the details.

*1 : A check sum can be added in case of RS-232C.

*2 : You can select [CR] or [CR+LF] for a delimiter in case of RS-232C. [CR] is fixed in case of Ethernet.

Reference

- The laser marker recognizes the data from the start code (STX) to the delimiter (CR or CR+LF) as one command data. If there exists an unnecessary character string before the start code or after the delimiter, it is ignored (neither an abnormal response data is returned).
- When using the external device set by 2byte, NUL(00 (HEX)) can be used.
- Add to NUL before STX or after delimiter.

3-5-2 Response Data

Response data is data which is returned from the laser marker for the command sent by an external device and consists of the following three types.

1. Response data for normal receiving

The data starts with the start code "ACK". It returns when the command transmitted is normal or the command processing has been completed normally.

2. Response data for abnormal receiving

The data starts with the start code "NAK". It returns when the command transmitted is abnormal or the command processing has been completed abnormally.

3. Readout data

The data starts with the start code "STX". It returns when the command transmitted is normal and the sub command is specified to "R".

■ Response data format for normal receiving

Start Code Single Character	Response Code Two Characters	Check Sum Two Characters	Delimiter Two Characters/ Single Character
Head			End

Code	Description
Start Code	ACK (code: 06(HEX)) fixed. A start code is a code to identify the data head and to indicate that the data is a response data for normal receiving.
Response Code	Two characters "00" is returned if the start code is ACK.
Check Sum *1	Check sum indicates the lower 1-byte of adding result of value (binary) from the start code to the response code by converting it to two characters by ASCII code. (ex): 06(HEX)+30(HEX)+30(HEX)=66(HEX) 66(HEX) is converted to 36(HEX)+36(HEX), to two characters by ASCII code. ON/OFF of check sum can be selected on the environment setting of laser marker. Refer to the Operation/Maintenance Manual for the details.
Delimiter *2	Delimiter is a code to identify the end of data. CR+LF (0D(HEX) 0A(HEX)) or CR(0D(HEX)). Selects CR+LF or CR on the console. Refer to the Operation/Maintenance Manual for the details.

*1 : A check sum can be added in case of RS-232C.

*2 : You can select [CR] or [CR+LF] for a delimiter in case of RS-232C. [CR] is fixed in case of Ethernet.

■ Response data format for abnormal receiving

Start Code Single Character	Response Code Two Characters	Check Sum Two Characters	Delimiter Two Characters/ Single Character
Head		End	

Code	Description
Start Code	NAK (code: 15(HEX)) fixed. A start code is a code to identify the data head and to indicate that the data is a response data for abnormal receiving.
Response Code	Two characters is returned if the start code is NAK. "01": Inappropriate STX has been received. "02": Inappropriate delimiter has been received. "03": Unacceptable command because the shutter is opened or "command reception mode ON" is not set for the MKM command "04": No applicable command "05": Incorrect check sum "06": Incorrect length of receiving data "07": Unacceptable command due to priority of I/O terminal control "08": Incorrect sub command "09": Incorrect receiving data "10": Alarm or warning occurs "11": Serial data input is not acceptable because of following conditions. • Internal shutter status is close • Transmitting Serial data input twice or more to the same number of serial data • No setting of Serial data input (command: SIN) on character string "12": The file cannot be saved due to lack of capacity in the flash disk "99": Others
Check Sum *1	Check sum indicates the lower 1-byte of adding result of value (binary) from the start code to the response code by converting it to two characters by ASCII code. (ex): where the response code is "20", 15(HEX)+32(HEX)+30(HEX)=77(HEX) 77(HEX) is converted to 37(HEX)+37(HEX), to two characters by ASCII code. ON/OFF of check sum can be selected on the environment setting of laser marker. Refer to the Operation/Maintenance Manual for the details.
Delimiter *2	Delimiter is a code to identify the end of data. CR+LF (0D(HEX) 0A(HEX)) or CR(0D(HEX)). Selects CR+LF or CR on the console. Refer to the Operation/Maintenance Manual for the details.

*1 : A check sum can be added in case of RS-232C.

*2 : You can select [CR] or [CR+LF] for a delimiter in case of RS-232C. [CR] is fixed in case of Ethernet.

■ Readout data format

Start Code Single Character	Command Three Characters	Sub Command Single Character	Data Variable length	Check Sum Two Characters	Delimiter Two Characters/ Single Character
Head				End	

Code	Description
Start Code	A start code is a code to identify the data head. STX(code:02(HEX)) fixed.
Command	A command is specified with three characters. Refer to “3-6 Communication Command List” (P.73).
Sub Command	A sub command is an instruction of setting/readout complementary added to a command. Specifies one of the characters below. “S”: Data setting or operation (Set) “R”: Readout of setting data (Read) (Note) “S” or “R” cannot be selected for some commands.
Data	Data specified per command The content to be specified varies per command. Refer to “3-7 Command Description” (P.77).
Check Sum *1	Check sum indicates the lower 1-byte of adding result of value (binary) from the start code to the last data by converting it to two characters by ASCII code. ex): where the command is “ABC”, sub command is “A” and data is “000” 02(HEX)+41(HEX)+42(HEX)+43(HEX)+41(HEX)+30(HEX)+30(HEX)+30(HEX)=199(H EX) 99(HEX), the lower 1-byte of 199(HEX) is converted to 39(HEX)+39(HEX), to two characters by ASCII code. ON/OFF of check sum can be selected on the environment setting of laser marker. Refer to the Operation/Maintenance Manual for the details.
Delimiter *2	Delimiter is a code to identify the end of data. CR+LF (0D(HEX) 0A(HEX)) or CR(0D(HEX)). Selects CR+LF or CR on the console. Refer to the Operation/Maintenance Manual for the details.

*1 : A check sum can be added in case of RS-232C.

*2 : You can select [CR] or [CR+LF] for a delimiter in case of RS-232C. [CR] is fixed in case of Ethernet.

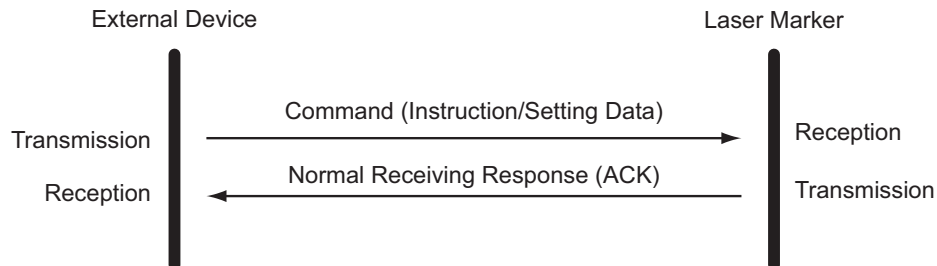
3-5-3 Communication Sequence

This chapter explains the communication (transmitting/receiving) sequence of command or response data between external device and laser marker.

The communication sequence differs when the marking status is set to "transmission prohibited" from "transmission permitted".

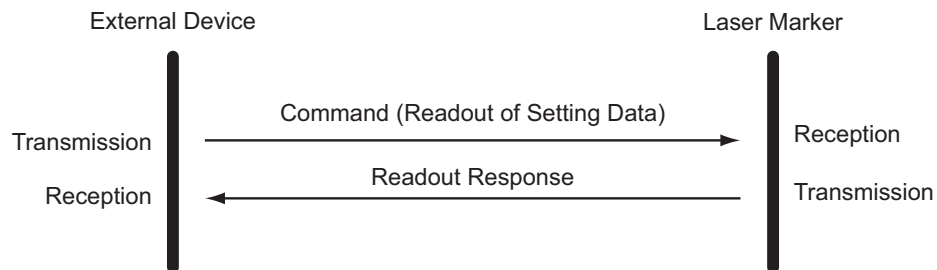
■ Communication sequence at normal data setting/operation instruction

The communication sequence where normal command/setting is transmitted from external device to laser marker is shown below.



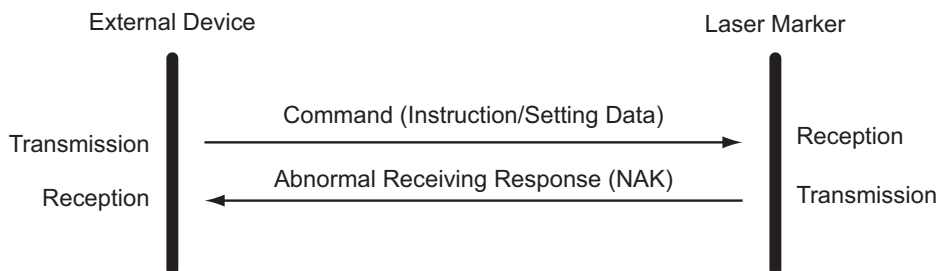
■ Communication sequence at normal readout of setting data

The communication sequence where normal readout of setting (sub command "R") is transmitted from external device to laser marker is shown below.



■ Communication sequence at abnormal data setting/operation instruction

The communication sequence where abnormal command/setting is transmitted from external device to laser marker is shown below.



■ Reception time-out

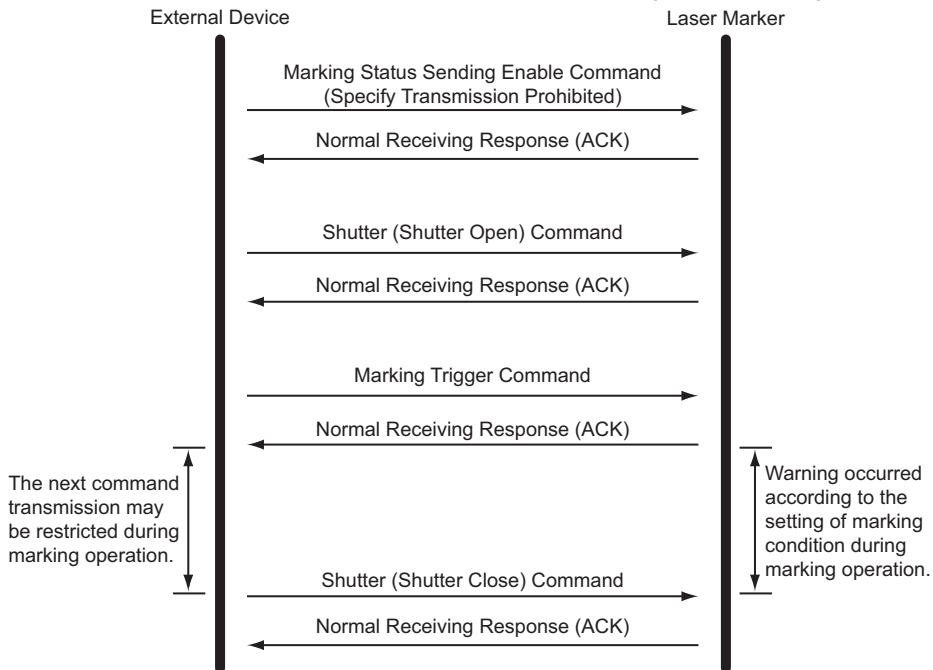
The laser marker has "reception time-out check" function, which monitors the lapsed time of receiving the command from the head till the end when it receives the command from external device. The period for reception time-out is 10 seconds. If the telegraphic message reception has not been fully completed within the specified period, the laser marker considers that any trouble may occur in external device or in the communication line and stops all communication process.

The data under being received are broken.

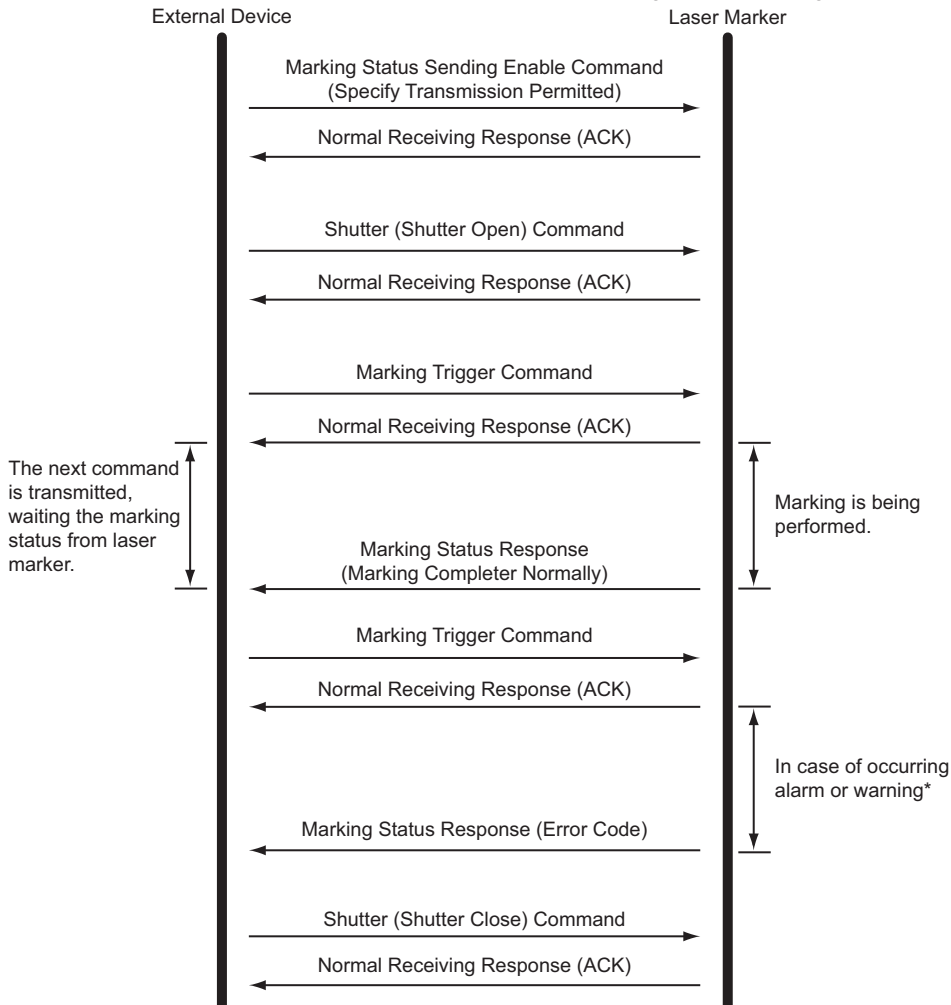
■ Communication sequence at transmission prohibition/permission for marking status

Generally in the communication sequence, “the laser marker returns the response to the command from external device”. However, the marking operation (mark end or warning under some marking conditions) timing of the laser marker can be checked from the laser marker when the Marking Status Sending Enable is set to on. Refer to “Marking Status Transmission Permission (Code: MST)” (P.80).

- Communication sequence where “transmission prohibited” is set for marking status sending enable command



- Communication sequence where “transmission permitted” is set for marking status sending enable command



* When the alarm or warning occurs before Marking Trigger receipt, Marking Status Response (Error Code) is sent to the external devices at the timing of the error generation.

3-6 Communication Command List

Category	Name	Code	Function	Page
Operation Control	Command Reception Permission	MKM	Controls the reception permission (reception mode ON/OFF) for setting and readout of communication commands.	P.77
	Laser Pumping	LSR	Controls the laser pumping ON/OFF.	P.78
	Shutter	SHT	Controls the internal shutter opening/closing.	P.78
	Status request	STS	Requires the operation status of laser marker, such as ready status and error occurrence status.	P.79
	Marking Status Sending Permission	MST	Enables automatic response of marking result (e.g. normal end, and error occurrence, etc.) at the end of marking.	P.80
	Marking Trigger	MRK	Inputs marking trigger (laser radiation startup trigger).	P.81
	Guide Laser Control	GID	Controls radiation of red guide laser for marking position confirmation.	P.81
File	File Change (No. Specified)	FNO	Specifies the file No. to change the file.	P.82
	File Change (Comment Specified)	FNN	Specifies the file name (comment) to change the file.	P.82
	File Overwriting Registration	FOR	Overwrite and register the file under editing.	P.82
	File Registration	FRG	Register the file under editing to the specified No.	P.83
	File Name	FNM	Sets name (comment) of file under editing.	P.83
Character Input	Marking Character String (ASCII Code Specified)	MCS	Sets the marking character string by ASCII code. (For alphanumeric characters only)	P.84
	Marking Character String (Shift JIS Code Specified)	STR	Sets the marking character string by shift JIS code. (For characters including KANA, KANJI and function characters)	P.84
	Serial Data Input	SIN	Sets the character string specified for "Serial Data Function" to change characters for each marking.	P.86
	Rank Condition	RKC	Sets input conditions of "Rank Function" to switch characters using I/O input.	P.88
	Rank Character String	RKS	Sets character string used for "Rank Function" to switch characters using I/O input.	P.88

Category	Name	Code	Function	Page
Function Character	Counter Condition	CNT	Sets the counter conditions.	P.89
	Counter Reset	CTR	Resets the current counter value to the initial value.	P.90
	Expiry Date/Time Condition	LMT	Sets the expiry date/time condition.	P.90
	Lot Condition	LTC	Sets the condition of "Lot Function" to change characters depending on date/time and counter values.	P.91
	Lot Character String	LTS	Sets the character string used for "Lot Function" to change characters depending on date/time and counter values.	P.92
Bar Code / 2D Code	Bar Code Marking Data (ASCII Code Specified)	BCS	Sets character string to be encoded as a bar code or 2D code by ASCII code. (For alphanumeric characters only)	P.93
	Bar Code Marking Data (Shift JIS Code Specified)	BRS	Sets character string to be encoded as a bar code or 2D code by shift JIS code. (For characters including control code, KANA, KANJI and function characters)	P.94
	Bar Code Marking Condition	BRF	Sets the marking condition for bar code and 2D code.	P.95
	Human Readable Text	BRV	Sets the marking condition for the Human Readable Text to be added to a bar code or 2D code.	P.105
	2D Code Pattern	BRP	Sets 2D code module marking pattern.	P.107
Logo (Image Data)	Logo File	CDF	Sets the logo file.	P.108
	VEC Logo Conditions	CDC	Sets the marking condition of VEC (work shape converted for laser marker) logo file.	P.109
	DXF Logo Conditions	CDD	Sets the marking condition of DXF logo file.	P.110
Processing	Processing Element	FIG	Sets the processing element type (straight line, circle, arc) and coordinates.	P.112
	Processing Condition	LAY	Sets X/Y coordinate offset and laser power correction ratio, etc. for the specified processing condition No.	P.115
	Arbitrary Point Radiation Coordinate and Time	PRD	Sets arbitrary point radiation X/Y coordinates, radiation time and laser power correction ratio.	P.116
	Arbitrary Point Radiation Conditions	PRF	Sets X/Y coordinate offset and laser power correction ratio, etc. for the specified arbitrary point radiation condition.	P.117

Category	Name	Code	Function	Page
Layout / Position Adjustment	General Condition	ALC	Sets the conditions related to whole file.	P.118
	Character Condition (Shorted Form)	SPC	Sets the condition for marking character string per line. (X/Y coordinates and laser power correction ratio only)	P.119
	Character Conditions	STC	Sets the condition for marking character string per line.	P.120
	External Offset Condition	OFC	Sets input conditions of "External Offset Function" to switch coordinates using I/O input.	P.123
	External Offset Coordinates	OFS	Sets offset coordinates used for "External Offset Function" to switch coordinates using I/O input.	P.123
	Step & Repeat Condition	SRC	Sets the condition of "Step & Repeat" to mark the same marking contents on multiple locations in one file.	P.124
	Step & Repeat Fine-Adjustment	SRA	Sets the fine adjustment of "Step & Repeat" to mark the same marking contents on multiple locations in one file.	P.125
Laser Condition	Laser Power	LPW	Sets the laser power.	P.127
	Scan Speed	SSP	Sets the scan speed of the laser.	P.127
	Laser Pulse Cycle [LP-V series only]	MPL	Sets the laser pulse cycle of LP-V series.	P.128
	CW Laser Pulse Cycle/Duty [LP-W series only]	CWL	Sets the laser pulse cycle and duty of LP-W series.	P.128
	CO2 Laser Frequency [LP-400 series only]	MPL	Sets the laser frequency of LP-400 series.	P.129
	Line Width/Marking Pitch	WDC	Sets the width necessary to avoid crossing at marking intersection and marking pitch of the bold characters and bar code.	P.129
	Marking Quality Adjustment	WTC	Sets laser start point, end point, edge and curve adjustments, etc.	P.130

Category	Name	Code	Function	Page
Flying Object	Trigger Condition	TRG	Sets the flying object/static object marking, and the condition of flying object.	P.131
	Delay	DLY	Sets the delay time and distance from trigger input to marking startup.	P.132
	Marking Interval	INT	Sets the marking interval (distance) in "Equidistant Marking" setting for flying object marking.	P.132
	Flying Object Wait	MWT	Sets the waiting time for marking corresponding to the line speed for flying object marking.	P.133
	Line Speed	LSP	Sets the line speed in flying object marking.	P.133
	Encoder Signal	ENC	Sets the encoder pulse value for use of the encoder in flying object marking.	P.134
Maintenance	Laser Check Radiation	SPT	Controls "Laser Check Radiation" for laser radiation at the center of the marking area.	P.134
	Power Check [LP-V/ LP-W series only]	PWR	Measures the current power ratio [%] in comparison with the default laser power.	P.135
Environment	Year/Month/Date/Time	YMD	Sets year, month, date, time for system.	P.137
	Era Year	ERA	Sets era year.	P.137
	Week Setting	WKM	Sets the update timing of week number and sets the definition of the first week of the year.	P.138
	I/O Environment	ENV	Sets the operating environment of the I/O terminal and I/O connector.	P.138

3-7 Command Description

Reference

- The laser marker sends a response data after setting/readout command is transmitted. Refer to "3-5-3 Communication Sequence" (P.71).

Command Reception Permission (Code: MKM)

Controls the reception permission (reception mode ON/OFF) for setting and readout of communication commands.

- Setting / Readout data of marking mode

STX	MKM	Sub Command	[Command reception mode] 1-byte	(Check Sum)	Delimiter
-----	-----	-------------	------------------------------------	-------------	-----------

Sub command is "S" at the time of setting and "A" for response data at the time of readout.

- Readout request of marking mode

STX	MKM	R	(Check Sum)	Delimiter
-----	-----	---	-------------	-----------

Name	Data Length [byte]	Description	Remarks
Command reception mode	1	"0": Reception mode ON (Start command reception in the marking ready OFF status) "1": Reception mode OFF (Finish command reception and resume the marking ready ON status)	In the shutter open or marking ready ON status, set "reception mode ON" when transmitting the communication command including an action to update the laser marker data. To resume the ready ON status after command transmission, set "reception mode OFF".

Reference

- For details on command reception permission, refer to "3-2 Command Reception Condition" (P.61).
- Send MKM command with the shutter opened state. When DIP switch No. 2 is ON and the shutter is closed, the shutter opens at the timing of "reception mode OFF" is set.

■ Laser Pumping (Code: LSR)

Controls the laser pumping ON/OFF.

• Setting / Readout data of laser Pumping

STX	LSR	Sub Command	[Laser Pumping] 1-byte	(Check Sum)	Delimiter
-----	-----	-------------	---------------------------	-------------	-----------

Sub command is "S" at the time of setting and "A" for response data at the time of readout.

• Readout request of laser pumping state

STX	LSR	R	(Check Sum)	Delimiter
-----	-----	---	-------------	-----------

Name	Data Length [byte]	Description	Remarks
Laser Pumping	1	"0": Laser pumping OFF "1": Laser pumping ON	

↓ Reference

- Control of laser pumping by this command is unavailable when the No.2 DIP switch on the back surface of controller is turned to OFF.
- It takes about 20 seconds for LP-V series and about 15 seconds for LP-400/LP-W series from turning ON the laser pumping to the completion of pumping.

■ Shutter (Code: SHT)

Controls the internal shutter opening/closing.

• Setting of shutter

STX	SHT	S	[Shutter Status] 1-byte	(Check Sum)	Delimiter
-----	-----	---	----------------------------	-------------	-----------

Name	Data Length [byte]	Description	Remarks
Shutter Status	1	"0": close "1": open	

↓ Reference

- Control of shutter by this command is unavailable when the No.2 DIP switch on the back surface of controller is turned to OFF.
- Response data for abnormal receiving (NAK03) is returned when shutter open command is transmitted in shutter open status.
- If the shutter close command is transmitted during marking, the internal shutter is closed after the marking is completed.
- For LP-400 series, the shutter cannot open until the laser pumping is completed.

■ Status Request (Code: STS)

Requires the operation status of laser marker, such as ready status and error occurrence status.

• Status Request

STX	STS	R	(Check Sum)	Delimiter
-----	-----	---	-------------	-----------

• Response to status request

Read out with the following format:

STX	STS	A	[Error occurrence status] [Laser Pumping Status] [Command reception status] [Marking Ready Status] [Trigger Status] 5-byte	(Check Sum)	Delimiter
-----	-----	---	---	-------------	-----------

Name	Data Length [byte]	Description	Remarks
Error occurrence status	1	"0": no error "1": error occurrence	
Laser Pumping Status	1	"0": laser pumping OFF "1": laser pumping "2": laser pumping completed	
Command reception status	1	"0": Shutter close or command reception mode ON (including while the shutter is opened) "1": Shutter open (excepting when the command reception mode is ON)	Shutter and command reception mode (MKM command) status is indicated. Use this for determination of whether various commands can be transmitted. For details, refer to "Command Reception Condition".
Marking Ready Status	1	"0": marking disable (ready OFF) "1": marking enable (ready ON)	The status of marking trigger acceptability is indicated.
Trigger Status	1	"0": trigger OFF "1": Trigger ON	The status of trigger input (TRIG.IN) is indicated when "equidistant marking" is selected at trigger condition.

* Marking is enable when the response data is either "02110" or "02111".

■ Marking Status Transmission Permission (Code: MST)

Enables automatic response of marking result (e.g. normal end, and error occurrence, etc.) at the end of marking.

• Setting / Readout data of marking status transmission permission

STX	MST	Sub Command	[Trans-mission Permission/Prohibition] 1-byte	(Check Sum)	Delimiter
-----	-----	-------------	--	-------------	-----------

Sub command is "S" at the time of setting and "A" for response data at the time of readout.

• Readout request of transmission permission/prohibition of response

STX	MST	R	(Check Sum)	Delimiter
-----	-----	---	-------------	-----------

Name	Data Length [byte]	Description	Remarks
Trans-mission Permission/Prohibition	1	"0": Transmission prohibited "1": Transmission permitted	

• Data transmission after setting marking status transmission permission

The status which shows if the marking operation is normally finished is transmitted when receiving a marking trigger from I/O or RS-232C/Ethernet after marking status transmission permission is set.

STX	MST	A	[Status] 4-byte	(Check Sum)	Delimiter
-----	-----	---	--------------------	-------------	-----------

Name	Data Length [byte]	Description	Remarks
Status	4	"0000": Marking is normally completed "E001" to "E999": Error code at marking operation	The status after marking operation is indicated.

↓ Reference

- When marking status function is used, set the transmission permission before every shifting to the remote mode.
- When the remote mode is released, the marking status transmission is returned to the default transmission prohibition.
- For the error code at marking operation, refer to "Error Indication" (P.149).

■ Marking Trigger (Code: MRK)

Inputs marking trigger (laser radiation startup trigger).

• Setting of marking trigger

STX	MRK	S	[Marking Trigger] 1-byte	(Check Sum)	Delimiter
-----	-----	---	-----------------------------	-------------	-----------

Name	Data Length [byte]	Description	Remarks
Marking Trigger	1	"0": stop (available only with equidistant" status) "1": start	<ul style="list-style-type: none"> Marking operation is started when this command is accepted. During "equidistant" status at marking to flying object, the instruction of marking start/stop is executed.

↓ Reference

- Marking is performed at command reception, regardless of the setting in "marking trigger" when "equidistant marking" is set at the trigger type.
- When this command is sent when the marking trigger cannot be accepted (Ready is OFF), abnormal receiving response is returned from laser marker.

■ Guide Laser Control (Code: GID)

Controls radiation of red guide laser for marking position confirmation.

• Setting of Guide Laser Control:

STX	GID	S	[Display contents] 1-byte	(Check Sum)	Delimiter
-----	-----	---	------------------------------	-------------	-----------

Name	Data Length [byte]	Description	Remarks
Display contents	1	"0": Display stop "1": Marking area "2": Marking Character "3": Dual pointer	

↓ Reference

- This command that controls the red guide laser become unavailable when DIP switch (No.2) on the back of the controller is turned OFF.
- This command can be transmitted only when the shutter is closed or when the "command reception mode ON" is set by Command reception permission (MKM) command.

■ File Change [No. Specified] (Code: FNO)

Specifies the file No. to change the file.

• Change File No.

Read out the file of specified number.

STX	FNO	Sub Command	[File No.] 4-byte	(Check Sum)	Delimiter
-----	-----	-------------	----------------------	-------------	-----------

Sub command is "S" at the time of setting and "A" for response data at the time of readout.

• Readout request of file No.

STX	FNO	R	(Check Sum)	Delimiter
-----	-----	---	-------------	-----------

Name	Data Length [byte]	Description	Remarks
File No.	4	"0000" to "2047" "9999": new file	The file number to be used and the file number currently being used is indicated at file No. change and readout of file No. respectively.

■ File Change [Comment Specified] (Code: FNN)

Specifies the file name (comment) to change the file.

• Change File No.

Changes file No. according to the file name (comment).

STX	FNN	S	[File Name] Max. 20-byte	(Check Sum)	Delimiter
-----	-----	---	-----------------------------	-------------	-----------

Name	Data Length [byte]	Description	Remarks
File Name	Max 20	Specify the file name with 10 or less characters of shift JIS code, or 20 or less characters of ASCII code.	Ex) When changing to a file name (comment) with "ABCD", set as follows: • When specifying the file name in shift JIS code: 82,60,82,61,82,62,82,63(HEX) • When specifying the file name in ASCII code: 41,42,43,44(HEX)

⬇ Reference

- When two or more of the same file names exists, the file with the smaller no. is selected.

■ File Overwriting Registration (Code: FOR)

Overwrite and register the file under editing.

Overwriting is possible when the file number has been already determined.

• Overwriting of file

STX	FOR	S	(Check Sum)	Delimiter
-----	-----	---	-------------	-----------

■ File Registration (Code: FRG)

Register the file under editing to the specified No.

• Registration of file

Register the file of specified number.

STX	FRG	S	[File No.] 4-byte	(Check Sum)	Delimiter
-----	-----	---	----------------------	-------------	-----------

Name	Data Length [byte]	Description	Remarks
File No.	4	“0000” to “2047”	Register the file currently used to the file of specified number and change the file number currently being edited to the specified number.

■ File Name (Code: FNM)

Sets name (comment) of file under editing.

• Setting / Readout data of file name

STX	FNM	Sub Command	[File Name] Max. 20-byte	(Check Sum)	Delimiter
-----	-----	----------------	-----------------------------	-------------	-----------

Sub command is "S" at the time of setting and "A" for response data at the time of readout.

• Readout request of file name

STX	FNM	R	(Check Sum)	Delimiter
-----	-----	---	-------------	-----------

Name	Data Length [byte]	Description	Remarks
File Name	Max 20	Specify the file name of currently specified number with 10 or less characters of shift JIS code, or 20 or less characters of ASCII code. Specify 0 byte to the file name to be deleted.	<p>Ex) When changing to a file name (comment) with “ABCD”, set as follows:</p> <ul style="list-style-type: none"> When specifying the file name in shift JIS code: 82,60,82,61,82,62,82,63(HEX) When specifying the file name in ASCII code: 41,42,43,44(HEX)

■ Marking Character String (ASCII Code Specified) (Code: MCS)

Sets the marking character string by ASCII code. (For alphanumeric characters only)

• Setting / Readout data of marking character string

STX	MCS	Sub Command	[Line No.] [Marking Character String] Max. 32-byte	(Check Sum)	Delimiter
-----	-----	-------------	---	-------------	-----------

Sub command is "S" at the time of setting and "A" for response data at the time of readout.

• Readout request of marking character string

STX	MCS	R	[Line No.] 2-byte	(Check Sum)	Delimiter
-----	-----	---	----------------------	-------------	-----------

Name	Data Length [byte]	Description	Remarks
Line No.	2	"01" to "60" [row]	"51" to "60": common setting lines
Marking Character String	Max 30	20 characters within the range from (HEX) to 7E(HEX) of ASCII code (functional characters should not be included)	Specify 0 byte to the character string to be deleted.

↓ Reference

- If readout data includes function characters (such as "%SFT:0"), the setting character ("%SFT:0") is read out, but characters to be actually marked are not.
- If readout data includes characters that cannot be expressed in ASCII code such as Katakana and Kanji (2-byte character), only these 2-byte characters are read out in shift JIS code.
- If the marking character string contains any function or 2-byte character, the maximum readout data will be 32-byte or more.

■ Marking Character String (Shift JIS Code Specified) (Code: STR)

Sets the marking character string by shift JIS code. (For characters including KANA, KANJI and function characters)

• Setting / Readout data of marking character string

STX	STR	Sub Command	[Line No.] [Marking Character String] Max. 62-byte	(Check Sum)	Delimiter
-----	-----	-------------	---	-------------	-----------

Sub command is "S" at the time of setting and "A" for response data at the time of readout.

• Readout request of marking character string

STX	STR	R	[Line No.] 2-byte	(Check Sum)	Delimiter
-----	-----	---	----------------------	-------------	-----------

Name	Data Length [byte]	Description	Remarks
Line No.	2	"01" to "60" [row]	"51" to "60": common setting lines
Marking Character String	Max 60 (When specifying in shift JIS code)	The character string (Up to 30 characters) to be set in the specified line is specified with shift JIS code.(However, the function character should be specified by ASCII code.) Specify 0 byte to the character string to be deleted.	See the next page.

Setting method of character string for marking (specified with shift JIS code)

Use shift JIS code "Character Code Table" (P.156) to set standard characters and registered characters. In case of setting with ASCII code, use the MCS command.

Functional character (specified with ASCII code)

Use ASCII code to set the functional character.

N:	digit number (1 to 6)
MM:	number of digits (01 to 30)
X:	Type (Y: dominical year, y: era year, M: month, D: date, H: 24-hour time, h: 12-hour time, m: minute, s: second, w: week, J: 365 days, C: counter)
n:	counter number, lot function number (0 to 7), date/time number (0: current date/time, 1 to 8: expiry date/time, rank function number (0 to 3), serial data function number (0 to 9, A to F), bar code number (0 to 7)
Y:	counter offset (+1 to +9) This letter is not used in case of no offset.
Z:	counter numbering system -1 (1 to 9, A to Z) This letter is not used when decimal number is used.

%0N:XnY/Z = with zero	%N-:XnY/Z = without zero justify	%INP:n = Rank
%_N:XnY/Z = right aligned without zero	%APM:n = "AM" (before noon), "PM" (afternoon)	%MM:Sn = Serial Data
%N_:XnY/Z = left aligned without zero	%SFT:n = Lot character	%BAR:n = Check Digit

(Above "_" represents a space.)

Examples

- Character setting by shift-JIS code: Marking of "ABCD" (with hexadecimal number)
82,60,82,61,82,62,82,63
- Functional character setting by ASCII code: Marking of "counter 0" by 6 digits, right aligned without zero
25,20,36,3A,43,30 = "%_6:C0"
(Above "_" represents a space.)
- Shift-JIS character and functional character mixed case:
Marking of current year/month/date with four digits for dominical year, two digits for month and date respectively, with zero, and of the unit by Kanji.
25,30,34,3A,59,30,94,4E,25,30,32,3A,4D,30,8C,8E,25,30,32,3A,44,30,93,FA = "%04:Y0 Year %02:M0 Month %02:D0 Day"

■ Serial Data Input (Code: SIN)

Sets the character string specified for "Serial Data Function" to change characters for each marking.

Function characters (serial data) are preset to the marking character string or bar code data. Marking of the transmitted character string corresponding with the serial data starts.

• Setting of serial data input

STX	SIN	S	[Serial Data No.] [Marking Data] Max. 512-byte	(Check Sum)	Delimiter
-----	-----	---	---	-------------	-----------

Name	Data Length [byte]	Description	Remarks
Serial Data No.	2	"00" to "15"	
Marking Data	Max 510	one-byte or double-byte (shift JIS code) characters less than 255 (mixed not available)	For the character, up to 30 characters and for the code data, up to 255 characters can be input.

↓ Reference

- Only when the internal shutter is opened during the remote control ("Reception mode ON" is not set for command reception permission (MKM command)), the serial data can be transmitted to the laser marker.
- For using this command, set "serial data" of function characters at setting screen beforehand.
- When using this function (serial data), transmit this command by every marking. Otherwise it does not become marking ready condition, and marking is not available.
- When transmit this command without any data, marking ready become ON, then nothing to be marked with serial data input.
- For resetting the data, set the "reception mode ON" for command reception permission (MKM command) or close the shutter.
- SIN command cannot be used with the rank function, external offset and equidistant marking to moving object.
- If SIN command is used with the marking to the flying object, make sure that the marking interval time is enough to the required period to input the marking data and to confirm the marking ready output.
- In case of transmitting character by this command which is differed to the specified number of digit, the character is marked with the differed number of digit.
- To input the control code for CODE 128, Data matrix or QR code (binary mode), use the following alternate codes instead of ASCII code.

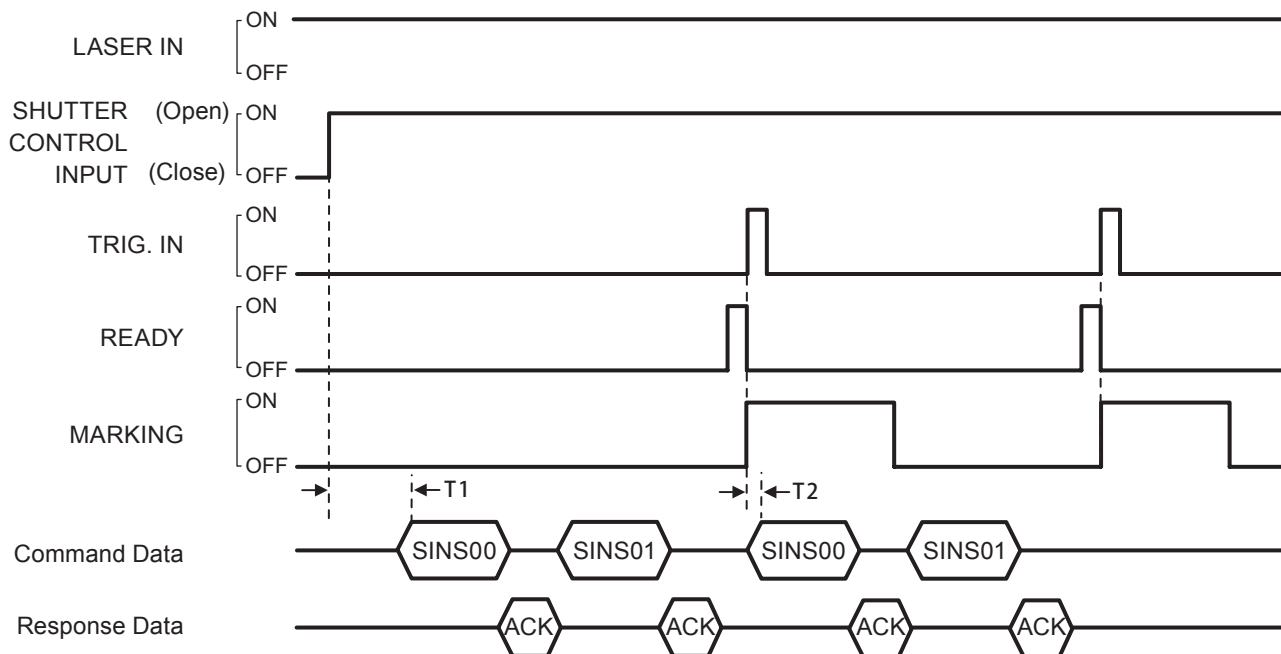
Control Code	00 (HEX)	to	1F (HEX)	7F (HEX)
Alternate code	F050 (HEX)	to	F06F (HEX)	F071 (HEX)

- To input "FNC1" for CODE128, GS1 Data Matrix, GS1 DataBar Expanded, and 2D side of Composite code, use the following alternate code.

Control Code	FNC1
Alternate code	F072 (HEX)

Timing Chart for Serial Data Marking

The timing chart for the command for serial data input (SIN) of RS-232C/Ethernet is shown below.
 %01:S0, %01:S1 (example when serial data number 0 and 1 are set)



Item	Time	Remarks
T1	1 second or more	SIN command cannot be sent until the shutter opens. The shutter opens approx. 1 second after the shutter open input.
T2	0 ms or more	After confirming the marking output is turned ON, the next SIN command data can be sent.

Reference

- The command for serial data input (SIN) can be transmitted to the laser marker only under remote control, and when the internal shutter is opened (“Reception mode ON” is not set for command reception mode (MKM command)).
- Whenever marking is performed, data of all set serial data function numbers must be transmitted.

■ Rank Condition (Code: RKC)

Sets input conditions of "Rank Function" to switch characters using I/O input.

• Setting / Readout data of rank condition

STX	RKC	Sub Command	[Parallel Input] 1-byte	(Check Sum)	Delimiter
-----	-----	-------------	----------------------------	-------------	-----------

Sub command is "S" at the time of setting and "A" for response data at the time of readout.

• Readout request of rank condition

STX	RKC	R	(Check Sum)	Delimiter
-----	-----	---	-------------	-----------

Name	Data Length [byte]	Description	Remarks
Parallel Input	1	"1": 4-bit × 4 "2": 8-bit × 2	

■ Rank Character String (Code: RKS)

Sets character string used for "Rank Function" to switch characters using I/O input.

• Setting / Readout data of rank character string

STX	RKS	Sub Command	[Rank No.] [Marking Character String] Max. 21-byte	(Check Sum)	Delimiter
-----	-----	-------------	---	-------------	-----------

Sub command is "S" at the time of setting and "A" for response data at the time of readout.

• Readout request of rank character string

STX	RKS	R	[Rank No.] 3-byte	(Check Sum)	Delimiter
-----	-----	---	----------------------	-------------	-----------

Name	Data Length [byte]	Description	Remarks	
Rank No.	3	Parallel Input	Setting range	
		8-bit (D15-8)	"256" to "511"	
		8-bit (D7-0)	"000" to "255"	
		4-bit (D15-12)	"048" to "063"	
		4-bit (D11-8)	"032" to "047"	
		4-bit (D7-4)	"016" to "031"	
4-bit (D3-0)	"000" to "015"	The number in which the character string is set is indicated. The setting range varies depending on the condition of parallel input.		
Marking Character String	Max 18		Use the shift JIS code. (Up to 9 characters)	The character string to be marked with the specified period is set. Specify 0-byte of data length to delete the character string of period.

■ Counter Condition (Code: CNT)

Sets the counter conditions.

• Setting / Readout data of counter condition

STX	CNT	Sub Command	[Counter No.] [Current Value] [Initial value] [End Value] [Step] [Count Source] [Flag Reset] 27-byte	(Check Sum)	Delimiter
-----	-----	-------------	--	-------------	-----------

Sub command is "S" at the time of setting and "A" for response data at the time of readout.

• Readout request of counter condition

STX	CNT	R	[Counter No.] 1-byte	(Check Sum)	Delimiter
-----	-----	---	-------------------------	-------------	-----------

Name	Data Length [byte]	Description	Remarks
Counter No.	1	"0" to "7"	"4" to "7": common counter
Current Value	6	"000000" to "999999"	No minus number.
Initial Value	6	"000000" to "999999"	
End Value	6	"000000" to "999999"	
Step	6	"000000" to "999999"	
Count Source	1	"0": Counter 0 "1": Counter 1 "2": Counter 2 "3": Counter 3 "4": Counter 4 "5": Counter 5 "6": Counter 6 "7": Counter 7 "8": Trigger input	
Flag Reset	1	"0": reset OFF at re-dating "1": reset ON at re-dating	When the marking on the flying object is valid, set "0".

Reference

- When marking on the flying object is valid, counter reset at re-dating timing cannot be used.

■ Counter Reset (Code: CTR)

Resets the current counter value to the initial value.

• Counter reset

STX	CTR	S	[counter 0 to 7] 8-byte	(Check Sum)	Delimiter
-----	-----	---	----------------------------	-------------	-----------

Name	Data Length [byte]	Description	Remarks
Counter 0	1	"0": reset OFF "1": reset ON	Counter 4 to counter 7 are common counters.
Counter 1	1		
Counter 2	1		
Counter 3	1		
Counter 4	1		
Counter 5	1		
Counter 6	1		
Counter 7	1		

■ Expiry Date/Time Condition (Code: LMT)

Sets the expiry date/time condition.

Expiry date/time can be set within the range from January 1, 1980 to December 31, 2099.

• Setting / Readout data of Expiry Date/Time Condition

STX	LMT	Sub Command	[Expiry No.] [Expiry] [Reference Unit] [Start Date] 7-byte	(Check Sum)	Delimiter
-----	-----	-------------	---	-------------	-----------

Sub command is "S" at the time of setting and "A" for response data at the time of readout.

• Readout request of expiry date/time Condition

STX	LMT	R	[Expiry No.] 1-byte	(Check Sum)	Delimiter
-----	-----	---	------------------------	-------------	-----------

Name	Data Length [byte]	Description	Remarks
Expiry No.	1	"1" to "8"	"5" to "8": common expiry date/time
Expiry	4	"-999" to "+999"	
Reference Unit	1	"0": year "1": month "2": day "3": hour "4": minute	
Start Date	1	"0": Today not included "1": Today included	Possible to be set only when the reference unit is set to "year" or "month". Indicating if the date of "today" is included or not.

■ Lot Condition (Code: LTC)

Sets the condition of "Lot Function" to change characters depending on date/time and counter values.

• Setting / Readout data of lot condition

STX	LTC	Sub Command	[Lot No.] [Period] [Period Unit] 4-byte	(Check Sum)	Delimiter
-----	-----	-------------	--	-------------	-----------

Sub command is "S" at the time of setting and "A" for response data at the time of readout.

• Readout request of lot condition

STX	LTC	R	[Lot No.] 1-byte	(Check Sum)	Delimiter
-----	-----	---	---------------------	-------------	-----------

Name	Data Length [byte]	Description	Remarks
Lot No.	1	"0" to "7"	"4" to "7": common lot
Period	2	"00": current "01" to "08": expiry 1 to 8 "10" to "17": counter 0 to 7	The unit of period to switch the character string for marking is indicated.
Period Unit	1	"0": year or counter "1": month "2": day "3": Y/M "4": M/D "5": day of week "6": hour "7": week "8": minute "9": hour/min.	

↓ Reference

- The settings for all period number of the lot functional number are cleared if the lot condition is changed.

■ Lot Character String (Code: LTS)

Sets the character string used for "Lot Function" to change characters depending on date/time and counter values.

• Setting / Readout data of lot character string

STX	LTS	Sub Command	[Lot No.] [Period Unit] [Start Period] [End Period] [Marking Character String] Max. 33-byte	(Check Sum)	Delimiter
-----	-----	-------------	---	-------------	-----------

Sub command is "S" at the time of setting and "A" for response data at the time of readout.

• Readout request of lot character string

STX	LTS	R	[Lot No.] [Period Unit] 3-byte	(Check Sum)	Delimiter
-----	-----	---	-----------------------------------	-------------	-----------

Name	Data Length [byte]	Description	Remarks																								
Lot No.	1	"0" to "7"	"4" to "7": common lot																								
Period Unit	2	<table border="1"> <thead> <tr> <th>Period Condition</th> <th>Setting range</th> </tr> </thead> <tbody> <tr><td>Year</td><td>"01" to "60"</td></tr> <tr><td>Month</td><td>"01" to "12"</td></tr> <tr><td>Day</td><td>"01" to "31"</td></tr> <tr><td>Y/M</td><td>"01" to "60"</td></tr> <tr><td>M/D</td><td>"01" to "60"</td></tr> <tr><td>Hour</td><td>"01" to "24"</td></tr> <tr><td>Minute</td><td>"01" to "60"</td></tr> <tr><td>Hour/Minute</td><td>"01" to "60"</td></tr> <tr><td>Week</td><td>"01" to "54"</td></tr> <tr><td>Day of Week</td><td>"01" to "07"</td></tr> <tr><td>Counter</td><td>"01" to "60"</td></tr> </tbody> </table>	Period Condition	Setting range	Year	"01" to "60"	Month	"01" to "12"	Day	"01" to "31"	Y/M	"01" to "60"	M/D	"01" to "60"	Hour	"01" to "24"	Minute	"01" to "60"	Hour/Minute	"01" to "60"	Week	"01" to "54"	Day of Week	"01" to "07"	Counter	"01" to "60"	The setting range varies depending on the condition of period unit.
		Period Condition	Setting range																								
		Year	"01" to "60"																								
		Month	"01" to "12"																								
		Day	"01" to "31"																								
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Start Period	6	<table border="1"> <thead> <tr> <th>Period Condition</th> <th>Setting range</th> </tr> </thead> <tbody> <tr><td>Year</td><td>"198000" to "209900"</td></tr> <tr><td>Month</td><td>"000001" to "000012"</td></tr> <tr><td>Day</td><td>"000001" to "000031"</td></tr> <tr><td>Y/M</td><td>"198001" to "209912"</td></tr> <tr><td>M/D</td><td>"000101" to "001231" (The higher 4 characters: month, the lower 2 characters: date)</td></tr> </tbody> </table>	Period Condition	Setting range	Year	"198000" to "209900"	Month	"000001" to "000012"	Day	"000001" to "000031"	Y/M	"198001" to "209912"	M/D	"000101" to "001231" (The higher 4 characters: month, the lower 2 characters: date)	The start / end period of marking the character string for setting is set. The setting range varies depending on the condition of period unit. Set "?????" for both of start and end period to delete it. "?????" is indicated if the period which has not been set is read out.												
		Period Condition	Setting range																								
		Year	"198000" to "209900"																								
		Month	"000001" to "000012"																								
		Day	"000001" to "000031"																								
		Y/M	"198001" to "209912"																								
M/D	"000101" to "001231" (The higher 4 characters: month, the lower 2 characters: date)																										
End Period	6	<table border="1"> <tbody> <tr><td>Hour</td><td>"000000" to "000023"</td></tr> <tr><td>Minute</td><td>"000000" to "000059"</td></tr> <tr><td>Hour/Minute</td><td>"000000" to "002359"</td></tr> <tr><td>Week</td><td>"000000" to "000054"</td></tr> <tr><td>Day of Week</td><td>"000000" to "000006" ("000000": Sunday, "000006": Saturday)</td></tr> <tr><td>Counter</td><td>"000000" to "999999"</td></tr> </tbody> </table>	Hour	"000000" to "000023"	Minute	"000000" to "000059"	Hour/Minute	"000000" to "002359"	Week	"000000" to "000054"	Day of Week	"000000" to "000006" ("000000": Sunday, "000006": Saturday)	Counter	"000000" to "999999"													
		Hour	"000000" to "000023"																								
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		Hour/Minute	"000000" to "002359"																								
		Week	"000000" to "000054"																								
		Day of Week	"000000" to "000006" ("000000": Sunday, "000006": Saturday)																								
Counter	"000000" to "999999"																										
Marking Character String	Max 18	Use the shift JIS code. (Up to 9 characters)	The character string to be marked with the specified period is set. Specify 0-byte of data length to delete the character string of period.																								

■ Bar Code Marking Data (ASCII Code Specified) (Code: BCS)

Sets character string to be encoded as a bar code or 2D code by ASCII code. (For alphanumeric characters only)

• Setting / Readout data of marking character string

STX	BCS	Sub Command	[Bar Code No.] [Line No.] [Bar Code Data] Max. 33-byte	(Check Sum)	Delimiter
-----	-----	-------------	---	-------------	-----------

Sub command is "S" at the time of setting and "A" for response data at the time of readout.

• Readout request of bar code setting (one-byte character)

STX	BCS	R	[Bar Code No.] [Line No.] Max. 3-byte	(Check Sum)	Delimiter
-----	-----	---	--	-------------	-----------

Name	Data Length [byte]	Description	Remarks
Bar Code No.	1	"0" to "7"	
Line No.	1 or 2	1D code: "1" to "2" 2D code: "1" to "9" 2D part of Composite: "01" to "09"	Specifies the line for data setting.
Bar Code Data	Max 30	20 ASCII code characters within the range from (HEX) to 7E(HEX). (Functional characters should not be included.) FNC1 can be entered at 1D(HEX).	Specifies the character setting in the specified line. Specify the data length with 0 byte in order to delete the character string.

Reference

- If readout data includes function characters (such as "%SFT:0"), the setting character ("%SFT:0") is read out, but characters to be actually marked are not.
- If readout data includes characters that cannot be expressed in ASCII code such as Katakana and Kanji (Shift JIS Code Specified), only these 2-byte characters are read out in shift JIS code.
- If the marking character string contains any function or 2-byte character, the maximum readout data will be 32-byte or more.
- Use the BRS command (2-byte character) when bar code data includes a control code.
- When setting bar code marking data in multiple lines, data in each line are jointed in the order of line numbers and they are coded as the data in one line. (No line break is inserted for each line.)
- When setting bar code marking data in multiple lines, the total input data should be 510-Byte or less.
- In the case that "GS1 Data Matrix" is selected as bar code type in bar code condition setting, the separator of variable length AI data is inputted at GS (1D(HEX)) in this command. The separator can be coded as "FNC1" or "GS". Set beforehand either "GS" or "FNC1" as the separator in Environment 3 on the environment setting screen.
- For codes other than GS1 Data Matrix, the separator of variable length AI data is coded as "FNC1" (fixed). FNC1 can be entered at 1D(HEX).
- If readout data includes a separator of variable length AI data, it is read out as "GS" for all codes regardless of whether "FNC1" or "GS" is inputted.

■ Bar Code Marking Data (Shift JIS Code Specified) (Code: BRS)

Sets character string to be encoded as a bar code or 2D code by shift JIS code. (For characters including control code, KANA, KANJI and function characters)

• Setting / Readout data of bar code marking data

STX	BRS	Sub Command	[Bar Code No.] [Line No.] [Bar Code Data] Max. 63-byte	(Check Sum)	Delimiter
-----	-----	-------------	---	-------------	-----------

Sub command is "S" at the time of setting and "A" for response data at the time of readout.

• Readout request of bar code marking data

STX	BRS	R	[Bar Code No.] [Line No.] Max. 3-byte	(Check Sum)	Delimiter
-----	-----	---	--	-------------	-----------

Name	Data Length [byte]	Description	Remarks
Bar Code No.	1	"0" to "7"	
Line No.	1 or 2	1D code: "1" to "2" 2D code: "1" to "9" 2D part of Composite: "01" to "09"	Specifies the line for data setting.
Bar Code Data	Max 60 (When specifying in shift JIS code)	Specifies the character string within 30 characters with shift JIS code for setting in the specified line. However, for the functional characters, specifies in ASCII code characters with beginning with "%" (25(HEX)).	

Reference

- For the method to specify bar code data, refer to "Setting method of character string for marking (specified with shift JIS code)" (P.85). and "Functional character (specified with ASCII code)" (P.85).
- To input the control code for CODE 128, Data matrix or QR code (binary mode), use the following alternate codes instead of ASCII code.

Control Code	00 (HEX)	to	1F (HEX)	7F (HEX)
Alternate code	F050 (HEX)	to	F06F (HEX)	F071 (HEX)

- To input "FNC1" for CODE128, GS1 Data Matrix, GS1 DataBar Expanded, and 2D side of Composite code, use the following alternate code.

Control Code	FNC1
Alternate code	F072 (HEX)

- When setting bar code marking data in multiple lines, data in each line are jointed in the order of line numbers and they are coded as the data in one line. (No line break is inserted for each line.)
- When setting bar code marking data in multiple lines, make sure the sum of all barcode data is 510-byte or less.
- If readout data includes function characters (such as "%SFT:0"), the setting character ("%SFT:0") is read out, but characters to be actually marked are not.

■ Bar Code Marking Condition (Code: BRF)

Sets the marking condition for bar code and 2D code.

• Setting / Readout data of bar code marking condition

STX	BRF	Sub Command	[Bar Code No.] [Area No.] [Code Type] [Setting Data (varies depending on bar code type)]	(Check Sum)	Delimiter
-----	-----	-------------	---	-------------	-----------

Sub command is "S" at the time of setting and "A" for response data at the time of readout.

• Readout request of bar code marking condition

If the code type is other than composite

STX	BRF	R	[Bar Code No.] 1-byte	(Check Sum)	Delimiter
-----	-----	---	--------------------------	-------------	-----------

If the code type is composite

STX	BRF	R	[Bar Code No.] [1D/2D Selection] 2-byte	(Check Sum)	Delimiter
-----	-----	---	--	-------------	-----------

In [1D/2D Selection] field, specify "0" for readout of 1D side or "1" for readout of 2D side of composite code.

1. QR Code (Data length...41-byte)

Name	Data Length [byte]	Description	Remarks										
Bar Code No.	1	"0" to "7"											
Area No.	1	"0" to "9", "A" to "F"	Specifies which area part is the marking position of the concatenated marking on the flying object. In case of marking static object, specify "0".										
Code Type	2	"10": model 1 "11": model 2 "12": micro QR code											
Version	2	Model 1: "00" to "14" Model 2: "00" to "22" Micro QR: "00" to "04"	When specifying "00", it is automatically specified.										
Data Input Mode	1	"0": Number "1": Alpha (text) "2": Binary "3": Kanji											
Error Correction Level	1	"0": L "1": M "2": Q "3": H	For micro QR, Error Correction Level "H" cannot be used.										
X Position	8	<table border="1"> <thead> <tr> <th>Model type*</th> <th>Setting range [mm]</th> </tr> </thead> <tbody> <tr> <td>LP-V10</td> <td>"-045.000" to "+045.000"</td> </tr> <tr> <td>LP-4x0</td> <td>"-055.000" to "+055.000"</td> </tr> <tr> <td>LP-4x5/LP-V15</td> <td>"-080.000" to "+080.000"</td> </tr> <tr> <td>LP-4x1/LP-W</td> <td>"-027.500" to "+027.500"</td> </tr> </tbody> </table>	Model type*	Setting range [mm]	LP-V10	"-045.000" to "+045.000"	LP-4x0	"-055.000" to "+055.000"	LP-4x5/LP-V15	"-080.000" to "+080.000"	LP-4x1/LP-W	"-027.500" to "+027.500"	Specifies the center coordinate of the code.
Model type*	Setting range [mm]												
LP-V10	"-045.000" to "+045.000"												
LP-4x0	"-055.000" to "+055.000"												
LP-4x5/LP-V15	"-080.000" to "+080.000"												
LP-4x1/LP-W	"-027.500" to "+027.500"												
Y Position	8												
Rotation Angle	7	"-180.00" to "+180.00" [°]											
Module H.	5	"0.050" to "1.000" [mm]	Interval of module in longitudinal direction.										
Module W.	5		Interval of module in lateral direction.										

* For the detail of the model type, refer to "Target Laser Marker" (P.7).

2. For data matrix code / GS1 data matrix code (Data length: 42-byte)

Name	Data Length [byte]	Description	Remarks						
Bar Code No.	1	"0" to "7"							
Area No.	1	"0" to "9", "A" to "F"	Specifies which area part is the marking position of the concatenated marking on the flying object. In case of marking static object, specify "0".						
Code Type	2	"20": Data matrix (ECC200) "21": GS1 Data Matrix without human readable text "22": GS1 Data Matrix with human readable text							
Data Input Mode	1	"0": Binary "1": Kanji	For the GS1 data matrix, select always "0".						
Number of Row	2	"00", "08" to "88" (Combination of number of row and column is limited. *1)	Number of module in Y direction Specifying "00" for number of both row and column encodes with the minimum size (square).						
Number of column	2	"00", "10" to "80" (Combination of number of row and column is limited.*1)	Number of module in X direction Specifying "00" for number of both row and column encodes with the minimum size (square).						
X Position	8	<table border="1"> <thead> <tr> <th>Model type*2</th> <th>Setting range [mm]</th> </tr> </thead> <tbody> <tr> <td>LP-V10</td> <td>"-045.000" to "+045.000"</td> </tr> <tr> <td>LP-4x0</td> <td>"-055.000" to "+055.000"</td> </tr> </tbody> </table>	Model type*2	Setting range [mm]	LP-V10	"-045.000" to "+045.000"	LP-4x0	"-055.000" to "+055.000"	Specifies the center coordinate of the code.
Model type*2	Setting range [mm]								
LP-V10	"-045.000" to "+045.000"								
LP-4x0	"-055.000" to "+055.000"								
Y Position	8	<table border="1"> <tbody> <tr> <td>LP-4x5/LP-V15</td> <td>"-080.000" to "+080.000"</td> </tr> <tr> <td>LP-4x1/LP-W</td> <td>"-027.500" to "+027.500"</td> </tr> </tbody> </table>	LP-4x5/LP-V15	"-080.000" to "+080.000"	LP-4x1/LP-W	"-027.500" to "+027.500"			
LP-4x5/LP-V15	"-080.000" to "+080.000"								
LP-4x1/LP-W	"-027.500" to "+027.500"								
Rotation Angle	7	"-180.00" to "+180.00" [°]							
Module H.	5	"0.001" to "1.000" [mm]	Interval of module in longitudinal direction.						
Module W.	5		Interval of module in lateral direction.						

*1 : Available combination of number of row and column Auto:

Auto: 00 × 00

Square: 10 × 10, 12 × 12, 14 × 14, 16 × 16, 18 × 18, 20 × 20, 22 × 22, 24 × 24, 26 × 26,
32 × 32, 36 × 36, 40 × 40, 48 × 48, 52 × 52, 64 × 64, 72 × 72, 80 × 80, 88 × 88

Rectangle: 08 × 18, 08 × 32, 12 × 26, 12 × 36, 16 × 36, 16 × 48

*2 : *For the detail of the model type, refer to "Target Laser Marker" (P.7).

3. For ITF/CODE39/NW-7

Data length : 57-byte (LP-V series), 54-byte (LP-400/LP-W series)

Name	Data Length [byte]	Description	Remarks										
Bar Code No.	1	"0" to "7"											
Area No.	1	"0" to "9", "A" to "F"	Specifies which area part is the marking position of the concatenated marking on the flying object. In case of marking static object, specify "0".										
Code Type	2	"00": CODE39 "03": NW-7 "01": ITF											
Inversion	1	"0": Do not invert "1": Invert											
Check Character/ Start/Stop Character	1	<ul style="list-style-type: none"> For CODE39, ITF "0": Check character absence "1": Check character presence For NW-7 "A" to "D": Check character absence "a" to "d": Check character presence 	<ul style="list-style-type: none"> For CODE39, ITF, specify the existence of check character. For NW-7, select start and stop characters from A, B, C and D and specify the existence of check character. 										
Bar Code Height	7	<table border="1"> <thead> <tr> <th>Model type*</th> <th>Setting range [mm]</th> </tr> </thead> <tbody> <tr> <td>LP-V10</td> <td>"001.000" to "090.000"</td> </tr> <tr> <td>LP-4x0</td> <td>"001.000" to "110.000"</td> </tr> <tr> <td>LP-4x5/LP-V15</td> <td>"001.000" to "160.000"</td> </tr> <tr> <td>LP-4x1/LP-W</td> <td>"001.000" to "055.000"</td> </tr> </tbody> </table>	Model type*	Setting range [mm]	LP-V10	"001.000" to "090.000"	LP-4x0	"001.000" to "110.000"	LP-4x5/LP-V15	"001.000" to "160.000"	LP-4x1/LP-W	"001.000" to "055.000"	
		Model type*	Setting range [mm]										
		LP-V10	"001.000" to "090.000"										
		LP-4x0	"001.000" to "110.000"										
		LP-4x5/LP-V15	"001.000" to "160.000"										
LP-4x1/LP-W	"001.000" to "055.000"												
Narrow Element	5	"0.050" to "1.000" [mm]	Indicates the width of narrow element of bar and space. Set the larger value than 'Line width' in laser setting screen.										
X Position	8	<table border="1"> <thead> <tr> <th>Model type*</th> <th>Setting range [mm]</th> </tr> </thead> <tbody> <tr> <td>LP-V10</td> <td>"-045.000" to "+045.000"</td> </tr> <tr> <td>LP-4x0</td> <td>"-055.000" to "+055.000"</td> </tr> <tr> <td>LP-4x5/LP-V15</td> <td>"-080.000" to "+080.000"</td> </tr> <tr> <td>LP-4x1/LP-W</td> <td>"-027.500" to "+027.500"</td> </tr> </tbody> </table>	Model type*	Setting range [mm]	LP-V10	"-045.000" to "+045.000"	LP-4x0	"-055.000" to "+055.000"	LP-4x5/LP-V15	"-080.000" to "+080.000"	LP-4x1/LP-W	"-027.500" to "+027.500"	Specifies the center coordinate of the code.
Model type*		Setting range [mm]											
LP-V10		"-045.000" to "+045.000"											
LP-4x0		"-055.000" to "+055.000"											
LP-4x5/LP-V15	"-080.000" to "+080.000"												
LP-4x1/LP-W	"-027.500" to "+027.500"												
Y Position													
Tilt Angle	7	"-180.00" to "+180.00" [°]											
Quiet/ Narrow Element W	4	"00.0" to "20.0"	Ratio of quiet width to narrow element width..										
Wide/ Narrow Element W	3	"1.8" to "3.4"	Ratio of wide element width to narrow element width.										
Laser Power Correction	3	"000" to "200" [%]	<ul style="list-style-type: none"> The correction ratio is calculated using the value set at the laser setting as 100%. With LP-400/LP-W series, nothing should be input in Laser Pulse Cycle Correction. 										
Scan Speed Correction	3	"005" to "500" [%]											
(Laser Pulse Cycle Correction) (Only for LP-V series)	(3)	"050" to "200" [%]											

* For the detail of the model type, refer to "Target Laser Marker" (P.7).

4. For CODE128, EAN/UPC

Data length : 63-byte (LP-V series), 60-byte (LP-400/LP-W series)

Name	Data Length [byte]	Description	Remarks										
Bar Code No.	1	"0" to "7"											
Area No.	1	"0" to "9", "A" to "F"	Specifies which area part is the marking position of the concatenated marking on the flying object. In case of marking static object, specify "0".										
Code Type	2	"02": CODE128 "04": EAN/UPC "08": EAN/UPC with human readable text "09": CODE128 with human readable text											
Inversion	1	"0": Do not invert "1": Invert											
Check Character	1	"0": Check character absence "1": Check character presence											
Bar Code Height	7	<table border="1"> <thead> <tr> <th>Model type*</th> <th>Setting range [mm]</th> </tr> </thead> <tbody> <tr> <td>LP-V10</td> <td>"001.000" to "090.000"</td> </tr> <tr> <td>LP-4x0</td> <td>"001.000" to "110.000"</td> </tr> <tr> <td>LP-4x5/LP-V15</td> <td>"001.000" to "160.000"</td> </tr> <tr> <td>LP-4x1/LP-W</td> <td>"001.000" to "055.000"</td> </tr> </tbody> </table>	Model type*	Setting range [mm]	LP-V10	"001.000" to "090.000"	LP-4x0	"001.000" to "110.000"	LP-4x5/LP-V15	"001.000" to "160.000"	LP-4x1/LP-W	"001.000" to "055.000"	
		Model type*	Setting range [mm]										
		LP-V10	"001.000" to "090.000"										
		LP-4x0	"001.000" to "110.000"										
		LP-4x5/LP-V15	"001.000" to "160.000"										
LP-4x1/LP-W	"001.000" to "055.000"												
Narrow Element	5	"0.050" to "1.000" [mm]	Indicates the width of narrow element of bar and space. Set the larger value than 'Line width' in laser setting screen.										
X Position	8	<table border="1"> <thead> <tr> <th>Model type*</th> <th>Setting range [mm]</th> </tr> </thead> <tbody> <tr> <td>LP-V10</td> <td>"-045.000" to "+045.000"</td> </tr> <tr> <td>LP-4x0</td> <td>"-055.000" to "+055.000"</td> </tr> </tbody> </table>	Model type*	Setting range [mm]	LP-V10	"-045.000" to "+045.000"	LP-4x0	"-055.000" to "+055.000"	Specifies the center coordinate of the code.				
Model type*	Setting range [mm]												
LP-V10	"-045.000" to "+045.000"												
LP-4x0	"-055.000" to "+055.000"												
Y Position	8	<table border="1"> <tbody> <tr> <td>LP-4x5/LP-V15</td> <td>"-080.000" to "+080.000"</td> </tr> <tr> <td>LP-4x1/LP-W</td> <td>"-027.500" to "+027.500"</td> </tr> </tbody> </table>	LP-4x5/LP-V15	"-080.000" to "+080.000"	LP-4x1/LP-W	"-027.500" to "+027.500"							
LP-4x5/LP-V15	"-080.000" to "+080.000"												
LP-4x1/LP-W	"-027.500" to "+027.500"												
Tilt Angle	7	"-180.00" to "+180.00" [°]											
Quiet / Narrow Element W	4	"00.0" to "20.0"	Ratio of quiet width to narrow element width.										
Double Width / Narrow Element	3	"1.4" to "2.6"	Ratio of double width to narrow element width.										
Triple Width / Narrow Element	3	"2.1" to "3.9"	Ratio of triple width to narrow element width.										
Quadruple Width / Narrow Element	3	"2.8" to "5.2"	Ratio of quadruple width to narrow element.										
Laser Power Correction	3	"000" to "200" [%]	<ul style="list-style-type: none"> The correction ratio is calculated using the value set at the laser setting as 100%. With LP-400/LP-W series, nothing should be input in Laser Pulse Cycle Correction. 										
Scan Speed Correction	3	"005" to "500" [%]											
(Laser Pulse Cycle Correction) (Only for LP-V series)	(3)	"050" to "200" [%]											

* For the detail of the model type, refer to "Target Laser Marker" (P.7).

5. For RSS-14 (GS1 DataBar) Standard & Truncated, RSS (GS1 DataBar) Limited and RSS (GS1 DataBar) Expanded (Including when these codes are 1D part of the composite code.)
Data length : 50-byte (LP-V series), 47-byte (LP-400/LP-W series)

Name	Data Length [byte]	Description	Remarks										
Bar Code No.	1	"0" to "7"											
Area No.	1	"0" to "9", "A" to "F"	Specifies which area part is the marking position of the concatenated marking on the flying object. In case of marking static object, specify "0".										
Code Type	2	"30": RSS-14 STD & Truncated "33": RSS Limited "34": RSS Expanded "40": RSS-14 STD & Truncated CC-A "43": RSS Limited CC-A "44": RSS Expanded CC-A "50": RSS-14 STD & Truncated CC-B "53": RSS Limited CC-B "54": RSS Expanded CC-B											
Human Readable Text	1	"0": Invalid "2": Valid											
Inversion	1	"0": Do not invert "1": Invert "2": Invert with guard pattern											
Bar Code Height	7	<table border="1"> <thead> <tr> <th>Model type*</th> <th>Setting range [mm]</th> </tr> </thead> <tbody> <tr> <td>LP-V10</td> <td>"001.000" to "090.000"</td> </tr> <tr> <td>LP-4x0</td> <td>"001.000" to "110.000"</td> </tr> <tr> <td>LP-4x5/LP-V15</td> <td>"001.000" to "160.000"</td> </tr> <tr> <td>LP-4x1/LP-W</td> <td>"001.000" to "055.000"</td> </tr> </tbody> </table>	Model type*	Setting range [mm]	LP-V10	"001.000" to "090.000"	LP-4x0	"001.000" to "110.000"	LP-4x5/LP-V15	"001.000" to "160.000"	LP-4x1/LP-W	"001.000" to "055.000"	
Model type*	Setting range [mm]												
LP-V10	"001.000" to "090.000"												
LP-4x0	"001.000" to "110.000"												
LP-4x5/LP-V15	"001.000" to "160.000"												
LP-4x1/LP-W	"001.000" to "055.000"												
Module width	5	"0.050" to "1.000" [mm]	Set the larger value than 'Line width' in laser setting screen.										
X Position	8	<table border="1"> <thead> <tr> <th>Model type*</th> <th>Setting range [mm]</th> </tr> </thead> <tbody> <tr> <td>LP-V10</td> <td>"-045.000" to "+045.000"</td> </tr> <tr> <td>LP-4x0</td> <td>"-055.000" to "+055.000"</td> </tr> </tbody> </table>	Model type*	Setting range [mm]	LP-V10	"-045.000" to "+045.000"	LP-4x0	"-055.000" to "+055.000"	Specifies the center coordinate of the code.				
Model type*	Setting range [mm]												
LP-V10	"-045.000" to "+045.000"												
LP-4x0	"-055.000" to "+055.000"												
Y Position	8	<table border="1"> <tbody> <tr> <td>LP-4x5/LP-V15</td> <td>"-080.000" to "+080.000"</td> </tr> <tr> <td>LP-4x1/LP-W</td> <td>"-027.500" to "+027.500"</td> </tr> </tbody> </table>	LP-4x5/LP-V15	"-080.000" to "+080.000"	LP-4x1/LP-W	"-027.500" to "+027.500"							
LP-4x5/LP-V15	"-080.000" to "+080.000"												
LP-4x1/LP-W	"-027.500" to "+027.500"												
Tilt Angle	7	"-180.00" to "+180.00" [°]											
Laser Power Correction	3	"000" to "200" [%]	<ul style="list-style-type: none"> The correction ratio is calculated using the value set at the laser setting as 100%. With LP-400/LP-W series, nothing should be input in Laser Pulse Cycle Correction. 										
Scan Speed Correction	3	"005" to "500" [%]											
(Laser Pulse Cycle Correction) (Only for LP-V series)	(3)	"050" to "200" [%]											

* For the detail of the model type, refer to "Target Laser Marker" (P.7).

6. For RSS-14 (GS1 DataBar) Stacked, RSS-14 (GS1 DataBar) Stacked Omnidirectional
(Including when these codes are 1D part of the composite code.)
Data length : 54-byte (LP-V series), 51-byte (LP-400/LP-W series)

Name	Data Length [byte]	Description	Remarks										
Bar Code No.	1	"0" to "7"											
Area No.	1	"0" to "9", "A" to "F"	Specifies which area part is the marking position of the concatenated marking on the flying object. In case of marking static object, specify "0".										
Code Type	2	"31": RSS-14 Stacked "32": RSS-14 Stacked Omnidirectional "41": RSS-14 Stacked CC-A "42": RSS-14 Stacked Omnidirectional CC-A "51": RSS-14 Stacked CC-B "52": RSS-14 Stacked Omnidirectional CC-B											
Human Readable Text	1	"0": Invalid "2": Valid											
Inversion	1	"0": Do not invert "1": Invert "2": Invert with guard pattern											
Lower Bar Height (RSS-14 Stacked) One Bar Code Height (RSS-14 Stacked Omnidirectional)	7	<table border="1"> <thead> <tr> <th>Model type*</th> <th>Setting range [mm]</th> </tr> </thead> <tbody> <tr> <td>LP-V10</td> <td>"001.000" to "090.000"</td> </tr> <tr> <td>LP-4x0</td> <td>"001.000" to "110.000"</td> </tr> <tr> <td>LP-4x5/LP-V15</td> <td>"001.000" to "160.000"</td> </tr> <tr> <td>LP-4x1/LP-W</td> <td>"001.000" to "055.000"</td> </tr> </tbody> </table>	Model type*	Setting range [mm]	LP-V10	"001.000" to "090.000"	LP-4x0	"001.000" to "110.000"	LP-4x5/LP-V15	"001.000" to "160.000"	LP-4x1/LP-W	"001.000" to "055.000"	
Model type*	Setting range [mm]												
LP-V10	"001.000" to "090.000"												
LP-4x0	"001.000" to "110.000"												
LP-4x5/LP-V15	"001.000" to "160.000"												
LP-4x1/LP-W	"001.000" to "055.000"												
Separator Height/ (W)	4	"00.0" to "10.0"	Ratio of separation pattern height to width in laser setting screen.										
Module width	5	"0.050" to "1.000" [mm]	Set the larger value than 'Line width'.										
X Position	8	<table border="1"> <thead> <tr> <th>Model type*</th> <th>Setting range [mm]</th> </tr> </thead> <tbody> <tr> <td>LP-V10</td> <td>"-045.000" to "+045.000"</td> </tr> <tr> <td>LP-4x0</td> <td>"-055.000" to "+055.000"</td> </tr> </tbody> </table>	Model type*	Setting range [mm]	LP-V10	"-045.000" to "+045.000"	LP-4x0	"-055.000" to "+055.000"	Specifies the center coordinate of the code.				
Model type*	Setting range [mm]												
LP-V10	"-045.000" to "+045.000"												
LP-4x0	"-055.000" to "+055.000"												
Y Position	8	<table border="1"> <tbody> <tr> <td>LP-4x5/LP-V15</td> <td>"-080.000" to "+080.000"</td> </tr> <tr> <td>LP-4x1/LP-W</td> <td>"-027.500" to "+027.500"</td> </tr> </tbody> </table>	LP-4x5/LP-V15	"-080.000" to "+080.000"	LP-4x1/LP-W	"-027.500" to "+027.500"							
LP-4x5/LP-V15	"-080.000" to "+080.000"												
LP-4x1/LP-W	"-027.500" to "+027.500"												
Tilt Angle	7	"-180.00" to "+180.00" [°]											
Laser Power Correction	3	"000" to "200" [%]	<ul style="list-style-type: none"> The correction ratio is calculated using the value set at the laser setting as 100%. With LP-400/LP-W series, nothing should be input in Laser Pulse Cycle Correction. 										
Scan Speed Correction	3	"005" to "500" [%]											
(Laser Pulse Cycle Correction) (Only for LP-V series)	(3)	"050" to "200" [%]											

* For the detail of the model type, refer to "Target Laser Marker" (P.7).

7. For RSS (GS1 DataBar) Expanded Stacked
(Including when this code is 1D part of the composite code.)
Data length : 56-byte (LP-V series), 53-byte (LP-400/LP-W series)

Name	Data Length [byte]	Description	Remarks
Bar Code No.	1	"0" to "7"	
Area No.	1	"0" to "9", "A" to "F"	Specifies which area part is the marking position of the concatenated marking on the flying object. In case of marking static object, specify "0"
Code Type	2	"35": RSS Expanded Stacked "45": RSS Expanded Stacked CC-A "55": RSS Expanded Stacked CC-B	
Human Readable Text	1	"0": Invalid "2": Valid	
Inversion	1	"0": Do not invert "1": Invert "2": Invert with guard pattern	
One Bar Code Height	7	Model type*	Setting range [mm]
		LP-V10	"001.000" to "090.000"
		LP-4x0	"001.000" to "110.000"
		LP-4x5/LP-V15	"001.000" to "160.000"
LP-4x1/LP-W	"001.000" to "055.000"		
Separator Height/(W)	4	"00.0" to "10.0"	Ratio of separation pattern height to width.
Symbol Char. In row	2	"02" to "20" Only even value applied	Number of Symbol Character in lateral direction.
Module width	5	"0.050" to "1.000" [mm]	Set the larger value than 'Line width' in laser setting screen.
X Position	8	Model type*	Setting range [mm]
		LP-V10	"-045.000" to "+045.000"
Y Position	8	LP-4x0	"-055.000" to "+055.000"
		LP-4x5/LP-V15	"-080.000" to "+080.000"
LP-4x1/LP-W	"-027.500" to "+027.500"	Specifies the center coordinate of the code.	
Tilt Angle	7	"-180.00" to "+180.00" [°]	
Laser Power Correction	3	"000" to "200" [%]	<ul style="list-style-type: none"> The correction ratio is calculated using the value set at the laser setting as 100%. With LP-400/LP-W series, nothing should be input in Laser Pulse Cycle Correction.
Scan Speed Correction	3	"005" to "500" [%]	
(Laser Pulse Cycle Correction) (Only for LP-V series)	(3)	"050" to "200" [%]	

* For the detail of the model type, refer to "Target Laser Marker" (P.7).

8. When EAN/UPC and EAN128 (GS1-128) are 1D part of composite code
 Data length : 54-byte (LP-V series), 51-byte (LP-400/LP-W series)

Name	Data Length [byte]	Description	Remarks										
Bar Code No.	1	“0” to “7”											
Area No.	1	“0” to “9”, “A” to “F”	Specifies which area part is the marking position of the concatenated marking on the flying object. In case of marking static object, specify “0”.										
Code Type	2	CC-A Composite 1D part “46”: EAN/UPC “47”: UCC/EAN128 “48”: EAN/UPC with human readable text “49”: UCC/EAN128 with human readable text CC-B Composite 1D part “56”: EAN/UPC “57”: UCC/EAN128 “58”: EAN/UPC with human readable text “59”: UCC/EAN128 with human readable text CC-C Composite 1D part “67”: UCC/EAN128 “69”: UCC/EAN128 with human readable text											
System reservation	1	“0” fixed											
Inversion	1	“0”: Do not invert “1”: Invert											
Bar Code Height	7	<table border="1"> <thead> <tr> <th>Model type*</th> <th>Setting range [mm]</th> </tr> </thead> <tbody> <tr> <td>LP-V10</td> <td>“001.000” to “090.000”</td> </tr> <tr> <td>LP-4x0</td> <td>“001.000” to “110.000”</td> </tr> <tr> <td>LP-4x5/LP-V15</td> <td>“001.000” to “160.000”</td> </tr> <tr> <td>LP-4x1/LP-W</td> <td>“001.000” to “055.000”</td> </tr> </tbody> </table>	Model type*	Setting range [mm]	LP-V10	“001.000” to “090.000”	LP-4x0	“001.000” to “110.000”	LP-4x5/LP-V15	“001.000” to “160.000”	LP-4x1/LP-W	“001.000” to “055.000”	
Model type*	Setting range [mm]												
LP-V10	“001.000” to “090.000”												
LP-4x0	“001.000” to “110.000”												
LP-4x5/LP-V15	“001.000” to “160.000”												
LP-4x1/LP-W	“001.000” to “055.000”												
Narrow Element	5	“0.050” to “1.000” [mm]	Set the larger value than 'Line width' in laser setting screen.										
X Position	8	<table border="1"> <thead> <tr> <th>Model type*</th> <th>Setting range [mm]</th> </tr> </thead> <tbody> <tr> <td>LP-V10</td> <td>“-045.000” to “+045.000”</td> </tr> <tr> <td>LP-4x0</td> <td>“-055.000” to “+055.000”</td> </tr> <tr> <td>LP-4x5/LP-V15</td> <td>“-080.000” to “+080.000”</td> </tr> <tr> <td>LP-4x1/LP-W</td> <td>“-027.500” to “+027.500”</td> </tr> </tbody> </table>	Model type*	Setting range [mm]	LP-V10	“-045.000” to “+045.000”	LP-4x0	“-055.000” to “+055.000”	LP-4x5/LP-V15	“-080.000” to “+080.000”	LP-4x1/LP-W	“-027.500” to “+027.500”	Specifies the center coordinate of the code.
Model type*	Setting range [mm]												
LP-V10	“-045.000” to “+045.000”												
LP-4x0	“-055.000” to “+055.000”												
LP-4x5/LP-V15	“-080.000” to “+080.000”												
LP-4x1/LP-W	“-027.500” to “+027.500”												
Y Position	8												
Tilt Angle	7	“-180.00” to “+180.00” [°]											
Quiet/Narrow Element W	4	“00.0” to “20.0”	Ratio of quiet width to narrow element width.										
Laser Power Correction	3	“000” to “200” [%]	<ul style="list-style-type: none"> The correction ratio is calculated using the value set at the laser setting as 100%. With LP-400/LP-W series, nothing should be input in Laser Pulse Cycle Correction. 										
Scan Speed Correction	3	“005” to “500” [%]											
(Laser Pulse Cycle Correction) (Only for LP-V series)	(3)	“050” to “200” [%]											

* For the detail of the model type, refer to “Target Laser Marker” (P.7).

9. For 2D part of composite code

Data length : 32-byte (LP-V series), 29-byte (LP-400/LP-W series)

Name	Data Length [byte]	Description	Remarks
Bar Code No.	1	"0" to "7"	
Area No.	1	"0" to "9", "A" to "F"	Specifies which area part is the marking position of the concatenated marking on the flying object. In case of marking static object, specify "0".
Code Type	2	CC-A Composite 1D part "40": RSS-14 STD & Truncated "41": RSS-14 Stacked "42": RSS-14 Stacked Omnidirectional "43": RSS Limited "44": RSS Expanded "45": RSS Expanded Stacked "46": EAN/UPC *1 "47": UCC/EAN128 "48": EAN/UPC with human readable text "49": UCC/EAN128 with human readable text CC-B Composite 1D part "50": RSS-14 STD & Truncated "51": RSS-14 Stacked "52": RSS-14 Stacked Omnidirectional "53": RSS Limited "54": RSS Expanded "55": RSS Expanded Stacked "56": EAN/UPC *1 "57": UCC/EAN128 "58": EAN/UPC with human readable text "59": UCC/EAN128 with human readable text CC-C Composite 1D part "67": UCC/EAN128 "69": UCC/EAN128 with human readable text	
Human readable text of 2D part	1	"1": Invalid "3": Valid	
Composite Row Height	5	"0.050" to "9.999" [mm]	
Number of Column	2	"00": Auto "03" to "90" (Limited: *2)	
Number of Row	2	"00" for CC-A or CC-B "00" to "30" for CC-C ("00" is Auto)	
Separator Height/ (W)	4	"00.0" to "10.0"	Ratio of separator height to narrow element width of 1D part.
Quiet/ (W) Ratio	4	"00.0" to "20.0"	Ratio of quiet width to narrow element width of 1D part.
Error Correction Level	1	"0" for CC-A or CC-B "0" to "9" for CC-C	

Name	Data Length [byte]	Description	Remarks
Laser Power Correction	3	"000" to "200" [%]	<ul style="list-style-type: none"> The correction ratio is calculated using the value set at the laser setting as 100%. With LP-400/LP-W series, nothing should be input in Laser Pulse Cycle Correction.
Scan Speed Correction	3	"005" to "500" [%]	
(Laser Pulse Cycle Correction) (Only for LP-V series)	(3)	"050" to "200" [%]	

*1 : In case of selecting ["46": EAN/UPC CC-A] or ["56": EAN/UPC CC-B] of bar code type, a bar code is automatically generated according to the input characters in bar code data (1D side).

Input Characters	Bar Code type
Input 12 digit excepting a check digit.	EAN/JAN-13
Input 7 digit excepting a check digit.	EAN/JAN-8
Input 11 digit excepting a check digit.	UPC-A
Input 6 digit excepting a check digit.	UPC-E

*2 : The number of column of bar code is limited according to bar code's type.

Bar Code Type	The Number of Column Available for CC-A Code	The Number of Column Available for CC-B Code
UPC-E RSS-14 (GS1 DataBar) Stacked RSS-14 (GS1 DataBar) Stacked Omnidirectional	5, 6, 7, 8, 9, 10, 12 [column]	8, 11, 14, 17, 20, 23, 26 [column]
EAN/JAN-8 RSS (GS1 DataBar) Limited	4, 5, 6, 7, 8 [column]	6, 8, 10, 12, 15, 20, 26, 32, 38, 44 [column]
EAN-13/JAN-13 UPC-A UCC/EAN128 RSS-14 (GS1 DataBar) RSS-14 (GS1 DataBar) Truncated RSS (GS1 DataBar) Expanded RSS (GS1 DataBar) Expanded Stacked	3, 4, 5, 6, 7 [column]	4, 6, 8, 10, 12, 15, 20, 26, 32, 38, 44 [column]

■ Human Readable Text (Code: BRV)

Sets the marking condition for the Human Readable Text to be added to a bar code or 2D code.

• Setting / Readout data of Human Readable Text

STX	BRV	Sub Command	[Bar Code No.] [Setting Section] [Human Readable Text Setting] Max 57-byte (LP-V series), Max 54-byte (LP-400/LP-W series)	(Check Sum)	Delimiter
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Sub command is "S" at the time of setting and "A" for response data at the time of readout.

• Readout request of Human Readable Text

STX	BRV	R	[Bar Code No.] [Setting Section] 2-byte	(Check Sum)	Delimiter
-----	-----	---	--	-------------	-----------

Reference

- A one-byte character which can not be converted to one-byte, including Katakana, is read out using the corresponding double-byte character (shift JIS code).

Name	Data Length [byte]	Description	Remarks										
Bar Code No.	1	"0" to "7"											
Setting Section	1	"1": Bar code, GS1 Data Matrix, or 1D side of Composite code "2": 2D side of Composite code	When the code type is other than the Composite code, select "1".										
X Position	8	<table border="1"> <thead> <tr> <th>Model type*</th> <th>Setting range [mm]</th> </tr> </thead> <tbody> <tr> <td>LP-V10</td> <td>"-045.000" to "+045.000"</td> </tr> <tr> <td>LP-4x0</td> <td>"-055.000" to "+055.000"</td> </tr> </tbody> </table>	Model type*	Setting range [mm]	LP-V10	"-045.000" to "+045.000"	LP-4x0	"-055.000" to "+055.000"	Specifies relative coordinate of X/Y position of human readable text to the center of bar code.				
Model type*	Setting range [mm]												
LP-V10	"-045.000" to "+045.000"												
LP-4x0	"-055.000" to "+055.000"												
Y Position	8	<table border="1"> <tbody> <tr> <td>LP-4x5/LP-V15</td> <td>"-080.000" to "+080.000"</td> </tr> <tr> <td>LP-4x1/LP-W</td> <td>"-027.500" to "+027.500"</td> </tr> </tbody> </table>	LP-4x5/LP-V15	"-080.000" to "+080.000"	LP-4x1/LP-W	"-027.500" to "+027.500"							
LP-4x5/LP-V15	"-080.000" to "+080.000"												
LP-4x1/LP-W	"-027.500" to "+027.500"												
Character Height	7	<table border="1"> <thead> <tr> <th>Model type*</th> <th>Setting range [mm]</th> </tr> </thead> <tbody> <tr> <td>LP-V10</td> <td>"000.100" to "090.000"</td> </tr> <tr> <td>LP-4x0</td> <td>"000.100" to "110.000"</td> </tr> </tbody> </table>	Model type*	Setting range [mm]	LP-V10	"000.100" to "090.000"	LP-4x0	"000.100" to "110.000"					
Model type*	Setting range [mm]												
LP-V10	"000.100" to "090.000"												
LP-4x0	"000.100" to "110.000"												
Character Width	7	<table border="1"> <tbody> <tr> <td>LP-4x5/LP-V15</td> <td>"000.100" to "160.000"</td> </tr> <tr> <td>LP-4x1/LP-W</td> <td>"000.100" to "055.000"</td> </tr> </tbody> </table>	LP-4x5/LP-V15	"000.100" to "160.000"	LP-4x1/LP-W	"000.100" to "055.000"							
LP-4x5/LP-V15	"000.100" to "160.000"												
LP-4x1/LP-W	"000.100" to "055.000"												
Character Interval	7	<table border="1"> <thead> <tr> <th>Model type*</th> <th>Setting range [mm]</th> </tr> </thead> <tbody> <tr> <td>LP-V10</td> <td>"000.000" to "090.000"</td> </tr> <tr> <td>LP-4x0</td> <td>"000.000" to "110.000"</td> </tr> <tr> <td>LP-4x5/LP-V15</td> <td>"000.000" to "160.000"</td> </tr> <tr> <td>LP-4x1/LP-W</td> <td>"000.000" to "055.000"</td> </tr> </tbody> </table>	Model type*	Setting range [mm]	LP-V10	"000.000" to "090.000"	LP-4x0	"000.000" to "110.000"	LP-4x5/LP-V15	"000.000" to "160.000"	LP-4x1/LP-W	"000.000" to "055.000"	
Model type*	Setting range [mm]												
LP-V10	"000.000" to "090.000"												
LP-4x0	"000.000" to "110.000"												
LP-4x5/LP-V15	"000.000" to "160.000"												
LP-4x1/LP-W	"000.000" to "055.000"												
Font	1	"1": Character font 1 "2": Character font 2											
Laser Power Correction	3	"000" to "200" [%]	<ul style="list-style-type: none"> The correction ratio is calculated using the value set at the laser setting as 100%. With LP-400/LP-W series, nothing should be input in Laser Pulse Cycle Correction. 										
Scan Speed Correction	3	"005" to "500" [%]											
(Laser Pulse Cycle Correction) (Only for LP-V series)	(3)	"050" to "200" [%]											

Name	Data Length [byte]	Description	Remarks										
Linefeed	(1)	"0": Without linefeed "1": With linefeed (Only for 2D side or GS1 data matrix)	Specifies the linefeed at marking human readable text. When the linefeed is valid, the line break part conforms with the line number of the bar code data.										
Line Interval	(7)	<table border="1"> <thead> <tr> <th>Model type*</th> <th>Setting range [mm]</th> </tr> </thead> <tbody> <tr> <td>LP-V10</td> <td>"000.000" to "090.000"</td> </tr> <tr> <td>LP-4x0</td> <td>"000.000" to "110.000"</td> </tr> <tr> <td>LP-4x5/LP-V15</td> <td>"000.000" to "160.000"</td> </tr> <tr> <td>LP-4x1/LP-W</td> <td>"000.000" to "055.000"</td> </tr> </tbody> </table>	Model type*	Setting range [mm]	LP-V10	"000.000" to "090.000"	LP-4x0	"000.000" to "110.000"	LP-4x5/LP-V15	"000.000" to "160.000"	LP-4x1/LP-W	"000.000" to "055.000"	(Only for marking of Composite on a new line on 2D side.) Specifies the line interval at marking human readable text on a new line.
		Model type*	Setting range [mm]										
		LP-V10	"000.000" to "090.000"										
		LP-4x0	"000.000" to "110.000"										
LP-4x5/LP-V15	"000.000" to "160.000"												
LP-4x1/LP-W	"000.000" to "055.000"												

* For the detail of the model type, refer to "Target Laser Marker" (P.7).

■ 2D Code Pattern (Code: BRP)

Sets 2D code module marking pattern.

• Setting / Readout data of 2D code pattern

STX	BRP	Sub Command	[Bar Code No.] [Pattern Type] [Character Code] [Laser Power Correction] [Scan Speed Correction] [Laser Pulse Cycle Correction] 15-byte (LP-V series), 12-byte (LP-400/LP-W series)	(Check Sum)	Delimiter
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Sub command is "S" at the time of setting and "A" for response data at the time of readout.

• Readout request of 2D code pattern

STX	BRP	R	[Bar Code No.] [Pattern Type] 2-byte	(Check Sum)	Delimiter
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Name	Data Length [byte]	Description	Remarks
Bar Code No.	1	"0" to "7"	
Pattern Type	1	<ul style="list-style-type: none"> QR code: <ul style="list-style-type: none"> "0": Margin "1": Dark Module "2": Light Module "3": Alignment "4": Finder Data Matrix code: <ul style="list-style-type: none"> "0": Quiet Zone: "1": Mark Module "2": Space Module 	
Character code	4	"0000", "2230" to "2239" or "8121" to "8152"	Specifies the character code to be used as a pattern in JIS code. Set "0000" to no marking pattern. However, when the alignment finder pattern of the QR code is set to "0000", marking is performed using the dark/light module.
Laser Power Correction	3	"000" to "200" [%]	<ul style="list-style-type: none"> The correction ratio is calculated using the value set at the laser setting as 100%. With LP-400/LP-W series, nothing should be input in Laser Pulse Cycle Correction.
Scan Speed Correction	3	"005" to "500" [%]	
(Laser Pulse Cycle Correction) (Only for LP-V series)	(3)	"050" to "200" [%]	

■ Logo File (Code: CDF)

Sets the logo file.

• Setting / Readout data of logo marking function

STX	CDF	Sub Command	[Log No.] [Log File Name] Variable length	(Check Sum)	Delimiter
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Sub command is "S" at the time of setting and "A" for response data at the time of readout.

• Readout request of logo marking function

STX	CDF	R	[Logo No.] 2-byte	(Check Sum)	Delimiter
-----	-----	---	----------------------	-------------	-----------

Name	Data Length [byte]	Description	Remarks
Logo No.	2	"00" to "15"	
Logo File Name	Variable length	The long file name can be specified. Except the extended characters, entry of up to 10 Shift-JIS characters or 20 ASCII code characters is recommended.	<p>The logo file name corresponding to the specified number is indicated. The logo file setting will be deleted when no file name is specified in this command.</p> <ul style="list-style-type: none"> For VEC file, the extension can be omitted (in this case, the response has an extension.) When the file name is "ABCD.VEC": "ABCD" or "ABCD.VEC" For a DXF file, an extension is required. When the file name is "ABCD.DXF": "ABCD.DXF".

↓ Reference

- In the case of specifying logo file in VEC format, apply CDC command for setting logo condition, and in the case of specifying logo file in DXF format, apply CDD command for setting logo condition.
- If readout data includes characters that cannot be expressed in ASCII code such as Katakana and Kanji (2-byte character), these 2-byte characters are read out in shift JIS code.

■ VEC Logo Conditions (Code: CDC)

Sets the marking condition of VEC (work shape converted for laser marker) logo file.

• Setting / Readout data of VEC logo condition

STX	CDC	Sub Command	[Logo No.] [Area No.] [X Scale] [Y Scale] [X Position] [Y Position] [Rotation Angle] [Laser power correction] [Scan speed correction] [Laser Pulse Cycle Correction] 51-byte (LP-V series), 48-byte (LP-400/LP-W series)	(Check Sum)	Delimiter
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Sub command is "S" at the time of setting and "A" for response data at the time of readout.

• Readout request of VEC logo condition

STX	CDC	R	[Logo No.] 2-byte	(Check Sum)	Delimiter
-----	-----	---	----------------------	-------------	-----------

Name	Data Length [byte]	Content	Remarks
Logo No.	2	"00" to "15"	
Area No.	1	"0" to "9", "A" to "F"	Specifies which area part is the marking position of the concatenated marking on the flying object. In case of marking static object, specify "0".
X Scale	8	"0010.000" to "1000.000" [%]	
Y Scale	8		
X Position	8	"-300.000" to "+300.000" [mm]	Specifies the origin coordinate of the logo.
Y Position	8		
Rotation Angle	7	"-180.00" to "+180.00" [°]	The center of the rotation is the origin position of logo file.
Laser Power Correction	3	"000" to "200" [%]	<ul style="list-style-type: none"> The correction ratio is calculated using the value set at the laser setting as 100%. With LP-400/LP-W series, nothing should be input in Laser Pulse Cycle Correction.
Scan Speed Correction	3	"005" to "500" [%]	
(Laser Pulse Cycle Correction) (Only for LP-V series)	(3)	"050" to "200" [%]	

↓ Reference

- Use the CDD Command for the condition setting of DXF file. The common parameters with VEC and DXF files are changed by either CDC/CDD command.

■ DXF Logo Condition (Code: CDD)

Sets the marking condition of DXF logo file.

• Setting / Readout data of DXF logo condition

STX	CDD	Sub Command	[Logo No.] [Area No.] [Origin Position] [X Position] [Y Position] [Rotation Angle] [Size Specification] [Width] [Height] [Font] [Marking Pitch] [Marking Direction] [Laser Power Correction] [Scan Speed Correction] [Laser Pulse Cycle Correction] Max. 58-byte (LP-V series), Max. 55-byte (LP-400/LP-W series)	(Check Sum)	Delimiter
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Sub command is "S" at the time of setting and "A" for response data at the time of readout.

• Readout request of DXF logo condition

STX	CDD	R	[Logo No.] 2-byte	(Check Sum)	Delimiter
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Name	Data Length [byte]	Content	Remarks						
Logo No.	2	"00" to "15"							
Area No.	1	"0" to "9", "A" to "F"	Specifies which area part is the marking position of the concatenated marking on the flying object. In case of marking static object, specify "0".						
Origin Position	1	"0": Center "1": Left bottom "2": Right bottom "3": Left top "4": Right top "5": Original graphic							
X Position	8	"-300.000" to "+300.000"[mm]	Specifies the origin coordinate of the logo.						
Y Position	8								
Rotation Angle	7	"-180.00" to "+180.00" ["]							
Size Specification	1	"0": Height/Width "1": Width "2": Height(width fixed) "3": As original graphic size							
Width	(7)	<table border="1"> <thead> <tr> <th>Model type*</th> <th>Setting range [mm]</th> </tr> </thead> <tbody> <tr> <td>LP-V10</td> <td>"000.100" to "090.000"</td> </tr> <tr> <td>LP-4x0</td> <td>"000.100" to "110.000"</td> </tr> </tbody> </table>	Model type*	Setting range [mm]	LP-V10	"000.100" to "090.000"	LP-4x0	"000.100" to "110.000"	Available only "0": Height/Width or "1": Width is specified at "Size specification".
Model type*	Setting range [mm]								
LP-V10	"000.100" to "090.000"								
LP-4x0	"000.100" to "110.000"								
Height	(7)	<table border="1"> <tbody> <tr> <td>LP-4x5/LP-V15</td> <td>"000.100" to "160.000"</td> </tr> <tr> <td>LP-4x1/LP-W</td> <td>"000.100" to "055.000"</td> </tr> </tbody> </table>	LP-4x5/LP-V15	"000.100" to "160.000"	LP-4x1/LP-W	"000.100" to "055.000"	Available only "0": Height/Width or "2": Height is specified at "Size specification".		
LP-4x5/LP-V15	"000.100" to "160.000"								
LP-4x1/LP-W	"000.100" to "055.000"								
Font	1	"1": Character font 1 "2": Character font 2	Sets font of logo file data.						
Marking Pitch	5	"0.010" to "2.000"							
Marking Direction	1	"0": Lateral "1": Longitudinal							

Name	Data Length [byte]	Content	Remarks
Laser Power Correction	3	"000" to "200" [%]	<ul style="list-style-type: none"> The correction ratio is calculated using the value set at the laser setting as 100%. With LP-400/LP-W series, nothing should be input in Laser Pulse Cycle Correction.
Scan Speed Correction	3	"005" to "500" [%]	
(Laser Pulse Cycle Correction) (Only for LP-V series)	(3)	"050" to "200" [%]	

* For the detail of the model type, refer to "Target Laser Marker" (P.7).

Reference

- Use the CDC Command for the condition setting of VEC file. The common parameters with VEC and DXF files are changed by either CDC/CDD command.

■ Processing Element (Code: FIG)

Sets the processing element type (straight line, circle, arc) and coordinates.

• Setting / Readout data of processing element

STX	FIG	Sub Command	[Processing Condition No.] [Processing Element No.] [Element type] [depending on the element type] Max 60-byte	(Check Sum)	Delimiter
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Sub command is "S" at the time of setting and "A" for response data at the time of readout.

• Readout request of processing element

STX	FIG	R	[Processing Condition No.] [Processing Element No.] 4-byte	(Check Sum)	Delimiter
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1. For straight line: (Data length: Max. 51-byte)

Name	Data Length [byte]	Description	Remarks										
Processing Condition No.	1	"0" to "7"											
Processing Element No.	3	"000" to "031"											
Element type	1	"0": straight line											
X Coordinate of Start Point	8	<table border="1"> <thead> <tr> <th>Model type*</th> <th>Setting range [mm]</th> </tr> </thead> <tbody> <tr> <td>LP-V10</td> <td>"-045.000" to "+045.000"</td> </tr> <tr> <td>LP-4x0</td> <td>"-055.000" to "+055.000"</td> </tr> <tr> <td>LP-4x5/LP-V15</td> <td>"-080.000" to "+080.000"</td> </tr> <tr> <td>LP-4x1/LP-W</td> <td>"-027.500" to "+027.500"</td> </tr> </tbody> </table>	Model type*	Setting range [mm]	LP-V10	"-045.000" to "+045.000"	LP-4x0	"-055.000" to "+055.000"	LP-4x5/LP-V15	"-080.000" to "+080.000"	LP-4x1/LP-W	"-027.500" to "+027.500"	
Model type*	Setting range [mm]												
LP-V10	"-045.000" to "+045.000"												
LP-4x0	"-055.000" to "+055.000"												
LP-4x5/LP-V15	"-080.000" to "+080.000"												
LP-4x1/LP-W	"-027.500" to "+027.500"												
Y Coordinate of Start Point	8												
X Coordinate of End Point	8												
Y Coordinate of End Point	8												
Dashed Line: Length of Solid Part	(7)	<table border="1"> <thead> <tr> <th>Model type*</th> <th>Setting range [mm]</th> </tr> </thead> <tbody> <tr> <td>LP-V10</td> <td>"000.010" to "090.000"</td> </tr> <tr> <td>LP-4x0</td> <td>"000.010" to "110.000"</td> </tr> <tr> <td>LP-4x5/LP-V15</td> <td>"000.010" to "160.000"</td> </tr> <tr> <td>LP-4x1/LP-W</td> <td>"000.010" to "055.000"</td> </tr> </tbody> </table>	Model type*	Setting range [mm]	LP-V10	"000.010" to "090.000"	LP-4x0	"000.010" to "110.000"	LP-4x5/LP-V15	"000.010" to "160.000"	LP-4x1/LP-W	"000.010" to "055.000"	Set the larger value than 'Line width' in laser setting screen. To make it not dashed line (solid line), input nothing.
Model type*	Setting range [mm]												
LP-V10	"000.010" to "090.000"												
LP-4x0	"000.010" to "110.000"												
LP-4x5/LP-V15	"000.010" to "160.000"												
LP-4x1/LP-W	"000.010" to "055.000"												
Dashed Line: Length of Blank Part	(7)	<table border="1"> <thead> <tr> <th>Model type*</th> <th>Setting range [mm]</th> </tr> </thead> <tbody> <tr> <td>LP-V10</td> <td>"000.000" to "090.000"</td> </tr> <tr> <td>LP-4x0</td> <td>"000.000" to "110.000"</td> </tr> <tr> <td>LP-4x5/LP-V15</td> <td>"000.000" to "160.000"</td> </tr> <tr> <td>LP-4x1/LP-W</td> <td>"000.000" to "055.000"</td> </tr> </tbody> </table>	Model type*	Setting range [mm]	LP-V10	"000.000" to "090.000"	LP-4x0	"000.000" to "110.000"	LP-4x5/LP-V15	"000.000" to "160.000"	LP-4x1/LP-W	"000.000" to "055.000"	To make it not dashed line (solid line), input nothing.
Model type*	Setting range [mm]												
LP-V10	"000.000" to "090.000"												
LP-4x0	"000.000" to "110.000"												
LP-4x5/LP-V15	"000.000" to "160.000"												
LP-4x1/LP-W	"000.000" to "055.000"												

For deletion of the processing element, set the element type to straight line, and set X and Y coordinates of both start and end points to "0".

* For the detail of the model type, refer to "Target Laser Marker" (P.7).

2. For circle (Data length: Max. 42-byte)

Name	Data Length [byte]	Description	Remarks										
Processing Condition No.	1	"0" to "7"											
Processing Element No.	3	"000" to "031"											
Element type	1	"1": circle											
Center X	8	<table border="1"> <thead> <tr> <th>Model type*</th> <th>Setting range [mm]</th> </tr> </thead> <tbody> <tr> <td>LP-V10</td> <td>"-045.000" to "+045.000"</td> </tr> <tr> <td>LP-4x0</td> <td>"-055.000" to "+055.000"</td> </tr> </tbody> </table>	Model type*	Setting range [mm]	LP-V10	"-045.000" to "+045.000"	LP-4x0	"-055.000" to "+055.000"					
Model type*	Setting range [mm]												
LP-V10	"-045.000" to "+045.000"												
LP-4x0	"-055.000" to "+055.000"												
Center Y	8	<table border="1"> <tbody> <tr> <td>LP-4x5/LP-V15</td> <td>"-080.000" to "+080.000"</td> </tr> <tr> <td>LP-4x1/LP-W</td> <td>"-027.500" to "+027.500"</td> </tr> </tbody> </table>	LP-4x5/LP-V15	"-080.000" to "+080.000"	LP-4x1/LP-W	"-027.500" to "+027.500"							
LP-4x5/LP-V15	"-080.000" to "+080.000"												
LP-4x1/LP-W	"-027.500" to "+027.500"												
Radius	7	<table border="1"> <thead> <tr> <th>Model type*</th> <th>Setting range [mm]</th> </tr> </thead> <tbody> <tr> <td>LP-V10</td> <td>"000.010" to "045.000"</td> </tr> <tr> <td>LP-4x0</td> <td>"000.010" to "055.000"</td> </tr> <tr> <td>LP-4x5/LP-V15</td> <td>"000.010" to "080.000"</td> </tr> <tr> <td>LP-4x1/LP-W</td> <td>"000.010" to "027.500"</td> </tr> </tbody> </table>	Model type*	Setting range [mm]	LP-V10	"000.010" to "045.000"	LP-4x0	"000.010" to "055.000"	LP-4x5/LP-V15	"000.010" to "080.000"	LP-4x1/LP-W	"000.010" to "027.500"	
Model type*	Setting range [mm]												
LP-V10	"000.010" to "045.000"												
LP-4x0	"000.010" to "055.000"												
LP-4x5/LP-V15	"000.010" to "080.000"												
LP-4x1/LP-W	"000.010" to "027.500"												
Dashed Line: Length of Solid Part	(7)	<table border="1"> <thead> <tr> <th>Model type*</th> <th>Setting range [mm]</th> </tr> </thead> <tbody> <tr> <td>LP-V10</td> <td>"000.010" to "090.000"</td> </tr> <tr> <td>LP-4x0</td> <td>"000.010" to "110.000"</td> </tr> <tr> <td>LP-4x5/LP-V15</td> <td>"000.010" to "160.000"</td> </tr> <tr> <td>LP-4x1/LP-W</td> <td>"000.010" to "055.000"</td> </tr> </tbody> </table>	Model type*	Setting range [mm]	LP-V10	"000.010" to "090.000"	LP-4x0	"000.010" to "110.000"	LP-4x5/LP-V15	"000.010" to "160.000"	LP-4x1/LP-W	"000.010" to "055.000"	Set the larger value than 'Line width' in laser setting screen. To make it not dashed line (solid line), input nothing.
Model type*	Setting range [mm]												
LP-V10	"000.010" to "090.000"												
LP-4x0	"000.010" to "110.000"												
LP-4x5/LP-V15	"000.010" to "160.000"												
LP-4x1/LP-W	"000.010" to "055.000"												
Dashed Line: Length of Blank Part	(7)	<table border="1"> <thead> <tr> <th>Model type*</th> <th>Setting range [mm]</th> </tr> </thead> <tbody> <tr> <td>LP-V10</td> <td>"000.000" to "090.000"</td> </tr> <tr> <td>LP-4x0</td> <td>"000.000" to "110.000"</td> </tr> <tr> <td>LP-4x5/LP-V15</td> <td>"000.000" to "160.000"</td> </tr> <tr> <td>LP-4x1/LP-W</td> <td>"000.000" to "055.000"</td> </tr> </tbody> </table>	Model type*	Setting range [mm]	LP-V10	"000.000" to "090.000"	LP-4x0	"000.000" to "110.000"	LP-4x5/LP-V15	"000.000" to "160.000"	LP-4x1/LP-W	"000.000" to "055.000"	To make it not dashed line (solid line), input nothing.
Model type*	Setting range [mm]												
LP-V10	"000.000" to "090.000"												
LP-4x0	"000.000" to "110.000"												
LP-4x5/LP-V15	"000.000" to "160.000"												
LP-4x1/LP-W	"000.000" to "055.000"												

For deletion of the processing element, set the element type to straight line, and set X and Y coordinates of both start and end points to "0".

* For the detail of the model type, refer to "Target Laser Marker" (P.7).

3. For arc (Data length: Max. 60-byte)

Name	Data Length [byte]	Description	Remarks										
Processing Condition No.	1	"0" to "7"											
Processing Element No.	3	"000" to "031"											
Element type	1	"2": arc											
X Coordinate of Start Point	8	<table border="1"> <thead> <tr> <th>Model type*</th> <th>Setting range [mm]</th> </tr> </thead> <tbody> <tr> <td>LP-V10</td> <td>"-045.000" to "+045.000"</td> </tr> <tr> <td>LP-4x0</td> <td>"-055.000" to "+055.000"</td> </tr> <tr> <td>LP-4x5/LP-V15</td> <td>"-080.000" to "+080.000"</td> </tr> <tr> <td>LP-4x1/LP-W</td> <td>"-027.500" to "+027.500"</td> </tr> </tbody> </table>	Model type*	Setting range [mm]	LP-V10	"-045.000" to "+045.000"	LP-4x0	"-055.000" to "+055.000"	LP-4x5/LP-V15	"-080.000" to "+080.000"	LP-4x1/LP-W	"-027.500" to "+027.500"	
Model type*	Setting range [mm]												
LP-V10	"-045.000" to "+045.000"												
LP-4x0	"-055.000" to "+055.000"												
LP-4x5/LP-V15	"-080.000" to "+080.000"												
LP-4x1/LP-W	"-027.500" to "+027.500"												
Y Coordinate of Start Point	8												
X Coordinate of End Point	8												
Y Coordinate of End Point	8												
Radius	7	"000.010" to "300.000" [mm]											
Direction	1	"0": CCW "1": CW											
Open Angle	1	"0": 180° under "1": 180° more											
Dashed Line: Length of Solid Part	(7)	<table border="1"> <thead> <tr> <th>Model type*</th> <th>Setting range [mm]</th> </tr> </thead> <tbody> <tr> <td>LP-V10</td> <td>"000.010" to "090.000"</td> </tr> <tr> <td>LP-4x0</td> <td>"000.010" to "110.000"</td> </tr> <tr> <td>LP-4x5/LP-V15</td> <td>"000.010" to "160.000"</td> </tr> <tr> <td>LP-4x1/LP-W</td> <td>"000.010" to "055.000"</td> </tr> </tbody> </table>	Model type*	Setting range [mm]	LP-V10	"000.010" to "090.000"	LP-4x0	"000.010" to "110.000"	LP-4x5/LP-V15	"000.010" to "160.000"	LP-4x1/LP-W	"000.010" to "055.000"	To make it not dashed line (solid line), input nothing.
Model type*	Setting range [mm]												
LP-V10	"000.010" to "090.000"												
LP-4x0	"000.010" to "110.000"												
LP-4x5/LP-V15	"000.010" to "160.000"												
LP-4x1/LP-W	"000.010" to "055.000"												
Dashed Line: Length of Blank Part	(7)	<table border="1"> <thead> <tr> <th>Model type*</th> <th>Setting range [mm]</th> </tr> </thead> <tbody> <tr> <td>LP-V10</td> <td>"000.000" to "090.000"</td> </tr> <tr> <td>LP-4x0</td> <td>"000.000" to "110.000"</td> </tr> <tr> <td>LP-4x5/LP-V15</td> <td>"000.000" to "160.000"</td> </tr> <tr> <td>LP-4x1/LP-W</td> <td>"000.000" to "055.000"</td> </tr> </tbody> </table>	Model type*	Setting range [mm]	LP-V10	"000.000" to "090.000"	LP-4x0	"000.000" to "110.000"	LP-4x5/LP-V15	"000.000" to "160.000"	LP-4x1/LP-W	"000.000" to "055.000"	To make it not dashed line (solid line), input nothing.
Model type*	Setting range [mm]												
LP-V10	"000.000" to "090.000"												
LP-4x0	"000.000" to "110.000"												
LP-4x5/LP-V15	"000.000" to "160.000"												
LP-4x1/LP-W	"000.000" to "055.000"												

For deletion of the processing element, set the element type to straight line, and set X and Y coordinates of both start and end points to "0".

* For the detail of the model type, refer to "Target Laser Marker" (P.7).

■ Processing Condition (Code: LAY)

Sets X/Y coordinate offset and laser power correction ratio, etc. for the specified processing condition No.

• Setting / Readout data of processing condition

STX	LAY	Sub Command	[Processing Condition No.] [Area No.] [X Offset] [Y Offset] [Rotation Angle] [Laser Power Correction] [Scan Speed Correction] [Laser Pulse Cycle Correction] Max. 34-byte (LP-V series), Max. 31-byte (LP-400/LP-W series)	(Check Sum)	Delimiter
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Sub command is "S" at the time of setting and "A" for response data at the time of readout.

• Readout request of processing condition

STX	LAY	R	[Processing Condition No.] 1-byte	(Check Sum)	Delimiter
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Name	Data Length [byte]	Description	Remarks						
Processing Condition No.	1	"0" to "7"							
Area No.	1	"0" to "9", "A" to "F"	Specifies which area part is the marking position of the concatenated marking on the flying object. In case of marking static object, specify "0".						
X Offset	8	<table border="1"> <thead> <tr> <th>Model type*</th> <th>Setting range [mm]</th> </tr> </thead> <tbody> <tr> <td>LP-V10</td> <td>"-045.000" to "+045.000"</td> </tr> <tr> <td>LP-4x0</td> <td>"-055.000" to "+055.000"</td> </tr> </tbody> </table>	Model type*	Setting range [mm]	LP-V10	"-045.000" to "+045.000"	LP-4x0	"-055.000" to "+055.000"	
Model type*	Setting range [mm]								
LP-V10	"-045.000" to "+045.000"								
LP-4x0	"-055.000" to "+055.000"								
Y Offset	8	<table border="1"> <tbody> <tr> <td>LP-4x5/LP-V15</td> <td>"-080.000" to "+080.000"</td> </tr> <tr> <td>LP-4x1/LP-W</td> <td>"-027.500" to "+027.500"</td> </tr> </tbody> </table>	LP-4x5/LP-V15	"-080.000" to "+080.000"	LP-4x1/LP-W	"-027.500" to "+027.500"			
LP-4x5/LP-V15	"-080.000" to "+080.000"								
LP-4x1/LP-W	"-027.500" to "+027.500"								
Rotation Angle	7	"-180.00" to "+180.00" [°]							
Laser Power Correction	3	"000" to "200" [%]	<ul style="list-style-type: none"> The correction ratio is calculated using the value set at the laser setting as 100%. With LP-400/LP-W series, nothing should be input in Laser Pulse Cycle Correction. 						
Scan Speed Correction	3	"005" to "500" [%]							
(Laser Pulse Cycle Correction) (Only for LP-V series)	(3)	"050" to "200" [%]							

* For the detail of the model type, refer to "Target Laser Marker" (P.7).

■ Arbitrary Point Radiation Coordinate and Time (Code: PRD)

Sets arbitrary point radiation X/Y coordinates, radiation time and laser power correction ratio.

• Setting of arbitrary point radiation coordinate and time

STX	PRD	S	[Point Radiation Condition No.] [Start Line] [Radiation Time] [Laser Power Correction] [X Position] [Y Position] [•••] [X Position] [Y Position] 15+16n-byte	(Check Sum)	Delimiter
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• Setting of radiation time, and laser power correction only

STX	PRD	S	[Point Radiation Condition No.] [Line No.] [Radiation Time] [Laser Power Correction] 15-byte	(Check Sum)	Delimiter
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• Delete of arbitrary point radiation condition

STX	PRD	S	[Point Radiation Condition No.] [Start Line] [End Line] 8-byte	(Check Sum)	Delimiter
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• Readout request of arbitrary point radiation coordinate and time

STX	PRD	R	[Point Radiation Condition No.] [Line No.] 5-byte	(Check Sum)	Delimiter
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• Readout data

STX	PRD	A	[Point Radiation Condition No.] [Line No.] [Radiation Time] [Laser Power Correction] [X Position] [Y Position] Max. 31-byte	(Check Sum)	Delimiter
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When there is no setting data in the selected line, [Radiation Time], [Laser Power Correction], [X Coordinate] and [Y Coordinate] fields are not existed.

Name	Data Length [byte]	Description	Remarks						
Point Radiation Condition No.	2	"00" to "15"							
Line No.	3	"000" to "049"							
Start Line	3	"000" to "049"							
End Line	3								
Radiation Time	7	"00000.1" to "99999.9" [ms]							
Laser Power Correction	3	"000" to "200" [%]	The correction ratio is calculated using the value set at the laser setting as 100%.						
X Position	8	<table border="1"> <thead> <tr> <th>Model type*</th> <th>Setting range [mm]</th> </tr> </thead> <tbody> <tr> <td>LP-V10</td> <td>"-045.000" to "+045.000"</td> </tr> <tr> <td>LP-4x0</td> <td>"-055.000" to "+055.000"</td> </tr> </tbody> </table>	Model type*	Setting range [mm]	LP-V10	"-045.000" to "+045.000"	LP-4x0	"-055.000" to "+055.000"	
Model type*	Setting range [mm]								
LP-V10	"-045.000" to "+045.000"								
LP-4x0	"-055.000" to "+055.000"								
Y Position	8	<table border="1"> <tbody> <tr> <td>LP-4x5/LP-V15</td> <td>"-080.000" to "+080.000"</td> </tr> <tr> <td>LP-4x1/LP-W</td> <td>"-027.500" to "+027.500"</td> </tr> </tbody> </table>	LP-4x5/LP-V15	"-080.000" to "+080.000"	LP-4x1/LP-W	"-027.500" to "+027.500"			
LP-4x5/LP-V15	"-080.000" to "+080.000"								
LP-4x1/LP-W	"-027.500" to "+027.500"								

* For the detail of the model type, refer to "Target Laser Marker" (P.7).

Reference

- The coordinate numbers that can be set or read out at once are max. 50 points.

■ Arbitrary Point Radiation Condition (Code: PRF)

Sets X/Y coordinate offset and laser power correction ratio, etc. for the specified arbitrary point radiation condition.

• Setting / Readout data of general condition

STX	PRF	Sub Command	[Point Radiation Condition No.] [System Reservation] [X Offset] [Y Offset] [Laser Power Correction] [Laser Pulse Cycle Correction] 25-byte (LP-V series), 22-byte (LP-400/LP-W series)	(Check Sum)	Delimiter
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Sub command is "S" at the time of setting and "A" for response data at the time of readout.

• Readout request of processing condition

STX	PRF	R	[Point Radiation Condition No.] 2-byte	(Check Sum)	Delimiter
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Name	Data Length [byte]	Description	Remarks						
Point Radiation Condition No.	2	"00" to "15"							
System reservation	1	"0" fixed	System reservation field.						
X Offset	8	<table border="1"> <thead> <tr> <th>Model type*</th> <th>Setting range [mm]</th> </tr> </thead> <tbody> <tr> <td>LP-V10</td> <td>"-045.000" to "+045.000"</td> </tr> <tr> <td>LP-4x0</td> <td>"-055.000" to "+055.000"</td> </tr> </tbody> </table>	Model type*	Setting range [mm]	LP-V10	"-045.000" to "+045.000"	LP-4x0	"-055.000" to "+055.000"	
Model type*	Setting range [mm]								
LP-V10	"-045.000" to "+045.000"								
LP-4x0	"-055.000" to "+055.000"								
Y Offset	8	<table border="1"> <tbody> <tr> <td>LP-4x5/LP-V15</td> <td>"-080.000" to "+080.000"</td> </tr> <tr> <td>LP-4x1/LP-W</td> <td>"-027.500" to "+027.500"</td> </tr> </tbody> </table>	LP-4x5/LP-V15	"-080.000" to "+080.000"	LP-4x1/LP-W	"-027.500" to "+027.500"			
LP-4x5/LP-V15	"-080.000" to "+080.000"								
LP-4x1/LP-W	"-027.500" to "+027.500"								
Laser Power Correction	3	"000" to "200" [%]	<ul style="list-style-type: none"> The correction ratio is calculated using the value set at the laser setting as 100%. With LP-400/LP-W series, nothing should be input in Laser Pulse Cycle Correction. 						
(Laser Pulse Cycle Correction) (Only for LP-V series)	(3)	"050" to "200" [%]							

* For the detail of the model type, refer to "Target Laser Marker" (P.7).

■ General Condition (Code: ALC)

Sets the conditions related to whole file.

• Setting / Readout data of general condition

STX	ALC	Sub Command	[X Offset] [Y Offset] [Rotation Offset] [Overwriting Frequency] [Overwriting Interval] [Mirror (Y Axis Symmetry)] [Flip (X Axis Symmetry)] [Kerning] Max. 31-byte	(Check Sum)	Delimiter
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Sub command is "S" at the time of setting and "A" for response data at the time of readout.

• Readout request of general condition

STX	ALC	R	(Check Sum)	Delimiter
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Name	Data Length [byte]	Description	Remarks
X Offset	8	Model type*	Setting range [mm]
		LP-V10	"-045.000" to "+045.000"
Y Offset	8	LP-4x0	"-055.000" to "+055.000"
		LP-4x5/LP-V15	"-080.000" to "+080.000"
		LP-4x1/LP-W	"-027.500" to "+027.500"
Rotation Offset	7	"-180.00" to "+180.00" [°]	
Overwriting Frequency	2	"01" to "99" [times]	Marking is repeated by the repeat number set. When the marking on the flying object is valid, set "01".
Overwriting Interval	3	"0.0" to "9.9" [sec] or "010" to "060" [sec]	The interval period at overwriting marking is set.
Mirror (Y Axis Symmetry)	1	"0": inversion OFF "1": inversion ON	The character marked is inverted to the Y axis.
Flip (X Axis Symmetry)	1	"0": inversion OFF "1": inversion ON	The character marked is inverted to the X axis.
Kerning (omissible)	(1)	"1": Level 1: Minimize the origin point of the character interval with this condition. The character width such as "i" and "l" (small letter "L") is recognized as "0". "2": Level 2: Set the origin point of the character with intermediate degree between the character interval set with Level 1 and Level 3. The character interval such as "i" and "l" (small letter "L") becomes 1/4 (fourth) of character width. "3": Level 3: Maximize the origin point of the character interval with this condition. The character width such as "i" and "l" (small letter "L") becomes 1/2 (half) of character width.	Specifies the balance of the character interval when "Proportional" is set to "Marking Shape" on the "Marking Condition".

* For the detail of the model type, refer to "Target Laser Marker" (P.7).

↓ Reference

- When marking on the flying object is valid, Overwriting Function cannot be used.

■ Character Condition (Shortened Form) (Code: SPC)

Sets the condition for marking character string per line.

(X/Y coordinates and laser power correction ratio only)

• Setting / Readout data of character condition (shortened form)

STX	SPC	Sub Command	[Condition No.] [X Position] [Y Position] [Laser Power Correction] 21-byte	(Check Sum)	Delimiter
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Sub command is "S" at the time of setting and "A" for response data at the time of readout.

• Readout request of character condition (shortened form)

STX	SPC	R	[Condition No.] 2-byte	(Check Sum)	Delimiter
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Name	Data Length [byte]	Description	Remarks										
Condition No.	2	"01" to "60"											
X Position	8	When the marking form is other than "fan like": <table border="1"> <thead> <tr> <th>Model type*</th> <th>Setting range [mm]</th> </tr> </thead> <tbody> <tr> <td>LP-V10</td> <td>"-045.000" to "+045.000"</td> </tr> <tr> <td>LP-4x0</td> <td>"-055.000" to "+055.000"</td> </tr> <tr> <td>LP-4x5/LP-V15</td> <td>"-080.000" to "+080.000"</td> </tr> <tr> <td>LP-4x1/LP-W</td> <td>"-027.500" to "+027.500"</td> </tr> </tbody> </table>	Model type*	Setting range [mm]	LP-V10	"-045.000" to "+045.000"	LP-4x0	"-055.000" to "+055.000"	LP-4x5/LP-V15	"-080.000" to "+080.000"	LP-4x1/LP-W	"-027.500" to "+027.500"	Sets the coordinate (X/Y) of the character. The base position of the coordinate varies from "alignment" setting: <ul style="list-style-type: none"> • Left: lower left of the first character • Center: the center of the string • Right: lower right of the last character
Model type*	Setting range [mm]												
LP-V10	"-045.000" to "+045.000"												
LP-4x0	"-055.000" to "+055.000"												
LP-4x5/LP-V15	"-080.000" to "+080.000"												
LP-4x1/LP-W	"-027.500" to "+027.500"												
Y Position	8	When the marking form is "fna like": "-300.000" to "+300.000" [mm]											
Laser Power Correction	3	"000" to "200" [%]	Indicates the correction value corresponding with the marking pulse cycle specified value here.										

* For the detail of the model type, refer to "Target Laser Marker" (P.7).

■ Character Condition (Code: STC)

Sets the condition for marking character string per line.

• Setting / Readout data of character condition

STX	STC	Sub Command	[Character Condition No.] [Area No.] [Start Line] [End Line] [Marking Shape] [Vary with the Marking Shape] [Font No.] [Bold Line Width] [Laser Power Correction] [Scan Speed Correction] [Laser Pulse Cycle Correction] Max. 83-byte (LP-V series), Max. 80-byte (LP-400/LP-W series)	(Check Sum)	Delimiter
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Sub command is "S" at the time of setting and "A" for response data at the time of readout.

• Readout request of character condition

STX	STC	R	[Character Condition No.] 2-byte	(Check Sum)	Delimiter
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1. When marking shape is straight line/proportional/justify

Data length : 75-byte (LP-V series), 72-byte (LP-400/LP-W series)

Name	Data Length [byte]	Description	Remarks						
Character Condition No.	2	"01" to "60"							
Area No.	1	"0" to "9", "A" to "F"	Specifies which area part is the marking position of the concatenated marking on the flying object. In case of marking static object, specify "0".						
Start Line	2	"01" to "60" [row]	The start/end line of character string for marking with this condition is indicated.						
End Line	2	("51" to "60": common setting lines)							
Marking Shape	1	"0": straight line "1": Proportional "2": Justify							
Alignment	1	"0": left "1": center "2": right							
Character Height	7	<table border="1"> <thead> <tr> <th>Model type*</th> <th>Setting range [mm]</th> </tr> </thead> <tbody> <tr> <td>LP-V10</td> <td>"000.100" to "090.000"</td> </tr> <tr> <td>LP-4x0</td> <td>"000.100" to "110.000"</td> </tr> </tbody> </table>	Model type*	Setting range [mm]	LP-V10	"000.100" to "090.000"	LP-4x0	"000.100" to "110.000"	
Model type*	Setting range [mm]								
LP-V10	"000.100" to "090.000"								
LP-4x0	"000.100" to "110.000"								
Character Width	7	<table border="1"> <tbody> <tr> <td>LP-4x5/LP-V15</td> <td>"000.100" to "160.000"</td> </tr> <tr> <td>LP-4x1/LP-W</td> <td>"000.100" to "055.000"</td> </tr> </tbody> </table>	LP-4x5/LP-V15	"000.100" to "160.000"	LP-4x1/LP-W	"000.100" to "055.000"			
LP-4x5/LP-V15	"000.100" to "160.000"								
LP-4x1/LP-W	"000.100" to "055.000"								
X Position	8	<table border="1"> <thead> <tr> <th>Model type*</th> <th>Setting range [mm]</th> </tr> </thead> <tbody> <tr> <td>LP-V10</td> <td>"-045.000" to "+045.000"</td> </tr> <tr> <td>LP-4x0</td> <td>"-055.000" to "+055.000"</td> </tr> </tbody> </table>	Model type*	Setting range [mm]	LP-V10	"-045.000" to "+045.000"	LP-4x0	"-055.000" to "+055.000"	
Model type*	Setting range [mm]								
LP-V10	"-045.000" to "+045.000"								
LP-4x0	"-055.000" to "+055.000"								
Y Position	8	<table border="1"> <tbody> <tr> <td>LP-4x5/LP-V15</td> <td>"-080.000" to "+080.000"</td> </tr> <tr> <td>LP-4x1/LP-W</td> <td>"-027.500" to "+027.500"</td> </tr> </tbody> </table>	LP-4x5/LP-V15	"-080.000" to "+080.000"	LP-4x1/LP-W	"-027.500" to "+027.500"			
LP-4x5/LP-V15	"-080.000" to "+080.000"								
LP-4x1/LP-W	"-027.500" to "+027.500"								
			Sets the coordinate (X/Y) of the character. The base position of the coordinate varies from "alignment" setting: Left: lower left of the first character Center: the center of the string Right: lower right of the last character						

Name	Data Length [byte]	Description	Remarks
Character Interval/ Character String Width	7	Model type*	Setting range [mm]
		LP-V10	"000.000" to "090.000"
		LP-4x0	"000.000" to "110.000"
		LP-4x5/LP-V15	"000.000" to "160.000"
Line Interval	7	LP-4x1/LP-W	"000.000" to "055.000"
Tilt Angle	7	"-180.00" to "+180.00" [°]	The marking interval to mark the next line is indicated when the character string is marked over two or more lines.
Font No.	1	"1": character font 1 "2": character font 2	The tilt angle for character for marking to X axis is indicated.
Bold Line Width	5	Model type*	Setting range [mm]
		LP-V10/LP-W	"0.000" to "2.000"
		LP-4x1/LP-V15	"0.000" to "4.000"
		LP-4x0/LP-4x5	"0.000" to "6.000"
Laser Power Correction	3	"000" to "200" [%]	<ul style="list-style-type: none"> The correction ratio is calculated using the value set at the laser setting as 100%. With LP-400/LP-W series, nothing should be input in Laser Pulse Cycle Correction.
Scan Speed Correction	3	"005" to "500" [%]	
(Laser Pulse Cycle Correction) (Only for LP-V series)	(3)	"050" to "200" [%]	

* For the detail of the model type, refer to "Target Laser Marker" (P.7).

2. When marking shape is fan like form

Data length : 83-byte (LP-V series), 80-byte (LP-400/LP-W series)

Name	Data Length [byte]	Description	Remarks
Character Condition No.	2	"01" to "60"	
Area No.	1	"0" to "9", "A" to "F"	Specifies which area part is the marking position of the concatenated marking on the flying object. In case of marking static object, specify "0"
Start Line	2	"01" to "60" [row]	The start/end line of character string for marking with this condition is indicated.
End Line	2	("51" to "60": common setting lines)	
Marking Shape	1	"3": Fan like form + (Outside arc with clockwise rotation) "4": Fan like form - (Inside arc with counter-clockwise rotation)	
Alignment	1	"0": left "1": center "2": right	

Name	Data Length [byte]	Description	Remarks										
Character Height	7	<table border="1"> <thead> <tr> <th>Model type*</th> <th>Setting range [mm]</th> </tr> </thead> <tbody> <tr> <td>LP-V10</td> <td>"000.100" to "090.000"</td> </tr> <tr> <td>LP-4x0</td> <td>"000.100" to "110.000"</td> </tr> </tbody> </table>	Model type*	Setting range [mm]	LP-V10	"000.100" to "090.000"	LP-4x0	"000.100" to "110.000"					
Model type*	Setting range [mm]												
LP-V10	"000.100" to "090.000"												
LP-4x0	"000.100" to "110.000"												
Character Width	7	<table border="1"> <tbody> <tr> <td>LP-4x5/LP-V15</td> <td>"000.100" to "160.000"</td> </tr> <tr> <td>LP-4x1/LP-W</td> <td>"000.100" to "055.000"</td> </tr> </tbody> </table>	LP-4x5/LP-V15	"000.100" to "160.000"	LP-4x1/LP-W	"000.100" to "055.000"							
LP-4x5/LP-V15	"000.100" to "160.000"												
LP-4x1/LP-W	"000.100" to "055.000"												
Center Position X	8	"-300.000" to "+300.000" [mm]											
Center Position Y	8												
Radius	8	"000.000" to "+300.000" [mm]	The center coordinate for arc is indicated.										
Radius of Line Interval	7	<table border="1"> <thead> <tr> <th>Model type*</th> <th>Setting range [mm]</th> </tr> </thead> <tbody> <tr> <td>LP-V10</td> <td>"000.000" to "090.000"</td> </tr> <tr> <td>LP-4x0</td> <td>"000.000" to "110.000"</td> </tr> <tr> <td>LP-4x5/LP-V15</td> <td>"000.000" to "160.000"</td> </tr> <tr> <td>LP-4x1/LP-W</td> <td>"000.000" to "055.000"</td> </tr> </tbody> </table>	Model type*	Setting range [mm]	LP-V10	"000.000" to "090.000"	LP-4x0	"000.000" to "110.000"	LP-4x5/LP-V15	"000.000" to "160.000"	LP-4x1/LP-W	"000.000" to "055.000"	The difference of radius from the center position of marking position to the next line is indicated when the character string is marked over two or more lines.
Model type*	Setting range [mm]												
LP-V10	"000.000" to "090.000"												
LP-4x0	"000.000" to "110.000"												
LP-4x5/LP-V15	"000.000" to "160.000"												
LP-4x1/LP-W	"000.000" to "055.000"												
Start Angle	7	"-180.00" to "+180.00" [°]	The angle from the positive (+) side of X coordinate with counter-clockwise at the first character in character string for marking is indicated.										
Angle of Character Interval	7	"-180.00" to "+180.00" [°]	The angle between the center of character and the center of next character is indicated.										
Font No.	1	"1": character font 1 "2": character font 2	The number corresponding to the 2 fonts previously registered is indicated.										
Bold Line Width	5	<table border="1"> <thead> <tr> <th>Model type*</th> <th>Setting range [mm]</th> </tr> </thead> <tbody> <tr> <td>LP-V10/LP-W</td> <td>"0.000" to "2.000"</td> </tr> <tr> <td>LP-4x1/LP-V15</td> <td>"0.000" to "4.000"</td> </tr> <tr> <td>LP-4x0/LP-4x5</td> <td>"0.000" to "6.000"</td> </tr> </tbody> </table>	Model type*	Setting range [mm]	LP-V10/LP-W	"0.000" to "2.000"	LP-4x1/LP-V15	"0.000" to "4.000"	LP-4x0/LP-4x5	"0.000" to "6.000"			
Model type*	Setting range [mm]												
LP-V10/LP-W	"0.000" to "2.000"												
LP-4x1/LP-V15	"0.000" to "4.000"												
LP-4x0/LP-4x5	"0.000" to "6.000"												
Laser Power Correction	3	"000" to "200" [%]	<ul style="list-style-type: none"> The correction ratio is calculated using the value set at the laser setting as 100%. With LP-400/LP-W series, nothing should be input in Laser Pulse Cycle Correction. 										
Scan Speed Correction	3	"005" to "500" [%]											
(Laser Pulse Cycle Correction) (Only for LP-V series)	(3)	"050" to "200" [%]											

* For the detail of the model type, refer to "Target Laser Marker" (P.7).

Reference

- At marking of bold characters, set the values so ratio of character height to character width be within 1/4 to 4.
- Set the Bold Line Width to 1/4 or less of the character height or the character width, whichever is smaller.

■ External Offset Condition (Code: OFC)

Sets input conditions of "External Offset Function" to switch coordinates using I/O input.

• Setting / Readout data of external offset condition

STX	OFC	Sub Command	[External Offset] 1-byte	(Check Sum)	Delimiter
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Sub command is "S" at the time of setting and "A" for response data at the time of readout.

• Readout request of external offset condition

STX	OFC	R	(Check Sum)	Delimiter
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Name	Data Length [byte]	Description	Remarks
External Offset	1	"0": no use "1": low 4-bit "2": low 8-bit	

■ External Offset Coordinates (Code: OFS)

Sets offset coordinates used for "External Offset Function" to switch coordinates using I/O input.

• Setting / Readout data of external offset coordinates

STX	OFS	Sub Command	[Parallel Data No.] [X Offset] [Y Offset] [θ Offset] 26-byte	(Check Sum)	Delimiter
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Sub command is "S" at the time of setting and "A" for response data at the time of readout.

• Readout request of external offset coordinates

STX	OFS	R	[Parallel Data No.] 3-byte	(Check Sum)	Delimiter
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Name	Data Length [byte]	Description	Remarks						
Parallel Data No.	3	"000" to "255"	The parallel data number in which offset is set is indicated.						
X Offset	8	<table border="1"> <thead> <tr> <th>Model type*</th> <th>Setting range [mm]</th> </tr> </thead> <tbody> <tr> <td>LP-V10</td> <td>"-045.000" to "+045.000"</td> </tr> <tr> <td>LP-4x0</td> <td>"-055.000" to "+055.000"</td> </tr> </tbody> </table>	Model type*	Setting range [mm]	LP-V10	"-045.000" to "+045.000"	LP-4x0	"-055.000" to "+055.000"	
Model type*	Setting range [mm]								
LP-V10	"-045.000" to "+045.000"								
LP-4x0	"-055.000" to "+055.000"								
Y Offset	8	<table border="1"> <tbody> <tr> <td>LP-4x5/LP-V15</td> <td>"-080.000" to "+080.000"</td> </tr> <tr> <td>LP-4x1/LP-W</td> <td>"-027.500" to "+027.500"</td> </tr> </tbody> </table>	LP-4x5/LP-V15	"-080.000" to "+080.000"	LP-4x1/LP-W	"-027.500" to "+027.500"			
LP-4x5/LP-V15	"-080.000" to "+080.000"								
LP-4x1/LP-W	"-027.500" to "+027.500"								
θ Offset	7	"-180.00" to "+180.00" [°]	The rotation offset is indicated.						

* For the detail of the model type, refer to "Target Laser Marker" (P.7).

■ Step & Repeat Condition (Code: SRC)

Sets the condition of "Step & Repeat" to mark the same marking contents on multiple locations in one file.

• Setting / Readout data of general condition

Set the Step & Repeat condition for specified number with the following format:

STX	SRC	Sub Command	[Step & Repeat] [Number of Row] [Number of column] [Row Step] [Column Step] [X Offset] [Y Offset] [Counter Update at each step] Max. 39-byte	(Check Sum)	Delimiter
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Sub command is "S" at the time of setting and "A" for response data at the time of readout.

• Readout request of general condition

STX	SRC	R	(Check Sum)	Delimiter
-----	-----	---	-------------	-----------

Name	Data Length [byte]	Description	Remarks						
Step & Repeat	1	"0": OFF "1": ON	Marking the same data is repeated to the X or Y axis direction.						
Number of Row	3	"001" to "100"	The number of repeated marking to Y direction.						
Number of column	3	(number of row x column < 1000)	The number of repeated marking to X direction.						
Row Step	7	<table border="1"> <thead> <tr> <th>Model type*</th> <th>Setting range [mm]</th> </tr> </thead> <tbody> <tr> <td>LP-V10</td> <td>"000.000" to "090.000"</td> </tr> <tr> <td>LP-4x0</td> <td>"000.000" to "110.000"</td> </tr> </tbody> </table>	Model type*	Setting range [mm]	LP-V10	"000.000" to "090.000"	LP-4x0	"000.000" to "110.000"	The marking pitch to the Y direction is specified.
Model type*	Setting range [mm]								
LP-V10	"000.000" to "090.000"								
LP-4x0	"000.000" to "110.000"								
Column Step	7	<table border="1"> <tbody> <tr> <td>LP-4x5/LP-V15</td> <td>"000.000" to "160.000"</td> </tr> <tr> <td>LP-4x1/LP-W</td> <td>"000.000" to "055.000"</td> </tr> </tbody> </table>	LP-4x5/LP-V15	"000.000" to "160.000"	LP-4x1/LP-W	"000.000" to "055.000"	The marking pitch to the X direction is specified.		
LP-4x5/LP-V15	"000.000" to "160.000"								
LP-4x1/LP-W	"000.000" to "055.000"								
X Offset	(8)	<table border="1"> <thead> <tr> <th>Model type*</th> <th>Setting range [mm]</th> </tr> </thead> <tbody> <tr> <td>LP-V10</td> <td>"-045.000" to "+045.000"</td> </tr> <tr> <td>LP-4x0</td> <td>"-055.000" to "+055.000"</td> </tr> </tbody> </table>	Model type*	Setting range [mm]	LP-V10	"-045.000" to "+045.000"	LP-4x0	"-055.000" to "+055.000"	Specifies X/Y Offset of the reference step. (If both values of X&Y offsets are "0", X/Y off setting can be omitted.)
Model type*	Setting range [mm]								
LP-V10	"-045.000" to "+045.000"								
LP-4x0	"-055.000" to "+055.000"								
Y Offset	(8)	<table border="1"> <tbody> <tr> <td>LP-4x5/LP-V15</td> <td>"-080.000" to "+080.000"</td> </tr> <tr> <td>LP-4x1/LP-W</td> <td>"-027.500" to "+027.500"</td> </tr> </tbody> </table>	LP-4x5/LP-V15	"-080.000" to "+080.000"	LP-4x1/LP-W	"-027.500" to "+027.500"			
LP-4x5/LP-V15	"-080.000" to "+080.000"								
LP-4x1/LP-W	"-027.500" to "+027.500"								
Counter Update at each step	2	<p>"00": same in all steps "xy": counter is activated in each steps "x" represents how to count if there are "Mark OFF" part in Step & Repeat. "x=1": skips the counter (missing number) "x=2": not skip the counter (sequential number) "y" represents direction for counting order. "y=0": from upper left to right "y=1": from upper left to bottom "y=2": from upper right to left "y=3": from upper right to bottom</p>							

* For the detail of the model type, refer to "Target Laser Marker" (P.7).

↓ Reference

- When the Step and Repeat setting is set to "None," the Step and Repeat setting can be omitted. If data is input and that data is out of the setting range, response data for abnormal receiving is returned.
- When the data is readout under the step & repeat is set to "none", the subsequent fields following to "number of Row" is not readout.

■ Step & Repeat Fine Adjustment (Code: SRA)

Sets the fine adjustment of "Step & Repeat" to mark the same marking contents on multiple locations in one file.

• Setting / Readout data of Step & Repeat fine adjustment

STX	SRA	Sub Command	[List line] [Fine Adj. Type] [Varies depending on the Fine Adj. Type] Max. 603-byte	(Check Sum)	Delimiter
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Sub command is "S" at the time of setting and "A" for response data at the time of readout.

• Readout request of Step & Repeat fine adjustment

STX	SRA	R	[List line] 2-byte	(Check Sum)	Delimiter
-----	-----	---	-----------------------	-------------	-----------

1. Setting deletion (data length: max. 6-Byte)

Name	Data Length [byte]	Description	Remarks
List line	2	"00" to "99"	
Fine Adj. Type	1	"0": Setting deletion	
Number of delete line	(3)	"001" to "100"	If only the first line in the list line will be deleted, the setting can be omitted.

2. In case of "Single" as fine adjustment type (data length: max. 35-Byte)

Name	Data Length [byte]	Description	Remarks						
List line	2	"00" to "99"							
Fine Adj. Type	1	"1": single fine adjustment							
Target Row	3	"001" to "100"							
Target Column	3	"001" to "100"							
Fine Tune X	8	<table border="1"> <thead> <tr> <th>Model type*1</th> <th>Setting range [mm]</th> </tr> </thead> <tbody> <tr> <td>LP-V10</td> <td>"-045.000" to "+045.000"</td> </tr> <tr> <td>LP-4x0</td> <td>"-055.000" to "+055.000"</td> </tr> </tbody> </table>	Model type*1	Setting range [mm]	LP-V10	"-045.000" to "+045.000"	LP-4x0	"-055.000" to "+055.000"	
Model type*1	Setting range [mm]								
LP-V10	"-045.000" to "+045.000"								
LP-4x0	"-055.000" to "+055.000"								
Fine Tune Y	8	<table border="1"> <tbody> <tr> <td>LP-4x5/LP-V15</td> <td>"-080.000" to "+080.000"</td> </tr> <tr> <td>LP-4x1/LP-W</td> <td>"-027.500" to "+027.500"</td> </tr> </tbody> </table>	LP-4x5/LP-V15	"-080.000" to "+080.000"	LP-4x1/LP-W	"-027.500" to "+027.500"			
LP-4x5/LP-V15	"-080.000" to "+080.000"								
LP-4x1/LP-W	"-027.500" to "+027.500"								
Rotation Angle *2	(7)	"-180.00" to "+180.00" [°]							
Laser Power Adjustment *2	(3)	"-50" to "+50" [%]							

*1 : For the detail of the model type, refer to "Target Laser Marker" (P.7).

*2 : When both setting values of the rotation angle and laser power adjustment are "0", those settings can be omitted.

3. In case of "Marking OFF" as fine adjustment type (data length: max. 3 + 6n Byte)

Name	Data Length [byte]	Description	Remarks
List line	2	"00" to "99"	
Fine Adj. Type	1	"2": Marking OFF	
Target Row	3	"001" to "100"	
Target Column	3	"001" to "100"	

* Setting of the target row and target column can be successively-implemented up to 100 sets.

4. For fine adjustment for all columns/fine adjustment for all rows/fine adjustment for column/fine adjustment for row (data length: max. 32-Byte)

Name	Data Length [byte]	Description	Remarks						
List line	2	"00" to "99"							
Fine Adj. Type	1	"3": fine adjustment for all columns "4": fine adjustment for all rows "5": fine adjustment for column "6": fine adjustment for row							
Target Column or Row	3	"001" to "100"	Sets target column(s) or row(s) for fine adjustment. In case of fine adjustment for all columns/rows, the specified column/row and all subsequent columns/rows will be subject to fine adjustment.						
Fine Tune X	8	<table border="1"> <thead> <tr> <th>Model type*1</th> <th>Setting range [mm]</th> </tr> </thead> <tbody> <tr> <td>LP-V10</td> <td>"-045.000" to "+045.000"</td> </tr> <tr> <td>LP-4x0</td> <td>"-055.000" to "+055.000"</td> </tr> </tbody> </table>	Model type*1	Setting range [mm]	LP-V10	"-045.000" to "+045.000"	LP-4x0	"-055.000" to "+055.000"	
Model type*1	Setting range [mm]								
LP-V10	"-045.000" to "+045.000"								
LP-4x0	"-055.000" to "+055.000"								
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LP-4x5/LP-V15	"-080.000" to "+080.000"								
LP-4x1/LP-W	"-027.500" to "+027.500"								
Rotation Angle *2	(7)	"-180.00" to "+180.00" [°]							
Laser Power Adjustment *2	(3)	"-50" to "+50" [%]							

*1 : For the detail of the model type, refer to "Target Laser Marker" (P.7).

*2 : When both setting values of the rotation angle and laser power adjustment are "0", those settings can be omitted.

■ Laser Power (Code: LPW)

Sets the laser power.

- Setting / Readout data of laser power

STX	LPW	Sub Command	[Laser Power] 5-byte	(Check Sum)	Delimiter
-----	-----	-------------	-------------------------	-------------	-----------

Sub command is "S" at the time of setting and "A" for response data at the time of readout.

- Readout request of laser power

STX	LPW	R	(Check Sum)	Delimiter
-----	-----	---	-------------	-----------

Name	Data Length [byte]	Description	Remarks
Laser Power	5	"000.5" ~ "100.0" (Set by increment of 0.5)	

■ Scan Speed (Code: SSP)

Sets the scan speed of the laser.

- Setting / Readout data of scan speed

STX	SSP	Sub Command	[Scan Speed] 5-byte	(Check Sum)	Delimiter
-----	-----	-------------	------------------------	-------------	-----------

Sub command is "S" at the time of setting and "A" for response data at the time of readout.

- Readout request of scan speed

STX	SSP	R	(Check Sum)	Delimiter
-----	-----	---	-------------	-----------

Name	Data Length [byte]	Description		Remarks
Scan Speed	5	Model type*	Setting range [mm/sec]	
		LP-V10/LP-V15	"00001" to "12000"	
		LP-4x0/LP-4x5		
		LP-4x1/LP-W	"00001" to "06000"	

* For the detail of the model type, refer to "Target Laser Marker" (P.7).

■ Laser Pulse Cycle (Code: MPL)

[Supported models: LP-V series]

Sets the laser pulse cycle of LP-V series.

- Setting / Readout data of laser pulse cycle

STX	MPL	Sub Command	[Laser Pulse Cycle] 4-byte	(Check Sum)	Delimiter
-----	-----	-------------	-------------------------------	-------------	-----------

Sub command is "S" at the time of setting and "A" for response data at the time of readout.

- Readout request of laser pulse cycle

STX	MPL	R	(Check Sum)	Delimiter
-----	-----	---	-------------	-----------

Name	Data Length [byte]	Description	Remarks
Laser Pulse Cycle	4	"10.0" to "50.0" [μs]	

■ CW Pulse Cycle/Duty (Code: CWL)

[Supported models: LP-W series]

Adjust the laser pulse cycle and duty of LP-W series.

- Setting / Readout data of CW pulse cycle and duty

STX	CWL	S	[CW Pulse Cycle] [Duty] 7-byte	(Check Sum)	Delimiter
-----	-----	---	-----------------------------------	-------------	-----------

Sub command is "S" at the time of setting and "A" for response data at the time of readout

- Readout request of CW pulse cycle and duty

STX	CWL	R	(Check Sum)	Delimiter
-----	-----	---	-------------	-----------

Name	Data Length [byte]	Description	Remarks
CW Pulse Cycle	4	"0050" to "1000"	
Duty	3	"050" to "100"	

■ CO₂ Laser Frequency (Code: MPL)

[Supported models: LP-400 series]

Sets the laser frequency of LP-400 series.

• Setting / Readout data of laser frequency

STX	MPL	Sub Command	[Laser Frequency] 1-byte	(Check Sum)	Delimiter
-----	-----	-------------	-----------------------------	-------------	-----------

Sub command is "S" at the time of setting and "A" for response data at the time of readout.

• Readout request of laser frequency

STX	MPL	R	(Check Sum)	Delimiter
-----	-----	---	-------------	-----------

Name	Data Length [byte]	Description	Remarks
Laser Frequency	1	"0": 5 kHz "1": 10 kHz "2": 20 kHz	

■ Line Width/Marking Pitch (Code: WDC)

Sets the width necessary to avoid crossing at marking intersection and marking pitch of the bold characters and bar code.

• Setting / Readout data of line width and marking pitch

STX	WDC	Sub Command	[Line Width] [Marking Pitch] 10-byte	(Check Sum)	Delimiter
-----	-----	-------------	---	-------------	-----------

Sub command is "S" at the time of setting and "A" for response data at the time of readout.

• Readout request of line width and marking pitch

STX	WDC	R	(Check Sum)	Delimiter
-----	-----	---	-------------	-----------

Name	Data Length [byte]	Description	Remarks
Line Width	5	"0.010" to "2.000" [mm]	The line width for crossing avoidance at the crossing point of marking line is indicated.
Marking Pitch	5	"0.010" to "2.000" [mm]	Sets the marking pitch of the bold characters and bar code module.

■ Marking Quality Adjustment (Code: WTC)

Sets laser start point, end point, edge and curve adjustments, etc.

• Setting / Readout data of marking quality adjustment

STX	WTC	Sub Command	[Adjustment of Starting Point] [Adjustment of Ending Point] [Edge Adjustment] [Curve Adjustment] [Waiting Time] [Pre-scan Time] [Jump Adjustment] [Point Radiation ON] [Point Radiation OFF] Max. 33-byte	(Check Sum)	Delimiter
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Sub command is "S" at the time of setting and "A" for response data at the time of readout.

• Readout request of marking quality adjustment

STX	WTC	R	(Check Sum)	Delimiter
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Name	Data Length [byte]	Description	Remarks
Adjustment of Starting Point	4	"-100" to "+100"	The timing of starting laser is adjusted.
Adjustment of Ending Point	4	"-100" to "+100"	The timing of stopping laser is adjusted.
Edge Adjustment	3	"000" to "100"	The wait at edge is adjusted.
Curve Adjustment	3	"000" to "100"	The wait at curved line is adjusted.
Waiting Time	3	"000" to "100"	The waiting time is adjusted.
Pre-scan Time	5	"00.00" to "10.00" [ms]	The pre-scan time is adjusted.
Jump Adjustment	(3)	"000" to "100"	The correction value of galvano jump is adjusted. (omissible)
Point Radiation ON	(4)	"0.00" to "9.99" [ms]	The timing of the point radiation ON is adjusted. (omissible *)
Point Radiation OFF	(4)	"0.00" to "9.99" [ms]	The timing of the point radiation OFF is adjusted. (omissible *)

* Only one of [Point Radiation ON] and [Point Radiation OFF] cannot be omitted. (Response is not omitted.)
When setting arbitrary point radiation ON/OFF adjustment, jump adjustment is not omissible.

■ Trigger Condition (Code: TRG)

Sets the flying object/static object marking, and the condition of flying object.

- Setting / Readout data of trigger condition

STX	TRG	Sub Command	[Moving Direction] [Encoder] [Trigger Type] 3-byte	(Check Sum)	Delimiter
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Sub command is "S" at the time of setting and "A" for response data at the time of readout.

- Readout request of trigger condition

STX	TRG	R	(Check Sum)	Delimiter
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Name	Data Length [byte]	Description	Remarks
Moving Direction	1	"0": still "1": left "2": right "3": front "4": back	The moving direction of line at marking to flying object is set.
Encoder	1	"0": OFF "1": ON	The ON/OFF of encoder signal is indicated.
Trigger Type	1	"0": trigger marking "1": Equidistant marking	Available only when the "moving speed" is "still". Select the laser emission timing between trigger input timing and equal interval timing.

Reference

- The setting changed by this command is saved without overwriting.

■ Delay (Code: DLY)

Sets the delay time and distance from trigger input to marking startup.

• Setting / Readout data of delay

STX	DLY	Sub Command	[Delay Time/Distance] 6-byte	(Check Sum)	Delimiter
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Sub command is "S" at the time of setting and "A" for response data at the time of readout.

• Readout request of delay

STX	DLY	R	(Check Sum)	Delimiter
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Name	Data Length [byte]	Description	Remarks
Delay Time/ Distance	6	<ul style="list-style-type: none"> • Delay Time: "000000" to "005000" [ms] • Delay Distance: "000.00" to "500.00" [mm] 	<ul style="list-style-type: none"> • When the moving speed is "still", delay time is shown and the marking start time after the trigger input is displayed. • When the moving speed is other than "still", delay distance is shown and the distance where the marking starts after the trigger input is displayed.

■ Marking Interval (Code: INT)

Sets the marking interval (distance) in "Equidistant Marking" setting for flying object marking.

• Setting / Readout data of marking interval

STX	INT	Sub Command	[Marking interval] 6-byte	(Check Sum)	Delimiter
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Sub command is "S" at the time of setting and "A" for response data at the time of readout.

• Readout request of marking interval

STX	INT	R	(Check Sum)	Delimiter
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Name	Data Length [byte]	Description	Remarks
Marking Interval	6	"0000.0" to "3000.0" [mm]	Available only when the moving direction is other than "still" and trigger type is "equidistant".

■ Flying Object Wait (Code: MWT)

Sets the waiting time for marking corresponding to the line speed for flying object marking.

• Setting / Readout data of flying object wait

STX	MWT	Sub Command	[Flying Object Wait] 6-byte	(Check Sum)	Delimiter
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Sub command is "S" at the time of setting and "A" for response data at the time of readout.

• Readout request of flying object wait

STX	MWT	R	(Check Sum)	Delimiter
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Name	Data Length [byte]	Description	Remarks
Flying Object Wait	6	"000.00" to "500.00" [ms]	Available only when the moving direction of marking object is other than "still".

■ Line Speed (Code: LSP)

Sets the line speed in flying object marking.

• Setting / Readout data of line speed

STX	LSP	Sub Command	[Line Speed] 7-byte	(Check Sum)	Delimiter
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Sub command is "S" at the time of setting and "A" for response data at the time of readout.

• Readout request of line speed

STX	LSP	R	(Check Sum)	Delimiter
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Name	Data Length [byte]	Description	Remarks
Line Speed	7	Model type*	Setting range [m/min.]
		LP-V10/LP-V15/ LP-430/LP-435/ LP-420/LP-425	"000.060" to "240.000"
		LP-W/LP-431/ LP-421	"000.060" to "120.000"
		LP-410	"000.060" to "170.000"
		LP-411	"000.060" to "085.000"
			The speed with which the object to be marked passes is indicated, available only when the traveling direction is other than "still" and encoder signal is "OFF".

* For the detail of the model type, refer to "Target Laser Marker" (P.7).

■ Encoder Signal (Code: ENC)

Sets the encoder pulse value for use of the encoder in flying object marking.

• Setting / Readout data of encoder signal

STX	ENC	Sub Command	[Encoder Pulse] 6-byte	(Check Sum)	Delimiter
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Sub command is "S" at the time of setting and "A" for response data at the time of readout.

• Readout request of encoder signal

STX	ENC	R	(Check Sum)	Delimiter
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Name	Data Length [byte]	Description	Remarks
Encoder Pulse	6	"005.00" to "600.00" [Pulse/mm]	Available only when the moving direction is other than "still".

↓ Reference

- The setting changed by this command is saved without overwriting.

■ Laser Check Radiation (Code: SPT)

Controls "Laser Check Radiation" for laser radiation at the center of the marking area.

• Setting of laser check

STX	SPT	S	[Laser Check Radiation] 1-byte	(Check Sum)	Delimiter
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Name	Data Length [byte]	Description	Remarks
Laser Check Radiation	1	"0": Stop radiation "1": Start radiation "2": Stop radiation temporarily	<ul style="list-style-type: none"> • The internal shutter is automatically opened and closed at the time of start and stop of radiation. • "Stop radiation temporarily" refers to the status stopping radiation with the shutter opened. Use this state only when restarting radiation in a while. • To restart the radiation after sending "2" (Stop radiation temporarily), send "1" without closing the shutter.

↓ Reference

- This command is available only when the DIP switch No. 2 on the rear side of the controller is ON.
- You can start the laser radiation only when the laser pumping is completed and the shutter is closed or the "command reception mode ON" is set by Command reception permission (MKM) command.
- The laser is radiated at the center position.
- The laser power can be changed by setting the laser condition.
- Even without "stop" or "interrupt" command, the laser radiation automatically stops after about one minute and the shutter is closed.
- Do not control other operation or setting with "Stop radiation temporarily" status. Laser radiation should be ended with "Stop radiation" status.
- Do not execute any other operation during the laser radiation.

■ Power Check (Code: PWR)

[Supported models: LP-V/LP-W series]

Measures the current power ratio [%] in comparison with the default laser power.

• Power check designation

STX	PWR	S	[Designation Mode] [Power Correction Ratio] max. 4-byte	(Check Sum)	Delimiter
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Name	Data Length [byte]	Content	Remarks
Designation Mode	1	"0": Starts the power check (Start of current power measurement) "1" : Start of automatic power correction "2" : Start of manual power correction	The mode of power check is indicated. It is necessary to conduct a power check immediately before starting the automatic/manual power correction.
Power Correction Ratio	(3)	"050" to "200"[%]	Indicates the power correction ration in the manual power correction mode. Adds this data only when the destination mode is set to the manual power correction.

↓ Reference

- The power check command is rejected when the DIP switch (No. 2) in the rear side of the laser marker is set to OFF.
- Transmit the power check command with laser pumping turned ON and the shutter closed. Response data for abnormal receiving (NAK03 or NAK99) is returned when the laser pumping is OFF or the shutter is opened. (Even when the "reception mode ON" is set for the command reception permission: MKM command, it is refused if the shutter is opened.)
- When the Marking Status Sending Enable is set to on, marking status is returned after the power check and power correction are performed.

• Power check readout designation

STX	PWR	R	(Check Sum)	Delimiter
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↓ Reference

- Transmit the power check readout command after 6 seconds from transmission of the power check command.
- If the "Marking Status Transmission Permission (MST Command)" is set to "Transmission permitted", send the readout command after response of the marking status.

• Response to readout designation of power check result

STX	PWR	A	[Current Power] [Power after Correction] [Power Correction Ratio] [Correction Date] [Total Laser Radiation time] 32Byte	(Check Sum)	Delimiter
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Name	Data Length [byte]	Content	Remarks
Current Power	3	"000" to "xxx"	Indicates the current power ratio [%] in comparison with the default laser power.
Power after Correction	3	"000" to "xxx"	<ul style="list-style-type: none"> The value obtained by multiplying the current power by the power correction ratio is indicated. It may differ from the calculated value depending on the correction ratio. When the power correction has not been performed, this value is "000".
Power Correction Ratio	5	"050.0" to "200.0" [%]	When the power correction has not been performed, this value is "000".
Correction Date	14	For 15:00:00 on April 1, 2012 "20120401150000"	When the power correction has not been performed, this value is "00000000000000".
Total Laser Radiation Time	9	"0000000.0" to "1000000.0"[h]	

Reference

- Power correction refers to the function to correct not the max. laser power [W] value but the laser power setting value. Power correction does not change the actual max. output power relative to initial power.

■ Year/Month/Date/Time (Code: YMD)

Sets year, month, date, time for system.

- Setting / Readout data of year/month/date/time

STX	YMD	Sub Command	[Dominical Year] [Month] [Day] [Hour] [Minute] [Second] 14-byte	(Check Sum)	Delimiter
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Sub command is "S" at the time of setting and "A" for response data at the time of readout.

- Readout request of year/month/date/time

STX	YMD	R	(Check Sum)	Delimiter
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Name	Data Length [byte]	Description	Remarks
Dominical Year	4	"1980" to "2037" [year]	
Month	2	"01" to "12" [month]	
Day	2	"01" to "31" [day]	
Hour	2	"00" to "23" [hour]	
Minute	2	"00" to "59" [minute]	
Second	2	"00" to "59" [second]	

Reference

- The setting changed by this command is saved without overwriting.

■ Era Year (Code: ERA)

Sets era year.

- Setting / Readout data of era year

STX	ERA	Sub Command	[Era year] 2-byte	(Check Sum)	Delimiter
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Sub command is "S" at the time of setting and "A" for response data at the time of readout.

- Readout request of era year

STX	ERA	R	(Check Sum)	Delimiter
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Name	Data Length [byte]	Description	Remarks
Era Year	2	"01" to "99" [year]	

Reference

- The setting changed by this command is saved without overwriting.

■ Week Setting (Code: WKM)

Sets the update timing of week number and sets the definition of the first week of the year.

• Week Setting

STX	WKM	Sub Command	[Week update day] [First-Week-of- the-year] 2-byte	(Check Sum)	Delimiter
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Sub command is "S" at the time of setting and "A" for response data at the time of readout.

• Readout request of week setting

STX	WKM	R	(Check Sum)	Delimiter
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Name	Data Length [byte]	Description	Remarks
Week update day	1	"0": Sunday (Renews at 0:00) "1": Monday (Renews at 0:00)	
First-Week-of-the-year	1	"0": after JAN.1, week which contains JAN. "1": Week which contains the first Thursday	

Reference

- The setting changed by this command is saved without overwriting.

■ I/O Environment (Code: ENV)

Sets the operating environment of the I/O terminal and I/O connector.

• Setting / Readout data of I/O environment

STX	ENV	Sub Command	[One-shot output time] [Detect TRIG. warning during marking] 4-byte	(Check Sum)	Delimiter
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Sub command is "S" at the time of setting and "A" for response data at the time of readout.

• Readout request of I/O environment

STX	ENV	R	(Check Sum)	Delimiter
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Name	Data Length [byte]	Description	Remarks
One-shot output time	3	"002" to "510" [ms]	
Detect TRIG. warning during marking	1	"0": no output "1": output	The output status of warning at detection of trigger during marking operation is indicated.

Reference

- The setting changed by this command is saved without overwriting.

Troubleshooting

Troubleshooting

If any operation errors occur, check items below.

When the problems cannot be resolved, please contact our sales office.

■ Start-up

Troubles	Causes	Measures
<ul style="list-style-type: none"> Power supply is not turned on. The unit does not start up. 	Power cable is not connected.	Connect the power supply cable.
	Key switch is not turned on.	Turn on the key switch.
	Power is not supplied.	Check the power supply.
	Fuse is blown.	Replace the fuse by following the procedures in Operation/Maintenance Manual.

■ Laser Pumping

Troubles	Causes	Measures
Laser is not pumped.	Emergency stop switch is pressed.	Reset emergency stop switches located on the head and controller.
	[IN COM.] [OUT COM.] of I/O terminal is not connected to the power supply.	Connect [IN COM.] and [OUT COM.] in I/O Terminal to internal power supply or supply power from outside.
	Emergency stop input on I/O terminal is in OPEN status, or safety equipment such as door and switch connected to the Emergency stop input on I/O terminal is in OPEN status.	<ul style="list-style-type: none"> Check the connection of [EMER.+] and [EMER.-] (for PNP type model, [OUT COM]) of I/O terminal. Restore the original condition of the safety equipment connected to the Emergency stop input.
Laser is not pumped in remote mode.	Laser pumping ON signals from the external control equipment are not input or not accepted in remote mode.	<ul style="list-style-type: none"> Check connections with external equipment for mis-connection, disconnection or contact failure due to any loose connector. When controlling the laser pumping by I/O signal, turn off DIP switch No. 2 and turn on [LASER IN]. When controlling the laser pumping by serial communication, turn on DIP switch No. 2 and transmit the laser pumping command (LSR). To change the DIP setting, the switch of the laser marker should be set at power OFF state.

■ Display

Troubles	Causes	Measures
Touch panel console shows nothing.	Laser marker has not be started.	See remedial action against “Laser marker fails to start up”.
	Power cable of console is not connected.	Check that console cable is securely connected to connector [CONSOLE] on front of controller.
	Return harness is not connected.	Connect return harness ([RETURN OUT] [VGA OUT] [(VGA+RETURN) IN]) on the rear of the controller.
Touch panel console does not respond to screen tap.	Return harness is not connected.	Connect return harness ([RETURN OUT] [VGA OUT] [(VGA+RETURN) IN]) on the rear of the controller.
Monitor shows nothing.	Monitor is not turned on.	Check power to monitor.
	Monitor cable is not connected.	Check that monitor cable is securely connected to connector [VGA OUT] on back of controller.
	VGA-compatible monitor is not connected.	Connect a VGA-compatible monitor.
Mouse does not work. (When the controller is the PS/2 mouse supported type)	Mouse relay cable is not connected. (A mouse is plugged directly into mouse connector on back of controller.)	Use mouse adaptor cable for the PS/2 type mouse.
Mouse does not work. (When the controller is the USB mouse supported type)	The mouse is connected to the USB hub.	Connect the USB mouse to the laser marker controller directly without USB hub.
	The mouse type is not supported by this product.	Use the USB mouse with Human interface device (HID) class.

■ Marking

Troubles	Causes	Measures
Marking cannot be done. (Even though the laser radiation indicator changes to the marking status, nothing marked on the object.)	Obstacle hinders laser beam.	Remove obstacle between head of laser marker and object.
	For LP-V / LP-W series: Lens cap has not been removed.	Remove lens cap.
	Distance to object is not appropriate.	Adjust distance between bottom surface of laser maker and target surface of object as specified.
	Object is not in place.	Correct position of object. Guide indication feature may be helpful for this purpose.
	The laser marker is set for the marking on flying objects despite the static object.	Set "Moving direction" to "STILL." on the Trigger Setting screen.
	Laser power is insufficient.	<ul style="list-style-type: none"> • Increase laser power (including correction factor). • Decrease scan speed (including correction factor).
Laser wavelength is not appropriate for material of objects.	<p>Materials on which can be marked differ depending on wavelength and output power of laser marker.</p> <p>Applicable marking object is as follows;</p> <ul style="list-style-type: none"> • FAYb laser marker (LP-V/LP-W series) : Metal, resin (excluding transparent and translucent types) • CO₂ laser marker (LP-400 series) : Resin (including transparent and translucent types) and paper. 	
Marking cannot be done. (The laser radiation indicator does not change to the marking status.)	When the marking mode is TEST: The marking mode is "RUN".	Select [TEST] of the marking mode.
	When the marking mode is RUN: The run mode is not started or the marking trigger is not input.	Set the marking mode into [RUN] and press [Start]. Then, input the marking trigger from [TRIG. IN] signal on the I/O terminal.
	When the laser marker is under the remote mode or run mode: Marking trigger signal is not input.	<p>Check connections with external equipment for mis-connection, disconnection or contact failure due to any loose connector.</p> <p>When the marking trigger is input from the I/O terminal, check if marking trigger signal meets write conditions.</p> <ul style="list-style-type: none"> • For Trigger Marking: Check if one-shot signal of 10 ms or longer is provided per marking cycle. • For Equidistant Marking: Check if status of the signal remains on during marking.

Troubles	Causes	Measures
Marking cannot be done. (The laser radiation indicator does not change to the marking status.)	When the laser marker is under the remote mode or run mode: Next marking trigger signal is entered before completion of current marking cycle. (E800 occurs.)	Enter next marking trigger signal after making sure that READY output is on.
	When the laser marker is under the remote mode: Marking trigger is input when the READY output is OFF status.	Refer to "READY signal is not turned to ON" in the External Control Troubleshooting.

■ Marking Quality

Troubles	Causes	Measures
Marking fades entirely/ partially.	Laser emission port is not clean.	Refer to Operation/Maintenance Manual and clean contaminants off the laser emission port. If contaminants persist, replace lens and/or laser emission port protection glass (for LP-V/LP-W series only). Contact our sales office.
	Fumes occurring during marking hinder laser beam.	Install dust collector.
		Check that dust collector works well.
	Distance to object is not appropriate.	Adjust distance between bottom surface of laser maker and target surface of object.
	Target surface of object is inclined.	Make adjustment so that bottom surface of laser marker head and target surface of object are parallel with each other.
	There are variations in properties of objects. <ul style="list-style-type: none"> • Object thickness • Distance to object • Object surface condition (including roughness, gloss level, etc.) • Object material (including chemical composition ratio) 	Adjust marking conditions according to variations found.
	Object feeder is not stable.	Adjust object feeder so that position of objects become stable.
Performance of laser oscillator deteriorates due to aging.	<ul style="list-style-type: none"> • Increase laser power setting. • Decrease scan speed. If initial marking quality cannot be reached even if laser power is set to the upper limit, laser oscillator must be replaced. Contact our sales office.	

Troubles	Causes	Measures
Character is partially chipped.	Obstacle hinders laser beam.	Remove obstacle between head of laser marker and object.
	Laser emission port is not clean.	Refer to Operation/Maintenance Manual and clean contaminants off the laser emission port. If contaminants persist, replace lens and/or protection glass of laser emission port (for LP-V/ LP-W series only). Contact our sales office.
Marking is dotted.	For LP-V series: Setting of laser pulse cycle and scan speed are inadequate.	Decrease scan speed or marking pulse interval.
Marking line runs over the intended start or end points.	The setting in marking quality adjustment parameter does not match the other marking conditions.	Input the suitable adjustment value in marking quality parameters such as start point, end point, or wait value in laser setting screen.
Marking disorder (Characters crushed, unreadable)	The Fixing strength of the laser marker head is insufficient.	<ul style="list-style-type: none"> • Fix the head part tightly with the specified torque value. • Improve the strength of the stand on that the head is installed.
	There are continuous vibrations coming from surrounding equipment such as motor and press.	Perform vibration prevention measures.
	There are irregular vibrations coming from surrounding equipment such as air cylinder and forklift.	
	Start and/or stop timing of feeder does not match with marking operation. (Marking is disturbed at beginning/end of marking.)	<ul style="list-style-type: none"> • When disturbed at the beginning of marking: Marking trigger signal is likely to be entered before object is fully stopped. Marking may be disturbed due to remaining vibration even if object is in full stop. Use delay timer etc. so that marking trigger signal turns on after vibrations are completely damped. • When disturbed at the end of marking: Object is likely to start moving before completion of marking. Delay start timing of feeder or decrease scan speed so that marking is finished before object starts moving.
	There are noises coming from surrounding equipment.	Protect laser marker against noises as follows: <ul style="list-style-type: none"> • Securely ground frame ground (FG) of laser marker or surrounding equipment. • Isolate power and signal lines from each other if they have been routed in parallel. • Shield signal line. • Isolate power supply for laser marker from other equipment. • Use noise cut transformer to absorb noises from power supply.

■ Moving objects

Troubles	Causes	Measures
Marking cannot be done.	Encoder signal is off.	Check for proper connection to encoder.
Marking is sometimes skipped. (E800 occurs.)	Marking trigger signal is entered before current marking is finished.	<ul style="list-style-type: none"> • Increase scan speed setting of laser marker. • Decrease delay distance setting of laser marker. • Reduce feeder speed. • Increase marking interval (interval between objects on feeder).
Characters unreadable	Feed direction is not correct.	Match feed direction with laser marker operation.
	Speed changes at conveyor junction.	If conveyors are coupled, avoid marking near conveyor junction.
	Actual speed and preset speed for feeding objects are different due to slippage of objects.	Remove cause of object slippage.
	Pulse setting of encoder is not correct.	Measure the number of encoder pulses and adjust "Number of encoder pulses".
	Encoder is out of order.	Check encoder for proper function.
Marking position is unstable.	Positional misalignment is likely to occur due to meandering motion of conveyor.	Secure objects to prevent misalignment.
Marking character pitch is unstable.	The line speed at the marking position is different from the speed at the installation site of the encoder.	Place the encoder as close as possible to the marking position.
		Decrease the encoder resolution to block the effect of the line speed fluctuation. Note that the minimum value of the encoder pulse should be 10 P/mm.
Character is partially chipped.	Obstacle hinders laser beam.	Remove obstacle between head of laser marker and object.
Actual spacing between characters is larger or small than setting.	Pulse setting of encoder is not correct.	Check setting to be sure that: <ul style="list-style-type: none"> • When using A phase only: Number encoder pulses = Number of pulses/mm x 2 • When using A and B phases: Number encoder pulses = Number of pulses/mm x 4
	Either A or B phase signal is refused. (A and B phase used)	Check that signal is applied to A and B phase terminals of encoder.
	Measured number of encoder pulses differs from calculated one.	Increase or decrease values in "Encoder fine adjustment" field as appropriate. <ul style="list-style-type: none"> • When the character interval is wide: Increase the setting. • When the character interval is narrow: Decrease the setting.

■ External control

Troubles	Causes	Measures
Laser marker cannot be controlled by the external signal.	Laser marker is not in remote mode.	Press Remote switch on front of controller or enter remote mode in a manner described in External Control Manual.
	The wiring between the laser marker and the external control devices is incorrect.	Check connections with external equipment for mis-connection, disconnection or contact failure due to any loose connector. Check for continuity using tester or the like.
	There are noises coming from surrounding equipment.	Protect laser marker against noises as follows: <ul style="list-style-type: none"> Securely ground frame ground (FG) of laser marker or surrounding equipment. Isolate power and signal lines from each other if they have been routed in parallel. Shield signal line. Isolate power supply for laser marker from other equipment. Use noise cut transformer to absorb noises from power supply.
Serial communication control fails	Selected communication port is inappropriate.	For communication with external devices, select either RS-232C or Ethernet port. (They cannot be used at the same time, or switched.) The port selected in the environment setting screen indicates the valid communication port. RS-232C is selected at factory shipment.
	Type of connection cable used is inappropriate.	For RS-232C, use a commercially available cross cable. (A straight cable cannot be used.) Laser marker has three-wire connection. (Only pins Nos. 2, 3 and 5 of RS-232C connector are used.) For Ethernet, check the followings: <ul style="list-style-type: none"> To use an external device and the laser marker one to one, connect them with a commercially available cross cable (STP cross cable of the Category 5e or higher is recommended). To use an external device and the laser markers one to many, prepare a hub or router compliant to 1000BASE-T, 100BASE-TX, or 10BASE-T and connect them with a commercially available straight cable (STP cross cable of the Category 5e or higher is recommended).
	Communication parameter settings are incorrect.	Match communication parameter settings to external equipment. Communication parameter settings of laser marker can be checked in the environment setting screen.

Troubles	Causes	Measures
Serial communication control fails	The RS-232C cable is connected to the wrong connector (RETURN OUT).	Connect the RS-232C cable to "RS-232C" connector on the rear of the controller.
	Communication parameter settings are changed when the backup data is restored to the laser marker.	Check the communication parameter settings. If Ethernet is used, confirm the IP address and other parameters. When the backup data is restored to the laser marker, communication parameter settings are overwritten with the backup data.
	Command data is not received from external equipment.	Using commercially available line monitor or protocol analyzer, check if external equipment transmits data.
	Communication data format is incorrect.	Check if format of communication data command transmitted from external equipment is correct. <ul style="list-style-type: none"> • Check if start code STX (02: HEX) is placed at beginning of transmitted data. • Check if the delimiter is added to the end of the transmission data. ([CR] (0D:HEX) or [CR+LF] (0D:HEX 0A:HEX) for RS-232C, [CR] (0D:HEX) for Ethernet)
READY signal is not turned to ON.	Alarm or error occurs.	Release the alarm or warning referring to the measures for the corresponding error code.
	Laser has not been pumped.	Refer to "The laser is not pumped".
	Internal shutter is closed.	Open the internal shutter. <ul style="list-style-type: none"> • When controlling the shutter by I/O signal, turn off DIP switch No. 2 and turn on terminal SHUTTER in terminal block. • When controlling the shutter by serial communication, turn on DIP switch No. 2 and send shutter command (SHT). * To change the DIP setting, the switch of the laser marker should be set at power OFF state..
	The changing operation of the file data is unfinished.	It takes from tens of msec. to several seconds to complete the changing file data. During that time, READY output is in OFF status. Enter marking trigger signal after making sure that [READY] output is on if you want to change file to another one.
	Marking data is not sent to the laser marker from the external devices, in case of using Rank Function, External Offset Function, or Serial Data Input Function.	If rank, external offset and serial data functions are enabled while marking conditions are not yet specified, enter respective data per marking cycle. Enter marking trigger signal after making sure that [READY] output is on or checking status of READY using status request command.
Under serial communication control: Mark trigger signal is ON while the command reception permission (MKM command) is set to "Reception mode ON".	Set "reception mode OFF" for command reception permission (MKM command). Before entering marking trigger signal, use status request command [STS] to make sure that READY is on.	

Troubles	Causes	Measures
The sending command is not accepted by the laser marker. (NAK response)	DIP switch No. 2 on back of laser marker is off.	To control the following commands with the serial communication, turn ON DIP switch No. 2. <ul style="list-style-type: none"> • Laser Control [LSR] • Shutter Control [SHT] • Laser Check Radiation [SPT] • Guide LD Indication [GID] • Power Check [PWR]
	“Reception mode ON” is not set for command reception permission (MKM command)	The laser marker does not accept commands except the following unless it is in the “reception mode ON” status. For command transmission, set “reception mode ON” for “command reception permission (MKM command)”. <ul style="list-style-type: none"> • File Change (No. Specified) [FNO] • File Change (Comment Specified) [FNN] • Shutter Control [SHT] • Command Reception Permission [MKM] • Laser Control [LSR] • Counter Reset [CTR] • Status Request [STS] • Marking Trigger [MRK] • Serial Data Input [SIN]
	Alarm or error occurs.	All commands except the following are refused while alarm or error is active. <ul style="list-style-type: none"> • When alarm occurred: <ul style="list-style-type: none"> • Status Request [STS] • When warning occurred: <ul style="list-style-type: none"> • Status Request [STS] • Shutter control [SHT] (for closing motion only) • Command Reception Permission [MKM] (Only for reception mode ON and reception mode readout)
	Two or more command data are transmitted at the same time.	After sending the command, confirm the response data from the laser marker. Do not send the next command before receiving the response.

■ Others

Troubles	Causes	Measures
Laser is emitted at unintended timing.	Photoelectric sensor for marking trigger signal malfunctions.	Fumes may cause malfunction of photoelectric sensor for marking trigger signal. <ul style="list-style-type: none"> • Install dust collector. • Check that dust collector works well.
Date is reset.	Internal battery has run out.	Contact failure may also be a cause of this symptom. When laser marker have been in use for five years or more, internal battery is easy to run out. Contact our sales office for replacement of internal battery.

Error Indication

When an error occurs, an error code appears on the front panel of the laser marker controller.

Errors are categorized into alarm and warning depending on their details.

This chapter describes the details and measures of errors.

Alarm

Errors that occur when highly emergent safety function is activated or there is any abnormality in laser marker are output as alarm.

When an alarm occurs, the laser pumping is turned OFF, and the laser radiation is stopped if during lasing.

Release Method of Alarm

- 1) Remove a cause of alarm. Note that any alarms due to hardware's problem cannot be released.
- 2) If the error E002, E004 or E011 occurs, push the alarm reset switch on the front of the controller, or input the alarm reset signal on the I/O terminal.
For other errors, reboot the laser marker.
- 3) If the alarm occurs during the marking operation of the files in which the counter function is set, check if the counter value is correct before restart the marking operation.

ERROR CODE	Error details	Measures
E002	Emergency stop button of controller is pushed.	Release emergency stop button of controller by turning it in arrow direction.
E004	Emergency stop occurred on external terminal.	<ul style="list-style-type: none">• Check the connection of EMERGENCY STOP or LASER STOP terminal on the I/O terminal.• Check the status of the safety equipment connected to the EMERGENCY STOP or LASER STOP terminals.• Confirm operation logic of the connected devices.• Connect the internal or external power supply to IN COM. and OUT COM. in the I/O terminal respectively.
E011	Laser stop has occurred on external terminal.	
E020 *1	Cover of scanning section in head unit is opened.	Contact to our sales office.
E210 to E213	Galvanometer error.	<ul style="list-style-type: none">• Check and correct the power status.• Check if the AC power line is effected by noise.• Connect head control cable or head power cable properly, and restart with key switch.• If there is a marking line scanned for 1 minute or more at once, decrease the scan speed.• When not recovered, contact our sales office.
E220	Automatic shutter error.	<ul style="list-style-type: none">• Connect head control cable properly, and restart with key switch.• Contact to our sales office.

*1: Error that may occur for LP-V / LP-W series only.

ERROR CODE	Error details	Measures
E230 to E233	<p>Laser error.</p> <ul style="list-style-type: none"> • Temperature in the laser oscillator exceeds the limit. • Instantaneous interruption of laser power supply is detected. • Head control cable is not connected properly. • Fiber cable is broken. (only for LP-V/LP-W series) • Failure of laser oscillator is detected. • There might be occurred the malfunction of the internal shutter. 	<p>Turn the key switch to the OFF position and check the followings: Cool the laser oscillator thoroughly before restarting the controller.</p> <ul style="list-style-type: none"> • Check that the ambient temperature is in the specified operating temperature. • Check the air filter, the air intake / exhaust port and the fan of the cooling part for clogging. • Check and correct the power status. • Check if the AC power line is effected by noise. • Connect head control cable and head power cable properly, and restart with key switch. • When not recovered, contact our sales office.
E235 *2	There is a short line segment that cannot be marked.	<p>Check and delete if there is an unnecessary short line segment in logo files.</p> <hr/> <p>Set scan speed smaller, or "0" to "Pre-Scan time" on Laser Setting.</p>
E240 E241	The temperature of the laser has reached its limit.	<ul style="list-style-type: none"> • Check that the ambient temperature is in the specified operating temperature. • Make sure cooling fan operates. • When not recovered, contact our sales office.
E250	Detected a decrease in power supply voltage.	<ul style="list-style-type: none"> • Check and correct the power status. • Check if the AC power line is effected by noise. • Connect head power cable properly, and restart with key switch. • When not recovered, contact our sales office.
E300	A head is not connected. Shut off a power and connect a head.	Connect head control cable properly, and restart with key switch.
E310	Unsupported head. Change either head or controller.	<ul style="list-style-type: none"> • Connect head control cable properly, and restart with key switch.
E311	<p>System error.</p> <ul style="list-style-type: none"> • Head control cable is not connected properly. • Wrong head has been connected to controller. 	<ul style="list-style-type: none"> • Check if head with correct model has been connected. If it is wrong, replace head or controller with correct one.
E312	System error.	Restart the laser marker. When not recovered, contact to our sales office.

*2 : Error that may occur for LP-400 series only.

ERROR CODE	Error details	Measures
E320	Unit combination is incorrect.	<ul style="list-style-type: none"> • Connect head control cable properly, and restart with key switch. • Check if head with correct model has been connected. If it is wrong, replace head or controller with correct one.
E410 to E443 E990 to E999	System error.	Restart the laser marker. When not recovered, contact to our sales office.
E450 to E456	Memory error.	
E700	The laser pumping turned OFF while marking.	<ul style="list-style-type: none"> • Change timing so that the marking trigger is input after the laser pumping has completed. • Check wiring and control procedure for the I/O terminal block, wiring to communication port, and the procedure of the communication command.

Reference

- When other error not listed in this section was occurred, restart the laser marker.
- If the symptom persists after restart, contact our sales office.

Warning

Errors that notify of that the setting data are incorrect or laser radiation conditions are not met are output as warnings. Marking operation cannot be started while any warning is active. Laser pumping maintains the state before the warning.

Release Method of Warning

- 1) Remove a cause of warning. If the warning cause is the wrong setting, correct the file data.
- 2) When the laser marker is under the remote mode, close the shutter by I/O or serial communication control.
In case of the following warning, the shutter control is unnecessary.
 - E800: the warning occurs only while the specified one-shot output time and it is released automatically.
 - E811: the warning occurs only during the laser stop is opened, and then it is released automatically when the laser stop is closed.
- 3) If the warning occurs during the marking operation of the files in which the counter function is set, check if the counter value is correct before restart the marking operation.
- 4) In case that marking is executed again, make sure that the warning output is turned on, and then open the internal shutter.

ERROR CODE	Error details	Measures
E251	Detected a decrease in clock battery voltage. Reset present time.	Contact to our sales office. While laser Marker power is on, reset "Present Time" in Environment Setting. When the power is off, reset "Present Time".
E500	There is not enough free space. The file cannot be registered.	Delete registered file and logo file.
E501	Cannot register setting because of memory error.	<ul style="list-style-type: none"> • Restart with key switch. • When not recovered, contact our sales office.
E502 E503	Invalid file format of font or logo file.	<ul style="list-style-type: none"> • Register the logo or font file again on the USB screen. • For the logo file, convert the logo data to VEC format again with Logo data conversion software.
E600	No setting file.	Set the marking data such as character, barcode and logo.
E601	No font file.	<ul style="list-style-type: none"> • Register font file. • Set a registered font to the font in character condition.
E602	Lack of font memory.	Make font file smaller, or delete unnecessary font file.
E603	No logo file.	Register logo file.
E604	Included character not registered into font file.	Change characters. Or set the font file containing the setting characters.
E605	Exceed valid number of characters. (Max. 30 characters/line.)	Make numbers of characters smaller.

ERROR CODE	Error details	Measures
E606	Existed marking data outside of marking area.	Contain marking data within marking area. <ul style="list-style-type: none"> • Change marking position. • Make characters smaller. • Narrow character interval. * If there is no data out of the marking field in the image display, check the “system offset” in the environment setting. “System offset” value is not shown in the image display.
E607	Cannot create bolded character.	<ul style="list-style-type: none"> • Set any standard font without original 4 font. • Use Font Maker provided to create the proper pattern font. • Set line width of bold character to quarter or below of character height and width. • When marking the bold character, set the comparison ratio between character height and width become 1/4 to 4. • Check the line width of bold character not exceed the specified value.
E610 E612	Lack of marking memory. <ul style="list-style-type: none"> • Marking data is too large. • The line length is too long. (spiral, etc.) 	<ul style="list-style-type: none"> • Reduce numbers of characters and logo data. • Reduce numbers of step & repeat. • Reduce numbers of a start point and a end point of characters or logo data. • Separate the long segment into short data.
E620 E621	Flying object area over. (Can not follow line speed of flying object marking.)	<ul style="list-style-type: none"> • Shorten marking time with the following methods. <ul style="list-style-type: none"> • Speed up scan speed. • Narrow character interval. • Make characters smaller. • Reduce numbers of characters. • Change setting of curve/edge. • Reduce numbers of character lines. • Displace a start point of marking, etc. • Adjust the line speed of the flying object. • Adjust the waiting time of the flying object. • Set the coordinate of the marking data close to the center of the marking field.
E622	Flying object time over. (Can not follow line speed of flying object marking.)	
E623	Too narrow marking interval for proportioned flying object.	Increase setting value of marking spacing. Shorten marking time with the following methods. <ul style="list-style-type: none"> • Speed up scan speed. • Narrow character interval. • Make characters smaller. • Reduce numbers of characters. • Change setting of curve/edge. • Reduce numbers of character lines. • Set smaller value to the one-shot output time, etc.
E630	Too much quantity of Step and Repeat marking.	Reduce numbers of characters to be marked. (Max.: 1000)

ERROR CODE	Error details	Measures
E640	Invalid function for combining with flying object.	<ul style="list-style-type: none"> • With the marking to flying object, do not use the following functions. <ul style="list-style-type: none"> • Step & Repeat • Reset at date update function • Arbitrary point radiation • Overwrite function • With the equidistant marking to flying object, do not use the following functions. <ul style="list-style-type: none"> • Rank • External offset • Serial data marking • Release flying object marking function with trigger setting.
E650	Invalid setting of processing element.	Set the distance between start and end points of the arc smaller than double of radius.
E651	Too short line segment of processing element.	Set the larger value to the length of the line than width of the line.
E660	Cannot convert dxf file.	<ul style="list-style-type: none"> • Save the DXF file with DXF-R12J, R13J or R14 format. • Delete the entities which are not supported by laser marker in the DXF file. • Read the DXF file again to the laser marker.
E690	Cannot finish measurement during specified time.	<ul style="list-style-type: none"> • Reduce marking contents and measure marking time. • Speed up scan speed.
E700	Started marking in laser pumping OFF state.	Turn ON the laser pumping and check that the laser pumping has completed, and then start marking.
E701 *1	Started laser power check in laser pumping OFF state.	Turn ON the laser pumping and check that the laser pumping has completed, and then start power check.
E800	----- (no message : Invalid input of marking trigger while Ready is OFF.)	<ul style="list-style-type: none"> • Change marking timing so that trigger input is performed after marking ready output is turned on. • Check wiring and control procedure for I/O terminal, wiring to communication port, and the procedure of the communication command.
E811	Occurred laser stop from external terminal.	<ul style="list-style-type: none"> • Check the wiring of the laser stop input terminal and contact of the switch. • Confirm operation logic of connection device.
E900	Existed invalid function character for simultaneous use. The following combination of the functions are not available in one file. <ul style="list-style-type: none"> • Serial data marking function and rank function • Serial data marking function and external offset function 	Delete any one of these functions from the file.
E901	Existed invalid character for converting into 2D code.	Set the character that can be converted into 2D code.
E902	Cannot create 2D code.	Use the condition where 2D code can be created.

*1: Error that may occur for LP-V / LP-W series only.

ERROR CODE	Error details	Measures
E903	No specified 2D code pattern.	Specify 2D pattern code which has been already registered.
E910	Existed invalid character for converting into bar code.	Set the character that can be bar coded.
E911	Cannot create bar code.	Use the condition where a barcode can be created.
E912	Too small dimension of narrow element/basic module width for bar code.	Specify the setting value for the width of the narrow element/basic module larger than that of the line width of the laser.
E913	No quiet zone in bar code.	Set the proper value for "Quiet/Narrow Ratio". With the inversion setting, set always quiet zone.
E914	Too small separate pattern or composite row height.	<ul style="list-style-type: none"> Adjust the height of one step bar code. Specify the proper value for "Separation Ptrn H/W" so that the "Separation Pattern Height" becomes "0" or "Marking Width" is larger than "Separation Pattern Width".

Reference

- When other error not listed in this section was occurred, restart the laser marker.
- If the symptom persists after restart, contact our sales office.

Character Code Table

ASCII Code

Use the ASCII Code shown below for the communication data.

The characters described with [] denote control character.

Top Bottom	00	10	20	30	40	50	60	70
0	[NUL]	[DLE]	(SP)	0	@	P	'	p
1	[SOH]	[DC1]	!	1	A	Q	a	q
2	[STX]	[DC2]	"	2	B	R	b	r
3	[ETX]	[DC3]	#	3	C	S	c	s
4	[EOT]	[DC4]	\$	4	D	T	d	t
5	[ENQ]	[NAK]	%	5	E	U	e	u
6	[ACK]	[SYN]	&	6	F	V	f	v
7	[BEL]	[ETB]	'	7	G	W	g	w
8	[BS]	[CAN]	(	8	H	X	h	x
9	[HT]	[EM]	)	9	I	Y	i	y
A	[LF]	[SUB]	*	:	J	Z	j	z
B	[VT]	[ESC]	+	;	K	[	k	{
C	[FF]	[FS]	,	<	L	¥	l	|
D	[CR]	[GS]	-	=	M	]	m	}
E	[SO]	[RS]	.	>	N	^	n	-
F	[SI]	[US]	/	?	O	_	o	[DEL]

Reference

- This ASCII Code differs from the ANSI Standard ASCII Code in the symbols denoted by the following codes.
 - 5C (HEX)
 - 60 (HEX)
 - 7E (HEX)
- When using the external device set by 2byte, NUL00 (HEX) can be used. Please add NUL00 (HEX) before STX or after delimiter.
- To input the control code for CODE 128, Data matrix or QR code (binary mode) by using BRS or SIN command, use the following alternate codes instead of ASCII code.

Control Code	00 (HEX) to 1F (HEX)	7F (HEX)
Alternate code	F050 (HEX) to F06F (HEX)	F071 (HEX)

- To input "FNC1" for CODE128, GS1 Data Matrix, GS1 DataBar Expanded, and 2D side of Composite code by using BRS or SIN command, use the following alternate code.

Control Code	FNC1
Alternate code	F072 (HEX)

Original Font

	Shift JIS	JIS	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F	
Symbols	813F	2120			、	。	、	。	・	：	；	？	！	”	°	´	、	¨	
	814F	2130	^	—	—	、	、	、	、	//	全	々	々	×	○	—	—	-	/
	815F	2140	\	~	//	|	...	..	'	'	"	"	(	)	{	}	[	]
	816F	2150	{	}	<	>	《	》	「	」	『	』	【	】	+	-	±	×	
	8180	2160	÷	=	≠	<	>	≤	≥	∞	∴	♂	♀	°	'	"	°C	¥	
	8190	2170	\$	¢	£	%	#	&	*	@	§	☆	★	○	●	◎	◇		
	819E	2220		◆	□	■	△	▲	▽	▼	※	〒	→	←	↑	↓	■		
	81AE	2230											∈	∋	⊆	⊇	⊂	⊃	
	81BE	2240	U	∩									∧	∨	¬	⇒	⇔	∇	
	81CE	2250	∃												∠	⊥	∩	∂	
	81DE	2260	∇	≡	≐	≪	≫	√	∞	∞	∴	∫	∫∫						
81FE	2270			Å	%	#	b	♪	†	‡	¶								
Alpha-numeric	824F	2330	0	1	2	3	4	5	6	7	8	9							
	825F	2340		A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	
	826F	2350	P	Q	R	S	T	U	V	W	X	Y	Z						
	8280	2360		a	b	c	d	e	f	g	h	i	j	k	l	m	n	o	
	8290	2370	p	q	r	s	t	u	v	w	x	y	z						

* JIS code "2121" is a blank character (space), and any characters are not registered into the blank.

* The following character is registered in white.

Shift JIS	JIS	JIS
8179	215A	【
817A	215B	】
819A	217A	★
819C	217C	●
819F	2221	◆
81A1	2223	■
81A3	2225	▲
81A5	2227	▼
81AC	222E	■

JIS Level-1 Font

JIS X 0208:1997

	Shift JIS	JIS	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
Hiragana	829E	2420		あ	あ	い	い	う	う	え	え	お	お	か	が	き	ぎ	く
	82AE	2430	ぐ	け	げ	こ	ご	さ	ざ	し	じ	す	ず	せ	ぜ	そ	ぞ	た
	82BE	2440	だ	ち	ぢ	っ	つ	づ	て	で	と	ど	な	に	ぬ	ね	の	は
	82CE	2450	ば	ぱ	ひ	び	び	ふ	ぶ	ぶ	へ	べ	べ	ほ	ぼ	ぼ	ま	み
	82DE	2460	む	め	も	ゃ	や	ゆ	ゆ	よ	よ	ら	り	る	れ	ろ	わ	わ
82EE	2470	ゐ	ゑ	を	ん													
Katakana	833F	2520		ア	ア	イ	イ	ウ	ウ	エ	エ	オ	オ	カ	ガ	キ	ギ	ク
	834F	2530	グ	ケ	ゲ	コ	ゴ	サ	ザ	シ	ジ	ス	ズ	セ	ゼ	ソ	ゾ	タ
	835F	2540	ダ	チ	ヂ	ッ	ツ	ヅ	テ	デ	ト	ド	ナ	ニ	ヌ	ネ	ノ	ハ
	836F	2550	バ	パ	ヒ	ビ	ピ	フ	ブ	プ	ヘ	ベ	ペ	ホ	ボ	ポ	マ	ミ
	8380	2560	ム	メ	モ	ャ	ヤ	ユ	ユ	ヨ	ヨ	ラ	リ	ル	レ	ロ	ワ	ワ
	8390	2570	ヰ	ヱ	ヲ	ン	ヴ	カ	ケ									
Greek Character	839E	2620		Α	Β	Γ	Δ	Ε	Ζ	Η	Θ	Ι	Κ	Λ	Μ	Ν	Ξ	Ο
	83AE	2630	Π	Ρ	Σ	Τ	Υ	Φ	Χ	Ψ	Ω							
	83BE	2640		α	β	γ	δ	ε	ζ	η	θ	ι	κ	λ	μ	ν	ξ	ο
	83CE	2650	π	ρ	σ	τ	υ	φ	χ	ψ	ω							
Russian Character	843F	2720		А	Б	В	Г	Д	Е	Ё	Ж	З	И	Й	К	Л	М	Н
	844F	2730	О	П	Р	С	Т	У	Ф	Х	Ц	Ч	Ш	Щ	Ъ	Ы	Ь	Э
	845F	2740	Ю	Я														
	846F	2750		а	б	в	г	д	е	ё	ж	з	и	й	к	л	м	н
	8480	2760	о	п	р	с	т	у	ф	х	ц	ч	ш	щ	ъ	ы	ь	э
	8490	2770	ю	я														
あ	889E	3020		亜	啞	娃	阿	哀	愛	挨	始	逢	葵	茜	穉	惡	握	渥
	88AE	3030	旭	葦	芦	鮪	梓	庄	幹	扱	宛	姐	虻	飴	絢	綾	鮎	或
い	88BE	3040	粟	裕	安	庵	按	暗	案	闇	鞍	杏						
	88CE	3050	夷	委	威	尉	惟	意	慰	易	椅	為	畏	異	移	維	緯	胃
	88DE	3060	萎	衣	謂	違	遺	医	井	亥	域	育	郁	磯	一	吉	溢	逸
	88EE	3070	稻	茨	芋	鱒	允	印	咽	員	因	姻	引	飲	淫	胤	蔭	
	893F	3120		院	陰	隱	韻	吋										
う	893F	3120							右	宇	烏	羽	迂	雨	卯	鵜	窺	丑
	894F	3130	確	白	渦	嘘	唄	鬱	蔚	鰻	姥	厩	浦	瓜	閨	樽	云	運
	895F	3140	雲															
	896F	3150		荏	餌	叡	宮	嬰	影	映	曳	榮	永	泳	洩	瑛	盈	穎
え	896F	3150	穎	英	衛	詠	銳	液	疫	益	駅	悦	謁	越	閱	榎	厭	円
	8980	3160	園	堰	奄	宴	延	怨	掩	援	沿	演	炎	焰	煙	燕	猿	縁
	8990	3170	艶	苑	菌	遠	鉛	鴛	塩									
お	899E	3220		押	旺	横	欧	殴	王	翁	襖	鶯	鶇	央	奥	往	応	億
	89AE	3230	屋	憶	臆	桶	牡	乙	俺	卸	恩	温	穩	音				
か	89BE	3240	伽	伽	佳	加	可	嘉	夏	嫁	家	寡	科	暇	果	架	歌	河
	89CE	3250	火	珂	禍	禾	稼	箇	花	苛	茄	荷	華	菓	蝦	課	嘩	貨
	89DE	3260	迦	過	霞	蚊	俄	峨	我	牙	画	臥	芽	蛾	賀	雅	餓	駕
	89EE	3270	介	会	解	回	塊	壞	廻	快	怪	悔	恢	懷	戒	拐	改	
	8A3F	3320		魁	晦	械	海	灰	界	皆	絵	芥	蟹	開	階	貝	凱	効
	8A4F	3330	外	咳	害	崖	慨	概	涯	碍	蓋	街	該	鎧	骸	湮	馨	蛙
	8A5F	3340	垣	柿	蛭	鈎	劃	嚇	各	廓	拵	攪	格	核	殼	獲	確	穫

	Shift JIS	JIS	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
か	8A6F	3350	覚	角	赫	較	郭	閣	隔	革	学	岳	楽	額	顎	掛	笠	檉
	8A80	3360	櫃	梶	鯁	渴	割	喝	恰	括	活	渴	滑	葛	褐	轄	且	鯉
	8A90	3370	叶	栳	樺	鞆	株	兜	竈	蒲	釜	鎌	嚙	鴨	栢	茅	萱	
	8A9E	3420		粥	刈	苴	瓦	乾	侃	冠	寒	刊	勘	勸	卷	喚	堪	姦
	8AAE	3430	完	官	寬	干	幹	患	感	慣	憾	換	敢	柑	桓	棺	款	歎
	8ABE	3440	汗	漢	澗	淮	環	甘	監	看	竿	管	簡	緩	缶	翰	肝	艦
	8ACE	3450	莞	觀	諫	貫	還	鑑	問	閑	閑	陷	韓	館	館	丸	含	岸
	8ADE	3460	巖	玩	癌	眼	岩	翫	贗	雁	頑	顔	願					
き	8AEE	3470	基	奇	嬉	寄	岐	希	幾	忌	揮	机	旗	既	期	棋	棄	
	8B3F	3520		機	歸	毅	氣	汽	畿	祈	季	稀	紀	徼	規	記	貴	起
	8B4F	3530	軌	輝	飢	騎	鬼	龜	偽	儀	妓	宜	戲	技	擬	欺	犧	疑
	8B5F	3540	祇	義	蟻	誼	議	掬	菊	鞠	吉	吃	喫	桔	橘	詰	砧	杵
	8B6F	3550	黍	却	客	脚	虐	逆	丘	久	仇	休	及	吸	宮	弓	急	救
	8B80	3560	朽	求	汲	泣	灸	球	究	窮	笈	級	糾	給	旧	牛	去	居
	8B90	3570	巨	拒	拋	拳	渠	虚	許	距	鋸	漁	禦	魚	亨	享	京	
	8B9E	3620		供	俠	僑	兇	競	共	凶	協	匡	卿	叫	喬	境	峽	強
	8BAE	3630	疆	怯	恐	恭	挾	教	橋	況	狂	狹	矯	胸	脅	興	蕎	鄉
	8BBE	3640	鏡	響	饗	驚	仰	凝	堯	曉	業	局	曲	極	玉	桐	秆	僅
	8BCE	3650	勤	均	巾	錦	斤	欣	欽	琴	禁	禽	筋	緊	芹	菌	衿	襟
	8BDE	3660	謹	近	金	吟	銀											
く	8BEE	3670	駒	具	愚	虞	喰	空	偶	寓	遇	隅	串	櫛	釧	屑	屈	
	8C3F	3720		掘	窟	杏	靴	轡	窪	熊	隈	叢	栗	繰	桑	鋤	勲	君
	8C4F	3730	薰	訓	群	軍	郡											
	8C5F	3740	契	形	徑	惠	慶	慧	憩	掲	携	敬	景	桂	溪	畦	稽	系
け	8C6F	3750	経	繼	繫	野	荃	荊	蚩	計	詣	警	輕	頸	鷄	芸	迎	鯨
	8C80	3760	劇	戟	擊	激	隙	桁	傑	欠	決	潔	穴	結	血	訣	月	件
	8C90	3770	儉	倦	健	兼	券	劍	喧	圈	堅	嫌	建	憲	懸	拳	捲	
	8C9E	3820		檢	権	牽	犬	猷	研	硯	絹	梟	肩	見	謙	賢	軒	遣
	8CAE	3830	鍵	險	頭	驗	鹵	元	原	巖	幻	弦	減	源	玄	現	絃	舷
	8CBE	3840	言	諺	限													
	8CCE	3850	湖	狐	糊	袴	股	胡	菰	虎	誇	跨	鉗	雇	顧	鼓	五	互
	8CDE	3860	伍	午	吳	吾	娛	後	御	悟	梧	檣	瑚	碁	語	誤	護	醐
	8CEE	3870	乞	鯉	交	佼	侯	候	倅	光	公	功	効	勾	厚	口	向	
	8D3F	3920		后	喉	坑	垢	好	孔	孝	宏	工	巧	巷	幸	広	庚	康
8D4F	3930	弘	恒	慌	抗	拘	控	攻	昂	晃	更	杭	校	梗	構	江	洪	
こ	8D5E	3940	浩	港	溝	甲	皇	硬	稿	糠	紅	紘	絞	綱	耕	考	肯	肱
	8D6F	3950	腔	膏	航	荒	行	衡	講	貢	購	郊	酵	鉞	砢	鋼	閤	降
	8D80	3960	項	香	高	鴻	剛	劫	号	合	壕	拷	濠	豪	轟	趨	克	刻
	8D90	3970	告	国	穀	酷	鵠	黒	獄	漉	腰	甌	忽	惚	骨	狛	込	
	8D9E	3A20		此	頃	今	困	坤	墾	婚	恨	懇	昏	昆	根	梱	混	痕
	8DAE	3A30	紺	良	魂													
	8DBE	3A40	娑	坐	座	挫	債	催	再	最	哉	塞	妻	宰	彩	才	採	栽
	8DCE	3A50	歳	濟	災	采	犀	碎	砦	祭	斎	細	菜	裁	載	際	劑	在
	8DDE	3A60	材	罪	財	冴	坂	阪	堺	柵	肴	咲	崎	埼	碕	鷺	作	削
	8DEE	3A70	咋	搾	昨	朔	柵	窄	策	索	錯	桜	鮭	笹	匙	冊	刷	

	Shift JIS	JIS	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
さ	8E3F	3B20		察	撈	撮	擦	札	殺	薩	雜	臯	鯖	捌	鑄	鮫	皿	晒
	8E4F	3B30	三	傘	參	山	慘	撒	散	棧	燦	珊	産	算	纂	蚕	讚	贊
	8E5F	3B40	酸	餐	斬	暫	残											
し								仕	仔	伺	使	刺	司	史	嗣	四	士	始
	8E6F	3B50	姉	姿	子	屍	市	師	志	思	指	支	孜	斯	施	旨	枝	止
	8E80	3B60	死	氏	獅	祉	私	糸	紙	紫	肢	脂	至	視	詞	詩	試	誌
	8E90	3B70	諮	資	賜	雌	飼	齒	事	似	侍	児	字	寺	慈	持	時	
	8E9E	3C20		次	滋	治	爾	璽	痔	磁	示	而	耳	自	蒔	辞	汐	鹿
	8EAE	3C30	式	識	嶋	竺	軸	穴	霰	七	叱	執	失	嫉	室	悉	湿	漆
	8EBE	3C40	疾	質	実	蔀	篠	俣	柴	芝	屢	蕊	縞	舍	写	射	捨	赦
	8ECE	3C50	斜	煮	社	紗	者	謝	車	遮	蛇	邪	借	勺	尺	杓	灼	爵
	8EDE	3C60	酌	釈	錫	若	寂	弱	惹	主	取	守	手	朱	殊	狩	珠	種
	8EEE	3C70	腫	趣	酒	首	儒	受	呪	寿	授	樹	綬	需	囚	収	周	
	8F3F	3D20		宗	就	州	修	愁	拾	洲	秀	秋	終	繡	習	臭	舟	菟
	8F4F	3D30	衆	襲	讐	蹴	輯	週	酋	酬	集	醜	什	住	充	十	從	戎
	8F5F	3D40	柔	汁	渋	獸	縱	重	銃	叔	夙	宿	淑	祝	縮	肅	塾	熟
	8F6F	3D50	出	術	述	俊	峻	春	瞬	竣	舜	駿	准	循	旬	楯	殉	淳
	8F80	3D60	準	潤	盾	純	巡	遵	醇	順	処	初	所	暑	曙	渚	庶	緒
	8F90	3D70	署	書	薯	諸	諸	助	叙	女	序	徐	恕	鋤	除	傷	償	
	8F9E	3E20		勝	匠	升	召	哨	商	唱	嘗	獎	妾	娼	宵	將	小	少
	8FAE	3E30	尚	庄	床	廠	彰	承	抄	招	掌	捷	昇	昌	昭	晶	松	梢
	8FBE	3E40	樟	樵	沼	消	涉	湘	燒	焦	照	症	省	硝	礁	祥	称	章
	8FCE	3E50	笑	粧	紹	肖	苜	蔣	蕉	衝	裳	訟	証	詔	詳	象	賞	醬
	8FDE	3E60	鉦	鍾	鐘	障	鞘	上	丈	丞	乘	冗	剩	城	場	壤	嬢	常
	8FEE	3E70	情	擾	条	杖	淨	状	畳	穰	蒸	讓	釀	錠	囑	埴	飾	
	903F	3F20		拭	植	殖	燭	織	職	色	触	食	蝕	辱	尻	伸	信	侵
	904F	3F30	唇	娠	寢	審	心	慎	振	新	晋	森	榛	浸	深	申	疹	真
	905F	3F40	神	秦	紳	臣	芯	薪	親	診	身	辛	進	針	震	人	仁	刃
	906F	3F50	塵	壬	尋	甚	尽	腎	訊	迅	陣							
	す													筭	誨	須	酢	凶	厨
9080		3F60	逗	吹	垂	帥	推	水	炊	睡	粹	翠	衰	遂	醉	錐	錘	随
9090		3F70	瑞	髓	崇	嵩	数	枢	趨	雛	据	杉	梶	菅	頗	雀	裾	
せ	909E	4020		澄	摺	寸												
	90AE	4030	整	星	晴	棲	栖	正	清	性	生	盛	精	聖	声	製	西	誠
	90BE	4040	誓	請	逝	醒	青	静	斉	税	脆	隻	席	惜	戚	斥	昔	析
	90CE	4050	石	積	籍	績	脊	責	赤	跡	蹟	碩	切	拙	接	掇	折	設
	90DE	4060	窃	節	説	雪	絶	舌	蟬	仙	先	千	占	宣	専	尖	川	戦
	90EE	4070	扇	撰	栓	栴	泉	浅	洗	染	潜	煎	煽	旋	穿	箭	線	
	913F	4120		織	羨	腺	舛	船	薦	詮	賤	踐	選	遷	錢	銑	閃	鮮
	914F	4130	前	善	漸	然	全	禪	繕	膳	糲							
そ												噌	塑	岨	措	曾	曾	楚
	915F	4140	狙	疏	疎	礎	祖	租	粗	素	組	蘇	訴	阻	遡	鼠	僧	創
	916F	4150	双	叢	倉	喪	壯	奏	爽	宋	層	匠	惣	想	搜	掃	挿	搔
	9180	4160	操	早	曹	巢	槍	槽	漕	燥	争	瘦	相	窓	糟	総	綜	聡
	9190	4170	草	莊	葬	蒼	藻	装	走	送	遭	鎗	霜	騷	像	増	憎	
	919E	4220		臆	蔵	贈	造	促	側	則	即	息	捉	束	測	足	速	俗
た	91AE	4230	属	賊	族	続	卒	袖	其	揃	存	孫	尊	損	村	遜		他
	91BE	4240	太	汰	訛	唾	墮	妥	惰	打	柁	舵	橈	陀	馱	驛	体	堆

	Shift JIS	JIS	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F	
た	91CE	4250	対	耐	岱	帯	待	怠	態	戴	替	泰	滯	胎	腿	苔	袋	貸	
	91DE	4260	退	逮	隊	黛	鯛	代	台	大	第	醜	題	鷹	淹	瀧	卓	啄	
	91EE	4270	宅	托	扞	拓	沢	濯	琢	託	鐸	濁	諾	茸	夙	蛸	只		
	923F	4320		叩	但	達	辰	奪	脱	巽	豎	汕	棚	谷	狸	鱈	樽	誰	
	924F	4330	丹	单	嘆	坦	担	探	旦	歎	淡	湛	炭	短	端	筆	綻	耽	
	925F	4340	胆	蛋	誕	鍛	団	壇	彈	断	暖	檀	段	男	談				
ち	926F	4350	弛	恥	智	池	痴	稚	置	致	蜘	遲	馳	築	畜	竹	筑	蓄	
	9280	4360	逐	秩	窒	茶	嫡	着	中	仲	宙	忠	抽	昼	柱	注	虫	衷	
	9290	4370	註	耐	鑄	駐	樗	瀦	猪	苧	著	貯	丁	兆	涸	喋	寵		
	929E	4420		帖	帳	庁	弔	張	彫	徵	懲	挑	暢	朝	潮	牒	町	眺	
	92AE	4430	聽	脹	腸	蝶	調	諜	超	跳	鈔	長	頂	鳥	勅	抄	直	朕	
	92BE	4440	沈	珍	賃	鎮	陳												
つ	92CE	4450	槻	佃	漬	柘	辻	薦	綴	鏝	樁	潰	坪	壺	孀	紬	爪	吊	
	92DE	4460	釣	鶴															
て	92EE	4470	悌	抵	挺	提	梯	汀	碇	禎	程	締	艇	訂	諦	蹄	遞		
	933F	4520		邸	鄭	釘	鼎	泥	摘	擢	敵	滴	的	笛	適	鎬	溺	哲	
	934F	4530	徹	撤	轍	迭	鉄	典	填	天	展	店	添	纏	甜	貼	転	顛	
	935F	4540	点	伝	殿	澱	田	電											
	936F	4550	登	菟	賭	途	都	鍍	砥	砺	努	度	土	奴	怒	倒	党	冬	
と	9380	4560	凍	刀	唐	塔	塘	套	宕	島	嶋	悼	投	搭	東	桃	拷	棟	
	9390	4570	盜	淘	湯	涛	灯	燈	当	痘	禱	等	答	筒	糖	統	到		
	939E	4620		董	蕩	藤	討	騰	豆	踏	逃	透	鐙	陶	頭	騰	鬪	働	
	93AE	4630	動	同	堂	導	懂	撞	洞	瞳	童	胴	荀	道	銅	峠	鴉	匿	
	93BE	4640	得	徳	洩	特	督	秃	篤	毒	独	読	析	橡	凸	突	椽	届	
	93CE	4650	鳶	苫	寅	酉	瀨	噸	屯	惇	敦	沌	豚	遁	頓	吞	曇	鈍	
	93DE	4660	奈	那	内	乍	凧	薙	謎	灘	捺	鍋	檣	馴	縄	啜	南	楠	
93EE	4670	軟	難	汝															
に					二	尼	弍	迹	勾	賑	肉	虹	廿	日	乳	入			
			如	尿	菲	任	妊	忍	認										
ぬ	943F	4720								濡									
											襦	衤	寧	葱	猫	熱	年		
ね	944F	4730	念	捻	燃	燃	粘												
								乃	迺	之	埜	囊	惱	濃	納	能	腦	膿	
の	945F	4740	農	覗	蚤														
					巴	把	播	霸	杷	波	派	琶	破	婆	罵	芭	馬		
	946F	4750	俳	靡	拝	排	敗	杯	盃	牌	背	肺	輩	配	倍	培	媒	梅	
	9480	4760	煤	煤	狼	買	売	賠	陪	這	蠅	秤	矧	萩	伯	剥	博	拍	
	9490	4770	柏	泊	白	箔	粕	舶	薄	迫	曝	漠	爆	縛	莫	駁	麦		
	949E	4820		函	箱	裕	箸	肇	筈	櫨	幡	肌	畑	畠	八	鉢	澆	発	
	94AE	4830	醜	髪	伐	罰	抜	筏	閥	鳩	嘶	塙	蛤	隼	伴	判	半	反	
	94BE	4840	叛	帆	搬	斑	板	汜	汎	版	犯	班	畔	繁	般	藩	販	範	
は	94CE	4850	采	煩	頒	飯	挽	晩	番	盤	磐	蕃							
													匪	卑	否	妃	庇		
ひ	94DE	4860	彼	悲	扉	批	披	斐	比	泌	疲	皮	碑	秘	緋	罷	肥	被	
	94EE	4870	誹	費	避	非	飛	樋	簸	備	尾	微	枇	毘	琵琶	眉	美		
	953F	4920		鼻	柇	稗	匹	疋	髭	彦	膝	菱	肘	弼	必	畢	筆	逼	

	Shift JIS	JIS	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
ひ	954F	4930	桧	姫	媛	紐	百	謬	俵	彪	標	氷	漂	瓢	票	表	評	豹
	955F	4940	廟	描	病	秒	苗	錨	鋌	蒜	蛭	鱗	品	彬	斌	浜	瀕	貧
	956F	4950	賓	頻	敏	瓶												
ふ							不	付	埠	夫	婦	富	富	布	府	怖	扶	敷
	9580	4960	斧	普	浮	父	符	腐	膚	芙	譜	負	賦	赴	阜	附	侮	撫
	9590	4970	武	舞	葡	蕪	部	封	楓	風	葺	菴	伏	副	復	幅	服	
	959E	4A20		福	腹	複	覆	淵	弗	弘	沸	仏	物	鮒	分	吻	噴	墳
	95AE	4A30	憤	扮	焚	奮	粉	糞	紛	雰	文	間						
へ													丙	併	兵	摒	幣	平
	95BE	4A40	弊	柄	並	蔽	閉	陛	米	頁	僻	壁	癖	碧	別	瞥	蔑	筓
	95CE	4A50	偏	變	片	篇	編	辺	返	遍	便	勉	婉	弁	鞭			
ほ																保	舗	舗
	95DE	4A60	圃	捕	步	甫	補	輔	穂	募	墓	慕	戊	暮	母	簿	菩	倣
	95EE	4A70	俸	包	呆	報	奉	宝	峰	峯	崩	庖	抱	捧	放	方	朋	
	963F	4B20		法	泡	烹	砲	縫	胞	芳	萌	蓬	蜂	褒	訪	豊	邦	鋒
	964F	4B30	飽	鳳	鵬	乏	亡	傍	剖	坊	妨	帽	忘	忙	房	暴	望	某
	965F	4B40	棒	冒	紡	肪	膨	謀	貌	貿	鉾	防	吠	頰	北	僕	卜	墨
	966F	4B50	撲	朴	牧	睦	穆	釳	勃	沒	殆	堀	幌	奔	本	翻	凡	盆
ま	9680	4B60	摩	磨	魔	麻	埋	妹	昧	枚	每	哩	禎	幕	膜	枕	鮪	枉
	9690	4B70	鱒	桫	亦	俣	又	抹	末	沫	迄	俛	繭	磨	万	慢	滿	
	969E	4C20		漫	蔓													
み						味	未	魅	巳	箕	岬	密	蜜	湊	蓑	稔	脈	妙
	96AE	4C30	耗	民	眠													
む	96AE	4C30				務	夢	無	牟	矛	霧	鷓	椋	婿	娘			
め	96AE	4C30														冥	名	命
	96BE	4C40	明	盟	迷	銘	鳴	姪	牝	滅	免	棉	綿	緬	面	麵		

	Shift JIS	JIS	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F	
も	96BE	4C40															摸	模	
	96CE	4C50	茂	妄	孟	毛	猛	盲	網	耗	蒙	儲	木	默	目	空	勿	餅	
	96DE	4C60	尤	戾	矧	貫	問	悶	紋	門	匆								
や													也	冶	夜	爺	耶	野	弥
	96EE	4C70	矢	厄	役	約	藥	訖	躍	靖	柳	藪	鎗						
ゆ														愉	愈	油	癒		
	973F	4D20		諭	輸	唯	佑	優	勇	友	宥	幽	悠	憂	揖	有	柚	湧	
	974F	4D30	涌	猶	猷	由	祐	裕	誘	遊	邑	郵	雄	融	夕				
よ																予	余	与	
	975F	4D40	誉	輿	預	傭	幼	妖	容	庸	揚	揺	擁	曜	楊	様	洋	溶	
	976F	4D50	熔	用	窯	羊	耀	葉	蓉	要	謡	踊	遙	陽	養	慾	抑	欲	
ら	9780	4D60	沃	浴	翌	翼	淀												
	9790	4D70	乱	卵	嵐	欄	濫	羅	螺	裸	来	萊	頼	雷	洛	絡	落	酪	
り												利	吏	履	李	梨	理	璃	
	979E	4E20		痢	裏	裡	里	離	陸	律	率	立	莅	掠	略	劉	流	溜	
	97AE	4E30	琉	留	硫	粒	隆	竜	龍	侶	慮	旅	虜	了	亮	僚	両	凌	
	97BE	4E40	寮	料	梁	涼	獵	療	瞭	稜	糧	良	諒	遼	量	陵	領	力	
	97CE	4E50	緑	倫	厘	林	淋	隣	琳	臨	輪	隣	隣						
る																瑠	壘	涙	累
	97DE	4E60	類																
れ				令	伶	例	冷	励	嶺	伶	玲	礼	苓	鈴	隸	零	靈	麗	
	97EE	4E70	齡	曆	歴	列	劣	烈	裂	廉	恋	憐	漣	煉	簾	練	聯		
	983F	4F20		蓮	連	鍊													
ろ							呂	魯	櫓	炉	賂	路	露	勞	婁	廊	弄	朗	
	984F	4F30	楼	榔	浪	漏	牢	狼	籠	老	聾	蝻	郎	六	麓	禄	肋	録	
	985F	4F40	論																
わ				倭	和	話	歪	賄	脇	惑	梓	驚	互	巨	鰐	詫	藁	蕨	
	986F	4F50	椀	湾	碗	腕													

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	Shift JIS	JIS	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F	
一	989E	5020		弋	丐	丕													
一	989E	5020					个	卩											
、	989E	5020							、	井									
丿	989E	5020									丿	乂	乖	乘					
乙	989E	5020													亂				
丨	989E	5020														丨	豫	事	
丨	98AE	5030	舒																
二	98AE	5030		式	于	亞	亟												
十	98AE	5030						十	亢	京	毫	亶							
人	98AE	5030											从	仍	仄	仆	仂	仗	
	98BE	5040	仞	仞	仞	价	伉	侏	估	佛	佝	佗	佇	佶	侈	侏	侗	佻	
	98CE	5050	佩	佰	侑	佯	來	侖	儘	倪	俟	俎	俘	俛	俑	俚	俐	佻	
	98DE	5060	俚	倚	倨	偃	倪	倥	倅	倅	倝	倡	倩	倬	倭	俯	們	倆	
	98EE	5070	偃	假	會	偕	修	偈	倣	倣	倣	倣	倣	倣	倣	倣	倣	倣	倣
	993F	5120		僉	僊	僊	僊	僊	僊	僊	僊	僊	僊	僊	僊	僊	僊	僊	僊
	994F	5130	僊	僊	僊	僊	僊	僊	僊	僊	僊	僊	僊	僊	僊	僊	僊	僊	僊
儿	994F	5130										儿	兀	兒	兌	兔	兢	競	
入	995F	5140	兩	兪															
八	995F	5140			兮	冀													
冂	995F	5140					冂	冂	册	冉	冂	冂	冂	冂	冂				
冂	995F	5140													冂	冤	冠	冂	
	996F	5150	寫	冂															
冂	996F	5150			冂	决	冂	冲	冰	况	冽	冂	凉	凜					
几	996F	5150													几	處	冂	凭	
	9980	5160	凰																
冂	9980	5160		冂	函														
刀	9980	5160				刃	刊	剌	刎	刎	刪	刮	剗	剗	剗	剗	剗	剗	
	9990	5170	剗	剔	剪	剗	剗	剗	剗	剗	劍	劍	劍	劍	劈	剗	剗		
	999E	5220		辦															
力	999E	5220			勐	劭	劭	劭	劭	劭	劭	劭	劭	勳	勳	勳	勳	勳	
	99AE	5230	勳																
勹	99AE	5230		勹	匆	匈	甸	甸	甸	匏									
匕	99AE	5230									匕								
匚	99AE	5230										匚	匚	匚	匚	匚			
匚	99AE	5230															匚	區	
十	99BE	5240	卒	卅	卅	卉	卂	準											
卜	99BE	5240							卜										
冂	99BE	5240								冂	卮	卮	卮	卷					
厂	99BE	5240													厂	彪	厠	厦	
	99CE	5250	厥	厮	厥														
厶	99CE	5250				厶	參	篡											

	Shift JIS	JIS	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
又	99CE	5250							雙	叟	曼	變						
口	99CE	5250											叮	叨	叭	叭	吁	吡
	99DE	5260	呀	听	吭	吼	吮	呐	吩	吝	呖	咏	呵	咎	咄	呱	呷	咭
	99EE	5270	咒	呻	咀	呶	咄	附	咆	哇	号	咸	啞	咬	哄	哈	咨	
	9A3F	5320		咫	哂	咤	咤	昂	吁	哥	哦	唏	唔	哽	哮	哭	哺	哢
	9A4F	5330	啞	哇	啣	啞	售	啜	啁	啖	啗	啖	唵	唵	喙	喀	咯	喊
	9A5F	5340	啗	啗	啣	喘	啣	單	啼	喃	喻	喇	唳	嗚	嗅	嗟	嘎	嗜
	9A6F	5350	啞	嗔	嘔	嗽	嘖	嗑	嗽	嘛	噠	噠	噠	噠	噠	噠	噠	噠
口	9A80	5360	噫	噤	嘯	噬	噪	嚙	嚙	嚙	嚙	嚙	嚙	嚙	嚙	嚙	嚙	嚙
	9A90	5370	嚼	囁	囁	囁	囁	囁	囁	囁	囁	囁	囁	囁	囁	囁	囁	囁
口	9A90	5370									口	囁	囁	囁	囁	囁	囁	
	9A9E	5420		囁	國	圍	圓	團	圖	喬	園							
土	9A9E	5420										坎	坏	址	坎	圪	址	坏
	9AAE	5430	坩	垂	垩	坡	坩	坩	垩	垩	坩	坩	坩	坩	坩	坩	坩	坩
	9ABE	5440	埒	埒	埒	埒	埒	埒	埒	埒	埒	埒	埒	埒	埒	埒	埒	埒
	9ACE	5450	墅	塢	墟	塢	塢	塢	塢	塢	塢	塢	塢	塢	塢	塢	塢	塢
	9ADE	5460	壘	壘	壘													
士	9ADE	5460				壯	壺	壹	壻	壺	壽							
夕	9ADE	5460										夕						
夕	9ADE	5460											夕	夕				
夕	9ADE	5460													夕	夕	夕	
大	9ADE	5460																夫
	9AEE	5470	夭	本	夸	夾	奇	奕	奂	奎	奚	奘	奢	奠	奧	獎	奘	
女	9B3F	5520		奸	妁	妝	佞	佞	妣	妣	姆	姨	姜	妍	妊	姚	娥	娟
	9B4F	5530	娑	娜	娉	娉	娉	姪	婉	姪	娶	婢	婪	媚	媪	媪	媪	媪
	9B5F	5540	媽	媽	媪	娉	嫩	嫖	嫖	嫖	嬌	嬋	嬋	嬋	嬋	嬋	嬋	嬋
	9B6F	5550	孃	孃	孃													
子	9B6F	5550				子	孕	孚	孛	孛	孩	孰	孛	孛	學	孛	孛	
宀	9B6F	5550																宀
	9B80	5560	它	宦	宸	寃	寇	崔	寔	寐	寤	寤	寤	寤	寤	寤	寤	寤
	9B90	5570	寶															
寸	9B90	5570		尅	將	專	對											
小	9B90	5570						尔	尅									
尢	9B90	5570								尢	尢							
尸	9B90	5570										尸	尹	屁	屈	尿	肩	
	9B9E	5620		屐	屐	屐	屬											
屮	9B9E	5620						屮										
山	9B9E	5620							屮	岌	屹	岌	岌	岌	岌	岌	岌	岌
	9BAE	5630	岬	岬	岬	岬	岬	岬	岬	岬	岬	岬	岬	岬	岬	岬	岬	岬
	9BBE	5640	峯	嶺	嶺	嶺	嶺	嶺	嶺	嶺	嶺	嶺	嶺	嶺	嶺	嶺	嶺	嶺
	9BCE	5650	嶺	嶺	嶺	嶺	嶺	嶺	嶺	嶺	嶺	嶺	嶺	嶺	嶺	嶺	嶺	嶺
彡	9BCE	5650																彡
工	9BDE	5660	巫															
巳	9BDE	5660		巳	卮													
巾	9BDE	5660				帟	帟	帟	帟	帟	帟	帟	帷	幄	幃	幃	幃	幃
	9BEE	5670	幃	幃	幣	幣												
干	9BEE	5670				干	并											
幺	9BEE	5670							幺	麼								
广	9BEE	5670									广	庠	廁	廂	廈	廐	廐	
	9C3F	5720		廖	廣	廐	廐	廐	廐	廐	廐	廐	廐	廐	廐	廐	廐	廐

	Shift JIS	JIS	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F	
廾	9C3F	5720															廾	廾	
卅	9C4F	5730	卅	弃	卅	彘	彘												
弋	9C4F	5730						弋	弋										
弓	9C4F	5730								弓	弩	弭	弭	弭	彈	彌	彎	彎	
彑	9C5F	5740	彑	彑	彑	彑													
彳	9C5F	5740							彳	徃	徃	徃	徃	徃	徃	徃	徃	徃	
心	9C6F	5750							忖	忖	忖	忖	忖	忖	忖	忖	忖	忖	
	9C80	5760	忖	忖	忖	忖	忖	忖	忖	忖	忖	忖	忖	忖	忖	忖	忖	忖	
	9C90	5770	忖	忖	忖	忖	忖	忖	忖	忖	忖	忖	忖	忖	忖	忖	忖	忖	
	9C9E	5820		忖	忖	忖	忖	忖	忖	忖	忖	忖	忖	忖	忖	忖	忖	忖	
	9CAE	5830	忖	忖	忖	忖	忖	忖	忖	忖	忖	忖	忖	忖	忖	忖	忖	忖	
	9CBE	5840	忖	忖	忖	忖	忖	忖	忖	忖	忖	忖	忖	忖	忖	忖	忖	忖	忖
	9CCE	5850	忖	忖	忖	忖	忖	忖	忖	忖	忖	忖	忖	忖	忖	忖	忖	忖	忖
	9CDE	5860	忖	忖	忖	忖	忖	忖	忖	忖	忖	忖	忖	忖	忖	忖	忖	忖	忖
	9CEE	5870	忖	忖	忖	忖	忖	忖	忖	忖	忖	忖	忖	忖	忖	忖	忖	忖	忖
戈	9CEE	5870										戈	戈	戈	戈	戈	戈	戈	
	9D3F	5920		戔	戔	戔	戔	戔	戔	戔	戔								
戶	9D3F	5920									扁								
手	9D3F	5920										扌	扌	扌	扌	扌	扌	扌	
	9D4F	5930	扌	扌	扌	扌	扌	扌	扌	扌	扌	扌	扌	扌	扌	扌	扌	扌	
	9D5F	5940	扌	扌	扌	扌	扌	扌	扌	扌	扌	扌	扌	扌	扌	扌	扌	扌	
	9D6F	5950	扌	扌	扌	扌	扌	扌	扌	扌	扌	扌	扌	扌	扌	扌	扌	扌	
	9D80	5960	扌	扌	扌	扌	扌	扌	扌	扌	扌	扌	扌	扌	扌	扌	扌	扌	
	9D90	5970	扌	扌	扌	扌	扌	扌	扌	扌	扌	扌	扌	扌	扌	扌	扌	扌	扌
	9D9E	5A20		扌	扌	扌	扌	扌	扌	扌	扌	扌	扌	扌	扌	扌	扌	扌	
	9DAE	5A30	扌	扌	扌	扌	扌	扌	扌	扌	扌	扌	扌	扌	扌	扌	扌	扌	
支	9DAE	5A30														支	支	支	
	9DBE	5A40	收	攸	攸	攸	攸	攸	攸	攸	攸	攸	攸	攸	攸	攸	攸	攸	
斗	9DBE	5A40																斛	
	9DCE	5A50	斛																
斤	9DCE	5A50		斤	斤														
方	9DCE	5A50				旃	旃	旁	旃	旃	旃	旃	旃	旃					
无	9DCE	5A50												无	无				
日	9DCE	5A50														早	早	昊	
	9DDE	5A60	昊	昊	昝	昝	昝	昝	昝	昝	昝	昝	昝	昝	晞	晞	晞	晨	
	9DEE	5A70	晞	晞	晞	晞	晞	晞	晞	晞	晞	晞	晞	晞	晞	晞	晞	晞	
	9E3F	5B20		晞	晞	晞	晞	晞	晞	晞	晞	晞	晞	晞	晞	晞	晞	晞	
日	9E3F	5B20										日	日	曷					
月	9E3F	5B20													朙	朙	朙	朙	
	9E4F	5B30	朙	朙														朙	

	Shift JIS	JIS	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
木	9E4F	5B30			朮	束	朶	杓	杓	杓	杆	杞	杠	杙	杢	朽	杅	杰
	9E5F	5B40	忝	杼	杪	杌	杌	杌	杌	杌	枷	柯	楞	束	枳	柩	杓	杅
	9E6F	5B50	柞	柞	柞	柞	柞	柞	柞	柞	柞	柞	柞	柞	柞	柞	柞	柞
	9E80	5B60	梳	柞	柞	柞	柞	柞	柞	柞	柞	柞	柞	柞	柞	柞	柞	柞
	9E90	5B70	梵	柞	柞	柞	柞	柞	柞	柞	柞	柞	柞	柞	柞	柞	柞	柞
	9E9E	5C20		柞	柞	柞	柞	柞	柞	柞	柞	柞	柞	柞	柞	柞	柞	柞
	9EAE	5C30	柞	柞	柞	柞	柞	柞	柞	柞	柞	柞	柞	柞	柞	柞	柞	柞
	9EBE	5C40	榆	柞	柞	柞	柞	柞	柞	柞	柞	柞	柞	柞	柞	柞	柞	柞
	9ECE	5C50	榻	柞	柞	柞	柞	柞	柞	柞	柞	柞	柞	柞	柞	柞	柞	柞
	9EDE	5C60	柞	柞	柞	柞	柞	柞	柞	柞	柞	柞	柞	柞	柞	柞	柞	柞
	9EEE	5C70	榻	柞	柞	柞	柞	柞	柞	柞	柞	柞	柞	柞	柞	柞	柞	柞
	9F3F	5D20		柞	柞	柞	柞	柞	柞	柞	柞	柞	柞	柞	柞	柞	柞	柞
	9F4F	5D30	柞	柞	柞	柞	柞	柞	柞	柞	柞	柞	柞	柞	柞	柞	柞	柞
	欠	9F4F	5D30								欸	欸	盜	欸	飲	歇	歇	歇
9F5F		5D40	欸	歇	欸	歇	歡											
止	9F5F	5D40						歸										
歹	9F5F	5D40							歹	歹	歹	歹	歹	歹	歹	歹	歹	
	9F6F	5D50	殫	殫	殫	殫	殫											
殳	9F6F	5D50						殳	殳	殳	殳							
毋	9F6F	5D50										毋	毋					
毛	9F6F	5D50												毳	毳	毳	毳	
	9F80	5D60	毳	毳														
氏	9F80	5D60			氏													
气	9F80	5D60				气	气	气	气									
水	9F80	5D60							汞	汕	汕	汪	汪	沂	沂	沂	沂	
	9F90	5D70	汾	汨	汨	沒	沐	泄	決	泓	沽	泗	泗	沂	沂	沂	沂	
	9F9E	5E20		汨	泛	泯	泯	泯	泯	泯	泯	泯	泯	泯	泯	泯	泯	
	9FAE	5E30	洌	浣	涓	浚	浚	浚	浙	涎	涕	濤	涅	淹	洌	洌	洌	
	9FBE	5E40	淦	涸	涓	涓	涓	涓	涓	涓	涓	涓	涓	涓	涓	涓	涓	
	9FCE	5E50	湮	涸	渙	渙	渙	渙	渙	渙	渙	渙	渙	渙	渙	渙	渙	
	9FDE	5E60	滿	渝	游	涑	溪	澍	混	溷	溷	溷	溷	溷	溷	溷	溷	
	9FEE	5E70	溥	滂	溟	潁	溉	灌	漚	漚	漚	漚	漚	漚	漚	漚	漚	
	E03F	5F20		漾	漓	滷	澆	澆	澆	澆	澆	澆	澆	澆	澆	澆	澆	
	E04F	5F30	澎	溜	濂	潦	澳	滌	滌	滌	滌	滌	滌	滌	滌	滌	滌	
	E05F	5F40	濱	濮	濛	瀉	瀉	瀉	瀉	瀉	瀉	瀉	瀉	瀉	瀉	瀉	瀉	
	E06F	5F50	瀾	瀾	激	灑	灣											
火	E06F	5F50						炙	炒	炯	炯	炬	炸	炳	炮	烟	然	
	E080	5F60	烙	焉	烽	焜	焙	煥	熙	熙	煦	煨	煨	煨	煨	煨	燻	
	E090	5F70	煩	熨	熬	爛	熹	熹	燒	燉	燉	燉	燉	燉	燉	燉	燉	
	E09E	6020		燧	燧	燧	燧	燧	燧	燧	燧	燧	燧	燧	燧	燧	燧	
爪	E09E	6020								爭	爬	爰	爲					
爻	E09E	6020											爻	爻				
片	E09E	6020													片	牀		
片	E0AE	6030	牀	牀														
牛	E0AE	6030			牀	牀	犁	犁	犇	犇	犇	犇	犇	犇				
犬	E0AE	6030												犹	豺	狃		
	E0BE	6040	狎	狎	狎	狼	狡	狹	狹	狹	狹	狹	狹	猜	猜	猜		
	E0CE	6050	猥	猥	獎	猥	默	獬	獬	獨	獨	獨	獨	獨	獨	獨		

	Shift JIS	JIS	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
王	E0CE	6050														珈	玳	玼
	E0DE	6060	玻	珀	珥	珮	珞	璠	琅	瑯	瑤	瑛	瑛	珅	珉	瑕	璵	瑟
	E0EE	6070	瑁	瑜	瑩	瑰	瑣	瑪	瑤	瑾	璋	璞	璧	瓊	瓏	瓔	玳	
瓜	E13F	6120		瓠	瓣													
瓦	E13F	6120				甌	甌	瓮	甌	甌	甌	甌	甌	甌	甌	甌	甌	甌
	E14F	6130	甍	甍	甍													
甘	E14F	6130				菅												
生	E14F	6130					甦											
用	E14F	6130						甬										
田	E14F	6130							𠂔	𠂔	𠂔	𠂔	𠂔	𠂔	𠂔	𠂔	𠂔	𠂔
	E15F	6140	畧	畫	畚	疇	當	疆	疇	疇	疊	疊	疊					
	E15F	6140												疔	疔	疔	疔	疔
	E16F	6150	疝	疔	疔	疔	疔	疔	疔	疔	疔	疔	疔	疔	疔	疔	疔	疔
	E180	6160	疔	疔	疔	疔	疔	疔	疔	疔	疔	疔	疔	疔	疔	疔	疔	疔
	E190	6170	癩	癩	癩	癩	癩	癩	癩	癩	癩	癩	癩	癩	癩	癩	癩	癩
	E19E	6220		癩														
𠂔	E19E	6220		𠂔	癸	發												
白	E19E	6220						皂	兒	𠂔	𠂔	𠂔	𠂔	𠂔	𠂔	𠂔	𠂔	
皮	E19E	6220															𠂔	𠂔
	E1AE	6230	𠂔	𠂔	𠂔													
皿	E1AE	6230				孟	盃	盃	盃	盃	盃	盃	盃	盃	盃	盃	盃	盃
目	E1AE	6230														𠂔	𠂔	𠂔
	E1BE	6240	𠂔	𠂔	𠂔	真	皆	眦	眦	眦	眦	眦	眦	眦	眦	眦	眦	眦
	E1CE	6250	𠂔	𠂔	𠂔	𠂔	𠂔	𠂔	𠂔	𠂔	𠂔	𠂔	𠂔	𠂔	𠂔	𠂔	𠂔	𠂔
	E1DE	6260	𠂔	𠂔														
矛	E1DE	6260			矜													
矢	E1DE	6260				矣	矮											
石	E1DE	6260						𠂔	𠂔	𠂔	𠂔	𠂔	𠂔	𠂔	𠂔	𠂔	𠂔	𠂔
	E1EE	6270	𠂔	𠂔	𠂔	𠂔	𠂔	𠂔	𠂔	𠂔	𠂔	𠂔	𠂔	𠂔	𠂔	𠂔	𠂔	𠂔
	E23F	6320		𠂔	𠂔	𠂔	𠂔	𠂔	𠂔	𠂔	𠂔	𠂔	𠂔	𠂔	𠂔	𠂔	𠂔	𠂔
示	E23F	6320												祀	祠	祇	崇	祚
	E24F	6330	祕	祕	祺	祿	禔	禔	禔	禔	禔	禔	禔					
	E24F	6330												禹	禺			
禾	E24F	6330														秉	秝	秧
	E25F	6340	秬	秬	秬	秬	稍	秬	秬	秬	秬	秬	稱	稻	稟	稷	稷	穗
	E26F	6350	秬	秬	秬	穩	穩	穰										
穴	E26F	6350							穹	穿	窈	窗	窈	窈	窈	窩	窈	窈
	E280	6360	窈	窈	窈	窿	邃	竇	竊									
立	E280	6360								𠂔	𠂔	𠂔	𠂔	站	𠂔	𠂔	𠂔	𠂔
	E290	6370	竝	竭	𠂔													
竹	E290	6370				笄	笄	笄	笄	笄	笄	笄	笄	笄	笄	笄	笄	笄
	E29E	6420		篋	笄	筍	筍	筍	筍	筍	筍	筍	筍	筍	筍	筍	筍	筍
	E2AE	6430	篋	篋	篋	篋	篋	篋	篋	篋	篋	篋	篋	篋	篋	篋	篋	篋
	E2BE	6440	篋	篋	篋	篋	篋	篋	篋	篋	篋	篋	篋	篋	篋	篋	篋	篋
	E2CE	6450	篋	篋	篋	篋	篋	篋	篋	篋	篋	篋	篋	篋	篋	篋	篋	篋
	E2DE	6460	篋	篋														
米	E2DE	6460			𠂔	𠂔	𠂔	𠂔	𠂔	𠂔	𠂔	𠂔	𠂔	𠂔	𠂔	𠂔	𠂔	𠂔
	E2EE	6470	粽	糝	糝	糝	糝	糝	糝	糝	糝	糝	糝	糝	糝	糝	糝	糝

	Shift JIS	JIS	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F	
糸	E2EE	6470														紉	紆		
	E33F	6520		紉	紆	紇	紈	紉	紊	紋	紌	納	紎	紏	紐	紑	紒	紓	
	E34F	6530	紒	紓	純	紕	紖	紗	紘	紙	級	紛	紜	紝	紞	紟	素	紡	
	E35F	6540	索	紣	紤	紥	紦	紧	紨	紩	紪	紫	紬	紭	紮	紱	紲	紳	紴
	E36F	6550	紵	紶	紷	紸	紹	紺	紻	紼	紽	紾	紿	紽	紿	紿	紿	紿	紿
	E380	6560	紿	紿	紿	紿	紿	紿	紿	紿	紿	紿	紿	紿	紿	紿	紿	紿	紿
	E390	6570	紿	紿	紿	紿	紿	紿	紿	紿	紿	紿	紿	紿	紿	紿	紿	紿	紿
缶	E390	6570														缸	缺		
	E39E	6620		罇	罈	罉	罊	罋											
网	E39E	6620							网	罕	罔	罟	罞	罟	罞	罟	罞	罟	
	E3AE	6630	罟	罞	罟	罞	罟												
羊	E3AE	6630						羌	羔	羞	羝	羚	羴	羯	羸	羸	羸	羸	
	E3BE	6640	羸	羸															
羽	E3BE	6640			翅	翠	翊	翕	翔	翥	翦	翮	翯	翰	翱				
老	E3BE	6640														耆	耄	耋	
耒	E3CE	6650	耒	耘	耜	耒	耒	耒											
耳	E3CE	6650							耿	耻	聊	聆	聒	聘	聚	聒	聒	聒	
	E3DE	6660	聒	聒	聒	聒	聒	聒											
聿	E3DE	6660						聿	肆	肆	聿								
肉	E3DE	6660											肱	肱	肱	肱	肱	肱	
	E3EE	6670	肱	肱	肱	肱	肱	肱	肱	肱	肱	肱	肱	肱	肱	肱	肱	肱	
	E43F	6720		隋	腴	腴	腴	腴	腴	腴	腴	腴	腴	腴	腴	腴	腴	腴	
	E44F	6730	膂	膂	膂	膂	膂	膂	膂	膂	膂	膂	膂	膂	膂	膂	膂	膂	
	E45F	6740	膂	膂	膂	膂	膂	膂	膂	膂	膂	膂	膂	膂	膂	膂	膂	膂	
臣	E45F	6740										臧							
至	E45F	6740											臺	臻					
臼	E45F	6740													臽	舂	舂	舂	
	E46F	6750	與	舊															
舌	E46F	6750			舍	舐	舖												
舟	E46F	6750						舩	舩	舩	舩	舩	舩	舩	舩	舩	舩	舩	
	E480	6760	舩	舩	舩	舩	舩												
艮	E480	6760						艮											
色	E480	6760							艷										
艸	E480	6760							艸	艾	芍	芒	芫	芫	芫	芫	芫	芫	
	E490	6770	芫	芫	芫	芫	芫	芫	芫	芫	芫	芫	芫	芫	芫	芫	芫	芫	
	E49E	6820		茵	茵	茵	茵	茵	茵	茵	茵	茵	茵	茵	茵	茵	茵	茵	
	E4AE	6830	莪	莪	莪	莪	莪	莪	莪	莪	莪	莪	莪	莪	莪	莪	莪	莪	
	E4BE	6840	萱	萱	萱	萱	萱	萱	萱	萱	萱	萱	萱	萱	萱	萱	萱	萱	
	E4CE	6850	莢	莢	莢	莢	莢	莢	莢	莢	莢	莢	莢	莢	莢	莢	莢	莢	莢
	E4DE	6860	葯	葯	葯	葯	葯	葯	葯	葯	葯	葯	葯	葯	葯	葯	葯	葯	
	E4EE	6870	莠	莠	莠	莠	莠	莠	莠	莠	莠	莠	莠	莠	莠	莠	莠	莠	
	E53F	6920		蓐	蓐	蓐	蓐	蓐	蓐	蓐	蓐	蓐	蓐	蓐	蓐	蓐	蓐	蓐	
	E54F	6930	蓐	蓐	蓐	蓐	蓐	蓐	蓐	蓐	蓐	蓐	蓐	蓐	蓐	蓐	蓐	蓐	
E55F	6940	蓐	蓐	蓐	蓐	蓐	蓐	蓐	蓐	蓐	蓐	蓐	蓐	蓐	蓐	蓐	蓐		
虎	E55F	6940									虎	虬	虬	虬	虬	虬	虬		

	Shift JIS	JIS	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F	
虫	E55F	6940														虱	蚓	蚣	
	E56F	6950	蚩	蚪	蚋	蚌	蚶	蚯	蛄	蛆	蚰	蛉	螭	虻	蛔	蛞	蝥	蝱	
	E580	6960	蛟	蛛	蛭	蜒	蚘	蜈	蜀	蜃	蛻	蟹	蜂	蜂	蜂	蜂	蜂	蜂	
	E590	6970	蝮	蜻	蜥	蝮	蜚	蝠	蝮	蝮	蝮	蝮	蝮	蝮	蝮	蝮	蝮	蝮	蝮
	E59E	6A20		蝮	蝮	蝮	蝮	蝮	蝮	蝮	蝮	蝮	蝮	蝮	蝮	蝮	蝮	蝮	蝮
	E5AE	6A30	蝮	蝮	蝮	蝮	蝮	蝮	蝮	蝮	蝮	蝮	蝮	蝮	蝮	蝮	蝮	蝮	蝮
	E5BE	6A40	蝮	蝮	蝮	蝮	蝮	蝮	蝮	蝮	蝮	蝮	蝮	蝮	蝮	蝮	蝮	蝮	蝮
血	E5BE	6A40										衄	衄						
行	E5BE	6A40											衞	衞	衞	衞			
衣	E5BE	6A40															衫	袁	
	E5CE	6A50	衾	袞	袂	袂	袂	袂	袂	袂	袂	袂	袂	袂	袂	袂	袂	袂	袂
	E5DE	6A60	袂	袂	袂	袂	袂	袂	袂	袂	袂	袂	袂	袂	袂	袂	袂	袂	袂
	E5EE	6A70	袂	袂	袂	袂	袂	袂	袂	袂	袂	袂	袂	袂	袂	袂	袂	袂	袂
	E63F	6B20		襦	襦	襦	襦	襦	襦	襦	襦	襦	襦	襦	襦	襦	襦	襦	襦
西	E63F	6B20										西	覃	覈	羈				
見	E63F	6B20														覓	覓	覓	
	E64F	6B30	覓	覓	覓	覓	覓	覓	覓	覓	覓	覓	覓	覓	覓	覓	覓	覓	
角	E64F	6B30										觚	觚	觚	觚	觚	觚	觚	
言	E64F	6B30															訃	訖	
	E65F	6B40	訖	訖	訖	訖	訖	訖	訖	訖	訖	訖	訖	訖	訖	訖	訖	訖	
	E66F	6B50	訖	訖	訖	訖	訖	訖	訖	訖	訖	訖	訖	訖	訖	訖	訖	訖	
	E680	6B60	訖	訖	訖	訖	訖	訖	訖	訖	訖	訖	訖	訖	訖	訖	訖	訖	
	E690	6B70	訖	訖	訖	訖	訖	訖	訖	訖	訖	訖	訖	訖	訖	訖	訖	訖	
	E69E	6C20		訖	訖	訖	訖	訖	訖	訖	訖	訖	訖	訖	訖	訖	訖	訖	
谷	E69E	6C20														𪗇	𪗇		
	E6AE	6C30	𪗇																
豉	E6AE	6C30		豉	豉	豉	豉	豉	豉	豉	豉	豉	豉	豉	豉	豉	豉	豉	
豕	E6AE	6C30						豕	豕	豕									
豸	E6AE	6C30									豸	豸	豸	豸	豸	豸	豸	豸	
	E6BE	6C40	豸	豸	豸														
貝	E6BE	6C40				賤	賤	賤	賤	賤	賤	賤	賤	賤	賤	賤	賤	賤	
	E6CE	6C50	賤	賤	賤	賤	賤	賤	賤	賤	賤	賤	賤	賤	賤	賤	賤	賤	
赤	E6CE	6C50																赧	
	E6DE	6C60	赧																
走	E6DE	6C60		走	走	走	走												
足	E6DE	6C60						跂	跂	跂	跂	跂	跂	跂	跂	跂	跂	跂	
	E6EE	6C70	跟	跟	跟	跟	跟	跟	跟	跟	跟	跟	跟	跟	跟	跟	跟	跟	
	E73F	6D20		蹇	蹇	蹇	蹇	蹇	蹇	蹇	蹇	蹇	蹇	蹇	蹇	蹇	蹇	蹇	
	E74F	6D30	蹇	蹇	蹇	蹇	蹇	蹇	蹇	蹇	蹇	蹇	蹇	蹇	蹇	蹇	蹇	蹇	
身	E74F	6D30												躬	躬	體	躰	躰	
	E75F	6D40	躰	躰															
車	E75F	6D40			軋	軋	軋	軋	軋	軋	軋	軋	軋	軋	軋	軋	軋	軋	
	E76F	6D50	輟	輟	輟	輟	輟	輟	輟	輟	輟	輟	輟	輟	輟	輟	輟	輟	
	E780	6D60	輟	輟	輟														
辛	E780	6D60			辜	辟	辣	辭	辯										
	E780	6D60								亾	亾	迴	迢	迪	迢	邇	邇		
	E790	6D70	迢	迢	迢	迢	迢	迢	迢	迢	迢	迢	迢	迢	迢	迢	迢	迢	
	E79E	6E20		迢	迢	迢	迢	迢	迢	迢	迢	迢	迢	迢	迢	迢	迢	迢	
	E7AE	6E30	迢	迢	迢	迢	迢	迢	迢	迢	迢	迢	迢	迢	迢	迢	迢	迢	

	Shift JIS	JIS	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
邑	E7AE	6E30								邨	邨	邱	邵	郢	郤	扈	郚	鄂
	E7BE	6E40	鄒	鄒	鄒	鄰												
酉	E7BE	6E40					酏	酏	醜	酣	酥	酪	醕	醜	醋	醉	醜	醜
	E7CE	6E50	醫	醜	醜	醜	醜	醜	醜	醜	醜							
采	E7CE	6E50									糶	釋						
里	E7CE	6E50											釐					
金	E7CE	6E50												釧	釧	釧	釧	釧
	E7DE	6E60	釧	鈹	鈹	鈹	鈹	鈹	鈹	鈹	鈹	鈹	鈹	鈹	鈹	鈹	鈹	鈹
	E7EE	6E70	鈹	鈹	鈹	鈹	鈹	鈹	鈹	鈹	鈹	鈹	鈹	鈹	鈹	鈹	鈹	鈹
	E83F	6F20		鎰	鎰	鎰	鎰	鎰	鎰	鎰	鎰	鎰	鎰	鎰	鎰	鎰	鎰	鎰
	E84F	6F30	鎰	鎰	鎰	鎰	鎰	鎰	鎰	鎰	鎰	鎰	鎰	鎰	鎰	鎰	鎰	鎰
	E85F	6F40	鎰	鎰	鎰	鎰	鎰	鎰	鎰	鎰	鎰	鎰	鎰	鎰	鎰	鎰	鎰	鎰
	E86F	6F50	鎰	鎰	鎰	鎰	鎰	鎰	鎰	鎰	鎰	鎰	鎰	鎰	鎰	鎰	鎰	鎰
門	E86F	6F50										門	門	問	問	問	問	問
	E880	6F60	閨	閨	閨	閨	閨	閨	閨	閨	閨	閨	閨	閨	閨	閨	閨	閨
	E890	6F70	關	關	關	關												
阜	E890	6F70					阡	阡	阡	阡	阡	阡	阡	阡	阡	阡	阡	阡
	E89E	7020		陝	陝	陝	陝	陝	陝	陝	陝	陝	陝	陝	陝	陝	陝	陝
隶	E8AE	7030	隶	隸														
隹	E8AE	7030			隹	隹	隹	隹	隹	隹	隹	隹	隹	隹	隹	隹	隹	隹
雨	E8AE	7030												雹	霄	霽	霽	霽
	E8BE	7040	霽	霽	霽	霖	霽	霽	霽	霽	霽	霽	霽	霽	霽	霽	霽	霽
青	E8CE	7050	靜															
非	E8CE	7050		靠														
革	E8CE	7050			鞣	靦	靦		勒	鞣	鞣	鞣	鞣	鞣	鞣	鞣	鞣	鞣
	E8DE	7060	鞣	鞣	鞣	鞣	鞣	鞣	鞣	鞣	鞣	鞣	鞣	鞣	鞣	鞣	鞣	鞣
韋	E8DE	7060											韋	韋				
韭	E8DE	7060													韭	齋	壘	
	E8EE	7070	韶	韵														竟
頁	E8EE	7070			頡	頡	頡	頡	頡	頡	頡	頡	頡	頡	頡	頡	頡	頡
	E93F	7120		顛	顛	顛												
風	E93F	7120					風	風	風	風	風	風	風					
食	E93F	7120												飩	飩	餃	餉	餉
	E94F	7130	舖	餘	餡	飭	餞	餞	餅	餬	餬	餬	餬	餬	餬	餬	餬	餬
	E95F	7140	饑	饒	饒	饒												
首	E95F	7140					馮	馮										
香	E95F	7140						馥										
馬	E95F	7140							馭	馮	馮	馮	馮	馮	馮	馮	馮	馮
	E96F	7150	駁	駱	駱	駱	駱	駱	駱	駱	駱	駱	駱	駱	駱	駱	駱	駱
	E980	7160	騾	驕	驕	驕	驕	驕	驕	驕	驕	驕	驕	驕	驕	驕	驕	驕
骨	E980	7160													肝	般	骼	髀
	E990	7170	體	體	體	體												
高	E990	7170					髡											
髟	E990	7170						髡	髡	髡	髡	髡	髡	髡	髡	髡	髡	髡
	E99E	7220		髡	髡	髡	髡	髡	髡	髡	髡	髡	髡	髡	髡	髡	髡	髡
鬥	E99E	7220									鬥	鬪	鬪	鬪	鬪	鬪	鬪	
鬯	E99E	7220															鬯	
鬲	E99E	7220																鬲

	Shift JIS	JIS	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F	
鬼	E9AE	7230	魄	魃	魏	魍	魎	魑	魇										
魚	E9AE	7230								魴	魷	魷	鮑	鮑	鮑	鮑	鮑	鮑	
	E9BE	7240	鮠	鮡	鮢	鮣	鮤	鮥	鮦	鮧	鮨	鮩	鮪	鮫	鮬	鮭	鮭	鮭	
	E9CE	7250	鮭	鮭	鮭	鮭	鮭	鮭	鮭	鮭	鮭	鮭	鮭	鮭	鮭	鮭	鮭	鮭	鮭
	E9DE	7260	鮭	鮭	鮭	鮭	鮭	鮭	鮭	鮭	鮭	鮭	鮭	鮭	鮭	鮭	鮭	鮭	鮭
鳥	E9DE	7260											鳧	鳧	鳧	鳧	鳧	鳧	
	E9EE	7270	鸢	鸢	鸢	鸢	鸢	鸢	鸢	鸢	鸢	鸢	鸢	鸢	鸢	鸢	鸢	鸢	
	EA3F	7320		鸢	鸢	鸢	鸢	鸢	鸢	鸢	鸢	鸢	鸢	鸢	鸢	鸢	鸢	鸢	鸢
	EA4F	7330	鸢	鸢	鸢	鸢	鸢	鸢	鸢	鸢	鸢	鸢	鸢	鸢	鸢	鸢	鸢	鸢	鸢
	EA5F	7340	鸢	鸢	鸢														
鹵	EA5F	7340				鹵	鹹	鹽											
鹿	EA5F	7340							鹿	麋	麋	麋	麋	麋	麋	麋	麋	麋	
麥	EA5F	7340															麥	麩	
	EA6F	7350	麩	麩	麩														
麻	EA6F	7350				麻													
黄	EA6F	7350					黄												
黎	EA6F	7350						黎	黏	黏									
黑	EA6F	7350									黔	黜	黜	黜	黜	黜	黜	黜	
	EA80	7360	黜	黜	黜														
黼	EA80	7360				黼	黼	黼											
黻	EA80	7360							黻	黻									
鼓	EA80	7360										鼓	琴						
鼠	EA80	7360											鼠	鼯					
鼻	EA80	7360														鼻			
齊	EA80	7360															齊		
齒	EA80	7360																齒	
	EA90	7370	齒	齒	齒	齒	齒	齒	齒	齒	齒	齒	齒	齒	齒				
龍	EA90	7370													龍				
龜	EA90	7370														龜			
龠	EA90	7370															龠		
	EA9E	7420		堯	禛	遙	瑤	凜	熙										

User Registration Character Font

The character which can be registered as a user's registration character is 50 kinds to 8121-8152 of JIS code.

The following character fonts are previously registered at 8121(HEX) to 8129(HEX) in the character font by user registration installed in the CD-ROM.

	Shift JIS	JIS	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
User Registration Character	F13F	8120		ㄣ	ㄣ	ㄣ	ㄣ	ㄣ	ㄣ	ㄣ	ㄣ	ㄣ	ㄣ	ㄣ				
	F14F	8130																
	F15F	8140																
	F16F	8150																

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