SEKONIC CORPORATION

Head Office : 3-1-3, Ikejiri, Setagaya-ku, Tokyo 154-0001, Japan
Telephone : +81-3-5433-3611 Fax : +81-3-3410-2611
Web Site: https://www.sekonic.co.jp

CM0697512

SEKONIC

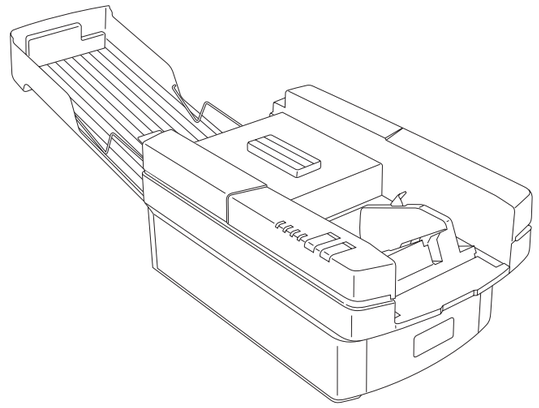
OPTICAL MARK READER SR-450

Operating manual

SEKONIC

OPTICAL MARK READER SR-450

Operating manual

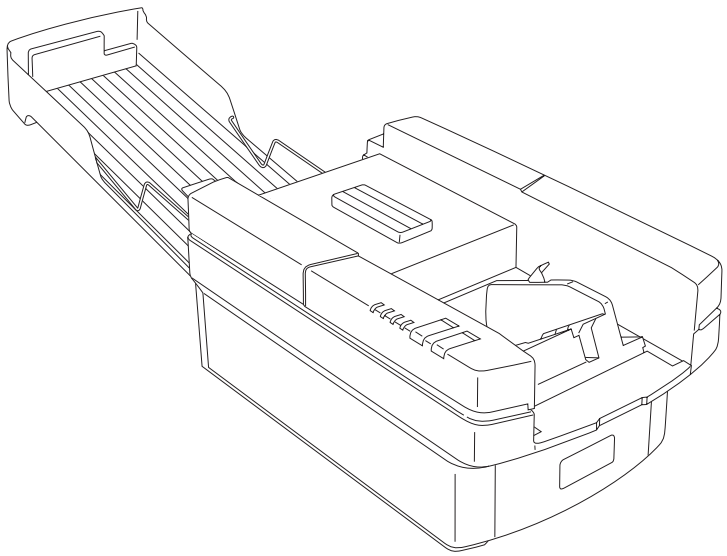


DIC 579 K

Introduction

Thank you very much for purchasing our product.

Please read the operating manual before using this product, and be sure to use it properly. After reading this operating manual, be sure to keep it in a place that you can access at any time.



This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules.
In a residential environment this device may cause radio interference.
In this case, the user may be required to take appropriate measures.

Notice

Microsoft Visual Basic is a registered trademark of Microsoft Corporation.

Software License Agreement

Notice Please read before opening this packaging.

This agreement sets the conditions by which SEKONIC CORPORATION (hereafter call SEKONIC) gives its customer (hereafter called "the user") license to use the software.
The removal of the packaging will automatically indicate that the user has agreed to the terms of the agreement.
If you cannot agree to the following terms, please return the software unopened to the store of purchase.

1. Definitions

“Software” as mentioned in this agreement includes the software program and all related materials included in this packaging.

2. License

SEKONIC gives the user the license to use the software mentioned in this agreement. The user may make unlimited copies of this software for distribution.

3. Rights to the Software

The copyright and property rights of this software belong to SEKONIC. The user is given the right to use and reuse the software in accordance with this agreement, but does not have the copyright or property right or any other right to this software.

4. Limitation

The user may not translate this software in to a form that is readable by a human being through reverse compilation, reverse assembling, reverse engineering or any other method.

5. Termination of the agreement

This agreement is valid until it is terminated. The user may terminate the agreement at any time by destroying the software and all copies made.

6. Guarantee period for the recording medium

SEKONIC will exchange the software's recording medium on its own judgment within 90 days of purchase if a flaw is found in the medium. However, it does not take any responsibility for replacing a recording medium which has been damaged by accident, abuse, or misuse.

7. Relinquishment of guarantee for software

The user will agree to this agreement with the understanding that the user must make responsible use of this software. The software is provided “as it is,” and SEKONIC makes no guarantees. SEKONIC has no obligation to give or declare an explicit or implicit guarantee of any kind concerning the rights of a third party, or the merchantability, integrity or quality of the software.

8. Limit of Responsibility

SEKONIC will not take any responsibility for accidental, unusual, or consequential loss due to the use or inability to use the software in any situation, including the loss of the software.
In any case, if at any time SEKONIC is deemed responsible, the highest compensation will be the amount paid by the user in damage, cost and legal fees.

Before Usage

Make sure that the following are contained in the package immediately after unpacking the product.

1. Main unit
2. Power cord
3. Operation manual
4. Stopper plate
5. Cards
    1) 12-line standard-sized check cards (5)
    2) 15-line postcard-sized check cards (5)
    3) Paper feeding roller protection card (1)
6. CD-ROM
7. USB cable
8. Procedure for install the USB Driver

Warranty

This product will be warranted without any charge for one year after delivery.

In case of a failure occurring during this period, we repair it for free if it is judged to be related to our responsibility. In this case, we temporarily keep the failed product to repair it. For details, contact the shop at which you have purchased it.

In case that the free warranty period has expired or the failure is related to your responsibility or has resulted from a worn part, we will repair it with charge.

The scope of this warranty is limited to this product and its accessories. Note that SEKONIC will not be responsible for any financial damage, lost profit or claim from a third party resulting from operation of this product.

Safety Precautions

Notice Handling the Device Correctly and Safely

Read the "Safety Precautions" carefully before using, and use this product correctly.
This "Safety Precautions" page lists various graphical symbols to ensure the safe operation of this product to prevent users, other people or property from being damaged. Thoroughly read these precautions and understand the meaning of the symbols before proceeding to the main text of this manual.

■ The levels of danger and damage that will arise if the device is inappropriately used are classified and indicated as shown below.

⚠ Warning	Improper operation by neglecting this instruction may result in personal death or serious injury.
⚠ Caution	Improper operation by neglecting this instruction may result in personal injury or property damage.

■ The following graphic symbols explain the necessary actions to be taken.

	Indicates warning and precautions. The exact warnings and precautions are shown in the symbols.
	Indicates prohibited actions. The exact prohibited actions are shown in the symbols.
	Indicates actions that must be carried out. The exact required actions are shown in the symbols.

⚠ Warning	
	**Do not place your hand on the paper feeding surface while the device is in operation.** Your hand can be caught and injured due to incorrect usage.
	**Do not place your hand into any moving parts while the device is in operation.** Your hand can be caught and injured due to incorrect usage.
	**When placing your hand on the paper feeding surface during a paper jams, be careful not to allow your fingers to be caught or hit.** Your finger or hand can be caught on the paper feeding surface or the upper cover and this may result in a injury. Turn the power switch off while working.

How to Handle Power Cord and Power Plug

	**Stop using the device immediately in the event of abnormal operation or a break-down, and unplug the power cord.** ● The device emits smoke or a strange odor or noise. ● Liquid such as water or a foreign matter enters inside. ● The power plug gets abnormally hot. ● There is deformation or damage to the device. If the product is used as is, a fire or an electric shock may result. ・Immediately turn the power switch off and contact the sales shop. Never attempt to repair by yourself since it may cause serious danger.
	**Make sure the power outlet is within reach so the power cord can be easily unplugged.** **Make sure the plug is firmly inserted into the outlet.**
	**Do not use the device with other supply voltage than the specified one.** **Use only appropriately rated outlet and wiring tools.** **Avoid the use of multi-socketed adapters.** This may cause a fire due to heat generation.
	**Do not damage the power cord or power plug.** This may cause a fire due to an electric shock or short circuit.
	**Do not pull the cable when unplugging the power cord.** Damage to the power cord or deformation of the plug can cause a fire or an electric shock.
	**Do not touch the power plug or the device itself during a thunder and lightening storm.** This may result in an electric shock.
	**Do not connect or disconnect the power plug with a wet hand.** This may cause electric shock.

	**Connect a ground cable and ground the device.** Be sure to ground the device with a ground cable. Otherwise, an electric shock may occur.
	**When connecting or disconnecting the ground cable, unplug the power cord first.** Otherwise, an electric shock may occur.

⚠ Warning

How to Handle the Device

	**Do not spray organic solvent such as flammable fluids or paint thinner.** Flammable gas remaining inside the device can catch fire from static electricity, which may cause a fire, burn or injury.
	**If the device is dropped or the cover is broken, power down and remove the power plug.** If the device is dropped or the cover is broken, immediately turn the power switch off and remove the power plug from the outlet. Then contact the distributor.
	**For internal inspection, adjustment or repair of the product, contact the distributor.** **Caution: High Pressure** Only service staff should remove the cover. Do not attempt to do this yourself as it may cause an electric shock.
	**Do not modify the device, remove the cover or disassemble it.** There is a high voltage part inside. It may cause a fire or an electric shock.
	**Do not place the device in areas subject to liquid, dust, or humidity.** This may cause a fire.
	**Don't insert or drop foreign objects such as metals or flammables into the opening.** This may result in a fire or an electric shock.
	**Do not place a container with liquid or a metal piece on the device.** Do not place a container with chemicals or liquid or a small metal piece on the device. This may cause a fire.
	**Do not cover the vent holes.** Otherwise, the heat contained inside could result in a fire.
	**Do not use in a place where there is explosive, combustible or flammable gas.** It is extremely dangerous to use the device in a place where there is explosive, combustible or flammable gas. You must not do this.

⚠ Caution

	**Before moving the device, make sure to unplug the power cord from the outlet.** Before moving the device, make sure to unplug the power cord from the outlet. If the power cord is damaged, a fire or an electric shock may occur.
	**Do not install on an unstable surface.** Do not place or install the device on an unstable surface. It may fall, resulting in an injury.
	**Avoid using the device in the following places as this may cause malfunction.** 1. a place receiving radiant heat (such as direct sunlight) 2. a place where mechanical vibration frequently occurs 3. a place near the source of an electromagnetic field 4. a place where dust and oily smoke are frequently released 5. a place prone to steam, water or condensation 6. an environment that contains organic gas, inorganic gas or salinity.
	**The device should only be used indoors. Do not use it outdoors.** The device is designed only for indoor use. Do not use it outdoors. This may cause a fire or malfunction.
	**When the device is not in use for a long time, remove the power cord for safety.** When the device is not in use for a long period of time, remove the power cord from the outlet for safety.

⚠ Caution

Cleaning

	**Regularly wipe off dust on the power plug.** If dust builds up on the power plug, it may cause problems in insulation, which could lead to a fire. *Unplug the power cord and wipe with a dry cloth.
	**Unplug the power cord before cleaning for safety.** When cleaning, first unplug the power cord for your safety. Failure to so may cause an electric shock, fire or injury.

Caution

Do not dispose of the device with general household waste.

Waste electrical product disposal must be conducted according to the regulations of the area or the relevant local government.

Table of Contents

1. Precautions on Usage

Handle the device with the following in mind so as to enable the functions of it to be fully utilized.

(1) Before usage, make sure that the power cord is firmly connected to an outlet. Avoid connecting or disconnecting the connector during operation or while the power switch is turned on.
(It may result in a failure.)

(2) Since the card reading part is equipped with an optical lens, never insert a screwdriver or the like.
(Otherwise, reading may be disabled.)
If card feeding is disabled due to clogged dust or the like in the card feeder, open the top cover to remove it. (Refer to "11. Cleaning".)

(3) Allow an interval of at least 5 seconds between turning the power switch on and off.
(Otherwise, a failure may result.)

(4) Be sure to ground the device so as to prevent noise or static electricity from damaging the device.
Also, do not touch the metallic part of the device during card feeding operation.
If the device is used without being grounded or the metallic part is touched, malfunction or an electric shock may result.

(5) Do not place the device in a place subject to direct sunlight or near a heater. Also be careful not to allow sudden temperature change, moisture, dust or excessive shock around the device.
(Otherwise, a failure like wrong paper feeding, reading or operation may occur.)

(6) When the device is not in use for long periods, insert the paper feeding roller protection card between the paper feeding roller and the separation pad to prevent the roller material from deteriorating.

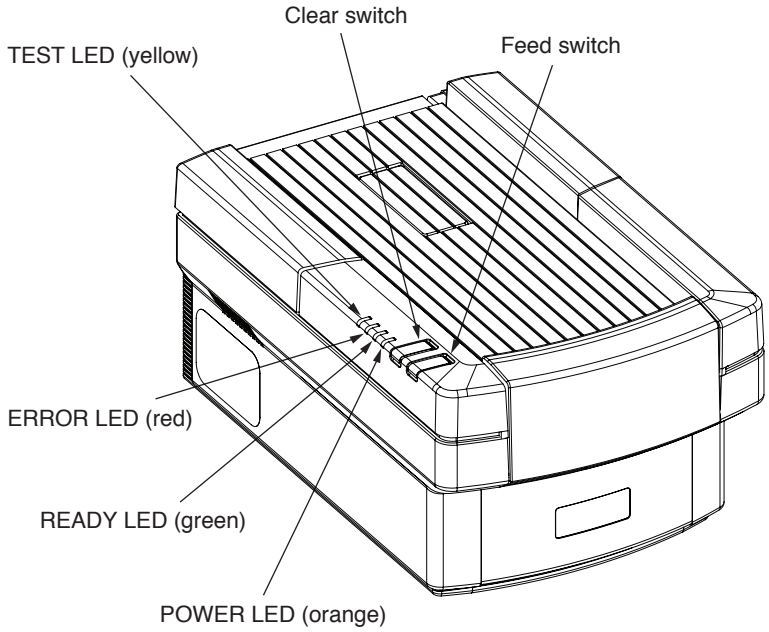
(7) If the paper feeding roller becomes soiled with powder from card paper or pencil, the roller and the card may slip.
In order to prevent it, clean the paper feeding roller at proper intervals. (Refer to "11. Cleaning".)

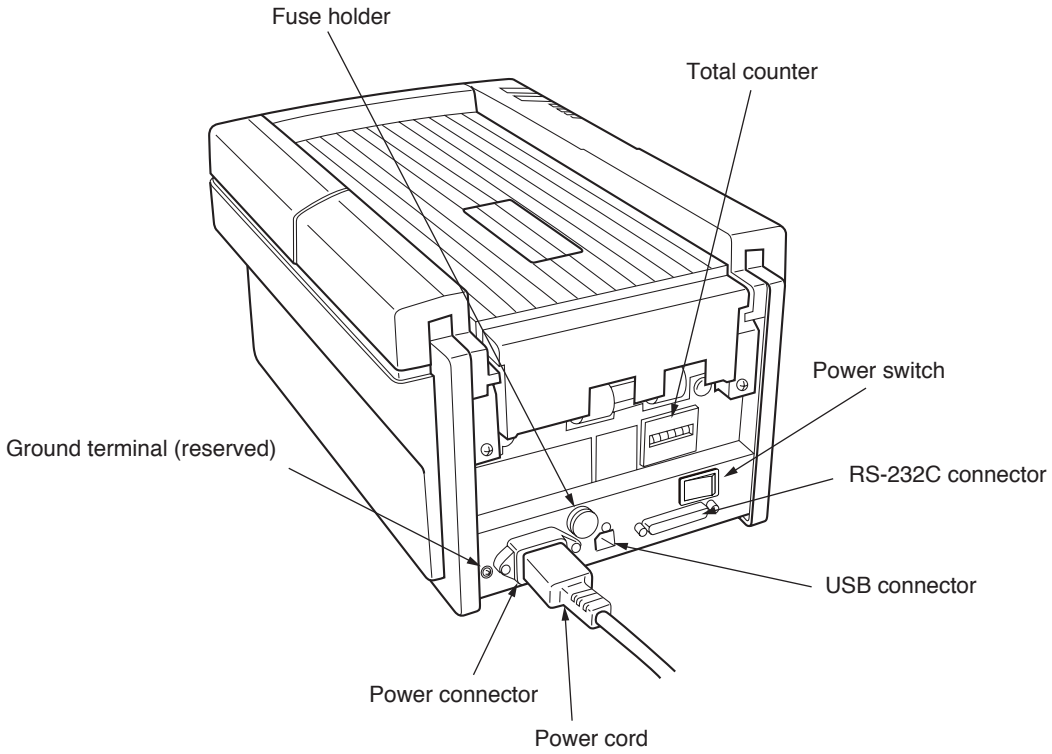
(8) If the exterior of the device is soiled, slightly wipes with soft cloth wetted with water or neutral detergent. Note that wiping with cloth wetted with volatile chemicals like benzine or thinner may cause deforming or decoloring.

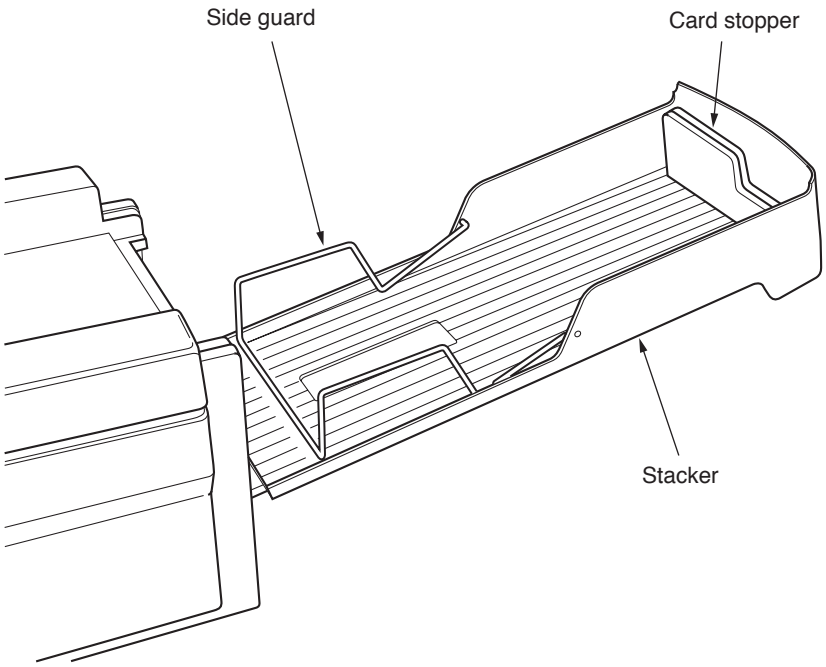
(9) When connecting by RS-232C, consult with the distributor.

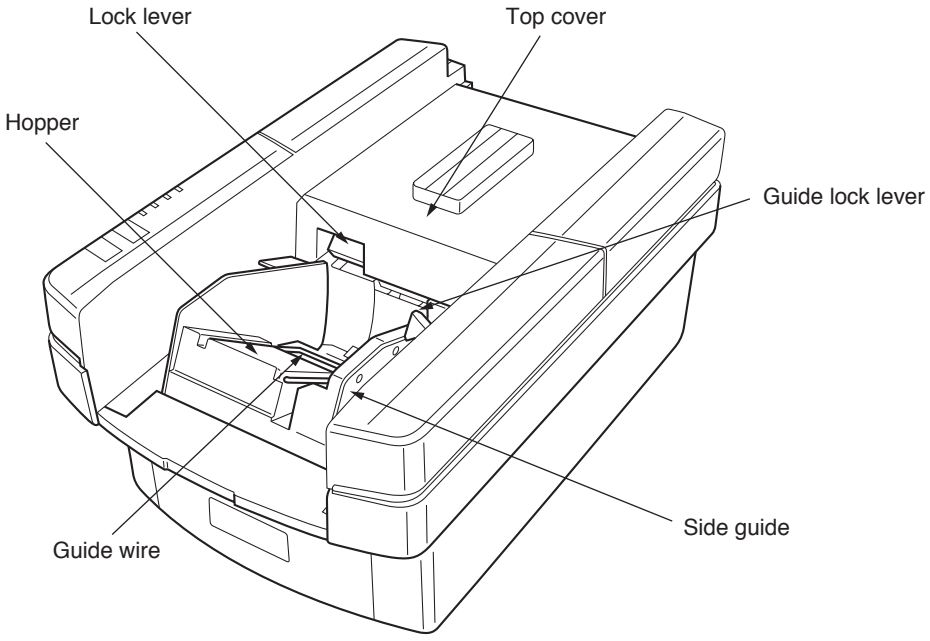
(10) Use only the USB cable and power cord that came with the device.

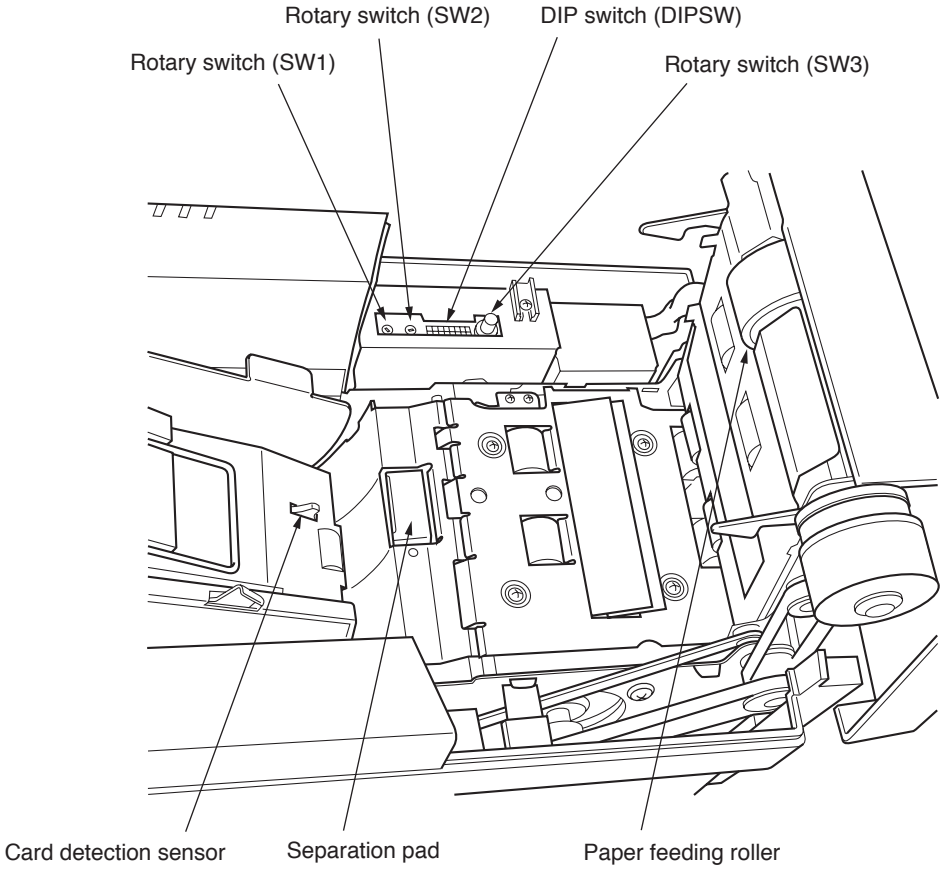
2. Names of Each Part






Side guard
Card stopper
Stacker


Lock lever
Top cover
Hopper
Guide lock lever
Side guide
Guide wire


Rotary switch (SW2)
DIP switch (DIPSW)
Rotary switch (SW1)
Rotary switch (SW3)
Card detection sensor
Separation pad
Paper feeding roller

3. Specifications

1.	Available cards	Card size: Standard-sized card, postcard-sized card, long-sized card Paper type: OCR paper. ※Refer to 13.A-(1) Paper ream weight: (70)* 90kg to 135kg (basic weight: (83.8g/m^2) 104.7g/m^2 to 157.0g/m^2) (thickness: (0.11mm) 0.13mm to 0.19mm) The 70kg paper is available to standard size only.
2.	Mark line number	Standard-sized card: Data = 12 lines, timing = 1 line Postcard-sized card: Data = 15 lines, timing = 1 line
3.	Mark column	Max. 140 columns. (specified by program)
4.	Reading method	Direct-under type, timing control type, mark-to-mark type
5.	Marking	Infrared ray: Pencil of HB or softer, machanical pencil [visible ray: The above, ball-point pen]
6.	Reading wavelength:	Infrared ray: 940nm [visible ray: 660nm]
7.	Card feeding rate	Approx. 256 sheets/min (115V AC/50Hz, machine feeding rate using standard-sized cards at room temperature)
8.	Hopper capacity	Max. 200 cards. (paper of ream weight of 110kg (basis weight of 127.9g/m^2), standard-sized card)
9.	Error check	Four types of errors can be judged (jam, timing mark, card empty and double-feeding errors)
10.	Self-check	The card detection sensor is to be checked.
11.	Serial Interface	Serial EIA RS-232C-based, asynchronous, half-duplex, data transfer rate = 2,400 to 115,200bps (variable) variable data format
12.	USB interface	USB 2.0 full-speed Virtual COM Port Device (same specification as 11.Serial interface)
13.	Power supply	Supply voltage = 115VAC, Frequency = 60Hz Current = Approx. 0.6A (during motor rotation) Approx. 0.1A (in standby mode) Supply voltage = 220VAC, Frequency = 50/60Hz Current = Approx. 0.3A (during motor rotation) Approx. 0.1A (in standby mode)
14.	Operating environments	Room temperature = 5 to 35C° Relative humidity = 40 to 80% RH (no dew condensation)
15.	Overall dimensions	360 (L) x 222 (W) x 171 (H) (mm) (Length in operation: 695 mm)
16.	Weight	Main unit = Approx. 6kg

[ ] is option

4. Installing the USB Driver

The USB driver must be installed to use this product over a USB interface connection. If using this product over a RS-232C connection, the driver does not need to be installed, and the procedures in this chapter are not necessary.

4-A Before Installation

To use a USB interface connection, load the supplied CD-ROM, and install the driver by following the installation procedure in this chapter.
If the old SR-450 USB driver is installed, please uninstall it first.
Be sure to install the USB driver before inserting the SR-450 into the computer's USB port. The driver cannot be installed properly if the SR-450 is inserted into the USB port first.

Notes

- If you accidentally connect the SR-450 before performing the installation, delete the falsely-identified driver from "Add or Remove Programs".
- To install the driver, you must log in as a user with administrator privileges.

Operating Environment

Software	USB driver
OS	Windows 10 version 21H2 and later (32bit,64bit) Windows 11 (64bit)
PC	Computer with USB interface in standard configuration *

Get the latest information at our website. (https://www.sekonic.co.jp/english)

* • The OS must be preinstalled.
- The software may not work for certain computer models and configurations.
- Operation is not guaranteed for systems with an upgraded OS, add-on USB interface, self-built computers, built-to-order computers, and in emulator environments (such as Virtual PC).
- Operation is not guaranteed for connections that pass through a USB hub.
- A drive capable of reading CD-ROMs is required for installing the software.
- Windows on Arm is not supported

4-B Installation Procedure (*The screens in the explanations below use Windows 10.)

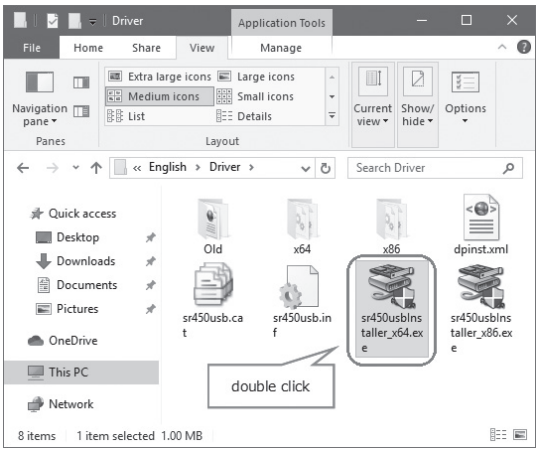
(1) Check that the SR-450 is not connected.

(2) Start Windows, load the "driver CD", and run the installer program forpertinent OS on the CD.

(For 32bit OS) (on the CD)\English\Driver\sr450usbInstaller_x86.exe

(For 64bit OS) (on the CD)\English\Driver\sr450usbInstaller_x64.exe

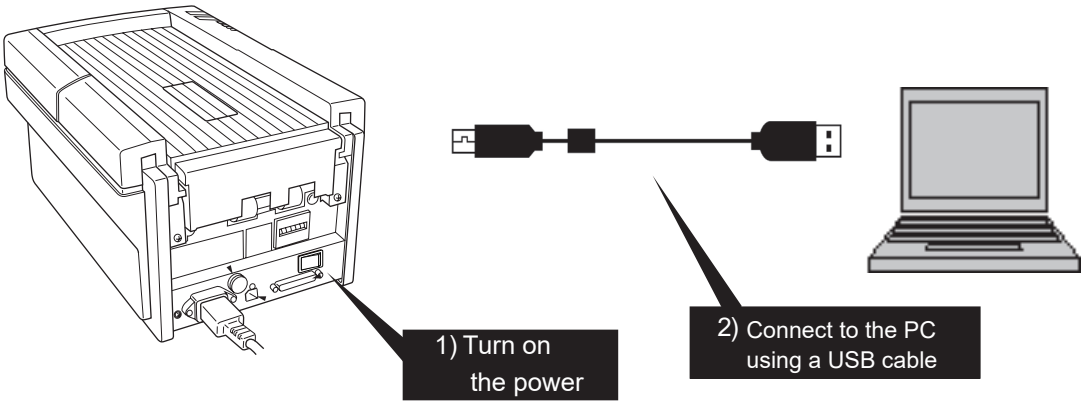
* If you have installed incorrect USB driver, please un-install it from the computer. When finished, please install the correct USB driver to the computer.



(3) Click "Next" and follow the instructions on the screen.

(4) After installation is complete, the program will ask you to restart the computer. Click "Yes" to restart the computer.

(5) After the computer is restarted, turn on the power for the SR-450, and connect it to the computer's USB port.

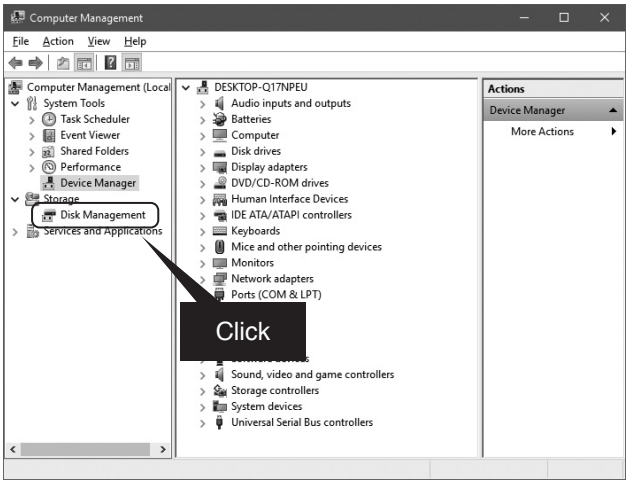


4-C Checking the Assigned Port

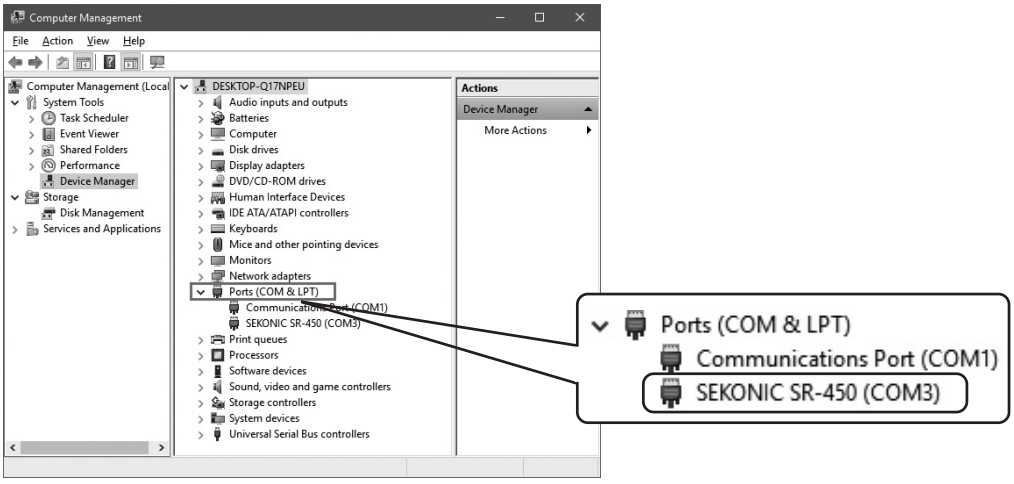
The COM port must be designated when using this software. After installing the USB driver, follow the procedure below to check the port number assigned when using the USB interface.

(1) Right-click this PC on the Desktop to open a pop-up menu, and click Manage.

(2) Click the Device Manager.



(3) Click Ports, and check the assigned port in parentheses for the "SR-450" entry.



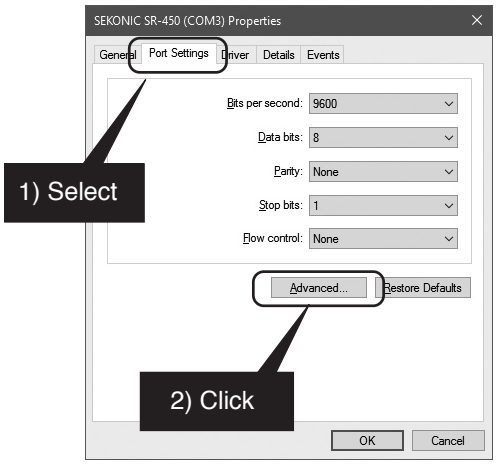
4-D Troubleshooting for Communication Errors

-1 Changing the Assigned Port

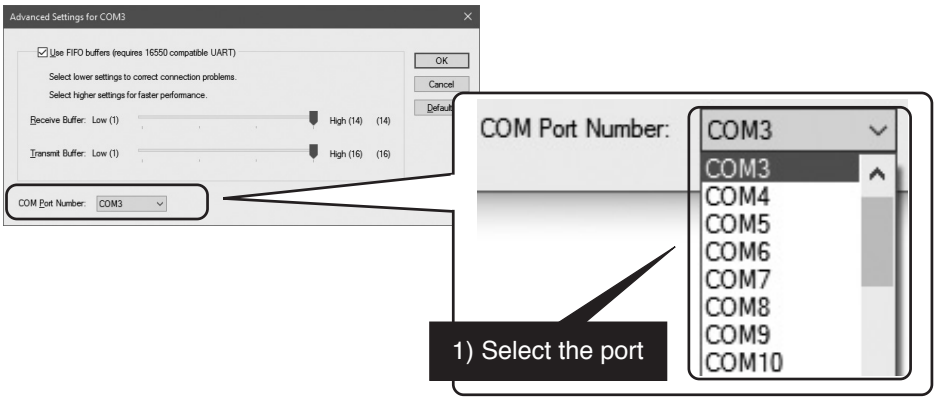
The assigned port can be changed if the port number assigned to the SR-450 cannot be recognized by the software or when you want to use a specific port. The procedure for changing the port is described below.

(1) Right-click the "SR-450" entry from the Device Manager screen (see section 4-C), and then click Properties from the pop-up menu.

(2) Select the "Port Settings" tab, and then click Advanced.

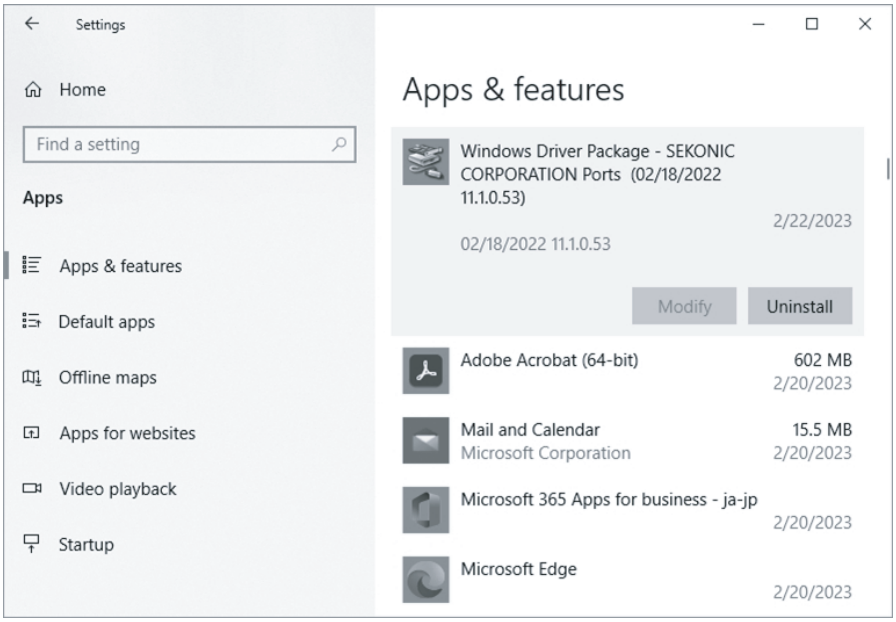


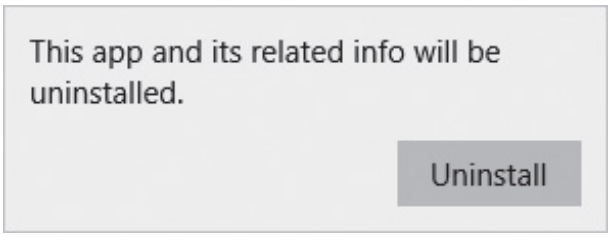
(3) At "COM Port Number", select the port number that you want to change to.



4-E Uninstall Procedure

On the "Start" menu, click "Settings", open the "App", select the "Driver", and then click "Uninstall".



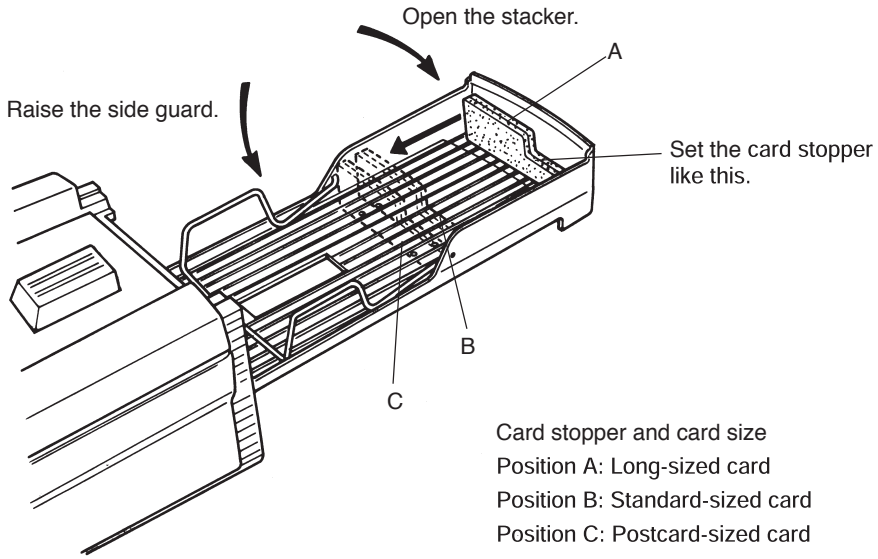


5. Operation

5-A Preparation

Install the device and open the stacker. Set the card stopper at an appropriate position for the card size to be used and raise the side guard at the specified position. (Make sure that the card stopper has not been set inside out.)

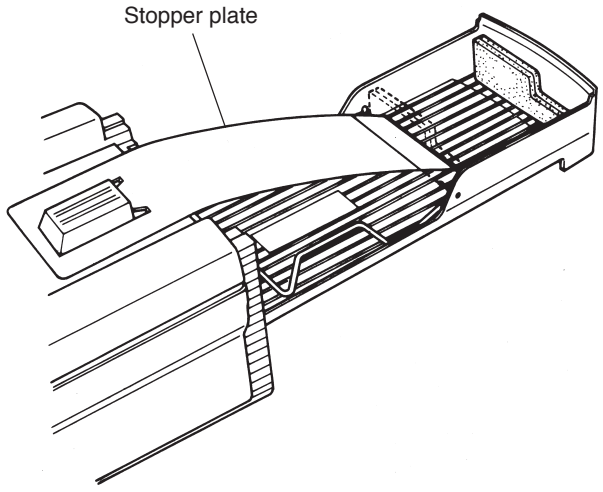
During this operation, be careful not to allow bright light to directly enter the card ejector or hopper.



When using long-sized cards it is recommended to use the stopper plate so as to prevent paper from coming out of the stacker.

Setting method: Engage the angled hole on the stopper plate with the protrusion at the center of the top cover and firmly set it so that it is not disengaged even after you take off the hands.

(Be careful that the front and rear surfaces are set properly.)



5-B Functions and Operating Method of Operation Panel

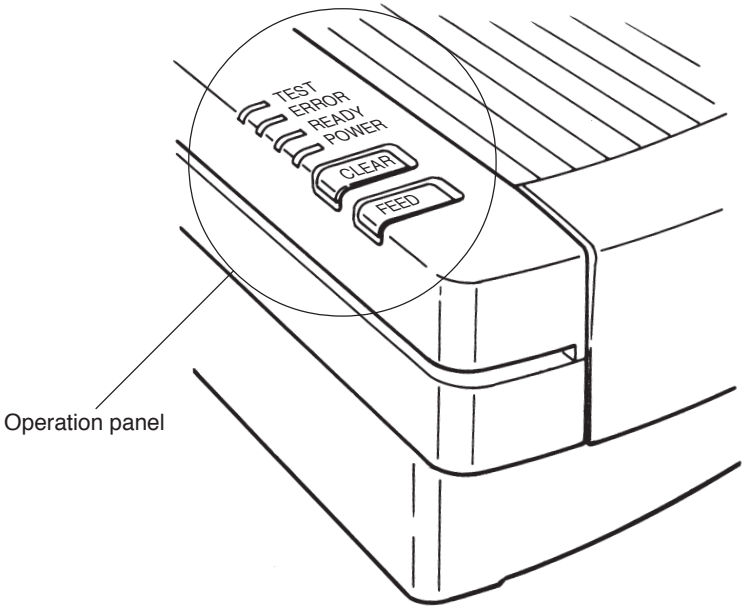
The operation panel is equipped with the following two switches and four LEDs (lamps):

(1) Functions of switches

FEED	: Pressing this switch feeds one card.
CLEAR	: Clears an error, if any.
	The hardware or cover open error, however, cannot be cleared.

(2) Meanings of LED display

TEST (yellow)	: Comes on in the test mode.
ERROR (red)	: Comes on when an error occurs.
READY (green)	: Comes on when communication is enabled.
POWER (orange)	: Comes on when the power is turned on.



5-C Setting Cards

(1) Pressing the [PUSH] button on the left of the hopper generates a "clicking" sound to lock the hopper at the card setting position. Pressing the [PUSH] button again unlocks the hopper to raise it. Do not unlock it by pressing the card.

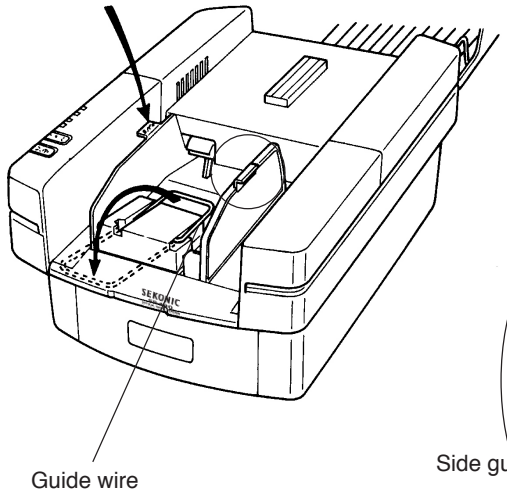
(2) Set cards while the hopper is lowered at the setting position. Set them with the marked surfaces facing upward and the timing mark sides facing left.
At this time, well-align the cards. Pay particular attention to the ends of the cards since a paper feeding error may occur unless they are well-aligned.

(3) Press the side guide hard to the cards so that no clearance is allowed between them. Otherwise, a reading error may occur.
When moving the side guide, keep pressing the guide lock lever (green). The side guide is fixed when the lever is released.

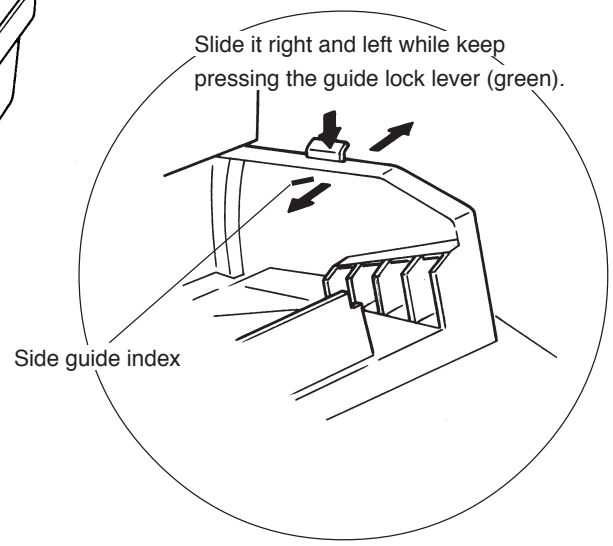
(4) For the maximum card number settable onto the hopper, refer to the side guide index.
Note that setting too many cards on it may result in a paper feeding error or misreading.

(5) When using long-sized cards, raise the guide wire toward the external side of the hopper.

Pressing once: Locks the hopper.
twice: Unlocks the hopper.



How to move side guide



Notes

1. Carefully handle cards so that they will not be bent or damaged. Otherwise, a paper feeding or reading error may occur.
2. When adding cards, lower the hopper and be sure to reset cards. Otherwise, a paper feeding error may occur.

(6) Setting double-feeding detection function

The device is equipped with a function to detect a double-feeding (DF) error.

A transmission-type sensor is used for detection, and double-feeding is judged based on a difference in the amounts of light transmitted due to a difference in card thickness.

Before using the device, match the thickness of the cards to be used and the paper ream weight setting of SW3.

The settings of SW3 are as follows:

(If DF is detected in the SR-307 or SR-305 <SR-305S> mode, an error code is outputted as a jam error.)

Switch Position	0	1	2	3	4	5	6
					*		
DF sensitivity	Auto	DF not judged	Thin ←				→ Thick

" * " refers to the initial setting.

Note Please set position between 0and 6. The deveice will not work correctly, if it is not set to the correct position, as specified bellow.

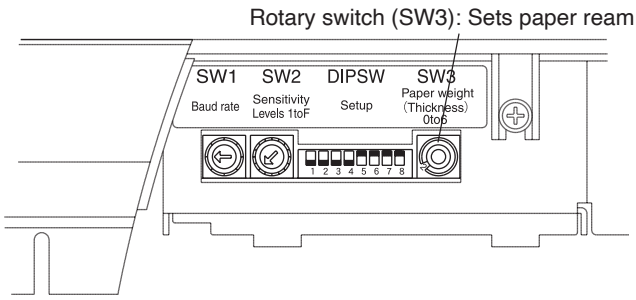
Switch position and paper ream weight

Switch Position	Paper ream weight (basis weight)
0	Auto
1	DF not judged
2	72kg (83.8g/m^2)
3	90kg (104.7g/m^2)
4	110kg (127.9g/m^2)
5	135kg (157.0g/m^2)
6	Not to use

※ Please turn the SW3 to one more larger number (switch position) when a DF error occurs in a paper feeding

※ In the "Auto" setting, a double feed is detected on the basis of the thickness of the sheet to be read first when the device is initially activated or the software is reset. Therefore, make sure there is no double feeding of the top sheet.

* The thickness of the sheet varies depending on paper quality. Therefore, change the number (switch position) in accordance with the card feeding condition.

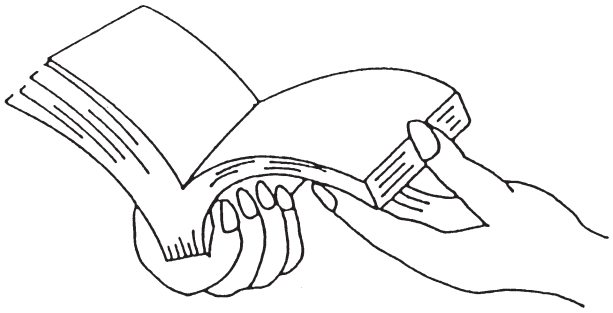


(7) Handling cards

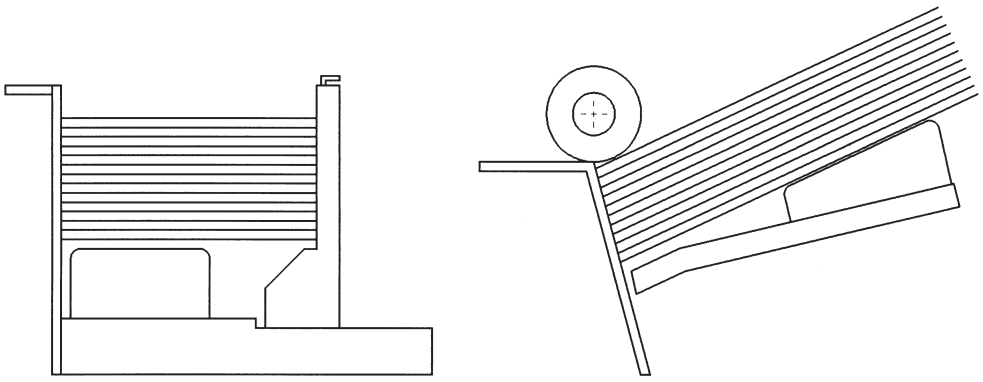
1) Do not use any card in one of the following states:
Soiled or damaged card, card to which dust or a foreign matter adheres, curled card or folded card (folded in two, four, etc.)

2) Storage of cards
Avoid storing cards in a place subject to sudden environmental change. Pay sufficient attention to moisture and keep them in a cabinet or the like. Do not leave them in a dusty place like near a window.

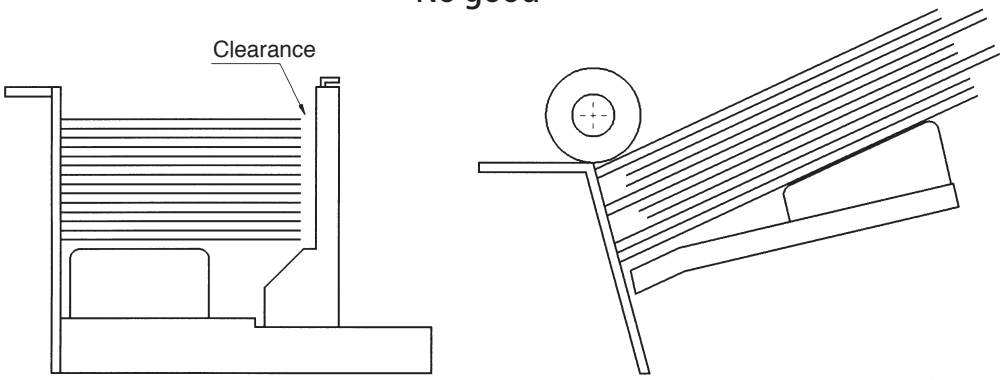
3) Before using new cards to test card feeding, be sure to loosen each card apart as shown in the figure below so as to prevent double-feeding due to cards not completely separated.

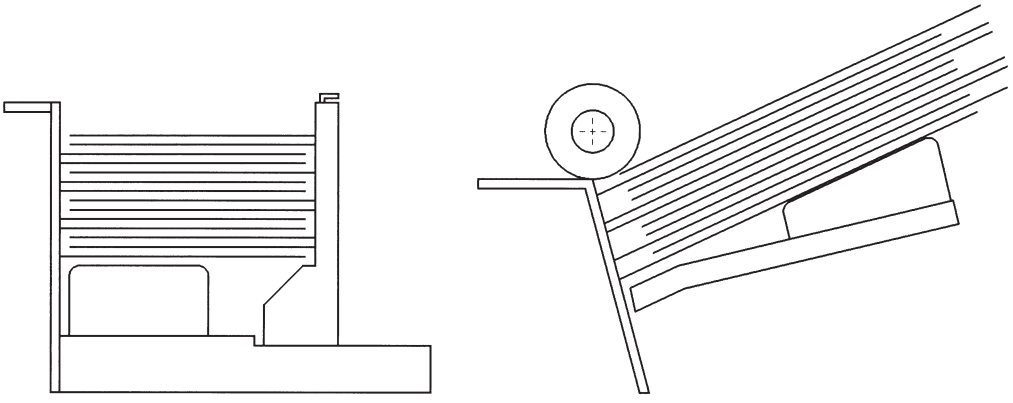


Good



No good





No clearance, but cards are not aligned.

5-D Power Connection and Operation Test

(1) Connect the power cord after turning the power switch off.

(2) Turning the power switch on lights the "POWER" LED (orange) with a buzzer sound.
This turns the device in the ready status for commands from the host computer.
If the "ERROR" LED (red) comes on or a buzzer continuously sounds, turn the power switch off and refer to "5-F Troubleshooting".

(3) Pressing the "Feed" switch once feeds one card.
Keeping pressing it continuously feeds cards.

5-E Test Mode

Test mode: Checks reading. For checking, use a specified check card that came with the device.

(1) Turning the power switch on while pressing the "Feed" switch sounds a buzzer and calls the test mode, turning all LEDs on.

(2) Pressing the "Feed" switch once feeds cards continuously. During this continuous feeding, a buzzer goes off if a reading error occurs.

(3) Keeping pressing the "Feed" switch stops card feeding.

(4) In order to exit from the test mode, turn the power off and on again.

Note
The check card to be used must be changed as follows depending on the setting of DIP SW6:
DIP SW6 = OFF : Timing direct-under-type, 12-line, standard-sized card
ON : Timing control-type, 15-line, postcard-sized card
(With this setting, the mark-to-mark-type or direct-under-type selected by DIP SW5 is neglected.)

5-F Troubleshooting

(1) Error display

Contents of error	Error type (HEX error code)	Action	
Internal error	Hardware error (70H to 76H)	Turn the power off once and on again. If the device is not restored, contact the sales shop.	
Card jamming	Card jam (31H or 32H)	Remove cards by referring to 5-F-(2).	Reset the error by pressing the "Clear" switch to reboot the device.
- Card slips to prevent feeding. - Card is attempted to be fed with the hopper being lowered.	Card feeding error (33H)		
More than one card are fed at a time.	DF error (36H)	Check the card conditions.	
Timing mark reading fails.	Timing mark error (40H)	Available timing marks are three or less or no timing mark is detected. Check cards.	
Communication line error between host computer and device - Overrun error - Parity error - Framing error	Communication error (51H)	Make sure that the communication-related settings are proper.	
Invalid command or parameter is entered.	Command or parameter error (50H)	Enter a valid command or parameter.	
No card available in hopper.	Card empty (42H)	Set cards in the hopper.	
Top cover is open.	Cover open (44H)	Close the top cover.	

(2) Action when a card jam or feeding error occurs

Follow the procedure below when a card jam or feeding error occurs.

Procedure

1) Lower the hopper to open the top cover.
2) Manually remove the jammed card(s).
3) After removing, make sure that no torn piece of paper is left.
4) Slowly lower the top cover toward you until it is locked.
   (Make sure it has been locked, otherwise, a feeding error may occur.)
   This turns the "ERROR" LED (red) off.
5) If the "ERROR" LED (red) is still on, repeat steps 3) and 4) again.
6) Correct the error appropriately by referring to the following causes for a card jam or feeding error.

Cause	Reference section for troubleshooting
Card deforming or breaking, foreign matter adhered	1) and 2) in "(7) Handling cards" in 5-C.
Soiled roller	"(1) Cleaning of rollers"" in "11. Cleaning".

(3) Action when the device does not function

If the device should malfunction, correct it by referring to the following actions for each symptom.

Symptom	Action
• The power cannot be turned on.	Make sure that the power cord is properly connected.
• The "ERROR"LED (red) comes on after turning the power on.	Refer to 5-F-(1).
• Reading is disabled.	• Make sure that the side guide is properly set. If the clearance between the side guide and cards is wide, cards are not fed properly, resulting in a reading error. • Aren't cards deformed? • Aren't cards set in the opposite direction (left-side right, upside down, etc.)? • Check operation of the device through self-check using the attached check card.
• The program malfunctions.	• Make sure that the cable is not disconnected. • Make sure that the communication-related settings are proper.

6. Connection to Computer

SR-450 is available to connect either RS-232C or USB to the computer.

The Computer is recognized by USB interface if both of cables are connected to the computer.

Connection status	USB	RS-232C
Only USB is connected.	Available	N/A
Only RS-232C is connected.	N/A	Available
USB & RS-232C are connected.	Available	N/A

Connect the device to the computer by referring to the following procedure.

(1) Connection to interface cable

This deveice can be connected by USB interface or RS-232C interface.

Please choose a cable according to interface to be used.

* RS-232C must be used a straight cable.

Please set the following settings even if you use either USB initerface or RS232-C initerface.

(2) Setting data transfer rate

Set the same data transfer rate (baud rate) to this device and the computer. The device is set at 38,400bps by default. Before turning SW1, be sure to turn the device off.

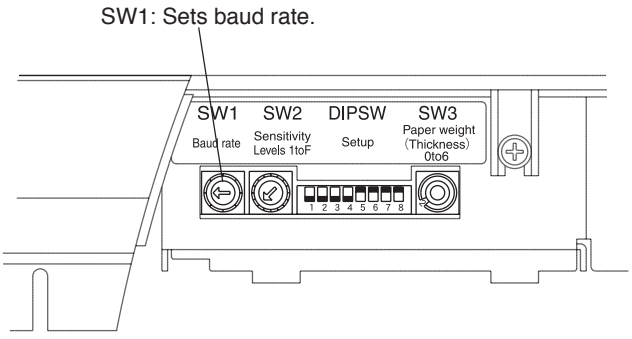
When setting the baud rate of the computer, refer to its operation manual.

The baud rate is set using 0 to 6 of SW1.

(* refers to the default setting)

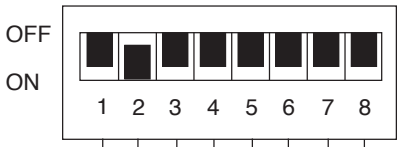
Switch position	Baud rate
0	2,400
1	4,800
2	9,600
3	19,200
4	38,400 *
5	57,600
6	115,200

(7 to 9 are not used)



(3) Setting data format

Set the same data format to this device and the computer. The DIP switches are set as shown in the table below by default. Before changing the settings of the DIP switches, be sure to turn the device off. When setting the data format of the computer, refer to its operation manual.



#1 DIP switch function: Set the device as follows:

(* refers to the default settings)

DIP SW No.	Function	ON	OFF
1	Sets communication data format.	Data bit length = 8	Data bit length = 7 *
2	Sets communication data format.	Parity check disabled *	Parity check enabled
3	Sets communication data format.	Odd parity	Even parity *
4	Sets communication data format.	Stop bit length = 1	Stop bit length = 2 *
5	Reading timing	Mark-to-mark type	Direct-under type *
6	Changes line compatible code in E mode	0123 〜 : ; < = >	987〜XYABC
	Readable line number	15	12
	Card used in test mode	Postcard-sized, timing control type	Card-sized, timing direct-under type *
7,8 (note)	Operation mode	7	8
	SR-450 (SR-410/430 compatible)	OFF	OFF
	SR-307 compatible	ON	OFF
	SR-305 compatible SR-305S compatible	OFF	ON
	Not used	ON	ON

Note:

Note that the reading sensitivity is graded in eight levels in the SR-307/305 compatible mode.

(4) Communication control method

This device has the following two unreceivable states. In these states, set the communication timing by the host computer.

1. Due to half-duplex communication, data reception is disabled while the device is sending data.
2. Data reception is disabled while the device is executing a command or the internal communication buffer is full.
   The device notifies this state using an RS signal.

The following signals are only available to use RS-232C connection.

(5) Control line level

CS: The device sends data when this signal is at the high level.

RS: The device outputs low-level RSs in the unreceivable state.

DR: The device outputs high-level DRs while the power is turned on.

Signal level

High: +3V to +12V

Low: -3V to -12V

(6) Signal name and pin connection

Signal	External computer		Signal direction	This device	
	Signal	Pin		Pin	Signal
(GND)	FG	1	———	1	FG
(Data to send)	SD	2	———→	2	RD
(Data to receive)	RD	3	←———	3	SD
(Request to Send)	RS	4	———→	4	CS
(Clear to Send)	CS	5	←———	5	RS
(Data set Ready)	DR	6	←———	6	DR
(Signal GND)	GND	7	———	7	GND

7. How to Fill in Mark

(1) Dimensions of mark : Width = 3.5 to 4.3 mm
Thickness = 0.4 mm or more

(2) Writing implement : For infrared ray : Pencil of HB or softer, mechanical pencil
For visible ray : the above, ball-point pen

(3) Density : PCS = Min. 0.7 (*1)

(4) Mark Example

Good Mark	
Reason	The mark is within the frame.
Note	The mark can be recognized correctly.

Bad Mark						
Reason	The mark is over the frame to right and left.	The mark is over the frame to up and down.	The mark is bigger than the frame.	The mark is out of the frame.	The mark is out of specified size.	
Note	The marks neighboring in right and left cannot be recognized correctly.	The marks neighboring up and down cannot be recognized correctly.	The marks neighboring in right and left, up and down cannot be recognized correctly.	The mark cannot be recognized correctly.		

Note:
When using a mechanical pencil, be sure to fill in a mark with enough density.

(*1)
PCS = Printed Contrast Signal
It refers to the contrast in reflectance of a printed mark, symbol or letter against the non-printed part of paper. It is calculated as follows:

PCS = (white reflectance - black reflectance)/white reflectance

8. Adjusting Reading Sensitivity

Although the mark reading sensitivity of this device is set to level 4 by default, it can be changed so as not to read stains as marks when particularly stained cards are read.

(1) Open the top cover of the device to turn SW2.
In SR-450 (SR-410/430 compatible) mode
Turn SW2 to level 1 to maximize the reading sensitivity.
Turn SW2 to level 0 to minimize the reading sensitivity.

IN SR-305(SR-305S)/SR-307 compatible mode
Turn SW2 to level 1 to maximize the reading sensitivity.
Turn SW2 to level 8 to minimize the reading sensitivity.
For SW2, use level 1 to 8 and do not use level 0, 9 to F.

(2) When adjusting the sensitivity, fill in marks with different densities (line width or thickness) on mark cards to test reading. Check and adjust filled marks and the reading sensitivity level using SW2.

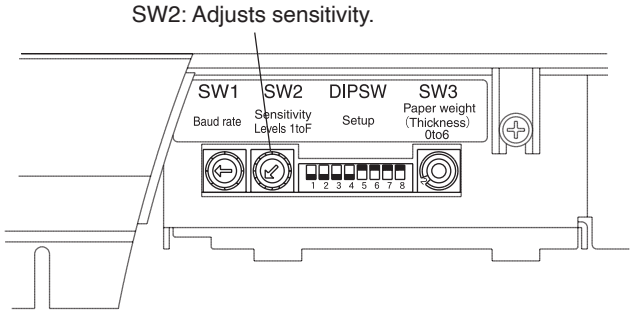
(3) Functions of SW2
SR-450 (SR-410/430 compatible) mode

Position	1 2 3 4 5 6 7 8 9 A B C D E F 0 *
Sensitivity	High ← Reading sensitivity → Low

SR-305(SR-305S)/SR-307 compatible mode

Position	1 2 3 4 5 6 7 8
Sensitivity	High ← Reading sensitivity → Low

Note
"*" refers to the default setting.
Reference detection density data of each level differs between the SR-450 (SR-410/430 compatible) and SR-305(SR-305S)/SR-307 compatible modes.



9. Control Commands

This device operates according to command signals sent from the host computer. Control commands and data are all sent and received in ASCII codes.

9-A Initialize Commands

The following commands are used to change the status of the device immediately after the power is turned on:

-1 Kinds of Initialize Commands

Command	Format	Explanation
DL	DLE DL～	Sets the reading density.
DD	DC3 DD～	Sets the difference in the reading density.
T	DLE T～	Sets the timing format.
DC3	DC3 ～ DC3 L～	Selects the 12-line or 15-line output. Specifies the lines to be read in the E, EA, ED or ES mode.
DC4	DC4 ～	Sets separator codes and others.
CAN	CAN CR	Resets the device.

-2 DLE DL Command (Reading Sensitivity Setting Command)

[Explanation]

This command is for setting the reading sensitivity level.
16 levels corresponding to density levels 1 to 16 can be set.

For example, a mark of density level 2 or more is read when "02" is set.

The setting of the rotary switch is enabled when the power is turned on while software is prioritized when a DL command is used.

This setting is not stored after the power is turned off.
* This applies to when the CAN command is executed.

In the SR-307 compatible mode, the density levels are 1 to 8.

[Format]

DLE	D	L	N1 N2	CR
(10H)	(44H)	(4CH)		(0DH)

N1N2: 2-byte ASCII code

-3 DC3 DD Command (Reading Density Difference Setting Command)

[Explanation]

This command is for setting the density difference allowable from the darkest mark in the CA and EA modes.

After setting the difference, marks thinner than the setting are cancelled and those in the allowable range are all output.

The density difference is set at "01" by default. In this case, mark data of the darkest density are output.

This setting is not stored after the power is turned off.

* This applies to when the CAN command is executed.

Notes 1. Relationship with the sensitivity level setting

When there is one mark, the existence is judged according to the set sensitivity level.

When there are more than one mark, the density differences are compared among those at the set level or more and marks under the set level are cancelled.

2. When there are more than one mark at the same density level, more than one pieces of data are also output.

e.g.1. When the density level is set at 2 and there are marks of density 6, 4 and 3

If the density difference of 3 is specified, the mark under the density level of 3 (6 - 3 = 3) is cancelled and two pieces of data of density 6 and 4 are judged to exist and output.

e.g.2. When the density level is set at 4 and there are marks of density 8, 5, 4 and 3

If the density difference of 3 is specified, the mark under the density level of 4, namely, the mark of density 3, is first cancelled due to the sensitivity level setting and then the marks under the density level of 5 (8 - 3 = 5) are cancelled. Thus, data of density 8 is judged to exist and output.

[Format]

DC3	D	D	N1 N2	CR
(13H)	(44H)	(44H)		(0DH)

N1N2: 2-byte ASCII code

-4 DLE T Command (Timing Format Setting Command)

[Explanation]

This command is for setting mark read timing (timing mark type). If the DIP switch setting has not been changed, the setting by this command is not required when the power is turned on.

When the T command is executed, the set value remains unchanged unless the device is reset or the power is turned off.

When using the timing control type, be sure to set the read timing by this command.

-4-1 In SR-450 (SR-410/430 compatible) mode

[Format]

Host Computer							This device
DLE	T	CR	STX	N	CR	⟶	Receive
(10H)	(55H)	(0DH)	(02H)		(0DH)		

* N: Specifies the format (1-byte ASCII numerical code between 1 and 5)

N	Mark read timing format
1	Timing control type
2	Direct-under type
3	Not used
4	Mark-to-mark type (end or blank space not to be read)
5	Mark-to-mark type (end or blank space to be read)

N values determine the mark read areas in the formats shown in the table below:

Setting method of timing control type

Specifying the timing control type with N = 1 when specifying the T command sets the read area at three times of the timing mark.

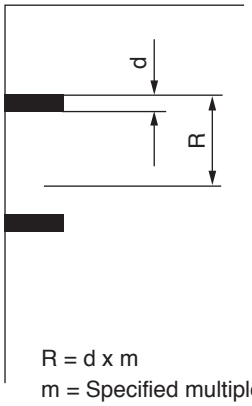
[Format]

DLE	T	CR	STX	1	CR
(10H)	(55H)	(0DH)	(02H)	(31H)	(0DH)

Descriptions of each read timing format ("R" refers to the read area)

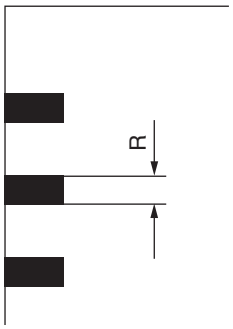
[Descriptions of each control type]

1. Timing control type

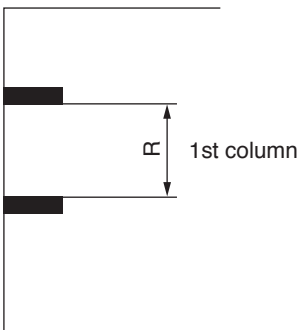


R = d x m
m = Specified multiple (fixed at 3)
d = Timing mark width

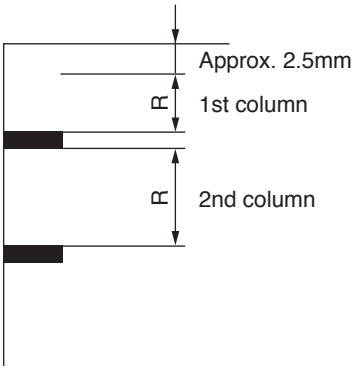
2. Direct-under type



3. Mark-to-mark type
(Not read blank space of front end)



4. Mark-to-mark type
(Read blank space of front end)



-4-2 In SR-307 compatible mode

[Format]

Host Computer					This device
DLE	T	CR	N	CR	→ Receive
(10H)	(55H)	(0DH)		(0DH)	

* N is the 1-byte ASCII numerical code indicating the reading method.

N values determine the mark read areas in the formats shown in the table below:

N	Mark read timing format
0	Mark-to-mark type
1	Timing mark direct-under type
2	Timing control type (read multiple = 3 times)

-4-3 In SR-305 (SR-305S) compatible mode

[Format]

Host Computer					This device
DLE	T	CR	N	CR	→ Receive
(10H)	(55H)	(0DH)		(0DH)	

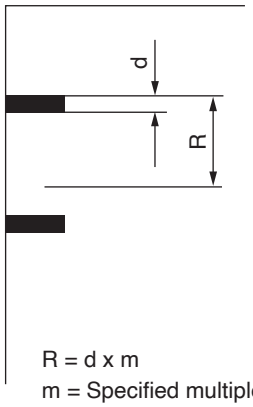
* Specifies the timing control type.

N is the 1-byte ASCII numerical code indicating the reading method.

Descriptions of each read timing format ("R" refers to the read area)

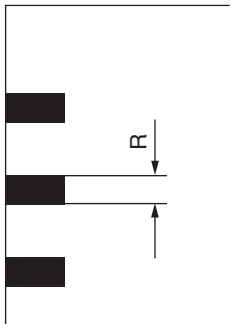
[Descriptions of each control type]

1. Timing control type



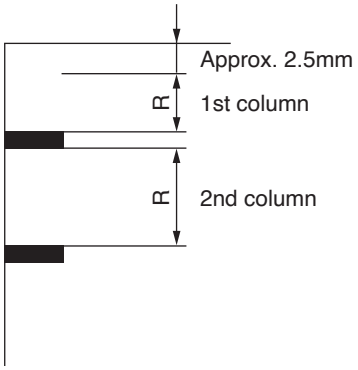
R = d x m
m = Specified multiple (fixed at 3)
d = Timing mark width

2. Direct-under type



3. Mark-to-mark type

(Read blank space of front end)



-5 DC3 Command (Read Line Specify Command)

[Explanation]

This command is for specifying the number of lines of data to be read. When the DC3 command is executed, the set value remains until the device is reset or the power is turned off.

When the power is turned on or the device is reset, the number of lines will become the value set to the DIP switch, and when the DC3 command is executed, the priority will be given to the software.

[Format]

DC3	N1 N2	CR
(13H)		(0DH)

The value of N1N2 determines the number of lines of data to be read.

N1N2 = 12 : Data is read assuming the number of lines as 12.

N1N2 = 15 : Data is read assuming the number of lines as 15.

(The modes in which the 15-line format is available are C, CA, D, E, EA, ED, ES and F modes.)

-6 DC3 L Command (Read Line Area Setting Command)

[Explanation]

This command is executed together with any of data read commands such as E, EA, ED and ES. This command is for specifying the read area of each line and the range of line whose density is compared.

The setting of this command is not stored.

The initial value after the power is turned on is set for each column (as 12 lines or 15 lines).

Note :

When executed together with any of the E, EA, ED or ES command, this command can specify square areas.

[Format]

DC3	L	N1 N2	M1 M2	CR
(13H)	(4CH)			(0DH)

The values of N1N2 and M1M2 determine the range of lines to be read.

N1N2 : Read starting line counted from the timing mark side.

M1M2 : Number of lines to be read.

Note:

Although the E, EA, ED or ES command also follows the DC3 command, it does not follow the DC3 command once the DC3 L command is used.

-7 DC4 Command (STX, ETX Setting Command)

[Explanation]

This command is for determining the ETX code following data output from the device and the recognizing method of received data.

When the DC4 command is executed, the set value remains until the device is reset or the power is turned off.

[Format]

DC4	S1	S2	S3	CR
(14H)				(0DH)

The values of S1 determine the statuses of the ETX code, etc.

S1 = 0 : Initializes the device. (This value erases S1 = 7 data stored in the memory.)
Does not add the ETX (CR) code. (S2 and S3 are not necessary.)

S1 = 1 : Adds CR as the ETX (CR) code. (S2 and S3 are not necessary.)

S1 = 2 : Adds the code specified by S2 as the ETX code. (S3 is not necessary.)

S1 = 3 : Adds the STX code. This value adds the code specified by S2 as the STX code.
CR is added as ETX. (S3 is not necessary.)

S1 = 4 : Adds the STX and ETX codes. This value adds the code specified by S2 as the ETX code and the code specified by S3 as the STX code.

S1 = 5 : The device neglects the codes specified by S2 or S3 as data at the time of reception (S3 can be omitted.)
Codes which are used in commands are not neglected.
Codes up to 6 bytes can repeatedly be specified (2-byte codes only in the 307 compatible mode) .
All settable character codes are shown on the next page. All other codes cause command errors.

S1 = 6 : Not used.

S1 = 7 : Stores the set STX and ETX codes. The set values remain even after the power is turned on or the CAN command is executed. (S2 and S3 are not necessary.)

Note :

Only S1=0, 1, 2 and 5 are effective in the SR-307 mode.

Contents of separators added for each mode

- SR-450 (SR-410/430 compatible) mode

→ Command

↓ S1

	?	ENQ	ENQ T	C	E	EA
0	~	~	~	~	~CR	~CR
1	~CR	~CR	~CR	~CR	~CR CR	~CR CR
2	~ETX	~ETX	~ETX	~ETX	~CR ETX	~CR ETX
3	STX~CR	STX~CR	STX~CR	STX~CR	STX~CR CR	STX~CR CR
4	STX~ETX	STX~ETX	STX~ETX	STX~ETX	STX~CR ETX	STX~CR ETX

	ED	ES	CAN
0	~CR	~CR CR	ACK
1	~CR CR	~CR~CR CR	ACK
2	~CR ETX	~CR~CR ETX	ACK
3	STX~CR CR	STX~CR~CR CR	ACK
4	STX~CR ETX	STX~CR~CR ETX	ACK

" ~ ": Data output from the device

- SR-307 compatible mode

	?	ENQ	ENQ T	ENQ S	A	B
0	~	~	~	~	~	~
1	~CR	~CR	~CR	~CR	~CR	~CR
2	~ETX	~ETX	~ETX	~ETX	~ETX	~ETX
3	STX~CR	STX~CR	STX~CR	STX~CR	STX~CR	STX~CR
4	STX~ETX	STX~ETX	STX~ETX	STX~ETX	STX~ETX	STX~ETX

	C	CA	D	E	EA	ED
0	~	~	~	~CR	~CR	~CR
1	~CR	~CR	~CR	~CR	~CR	~CR
2	~ETX	~ETX	~ETX	~ETX	~ETX	~ETX
3	STX~CR	STX~CR	STX~CR	STX~CR	STX~CR	STX~CR
4	STX~ETX	STX~ETX	STX~ETX	STX~ETX	STX~ETX	STX~ETX

	ES	F	G	H	I	J
0	~CR~CR	~	~	~	~	~
1	~CR~CR	~CR	~CR	~CR	~CR	~CR
2	~ETX~ETX	~ETX	~ETX	~ETX	~ETX	~ETX
3	STX~CR~CR	STX~CR	STX~CR	STX~CR	STX~CR	STX~CR
4	STX~ETX~ETX	STX~ETX	STX~ETX	STX~ETX	STX~ETX	STX~ETX

	K	L	CAN
0	~	~	ACK
1	~CR	~CR	ACK
2	~ETX	~ETX	ACK
3	STX~CR	STX~CR	ACK
4	STX~ETX	STX~ETX	ACK

Character codes settable when S1 = 5

Lower 4 bit \ Upper 4 bit	0	1	2	3	4	5
0					@	
1	SH		!			
2		D2	”			
3	EX					
4	ET		$			
5		NK	%			
6	AK	SN	&			
7	BL	EB	’			
8	BS		(			
9	HT	EM	)			
A	LF	SB		:		
B	HM	EC		;		[
C	CL	→	,	<		¥
D		←		=		]
E	SO	↑	.	>		^
F	SI	↓				_

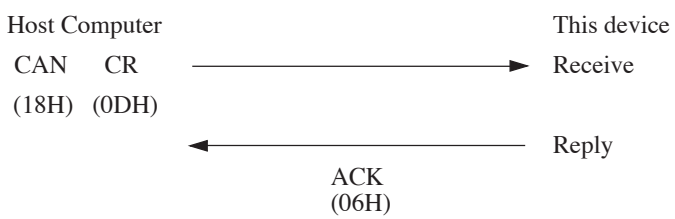
-8 CAN Command (Reset Command)

[Explanation]

This command is used as the reset command. (This command initializes the device.) After this command is executed, the device is reset internally and returns the ACK code (06H). At the time, the "READY" LED (green) and "ERROR" LED (red) blink. The host computer must be designed to transmit the next command after receiving this code.

Separators like STX and ETX can be added by the DC4 command (only in the SR-450 (SR-430 /410 compatible) mode).

[Format]



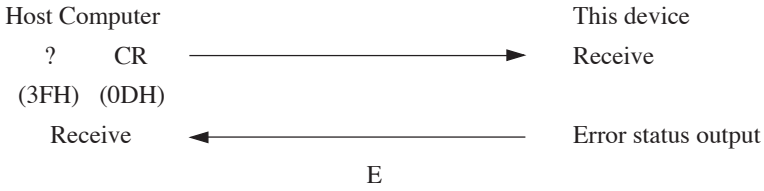
9-B Card Feed Commands

-1 ? Command (Card Feed Command)

[Explanation]

When this command is transmitted, the device sends one card only and reads it. After reading the card, the device outputs an error status code and waits for a command from the host computer. Separators like STX and ETX can be added using the DC4 command.

[Format]



E: 1-byte error status (for the meaning, refer to the error status code table)

-2 Error Status Code Table

-2-1 SR-450 (SR-410/430 compatible) mode

Code	HEX	Explanation
0	30H	Normal
1	31H	Internal jam error (during card feeding)
2	32H	Cards remain inside the device.
3	33H	Card feed error (S2 cannot be turned on)
4	34H	Not used.
5	35H	Not used.
6	36H	DF error (only when a DF check is set) (Double-feeding has occurred.)
@	40H	Timing mark error (only 3 or less timing marks detected)
A	41H	Not used.
B	42H	Card empty
C	43H	Not used.
D	44H	Cover open
P	50H	An invalid command or parameter has been input.
Q	51H	Communication error
p	70H	Hardware error of the main unit * If a hardware error should occur, turn the power off once and reboot the device. If the device is not restored, contact the sales shop.
q	71H	
s	73H	
t	74H	
u	75H	
v	76H	

-2-2 SR-307 compatible mode

Code	HEX	Explanation
0	30H	Cards have been sent normally.
1	31H	Not used.
2	32H	Jam error (cards have not been sent normally.)
3	33H	Not used.
4	34H	Timing mark error (only 3 or less timing marks detected.)
5	35H	Card empty (There is no card in the card hopper.)

A jam error (32H) is assumed for the DF error.

9-C Device Control Setting Commands

-1 DC3 B Command (Buzzer Control Command)

[Explanation]

This command is for setting whether to sound a buzzer when no card exists or an error occurs.
The initial value after the power is turned on is set to flash the red LED three times and then turn the light off without sounding a buzzer when no card exists (N = 0).

[Format]

Host Computer

DC3	B	N	CR
(13H)	(42H)		(0DH)

The value of N determines the setting.

N = 0: The red LED flashes three times without sounding a buzzer when no card exists.

N = 1: The red LED does not come on but a buzzer goes off when no card exists.

N = 2: The red LED flashes three times without sounding a buzzer for all types of errors.

When no card exists

	N = 0	N = 1	N = 2
Buzzer	Not goes off.	Goes off.	Not goes off.
LED	Comes off after flashing 3 times.	Not comes on.	Comes off after flashing 3 times.

When an error occurs

	N = 0	N = 1	N = 2
Buzzer	Goes off.	Goes off.	Not goes off.
LED	Comes on.	Comes on.	Flashes 3 times.

10. Data Transfer Mode

10-A Data Transfer Commands

The following commands are used to transfer data read from one card to the host computer:

-1 Types of data transfer commands

Mode	Explanation
A	Outputs the number at a mark when the mark is detected on the 9 to 0 lines in one column, or outputs a space when no mark or more than 2 marks are detected. The data is output as an ASCII code. The X and Y lines are neglected.
B	Outputs data in one specified column in the A mode format.
C	Divides one column in units of 4 lines and outputs the ASCII codes of 0 to F regarding the data as hexadecimal numbers.
CA *	Outputs the darkest mark in the C mode only as data.
D	Outputs data of one specified column in the C mode format.
E	Outputs ASCII codes corresponding to marked line positions.
EA *	Outputs the darkest mark in the E mode only as data.
ED *	Adds 1-byte density data after mark data in the E mode.
ES *	Outputs mark and density data separately in the ED mode.
F	Outputs data of one specified column in the E mode format.
G	Reads EBCDIC-based punched-hole codes of one column and converts the codes into ASCII codes to output them.
H	Outputs data of one specified column in the G mode format.

Modes marked "*" are for density-related commands.

Note:

The A, B, CA, D, F, G and H modes are available in the 307 compatible mode only.

10-B A Mode(1-byte Fixed Output Command)

[Explanation]

This command is for outputting the number at a mark when a mark is detected on the 9 to 0 lines in one column or outputs a space when no mark or more than two marks are detected. This device neglects marks and prints on the X and Y lines and outputs data as a 1-byte fixed length ASCII code for one column.

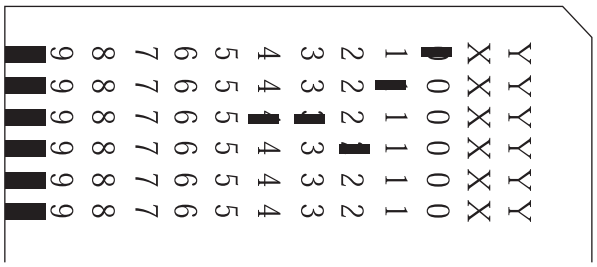
Separators like STX and ETX can be added using the DC4 command.

Note:

This mode is enabled only with the 12-line format setting.

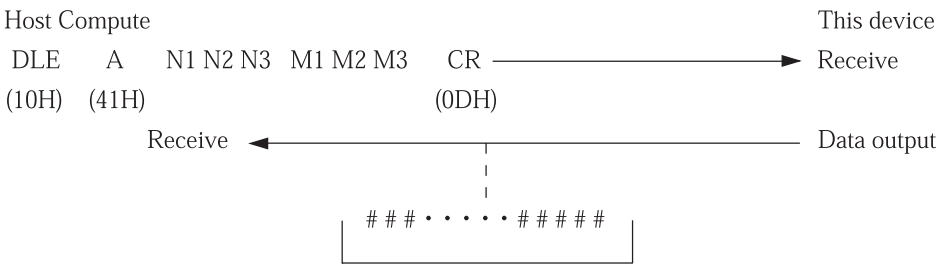
Example

ASCII output data for the following marks



		1st column	2nd column	3rd column	4th column	— — — —
Output data	ASCII code	0	1	SP	2	— — — —
	HEX code	30H	31H	20H	32H	— — — —

[Format]



Fixed length of 1 byte a column x M1M2M3 columns

N1N2N3 : 3-byte ASCII code indicating read start column number

(Example) From the 3rd column = 003 (30H, 30H, 33H)

M1M2M3 : 3-byte ASCII code indicating number of columns to be read

(Example) 50 columns = 050 (30H, 35H, 30H)

Note:

N1N2N3 and M1M2M3 cannot be omitted as 6-byte fixed length data.

10-C C Mode (Fixed Length Output Command)

[Explanation]

One column is divided in units of four lines. Existence of a mark on each line is indicated by "1" and non-existence is indicated by "0." The 4-bit unit is regarded as a 4-digit hexadecimal number, and the ASCII codes from 0 to F are output.

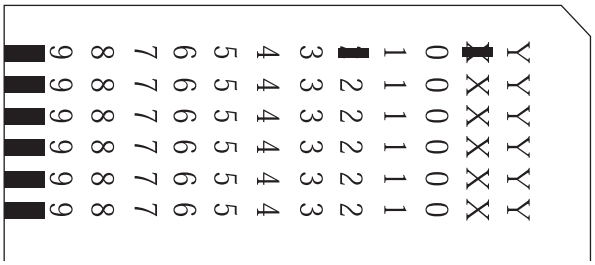
Data are of fixed length of 3 bytes a column.

(A 15-line postcard-sized card is a fixed length of 4 bytes a column. The 16th line, however, is always "0" as a dummy line.)

Separators like STX and ETX can be added using the DC4 command.

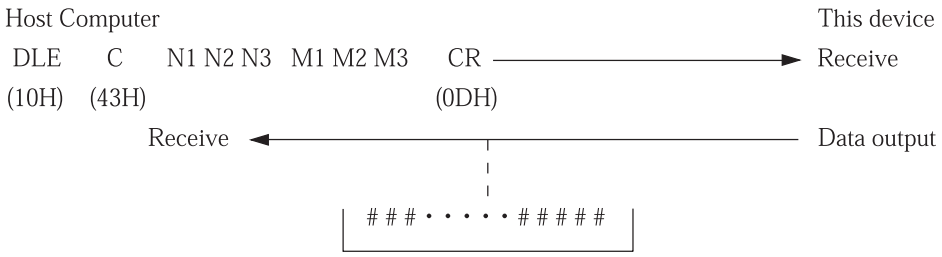
Example

ASCII output data for the following marks in one column



	Number of lines	1	2	3	4	5	6	7	8	9	10	11	12
	One column	0	0	0	0	0	0	0	1	0	0	1	0
Output data	ASCII code	0				1				2			
	HEX code	30H				31H				32H			

[Format]



Fixed length of 3 (4) bytes a column x M1M2M3 columns

N1N2N3 : 3-byte ASCII code indicating read start column number

(Example) From the 3rd column = 003 (30H, 30H, 33H)

M1M2M3 : 3-byte ASCII code indicating number of columns to be read

(Example) 50 columns = 050 (30H, 35H, 30H)

Note :

N1N2N3 and M1M2M3 cannot be omitted as 6-byte fixed length data.

10-D CA Mode (Fixed Length Output Command for Automatic Density Distinction)

[Explanation]

The data format is the same as the one in the C mode.

This command is for automatically distinguishing mark density for one column. When there are several marks, it cancels light-colored marks of larger density difference than the set difference and outputs marks of smaller density difference than the set difference. Since the density difference is set at 01 by default, the darkest mark data is output in this case. Density difference between a dark mark and the next darker mark to be canceled can be set using the DC3 DD command.

Separators like STX and ETX can be added using the DC4 command.

Note: Relationship with sensitivity level setting

When there is only one mark, the existence of a mark is distinguished according to the preset sensitivity level.

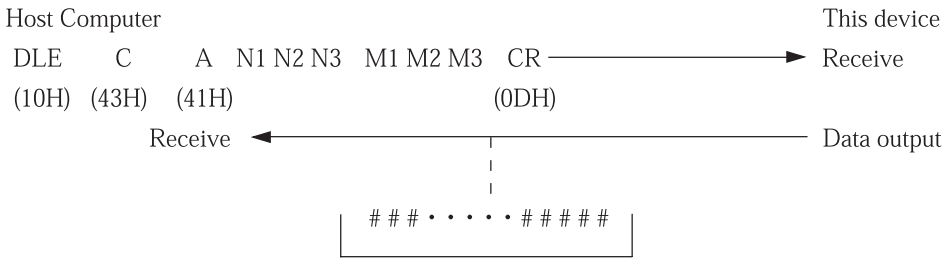
When there are several marks, density differences are compared among marks of density more than the preset sensitivity level.

Marks of density less than the preset sensitivity level are canceled.

Note:

When there are several marks of the same density level, data is also output in a plural form.

[Format]



Fixed length of 3 (4) bytes a column x M1M2M3 columns

N1N2N3 : 3-byte ASCII code indicating read start column number
(Example) From the 3rd column = 003 (30H, 30H, 33H)

M1M2M3 : 3-byte ASCII code indicating number of columns to be read
(Example) 50 columns = 050 (30H, 35H, 30H)

Note:

N1N2N3 and M1M2M3 cannot be omitted as 6-byte fixed length data.

10-E E Mode (Variable Length Output Command)

[Explanation]

This command is for returning ASCII codes corresponding to marked line positions. Data are of a variable length corresponding to the number of marks. CR codes are added at break points between columns.

When no mark is detected in a column, "a space + CR" is output.

The correspondence between line positions and ASCII codes can be set in two ways as shown in the tables below by turning DIP SW6 on and off.

Separators like STX and ETX can be added using the DC4 command.

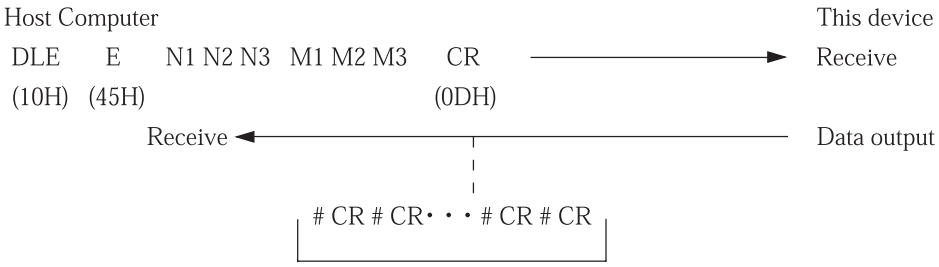
DIP SW6 = OFF

Line	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Code	9	8	7	6	5	4	3	2	1	0	X	Y	A	B	C

DIP SW6 = ON

Line	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Code	0	1	2	3	4	5	6	7	8	9	:	;	<	=	>

[Format]



Data of X+1 bytes a column x M1M2M3 columns

X + 1: Variable length data of number of marks + 1-byte "CR"

N1N2N3 : 3-byte ASCII code indicating read start column number.

(Example) From the 3rd column = 003 (30H, 30H, 33H)

M1M2M3 : 3-byte ASCII code indicating number of columns to be read.

(Example) 50 columns = 050 (30H, 35H, 30H)

Note:

N1N2N3 and M1M2M3 cannot be omitted as 6-byte fixed length data.

10-F EA Mode (Variable Length Output Command for Automatic Density Distinction)

[Explanation]

The data format is the same as the one in the E mode.

This command is for automatically distinguishing mark density for one column. When there are several marks, it cancels light-colored marks of larger density difference than the set difference and outputs marks of smaller density difference than the set difference. Since the density difference is set at 01 by default, the darkest mark data is output in this case. Density difference between a dark mark and the next darker mark to be canceled can be set using the DC3 DD command.

Separators like STX and ETX can be added using the DC4 command.

Note: Relationship with sensitivity level setting

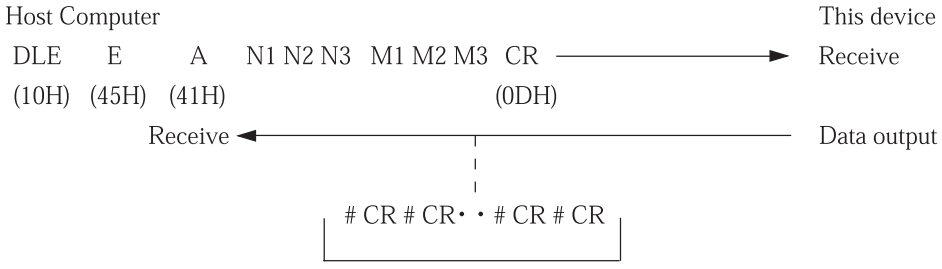
When there is only one mark, the existence of a mark is distinguished according to the preset sensitivity level.

When there are several marks, density differences are compared among marks of density more than the preset sensitivity level.

Marks of density less than the preset sensitivity level are canceled.

Note: When there are several marks of the same density level, data is also output in a plural form.

[Format]



Data of X+1 bytes a column x M1M2M3 columns

X + 1: 1-byte variable length data of number of marks + "CR"

N1N2N3 : 3-byte ASCII code indicating read start column number.

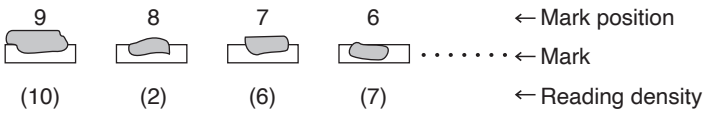
(Example) From the 3rd column = 003 (30H, 30H, 33H)

M1M2M3 : 3-byte ASCII code indicating number of columns to be read.

(Example) 50 columns = 050 (30H, 35H, 30H)

Note: N1N2N3 and M1M2M3 cannot be omitted as 6-byte fixed length data.

[Example]



When reading sensitivity = 3 and density difference = 4

Marks of reading sensitivity 3 or less are cancelled and the set density of 4 is subtracted from the maximum density.

In this example, the density setting of 4 is subtracted from the maximum reading density of 10. Accordingly, marks of reading density 6 (10 - 4 = 6) or less are cancelled.

This outputs data at mark positions 9 and 6.

10-G ED Mode (Variable Length Output Command with Density Data)

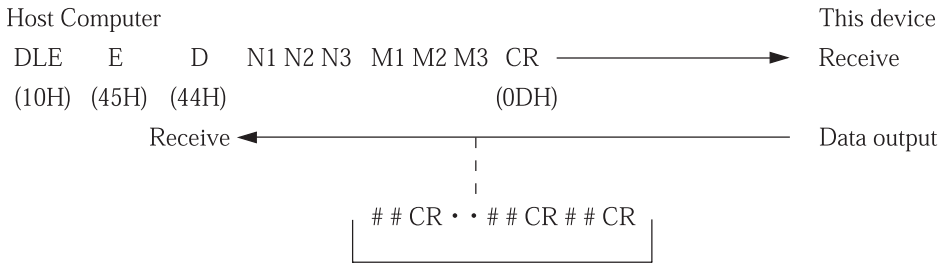
[Explanation]

The data format is the same as the one in the E mode.

One byte indicating density data is added after each mark data to output it in two byte units.

Separators like STX and ETX can be added using the DC4 command.

[Format]



Data of number of marks x 2 bytes + CR a column x M1M2M3 columns

N1N2N3 : 3-byte ASCII code indicating read start column number.

(Example) From the 3rd column = 003 (30H, 30H, 33H)

M1M2M3 : 3-byte ASCII code indicating number of columns to be read.

(Example) 50 columns = 050 (30H, 35H, 30H)

Note:

N1N2N3 and M1M2M3 cannot be omitted as 6-byte fixed length data.

A column without a mark is handled as space CR(20H, 0DH).

[Example]

When there are a mark of density level 2 at position 9 and one of density level 3 at position 1, data of one column to be sent from the device is as follows:

HEX code	:	(39H)	(32H)	(31H)	(33H)	(0DH)
Data	:	9	2	1	3	CR
		Mark	Density	Mark	Density	

Density information output data

Density level	:	1	2	・・・	10	11	12	13	14	15	16
Output data	:	1	2	・・・	:	;	<	=	>	?	@
ASCII code	:	(31H)	(32H)		(3AH)	(3BH)	(3CH)	(3DH)	(3EH)	(3FH)	(40H)

* In the order of ASCII code

In the SR-307 compatible mode, the density levels of 1 to 8 are output.

10-H ES Mode (Variable Length Output Command by Density and Mark Data)

[Explanation]

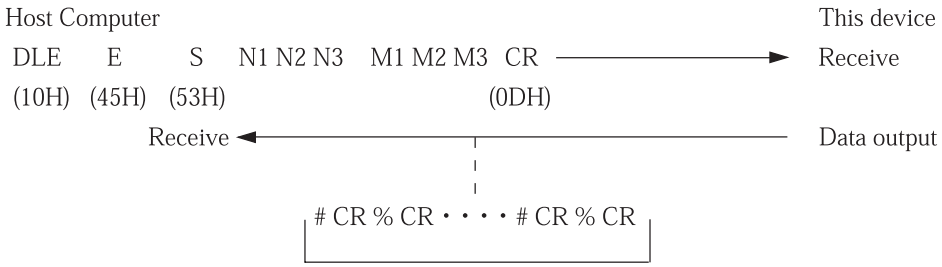
The data format is the same as the one in the E mode.

This command is for outputting mark and density data separately.

The density data format is also the same as the one in the ED mode.

Separators like STX and ETX can be added using the DC4 command.

[Format]



Data of number of marks + CR + number of marks + CR a column x M1M2M3 columns

(mark data) (density data)

N1N2N3 :3-byte ASCII code indicating read start column number.

(Example) From the 3rd column = 003 (30H, 30H, 33H)

M1M2M3 :3-byte ASCII code indicating number of columns to be read.

(Example) 50 columns = 050 (30H, 35H, 30H)

Note:

N1N2N3 and M1M2M3 cannot be omitted as 6-byte fixed length data.

A column without a murk is handled as space CR space CR (20H, 0DH, 20H and 0D).

[Example]

When there are a mark of density level 2 at position 9 and one of density level 3 at position 1, data of one column to be sent from the device is as follows:

HEX code	:	(39H)	(31H)	(0DH)	(32H)	(33H)	(0DH)			
Data	:	9	1	CR	2	3	CR			
		(Mark data)			(Density data)					

Density information output data

Density level	:	1	2	・・・	10	11	12	13	14	15	16
Output data	:	1	2	・・・	:	;	<	=	>	?	@
ASCII code	:	(31H)	(32H)		(3AH)	(3BH)	(3CH)	(3DH)	(3EH)	(3FH)	(40H)

* In the order of ASCII code

In the SR-307 compatible mode, the density levels of 1 to 8 are output.

10-I G Mode (EBCDIC Code Convert and Output Command)

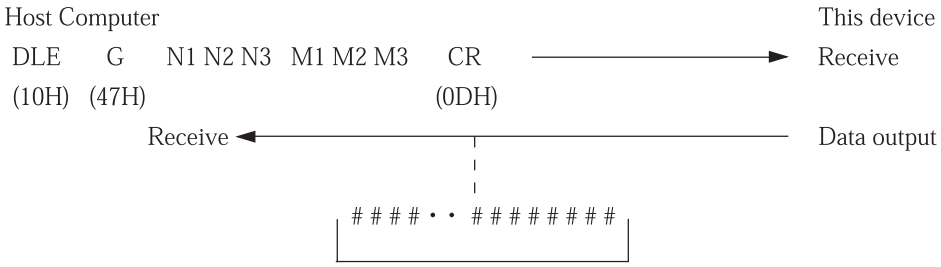
[Explanation]

This command is for reading EBCDIC-based punched hole codes of one column and converting the codes into 1-byte ASCII codes to output them.

This device outputs a space when a mark position does not agree with the EBCDIC code or when no mark is detected.

Separators like STX and ETX can be added using the DC4 command.

[Format]



Fixed length of 1 byte a column x M1M2M3 columns

N1N2N3 :3-byte ASCII code indicating read start column number.

(Example) From the 3rd column = 003 (30H, 30H, 33H)

M1M2M3 :3-byte ASCII code indicating number of columns to be read.

(Example) 50 columns = 050 (30H, 35H, 30H)

Note:

N1N2N3 and M1M2M3 cannot be omitted as 6-byte fixed length data.

10-J B Mode

[Explanation]

This command is for outputting data in one specified column in the A mode format after indicating a certain column.

[Format]

DLE	B	CR	NI N2	CR
(10H)	(42H)	(0DH)		(0DH)

N1N2 .... Specifies a certain column.

10-K D Mode

[Explanation]

This command is for outputting data in one specified column in the C mode format after indicating a certain column.

[Format]

DLE	D	CR	NI N2	CR
(10H)	(44H)	(0DH)		(0DH)

N1N2 .... Specifies a certain column.

10-L F Mode

[Explanation]

This command is for outputting data in one specified column in the E mode format after indicating a certain column.

[Format]

DLE	F	CR	NI N2	CR
(10H)	(46H)	(0DH)		(0DH)

N1N2 .... Specifies a certain column.

10-M Other Commands

-1 ENQ Command (Error Status Output Command)

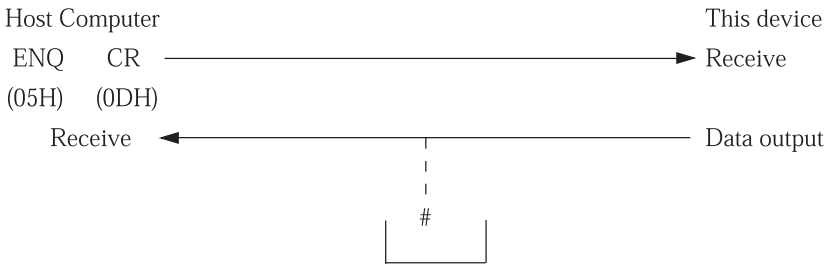
[Explanation]

This command is for outputting the status after card feeding.

The data are of 1-byte fixed length ASCII codes.

Separators like STX and ETX can be added using the DC4 command.

[Format]



Error status

For error statuses, see 9-B-2.

-2 Timing Mark Count Check Commands

ENQ T Command (Read Area Count Output Command)

[Explanation]

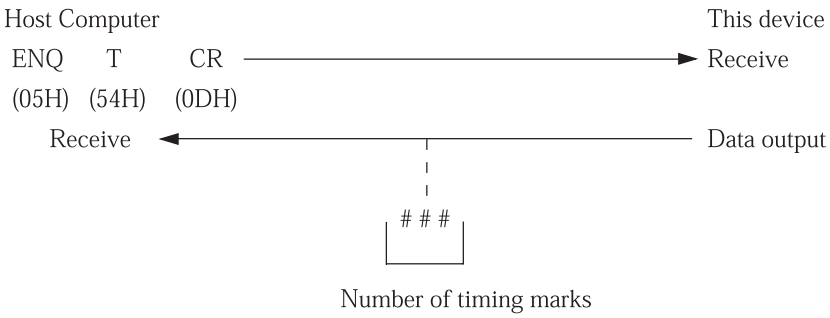
This command is for returning the number of read timing marks.

Whether a certain record has a different timing mark count or not can be checked by checking the number of timing marks after the card feed command (? command) is issued.

The data are of 3-byte fixed length ASCII codes.

Separators like STX and ETX can be added using the DC4 command.

[Format]



Number of timing marks

Example

When the number of timing marks is "64", "064" data is output.

Note:

In the case of the mark-to-mark type, the contents of data vary for each mode.

SR-450 (SR410/430 compatible) mode : Number of read areas

SR-307 compatible mode : Number of timing marks

-3 Sensor Status Check Commands

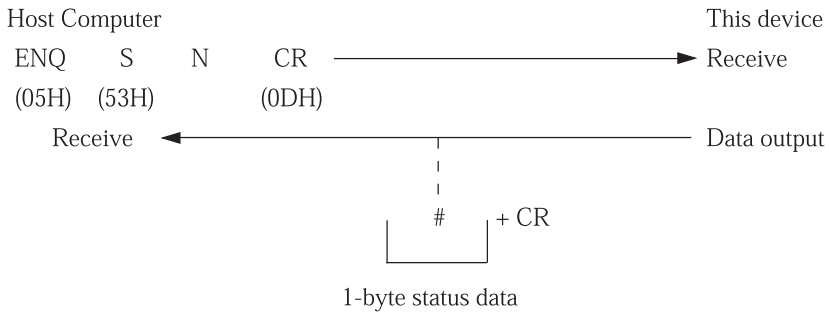
ENQ S Command (Sensor Status Inquiry Command)

[Explanation]

This command is for returning the present status of the card sensor. (The existence of a card at each sensor position can be detected using this command.)

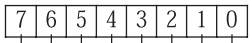
The data is of a form of 1-byte ASCII numeric code + CR. "1" is returned when a card is detected or "0" when no card is detected.

[Format]



N is a 1-byte ASCII code indicating the sensor number. 1-byte data indicating the status of each sensor by bit is returned when N is 0 or the status of a specified sensor when N is not 0.

When N = 0



Bit	Signal	Status control
0	Sensor S1	0: Card available, 1: Card not available
1	Sensor S2	
2	Sensor S3	
3	Sensor S4	
4	DF sensor	
5	Cover open	0: CLOSE 1: OPEN
6	Not used	1 (always 1)
7	Not used	0 (always 0)

When N ≠ 0: The sensor is turned on when status data = 1 or off when status data = 0

N = 1 (31H): Sensor S1
2 (32H): Sensor S2
3 (33H): Sensor S3
4 (34H): Sensor S4
5 (35H): DF sensor
6 (36H): Cover open
(0: Close, 1: Open)

① Roles of sensors

Sensor S1 : Located at the card hopper and detects that cards have been set.

Sensor S2 : Located at the card feeding port and detects that card feeding has started.

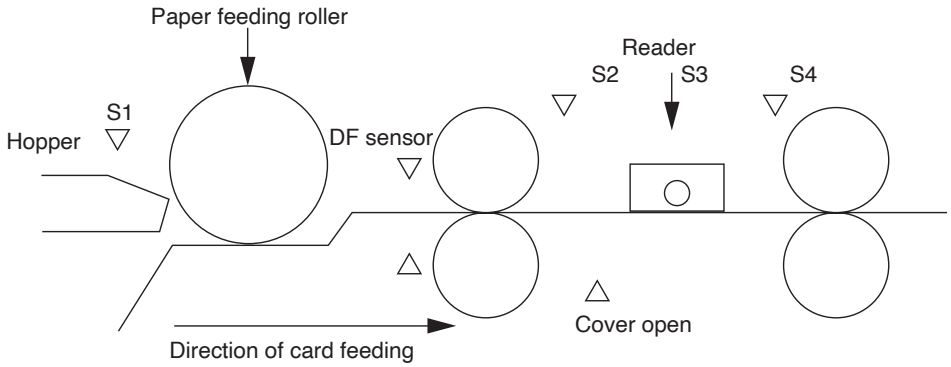
Sensor S3 : Located at the reader and reads data.

Sensor S4 : Located at the card ejector and detects that cards have been ejected.

DF sensor : Located between S1 and S2 and detects double-feeding.

Cover open : Detects whether the top cover is open or not.

② Sensor position



10-N SR-305 Compatible Command

[Explanation]

The SR-305 (SR-305S) type is equipped with data transfer modes of A, B, C, D, E, F, G and H, which are also available for this device.

For details, refer to the SR-305 operation manual.

11. Cleaning and Service Schedule

11-A Cleaning

Clean the rollers, reading lens and sensors since various malfunctions can occur if they are stained.

Warning

- Do not spray any materials containing a inflammable gas or liquid on the device and be sure to keep these kinds of materials away from the device.
  Use a cleaning cloth with a suitable amount of cleaning liquid to wipe off well, after removing the power plug from the outlet and the device has cooled off.
- When doing maintenace, be sure to remove the power plug from the outlet.

(1) Cleaning of rollers

After feeding 5,000 cards, a large amount of cards, or carbon paper, gently wipe the rollers with a clean cloth slightly wetted with disinfectant alcohol (ethanol).

If the rollers are stained, the stains may rub off onto cards or a malfunction may occur.

(2) Cleaning of reading lens

Gently wipe the lens on the reader with a clean cloth slightly wetted with disinfectant alcohol (ethanol). (Once a month or after every 5,000 card feeding.)

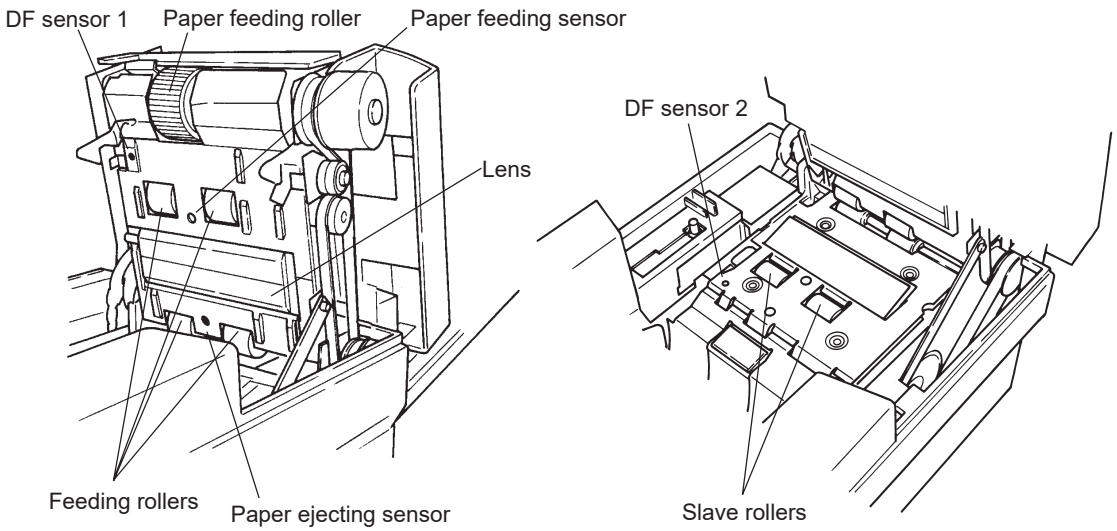
If the reading lens is stained, a reading error may occur.

(3) Cleaning of various sensors

Gently wipe the sensor part with a clean cloth containing a little diluted alcohol sanitizer (ethanol). (Once a month or after every 5,000 card feeding.)

Adhesion of dirt (such as paper dust) on the sensor part causes erroneous detection.

* Diluted alcohol sanitizer is the ratio of alcohol (ethanol) 1 to tap water 5.



(4) Cleaning procedure

1) Turn the power off and remove the power cord from the outlet.

2) Lower the hopper and open the top cover.

Opening method

(1) Raise the lock lever toward you to unlock the cover.

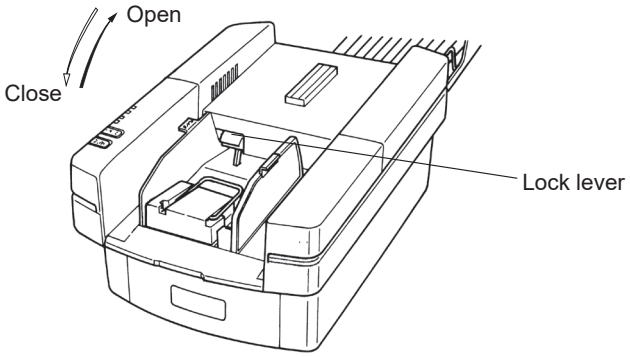
(2) Pressing up the top cover away from you holds the cover automatically.

3) Clean the internal parts.

4) Close the top cover.

Closing method

Slowly lower the cover toward you until it is locked.



(5) When the device is not in use for long periods, insert the paper feeding roller protection card between the paper feeding roller and the separation pad to prevent the roller material from deteriorating.

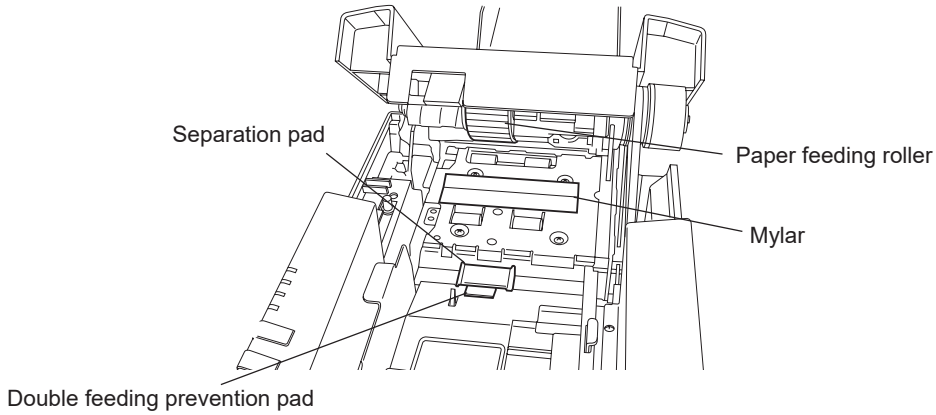
11-B Service Schedule

Spare or consumption parts are required to be regularly changed in order to use this device safely and comfortably.

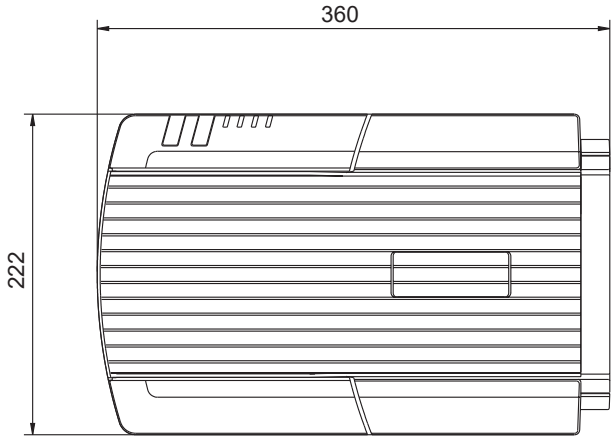
Please make contact with the distributor when they will become a time to be changed.

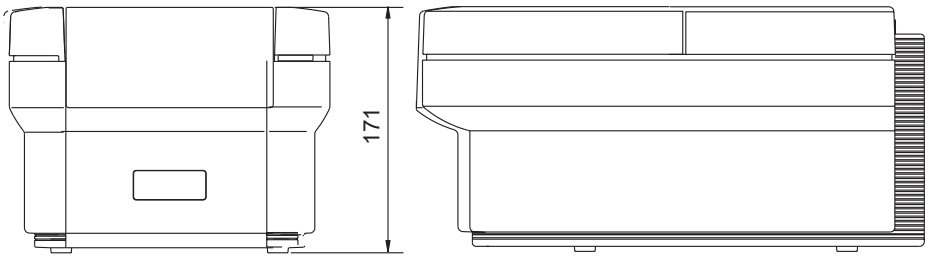
Part name	Time of change (Number of counter)
Paper feeding roller	200,000 or 3 years
Separation pad	200,000 or 3 years
Mylar (two kinds)	100,000 or 3 years
Double feeding prevention pad	200,000 or 3 years

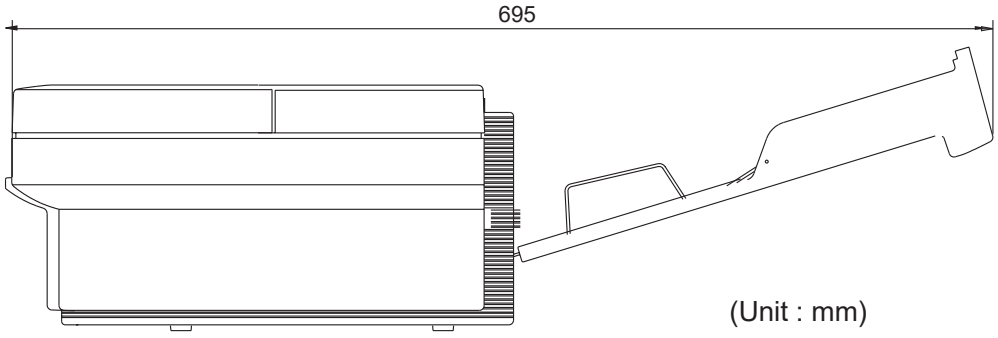
*A change of the above parts depends on condition of the device.



12. External Views







(Unit : mm)

13. Appendix

13-A Card creation reference

(1) Overall dimensions of card

	Width	Length
Standard-sized card	82.55 mm	187.32 mm
Postcard-sized card	105 mm	148 mm
Long-sized card	82.55 mm	304.8 mm
Card of other size	82.55 ~ 110.0 mm	150 ~ 304.8 mm

For details of dimensions of cards, refer to the reference drawing in 13-A-(6).

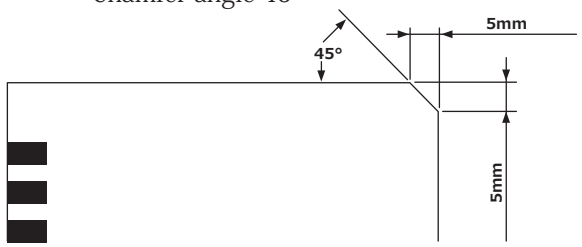
*Cut corners and round corners

They help you to easily check if paper is placed in the right direction, and help you to manage paper and keep it orderly.

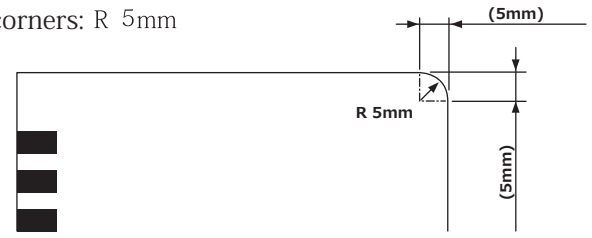
Cut paper corners straight or rounded according to the specifications shown below.

Straight cut corners: standard 6mm or less.

Chamfer angle 45°



Round corners: R 5mm



(2) Weight and thickness

	Standard-sized card	Postcard-sized card , Long-sized card
Kg (ream weight)	72	90 ~ 135
g/m² (grams per sheet)	83.8	104.7 ~ 157
mm (thickness)	0.11	0.13 ~ 0.19

(3) Paper quality

OCR paper, Wood free paper compliant to “JIS X 9004”

(4) Printing (printing surrounding mark fields)

① Near-infrared sensor (for pencil marks)

i. Printing of marking frames and dotted lines: Print at a PCS value of 0.15 or below. (The black backing method shall be employed for measurement.)

ii. Printing of timing marks and ID marks : Print using ink with a PCS value of 0.85 or higher.
*PCS values are measured at a spectral band of B900 with a read sensor with a wavelength of 940 nm.

② Visible light sensor (for pencil or ball-point pen marks)

i. Printing of marking frames and dotted lines: Print at a PCS value of 0.15 or below.(The black backing method shall be employed for measurement.)

ii. Printing of timing marks and ID marks : Print using ink with a PCS value of 0.85 or higher.
*PCS values are measured at a spectral band of B900 with a read sensor with a wavelength of 660 nm.

(5) Printing position accuracy

Parallelism : Adjust printing parallelism for timing marks and data marks 0.2 mm or less based on the cutting edge of the timing mark side.

Perpendicularity : Adjust printing perpendicularity for timing marks and data marks within ± 0.2 mm based on the cutting edge of the timing mark side.

Other : Adjust to ± 0.2 mm or less of specified measurements unless otherwise specified.

(6) Clear areas

Printing is forbidden for the areas from ① to ⑤ below. Do not attempt to print in any colors except the dropout colors (PCS value is 0.15 or below).

① Areas between timing marks and between the top end (bottom end) timing mark and the top end (bottom end) timing mark.

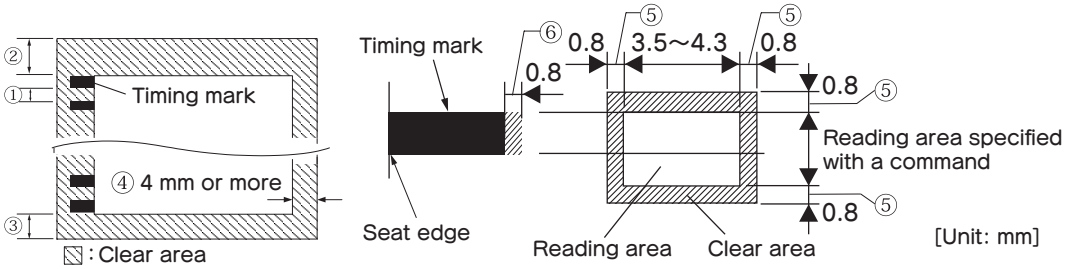
② Top margin : Area between the sheet end to the first timing mark (9 mm or more).

③ Bottom margin : Area between the sheet end to the first timing mark (9 mm or more)

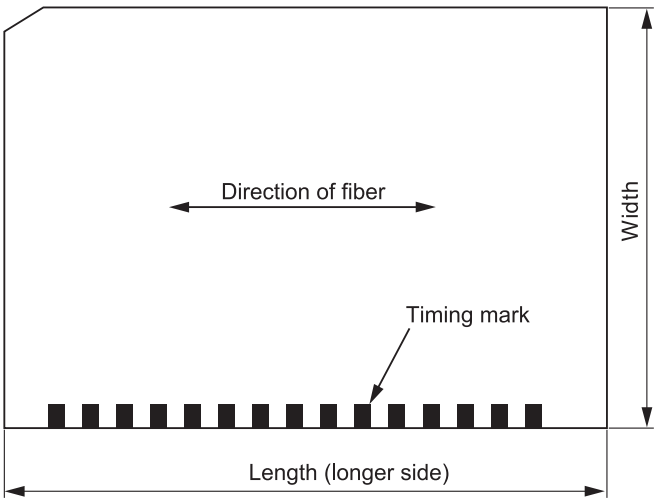
④ Side margin : Area of 4 mm in the opposite side of the sheet timing mark.

⑤ Area of 0.8 mm around the reading area and area of 0.8 mm from the ends of longitudinal side of the timing mark.

*The top margin is 5 mm or more and the bottom margin is 6 mm or more for an Timing mark direct-under type.



(7) Direction of paper grain
Feed paper in the direction of its grain to eliminate curling.



Note : When using carbon paper, design it so as not to allow the pasting position to overlap the end of the card feeding direction.

(8) Black ink printing
Descriptions, etc. can be printed in areas clear areas. However, never print anything at PCS 0.15 or more other than timing marks in timing mark columns from the top edge of sheet to the bottom edge on either side of the paper.

(9) Printing on back surface

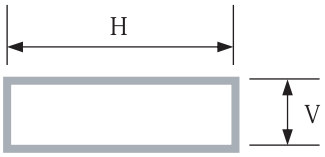
You can print on the back surface except in clear areas. However, do not print at PCS exceeding 0.15 in clear areas on the front surface in case of bleeding through from the back.

(10) ID mark

Set an ID mark for identification as necessary.
Size : Vertical (V) 0.8 to 1.5 mm x Horizontal (H) 3.5 to 4.3 mm
Caution) Must follow the regulation below.
(W>V+Vspx2, Refer to the figure in P59)
Reading darkness : PCS 0.85 or higher
Angle : ± 5 degree or less
(against the line perpendicular to the standard side)

(11) Mark frame

Frame size should be smaller than the reading area in various reading methods (direct under type, timing control type, and mark to mark type).
Recommended sizes are as follows.
Rectangles : Vertical(V)0.8 to 1.5 mm Horizontal(H)3 to 4.3 mm



*Printing color: print at PCS 0.15 or less in dropout color.

(12) Printing of timing mark

	Direct-under type		Control type	Mark-to-mark type
	Standard-sized card	Card of other size		
Timing mark width (W)	1.0±0.05 mm	2.0 ～ 10 mm	0.89±0.05 mm	1.0±0.05 mm
Timing mark length (L)	3.0±0.1 mm			
Timing mark pitch (P)	2.21 mm	Min. 3.5 mm	Min. 4.17 mm	Min. 2.5 mm
Blank between timing marks (D)	1.21 mm	Min. 1.5 mm	Timing mark width min. ×2+1.5 mm	1.5 ～ 30.0 mm
Number of timing marks	min Four points			
Reference drawing in 15－A (14)	①	②	③	④

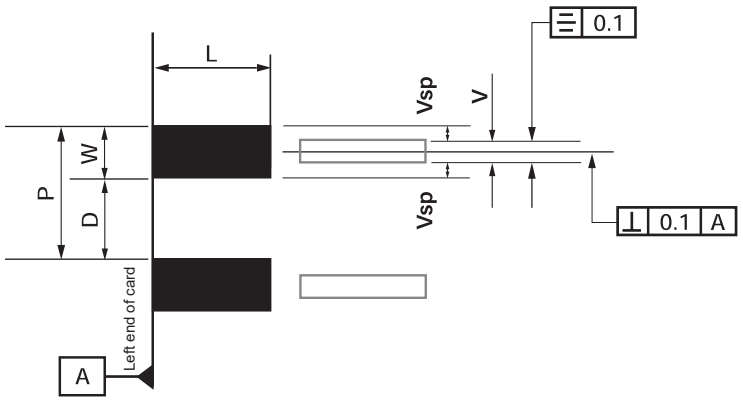
* For postcard-sized cards, use the timing mark control type.

*Details of positioning timing mark and mark frame

【 Timing mark direct-under type 】

W ＞ V+Vsp(0.5mm以上)×2

*This regulation cannot be applied to standard-sized card.
Pay attention not to fill in a mark over the frame.

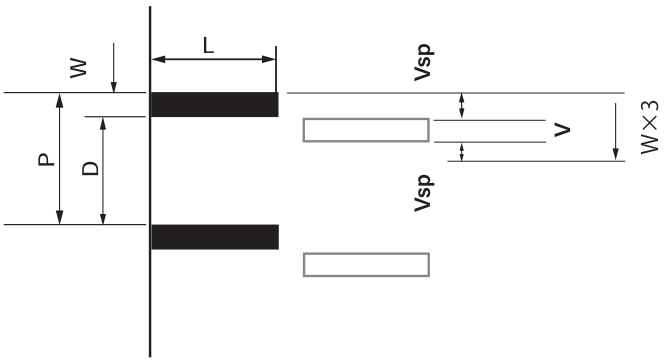


【 Timing mark control type 】

W×3 ＞ V+Vsp(0.5mm or more)×2

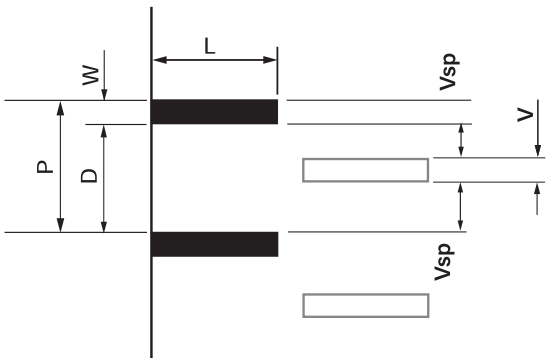
and

P ＞ W×3+1.5mm



【 Timing mark-to-mark type 】

D ＞ V+Vsp(0.5mm or more)×2

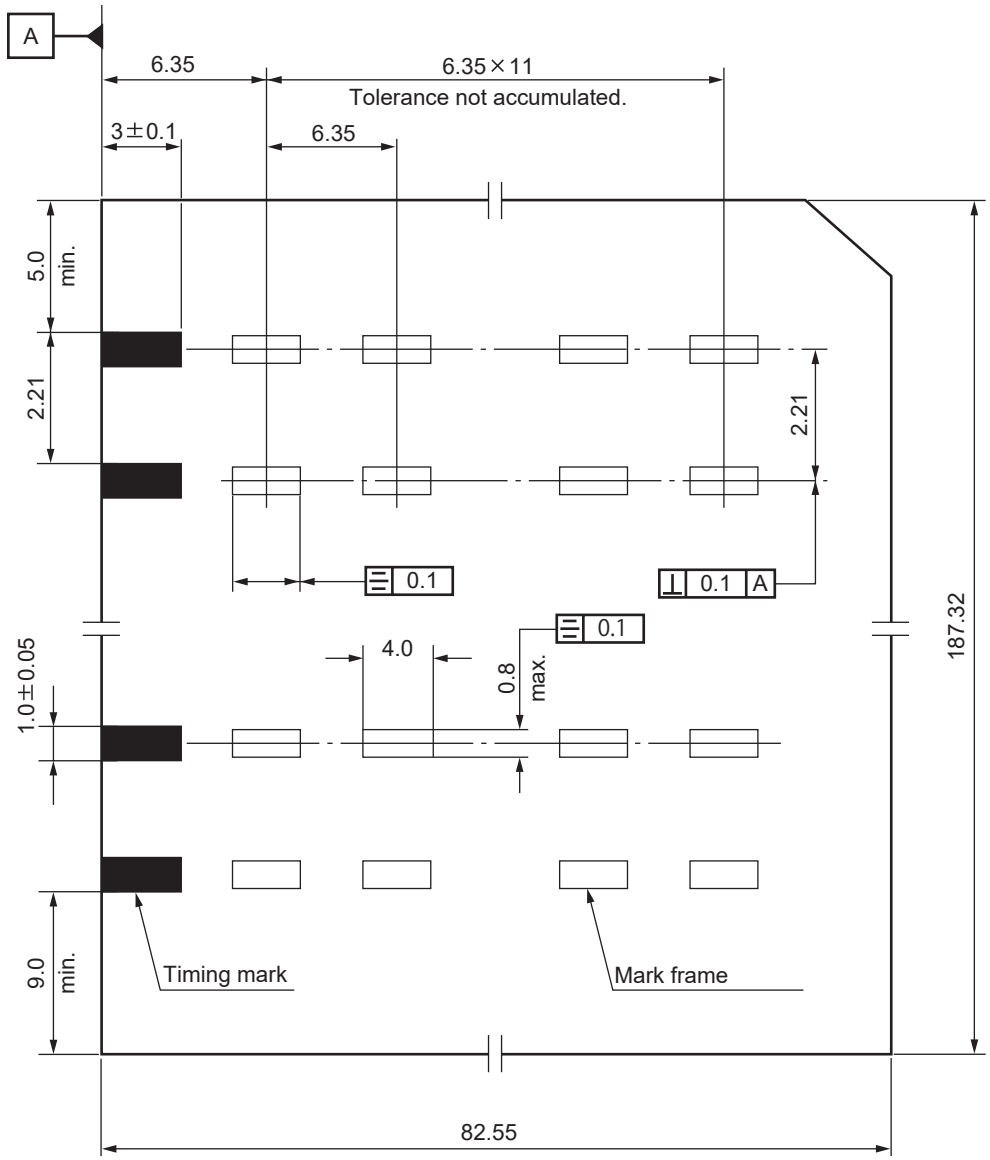


(13) Required number of timing marks

Minimum 4 timing marks required, otherwise it will be error.

(14) Reference Drawings

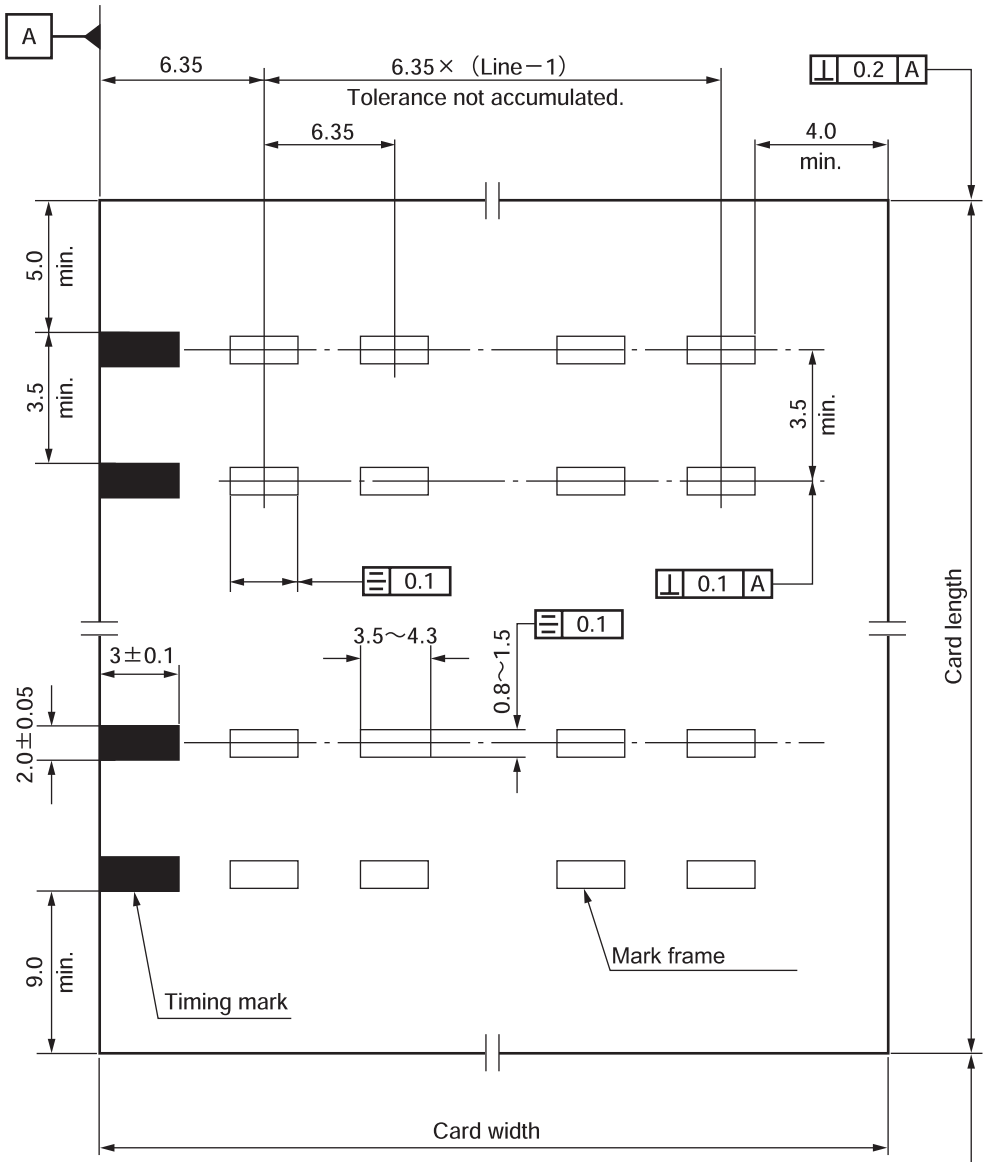
① Timing mark direct-under type (standard-sized card)



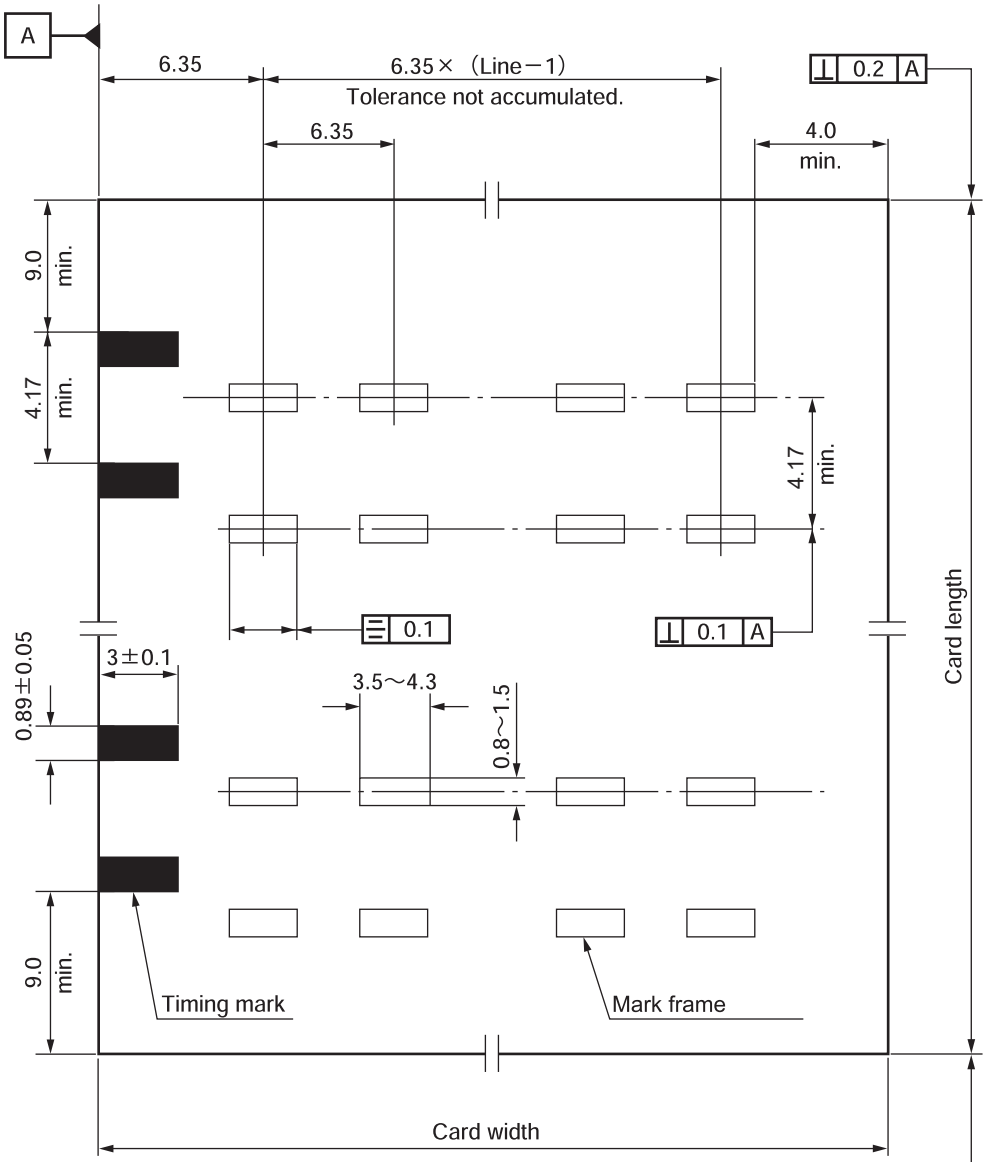
General tolerance ±0.20

Unit: mm

② Timing mark direct-under type



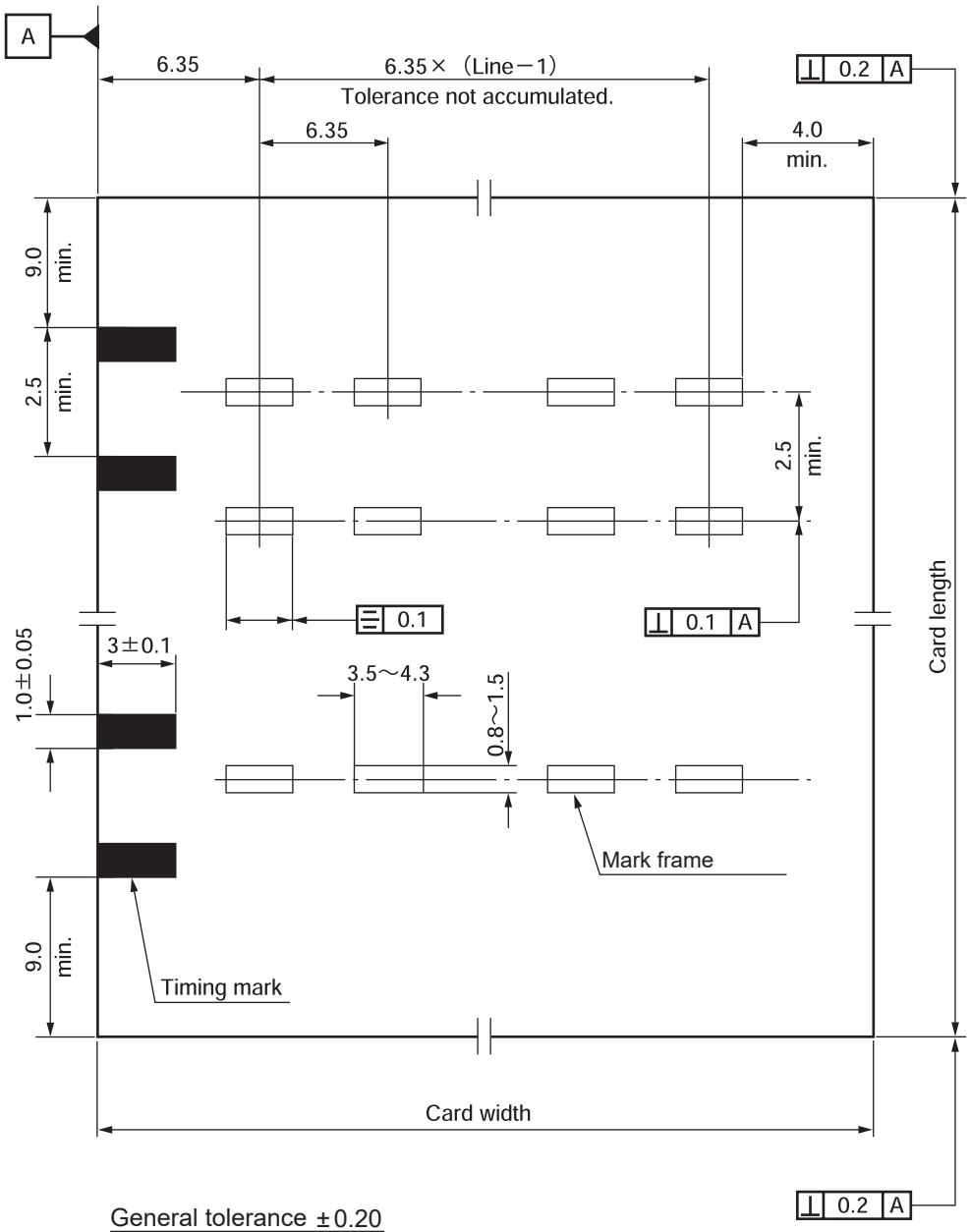
③ Timing mark control type



General tolerance ±0.20

Unit: mm

④ Timing mark-to-mark type



General tolerance ±0.20

Unit: mm

13-B Code Tables

(1) ASCII code

Lower bit \ Upper bit		0 000	1 001	2 010	3 011	4 100	5 101	6 110	7 111
0	0000	NUL	DLE	SP	0	@	P		p
1	0001	SOH	DC1	!	1	A	Q	a	q
2	0010	STX	DC2	”	2	B	R	b	r
3	0011	ETX	DC3	#	3	C	S	c	s
4	0100	EOT	DC4	$	4	D	T	d	t
5	0101	ENQ	NAK	%	5	E	U	e	u
6	0110	ACK	SYN	&	6	F	V	f	v
7	0111	BEL	ETB	’	7	G	W	g	w
8	1000	BS	CAN	(	8	H	X	h	x
9	1001	HT	EM	)	9	I	Y	i	y
A	1010	LF	SUB	*	:	J	Z	j	z
B	1011	VT	ESC	+	;	K	〔	k	{
C	1100	FF	FS	,	<	L	／	l	|
D	1101	CR	GS	−	=	M	〕	m	}
E	1110	SO	RS	.	>	N	↑	n	～
F	1111	SI	US	／	?	O	←	o	DEL

(2) ASCII/decimal notation correspondence table

Code	ASCII hexadecimal number	Decimal notation	Code	ASCII hexadecimal number	Decimal notation
ENQ	05H	5	E	45H	69
CR	0DH	13	F	46H	70
DEL	10H	16	G	47H	71
DC1	11H	17	H	48H	72
DC2	12H	18	I	49H	73
DC3	13H	19	J	4AH	74
DC4	14H	20	K	4BH	75
Space	20H	32	L	4CH	76
0	30H	48	M	4DH	77
1	31H	49	N	4EH	78
2	32H	50	O	4FH	79
3	33H	51	P	50H	80
4	34H	52	Q	51H	81
5	35H	53	R	52H	82
6	36H	54	S	53H	83
7	37H	55	T	54H	84
8	38H	56	U	55H	85
9	39H	57	V	56H	86
A	41H	65	W	57H	87
B	42H	66	X	58H	88
C	43H	67	Y	59H	89
D	44H	68	Z	5AH	90

(3) EBCDIC punch code/ASCII code correspondence table

Character	Punched hole position	ASCII code	Character	Punched hole position	ASCII code
Space	None	20H	+	8, 6, Y	2BH
&	Y	26H	;	8, 6, X	3BH
-	X	2DH	>	8, 6, 0	3EH
^	X, Y	5EH	"	8, 7	22H
/	1, 0	2FH	?	8, 7, 0	3FH
0	0	30H	+	3, 0, Y	2BH
1	1	31H	A	1, Y	41H
2	2	32H	B	2, Y	42H
3	3	33H	C	3, Y	43H
4	4	34H	D	4, Y	44H
5	5	35H	E	5, Y	45H
6	6	36H	F	6, Y	46H
7	7	37H	G	7, Y	47H
8	8	38H	H	8, Y	48H
9	9	39H	I	9, Y	49H
&	7, 6	26H	J	1, X	4AH
:	8, 2	3AH	K	2, X	4BH
$	8, 2, Y	24H	L	3, X	4CH
!	8, 2, X	21H	M	4, X	4DH
#	8, 3	23H	N	5, X	4EH
.	8, 3, Y	2EH	O	6, X	4FH
$	8, 3, X	24H	P	7, X	50H
,	8, 3, 0	2CH	Q	8, X	51H
@	8, 4	40H	R	9, X	52H
<	8, 4, Y	3CH	S	2, 0	53H
*	8, 4, X	2AH	T	3, 0	54H
%	8, 4, 0	25H	U	4, 0	55H
'	8, 5	27H	V	5, 0	56H
(	8, 5, Y	28H	W	6, 0	57H
)	8, 5, X	29H	X	7, 0	58H
-	8, 5, 0	5FH	Y	8, 0	59H
=	8, 6	3DH	Z	9, 0	5AH

13-C Sample program

Sample program using Microsoft Visual Basic

(Sample program is contained in the accessory CD-ROM)

The sample program is designed to open and close a communion line, transmit data and control how to receive data of a fixed or variable length. Refer to this program for programming.

Note: We do not support communication of custom control software which but actually, delete that made by a third party.