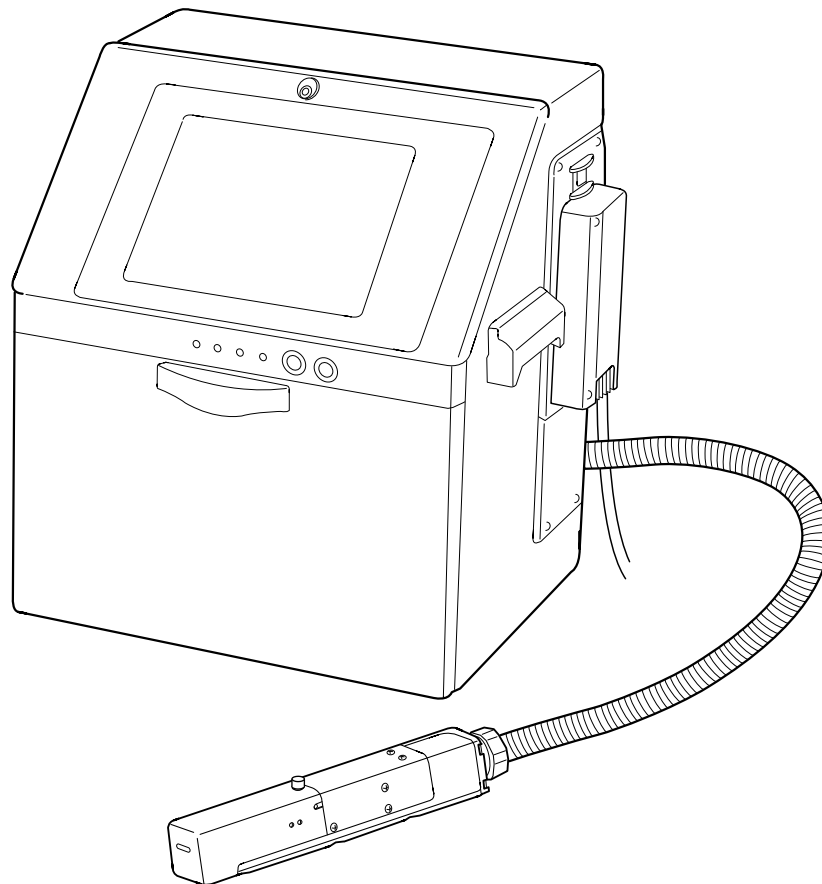


# Technical Manual

## INK JET PRINTER FOR INDUSTRIAL MARKING

# HITACHI Printer

## Model RX



Thank you for purchasing the Hitachi IJ Printer Model RX.

This printer employs a noncontact, ink-jet method to print onto a print target.

This instruction manual describes the basic operating procedures, maintenance procedures, and other detailed handling procedures of the Hitachi IJ Printer Model RX.

If the printer is improperly handled or maintained, it may not operate smoothly and may become defective or cause an accident. It is therefore essential that you read this manual to gain a complete understanding of the printer and use it correctly.

After thoroughly reading the manual, properly store it for future reference.



IF you changed the language of screen by mistake, see the chapter 7.8 "Selecting Languages".

# HITACHI









# SAFETY PRECAUTIONS

- Before using the printer, thoroughly read the following safety precautions for optimum printer use.
- You should observe the precautions set forth below in order to use the product properly and avoid endangering you or other persons or damaging property. For the purpose of clarifying the severity of injury or damage and likelihood of occurrence, the precautions are classified into two categories, WARNING and CAUTION, which both describe a hazardous situations that may arise if you ignore the precautions and perform an incorrect handling or operating procedure. The precautions in these two categories are both important and must therefore be observed without fail.

 <b>WARNING</b>	WARNING is used to indicate the presence of a hazard which may cause severe personal injury or death if the warning against performing an incorrect handling procedure is ignored.
 <b>CAUTION</b>	CAUTION is used to indicate the presence of a hazard which may cause personal injury or property damage if the warning against performing an incorrect handling procedure is ignored.

- If the warning in the CAUTION category is ignored, serious results may occur depending on the situation.
- After the manual has been read, it must be stored in such a location that all printer operation personnel can refer to it at all times.
- All the instructions set forth in this manual are important and must therefore be observed without fail.

## Pictograph Examples

	The  symbols are used to indicate precautions (including those related to potential warnings) to be observed. Detailed information is furnished by a picture within the symbol outline (a shock hazard is indicated by the example shown at left).
	The  symbols are used to describe prohibited actions. The details of a prohibited action are given by a picture within or near the symbol outline (the example shown at left dictates that you must keep flames away).
	The  symbols are used to describe required actions. Detailed instructions are given by a picture within the symbol outline (the example shown at left dictates that a ground connection must be made).

## Restrictions on Export

User hereby agrees not to export or re-export this product to any end-user who the user has reason to suspect may utilize the product for the design, development or reproduction of nuclear, chemical or biochemical weapons.

File management and USB management are carried out using eParts made from eSOL. Ethernet is the product name of Xerox Corporation in America.



# SAFETY PRECAUTIONS (Continued)



## WARNING

- Ensure that there is no flame- or arc-generating device around the printer.

The ink and makeup are both flammable and may cause fire.

Fire can be generated by matches, lighters, cigarettes, heaters, stoves, gas burners, welders, grinders and static electricity. Arcs may be generated from open-type relays, switches, and brush motors. Before handling the ink and makeup, remove static electricity from your body, peripheral equipment, and so on. In the interest of safety, position a dry-chemical fire extinguisher near the printer.



- Since the ink and makeup contain organic solvents, install the printer at an adequately ventilated location.

① Never install the printer in an enclosed space.

② Connect exhaust equipment to the printer in order to prevent it from filling with organic solvent vapor.

- Do not insert tweezers, a screwdriver, or any other metal article into the ink ejection hole in the end of the print head.

When the printer is ready to print, a high voltage (approximately 6 kV) is applied to the deflection electrode section in the print head.

Exercise caution to avoid electric shock, injury, and fire.



- Do not remove the outer covering.

A high voltage is applied to some sections of the printer.

Exercise caution to avoid electric shock and injury.

- Use an AC voltage of 100 to 120 V or 200 to 240 V  $\pm 10\%$  only and a power frequency of 50 or 60 Hz only.

If the above requirements are not met, the electric parts may overheat and burn, creating a risk of fire or electric shock.



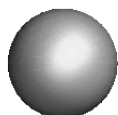
- Never drain the ink or makeup waste solution into a public sewer system.

Waste disposal must comply with all appropriate regulations. Consult the appropriate regulatory agency for further information.

- Exercise caution to avoid inadvertently disconnecting, forcibly pulling, or bending piping tubes.

Since the ink and makeup in some portions of piping tubes are pressurized, they may splash into your eyes or mouth or onto your hands or clothing.

If any ink or makeup enters your eyes or mouth, immediately flush with warm or cold water and consult a physician.



# SAFETY PRECAUTIONS (Continued)



## WARNING

- While the printer is operating, do not look into the ink ejection hole in the end of the print head.  
Ink or makeup may enter your eyes or mouth or soil your hands or clothing. If any ink or makeup enters your eyes or mouth, immediately flush with warm or cold water and consult a physician.



- Before servicing the printer, be sure to stop the ink ejection.  
Because ink or makeup may splash into your eyes or mouth or onto your hands or clothing. If any ink or makeup enters your eyes or mouth, immediately flush with warm or cold water and consult a physician.
- If an earthquake, fire, or other emergency occurs while the printer is engaged in printing or just turned on, press the Main power switch to turn off the power.
- The printer must be managed in compliance with all appropriate regulations.



Read and understand the appropriate Material Safety Data Sheet (MSDS) before using any ink or makeup.

- Use Hitachi approved consumables and periodic replacement parts.  
Using products that are not designated by Hitachi could cause a failure in certain functions.

- Warning for Mercury



-- THE LAMP IN THIS PRODUCT CONTAINS MERCURY.  
RECYCLE OR DISPOSE OF IT ACCORDING TO APPLICABLE ENVIRONMENTAL LAWS.

For Recycling and Disposal information, contact your government agency, the Electronic Industries Alliance at [www.eiae.org](http://www.eiae.org), and/or [www.lamprecycle.org](http://www.lamprecycle.org) (in the US), or the Electronic Product Stewardship Canada at [www.epsc.ca](http://www.epsc.ca) (in Canada). For more information, call 1-800-HITACHI (1-800-448-2244) (in the US).



# SAFETY PRECAUTIONS (Continued)



## WARNING

- When charging a refill of ink or makeup, exchanging ink, or otherwise handling ink or makeup, take enough care not to spill ink or makeup. If you spill any ink or makeup by mistake, wipe it off neatly and promptly with wiping paper or something similar. Do not close the maintenance cover until you make sure that the portion you have just wiped is completely dry.

You must pay particular attention when you have spilled ink or makeup inside the printer and it is not completely dry. Why? Because vapors of ink or makeup will stay inside the printer and may catch on or cause a fire.

If you find it hard to wipe the printer when it is turned on, stop it with the maintenance cover open. Power it down, and then wipe it off again.

- If you wish to clean the casing of the printer with wiping paper impregnated with makeup, be sure to do so with the power off.

Attempting to clean it when the power is on will cause makeup or vapors of makeup to enter the printer, possibly catching on or causing a fire.

When the cleaning is over, open the maintenance cover and make sure that no makeup has entered and no vapors remain inside.

- Should you find a leak of ink or makeup inside the printer while the printer is running or being maintained, wipe it off promptly with wiping paper or something similar. Then, with the maintenance cover open, stop the printer, power it down, and repair the leak.

Continuing operation with a leak of ink or makeup will cause an anomaly, resulting in abnormal printing.

Ink and makeup are flammable. They may therefore catch on or cause a fire.

- If you wish to receive ink particles in a beaker, for a printing test for example, use an electrically conductive beaker and connect the beaker securely to the ground.

Do not let the tip of the printing head enter the beaker.

Ink particles used for printing are electrically charged. An ungrounded beaker has a gradually rising charge, possibly catching on or causing a fire.

- Ensure that all electrical wiring, connections and grounding comply with applicable cords. Properly connect the printer to its dedicated ground. Complete the above procedure to avoid electrical shock hazards.

- When welding, keep enough space between the IJ printer and the welding work area to prevent the arc from starting a fire. Also, be sure to insulate the printhead and IJ printer frame to keep the welding current from flowing to the control section of the printer, and to make a separate ground connection for the printer.





# SAFETY PRECAUTIONS (Continued)



## CAUTION

- Only persons who have completed an operator training course for Hitachi IJP can operate and service the printer.  
If the printer is operated or serviced incorrectly, it may malfunction or break down.



- Do not attempt to make repairs for any purpose other than operation or maintenance.



- Since the ink and makeup contain organic solvents, observe the following handling precautions.
  - ① Secure adequate space for the ink/makeup handling area and printer installation site. At least 200 m<sup>3</sup> must be provided per print head. Ensure that adequate ventilation is provided.
  - ② When handling the ink or makeup, wear protective gloves and safety goggles to avoid direct skin contact. If the ink or makeup comes into contact with skin, wash thoroughly with soap and warm or cold water.
  - ③ When transferring the ink or makeup to or from a bottle, exercise caution to prevent it coming into contact with the printer or surrounding articles. If there is any spillage, immediately wipe it clean using a cloth moistened with makeup.



- Ink and makeup must be stored as flammable liquids. Storage must comply with local regulatory requirements. Consult the appropriate regulatory agency for further information.
- If extraneous noise enters the printer, it may malfunction or break down. For maximum noise immunity, observe the following installation and wiring precautions.
  - ① Ensure that 100 to 120 VAC or 200 to 240 VAC power cables are not bundled with other power supply cables.
  - ② Insulate the printer main body and print head so that they do not come into direct contact with the conveyor or other devices.
  - ③ If the employed print target detector is housed in a metal case, use a plastic mounting brace for the purpose of insulating the detector from the conveyor and other devices.
  - ④ Be sure that the print target detector wiring is not bundled together with other power supply cables.
- Please make sure the print status and print content are correct each time when you start operation of IJP.
- Please implement periodical checkup of print status in the process, even including during production.
- A touch panel is employed for data entry to operation screen. When manipulating the Touch panel, use only fingers. If the touch panel is operated with metal and/or sharp objects such as ball point pen, it may malfunction or break down.



# SAFETY PRECAUTIONS (Continued)

## FCC Notice

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. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment.

This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

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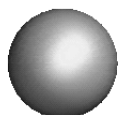
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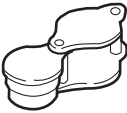
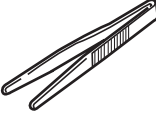



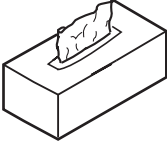
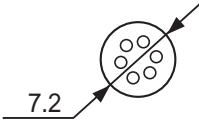
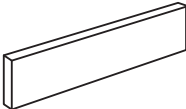
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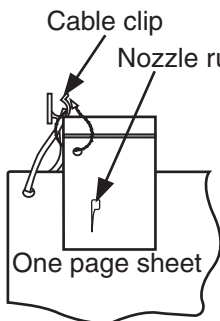
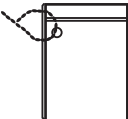


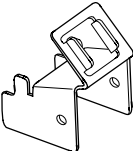
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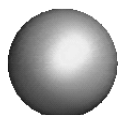
# 1. DELIVERED GOODS

●Unpack the equipment and check the delivered goods.

No.	Part Name	Qty	Product code.	Remarks
1	IJ printer body	1	-	
2	Instruction manual	1	-	
3	Technical manual	1	-	
4	One-page sheet	1	-	
5	Magnifying glass 	1	451274	Used in ink particles shape check, ink beam position check, etc.
6	Tweezers 	1	451412	Used when removing the orifice, etc.
7	Cleaning bottle 	1	451058	Filled with makeup and used in print head cleaning, etc.
8	Beaker with handle 	1	451410	Used in print head cleaning, ink replacement, etc.
9	Wide mouth bottle 	1	451126	Use to hold the waste liquid.
10	Wiping paper 	1	-	Use for wiping after print head cleaning, etc.
11	Nozzle seal plate 	3	451913	Orifice plate seal packing (spare part)
12	Cable seal 	3	-	Seal for power cable and ] external communications cable.

No.	Part Name	Qty	Product code	Remarks
13	Cable clip 	1	-	 <p>Cable clip Nozzle rubber seal One page sheet</p>
14	Plastic bag with zipper 	1	-	
15	Mini Filter 	1	451857	Recovery filter, Makeup filter (Spare parts)
16	Nozzle tool A 	1	451939	Used when removing the orifice.
17	Nozzle tool B 	1	451940	

Note “Part Name” and “Product code” when ordering the parts.



## 2. INSTALLING PRECAUTIONS

### WARNING

- **Ensure that there is no flame- or arc-generating device around the printer.**

The ink and makeup are both flammable and may cause fire.

Fire can be generated by matches, lighters, cigarettes, heaters, stoves, gas burners, welders, grinders and static electricity. Arcs may be generated from open-type relays, switches, and brush motors. Before handling the ink and makeup, remove static electricity from your body, peripheral equipment, and so on. In the interest of safety, position a dry-chemical fire extinguisher near the printer.



- **Since the ink and makeup contain organic solvents, install the printer at an adequately ventilated location.**

① Never install the printer in an enclosed space.

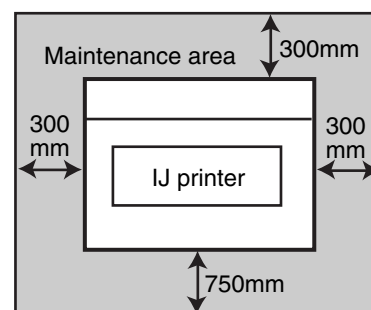
② Connect exhaust equipment to the printer in order to prevent it from filling with organic solvent vapor.

### CAUTION

- **The employed ink and makeup contain organic solvents. Furnish an adequate space for the ink/makeup handling area and printer installation site. A space of at least 200 m<sup>3</sup> must be provided per print head. Ensure that adequate ventilation is provided. Follow all regulation in your country.**



- (1) Provide a clearance around the IJ printer for daily operation, handling, and maintenance access (see the figure at right).
- (2) The print head needs to be cleaned with the makeup while the printer is operated and stopped (daily maintenance). Adopt a fixed structure in consideration of print head cover and print head removal.
- (3) Installation must be completed so that no vibration will be applied to the IJ printer main body, print head, or print head cable. If they are vibrated, print quality deterioration and print irregularity may be incurred (the maximum permissible vibration value is 1.96m/s<sup>2</sup>).
- (4) The IJ printer main body must be installed with a levelness error of not over  $\pm 1^\circ$ .
- (5) The IJ printer main body must be electrically insulated from the other equipment (conveyors, packing machines, etc.), photoelectric switches, and the rotary encoder.
- (6) The standard distance between the printing head and the object to be printed on is as indicated in the right-hand table. The smaller the clearance between the print head and print target, the smaller the character height and the better printing.
- (7) The IJ printer proper requires maintenance as the occasion may demand including replenishment of ink and makeup and replacement of filter.
- (8) If ambient humidity is 85 to 90%RH, you must purge inside of print head by air.  
It is necessary for dry-clean air, regulator for pressure of air and air filter.  
(Quantities of the air are 1L / minutes.)



Top view

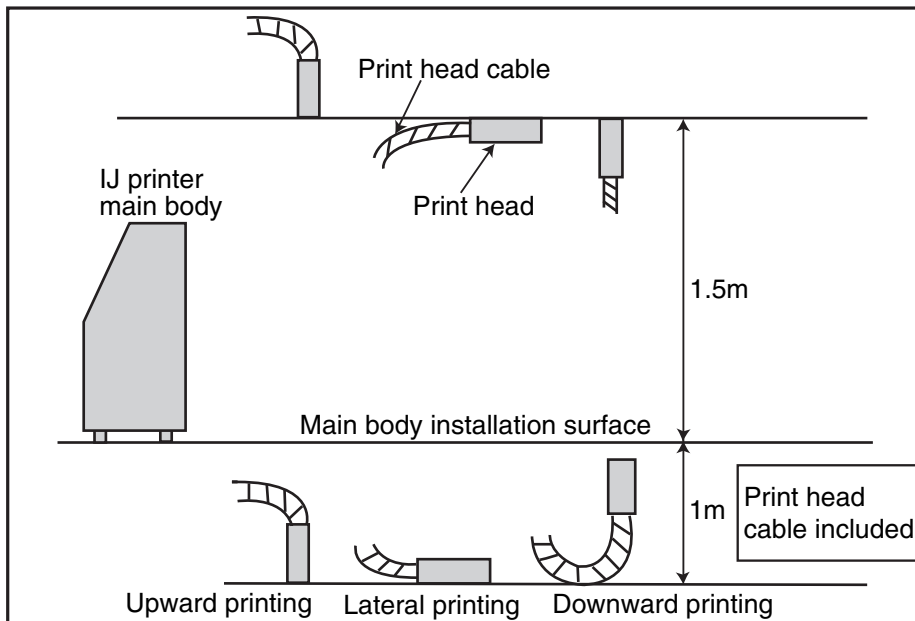
\* Leave a maintenance area of at least 20 cm for the upside of printer.

Distance between the printing head and the object to be printed on

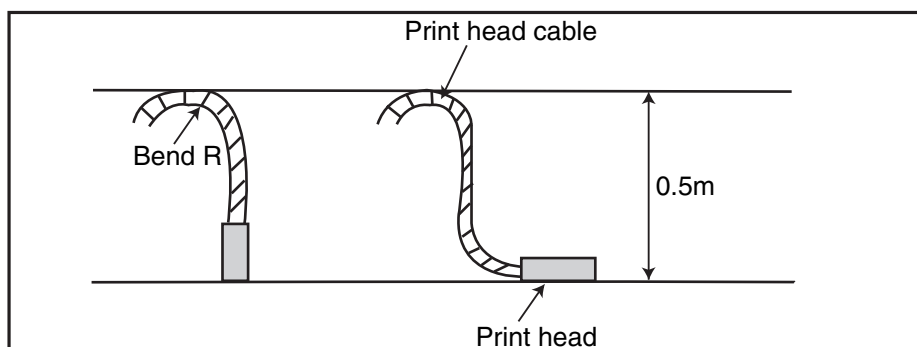
Nozzle diameter	Distance
65μm	10 to 30mm

(9) When installing the print head and print head cable, comply with the following conditions.

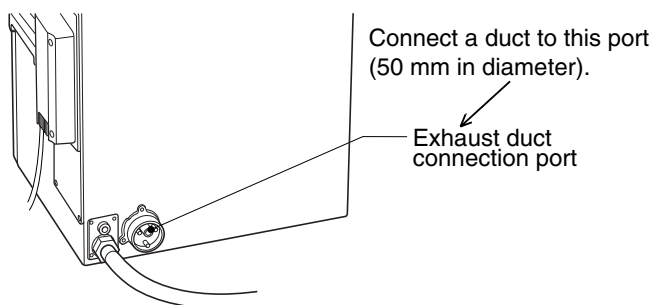
- ① When positioning the end of the print head above the printer main body installation surface, ensure that the distance between the end of the print head and the installation surface does not exceed 1.5 m.
- ② When positioning the end of the print head below the printer main body installation surface, ensure that the distance between the end of the print head and the installation surface does not exceed 1 m.



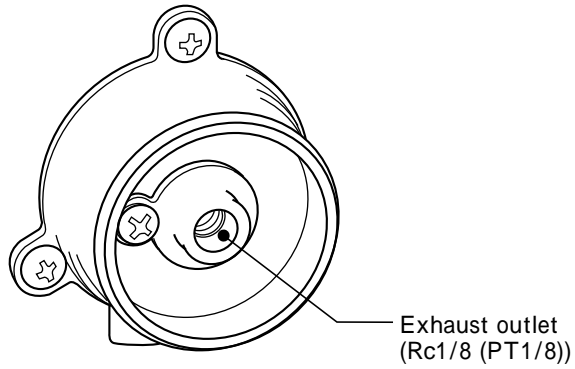
(10) When using the printer for upward or lateral printing, ensure that the rising print head cable upper end is positioned not more than 0.5 m above the print head.



- (11) If you fixed the print head, ensure that the minimum bend radius of the print head cable is at least 150 mm.
- (12) The ink stream may bend for some reason or other (due, for instance, to dirt). The facilities positioned in the direction of ink ejection should be partially covered as needed to avoid ink accumulation.
- (13) When connecting an exhaust duct to the printer, install a damper and adjust the wind velocity at the intake port to 0.3 to 0.5 m/s. (Use an anemometer for verification. If the wind velocity is too high, the makeup consumption increases.)



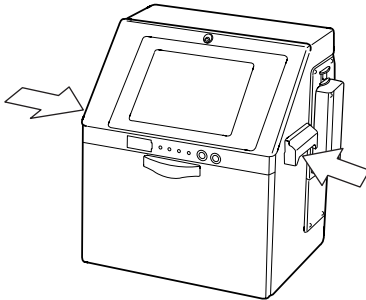
In case there is no space to place an exhaust duct, connect suitable length of extension tube to the exhaust-outlet (Rc1/8 (PT1/8)), and fix another side of the tube end at where an exhaust duct is placed.



(14) If you try to fix the print head with a magnetic substance (such as iron), the cover switch will malfunction resulting in an "Cover Open" error.

This, you must only use nonmagnetic resins or metals for fixing the print head.

(15) In the case of carrying the printer proper, use the handles in the drawing below.





## 3. INSTALLATION CHECK ITEMS

### 3.1 Print head air purge

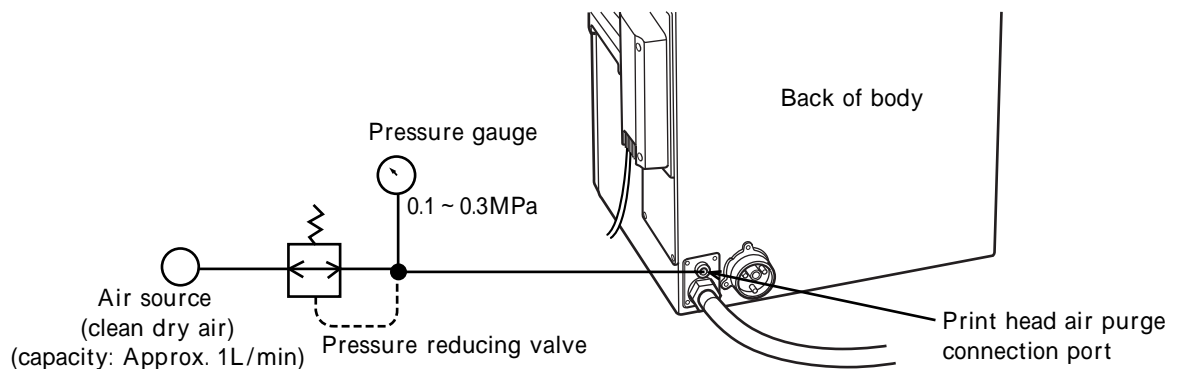
If the makeup remains in the electrode section after cleaning or if you use the IJ printer at a high humidity, moisture condensation may occur within the print head, causing leakage from the deflection electrode section. It is also important to remember that dust or splashed ink accumulation on the deflection electrode section may cause leakage. Performing the following air purge procedure for the print head interior is effective in preventing such leakage.

#### (1) Situations requiring an air purge

- ① When the printer is used in a highly humid place such as a beer or other beverage can line (If you use the printer in an environment in which the relative humidity is 85% or higher, complete the print head air-purge procedure).
- ② When a water drainage blow sequence is performed before printing.
- ③ When the printer is used in a place where a considerable amount of paper powder or other dust exists.
- ④ When the printing distance is short so that the end of the print head is splashed with ink.
- ⑤ When you use inks that are indicated on the handling guidance of each ink to complete air-purge procedure.

#### (2) Air-purging procedure

Introduce clean dry air into the print head air purge connection port (Rc 1/8 (PT 1/8)×screw) in the rear of the printer main body at a pressure of about 0.1 to 0.3 MPa. If it is possible that the employed air tanks oil or water, turn it into clean dry air with an air filter, micro-mist separator, or the like before introducing it into the printer main body.



Made of resin. Be careful not to tighten too tightly when connecting with a metal joint.

Max. tightening torque: 1.5N·m

#### NOTICE

If the air-purge amount is excessive, print irregularities may occur. After air-purge pressure adjustment, be sure to perform a printing test to verify the printing results.



## 3.2 Setting functions which can be performed

### (1) Functions

- Sets whether or not each function is enabled or disabled for each login user.
- The operation buttons of disabled functions are not displayed or the screen cannot be entered.
- "User conditions setup" and "Using environment setup" can be started when the administrator logs in.
- The function restrictions state can be checked at the function restrictions screen. (Refer to "Instruction manual 5.5 Checking functions which can be performed")

#### Protected functions

Item	Protected function name	
Edit message	<ul style="list-style-type: none"> <li>•Edit message</li> <li>•Calendar conditions</li> <li>•Substitution rules setting</li> <li>•Count conditions</li> </ul>	
Select message	<ul style="list-style-type: none"> <li>•Select message</li> </ul>	
Save message	<ul style="list-style-type: none"> <li>•Save message</li> <li>•Overwrite message</li> </ul>	
Print specifications	<ul style="list-style-type: none"> <li>•Print specifications</li> <li>•Various print setup</li> <li>•Adjust print parameters</li> </ul>	
Print format	<ul style="list-style-type: none"> <li>•Print format</li> <li>•Adjust inter-character space</li> </ul>	
Maintenance	[Auxiliary functions] <ul style="list-style-type: none"> <li>•Manage messages/group</li> <li>•Create user pattern</li> <li>•Calibrate touch screen coordinates</li> <li>•Copy data (IJP→USB)</li> <li>•Copy data (USB→IJP)</li> <li>•Edit standard pattern</li> <li>•Edit substitution rules</li> <li>•Select language</li> </ul>	[Environment setup] <ul style="list-style-type: none"> <li>•User environment setup</li> <li>•Date/time setup</li> <li>•Communication environment setup</li> <li>•Touch screen setup</li> </ul> [Maintenance work] <ul style="list-style-type: none"> <li>•Operation management</li> <li>•Excitation V update</li> <li>•Circulation control</li> <li>•Solenoid valve/pump test</li> </ul>
Password setup	<ul style="list-style-type: none"> <li>•Password setup</li> </ul>	

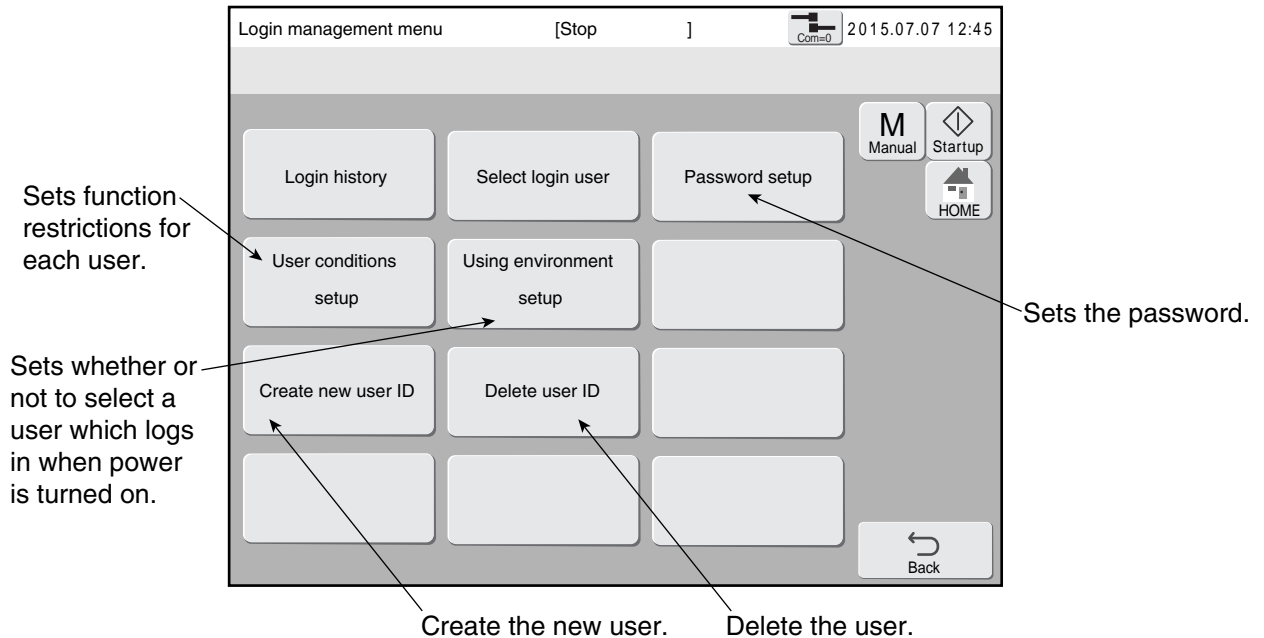
## (2) Operation

The administrator is logged in.

### 1 Press **Login management** of the Environment setup menu.

The Login management menu is displayed.

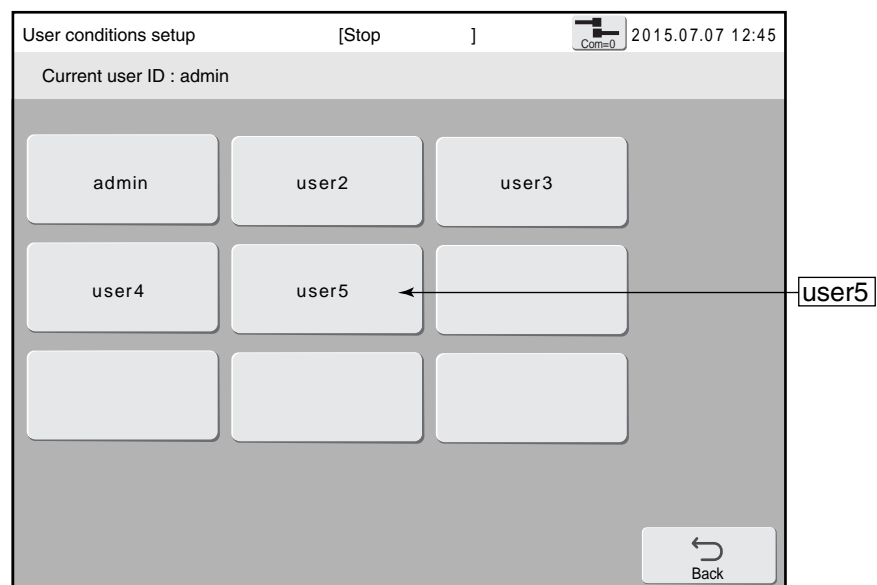
Log in as a user with administrator rights when **User conditions setup** or **Using environment setup** are not displayed on Login management menu.



### 2 Press **User conditions setup**.

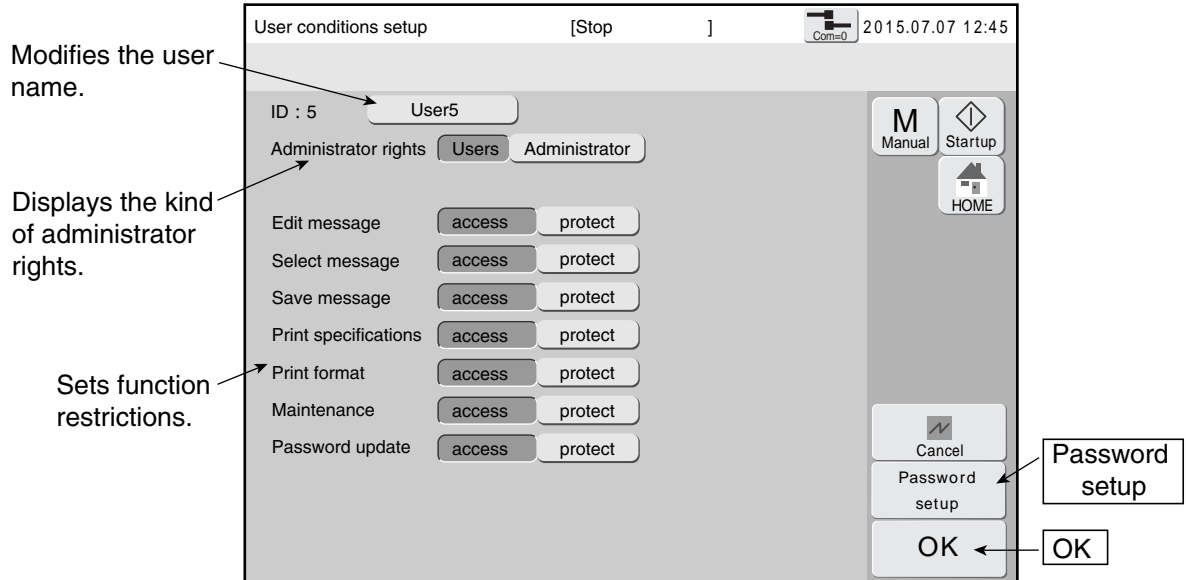
The User conditions setup screen is displayed.

A user list is displayed.



**3 Select User5.**

“User5” settings are displayed.



**4 Select the administrator rights.**

**5 Select “access” or “protect” for each function item.**

**6 Press Password setup and set the password.**

An error message appears when the entry in the old password input field does not agree with the current password.  
However, the error does not occur if you type in "IGNOREPW" as the password.  
Use this word if you forget your password.

**7 Press OK.**

The administrator rights, function restrictions, user name, and password for user “User5” are set.

## 3.3 Selecting user when power is turned on

### (1) Functions

- Sets whether or not to select a user which logs in when power is turned on.

Possible login methods

	Login method “Disable”	Login method “Enable”
Operation when power is turned on	Immediately displays the Print description screen when the power is turned on. The login user is decided beforehand.	Selects the user which logs in when the power is turned on.

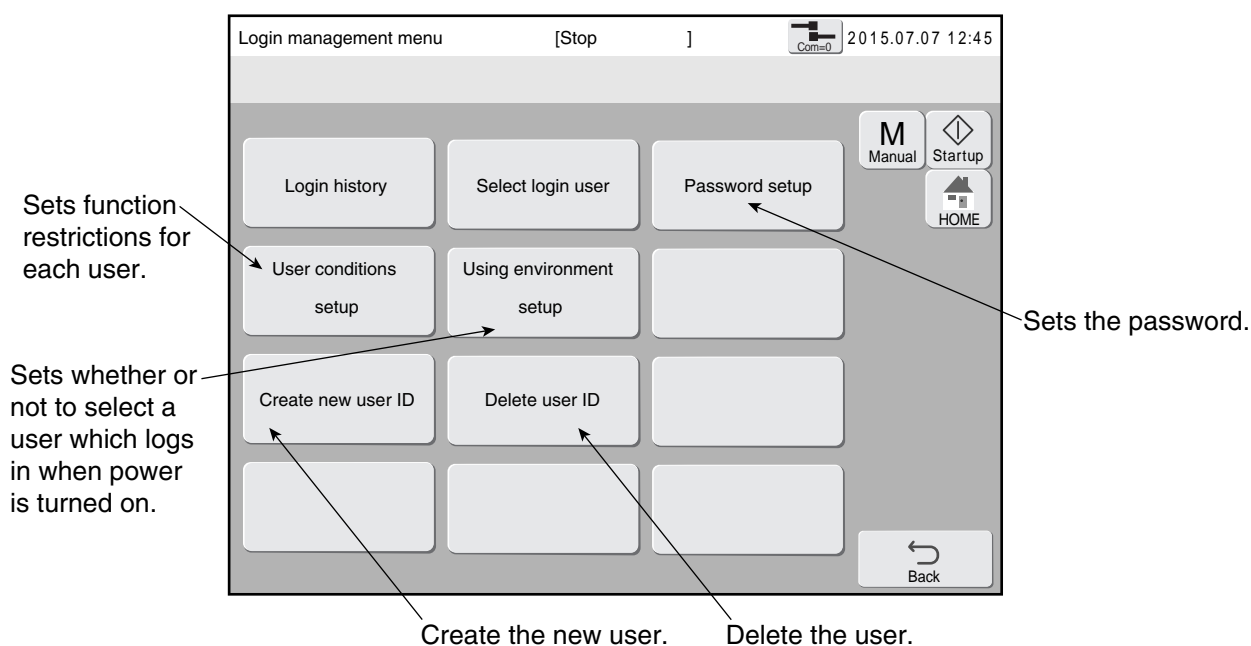
- The login user can be changed by login user change function even when the login method is “Disable”.
- “User conditions setup” and “Using environment setup” can be started when the administrator is logged in.

### (2) Operation

Log in the administrator.

#### 1 Press **Login management** of the Environment setup menu.

The Login management menu is displayed.

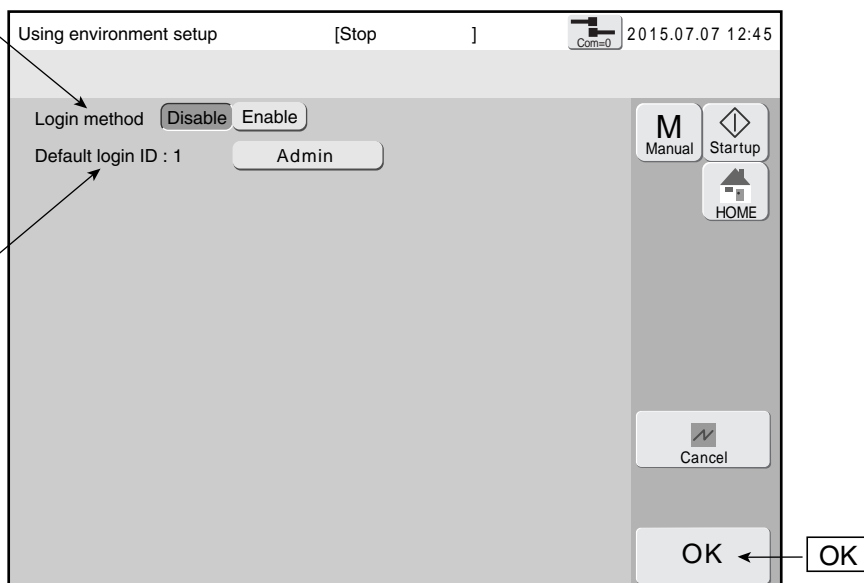


## 2 Press **Using environment setup**.

The Using environment setup screen is displayed.

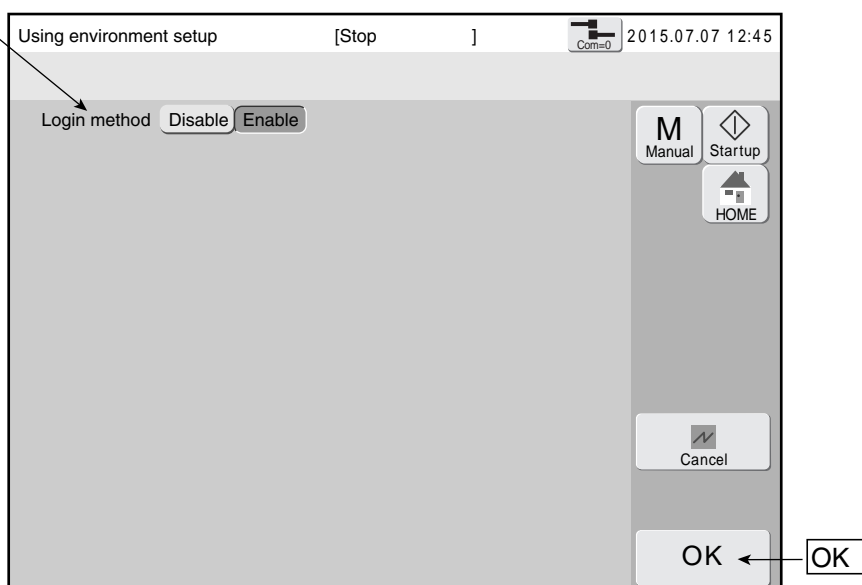
When "Disable" is selected, the Print description screen is immediately displayed when the power is turned on.

Specifies the login user



## 3 Press Login method **Enable**.

When "Enable" is selected, selects the user which logs in when the power is turned on.



## 4 Select the login method and press **OK**.

Sets whether or not to select a user which logs in when power is turned on.

### CAUTION

When the Login method is "Enable", the Select login user screen is displayed when the power is turned on. At this time, if the set password is forgotten, the program will not advance to the print description screen. Set and manage the password carefully.  
If you forget the password, consult your nearest local distributor.



# 4. ELECTRIC SIGNAL CONNECTION

## 4.1 Wiring precautions

(1) If noise enters the IJ printer from the outside, there is the danger of erroneous operation or trouble.

To improve noise resistance, perform wiring work as follows:

- ① Separate the power cable to the IJ printer from other power lines for powering use (especially, power line for a speed control inverter, etc.).

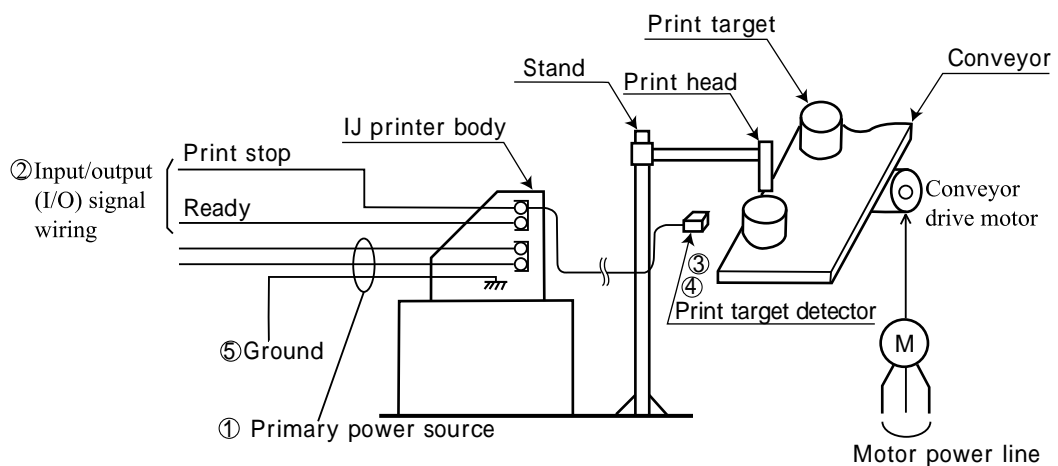
Wiring the power cable through a separate duct is even better.

- ② Do not bundle input/output (I/O) signal wiring together with other power lines. Wire them independently instead.

- ③ Electrically isolate the print target detector, print head, stand, and IJ printer body from other machinery and equipment (conveyor, etc.).

- ④ Separate the print target detector wiring from other power lines.

- ⑤ Perform that all electrical wiring, connections and grounding comply with applicable cords.  
(When erroneous operation was caused by noise, etc., use a dedicated ground.)

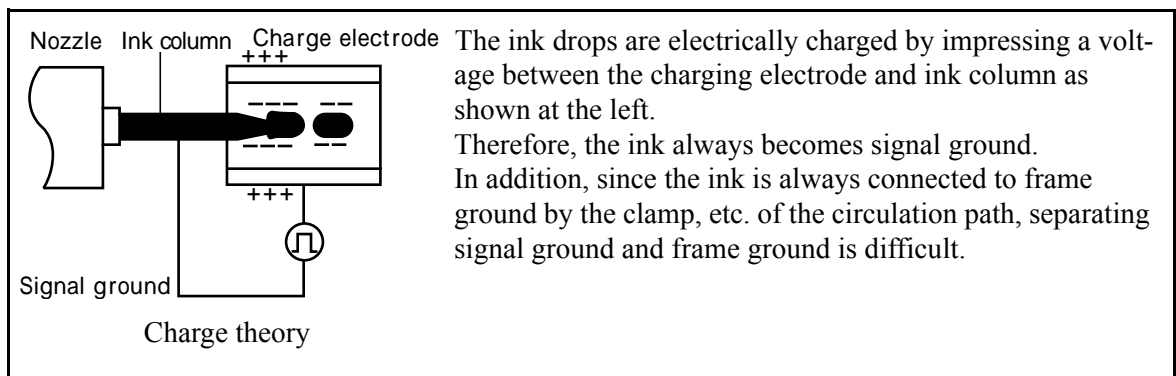


(2) Connection to power supply

Use a suitable plug and always connect the power source to a protective ground. In addition, arrange the receptacles near the IJ printer so that removal is easy.

### (3) Precautions related to welding current of welder

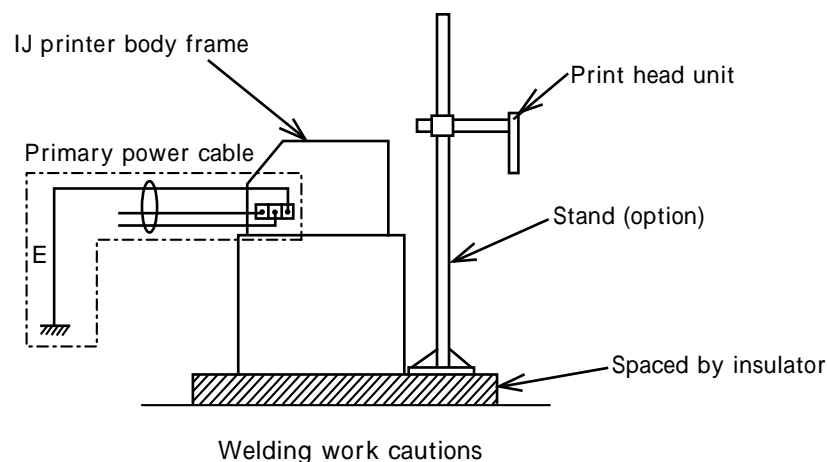
Signal (weak electric) ground and frame ground are connected because the ink drops of the IJ printer are electrically charged.



Therefore, when a large current (for example, the welding current of a welder) flows from the outside through frame ground, the current is also diverted to signal ground and the PC boards may be damaged. For this reason, when performing welding work near the IJ printer, proceed as follows:

#### Method

Be sure to insulate the printhead and IJ printer frame to keep the welding current from flowing to the control section of the printer, and to make a separate ground connection for the printer. If this method is used, welding work becomes possible even while the IJ printer is operating.



#### **WARNING**

##### ●Fire is strictly forbidden around the IJ printer

The ink and makeup are both flammable. Welding sparks may cause ignition or a fire. Take measures so that sparks do not enter the surrounding area whether or not the IJ printer is operating, and ventilate sufficiently. Just in case, ensure safety by installing a powder type fire extinguisher nearby.



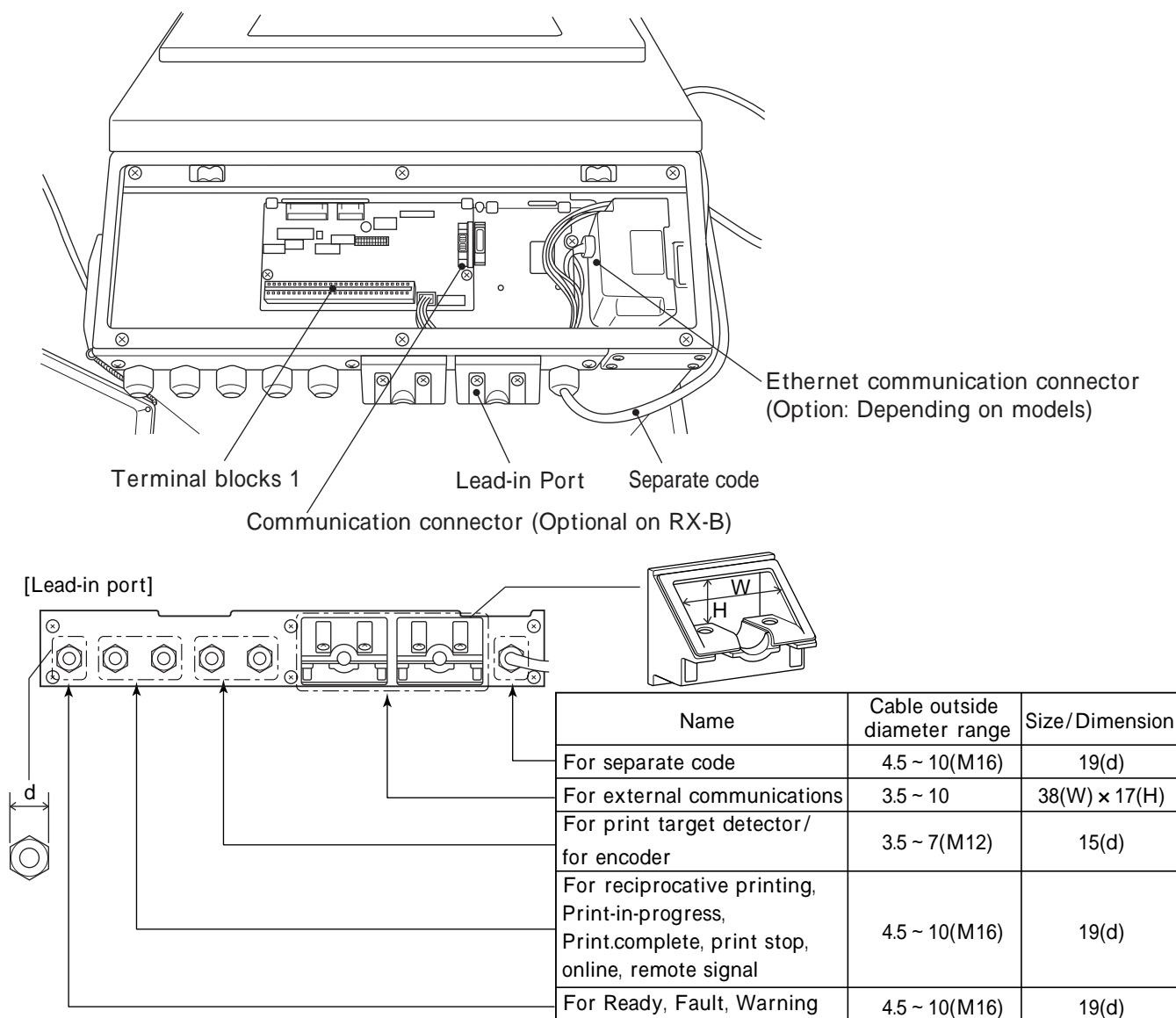
## 4.2 Input/output (I/O) signal connection

### 4.2.1 Wiring the I/O line

Open the top cover and run the I/O line wiring from the lead-in port on the side and connect it to external connection terminal boards 1 and 2 and the external communications connector inside the IJ printer.

#### **⚠ CAUTION**

**When performing wiring work, always turn off the power.  
During normal use, leave the top cover closed.**



#### **⚠ CAUTION**

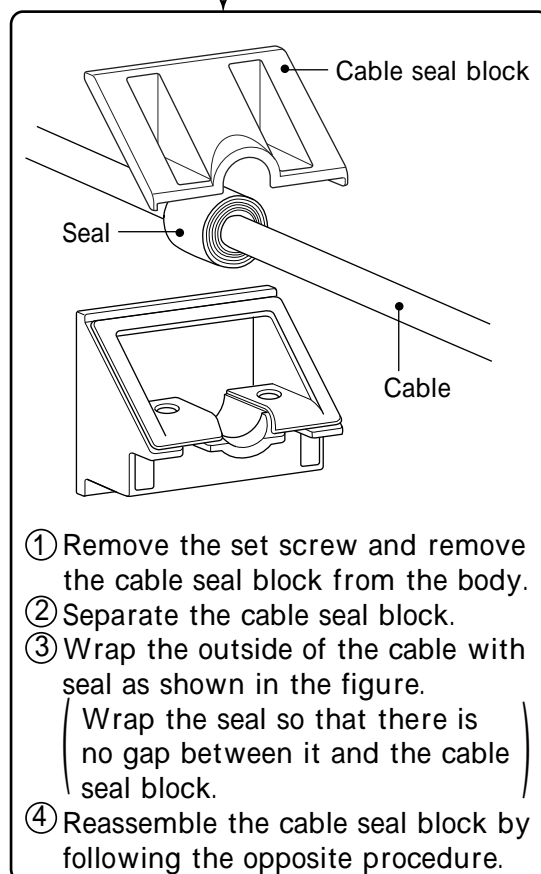
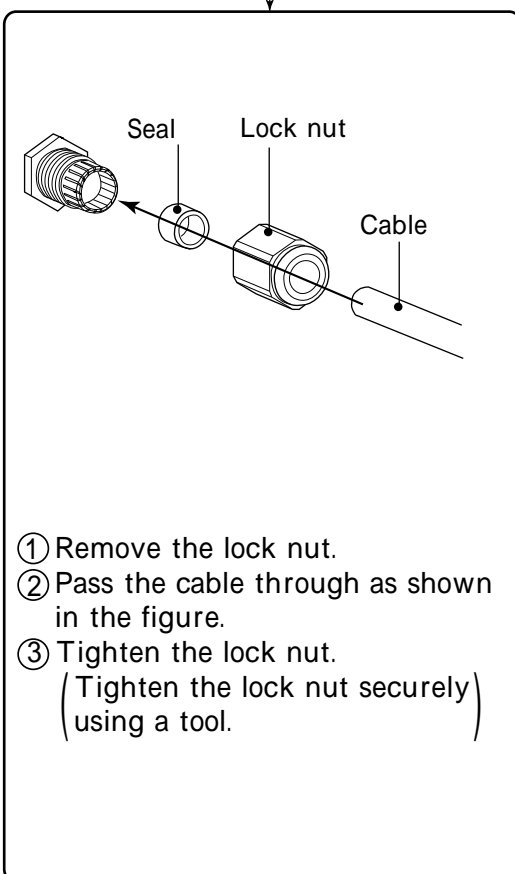
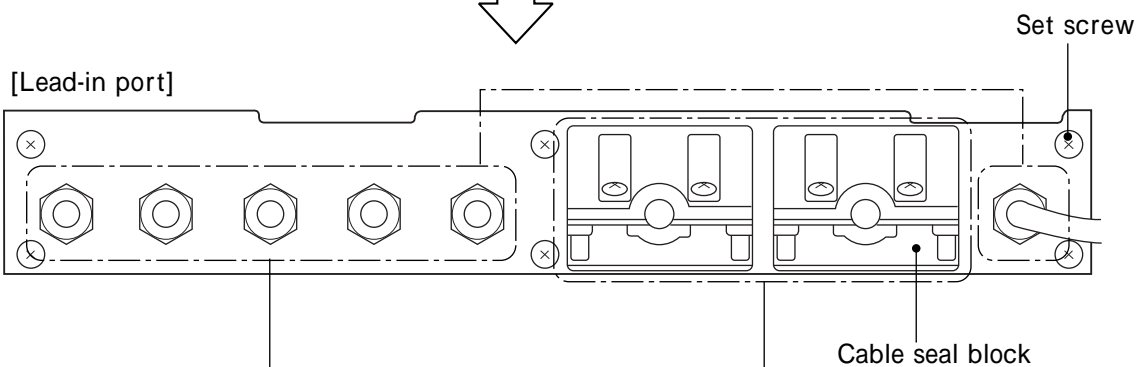
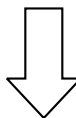
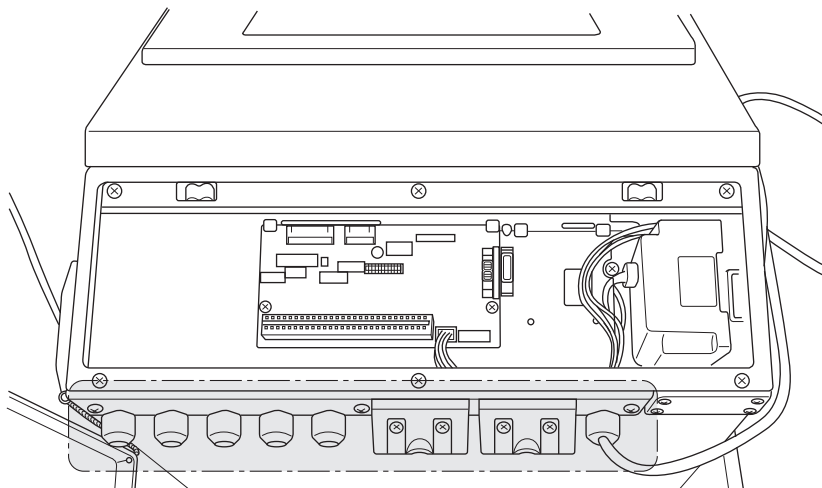
**Use cables with an outside diameter within the range specified above. Firmly tighten the lead-in port lock nut.**

**In addition, do not bundle weak electric system and strong electric system cables together inside and outside the IJ printer so that the weak electric system signals (signals to terminal board 1 and external communication connector) are not affected by strong electric system signals (power source).**

**Especially, absolutely never bundle together the print target detector and print stop signals and the power source and Ready to print signal cable and do not wire them inside the same duct.**



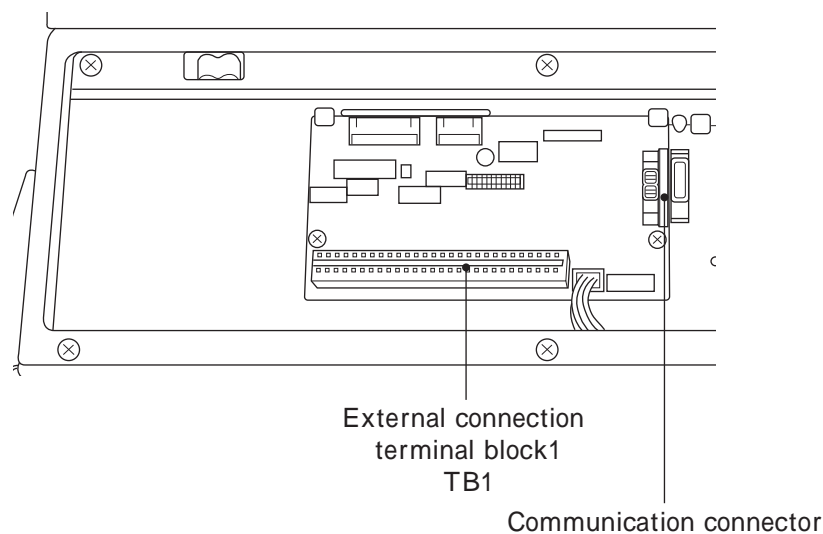
## Lead-in port connection method



## 4.2.2 Connection to input/output (I/O) terminals

[Overview of Terminals and Connectors]

The terminal blocks and connectors for wiring are located behind the electrical access door (upper front panel door).

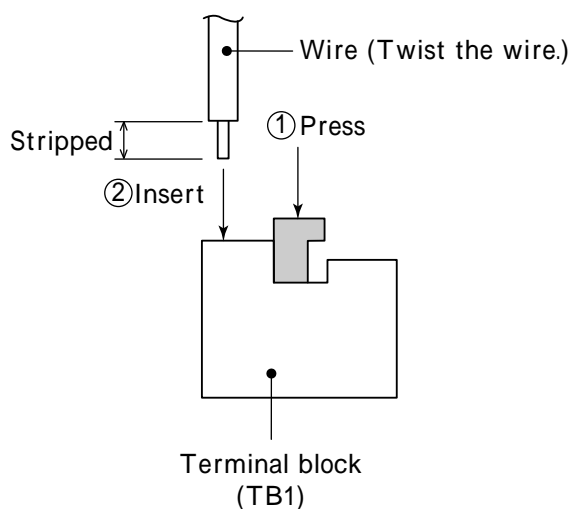


### CAUTION

**Faulty wiring causes the substrate breakdown.  
Before wiring, be sure to confirm the terminal signal.**

[Usage for the External connection terminal block 1 (TB1)]

- Applicable cable size : AWG26 to 18 ( $\Phi 0.4$  to 1.0) (Note1)
- Wire covering to be stripped : 8 to 9 mm



(Note1)

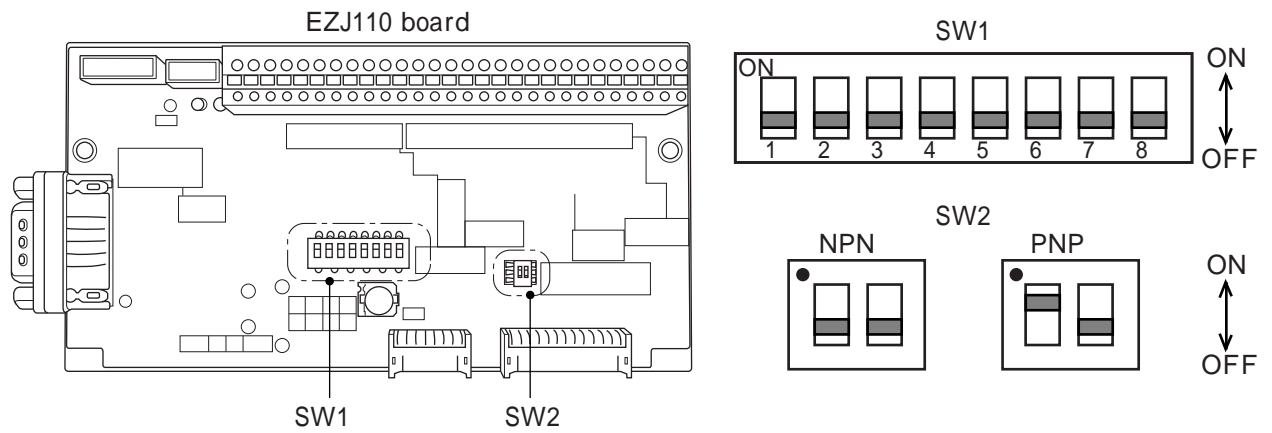
Since the applicable wire size for terminal block TB1 has acquired UL approval with AWG26 to 20, when using under conditions equivalent to UL Standards, use AWG26 to 20 wire.

[ Connection to the external connection terminal block (TB1 of EZJ110 P.W.B) ]

- The I/F signal with conveyer is connected.
- NPN/PNP interface can be selected for the print target detector and a part of I/O signals.
- Totem pole/Open collector(NPN) can be selected for the encoder signal.
- Pin #5, #6 and #11 to 24 --- RX-S:Standard, RX-B: Option

Pin No.	Name		Input/output		Remarks
	NPN Interface	PNP Interface	NPN	PNP	
1	Power supply	Print target detector	Output	Input	<ul style="list-style-type: none"><li>● DC24V, 100mA max. (*1)</li><li>● Power supply can be selected by SW1</li><li>● Connection pin number is different between NPN and PNP interface.</li></ul>
2	Print target detector	Ground	Input	-	
3	Ground	NC	-	-	
4	NC	Power supply	-	Output	
5	Print stop		Input		<ul style="list-style-type: none"><li>● NPN / PNP can be selected by SW2</li><li>● RX-S: Standard, RX-B: Option</li></ul>
6	Signal ground		-		
7	Encoder power supply		Output		<ul style="list-style-type: none"><li>● DC24V, 100mA max. (*1)</li><li>● Totem pole / Open collector (NPN) can be selected by SW1</li><li>● Power supply can be selected by SW1</li></ul>
8	Encoder signal (Totem pole)		Input		
9	Encoder signal (Open collector NPN)		Input		
10	Encoder ground		-		
11	Deflection voltage ON/OFF signal		Input		<ul style="list-style-type: none"><li>● NPN / PNP can be selected by SW2</li><li>● RX-S: Standard, RX-B: Option</li></ul>
12	Reciprocative print signal		Input		
13	Run signal		Input		
14	Reset signal		Input		
15	Stop signal		Input		
16	Print-in-progress/ Print-complete	-	Output	-	<ul style="list-style-type: none"><li>● Print-in-progress/ Print-complete can be selected with screen operation.</li><li>● Connection pin number is different between NPN and PNP interface. NPN interface: No.16-19 PNP interface: No. 20-23</li><li>● RX-S: Standard, RX-B: Option</li></ul>
17	Online output	-	Output	-	
18	Universal output 1	-	Output	-	
19	Universal output 2	-	Output	-	
20	-	Print-in-progress/ Print-complete	-	Output	
21	-	Online output	-	Output	
22	-	Universal output 1	-	Output	
23	-	Universal output 2	-	Output	
24	Signal ground		-		<ul style="list-style-type: none"><li>● Open collector (NPN) only</li></ul>
25	Ready	-	Output	-	
26	Signal ground	-	-	-	
27	Fault	-	Output	-	
28	Warning	-	Output	-	

(\*1): The supplying power capacity for print target detector and encoder is up to 100mA in total.



(Precautions when using combination of NPN/PNP interfaces)

- Use either NPN or PNP interface for input/output signals #5 to 6 and #11 to 24. Do not use a combination of the interfaces for these input/output signals.
- Interfaces can be combined for units of print material sensor signals (#1 to 4), encoder signals (#7 to 10), input/output signals (#5 to 6, #11 to 24) and status output signals (#25 to 28).  
(For example, PNP interface can be used for print material sensor and NPN interface can be used for status output signals (#25 to 28)).

## 4.3 Input/output (I/O) specifications

When handling external signals, observe the voltage, current, and time given in this manual.  
Operation is not guaranteed if external signals are not handled properly.

[Input / Output Signal Specifications]

(1) Input signals (external device → IJ printer)

No.	Signal name	Function	Electrical characteristics	
			+NPN input	PNP input
1	Print object detection	Indicates the arrival of a print object.	+24 V output (Up to 100mA *1)	
			ON state : I out : 12 mA max.; OFF state: Vout : 24 V *3)	ON state : I in(at24V): 12 mA max. OFF state: V in: 1V max. *3)
2	Printing stop	Issues instructions so that printing does not start even if a print object is detected.	ON state : I out : 6 mA max.; OFF state: Vout : 24 V *3)	ON state : I in(at24V): 6 mA max. OFF state: V in: 1V max. *3)
3	Reciprocative printing	Issues instructions so as to change the order of characters to be printed. OFF:Transport in normal direction ON :Transport in reverse direction	ON state : I out : 6 mA max.; OFF state: Vout : 24 V *3)	ON state : I in(at24V): 6 mA max. OFF state: V in: 1V max. *3)
4	Encoder (for speed follow-up)	Makes a pulse entry in proportion to the print object transport speed.	+24 V output (Up to 100mA *1)	
			NPN open collector ON state : I out : 20mA max.; OFF state: Vout : 24 V *3)	Totem pole ON state : I in(at24V): 20mA max. OFF state: V in: 1V max. *3)
5	Run *2)	Functionally the same as the RUN key on the operator panel. Performs processing from "ink injection" to "ready to print"	ON state : I out : 6 mA max.; OFF state: Vout : 24 V *3)	ON state : I in(at24V): 6 mA max. OFF state: V in: 1V max. *3)
6	Reset	Functionally the same as the Reset key and the Message Delete key on the Error Message window. Resets an error.	ON state : I out : 6 mA max.; OFF state: Vout : 24 V *3)	ON state : I in(at24V): 6 mA max. OFF state: V in: 1V max. *3)
7	Stop	Functionally the same as the STOP key on the operator panel. Stops injection of ink (automatic flushing).	ON state : I out : 6 mA max.; OFF state: Vout : 24 V *3)	ON state : I in(at24V): 6 mA max. OFF state: V in: 1V max. *3)
8	High voltage ON/OFF	Functionally the same as the Deflection Voltage Control function in a message which appears when the CONTROL key on the operator panel is pressed. The deflection voltage is turned on (Ready) and off (Standby) alternately each time this signal is entered.	ON state : I out : 6 mA max.; OFF state: Vout : 24 V *3)	ON state : I in(at24V): 6 mA max. OFF state: V in: 1V max. *3)

\*1) The current supply capacity of +24V for Print object detector and encoder is up to 100mA in total.

\*2) RUN signal instructs to inkjet ink. Handle the signal with care.

\*3) Ensure that the external device transistor leak current doesn't exceed 0.1mA while the input signal is OFF.

(2) Output signals (IJ printer → external device)

No.	Signal name	Function	Electrical characteristics	
1	Ready	Operates when the IJ printer is ready for printing or in input mode.	Open collector (NPN) • Sink current: 20 mA max. • ON voltage: 0.5 V or less • Operating voltage: 30 V or less	
2	Fault	Operates when the IJ printer is fault state.		
3	Warning	Operates when the IJ printer is in alarm condition.		
4	Print. in Progress *4)	Operates when the IJ printer is engaged in printing.	Open collector (NPN) • ON voltage: 0.5 V or less • Sink current: 20 mA max. • Operating voltage: 30 V or less	Open collector (PNP) • I in: 10 mA max. (Load resistor: 2.2kΩ or more) • ON voltage: +24V
	Print. Completed *4)	Operates when the IJ printer completes a printing process (outputs a pulse of up to 1 second).		
5	Online output	Operates when the IJ printer is in online mode		

\*4): As regards "Print. in progress" and "Print. completed", one must be selected from a screen.

### 4.3.1 Print target detector input

This function inputs the IJ printer print start signal.

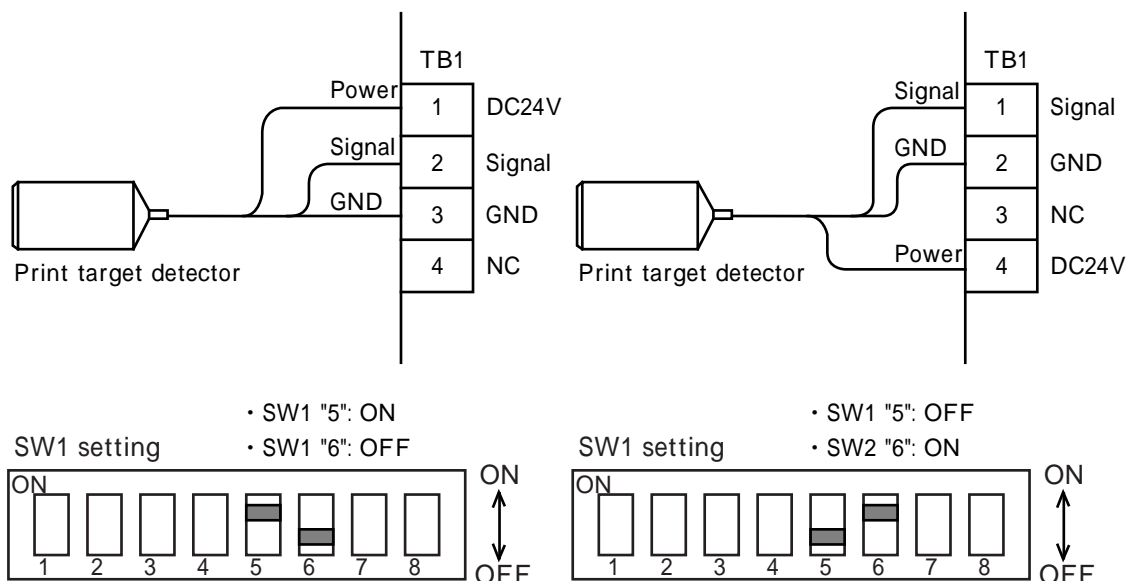
Use a no-contact (transistor) type print target detector. An optoelectronic sensor with built-in amplifier which uses a light beam to detect the print target is ideal. When the total current consumption of the print target detector and the rotary encoder is 100mA or less, power can be supplied from the power supply built into the IJ printer. When the total current consumption exceeds 100mA, provide a dedicated power supply.

In this case, perform wiring and setting as described below.

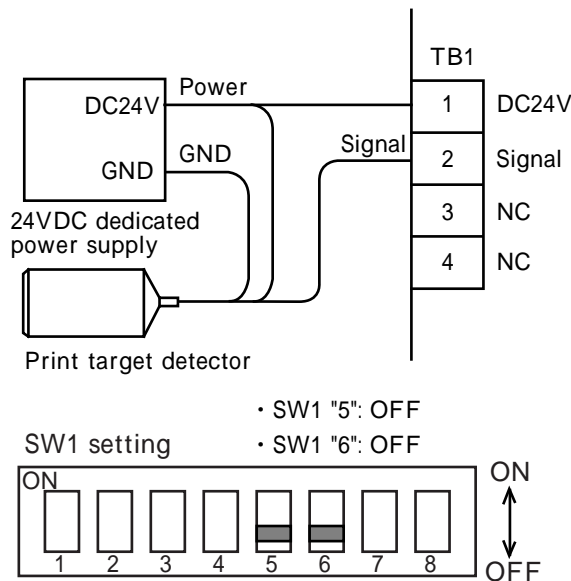
(1) Print target detector connection method

(a) When NPN interface and IJ printer built-in power supply are used

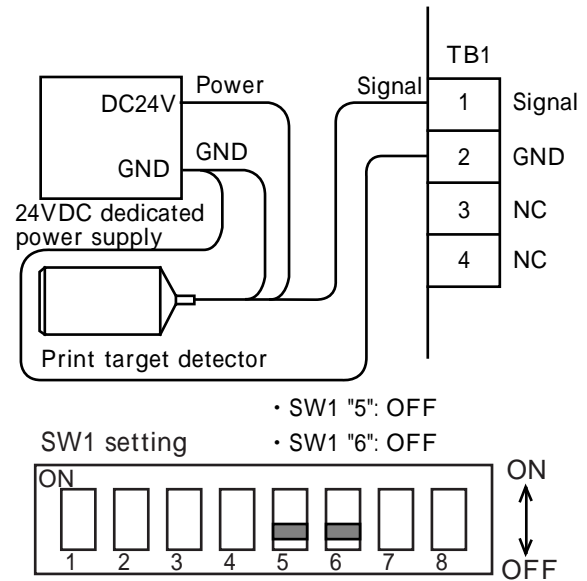
(b) When PNP interface and IJ printer built-in power supply are used



(c) When NPN interface and dedicated power supply are used



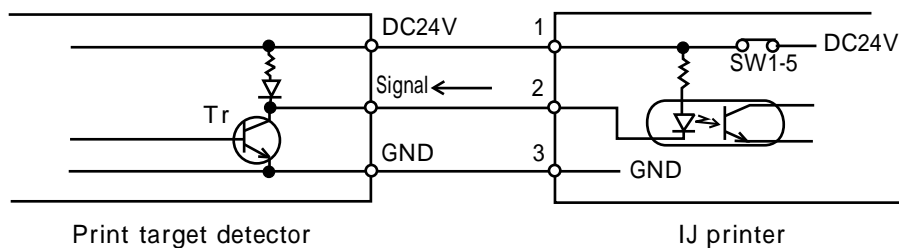
(d) When PNP interface and dedicated power supply are used



## (2) Print target detector specifications

(a) When NPN interface is used

■ Internal circuit diagram



When the IJ printer input circuit is a current drive load for the print target detector output circuit and output transistor Tr of the print target detector is ON, it becomes the print start signal input.

Use an output transistor Tr which satisfies the following specifications (NPN/PNP):

- Withstand voltage : 24VDC or greater
- Maximum drive current : 12mA or greater ( $I_L = 10\text{mA}$ )
- Residual voltage : 2V or less
- Leakage current : 0.1mA or less

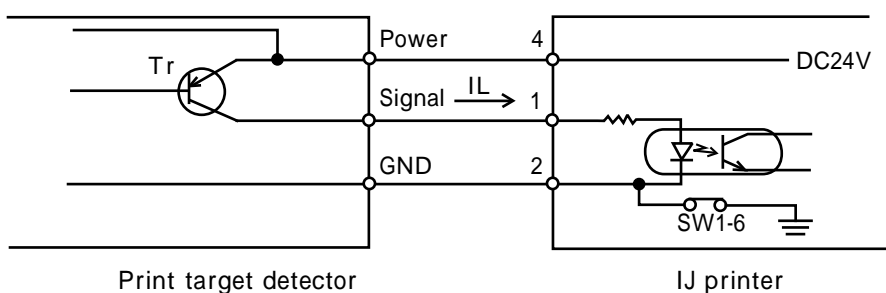
■ The IJ printer built-in power supply specifications are:

- Power supply voltage : 24V
- Maximum supply current : 100mA \*Note 1

\*Note 1: Total power supply to print target detector and rotary encoder is max. 100mA

(b) When PNP interface is used

■ Internal circuit diagram

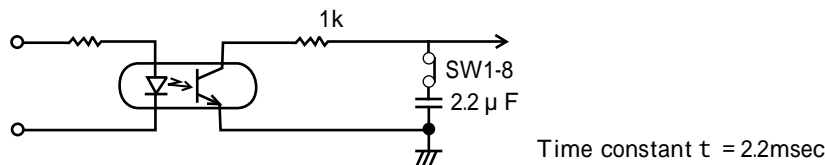


### (3) Print target detector signal noise filter setting

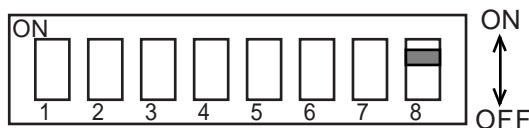
This function uses to filter the normal noise generated at the print target detector signal and noise generated by water drops, etc. with CR.

The target sensor filter function (See "Instruction manual 4.13 Set the print specifications") is effective against sensor chattering.

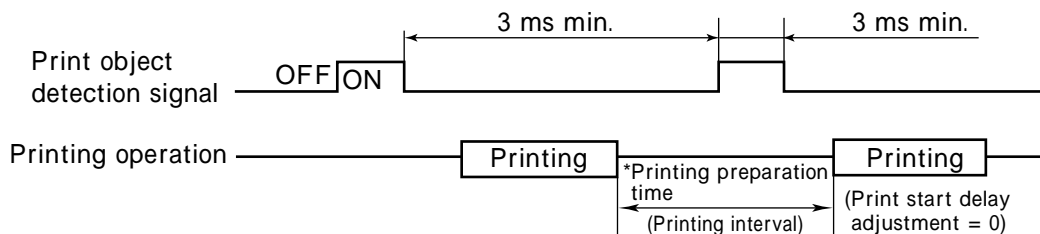
#### ■ Internal circuit diagram



SW1 setting • SW1 "8" ON : Filter ON  
OFF: Filter OFF



### (4) Relationship between print object detection signal and printing operation



\*: The printing preparation time minimum value varies with the print dot matrix, ink drop use, etc., however, the right table can be used as a reference.

Nozzle size	Reference of printing preparation time minimum value
65μm	9 ms

The accurate printing preparation time can be calculated by following formula.

Necessary printing preparation time (Note 1) =  $[(\text{One scan time}) \times (N + 1)]$  (ms)

$$(\text{One scan time}) = \frac{(\text{Number of vertical dots} + \text{Character width}) \times \text{Ink drop use percentage}}{\text{Excitation frequency (kHz)}} \text{ (ms)}$$

$N : (\text{One scan time} \times N) \geq \text{Remaining number that is set to "a"}$   
(a: Refer to the right table.)

Nozzle size	a
65μm	5.5

Excitation frequency: 75.4 (Model RX, with 65μm nozzle and JP-K69 ink)

(Note 1) Time for repeated printing of fixed characters. When using the communications function or 2-dimensional bar code function, it will be longer than the time calculated from this formula.

When the speed is followed up, the number of encoder pulses shown below will serve as reference for the minimal value of print space:

$$\text{Minimal time of 1 pulse} = \frac{(\text{Number of vertical dots} + \text{Character width}) \times \text{Ink drop use percentage}}{\text{Excitation frequency (kHz)}} \text{ (ms)}$$

$$\text{Number of necessary encoder pulses} = \frac{a}{\text{Minimal time of 1 pulse}} \times \text{Frequency division setting value (pulse)}$$



(5) Tracking function

- This function achieves printing even when two or more print objects are positioned between the print object detector and print head.
- Up to four print objects can be positioned between the print object detector and print head.
- This function cannot be exercised simultaneously with the repeat-printing function.

## 4.3.2 Product speed matching function using a rotary encoder

The product speed matching function is used when the speed of the print target or the conveyer carrying the print target changes while the IJ printer is printing. If this function is not used, when the speed changes, the width of the printed characters may change and the characters may be difficult to read.

When the product speed matching function is used, it is necessary to input an external electric pulse having a period proportional to the speed to the IJ printer. Ordinarily a rotary encoder is used for this purpose. The IJ printer can print each vertical line of the printed message in synchronization with the pulses from the rotary encoder.

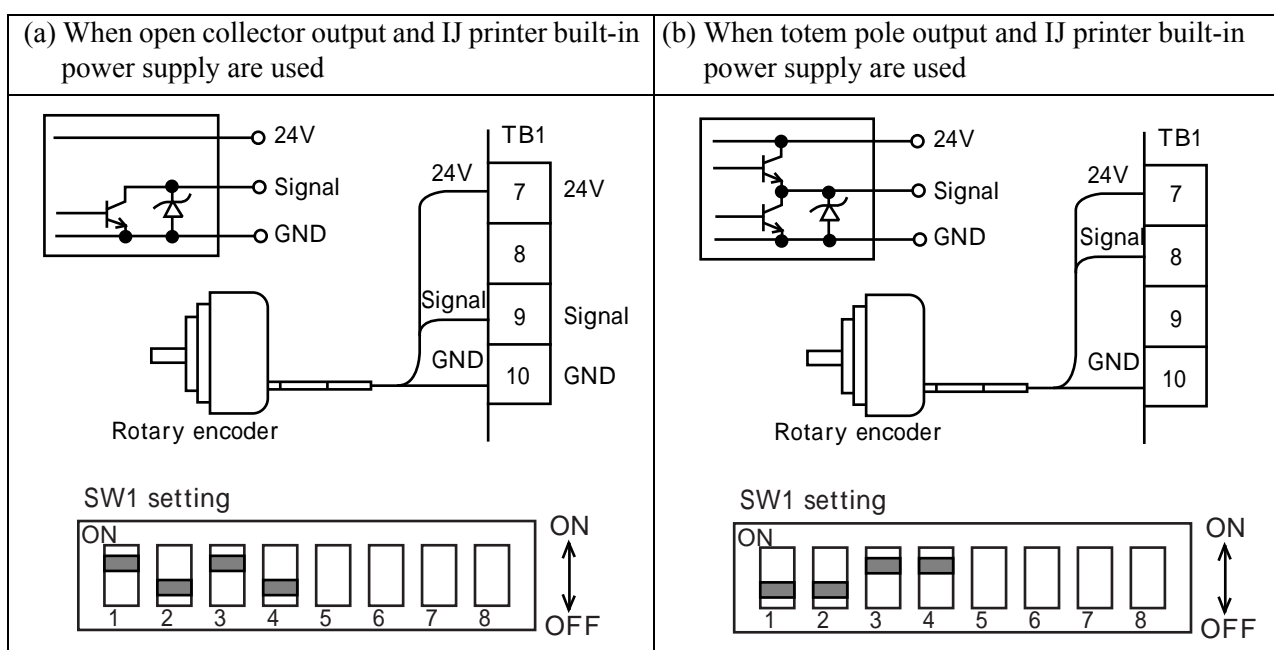
### 4.3.2-1 Rotary encoder specifications wiring and switch setting

(1) The specifications of the connectable rotary encoders are:

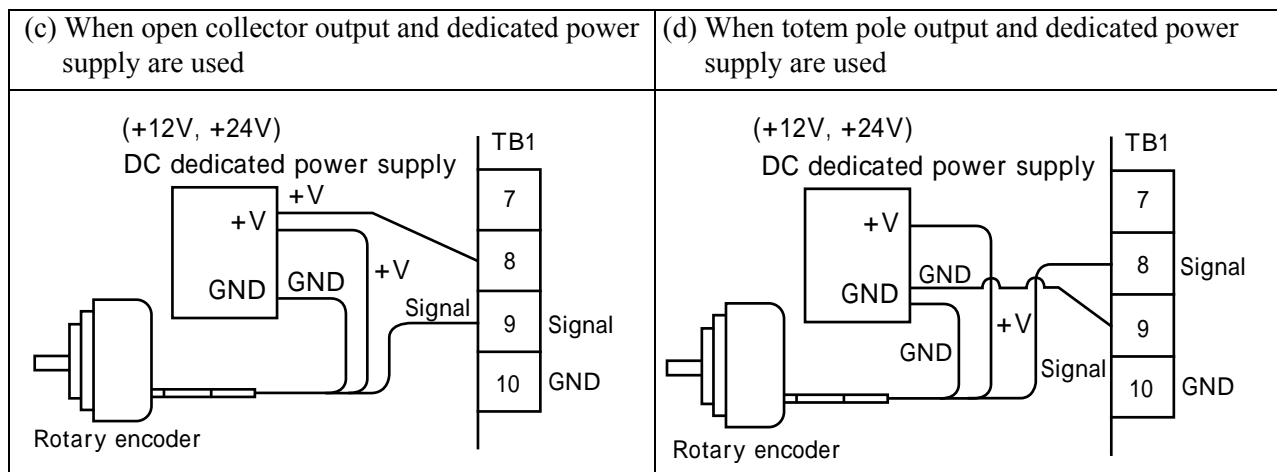
Output waveform	: Square wave (duty: 30to 70%)
Output withstand voltage	: 24VDC or greater
Load current	: 20mA or greater
Leakage current	: 0.1mA or less
Power supply voltage	: 24VDC
Current consumption	: 100mA or less *Note 1
(When the IJ printer built-in power supply is used, the total current consumption with the detectors is 100mA or less.)	
Input signal frequency	: 200kHz or less
Number of pulses	: Decided by production line conditions

\*Note 1) The maximum power supply capacity of the IJ printer built-in power supply (24VDC) is 100mA. When the current consumption of the detector and encoder exceeds 100mA and the power supply voltage is outside 24V, use a dedicated power supply and perform the wiring work described in (3) below.

(2) Encoder wiring and setting of SW1 on PC board EZJ110 when IJ printer built-in power supply is used

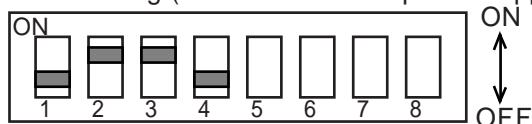


- (3) Encoder wiring and setting of SW1 on EZJ110 PC board when used with a dedicated power supply
- Wiring used for a dedicated power supply differs according to output interface of the encoder, but can be the same depending on power supply voltage.



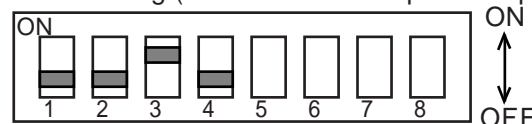
- Switch setting for a dedicated power supply differs according to power supply voltage, but can be the same depending on output interface of the encoder.

- SW1 setting (for 12V dedicated power supply)



\*For open collector output and totem pole output

- SW1 setting (for 24V dedicated power supply)



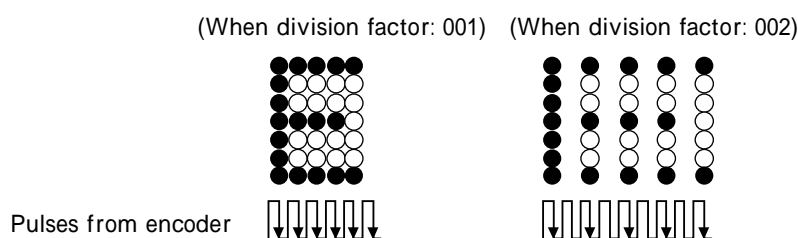
\*For open collector output and totem pole output

### 4.3.2-2 Setting to IJ printer

- (1) Make the settings related to “Product speed matching” and “Pulse rate div. factor” at the “Print specifications” screen. (See “Instruction manual 4.13 Set the print specifications”.)

- Set “Product speed matching” to “1: Enable”.
- Set “Pulse rate div. factor” as required. This function lowers (makes the period longer) the frequency of the input pulses inside the IJ printer. The divided pulses become the pulses used in printing.

<Description of pulse division function>



- The rotary encoder signal pulse frequency, the print scan frequency and the division factor have the relationship shown in (Eq. 1).

$$\text{Encoder pulse frequency [kHz]} = \frac{\text{Print scan count [kHz]}}{\text{Division factor (1/n)}} \text{ ----(Eq. 1)}$$

- Set “Speed compensation” at the “User environment setup” screen to “Enable”, as required.

<What is “Speed compensation”?>

This function reduces changes in the print start delay when the conveyer speed changes.

### CAUTION

This function cannot be used when the product speed matching function is not used.  
In addition, this function cannot be used when “Repeat print” mode is set at the “Print specifications” screen.  
When “Speed compensation” is enabled, print start is delayed for 30 scans.

### 4.3.2-3 Method of calculating the conditions which allow product speed matching

Calculate to find whether the Ink drop use and division factor are the conditions which allow product speed matching, based on the following.

Print quality improves as the calculation shown below is performed and the Ink drop use becomes smaller. In addition, when changing Ink drop use, check the print quality.

- (1) The character width set value is automatically set as shown in the table below. The set value is different depending on Ink drop use. Consider it when calculating to find whether the conditions allow product speed matching.

<div style="display: flex; align-items: center; justify-content: center;"> <div style="margin-right: 5px;">Large</div> <div style="margin-right: 5px;">↑</div> <div style="margin-right: 5px;">↓</div> <div style="margin-right: 5px;">Small</div> </div>	Ink drop use	Character width set value
	1/1	002
	1/2	001
	1/3 to 1/16	000

- (2) The maximum print scan frequency is found from the following equation by means of the printed character width and highest conveyer speed. Substitute the value according to the nozzle diameter of the type used at d.

Max. number of print scans [kHz] =

$$\text{Highest conveyer speed [m/min]} \times \frac{1}{60} \times \frac{\text{Number of horizontal dots} - 1}{\text{Print length [mm]} - d[\text{mm}]} \text{ ----- (Eq. 2)}$$

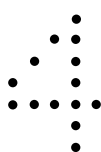
Nozzle diameter	d
65μm	0.33

- (3) Next, use (Eq. 3) to check if the maximum print scan frequency found from (Eq. 2) can be matched at IJ printer set print speed.

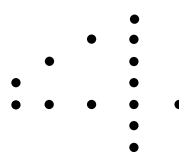
$$\frac{\text{Excitation frequency (f)}}{(\text{Number of vertical dots} + \text{character width set value} + 1) \times (\text{Denominator of ink drop use} (*1))} [\text{kHz}] \text{ (Eq. 3)}$$

> Max. number of print scans [kHz]

- When the result of (Eq. 3) is smaller than the maximum print scan frequency (Eq. 2), product speed matching is not performed normally and the character width becomes large.



Normal



Character width large

(Note1) The value is 3 when the ink drop use is 1/3.

- In addition, when “Product speed matching error” warning is set, a warning is generated. In this case, (1) lower the conveyer speed, (2) widen the print character width, or (3) set Ink drop use larger, so that the maximum print scan frequency becomes smaller than the calculated value of (Eq. 3). (Makes the IJ printer set print speed faster than the highest conveyer speed.)

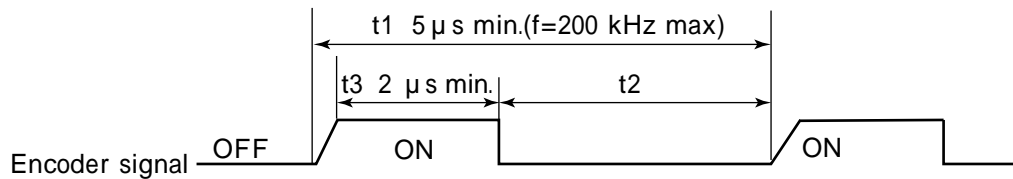
- (4) The excitation frequency (f) in (Eq. 3) depends on the type of ink used. The excitation frequency by typical nozzle diameter and ink is shown below. For other inks, refer to the handling guidance of each ink.

Nozzle diameter	Type of ink	Excitation frequency (f)
65μm	JP-K67	75.4 kHz
65μm	JP-K33	75.4 kHz
65μm	JP-K69	75.4 kHz

(5) When a rotary encoder is used, the print character width cannot be changed by changing the IJ printer character width set value.

When the print character width must be changed, a device (timing belt, pulley, etc.) which varies the conveyer speed and rotary encoder speed synch signal pulse frequency ratio must be installed.

(6) Restriction of the speed synchronization signal pulse frequency from the rotary encoder



See that the duty is between 30% and 70%. Duty =  $\frac{t2}{t1} \times 100\%$

Arrange for encoder signal cycle time ( $t1$ ) to be at least 5  $\mu$ s.

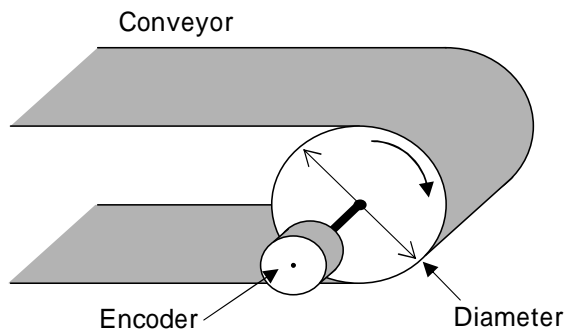
Flat period of encoder signal ( $t3$ ) : 2  $\mu$ s min.

(7) Rotary encoder selection method and calculation method

The print character width when the product speed matching function is used is determined by the amount of movement of the product per encoder pulse.

Several examples are introduced below.

Example 1: Calculate the resolution of the rotary encoder when the rotary encoder is connected directly to the conveyer shaft.

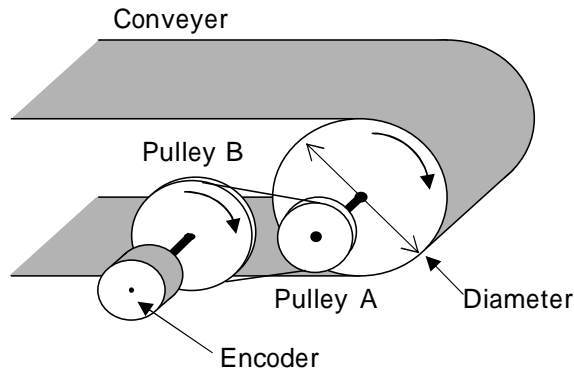


<Calculation conditions>

- Dot font : 5x7 dots (horizontal direction 5, vertical direction 7)
- Inter-character space : 1 dot (1 scan)
- Inter-character interval : 1.8mm [horizontal direction 6 dots (6 scans)]  
(Inter-character dots 5 + inter-characters space 1)
- Diameter of conveyer pulley : 60mm

- ① Distance the conveyer moves per 1 revolution of the rotary encoder  
60mmx3.14=188.4mm/rev
- ② Number of scans which must be executed while the conveyer is moving 1mm  
6 scans/1.8mm=3.33 scans/mm
- ③ Required resolution of the rotary encoder (number of output pulses per 1 revolution of the rotary encoder)  
188.4mm/rev x 3.33 scans/mm=628PPR ( $\approx$ 2500PPR, Division factor=4)

Example 2: Calculate the diameter ratio (RT) of the pulley when the rotary encoder is connected to the conveyer through a pair of pulleys.

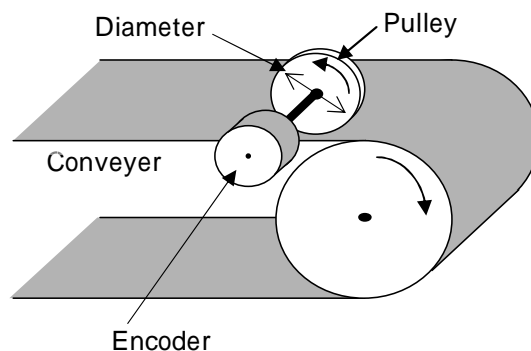


<Calculation conditions>

- Dot font : 5x7 dots (horizontal direction 5, vertical direction 7)
- Inter-character space : 1 dot (1 scan)
- Inter-character interval : 1.8mm [horizontal direction 6 dots (6 scans)]  
(inter-character dots 5 + inter-character space 1)
- Diameter of conveyer pulley : 60mm
- Resolution of rotary encoder : 1,000PPR

- ① Amount of movement of conveyer per 1 revolution of rotary encoder  
 $60\text{mm} \times 3.14 = 188.4\text{mm/rev}$
- ② Number of scans which must be executed while conveyer moves 1mm  
 $6\text{ scans}/1.8\text{mm} = 3.33\text{ scans/mm}$
- ③ Necessary number of output pulses (resolution) from rotary encoder  
 $188.4\text{mm/rev} \times 3.33\text{ scans/mm} = 628\text{PPR}$
- ④ Diameter ratio (RT) of pulley  
 $\text{RT} = \text{Diameter of pulley B} / \text{diameter of pulley A} = 1,000\text{PPR} / 628\text{PPR} = \text{Approx. } 1.6/1$

Example 3: Calculate the necessary rotary encoder resolution when a pulley is installed to the shaft of the rotary encoder and this pulley is connected to the conveyer.



<Calculation conditions>

- Dot font : 5x7 dots (horizontal direction 5, vertical direction 7)
- Inter-character space : 1 dot (1 scan)
- Inter-character interval : 1.8mm [horizontal direction 6 dots (6 scans)]  
(Inter-character dots 5 + inter-character space 1)
- Diameter of rotary encoder pulley : 95.5mm

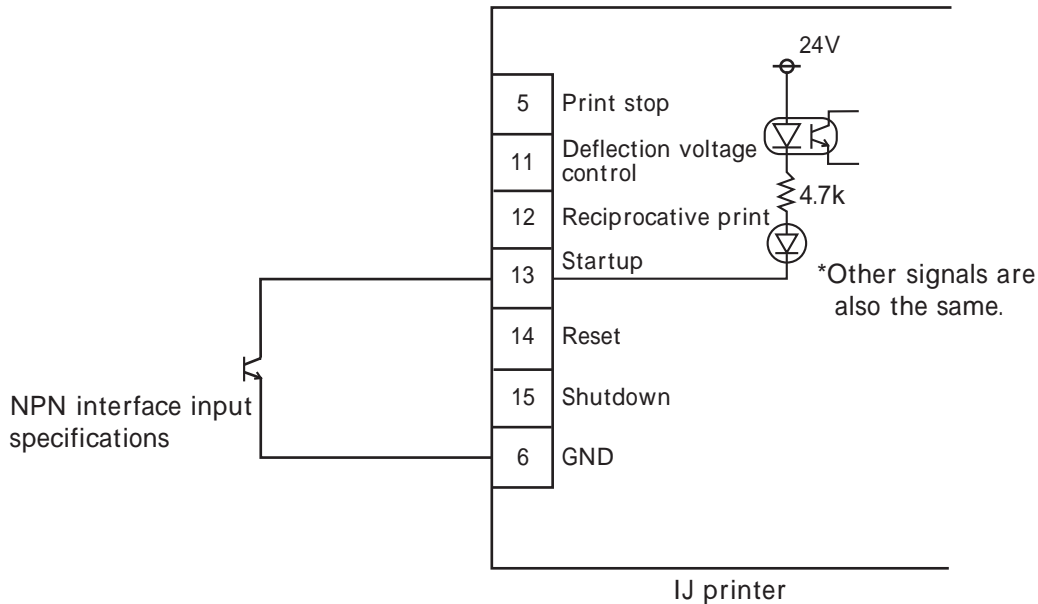
- ① Amount of movement of conveyer per 1 revolution of rotary encoder  
 $95.5\text{mm} \times 3.14 = 300\text{mm/rev}$
- ② Number of scans which must be executed while the conveyer is moving 1mm  
 $6\text{ scans}/1.8\text{mm} = 3.33\text{ scans/mm}$
- ③ Necessary number of output pulses (resolution) from rotary encoder  
 $300\text{mm/rev} \times 3.33\text{ scans/mm} = 1,000\text{PPR}$

### 4.3.3 Input function

The IJ printer can be controlled by inputting print stop, remote operation (“Startup”, “Shutdown”, “Reset”, “Deflection voltage control”) and reciprocative print switching to pins 5, 6, and 11 to 15 of TB1 by switch or contact signal from the outside.

#### ■ Internal circuit diagram

##### (a) NPN interface input (no voltage input)



● Each input is activated when contact ON.

##### ● No-contact signal (transistor)

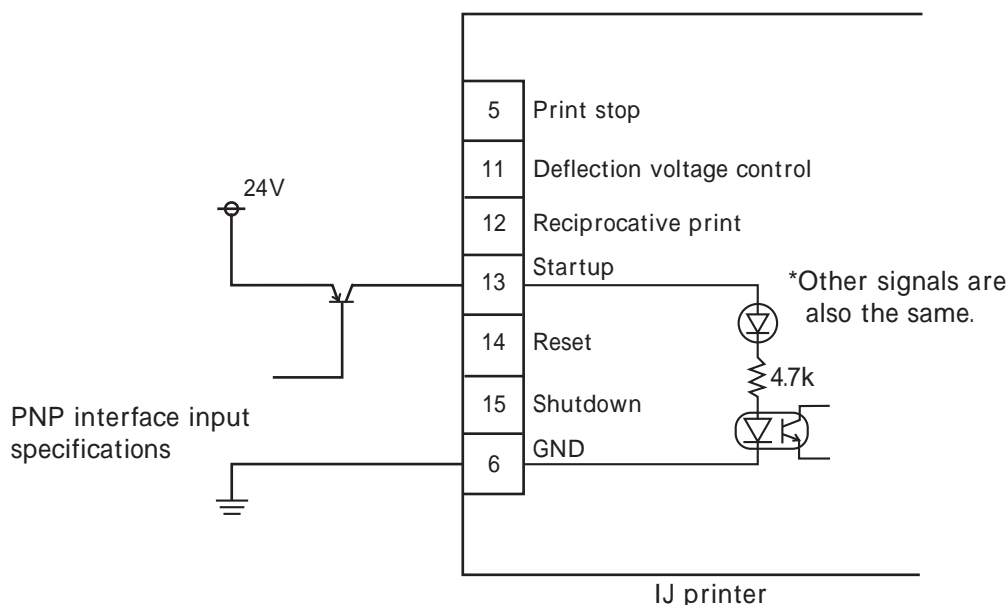
Withstand voltage : 30VDC or greater  
 Maximum drive current : 6mA or greater  
 Residual voltage : 2V or less  
 Leakage current : 0.1mA or less  
 Drive method : Open collector

##### ● Contact signal

Use a relay whose contacts chattering at contacts ON/OFF is 2.0ms or less.

##### (b) PNP interface input (voltage input)

##### ● Impressed voltage 24 to 30V



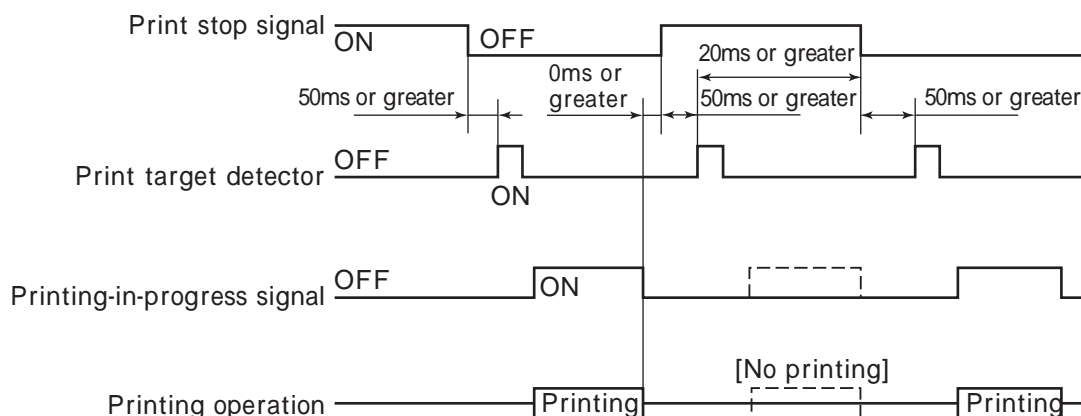
● Each input is activated when contact ON.

- No-contact (transistor)
  - Withstand voltage : 30VDC or greater
  - Maximum drive current : 6mA or greater
  - Residual voltage : 2V or less
  - Leakage current : 0.1mA or less
  - Drive method : Open collector
- Contact signal
  - Use a relay whose contacts chattering at contacts ON/OFF is 2.0ms or less.

### 4.3.3-1 Print stop signal input

[Function] This function prevents printing from the outside. (Note that the Ready to print output signal does not change even if this signal is input from the outside.)

- Input ON - In the IJ printer Ready to print state, the printer does not print even if the product target detector is turned ON. However, the product being printed cannot be aborted.
- Input OFF - In the IJ printer Ready to print state, the printer prints when the product target detector is turned ON.

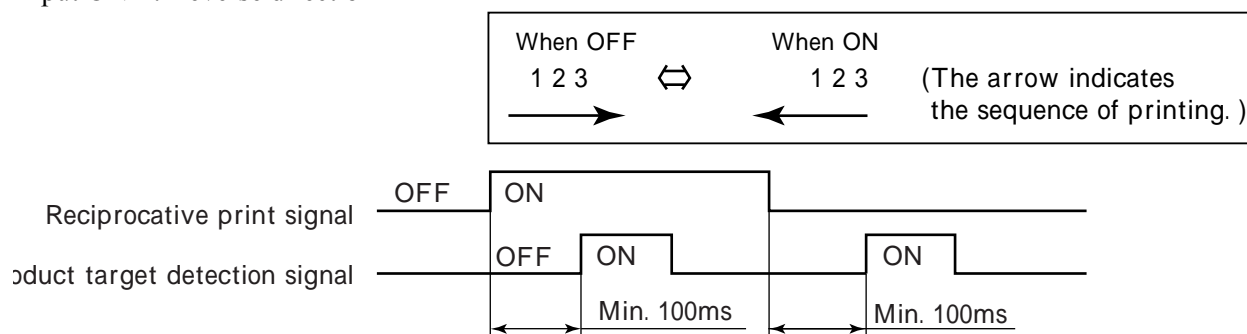


- Regarding the signal levels, the ON state indicates low level and the OFF state indicates high level.
- The tracking function cannot be used.  
In the tracking mode, the timing which stops printing by print stop signal cannot be specified.
- When Repeat print is set, the IJ printer is controlled by a print start signal generated internally.

### 4.3.3-2 Reciprocatve print signal input

[Function] This function switches the order of the characters to be printed.

- Input OFF : Forward direction (Example)
- Input ON : Reverse direction



\*When the user environment setup item "Change Character Orientation" was set to "Reverse direction printing", provide a minimum interval of 100ms up to input of the print target detector signal after changeover (ON→OFF, OFF→ON) of the reciprocative printing signal.  
When the Change Character Orientation was set to "normal or inverted" or "Character orientation 0 or 3", provide a minimum interval of 400ms up to input of the print target detector signal after signal changeover.

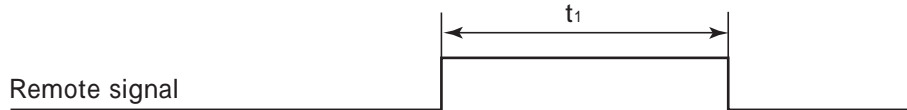
### 4.3.3-3 Remote startup signal input

[Function] This function inputs the same operations as the IJ printer operation state operation keys (“Startup”, “Shutdown”, “Reset”, “Deflection voltage control”(standby state and Ready to print state switching)) by external switch or contact signal.

#### (a) Judgment conditions

##### (a-1) Remote signals in general

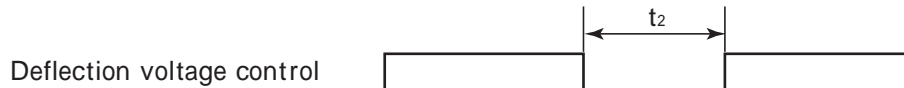
- ① Remote signal ON time  $t_1$  shall be 100ms or greater.



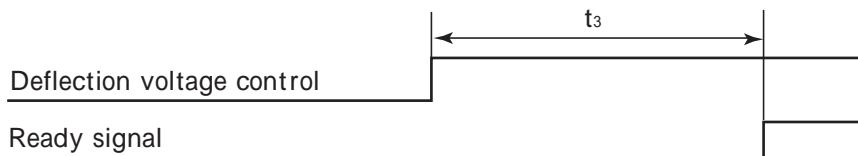
- ② Take measures so that multiple remote signals are not turned ON simultaneously. If multiple signals are turned ON simultaneously, the signals will not be accepted.
- ③ Signals cannot be received in the following cases:
  - ① When a confirmation window is open
  - ② When the Circulation control screen is opened by maintenance function
  - ③ When the Touch screen coordinate correction screen is opened by auxiliary function

##### (a-2) “Deflection voltage control”

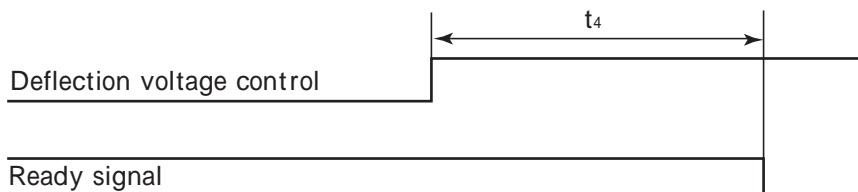
- ① When “Deflection voltage control” is input continuously, a certain OFF period is necessary. When  $t_2$  is 10ms or less, OFF is not detected and the signal is not received.



- ② Time until state changes after “Deflection voltage control” is input  $t_3$ : Within 3 seconds (Standby→Ready)



- $t_4$ : Within 100ms (Ready→Standby)

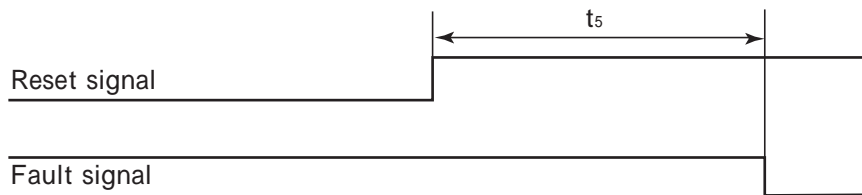


- ③ When “Deflection voltage control” is turned ON, state confirmation is necessary. If “Deflection voltage control” is turned on by mistake during printing, printing is aborted even in the process of printing and the IJ printer is switched from the Ready state to the Standby state. To prevent erroneous printing, input this signal when the printer is in a not printing state.
- ④ When the Product speed matching function is used, and when the print description is changed when the line is stopped during printing, etc., the IJ printer will enter the Standby state by this signal and the print description can be changed.



(a-3) “Reset signal”

- ① Input this signal when the fault signal is ON.  
In addition, after signal input, check if “Fault” is cleared.
- ② Turn on the “Reset signal” 30 seconds or longer after the IJ printer power is turned on.
- ③ The time until the fault is cleared after the “Reset signal” is input  
 $t_5$ : within 100ms

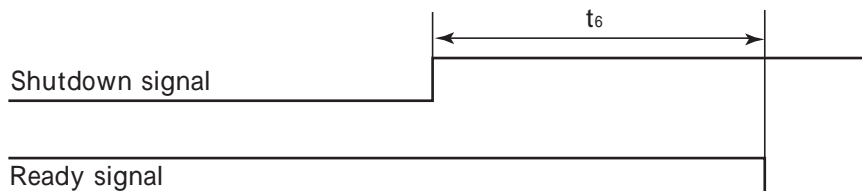


(a-4) “Startup signal”

- ① The “Startup signal” is a signal that specifies an automatic procedure up to ink ejection.  
Handle it with care.
- ② When the “Startup signal” is turned ON during ink stop processing, it is ignored.
- ③ Turn on the “Startup signal” 30 seconds or longer after the IJ printer power is turned on.  
In addition, input this signal after checking if the “Fault” is cleared.  
Moreover, it takes about 2 minutes for the IJ printer to enter the Ready to print state after the “Startup signal” is turned ON.

(a-5) “Shutdown signal”

- ① Turn off the power after confirming that the IJ printer has entered the Stop state after the “Shutdown signal” is turned ON  
It takes about 3 minutes for the IJ printer to enter the Stop state after the “Shutdown signal” is turned ON.
- ② The time until the state changes after the “Shutdown signal” is input  
 $t_6$ : within 100ms



(Notes)

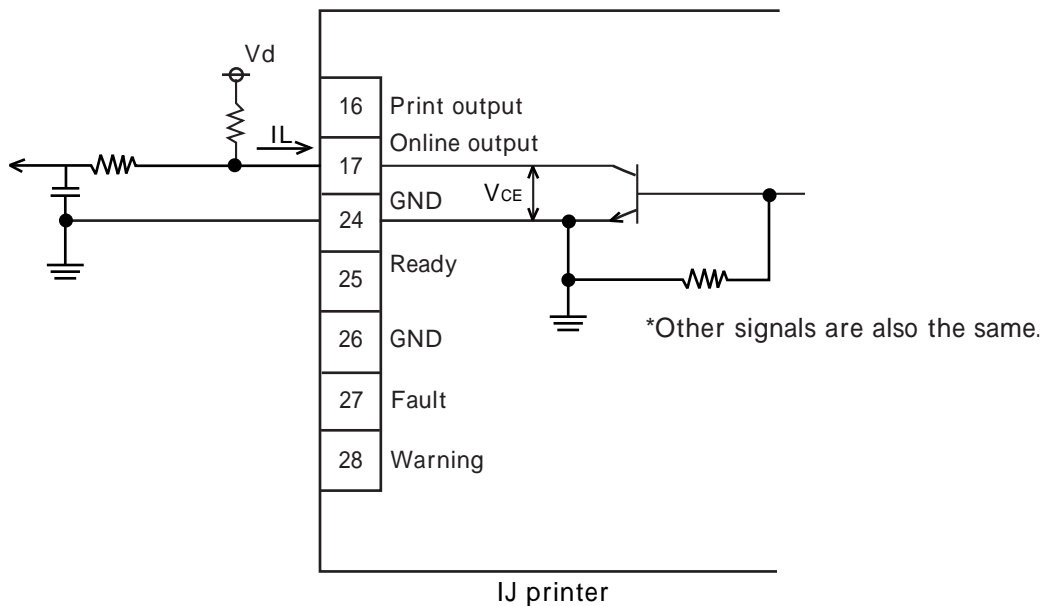
- (1) For key input, input must be confirmed, but when an external signal is input, processing is performed in accordance with the signal instructions. Especially, since “Startup”(startup signal) specifies ejection of the ink, handle it with care.
- (2) When a confirmation window is opened, input of all remote operation signals is disabled. Re-input the signals after the confirmation window is closed.  
When the line monitor screen is displayed, input of all the remote operation signals is disabled.
- (3) When the Touch screen coordinate correction or Circulation control screen is displayed, input of all the remote operation signals is disabled. Re-input the signals after a different screen was displayed.
- (4) The remote operation signals are enabled even when a rotary encoder is used and the conveyer is stopped during printing.
- (5) When the Shutdown signal is input while the Fault window is open, the ink is stopped with the window remaining displayed.

### 4.3.4 Output function

The state of the IJ printer is monitored by connecting the print output (“Print-in-progress” or “Print.complete”), online output, Ready, Fault, and Warning signals to pins 16 to 28 of TB1. (No-contact (transistor) output)

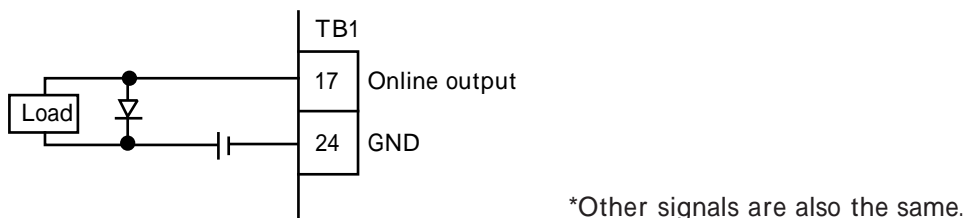
#### Internal circuit diagram

##### (a) NPN interface output (no-voltage output)



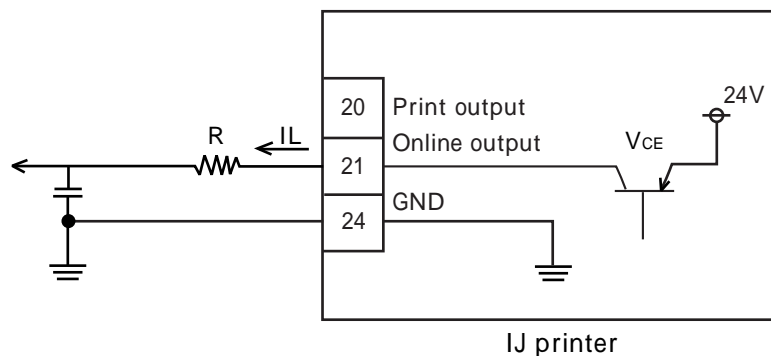
- The output transistor is open collector, and the logic is transistor ON at operation ON.
- The voltage and current used by the external equipment must satisfy the following specifications:  
 $1L \leq 20\text{mA}$  ( $V_{CE}$  : TYP0.6V, MAX2V)  
 $V_d \leq \text{DC}30\text{V}$

##### •Wiring precautions



- When the load is a relay, solenoid, or other inductive load, connect a diode to prevent generation of a counter electromotive force in parallel with the load.
- The load circuit is DC dedicated. It cannot be used with an AC load.

##### (b) PNP interface output (voltage output)



- The output transistor is open collector and the logic is transistor ON (voltage output) at operation ON.
- When used with external equipment, the following shall be satisfied:  
 $1L \leq 10\text{mA}$  ( $V_{CE}$  : TYP0.6V, MAX2V), Guide line of R :  $R \geq 2.2\text{k}\Omega$   
 Withstand voltage 50VDC or greater (2 times or more of the voltage used)

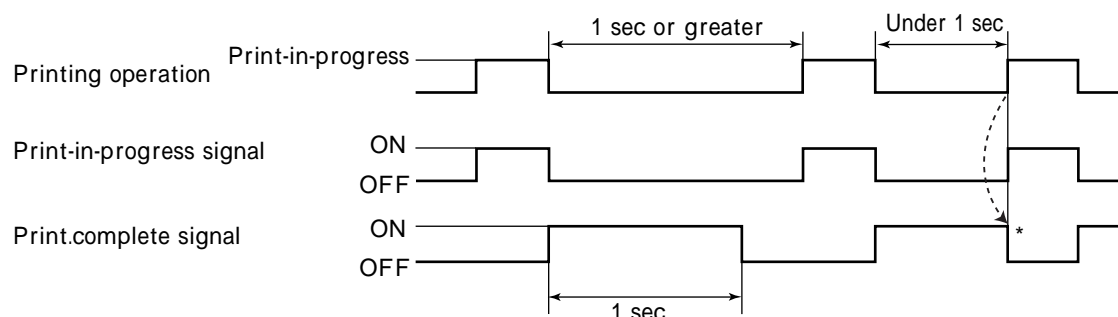
#### 4.3.4-1 Print output signal (NPN interface output : TB1-16, PNP interface output : TB1-20)

[Function] This function outputs a signal to the outside at IJ Printer Print.complete or Print-in-progress.

(a) Print-in-progress and Print.complete switching

Switching of the Print-in-progress and Print.complete signals is set at the User environment setup screen.  
(See Instruction manual “6.1 Set the user environment”.)

(b) Signal timing



\*When the next printing operation started within 1 second, turned OFF at the stage at which the printing operation started.

#### 4.3.4-2 Online output signal (NPN interface output : TB1-17, PNP interface output : TB1-21)

[Function] This function outputs a signal to the outside when the IJ printer is online.

#### 4.3.4-3 Ready output (NPN interface output only : TB1-25)

[Function] This function outputs a signal to the outside to indicate IJ printer Ready-to-print state or input mode state. (It is used to stop the conveyer when the IJ printer cannot print to prevent the product from flowing without being printed.)

#### 4.3.4-4 Fault signal output (NPN interface output only : TB1-27)

[Function] This function outputs an “IJ printer in fault mode” signal to the outside.

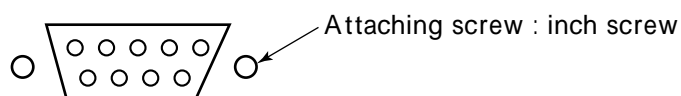
#### 4.3.4-5 Warning signal output (NPN interface output only : TB1-28)

[Function] This function outputs an “IJ printer in warning mode” signal to the outside.

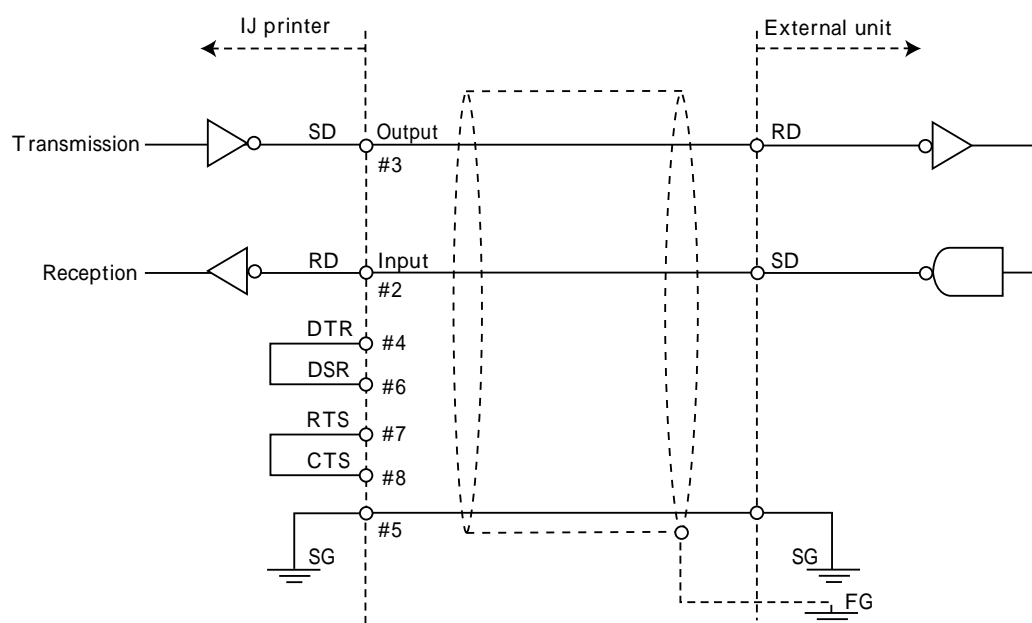
### 4.3.4-6 External communication (RS-232C)

External equipment is connected to the IJ printer by serial communication of RS-232C.

Pin No.	Name	Input/Output	Remarks
1	(NC)	-	
2	RD	Input	
3	SD	Output	
4	DTR	-	Connect with DSR by IJ printer side.
5	SG	-	
6	DSR	-	Connect with DTR by IJ printer side.
7	RTS	-	Connect with CTS by IJ printer side.
8	CTS	-	Connects with RTS by IJ printer side.
9	(NC)	-	



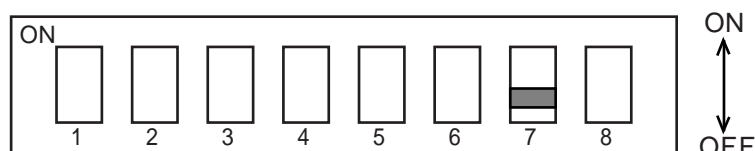
Connector on EZJ110 board :9-pin D sub-contractor(plug)



Cable length : maximum 5 m

Turn OFF SW1-bit7 on EZJ 110 board.

SW1



#### ⚠ CAUTION

- Do not bundle it together with heavy-current signals inside and outside the equipment so that it will not be influenced by noise from a heavy-current signals (a connection signal to the power supply, etc).
- Use a cable which is as short as possible.



# 5.COMMUNICATION (Optional on RX-B)

## 5.1 Overview

The functions described in this document are used to transmit printings and their registration numbers and enter them into the IJ printer with an external device connected to the IJ printer via an RS-232C serial communication line.

### (1) Printings transmission

- An "item number" and "character string" are transmitted from the external device to the IJ printer.
- The IJ printer receives the "item number" and "character string" and then makes preparations for making designated prints.
- The printings of print item for which bar codes or increased-width printings can also be transmitted by the communication functions.
- When a number (alphabetical character) is transmitted via a communications link to a count setting digit, the default value can be set.

### (2) Print data recall transmission

- A print data "message number" is transmitted from the external device to the IJ Printer.
- The IJ printer recalls print data designated by a "message number" and makes preparations for making prints.

### (3) Print data registration transmission

- Transmits Print data's "message number" and "message name" from external unit to the IJ printer.
- The IJ printer provides a "message name" and registers data currently being printed as print data of "registration No."

### (4) Print condition transmission

- The external device transmits "print specifications" and "print format" to the IJ printer.
- The IJ printer receives the "print specifications" and "print format", and prepares for making prints under the specified conditions.

### (5) Calendar conditions transmission, count conditions transmission

- Transmits and sets "initial values", "range" of count conditions, and "offset", "zero suppress" of calendar condition etc. from external unit to the IJ printer.

(6) User pattern character transmission

- This function is used to transmit a user pattern and enter it into the IJ printer.
- A transmitted user pattern can be edited using the "Create user pattern" function, which is provided as an auxiliary function.

(7) On-line/off-line transmission procedure

- Specifies switch of online state and offline state from external unit to the IJ printer.

(8) Remote operation transmission

- Specifies ink ejection/stop, deflection voltage control (on/off) and error reset from external unit to the IJ printer.

(9) Time control

- Transmits and sets "current time", "calendar time", etc., from external unit to the IJ printer.
- Inquires current time from external unit to the IJ printer and the IJ printer returns "current time".

(10) Communication buffer

- The print contents received through print content transmission will not be reflected in printing immediately, but will be temporarily held in buffer.
- The print contents are fetched from the buffer one by one for each printing, and reflected in subsequent printing.

## 5.2 Setting Communication Environment

### 5.2.1 Setting Communication Environment

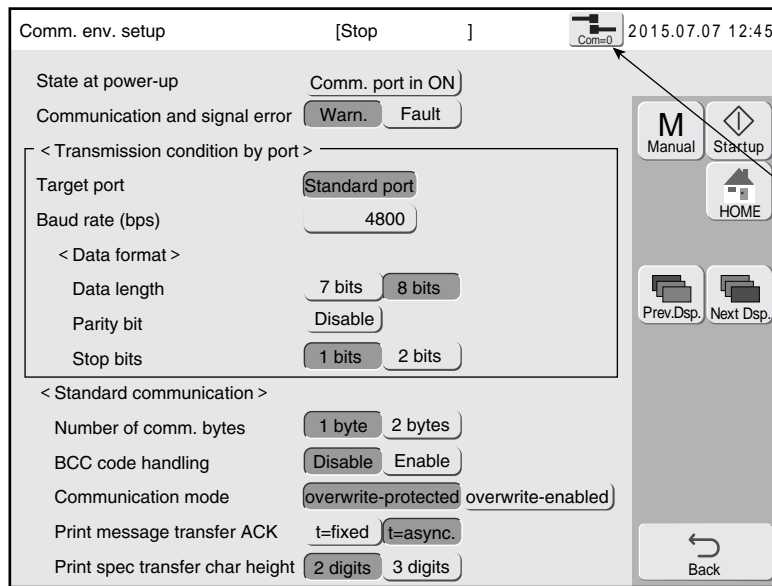
#### (1) Overview

Function	Description	Default
State at power-up	<ul style="list-style-type: none"> <li>Comm. port is OFF : Offline mode when the power is turned on.</li> <li>Comm. port is ON : Online mode when the power is turned on.</li> <li>OFF fixed : Always offline mode and you cannot change to the online mode.</li> </ul>	Comm. port is OFF
Communication and signal error	<ul style="list-style-type: none"> <li>Warning : An external communication error and external signal error are considered to be "Warning."</li> <li>Fault : An external communication error and external signal error are considered to be "Fault." The printer does not print even if the product target detector is turned ON.</li> </ul>	Warning
Baud rate	<ul style="list-style-type: none"> <li>Sets the baud rate at which communication is established with the outside.</li> <li>Eleven different settings are selectable: 150, 300, 600, 1,200, 2,400, 4,800, 9,600, 19,200, 38,400, 57,600, or 115,200 bps.</li> </ul>	4,800bps
Data format	<ul style="list-style-type: none"> <li>Sets the data length, parity bit, and stop bits for communication with the outside.</li> <li>T<sup>①</sup> following settings are available. <ul style="list-style-type: none"> <li>②Data length: 7 or 8 bits</li> <li>③Parity bit: none, odd, or even</li> <li>Stop bits: 1 bit or 2 bits</li> </ul> </li> </ul>	Data length: 8 bit Parity bit : none Stop bits : 1 bit
Number of comm. bytes	<ul style="list-style-type: none"> <li>Sets the number of character code bytes for communication with the outside.</li> <li>A setting of 1 byte or 2 bytes can be selected.</li> </ul>	1 byte
BCC code handling	<ul style="list-style-type: none"> <li>Setup can be performed so that no communication error occurs even if BCC code attached data is received.</li> </ul>	Disable
Communication mode	<ul style="list-style-type: none"> <li>Overwrite-protected: No new data will be received until the previously received data is printed.</li> <li>Overwrite-enabled : New data is received even if the previously received data has not been printed. The newly received data overwrites the old data.</li> </ul>	Overwrite- protected
Print message transfer ACK	<ul style="list-style-type: none"> <li>t=fixed : The time from receiving the print description from an external device to sending ACK becomes nearly fixed regardless of the transmission volume.</li> <li>t=async. : The system will be ready to print immediately after returning ACK.</li> </ul>	t=async.
Print spec. transfer char. height	<ul style="list-style-type: none"> <li>2 digits: Uses 2-digit data for character height setting ([00] to [99]) transmission.</li> <li>3 digits: Uses 3-digit data for transmission.</li> </ul>	2 digits

## (2) Operating procedure

### 1 Press **Communication environment setup** from the Environment setup menu.

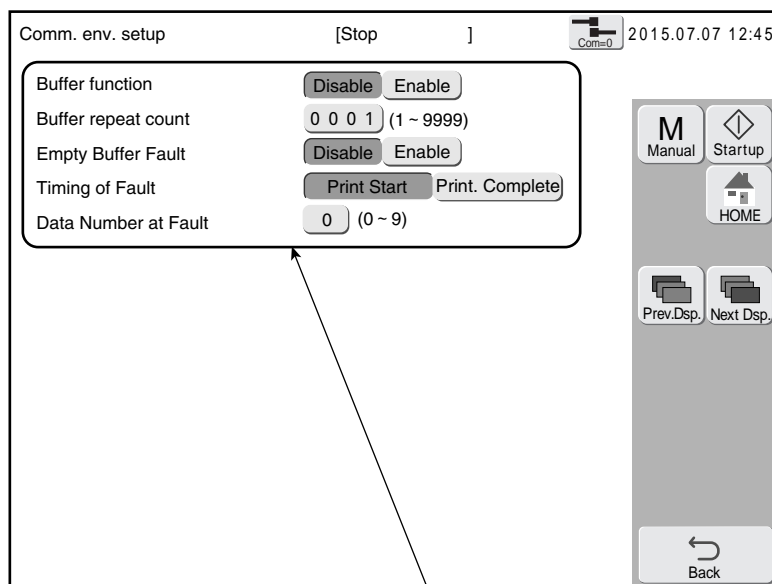
The "Communication environment setup" screen appears.



Change the on-line or off-line.

### 2 Press **Next settings**.

The second screen appears.



Setting of communication buffer  
(Refer to " 5.9 Communication buffer".)



## 5.2.2 Transmission Specifications

- (1) Communication method : Half duplex
- (2) Startup method : Started up by host
- (3) Synchronization method : Asynchronous
- (4) Transmission method : Bit serial transmission
- (5) Baud rate : 150, 300, 600, 1,200, 2,400, 4,800, 9,600, 19,200, 38,400, 57,600, 115,200(bps)
- (6) Codes transmitted : Alphanumerical characters, symbols, dedicated characters, user pattern characters, and punctuation characters
- (7) Data format : Formats A through J are selectable (see the table below).  
No other formats can be chosen.

Data format table

Format \ Item	Start bit (bits)	Data length (bits)	Parity bit (bits)	Stop bits (bits)
A	1	7	1 (even)	2
B	1	7	1 (odd)	2
C	1	7	1 (even)	1
D	1	7	1 (odd)	1
E	1	8	None	2
F (default)	1	8	None	1
G	1	8	1 (even)	1
H	1	8	1 (odd)	1
I	1	8	1 (even)	2
J	1	8	1 (odd)	2

Selecting a data length of 7 bits allows you to transmit alphanumerical characters and symbols but inhibits you from transmitting punctuation characters and using 2-byte codes to send dedicated characters and user pattern characters.

### (8) Bit configuration

Formats A and B

Start	b0	b1	b2	b3	b4	b5	b6	Parity	Stop	Stop
-------	----	----	----	----	----	----	----	--------	------	------

Formats C and D

Start	b0	b1	b2	b3	b4	b5	b6	Parity	Stop
-------	----	----	----	----	----	----	----	--------	------

Formats E

Start	b0	b1	b2	b3	b4	b5	b6	b7	Stop	Stop
-------	----	----	----	----	----	----	----	----	------	------

Formats F

Start	b0	b1	b2	b3	b4	b5	b6	b7	Stop
-------	----	----	----	----	----	----	----	----	------

Formats G and H

Start	b0	b1	b2	b3	b4	b5	b6	b7	Parity	Stop
-------	----	----	----	----	----	----	----	----	--------	------

Formats I and J

Start	b0	b1	b2	b3	b4	b5	b6	b7	Parity	Stop	Stop
-------	----	----	----	----	----	----	----	----	--------	------	------

Order of code transmission: Transmission occurs beginning with the least significant bit (b0).

### (9) Error control

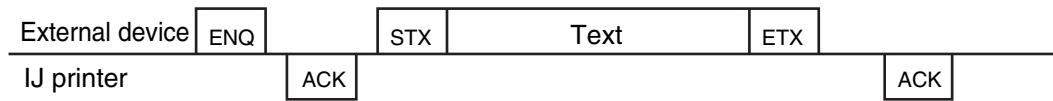
- Vertical parity error (detection on an individual character basis)
- Overrun error
- Framing error

## 5.3 Transmission Sequences

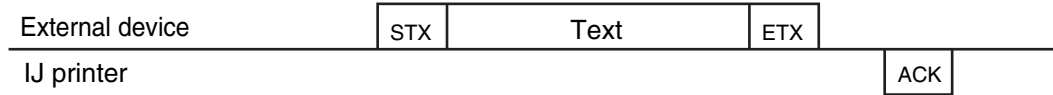
### 5.3.1 Common Transmission Sequences

#### (1) Basic transmission operation.

① When ENQ and ACK are present:

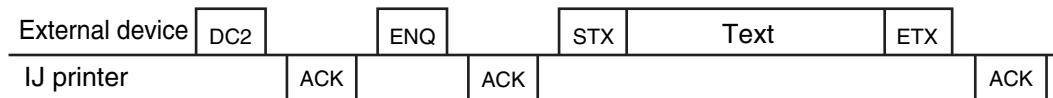


② When ENQ is omitted:

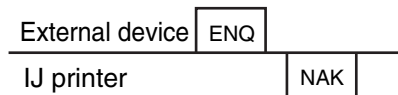


#### (2) When DC2 (retransmission) code is used

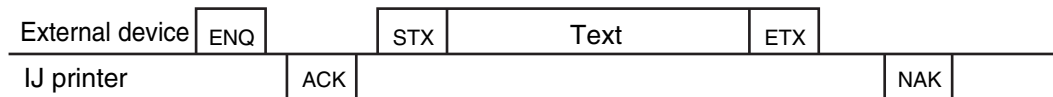
(When no response is received though ENQ has been issued and yet the contents of print area switched)



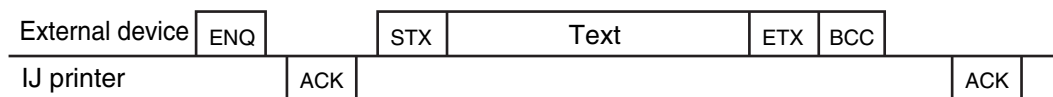
#### (3) When the IJ printer is incapable of receiving data or is off-line



#### (4) Abnormal transmission operation (when the text contains an erroneous message)



#### (5) When BCC code is included



#### (6) When the IJ printer power is OFF

No response will be returned for any code transmission from the external device.

#### (7) The printings, print specifications, print format, and user pattern data can be consecutively transmitted in the following order in a single session.

- ① Print format
- ② Print specifications
- ③ Printings

(Example)

Print format	Print format	Print format	Print specification	Print specification	Print content
--------------	--------------	--------------	---------------------	---------------------	---------------

The user pattern can be positioned anywhere within the above data chain.

The overall column setup data must be transmitted independently. If an attempt is made to send it together with the other data, a communication error (NAK response) occurs.

The print data recall must also be transmitted independently. Even if it is sent together with the other data, no error occurs. However, the print data recall takes precedence, rendering the other data invalid.

#### (8) Up to 3000 bytes of data can be transmitted at a time, including "STX" and "ETX". If the 3000-byte limit is exceeded, a communication error (NAK response) occurs.

(9) Any data transmitted by communication (print contents, print specifications, print format, and user pattern) is not stored except in the following cases.

[Conditions for storing the data]

- ① When the ink is stopped after communication by the Shut down key or a stop signal.
- ② At 01 minute of every hour.

(10) Transmit to the existing print item after creating a transmission objective print item.

## 5.3.2 Printings Transmission

### 5.3.2-1 Text

(1) When printings are to be changed

DLE	Item number	Printings
-----	-------------	-----------

(2) If deleting character string within print item

DLE	Item number
-----	-------------

(3) When multiple printings are to be designated

DLE	Item number	Printings	DLE	Item number
← Printings change →			← Printings erasure →	

- Multiple print items can be consecutively transmitted within one session.
- Print items are to be designated by specifying the item numbers. The item numbers need not be sorted.
- Print items not transmitted are not changed.
- Both calendar characters and count characters can be transmitted.

### 5.3.2-2 Item number

Item number	1	2	3	4	5	6	7	8	9	10
Code	31H	32H	33H	34H	35H	36H	37H	38H	39H	3AH
Item number	11	12	13	14	15	16	17	18	19	20
Code	3BH	3CH	3DH	3EH	3FH	40H	41H	42H	43H	44H
Item number	21	22	23	24	25	26	27	28	29	30
Code	45H	46H	47H	48H	49H	4AH	4BH	4CH	4DH	4EH
Item number	31	32	33	34	35	36	37	38	39	40
Code	4FH	50H	51H	52H	53H	54H	55H	56H	57H	58H
Item number	41	42	43	44	45	46	47	48	49	50
Code	59H	5AH	5BH	5CH	5DH	5EH	5FH	60H	61H	62H
Item number	51	52	53	54	55	56	57	58	59	60
Code	63H	64H	65H	66H	67H	68H	69H	6AH	6BH	6CH
Item number	61	62	63	64	65	66	67	68	69	70
Code	6DH	6EH	6FH	70H	71H	72H	73H	74H	75H	76H
Item number	71	72	73	74	75	76	77	78	79	80
Code	77H	78H	79H	7AH	7BH	7CH	7DH	7EH	7FH	80H
Item number	81	82	83	84	85	86	87	88	89	90
Code	81H	82H	83H	84H	85H	86H	87H	88H	89H	8AH
Item number	91	92	93	94	95	96	97	98	99	100
Code	8BH	8CH	8DH	8EH	8FH	90H	91H	92H	93H	94H

- The order of print items is indicated below.  
(3-column example) Circled number: Item number

Row1	Row2
①	④
②	⑤
③	⑥

### 5.3.2-3 Printings

- An array of “character codes”.
- The coding system varies with the mode which is designated by the “Number of communication bytes” setting entered from the communication environment setup screen.

Number of communication bytes	Alphanumerical characters and symbols	Dedicated characters	User pattern		Punctuation mark	Katakana	Calendar characters, Count characters
			(00 to 47)	(48 to 199)			
1-byte mode	ASCII	ASCII	ASCII	2-byte code	2-byte code	2-byte code	2-byte code
2-byte mode	ASCII	2-byte code	2-byte code	2-byte code	2-byte code	2-byte code	2-byte code

### 5.3.2-4 Character codes

#### (1) 2-byte code (number of communication bytes: 1-byte mode)

- For 1-byte mode, 2-byte codes are sandwiched between "SI" and "SO."

- One character

SI	High-order byte	Low-order byte	SO
----	-----------------	----------------	----

- Two or more characters

SI	High-order byte	Low-order byte	High-order byte	Low-order byte	High-order byte	Low-order byte	SO
----	-----------------	----------------	-----------------	----------------	-----------------	----------------	----

#### (2) 2-byte code (number of communication bytes: 2-byte mode)

High-order byte	Low-order byte
-----------------	----------------

#### (3) Mixture of ASCII and 2-byte codes (number of communication bytes: 1-byte mode)

ASCII	ASCII	SI	High-order byte	Low-order byte	High-order byte	Low-order byte	SO	ASCII
-------	-------	----	-----------------	----------------	-----------------	----------------	----	-------

#### (4) Mixture of ASCII and 2-byte codes (number of communication bytes: 2-byte mode)

ASCII	ASCII	High-order byte	Low-order byte	High-order byte	Low-order byte	ASCII
-------	-------	-----------------	----------------	-----------------	----------------	-------

### 5.3.2-5 Example of print contents transmission

#### (1) Example when No. of communication bytes: 1 byte mode

02H	10H	31H	41H	42H	43H	10H	32H	0FH	F2H	52H	F2H	52H	0EH	03H
STX	DLE	1	A	B	C	DLE	2	SI	Calendar		Calendar		SO	ETX
Print item 1						Print item 2								

#### (2) Example when No. of communication bytes: 2 byte mode

02H	10H	31H	41H	42H	43H	10H	32H	F2H	52H	F2H	52H	03H
STX	DLE	1	A	B	C	DLE	2	Calendar		Calendar		ETX
Print item 1						Print item 2						

[Transmission results]

Print item 1 → ABC  
Print item 2 → DD

DD:Calendar character "day"

# 5.3.3 Print Data Recall Transmission

## 5.3.3-1 Text

ESC2	Header 20H	Classification 31H	1000s place	100s place	10s palce	Units place

Print data message number (1000 to 2000)

[Existing machine message] Existing machine message can also be used.

ESC	Header 55H	100s place	10s place	Units place
-----	------------	------------	-----------	-------------

Print data message number (001 to 999)

ESC	Header 25H	10s place	Units place
-----	------------	-----------	-------------

Print data message number (01 to 99)

## 5.3.3-2 Print data message number

- An already saved print data number is to be designated as the print data message number.
- The message number is expressed by a combination of three ASCII codes.

## 5.3.3-3 Example of print contents transmission

### (1) Example of specifying 4-digit print data registration No.

02H	1FH	20H	31H	30H	30H	31H	32H	03H
STX	ESC2		1	0	0	1	2	ETX

Header, classification

Print data message number

[Transmission results]

Calls print data of print data message number 12.

## 5.3.4 Print data registration transmission

### 5.3.4-1 Text

- Specifies message number

ESC2	Header 21H	Classification 31H	1000s place	100s place	10s place	Units place
Print data message number (0001 to 2000)						

- Specifies registration No. and message name.

ESC2	Header 21H	Classification 31H	1000s place	100s place	10s place	Units place	(Contd.)
			Print data message number (0001 to 2000)				

ESC2	Header 21H	Classification 32H	Message name (1 to 12 digits)
			Message name : ASCII code (20H to 5FH, 61H to 7AH)

[Existing machine message] Existing machine message can also be used.

- Specifies registration No.

ESC	Header 55H	100s place	10s place	Units place
Print data message number (001 to 999)				

ESC	Header 25H	10s place	Units place
Print message number (01 to 99)			

- Specifies registration No. and message name.

ESC	Header 55H	100s place	10s place	Units place	ESC	Header 86H	Message name (1 to 12 digits)
Print data message number (001 to 999)							

ESC	Header 25H	10s place	Units place	ESC	Header 86H	Message name (1 to 12 digits)
Print data message number (01 to 99)						

## 5.3.4-2 Message name

### (1) message number specified

- A message name is automatically attached when print data is registered.
- Based on the message name displayed in the upper left hand corner of the screen, the last 4 digits are replaced with the message number and used as the new message name.

(Example) Registering for No. 123

Contents displayed in upper left hand corner of the screen :“ABCDEFGHijkl”  
 Message name after registration :“ABCDEFG 0123”

### (2) Message number and message name specified

- The specified message name attached when print data is registered.

### (3) Same message name is used for other message number

- If a message name is in use for other message number, new message name will be created by using original message name as a base and replacing its 7th and 8th digits with AA~ZZ.

(Example) Message name [ABC] is already registered on No.1. Register on No.2 using identical message name.

Message name of No.1: [ABC ]  
 Message name of No.2: [ABC AA ]

### (4) Characters available for message name

- Characters used for setting the message name transmission are different from characters used in manual input on registration screen.

Function	Alphanumeric character/ Symbols	Accent character/ Arabic character
Manual input	Available	Available
Message name transmission	Available	Unavailable

Numbers/symbols (ASCII code): 20H to 5FH, 61H to 7AH

## 5.3.4-3 Supplement

- When transmitting print data together with the print contents, send the print contents last.

## 5.3.4-4 Example of print data registration transmission

### (1) Example of registering by specifying message name

02H	1FH	21H	31H	30H	30H	31H	32H	1FH	21H	32H	41H	42H	43H	03H
STX	ESC2	!	1	0	0	1	2	ESC2	!	2	A	B	C	ETX

Header, classification    Print data message number    Header, classification    Message name

[Transmission results]

Message name "ABC" is assigned to current print data and is registered under message number 12.

## 5.3.5 Print Condition Transmission

### 5.3.5-1 Text

#### (1) Line count / print format uniformity

ESC2	Header 22H	Classification 31H
------	------------	--------------------

- Line count and print format are made uniform for all print items.
- Line count of all rows are made uniform based on the first row.
- Space between stages, character size, space between characters, whether or not to use bar code and double width size are made uniform based on the setting value of the first print item.
- Send the message independently. The message cannot be sent together with print format, print specs., and print contents.

[Existing machine message] Existing machine message can also be used.

ESC	Header 2BH	30H
-----	------------	-----

#### (2) Configuration of print format text

- Print item not specified

Print format text
-------------------

If item No. is not specified, it is set for all items.

To transmit print format and print specs. consecutively, transmit in the order of ① print format and ② print specs. If transmitted the other way round, an error will occur.

- Print item specified

ESC2	Header 70H	Item No.	Print format text

Item No. specified (1 to 100)

Only specified print item is applicable for change.

[Existing machine message] Existing machine message can also be used.

ESC2	Header 24H	Item No.	Print format text

Item No. specified (1 to 100)



### (3)Print format txet

- Line count and Line spacing

ESC2	Header 22H	Classification 32H	Line count	Line spacing
			Line count (1 to 4)	Line spacing (0 to 2)

- Character size and inter-character space

ESC2	Header 23H	Classification 31H	Character size	10s place	Units place
			Character size (30H to 3CH)	Inter-character space (0 to 28)	

- Increased width

ESC2	Header 23H	Classification 32H	Increased width
			Increased width (1 to 9)

Character size  
 30H : 4x5  
 31H : 5x5  
 32H : 5x8(5x7)  
 33H : 9x8(9x7)  
 34H : 7x10  
 35H : 10x12  
 36H : 12x16  
 37H : 18x24  
 38H : 24x32  
 39H : 11x11  
 3AH: 5x3(Chimney)  
 3BH: 5x5(Chimney)  
 3CH: 7x5(Chimney)

- Bar code type (Type change, Bar code "not used" → "used")

ESC2	Header 23H	Classification 33H	Type
			Bar code type (30H to 44H)

- Bar code "used"→ "not used"

ESC2	Header 23H	Classification 33H	30H
			30H :Bar code "not used"

- Readable code (Bar code EAN-13)

ESC2	Header 23H	Classification 34H	Code
			Readable code type (0: None, 1: 5 x 5, 2: 5 x 7)

- Prefix code (Bar code EAN-13)

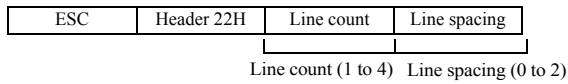
ESC2	Header 23H	Classification 35H	Tens position	Units position
				Prefix code (00 to 99)

Bar code type  
 30H : not used  
 31H : code 39  
 32H : ITF  
 33H : NW-7  
 34H : EAN-13  
 35H : DM8x32  
 36H : DM16x16  
 37H : DM16x36  
 38H : DM16x48  
 39H : DM18x18  
 3AH: DM20x20  
 3BH: DM22x22  
 3CH: DM24x24  
 3DH: Code 128 (Code set B)  
 3EH: Code 128 (Code set C)  
 3FH: UPC-A  
 40H: UPC-E  
 41H: EAN-8  
 42H: QR21x21  
 43H: QR25x25  
 44H: QR29x29

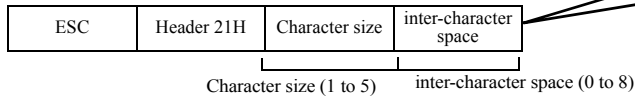
- Two or more print format items can be consecutively transmitted in a single chain.

[Existing machine message] Existing machine message can also be used.

- Line count and Line spacing

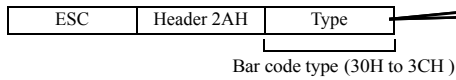


- Character size and inter-character space



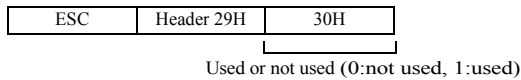
Character size  
 0 : 5x5  
 1 : 5x8(5x7)  
 2 : 7x10  
 3 : 12x16  
 4 : 18x24  
 5 : 24x32

- Bar code type

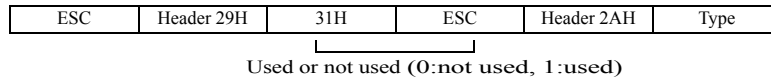


Bar code type  
 30H : code 39  
 31H : ITF  
 32H : NW-7  
 33H : EAN-13  
 34H : DM16x16  
 35H : DM8x32  
 36H : Code 128  
 37H : DM16x36  
 38H : DM16x48  
 39H : DM18x18  
 3AH : DM20x20  
 3BH : DM22x22  
 3CH : DM24x24

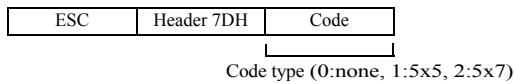
- Bar code "used" → "not used"



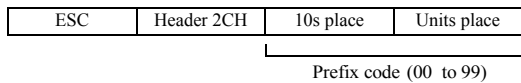
- Bar code "not used" → "used"



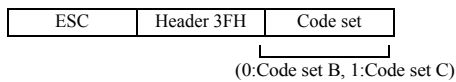
- ID code (Bar code EAN-13)



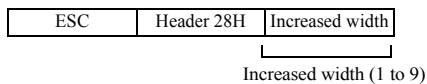
- Prefix code (Bar code EAN-13)



- Code set (Code128)

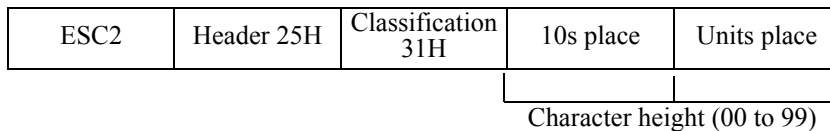


- Increased width

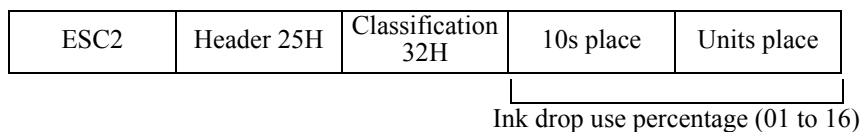


## (4) Print specifications

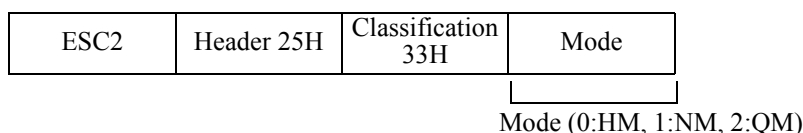
- Character height



- Ink drop use percentage



- High-speed printing



- Character width

ESC2	Header 25H	Classification 34H	1000s place	100s place	10s place	Units place
Character width (0000 to 3999)						

- Character orientation

ESC2	Header 25H	Classification 35H	Character orientation
Character orientation (0 to 3)			

- Print start delay

ESC2	Header 25H	Classification 36H	1000s place	100s place	10s place	Units place
Print start delay (0000 to 3999)						

- Print start delay (reverse)

ESC2	Header 25H	Classification 37H	1000s place	100s place	10s place	Units place
Print start delay (reverse) (0000 to 3999)						

- Product speed matching

ESC2	Header 25H	Classification 38H	Character orientation
Product speed matching (0:Time-based, 1:Encoder based)			

- Pulse rate division Factor

ESC2	Header 25H	Classification 39H	100s place	10s place	Units place
Pulse rate division Factor (001 to 999)					

- Repeat count

ESC2	Header 25H	Classification 3DH	1000s place	100s place	10s place	Units place
Repeat count (0000 to 9999)						

- Repeat intervals

ESC2	Header 25H	Classification 3EH	10000s place	1000s place	100s place	10s place	Units place
Repeat intervals (00000 to 99999)							

- Target sensor timer

ESC2	Header 25H	Classification 3FH	100s place	10s place	Units place
Target sensor timer (000 to 999)					

- Target sensor filter

ESC2	Header 25H	Classification 40H	Division
------	------------	-----------------------	----------

Division (1:time setup, 2:until end of print)

- Target sensor filter setting value

ESC2	Header 25H	Classification 41H	1000s place	100s place	10s place	Units place
------	------------	-----------------------	-------------	------------	-----------	-------------

Value (0000 to 9999)

- Two or more print specification items can be consecutively transmitted in a single chain.

[Existing machine message] Existing machine message can also be used.

- Character height

ESC	Header 30H	10s place	Units place
-----	------------	-----------	-------------

Character height (00 to 99)

- Character width

ESC	Header 31H	100s place	10s place	Units place
-----	------------	------------	-----------	-------------

Character width (000 to 199)

- Character orientation

ESC	Header 32H	Units place
-----	------------	-------------

Character orientation (0 to 3)

- Repeat intervals

ESC	Header 34H	1000s place	100s place	10s place	Units place
-----	------------	-------------	------------	-----------	-------------

Repeat intervals (0000 to 9999)

- Repeat count

ESC	Header 35H	1000s place	100s place	10s place	Units place
-----	------------	-------------	------------	-----------	-------------

Repeat count (0000 to 9999)

- Print start delay

ESC	Header 33H	1000s place	100s place	10s place	Units place
-----	------------	-------------	------------	-----------	-------------

Print start delay (0000 to 9999)

- Print start delay (reverse)

ESC	Header 36H	1000s place	100s place	10s place	Units place
-----	------------	-------------	------------	-----------	-------------

Print start delay (reverse) (0000 to 9999)

- Target sensor timer

ESC	Header 37H	100s place	10s place	Units place
-----	------------	------------	-----------	-------------

Target sensor timer (000 to 999)

- Target sensor filter

ESC	Header 38H	1000s place	100s place	10s place	Units place
-----	------------	-------------	------------	-----------	-------------

Target sensor filter (0000 to 9999)

ESC	Header 39H	Division
-----	------------	----------

Division (1:time setup, 2:until end of print)

- High-speed printing

ESC	Header 3AH	Mode
-----	------------	------

Mode (0:HM, 1:NM, 2:QM)

- Product speed matching

ESC	Header 3BH	Character orientation
-----	------------	--------------------------

Product speed matching (0:Time-based, 1:Encoder based)

- Pulse rate division Factor

ESC	Header 3CH	100s place	10s place	Units place
-----	------------	------------	-----------	-------------

Pulse rate division Factor (001 to 999)

- Ink drop use percentage

ESC	Header 3DH	10s place	Units place
-----	------------	-----------	-------------

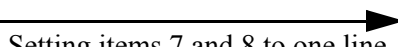
Ink drop use percentage (01 to16)

## 5.3.5-2 Text setup rules

### (1) Line count

- When you change the line count for a print item in a certain column, you must also set the line count for the other print items that belong to the same column.

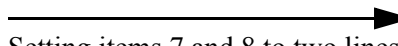
(Example)

1	3	5	7	 Setting items 7 and 8 to one line		1	3	5	
2	4	6	8			2	4	6	7 8

Transmit the line count consecutively to items 7 and 8. If you transmit the line count to only one of them, a communication error occurs.

- When you change the line count for a print item, you must also set the line count for the other print items that belong to the same column as the former one.

(Example)

1	3	5		 Setting items 7 and 8 to two lines		1	3	5	7
2	4	6	7 8			2	4	6	8

Transmit the line count consecutively to items 7 and 8. If you transmit the line count to only one of them, a communication error occurs.

### (2) Line spacing

- When you transmit one-line setup data for a certain print item, you have to transmit a line spacing setting of "0" as well as for the same chain as the one-line setup data.  
If you do not transmit a line spacing setting of "0", a communication error occurs.
- Ensure that the same line spacing setting is selected for print items belonging to the same column.  
In other words, when you transmit a new line spacing setting for a print item in a certain column, you must consecutively transmit the same setting to the other print items in the same column.

### (3) Character size and inter-character space

- The available inter-character space varies with the character size.  
See "4.7.4 Set dot matrix, inter-character space, and other parameters" ④ of the Instructions Manual.
- The total number of vertical dots cannot exceed the limit.

Machine type	Maximum number of vertical dots
RX-BD, RX-SD(2-line)	20 dots
Option:RX-SD(3-line)	30 dots
Option:RX-SD(4-line)	32 dots

- Some characters cannot be entered depending on the character size. If a print item contains an unavailable character after a character size change, its contents are changed to a space.  
See "4.7.4 Set dot matrix, inter-character space, and other parameters" ③ of the Instructions Manual.
- If an inter-character space other than "0" is transmitted for a print item for which bar code setup is completed, a communication error occurs.

#### (4) Bar code use and bar code type

- Two or more bar code types cannot coexist.
- When bar code set up is completed for a print item, its inter-character space can not be changed.  
(The inter-character space need not be transmitted in this case.)
- When the bar code type is ITF or code128(code set C), you have to observe the following input rules.  
If you violate the rules, the contents of an illegal print item will be deleted.

ITF or code128(code set C) input rules

No.	Input rule	Input example
1	Characters must be paired to make an entry.	(Correct) [012345] (Incorrect) [01234]

- Some characters cannot be entered depending on the bar code type.  
If any unacceptable character is included in a print item for which bar code setup is completed, the contents of the print item are changed to a null character. See "4.7.5 Print a bar code" of the Instructions Manual.
- FNC1 is a control code used for Code128, 2-byte code of 81A6, indicated as ※ on print layout screen.

### 5.3.5-3 Example of print conditions transmission

#### (1) Example where print item is not specified

02H	1FH	22H	32H	31H	30H	1FH	25H	36H	30H	31H	32H	33H	03H
STX	ESC2	"	2	1	0	ESC2	%	6	0	1	2	3	ETX

Header, classification
Line count 1  
line spacing 0
Header, classification
Write position 123

[Transmission results]

All print items are set as 1 stage, write position is changed to 0123.

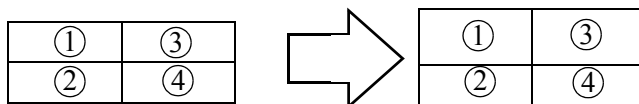
#### (2) Example where print item is specified

02H	1FH	70H	31H	1FH	23H	31H	34H	30H	30H	1FH	70H	33H	1FH	23H	31H	34H	30H	30H	03H
STX	ESC2	p	1	ESC2	#	1	4	0	0	ESC2	p	3	ESC2	#	1	4	0	0	EXT

Header, item No.
Header, classification
Character size 7x10,  
inter-character space 0
Header, item No.
Header, classification
Character size 7x10,  
inter-character space 0

[Transmission results]

Upper stage character size is changed.



## 5.3.6 Calendar Conditions Transmission

### 5.3.6-1 Text

#### (1) Calendar Conditions Transmission

- Offset

ESC2	Header 28H	Classification 32H	Calendar block No.	Type	1000s place	100s place	10s place	Units place
------	------------	--------------------	--------------------	------	-------------	------------	-----------	-------------

Calendar block No.  
(1 to 8)

Type  
30H : Year  
31H : Month  
32H : Day  
33H : Hour  
34H : minute

Offset

Offset setting range

Setting item	Offset setting range
Year	0000 to 9999
Month	0000 to 9999
Day	0000 to 1999
Hour	-023 to 0099
Minute	-059 to 0099

“-” (2DH) when setting negative offset to hour, minute.

- Zero-suppression

ESC2	Header 28H	Classification 34H	Calendar block No.	Type	Mode
------	------------	--------------------	--------------------	------	------

Calendar block No.  
(1 to 8)

Type  
30H : Year  
31H : Month  
32H : Day  
33H : Hour  
34H : minute  
35H : Weeks  
36H : Day of week

Mode  
30H : Disable  
31H : Zero-suppression (space)  
32H : Zero-suppression (character fill)

[Existing machine message] Existing machine message can also be used.

- Offset

ESC2	Header 76H	Item No.	Type	1000s place	100s place	10s place	Units place
------	------------	----------	------	-------------	------------	-----------	-------------

Offset

- Zero-suppression

ESC2	Header 77H	Item No.	Type	Disable or Enable
------	------------	----------	------	-------------------

Disable or Enable (0: Disable;  
1: Zero-suppression (space))

Type  
30H : Year  
31H : Month  
32H : Day  
33H : Hour  
34H : minute

## (2) Count Conditions Transmission

ESC2	Header 2CH	Classification	Count block No.	Setting value
------	------------	----------------	-----------------	---------------

Calendar block No.  
(1 to 8)

Classification	Item name	Setting value
31H	Initial value	Character code
32H	Range 1	Character code
33H	Range 2	Character code
34H	Update setting range (In progress)	000000 to 999998
35H	Update setting range (Unit)	000001 to 999999
36H	Increment setting range	01 to 99
37H	Direction	0: up, 1: down
38H	Jump from	Character code
39H	Jump to	Character code
3AH	Reset	Character code
3BH	Reset signal (option)	0:signal 1, 1:signal 2
3EH	External signal count (option)	0: Disable, 1: Enable

Character code of setting value

Mode	Alphanumeric	User pattern
1-byte mode	ASCII	ASCII
2-byte mode	ASCII	2-byte code

\*) When count characters has been divided (e.g., [ **CC** **CC** ]), transmit four-digits characters.



[Existing machine message] Existing machine message can also be used.

(1) Initial value, Range, Jump from, Jump to, Reset

ESC	Header 80H	Item No.	Type	Setting value
-----	------------	----------	------	---------------

Code of type

	Initial value	Range 1	Range 2	Jump from	Jump to	Reset
ASCII	30	31	32	33	34	35

ASCII is hexadecimal number.

Character code of setting value

Mode	Alphanumeric	User pattern
1-byte mode	ASCII	ASCII
2-byte mode	ASCII	1-byte code

\*) When count characters has been divided (e.g., [ CC CC ]), transmit four-digits characters.

(2) Update setting range

ESC	Header 81H	Item No.	Type	100000s place	10000s place	1000s place	100s place	10s place	Units place
-----	------------	----------	------	---------------	--------------	-------------	------------	-----------	-------------

Code of type

	In progress	Unit
ASCII	30	31

ASCII is hexadecimal number.

Update setting range

Set item	Update setting range
In progress	000000 to 999998
Unit	000001 to 999999

(3) Direction, External signal count, Reset signal

ESC	Header 82H	Item No.	Type	0/1
-----	------------	----------	------	-----

Direction (0: up, 1: down)  
External signal count (0: Disable, 1: Enable)  
Reset signal (0:Signal1, 1:Signal2)

Code of type

	Direction	External signal count	Reset signal
ASCII	30	31	32

ASCII is hexadecimal number.

(4) Increment

ESC	Header 83H	Item No.	Type	10s place	Unit place
-----	------------	----------	------	-----------	------------

Increment setting range

Set item	Increment setting range
Increment	01 to 99

## 5.3.6-2 Example of calendar conditions transmission

### (1) Example of offset

02H	1FH	28H	32H	32H	32H	30H	30H	31H	32H	03H
STX	ESC2	(	2	2	Day	0	0	1	2	ETX

Header, Calendar Offset 12 days  
classification block No.

[Transmission results]

Defines offset 12 days for calendar block 2.

### 5.3.6-3 Example of count conditions transmission

#### (1) Example of reset

02H	1FH	2CH	3AH	31H	30H	30H	30H	30H	30H	03H
STX	ESC2	,	:	1	0	0	0	0	0	ETX

Header,  
classification
Count  
block No.
Reset value 00000

[Transmission results]

Defines reset value 00000 for count block 1.

### 5.3.7 User Pattern Character Transmission

#### 5.3.7-1 Text

- When the number of communication bytes is set to "1" for communication

ESC2	Header 32H	Classification	Character code	Pattern data array
------	------------	----------------	----------------	--------------------

Character size

- When the number of communication bytes is set to "2" for communication environment setup purposes

ESC2	Header 32H	Classification	High-order byte	Low-order byte	Pattern data array
------	------------	----------------	-----------------	----------------	--------------------

Character size
Character code

[Existing machine message] Existing machine message can also be used.

- When the number of communication bytes is set to "1" for communication environment setup purposes

ESC2	Header 20H	Character size	Character code	Pattern data array
------	------------	----------------	----------------	--------------------

Character size

0 : 5x5

1 : 5x8(5x7)

2 : 7x10

3 : 12x16

4 : 18x24

5 : 24x32

- When the number of communication bytes is set to "2" for communication environment setup purposes.

ESC2	Header 20H	Character size	High-order byte	Low-order byte	Pattern data array
------	------------	----------------	-----------------	----------------	--------------------

Character code

### 5.3.7-2 Character size

- The character size is represented by the codes shown in the following table.

### 5.3.7-3 Pattern data

#### (1) Pattern data length

- The pattern data length per character varies with the character size as indicated below.

Character size code table

No.	Character size	Character size code	Pattern data length (bytes)	Remarks
1	4x5	30H	8	
2	5x5	31H	8	
3	5x8(5x7)	32H	8	
4	9x8(9x7)	33H	16	
5	7x10	34H	16	
6	10x12	35H	32	
7	12x16	36H	32	
8	18x24	37H	72	
9	24x32	38H	128	
10	11x11	39H	32	
11	5x3(chimney)	3AH	5	
12	5x5(chimney)	3BH	5	
13	7x5(chimney)	3CH	7	

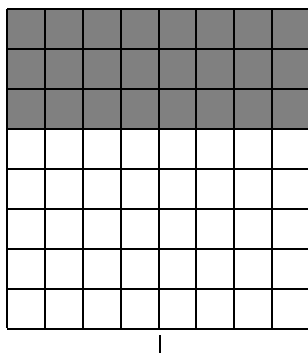
#### (2) Pattern data structure

The pattern data structure and data creation rules are explained below.

##### a) Rules

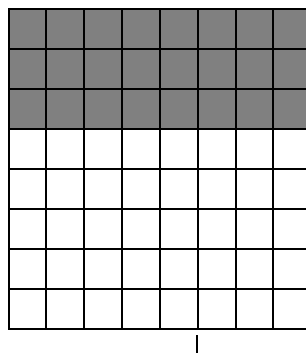
- Each pattern data unit consists of 8 bits. For each bit, dot presence is indicated by the value 1 (dot present) or 0 (dot not present).
- Vertically arrayed 8 dots correspond to 8 bits (1 byte).
- For character sizes of 4x5, 5x5, 7x10, 5x7, and 9x7, etc., some portions of 8-bit data are unavailable. Set such portions to "0". (Even if you set them to "1", processing will be performed with their settings changed to "0".)

4x5



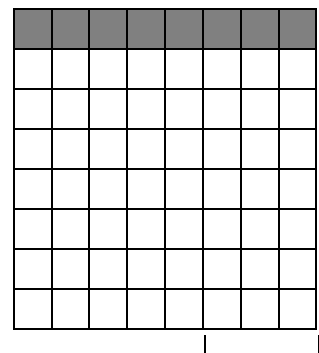
Inter-character space data area

5x5



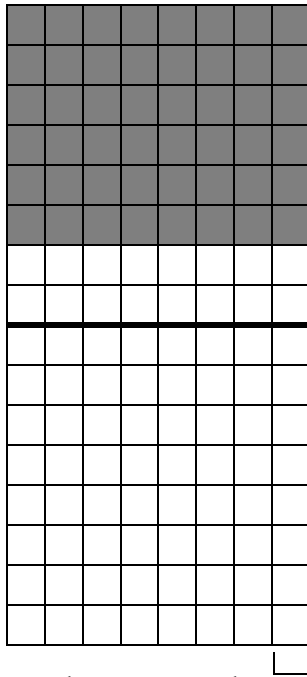
Inter-character space data area

5x7



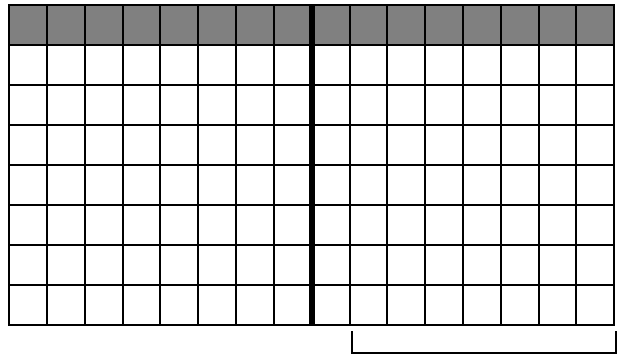
Inter-character space data area

7x10



Inter-character space data area

9x7

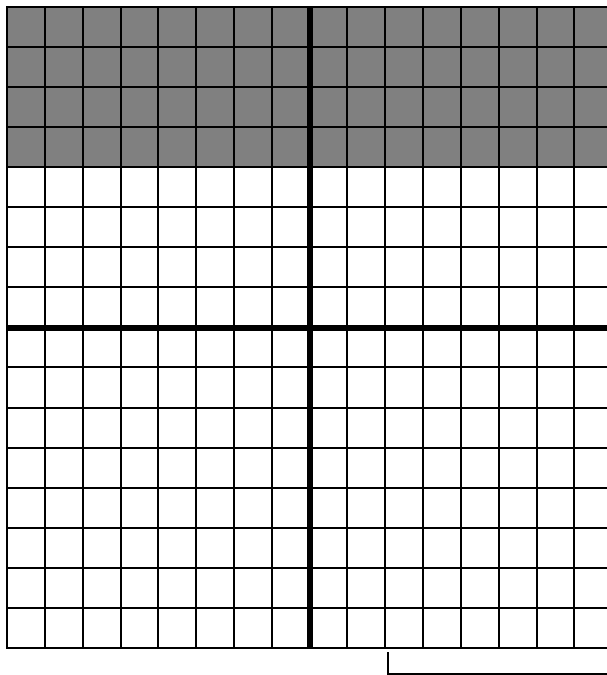


Inter-character space data area

Unavailable area

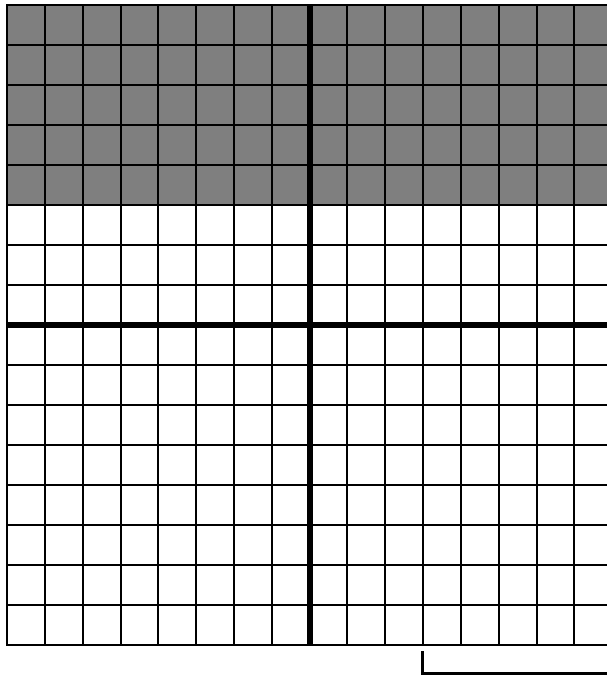
Note: The inter-character space is 1 dot at the maximum.

10x12



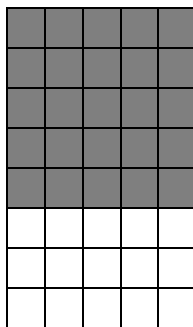
Inter-character space data area

11x11

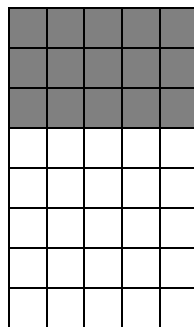


Inter-character space data area

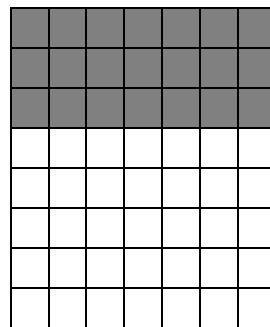
5x3 (Chimney)



5x5 (Chimney)



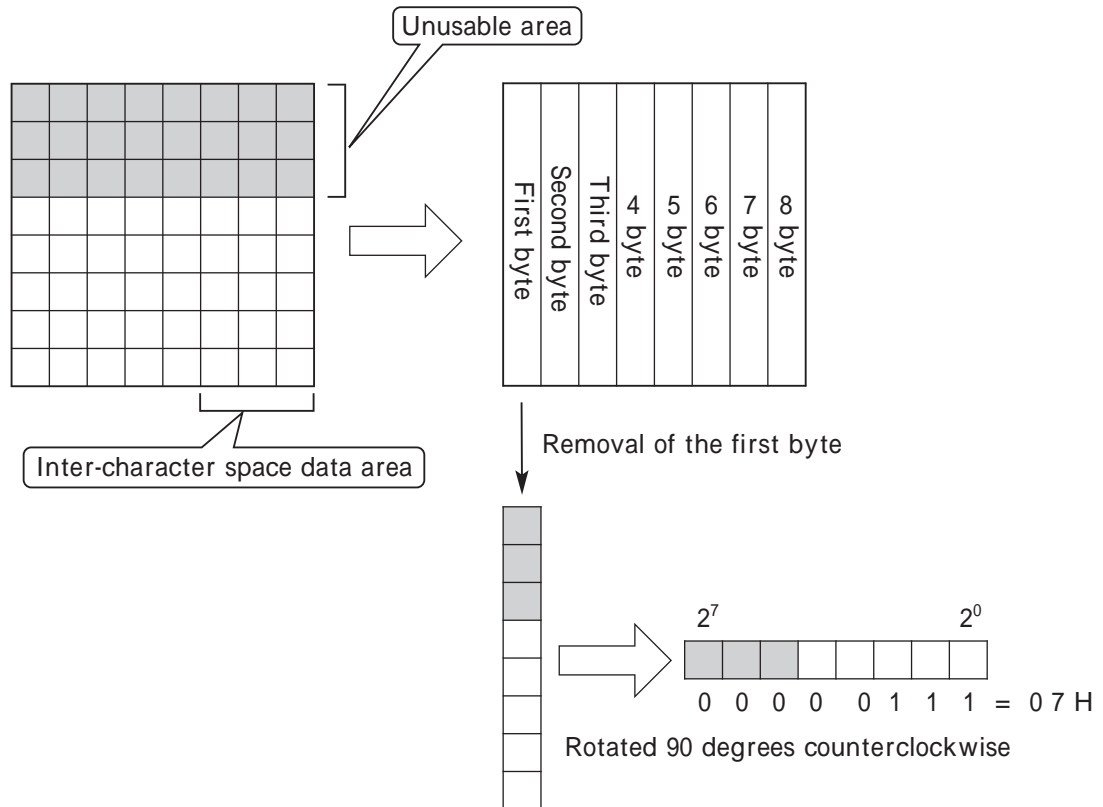
7x5 (Chimney)



- For pattern data composition purposes, the data is arranged in successive order, beginning from the bottom left, from bottom to top and from left to right.

## b) Pattern data example

[For a character size of 5x5]



Composition order	1	2	3	4	5	6	7	8
Pattern data	07H	0AH	12H	0AH	07H	00H	00H	00H

A full-page sheet of white graph paper with a light gray grid. The grid consists of small squares, approximately 10 units wide by 10 units high. There are no margins or additional markings on the page.

## 5-27 • Transmission Sequences

### 5.3.7-4 Character codes

For character code designation, either ASCII codes or 2-byte codes are used.

#### (1) ASCII codes (when the number of communication bytes is 1)

User pattern character	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15
ASCII	D0	D1	D2	D3	D4	D5	D6	D7	D8	D9	DA	DB	DC	DD	DE	DF
User pattern character	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
ASCII	E0	E1	E2	E3	E4	E5	E6	E7	E8	E9	EA	EB	EC	ED	EE	EF
User pattern character	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47
ASCII	F0	F1	F2	F3	F4	F5	F6	F7	F8	F9	FA	FB	FC	FD	FE	FF

ASCII codes are in hexadecimal notation.

Applicable to cases where the number of user pattern characters does not exceed 48 (user pattern characters 00 through 47).

#### (2) 2-byte codes (when the number of communication bytes is 2)

User pattern character 00: F140 = high-order byte F1 + low-order byte 40

See "5.4.1 Code Tables".

### 5.3.7-5 Supplement

- (1) If the same character code is used to transmit two or more user pattern character data in a single message, the last-transmitted data takes effect.
- (2) When two or more user pattern characters having differing character sizes or character codes are transmitted in a single message, no limitations are imposed on the order in which they are transmitted.

### 5.3.7-6 Example of user registration character transmission

#### (1) Example where number of communication bytes of communication environment settings is "1 byte," character size is "5 x 5" and character code is "47."

02H	1FH	32H	31H	FFH	07H	0AH	12H	0AH	07H	00H	00H	00H	03H
STX	ESC2	2	5x5	47	-	-	-	-	-	-	-	-	ETX

Header,  
classification

Code 47

Pattern data arrangement

[Transmission results]

Defines character size 5 x 5, character code 47 user pattern.



## 5.3.8 On-line/off-line Transmission Procedure

### 5.3.8-1 Text

#### (1) Change to online

ESC2	Header 73H
------	------------

#### (2) Change to offline

ESC2	Header 74H
------	------------

[Existing machine message] Existing machine message can also be used.

(1) Change to online

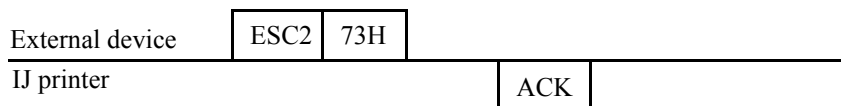
ESC	Header 79H
-----	------------

(2) Change to offline

ESC	Header 7AH
-----	------------

- In the following cases, Online/Offline transmission cannot be performed.  
If it is attempted, NAK code will be the reply:
  - ① "Apply" key is displayed while inputting set value.
  - ② In the "Communication environment setup" screen, "Off fixed" is selected for "State at power-up" item.
  - ③ During input of count conditions.
  - ④ The confirmation window is open.
  - ⑤ The circulation control screen is opened by the maintenance function.
  - ⑥ The touch screen setup screen is opened by the auxiliary function.
  - ⑦ The communication monitor screen is opened.

### 5.3.8-2 Transmission example



ENQ, STX and ETX are not required.

## 5.3.9 Remote Operation Transmission

### 5.3.9-1 Text

ESC2	Header 72H	Type
------	------------	------

Type  
 30H:Operation start  
 31H:Operation stop  
 32H:Deflection voltage control (ON)  
 33H:Deflection voltage control (OFF)  
 34H:Fault clear

[Existing machine message] Existing machine message can also be used.

ESC	Header 71H	Type
-----	------------	------

### 5.3.9-2 Types of control

Types of control for operation

No.	Type	Content	Function enabled status
1	Operation start	Starts to jet ink, and shifts from stop status to ready status. (Same process as with <Startup> button)	Stop status
2	Operation stop	Stops ink jet, and shifts to stop status (Same process as with <Shutdown> button)	When ink is being jetted (standby, ready status, etc.)
3	Deflection voltage control (ON)	Turns deflection voltage on (Same process as with <Ready> button in Manual control menu window)	Standby status
4	Deflection voltage control (OFF)	Turns deflection voltage off (Same process as with <Standby> button in Manual control menu window)	Ready status
5	Fault clear	Closes the window for any fault that has occurred. However, the window will remain if the cause of fault is not resolved.	When fault has occurred

- Specify only one category of control at a time.
- Even if executing function is not possible, ACK will be answered, but no function will be executed.

# 5.3.10 Time control

## 5.3.10-1 Text

### (1) Date/time setup transmission

• Current time

ESC2	Header 2EH	Classification 32H	1000s place	100s place	10s place	Units place	10s place	Units place	(Contd.)
						Year			Month

10s place	Units place	10s place	Units place	10s place	Units place	10s place	Units place
Day		Hour		Minutes		Second	

• Calendar time control

ESC2	Header 2EH	Classification 32H	Control type

Control type (31H: Same as current time; 32H: Clock stop)

• Calendar time

ESC2	Header 2EH	Classification 33H	1000s place	100s place	10s place	Units place	10s place	Units place	(Contd.)
						Year			Month

10s place	Units place	10s place	Units place	10s place	Units place	10s place	Units place
Day		Hour		Minutes		Second	

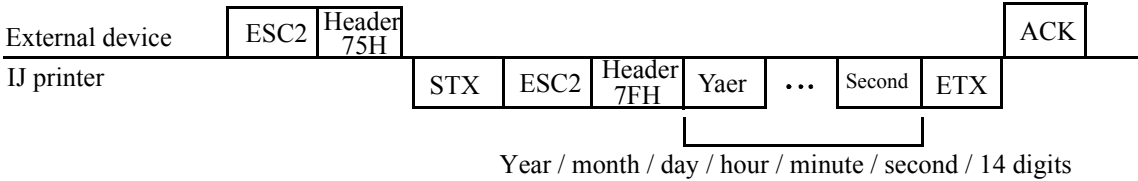
• Clock system

ESC2	Header 2EH	Classification 34H	Control type

Control type (31H: 24-hour system; 32H: 12-hour system)

### (2) Current time output transmission

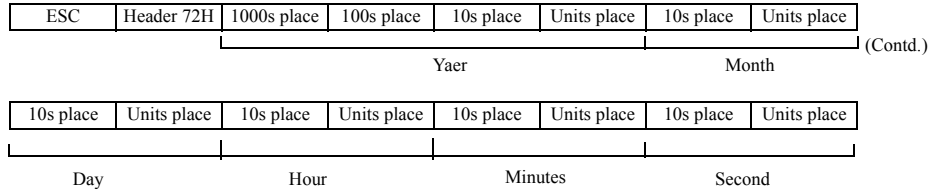
Outputs current time of IJ printer internal calendar.



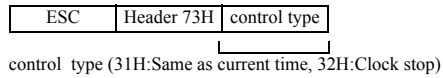
[Existing machine message] Existing machine message can also be used.

#### (1) Date/time setup transmission

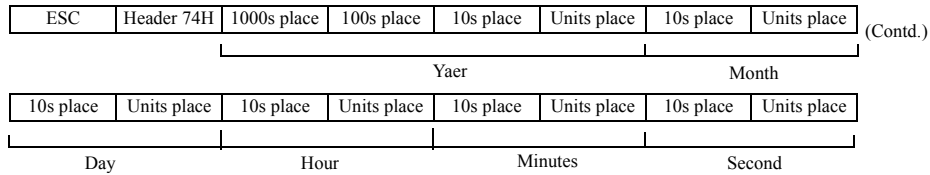
- Current date/time



- Calendar time control

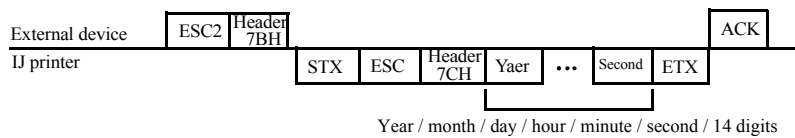
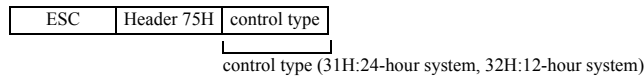


- Current time



#### (2) Current time output transmission

- Clock system



### 5.3.10-2 Date/time setup

- (1) This function allows operator to set each item on "Date/time setup screen" for Maintenance menu.

No.	Setting item	Setting contents
1	Current time	Current date time displayed across the very top of screen (year/month/day/hour/minute/second)
2	Calendar time control	Same as current time, clock stopped
3	Calendar time	Time reflected in calendar characters of print contents
4	Clock system	24/12-hour system

- (2) After receiving date and time setting transmission, the print contents calendar characters and current time display are updated.
- (3) When transmitting "calendar time", first transmit the message for "calendar time: clock stop":  
Simultaneous transmission is also possible.
- (4) When changing the calendar time control from "clock stop" to "same as current time", the values on calendar time will not be saved.

### 5.3.10-3 Example of time control transmission

#### (1) Example of setting current time

02H	1FH	2EH	31H	32H	30H	31H	35H	30H	37H	30H	37H	31H	32H	34H	35H	30H	30H	30H
STX	ESC2	.	1	2	0	1	52	0	7	0	7	1	2	4	5	0	0	ETX
		Header, classification		Yaer		Month		Day		Hour		Minutes		Second				

[Transmission results]

Set current time to 2015/07/07, 12:45:00.

## 5.4 Code Tables

### 5.4.1 Code Tables

#### (1)Transmission control

ASCII	Name	Description
02H	STX (start)	Code that is transmitted immediately before text.
03H	ETX (end)	Code that is transmitted immediately after text.
05H	ENQ (enquiry)	This enquiry code is used when the external device checks whether the IJ printer is ready for signal reception. This code must be transmitted before data transmission to the IJ printer. When the IJ printer is ready for reception, the "ACK" code is transmitted after ENQ code reception. If the IJ printer is not ready for reception, the "NAK" code is transmitted.
06H	ACK (acknowledgment)	①When the IJ printer is ready for reception, it transmits this code in response to an "ENQ" code reception from the external device. ②This code reports that text reception is normally completed.
0EH	SO (shift out)	When the 1-byte transmission mode prevails, this code is positioned at the end of 2-byte code for transmission purposes.
0FH	SI (shift in)	When the 1-byte transmission mode prevails, this code is positioned at the beginning of 2-byte code for transmission purposes.
10H	DLE (start of item)	This code is positioned at the beginning of printings for each print item for transmission purposes.
12H	DC2 (retransmission)	This code is transmitted if the printings need to be changed before the printing of the contents transmitted to the IJ printer while the overwrite-protected mode prevails. After receipt of this code, the IJ printer transmits the ACK code and becomes ready for reception. However, if the IJ printer is off-line, the "NAK" code is transmitted.
13H	DC3 (retransmission)	The same as DC2. However, when receiving DC3, the IJ printer terminates printing forcibly.
15H	NAK (negative acknowledgment)	①The IJ printer transmits this code if it is not ready for reception when it receives the "ENQ" code from the external device. ②This code reports that text reception is not normally completed (when, for instance, the received data is in transmission error or an unregistered print data number is received)
1BH	ESC (start of header)	This code is positioned at the beginning of a header for transmission purposes. The header is a code that recognizes the transmission data type and is transmitted next to STX. (Existing machine / message specs.)
1FH	ESC2 (start of header)	This code is positioned at the beginning of a header for transmission purposes. The header is a code that recognizes the transmission data type and is transmitted next to STX.

## (2)ASCII codes

High-order Low-order	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0		DLE	Space	0	■	P		p	个	↑	↑	保质		00	16	32
1			!	1	A	Q	a	q	元	↑	有限	↑		01	17	33
2	STX	DC2	”	2	B	R	b	r	g	饮用	↑	↑		02	18	34
3	ETX	DC3	#	3	C	S	c	s	年	↑	↑	使用		03	19	35
4			\$	4	D	T	d	t	月	↑	生产	↑		04	20	36
5	ENQ	NAK	%	5	E	U	e	u	日	期限	↑	↑		05	21	37
6	ACK		&	6	F	V	f	v	制造	↑	↑	合格		06	22	38
7			,	7	G	W	g	w	↑	↑	批号	↑		07	23	39
8			(	8	H	X	h	x	↑	日期	↑	↑		08	24	40
9			)	9	I	Y	i	y	品名	↑	↑			09	25	41
A			*	:	J	Z	j	z	↑	↑	供货			10	26	42
B		ESC	+	;	K	[	k		↑	期至	↑			11	27	43
C			,	<	L	¥	l		名称	↑	↑			12	28	44
D			-	=	M	]	m		↑	↑	有效			13	29	45
E	SO		.	>	N	×	n		↑	时	↑			14	30	46
F	SI	ESC2	/	?	O	_	o		食用	公司	↑			15	31	47
Category	Transmi- sion control	Standard characters						Dedicated characters						User pattern character		

■ : Unusable

↑ : Dedicated character consisting of multiple codes

nn : User pattern character number

### NOTICE

- ① As regards a dedicated character (e.g., 制造 (3-code)) consisting of two or more codes, the text must be created so that it can be contained within a single print item.
- ② As regards a print item for which a bar code is set up, the text must be created in such a manner that the employed character codes are within the range applicable to the bar code.

## (3)Dedicated characters (2-byte codes)

Dedicated characters	个	元	g	年	月	日	制造	←	←	品名	←	←	名称	←	←	食用
2-byte code	F040	F041	F042	F043	F044	F045	F046	F047	F048	F049	F04A	F04B	F04C	F04D	F04E	F04F
Dedicated characters	←	←	饮用	←	←	期限	←	←	日期	←	←	期至	←	←	时	公司
2-byte code	F050	F051	F052	F053	F054	F055	F056	F057	F058	F059	F05A	F05B	F05C	F05D	F05E	F05F
Dedicated characters	←	有限	←	←	生产	←	←	批号	←	←	供货	←	←	有效	←	←
2-byte code	F060	F061	F062	F063	F064	F065	F066	F067	F068	F069	F06A	F06B	F06C	F06D	F06E	F06F
Dedicated characters	保质	←	←	使用	←	←	合格	←	←							
2-byte code	F070	F071	F072	F073	F074	F075	F076	F077	F078							

←: Dedicated characters consisting of two or more codes.

“制造” consists of three characters (F046, F047, and F048).

**Special characters (2-byte codes)**  
**(When special characters can be input)**

Characters	À	Á	Â	Ã	Ä	È	É	Ê	Ë	Ì	Í	Î	Ï	Ò	Ó	Ô
Communication code	F340	F341	F342	F343	F344	F345	F346	F347	F348	F349	F34A	F34B	F34C	F34D	F34E	F34F
Characters	Õ	Ö	Ù	Ú	Û	Ü	Æ	Ç	Ñ	Œ		Å	Ø		£	€
Communication code	F350	F351	F352	F353	F354	F355	F356	F357	F358	F359		F35B	F35C		F35E	F35F
Characters	à	á	â	ã	ä	è	é	ê	ë	ì	í	î	ï	ò	ó	ô
Communication code	F360	F361	F362	F363	F364	F365	F366	F367	F368	F369	F36A	F36B	F36C	F36D	F36E	F36F
Characters	õ	ö	ù	ú	û	ü	æ	ç	ñ	œ	ß	å	ø			
Communication code	F370	F371	F372	F373	F374	F375	F376	F377	F378	F379	F37A	F37B	F37C			
Characters	İ	I	Ĝ	Ş	Ŭ	Ý	Č	Ď	Ě	Ň	Ř	Š	Ť	Ž	Ą	Ć
Communication code	F380	F381	F382	F383	F384	F385	F386	F387	F388	F389	F38A	F38B	F38C	F38D	F38E	F38F
Characters	Ę	Ł	Ń	Ś	Ż	Ž	Ł	Ł	Ŕ	Đ	Ŏ	Ű				
Communication code	F390	F391	F392	F393	F394	F395	F396	F397	F398	F399	F39A	F39B				
Characters	ı	ı	ğ	ş	ŭ	ý	č	ď	ě	ň	ř	š	ť	ž	ą	ć
Communication code	F3A0	F3A1	F3A2	F3A3	F3A4	F3A5	F3A6	F3A7	F3A8	F3A9	F3AA	F3AB	F3AC	F3AD	F3AE	F3AF
Characters	ę	ł	ń	ś	ż	ž	ı	ı	ŕ	đ	ő	ű				
Communication code	F3B0	F3B1	F3B2	F3B3	F3B4	F3B5	F3B6	F3B7	F3B8	F3B9	F3BA	F3BB				
Characters																ς
Communication code																F29F
Characters													Α			
Communication code													F2AC			
Characters	Β	Γ	Δ	Ε	Ζ	Η	Θ	Ι	Κ	Λ	Μ	Ν	Ξ	Ο	Π	Ρ
Communication code	F3C0	F3C1	F3C2	F3C3	F3C4	F3C5	F3C6	F3C7	F3C8	F3C9	F3CA	F3CB	F3CC	F3CD	F3CE	F3CF
Characters	Σ	Τ	Υ	Φ	Χ	Ψ	Ω									α
Communication code	F3D0	F3D1	F3D2	F3D3	F3D4	F3D5	F3D6									F3DF
Characters	β	γ	δ	ε	ζ	η	θ	ι	κ	λ	μ	ν	ξ	ο	π	ρ
Communication code	F3E0	F3E1	F3E2	F3E3	F3E4	F3E5	F3E6	F3E7	F3E8	F3E9	F3EA	F3EB	F3EC	F3ED	F3EE	F3EF
Characters	σ	τ	υ	φ	χ	ψ	ω									
Communication code	F3F0	F3F1	F3F2	F3F3	F3F4	F3F5	F3F6									
Characters	А	Б	В	Г	Д	Е	Ё	Ж	З	И	Й	К	Л	М	Н	О
Communication code	F540	F541	F542	F543	F544	F545	F546	F547	F548	F549	F54A	F54B	F54C	F54D	F54E	F54F
Characters	П	Р	С	Т	У	Ф	Х	Ц	Ч	Ш	Щ	Ъ	Ы	Ь	Э	Ю
Communication code	F550	F551	F552	F553	F554	F555	F556	F557	F558	F559	F55A	F55B	F55C	F55D	F55E	F55F
Characters	Я	Ѡ	Ј	Љ	Њ	Ѣ	Ї									
Communication code	F560	F561	F562	F563	F564	F565	F566									
Characters	а	б	в	г	д	е	ё	ж	з	и	й	к	л	м	н	
Communication code	F570	F571	F572	F573	F574	F575	F576	F577	F578	F579	F57A	F57B	F57C	F57D	F57E	
Characters	о	п	р	с	т	у	ф	х	ц	ч	ш	щ	ъ	ы	ь	э
Communication code	F580	F581	F582	F583	F584	F585	F586	F587	F588	F589	F58A	F58B	F58C	F58D	F58E	F58F
Characters	ю	я	ђ	ј	љ	њ	ћ	џ								
Communication code	F590	F591	F592	F593	F594	F595	F596	F597								

## Arabic characters (2-byte codes)

Characters	ا	ب	ب	ب	ب	ت	ت	ث	ث	ث	ث	ث	ث	ث	ث	ا
Communication code	F44D	F44C	F44B	F44A	F449	F448	F447	F446	F445	F444	F443	F442	F441			F440
Characters	ح	ح	ح	ح	ح	ح	ح	ح	ح	ح	ح	ح	ح	ح	ح	ح
Communication code	F45B			F45A	F459	F458	F457	F456	F455	F454	F453	F452	F451	F450	F44F	F44E
Characters	ذ	ذ	ذ	ذ	ذ	ذ	ذ	ذ	ذ	ذ	ذ	ذ	ذ	ذ	ذ	ذ
Communication code	F465	F464	F463	F462	F461			F460	F45F			F45B	F45D			F45C
Characters	ش	ش	ش	ش	ش	ش	ش	ش	ش	ش	ش	ش	ش	ش	ش	ش
Communication code	F475	F474	F473	F472	F471	F470	F46F	F46E	F46D	F46C	F46B	F46A	F469	F468	F467	F466
Characters	ظ	ظ	ظ	ظ	ظ	ظ	ظ	ظ	ظ	ظ	ظ	ظ	ظ	ظ	ظ	ظ
Communication code	F485	F484	F483	F482	F481	F480	F47F	F47E	F47D	F47C	F47B	F47A	F479	F478	F477	F476
Characters	ق	ق	ق	ق	ق	ق	ق	ق	ق	ق	ق	ق	ق	ق	ق	ق
Communication code	F495	F494	F493	F492	F491	F490	F48F	F48E	F48D	F48C	F48B	F48A	F489	F488	F487	F486
Characters	ن	ن	ن	ن	ن	ن	ن	ن	ن	ن	ن	ن	ن	ن	ن	ن
Communication code	F4A3	F4A2	F4A1	F4A0	F49F			F49E	F49D	F49C	F49B	F49A	F499	F498	F497	F496
Characters	لا	لا	لا	لا	لا	لا	لا	لا	لا	لا	لا	لا	لا	لا	لا	لا
Communication code				F4AA	F4A9			F3A8	F4A7			F4A6	F4A5			F4A4
Characters	أ	أ	أ	أ	أ	أ	أ	أ	أ	أ	أ	أ	أ	أ	أ	أ
Communication code	F4B2			F4B1	F4B0			F4AF	F4AE			F4AD	F4AC			F4AB
Characters	لأ	لأ	لأ	لأ	لأ	لأ	لأ	لأ	لأ	لأ	لأ	لأ	لأ	لأ	لأ	لأ
Communication code	F4BC	F4BB	F4BA	F4B9	F4B8			F4B7	F4B6			F4B5	F4B4			F4B3
Characters	٠	١	٢	٣	٤	٥	٦	٧	٨	٩						
Communication code								F4C6	F4C5	F4C4	F4C3	F4C2	F4C1	F4C0	F4BF	F4BD



#### (4) User pattern characters (2-byte codes)

##### Fixed size

User pattern character	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15
2-byte code	F140	F141	F142	F143	F144	F145	F146	F147	F148	F149	F14A	F14B	F14C	F14D	F14E	F14F
User pattern character	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
2-byte code	F150	F151	F152	F153	F154	F155	F156	F157	F158	F159	F15A	F15B	F15C	F15D	F15E	F15F
User pattern character	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47
2-byte code	F160	F161	F162	F163	F164	F165	F166	F167	F168	F169	F16A	F16B	F16C	F16D	F16E	F16F
User pattern character	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63
2-byte code	F170	F171	F172	F173	F174	F175	F176	F177	F178	F179	F17A	F17B	F17C	F17D	F17E	F17F
User pattern character	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79
2-byte code	F180	F181	F182	F183	F184	F185	F186	F187	F188	F189	F18A	F18B	F18C	F18D	F18E	F18F
User pattern character	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95
2-byte code	F190	F191	F192	F193	F194	F195	F196	F197	F198	F199	F19A	F19B	F19C	F19D	F19E	F19F
User pattern character	96	97	98	99	A0	A1	A2	A3	A4	A5	A6	A7	A8	A9	B0	B1
2-byte code	F1A0	F1A1	F1A2	F1A3	F1A4	F1A5	F1A6	F1A7	F1A8	F1A9	F1AA	F1AB	F1AC	F1AD	F1AE	F1AF
User pattern character	B2	B3	B4	B5	B6	B7	B8	B9	C0	C1	C2	C3	C4	C5	C6	C7
2-byte code	F1B0	F1B1	F1B2	F1B3	F1B4	F1B5	F1B6	F1B7	F1B8	F1B9	F1BA	F1BB	F1BC	F1BD	F1BE	F1BF
User pattern character	C8	C9	D0	D1	D2	D3	D4	D5	D6	D7	D8	D9	E0	E1	E2	E3
2-byte code	F1C0	F1C1	F1C2	F1C3	F1C4	F1C5	F1C6	F1C7	F1C8	F1C9	F1CA	F1CB	F1CC	F1CD	F1CE	F1CF
User pattern character	E4	E5	E6	E7	E8	E9	F0	F1	F2	F3	F4	F5	F6	F7	F8	F9
2-byte code	F1D0	F1D1	F1D2	F1D3	F1D4	F1D5	F1D6	F1D7	F1D8	F1D9	F1DA	F1DB	F1DC	F1DD	F1DE	F1DF
User pattern character	G0	G1	G2	G3	G4	G5	G6	G7	G8	G9	H0	H1	H2	H3	H4	H5
2-byte code	F1E0	F1E1	F1E2	F1E3	F1E4	F1E5	F1E6	F1E7	F1E8	F1E9	F1EA	F1EB	F1EC	F1ED	F1EE	F1EF
User pattern character	H6	H7	H8	H9	I0	I1	I2	I3	I4	I5	I6	I7	I8	I9	J0	J1
2-byte code	F1F0	F1F1	F1F2	F1F3	F1F4	F1F5	F1F6	F1F7	F1F8	F1F9	F1FA	F1FB	F1FC	F1FD	F1FE	F1FF
User pattern character	J2	J3	J4	J5	J6	J7	J8	J9								
2-byte code	F220	F221	F222	F223	F224	F225	F226	F227								

User pattern character display scheme

00,01 ..... 09 (0 to 9)

10,11 ..... 19 (10 to 19)

:

90,91 ..... 99 (90 to 99)

A0,A1 ..... A9 (100 to 109)

:

J0,J1 ..... J9 (190 to 199)

## Free size

User pattern character	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15
2-byte code	F640	F641	F642	F643	F644	F645	F646	F647	F648	F649	F64A	F64B	F64C	F64D	F64E	F64F
User pattern character	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
2-byte code	F650	F651	F652	F653	F654	F655	F656	F657	F658	F659	F65A	F65B	F65C	F65D	F65E	F65F
User pattern character	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47
2-byte code	F660	F661	F662	F663	F664	F665	F666	F667	F668	F669	F66A	F66B	F66C	F66D	F66E	F66F
User pattern character	48	49														
2-byte code	F670	F671														

## (5)Punctuation characters (2-byte codes)

Punctuation character	‘	’	:	,	Space	;	!
2-byte code	F240	F241	F242	F243	F244	F245	F246

## (6)Katakana (when KANA and dedicated characters can be input)

### ① Available character sizes

	5x8	7x10	10x12	12x16	18x24
Inter-character space (dots)	1 to 3	1	2	4	6

### ② Character codes table (2-byte code)

#### (1)Character size 5x8, 7x10

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
834*	ア	ア	イ	イ	ウ	ウ	エ	エ	オ	オ	カ		キ		ク	
835*	ケ		コ		サ		シ		ス		セ		ソ		タ	
836*	チ		ツ	ツ	テ		ト		ナ	ニ	ヌ	ネ	ノ	ハ		
837*		ヒ			フ			ヘ			ホ			マ	ミ	
838*	ム	メ	モ	ヤ	ヤ	ユ	ユ	ヨ	ヨ	ラ	リ	ル	レ	ロ		ワ
839*			ヲ	ン										ゝ	。	ー

#### (2)Character size 10x12, 12x16, 18x24

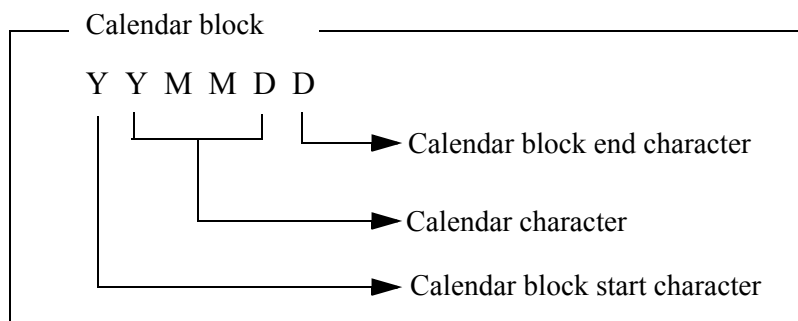
	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
834*	ア	ア	イ	イ	ウ	ウ	エ	エ	オ	オ	カ	ガ	キ	ギ	ク	グ
835*	ケ	ゲ	コ	ゴ	サ	ザ	シ	ジ	ス	ズ	セ	ゼ	ソ	ゾ	タ	ダ
836*	チ	ヂ	ツ	ツ	ヅ	テ	デ	ト	ド	ナ	ニ	ヌ	ネ	ノ	ハ	バ
837*	パ	ヒ	ビ	ピ	フ	ブ	プ	ヘ	ベ	ペ	ホ	ボ	ポ	マ	ミ	
838*	ム	メ	モ	ヤ	ヤ	ユ	ユ	ヨ	ヨ	ラ	リ	ル	レ	ロ		ワ
839*			ヲ	ン												

Character code of long “ー” is 815B.

## (7)Calendar character code

- Set "calendar block starting character"as the first character and set "calendar block ending charater" as the last character.

(Example)



	Yaer	Month	Day	Hour	Minute	Second	Total number of days	Weeks	Day of week
Calendar character	F250	F251	F252	F253	F254	F255	F256	F258	F259
Calendar block start chracter	F260	F261	F262	F263	F264	F265	F266	F268	F269
Calendar block end chracter	F270	F271	F272	F273	F274	F275	F276	F278	F279

Calendar character is 2-byte code only.

### Specified number of digits for calendar characters

Calendar character	Specified number of digits
Yaer	1 to 4 digits
Month	1 to 3 digits
Day	1 to 3 digits
Hour	1 to 2 digits
Minute	1 to 2 digits
Second	1 to 2 digits
Total number of days	1 to 3 digits
Weeks	1 to 3 digits
Day of week	1 to 3 digits

### Example of when performing printings transmission of calendar character

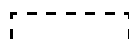
(Example 1) Example of when setting a calendar block to print item 1

02H	10H	31H	0FH	F2H	60H	F2H	50H	F2H	51H	F2H	71H	0EH	03H
STX	DLE	1	SI	Start chracter	Calendar	Calendar	End chracter	SO	ETX				

Calendar block

[Transmission results]

Print item1 →



: Calendar block range

YM

: Calendar character "Year, Month"

**(Example 2) Example of when setting 2 calendar blocks to print item 1**

02H	10H	31H	0FH	F2H	60H	F2H	50H	F2H	51H	F2H	51H	F2H	52H	F2H	72H	0EH	(Contd.)
STX	DLE	1	SI	Start chracter		Calendar		Calendar		Calendar		Calendar		End chracter		SO	

Calendar block 1

41H	42H	43H	0FH	F2H	62H	F2H	52H	F2H	53H	F2H	73H	0EH	03H
A	B	C	SI	Start chracter	Calendar	Calendar	End chracter	SO	ETX				

Calendar block 2

[Transmission results]

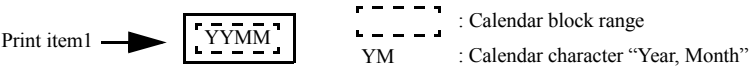


[Existing machine message] Existing machine message can also be used.

02H	10H	31H	0FH	F2H	50H	F2H	50H	F2H	51H	F2H	51H	0EH	03H
STX	DLE	1	SI	Calendar	Calendar	Calendar	Calendar	SO	ETX				

Calendar block

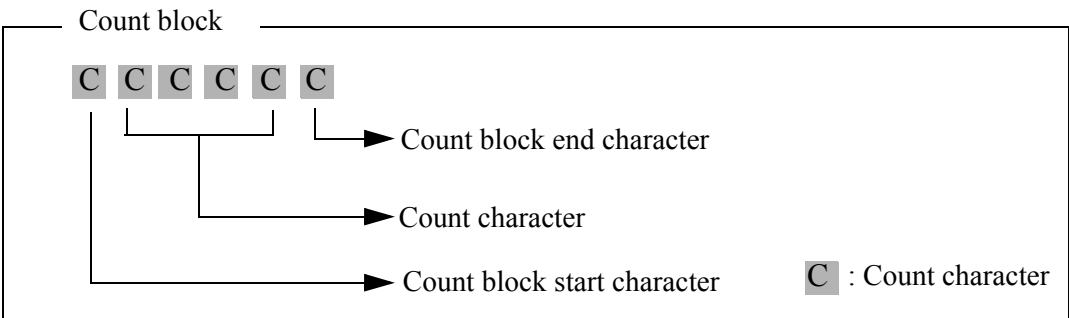
[Transmission results]



**(8)Count character code**

- Set "count block starting character"as the first character and set "count block ending charater" as the last character.

(Example)



Count character	Count block start character	Count block end character
F25A	F26A	F27A

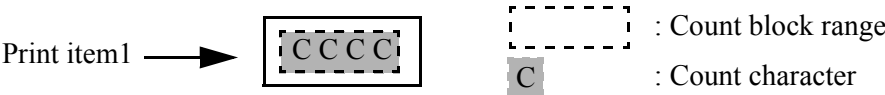
Count character is 2-byte code only.

**Example of when performing printings transmission of count character**  
**(Example 1)Example of when setting a count block to print item 1**

02H	10H	31H	0FH	F2H	6AH	F2H	5AH	F2H	5AH	F2H	7AH	0EH	03H
STX	DLE	1	SI	Start chracter		Count		Count		End chracter		SO	ETX

Count block

[Transmission results]



**(Example 2)Example of when setting 2 count blocks to print item 1**

02H	10H	31H	0FH	F2H	6AH	F2H	5AH	F2H	5AH	F2H	5AH	F2H	5AH	F2H	5AH	F2H	7AH	0EH
STX	DLE	1	SI	Start chracter		Count		Count		Count		Count		End chracter		SO		

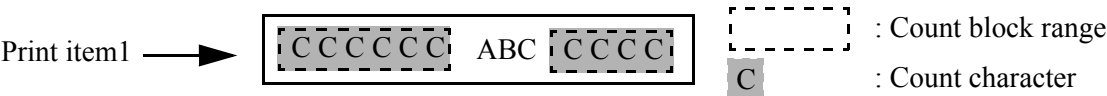
Count block 1

(Contd.)

41H	42H	43H	0FH	F2H	6AH	F2H	5AH	F2H	5AH	F2H	7AH	0EH	03H
A	B	C	SI	Start chracter		Count		Count		End chracter		SO	ETX

Count block 2

[Transmission results]



[Existing machine message] Existing machine message can also be used.

02H	10H	31H	0FH	F2H	5AH	F2H	5AH	F2H	5AH	F2H	5AH	0EH	03H
STX	DLE	1	SI	Count		Count		Count		Count		SO	ETX

Countr block

[Transmission results]

Print item1

: Count block range  

C

 : Count character

## 5.4.2 Header Table

ESC2	Header	Classification	
------	--------	----------------	--

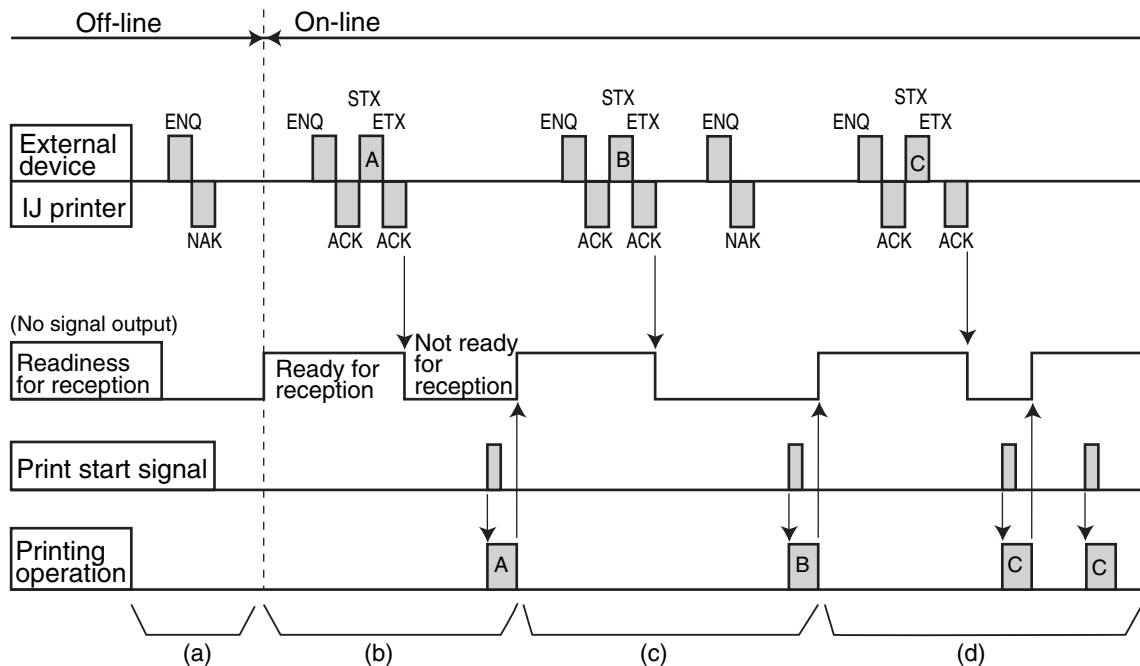
	Type	Header	Classification	Data count	Data section
Recall	Message number	20H	31H	4	0001 to 2000
Registration	Message number	21H	31H	4	0001 to 2000
	Message name		32H	1 to 12	Message name: Max 12 digits
Print format	Line count, print format uniformity	22H	31H	0	-
	Line count/Line spacing		32H	2	Line count : 1 to 4 Line spacing: 0 to 2
	Character size/ inter character space	23H	31H	3	Character size : 30H to 3CH Inter character space : 00 to 28
	Increased width		32H	1	1 to 9
	Bar code		33H	1	30H to 44H
	Readable code		34H	1	0 to 2
	Prefix Code		35H	2	00 to 99
Print specifications	Character height	25H	31H	2	00 to 99
	Ink drop use percentage		32H	2	01 to 16
	High-speed printing		33H	1	0 to 2
	Character width		34H	4	0000 to 3999
	Character orientation		35H	1	0 to 3
	Print start delay		36H	4	0000 to 9999
	Print start delay (reverse)		37H	4	0000 to 9999
	Product speed matching		38H	1	0 to 1
	Pulse rate division Factor		39H	3	001 to 999
	Repeat count		3DH	4	0000 to 9999
	Repeat intervals		3EH	5	00000 to 99999
	Target sensor timer		3FH	3	000 to 999
	Target sensor filter		40H	1	1 to 2
	Target sensor filter value		41H	4	0000 to 9999
Calendar condition	Offset (Year / month / day / hour / minute)	28H	32H	6	Calendar block : 1 to 8 Type : 0 to 4 Offset : Year 0000 to 0099 Month 0000 to 0099 Day 0000 to 1999 Hour -023 to 0099 Minute -059 to 0099
	Zero suppress usage (Year / month / day / hour / minute / week / Day of week)		34H	3	Calendar block : 1 to 8 Type : 0 to 6 Mode : 0 to 2

	Type	Header	Classification	Data count	Data section
Count condition	Initial value	2CH	31H	Variable	Count block : 1 to 8 Initial value : max 20 digits
	Range 1		32H	Variable	Count block : 1 to 8 Range 1 : max 20 digits
	Range 2		33H	Variable	Count block : 1 to 8 Range 2 : max 20 digits
	Update (in progress)		34H	7	Count block : 1 to 8 Update (in progress) : 000000 to 999998
	Update (unit)		35H	7	Count block : 1 to 8 Update (unit) : 000001 to 999999
	Increment		36H	3	Count block : 1 to 8 Increment : 01 to 99
	Direction		37H	2	Count block : 1 to 8 Direction : 0 to 1
	Jump from		38H	Variable	Count block : 1 to 8 Jump from : max 20 digits
	Jump to		39H	Variable	Count block : 1 to 8 Jump to : max 20 digits
	Reset		3AH	Variable	Count block : 1 to 8 Reset : max 20 digits
	Reset signal		3BH	2	Count block : 1 to 8 Reset signal : 0 to 1
	External signal count		3EH	2	Count block : 1 to 8 External count : 0 to 1
Date/time setup	Current time	2EH	31H	14	Year, Month, Day, Hour, Minute, Second (14 digits)
	Calendar time control		32H	1	1 to 2
	Calendar time		33H	14	Year, Month, Day, Hour, Minute, Second (14 digits)
	Clock system		34H	1	1 to 2
User pattern character transmission	Character size fixed pattern	32H	30H to 3CH	-	Character code + pattern data
Other	Item No. specification	70H	Item No.	-	Used together with print format message
	Remote operation	72H	30H to 34H	-	
	Online	73H	-	-	No STX/ETX
	Offline	74H	-	-	No STX/EXT
	Current time inquiry	75H	-	-	No STX/ETX; Inquiry
	Communication buffer Clear buffer	76H	-	-	
	Communication buffer Reset printing	77H	-	-	
	Current time output	7FH	-	14	Year, Month, Day, Hour, Minute, Second (14 digits)

## 5.5 Communication Timing

### 5.5.1 Signal Timing

#### (1) In overwrite-protected mode



#### (a) When the IJ printer is off-line

- The NAK code is transmitted in response to an ENQ code reception from the outside.

#### (b) When the IJ printer is on-line

##### ① When transmitting printing only

- Transmission data is received from the external device. When the received data is not in error, the ACK code is transmitted and the "not ready for reception" state prevails.
  - To switch from the "not ready for reception" state to the "ready for reception" state, perform one of the following procedures.
    - 1) Perform a printing operation once.
    - 2) Transmit the DC2 (retransmission) code to the IJ printer.
    - 3) Press the Comm[On/Off] button to enter the off-line mode, and then switch back to the on-line mode.
  - If the data transmitted from the external device is in error, the NAK code is transmitted after receipt of the ETX code.
- Since the "ready for reception" state is maintained in this instance, retransmit the data beginning.

##### ② When transmitting print conditions, user pattern characters, and print data recall

- When the data received from the external device is not in error, the ACK code is transmitted. In this instance, the "ready for reception" state is maintained.

##### ③ When transmitting printing, print conditions, user pattern characters, and print data recall

- When transmitting printing, print conditions, user pattern characters, and print data recall, ensure that the print conditions, user pattern characters, and print data recall are transmitted prior to the printing. If the printing is transmitted earlier than the other data, the "not ready for reception" state prevails. Therefore, the subsequent transmission of the print conditions, user registration characters, and print data recall causes a communication error.

#### (c) When the "not ready for reception" state prevails after transmission data reception from the external device

- The NAK code is transmitted in response to the ENQ code reception from the outside.

#### (d) Transmission data received from the external device

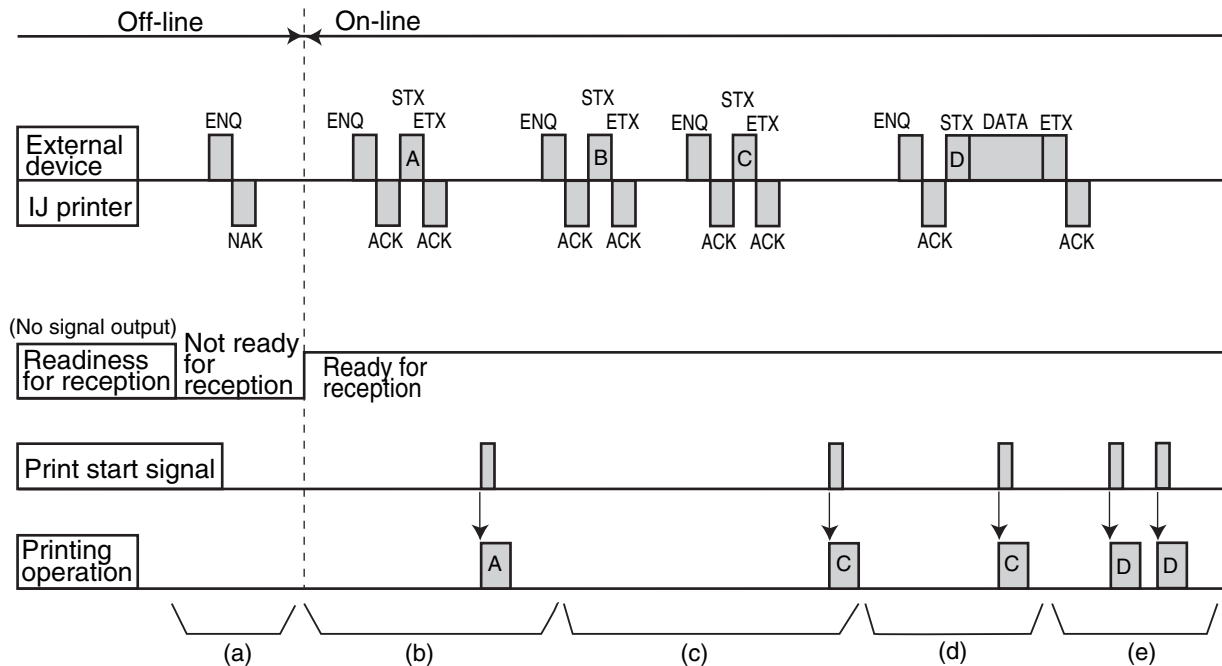
- Error-free transmission data is stored in the IJ printer. The same contents are printed until different transmission data is transmitted to the IJ printer.
- If the data transmitted from the external device is in error, the IJ printer printings remain unchanged. In such an instance, retransmit the data beginning as explained in (b). The retransmission count setup must be determined from the device side.



### (e) When a data transmission is aborted (the transmission of up to the ETX

- The IJ printer printings remain unchanged. For data retransmission, perform either of the following procedures.
  - ① Transmit the DC2 (retransmission) code to the IJ printer.
  - ② Press the Comm[On/Off] button to enter the off-line mode, and then switch back to the on-line mode.

## (2) In overwrite-enabled mode



### (a) When the IJ printer is off-line

- The NAK code is transmitted in response to an ENQ code reception from the outside..

### (b) When the IJ printer is on-line

- Transmission data is received from the external device. When it contains no error, the ACK code is transmitted. In this instance, the "ready for reception" state is maintained.
- If the data transmitted from the external device is in error, the NAK code is transmitted after receipt of the ETX code.  
In this instance, retransmit the data beginning.

### (c) Data retransmission

- Transmission data is received from the external device, and subsequent transmission data is accepted. In this case, the received data is accepted even if the DC2 (retransmission) code is not attached.

### (d) Printing during reception

- While data is being received from the external device, the previously printed contents are printed.

### (e) Transmission data received from the external device

- Error-free transmission data is stored in the IJ printer. The same contents are printed until different transmission data is transmitted to the IJ printer.

### (f) When a data transmission is aborted

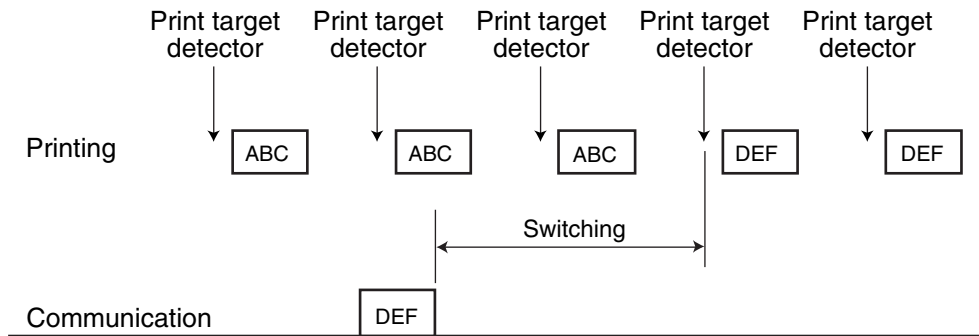
#### (the transmission of up to the ETX code is not completed)

- The IJ printer printings remain unchanged. For data retransmission, perform either of the following procedures.
  - ① Transmit the DC2 (retransmission) code to the IJ printer.
  - ② Press the Comm[On/Off] button to enter the off-line mode, and then switch back to the on-line mode.

### (3) Switching print data with no occurrence of fault "Print data changeover in progress M"

The following shows the method of use with no occurrence of "Print data changeover in progress M" when switching the print contents during transmission:

#### (a) Print timing schematic diagram



- ① The IJ printer receives contents "DEF" in communication while printing contents "ABC".
- ② The IJ printer switches printing to the received contents: It will print the previous data during switching.

Switching time

No.	Transmission type	Conditions	Maximum time (ms)
1	Print description	-	100
2	Print data recall	When the character height, character width, character orientation, ink drop use percentage, or print format changes before or after recall.	500
		When the character height, character width, character orientation, ink drop use percentage, or print format does not change before or after recall.	100
3	Print conditions	-	500

- The fewer characters, the shorter the time.
- The fewer different time of the print format, the shorter the time.

#### (b) Restrictions

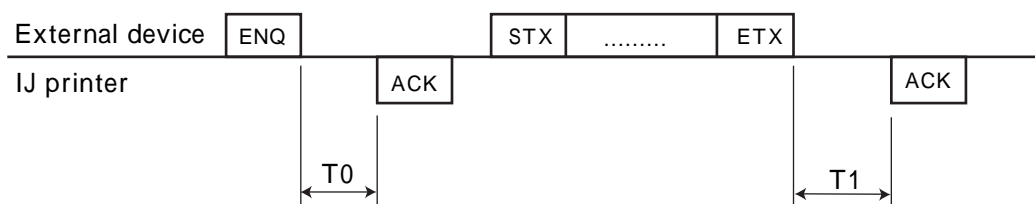
Perform communications only under the conditions shown below. If even one of these conditions is not met, any input to print target detector while the communicated contents are being printed will cause fault "Print data changeover in progress M" to occur.

Conditions that the print target detector input will not cause an abnormality

No.	Conditions
1	Make sure that none of the following software options are provided: Barcode Reader Connection (SOP-08)
2	Set the Print data changeover on User environment setup screen to "Disable".
3	Set the Communication mode on Communication environment setup screen to "overwrite-enabled".
4	Set the Buffer function on Communication environment setup screen to "Disable".
5	Transmit print contents independently, and do not package print content transmission with print condition transmission.
6	Transmit to print items with no count block.
7	Do not transmit the count characters.

## 5.5.2 Response Time

### (1) Time interval (T1) between external device communication and IJ printer response



Baud rate (bps)	T0 Maximum time (ms)
150 to 1200	5
2400 to 115200	1

No.	Transmission type	Conditions	T1 Maximum time (ms)	Remarks
1	Print description	The print message transfer ACK condition is t=fixed.	10	*1
		The print message transfer ACK condition is t=async.	$\frac{M}{10} + 25$ (N: Number of communication characters)	*1 *2
2	Print data recall	-	5	
3	Print data registration	-	1800	
4	Print conditions	Print specifications	10	
5		Print format	20	
6		Line count / print format uniformity	20	
7	User pattern character	-	M+10 (M: Number of communication patterns)	
8	Date/time setup	-	5	*3
9	Remote operation	Operation stop	20	
		Operation start, deflection voltage control, error reset	15	

\*1 For "t=fixed" and "t=async.", see Section 5.2.1, "Setting Communication Environment".

\*2 When there is a data matrix and QR code setting, the time is as follows:

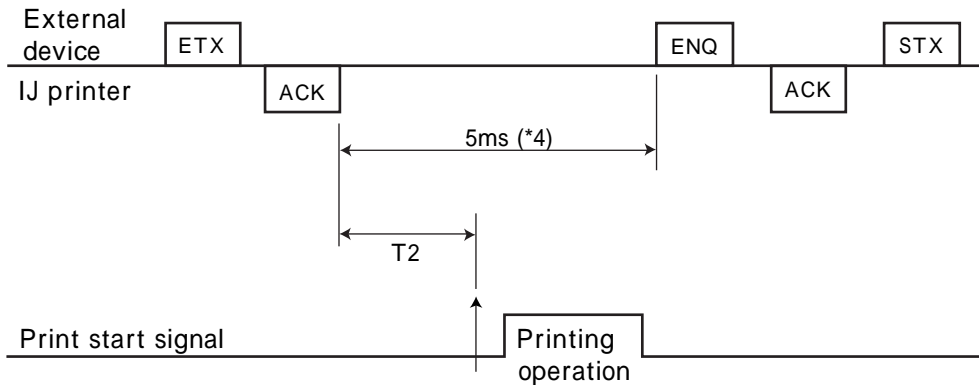
\*3 If time changes just before 3ACK transmission, ACK transmission may be delayed about 20 ms.

Time T1 when there is a data matrix and QR code setting

	Character size	T1 Maximum time (ms)
Data matrix	5x8	8x N+20
	12x16, 18x24	15x N+40
QR code	QR (21x21)	200xN
	QR (25x25)	300xN
	QR (29x29)	400xN

(N : Number of 2-Dimensional codes)

## (2) Time interval (T2) between IJ printer response and printing start



No.	Transmission type	Conditions	T2 Minimum time (ms)	Remarks
1	Print description	The print message transfer ACK condition is t=fixed.	$\frac{M}{10} + 15$ (N: Number of communication characters)	*5
		The print message transfer ACK condition is t=async.	0	
2	Print data recall	When the character height, character width, character orientation, ink drop use percentage, or print format changes before or after recall	400	
		When the character height, character width, character orientation, ink drop use percentage, or print format does not change before or after recall	40	
3	Print data registration	-	30	
4	Print conditions	Print specifications	400	
5		Print format	400	
6		Overall column setup	200	
7	User pattern character	-	25	
8	Date/time setup	-	$\frac{M}{10} + 15$ (N: Number of printing characters)	

- The IJ printer executes an internal process to make printing preparations in accordance with the received print data. Do not enter the print start signal during internal process execution.
- In the overwrite-protected mode, initiate the next communication after completion of printing.
- In the overwrite-enabled mode, the next communication can be transmitted during printing, but the ACK/NAK response does not return until the ongoing printing operation is complete. (t=async.)
- When a print start signal is input with shorter timing than T2, the fault "Print data changeover in progress M" occurs.
- The more different items of the print format, the longer the time until ready to print.

\*4 If the communication time interval is not sufficiently secured, it may not operate normally.

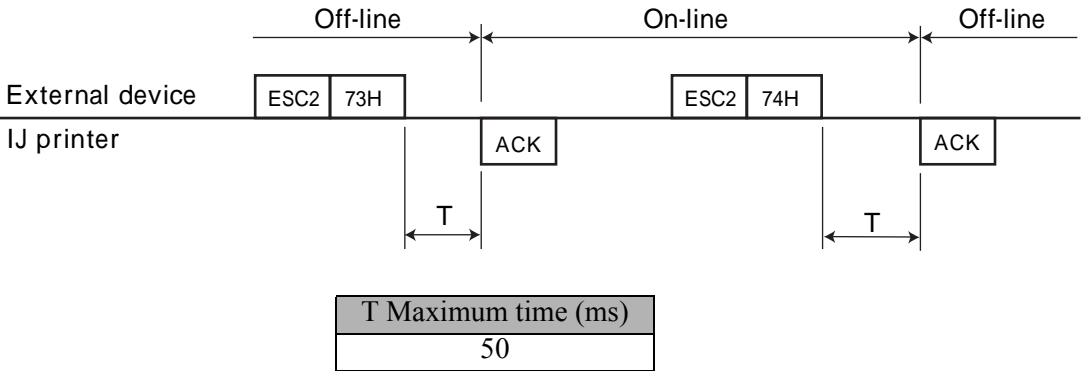
\*5 When there is a data matrix and QR code setting, the time is as follows:

Time T2 when there is a data matrix and QR code setting

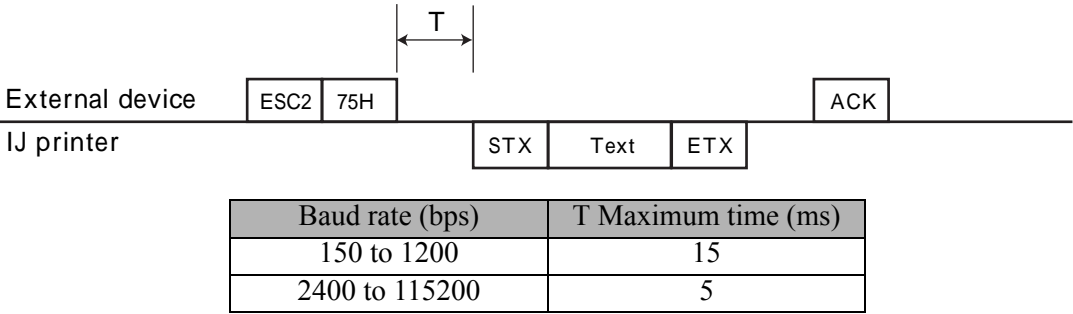
	Character size	T2 Minimum time (ms)
Data matrix	5x8	8x N+20
	12x16, 18x24	15x N+40
QR code	QR (21x21)	200xN
	QR (25x25)	300xN
	QR (29x29)	400xN

(N : Number of 2-Dimensional codes)

(3) On-line/Off-line Transmission



(4) Current time output Transmission



## 5.6 Communication Monitor Function

- The contents of serial communications between the external device and IJ printer are displayed.
- Up to 3,000 bytes of data can be acquired at a time.
- When you press the **Start** button, the system erases monitored data and acquires new data.

No	Trans.	Communication description
1	R	05
2	S	06
3	R	02 10 31 41 42 43 44 45 10 32 31 32 33 34 35 03
4	S	06
5	R	05
6	S	06
7	R	02 10 31 41 42 43 44 45 10 32 31 32 33 34 7F 03
8	S	15

### (1) Screen display

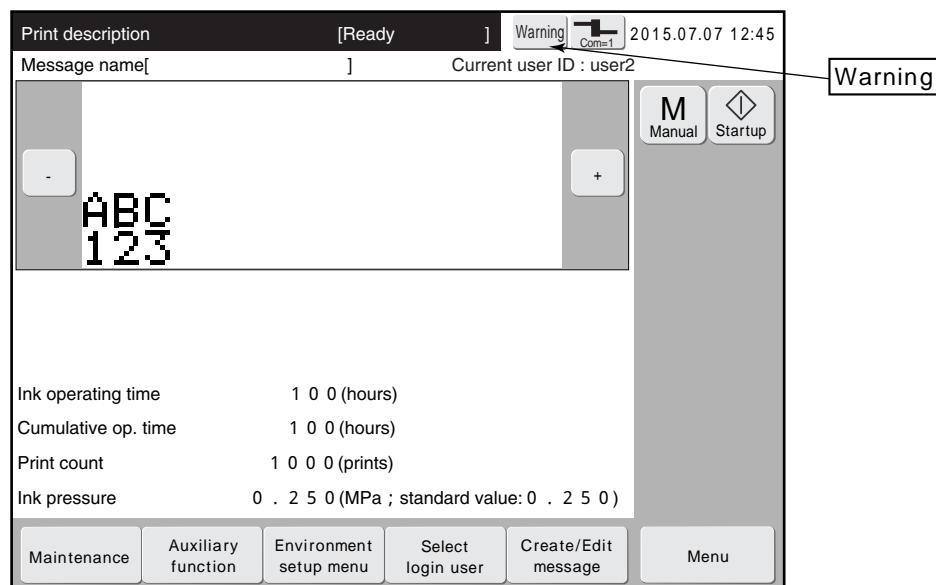
Item	Description
Trans.	External device → IJ printer : R (Receive) IJ printer → External device : S (Send)
Communication description	Sended/received data are displayed in hexadecimal notation. Sixteen bytes of data are displayed per line.
Proc. status	The current status is indicated (monitoring or interrupted).

### (2) Input keys

Item	Description
Start	Starts exercising the line monitor function. Erases the monitored information.
Abort	Aborts the execution of the line monitor function.
Error detection	This switches over whether the system is to detect error-ridden locations. <ul style="list-style-type: none"> <li>• Disable: The system will not detect error-ridden locations. The system will memorize up to bytes 3,000 of data transmitted and received.</li> <li>• Enable: The system will display error-ridden locations in red. The system will memorize up to transmitted and received data up to the location where an error was detected.</li> </ul>
Previous list/ Next list	Used to switch to another screen when the amount of information to be displayed is too large to fit on a single screen.
Back	Returns you to the maintenance menu.

## 5.7 Warning Messages

- If any communication is in error, the associated **warning** message appears below the status display area.
- Note the message to confirm the error and then take remedial action as appropriate for the indicated error code.



Error code table

Error code	Name	Description	Check
001	Transmissioncode error	<ul style="list-style-type: none"> <li>• The transmitted code was not defined for communication use.</li> <li>• The transmitted message had an illegal structure.</li> </ul>	Check the baud rate and transmission code.
002	Print specifications code error	The print specifications data value was illegal.	Check the print specifications communication text.
003	Print character code error	The maximum value was exceeded by the number of characters for printings that could be received as one item.	Check the printings communication text.
004	Item number error	The item number code value was illegal.	Check the printings communication text.
005	Header error	The header value was illegal.	Check the header.
006	Ready-for-reception error	<ul style="list-style-type: none"> <li>• An attempt was made to establish communication while the "not ready for reception" state prevailed.</li> <li>• "Apply" key and message window were both displayed.</li> <li>• "Off-line fixed" has been set in Communication environment.</li> <li>• Communication monitor screen was displayed.</li> </ul>	Check the transmission timing.
008	Print specifications code error	The maximum value was exceeded by the print specifications data.	Check the print specifications communication text.
009	ETX code error	The ETX code position was illegal.	Check the transmission procedure and ETX code.
010	DLE code error	The DLE code position was illegal.	Check the transmission procedure and DLE code.
011	STX code error	The STX code position was illegal.	Check the transmission procedure and STX code.
012	ENQ code error	The ENQ code position was illegal.	Check the transmission procedure and ENQ code.
013	ESC code error (ESC, ESC2)	The ESC code position was illegal.	Check the transmission procedure and ESC code.

Error code	Name	Description	Check
014	Parity error	The parity error occurred.	Check the baud rate and data format.
015	Print format code error	The print format data value was illegal.	Check the print format transmission text section.
016	Overrun error	The overrun error occurred.	Check the baud rate and data format.
017	Framing error	The framing error occurred.	Check the baud rate and data format.
019	2-byte code error	<ul style="list-style-type: none"> <li>• An illegal 2-byte code (2 bytes per character) was transmitted.</li> <li>• Only one byte of 2-byte code was transmitted.</li> </ul>	Check the 2-byte code transmission text.
020	Print data code error	<ul style="list-style-type: none"> <li>• The print data registration number was illegal.</li> <li>• An unregistered number was encountered.</li> </ul>	Check the print data recall / transmission code.
021	SI/SO code error	The SI (shift in) or SO (shift out) code position was illegal.	Check the printings communication text.
022	User pattern character size/ character code error	The character size or character code values were illegal.	Check the user pattern communication text.
023	High-speed printing setup error	<ul style="list-style-type: none"> <li>• When necessary conditions for high speed printing were not satisfied, NM or QM mode was transmitted.</li> <li>• When High speed printing NM or QM mode was set, a setting which did not satisfy necessary conditions for high speed printing was transmitted.</li> </ul>	Check the print specifications communication text.
024	Calendar/count conditions error	<ul style="list-style-type: none"> <li>• Transmitted to block where calendar/count characters were not present.</li> <li>• Set value was outside specifications.</li> <li>• Zero suppression transmission was performed to print item for which barcode had been set.</li> </ul>	Check calendar/count condition communication text.
026	Bar code setup error	<ul style="list-style-type: none"> <li>• A character undefined for bar code use was found in the printings.</li> <li>• The number for ITF did not consist of an even number of numerals beginning with an odd digit position.</li> <li>• The input data for EAN-13 was not numeric.</li> </ul>	Check the printings print format communication text.
027	Printings error	<ul style="list-style-type: none"> <li>• A dedicated character or katakana was transmitted in a character size which cannot be inputted.</li> <li>• The three characters of a dedicated character string were not properly grouped.</li> <li>• A count value is out of a count range.</li> </ul>	Check the printings communication text
031	Create messages error	<ul style="list-style-type: none"> <li>• While "Create messages" function was operating, on-line transmission was performed.</li> <li>• On-line transmission was performed when print data which was controlled separately from data created and registered by print description screen, was present.</li> </ul>	Check the timing of on-line transmission.
032	Setting conditions error	<ul style="list-style-type: none"> <li>• Setting value does not satisfy the required conditions.</li> </ul>	Communication text re-check.
033	Setting range error	<ul style="list-style-type: none"> <li>• Setting value is out of stipulated range.</li> </ul>	Communication text re-check.



## 5.8 Precautions

### 5.8.1 Notes on Product speed matching Feature Use

- (1) If the product speed matching signal cannot be entered during printing, the printing state continues to prevail so that communication may not be established (no response can be made). If such a situation is encountered, perform procedure ① or ② below.

- ① Enter the standby state and then initiate the communication.
- ② Issue the print abort code "DC3". After the IJ printer returns an "ACK" response,

- (2) Number of pulses necessary for a rotary encoder from print signal detection until the start of printing.

Number of pulses necessary = Number of printing preparation pulses (①) + Print start delay.

- ① Number of printing preparation pulses =  $A / 1 \text{ scan time}$

Use an integer by rounding up the fractional portion.

Nozzle diameter	Value of A
65μm	5.5

$$1 \text{ scan time} = \frac{(\text{Vertical dot count} + \text{character width setting}) \times \text{Ink drop use percentage}}{\text{Excitation frequency (kHz)}} \text{ (ms)}$$

When "Speed compensation" is enabled, print start is delayed for 30 scans.

### 5.8.2 Notes on Print Condition Transmission

- (1) The number of digits for character height data is 2 by default. However, the preceding IJ printer models GX and HX use 3 digits by default for print condition transmission (optional function). If the new model of the IJ printer is used as a replacement for such a predecessor, open the following screen from the communication environment setup screen and change the number of digits for character height data to 3.



Data digts of the character height

- Character height (when the 3-digit data format is chosen)

ESC	Header 30H	100s place	10s place	Units place

Character height (000 to 099)

Note: If the value is within the range from 100 to 999, an error occurs.

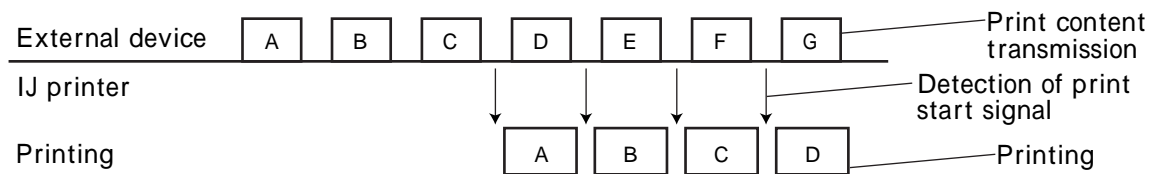
## 5.9 Communication Buffer

### 5.9.1 Overview

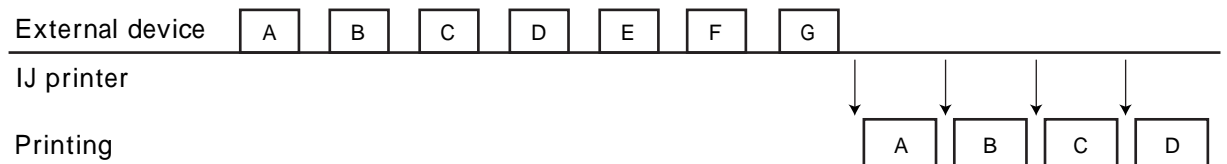
#### (1) Print content transmission

- The print contents received through print content transmission will not be reflected in printing immediately, but will be temporarily held in buffer.
- The print contents are fetched from the buffer one by one for each printing, and reflected in subsequent printing.

[Example of transmitting print contents constantly during printing]



[Example of transmitting collective print contents at the beginning]



## 5.9.2 Description of Functions

### (1) Application procedure

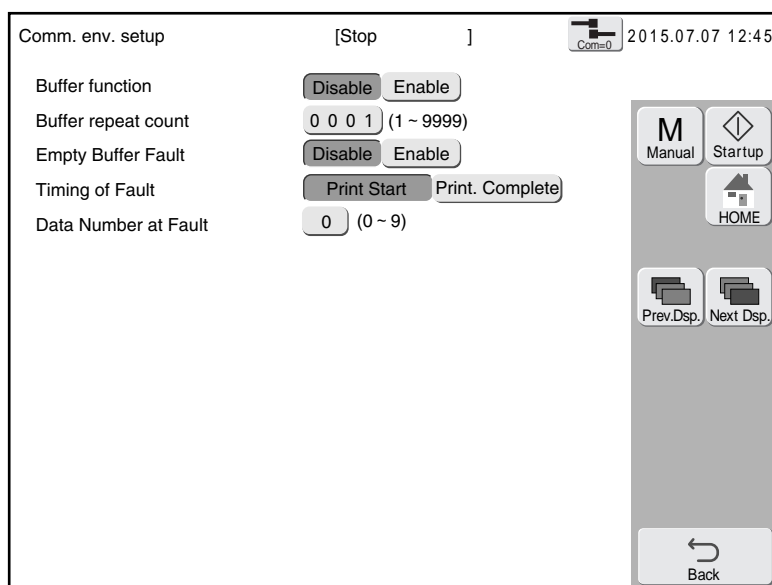
- Prepare the following in advance:

#### Preliminary Preparation Items

No.	Procedure
1	Specify "overwrite-enabled" for communication mode on the communication environment screen. In addition, specify "t=fixed" for print message transfer ACK.
2	Set the buffer function on the second page of the communication environment setting screen to "enable."
3	Confirm the setting values for "Switch print count," "Buffer error," "Error timing" and "Data count when error occurs" on the second page of the communication environment setting screen.

#### Setting items of communication environment setting screen

Setting items	Description	Initial values
Buffer function	Selects enable/disable for buffer function.	Disable
Buffer repeat count	Sets how many times printing is to be executed before switching the printing contents.	1
Empty Buffer Fault	Selects whether or not communication buffer errors are to be generated. The conditions for occurrence are set by "error timing" and "Data count when error occurs."	Disable
Timing of Fault	Selects timing by which communication buffer errors are to be generated.	Print Start
Data number at Fault	Sets the number of print data items by which a communication buffer error is to be generated.	0



- The function (application) will be valid only when the printer is online and in the ready status. Offline will set to standard-mode printing.
- The following shows the application procedure :

#### Application Procedure

No.	Procedure
1	Switch to online.
2	Set to the ready status.
3	Transmit print contents accordingly so that print contents sent at least N times remain in the buffer. (N: Data number at Fault)
4	Print.
5	Subsequently repeat steps 3 and 4 above.

Procedure No.1 and 2 can be in random order

## (2) Buffer

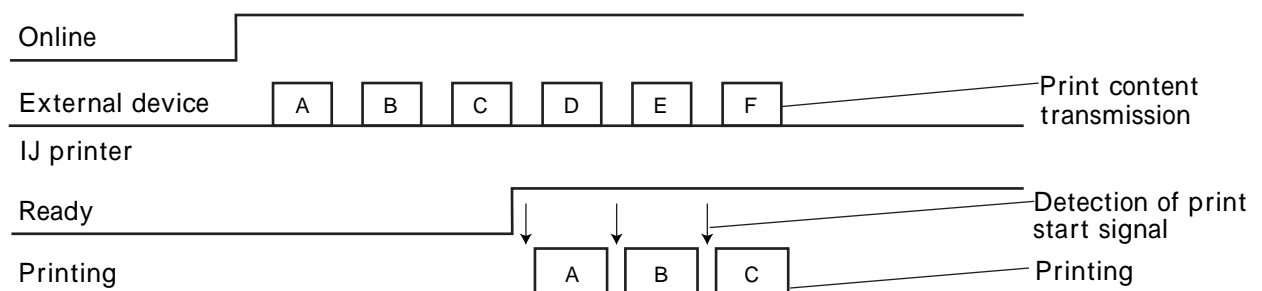
- The print content receive buffer has a queue structure (beginning with oldest data, in sequence).
- Print content is fetched from the buffer for each printing.
- Once the Ready status is set, the first print content will be fetched from the buffer.
- The buffer capacity is 100 print items (total 1000 characters). An alarm will be raised if it exceeded its capacity.
- The buffer will be cleared when offline is set.
- The buffer is always empty immediately after power is turned on.
- The buffer will not be cleared even if the status is changed to that other than the print enable status.
- When offline is switched to online, the contents in buffer will be cleared, and then the standard-mode print operation will continue. In this case, print contents of at the time it was changed offline will be printed, then subsequently same print contents will be printed. However, this option feature will be effective again by reconfiguring the setting according to the procedure described in the previous page.
- If printing is interrupted because of some fault (print overlap fault, etc.), printing will restart from the subsequent data in buffer.

## (3) Character types available

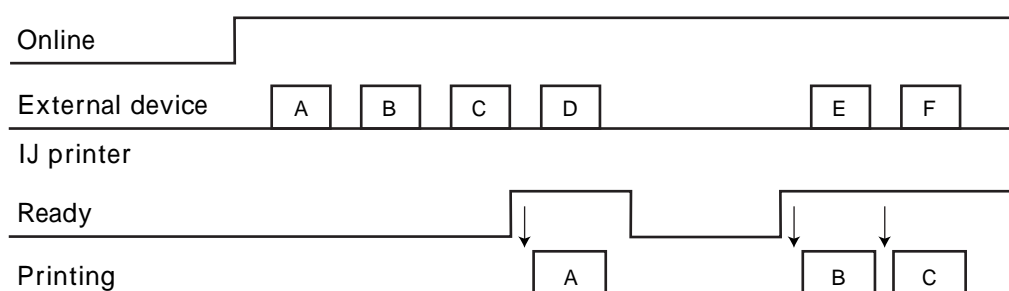
- Calendar characters and count characters are not available.
- To use user pattern characters, define them in advance using "Create user pattern" function. Undefined user pattern characters will be printed as spaces.

## (4) Examples of operational procedure

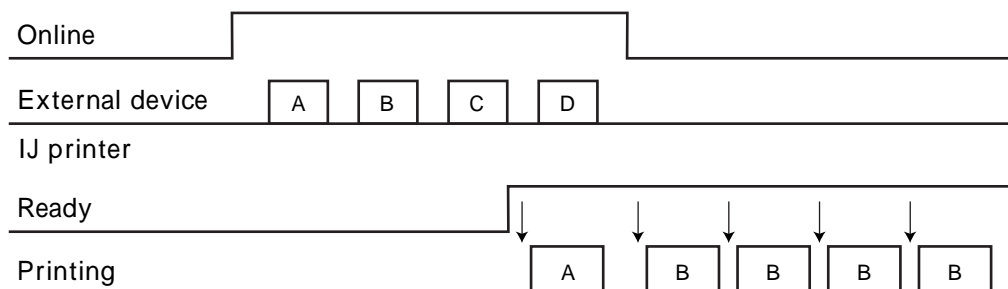
(Example 1) Normal operation:



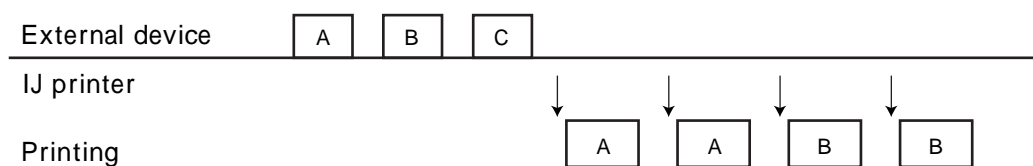
(Example 2) When status is restored to that other than ready during normal operation, and printing is to restart in ready status:



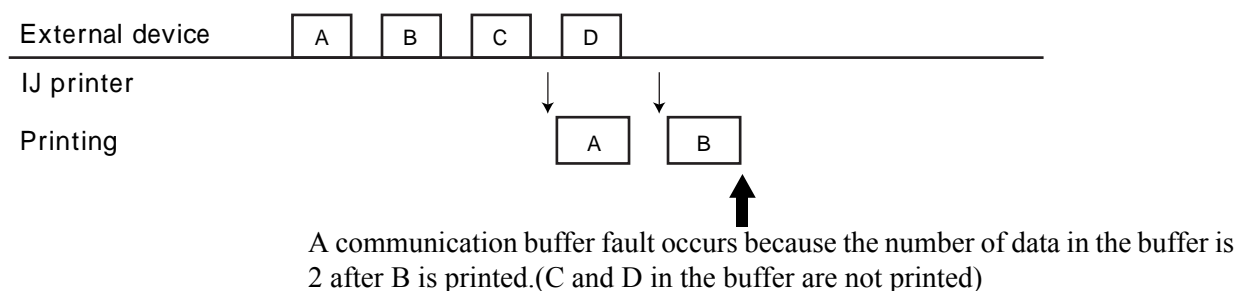
(Example 3) When offline is restored during normal operation, and printing is subsequently performed in standard mode:



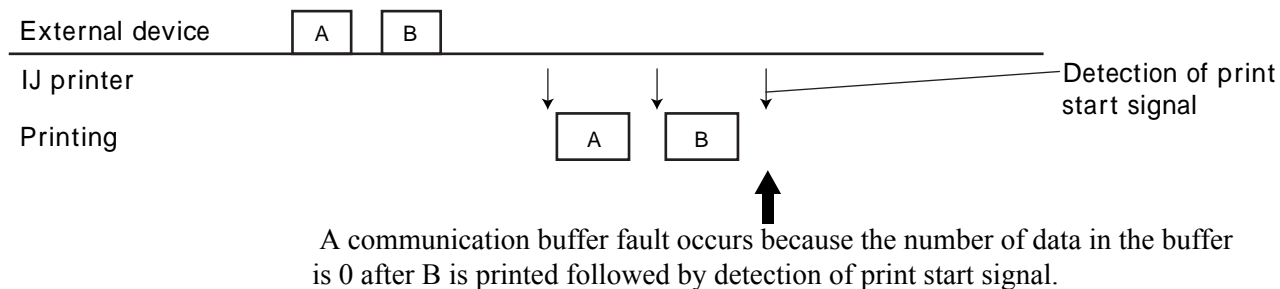
(Example 4) Switch print count is 2.



(Example 5) Error timing : Print completed, Data count when error occurs : 2



(Example 6) Error timing : Print started, Data count when error occurs : 0

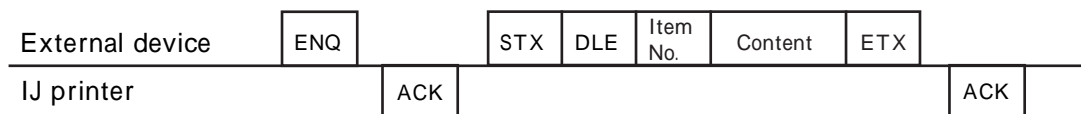


## 5.9.3 External Communications

### 5.9.3-1 Transmitting print contents

#### (1) Function

- The received print content will not be reflected in printing immediately, but temporarily held in buffer.



- To facilitate operation, first input fixed characters that do not need to be changed, and then transmit only the print items to be changed.

#### (2) Restriction

- The maximum number of print items which can be sent at 1 time is 8 print items (maximum 80 characters).

### 5.9.3-2 Clearing buffer and restarting printing

#### (1) Function

- When text "clear buffer" is transmitted, the print contents held in buffer will be cleared.
- To restart printing, perform the following procedure after transmitting text "clear buffer".  
If this procedure is not followed, the print contents stored before the buffer cleared may be printed.

Procedure: ① Transmit print contents so that print contents sent at least N times remain in the buffer.  
(N: Data number at Fault)

② Transmit text "restart printing".

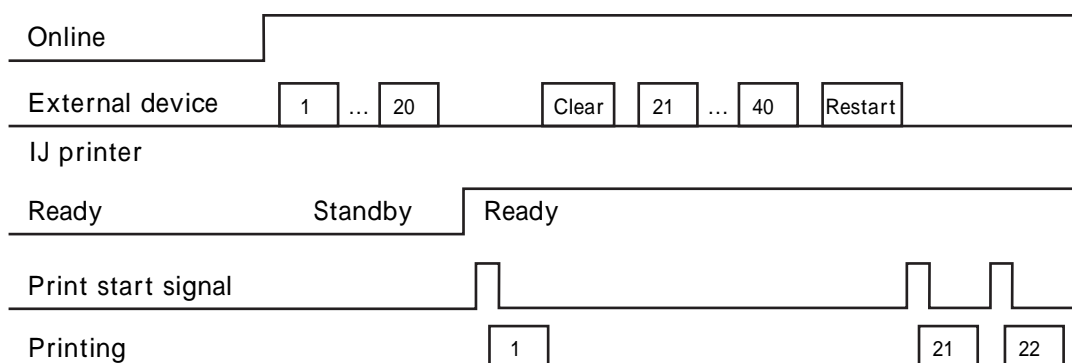
③ Printing is possible whenever the print start signal is input.



[Existing machine message] Existing machine message can also be used.



[Conceptual diagram of transmission procedure]



#### (2) Restriction

- Independently transmit text "clear buffer" or "restart printing": These cannot be transmitted with another text (print content transmission, print data call-up transmission, etc.).
- Transmit text "clear buffer" or "restart printing" only while printing is not in progress.
- Input the print start signal at least 500 ms after ACK is returned to "restart printing".

### 5.9.3-3 Print data call-up transmission

- (1) When calling up print data via communication, always execute the call-up before transmitting data to the buffer. If call-up is executed in the Ready status, the called up print content will be printed.

## 5.9.4 Errors

### (1) Errors during external communications

#### Errors during print content transmission and print data call-up

No.	Condition	Type of error
1	Not all received print contents could be held in buffer because its capacity was exceeded	NAK is returned. However, this will not cause any external communication error.
2	Number of print items of received contents is more than 9.	External communication error 030
3	Calendar or count character was included in print data call-up transmission	External communication error 027

#### Error when buffer is cleared

No.	Condition	Type of error
1	Text was transmitted together with another text	External communication error 002

### (2) Errors during printing

#### Errors during printing

No.	Condition	Type of error
1	The number of received contents in buffer was less than "Data number at Fault".	Fault "Communication Buffer Fault"
2	Print start signal was received during print data switching immediately after ACK was returned to "restart printing"	Fault "Invalid Data Change Timing"

- When "communication buffer fault" occurs, the window will be cleared, followed by standby status.

### (3) Error when status is changed

#### Error when status is changed

No.	Condition	Type of error
1	Calendar characters or count characters were included to existing print contents when restored to online.	Confirmation message "Communication buffer error"



## 6. CIRCULATION SYSTEM WORK AND ADJUSTMENT METHOD

### WARNING

- Never pour the ink and makeup waste into a sewer, etc.  
Have the ink and makeup drainage processed by an industrial waste processor as special control industrial waste and the empty container as industrial waste.
- Do not remove, apply unreasonable force to, or bend the piping tubes unnecessarily. Since high pressure is applied to parts of the ink and solvent inside the piping tube, the ink and solvent may spurt out and get into your eyes and mouth or soil your hands and clothing.  
If the ink or solvent gets into your eyes or mouth, immediately rinse it out with warm water and see a doctor.



- When replenishing the ink and makeup, changing the ink, or performing other work in which the ink and makeup are handled, be sure not to spill the ink and makeup. If the ink and makeup is accidentally spilled, quickly wipe it off with wiping paper, etc. Do not close the maintenance cover until you verify that the wiped parts are completely dry.  
Since the ink and makeup vapor will collect inside the printer especially in the state in which the ink and makeup was spilled inside the printer and was not wiped off completely, it will cause ignition and fire.  
When wiping is difficult in the energized state, perform shutdown processing with the maintenance cover remaining open and turn off the power, then perform wiping again.
- If leaking of the ink and makeup inside the printer was detected during printer operation or maintenance, quickly wipe it with wiping paper, etc. and perform shutdown processing with the maintenance cover remaining open and turn off the power, then repair the leak.  
If operation is continued when the ink and makeup is leaking, it will cause trouble and prevent normal printing will become.  
In addition, since the ink and makeup are combustible, they may cause a fire.
- When the ink particles are caught in a beaker during test printing, etc., use a conductive beaker and securely connect the beaker to a ground.  
In addition, be sure that the print head is not inserted into the beaker.  
Since the ink particles used in printing are electrically charged, if the beaker is not connected to a ground, the charge load will gradually increase and cause a fire.



### CAUTION

- Pay careful attention to the following items regarding handling of the ink and makeup:
  - ① Wear gloves and goggles so that the ink and makeup will not directly contact your skin.  
If the ink or makeup gets on your skin, wash it off with soap and warm water.
  - ② When taking the ink or makeup in and out of the bottle, be sure that the ink or makeup does not get on the equipment and surroundings. If the ink or makeup gets on the equipment or surroundings, immediately wipe it off with makeup.
  - ③ Since the vapor pressure of the makeup is generally high, if the ambient temperature is high such as in the summer, etc., the internal pressure will rise and makeup could spurt out when the outside cover is removed. Therefore, when unplugging,
    - do not hold the bottle near your face
    - place the can on a level surface
    - open while covering the opening with a rag, etc.

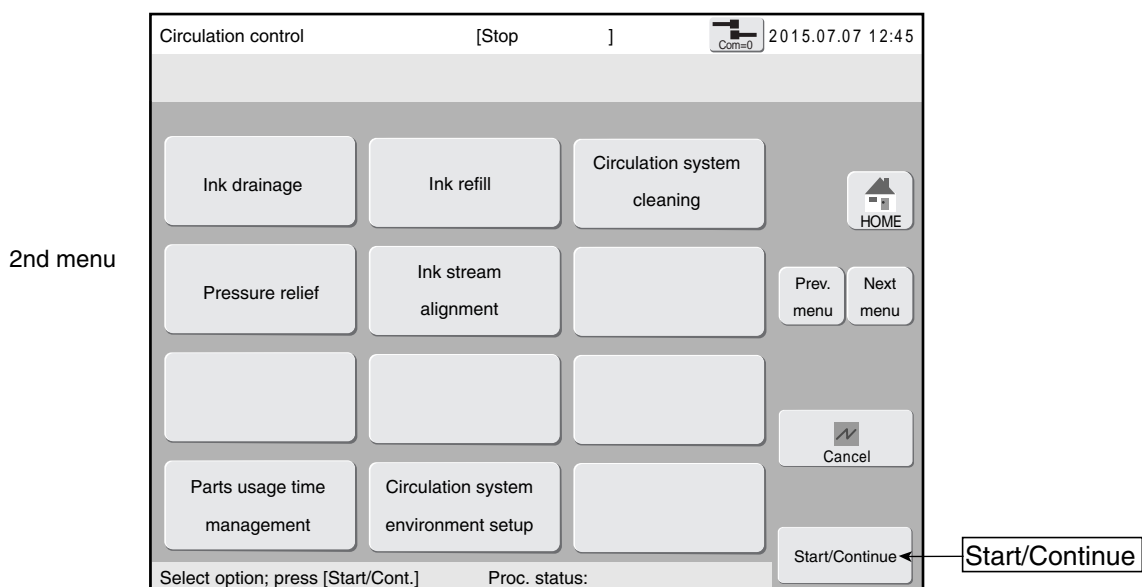
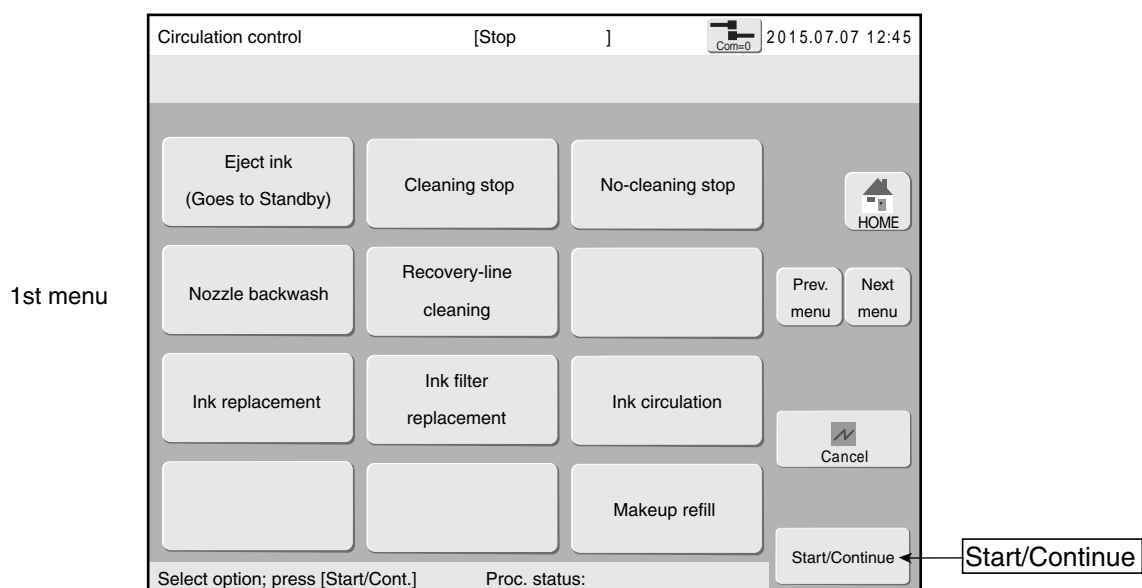




## 6.1 Circulation control screen operation

### 1 Start from the Maintenance menu.

Perform menu 1 and menu 2 switching using **Prev. menu** and **Next menu**.



### 2 Select the function you want to perform and press **Start/Continue**.

### 3 Different operation guides are displayed depending on the selected function.

- Perform operation in accordance with the operation guide.
- When you want to stop operation, press **Abort**.

## 6.2 Circulation control contents

- During generation of an “Main Ink Tank Too Full” fault, input from any of the keys is not accepted. Perform operation after referring to par. “6.12 Draining the ink from the main ink tank” and clearing the fault.
- The receivable states are different depending on the contents of circulation control. Note that operation cannot be performed from states other than those shown in the table below.

Circulation control name	Contents	Receivable state
Eject ink (Goes to Standby)	Used for startup at maintenance. (Ink ejection only. The IJ printer does not enter the Ready state.)	Stop
Cleaning stop	Normal shutdown processing. The nozzle is automatically cleaned and the printer is stopped.	Ready or Standby
No-cleaning stop	Shutdown processing used when stopping temporarily. Automatic nozzle cleaning is not performed.	Ready or Standby
Nozzle backwash	makeup is sucked in from the nozzle and the nozzle is cleaned. Perform this operation while pouring makeup from the cleaning bottle onto the nozzle tip (orifice plate surface).	Stop
Gutter cleaning (Recovery-line cleaning)	makeup is sucked in from the gutter and cleaning of the recovery-line is performed. Perform this operation while pouring makeup from the cleaning bottle onto the end of the gutter.	Stop
Ink replacement	Used when replacing the ink inside the IJ printer with new ink. This operation performs from ink drainage to refilling consecutively.	Stop
Ink filter replacement	Used when replacing the ink filter. This operation performs from ink drainage to refilling consecutively.	Stop
Ink circulation	Used when bleeding the air from inside the circulation line and when making the ink inside the flow lines uniform. This operation can be performed even while ink is being ejected. At the end of this operation, the IJ printer enters the Eject ink (standby) state.	Standby
Makeup refill	Used when filling the cleaning line with makeup during IJ printer installation.	Stop
Ink drainage	Used when draining the ink inside the ink drainage unit.	Stop
Ink refill	Used when refilling the IJ printer with ink. The amount of ink in the main ink tank is set to the initial level. After refilling, the IJ printer enters the Eject ink (standby) state.	Stop
Circulation system cleaning	Used when cleaning the inside of the circulation system.	Stop
Pressure relief	Depressurizes the inside the entire circulation system. (Used when performing maintenance work.)	Stop
Ink stream adjustment	Used when adjusting the ink stream position. Ejects makeup from the nozzle.	Stop
Parts usage time management	Used when managing the usage time of the circulation system parts. Used when checking the amount of ink and makeup consumption.	All status
Circulation system environment setup	Used when selecting ink concentration management.	Stop

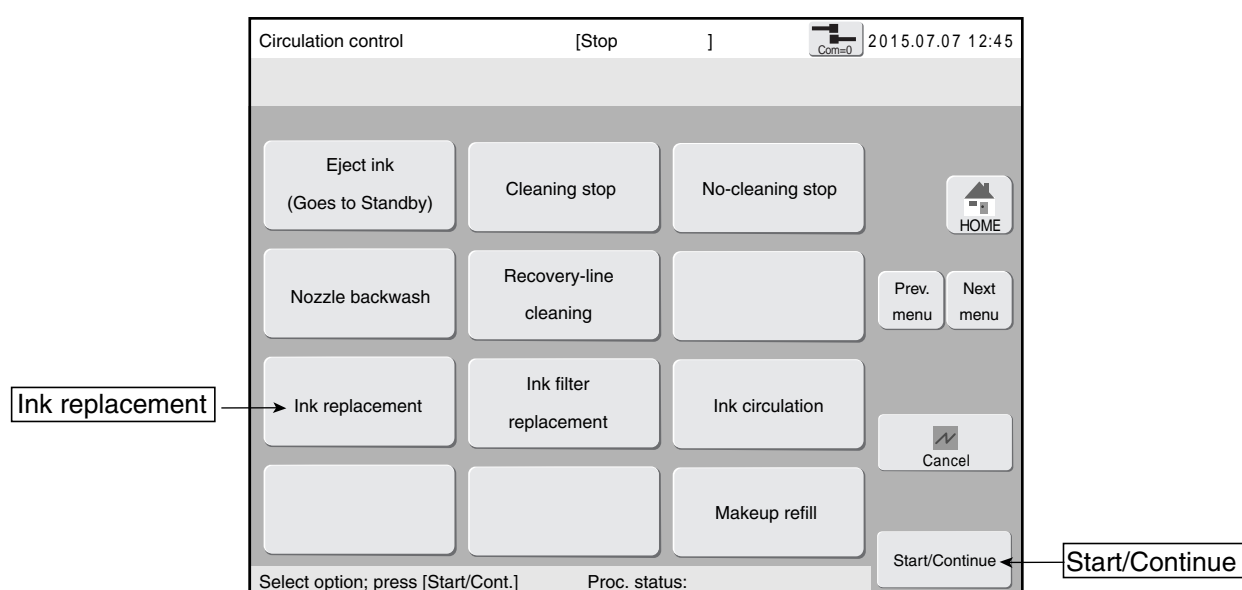
## 6.3 Replacing the ink

### (1) Overview

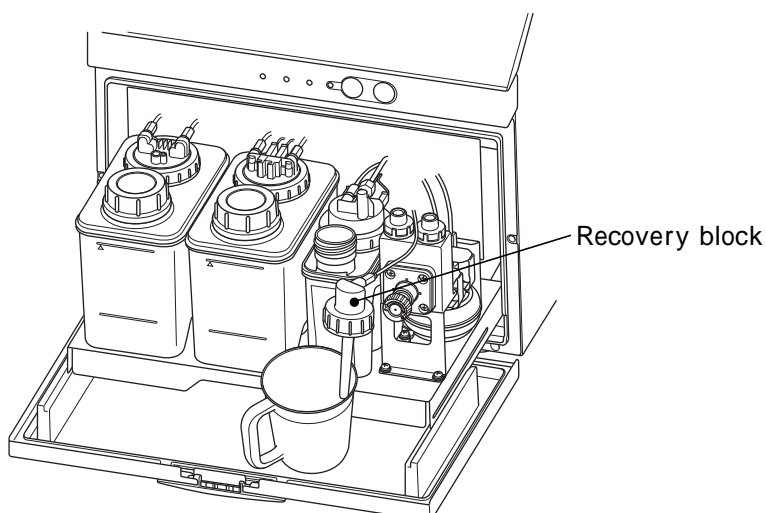
- This operation is performed when replacing old ink with new ink.
  - Consecutively performs from ink drainage to ink replacement to ink refilling.
  - Do not perform this operation while ink is being ejected. Perform it after setting the IJ printer to the “Stop” state.
- \*If replacement of the filters is matched to replacement of the ink, ink will not be wasted.
- \*When performing ink drainage or ink refilling separately, proceed by selecting each function at menu 2 of the Circulation control screen.

### (2) Operation

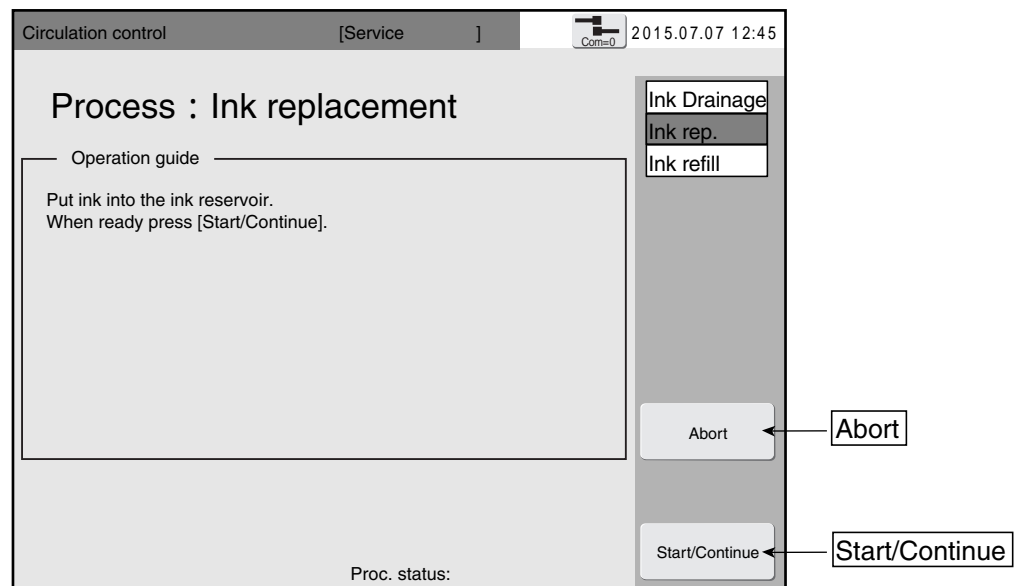
- 1** Display the Circulation control screen and press the **Ink replacement** → **Start/Continue**.



- 2** Drain ink in accordance with the operation guide on the screen.
  - When you want to stop drainage, press **Abort**.
  - When abort processing was performed, repeat operation from step **1**.

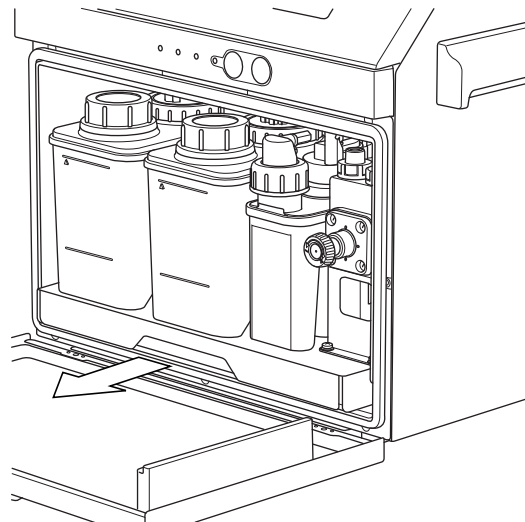


**3** At the end of drainage, the following guide is displayed.



**4** When the ink inside the ink reservoir is within the replacement period, the drainage is not necessary. In this case, go to step **7**.

**5** Loosen the set screw and pull out the reservoir.



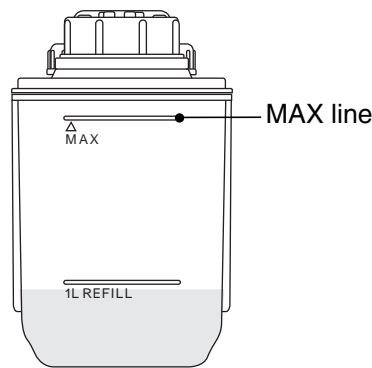
**6 Remove the cap and sensor-block, then drain the ink remaining in the ink reservoir.**

- Clean the inside of the reservoir with makeup.



**7 Fill the reservoir with new ink.**

- Be sure not to exceed the MAX line.



**8 Insert the tip of the print head into a beaker.**

- Prepares for bending of the ink stream.

**9 Press Start/Continue.**

- After a while, ink is ejected from the nozzle. Check the position of the ink stream.
- When you want to stop the operation, press Abort.
- When abort processing was performed, select “Ink refill” from the Circulation control screen and execute.

**10 At the end of operation, the screen returns to the Circulation control screen.**

**11 Display the Operation management screen and set the Ink operating time to “0”.**

## 6.4 How to correct ink stream bending and nozzle clogging

### WARNING

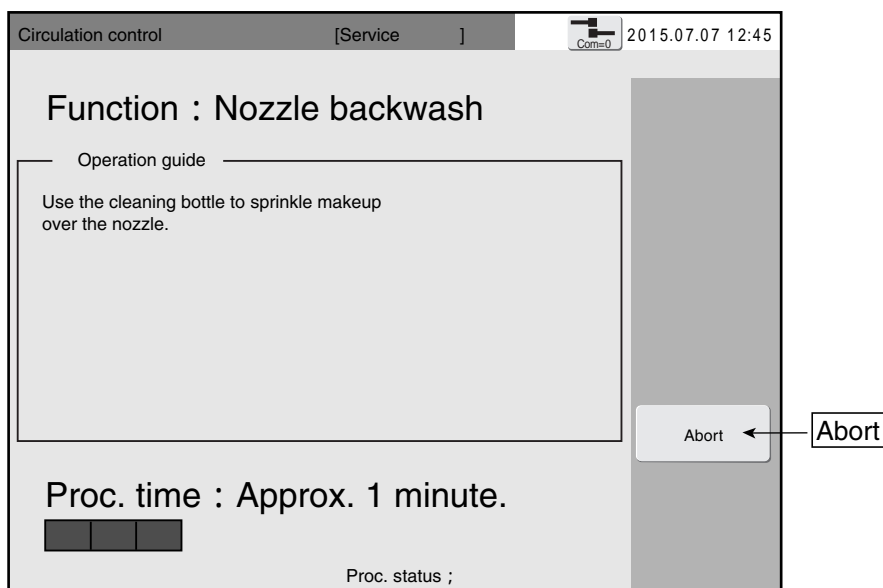
- Wear protective gear (goggles and mask).
- If the ink or makeup gets in your eyes or mouth, immediately rinse with warm water and consult a doctor.
- Perform work after confirming that there is no one in the ink ejection direction.  
(Perform this work by inserting the print head tip into a beaker, etc.)

### 6.4.1 Nozzle backwash

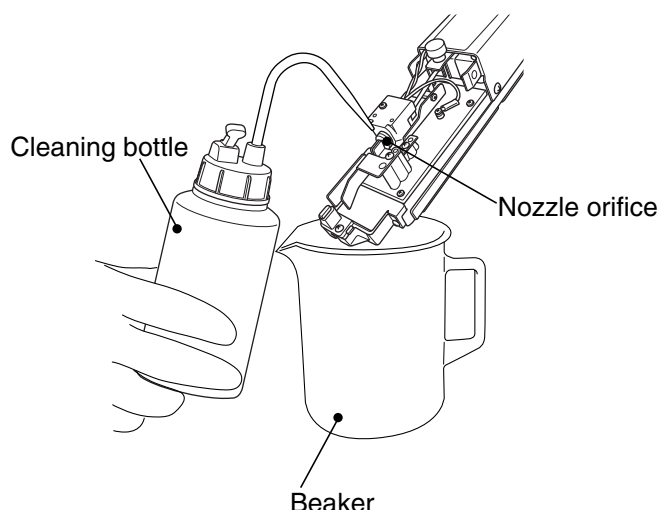
- Sucks in makeup from the nozzle and remove clinging foreign matter, etc.
- To prevent thinning of the ink, do not perform this more than 3 consecutive times.
- Do not perform this work while the ink is being ejected. Perform it after setting the IJ printer to the Stop state.

**1** Procure a cleaning bottle filled with makeup and a beaker and remove the print head cover.

**2** Press the Maintenance menu **Circulation control** → **Nozzle backwash** .  
The nozzle backwash screen is displayed.



**3** Suction begins automatically. Sprinkle the nozzle orifice with makeup.

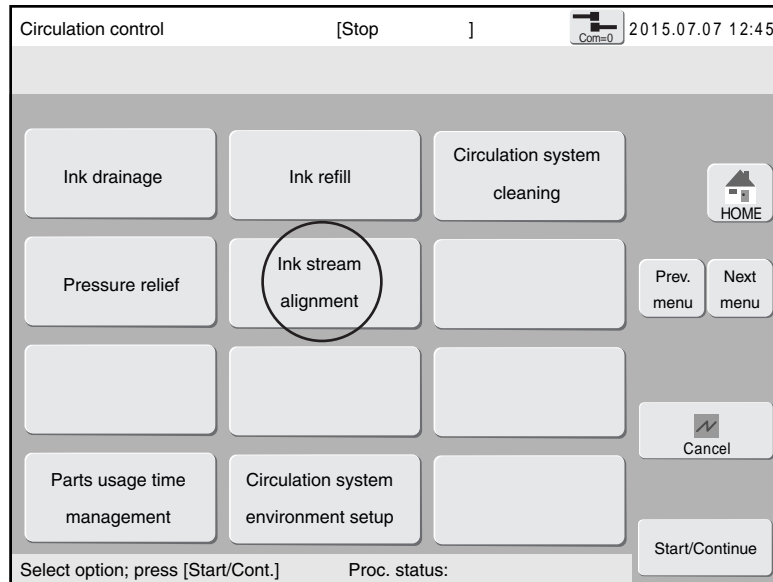


**4 Suction ends in about 1 minute and the screen returns to the Circulation control screen.**

- To stop operation, press **Abort**.

**5 Check if ink stream bending or nozzle clogging has been repaired.**

- Display the screen after the Circulation control screen.

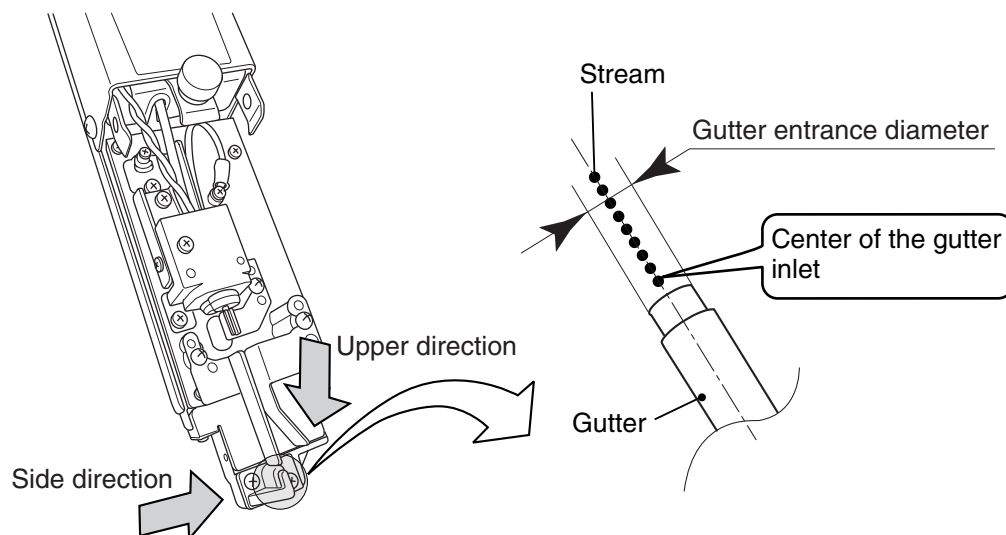


**6 With the print head cover removed, press the **Ink stream alignment** → **Start/Continue** to eject the makeup.**

- Perform this work with the print head tip inserted into a beaker.

**7 Confirm that the stream is in the center of the gutter.**

- Confirm the stream position from the horizontal direction and vertical direction of the print head as shown in the figure.

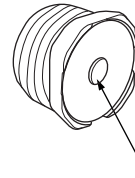


- If the ink stream is not in the center of the gutter, perform nozzle backwash again. If the stream is not corrected even after the nozzle backwash has been performed 3 times, perform par. “6.4.2 Nozzle orifice disassembly and cleaning”.

**8 At the end of confirmation, press **Abort** and stop ejection of the makeup.**

## 6.4.2 Nozzle orifice disassembly and cleaning

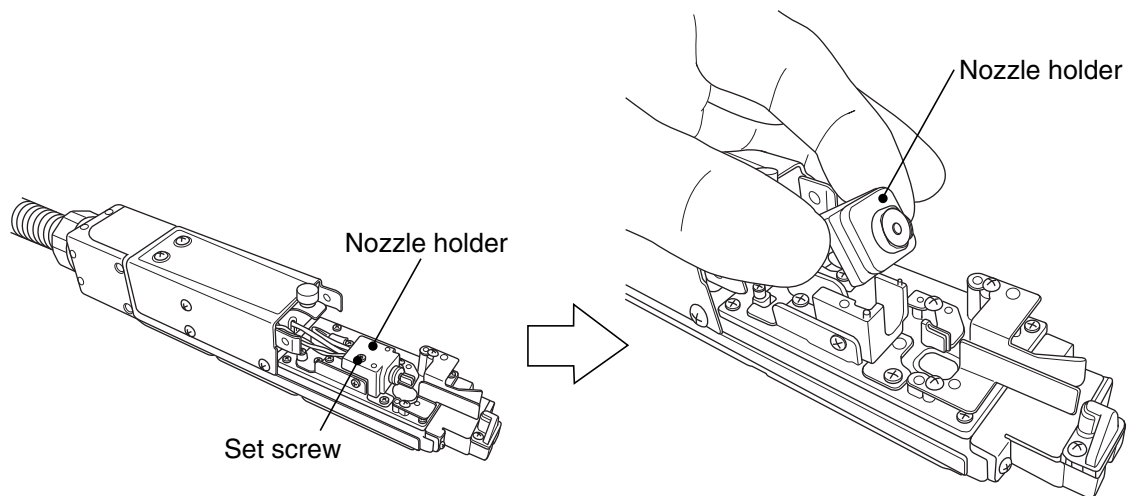
- This is the processing method when ink stream bending or nozzle clogging is not repaired even when nozzle backwash was performed.
  - Do not perform this work while ink is being ejected. Perform it after setting the IJ printer to the Stop state.
  - Do not touch the ejection port of the nozzle orifice directly with your hand. (Use the accessory tweezers.)
  - If the ejection port of the nozzle orifice is damaged, it may be impossible to fulfill its function.
- Handle the nozzle orifice carefully so that the ejection port is not damaged by the tool.



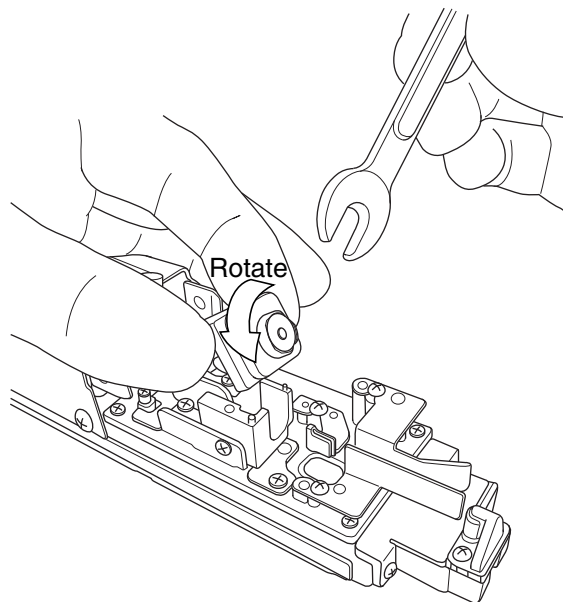
Ejection port of the nozzle orifice

### 1 Remove and clean the nozzle orifice.

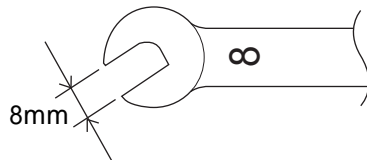
(a) Remove the set screw and float the nozzle holder.



(b) Grasp the nozzle holder and use a wrench to remove the nozzle orifice.

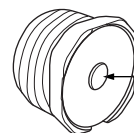


When using the wrench on the market, select 8mm width.



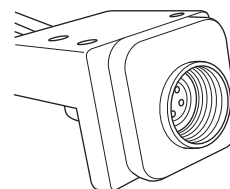
#### PRECAUTIONS

- Do not touch the ejection port of the nozzle orifice.



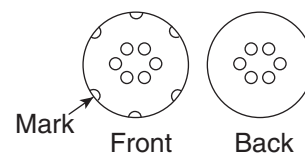
Ejection port

- The seal plate may come out together with the nozzle orifice. Place the seal plate in a beaker containing makeup and be careful not to lose it.



Seal plate

- Seal plate has two side. Front side is marked with dents.

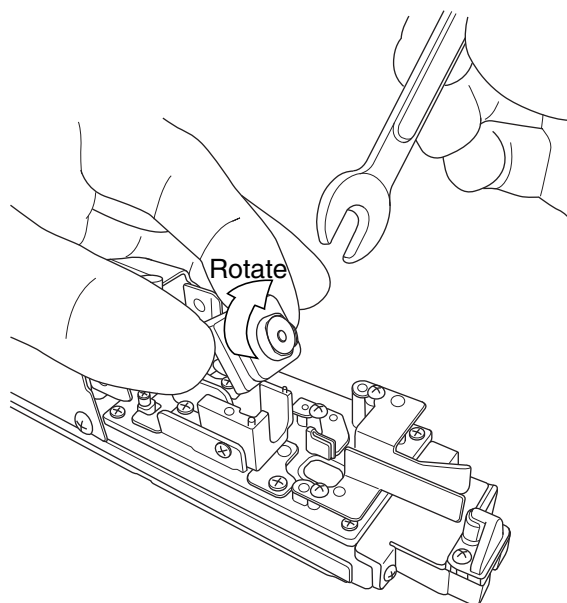


(c) Place the removed nozzle orifice into a beaker containing makeup and clean the orifice.

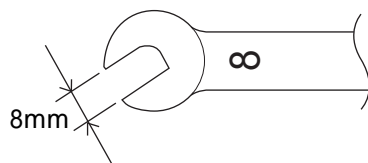


## 2 Install the nozzle orifice.

- Grasp the nozzle holder and use a wrench to install the cleaned nozzle orifice.

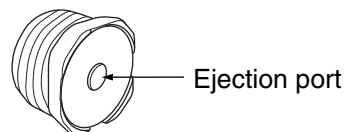


When using the wrench on the market, select 8mm width.

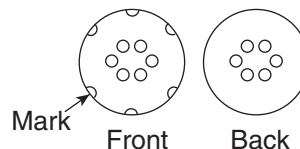


### PRECAUTIONS

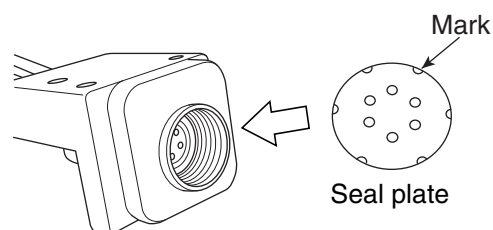
- Do not touch the ejection port of the nozzle orifice.



- Seal plate has two side.  
Front side is marked with dents.

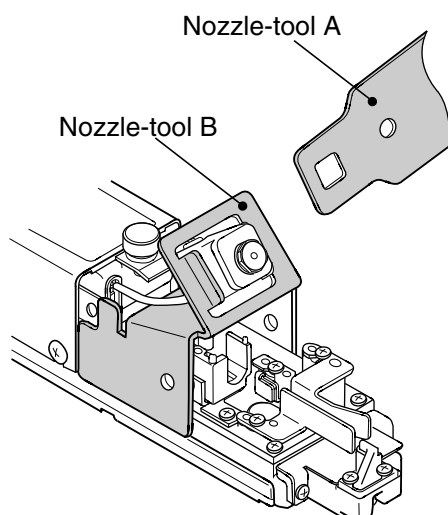


- Make sure to attach the seal plate with marked surface visible from front (front facing position).

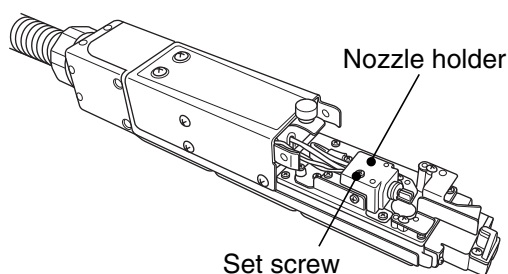


- When replacing the nozzle orifice, seal plate should be replaced at the same time.  
Nozzle orifice and seal plate should always be used in a pair.

- Tighten the nozzle orifice until it will not turn any farther.  
When using the attached “Nozzle-tool”, use it as below drawing.



## 3 Return the nozzle holder to its original position and tighten the set screw.



**4 Press the Ink stream alignment → Start/Continue and confirm that bending of the stream and clogging of the nozzle have been repaired.**

- Perform this operation with the tip of the print head inserted into a beaker.
- When the ink stream is way outside the gutter, cleaning of the nozzle orifice may not be sufficient. Disassemble and clean the nozzle orifice again.
- When the ink stream position has deviated from the center of the gutter, adjust it in accordance with par. “6.5 Stream alignment”.

## 6.5 Stream alignment

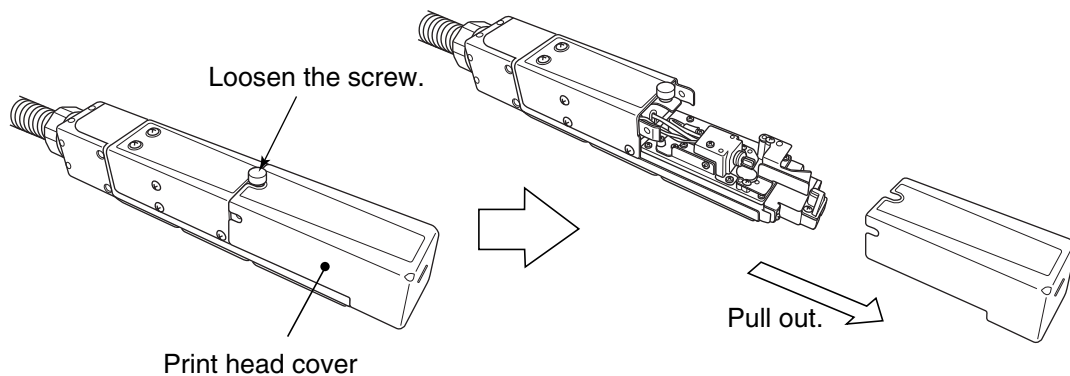
### **WARNING**

- Wear protective gear (goggles and mask).
- If the ink or makeup gets in your eyes or mouth, immediately rinse with warm water and consult a doctor.
- Perform work after confirming that there is no one in the ink ejection direction.  
(Perform this work by inserting the print head tip into a beaker, etc.)

This operation is performed when the nozzle or nozzle orifice has been replaced. Ordinarily, ink stream alignment is unnecessary.

- Adjust the stream position so that the stream ejected from the nozzle is at the center of the gutter.
- Adjustment in 2 directions, horizontal direction and vertical direction, is necessary.

**1 Remove the print head cover in the stop state.**



**2 At the Circulation control screen, press the Ink stream alignment → Start/Continue.**

- Perform this operation with the print head tip inserted into a beaker.

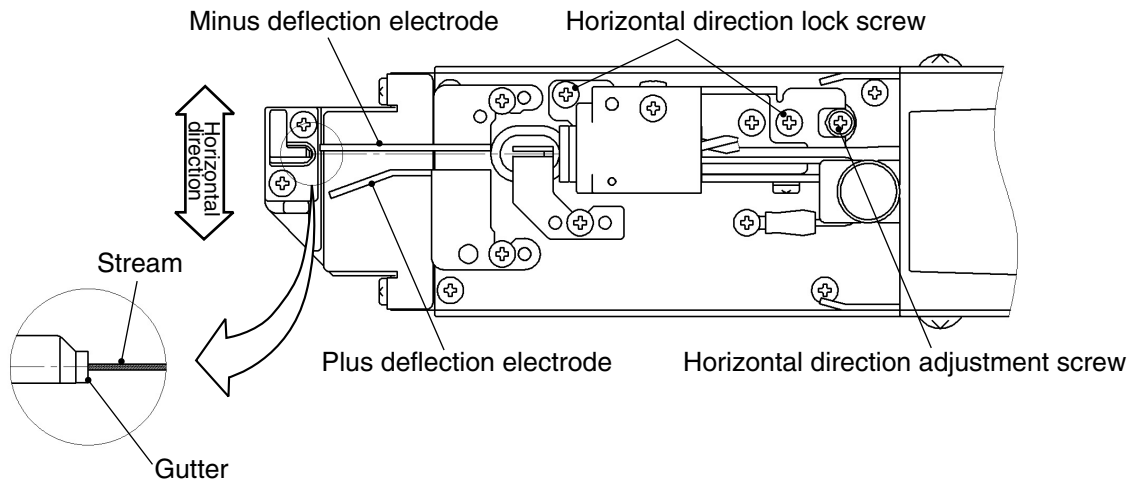
### 3 Adjust the horizontal direction and vertical direction positions.

#### (a) Horizontal direction adjustment procedure

- ① Slightly loosen the horizontal direction lock screws (2).
- ② Turn the horizontal direction adjustment screw and adjust the position of the makeup.  
When you want to move in the minus electrode direction : Turn clockwise  
When you want to move in the plus electrode direction : Turn counterclockwise

**Adjust so that the stream is approximately at the center of the gutter.**

- ③ After adjustment, tighten the horizontal direction lock screws (2).

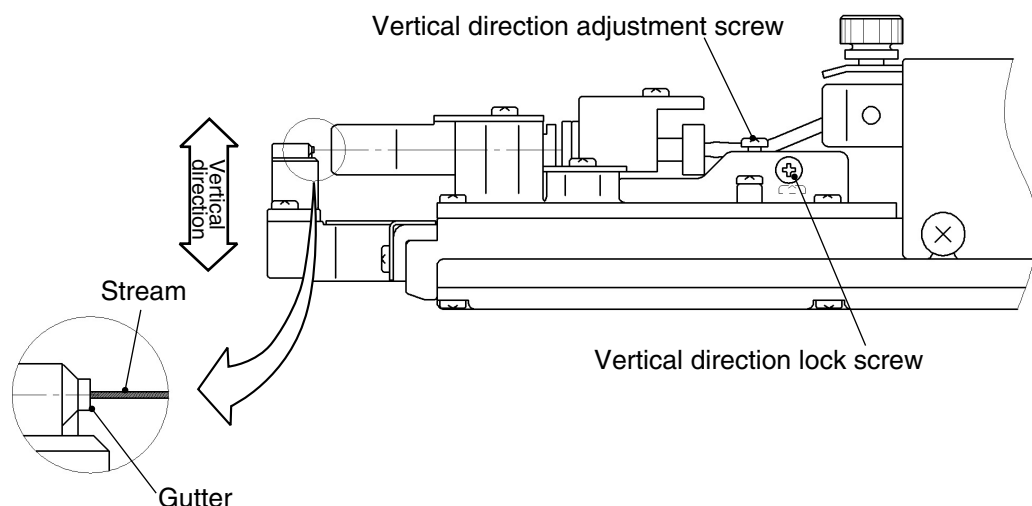


#### (b) Vertical direction adjustment procedure

- ① Slightly loosen the vertical direction lock screw (1).
- ② Turn the vertical direction adjustment screw and adjust the position of the stream.  
When you want to move to the bottom of the gutter : Turn counterclockwise  
When you want to move to the top of the gutter : Turn clockwise

**Adjust so that the stream is approximately at the center of the gutter.**

- ③ After adjustment, tighten the vertical direction lock screw (1).



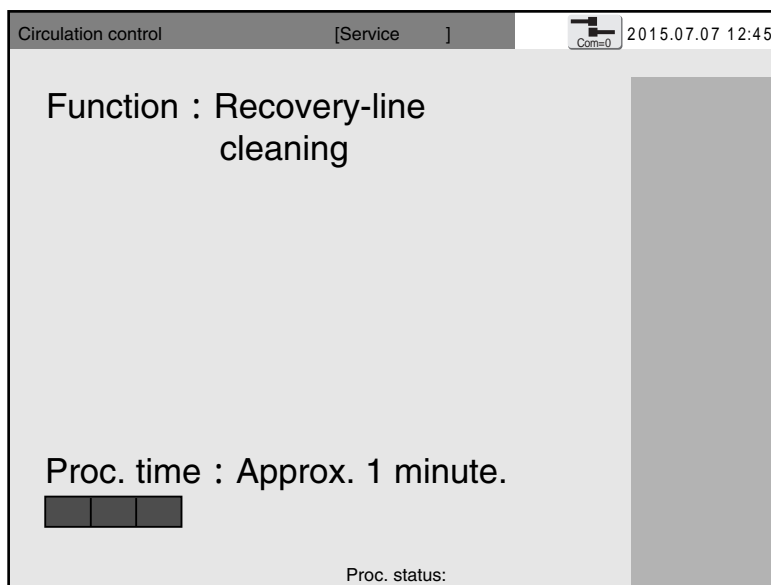
### 4 At the end of adjustment, press **Abort**.

## 6.6 Cleaning the recovery line

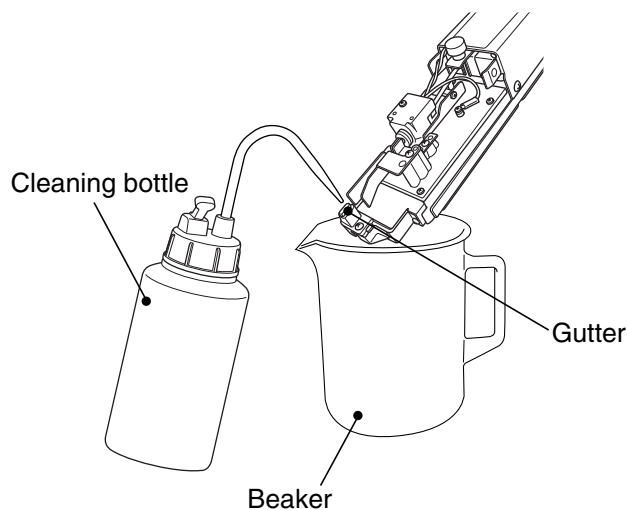
- When the ink recovery system becomes dry or clogged, the line from the gutter to the ink main tank can be cleaned by performing “Recovery-line cleaning”.
- Do not perform this operation while ink is being ejected. Perform it after setting the IJ printer to the “Stop” state.
- Have ready a cleaning bottle filled with makeup and a beaker and remove the print head cover.
- If recovery-line cleaning is performed continuously, the ink will become thin and cause printing distortion. Since ink replacement may become necessary after repair, do not perform cleaning more than 2 consecutive times.

**1** Display the Circulation control screen and press the **Recovery-line cleaning** → **Start/Continue**.

**2** Perform cleaning in accordance with the operation guide.



- Pour makeup onto the gutter.



- To stop operation, press **Abort**.

**3** Cleaning ends in about 1 minute and the screen returns to the Circulation control screen.

## 6.7 Replacing the ink filter

Replace the ink filter after the ink filter gets empty. As the ink filter can be replaced without draining ink in the filter, ink will not be wasted.

- 1 Display the Circulation control screen and press the **Ink filter replacement** → **Start/Continue**.

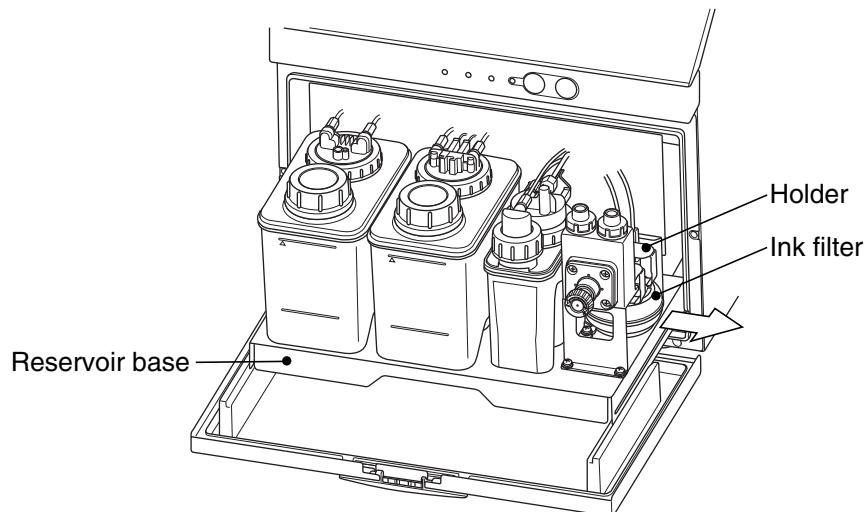
- 2 A filter replacement operation guide is displayed.

- When **Start/Continue** is pressed, ink in the ink filter is transferred to the main ink tank.
- When operation was aborted, repeat operation from step 1.
- When “The main ink tank too full” fault is generated, refer to “6.12 Draining ink from the main ink tank” and drain approx. 100ml of ink, then retry from 1.

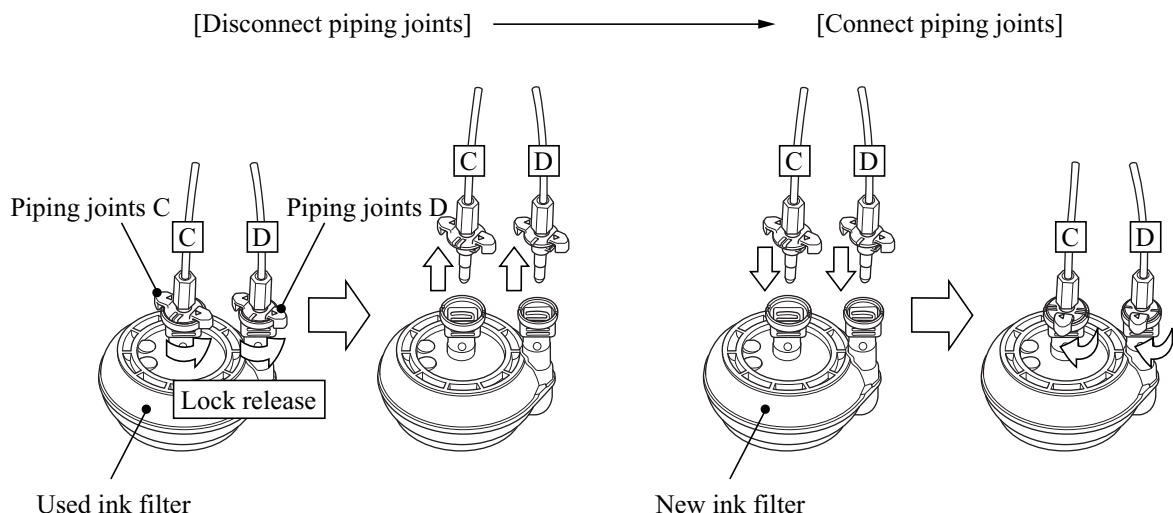
### ⚠ CAUTION

- If the ink was accidentally spilled, quickly wipe it off with wiping paper, etc. In addition, do not close the maintenance cover until you confirm that the wiped part is completely dry.

- 3 When the operation guide “Replace ink filter ....” is displayed, pull out the reservoir base and remove the ink filter from the holder.



- 4 Disconnect piping joints C and D and connect them to a new ink filter.



## ⚠ CAUTION

- ① The joints cannot be installed if the installation position of the piping is incorrect. (C is at the center of the ink filter and D is at the outside.)
- ② When installing, always lock piping joints C and D by turning them clockwise.
- ③ A small amount of ink will remain inside the ink filter even after ink drainage. Be careful that the ink does not spill when handling the used ink filter.

### 5 Set the ink filter at the holder.

- When **Start/Continue** is pressed, refilling of the lines with ink begins.
- After a while, ink is ejected from the nozzle. Check the position of the ink stream.
- Confirm that there is no ink leaking from the piping joints of the replaced ink filter.
- When operation was aborted, execute “Ink refill” from the Circulation control screen.

### 6 Return the reservoir base to its original position.

### 7 Close the maintenance cover.

### 8 Open the Parts usage time mgmt. screen (menu 2 of the Circulation control screen), and set the Ink filter time to “0”.

Parts usage time mgmt.
[Stop ]

Com=0
 2015.07.07 12:45

( hours )		( hours )	
Ink filter	0 0 0 0 0	Pump	0 1 0 0 0
Makeup filter	0 1 0 0 0	Heating unit	0 1 0 0 0
Recovery filter	0 1 0 0 0	M V 1	0 1 0 0 0
		M V 2	0 1 0 0 0
Viscometer filter	0 1 0 0 0	M V 3	0 1 0 0 0
MV9 filter	0 1 0 0 0	M V 4	0 1 0 0 0
		M V 5	0 1 0 0 0
		M V 6	0 1 0 0 0
< Consumption >		M V 7	0 1 0 0 0
Ink	0 0 1 0 0 0 (ml)	M V 8	0 1 0 0 0
Makeup	0 0 1 0 0 0 (ml)	M V 9	0 1 0 0 0
Print count	0 0 0 0 0 1 0 0 0	M V 1 1	0 1 0 0 0

Update log 2015/03/22 08:15

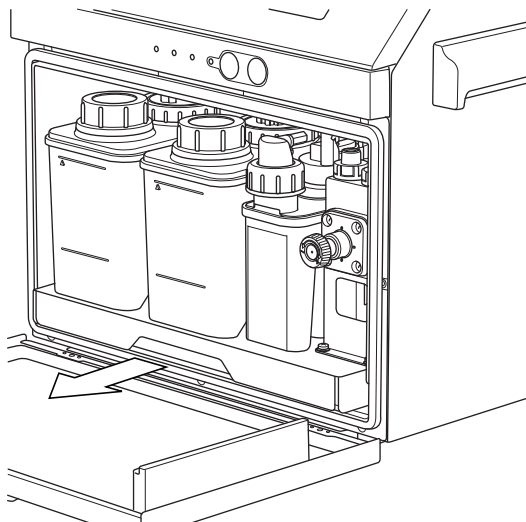
HOME

Back

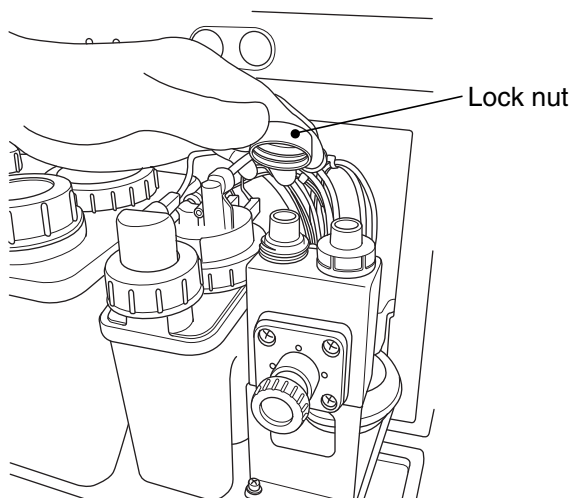
## 6.8 Replacing the recovery filter and makeup filter

- Do not perform this operation while ink is being ejected. Perform it after setting the IJ printer to the “Stop” state.

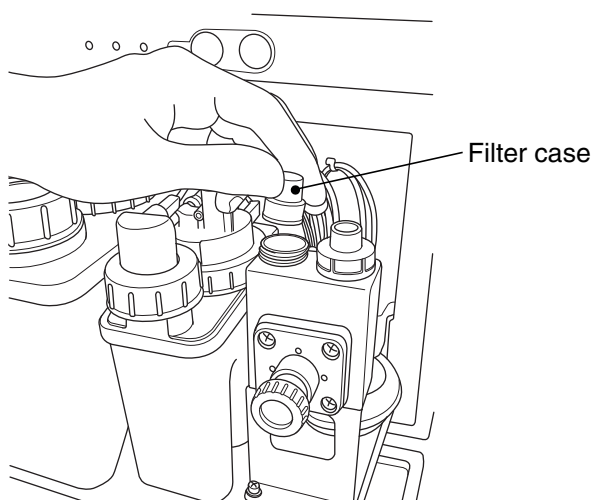
### 1 Pull out the circulation system.



### 2 Remove the lock nut by turning it by hand.



### 3 Remove the filter case upward.



- 4 Install the new filter case and return the circulation system to its original state by the opposite procedure.
  - Tighten the nuts firmly by hand.
- 5 When the makeup filter is replaced, display the Circulation control screen and press the **makeup refill** → **Start/Continue**.
- 6 Operate the IJ printer and check that there is no liquid leaking from the replaced part.
- 7 Open the Part usage time mgmt. screen (menu 2 of the Circulation control screen) and set the time of the replaced filter to “0”.

Parts usage time mgmt.
[Stop      ]

2015.07.07 12:45

	( hours )		( hours )
Ink filter	0 1 0 0 0	Pump	0 1 0 0 0
Makeup filter	0 0 0 0 0	Heating unit	0 1 0 0 0
Recovery filter	0 0 0 0 0	M V 1	0 1 0 0 0
		M V 2	0 1 0 0 0
Viscometer filter	0 1 0 0 0	M V 3	0 1 0 0 0
MV9 filter	0 1 0 0 0	M V 4	0 1 0 0 0
		M V 5	0 1 0 0 0
< Consumption >		M V 6	0 1 0 0 0
Ink	0 0 1 0 0 0 (ml)	M V 7	0 1 0 0 0
Makeup	0 0 1 0 0 0 (ml)	M V 8	0 1 0 0 0
Print count	0 0 0 0 0 1 0 0 0	M V 9	0 1 0 0 0
		M V 1 1	0 1 0 0 0

Update log   2015/03/22   08:15

HOME

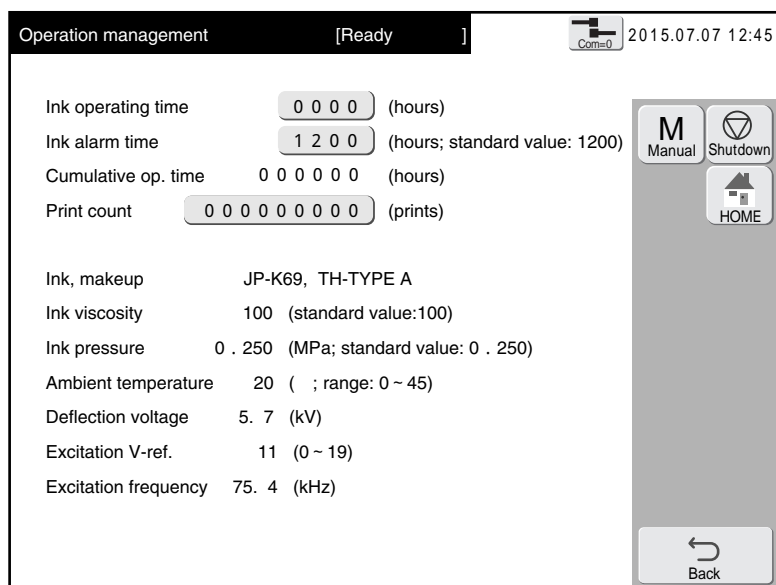
Back



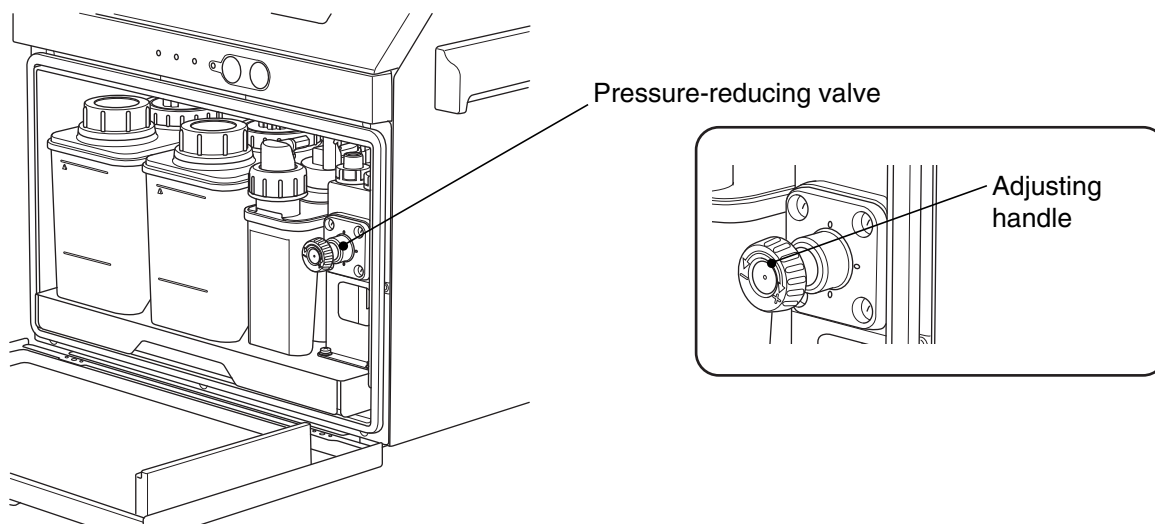
## 6.9 Adjusting the pressure

- Check the pressure before printing state check at the start of operation.
- Do not perform this operation in the Stop state. Perform it in the state in which ink is ejected.

### 1 Open the Operation management screen.



### 2 Check the displayed ink pressure value. If there is a difference of 0.010 or more from the standard value, adjust the pressure to the standard value $\pm 0.002$ by turning the “Adjusting handle” by hand.



To raise the pressure : rotate clockwise.

To lower the pressure : rotate counterclockwise.

## 6.10 Excitation V adjustment

### (1) Overview

- The Excitation V set value is 0 to 19. The state of the ink drops is different for each setting.
- The optimum Excitation V set value must be input to maintain good print quality.
- Perform nozzle property test printing, and the center value of the range where printing is good is the optimum Excitation V set value.

(Example) When printing is good at the Excitation V set value 5 to 15 range at nozzle property test, the optimum Excitation V set value is the center value 10.

- Memorizes the ambient temperature when the Excitation V set value was updated as the reference ambient temperature.

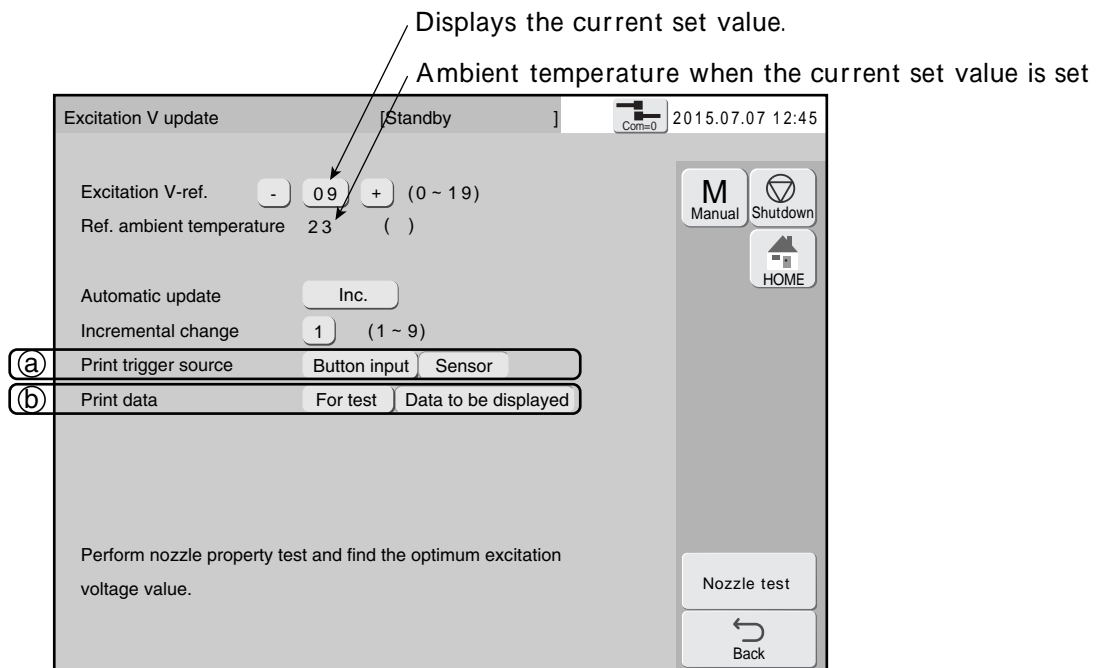
If the ambient temperature and the reference ambient temperature difference exceeds a certain value during use, “Check Excitation V set value” warning will be generated. In that case, readjust the Excitation V setting.

### (2) Operation

- For Excitation V setting, select the optimum set value from the result of test printing for each set value and input the selected value from the operation panel. Perform operation in accordance with the following procedure:

#### 1 At the Maintenance menu, press **Excitation V update (nozzle test)**.

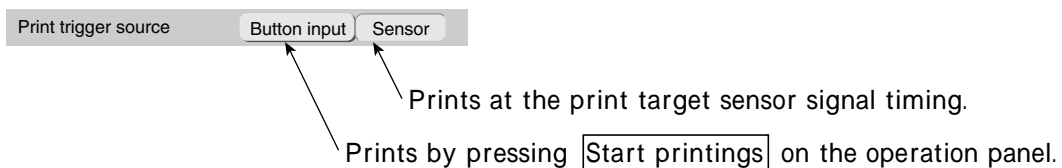
- The Excitation V update screen is displayed.



#### 2 Set (a) Print trigger source and (b) Print data of nozzle property test printing.

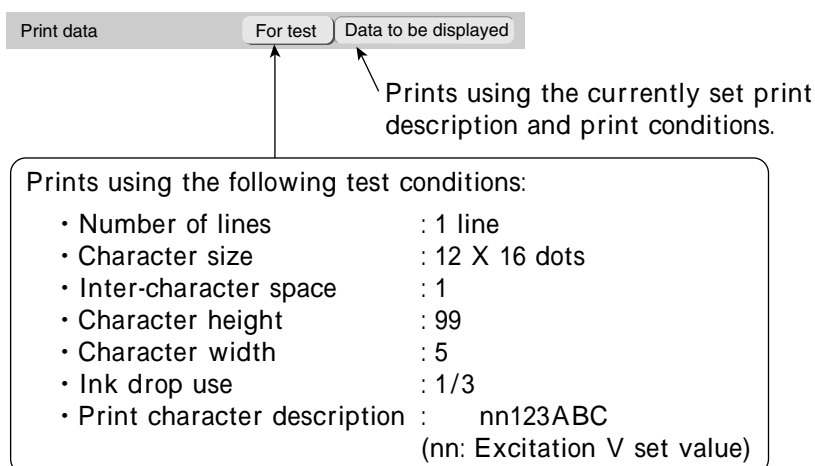
##### (a) Print trigger source

Select the timing at which printing is performed.



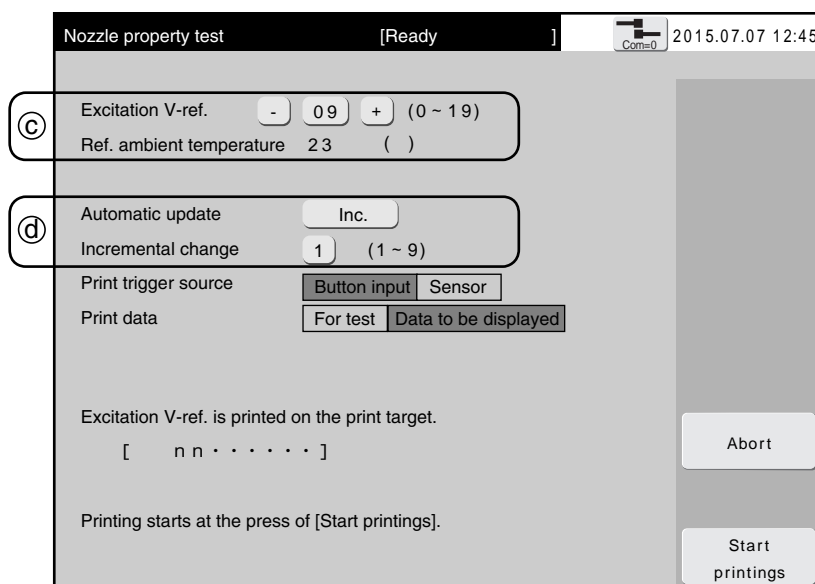
## b Print data

Select the contents and conditions of the characters to be printed.



## 3 Confirm that the IJ printer is in the Standby state and press **Nozzle test**.

- The Nozzle property test screen is displayed. The IJ printer enters the Ready to print state.



## c Excitation V-ref.

Input the set value you want to print. (Set value is 00 to 19.)

Change the setting using or input a value by touching the number.

## d Automatic update

Select whether or not to automatically switch to the next set value after printing one setting.

- Disable : Set value does not change.
- Dec. : Set value is automatically decremented at each printing.
- Inc. : Set value is automatically incremented at each printing.

At “Inc.”, the change width by which the value is automatically switched is set.

#### 4 Perform nozzle property test printing.

- When “Print trigger source” is  , press .
- When “Print trigger source” is  , input the sensor signal.

### ⚠ CAUTION

- During the nozzle property test, the state of creation of the ink drops may become poor and an “Ink Drop Charge Too High” or other fault may be generated and the ink may stop, depending on the Excitation V value. <sup>3</sup>  
In this case, after cleaning the print head, eject the ink again. (Refer to par. “3.1.2 When an error occurred at the start of operation” of the instruction manual and perform the same work.)  
The possibility of fault is high when Excitation V is set less than 5. When performing test printing again, start from setting 10 and test print while decrementing.

#### 5 Check the printed result.

- Check the Excitation V range at which printing is good. The center of that range is the optimum value.

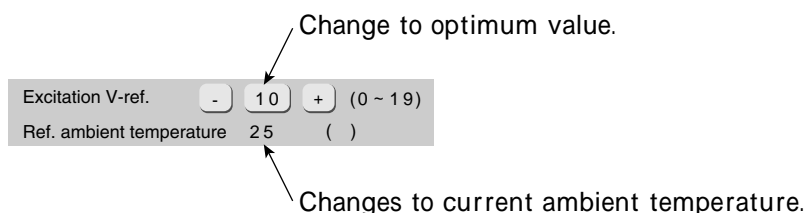
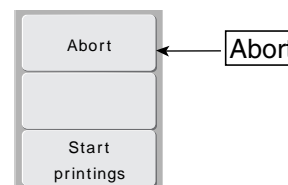
(Example) Printing good range 5 to 15→Optimum value 10

O: Good ×: Bad Space: Not checked

Check date	Ambient temperature	Excitation V value																			optimum value
		0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
2015.07.07	25°C			×	×	×	○	○	○	○	○	○	○	○	○	○	×	×	×	×	10

#### 6 Update the Excitation V-ref. value.

- At the end of test printing, press [Abort] of the “Nozzle property test” screen and return to the “Excitation V update” screen.
- Change “Excitation V-ref.” to the optimum value confirmed at step **5**.



#### 7 When the screen is returned to the “Maintenance menu” by , set value change is complete.

### ⚠ CAUTION

- Repeat print setting is disabled during the nozzle property test. Only one printing is performed by one input signal.
- Product speed matching setting is disabled during the nozzle property test. The character width may be different from the actual character width.

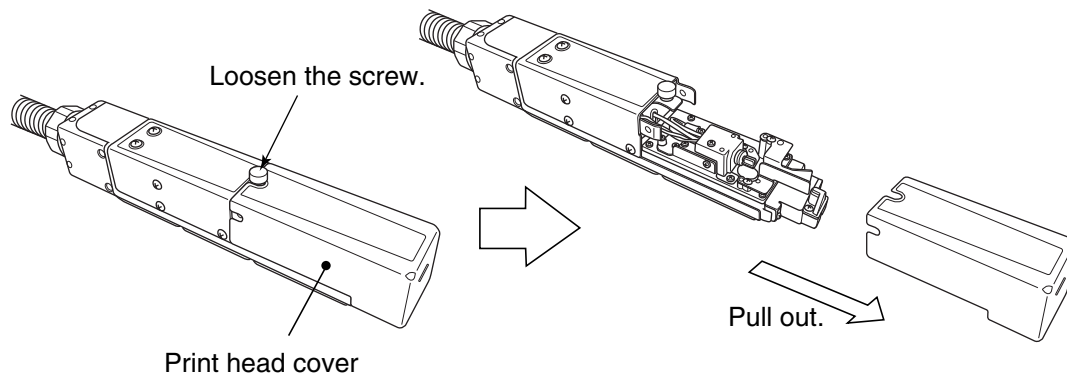
## 6.11 Ink drop state check method

- The state of the ink drops can be checked by using a magnifying glass.
- Perform this work in the Eject ink state.

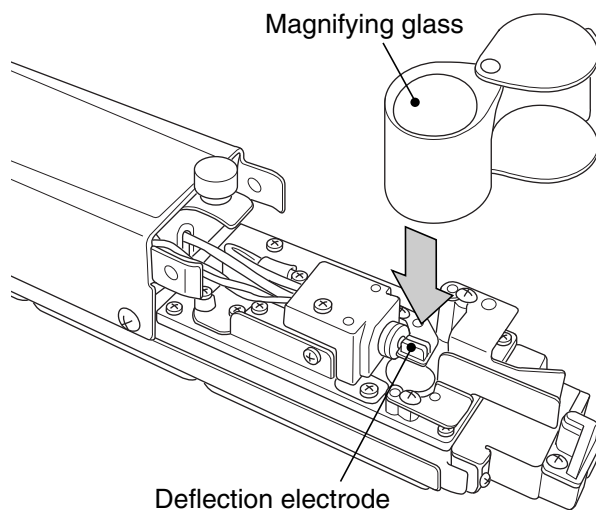
### WARNING

- Wear protective gear (goggles and mask).
- If the ink or makeup gets in your eyes or mouth, immediately rinse with warm water and consult a doctor.
- Perform work after confirming that there is no one in the ink ejection direction.  
(Perform this work by inserting the print head tip into a beaker, etc.)

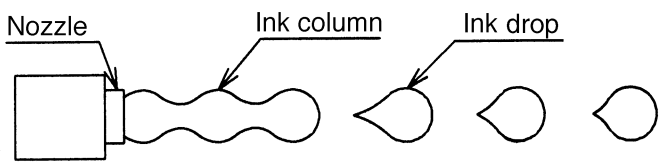
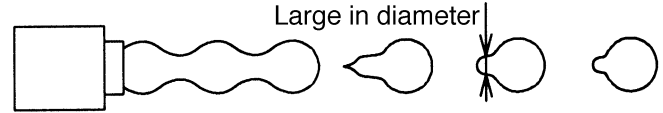
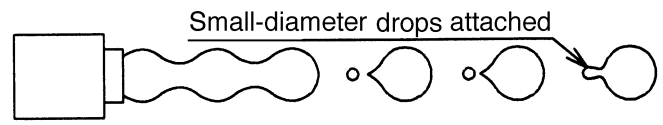
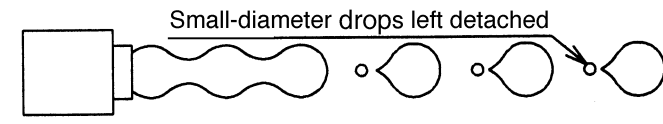
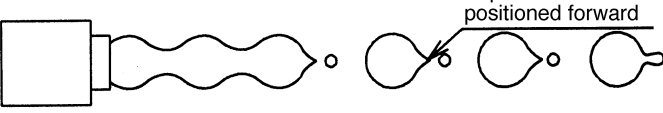
- 1** Confirm that the IJ printer is in the Standby state and then remove the print head cover.



- 2** Using a magnifying glass, observe the ink drops in the charging electrode.



Ink drops creation state confirmation table

Ink drop shape	Judgment	Name	Remarks
 <p>Nozzle</p> <p>Ink column</p> <p>Ink drop</p>	○	A mode	Good
 <p>Large in diameter</p>	○	B mode	Perfect
 <p>Small-diameter drops attached</p>	○	High-speed small-diameter mode Two or fewer small-diameter drops	Allowable
 <p>Small-diameter drops left detached</p>	×	Constant-speed small-diameter mode	Not allowed
 <p>Separated ink end positioned forward</p>	×	Low-speed small-diameter mode	Not allowed

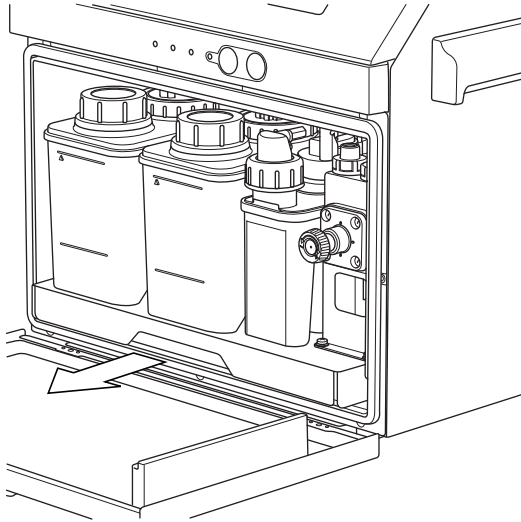
When the shape of the ink drops is not allowed, update to the optimum set value at par. “6.10 Excitation V adjustment” and check again. Or contact your local distributor.

### 3 After the check, install the print head cover.

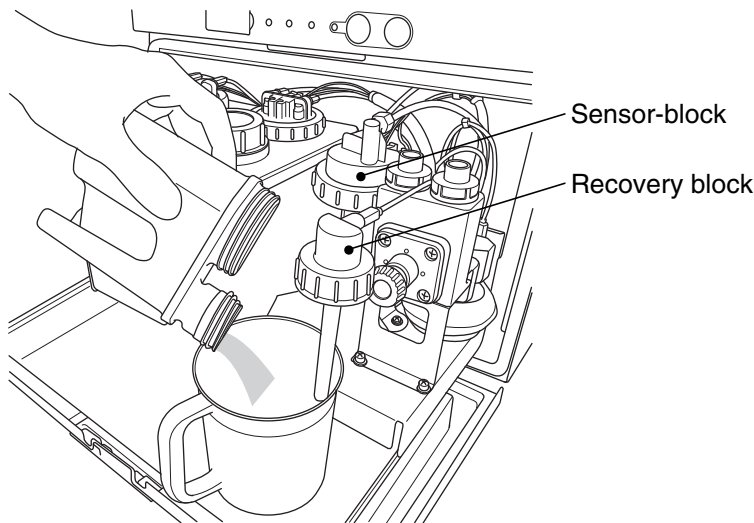
## 6.12 Draining ink from the main ink tank

- When the main ink tank full fault is generated, the ink cannot be drained by screen operation. Drain the ink and refill with new ink as follows:

### 1 Pull out the circulation system.



### 2 Remove the recovery block and the sensor-block from the main ink tank and drain the ink for about 100ml from inside the tank into a beaker.



### 3 Return the circulation system to its original state and display the Circulation control screen and press the **Ink refill** → **Start/Continue**.

\*Note that if operation is started without refilling the ink, a “Replenishment Time-out” fault will be generated.

#### CAUTION

- If the ink is accidentally spilled, quickly wipe it off with wiping paper, etc. In addition, do not close the maintenance cover until you confirm that the wiped part is completely dry.

## 6.13 Test of solenoid valve/pump

- The operation confirmation of solenoid valve and pump is performed.

- |                           |                               |
|---------------------------|-------------------------------|
| ① Supply valve (MV1)      | ② Replenishment valve (MV2)   |
| ③ Recovery valve (MV3)    | ④ Agitation valve (MV4)       |
| ⑤ Circulation valve (MV5) | ⑤ Pressure relief valve (MV6) |
| ⑦ Makeup valve (MV7)      | ⑥ Cleaning valve (MV8)        |
| ⑨ Shutoff valve (MV9)     | ⑩ Pump                        |
| ⑪ Viscosity meter (MV10)  | ⑫ Exhaust valve (MV11)        |

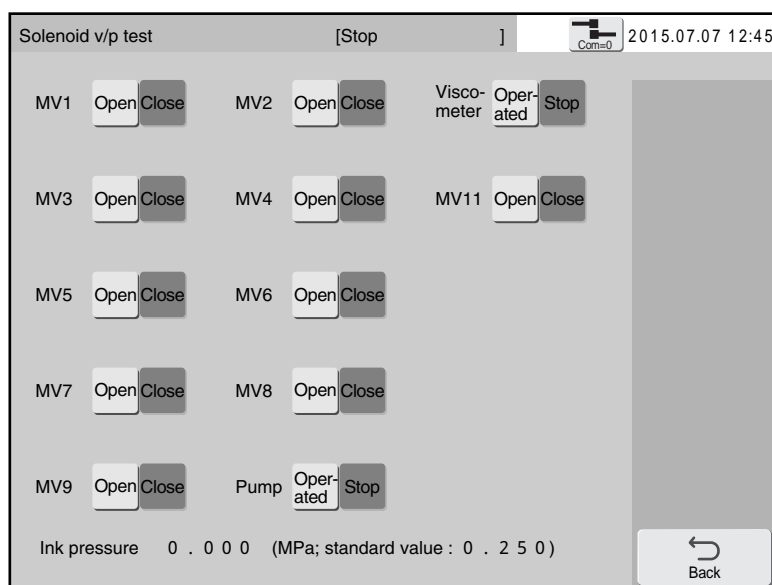
- If circulating system can not be operated due to no ink ejection, ink overflow from the gutter and such, there are possibilities of solenoid valve or pump failure. Please perform operation test under service personnel's guidance.
- In an operation state, only an operating state is displayed.

Different operations by state

Ink stop state	Except for Ink stop state
The operation confirmation of solenoid valve and pump is performed( Operates each valves individually ).	Displays operating state only. Operating test such as open/close valve cannot be performed.

### 1 At the maintenance menu, press **Solenoid valve / pump test**.

The solenoid valve / pump test screen is displayed.



### 2 Press operation button.

The operating state of the solenoid valve and the pump is displayed.  
(Confirm the operation by an operating sound.)

- Open : The solenoid valve is opened.
- Close : The solenoid valve is closed.
- Operated : The pump is operated.
- Stop : The pump is stopped.





## 7. MAINTENANCE SERVICE

- For the IJ printer to operate smoothly, the following maintenance work is necessary.

### (1) Replacement of consumables

Replace the following filters according to the “Replacement guideline”.

No.	Consumable	Replacement guideline	Replacement procedure description
1	Ink filter	2,400 hr (RX-S, RX-B)	"6.7 Replacing the ink filter"
2	Recovery filter	1,200 hr (RX-S, RX-B)	"6.8 Replacing the recovery filter and makeup ink filter"
3	Makeup filter	4,800hr (RX-S, RX-B)	

- In the case of standard operation (8 hrs/day, 25 days/month operation), 2400 hours corresponds to 1 year.
- The minimum retention period of IJ printer repair parts, including consumables, is 7 years after discontinuation of manufacture.
- When ordering consumables, please specify the following order name and part code No.

No.	Consumable	Order name	Part code No.	Remarks
1	Ink filter	Filter capsule parts	-	
2	Recovery filter	Mini filter parts	-	2 pcs/pack
3	Makeup filter			

### (2) Other maintenance

- About once a week, check whether or not the pump makes an abnormal sound (metal sound, etc.).
- Before performing print state check at the start of operation, check whether or not the pressure is suitable.  
(See par. “6.9 Adjusting the pressure” for a description of the check procedure.)
- For a description of ink drops and excitation voltage checks, see pars. “6.10 Excitation V adjustment” and “6.11 Ink drops state check method”.

### (3) About periodic replacement parts

- To use the IJ printer stably, clock battery, circulation system parts (pump, solenoid valve, etc) and heating unit must be periodically replaced. Please consult your nearest local distributor.

## About maintenance service

If trouble or damage occurs within 1 year after delivery or accumulated operating time of 2400 hours, whichever is sooner, repairs will be made free of charge. However, the following cases are outside the warranty even within the free warranty period:

- (1) When trouble was due to handling outside the instruction manual
- (2) When materials and parts other than ours, including the ink, were used and damage was caused by them
- (3) When repair was performed by other than us or our designated representative and damage was caused by this
- (4) When trouble was due to external causes (abnormal print material, etc.) other than this equipment or by moving or transportation of the equipment after delivery
- (5) When operated in a usage environment outside the specifications of par. "12. Specifications" of the instruction manual.
- (6) When damaged by fire, water, or other natural disaster

Loss of production due to down time and physical loss due to trouble or error of delivered equipment (loss of print material, related facility, etc.) is outside the warranty. If trouble occurs, an engineer shall be dispatched as quickly as possible and maximum efforts will be made so that the down time is as short as possible.

If there is no danger of being misread, excessive or insufficient dot configuration shall be considered allowable.

The IJ printer has an alarm function to prevent major printing faults before they happen, but this function does not inspect the quality of the printed characters.  
Consideration shall be given so that the printed character state is visible at some process.

## Parts retention period

The retention period of the performance parts for repair of this equipment is 7 years after discontinuation of manufacture.

"Performance parts for repair" are parts necessary to maintain the functions of the product.

Customer memo: Please fill in for later use.  
Useful when communicating with the service in charge.

Your Hitachi sales representative:

Tel:

Your Hitachi distributor:

Person in charge:

Tel:

Date of purchase:                      year                      month                      day

Person in charge:



Technical drawings of the RCU-1000 cabinet showing front, side, and rear views with dimensions and labels.

**Front View:**

- Overall width: 400
- Overall height: 750
- Top section height: 300
- Bottom section height: 300
- Labels: External interface inlets, Maintenance area

**Side View:**

- Overall width: 465
- Overall height: 400
- Top section height: 230
- Bottom section height: 300
- Labels: Touch screen, Maintenance cover

**Rear View:**

- Overall width: 37
- Overall height: 25
- Labels: Power switch, Power inlet ( $\phi 7 \sim 10$ ), Power inlet ( $\phi 7 \sim 10$ ), Printhead cable (4m), Printhead, Exhaust duct ( $\phi 50$ ), Purging air inlet (Rc1/8)

Fig. 8-1 Model RX-S, RX-B IJ printer outside dimensions



# 8.2 Electrical Connection Diagram

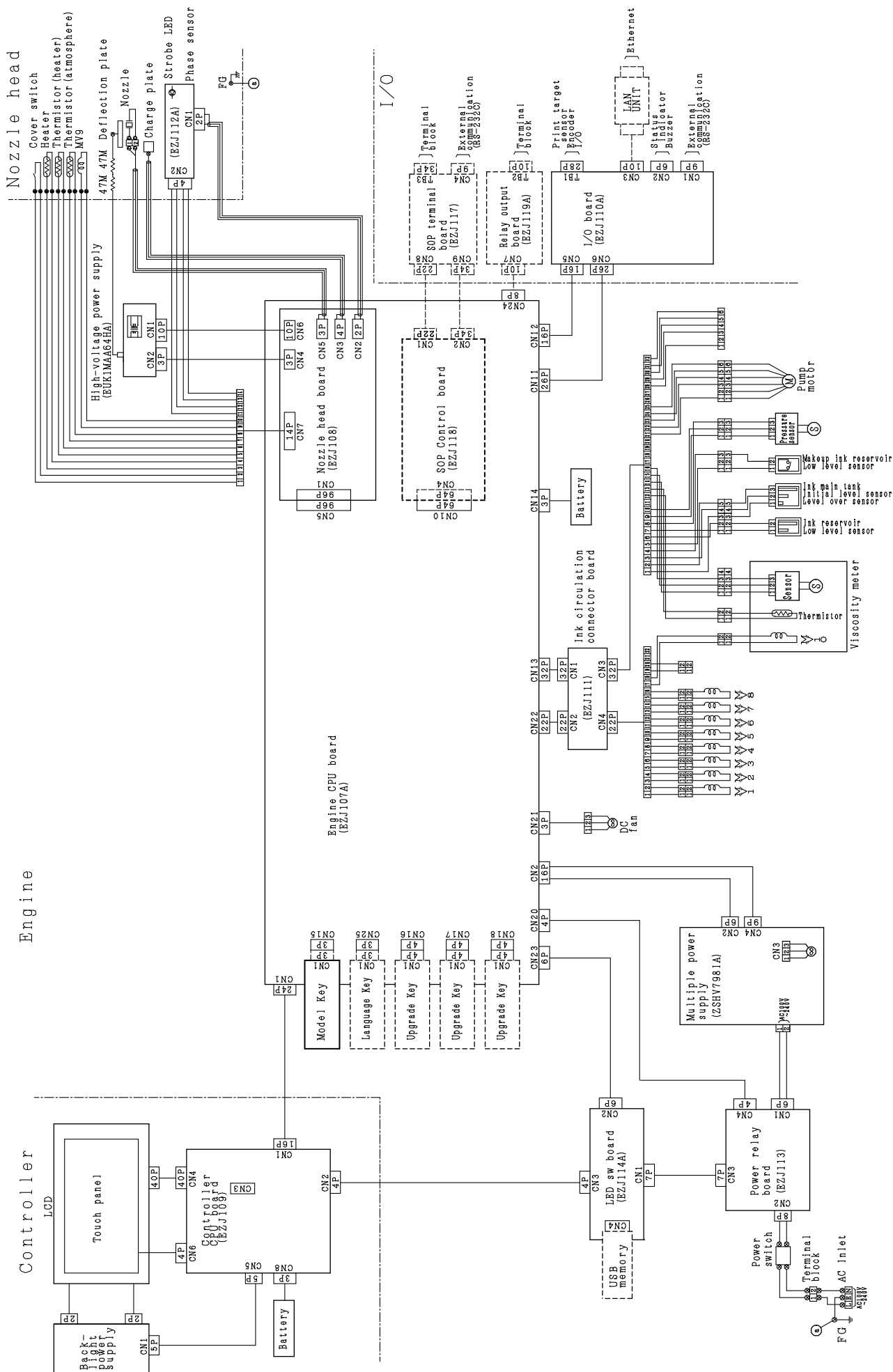


Fig.8-3 Model RX-S Electrical connection diagram

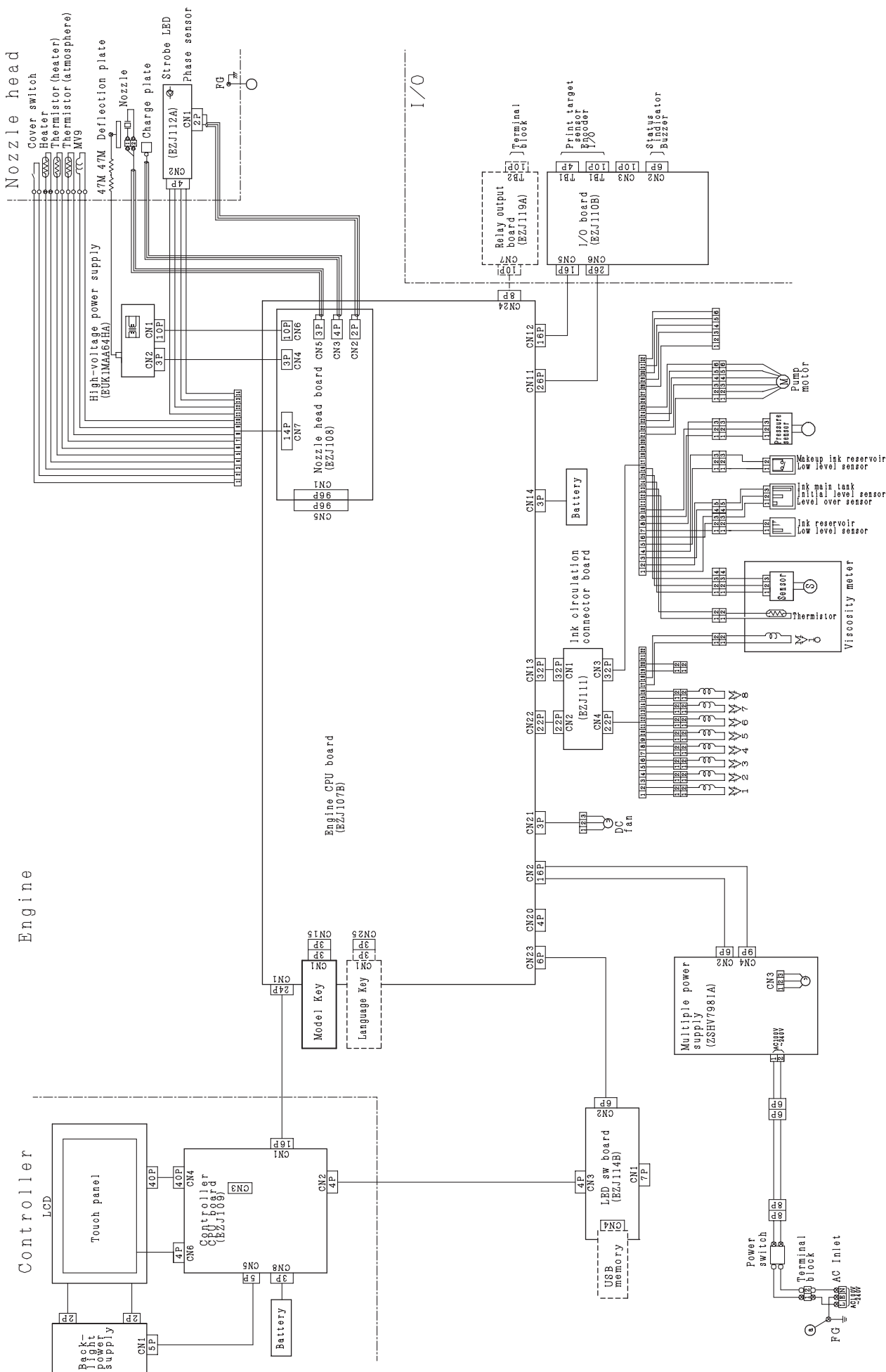


Fig.8-4 Model RX-B Electrical connection diagram

# 8.3 Circulation System Diagram

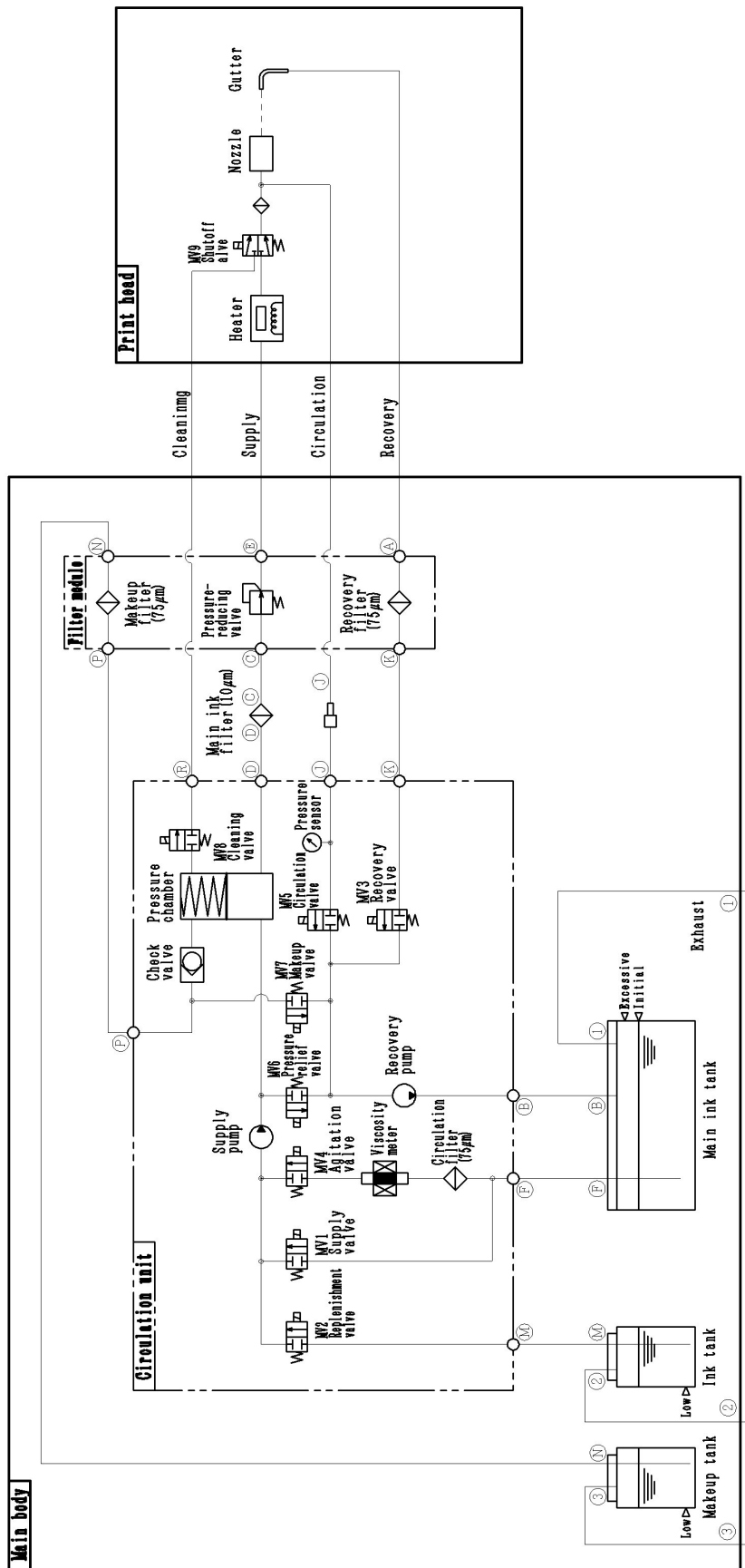
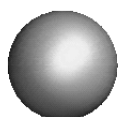


Fig.8-5 Model RX-S, RX-B Circulation System diagram



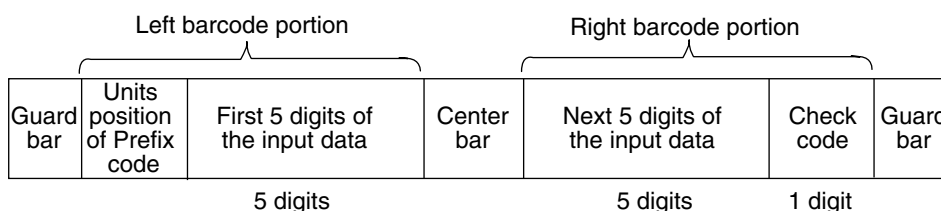
# 9. APPENDIX

## Bar code, 2-dimensional code

- See "4.7.5 Print bar codes" and "4.13.3 Set various printing" in the Instruction Manual.

### (1) Precautions when using EAN-13 code

- When bar code is "EAN-13," the area for inputting the 2-digit "country code" is displayed on the print format screen. Be sure to input the country code. The country code can be input at the beginning of the data on the character input screen. See "4.13.3 Setting various types of printing" in the Instruction Manual.
- Guard bar, center bar and check code are automatically added.



- When adding Readable code (number; human readable code), select either 5 x 5 or 5 x 7 as the size of the numbers added.



Conditions whereby Readable code can be added to be printed

No.	Condition
1	Made the number of lines of the EAN-13 printing item 1 line.
2	Set character size 12x16, 18x24, or 24x32.

### (2) Precautions when using EAN Prefix

- Whether to set bar code EAN-13, EAN-8 country code by character input or print format is selected.

Number of digits of bar code

	Country code	Data	Check digit	Total number of digits
EAN-13	2	10	1	13
EAN-8	2	5	1	8

EAN Prefix

	Set value	
	Character input	Print format
Handling of country code	Country code is input at the head of the data.	Set by print format without including country code in the data.
Print format screen	Country code is not displayed.	Set the country code.
Edit message screen	For EAN-13, input 12 digits and for EAN-8, input 7 digits, all including the country code. However, check digit is excluded.	For EAN-13 input 10 digits and for EAN-8, input 5 digits, without including the country code. However, the check digit is excluded.

- When the country code is changed at the Print format screen, the country code for all the bar code items in that message is changed to the same value.



### (3) Precautions when using code 128

- The 2 modes include Code set B (Alphanumeric , numbers, symbols) and Code set C (numbers only).  
The mode can be changed by pressing "Code B" or "Code C" on the keyboard.
- In the case of continuous numbers, the bar can be shortened by setting to code set C.
- When printing in 2 lines or more, only one "code 128" can be set for one column.  
If you attempt to set more than one "code 128" for the same row, an "illegal bar code 2" error occurs.
- When code set was changed over, return to the original code set.

(Example)

① Code set B : ABCD<C>0123<B>

② Code set C : 0123<B>ABCD<C>45<B>EF<C>

<B>, <C> : Code set changeover keys      ↑  
Return to original

### (4) Precautions when using DM code

- Set as shown below for print item to which DM is to be set:
  - (i) Number of lines : 1 line
  - (ii) Character size : 5x8, 12x16, 18x24
- Set barcode type on the print format screen.

Data matrix: Type of size and maximum character number

Character size		5x8		12x16		18x24			
DM size		8x32	16x16	16x36	16x48	18x18	20x20	22x22	24x24
No. of vertical dots *Note 1		8	16	16	16	18	20	22	24
Max. number of characters	Numbers only	20	24	64	98	36	44	60	72
	Alphabetical characters only	10	12	32	49	18	22	30	36
	Combination of alphabetical characters and numbers	10-19	12-23	32-63	49-97	18-35	22-43	30-59	36-71

(The number of characters that can be coded differs according to the numbers/characters string.)

(Note 1) Use the number of vertical dots provided in the table for speed calculation .

[Rules for calculating number of digits]

Alphabetical characters are treated as one digit per character.

Single independent numbers are treated as one digit per number.

In the case of consecutive numbers, two numbers are treated as one digit.

If a single number is left over, it is treated as one digit.

The total is within 12 digits for 16 x 16 and within 10 digits for 8 x 32.

(Example)  $\begin{array}{ccc} \text{A} & \text{B} & \text{C} \\ \hline & & \end{array}$  3 characters = 3 digits     $\begin{array}{cc} \text{1} & \text{2} \\ \hline & \end{array}$  1 digit     $\begin{array}{cc} \text{3} & \text{4} \\ \hline & \end{array}$  1 digit    5 1 digit     $\begin{array}{ccc} \text{D} & \text{6} & \text{E} \\ \hline & & \end{array}$  3 characters = 3 digits    Total 9 digits

- Input characters within the specified digit number for print item to which barcode has been set.
- When alphabet letters and numerals occur together, the number of characters which can be coded will vary depending on character array.
- When "DM8x32" is used, set item "character size 1" on the user environment setup screen to "5x8".

## (5) Precautions when using QR Code

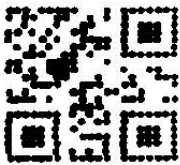

- Set as shown below for print item to which QR code is to be set:
  - (i) Number of lines : 1 line
  - (ii) Character size : 18x24, 24x32
- Set barcode type on the print format screen.

QR code: Type of size and maximum character number

Character size		18x24	24x32	
QR code size		21x21	25x25	29x29
No. of vertical dots (for speed calculation)		21	25	29
Max. number of characters	Numbers only	34	63	101
	Capital alphabetical characters, numbers	10	38-58	61-96
	Combination of alphabetical characters, numbers and symbols	10-19	26-58	42-96

(The number of characters that can be coded differs according to the character string.)

- Input characters within the specified digit number for print item to which barcode has been set.
- When alphabet letters and numerals occur together, the number of characters which can be coded will vary depending on character array.
- When character orientation is 0 or 1 (erect printing), printing is performed by rotating the normal direction 180°.

Character orientation	Printing example	Remarks
0 or 1		180° rotation
2 or 3		Normal direction

# Setting high-speed printing (Optional on RX-S)

## (1) Overview

- When the character size setting is 5 x 7 or 5 x 8 dots, and print line is set to 2 or 3 lines, three modes of HM, NM or QM can be selected.  
By selecting the mode, high quality printing result can be ensured according to the line speed.

HM mode	NM mode	Remarks
		HM mode is equivalent to particle use percentage of 1/1. In the 2-line print setting, NM mode is equivalent to ink drop use percentage of 1/1.5. If the line speed remains the same, print width in the NM mode will widen by 1.5 times with respect to HM mode.

### ① Necessary conditions to perform high-speed print

- When all necessary conditions from Nos. 1 to 7 are satisfied, high-speed print HM, NM or QM mode can be selected.

No.	Item	Condition of nozzle diameter is 65μm
1	Character size	Character size is 5 x 7 or 5 x 8 for all printing items.
2	Print line	Number of lines is 2 or 3 in all columns.
3	Line spacing	Line spacing is equal in all columns.
4	Barcode	No barcode is set for any print items.
5	Character orientation	Set value of character orientation is 0 or 1.
6	Ink drop use percentage	Ink drop use percentage: 1/1

### ② Type of high-speed print and number of vertical dots used

- Number of vertical dots used in high-speed print is shown in Table below.
- When calculating printing preparation time, etc., pay attention to number of vertical dots.








Number of vertical dots used in the nozzle diameter is 65μm

Ink drop use rate	Type	Number of vertical dots used in		Number of vertical dots used in	
		Character size 5x7	Character size 5x8	Character size 5x7	Character size 5x8
1/1	HM	14	16	21	24
	NM	21*	24*	28	32
	QM	21*	24*	35	40
1/2	-	28	32	42	48















(Note) \* When 2-line printing is set, setting of NM and QM will be the same.

## Icon list















### (1) Operation control buttons group

No.	Icon	Button name
1		Startup
2		Shutdown
3		Manual
4		Com=0
5		Com=1
6		HOME
7		Apply













### (2) Common buttons group

No.	Icon	Button name
8		Decrement
9		Increment
10		Enter
11		Prev. column
12		Next column
13		Prev.item
14		Next item
15		Prev.Dsp.
16		Next Dsp.
17		Back space
18		Delete
19		OK
20		Cancel
21		Back

### (3) Keyboard buttons group

No.	Icon	Button name
22		Change
23		Change
24		ABC...
25		Numeral/sign
26		Logo
27		Accent 1
28		Accent 2
29		Arabic 1
30		Arabic 2
31		Arabic 3
32		Arabic number
33		Greek
34		Russian 1
35		Russian 2

### (4) Print format screen buttons group

No.	Icon	Button name
36		1 line
37		2 lines
38		3 lines
39		4 lines
40		1st line
41		2nd line
42		3rd line
43		4th line
44		To Overall
45		Delete Column
46		Insert Column
47		Add Column

# INDEX

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