HITACHI
Inspire the Next

HITACHI IJ Printer

Model UX2

Technical Manual

- Before using the printer, thoroughly read this technical manual for optimum printer use.
- After reading the manual, properly keep it for future reference.

Hitachi Industrial Equipment Systems Co., Ltd.

To export the product, check the export control-related regulations, such as the Foreign Exchange and Foreign Trade Law and the Export Administration Regulations, and follow the necessary procedures.
If you have any questions, contact your Hitachi sales representative.

February 2024 (rev.G)

Important Notes

■ Precautions before using the product

- Be sure to read the separate instruction manual and related documents thoroughly before using this product. Follow the instructions, such as product description, safety information and precautions, and operation and handling methods, for proper use.
  - Make sure that you always use the product within the specification range mentioned in this manual.
  - Perform proper inspection and maintenance to prevent failures.
- After reading the manual, keep it in an easily accessible place for future reference.

■ 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.
- The product or system including the product cannot be used in countries or areas other than those which have concluded a sales contract.

■ Disclaimer

- Do not perform operation not in accordance with this technical manual, such as using replacement parts other than ones supplied by Hitachi or modifying parts. Doing so may cause machine failure or personal injury. Hitachi will not bear any responsibility for damage resulting from these actions.
  For the details on the product warranty and agreement terms, see the separate written agreement.
- The warranty does not cover any production loss due to downtime or physical loss (damage to a printed object and related equipment) due to a failure or malfunction of the delivered product. Should any failure occur, Hitachi will send a technician as soon as possible to try to minimize the downtime.
  - It is recommended that you check the printing state periodically in a process even during production.
  - When starting the IJ Printer, check if the printing state and print description are correct.

Important Notes (Continued)

■ Related laws

- 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.
- The printer must be managed in compliance with all appropriate regulations. Read and understand the appropriate Safety Data Sheet (SDS) before using any ink or makeup.

■ Security precautions

- More control systems are getting connected with information and telecommunications systems recently, which results in an increased number of security risks such as cyberattacks.
  A system using this product requires both physical security measures mainly in the installation location and security measures against network usage.
  [Examples of security risks via network]
  - Abnormal operation, performance degradation, information leakage, and data tampering by attacks from outside
  - Malfunction, harm, and damage due to program and/or data tampering from outside
  - Used as a step for attacking other systems

  However, the security level required in control systems varies depending on the system. In addition, potential security risks are not consistent but change on a daily basis. Not only in Hitachi products but also in system components, the security protection support functions are just one means to ensure the security level required for the system but do not completely prevent increased security risks.
  The security level required in each control system must be constructed by the system and customer.
  The maintenance of the security level requires continuous improvement measures.
  Hitachi will not bear any responsibility for trouble, accident, or damage caused by unauthorized external access in a system using this product.
- Please use USB memory only on this product.
  Perform periodic virus check on a computer where USB memory is inserted using the latest anti-virus software.

Important Notes (Continued)

- Open source software licenses used in the product

  For the Open Source Software used in this product, refer to Appendix 15-1 of the instruction manual.

- Intellectual property

  Hitachi owns the rights of intellectual property for all the contents of this manual. No part of the manual shall be disclosed to third parties without prior written consent of Hitachi.

- Contact

If you have any questions about this manual or need consultation or after-sales services, contact your dealer or nearest local distributor.

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Safety Precautions

- 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 three categories, WARNING, CAUTION, and NOTE, all of which describe hazardous situations that may arise if you ignore the precautions and perform an incorrect handling or operating procedure. These precautions are all important and must therefore be observed without fail.

⚠ **WARNING**	Indicates the presence of a hazard which may cause severe personal injury or death unless avoided.
⚠ **CAUTION**	Indicates the presence of a hazard which may cause moderate or minor personal injury unless avoided.
NOTE	Indicates the presence of a hazard which may cause non-personal damage unless avoided.

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 mandatory 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).

Installation environment

NOTE

- If extraneous noise enters the product, it may malfunction or break down.
  For maximum noise immunity, observe the following installation and wiring precautions.
  - Ensure that 100 or 200 VAC power cables are not bundled with other power supply cables.
  - Insulate the product main body and print head so that they do not come into direct contact with the conveyor or other devices.
  - If the employed print target detector is housed in a metal case, use a plastic mounting brace to insulate the detector from the conveyor and other devices.
  - Ensure that the print target detector wiring is not bundled together with other power supply cables.

Safety Precautions (Continued)

Grounding

⚠ WARNING

- Ensure that all electrical wiring, connections, and grounding comply with applicable cords. Properly connect the product to its dedicated ground.
  Complete the above procedure to avoid electrical shock hazards.
- When welding, keep enough space between the product and the welding work area to prevent the arc from starting a fire. Also, insulate the print head and product frame to keep the welding current from flowing to the control section of the product, and make a separate ground connection for the product.
- If you need to receive ink drops in a beaker, 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 drops used for printing are electrically charged. An ungrounded beaker has a gradually rising charge, possibly catching on or causing a fire.

Power cable handling

⚠ WARNING

- Use an AC voltage of 100 to 120 V or 200 to 240 V ±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, causing a fire or electric shock.

Safety Precautions (Continued)

Ink and makeup handling

⚠ CAUTION

- When cleaning the product or replenishing 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.
- When transferring the ink or makeup to or from a bottle, exercise caution to prevent it from coming into contact with the product or surrounding articles. If there is any spillage, immediately wipe it to clean using a cloth moistened with makeup.

Safety Precautions (Continued)

Main body handling

⚠ WARNING

- Do not insert tweezers, a screwdriver, or any other metal article into the ink ejection hole at the end of the print head.
  When the product 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 covers and/or screws not specified in this manual.
  A high voltage is applied to some sections of the product.
  Exercise caution to avoid electric shock and injury.
- 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.
- While the product is operating, do not look into the ink ejection hole at 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 product, be sure to stop the ink ejection.
  This is 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.
  Do not perform this operation in any other situation than emergency.

NOTE

- Only people who have completed an operator training course for Hitachi can operate and service the product.
  - If the printer is operated or serviced incorrectly, it may malfunction or break down.
- Do not attempt to repair the product for any other purpose than operation or maintenance.
  Otherwise, it may cause a malfunction, so if a repair is needed, contact your nearest local distributor.

Safety Precautions (Continued)

Related Regulations

⚠WARNING

- 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.
- The printer must be managed in compliance with all appropriate regulations. Read and understand the appropriate Safety Data Sheet (SDS) before using any ink or makeup.

FCC Notice

- This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions. (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.
- 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.

Safety Precautions (Continued)

Related Regulations (continued)

⚠WARNING

< Keep all fire away.>

- Ink and Makeup are flammable.
- All fire must be kept away from the machine.
- Spilled Ink and Makeup must be wiped off and dried up immediately.

<Caution when handling Ink/Makeup>

- Strage must comply with local regulatory requirements .
- Read and understand Safety Data Sheet(SDS).
- Be sure to wear protective gloves and safety goggles.
- If the Ink/Makeup in used is an organic solvent, it must be managed in compliance with the Ordinance on the prevention or Organic Solvent poisoning. Refer to the "Instruction Manual" and the "Handling guidance of each ink" for details.

⚠AVERTISSEMENT

< Tenir hors de portée du feu. >

- L’encre et la composition sont inflammables.
- Tenir la machine hors de portée du feu.
- Nettoyez et séchez immédiatement les projections d’encre et de composition.

<Soyez prudent lorsque vous manipulez l’encre/la composition>

- Le stockage doit respecter les obligations réglementaires locales.
- Lisez attentivement la fiche signalétique de sécurité de l’appareil (FSSP).
- Assurez-vous de porter des gants et des lunettes de protection.
- Si l’encre/la composition utilisée est un solvant biologique, vous devez le manipuler conformément au décret sur la prévention des empoisonnements par solvant biologique. Reportez-vous au «Mode d’emploi» et aux «Conseils de manipulation de chaque type d’encre» pour plus de détails.

Preface

Hitachi Inkjet (IJ) Printer (hereinafter referred to as "the unit") employs a non-contact, ink-jet method to print onto a print target.
This Technical Manual (hereinafter referred to as "this manual") describes more technical details such as installation and electric wiring.
The separate instruction manual describes the basic operating procedures, maintenance procedures, and other detailed handling procedures of the unit.
Proper handling and maintenance of the unit are important to operate it smoothly. It is therefore essential that you read this manual thoroughly to gain a complete understanding of the printer and use it correctly.
After reading the manual, properly keep it with the related documents for future reference.

<Scope of application>

This manual is prepared for all the models of "HITACHI IJ Printer Model UX2 for Dye Ink", which are listed in the table below.
Please be advised that the differences among these models such as a model type and nozzle diameter or applicable functions are referred to in the relevant section in this manual.

[HITACHI IJ Printer Model UX2 for Dye Ink]

		Model type	Nozzle diameter
UX2-D160W	Standard model	UX2-D	65 μm
UX2-D140W	Small character	UX2-D	40 μm
UX2-D150W	High speed printing	UX2-D	55 μm

Preface (Continued)

<Related manual>

Manuals related to the unit are "Basic Operation Manual", "Instruction Manual", "Technical Manual" (this manual), "Communication Manual", and the handling guidance of each ink.
Read these manuals as needed.

Basic Operation Manual

The basic operation manual is prepared for all the models of "HITACHI IJ Printer Model UX2 for Dye Ink", which describes basic operations, ink and makeup replenishment, and emergency operations.
It is suitable for those who use it for regular work or those who want to instantly know individual operation methods.

Instruction Manual

The instruction manual describes how to input and edit the print description, in addition to the contents of the basic operation manual.
It provides the information you need for all aspects of the unit from initial use to maintenance.
It is suitable for beginners or those who want to teach a set of operations.

Technical Manual (this manual)

The technical manual mainly describes precautions and check items for installation, connection of electric signals of the print target detector and encoder, and operation and adjustment methods of the circulation system.
It is suitable for those who perform maintenance and contains the information that can be used to determine the cause of a unit fault.

Communication Manual

The communication manual describes how to control the unit through communication.
It contains a communication connection method, a list of communication codes, and countermeasures for warnings and faults in communication.
It is recommended to use this manual in combination with the instruction manual and the basic operation manual.

Handling guidance of each ink

The handling guidance of each ink describes the classification of the Industrial Safety and Health Act, the Fire Service Act, and the PRTR system, replacement interval, storage precautions, temperature range, and notes regarding each ink and makeup.
It is recommended that all users of the unit read this manual before use.

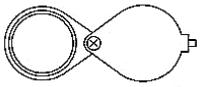
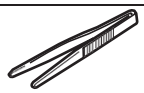
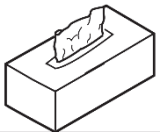
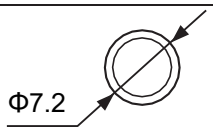
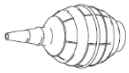
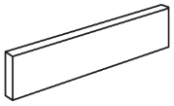
Contents

1. Overview

1.1. Delivered Items and Accessories

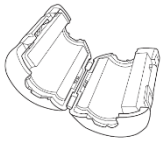
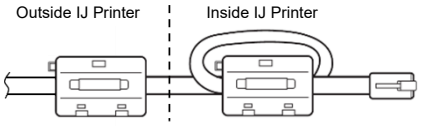
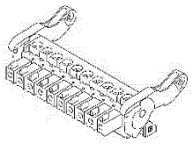
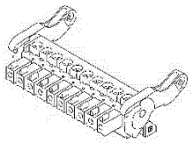
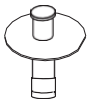
The delivered items and accessories are listed in the table below.

List of delivered items and accessories

No.	Item name	Quantity	Parts code No.	Remarks
1	IJ Printer	1	-	The IJ Printer UX2-S has the cleaning unit already installed when shipped.
2	CD	1	-	It describes about Safety Guide
3	Magnifying glass 	1	451274	Used to check the shape of ink drop and the position of ink stream.
4	Tweezers 	1	451412	Used to remove the orifice.
5	Cleaning bottle 	1	451058	Used to contain makeup for print head cleaning.
6	Beaker with handle 	1	451410	Used when cleaning the print head or replacing ink.
7	Waste solution bottle 	1	-	Used when replacing ink or a filter.
8	Wiping paper 	1	-	Used to wipe the print head after cleaning.
9	Small filter 	1	451857	Recovery filter. (Spare)
10	O-ring SF7000-5.6 	1	451589	O-ring for the nozzle orifice seal. (Spare)
11	Blower 	1	451522	Used to dry the print head after cleaning.
12	Cable seal 	3	-	Seal for the power cable or the external communication cable.

(Continue to next page)

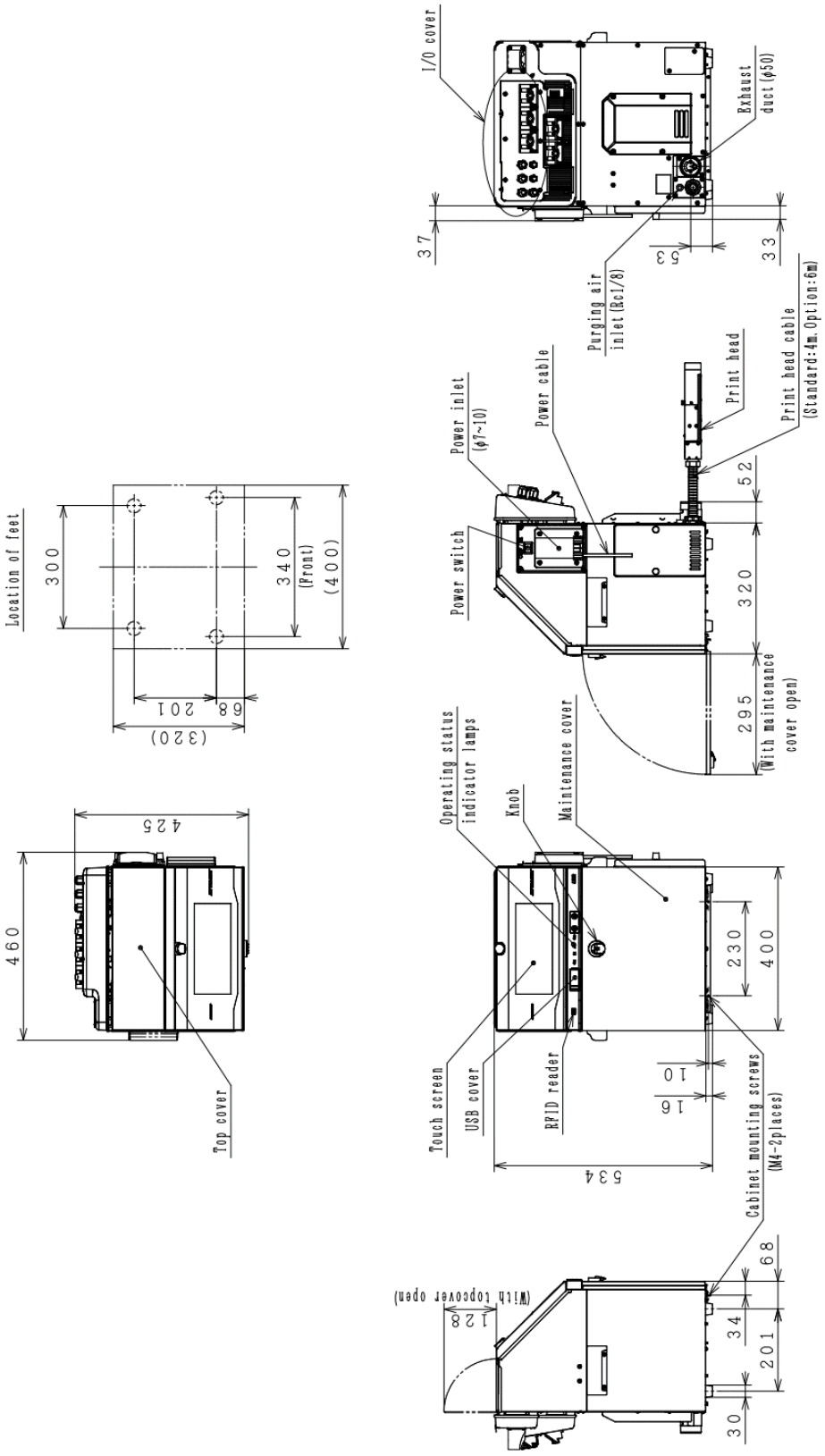
List of delivered items and accessories (continued)

No.	Item name	Quantity	Parts code No.	Remarks
13	Waste tube 	1	-	Used when replacing ink or a filter. (using the beaker with handle instead of the waste solution bottle)
14	Ferrite core 	2	-	When connecting the LAN cable to the IJ Printer, put one core around the cable outside the printer and the other through one loop of the cable inside the printer as shown below. 
15	I/O plug 10 pins 	1	-	Used to connect the input/output (I/O) signals. See "4" in this manual for details on how to use the plug.
16	I/O plug 13 pins 	1	-	Used to connect the input/output (I/O) signals. See "4. Connecting Electric Signals" in this manual for details on how to use the plug.
17 (*1)	Nozzle rubber seal 	1	-	Used when the IJ Printer will not be used for several days. This is described in "5.15.1. Process prior to Long-term Shutdown".
18 (*1)	Supply port cap 	2	-	It is attached to the ink/makeup reservoir when shipped. Used when the IJ Printer will not be used for several days.

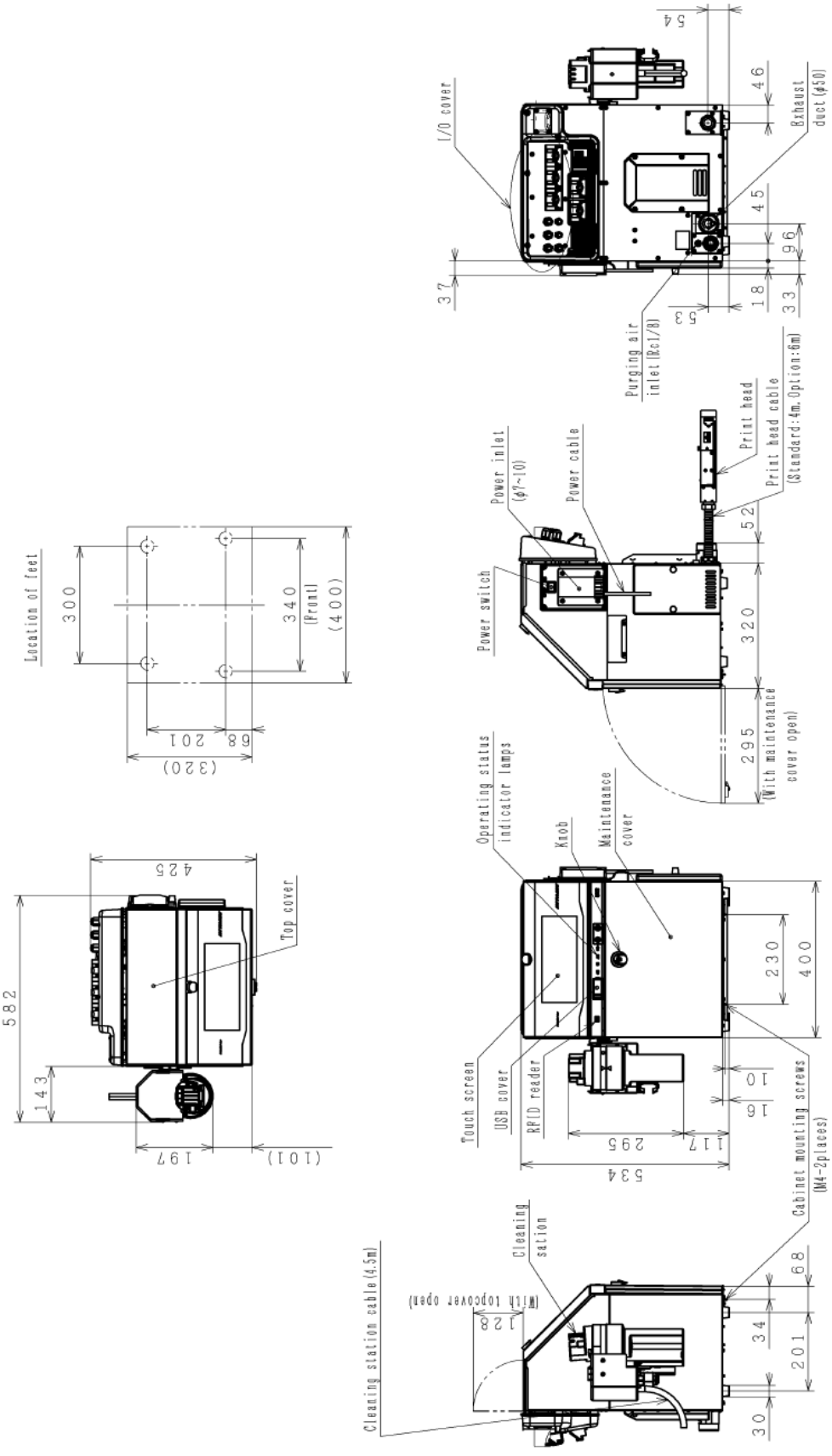
(*1) Store these items in a plastic bag, etc., to protect them from dirt and dust.

1.2. Dimensional Drawing

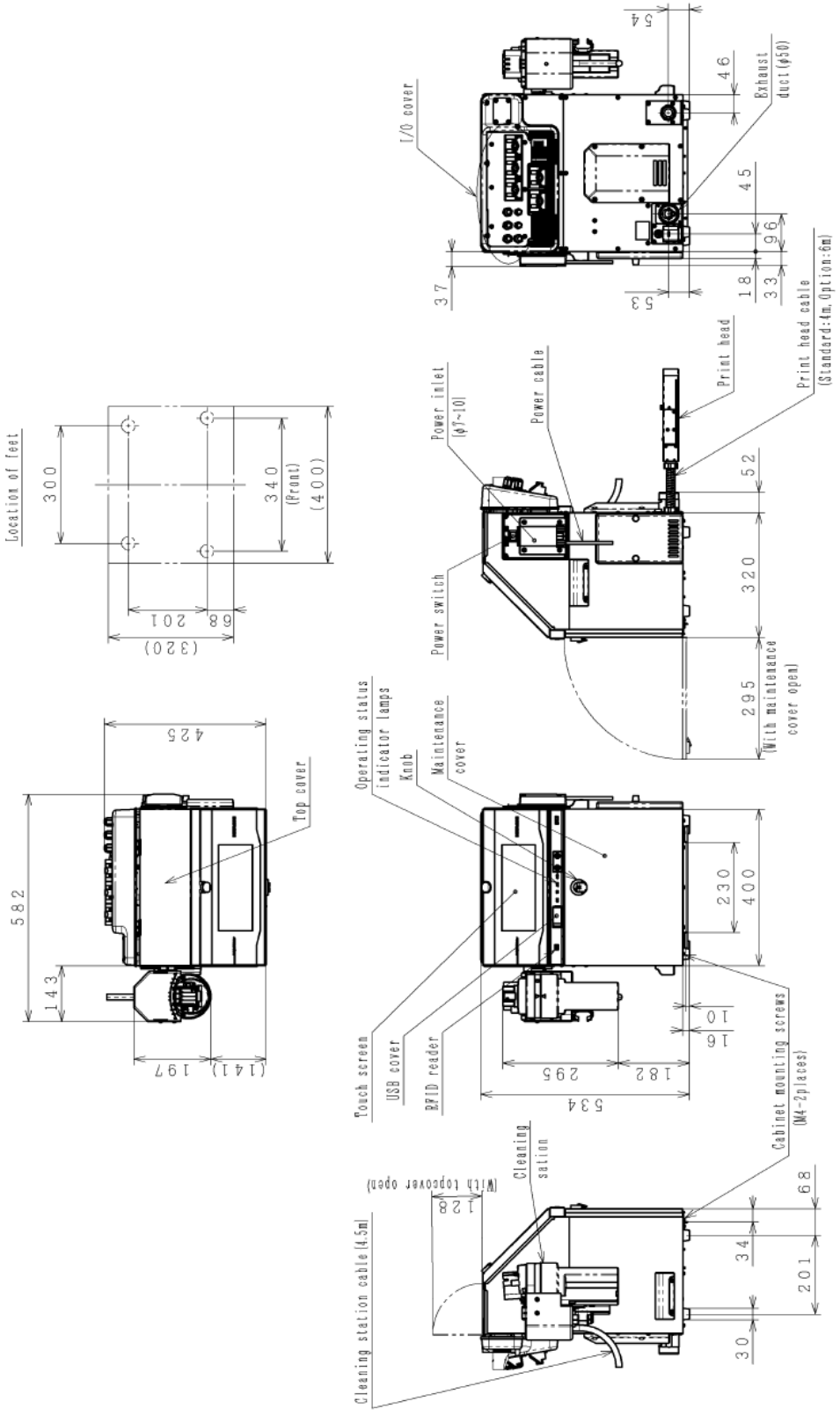
The dimensional drawings of the main body, print head, and cleaning unit of the IJ Printer are shown below.



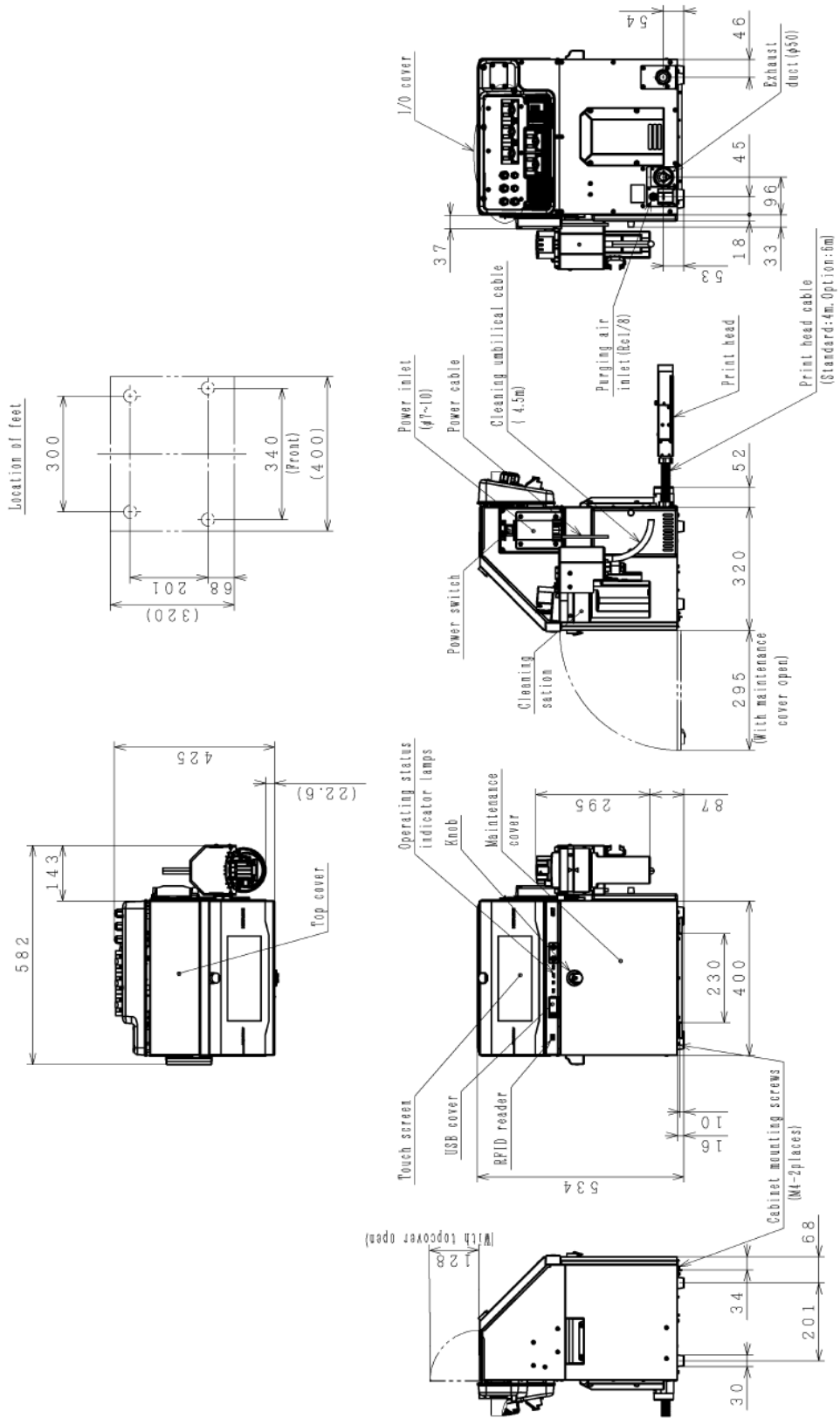
Model UX2 IJ Printer, main body dimensional drawing



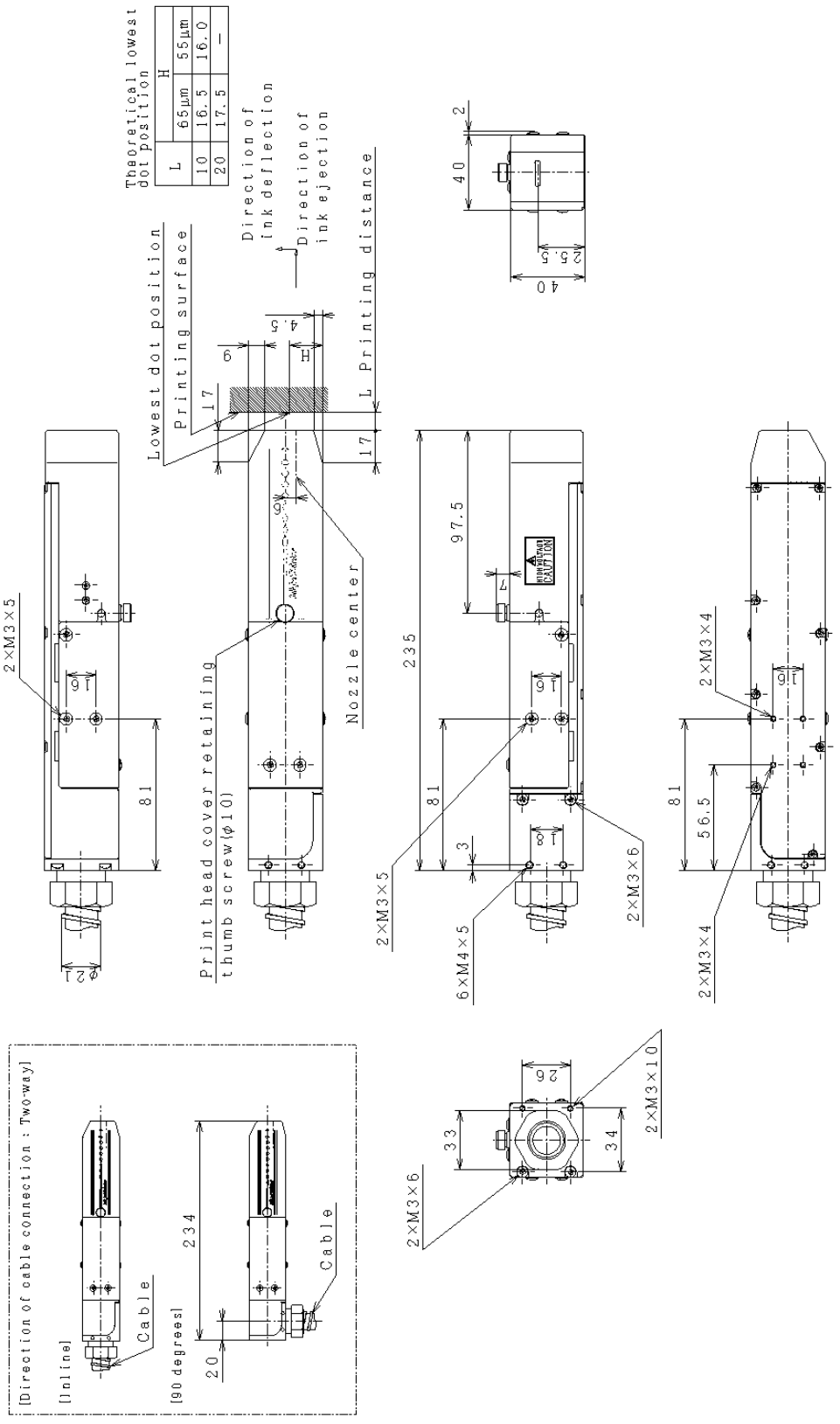
Model UX2 IJ Printer, main body with Safe Clean Station dimensional drawing



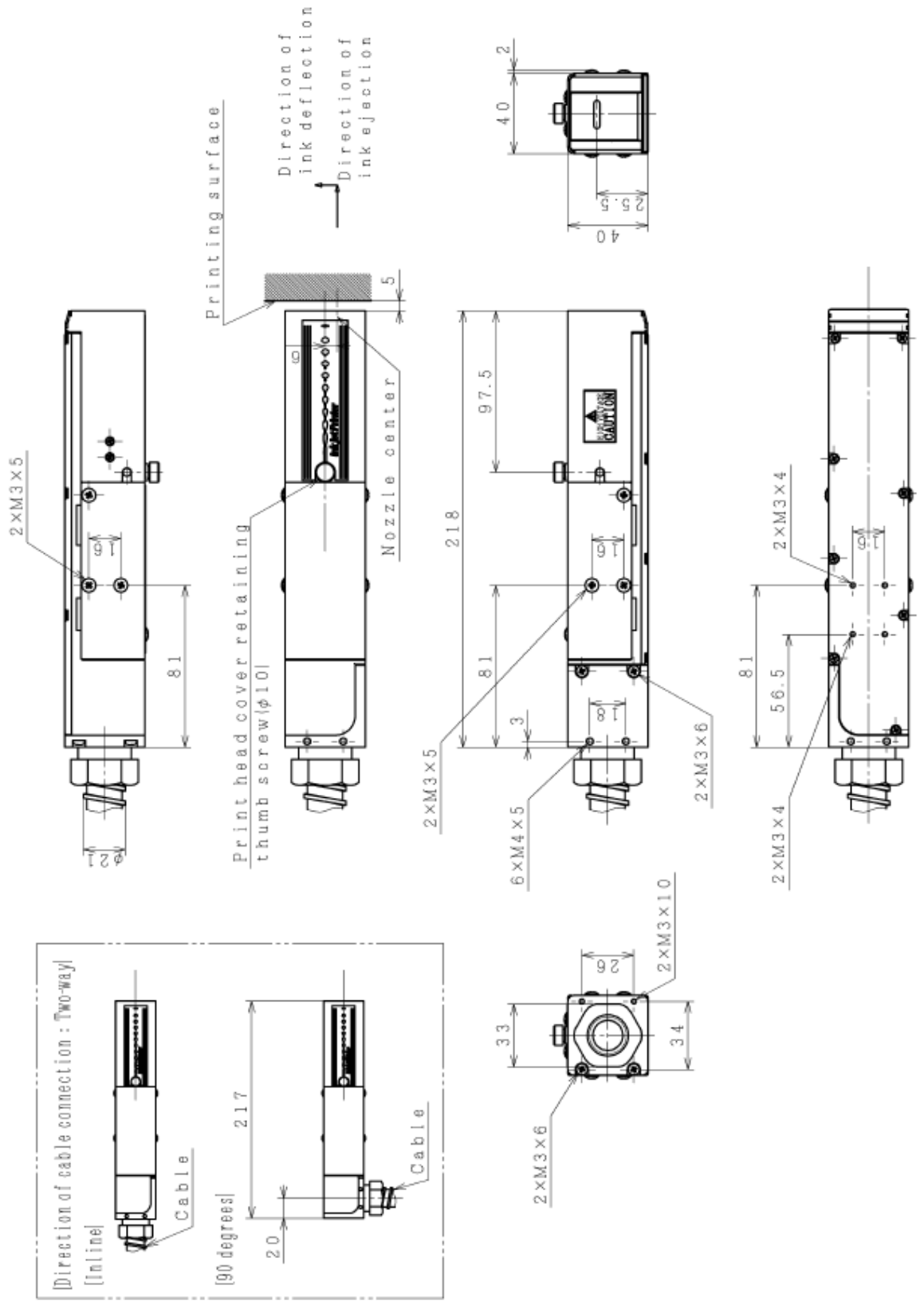
Model UX2 IJ Printer, main body with Safe Clean Station dimensional drawing
(Safe Clean Station and Handle are mounted)
***Supported from October 2023 production onward**



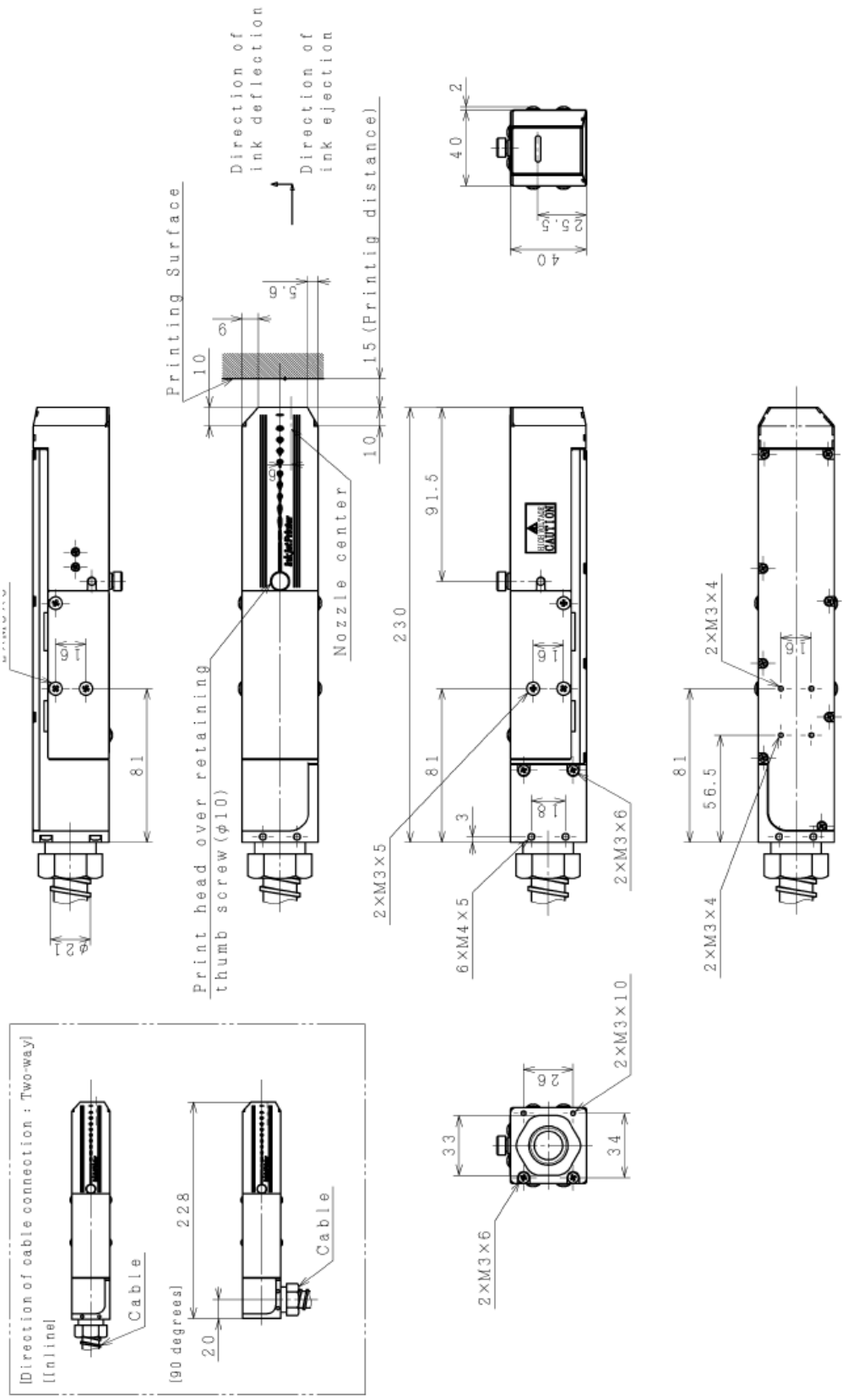
Model UX2 IJ Printer, main body with Safe Clean Station dimensional drawing
(Safe Clean Station is attached to the right side when viewed from the front)
***Supported from October 2023 production onward**



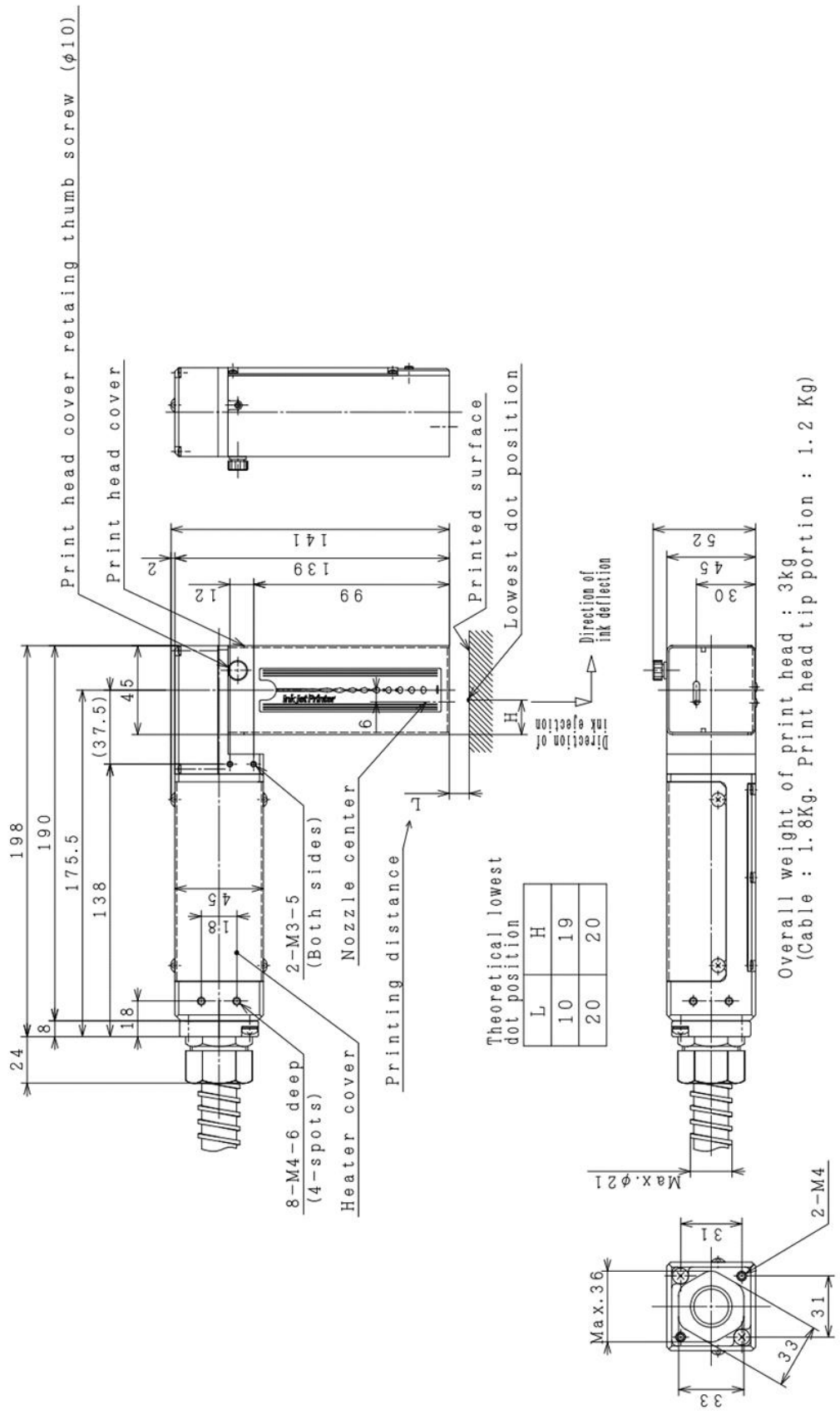
Model UX2-D160W/UX2-D150W IJ Printer, print head dimensional drawing



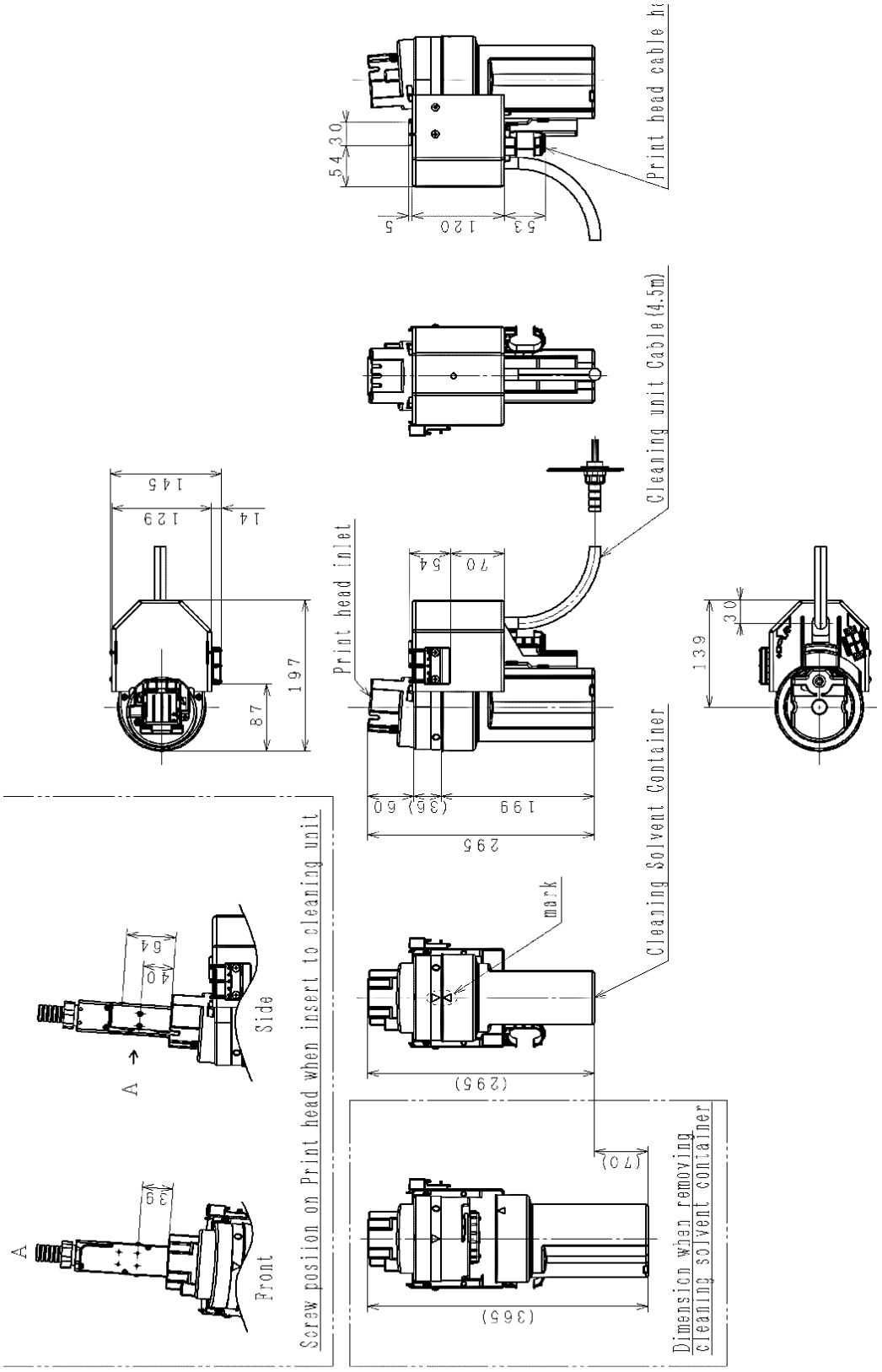
Model UX2-D140W IJ Printer, print head dimensional drawing



Model UX2-D160W/UX2-D150W IJ Printer, Short-print head dimensional drawing



Model UX2-D160W IJ Printer, 90 Degree print head dimensional drawing



Safe Clean Station (Optional parts), cleaning unit dimensional drawing

2. Installation Precautions

When installing the unit, note the following:

Installation environment

⚠ WARNING

- Ensure that no flame- or arc-generating devices are installed around the product.
  - Fire: (Examples) Matches, lighters, cigarettes, heaters, stoves, gas burners, welders, grinders, static electricity, etc.
  - Flammable: (Examples) Ink, makeup
  - Arc-generating device: (Examples) Open-type relays, open-type switches, brush motors, etc.
    Before handling ink and makeup, remove static electricity from your body, peripheral equipment, and so on.
    In the interest of safety, place a dry-chemical fire extinguisher near the product.
- Install the product in an adequately ventilated location.
- Do not install the product in an enclosed space.
- Connect the product to exhaust equipment to prevent it from being filled with organic solvent vapor.
- Secure adequate space for the ink/makeup handling area and product installation site. At least 200 m^3 must be provided per print head. Ensure that adequate ventilation is provided.

* If ink or makeup contains any organic solvents or specified chemical substances, it must be managed under the Industrial Safety and Health Act.

(1) Keep the maintenance areas listed below around the IJ Printer for daily operations and handling.
- Open the maintenance cover to keep an area of 750 mm forward the unit for ink and makeup replacement.
- Keep an area of 750 mm backward the unit for I/O area wiring.
- To use the main power switch to turn the power on and off, keep an area of 400 mm on the right side in front of the unit.

* The above values are for reference only.

(2) Cleaning of the print head with makeup (daily maintenance) is required when the unit is operated or stopped. Fix the print head, considering removal of the print head cover and pullout of the print head.

(3) Install the IJ Printer, print head, and print head cable, preventing vibration. Vibration not only affects the print quality but also causes printing disturbance. Even if the acceleration of the vibration is small, when shaking can be seen visually in the print head, printed characters will undulate in accordance with the shaking.

(4) Install the IJ Printer with an inclination of ±1° or less.

(5) Electrically isolate the IJ Printer main body, print head, print target detector, and rotary encoder from other machines (such as a conveyor and packaging machine).

(6) The standard distance between the print head and the print target is listed in the table below. The closer the print head is to the target, the smaller the character height and the better the print quality.

		Model type	Nozzle diameter	Distance between the print head and the target
UX2-D160W	Standard model	UX2-D	65 μm	15 mm
	90-Degree print head option			
	Short head option			
UX2-D140W	Small Character		40 μm	5 mm
UX2-D150W	High speed printing		55 μm	10 mm
	Short head option			

※ Distance is recommended. Please request confirmation of printing conditions and printing results before purchasing.

(7) The IJ Printer requires timely maintenance such as replenishment of ink/makeup and replacement of ink/filters.

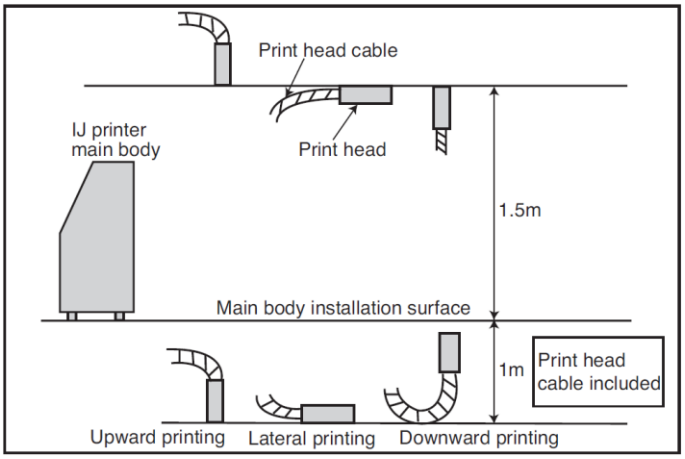
(8) Air purge of the print head is required when the printer is used in a high-humidity environment (85 to 90 % RH). Prepare clean dry air, an air pressure adjustment regulator, and air filter (a capacity of about 1 L/min). Air purge is NOT able to be used depending on the type of ink to be used. See the handling guidance of each ink.

(9) Install the print head and print head cable under the conditions listed below. Otherwise, the ink supply performance and ink recovery performance may deteriorate.

(a) 0 to 45ºC

(i) Install the end of the print head within a range of 1.5 m above the installation surface of the printer.

(ii) Install the end of the print head within a range of 1.0 m below the installation surface of the printer.

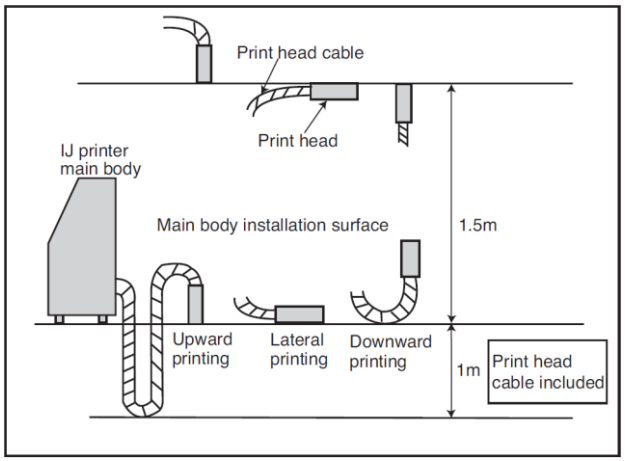


Installation position of end of print head (for 0 to 45ºC)

(b) 45 to 50ºC

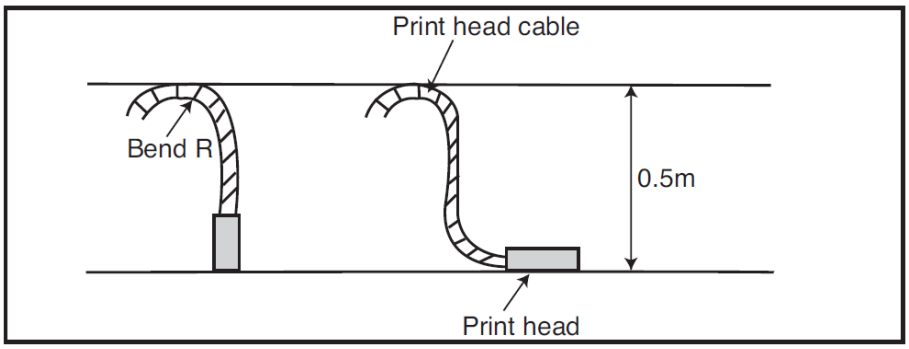
(i) Install the end of the print head within a range of 1.5 m above the installation surface of the printer.

(ii) Do not install the end of the print head below the installation surface of the printer.



Installation position of end of print head (for 45 to 50ºC)

(10) When using the printer for upward and lateral printing, make sure that the length of raising the print head cable from the print head is within a range of 0.5 m.



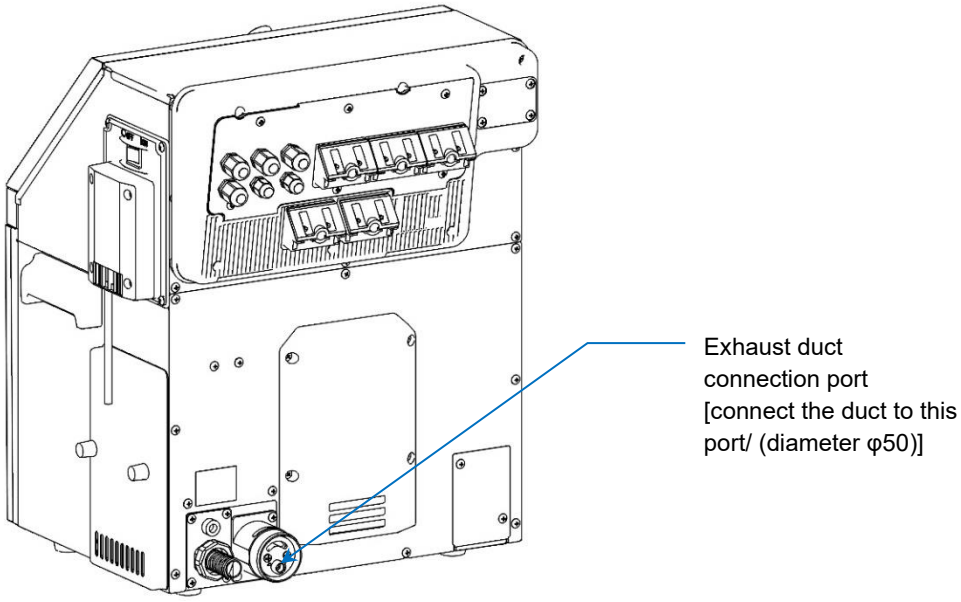
Length of raising print head cable

(11) The minimum bend radius of the print head cable must be at least 150 mm.

NOTE: If the head cable is installed at a bend radius smaller than its minimum bend radius of 150 mm, the wiring and piping inside the cable may be broken or damaged.

(12) The ink stream may bend for some reasons (such as dust). If a facility is placed in the ejection direction that may cause an ink attachment problem, partially install a cover on the facility.

(13) When connecting the exhaust duct, install the damper and adjust the duct so that the wind velocity at the intake port is 0.3 to 0.5 m/s. Check the wind velocity with an anemometer. If the wind velocity is fast, the amount of makeup used will increase.



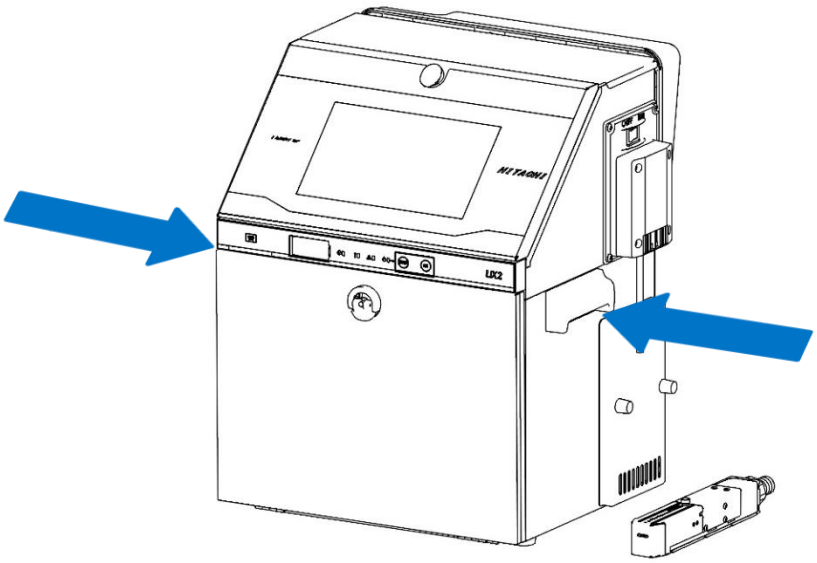
Exhaust duct connection port

⚠ WARNING

- Solvent steam is discharged from the exhaust duct connection port.
  Do not route the power cable or various signal wires near the exhaust duct. Solvent steam may affect the sheath, depending on its materials.
  In addition, solvent steam may liquefy and drip from the exhaust duct connection port, depending on an installation environment. Route the power cable and various signal wires, considering the possibility that the fluid may drip from the exhaust duct connection port.

(14) When a magnetic substance (such as iron) is used to fix the print head, the cover switch may malfunction, resulting in the [Cover open] fault. Use nonmagnetic resin or metal to fix the print head.

(15) When carrying the unit, use the handles on both sides indicated by the arrows below.



Handles of unit

[Note]
It is not recommended to carry the unit with the Cleaning Station installed. To carry it, remove the Cleaning Station and install the handles.

3. Installation Check Items

3.1. Print Head Air Purge

> When you use the IJ Printer under the operating conditions described in "(1) Conditions under which air purge is required" below, electrical leakage may occur inside the print head, resulting in malfunction of the printer due to electrical errors. In this case, air purge inside the print head will enable the printer to operate normally.

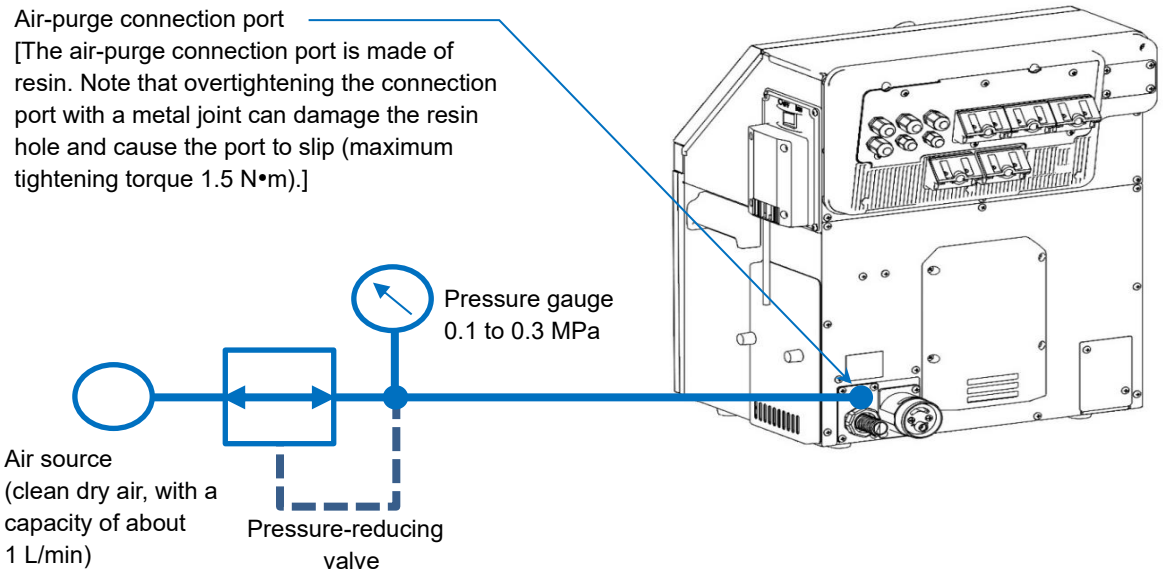
(1) Conditions under which air purge is required

Below is the conditions under which air purge is required.

- When the printer is used in a high-humidity environment, such as a beverage can or beer can line (Perform air purge when using it in the 85 % RH or higher humidity environment.)
- When a water drainage blow sequence is performed before printing
- When you use the printer in an environment with a lot of paper powder or dust
- When the end of the print head becomes dirty because the distance between the print head and the target is too close and ink splashing occurs
- When you use the ink for which the need for air purge is described in the handling guidance of each ink

(2) Air purge method

Put clean dry air of about 0.1 to 0.3 MPa from the print head air purge connection port [Rc1/8 (PT1/8) x screw] on the back of the unit. Use an air filter or micro mist separator to convert air possibly containing oil and water to clean dry air before putting it into the IJ Printer.



Air-purge connection port

[Note]

An excessive amount of purged air causes printing disturbance. After adjusting the air purge pressure, be sure to perform the test print and check the printing state.

3.2. Setting Functions which can be Used for Each Login User

(1) Overview

- Administrative rights allow you to restrict the use of the functions listed in the table below for each login user.
- Depending on the type of a restricted function, the user will not be able to open its corresponding screen or will not see its corresponding operation button.
- You can check restricted functions on the [Password protection] screen.

Functions that can be restricted

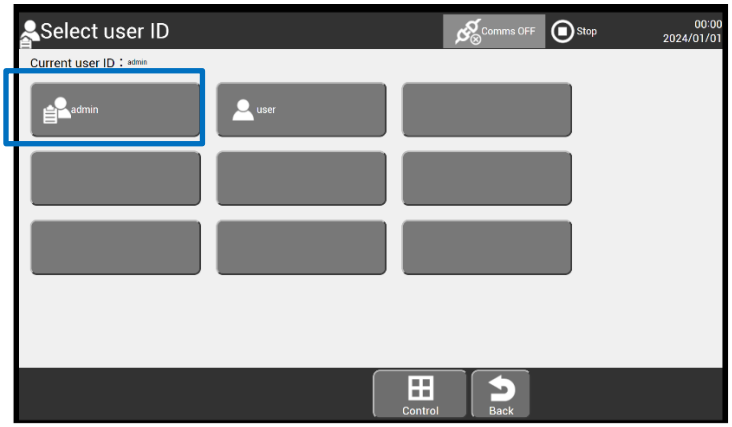
Item	Functions that can be restricted	
Edit	● Edit ● Calendar conditions ● Substitution rules setting ● Count conditions	
Select message	● Select message	
Save message	● Save message ● Enter	
Print specifications	● Print specifications ● Adjust print parameters	
Print format	● Print format ● Adjust Inter-character space	
Maintenance	Auxiliary functions ● Print data/Manage group ● Calibrate touch screen coordinates ● Backup (IJP -> USB) ● Copy data (USB -> IJP) ● Edit substitution rule	Environment setup ● User environment setup ● Communication environment setup ● Touch screen setup ● Maintenance work ● Operation management ● Excitation V update ● Circulation control ● Solenoid valve/pump test ● Periodic replacement parts mgmt.
Date/time setup	● Date/time setup	
Password setup	● Password setup	

(2) Setup procedure

1 Press Login on the [HOME] screen.

[HOME] screen (selecting login user)

2 Log in to the system as an administrator.

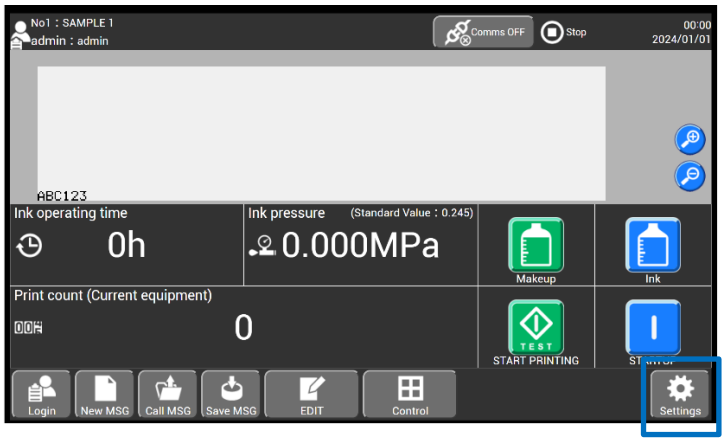


Administrator login screen

An icon showing a binder represents a user with administrator rights.

An icon showing no binder represents a general user.

3 Press Settings on the [HOME] screen.



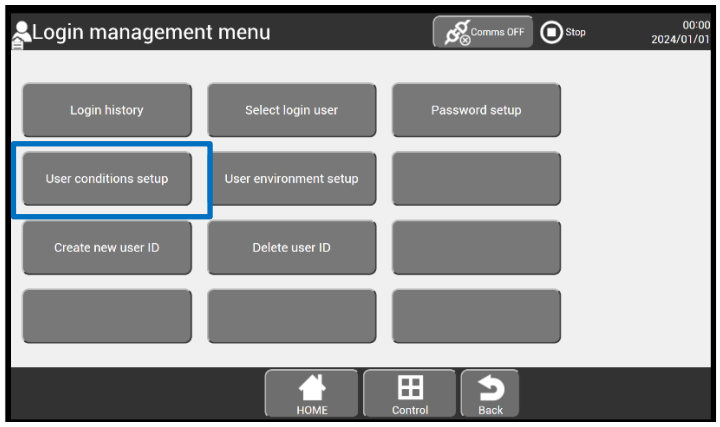
[HOME] screen (opening [Settings] screen)

4 Press Login management on the [Settings(Environment setup menu)] screen.

[Settings(Environment setup menu)] screen (selecting [Login management])

The [Login management] screen appears.

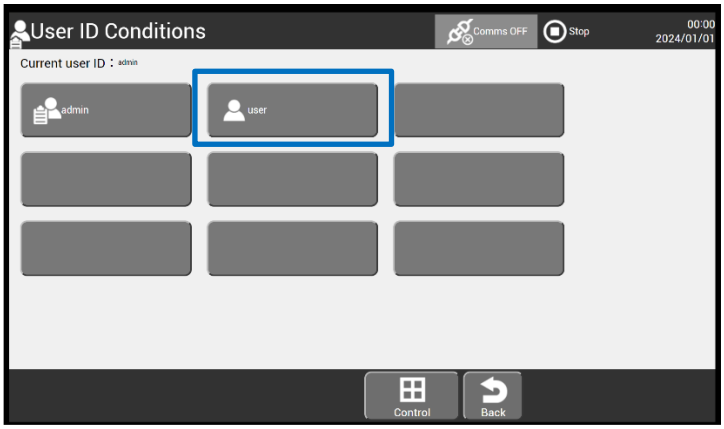
5 Press User conditions setup on the [Login management] screen.



[Login management] screen ([User conditions setup])

If [User conditions setup] and [Using environment setup] do not appear on the [Login management] screen, you may not log in as a user with administrator rights.

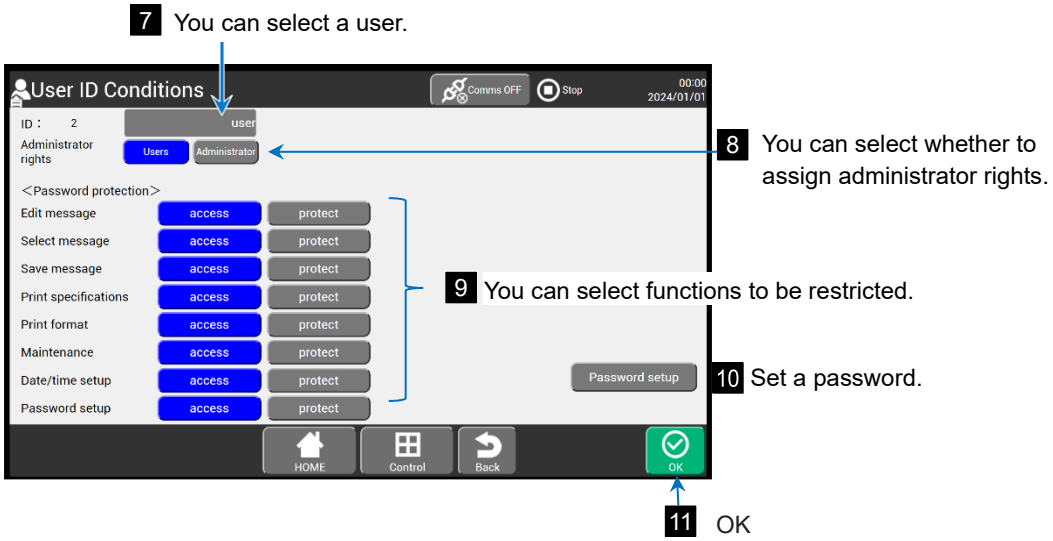
6 Select any "user" on the [User ID Conditions] screen.



[User ID Conditions] screen (selecting user)

The [User ID Conditions] screen appears. A list of users appears on this screen.

The layout of the [User conditions setup] screen is shown below.



Layout of [User conditions setup] screen

7 Select any registered user in [ID:].

8 Select [Users] or [Administrator] in [Administrator rights].

9 Select [access] or [protect] for password protection items.

10 Press Password setup to set a password.
If the password entered in the old password field is different from the currently set one, an error message is displayed. However, when "IGNOREPW" is entered as the password, no error occurs. If you forget your password, use "IGNOREPW".

11 Press OK.
The administrator rights, password protection, user name, and password of the "user" have been set.

3.3. Selecting User to be Logged in at Power-on

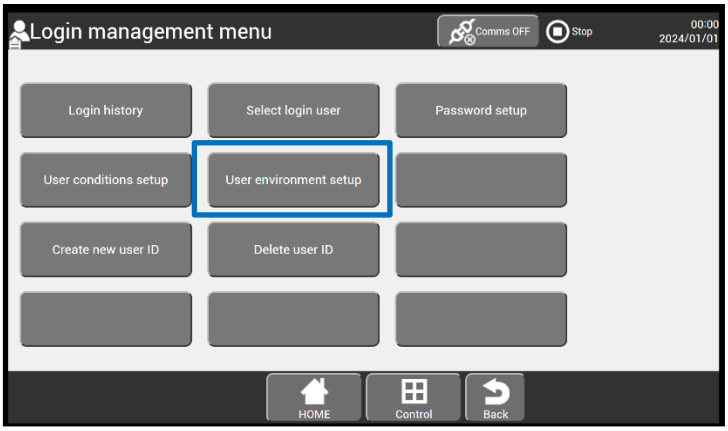
(1) Overview

Select whether to display the login screen at power-on.

(2) Setup procedure

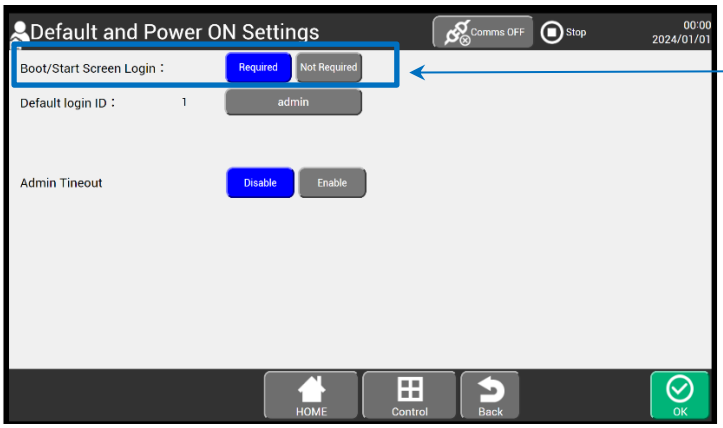
1 When you log in to the system as the administrator, the [Login management] screen appears. Perform **1** to **4** described in 3.2. (2) Setup procedure.

2 Press User environment setup on the [Login management] screen.



[Login management menu] screen ([User environment setup])

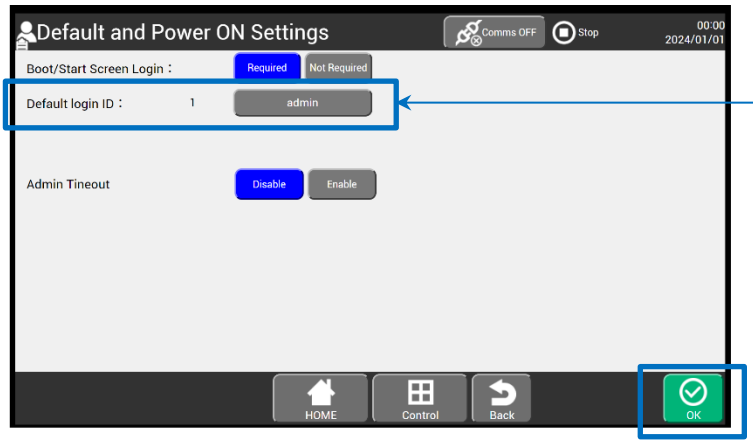
The [Default and Power ON Settings] screen appears.



Select whether to display the login screen at power-on. When Required is selected in [Boot/Start Screen Login], the login screen appears at power-on.

Screen for selecting [Boot/Start Screen Login]

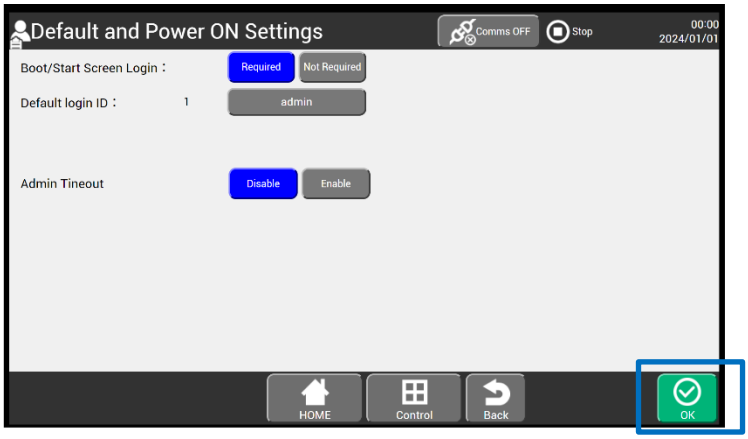
The figure below shows that Not Required is selected in [Boot/Start Screen Login].
Select Not Required and press OK in the lower right of the screen, and the settings are applied.



You can specify the default user to be logged in after power-on.

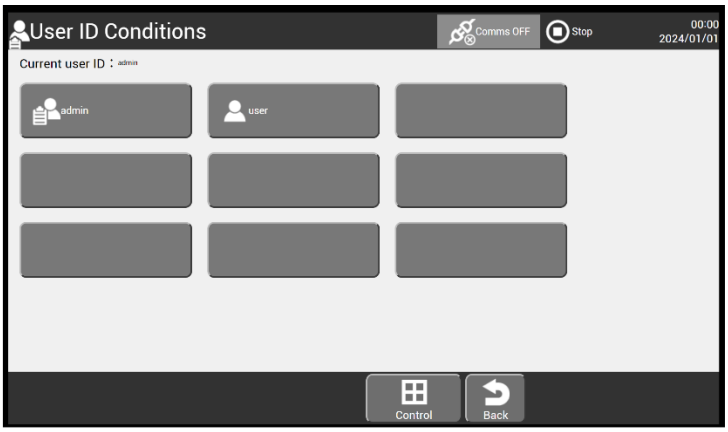
Screen for specifying default login user

The figure below shows that Required is selected in [Boot/Start Screen Login].
Select Required and press OK in the lower right of the screen, and the settings are applied.



Screen for Settings [Boot/Start Screen Login]

When Required is selected in [Boot/Start Screen Login], the [User ID Conditions] screen appears instead of the [HOME] screen immediately after power-on, as shown below.



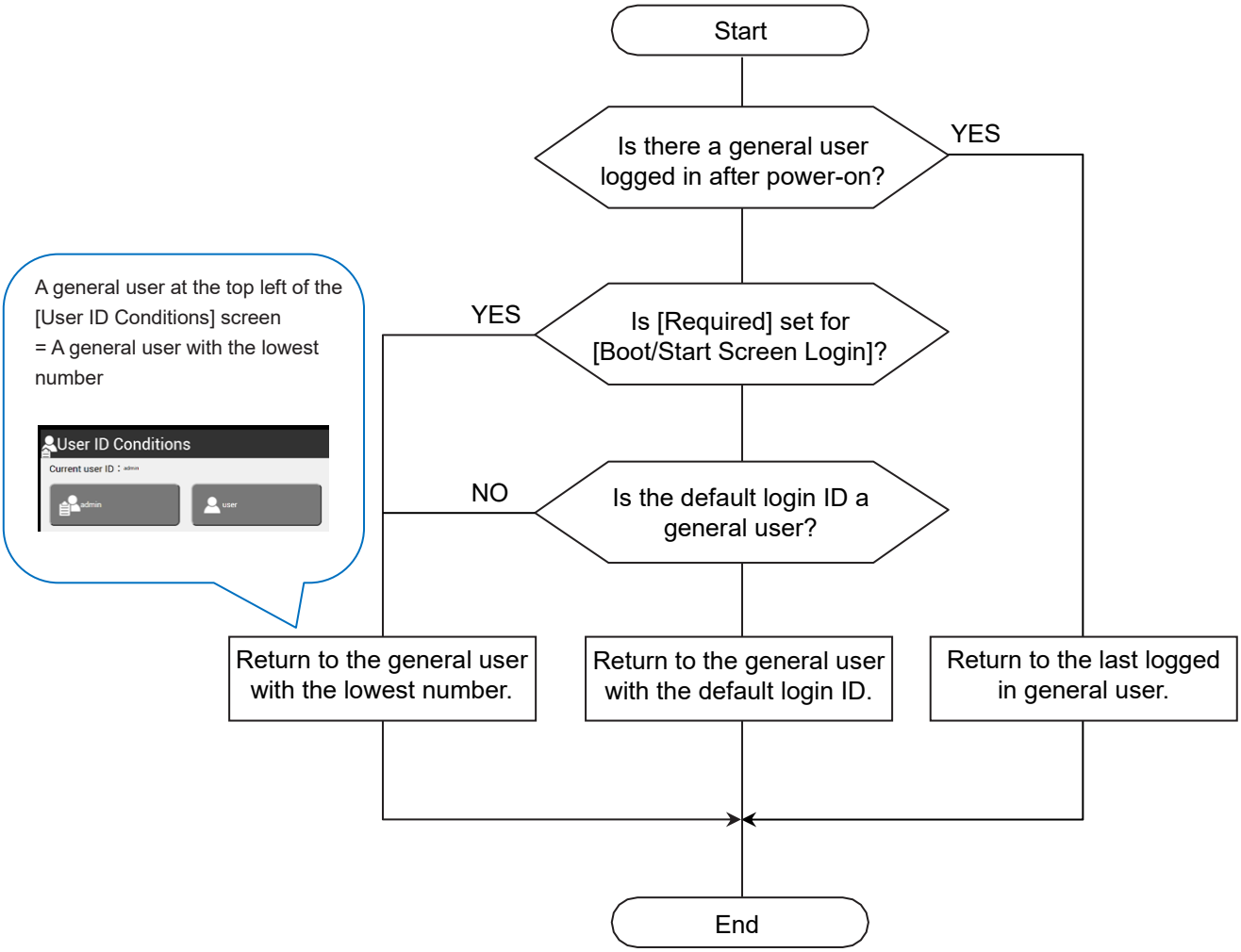
[User ID Conditions] screen (immediately after power-on)

[Note]
When [Required] is selected in [Boot/Start Screen Login], the [User ID Conditions] screen appears at power-on. If you forget the set password, you will not be able to go to the [Print description] screen. Take enough care to set and manage your password.
If you forget your password, contact your nearest local distributor.

3.4. Automatically Returning Administrator Login State to General User Login State

(1) Overview

This section describes how to automatically return to the general user state if the unit sits idle with the administrator logged in. If no keystrokes are made for 15 minutes after the administrator logs in, the system will return to the login state of a selected general user, according to the flow below.



Flow of returning to general user login state

(2) Conditions for automatically returning to the general user login state

The operating conditions for returning to the general user login state are listed in the table below. (All the conditions must be met.) If any of these conditions are not met, the system will not be able to return to the general user login state.

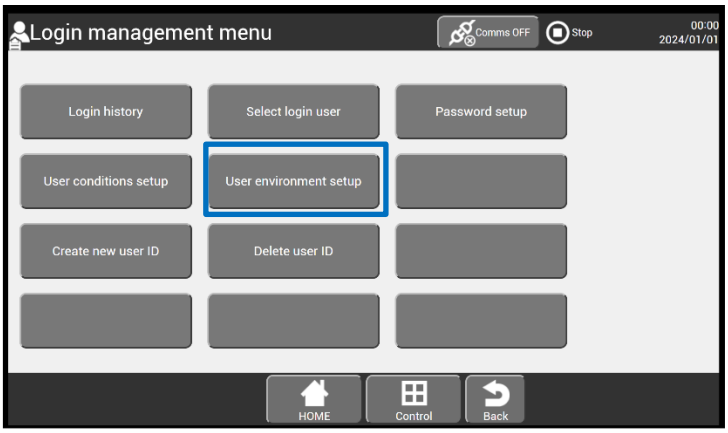
Operating conditions (all must be met)

No.	Operating condition
1	[Enable] must be set for [Administrator Automatic Deselect].
2	At least one general user must be registered as the login user.
3	The screens listed below must be displayed. ([Print description], [Change message], [Print format], [Adjust Inter-character space], [Edit], [Count conditions], [Print specifications], [Save message], [Select message], [Adjust print parameters], [Operation management], [Maintenance work] , [Auxiliary functions] , [Environment setup])
4	The apply key must not be displayed.

(3) Setup procedure

1 When you log in to the system as the administrator, [Login management] appears.
Perform 1 to 4 described in 3.2. (2) Setup procedure.

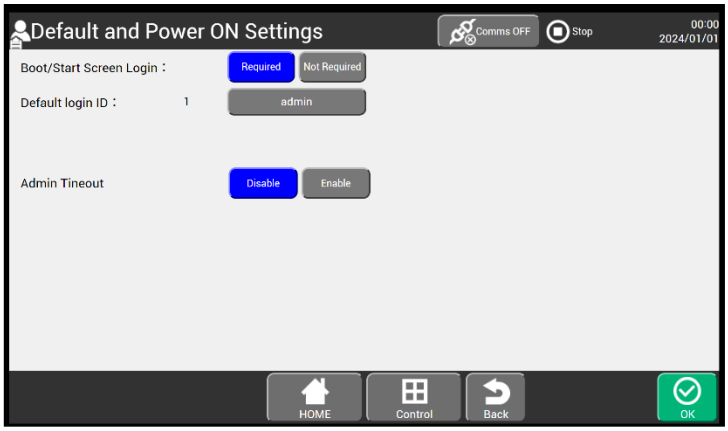
2 Press User environment setup on the [Login management] screen.



[Login management] screen (opening [User environment setup] screen)

The [Using environment setup] screen appears.

3 Select Enable in [Admin Timeout]. Press OK in the lower right of the screen, and the settings are applied.



Screen for selecting [Admin Timeout]

If no keystrokes are made for 15 minutes after the administrator logs in, the system will return to the login state of the general user selected according to the flow in (1) Overview.

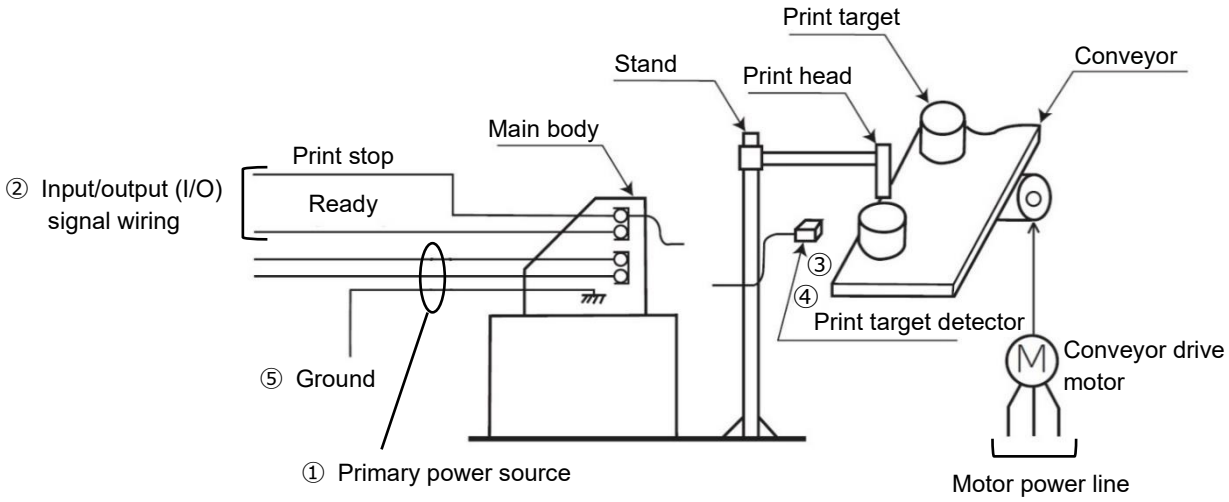
4. Connecting Electric Signals

This chapter describes the connection and wiring methods for the electric signals of the unit.

4.1. Wiring Precautions

(1) Wiring

NOTE
● If extraneous noise enters the unit, it may malfunction or fail. To improve noise immunity, observe the following wiring precautions.



Electric signal connection diagram

① Keep the power cable to the unit away from other power supply cables (in particular, a speed control inverter power supply cable, etc.). Putting them into different ducts provides better performance.

② Wire input/output (I/O) signal cables individually. Do not bundle them together with other power supply cables.

③ Electrically isolate the print target detector, print head, stand, and main body from other machines (such as a conveyor).

④ Keep the wiring of print target detector away from other power supply cables.

⑤ Ensure that all electrical wiring, connections, and grounding comply with applicable cords. If a malfunction occurs due to noise, make a separate ground connection.

(2) Connecting to the power supply

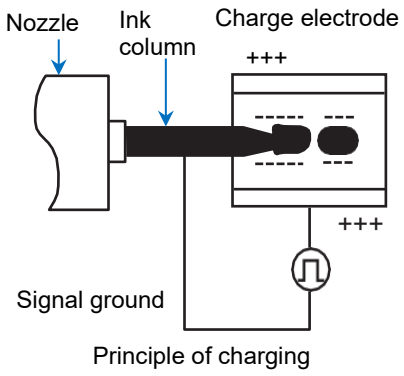
Use a proper plug for the power supply, and be sure to make a protective ground connection. Place the power outlet in an easily removable location near the unit.

(3) Cautions on welding current of welding machine

⚠ WARNING

- Flames are strictly prohibited around the unit.
  Both ink and makeup are flammable. Sparks from welding can cause ignition or a fire. Avoid sparks around the IJ Printer and provide sufficient ventilation, whether it is operating or not.
  In the interest of safety, place a dry-chemical fire extinguisher near the product.

The signal (weak electric) ground and frame ground are connected to the unit, based on its principle of charging ink drops.



Principle of charging

Charge ink drops by applying a voltage between the charge electrode and the ink column, as shown on the left. Therefore, the ink always becomes signal ground. In addition, since the ink is always connected to frame ground by the clamp, etc. of the circulation path, separating signal ground and frame ground is difficult.

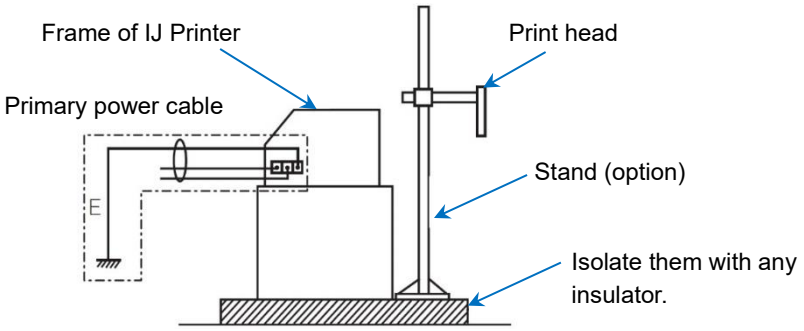
NOTE

- If a large current (such as welding current of a welder) flows from the outside through the frame ground, the current may also flow around the signal ground, which may damage the printed circuit board or melt the ground wire.

Therefore, when performing welding work near the IJ Printer, follow the method below regardless of whether it is in operation.

Cautions on welding

Isolate the frame, print head, and print target detector of the unit from the conveyor and ground, and make a separate ground connection for the printer. With this method, you can perform welding work even when the IJ Printer is in operation.



Cautions on welding

4.2. Connecting Input/Output (I/O) Signals

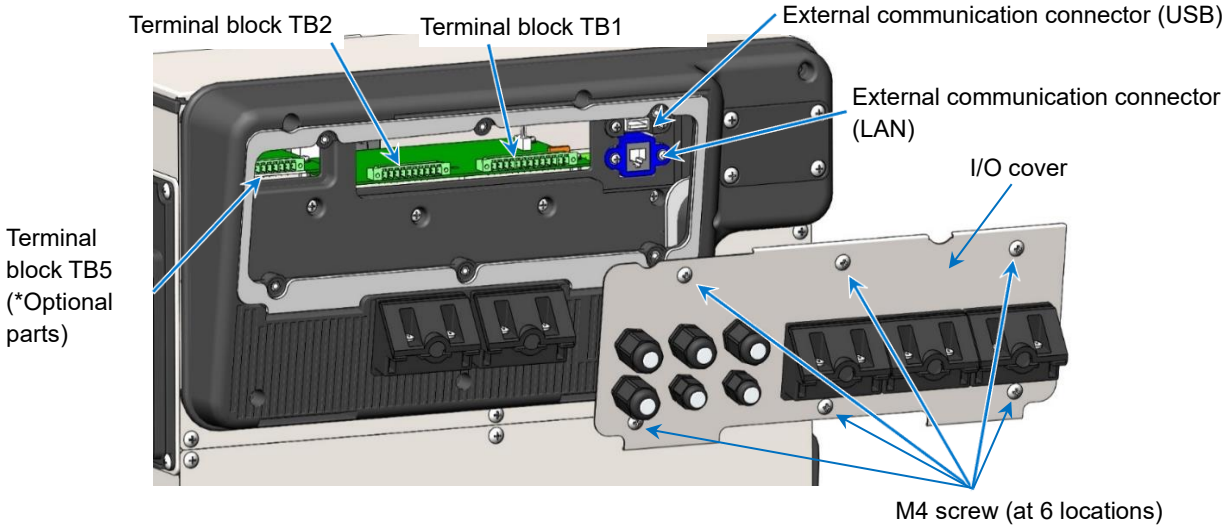
Lead the I/O lines from the I/O cover lead-in port on the back of the unit, and connect them to the internal terminal blocks and external communication connectors.

⚠ CAUTION

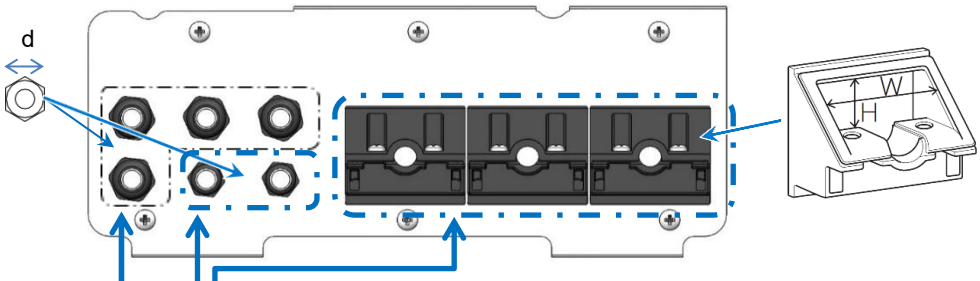
- Turn the power off before wiring.
  Usually, use the unit with the top and I/O covers closed.

4.2.1. Leading Input/Output Lines

Loosen the six screws to remove the I/O cover.



Lead-in port of input/output lines



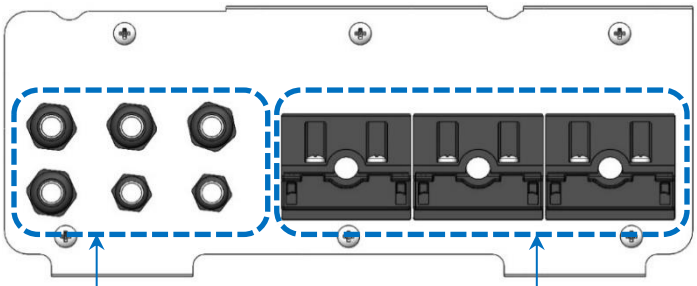
Purpose	Cable outside diameter range	Nut size/Dimension
External communication (LAN, USB cables)	φ3.5 to 10	38 (W) x 17 (H)
Print target detector, encoder	φ3.5 to 7 (M12)	15 (d)
Reciprocative printing, print-in-progress, print-complete, print stop, online, remote signals	φ4.5 to 10 (M16)	19 (d)
Ready, fault, warning	φ4.5 to 10 (M16)	19 (d)

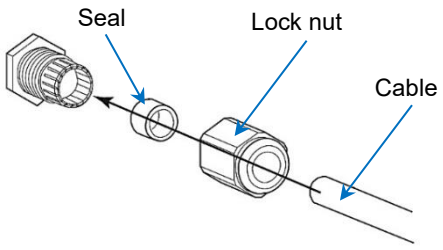
I/O cover, lead-in port

NOTE

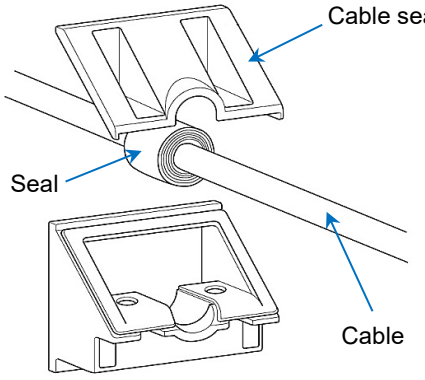
- Use a cable whose outside diameter is within the specified range. Securely tighten the lock nut at the lead-in port.
  In addition, do not bundle cables of weak and strong electric systems inside or outside the unit, in order to minimize the influence of noise from strong electric system signals (connection signals to the power supply and terminal block TB5) on weak electric system signals (connection signals to terminal blocks TB1, TB2, and external communication connectors). In particular, do not bundle the print target detector, print stop signal, power supply, and ready signal cables, or do not route them in the same duct.

[Method for connecting the cable to the lead-in port]
The procedure for connecting the cable to the lead-in port is described below.





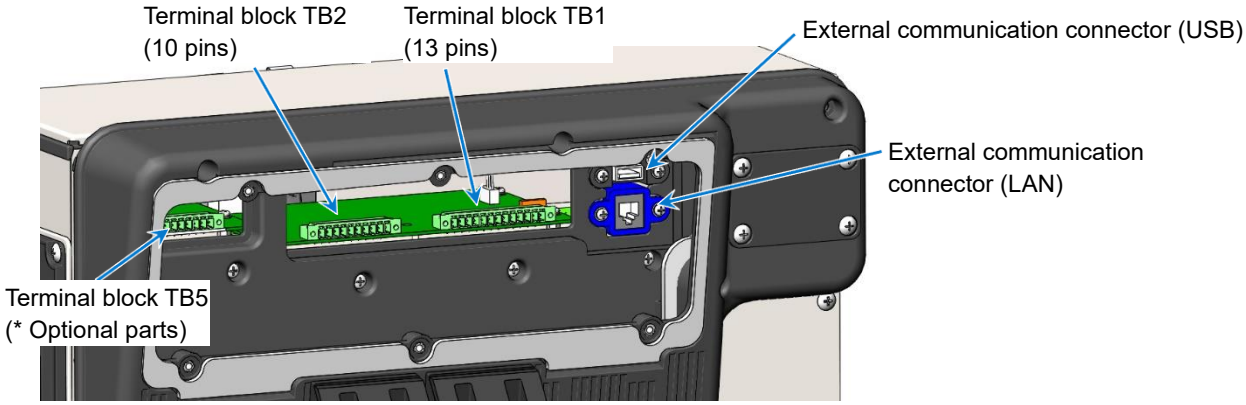
(1) Remove the lock nut.
(2) Insert the cable as shown above.
(3) Tighten the lock nut.
Tighten it with a tool securely.



(1) Remove the set screw, and remove the cable seal block from the unit.
(2) Divide the cable seal block.
(3) Wrap the seal around the outside of the cable as shown above. At this time, wrap it so that there is no gap between the seal and the cable seal block.
(4) Put the part where the seal was wrapped into the cable seal block, tighten the set screw, and install it to the unit.

4.2.2. Connecting to Input/Output (I/O) Terminals

NOTE
● Check terminal signals for secure wiring. Incorrect wiring may cause a board failure.



Layout drawing of connectors

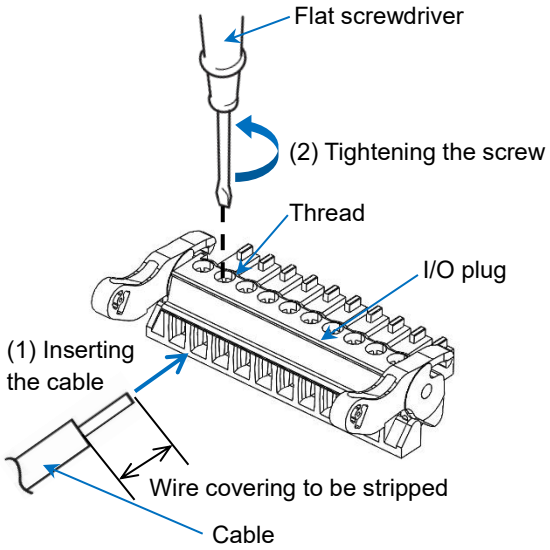
[How to use the I/O plug]

(1) Swage method

Applicable cable size: AWG24 to 16 (φ0.5 to 1.3)

Wire covering to be stripped: 8 to 9 mm

- Insert the stripped part of the wire covering into the pin of the I/O plug.
- Tighten the screw on the top of the pin to secure the cable.

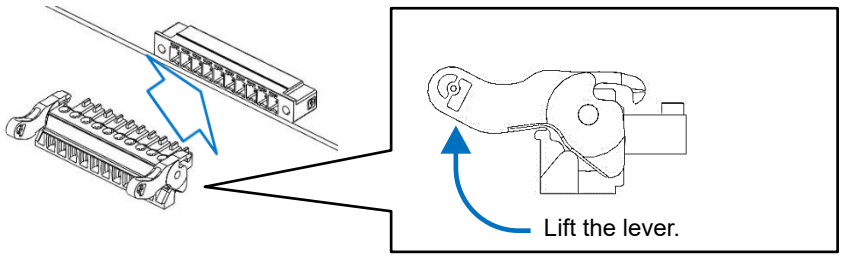


(2) Method for connecting to and removing from the terminal block

- Connecting the I/O plug

  Be sure to keep up the lever, insert the plug into the terminal block.

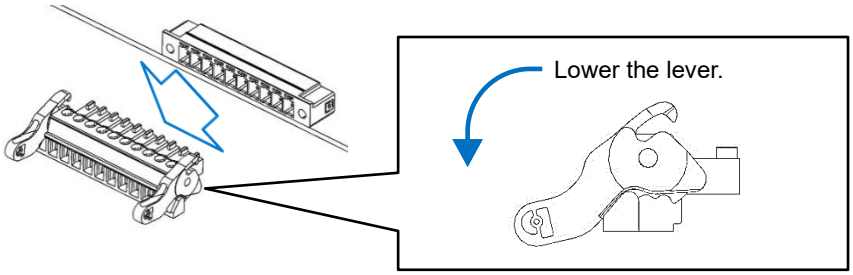
  Make sure that the I/O plug is securely inserted into the terminal block and that the left and right levers are locked on the protrusions of the terminal block.



- Removing the I/O plug

  You can remove the plug by lowering the lever.

  If it is difficult to remove, lower the left and right levers alternately little by little.



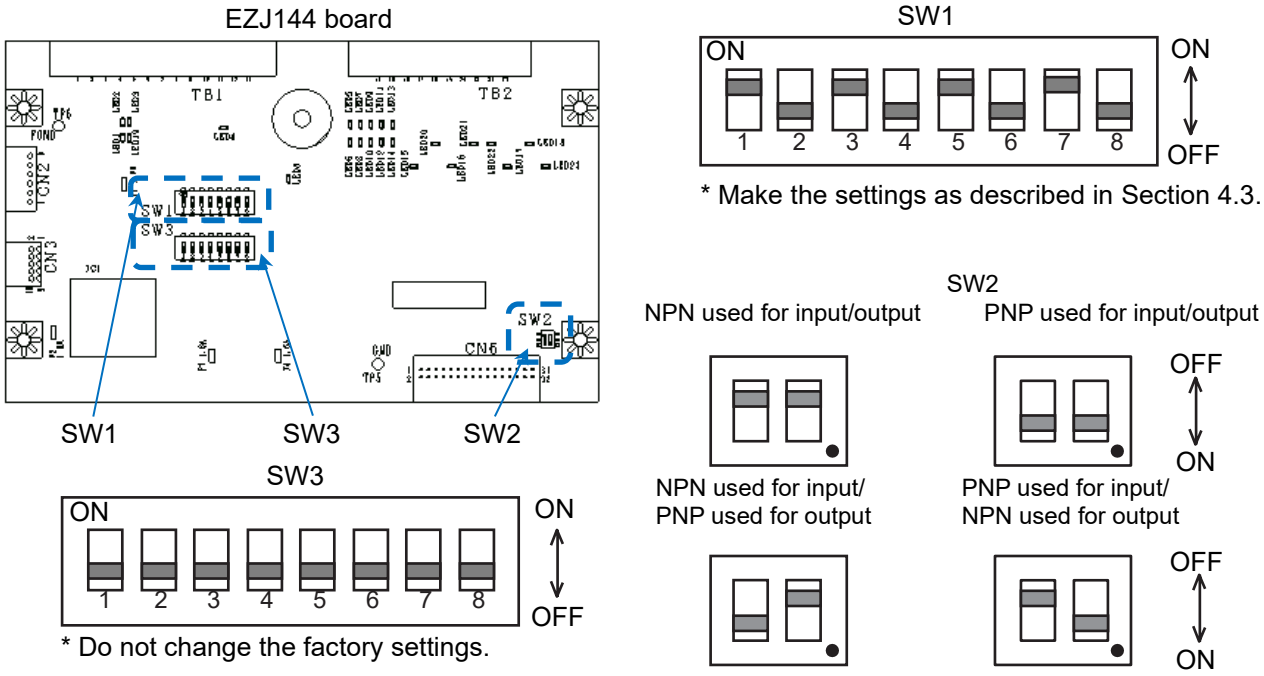
[Connecting to the external connection terminal block (TB1 and TB2 on the EZJ144 board)]

- Terminal block (TB1 and TB2 on the EZJ144 board): Conveyor interface
- The print target detector and some of input/output signals can support the NPN and PNP interface signals.
- Encoder signals can support a totem pole and an open collector (NPN).

Terminal block	Pin No.	Name		I/O		Remarks
		For NPN interface	For PNP interface	NPN	PNP	
TB1	1	Power supply for print target detector		Output		• 24 VDC, maximum: 100 mA (*) • The SW1 setting enables power supply and switching between the NPN and PNP interfaces.
	2	Print target detector signal		Input		
	3	Ground for print target detector		–		
	4	Print stop Input		Input		• The SW2 setting enables switching between NPN and PNP.
	5	Signal ground		–		
	6	Power supply for encoder		Output		• 24 VDC, maximum: 100 mA (*) • The SW1 setting enables switching of power supply. • The SW1 setting enables switching between the totem pole and open collector (NPN).
	7	Encoder signal (totem pole)		Input		
	8	Encoder signal [Open collector (NPN)]		Input		
	9	Ground for encoder		–		
	10	Ready	–	Output	–	• Non-contact output: Open collector (NPN) only
	11	Signal ground	–	–	–	
	12	Fault	–	Output	–	
	13	Warning	–	Output	–	
TB2	14	Deflection voltage ON/OFF signal		Input		• The SW2 setting enables switching between NPN and PNP.
	15	Reciprocative printing signal		Input		
	16	Startup signal		Input		
	17	Reset signal		Input		
	18	Stop signal		Input		
	19	Print-in-progress/print-complete signals		Output		• Set [print.-in-progress] or [print. complete] on the screen operation. • The SW2 setting enables switching between NPN and PNP.
	20	Online signal		Output		
	21	Universal 1		Output		
	22	Universal 2		Output		
	23	Signal ground		–		

(*): The maximum supply current in the combination of the print target detector and encoder is 100 mA.

[SW1 to SW3 settings on the EZJ144 board]



[Cautions on using the mixture of NPN/PNP interfaces]

Input/output signals of the pin numbers 4 and 5 on the terminal block TB1 and the pin numbers 14 to 23 on the terminal block TB2 should be used via either of the NPN/PNP interfaces. Do not use the mixture of the interfaces for these input or output signals.

The mixture of these interfaces can be used for print target detector signals (pins 1 to 3), encoder signals (pins 6 to 9), input/output signals (pins 4 and 5, 14 to 18), and status output signals (pins 19 to 22).

[Example: You can use the PNP interface for print target detector signals (pins 1 to 3) and the NPN interface for status output signals (pins 19 to 22).]

Connecting to external connection terminal block (TB5 on EZJ149 board * Optional parts)

Terminal block	Pin No.	Name	I/O	Remarks
TB5 *Optional parts	1	Ready	NC	Contact: 30 VAC/0.5 A or 30 VDC/1 A
	2		NO	Contact: 30 VAC/0.5 A or 30 VDC/1 A
	3		COM	
	4	Fault	NC	Contact: 30 VAC/0.5 A or 30 VDC/1 A
	5		NO	Contact: 30 VAC/0.5 A or 30 VDC/1 A
	6		COM	
	7	Warning	NC	Contact: 30 VAC/0.5 A or 30 VDC/1 A
	8		NO	Contact: 30 VAC/0.5 A or 30 VDC/1 A
	9		COM	

4.3. Specifications of Input/Output (I/O)

To handle external signals, follow the voltage, current, and time described in this manual. Otherwise, operation of the unit cannot be guaranteed. The electrical characteristics of input/output (I/O) signals are listed in the table below.

(a) Input signal (external unit -> IJ Printer)

Electrical characteristics of input signals (external unit -> IJ Printer)

<table>
<tr><th>No.</th><th>Signal name</th><th>Function</th><th colspan="2">Electrical characteristics</th></tr>
<tr><td rowspan="2">1</td><td rowspan="2">Print target detector</td><td rowspan="2">Indicates the arrival of a print target.</td><td colspan="2">With +24 V power supply (maximum 100 mA) (*1)</td></tr>
<tr><td>• For no-voltage input (NPN)
ON output current:
Maximum 12 mA
OFF output voltage: 24 V
(*3)</td><td>• For voltage input (PNP)
ON input current (at 24 V):
Maximum 12 mA
OFF input voltage:
Maximum 1 V (*3)</td></tr>
<tr><td>2</td><td>Print stop</td><td>Instructs not to print even when a print target is detected.</td><td>• For no-voltage input (NPN)
ON output current:
Maximum 6 mA
OFF output voltage: 24 V
(*3)</td><td>• For voltage input (PNP)
ON input current (at 24 V):
Maximum 6 mA
OFF input voltage:
Maximum 1 V (*3)</td></tr>
<tr><td rowspan="2">3</td><td rowspan="2">Encoder
(for speed matching)</td><td rowspan="2">Inputs a pulse proportional to the transport speed of a print object.</td><td colspan="2">With +24 V power supply (maximum 100 mA) (*1)</td></tr>
<tr><td>• No-voltage input
(NPN open collector)
ON output current:
Maximum 20 mA
OFF output voltage: 24 V
(*3)</td><td>• Voltage input
(totem pole)
ON input current (at 24 V):
Maximum 20 mA
OFF input voltage:
Maximum 1 V</td></tr>
<tr><td>4</td><td>Startup (*2)</td><td>Indicates a signal with the same function as the [Start] button on the screen operation. The process from ink ejection to ready state is performed.</td><td>• For no-voltage input (NPN)
ON output current:
Maximum 6 mA
OFF output voltage: 24 V
(*3)</td><td>• For voltage input (PNP)
ON input current (at 24 V):
Maximum 6 mA
OFF input voltage:
Maximum 1 V (*3)</td></tr>
<tr><td>5</td><td>Reset</td><td>Indicates a signal with the same function as the [Reset] or [Close] button in the fault message window. The fault is reset.</td><td>• For no-voltage input (NPN)
ON output current:
Maximum 6 mA
OFF output voltage: 24 V
(*3)</td><td>• For voltage input (PNP)
ON input current (at 24 V):
Maximum 6 mA
OFF input voltage:
Maximum 1 V (*3)</td></tr>
<tr><td>6</td><td>Stop</td><td>Indicates a signal with the same function as the [Stop] button on the screen operation. Ink stop (automatic cleaning stop) is performed.</td><td>• For no-voltage input (NPN)
ON output current:
Maximum 6 mA
OFF output voltage: 24 V
(*3)</td><td>• For voltage input (PNP)
ON input current (at 24 V):
Maximum 6 mA
OFF input voltage:
Maximum 1 V (*3)</td></tr>
<tr><td>7</td><td>Deflection voltage ON/OFF</td><td>Indicates a signal with the same function as [Ready] or [Standby] on the [HOME] screen operation. Each time a signal is input, deflection voltage is switched on/off, and the ready and standby states are switched.</td><td>• For no-voltage input (NPN)
ON output current:
Maximum 6 mA
OFF output voltage: 24 V
(*3)</td><td>• For voltage input (PNP)
ON input current (at 24 V):
Maximum 6 mA
OFF input voltage:
Maximum 1 V (*3)</td></tr>
</table>

(*1): The maximum supply current of +24 V power supply in the combination of the print target detector and encoder is 100 mA.

(*2): Take enough care to handle the startup signal that instructs ink ejection.

(*3): When the input signal is OFF, the transistor leak current of the external unit should be 0.1 mA or less.

(b) Output signal (IJ Printer -> external unit)

Electrical characteristics of output signals (IJ Printer -> external unit)

<table>
<tr><th>No.</th><th>Signal name</th><th>Function</th><th colspan="2">Electrical characteristics</th></tr>
<tr><td>1</td><td>Ready</td><td>Operates when the IJ Printer is in the ready state.</td><td rowspan="3">No-contact output
Open collector (NPN)
• Sink current: Maximum 20 mA
• ON voltage: 0.5 V or less
• Operating voltage: 30 V or less</td><td rowspan="3">Relay output (optional)
Contact C x 1 (*5)
30 VDC/1A,
30 VAC/0.5 A
(resistance load) (*6)</td></tr>
<tr><td>2</td><td>Fault</td><td>Operates when the IJ Printer is in the fault state.</td></tr>
<tr><td>3</td><td>Warning</td><td>Operates when the IJ Printer is in the warning state.</td></tr>
<tr><td rowspan="2">4</td><td>Print-in-progress (*7)</td><td>Operates when printing is in progress in the IJ Printer.</td><td rowspan="3">No-contact output
Open collector (NPN)
• Sink current: Maximum 20 mA
• ON voltage: 0.5 V or less
• OFF: Open
• Operating voltage: 30 V or less</td><td rowspan="3">No-contact output
Open collector (PNP)
• Source current: Maximum 10 mA
(Connect a resistance load of 2.2 kΩ or more.)
• ON voltage: +24 V output
• OFF: Open</td></tr>
<tr><td>Print-complete (*7)</td><td>Operates when the IJ Printer completes printing.
(pulse output of up to one second)</td></tr>
<tr><td>5</td><td>Online output</td><td>Operates when the IJ Printer is online.</td></tr>
</table>

(*5): For inductive load, protect the contact with a surge absorber and others.

(*6): Relay output and no-contact output can be used at the same time.

(*7): Select either [print.-in-progress] or [print. complete] on the screen.

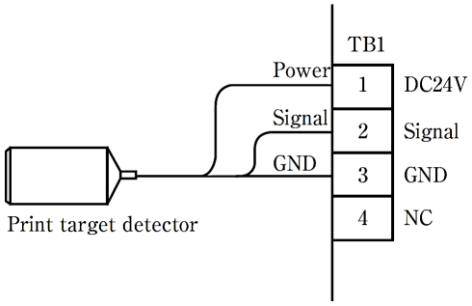
4.3.1. Print Target Detector Input

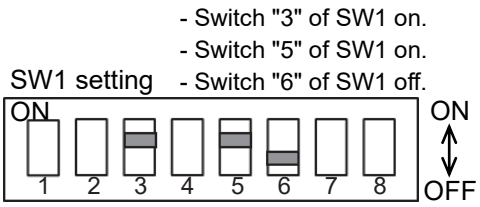
The print target detector input function is used to input the start print signal of the IJ Printer. Use a no-contact (transistor) type output for the print target detector. An optoelectronic sensor with built-in amplifier that detects a print target with an optical beam is the most suitable. When the power consumption of the print target detector and rotary encoder is 100 mA or less in total, power can be supplied from the IJ Printer built-in power supply. When it exceeds 100 mA in total, provide a dedicated power supply. The wiring and settings in this case are shown below.

(1) Connecting the print target detector

(a) NPN interface

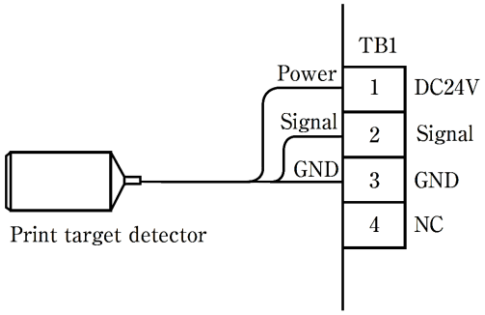
When the IJ Printer built-in power supply is used.

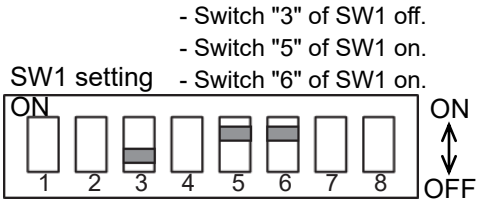




(b) PNP interface

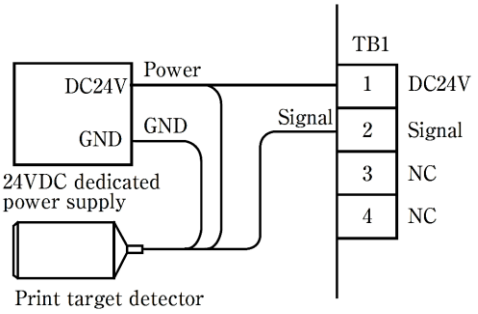
When the IJ Printer built-in power supply is used.

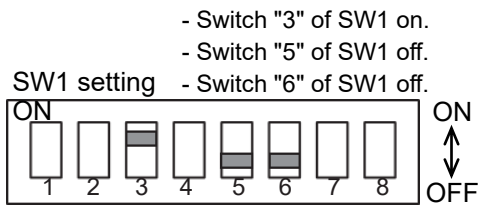




(c) NPN interface

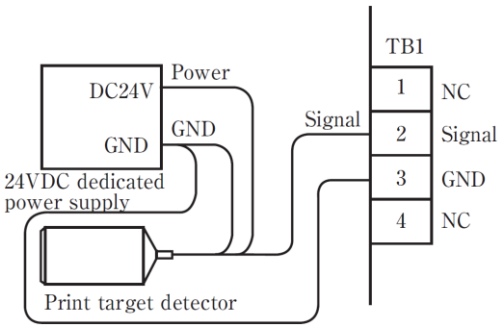
When the dedicated power supply is used.

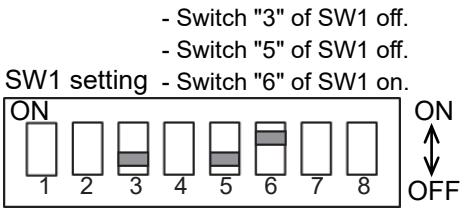




(d) PNP interface

When the dedicated power supply is used.

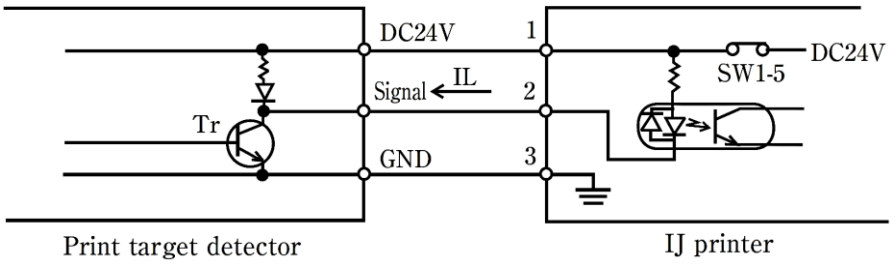




(2) Specifications of the print target detector

(a) When the NPN interface is used

- Internal circuit diagram



The input circuit of the IJ Printer is a current drive load to the output circuit of the print target detector, and when the output transistor Tr of the print target detector is switched on, it becomes an input of the start print signal.

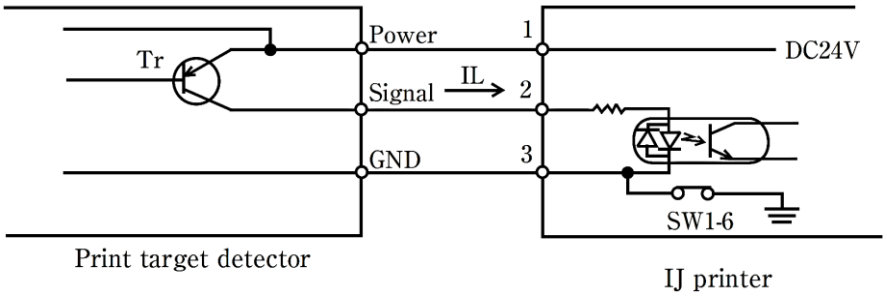
Use the output transistor Tr that meets the specifications below (common to NPN/PNP).

– Withstand voltage: 24 VDC or more
– Maximum drive current: 12 mA or more (IL ≈ 10 mA)
– Residual voltage: 2 V or less
– Leakage current: 0.1 mA or less

- Specifications of the IJ Printer built-in power supply
  – Power supply voltage: 24 V
  – Maximum supply current: 100 mA (*)
  (*): The maximum power supply to the print target detector and rotary encoder is 100 mA in total.

(b) When the PNP interface is used

- Internal circuit diagram

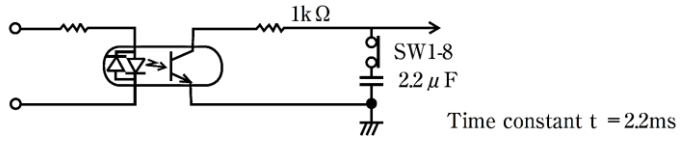


(3) Print target detector signal noise filter

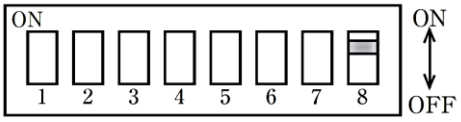
(a) Settings of IJ Printer built-in print target detector signal noise filter

This filter provides a function that uses CR method to filter the noise constantly generated in print target detector signals and the noise generated by water drops. For sensor chattering, the sensor filter function (see "5.6. Setting Print Specifications" in the Instruction Manual) is effective.

- Internal circuit diagram



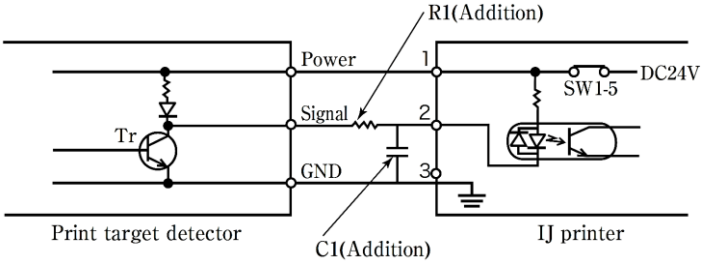
SW1 setting · SW1 "8" ON : Filter ON
OFF: Filter OFF



(b) Settings of print target detector signal noise filter to the outside of the IJ Printer

If the built-in filter cannot eliminate noise, use CR method to add a filter circuit to the outside of the IJ Printer as shown below.

When R1 is set to 1 kΩ (0.5 W) and C1 to 1 μF/25 V, the time constant t becomes 1 ms, and elimination of noise of several hundred μs or less can be expected. When you want to eliminate more noise, add a capacitor in parallel with C1.

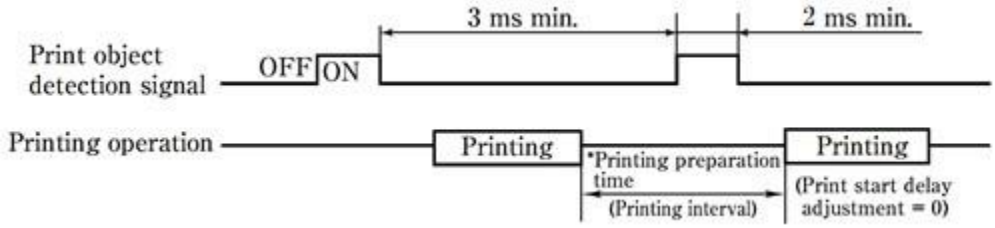


[Cautions on adding the CR filter]

- For stable operation of a photocoupler, the constant of R1 should be 1 kΩ or less.
- For C1, use a temperature compensating ceramic capacitor as much as possible. If the temperature compensating ceramic capacitor cannot be used due to capacitive and physical dimensions, use a high dielectric ceramic capacitor with good accuracy and temperature characteristics.
- Place R1 and C1 as close as possible to the IJ Printer.

(4) Relationship between print target detector signals and printing operation

The relationship between print target detector signals and printing operation is shown in the figure below.



(*1): The minimum value of time of preparing for printing depends on the dot matrix to be printed and the ink drop use. See the table on the right for estimated time.
The precise time can be calculated by the formula below using the set number of vertical dots, character width, and ink drop use.
Required time of preparing for printing (*2)

= [Time of one scan × (N + 1)] (ms)

Estimated time of preparing for printing

Nozzle diameter	Estimated time
40, 55, 65 µm	9 ms

Nozzle diameter	a
40, 55, 65 µm	5.5

$$\text{Time of one scan} = \frac{(\text{Number of vertical dots} + \text{Character width}) \times \text{Ink drop use}}{\text{Excitation frequency (kHz) (*3)}} \quad \text{(ms)}$$

N: An integer that meets (Time of one scan × N) ≥ a. However, "a" depends on the table on the upper right.

(*2): This is the time required for repeatedly printing of fixed characters. When you use the communication function or 2-dimensional bar code function, this will be longer than the time obtained by this formula.

(*3): Excitation frequency: Model UX2, 65 µm nozzle 1067K ..... 68.9 or 76.9 kHz
Model UX2, 40 µm nozzle 1067K ..... 90.9 kHz
Model UX2, 55 µm nozzle 1067K ..... 95.2 kHz
For excitation frequency, see the handling guidance of each ink.

(5) Tracking function

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

4.3.2. Speed Matching Function Using Rotary Encoder

The speed matching function is used when the speed of a print target or the speed of the conveyor carrying the target changes while printing is in progress in the IJ Printer. Without this function, a change in the speed may change the width of characters to be printed, causing the difficulty in reading them.

To use the function, you need to input an electrical pulse with a period proportional to the speed to the IJ Printer from the outside. The rotary encoder is generally used for this purpose. The rotary encoder detects the speed by connecting it to the conveyor shaft or touching the surface of the conveyor belt.

The IJ Printer can print vertical lines of a print message in synchronization with pulses from the rotary encoder.

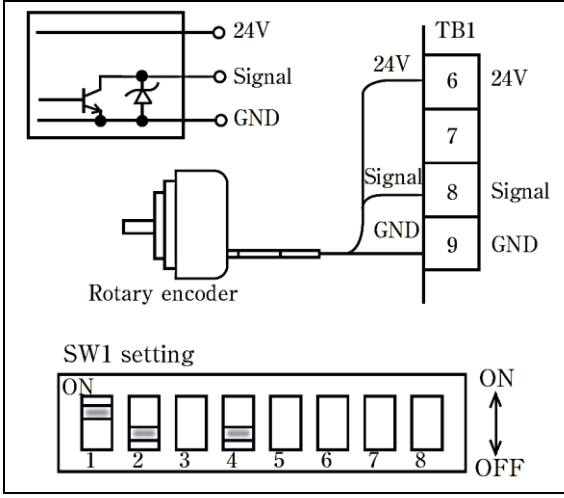
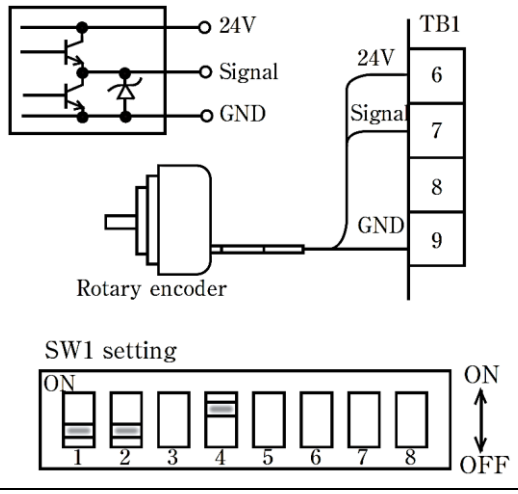
4.3.2.1. Specifications and Wiring of Rotary Encoder, and Switch Settings

(1) The specifications of the rotary encoder that can be connected are described below.

– Output waveform: Square wave (duty: 30 to 70 %)
– Output withstand voltage: 24 VDC or more
– Load current: 20 mA or more
– Leakage current: 0.1 mA or less
– Power supply voltage: 24 VDC
– Current consumption: 100 mA or less (*)
(The current consumption of the rotary encoder and sensor is 100 mA or less in total when the IJ Printer built-in power supply is used.)
– Input signal frequency: 200 kHz or less
– Number of pulses: Depending on production line conditions

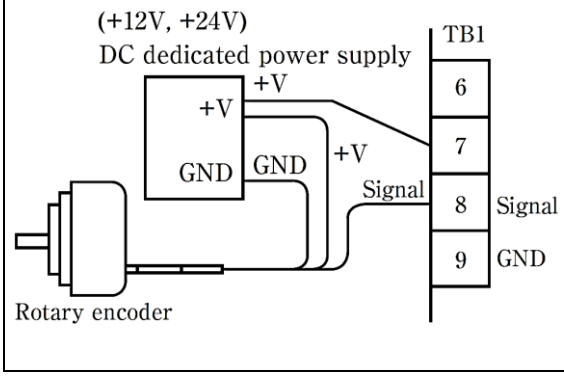
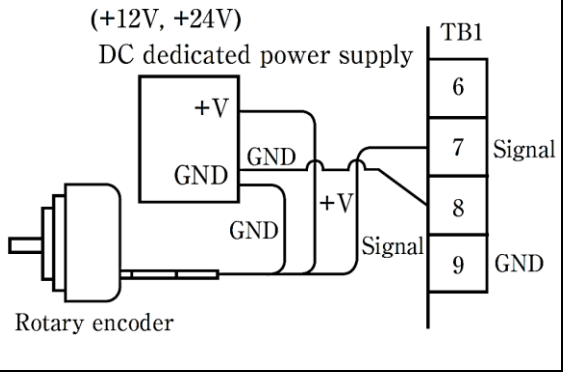
(*): The maximum capacity of the IJ Printer built-in power supply (24 VDC) is 100 mA. When the current consumption of the sensor and encoder exceeds 100 mA, or when the power supply voltage is not 24 V, use a dedicated power supply and connect wires as shown in (3).

(2) The figure below shows the encoder wiring and the SW1 setting on the EZJ144 board at the use of the IJ Printer built-in power supply.

(a) When open collector output and the IJ Printer built-in power supply are used.	(b) When totem pole output and the IJ Printer built-in power supply are used.
	

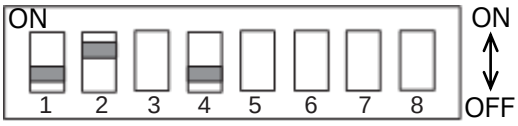
(3) The figure below shows the encoder wiring and the SW1 setting on the EZJ144 board at the use of the dedicated power supply.

- The wiring for the dedicated power supply varies depending on the output interface of the encoder but can be the same depending on the power supply voltage.

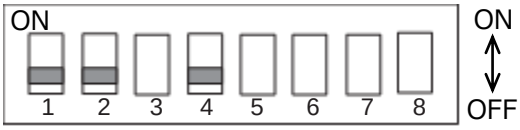
(a) When open collector output and the dedicated power supply are used.	(b) When totem pole output and the dedicated power supply are used.
	

- The SW setting used for the dedicated power supply varies depending on the power supply voltage but does not depend on the output interface of the encoder.

- SW1 setting (for dedicated power supply 12 V)



- SW1 setting (for dedicated power supply 24 V)

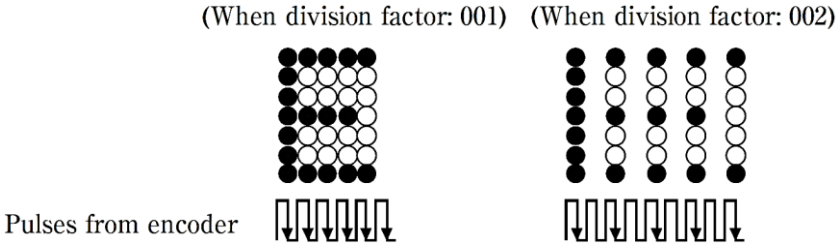


* This setting does not depend on the open collector output and totem pole output.

4.3.2.2. Setting to IJ printer

Make the [Product speed matching] and [Pulse rate div. Factor] settings on the [Print specifications] screen (See "5.6. Setting Print Specifications" in the Instruction Manual.)

- Set [Product speed matching] to [Encoder Signal].
  - Set [Pulse rate div. Factor] if necessary. This function lowers the frequency of the input pulse (makes its period longer) inside the IJ Printer. Divided pulses are used for printing as shown below.



Description of pulse division function

  - The relationship among the rotary encoder signal pulse frequency, print scan frequency, and division factor is shown in the formula 1.

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

4.3.2.3. Calculation of Conditions that Allow Product Speed Matching

Calculate whether the ink drop use and division factor can meet the conditions that allow product speed matching, based (1) to (7) below. Perform the calculations below. The lower the ink drop use is, the better the print quality is. To change the ink drop use, check the print quality.

(1) Set the character width value according to the ink drop use, as listed in the table below.
High speed printing model (55μm): Refer to section “5.7 Setting Print Specification (8) [Character width]” of Instruction Manual.

Character width set value

Large ↕ Small

Ink drop use	[Character width] setting value
1/1	002
1/2	001
1/3 to 1/16	000

(2) The maximum value of the print scan frequency is obtained by the formula 2 according to the width of characters to be printed and the highest conveyor speed.
Substitute a value for "d" according to the nozzle diameter of your model.

Nozzle diameter	d
65 μm	0.33
40 μm	0.2
55 μm	0.28

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

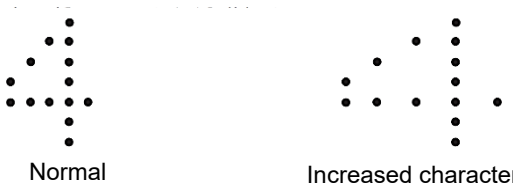
(3) Next, use the formula 3 to check whether the set print speed of the IJ Printer can follow the maximum value of the print scan frequency obtained by the formula 2.

$$\frac{\text{Excitation frequency (f)}}{\text{(Number of vertical dots + Character width set value + 1) x (Denominator of ink drop use)}}$$

[kHz] (formula 3) > Maximum value of print scans [kHz]

(Example) When the ink drop use is 1/3, the denominator is 3.

- When the value obtained by the formula 3 becomes smaller than the maximum value of the print scan frequency (obtained by the formula 2), the product speed matching will not be performed normally, and the character width will increase as shown in the figure below.



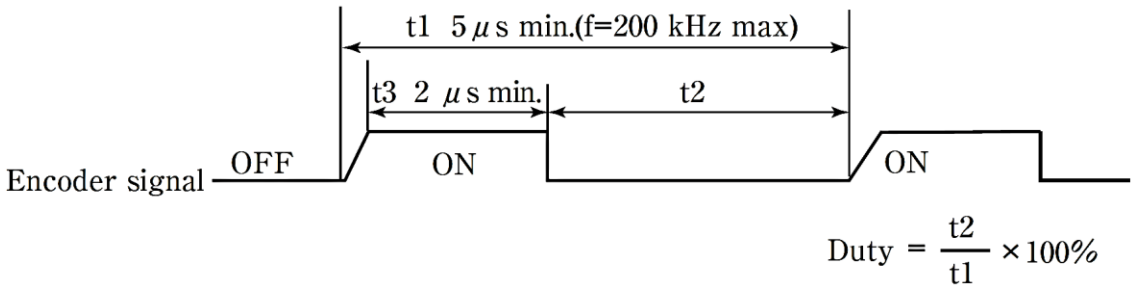
Normal　　Increased character width

- When the [Product Speed Matching Error] warning alarm is set, an alarm occurs. In this case, decrease the conveyor speed, increase the print character width, and increase the ink drop use to make the maximum value of the print scan frequency smaller than the value obtained by the formula 3 (to make the set print speed of the IJ Printer faster than the highest conveyor speed).

(4) The value of excitation frequency (f) in the formula 3 varies depending on the type of ink to be used. See the handling guidance of each ink.
(Typical example) Nozzle diameter 65 µm, ink type 1067K: Excitation frequency (f) = 68.9 or 76.9 kHz
Nozzle diameter 40 µm, ink type 1067K: Excitation frequency (f) = 90.9 kHz
Nozzle diameter 55 µm, ink type 1067K: Excitation frequency (f) = 95.2 kHz

(5) When using the rotary encoder, you cannot change the print character width by changing the character width set value of the IJ Printer.
To change it, you need to install a device (such as a timing belt or pulley) to vary the ratio between the conveyor speed and the speed synchronization signal pulse frequency from the rotary encoder.

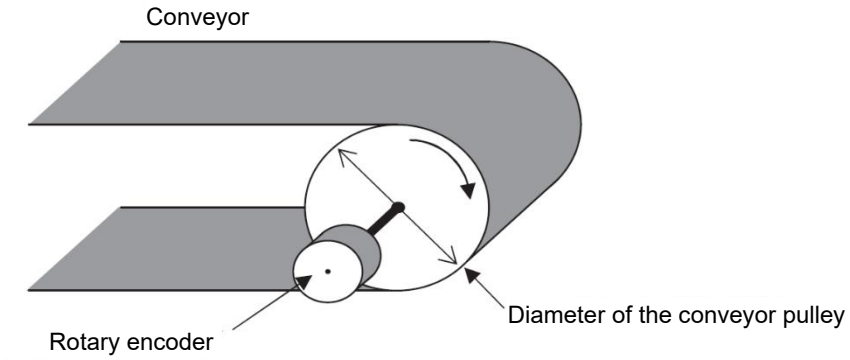
(6) The speed synchronization signal pulse frequency from the rotary encoder is restricted as shown in the figure below.



The duty should be 30 to 70 %.
However, ensure an encoder signal period time (t1) of at least 5 µs.
Ensure a flat period (t3) of at least 2 µs when the encoder signal is switched on.

(7) How to select and calculate the rotary encoder
The print character width at the use of the product speed matching function is determined by the amount of movement of the product per encoder pulse. Three examples are described below.

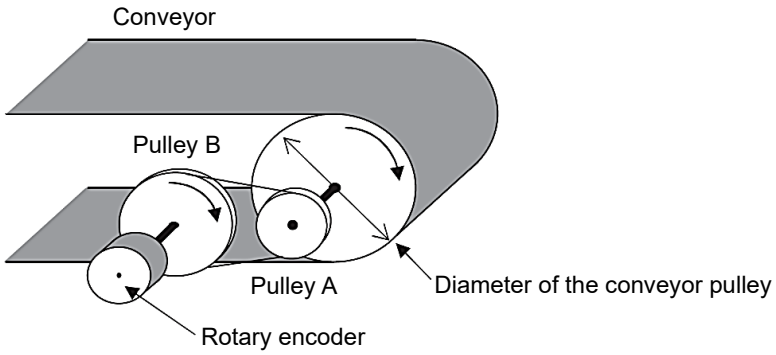
Example 1:
Calculate the resolution of the rotary encoder when it is directly connected to the conveyor shaft.



<Calculation condition>
- Dot font: 5 x 7 dots (horizontal 5, vertical 7)
- Space between characters: 1 dot (1 scan)
- Inter-character interval: 1.8 mm [horizontal 6 dots (6 scans)]
  (Inter-character dot 5 + Space between characters 1)
- Diameter of the conveyor pulley: 60 mm

(1) Distance the conveyor moves per revolution of the rotary encoder:
60 mm x 3.14 = 188.4 mm/revolution
(2) Number of scans that must be performed while the conveyor is moving 1 mm:
6 scans/1.8 mm = 3.33 scans/mm
(3) Required resolution of the rotary encoder (number of output pulses per revolution of the encoder):
188.4 mm/revolution x 3.33 scans/mm = 628PPR (≈ 2,500PPR, pulse rate division factor: 4)

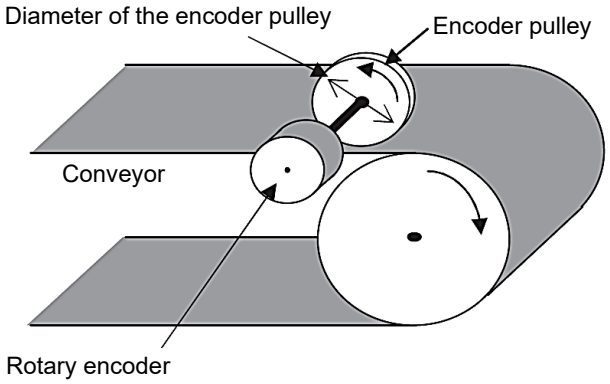
Example 2:
Calculate the diameter ratio (RT) of the pulley when the rotary encoder is connected to the conveyor via a pair of pulleys.



<Calculation condition>
- Dot font: 5 x 7 dots (horizontal 5, vertical 7)
- Space between characters: 1 dot (1 scan)
- Inter-character interval: 1.8 mm [horizontal 6 dots (6 scans)]
  (Inter-character dot 5 + Space between characters 1)
- Diameter of the conveyor pulley: 60 mm
- Resolution of the rotary encoder: 1,000PPR

(1) Distance the conveyor moves per revolution of the rotary encoder:
60 mm x 3.14 = 188.4 mm/revolution
(2) Number of scans that must be performed while the conveyor is moving 1 mm:
6 scans/1.8 mm = 3.33 scans/mm
(3) Required number of output pulses from the rotary encoder (resolution):
188.4 mm/revolution x 3.33 scans/mm = 628PPR
(4) Diameter ratio of the pulley (RT):
RT = Diameter of the pulley B/Diameter of the pulley A = 1,000PPR/628PPR = About 1.6/1

Example 3:
Calculate a rotary encoder resolution required when the pulley installed on the rotary encoder shaft is in contact with the conveyor belt.



<Calculation condition>
- Dot font: 5 x 7 dots (horizontal 5, vertical 7)
- Space between characters: 1 dot (1 scan)
- Inter-character interval: 1.8 mm [horizontal 6 dots (scans)]
  (Inter-character dot 5 + Space between characters 1)
- Diameter of the rotary encoder pulley: 95.5mm

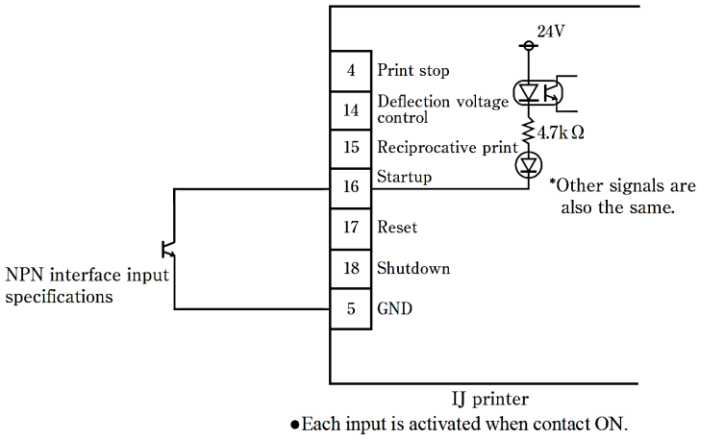
(1) Distance the conveyor moves per revolution of the rotary encoder:
95.5 mm x 3.14 = 300 mm/revolution
(2) Number of scans that must be performed while the conveyor is moving 1 mm:
6 scans/1.8 mm = 3.33 scans/mm
(3) Required number of output pulses from the rotary encoder (resolution):
300 mm/revolution x 3.33 scans/mm = 1,000 PPR

4.3.3. Input Function

You can control the IJ Printer by inputting print stop and remote operation (startup, stop, fault reset, and deflection voltage control) to the pin numbers 4 and 5 on the terminal block TB1 and the pin numbers 14 to 18 on the terminal block TB2 via an external switch or contact signal.

- Internal circuit diagram

(a) Input via the NPN interface (no-voltage input)



- No-contact (transistor)

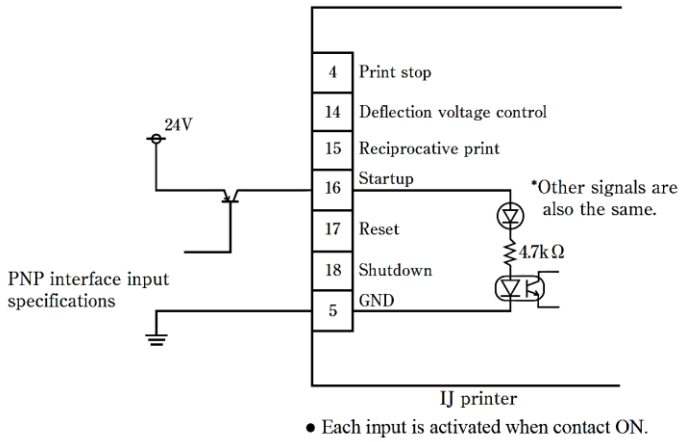
  Withstand voltage: 30 VDC or more
  Maximum drive current: 6 mA or more
  Residual voltage: 2 V or less
  Leakage current: 0.1 mA or less
  Drive method: Open collector

- Contact signal

  Use chattering of 2.0 ms or less to switch the contact on/off.

(b) Input via the PNP interface (voltage input)

- Impressed voltage 24 to 30 V

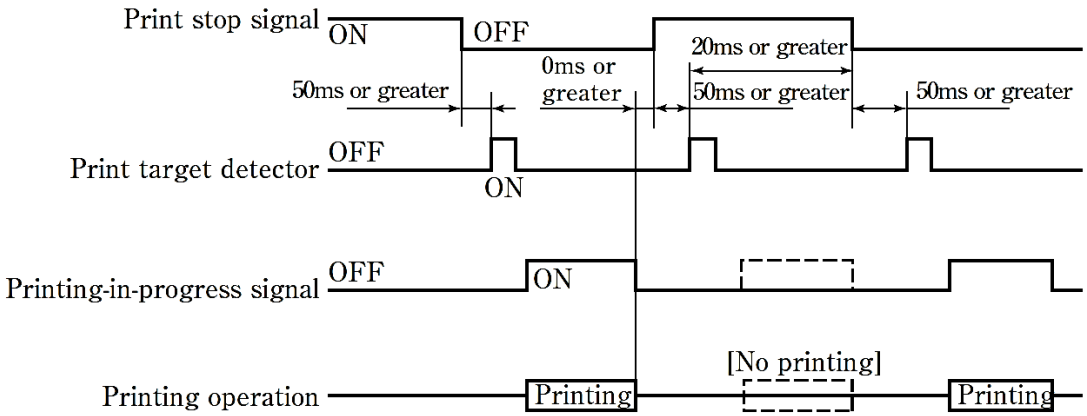


- No-contact (transistor)
  Withstand voltage: 30 VDC or more
  Maximum drive current: 6 mA or more
  Residual voltage: 2 V or less
  Leakage current: 0.1 mA or less
  Drive method: Open collector
- Contact signal
  Use chattering of 2.0 ms or less to switch the contact on/off.

4.3.3.1. Print Stop Signal

The print stop signal provides a function to prevent printing from the outside.
Note that the ready to print output signal does not change even when this signal is input from the outside.

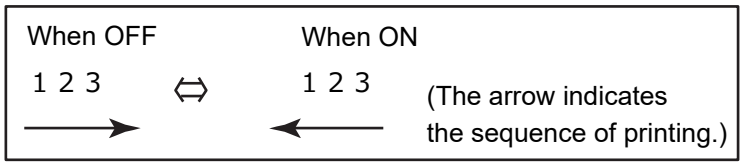
Input ON: The IJ Printer in the ready state does not print characters even if the print target detector is turned on. However, if printing is in progress in the IJ Printer, it cannot be interrupted.
Input OFF: The IJ Printer in the ready state prints characters even if the print target detector is turned on.

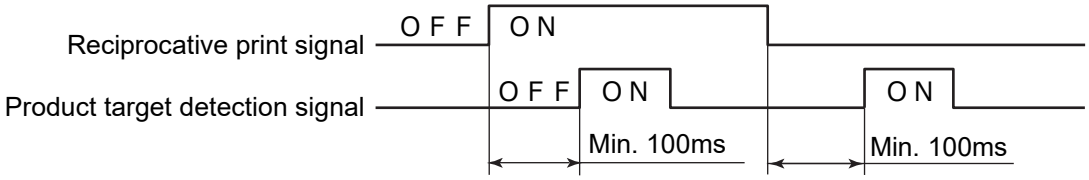


- The ON state indicates the low signal level and the OFF state the high signal level.
- The tracking function is unavailable. In tracking mode, the print stop signal cannot be used to specify the timing of print stop.
- When [Repeat print] is set, repeat printing operates according to the start print signal created inside the IJ Printer.

4.3.3.2. Reciprocative print signal

This function switches the order of the characters to be printed.
Input OFF : Forward direction
Input ON : Reverse direction
(Example)



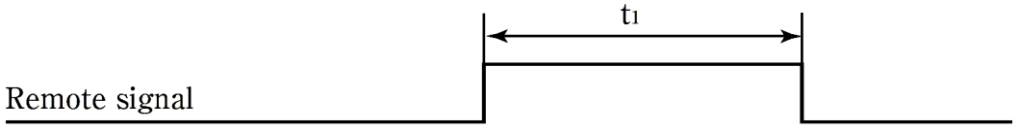


*When the user environment setup item "Change Character Orientation" was set to "Reverse direction printing", provide a minimum interval of 100ms up to input of the print target detector signal after changeover (ON→OFF, OFF→ON) of the reciprocative printing signal.
When the Change Character Orientation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

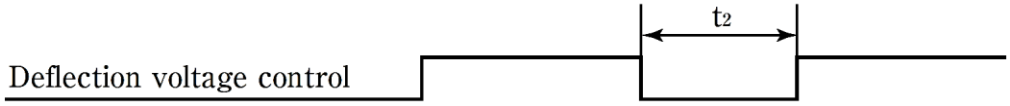
The remote operation signal provides a function to input the same operation as the operation keys ("Startup", "Shutdown", "Reset", "Deflection voltage control" (standby state and Ready to print state switching)) of the IJ Printer using an external switch or contact signal.

(1) Judgment condition
  (a) Remote signals in general
    (i) The ON time t1 of the remote signal shall be 100 ms or more.

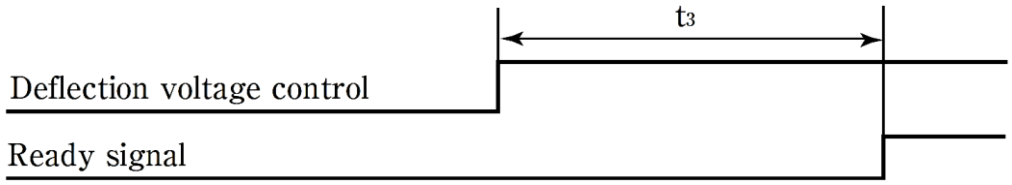


    (ii) Do not switch multiple remote signals on at the same time. If so, they will not be accepted.
    (iii) No signals can be accepted in the cases below.
      - When the [Confirm] window opens
      - When the [Circulation control] screen opens as a maintenance function
      - When [Touch screen calibration.] opens as an auxiliary function

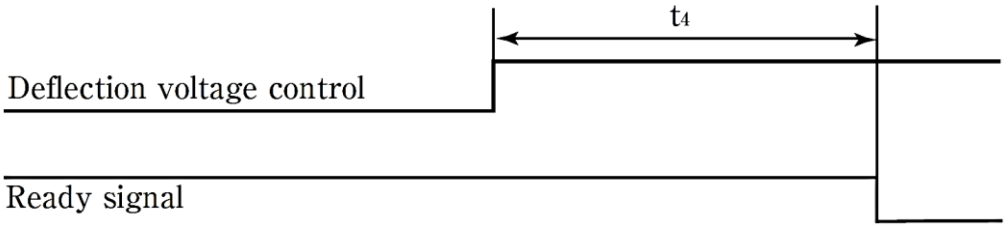
  (b) Deflection voltage control
    (i) When you input deflection voltage control continuously, a certain OFF period is required. If t2 is 10 ms or less, OFF cannot be detected and no signals are accepted.



(ii) The time t3 between the input of deflection voltage control and the change of the state is within three seconds.
(standby => ready)



t4 is within 100 ms. (ready => standby)



(iii) You need to check the state before switching deflection voltage control on.
If you switch deflection voltage control on during printing by mistake, the unit stops the printing halfway and switches from the ready state to the standby state even in the process of printing.
To prevent erroneous printing, input a signal when printing is not in progress.

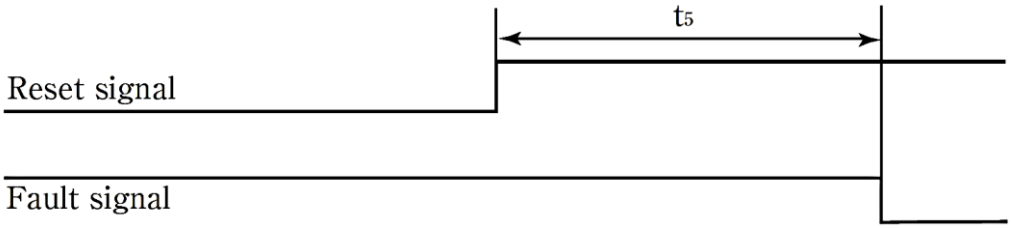
(iv) With the product speed matching used, you can change the print description at the time of transport stop in the process of printing by using this signal to temporarily change the unit to the standby state.

(c) Fault reset signal

(i) Input this signal when the fault signal is ON.
After the signal is input, check whether the fault is cleared.

(ii) Switch the fault reset signal ON after turn on the IJ Printer and the [HOME] screen appears.

(iii) The time t5 from when the fault reset signal is input until when the fault is cleared is within 100 ms.



(d) Startup signal

(i) The startup signal instructs the unit to automatically eject ink. Take care to handle this signal.

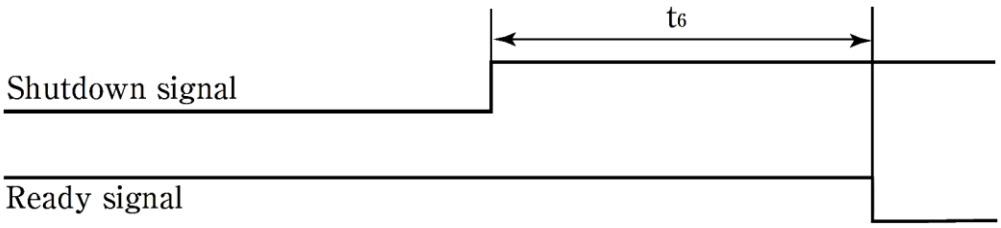
(ii) When the startup signal is switched on in the process of ink stop, it is ignored.

(iii) Wait at least 30 seconds after the power-on of the IJ Printer before switching the startup signal on. After checking whether the fault is cleared, input the signal.
It takes about two minutes from switch-on of the startup signal to entering the ready state.

(e) Stop signal

(i) After switching the stop signal on, check that the IJ Printer is in the stop state, and then turn the power off.
It takes about three minutes from switch-on of the stop signal to entering the stop state.

(ii) The time t6 between the input of the stop signal and the change of the state is within 100 ms.



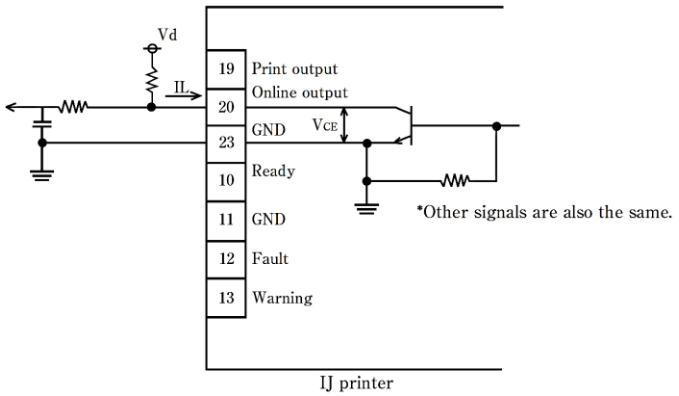
[Note]

- In the case of key input, you need to confirm the input instruction before the printer proceeds the operation. In the case of external signal input, however, it performs the operation instructed by the signal without asking for a confirmation. Take enough care to handle the startup signal that instructs ink ejection.
- While the [Confirm] window is displayed, the input of all remote operation signals is disabled. Close the window and then input the signal again.
- While the communication monitor screen is displayed, the input of all remote operation signals is disabled.
- If the conveyor stops in the process of printing with the rotary encoder used, remote operation signals are enabled.
- If a stop signal is input while a fault window is displayed, the window remains displayed and ink stops.

4.3.4. Output Function

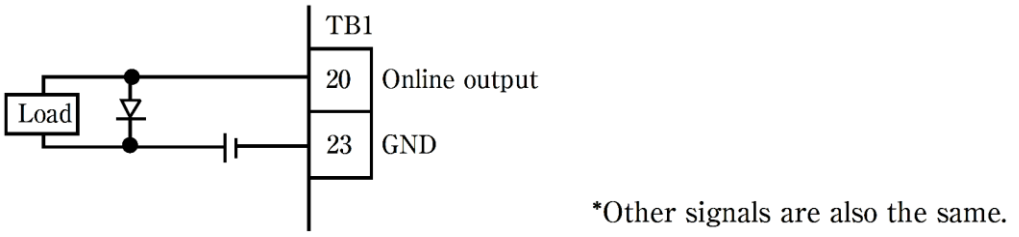
Monitor the states of the IJ Printer by connecting the print output (print-in-progress or print-complete), online output, ready, fault, and warning signals to the pin numbers 10 to 23 on the terminal blocks TB1 and TB2. Monitor the ready, fault, and warning output signals by connecting no-contact (transistor) output or contact (relay) output to the pin numbers 1 to 9 on the terminal block TB5 *TB5 is optional parts.

- Internal circuit diagram
  (a) Output via the NPN interface (no-voltage input)



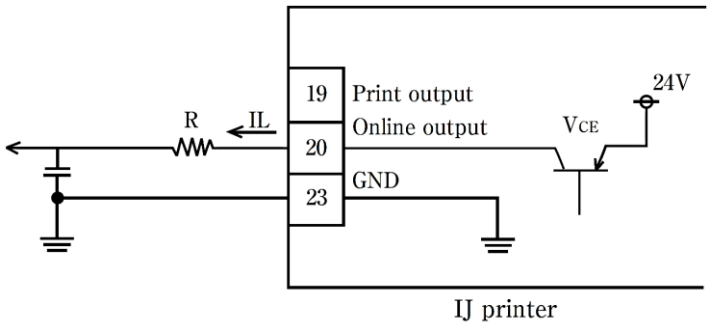
- The output transistor is an open collector and uses the logic to turn the transistor on at operation ON.
- In the external unit, use a voltage and current that meet the specifications below.
  – IL ≤ 20 mA (VCE: TYP0.6 V, MAX.2 V)
  – Vd ≤ 30 VDC

- Wiring precautions



- When a load is an inductive charge such as a relay or solenoid, connect a counter electromotive force diode in parallel with the load.
- The load circuit is for DC only. It is not used for AC load.

(b) Output via the PNP interface (voltage output)



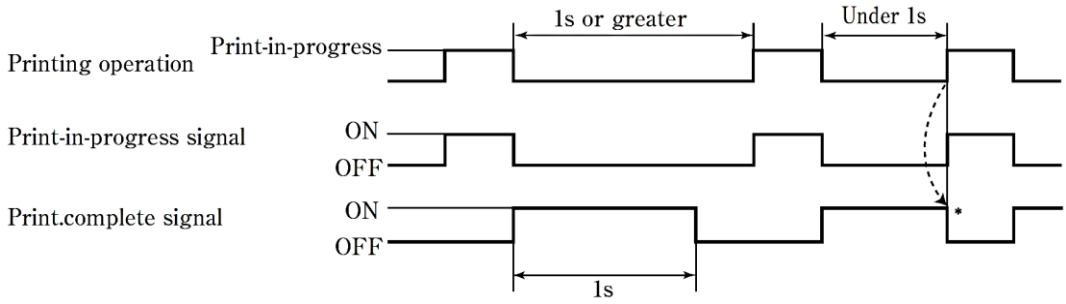
- The output transistor is an open collector and uses the logic to turn the transistor on (voltage output) at operation ON.
- In the external unit, use a voltage and current that meet the specifications below.
  – IL ≤ 10 mA (VCE: TYP0.6 V, MAX.2 V), Estimate for R, R ≥ 2.2 kΩ
  – Withstand voltage of 50 VDC or more (twice or more the voltage used)

4.3.4.1. Print Output Signal (Output via NPN/PNP Interfaces: Pin Number 19 on Terminal Block TB2)

The print output signal provides a function that outputs a signal to the outside when the IJ Printer is in the print-in-progress or print-complete state.

(1) Switching between print-in-progress and print-complete
Switch between the print-in-progress signal and print-complete signal on the [User environment setup] screen.
See "9.1. Setting User Environment" in the Instruction Manual.

(2) The timing of the signal is shown in the figure below.



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

Timing of print output signals

4.3.4.2. Online Output Signal (Output via NPN/PNP Interfaces: Pin Number 20 on Terminal Block TB2)

The online output signal provides a function that outputs a signal to the outside when the IJ Printer is online.

4.3.4.3. Ready Output (Output via NPN/PNP Interfaces: Pin Number 10 on Terminal Block TB1, Relay Output: Pin Numbers 1 to 3 on Terminal Block TB5 *TB5 IS OPTIONAL PARTS.)

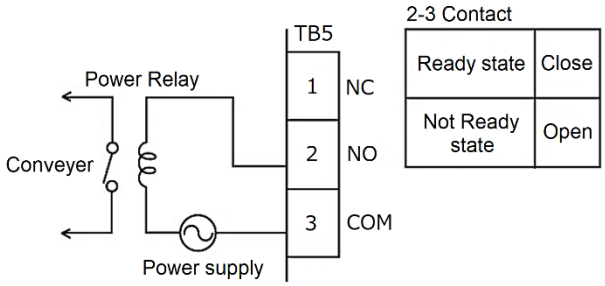
The ready output provides a function that outputs a signal to the outside indicating that the IJ Printer is in the ready state.

This function is used to stop the conveyor when printing cannot be performed in the IJ Printer, in order to prevent the products that are not printed from being transported.

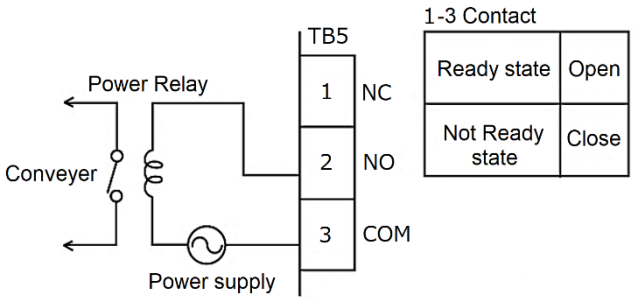
To connect this signal to relay output, set the ready output switch to "1". See "(3) Handling the ready output selector".

[When the signal is connected to relay output]

(1) When NO (contact a) is used

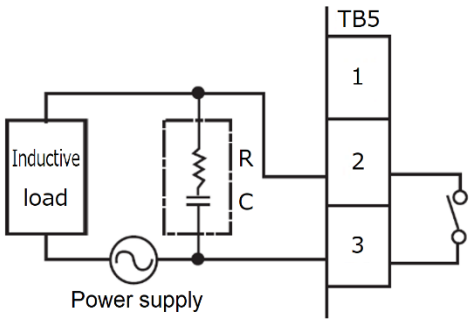


(2) When NC (contact b) is used



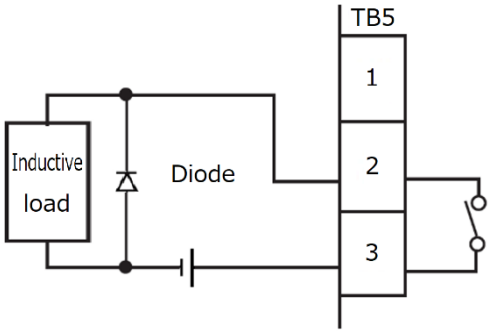
Each of NO and NC contacts supports a capacity of up to 30 VAC/0.5 A or 30 VDC/1 A. For the use of the unit under a load larger than the capacity, interpose another relay in the connection.
When the load is an inductive load such as a motor or a relay, counter electromotive force may be generated, which may shorten the life of the contact. Be sure to protect the contact.
Typical contact protection methods are described below.

(a) CR method (applied to AC and DC)



The estimated values of the capacitor C and the resistance R are listed below.
– C: 0.5 to 1 μF, no polarity
– R: 0.5 to 1 Ω for 1 V
– For both C and R, use devices that have a withstand voltage at least twice the voltage used.

(b) Diode method (applied to DC, not applied to AC)

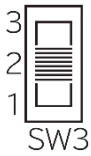
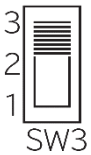


Use a diode that has a reverse withstand voltage 10 times or more the voltage used and a forward current more than the load current.

(3) Handling the ready output selector

The ready output selector (SW3) on the EZJ149 board enables or disables the output of the ready output signal. (* EZJ149 board is optional parts)

Switch settings and opening/closing between terminals

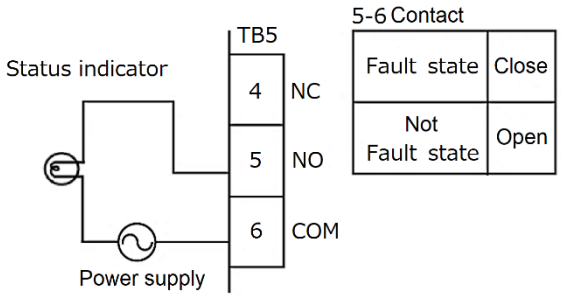
<table>
<tr><th>Switch setting</th><th colspan="2">Ready output state</th></tr>
<tr><td> 
</td><td>The ready output signal is enabled in this setting.
The open and close states between the TB5 terminals are switched according to the ready/not-ready state of the IJ Printer.</td><td>
<table>
<tr><th></th><th colspan="2">Ready state</th><th colspan="2">Not-ready state</th></tr>
<tr><td rowspan="2">TB5</td><td>Contact between terminals 1 and 3</td><td>Open</td><td>Contact between terminals 1 and 3</td><td>Close</td></tr>
<tr><td>Contact between terminals 2 and 3</td><td>Close</td><td>Contact between terminals 2 and 3</td><td>Open</td></tr>
</table>
</td></tr>
<tr><td> 
</td><td>The ready output signal is disabled when NC (contact b) is used.
As listed in the table on the right, the state between the TB5 terminals is open regardless of the ready/not-ready state of the IJ Printer.</td><td>
<table>
<tr><th></th><th colspan="2">Ready state</th><th colspan="2">Not-ready state</th></tr>
<tr><td>TB5</td><td>Contact between terminals 1 and 3</td><td>Open</td><td>Contact between terminals 1 and 3</td><td>Open</td></tr>
</table>
</td></tr>
<tr><td> 
</td><td>The ready output signal is disabled when NO (contact a) is used.
As listed in the table on the right, the state between the TB5 terminals 1 and 3 is open and the state between the terminals 2 and 3 is close, regardless of the ready/not-ready state of the IJ Printer.</td><td>
<table>
<tr><th></th><th colspan="2">Ready state</th><th colspan="2">Not-ready state</th></tr>
<tr><td>TB5</td><td>Contact between terminals 2 and 3</td><td>Open</td><td>Contact between terminals 2 and 3</td><td>Close</td></tr>
</table>
</td></tr>
</table>

4.3.4.4. Fault Signal Output (Output via NPN Interface: Pin Number 12 on Terminal Block TB1, Relay Output: Pin Numbers 4 to 6 on Terminal Block TB5 *TB5 IS OPTIONAL PARTS.)

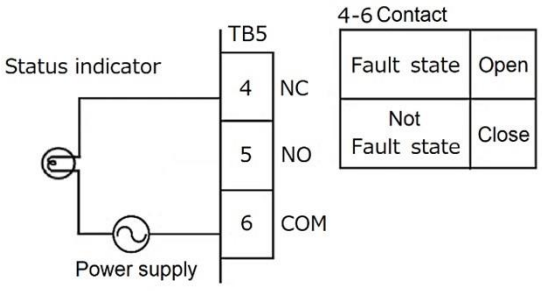
The fault signal output provides a function that outputs a signal to the outside indicating that the IJ Printer is in fault mode.

[When the signal is connected to relay output]

(1) When NO (contact a) is used



(2) When NC (contact b) is used

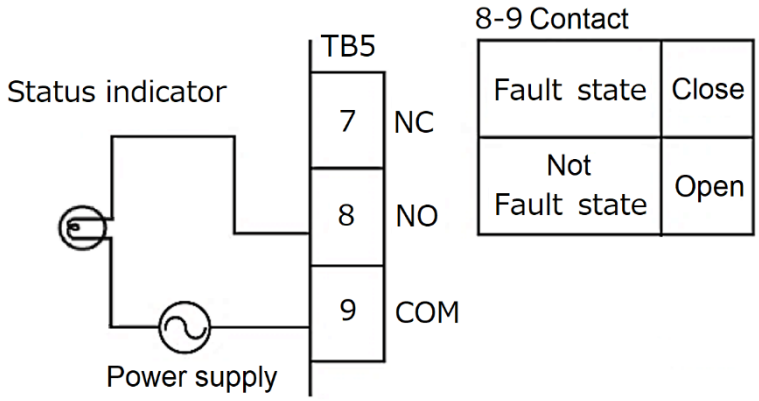


4.3.4.5. Warning Signal Output (Output via NPN Interface: Pin Number 13 on Terminal Block TB1, Relay Output: Pin Numbers 7 to 9 on Terminal Block TB5 *TB5 IS OPTIONAL PARTS.)

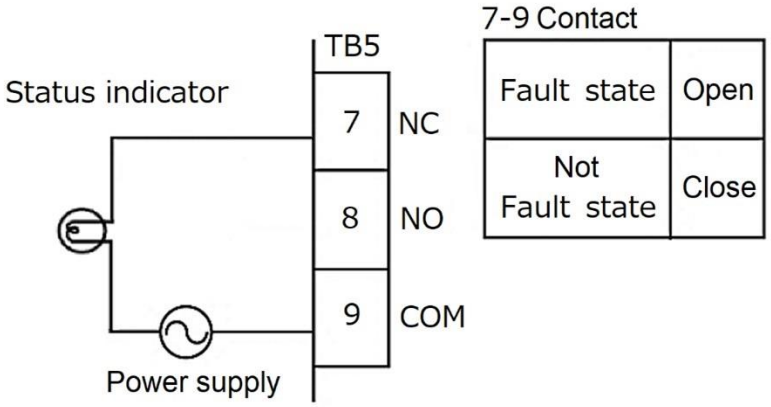
The warning signal output provides a function that outputs a signal to the outside indicating that the IJ Printer is in warning mode.

[When the signal is connected to relay output]

(1) When NO (contact a) is used



(2) When NC (contact b) is used



For warning and fault output, each of NO and NC contacts supports a capacity of up to 100 VAC/0.5 A or 30 VDC/1 A. For the use of the unit under a load larger than the capacity, interpose another relay in the connection.

When the load is an inductive load such as a motor or a relay, counter electromotive force may be generated, which may shorten the life of the contact. Be sure to protect the contact according to the wiring of ready output signal.

4.3.5 Product speed matching function without a rotary encoder

4.3.5-1 Auto product speed matching function

Auto product speed matching function is used for detecting the change of speed of the conveyer carrying print target using the print target detector connected to the IJ printer, and prints each vertical line of the print according to the change of speed in the same way as the Speed matching function using a rotary encoder. Ensure to confirm the print start position and check for the slip of the print target by thoroughly testing before using this function. If the print start position or the character width of print vary widely as a result of the test, use the Speed matching function using a rotary encoder.

Cases that the speed can not be matched

No.	Conditions of use
1	In case the print target slips on the conveyer between after the print target passes the print target detector and before IJ printer complete printing.
2	In case the carrying speed changes or the conveyer stops between after the print target passes the print target detector and before IJ printer complete printing.

4.3.5-2 Print target detector

- Use a no-contact (transistor) output type print target detector with a photoelectric sensor with built-in amplifier which detects the target using the optical beam.
- To start the print from the edge of the print target, place the print target detector so that the "Distance between the print head and print target detector" is larger in width than print target.

4.3.5-3 IJ Printer setup

- Configure the setting for "Product speed matching", "Print target width", and "Actual print width" on "Print Specifications" screen. (See Chapter 5.7 "Set the print specifications" in the Instruction Manual)
- Set "Auto" for "Product speed matching".
- Enter "Print Target width" and "Actual Print width" in mm.
  The value for "Actual Print width" must be smaller than "Print Target width".
- "Enable" the "Speed compensation" as required.

CAUTION

- When "Speed compensation" is enabled, the print start position is delayed 2 scans because calculation is performed to reduce the change of the print start position.
- The position accuracy of the print start position may be worse than the product speed matching function using a rotary encoder, because calculation is performed by sensing the print target detector.

- When "Sensor filter" in "Print Specification" is set to "print completion", it will be automatically corrected to "time setting". In addition, the time setting value should be set to the time when the sensor filter function terminates before the printing material sensor passes through the printing object.
- Because it cannot be used at the same time as the repeat print of "Printing specification", it is automatically set to disable of repeat print.

● The Character width on the "Print specifications" is automatically set as below depending on the Ink drop use.

Character width set value

Large
↕
Small

Ink drop use	[Character width] setting value
1/1	002
1/2	001
1/3 to 1/16	000

4.3.5-4 Carrying speed

● Set the minimum speed the target print is carried by conveyer to 1m/min.

● If the carrying speed the IJ printer detects is faster than the speed of when the printed without Speed matching, print is made with the same interval as when the Speed matching function is not used. (At the time speed exceeds the limit speed in the condition)

● If "Print Target width" or "Actual Print width" on the "Print specifications" is not entered, the print is made with the same interval as when the Speed matching function is not used.

4.4. I/O signal confirmation(Switch Output signal)

This section describes how to check the I/O signal confirmation(Switch Output signal).

(1) Overview

●The connection status of input/output (I/O) signals between the terminal block for external connection and external devices can be checked.
It is also possible to check wiring and connections in the event of trouble.

① 「I/O signal confirmation」

・ON/OFF status of I/O signal can be checked on the screen.

② 「Switch Output signal」

・Output signals can be switched ON/OFF on the screen to check the connection status.

Signal name to be covered

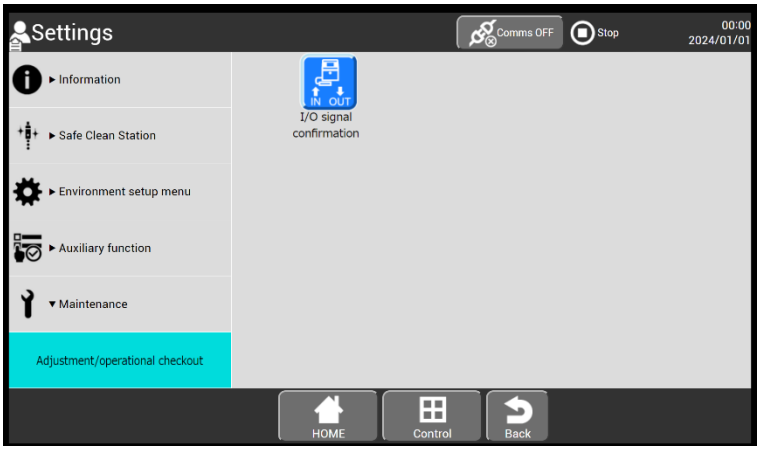
No.	Input signal
1	Print target detector
2	Encode
3	Print stop
4	Reciprocative print
5	Run
6	Stop
7	Deflection voltage ON/OFF
8	Reset

No.	Output signal
1	Ready
2	Fault
3	Warnning
4	Print-in progress Print-complete
5	Online
6	Universal1
7	Universal2

(2) How to operate I/O signal confirmation

■ Adjustment/operational checkout appears on the [Settings(Maintenance)] screen.

The list of adjustment/operational checkout is displayed.



■ Press I/O signal confirmation in the list of Adjustment/Operation checkout.

I/O signal confirmation screen is displayed.

(3) I/O signal confirmation Display specifications

●When ON is detected as an I/O signal, ON is displayed.
●When ON is detected as an I/O signal, OFF is displayed.
●When the signal changes, the screen display changes every second.
●Signals that change ON⇔OFF many times within 1 second are changed ON⇔OFF every second.
●Since the encoder refers to the signal status in 10 ms cycles, if the pulse cycle of the encoder signal matches the 10 ms cycle, there is no ON⇔OFF change on the screen.
●Remote operation ("Startup", "Shutdown", "Deflection voltage control") is disabled on the I/O signal confirmation screen.

(4) Switching output signal Operation method

●Switching output signal cannot be performed during eject ink.
Make sure the ink is stopped before performing the function.

Execution judgment by IJP status

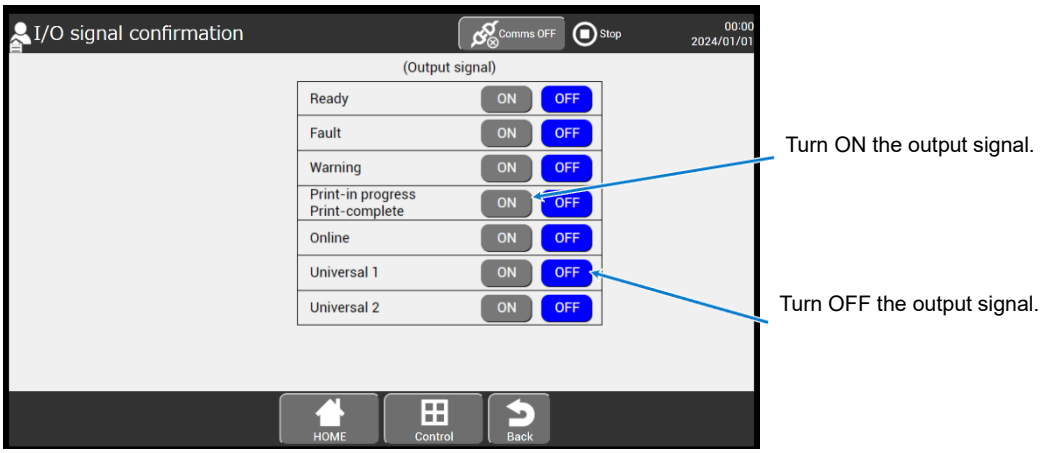
	I/O signal confirmation	Switching output signal
Stop	○	○
Standby	○	×
Ready	○	×
Starting	×	×
Drop adjust	○	×
Ink heating	×	×
Cover open	○	×
Stopping	×	×
Service	×	×
Fault (stop)	○	○
Fault (Eject ink)	×	×

■ Press I/O signal confirmation in the list of Adjustment/Operation checkout.

I/O signal confirmation screen is displayed.

■ Press Switching output signal in the I/O signal confirmation.

Switching output signal screen is displayed.



■ To output signal ON, press ON.

To output signal OFF, press OFF.

(5) Switching output signal Operation method

- ●At the end of the function (Back, Home), the output signal state is returned to the original state.
- ●When an error/alarm occurs during screen display, it switches to the ON button selection state.
  - ●If all errors/alarms are cleared while the screen is displayed, it switches to the OFF button selection state.

5. Work and Adjustment in Circulation System

This chapter describes circulation control, how to replace ink, and how to correct stream bending and nozzle clogging for the unit.

Ink and makeup handling

⚠ WARNING

- When handling ink or makeup, such as replenishment or replacement, 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. This is because vapors of ink or makeup will stay inside the product and may catch on or cause a fire.
  If you find it hard to wipe the printer with the power on, stop it with the maintenance cover open. Power it down and then wipe it off again.
- If you need to clean the casing of the product with wiping paper soaked with makeup, be sure to do so when the power is off.
  Attempting to clean it with the power on will cause makeup or vapors of makeup to enter the product, possibly catching on or causing a fire.
  When the cleaning is finished, 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 product while the product is running or being maintained, wipe it off promptly with wiping paper or something similar. Then, with the maintenance cover open, stop the product, power it down, and repair the leak.
  Otherwise, contact your nearest local distributor.
  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.
- Ink and makeup, their waste solution, used wiping paper and empty containers are flammable. Make sure that these waste disposals are kept away from a flame or arc.

⚠ CAUTION

- When cleaning the product or replenishing 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.
- When transferring the ink or makeup to or from a bottle, exercise caution to prevent it from coming into contact with the product or surrounding articles. If there is any spillage, immediately wipe it to clean using a cloth moistened with makeup.

5.1. Operation and Details on Circulation Control Screen

This section describes operation and details on the [Circulation control] screen.

5.1.1. Operation on Circulation Control Screen

This section describes how to operate the [Circulation control] screen.

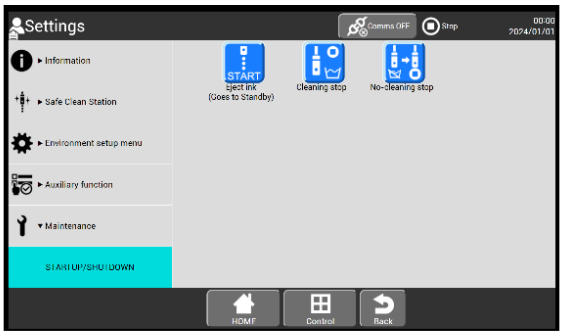
1 Press Settings on the [HOME] screen.

[HOME] screen (selecting [Settings])

2 Circulation control appears on the [Settings(Maintenance)] screen.

[Settings(Maintenance)] screen (selecting Circulation control)

The page layout of the Circulation control is shown below.



[STARTUP/SHUTDOWN] screen

[Ink circulation] screen

[Equipment Maintenance] screen

[Process prior to long-term shutdown] screen

3 When you select the function you want to perform, the operation guidance is displayed.

- Follow the operation guidance to perform the operation.
- If you want to abort the operation, press Abort.

5.1.2. Details of Circulation Control

This section describes the names and details of circulation control.

- During the [Main Ink Tank Too Full] fault, input from any key is not accepted. See "5.12. Ink Disposal through Drain Tube from Main Ink Tank" to clear the fault, and then proceed with the operation.
- Acceptable states depend on details of circulation control. Note that you cannot perform operation in the states that are not listed in the table below.

List of circulation control states

Circulation control name	Description	Acceptable state
Eject ink (Goes to Standby)	Used for startup during maintenance (ink ejection only, not the ready state).	Stop
Cleaning stop	A normal stop process. The nozzle is automatically cleaned, and the unit is stopped.	Ready or standby
No-cleaning stop	A stop process used to temporarily stop the IJ Printer. The nozzle is not automatically cleaned.	Ready or standby
Nozzle backwash	Suctions makeup from the nozzle to clean it. The makeup is applied to the end of the nozzle (nozzle orifice surface) from the cleaning bottle.	Stop
Gutter cleaning	Suctions makeup from the gutter to clean the recovery route. The makeup is applied to the end of the gutter from the cleaning bottle.	Stop
Ink replacement	Used to replace the ink in the unit with new one. The process from ink disposal to ink refill is consistently performed.	Stop
Ink filter replacement	Used to replace the ink filter. The process from ink disposal to ink refill is consistently performed.	Stop
Ink circulation	Used to vent the air in the circulation route and equalize the ink in the flow line. This process can be performed even during ink ejection. After it is completed, the unit enters the ink ejection (standby) state.	Standby
Process prior to long-term shutdown (ink disposal and cleaning)	Used to perform the process prior to long-term shutdown of the unit.	Stop
Process after long-term shutdown	Used to start the unit in the process after long-term shutdown.	Stop
Makeup refill	Used to refill the cleaning path with makeup when installing the unit.	Stop
InkDrainage (except for the ink reservoir)	Used to dispose of the ink in the main ink tank and path.	Stop
Ink refill	Used to refill the unit with ink. The amount of ink in the main ink tank is set to the initial level. After it is completed, the unit enters the ink ejection (standby) state.	Stop
Pressure relief	Relieves the pressure in the entire circulation path (used for maintenance).	Stop
Ink stream alignment	Used to adjust the ink stream position. Makeup is ejected from the nozzle.	Stop

(Continue to next page)

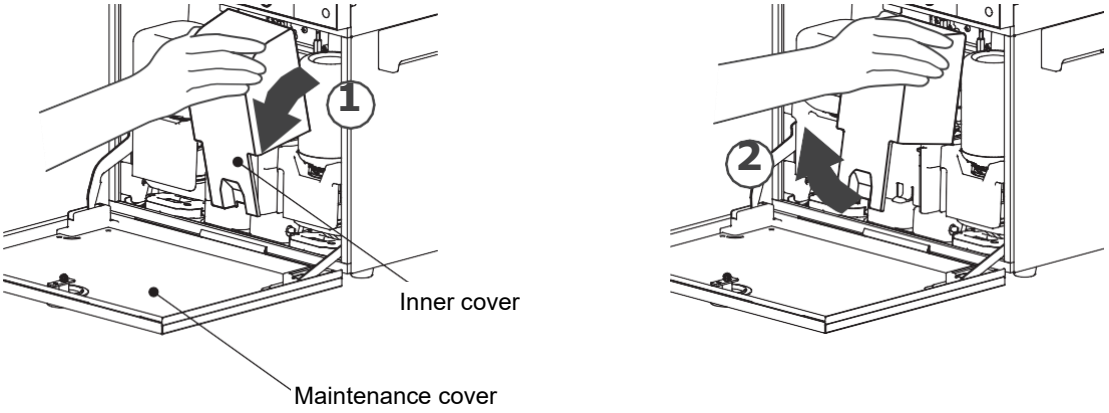
List of circulation control states (continued)

Circulation control name	Description	Acceptable state
Usage time management	Used to manage the usage time of circulation system parts. It is used to check the consumption of ink and makeup.	All states
Circulation system environment setup	Used to select [Ink concentration control] and [High temperature print control].	Stop
All Ink Drainage	Used to dispose of the ink in the ink cartridge, ink reservoir, main ink tank, and route.	Stop
Reservoir Ink Drainage	Used to dispose of the ink in the ink cartridge and ink reservoir.	Stop
Reservoir Makeup Drainage	Used to dispose of the ink in the makeup cartridge, makeup reservoir, main ink tank, and route.	Stop

5.2. Removing Inner Cover

This section describes how to remove the inner cover.

(1) Open the maintenance cover.
(2) With the inner cover tilted in the direction indicated by 1, pull up the cover in the direction indicated by 2 to remove it.
(3) Install it in the reverse order.



Procedure for removing inner cover

5.3. Replacing Ink

This section describes the procedure for replacing ink.

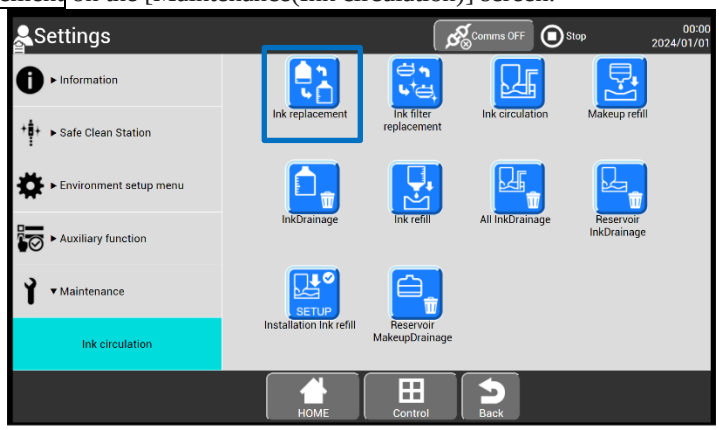
(1) Overview

- Perform this procedure to replace old ink with new one.
- The process involving ink disposal, ink replacement, and ink refill is consistently performed.
- You cannot perform the procedure during ink ejection. Switch the unit to the stop state before performing it.

  (
  - Filter replacement at the time of ink replacement prevents waste of ink.
  - To perform only ink disposal or ink refill, select each function on the [Maintenance(Ink circulation)] screen.
)

(2) Operation procedure

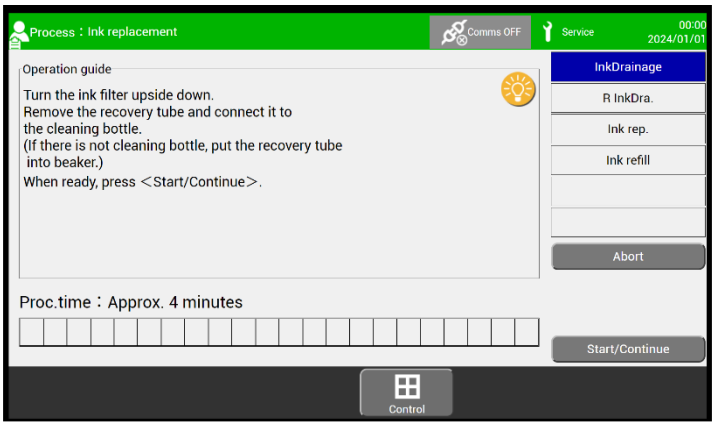
1 Press Ink replacement on the [Maintenance(Ink circulation)] screen.



[Maintenance(Ink circulation)] screen (selecting [Ink replacement])

2 Dispose of ink in accordance with the operation guidance on the screen.

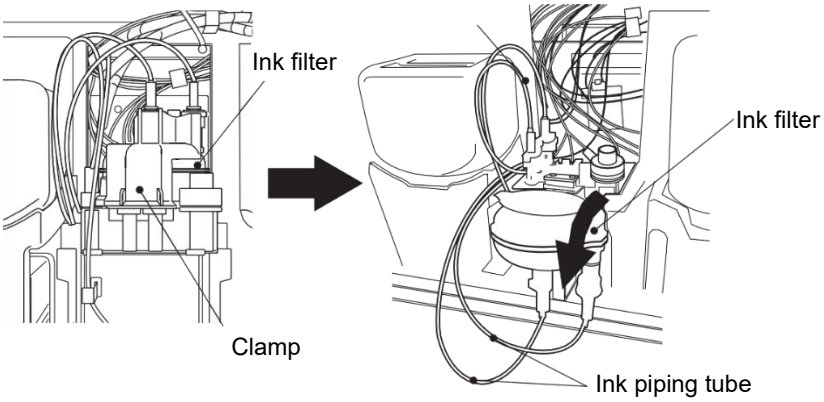
- To abort the ink disposal, press Abort.
- When the abort process has been performed, start with 1 again.



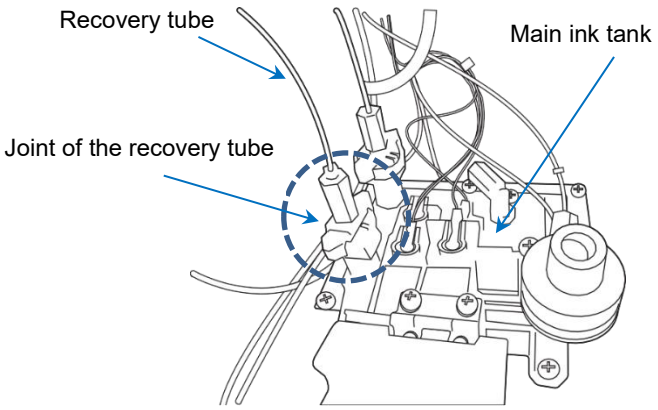
[Ink replacement] screen ([InkDrainage])

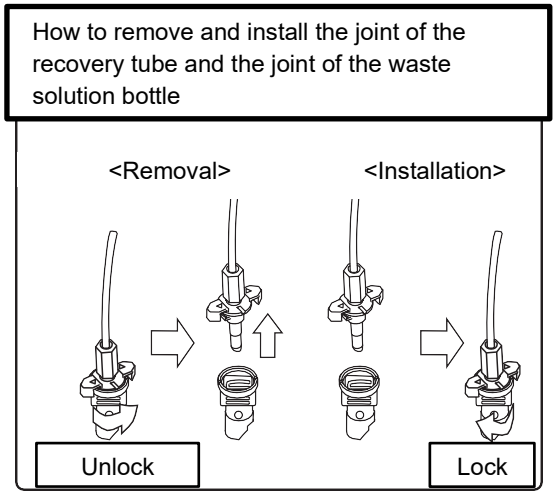
(a) Flip the ink filter vertically. Remove the recovery tube and connect it to the waste solution bottle.

- Open the maintenance cover and remove the inner cover.
- Tilt the clamp forward and flip the ink filter vertically.



- Remove the joint of the recovery tube connected to the main ink tank.



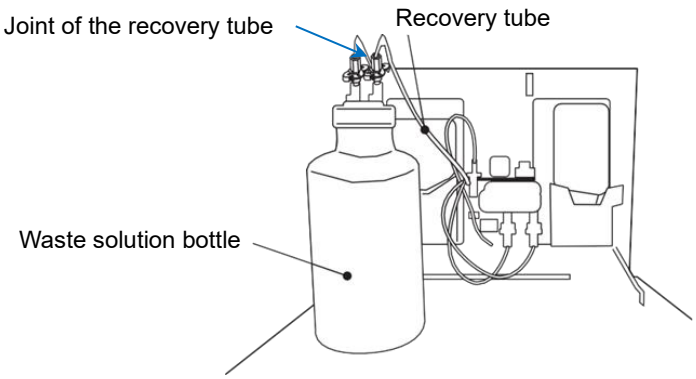


[When the waste solution bottle is used]

NOTE

- In disposing of ink, the pressure of the ink from the recovery tube may cause the waste solution bottle to fall over. During ink disposal, prevent the ink from spilling by holding the waste solution bottle with your hands.
- Dispose of the ink from the waste solution bottle and wash the bottle with makeup after use. If the bottle is left uncleaned, the ink may clog and the pressure in the recovery line may rise abnormally at the next use.
- Do not store the waste solution bottle with ink contained for a long period of time.
- Do not store the waste solution bottle at a place subject to high temperatures.
- Be careful not to spill ink when removing the joint of the waste solution bottle.

- To replace the ink filter using the waste solution bottle, connect the joint of the recovery tube to the supplied waste solution bottle as shown in the figure below.

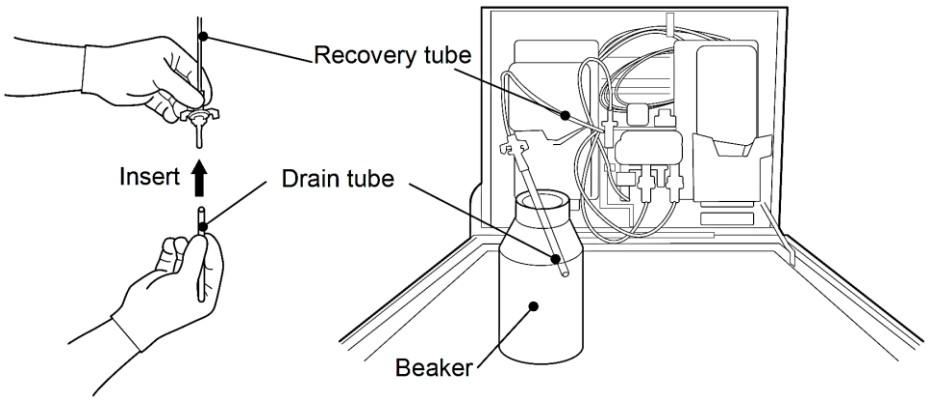


[When the waste solution bottle is not used]

NOTE

- In disposing of ink, the recovery tube may pulsate due to the pressure of the ink from the tube. During ink disposal, prevent the ink from spilling by holding a prepared container and the recovery tube with your hands.
- Wash the waste tube with makeup after use. If the bottle is left uncleaned, the ink may clog and the pressure in the recovery line may rise abnormally at the next use.
- If you do not have a waste solution bottle, use a container with a capacity of 1.5 L or more to prevent ink from overflowing. Use a container made of a solvent resistant material (examples: polypropylene, polyethylene, fluorine resin, glass, and stainless steel).
- If you spill any ink 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.

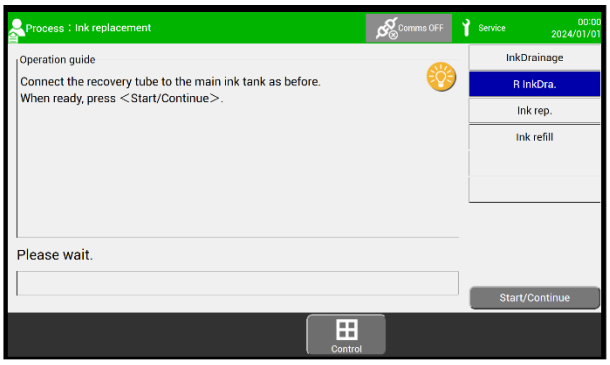
- To replace the ink filter without the waste solution bottle, insert the supplied waste tube into the end of the joint of the recovery tube and put it into a container with a capacity of 1.5 L or more, as shown below.



(b) Press OK.
The ink circulating inside the unit is disposed of from the recovery tube to the waste solution bottle or container.
[Note]
To abort the ink disposal, press Abort.

(c) After the disposal of the ink circulating inside the unit, dispose of the ink in the ink reservoir.

- If you do not dispose of the ink in the ink reservoir, press Abort and go to (d).

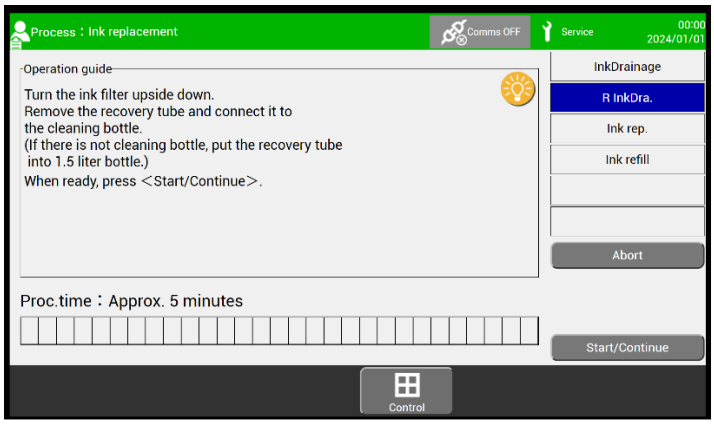


[Ink replacement] screen ([R InkDra.])

After the completion of the ink disposal, put the recovery tube back to its original position according to the displayed operation guidance, and then press OK. You are returned to the [Maintenance(Ink circulation)] screen.

- When the abort process has been performed, start with 1 again.
- Remember to put the recovery tube back to its original position after the abort process.

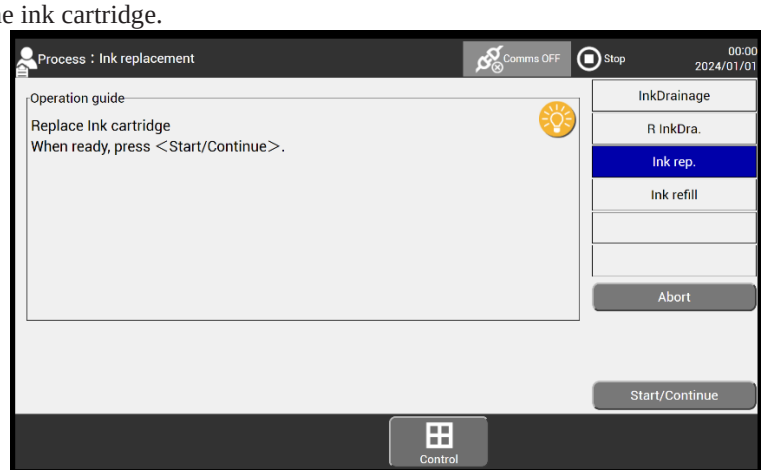
(d) Connect the recovery tube to the main ink tank according to the guidance after the elapse of a predetermined amount of time.



[Ink replacement] screen (connecting recovery tube)

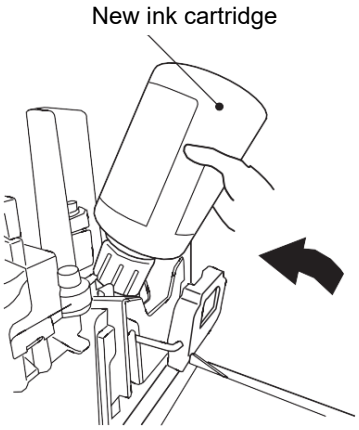
- Clean the connection part of the end of the recovery tube with makeup, and then connect it back to its original position.
- To prevent the recovery tube from bending, do not intersect it with other tubes.

3 Replace the ink cartridge.



[Ink replacement] screen ([Ink rep.])

(a) Place a new ink cartridge bottle in the ink reservoir.

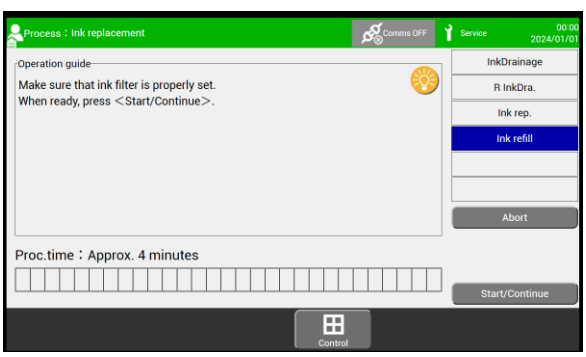


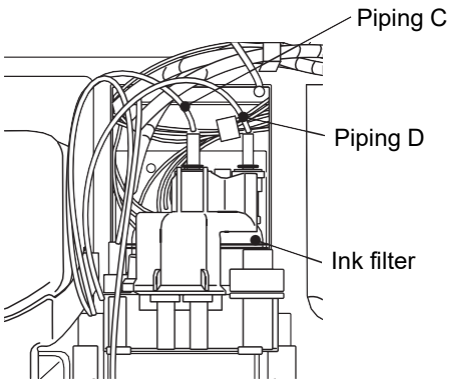
NOTE

- If you spill any ink 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.

(b) Put the vertically flipped ink filter back to its original position in accordance with the guidance.

- Confirm that the ink filter is placed as shown in the figure below.
  (The piping D is on the right side.)

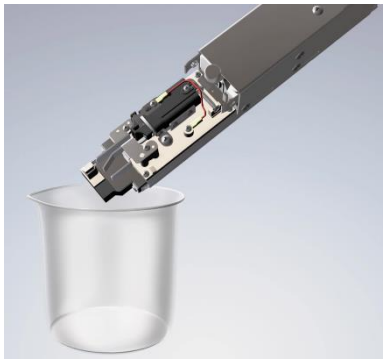




[Ink filter replacement] screen

(c) Put the inner cover back to its original position. (See “5.2. Removing Inner Cover".)

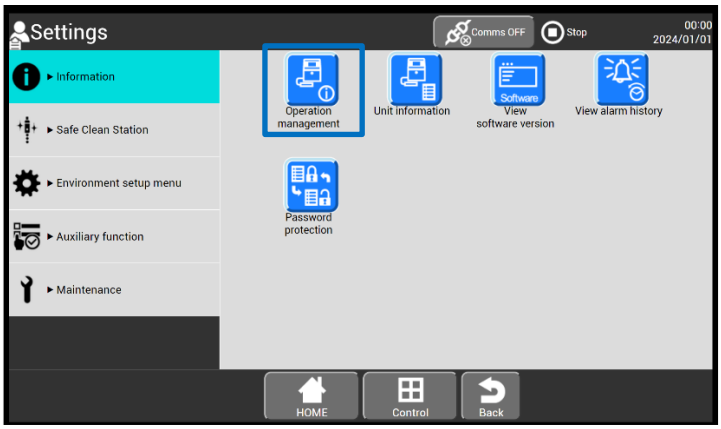
(d) Remove the print head cover and put the end of the print head in the beaker to be ready for ink ejection.



(e) Press OK. After refilled, the ink is ejected from the nozzle inside the print head.

- The ink is ejected from the nozzle after a while. Check the ink stream position.
- To abort the ink ejection, press Abort and follow the displayed operation guidance. After the completion of the abort process, you are returned to the [Circulation control] screen. When the abort process has been performed, select [Ink refill] on the [Circulation control] screen.

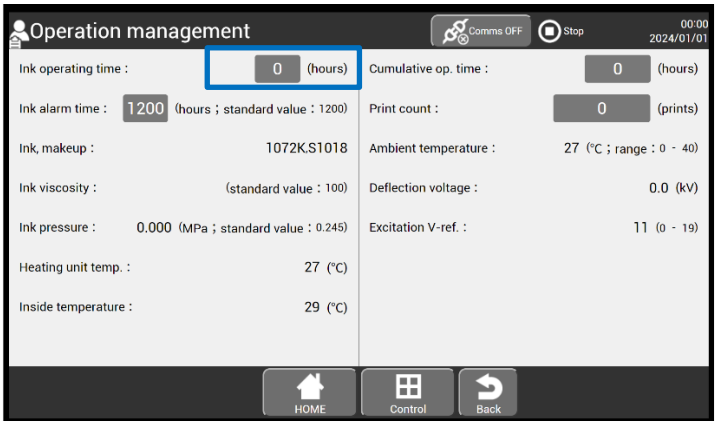
4 Press [Operation management] on the [Settings(Information)] screen.



[Settings(Information)]screen (selecting [Operation management])

The [Operation management] screen appears.

Set 0 as a value setting item in [Ink operating time].



[Operation management] screen (Settings [Ink operating time])

This completes the procedure for replacing ink.

5.4. How to Correct Stream Bending and Nozzle Clogging

This section describes how to correct stream bending and nozzle clogging for the unit.

⚠ WARNING

- Wear protective gear (goggles and mask) when operating.
- If any ink or makeup enters your eyes or mouth, immediately flush with warm or cold water and consult a physician.
- Before ejecting the ink, make sure that there is no one in the ejection direction. (Operate with the end of the print head inserted in a beaker, etc.)

Two methods used to correct these problems are as follows:

- Nozzle backwash
- Disassembly and cleaning of the nozzle orifice

Each of the methods is described below in detail.

5.4.1. Nozzle Backwash

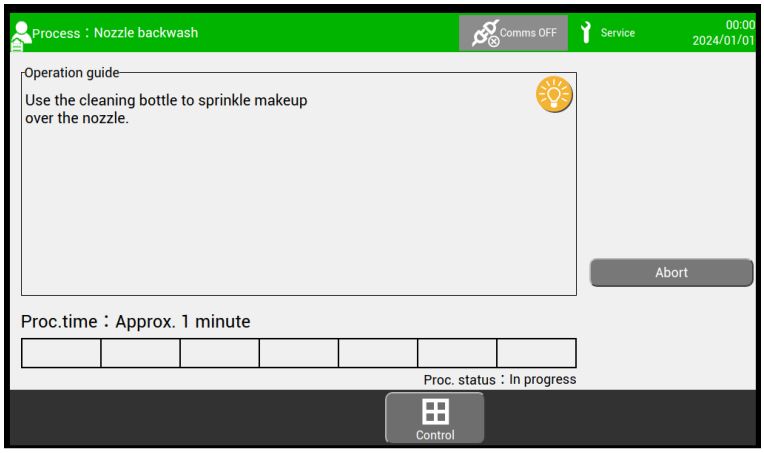
The nozzle backwash method sucks makeup from the nozzle to remove attached foreign objects. The operation procedure is described below.

- To prevent the ink viscosity in the main ink tank from decreasing, limit the number of times that consecutive nozzle backwash is performed to a maximum of three.
- You cannot perform this operation during ink ejection. Switch the unit to the stop state and then perform the operation.

1 Prepare the cleaning bottle and beaker containing makeup, and remove the print head cover.

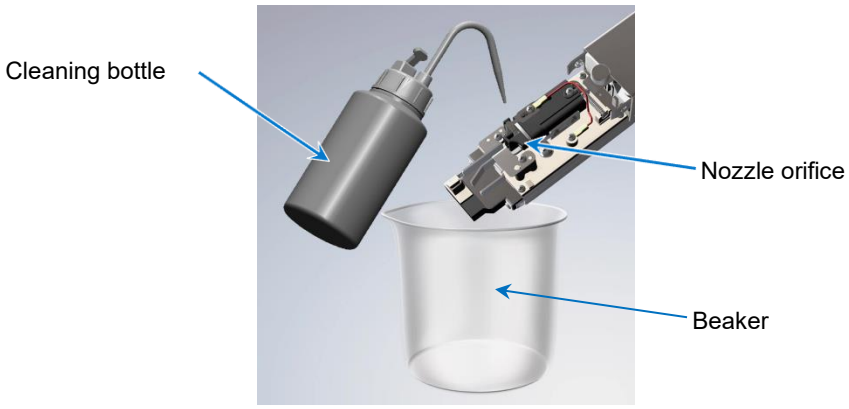
2 Press Nozzle backwash on the [Settings(Equipment Maintenance)] screen.
Upon pressing it, nozzle backwash (suction from the nozzle orifice) starts.

[Settings(Equipment Maintenance)]screen (selecting [Nozzle backwash])



[Nozzle backwash] screen

3 The makeup is suctioned from the nozzle orifice. Therefore, pour the makeup from the cleaning bottle into the nozzle orifice to clean it as shown in the figure below.



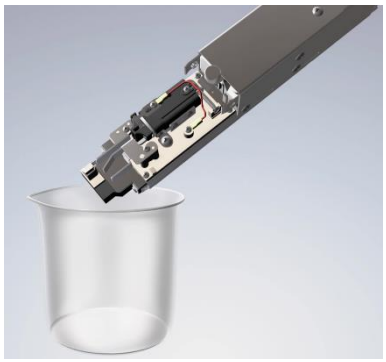
4 The nozzle backwash takes about one minute. When the nozzle backwash completes or when you press Abort, you are returned to the [Settings(Equipment Maintenance)] screen.

5 Confirm that the ink stream bending or nozzle clogging has been corrected. Move to the [Setting(Equipment Maintenance)] screen and press Ink stream alignment.

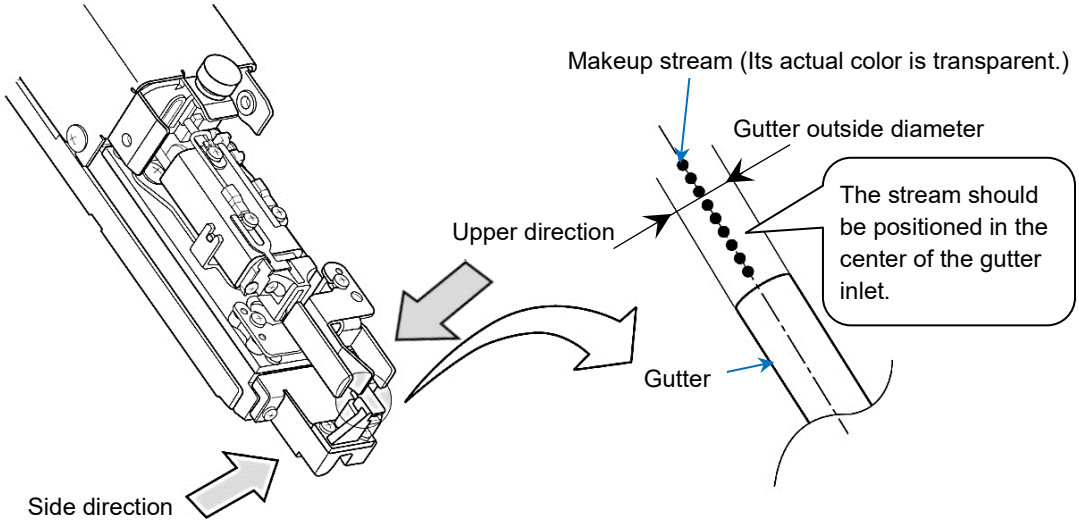
[Setting(Equipment Maintenance)]screen (selecting [Ink stream alignment])

The [Ink stream alignment] screen appears.

6 Remove the print head cover and put the end of the print head in the beaker to be ready for makeup ejection.



7 Press OK, and the makeup stream is ejected from the nozzle orifice.
Check the makeup stream position from the upper and side directions of the print head as shown in the figure below.



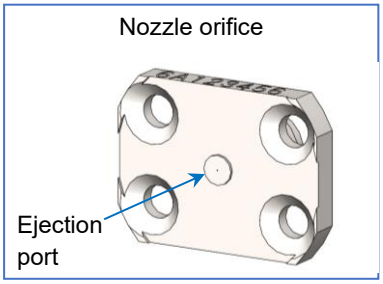
If the stream is not in the center of the gutter, perform the nozzle backwash again.
If the problem is not corrected even after the nozzle backwash is performed three times, see "5.4.2. Disassembly and Cleaning of Nozzle Orifice".

8 After checking the makeup stream position, press Abort to stop the makeup ejection.

5.4.2. Disassembly and Cleaning of Nozzle Orifice

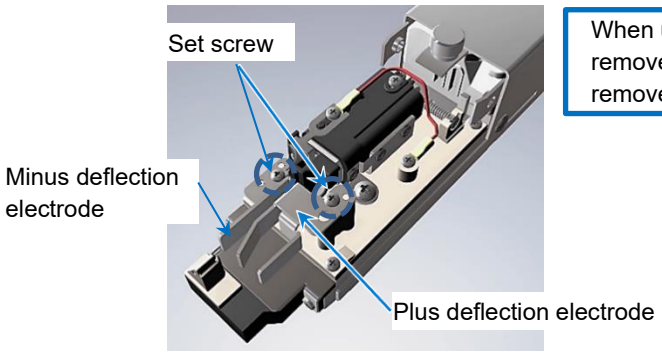
Disassembly and cleaning of the nozzle orifice is performed if stream bending or nozzle clogging is not corrected even after nozzle backwash is performed. The operation procedure is described below.

- You cannot perform this operation during ink ejection. Switch the unit to the stop state and then perform the operation.
- Do not touch the ejection port of the nozzle orifice directly with your hands. (Use the supplied tweezers.)
- Damage to the ejection port of the nozzle orifice may prevent it from functioning. To prevent any damage to the ejection port caused by a tool, take care to handle the nozzle orifice.

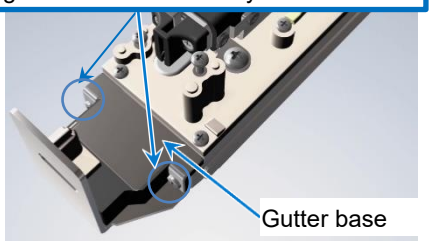


1 Perform Steps (a) to (d) to remove the nozzle orifice and wash it.

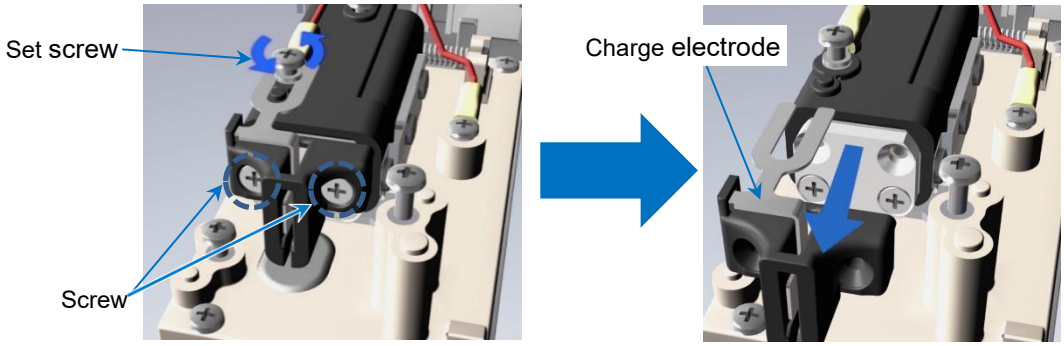
(a) Loosen the set screws, and remove the plus and minus deflection electrodes. To prevent the screws from dropping, do not loosen them too much.



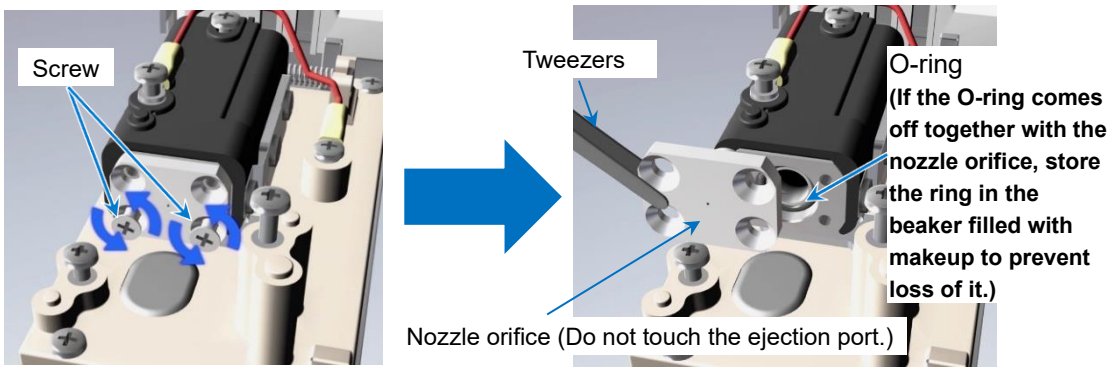
When using Safe-Clean Station (Optional parts), remove the screws of the gutter base, and remove the gutter base if necessary.



(b) Loosen the set screw, remove the two screws of the nozzle orifice, and remove the charge electrode.

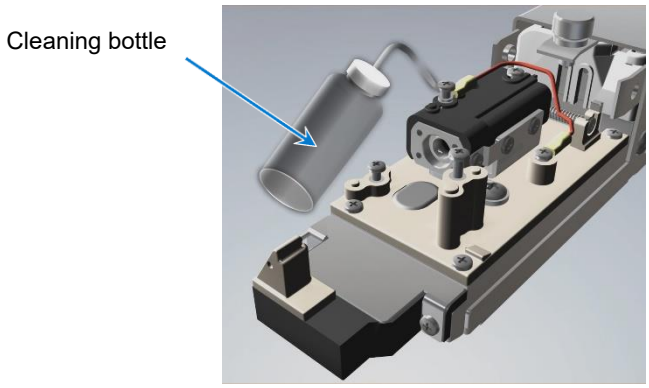


(c) Loosen the set screw, remove the two screws of the nozzle orifice, and remove the nozzle orifice.



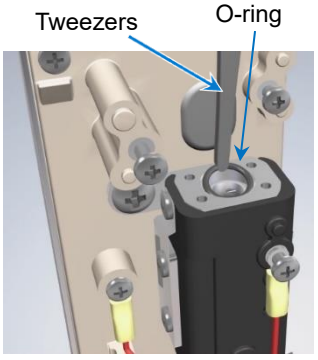
(d) Put the removed nozzle orifice into the beaker filled with makeup and clean it.

2 With the nozzle orifice removed, clean the nozzle with makeup as shown in the figure below.

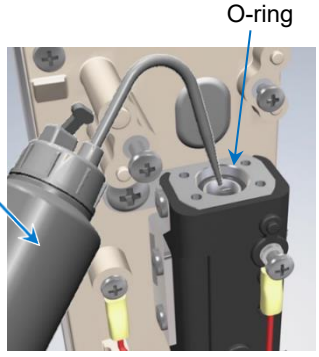


3 Install the nozzle orifice according to Steps (a) to (g).

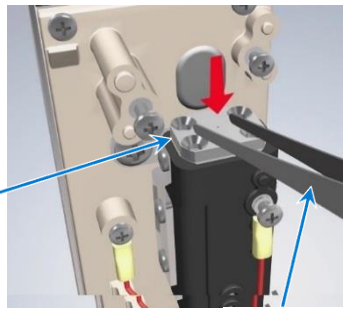
(a) If the O-ring comes off together with the nozzle orifice, hold the ring with the tweezers and insert it into the nozzle.



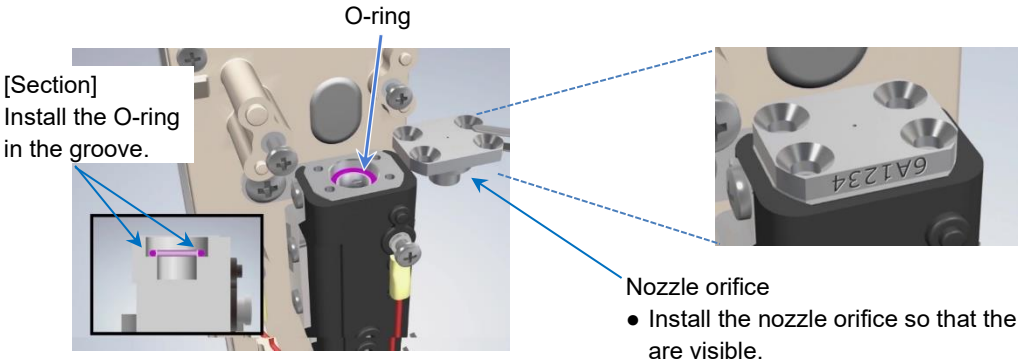
(b) Pour a few drops of makeup into the O-ring from the cleaning bottle to make it easier to insert the nozzle orifice.



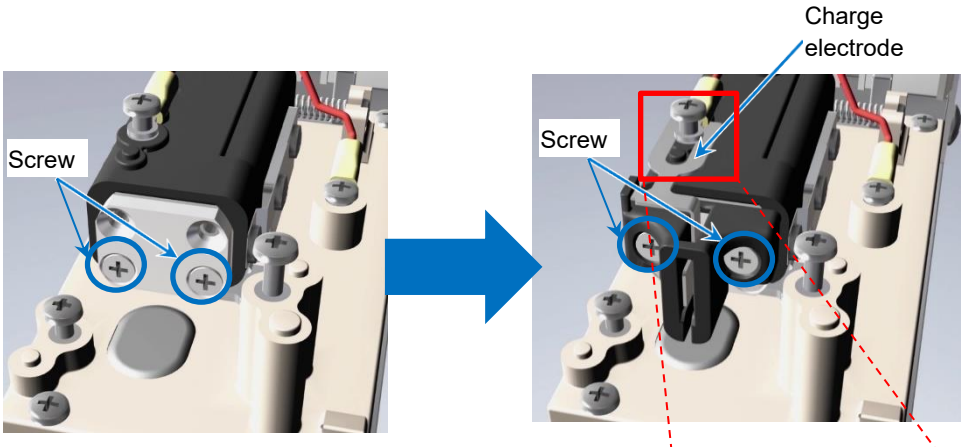
(c) Insert the nozzle orifice, and lightly press it down with the tweezers as shown.



(d) Remove the nozzle orifice temporarily and check the O-ring for installation.

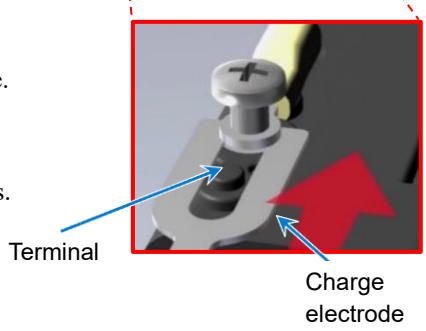


(e) Insert the nozzle orifice again and fix it with two screws.



(f) Tighten the screw shown in the figure on the right, and fix the terminal and charge electrode. Ensure that the charge electrode is below the terminal.

(g) Install the minus and plus deflection electrodes.



4 Confirm that the ink stream bending or nozzle clogging has been corrected.
For the check procedure, see 5 to 8 in "5.4.1. Nozzle Backwash".

[If makeup stream is not in the center of the gutter]

- If the stream deviates significantly from the gutter, the nozzle orifice may not have been cleaned sufficiently. Perform the procedure described in "5.4.2. Disassembly and Cleaning of Nozzle Orifice" again. If the problem is not corrected even after it is performed, contact your nearest local distributor.
- If the stream is in the gutter but deviates from the center of the gutter, adjust the stream position according to "5.5. Stream Alignment".

5.5. Stream Alignment

This section describes stream position alignment.

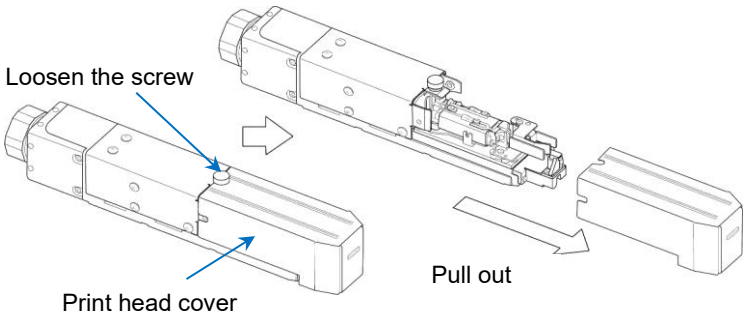
⚠ WARNING

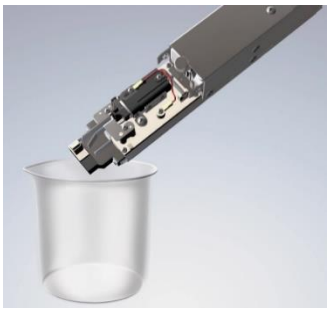
- Wear protective gear (goggles and mask) when operating.
- If any ink or makeup enters your eyes or mouth, immediately flush with warm or cold water and consult a physician.
- Before ejecting the ink, make sure that there is no one in the ejection direction. (Operate with the end of the print head inserted in a beaker, etc.)

Perform stream position alignment when the nozzle or nozzle orifice has been replaced. Stream alignment is not usually necessary.

- Adjust the stream position so that the stream ejected from the nozzle is in the center of the gutter.
- You need to adjust the stream position in two directions: horizontal and vertical.

1 Remove the print head cover in the stop state and put the end of the print head in the beaker to be ready for makeup ejection.





2 Move to the [Maintenance(Equipment Maintenance)] screen and press Ink stream alignment.

[Maintenance(Equipment Maintenance)] screen (selecting [Ink stream alignment])

- Press the OK key on the [Ink stream alignment] screen, and makeup is ejected.

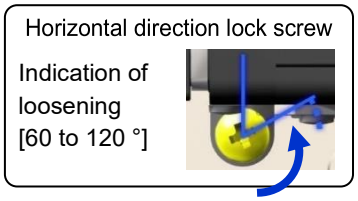
3 Adjust the stream position in the horizontal and vertical directions.

NOTE

- Do not loosen the horizontal and vertical direction lock screws, which are indicated in the text below, at the same time. Doing so makes it difficult to adjust the stream position.

[Procedure for stream alignment in the horizontal direction]
Follow the procedure below to adjust the stream position in the horizontal direction.

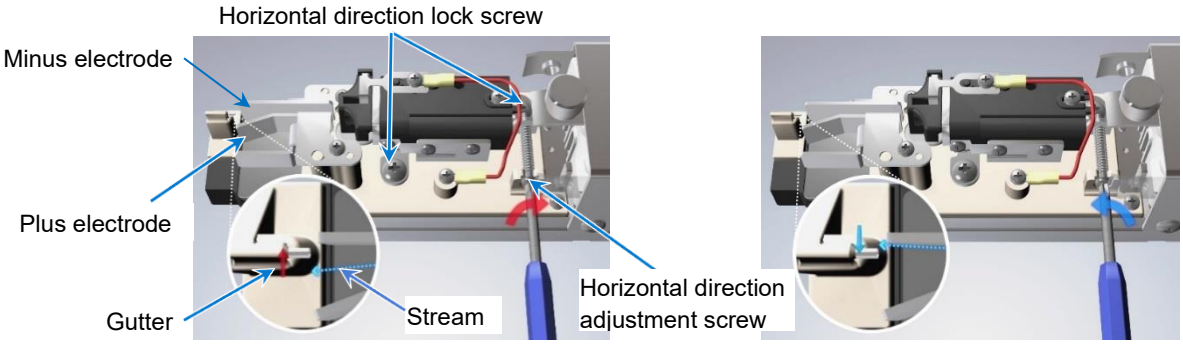
(a) Loosen the horizontal direction lock screws (at two locations) shown in the figure below according to the indication of loosening shown in the figure on the right.
- Loosening them too much makes it difficult to adjust the stream position.



(b) Turn the horizontal direction adjustment screw according to the figure below to adjust the stream position to the center of the gutter.

Move the stream position in the direction of the minus deflection electrode: Turn the screw clockwise.

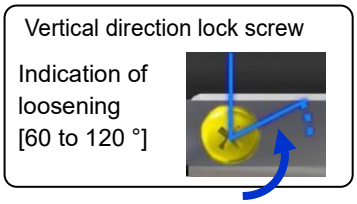
Move the stream position in the direction of the plus deflection electrode: Turn the screw counterclockwise.



(c) Tighten the horizontal direction lock screws (at two locations) after adjusting the stream position. This completes the stream position alignment in the horizontal direction.

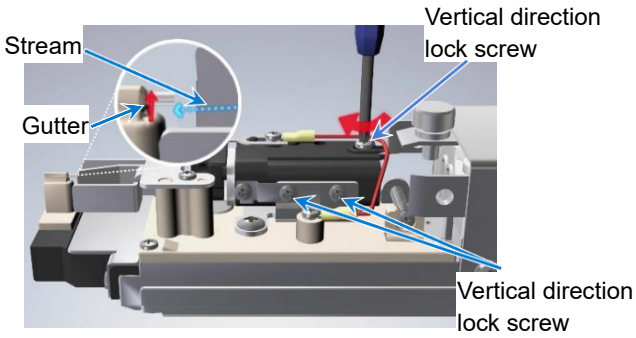
[Procedure for stream alignment in the vertical direction]
Follow the procedure below to adjust the stream position in the vertical direction.

(a) Loosen the vertical direction lock screws (at two locations) shown in the figure below according to the indication of loosening shown in the figure on the right.
- Loosening them too much makes it difficult to adjust the stream position.

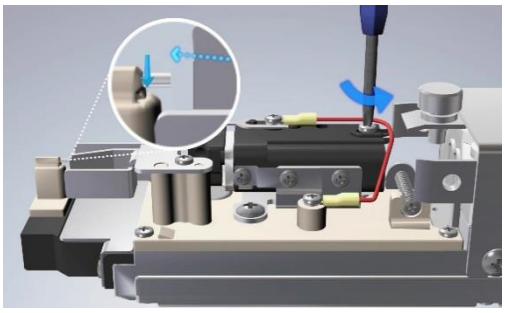


(b) Turn the vertical direction adjustment screw according to the figure below to adjust the stream position to the center of the gutter.

Move the stream position to the upper side of the gutter:
Turn the screw clockwise.



Move the stream position to the lower side of the gutter:
Turn the screw counterclockwise.



(c) Tighten the vertical direction lock screws (at two locations) after adjusting the stream position. This completes the stream position alignment in the vertical direction.

4 After the completion of the alignment, press Abort on the [Ink stream alignment] screen.

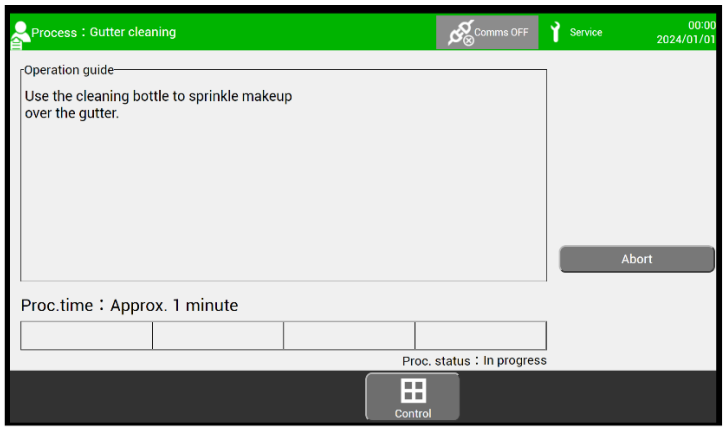
5.6. Cleaning Gutter

If the ink recovery system is dried up or is clogged, the gutter can be cleaned to clean the range from the gutter to the ink main tank.

- You cannot perform this operation during ink ejection. Switch the unit to the stop state before performing it.
- Prepare the cleaning bottle and beaker containing makeup, and remove the print head cover.
- Consecutive gutter cleaning may cause thinning of ink, resulting in printing disturbance. Ink replacement may be required after the printing disturbance is corrected. Limit the number of times that consecutive gutter cleaning is performed to a maximum of two.

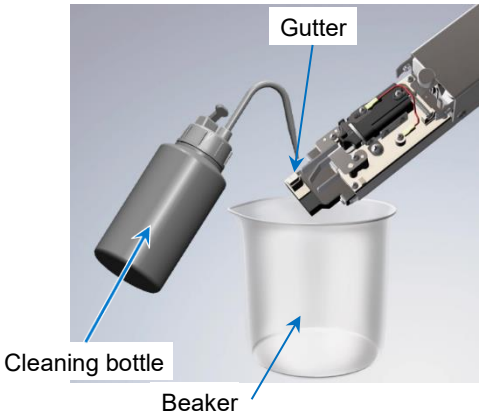
1 Move to the [Maintenance(Equipment Maintenance)]screen and press Gutter cleaning.
Upon pressing it, gutter cleaning (suction from the gutter) starts.

[Maintenance(Equipment Maintenance)]screen (selecting [Gutter cleaning])



[Gutter cleaning] screen

2 The makeup is suctioned from the gutter. Therefore, pour the makeup from the cleaning bottle into the nozzle orifice to clean it as shown in the figure below.



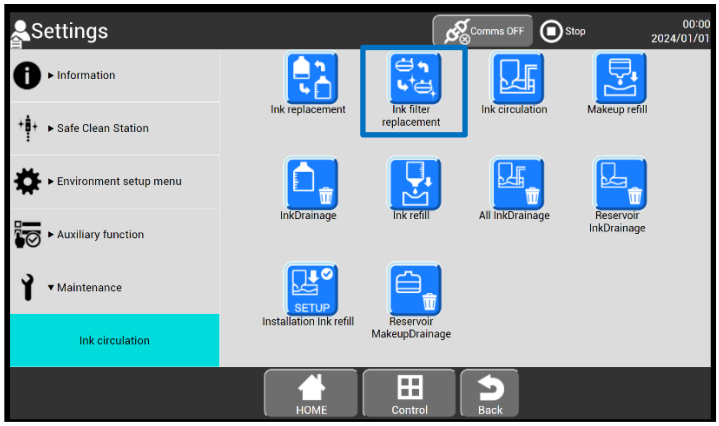
- To abort the process, press Abort.

3 The gutter cleaning is finished in about one minute, and you are returned to the [Maintenance(Equipment Maintenance)] screen.

5.7. Replacing Ink Filter

This section describes the procedure for replacing the ink filter. This operation involves disposing of the ink in the main ink tank. If the ink filter replacement interval and the ink replacement interval are the same, it is recommended to dispose of the ink first, perform this operation, and then replace the ink according to the procedure described in "5.3. Replacing Ink".

1 Move to the [Maintenance(Ink circulation)] screen, and press Ink filter replacement.



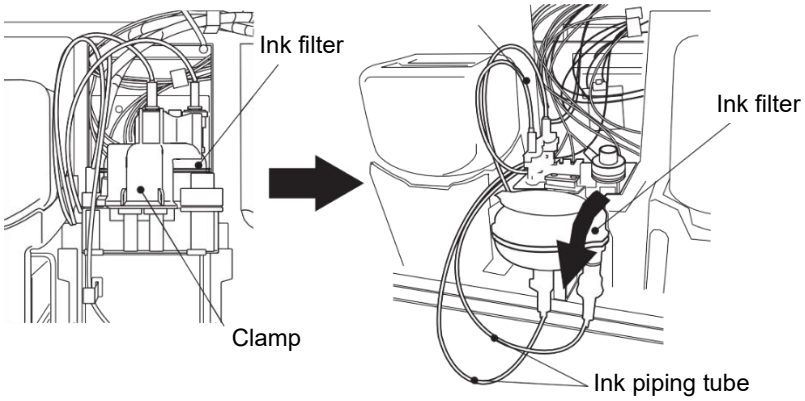
[Maintenance(Ink circulation)] screen (selecting [Ink filter replacement])

2 Dispose of ink in accordance with the operation guidance on the screen.

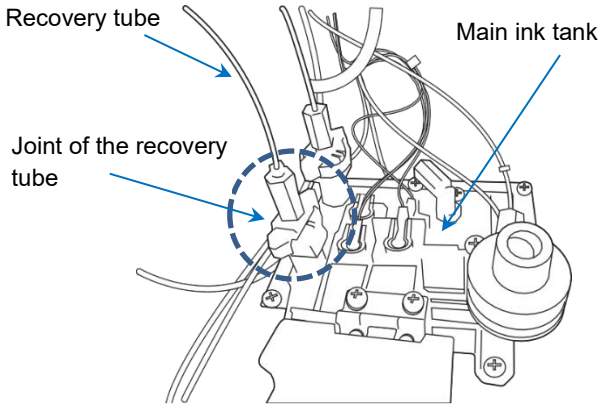
- To abort the process, press Abort.
- When the abort process has been performed, start with **1** again.

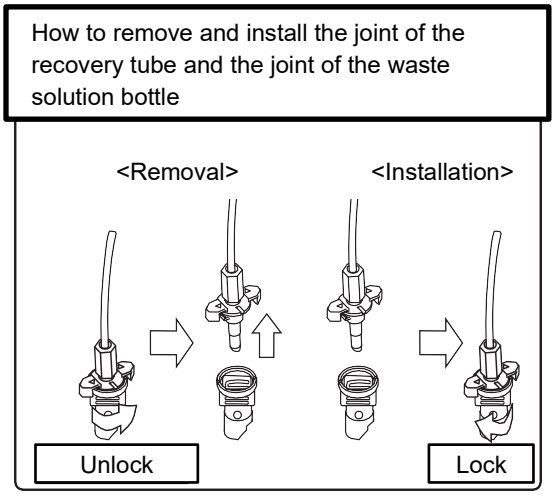
(a) Flip the ink filter vertically. Remove the recovery tube and connect it to the waste solution bottle.

- Open the maintenance cover and remove the inner cover.
- Tilt the clamp forward and flip the ink filter vertically.



- Remove the joint of the recovery tube connected to the main ink tank.



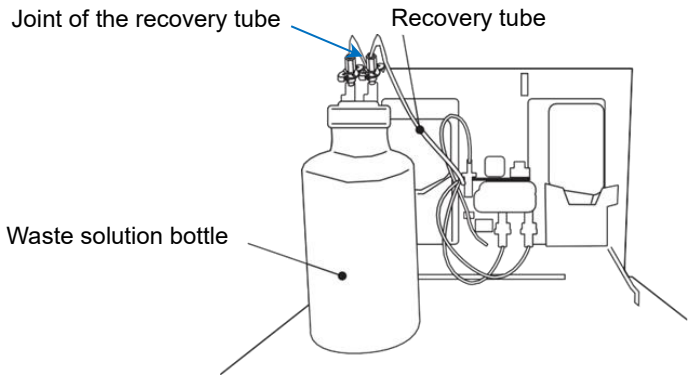


[When the waste solution bottle is used]

NOTE

- In disposing of ink, the pressure of the ink from the recovery tube may cause the waste solution bottle to fall over. During ink disposal, prevent the ink from spilling by holding the waste solution bottle with your hands.
- Dispose of the ink from the waste solution bottle and wash the bottle with makeup after use. If the bottle is left uncleaned, the ink may clog and the pressure in the recovery line may rise abnormally at the next use.
- Do not store the waste solution bottle with ink contained for a long period of time.
- Do not store the waste solution bottle at a place subject to high temperatures.
- Be careful not to spill ink when removing the joint of the waste solution bottle.

- To replace the ink filter using the waste solution bottle, connect the joint of the recovery tube to the supplied waste solution bottle as shown in the figure below.

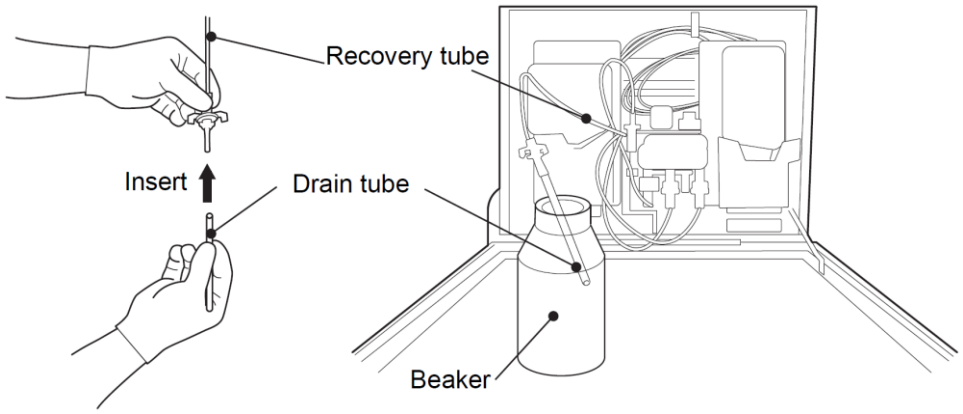


[When the waste solution bottle is not used]

NOTE

- In disposing of ink, the recovery tube may pulsate due to the pressure of the ink from the tube. During ink disposal, prevent the ink from spilling by holding a prepared container and the recovery tube with your hands.
- Wash the waste tube with makeup after use. If the bottle is left uncleaned, the ink may clog and the pressure in the recovery line may rise abnormally at the next use.
- If you do not have a waste solution bottle, use a container with a capacity of 1.5 L or more to prevent ink from overflowing. Use a container made of a solvent resistant material (examples: polypropylene, polyethylene, fluorine resin, glass, and stainless steel).
- If you spill any ink 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.

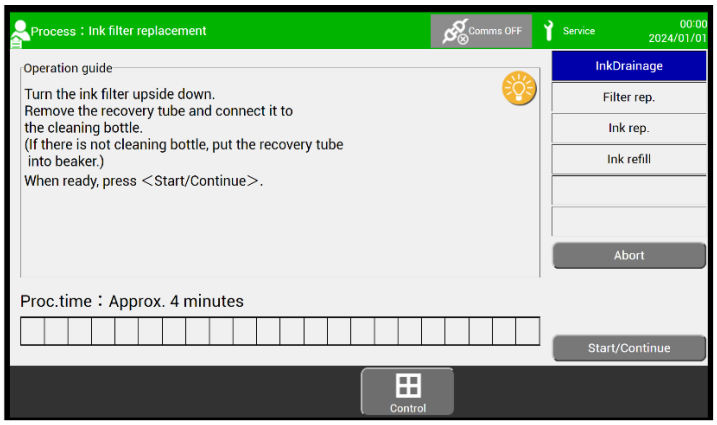
- To replace the ink filter without the waste solution bottle, insert the supplied waste tube into the end of the joint of the recovery tube and put it into a container with a capacity of 1.5 L or more, as shown below.



(b) Press OK.
The ink circulating inside the unit is disposed of from the recovery tube to the waste solution bottle or container.

[Note]
- To abort the ink disposal, press Abort.
- When the abort process has been performed, follow the displayed operation guidance.
- When the abort process has been performed, remember to put the recovery tube back to its original position.

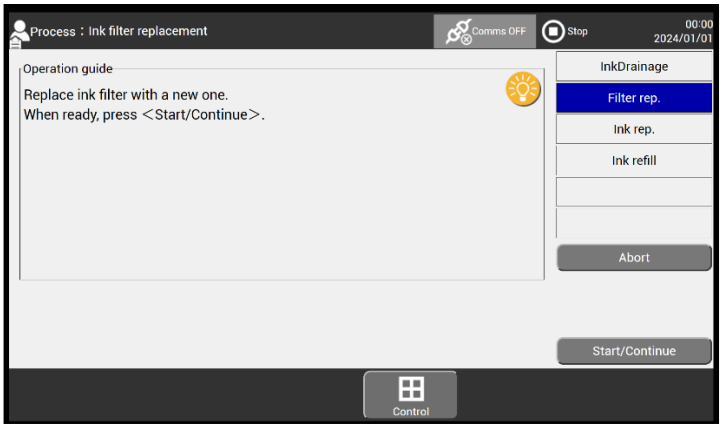
(c) Connect the recovery tube to the main ink tank according to the guidance after the elapse of a predetermined amount of time.



[Ink filter replacement] screen ([Ink rep.])

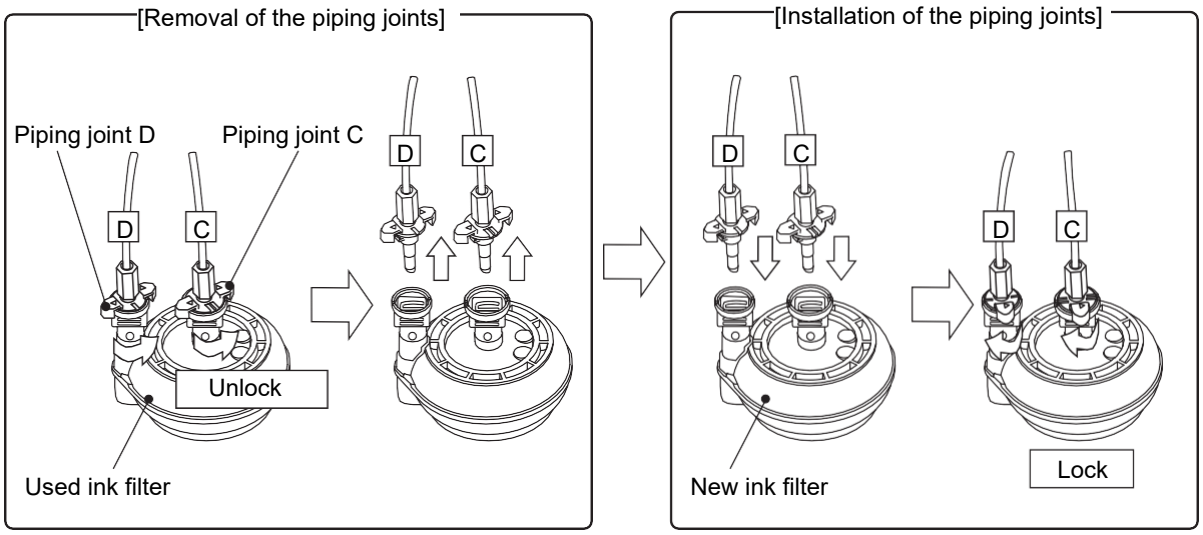
- Clean the connection part of the end of the recovery tube with makeup, and then connect it back to its original position.
- To prevent the recovery tube from bending, do not intersect it with other tubes.

3 When [Replace ink filter with a new one.] is displayed in [Operation guide], install a new filter.



[Ink filter replacement] screen ([Filter rep.])

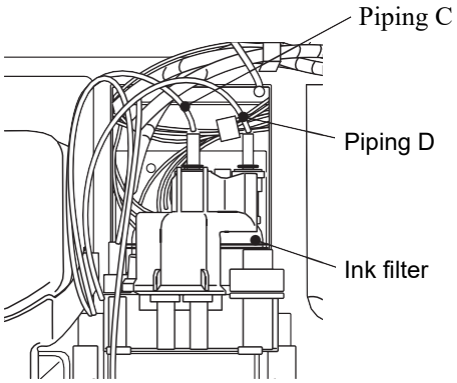
(a) Remove the piping joints C and D, and install a new ink filter.



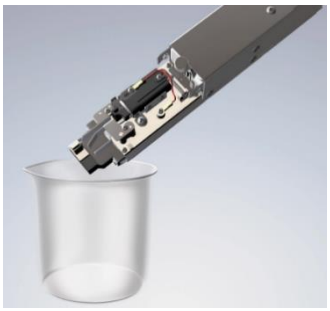
NOTE

- If the position of piping is incorrect, it cannot be installed.
  (C is on the center side of the ink filter and D is on the outside of it.)
- When installing the piping, rotate the piping joints C and D clockwise to lock them.
- A small amount of ink remains in the ink filter even after ink disposal. Take enough care not to spill ink when handling the used ink filter.

(b) Place the ink filter as shown in the figure below. (The piping D is on the right side.)

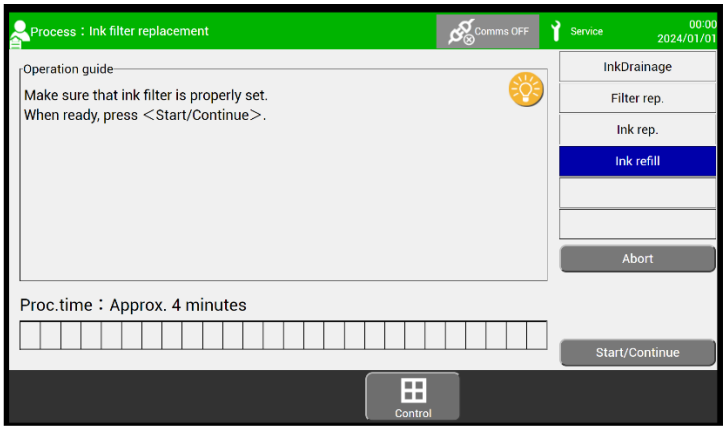


(c) Put the end of the print head in the beaker to be ready for ink stream ejection.



4 Start ink refill.

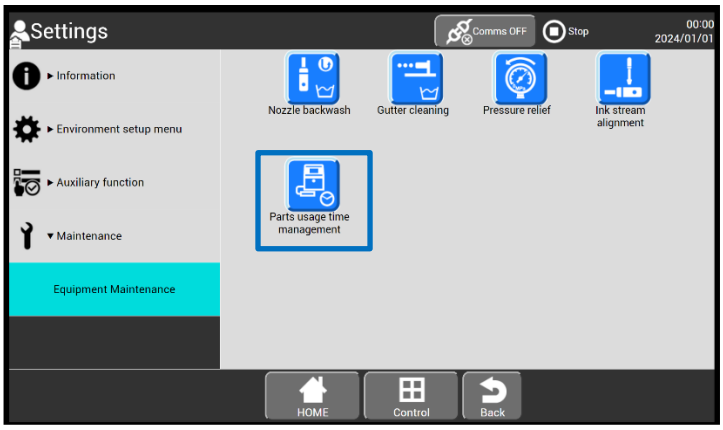
- Press Start/Continue on the screen below, and the unit starts to refill the circulation route with ink.
- The ink is ejected from the nozzle after a while. After the ink is ejected, check the ink stream position.



[Ink filter replacement] screen ([Ink refill])

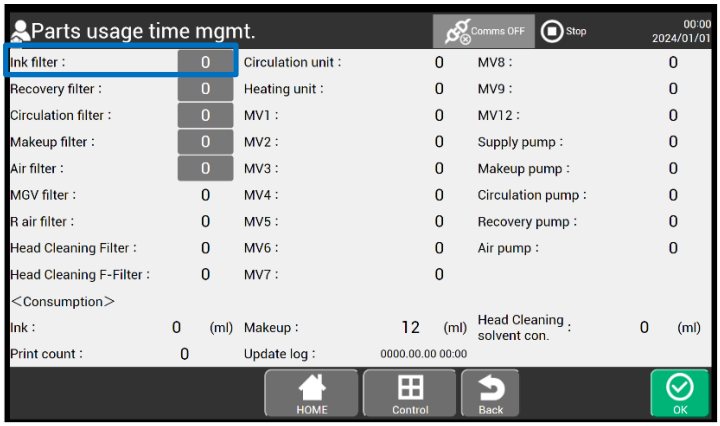
- To abort the ink ejection, press Abort and follow the displayed operation guidance. After the completion of the abort process, you are returned to the [Maintenance(Ink circulation)] screen.
- When the abort process has been performed, select [Ink refill] on the [Maintenance(Ink circulation)]screen.
- If the message below appears during ink refill, the unit automatically enters the stop state.
  [Failure was detected in level sensor, pump or solenoid valve. When ready, press <Start/Continue>.]
  Press OK and select [Ink refill] on the [Maintenance(Ink circulation)]screen.
- If the same message occurs again, contact your nearest local distributor.

5 Move to the second screen of the [Settings(Equipment Maintenance)] screen and press Parts usage time management.



[Settings(Equipment Maintenance)] screen (selecting [Parts usage time management])

The [Parts usage time management] screen appears.
Set 0 as a value setting item in [Ink filter].



[Parts usage time management] screen (setting [Ink filter] value)

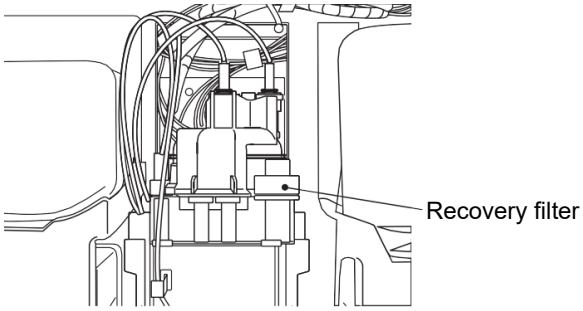
This completes the ink filter replacement.

5.8. Replacing Recovery Filter

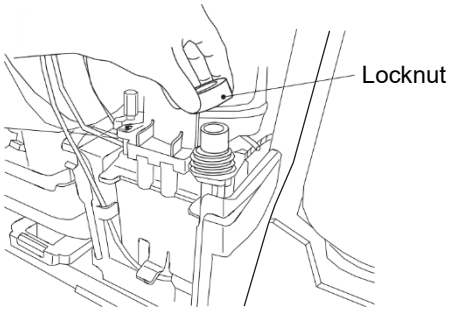
This section describes the procedure for replacing the recovery filter.

NOTE
● Do not perform this operation while ink is being ejected. Doing so may overflow the ink. ● Make sure that the unit is in the stop state.

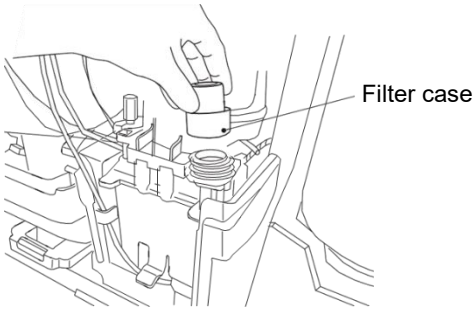
1 Remove the inner cover.



2 Turn the locknut by hand.



3 Remove the filter case upward.

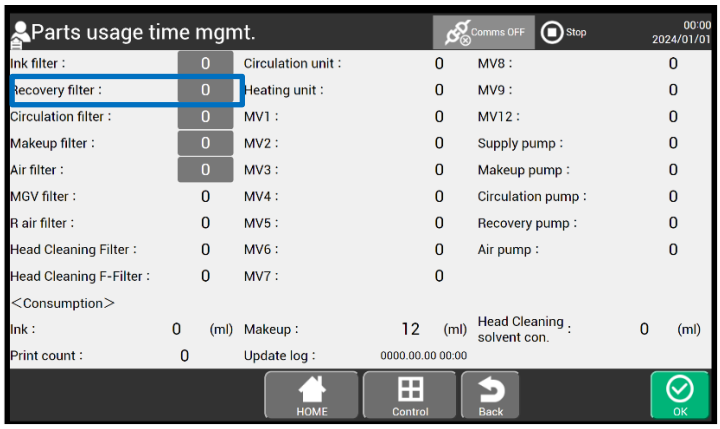


4 Install a new filter case and fix it with the lock nut.

5 Move to the[Settings(Equipment Maintenance)]screen and press Parts usage time management.

[Settings(Equipment Maintenance)]screen (selecting [Parts usage time management])

The [Parts usage time management] screen appears.
Set 0 as a value setting item in [Recovery filter].



[Parts usage time management] screen (setting [Recovery filter] value)

This completes the recovery filter replacement.

5.9. Adjusting Pressure

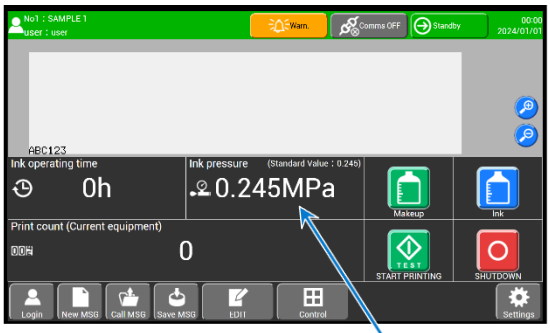
This section describes how to adjust pressure.

You can adjust pressure only during ink ejection. To adjust pressure, eject ink.

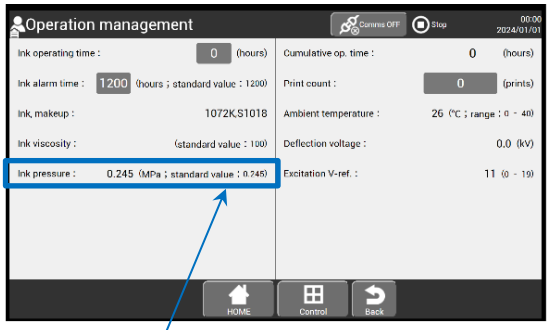
Check pressure before printing.

1 You can check pressure on the [HOME] screen or [Operation management] screen.

<< [Home] screen >>



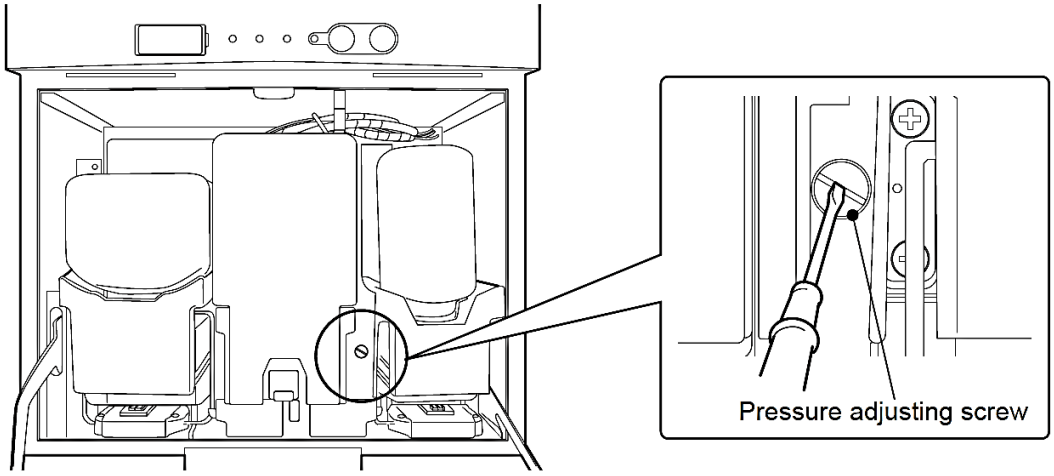
<< [Operation management] screen >>



Ink pressure display value
The value within brackets () is a standard value.

[Home] screen (checking ink pressure) **[Operation management] screen (checking ink pressure)**

If there is a difference of 0.010 MPa or more between the displayed value and the standard value, adjust the pressure by turning the pressure adjusting screw with a flat screwdriver so that the difference falls within ± 0.002 MPa of the standard value.



To raise the pressure : rotate clockwise.
To lower the pressure : rotate counterclockwise.

5.10. Updating Excitation V-ref.

This section describes updating excitation V-ref.

(1) Overview

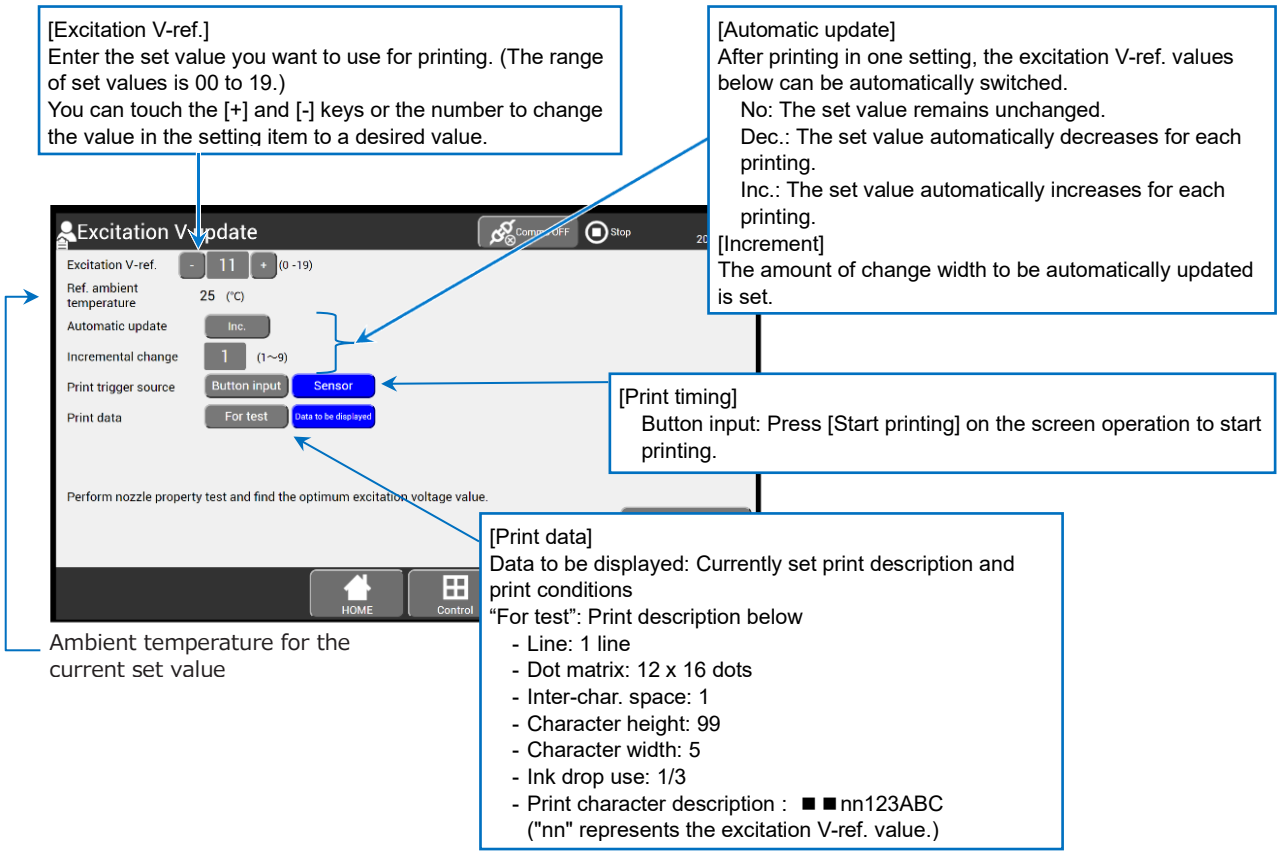
- The range of excitation V-ref. values is 0 to 19. The ink drop state varies depending on each setting.
- You need to input the optimum excitation V-ref. value to maintain good printing quality.
- Perform the nozzle test. The center value of the printing good range is set as the optimum excitation V-ref. value.

  (Example) When good printing is obtained within the range of the excitation V-ref. values 5 to 15 in a nozzle test, the optimum excitation V-ref. value is 10, the center value of the range.
- The ambient temperature at the update of the excitation V-ref. value is stored as the reference ambient temperature. If the difference between the ambient temperature and the reference ambient temperature exceeds a certain value while the unit is in use, the [Excitation V-ref. Review] warning will occur. In this case, readjust the excitation V-ref. value.

(2) Procedure

- Select the optimum excitation V-ref. value from the results of test printing for each set value, and enter it on the screen operation. Use the procedure below to perform the operation.

1 Press Excitation V update (Nozzle test) on the third screen of the [Settings(Maintenance)] screen. The [Excitation V update] screen appears. The layout of the screen is shown below.



Layout of [Excitation V update] screen

2 Press Nozzle test on the [Excitation V update] screen in the standby state.
When [Button input] is selected in [Print timing], you can press [Start printing] to start printing.
When [Sensor] is selected in [Print timing], you can input a print target detector signal to start printing.

NOTE

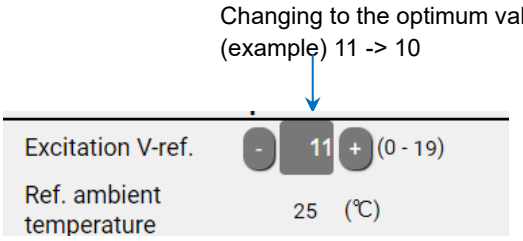
- Depending on an excitation v-ref. value, the ink drop creation state may be worse during a nozzle test. This may cause a fault such as [Ink Drop Charge Too High], resulting in the ink ejection to stop.
  In this case, clean the print head and then eject the ink again. To perform the same operation, see "4.2.2. When Error Occurs at Start of Operation" in the Instruction Manual.
  When the excitation v-ref. value is "5" or less, a fault is more likely to occur. To perform the test print again, set the excitation v-ref. value to "10" first and then reduce the value gradually.

3 Check the printing result.
Check the range of excitation V-ref. values that resulted in good printing. The center of the range is the optimum value. However, if the excitation V-ref. values at the end of the good print range (05 and 15) is set, the risk of poor print quality increases.

(Example) Printing good range 05 to 15 → Optimum value 10 ○: Good, ×: Bad/Space: Unconfirmed

Date	Ambient temperature [°C]	Excitation V-ref. value																				Optimum value
		00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	
November 5, 2020	25			×	×	×	○	○	○	○	○	○	○	○	○	○	○	×	×	×		10

4 Update the excitation V-ref. value.
(a) After the completion of the test printing, press Abort on the [Nozzle test] screen to return to the [Excitation V update] screen.
(b) Change to the obtained optimum value in [Excitation V-ref.].



Example of changing [Excitation V-ref.]

This completes the excitation V-ref. update.

[Note]

- The [Repeat print] setting is disabled during the nozzle test.
  One-time printing is performed per input signal.
- The [Product speed matching] setting is disabled during the nozzle test.
  In this case, the character width may differ from the actual one.
- After Updating Excitation V-ref by setting [Print data] on the “Excitation V update screen” to “For test”, if the actual printing result is not good, set [Print data] to “Data to be displayed”, perform the Nozzle test again, and set the excitation setting value for optimal printing. (When printing under conditions different from "For test" (especially when the set value of the particle usage rate is large, etc.), the good printing range may differ.)

5.11. How to Check Ink Drop State

This section describes how to check the ink drop state using a magnifying glass.
Note that switch the unit to the ink ejection state to perform this operation.

⚠ WARNING

- Wear protective gear (goggles and mask) when operating.
- If any ink or makeup enters your eyes or mouth, immediately flush with warm or cold water and consult a physician.
- Before ejecting the ink, make sure that there is no one in the ejection direction. (Operate with the end of the print head inserted in a beaker, etc.)

1 Check that the unit is in the standby state, and remove the print head cover.

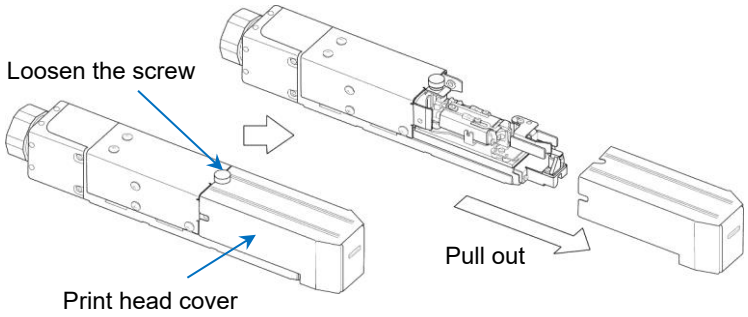


Diagram of removing print head cover

2 Use the magnifying glass to observe the ink drops in the charge electrode.

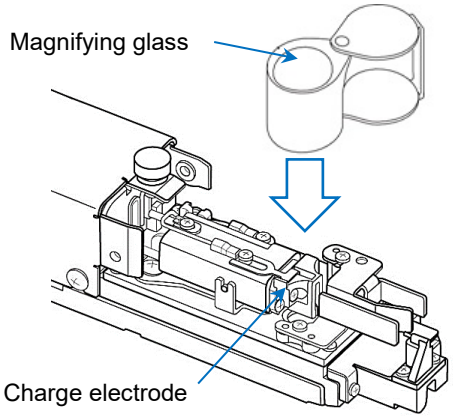
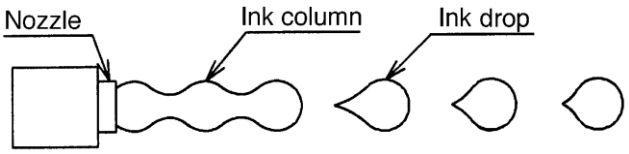
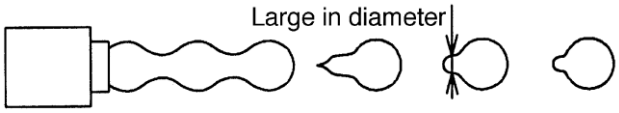
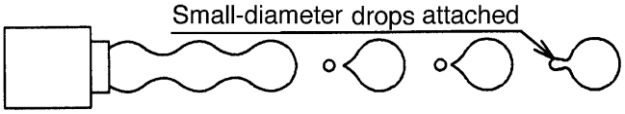
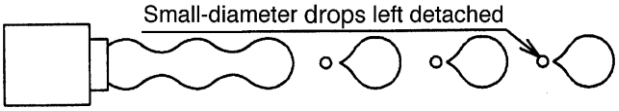
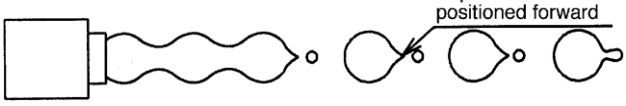


Diagram of observing ink drops (using magnifying glass)

⚠WARNING

- Do not look at the red LED for a long time.
  Doing so may adversely affect your eyes.

Check list of ink drop creation states

Shape of ink drop	Judgment	Name	Remarks
	○	A mode	Good
	○	B mode	Perfect
	○	High-speed small-diameter mode Small-diameter drops two or less	Acceptable
	×	Constant-speed small-diameter mode	Unacceptable
	×	Low-speed small-diameter mode	Disabled

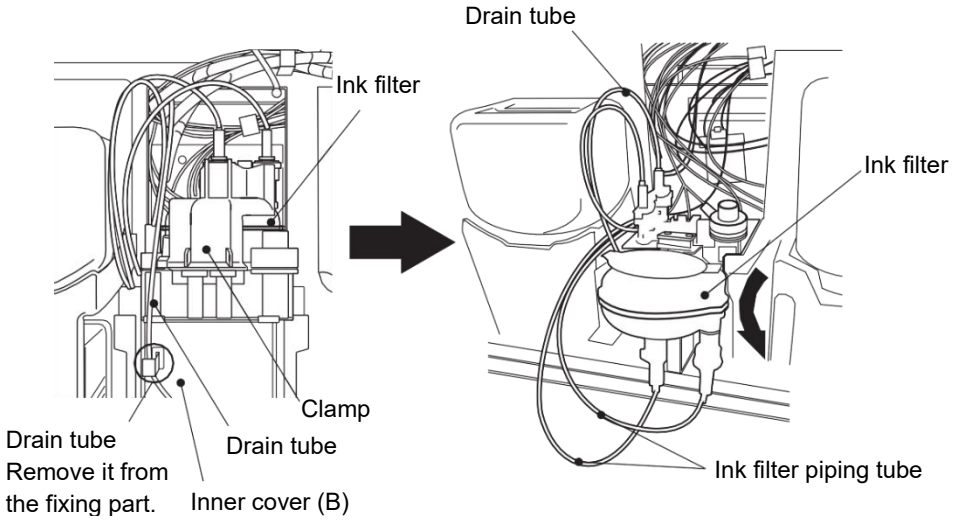
If the shape of ink drop is "Unacceptable", perform the procedure described in "5.10. Updating Excitation V-ref." to update to the optimum excitation V-ref. value, and check the shape again. Alternatively, contact your nearest local distributor.

3 After checking the ink drop state, remember to install the print head cover.

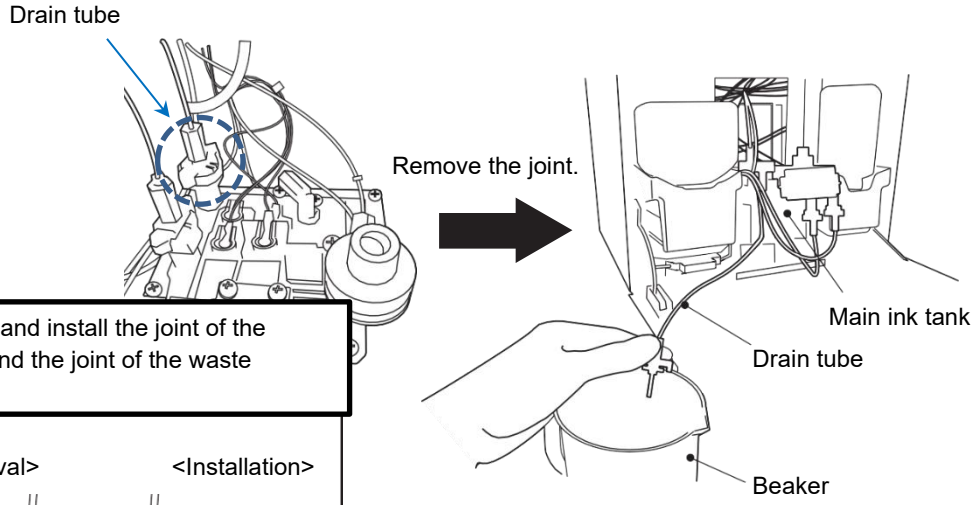
5.12. Ink Disposal through Drain Tube from Main Ink Tank

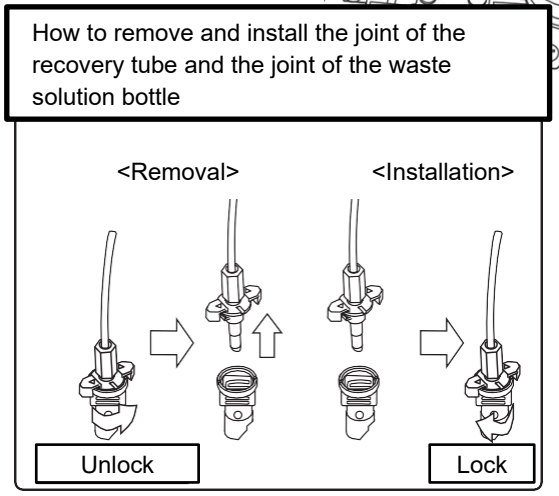
This section describes how to dispose of ink from the main ink tank without screen operations. This process is required when circulation system control is unavailable due to a fault such as [Main Ink Tank Too Full].

1. Open the maintenance cover and remove the inner cover.
2. Remove the drain tube from the fixing part of the inner cover (B).
3. Tilt the clamp forward and flip the ink filter vertically.



4. Remove the drain tube from the main ink tank and put it into the beaker.
   * Place the beaker at a position lower than that of the main ink tank.





NOTE

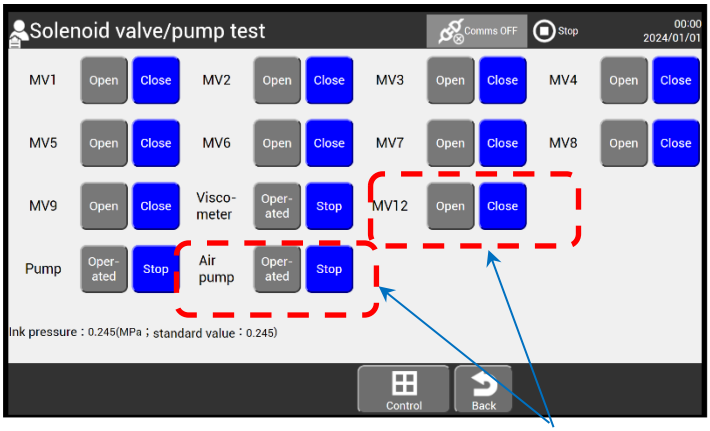
- If you spill any ink by mistake, wipe it off neatly and promptly with wiping paper or something similar.
  Do not close the maintenance cover until you make sure that the portion you have just wiped is completely dry.

5 Display [Circulation control] and press Ink refill.
Be aware that starting the unit without ink refill may cause the [Ink Replenishment Time-out] fault. If it occurs, press [Reset] to clear it, and refill the tank with ink.

5.13. Operation Test of Solenoid Valve and Pump

This section describes how to check the operation of the solenoid valve and pump. If ink is not ejected or overflows from the gutter, follow the procedure below to check whether the solenoid valve and pump are operating.

1 Press Solenoid valve/pump test on the [Settings(Maintenance)]screen.



These items appear for using Safe-Clean Station (Optional parts).

[Solenoid valve/pump test] screen

Operation differences depending on states

[Stop] state	Not [Stop] state
Check the operation of the solenoid valve and pump. (Operate the solenoid valves one by one.)	The operation state is only displayed. Operation check such as opening/closing the solenoid valve is not possible.

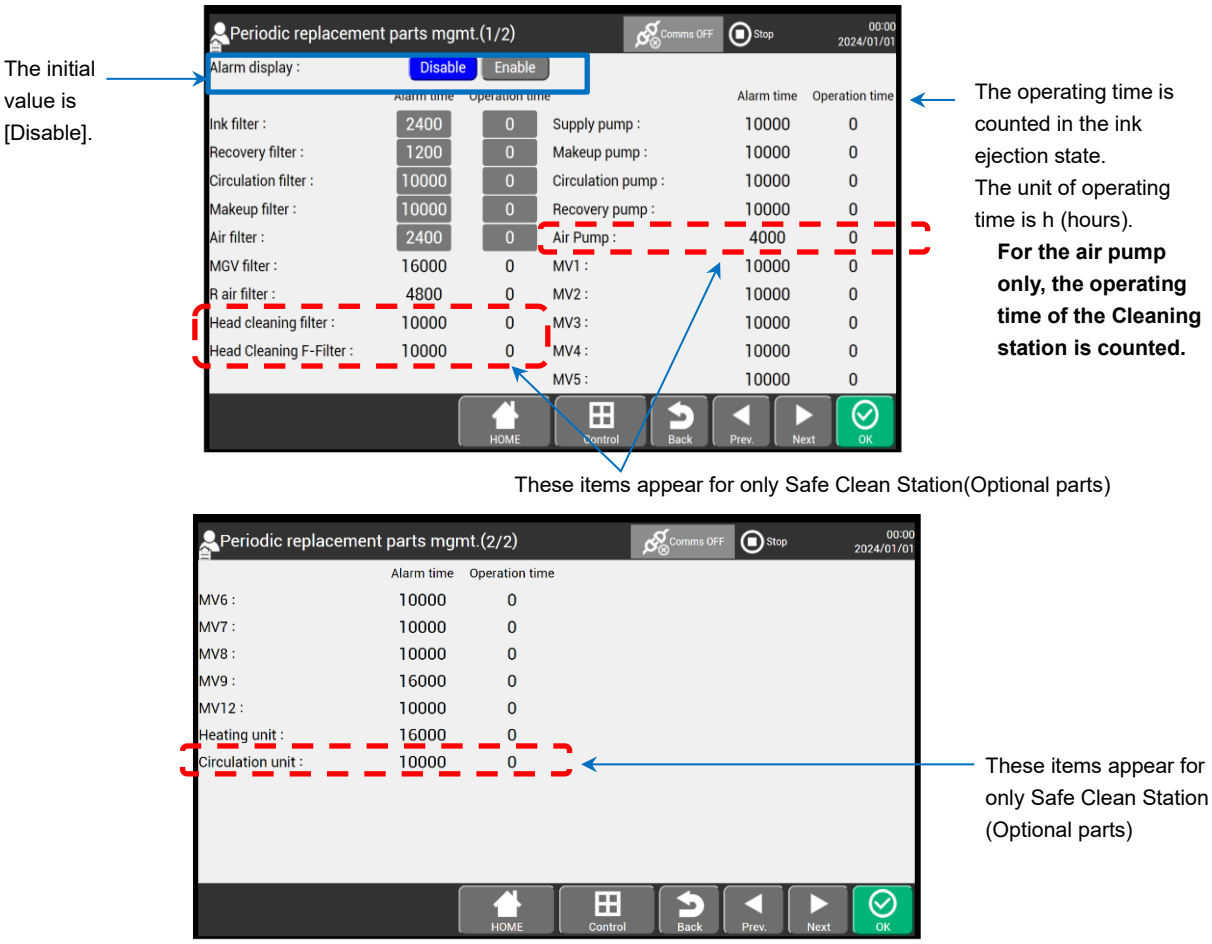
2 Press the operation button, and check if the operational sound of the solenoid valve/pump is heard.
The function of each operation button is as follows:

- Open: Opens the solenoid valve.
- Close: Closes the solenoid valve.
- Operated: Operates the pump.
- Stop: Stops the pump.

5.14. How to Display Alarm for Replacement Period of Maintenance Parts

This section describes how to display an alarm that notifies you of the time of replacing maintenance parts such as the filter, pump, or solenoid valve.

1 Press Periodic replacement parts mgmt. on the second screen of the [Settings(Maintenance)]screen.
The [Periodic replacement parts mgmt.] screen appears.



[Periodic replacement parts mgmt.] screen ([Alarm display])

2 Set Enable in [Alarm display].

3 Press OK, and the settings are applied.

NOTE

- If [Warning] has been set in [Alarm display] and you want to reset it to [Disable]/[Enable], contact your nearest local distributor.

With [Warning] set in [Alarm display], you cannot reset it to [Disable] / [Enable].

5.15. Long-term Shutdown

This section describes the process to shut down the unit for the long term.

NOTE

- Since long-term shutdown requires special work, it is recommended to contact your nearest local distributor and ask for the work. In the unlikely event that you do this operation yourself, be sure to sufficiently understand the warnings and notes in the procedure. Even when you do this yourself, contact your nearest local distributor.
- Depending on the type, storage temperature, and storage period of ink, remaining ink components may become stuck in the circulation system even if the process is performed prior to long-term shutdown. To perform the process after long-term shutdown, contact your nearest local distributor as much as possible.
- In particular, if the storage temperature is high (30 °C or higher), or if the storage period exceeds six months, contact your nearest local distributor.
- Follow the procedure described in "5.15.2. Process after Long-term Shutdown" to perform the process after long-term shutdown for safe operation.
- Even if the unit is left unused for a long period of time without the process performed prior to long-term shutdown, follow the procedure described in "5.15.2. Process after Long-term Shutdown" before the process. During the operation described in "5.15.2. Process after Long-term Shutdown", continuing the operation without confirming that the unit works properly will increase the pressure in the circulating system, causing the danger of ink strongly ejected from the nozzle or gutter. If you cannot confirm that the unit works properly, abort the operation and contact your nearest local distributor.

5.15.1. Process prior to Long-term Shutdown

This section describes the procedure for the process prior to long-term shutdown.

(1) Overview

NOTE

- Store the unit at as low temperature as possible.
- This process is not necessary if the unit can be operated at least once within the period listed in the table on the section indicated below.
  For the operating time in this case, see "1.2.5. Cautions on Operating Time When Unit Is in Service" in the Instruction Manual and the handling guidance of each ink.
- Depending on the storage temperature and storage period of ink, remaining ink components may become stuck in the circulation system even if the process is performed prior to long-term shutdown.
- If the unit is left unused over the above period without the process performed prior to long-term shutdown, check the state according to 1 Operation check in "5.15.2. Process after Long-term Shutdown". If you have any problem, contact your nearest local distributor.

This is a storage process performed when the IJ Printer is shut down for a period of time longer than those listed in the table below. The storage process means removal of the ink in the ink circulation system and washing it with makeup.

Guide of storage temperature and allowable shutdown period of the unit

Storage temperature	Recommended shutdown period (*)
0 to 35 ℃	3 weeks
35 to 40℃	2 weeks
40 to 45℃	1 week

(*): It represents the maximum period of time that allows consecutive shutdown without the operation (= ejecting ink).

- I The values in the table are for MEK-based ink.
- I Ink other than the above requires special handling in accordance with the handling guidance of each ink.
- I Please note the ink may harden within a week when it is stored at 45 ºC or higher.

(2) Operation

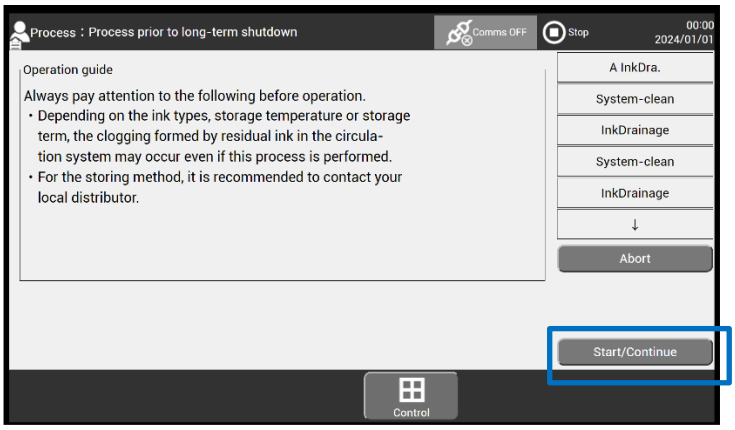
⚠WARNING

- Wear protective gear (goggles and mask) when operating.
- If any ink or makeup enters your eyes or mouth, immediately flush with warm or cold water and consult a physician.
- Before ejecting the ink, make sure that there is no one in the ejection direction. (Operate with the end of the print head inserted in a beaker, etc.)

1 Display the [Process prior to long-term shutdown] screen and press [Process prior to long-term shutdown].

[Process prior to long-term shutdown] screen (selecting [Process prior to long-term shutdown])

2 Read the guidance shown below, and press Start/Continue.



[Process prior to long-term shutdown] screen (guidance)

3 Dispose of the ink.

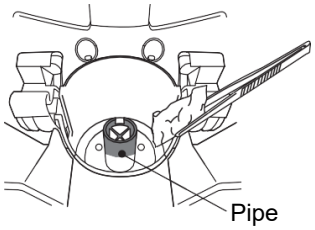
Perform Steps (a) to (d) in (2) Operation procedure, 2 of "5.3. Replacing Ink".

- Perform the procedure until the ink is removed.
- Follow the prompts on the screen to remove the ink.

4 Release the lock pin on the ink side and remove the empty ink cartridge bottle.

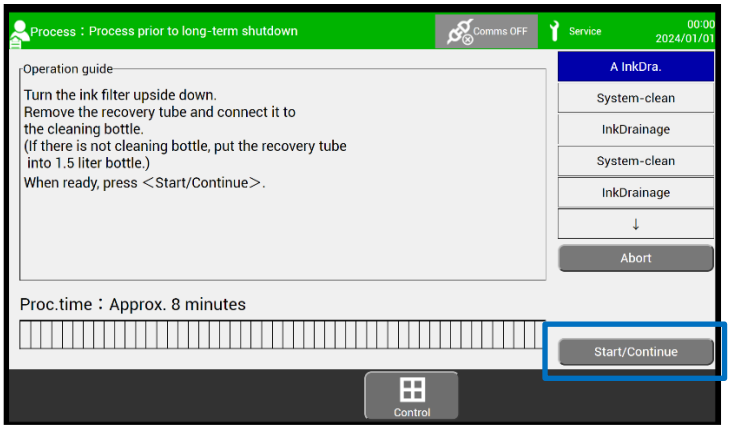
Wipe the pipe surface of the ink reservoir using wiping paper dampened with makeup.

Be careful not to damage the pipe.



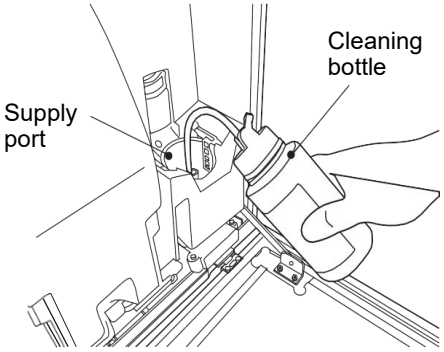
5 Clean the circulation system.

- Perform the operation according to the prompts on the screen.



[Process prior to long-term shutdown] screen (circulation system cleaning)

(a) Insert the nozzle of the cleaning bottle into the supply port, and pour about 150 mL of makeup into the ink reservoir.



NOTE

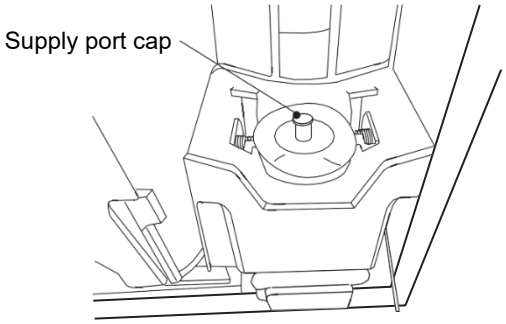
- If you spill any ink by mistake, wipe it off neatly and promptly with wiping paper or something similar.
  Do not close the maintenance cover until you make sure that the portion you have just wiped is completely dry.

(b) Press OK.
- Circulation system cleaning starts.

6 Repeat **3** and **5**.
Dispose of the ink four times and clean the circulation system four times.

7 Insert the nozzle of the cleaning bottle into the supply port, and pour about 100 mL of makeup into the ink reservoir.

8 Install the supply port cap on the ink supply port.



9 Attach the nozzle rubber seal.
- Attach the nozzle rubber seal between the charge electrode and the nozzle orifice.

NOTE

- Attach the nozzle rubber seal after washing it with makeup.
- Be careful not to deform the charge electrode when attaching the nozzle rubber seal.

This completes the process prior to long-term shutdown. The circulation system is now refilled with makeup. Be sure to perform the procedure described in "5.15.2. Process after Long-term Shutdown" for the process after long-term shutdown.

5.15.2. Process after Long-term Shutdown

This section describes the procedure for the process after long-term shutdown.

(1) Overview

- This process removes the makeup used to clean the ink circulation system in the process prior to long-term shutdown of the IJ Printer and refills the system with ink.
- To completely remove the makeup in the circulation system, after refilling the system with ink, dispose of it and then refill with ink again.
- For safe operation, perform "1 Operation check" before "2 Process after long-term shutdown".

⚠ CAUTION

- Perform "1 Operation check" before the process after long-term shutdown. If you cannot confirm that the printer works properly after the operation check, contact your nearest local distributor because special work is required to repair it.
  Continuing to operate without repairing it will increase the pressure in the circulating system, causing the danger of ink strongly ejected from the nozzle or gutter. Stop the operation and contact your nearest local distributor.

(2) Operation

1 Operation check

⚠WARNING

- Wear protective gear (goggles and mask) when operating.
- If any ink or makeup enters your eyes or mouth, immediately flush with warm or cold water and consult a physician.
- Before ejecting the ink, make sure that there is no one in the ejection direction. (Operate with the end of the print head inserted in a beaker, etc.)

(a) Remove the nozzle rubber seal.

(b) Perform Solenoid valve/pump test in [Settings] to confirm that each of MV1 through MV9 and MV12 is operating normally.
For how to confirm it, see "5.13. Operation Test of Solenoid Valve and Pump". (If the operational sound can be heard, it means that each function is operating normally.)

NOTE

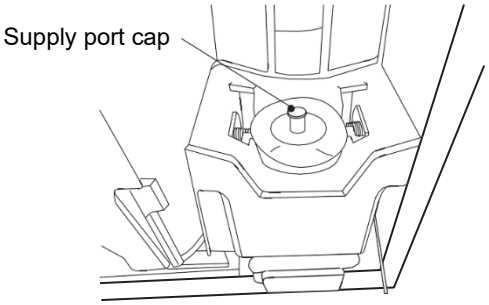
- If no operational sound can be heard, the solenoid valve may be stuck.
  Special work is required to repair it. Contact your nearest local distributor.

(c) Display the [Circulation control] screen, and press Ink stream alignment and then OK.
- Make sure that the stream ejected from the nozzle is in the center of the gutter.
- Make sure that the gutter is recovering the liquid.

NOTE

- If ejection cannot be confirmed, perform Ink stream alignment again. If you cannot confirm ejection even after performing this operation twice, ink may be stuck. In addition, if suction of the gutter cannot be confirmed, ink may be stuck in the recovery route. Special work is required to repair it. Contact your nearest local distributor.
- If ink stream bending occurs, repair it referring to "5.4. How to Correct Stream Bending and Nozzle Clogging". If the ink stream bending is not improved, special work is required to repair it. Contact your nearest local distributor.

(d) Remove the supply port cap from the ink supply port.



2 Process after long-term shutdown

(a) Display the second screen of the [Process prior to long-term shutdown] screen and press [Process after long-term shutdown].

[Process prior to long-term shutdown] screen (selecting [Process after long-term shutdown])

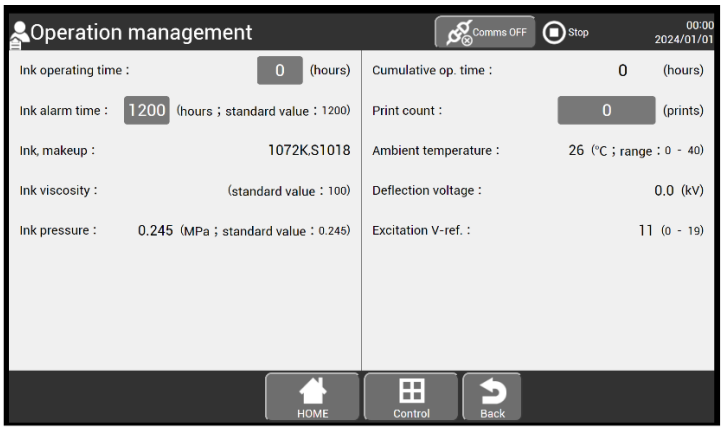
(b) Perform the operation according to the prompts on the screen.

(c) As soon as the second ink refill is finished, you are taken to the [Operation management] screen.

NOTE

- Perform Ink refill with the end of the print head put in the beaker. Press OK, and the ink is ejected after a while.
- If no ink is ejected for a while after Ink refill is performed, or if [Ink pressure low] and [No Ink Drop Charge] warnings and a fault occur, repair is required. Special work is required to repair it. Contact your nearest local distributor.
- If a viscometer fault message is displayed, ink may be stuck.
  Special work is required to repair it. Contact your nearest local distributor.

3 Open [Operation management], and optionally rotate the pressure-reducing valve shaft clockwise or counterclockwise to check whether the pressure fluctuates.
After checking it, adjust the ink pressure so that the displayed value of ink pressure is within ± 0.002 of the standard value.



[Operation management] screen (process after long-term shutdown)

NOTE

- If pressure does not fluctuate even after the shaft is rotated, special work is required to repair it. Contact your nearest local distributor.

This completes the process after long-term shutdown.

6. Safe-Clean Station (Optional parts)

6.1. Installation of Cleaning Station

This section describes how to install the Cleaning Station.

⚠ CAUTION

- If the Cleaning Station is installed at a place higher than your eye level (such as a high place), makeup may splash on your face due to incorrect operation of the unit. Build scaffolding to keep the unit at a place lower than your eye level, or install a cover to prevent makeup from splashing on your face.

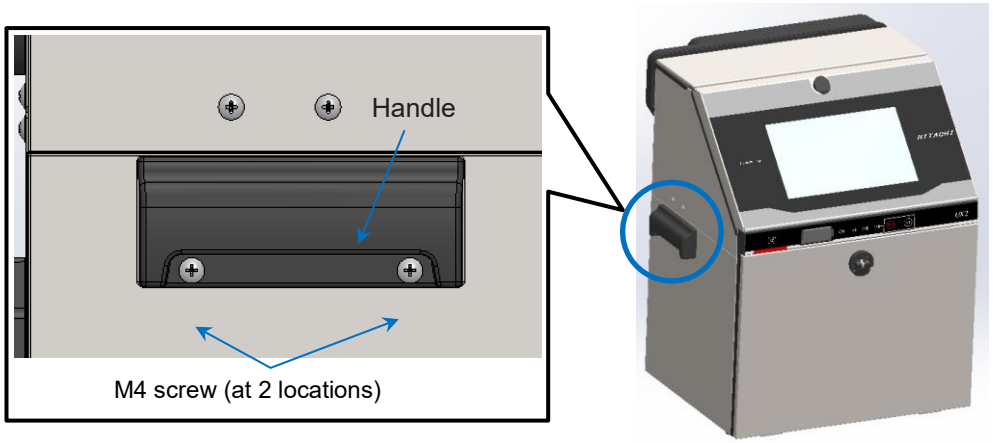
NOTE

- Solvent steam is produced in the Cleaning Station during drying. When working around the unit, sufficiently provide ventilation with a ventilating facility. Install the ventilation facility under the unit because it efficiently discharges solvent steam heavier than air.
- If it is required to install the Cleaning Station away from the main body, install it within the range where the print head cable can be inserted with allowance. Otherwise, an unexpected malfunction such as a break in the cable may occur.

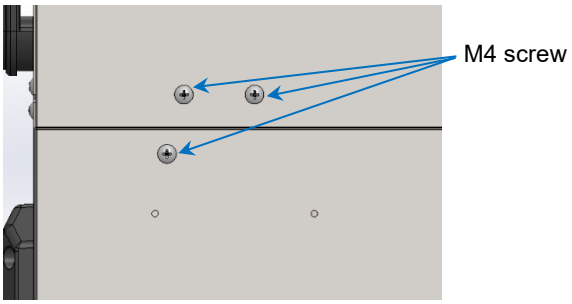
6.1.1. How to Install Cleaning Station on Main body

This section describes how to install the Cleaning Station on the main body.

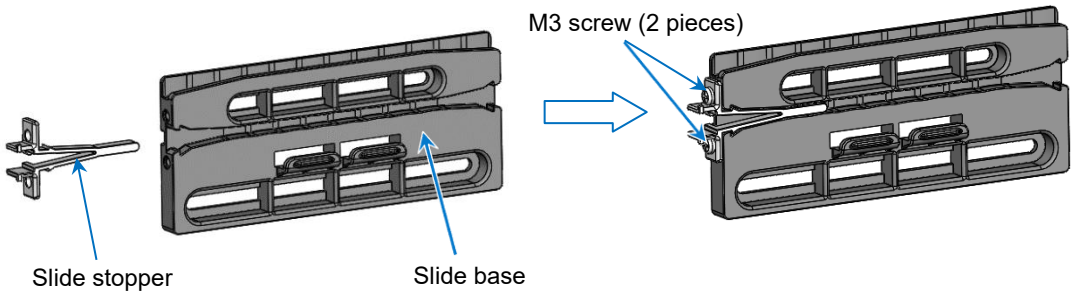
(1) Remove the handle on the left when viewing the main body from the front. You can remove the M4 screws at 2 locations shown below to remove the handle.



(2) Remove the M4 screws (at 3 locations) attached to the main body.



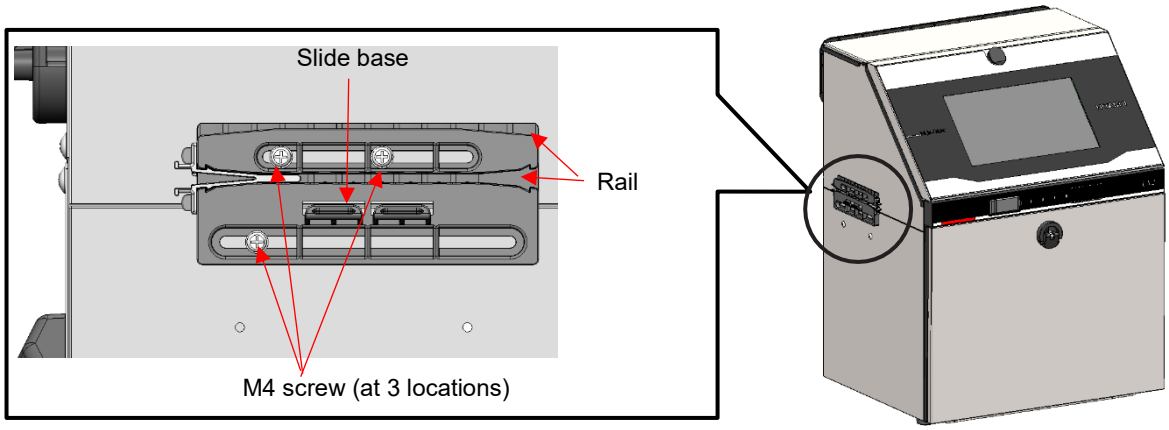
(3) Install the cleaning unit stopper on one side of the Slide base, and fix it with two M3 screws. All the parts are supplied as delivered items and accessories.



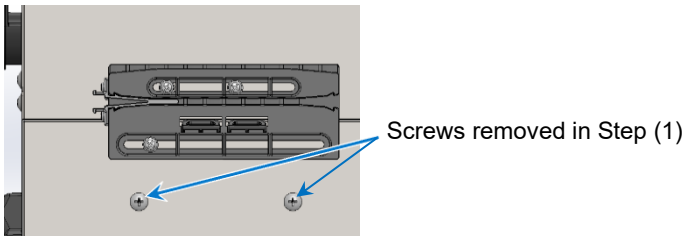
(4) Fix the Slide base to the main body with the supplied M4 screws (3 pieces).

NOTE

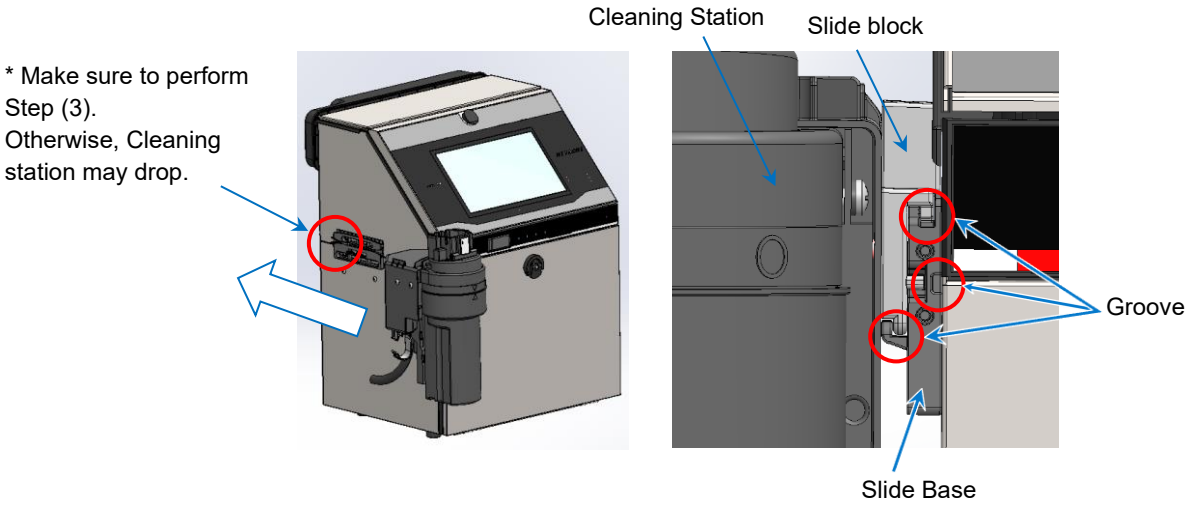
- Install the Cleaning Station with the rail facing up.
- Be careful for the loose screws. Looseness of the screws may cause rattling or dropping.
- Use the three screw holes on the upper side to fix the Slide base. The use of three screw holes on the lower side may damage parts when the Cleaning Station is installed or removed.



(5) Attach the M4 screws removed in Step (1) to their original positions.



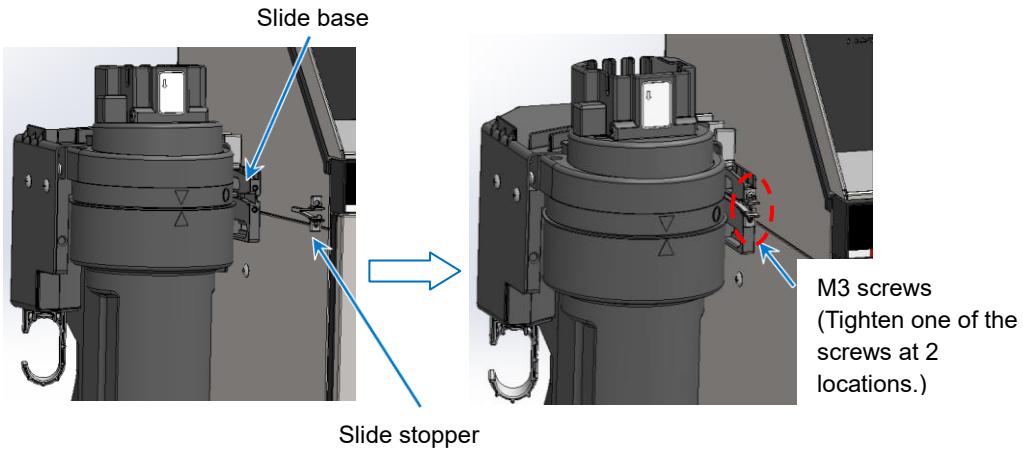
(6) Align the Slide base with the grooves of the slide block, and slide the jig to install it.



(7) Install the cleaning unit stopper (one piece) on the Slide base, and fix the Cleaning Station with the supplied M3 screws.

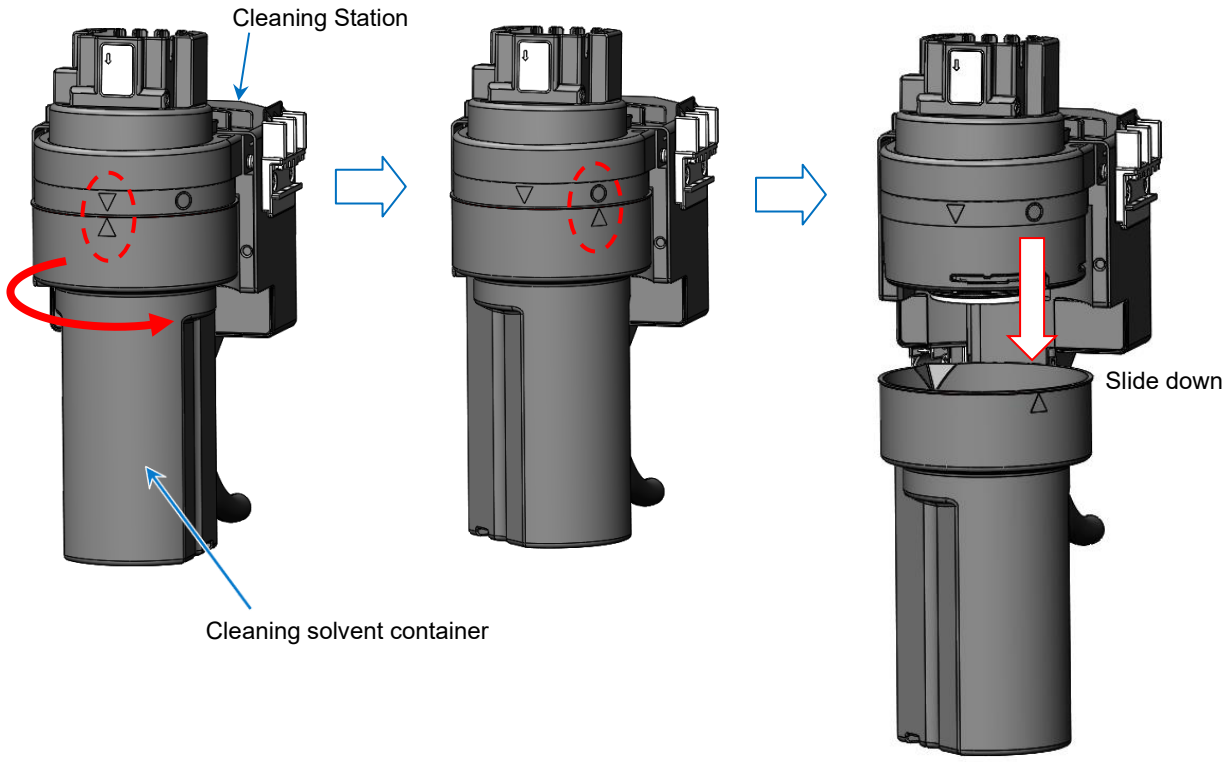
NOTE

- The M3 screw for fixing the cleaning unit stopper is a tapping screw. If the screw is tightened excessively, the screw hole may be damaged.



(8) Remove the cleaning solvent container.

<<How to remove the cleaning solvent container>>
Hold and turn the cleaning solvent container until its "△" mark is aligned with the "○" mark on the Cleaning Station. Then, slide the cleaning solvent container down to remove it from the Cleaning Station.

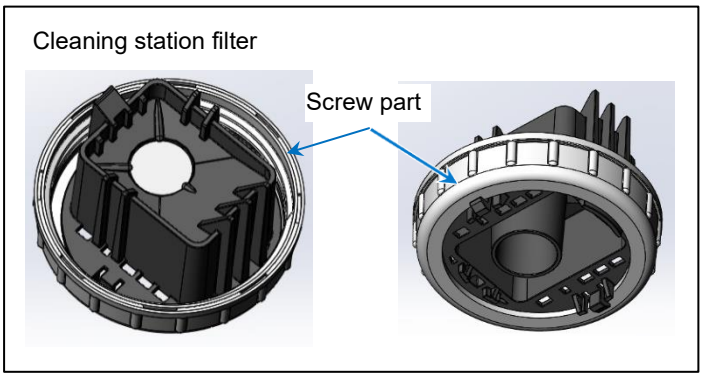


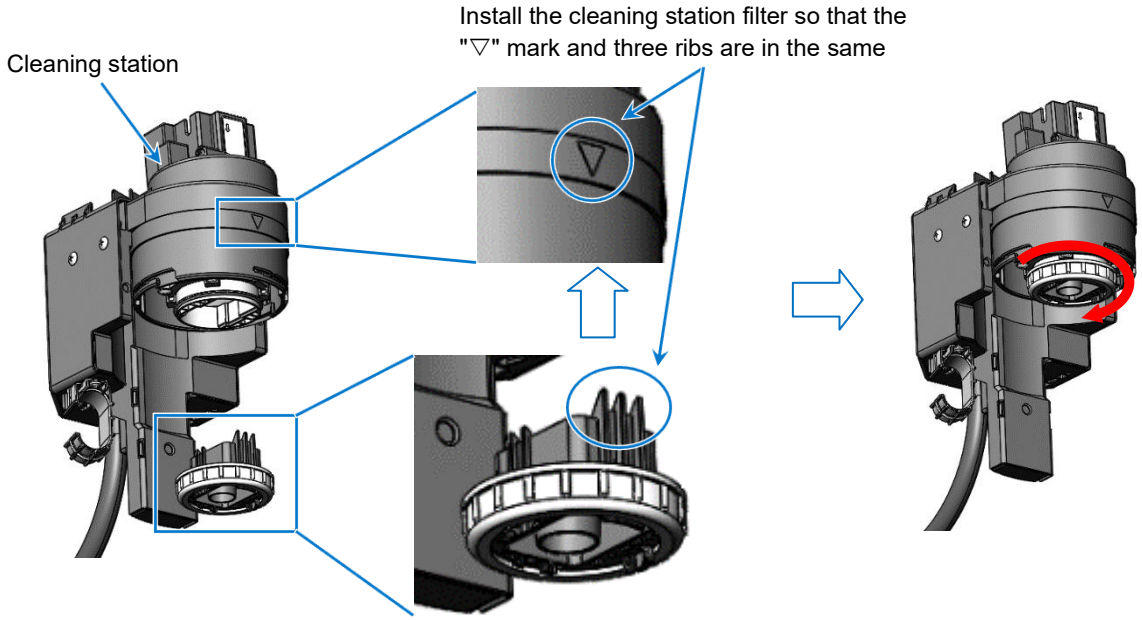
How to remove cleaning solvent container

(9) Install the cleaning station filter of accessories on the cleaning station.

NOTE
• Tighten the screw securely to prevent it from loosening. If the screw may become loose due to vibration, the Cleaning Station may fall.

<<How to install the cleaning station filter>>
Insert the cleaning station filter so that the "▽" mark on the Cleaning Station and three ribs of the filter are in the same direction. Turn and fix the screw parts of the cleaning station filter.

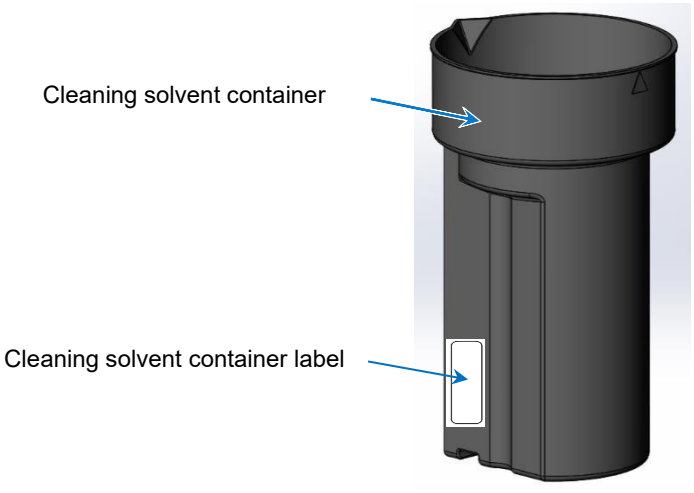




How to install cleaning station filter

(10) Write the start date of use on the cleaning solvent container label of accessories and attach it on the cleaning solvent container like below.

NOTE
● The service life of a cleaning solvent container is about two years. If the surface of the cleaning solvent container is broken, cracked, or chipped, stop using it and replace it with a new one.

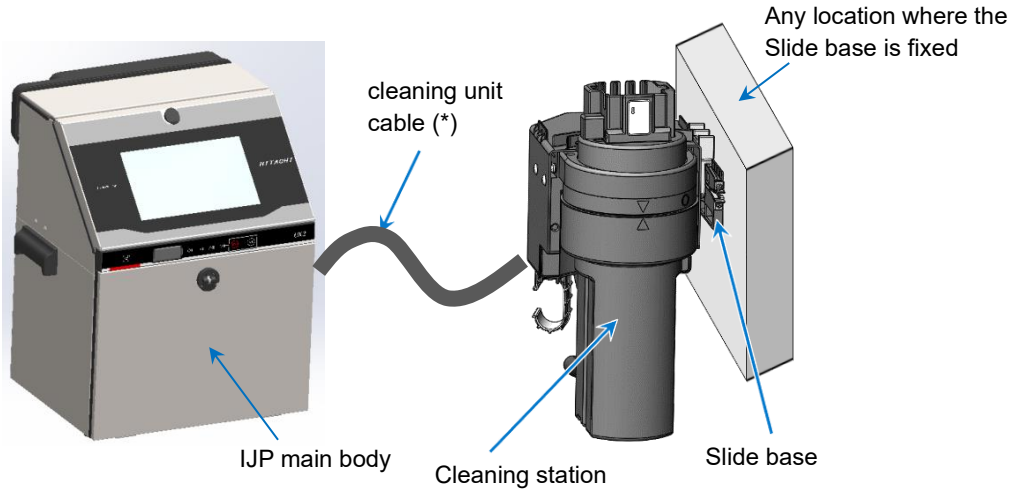


Attachment position of cleaning solvent container label

(11) Install the cleaning solvent container on the Cleaning station in the reverse order of its removal operation.

6.1.2. How to Install Cleaning Station on Parts Other Than Main body

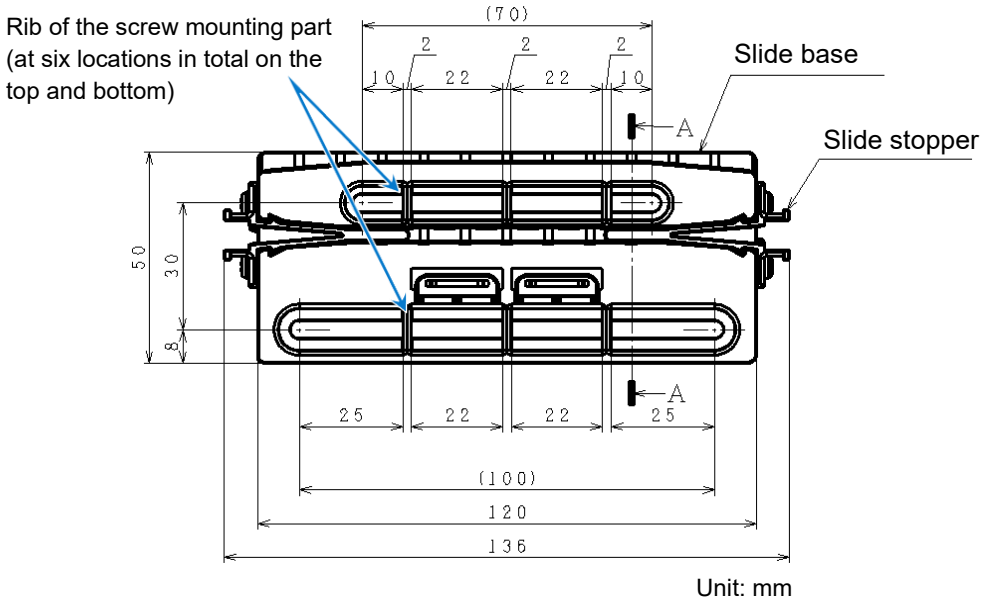
This section describes how to install the Cleaning Station on parts other than the main body.
When the Slide base is fixed at any location, the Cleaning Station can be installed away from the IJP main body.



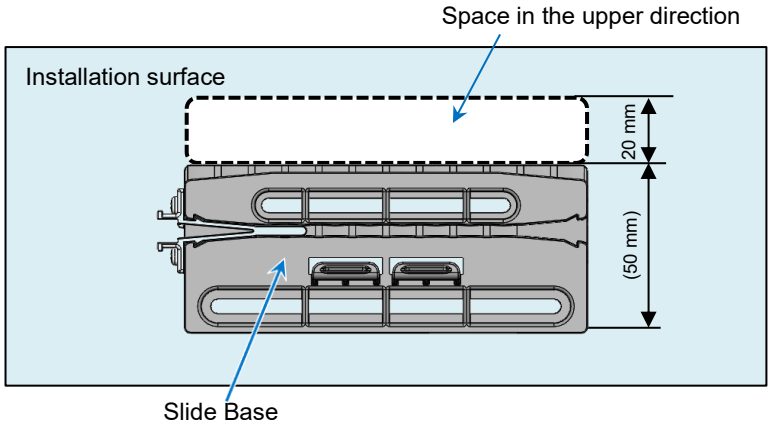
* The length of the cleaning unit cable is 4.5 m.

(1) Provide four M4 screw holes at a location where you want to install the Cleaning Station.

- The screws of the Slide base should be spaced referring to the dimensions shown below. Avoid interference with the ribs of the screw mounting part.

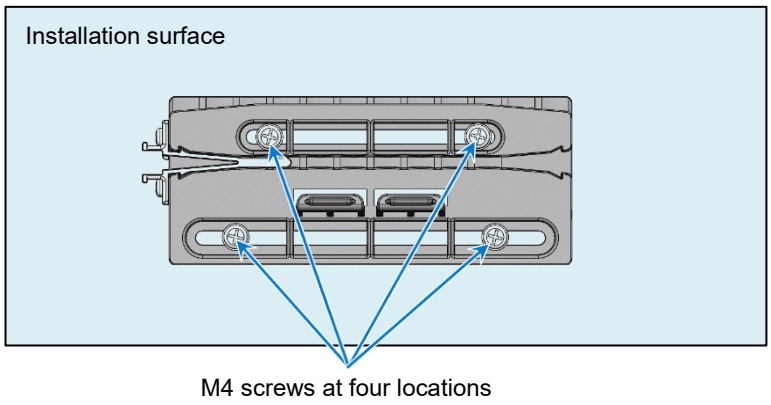


- Keep a space of 20 mm in the upper direction of the Slide base for the stable installation state of the Cleaning Station.



(2) Fix the Slide base with the supplied M4 screws (4 pieces).

- Fix the Slide base at a sturdy location which can withstand a load of 7 kg. (maximum load of the Cleaning Station: 7 kg)



- If you do not use the supplied M4 screws, use M4 screws (6 mm or more in length) whose screw head protrudes from the screw mounting part of the Slide base and does not interfere with the slide block.

6.1.3. Mounting pattern of the Cleaning Station on Main body

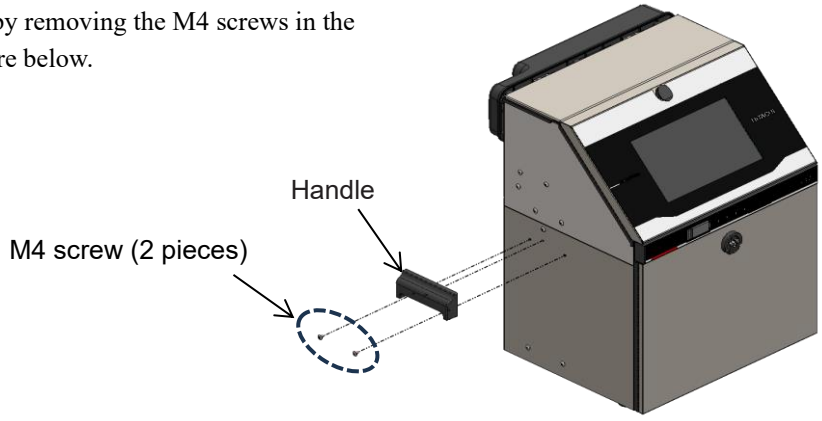
It is also possible to install the Cleaning Station on the main body in a different position from "6.1.1. How to Install Cleaning Station on Main body".

NOTE
● For this section, we mainly refer to "6.1.1. How to Install Cleaning Station on Main body", and the contents that are common are omitted. ● The support for the mounting patterns described below applies only to productions October 2023 onward.

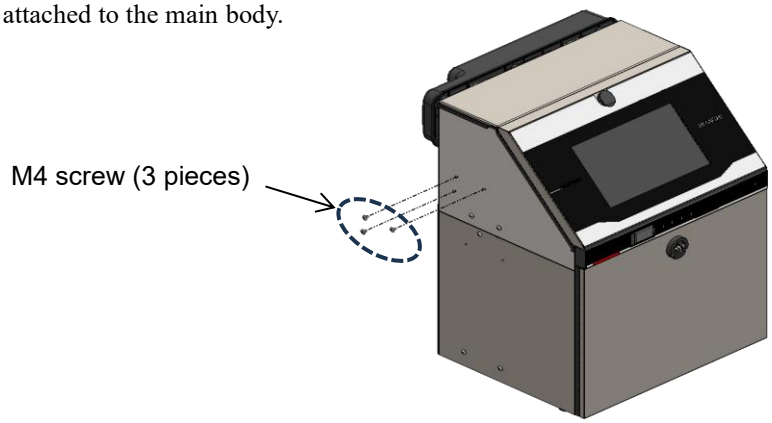
6.1.3.1. When you want to mount the Cleaning Station on the left side of the main body when viewed from the front

Please use the handle to carry the main body after mounting the Cleaning Station to the main body

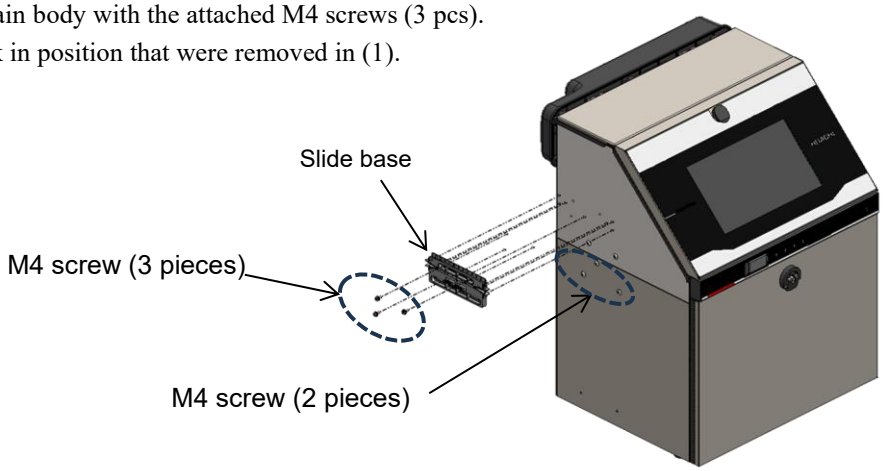
(1) Remove the left handle from the main body when viewed from the front. The handle can be removed by removing the M4 screws in the two places shown in the figure below.



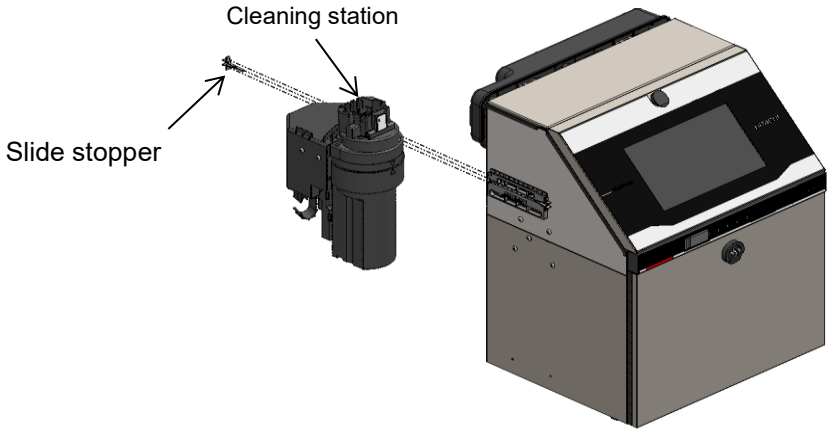
(2) Remove the M4 screws (3 places) attached to the main body.



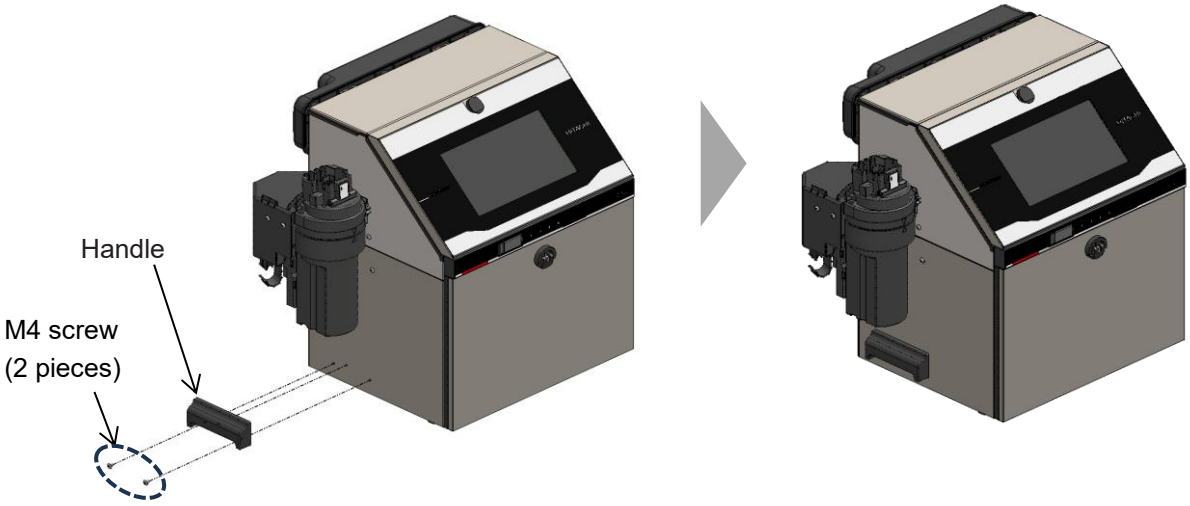
(3) Secure the Slide base to the main body with the attached M4 screws (3 pcs).
Attach M4 screws (2 pcs) back in position that were removed in (1).



(4) Mount Cleaning Station to the main body.



(5) Remove the M4 screws (two places) on the main body once and use these M4 screws to attach the handle.

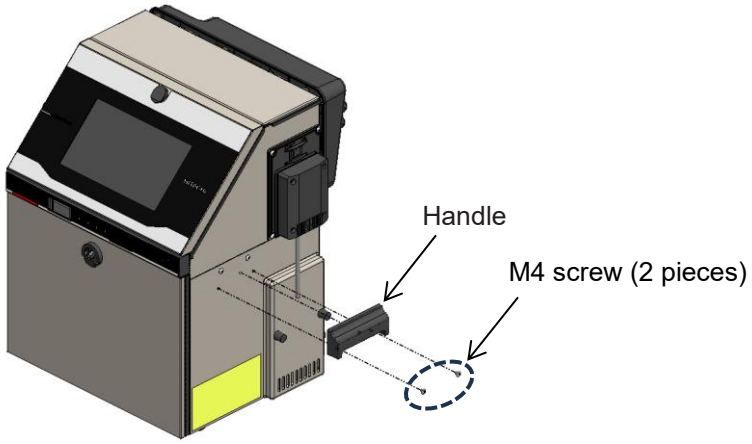


This completes the installation of the Cleaning Station.

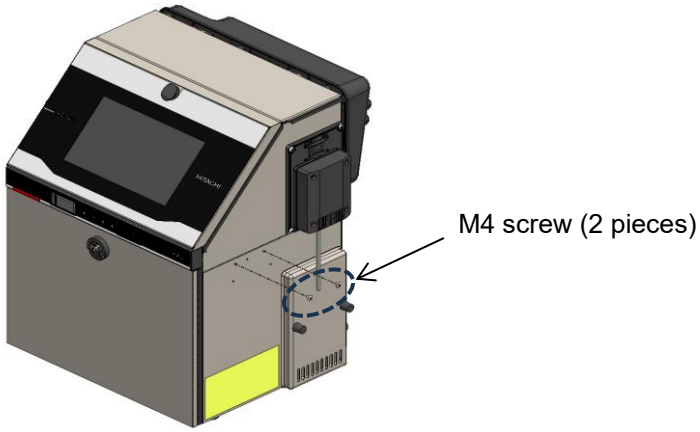
6.1.3.2. When you want to mount the Cleaning Station on the right side of the main body when viewed from the front

Please use this method when you want to mount the Cleaning Station on the right side of the main body when viewed from the front.

(1) Remove the right handle from the main body when viewed from the front.
The handle can be removed by removing the M4 screws in the two places shown in the figure below.



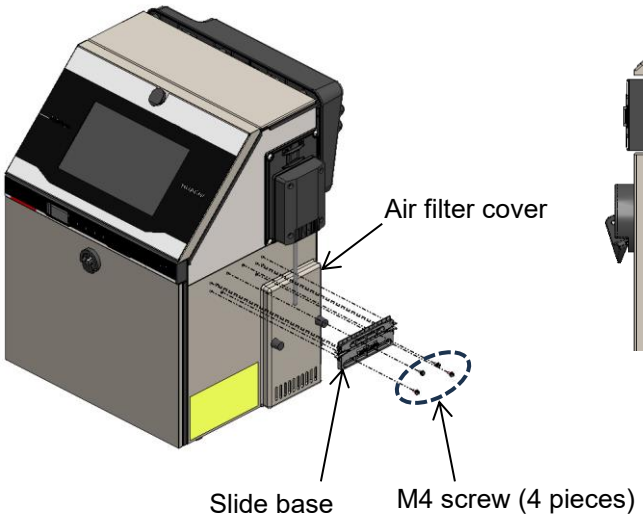
(2) After removing the handle, remove the M4 screws (2 places) attached to the main body

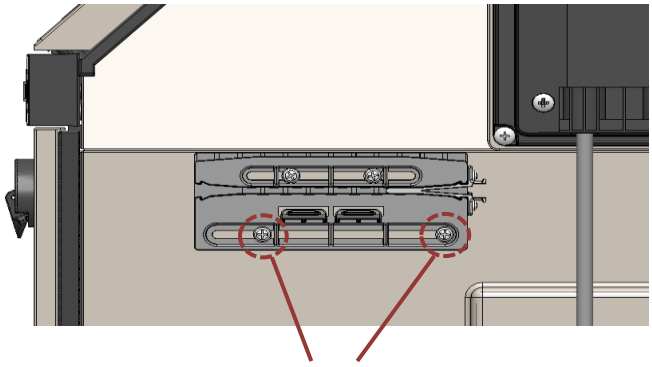


(3) Use attached M4 screws (4 pcs) to fix the Slide base to the main body.

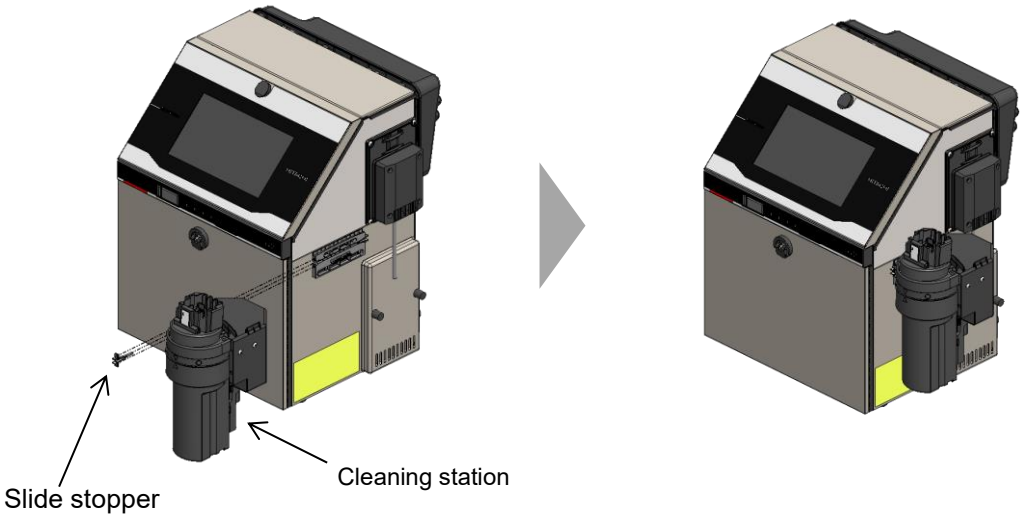
NOTE

- Secure the Slide base closer to the front of the main body. If the Slide base is fixed closer to the rear of the main body, the workability may lower when removing and installing the Air filter cover when replacing the Air filter.





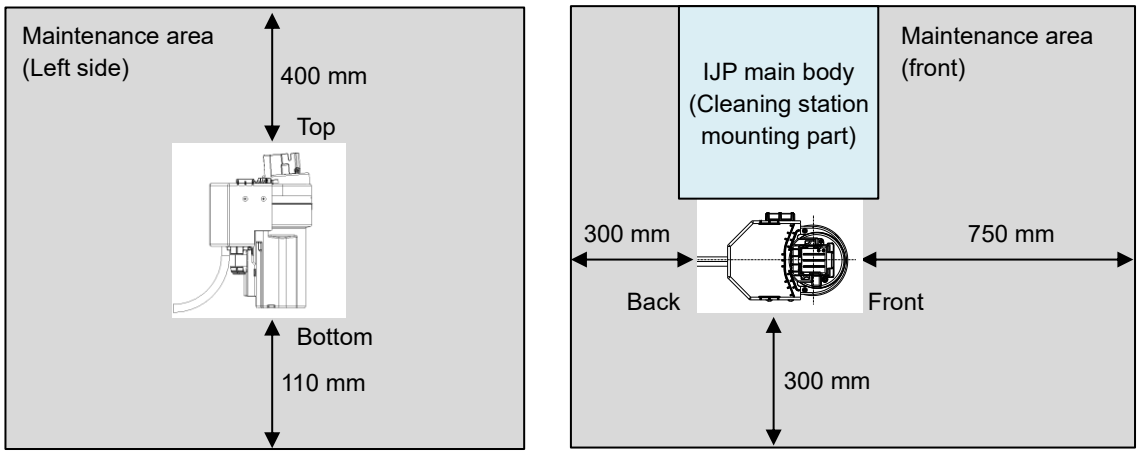
(4) Mount the Cleaning Station.



This completes the installation of the Cleaning Station.

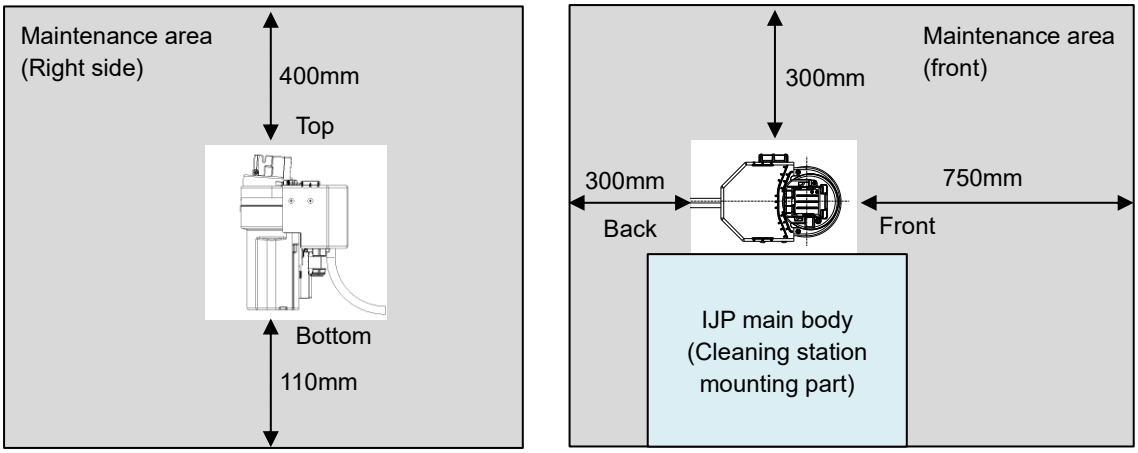
6.2. Cautions on Installation of Cleaning Station

(1) Keep the areas shown in the figure below around the Cleaning Station for daily operations, handling, maintenance, and inspection.



Installation position of Cleaning Station

(When fixing the Cleaning Station on the left side when viewed from the front of the main body)

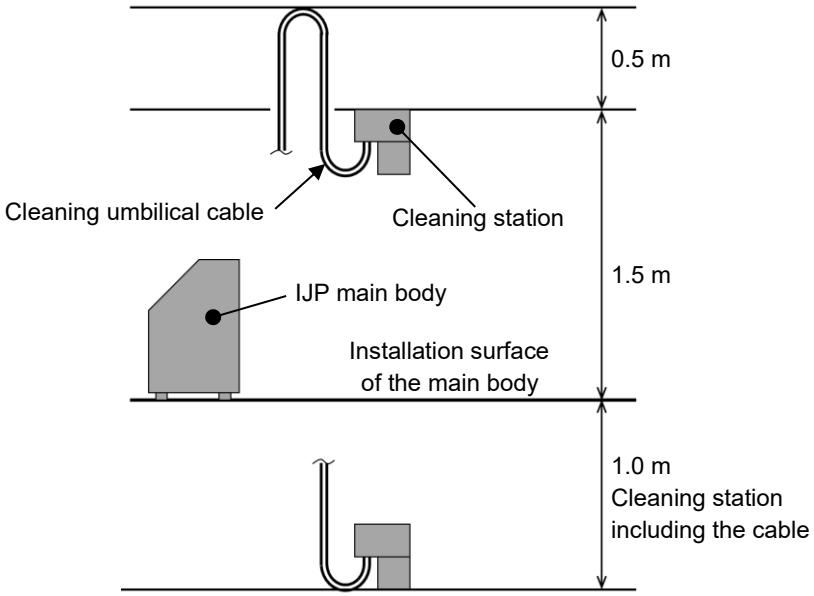


Installation position of Cleaning Station

(When fixing the Cleaning Station to the right side when viewed from the front of the main body)

(2) Install the Cleaning Station and cleaning cable under the conditions below.
Failure to observe them may affect cleaning performance (cleaning ink stains or drying the head).

- Install the Cleaning Station within 1.5 m above and 1.0 m below the installation surface of the main body.
- Make sure that the length of raising the cable from the Cleaning Station is 0.5 m.
- Install the Cleaning Station horizontally.
- Install the Cleaning Station cable at a bend radius of 150 mm or longer.

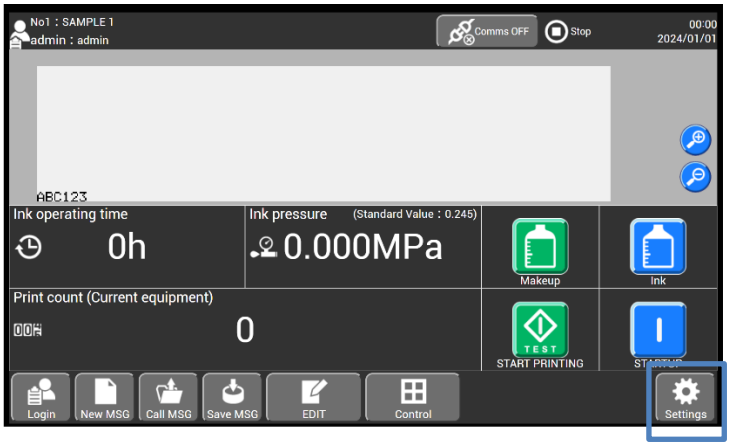


Installation positions of Cleaning Station and cleaning umbilical cable

6.3. Safe-Clean Station Function, Operation and Details of Control on Screen

6.3.1. Operation of Safe-Clean Station Function

1 Press Settings on the [HOME] screen.



2 Press Safe clean station on the [Settings] screen.

The page layout of the [Settings(Safe clean station)] screen is as follows:

3 Select the function you want to perform, and the operation guidance appears.

- Follow the operation guidance to perform the operation.

6.3.2. Details of Safe-Clean Station Function

Circulation control name	Description	Acceptable state
Head washing	Cleans the print head using the Safe-Clean Station. For the operation procedure, see "11.2. Head Cleaning Using Cleaning Station" in the Instruction Manual.	Stop or standby
Safe Clean station environment setup	Configures various settings of the Safe-Clean Station function. (1) You can select one from the head cleaning modes. (2) You can change a value in [Setting head drying time]. For the operation procedure for (1) and (2) listed above, see "11.1. Setting Head Cleaning Mode" in the Instruction Manual. (This setting is applied for only head cleaning.) (3) You can set an automatic operation period in [Automatic Circulation during Stop(S)]. See "6.3.5 Automatic Circulation during Stop (S)".	Stop
Eject ink (S)	Starts ink ejection using the Cleaning station. If a fault is detected at the start of ink ejection, the nozzle is automatically cleaned and ink ejection starts again. For the operation procedure, see "11.3. Start Operation Using Cleaning station" in the Instruction Manual.	Stop
Nozzle backwash (S)	Cleans the nozzle by using the Cleaning Station to suck makeup from the nozzle orifice. See "6.3.4. Nozzle Backwash (S)".	Stop
Gutter Cleaning (S)	Cleans the recovery route by using the Cleaning Station to suck makeup from the gutter. See "6.3.3. Gutter Cleaning (S)".	Stop
Automatic Circulation during Stop(S)	Prevents sticking by using the Cleaning station to automatically operate the unit periodically. See "6.3.5. Automatic Circulation during Stop (S)".	Stop
Improving High ink viscosity	Used at the occurrence of the [Ink Viscosity High] warning. The ink viscosity is adjusted. See "6.3.7. Improving High ink viscosity".	Standby
Head Cleaning + Ink Ejection (S)	Automatically performs the process from head cleaning to ink ejection using the Cleaning station. If a fault is detected at the start of ink ejection, the nozzle is automatically cleaned and ink ejection starts again. See "6.3.6. Head Cleaning + Ink Ejection (S)	Stop

*1 Gutter Cleaning (S) is not available to UX2-D150W and Short print head (Optional parts)

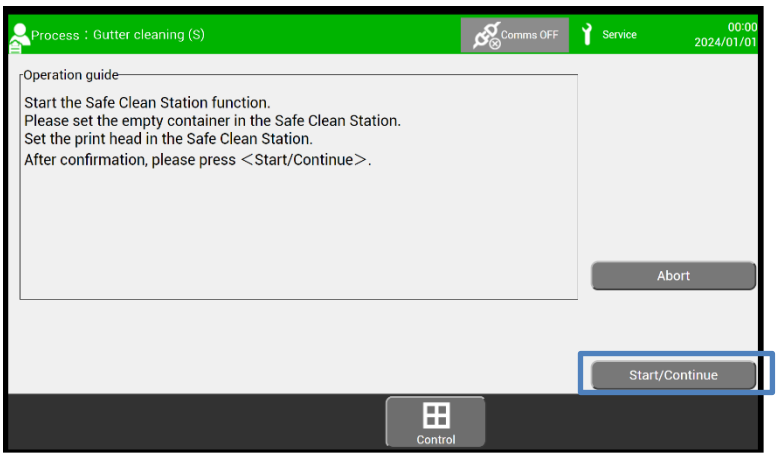
6.3.3. Gutter Cleaning (S)

- If the recovery route is dried up or is clogged, performing gutter cleaning (S) using the Cleaning station allows cleaning of the range from the gutter to the main ink tank.
- You cannot perform this operation during ink ejection. Switch the unit to the stop state before performing it.
- Continuous gutter cleaning (S) may cause thinning of ink, resulting in printing disturbance. Ink replacement may be required after the problem is corrected. Limit the number of times that consecutive gutter cleaning is performed to a maximum of two.
- Gutter Cleaning (S) is not available to UX2-D150W and Short print head (Optional parts).

1 Insert the print head into the Cleaning station. (See Steps 1 to 6 in "11.2. Head Cleaning Using Cleaning station" of the Instruction Manual.)

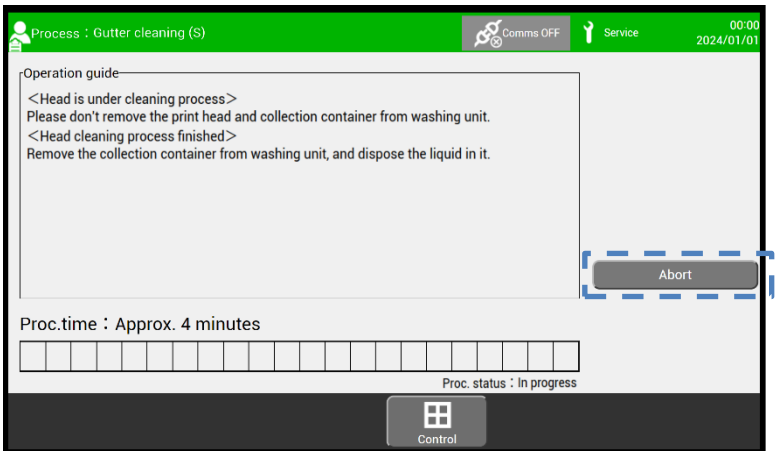
2 Press Gutter Cleaning (S) on the [Settings(Safe clean station)] screen.

3 The screen below appears. Press [Start/Continue].

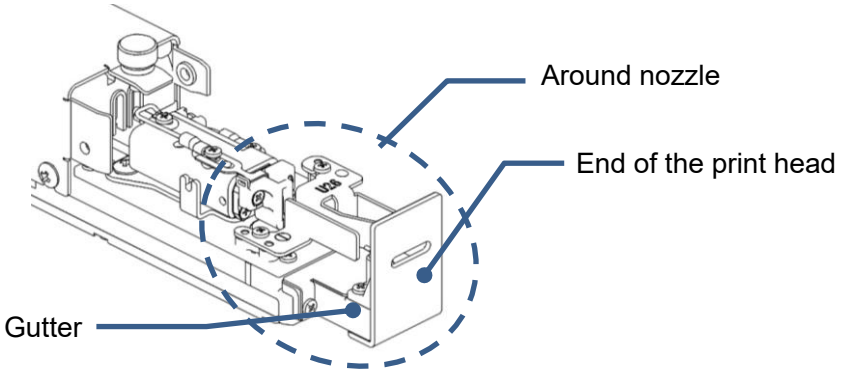


4 When the cleaning process starts, the screen below appears.

- To abort the process, press the Abort button.



5 Remove the print head from the Cleaning station and make sure that the area around the nozzle including the gutter and the end of the print head is cleaned and the makeup is dried up.



NOTE

- The ink stain may remain or the head is not dried enough depending on the ink stain level or operating environment.
- After cleaning, wipe off the print head with wiping paper if it is wet.
- If the print head is stained after cleaning, perform head cleaning again or clean the print head using a cleaning bottle.
- If the ink does not come off easily, wipe it off with wiping paper soaked in makeup.
- Do not apply excessive force to the electrode when wiping. Otherwise, the print head may deform, causing an unexpected malfunction.

6 Remove the cleaning solvent container from the Cleaning station and dispose of the makeup in the bottle. (See Steps 11 to 12 in "11.2. Head Cleaning Using Cleaning station" of the Instruction Manual.)

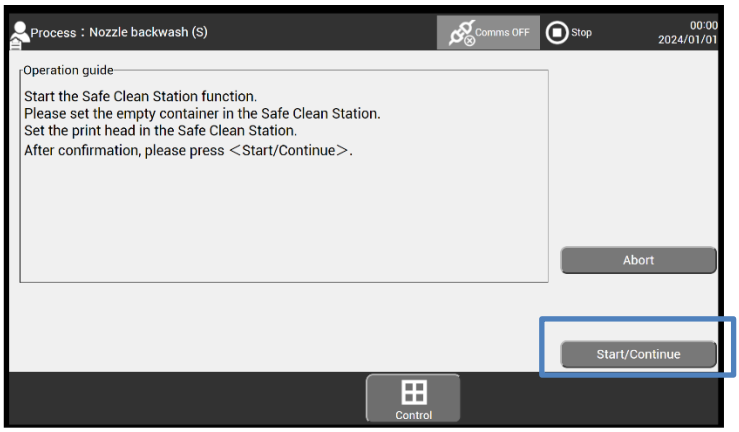
6.3.4. Nozzle Backwash (S)

- Nozzle backwash (S) using the Cleaning station sucks the makeup from the nozzle orifice and removes attached foreign objects.
- You cannot perform this operation during ink ejection. Switch the unit to the stop state before performing it.
- Continuous nozzle backwash (S) may cause thinning of ink, resulting in printing disturbance. Ink replacement may be required after the problem is corrected. Limit the number of times that consecutive nozzle backwash is performed to a maximum of three.
- If it is not corrected even after nozzle backwash is performed three times, perform the procedure described in "5.4.2. Disassembly and Cleaning of Nozzle Orifice".

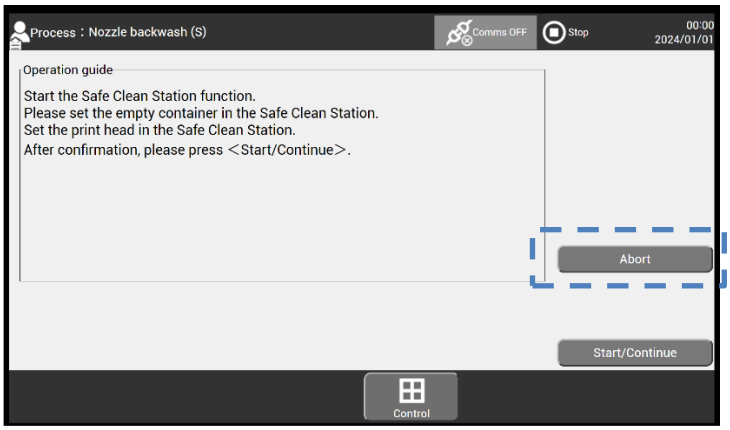
1 Insert the print head into the Cleaning station. (See Steps **1** to **6** in "11.2. Head Cleaning Using Cleaning station" of the Instruction Manual.)

2 Press Nozzle backwash (S) on the [Settings(Safe clean station)] screen.

3 The screen below appears. Press [Start/Continue].

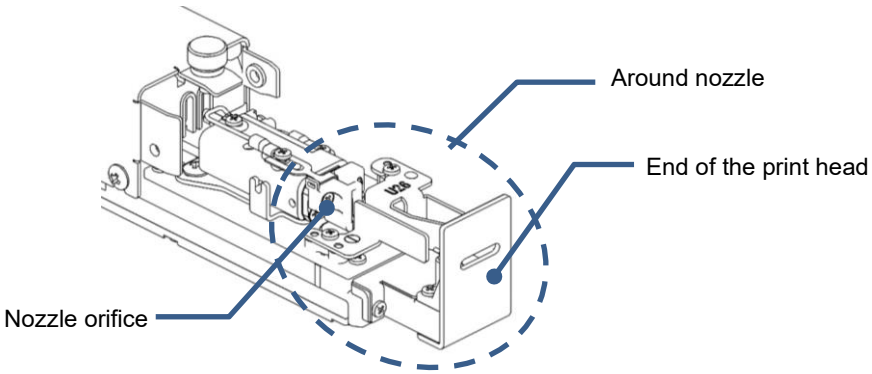


4 When the cleaning process starts, the screen below appears.



- To abort the process, press the Abort button.

5 Remove the print head from the Cleaning station and make sure that the area around the nozzle including the nozzle orifice and the end of the print head is cleaned and the makeup is dried up.



NOTE

- The ink stain may remain, or the head is not dried enough depending on the ink stain level or operating environment.
- After cleaning, wipe off the print head with wiping paper if it is wet.
- If the print head is stained after cleaning, perform head cleaning again or clean the print head using a cleaning bottle.
- If the ink does not come off easily, wipe it off with wiping paper soaked in makeup.
- Do not apply excessive force to the electrode when wiping. Otherwise, the print head may deform, causing an unexpected malfunction.

6 Remove the cleaning solvent container from the Cleaning station and dispose of the makeup in the bottle. (See Steps 11 to 12 in "11.2. Head Cleaning Using Cleaning station" of the Instruction Manual.)

6.3.5. Automatic Circulation during Stop (S)

● Prevent sticking by using the Cleaning station to automatically operate the unit periodically.

6.3.5.1. Operation of Automatic Circulation during Stop (S)

This section describes the operation of automatic circulation during stop (S).

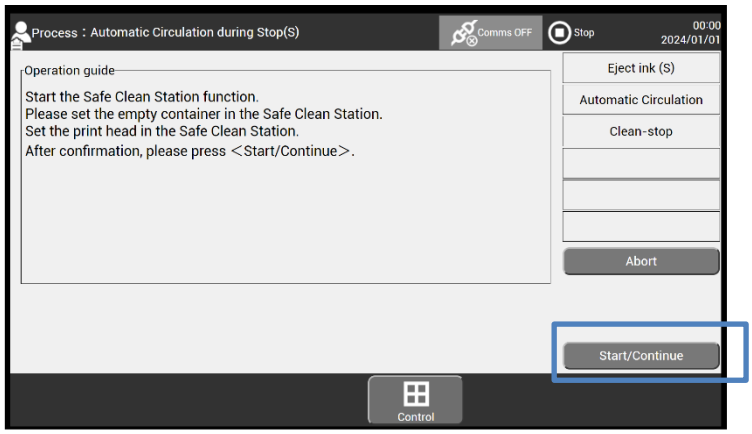
NOTE

- If the unit is powered off when automatic circulation during stop (S) is in progress, the process is aborted.
  In the case power it on, and perform automatic circulation during stop (S) again.
- Automatic circulation during stop (S) will use approximately 8 ml of Makeup per day. If some faults occur when automatic circulation during stop (S) is in progress, this process automatically restart only once after cleaning print head. (Approximately 40 ml makeup will be consumed). If the warning [Makeup Low Warning] appear when automatic circulation during stop (S) is in progress, the process is aborted. Please check the Makeup level and replenish as needed before starting this process.
- If a fault is detected when automatic circulation during stop (S) is in progress, the process is aborted.

1 Insert the print head into the Cleaning station.
(See Steps 1 to 6 in "11.2. Head Cleaning Using Cleaning station"" of the Instruction Manual.)

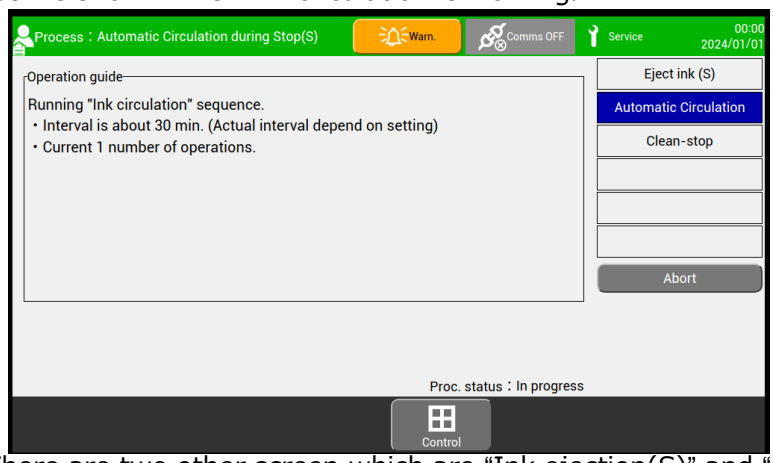
2 Press Automatic Circulation during Stop(S) on the [Settings(Safe clean station)] screen.

3 The screen below appears. Press [Start/Continue].



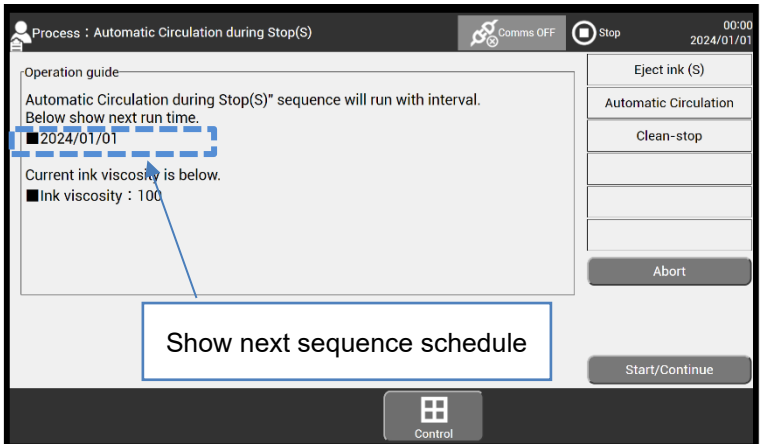
4 The following four screens are displayed alternately depending on the status when automatic circulation during stop (S) is in progress.

<This screen is shown when ink circulation is working>



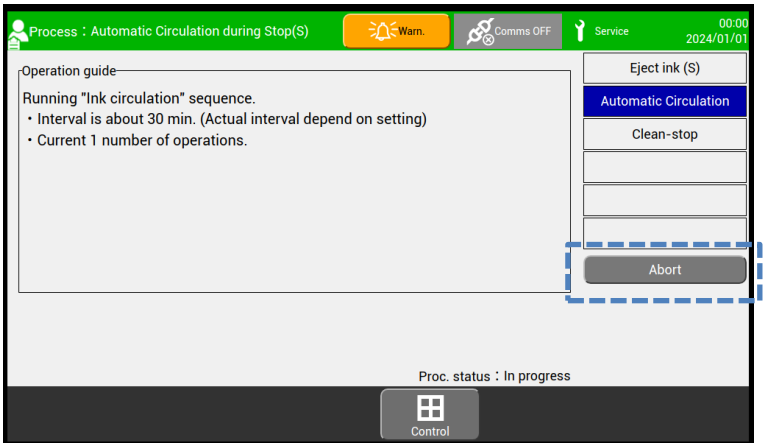
※ There are two other screen which are “Ink ejection(S)” and “Cleaning Stop”.

<This screen is shown when stop status>



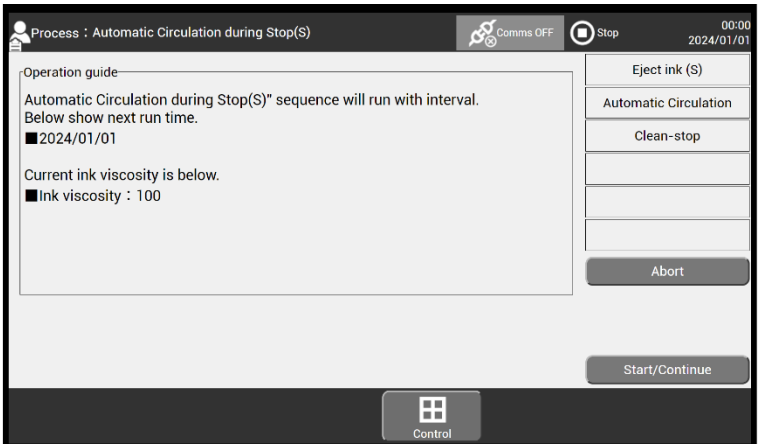
5 To finish the process, press [Abort].

(a) Press [abort] during showing the following screen, go to HOME screen with Standby status.



※ If press [abort] during “Ink Ejection(S)” or “Cleaning Stop” is in progress, “No cleaning stop” will run. Please clean the nozzle in print head.

(b) Press [abort] during showing the following screen, go to HOME screen with Stop status.



NOTE

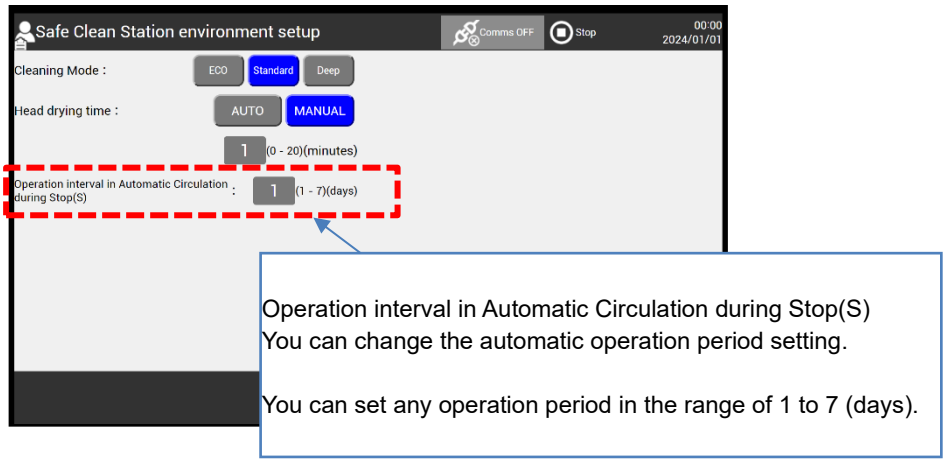
- The ink viscosity will gradually change during use of this function (It is depend on ambient temperature, usage interval of this function and ink type). If the [Ink Viscosity High] warning occurs, perform the operation described in "6.3.7. Improving High Ink Viscosity ".
- Repeat aborting automatic circulation during stop (S) may cause thinning of ink.

6.3.5.2. Setting of Automatic Circulation during Stop (S)

This section describes how to change the automatic operation period setting.

1 Press Safe Clean station environment setup on the [Settings(Safe clean station)] screen.

2 Set Operation interval in Automatic Circulation during Stop(S) .



3 Press OK in the lower right of the screen, and the settings are applied.

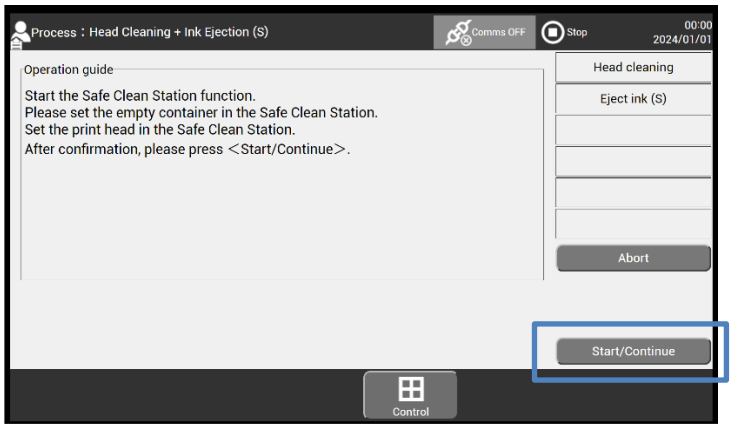
6.3.6. Head Cleaning + Ink Ejection (S)

- The process from head cleaning to ink ejection is automatically performed using the Cleaning station.
- Switch the unit to the stop state before performing it.
- Head cleaning mode [Eco, Standard, Deep] is possible to change (see "11.1 Setting Head Cleaning Mode " of the Instruction Manual)
- The drying time automatically changes depending on the ink type or IJP detection temperature .

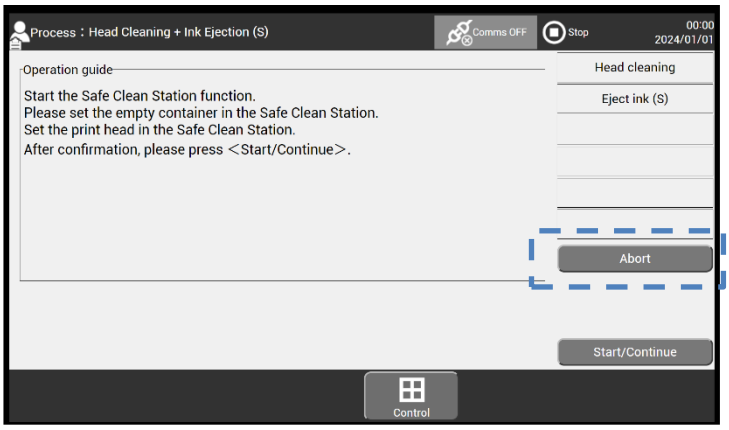
1 Insert the print head into the Cleaning station. (See Steps **1** to **6** in "11.2. Head Cleaning Using Cleaning station" of the Instruction Manual.)

2 Press Head Cleaning + Ink Ejection (S) on the [Settings(Safe clean station)] screen.

3 The screen below appears. Press [Start/Continue].

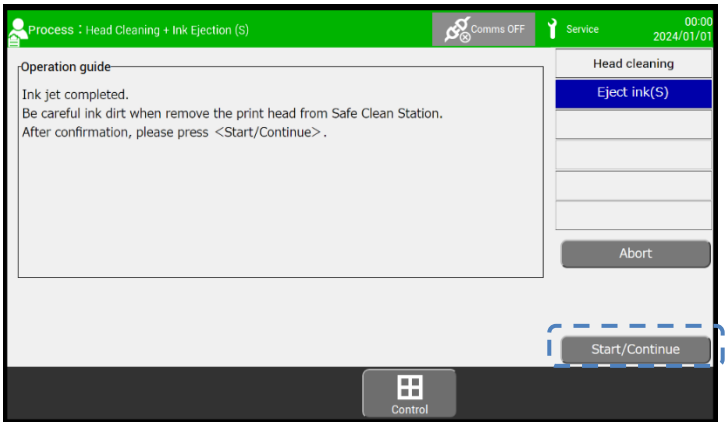


4 The screen below appears after starting Head Cleaning + Ink Ejection (S).



- To abort the process, press the Abort button.

5 Press the Start/Continue key



Startup screen

NOTE

- If some faults occur when automatic circulation during stop (S) is in progress, automatically this process restart only once after cleaning print head. If faults appear again, please follow guidance on the message which is displayed on screen.
- If any vibration or impact is applied to the print head during removing print head from Cleaning station, there is possibility that print head get dirt.

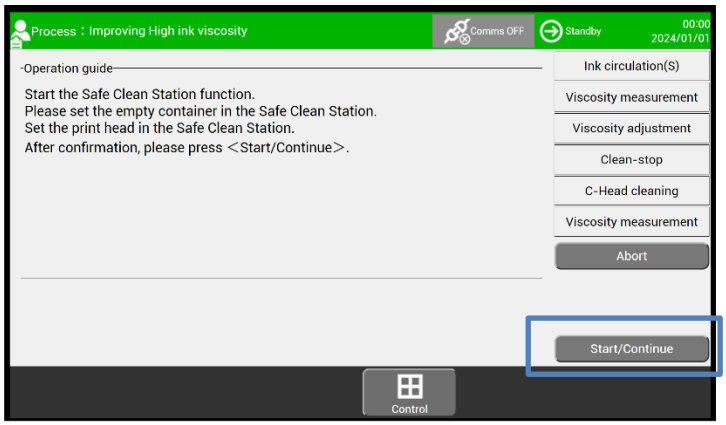
6.3.7. Improving High Ink Viscosity

- For high ink viscosity, use the Cleaning station to adjust the ink viscosity.
- Basically use this function when "High Ink Viscosity" warning appear.
- Switch the unit to the standby state before performing it.

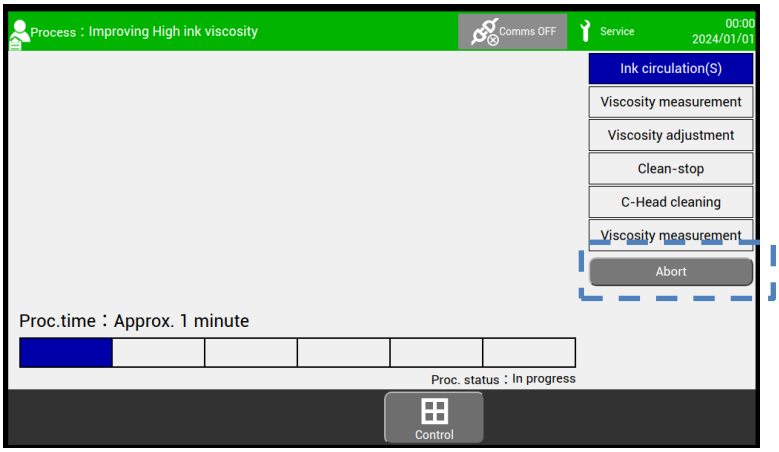
1 Insert the print head into the Cleaning station. (See Steps 1 to 6 in "11.2. Head Cleaning Using Cleaning station" of the Instruction Manual.)

2 Press Improving High ink viscosity on the [Settings(Safe clean station)] screen.

3 The screen below appears. Press [Start/Continue].

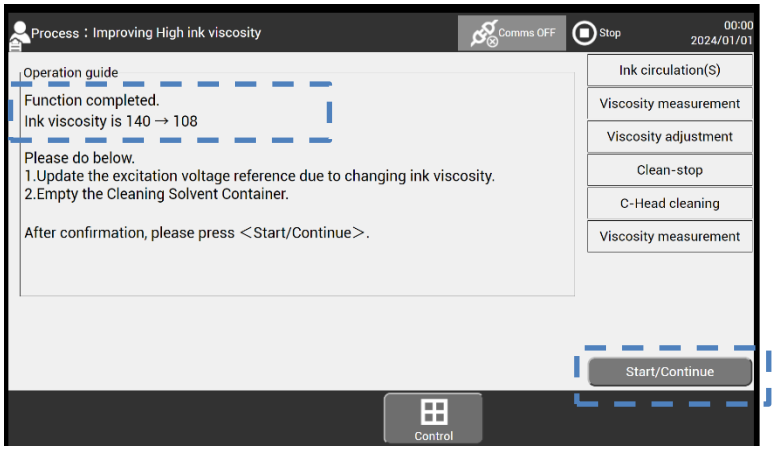


4 The screen below appears after starting Improving High Ink Viscosity



- To abort the process, press the Abort button.

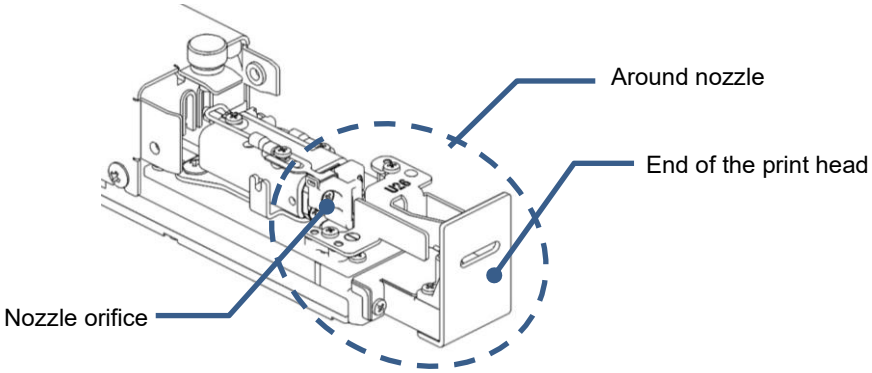
5 Confirm ink viscosity on the screen below, then Press [Start/Continue].



NOTE

- The ink viscosity may not reach 100 %. However, there is no problem if no warning message.
- If ink viscosity is higher than 140, we recommend replacing ink (see “5.3 Replacing ink”)

6 Remove the print head from the Cleaning station and make sure that the area around the nozzle including the nozzle orifice and the end of the print head is cleaned and the makeup is dried up.



NOTE

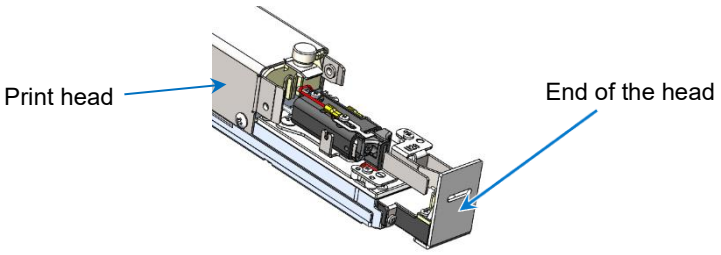
- The ink stain may remain or the head is not dried enough depending on the ink stain level or operating environment.
- After cleaning, wipe off the print head with wiping paper if it is wet.
- If the print head is stained after cleaning, perform head cleaning again or clean the print head using a cleaning bottle.
- If the ink does not come off easily, wipe it off with wiping paper soaked in makeup.
- Do not apply excessive force to the electrode when wiping. Otherwise, the print head may deform, causing an unexpected malfunction.

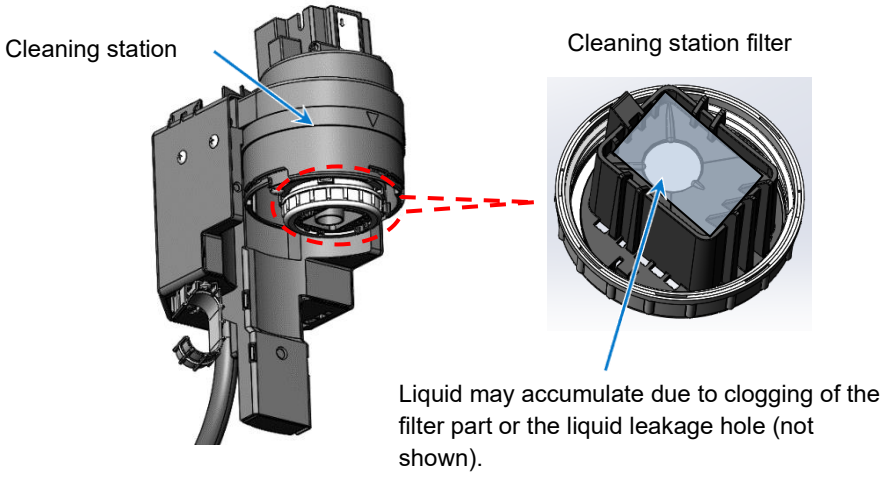
7 Remove the cleaning solvent container from the Cleaning station and dispose of the makeup in the bottle. (See Steps 11 to 12 in "11.2. Head Cleaning Using Cleaning station" of the Instruction Manual.)

6.4. Maintenance of Cleaning Station

6.4.1. Cleaning station filter

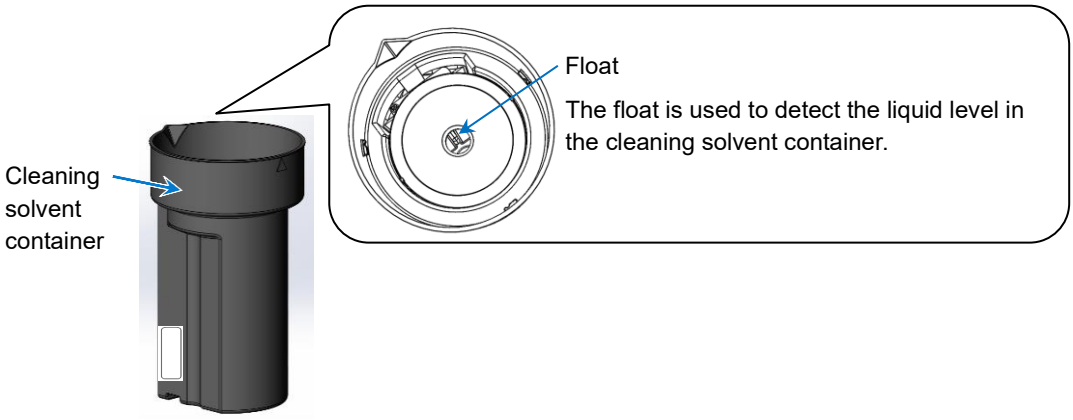
If the end of the print head is entirely wet after head cleaning, the cleaning station filter may be clogged.
In that case, replace the cleaning station filter.





6.4.2. Cleaning solvent container

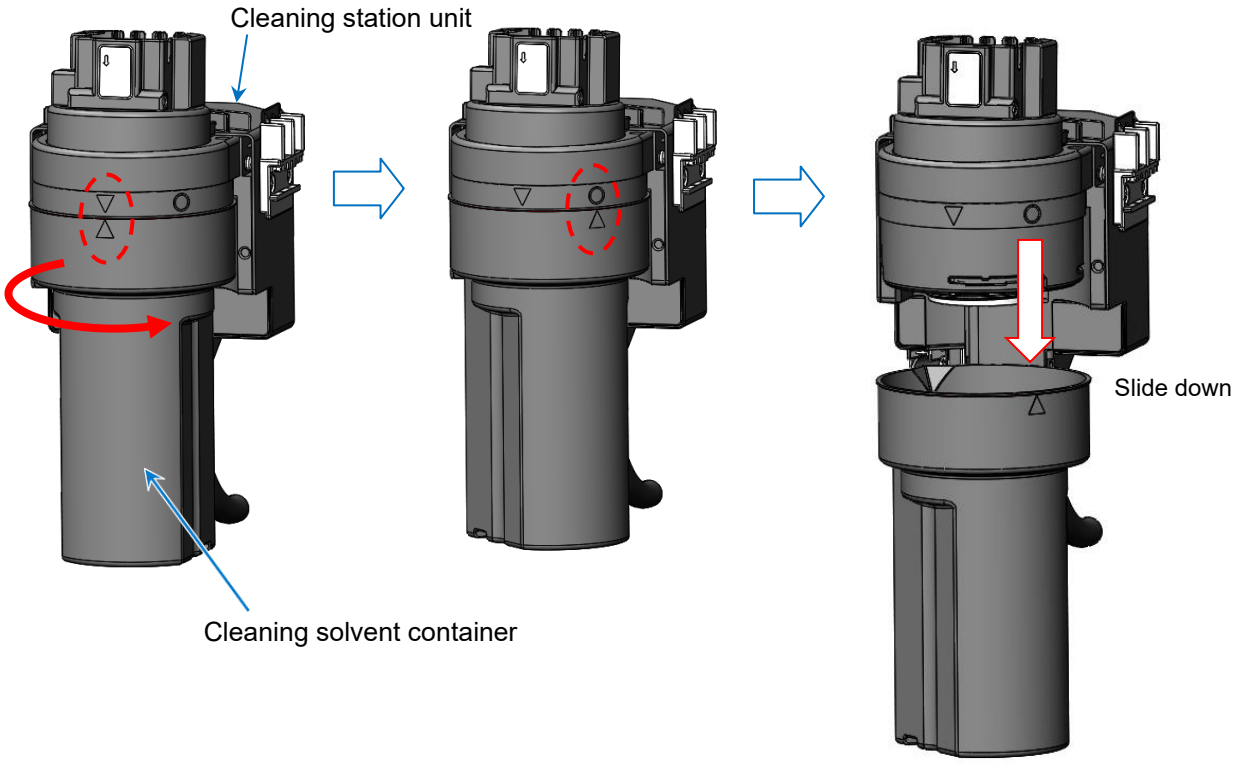
As a guide, replace the cleaning solvent container two years after use. If its surface is broken, cracked, or chipped before a lapse of two years, it should be replaced.
After it is left for a long time, the float may be stuck.
Replace the cleaning solvent container if the float is still stuck even after cleaning it with makeup.



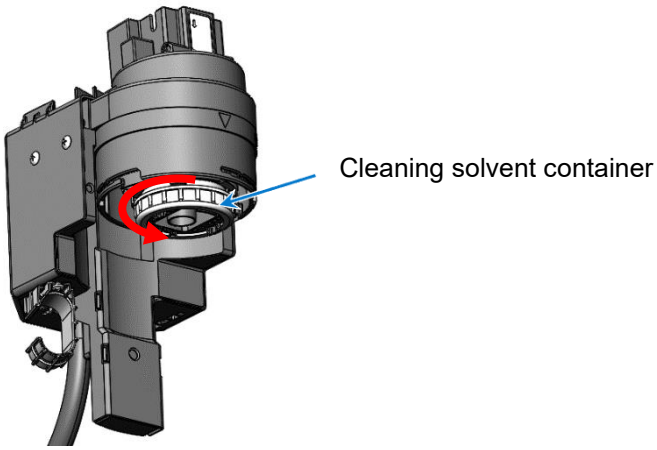
6.4.3. Cleaning Nozzle

Please clean the cleaning nozzle according to the following process if head cleaning capability decrease.
After that if it doesn't repair, it is recommended to contact your nearest local distributor and ask for the work.

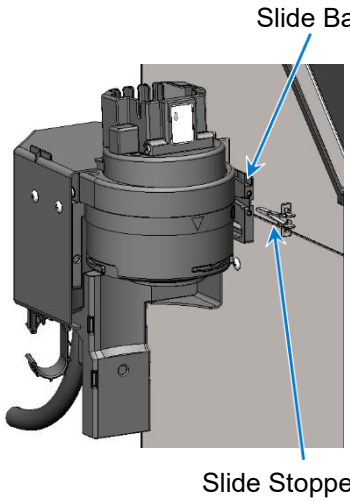
1 Remove the Cleaning solvent container.

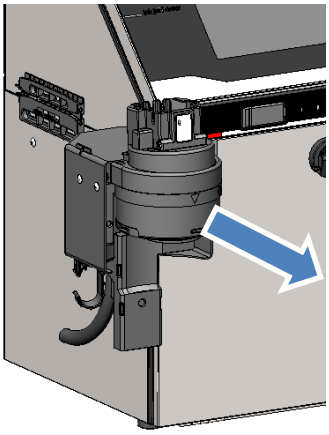


2 Remove the Cleaning station filter

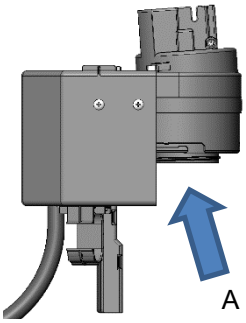


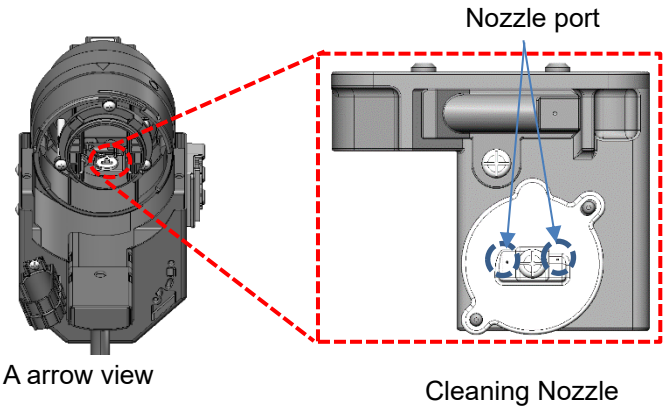
3 Remove the Slide stopper from Slide base, then remove the Cleaning Station.





4 Brush around Nozzle port by toothbrush with solvent.





NOTE
● There is possibility to drip solvent from nozzle port.

5 Reverse the procedure above to reassemble the cleaning station unit in its original position.

7. Maintenance Service

Perform the maintenance work below to keep performance of the unit.

NOTE

- Use consumables and periodic replacement parts designated by Hitachi.
  If you use parts that are not designated by Hitachi, the specified performance may not be delivered.

(1) Replacement of consumables

Replace the consumables of the unit listed below according to the recommended time of replacement.

Recommended time of replacement

No.	Consumable (order name)	Recommended time of replacement	Parts code No.	Remarks
1	Ink filter (ink filter part)	2,400 hours	451867	For the replacement procedure, see "5.7. Replacing Ink Filter".
2	Recovery filter (mini filter part)	1,200 hours	451857	One pack contains two parts. For the replacement procedure, see "5.8. Replacing Recovery Filter".
3	Air filter (air filter AF3 part)	2,400 hours	451963	One pack contains two parts. For the replacement procedure, see (3) in this section.
4	Cleaning station filter (cleaning station filter part)	(*1)	452199	Only model with Cleaning station. For the replacement procedure, see "6.1. Installation of ".
5	Cleaning solvent container (cleaning solvent container part)	2 years (*2)	452200	Only model with Cleaning station. For the replacement procedure, see "6.1. Installation of ".

- In a typical operation case (eight hours per day, 25 days per month), 2,400 hours equals one year.
- The minimum retention period of repair parts for the IJ Printer, including consumables, is seven years after discontinuation of manufacture.
- When ordering consumables, provide the order name and the Parts code number.
- The periodic replacement parts differ depending on the ink type. See the handling guidance of each ink "4. Precautions" for details.

(*1) Because the amount of accumulated dirt varies depending on the operating frequency and operating environment, the recommended time is not set. The recommended time and method of replacement are described in Section .

(*2) The degree of deterioration of the cleaning solvent container varies depending on the operating frequency and operating environment. If the surface of the cleaning solvent container is broken, cracked, or chipped, stop using it and replace it with a new one.

(2) Periodic replacement part

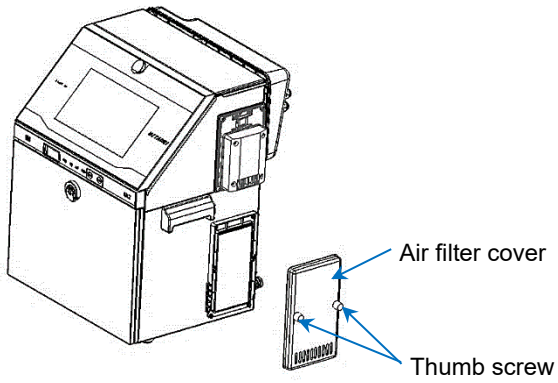
To ensure stable use of the IJ Printer, you need to replace the backup battery, circulation system parts (such as the pump and solenoid valve), and heating unit periodically. Contact your nearest local distributor.

(3) Procedure for replacing the air filter

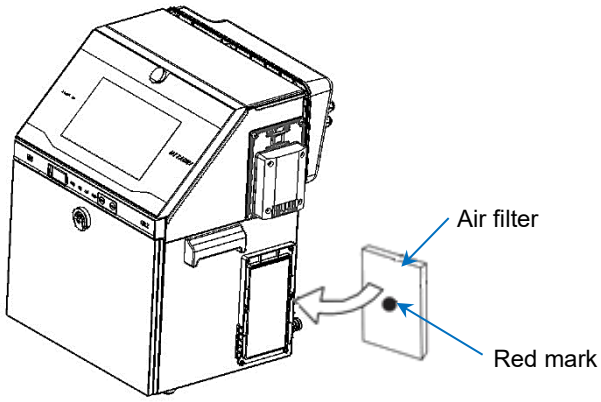
The procedure for replacing the air filter is described below.

1 Power off the IJ Printer.

2 Loosen the thumb screws and remove the air filter cover.

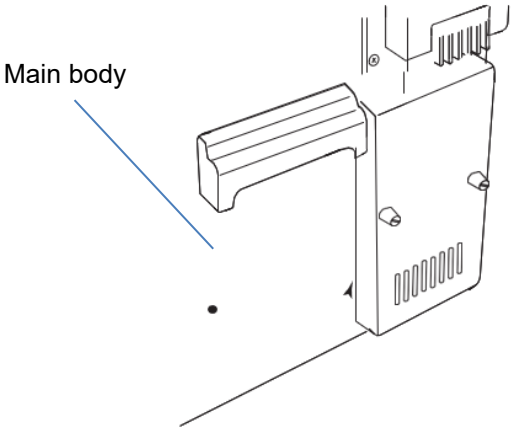


3 Remove the old air filter, check the position of the red mark, and install a new one.
(Place it so that the red mark is in the back.)

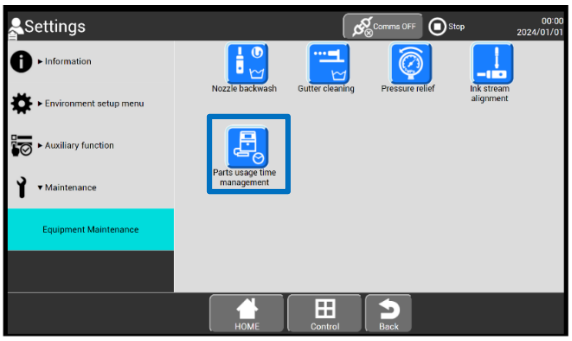


4 Install the air filter cover.

* Turn the thumb screws until the cover is in contact with the unit.



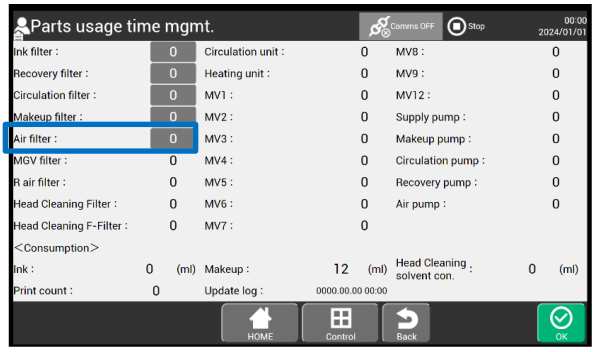
5 Move to the second screen of the [Settings(Equipment Maintenance)] screen and press Parts usage time management.



[Settings(Equipment Maintenance)] screen (selecting [Parts usage time management])

The [Parts usage time management] screen appears.

Set 0 as a value setting item in [Air filter].



[Parts usage time management] screen (setting [Air filter] value)

This completes the air filter replacement.

Maintenance service

If the unit fails or is damaged within one year after delivery or a total operating time of 2,400 hours, whichever comes first, we will repair it without charge. However, the unit may not be guaranteed even under warranty in the cases below.

(1) The unit failed due to its handling not described in the Instruction Manual.
(2) The unit failed due to use of any material or part including ink not supplied by Hitachi.
(3) The unit failed due to repairs not performed by Hitachi or someone designated by Hitachi.
(4) The unit failed due to external factors other than the unit (such as an abnormal print target) or due to movement or transportation of the unit after delivery.
(5) The unit was operated outside the scope of "2. Specifications" in the Instruction Manual.
(6) The unit failed due to fire, flood, or other natural disasters.

The warranty does not cover any production loss due to downtime or physical loss (damage to a printed object and related equipment) due to a failure or malfunction of the delivered product. Should any failure occur, Hitachi will send a technician as soon as possible to try to minimize the downtime.

Even if the dot matrix is excessive/insufficient or if distortion occurs, they shall be acceptable as long as they are not likely to be misread.

The IJ Printer has an alarm function to prevent major printing faults, but this function is not used for quality judgment of printed characters.
Consideration shall be given to visually check the printed character state at some process.

Retention period of parts

The retention period of performance parts for repair of the unit is seven years after discontinuation of manufacture.
Performance parts for repair are those necessary to maintain the functions of the unit.

Customer memo: Fill it out in advance.
This is useful when you contact the service

Sales representative: Telephone

Person in charge

Hitachi distributor: Telephone

Person in charge

Date of purchase: Year Month Day

8. APPENDIX

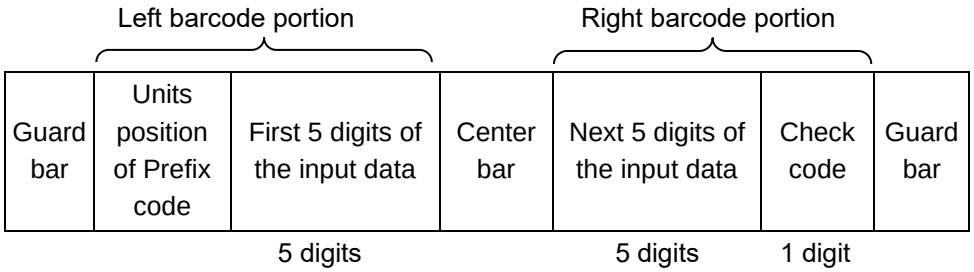
8.1. Bar code, 2-dimensional code

● To print a barcode or 2D code, refer to "5.5.5 Printing Barcode" in the instruction manual.

8.1.1. Precautions when using EAN-13 code

● When bar code is "EAN-13" and "EAN-13 Add-On 5" 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 "5.5.5. Printing Barcode (2) EAN Prefix" in the Instruction Manual.

● Guard bar, center bar and check code are automatically added.



● When adding Readable code (number; human readable code), select either 5×5 or 5×7 as the size of the numbers added.

Example of EAN-13 with identification numbers

Example of EAN13 Add-On 5 with identification numbers

Conditions whereby Readable code can be added to be printed

No.	Condition
1	Made the number of lines of the EAN-13, EAN-8, UPC-A, UPC-E and EAN-13 Add-On 5 printing item 1 line or 2 lines.
2	Set character size 12×16, 18×24, or 24×32 (1 line only).

8.1.2. Precautions when using EAN Prefix

● Whether to set bar code EAN-13, EAN-8, EAN-13 Add-on 5 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-13 Add-On 5	2	15	1	18

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, for EAN-8, input 7 digits and for EAN-13 Add-On 5, input 17 digits, all including the country code. However, check digit is excluded.	For EAN-13 input 10 digits, for EAN-8, input 5 digits and for EAN-13 Add-On 5, input 15 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.

8.1.3. 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)

①Code set B: ABCD<C>0123<B>

②Code set C: 0123<B>ABCD<C>45<B>EF<C>

↑

<B>,<C>: Code set changeover keys Return to original

8.1.4. Precautions for use of 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 : 5×8, 10x12, 12×16, 18×24
- Set barcode type on the print format screen.

Type of DM size and Maximum number of characters

Character size		5x8	10x12		12x16				18x24			
DM size		8x32	12x12	12x26	14x14	16x16	16x36	16x48	18x18	20x20	22x22	24x24
No. of vertical dots[*1]		8	12	12	14	16	16	16	18	20	22	24
Maximum number of characters	Numbers only	20	10	32	16	24	64	98	36	44	60	72
	Alphabetical characters only	10	5	16	8	12	32	49	18	22	30	36
	Combination of numbers, alphabetical characters and symbols	10-19	5-9	16-31	8-15	12-23	32-63	49-97	18-35	22-43	30-59	36-71
	Uppercase alphabet	13	6	22	10	16	-	-	-	-	-	-
	Lowercase alphabet	13	6	22	10	16	-	-	-	-	-	-

(The number of characters that can be coded differs according to the numbers/characters string.)
(*1) Use the number of vertical dots provided in the table for speed calculation.

[Type of Encoding]
IJ printer automatically judges the character string which is input and executes the encoding as follow:
[1] When the number of digits of characters which are input is less than or that of Maximum number of characters (Alphabet only), ASCII Encoding is executed.
[2] If the number of digits exceeds Maximum number of characters (Alphabet only), C40 Encoding or Text Encoding is executed.

[Rules for calculating number of digits]
[1] In case that Alphanumeric and Symbols are mixed. (ASCII Encoding)
Alphabetical characters and symbols 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 16×16 and within 10 digits for 8×32.

(Example 1) Basic calculation rule

A B C | 1 2 | 3 4 | 5 | D 6 E — Total 9 digits

3 characters = 3 digits | 1 digit | 1 digit | 1 digit | 3 characters = 3 digits

[2] In case that Numbers and Uppercase characters are mixed. (C40 Encoding)

3 characters are treated as 2 digits.

(Example 2) Basic calculation rule

A B 1	C D 2	E F 3	G H 4	I J 5	K	Total 11 digits
3 characters = 2 digits	3 characters = 2 digits	3 characters = 2 digits	3 characters = 2 digits	3 characters = 2 digits	1 digit	

[3] In case that Numbers and Lowercase characters are mixed. (Text Encoding)

3 characters are treated as 2 digits.

(Example 3) Basic calculation rule

a b 1	c d 2	e f 3	g h 4	i j 5	k	Total 11 digits
3 characters = 2 digits	3 characters = 2 digits	3 characters = 2 digits	3 characters = 2 digits	3 characters = 2 digits	1 digit	

(Example 4) Example of Character input for DM 16×16

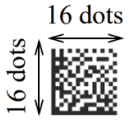
Encode	Print contents	Number of characters	Digit calculation result	Doable or not (DM16×16)
ASCII	1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 1 digit ····· 1 digit	24 characters	12 digits	Doable. Result is less than or equal to maximum of 12 digits.
	1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 A 1 digit ····· 1 digit	23 characters	12 digits	
	1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 A B 1 digit ····· 1 digit	23 characters	13 digits	Not doable. Result exceeds maximum of 12 digits.
C40	AB1 CD2 EF3 GH4 IJ5 K 2 digit ····· 1 digit (Encoding switching code, 1 digit is added.)	16 characters	12 digits	Doable. Result is less than or equal to maximum of 12 digits.
Text	ab1 cd2 ef3 gh4 ij5 k 2 digit ····· 1 digit (Encoding switching code, 1 digit is added.)	16 characters	12 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 string.
- When "DM8×32" is used, set item "character size 1" on the user environment setup screen to "5×8".

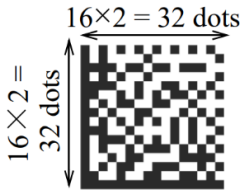
[DM16×16: Regarding Cell size (1 dot / 2 dots)]

- When DM(16×16) is selected and when Bold is set to 2, IJ printer can print Cell size (width and height) of 2 dots.
- Ink drop use percentage: If Bold is set to 2, for optimal printing quality, ink drop use percentage should be set to 1/5 - 1/16.
- Adjust the printing distance so that the printed dots do not overlap, and adjust horizontal and vertical ratio even.

[Note]
- Please confirm the readability of DM with actual usage conditions (Print size, Print speed, Barcode reader, etc.) in advance, and use this function.
- If cell size of 2 dots is used by the user who is already using DM(16×16) with cell size of 1 dot, please note that the print speed is reduced because the number of print dots increases.



1 Cell = 1 dot (Vertical 1 dot × Horizontal 1 dot)



1 Cell = 2 dots (Vertical 2 dots × Horizontal 2 dots)

Printed image of DM16×16

8.1.5. Precautions when using QR Code and Micro QR

- Set as shown below for print item to which QR code or Micro QR is to be set:
  (i) Number of lines : 1 line
  (ii) Character size : 18×24, 24×32 (for QR code), 12×16 (for Micro QR), QR33 (for QR code 33×33)
- Set barcode type on the print format screen.
- Set error correction level on the Barcode feature settings screen.
  For Micro QR, printing will be performed in error correction level M even if level Q selected.
  If QR code 33×33 will be set, error correction level has to be set to M in advance.

QR code: Type of size and maximum character number

Character size		18x24		24x32				QR33	12x16
QR code size/Micro QR size		21x21		25x25		29x29		33x33	15x15
No. of vertical dots (for speed calculation)		21		25		29		33	15
Error correction level		M	Q	M	Q	M	Q	M	M
Max. number of characters	Numbers only	34	27	63	48	101	77	149	18
	Capital alphabetical characters, numbers	20-29	16-22	35-58	29-43	61-96	47-72	90-144	11-15
	Combination of alphabetical characters, numbers and symbols	14-29	11-22	26-58	20-43	42-96	32-72	62-144	7-15

(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 number of characters which can be coded will vary depending on character array.
- "QR code printing" is added on "User environment setup" screen. It makes users possible to select the direction of QR code / Micro QR code to be printed.
- Please check if QR code / Micro QR code can be read properly by barcode reader before executing this new function of "QR code printing".

Character orientation	QR code printing	Printing example	Remarks
0 or 1	180-degree rotation		Rotated by 180 degrees and printed.
	Normal		Printed in normal direction.
2 or 3	180-degree rotation		Printed in normal direction.
	Normal		Rotated by 180 degrees and printed.

[About QR code 33×33]

- If the all conditions of the Table below are satisfied, dot matrix "QR33" and Bar code "QR(33×33)" will appear on Print format screen.
- Ink drop use percentage : For better printing quality, ink drop use percentage should be set to 1/7 or 1/6.
- Printing direction of QR code 33×33 : For better printing quality, QR code 33×33 should be printed in a state where is rotated by 180 degrees.

The conditions for printing QR code 33×33

No.	Item	Condition
1	Format Setup	Individual setup or Overall setup
2	Column for QR code 33×33	1 line
3	Ink drop use percentage	1/2 - 1/16
4	QR Error correction level	M (15%)

- Edit message screen : When the print item of QR code 33×33 is selected, "FNC1", "RS" and "EOT" button appear on the keyboard and can be input QR code 33×33.

Available control codes for QR code 33×33

No.	Control code	Usage
1	FNC1(GS)	The control code that indicates GS1 standard symbol or where the data ends.
2	RS	The control code that indicates the end of strings (record).
3	EOT	The control code that indicates the conclusion of a transmission.

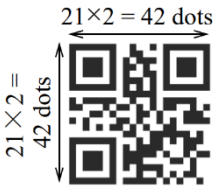
[QR code 21×21: Regarding Cell size (height)]

- When QR(21×21) is selected and when Bold is set to 2, IJ printer can print Cell size (width and height) of 2 dots.
  (When Format setup is Free layout on the Change message screen, the setting for Bold is fixed to 1.)
- Ink drop use percentage: When QR(21×21) with cell size of 2 dots is set, the ink drop use shall be in the range of 1/5 to 1/16.
  If Bold is set to 2 for optimal printing quality, ink drop use percentage should be set to 1/7 - 1/16.
- Printing direction of QR code: For optimal printing quality, QR code should be printed in a state where is rotated by 180 degrees.
- Adjust the printing distance so that the printed dots do not overlap, and adjust horizontal and vertical ratio even.

[Note]

- Please confirm the readability of QR with actual usage conditions (Print size, Print speed, Barcode reader, etc.) in advance, and use this function.
- If cell size of 2 dots is used by the user who is already using QR(21×21) with cell size of 1 dot, please note that the print speed is reduced because the number of print dots increases.

1 Cell = 1 dot (Vertical 1 dot × Horizontal 1 dot)



1 Cell = 2 dots (Vertical 2 dots × Horizontal 2 dots)

Printed image of QR code 21×21

8.1.6. Precautions when using GS1 DataBar(Limited, Omnidirectional, Stacked) code

- Thirteen(13) characters can be inputted.
  When a GS1 DataBar Limited is set, the heading character shall be 0 or 1 (zero or one).
- When adding Readable code (number; human readable code), select either 5×5 or 5×7 as the size of the numbers added.
  When GS1 DataBar with Human readable code is printed, the printed width will be bigger than that of "without Human readable code".
- Application Identifier(01) is automatically added to Human readable code.
- Please pay attention to the fact that there is an output of Application Identifier(01) or no output of Application Identifier(01), depending on the barcode reader.

Example of GS1 DataBar (Limited)
with identification numbers

Example of GS1 DataBar (Omnidirectional)
with identification numbers

Example of GS1 DataBar (Stacked)
with identification numbers

Conditions whereby Readable code can be added to be printed

No.	Condition
1	Made the number of lines of the GS1 DataBar printing item 1 line or 2 lines.
2	In case of GS1 DataBar (Limited and Omnidirectional) : Set either of character size 12×16, 18×24, or 24×32 (1 line only). In case of GS1 DataBar (Stacked) : Set character size 18×24 (1 line only)
3	Set "Barcode printing" to "Normal" on the Barcode feature settings screen.

8.1.7. Precautions when using DotCode

- The column which includes DotCode shall be set as follows.
  (i) Number of lines : 1 line - 4 lines*
  * When printing in 2 lines or more, only one "DotCode" can be set in one column. Two (2) or more DotCode cannot be set in the same column.
  (ii) When printing 2 lines or more with DotCode, as to the column including DotCode, the dot matrix of the line(s) other than the line where DotCode is included shall be set to either 4×5 or 5×5 or 5×7(8) in advance.
  (iii) 7 or 8 dots of DotCode height shall be set by "Char. size menu 1" on "User environment setup" screen.
- Set "Barcode" to "DotCode", and then select the "DotCode Height" on "Print format" screen.
- The number of horizontal dots of DotCode is variable according to the number of characters input and the character type. (Max. horizontal 128 dots)
  Please confirm first the readability of DotCode with user's usage conditions (Print size, Print speed, Barcode reader, etc.), and use this function.
- For the best result, "Ink drop use percentage" on "Print specifications" screen shall be set to 1/3 - 1/16.
- Adjust the print distance so that the printed dots placed obliquely do not overlap or the printed dots are not separated too much.

DotCode size and Maximum number of characters

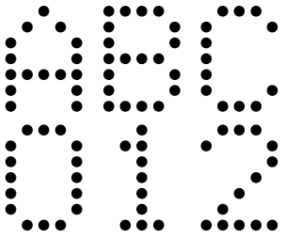
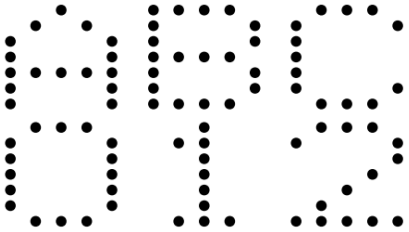
Character size		5x7	5x8	7x10	10x12	12x16	
DotCode Height (Horizontal dots; for speed calculation)		7	8	10	12	14	16
Maximum number of characters	Numbers only	62	70	90	108	126	128
	Alphabetical characters only	30	34	44	53	62	72
	Combination of numbers, alphabetical characters and symbols**	30-61	34-69	44-89	53-107	62-126	72-127

**The number of characters that can be coded differs according to the alphanumeric character string.

8.2. Setting high-speed printing

8.2.1. Overview

● Six modes of HM, NM, QM, SM, D1 or D3 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.

● References for each nozzle diameter

Nozzle diameter	References
65μm	Refer to (8.2.2.) and (8.2.3.) below in this section.
40μm	Refer to (8.2.4.) below in this section.
55μm	Refer to Instruction manual “5.8 Setting high-speed printing (Nozzle diameter 55μm)”.

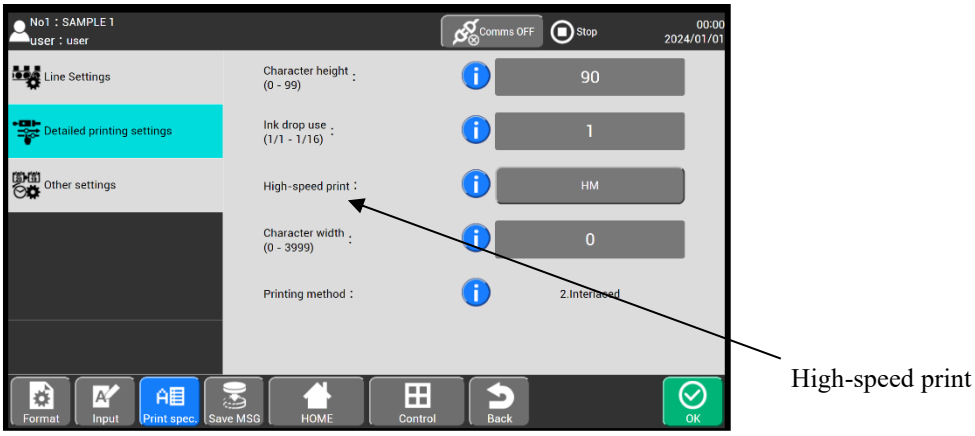
8.2.2. When performing high-speed printing by 1 to 3 lines. (Nozzle diameter : 65μm)

①Necessary conditions to perform high-speed print

● When all necessary conditions from Nos. 1 to 7 are satisfied, high-speed print HM, NM, QM, SM, D1 or D3 mode can be selected.

No.	Item	Conditions
1	Print line	Number of lines of all columns is the same. (Refer to Table in " Type of high-speed print and number of vertical dots used" for number of print lines available.)
2	Character size	Character size of all print items is the same. (Refer to Table in " Type of high-speed print and number of vertical dots used" for character sizes available.)
3	Line spacing	Line spacing of all columns is the same. However, if Line spacing is set to 3 or more, High-speed printing is NOT available.
4	Barcode	NOT available.
5	Character orientation	0 or 1.
6	Ink drop use rate	1/1
7	Ink drop charge rule	Standard (Single scan or interlaced)

* If high-speed print mode is “D1” or “D3”, it is better to select same Inter-character space setting for keeping better print quality.



②Type 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		1/1						1/2
		HM	D1	D3	NM	QM	SM	-
1-line print	Character size 12x16	16	-	-	24	-	-	32
2-line print	Character size 5x5	10	-	-	15	-	13	20
	Character size 5x7	14	15	-	21	-	18	28
	Character size 5x8	16	-	-	24	-	21	32
	Character size 7x10	20	-	-	30	-	-	40
3-line print	Character size 5x5	15	-	-	30	25	22	30
	Character size 5x7	21	-	24	28	35	31	42
	Character size 5x8	24	-	-	32	40	36	48

8.2.3. When performing high-speed printing by 4 lines. (Nozzle diameter: 65μm)

①Necessary conditions for high-speed printing

- When all necessary conditions from Nos. 1 to 7 are satisfied, high-speed print HM, NM, QM or SM mode can be selected.

No.	Item	Conditions
1	Print line	Print line of all columns is the 4.
2	Character size	Character size of all print items is the same. (Refer to Table in "②Type of high-speed print and number of vertical dots used" for character sizes available.)
3	Line spacing	Line spacing of all columns is the same. However, if Line spacing is set to 3 or more, High-speed printing is NOT available.
4	Barcode	NOT available.
5	Character orientation	0 to 3.
6	Ink drop use rate	1/2
7	Ink drop charge rule	Standard (Single scan or interlaced)

②Type 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		1/1	1/2				
		-	HM	NM	QM	SM	D1
4-line print	Character size 5x5	20	40	-	-	36	-
	Character size 5x7	28	56	-	-	50	-
	Character size 5x8	32	64	-	-	58	-

8.2.4. When performing high-speed printing on Small character model (Nozzle diameter: 40μm)

When the character size is 5x5, 5x7 or 5x8, the high-speed print HM mode can be selected for 1-line print, and the high-speed print QM/SM mode can be selected for 2-line print.

①Necessary conditions for high-speed printing

● When all necessary conditions from Nos. 1 to 7 are satisfied, high-speed print HM, QM or SM mode can be selected.

No.	Item	Conditions on 40μm model
1	Print line	The number of Print lines of all columns is the same. (Refer to Table in "②Type of high-speed print and the number of vertical dots used" for the number of print lines available.)
2	Character size	Character size of all print items is the same. (Refer to Table in "②Type of high-speed print and the number of vertical dots used" for character sizes available.)
3	Line spacing	Line spacing of all columns is the same. However, if Line spacing is set to 3 or more, High-speed print is NOT available.
4	Barcode	NOT available.
5	Character orientation	0 to 1
6	Ink drop use rate	1/1
7	Ink drop charge rule	Standard (Single scan or interlaced)

②Type of high-speed print and the number of vertical dots used

●Number of vertical dots used in high-speed print is shown in Table below.

Ink drop use rate		1/1				1/2
		HM	NM	QM	SM	-
1-line print	Character size 5x5	5	-	-	-	10
	Character size 5x7	7	-	-	-	14
	Character size 5x8	8	-	-	-	16
2-line print	Character size 5x5	-	-	15	13	20
	Character size 5x7	-	-	21	18	28
	Character size 5x8	-	-	24	21	32
3-line print	Character size 5x5	-	-	25	22	30
	Character size 5x7	-	-	35	31	42
	Character size 5x8	-	-	40	36	48
4-line print	Character size 5x5	-	-	-	-	40
	Character size 5x7	-	-	-	-	56
	Character size 5x8	-	-	-	-	64

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