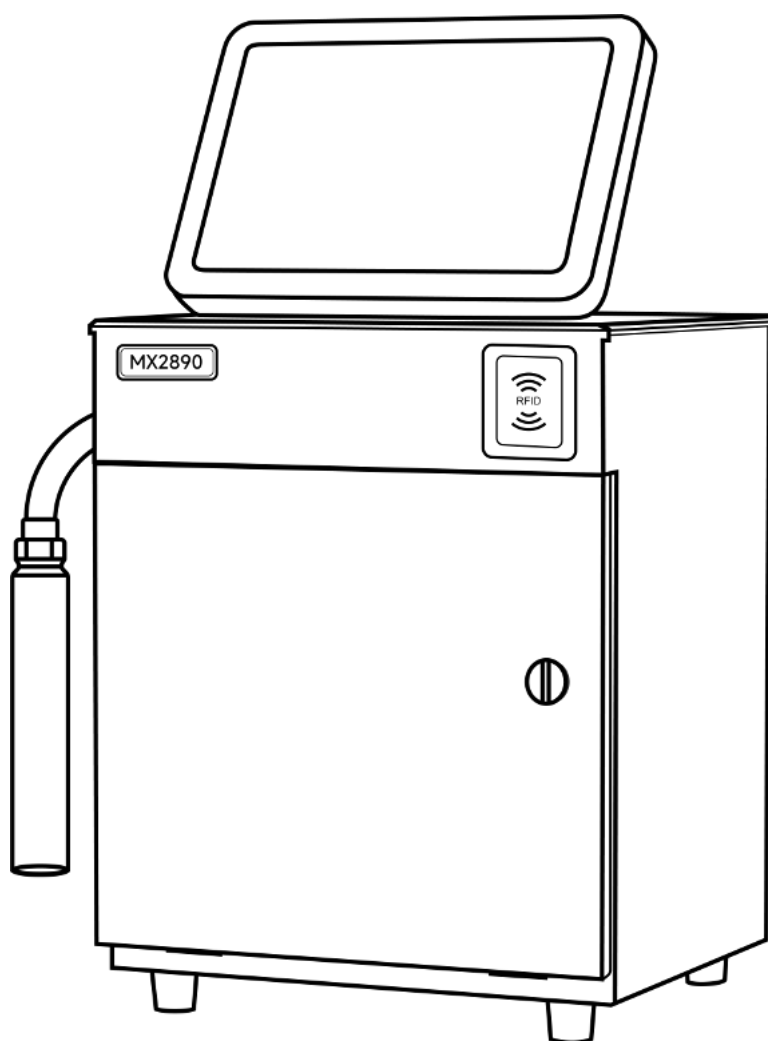


MX2890 Continuous Inkjet Printer

User Manual



Document No.: MX2890-UM-F (F = 6th Revision)

Applicable Software Version: v1.3.9_260707

Contents

Revision History.....	4
Chapter 1 Safety Information	5
Chapter 2 Operation	9
2.3 Selecting a Job for Printing	11
2.4 Faults and Warnings.....	11
2.5 Starting Printing	11
2.6 Stopping Printing and Powering Off.....	12
2.7 Menu Tree & Navigation	12
Chapter 3 Job Editor	13
3.2 Editing Print Messages	15
3.3 How to Edit, Delete, Rename, and Copy Saved Print Files	26
Chapter 4 Tools.....	28
4.1 Adjust.....	28
4.2 Tools.....	32
4.3 Login.....	38
Chapter 5 Device Description	39
5.1 Overall Structure Overview	40
5.2 Printhead Structure.....	42
5.3 Ink Circuit System.....	43
5.4 Nameplate and Serial Number.....	45
Chapter 6 Maintenance.....	45
6.1 General Maintenance Safety Guidelines	45
6.2 Preventive Maintenance Schedule	45
6.3 Standard Format for Maintenance Procedures	46
6.4 Daily Inspection	47
6.5 Printhead Cleaning	47
6.6 Ink and Solvent Replenishment	51

6.7 Main Filter Replacement.....	51
6.8 Ink Pump Maintenance	53
6.9 Ink Circuit Draining and Flushing (Long-term Shutdown / Transport)	53
6.10 Maintenance Records.....	54
Chapter 7 Troubleshooting	54
7.1 Warning and Fault Mechanism	54
7.2 Preliminary Checks.....	55
7.3 7.3 Troubleshooting Table	55
7.4 Preparation Before Requesting Technical Support.....	58
Chapter 8 External Connections and Input/Output.....	59
8.1 Overview.....	59
8.2 Interface Locations and Pin Definitions.....	59
8.3 Photocell (Product Detector) Connection and Installation.....	61
8.4 Encoder (Synchronizer) Connection and Settings	61
8.5 Alarm Output (If Configured).....	62
8.6 Trigger Timing.....	62
Chapter 9 Communication and Data Interfaces	63
9.1 USB Flash Drive Data Transfer	63
9.2 Parameter Backup and Restoration.....	63
9.3 Network and Serial Communication (If Configured).....	64
Chapter 10 Technical Specifications and Print Performance	65
10.1 General Technical Specifications.....	65
10.2 Print Performance Table	65
10.3 Consumable Specifications.....	66
10.4 Installation Conditions.....	66
Appendix A Error and Warning Code Reference List.....	67

Revision History

- V1.0: Initial release.

V1.1 (2026-07): Full text proofreading; corrected typos and figure numbering errors. Rewrote Chapter 1 Safety Information (added signal word classification, high-voltage warnings, chemical safety and MSDS, PPE, grounding and ESD protection, and expanded emergency response procedures). Added Appendix A Complete List of Fault and Warning Codes (Draft Framework).

- V1.5 (2026-07): Added Chapter 5 Device Description (Overall Structure Overview / Printhead Architecture / Fluidic System), Chapter 6 Maintenance (Preventive Maintenance Schedule and 7-Element SOP Template), and Chapter 7 Troubleshooting (Preliminary Checks and Troubleshooting Guide). Added cross-references to Appendix A. Added Appendix B Pending Information Checklist. Marked items requiring R&D team input with uniform tags: [TBD - Item] and [Image Placeholder].
- V2.0 (2026-07): Added Chapter 8 External Connections & I/O, Chapter 9 Communication & Data Transfer, and Chapter 10 Technical Specifications & Print Performance. Added Section 2.7 Menu Tree & Access Control Matrix in Chapter 2. Added Section 3.2.7 Message Attribute Parameters in Chapter 3. Upgraded print, counter, and fluidic parameters in Chapter 4 into 4-element tables (Definition - Range - Default Value - Impact/Effect). Added Document Number to the front cover. Expanded Appendix B accordingly.
- V2.1 (2026-07): Finalized data integration based on feedback collected from the MX2890 Manual V2.0 Pending Information Form and CIJ Fault Code Sheet:

Restructured Appendix A into module-categorized fault code tables (9 categories: A/B/C/D/E/F/G/H/Z), including trigger conditions and automated actions for implemented codes.

Populated access control matrix, default passwords, message attributes, print/fluidic parameters, maintenance schedules, consumables specifications, interface pinouts, electrical characteristics, USB specifications, technical specs, and actual test data for print performance.

Added 15 illustrations (Figures 5-1 to 5-4, 6-1 to 6-3, 7-1 to 7-5, and 8-1 to 8-3).

Rewrote Section 6.9 based on Fluidic Team feedback (routine draining is not required in automatic circulation mode) and Section 6.5 printhead cleaning interval (15 days under normal conditions, 7 days in harsh environments).

Clarified in Section 9.3 that Ethernet is not equipped on this unit. Remaining unconfirmed items are detailed in Appendix B.

- V2.2 (2026-07): Completed final data integration based on redline feedback on Appendix B:

Populated message attributes, print/reciprocating parameter ranges and defaults, maintenance duration, ink pump wear criteria, line count/character height, matrix aperture (standardized to 11-dot), IP54 protection rating, printhead elevation difference (± 2 m), minimum distance between prints (3 mm), parameter backup procedures, and .cij naming conventions.

Removed descriptions of non-equipped components (wash pump, printhead drain valve, printhead ink supply valve) and updated Figure 5-4 accordingly.

Retained only the 12 active/implemented error codes in Appendix A. Removed Appendix B entirely.

Added Figure 9-1 Parameter Backup Interface.

- V2.4: Comprehensive deep audit and format refinement. Unified technical terminology, eliminated placeholders, bolded UI interactive text, reflowed layout (compressed empty paragraphs, standardized figure numbers/captions and body styles), and optimized typography for delivery-grade presentation.

Chapter 1 Safety Information

1.1 Introduction

The intended use of this printer is to apply characters, codes, and graphics onto product surfaces using Continuous Inkjet (CIJ) technology. Using this equipment for any other purpose may cause severe personal injury or damage to the device.

Read this entire chapter thoroughly before installing, operating, or maintaining this equipment. This manual must be kept near the printer at all times for easy reference by all operating and maintenance personnel.

The inks and solvents (wash solutions) used in this printer are flammable chemicals. Before use, always read the Safety Data Sheet (SDS/MSDS) for each consumable. You can request SDS documents from your distributor or directly from our company.

1.2 Signal Word Classification

This manual uses the following four-level signal words to highlight safety messages. Ensure you understand their meanings and strictly adhere to all precautions:

【DANGER】 : Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.

【WARNING】 : Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

【CAUTION】 : Indicates a situation which, if not avoided, may result in minor or moderate personal injury or equipment damage.

【NOTE】 : Provides supplementary information that is not safety-related but helpful for proper operation and maintenance.

In addition to being grouped in this chapter, safety warnings appear throughout this manual before specific operational steps involving corresponding risks. Always follow localized safety warnings during operation.

1.3 General Safety Guidelines

This equipment must only be operated by trained personnel. Service, maintenance, and repairs must be performed exclusively by qualified service technicians.

Do not use non-authorized power adapters. Doing so may damage the printer or cause severe safety hazards.

Inspect all cables for damage or wear prior to operating the printer to prevent safety accidents.

Do not expose the machine to heat sources, strong direct sunlight, open flames, or similar high-temperature environments for extended periods.

Use official accessories (such as shaft encoders and photocells) whenever possible. If third-party accessories are used, ensure they meet all required electrical specifications.

Avoid storing or operating the printer in heavily dusty or excessively humid environments.

Use only a soft brush or lint-free cloth when cleaning the printer. Do not use high-pressure air, waste cotton rags, or abrasive tools. Keep water away from the unit, and never use non-approved chemical solvents for cleaning.

1.4 Electrical Safety & High Voltage Warnings

DANGER — HIGH VOLTAGE SHOCK HAZARD:

The deflector plates (high-voltage plates) inside the printhead carry several thousand volts DC during operation. NEVER initiate printing while the printhead cover is removed, or if residual ink/solvent is present on the charge electrode or deflector plates. After cleaning the printhead, ensure it is completely dry and settled before restarting print operations.

WARNING:

Before opening the electronics cabinet (cabinet door/cover), power down the equipment, disconnect the power cord, and wait at least **5 minutes** for internal capacitors to discharge fully. **NEVER** open the cabinet while power is connected.

WARNING:

Do not plug or unplug any components or cables (including printhead conduits, encoders, photocells, and communication cables) while power is applied. Doing so may cause electrical shock or damage internal electronics.

CAUTION:

The equipment must be connected to a power outlet with a reliable protective earth ground. Supply voltage must match the voltage rating specified on the nameplate. Use a voltage stabilizer in areas subject to significant power fluctuations.

1.5 Chemical Safety (Ink & Solvent)

DANGER — FIRE & EXPLOSION HAZARD:

Most inks, solvents, and cleaning solutions used in this printer are MEK- or alcohol-based flammable liquids with low flash points. Smoking, open flames, welding, or sparks are strictly prohibited in operating and storage areas. Keep consumables away from all ignition sources. Equip the workspace with appropriate fire extinguishers for chemical fires (e.g., dry powder or CO₂). **NEVER use water to extinguish solvent fires.**

WARNING — VOC EXPOSURE HAZARD:

Volatile Organic Compound (VOC) vapors emitted from inks and solvents can cause respiratory irritation. Install the equipment in a well-ventilated area. Use mechanical extraction/ventilation if operating in confined spaces. Wear appropriate respiratory protective equipment during prolonged exposure.

WARNING — FIRST AID MEASURES:

- **Eye Contact:** Immediately flush eyes with plenty of clean water for at least **15 minutes**, keeping upper and lower eyelids open. Seek immediate medical attention.
- **Skin Contact:** Remove contaminated clothing immediately. Wash affected area thoroughly with soap and water. If redness, irritation, or stinging persists, seek medical advice.
- **Inhalation:** Immediately move the affected individual to fresh air. If discomfort or symptoms persist, seek medical attention.
- **Ingestion: Do NOT induce vomiting.** Seek immediate medical attention and present the corresponding consumable SDS to the medical staff.

CAUTION — CONSUMABLE STORAGE:

Store inks and solvents in a cool, well-ventilated, designated area away from fire and ignition sources. Keep containers tightly sealed and stored upright. Always use consumables within their stated expiration/shelf-life dates.

CAUTION — WASTE DISPOSAL:

Waste ink, waste solvent, flushing fluids, and contaminated cleaning rags are hazardous waste. They must be collected and disposed of by authorized waste disposal entities in compliance with local environmental regulations. **NEVER pour chemical waste down drains, sewers, or dispose of it with municipal garbage.**

1.6 Personal Protective Equipment (PPE)

Always wear the following protective gear when performing ink/solvent topping up, printhead cleaning, fluidic system maintenance, or any procedure involving potential exposure to chemicals:

- **Safety Goggles / Face Shield:** To protect eyes from chemical splashes.
- **Solvent-Resistant Gloves (e.g., Nitrile Gloves):** To prevent direct skin contact with ink and solvent.
- **Protective Apron & Respirator:** Recommended when operating in areas with limited ventilation or during extensive fluidic servicing.

Maintenance procedures in this manual that involve chemical risks will include a list of required PPE prior to the step-by-step instructions.

1.7 Grounding & Electrostatic Discharge (ESD) Protection

WARNING:

Static accumulation can ignite volatile solvent vapors. The printer enclosure must be reliably grounded. Avoid pouring solvent rapidly during replenishment to minimize static charge build-up.

CAUTION:

Use shielded cables for encoders, photocells, alarm lights, and communication lines. Ground the cable shields securely to prevent electromagnetic interference from triggering false signals or causing communication faults.

CAUTION:

Before touching printed circuit boards (mainboard, driver boards, or other ESD-sensitive components), operators must wear an anti-static wrist strap or touch a grounded metal object to discharge static electricity. Always store spare circuit boards in anti-static bags.

1.8 Standard Operating Guidelines

- Use only manufacturer-approved inks and solvents. **NEVER mix different models or types of ink.**
- Do not connect or disconnect cables or accessories while the printer is powered on.
- Before long-term shutdown, flush and drain the fluidic system as detailed in the Maintenance chapter to prevent dried ink from clogging fluid lines and the nozzle orifice.
- Before transporting the machine, power down, disconnect mains power, cap/seal the nozzle, and keep the printer upright to prevent ink or solvent leakage.

1.9 Emergency Response Procedures

If any of the following emergency conditions occur, **immediately disconnect the main power supply, stop operating the equipment**, and contact official technical support:

- Smoke, burning odors, or unusual noises (such as popping/arcing sounds) emitted from the machine.
- Uncontrolled continuous printing or continuous uncontrolled ink jetting from the printhead.
- Massive ink or solvent leaks.

Emergency Action Steps:

- **In Case of Chemical Spills:** Evacuate non-essential personnel and eliminate all ignition sources immediately. Don proper PPE, then use non-sparking tools and absorbent materials (e.g., chemical spill pads) to clean up the spill. Treat collected waste as hazardous chemical waste.
- **In Case of Fire:** Immediately cut off electrical power. Use dry chemical or CO₂ fire extinguishers to fight the fire. **NEVER use water.** If the fire cannot be controlled immediately, evacuate the area and call emergency services.

1.10 Product Warranty

Warranty Coverage: The complete equipment is covered by a **12-month warranty** starting from the Bill of Lading (B/L) date. This warranty does not cover damages or failures resulting from misuse, unauthorized modification, or improper operation.

The following conditions are **EXCLUDED** from warranty coverage:

1. Damage caused by using non-approved inks, solvents, or additives, or unauthorized disassembly, repair, or modification of the product.
2. Accidental damage caused by natural disasters, improper storage, or transit accidents (e.g., dropping or impact).

3. Fluid damage resulting from spraying water or other liquids onto the equipment.
4. Machine damage caused by using unapproved, incorrect, or unstable power supplies.

Chapter 2 Operation

2.1 Powering On the Printer

Perform the following steps to power on the printer:

1. Conduct a visual inspection to ensure all connections are secure and all cables are properly connected.
2. Ensure the main power cable is securely plugged in.
3. Press the power switch on the left side or touch and hold the screen for more than 5 seconds to wake up and start the printer. *(Note: This printer features an automatic fluid circulation function and can remain powered on for extended periods.)*
4. Once the printer boots successfully, the touchscreen displays the main User Interface (UI).

2.2 User Interface Overview

The user interface is a touch-based control system featuring an intuitive touchscreen with most display areas being interactive. All technical printer settings and operations are performed via touch buttons.

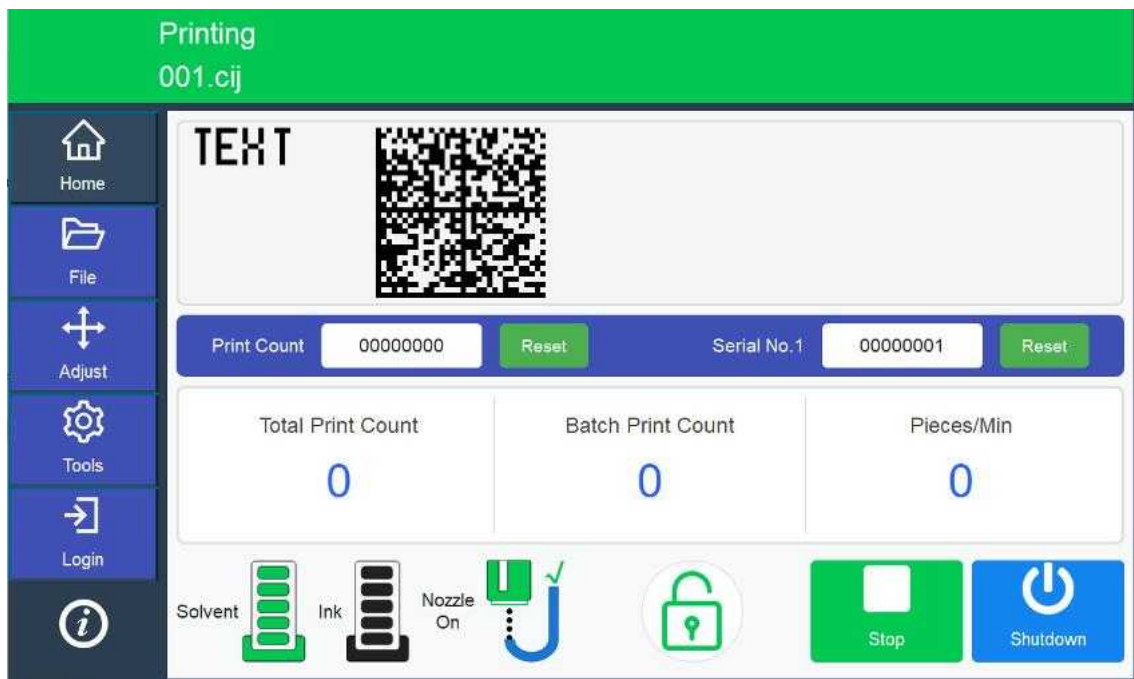
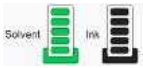
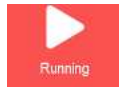


Figure 2-1 Main Interface Overview

(Status Bar Region: Displays the current operating status of the printer)

- **Ready:** The ink supply system has completed initialization and the nozzle is sealed. Printing cannot be performed in this state.
- **Printing:** The gutter/seal mechanism has moved to the designated operational position. The printer is ready to print.
- **Yellow Warning:** Alerts the operator to a potential issue or maintenance item; action should be taken before the printer stops operation.
- **Red Fault:** Indicates a critical error. The operator must resolve the fault before print operations can begin.

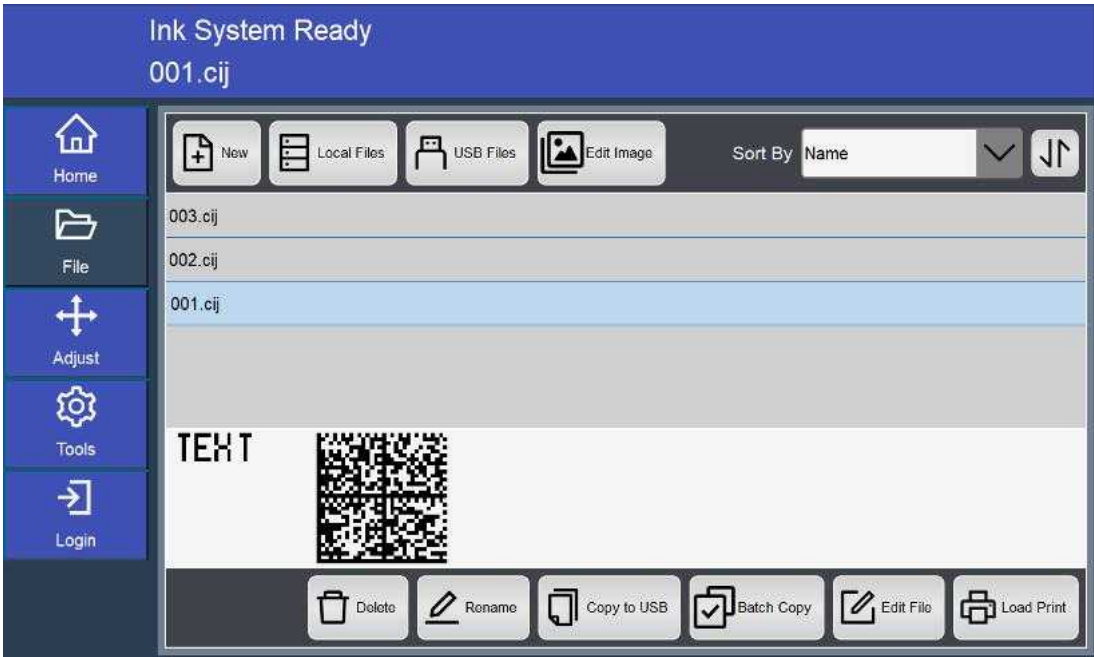
Button Icon	Name	Description
	Main Menu	Displays operating status information, currently loaded message preview, total print count, batch print count, and speed (Items/Min).
	File	Manage print files: create new files, open local or USB files, delete, rename, copy, edit, and load messages for printing.
	Adjustments	Configure print parameters/styles and counter settings.
	Tools	Access functional utilities for system configuration and maintenance, including Fluidic Maintenance, System Config, Factory Mode, and System Logs.
	Login	Switch user roles with different access permissions by entering the password.
	"i"	Displays real-time operational status and diagnostics (e.g., printhead temperature, cabinet temperature, ink pressure, pump speed, ink viscosity, mixing tank level, ink temperature).
	Consumable Levels	Displays remaining levels / consumption of ink and solvent.
	Run	Unseals the nozzle and moves the seal/gutter mechanism to the designated printing position.
	Power Off	Stops printing, seals the nozzle, and turns off the display screen.
	Nozzle Open	Opens the nozzle and moves the seal mechanism to the bottom position.

	Nozzle Close	Seals the nozzle and returns the mechanism to the home/sealed position.
---	--------------	---

2.3 Selecting a Job for Printing



1. Tap the **File** button on the main interface. Select the job name (e.g., "001") from the file list displayed in the center of the screen.



2. After selecting the desired job, a preview of the print message will be displayed at the bottom of the screen. (As shown in Figure 2-2)



3. Tap the **Load Print** button. The system will return to the main interface and wait for a print trigger signal.

2.4 Faults and Warnings

When a warning or fault occurs, a corresponding alert message will pop up in the status bar at the top of the screen.

2.5 Starting Printing



Once the status bar displays "Printing", print operations can begin immediately.

2.6 Stopping Printing and Powering Off



Tap the  button. Wait until the seal mechanism returns to its home position (sealing the nozzle) and the display screen turns off. Operators may then leave the workstation.

2.7 Menu Tree & Navigation

All functions on the machine are organized according to the menu tree structure below. To locate a specific function, follow the path level by level. In this manual, the ► symbol indicates menu navigation paths (e.g., [Tools] ► [Fluidic Maintenance] ► [Printhead Maintenance]).

Main Interface

- └ Main Menu: Operating Status, Loaded Job Preview, Total Print Count, Batch Count, Speed (Items/Min)

- └ File

- └ New ► Message Editor (Text / Time & Date / Serial No. / 1D Barcode / 2D Barcode / Image)

- └ Local Files ► Delete / Rename / Copy to USB / Edit File / Load for Printing

- └ USB Files ► Delete / Rename / Copy to Local / Edit File / Load for Printing

- └ Adjustments

- └ Print Style ► General Parameters / Reciprocating Print

- └ Counter Settings ► Counter 1 / Counter 2 / Product Count Reset

- └ Tools

- └ Fluidic Maintenance ► Fluidic Parameters / Printhead Maintenance / Smart Param Settings / Consumable Model / Solvent Info / Ink Info

- └ System Config ► Localization / Firmware Upgrade / Parameter Backup / User Management / System Info

- └ System Logs ► Event Log / Fluidic Operating Log / Fault Log

- └ Factory Mode ► Single-step Debugging / Servicing

- └ Login ► Administrator / Maintenance / Operator (See Access Control Matrix below)

└ Quick Actions: [i] Info / Consumables / Run / Power Off / Nozzle Open / Nozzle Close

User Access Control Matrix

The permissions for the three user roles are defined below ("√" = Allowed; "X" = Invisible or Restricted; this table represents default factory settings):

Functional Item	Operator	Maintenance	Administrator
Select Job / Start & Stop Printing	√	√	√
Create / Edit / Delete Jobs	x	x	√
Adjustments (Print Style / Counter Settings)	x	√	√
Fluidic Maintenance (Parameters / Printhead / Smart Params)	x	√	√
System Config (Localization / Upgrade / Backup / User Mgmt)	x	x	√
Factory Mode (Single-step Debugging / Servicing)	x	x	√
View System Logs	√ (Read-Only)	√ (Read-Only)	√

【NOTE】 :

The factory default password for Administrator, Maintenance, and Operator is 123456. Change all role passwords immediately after initial startup. If you forget your password, contact official technical support for assistance.

Chapter 3 Job Editor

3.1 Creating a New Print File

This chapter describes three ways to create a new print file:

1. Using the [**New**] function.
2. Using the [**Local Files**] function.
3. Using the [**USB Files**] function.

All three methods allow you to enter the Message Editor interface. The following sections describe the detailed operational steps.

3.1.1 Using the [New] Function



1. Tap the  button on the main interface to enter the file management interface, as shown in Figure 3-1.

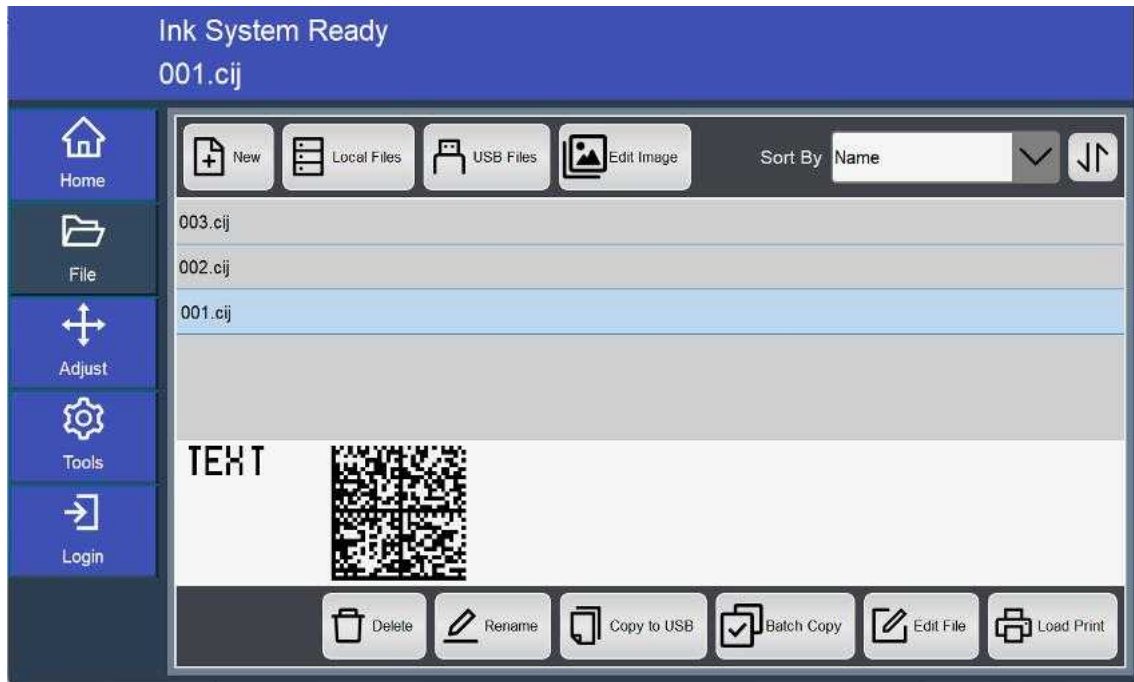


Figure 3-1 File Management Interface

2. Tap the [New] button in the file management interface to open the dialog box shown in Figure 3-2.

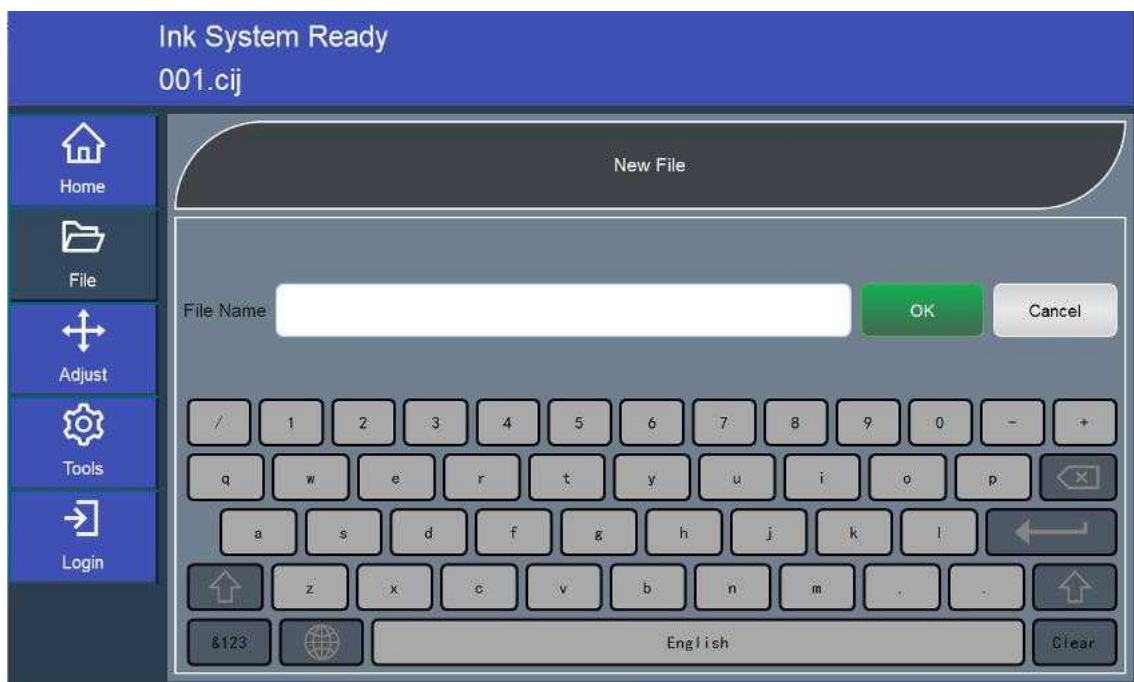
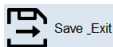


Figure 3-2 File Management Interface

3. Enter the file name and tap , and the system will open the message editor interface, as shown in Figure 3-3 Message Editor Interface. After configuring and editing the content based on your requirements, you can tap  to save the file, or tap  to exit without saving and return to the file management interface; tapping [Home] will return to the main interface.

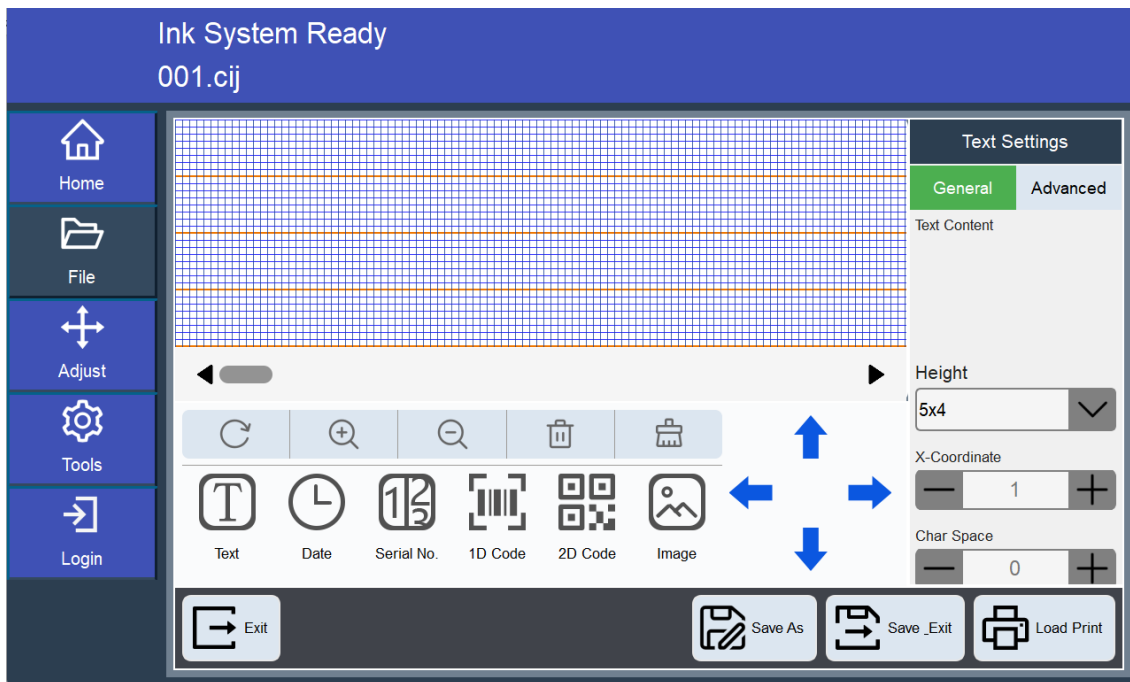


Figure 3-3 Message Editor Interface

3.1.2 Using [Local Files] and [USB Files] Functions

1. Tap the  or  button, and the system will display the list of files stored locally or on the USB flash drive, as shown in Figure 3-4 File List Interface.

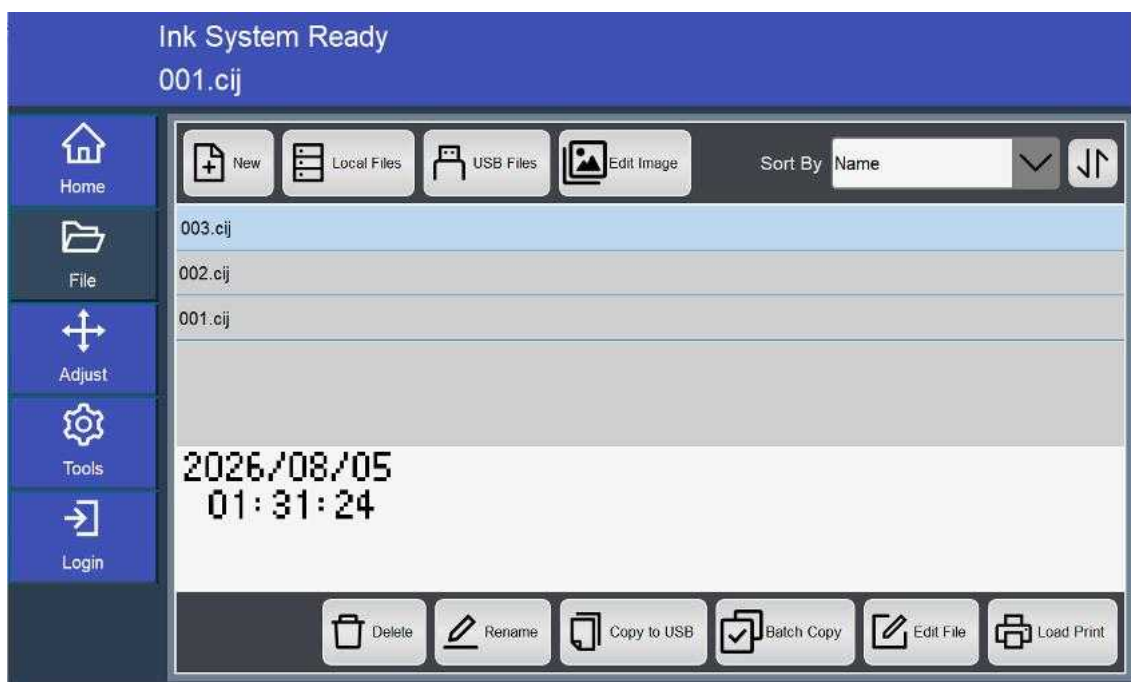


Figure 3-4 File List Interface

2. After selecting the required file, you can perform operations such as Delete, Rename, Copy to Local (or Copy to USB), Edit File, and Load for Printing.

3.2 Editing Print Messages

This section describes how to edit different types of print message elements.

1. Follow any of the three methods outlined in Section 3.1 to navigate to the Message Editor interface, as shown in Figure 3-5 (the figure illustrates the Message Editor interface accessed via the [New] function, with Text selected as the element type to edit).

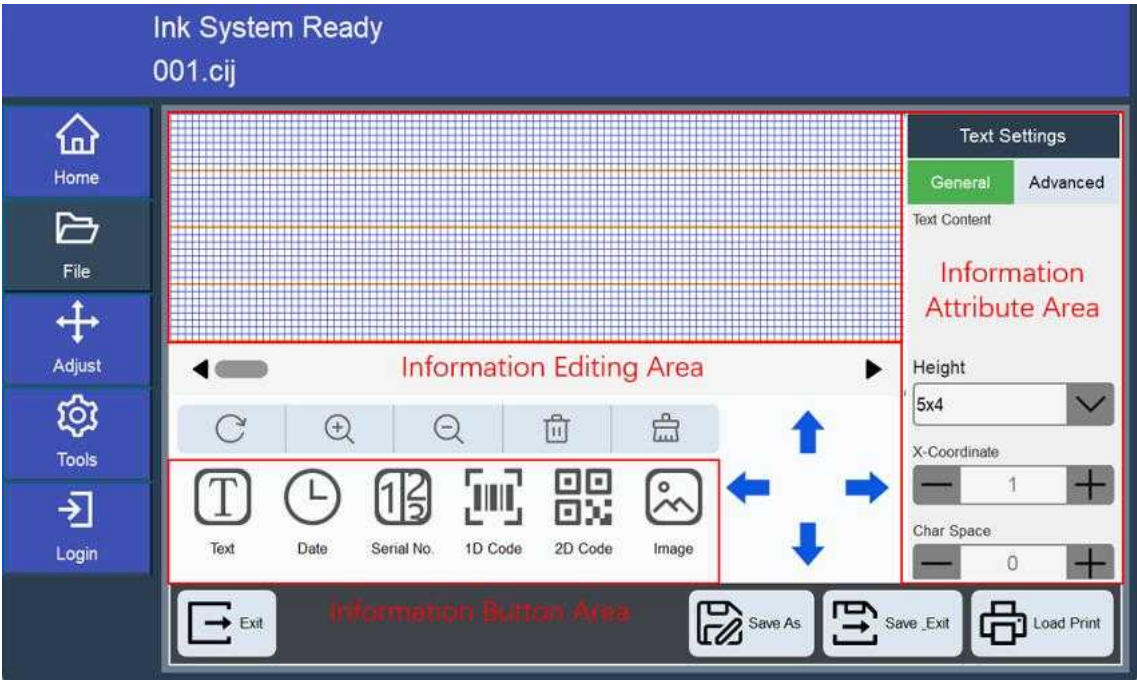
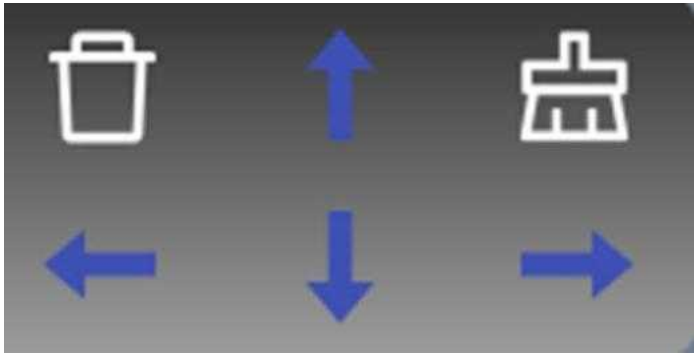
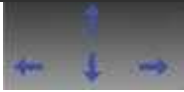


Figure 3-5 Message Editor Interface

2. In the Message Editor interface, you can compose and edit print messages. A message can include various elements such as Text, Time & Date, Serial Number, 1D Barcode, 2D Barcode (QR Code), and Image.



Button Icon	Description
	Delete the selected message element in the editing area.
	Clear all message content in the editing area.
	Adjust the position of the element according to the direction of the arrow.

3.2.1 Text Editing

1. To print Chinese characters, English letters, numbers, or symbols, tap the [Text] button in the element selection area. A default text item will appear in the [Message Editing Area]. Tap

the input box in the [Message Properties Area], and enter the required information using the pop-up keyboard, as shown in Figure 3-6.

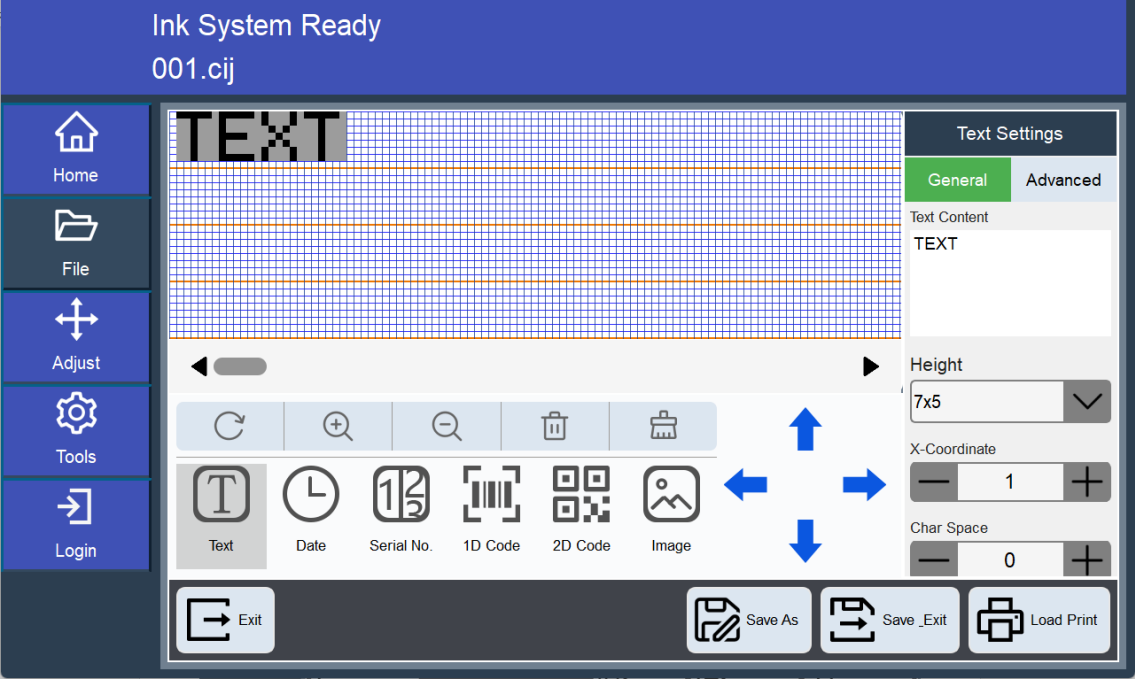
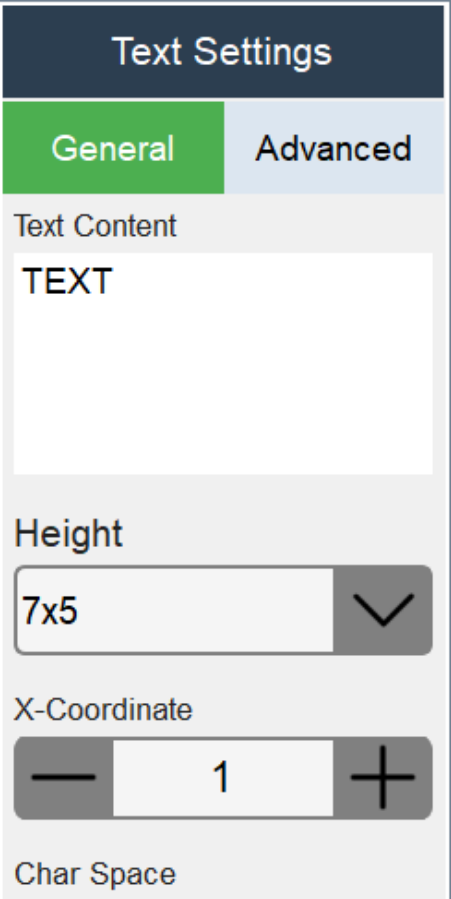


Figure 3-6 Text Editing Interface



2. In [Text Properties], you can adjust the font style, letter spacing (character spacing), and layout.

3.2.2 Time & Date Editing

1. To print real-time dynamic time/date—where the time automatically updates without requiring manual intervention—tap the [Date] button in the element selection area. A default time entry will appear in the [Message Editing Area], as shown in Figure 3-7.

Supports dynamic, real-time time & date updates: while in printing status, time/date information is updated in real time.

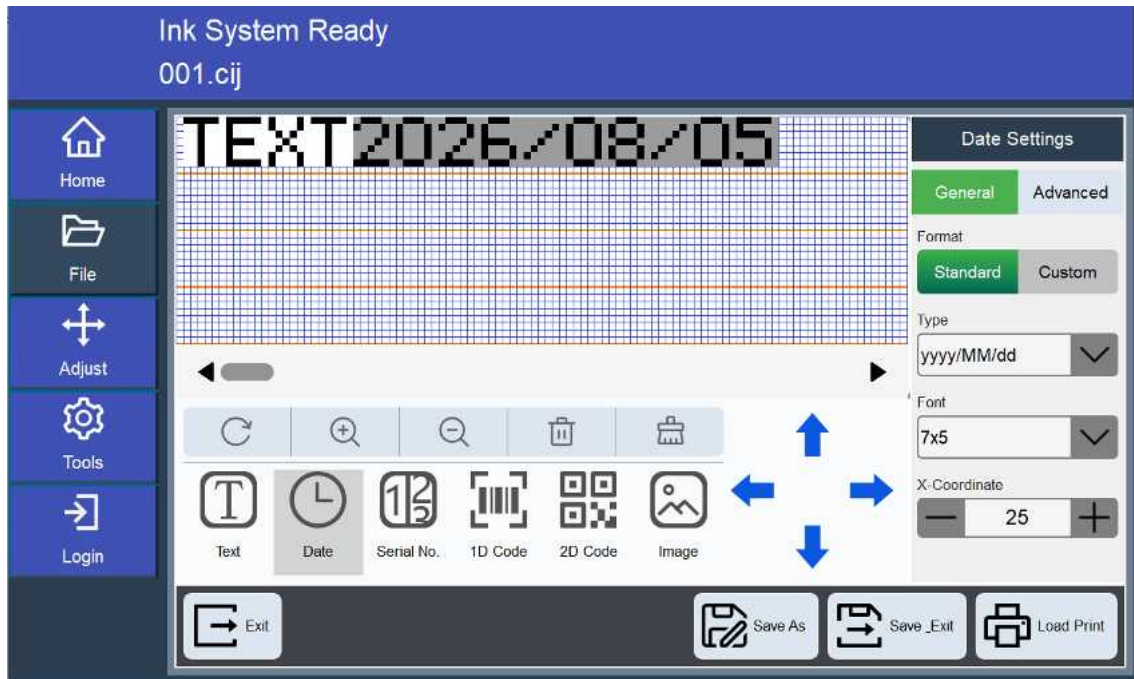
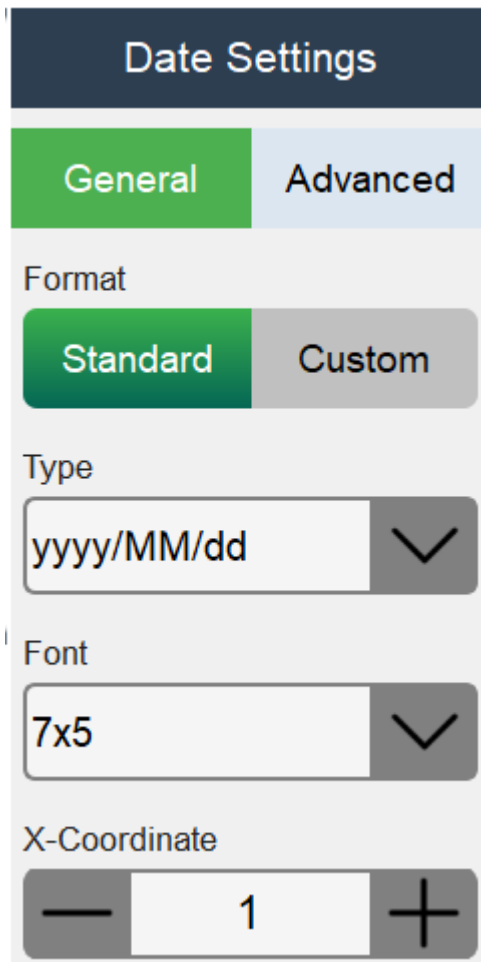


Figure 3-7 Time & Date Editing Interface

The image shows a 'Date Settings' dialog box. At the top is a dark blue header with the title 'Date Settings' in white. Below the header are two tabs: 'General' (highlighted in green) and 'Advanced' (light blue). Under the 'General' tab, there are three sections. The first section is 'Format', with two sub-tabs: 'Standard' (highlighted in green) and 'Custom' (grey). The second section is 'Type', featuring a text input field containing 'yyyy/MM/dd' and a downward-pointing chevron icon. The third section is 'Font', featuring a text input field containing '7x5' and a downward-pointing chevron icon. The fourth section is 'X-Coordinate', featuring a numeric input field with the value '1', flanked by minus and plus icons for adjustment.

2. In [**Date Properties**], you can configure the date format (type), font style, letter spacing (character spacing), and layout.

3.2.3 Serial Number Editing

1. To print dynamic counter numbers—where the sequence automatically updates without requiring manual intervention—tap the [**Serial Number / Counter**] button in the element selection area. A default serial number entry will appear in the [**Message Editing Area**], as shown in Figure 3-8.

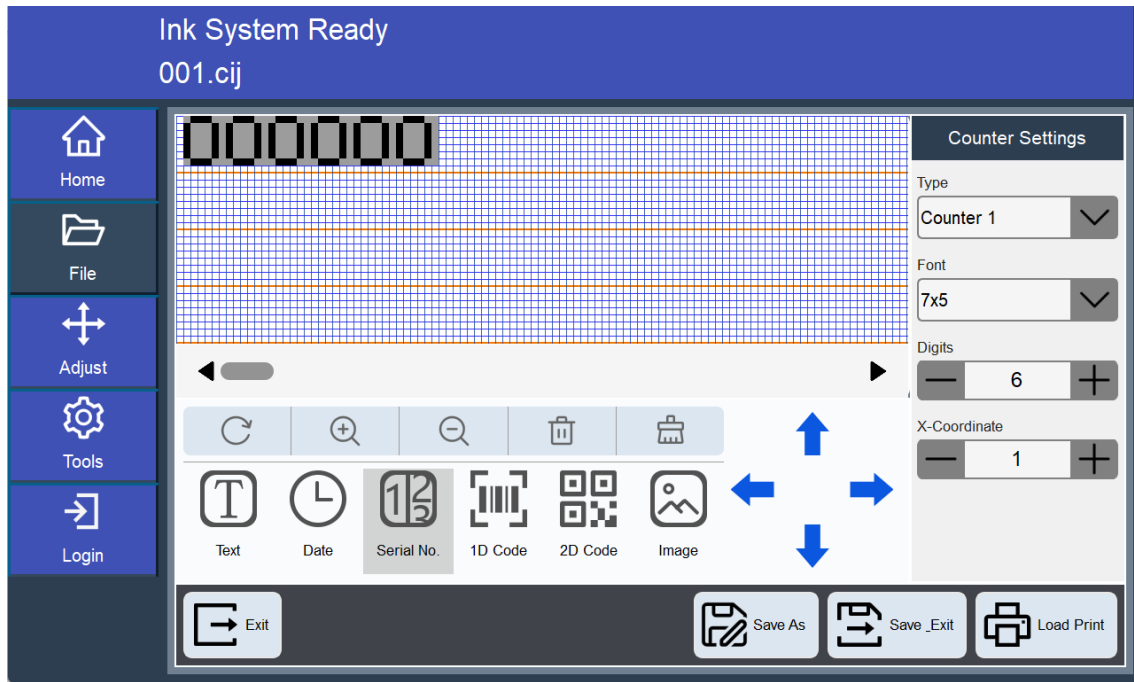


Figure 3-8 Serial Number Editing Interface

Counter Settings

Type

Counter 1

Font

7x5

Digits

6

X-Coordinate

1

2. In [**Counter Properties**], you can configure the counter type, font style, total digits, letter spacing (character spacing), and layout.

3. The system supports two independent counters: **Counter 1** and **Counter 2**, each supporting a maximum length of **8 digits**.

3.2.4 1D Barcode Editing

1. To print a 1D barcode, tap the  button in the element selection area. A default 1D barcode will appear in the [Message Editing Area], as shown in Figure 3-9.

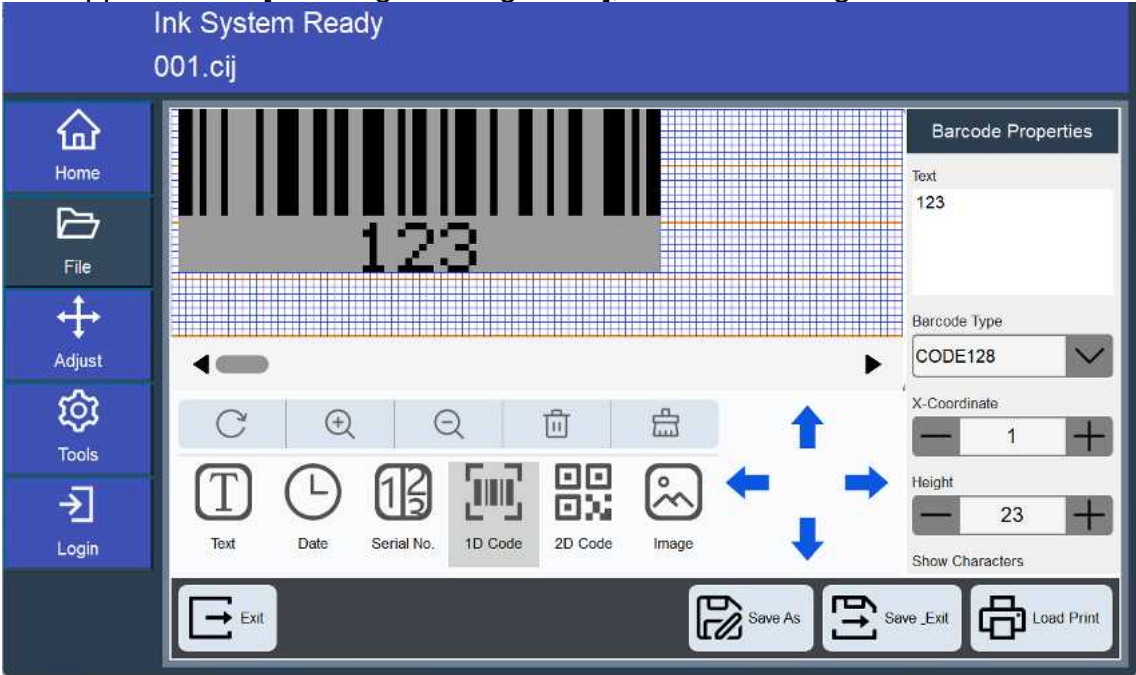


Figure 3-9 1D Barcode Editing Interface

Barcode Properties

Text

123

Barcode Type

CODE128

X-Coordinate

—

1

+

Height

—

23

+

2. In [**Barcode Properties**], you can configure the barcode's text content, barcode type (symbology), and height.

3.2.5 2D Barcode (QR Code) Editing



1. To print a 2D barcode, tap the  button in the element selection area. A default 2D barcode will appear in the [Message Editing Area], as shown in Figure 3-10.

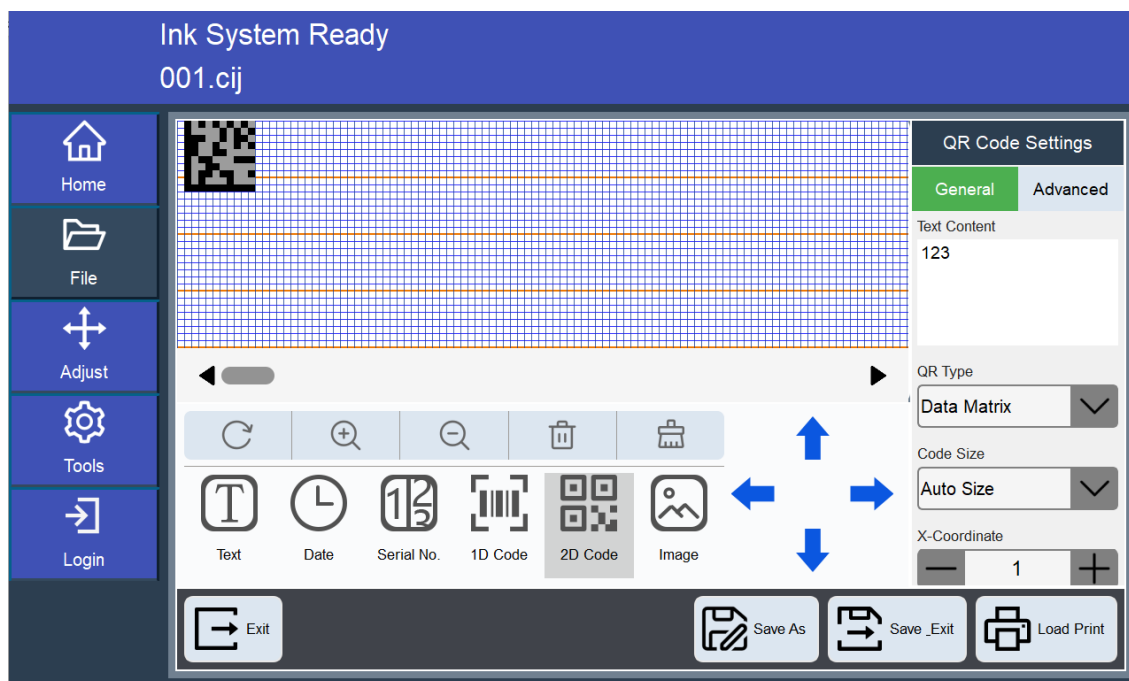


Figure 3-10 2D Barcode Editing Interface

QR Code Settings

General

Advanced

Text Content

123

QR Type

Data Matrix

▼

Code Size

Auto Size

▼

X-Coordinate

2. In **[2D Barcode Properties]**, you can configure the text content, 2D barcode type, barcode size, and error correction level.

3.2.6 Image Editing



1. To print an image, tap the  button in the element selection area. A default image will appear in the **[Message Editing Area]**, as shown in Figure 3-11.

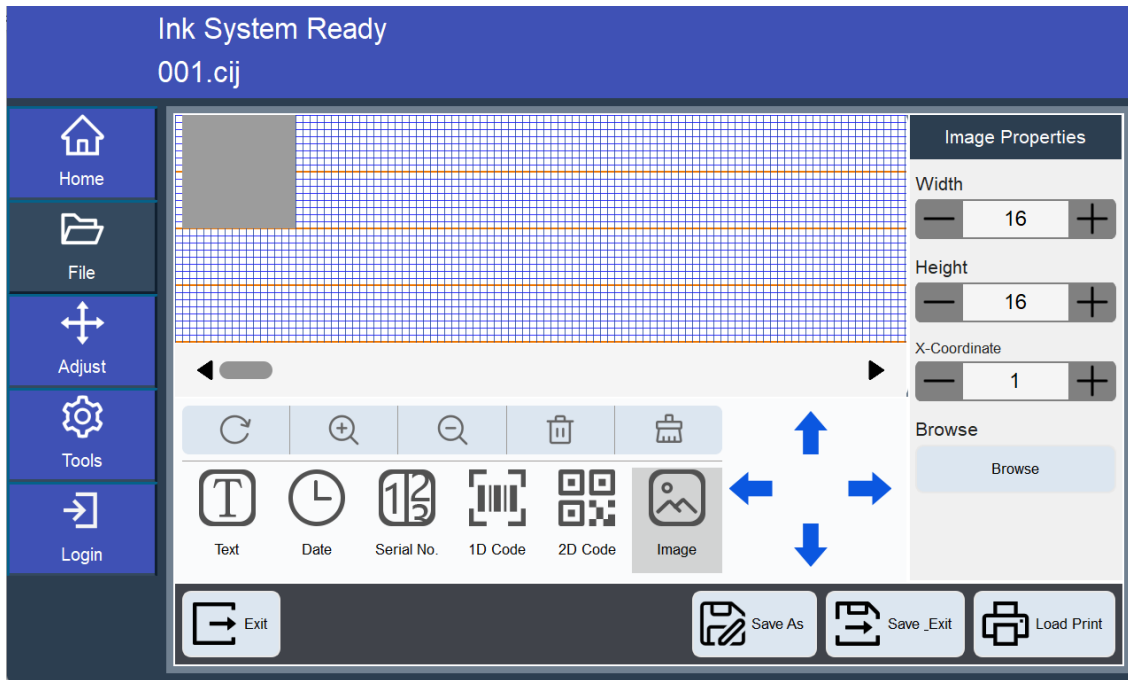
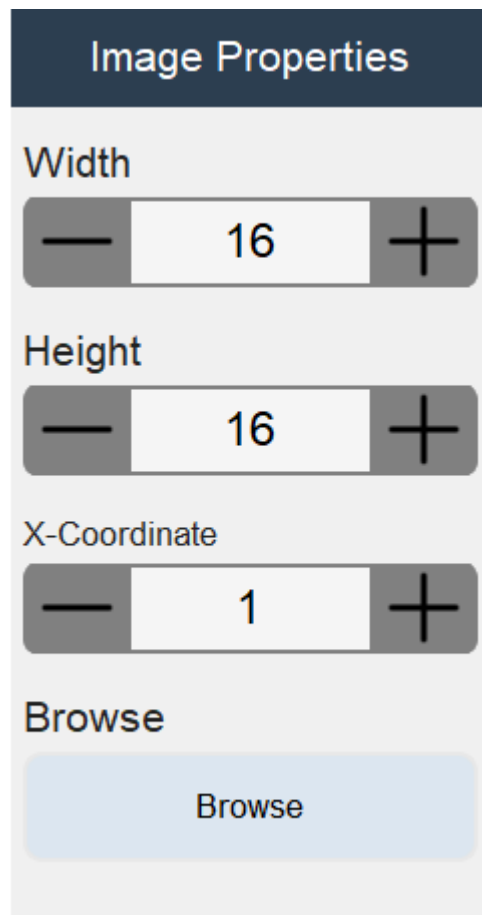


Figure 3-11 Image Editing Interface



2. In [**Image Properties**], you can adjust the image width and height. Tap [**Browse**] to choose the image file you want to print

3.2.7 Message Property Parameter Specifications

The property parameters for each message type are described below based on "Definition / Value Range / Default Value / Adjustment Effect" (verified against the current software version

options; this table will be updated accordingly when new options are added in software upgrades):

Message Type	Property Parameters	Definition & Values	Adjustment Effect & Suggestions
Text	Character Type / Font / Character Spacing / Layout	Character Type: English / Chinese Font: 5, 7, 9, 11, 16, 24, 32 dot-matrix font libraries Character Spacing: -5 to 10 Layout: Normal / Mirror / Inverted / Tower	Larger font matrix sizes result in taller characters, which proportionately reduces the maximum printing speed.
Time	Date Type / Font / Character Spacing / Layout	Date Type (Format): yyyy/MM/dd, yyyy-MM-dd, yyyyMMdd, yy/MM/dd, yy-MM-dd, yyMMdd, hh:mm:ss, hh:mm, day of year (Julian day), with custom formats supported.	Time/date information automatically updates in real time during printing status without manual intervention.
Serial Number	Counter Selection / Type / Digits / Font / Character Spacing / Layout	Counter: Counter 1 / Counter 2 Digits: Max 8 digits Type: Counter 1 / Counter 2	The start/end values and step size are configured under [Adjustment] ► [Counter Settings]. This option only selects which counter to reference.
1D Barcode	Text Content / Barcode Type / Barcode Height	Supported Symbologies: Code39, Code93, Code128, EAN-13, GS1-128, UPC-A, UPC-E Barcode Height: Set according to interface options.	When including variables such as date or counter, the content format must be compatible with the character set of the selected barcode symbology; otherwise, it cannot be generated.
2D Barcode	Text Content / 2D Barcode Type / Barcode Size / Error Correction Level	Type: QR Code (Versions 1–3), DataMatrix (ECC200) Error Correction Level: L / M / Q / H	Higher error correction levels increase resistance to damage/stains, but result in a larger code for the same content. When jet-printing 2D barcodes, strictly control the gap between the printhead and product surface (see Section 7.3, Item 5).
Image	Width / Height / Image File	Supported Formats: Monochrome BMP Max Height: ≤ 32 dots (constrained by	Image height is limited by the maximum dot matrix

Message Type	Property Parameters	Definition & Values	Adjustment Effect & Suggestions
		printhead max matrix size)	of the printhead. Automatic scaling when exceeding limits may result in loss of detail.

3.3 How to Edit, Delete, Rename, and Copy Saved Print Files

This section describes how to edit, delete, rename, and copy saved print files. The saved print file directories are divided into Local Files and USB Files. Tap the [Local Files] button on the main interface (or as shown in Figure 3-12).

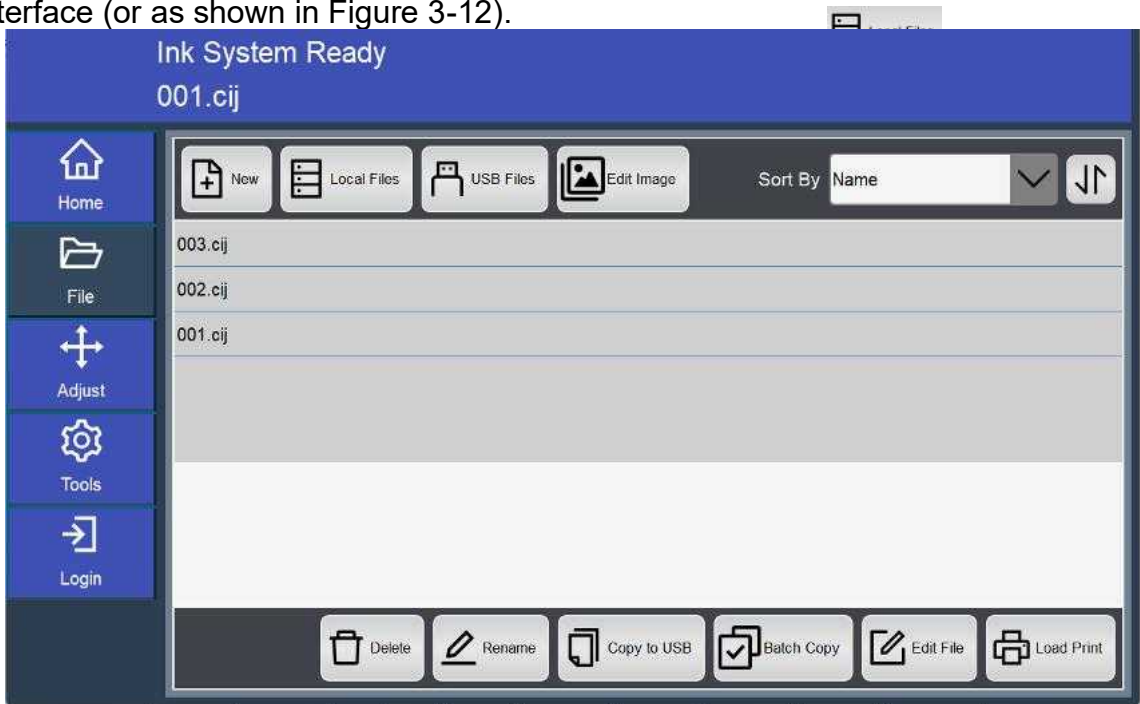


Figure 3-12 File List Interface

3.3.1Editing Files

1. Select the file you want to edit from the file list and tap the [Edit File] button. The system enters the file editing interface, displaying the file's message content in the [Message Editing Area].
2. Tap to select specific message elements to edit or modify them. Once editing is complete, tap the [Save _Exit] button. The system will return to the file list interface, where you can select other files to continue editing.

3.3.2Deleting Files

Select the file you want to delete from the file list and tap the [Delete] button. The system will prompt a confirmation message: " Delete permanently. Confirm?", as shown in Figure 3-13. Tap [OK] to permanently delete the file.

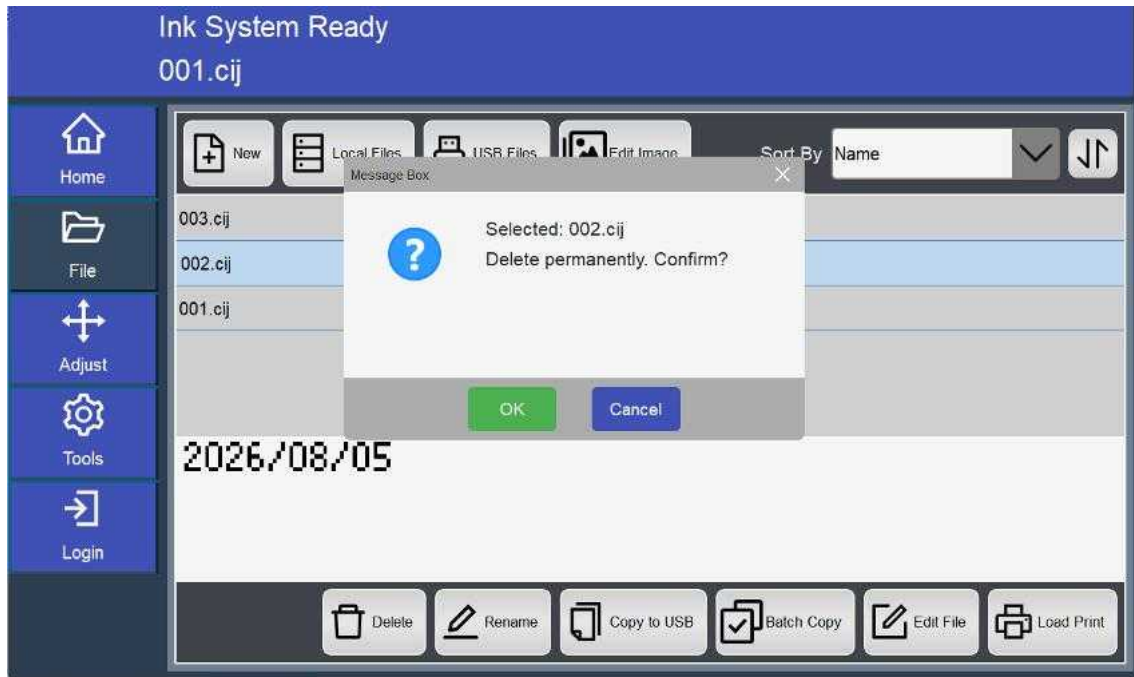


Figure 3-13 File Deletion Prompt

3.3.3 Renaming Files

Select the file you want to rename from the file list and tap the [Rename] button. The system will switch to the new file name input box, as shown in Figure 3-14. Enter the new file name and tap [OK / Confirm] to complete renaming.

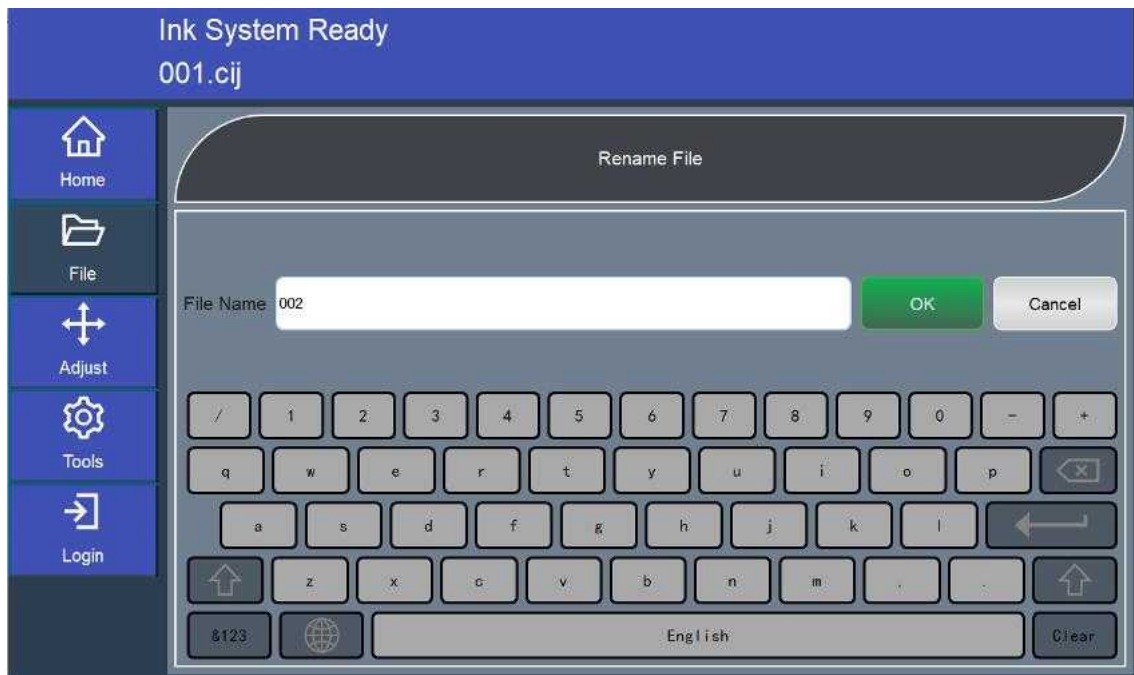


Figure 3-14 File Renaming Prompt Interface

3.3.4 Copying Files

Select the file you want to copy from the file list:

- Tap [Copy to USB] to copy a local file to the USB drive.
- Tap [Copy to Local] to copy a USB file to the local storage.

Chapter 4 Tools

4.1 Adjust

4.1.1 Print Style

Print Style contains the general parameters and style settings for basic printing.

4.1.1.1 General Params

The General Params interface is shown in Figure 4-1, including Print Direction, Encoder Switch, Print Width, Print Bold, Print Delay, Print Height, and Print Compress. Users can configure these settings according to their specific printing requirements.

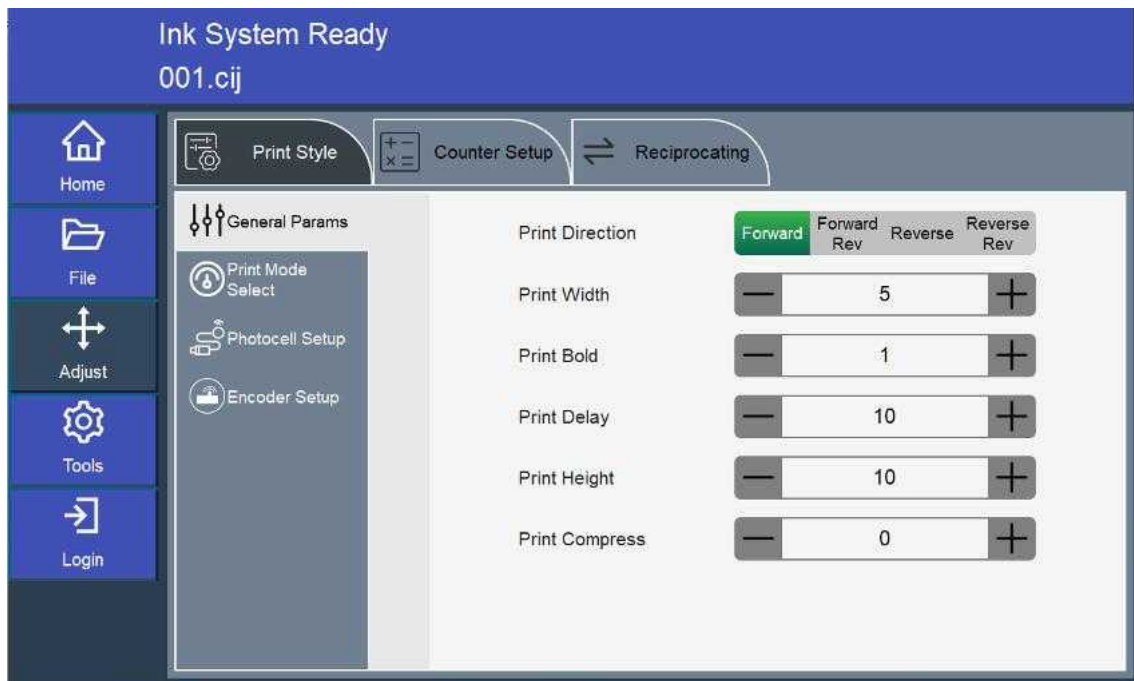


Figure 4-1 General Parameters Interface

Each parameter is described below (value ranges are organized based on the upper and lower limits of the software interface, see Figure 4-1; if interface limits change after a software upgrade, the interface shall prevail):

Parameter	Definition & Function	Range / Unit	Default	Adjustment Effect & Suggestions
Print Direction	Sets the character arrangement relative to product movement (normal, reversed, inverted, etc.) to adapt to printhead orientation and product flow.	Forward / Forward Rev / Reverse / Reverse Rev	Normal	Incorrect direction results in mirrored or upside-down characters; must be updated if the printhead mounting angle changes.
Encoder Switch	Selects the print speed synchronization mode:	On / Off	Subject to factory	Must be turned On for production lines with

Parameter	Definition & Function	Range / Unit	Default	Adjustment Effect & Suggestions
	Off uses internal speed; On synchronizes with encoder pulses.		settings	variable speeds, otherwise character width will fluctuate with speed (see Section 8.4).
Print Width	Character width along the direction of product movement (column spacing).	1~255	5	Larger values produce wider characters; values that are too small cause column overlap and lower legibility.
Print Bold	Number of times ink droplets are repeatedly jetted per column to increase character darkness.	0~7	0	Bold printing multiplies ink consumption and reduces the maximum achievable print speed.
Print Delay	Delay between sensor product detection and print start; determines the initial print location on the product.	0~16777215	50	Must be readjusted if sensor-to-printhead distance changes; increase value to move print backward, decrease to move forward.
Print Height	Character height (adjusted via ink droplet deflection amplitude).	Set per interface limits	Subject to factory settings	Excessive height causes dots at top/bottom edges to scatter or deform; affected by printhead-to-product distance.
Print Compression	Horizontal character compression ratio, used to condense character width without changing the matrix.	Set per interface limits	Subject to factory settings	Higher compression ratios produce narrower characters; over-compression causes adjacent columns to overlap and reduces legibility.

4.1.1.2 Reciprocating Printing

The interface for Reciprocating Printing is shown in Figure 4-2. Users can select forward or reverse printing according to production requirements, and adjust parameters including print

delay, print count, and print interval.

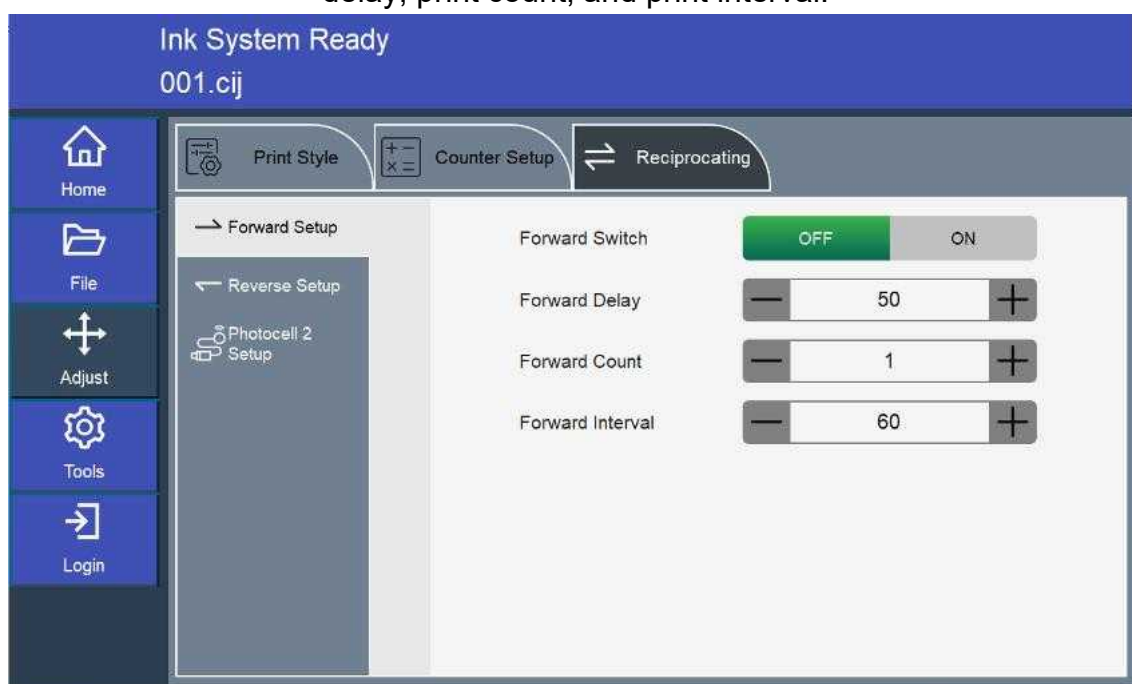


Figure 4-2 Bidirectional Printing Interface

Each parameter is described below:

Parameter	Definition & Function	Range / Unit	Default	调整效果与建议
Print Direction	Selects forward or reverse printing, used for applications where the printhead moves back and forth (e.g., gantry/flatbed systems).	Forward / Reverse	Subject to factory settings	If the selected direction does not match the actual movement direction of the printhead, characters will appear mirrored.
Print Delay	The delay from trigger to print start during each reciprocating stroke.	0~65535		Determines the starting position of the print for each stroke.
Print Count	The number of consecutive prints performed after a single trigger.	0~63		Works together with the Print Interval to achieve multiple prints per trigger signal.
Print Interval	The distance or delay gap between consecutive prints.	0~65535		The interval must be set larger than the physical length of a single message; otherwise, printed content will overlap.

4.1.2 Counter Settings

The Counter Settings interface is shown in Figure 4-3. The system includes two independent counters: Counter 1 and Counter 2. Users can configure parameters including Current Value,

Step Value, Initial Value, and End Value. Additionally, the Product Count feature allows resetting both the Current Batch Count and Total Print Count.

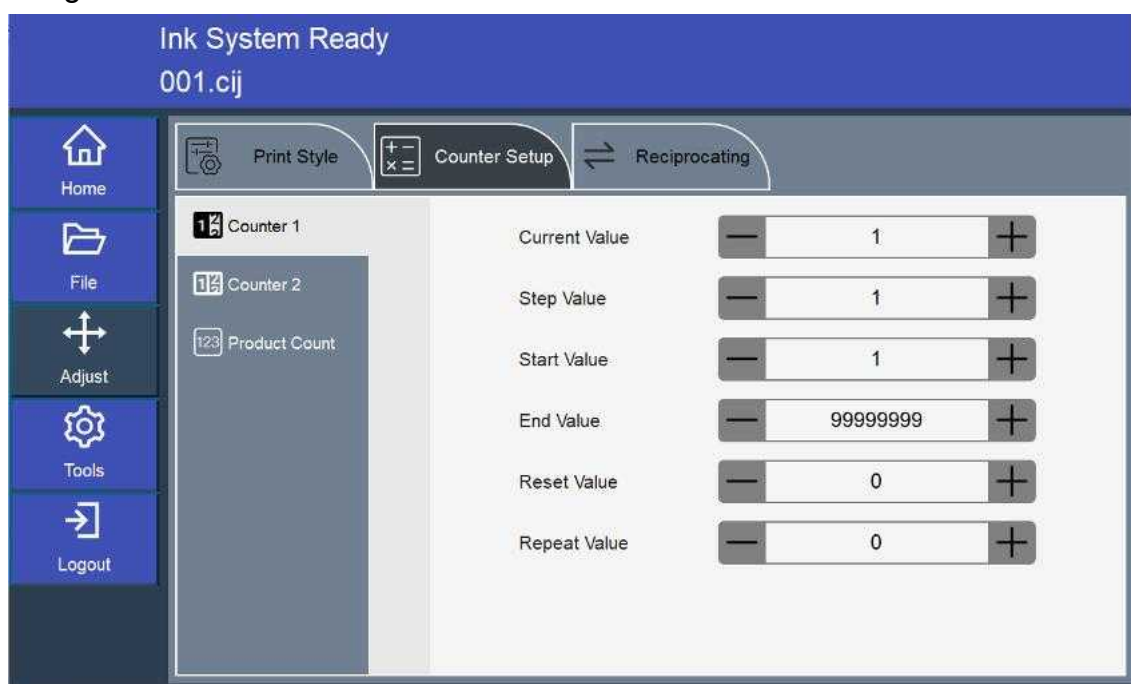


Figure 4-3 Counter Settings Interface

Each parameter is described below:

Parameter	Definition & Function	Range / Unit	Default	Adjustment Effect & Suggestions
Current Value	The value currently displayed by the counter that will be printed next.	≤ 8 digits	Subject to factory settings	Can be overwritten directly when switching batches mid-production.
Initial Value	The starting point of the counting cycle; resetting the counter returns it to this value.	≤ 8 digits	Subject to factory settings	—
Step Value	The increment applied to the counter after each trigger.	1~99999999	1	When the step value is n, the count increases by n with each item printed.
End Value	The end point of the counting cycle; upon reaching this value, the counter automatically resets to the Initial Value to continue the loop.	≤ 8 digits	Subject to factory settings	—
Product Count Reset	Clears and resets both the Current Batch Count and Total Print Count to zero.	Action Button	—	Reset the batch counter during batch transitions; record total counts prior to resetting, as this impacts yield statistics.

4.2 Tools

The **Tools** module consists of five main functions: **Ink Circuit Maintenance**, **System Configuration**, **Factory Mode**, **External Communication** (*technical documentation provided separately*), and **System Logs**. It serves primarily as a toolkit for professional technical personnel to configure machine parameters, commission, maintain, and repair the printer. The interface is shown in **Figure 4-4**.

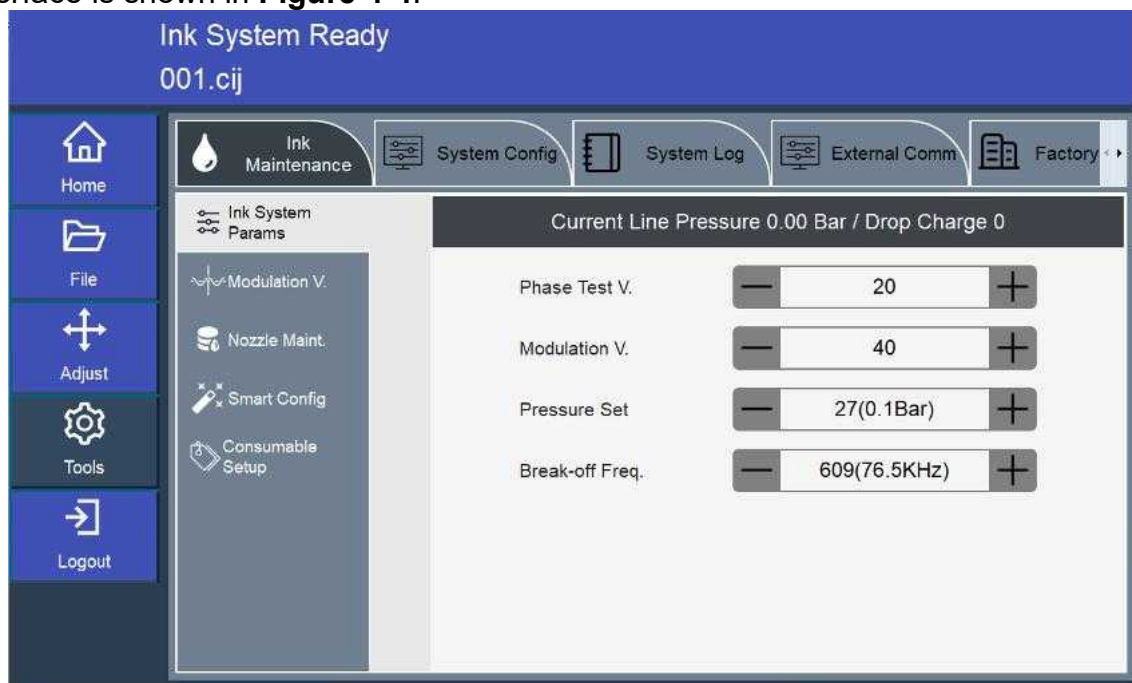


Figure 4-4 Tools Interface

4.2.1 Ink Circuit Maintenance

The Ink Circuit Maintenance module includes Ink Circuit Parameters, Printhead Maintenance, Smart Parameter Configuration, Consumable Model Settings, Solvent Information, and Ink Information.

4.2.1.1 Ink Circuit Parameters

The Ink Circuit Parameters interface is shown in Figure 4-5. Technicians can check the current ink circuit pressure value, as well as view and adjust various parameters such as Phase Detection Voltage, Piezo/Crystal Voltage, Pressure Setting, Break-off Frequency, and Level / Grade.

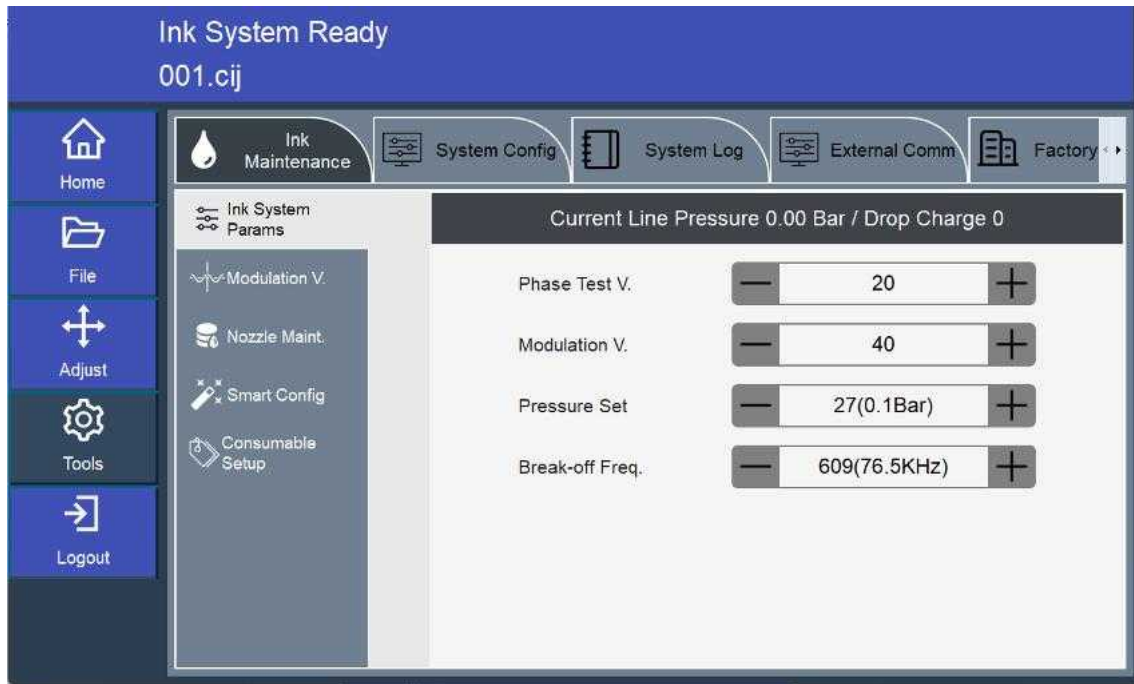


Figure 4-5 Ink Circuit Parameters Interface

[WARNING] Ink circuit parameters directly govern droplet formation and charging deflection quality. These settings are restricted to professional technicians ONLY. Always record the original values prior to modification, and observe the ink circuit operational logs after adjustments to confirm system stability.

Each parameter is described below:

Parameter	Definition & Function	Range / Unit	Default	Adjustment Effect & Suggestions
Phase Detection Voltage	Charging phase detection voltage; ensures droplet charging is synchronized with the break-off phase.	Factory setting: 4 V (adjustable range subject to interface limits)	4 V	Phase misalignment causes charging faults and scattered dots; restricted to professional technicians ONLY.
Piezo / Crystal Voltage	Piezoelectric crystal drive amplitude; dictates the ink stream break-off formation.	Factory setting: 120 (dimensionless interface setting value)	120	Values that are too high or too low lead to poor break-off and increased satellite droplets.
Pressure Setting	Operating pressure of the ink circuit; determines the velocity of the ink stream.	Factory setting: 0.25 MPa	0.25 MPa	Abnormal pressure directly affects whether the ink stream enters the gutter properly, as well as character height consistency.
Break-off Frequency	Frequency at which the ink stream breaks up into droplets.	Factory setting: 70.1 kHz	70.1 kHz	Related to ink model and viscosity; matched and set at the factory according to consumables.
Grade / Level	Set at the factory according to	—	—	Consult official technical support before making

Parameter	Definition & Function	Range / Unit	Default	Adjustment Effect & Suggestions
	consumable specifications; non-field-adjustable item. If modification is required, contact official support.			any adjustments.

4.2.1.2 Printhead Maintenance

The Printhead Maintenance interface is shown in Figure 4-6. Professional technicians can enable the nozzle wash switch to troubleshoot nozzle faults.

- Unclogging:** When nozzle clogging or ink stream deviation occurs, using the Nozzle Wash function can effectively unblock the nozzle.
- Suction & Cleaning:** When nozzle wash is activated, negative pressure is generated at the nozzle orifice; flushing the nozzle with cleaning solvent at this time effectively cleans the nozzle passage.
- Post-Cleaning Notice:** To maintain good printing results, ensure that the charge electrode and high-voltage deflection plates are free of ink residue after cleaning. Allow the assembly to sit idle for 1 minute before resuming printing.

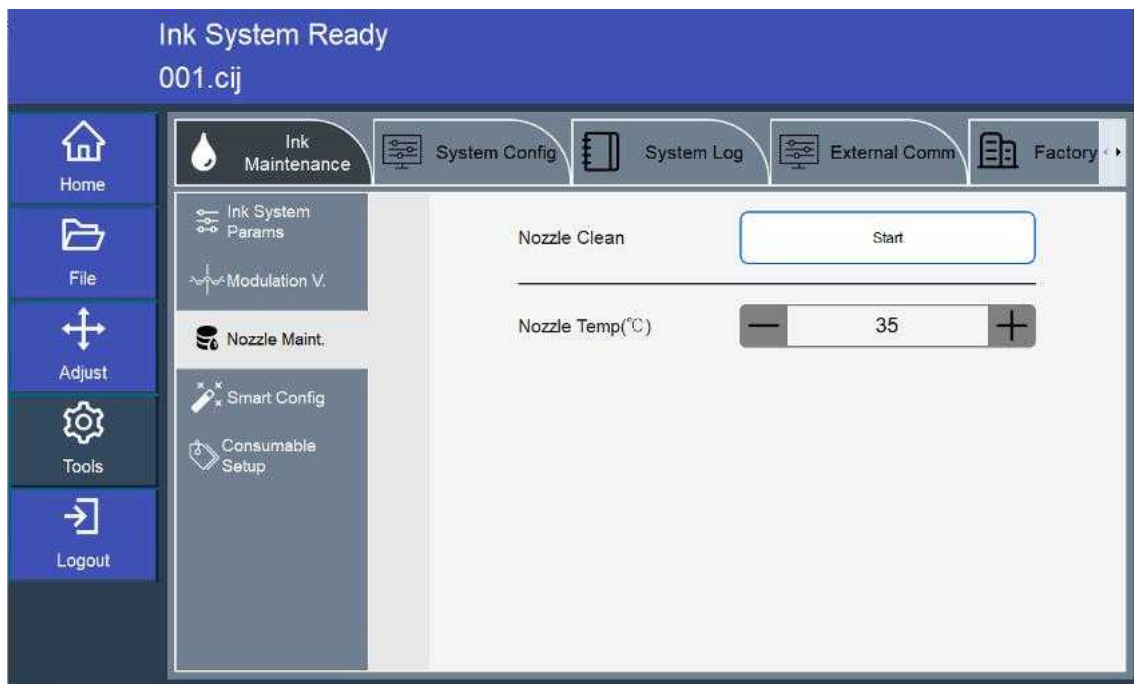


Figure 4-6 Nozzle Maintenance Interface

4.2.1.3 Smart Parameter Settings

The Smart Parameter Settings interface is shown in Figure 4-7. Professional technicians can enable or disable functions such as Auto Stop Ink on Gutter Fault, Auto Stop Ink on Charge Fault, Printhead Cover Switch, Auto Ink Viscosity Setting, and Ink Circulation Function.

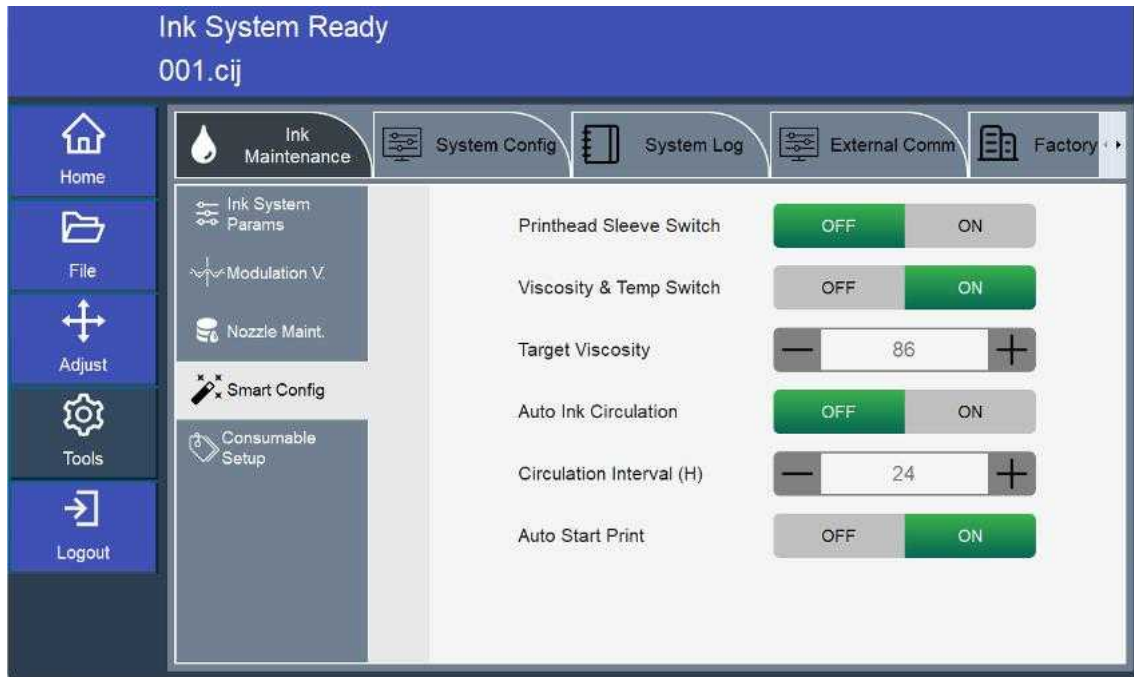


Figure 4-7 Smart Parameter Settings Interface

4.2.2 System Configuration

The System Configuration module includes functions such as Localization, System Upgrade, Parameter Backup, User Management, and Device Information.

4.2.2.1 Localization

The Localization interface is shown in Figure 4-8. Users can adjust system language, time, and screen saver timeout according to their needs.

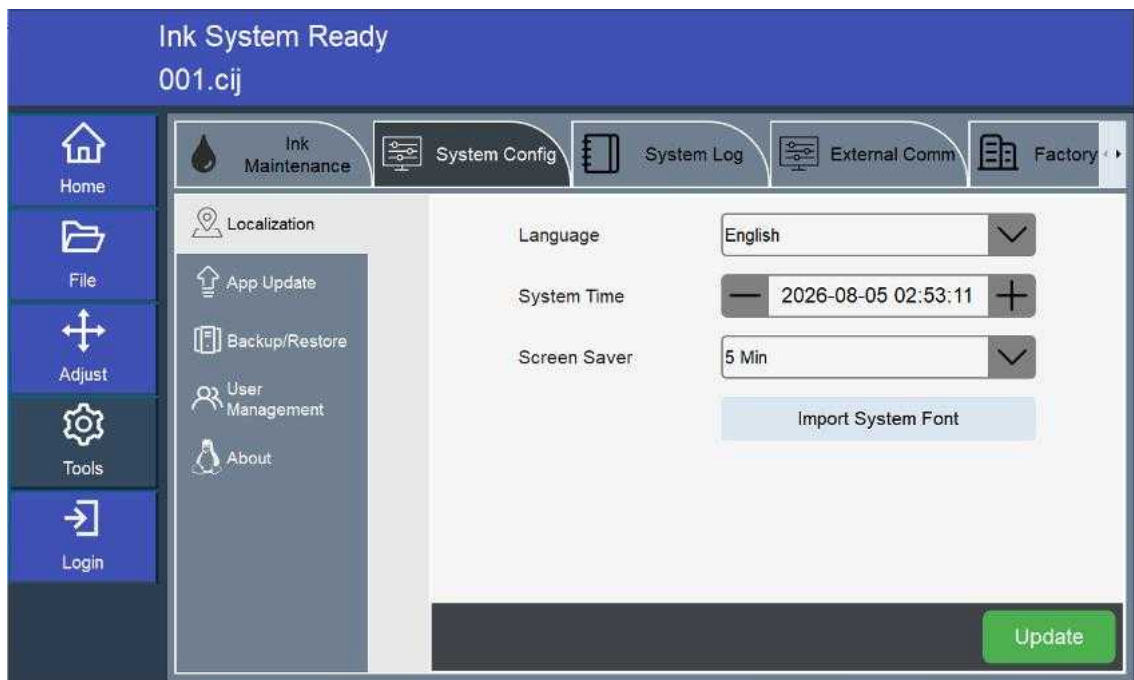


Figure 4-8 Localization Interface

4.2.2.2 System Upgrade

The System Upgrade interface is shown in Figure 4-9. Users can check the current software version and perform system upgrades via a USB drive as needed.

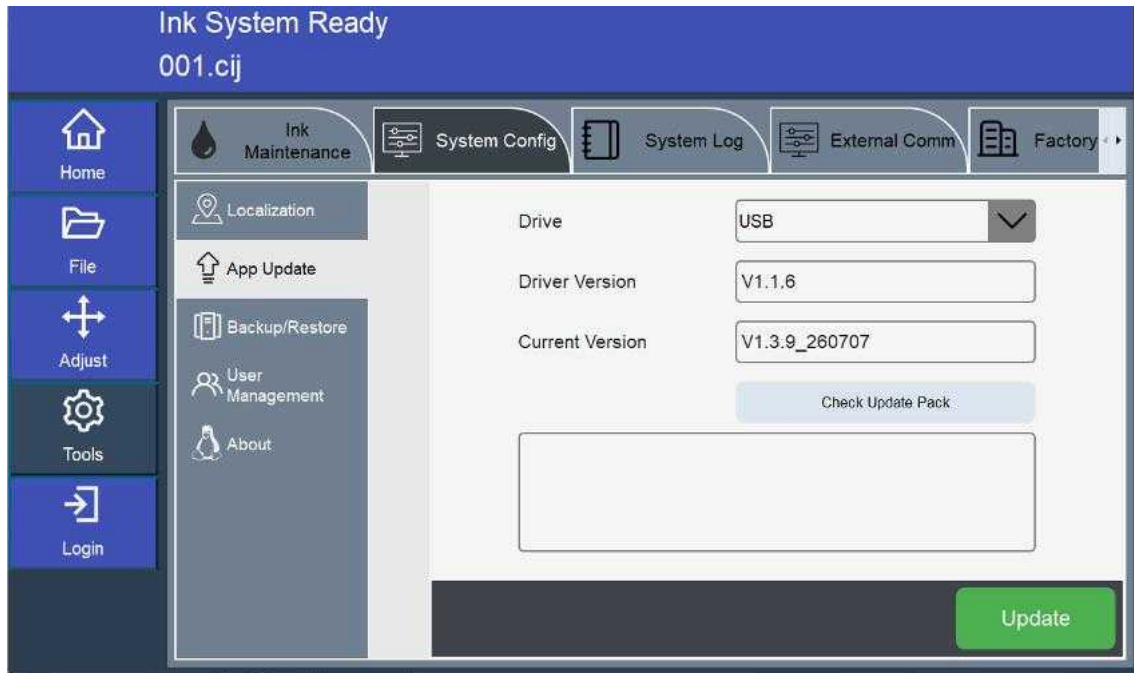


Figure 4-9 System Upgrade Interface

4.2.2.3 User Management

The User Management interface is shown in Figure 4-10. Users can configure user access permissions and login passwords.

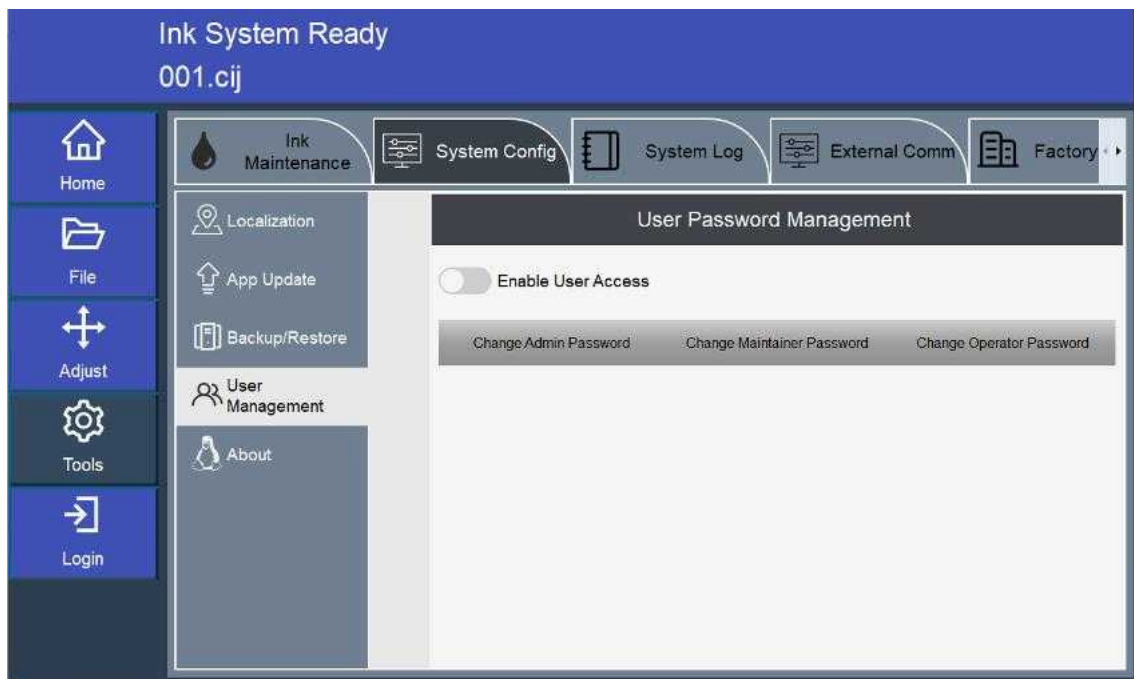


Figure 4-10 User Management Interface

4.2.3 System Logs

System Logs comprise three types of log records: Event Logs, Ink Circuit Operational Logs, and Fault Logs.

4.2.3.1 Event Logs

The Event Logs interface is shown in Figure 4-11. It records operation logs generated during inkjet printer operation.

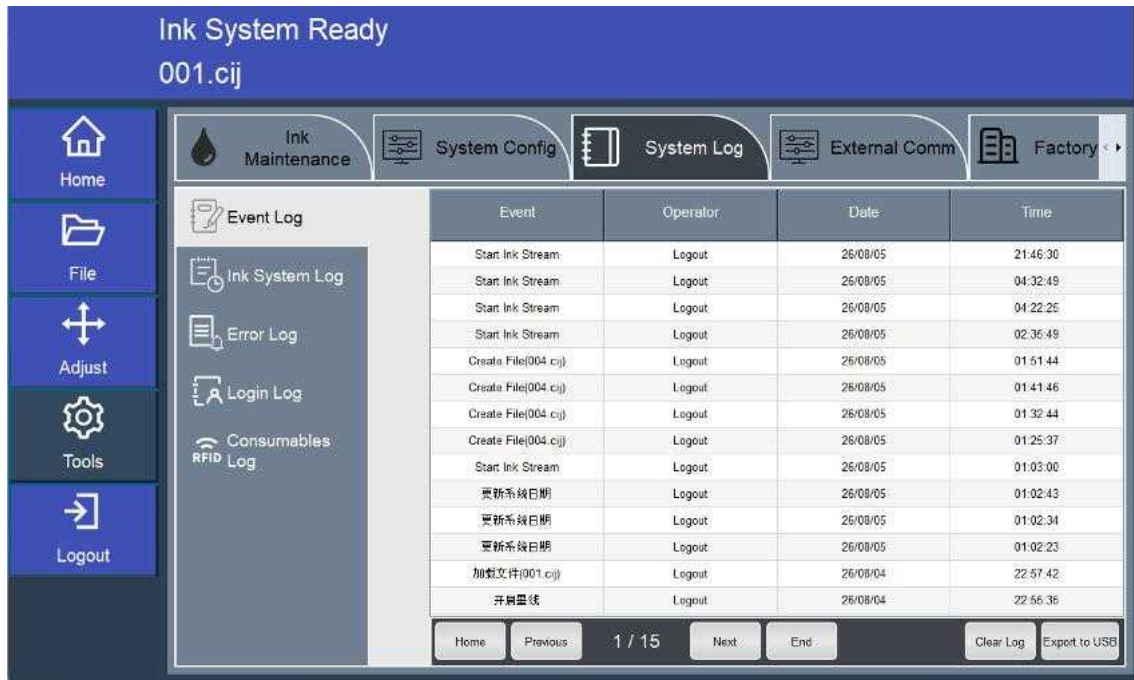


Figure 4-11 Event Logs Interface

4.2.3.2 Ink Circuit Operational Logs

The Ink Circuit Operational Logs interface is shown in Figure 4-12. It records the printer's ink viscosity, ink pump speed, and pressure at 10-minute intervals.

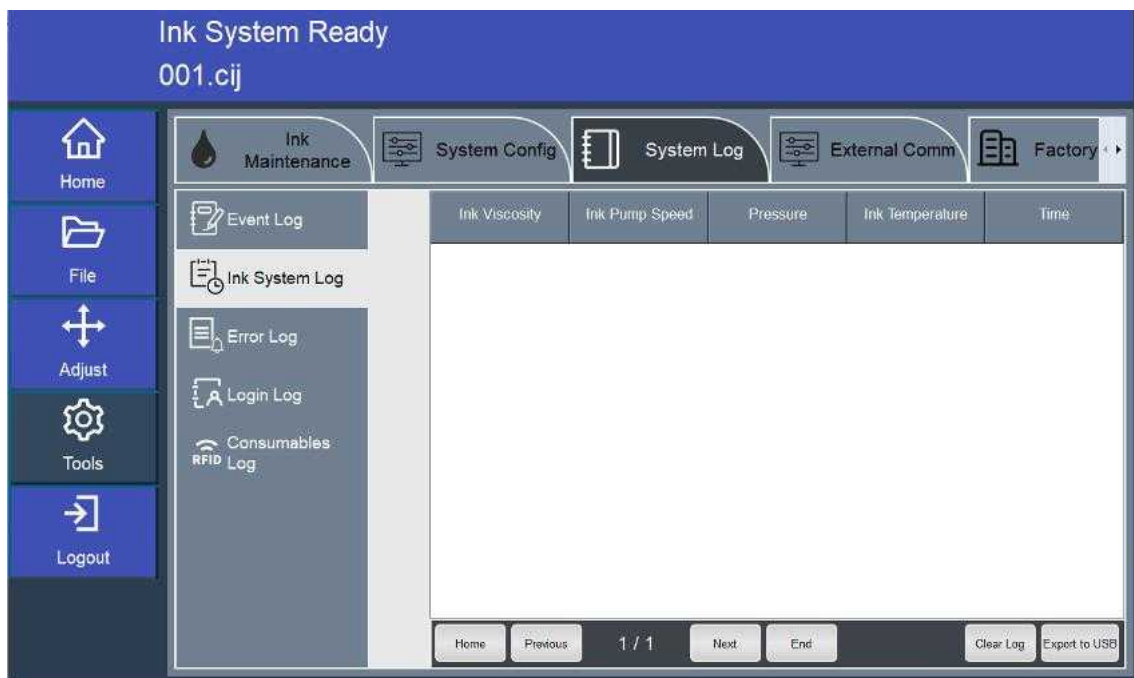


Figure 4-12 Ink Circuit Operational Logs Interface

4.2.3.3 Fault Logs

The Fault Logs interface is shown in Figure 4-13. It records system fault logs for the inkjet printer.

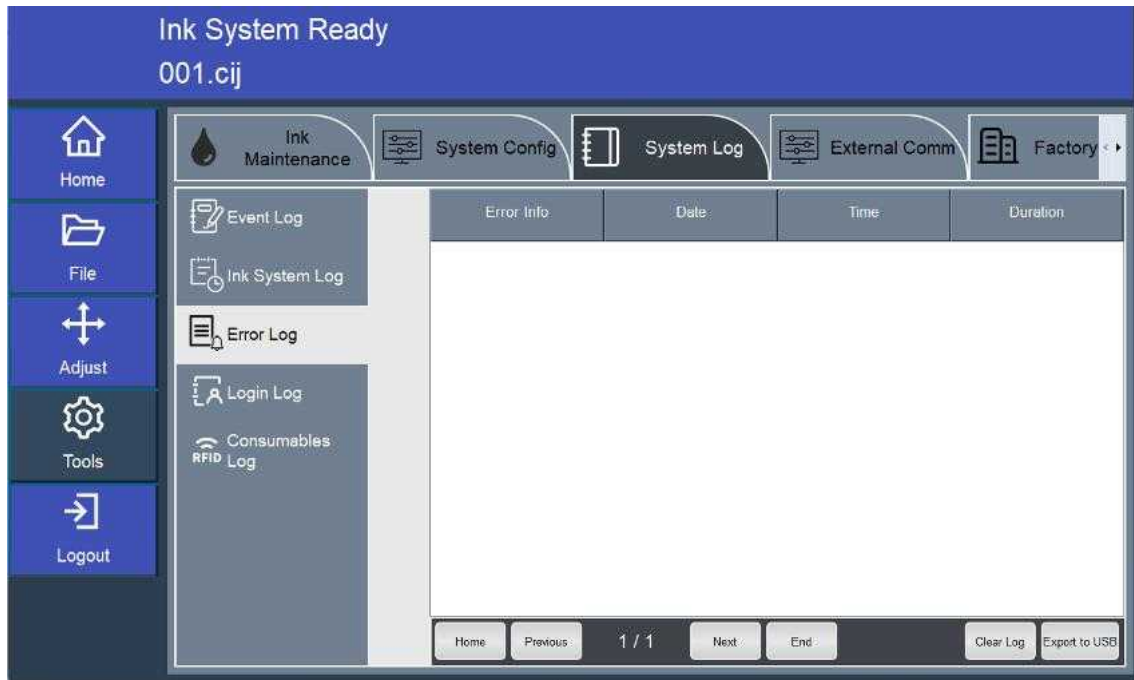


Figure 4-13 Fault Logs Interface

4.2.4 Factory Mode

Factory Mode consists of two main modules: Single-Step Debugging and Maintenance.

4.2.4.1 Single-Step Debugging

The Single-Step Debugging interface is shown in Figure 4-14. Used by professional technicians for machine commissioning, this function allows manual toggling of individual control valves on the inkjet printer to perform testing, inspection, and maintenance operations.

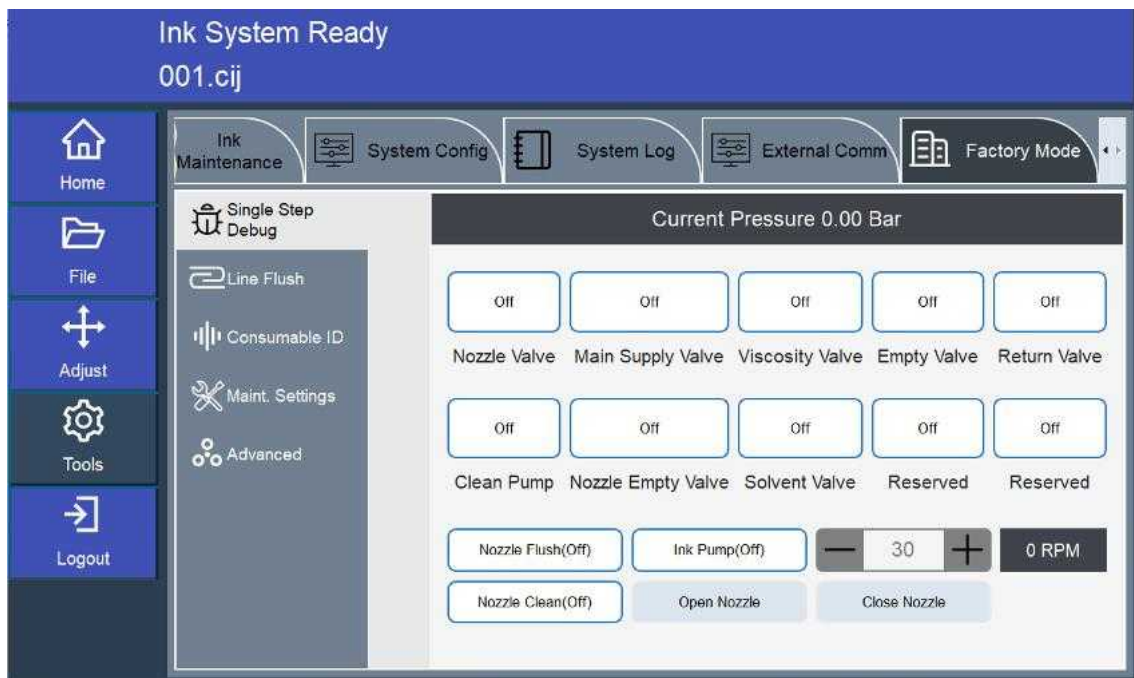


Figure 4-14 Single-Step Debugging Interface

4.3 Login

Click the Login button to open the user login interface, as shown in Figure 4-16.

The system defines three user roles—Administrator, Maintenance Technician, and Operator—each assigned different access permissions and configurable passwords. To log in, select the corresponding user role and enter the configured password.

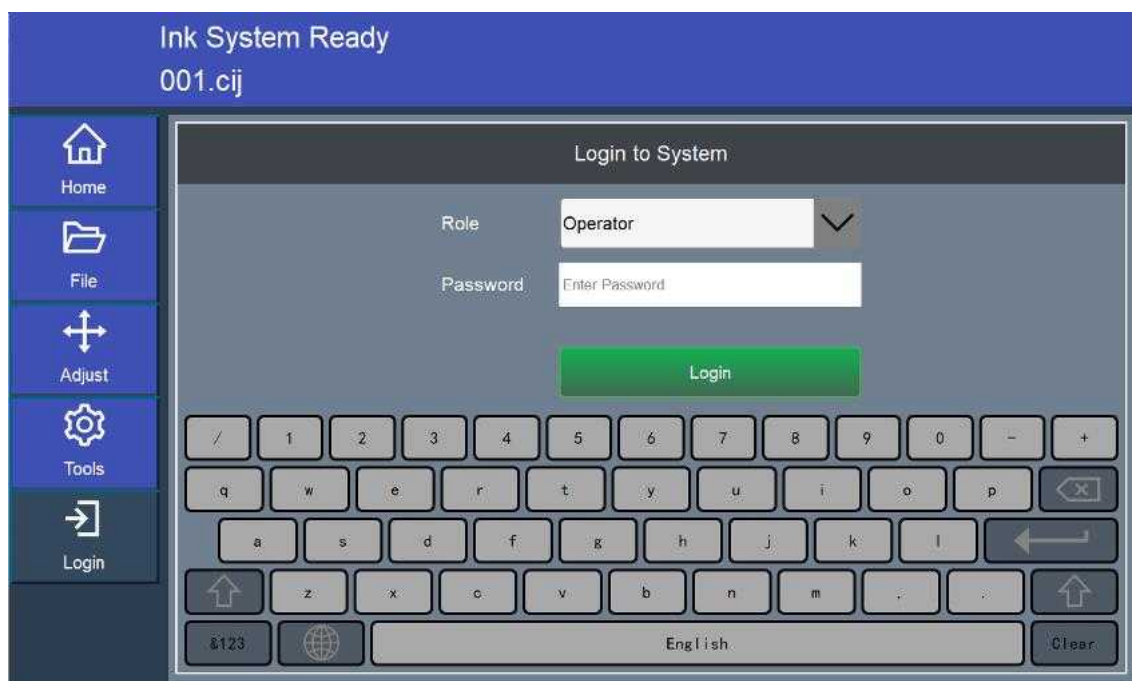


Figure 4-16 User Login Interface

Chapter 5 Device Description

This chapter introduces the overall components, printhead structure, and ink circuit operating principles of the MX2890 inkjet printer. Understanding the contents of this chapter serves as the foundation for properly performing the maintenance procedures in Chapter 6 and troubleshooting in Chapter 7.

5.1 Overall Structure Overview

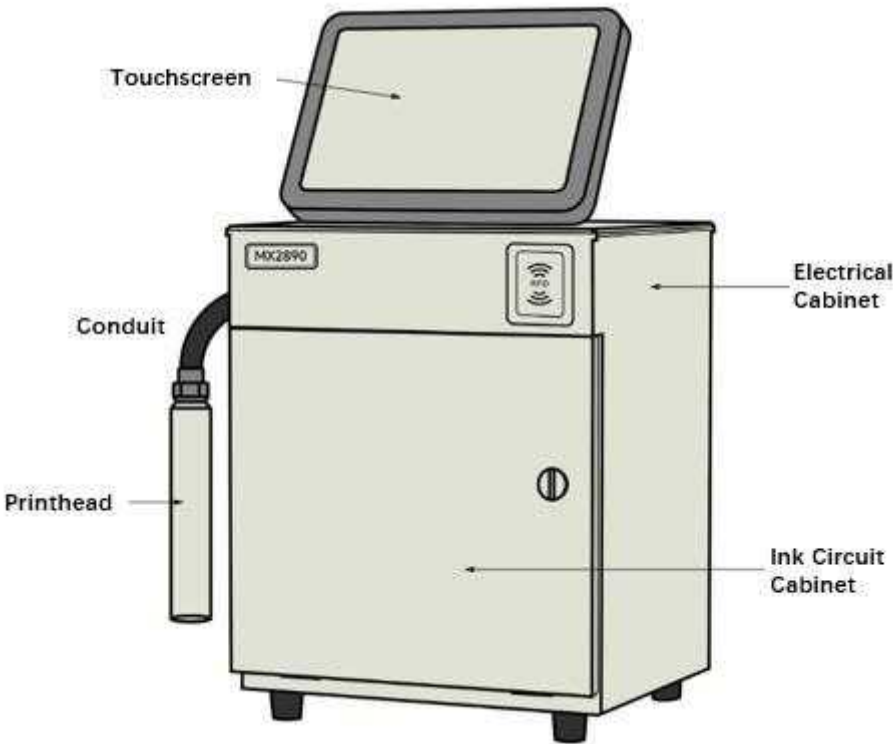


Figure 5-1 Front Structure of the Overall Unit
(Touchscreen, Electrical Cabinet, Ink Circuit Cabinet, Conduit, and Printhead)

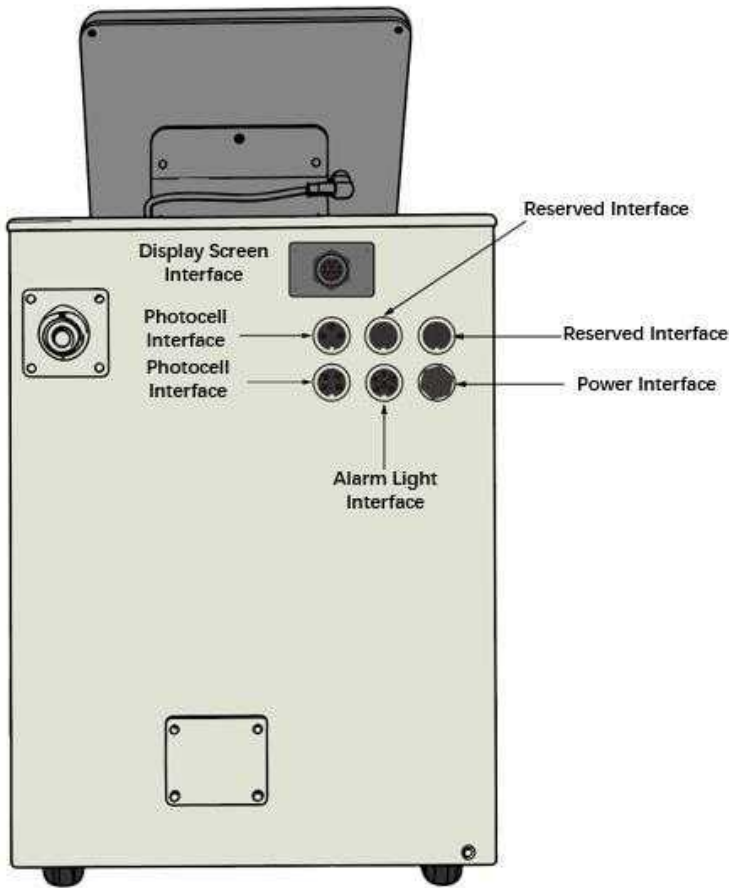


Figure 5-2 Rear Panel Interface Distribution (Display Screen Interface, Photocell Interface, Encoder Interface, Alarm Light Interface, Reserved Interface, and Power Interface)

No.	Component Name	Function Description
1	Touch Display	10.1-inch capacitive touchscreen for completing all setup and control operations; adjustable viewing angle.
2	Electrical Cabinet	Housing for the main control board, driver board, and power supply. Power must be disconnected and wait at least 5 minutes before opening (see Section 1.4).
3	Ink Circuit Cabinet	Housing for the ink bottle, solvent bottle, mixing tank, main ink pump, main filter, and solenoid valves; accessed for routine maintenance (see Section 5.3).
4	Consumable RFID Zone	Located on the upper front of the chassis to identify official consumable models and batch numbers; triggers an alarm (Code D18) if the model does not match settings.
5	Conduit (Flexible Conduit)	Metallic corrugated conduit bundle (2.5 m length, minimum bending radius ≥ 150 mm) containing ink lines and signal cables connecting chassis and printhead; twisting and severe bending are strictly prohibited.
6	Printhead	Core printing component (~210 mm long); see Section 5.2 for structural details.
7	Ink Fill Port	Located inside the ink circuit cabinet with a threaded cap; used to refill officially certified ink (see Section 6.6).
8	Solvent Fill Port	Located inside the ink circuit cabinet with a threaded cap; used to refill officially certified solvent (see Section 6.6).
9	Mixing Tank (Ink Reservoir)	Intermediate tank for ink/solvent mixing, viscosity adjustment, and liquid level detection.
10	Main Ink Pump	Supplies 0.25 MPa working pressure to drive ink circulation; speed can be set in Single-Step Debugging mode.
11	Main Filter	Filters impurities from ink to prevent nozzle clogging; see Section 6.7 for replacement details.
12	Power Switch	Located on the side of the chassis for initial power-on; can be woken via touchscreen during daily operation (auto ink circulation feature, see Section 2.1).
13	Power Port	Located on the rear panel; connects to the official power cable (110–240 VAC).
14	Photoelectric Sensor Port	3-pin DIN socket; connects to the photoelectric sensor (product detector); see Section 8.3.
15	Encoder Port	4-pin DIN socket; connects to the rotary encoder (synchronizer); see Section 8.4.
16	Alarm Lamp Port	6-pin DIN socket; connects to the tri-color alarm lamp and buzzer; see Section 8.5.
17	Reserved Ports	Two reserved sockets on the rear panel; inactive in the current software version.
18	Display Port	Aviation socket connecting the touch display; hot-unplugging/plugging is strictly prohibited.
19	Product Nameplate	Located at the lower right corner of the rear panel; displays model, power specifications, serial number, and manufacture date (see Section 5.4).

5.2 Printhead Structure

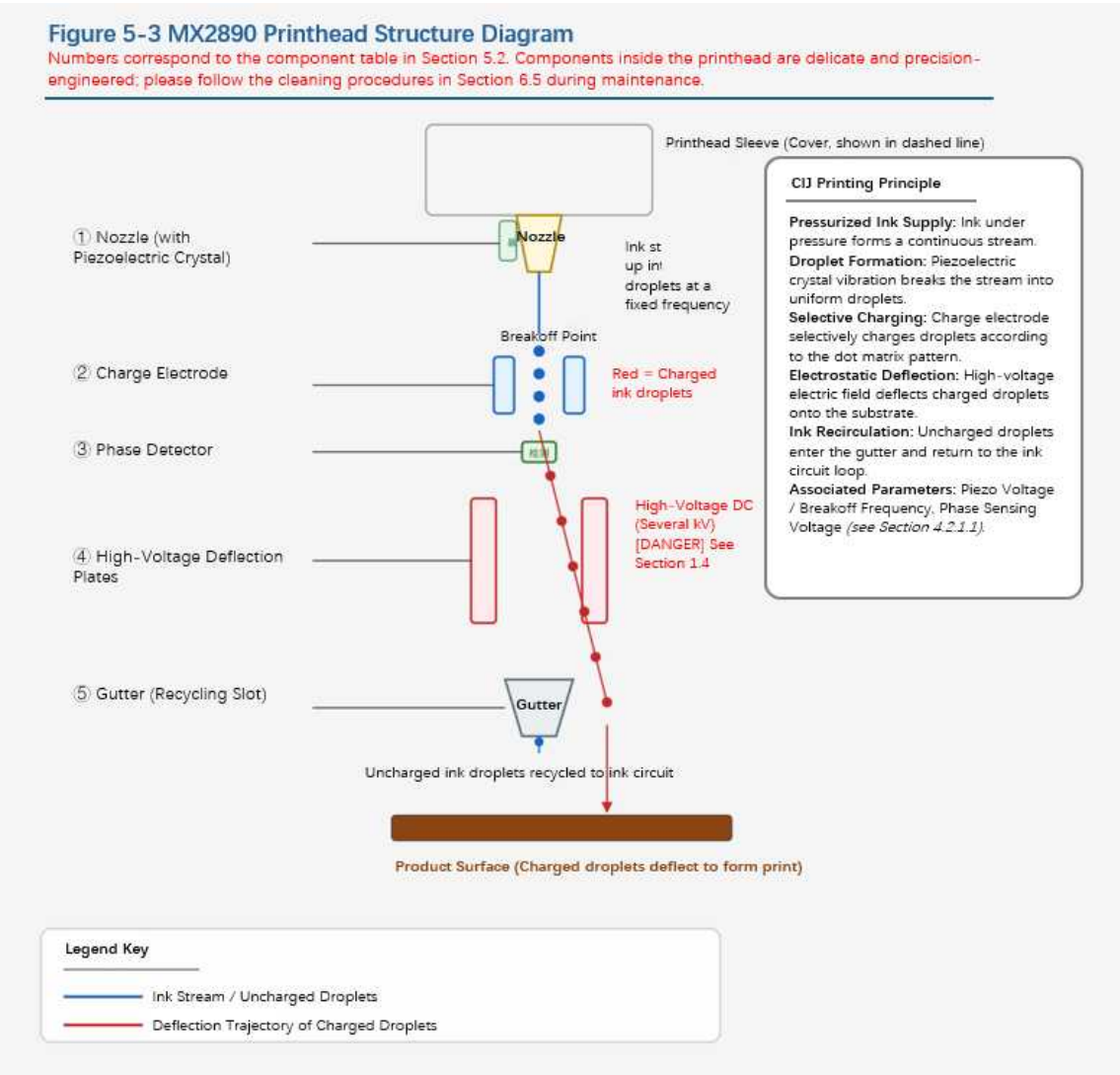


Figure 5-3 Schematic Diagram of Printhead Structure
(Callouts correspond to component table in Section 5.2)

The MX2890 operates on Continuous Inkjet (CIJ) technology:

Under pressure from the ink pump, ink is continuously expelled through the nozzle to form a stream. The piezoelectric crystal oscillator inside the nozzle vibrates at a fixed frequency, breaking the ink stream at a precise location into uniform ink drops (referred to as the "break-off point").

As the drops pass through the charge electrode, they are selectively charged. Subsequently, they fly through the high-voltage electric field created by the deflection plates; the charged drops are deflected onto the product surface to form character dot matrices, while uncharged drops travel in a straight line into the gutter and return to the ink circuit for recirculation.

No.	Component Name	Function Description	Associated Interface Parameter
1	Nozzle (with Piezo Crystal Oscillator)	Expels the ink stream and breaks it into uniform ink drops	Crystal Voltage, Break-off Frequency ([Tools] ► [Ink Circuit Maintenance])

No.	Component Name	Function Description	Associated Interface Parameter
			► [Ink Circuit Parameters])
2	Charge Electrode	Selectively charges ink drops to determine their deflection distance	Phase Detection Voltage
3	Phase Detection Electrode	Detects drop charging phase to ensure synchronization between charging and break-off	Phase Detection Voltage
4	Deflection Plates	Generates a high-voltage electric field of several kilovolts to deflect charged drops onto the substrate ([DANGER] High-voltage components, see Section 1.4)	—
5	Gutter (Recycling Slot)	Recovers unprinted ink drops; seals against the nozzle when the nozzle-sealing mechanism is active	Auto Ink Stop on Gutter Fault (Smart Parameters)
6	Printhead Cover	Protects internal printhead components; removed during maintenance	Printhead Cover Print Switch (Smart Parameters)

[CAUTION] Internal components of the printhead are precision-engineered and delicate. Cleaning must be performed using only official cleaning solvent, squeeze bottles, and air blowers. Scrape-cleaning electrode surfaces with hard objects is strictly prohibited.

5.3 Ink Circuit System

Figure 5-4 MX2890 Ink Circuit System Schematic

Valve and pump component names correspond directly to the [Tools] ► [Factory Mode] ► [Single-Step Debug] interface (refer to Section 5.3 for the component cross-reference table). Software reserved functions such as the wash pump and printhead flush valve are not equipped on this machine.

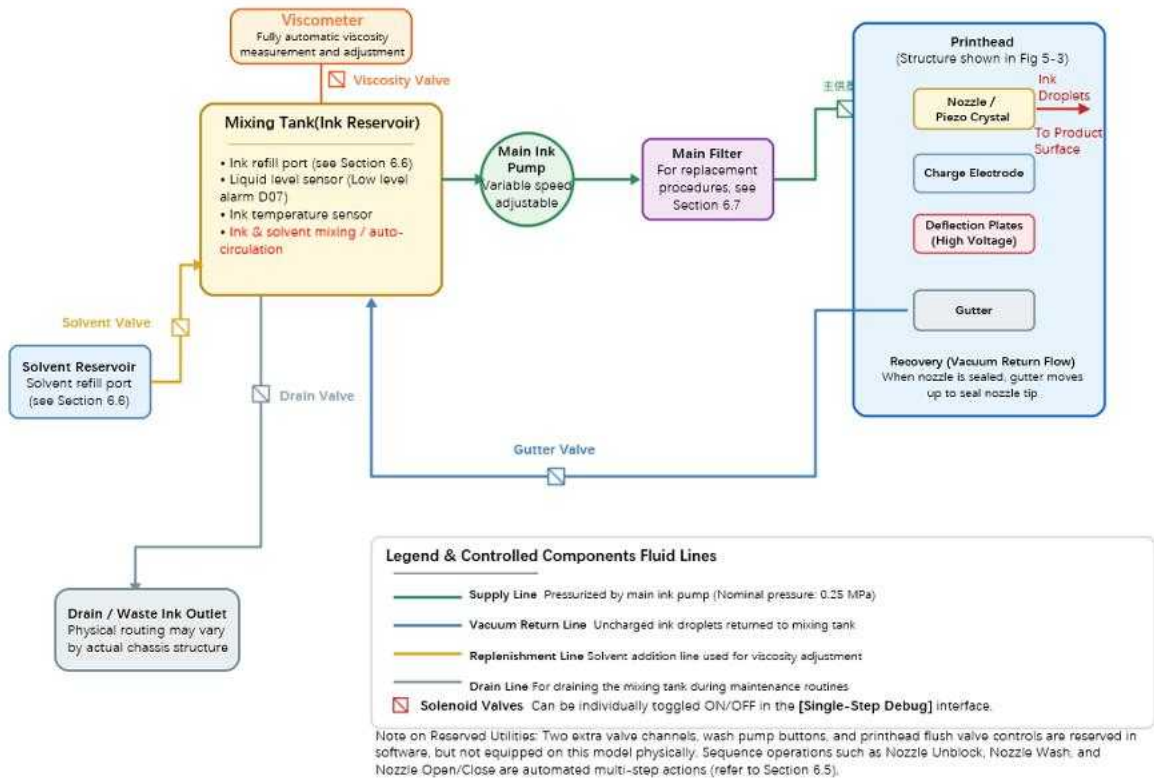


Figure 5-4 Ink Circuit System Schematic Diagram

(Valves and pumps are named consistently with the [Single-Step Debugging] interface; components corresponding to reserved interface buttons are not equipped on this model)

The basic flow path of the ink circuit system is as follows:

Ink from the mixing tank is pressurized by the ink pump, filtered through the main filter, and delivered to the printhead nozzle for jetting. Unprinted ink drops are drawn back into the mixing tank from the gutter via the recovery line. The system automatically measures ink viscosity at set intervals and automatically replenishes solvent when the viscosity is too high.

This unit features an automatic ink circulation function, which automatically maintains ink condition during prolonged power-on periods.

Solenoid valves and pumps in the ink circuit can be individually controlled by professional technicians in the [Tools] ► [Factory Mode] ► [Single-Step Debugging] interface for testing, inspection, and maintenance operations (see Figure 4-14 for the interface). The control mappings are as follows:

[NOTE] The "Cleaning Pump", "Printhead Drain Valve", and certain reserved buttons in the Single-Step Debugging interface are software-reserved options. This machine model is not equipped with these corresponding physical components, so operating them produces no actual physical action. Printhead ink supply is controlled by the "Main Supply Valve".

Single-Step Debugging Control	Corresponding Ink Circuit Component	Function
Main Supply Valve	Ink supply solenoid valve between piping system and printhead	Toggles printhead ink supply on/off; operates during stream establishment and ink circuit pressure building upon startup.
Viscosity Valve	Viscosity meter sampling valve	Samples ink into the viscosity meter to facilitate automatic viscosity measurement.
Drain Valve	Mixing tank drain valve	Drains ink from the mixing tank during maintenance (see Section 6.9).
Recovery Valve	Recovery line solenoid valve	Toggles printhead recovery circuit on/off to allow unprinted ink drops to flow back into the mixing tank.
Solvent Valve	Solvent replenishment valve	Replenishes solvent into the mixing tank for viscosity adjustment.
Reserved (2 Channels)	—	Reserved valve positions; inactive in current software version.
Nozzle Unblock	Nozzle (Combined action)	Momentarily flushes and unblocks the nozzle; used for emergency treatment of mild clogs.
Main Ink Pump	Main ink pump and its speed settings	Manually starts/stops the main ink pump and sets target speed; interface displays actual real-time speed (RPM).
Execute Nozzle Cleaning	Nozzle and gutter (Combined action)	Opens the gutter and creates negative pressure at the nozzle to unblock with cleaning solvent (see Section 6.5.2).
Open Nozzle	Nozzle sealing mechanism	Releases nozzle seal; gutter moves to the printing position.
Close Nozzle	Nozzle sealing mechanism	Seals the nozzle; gutter moves to the sealed position.

[TIP] The Ink Circuit Operation Logs ([Tools] ► [System Logs] ► [Ink Circuit Operation Logs]) record ink viscosity, ink pump speed, and system pressure every 10 minutes. This log serves as crucial data for evaluating ink circuit health and applying for technical support.

5.4 Nameplate and Serial Number

The product nameplate is located at the lower right corner of the machine's rear panel, displaying the device model, power supply specifications, factory serial number, and manufacture date.

When contacting technical support or after-sales service, please provide the Serial Number listed on the nameplate as well as the current Software Version Number (View path: [Tools] ► [System Configuration] ► [Device Information]).

Chapter 6 Maintenance

6.1 General Maintenance Safety Guidelines

Before executing any maintenance procedures in this chapter, please review Chapter 1 Safety Information, particularly Section 1.4 Electrical Safety and High Voltage Warnings, Section 1.5 Chemical Safety, and Section 1.6 Personal Protective Equipment.

[WARNING]

- **Personal Protection:** Safety goggles and solvent-resistant gloves must be worn during all operations involving contact with ink, solvent, or cleaning fluid.
- **Printhead Safety:** Any work involving printhead electrodes or deflection plates must be performed only after printing has stopped and the printhead is completely dry.
- **Electrical Safety:** Before opening or entering the electrical cabinet, the main power supply must be disconnected, and you must wait at least 5 minutes.

Hazardous waste generated during maintenance—such as waste liquid, used filters, and solvent-contaminated wipes—must be disposed of as hazardous chemical waste (see Section 1.5).

6.2 Preventive Maintenance Schedule

Executing preventive maintenance according to the schedule below significantly reduces the risk of nozzle clogging, print quality degradation, and unscheduled downtime. Maintenance intervals follow a "whichever comes first" basis (elapsed calendar time or operating running hours).

Interval	Maintenance Item	Summary of Tasks	Estimated Time	Procedure Section
Daily (Pre-shift)	Visual & First-Article Inspection	Check printhead electrodes for contamination or ink leaks; check ink/solvent levels; print a test article to verify quality.	5 min	6.4
Every 15 Days	Routine Printhead	Clean charge electrode, deflection plates, and gutter, then blow dry	10 min	6.5

Interval	Maintenance Item	Summary of Tasks	Estimated Time	Procedure Section
	Cleaning	thoroughly (every 7 days in harsh environments like high temperature or high dust).		
Weekly	Chassis Cleaning	Clean the chassis, display screen, and ventilation vents with a soft brush and lint-free cloth; high-pressure air and water are strictly prohibited.	5 min	6.1
Monthly	Line & Cable Inspection	Check ink line connectors for leakage, inspect cables for damage, and verify that the printhead mounting bracket is secure without loose vibration.	10 min	6.4
Every 18 Months	Main Filter Replacement	Replace the ink circuit main filter.	~5 min	6.7
Every 10,000–14,000 Hours	Ink Pump Inspection / Replacement	Check the correlation between pump speed and pressure; replace if out of specification (standard ink: 10,000–14,000 hrs; shorten interval as advised by technical support for specialty inks).	Performed by Service Engineer	6.8
Before Long-term Shutdown Storage / Long-distance Transport / Changing Ink Type	Ink Circuit Draining & Flushing	Performed by a service engineer; draining is not required when the system is normally powered on with automatic ink circulation enabled.	—	6.9

[TIP] This machine features an automatic ink circulation design: as long as power is maintained and the automatic ink circulation mode is enabled, the ink circuit can maintain proper ink condition for extended periods. Therefore, no routine draining or flushing schedule is required. Draining and flushing are only necessary before long-term powered-off storage, long-distance transport, or when changing ink models, and must be performed by a service engineer (see Section 6.9).

6.3 Standard Format for Maintenance Procedures

All maintenance procedures in this chapter follow a standard seven-element template. Please verify each item step by step during execution:

1. Estimated Time
2. Required Tools and Spare Parts
3. Mandatory Personal Protective Equipment (PPE)
4. Numbered Step-by-Step Instructions
5. Key Step Illustrations
6. Post-Maintenance Verification Method
7. Maintenance Record Requirements (see Section 6.10)

6.4 Daily Inspection

- Estimated Time: 5 minutes
- Required Tools: None
- Mandatory PPE: None (no contact with liquids)

Procedure Steps:

1. **Visual Inspection of the Printhead:** Ensure the surfaces of the charge electrode and deflection plates are dry and free of ink buildup; verify no ink leakage around the gutter. If contamination is found, perform cleaning according to Section 6.5.
2. **Check Consumable Levels:** Check the consumable level indicators on the main interface. If ink or solvent levels are low, refill according to Section 6.6.
3. **Check Status Bar:** If any yellow warning icons appear, resolve them according to Appendix A before starting production.
4. **First-Article Test Print:** Perform a test print and check the output: characters must be complete, without missing dots or distortion (if abnormal, refer to the Troubleshooting Table in Section 7.3).
5. **Documentation:** No record is required if inspection passes normally. If any abnormality is found and corrected, record it in the Maintenance Log (see Section 6.10).

6.5 Printhead Cleaning

6.5.1 Routine Cleaning (Every 15 Days)

- **Cleaning Schedule:** Every 15 days when using standard ink; every 7 days in harsh environments (high temperatures, excessive dust, oil mist, etc.).
- **Estimated Time:** 10 minutes
- **Required Tools & Spare Parts:** Official cleaning solvent, squeeze bottle, air blower, lint-free wipes, liquid catch tray.
- **Mandatory PPE:** Safety goggles, solvent-resistant gloves.

[WARNING] Before cleaning, printing must be stopped and the nozzle close (sealing) operation executed. Flushing the printhead while the ink stream is active is strictly prohibited.

Procedure Steps:

1. **Shutdown/Seal Nozzle:** Tap the [Power Off] / [Close Nozzle] button on the main interface. Wait until the gutter moves to the sealed position and the screen displays completion.

2. **Prepare Printhead:** Position the printhead over the liquid catch tray and remove the printhead cover.
3. **Rinse Components:** Use the squeeze bottle to gently rinse the charge electrode, deflection plates, and gutter surfaces with cleaning solvent until no visible ink residue remains (see Figure 6-1 for rinsing locations).

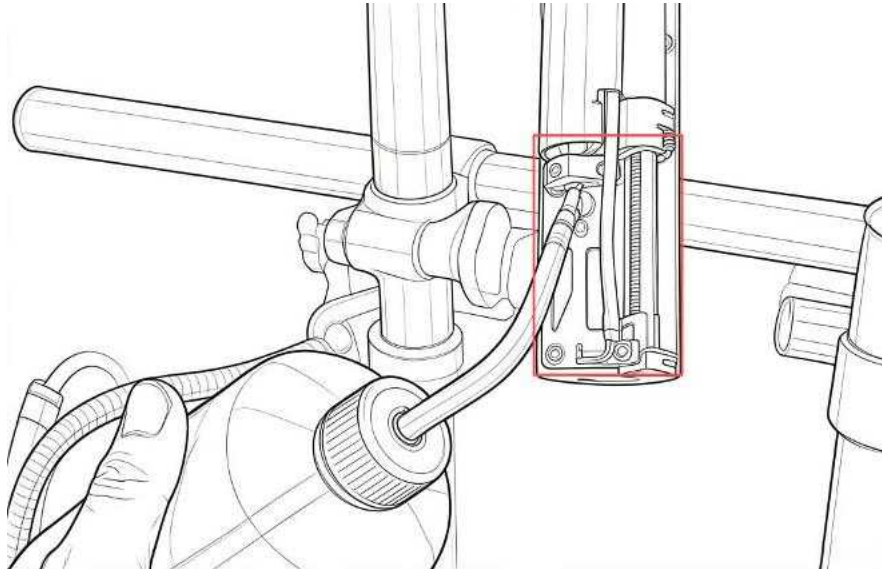


Figure 6-1 Printhead Rinsing Locations Schematic

(Red boxes indicate key rinsing areas)

4. **Blow Dry:** Use the air blower to blow dry all residual cleaning solvent off the electrode surfaces completely. Stubborn residue can be gently wiped using a lint-free cloth dampened with cleaning solvent. Scrape-cleaning with hard objects is strictly prohibited.
5. **Drying Wait:** Allow the printhead to stand idle for at least 1 minute to ensure the charge electrode and deflection plates are thoroughly dry with zero liquid residue.
6. **Reassembly & Resume:** Reinstall the printhead cover and resume printing operations.
 - Verification: After powering on, verify there are no charge fault or gutter recovery fault alarms, and confirm test-printed characters are sharp and clear.
 - Documentation: Record the cleaning date and operator name in the Maintenance Log (see Section 6.10).

6.5.2 Nozzle Unblocking (Deep Cleaning)

- Applicable Scenarios: Nozzle clogging, ink stream misalignment, or persistent missing dots during printing.
- Estimated Time: 15 minutes
- Required Tools & Spare Parts: Official cleaning solvent, squeeze bottle, air blower, liquid catch tray.
- Mandatory PPE: Safety goggles, solvent-resistant gloves.

Procedure Steps:

1.Navigate to Maintenance Interface:

Enter the [Tools] ► [Ink Circuit Maintenance] ► [Printhead Maintenance] interface (see Figure 6-2a).

2.Prepare the Printhead:

Remove the printhead cover and position the printhead directly over the liquid catch tray.

3.Activate Nozzle Cleaning Mode:

Tap the [ON] button next to [Execute Nozzle Cleaning], then tap [OK] in the pop-up confirmation dialog box (see Figure 6-2b).

The screen will display the [Nozzle Cleaning Status] window, indicating solenoid valve response and that the gutter has opened, generating negative pressure at the nozzle orifice (see Figure 6-2c).

4.Rinse the Nozzle Orifice:

Aim the squeeze bottle at the nozzle orifice and flush it with cleaning solvent. The negative pressure will pull the solvent into the interior of the nozzle to clear the blockage (see the diagram on the right side of Figure 6-2c for the operation location).

5.Complete Cleaning and Exit:

Continue rinsing for approximately 60 seconds, then turn off the "Nozzle Cleaning" toggle switch. Tap Exit in the [Nozzle Cleaning Status] window to return to the main menu.

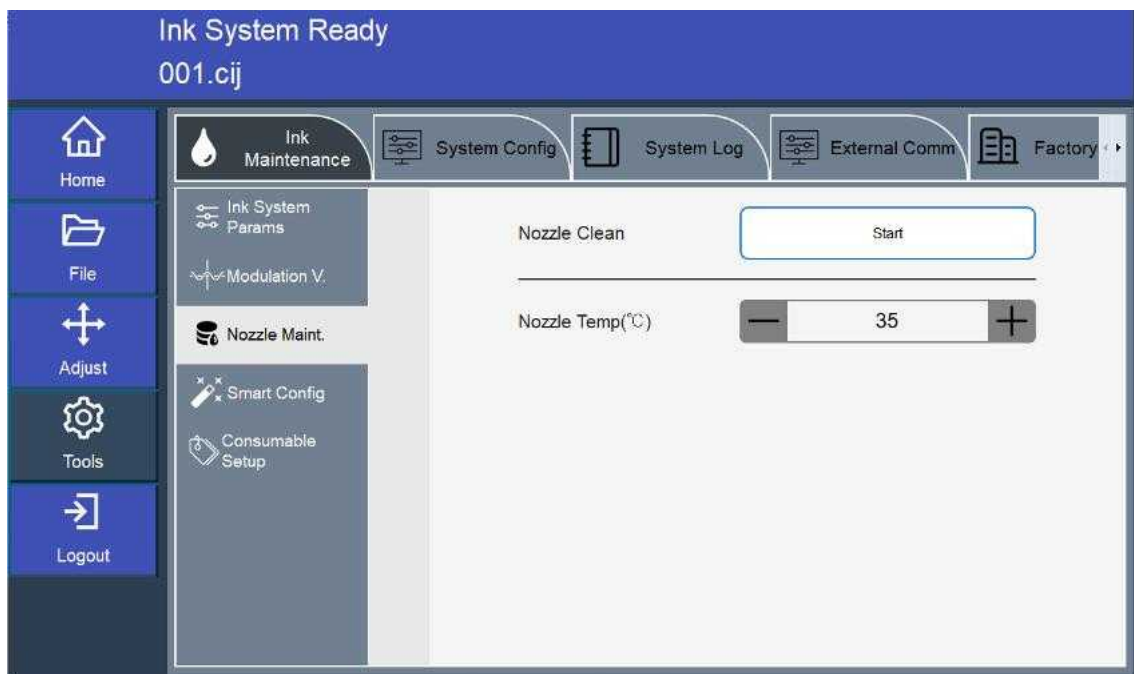


Figure 6-2a Nozzle Cleaning Interface Entry

([Tools] ► [Ink Circuit Maintenance] ► [Printhead Maintenance])

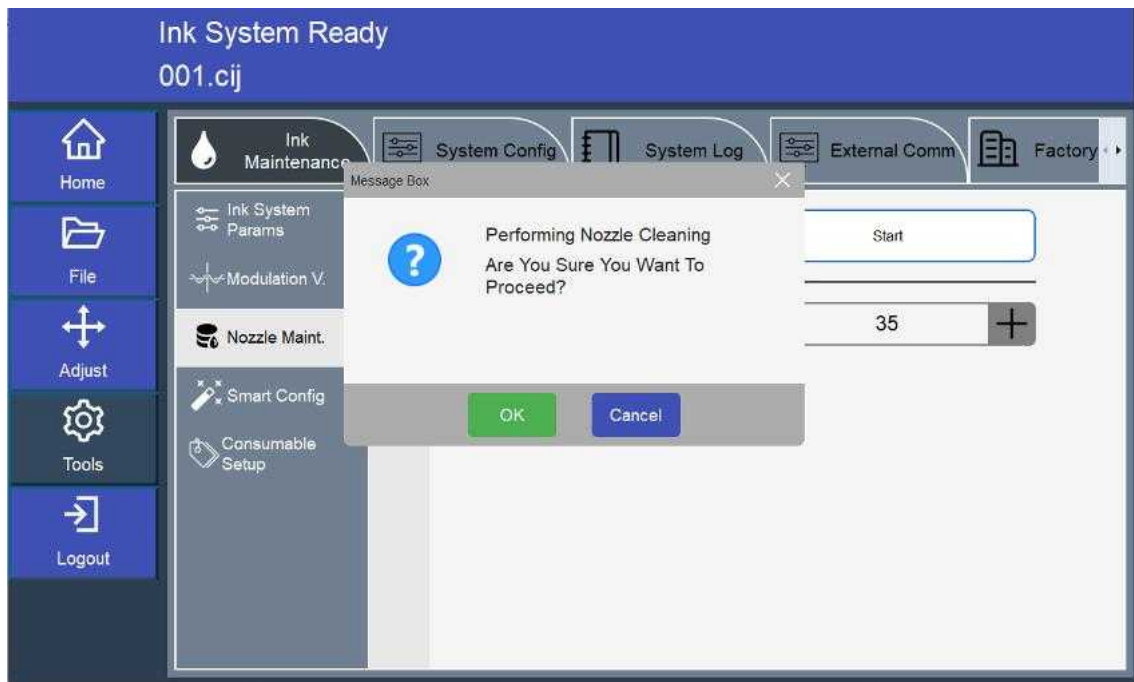


Figure 6-2b Confirmation Dialog Box for Executing Nozzle Cleaning

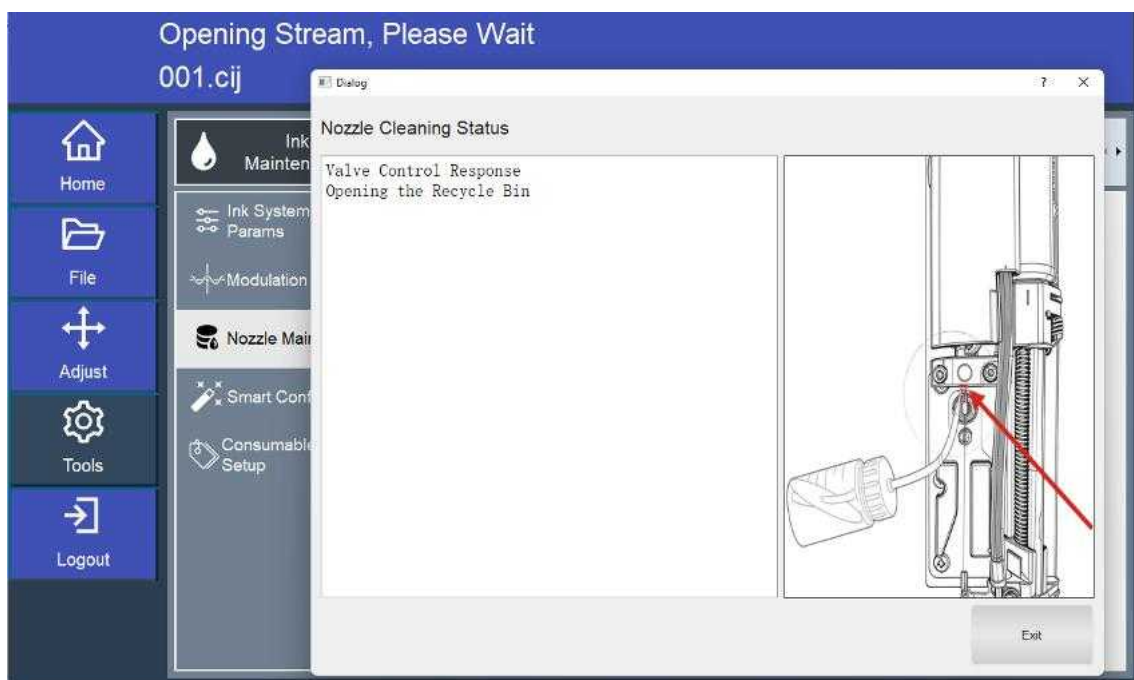


Figure 6-2c Nozzle Cleaning Status Prompt and Cleaning Solvent Rinsing Location

6.Clean and Dry Printhead Assembly:

Rinse and blow dry the entire printhead following Steps 3–5 in Section 6.5.1, then allow it to stand idle for at least 1 minute.

7.Reassemble and Test Ink Stream:

Reinstall the printhead cover and enable printing. Observe whether the ink stream enters the gutter accurately and squarely.

- Verification: The ink stream enters the gutter centered, no gutter recovery fault alarm is triggered, and test printing shows no missing dots.
- Troubleshooting Note: If no ink stream emerges or if stream misalignment persists after two unblocking attempts, please contact customer support / technical service.

6.6 Ink and Solvent Replenishment

- Estimated Time: 5 minutes
- Required Tools & Spare Parts: Officially certified ink/solvent.
- Mandatory PPE: Safety goggles, solvent-resistant gloves.

[WARNING] Use only officially certified consumables matching this specific machine model (for model settings, navigate to [Tools] ► [Ink Circuit Maintenance] ► [Consumable Model Settings]). Mixing different models or types of ink is strictly prohibited. Keep away from ignition sources during replenishment and avoid rapid pouring to prevent static electricity accumulation (see Section 1.7).

Procedure Steps:

1. Check Consumable Information:

When the main interface displays low consumable levels or a low level warning, prepare the corresponding consumable and verify the model number and expiration date on the bottle label.

2. Access Filling Port:

Open the ink circuit cabinet door, locate the ink or solvent filling port (located inside the machine's ink circuit cabinet), and unscrew the threaded cap.

3. Replenish Consumable:

Slowly pour in the consumable. The maximum volume for a single addition must not exceed 500 mL and must not go beyond the upper level limit mark on the filling port.

4. Secure Port and Confirm Level:

Tighten the filling port cap securely and confirm on the screen that the level indicator has returned to normal.

- Verification: The low level warning clears; the ink circuit pressure in the "i" info panel on the main interface is approximately 0.25 MPa, and the ink viscosity reads within the range of 85–120.
- Documentation: Record the replenishment date, consumable model number, and batch number in the Maintenance Log.

6.7 Main Filter Replacement

- Estimated Time: Approx. 5 minutes
- Required Tools & Spare Parts: New main filter, liquid catch tray, waste liquid container, lint-free wipes.
- Mandatory PPE: Safety goggles, solvent-resistant gloves.

[WARNING] Printing must be stopped and the power turned off before replacement. The ink lines contain pressurized ink; wrap connectors with a lint-free wipe and loosen them slowly to prevent splashing.

Procedure Steps:

1.Power Off and Remove Filter Housing:

After powering off and disconnecting power, open the ink circuit cabinet door and place a liquid catch tray beneath the filter. Wrap the connectors with a lint-free wipe, unscrew and remove the filter bowl, and drain residual ink into the waste liquid container (see Figure 6-3a).

2.Replace Filter Element and Reassemble:

Remove the old filter element. Insert the new filter element following the flow direction indicators, confirm that the O-ring seal is properly seated, reattach the filter bowl, and tighten securely (see Figure 6-3b for the installation location of the filter inside the ink circuit cabinet).

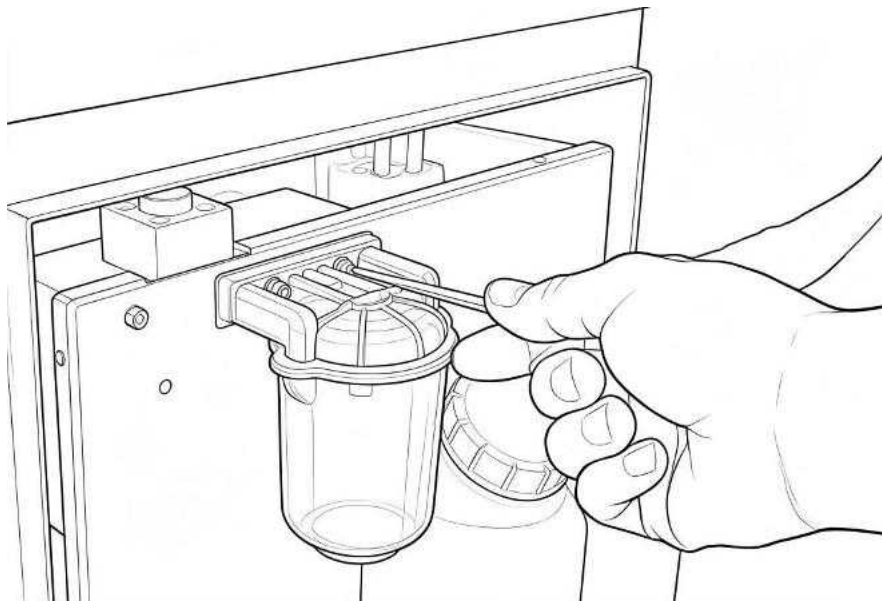


Figure 6-3a Unscrewing and Removing the Main Filter Bowl

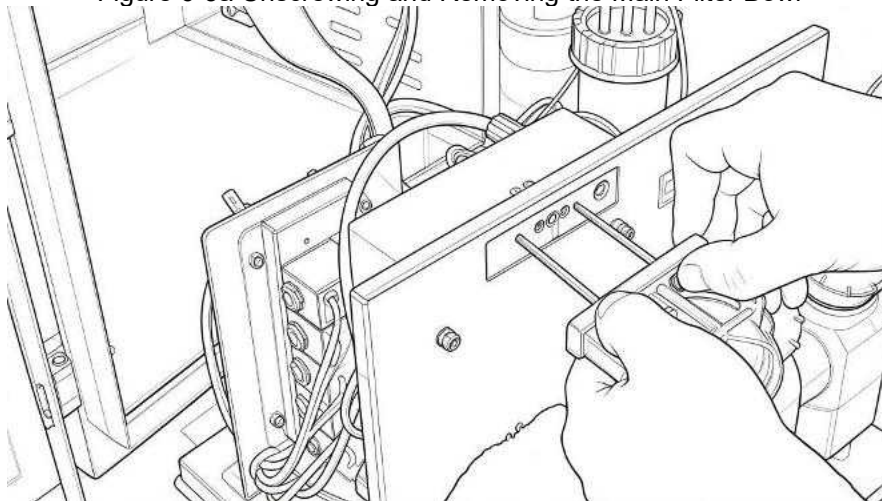


Figure 6-3b Installation Location and Fastener Disassembly/Reassembly of the Main Filter inside the Ink Circuit Cabinet

[TIP] The above assembly and disassembly steps are compiled based on field photos. Please refer to the instructions included with the spare part or official customer support guidance for specific tightening methods, filter element orientation, and torque requirements.

3.Power On and Inspect for Leaks:

Power on the device again and observe the filter connectors to ensure there are no leaks.

- Verification: The ink circuit pressure reading returns to the normal range; connectors are completely dry with zero leakage.
- Documentation: The replacement date and spare part batch number must be recorded in the Maintenance Log (used to calculate the next replacement interval).

6.8 Ink Pump Maintenance

- Diagnostic Criteria: Under a pressure setting of 0.25 MPa and an ink viscosity of 85–120, if the main ink pump speed reaches or exceeds 3,000 rpm, or if the pressure fails to reach the 0.25 MPa setpoint, it indicates ink pump wear, and inspection or replacement should be scheduled.
- Estimated Time: Performed by a Service Engineer.
- Required Tools & Spare Parts: New ink pump, liquid catch tray, waste liquid container.
- Mandatory PPE: Safety goggles, solvent-resistant gloves.

[NOTE] Replacing the ink pump involves disassembling/reassembling ink circuit tubing and performing pressure calibration, which must be executed by a trained service engineer. It is recommended to perform this operation after the ink circuit has been fully drained. For step-by-step procedures and diagrams, please contact official technical support.

- Verification: After powering on, the ink circuit pressure successfully reaches the 0.25 MPa setpoint, the ink pump speed remains stable, and all line connectors are dry with zero leakage.
- Documentation: Record the replacement date and spare part batch number in the Maintenance Log.

6.9 Ink Circuit Draining and Flushing (Long-term Shutdown / Transport)

This machine features an automatic ink circulation design; under normal powered operation, routine draining and flushing are not required. Draining and flushing the ink circuit are only necessary under the following circumstances:

- Long-term powered-off storage or warehousing of the equipment.
- Long-distance transportation.
- Changing the ink model/type as directed by technical support.

[IMPORTANT] The user operator interface in the current software version does not provide an entry point for the draining and flushing function. In-factory flushing operations are performed by service engineers who manually open valves and run the pump via [Tools] ► [Factory Mode] ► [Single-Step Debugging]. Users must not attempt this operation independently. A guided draining and flushing wizard is planned for a future software update.

When any of the above situations arise, please contact official customer support to have a service engineer perform the procedure on-site or provide remote guidance. Do not disassemble ink circuit tubing or connectors on your own.

- **Post-Procedure Actions:** Install protective caps on the ink and solvent filling ports, secure the printhead cover properly, and store the machine body upright in a cool, dry place.
- **Documentation:** Record the draining date and reason in the Maintenance Log. When recommissioning the equipment, the initial ink priming process must be executed by a service engineer (a software wizard will be provided in a future version; please contact official support for guidance in the interim).

6.10 Maintenance Records

After each maintenance operation, the following information should be recorded to facilitate traceability and predictive maintenance. System logs within the equipment ([Tools] ► [System Logs]) automatically log operation events and ink circuit operating data; manual maintenance activities should be simultaneously recorded in the maintenance log:

Date	Maintenance Item	Replaced Parts & Batch No.	Operating Hours	Operator	Remarks

[TIP] Before requesting technical support, please prepare the following information:

- Equipment Serial Number (S/N)
- Software Version
- Error / Fault Codes
- Ink circuit operation logs and fault logs from before and after the issue occurred

Log Export Method: Insert a USB flash drive, enter the [Tools] ► [System Logs] interface, and tap the [Export] button in the lower-right corner. The exported file will be saved in .txt format.

Chapter 7 Troubleshooting

7.1 Warning and Fault Mechanism

The printer alerts operators to two levels of abnormalities via the status bar on the screen:

- **Yellow Warning:** An abnormality exists, but the machine can continue printing. The operator should investigate and resolve the cause as soon as possible to prevent it from escalating into a fault.

- **Red Fault:** An abnormality exists that prevents printing; printing will stop or cannot start. Production can only be resumed after the fault is cleared.

The history of faults and warnings can be viewed under [Tools] ► [System Logs] ► [Fault Logs]. For a complete list of error codes and resolution methods, refer to Appendix A.

7.2 Preliminary Checks

Troubleshooting for any fault should always begin with preliminary checks. These checks can identify most issues caused by contamination, loose connections, or consumable status:

Inspection Area	Check Items	Result
Power Supply	Power cord is securely connected, voltage matches the rating plate, and the official power adapter is used.	☐
Cables & Hoses	Printhead conduit/umbilical, encoder, and photocell sensor cables are free of damage, and connectors are fully seated.	☐
Printhead Appearance	Charge electrode and deflection plates are free of ink buildup/stains, no ink leakage around the gutter, and the printhead cover is properly installed.	☐
Consumables	Ink and solvent levels are sufficient, models match the software settings, and consumables are within their expiration dates.	☐
Operating Environment	Ambient temperature is +5 to +40 °C, relative humidity is 30 –70% RH (non-condensing), ventilation is good, and dust is controlled.	☐
Operating Parameters	Check the "i" info panel on the main interface: Ink pressure is approx. 0.25 MPa, ink viscosity is within 85–120, and there are no abnormal alarms for printhead temperature, cabinet temperature, or ink pump speed.	☐

7.3 Troubleshooting Table

After completing the preliminary checks, locate the fault symptom in the table below and attempt the corrective measures sequentially in order (a, b, c). After performing a measure, clear the fault/warning notification on the screen before retesting. For print quality issues, you may first compare the printed output with the defect sample photos in Figures 7-1 through 7-5 to identify the exact defect type before consulting the table.

Common Print Defect Sample Comparisons (Actual Test Photos)

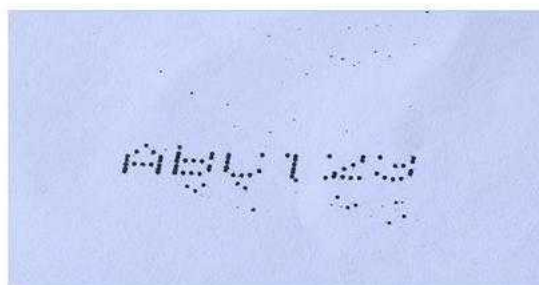


Figure 7-1 Missing Dots / Broken Lines: Character dot matrix drops dots, commonly caused by partial nozzle clogging.

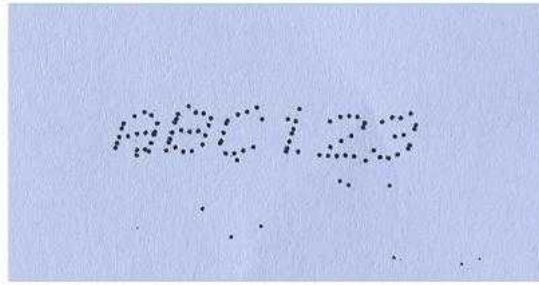


Figure 7-2 Ink Splatter / Overspray: Stray ink droplets appear around characters, commonly caused by ink residue on deflection plates or excessive throw distance (printhead-to-substrate distance).

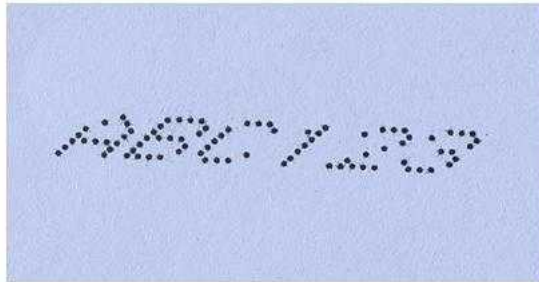


Figure 7-3 Skewed / Jittered: Characters appear tilted or distorted, commonly caused by printhead bracket vibration or conveyor belt slippage.

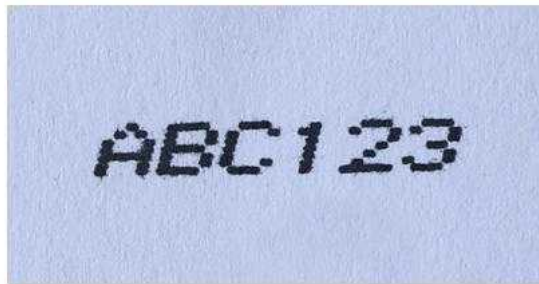


Figure 7-4 Excessively Dark / Heavy Print: Ink dots are oversized and bleed together, commonly caused by low ink viscosity or excessive boldness settings.

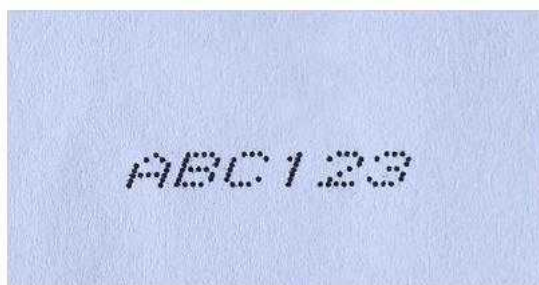


Figure 7-5 Excessively Faint / Light Print: Characters appear pale and indistinct, commonly caused by high ink viscosity, insufficient pressure, or expired ink.

No.	Fault Symptom	Corrective Measures (Try in sequential order)
1	Screen does not light up; unable to power on.	1a-Check the power cord and power adapter connections; 1b-Press and hold the screen for over 5 seconds to wake it up (automatic ink loop standby state); 1c-Press the left power switch to power cycle the unit; 1d-If still unresponsive, contact customer service.
2	No ink stream after startup (no ink issuing from	2a-Confirm that "Run / Nozzle ON" has been executed and the gutter is fully open/in position;

No.	Fault Symptom	Corrective Measures (Try in sequential order)
	nozzle).	2b-Check ink level and ink circuit pressure readings; 2c-Perform nozzle unblocking according to Section 6.5.2; 2d-If two unblocking attempts fail, contact customer service.
3	Ink stream misaligned / failing to enter the gutter (Gutter Fault).	3a-Clean and thoroughly blow dry the printhead according to Section 6.5.1; 3b-Perform nozzle unblocking according to Section 6.5.2; 3c-Check if the printhead cover is properly installed; 3d-If ineffective, contact customer service (mechanical alignment of the ink stream may be required).
4	Charge Fault Alarm.	4a-Clean and thoroughly dry the charge electrode and high-voltage deflection plates; allow to stand idle for 1 minute before retrying; 4b-Check if ambient humidity is too high (causing solvent vapor condensation); 4c-If ineffective, contact customer service.
5	Poor print quality — Missing dots / Broken lines (See Fig. 7-1 for sample).	5a-Perform printhead cleaning according to Section 6.5.1 and nozzle unblocking according to Section 6.5.2; 5b-Check the throw distance between printhead and product (recommended ≤ 30 mm); 5c-Check whether ink circuit parameters such as modulation frequency or drive voltage have been modified (see Section 4.2.1.1); 5d-If ineffective, contact customer service.
6	Poor print quality — Skewed / Jittered characters (See Fig. 7-3 for sample).	6a-Check printhead bracket mounting to eliminate vibration; 6b-Check for product conveyor slippage and ensure the encoder is securely installed; 6c-Check if character width / encoder toggle settings match the actual line speed.
7	Poor print quality — Ink splatter / Overspray (See Fig. 7-2 for sample).	7a-Clean the printhead (residual ink on deflection plates causes splatter); 7b-Check if the throw distance between printhead and product is too large; 7c-Check if the ink viscosity reading is within normal range.
8	Poor print quality — Overall faint / Uneven density (See Figs. 7-4 & 7-5 for samples).	8a-Check ink viscosity and pressure readings; 8b-Confirm ink is within expiration date and model is correct; 8c-Check print bolding and font height settings; 8d-If ineffective, contact customer service.
9	Trigger signal received but no printing occurs, with no fault prompt.	9a-Confirm a job is loaded and the status bar reads "Printing"; 9b-Check photocell sensor mounting position, sensitivity, and distance to printhead to match print delay settings; 9c-Check encoder toggle settings and encoder connection; 9d-Perform static test printing (encoder toggle turned off) to differentiate signal issues from printing issues.
10	Duplicate printing or missed printing.	10a-Check if the photocell sensor is falsely triggered by product reflection or product gaps; 10b-Check print delay and product spacing;

No.	Fault Symptom	Corrective Measures (Try in sequential order)
		10c-Check if reverse/reciprocating printing settings were mistakenly enabled.
11	Inaccurate counter value.	11a-Check current value / step value / initial value in counter settings; 11b-Verify if batch count and total count have been reset; 11c-Troubleshoot photocell sensor false triggers (see Item 10).
12	Continuous High / Low Ink Viscosity Alarm.	12a-Confirm solvent level is sufficient and model is correct (JK01); 12b-Check if ambient temperature exceeds +5 to +40 °C; 12c-Wait for automatic viscosity adjustment to complete (approx. 10–30 minutes); 12d-If ineffective, contact customer service (Codes D14 / D15 / D16).
13	Printhead / Cabinet Over-Temperature Alarm.	13a-Check ambient temperature and ventilation; 13b-Clean cabinet ventilation slots; 13c-If ineffective, contact customer service.
14	USB drive not recognized / File import failed.	14a-Confirm USB drive is FAT32 format with capacity ≤16 GB; 14b-Confirm print files are in .cij format and placed in directories compliant with Section 9.1 requirements; 14c-Try a different USB drive.
15	System upgrade failure.	15a-Confirm the upgrade package is located in the [MX2890-app-升级软件] folder in the root directory of the USB drive (see Section 9.1); 15b-Powering off during upgrade is strictly prohibited; 15c-Reboot and retry upon failure; if it still fails, contact customer service (Code F12).

7.4 Preparation Before Requesting Technical Support

If the fault cannot be resolved after following the above steps, please contact official technical support. To minimize resolution time, please prepare the following information in advance:

1. Equipment Model and Serial Number (S/N): Found on the nameplate and under [Tools] ► [System Configuration] ► [Device Information].
2. Software Version Number.
3. Fault/Warning Codes and Full Message Text Displayed on Screen: Photos of the screen are recommended.
4. Fault Logs and Ink Circuit Operation Logs: Covering the period shortly before and after the fault occurred.
5. Model and Batch Numbers: For both the ink and solvent currently in use.
6. Detailed Description of Operations: Operational sequence leading up to the issue, along with photos of defective print samples.

Chapter 8 External Connections and Input/Output

8.1 Overview

The printer exchanges the following signals with production line equipment via its external interfaces:

- Product Detection Signal (Photocell Sensor): Detects product arrival to trigger a print job.
- Speed Synchronization Signal (Encoder/Synchronizer): Tracks conveyor belt speed to ensure consistent character width regardless of speed variations.
- Alarm/Fault Output (If Configured): Outputs equipment status to production line alarm tower lights or a PLC.
- Communication Links: USB, Ethernet port, and Serial port (refer to Chapter 9).

[WARNING] All external wiring operations must be performed with the equipment powered off. User-supplied accessories must comply with the electrical specification requirements outlined in this chapter (see Section 1.3). Signal cables should use shielded wire and be reliably grounded (see Section 1.7).

8.2 Interface Locations and Pin Definitions

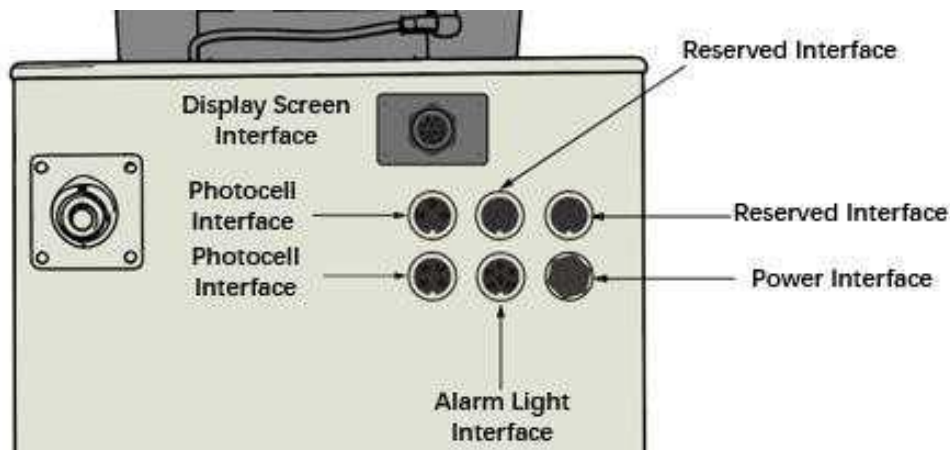
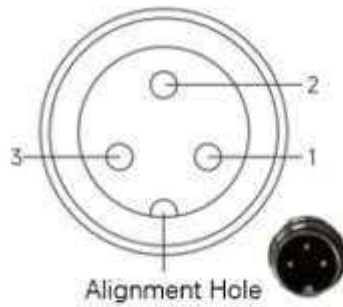


Figure 8-1 Interface Panel Location on the Rear of the Cabinet

1 Photocell Connector Pinouts

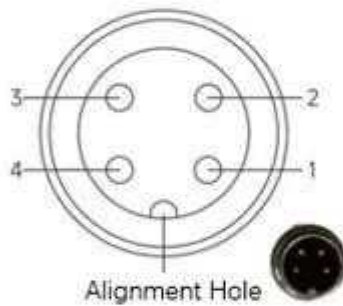
II



Pin	Function
DIN Pin 1	Power Supply (+V)
DIN Pin 2	Signal
DIN Pin 3	GND

2 Encoder Connector Pinouts

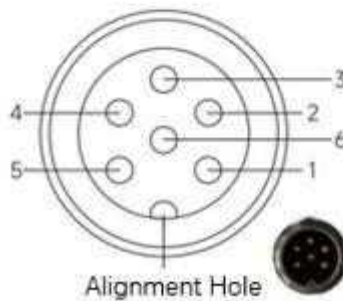
II



Pin	Function
DIN Pin 1	Power Supply (+V)
DIN Pin 2	Phase A Signal
DIN Pin 3	Phase B Signal
DIN Pin 4	GND

3 Alarm Light Connector Pinouts

II



Pin	Function
DIN Pin 1	Red Indicator Light (+)
DIN Pin 2	Yellow Indicator Light (+)
DIN Pin 3	Green Indicator Light (+)
DIN Pin 4	Buzzer (+)
DIN Pin 5	Power Supply (+V)
DIN Pin 6	N/C

[NOTE] Wiring Configuration: Common Anode

Figure 8-2 Pin Definitions for Photocell, Synchronizer (Encoder), and Alarm Tower Light Connectors

Interface Name	Connected Device	Connector Type	Pin Definitions	Electrical Specifications
Trigger Interface	Photocell Sensor (Product Detector)	Photocell Sensor (Product Detector)	1-Power Supply (+V); 2-Signal; 3-GND (Ground)	Power supply 24 VDC; Signal type NPN Normally Open (NO); Trigger pulse width ≥ 2 ms
Encoder Interface	Rotary Encoder (Synchronize)	4-pin DIN circular socket ("Encoder)	1-Power Supply (+V); 2-Phase A; 3-Phase B;	Power supply 24 VDC; A/B dual-phase incremental

Interface Name	Connected Device	Connector Type	Pin Definitions	Electrical Specifications
	r)	Interface" on rear of cabinet)	4-GND (Ground)	output; Max input frequency 200 kHz
Alarm Output Interface	Three-color Alarm Light / PLC	6-pin DIN circular socket ("Alarm Light" on rear of cabinet, reserved)	1-Red Indicator (+); 2-Yellow Indicator (+); 3-Green Indicator (+); 4-Buzzer (+); 5-Power Supply; 6-NC (Common Anode)	Output electrical specifications: Please contact official customer support for verification
Communication Interface	Host PC / Network	5-pin Serial Socket (reserved, rear of cabinet); Ethernet port not equipped	See Chapter 9	—

8.3 Photocell (Product Detector) Connection and Installation

1. **Installation Location:** The photocell must be mounted upstream of the printhead. The distance between the sensing point and the print nozzle location serves as the physical reference for Print Delay. If this distance changes, the Print Delay must be recalibrated and reset (see Section 4.1.1.1).
2. **Sensing Type:** Choose diffuse-reflective, through-beam, or retro-reflective photocells based on the product surface material. For products with highly reflective surfaces or irregular gaps, conduct on-site verification to ensure zero false triggers (refer to Section 7.3, Item 10).
3. **Electrical Connection:** Wire according to the pin definitions in Section 8.2. The machine's photocell interface supplies 24 VDC power and is designed for NPN Normally Open (NO) signals. When using user-supplied photocells, the output type and operating voltage must strictly match.
4. **Signal Requirements:** The effective trigger signal pulse width must be ≥ 2 ms. The minimum spacing between two consecutive prints must be ≥ 3 mm (see Section 8.6), subject to the duration of a single print message and the conveyor line speed.

8.4 Encoder (Synchronizer) Connection and Settings

When conveyor belt speed fluctuates or is non-constant, an encoder must be used to synchronize printing; otherwise, character width will warp with speed changes.

1. **Installation:** Ensure the encoder wheel makes firm, continuous friction contact with the conveyor belt (or driven roller) without slippage. The wheel circumference must be known.
2. **Wiring:** Wire according to the pin definitions in Section 8.2 (1-Power, 2-Phase A, 3-Phase B, 4-GND). Power supply is 24 VDC, and the maximum input frequency must not exceed 200 kHz.
3. **Settings:** Enable the encoder toggle switch under [Adjust] ► [Print Style] ► [General Parameters].
4. **Resolution Calculation:**

$$\text{Pulses per mm} = \frac{\text{Encoder Pulses per Revolution (PPR)}}{\text{Encoder Wheel Circumference (mm)}}$$

[NOTE] The current software version does not provide a separate entry field for encoder resolution. Character width is adjusted via [Adjust] ► [Print Style] ► [General Parameters] ► [Character Width] in conjunction with the encoder toggle switch (see Section 4.1.1.1). Example: If an encoder produces 2,500 pulses per revolution and the wheel circumference is 200 mm:

$$\text{Pulses per mm} = \frac{2500}{200} = 12.5 \text{ pulses/mm}$$

(Example calculation; subject to actual on-site measurements).

8.5 Alarm Output (If Configured)

The rear panel of the cabinet is equipped with an alarm tower interface (6-pin DIN socket, common anode), which can be connected to a three-color alarm light and buzzer:

- Pin Definitions: 1-Red Light (+); 2-Yellow Light (+); 3-Green Light (+); 4-Buzzer (+); 5-Power Supply; 6-NC (see Figure 8-2).
- Wiring & Load Capacity: Refer to the interface table in Section 8.2. Output electrical specifications (output type, maximum voltage, and current rating) should be verified with official technical support before connecting external loads.
- Typical Applications: Connect a three-color alarm tower light to alert operators visually, or connect to a production line PLC to automatically halt the conveyor upon a printer fault.

8.6 Trigger Timing

Figure 8-3 MX2890 Trigger Timing Diagram

Trigger Mode: Pulse Width Trigger; trigger pulse width ≥ 2 ms is determined as a valid trigger; refer to Section 8.6 for values of α and c .

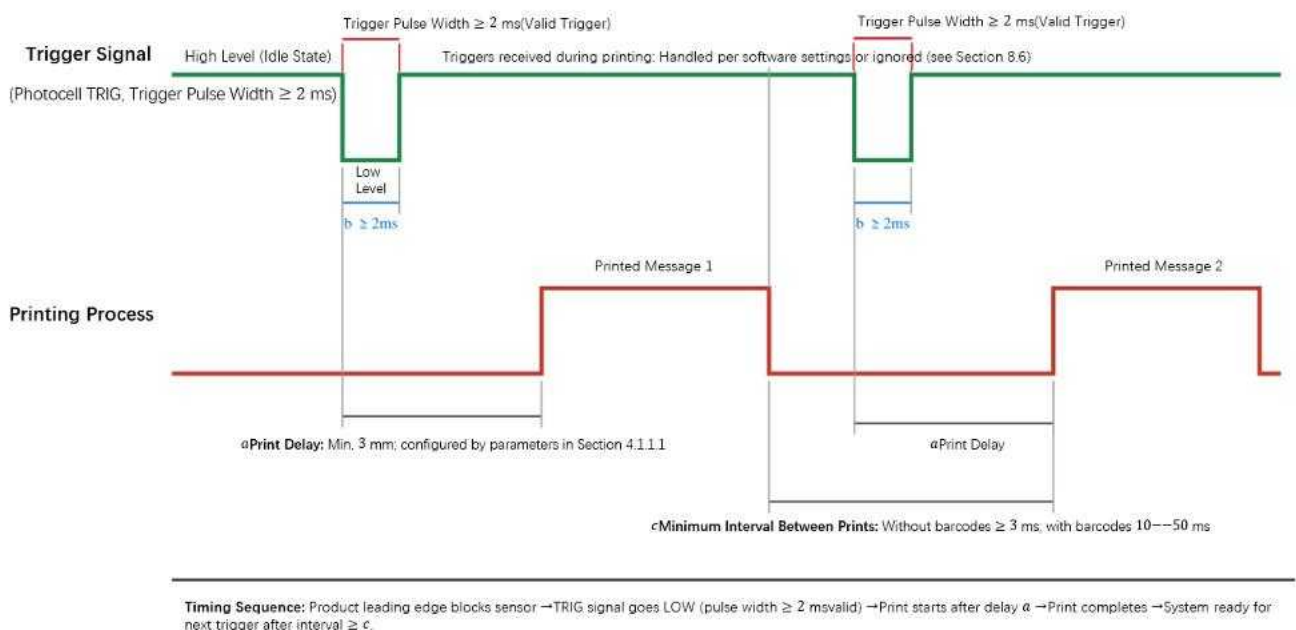


Figure 8-3 Trigger Timing Diagram

(Time Relationship Between Trigger Signal, Print Delay, and Print Process)

The sequence for a complete single print cycle is: The photocell sensor detects the leading edge of the product → Passes the distance/time corresponding to the "Print Delay" → Printing begins → Printing of the single message is completed → System waits for the next trigger.

Key Timing Constraints:

- Minimum Print Delay: 3 mm
- Minimum Effective Trigger Signal Width: 2 ms (narrower signals will be filtered out as noise)
- Minimum Spacing Between Two Prints: 3 mm (measured value, referencing industry standards for similar equipment). Messages containing barcodes require longer processing times; the actual spacing must be verified against line speed to avoid content overlap. Trigger signals arriving during active printing are handled or ignored according to software settings, which can be selected under the print parameters.

Chapter 9 Communication and Data Interfaces

9.1 USB Flash Drive Data Transfer

Print files can be imported/exported and system software upgraded via a USB flash drive:

- File Import / Export: Path: [File] ► [USB File]. Supports deleting, renaming, copying to local/copying to USB, editing, and loading for printing (refer to Section 3.3).
- System Upgrade: Path: [Tools] ► [System Configuration] ► [System Upgrade] (refer to Section 4.2.2.2). Powering off during the upgrade process is strictly prohibited.

USB Drive Requirements and File Specifications:

Item	Requirement
File System Format	FAT32
Capacity Upper Limit	≤16 GB
Print File Directory	Root directory of the USB drive; print files must have the .cij extension
Print File Naming Rules	Extension .cij; no length limit on file names
Upgrade Package Directory & Naming	Root directory ► [MX2890-app-升级软件] folder
Image File Format	Monochromatic BMP, height ≤32 dots

9.2 Parameter Backup and Restoration

Path: [Tools] ► [System Configuration] ► [Parameter Backup / Restore]. Performing a parameter backup is recommended at the following times: after equipment commissioning and

acceptance, prior to modifying ink circuit parameters, and before performing system software upgrades.

Operating Procedure:

1. Log in with Administrator privileges.
2. Navigate to [Tools] ► [System Configuration] ► [Parameter Backup / Restore] to review current parameters.
3. Tap [Backup] on this interface to back up ink circuit parameters.

[NOTE] The interface also provides options for [Restore Ink Parameters] and [Restore Print Parameters]. Prior to performing any restoration operation, back up existing parameters so you can revert if necessary.

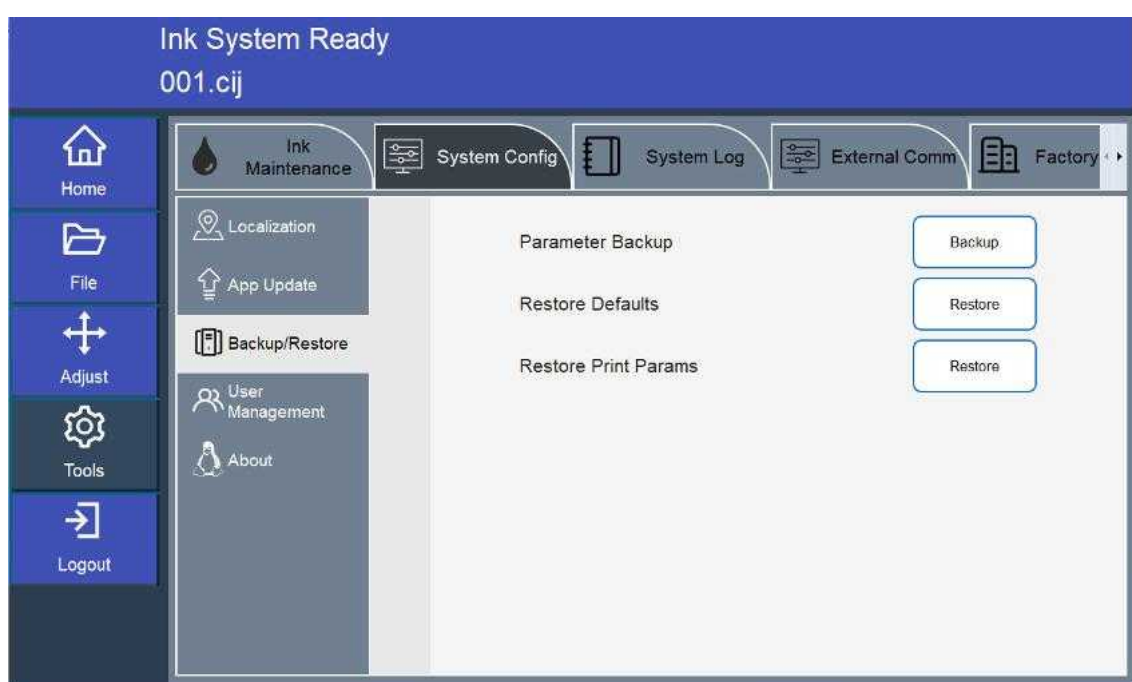


Figure 9-1 Parameter Backup and Restore Interface

([Tools] ► [System Configuration] ► [Parameter Backup / Restore])

9.3 Network and Serial Communication (If Configured)

This machine is not equipped with an Ethernet port and does not support network communication; please use a USB flash drive for data exchange (see Section 9.1). A 5-pin serial socket (baud rate 115200) is reserved on the rear panel of the cabinet. For details on the host communication protocol, please refer to the Communication Protocol Manual, which can be requested from official customer support.

Item	Content
Physical Interface	5-pin serial socket (reserved); Ethernet port not equipped on this machine
Serial Parameters	Baud rate 115200; Data bits / Parity / Stop bits are specified in the Communication Protocol Manual
Ethernet Parameters	N/A (Ethernet port not equipped)

Item	Content
Communication Protocol	Refer to the Communication Protocol Manual, available upon request from official customer support
Host PC Software	PC-side editing/management software is currently not provided; job files and upgrade packages are transferred via USB flash drive (see Section 9.1)

Chapter 10 Technical Specifications and Print Performance

10.1 General Technical Specifications

Category	Item	Specification
Appearance	Dimensions ($W \times D \times H$)	346 × 294 × 635 mm
Appearance	Printhead Size / Conduit Length	Printhead length approx. 210 mm / Conduit length 2.5 m (Metal corrugated conduit)
Appearance	Machine Weight	23 kg
Display	Touchscreen	10.1-inch capacitive touchscreen
Power Supply	Input Voltage / Power	110~240 VAC, 50/60 Hz / 120 W
Printing	Nozzle Diameter	65 µm
Printing	Print Lines / Character Height Range	1 to 5 lines / 2--17 mm
Printing	Supported Dot Matrices	5, 7, 9, 11, 16, 24, 32 dots
Printing	Message Content	Text, Time/Date, Serial Numbers, 1D Barcodes, 2D Barcodes, Logos/Images
Environment	Operating Temperature / Humidity	+5 to +40 °C / 30--70% RH (non-condensing)
Environment	Protection Rating	IP54
Interfaces	Standard Interfaces	USB (FAT32, ≤ 16 GB); Photocell, Encoder, and Alarm Light DIN sockets; 5-pin Serial Port (reserved); Ethernet port not equipped
Features	Auto Ink Circulation / Auto Viscosity Adjustment	Supported (allows long-term powered-on standby without draining; see Section 6.2 for boundary conditions)

10.2 Print Performance Table

Maximum print speed depends on the selected dot matrix and print mode. The table below lists the maximum production line speeds measured by the test team using a standard sample (single-line "ABC123", default character width, bold factor = 1), measured in m/min. An em dash

(—) indicates that the dot matrix is not supported in that mode. Actual achievable speeds are also affected by bold factor settings, message length, and barcode content.

Dot Matrix	High Speed Mode (m/min)	Fast Mode (m/min)	High Quality Mode 1 (m/min)	Remarks
5 Dots	372	248	149	Single line
7 Dots	186	186	106	Single line
9 Dots	—	149	82	Single line
11 Dots	—	114	62	Single line
16 Dots	—	87	46	Single line
24 Dots	—	—	31	Single line
32 Dots	—	—	23	Single line

10.3 Consumable Specifications

Consumable Category	Model	Application Scenario	Standard Packaging	Shelf Life
Ink	JD13	General-purpose for conventional substrates (confirm specific suitability with official support)	400 mL	12 months
Solvent / Make-up	JK01	Viscosity adjustment and automatic replenishment (see Section 6.6)	500 mL	24 months
Wash / Cleaner	JK1	Printhead cleaning and nozzle unblocking (see Section 6.5)	1000 mL	24 months

[WARNING] Officially certified consumables must be used, and the model setting in [Consumable Model Settings] must match the actual items used. Using uncertified consumables will void the warranty (see Section 1.10).

10.4 Installation Conditions

- **Placement:** The machine body must be placed vertically on a stable workbench or official stand, avoiding vibration and tilting.
- **Height Difference:** Maximum height difference between the printhead and machine body: ± 2 m. The flexible conduit is a 2.5 m metal corrugated tube. Avoid excessive height differences to prevent impacting ink circuit pressure and droplet recovery.
- **Conduit Bending Radius:** Minimum bending radius ≥ 150 mm. Twisting or sharp bending is strictly prohibited.
- **Ventilation:** Maintain a clearance gap of at least 100 mm around all sides of the cabinet for ventilation, keeping it away from heat and water sources.
- **Power Connection:** Connect to a power outlet with reliable protective grounding. Use a voltage stabilizer in environments with significant voltage fluctuations (see Section 1.4).

Appendix A Error and Warning Code

Reference List

The printer reports two levels of operational abnormalities to the operator via the screen status bar and fault log:

- **Warning (Yellow):** An abnormality exists, but printing can continue. Operators should investigate and resolve the warning before stopping printing.
- **Fault (Red):** An abnormality exists that prevents printing; printing cannot continue. Operators must resolve the fault before production can resume.

The table below lists all fault and warning codes implemented in the current software version along with recommended corrective actions. Code format: [Module Letter] + [Two-Digit Code]. Module letters: A - Mainboard, C - Printhead, D - Ink Circuit System, F - Software Logic. If you encounter a code not listed here, please contact official technical support.

In the Severity column, Fault prevents printing, while Warning allows printing to continue (see Section 7.1).

Code	Severity	Description	Operator Action	Service Contact Required
A03	Fault	Communication Fault: Mainboard received no signal response; pop-up on screen indicates communication fault.	Check if the communication cable between touchscreen and mainboard is loose; power off and restart.	Yes (if persistent)
C10	Fault	Phase Detection Fault: Detected phase count is > 12 or < 4 , triggering a phase fault warning.	Clean and thoroughly blow dry the printhead per Section 6.5.1; perform nozzle unblocking per Section 6.5.2 if necessary.	Yes (if persistent)
C12	Fault	Printhead Cover / Sleeve Not Detected: Ground contact on the printhead is not grounded, indicating the cover is open.	Reinstall the printhead sleeve properly into place; fault clears automatically.	No
D07	Warning	Main Ink Level Low: Level drops below low-level probe, prompting ink addition; ink supply will be disabled on next startup.	Add officially certified ink (JD13) per Section 6.6.	No
D12	Fault	Pipeline Pressure Fluctuation Abnormal: Absolute deviation between actual and set pressure $>$	Check ink lines for leaks, main filter for clogs, and whether pressure settings were altered; check ink circuit log.	Yes (if unresolved)

Code	Severity	Description	Operator Action	Service Contact Required
		0.07 MPa; machine stops after prompt.		
D14	Fault	Viscosity Too High: Actual viscosity exceeds setpoint by more than 12 units.	Confirm correct solvent model and check for accidental solvent overfills; re-test after running for a while.	Yes (if alarm persists)
D15	Warning	Viscosity Too Low: Actual viscosity is below setpoint by more than 12 units.	Confirm correct solvent model and check for accidental solvent overfills; re-test after running for a while.	Yes (if alarm persists)
D16	Warning	Viscosity Detection Timeout: Liquid level signal did not change within expected timeframe; viscosity detection stopped.	Review ink circuit run log; viscometer drain line or addition line may be clogged.	Yes (if recurring)
D17	Warning	Solvent Level Low: Solvent float is at low level, prompting solvent addition; printing stops after 32 cumulative hours of operation.	Add officially certified solvent (JK01) per Section 6.6.	No
D18	Warning	Consumable Model Mismatch: Detected consumable model does not match settings.	Verify [Consumable Model Settings] against actual consumables (see Section 10.3); mixing different ink types is strictly prohibited.	No
D19	Warning	Maintenance Reminder: Ink pump runtime has reached the set threshold.	Execute maintenance per procedures in Chapter 6 and record in the Maintenance Log (see Section 6.10).	No
F12	Fault	System Upgrade Failure: Software failed to update successfully.	Confirm upgrade package is placed in MX2890-app-升级软件 folder in root directory of USB drive; restart and retry; do not power off during upgrade.	Yes (if repeatedly failing)