



SC-080

Vibratory Bowl Feeder Vision

Operation Manual

感谢您使用仪器

Thanks for selecting our product

请在使用仪器前仔细阅读用户手册

**Please read the User's Manual carefully before
operating the instrument.**

● 请将用户手册作为仪器的一部分妥善保管，便于操作人员随时参阅。

Please keep this User's Manual as an integral part of the instrument for operators' ready reference.

● 本用户手册虽经认真审阅，但纰漏在所难免，如有不明之处，请联系公司客服中心或代理商。

Although this User's Manual has been carefully reviewed, omissions or errors may still exist. For any inquiries, please contact our Customer Service Center or authorized agents.

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The Company is committed to continuous product improvement. Contents of this User's Manual are subject to change without prior notice.

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Preface

This manual is intended to help users operate the product correctly and avoid personal hazards and property losses. Please read this manual carefully before use and keep it properly for future reference.

Safety Precautions

- Always cut off the power supply before wiring, disassembly or assembly. **Do not perform any operations with power on.**
- When multiple devices are connected to the same switching power supply, verify its power capacity and leave sufficient margin to prevent overheating and fire hazards.
- To reduce risks of fire and electric shock, keep the product away from rain and moisture.
- If the product emits smoke, abnormal odors or strange noises, turn off the power, unplug the power cord immediately and contact the manufacturer without delay.
- During installation and operation, strictly comply with national and local electrical safety regulations.
- Use an independent 24V switching power supply from qualified manufacturers for power supply, with rated power no less than 20W.
- Secure the product firmly during installation and ensure good ventilation around it.
- Do not install the product in places with vibration or impact, and keep it away from electromagnetic interference. Failure to comply may cause product damage.
- Avoid direct sunlight, poor ventilation areas and heat sources such as heaters. Failure to comply may lead to fire risks.
- For indoor use, do not install the product in areas exposed to water, other liquids or extremely humid conditions.
- Do not operate the product in extremely high/low temperature, dusty, corrosive or highly humid environments.
- Keep all original packaging materials properly. Use them to repack the device for return to the manufacturer when needed. Our company shall not be liable for any damage incurred during transportation caused by non-original packaging.
- Installation and commissioning personnel must be professional technicians with experience in installation and maintenance of weak current systems.

Notes on Preventing Electromagnetic Interference

- Take adequate measures to prevent electromagnetic interference during installation and operation. Otherwise, abnormal images, false camera triggers and other faults may occur.
- To prevent static electricity accumulation, ensure all on-site equipment and this product share the same ground.
- Do not route the product cables together with those of other devices, especially servo motors and high-power equipment. Keep a cable separation distance of more than 10 cm. If combined routing is unavoidable, apply shielding treatment to the cables.
- If the product is frequently powered on and off, enhance voltage regulation and isolation. A DC/DC isolation power module can be installed between the device and the switching power supply.
- For excessively long cables, bind them in a figure-eight shape. Apply insulation treatment to unused cables.
- Prevent high-voltage electric leakage during product installation and use.
- The product can share a 220V AC power circuit with low-power devices. **Do not connect it to the same circuit as servo motors or high-power equipment.** If it cannot be avoided, use red-black isolated power strips complying with the national standard GB/T 2099.3-2022.

Table of Contents

Chapter 1	Introduction to Vibratory Bowl Feeder Vision	1
Chapter 2	Main Software Interface	3
Chapter 3	Algorithm Function Configuration	4
	Step 1-Camera Settings	4
	Step 2-Reference Registration	5
	Step 3- Algorithm Tools	5
	AI tools	5
	Step 4 Output Configuration	9
Chapter 4	Common Function Menus	10
	4.1 Operation Management	10
	1) Log	10
	2) Clear	10
	3) Project/New/Manage/Switch	10
	4.2 System Settings	11
	1) Machine setting	11
	2) IOsetting	11
	3) Advanced	12
	4) Signal logic	12
Chapter 5	IO Signal Description	13
Chapter 6	FAQ List	14
Chapter 7	Notes	15

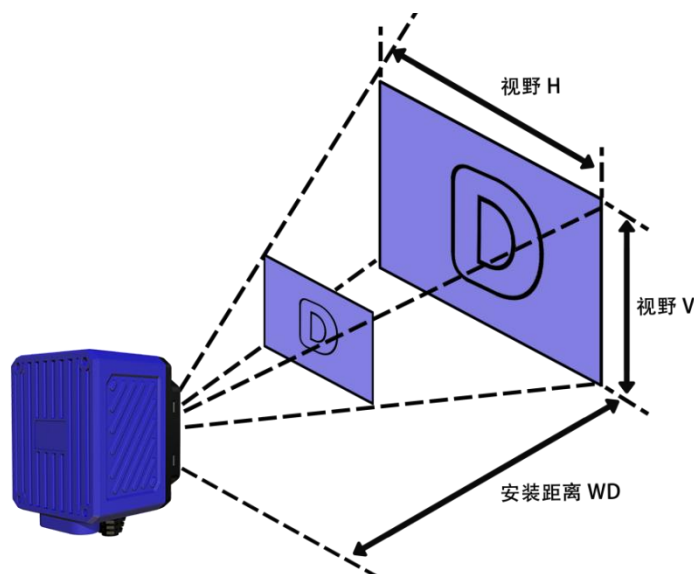
Chapter 1 Introduction to Vibratory Bowl Feeder Vision

1.1 Main Applications

This is a dedicated vibratory feeder vision inspection device, designed for real-time workpiece inspection during continuous feeding by vibratory bowls. It can automatically identify the front/back sides and placement orientation of products. Primarily used to replace traditional optical fiber sensors which fail to detect orientation and distinguish front from back, it solves the sorting difficulties of special-shaped workpieces and highly similar parts. The device is applicable to various automated feeding and sorting production lines.

1.2 Product Features

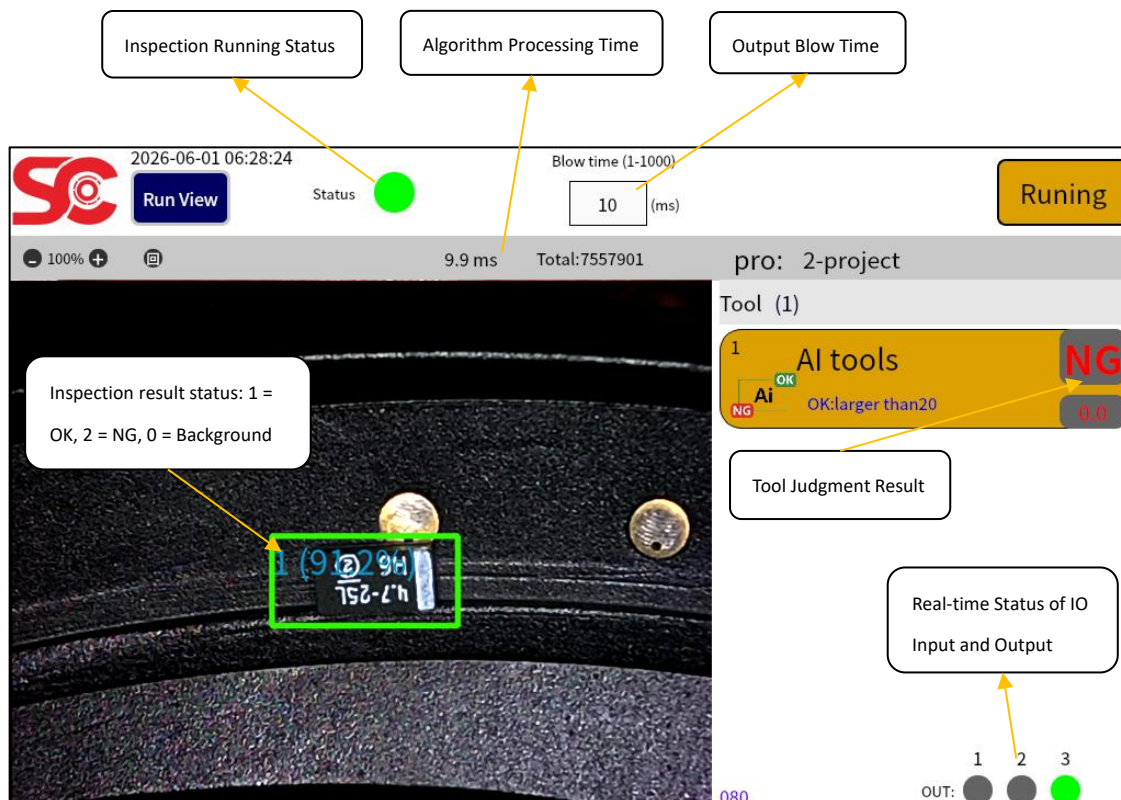
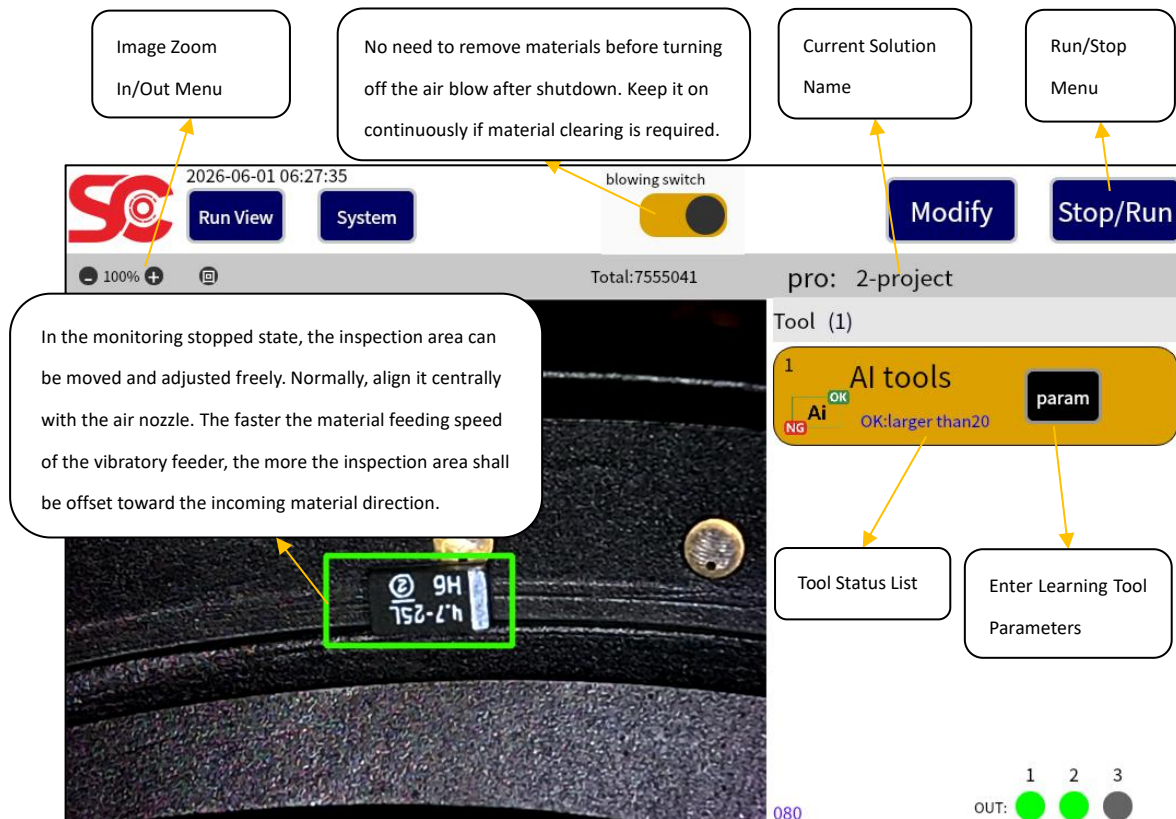
1. **AI Intelligent Inspection:** Equipped with self-developed deep learning AI algorithms. The device triggers image capture automatically without external sensors, enabling uninterrupted continuous inspection. It adapts to the disordered dynamic feeding scenarios of vibratory feeders.
2. **User-friendly HMI:** Fitted with a 7-inch industrial touch screen, which displays real-time inspection images, parameter status and operating data. Operation and commissioning are intuitive and easy.
3. **Industrial Protective Structure:** The housing is made of die-cast aluminum alloy with a fully sealed design. It reaches IP65 protection rating, featuring dustproof, oil-proof and anti-vibration performance, suitable for harsh workshop environments.
4. **Built-in Adjustable Light Source:** Integrated with an industrial digital light source. The brightness can be digitally adjusted via the touch screen. No additional auxiliary light is required, meeting imaging requirements for workpieces of reflective, dark, special-shaped and other various materials.
5. **Standard IO Interfaces:** It is equipped with 1 digital input channel and 2 channels of 24V voltage output. It can be directly connected to pneumatic solenoid valves, actuating cylinders and other automated actuators of vibratory feeders to realize linked sorting control.



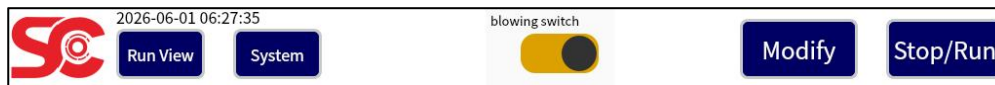
● Unit: mm

Model	Working Distance WD	FOV H	FOV V	Model	Working Distance WD	FOV H	FOV V
SC003C Standard Type 16mm	80	10	8	SC003C Standard Type 8mm	40	14	11
	100	13	10		100	32	24
	150	21	16		200	63	47
	200	29	22		300	93	69
	300	43	32		500	155	115
	450	66	49		1200	360	270
Model	Working Distance WD	FOV H	FOV V				
SC003C Wide FOV Type 4.7mm	30	25	19				
	100	62	46				
	200	118	90				
	300	170	130				
	500	285	210				
	1200	660	490				
Model	Working Distance WD	FOV H	FOV V	Model	Working Distance WD	FOV H	FOV V
SC013M Standard Type 16mm	75	18	13	SC013M Standard Type 8mm	30	18	14
	100	23	18		100	53	39
	150	35	26		200	101	75
	200	47	35		300	150	112
	300	71	53		500	245	184
	400	94	70		1200	575	435
Model	Working Distance WD	FOV H	FOV V	Model	Working Distance WD	FOV H	FOV V
SC013C Standard Type 16mm	90	25	19	SC013C Standard Type 8mm	50	36	27
	150	45	33		100	70	52
	300	92	69		300	198	148
	500	155	117		500	328	245
	700	217	163		700	455	340
	1000	316	234		1000	640	481
	1200	374	280		2000	1270	960

Chapter 2 Main Software Interface

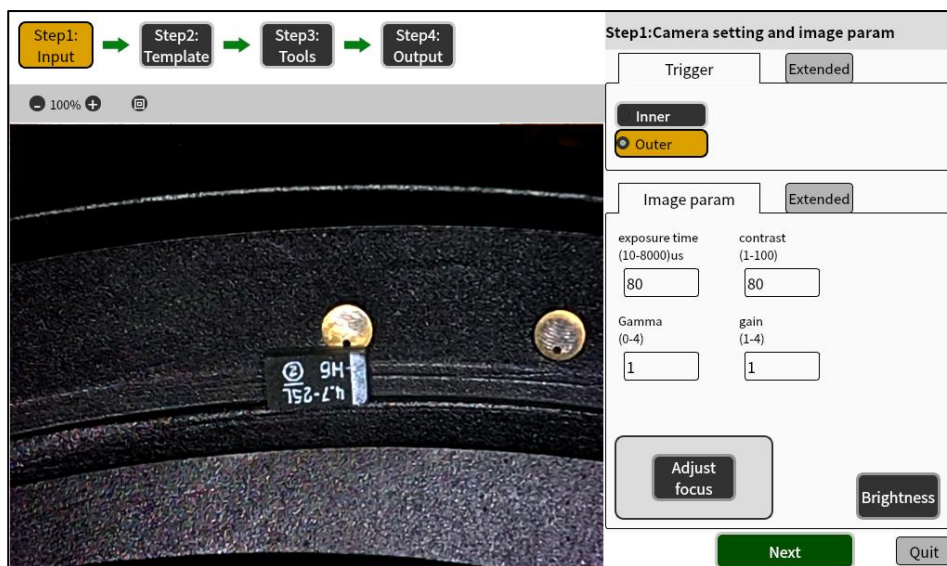


Chapter 3 Algorithm Function Configuration



To set or modify algorithm functions, stop the software first. Then click **New Solution** on the main interface menu. If a solution already exists, click **Edit Solution** directly to enter the solution configuration page.

- **Step 1 - Camera Settings:** Configure camera trigger mode, image parameters and light source brightness.



Trigger Mode: Select the appropriate trigger type flexibly according to actual inspection requirements.

Internal Trigger: The system uses the built-in AI algorithm of the learning tool to automatically capture images when the preset conditions are met.

External Trigger: Connect to external optical fiber for signal transmission. The system takes images synchronously upon receiving commands from external hardware.

Image Parameters: Adjust camera settings.

Exposure Time (1-10000 μ s): A higher value results in a brighter image, slower dynamic response and blurrier imaging for high-speed moving objects.

Parameter Recommendation: For vibratory feeder applications, set the exposure value ≤ 300 . The faster the material moves, the shorter the exposure time should be.

Contrast (1-100): It refers to the brightness difference between bright and dark areas of the image. A higher value creates more distinct light-dark contrast, clearer image layers and better visual effects.

Gamma (1-4): An auxiliary parameter for brightness and contrast adjustment. It indirectly changes the overall image brightness and light-dark contrast.

Gain (1-4): Used exclusively to adjust image brightness. A higher value produces a brighter image but also increases image noise.

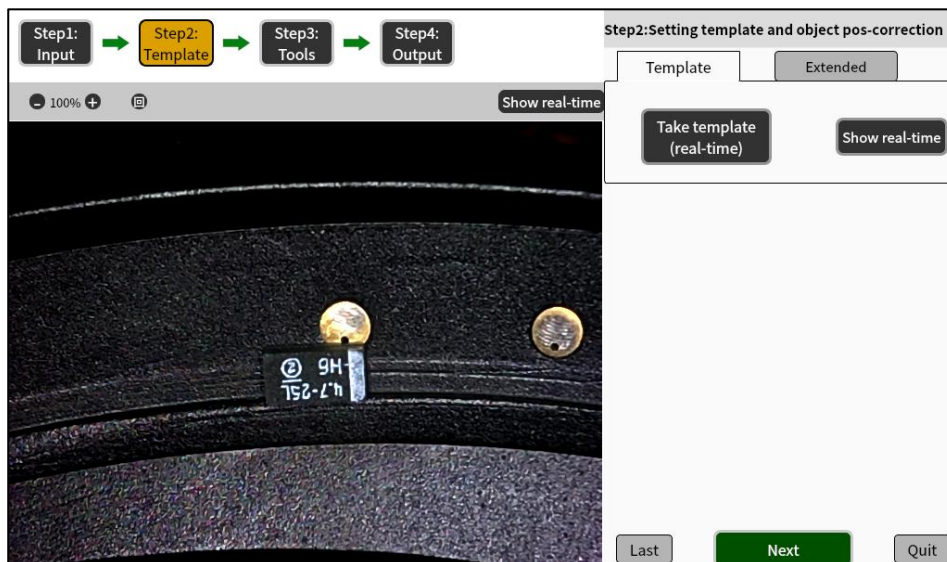
Adjust Focus: Click to enter the adjustment interface, and use +/- to adjust image sharpness.

Light Source Brightness: Manually adjust the brightness of the light source.

Extended Parameters:

Image Rotation Angle (0-360°): Freely adjust the rotation angle of the image to align the view and match the placement direction of materials, so as to meet the visual positioning requirements of different stations.

- **Step 2 - Reference Registration:** Set the reference image for the solution and correct the product position.



Set Reference Image: Configure the reference image for the current solution.

Register Live Image as Reference: Click to set the current live view as the reference image.

Show Live Image: Click to quickly switch to the live view interface.

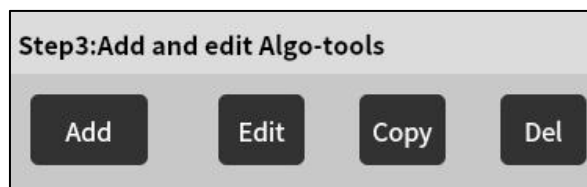
Extended Parameters:

Register History Report as Reference: Retrieve images from historical inspection reports and set the selected one as the reference image.

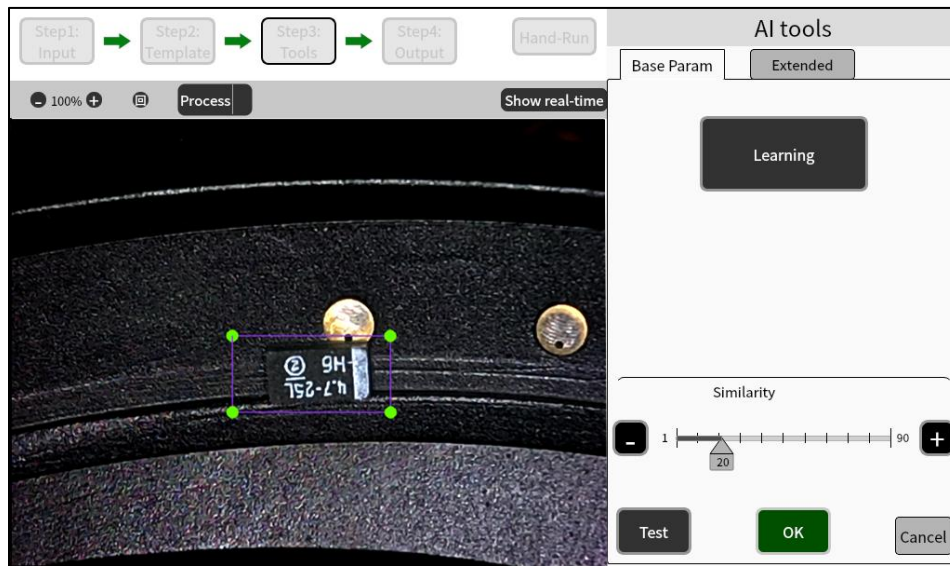
Register Triggered Capture as Reference: Capture an image upon receiving a trigger signal and use it as the reference image.

- **Step 3 - Algorithm Tool:** Add learning tools for detection.

Click Add Tool to enter the learning tool menu.



Basic Parameters:



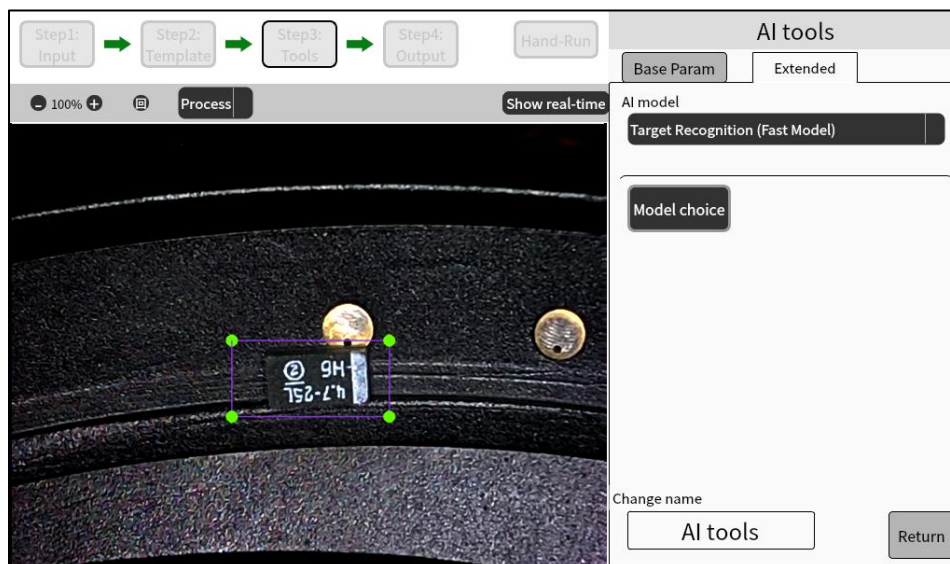
Sample Learning: Enter the submenu. Manually label samples of each category in real-time images, upload them to the cloud over the network for automatic training. After training is completed, the model will be automatically downloaded to the local model library.

Adjustment Area:

Target Detection Area: Drag freely on the left screen to adjust the position of the detection area.

Similarity: Adjust the similarity value of the learning tool. The result will be judged as OK only when the value exceeds the set threshold.

Extended Parameters:



AI Model: Select the corresponding model type before training samples.

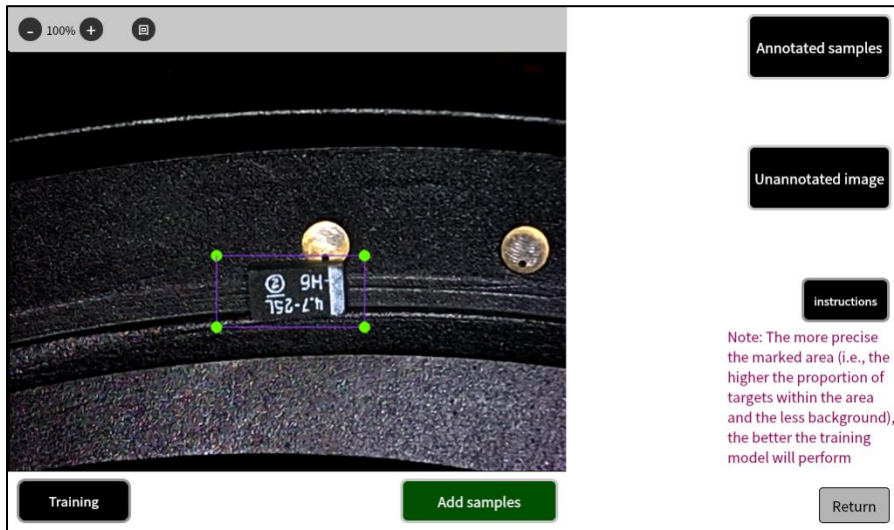
Target Recognition (Fast Model): Features fast running speed, suitable for products with obvious differences in orientation or front/back sides.

Target Recognition (Standard Model): Delivers high detection accuracy, suitable for products with slight differences in orientation or front/back sides.

Model Selection: Select the AI models trained locally on the device and call them directly to perform detection.

Rename: Modify the name of the current learning tool.

➤ Sample Learning Operation Procedure:



Sample Preparation:

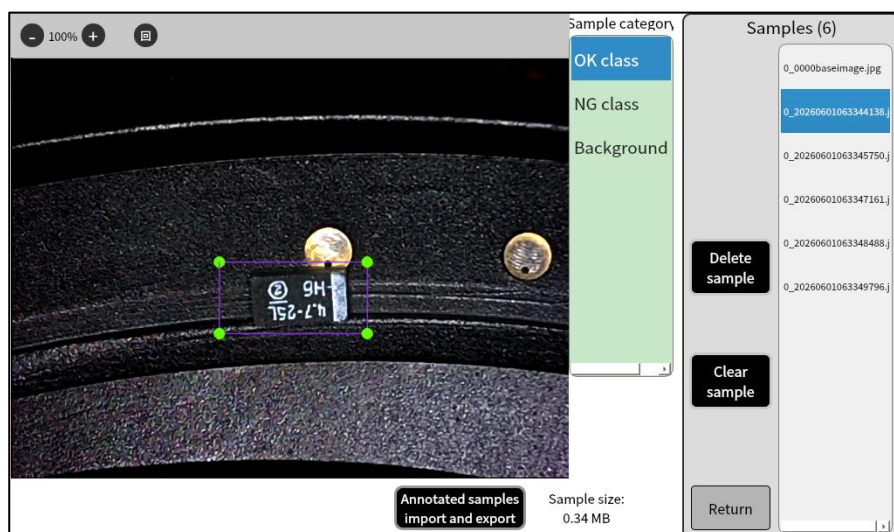
Prepare the samples to be tested. For products with significant differences in front/back sides or orientation, label 5 to 10 OK samples and NG samples respectively. If obvious image changes occur due to large swing angles during detection, appropriately increase the quantity of each type of sample. More labeled samples lead to more stable and accurate detection results.

OK/NG Sample Labeling:

Enter the sample learning interface, place the samples around the air nozzle, and accurately frame the product detection area. Click to add new labeled samples, select the corresponding OK/NG category and confirm to save. Replace samples one by one to complete labeling for all OK and NG samples.

Background Sample Labeling:

Remove all test samples and keep only the background view, then complete labeling for background images without products separately.



View and Delete Samples:

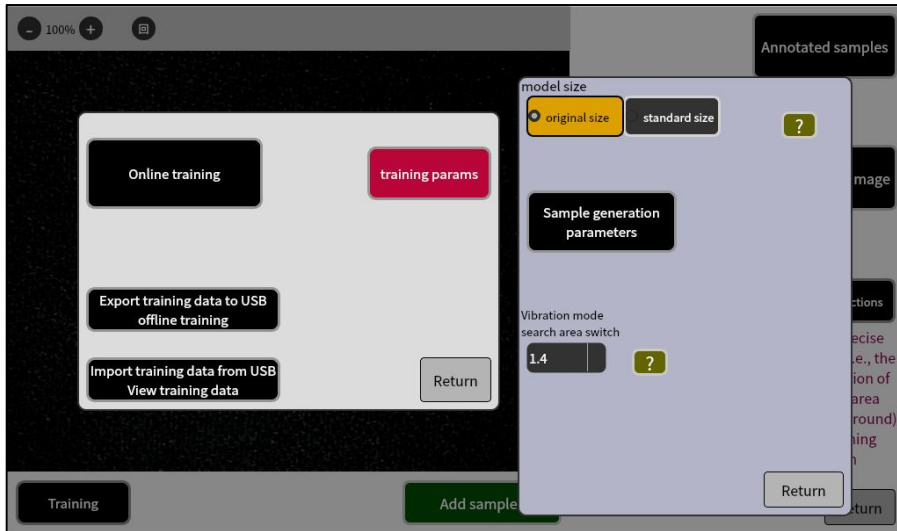
Click the labeled samples to view all categorized samples and check for incorrect labels. If any mislabeled sample is found, manually click to delete it.

Sample Import and Export:

Supports data transfer via USB flash drive. You can export labeled samples from the device to a USB flash drive for backup, or import samples from the USB flash drive to the device for use.

Unlabeled Images:

These are recognition result images captured during device operation. You can select misrecognition images here and add them as samples for retraining and optimization.

**Model Training:**

After completing sample labeling, click **Model Training**. Keep the training parameters as default for regular use; fine-tune them as needed under special circumstances.

Model Size:

Original Size: High accuracy with unchanged detection pixels.

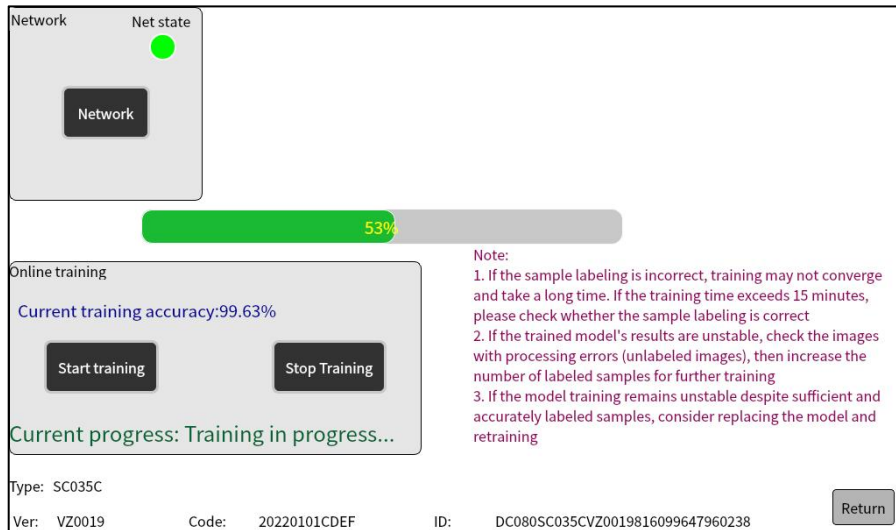
Standard Size: Faster detection speed with slightly reduced image pixels.

Vibratory Feeder Search Area Switch:

By default, the search range is set to 1.4 times the product size. A larger value means a wider search area. The device will not perform detection if more than half of the product lies outside the search area.

Detection Direction Description:

The vibratory feeder only supports detection for materials moving left and right, and does not support vertical detection. If the direction does not match requirements, adjust the mounting angle of the camera or rotate the image by 90 degrees for adaptation.



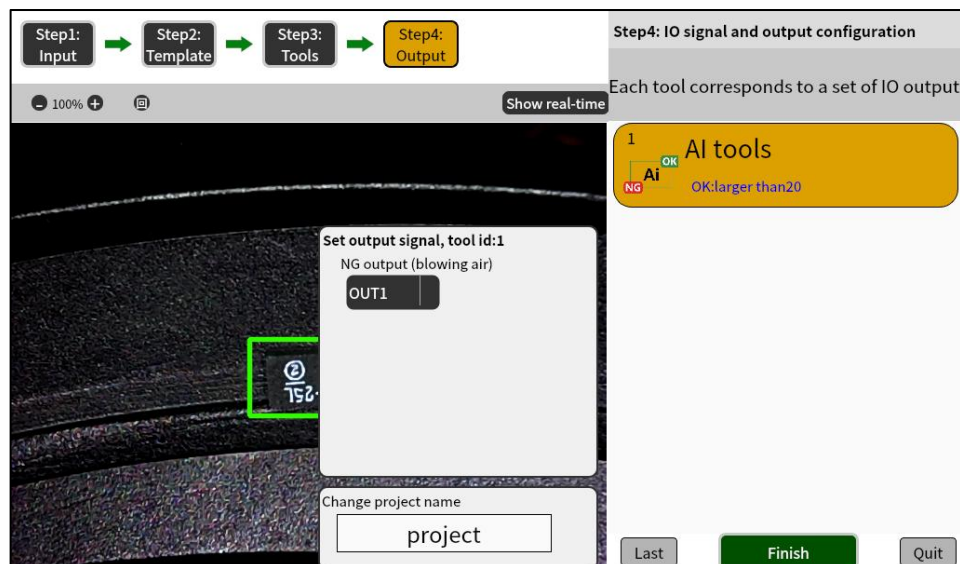
Online Training:

First, connect to an external network successfully. Tap to access the network sub-interface, select an available network from the Wi-Fi list, enter the password and click Connect. A green indicator light in the upper right corner will show when the network is connected. If no Wi-Fi is available on site, enable the mobile hotspot and connect the device to it. Then click Start Training. The training process takes approximately 2 to 10 minutes, depending on training parameters and the number of labeled samples.

➤ Step 4 - Output Configuration: Set IO signals and output parameters.

Tool Output Signal Logic Configuration:

Configure the IO output definition for each tool.



Set output signal, Tool ID:

Select the corresponding learning tool on the right, and set the air blowing output port for each group of tools.

Chapter 4 Common Menu Functions

4.1 Operation Management

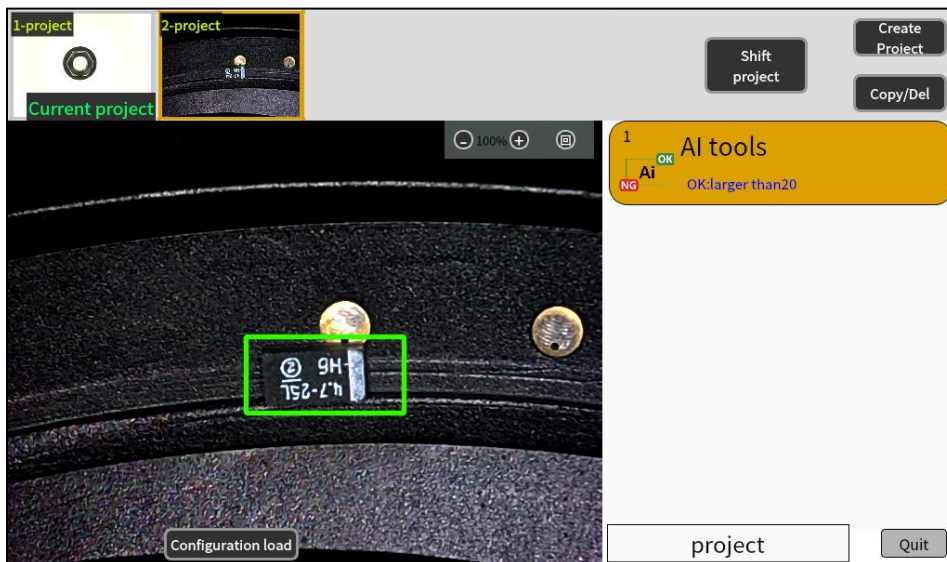
1) Diary

It can trace the operation records of the software .



2) Count Reset: Clear the current OK/NG count statistics.

3) Solution Creation/Management/Switching:



Create New Solution: Build a brand new solution.

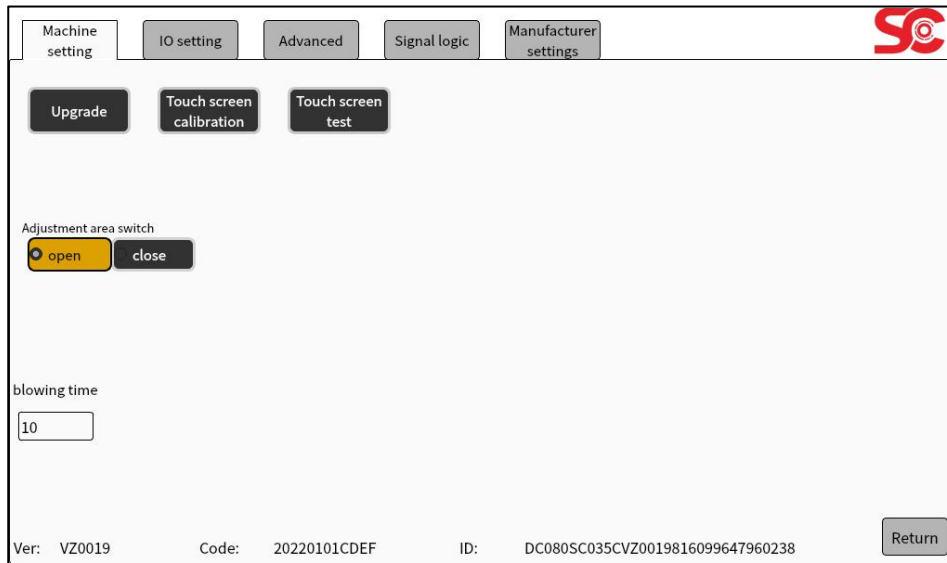
Copy/Delete: Copy or delete an existing solution.

Configuration Import/Export: Import or export solutions via USB flash drive.

Switch Solution: Switch to another solution.

4.2 System Settings

1) Machine Settings



Upgrade: Perform version upgrade remotely or via USB flash drive.

Touch Screen Calibration: Recalibrate the screen if the touch position is inaccurate.

Touch Screen Test: Manually check for touch position deviation.

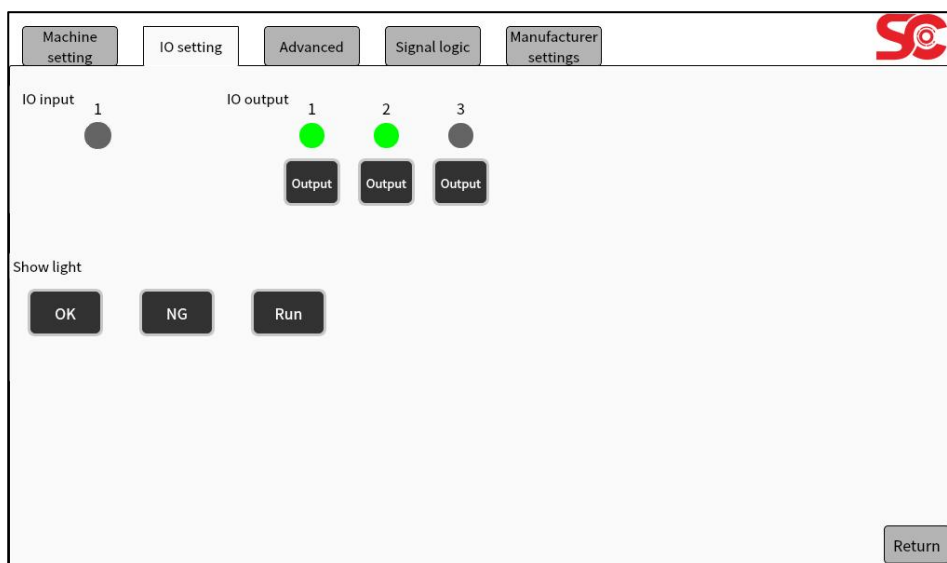
Blowing Time (1-1000) ms: Duration of the output signal for the air blowing port.

Upgrade Procedure:

First, connect to an external network. Tap Network to enter the sub-interface, select an available network from the Wi-Fi list, enter the password and tap Connect. A green indicator will light up in the upper-right corner to indicate successful connection. If no on-site Wi-Fi is available, enable your mobile hotspot and connect the device to it.

Return to the upgrade interface and tap Send ID. Then contact the manufacturer's technical team to upload the corresponding firmware version. After confirming the upload is complete, tap Download. Once the download finishes, select Upgrade from the menu and confirm to complete the update.

2) IO Test



3) Advanced Settings

Machine setting IO setting **Advanced** Signal logic Manufacturer settings

Gray image detection mode(Opening the switch will improve speed)
(If no color tools running, opening the switch, algorithm will detect the gray image)

☒ close ☐ open

Shift language
(system restart takes effect)

Chinese ☒ English

Default parameters Imaging update

Password System time setting Restore factory settings File import Algo advanced

Return

Monochrome Detection Mode (Enabling improves detection speed): All tools except color-related ones perform detection using monochrome images.

Chinese/English Switch: Toggle between Chinese and English interfaces.

Default Parameters: Modify default parameters for new solutions.

Password Restriction: Set a password for accessing system parameters.

System Time Setting: Adjust the current system time of the device.

Restore Factory Settings: Clear all parameters and configurations and restore to factory defaults.

File Import: Import update files via USB flash drive.

Advanced Algorithm Parameters: Advanced settings for position correction.

4) Signal Logic Setting

Machine setting IO setting **Advanced** **Signal logic** Manufacturer settings

Input filter time
(1-20)ms

1

Return

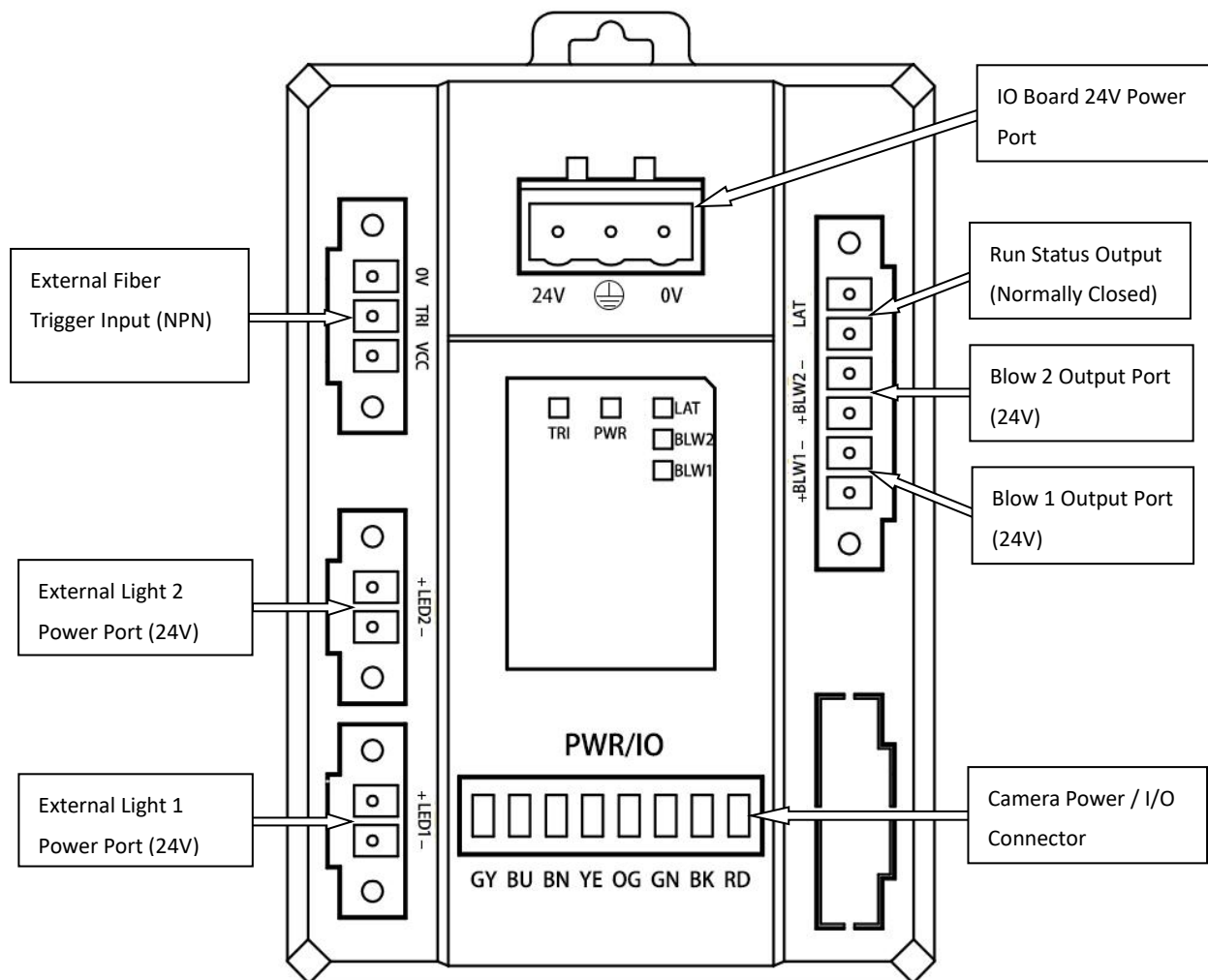
IO Input Filtering Time (1-10) ms: The interval between two input signals must exceed the set value; otherwise, the trigger will be deemed invalid.

Chapter 5 IO Signal Description

Description of 8-Pin Power/IO Cable

Signal Interface Description			
Pin Number	Color	Name	Content Description
1	Red	DC24	Positive Power Supply
2	Black	0V/COM	Negative Power Supply / Common I/O Terminal
3	Green	IN1	Camera Trigger Input
4	Orange	OUT1	Output 1
5	Yellow	OUT2	Output 2
6	Brown	OUT3	Output 3
7	Blue	RS232_RXD	Receive Data
8	Gray	RS232_TXD	Transmit Data

I/O Schematic Diagram:



Chapter 6 List of Common Problems

Problem Description	Possible Causes	Solutions
Screen is black with no display	Device not powered on	Check if the power connection is normal (Observe whether the top PWR indicator is on)
	Abnormal physical connection between screen and camera	Check if the pins on both ends of the cable connector are bent or broken
The image is completely black or too dark during solution debugging	Light source is off or brightness is too low	Turn on the light source and increase its brightness
	Exposure, gain and other parameters are adjusted too low	Properly increase exposure and gain
Excessively long detection and processing time during operation	Verify that the debugging parameters are correct	Reduce the search area appropriately, and set the detection accuracy to Standard or Low
No trigger signal detected during operation	Incorrect connection of trigger signal	Check if the trigger signal from the device is connected incorrectly and verify whether a signal is output during detection
No signal output after detection is completed during operation	Incorrect connection or parameter setting of output IO signals	Check whether the signal wiring connected to the device is correct. Proceed to Step 4 of solution editing and verify that the IO ports defined for OK and NG are set properly
The detection area of the tool fails to follow the product movement during operation	Position correction function is disabled	Proceed to Step 2 of solution editing, enable the position correction function and set relevant parameters

Chapter 7 Notes

1. Other Notes

- 1) The fluctuation range of power supply voltage shall be within 10%.
- 2) Be sure to connect the ground wire.
- 3) Do not place the unit near welding machines.
- 4) Keep away from strong magnetic fields and devices that generate strong magnetism.
- 5) Ambient temperature: 0°C ~ 50°C.
- 6) Clean the through holes on the main unit once a month.
- 7) In case of abnormality, manually stop the equipment first for safety. Resume operation only after troubleshooting.

2. Warranty Terms

This product has passed strict inspections by our company.

In the event of malfunctions arising from normal use, issues will be handled in accordance with the after-sales service regulations.

1) Warranty Period

The warranty period is 18 months upon completion of installation.

2) Items Not Covered by Warranty

Repairs will be chargeable for the following cases after the warranty period expires.

- a. Malfunctions or damages caused by improper handling such as dropping or impact during transportation and relocation by the customer.
- b. Malfunctions or damages resulting from natural disasters including fire, earthquake, flood, or abnormal voltage.
- c. Malfunctions caused by connecting devices other than those specified by our company to this product.
- d. Malfunctions arising from operations not described in the operating manual or methods not authorized by our company.
- e. Malfunctions caused by operation under special conditions or environments.
- f. Malfunctions due to incomplete supporting equipment or inadequate maintenance and management.

3) Operational Obligations for This Device

All operating procedures for this unit are specified in the operation manual. Please follow the instructions strictly during operation. Adhere to all specified requirements to ensure long-term service life of the equipment.

4) Service Fees After Warranty Expiry

For malfunctions occurring after the warranty period and repairs outside the warranty scope, charges will be applied based on material costs, repair fees and on-site service expenses.



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