



SC-080

Smart Camera

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.

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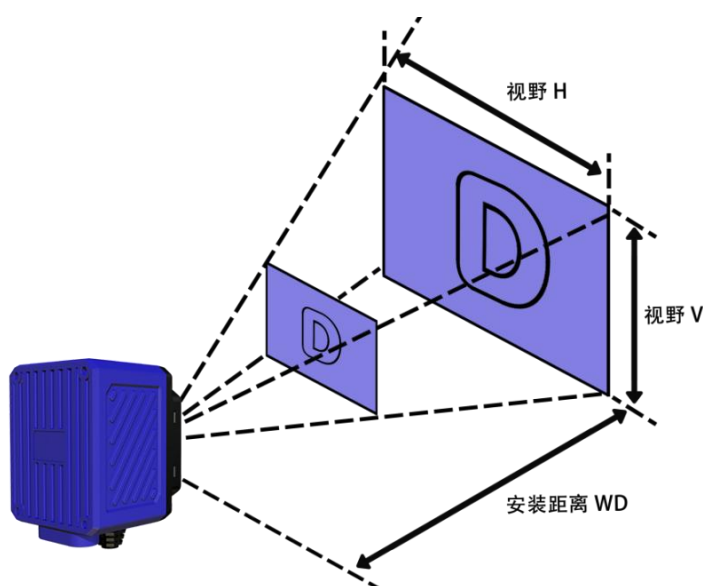
Chapter 1 Introduction to SC-080 Intelligent Camera

1.1 Main Applications

- 1) Automatically identify and verify whether the front/back orientation and placement direction of products are compliant during product assembly;
- 2) Inspect and confirm missing or absent materials during carrier tape packaging production;
- 3) Compare and verify the shape and specification of incoming materials prior to assembly to prevent defective materials from being put into production;
- 4) Rapidly measure and check product dimensions for quick compliance judgment;
- 5) Identify wire sequence colors of wiring harnesses and flat cables, and verify if the wire arrangement meets specifications.

1.2 Product Features

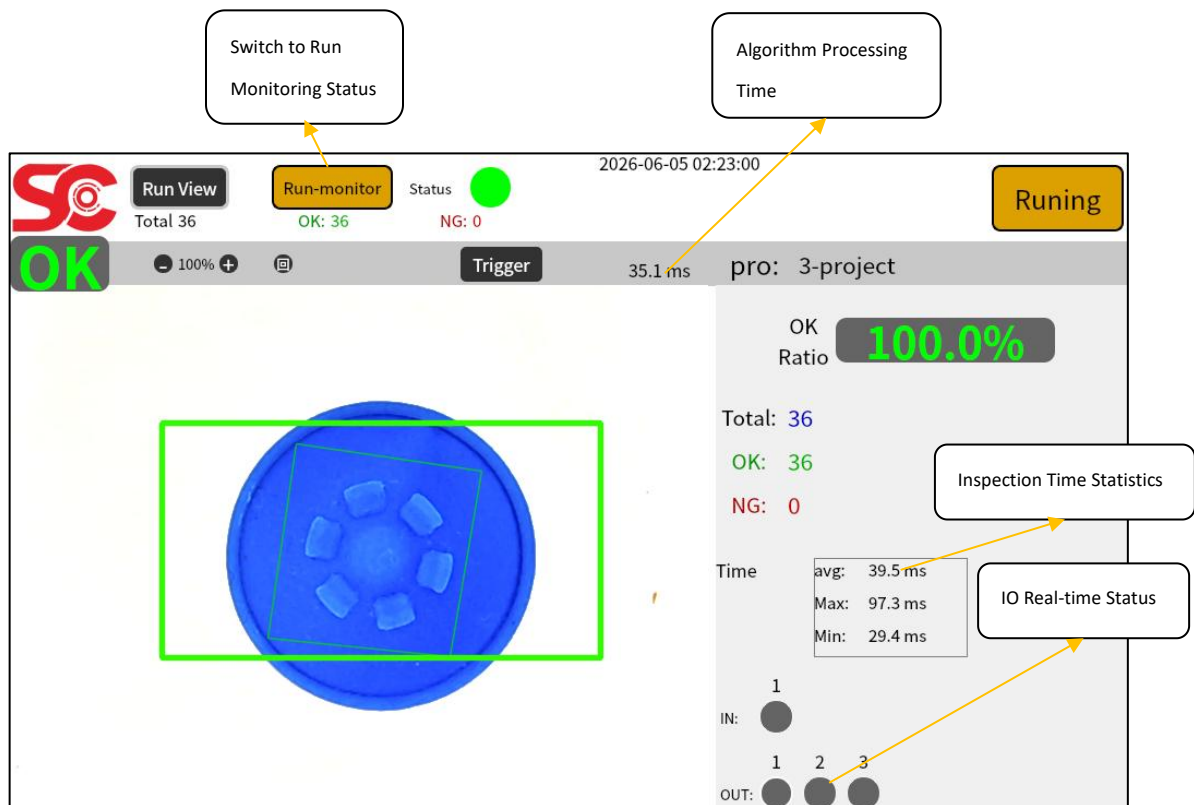
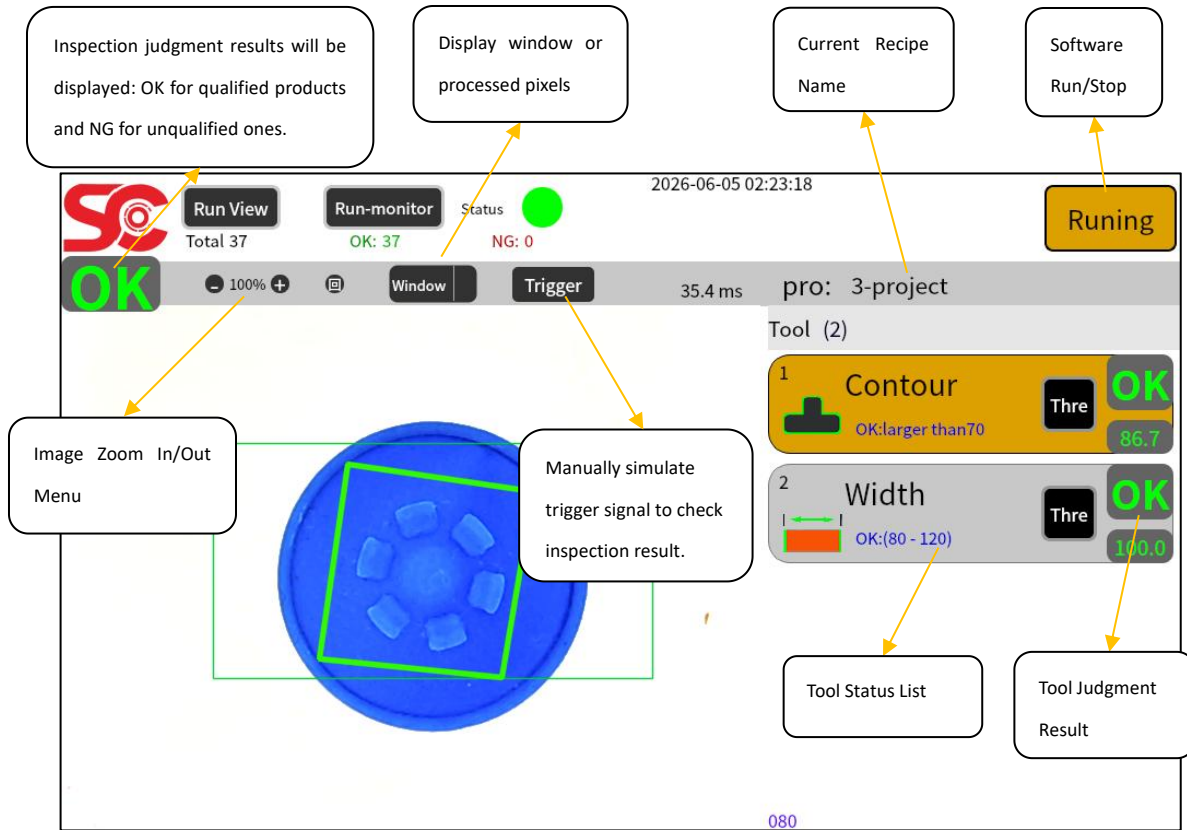
- 1) Equipped with self-developed AI vision algorithm software, it integrates multiple vision inspection functions including presence detection, front-rear orientation recognition, dimension measurement and contour matching, applicable to various industrial inspection scenarios.
- 2) Fitted with a 7-inch industrial touch screen for concise and intuitive human-machine interaction, enabling convenient and efficient parameter commissioning and equipment operation.
- 3) The unit adopts die-cast aluminum alloy housing with an integrated fully sealed structure, reaching IP65 protection grade to deliver outstanding dustproof and waterproof performance for harsh industrial working conditions.
- 4) Built-in adjustable digital light source whose brightness can be directly modified via the device touchscreen without extra peripheral equipment, adapting to variable ambient lighting conditions.
- 5) Comes with 1 digital input and 3 digital output channels with built-in optocoupler isolation circuits to ensure stable signal transmission and strong anti-interference capability.



● 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

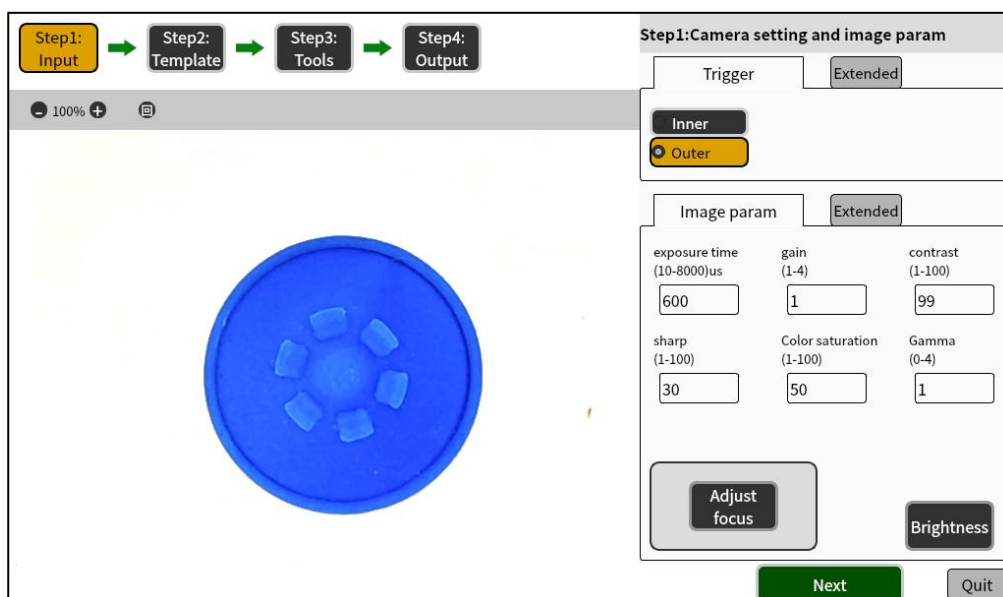


Chapter 3 Algorithm Configuration



To set or modify algorithm functions, stop the software first. Click Recipe Management on the main menu to enter the recipe page and create a new recipe. If a recipe already exists, click Modify Recipe directly to access the recipe configuration interface.

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



Trigger: Select trigger type per inspection requirements.

Inner: The software triggers image capturing at preset fixed intervals. Trigger Interval (ms): 1~10000

Trigger Enable Signal: Internal trigger can be enabled via IN1 input signal. (Extended Parameter)

Outer: Image capture is triggered by external signals. (Delay trigger or real-time trigger is selectable in extended parameters)

Delay Trigger: Set the delay time (0~10000ms) for image capture after receiving IN1 signal.

Image Parame: Adjust camera settings.

Exposure Time (1~10000μs):

Higher value brings brighter image and longer dynamic response time, resulting in degraded image quality for moving objects.

Gain (1~4):

Adjust image brightness; higher gain increases brightness but introduces more image noise.

Contrast (1~100):

Difference between the brightest and darkest areas of the image. Larger value widens the difference for sharper and more prominent display.

Sharpness (1~100):

Higher value enhances detail contrast for clearer image, yet may cause image distortion.

Color Saturation (1~100):

Color purity; higher value delivers vivid colors while lower value leads to dull colors.

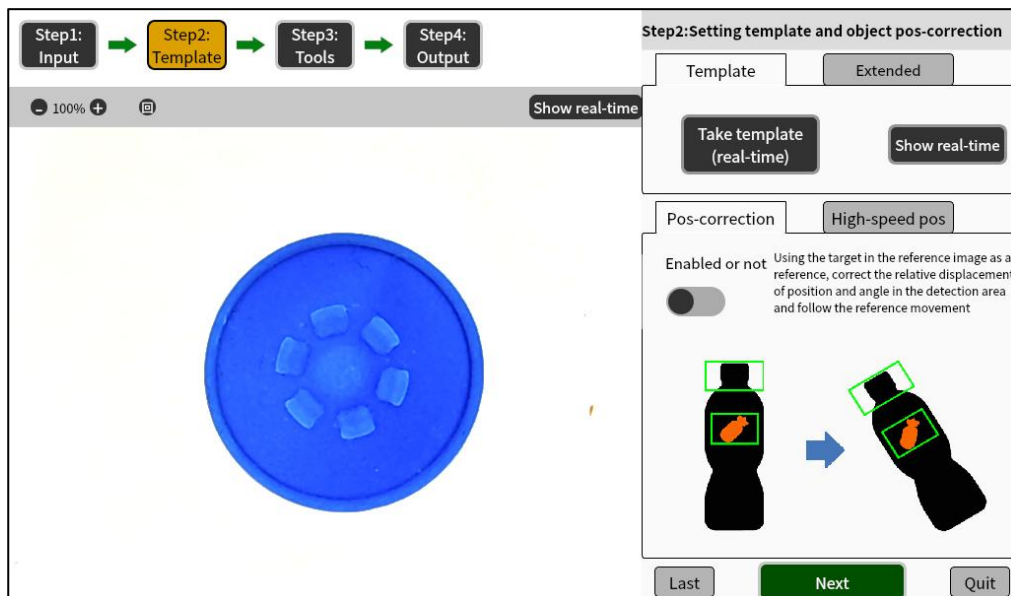
Gamma (1~4):

Auxiliary parameter for brightness and contrast; its adjustment affects overall image brightness and contrast.

Focus Adjustment: Click to enter adjustment interface, adjust image definition via +/- buttons.

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

- **Step 2 – Reference Registration:** Set the reference image for the recipe and perform position correction on products.



Template: Configure the reference image for the current recipe.

Register Live Image as Reference: Click this menu to register the current live image as reference image.

Show Live Image: Click the menu to switch to live image display.

Extended:

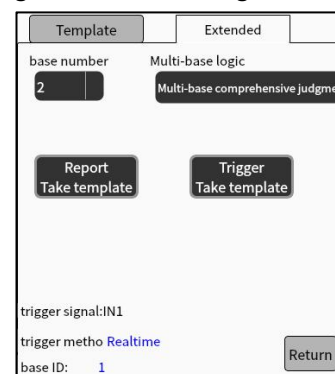
Reference Quantity (1~3): Set the number of references for the current recipe default value is 1.

Multi-reference Judgment Mode: For multiple references, select the output logic: comprehensive judgment of all references or separate judgment for each reference.

Register Reference from Historical Report: Access historical reports and select target images to register as reference.

Register Reference via Trigger Capture: Register reference by capturing images with trigger signal.

Trigger Delay Time: Delay duration before image capture after trigger input. (This menu is only available when Delay Trigger is selected for External Trigger in Step 1.)



- ✧ **Position Correction:** Correct product position via contour matching.

Enable Position Correction: Confirm whether position correction is required for the current recipe; enable manually if needed, disabled by default.

Edit Area: Click to enter submenu to configure valid area and search range for position correction.

Parameter Adjustment: Click to enter the submenu and adjust position correction parameters.

Basic Parameters:

Similarity: Adjust the contour similarity threshold for position correction; correction takes effect and result is judged OK only when the measured value meets the set threshold.

Angle Range: Adjust the angle range for position correction search; searching is limited within the configured range only.

Contour Sensitivity: Adjust the parameter for extracting edge contour feature points. A higher sensitivity enables detection of feature points on faint black-white edges, while a lower sensitivity only picks feature points with distinct black-white edges.

Extended Parameters:

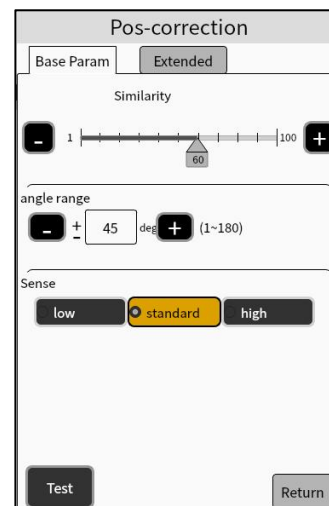
Contour Ignorance: Set partial image contour features to be invalid. (Support hand-drawing or frame selection for defining regions.)

Image Preprocessing: Readjust parameters such as contrast and brightness for position correction. (This preprocessing only applies to position correction.)

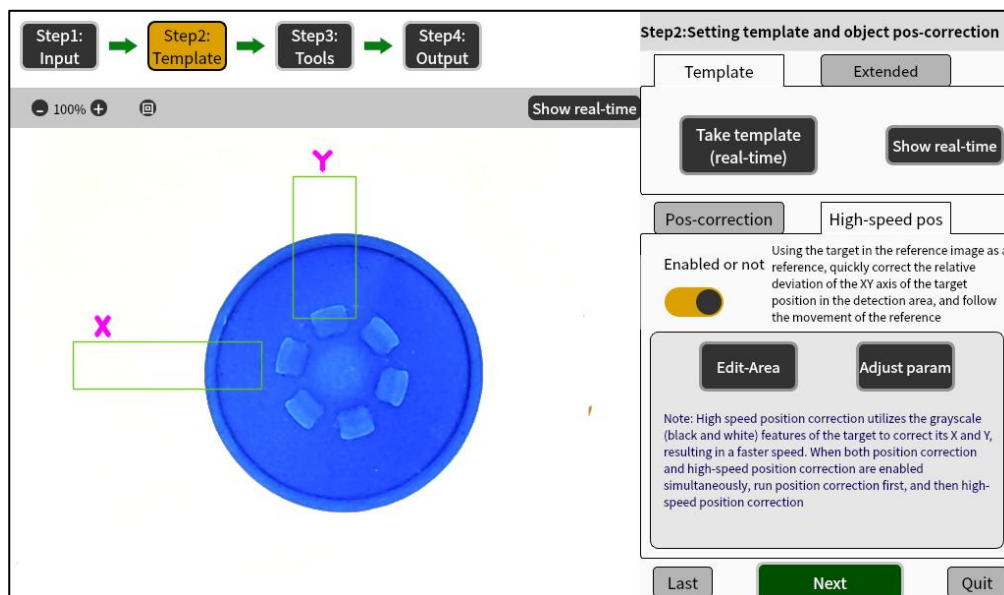
Correction Point: Select direction and angle during position correction.

Contour Extraction Method: Multiple edge extraction algorithms are optional.

Contour Search Algorithm: Higher precision yields more extracted contour feature points and better matching performance at the cost of slower calculation speed.



✧ **High-Speed Pos:** Correct product offset in X and Y directions by searching target black-and-white features.



Enabled or not: Enable manually if this function is required for the current recipe; disabled by default.

Edit Area: Configure valid detection area for high-speed position correction.

Adjust param: Click to enter submenu to modify parameters of high-speed position correction.

Base Param:

Direction: Set the moving direction for high-speed position correction.

Dual-axis (X+Y): High-speed position correction is applied to both X and Y axes.

Single-axis (X): High-speed position correction applies only to the X axis.

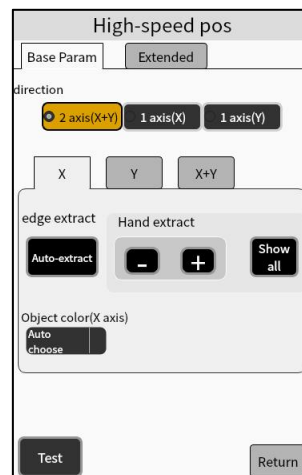
Single-axis (Y): High-speed position correction applies only to the Y axis.

Edge Extraction: Select feature edges required for correction; switch edges via +/- buttons.

Auto Extraction: The software automatically extracts edges with the most distinct contrast.

Show All: Display all extractable edges.

Test: Verify the effect after high-speed correction on real-time images.

**Extended:**

Target Sensitivity: Adjust the intensity parameter for edge feature extraction.

Auto Adjustment: By default, the software automatically calculates and sets an optimal sensitivity threshold via algorithm.

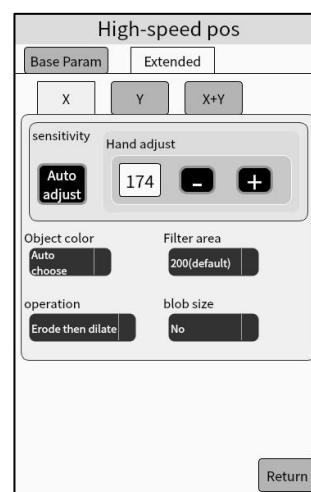
Manual Adjustment: Manually adjust the sensitivity threshold using +/- buttons.

Target Color: Select the color of target feature (white blob / black blob); auto-selected by default.

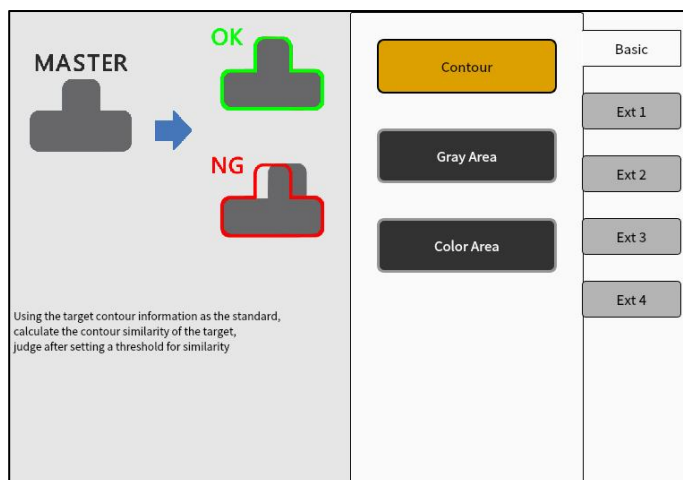
Target Filter Area: Define the minimum area of extracted targets; objects smaller than the set value will be filtered out.

Blob Operation: Define whether extracted targets adopt erosion followed by dilation or dilation followed by erosion.

Blob Size: Set the erosion/dilation level for blob operation; no processing by default.

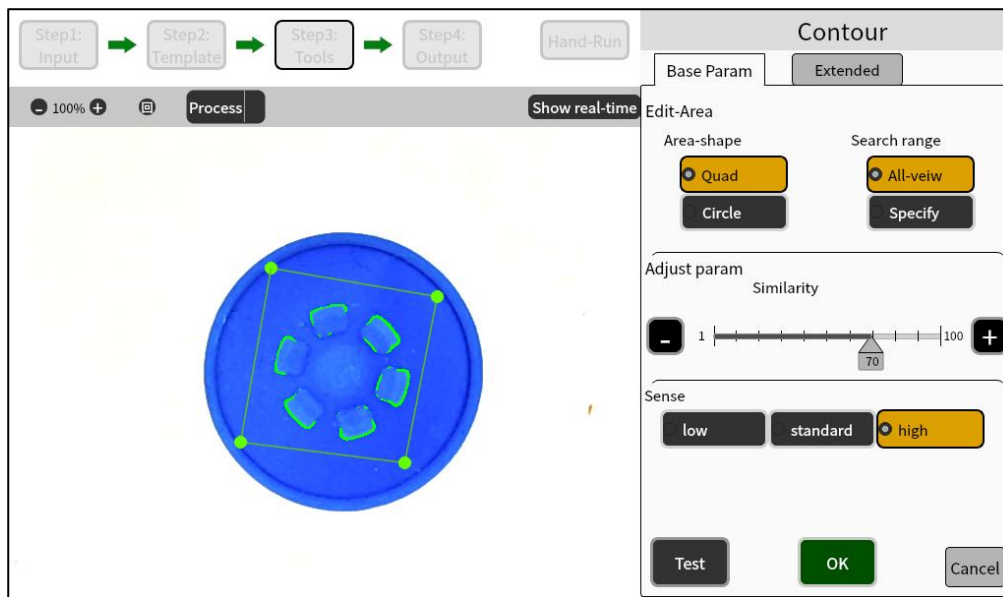


- **Step 3 - Algorithm Tools:** Add corresponding algorithm tools for inspection according to product features and detection requirements.



Click Add Tool to open the menu. Basic tools include Contour Matching, Grayscale Area and Color Area; select the required tool to add.

1) Contour



Base Param:

Edit Region: Modify the valid area and search range for contour matching.

Parameter Tuning: Adjust algorithm parameters for contour matching.

Similarity: Adjust the similarity threshold of contour matching; result is judged OK only when the value exceeds the set threshold.

Contour Sensitivity: Adjust the intensity parameter for extracting contour feature points. A higher sensitivity enables detection of faint black-white edge feature points; a lower sensitivity only picks prominent black-white edge features for calculation.

Extended:

Angle Range (1~180): Adjust the angular searching range for contour matching; matching is only valid within the configured range.

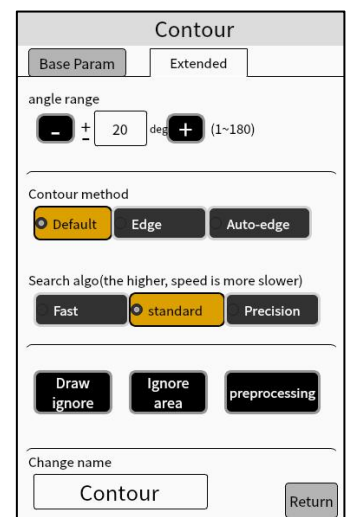
Contour Extraction Method: Select the proper contour edge extraction mode.

Search Algorithm: Higher precision means more extracted contour feature points, but slower computing speed.

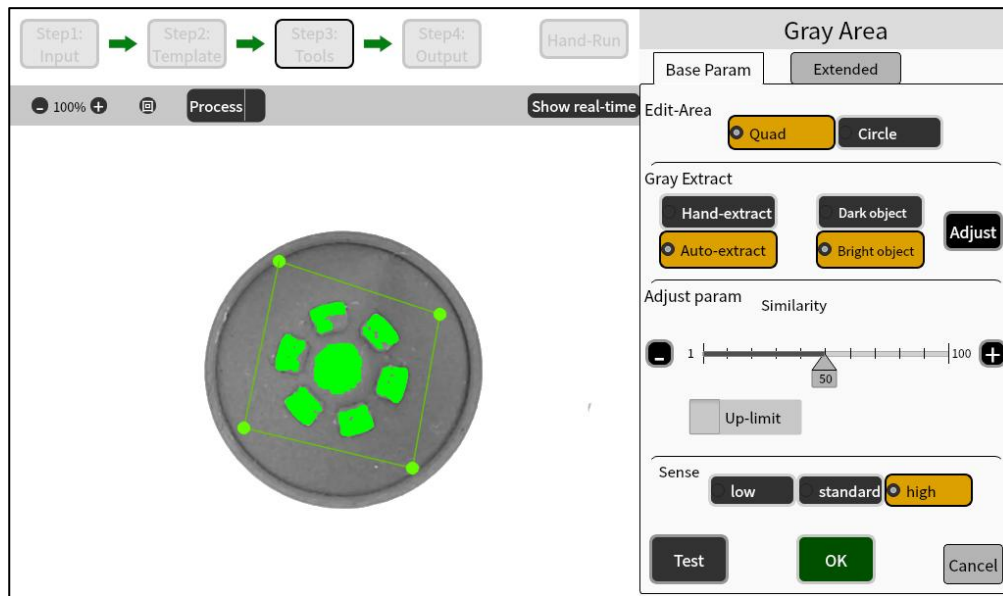
Contour Ignore: Configure partial image contour features to be invalid via freehand drawing or region framing.

Image Preprocessing: Readjust parameters such as contrast and brightness for contour matching only.

Rename: Modify the name of the current contour matching tool.



2) Gray Area



Base Param:

Edit Region: Set valid detection area for grayscale area inspection.

Gray Extraction: Define the range of grayscale values to be extracted.

Manual Sampling: Click Sample to open the sampling menu for manual extraction. (See figure on the right)

Operation: Move the cross cursor on the image to the target sampling position and click Confirm to finish grayscale extraction.

Adjust Sampling Range: Manually adjust the range of high and low thresholds.

Restore: Undo the last sampling operation.

Clear All: Remove all sampled grayscale values.

Auto Sampling: Select auto-extraction for dark or bright targets as required by inspection.

Parameter Setting: Adjust algorithm parameters of the grayscale area tool.

Similarity: Adjust the similarity threshold for grayscale area; the result is qualified only when the calculated value is higher than the set threshold.

Upper Limit Switch: When enabled, upper and lower similarity thresholds can be configured.

Sensitivity: Adjust the captured grayscale threshold range during detection. Lower sensitivity corresponds to a wider captured grayscale threshold range.

Extended:

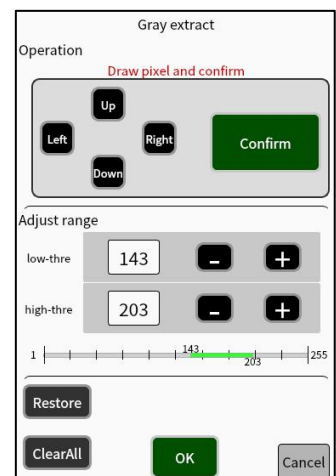
Area Ignore: Set partial image regions to be excluded from grayscale area calculation via freehand or box selection.

Preprocessing: Readjust parameters including contrast and brightness for grayscale area calculation only.

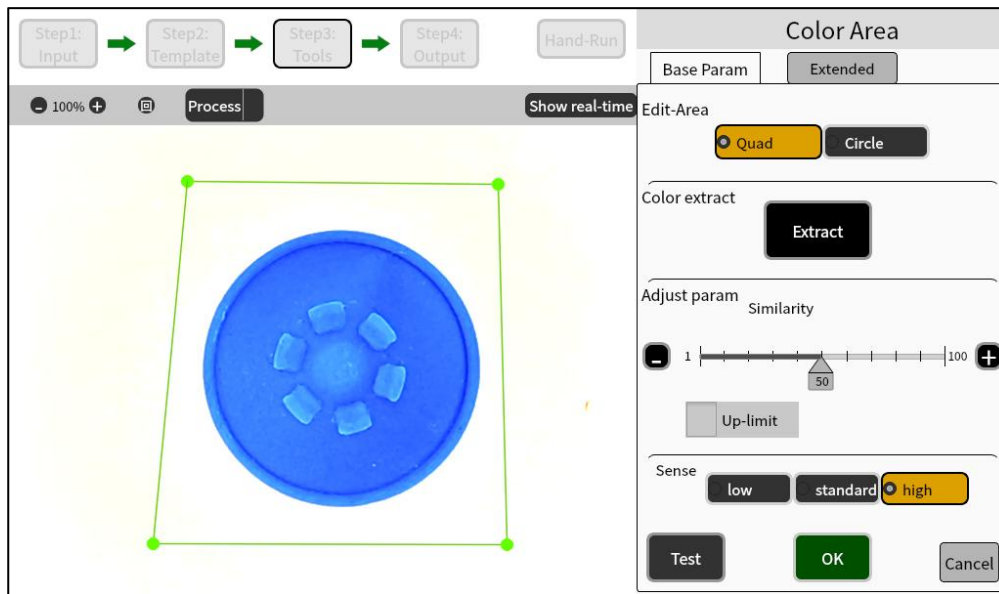
Blob Operation: Filter edge areas via erosion and dilation.

Similarity Precision: Set the similarity precision of the measured area.

Rename: Modify the name of the current grayscale area tool.



3) Color Area



Base Param:

Edit -Area: Configure valid detection area for Color Area tool. Available shapes: Quadrilateral and Circle.

Color Extract: Define target extraction colors; click Sample to enter the sampling menu.

Operation: Move the cross cursor on the image to the target sampling position, then click Confirm to complete color sampling.

Sampling Source: Sampling defaults on reference image; real-time image is optional.

Color Sensitivity: Adjust the captured color value range for detection. Lower sensitivity results in a wider captured color range.

Is it a neutral color: Check if sampled color belongs to black, white or gray. Select corresponding option for improved sampling accuracy.

Adjust Range: Manually adjust the threshold range of HSV values.

Restore: Undo the last sampling operation.

Clear All: Remove all sampled HSV values.

Adjust Param: Adjust threshold parameters of the Color Area tool.

Similarity: Adjust area similarity threshold of target color; result is judged OK only when the measured value exceeds the set value.

Upper Limit : When enabled, upper and lower similarity limits can be configured.

Sense: Adjust the color threshold range for detection. Lower sensitivity corresponds to a wider captured color range.

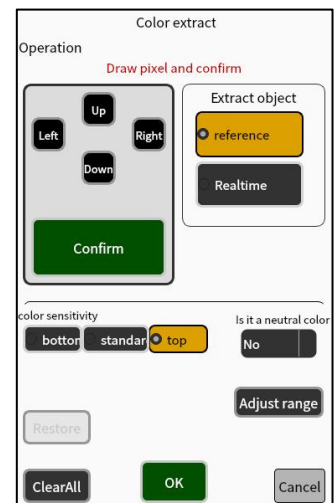
Extended :

Ignore Area: Exclude color area detection for partial image areas via freehand or box drawing.

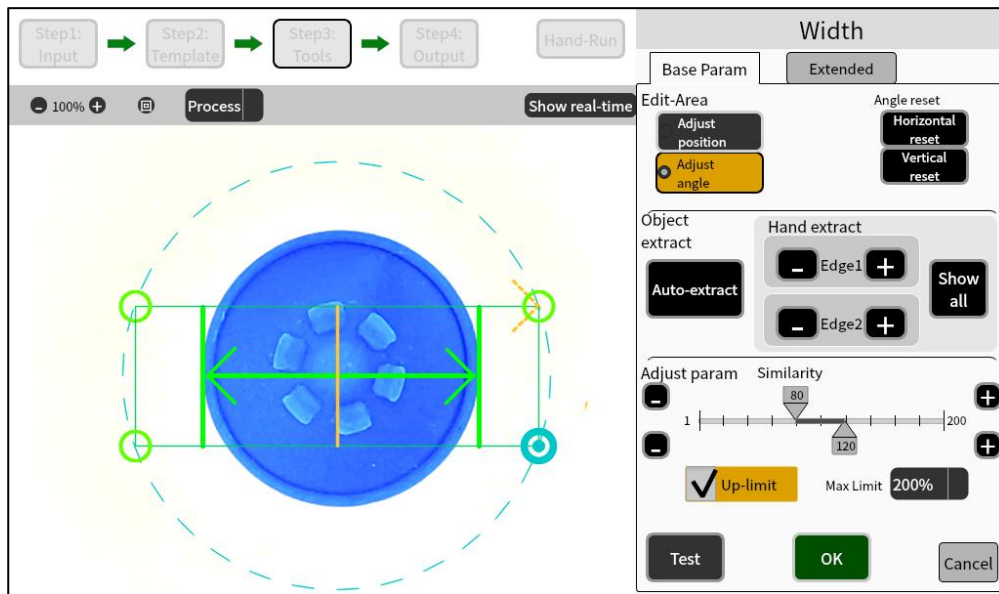
Operation: Filter edge areas via erosion and dilation.

Precision: Configure precision for area similarity calculation.

Rename: Modify the name of the current Color Area tool.



4) Width



Base Param:

Edit-Area:

Adjust Position: Modify valid detection range for width measurement.

Adjust Angle: Adjust the angle of width detection area.

Angle Reset:

Horizontal Reset: Restore detection area angle to horizontal.

Vertical Reset: Restore detection area angle to vertical.

Edge Extraction:

Auto Extract: Automatically pick the most prominent two edges for width measurement.

Manual Extract: Manually select Edge 1 and Edge 2; adjust via +/- buttons.

Show All: Display all available selectable measurement edges.

Similarity: Adjust the similarity threshold for width measurement; result passes OK only when value falls within preset range.

Up-Limit : When enabled, upper and lower similarity limits are configurable (max upper limit: 999%).

Extended :

Edge Sensitivity Adjust: Manually set threshold sensitivity for edge detection.

Measurement Mode:

Percentage: Unit for similarity precision when selected (default precision: 1%).

Actual Length: When selected, calibrate the correspondence between pixel and physical dimension.

Communication Settings: (Refer to Chapter 6 for detailed configuration)

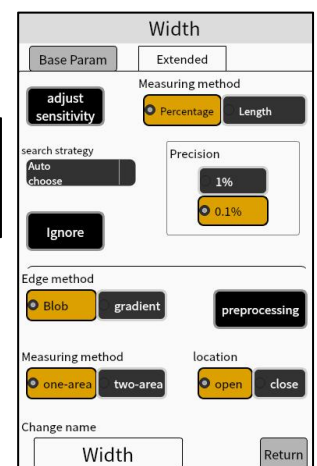
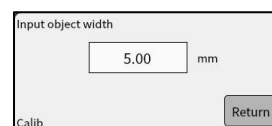
Target Search Strategy: Define the method for searching width edges (Auto Select, Target Size, Target Distance; default: Auto Select).

Ignore Area: Disable edge extraction within specified partial regions.

Percentage Precision: Set percentage accuracy for width measurement.

Edge Extraction Algorithm:

Blob: Extract measurement edges based on blob size or area.



Gradient: Select specific edges manually for measurement via gradient algorithm.

Measurement Mode:

Single Region: Measure dimension at both ends with one detection region.

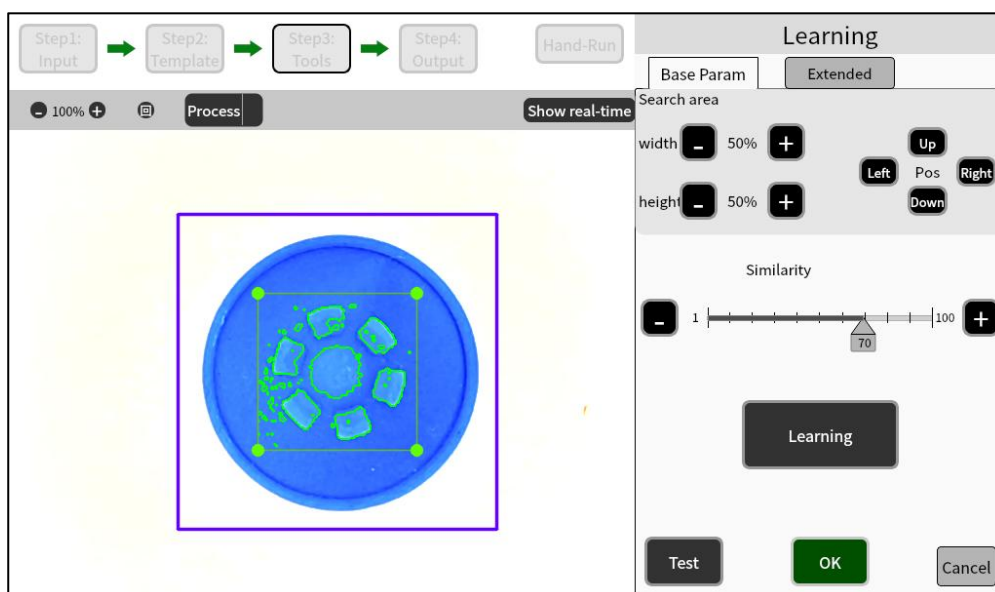
Dual Region: Measure dimensions via two separate regions, enabling measurement of features on different horizontal planes.

Preprocessing: Adjust parameters such as image contrast and brightness for measured images (preprocessing applies only to width measurement).

Local Positioning: Automatically locate measurement edges within the defined region.

Rename: Modify the name of the current width tool.

5) Learning



Base Param:

Search area: Edit valid search area for template learning; no detection outside this region.

Width: Adjust left-right range of the search region.

Height: Adjust top-bottom range of the search region.

Pos: Adjust the overall position of the search region.

Similarity: Adjust the similarity threshold for template matching; result is judged OK only when the measured value exceeds the set threshold.

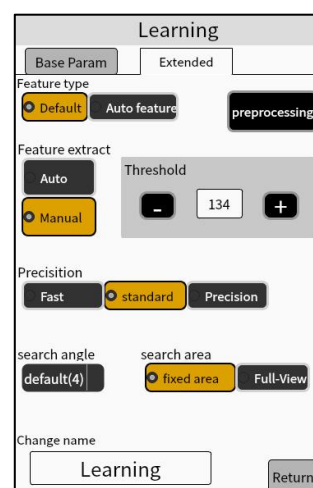
Learning: Multiple template images can be added based on the reference image. During inspection, the result is OK if matching any single template stored in the template library.

Extended :

Feature Extraction: Adjust black-white threshold sensitivity for edge extraction (Auto extraction by default).

Preprocessing: Adjust parameters including contrast and brightness for template learning images. This preprocessing function only takes effect for template learning.

Precision: Higher precision yields more extracted contour feature points but reduces processing speed.

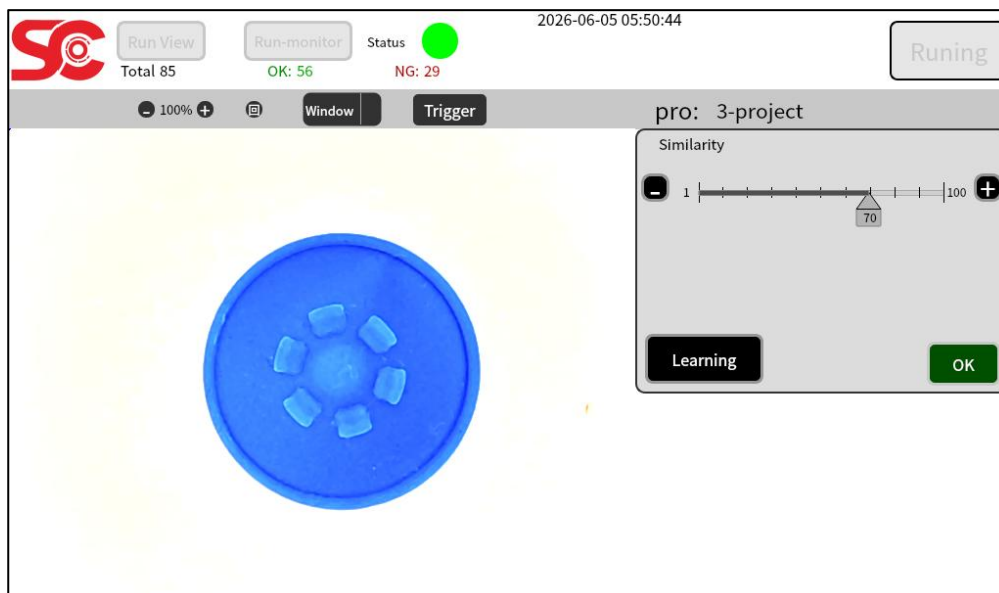


Search Angle: Adjust the angular search range for template learning; matching is only valid within the configured range.

Image Search Range: Template search defaults to the specified region; full-image search is optional.

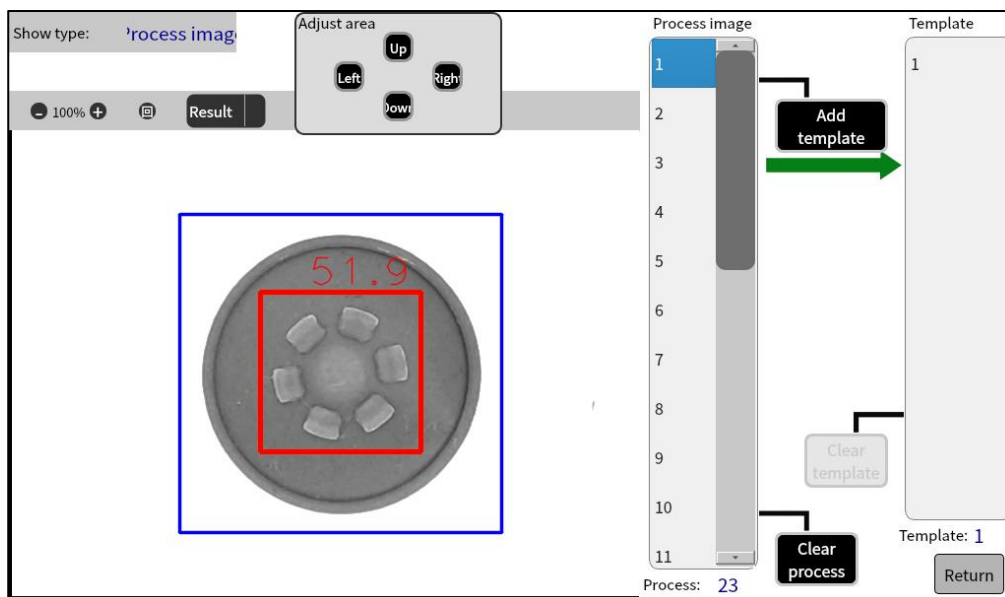
Rename: Modify the name of the current template learning tool.

◆ Template Learning Operation Procedure:



When using the template learning tool, if false alarms persist after adjusting the similarity threshold during inspection, add multiple template images via sample learning to optimize detection performance.

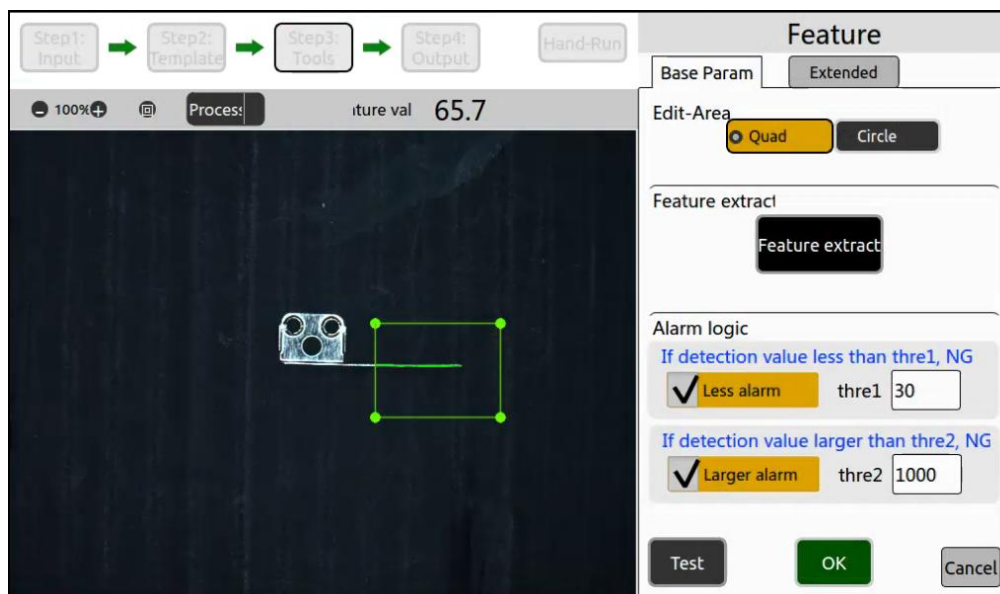
First, enter the sample learning interface.



Select falsely rejected good product images from the image library and add them to the template library. Subsequent identical cases will no longer be judged as NG during inspection.

- **Note:** Only add images of qualified products triggering false alarms. Incorrect template addition may result in missed detection of defective items.

6) Feature



Base Param:

Edit Area: Configure valid detection region for feature presence check (quadrilateral and circular shapes available).

Feature Extract: Define feature parameters to be extracted; click Feature Extraction to open the extraction menu.

Base Image Extract Features: Adjust parameters to preview extracted features on the reference image.

Realtime Extract Features: Adjust parameters to preview extracted features on the live real-time image.

Feature Type: Select extraction type (Dark Blob, Light Blob, Edge).

Sense: Adjust the threshold for acquiring feature points to filter target features. Fine-tune parameters to extract features with inconspicuous brightness contrast.

Erode Level: Higher level removes more tiny particles and noise around the target area while shrinking the target boundary inward further.

Alarm Logic: Set alarm scope and direction; each item can be enabled individually or simultaneously.

NG is triggered when the detected feature value is less than Threshold 1.

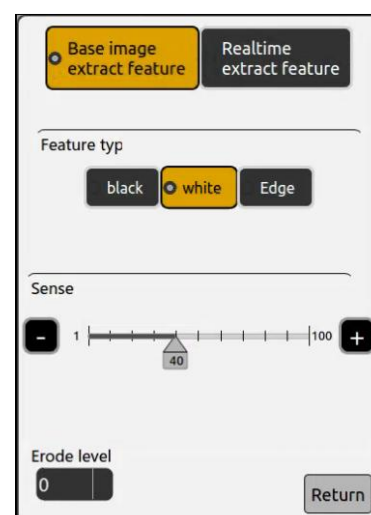
NG will be output if the detected feature value exceeds Threshold 2.

Extended :

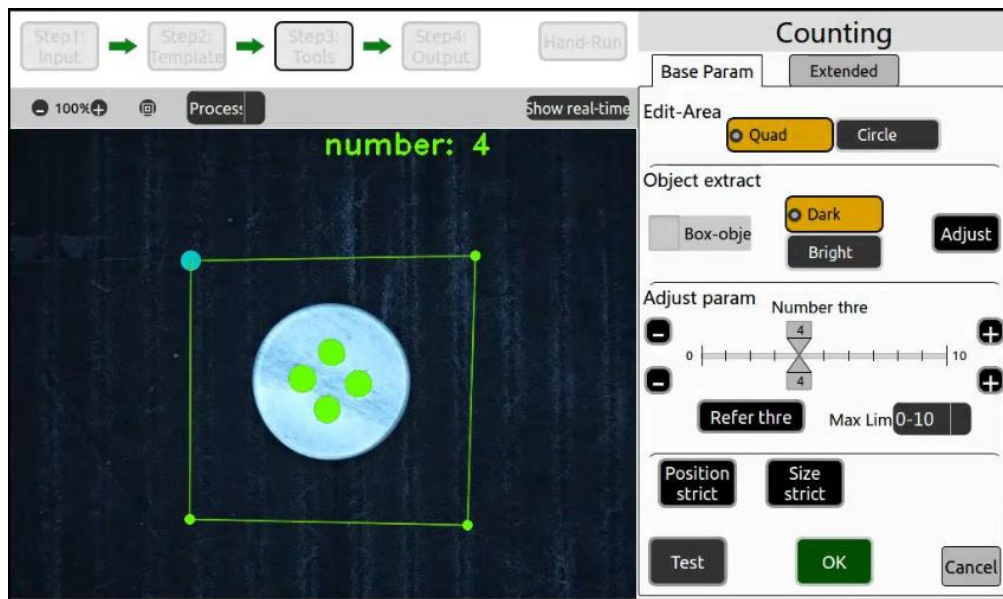
Ignore: Disable feature extraction within specified partial areas.

Preprocessing: Adjust parameters such as contrast and brightness for feature presence images. (This preprocessing function only applies to the Feature Presence tool.)

Rename: Modify the name of the current Feature Presence tool.



7) Counting



Base Param: (Extended Parameters valid when blob color is set to Black or White)

Edit Area: Edit valid detection region for Blob Counting (quadrilateral and circular available).

Blob Extraction: Set threshold range for blob extraction.

Blob Frame: After framing, each valid blob is displayed with an independent bounding box.

Dark : Automatically extract near-black blobs based on grayscale values within the detection area.

Bright: Automatically extract near-white blobs according to grayscale values inside the detection area.

Adjust: Manually modify the threshold range for blob extraction.

Parameter Adjustment: Tune algorithm parameters of the Blob Count tool.

Blob Count Threshold: Set the acceptable blob quantity range; result is OK only when the counted number falls within this range.

Reference Threshold: Automatically set the blob count threshold based on the blob quantity of the reference template.

Upper Limit: Set the upper threshold limit of blob quantity.

Position Strict: Configure whether blobs spilling outside the detection area are valid. (Count all blobs / Count only inner blobs)

Size Strict: Set valid judgment parameters for blobs (blob area range, blob width range, blob height range).

Extended :

Ignore Region: Disable blob extraction within specified partial regions.

Image Preprocessing: Adjust parameters including contrast and brightness for Blob Count images. (This preprocessing is only valid for the Blob Count tool.)

Blob Morphology: Perform erosion and dilation on the binary image of connected components.

Erosion then Dilation: also called Opening Operation. It is mainly used to remove tiny noise particles and small targets, strip thin adhesive junctions on object outlines to separate adjoining boundaries, and preserve the original object area roughly unchanged.

Dilation then Erosion: also known as Closing Operation. It is commonly used to fill tiny internal holes of targets and connect adjacent disconnected objects while keeping the object area roughly unchanged.

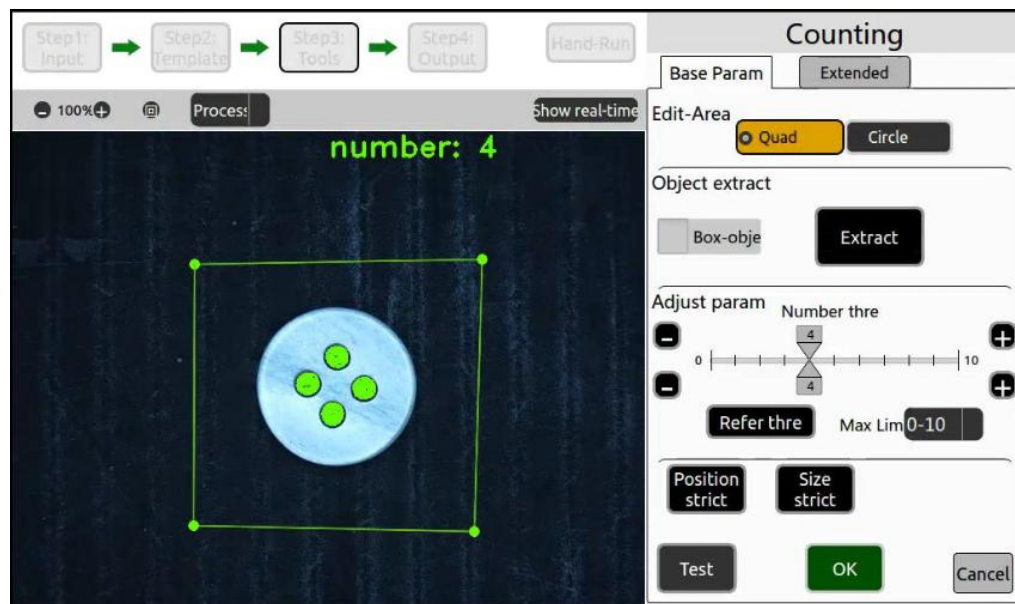
Erosion Level: Higher levels remove more small particles and noise around target regions and shrink target boundaries inward to a greater extent.

Dilation Level: Higher levels fill more tiny holes inside target areas and expand target boundaries outward further.

Blob Color: The Blob Count tool extracts blobs from grayscale images by default; color-image-based blob extraction is optional.

Sensitivity: Adjust the grayscale threshold range for detection. Lower sensitivity corresponds to a wider captured grayscale threshold range.

Rename: Modify the name of the current Blob Count tool.



Base Param (Extended Parameters available when Color is selected for Blob Color)

Edit-Area: Edit valid detection area for blob counting. (Quadrilateral, Circle)

Blob Extraction: Manually sample required blobs; click Extract to enter the extraction menu.

Operation: Move the cross cursor on the image to the target blob position, then click OK to finish blob extraction.

Color Invert: After inversion, valid blobs cover all colors except the sampled blob color.

Color Sensitivity: Adjust the color value range for blob detection. Lower sensitivity results in a wider captured color range.

Is it a neutral color: Check if sampled blobs consist of black, white or gray tones. Enable this option for improved extraction results when applicable.

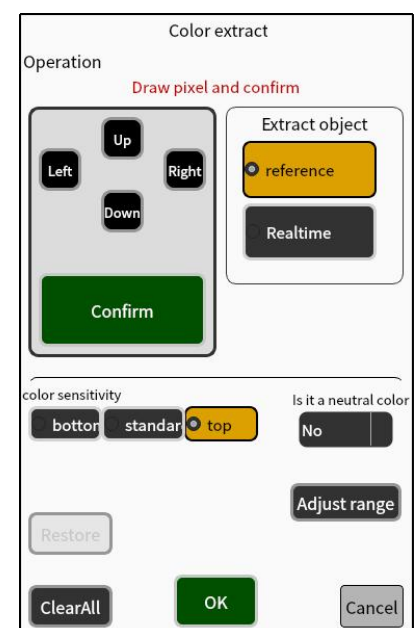
Adjust Extraction Range: Manually modify the HSV threshold range.

Restore: Undo the last extraction operation.

Clear All: Remove all sampled HSV values.

Parameter Adjustment: Tune algorithm parameters of the blob count tool.

Blob Count Threshold: Adjust the similarity value of color area; items exceeding the set value will be judged as OK.



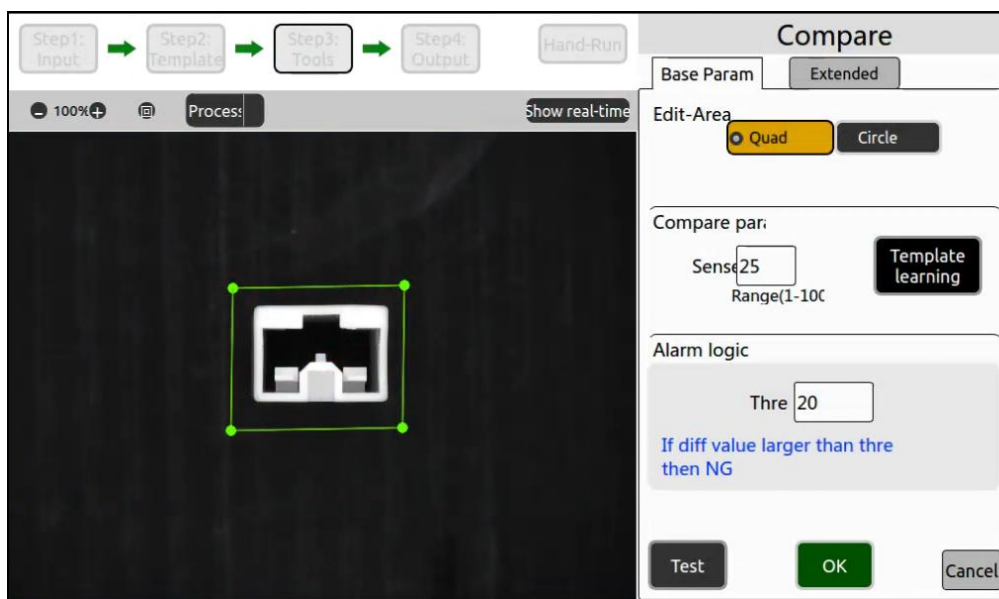
Reference Threshold: Automatically set the corresponding blob count threshold based on the blob quantity of the current reference template.

Upper Limit: Set the upper bound of the blob count threshold range.

Blob Position Limit: Configure whether blobs outside the detection Edit-Area are valid. (Count All Blobs / Count Inner Blobs Only)

Blob Size Limit: Set valid judgment parameters for blobs. (Blob Area Range, Blob Width Range, Blob Height Range)

8) Compare



Base Param:

Edit-Area: Edit valid detection area for grayscale contrast. (Available shapes: Quadrilateral, Circle)

Contrast Parameters: Configure parameters for grayscale contrast inspection.

Sensitivity: The comparison criterion for pixel grayscale values between the detected image in the current area and the reference image. Smaller values deliver higher precision, while larger values result in lower precision.

Template Learning: Multiple template images can be added based on the reference image. During grayscale contrast inspection, the result is OK if matching any single image in the template library.

Alarm Logic: Result is judged NG when the grayscale contrast difference exceeds the preset threshold.

Threshold: During inspection, the area of abnormal pixels is calculated via comparison with the reference template. Its value correlates with sensitivity; higher sensitivity results in fewer abnormal pixels being flagged.

Extended :

Ignore Area: Disable the grayscale contrast tool for specified partial regions.

Comparison Algorithm: (Higher precision comes with slower inspection speed) Higher precision collects more pixel data, which reduces the corresponding inspection speed.

Denoising Level: Filters tiny-area pixel noise in images. Higher levels remove more noise but reduce inspection precision.

Priority Check Maximum Defect: Prioritize detection of the largest defective target while ignoring minor defects.

Edge Processing: Filter out pixels at image edges to drastically reduce false alarms at the cost of lower inspection accuracy.

Rename: Modify the name of the current grayscale contrast tool.

- **Template Learning Operation Procedure:**



When using the grayscale contrast tool: if false alarms persist after threshold adjustment during inspection, add multiple template images via template learning to satisfy inspection requirements.

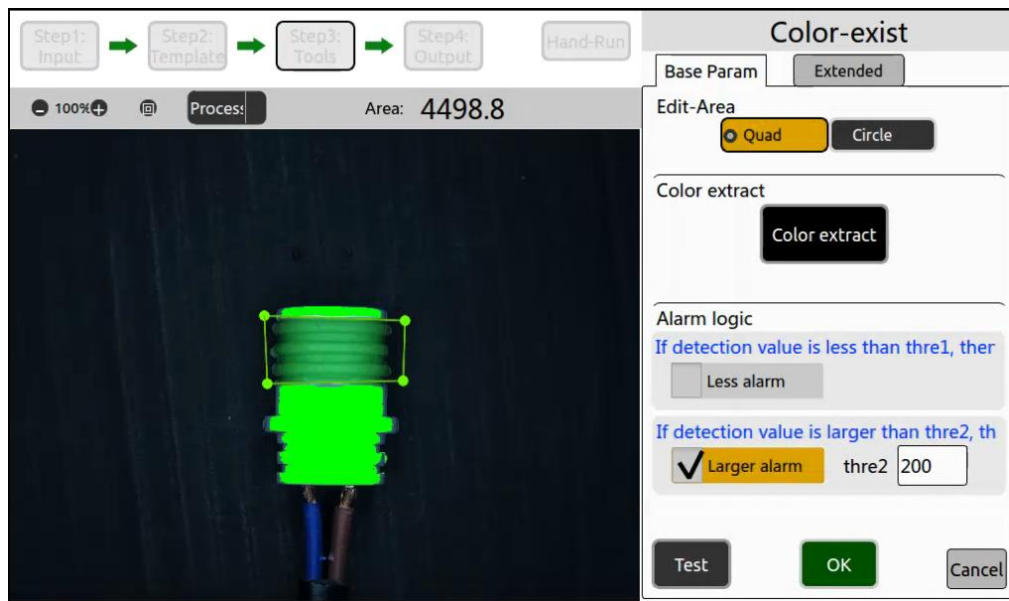
First, enter the template learning interface.



From the image library, select good-product images that triggered false rejects and add them to the template library. Subsequent identical scenarios will no longer be judged NG during inspection.

Note: Only confirmed OK images can be added. Incorrect template addition may cause defective products to escape inspection.

9) Color-exist



Base Param:

Edit-Area: Edit valid detection regions for Color Presence Check. (Available shapes: quadrilateral and circle)

Color Extraction: Define target extraction color and tap Extract to open the extraction menu.

Operation: Move the cross cursor on the image to the target sampling position, then click Confirm Extract to complete color sampling.

Extraction Source: Extract from reference image by default; real-time image is available as an alternative.

Color Sensitivity: Adjust the color value capture range for inspection. Lower sensitivity corresponds to a wider captured color range.

Is it a neutral color: Check if sampled color belongs to black, white or gray; enabling this option optimizes extraction results for neutral tones.

Adjust Range: Manually modify the HSV threshold range.

Restore: Undo the last color extraction operation.

Clear All: Erase all extracted HSV values.

Alarm Logic: Define the alarm range and direction for the detection area; each item can be enabled individually or simultaneously.

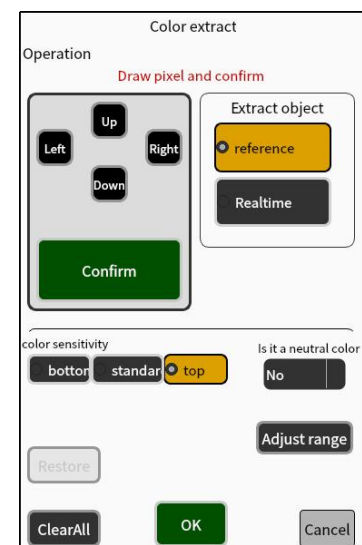
If the color feature value within the detection area is less than Threshold 1, the product is judged NG.

If the color feature value of the detection area exceeds Threshold 2, the product is judged NG.

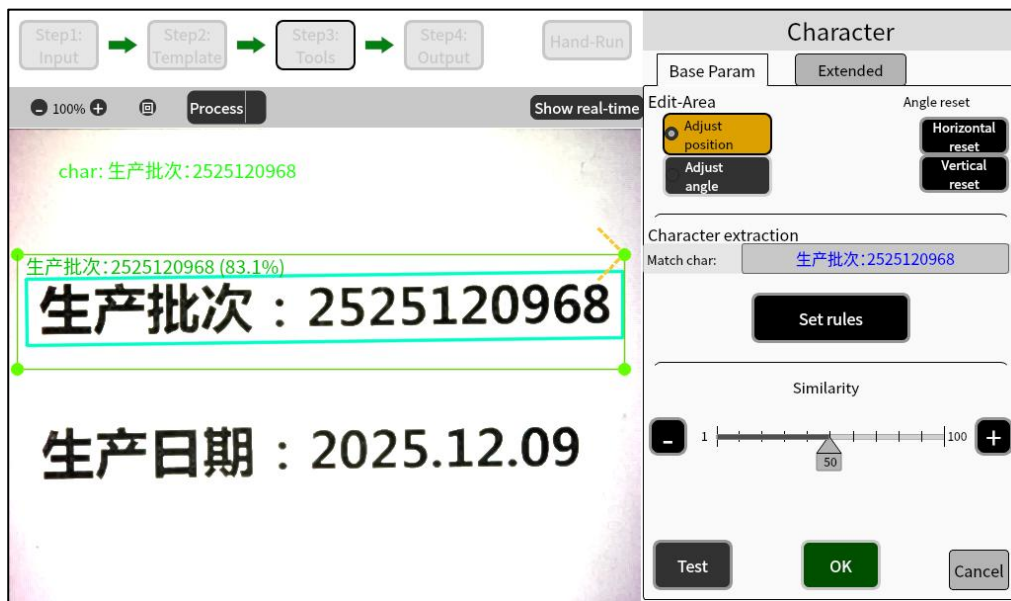
Extended :

Ignore Area: Configure partial regions to disable color extraction.

Rename: Modify the name of the current Color Presence Check tool.



10) Character



Base Param:

Edit-Area:

Adjust Position: Modify the valid detection range for character recognition.

Adjust Angle: Adjust the angle of the detection area for character recognition.

Angle Reset:

Horizontal Reset: Reset the detection area to horizontal orientation.

Vertical Reset: Reset the detection area to vertical orientation.

Character Extraction:

Match Characters: Automatically identify the extracted reference characters.

Set Rules: Configure extraction rules for character recognition.

Judging Condition: Criteria used for verification during character recognition inspection.

Reference Match: Verify whether recognized content matches the reference characters.

Count Judgment: Only verify if the recognized character quantity matches the reference count without content verification.

Manually Input: Manually enter reference characters for matching.

System Time Matching: Use system time as reference characters for recognition matching.

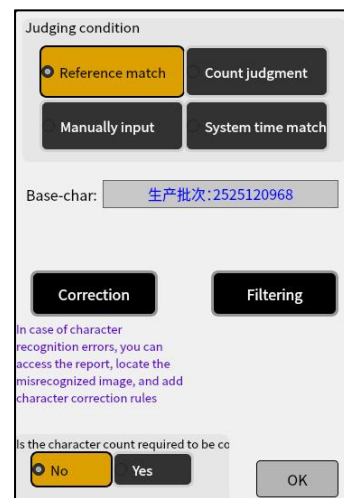
Correction: When misrecognition occurs during inspection, access reports to locate erroneous images and add correction rules.

Filtering: Select preset rules for recognition filtering (digits only, uppercase letters only, uppercase letters + digits). Single special characters can also be manually added to the filter list.

Count Consistency Required: When using reference character matching as judgment condition, enable simultaneous check to ensure the detected character count matches the reference; alarm for excess or missing characters.

System Time Rule:

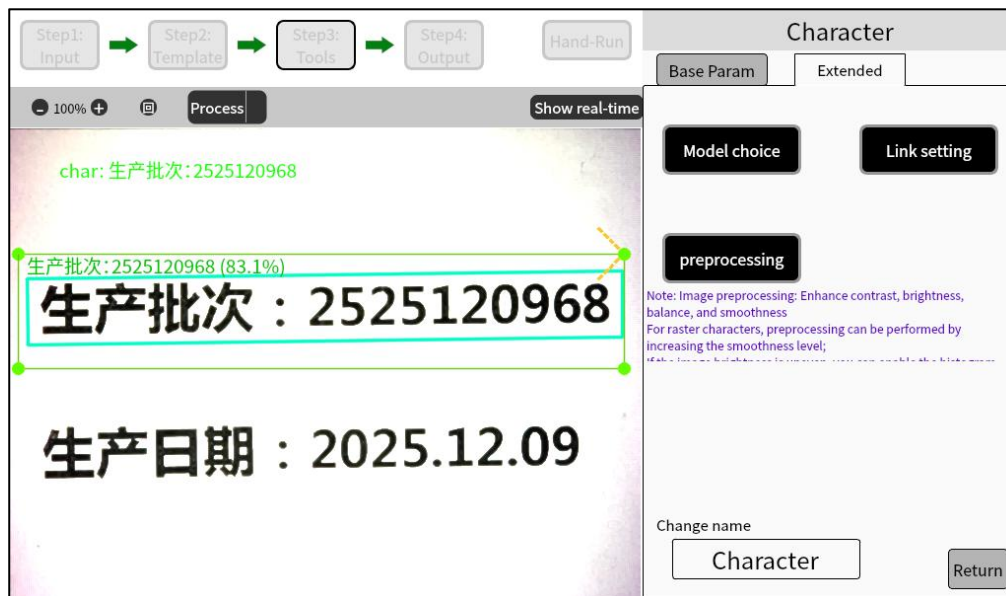
Time Format: Select the required date and time format.



Similar Character Correction Switch: When the judgment condition is System Time Matching, enabling this option forces similar alphabetic characters to be recognized as numerals.

Similarity: Adjust the similarity threshold for character recognition; result passes OK only when reaching the set similarity value.

Extended :



Model Selection: Select AI inspection model. (See figure on right)

Model: Multiple models available for different application scenarios.

Universal Standard Model: Supports Chinese and English characters for wide-range application scenarios.

Standard English Model: Designed for alphabetic characters with high precision and fast processing speed.

Universal High-Precision Model: Delivers superior recognition accuracy at the cost of relatively slower inspection speed.

Other Models: Additional feature-based models.

Character Positioning:

Enable (Multi-line Positioning & Recognition): Automatically calibrate detection position and recognize all characters within the region.

Enable (Single-line Positioning & Recognition): Automatically calibrate detection position and only recognize single-line characters for fast inspection speed.

Disable (Single-line Recognition, High Speed): Only single-line character recognition with higher speed and better performance, yet demanding strict positioning consistency of incoming products.

Model Import: Import pre-trained models via USB flash drive.

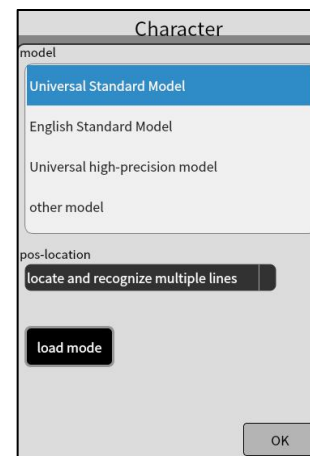
Positioning Method: For single-line positioning & recognition, select either AI-based positioning or contour positioning.

Communication Settings: (Refer to Chapter 6 for detailed configuration)

Image Preprocessing: Disabled by default. Related parameters can be configured once enabled.

Contrast: Higher level brings greater image contrast for sharper and more prominent display.

Brightness: The higher the level, the brighter the image.



Histogram Equalization: Adjusts the grayscale distribution of images to enhance image contrast.

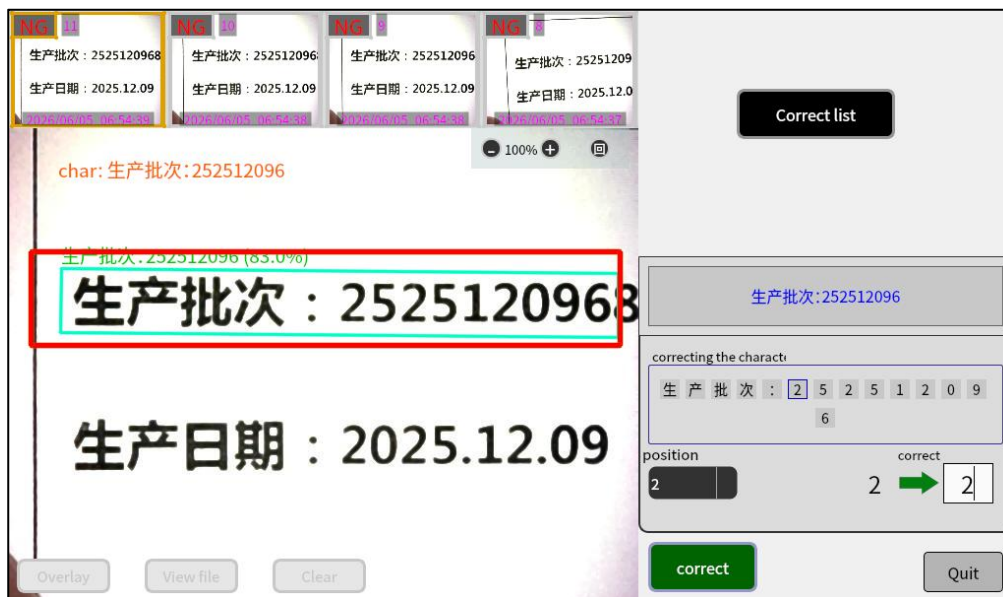
Smoothing Level: Evens out brightness variations across the image; higher levels result in blurred edges.

Rename: Allows modifying the name of the current character recognition tool.

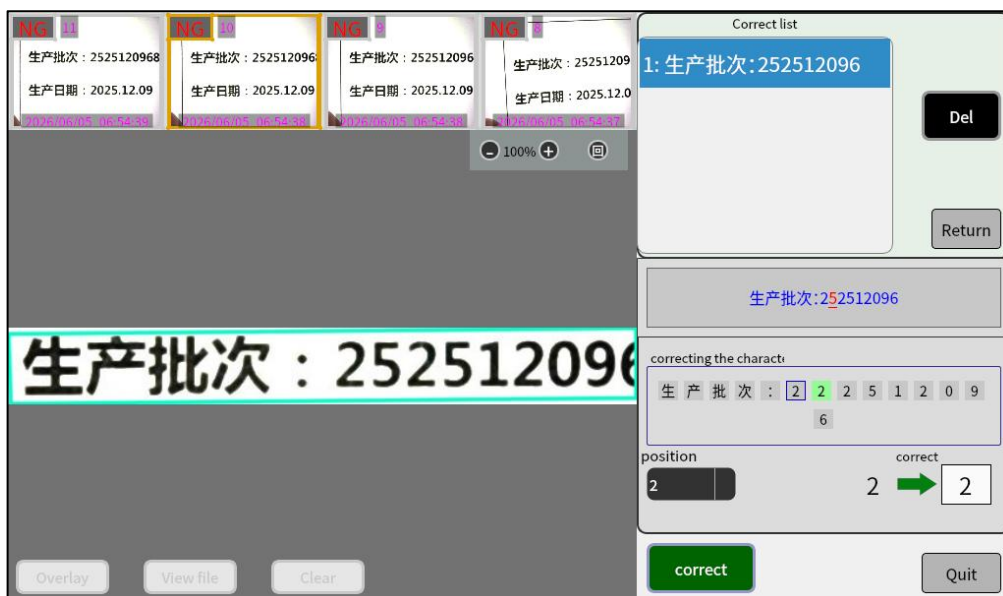
● Character Correction Operation Procedure:

When using the character recognition tool, if recognition errors occur during inspection, incorrect characters can be forcibly revised to the actual detected characters via the character correction menu.

First, click Operation Management on the main interface, enter the report page, select the character recognition tool and tap Modify to access the character correction menu.



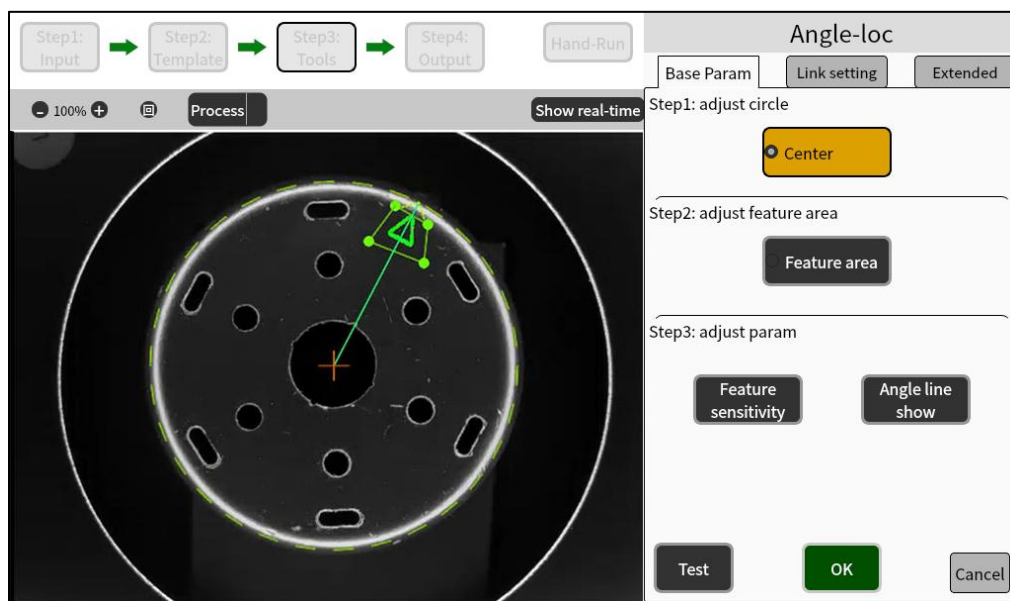
In the correction position menu, select the target correction position from the drop-down list, confirm the revised character, click Correct, enter the password and save to take effect.



Click Correction List to view correction records and delete unnecessary corrected character entries.

Note: After correction, characters appearing at the identical position in subsequent inspections will be judged per the revised setting.

11) Angle-loc



Base Param:

Step 1: Adjust Circle

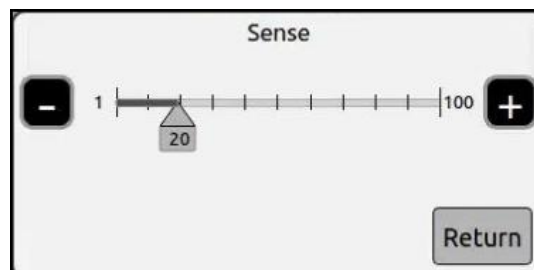
Adjust the detection center circle area to fully fit the product edge; the software automatically calculates the product's center point.

Step 2: Adjust Feature Area

Observe the contour features used for product positioning and adjust the feature area accordingly.

Step 3: Adjust Param

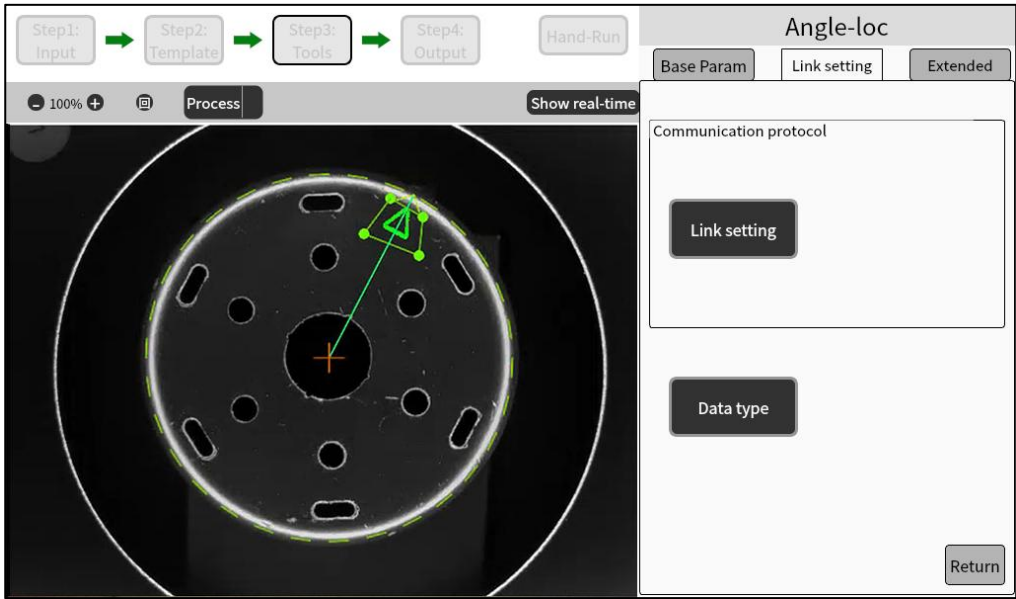
Feature Sensitivity: Threshold for acquiring contour feature points. Lower values capture more feature points, including indistinct contour points with subtle brightness differences.



Angle Line Display: The 12 o'clock direction of the reference image is defined as the reference 0° by default. The angle line overlaps the 0° reference initially, meaning a 0° offset is output when the product matches the reference image. If features deviate from the 0° reference direction, adjust the angle line to calculate the angular compensation required to align the feature direction back to the reference 0°. (Simplified explanation: The output value equals the current angular reading of the feature angle line.)

Auto Acquire: The system automatically calculates the position of the angle line based on the feature area; fine-tuning is also available via the menu below.

Link Setting:



◆ Link Setting:

Modbus-RTU: Standard RS-232 serial port is adopted for communication with Modbus-RTU serial protocol. The smart camera acts as Modbus master station to read and write data of the PLC terminal. (See right figure)

Baud: Confirm the baud rate of the PLC and select the corresponding parameter.

Data Bits: Confirm the data bits configured on the PLC and select the matching parameter.

Stop Bits: Confirm the stop bits of the PLC and select the corresponding parameter.

Parity Type: Confirm the parity type configured on the PLC and select the corresponding parameter.

Modbus Station ID: Confirm the master station ID and fill in the corresponding parameter.

Flag Address: Confirm the PLC register address for OK/NG judgment status feedback and input the parameter. Users may customize the value for OK/NG; the default value of OK is 1.

Angle Address: Confirm the PLC register address used for receiving angle data and fill in the parameter.

Other Link Setting: (Refer to Chapter 6 for detailed configuration)

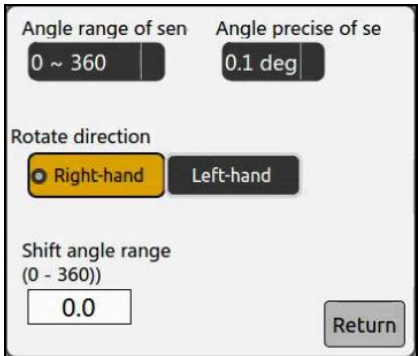
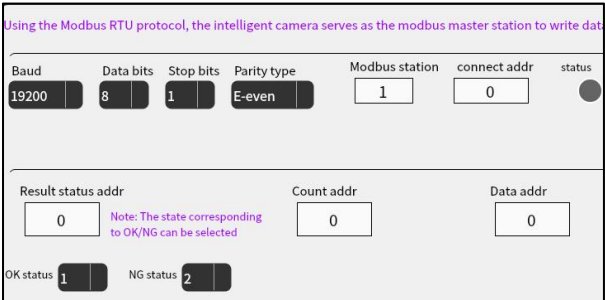
◆ Data Type:

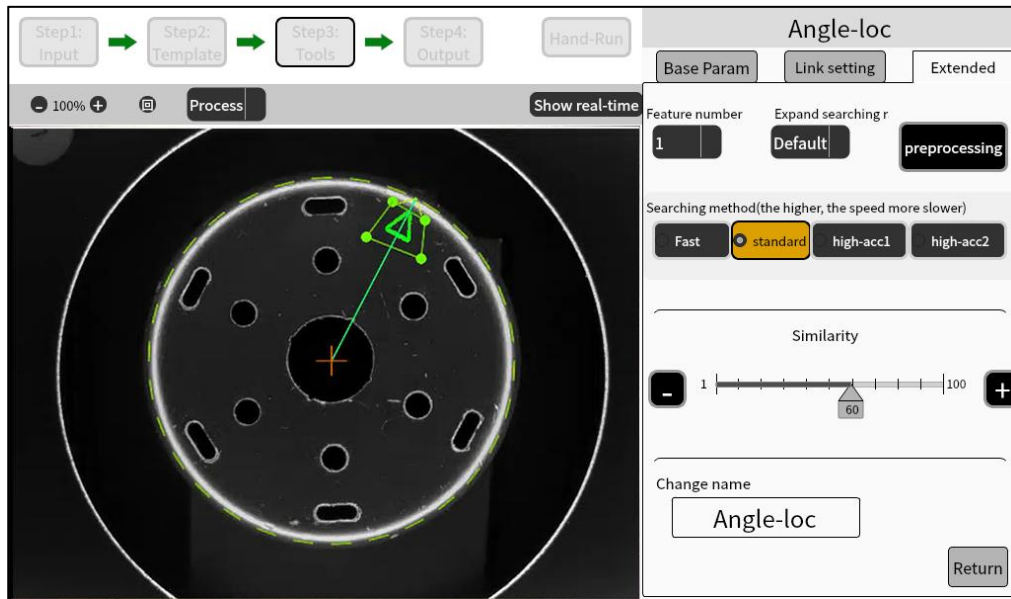
Transmission Angle Range: Select the range of angle values to be transmitted.

Transmission Angle Precision: Define the precision of transmitted angle values.

Rotating Coordinate System: Counterclockwise is the positive direction for the right-hand coordinate system, while clockwise is the positive direction for the left-hand coordinate system.

Transmission Compensation Angle Range (0-360): Actual transmitted angle can be adjusted via this compensation parameter. (Example: Original transmission angle is 100°, actual output becomes 130° with 30° compensation; actual output turns to 70° when compensated by 330°.)



Extended :

Feature number: Select the number of feature regions for angle positioning (1 by default, maximum 4).

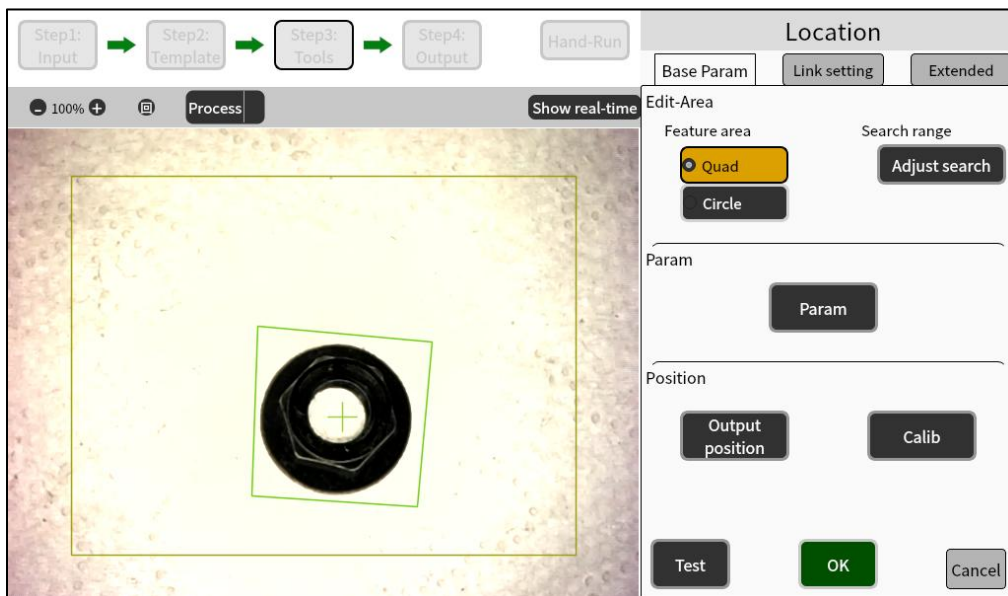
Expanded Search Range: Used to adjust the search scope of feature regions. Increase the range properly in case of large deviation of feature position.

Image Preprocessing: Adjust parameters such as contrast and brightness for angle positioning images. (This preprocessing only takes effect on angle positioning.)

Feature Search Algorithm: Higher precision yields more feature points but reduces detection speed.

Similarity: Threshold of feature matching score. Result is OK if the detected similarity exceeds the set threshold.

Rename: Modify the name of the current angle positioning tool.

12) Location**Base Param:**

Edit-Area:

Feature Area: Adjust the area for feature extraction in target location.

Search Range: Adjust the area range for feature searching.

Parameter Adjustment:

- **Positioning Parameters:** (Extended Parameters, Contour Selection for Positioning Features)

Position Direction: Select positioning requirements; X, Y and angle positioning by default, or configure single-axis positioning as needed.

Search Angle Range: The angular range for feature searching; matching is deemed OK only within this range.

Ignore Area: Set partial areas to be excluded from search. (Available in advanced parameter settings)

Search Algorithm: Higher selected precision extracts more edge feature points at the cost of slower calculation speed.

Edge Extraction Algorithm: Multiple edge extraction methods are available for selection.

Search Sensitivity: Adjust the parameter value controlling the intensity of contour feature extraction. A higher sensitivity picks faint-edge feature points for calculation, while a lower sensitivity only computes distinct-edge feature points.

- **Positioning Parameters:** (Extended Parameters, Blob Selection for Positioning Features)

Color Extraction: Confirm color extraction parameters; click Extract to open the parameter configuration menu.

Operation: Move the cross cursor on the image to the target sampling position, then click Confirm Extract to complete color sampling.

Extraction Range Adjustment: Manually adjust the range of HSV threshold values.

Restore: Undo the last extraction operation.

Clear All: Remove all sampled HSV values.

Ignore Area: Disable partial features of blobs as required.

Sensitivity: Adjust the intensity parameter for blob feature extraction. Higher sensitivity detects faint edge feature points, whereas lower sensitivity only identifies prominent edge feature points.

Position Direction (X for horizontal, Y for vertical): Select the required positioning direction.

Output Point Position: The output point can be set to the center or four edges.

Blob Operation: Perform erosion and dilation on the binary image of the blob.

Erosion Followed by Dilation: Also known as Opening Operation. It is commonly used to eliminate tiny noise spots and miniature targets, cut thin connecting spurs between adhered object contours for object separation, while keeping the object area nearly unchanged.

Dilation Followed by Erosion: Also referred to as Closing Operation. It is generally used to fill tiny internal voids within targets and connect adjacent disjointed objects while keeping the object area roughly unchanged.

Location

Direction(X is the horizontal direction, Y is the vert

☒ X ☒ Y ☒ angle

Angle range

- + 20 deg +

(1~180)

Advanced

Edge method

☒ Default ☐ Edge ☐ Auto-edge

Sensitivity

☐ low ☒ standard ☐ high

Test Return

Location

Color extract

☐ Ignore area

Sense

☐ low ☒ standard ☐ high

Direction(X is the horizontal direction, Y is the vert

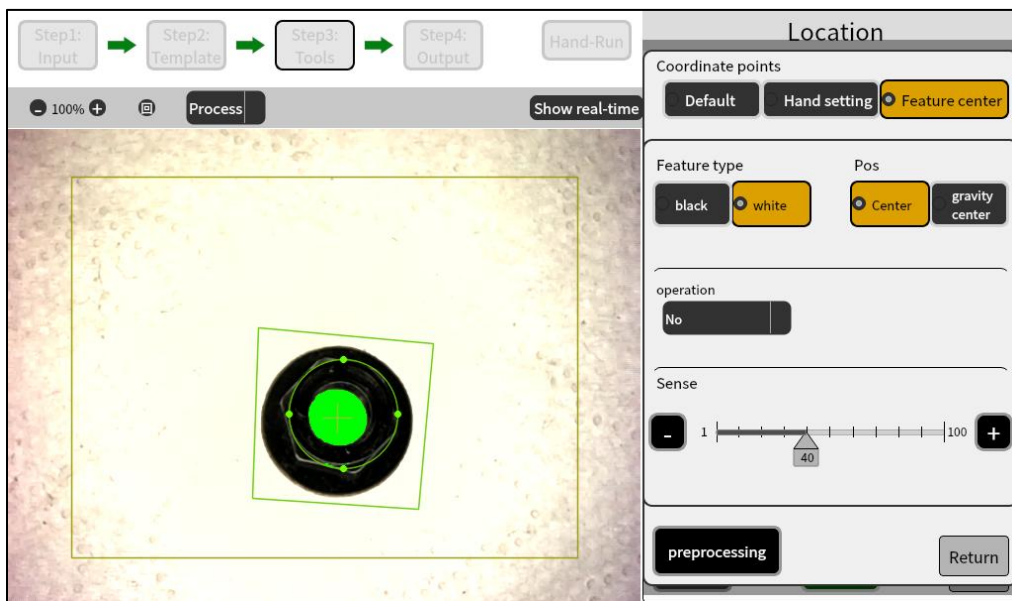
☒ X ☒ Y

point position

operation

Test Return

Output Position: Configure the location of output coordinate points.



Coordinate Points:

Default: The Output Position defaults to the center point of the feature region.

Hand Setting: Manually specify a point within the feature region as the Output Position.

Feature Center: Take the center point of a specified blob feature on the product as the Output Position.

Feature Type: Select the blob type to be extracted (dark blob / bright blob).

Pos: Select the location for positioning point (Center / Centroid).

Operation: Perform erosion and dilation on the blob's binary image.

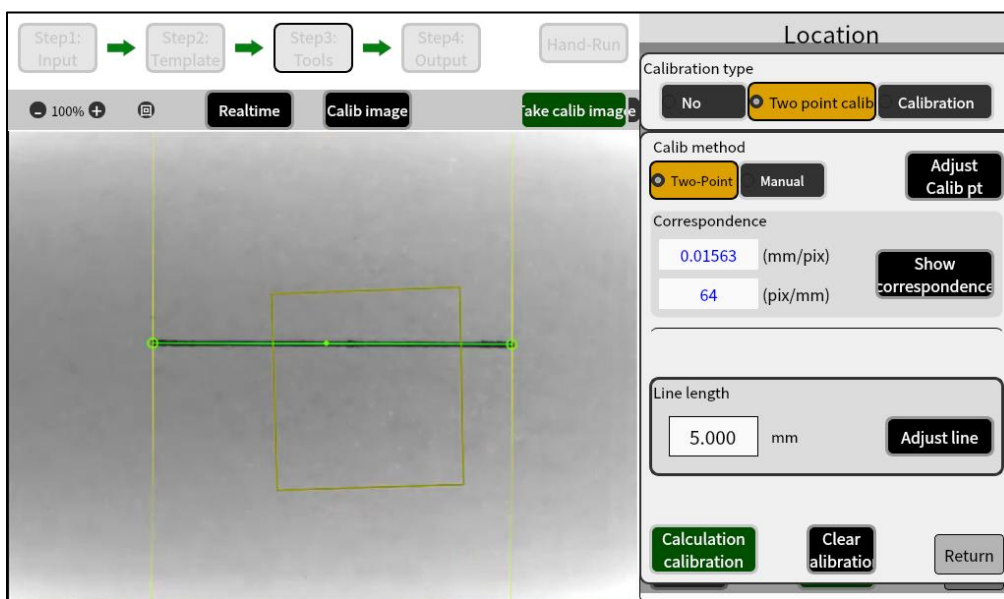
Sense: Adjust the threshold for distinguishing dark and bright features to filter required blob targets.

Calib: Calibrate the coordinate relationship between automated equipment and smart camera.

Calibration Type:

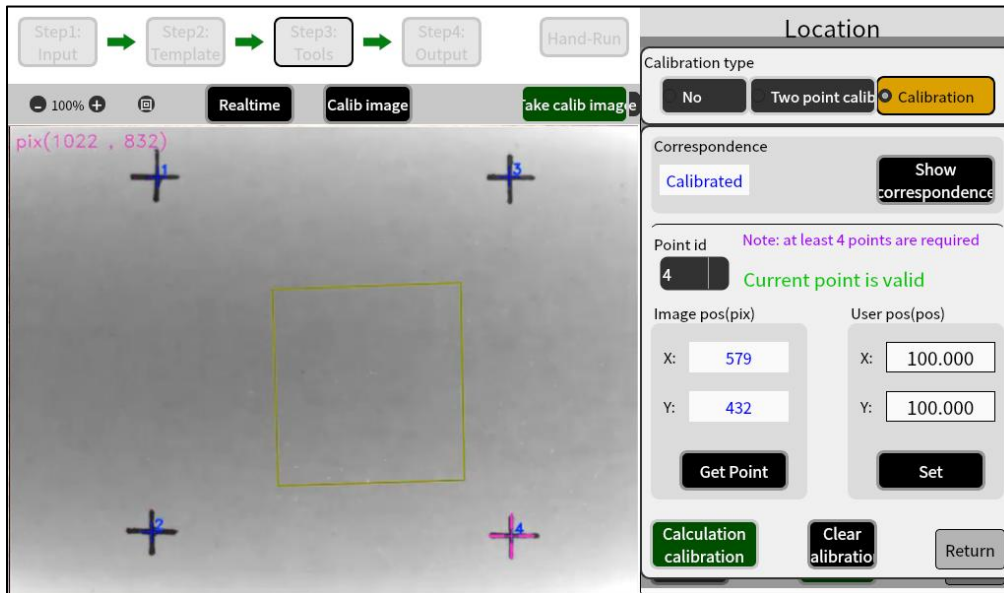
None: Skip calibration and directly output pixel coordinates and angles as the Output Position.

Two-Point Calibration: Output relative coordinate values for Output Position.



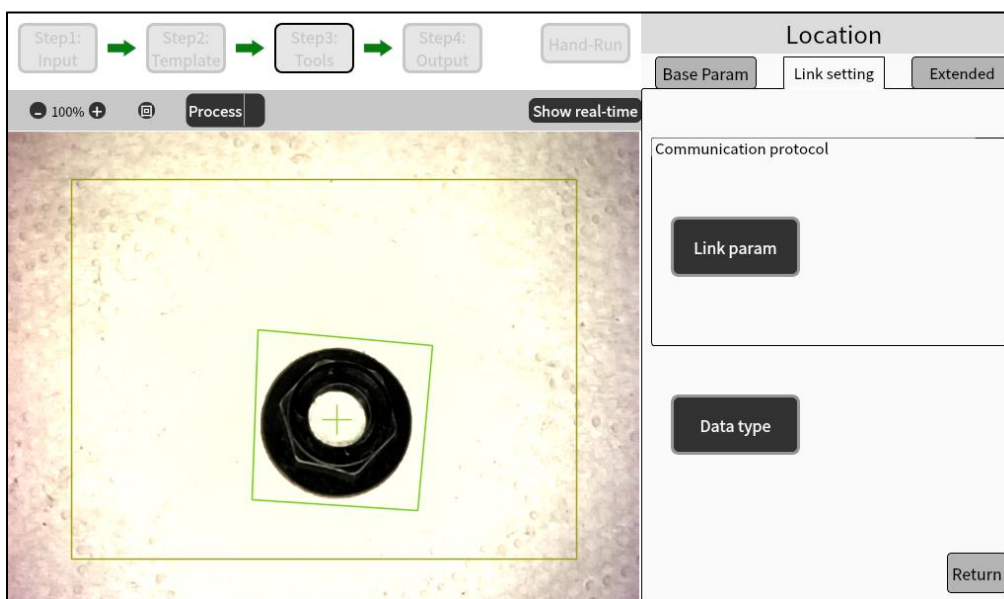
Click on the live image, place an object matching the product height with known physical dimensions within the field of view. Select Two-Point Calibration, then adjust the line segment so its two endpoints align with the two ends of the known-length reference. Enter the actual physical length of the segment in the corresponding input field and click Calculate Calibration. Afterwards, adjust the calibration origin to align the origin positions of the automation equipment and smart camera for Output Position mapping.

Calibration:



Select calibration point ID 1, pick a coordinate on the image and click Capture Point to obtain its pixel coordinate. Fill in the actual X and Y mechanical coordinates of the automation equipment in the user coordinate field, then click Apply to save settings. Repeat the same steps to calibrate point 2, 3 and 4. A minimum of four calibration points are required for Coordinate System Calibration. Finally click Calculate Calibration to finish the calibration for Output Position conversion.

Link Settings:



Link Param:

Modbus-RTU: Adopt standard RS-232 serial port for communication with Modbus-RTU protocol. The smart camera acts as Modbus master to read and write data with PLC.

Result Status Addr: Set the PLC register address for receiving OK/NG detection status and fill in parameters.

Count Addr: Specify the PLC register address storing the quantity of coordinate data and fill in relevant parameters.

Data Addr: Specify the PLC register address used to receive coordinate data and complete parameter configuration.

Other Communication Settings: (Refer to Chapter 6 for detailed configuration)

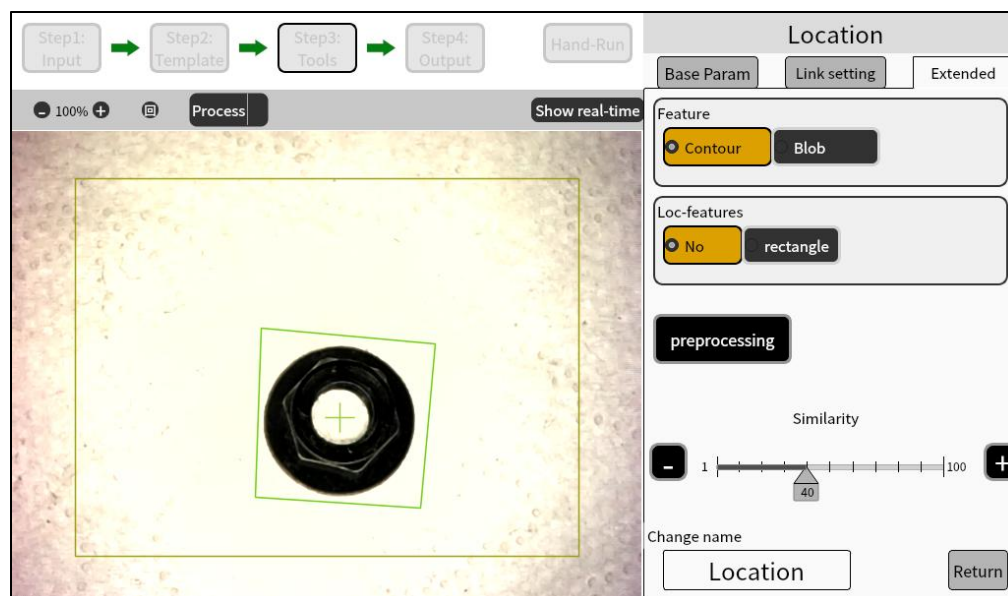
Data Format:

Angle Range of set: Used to offset and revise the final transmitted angle value for Output Position.

Rotate Direction: When right-handed coordinate system is selected, angle value increases counterclockwise; when left-handed coordinate system is selected, angle value increases clockwise.

Data Format: If Integer is selected, all transmitted values are multiplied by 1000; the PLC shall divide received data by 1000 to get the actual physical value. If Float is selected, raw original values are transmitted directly.

Extended :



Feature: Select feature type for target positioning.

Contour: Locate the position and rotation angle of workpiece via feature contour matching.

Blob : Perform positioning by calculating the center point of target connected regions.

Loc- Features: Custom precision positioning algorithm for square workpieces (available only when Contour is selected as positioning feature).

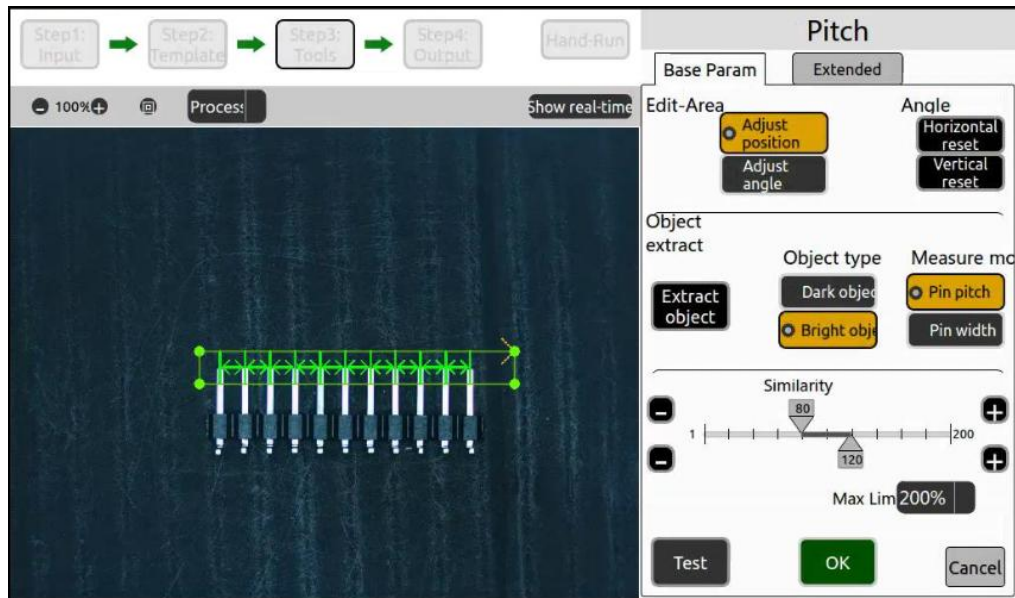
Preprocessing: Adjust parameters such as contrast and brightness for target positioning. This preprocessing function only takes effect on target positioning.

Similarity: Adjust the similarity threshold for target positioning. A detection result exceeding the set threshold will be judged as OK.

Rename: Modify the name of the current target positioning tool.

13) Pitch

Base Param:



Edit-Area:

Position Adjustment: Modify the valid detection range of pitch.

Angle Adjustment: Adjust the angle of the pitch detection area.

Angle Reset:

Horizontal Reset: Restore the detection area angle to horizontal orientation.

Vertical Reset: Restore the detection area angle to vertical orientation.

Target Extraction:

Target Extraction: Adjust algorithm parameters related to target extraction.

Target Type: Configure whether pin features are dark targets or bright targets.

Measurement Mode: Select detection mode for pin pitch or pin width.

Similarity: Adjust the similarity range for pitch detection; result is judged OK only when within the configured threshold range.

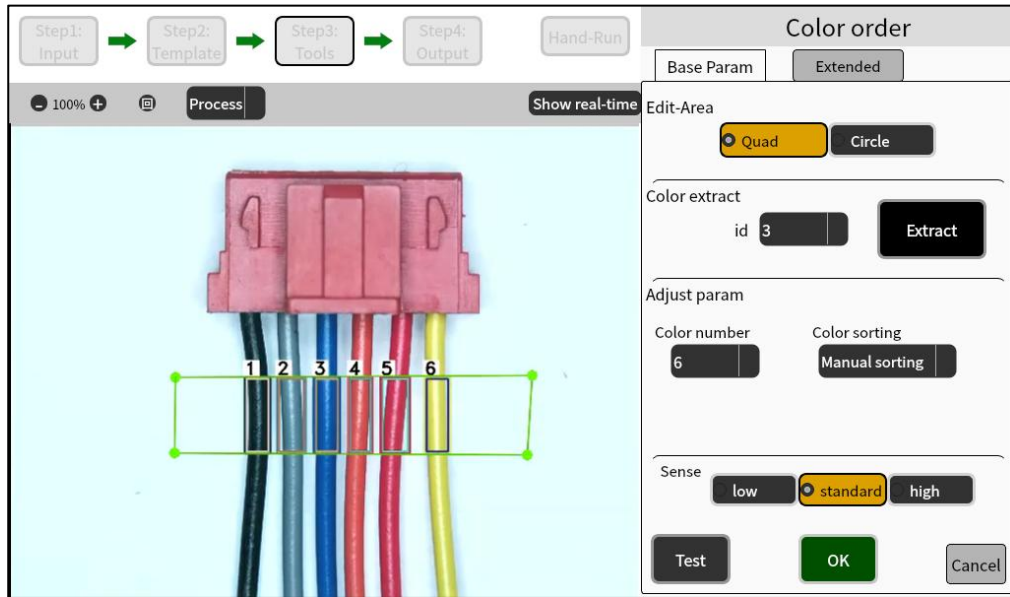
Upper Limit: Set the maximum threshold of similarity (configurable up to 999%).

Extended :

Image Preprocessing: Adjust parameters including contrast and brightness for the Pitch tool. This preprocessing is only applied to pitch measurement.

Rename: Edit the name of the current Pitch tool.

14) Color order



Base Param:

Edit-Area: Edit the valid detection area for wire sequence inspection; available area shapes include quadrilateral and circle.

Color Extraction: Select the extraction ID and click Extract to open the color extraction menu.

Operation: Move the cross cursor on the image to the target sampling position, then click Confirm Extract to complete color extraction.

Extraction Source: Sampling defaults to reference image; real-time image is available as an alternative.

Wire Sequence ID: Select to switch the extracted wire sequence ID.

Color Sensitivity: Adjust the color value capture range during inspection; lower sensitivity corresponds to a broader captured color range.

Neutral Color Option: Check if the sampled color belongs to black, white or gray; select the corresponding option if applicable to optimize extraction performance.

Tune Extraction Range: Manually adjust the threshold range of HSV.

Restore: Undo the previous color extraction operation.

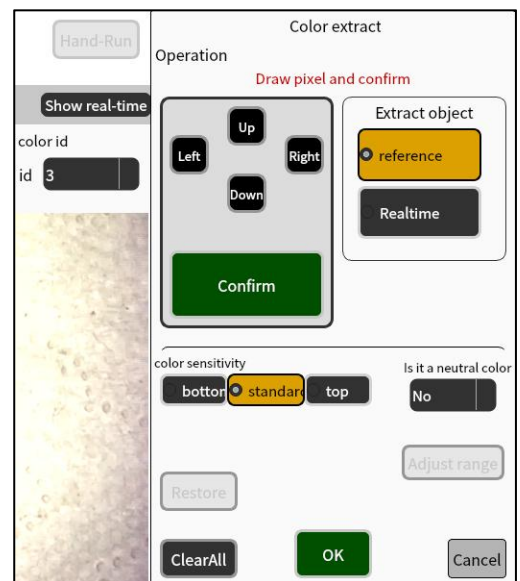
Clear All: Erase all saved HSV threshold values.

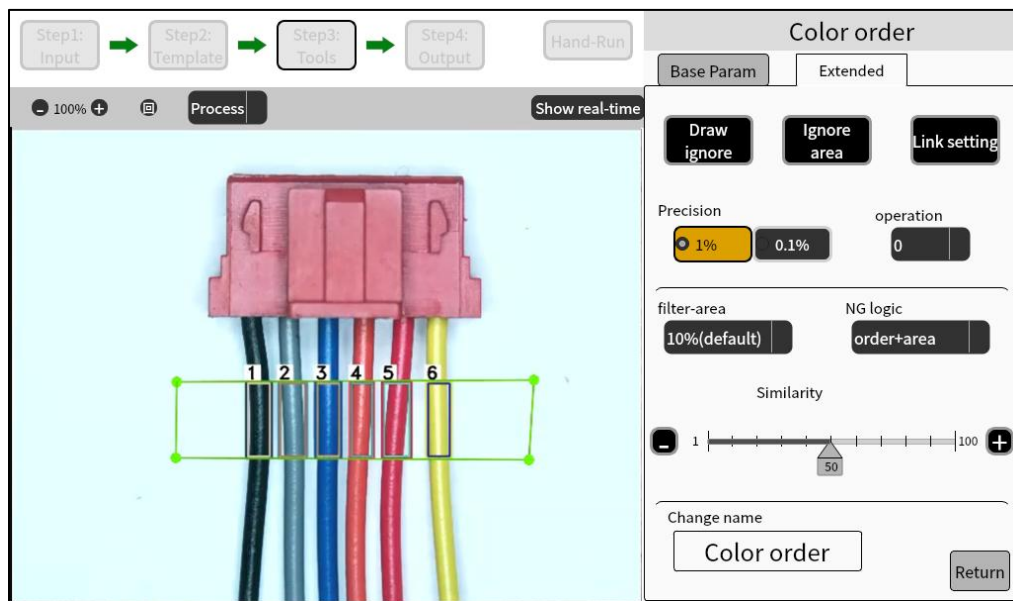
Parameter Adjustment: Modify threshold parameters for the tool's color area.

Color Count: Define the core quantity of the cable.

Color Sorting: Manual sorting follows the ID sequence of manually sampled colors; automatic sorting arranges colors from left to right by default.

Sensitivity: Adjust the color threshold capture range for inspection; lower sensitivity yields a wider captured color threshold range.



Extended :

Ignore Area: Configure partial regions to disable color value extraction, either by freehand drawing or frame selection.

Communication Settings: (Refer to Chapter 6 for detailed configuration.)

Similarity Precision: Minimum unit of measurement for similarity value.

Blob Operation: Higher level removes more tiny particles and noise surrounding target regions, accompanied by greater inward shrinkage of target boundaries.

Area Filter: Set the area percentage threshold for each wire sequence inspection; specimens failing to meet this area percentage shall be judged NG. (Default: 10%)

Color Strting:

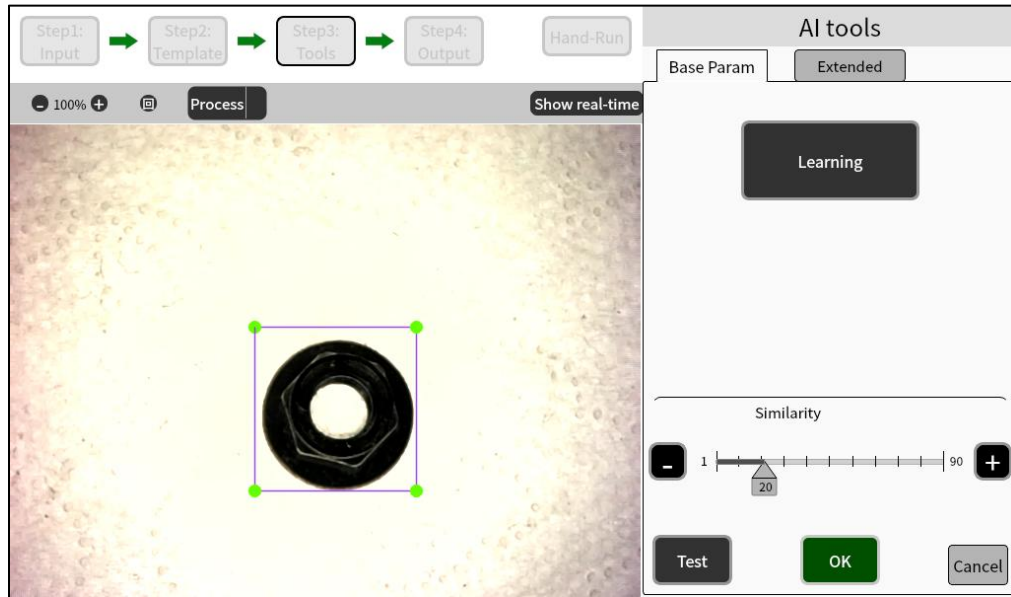
Manual Sorting: Pass criteria only verifies sufficient area of each wire core without checking wire sequence order.

Auto sorting: Verify both adequate area of each wire core and correctness of wire arrangement order.

Similarity: Adjust the area similarity threshold for each wire sequence; result is OK only when the measured value exceeds the set threshold.

Rename: Modify the name of the current wire sequence inspection tool.

15) AI Tool



Base Param:

Sample Learning: Enter the submenu, manually label samples of each category on the live image. Upload labeled data to the cloud for automatic model training, then download the trained model to the local model library.

Adjust Region: (AI Model: Single-Target Positioning & Recognition Selected)

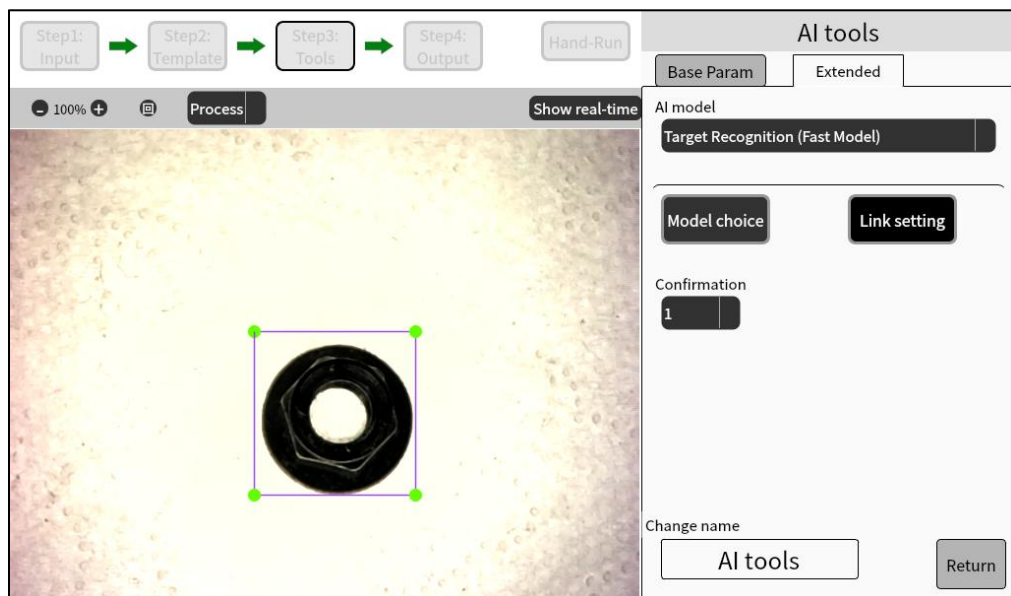
Target Area: Edit the valid detection region of the learning tool.

Search Area: Edit the effective search region of the learning tool.

Target Count Threshold: Set the acceptable quantity range of identified targets; judgment passes only when the detected count falls within the specified range. (Applicable when multi-object detection AI model and target counting inspection task are selected.)

Similarity: Adjust the similarity threshold of the learning tool; the result is OK only if the detected value exceeds the set value.

Extended :



AI Model: Confirm the AI model type prior to sample training.

Single-Target Positioning & Recognition: Locate targets within the search area prior to target identification and inspection.

Target Recognition (Fast Model): Perform identification inside the target area; acceptable only with limited target position deviation and features high processing speed.

Target Recognition (Standard Model): Conduct recognition within the target area with limited allowable target position deviation, delivering high detection accuracy.

Multi-Target Detection Model: Model designed for scenarios containing multiple targets within the detection area.

Object Presence: Detect the presence or absence of products within the inspection area.

Object Counting: Count the number of targets inside the inspection area.

Defect Detection: Detect defects on products within the inspection area.

Model Choice: Select locally pre-trained AI models for inspection execution.

Link Settings: Refer to Chapter 6 for detailed configuration.

Confirmation: The system makes internal judgments for a fixed number of times before outputting results during inspection. (Available when target recognition AI model is selected.)

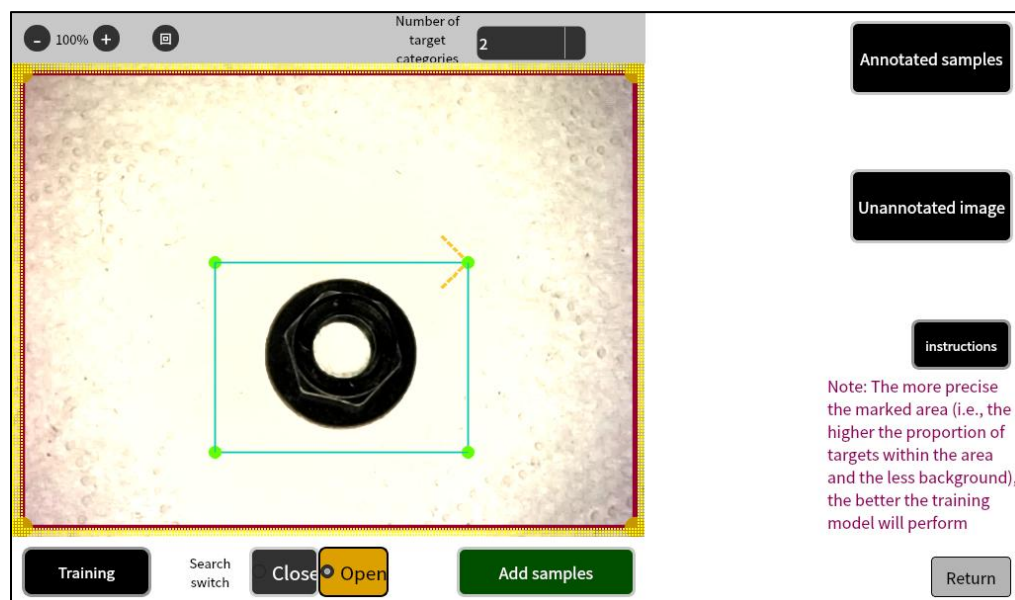
OK/NG Judgment Logic: Displayed only when the selected number of target categories is greater than 2; OK or NG result can be configured individually for each category.

Multi-category Signal Output: Available for display when the selected number of target categories exceeds 2; a corresponding output signal can be assigned to each category.

Rename: Modify the name of the current learning tool.

➤ Sample Learning Operation Procedure:

- ◆ Applicable AI Models (Single-Target Positioning & Recognition, Fast Target Recognition Model, Standard Target Recognition Model)



Before using this model, prepare sample images in advance.

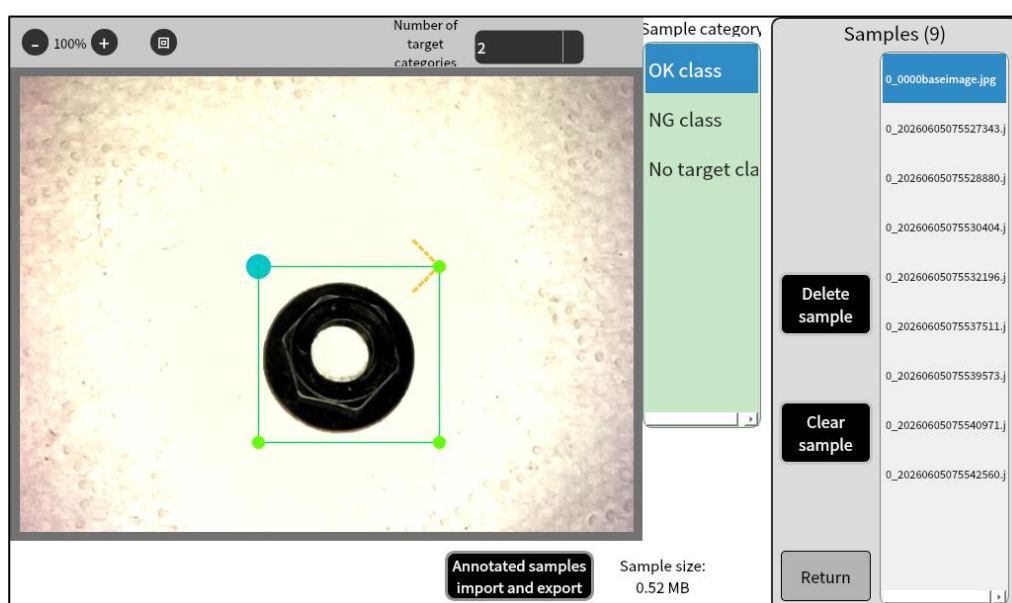
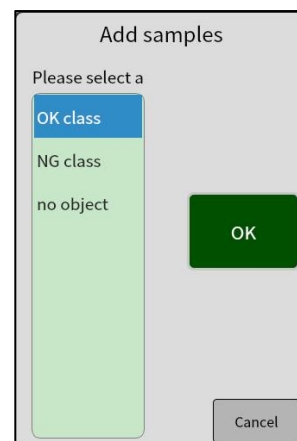
If multiple product categories exist, prepare several samples for each category. For cases only distinguishing front and reverse sides with obvious appearance differences, a small quantity of annotated images per class is sufficient. Generally, more annotated samples contribute to superior detection performance.

Operation Steps

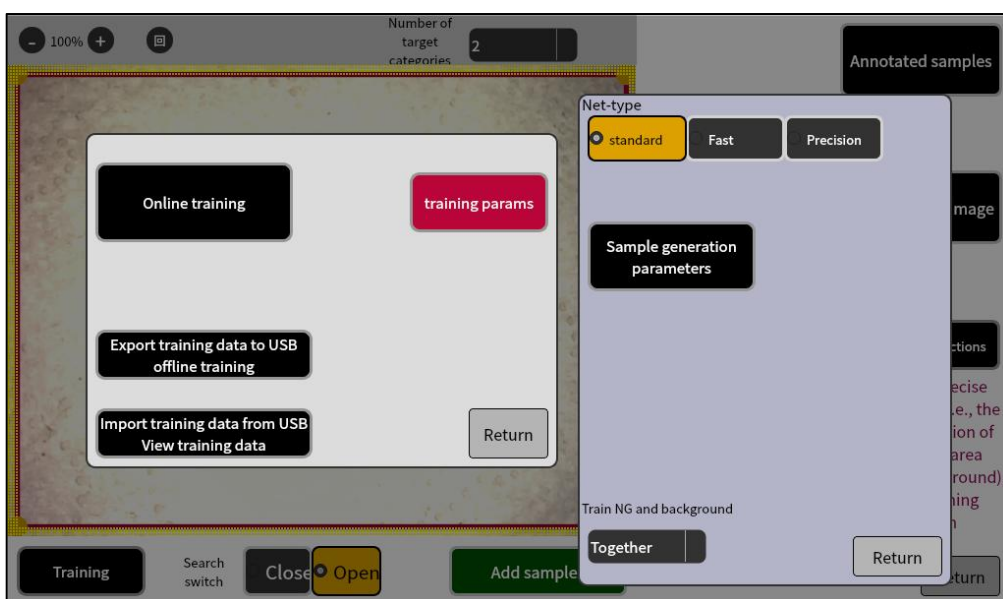
First enter the sample learning interface and define detection categories by setting the corresponding parameter for target category count (default: 2 categories). Place the sample, frame the product region, click Add Annotated Sample to open the corresponding menu, select the matching category (refer to the right figure), and confirm. After successful annotation, replace with a new sample and repeat the above steps to finish annotating all samples.

Search Area Switch: Displayed under Single-Target Positioning & Recognition mode; used to mask redundant background.

Click annotated samples to preview existing labeled images and check for mislabeled ones. Erase incorrect samples manually by tapping Delete Current Sample when needed.

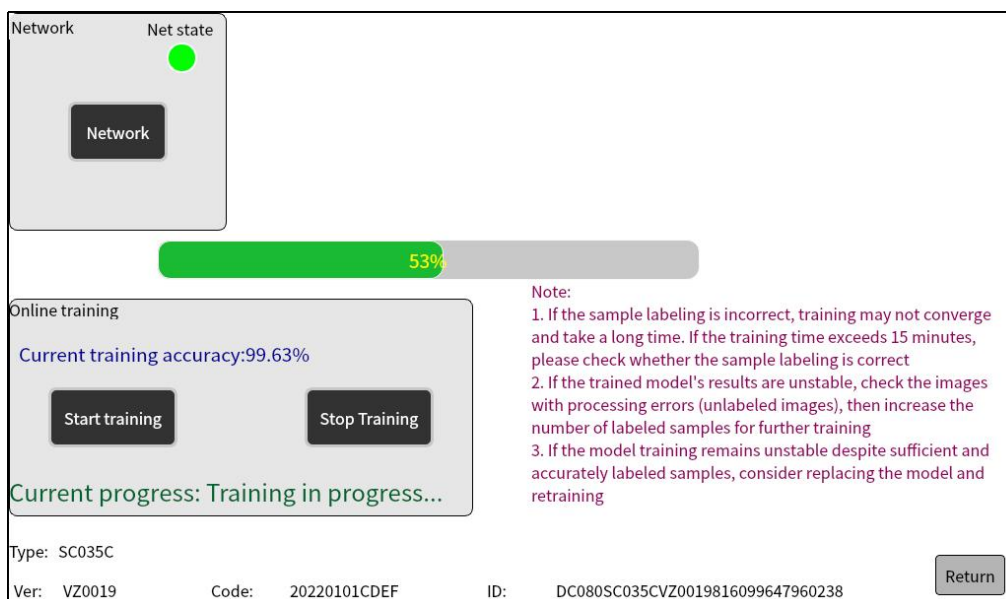


Unannotated Images: These are result images captured during runtime recognition. Misrecognized images can be supplemented as new samples on this interface for retraining.



After all samples are annotated, click Model Training. Training parameters can be adjusted appropriately according to inspection requirements; default settings are normally acceptable.

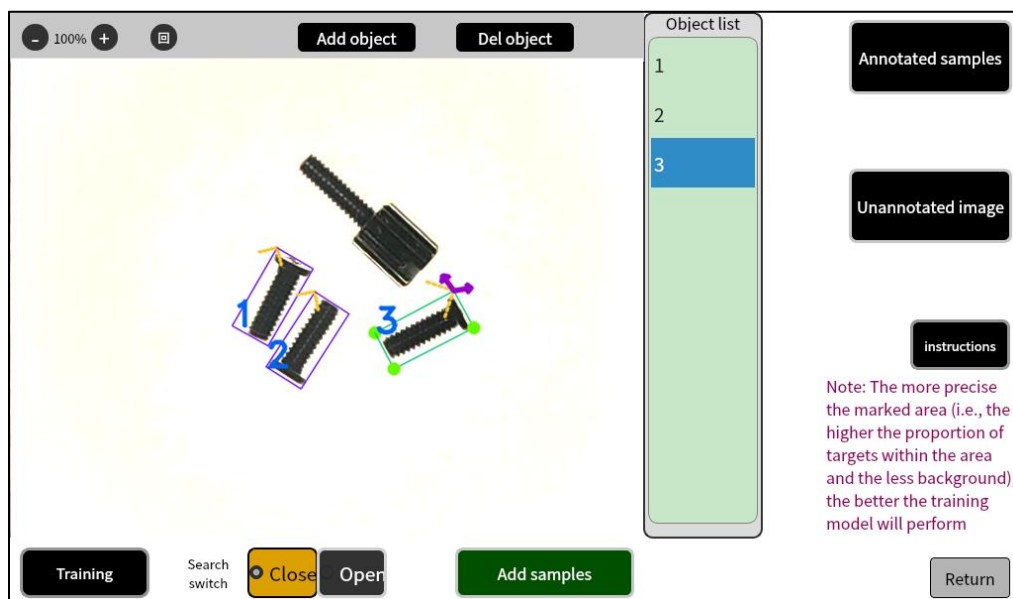
Click Online Training to enter the interface, then upload annotated samples to the cloud for model training.



Online Training Operation:

For online training, establish external network connection first. Tap Network Access to open the subpage, select an available Wi-Fi from the list, input the password and connect. A green indicator at the upper right corner signals successful network linkage. If no on-site Wi-Fi is available, enable mobile hotspot and connect to it instead. After network setup, click Start Training. Training duration ranges from 2 to 10 minutes, varying with training parameters and total annotated sample quantity.

◆ Applicable AI Model (Multi-Object Detection Model)



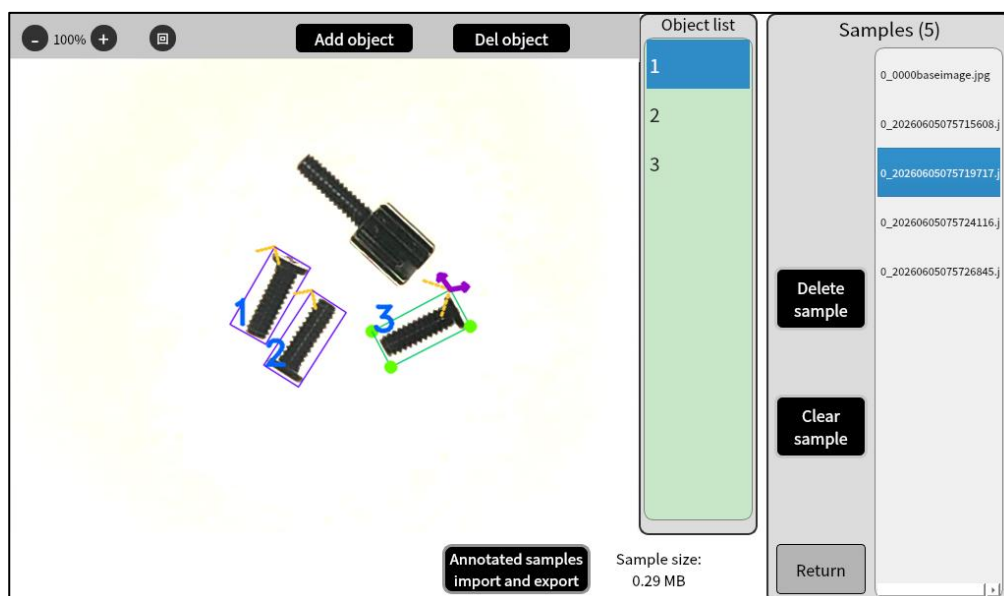
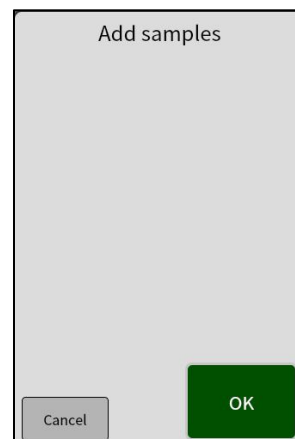
Before using this model, prepare sample images in advance.

Before using this model, prepare samples in advance. If multiple types of targets need to be identified, prepare several samples for each product. For defect detection applications, sufficient samples of both non-defective and defective products shall be prepared. Generally, more annotated samples lead to improved inspection performance.

First enter the sample learning interface and click Add Target. Draw bounding boxes for all target products in the field of view; add a corresponding target for every visible product with no omissions. For defect detection, enclose all defective regions with bounding boxes, then click Add Annotated Sample (refer to the right figure) and confirm.

After finishing labeling one sample, replace it with a new specimen. When inspecting defects, qualified products can be loaded directly without adding targets, simply click Add Annotated Sample. Repeat this workflow to complete labeling of all samples.

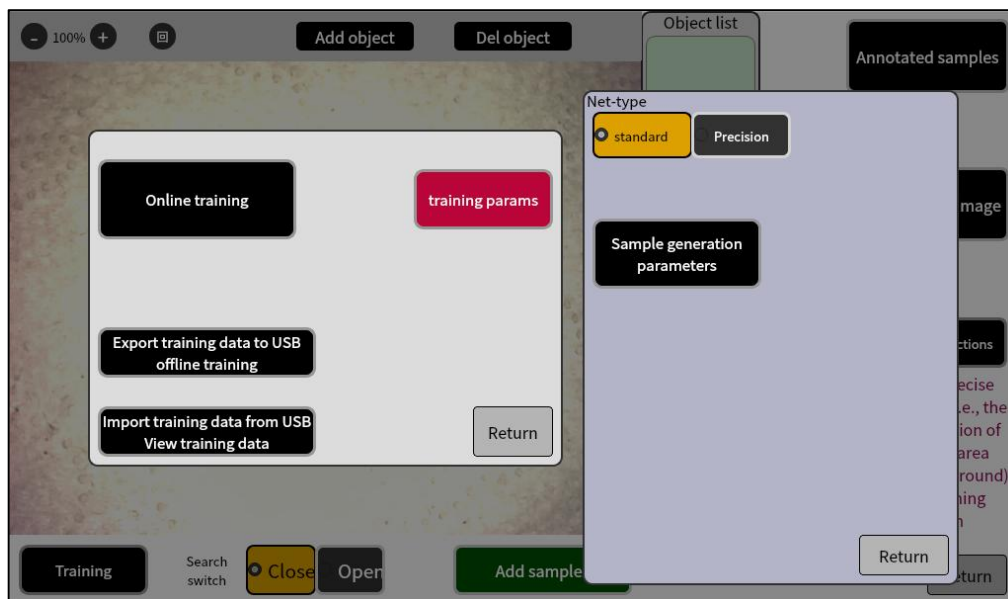
Search Area Switch: used to mask redundant background.



Click Annotated Samples to view labeled images and check for labeling errors. For missing targets, click Add Target; for incorrect targets, select and delete them accordingly.

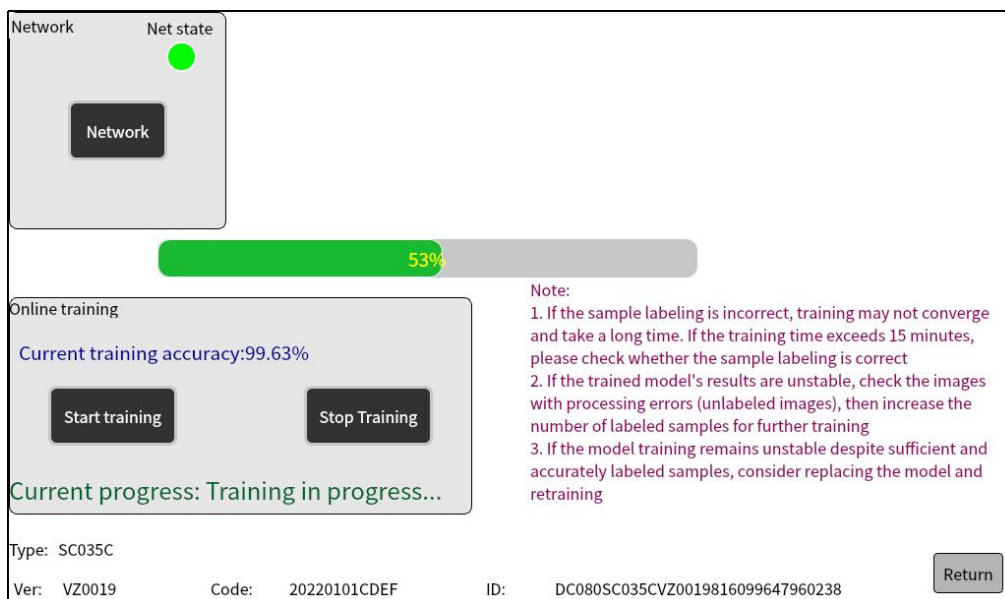
Annotated samples support import and export via USB flash drive: labeled samples can be exported to the USB drive or imported from the drive into the device.

Unannotated images are recognition result pictures generated during operation. Misrecognized images can be added as new samples on this page for retraining.



After all samples are annotated, click Model Training. Training parameters can be adjusted properly according to inspection requirements; default values work for most scenarios.

Click Online Training to open the interface and upload annotated samples to the cloud for training.

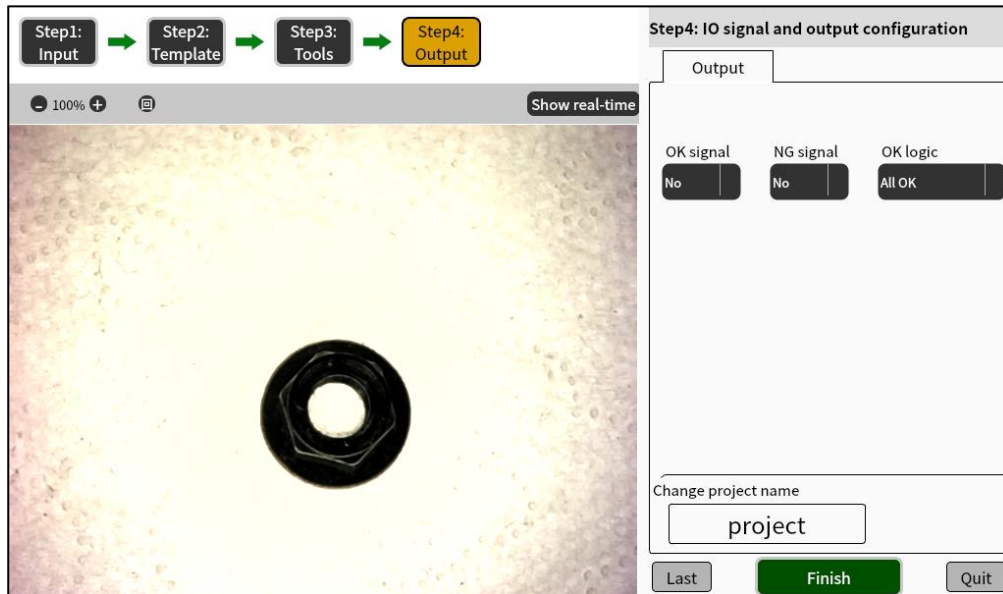


Online Training Operation:

For online training, establish external network connection first. Tap Network Access to open the subpage, select an available Wi-Fi from the list, input the password and connect. A green indicator at the upper right corner signals successful network linkage. If no on-site Wi-Fi is available, enable mobile hotspot and connect to it instead. After network setup, click Start Training. Training duration ranges from 2 to 10 minutes, varying with training parameters and total annotated sample quantity.

➤ **Step 4 – Output Configuration: Set up IO signals and output parameters.**

- ◆ **Single Reference Output Configuration:** Configure IO output definitions (OK and NG) for the current reference.



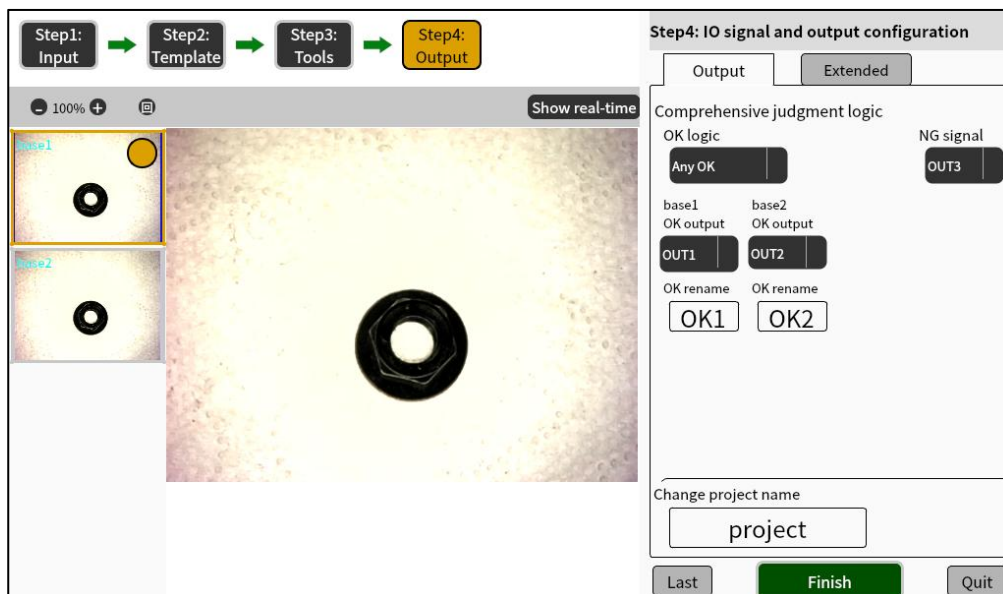
OK Output: Configure IO port output upon qualified (OK) judgment.

NG Output: Configure IO port output when the detection result is NG.

OK Logic: Define conditions for final OK result of current reference with multiple tools (All tools OK / Any single tool OK).

Rename Solution: Modify the name of the current solution.

- ◆ **Multi-reference Output Configuration:** Configure IO output definitions (OK, NG) for each reference.



Overall Reference Judgment Logic

OK Judgment Logic: Set the logic condition for final OK result under multi-reference mode (Any Reference OK / All References OK).

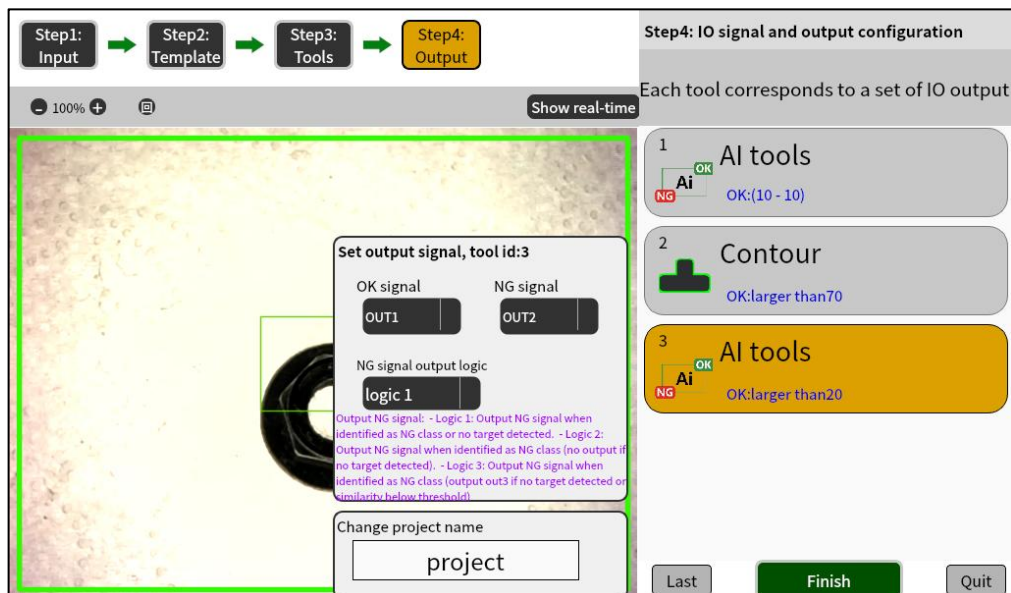
NG Output: Configure IO port output for NG after comprehensive judgment.

Extended:

OK Judgment Logic: Define the final OK condition for each reference when multiple tools are used (All Tools OK / Any Tool OK).

◆ **Tool Output Signal Logic Configuration:** (System access setting, signal logic setup, signal output unit configuration)

Configure IO output definitions for each tool.



Set output signal, Tool ID:

Select the corresponding tool on the right and configure OK and NG outputs for each tool group.

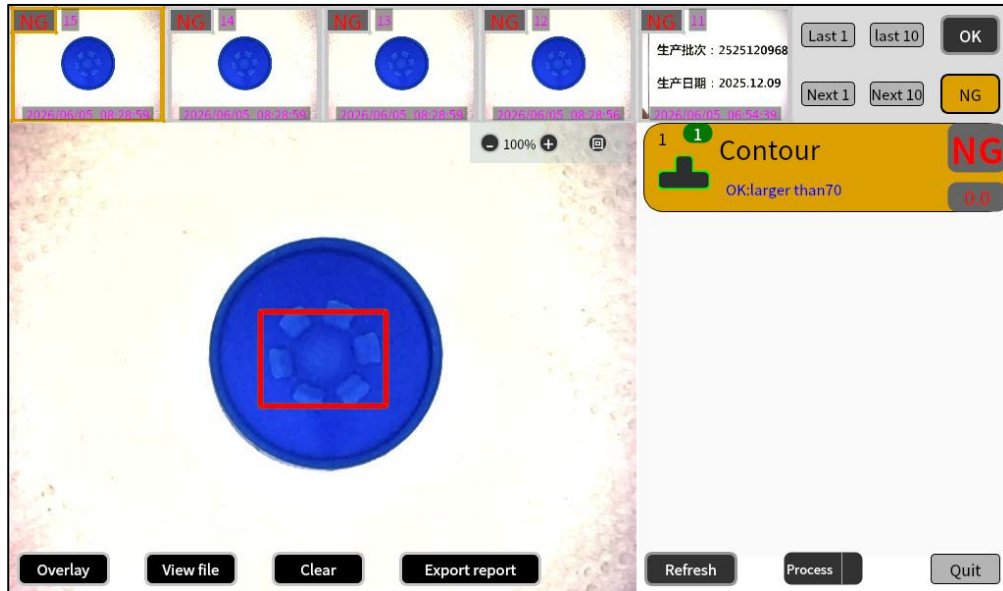
NG Signal Output Logic: Select the output logic of NG signals as required (applies to learn tools).

Chapter 4 Commonly Used Function Menu Features

4.1 Run View

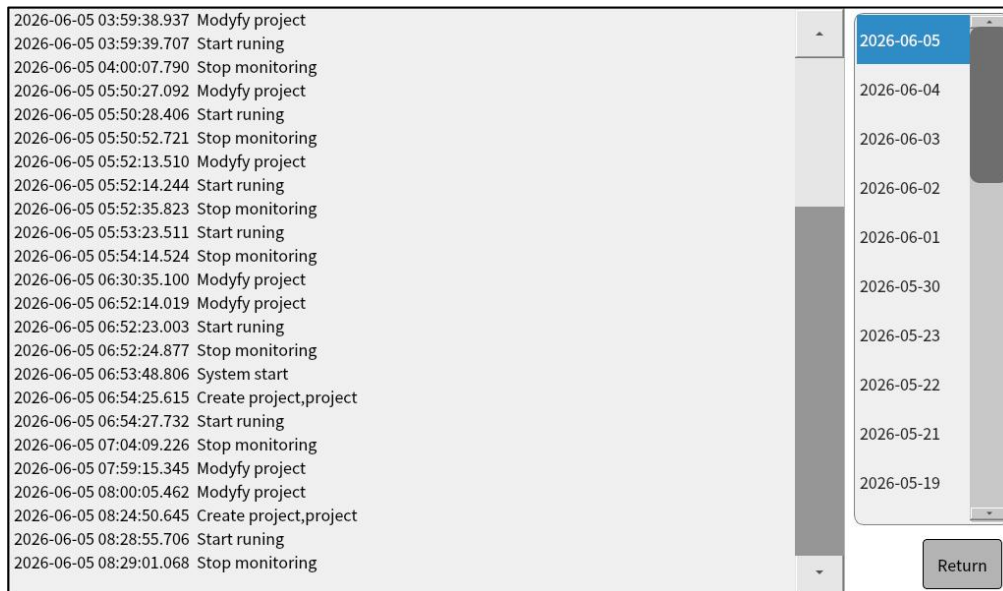
1) Report

Inspection results can be saved as images, and detailed information is available for each image in the report.



2) Log

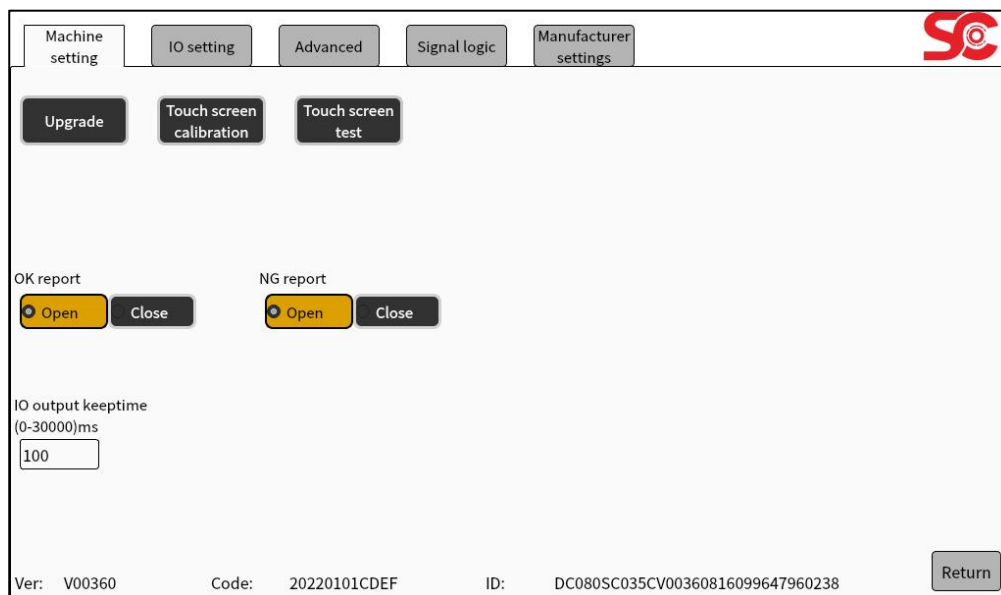
Supports traceability of software operation records (see figure below).



- 3) **Clear:** Clear current accumulated OK/NG count values.
- 4) **Overlay:** All regions are displayed by default; users may select to display only OK or NG regions.

4.2 System Settings

1) Machine Setting



Upgrade: Firmware version can be updated remotely or via USB flash drive.

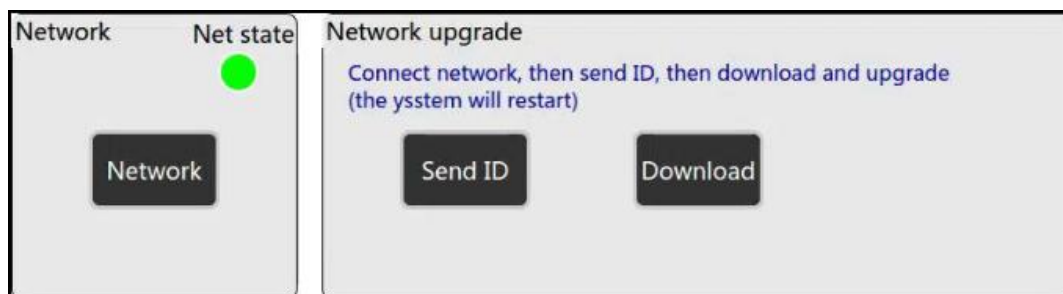
Touchscreen Calibration: Recalibrate the screen if touch positioning is inaccurate.

Touchscreen Test: Manually verify whether there is offset in touch position.

OK Report: Enable/disable saving of OK images.

NG Report: Enable or disable NG image saving.

IO Output Keep time (0~30000 ms): Duration for retaining OK/NG output signals after inspection completion.

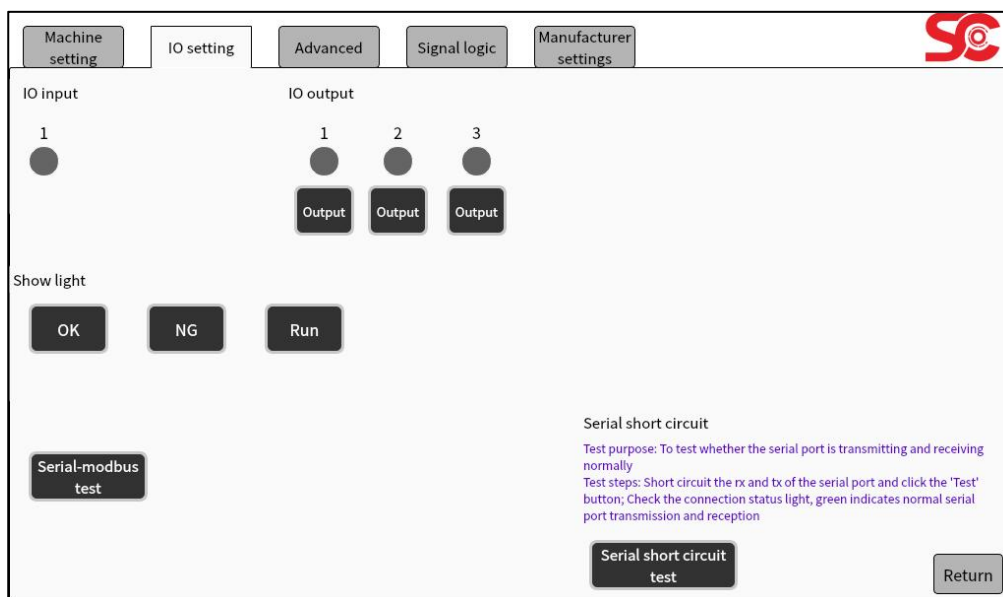


◆ Upgrade Operation Procedure:

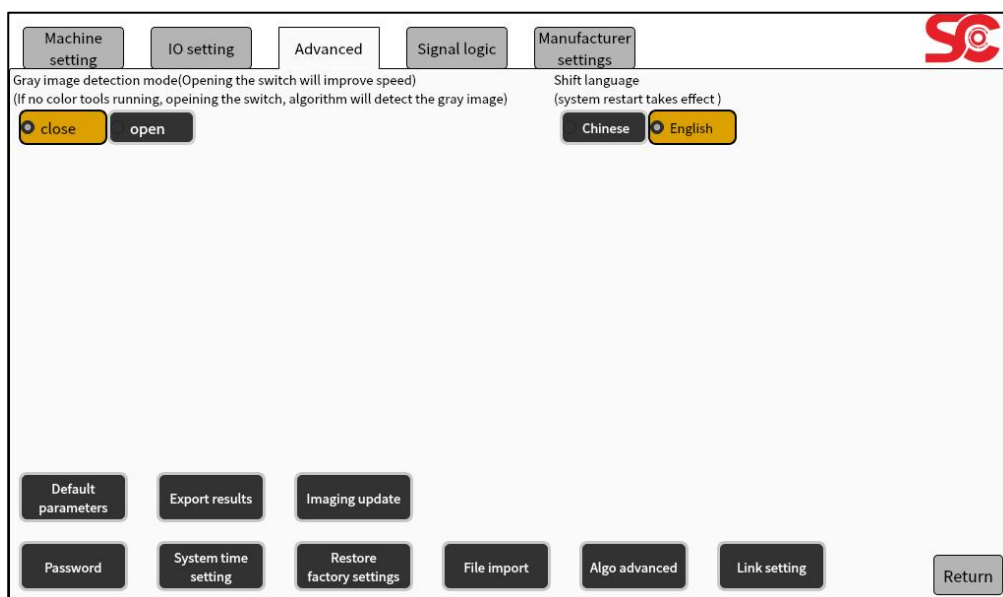
First, establish external network connection. Tap Connect to access the subpage, select an available network from the Wi-Fi list, input the password and tap Connect. A green indicator will light up beside Network Status at the upper right upon successful connection. (Due to field environment constraints, mobile hotspot is commonly used for network access.)

Return to the upgrade page afterward and tap Send ID. Contact the manufacturer's technical staff to upload the corresponding firmware version. After confirming upload completion, tap Download, then select Upgrade on the menu and confirm to finish the upgrade.

2) IO Setting



3) Advanced



Monochrome Inspection Mode (enabling improves inspection speed): All tools except color-related ones perform detection based on grayscale images.

Language Switch: Toggle between Chinese and English interface.

Default Parameters: Modify default settings for newly created projects.

Statistics Export: Statistical data can be exported via USB flash drive.

Password: Set access password for system parameter configuration.

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

Factory Reset: Erase all parameters and configurations to restore factory default settings.

File Import: Update files can be imported via USB flash drive.

Algo Advanced: Advanced configurations for position correction.

Link Setting: (Refer to Chapter 6 for detailed configuration.)

4) Signal Logic

Repeat Output Interval Setting: When the inspection results of two consecutive captures are identical, configure whether the previous output signal remains continuously active without cutoff.

Cancel Other Outputs Upon Trigger Input: Option: Cancel / Do Not Cancel

IO Output Delay Setting: Enable Delay / No Delay

Multiple frame Trigger Switch:

Internal Capture Triggered by External Signal: Enable internal image capture via external input signal. (After enabling, configure extended parameters and trigger frame count in Step 1)

IN1 Continuous Trigger Frames: Set internal trigger count after activation.

Trigger Stop Condition: Configure stop criteria for internal triggering inspection.

Unlimited Continuous Frame Trigger Mode: Select parallel trigger or serial trigger.

NG Signal Output on Position Correction Alarm: In Scheme Step 2, configure whether an NG signal is output directly upon failed position correction when position correction function is enabled.

Signal Output Unit:

Base: Take reference as output unit; one set of output signals corresponds to each reference.

Tool: Use tool as output unit, with one set of output signals for each tool.

Encoder I/O Board Switch: Enable/disable the encoder I/O board.

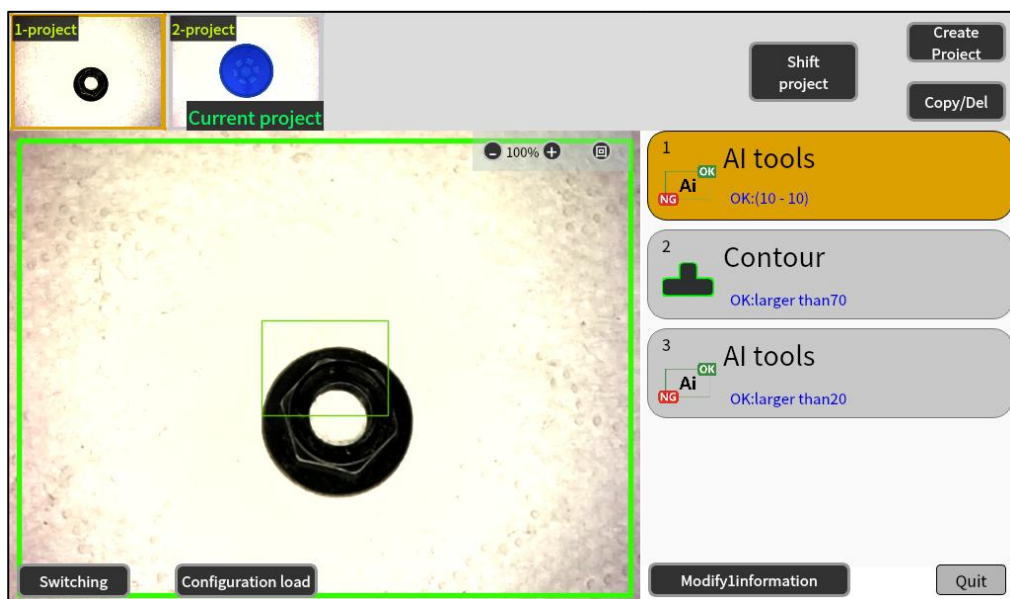
DC080 Standard I/O Board Switch: Enable or disable the standard I/O board.

Output Signal During Operation: Set whether OUT3 signal is enabled during runtime monitoring.

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

IO Falling Edge Filter Time (10~2000ms): The interval from the falling edge of OUT output signal to the next IN input signal shall exceed the set value; otherwise the incoming trigger is regarded as invalid.

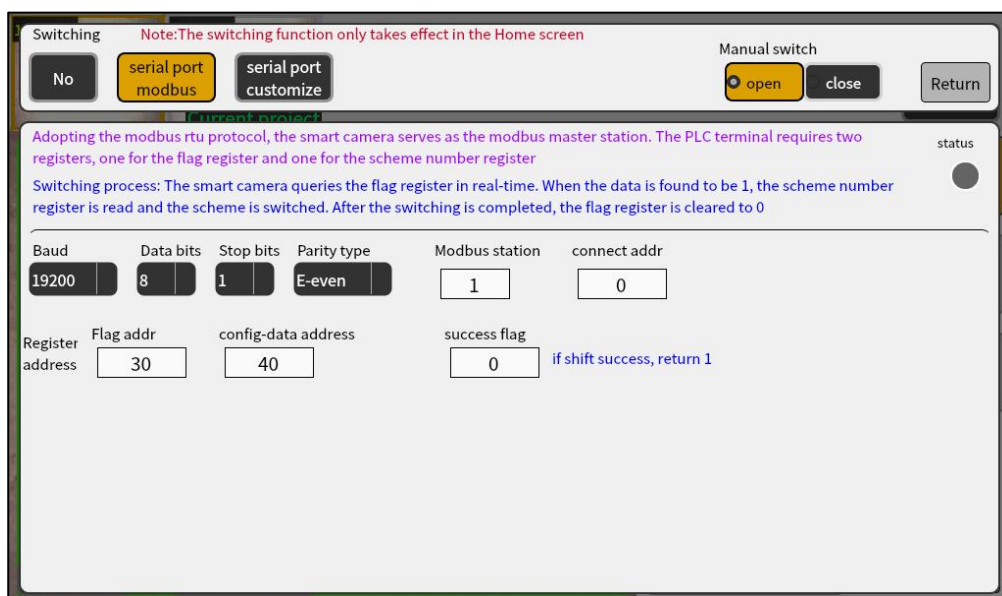
4.3 Manager-Shift



- 1) **Creste Project:** Create a brand-new project from scratch.
- 2) **Copy/Delete:** Copy or delete an existing project.
- 3) **Configuration Import/Export:** Import or export project files via USB flash drive.
- 4) **Shift Project:** Switch to another existing project.

Switch Mode: No, Serial-Modbus, Serial-Custom

- 1) **No:** Switch project manually by default.
- 2) **Serial-Modbus:** Switch projects over RS232 serial port via Modbus-RTU protocol.



Manual Switch: Define whether manual project switching is allowed when using RS232 Modbus-RTU for project switching.

Connect Addr: The camera reads and writes this register in real time to verify communication status between camera and PLC.

3) Serial-Custom: Switch projects via serial port using custom communication protocol.

Switching

Note: The switching function only takes effect in the Home screen

Manual switch

No

serial port modbus

serial port customize

open

close

Return

Current project

Using a custom protocol, with the smart camera as the receiving end and the upper computer as the sending end, send a custom format string to the smart camera

Baud

19200

Data bits

8

Stop bits

1

Parity type

E-even

Format:

Starting

+

project id or project name

+

Termination

start=

end

Switching process: The smart camera searches for serial port data sent by the upper computer in real-time. When the data content meets the conditions (custom format string), it starts switching configurations and returns "OK" to the upper computer. If the received data is "start=1 end" in the default format, switch to configuration 1; if the received data is "start=5end", switch to configuration 5

Read and write testing

Read

Write

Clear

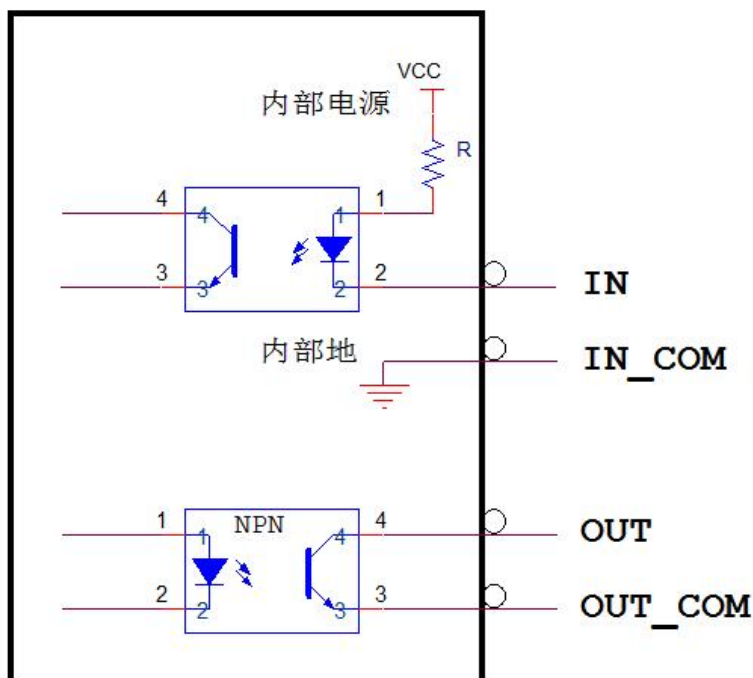
Write

Chapter 5 IO Signal Description

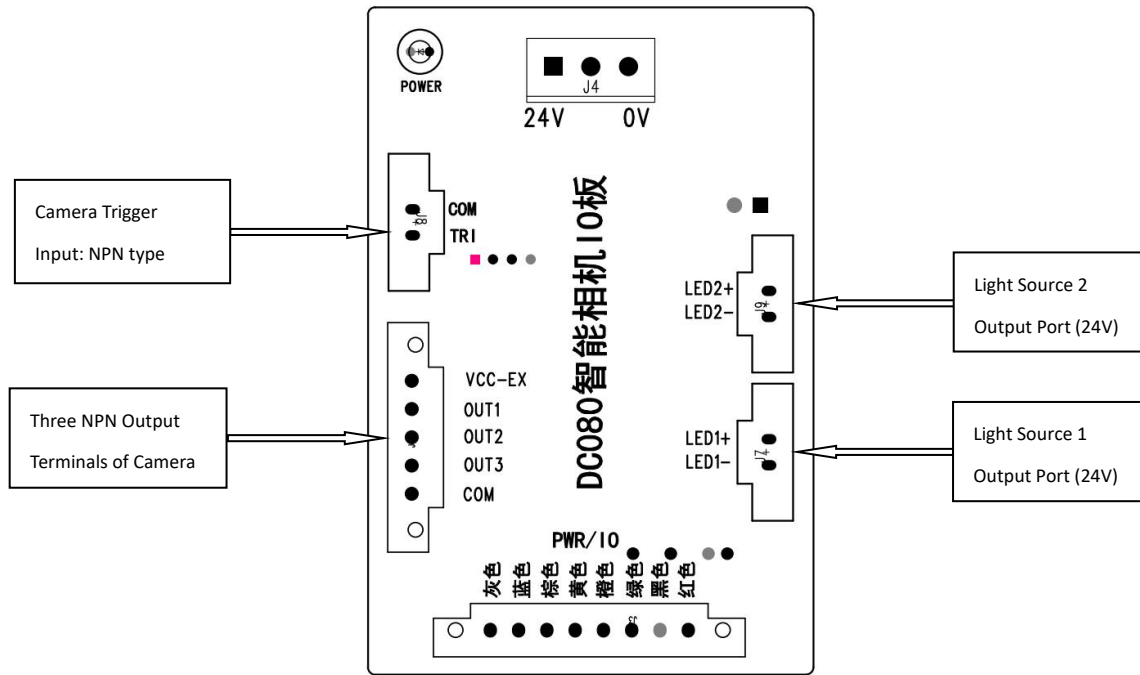
8P Power & I/O Cable Description

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

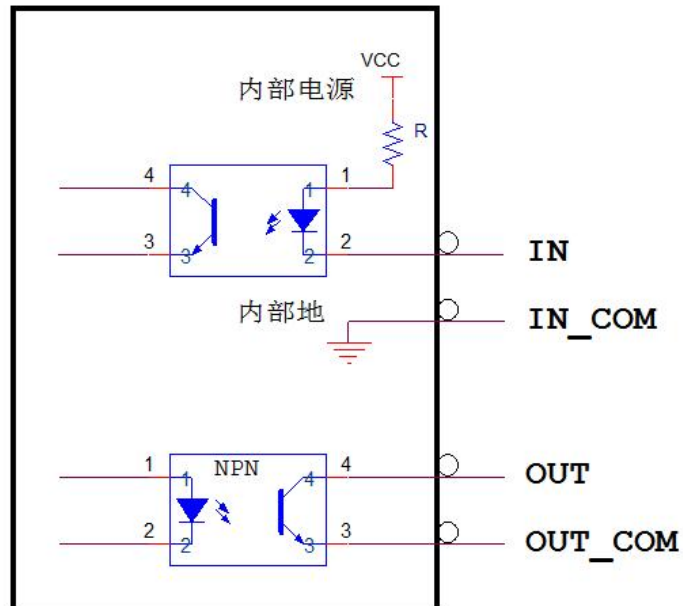
I/O Circuit Schematic:



Standard Power / I/O Board (Optional)



I/O Circuit Schematic:



Chapter 6 Communication Settings

Communication method

☒ No ☐ Serial

OK

Communication method

☐ No ☒ Serial

String transfer(Serial)

☒ Manual ☐ Modbus-RTU

Set

OK

Link Setting:

No: No data communication required; OK/NG signals are output via I/O terminals.

Serial: String data is transmitted via serial port (Custom, Modbus-RTU).

Manual: Adopt custom protocol. The smart camera serves as the transmitter and the host computer as the receiver to send string data to the host.

Using custom protocols, smart cameras send and receive string data

Baud: 19200 Data bits: 8 Stop bits: 1 Parity type: E-even

Trigger switch
trigger format: {trigger:in1}

General interactive commands

Heartbeat packet: The camera receives the string heartbeat and returns the camera
Restart: The camera receives the string reboot and returns OK. The camera restarts
Shutdown: The camera receives the string poweroff and returns OK. The camera shuts down

whether to output the result

NO
singel tool
☒ all tools

Data format:
{ status: ok/ng }

Read and write testing

Read

Write

Clear Write

OK

Using a custom protocol, with the smart camera as the sending end and the upper computer as the receiving end, send a string to the upper computer

Baud	Data bits	Stop bits	Parity type
19200	8	1	E-even

Data format:
{ id: Tool id ,status: ok/ng ,data: Data }

end marker
No

Read and write testing

Read

Write

Clear

Write

OK

Modbus-RTU:

Using the Modbus RTU protocol, the smart camera serves as the modbus master station and writes data to the register address of the receiving end. The receiving end needs to clear the data

Baud	Data bits	Stop bits	Parity type	Modbus station	connect addr	status
19200	8	1	E-even	1	0	☐

whether to output the result

NO
singel tool
☒ all tools

register address
0
Note: ok is 1, ng is 2.
plc need to clear the data

Trigger switch
No
☒ Yes

IN1 address
0
Trigger logic: The camera searches for the trigger value. If the value is 1, it triggers the camera to detect and clears the trigger value to zero
Note: Trigger the IN2 address to shift back one register on the IN1 address, and IN3 and IN4 will shift back sequentially

Read test (manual reading and writing of registers)

Addr
0

Data
0

Read

Write

OK

Using the Modbus RTU protocol, the intelligent camera serves as the modbus master station to write data (ASCII code), count of data, and result

Baud	Data bits	Stop bits	Parity type	Modbus station	connect addr	status
19200	8	1	E-even	1	0	☐

Result status addr
0
Note: The state corresponding to OK/NG can be selected

Count addr
0

Data addr
0

OK status 1 NG status 2

Read test (manually reading and writing the address of the result status register)

Result status
0

Read

Write

OK

Chapter 7 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 8 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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