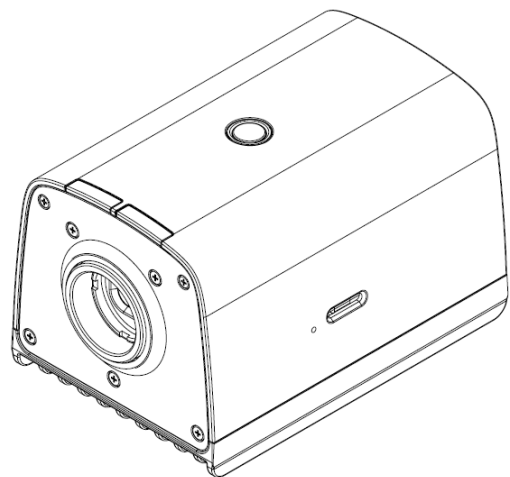


RICOH SC-20

Quick Start Guide



RICOH Industrial Solutions Inc.

How to Read This Manual

About Symbols

The symbols used in this manual have the following meanings.

Important

Indicates an explanation containing points to pay attention to when operating the device, restrictions, or other information. Be sure to read the explanation.

Note

Indicates an explanation containing information that is useful to know, a supplementary operating procedure, or other information.

Reference / (→P. ##)

Indicates reference information.

[]

Indicates a screen item or button name.

Abbreviation

The following abbreviation is used for simplicity in this manual.

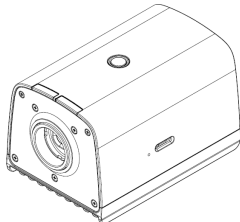
- microSD card: Indicates microSD, microSDHC, and microSDXC memory cards.

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1. Package Contents

- Unit



- Read this first
- Lens mount cap (already attached to the unit)
- Set of connector caps

The following items are included only in "models including an AC adapter".

- AC adapter
- AC cord

- * This product is not provided with any lens. Please purchase one before use.
- * Products other than those specified as "models including an AC adapter" do not include an AC adapter. Please purchase one before use.

Reference

- Attaching a Lens / Installing the Unit ([→P. 14](#))

The following can be downloaded from our website.

[Software]:

https://industry.ricoh.com/en/support/fa_camera_lens/download/soft/

- SC-20 Work Instructions Editor (PC software)

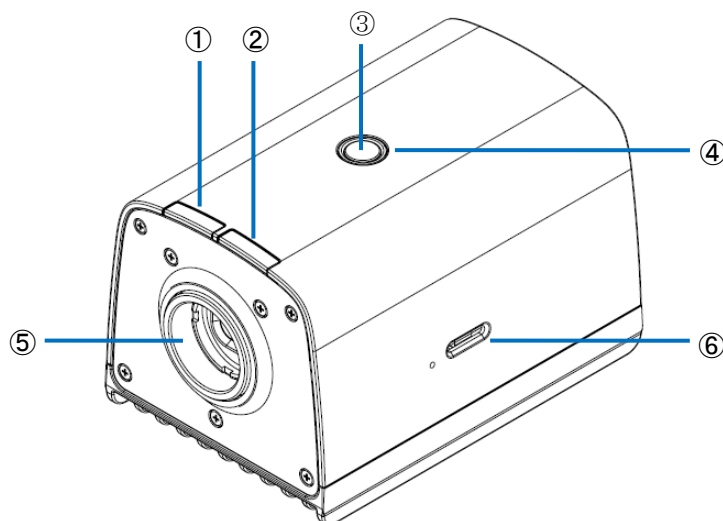
[Manual]:

https://industry.ricoh.com/en/support/fa_camera_lens/download/manual/

- SC-20 Operating Instructions
- SC-20 Quick Start Guide
- SC-20 Work Instructions Editor User's Guide
- SC-20 Socket Mode Function Operating Instructions
- SC-20 EtherNet/IP Mode Function Operating Instructions

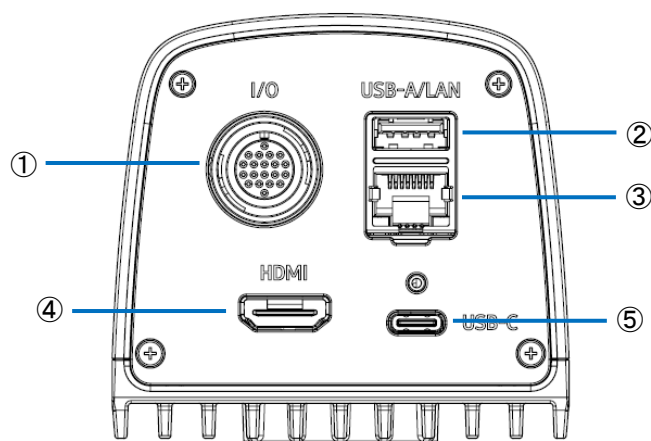
2. Names of Parts

Top, front, and side of unit:



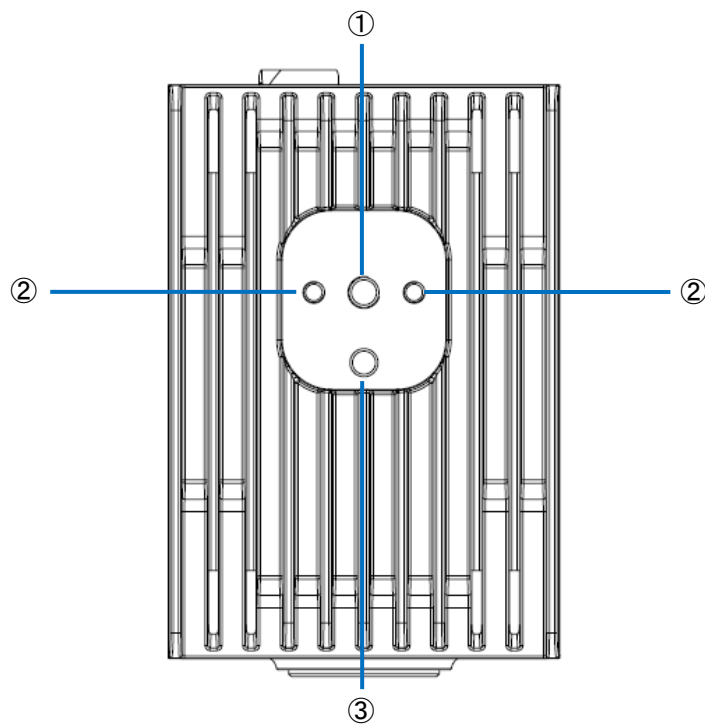
①	FAIL judgment LED lamp (red)	<p>When One Shot mode:</p> <ul style="list-style-type: none"> When the inspection step judgment is FAIL: Lights for a set time. <p>When Keep mode:</p> <ul style="list-style-type: none"> When the inspection step judgment is FAIL: Lights. When the inspection step judgment is OK: Turns off.
②	OK judgment LED lamp (green)	<p>When One Shot mode:</p> <ul style="list-style-type: none"> When the inspection step judgment is OK: Lights for a set time. <p>When Keep mode:</p> <ul style="list-style-type: none"> When the inspection step judgment is OK: Lights. When the inspection step judgment is FAIL: Turns off.
③	Power button	<p>When power off: Turns on the power.</p> <p>When power on:</p> <ul style="list-style-type: none"> When pressed for approximately 1 second: Displays the shutdown selection options (functions only on the Login screen and the main screen when the workflow has stopped). When pressed for approximately 4 seconds: Forcibly turns off the power.
④	Power LED lamp (green)	<p>Lights when the power turns on.</p> <p>Flashes while the workflow is stopped.</p>
⑤	Lens mount	C mount
⑥	Card slot	microSD

Rear of unit:



①	External connector
②	USB Type-A connector
③	LAN connector
④	HDMI connector
⑤	USB Type-C connector (USB Power Delivery supported / DisplayPort Alternate Mode not supported)

Bottom of unit:



①	Tripod mount screw hole
②	M4 screw holes
③	Tripod positioning hole

3. Overview of SC-20

SC-20 can be used to judge the degree of similarity of a master image and camera image. It supports automatic judgment by the pattern matching function and manual judgment by visual checking. SC-20 has three work modes. The matching mode is described in the Quick Start Guide.

1. Matching mode
2. Check mode
3. Data input mode

Register a combination of work modes to the workflow and then operate the device.

Reference

For details on the workflow, see the “Configuration example of workflow” below.

- Creating a workflow ([→P. 23](#))

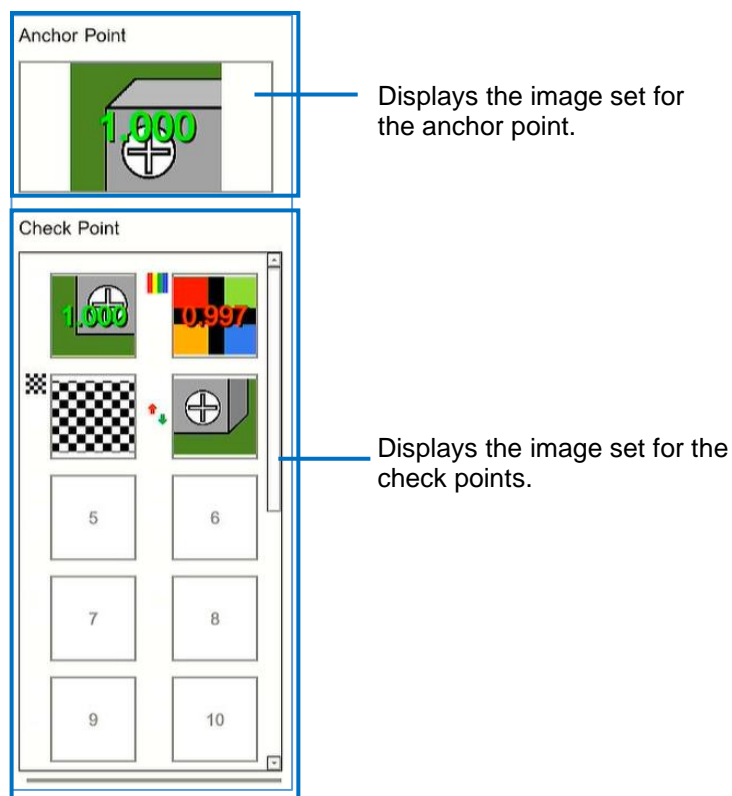
1. Matching mode:

This mode judges the degree of similarity (shape pattern, color, or texture) of a master image and camera image using the pattern matching function.

The matching methods are as described below.

- Relative search:
If an anchor point has been set when creating the workflow, this method makes a judgment by searching for the anchor point from the camera image and searching for the check points according to the relative position from the anchor point.
- Absolute search:
If an anchor point has not been set when creating the workflow, this method assumes the top left of the camera image as the reference position (x: 0, y: 0), and makes a judgment by searching for the check points according to the absolute position.
Use an absolute search when the target is fixed.

Matching mode execution screen:



↓ Note

- [When the color similarity check is set \(when \[Color Recognition\] is set for \[Check Method\]\), a color bar \(!\[\]\(c8dce68b26731c7aa5915072fc9d68dd_img.jpg\) \) is displayed at the top left of the check point image.](#)



- [When the texture similarity check is set \(when \[Texture\] is set for \[Check Method\]\), a checkered pattern \(!\[\]\(f15d3c54be60b4fd0ce1da9fb3f67256_img.jpg\) \) is displayed at the top left of the check point image.](#)



- [When the inversion of each similarity judgment logic is set \(when \[Inversion\] is set for \[Similarity\]\), an arrow \(!\[\]\(b1b781be830eb908d845c527ab08d5f8_img.jpg\) \) is displayed at the left center of the check point image.](#)



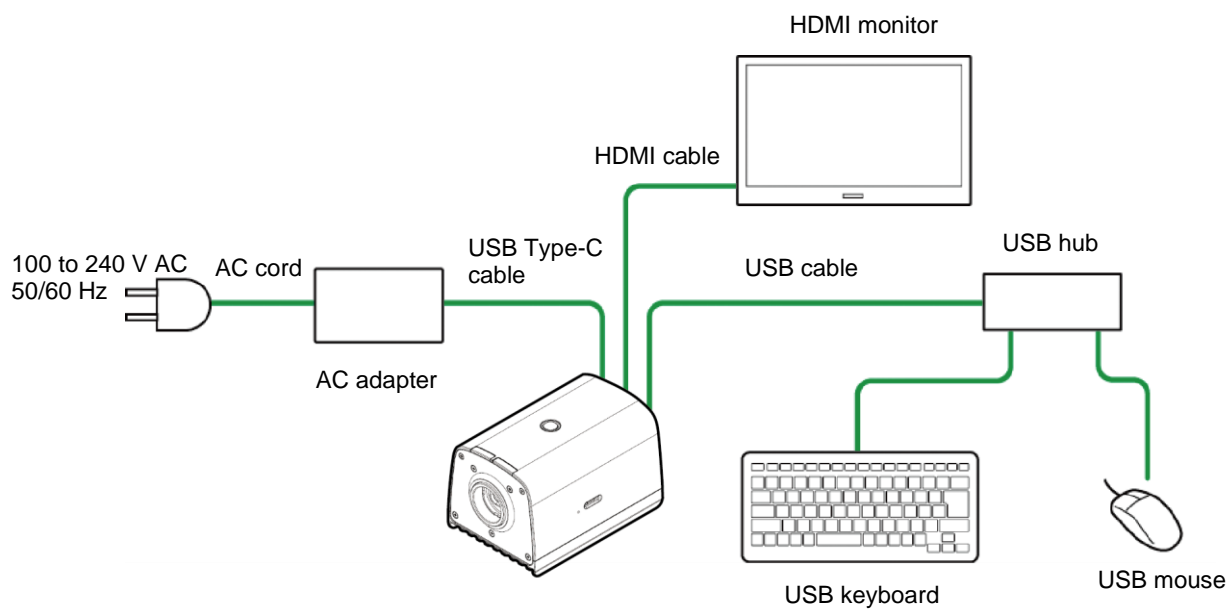
↓ Note

- If you are using any other mode (check mode, data input mode), refer to “SC-20 Operating Instructions”.

4. System Configuration Diagram

When connecting the AC adapter

Example:

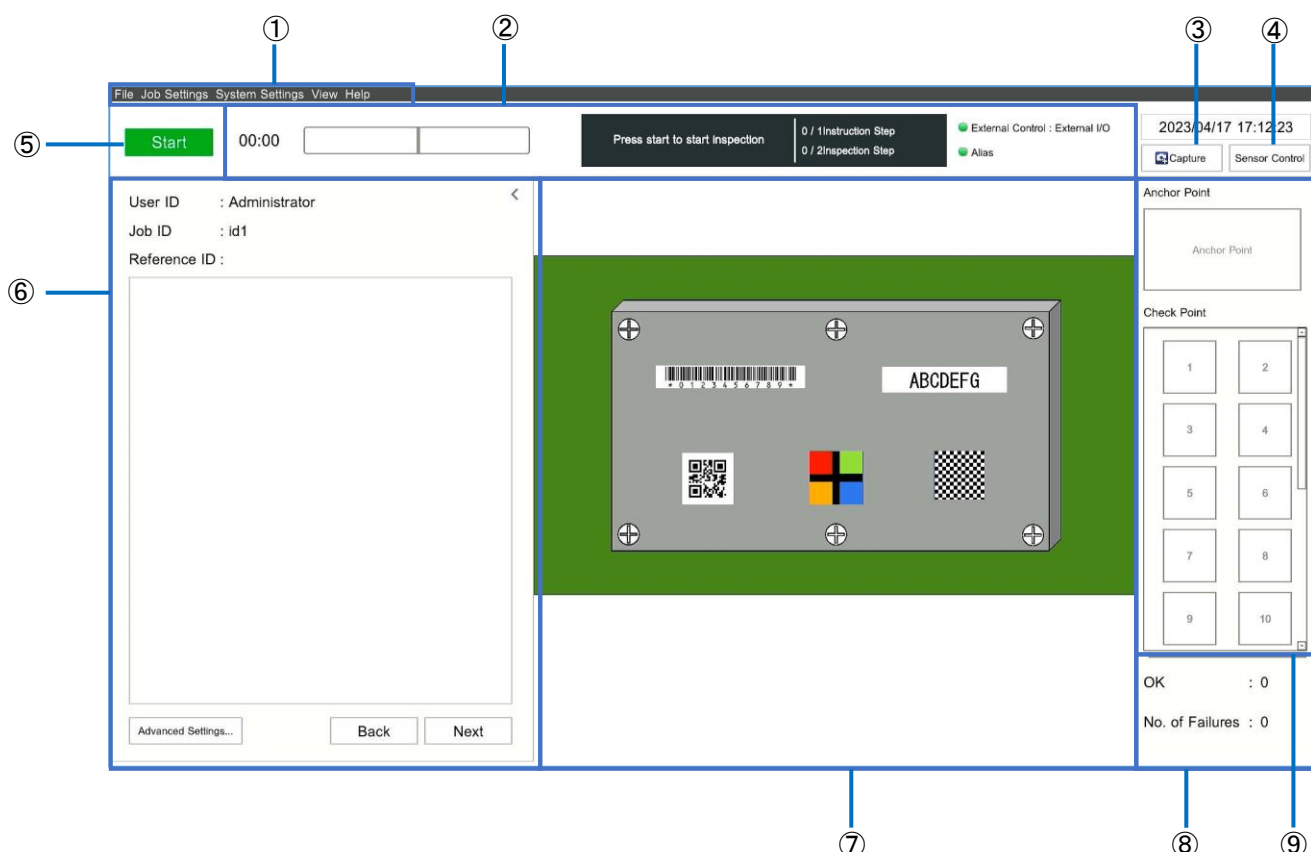


Note

- For other connections, refer to “SC-20 Operating Instructions”.

5. Screen Description

Main Screen



Note

For details on each item, refer to "SC-20 Operating Instructions" (Menu).

①	Menus	Configure settings and perform operations from each menu.
②	Status display area	Displays the progress of the job, alias settings, external control settings, standard time, and elapsed time.
③	Camera image capture button	Captures a camera image.
④	Sensor control button	Switches the inspection step display area to the [Sensor Control] settings screen and sets sensor control.
⑤	Start button	Executes the workflow.
⑥	Job information/Instruction step file display area	The [User ID], [Job ID], [Reference ID] being executed, and the [Instruction Step File] set in the workflow are displayed. The [Job ID] can be changed from the pull-down menu. If you click [<] at the top right, this area collapses and the camera image is magnified and displayed. This area is collapsed in the default state.
⑦	Camera image area	Displays the camera image.

⑧	Job result display area	Displays the job result OK/FAIL count.
⑨	Inspection step display area	Displays the inspection steps.

6. Flow Up to the Operation

This manual describes how to install, set, and operate this device using the following workflow.

Installation

Install the device and configure the initial settings.

STEP 1: Installation and Connections

Install the device and connect the cables.

STEP 2: Power-on and Initial Settings

Turn on the power and configure the initial settings.



Settings (administrator user)

Log in to the device as an administrator user and configure various settings.

STEP 1: Logging In

Log in to the device.

STEP 2: Creating a User

Create a new user for using the device.

STEP 3: Creating a Workflow

Register the job ID, instruction step, instruction step file, inspection step, and work mode to create a workflow.

STEP 4: Other Settings

Configure various settings.

Creating the instruction step file

Create the instruction step file with the "Work Instructions Editor". For details, refer to "SC-20 Work Instructions Editor User's Guide".



Operation/adjustments (administrator user)

Operate or stop the workflow and make adjustments to the parameters.

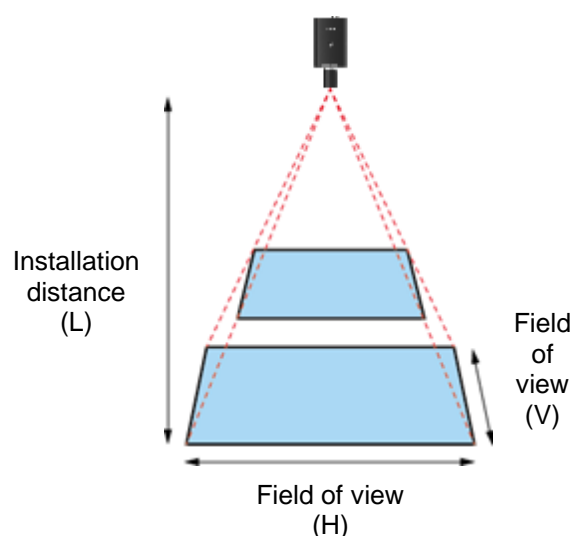
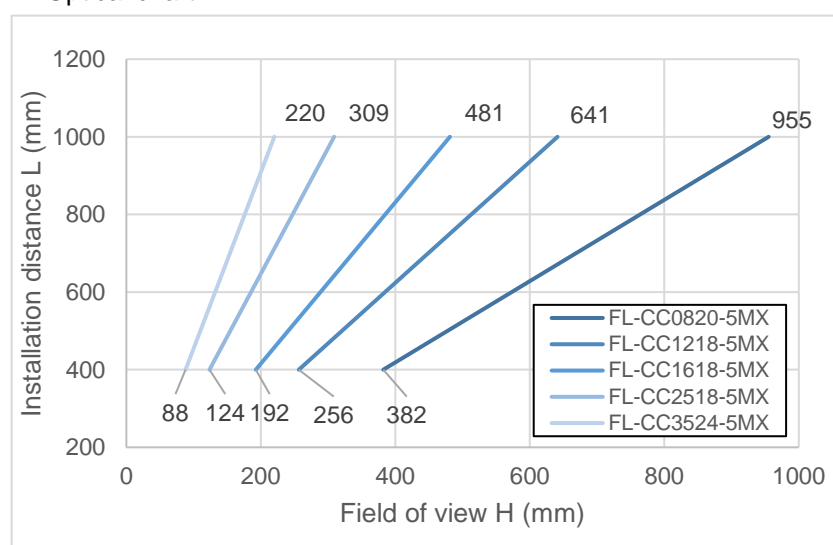
7. Installation: STEP 1 (Installation and Connections)

Attaching a Lens / Installing the Unit

1. Attach a lens (sold separately) to the lens mount.
2. Check the specifications of the attached lens and determine the installation distance in accordance with the field of view.

Recommended Lens / Field of View and Installation Distance

- Optical chart



- The optical chart indicates the field of view (H). The field of view (V) is almost 56% of the field of view (H).

Use a lens (sold separately) conforming to the following specifications:

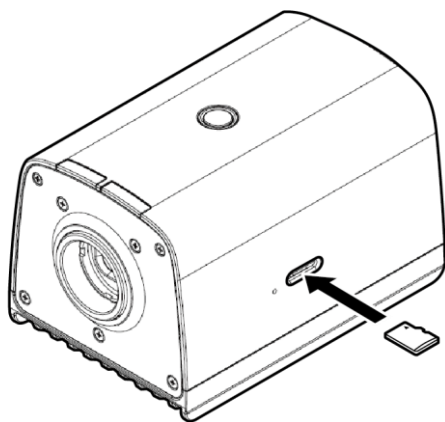
Mount: C mount, Image circle: 1/1.8" or more, Supported number of pixels: 5 MP or more (recommended)

Recommended lens: [5 megapixel lens \(manual diaphragm lens for image processing\) 5MX series](#)

3. Align the screw(s) (sold separately) with the tripod mount screw hole or M4 screw holes on the bottom of the unit and then fix the unit to the installation location.

Connections

1. **Attach the lens to the unit and fix the unit to the installation location ([→P. 14](#)).**
2. **Connect the unit and HDMI monitor with an HDMI cable.**
3. **Connect the unit to a USB hub and connect a keyboard and mouse to the USB hub with USB cables.**
4. **Connect a microSD card and LAN cable if necessary.**
 - When using a microSD card:
While being careful with regard to the orientation of the microSD card, insert the microSD card into the microSD card slot on the side of the unit until you hear a clicking sound.
To eject a microSD card, push in the card again.

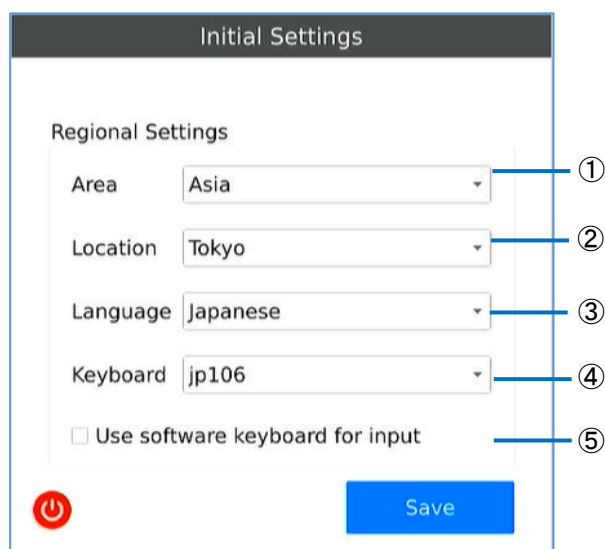


5. **Connect to a power supply.**


When using the AC adapter:
Connect the AC adapter to the USB Type-C connector on the rear of the unit. Connect the AC adapter and AC cord and connect to a power supply (100 to 240 V AC, 50/60 Hz).

8. Installation: STEP 2 (Power-on and Initial Settings)

1. **Press the power button on the top of the unit after turning on the power.**
The [Initial Settings] screen appears during the first startup, or after initializing the [System Settings].
 - The screen is displayed in English.
2. **Configure the following settings on the [Initial Settings] screen.**



①	Area	Select the area in which the device is located.
②	Location	Select the location where the device is located. • If the corresponding location is not in the list, select the one that is the closest.
③	Language	Select the display language.
④	Keyboard	Set the keyboard layout. The device does not support Japanese input. Japanese cannot be input even if you select [jp106].
⑤	Use software keyboard for input	If this checkbox is selected, input can be made from the software keyboard. The layout of the software keyboard is a US keyboard regardless of the [Keyboard] setting.

- The [Initial Settings] screen can also be displayed from the [System Settings] menu after logging in.
- Click  to shut down the system.

3. **Click [Save].**
The Login screen appears after restarting the device ([→P. 17](#)).

9. Settings: STEP 1 (Logging In)

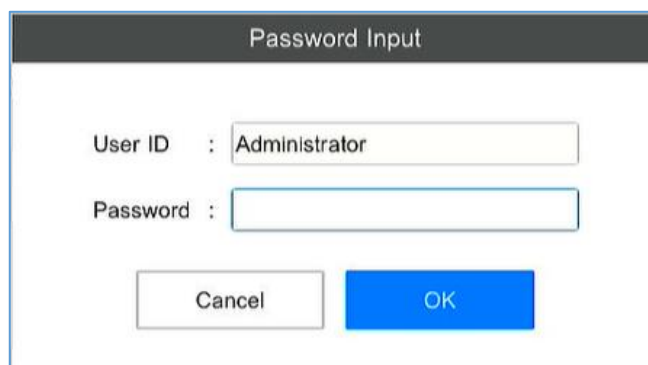
The user ID input screen appears when the device starts up (after configuring the initial setting at first startup).



1. Enter the [User ID] and click [Login].

- Enter the user ID registered in [Login/User Settings].
- To create a workflow and set parameters, enter the user ID of the administrator.
- If you log in with a general user ID, you will only be able to operate a workflow. ([→P. 26](#))
- The initial user ID for the administrator is "Administrator".

2. When the user ID for the administrator has been entered, enter the [Password] in the [Password Input] screen and click [OK].



- Enter the password for the user ID registered in [Login/User Settings].
- The password for the initial user ID for the administrator ("Administrator") is "admin".

Note

- In this manual, the state in which login is performed with a general user ID is called the [User Mode] and the state in which login is performed with the administrator user ID is called the [Administrator Mode].

10. Settings: STEP 2 (Creating/Managing a User)

Depending on the user authority, the users are divided into “general users” and “administrator users”. A “general user” can operate only some functions such as executing the workflow. An “administrator user” can perform all operations on the device such as creating a workflow or configuring system settings.

★ Important

- The following users are registered in the default state. These users can also be deleted or edited.
 - “Administrator user”: Administrator (password: admin)
 - “General user”: worker

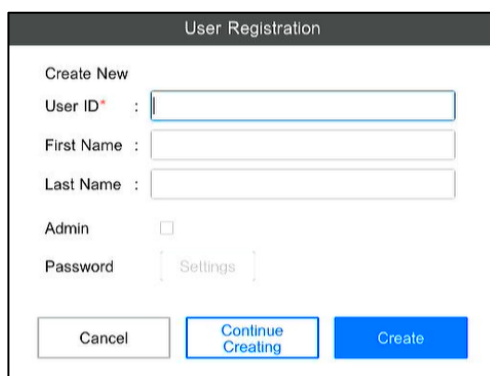
1. Click [Login/User Settings ...] from [System Settings].

The [Login/User Settings] screen appears. Use the right half of the screen for user management.

①	Create new user	Adds a new user.
②	User list	<p>Displays the registered users.</p> <ul style="list-style-type: none"> • [Delete]: Deletes a user. • [Edit]: Changes a user. • [<]: Returns the list to the previous page. • [>]: Advances the list to the next page. <p>★ Important</p> <p>Register at least one user each in [Administrator user] and [General user].</p>

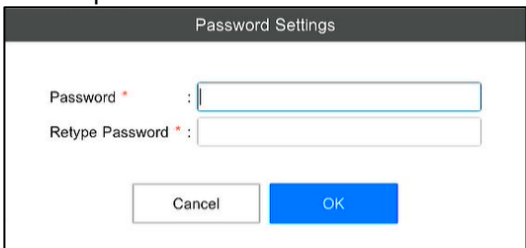
2. Click the [Create new user] button.

The [User Registration] screen appears.



The 'User Registration' dialog box contains the following fields and controls:

- Create New** (Section Header)
- User ID ***: Text input field
- First Name**: Text input field
- Last Name**: Text input field
- Admin**: Checkable checkbox
- Password**: Text input field with a 'Settings' link to its right
- Buttons**: 'Cancel', 'Continue Creating', and 'Create' buttons at the bottom.

User ID	<p>Set the user ID to register in 1 to 32 characters.</p> <p>Note</p> <ul style="list-style-type: none"> Input is mandatory. [\ / : * ? " < >] cannot be used. A blank or a period cannot be used as the starting or ending character.
First Name	Set the user's first name in 0 to 32 characters.
Last Name	Set the user's last name in 0 to 32 characters.
Admin	If this checkbox is selected, the user is registered as an "Administrator user".
Password	<p>Set the password of the administrator user in 1 to 32 characters.</p>  <p>The 'Password Settings' dialog box contains:</p> <ul style="list-style-type: none"> Password *: Text input field Retype Password *: Text input field Buttons: 'Cancel' and 'OK' buttons at the bottom. <p>Note</p> <ul style="list-style-type: none"> Input is mandatory.

3. When the input is complete, click the [Create] button.


11. Settings: STEP 3 (Creating a Workflow)

Manage job IDs and create a workflow on the [Job ID Settings] screen ([→P. 22](#) Registering/Managing Job IDs). Display the [Job ID Settings] screen by selecting [Job ID Settings ...] from the [Job Settings] menu of the main screen ([→P. 11](#)).

Flow for creating a workflow:

Create a workflow by creating instruction steps and setting the instruction step file and inspection steps (work modes).

STEP 1: Preparing a Master Image ([→P. 21](#)) and an Instruction Step File

- To register a matching mode for an inspection step in the workflow, prepare a master image in advance.
- Create the instruction step file with the “Work Instructions Editor”.
 -  **Reference**
 - “SC-20 Work Instructions Editor User's Guide”



STEP 2: Registering a Job ID ([→P. 22](#))

Registering job IDs enables workflows to be managed by IDs.
Either register a new job ID or copy and register an existing job ID.



STEP 3: Creating a Workflow

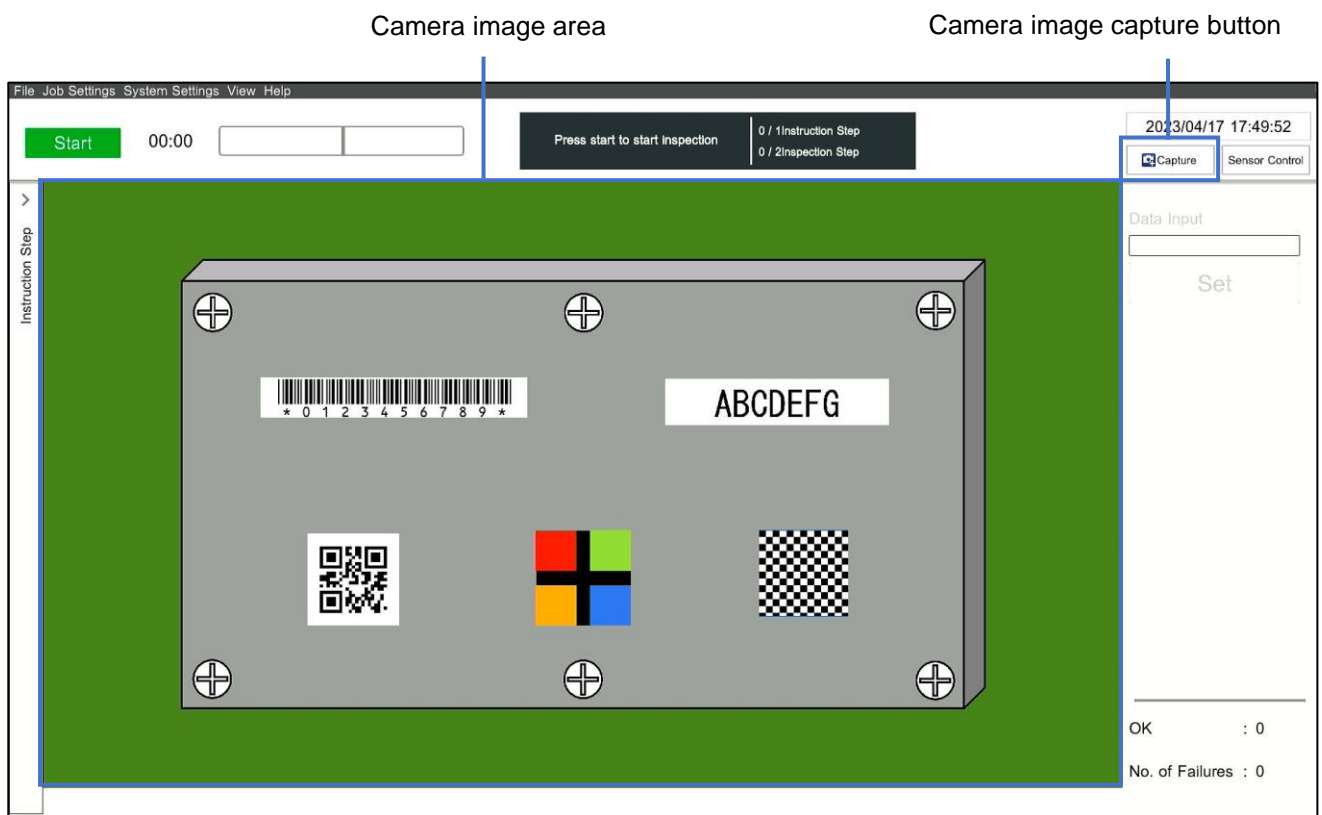
1. Create instruction steps ([→P. 23](#))
2. Create inspection steps ([→P. 24](#))
3. Save the workflow

Preparing a Master Image

To register a matching mode for an inspection step in the workflow, prepare a master image in advance.

Capturing a master image

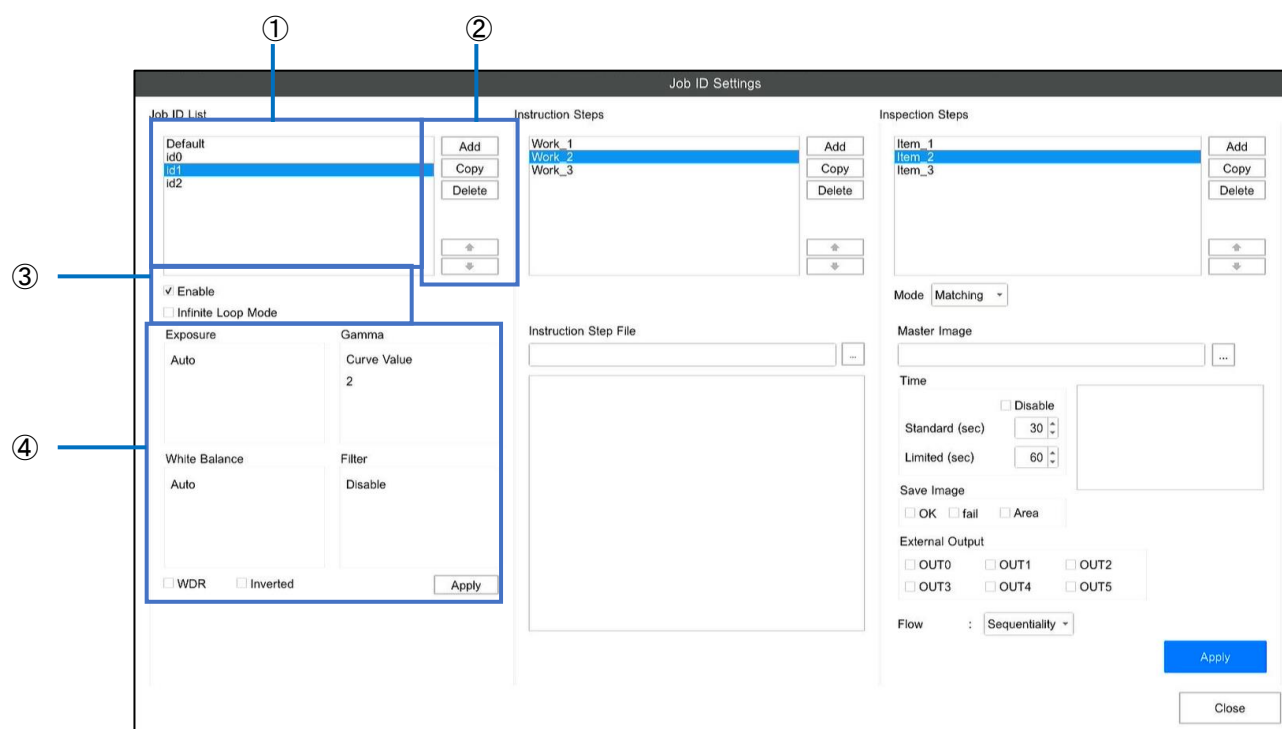
1. Display the target to be set as the master image in the camera image area.
2. Click the camera image capture button on the main screen.
3. Specify the save destination and file name to save the file.
4. If necessary, repeat steps 2 and 3 to register the master image.





Registering/Managing Job IDs

Register or manage the job IDs to identify the workflow.

1. Click **[Job ID Settings ...]** from the **[Job Settings]** menu of the main screen ([→P. 11](#)).
The **[Job ID Settings]** screen appears.



2. Perform the following operations as necessary.

①	Job ID List	<p>Displays the registered job IDs.</p> <ul style="list-style-type: none"> • [Default] is the job ID set by default. [Default] cannot be renamed or deleted. • The job ID can be renamed by double-clicking. • This is not case sensitive.
②	Job ID list operations	<ul style="list-style-type: none"> • [Add]: Adds a new job ID. • [Copy]: Selecting a job ID in the job ID list and clicking this button creates a copy of the selected job ID. • [Delete]: Selecting a job ID in the job ID list and clicking this button deletes the selected job ID. • : Selecting a job ID and clicking this button moves the selected job ID up one place in the list. • : Selecting a job ID and clicking this button moves the selected job ID down one place in the list.
③	Job ID control	<ul style="list-style-type: none"> • [Enable]: If this checkbox is selected, the job ID can be specified through job ID input during the workflow execution (→P. 26).

		<ul style="list-style-type: none"> [Infinite Loop Mode]: If this check box is selected, the workflow is automatically executed from the first inspection step when the workflow is completed. Even if the workflow is judged as FAIL, it is executed from the first inspection step without being stopped.
④	Sensor settings	Displays the sensor setting values retained by the selected job ID. <ul style="list-style-type: none"> If you click the [Apply] button, the displayed setting values are reflected in the [Sensor Control] settings screen.

Creating a Workflow

Register inspection steps in an instruction step, and set the work mode (matching mode).

Multiple inspection steps can be registered for each instruction step. A workflow can be configured by combining multiple work modes.

Creating Instruction Steps

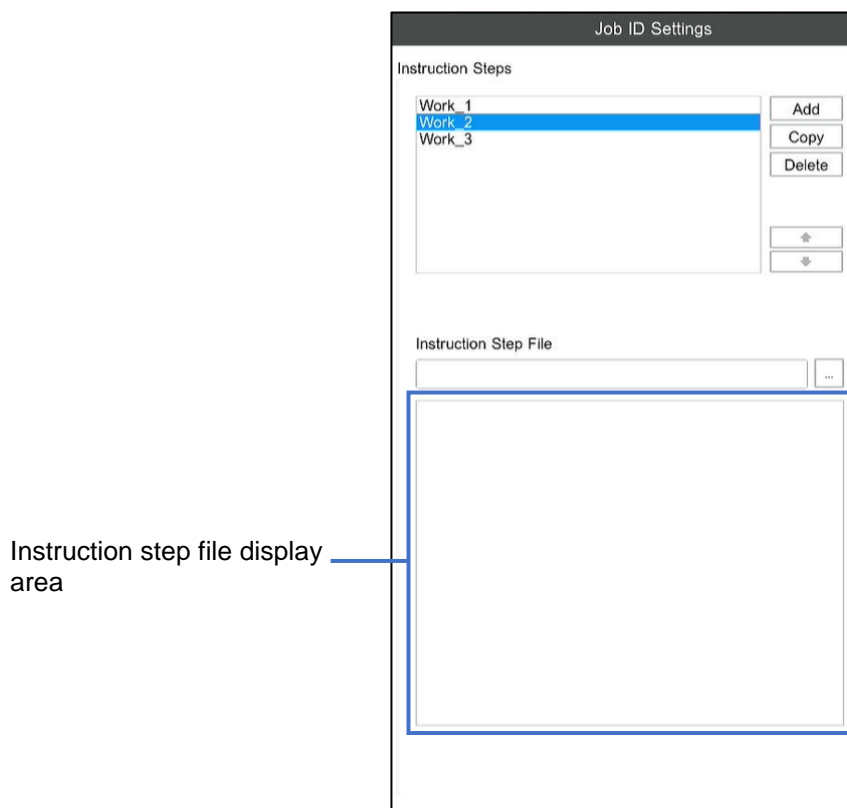
To create a workflow related to an instruction step file, create instruction steps and register the instruction step file.

Multiple instruction steps (instruction step files) can be set for each workflow.

Reference

- “SC-20 Work Instructions Editor User's Guide”

1. Select a job ID from the [Job ID List] on the [Job ID Settings] screen.
2. Click [Add] under [Instruction Steps].



3. Click [...] under [Instruction Step File] to set an instruction step file.

The selected instruction step file appears in the instruction step file display area.

4. If necessary, repeat steps 2 and 3 to register the instruction steps.

Creating an Inspection Step

1. Select a job ID from the [Job ID List] on the [Job ID Settings] screen.
2. Select an instruction step from [Instruction Steps].
3. Click [Add] under [Inspection Steps].
4. Create a new inspection step. Set the inspection step name and click [OK].

Pull-down list for mode selection

Inspection Steps

Item_1
Item_2
Item_3

Add
Copy
Delete

Mode Matching

Master Image

Time

☐ Disable

Standard (sec) 30

Limited (sec) 60

Save Image

☐ OK ☐ fail ☐ Area

External Output

☐ OUT0 ☐ OUT1 ☐ OUT2
☐ OUT3 ☐ OUT4 ☐ OUT5

Flow : Sequentiality

Apply

5. Select a work mode from the pull-down list for mode selection.
 - Matching: Sets the matching mode (shape, color recognition, texture).
6. Configure the following settings under [Time].

Disable	If you select this checkbox, the setting of [Standard Time] and [Upper Limit Time] is disabled. (The workflow is not judged as FAIL even if the job time exceeds the [Upper Limit Time].)
---------	---

Standard (sec)	Set the standard time for the execution of the inspection step. <ul style="list-style-type: none"> Set from 1 to 999 seconds. You cannot set a value larger than the [Upper Limit Time]. The workflow execution progress bar is displayed in green up to the set standard time.
Limited (sec)	Set the upper limit time for the execution of the inspection step. <ul style="list-style-type: none"> Set from 1 to 999 seconds. You cannot set a value smaller than the [Standard Time]. If the upper limit time is exceeded, the inspection step is judged to have failed. The workflow execution progress bar is displayed in yellow from the standard time up to the upper limit time, and in red when the upper limit time is exceeded.

7. Set saving of the camera image during judgment of inspection step result under [Save Image].

- If you select [OK], the image during OK judgment is saved.
- If you select [FAIL], the image during FAIL judgment is saved.
- If you select [Area], an OK (green) or FAIL (red) frame is added to the saved image (matching mode only).

Note

- Both the [OK] and [FAIL] settings can also be selected.
- The image to be saved is saved according to the [Log Output Settings].
- If the work mode is [Matching] and the processing method is [Sequentiality], an image is saved for each matching point.

8. Enable or disable the output functions allocated to the pins of the external connector under [External Output].

- Select the checkbox to enable the output function allocated to the pin of the external connector in [External I/O Settings ...] (also set the corresponding [EXTOUT] number in [External I/O Settings]).

9. Set the parameters for each mode.

Reference



- For details, refer to "SC-20 Operating Instructions".

10. When the settings are completed, click [Apply].

The settings are saved.

11. If necessary, repeat steps 2 to 10 to register the inspection steps.

Note

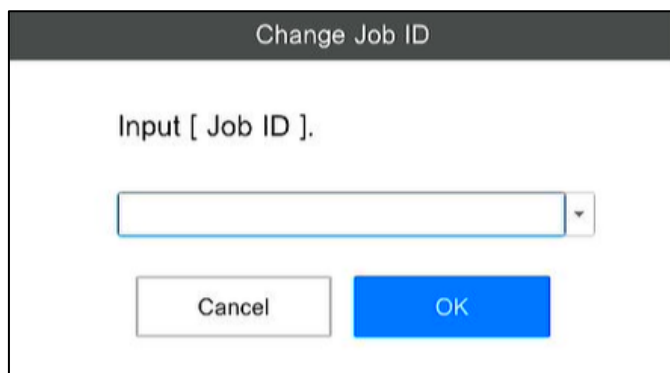
- If you select an inspection step and click  and , you can change its order in the list.
- The inspection step can be renamed by double-clicking.
- If you select an inspection step and click [Copy], you can create a copy of the selected inspection step.
- This is not case sensitive.
- If you select an inspection step and click [Delete], you can delete the selected inspection step.

12. Starting the Operation

Start the operation of a workflow.

1. Log in to the device as a general user ([→P. 17](#)).

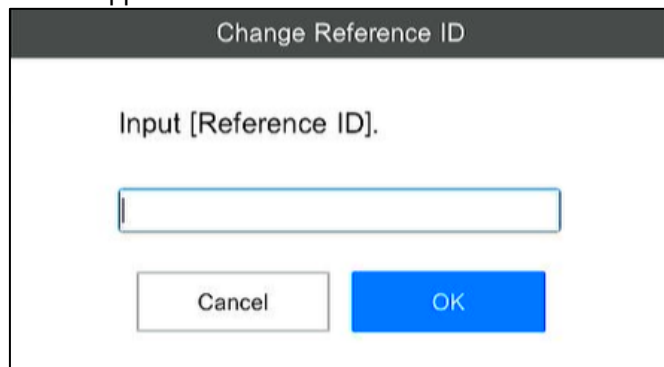
The [Change Job ID] screen appears.



The screenshot shows a dialog box titled "Change Job ID". Inside, there is a label "Input [Job ID]." followed by a text input field with a dropdown arrow on the right. Below the input field are two buttons: "Cancel" and "OK".

2. Enter the job ID and click [OK].

The [Change Reference ID] screen appears.



The screenshot shows a dialog box titled "Change Reference ID". Inside, there is a label "Input [Reference ID]." followed by a text input field. Below the input field are two buttons: "Cancel" and "OK".

3. Enter the reference ID and click [OK].

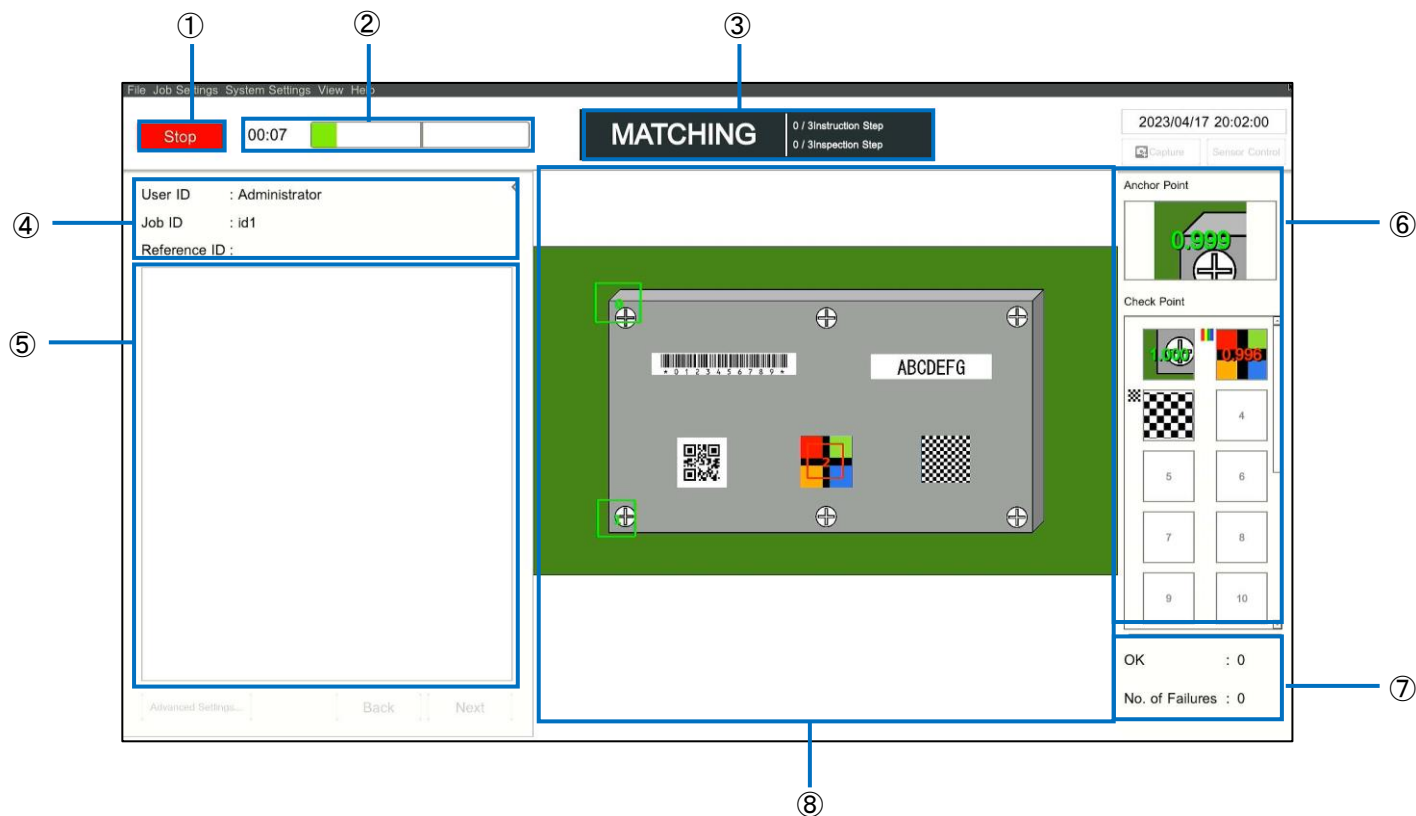
The operation of the workflow starts.

↓ Note

- The job ID and reference ID are recorded in the job log.
- If you click [Cancel] on the [Change Job ID] screen or [Change Reference ID] screen, the workflow stops.

Main screen during operation

The following explanation uses the example of the screen when the inspection step is matching mode.



①	Stop	Stops the workflow.
②	Status display area: Job time	<p>Displays a progress bar visually representing the elapsed time, standard time, and upper limit time.</p> <p>Elapsed time Standard time Upper limit time</p> <p>The progress bar is displayed in green up to the standard time, and in yellow from the standard time up to the upper limit time. If the upper limit time is exceeded, the progress bar is displayed in red.</p>
③	Status display area: Job status	<p>Displays the job status.</p> <p>During the execution of the workflow, the background color turns black, and the work mode being executed is displayed.</p> <p>The job result (OK/FAIL) is displayed when the workflow is complete. The background color is green when the job result is OK, and red when the job result is FAIL.</p> <p>The "X / X Instruction Step" indicates the "Executed number of instruction steps / Total number of instruction steps".</p> <p>The "X / X Inspection Step" indicates the "Executed number of inspection steps / Total number of inspection steps".</p>

④	Job information display area	The following job information is displayed: [User ID]: Displays the ID of the logged in user. [Job ID]: Displays the job ID of the workflow being executed. [Reference ID]: Displays the reference ID of the workflow being executed.
⑤	Instruction step file area	Displays the instruction step file set in the workflow.
⑥	Inspection step display area	When the matching mode is being executed, the matching results are displayed in [Anchor Point] and [Check Point] as thumbnails.
⑦	Job result display area	The following numeric values are incremented according to the job results: <ul style="list-style-type: none">– [OK]: When the workflow is complete– [No. of Failures]: When the inspection step is judged to be FAIL <p>This information is reset when logging out or changing Job ID. You can also make the setting to not reset the number of executions when logging out or changing Job ID.</p>
⑧	Camera image area	Displays the camera image.

13. Trademarks

- HDMI is a trademark or registered trademark of HDMI Licensing LLC.
- Ethernet is a trademark or registered trademark of Fuji Xerox Co., Ltd.
- IEEE is a trademark of The Institute of Electrical and Electronic Engineers, Inc.
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14. Inquiries

RICOH Industrial Solutions Inc.

<https://www.rins.ricoh.co.jp/en/contact/>

June 2023

Revision History

Rev.	Date	Changes	Note
1.0	June 14, 2023	New issue	

RICOH Industrial Solutions Inc.