



CAMERA UNIT & TRACE APPLICATION CX5039 Instruction Manual

Thank you for purchasing a HAKKO product.
This product is a camera unit and software dedicated to the HU-200.
Make sure to read this manual before using the product,
and keep it in a safe place for future reference.
In addition to this manual, make sure to read the instruction manual
of any device used with this product.

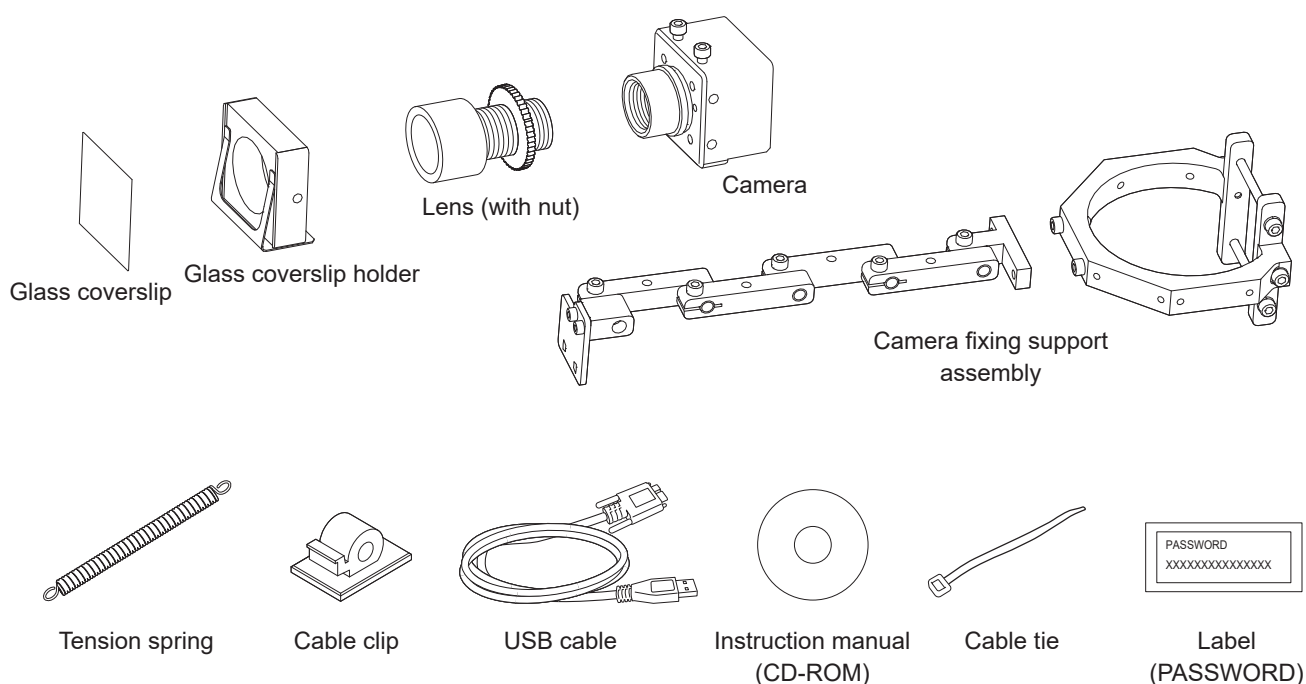
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1. Contents

Confirm the contents before use.

Camera.....	1	Cable tie	20
Lens (with nut).....	1	USB cable.....	1
Camera fixing support assembly	1	Tension spring	1
Glass coverslip holder (25 mm).....	1	Label (PASSWORD).....	1
Glass coverslip	5	Instruction manual (CD-ROM).....	1
Cable clip.....	3	Quick manual.....	1



See the web page for the product information such as replacement parts/options.
https://www.hakko.com/doc_hu200_option-e

2. Specifications

Recording format	H.264 ^{*1} , MPEG-4 ^{*2}	
Image quality	Can be selected from low, standard, or high. *The image quality can be customized by editing the file.	
Temperature recording interval	0.5 sec interval	
Monochrome/Polychrome	Polychrome	
Resolution	1.3 M pixels	
Shooting image size	1280 (H) × 720 (V), 1280 (H) × 960 (V)	
Shutter type	Rolling shutter	
Frame rate	1280 × 720: 10, 6, 5, 4, 3, 2, 1 fps 1280 × 960: 10, 6, 5, 3, 2, 1 fps	
Maximum frame rate	10 fps	
Image sensor	1/3.2" CMOS	
Mounting direction	At 45° increments (in 5 directions)	
Focus	Fixed focus	
Lens mount	S-mount (M12)	
Lens focal length	12 mm (optional)	Focus from 37 mm (from camera edge) Field of view at 37 mm : 7.5 mm × 4.1 mm Field of view at 300 mm : 108 mm × 61 mm
	25 mm	Focus from 100 mm (from camera edge) Field of view at 100 mm : 10.5 mm × 6 mm Field of view at 300 mm : 47.5 mm × 27 mm
Dimensions	25 (W) × 25 (H) × 28 (D) mm (1.0 × 1.0 × 1.1 in)	
Weight	23 g (camera only), 221 g (with arm) (0.8 oz (camera only), 7.8 oz (with arm))	
Interface	USB3.0	

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3. Warnings, cautions, and notes

Warnings, cautions, and notes are placed at critical points in this manual to direct your attention to significant items. They are defined as follows:

⚠ WARNING: Failure to comply with a WARNING may result in serious injury or death.

⚠ CAUTION: Failure to comply with a CAUTION may result in injury to the operator, or damage to the items involved.

NOTE : This indicates procedures or information that are important in a process described in this document.

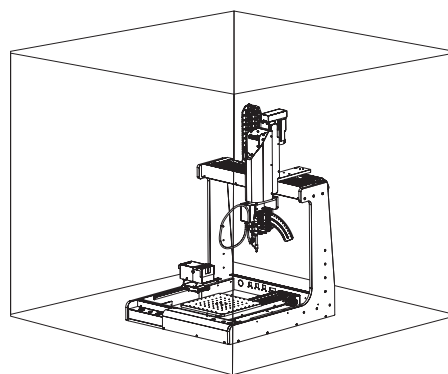
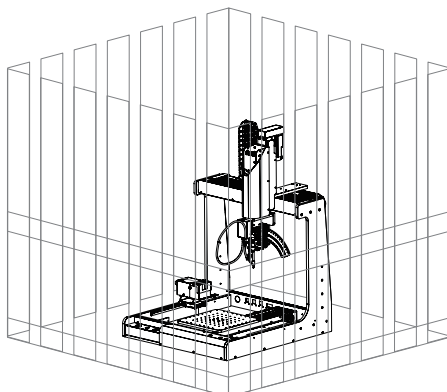
WARNING

1. Establish guidelines related to each of the following items and perform work following these guidelines.
 - (1) Robot operation and procedures (Refer to "7. Operation" of the HU-200 instruction manual (CD-ROM).)
 - (2) Speed of robot in operation (Refer to "7-1 Explanation of Software Screen/7-2 JOG Operation" of the HU-200 instruction manual (CD-ROM).)
 - (3) Operation when 2 or more operators are performing operations (Refer to "5-1 Cautions on Installation" of the HU-200 instruction manual (CD-ROM).)
 - (4) Measures if abnormalities are discovered (Refer to "9. Error Messages/ 10. Troubleshooting" of the HU-200 instruction manual (CD-ROM).)
 - (5) Measures to restart the device if abnormalities are discovered and robot operation is stopped. (Refer to "10. Troubleshooting" of the HU-200 instruction manual (CD-ROM).)
 - (6) Other required measures to prevent dangers due to unexpected robot operations and malfunctions (3. Warnings, cautions, and notes: During work)
2. Operators performing operations and personnel in charge of observing operators are to perform measures to stop robot operations when abnormalities are discovered. (3. Warnings, cautions, and notes: During work)
3. While work is being performed, perform required measures to prevent personnel other than designated operators from operating switches, etc. such as by displaying messages to the robot operating switches, etc. that work is being performed. (3. Warnings, cautions, and notes: During work)

During operation

There is a risk of death or injury if a person comes in contact with the robot while it is operating. Take safety measures (such as installation of a safety cover) to prevent workers from entering the robot's range of movement during operation.

If there is no safety cover, indicate the robot's range of movement and take necessary safety measures.



3. Warnings, cautions, and notes (cont'd)



WARNING

Installation/transportation

- Be sure that the main power supply is switched off when installing the robot and performing wiring, and check that wiring has been performed properly.

During work

- When training work, inspection, etc. is being performed, be sure that workers perform the work thoroughly.
- To enable operation to be immediately stopped in the event of a dangerous condition, perform work within reach of an emergency stop button, or install emergency stop devices close at hand.
- If a dangerous situation occurs, press the emergency stop button (button of emergency stop device) immediately.
- When work is being performed by multiple workers, perform work while giving voice instructions to each other and while checking safety to prevent other workers from performing careless operations during the work.
- When inspecting or replacing parts that do not require operation, switch off the main power supply before performing such work.

Other

- Handle glass coverslips with care to avoid cuts.
- Do not use near flammable, inflammable, explosive, or corrosive gases or materials.
- If the product will not be used for a long period of time, unplug the power plug.
- Do not touch metal parts near the tip while the tip is at high temperatures.
- Since there is a danger of fingers getting pinched, keep your fingers away from moving sections (X, Y, Z, and θ axes).
- When performing repairs or replacing parts, be sure to unplug the power plug and wait for the soldering iron to cool down before performing such work.
- Do not allow disassembly or repair to be performed by workers other than qualified repair technicians. Also, do not modify the product.

CAUTION

- Keep the lens surface clean as it may affect video recording.
- Do not touch the sensor inside the camera. It may cause malfunction.
- Securely tighten the screws to fix the USB connector. If loose, it may cause malfunction.
- Securely fasten the cable tie to fix the USB cable. If loose, it may cause malfunction.
- Replace the tension spring between the soldering unit fixture base and the soldering unit mount with the tension spring provided with this product. Operation without the replacement of the part may affect the soldering quality and cause the soldering defects.
- Adjust the camera position to avoid contact with the robot, accessories, workpiece, or safety cover.
- The recommended video recording format is MPEG-4. If H.264 is selected, the software may crash during the operation, depending on the tablet PC model connected to the robot.
- Attach only HAKKO-specified accessories to the robot, and do not use this product for applications other than soldering.
- Ensure safety by wearing a helmet, protective gloves, safety glasses, and safety shoes when necessary.
- Do not subject the product to strong impact.
- Product should be installed so that sufficient working space to safely perform preventive maintenance, etc. can be secured.
- Be sure to ground the product during use.
- Be sure to provide sufficient illumination to perform work safely.
(JIS Z9110 specifies 300 to 750 lux.)
- Do not touch the product with wet hands or use the product when the main body or cords are wet.
- Always hold the power plug when plugging it in or unplugging it.
- Do not place the cord close to heat, oil, or objects with protruding corners.
- Do not forcibly bend, pull on, or twist the cord.
- Do not use the cord if the plug is damaged or if it is loose in the electrical outlet.
- Systems related to safety do not lead to loss of safety functions even if defects of single parts occur. Defects of single parts are detected before safety functions of the next cycle are executed and safety functions remain enabled even if defects occur on single parts.
- This product is a precision equipment. Data may get lost due to sudden malfunctions, etc. As a precaution, periodically take backup of important data stored in this product. We shall not be held responsible for any damage or loss of the data stored in this product or in the connected products. Also, we are not capable of recovering, restoring, or duplicating recorded data. We shall not be held responsible if data could not be saved to this product for unspecified reasons.

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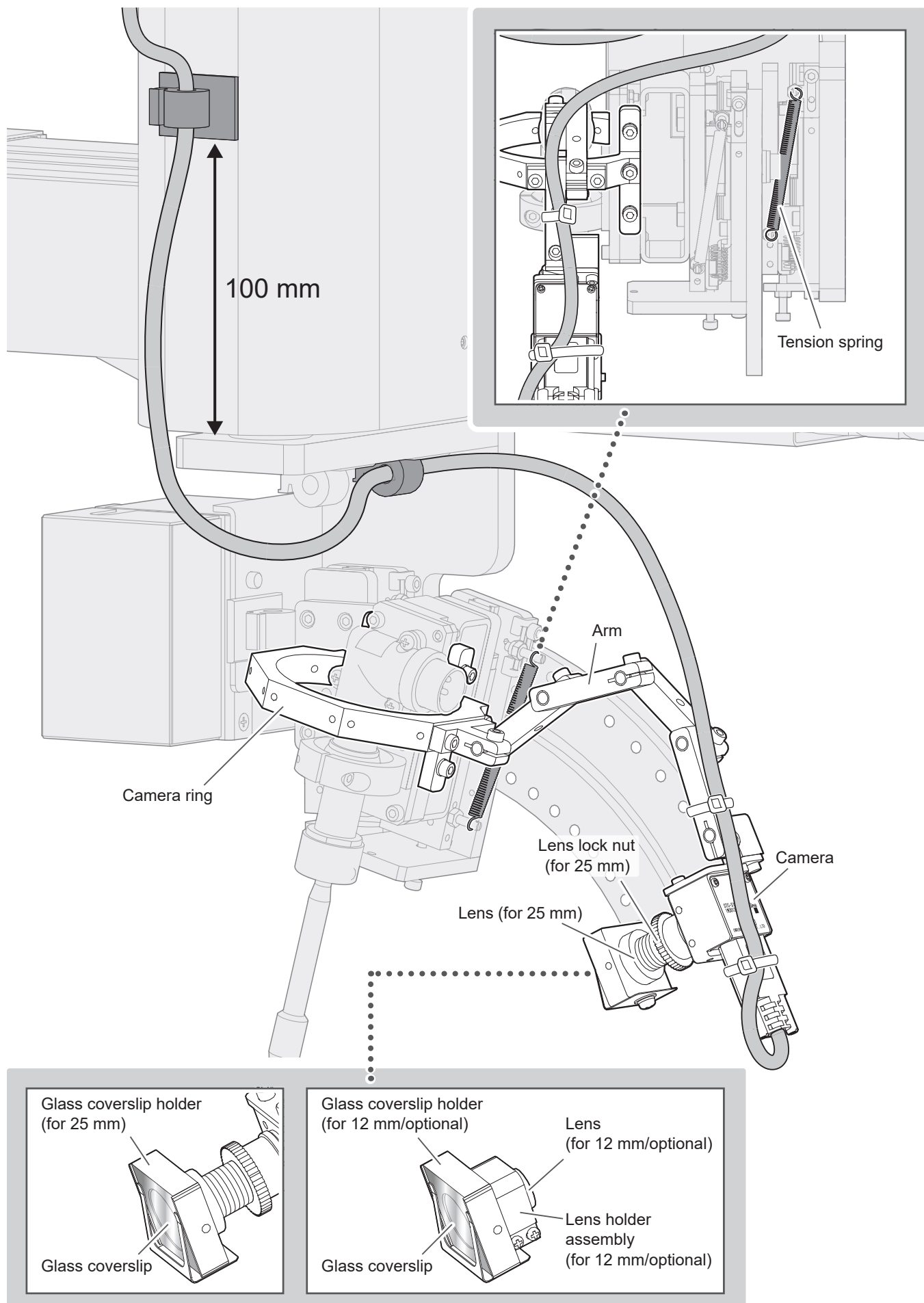
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4. Names of parts



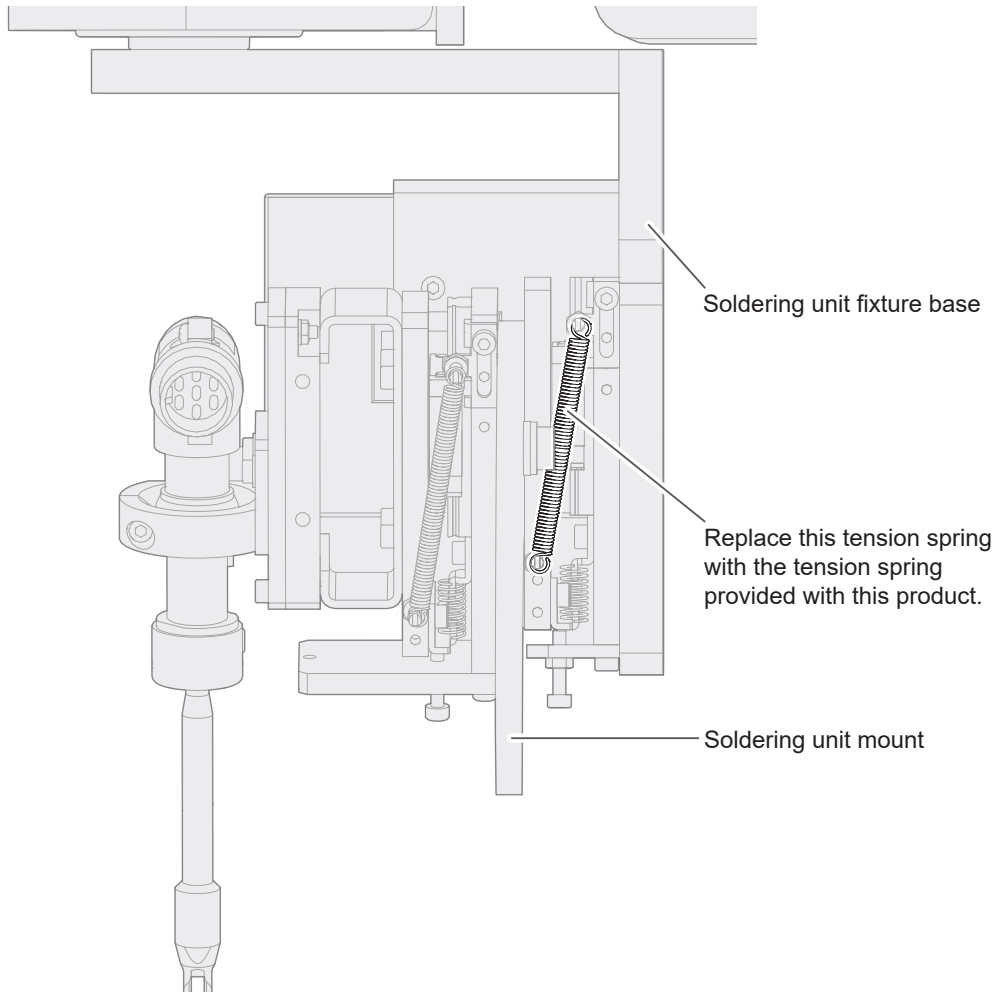
5. Assembly

5-1. Replacing the tension spring

CAUTION

Operation without the replacement of the tension spring provided with this product may affect the soldering quality and cause the soldering defects.

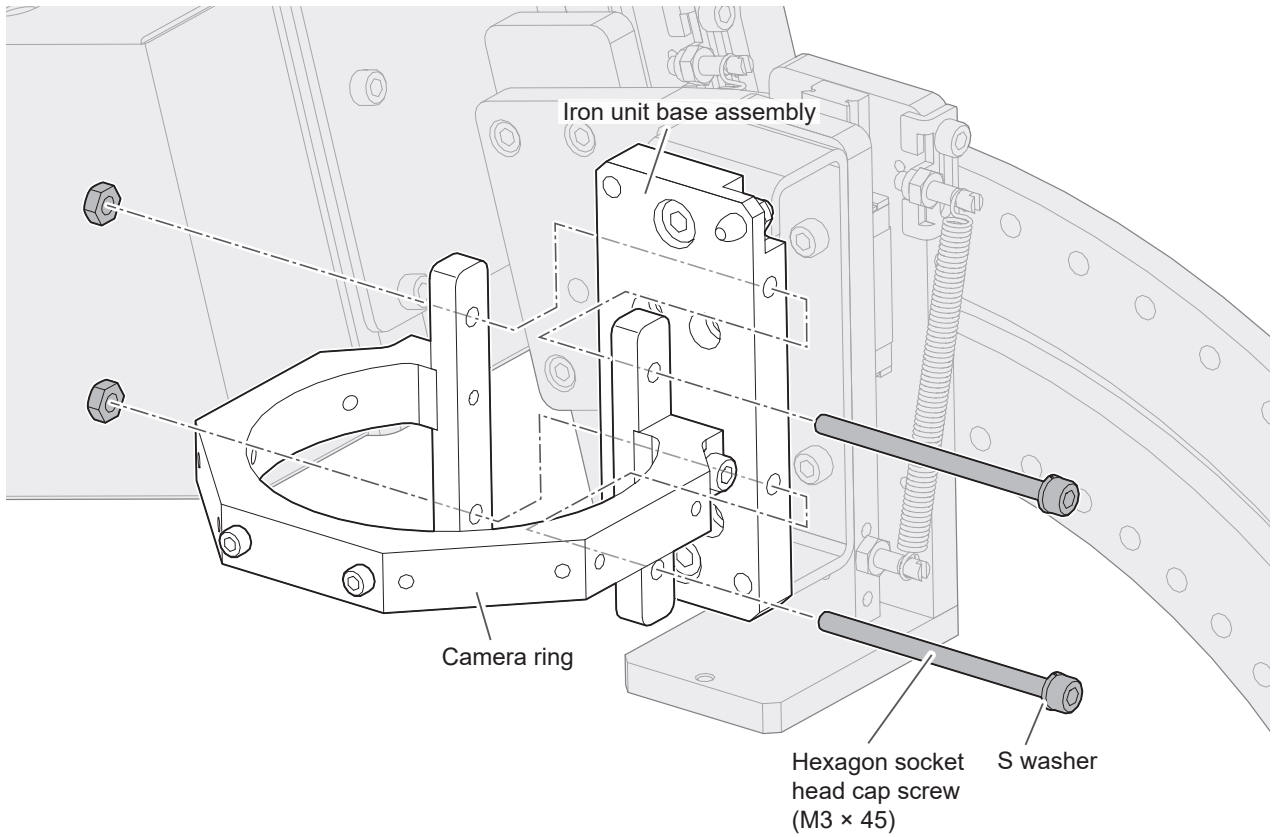
Replace the tension spring between the soldering unit fixture base and the soldering unit mount with the tension spring provided with this product.



5. Assembly (cont'd)

5-2. Mounting the camera ring

Mount the camera ring on the robot.



5-3. Assembling the camera

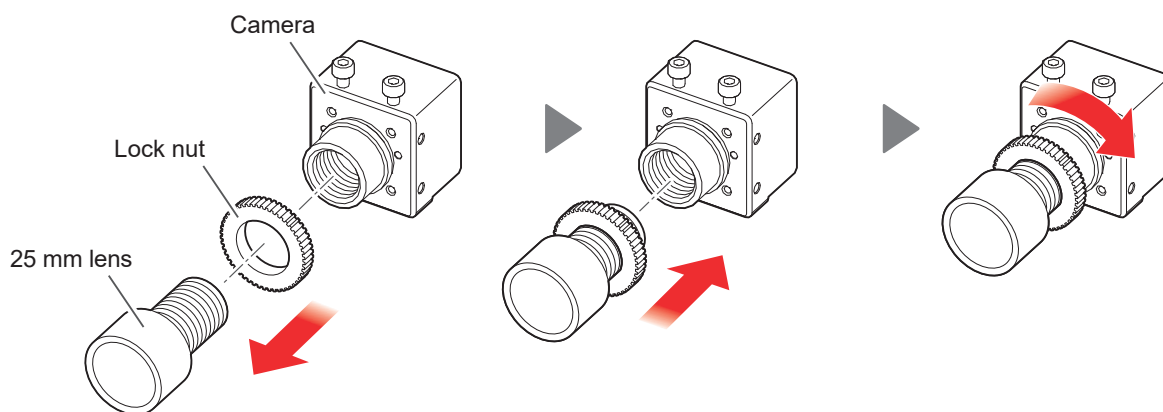
CAUTION

Tighten the lens securely after focusing.

1. Remove the dustproof tape from the camera.
2. Remove the lens cap.
3. Temporarily attach the lens to the camera.

For 25 mm lens

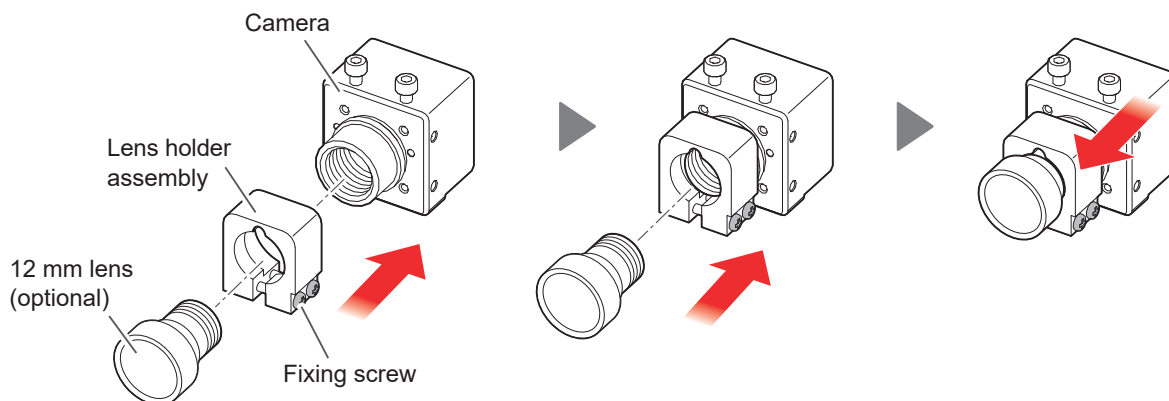
1. Attach the lock nut to the lens.
2. Attach the lock nut and lens to the camera.
3. Fix the lens with the lock nut.



For 12 mm lens (optional)

The optional 12 mm lens can be used to capture a wider field of view than the 25 mm lens.

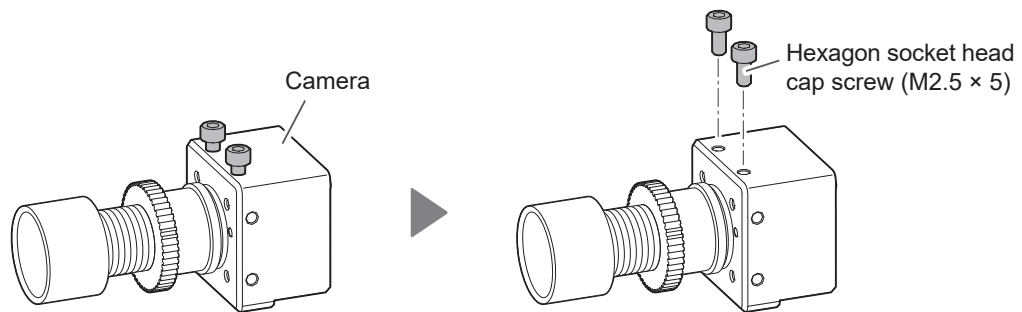
1. Loosen the fixing screw of the lens holder assembly and attach it to the camera. (Do not tighten the screw.)
2. Attach the lens to the camera.
3. Move the lens holder assembly toward the lens and tighten the fixing screw.



5. Assembly (cont'd)

5-4. Attaching the camera to the arm

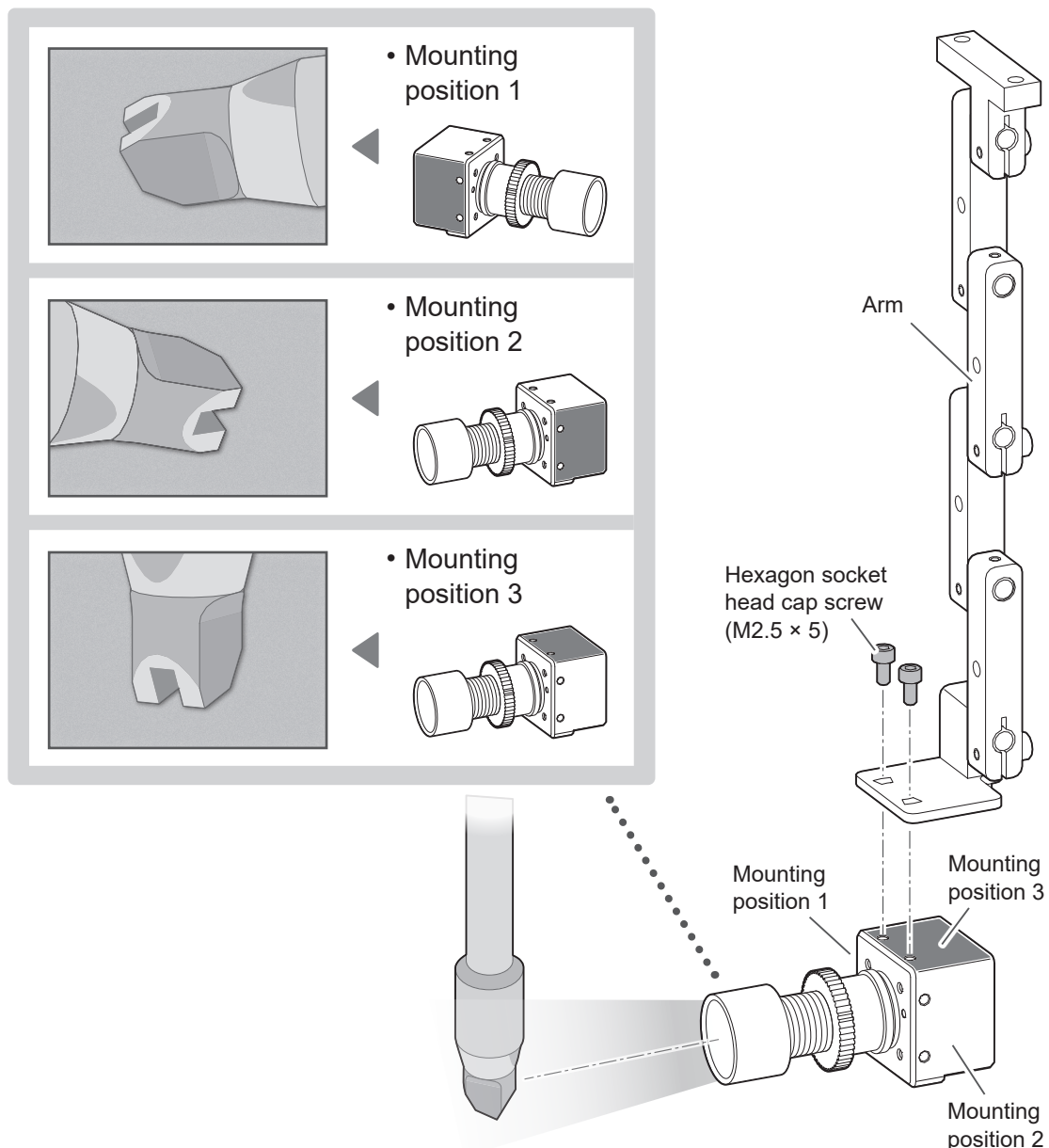
1. Remove the hexagon socket head cap screw (M2.5 × 5) from the camera.



2. Fix the camera to the arm with the screw (M2.5 × 5) in Step 1.

NOTE

The camera can be mounted in 3 different positions. Choose the best position for the video shooting direction.

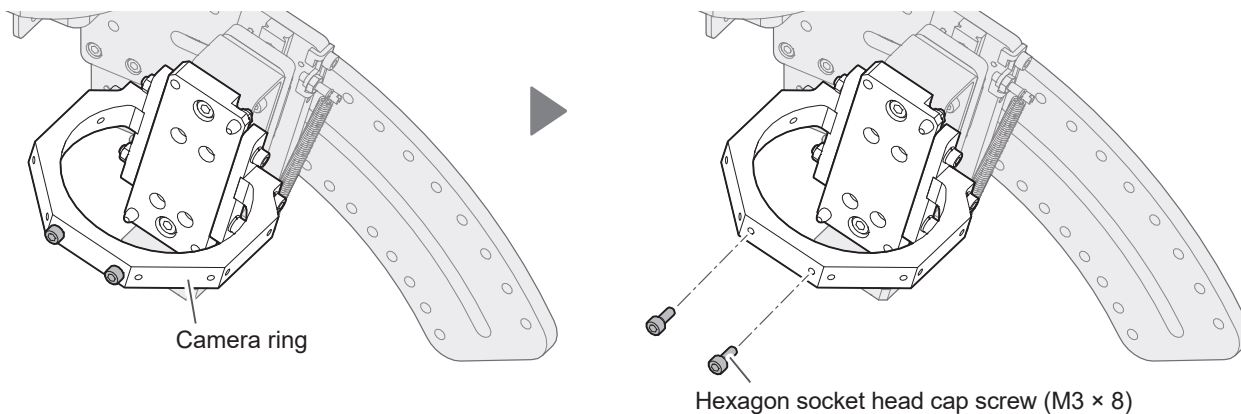


5-5. Mounting the camera ring to the arm

CAUTION

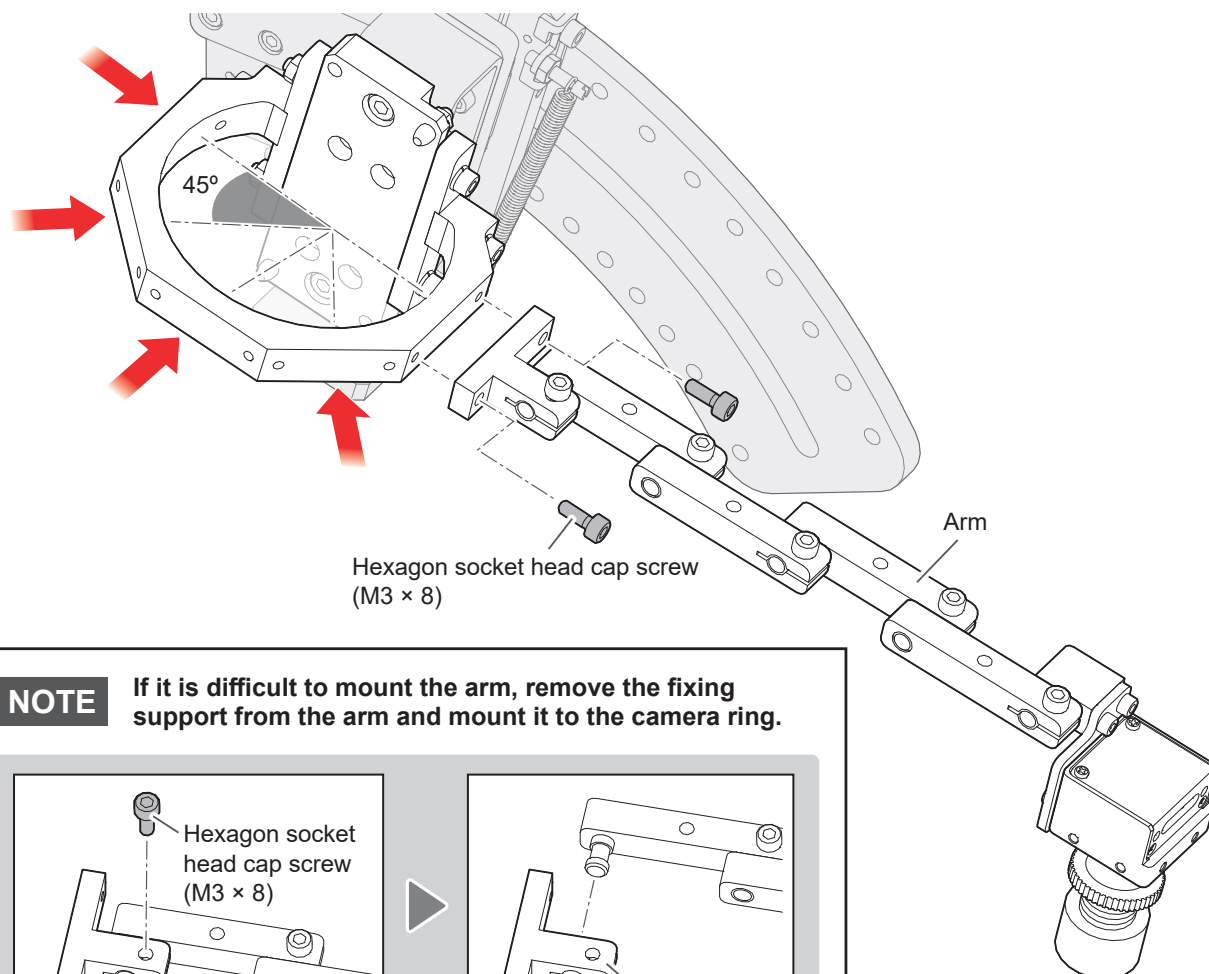
Mount the arm in the direction where the cable can be easily routed.

1. Remove the hexagon socket head cap screw (M3 × 8) from the camera ring.

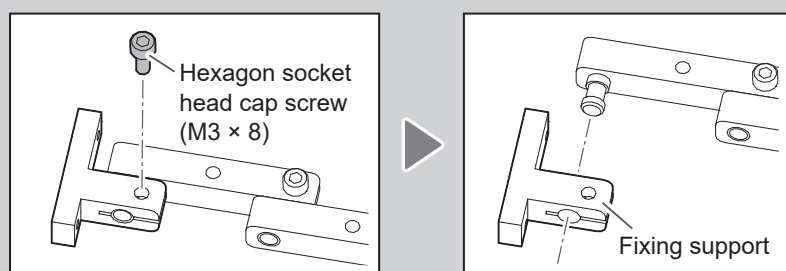


2. Mount the arm to the camera ring with the screw (M3 × 8) in Step 1.

NOTE The fixing support (Arm) can be mounted in any of 5 directions, with 45° increments.

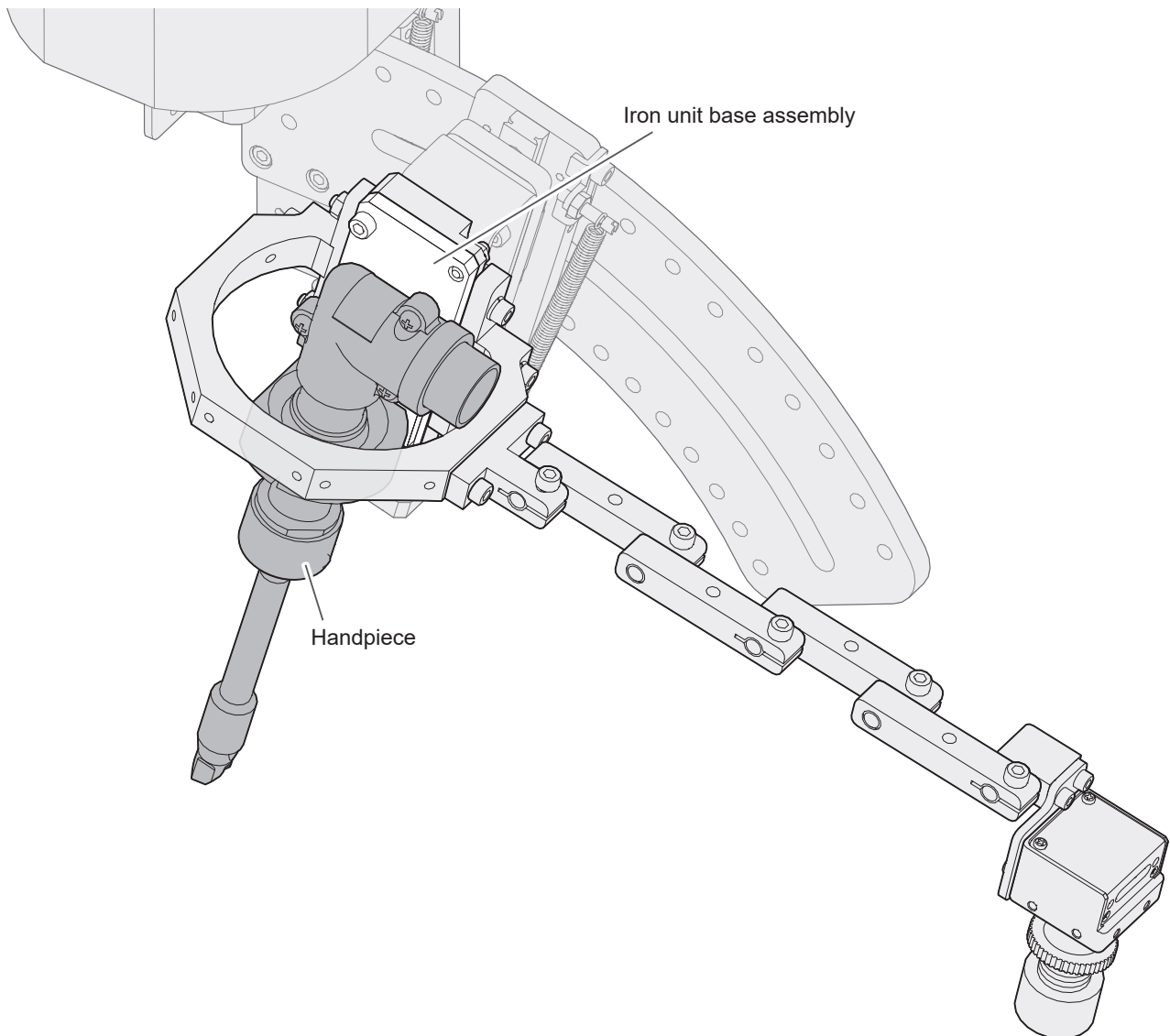


NOTE If it is difficult to mount the arm, remove the fixing support from the arm and mount it to the camera ring.



5. Assembly (cont'd)

3. Mount the handpiece on the iron unit base assembly.

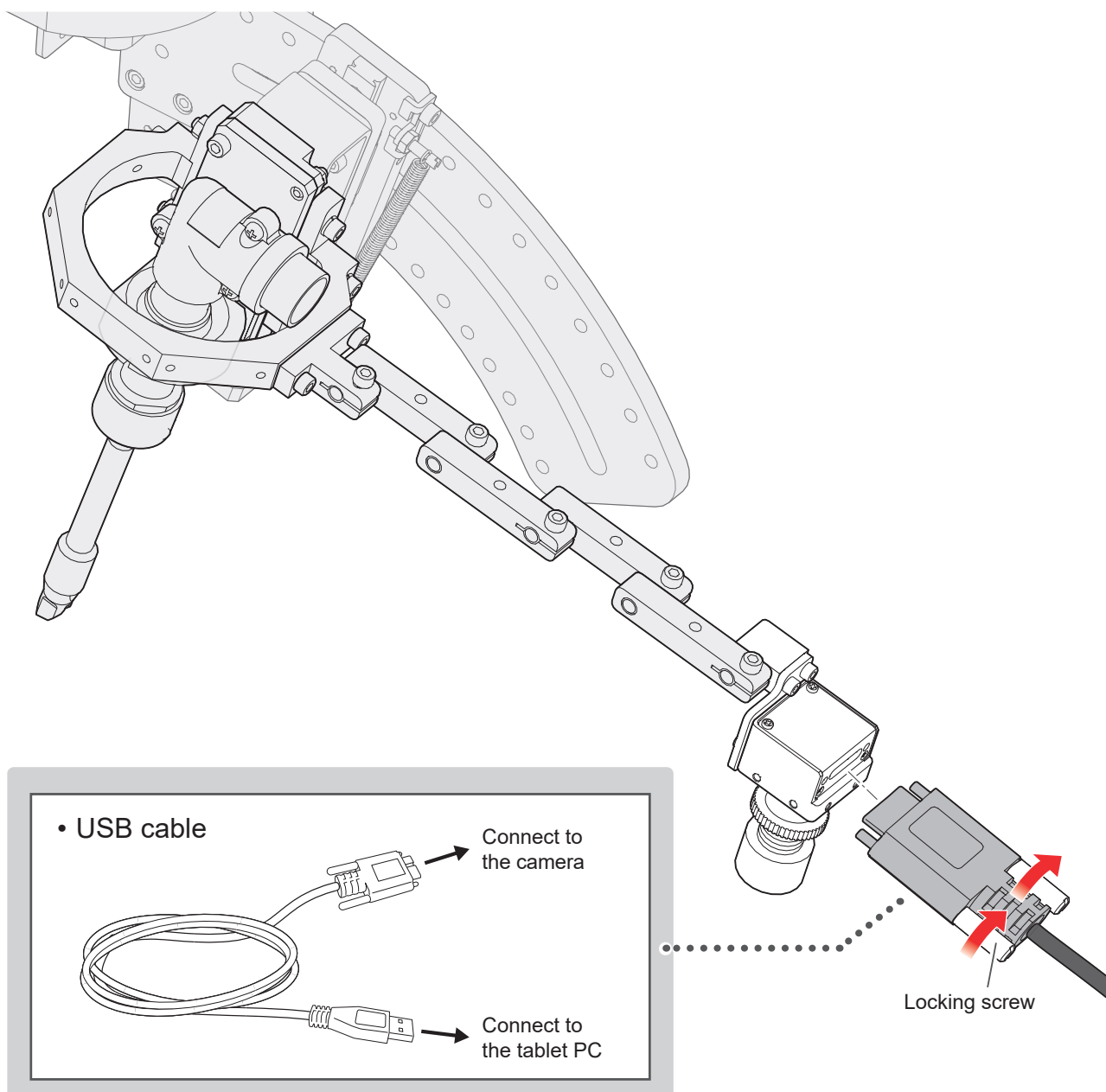


5-6. Connecting the USB cable

CAUTION

- Securely tighten the locking screws to fix the USB connector. If loose, it may cause malfunction.
- Securely fasten the cable tie to fix the USB cable. If loose, it may cause malfunction.

1. Connect the USB cable to the camera.
2. After inserting it all the way in, tighten the locking screws to fix it.



5. Assembly (cont'd)

3. Connect the USB to the USB3.0 port on the tablet PC.

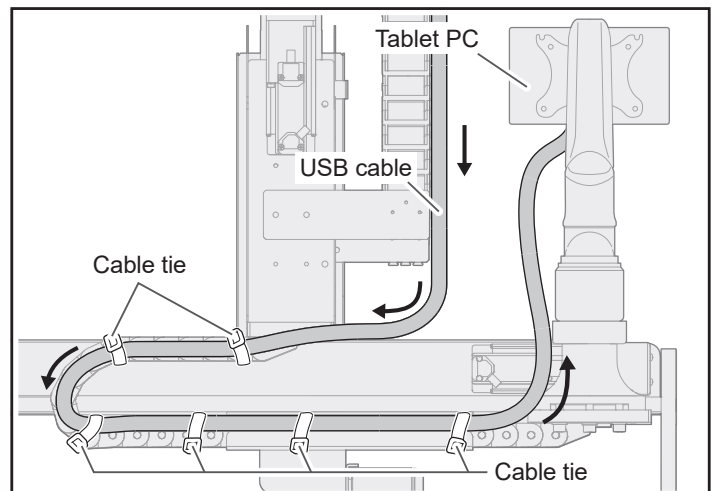
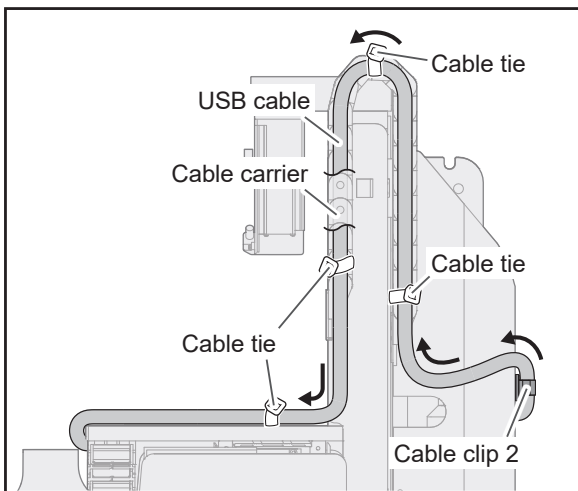
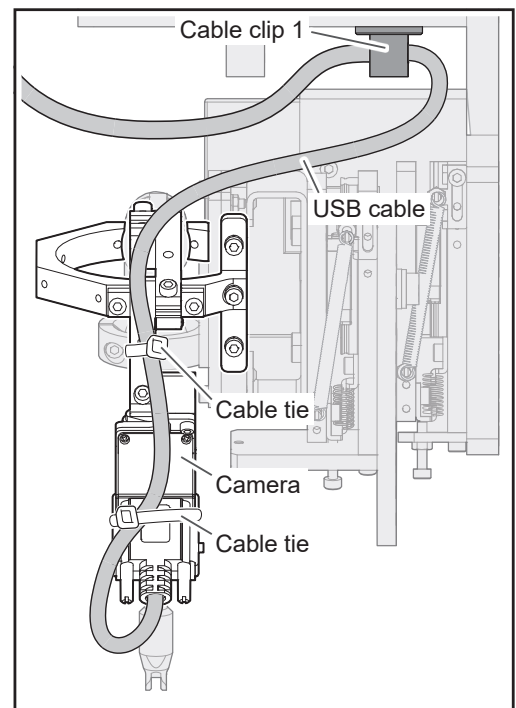
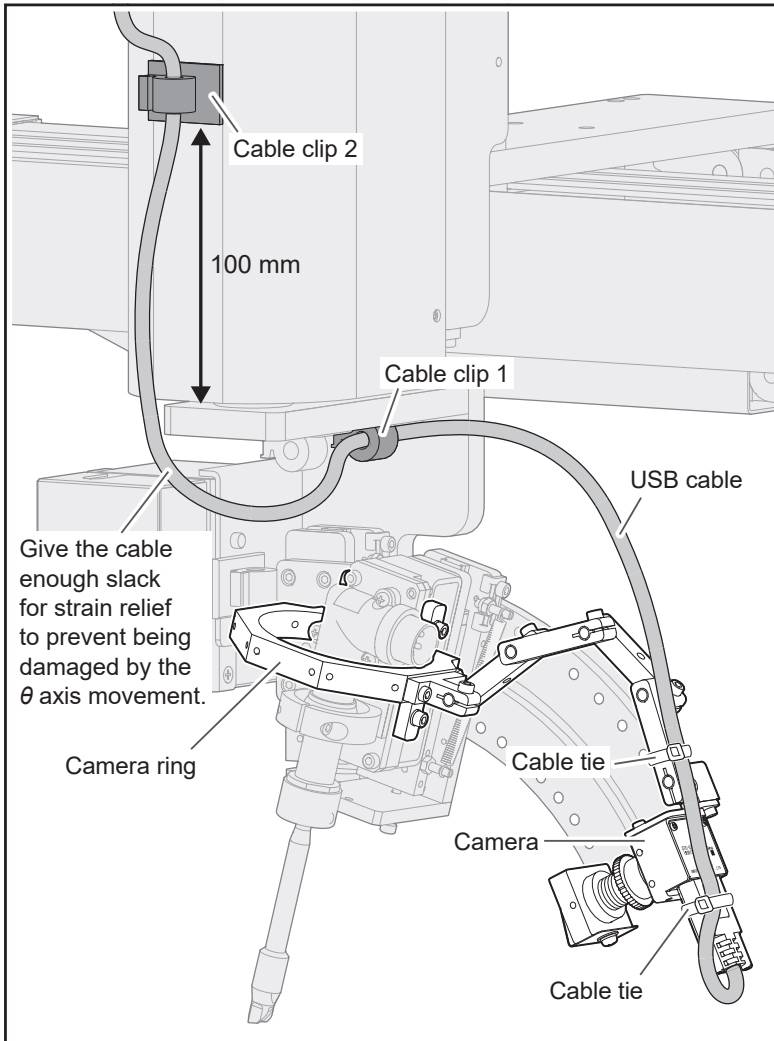
The USB3.0 ports have a blue plastic insert inside.

*The Surface tablet PC has only one USB port, and so it requires a USB3.0 hub to connect the camera and the HU-200.



5-7. Examples of USB cable wiring

After adjusting the camera focus (See "7-2. Adjusting the arm/the camera"), secure the USB cable as shown in the figure below.



6. Installation of the software

6-1. Trace function

The Trace function is available in HAKKO SOLDERING SYSTEM2 (hereinafter referred to as the software) version 4 or later.

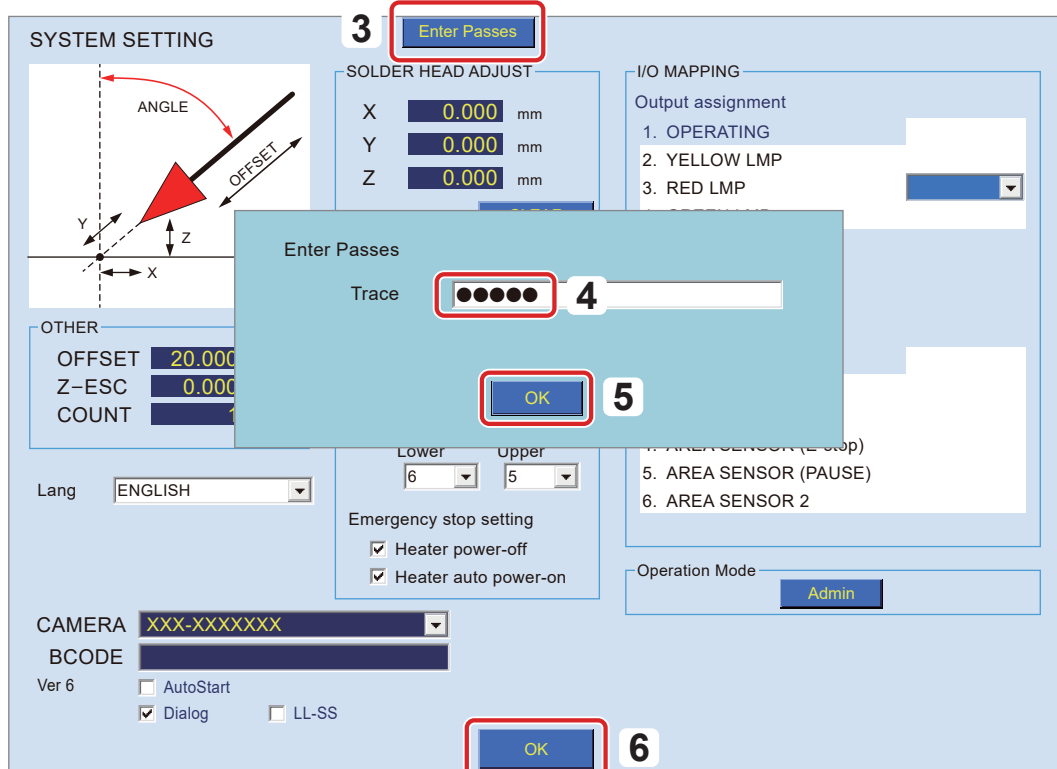
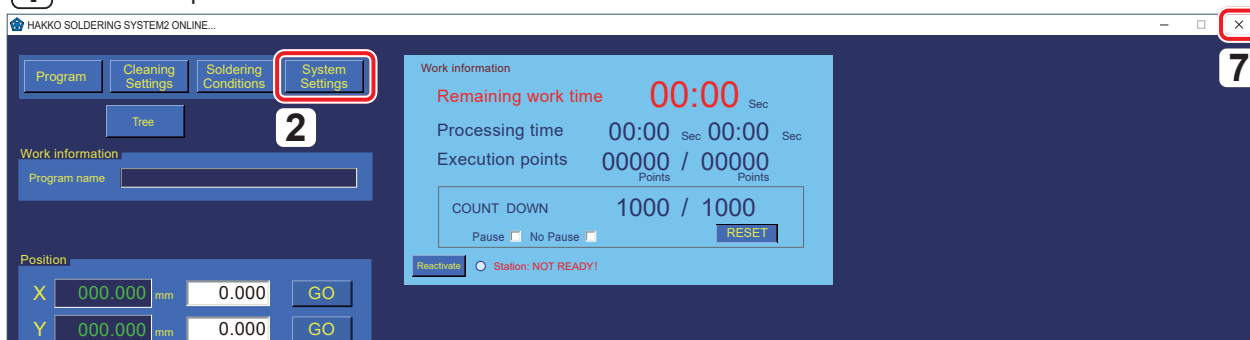
If the software version 4 or later is not installed, use the installer on the CD-ROM that came with this product CX5039.

For installation instructions, refer to "6-2 Performing a Software Update" in the HU-200 instruction manual.

Enabling the Trace function

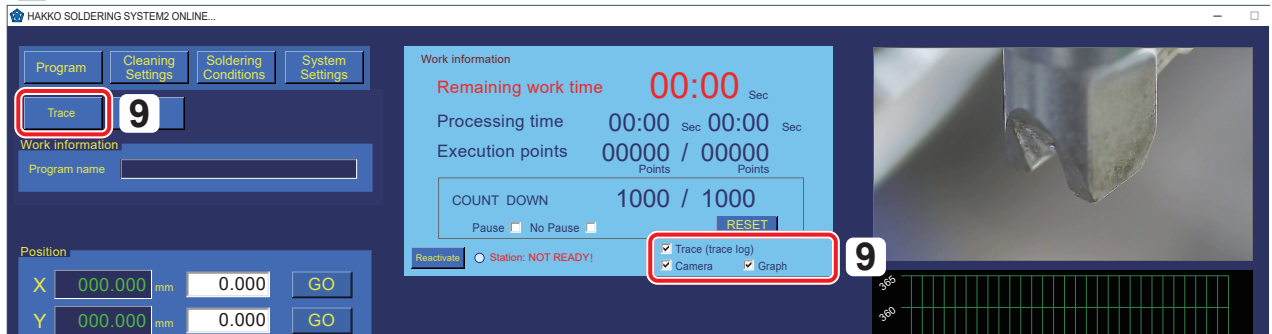
1. Open the software.
2. Tap or click **[System Settings]**.
3. Tap or click **[Enter Passes]** in the SYSTEM SETTING screen.
4. Enter the password provided with the product in the **[Trace]** box using half-width alphanumeric characters.
5. Tap or click **[OK]** to close the Enter Passes screen.
6. Tap or click **[OK]** to close the SYSTEM SETTING screen.
7. Tap or click the close button **[X]** to exit the software.

1 Software top screen



8. Restart the software.
9. The Trace function is now enabled.

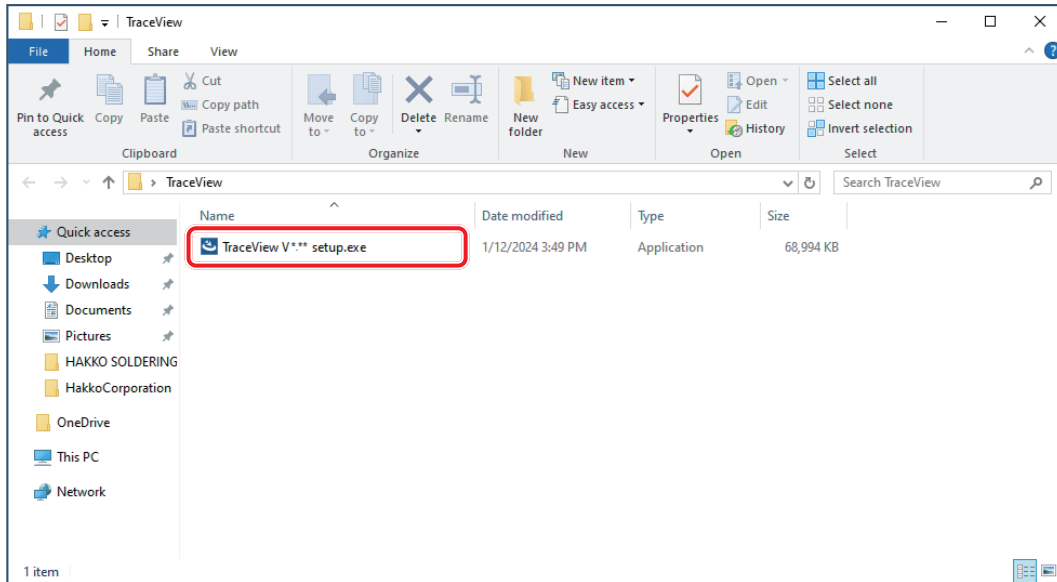
8 Software top screen



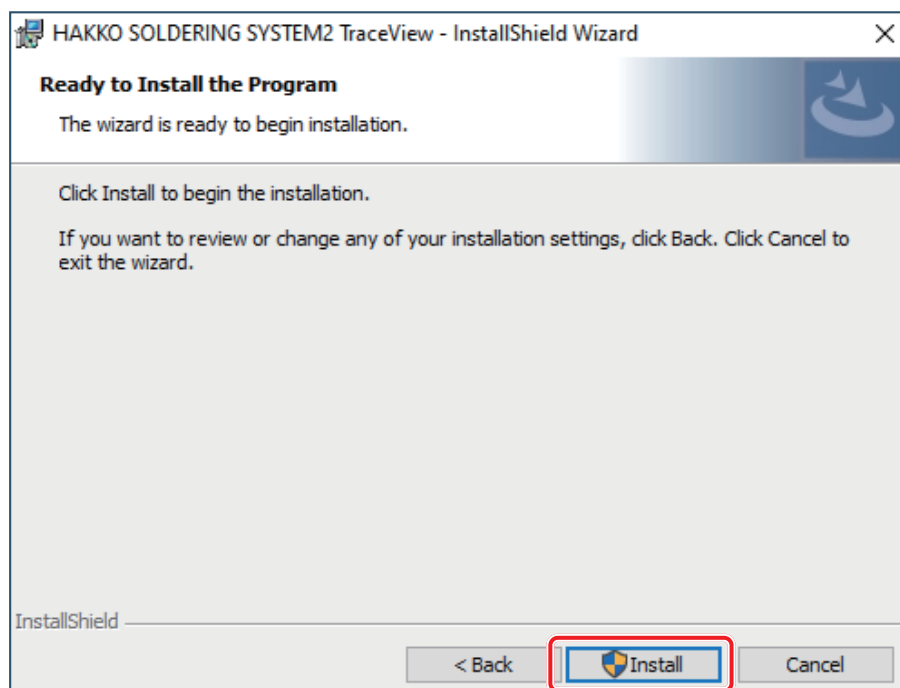
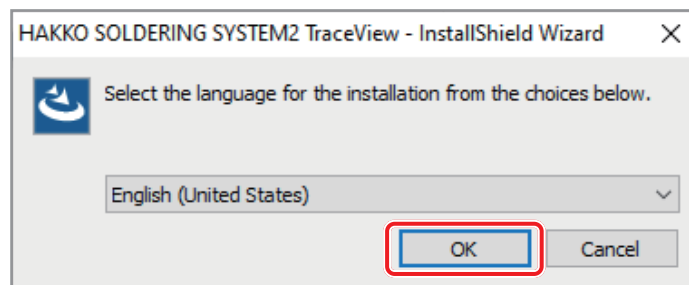
6. Installation of the software (cont'd)

6-2. Installation of TraceView

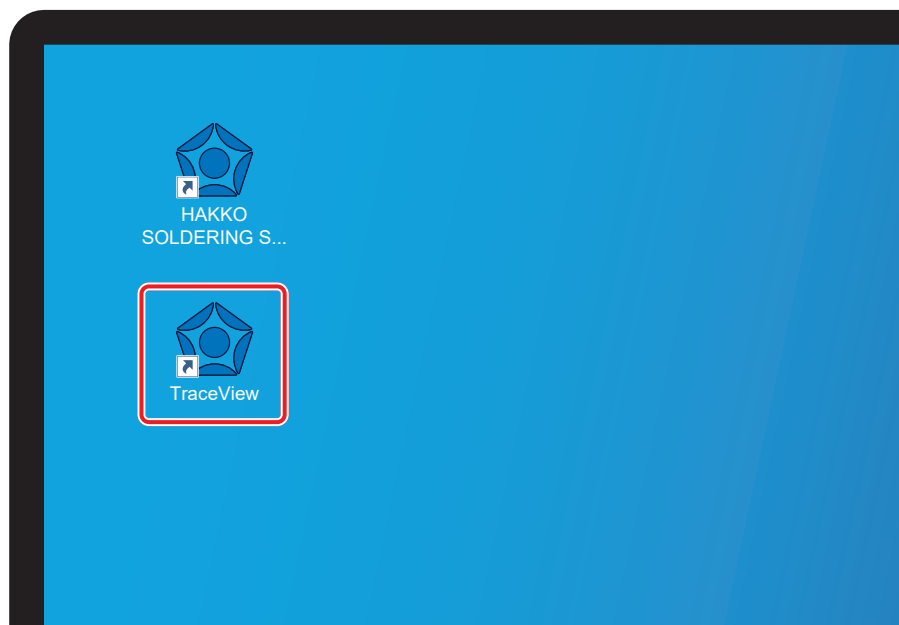
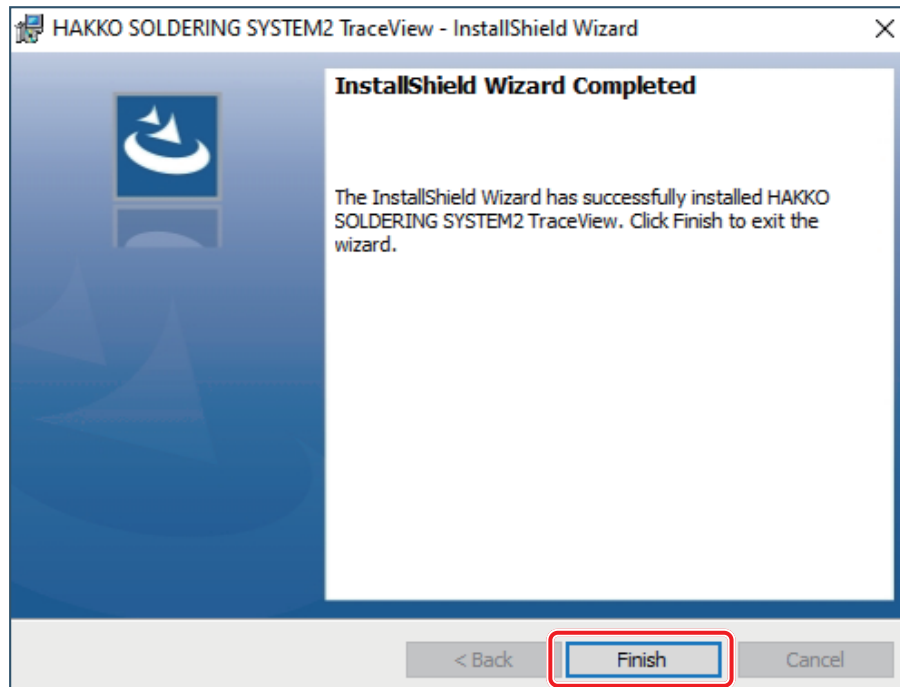
1. Double-tap or double-click the software "**TraceView V*.** setup.exe**" downloaded from CD-ROM.



2. Follow the on-screen instructions to complete the installation.



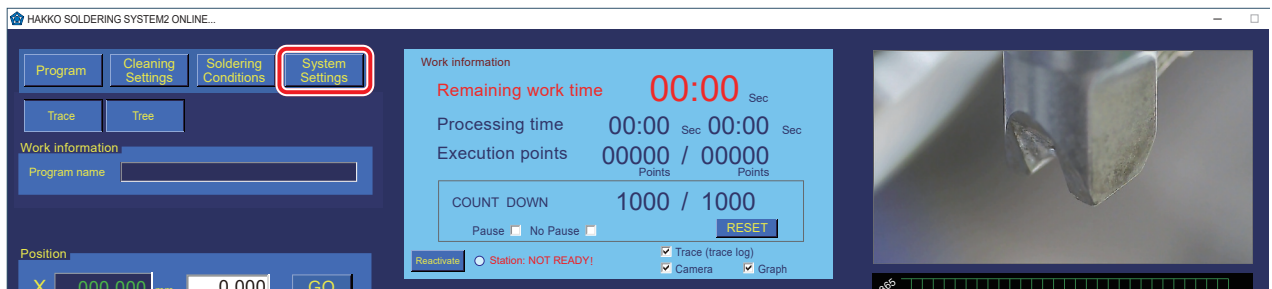
3. If the software is installed correctly, the shortcut will be created on the desktop.
4. Double-tap or double-click the shortcut.
5. TraceView will be launched and the logs can be viewed.



7. Operation

7-1. Camera settings

1. Tap or click [System Settings].



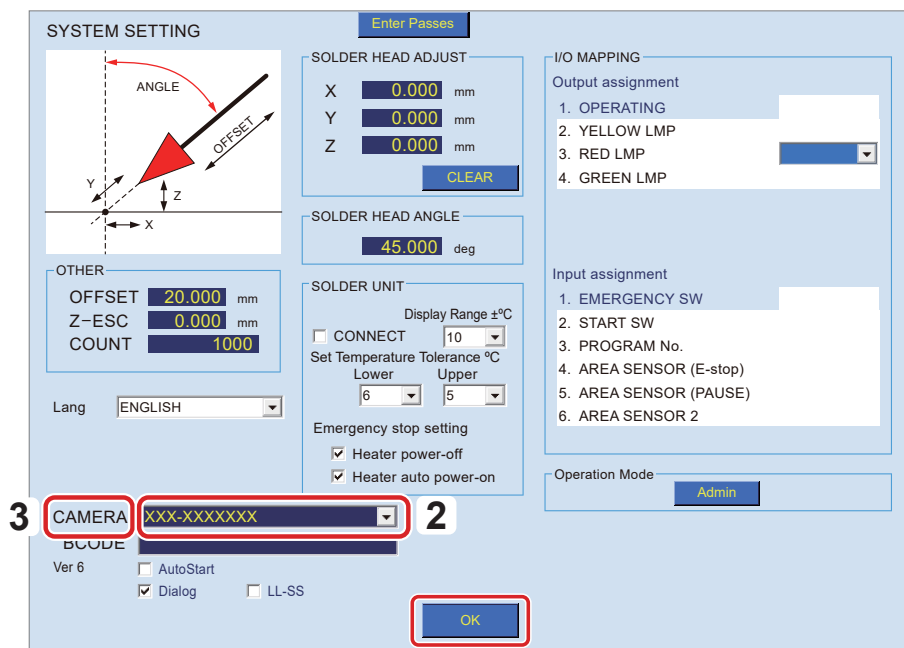
2. Select the camera to record video with the Trace function.

* The camera model number (example: STC-S133UVC) can be found on the rating label of the camera.

NOTE After connecting the camera, the list of available cameras will be displayed when starting the software.

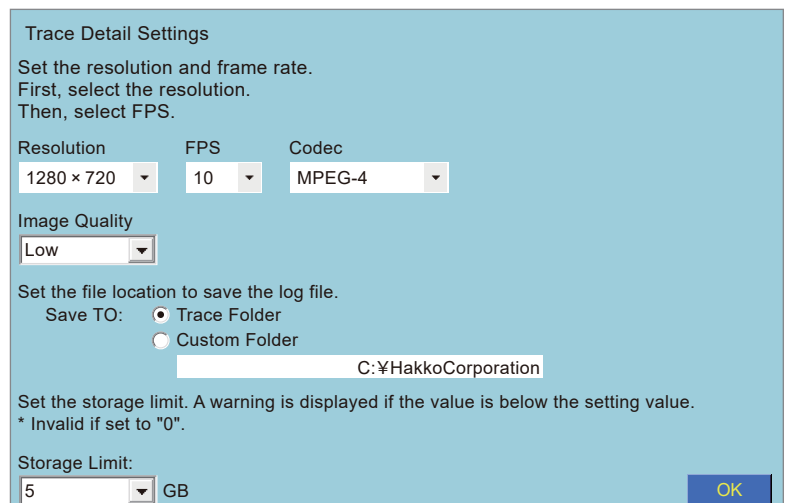
NOTE The camera of the table PC can be used as one of the cameras.

3. Double-tap or double-click the word [CAMERA].



4. The Trace Detail Settings screen will open.

5. The detailed settings screen for Trace is available.



7-1-1. Trace detail settings

Set the detailed settings for Trace.

Trace Detail Settings

Set the resolution and frame rate.
First, select the resolution.
Then, select FPS.

Resolution: 1280 x 720 FPS: 10 Codec: MPEG-4

Image Quality: Low

Set the file location to save the log file.
Save TO: ☒ Trace Folder ☐ Custom Folder
C:\¥HakkoCorporation

Set the storage limit. A warning is displayed if the value is below the setting value.
* Invalid if set to "0".

Storage Limit: 5 GB OK

Resolution	The list of resolutions that can be set for the selected camera. For processing reasons, the resolution is limited to 1280 pixel or less in height and width.
FPS^{*1}	The frame rate value for saving the video.
Codec	Select the software to compress the video. Select according to the compression ratio and the environment such as the video playback software environment.
Image Quality	Select the image quality when saving the video. Generally, higher image quality results in a larger video file size. As a rough guide, a 1-minute soldering video will have the following size. High: approx. 22 MB Standard: approx. 11 MB Low: approx. 4.5 MB
Save TO	Select the folder to save the video and solder log data. When [Trace Folder] is selected, the data is saved in the default folder. Default folder C:\HakkoCorporation\HAKKO SOLDERING SYSTEM2\Trace When [Custom Folder] is selected, the file can be saved in any folder. Click the white frame at the bottom to open the folder selection screen. When saving the data, if the drive specified in Custom Folder is not found, the warning message will appear and all the file will be saved in the default folder until the software is restarted.
Storage Limit	This is the warning threshold for the available space on the drive where the storage folder is located. If the available space on the drive falls below the specified value, a warning will be issued when saving recorded data. *When set to "0", the limit is disabled, and the available space is not monitored.

*1 FPS: Abbreviation for frame per sec.

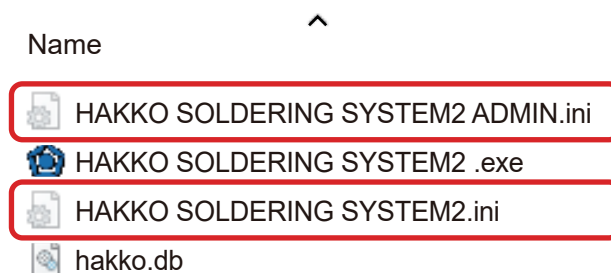
7. Operation (cont'd)

7-1-2. Changing the video quality

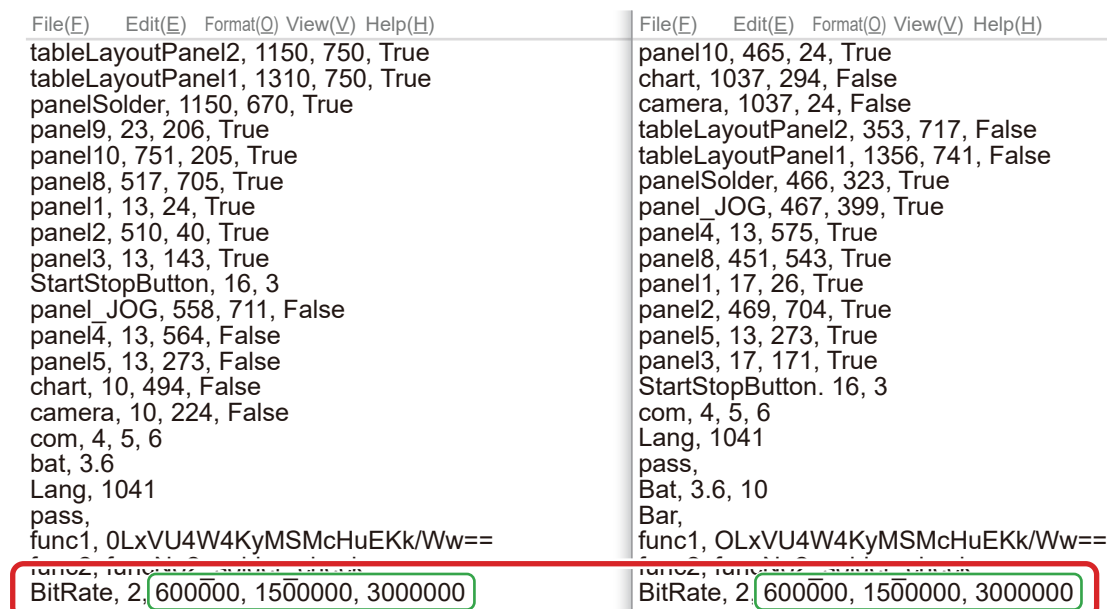
To adjust the Image quality (**High/Standard/Low**) for each, change the bit rate setting, which determines the amount of data space used per second.

The software must be closed before changing the settings.

1. Open the folder in which the software is installed.
2. Open "**HAKKO SOLDERING SYSTEM2 ADMIN.ini**" and "**HAKKO SOLDERING SYSTEM2.ini**" shown below in Microsoft Windows Notepad.



3. Change the three numbers enclosed in green boxes on the line labeled BitRate. The same numbers are written in "**HAKKO SOLDERING SYSTEM2 ADMIN.ini**" and "**HAKKO SOLDERING SYSTEM2.ini**". In the figure below, they are labeled "**600000, 1500000, 3000000**". The meanings of these numbers are 600 kbit/sec for **[Low]**, 1500 kbit/sec for **[Standard]**, and 3000 kbit/sec for **[High]** under **[Image Quality]**. Increasing the number improves the image quality, but increases the size of the video.

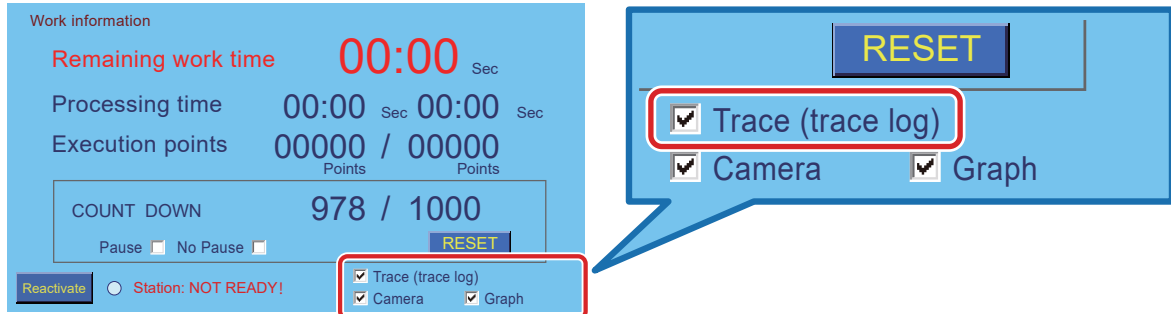


4. After changing the values, overwrite save the file and launch the software.

7-1-3. Setting up the Trace function

Set up the Trace function.

Trace setting



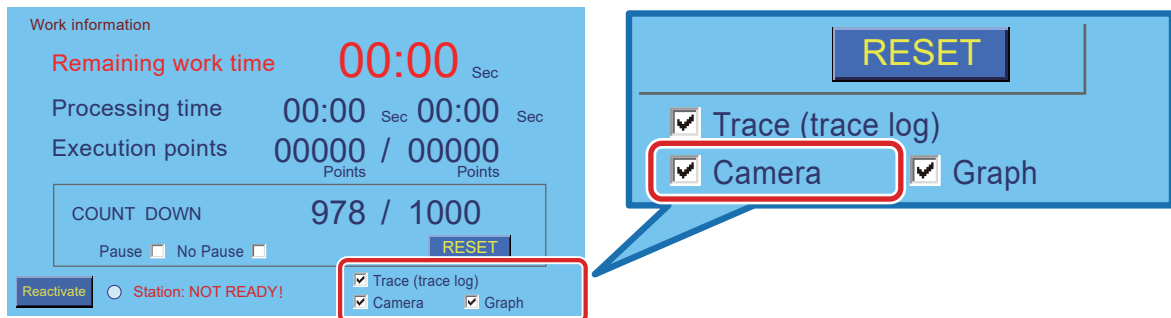
When the **[Trace]** is checked, the software will record soldering operation during program run.

***The current coordinates of X, Y, Z, and θ axis, solder feed conditions, and tip temperature (if CONNECT setting in SOLDER UNIT is checked) will be recorded. The video will also be recorded.**

*When the program is stopped due to the emergency stop or error, the record up to that point is saved.

*No recording during the DRY RUN.

Camera setting

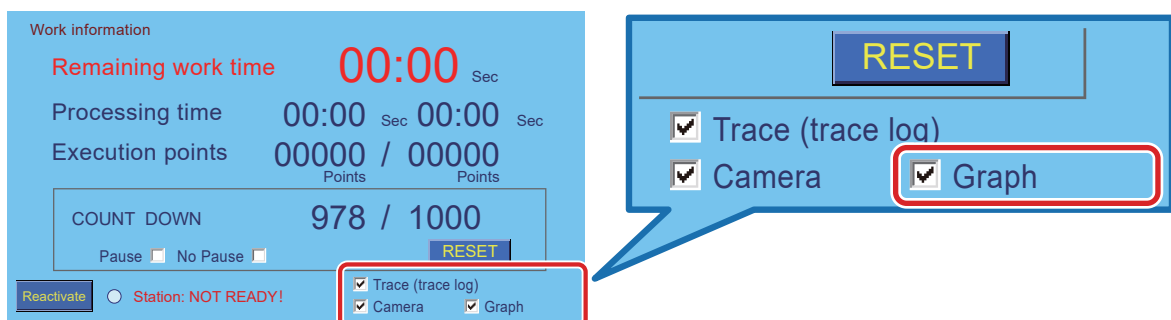


When the **[Camera]** is checked, the image of the selected camera will be displayed on the software top screen.

If a camera is not selected in SYSTEM SETTING screen, the image of the first camera in the camera list will be displayed.

When the **[Camera]** is unchecked, no image will be displayed but the Trace function will continue video recording with the camera.

Graph setting



When the **[Graph]** is checked, the graph of the tip temperature of the SOLDER UNIT will be displayed on the software top screen. When the **[Graph]** is unchecked, no graph will be displayed but the Trace function continues recording the tip temperature.

7. Operation (cont'd)

7-2. Adjusting the arm/the camera

1. Open the software top screen.
2. The camera footage is displayed in the upper right corner of the screen.

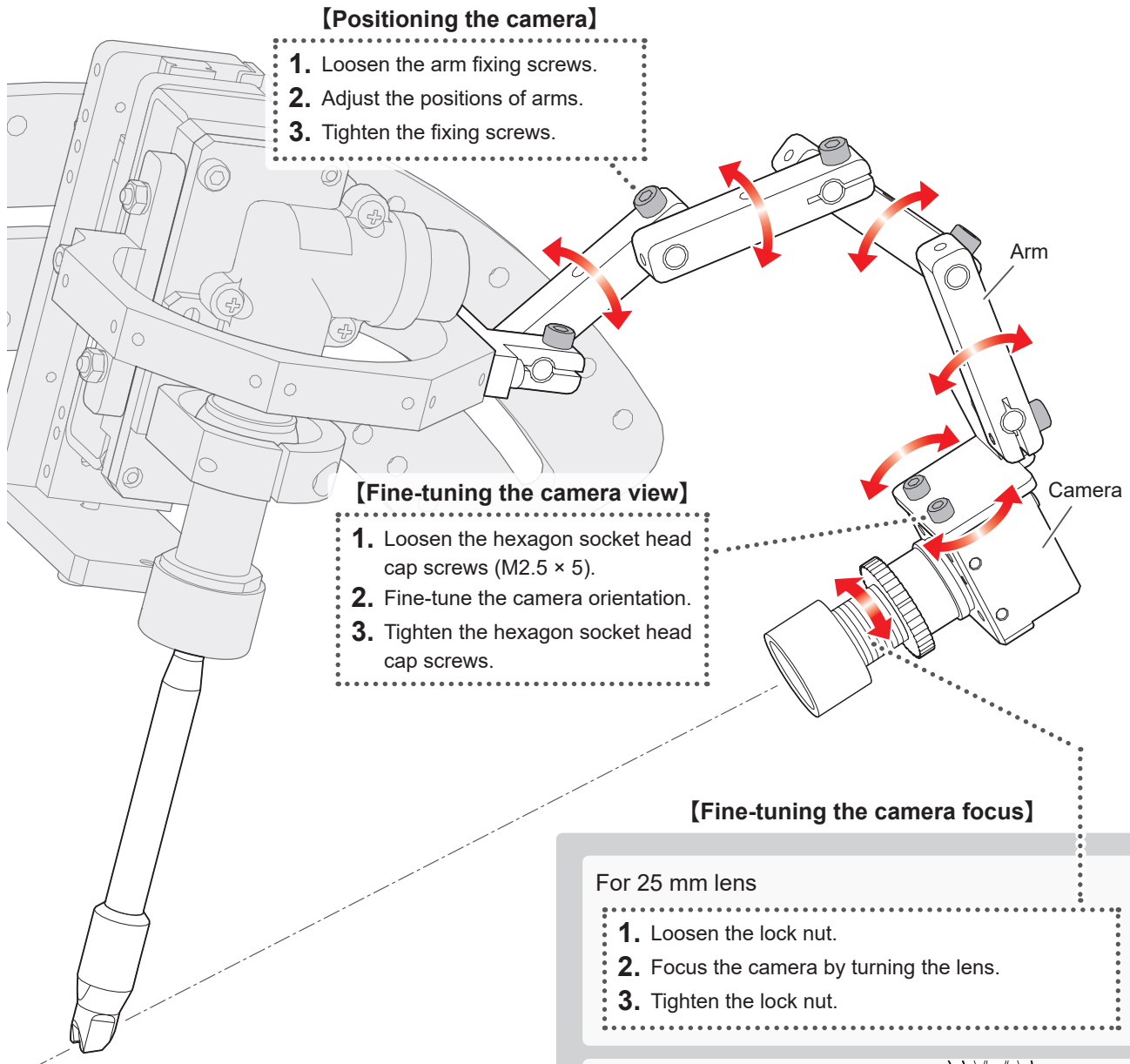


3. Adjust the arm/camera to the camera footage until the camera is in focus.

Example 1: Soldering iron tip

Example 2: Soldering point

NOTE The lens adjustment is easier without the glass coverslip holder.



[Fine-tuning the camera focus]

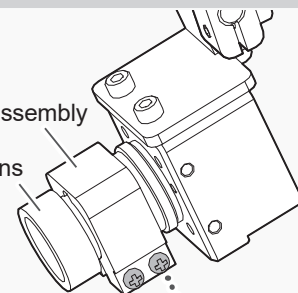
For 25 mm lens

1. Loosen the lock nut.
2. Focus the camera by turning the lens.
3. Tighten the lock nut.

For 12 mm lens (optional)

Lens holder assembly

Lens



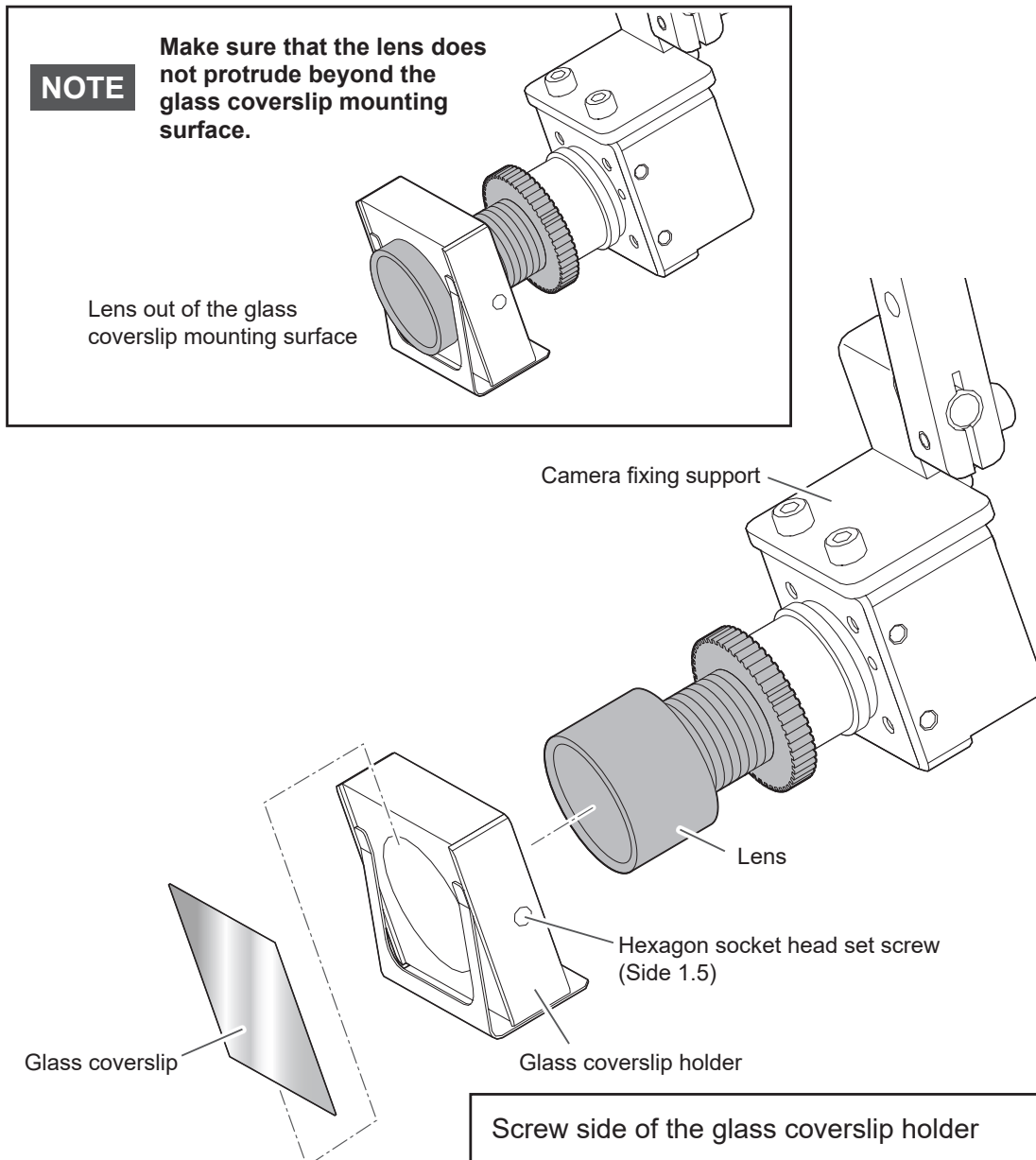
1. Loosen the fixing screws.
2. Focus the camera by turning the lens.
3. Tighten the fixing screws.

7. Operation (cont'd)

7-3. Attaching the glass coverslip holder

* The image below shows how to attach a 25 mm lens. The attachment method for the 12 mm (optional) lens is the same.

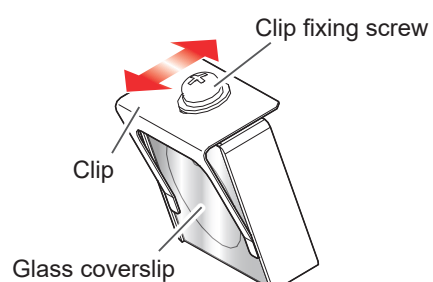
1. Loosen the hexagon socket head set screw to attach the glass coverslip holder to the lens and tighten the screw to fix it.
2. Insert the glass coverslip into the holder.



Screw side of the glass coverslip holder

NOTE

If it is hard to insert the glass coverslip or if it comes off the holder easily, loosen the screw to fix the clip of the holder and adjust it.

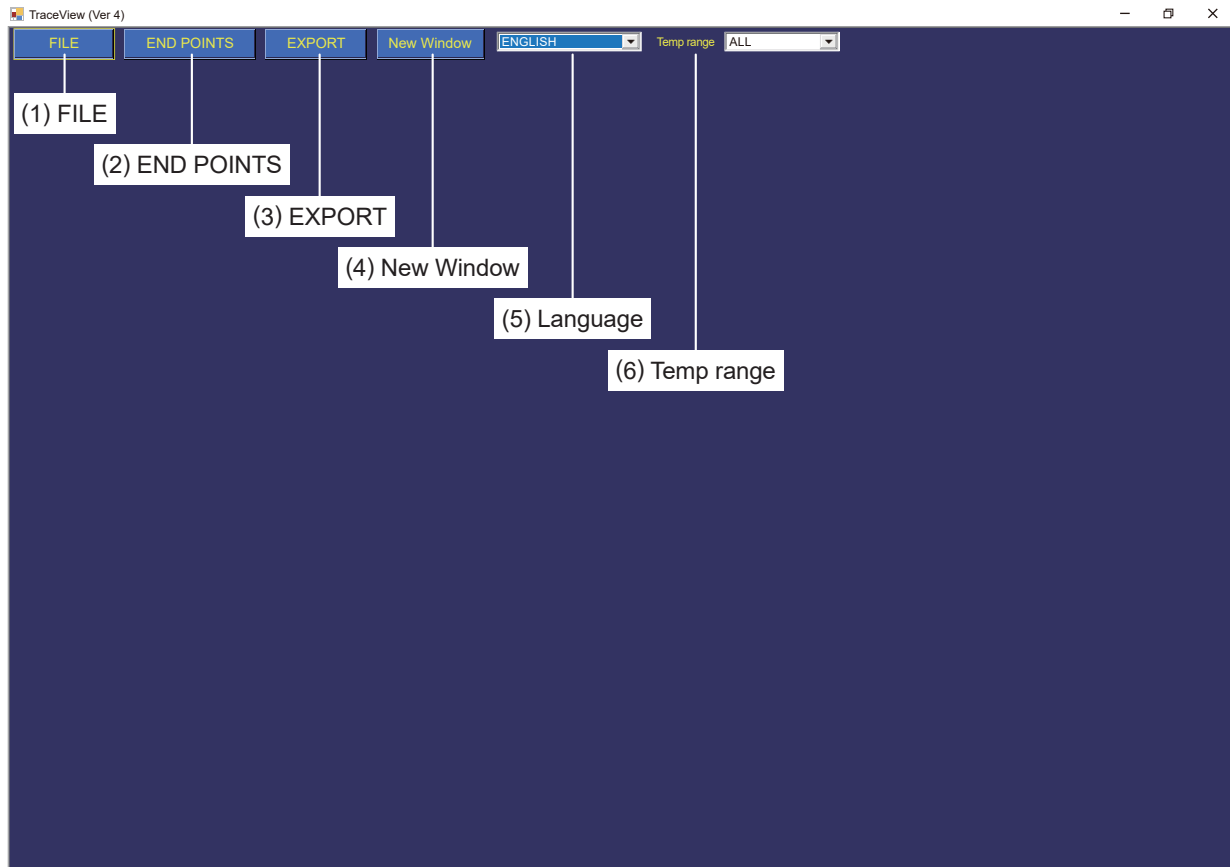


7-4. Checking the logs

7-4-1. Starting the TraceView

1. Press the **[Trace]** button on the software top screen.
Or, double-tap or double-click the TraceView shortcut on the desktop.
2. The TraceView starts.

● Names of parts



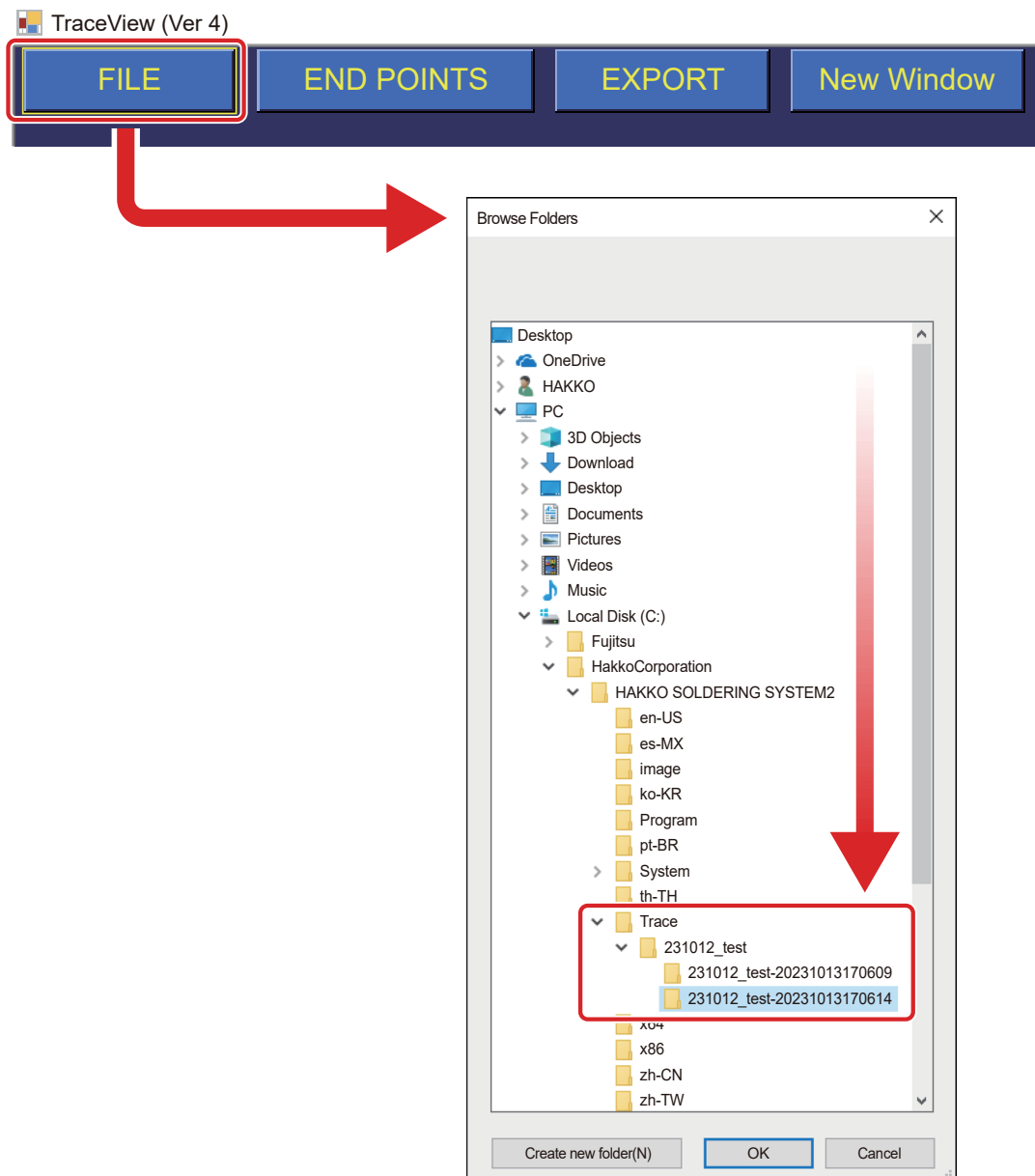
(1) FILE	This is the button to open the log file.
(2) END POINTS	This is the button to select all rows with coordinates in the END POSITION cells. The Export column of the selected row will be checked.
(3) EXPORT	This is the button to export the log data.
(4) New Window	This is the button to open a new TraceView window for comparing data.
(5) Language	This is the button to switch the display language.
(6) Temp range	This is the button to set the temperature range for display in the temperature window. The temperature $\pm$ temperature range for the selected row in the information window (p. 33) will be displayed.

7. Operation (cont'd)

7-4-2. How to open the log files

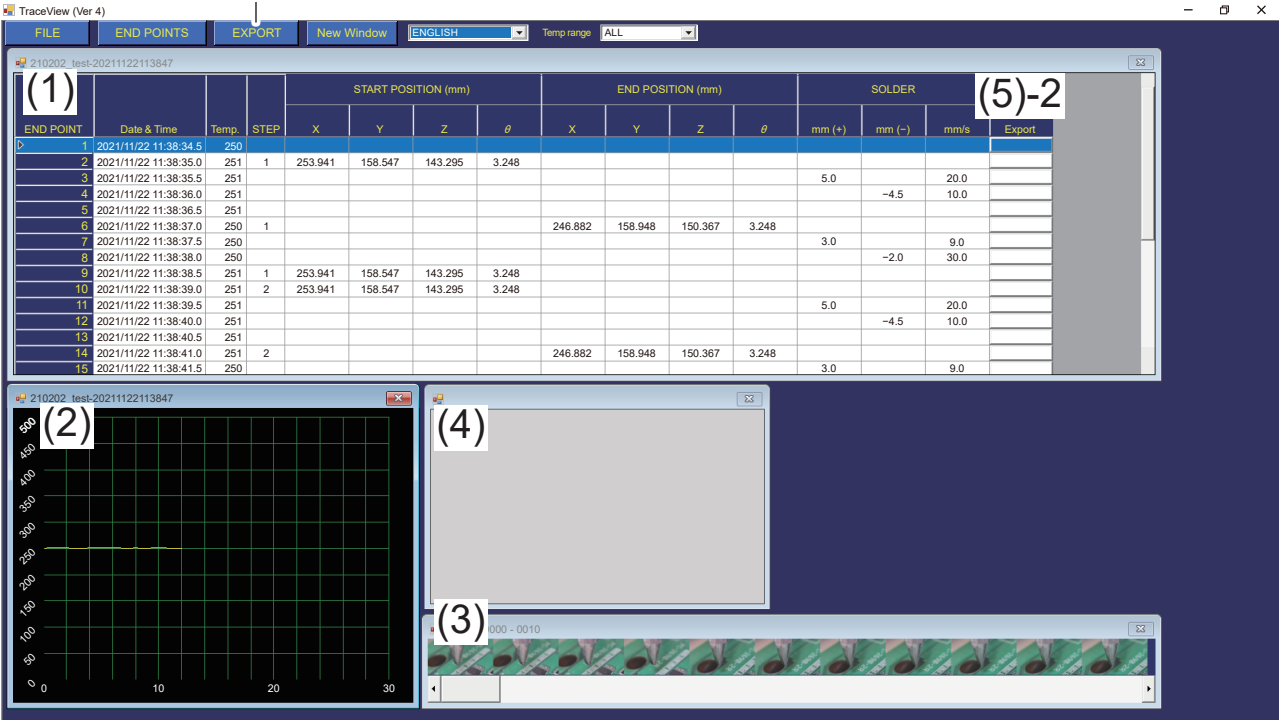
- Selecting the log data

1. Press the **[FILE]** button.
2. Follow the folder tree to the folder where the log file is stored.
In that folder, there are the log files for each soldering program name.
3. Select the folder specifically required for the date and time.
4. Press the **[OK]** button.



7-4-3. How to view the log data

(5)-1



● The function of each window

(1) Information window	The soldering iron temperature, robot position, solder feed information are displayed in the table. Since the soldering iron temperature is acquired every 0.5 seconds, the records of the robot's position and solder feed time are approximated to 0.5 seconds. When a row for a specific timing is clicked, the contents of the temperature, Camera, and Camera2 windows will change to the timing.
(2) Temperature window	The soldering iron temperature is displayed as the graph. When the yellow line for a specific timing is clicked, the contents of the information, Camera, and Camera2 windows will change to the timing.
(3) Camera window	The captured video is displayed frame by frame. When click a frame image for a specific timing, the enlarged image will be displayed in the Camera2 window. The contents of the information and temperature windows will change to the timing.
(4) Camera2 window	The enlarged images of the selected frame or a specific timing will be displayed.
(5)-1 [EXPORT] button	This is the button to export the log data.
(5)-2 Export button	This button has the same function as the [EXPORT] button. Tap or click the cell that displays Export.

7. Operation (cont'd)

7-4-4. How to output the log data

The read log data can be saved in the following two formats.

* Microsoft Excel is required to view the data saved by TraceView.

▪ Report format

Save the report in the following format as shown below.

* When selecting multiple data, a separate sheet is created for each data within a single file.

	A	B	C	D	E	F	G	H
1								
2								
3								
4								
5								
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								
16		Program Name 31012_test-20231013170614						
17		Soldering Date&Time 2023/09/28 13:16:34.0						
18		Soldering Sequence / 2 Program Step = 2						
19		Soldering Temperature 340(340) °C						
20		Soldering Condition 0mm, 0.0mm/s, 1H = 1.0sec						
21		5.0mm/s, 2B = 0.0mm, 0.0mm/s, 2H = 0.1sec						
22		0.0mm/s, 3B = 0.0mm, 0.0mm/s, 3H = 0.0sec						
23		End Position 0.308mm, θ = 0.000°						

▪ Table format

All data of the selected file will be saved in a tabular format similar to the information window.

Export data procedures

○ Report format

1. Check the **Export** box for the row to export.
2. Press the **[EXPORT]** button.
3. Select the location to save the file.

○ Table format

* If the **Export** column of any data row is checked, tap or click there to uncheck.

1. Press the **[EXPORT]** button.
2. Select the location to save the file.



Other functions

[END POINTS] button

This is the button to select all rows with coordinates in the **END POSITION** cells.
The **Export** column of the selected row will be checked.

8. Maintenance



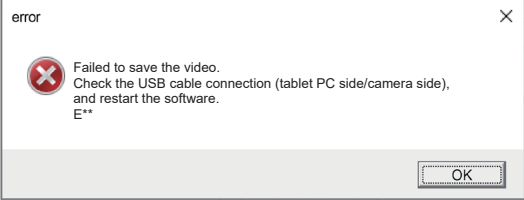
CAUTION

Turn the power off and unplug the power cord before inspecting or replacing any internal components.

■ Periodic maintenance

- Remove any flux residue from the camera unit (from camera ring to glass coverslip) with industrial alcohol.
- Replace the glass coverslip if it is dirty.

9. Troubleshooting

 CAUTION		
Unplug the power cord before inspecting or replacing any internal components.		
The following dialog box is displayed. 	Is the USB cable loose or disconnected? (See "5-6. Connecting the USB cable")	Reconnect the USB cable, and restart the software. ▶ If the problem persists, the camera may be broken. Please contact the distributors where you purchased the product.
The resolutions "1280 × 720" and "1280 × 960" are not listed on the dropdown list in Trace Detail Settings.	Is the USB cable (tablet PC side) connected to a USB2.0 port?	▶ Connect to a USB3.0 port (blue).
The software may crash during robot operation.	If the video recording format is set to H.264, the processing load may increase and the software may crash.	▶ MPEG-4 is recommended.

If you cannot find a solution in this manual, or if another problem occurs, please contact the distributors where you purchased the product.



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