

***ENGLISH***

**BK-11-13085  
INSTRUCTION MANUAL**

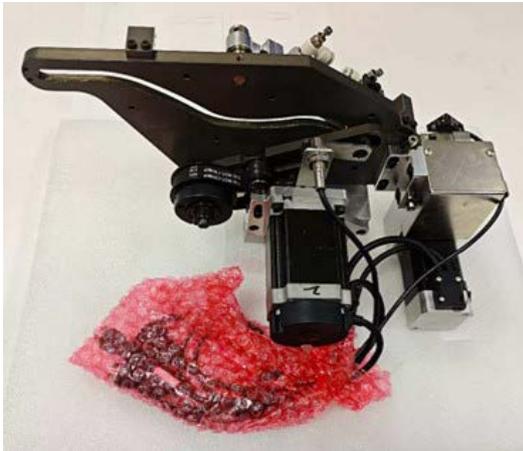
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# Component parts list

Check the below-stated parts.

**Bobbin changer asm., main body**



**BK expansion electrical control box, complete set**

**BK expansion electrical box, 1 pieces**

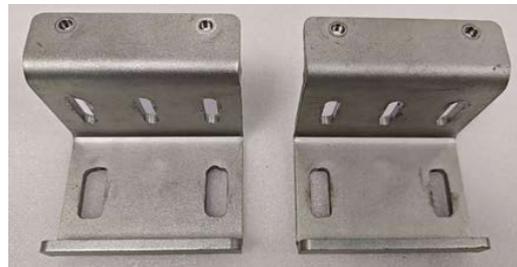
**BK communication cable, 1 pieces**



**BK base (13085 type)**



**BK base plate (13085 type)**



\* - - - - indicates individually packaged parts.

**[Cables and other parts]**

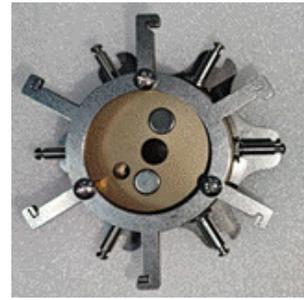
**Air pipe 370cm, 2 pieces**



**Spiral tube 40cm**



**Bobbin cassette, 2 pieces**



**Arm head motor  
encoder cable**



**Bobbin cassette motor  
encoder cable**



**Bobbin changer  
medium sensor cable**



**Arm head motor  
power cable**



**Bobbin cassette motor  
power cable**



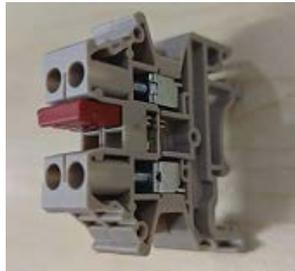
**Bobbin changer  
rear sensor cable**



**Solenoid valve, complete set**



**Ground terminal block, complete set**



**Cable clip band, 2 pieces**



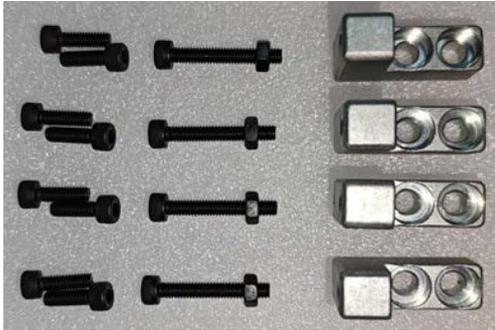
**FG wire**



\* - - - - indicates individually packaged parts.

[Screws and related parts]

Block : 4 pieces  
 Block mounting screw : 8 pieces  
 X-direction adjustment screw : 4 pieces  
 Nut : 4 pieces



Screw set 1

Z-direction adjustment screw : 4 pieces  
 Nut : 4 pieces



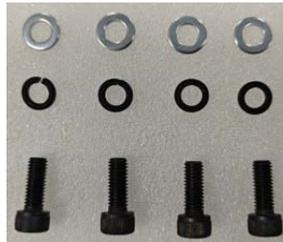
Screw set 2

Base plate mounting screws :  
 4 pieces  
 Spring washer : 4 pieces  
 Washer : 4 pieces



Screw set 3

Base plate mounting screw :  
 4 pieces  
 Spring washer : 4 pieces  
 Washer : 4 pieces



Screw set 4

BK device mounting screws :  
 4 pieces  
 Spring washer : 4 pieces  
 Washer : 4 pieces



Cable clip band fixing base :  
 4 pieces  
 mounting screw : 2 pieces



FG wire screw : 1 pieces



\* - - - - indicates individual-  
 ly packaged parts.

1. The bobbin case and bobbin are not included with the BK-11. Please purchase them separately.



2. When using the bobbin thread remaining detection device, please purchase the dedicated bobbin case. Part number: 40237773



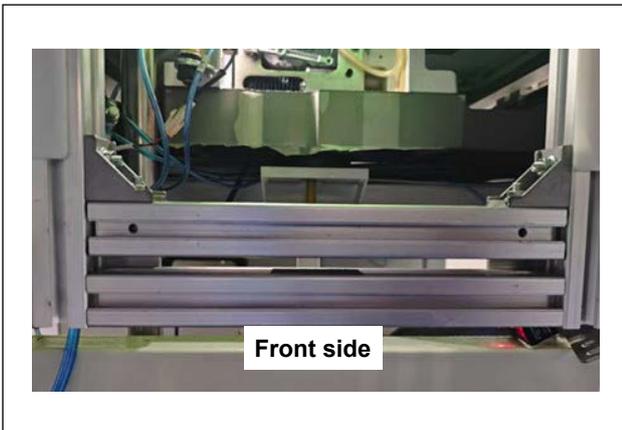
The dedicated bobbin case has a groove on its cylindrical portion.

3. The BK cassette can hold a total of six bobbins and bobbin cases; however, one slot is required as a space for removing the bobbin and bobbin case from the sewing machine. Recommended quantity for new purchase (two cassettes)  
 10 bobbins and 10 bobbin cases, 10 bobbins and 10 dedicated bobbin cases

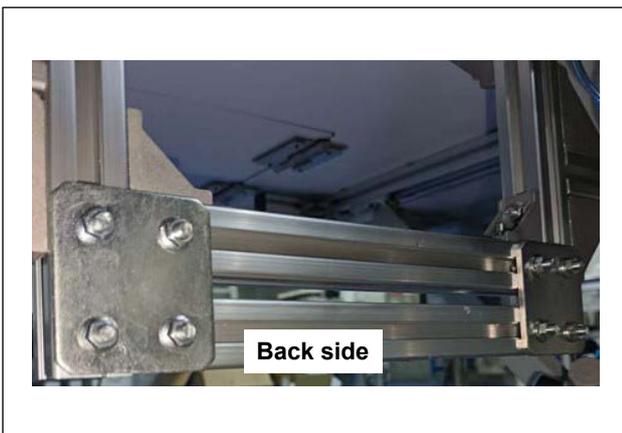
## 1. Modification of the PS810-13085 aluminum frame mounting plate



- 1) The mounting plate on the front aluminum frame of the 13085-specification sewing machine affects BK unit installation; therefore, modify it before installing the unit.



- 2) Remove the nuts from the mounting plate, then remove the plate and screws.



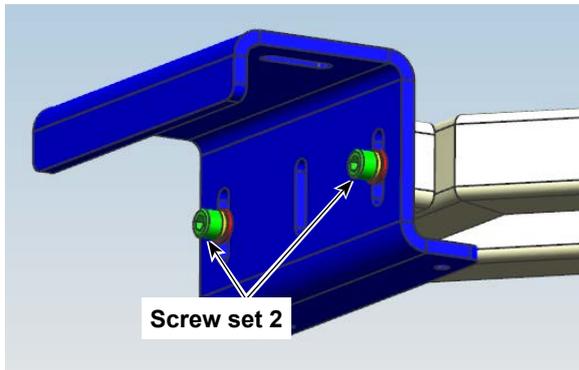
- 3) Reinstall the mounting plate in the same position as on the back side.

## 2. Installing the main body of automatic bobbin changer

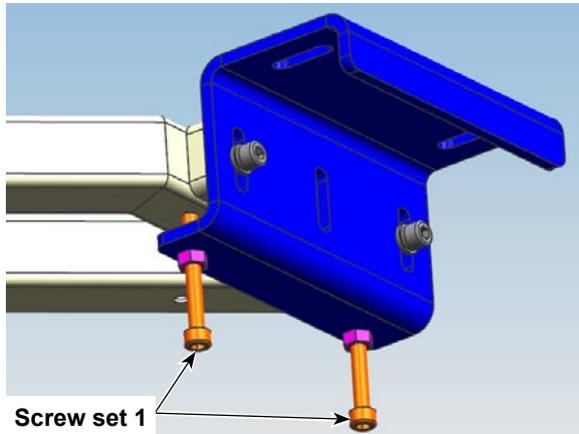
### 2-1. Installing the main body BK-11(13085 type)

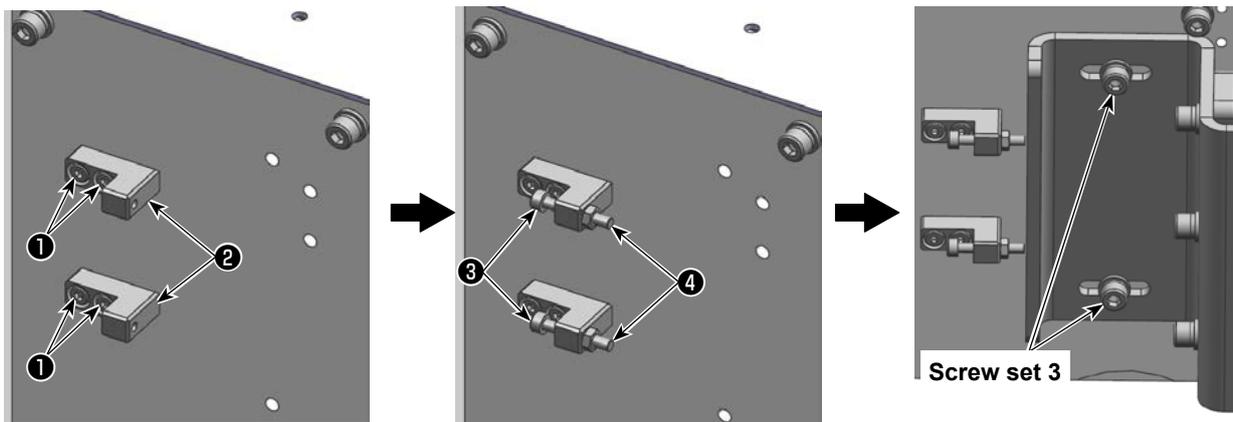
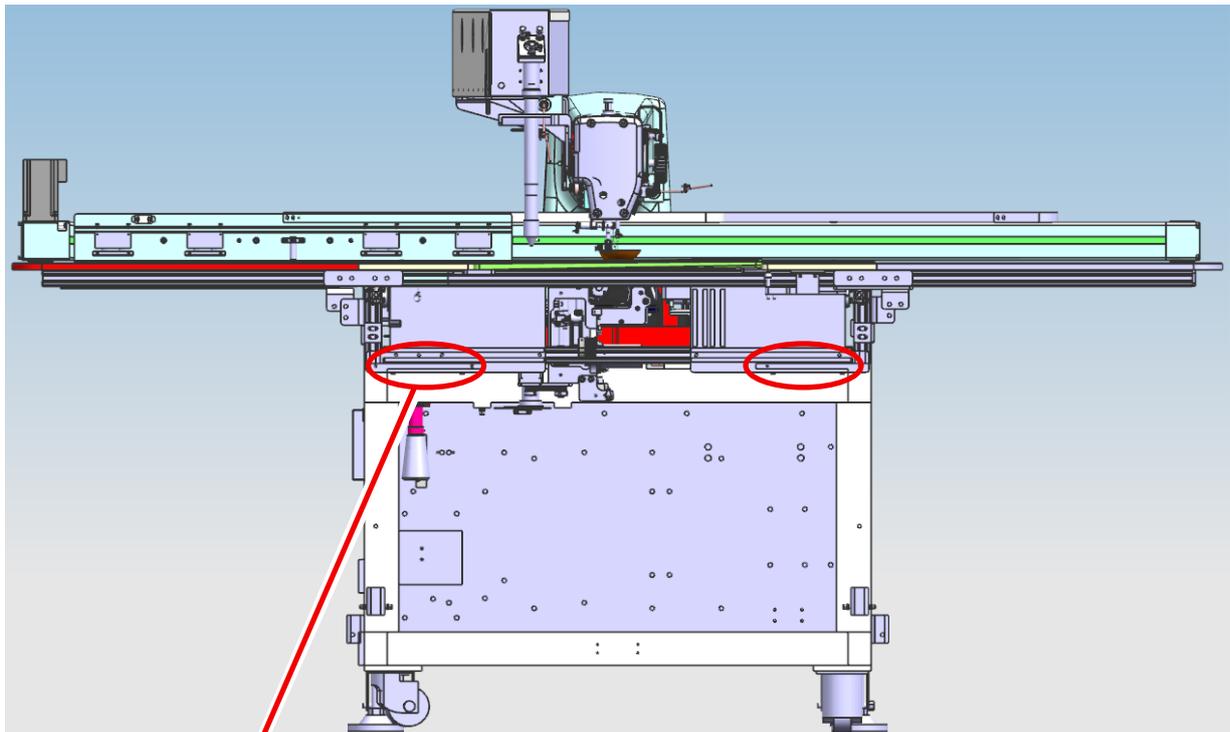
#### WARNING :

1. Installation procedure of the automatic bobbin changer must be carried out by a trained technical expert.
2. Before starting work, be sure to disconnect the power plug from the power outlet.
3. Request your distributor or a specialized electrician to carry out electric wiring.
4. Do not connect the power plug of the sewing machine before completing the installation procedure.  
If the start button is pressed during the work by mistake, the sewing machine will actuate, posing a great risk.
5. Be sure to connect the ground wire.  
If the ground wire connection is not proper, electric shock can be caused.

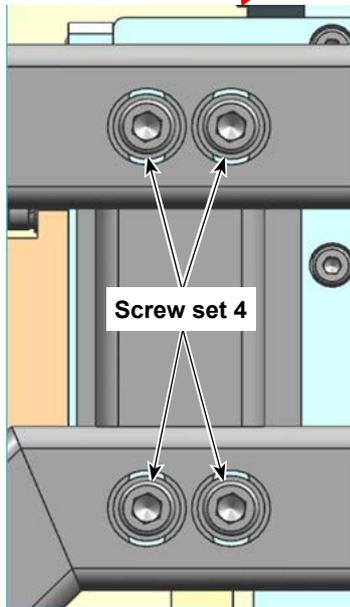
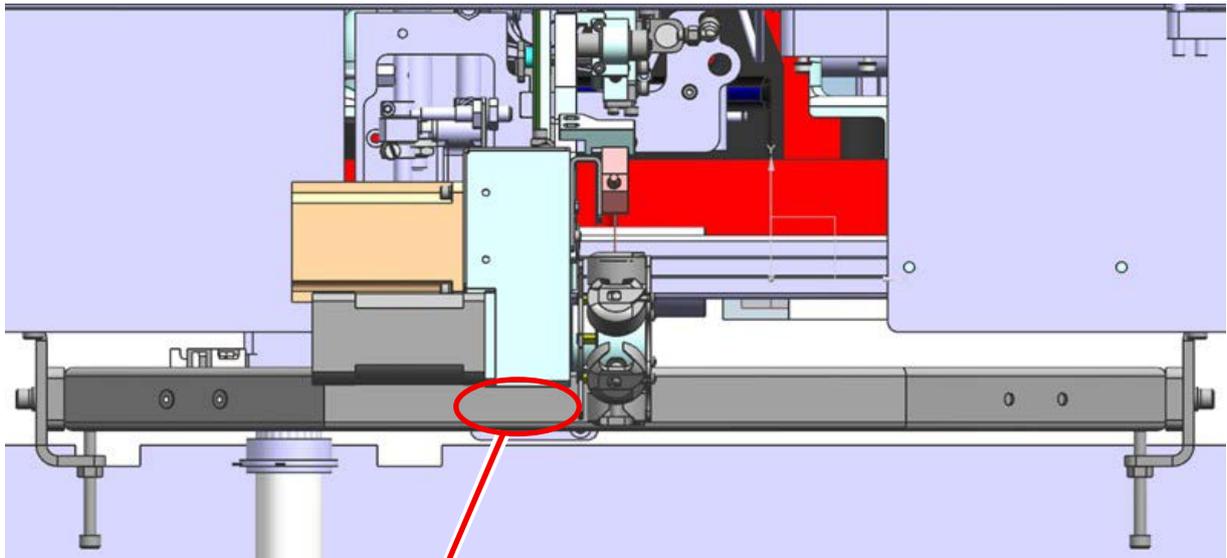


- 1) Assemble the BK base plate and BK base using the base plate mounting screws, spring washers, and flat washers from screw set 2. (Both sides)
- 2) Install the Z-direction adjustment screws with nuts onto the BK base plate from the bottom. (Both sides)





- 3) Using block mounting screws **1** , install block **2** at the spare mounting hole positions on the lower front side of the sewing machine frame. (Both sides, total of 4 locations)
- 4) Install the X-direction adjustment screw **3** into the block, and attach nut **4** to the side where the screw protrudes.
- 5) Using screw set 3, install the parts assembled in steps 1 and 2 at the spare mounting hole positions on the lower front side of the sewing machine frame.



6) Install the BK unit onto the BK base using screw set 4.

### 3. Adjusting the installation

#### 3-1. Adjusting the installation of the automatic bobbin changer

##### WARNING :

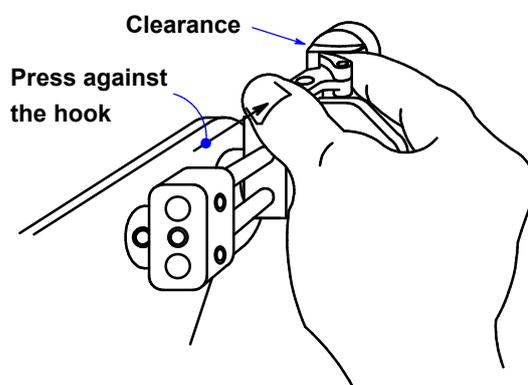
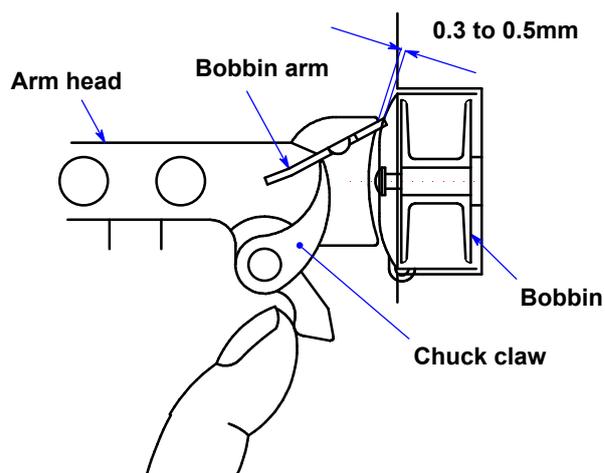
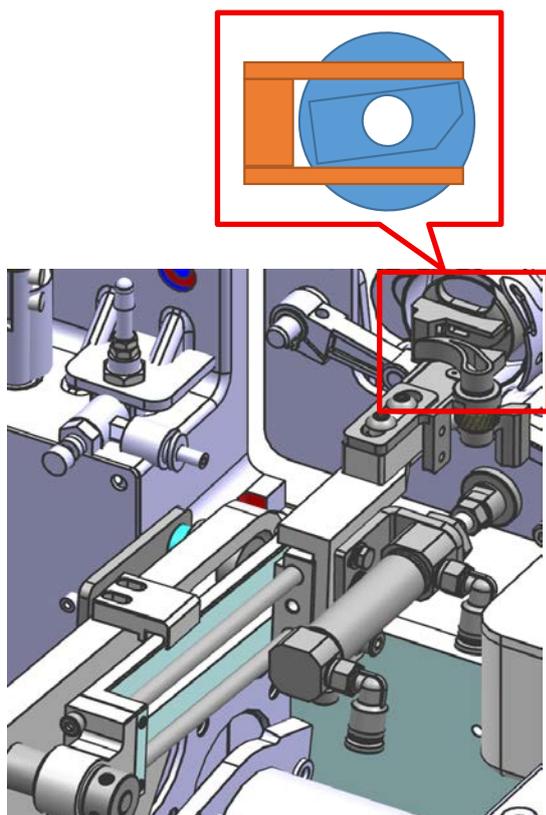


1. Adjustment procedure has to be carried out by a trained technical expert.
2. Be sure to turn OFF the power to the sewing machine and to the automatic bobbin changer, and unplug them. Turn OFF the air supply to decrease the air pressure to "0 (zero)". It is quite dangerous to actuate the sewing machine and / or the bobbin changer during the adjustment work.

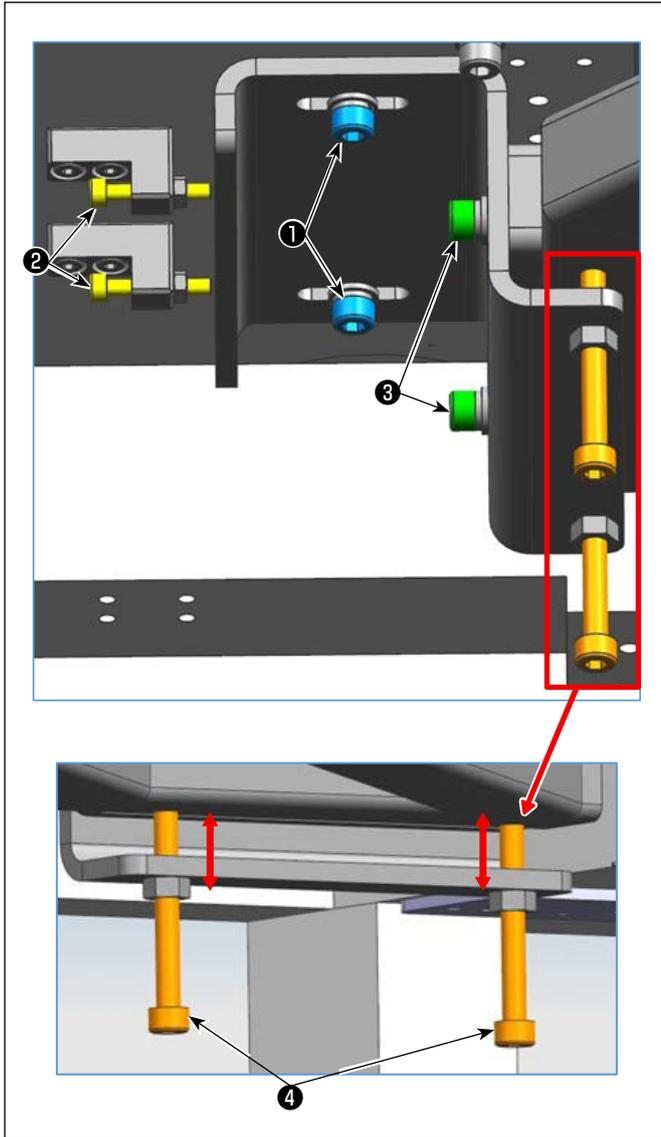
##### ■ Mounting position adjustment goal

The objective of the mounting position adjustment is to enable the bobbin case to be smoothly removed from and inserted into the hook.

- 1) First, move the arm head to the frontmost position so that it comes into contact with the bobbin.
- 2) Check the relative positions of the chuck jaw area and the bobbin case, then adjust the X, Y, Z, and tilt angle positions according to the degree of misalignment.
- 3) The final adjustment result should allow the bobbin arm to be securely clamped by the chuck jaws, enabling the bobbin case to be smoothly removed from and inserted into the hook.

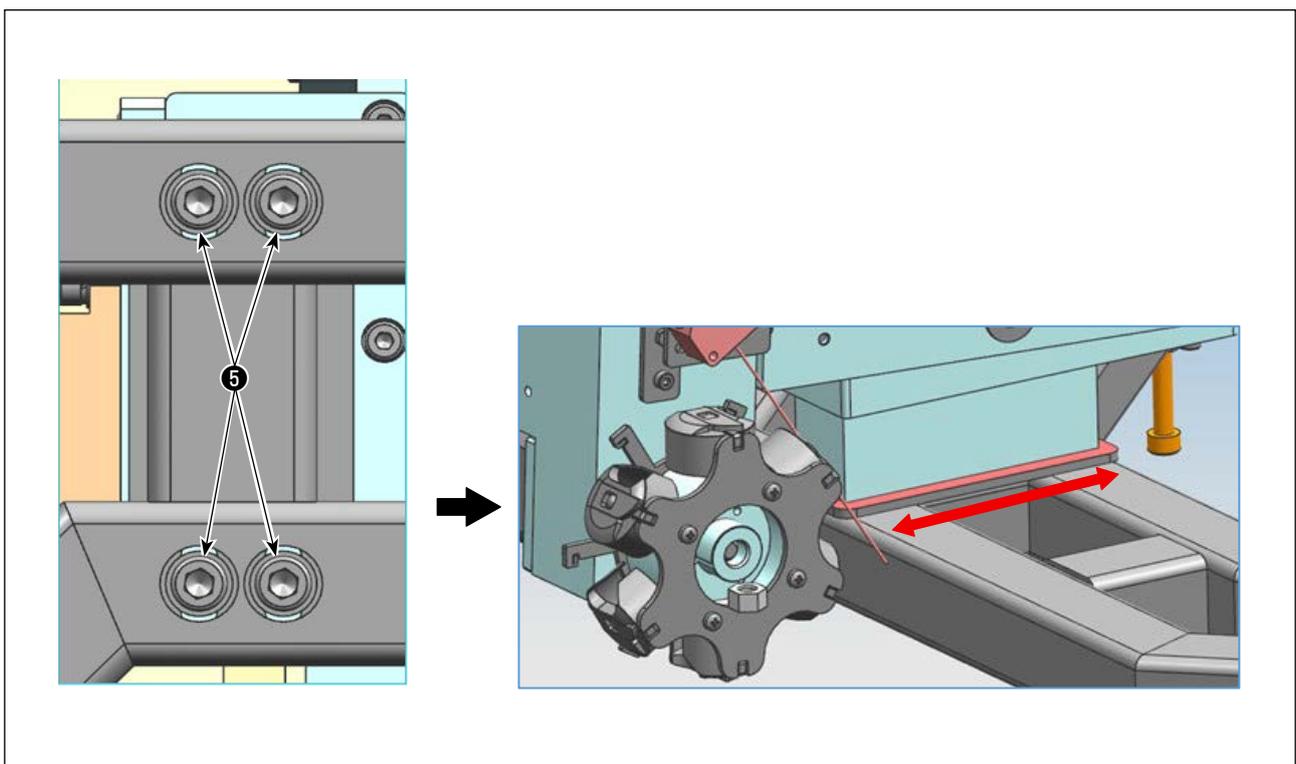


■ How to adjust the installation position



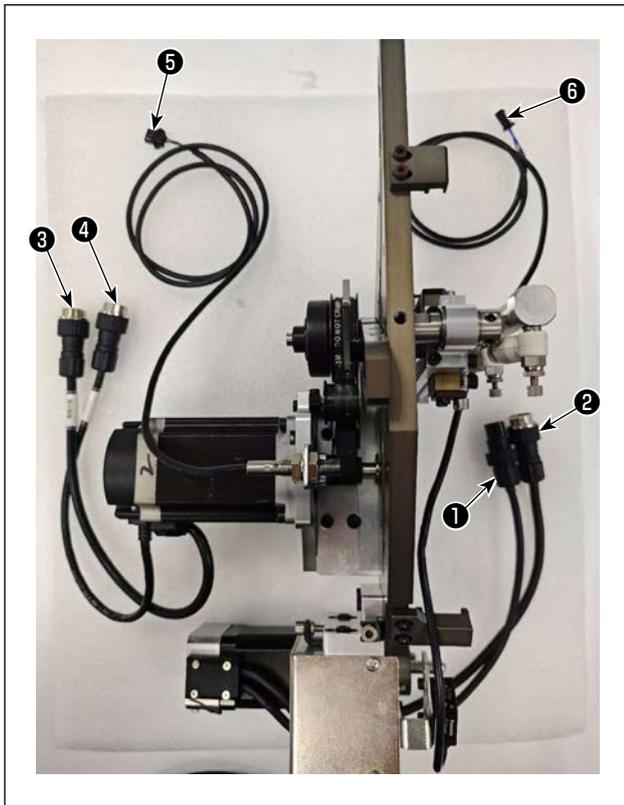
- 1) To adjust the X direction, loosen the four mounting base screws \$1\$, then adjust by moving the four adjustment screws \$2\$ left and right.
  - 2) To adjust the front-to-back direction, loosen the four BK unit mounting screws \$5\$, and move the BK unit forward or backward.
- \* We recommend adjusting the position to the foremost position.
- 3) To adjust the Y direction, loosen the four base assembly screws \$3\$, then adjust by moving the four Y-direction adjustment screws \$4\$ up and down.

**Caution**  
 If the clearance is too small when the arm head moves toward the hook, it may cause damage to the bobbin case or the sewing machine hook. If the clearance is too large, the chuck jaws may slip, resulting in a chuck error.



## 4. Wiring procedure

### 4-1. Wiring to the main body of BK-11



Connect the motor and sensor connectors of the bobbin changer unit to the corresponding cable connectors.

Make sure to connect them according to the connector numbers.

Connectors/cables:

- ❶ Bobbin cassette motor power supply
- ❷ Bobbin cassette motor encoder
- ❸ Arm head stroke power supply
- ❹ Arm head stroke motor encoder
- ❺ Bobbin changer position sensor (middle)
- ❻ Bobbin changer position sensor (rear)

Arm head motor  
encoder cable



Bobbin cassette motor  
encoder cable



Bobbin changer  
medium sensor cable



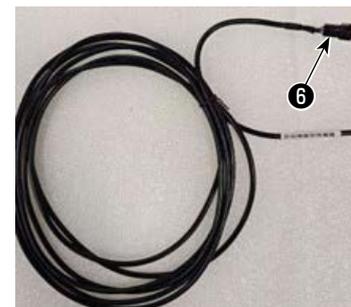
Arm head motor  
power cable

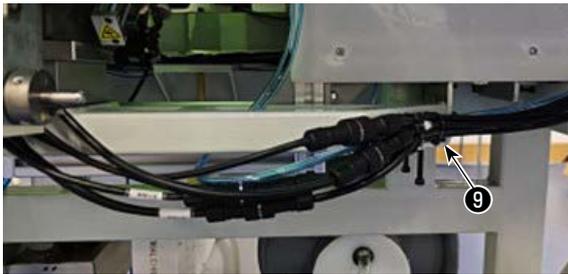
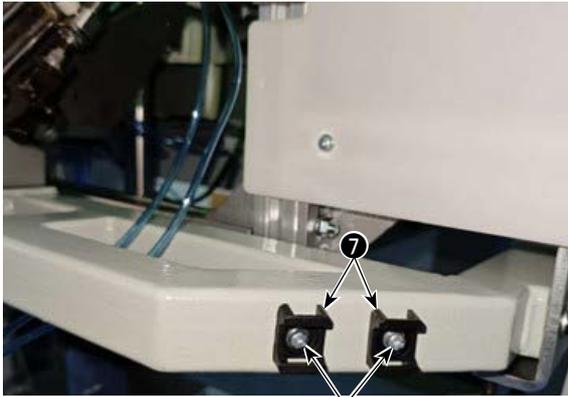


Bobbin cassette motor  
power cable



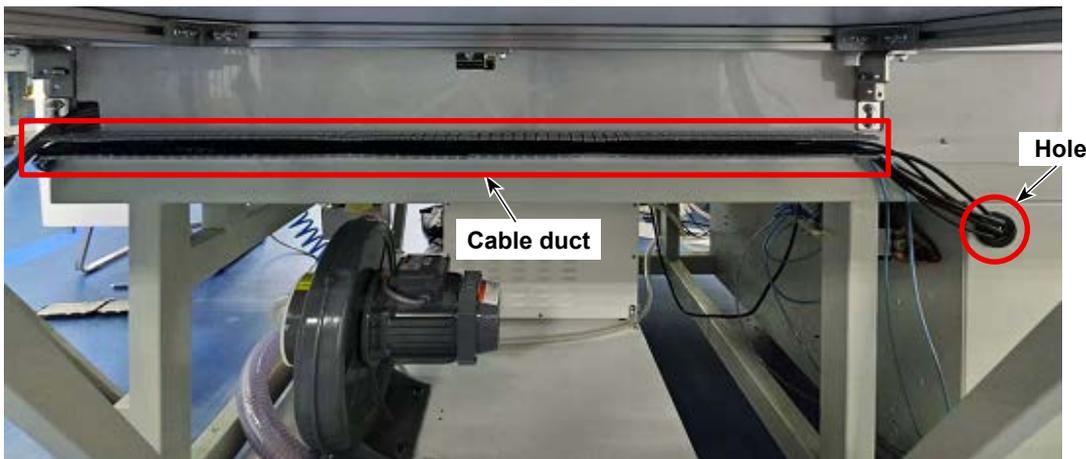
Bobbin changer  
rear sensor cable



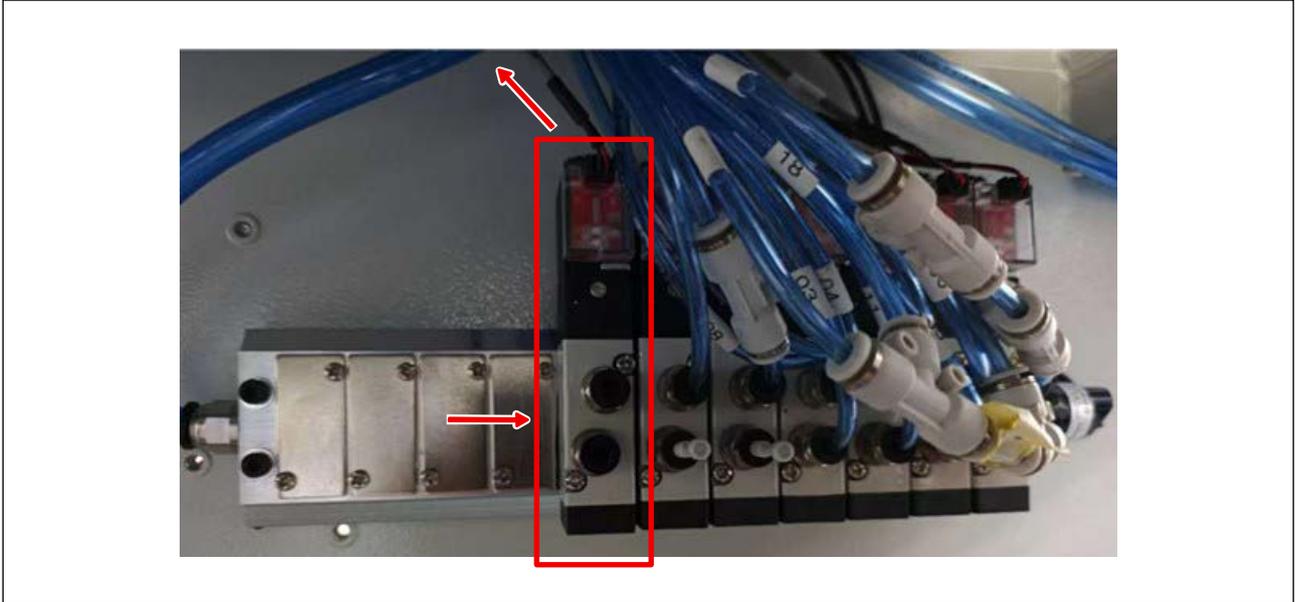


**[PS810-13085]**

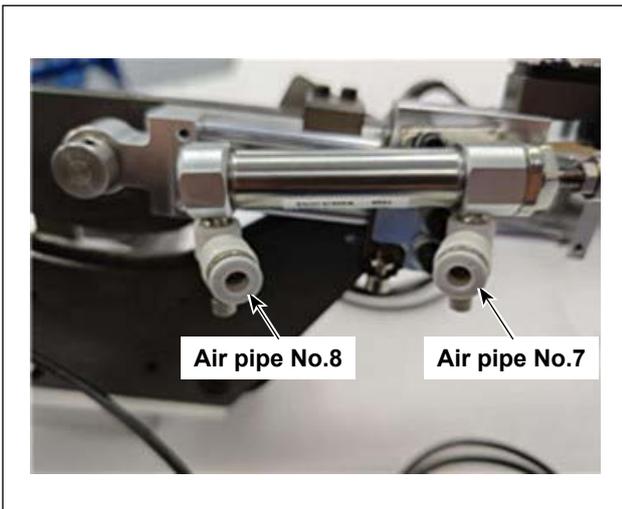
- 1) Attach the cable clip band fixing base \$7\$ to the bobbin changer base using mounting screws \$8\$.
  - 2) Bundle and secure the connected cables to the fixing base using the cable clip band \$9\$.
  - 3) Route the entire cable assembly of the bobbin changer unit through the cable duct on the right side of the sewing machine.
  - 4) Feed the cable into the electrical control box through the hole at the rear of the sewing machine.
- \* The rubber grommet for this hole is not pre-perforated as standard; therefore, it is necessary to cut a cross-shaped opening manually.



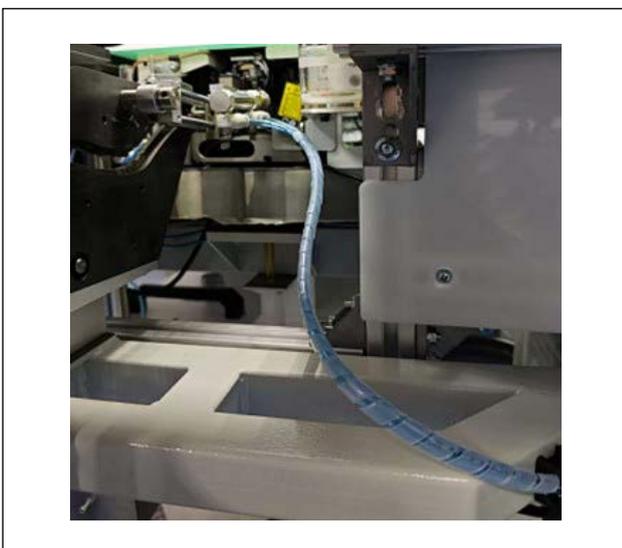
## 4-2. Air pipe wiring



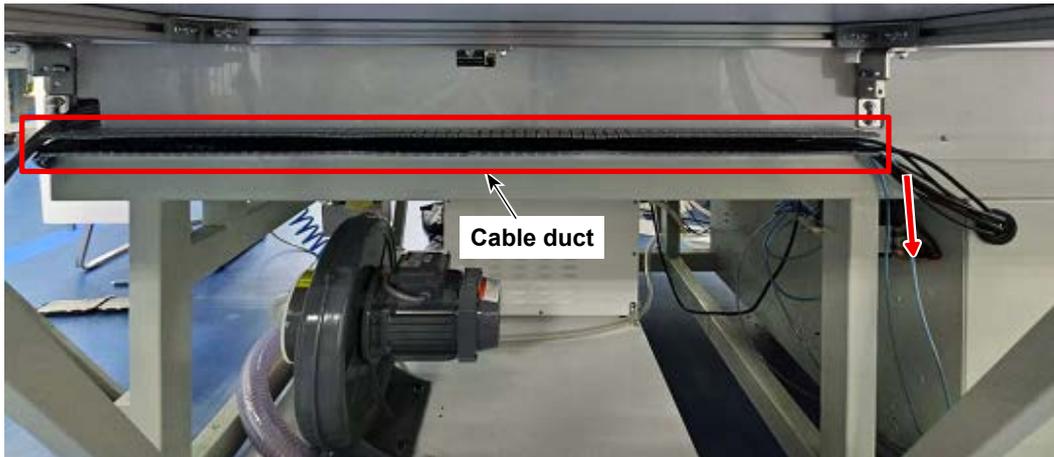
- 1) Attach the solenoid valve dedicated to the BK device to the solenoid valve mounting seat, and route the signal wire into the electrical control box area.



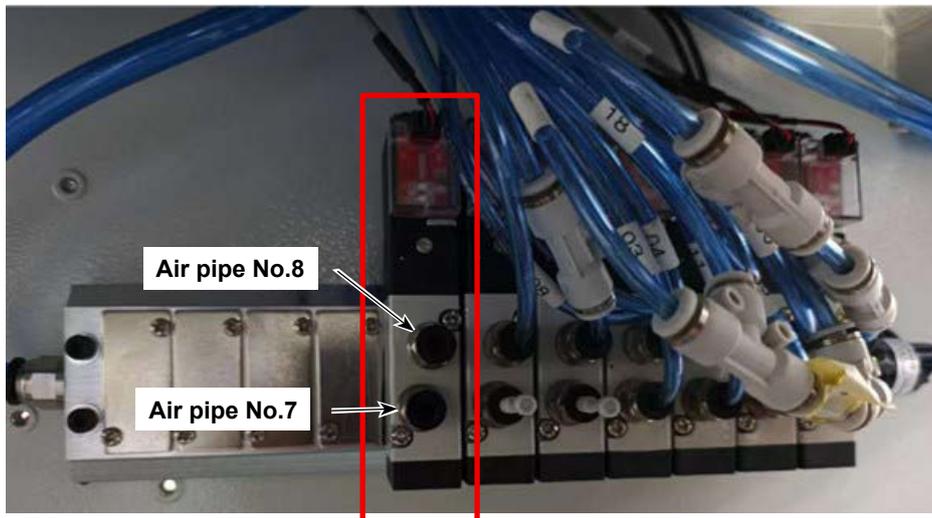
- 2) Connect one end of each of the two air pipes to the air fitting on the BK device arm head. Refer to the figure on the left for the air pipe number correspondence.



- 3) Connect a 45–50 cm air pipe for the moving part of the arm head using a spiral tube, and adjust the pipe routing so that it does not interfere with the right-side plate during operation.



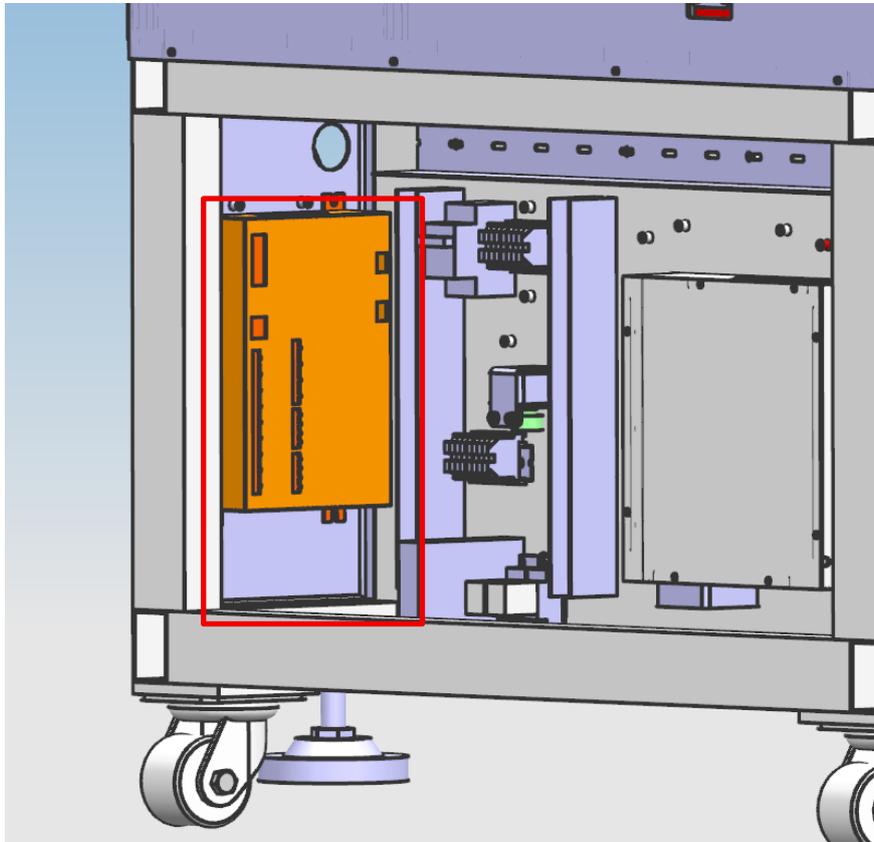
- 4) Route the cable through the cable duct in the rear area of the sewing machine, and guide the air pipe into the solenoid valve installation area.



- 5) Insert the air pipe into the air fitting of the solenoid valve dedicated to the BK device.

### 4-3. Installing the electrical control box

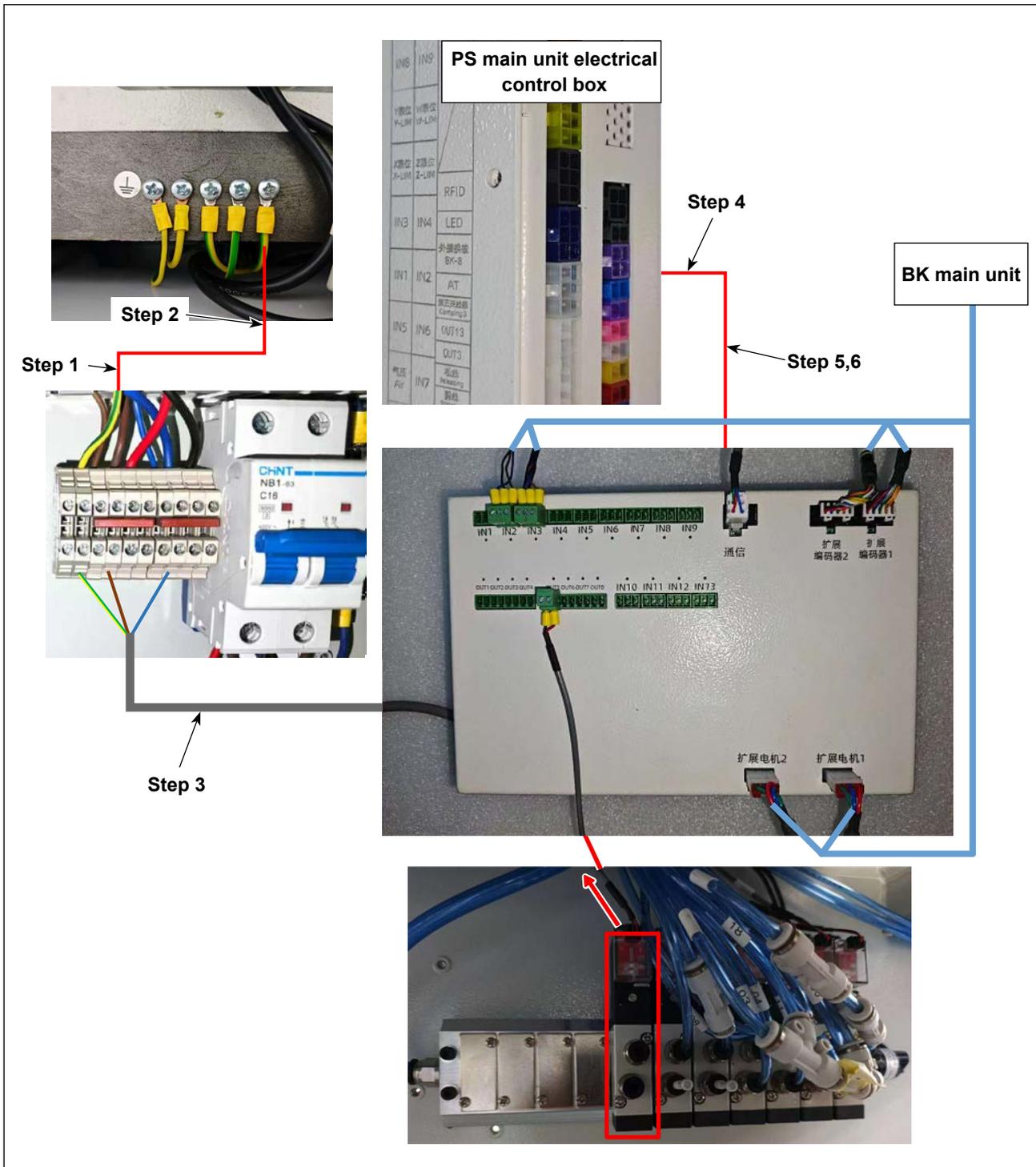
Loosen the four M5 screws attached to the side of the electrical control box, then attach the BK-dedicated expansion electrical control box to the screw posts shown in the figure below.



## 4-4. Wiring inside the electrical case



Before performing wiring work, make sure that the power plug is not connected to the power outlet.

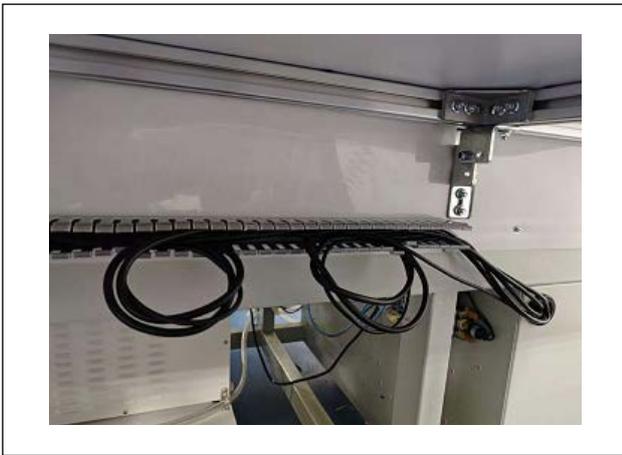


1. Attach the supplied terminal block to the DIN rail.
2. Using the supplied FG wire and FG wire screw, connect the added DIN rail to the ground lug at the rear of the machine head.
3. Connect the power cable of the BK-dedicated expansion electrical control box to the terminal block. As shown in the figure, securely connect the power wires (blue, brown) and the FG wire (green/yellow) to the terminal block.
4. Using the supplied communication cable, connect the BK-dedicated expansion electrical control box to the PS main unit electrical control box. Connect the communication cable to the BK device interface (purple) on the PS main unit electrical control box.

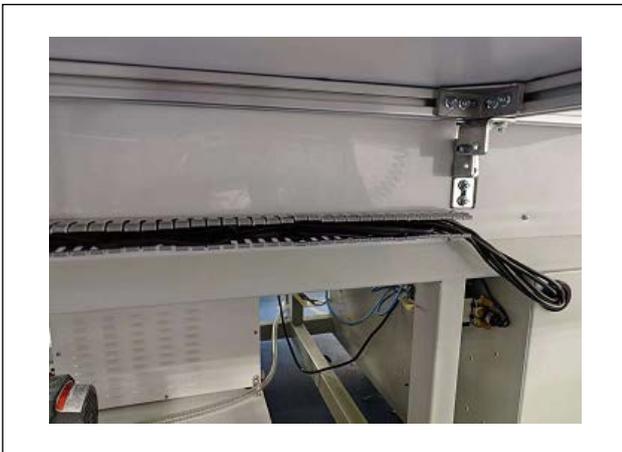
5. Connect the six cables connected to the BK main unit to the corresponding sockets.
  - "扩展电机 1" label cabl ⇒ 扩展电机 1 interface
  - "扩展电机 2" label cabl ⇒ 扩展电机 2 interface
  - "扩展编码器 1" label cabl ⇒ 扩展编码器 1 interface
  - "扩展编码器 2" label cabl ⇒ 扩展编码器 2 interface
  - "IN2" label cable ⇒ IN2 interface
  - "IN3" label cable ⇒ IN3 interface
6. Connecting the signal wire for the BK-dedicated solenoid valve  
Connect the signal wire of the BK-dedicated solenoid valve to the OUT5 interface of the BK-dedicated expansion electrical control box.

#### 4-5. Organizing excessively long cables

After wiring, the cables may be excessively long. Bundle any excess cable inside the cable duct.



- 1) Referring to the figure on the left, organize the six excessively long cables into two loops, with three cables per loop, ensuring that the cables do not become tangled or crowded.

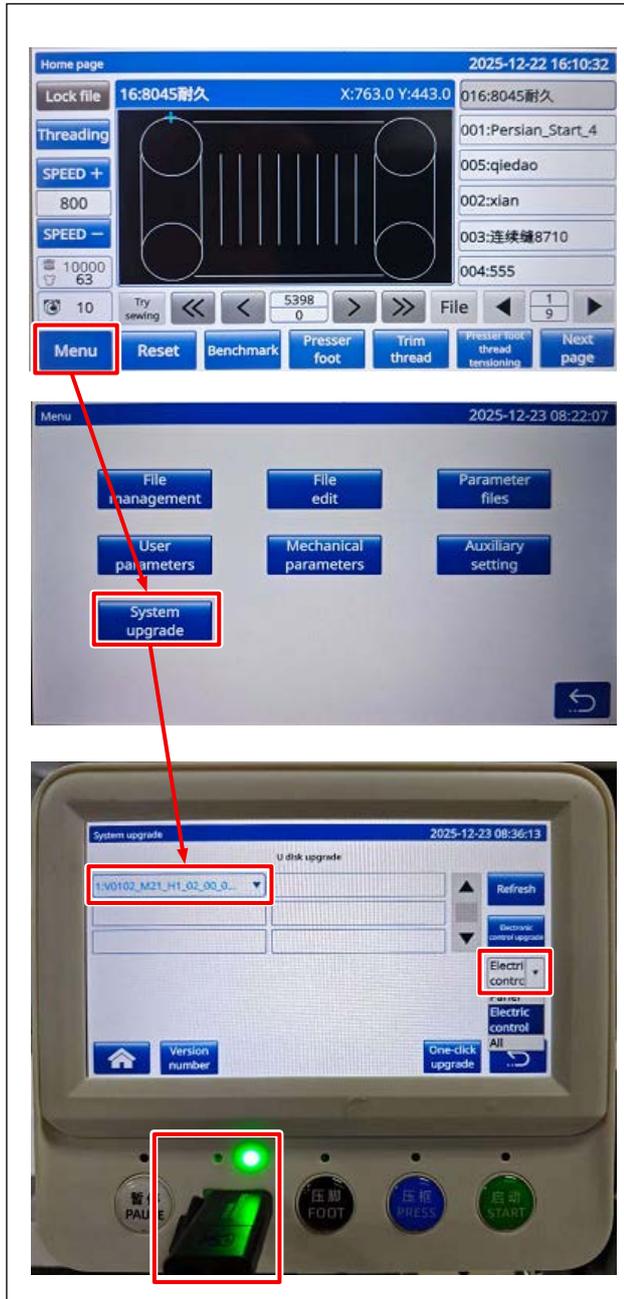


- 2) Place the organized cables inside the cable duct so that they do not protrude from the duct.

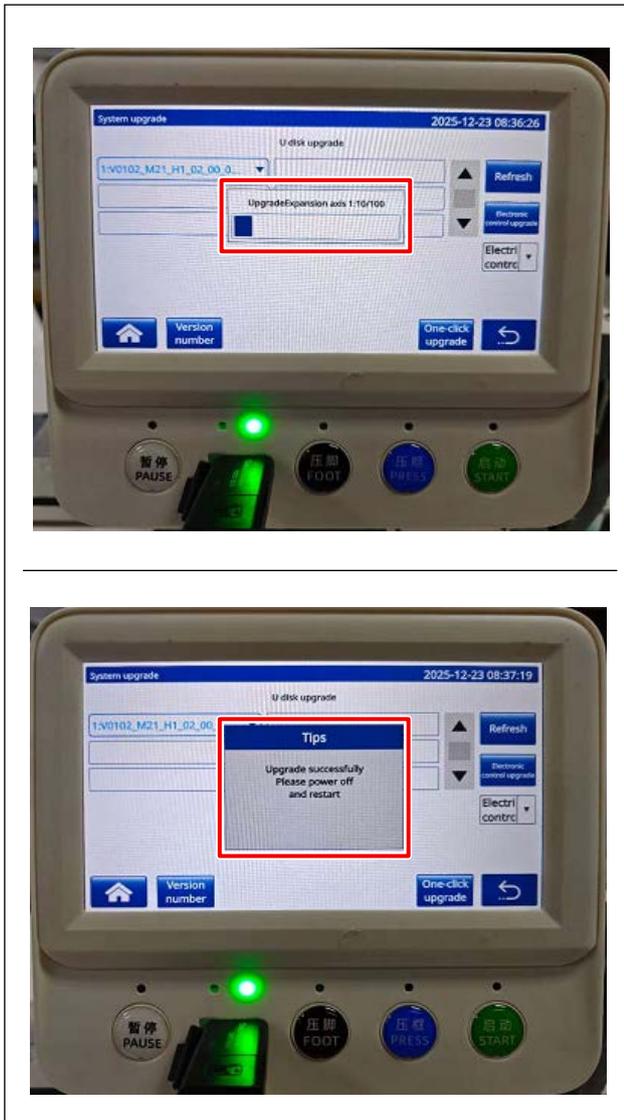


- 3) Arrange the cables properly, and then install the cable duct cover.

## 5. Updating the BK-dedicated electrical control box program version



- 1) After completing the wiring connections related to the BK device, turn on the power and start the sewing machine.
- 2) Enter the menu page and press the “System upgrade” button.
- 3) Insert the USB supplied with the PS main unit into the USB interface on the panel, switch the menu to “Electric control”, and select the upgrade program for the BK-dedicated electrical control box.

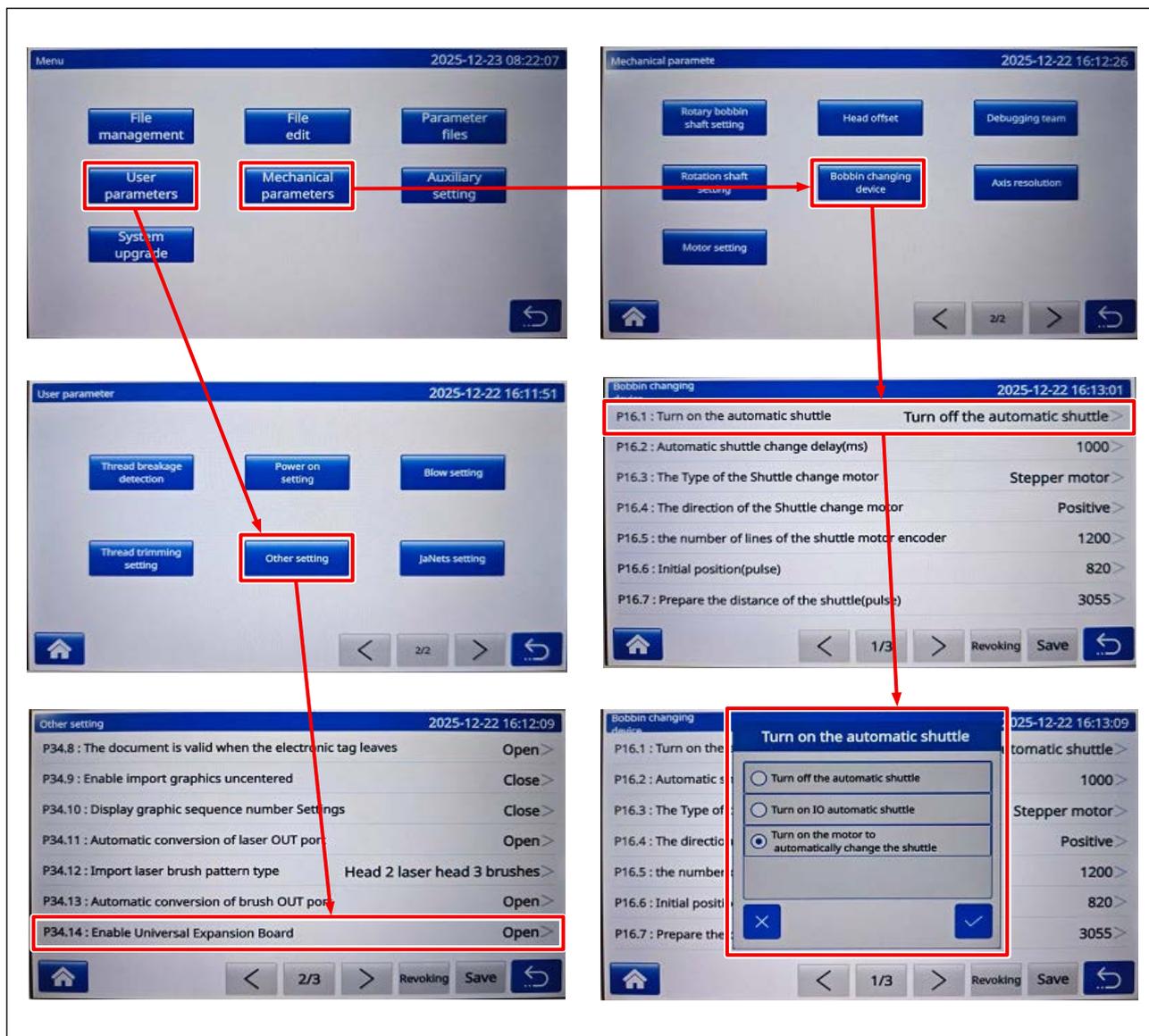


4) Press the “Electrical control upgrade” button to start the upgrade. After the upgrade is completed, turn off the power once to complete the update.

\* Do not turn off the power or remove the USB during the upgrade. Otherwise, the system may crash and fail to operate properly.

## 6. Setting the operation panel

### 6-1. Enabling the bobbin changer function



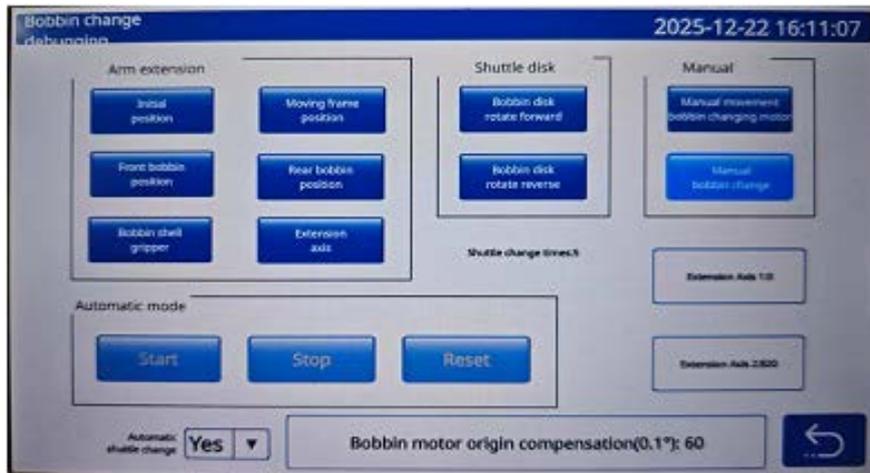
- 1) Enter the menu page and select "User parameters".  
Go to the second page of User parameters and select "Other settings".  
On the second page of "Other settings", select "Enable Universal Expansion Board" and set it to "ON".



**After completing the setting, turn off the sewing machine and then turn it back on.**

- 2) Enter the menu page and select "Mechanical parameters".  
On the second page of Mechanical parameters, select "BK changing device".  
On the "BK changing device" page, change the "Turn on the automatic shuttle" setting to "Turn on the motor to automatically change the shuttle".

## 6-2. Description of each button on the “Bobbin change debugging” page



**Initial position** : At the origin position, the arm head returns to this position each time the device is reset.

**Moving frame position** : Midpoint of the bobbin pickup stroke.

**Front bobbin position** : Position that determines the bobbin pickup operation.

**Rear bobbin position** : Position that determines the bobbin replacement operation in the bobbin cassette.

**Bobbin case clamp** : This button controls the opening and closing of the chuck jaws.

**Extension axis** : Real-time position parameter setting for the front BK position and rear BK position.

**BK forward** : The bobbin cassette rotates forward to the next bobbin position.

**BK reversal** : The bobbin cassette rotates backward to the previous bobbin position.

**Manual BK change motor** : Releases the servo lock of the BK device motor.

**Manual bobbin change** : Performs a manual bobbin change. When highlighted, manual mode is active.

**Start** : Executes the bobbin changer operation once in automatic mode.

**Stop** : Stops the automatic bobbin changer during operation.

**Reset** : Confirms that the entire BK device has been reset.

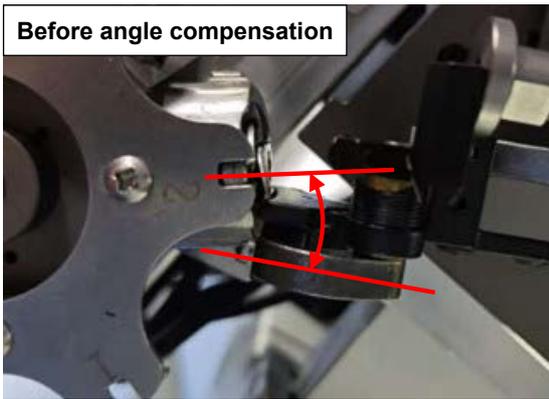
**Automatic bobbin change** : The BK function switch on this page is permanently set to “Yes”.

**Bobbin change count** : Records the number of bobbin changer operations and prompts for bobbin cassette replacement when the count reaches six.

**Bobbin motor origin correction (0.1°)** : Sets the correction value for the bobbin cassette rotation angle.

## 6-3. How to set the bobbin motor origin compensation

Before angle compensation



If an angle deviation occurs during the bobbin changing operation using the bobbin cassette, correct it using “Bobbin motor origin compensation”.

Refer to the center of the groove on the bobbin cassette and the center of the claw on the head.

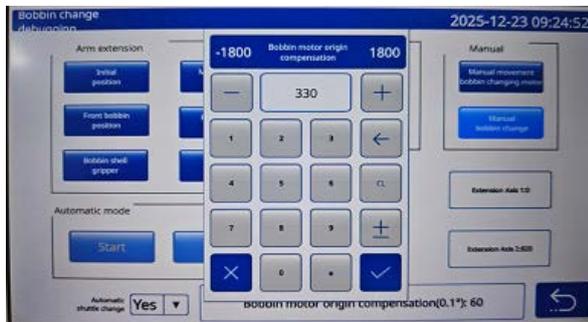
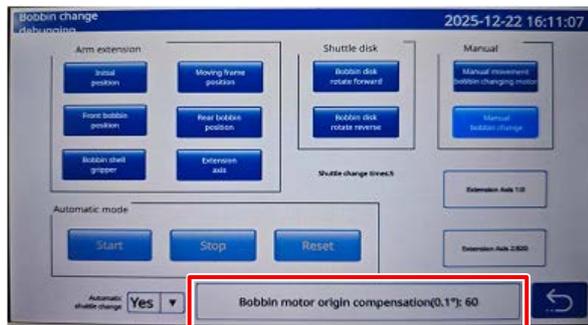
Before correcting the parameters, move the arm head to the initial position.

To display the parameter setting screen, press the “Bobbin motor origin compensation” area.

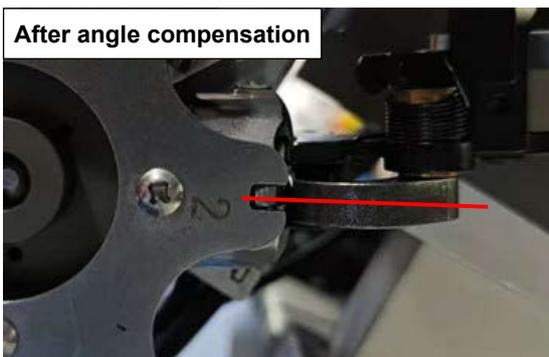
The minimum angle compensation value is 0.1°.

For example, if a 33° compensation is required, enter a value of 330.

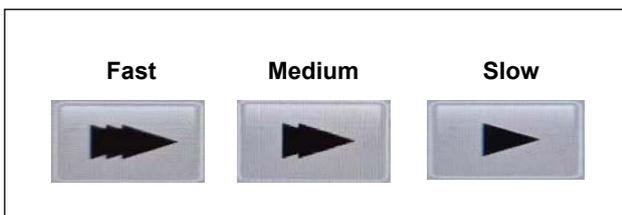
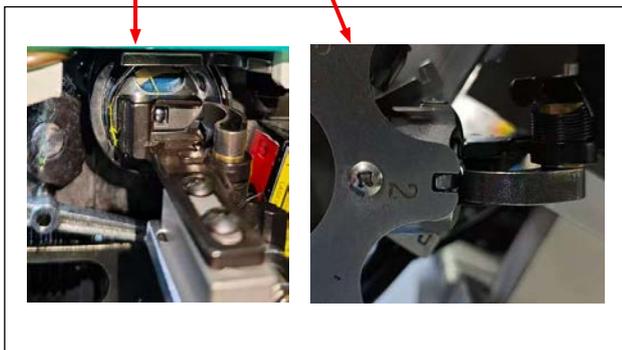
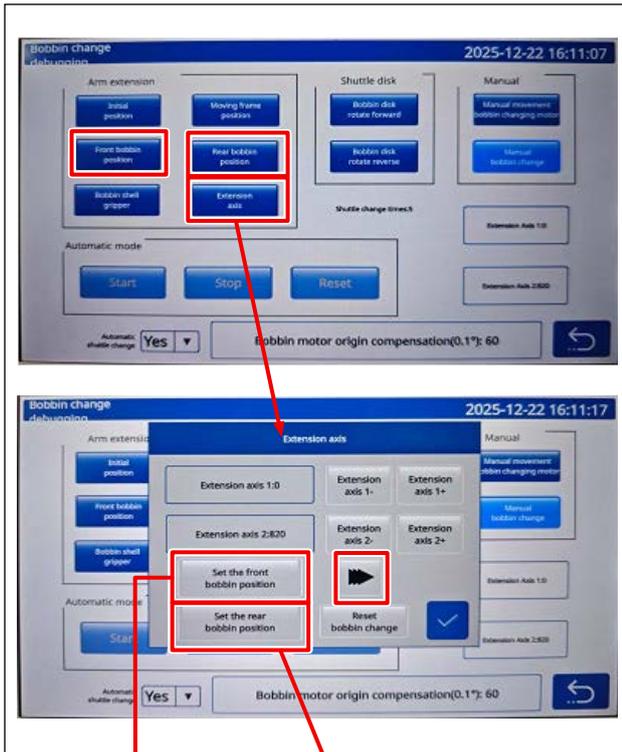
Press the  button to save the parameter. The bobbin cassette rotates automatically. Be careful during operation.



After angle compensation



## 6-4. "BK changing debugging" page settings



You can also adjust the bobbin pickup position on the "BK changing debugging" page.

- 1) Press the "Front bobbin position" button to move the arm head to the bobbin pickup position. Press the "Extension axis" button to proceed to the extension axis adjustment page. Use the "Extension axis 2+" and "Extension axis 2-" buttons to fine-tune the position of the arm head and adjust it to the appropriate bobbin pickup position.

\* Refer to "[How to adjust the installation position](#)" p.9 for details on the adjustment.

Once the position is determined, press the "Set the front bobbin position" button to save the current position parameters.

- 2) Press the "Rear bobbin position" button to move the arm head to the bobbin pickup position. Press the "Extension axis" button to proceed to the extension axis adjustment page.

Use the "Extension axis 2+" and "Extension axis 2-" buttons to fine-tune the position of the arm head and set it to the appropriate position.

Once the position is determined, press the "Set rear bobbin position" button to save the current position parameters.

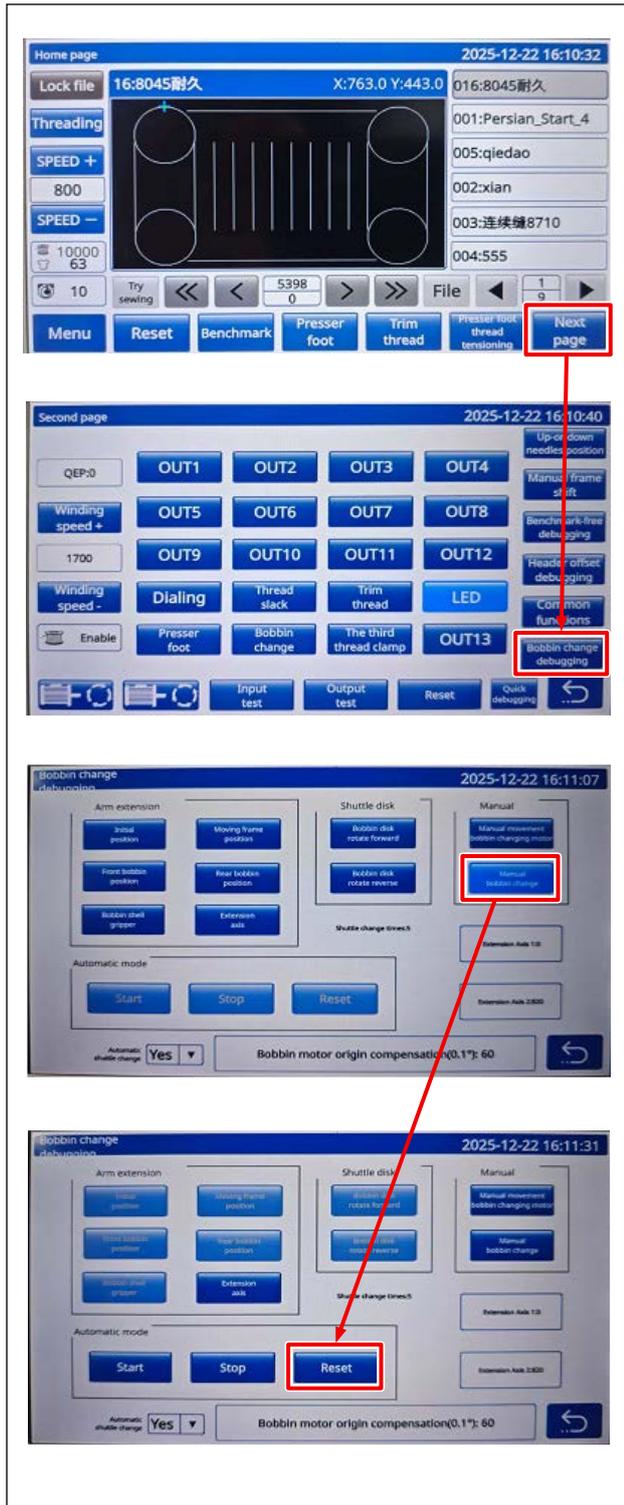
\* After changing the "Rear bobbin position", the default value is 0, and the recommended adjustment value is 35 to 40.

If an abnormality or incorrect operation occurs, refer to the setting explanation for "[P16.6 Initial position](#)" p.25, restore the default value, perform a BK reset, and then set the position again.

- 3) The extension axis adjustment page includes buttons for adjusting the movement speed when the extension axis is moved manually.

There are three speed levels. Select the appropriate speed according to the actual situation.

## 6-5. Checking the BK device operation and the installation position (panel control method)

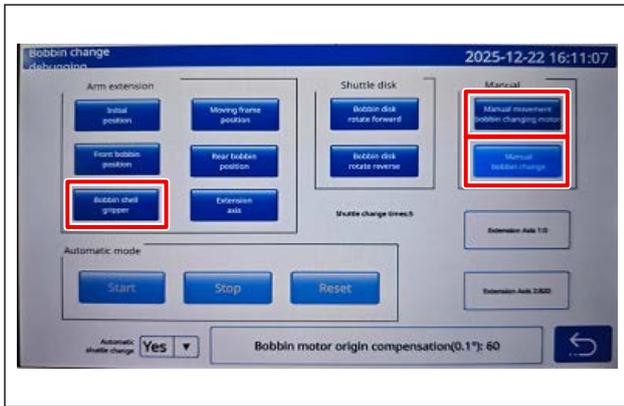


- 1) Switch the panel from the home page to the second page.  
Select “BK changing debugging” to proceed to the “BK changing debugging” page.
- 2) Press the “Manual bobbin change” button to change the BK device's operating state to automatic mode.  
In automatic mode, press the “Reset” button to check the reset operation.

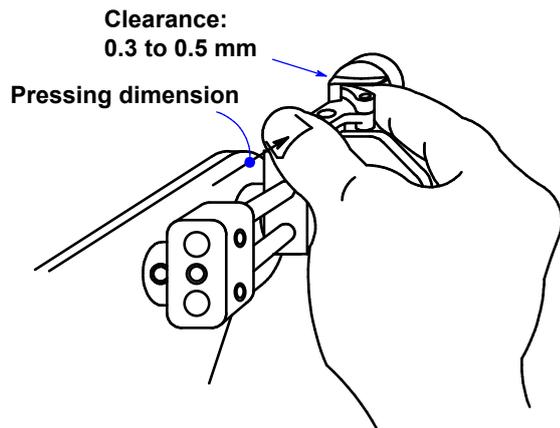
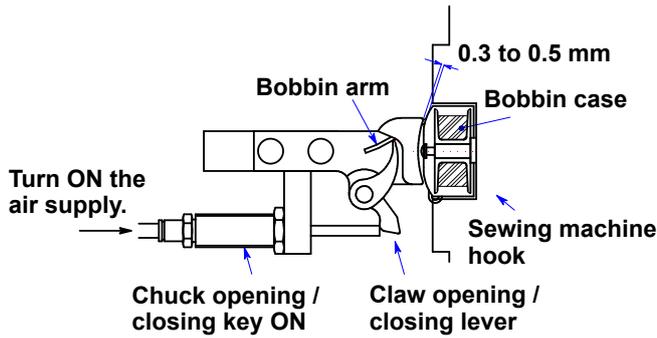
**When performing the reset operation for the first time, carefully observe whether any operational abnormalities occur.**



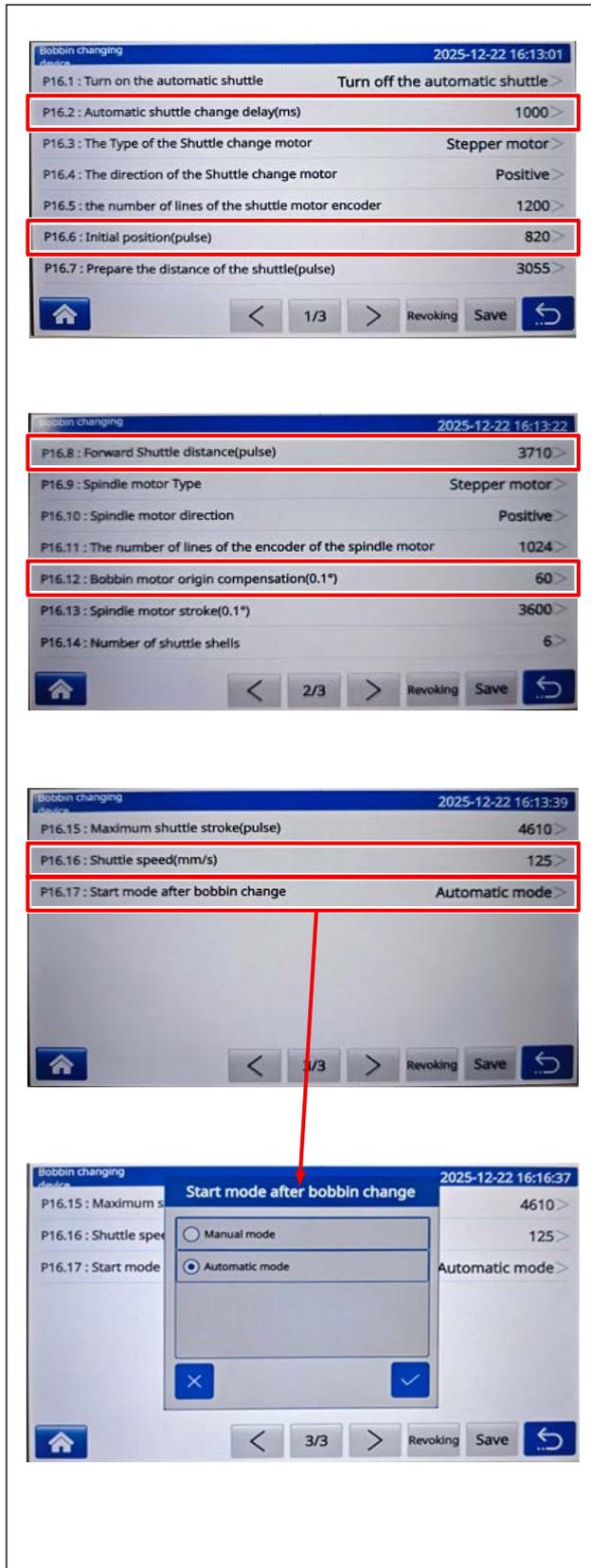
**If an abnormality occurs, press the emergency stop key to stop the machine operation immediately.**



- 3) After confirming that the reset operation is normal, return to manual mode. Press the “Manual bobbin change motor” button to set the BK device to the motor unlocked state. In this state, manually move the arm head to the bobbin case pickup position. Press the “Bobbin case clamp” button so that the chuck jaws grip the bobbin arm.
- 4) With the chuck engaged, move the arm head by hand and check whether the sewing machine hook moves in and out correctly. If it does not work properly, refer to the adjustment methods on pages 8 and 9 and fine-tune the installation position.



## 6-6. Description of BK device operating parameters



There are six adjustable parameters for the BK device. Refer to the explanations below.

### P16.2 Automatic shuttle change delay (ms)

When the automatic bobbin change operation is completed during production, a delay time can be set before sewing resumes.

A value of 1000 corresponds to approximately 1 second.

### P16.6 Initial position

The default initial position value is 860.

This parameter affects the stroke of the “Rear bobbin position”.

- \* Set this parameter in “Set rear bobbin position” on the Extension axis adjustment page within the “BK changing debugging” page.

### P16.8 Forward Shuttle distance

If the “Front bobbin position” setting value or the bobbin case pickup operating stroke is insufficient or excessive, adjust this parameter to correct it to the appropriate position.

- \* This parameter can also be set on the “BK changing debugging” page.

### P16.12 Bobbin motor origin compensation

Setting value for the bobbin cassette rotation angle.

If the “Rear bobbin position” is misaligned at the bobbin case pickup position, adjust this value to correct the angle.

- \* This parameter can also be set on the “BK changing debugging” page.

### P16.16 Shuttle speed

If the BK operation is stable, adjust this value according to the situation to increase the speed of the bobbin changer operation. (Recommended not to exceed 125.)

### P16.17 Start mode after bobbin change

Select the start mode after the bobbin change operation.

Manual mode: You must manually press the START key to begin sewing each time the bobbin is changed.

Automatic mode: After bobbin replacement, the machine automatically starts sewing the next stitch.

## 6-7. Checking operation in manual and automatic modes

After all position settings are complete, check that the BK device bobbin changer operates normally.

1) In manual mode, follow the steps below:

“Initial position” → “Moving frame position” → “Front bobbin position” → “Bobbin case clamp” → “Rear bobbin position” → “Bobbin case clamp” → “Initial position” → “BK forward” → “Rear bobbin position” → “Bobbin case clamp” → “Front bobbin position” → “Bobbin case clamp” → “Initial position”

2) In automatic mode, perform the automatic bobbin changer operation five consecutive times.

When the bobbin runs out, replace the bobbin cassette and continue the operation. Then, take the bobbin from the bobbin cassette and place it in the hook.

## 6-8. Bobbin change interruption

1) During the automatic bobbin change operation in “Automatic mode” on the “BK changing debugging” page, pressing the STOP key stops the continuous change operation. However, the current step is completed first, and the operation does not stop immediately.

2) As a general rule, do not press the PAUSE key on the sewing machine during bobbin replacement.

If the PAUSE key is pressed during bobbin replacement, restore the sewing machine by following the steps below.

① Press the PAUSE key. If there is no bobbin case on the arm head, reset the BK device.

At this time, if there is no bobbin case in the hook, manually replace the bobbin installed on the sewing machine side.

② If there is a bobbin case on the arm head, go to the “BK changing debugging” page, manually move the arm head to the “Initial position”, and manually open the “Bobbin case clamp” to remove the bobbin case.

After removing the bobbin case, reset BK device.

③ Check the condition of the bobbin case in the bobbin cassette and adjust it if necessary.



**Be careful, as resetting the BK device or turning off the power while the bobbin is clamped will cause the bobbin held in the chuck to fall out.**

## 7. How to attach the bobbin case to the bobbin cassette



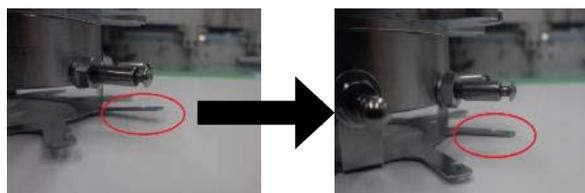
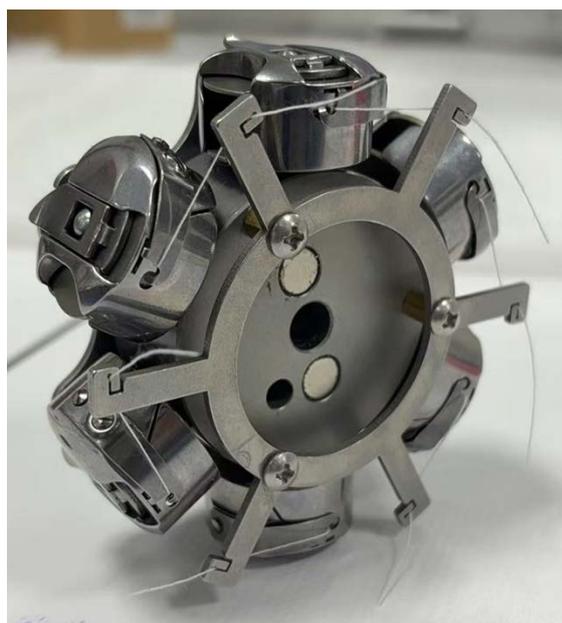
Before sewing using the BK function, you must attach the bobbin cases to the bobbin cassette.

To ensure stable bobbin thread tension, secure the bobbin thread in the groove of the thread holder and leave a certain length of thread.

For the first bobbin cassette, leave one slot empty so that a used bobbin case can be placed.

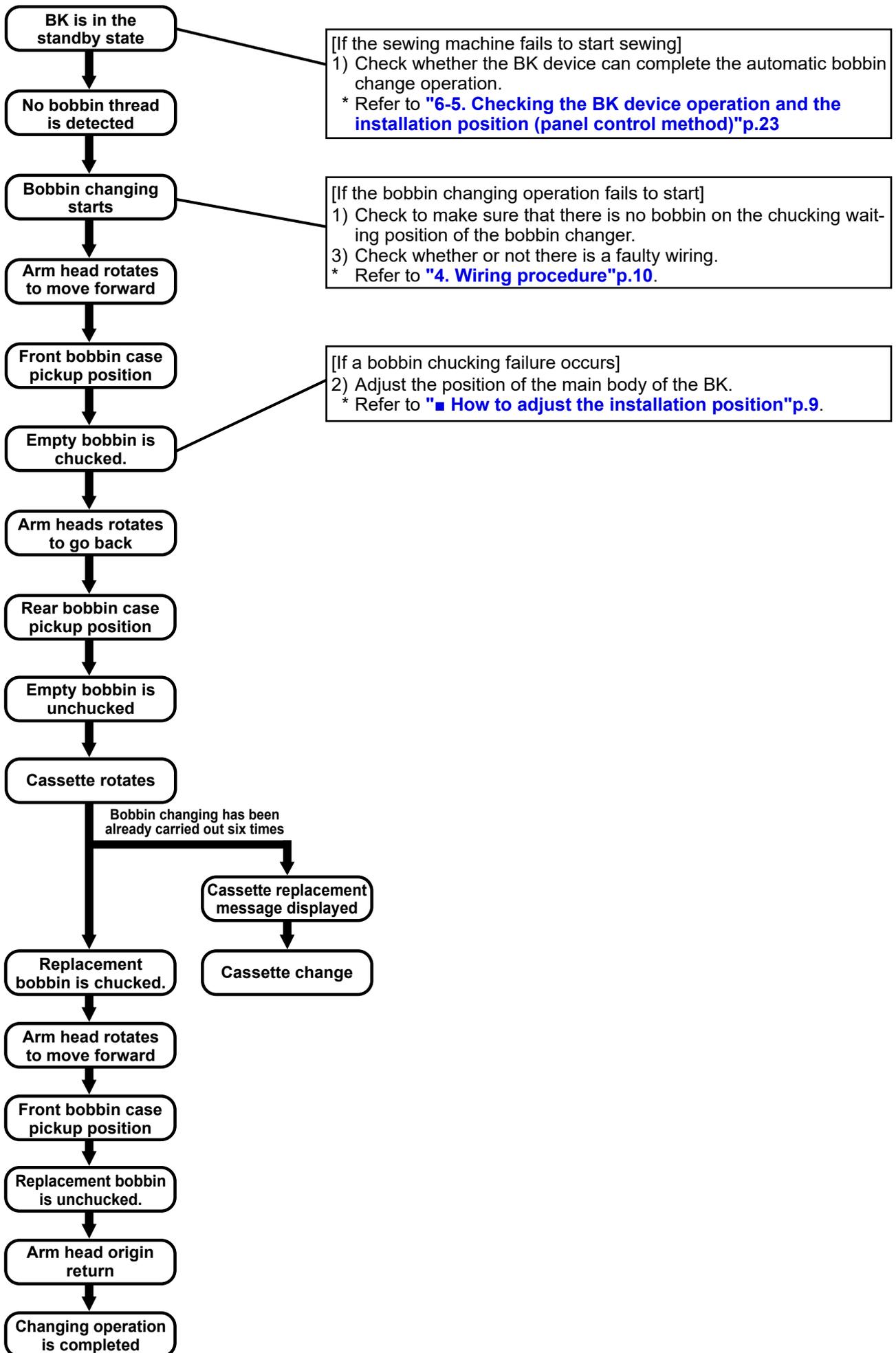
For the replacement bobbin cassette, all six bobbin cases must be installed.

Refer to the figure on the left for the installation method.



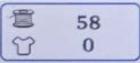
**Check to make sure that the thread retaining plate of the bobbin cassette board is not bent.**  
**If the thread retaining plate has ever become deformed, correct it.**

Operation flow of the bobbin changer and the precautions to be taken

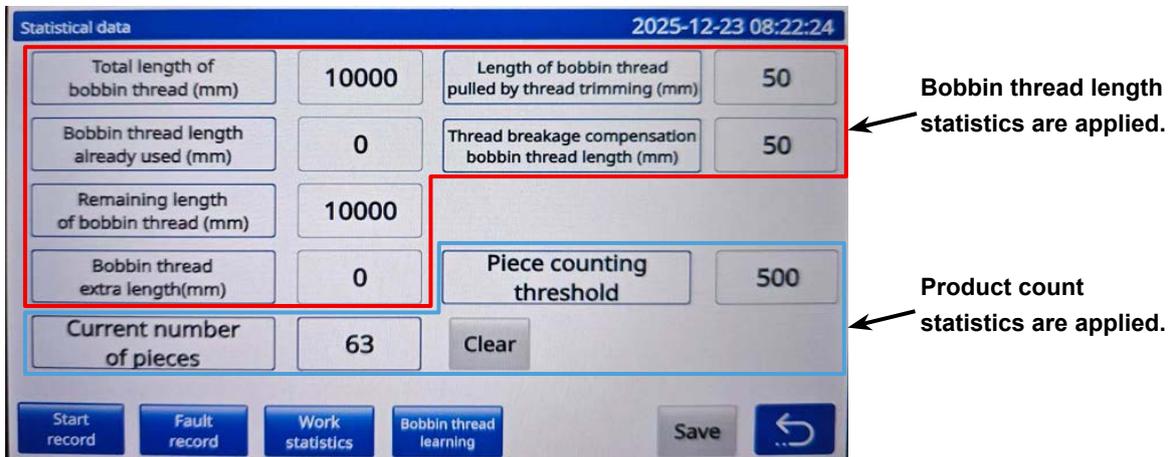


## 8. Bobbin thread counting mode setting

### 8-1. Bobbin thread setting mode

On the home page screen, press  58 0 to enter the processing statistics interface.

In this interface, you can view the processing quantity, time, bobbin thread length and other information.



The interface is described as follows :

Total length of bobbin thread (mm)

: Bobbin thread length (can be entered in bobbin thread setting mode)

Bobbin thread length already used (mm)

: Used bobbin thread length (can be entered)

Remaining length of bobbin thread (mm)

: Remaining bobbin thread length (automatic calculation, cannot be entered)

Bobbin thread extra length(mm)

: The actual bobbin thread length is slightly longer than the set value; this allowance must be taken into consideration when setting the length.

Length of bobbin thread pulled by thread trimming (mm)

**After sewing :** Estimated length of bobbin thread pulled up after thread trimming during normal operation (not applicable in bobbin thread sensor mode; can be entered).

**Before learning is completed in bobbin thread learning mode :** The number of thread trims is added to the total bobbin thread length.

After learning is completed in bobbin thread learning mode and in bobbin thread setting mode, the number of thread trims is added to the used bobbin thread length.

Thread breakage compensation bobbin thread length (mm)

**During sewing :** When a thread breakage error occurs due to a malfunction, the estimated length of bobbin thread to be pulled up is applied (not applicable in bobbin thread sensor mode; can be entered).

After learning is completed in bobbin thread learning mode and in bobbin thread setting mode: The number of thread breakages is added to the length of bobbin thread used.

Current number of pieces

: Number of items currently produced (cannot be entered)

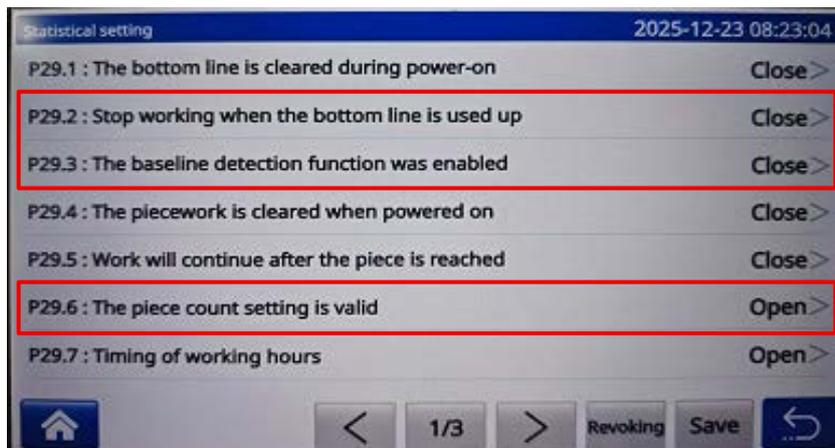
Clear

: Deletes the current number of items produced.

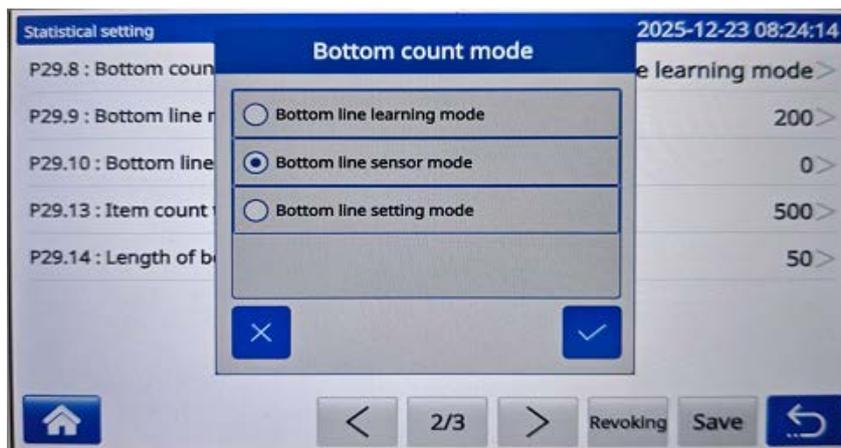
Piece counting threshold

: Production target number (can be entered)

1. Before using the statistics function, set P29.2 to “ON” in “User parameters” → “Statistics settings”.  
If this is not set, the notification function will be disabled once the statistical count is reached.
  - ① For bobbin thread length statistics, set P29.3 to “ON”.
  - ② For product count statistics, set P29.6 to “ON”.



2. Set P29.8 (Bobbin thread counting mode) under “User Parameters” → “Statistics Settings”.  
There are three modes to choose from.
  - ① Bobbin thread learning mode
  - ② Bobbin thread sensor mode
  - ③ Bobbin thread setting mode

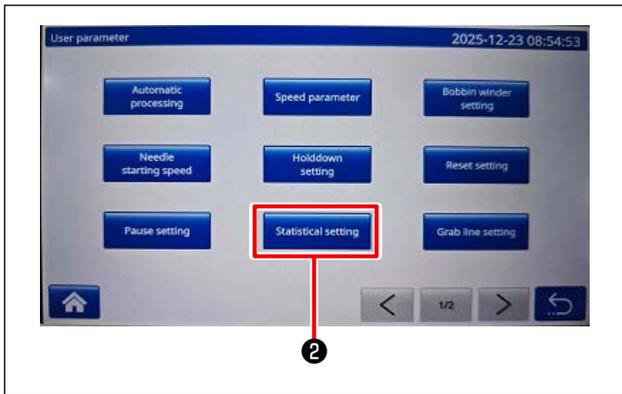


## 8-2. Bobbin thread sensor mode setting



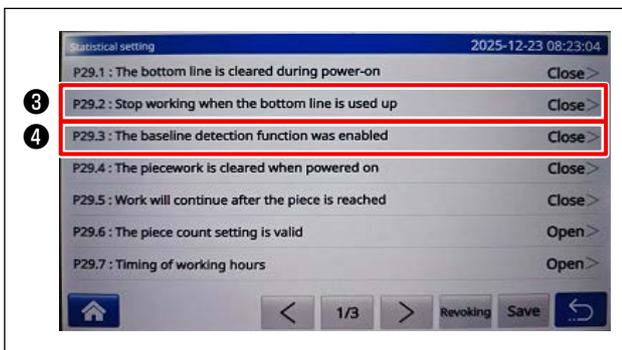
1) On the menu screen of the operation panel, press “User parameters” \$1\$.

The User parameter screen is displayed.



2) Press “Statistics settings” \$2\$.

The Statistics settings screen is displayed.



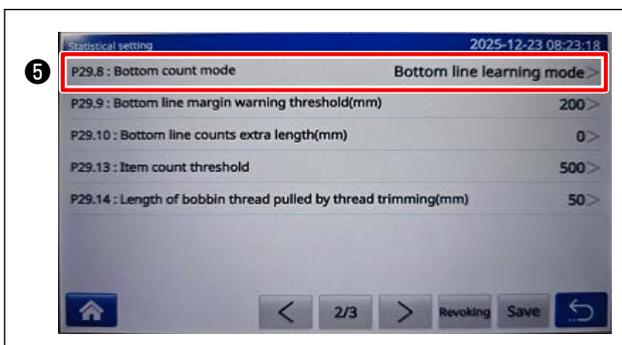
3) Set the following items ③ to ⑥ .

③ : P29.2 Stop working when the bottom line is used up

→ Open

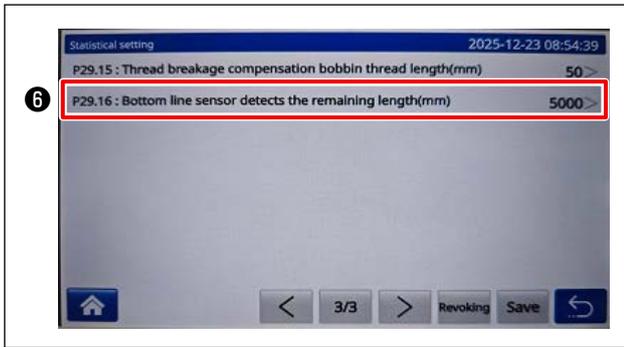
④ : P29.3 The baseline detection function was enabled

→ Open



⑤ : P29.8 Bottom count mode

→ Bobbin thread sensor mode

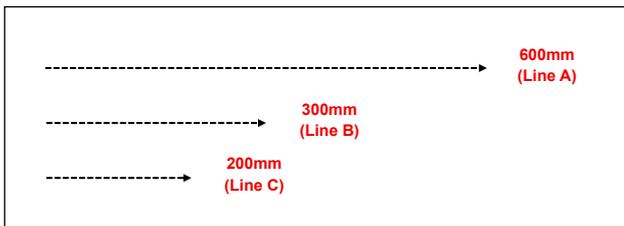


- ⑥ : P29.16 Bottom line sensor detects the remaining length (mm)  
 → Numerical value (user setting)  
 When the sensor is lit, this set value becomes effective and is compared with the length of the next stitching line to determine whether sewing is possible or not.  
 Set the remaining length (mm) for bottom line detection to 100 mm shorter than the longest or shortest stitching line in the sewing pattern.

The deviation of the remaining length varies greatly depending on the adjustment of the sensor detection position and the thickness of the thread.

**For thin threads:** Since the actual remaining length of the bobbin thread is long, set the value to 100 mm shorter than the longest stitching line to maximize bobbin thread consumption.

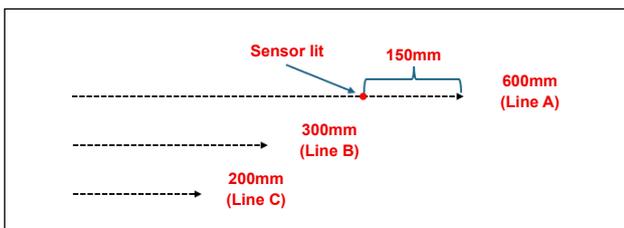
**For thick threads:** Since the actual remaining length of the bobbin thread is short, set the value to 100 mm shorter than the shortest stitching line to prevent sewing from being interrupted due to insufficient remaining bobbin thread.



For example, assume that there are three stitching lines in the pattern: 600 mm (line A), 300 mm (line B), and 200 mm (line C).

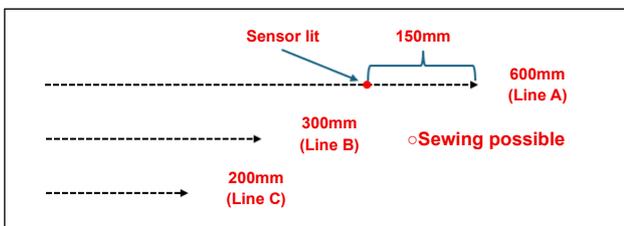
Sewing is performed in the order: line A → line B → line C.

If the remaining length is set to 100 mm shorter than the longest stitching line, enter 500 mm in ⑥.

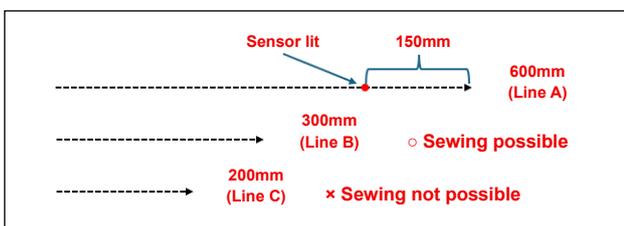


When the current stitching line (line A) is halfway through sewing (150 mm remaining until completion), the sensor lights up.

Before sewing the next stitching line (line B), the remaining length is compared with the length of line B. When the setting value is 500 mm and the sensor lights up, 150 mm remains until the completion of line A, leaving 350 mm of bobbin thread remaining.  $500 \text{ mm} - 150 \text{ mm} = 350 \text{ mm}$



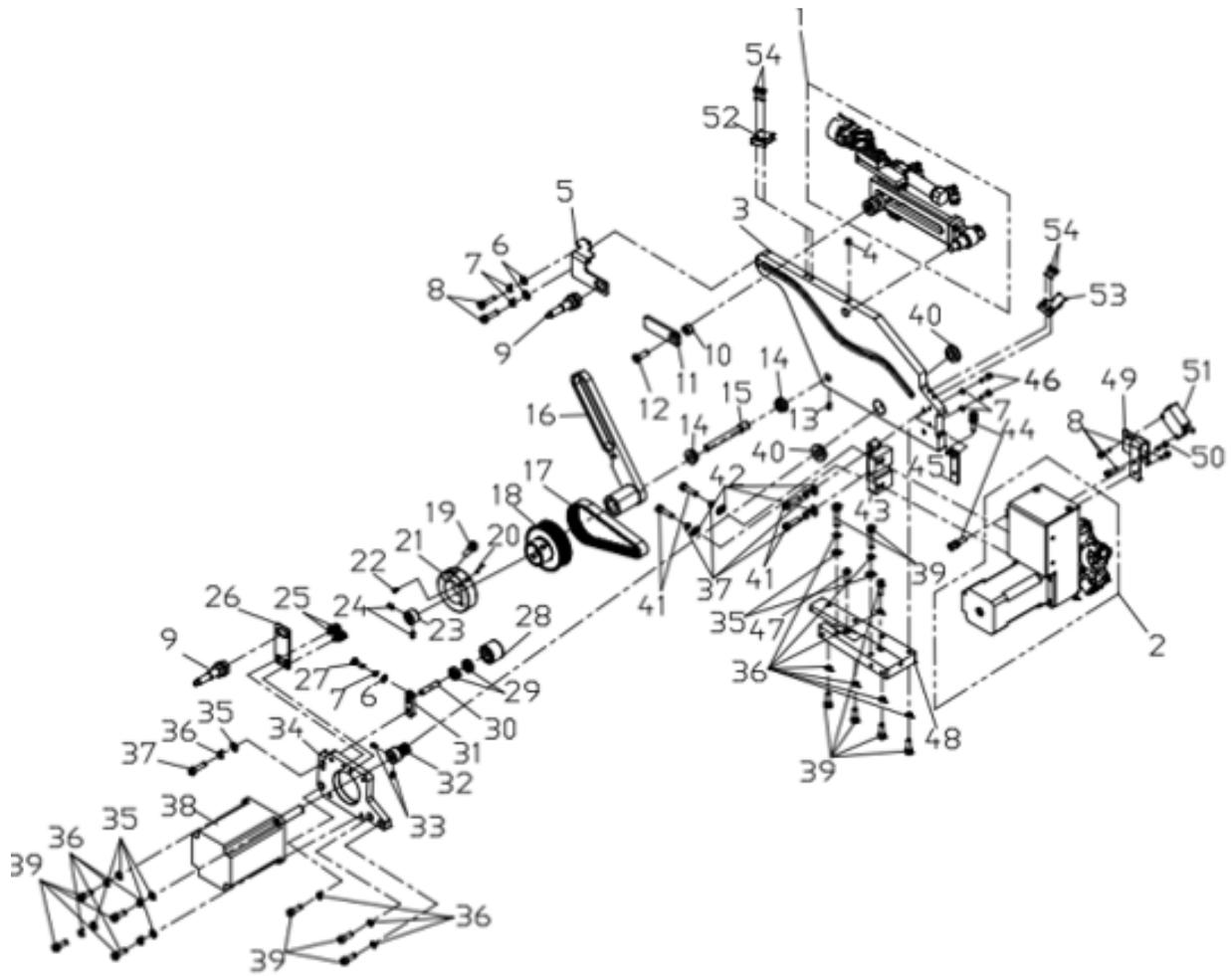
Because the remaining bobbin thread length of 350 mm is longer than line B (300 mm), it is determined that line B can be sewn, and sewing continues.



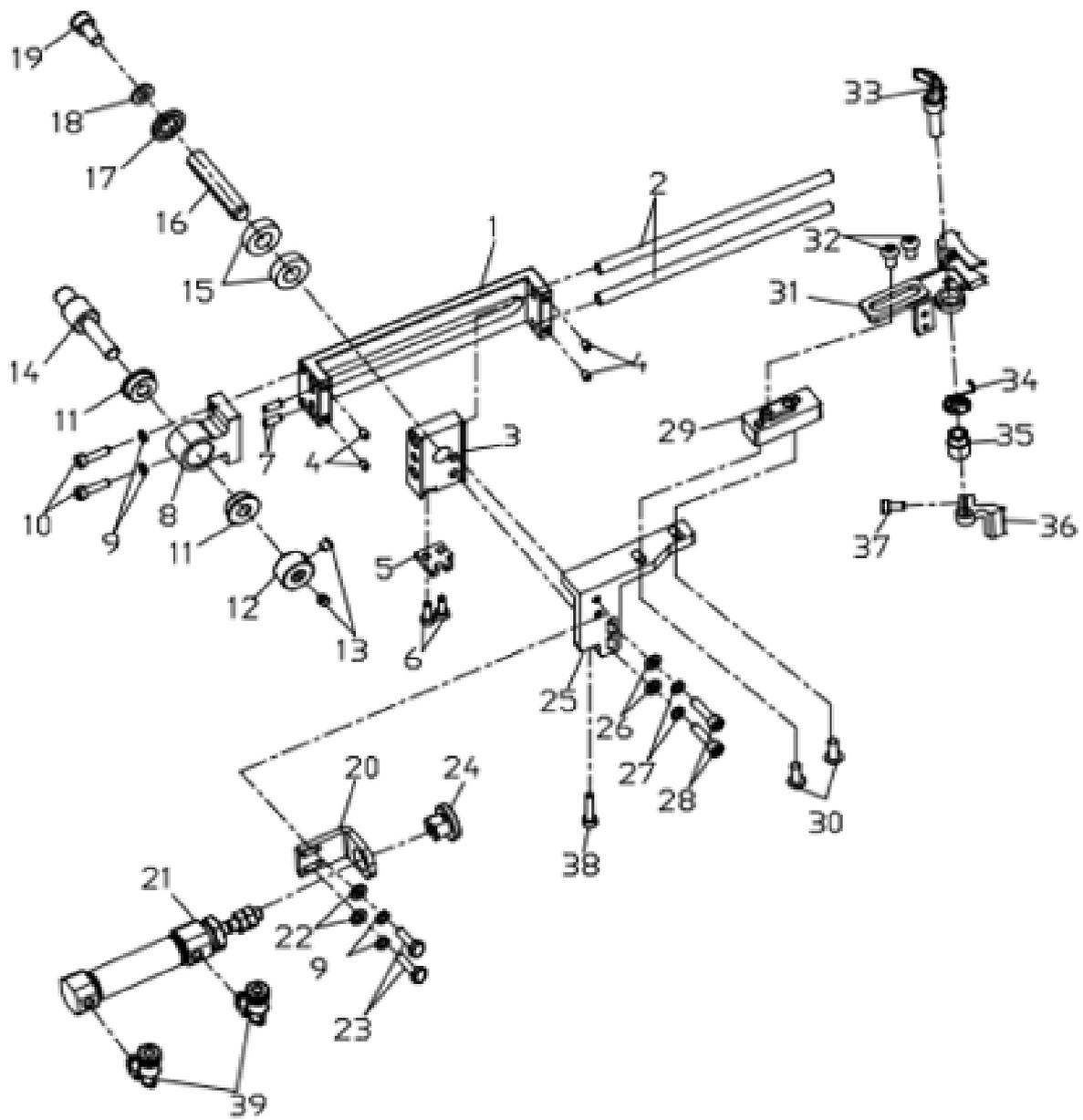
After sewing line B is completed, the remaining bobbin thread length becomes  $350 \text{ mm} - 300 \text{ mm} = 50 \text{ mm}$ .

Because the remaining bobbin thread length of 50 mm is shorter than line C (200 mm), it is determined that line C cannot be sewn. Sewing stops, and a message indicating that there is insufficient bobbin thread remaining is displayed.

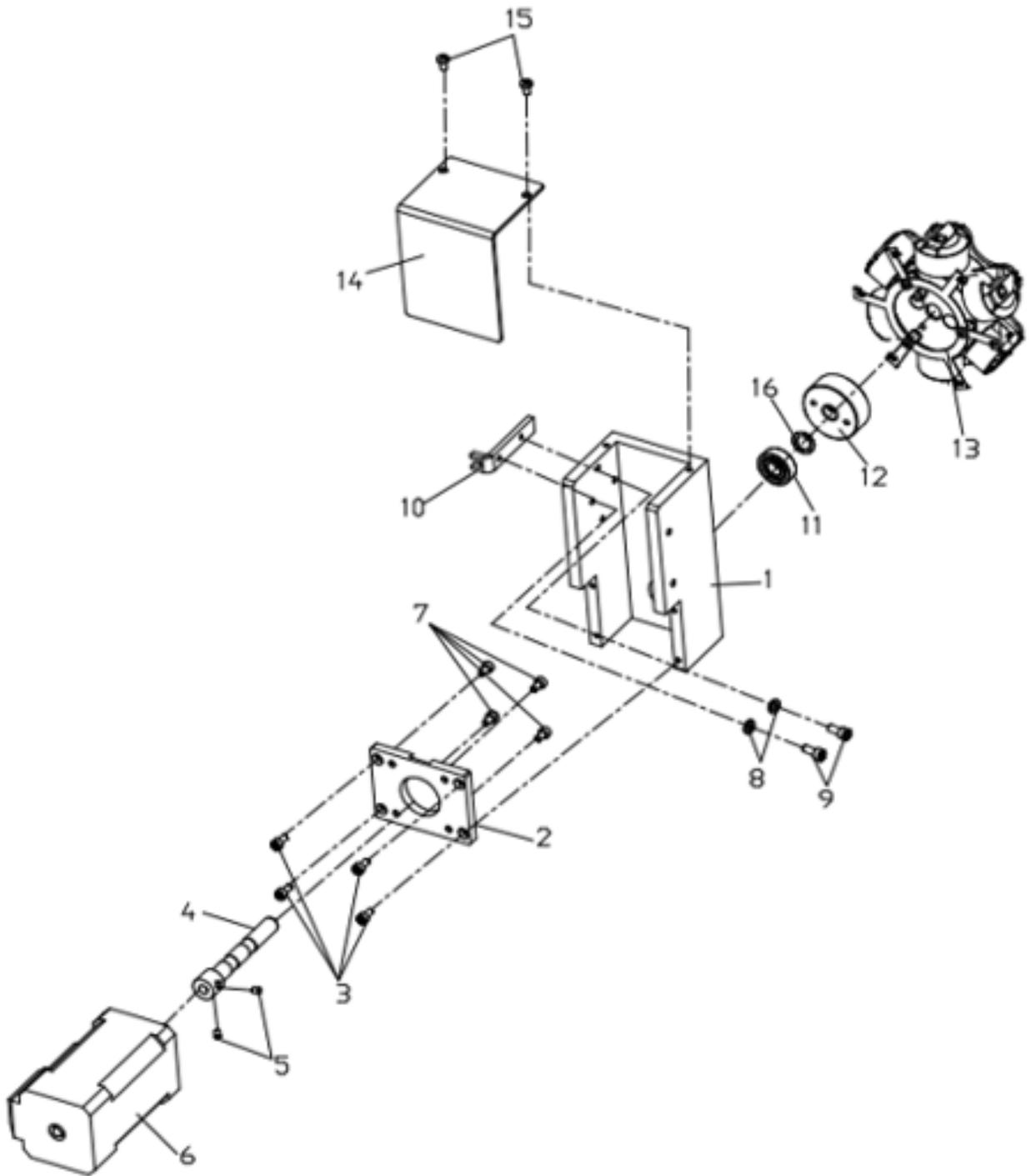
## 9. Parts list for the BK-11



No.	Part No.	Name of part	Quantity	Remarks
1	40316907	GUIDE_ARM_ASM	1	
2	40316908	MAIN_BASE_ASM	1	
3	40316909	BASE	1	
4	40234086	SCREW	1	
5	40316910	SENSOR_PLATE	1	
6	40234514	WASHER	3	
7	40268487	SPRING WASHER	5	
8	40235200	SCREW	5	
9	40316911	SENSOR	2	
10	40282417	COLLAR	1	
11	40316912	SENSOR_PLATE	1	
12	40308912	SCREW	1	
13	40234502	SCREW	1	
14	40316878	BEARING	2	
15	40316913	ARM_SHAFT	1	
16	40316914	LINK	1	
17	40316915	TIMING_BELT	1	
18	40316916	SPROCKET	1	
19	40234425	SCREW	1	
20	40268547	PIN	1	
21	40316917	Y_SPROCKET HOLDER	1	
22	40234086	SCREW	1	
23	40316879	COLLAR	1	
24	40228015	SCREW	1	
25	40234454	SCREW	2	
26	40316918	SENSOR_PLATE	1	
27	40268486	SCREW	1	
28	40316919	TIMING_BELT_COLLAR	1	
29	40316920	BEARING	2	
30	40316921	PIN	1	
31	40316922	TIMING_BELT_COLLAR HOLDER	1	
32	40316923	SPROCKET	1	
33	40228015	SCREW	2	
34	40316924	MOTOR_PLATE	1	
35	40228223	SCREW	1	
36	40234452	SPRING WASHER	19	
37	40234571	WASHER	7	
38	40316925	STEPPING_MOTOR	1	
39	40234451	SCREW	3	
40	40316926	BEARING	2	
41	40228223	SCREW	4	
42	40316927	WASHER	4	
43	40316928	BLOCK	1	
44	40316929	SCREW	2	
45	40316902	ADJUST_PLATE	1	
46	40268486	SCREW	2	
47	40316930	SCREW	1	
48	40316931	BASE	1	
49	40316932	SENSOR_PLATE	1	
50	40316886	SCREW	1	
51	40316933	CX441SENSOR	1	
52	40316934	FRONT_POSTION_BLOCK	1	
53	40316935	REAR_POSTION_BLOCK	1	
54	40316936	SCREW	4	



No.	Part No.	Name of part	Quantity	Remarks
1	40316871	GUIDE_ARM	1	
2	40316872	SHAFT	2	
3	40316873	BLOCK	1	
4	40234438	SCREW	4	
5	40316874	STOPPER_PLATE	1	
6	40235200	SCREW	2	
7	40316875	PIN	2	
8	40316876	BEARING_BASE	1	
9	40268487	SPRING WASHER	4	
10	40316877	SCREW	2	
11	40316878	BEARING	2	
12	40316879	COLLAR	1	
13	40228015	SCREW	2	
14	40316880	SUPPORT_SHAFT	1	
15	40316881	BEARING	2	
16	40316882	PIN	1	
17	40316883	WASHER	1	
18	40228171	WASHER	1	
19	40228498	SCREW	1	
20	40316884	CLYINDER_PLATE	1	
21	40316885	CLYINDER	1	
22	40234514	WASHER	2	
23	40316886	SCREW	2	
24	40316887	BOSS	1	
25	40316888	CHUCK_BASE	1	
26	40234571	WASHER	2	
27	40234452	SPRING WASHER	2	
28	40234451	SCREW	2	
29	40316889	ADJUST_BASE	1	
30	40316890	SCREW	2	
31	40316891	CHUCK_BASE	1	
32	40316892	SCREW	2	
33	40316893	CHUCK	1	
34	40316894	SPRING	1	
35	40316895	MATEL	1	
36	40316896	CHUCK HOLDER	1	
37	40234513	SCREW	1	
38	40228223	SCREW	1	
39	40268523	CYLINDER JOINT	2	



No.	Part No.	Name of part	Quantity	Remarks
1	40316897	MAIN_BASE	1	
2	40316898	MOTOR_PLATE	1	
3	40234513	SCREW	4	
4	40316899	CASSETE_SHAFT	1	
5	40228015	SCREW	2	
6	40316900	STEPPING_MOTOR	1	
7	40316901	SCREW	4	
8	40268487	SPRING WASHER	2	
9	40268486	SCREW	2	
10	40316902	ADJUST_PLATE	1	
11	40268556	BEARING	1	
12	40316903	CASSETE_COLLAR_ASM	1	
13	40228756	BOBIN CASE BASE	1	
14	40316904	COVER	1	
15	40316905	SCREW	2	
16	40316906	WASHER	1	