ENGLISH

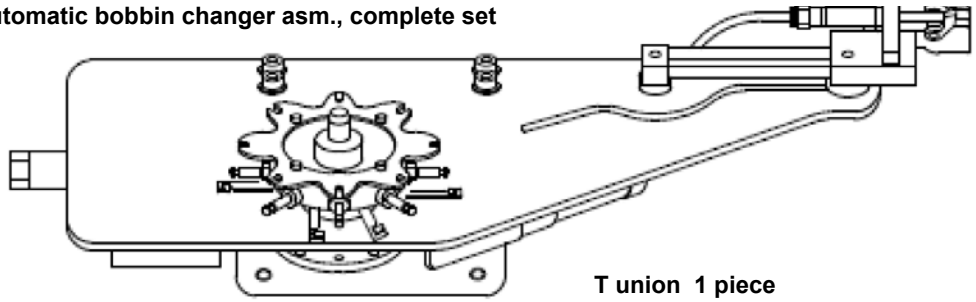
BK-10
INSTRUCTION MANUAL

CONTENTS

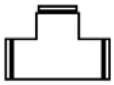
Component parts list

The BK-10 consists of the main body of the bobbin changer and the support device.
Check the component parts of the main body of the bobbin changer.

Automatic bobbin changer asm., complete set

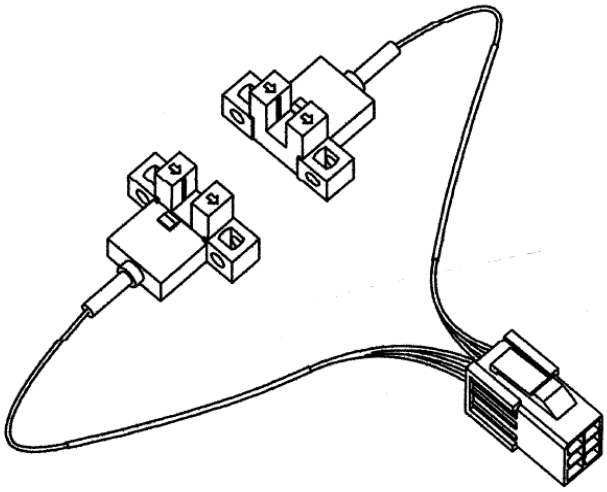


T union 1 piece
(ø8 × ø8 × ø8)

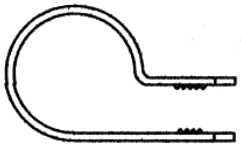


Air hose ø8 × 100 mm

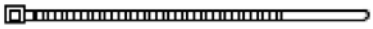
BK10_SENSOR_ASSY 1 piece



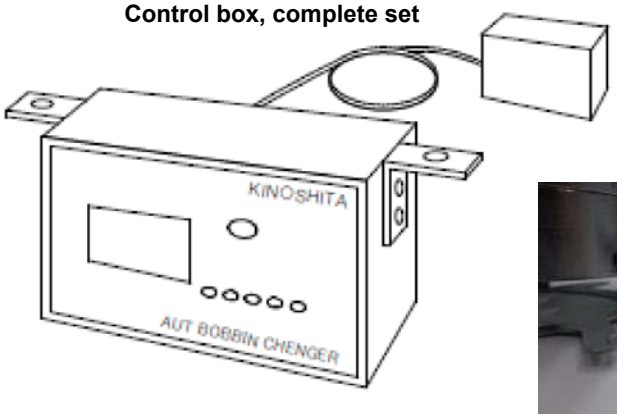
Cable clamp 4 pieces

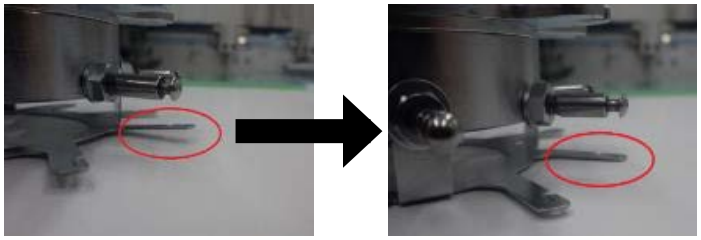


Cable clip band T-18R, 13 pieces



Control box, complete set

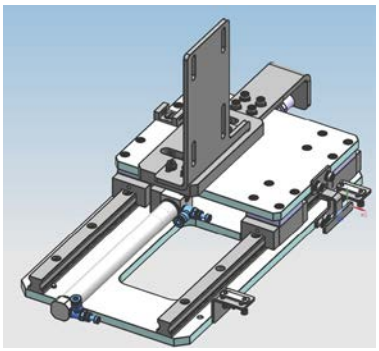




Caution

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.

Two different support devices are available; one for the PS-900/PS-910-13090 and the other for the PS-910-6055. The parts are packed in three boxes. Check the common parts structure.



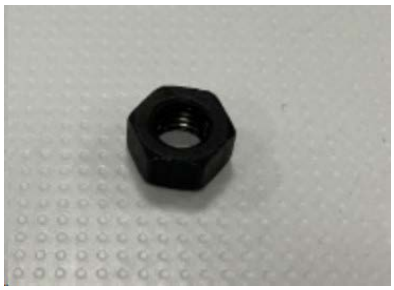
One set of the lengthwise feed base

Air hose Φ4×2500nn 2 pieces

Hexagon socket head cap screw M6×20L 4 pieces

Spring washer 8 pieces

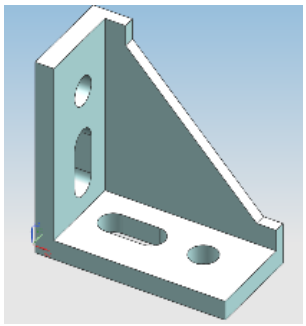
Washer 8 pieces



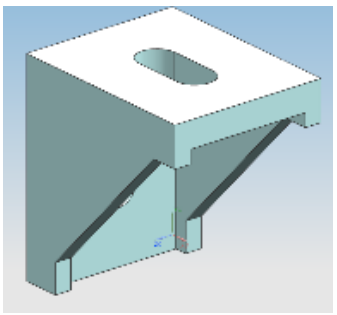
M6 nut 4 pieces

Aluminum frames, 7 pieces in total

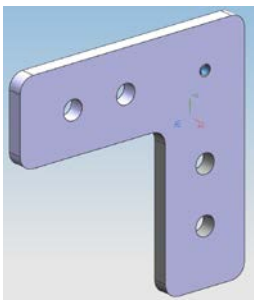
Length	Quantity	Photograph
284mm	4 pieces	
310mm	1 pieces	
352.5mm	2 pieces	



Large angle brackets 8 pieces



Small angle brackets 4 pieces



L link plates 12 pieces

M6 flange nuts 8 pieces

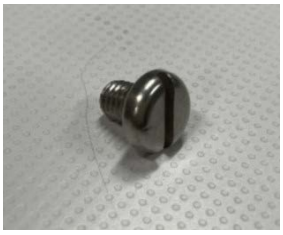
M6 aluminum frame dedicates screws 8 pieces

Hexagon socket head cap screw M6×14L 80 pieces

Washer, outside diameter ø17 80 pieces

M6 slide nuts 90 pieces

Fixing bases 8 pieces



Slotted head screw, M6×8L 4 pieces

Hexagon socket head cap screw M8×30L 4 pieces

Hexagon socket head cap screw M6×30L 8 pieces

Spring washer 8 pieces

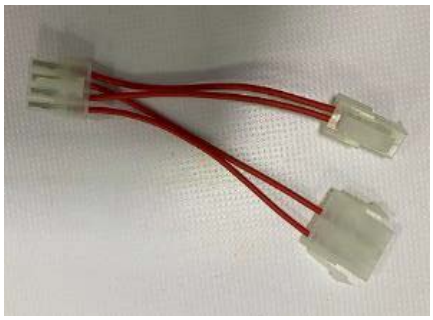
Hexagon socket head cap screw M4×8L 1 pieces

Hexagon socket head cap screw with washer M4 × 8L 2 pieces

30 × 30 aluminum frame end lids 8 pieces

BK10_GROUND_CABLE_ASSY
1 pieces

Toothed washer 1 piece



BK10_RELAY_CABLE_ASSY_C
1 pieces

Solenoid valve
(with unions and screws) 1 piece

BK10_SOLENOID VALVE_
CABLE_ASSY 1 pieces

BK10_RELAY_CABLE_ASSY_ B
1 pieces

RELAY TERMINAL
1 pieces

RELAY 1 pieces

BK10_24V_POWER 1 pieces

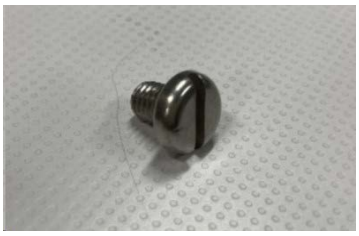
BK10_24V_POWER_CABLE
1 pieces

Check the components of PS900 and PS910-13090. (For users using BK-10 with PS900 and PS910-13090)

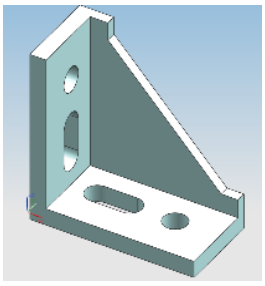
Aluminum frames, 7 pieces in total

Length	Quantity	Photograph
235mm	2 pieces	
265mm	1 pieces	
300mm	1 pieces	
216mm	2 pieces	
368mm	1 pieces	

Fixing bases 2 pieces



Slotted head screw, M6×8L 2 pieces



Large angle brackets 8 pieces

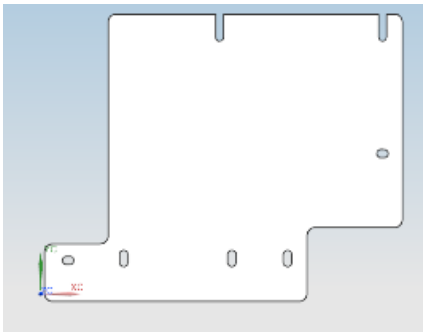
Phillips head screw, M4 × 30L 8 pieces

Rubber 8 pieces

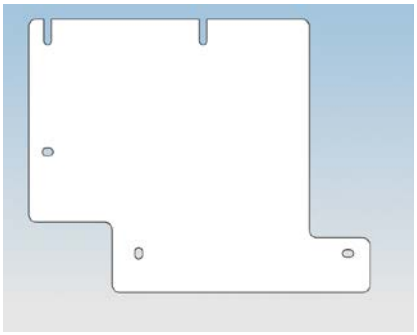
M6 flange nuts 32 pieces

M6 aluminum frame dedicates screws 32 pieces

30 × 30 aluminum frame end lids 4 pieces



Resin cover (left)



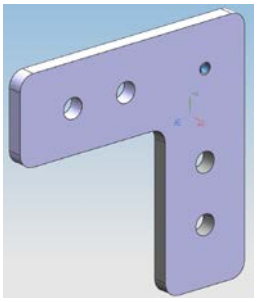
Resin cover (right)

BK10_RELAY_CABLE_ASSY_A 1 pieces

Check the component parts for the PS-910-6055. (For the customers who use the BK10 with the PS-910-6055)

Aluminum frames, 1 pieces in total

Length	Quantity	Photograph
380mm	1 pieces	



L link plates 12 pieces

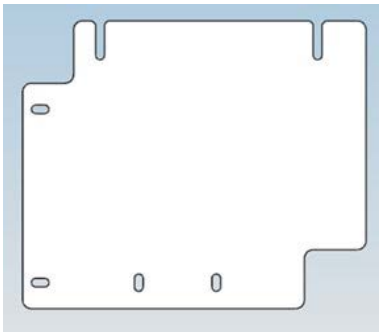
M6 flange nuts 8 pieces

M6 aluminum frame dedicates screws 8 pieces

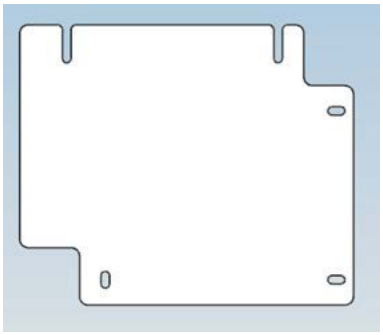
M4 Phillips head screw 12 pieces

M4 dedicated nuts 6 pieces

BK_RELAY_CABLE_E_6055 1 pieces

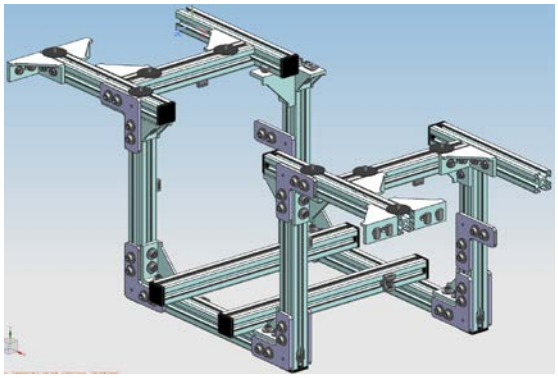


PS-910-6055 Resin cover (left)

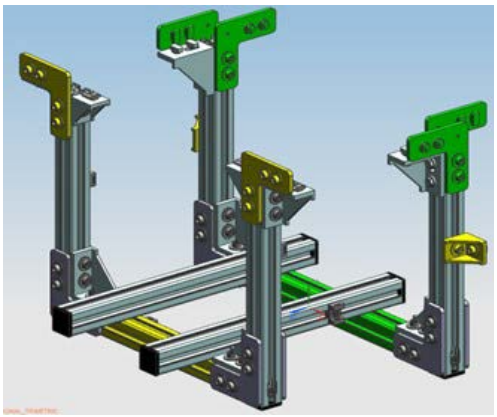


PS-910-6055 Resin cover (right)

Refer to the completed state of the support devices for the PS-900/PS-910-13090 and for the PS-910-6055.



PS-900/PS-910-13090 Reference drawing of the completed state of the aluminum frames



PS-910-6055 Reference drawing of the completed state of the aluminum frames

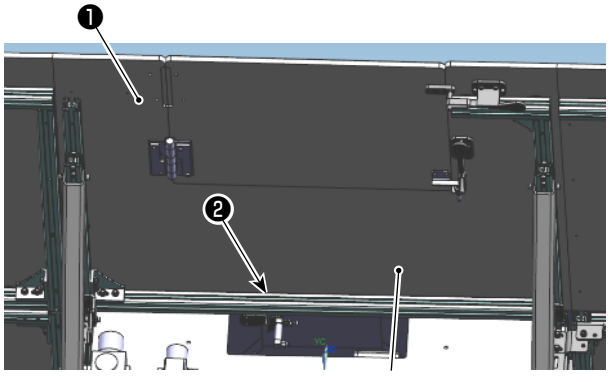
1. Installing the main body of automatic bobbin changer

WARNING :

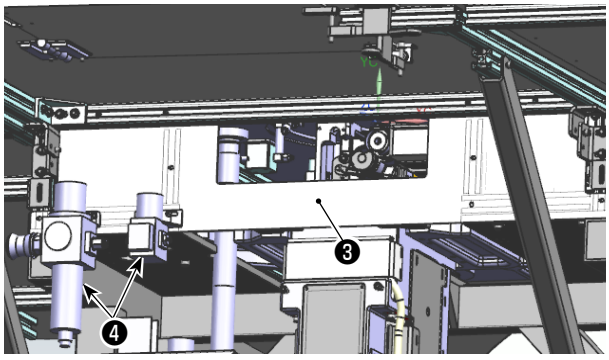
1. **Installation procedure of the automatic bobbin changer must be carried out by a trained technical expert.**
2. **Request your distributor or a specialized electrician to carry out electric wiring.**
3. **Do not connect the power plug of the sewing machine before completing the installation procedure.**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

1-1. Installing the aluminum frames (PS-900 to PS-910-13090)

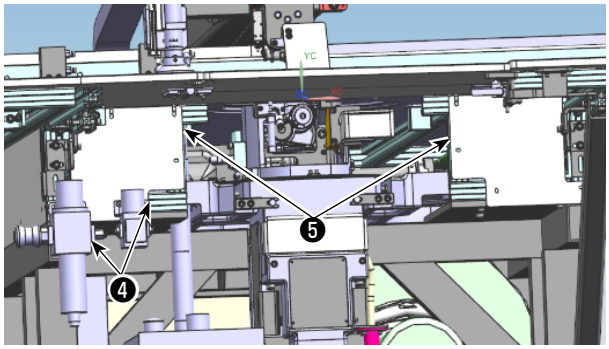
Caution **Refer to "1-2. Installing the aluminum frames (PS-910-6055)" p.13 for details on installing the aluminum frames for the PS910-6055.**



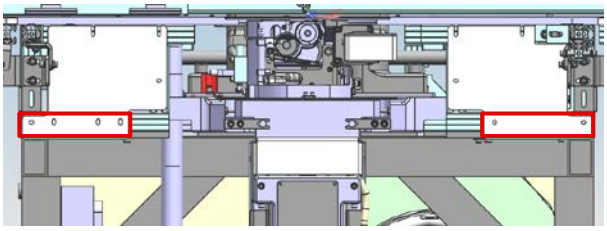
1) Remove the aluminum frame ❷ and large angle bracket from the intermediate table ❶ of the sewing machine.



2) Remove resin cover ❸ and regulators ❹ .

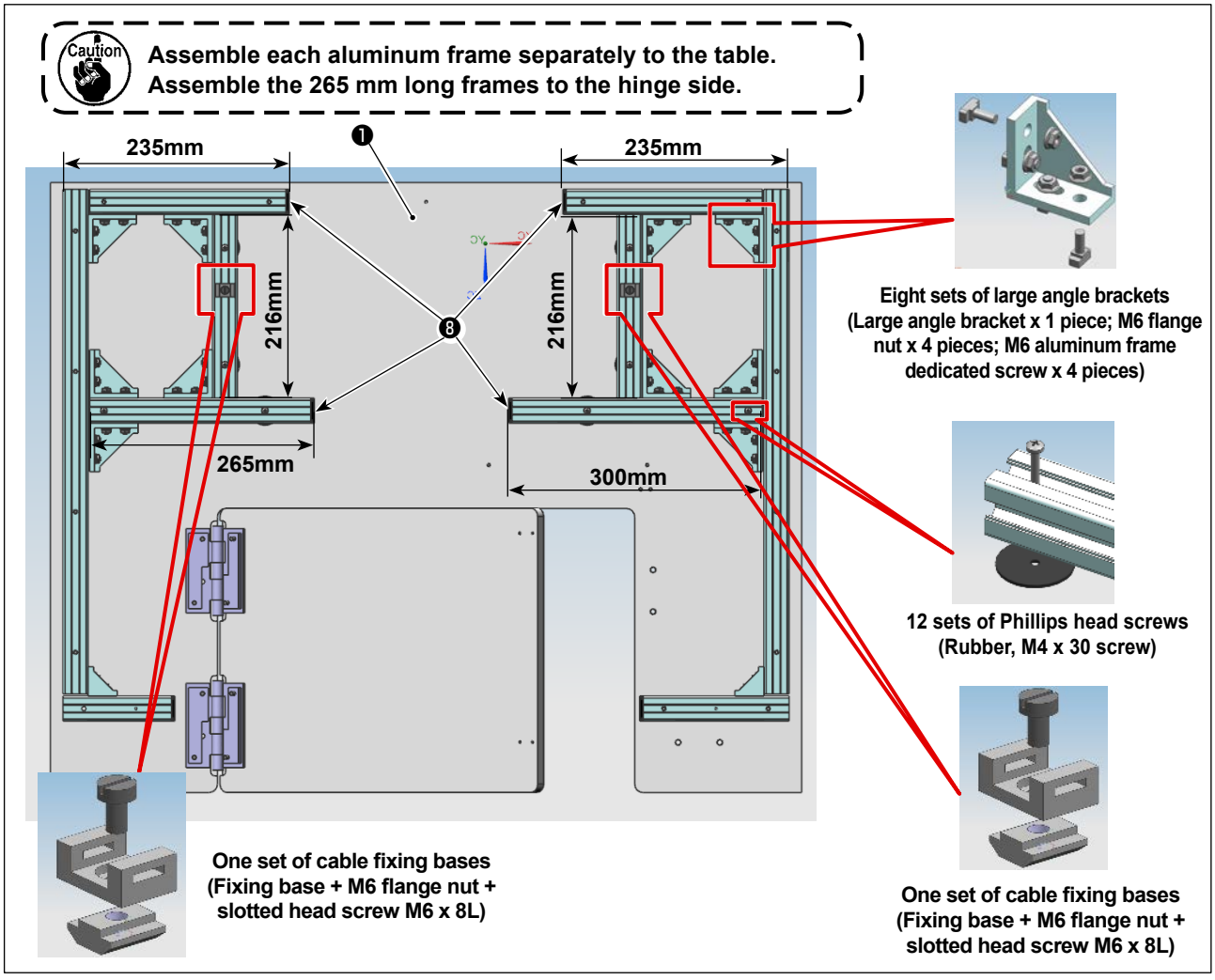


3) Attach new resin covers ❺ with the screws that have been used to secure resin cover ❸ . (Adjust the position of the slide nuts in accordance with the hole positions.)
Secure two regulators ❹ at the location shown below using holes in resin covers ❺ .

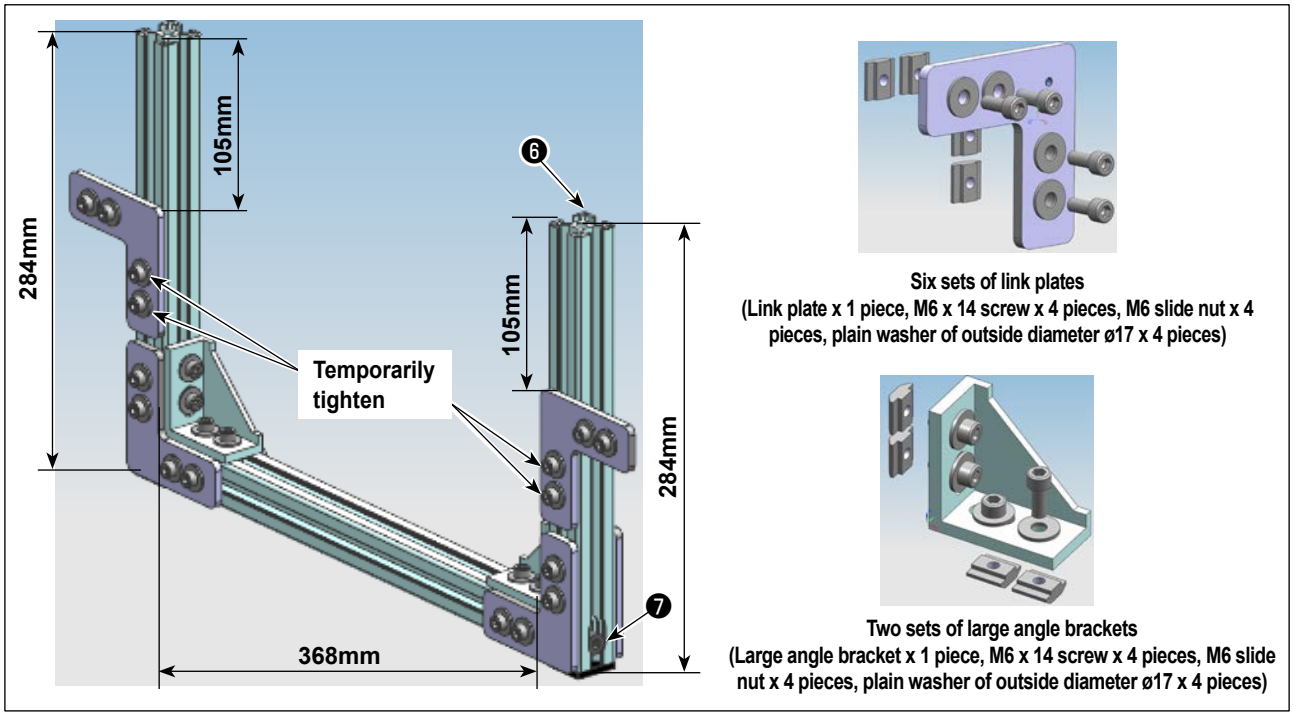


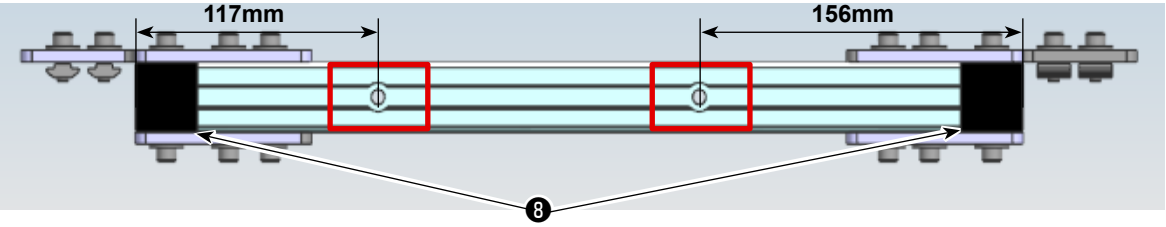
Caution **As shown in the figure by the red frames, attach the cover with four holes to the left and the cover with two holes to the right.**
Make sure that the left and right covers are assembled in their correct positions.

4) Install the support aluminum frames of the bobbin changer to the intermediate table (with tapped holes) ❶ according to their lengths.
Attach end lids ❽ to the aluminum frames at the far side. (Aluminum frame specifications, 235 mm: 2 pieces; 216 mm: 2 pieces; 300 mm: 1 piece; 265 mm: 1 piece)



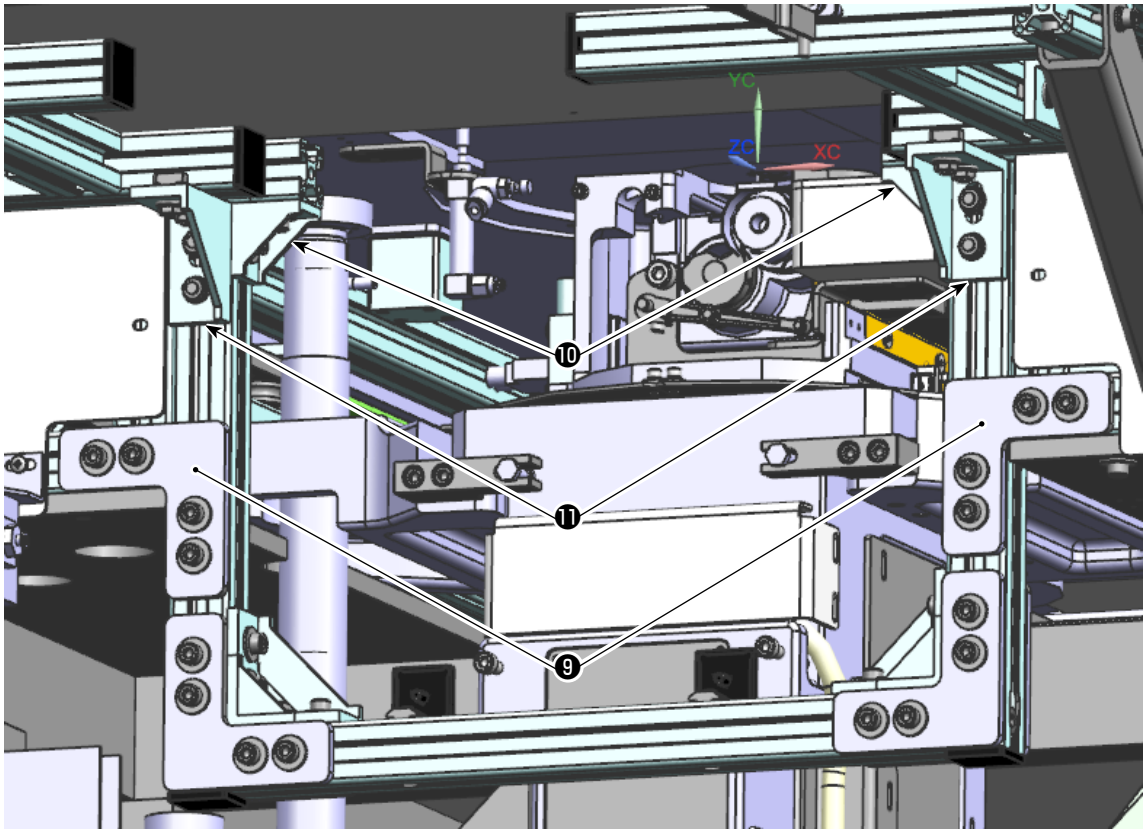
5) Assemble the support aluminum frames (asm.) ❻ according to the figure given below. Fix them by tightening M8 x 40 screws ❼ (two pieces) at both sides.
Attach end lids ❽ to the longitudinal aluminum frames. (Aluminum frame specifications, 284 mm: 2 pieces; 368 mm: 1 piece)

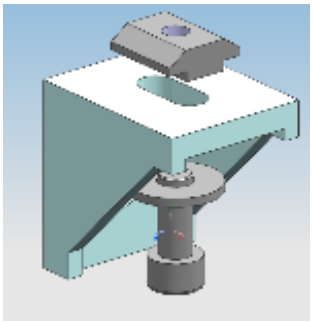




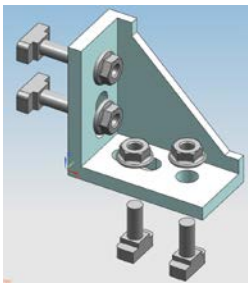
Undersurface of the horizontal aluminum frame has deep countersunk holes. Take care not to install the horizontal aluminum frame upside down.
Temporarily fix the link plate at the position that is 105 mm away from the end face of the longitudinal aluminum plate in preparation for the next installing work.

6) Install support aluminum frames (asm.) ❻ to the sewing machine. Secure link plates ❾ to the aluminum frames of the main body of the sewing machine in prior.
Then, assemble small angle brackets ❿ and large angle brackets ⓫ .





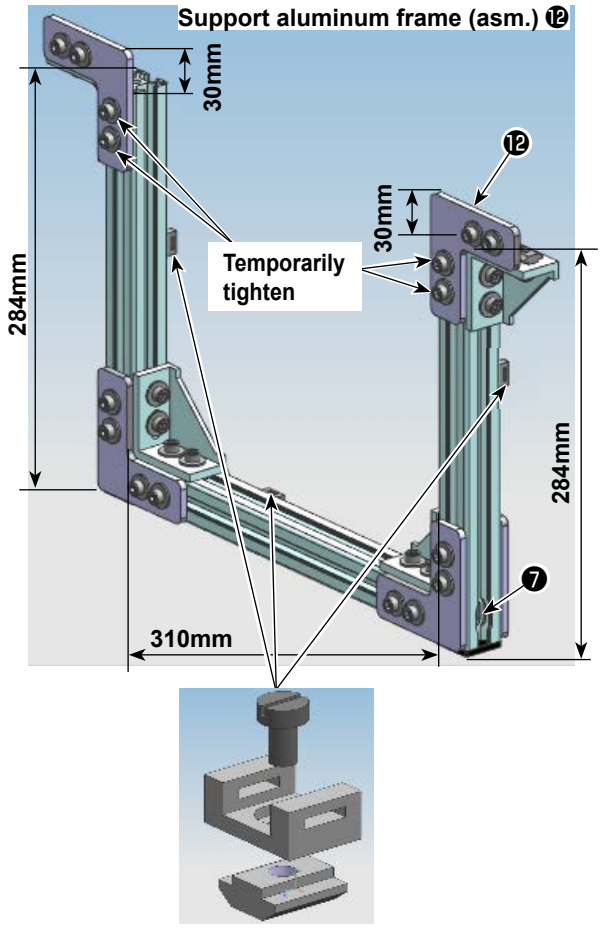
❿ Two sets of small angle brackets
(Small angle bracket x 1 piece, M6×14 screw x 2 pieces, M6 slide nut x 2 pieces, plain washer of outside diameter ø17 x 2 pieces)



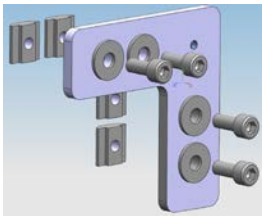
⓫ Two sets of large angle brackets
(Large angle bracket x 1 piece; M6 flange nut x 4 pieces; M6 aluminum frame dedicated screw x 4 pieces)

Put the slide nuts for securing link plate ❾ in the aluminum frames (sewing machine main body side) in prior.

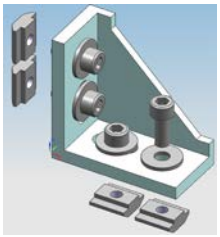
7) Assembly support aluminum frames (asm.) ⓬ according to the figure given below. Fix them by tightening M8 x 40 screws ❼ at both sides.
Attach end lids ❽ to the longitudinal aluminum frames.



Three sets of cable fixtures
(Fixing base + M6 flange nut + Slotted head screw M6 x 8L)

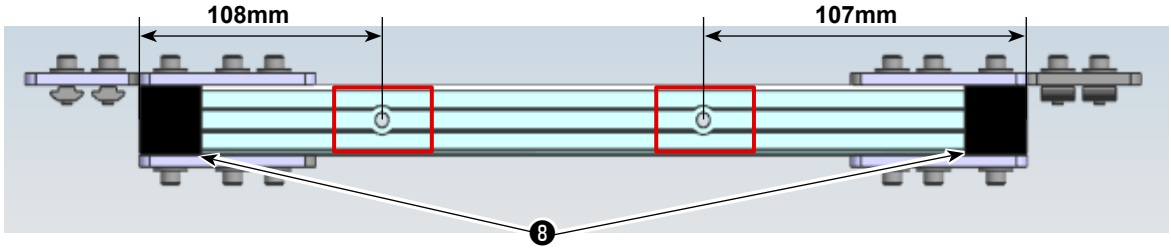


Six sets of link plates
(Link plate x 1 piece, M6 x 14 screw x 4 pieces, M6 slide nut x 4 pieces, plain washer of outside diameter ø17 x 4 pieces)



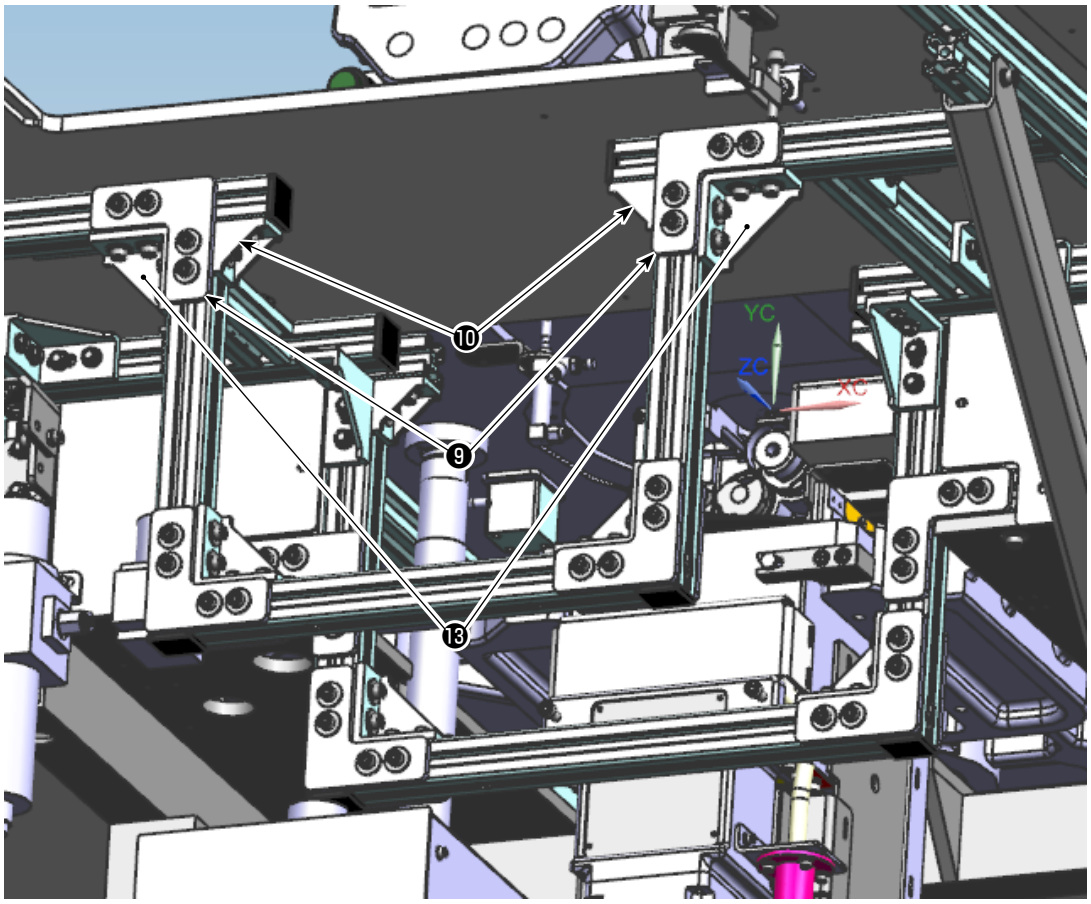
Two sets of large angle brackets
(Large angle bracket x 1 piece, M6 x 14 screw x 4 pieces, M6 slide nut x 4 pieces, plain washer of outside diameter ø17 x 4 pieces)

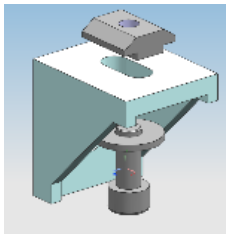
Caution
Before assembling the L-shaped sheet metal, be sure to insert the slide nuts into each aluminum frame (back side when viewed from the front) in advance.



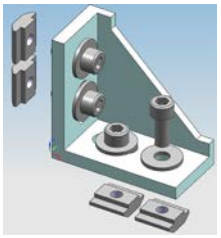
Caution
Undersurface of the horizontal aluminum frame has deep countersunk holes. Take care not to install the horizontal aluminum frame upside down.
Temporarily fix the link plate at the position that is 105 mm away from the end face of the longitudinal aluminum plate in preparation for the next installing work.

8) Attach the support aluminum frame (asm.) ⓬ to the intermediate table. First, fix the link plates ❾ to the aluminum frames of the table.
Next, assemble the small angle brackets ❿ and the large angle brackets ⓭ . Align the end faces of the small angle brackets ❿ with the end faces of the aluminum frame (the lids are not included).





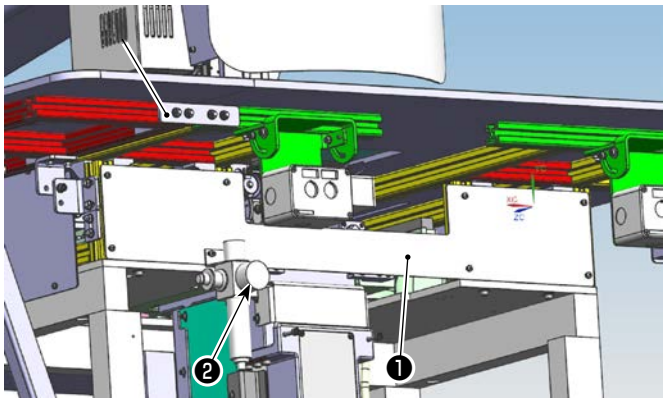
❿ Two sets of small angle brackets (Small angle bracket x 1 piece, M6x14 screw x 2 pieces, M6 slide nut x 2 pieces, plain washer with an outside diameter of ø17 x 2 pieces)



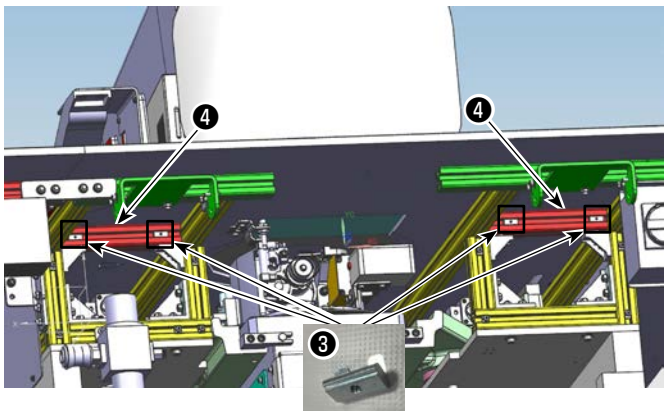
Two sets of large angle brackets (Large angle bracket x 1 piece, M6 x 14 screw x 4 pieces, M6 slide nut x 4 pieces, plain washer of outside diameter ø17 x 4 pieces)

Caution **Insert the slide nuts for fixing the angle brackets in the aluminum frames in advance.**

1-2. Installing the aluminum frames (PS-910-6055)

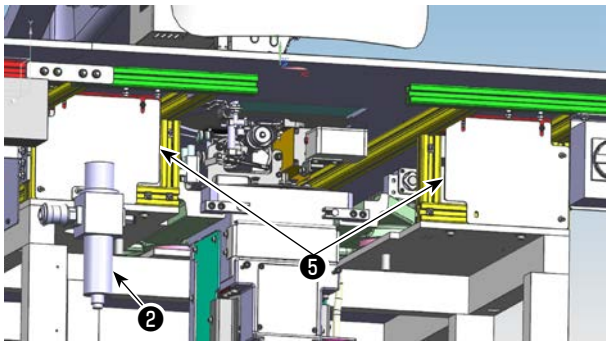


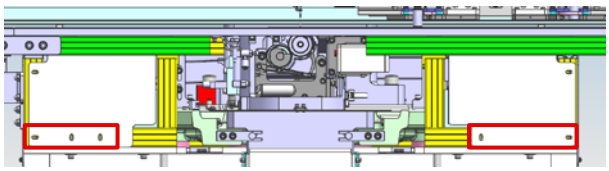
1) Remove aluminum frame ❷ from intermediate table ❶ of the sewing machine.



M4 dedicated nuts

2) Insert M4 dedicated nuts ❸ into the aluminum frames ❹ (two each into the right and left aluminum frames).





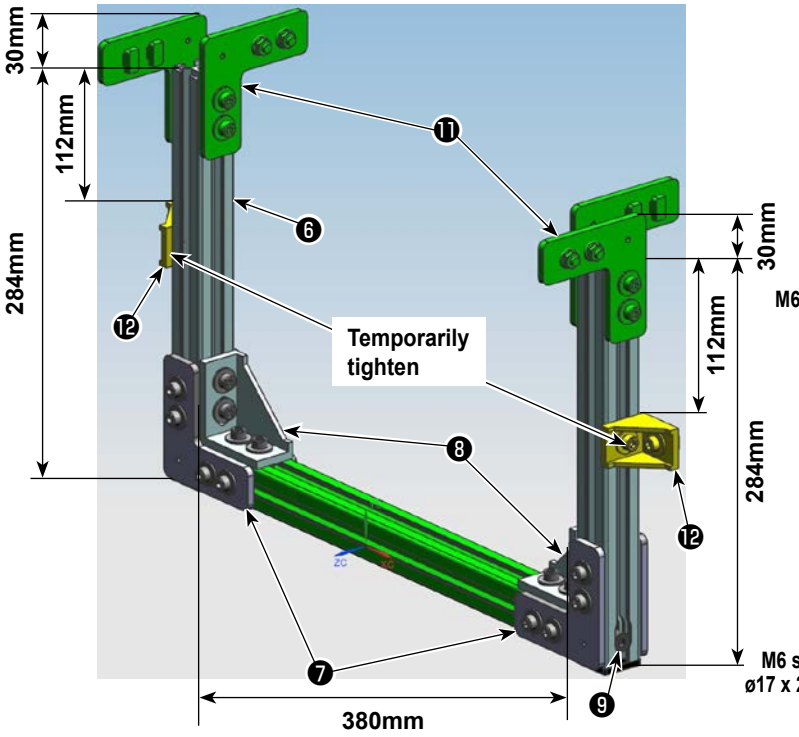
3) Attach new resin covers ❺ with the Phillips head screws (one that has been originally used for the sewing machine and the other that is supplied as an accessory). (Adjust the position of the slide nuts in accordance with the hole positions.)
Secure regulator ❷ at the location shown in the figure on the left using the hole in resin cover ❺ .

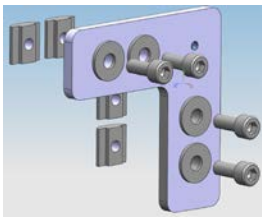
As shown in the figure by the red frames, attach the cover with three holes to the left and the cover with two holes to the right.
Make sure that the left and right covers are assembled in their correct positions.

4) Assemble the support aluminum frames (asm.) ❻ according to the figure given below.
Secure the aluminum frames with link plates (A) ❼ and large angle brackets (A) ❽ . Then, fix them by tightening M8 x 40 screws ❾ (two pieces) at both sides. Attach end lids ❿ (two pieces) to the longitudinal aluminum frame. (Aluminum frame specifications, 284 mm: 2 pieces; 380 mm: 1 piece)
Temporarily secure link plates (B) ⓫ and small angle brackets ⓬ .

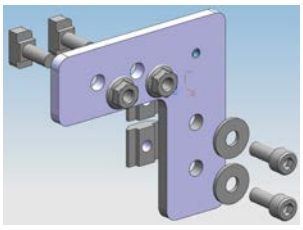
Caution

Undersurface of the horizontal aluminum frame has deep countersunk holes. Take care not to install the horizontal aluminum frame upside down.
Temporarily fix the small angle brackets respectively at the position of 112 mm and link plates (B) respectively at the positions of 30 mm, as shown in the figure, in preparation for the next installing work.

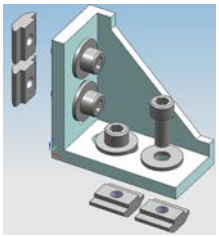




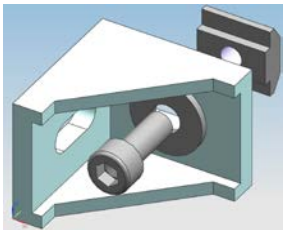
❼ four sets of link plates (A)
(Link plate x 1 piece, M6 x 14 screw x 4 pieces, M6 slide nut x 4 pieces, plain washer of outside diameter ø17 x 4 pieces)



⓫ four sets of link plates (B)
(Link plate x 1 piece, M6 x 14 screw x 2 pieces, M6 slide nut x 2 pieces, plain washer of outside diameter ø17 x 2 pieces, M6 flange nut x 2 pieces; M6 aluminum frame dedicated screw x 2 pieces)



❽ Two sets of large angle brackets
(Large angle bracket x 1 piece, M6×14 screw x 4 pieces, M6 slide nut x 4 pieces, plain washer of outside diameter ø17 x 4 pieces)



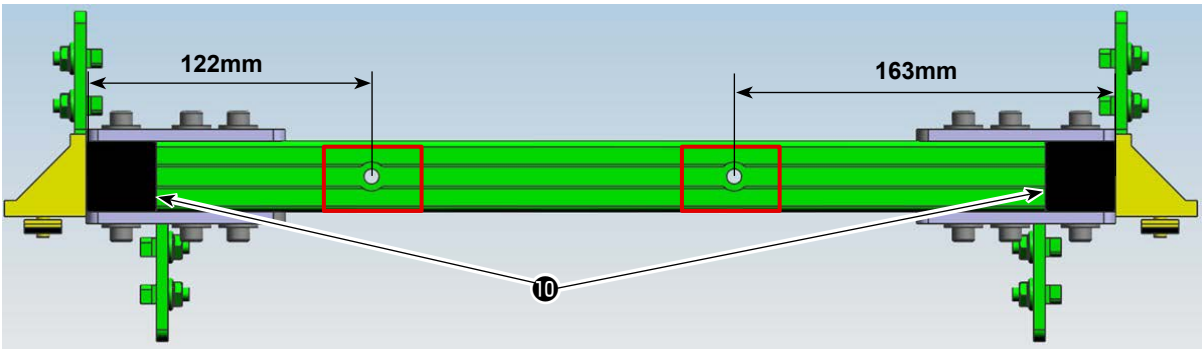
⓬ Two sets of small angle brackets
(Small angle bracket x 1 piece, M6×14 screw x 2 pieces, M6 slide nut x 2 pieces, plain washer of outside diameter ø17 x 2 pieces)

Caution

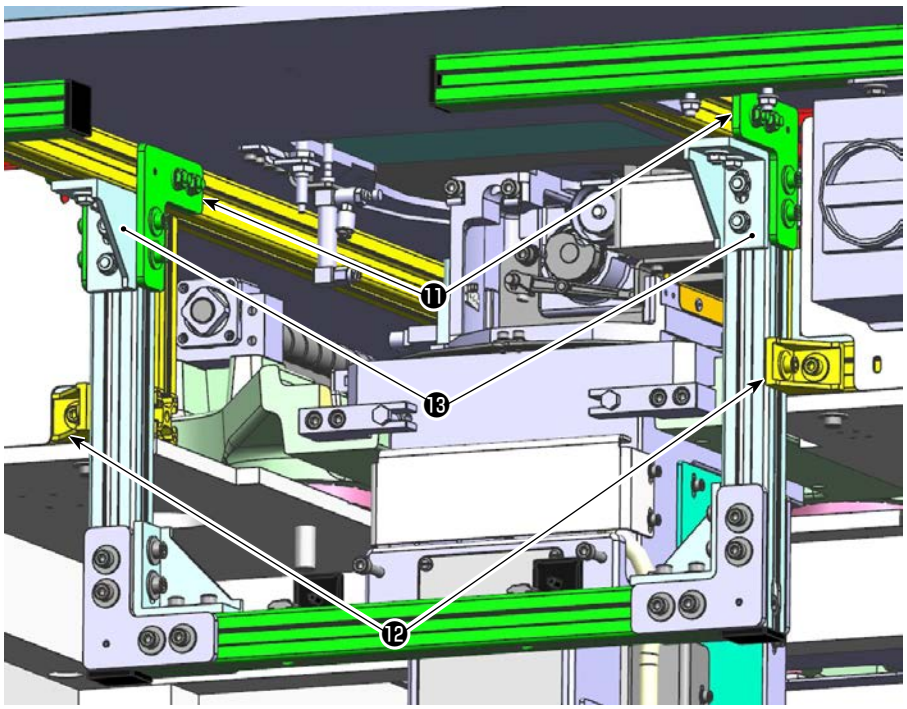
At the time of installation, note that the nuts and screws composing link plate asm. ❼ and those composing link plate asm. ⓫ are different.

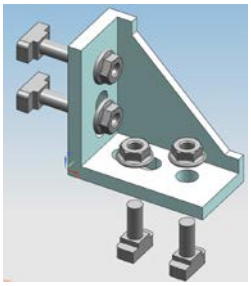
Caution

Before assembling the L-shaped metal plate, be sure to first insert the slide nuts into each aluminum frame.



5) Install support aluminum frames (asm.) ❻ to the sewing machine. Secure link plates (B) ⓫ (four sets) to the aluminum frames of the main body of the sewing machine in prior.
Then, assemble small angle brackets ⓬ and large angle brackets (B) ⓭ .

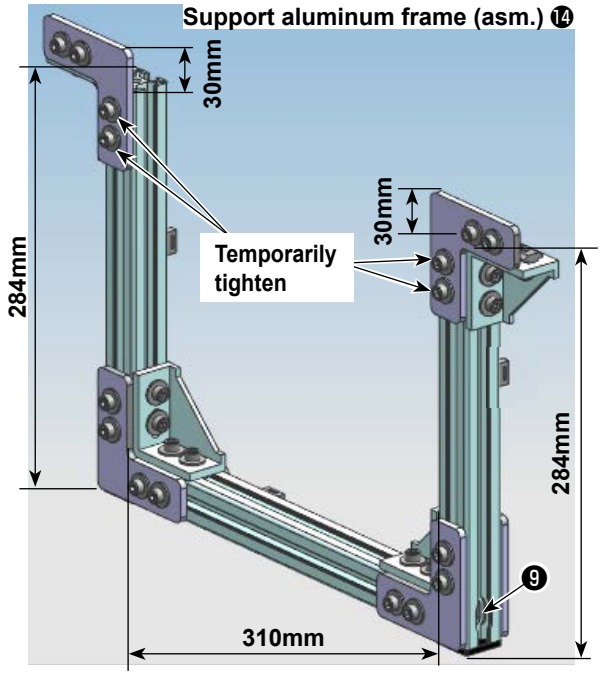


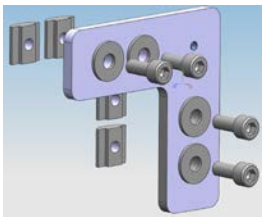


⓲ Two sets of large angle brackets (B) (Large angle bracket x 1 piece; M6 flange nut x 4 pieces; M6 aluminum frame dedicated screw x 4 pieces)

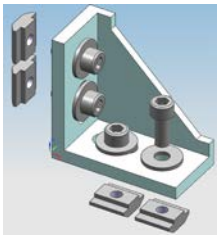
Caution **Put the slide nuts for securing the small angle brackets in the aluminum frames (sewing-machine main body side) in prior.**

6) Assembly support aluminum frames (asm.) ⓮ according to the figure given below. Fix them by tightening M8 x 40 screws ❾ at both sides.
Attach end lids ❿ to the longitudinal aluminum frames.

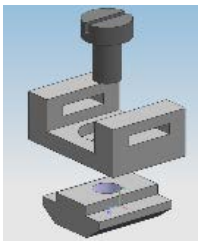




❼ Six sets of link plates (A)
(Link plate x 1 piece, M6 x 14 screw x 4 pieces, M6 slide nut x 4 pieces, plain washer of outside diameter ø17 x 4 pieces)



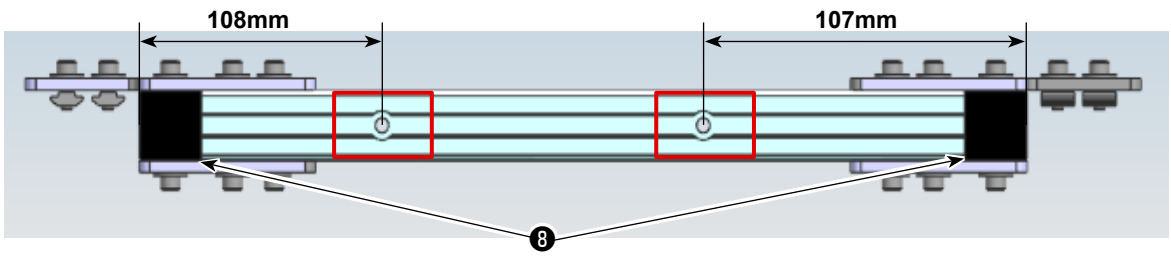
❽ Two sets of large angle brackets (A)
(Large angle bracket x 1 piece, M6 x 14 screw x 4 pieces, M6 slide nut x 4 pieces, plain washer of outside diameter ø17 x 4 pieces)



Three sets of cable fixtures
(Fixing base + M6 flange nut + Slotted head screw M5 x 8L)

Caution

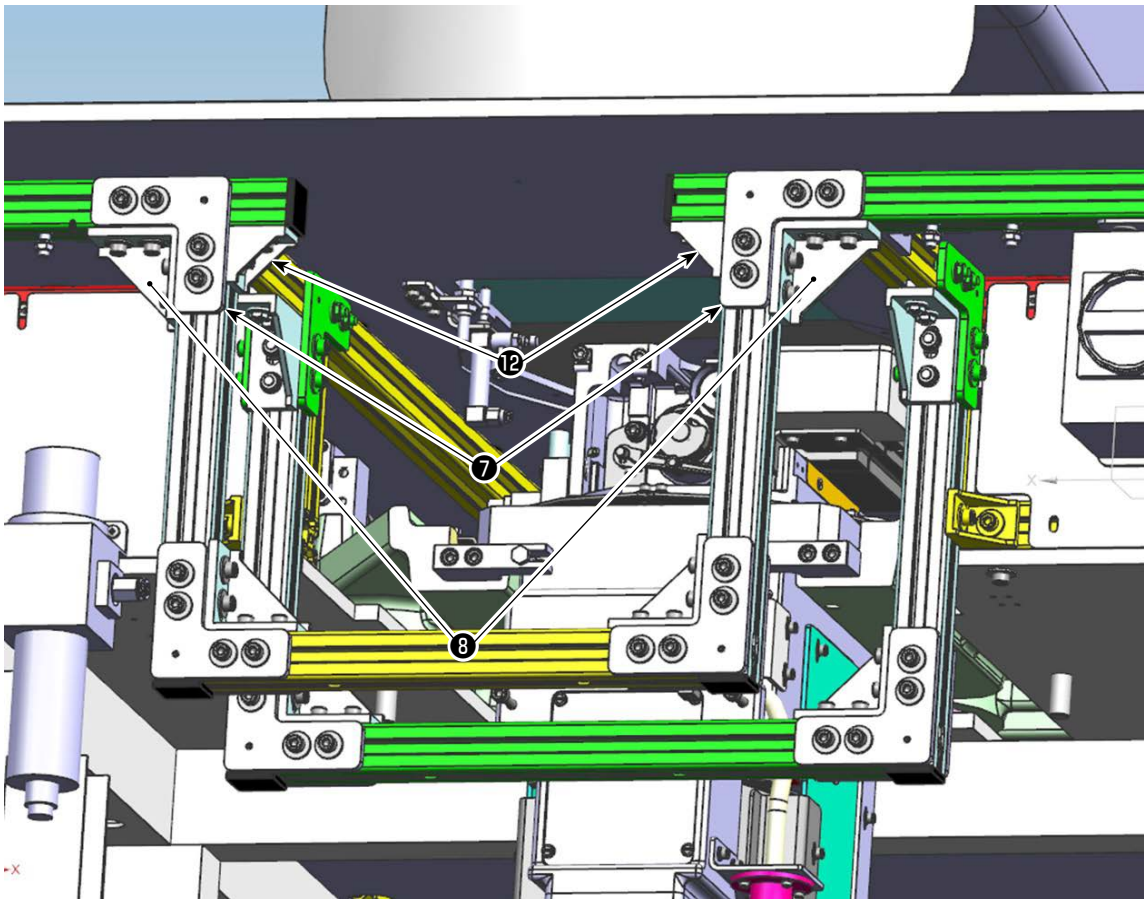
Before assembling the L-shaped sheet metal, be sure to insert the slide nuts into each aluminum frame (back side when viewed from the front) in advance.

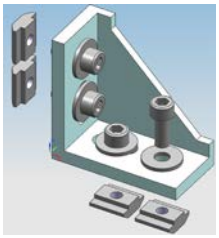


Caution

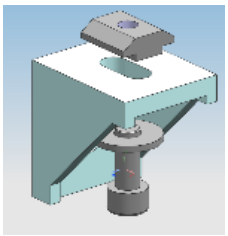
Undersurface of the horizontal aluminum frame has deep countersunk holes. Do not install the horizontal aluminum frame upside down.
Temporarily fix the link plate at the position that is 105 mm away from the end face of the longitudinal aluminum plate in preparation for the next installing work.

7) Attach support aluminum frames (asm.) ⓮ to the table. Secure link plate (A) ❼ to the aluminum frame of the table in prior.
Then, assemble small angle brackets ⓬ and large angle brackets (A) ❽ . Align the end faces of small angle brackets ⓬ with the end faces (the lids are not included) of the aluminum frames.





❽ Two sets of large angle brackets (A)
(Large angle bracket x 1 piece, M6 x 14 screw x 4 pieces, M6 slide nut x 4 pieces, plain washer of outside diameter ø17 x 4 pieces)

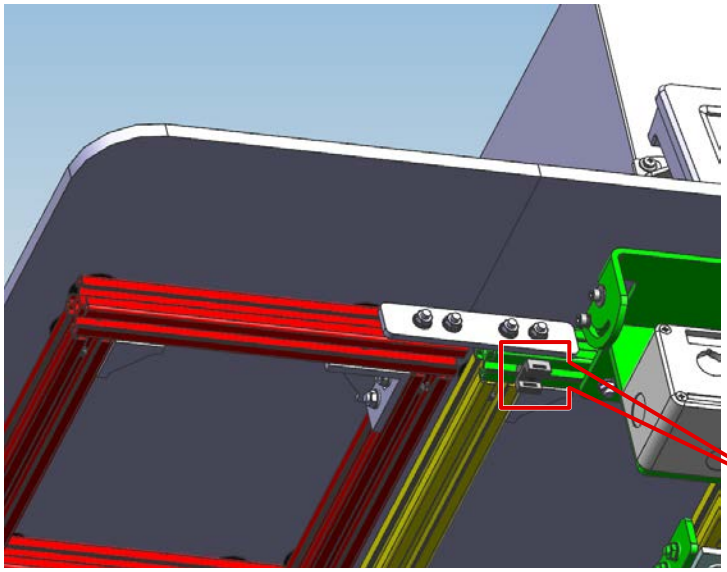


⓬ Two sets of small angle brackets
(Small angle bracket x 1 piece, M6×14 screw x 2 pieces, M6 slide nut x 2 pieces, plain washer of outside diameter ø17 x 2 pieces)

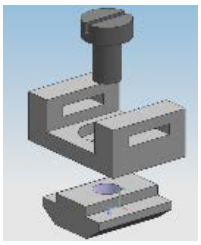
Caution

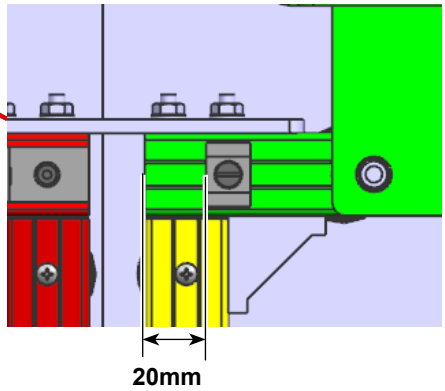
Put the slide nuts for fixing the angle brackets in the aluminum frames in prior.

8) Assemble the cable fixing base on the left side of the left switch of the sewing machine. The assembly position is 20 mm from the edge of the aluminum frame.

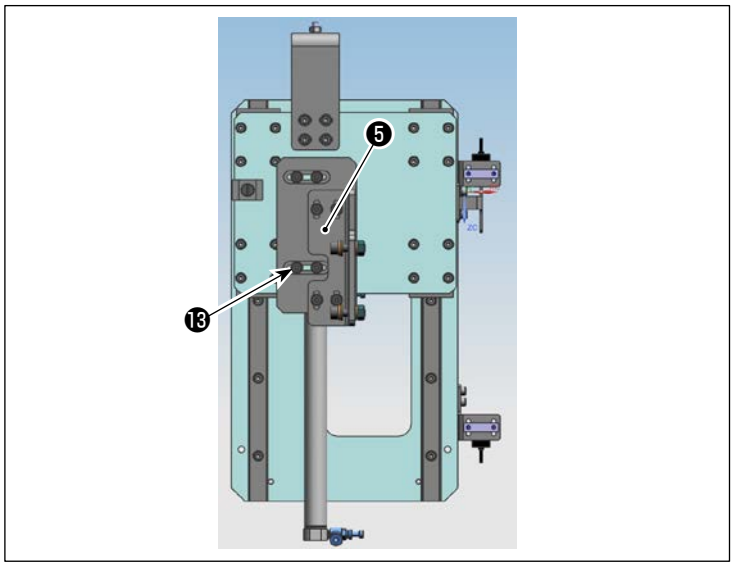


One set of cable fixtures (Fixing base + M6 slide nut + M6x8L slotted head screw)



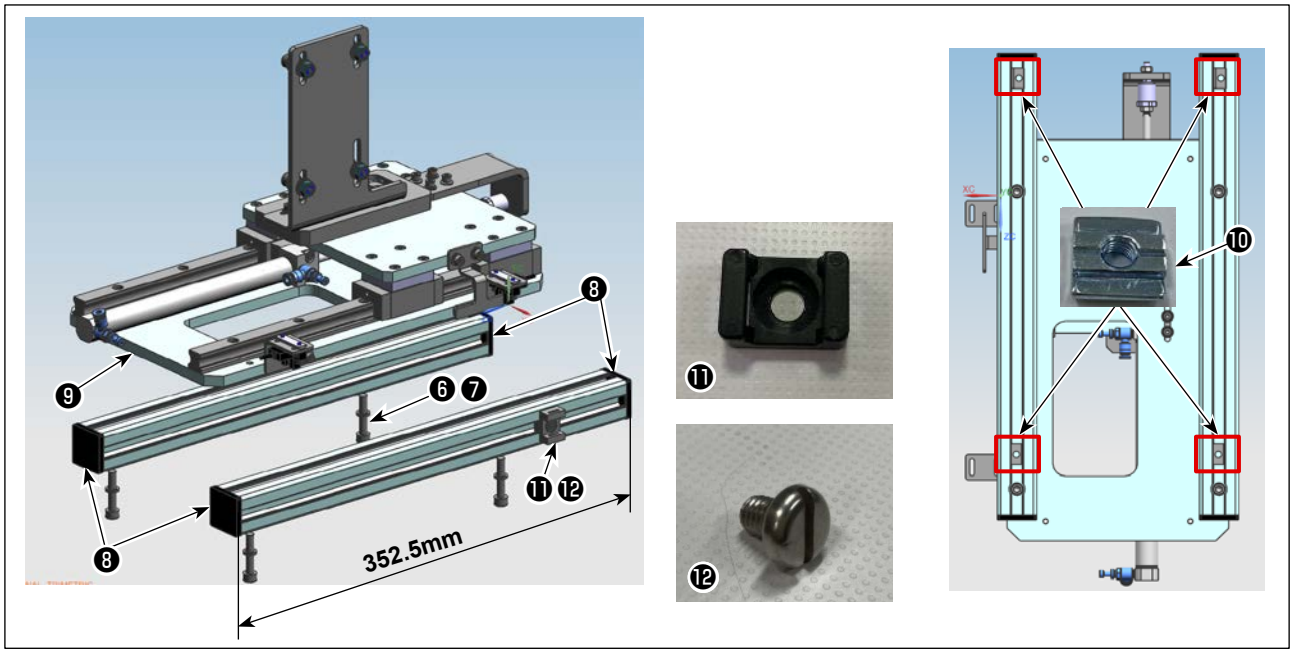


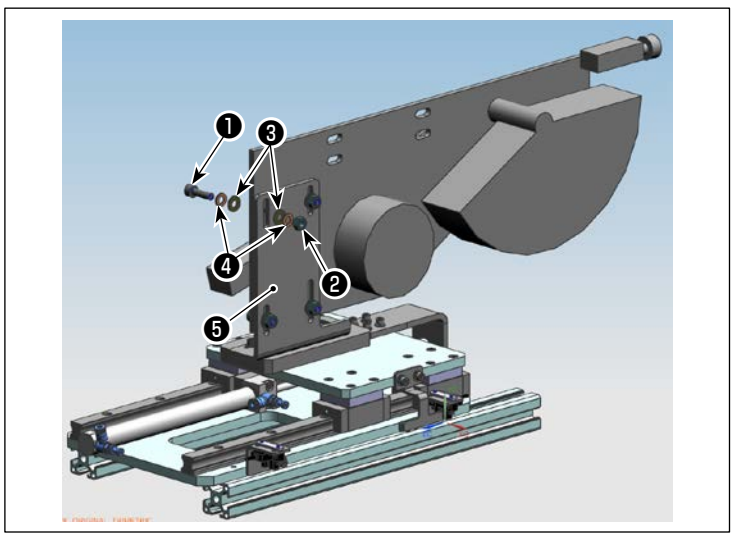
1-3. Installing the main body of the bobbin changer



1) Loosen the fixing screw ⓭ of the mounting bracket ❺ with the lengthwise feed base, move the mounting bracket ❺ back and forth, and then tighten the fixing screw ⓭ at the center position of the long hole.

2) Install lengthwise feed base ❾ to the aluminum frames with M6 x 30 screws ❻ and spring washers ❼ (four pieces each).
Put M6 slide nuts ❿ (two pieces each; totally four pieces) in the undersurfaces of right and left aluminum frame bases.
In addition, secure cable fixing base ⓫ on the side faces of the right and left aluminum frame bases with M6 x 8 straight slot screws ⓬ . Attach lids ❽ to both ends of the aluminum frames.



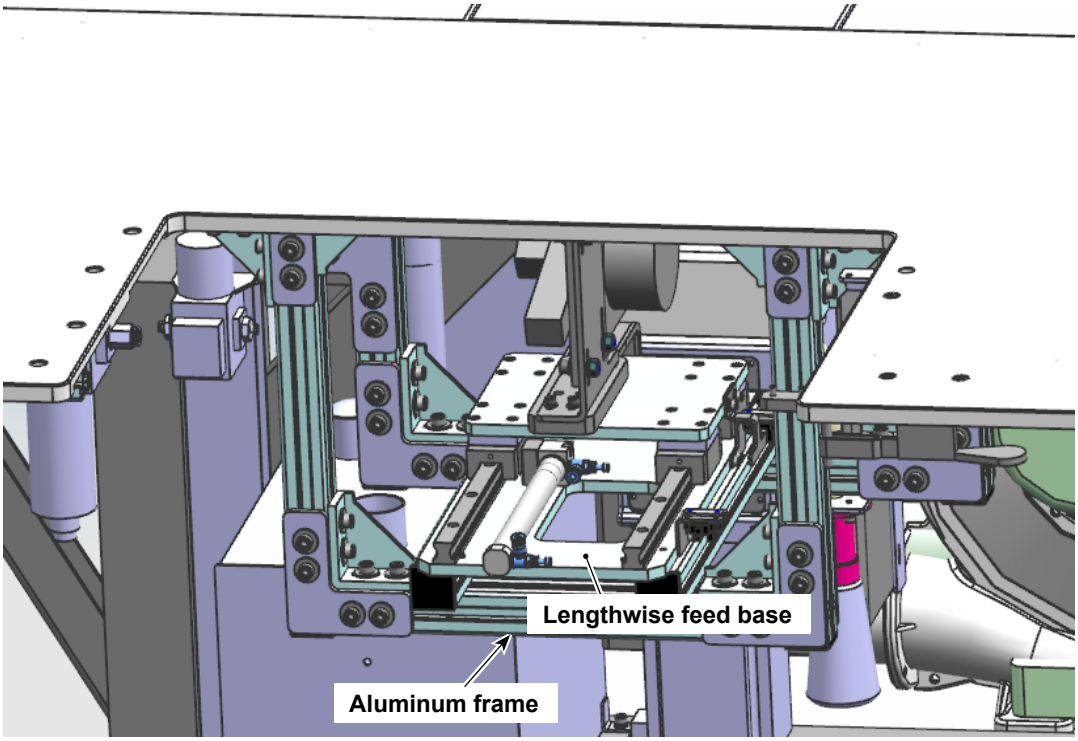


3) Temporarily secure the mounting bracket ❺ to the main body of the bobbin changer using M6x20 screws ❶ and nuts ❷ (four pieces each), and plain washers ❸ and spring washers ❹ (eight pieces each).

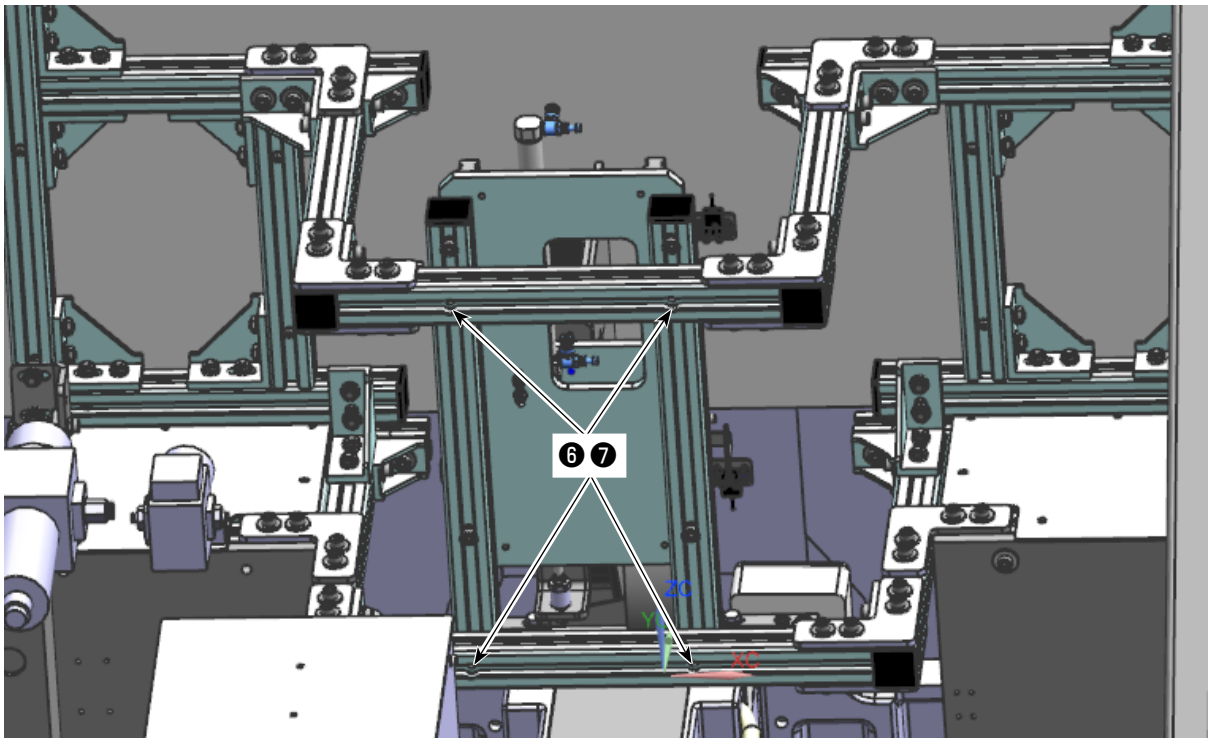
1-4. Installing the lengthwise feed base

Put the lengthwise feed base on the aluminum frames of the intermediate table. Install it to the aluminum frames with M6 x 30 screws ❻ and spring washers ❼ (four pieces each).

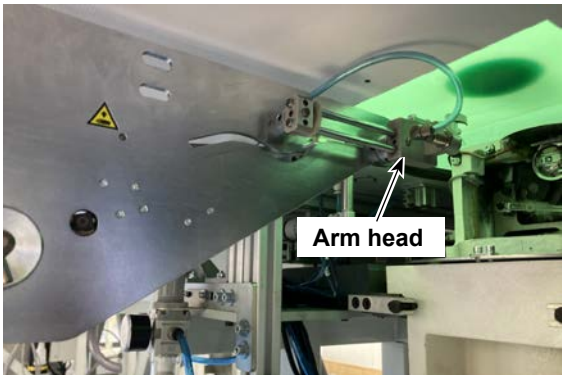
1) Put the lengthwise feed base on the aluminum frames of the intermediate table.

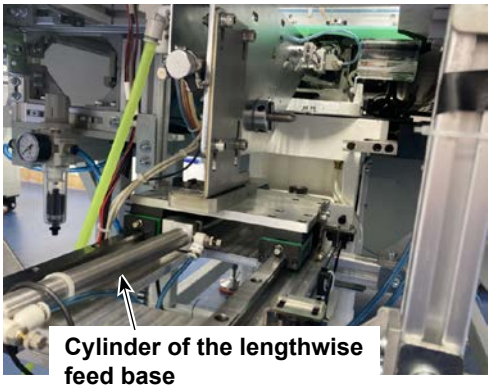


2) Temporally fix the lengthwise feed base to the aluminum frames with M6 x 30 screws ❻ and spring washers ❼ (four pieces each).



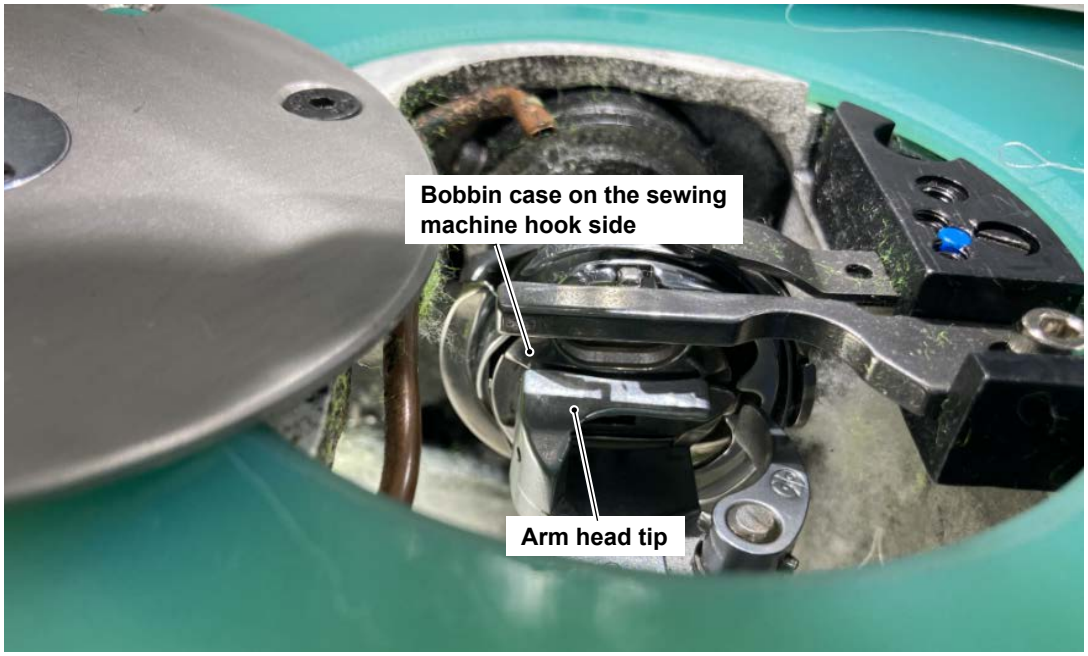
3) Manually turn the arm head of the main body of the bobbin changer to move it forward. Draw out the cylinder of the lengthwise feed base to the sewing machine side.





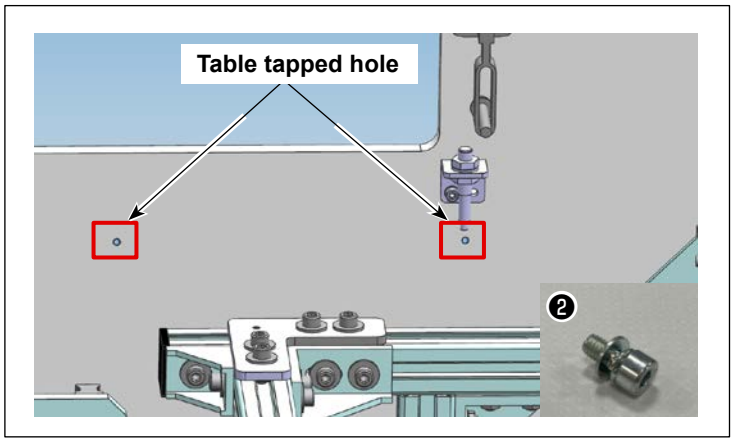
4) Correct the fixing position of the lengthwise feed base to align the top end of the arm head with the surface of the bobbin case on the sewing machine hook side.

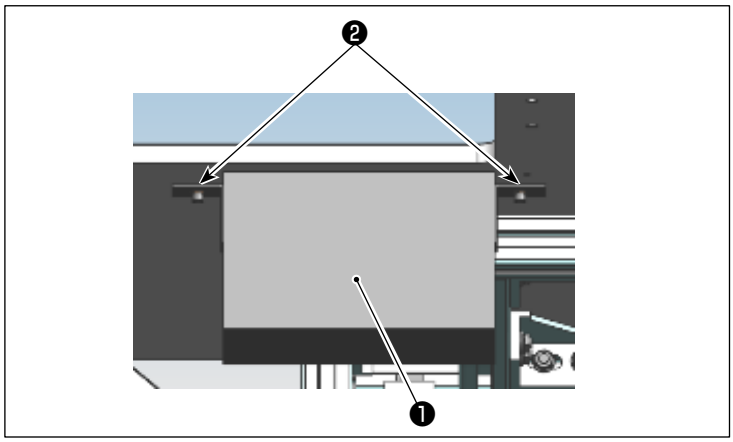
Explanation is given in "4-1. Checking the chuck claw position" p.59 for the fine adjustment of the vertical, lateral and longitudinal positions of the top end of the arm head relative to the bobbin case on the sewing machine hook side.



Take care not to drop the lengthwise feed base and other parts during the installation/assembly work.

1-5. Installing the control box (PS-900 to PS-910-13090)

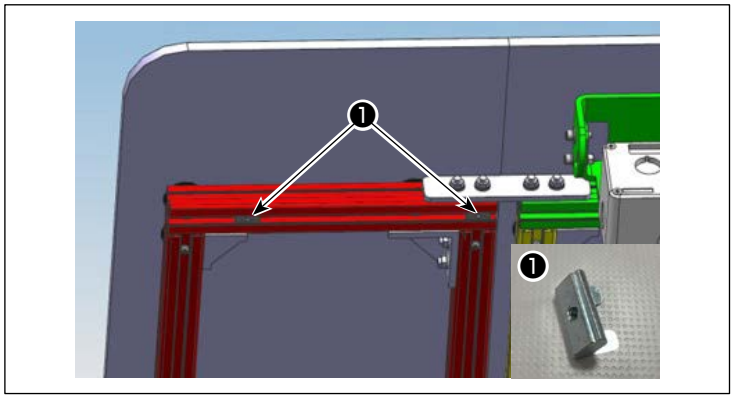




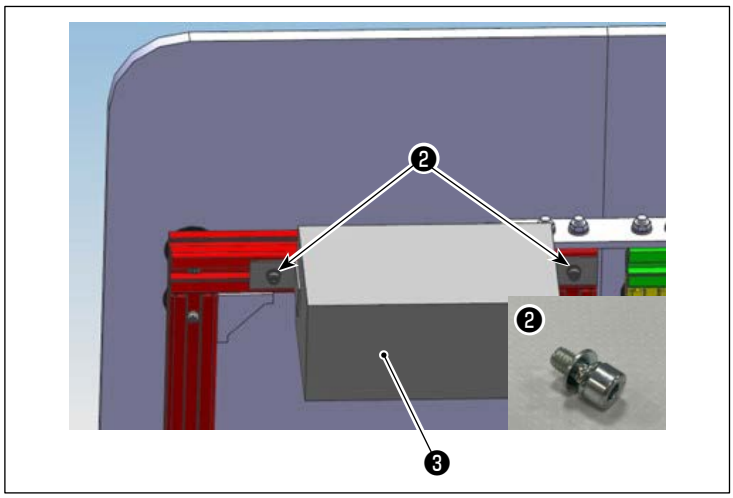
Install control box ❶ to the front center table of the sewing machine with M4 × 8 screws ❷ (two pieces).

Install the control box so that its operation buttons face the operator side.

1-6. Installing the control box (PS-910-6055)



Insert two M4 special nuts ❶ in the aluminum frame of the 6055 auxiliary table.



Install control box ❸ to the aluminum frame with M4 x 8 screws ❷ .

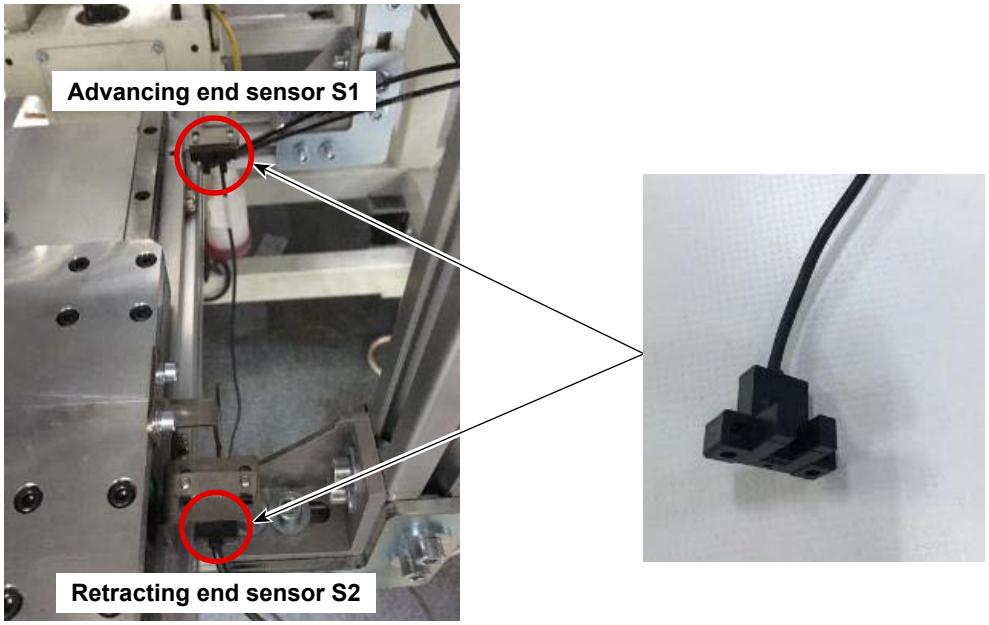
Install the control box so that its operation buttons face the operator side.

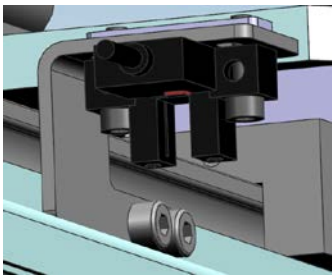
1-7. Installing the sensors

Install the sensors, which are connected to the control box, to the lengthwise feed base with M3 × 12 screws. In order to adjust the detection accuracy of the sensors, manually move the bobbin changer back and forth to bring the sensor detection plates to the center of the sensors.

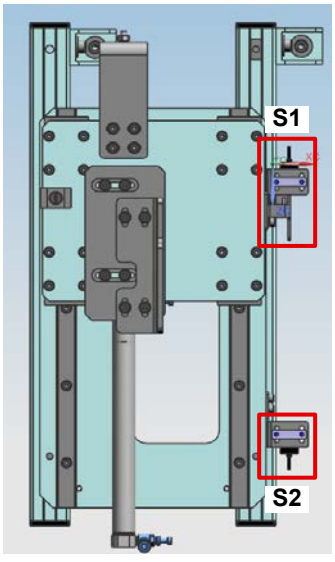
Turn ON the power to the sewing machine. Move the feed base back and forth to confirm the reaction of the sensor LEDs.
The sensor LEDs go out when the plate is detected or light up when it is not yet detected.
To confirm the above, check the following:

- The advancing end sensor when the feed base advances the most: The sensor LED goes out.
- The retracting end sensor when the feed base retracts the most: The sensor LED goes out.



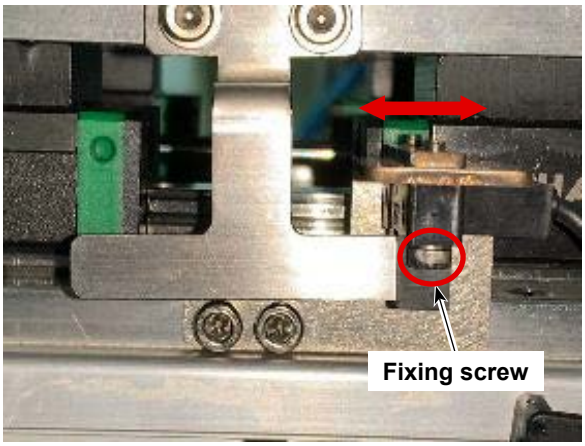


Fix it using screws so that the slit facing the sensor faces downward as shown on the left.



Sensor S1 cable should face the sewing machine
Sensor S2 cable should face the operator

Refer to **"2. Wiring procedure" p.28** for the electrical wiring of the sensors.

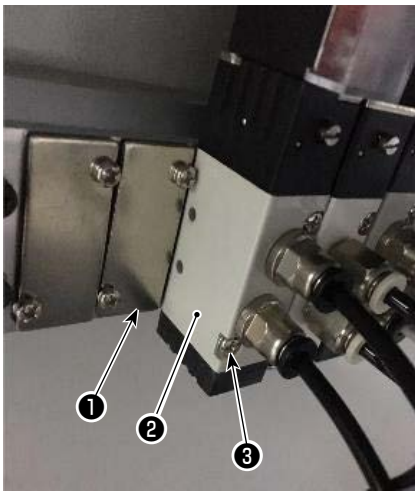


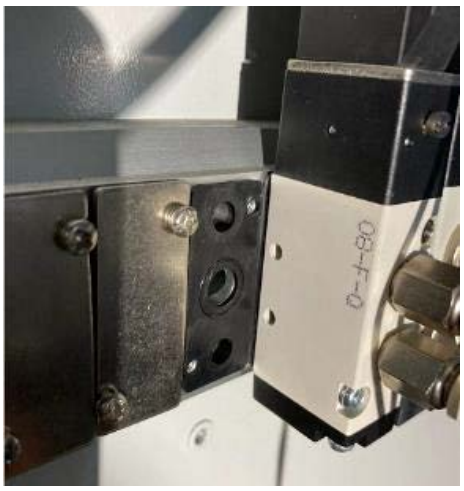
If the bobbin chuck is defective
Loosen the fixing screw of the advancing end sensor and adjust the sensor position. If the chuck timing is too early, the bobbin chuck timing will be retarded by adjusting the position of the advancing end sensor to the sewing machine side.

1-8. Installing the air tubes

1-8-1. Installing the solenoid valve

Turn OFF the air of the sewing machine. Remove plate cover ❶ (located next to the solenoid valve mounted to the sewing machine) from the solenoid valve manifold. Install solenoid valve ❷ to the manifold with screw ❸ (packed together with the solenoid valve).

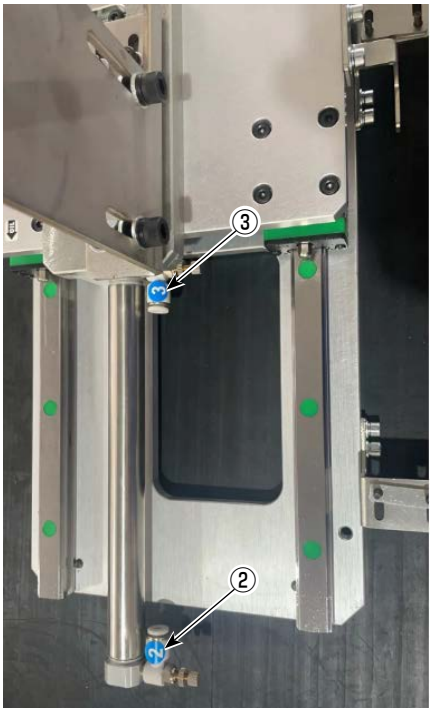


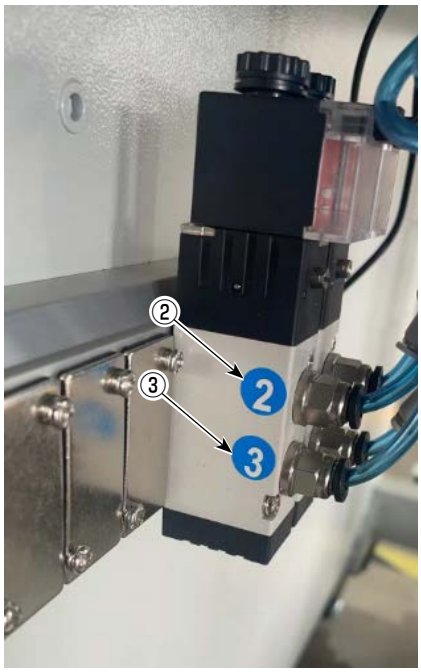


Refer to **"2. Wiring procedure" p.28** for the electric wiring of the solenoid valve.

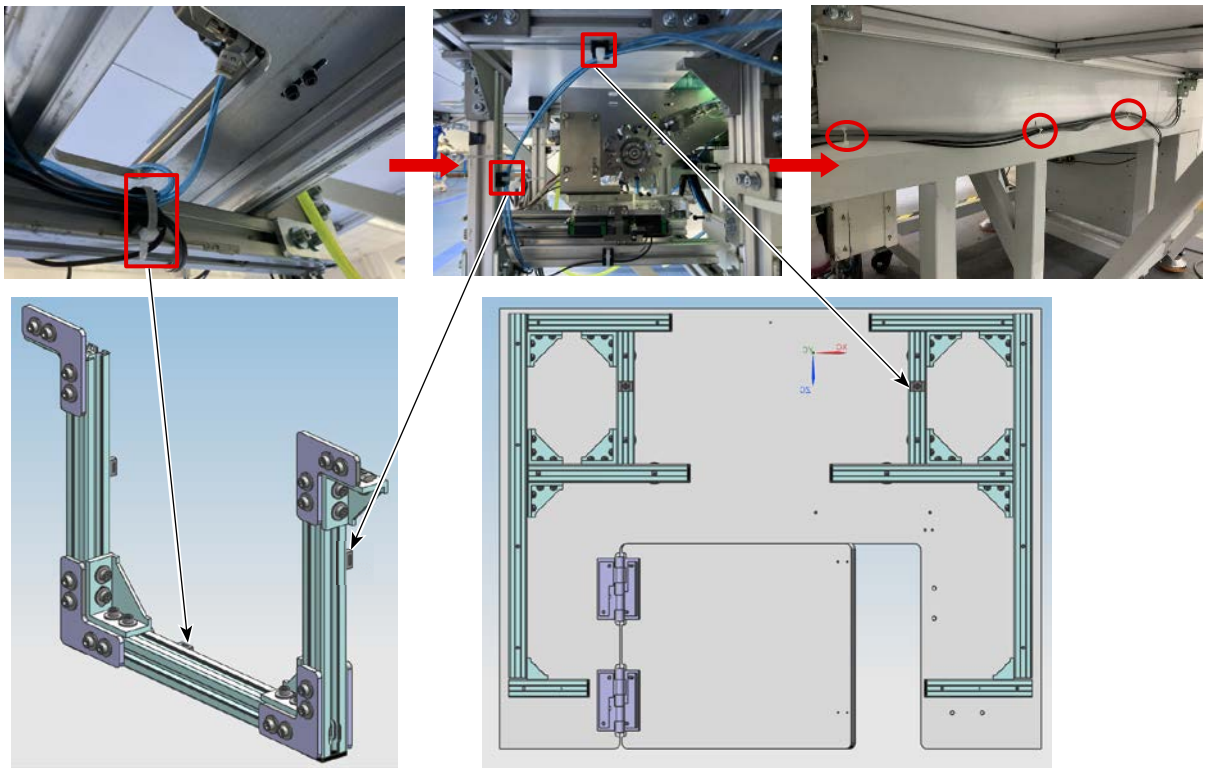
1-8-2. Cylinder piping

Connect the air tube of the moving cylinder of the lengthwise feed base to the solenoid valve that has been added to the sewing machine.
Connect the speed controller of the cylinder with numeral marking ② to the solenoid valve union with numeral marking ② using an air tube.
Connect the speed controller of the cylinder with numeral marking ③ to the solenoid valve union with numeral making ③ using an air tube.





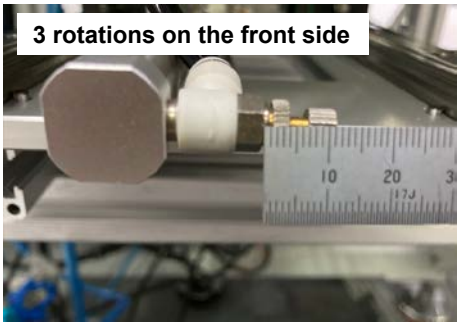
Fix the air tube to the aluminum frame with fixing bases and cable clip bands.
Fix it along the cable routing path on the right side of the sewing machine.

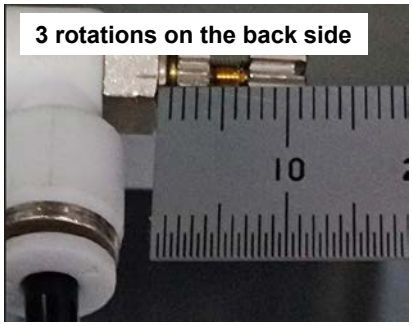


For the adjustment of the speed controller of the lengthwise feed base cylinder, the data given below is recommended.

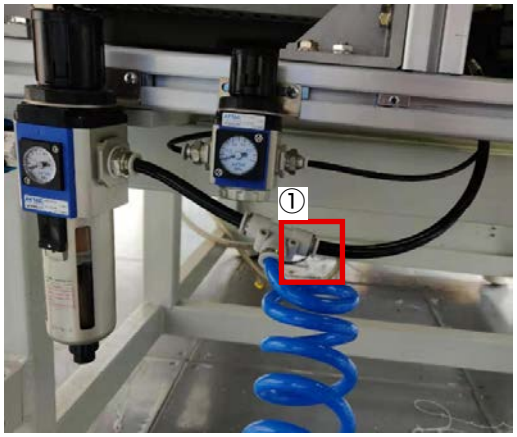
Speed controller of the lengthwise feed base

★ First, turn the speed controller clockwise to fully close it, then turn it counterclockwise three turns.

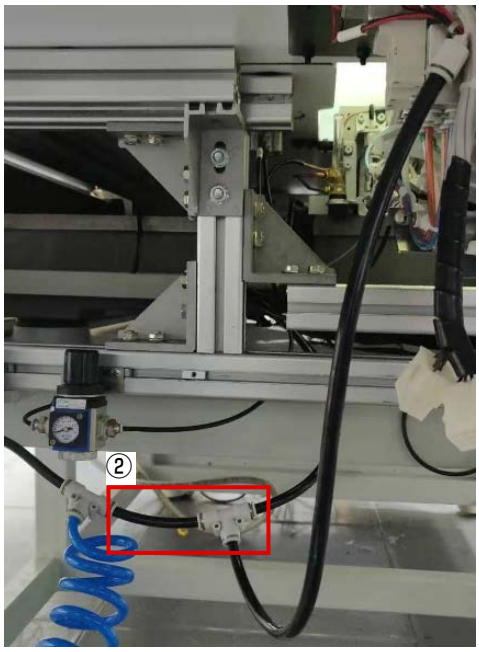




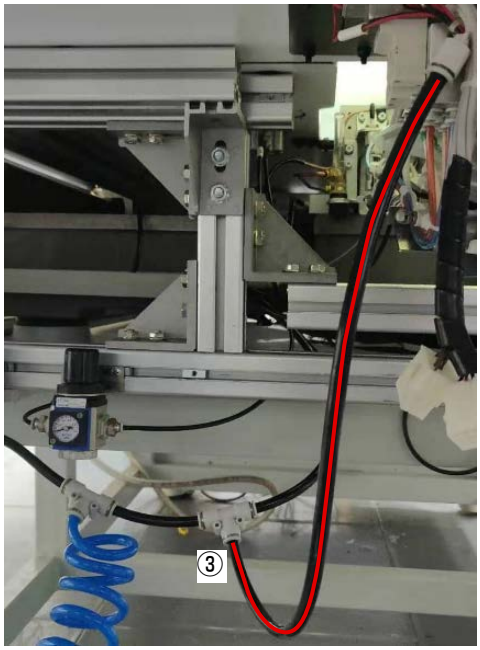
1-8-3. Ping the air supply



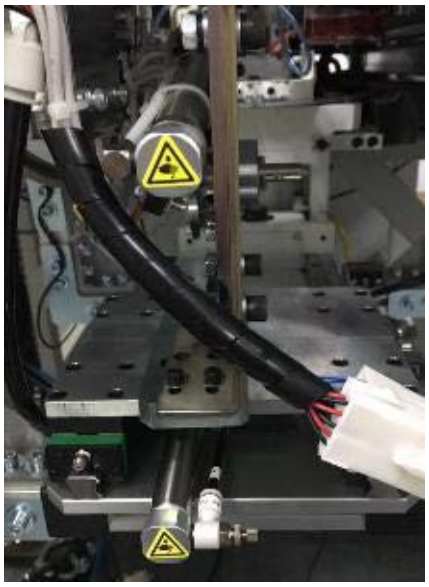
① Detach the air tube that has been connected to the manual valve.



② Connect the air tube (100 mm: 1 piece) coming from the BK-10 and the T-shaped union as shown in the figure.



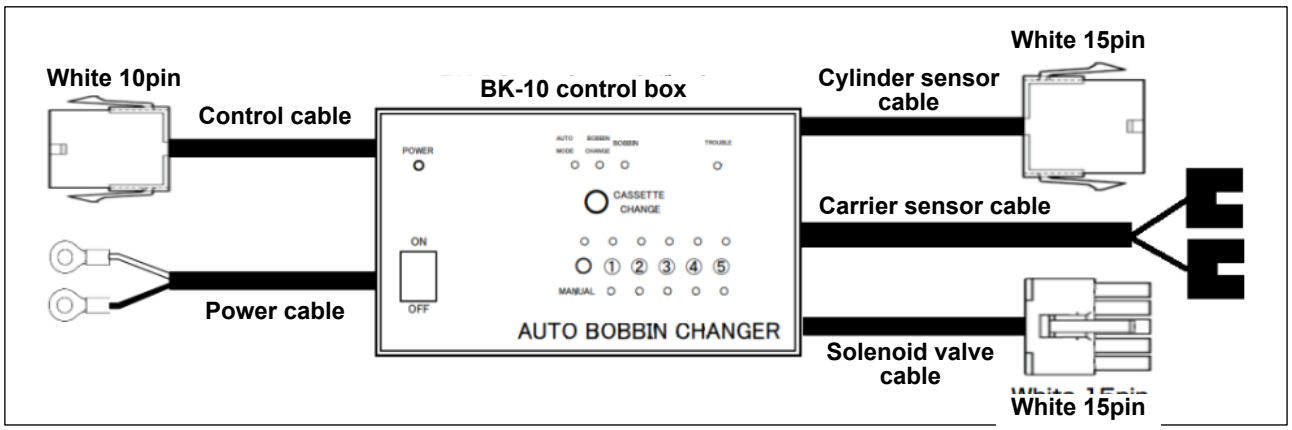
③ Connect the air tube (500 mm: 1 piece) coming from the BK-10 to the T-shaped union and the union on the BK main unit side as shown in the figure.



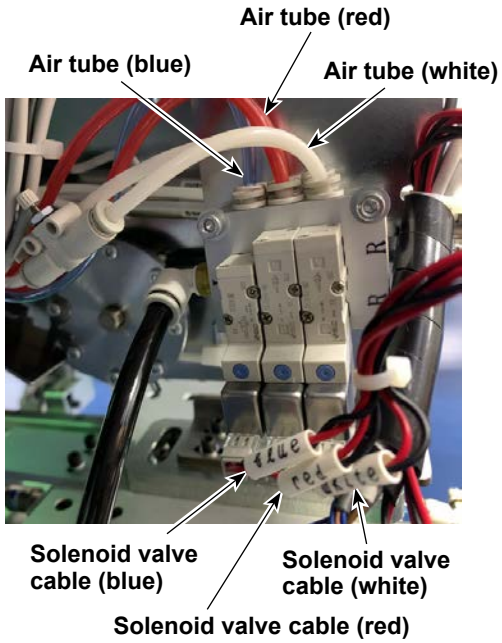
In order to ensure safety of the worker, be sure to move the main body of the bobbin changer to its origin (the worker side) before turning ON the air supply to the sewing machine.

2. Wiring procedure

2-1. PS-900/PS-910-13090 Wiring



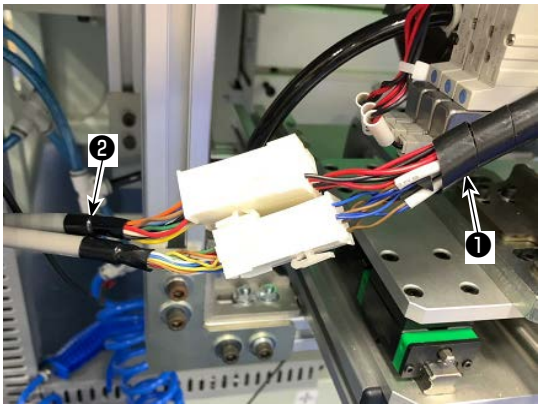
(1) Solenoid valve cable connection



1) Connect the solenoid valve cable according to the color of the solenoid valve air tube of the main body of the bobbin changer.

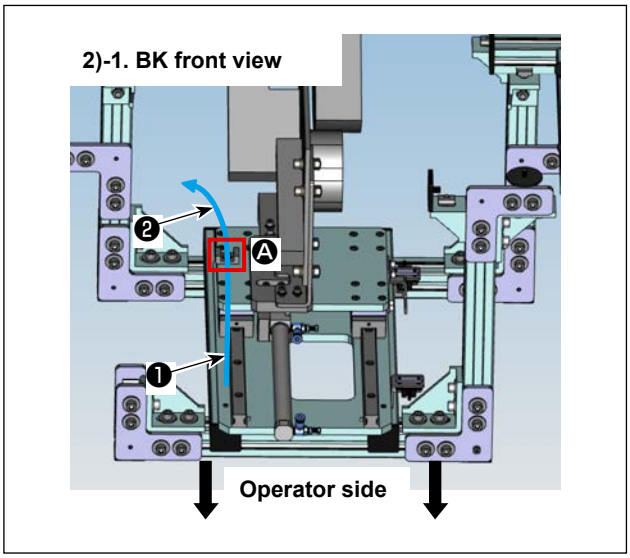
- Solenoid valve of the air tube (blue) ⇔ Solenoid valve cable (blue)
- Solenoid valve of the air tube (red) ⇔ Solenoid valve cable (red)
- Solenoid valve of the air tube (white) ⇔ Solenoid valve cable (white)

(2) Cylinder sensor cable and solenoid valve cable wiring

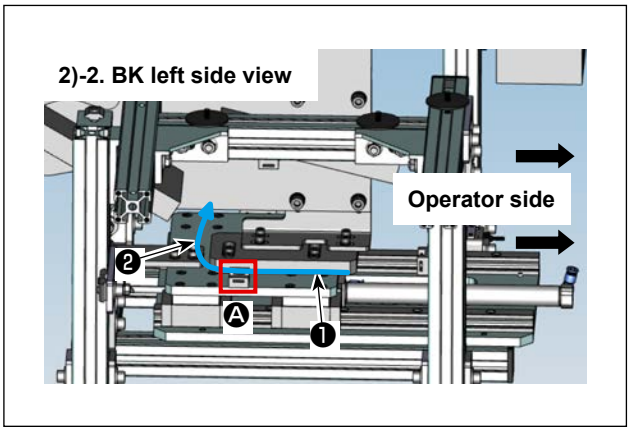


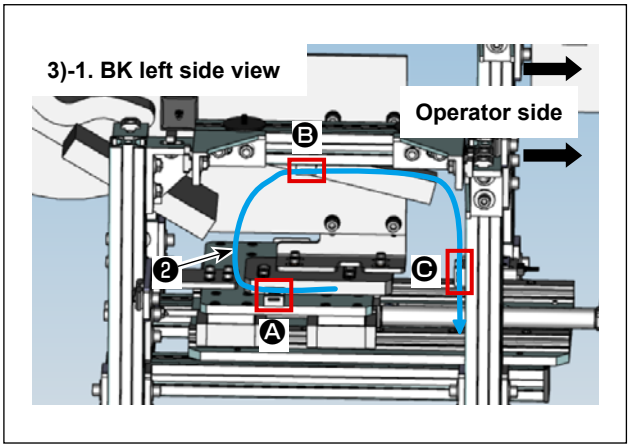
1) Connect the connectors of the cylinder sensor and solenoid valve cable ❶ on the BK main unit side to the connectors of the cylinder sensor and solenoid valve cable ❷ on the BK-10 control box side.

* Since the cylinder sensor cable and the solenoid valve cable share the same wiring route, the following description will cover both as a single wiring route.

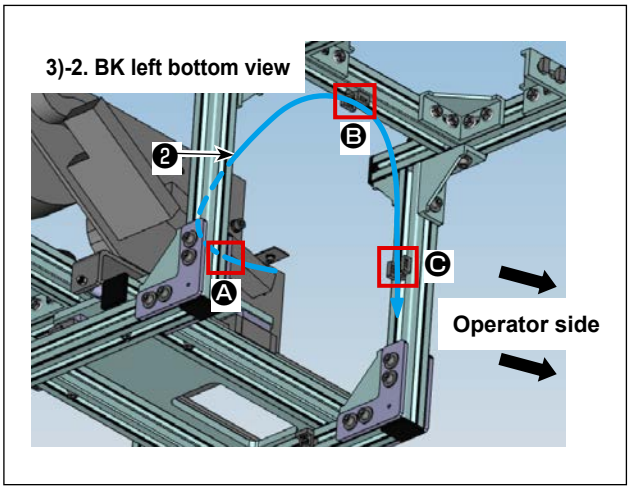


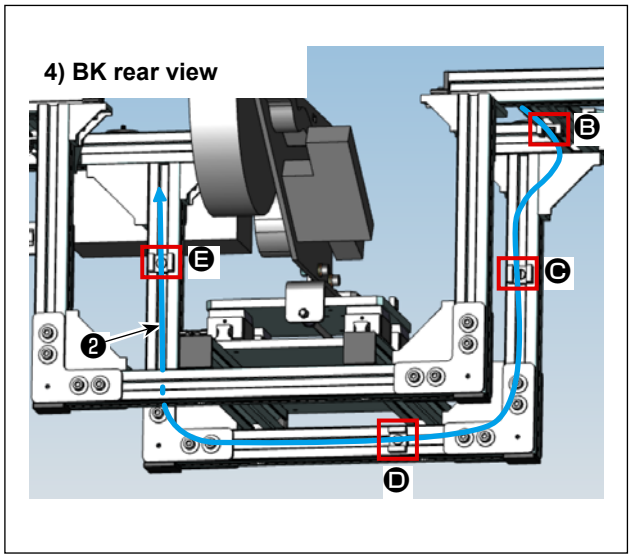
2) Wire the cylinder sensor and solenoid valve cables ❷ on the BK control box side according to the route indicated by the blue arrow in the figure. Fix them with a fixing base and a cable clip band at the position Ⓐ along the way.
(Since it is difficult to understand from only one view, a figure with another view has been included.)





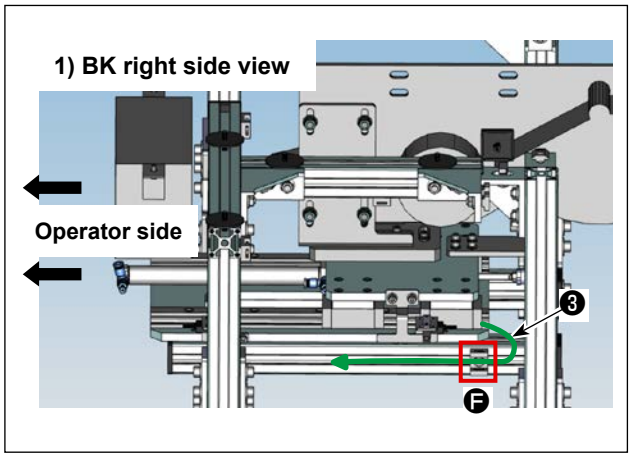
3) Wire the cylinder sensor and solenoid valve cables ❷ on the BK control box side according to the route indicated by the blue arrow in the figure. Fix them with a fixing base and a cable clip band at the positions Ⓑ and Ⓒ along the way.
(Since it is difficult to understand from only one view, a figure with another view has been included.)



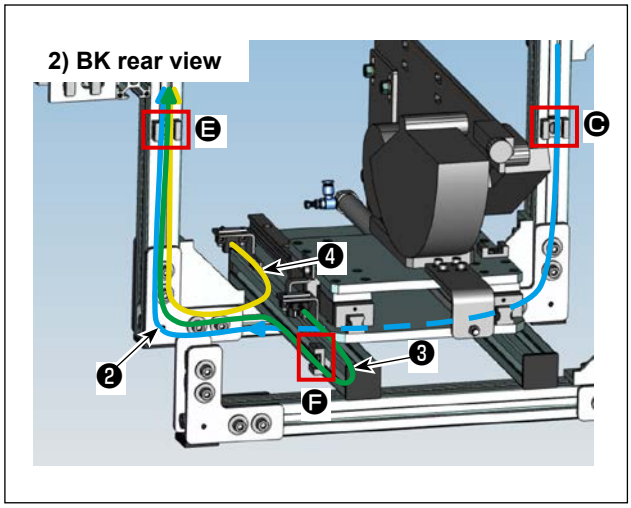


4) Wire the cylinder sensor and solenoid valve cables ❷ on the BK control box side according to the route indicated by the blue arrow in the figure. Fix them with a fixing base and a cable clip band at the position Ⓓ along the way.
Position Ⓔ should be temporarily fixed, as it will be fixed together with the sensor cable described later.

(3) Carrier sensor cable wiring



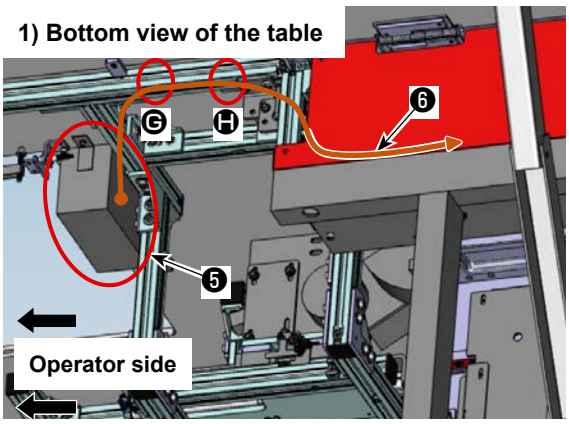
1) Wire the carrier sensor (S1) cable ❸ according to the route indicated by the green arrow in the figure.
Fix it with a fixing base and a cable clip band at the position Ⓕ along the way.



2) Wire the carrier sensor (S2) cable ❹ according to the route indicated by the orange arrow, the carrier sensor (S1) cable ❸ according to the route indicated by the green arrow, and the cylinder sensor and solenoid valve cables ❷ according to the route indicated by the blue arrow in the figure. Fix them with a fixing base and a cable clip band at the position Ⓔ along the way.

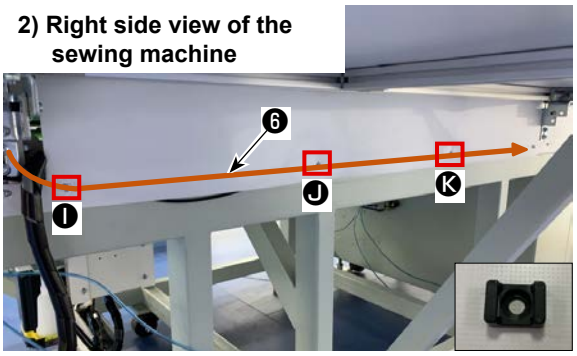
(4) Power cable and control cable wiring

1) Bottom view of the table



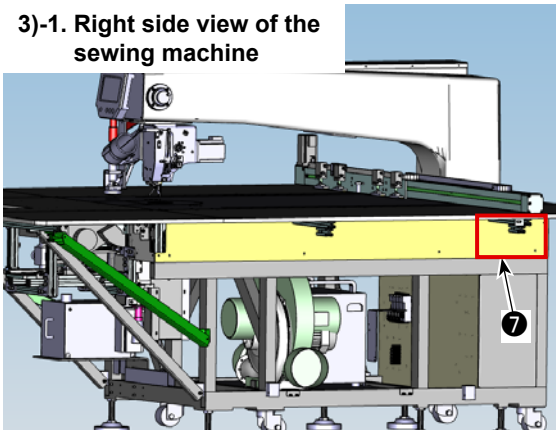
1) Wire the power cable and control cable ❻ coming out of the rear side of the BK control box ❺ according to the route indicated by the brown arrow in the figure.
Fix them with other cables using a cable clip band at the positions Ⓖ and Ⓗ along the way.

2) Right side view of the sewing machine



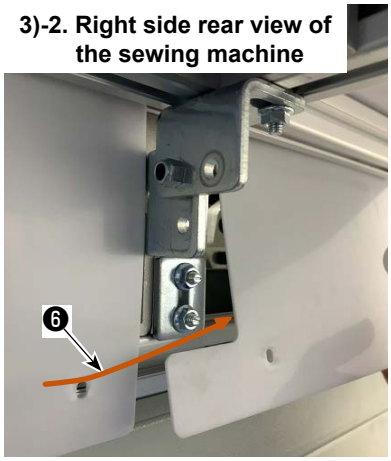
2) Remove the resin cover fixing screws at positions ❶, ❷, and ❽, and then attach the fixing base. After that, wire the power cable and control cable ❻ according to the route indicated by the brown arrow in the figure, and fix them with a fixing base and a cable clip band.

3)-1. Right side view of the sewing machine

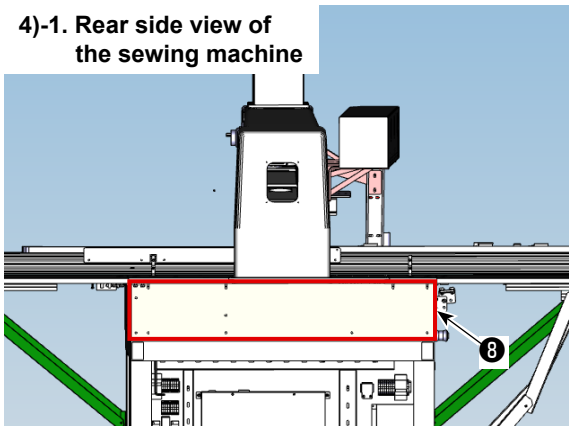


3) Remove the resin cover ❼ on the rear right side of the sewing machine and pull the power cable and control cable ❻ into the sewing machine.

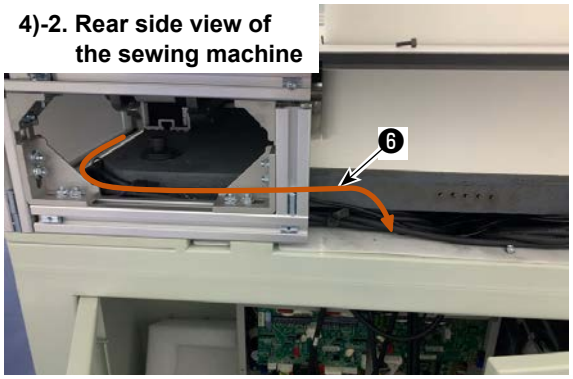
3)-2. Right side rear view of the sewing machine



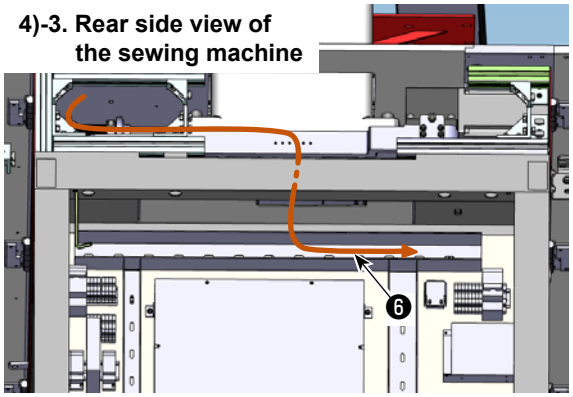
4)-1. Rear side view of the sewing machine



4)-2. Rear side view of the sewing machine



4)-3. Rear side view of the sewing machine

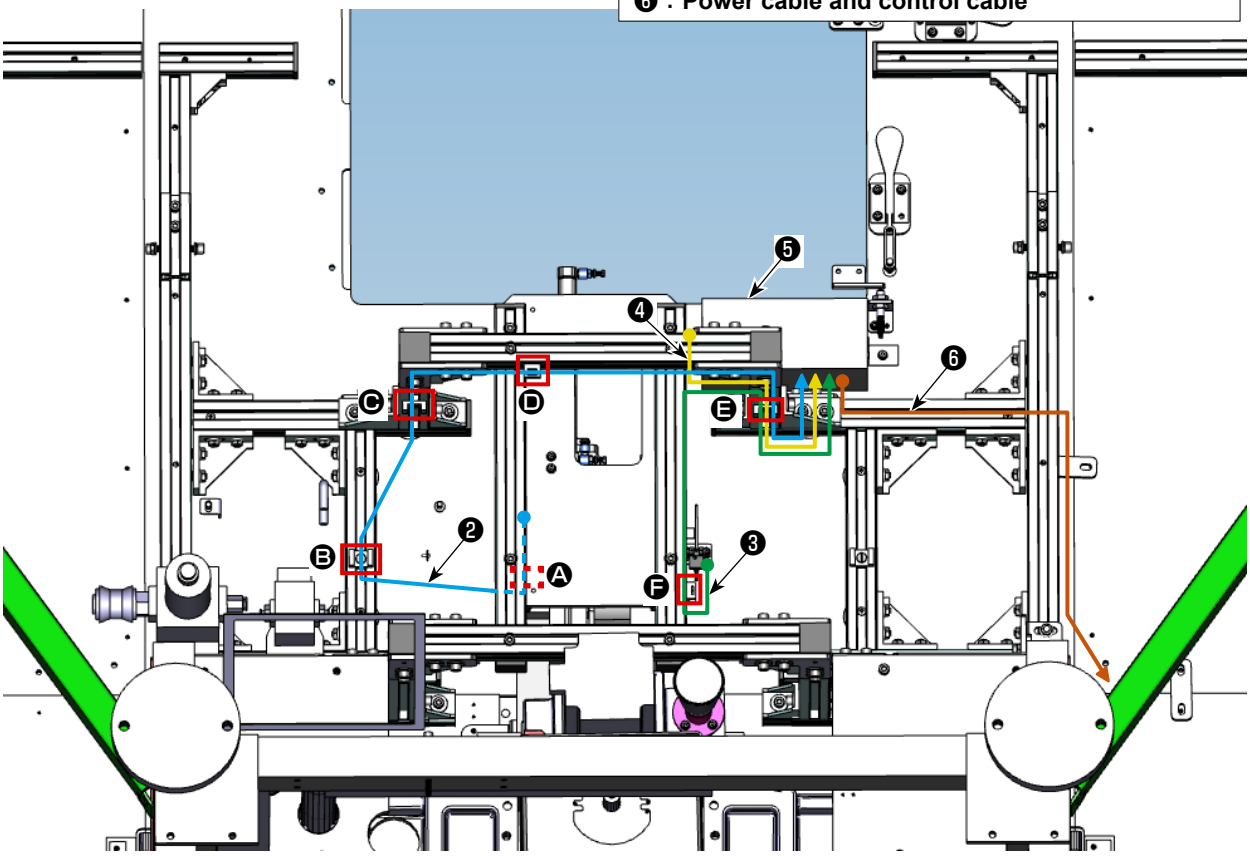


4) Remove the resin cover ❽ on the back of the sewing machine and pull the power cable and control cable ❻ into the electrical rack.
Leave the resin cover on the back of the machine removed in order to wire the solenoid valve cable, which will be described later.

[supplement]

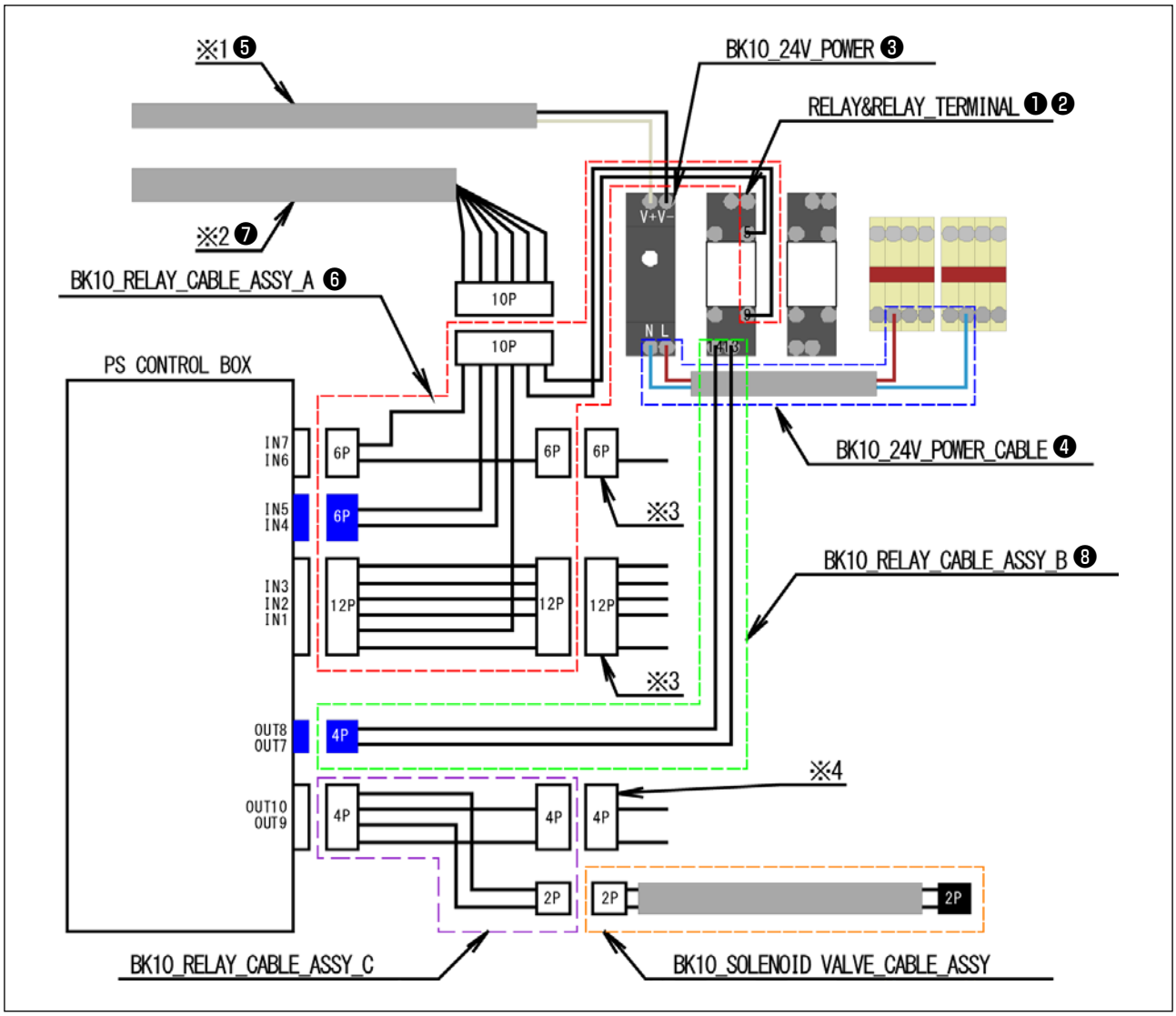
Overall wiring diagram of the table underside

❷ : Cylinder sensor cable and solenoid valve cable
❸ : Carrier sensor (S1) cable
❹ : Carrier sensor (S2) cable
❺ : BK10 control box
❻ : Power cable and control cable



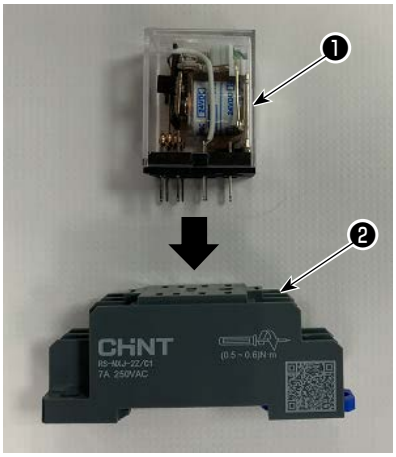
(5) Wiring inside the electrical rack of the PS-900 and -910-13090

Wiring inside the electrical rack is as shown in the figure below.
Refer to the description given below for details.



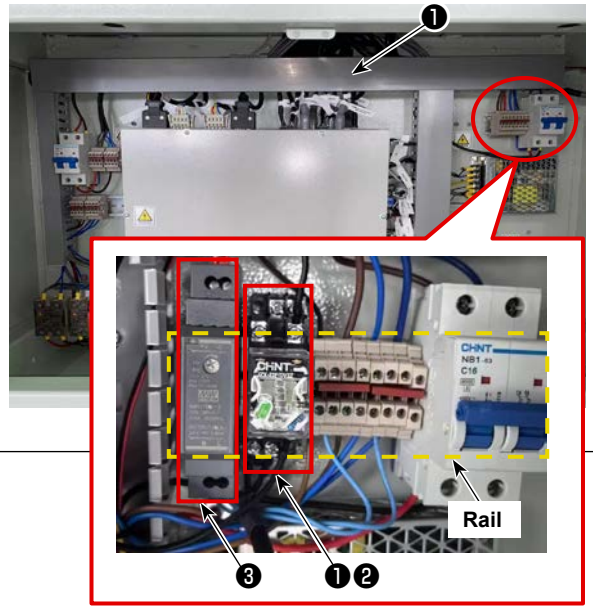
*1. Power cable of the BK control box
*2. Control cable of the BK control box
*3. Connector that has been originally connected to the PS control box
*4. Connector that has been originally connected to the PS control box (only for the laser type)

1)



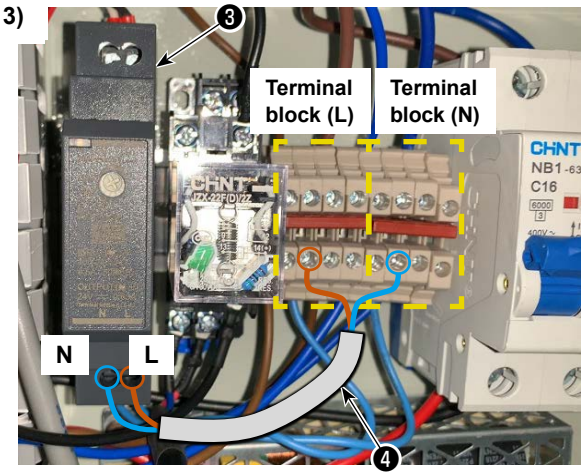
1) Insert RELAY ❶ supplied with the BK-10 into RELAY TERMINAL ❷ .

2)



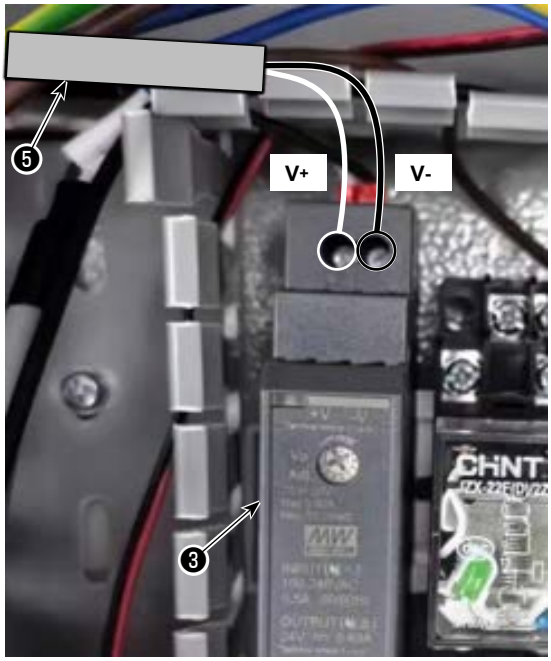
2) Attach RELAY ❶ , RELAY TERMINAL ❷ and BK10_24V_POWER_SUPPLY ❸ to the rail located at the upper right section of the electrical rack.

3)



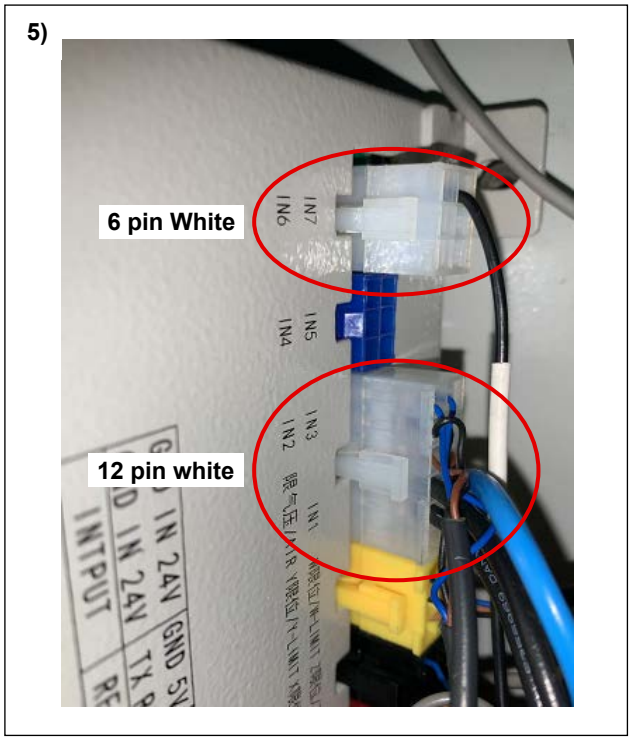
3) Connect BK10_24V_POWER_SUPPLY ❸ , terminal blocks (L) and (N) with BK10_24V_POWER_CABLE ❹ .

4)

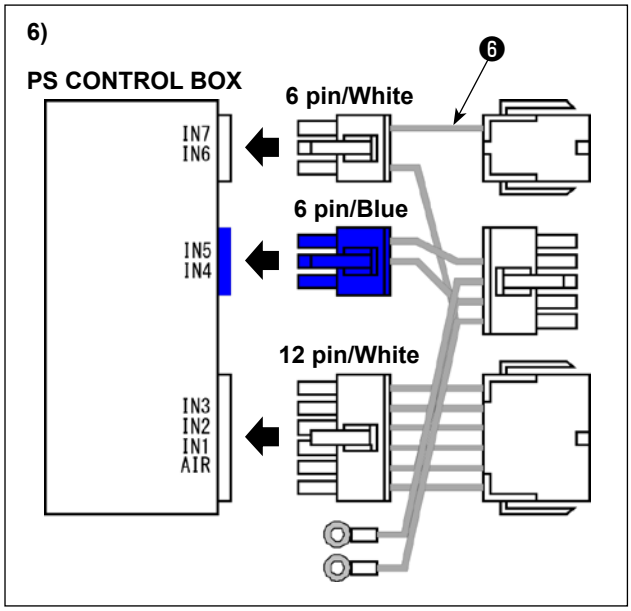


4) Connect power cable ❺ of the BK control box that you have drawn into the electrical rack in Steps ❹ to ❼ to BK10_24V_POWER_SUPPLY ❸ .

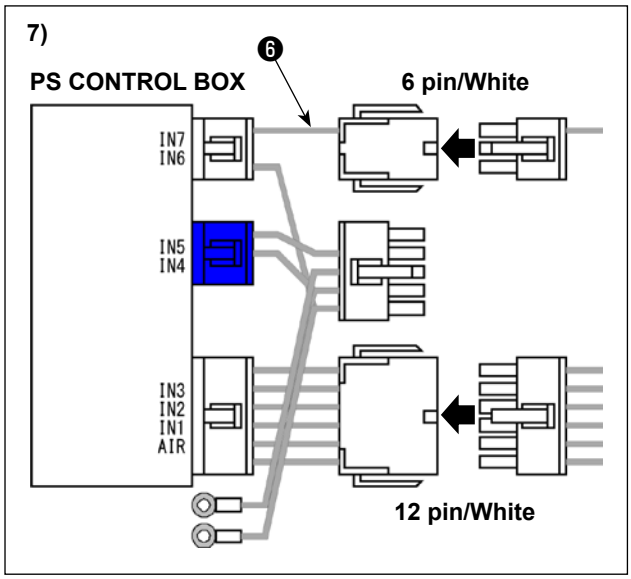
Power cable ❺	BK10_24V_POWER_SUPPLY ❸
White wire	V+
Black wire	V-



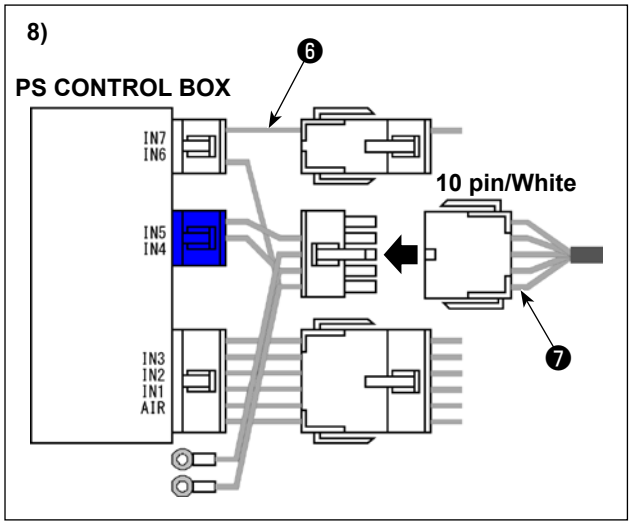
5) Remove the connectors (6-pin/White and12-pin/ White) that have been preliminarily connected to the side face of the electrical control box.



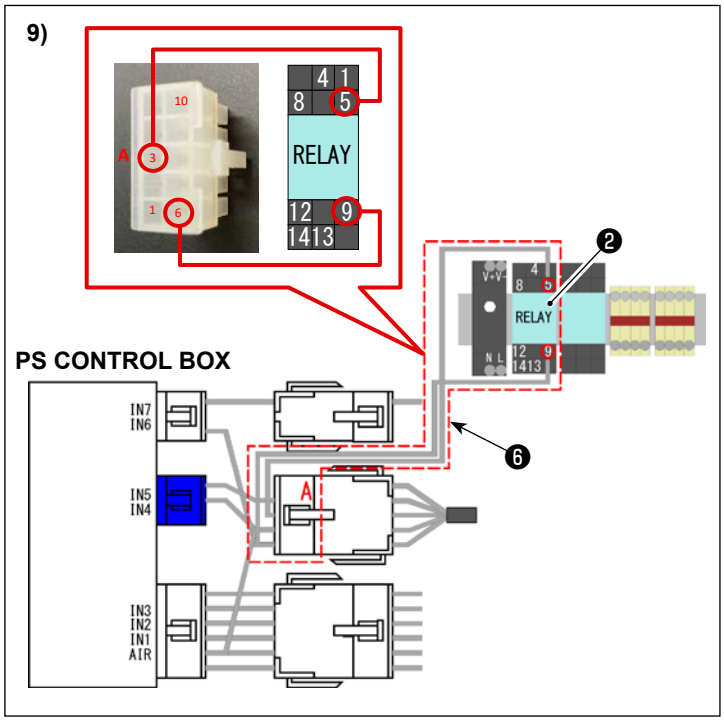
6) Connect the connectors (white/6-pin, blue/6-pin and white/12-pin) of BK10_RELAY_CABLE_ ASSY_A ❻ to the electrical control box.



7) Connect the connectors that you have removed from the electrical control box in Step ⓬ to the BK10_RELAY_CABLE_ASSY_A ❻ .

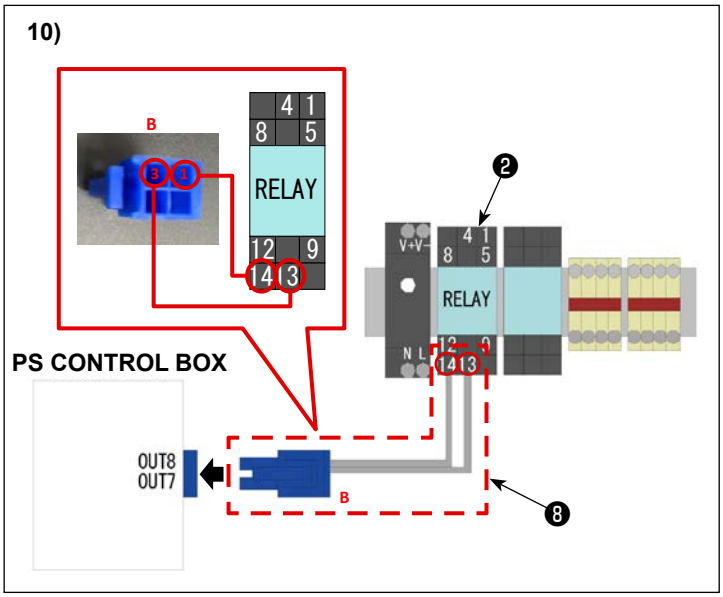


8) Connect control cable ❼ of the BK control box to BK10_RELAY_CABLE_ASSY_A ❻ .



9) Connect the ring terminal of BK10_ RELAY_CABLE_ASSY_A ❻ to RELAY TERMINAL ❷ .
The connection destinations are as follows.

BK10_RELAY_CABLE_ASSY_A ❻ ConnectorA Pin No.	RELAY TERMINAL ❷ Terminal No.
3	5
6	9



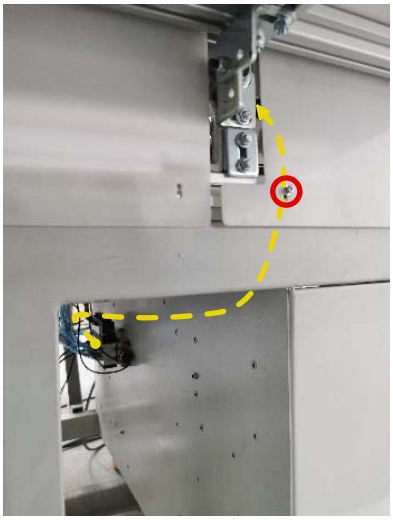
10) Connect the connector of BK10_RELAY_ CABLE_ASSY_B ❽ to the connector (4-pin/blue) of the OUT7/OUT8 of the electrical control box. Connect the ring terminal of BK10_RELAY_CABLE_ ASSY_B ❽ to RELAY TERMINAL ❷ .
The connection destinations are as follows.

BK10_RELAY_CABLE_ASSY_B ❽ ConnectorB Pin No.	RELAY TERMINAL ❷ Terminal No.
1	14
3	13

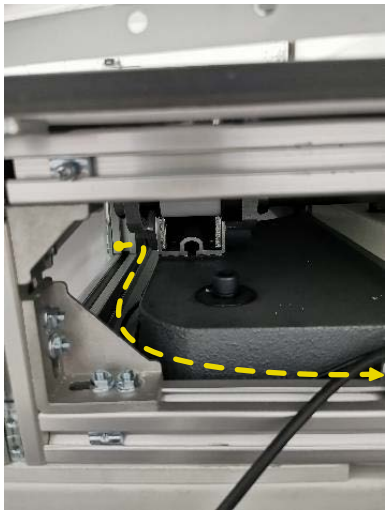
(6) Solenoid valve cable wiring

1) Connect the BK10_SOLENOID VALVE_CABLE_ ASSY to the solenoid valves you have installed as described in **"1-8. Installing the air tubes" p.24** and wire it according to the route shown in the figure.

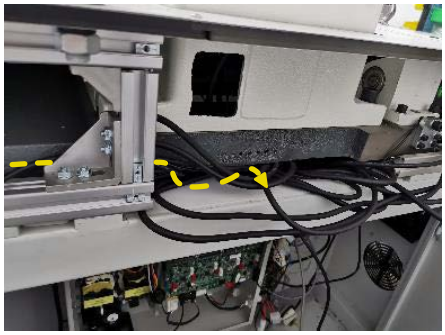
2) Wire the solenoid valve cable t according to the route shown in the figure and secure it with a cable clip band at the location shown in the figure together with the air tubes.



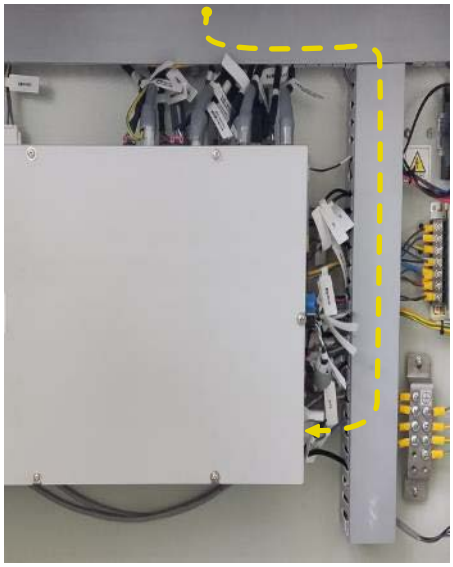
3) Wire the solenoid valve cable according to the route shown in the figure and secure it with the fixing base and a cable clip band at the location shown in the figure.



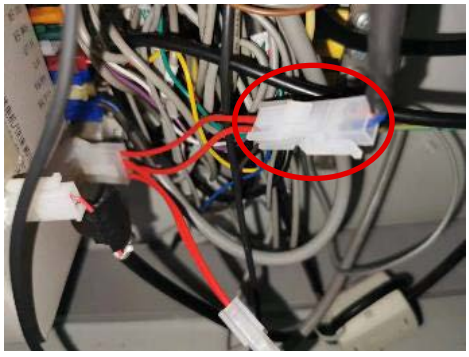
4) Wire the solenoid valve cable according to the route shown in the figure.



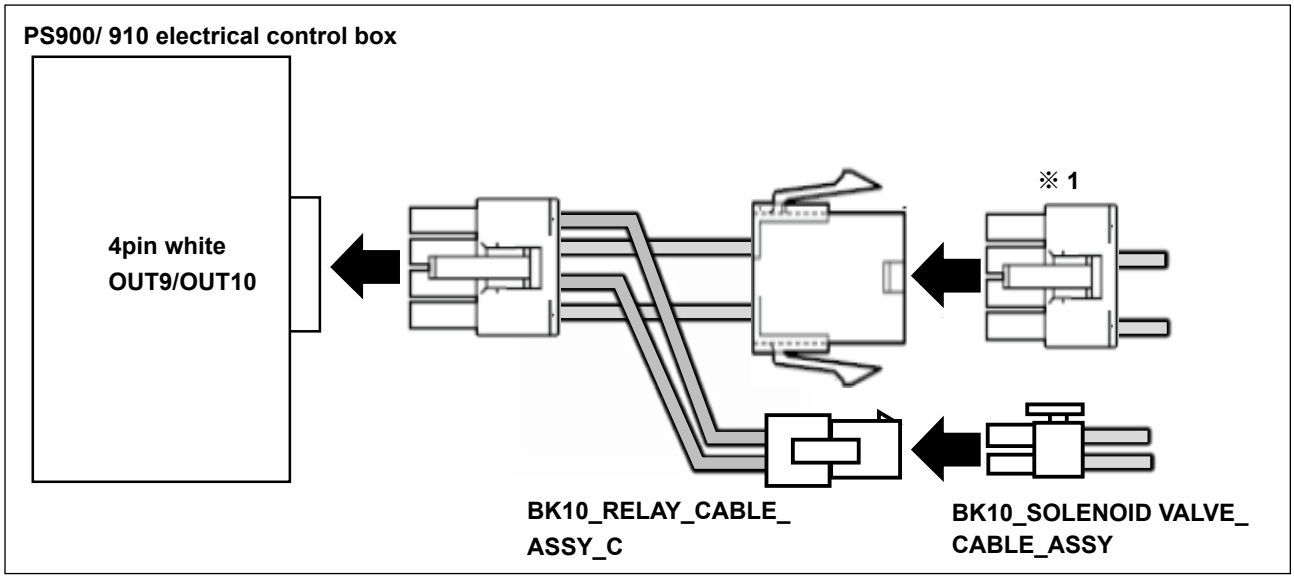
5) Wire the solenoid valve cable according to the route shown in the figure and pull it into the electrical control box.



6) Wire theBK10_SOLENOID VALVE_CABLE_ ASSY as shown in the figure.



7) Connect the BK10_SOLENOID VALVE_CABLE_ ASSY to the BK10_RELAY_CABLE_ASSY_C coming from the electrical control box.



8) Connect the BK10_RELAY_CABLE_ASSY_C to the electrical control box. Connect the BK10_RELAY_CABLE_ASSY_C to the BK10_SOLENOID VALVE_CABLE_ASSY.

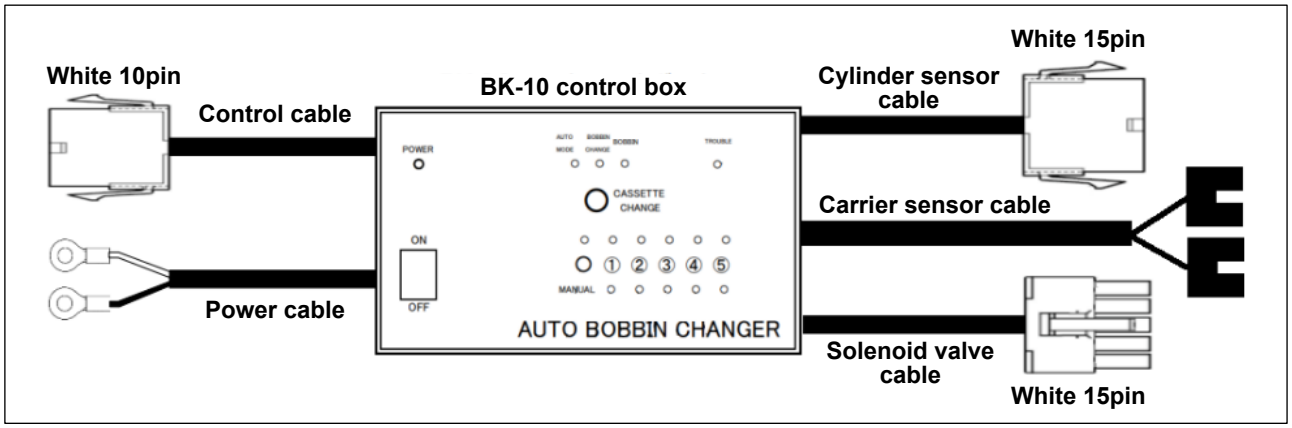
* 1. In the case of the laser type model, the connectors have been preliminarily connected to the OUT9 and OUT10 of the electrical control box. Detach them once. Connect the BK10_RELAY_CABLE_ASSY_C to the electrical control box. Then, connect the connectors to the BK10_RELAY_CABLE_ASSY_C.

(7) Adding a grounding wire

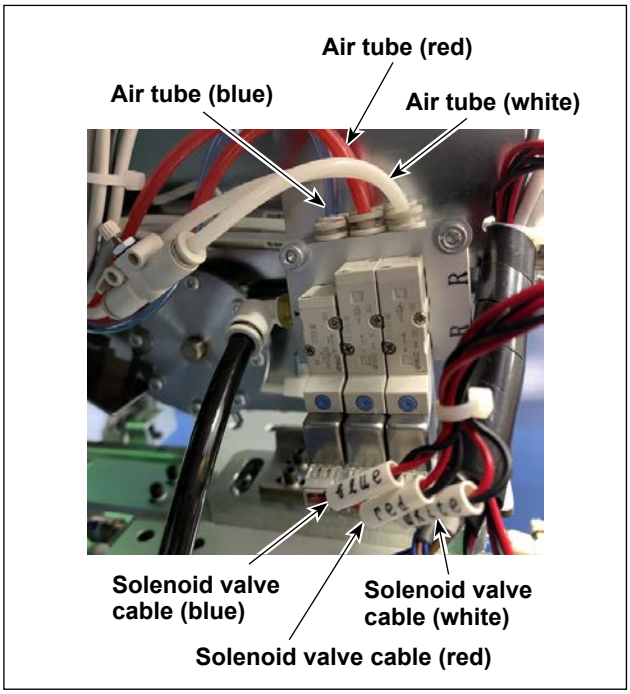
1) Fix a grounding wire to the BK control box with a screw.
   Put a toothed washer between the control box and the ring terminal.

2) Wire the grounding wire as shown in the figure.
   Secure the ring terminal to the sewing machine frame with a screw.

2-2. PS-910-6055 Wiring



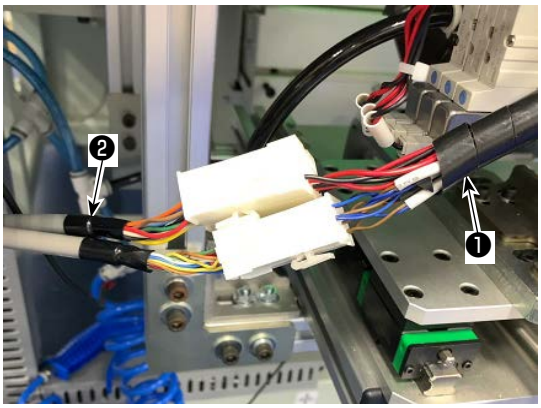
(1) Solenoid valve cable connection



1) Connect the solenoid valve cable according to the color of the solenoid valve air tube of the main body of the bobbin changer.

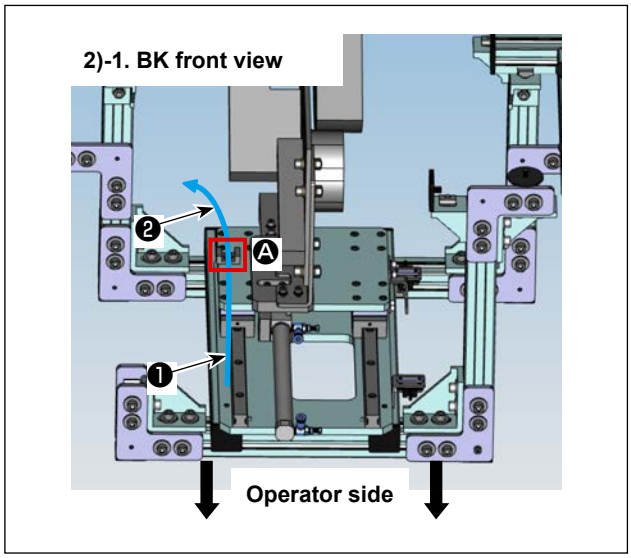
- Solenoid valve of the air tube (blue) ⇔ Solenoid valve cable (blue)
- Solenoid valve of the air tube (red) ⇔ Solenoid valve cable (red)
- Solenoid valve of the air tube (white) ⇔ Solenoid valve cable (white)

(2) Cylinder sensor cable and solenoid valve cable wiring

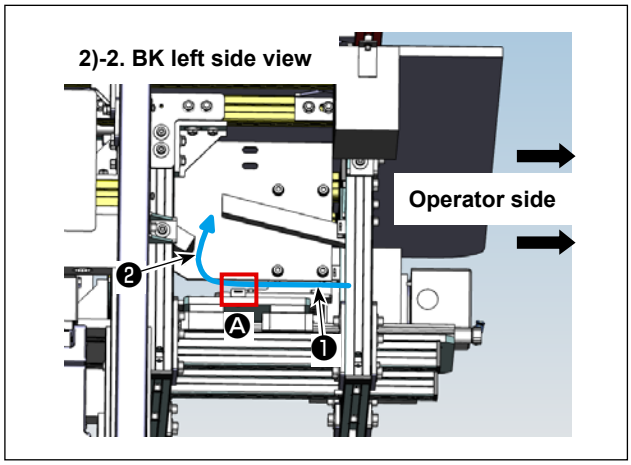


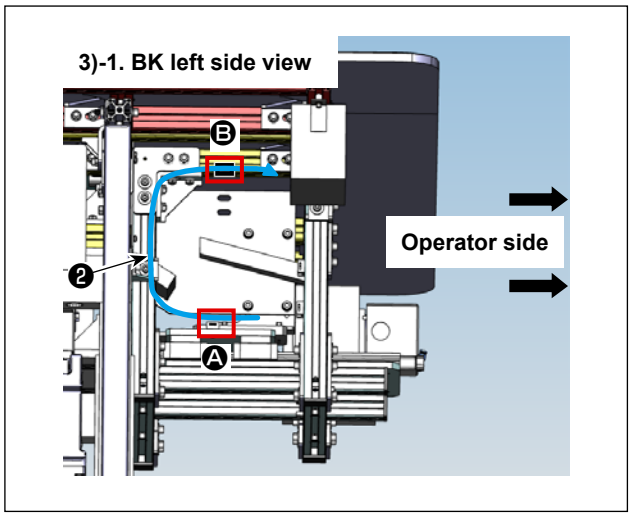
1) Connect the connectors of the cylinder sensor and solenoid valve cable ❶ on the BK main unit side to the connectors of the cylinder sensor and solenoid valve cable ❷ on the BK-10 control box side.

* Since the cylinder sensor cable and the solenoid valve cable share the same wiring route, the following description will cover both as a single wiring route.

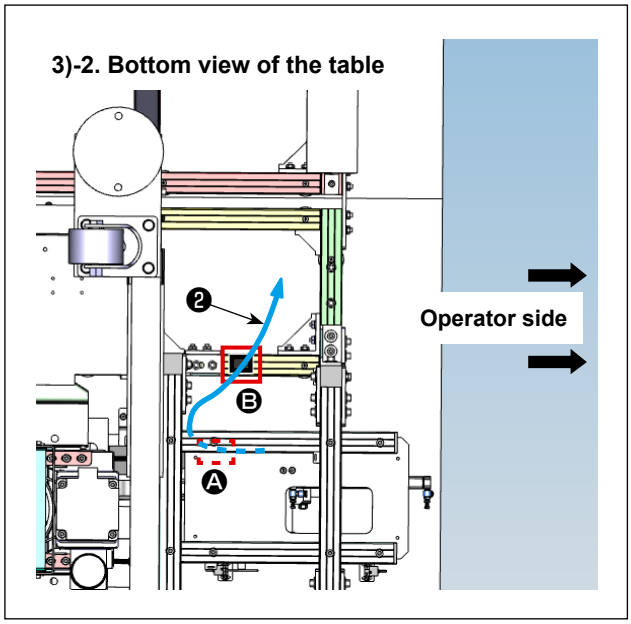


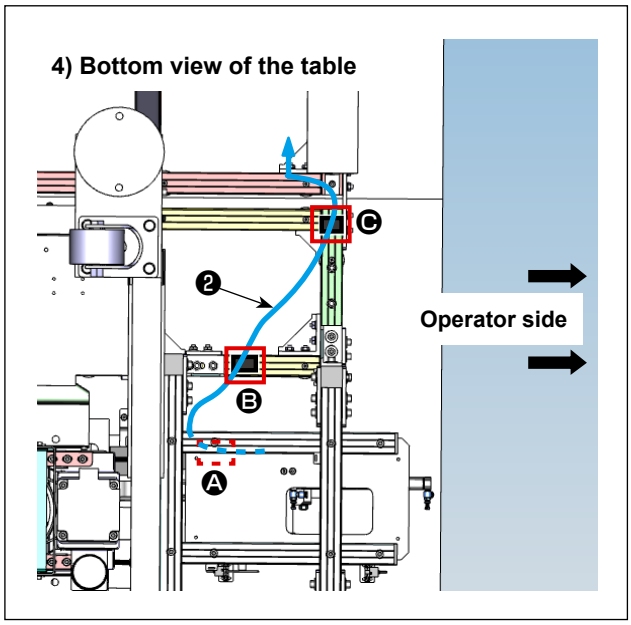
2) Wire the cylinder sensor and solenoid valve cables ❷ on the BK control box side according to the route indicated by the blue arrow in the figure. Fix them with a fixing base and a cable clip band at the position Ⓐ along the way.
(Since it is difficult to understand from only one view, a figure with another view has been included.)





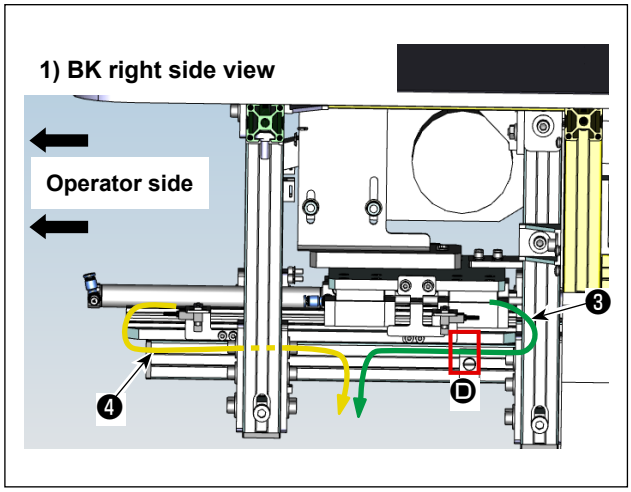
3) Wire the cylinder sensor and solenoid valve cables ❷ on the BK control box side according to the route indicated by the blue arrow in the figure. Fix them with a fixing base and a cable clip band at the positions Ⓑ along the way.
(Since it is difficult to understand from only one view, a figure with another view has been included.)





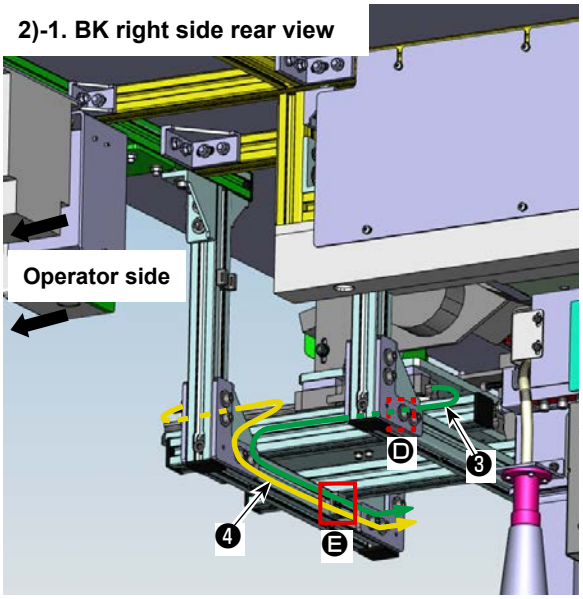
4) Wire the cylinder sensor and solenoid valve cables ❷ on the BK control box side according to the route indicated by the blue arrow in the figure. Fix them with a fixing base and a cable clip band at the position Ⓒ along the way.
Position Ⓒ should be temporarily fixed, as it will be fixed together with the sensor cable described later.

(3) Carrier sensor cable wiring



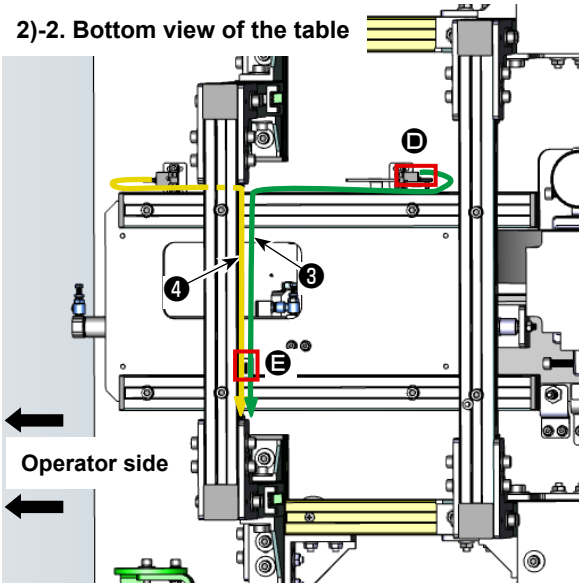
1) Wire the carrier sensor (S2) cable ❹ according to the route indicated by the orange arrow, and the carrier sensor (S1) cable ❸ according to the route indicated by the green arrow in the figure.
Fix the carrier sensor (S1) cable ❸ with a fixing base and a cable clip band at the position Ⓓ along the way.

2)-1. BK right side rear view

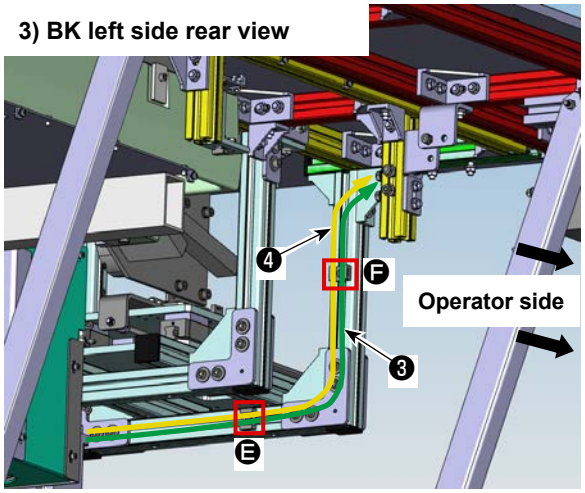


2) Wire the carrier sensor (S2) cable ❹ according to the route indicated by the orange arrow, and the carrier sensor (S1) cable ❸ according to the route indicated by the green arrow in the figure.
Fix them with a fixing base and a cable clip band at the position Ⓔ along the way.
(Since it is difficult to understand from only one view, a figure with another view has been included.)

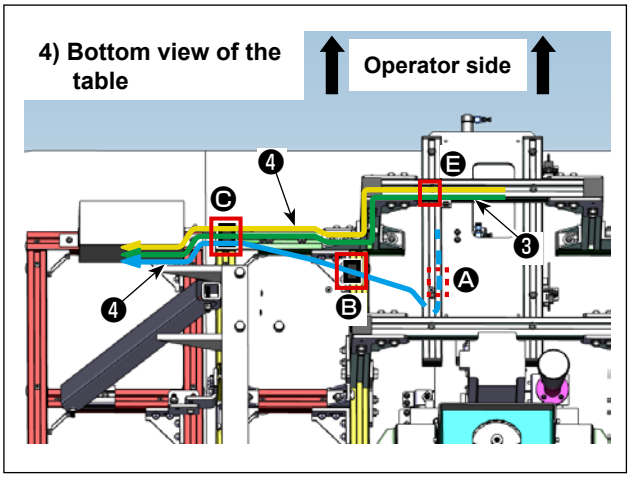
2)-2. Bottom view of the table



3) BK left side rear view

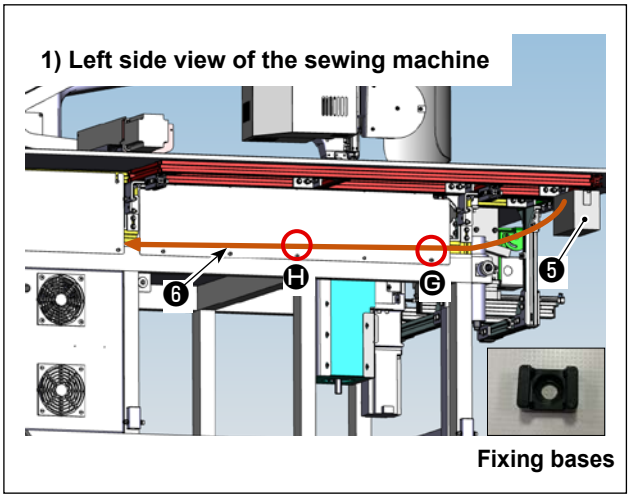


3) Wire the carrier sensor (S2) cable ❹ according to the route indicated by the orange arrow, and the carrier sensor (S1) cable ❸ according to the route indicated by the green arrow in the figure.
Fix them with a fixing base and a cable clip band at the position Ⓕ along the way.

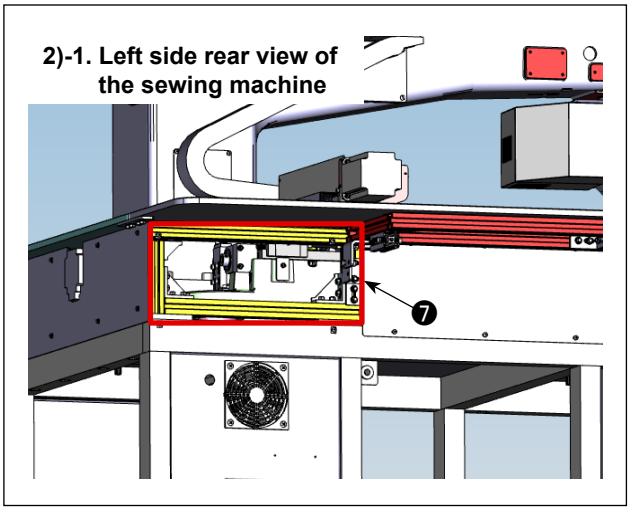


4) Wire the carrier sensor (S2) cable ❹ according to the route indicated by the orange arrow, the carrier sensor (S1) cable ❸ according to the route indicated by the green arrow, and the cylinder sensor and solenoid valve cables ❷ according to the route indicated by the blue arrow in the figure. Fix them with a fixing base and a cable clip band at the position Ⓒ along the way.

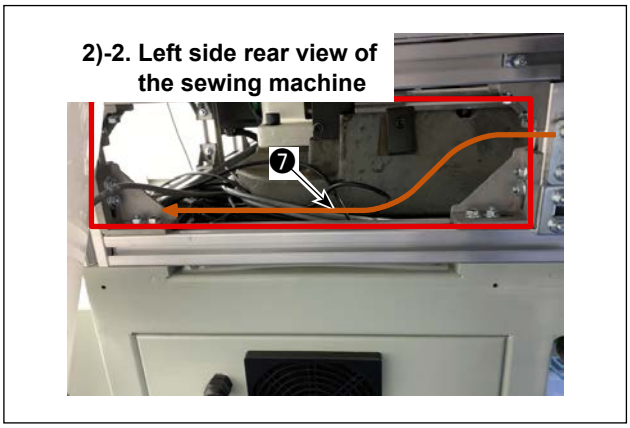
(4) Power cable and control cable wiring



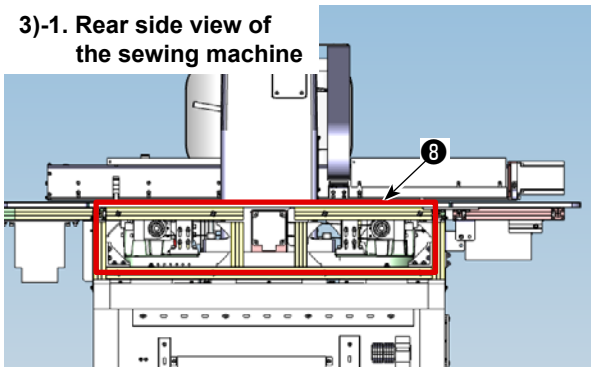
1) Wire the power cable and control cable ❻ coming out of the rear of the BK control box ❺ according to the route indicated by the brown arrow in the figure.
Remove the fixing screw of the resin cover on the side of the sewing machine once, and after attaching the fixing base at positions Ⓖ and Ⓗ along the way, fix the cable with a wire clip band.



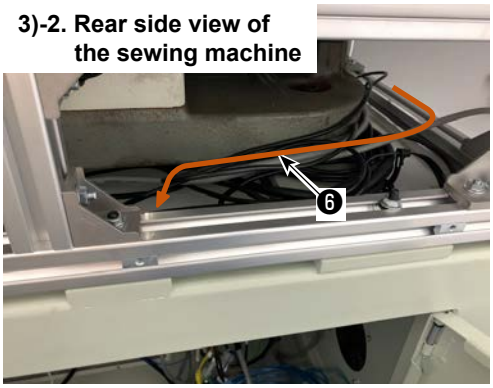
2) Remove the resin cover ❼ on the rear left side of the sewing machine and pull the power cable and control cable ❻ into the sewing machine.



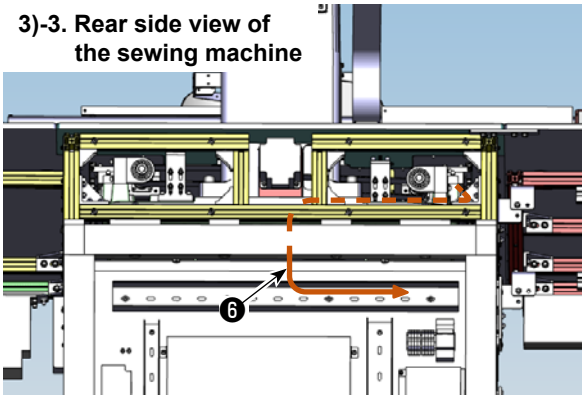
3)-1. Rear side view of the sewing machine



3)-2. Rear side view of the sewing machine



3)-3. Rear side view of the sewing machine

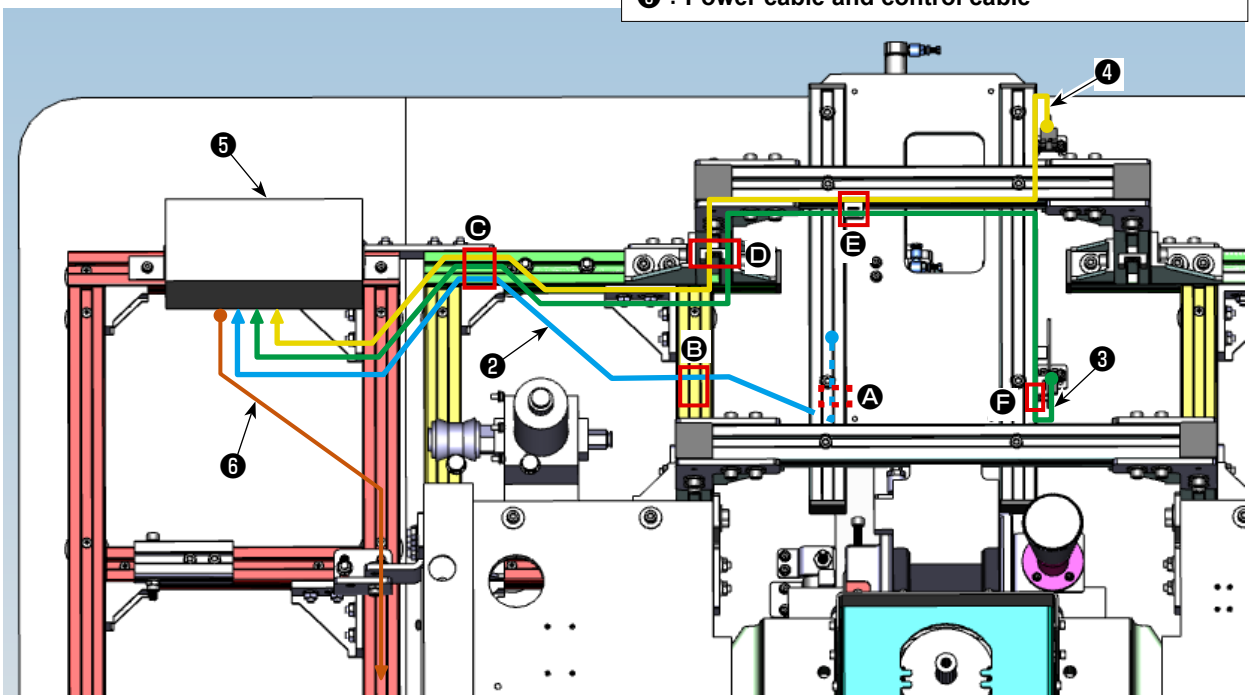


3) Remove the resin cover ❽ on the back of the sewing machine and pull the power cable and control cable ❻ into the electrical rack.
Leave the resin cover on the back of the machine removed in order to wire the solenoid valve cable, which will be described later.

[supplement]

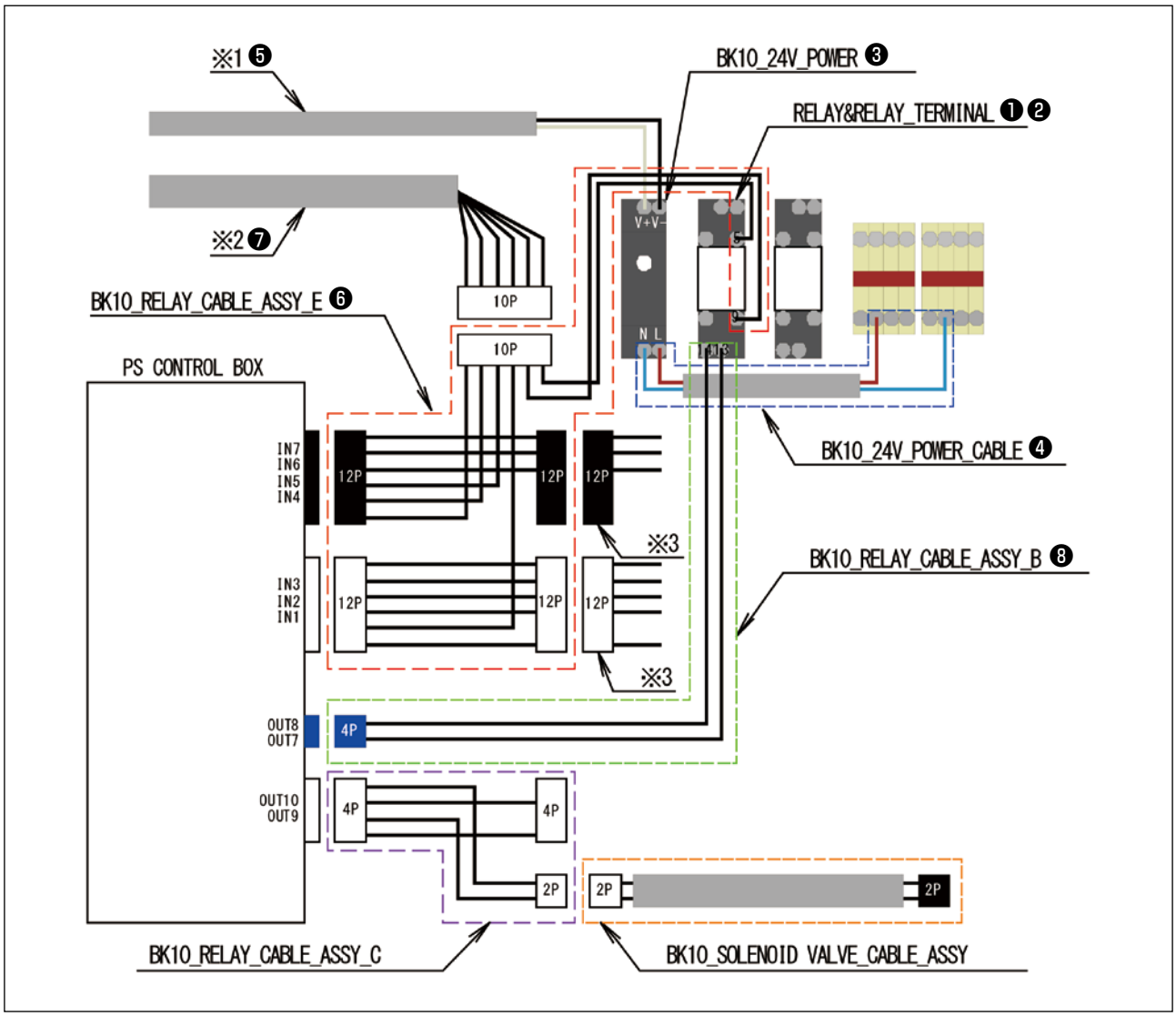
Overall wiring diagram of the table underside

❷ : Cylinder sensor cable and solenoid valve cable
❸ : Carrier sensor (S1) cable
❹ : Carrier sensor (S2) cable
❺ : BK10 control box
❻ : Power cable and control cable



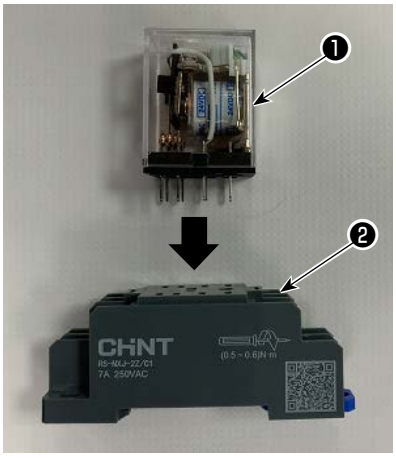
(5) Wiring inside the PS-910-6055 electrical rack

Wiring inside the electrical rack is as shown in the figure below.
Refer to the description given below for details.



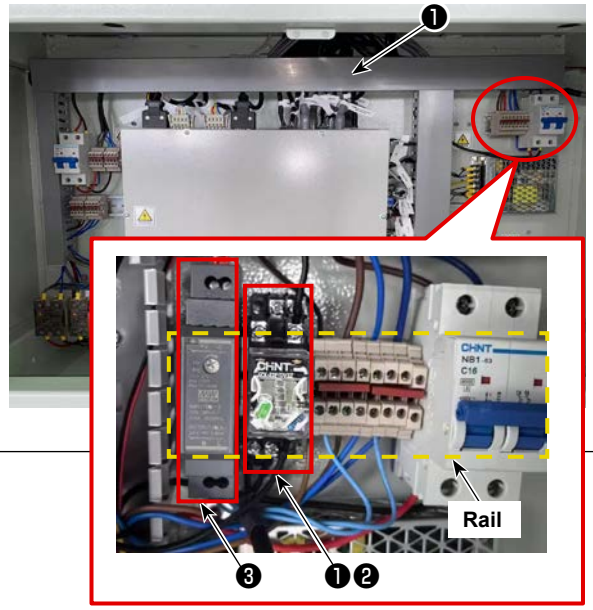
*1. Power cable of the BK control box
*2. Control cable of the BK control box
*3. Connector that has been originally connected to the PS control box

1)



1) Insert RELAY ❶ supplied with the BK-10 into RELAY TERMINAL ❷ .

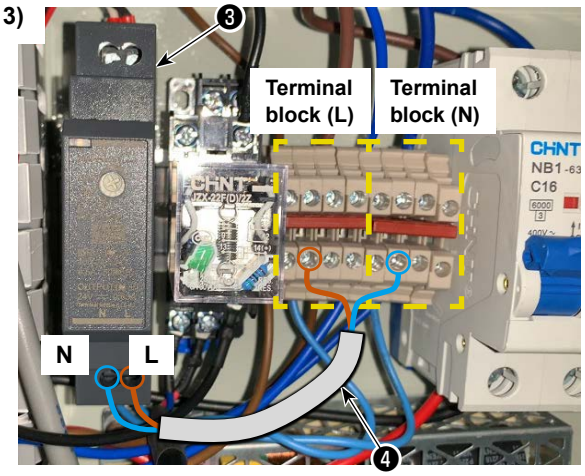
2)



2) Attach RELAY ❶ , RELAY TERMINAL ❷ and BK10_24V_POWER_SUPPLY ❸ to the rail located at the upper right section of the electrical rack.

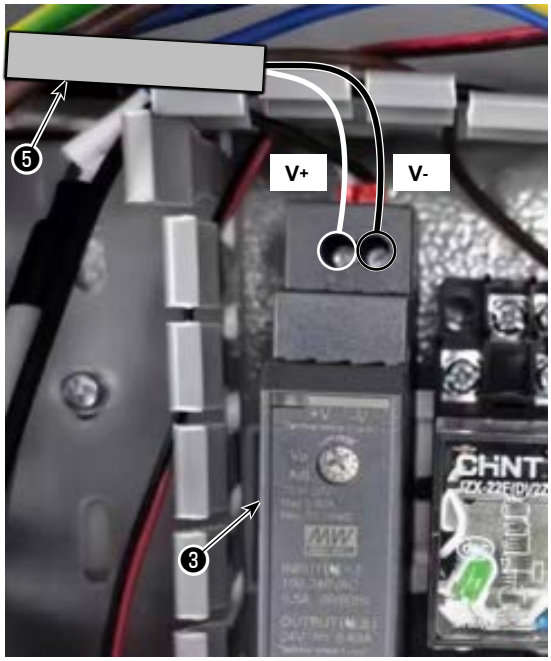
If the installation space is not enough, move the terminal block to the right.

3)



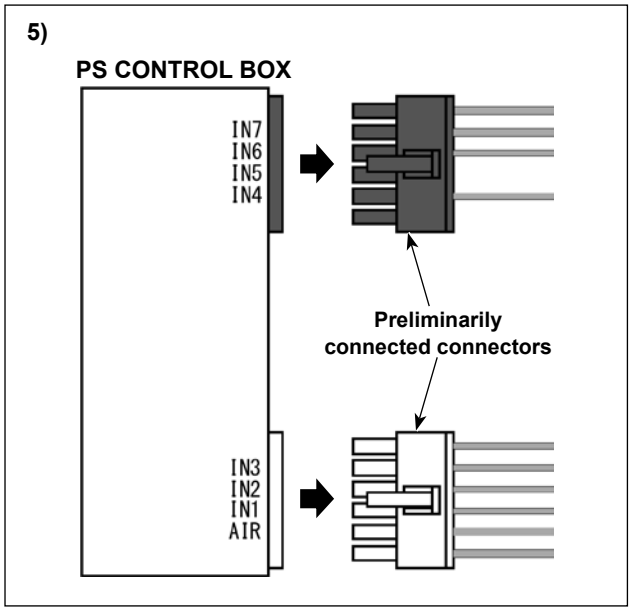
3) Connect BK10_24V_POWER_SUPPLY ❸ , terminal blocks (L) and (N) with BK10_24V_POWER_CABLE ❹ .

4)

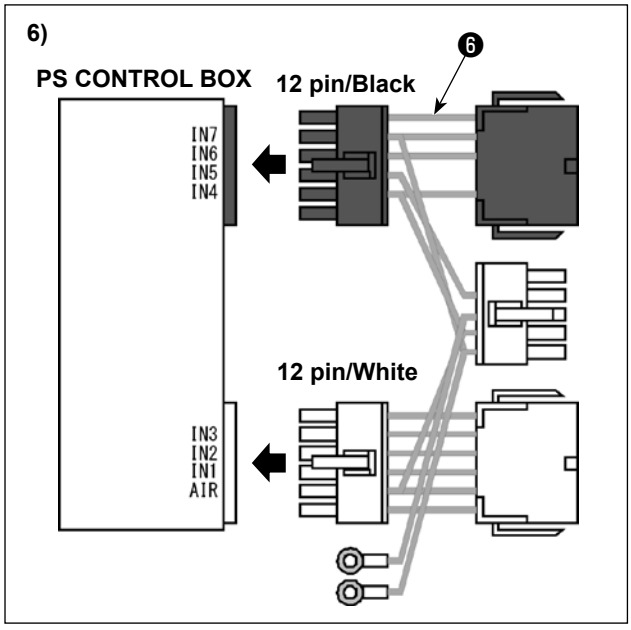


4) Connect power cable ❺ of the BK control box that you have drawn into the electrical rack in Steps ❹ to ❽ to BK10_24V_POWER_SUPPLY ❸ .

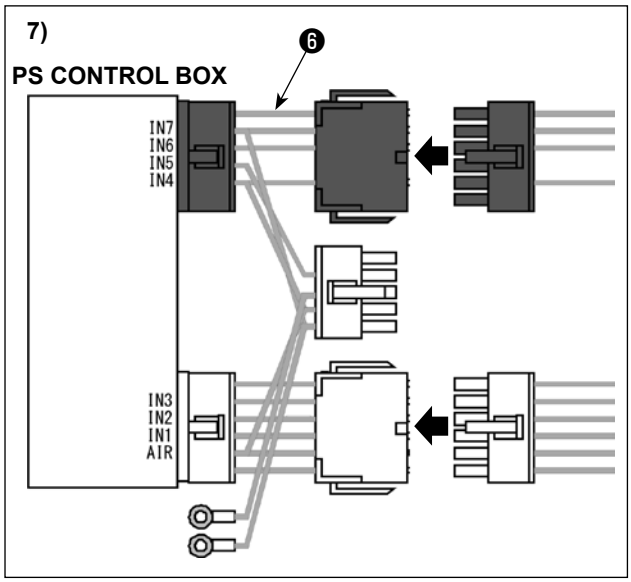
Power cable ❺	BK10_24V_POWER_SUPPLY ❸
White wire	V+
Black wire	V-



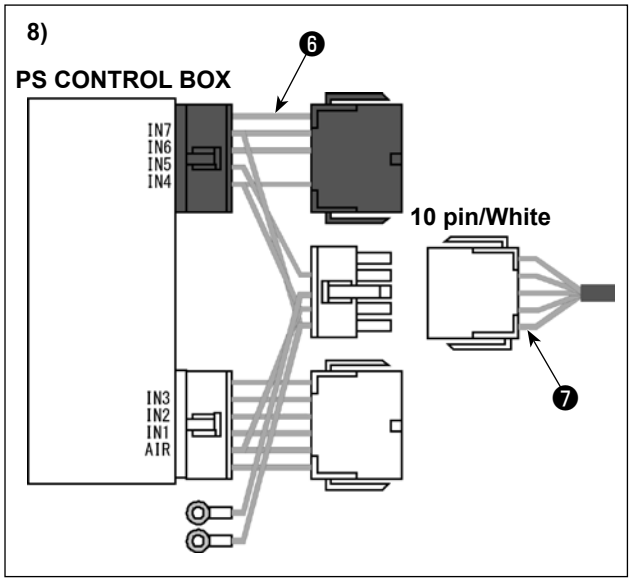
5) Remove the connectors (12-pin/black and 12-pin/white) that have been preliminarily connected to the side face of the electrical control box.



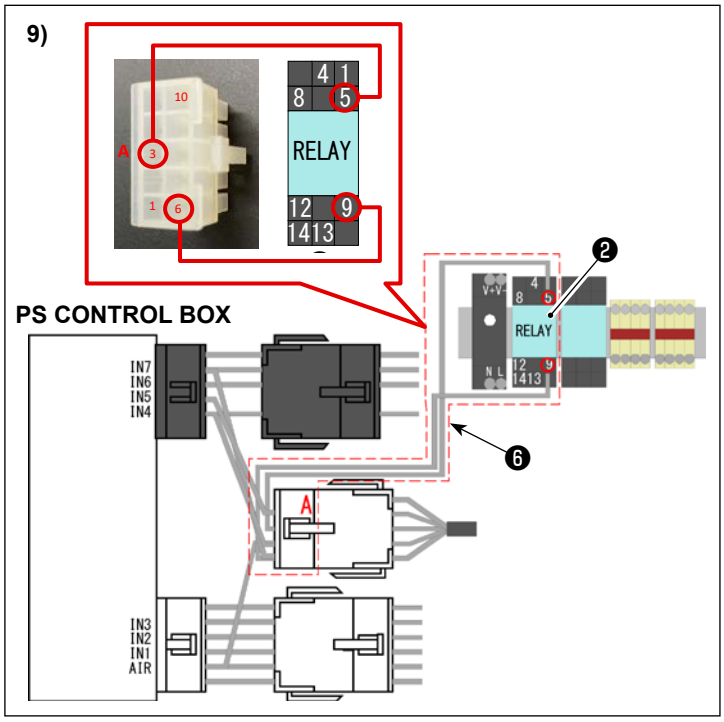
6) Connect the connectors (12-pin/black and 12-pin/white) of BK_RELAY_CABLE_E_6055 ❻ to the electrical control box.



7) Connect the connectors you have removed from the electrical control box in Step 5) to BK_RELAY_CABLE_E_6055 ❻ .

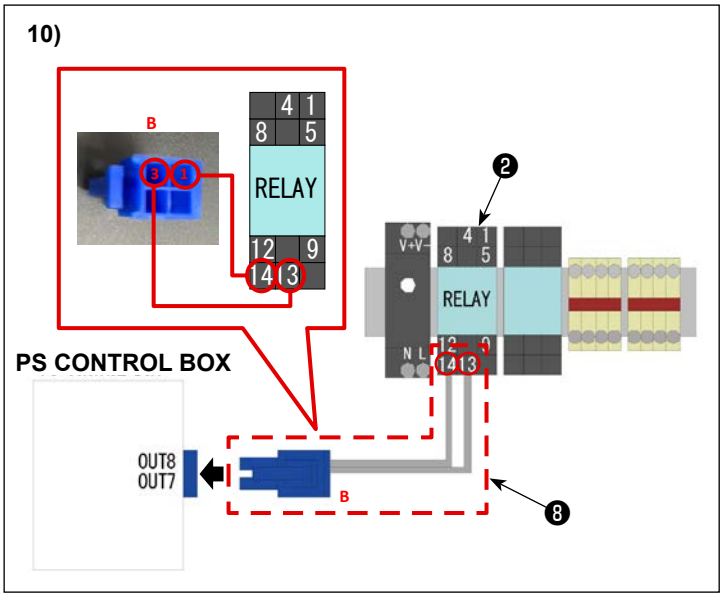


8) Connect control cable ❼ of the BK control box to BK10_RELAY_CABLE_ASSY_A ❻ .



9) Connect the ring terminal of BK10_RELAY_CABLE_ASSY_A ❻ to RELAY TERMINAL ❷ .
The connection destinations are as follows.

BK10_RELAY_CABLE_ASSY_A ❻ ConnectorA Pin No.	RELAY TERMINAL ❷ Terminal No.
3	5
6	9



10) Connect the connector of BK10_RELAY_CABLE_ASSY_B ❽ to the connector (4-pin/blue) of the OUT7/OUT8 of the electrical control box. Connect the ring terminal of BK10_RELAY_CABLE_ASSY_B ❽ to RELAY TERMINAL ❷ .

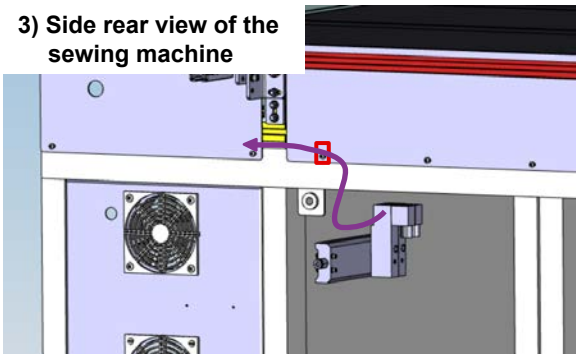
BK10_RELAY_CABLE_ASSY_B ❽ ConnectorB Pin No.	RELAY TERMINAL ❷ Terminal No.
1	14
3	13

(6) Solenoid valve cable wiring

1) Connect the BK10_SOLENOID VALVE_CABLE_ ASSY connector to the solenoid valve installed in **"1-8. Installing the air tubes" p.24**.

2) Bundle the BK10_SOLENOID VALVE_CABLE ASSY together with other air tubes using a cable clip band.

3) Side rear view of the sewing machine

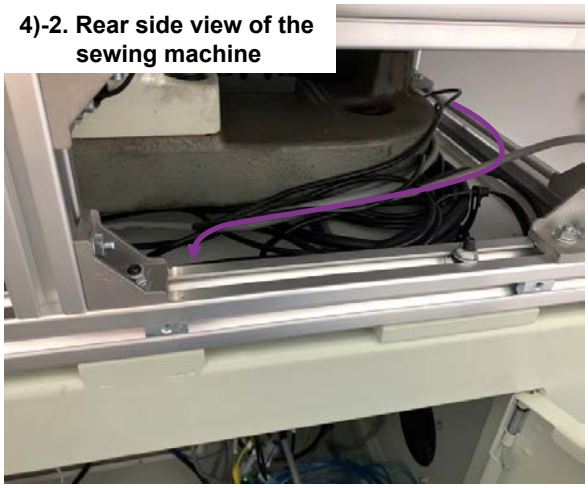


3) Wire the BK10_SOLENOID VALVE_CABLE_ ASSY according to the route indicated by the arrow in the figure.
Attach a fixing base at the position indicated by the red frame in the figure and fix the BK10_SOLENOID VALVE_CABLE_ASSY.

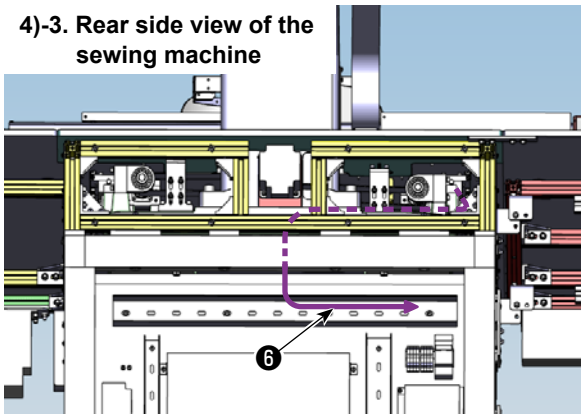
4)-1. Side rear view of the sewing machine

4) Remove the resin cover on the rear side of the sewing machine and pull the BK10_SOLENOID VALVE_CABLE_ASSY into the sewing machine.

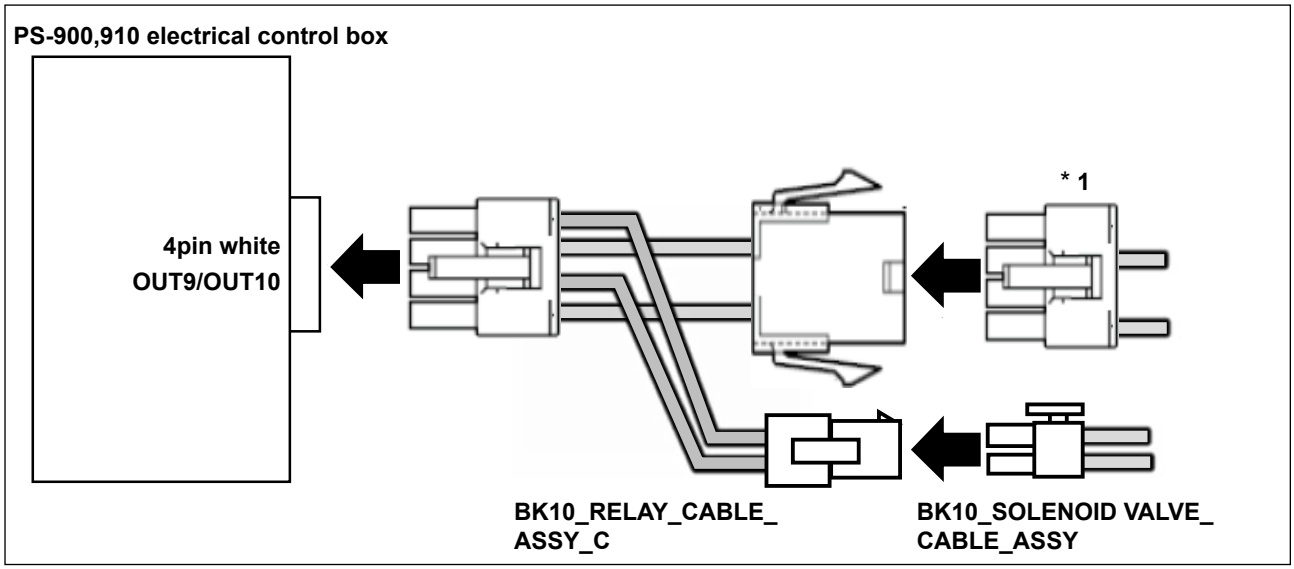
4)-2. Rear side view of the sewing machine



4)-3. Rear side view of the sewing machine



5) Wire the BK10_SOLENOID VALVE_CABLE_ ASSY according to the route indicated by the arrow in the figure.

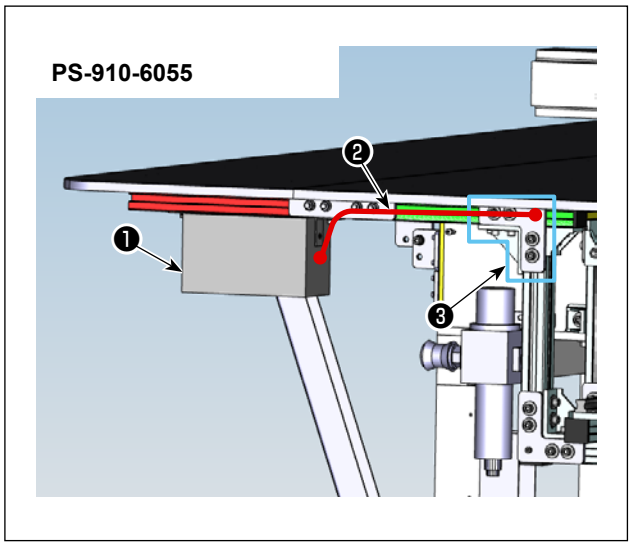


6) Connect the BK10_RELAY_CABLE_ASSY_C to the electrical control box. Connect the BK10_RELAY_CABLE_ASSY_C to the BK10_SOLENOID VALVE_CABLE_ASSY.

* 1. In the case of the laser type model, the connectors have been preliminarily connected to the OUT9 and OUT10 of the electrical control box. Detach them once. Connect the BK10_RELAY_CABLE_ASSY_C to the electrical control box. Then, connect the connectors to the BK10_RELAY_CABLE_ASSY_C.

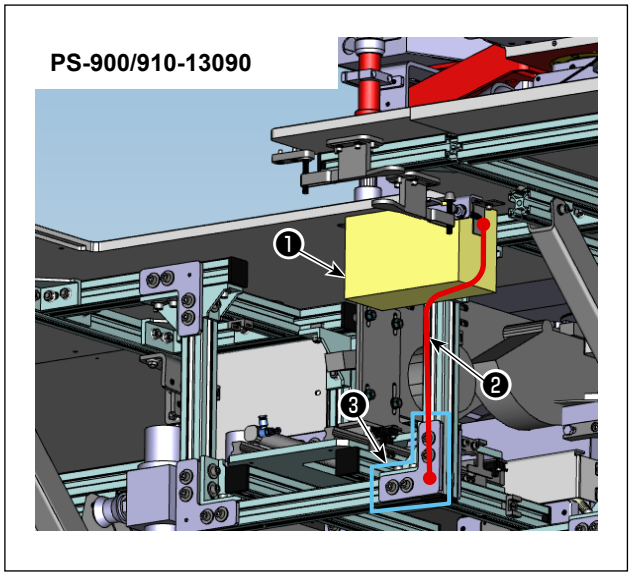
(7) Adding a grounding wire

1) Fix a grounding wire to the BK control box with a screw.
   Put a toothed washer between the control box and the ring terminal.



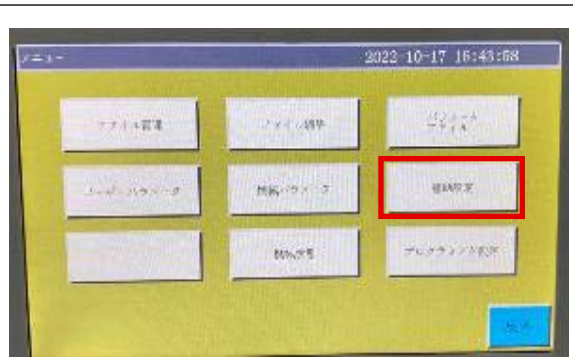
2) Wire the ground wire ❷ attached to the BK control box ❶ as indicated by the arrow in the figure, and use the screw holes in the L link plate ❸ to fix it with screws.

* Wiring route varies depending on the model.

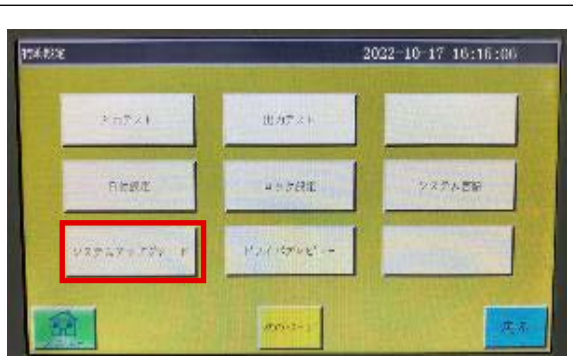

PS-900/910-13090
1
2
3

3. Re-writing the command file

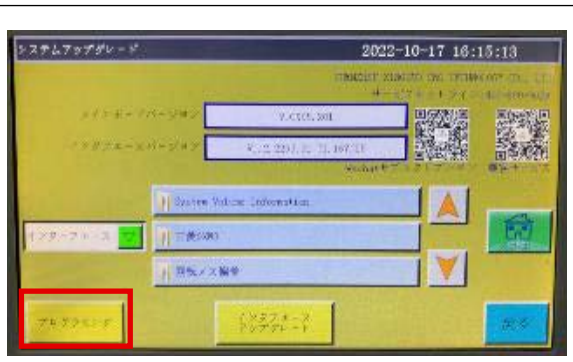
1) Insert the USB memory supplied with the sewing machine into the USB port on the panel.
2) Press the “Menu” button.



3) Press the "Assist settings" button.



4) Press the "System upgrade".



5) Press the "Programming".

6) Press “USB”.
Pressing “USB” displays a list of files on the USB memory.
If “USB” is not displayed on the screen but the “FLASH” button is, it means that you have already selected the “USB” button and do not need to press “USB” again.

7) Select the command file you want to use from the folder within the USB memory.
Note that the command files are stored in the folder “****_OP_software” (where **** represents the model name).

8) Press “Import”.
Pressing “Import” saves the selected command file in the panel’s internal memory.
Note that at this stage, the command file has not yet been enabled.

9) Press “FLASH”.
Pressing “FLASH” displays a list of files stored in the panel’s internal memory .
If “FLASH” is not displayed on the screen but the “USB” button is, it means that you have already selected the “FLASH” button and do not need to press “FLASH” again.

10) Select the command file you want to enable from the list of files in the panel’s internal memory.

11) Press “Write”.
Pressing “Write” enables the command file.

[Command file]
There are two types of command files for each model.
The difference between the two is the presence or absence of the automatic sewing start function after bobbin change.

Model	"Command file name (** represents the version)"	"Automatic sewing start after bobbin change"
PS900-13090	CM_13090S_J0**_BK10_Auto.xhc	Available
	CM_13090S_J0**_BK10_Manual.xhc	Not available
PS910-13090	CM_PS910_13090S_J0**_Auto.xhc	Available
	CM_PS910_13090S_J0**_Manual.xhc	Not available
PS910-6055	CM_PS910_6055A_J0**_Auto.xhc	Available
	CM_PS910_6055A_J0**_Manual.xhc	Not available

Save the relevant command files on the USB thumb drive. Press "USB" instead of "FLASH" in the aforementioned Step 5) to write the command files you have saved on the USB thumb drive.

When you use the BK-10, avoid adding the "OUT10" output setting in a sewing pattern separately.
Since the "OUT10" is used by the BK-10 device, setting it separately in a sewing pattern may cause a malfunction.

4. Adjusting the installation

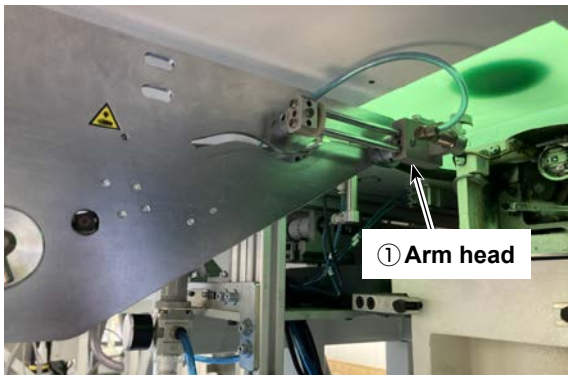
4-1. Checking the chuck claw position

WARNING :

1. Adjustment procedure has to be carried out by a trained technical expert.

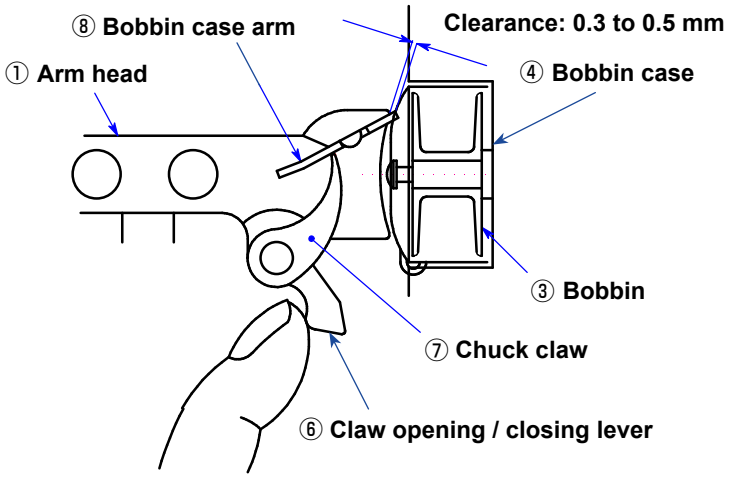
2. Be sure to turn OFF the power to the sewing machine and to the automatic bobbin changer, and unplug them. Turn OFF the air supply to decrease the air pressure to "0 (zero)".
It is quite dangerous to actuate the sewing machine and / or the bobbin changer during the adjustment work.

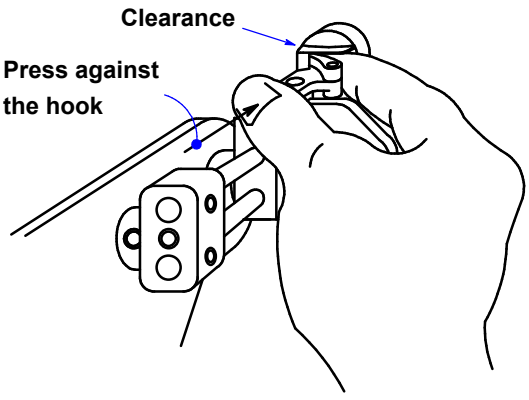
1) Manually rotate the arm head ① of the bobbin changer main body forward, and then move the lengthwise feed base ② toward the sewing machine.

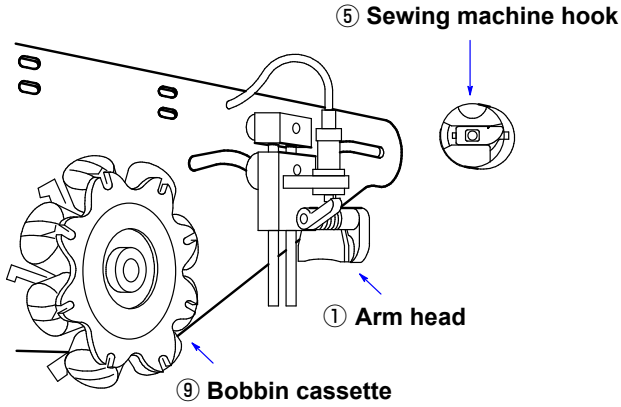


2) Checking the bobbin case and chuck claw position

Set the bobbin case in the sewing machine.
Manually press claw opening/closing lever ⑥ to check whether chuck claw ⑦ can catch bobbin case arm ⑧ .
Adjust the position (in terms of X, Y and Z directions) of the BK main body referring to the dimensions given in the figure below.







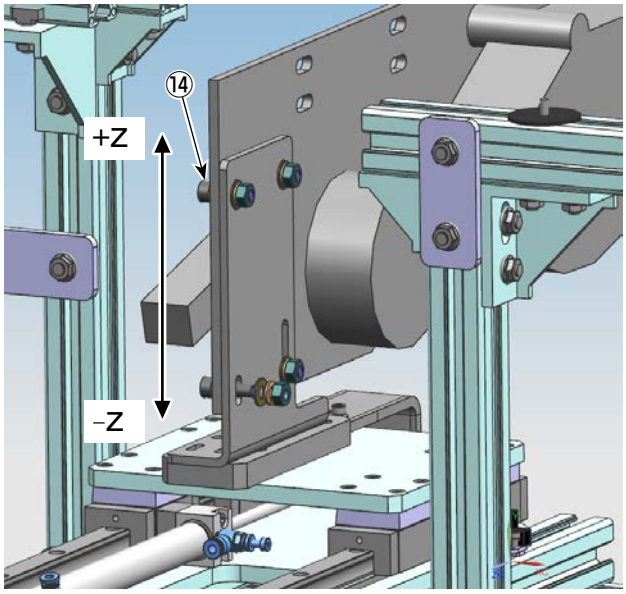
① Arm head
② Feed base
③ Bobbin
④ Bobbin case
⑤ Sewing machine hook
⑥ Claw opening / closing lever
⑦ Chuck claw
⑧ Bobbin case arm
⑨ Bobbin cassette

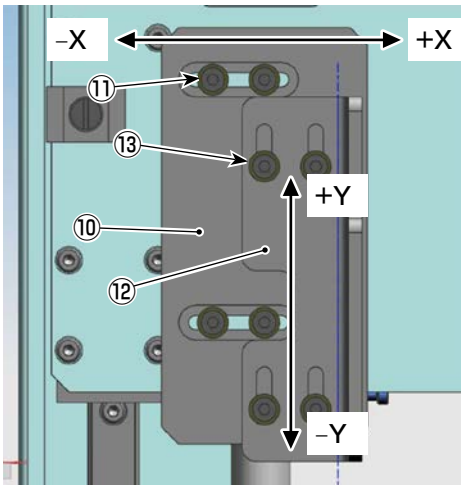
4-2. Adjusting the XYZ directions for bobbin changer installation

Adjust the XYZ directions to align the chuck claw ⑦ with the bobbin case arm ⑧ .

1) With respect to the X direction, loosen the base fastening bolts ⑪ (four pieces) of X direction adjustment base ⑩ and move X direction adjustment base ⑩ to the right and left to adjust the position of the automatic bobbin changer.
2) With respect to the Y direction, loosen fixing bolts ⑬ (four pieces) of changer mounting bracket ⑫ . Move changer mounting bracket ⑫ back and forth to adjust the position of the automatic bobbin changer.
3) With respect to the Z direction, loosen main body mounting bolts ⑭ (four pieces) of changer mounting bracket ⑫ . Move changer mounting bracket ⑫ up and down to adjust the position of the automatic bobbin changer.

If the aforementioned clearance is too small, bobbin case ④ and sewing machine hook ⑤ can be broken when arm head ① moves toward the hook side. On the other hand, if the aforementioned clearance is too large, chuck claw ⑦ can fail to grasp the bobbin case, causing a chuck error.





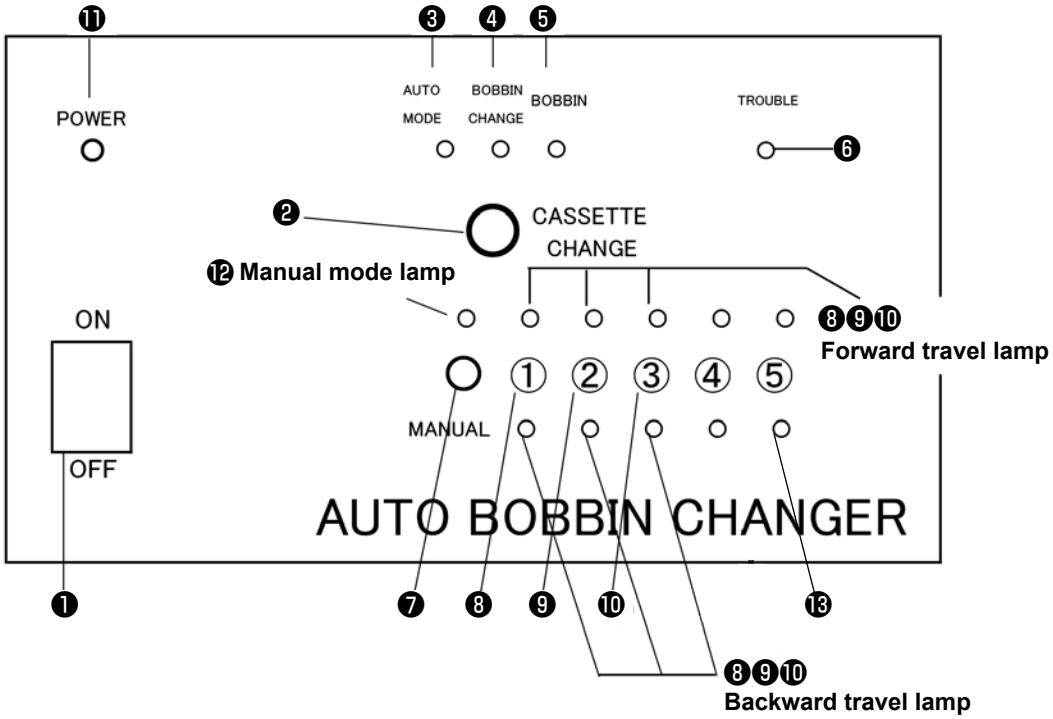
⑩ X direction adjustment base
⑪ Base fastening bolt
⑫ Mounting bracket
⑬ Fixing bolt
⑭ Main body mounting bolt

4-3. Rechecking the chuck claw position during stand-alone operation

Turn on the sewing machine electricity and air, then use the buttons on the control box and sewing machine panel to recheck the chuck claw position during stand-alone operation of the bobbin changer.

DANGER :
When air is turned off for position adjustment, etc., be sure to manually move the BK main unit toward the front (operator side) before turning the air back on.

1) Turn on the control box power supply ❶ and check the following lamps.
❶❶ Power lamp ❸ Automatic mode lamp ❽ Backward travel lamp for chuck opening/closing key ❾ Backward travel lamp for cassette feed key ❿ Arm head key ❶❸ Backward end sensor S2 detection lamp

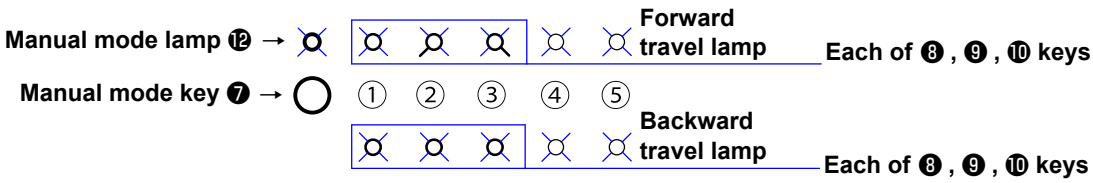


❶ Power switch
❷ Cassette replacement key
❸ Automatic mode lamp
❹ Bobbin replacement lamp
❺ Bobbin presence lamp
❻ Fault lamp
❼ Manual mode key
❽ Chuck opening / closing key
❾ Cassette feed key
❿ Arm head key
❶❶ Power lamp
❶❷ Manual mode lamp
❶❸ Backward end sensor S2 detection lamp

Actual photo

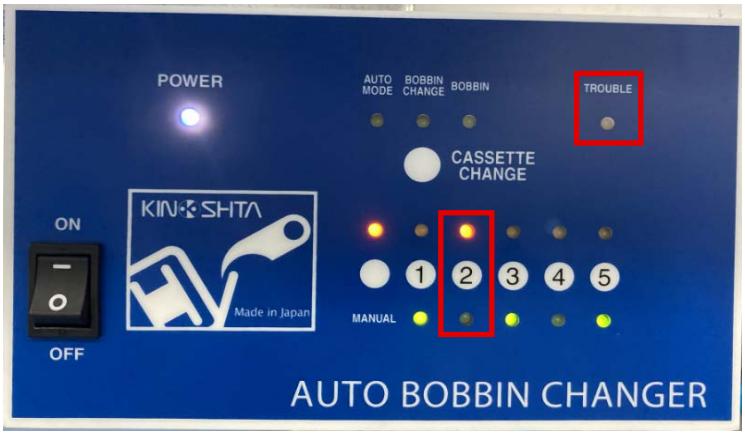
2) Switch the control box to manual mode operation.

When manual mode key ❼ is pressed, manual mode lamp ⓬ (orange) lights up, automatic mode lamp ❸ (green) goes out and the operation mode is changed over to the manual mode.

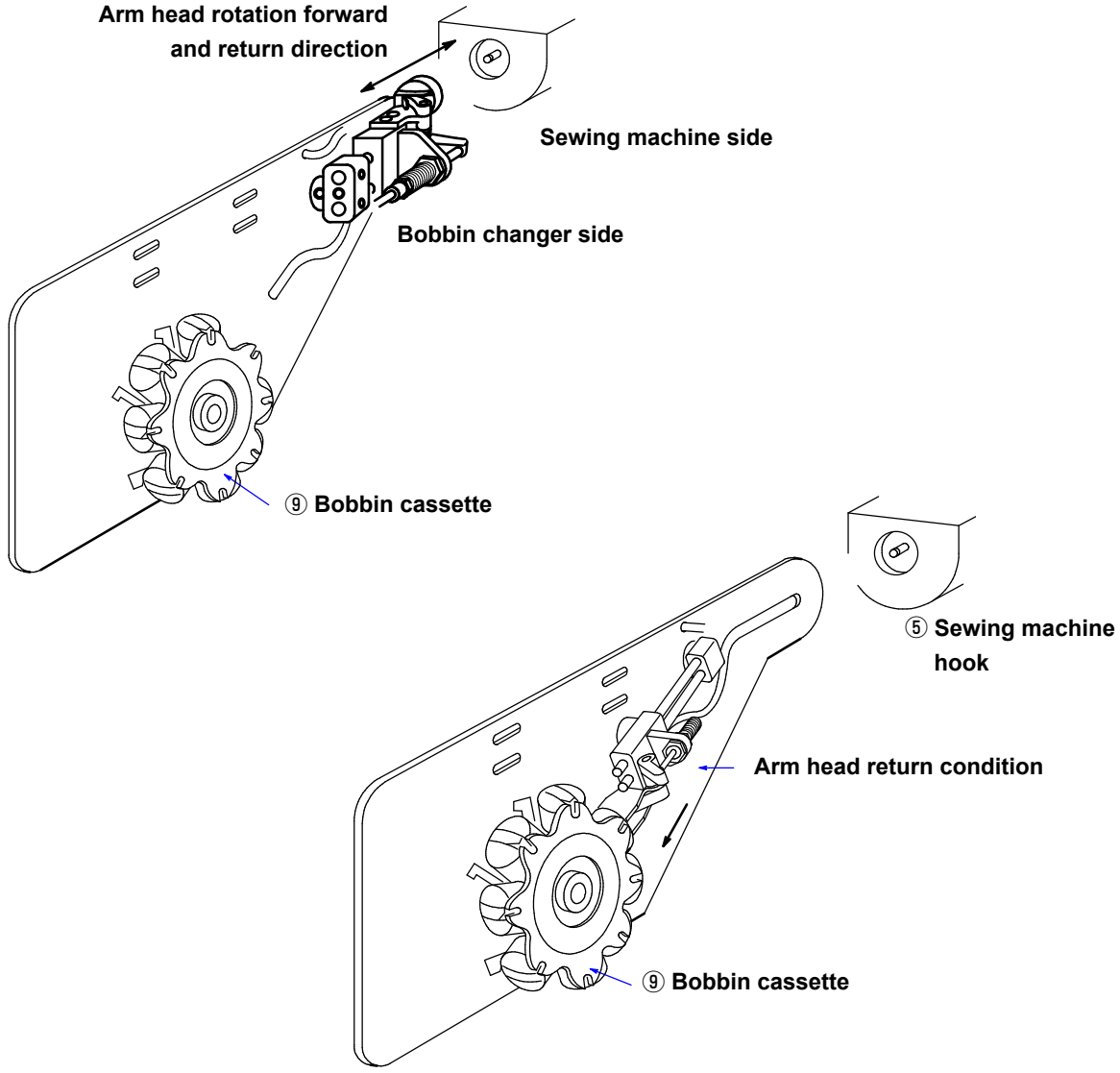


Press chuck opening/closing key ❽ once to close the chuck claw.
→ The upper lamp (orange) lights up and the lower lamp (green) goes out.
Press chuck opening/closing key ❽ again to open the chuck claw.
→ The upper lamp (orange) goes out and the lower lamp (green) lights up.

Press cassette feed key ❾ once to rotate the bobbin cassette of the BK once.
→ The upper lamp (orange) lights up and the lower lamp (green) goes out.
Press cassette feed key ❾ again to reset the bobbin cassette control cylinder.
* If you want to feed the bobbin cassette successively, press cassette feed key ❾ twice in a row.
* When fault lamp ❻ blinks after the bobbin cassette of the BK has rotated eight times, press cassette change key ❷ to reset it.



Press the arm head key ⑩ once to turn the arm head and move it forward.
Press the arm head key ⑩ again to return the arm head to the worker's side.



When pressing the arm head key ⑩ , be sure to move the bobbin changer feed base toward the operator side.

DANGER :
When you press the arm head key ⑩ , the arm head suddenly returns to the cassette side, which is dangerous as it may pinch your fingers.

For detailed instructions on the operation of the control box, refer to **"7. Explanation of operation of the control box of automatic bobbin changer" p.77**.

3) Panel operation

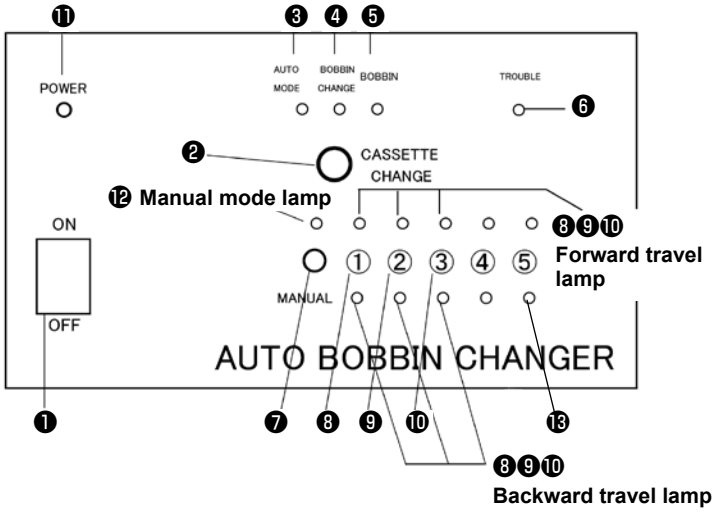
OUT10: This button is used to move the bobbin changer back and forth. Press this button once to move the entire bobbin changer toward the sewing machine, which will cause the backward end sensor S2 detection lamp ⓭ (green) to turn off.
Pressing it again returns the entire bobbin changer to the operator side.

The speed at which the bobbin changer moves back and forth can be adjusted with the speed controller.
Refer to "4-4. Speed adjustment for forward and backward movement" p.66 for the adjustment method.

Bobbin replacement: After the bobbin changer has been fully adjusted, perform a single continuous bobbin replacement operation.

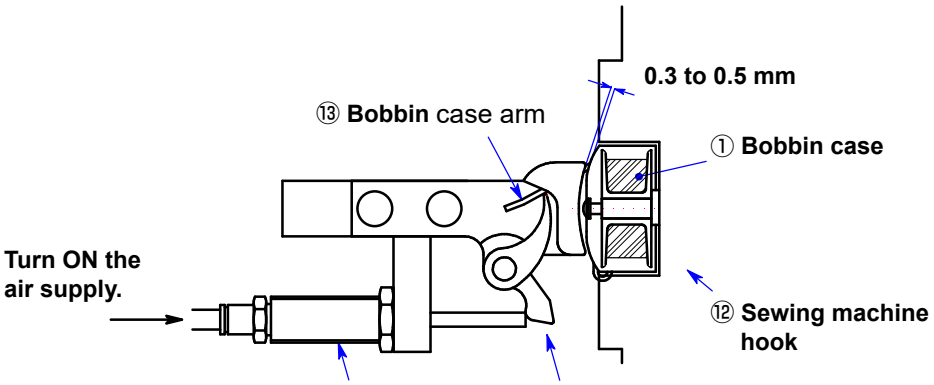
4) Fine adjustment of chuck claw and bobbin case alignment

Pressing the arm head key ⓾ once on the control box rotates the bobbin changer arm forward.
Press OUT10 on the panel to move to the bobbin changer sewing machine side. Press the chuck opening/closing key ❽ once on the control box and confirm that the bobbin changer claw is in the bobbin chucking condition.
Loosen the base tightening bolt ⓫ , fixing bolt ⓭ , and main body mounting bolt ⓮ respectively, fine-tune the XYZ positions to a position where the changer can be smoothly inserted and removed from the sewing machine hook, and then tighten and fix the changer in the optimal position.

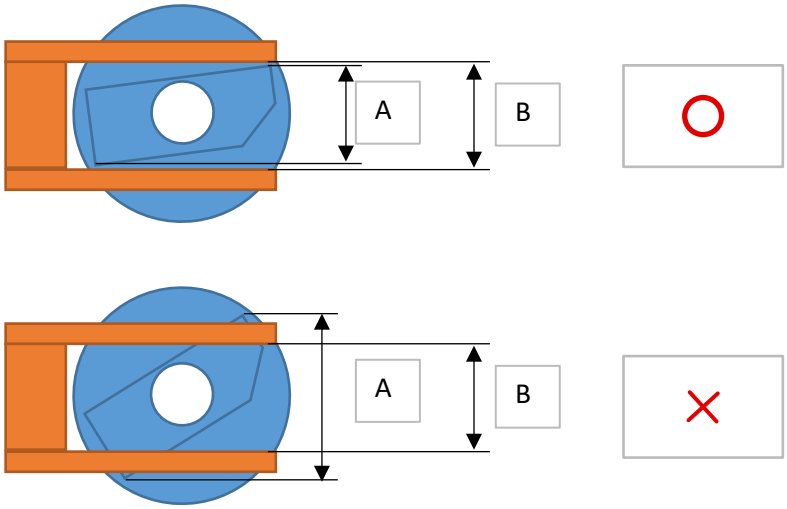


Adjusting the clamp clearance between bobbin case

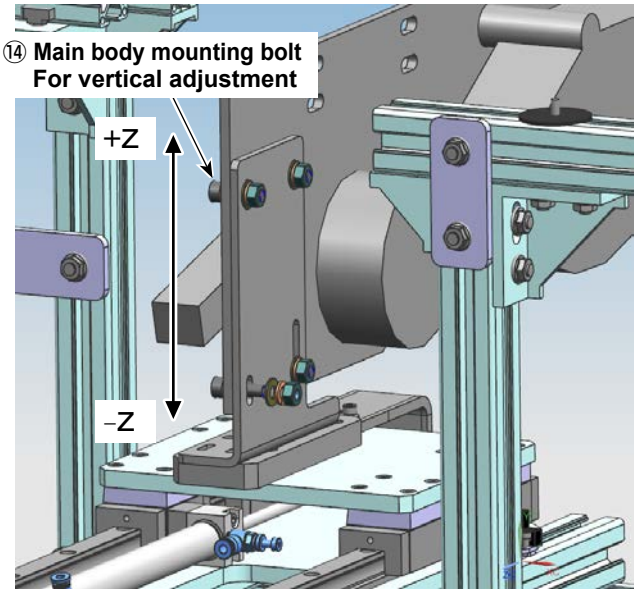
Press the chuck opening/closing key ❽ to grip the bobbin case arm ⑧ , and measure while the bobbin case ④ is pressed against the sewing machine hook.

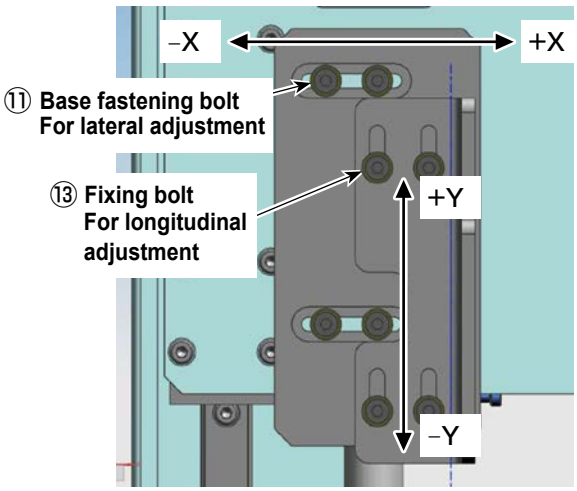


Checking the tilt of the bobbin case



The bobbin case may tilt according to the adjusted position of the stopper.
If the bobbin case has tilted, the dimension A of the bobbin case wing will exceed the chuck width dimension B, causing a problem of the chuck defects.
In this case, re-adjust the position of the stopper.





Cautions regarding the setting position of the bobbin changer in the longitudinal direction (Y direction)

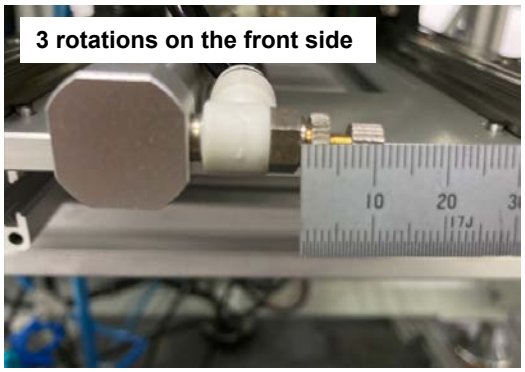
- **If the clearance provided between the bobbin case that is placed in the sewing machine hook and the chuck is too small when the chuck rests on the sewing machine side, breakage of the bobbin and hook and mis-chucking can be caused. On the other hand, if the aforementioned clearance is too large, malfunctions such that the chuck fails to grasp the bobbin case arm can occur.**
- **Finely adjust the setting position of the bobbin changer in longitudinal direction so that a clearance of 0.3 to 0.5 mm is provided between the bin case and the chuck when the chuck grasps the bobbin case arm.**

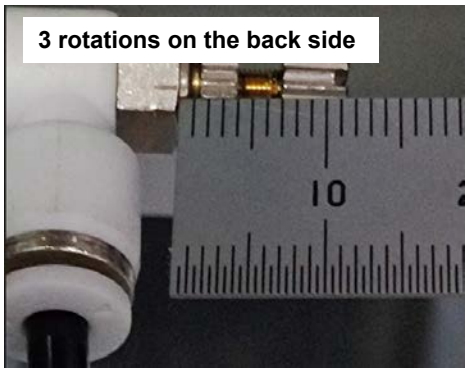
4-4. Speed adjustment for forward and backward movement

During stand-alone operation, pressing OUT10 moves the bobbin case back and forth. The speed of the forward and backward movement is adjusted using the speed controller of the cylinder.
The following data is recommended for adjusting the speed controller of the cylinder.

Speed controller of the lengthwise feed base

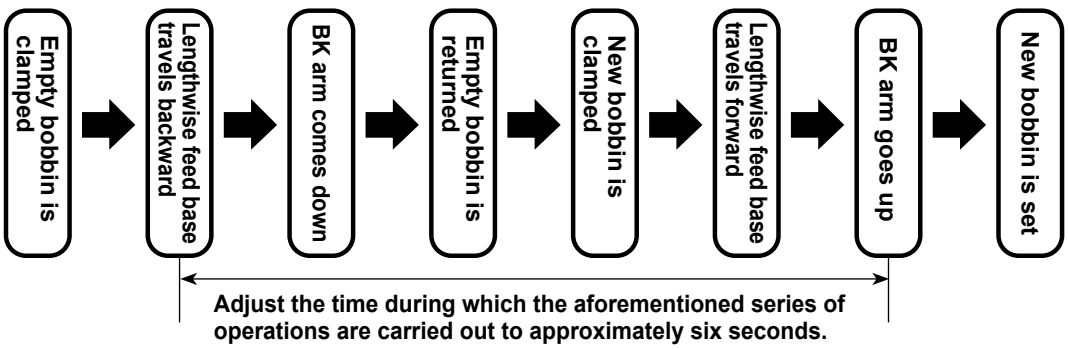
★ First, turn the speed controller clockwise to fully close it, then turn it counterclockwise three turns.





If an error recurs after you have adjusted the speed controller as described above, adjust the speed controller so that approximately six seconds are required from the moment the lengthwise feed base starts to retract to the moment the arm goes up.

A series of operations after an empty bobbin is clamped



4-5. Checking the overall stand-alone operation

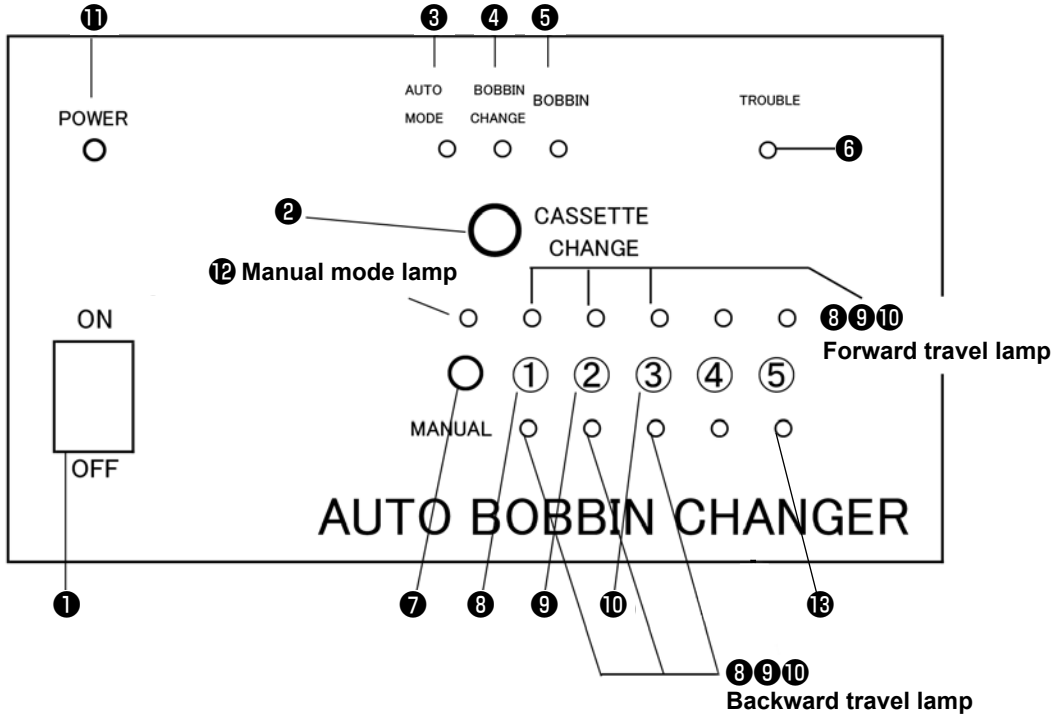
After the completion of the aforementioned adjustment of the bobbin changer, manually check the individual operation of the bobbin changer.

Carry out checking of the individual operation in the order described below.

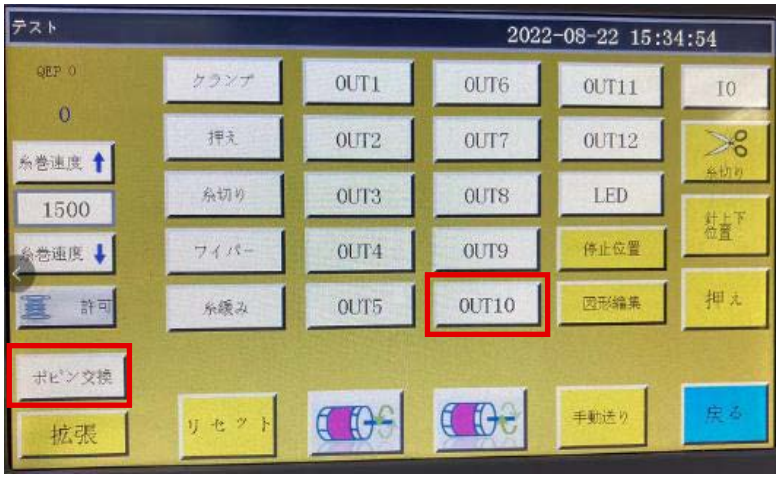
1. Press ⓾ on the control box: The bobbin changer arm rotates forward.
2. Press the "OUR10" on the operation panel: The bobbin changer travels to the sewing machine side.
3. Press ❽ on the control box: The bobbin change claw returns to this side.
4. Press the "OUT10" on the operation panel: The bobbin changer returns to this side.
5. Press ⓾ on the control box: The bobbin changer arm returns.
6. Press ❽ on the control box: The bobbin changer claw releases an empty bobbin.
7. Press ❾ on the control box twice: The bobbin changer cassette rotates.
8. Press ❽ on the control box: The bobbin changer claw chucks the bobbin with thread.
9. Press ⓾ on the control box: The bobbin changer arm rotates forward.
10. Press the "OUR10" on the operation panel: The bobbin changer travels to the sewing machine side.
11. Press ❽ on the control box: The bobbin changer claw releases a bobbin with thread.
12. Press the "OUT10" on the operation panel: The bobbin changer returns to this side.
13. Press ⓾ on the control box: The bobbin changer arm returns.
14. Bobbin changing procedure is completed.

When you have found no problem during the confirmation of manual operation, change over the mode of the control box to the automatic mode.

Press the [Change bobbin] on the operation panel to check the automatic operation.

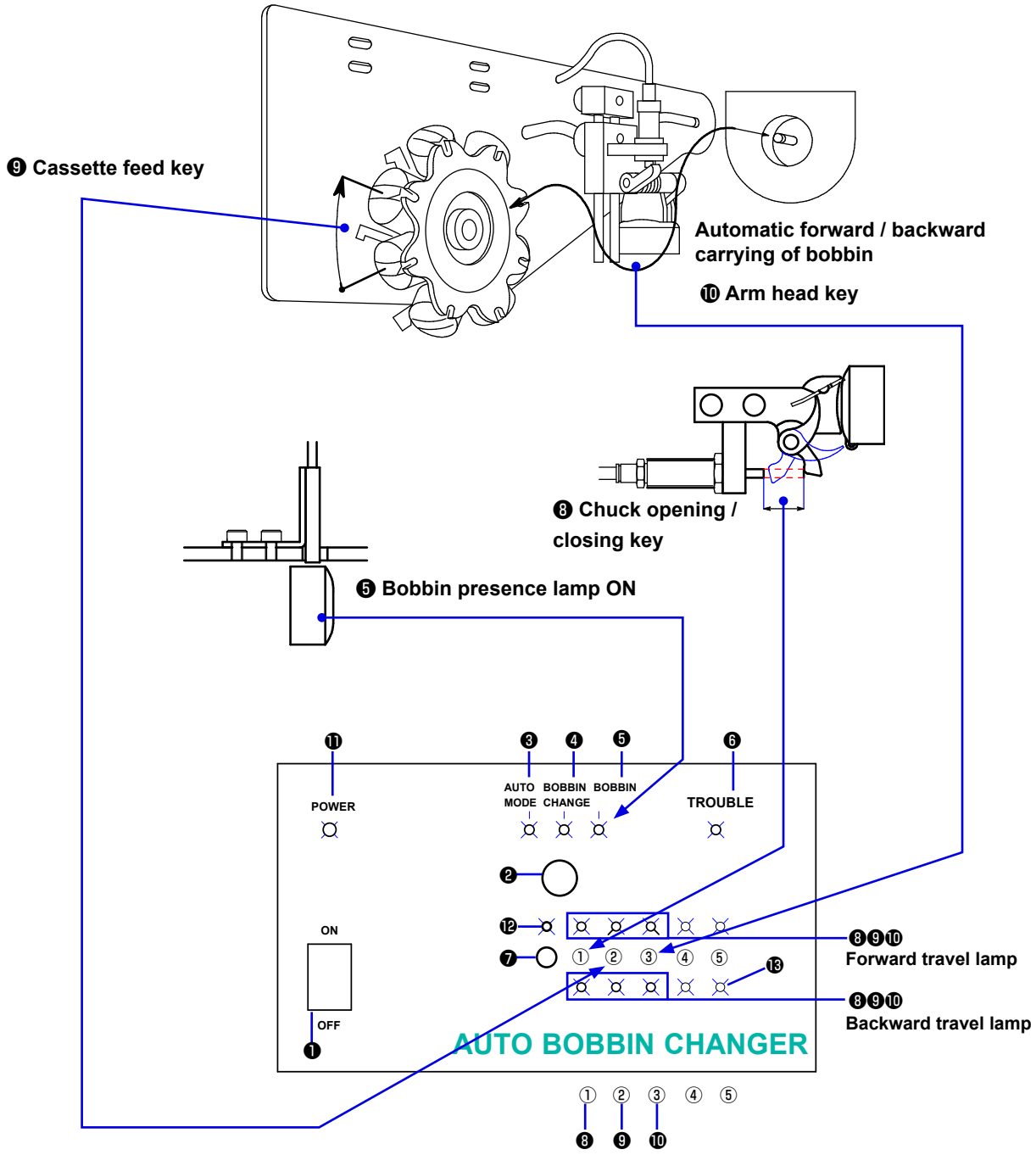


❶ Power switch
❷ Cassette replacement key
❸ Automatic mode lamp
❹ Bobbin replacement lamp
❺ Bobbin presence lamp
❻ Fault lamp
❼ Manual mode key
❽ Chuck opening / closing key
❾ Cassette feed key
⓾ Arm head key
⓫ Power lamp
⓬ Manual mode lamp
⓭ Backward end sensor S2 detection lamp



Caution **The rotating speed and longitudinal travel speed of the bobbin changer arm can be adjusted with the speed controller of each control cylinder.**

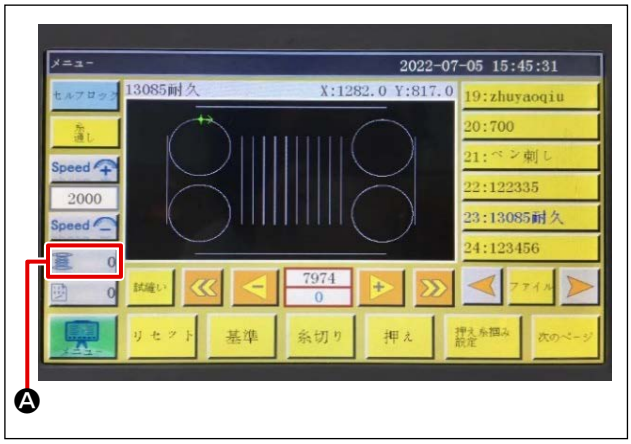
<Each operation button of the bobbin changer main unit>



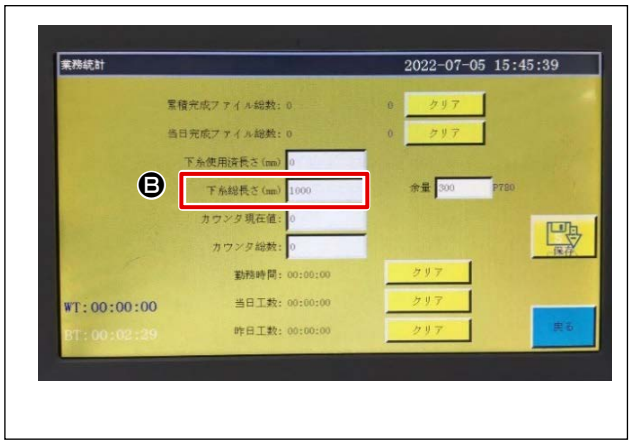
❶ Power switch
❷ Cassette replacement key
❸ Automatic mode lamp
❹ Bobbin replacement lamp
❺ Bobbin presence lamp
❻ Fault lamp
❼ Manual mode key
❽ Chuck opening / closing key
❾ Cassette feed key
❿ Arm head key
⓫ Power lamp
⓬ Manual mode lamp
⓭ Backward end sensor S2 detection lamp

5. Setting the operation panel

[Setting of the automatic bobbin changing]

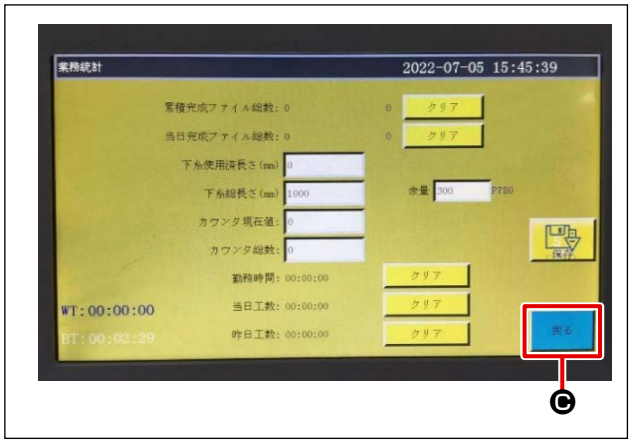


1) Press "Work Statistics" Ⓐ on the initial screen.

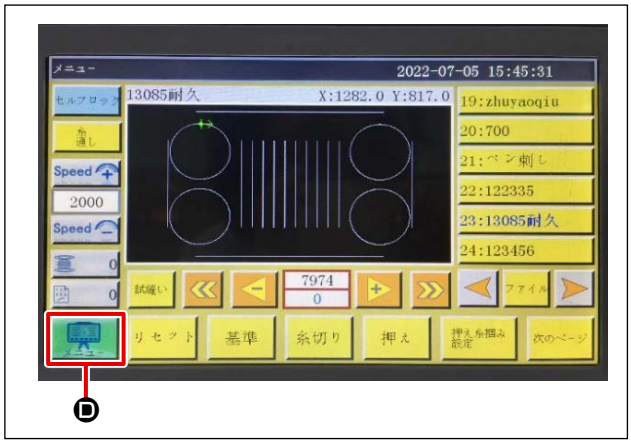


2) Set Ⓑ on the work statistics screen.

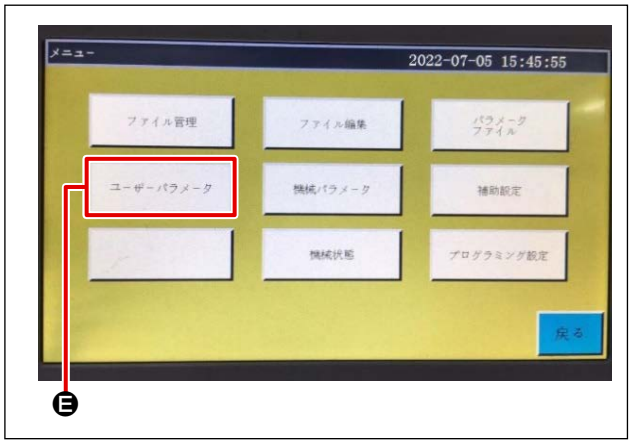
Ⓑ : Total length of the bobbin thread (mm) → Enter the total length of the bobbin thread wound on the bobbin.
The “Remaining length of the bobbin thread” is calculated as “Total length of the bobbin thread” less “Length of the bobbin thread used”. When the “Remaining length of the bobbin thread” becomes less than the “Length of the next seam line,” the bobbin replacement will start just before sewing the next seam line”.



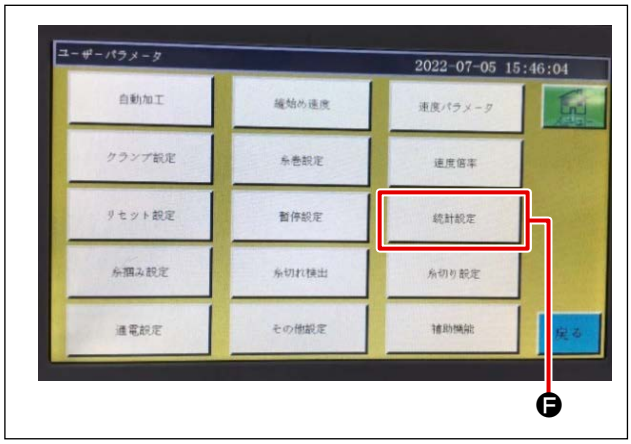
3) Press "Return" Ⓒ.



4) Press "Menu" Ⓓ on the initial screen.



5) Press "User Param" Ⓔ on the menu screen.



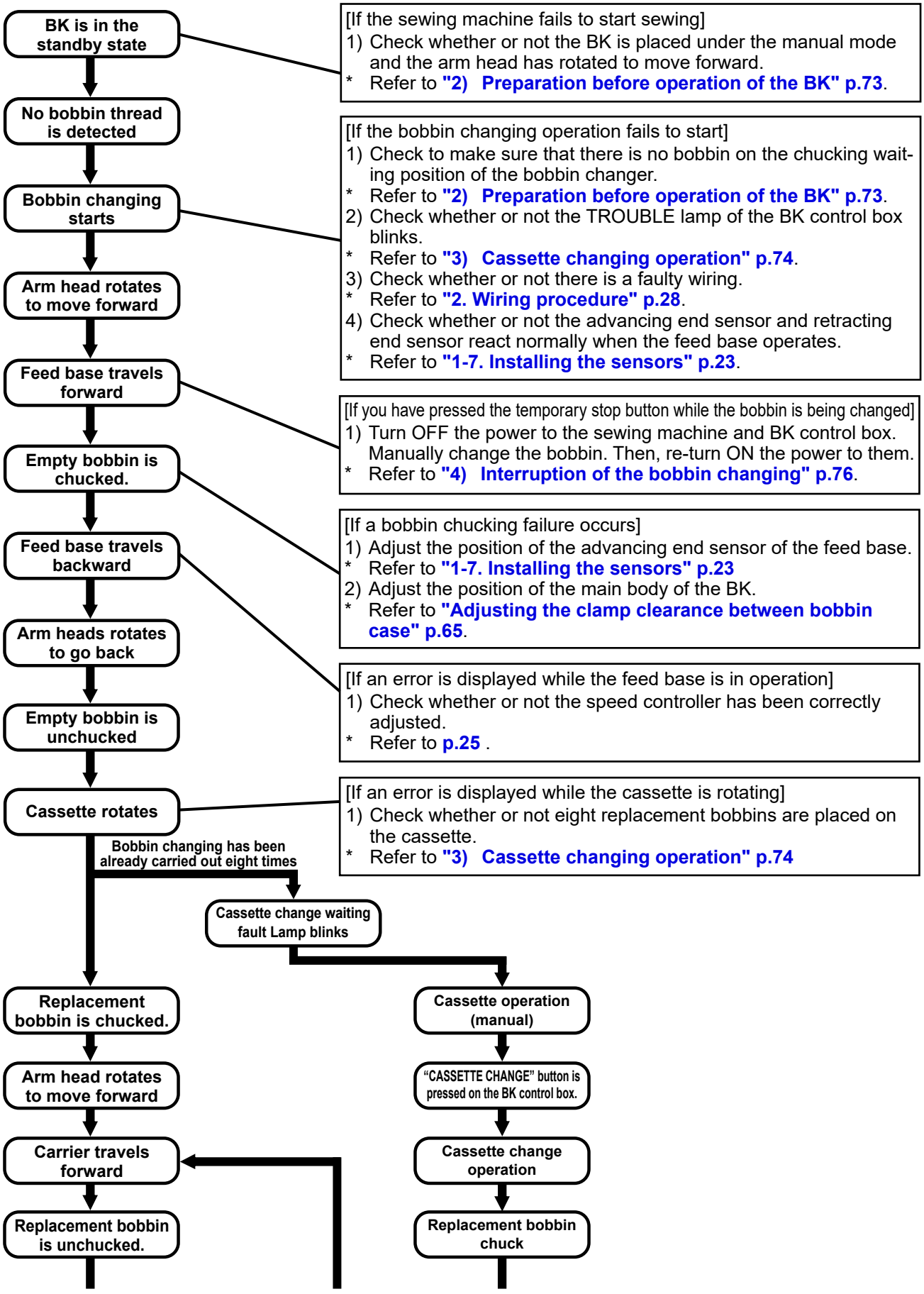
6) Press the "Statistic Setting" Ⓕ on the user parameter screen.

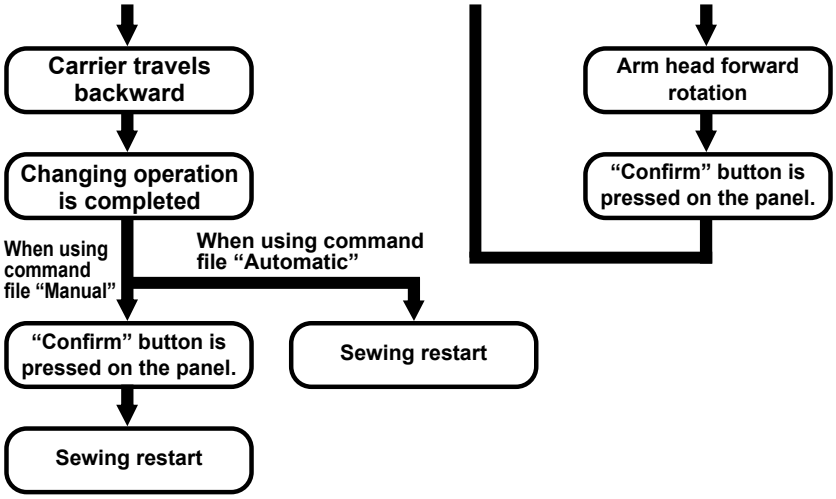
7) Set Ⓖ and Ⓗ on the statistic setting screen.
Ⓖ : Stopping working after the bobbin thread has run out → "Yes"
Ⓗ : Enabling the bobbin thread counter → "Yes"

6. Bobbin changer operation

The bobbin changer operation flow and notes are as follows.

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





[Precautions]

1) During work

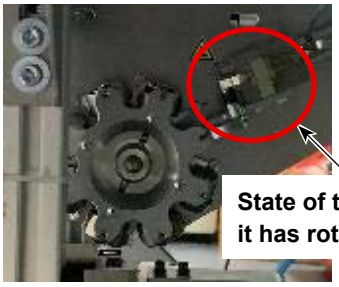
Be sure to turn OFF the power switch of the sewing machine in any of the following cases.
If not, the sewing machine will run when you press the start button by mistake during the work, inviting great danger.

- When the bobbin case in the sewing machine hook is replaced
- When the sewing machine is disused or the operator leaves the sewing machine side

2) Preparation before operation of the BK

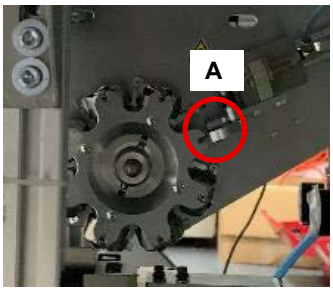
- The automatic bobbin changer carries out the following operations when receiving the "bobbin replacement command" from the sewing machine.
- Conditions to be satisfied to allow the automatic bobbin changer to accept the "bobbin replacement command" are as stated below.
  If one of the conditions is not satisfied, the automatic bobbin changer will not start the bobbin replacement operation even if the sewing machine outputs the "bobbin replacement command".

① Automatic mode…The select switch is placed in the "automatic" side.



② The arm head rotates to go back.

Caution **The sewing machine does not start sewing while the arm head rotates to go forward for the sake of safety.**

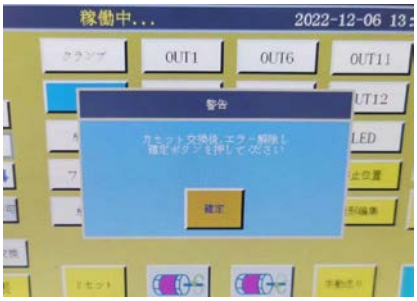


③ At the time of first setup after the power to the sewing machine is turned ON, the chuck stand-by position **A** of the BK should be empty with no bobbin placed on it.

If a bobbin is placed on the position A, the BK will not start changing the bobbin since there is no destination to which an empty bobbin on the sewing machine side is returned.

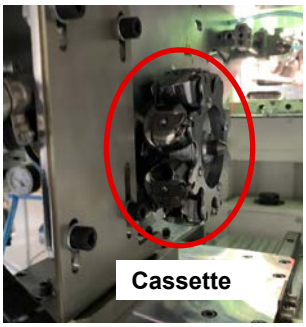
3) Cassette changing operation

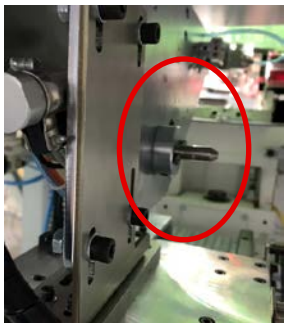
- When the bobbin changing operation has been carried out eight times, the BK enters the waiting state in which it waits for changing of cassette. In this state, the TROUBLE lamp blinks and the warning screen is displayed on the operation panel.
  Be sure to change the cassette following the steps of procedure described below. Then, press the Enter button on the operation panel.

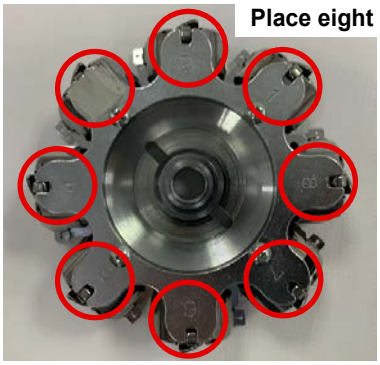


① Remove the cassette tha has been placed on the main body of the BK without turning OFF the power to the sewing machine and BK control box.

If you have turned OFF the power to the sewing machine or that to the BK controller, turn OFF the power to both of the sewing machine and the BK controller once. Then, re-turn ON the power to them.



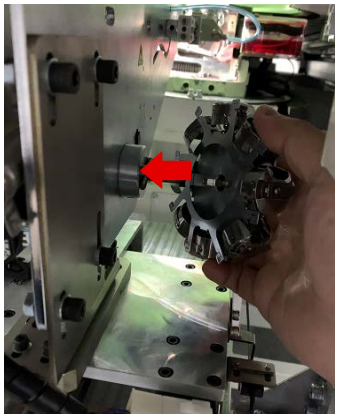




Replacement cassette

② Place bobbins on the replacement cassette. At this time, be sure to place eight bobbins on the replacement cassette.

Be sure to place eight bobbins on the replacement cassette.



③ Place the replacement cassette on the main body of the BK.

Check to make sure that no bobbin is left on the sewing machine side and that the BK is not left chucking the bobbin.

④ Press the “CASSETTE CHANGE” button on the BK control box.

⑤ A message is displayed on the operation panel of the sewing machine. Press the "Enter" button.

4) Interruption of the bobbin changing

- Basically, do not press the temporary stop button of the sewing machine while the bobbin changing operation is carried out.
  If you have pressed the temporary stop button during the bobbin changing operation, carry out the recovery work following the steps of procedure described below.

① Turn OFF the power to the sewing machine and BK controller.

Be aware that the bobbin may fall if you turn OFF the power while the bobbin is being chucked.

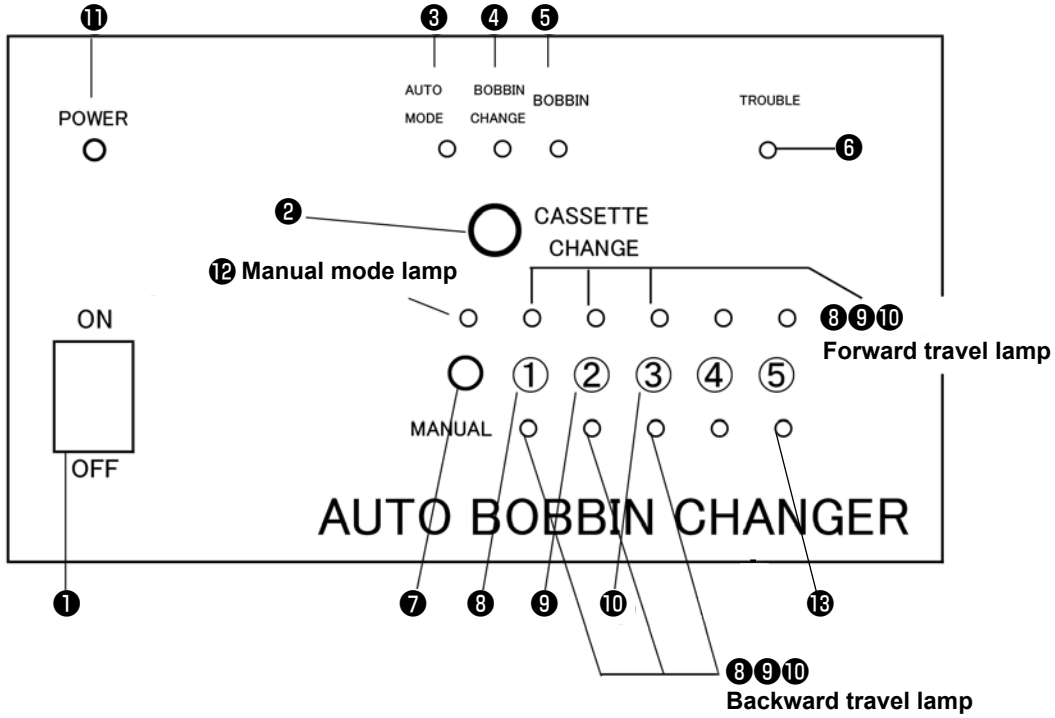
② Manually change the bobbin placed on the sewing machine side.

③ Check to make sure that the standby position A of the BK for chucking is left empty with no bobbin placed on it.

④ Turn ON the power to the sewing machine and BK control box.

7. Explanation of operation of the control box of automatic bobbin changer

★ Upper and lower lamps of ❽ , ❾ and ❿ automatically light up in sequence according to the operations carried out by the relevant sections of automatic bobbin changer (even under the automatic mode).



❶ Power switch

- When power switch ❶ is placed in <ON>, the power lamp ⓫ lights up. (If the power lamp does not light up, check the voltage of the 24 VDC connection point.)
  Check the voltage of the connection destination.
- When power switch ❶ is set to “ON”, the automatic mode lamp ❸ , the backward lamps (green) for the cassette feed key ❾ , arm head head ❿ , and chuck opening/closing key ❽ , as well as the backward end sensor S2 detection lamp ⓭ , will turn on. (Automatic mode)
  Caution: If the backward lamps (green) on the ❽ , ❾ , and ❿ keys, as well as the backward end sensor S2 detection lamp ⓭ , do not light up, there may be something wrong. Request an inspection from a technician.
- When the bobbin case is loaded in the cassette at the bobbin changing position, bobbin presence lamp ❺ lights up. When no bobbin case is present at the bobbin changing position, the lamp goes out.

❷ Cassette replacement key

- When the manual mode is selected:
  When this switch is pressed under the manual mode, the automatic bobbin changer does not operate. In the case the cassette is manually rotated by four or eight turns, the fault lamp lights up in order to prevent improper operation. In this state, the bobbin changer will no longer operate.
  This switch is used for resetting the fault lamp which flickers (when the preset final counter value is reached).
- When the automatic mode is selected:
  ① Normal operation When replacement of all of the bobbin cases (four or eight pieces) loaded in the automatic bobbin changer is completed, fault lamp ❻ flickers and the bobbin changer stops.
  When this switch is pressed after the replacement of cassette, the automatic bobbin changer takes out a bobbin case from the newly installed cassette and feeds it to the sewing machine.

② Forced replacement of the bobbin cassette

This function is provided to allow the cassette to be changed in the case of changing the thread color, etc. before it is emptied. (Regardless of the number of bobbins already used, the cassette replacement operation is carried out forcibly.)

When this switch is pressed while the sewing machine is at rest and the automatic bobbin changer rests at its origin (in this state, the green lamp of the respective cylinders light up and the bobbin presence (in the sewing machine) lamp and bobbin lamp on the bobbin changer side go out), fault lamp ❻ flickers, bobbin cases are taken out from the sewing machine to the bobbin changer side, and the chuck section retracts toward the sewing machine side. (At this time, fault lamp ❻ keeps flickering. Replace the bobbin cassette with a new one. When this switch is pressed again, the automatic bobbin changer takes out a bobbin from the newly installed cassette and feeds it the sewing machine.

❸ Automatic mode button

· When the automatic mode button ❸ lights up, the automatic bobbin changer is placed in the mode under which it automatically replaces the bobbin (automatic mode).

❹ Bobbin replacement lamp

- This lamp only lights up at the moment when the thread trimming signal and the count-completed signal are received from the sewing machine (bobbin thread remaining amount detector, counter circuit).
- When the thread absence signal and the count complete signal are received, the automatic bobbin changer automatically changes the bobbin.

❺ Bobbin presence lamp

- This lamp lights up when the bobbin case is put in the cassette at its bobbin changing position.

❻ Fault lamp

- Fault lamp ❻ flickers or lights up in the following cases.

<When the fault lamp lights up>

1. In the case the chuck fails to grasp the bobbin case (mis-grasping of the bobbin case on the sewing machine side and on the automatic bobbin changer side)
2. In the case the automatic bobbin changer stops operation halfway and fails to complete operation within the specified time since the cylinder advancing end sensor fails to detect or has broken.
3. In the case the cylinder sensor has failed.

<The fault lamp flickers>

1. In the case all of the bobbins (four or eight pieces) loaded in the cassette have been used.

   <u>When the manual mode is selected</u>

   If the cassette is manually rotated by one turn (four or eight bobbin cases) under the manual mode, the fault lamp will light up and the cassette cannot be rotated further in order to prevent improper operation. To re-start the automatic bobbin changer, press cassette replacement key ❷ . (Cassette replacement key ❷ , under the manual mode, is only used for resetting the flickering fault lamp. If this key is pressed, the bobbin changer will not move.)

   <u>Under the automatic mode (automatic mode is selected)</u>

   When the fault lamp flickers, the automatic bobbin changer returns all of the bobbin cases to the cassette and the arm head enters the standby state on the sewing machine side. When cassette replacement key ❷ is pressed after the replacement of the cassette, the bobbin changer takes out a bobbin case from the newly-installed cassette and feeds it to the sewing machine.

   * In the case the bobbin cassette is not fully loaded with bobbin cases (i.e., the number of bobbin cases loaded in the bobbin cassette is smaller than the maximum loadable number of bobbin cases), the bobbin changer operates while skipping the empty portions. However, when the cassette rotates four or eight turns to feed four or eight pieces of cassettes to the sewing machine, the fault lamp flickers and the bobbin changer stops. Then, the cassette changer will be placed in the standby state under which the bobbin changer waits for replacement of the cassette.

Keys used for manual operation

❼ Manual mode key

- When manual mode key ❼ is pressed, the manual mode lamp ⓬ lights up.
- The automatic bobbin changer can be operated manually with below-stated keys ❽ , ❾ and ❿ .
- When manual mode key ❼ is pressed again while all of the lower lamps (green) of the ❽ , ❾ and ❿ light up, automatic mode lamp ❸ lights up to return the operation mode to the < Automatic mode >.

❽ Chuck opening / closing key

- When chuck opening / closing key ❽ is pressed once, the chuck grasps the bobbin case arm (i.e., chuck closes) and forward travel lamp (red) lights up. When the chuck opening / closing key is pressed again, the chuck releases the bobbin case arm (i.e., chuck opens) and backward travel lamp (green) lights up.

* After the completion of operation, light up the backward travel lamp (green).

❾ Cassette feed key

- The cassette feed key is enabled when the arm head is distantly positioned from the cassette. (The forward travel lamp (yellow) of the arm head key ❿ lights up.)
- When cassette feed key ❾ is pressed once, the cassette is fed once and the forward travel lamp (yellow) lights up.
  When the key is pressed again, the cylinder returns to its home position and the backward travel lamp (green) lights up.

❿ Arm head rotating key

- The arm head rotating key is enabled when the arm head is distantly positioned from the cassette.
- When arm head key ❿ is pressed once, the arm head travels forward from the bobbin changer side to the sewing machine side and the forward travel lamp (red) lights up.
  When the key is pressed again, the arm head travels backward to the bobbin changer side and backward travel lamp (green) lights up.

* After the completion of the operation, return the arm head to the bobbin changer side. (The backward travel lamp (green) lights up.)

■ Connection

1) Connecting the power supply (control box)
   The supply voltage is 24 VDC (white → 24 V; black → 0 V).
   Never apply the AC voltage to the control box. Application of the AC voltage to the control box will break it.

2) Connecting the automatic bobbin changer to the sewing machine

Bobbin changer side			Sewing machine side
Wiring color	Wiring number & name of signal		
White	INPUT GND	←	Not used
Black	Sewing machine is running	←	Not used
Red	Bobbin replacement command	→	Output (output for down counter, etc.)
Yellow	OUTPUT GND	→	Not used
Brown	Prohibition of operation	→	Not used
Green	Bobbin replacement completed	→	Input (used for clearing the counter)
Blue	Automatic bobbin changer is faulty	→	Input (used for the case the fault indication, etc. is necessary)

Explanation of signals

① From the sewing machine: "Bobbin replacement command"
Output this signal at the timing of bobbin replacement such that the counter completes counting. While the "sewing machine is in operation" signal is being output, the automatic bobbin changer will not accept this signal.

② To the sewing machine: "Bobbin replacement completed"
This signal is output for approximately 0.5 s upon the completion of automatic bobbin replacement. It can be used to clear the counter, etc.

③ To the sewing machine: "Automatic bobbin changer is faulty"
This signal is output when the automatic bobbin changer is faulty (the fault lamp lights up).
It is not output when the fault lamp flickers (during the replacement of cassette).

Signals related to the checking sensors

Case AMP 172163-1
Pin AMP 170363-1

CN pin number	Name of signal	Wiring color
1 +5V	Arm forward / backward travel; advancing end	Yellow
2 +5V	Arm forward / backward travel; reversing end	Blue
3 GND	Arm forward / backward travel; common (-)	Brown and grey
4 +5V	Index; advancing end	White / black 1
5 +5V	Index; reversing end	Green / black 1
6 GND	Index; common (-)	Red / black 1 Yellow / black 1
7 +5V	Arm rotating; Advancing end of the carrier	Brown / black 1
8 +5V	Arm rotating; reversing end	Grey / black 1
9 GND	Arm rotating; common (-)	Blue / black 1 White / black 2
10 +24V	Bobbin presence / absence sensor (+) Carrier sensor (+)	Black and white
11 GND	Bobbin presence / absence sensor (-) Carrier sensor (-)	Green
12 +5V	Bobbin presence / absence sensor signal	Red
13 +5V	Reserved; advancing end	Red / black 2
14 +5V	Reserved; reversing end	Yellow / black 2
15 GND	Reserved; common (-)	Green / black 2 Brown / black 2

Signals related to the valves

Case AMP 172171-1
Pin AMP 170365-1

CN pin number	Name of signal	Wiring color
1 GND	Clamp SOL valve (-)	White
2 +24V	Clamp SOL valve (+)	Black
3 GND	Index SOL valve (-)	Green
4 +24V	Index SOL valve (+)	Red
5 GND	Arm rotating SOL valve (-)	Brown
6 +24V	Arm rotating SOL valve (+)	Yellow
7 GND	Arm forward / backward travel SOL valve (-)	Grey
8 +24V	Arm forward / backward travel SOL valve (+)	Blue
9 *GND	Reserved SOL valve (-)	Red / black 1
10 *+24V	Reserved SOL valve (+)	White / black 1
11		
12		
13		
14		
15		

Signals transmitted / received between the sewing machine and the automatic bobbin changer

Case Molex 5559-08P
Pin Molex 5558T2L

CN pin number	Name of signal	Wiring color
1	Automatic bobbin changer is faulty	Blue
2	Bobbin replacement completed	Green
3	Bobbin replacement command	Red
4	INPUT GND	White
5	Sewing machine is running	Black
6	OUTPUT GND	Yellow
7	Prohibition of operation	Brown
8	-	-