

ENGLISH

**AW-3SD
INSTRUCTION MANUAL**

Ver : 1.00

CONTENTS

1. GENERAL	1
1-1. Specifications of AW-3SD	1
1-2. Configuration	2
2. INSTALLATION	4
2-1. Installing the AW-3SD	4
2-2. Installation location	4
3. OPERATION PROCEDURE.....	5
3-1. Opening/closing the cover door.....	5
3-2. Removing the device cover	6
3-3. How to thread the device with the bobbin thread.....	7
3-4. How to set a bobbin.....	9
3-5. Length of remaining thread to be removed.....	11
3-6. Device operation lamp.....	11
3-7. Behavior of the AW-3SD device when the power is turned ON	12
3-8. Program mode list	12
3-9. Basic operation and setting.....	15
3-10. Operating the AW.....	16
3-11. Setting the AW number-of-stitches input mode, AW operation mode and remaining-thread allowance length.....	19
3-12. Example of operation	24
3-13. Turning OFF of the power	29
3-14. Error display and error handling procedure	29
3-15. Detection of errors related to the AW.....	31
3-16. List of errors.....	32
3-17. Cautions.....	33
4. MAINTENANCE	34
4-1. Attaching / removing the cover	34
4-2. Cleaning.....	35
4-3. Replacing the fuse	37
4-4. Replacing the gripper tube	37
4-5. Adjusting the air flow for the remaining thread guide	38
5. TROUBLESHOOTING	39

1. GENERAL

Conventionally, a series of operations including the replacement of a bobbin in the sewing machine hook, removal of thread remaining on a bobbin, winding of a bobbin, threading of the bobbin case tension spring, threading of the thread guide claw hole and trimming of thread have been carried out manually. Now, this device is developed to carry out the series of operations full-automatically. This device is provided with new functions in addition to the conventional AW-3's functions, thereby not only helps increase efficiency of sewing work but also improves convenience.

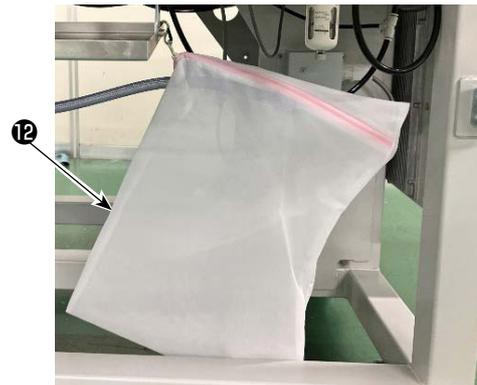
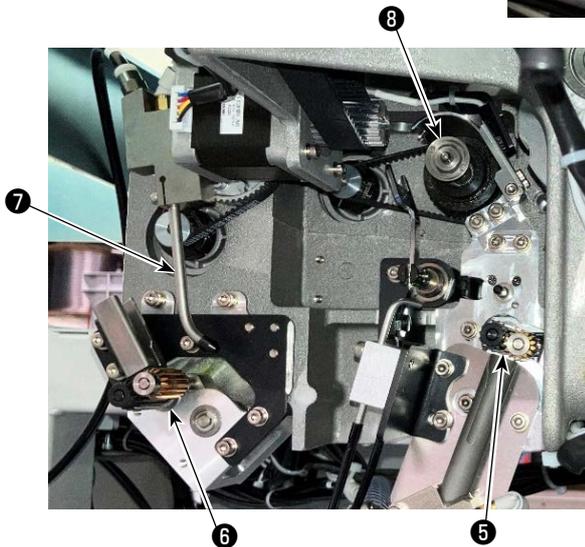
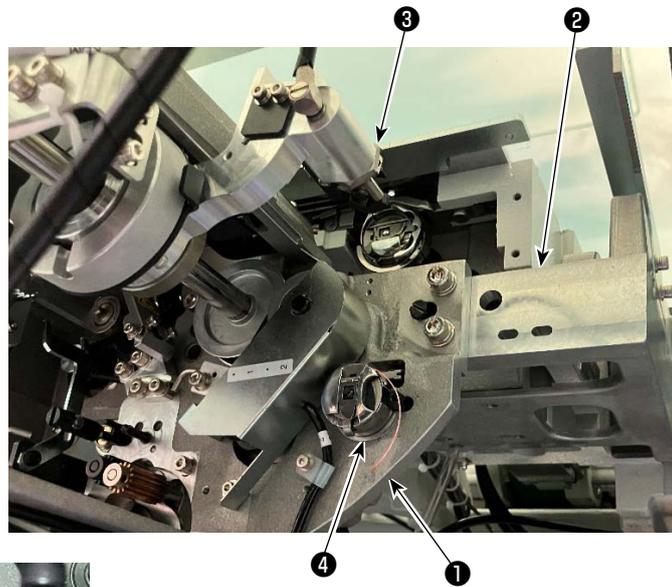
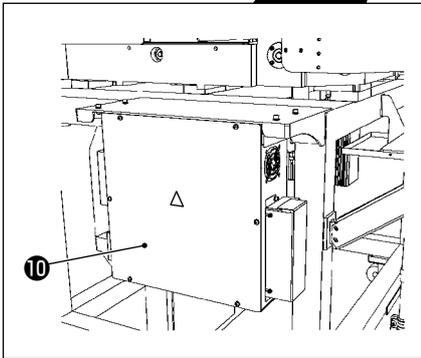
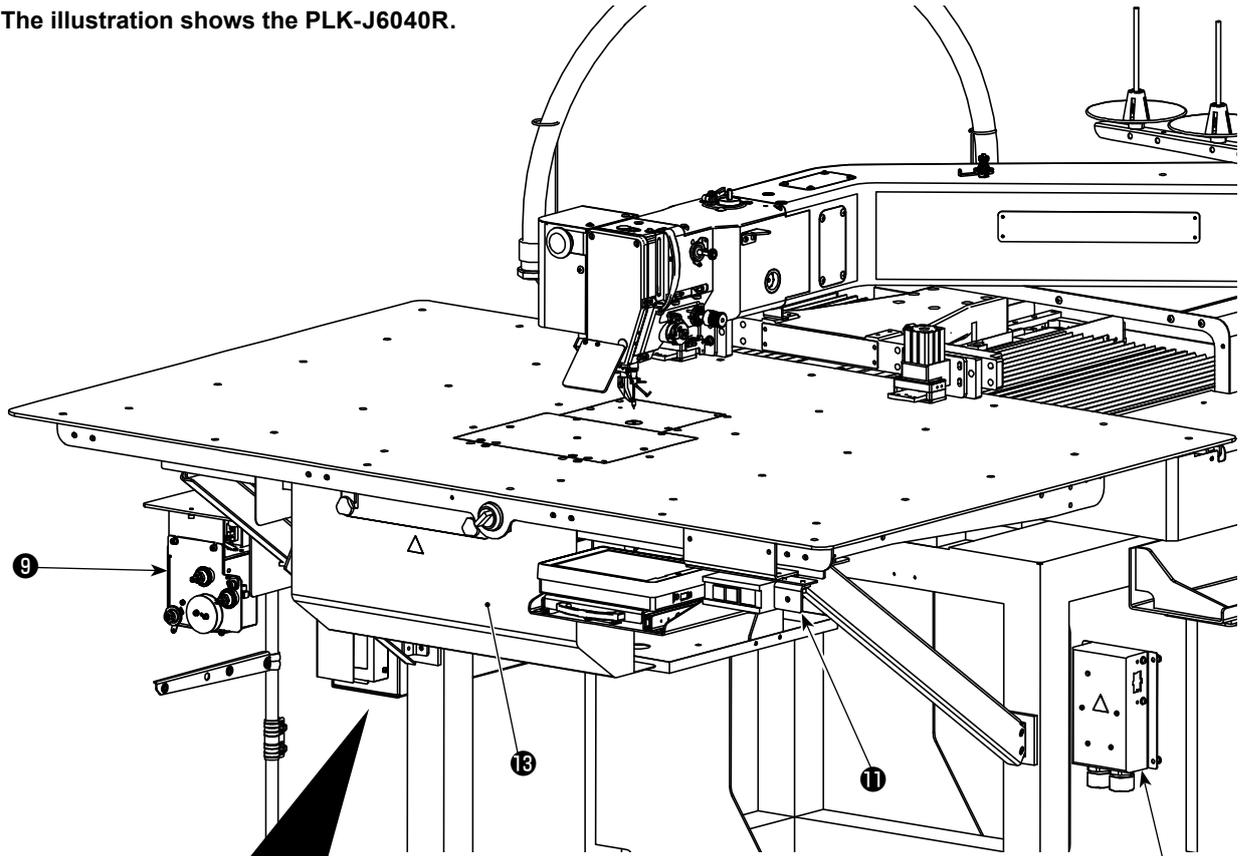
Refer to the technical data on the JUKI industrial computer-controlled sewing machine PLK-J, "Sewing machine head", "Operation panel" and "Control device" for information about the main body of the sewing machine.

1-1. Specifications of AW-3SD

1	Applicable bobbin, bobbin case	Exclusive double-capacity bobbin and bobbin case.
2	Applicable thread count	#5 to #30 (Japan), 135 to 45 (TEX), 020 to 060 (TKT)
3	Applicable type of thread	Synthetic thread
4	Remaining-thread removal and bobbin winding operation	Possible while the sewing machine is in operation.
5	Condition setting according to the thread type	Conditions to be met to unravel the thread at the beginning of winding a bobbin can be set.
6	Line voltage	200,220,240 Vac \pm 10 %, Single phase 50/60 Hz
7	Power consumption	100 VA
8	Air pressure used	0.4 to 0.5 MPa * Adjustment of the air pressure may be required depending on the thread to be used. (The air pressure for the AW-3SD has been factory-set to 0.5 MPa at the time of shipment.)
9	Air consumption	156 N ℓ / min (max. value)
10	Dimensions	700 mm (W) \times 650 mm (L) \times 430 mm (H) (Accessories included)
11	Mass of the device	38 kg
12	Operating temperature range	5 °C to 35 °C
13	Operating humidity range	35 % to 85 % (No dew condensation)
14	Noise	- Equivalent continuous emission sound pressure level (L _{pA}) at the workstation : A-weighted value \leq 80.0 dB ; (Includes K _{pA} = 2.5 dB) ; according to ISO 10821- C.6.2 -ISO 11204 GR2.

1-2. Configuration

* The illustration shows the PLK-J6040R.



	Name	Function
①	Main body of device	It is mounted under the sewing machine bed and is the mechanical section of the device which carries out replacement of the bobbin, removal of thread remaining on the bobbin, winding of thread on a bobbin, threading, thread trimming and thread unraveling automatically.
②	Angle section	It connects the main body of the AW device to the sewing machine bed.
③	Carrier arm	It is the mechanism for carrying a bobbin case to the hook, bobbin setting section, remaining thread removal section and bobbin winding section.
④	Bobbin setting section	It serves as an intermediary place used in the case of putting/removing a bobbin on/from the device.
⑤	Remaining thread removal section	It is the mechanism for removing the thread remaining on the bobbin taken out from the hook. It consists of the remaining thread removal roller, suction vacuum, etc.
⑥	Thread unraveling section	It is the mechanism for unraveling the tip of thread to be wound on a bobbin at the beginning of bobbin winding. It consists of the bobbin unraveling roller, etc.
⑦	Nozzle	Thread from the bobbin thread cone comes from the tip of the nozzle by way of the thread path. The thread coming out of the nozzle is wound on a bobbin.
⑧	Bobbin thread winding section	It is the mechanism for winding thread on a new bobbin, threading the bobbin case and trimming the thread. It consists of the clutch plate, threader, thread trimming knife, etc.
⑨	Thread feeding unit	It is used to feed the thread bit by bit from the tip of the nozzle and accurately measure the length of thread wound on a bobbin during bobbin winding.
⑩	Electrical control box of the device	It is the box which contains the PCB for controlling the operation of the device. This electrical control box is different from the one for the sewing machine.
⑪	Device operation lamp	It indicates that the device is in operation.
⑫	Dust bag	It is the place to store the remaining thread removed from the bobbin.
⑬	Cover	It is used to prevent the operator from coming in contact with the moving part of the device.
⑭	Power source distribution box	It distributes the power source to the sewing machine side and the AW device side.

2. INSTALLATION

2-1. Installing the AW-3SD

Refer to the "Engineer's Manual for the AW-3SD" for details.

2-2. Installation location

For the installation location, carefully check the following points.

- (1) This device uses an optical sensor. In order to protect the optical sensor from malfunctioning, do not install the device near a window or in any other location where it is likely to be exposed to direct sunlight. Alternatively, install the device in a direction where it will not be exposed to direct sunlight.
 - (2) In order to avoid malfunctioning, do not use the device near any equipment that generates large electrical noise. In addition, it is preferable to keep the power supply line away from the aforementioned equipment.
- * Be aware that the warranty may not apply if the aforementioned conditions are not met.

3. OPERATION PROCEDURE

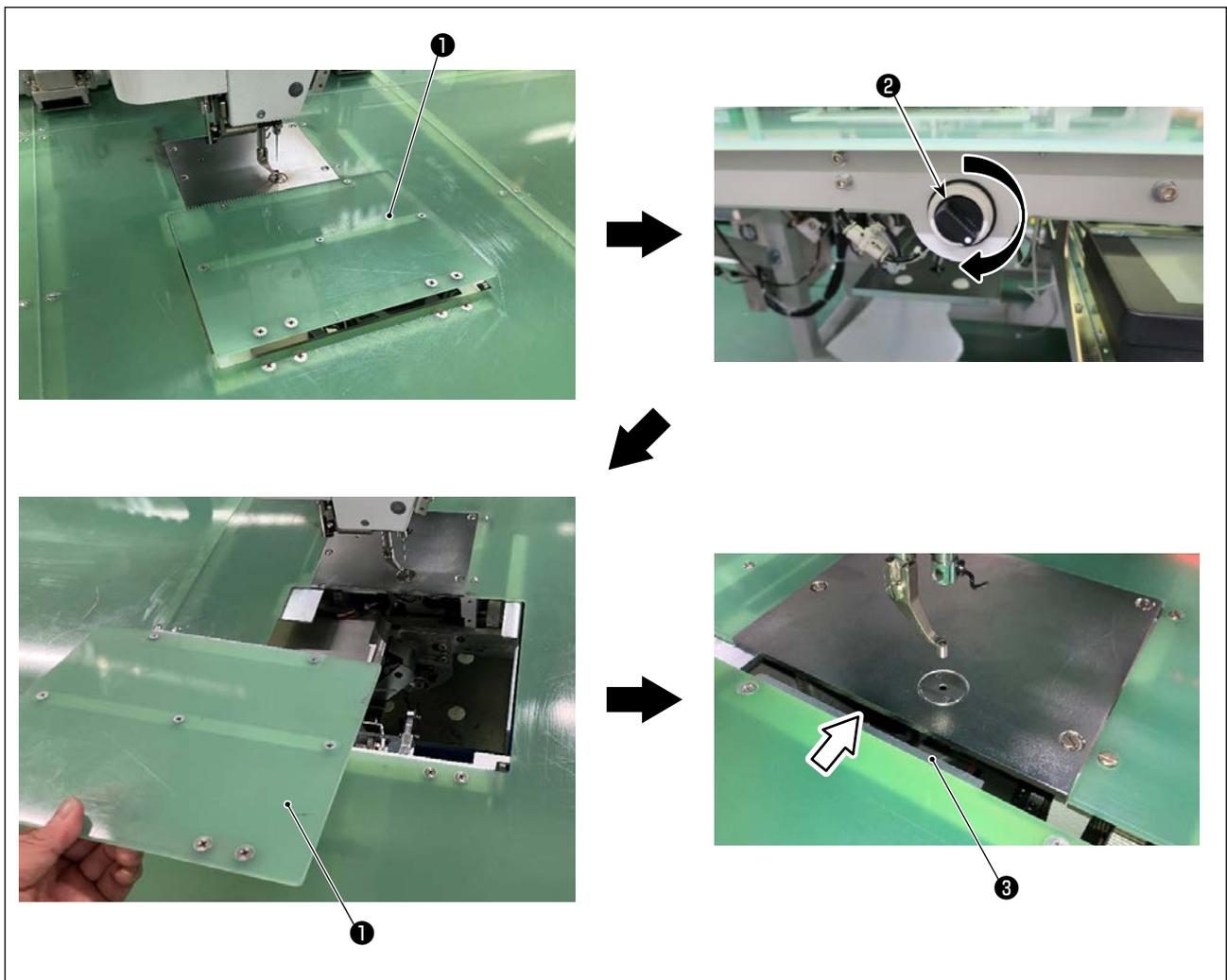


WARNING :
Turn OFF the power before starting the work so as to prevent accidents caused by abrupt start of the sewing machine.

3-1. Opening/closing the cover door

It is necessary to open cover door ❶ on the top of the table to set up a bobbin in the device. When you want to open cover door ❶, twist switch ❷ on the front face of the sewing machine by hand in the direction of the arrow in the figure. Then, the end portion of the cover door goes up from the top of the table. Remove cover door ❶ holding its end portion with your hand.

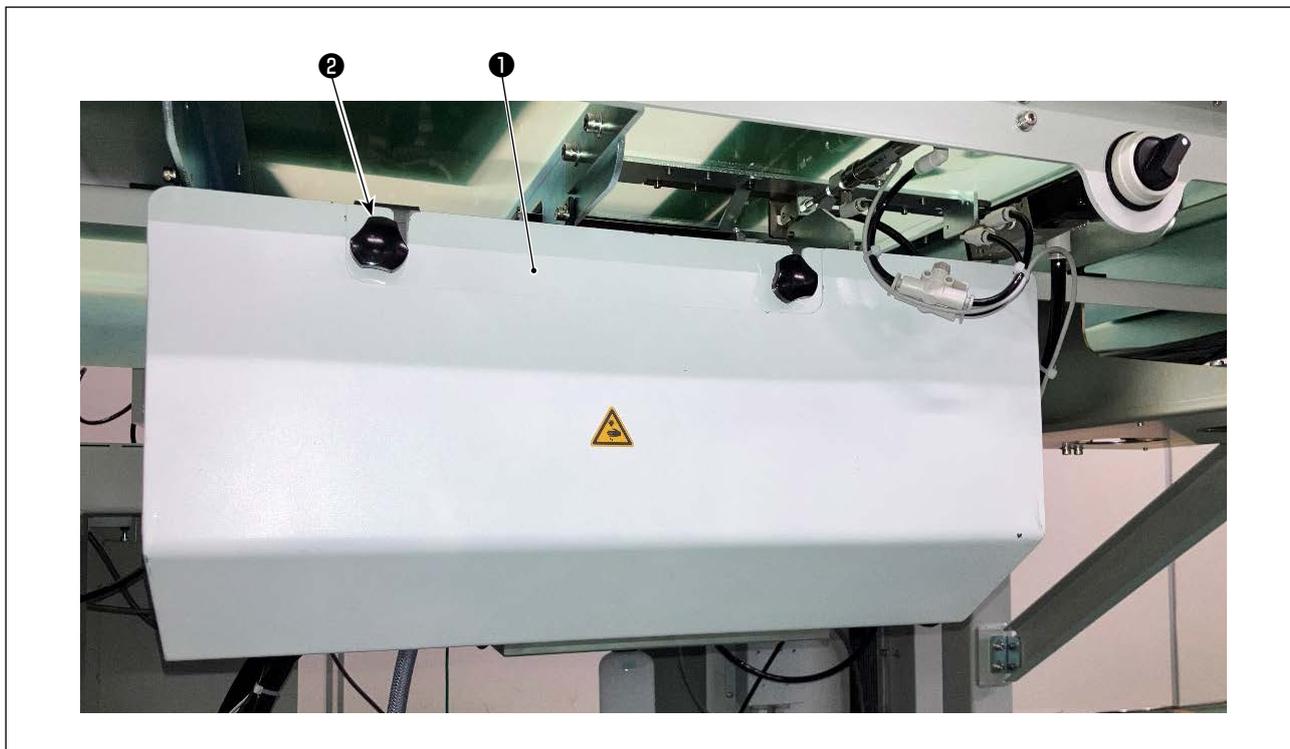
To close cover door ❶, insert protruding portion ❸ of cover door ❶ until it comes in contact with the table opening section and release your hand from it. Cover door ❶ is closed by twisting switch ❷ in the opposite direction of the arrow in the figure.



Be sure to close cover door ❶ for the sake of safety whenever you carry out sewing.
In addition, if cover door ❶ is not closed securely, the sensor will detect that the door is in the opened state to disable starting of sewing.
It should be noted, however, origin retrieval and inching operation are allowed to start. So, be careful.

3-2. Removing the device cover

It is necessary to remove device cover ❶ when passing the bobbin thread or conducting maintenance. Loosen hand-turned knob ❷ as shown in the figure. Then, shift device cover ❶ to the left to remove the device cover ❶ downward.

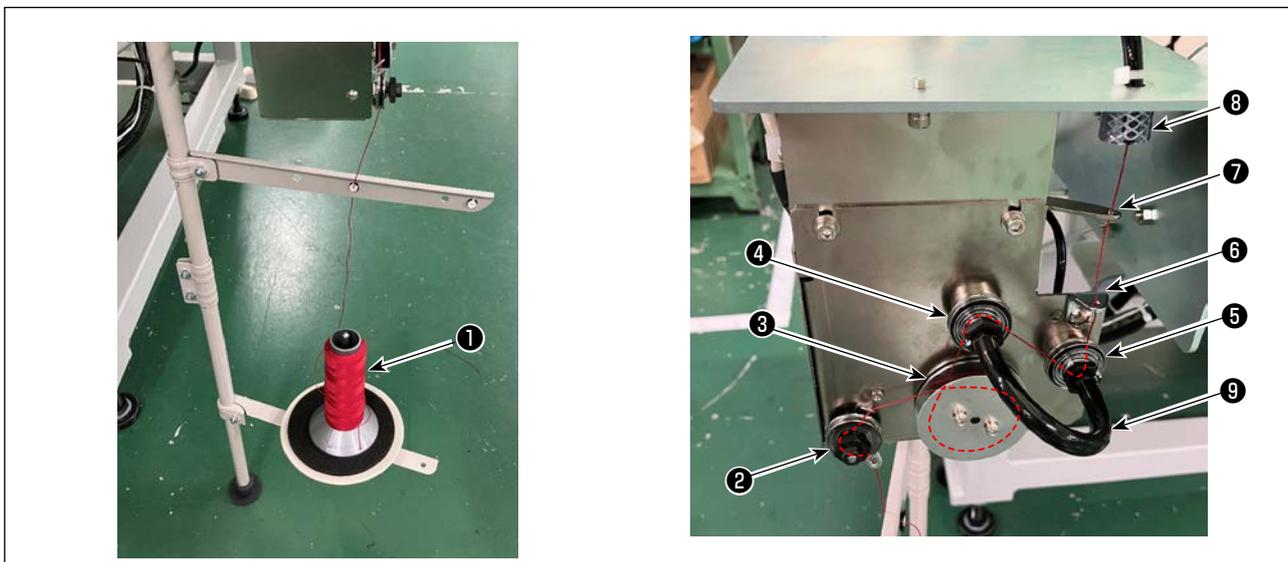


Be sure to close device cover ❶ for the sake of safety whenever you carry out sewing.

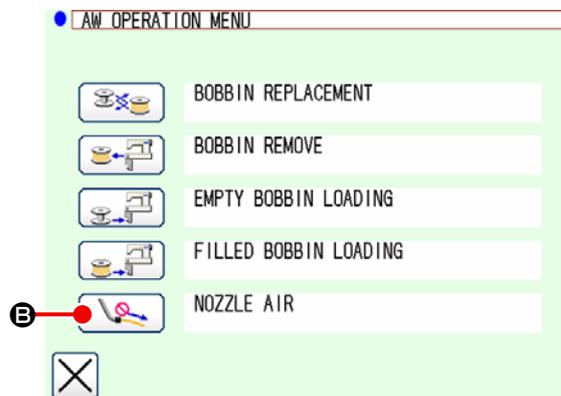
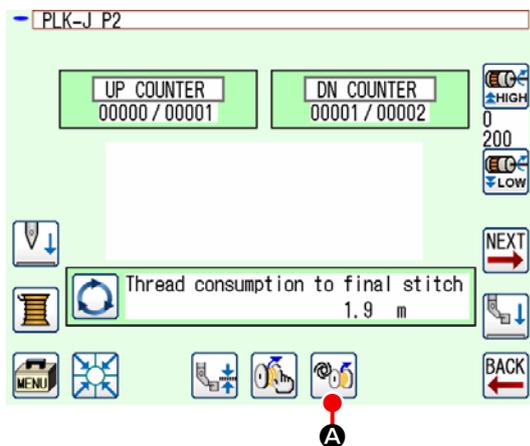
3-3. How to thread the device with the bobbin thread

In order to accurately measure the length of thread from the bobbin thread cone ❶ to be wound on a bobbin, guide the thread from the bobbin thread cone ❶ through the bobbin thread feeding unit and draw the thread out from the nozzle as illustrated in the figure.

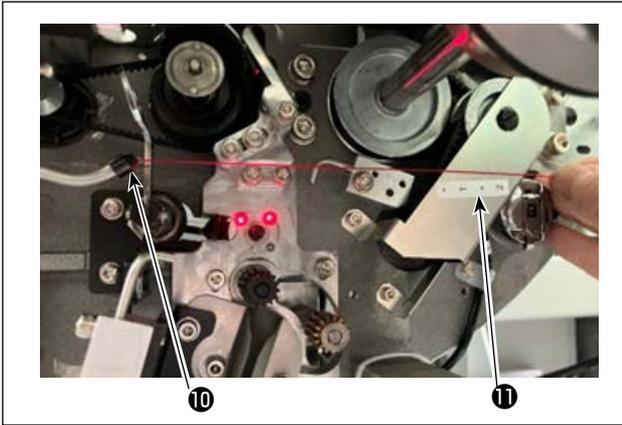
Install the spool holder disk to the lowest possible position. If it is installed at a high position, an excessive tension will be applied to the thread drawn from the bobbin thread cone ❶, causing a trouble.



- 1) Insert the power plug to a receptacle and turn ON the power to the device. Press , Wait until initialization operation of the device is completed. (Approx. 10 seconds)
- 2) Pass the thread drawn from bobbin thread cone ❶ through thread tension controller ❷.
- 3) Wind the thread on thread length measuring roller ❸ by one layer.
- 4) Pass the thread through thread guide ❹ by way of tension controllers ❷ and ❸.
- It should be noted that the tube extending between thread tension controllers ❷ and ❸ is intended to prevent thread from tangling on the shaft of the respective thread tension controllers. Pass the thread through the space inside the curved part of tube ❺.
- 5) Pass the thread through the hole in the tip of thread feed arm ❸.
- 6) Press  A on the standard screen 2. When the AW operation panel is displayed, press  B.



Be aware that the thread feed arm ❸ may operate when  B is pressed.



When the thread is put in thread path tube **8** , it is sucked. Put the thread in the tube, while pulling the thread from the bobbin thread cone, until the length of thread coming out of the tip of nozzle **10** becomes approximately 13 cm. If the thread stops halfway, pull it back slightly several times.

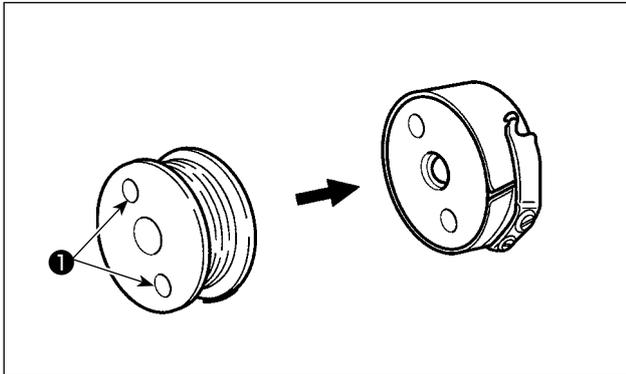
At this time, the bobbin winder nozzle is at its advanced position. In this state, adjust the length of thread while observing the scale on label **11** as a guide.

- 7) Suction is stopped by pressing  **B** again.

3-4. How to set a bobbin

This device uses two bobbin cases each of which is fitted with a bobbin.

(1) How to fit a bobbin in the bobbin case

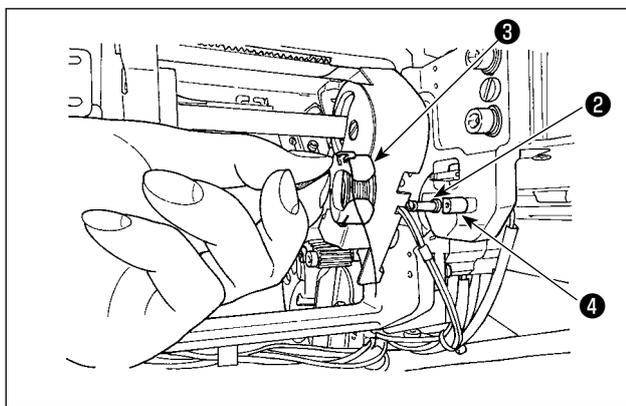


Fit a bobbin in the bobbin case so that clutch holes ① (at two locations) of bobbin are brought to the open side.



Before fitting a bobbin in the bobbin case, wipe the bobbin case to remove oil and dust. In particular, wipe the shaft section of bobbin case to remove oil and dust. In addition, blow out, with an air gun, oil and dust gathering under the bobbin idling prevention spring in the bobbin case.

(2) How to load a bobbin in the device



Load the bobbin case fitted with a bobbin, as described in (1), in bobbin setting section ② of the device.

Open the cover door according to "3-1. Opening/closing the cover door" p.5. Put your hand through the cover door to place a bobbin in the device.

Set the bobbin case in such a way that its opening section ③ aligns with lock member ④.

Place the bobbin case in the device with the claw of bobbin case raised. Push the bobbin case in the device fully until it will go no further.

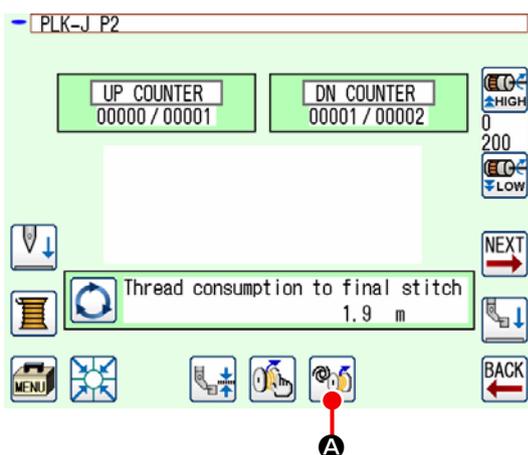


If the bobbin case is not correctly placed in the bobbin setting section ⑤ of the device, an error such that the gripper fails to catch the bobbin case can occur.

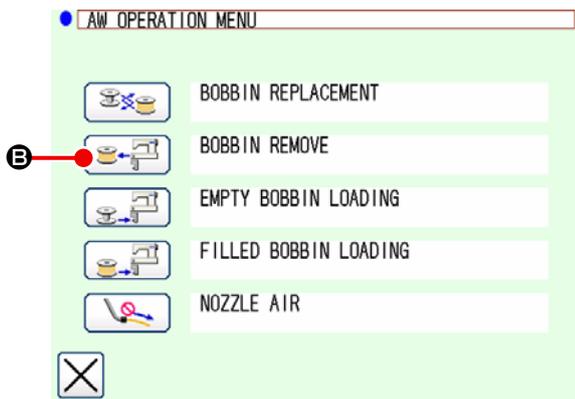
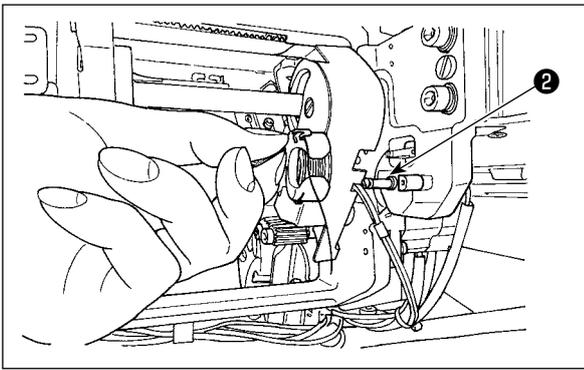
If the bobbin case is not correctly placed in the device, the bobbin case can drop from the device without raising its claw.

After you have set the bobbin case in the device, make sure that the bobbin case has not dropped from the device.

(3) How to remove/set the bobbin from/in the hook section



- 1) Turn the power ON.
- 2) When you press  ① on the standard screen 2, the AW operation screen is displayed.



3) Take out the bobbin from bobbin setting section ② by hand.

4) When you press  ③ icon on the AW operation screen, the bobbin placed in the device (or in the hook) is carried to bobbin setting section ②.

5) Take out the bobbin from bobbin setting section ② by hand.

When you want to take out the bobbin that is placed in the hook, be sure to firstly press  ③ to carry the bobbin from the hook to the bobbin setting section. Then, take out the bobbin from the bobbin setting section. If you directly remove the bobbin from the hook, the sewing machine may run with no bobbin placed in the hook.



6) Place the first bobbin in bobbin setting section ② by hand.

- In the case of an empty bobbin, press  ④.

- Press  ⑤ in the case of a bobbin that has already been wound with thread. The bobbin is carried to the hook.

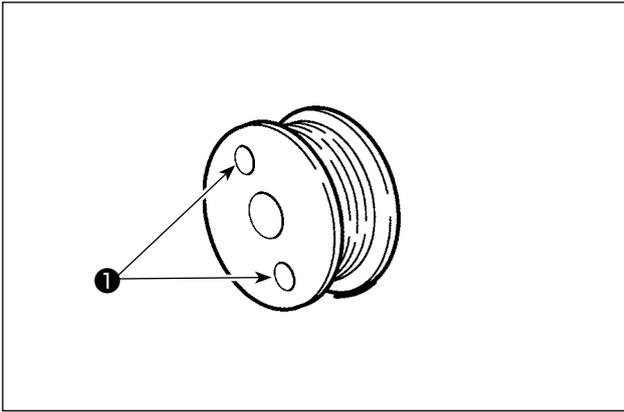
7) Subsequently, place the second bobbin in bobbin setting section ②.

- As with step 6), press  ④ in the case of an empty bobbin.

- Press  ⑤ in the case of a bobbin that has already been wound with thread.

8) Press  ⑥ to return to the standard screen 2. If one of the bobbins placed in the bobbin setting section is an empty bobbin, the device will wind thread on the bobbin. After the device completes winding of the bobbin, it will enter the standby state in preparation for bobbin replacement.

3-5. Length of remaining thread to be removed



During the remaining-thread removal operation, bobbin clutch holes ❶ turn as the bobbin rotates. The device recognizes that the remaining thread is being removed by detecting turning of the bobbin clutch holes ❶.



The maximum length of remaining thread that can be removed is 8 m.

Be aware that a remaining-thread removal error may occur if the bobbin is wound with thread to such an extent that the bobbin clutch holes ❶ are hidden by the thread.

If the remaining thread length exceeds 8 m, change the setting under the program mode. (Refer to "3-8.

[Program mode list •AWRL : Setting of the upper limit of the remaining thread removal amount" p.14.](#))

3-6. Device operation lamp



Lamp ❶ mounted next to the power switch indicates that the device is in operation.

Lamp status	Meaning
Light up (ON state)	Indicates that the device is in operation. While the lamp lights up, the device is engaged in removal of remaining thread from the bobbin or winding of a bobbin. Do not turn the power OFF unless there is an emergency.
Light off (OFF state)	Indicates that the device is in the standby state. Make sure that the lamp has gone out before turning the power OFF.



1. In the case the power is turned OFF while the lamp is in the ON state intentionally or unintentionally due to power failure or the like, it is necessary to remove the cover to check whether or not the device is tangled with thread. (Refer to "3-2. Removing the device cover" p.6.)

2. If the device is tangled with thread, remove the thread and draw out thread from the bobbin winder nozzle by approximately 13 cm. Then, attach the cover back. (Refer to "3-3. How to thread the device with the bobbin thread" p.7.)

3-7. Behavior of the AW-3SD device when the power is turned ON

When  or  is pressed after the power is turned ON, the AW-3SD carries out its initialization operation if it is operated for the first time.



This device operates on the premise that bobbins wound with thread are placed in the hook and bobbin setting section when the power is turned ON. If the power is turned ON in any state other than the above, operate this device to load bobbins. (Refer to "3-9. Basic operation and setting" p.15 for details.)

3-8. Program mode list

Group	Digital	Function name	Setting range	Editing unit	Initial value
Bobbin winding	AWRC	Determination of the bobbin thread remaining amount (0: Manual, 1: Auto)	0 to 1	1	0: Manual
Bobbin winding	AWMV	Manual threshold for the determination of the bobbin thread remaining amount	1 to 9999	1	100
Bobbin winding	AWWL	Setting of the bobbin thread winding length	20 to 2000	1	50: 5.0m
Bobbin winding	AWML	Setting of the remaining thread allowance length	1 to 350	1	350: 3.5m
Bobbin winding	AWCS	Setting of the thread unraveling strength	0 to 5	1	0
Bobbin winding	AWEL	Setting of the bobbin thread end pull-in amount	0 to 100	1	0
Bobbin winding	AWRW	Timing to determine the bobbin thread remaining amount shortage (0: By pattern, 1: By thread trimming)	0 to 1	1	0: By pattern
Bobbin winding	AWTR	Enable/disable of the bobbin thread release at the time of changing the bobbin (0: Disable, 1: Enable)	0 to 1	1	0: Disable
Bobbin winding	AWSM	Setting of the bobbin winding operation mode (0: Normal mode, 1: Power mode)	0 to 1	1	0: Normal mode
Bobbin winding	AWNM	Setting of the nozzle operation mode (0: Normal mode, 1: Power mode)	0 to 1	1	0: Normal mode
Bobbin winding	AWRM	Setting of the remaining thread removal operation mode (0: Normal mode, 1: Power mode)	0 to 1	1	0: Normal mode
Bobbin winding	AWDM	Setting of the threading operation mode (0: Normal mode, 1: Power mode)	0 to 1	1	0: Normal mode
Bobbin winding	AWSA	Setting of the retry of bobbin winding (0: Normal retry, 1: Short retry)	0 to 1	1	0: Normal retry
Bobbin winding	AWRT	Setting of the remaining thread removal error determination time (0: Short, 1: Long)	0 to 1	1	0: Short
Bobbin winding	AWRL	Setting of the upper limit of the remaining thread removal amount (0: Limited (8 m), 1: Not limited)	0 to 1	1	0: Limited (8 m)
Bobbin winding	AWDP	Setting of the stop position at the time of threading (0: Normal, 1: Far side)	0 to 1	1	0: Normal
Bobbin winding	AWES	ON/OFF of disabling of forced stop of the AW device	ON/OFF	-	OFF

- AWRC : Determination of the bobbin thread remaining amount,
AWMV : Manual threshold for the determination of the bobbin thread remaining amount
Refer to **"3-11-1. Bobbin thread remaining amount determination method" p.20.**
- AWWL : Setting of the bobbin thread winding length
Refer to **"3-11-2. Bobbin-thread winding length" p.21.**
- AWML : Setting of the remaining thread allowance length
Refer to **"3-11-3. Remaining thread allowance length" p.22.**
- AWCS : Setting of the thread unraveling strength
Refer to **"3-11-4. Thread unraveling strength" p.22.**
- AWEL : Setting of the bobbin thread end pull-in amount
Refer to **"3-11-5. Setting the bobbin thread end pull-in amount" p.22.**
- AWRW : Timing to determine the bobbin thread remaining amount shortage
The timing to determine whether the remaining amount of bobbin thread is insufficient for the sewing pattern is set.
If the bobbin thread amount is determined to be insufficient, change the bobbin.
0 : By pattern Determination is made at the start or end of sewing.
1 : By thread trimming Determination is made after thread trimming during sewing in addition to the start or end of sewing.
- AWTR : Enable/disable of the bobbin thread release at the time of changing the bobbin
For the large model of the PLK-J, the thread trimming knife holds the bobbin thread. However, if the bobbin thread remains held when changing the bobbin, the bobbin sometimes may not be normally taken out of the hook. To prevent this problem, the thread trimming knife is operated to release the bobbin thread.
- AWSM : Setting of the bobbin winding operation mode
In the case of using thick thread or bond thread that cannot be wound easily, the bobbin winding motor operates more strongly to wind the thread on a bobbin.
Instead of the stronger operation of the motor, the speed is decreased, thereby increases the bobbin winding time.
- AWNM : Setting of the nozzle operation mode
When using thick thread, the nozzle increases its force for remaining at the current position to prevent the nozzle from slipping out of position since it is pulled by the thread during bobbin winding.
- AWRM : Setting of the remaining thread removal operation mode
When removing thick thread or bond thread from a bobbin, the remaining thread removal motor operates more strongly to remove the thread from the bobbin.
Instead of the stronger operation of the motor, the speed is decreased, thereby increases the remaining thread removal time.
- AWDM : Setting of the threading operation mode
When conducting threading after winding a bobbin, the bobbin carrier arm increases its force for remaining at the current position to prevent the bobbin from slipping out of position since it is pulled by the thread.
- AWSA : Setting of the retry of bobbin winding
If the thread fails to be wound on a bobbin during bobbin winding, the thread is unraveled again and wound on a bobbin. If unraveling of the thread is not necessary, this operation can be skipped.
0 : Normal retry Thread is unraveled every time it is wound on a bobbin.
1 : Short retry Thread is not unraveled at retry of bobbin winding.
- AWRT : Setting of the remaining thread removal error determination time
If the remaining amount of thread is large, an error may occur at the start of removal of the remaining thread. In such a case, set this item to "1: Long".

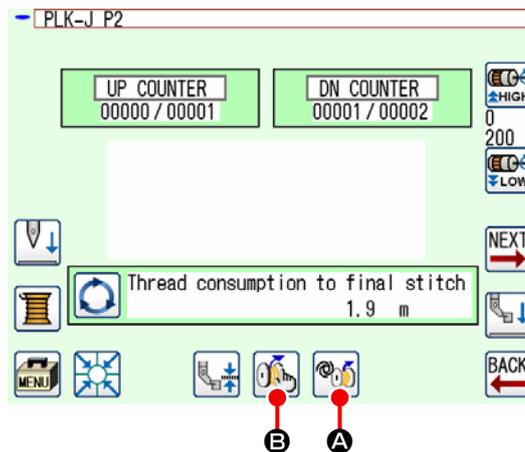
- **AWRL** : Setting of the upper limit of the remaining thread removal amount
If the remaining thread length exceeds 8 m, set this item to "1: Not limited".
- **AWDP** : Setting of the stop position at the time of threading
When conducting threading after winding a bobbin, the thread sometimes slips out of the tension spring.
In such a case, set this item to "1: Far side".
- **AWES** : ON/OFF of disabling of forced stop of the AW device
 OFF : The AW device stops in conjunction with a midpoint stop/error of the sewing machine. After the device has stopped, turn the power OFF. If the device stops during removal of the remaining thread or during winding of a bobbin, the thread may remain on the bobbin. In such a case, remove the thread from the bobbin.
 After turning the power ON, adjust the length of thread coming out of the nozzle following the steps 6) to 7) in **"3-3. How to thread the device with the bobbin thread" p.7**.
 ON : The AW device does not stop in conjunction with a midpoint stop/error of the sewing machine.

3-9. Basic operation and setting

The PLK-J is provided with the independent operation function for carrying out setup of the AW-3SD and the setting function related to the automatic bobbin changing.

Open the AW operation screen when carrying out the independent operation, or the AW thread information setting screen when carrying out setting.

*** Both the AW operation screen and the AW thread information setting screen can be opened from the standard screen 2.**

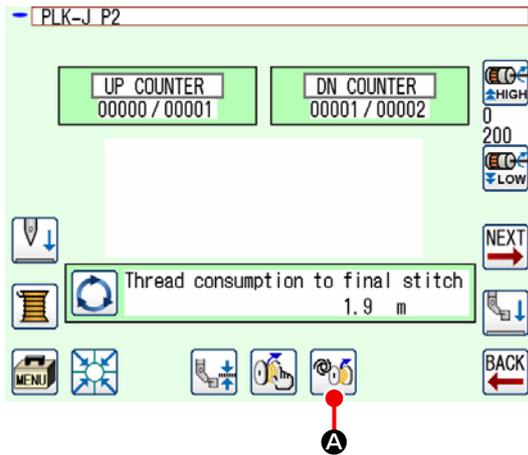


	Icons and display	Description
A		The AW operation screen is opened up. On the AW operation screen, setup of the AW such as loading/changing of bobbins can be carried out.
B		The AW thread information setting screen is opened. On the AW thread information setting screen, setting of data related to the automatic bobbin changing such as the bobbin thread winding quantity can be carried out.



While the AW-3SD is in operation and while the sewing machine is running (engaged in sewing), there will be no response if you press AW operation icon  **A. (Icon operation is disabled)**

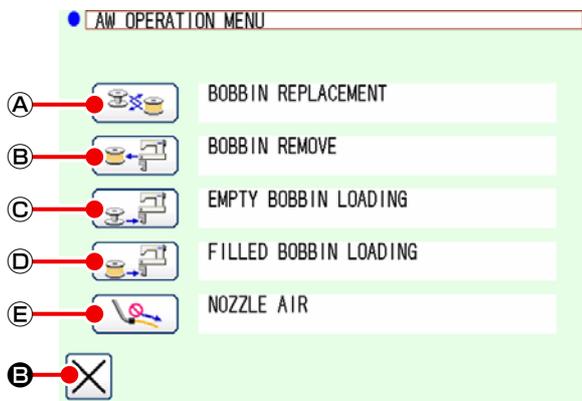
3-10. Operating the AW



When you press  **A** on the standard screen 2, the AW operation screen is displayed.

At this time, the bobbin check screen is displayed when no bobbin is loaded in the device, or the error screen is displayed when an AW error has occurred. On these screens, the error will be reset by completing loading of a bobbin.

The AW operation screen is displayed after resetting the error.



On the AW operation screen, the independent operation of the AW can be carried out respectively by pressing the below-stated icons.

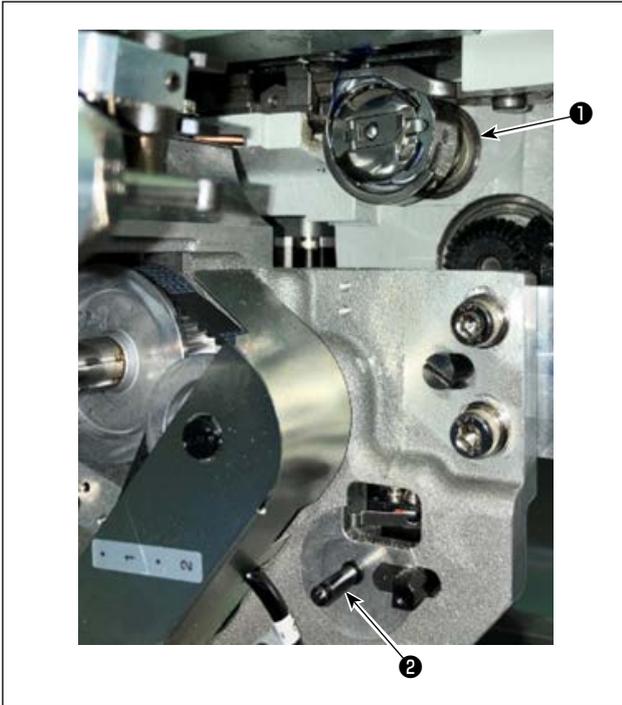
Press  **B** to close the screen.

- A** : Bobbin change icon
- B** : Bobbin take-out icon
- C** : Empty bobbin loading icon
- D** : Threaded bobbin loading icon
- E** : Nozzle air icon

Detailed explanation will be given from the next page.



Be aware that an error can be caused if the bobbin in hook ❶ is directly changed, etc. by hand without operating the AW operation screen after turning the power ON.



Ⓐ : Bobbin change icon

This button is used for winding a bobbin with new thread in the case of changing the thread, etc. When you press  Ⓐ, the bobbin placed in hook ❶ is changed with the bobbin in bobbin setting section ❷. Then, the thread remaining on the bobbin in hook ❶ is removed and new thread is wound on the empty bobbin.

Ⓑ : Bobbin take-out icon

This button is used for taking out the bobbin loaded in hook ❶. Take out the bobbin placed in bobbin setting section ❷ by hand before pressing  Ⓑ.

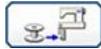
When you press  Ⓑ, the bobbin placed in hook ❶ is moved to bobbin setting section ❷.

Ⓒ : Empty bobbin loading icon

This button is used for loading an empty bobbin in the hook ❶.



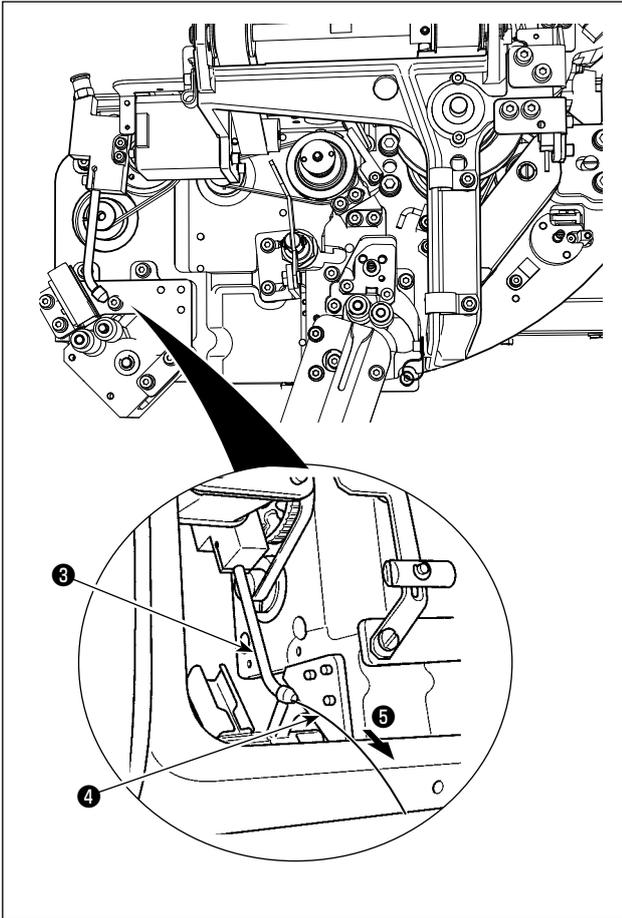
Be sure to check that the bobbin to be loaded in the hook ❶ is empty before pressing



Ⓒ. If a threaded bobbin is loaded in the hook ❶, a malfunction can occur when winding the bobbin or removing the thread remaining on the bobbin.

Place an empty bobbin in bobbin setting section ❷. Then, press  Ⓒ.

- If no bobbin is present in hook ❶, the empty bobbin placed as described above will be brought to hook ❶. Then, the device waits until the display is restored to the previous one and the next bobbin is placed. The device starts winding a bobbin when  Ⓒ or  Ⓓ is pressed after placing the next bobbin in the hook ❶.
- If a bobbin is already present in hook ❶, the device will start winding of the bobbin.



ⓓ : Threaded bobbin loading icon

This button is used for loading a threaded bobbin in the hook ❶.

Be sure to check the bobbin to be loaded in the hook ❶ is wound with thread before pressing  ⓓ . If an empty bobbin is loaded in the hook ❶ , a malfunction can occur during sewing.

Place a threaded bobbin in bobbin setting section ❷.

Then, press  ⓓ .

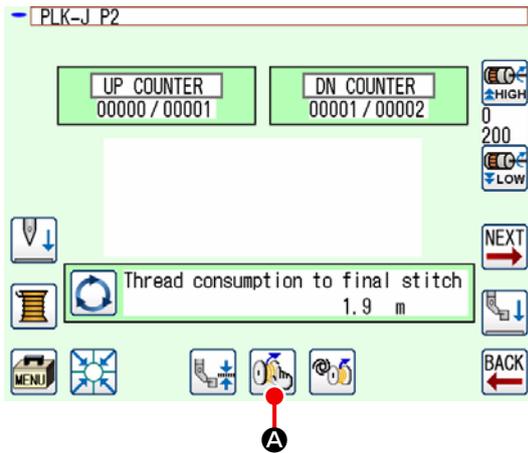
- If no bobbin is present in hook ❶ , the threaded bobbin placed as described above will be brought to hook ❶ . Then, the device waits until next bobbin is placed at the bobbin case stand-by position.
- If a threaded bobbin is present in hook ❶ , the device will stand ready as it is.

ⓔ : Nozzle air icon

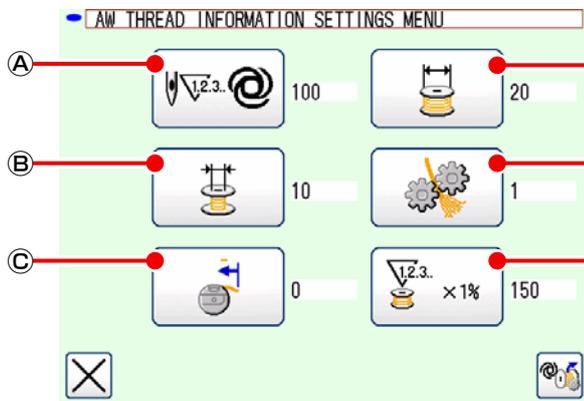
This button is used for operating nozzle air ❺ to feed thread ❹ from nozzle ❸ . Every time  ⓔ is pressed, nozzle air ❺ status will be changed over between "ON" and "OFF".

Caution Be aware that the thread feed arm may operate when  ⓔ is pressed.

3-11. Setting the AW number-of-stitches input mode, AW operation mode and remaining-thread allowance length



When you press  **A** on the standard screen 2, the AW thread information setting screen is displayed.



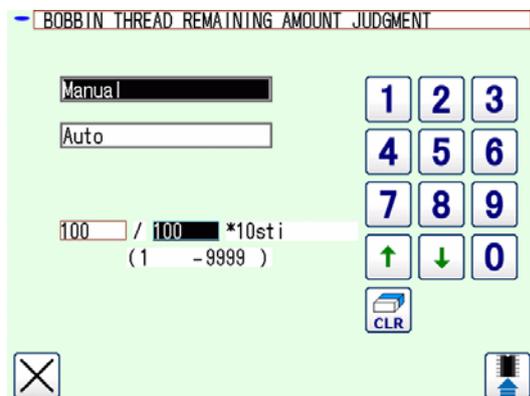
On the AW thread information setting screen, the independent operation of the AW can be carried out respectively by pressing the below-stated icons.

- A** : Bobbin thread remaining amount determination method setting icon
- B** : Remaining thread allowance length selection icon
- C** : Bobbin thread end pull-in amount setting icon
- D** : Bobbin thread winding length setting icon
- E** : Thread unraveling strength setting icon
- F** : Thread consumption allowance rate setting icon

3-11-1. Bobbin thread remaining amount determination method

When you press  (A), the bobbin thread remaining amount determination method setting screen is displayed.

On this screen, the method of determining the bobbin thread remaining amount can be set to the Manual or Auto.



(1) Manual

The number of stitches to be sewn before changing a bobbin can be set to 10 to 99990 stitches in increments of 10 stitches.

(2) Auto

Bobbin is changed when the sewing machine has completed sewing of the number of stitches that is automatically set from the average pitch, bobbin thread winding length, remaining thread allowance length and thread consumption allowance rate of the pattern.

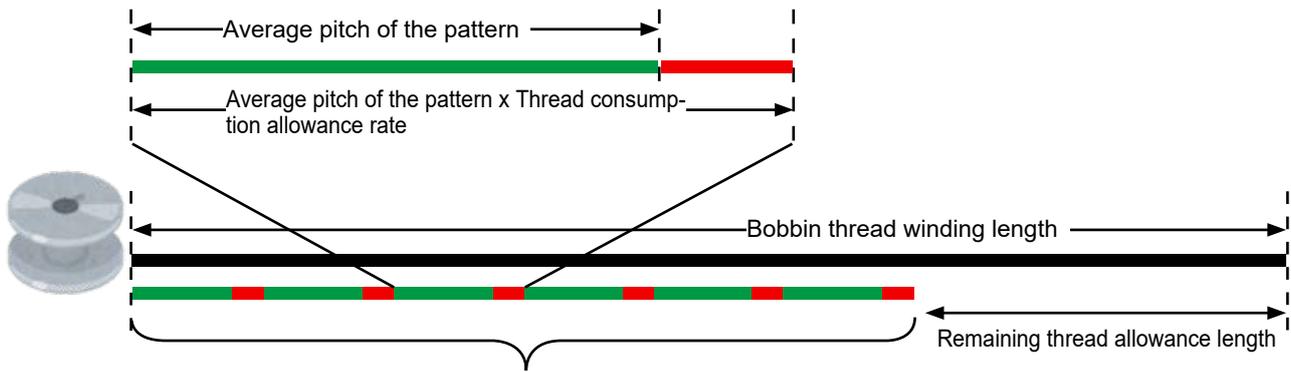
The updated number of stitches becomes the initial value by carrying out one of the below-stated operations.

- In the case the bobbin change is carried out on the AW operation screen
- In the case the bobbin is taken out on the AW operation screen
- In the case of changing the bobbin thread winding length on the AW thread information setting screen.
- In the case of changing over the bobbin thread remaining amount determination method

1. If you have changed this setting, carry out bobbin changing once on the AW operation screen.
2. If the remaining-thread allowance length setting does not match the sewing conditions, the bobbin thread may run out during sewing.
3. If the remaining-thread allowance length is set to a small value, the bobbin thread may run out due to changes in bobbin-thread consumption.
It is therefore necessary to check the actual remaining-thread length before changing the set value.
4. If the remaining-thread allowance length is 3.5 m, some waiting time can occur according to the swing conditions such as the thread count, bobbin-thread winding length and sewing pattern. In such a case, check the actual remaining thread length and re-set it.
5. If the bobbin thread tension of two bobbins differs, the remaining-thread length will also differ. It is necessary, therefore, to adjust so that the bobbin thread tensions of two bobbins are equal.
6. Automatic update of the preset number of stitches is carried out from the fourth automatic change of bobbin.



In the case of the Auto, settings of the respective data items are as shown in the table given below.



$$\text{Number of stitches to be sewn before changing a bobbin} = (\text{Bobbin thread winding length} - \text{Remaining thread allowance length}) \div (\text{Average pitch of the pattern} \times \text{Thread consumption allowance rate})$$

(3) Automatic bobbin changing to prevent the shortage of the bobbin thread remaining amount

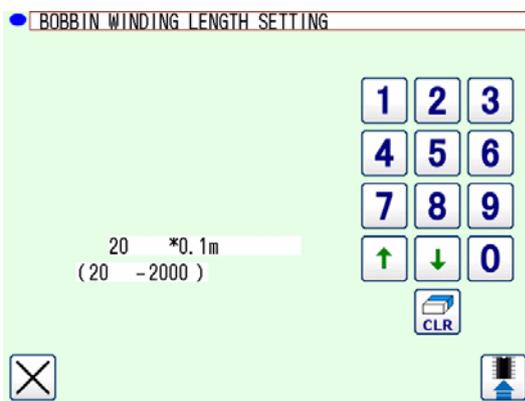
In the case the thread consumption is larger than the bobbin thread remaining amount, the bobbin is changed automatically at the start of sewing.

The subject of the thread consumption varies depending on the set value of the "AWRW: Timing to determine the bobbin thread remaining amount shortage".

By pattern : Thread consumption for sewing the pattern until its end

By thread trimming : Thread consumption for sewing until the next thread trimming

3-11-2. Bobbin-thread winding length



When   is pressed, the bobbin-thread winding length setting screen is displayed.

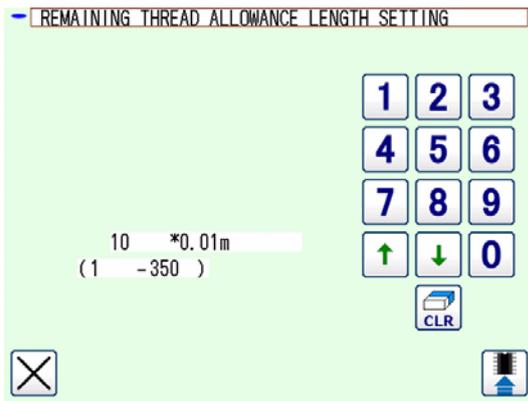
The bobbin thread winding length can be set to 2 to 200 m in increments of 0.1 m.

Caution
Set the bobbin-thread winding length so that thread wound on a bobbin do not protrude the bobbin case.

Refer to the table shown below for a guide for the bobbin-thread winding length.

Name	Yarn count	Bobbin thread winding quantity	Example of major use
polyester 100%	#8	26 m at the maximum	Car seats
polyester 100%	#5	15 m at the maximum	Car seats
Nylon bond 66	60dtex	17 m at the maximum	Airbags
Nylon bond 66NB	#5	15 m at the maximum	Airbags

3-11-3. Remaining thread allowance length

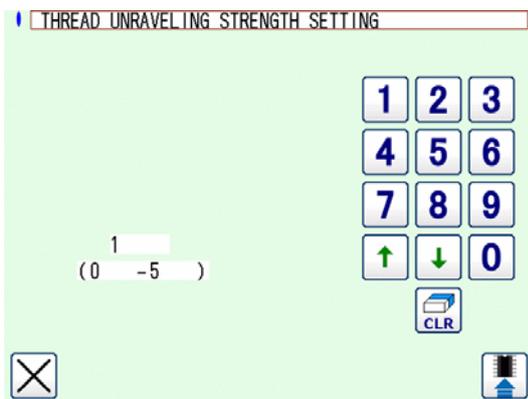


When you press  (E), the remaining thread allowance length setting screen is displayed.

The remaining thread allowance length can be set to 0 (zero) to 3.5 m in increments of 0.01 m.

The remaining thread allowance length is used in the case the bobbin thread remaining length determination method is set to the Auto.

3-11-4. Thread unraveling strength



When you press  (E), the thread unraveling strength setting screen is displayed.

The thread unraveling strength can be set in five levels, 1 to 5.

If "0" is entered for the thread unraveling strength, thread unraveling will not be carried out.

In the case the thread is stiffened with resin such as the bond thread (coating thread), it is not possible to wind the thread on a bobbin.

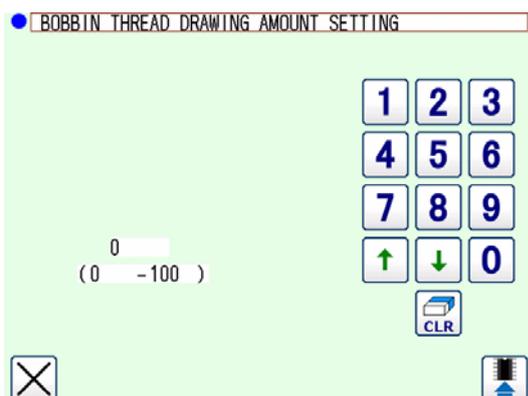
In such a case, enable the thread loosener to allow it to loosen the thread end.

The thread loosener operates to loosen the thread end. Its reference set value is "1". The larger the set value becomes, the more times the thread loosener operates in repetition according to the set value.



1. Thread loosening operation takes time. It is recommended to minimize the set value as long as the thread can be wound on a bobbin. The larger the set value becomes, the longer time is required for bobbin winding. In such a case, sewing cannot be started until the bobbin replacement is completed.
2. Do not enable the thread loosener when using any thread other than the bond thread (coating thread). If the thread loosener is enabled when using any other thread, the thread will be fluffed and will be caught in the bobbin. In such a case, the thread remaining in the bobbin cannot be completely removed.

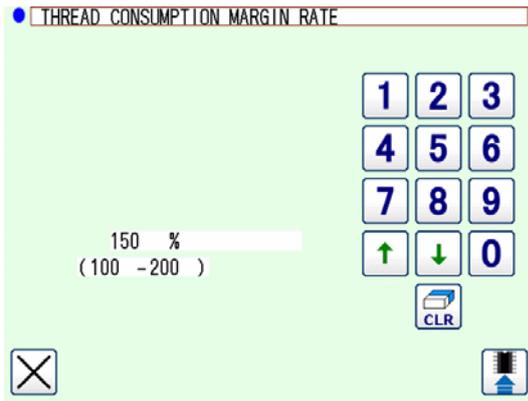
3-11-5. Setting the bobbin thread end pull-in amount



When you press  (C), the bobbin thread end pull-in amount setting screen is displayed.

On the bobbin thread end pull-in amount setting screen, the amount of the end of bobbin thread to be pulled into a bobbin can be set to 0 (zero) to 100. If it is set to 0 (zero), pulling in of the bobbin thread end is not performed. The thread end length becomes the length as trimmed by this device.

3-11-6. Thread consumption allowance rate

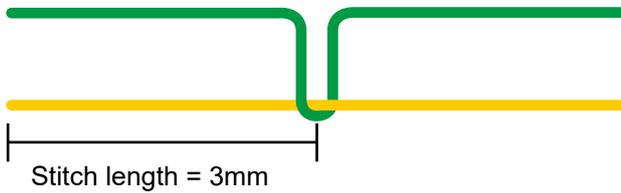


When you press  $\times 1\%$ (F), the thread consumption allowance rate setting screen is displayed.

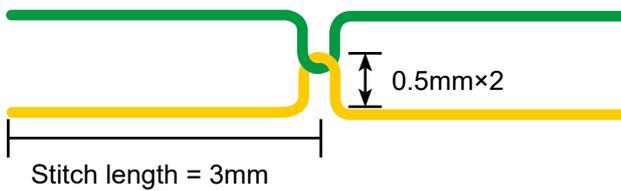
The thread consumption allowance rate can be set to 100 to 200%.

The thread consumption allowance rate is used in the case the bobbin thread remaining length determination method is set to the Auto.

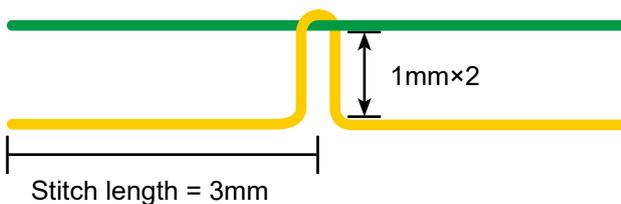
Concept of the thread consumption allowance rate (Example: In the case thickness of the sewing product is 1 mm)



Case 1) Needle thread tension \ll Bobbin thread tension
Since the actual thread consumption is 3 mm for the stitch length of 3 mm, the thread consumption allowance rate is: $3 \div 3 = 1 \Rightarrow 100\%$.



Case 2) Needle thread tension = Bobbin thread tension
Since the actual thread consumption is 4 mm for the stitch length of 3 mm, the thread consumption allowance rate is: $4 \div 3 = 1.33 \Rightarrow 133\%$



Case 3) Needle thread tension \gg Bobbin thread tension
Since the actual thread consumption is 5 mm for the stitch length of 3 mm, the thread consumption allowance rate is: $5 \div 3 = 1.66 \Rightarrow 166\%$

 Needle thread
 Bobbin thread

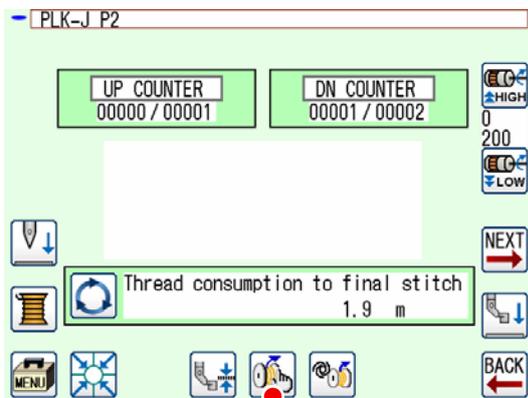


Actual thread consumption varies depending on thickness or hardness of the sewing product and the ratio between the needle thread tension and bobbin thread tension.

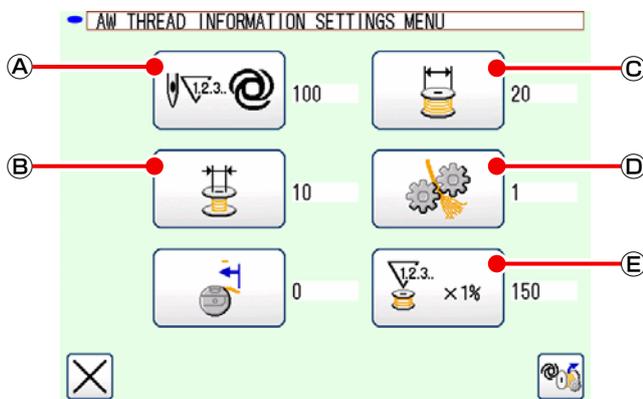
3-12. Example of operation

This clause gives an example of how to actually operate the device.

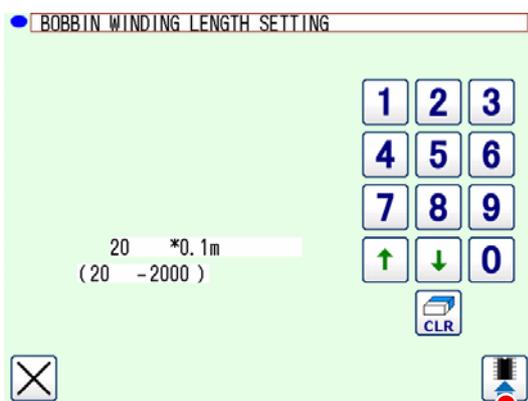
(1) In the case both of the two bobbins have been taken out of the device or both of the two bobbins are empty



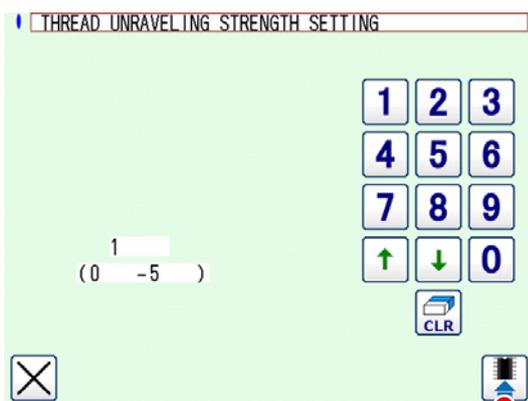
- 1) Turn the power to the device.
Press (A) on the standard screen 2.



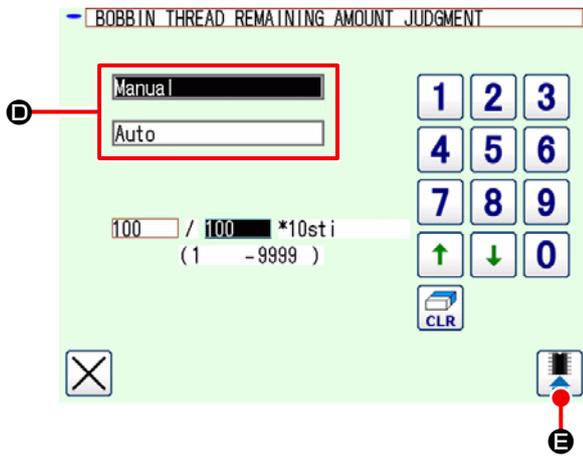
- 2) Set the bobbin-thread winding length to be wound on a bobbin.
Press (C) on the AW thread information setting screen.
Set the bobbin thread winding length using the up/down arrow icon and number icons.
After the entry of bobbin-thread winding length, press (B).



- 3) Setting the thread unraveling conditions
Press (D) on the AW thread information setting screen.
(0: Without thread unraveling function)
(1: Min. to 5: Max.)



Then, set the thread unraveling condition using the up/down arrow icon and number icons.
After the entry of bobbin-thread winding length, press (E).



- 4) Set the method to determine the bobbin thread remaining amount.

Press  (A) on the AW thread information setting screen.

Select either Manual or Auto (D).

In the case of the Manual, set the number of stitches using the up/down arrow icon and number icons.

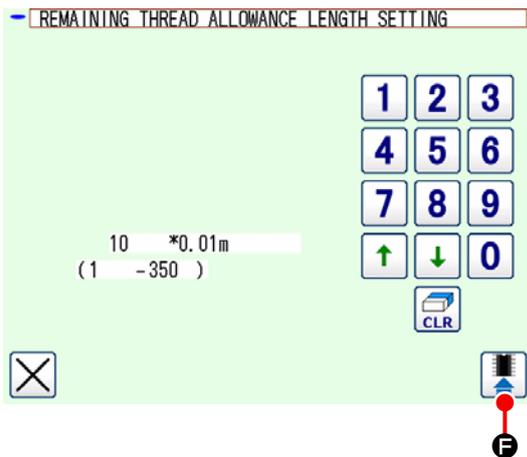
After the entry of bobbin-thread winding length, press  (E).

In the case of the Auto, set the remaining thread allowance length and thread consumption allowance rate.

Press  (B) on the AW thread information setting screen.

Set the remaining thread allowance length using the up/down arrow icon and number icons.

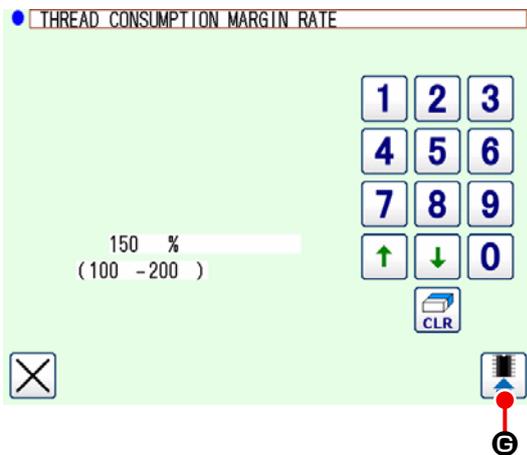
After the entry of bobbin-thread winding length, press  (F).



Press  (C) on the AW thread information setting screen.

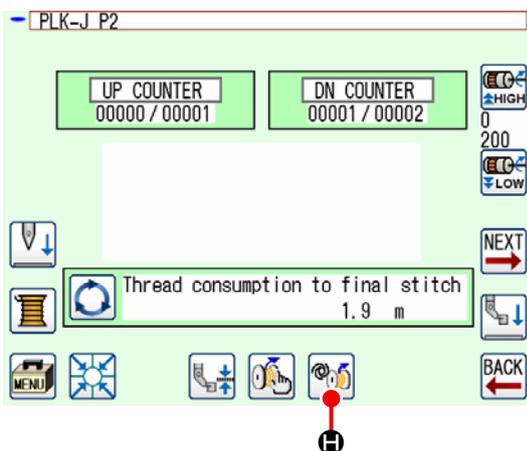
Set the thread consumption allowance rate using the up/down arrow icon and number icons.

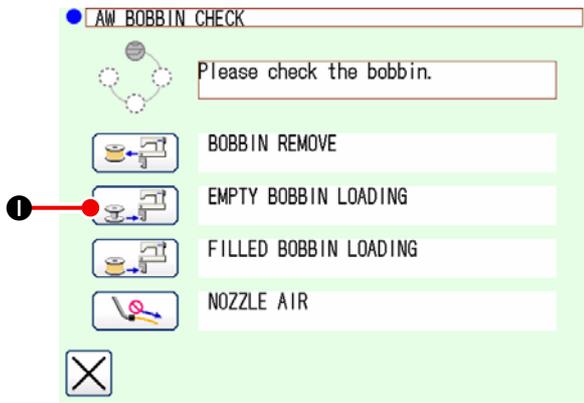
After the entry of bobbin-thread winding length, press  (G).



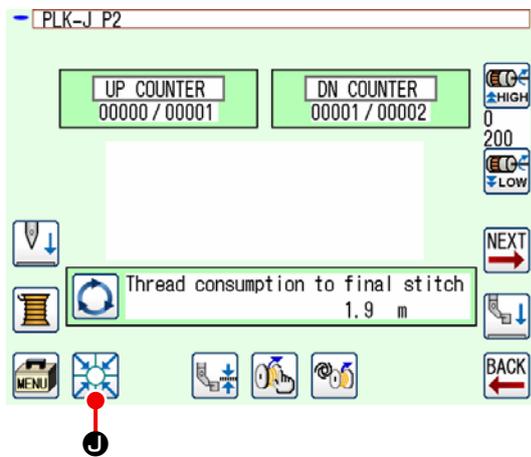
Press  on the AW thread information setting screen to return to the standard screen 2.

- 5) Press  (H). Wait until the initialization operation of the device completes.



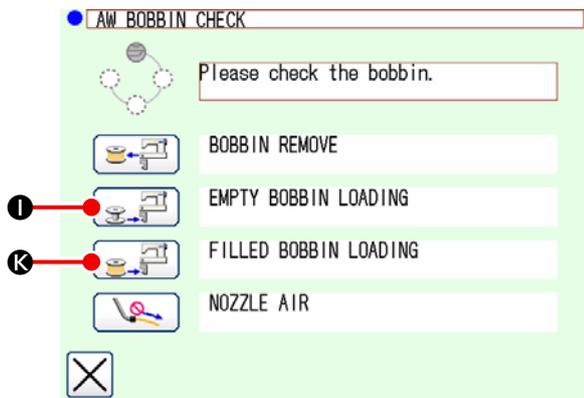
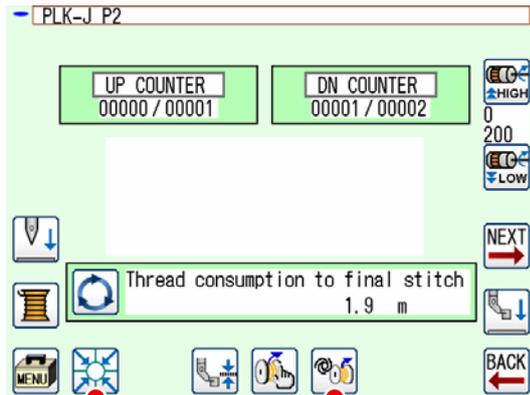


- 6) Place the first bobbin in the bobbin setting section. Then, press  1. The bobbin is taken in the device. (Refer to "3-4. How to set a bobbin" p.9 for the bobbin setting procedure.)
- 7) Subsequently, place the second bobbin in the bobbin setting section.
- 8) Press  1 in the similar manner.
- 9) Now, the device starts winding bobbin. Wait a moment until the device completes winding of bobbin.



- 10) Press  to return to the standard screen 2. Press  1 to complete the origin retrieval operation. Then, you can start sewing.

(2) In the case both of the two bobbins have been taken out of the device or one (or both) of the two bobbins is wound with thread



In this case, the steps of procedure to be taken up to step 5) are same with those in the case of (1). From step 6), take the following steps of procedure.

- 6) Place the first bobbin in the bobbin setting section. (Refer to **"3-4. How to set a bobbin" p.9** for the bobbin setting procedure.)

In the case the bobbin placed is:

- empty bobbin, press  **H** , then press  **I** .
- already wound with thread, press  **H** , then press  **K** .

The bobbin is placed in the hook.

- 7) Subsequently, place the second bobbin in the bobbin setting section.
- 8) As with step 6), in the case the bobbin placed in the bobbin setting section is:

- Press  **I** in the case of an empty bobbin.
- Press  **K** in the case of a bobbin that has already been wound with thread.

The bobbin is placed in the hook.

If one of the bobbins is empty, the device winds thread on the bobbin. After the device completes winding of the bobbin, it enters the standby state waiting for the moment to change the bobbin.

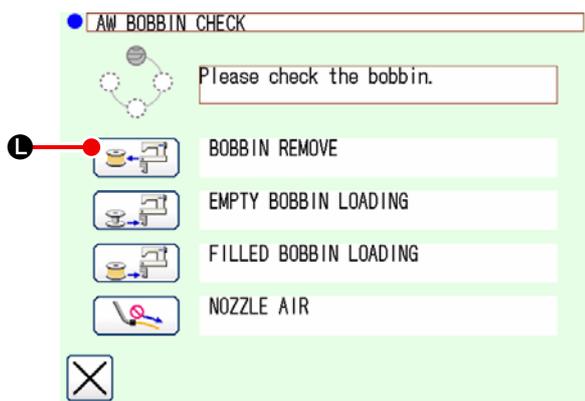
- 9) Press  to return to the standard screen 2. Press  **I** to display the sewing screen. Once the sewing screen is displayed, sewing can be started.



Special care should be taken when using a bobbin that has been already wound with thread, since the preset number of stitches may not be sewn in its entirety (i.e, bobbin thread may run out during sewing) if the quantity of thread wound on the bobbin is not sufficient.

It is recommended to avoid the use of bobbin which has been used halfway or the bobbin wound with unknown quantity of thread (or to use such a bobbin after removing the thread wound on it by hand until it becomes empty) in order to totally prevent the aforementioned problem. If it is necessary to use the bobbin which has been used halfway, it is necessary to set the number of stitches to a smaller value. The quantity of thread to be removed from a bobbin is large initially, but it will become more and more adequate if the "auto" is selected.

(3) In other case

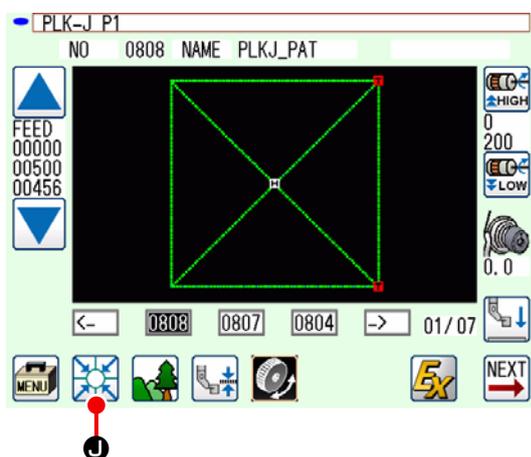


(In the case one or two bobbins are loaded in the device (including the hook) other than the case (2).)

- 1) Turn the power to the device.
- 2) If a bobbin is loaded in the bobbin setting section, take it out.
- 3) If any other bobbin still remains in the device (or in the hook), press  **L** to make the bobbin setting section to feed the bobbin to a position at which the bobbin can be taken out.

Then, carry out the operation procedure (1) or (2).

(4) In the case the device remains in the finished state of previous sewing

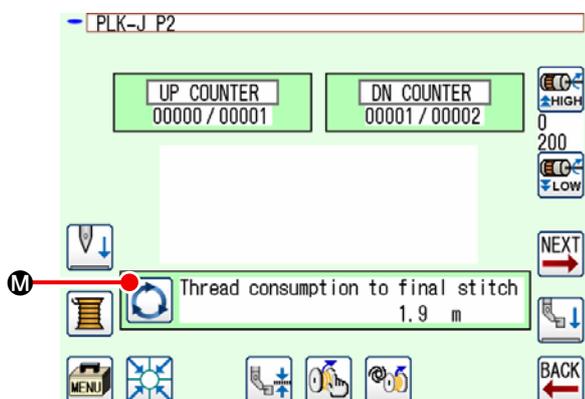


(In the case the previous sewing has been normally finished, and one bobbin is placed in the hook and the other bobbin is placed in the bobbin setting section.)

- 1) Turn the power to the device.
- 2) Press  **J** to display the sewing screen. Once the sewing screen is displayed, sewing can be started.

In other words, the operation required in the aforementioned state is only to turn ON the power to the device. Note that the number of stitches is set at the value that is effective at the end of previous sewing. So, sewing can be started continuously from the previous sewing.

(5) Confirming the thread information



Every time you press  **M** on the standard screen 2, the content of display of the bobbin thread information will be changed over.

The display items differ depending on the setting of the bobbin thread remaining amount determination.

- In the case of the Manual, "Thread consumption of the current pattern (m)" to "Remainder (x 10 stitches) until the bobbin changing"
- In the case of the Auto, "Bobbin thread remaining amount (%)" to "Bobbin thread remaining amount (m)" to "Thread consumption for the current pattern (m)" to "Remainder (cycles) until the bobbin changing" to "Remainder (x10 stitches) until the bobbin changing"

3-13. Turning OFF of the power

Do not turn OFF the power to the device in the following cases unless there is an emergency.



Device movement:

- ① While the device is engaged in the removal of thread remaining on the bobbin
- ② While the device is engaged in bobbin winding, threading or thread trimming

If the power is turned OFF while the device is performing one of the aforementioned procedures, the bobbin case will move while the thread is still engaged with the bobbin, causing troubles such that the mechanism is entangled with thread.

In the case of aforementioned ① or ②, device operation lamp ① is on. Do not turn OFF the power to the device while device operation lamp ① is lighted.

3-14. Error display and error handling procedure

If any of the following errors occurs while the device is in operation, the relevant error is displayed on the operation panel. Handle the errors according to the table shown below. Errors which are not included in the table below must be handled after turning OFF the power to the device once.

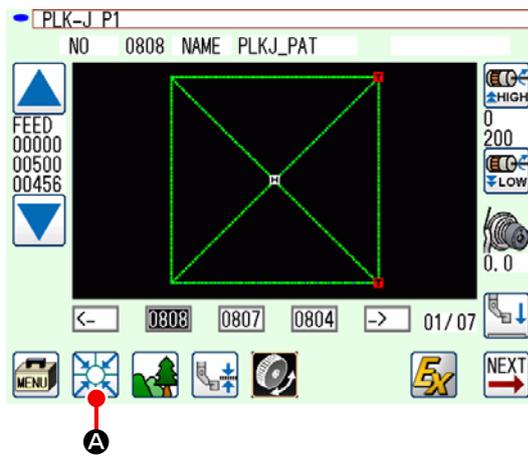
Refer also to ["5. TROUBLESHOOTING" p.39](#).

Error code	Description	Error handling procedure
Remaining thread removal error	Thread remaining on the used-up bobbin cannot be removed after changing the bobbin.	<ol style="list-style-type: none"> ① Take out the relevant bobbin from the bobbin setting section. If any thread remaining on the bobbin, remove it by hand. ② Load the bobbin again in the bobbin setting section. Press  displayed on the error screen. The device takes the bobbin in it and starts winding the bobbin. ③ When the bobbin winding is completed, the error screen is closed.

Error code	Description	Error handling procedure
Thread twining fault	When winding a bobbin, the device has failed to tangle the thread in the hook.	<ol style="list-style-type: none"> ① Take out the relevant bobbin from the bobbin setting section. If any thread remaining on the bobbin, remove it by hand. ② Check to be sure that the thread appears properly from the nozzle. ③ Load the bobbin again in the bobbin setting section. Press  displayed on the error screen. The device takes the bobbin in it and starts winding the bobbin. ④ When the bobbin winding is completed, the error screen is closed.
Bobbin winding fault	A fault has occurred during bobbin winding.	<ol style="list-style-type: none"> ① Take out the relevant bobbin from the bobbin setting section. If the thread is engaged with the bobbin, cut off the thread. If any thread remaining on the bobbin, remove it by hand. ② Check to be sure that the thread appears properly from the nozzle. ③ Load the bobbin again in the bobbin setting section. Press  displayed on the error screen. The device takes the bobbin in it and starts winding the bobbin. ④ When the bobbin winding is completed, the error screen is closed.

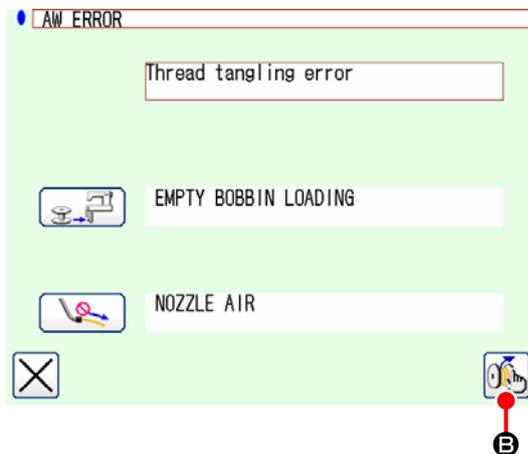
3-15. Detection of errors related to the AW

3-15-1. Error detection under the normal conditions



If you press  **A** on the standard screen or try to use the AW function in the state where no bobbin is loaded in this device (the state where two bobbins are not loaded), the AW error screen will be displayed.

The bobbin check screen will be displayed if no bobbin is loaded in this device. On the bobbin check screen, the error will be reset by conducting the bobbin loading operation to load two bobbins in the device. The screen will return to the previous screen after the error is reset.



The following switches can be operated on the bobbin check screen. Refer to **"3-10. Operating the AW" p.16** for detailed functions.

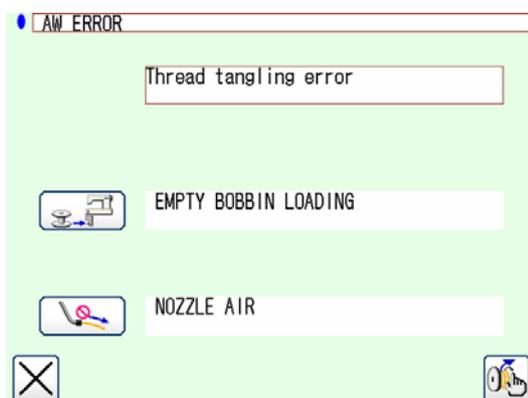
The icon displayed differs depending on the bobbin status.

The AW error screen is displayed when the remaining thread removal error, thread twining fault or bobbin winding fault is detected.

On this screen, the error will be reset by carrying out the empty/threaded bobbin loading operation. The operation item differs with the error.

When you press  **B**, the AW thread information setting screen is displayed to enable changing of settings of this device.

3-15-2. Detection of errors during sewing



If an error of this device is detected during sewing, the AW error screen will be displayed after the sewing machine completes sewing and stops.

The error resetting procedure is same with the error detected under the normal state.

Refer to **"3-15-1. Error detection under the normal conditions" p.31** for detailed functions.

3-16. List of errors

AW-related errors are listed in the table below.

Error No.	Description of error	How to recover
M-376 (AW error screen)	Remaining-thread removal error	Refer to "3-14. Error display and error handling procedure" p.29 for the error resetting method.
M-377 (AW error screen)	Thread twining fault	Refer to "3-14. Error display and error handling procedure" p.29 for the error resetting method.
M-378 (AW error screen)	Bobbin winding fault	Refer to "3-14. Error display and error handling procedure" p.29 for the error resetting method.
E-2082	Threading/thread trimming fault	Turn OFF the power
E-2083	Remaining thread removal axis sensor error	Turn OFF the power
E-2084	Device fault due to direct-drive failure	Turn OFF the power
E-2085	Device fault due to rotation failure	Turn OFF the power
E-2086	Device fault due to nozzle failure	Turn OFF the power
E-2087	Device fault due to moving knife failure	Turn OFF the power
E-2088	Device failure due to thread-feeding failure	Turn OFF the power
E-2089	AW device fault (origin error)	Turn OFF the power
E-2090	AW device fault (Remaining-thread removal position bobbin-sensor error)	Turn OFF the power
E-2091	AW device fault (Standby position bobbin-sensor error)	Turn OFF the power
E-3115	AW data fault (EEPROM)	Turn OFF the power
E-3116	AW data fault (Adjustment value)	Turn OFF the power
E-3117	AW CPU fault	Turn OFF the power
E-3118	AW-disconnection error	Turn OFF the power
E-3119	AW temperature-rise error	Turn OFF the power
E-3120	AW communication error	Turn OFF the power
E-3121	Bobbin carrier fault	Turn OFF the power

3-17. Cautions

1. During the use of the AW-3SD, the setting table changeover in conjunction with the sewing pattern is not supported.
2. Stitch length of the stitches produced by basting stitch (BAT code) is not counted in the thread consumption. If basting stitch is frequently used within one sewing pattern, you should carefully check the amount of thread remaining on the bobbin.
3. The bobbin is automatically changed in the case the amount of thread remaining on the bobbin is found to be insufficient by comparing the amount of thread remaining on the bobbin with the thread consumption for sewing the entire pattern or for sewing until the thread trimming at the start of sewing. If the length of thread wound on the bobbin is short, the bobbin changing will be frequently carried out to disable starting of sewing. Set the bobbin thread winding length to an adequate amount. If the bobbin changing is repeated, press the midpoint stop switch.
4. Change the bobbin thread cone early if you can see its core. If the amount of thread remaining on the bobbin thread cone is not sufficient, an adequate tension will not be obtained. In this case, a thread trimming failure may occur at the time of changing the bobbin.

4. MAINTENANCE

4-1. Attaching / removing the cover

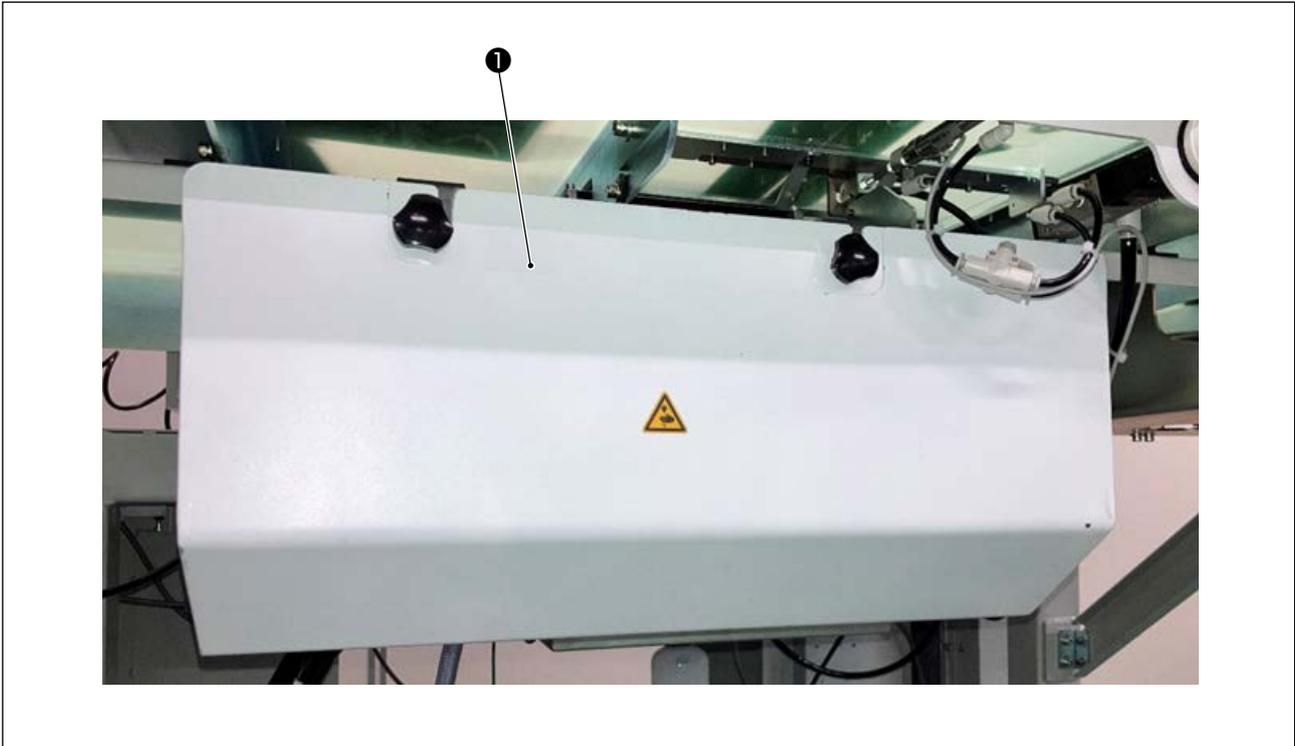


WARNING :

Turn OFF the power before starting the work so as to prevent accidents caused by abrupt start of the sewing machine.

Remove front cover ❶ from the device before carrying out cleaning, etc.

(Refer to "3-2. Removing the device cover" p.6)



When you want to carry out sewing, it is necessary to attach cover ❶ for the sake of safety.

4-2. Cleaning

Periodically carry out cleaning of each section of the device with an air gun supplied with the unit as an accessory.

WARNING :



In order to prevent the device from malfunctioning or being damaged, be sure to check the following items before using it.

- ① Turn OFF the power before starting the work so as to prevent accidents caused by abrupt start of the sewing machine.
- ② If a large quantity of sewing-machine hook oil gathers on the mechanical section of the device, wipe off the oil before carrying out cleaning with an air gun.

(1) Cleaning the periphery of hook

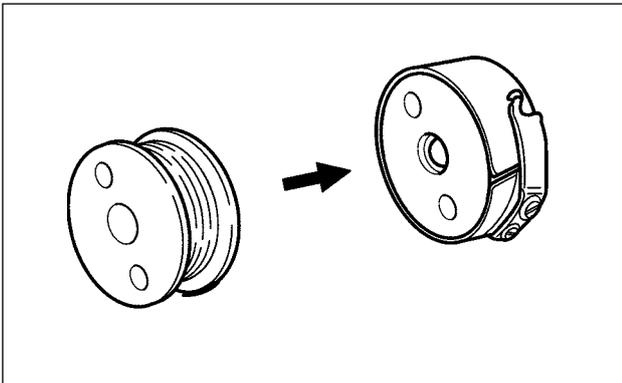


*** Be sure to carry out cleaning of the periphery of hook every working day.**

When sewing some types of materials, a great deal of dust can be generated. In such a case, carry out cleaning of the periphery of hook several times a day where necessary.

- 1) Remove the front cover from the device in accordance with "**3-2. Removing the device cover**" p.6.
- 2) Remove large dust balls lint around the hook with a pair of tweezers or the like.
- 3) Carry out cleaning by blowing away dust remaining around the hook with an air gun.

(2) Cleaning the bobbin and bobbin case

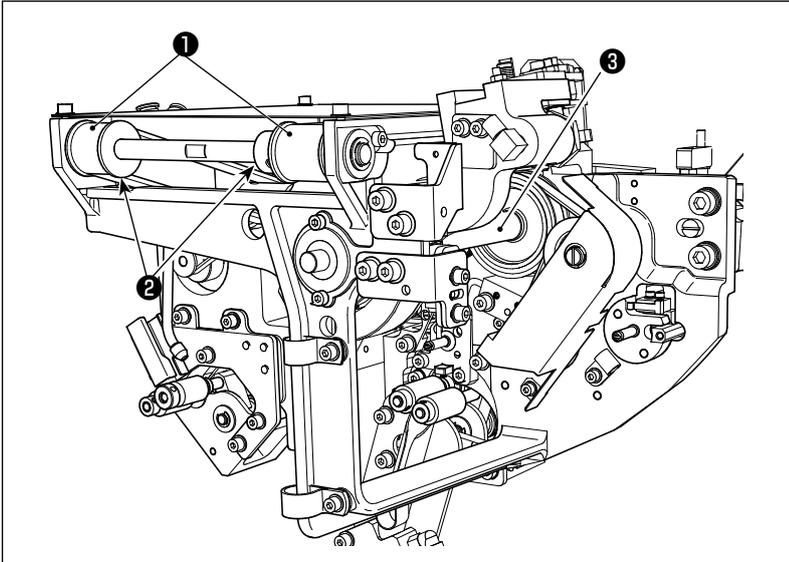


*** Be sure to carry out cleaning of the periphery of hook every working day.**

When sewing some types of materials, a great deal of dust can be generated. In such a case, carry out cleaning of the periphery of hook several times a day where necessary.

- 1) Wipe off oil and dust gathering on the bobbin case. In particular, carefully wipe off oil and dust from the bobbin case shaft section. In addition, blow away oil and dust gathering under the bobbin idling prevention spring inside the bobbin case with an air gun.
- 2) Clean the side face of bobbin to remove dust and lint gathering there.

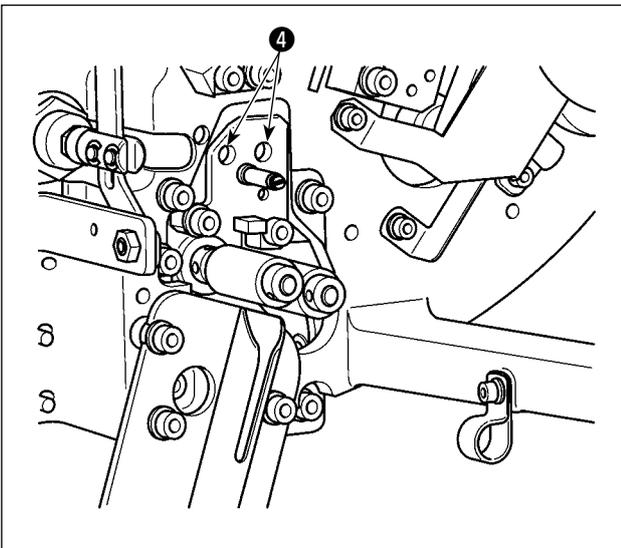
(3) Cleaning the mechanical section



Carry out cleaning of the mechanical section once a twice a week.

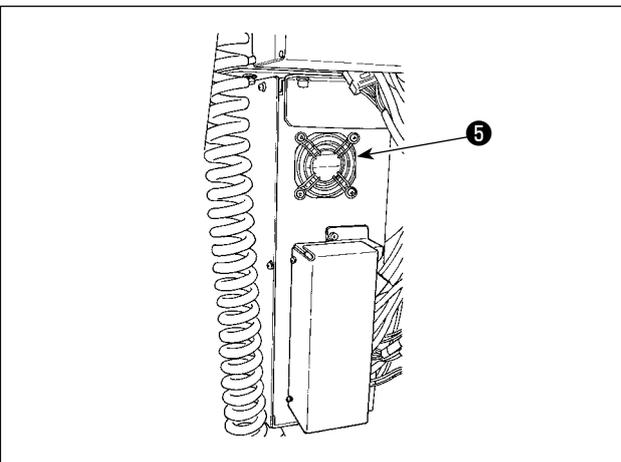
- 1) Carry out cleaning of each belt **1** and pulley **2** with an air gun. In addition, carry out cleaning of moving sections other than those shown in the figure appropriately.
- 2) Carry out cleaning of each shaft **3** with an air gun.

(4) Cleaning the sensor



Carry out cleaning of sensor **4** in the remaining-thread removal section with an air gun once or twice a week.

(5) Cleaning the control box for the device



Carry out cleaning of the control box once a week.

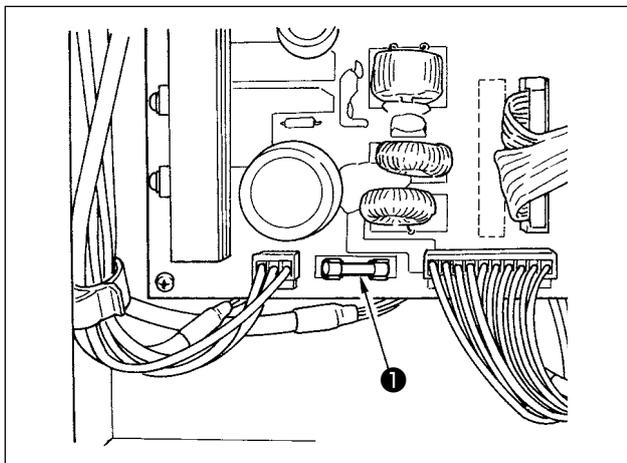
- 1) Carry out cleaning to remove dust from around the ventilation hole on the bottom of control box with an air gun.
- 2) Carry out cleaning to remove dust gathering in exhaust outlet **5** of fan motor with an air gun.

4-3. Replacing the fuse



DANGER :

In order to prevent accidents due to an electrical shock, be sure to turn OFF the power switch and remove the power plug from the receptacle before replacing the fuse. In addition, be sure to attach the rated fuse.



Carry out the following steps of procedure to replace fuse ❶ of the device.

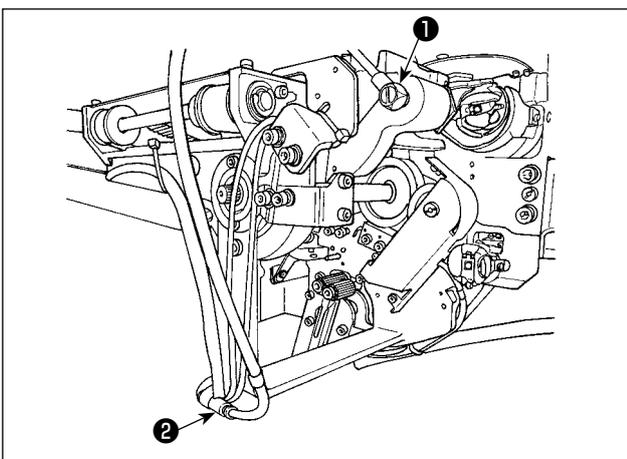
- 1) Turn OFF the power switch and wait for five or more minutes.
- 2) Remove the cover of control box for the device.
- 3) Replace fuse ❶ attached on the PCB with a new one. Use the fuse with a specified capacity (HF0037060PA, 125V/T6A).
- 4) Attach the cover removed in step 2) back in place.

4-4. Replacing the gripper tube



WARNING :

Turn OFF the power before starting the work so as to prevent accidents caused by abrupt start of the sewing machine. In addition, close the air valve before replacing the tube.



If the air tube at the gripper has worn out or is damaged, replace it with a spare tube supplied with the unit as an accessory following the steps of procedure described below.

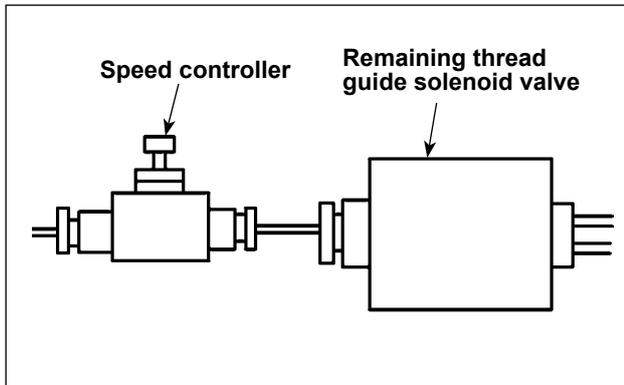
- 1) Detach hose nipple ❶ from the rear end of gripper. Then, detach the tube.
- 2) Detach the other end of tube from joint ❷.
- 3) Connect a new tube following the aforementioned steps of procedure in the reverse order.

4-5. Adjusting the air flow for the remaining thread guide



WARNING :

Turn OFF the power before starting the work so as to prevent accidents caused by abrupt start of the sewing machine.



The initial adjustment value of the speed controller has been adjusted to the value which is obtained by turning it in the reverse direction by seven revolutions from the fully-opened position.

If the remaining thread removal is not carried out stably according to the type and count of thread, finely adjust the speed controller.



Thick thread can be guided more smoothly by opening the speed controller since the air flow is increased by opening it. However, thin thread will be likely to flop when the air flow is excessively increased.

Thin thread can be guided more smoothly by closing the speed controller since the air flow is decreased by closing it. However, thick thread will be likely not to be guided smoothly.

5. TROUBLESHOOTING

If an error occurs while the device is in operation, the relevant error is displayed on the operation panel. Handle the error referring to **"3-14. Error display and error handling procedure" p.29**.

If the error cannot be reset or the error recurs, it is assumed there is some cause of malfunctions. In such a case, handle the error according to the table given below.

Description of error	Cause	Error handling procedure
Power cannot be turned ON.	<ul style="list-style-type: none"> ① The power plug is not inserted or contact failure. ② Fuse has blown. 	<ul style="list-style-type: none"> ○ Check how the power is supplied. ○ Replace the fuse according to "4-3. Replacing the fuse" p.37 . If the device cannot be powered even after the replacement of the fuse, the device may have failed. In such a case, stop using the device.
Removal of thread remaining on the bobbin is not carried out normally.	<ul style="list-style-type: none"> ① Obstacles such as dust, etc. gather on the moving section. ② Thread is entangled with unwinding elimination roller. ③ Remaining-thread sucking vacuum force is insufficient. ④ Thread end is not properly guided. ⑤ Type or count of thread is different from the specification. 	<ul style="list-style-type: none"> ○ Carry out maintenance referring to "4-2. Cleaning" p.35. ○ Remove the thread. ○ Check whether or not the dust bag is full of dust. ○ Check whether or not the air pressure has dropped.
Thread has failed to twine properly on the bobbin.	<ul style="list-style-type: none"> ① Obstacles such as dust, etc. gather on the moving section. ② Length of thread coming out of the nozzle is not appropriate. ③ Thread unraveling is not performed appropriately. ④ No thread on bobbin thread cone. ⑤ Thread tension is high at thread route. ⑥ Thread route is not correct. ⑦ Mounting position and direction of the nozzle are not appropriate. ⑧ Bobbin fails to rotate. ⑨ Bobbin thread feeding unit fails to operate. ⑩ Bobbin tape has worn out. ⑪ Thread type and yarn count do not conform to the specifications. 	<ul style="list-style-type: none"> ○ Carry out maintenance referring to "4-2. Cleaning" p.35. ○ Adjust the length of thread coming out of the nozzle to approximately 13 cm. ○ Check the thread unraveling condition setting. ○ Check the length of thread coming out of the nozzle. ○ Put the bobbin thread cone in place. ○ Referring to "3-3. How to thread the device with the bobbin thread" p.7, check the thread tension. ○ Check the threading route referring to "3-3. How to thread the device with the bobbin thread" p.7. In particular, the roller and actuating arm, etc. of the bobbin thread feeding unit are threaded correctly. ○ Referring to "3-4. How to set a bobbin" p.9, check whether or not the bobbin is fitted in the bobbin case correctly. ○ Check whether or not the connector, air tube, etc. coming from the bobbin thread feeding unit are correctly connected. ○ Change the bobbin with a new one. ○ Change the thread with another thread the type and yarn count of which conform to the specifications.

Description of error	Cause	Error handling procedure
Bobbin-thread winding is not carried out normally.	<ul style="list-style-type: none"> ① Obstacles such as dust, etc. gather on the moving section. ② Thread of the bobbin thread cone has run out during winding of a bobbin. ③ Thread has broken during winding of a bobbin. ④ Thread wound on the bobbin overflows from the bobbin flange. ⑤ Bobbin fails to rotate. ⑥ Thread slips out of the roller of bobbin thread feeding unit. ⑦ Bobbin thread feeding unit fails to operate. ⑧ Thread has tangled on the thread stand, etc. since the thread has vibrated excessively halfway through threading route. ⑨ Thread type and yarn count do not conform to the specifications. 	<ul style="list-style-type: none"> ○ Carry out maintenance referring to "4-2. Cleaning" p.35. ○ Put the bobbin thread cone in place. ○ Referring to "3-3. How to thread the device with the bobbin thread" p.7, check the thread tension. ○ Check the setting of bobbin-thread winding length. ○ Check whether or not the thread used in the previous sewing still remains on the bobbin. ○ Referring to "3-4. How to set a bobbin" p.9, check whether or not the bobbin is fitted in the bobbin case correctly. ○ If the thread tension is not sufficient, thread may slip off the roller. Check the thread tension. ○ Check whether or not the connector, air tube, etc. coming from the bobbin thread feeding unit are correctly connected. ○ Check the threading route referring to "3-3. How to thread the device with the bobbin thread" p.7. In particular, the roller and actuating arm, etc. of the bobbin thread feeding unit are threaded correctly. ○ Change the thread with another thread the type and yarn count of which conform to the specifications.