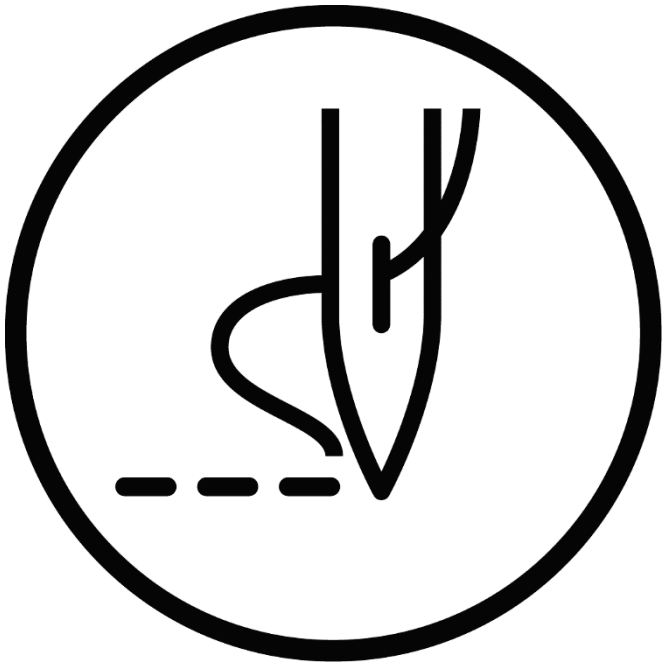
BAS-352K

INSTRUCTION MANUAL

Please read this manual before using the machine.
Please keep this manual within easy reach for quick reference.

DIRECT DRIVE
PROGRAMMABLE ELECTRONIC PATTERN SEWER



brother

Thank you very much for buying a BROTHER sewing machine. Before using your new machine, please read the safety instructions below and the explanations given in the instruction manual.

With industrial sewing machines, it is normal to carry out work while positioned directly in front of moving parts such as the needle and thread take-up lever, and consequently there is always a danger of injury that can be caused by these parts. Follow the instructions from training personnel and instructors regarding safe and correct operation before operating the machine so that you will know how to use it correctly.

SAFETY INSTRUCTIONS

[1] Safety indications and their meanings

This instruction manual and the indications and symbols that are used on the machine itself are provided in order to ensure safe operation of this machine and to prevent accidents and injury to yourself or other people.
The meanings of these indications and symbols are given below.

Indications

DANGER	**The instructions which follow this term indicate situations where failure to follow the instructions will result in death or serious injury.**
WARNING	**The instructions which follow this term indicate situations where failure to follow the instructions could result in death or serious injury.**
CAUTION	**The instructions which follow this term indicate situations where failure to follow the instructions may result in minor or moderate injury.**

Symbols

 · · · · · · **This symbol (△) indicates something that you should be careful of.**
The picture inside the triangle indicates the nature of the caution that must be taken.
(For example, the symbol at left means “beware of injury”.)

 · · · · · · **This symbol (⃠) indicates something that you must not do.**

 · · · · · · **This symbol (●) indicates something that you must do.**
The picture inside the circle indicates the nature of the thing that must be done.
(For example, the symbol at left means “you must make the ground connection”.)

[2] Notes on safety

DANGER

Wait at least 5 minutes after turning off the power switch and disconnecting the power cord from the wall outlet before opening the control box cover. Touching areas where high voltages are present can result in severe injury.

WARNING

Do not allow any liquids to get onto this sewing machine, otherwise fire, electric shocks or operating problems may occur.

If any liquid gets inside the sewing machine (machine head or control box), immediately turn off the power and disconnect the power plug from the electrical outlet, and then contact the place of purchase or a qualified technician.

CAUTION

Environmental requirements

Use the sewing machine in an area which is free from sources of strong electrical noise such as electrical line noise or static electric noise.
Sources of strong electrical noise may cause problems with correct operation.

Any fluctuations in the power supply voltage should be within ±10% of the rated voltage for the machine.
Voltage fluctuations which are greater than this may cause problems with correct operation.

The power supply capacity should be greater than the requirements for the sewing machine's power consumption.
Insufficient power supply capacity may cause problems with correct operation.

The pneumatic delivery capability should be greater than the requirements for the sewing machine's total air consumption.
Insufficient pneumatic delivery capability may cause problems with correct operation.

The ambient temperature should be within the range of 5°C to 35°C during use.
Temperatures which are lower or higher than this may cause problems with correct operation.

The relative humidity should be within the range of 45% to 85% during use, and no dew formation should occur in any devices.
Excessively dry or humid environments and dew formation may cause problems with correct operation.

In the event of an electrical storm, turn off the power and disconnect the power cord from the wall outlet.
Lightning may cause problems with correct operation.

Do not connect anything to the USB port other than the USB flash drive. If this is not observed, problems with operation may result.

CAUTION

Installation

Machine installation should only be carried out by a qualified technician.

When transporting the sewing machine, be careful not to get your feet caught in the casters. This may cause injury.

Contact your Brother dealer or a qualified electrician for any electrical work that may need to be done.

Do not connect the power cord until installation is complete. If the foot switch is depressed by mistake, the sewing machine might start operating and injury could result.

Be sure to connect the ground. If the ground connection is not secure, you run a high risk of receiving a serious electric shock, and problems with correct operation may also occur.

All cords should be secured at least 25 mm away from any moving parts.
Furthermore, do not bend the cords too tightly, otherwise there is the danger that fire or electric shocks could occur.

Attach the safety cover.

Lower the adjusters to secure the sewing machine.

Be sure to wear protective goggles and gloves when handling the lubricating oil and grease, so that they do not get into your eyes or onto your skin. If the oil and grease get into your eyes or onto your skin, inflammation can result. Furthermore, do not drink or eat the lubricating oil or grease. They may cause diarrhea or vomiting.
Keep the oil out of the reach of children.

Be careful to avoid injury from moving parts.

Sewing

To prevent problems, do not use objects with sharp points to operate the LCD panel.

This sewing machine should only be used by operators who have received the necessary training in safe use beforehand.

The sewing machine should not be used for any applications other than sewing.

Be sure to wear protective goggles when using the machine.
If goggles are not worn, there is the danger that if a needle breaks, parts of the broken needle may enter your eyes and injury may result.

Turn off the power switch at the following times. If the foot switch is depressed by mistake, the sewing machine might start operating and injury could result.

- When replacing the bobbin and needle
- When not using the machine and when leaving the machine unattended

Lower the adjusters to secure the sewing machine.

Attach all safety devices before using the sewing machine. If the machine is used without these devices attached, injury may result.

Do not place any part of your body on top of the auxiliary plate when starting the sewing machine. Otherwise, injury or damage to the sewing machine may result.

Do not touch any of the moving parts or press any objects against the machine while sewing, as this may result in personal injury or damage to the machine.

If you use a frame for a small sewing area for sewing data within a large sewing area by mistake, the needle will sew onto the frame, and injury or damage to the sewing machine may result.

If an error occurs in machine operation, or if abnormal noises or smells are noticed, immediately turn off the power switch. Then contact your nearest Brother dealer or a qualified technician.

If the machine develops a problem, contact your nearest Brother dealer or a qualified technician.

Cleaning

Turn off the power switch before carrying out cleaning. If the foot switch is depressed by mistake, the sewing machine might start operating and injury could result.

Be sure to wear protective goggles and gloves when handling the lubricating oil and grease, so that they do not get into your eyes or onto your skin. If the oil and grease get into your eyes or onto your skin, inflammation can result. Furthermore, do not drink or eat the lubricating oil or grease. They may cause diarrhea or vomiting.
Keep the oil out of the reach of children.

⚠CAUTION

Maintenance and inspection

Maintenance and inspection of the sewing machine should only be carried out by a qualified technician.

Ask your Brother dealer or a qualified electrician to carry out any maintenance and inspection of the electrical system.

Turn off the power switch and disconnect the power cord before carrying out the following operations. If the foot switch is depressed by mistake, the sewing machine might start operating and injury could result.

- **Inspection, adjustment and maintenance**
- **Replacing consumable parts such as the shuttle hook**

Disconnect the air hoses from the air supply and wait for the needle on the pressure gauge to drop to "0" before carrying out inspection, adjustment and repair of any parts which use the pneumatic equipment.

If the power switch needs to be left on when carrying out some adjustment, be extremely careful to observe all safety precautions.

The clamp should be carried by two or more people.

When replacing parts and installing optional accessories, be sure to use only genuine Brother parts.
Brother will not be held responsible for any accidents or problems resulting from the use of non-genuine parts.

If any safety devices have been removed, be absolutely sure to re-install them to their original positions and check that they operate correctly before using the machine.

Do not climb inside the sewing machine assembly.

Set the clamp so that it does not protrude from the auxiliary plate within the whole of the feed area. Otherwise, injury or damage to the sewing machine may result.

Modification

To prevent accidents and problems, do not modify the sewing machine (including the control devices) yourself.

Brother will not be held responsible for any accidents or problems resulting from modifications made to the equipment.

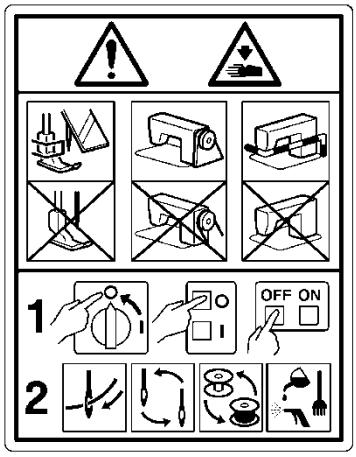
[3] Warning labels

The following warning labels appear on the sewing machine.
Please follow the instructions on the labels at all times when using the machine. If the labels have been removed or are difficult to read, please contact your nearest Brother dealer.

1

	⚠ 危 険	⚠ 危 险	
	高電圧部分にふれて、大けがをすることがある。 電源を切り、5分たってからカバーをはずすこと。	触摸高压电部分，会导致受伤。 在切断电源5分钟后，再开启盖罩。	
⚠DANGER	⚠GEFAHR	⚠DANGER	⚠PELIGRO
Hazardous voltage will cause injury.Turn off main switch and wait 5minutes before opening this cover.	Hochspannung verletzungsgefahr! Bitte schalten sie den hauptschalter aus und warten sie 5 minuten, bevor sie diese abdeckung öffnen.	Un voltage non adapte provoque des blessures.Eteindre l'interrupteur et attendre 5 minutes avantd'ouvrir le capot.	Un voltaje inadecuado puede provocar las heridas.Apagar el interruptor principal y esperar 5 minutos antes de abrir esta cubierta.

2



CAUTION
Moving parts may cause injury.

Operate with safety devices* installed.

Turn off the power before carrying out operations such as threading, changing the needle, bobbin, knives or hook, cleaning and adjusting.

3



Be careful to avoid injury from moving parts.

4



Be sure to connect the ground.
If the ground connection is not secure, you run a high risk of receiving a serious electric shock, and problems with correct operation may also occur.

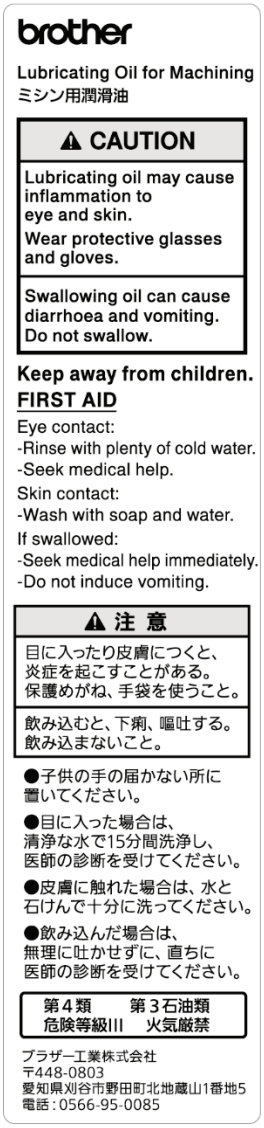
5



Direction of operation

* Safety devices:
Eye guard, Finger guard, Take-up cover, Motor cover, Tank cover, Rear cover 1, Rear cover 2, Front cover R, Front cover L, Side cover R, Side cover L, Y sensor plate cover, etc.

6


brother

Lubricating Oil for Machining
ミシン用潤滑油

⚠ CAUTION

Lubricating oil may cause inflammation to eye and skin.
Wear protective glasses and gloves.

Swallowing oil can cause diarrhoea and vomiting.
Do not swallow.

Keep away from children.

FIRST AID

Eye contact:
-Rinse with plenty of cold water.
-Seek medical help.
Skin contact:
-Wash with soap and water.
If swallowed:
-Seek medical help immediately.
-Do not induce vomiting.

⚠ 注 意

目に入ったり皮膚につくと、炎症を起こすことがある。
保護めがね、手袋を使うこと。

飲み込むと、下痢、嘔吐する。
飲み込まないこと。

●子供の手の届かない所に置いてください。

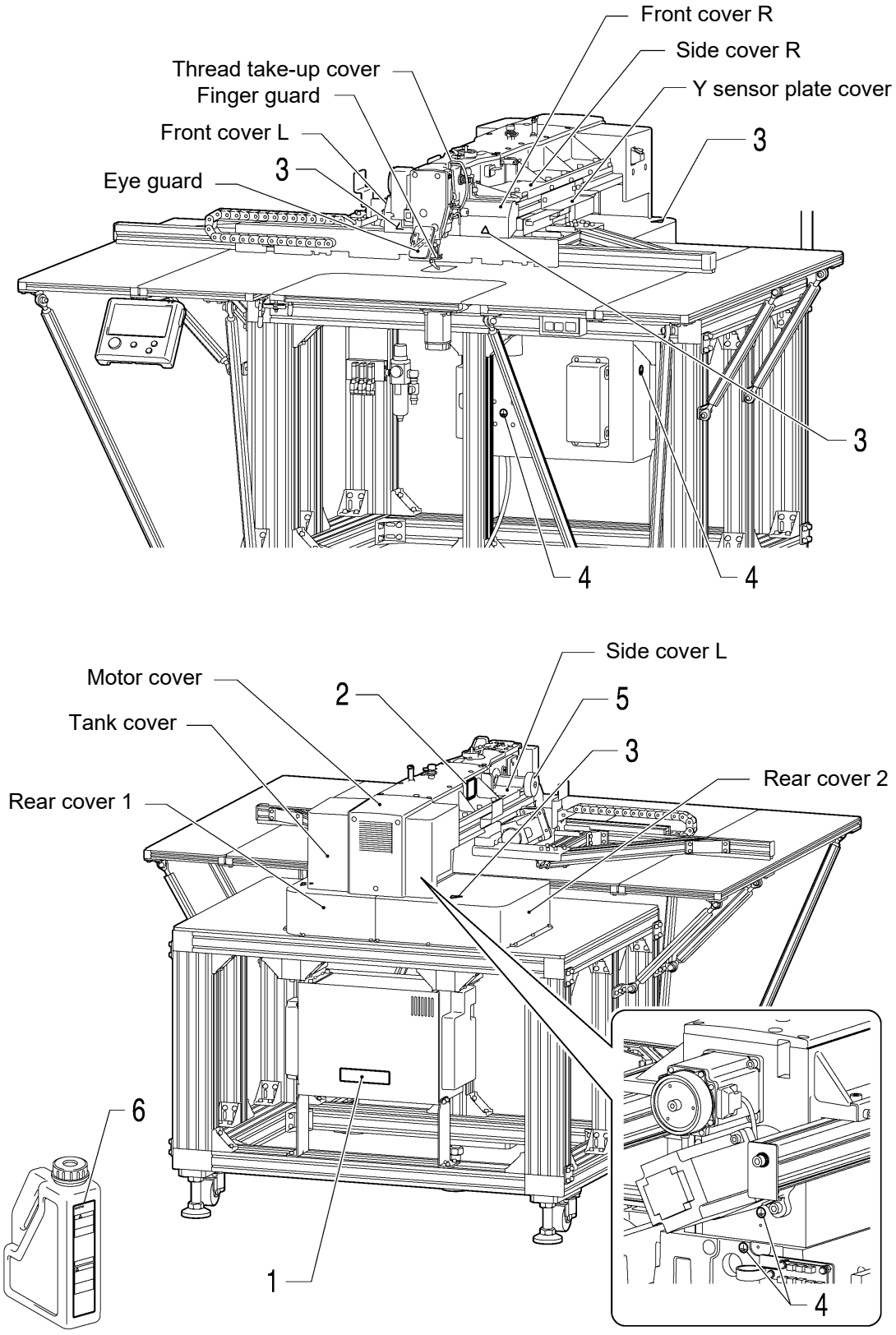
●目に入った場合は、清浄な水で15分間洗浄し、医師の診断を受けてください。

●皮膚に触れた場合は、水と石けんで十分に洗ってください。

●飲み込んだ場合は、無理に吐かせずに、直ちに医師の診断を受けてください。

第４類　第３石油類
危険等級III　火気厳禁

ブラザー工業株式会社
〒448-0803
愛知県刈谷市野田町北地蔵山1番地5
電話：0566-95-0085


Front cover R
Side cover R
Thread take-up cover
Finger guard
Y sensor plate cover
Front cover L
3
Eye guard
3
3
4
4
Side cover L
Motor cover
2
5
Tank cover
3
Rear cover 2
Rear cover 1
6
1
4
2156D

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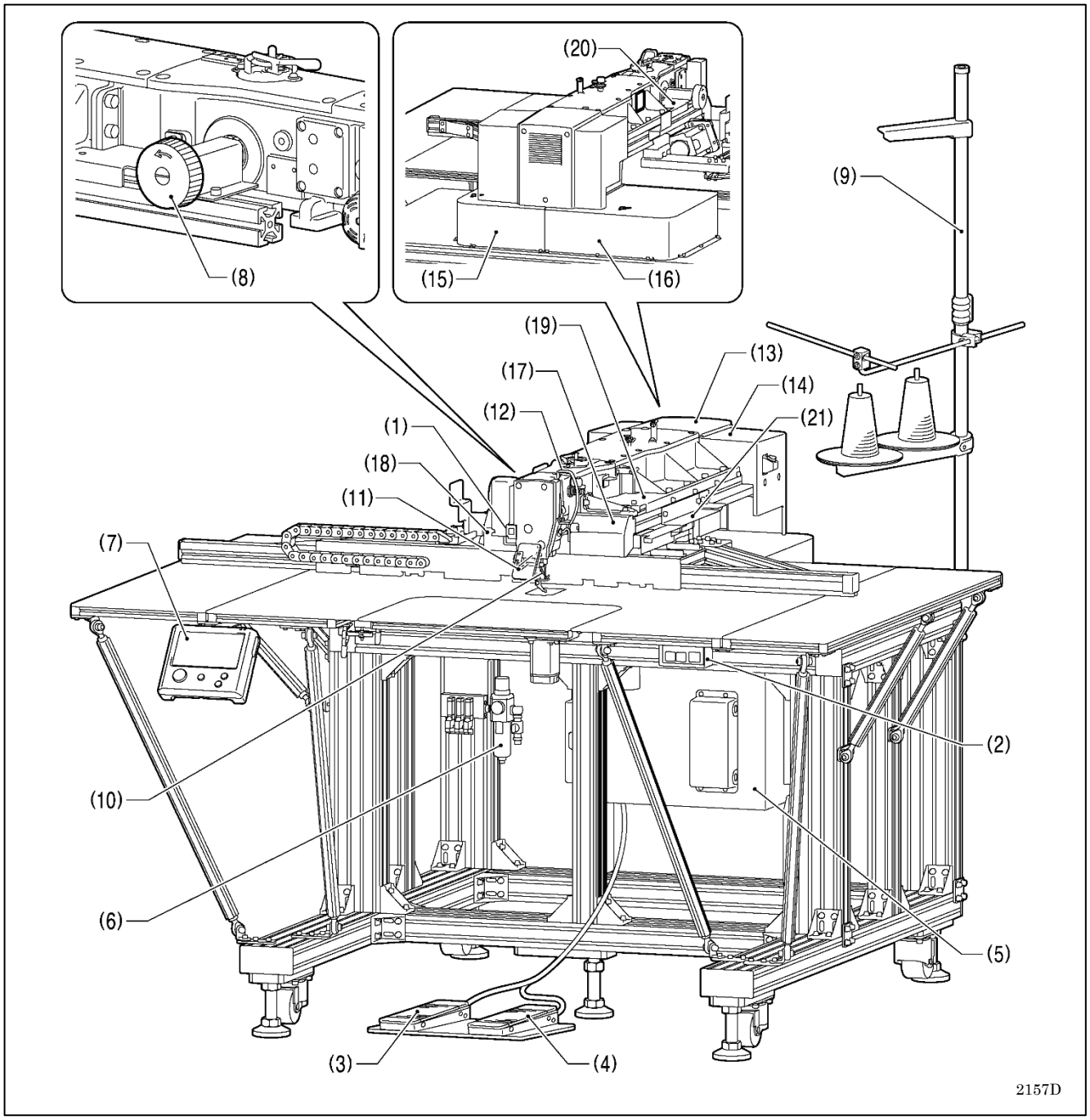
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1. NAMES OF MAJOR PARTS



(1) STOP switch
(2) Power switch
(3) Work clamp switch
(4) Start switch
(5) Control box
(6) Solenoid valve
(7) LCD panel
(8) Pulley
(9) Cotton stand

Safety devices:

(10) Finger guard
(11) Eye guard
(12) Thread take-up cover
(13) Motor cover
(14) Tank cover
(15) Rear cover 1
(16) Rear cover 2
(17) Front cover R
(18) Front cover L
(19) Side cover R
(20) Side cover L
(21) Y sensor plate cover

2. SPECIFICATIONS

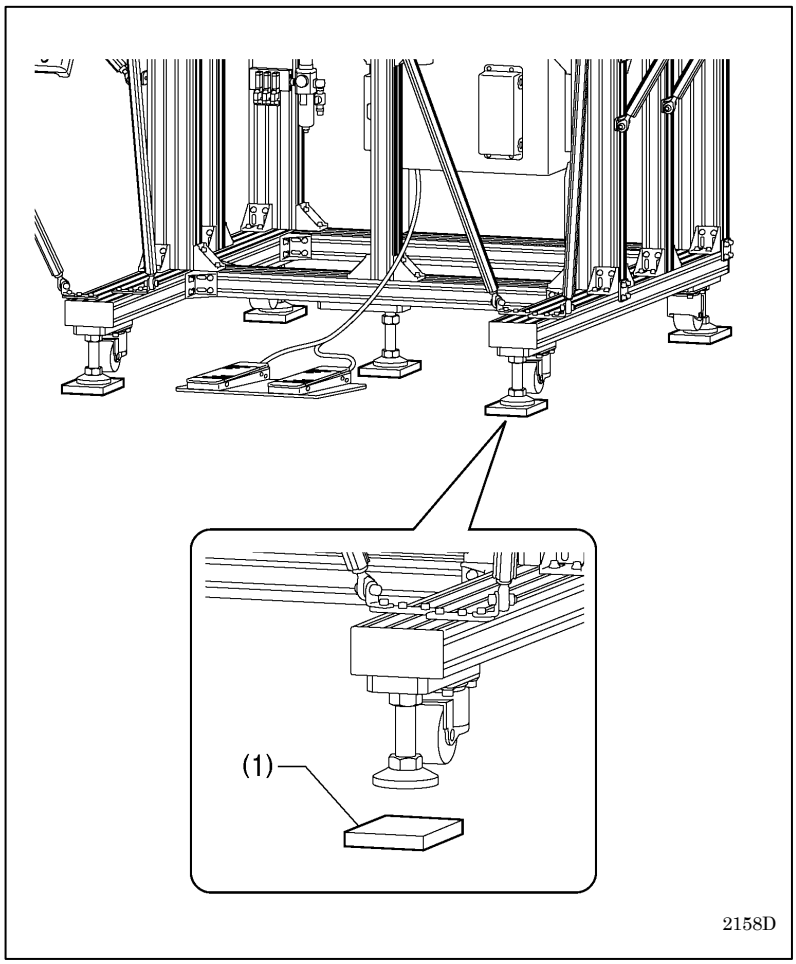
	BAS-352K
Stitch formation	Single needle lock stitch
Hook	Double-capacity shuttle hook
Needle type	DP×17 #24
Sewing speed	200–2,100 sti/min (in 100 sti/min increments)
Sewing area (W×D)	700 × 450 mm
Feed mechanism	Intermittent feed (pulse motor drive)
Stitch length	0.05 - 20.00 mm (per 0.05 mm)
Feed speed	100–500 mm/sec (in 100 mm/sec increments)
Maximum No. of stitches	100,000 stitches (per program)
Maximum No. of programs	999
Intermittent presser lift method	Pulse motor drive
Intermittent presser lift amount	27 mm (During reverse needle lifting)
Intermittent presser stroke	0 - 10 mm (per 0.1 mm)
Fabric thickness adjustment	0 - 17 mm (per 0.04 mm)
Chucking method	Air cylinder drive
Upper thread tension adjustment method	Digitally adjustable by proportional solenoid
Thread cutting method	Pulse motor drive
Skip stitch prevention function (start/cloth holding)	Standard equipment
Thread wiper method	Air drive
Winding	Standard equipment (main shaft drive system)
LED light (at hand)	Standard equipment (6 levels)
Start switch	2-pedal foot switch
Skip stitch / thread break detector	Standard equipment
Data storage method	Built-in flash memory (Data addition via external memory possible)
Main shaft motor	AC servo motor 1kW
Weight	333 kg
Installation area (W×D×H)	1770 × 1615 × 1275 mm
Shipping form	Shipped as a finished product including legs, table, and control box
Power supply voltage	Single-phase 220V, three-phase 200V / 220V / 230V
Power consumption	500 VA or less
Operation terminal / user interface	LCD touch panel + jog key
Air pressure / Air consumption	0.5 MPa / 1.8 l/min

3. INSTALLATION

⚠ CAUTION

- **Machine installation should only be carried out by a qualified technician.**
- **Contact your Brother dealer or a qualified electrician for any electrical work that may need to be done.**
- **Do not connect the power cord plug until installation is complete.**
  If this is not done, the sewing machine may operate if a switch is pressed by mistake, which could result in serious injury.
- **All cords should be secured at least 25 mm away from any moving parts. Furthermore, do not bend the cords too tightly, otherwise there is the danger that fire or electric shocks could occur.**
- **Be sure to connect the ground. If the ground connection is not secure, you run a high risk of receiving a serious electric shock, and problems with correct operation may also occur.**
- **Attach the safety cover.**

3-1. Installing the sewing machine

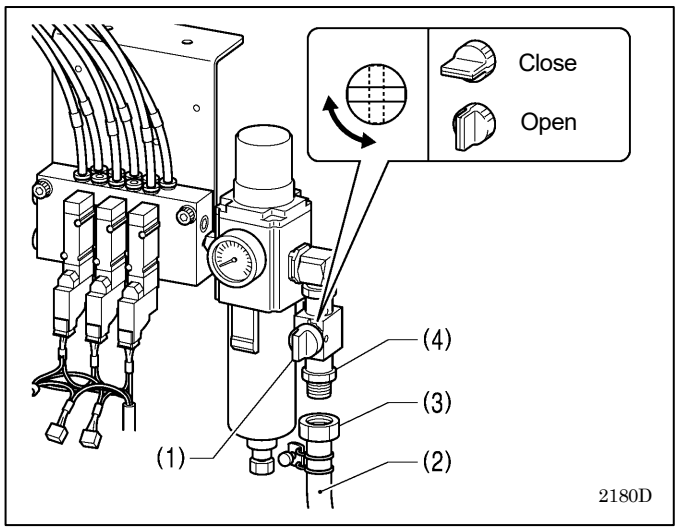


1. Place the sewing machine onto the rubber cushions.

[NOTE]

- **Use a hoist to install the sewing machine.**
- **Position the five rubber cushions (1) so that the adjusters come to about the middle of the five rubber cushions (1).**
- **Position the sewing machine so that the top of the auxiliary plate is level.**
- **When moving from the installation position, be careful not to get your feet caught by the casters.**

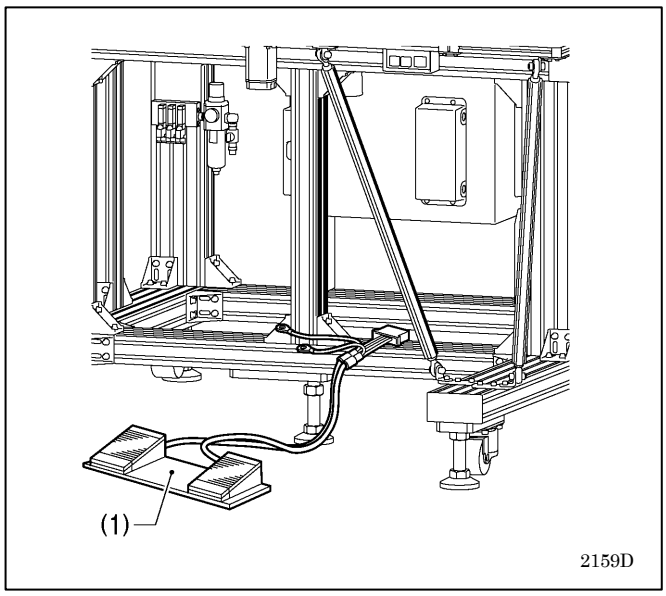
3-2. Installing the air hose



1. Close the cock (1).
2. Turn the nut (3) at the end of the air hose (2) and connect it to the valve (4).
3. Open the cock at the compressor.
   * Check that no air is leaking from the connection of the valve (4) and air hose (2).
4. Open the cock (1).
   (The meter pointer will turn clockwise.)

   [NOTE]
   Turn the cock (1) gently to open it.
5. Adjust the air pressure. (Refer to "7-10. Adjusting the air pressure".)

3-3. Installing the two-pedal foot switch

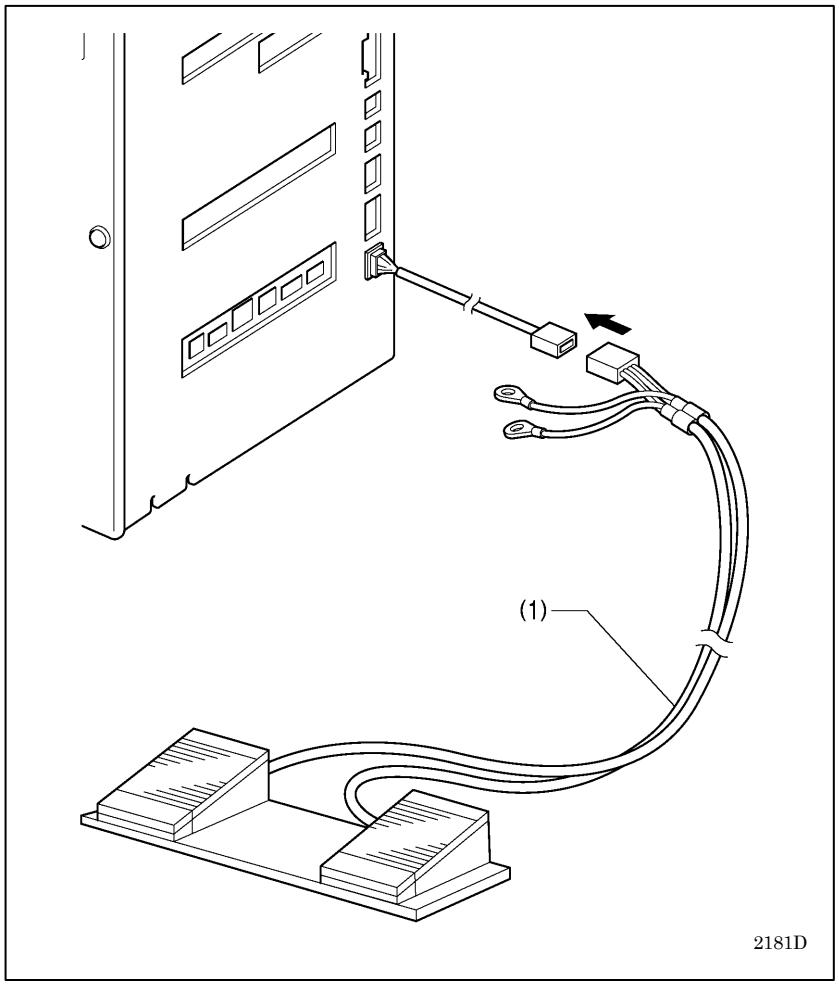


(1) Two-pedal foot switch

Insert the two-pedal foot switch (1) into the 10-pin relay connector coming out from the connector cover of the control box.
(Refer to "3-4. Connecting the cords".)

* Be sure to make the ground connection.
  (Refer to “3-5. Connecting the ground wire”.)

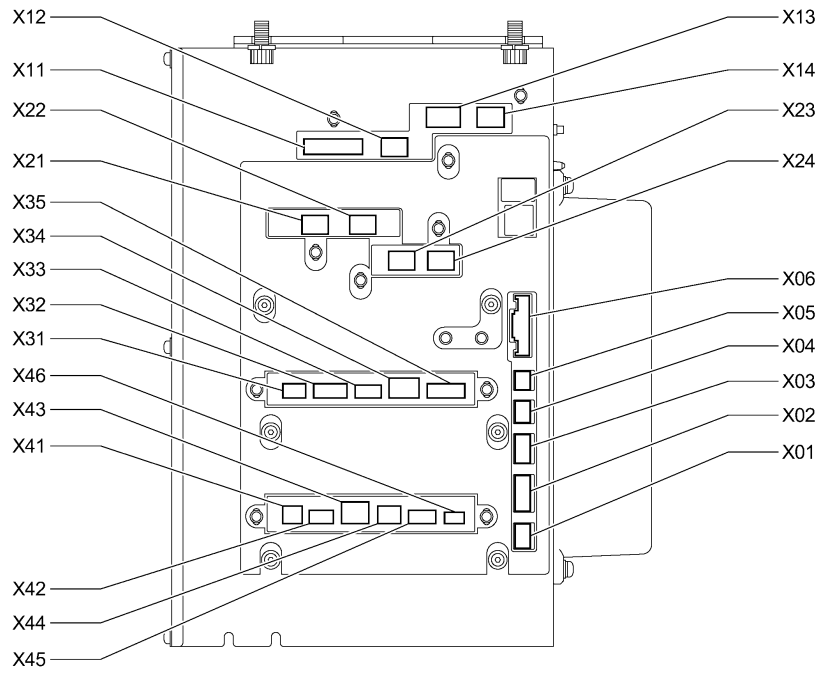
3-4. Connecting the cords



[NOTE]

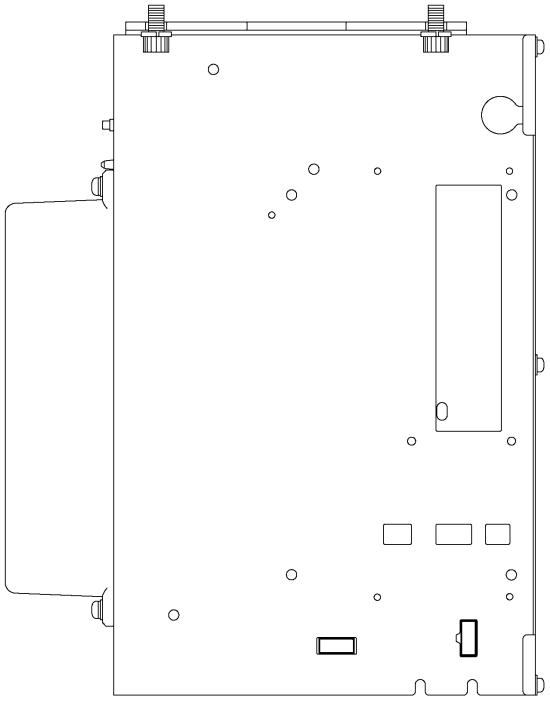
- **Check that the connector is facing the correct way, and then insert it firmly until it locks into place.**
- **Secure the cables with cable ties and cord clamps, while being careful not to pull on the connector.**

< Connector side >



Indication of connector insertion point on control box side	Harness side connector		
	Display	Connector	Usage
X01	X01	12-pin	2-foot switch
X02	X02	18-pin	Relay PCB
X03	X03	14-pin	Relay PCB
X04	X04	10-pin	Relay PCB
X05	X05	8-pin	Head detector
X06	No display	30-pin	LCD panel
X11	No display	4-pin	Main shaft motor
X12	X12	6-pin	Work clamp motor
X13	X13	16-pin	Main shaft motor encoder
X14	X14	12-pin	Work clamp motor encoder
X21	X21	6-pin	X-feed motor
X22	X22	6-pin	Y-feed motor
X23	X23	12-pin	X-feed motor encoder
X24	X24	12-pin	Y-feed motor encoder
X31	-	-	Not used
X32	X32	6-pin	Option Input _AIRSW
X33	-	-	Not used
X34	X34	14-pin	Needle guard sensing
X35	-	-	Not used
X41	No display	4-pin	Digital tension solenoid
X42	X42	4-pin	Thread trimming motor
X43	X43	8-pin	Valve
X44	X44	10-pin	Needle clearance sensing
X45	X45	5-pin	Thread trimming motor encoder
X46	No display	4-pin	Needle clearance zero point sensor

< **Opposite side of connector** >



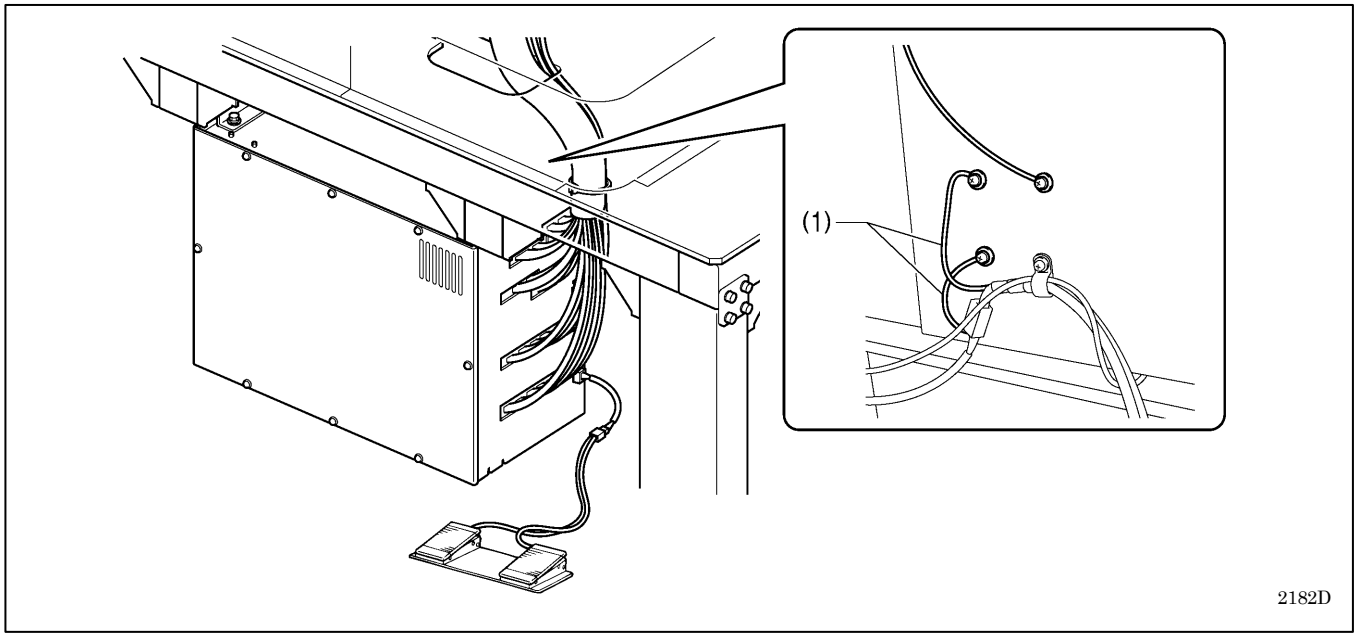
2097D

Indication of connector insertion point on control box side	Harness side connector		
	Display	Connector	Display
No display	No display	3-pin	Defect detection device board

3-5. Connecting the ground wire

⚠ CAUTION

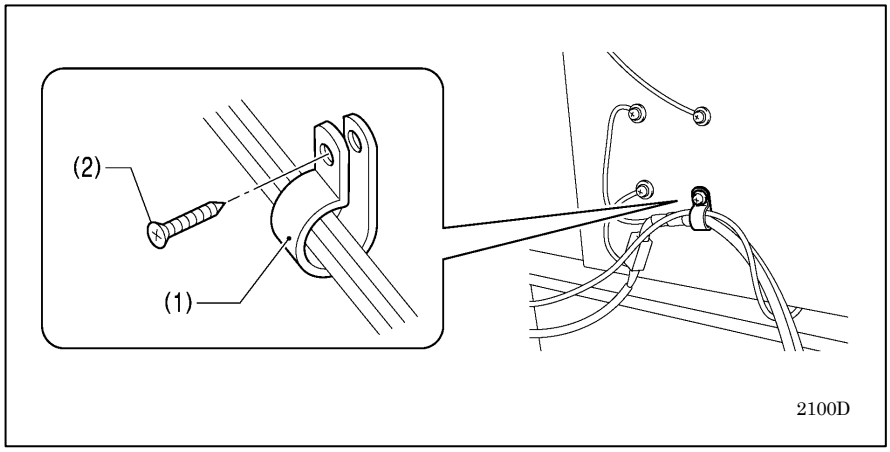
Be sure to connect the ground. If the ground connection is not secure, you run a high risk of receiving a serious electric shock, and problems with correct operation may also occur.



(1) Ground wires from two-pedal foot switch harnesses (2 wires)

[NOTE]
Make sure that the ground connections are secure in order to ensure safety.

3-6. Securing the cords



(1) Cord holders [1 pcs.]
(2) Screw [1 pc.]

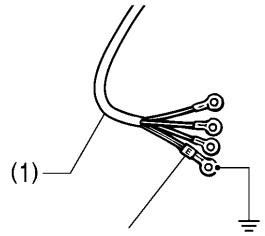
Secure the cables for the two-pedal foot switch and the sewing defect detector PCB to the back of the control box with the cord holder (1) and fixing screw (2).

3-7. Connecting the power cord

⚠ CAUTION

Be sure to connect the ground. If the ground connection is not secure, you run a high risk of receiving a serious electric shock, and problems with correct operation may also occur.

4117B



Green and yellow wire (ground wire)

1. Attach an appropriate plug to the power cord (1). (The green and yellow wire is the ground wire.)
2. Insert the power plug into a properly-grounded electrical outlet.

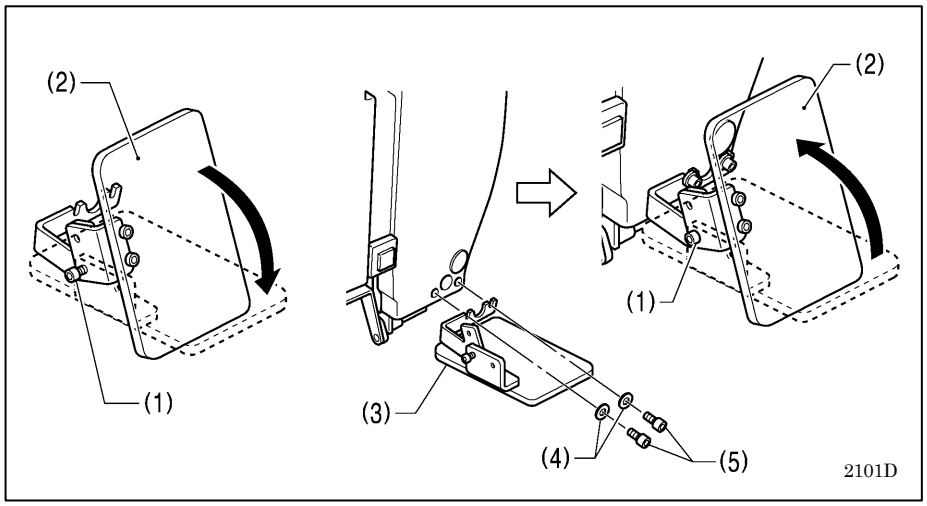
[NOTE]

Do not use extension cords, otherwise machine operation problems may result.

3-8. Installing the eye guard

CAUTION

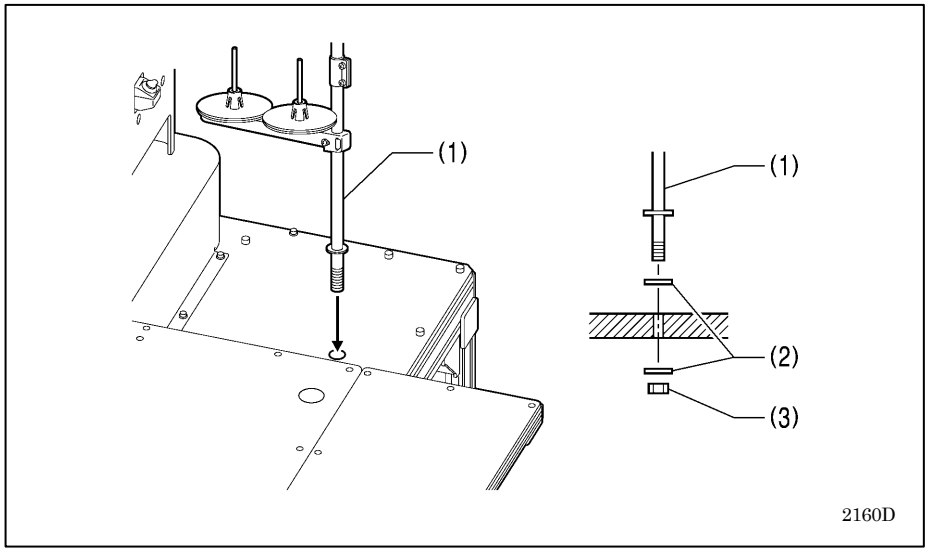
Attach all safety devices before using the sewing machine.
If the machine is used without these devices attached, injury may result.



(1) Bolt (loosen)
(2) Eye guard (tilt forward)
(3) Eye guard assembly
(4) Plain washers [2 pcs.]
(5) Bolts [2 pcs.]

After installing the eye guard assembly (3), return the eye guard (2) to its original angle, and then tighten the bolt (1) to secure it in place.

3-9. Installing the cotton stand



(1) Cotton stand

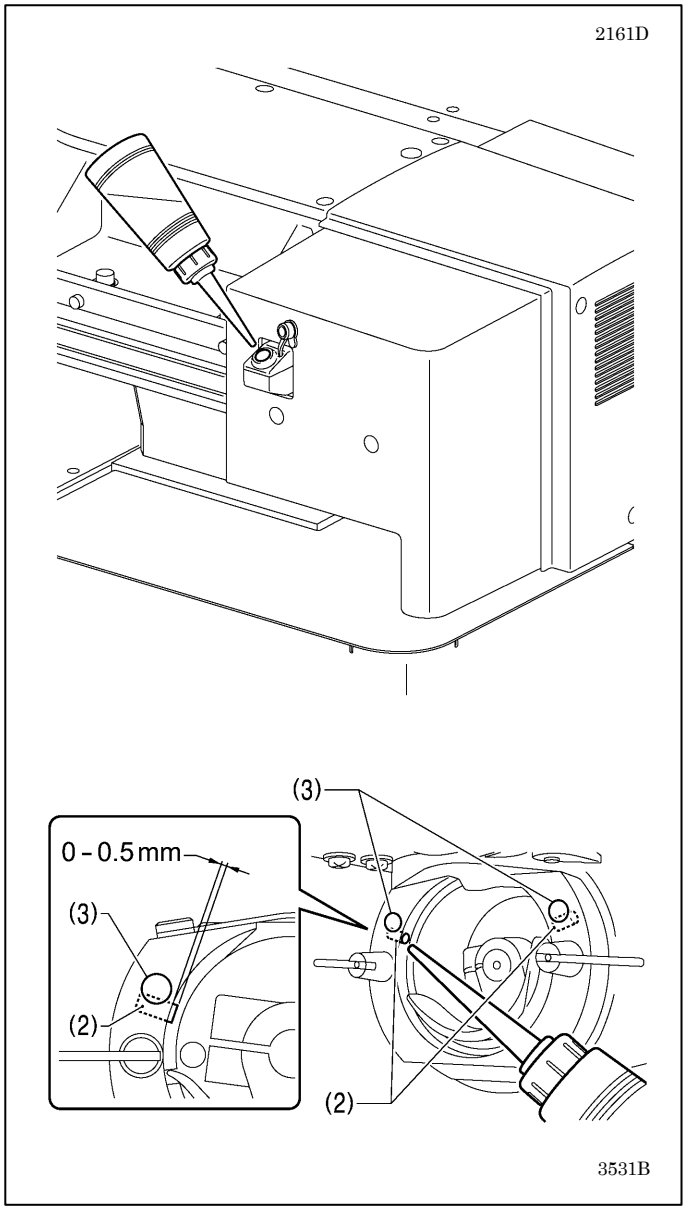
[NOTE]
Securely tighten the nut (3) so that [two] washers (2) are securely clamped so that the cotton stand (1) does not move.

3-10. Lubrication

⚠ CAUTION

Do not connect the power cord until lubrication is complete.
If the foot switch is depressed by mistake, the sewing machine might start operating and injury could result.

Be sure to wear protective goggles and gloves when handling the lubricating oil and grease, so that they do not get into your eyes or onto your skin. If the oil and grease get into your eyes or onto your skin, inflammation can result.
Furthermore, do not drink or eat the lubricating oil or grease. They may cause diarrhea or vomiting.
Keep the oil out of the reach of children.



- The sewing machine should always be lubricated and the oil supply replenished before it is used for the first time, and also after long periods of non-use.
- Use only the lubricating oil specified by Brother.

1. Add oil to the tank at the rear of the arm.

2. Pour oil in through the two holes of the shuttle race base assembly so that the felt (2) is lightly moistened. If it is difficult to add oil, you can also remove the rubber cap (3) and pour in the oil through the hole.

[NOTE]
- **The two pieces of felt (2) should normally project by 0 to 0.5 mm from the hook race. Be careful not to push in the felt (2) when lubricating.**
- **If there is no more oil on the felt (2) of the shuttle race base assembly, problems with sewing may result.**

4. PREPARATION BEFORE SEWING

⚠ CAUTION

Turn off the power switch before installing the needle.

If this is not done, the sewing machine may operate if a switch is pressed by mistake, which could result in serious injury.

Set the clamp so that it does not protrude from the auxiliary plate within the whole of the feed area. Otherwise, injury or damage to the sewing machine may result.

The clamp should be carried by two or more people.

4-1. Preparing the clamp

Prepare the clamp while referring to the information below.

Process the work clamp and feed plate which match the sewing pattern, while referring to the processing diagram below.
The maximum sewing area size at the time of shipment is 700 x 450 mm.
Please refer to the Service Manual if you need to change the sewing area size.

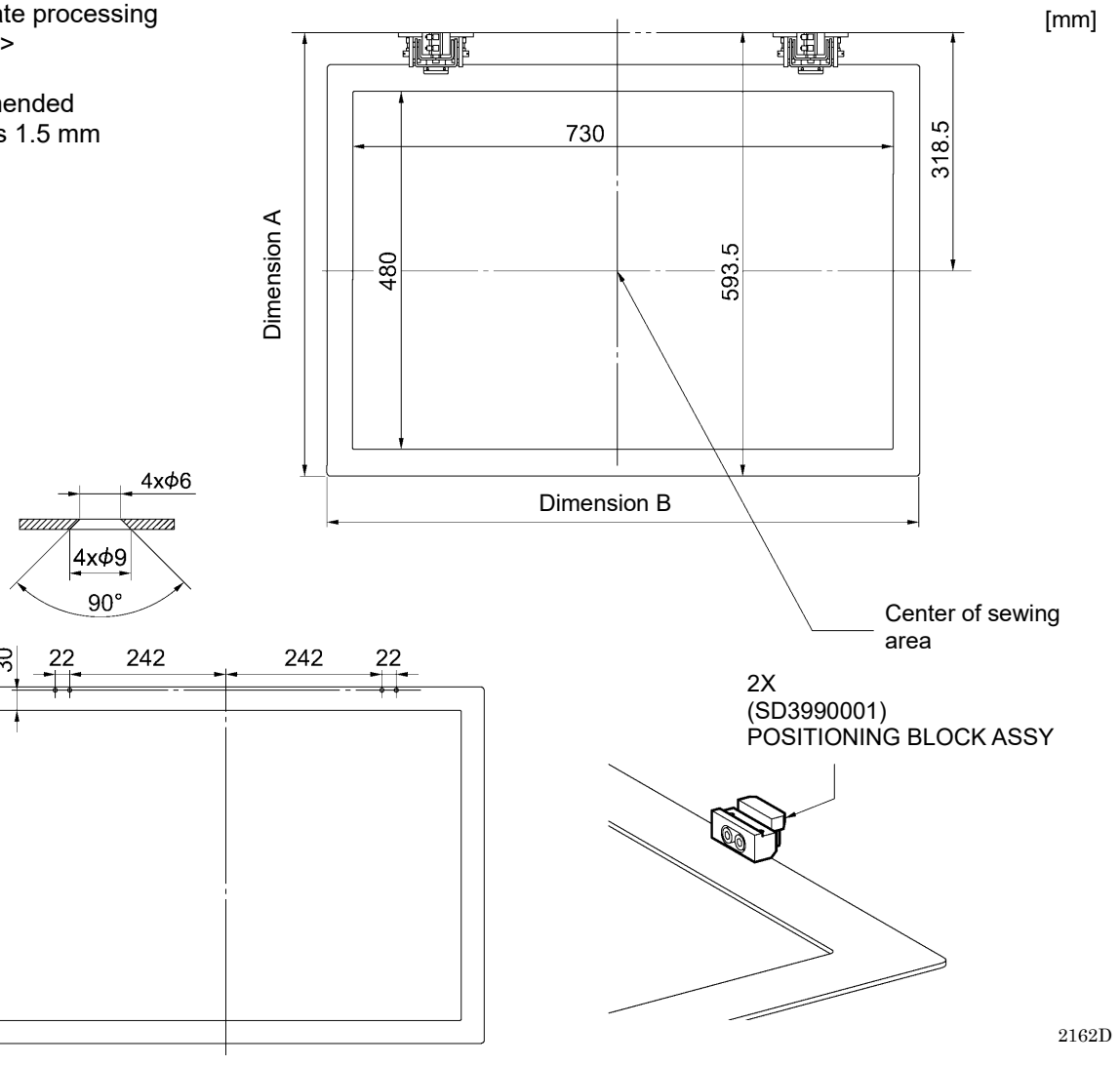
[NOTE]

- **If dimension A is 635 mm or more, the clamp will protrude from the auxiliary plate when moved forward.**
- **If dimension B is 1000 mm or more, the clamp will protrude from the auxiliary plate when moved sideways.**
- **Add a chamfer of approximately C0.5 to the ridge line on the bottom of the feed plate.**

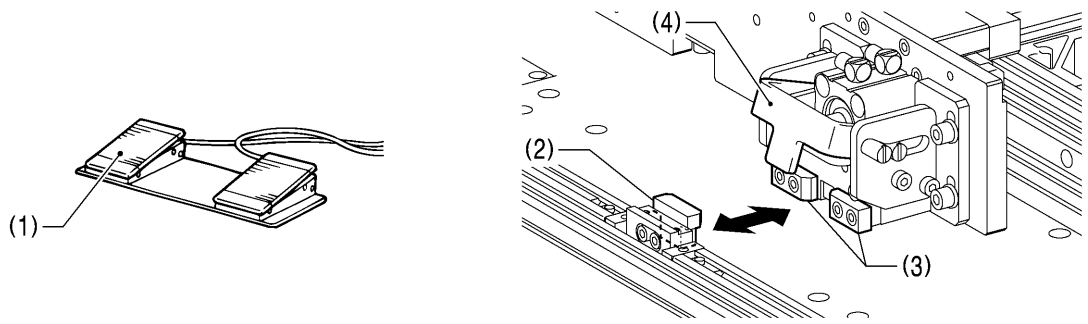
< Feed plate processing diagram >

Recommended thickness 1.5 mm

[mm]



4-2. Attaching and detaching the clamp

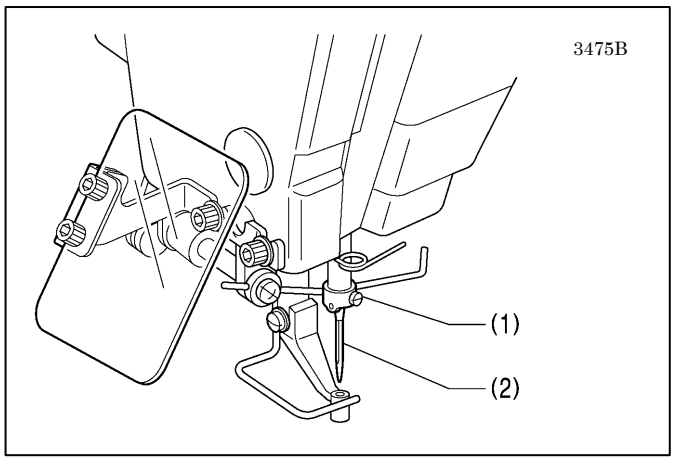


1. When you press the presser switch (1), the clamp lock is released and the clamp can be removed.
   Pull the clamp straight forward to remove it.
2. When attaching the clamp, insert the positioning blocks (2) of the clamp [2 pcs] between the guide blocks (3) [2 pcs].
   Press the presser switch (1) and the guide plates (4) [2 pcs] will close to lock the clamp.

4-3. Installing the needle

⚠ CAUTION

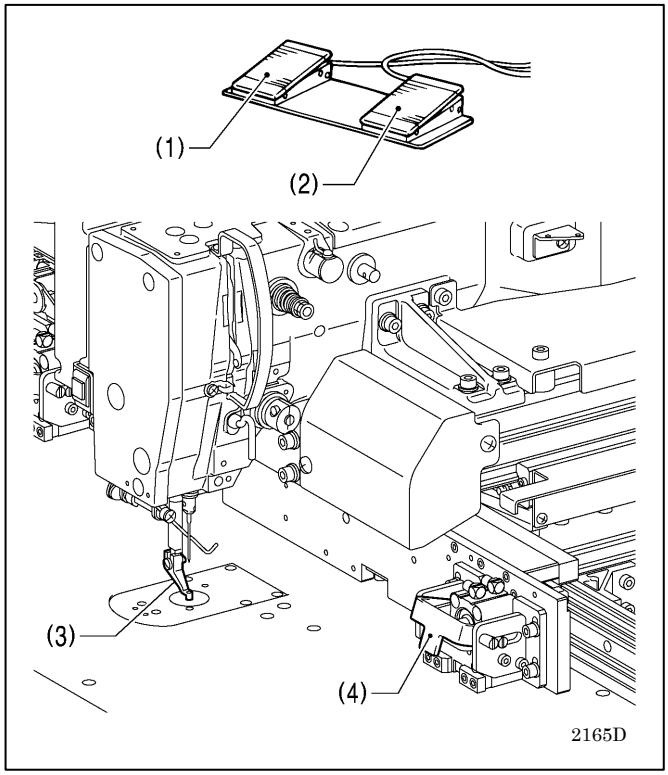
Turn off the power switch before installing the needle.
If the foot switch is depressed by mistake, the sewing machine might start operating and injury could result.



1. Loosen the set screw (1).
2. Insert the needle (2) in a straight line as far as it will go, making sure that the long groove on the needle is at the front, and then securely tighten the set screw (1).

[NOTE]
When changing the needle size, please refer to the following and perform the needle holder and needle clearance standard adjustment, as well as the needle holder and needle clearance adjustment.
"7-3. Needle bar and shuttle hook adjustment using the digital adjustment function"

4-4. Start switch operation method



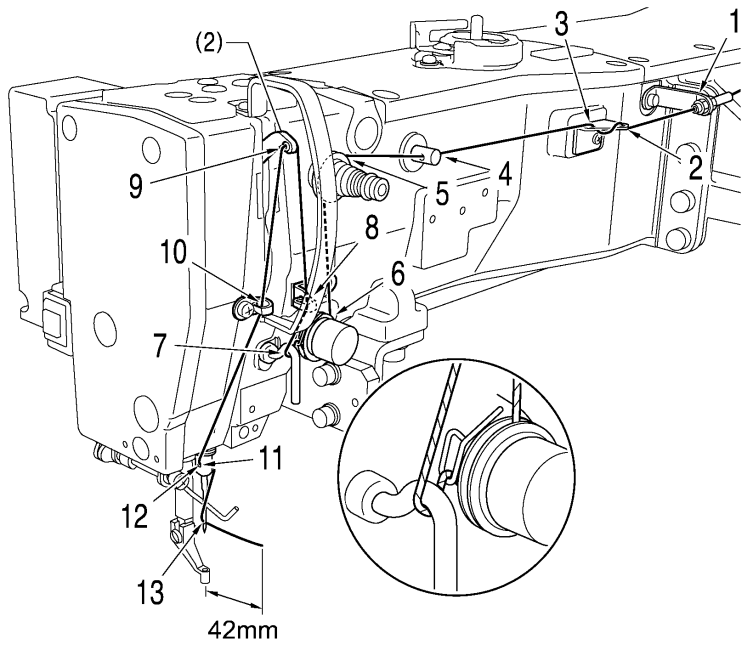
Press the presser switch (1) to close the intermittent presser (3) and the guide plates (4), and press the start switch (2) to start the sewing machine.

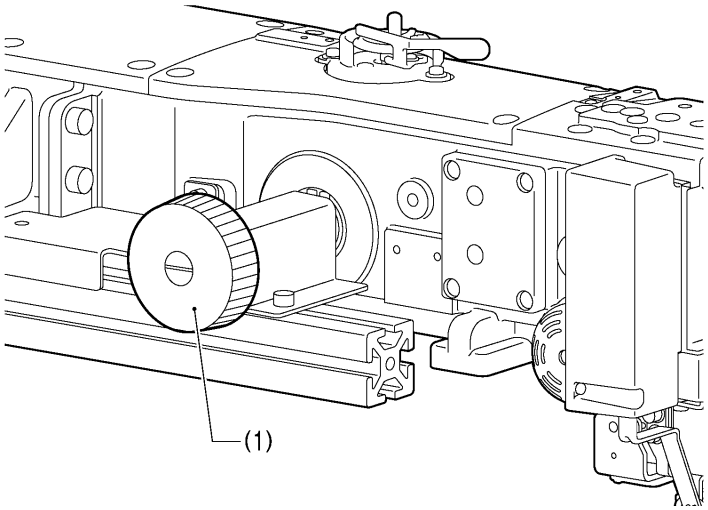
* If the auto-eject device is enabled, the sewing machine will not start without the clamp. For details, refer to the adjustment manual.

4-5. Threading the upper thread

Thread the upper thread correctly as shown in the illustration below.

* When using threading mode for threading, the thread can be threaded more easily.
(Refer to <Threading mode> on the next page.)



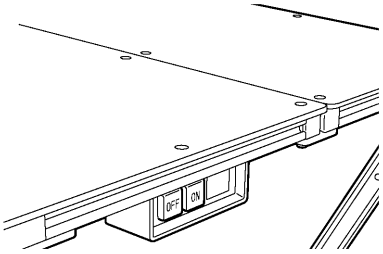


- Turn the pulley (1) and raise the thread take-up (2) to its highest position before threading the upper thread.
  (This will make threading easier and it will prevent the thread from coming out at the sewing start.)
- When threading the thread through the needle, allow a distance of approximately 42 mm between the needle hole and the end of the thread.
  If it is too long, the thread may become tangled, and if it is too short, the thread may pull out at the sewing start.

<Threading mode>

Threading mode is safe because the sewing machine will not start even when the start switch is depressed.

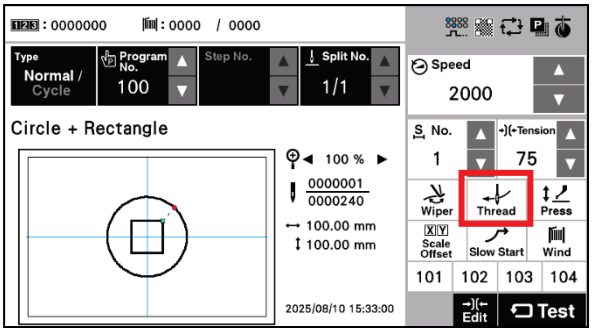
1

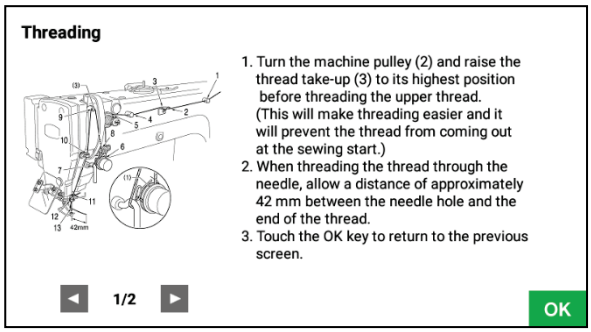


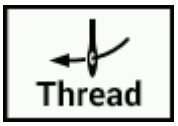
2168D

Turn on the power.

2





Touch the 

key on the screen.

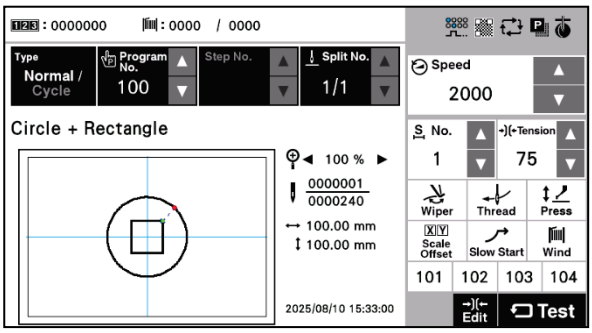
- Work clamp will drop.
- The tension discs will open.

3

Threading the thread.

4

Ending threading mode



Touch the 

key on the screen.

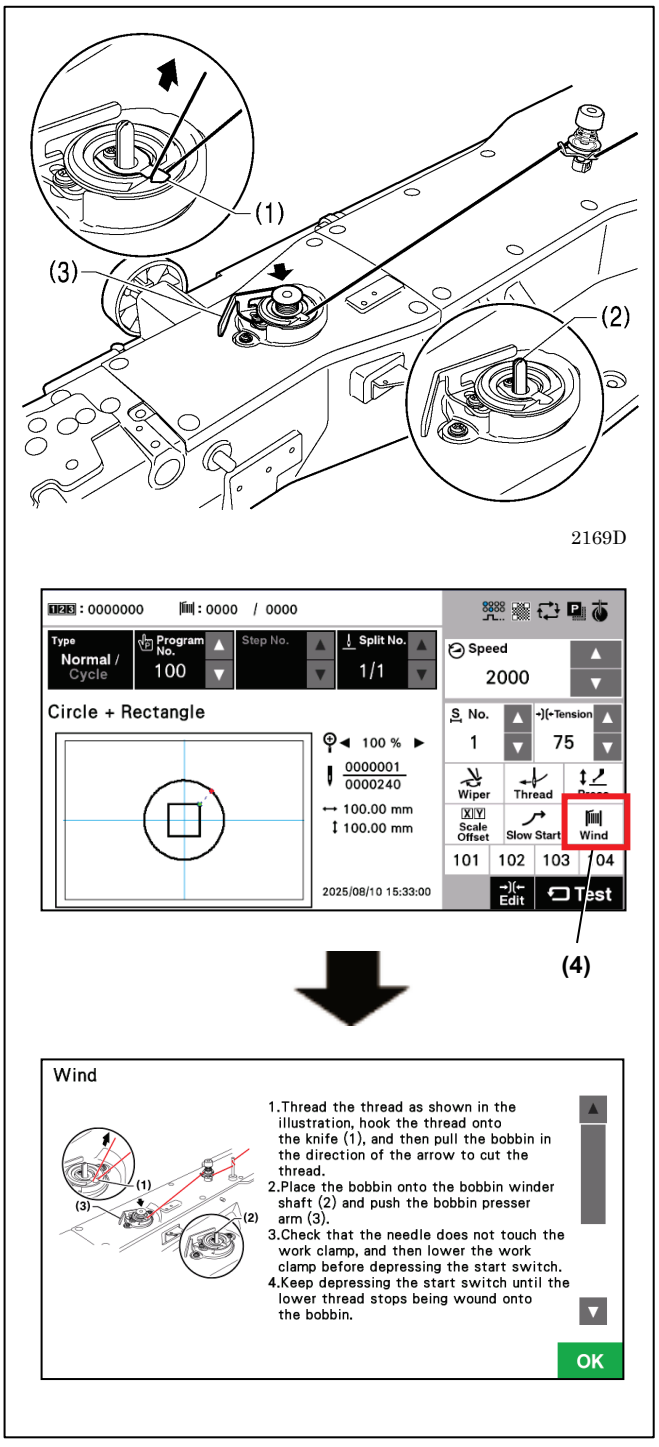
The display will return to the previous screen.

- The work clamp will return to where it was before threading mode was started.

4-6. Winding the lower thread

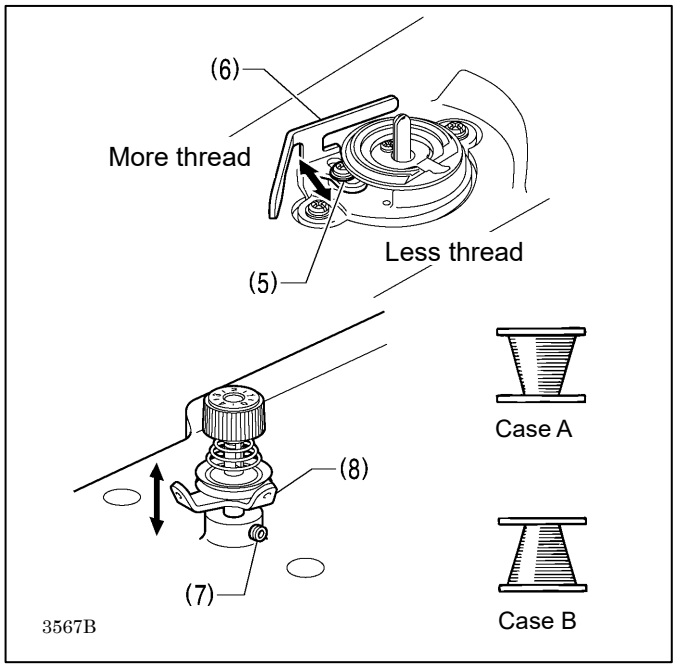
CAUTION

Do not touch any of the moving parts or press any objects against the machine while winding the lower thread, as this may result in personal injury or damage to the machine.



1. Thread the thread as shown in the diagram, hook it onto the knife (1), and then pull the thread in the direction of the arrow to cut it.
2. Place the bobbin onto the bobbin winder shaft (2).
3. Push the bobbin presser arm (3).
4. Turn on the power.
5. Lower the work clamp and then operate the start switch. Home position detection will be carried out.
6. Touch the Wind key (4) on the screen. The display will switch to the thread winding mode screen.
7. Check that the needle does not touch the work clamp, and then lower the work clamp and operate the start switch.
8. Keep depressing the start switch until the thread has finished being wound on.
9. Once winding of the set amount of thread is complete (80% to 90% of the bobbin diameter), the bobbin presser arm (3) will return automatically.
10. Remove the bobbin, hook the thread onto the knife (1), and then pull the thread in the direction of the arrow to cut it.
11. Touch the OK key to return to the previous screen.

If the thread tension is too strong, the thread may pull out and be lost at the start of winding.
In such cases, pull out about 10 mm of thread from the thread tension toward the sewing machine beforehand to make winding easier.



Adjusting the bobbin winding amount
Loosen the screw (5) and move the bobbin presser (6).

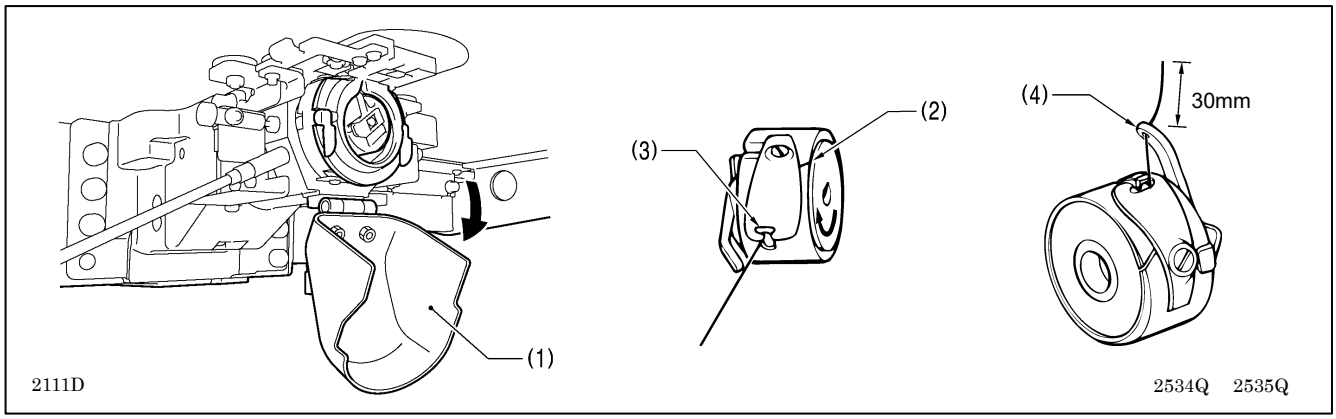
If the thread winds onto the bobbin unevenly
Loosen the set screw (7) and move the bobbin winder tension assembly (8) up and down to adjust.

* For case A, move the bobbin winder tension assembly (8) down, and for case B, move it upward.

4-7. Installing the bobbin case

⚠ CAUTION

Turn off the power switch before installing the bobbin case.
If the foot switch is depressed by mistake, the sewing machine might start operating and injury could result.



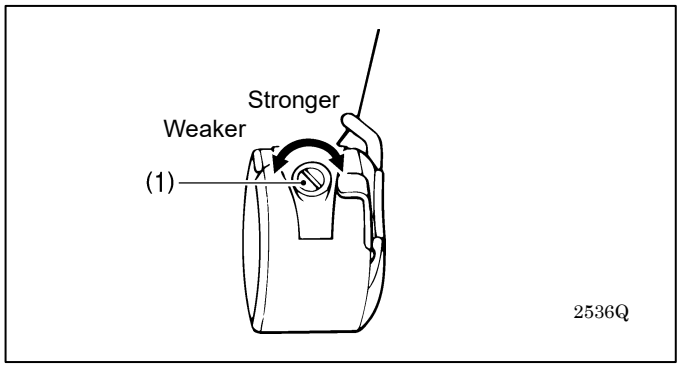
1. Open the shuttle hook cover (1).
2. While holding the bobbin so that the thread winds to the right, insert the bobbin into the bobbin case.
3. Pass the thread through the slot (2) and pull it out from the thread hole (3).
4. Check that the bobbin turns in the direction of the arrow when the thread is pulled.
5. Pass the thread through the lever thread hole (4), and then pull out approximately 30 mm of thread.
6. Hold the latch on the bobbin case and insert the bobbin case into the shuttle hook.

4-8. Thread tension

Thread tension reference

Upper thread	Air bag thread
Lower thread	Air bag thread
Upper thread tension (N) [Tension value]	2 - 3
Lower thread tension (N)	0.9 - 1.3
Tension setting value for thread trimming MSW589	80 - 120
Needle	DP ×17 #24
Normal sewing speed	2,000 sti/min

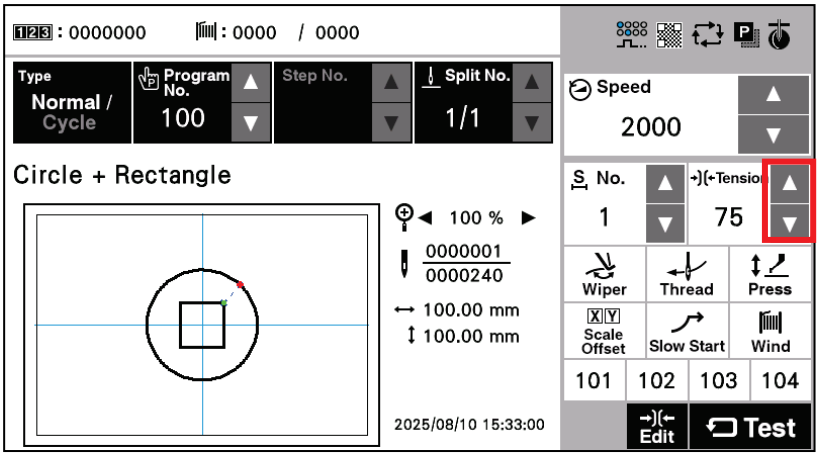
4-8-1. Lower thread tension

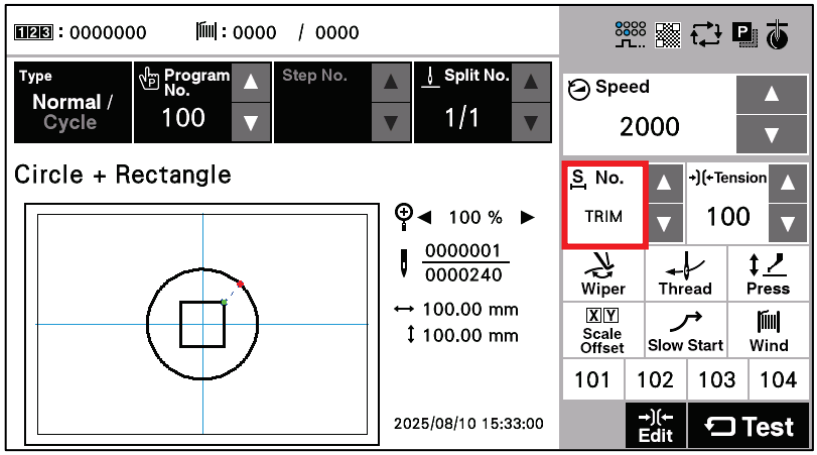


Adjust the thread tension to the weakest possible tension by turning the thread tension nut (1) until the bobbin case will not drop by its own weight while the thread end coming out of the bobbin case is held.

4-8-2. Upper thread tension

Sewing operation screen





Use the digital tension to adjust the tension as appropriate for the material being sewn.
(Refer to “Setting the tension value” below.)

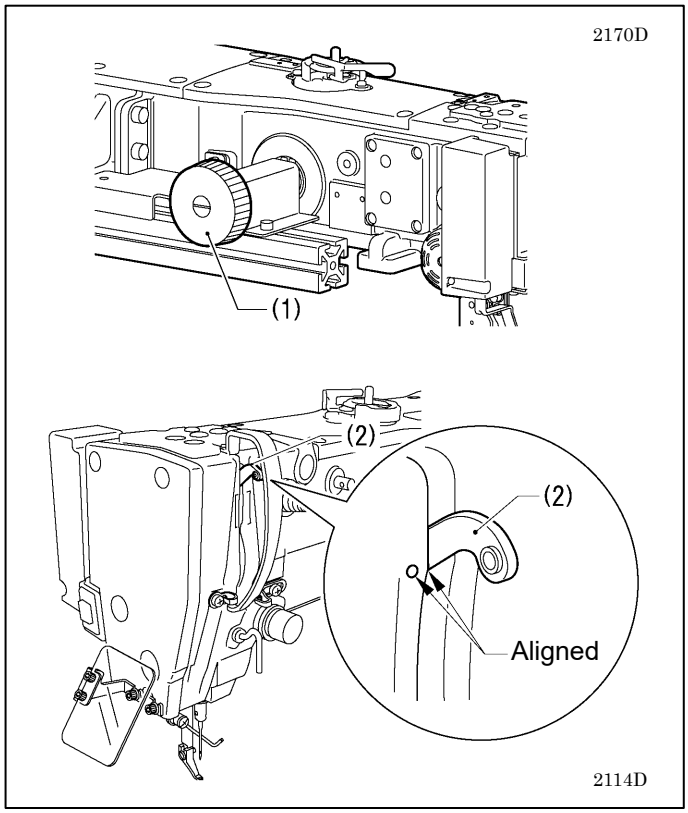
Also, adjust so that the remaining length of the upper thread is about 42 mm.

Setting the tension value

Touch the △ and ▽ keys (2) on the sewing operation screen to increase or decrease the Tension value.

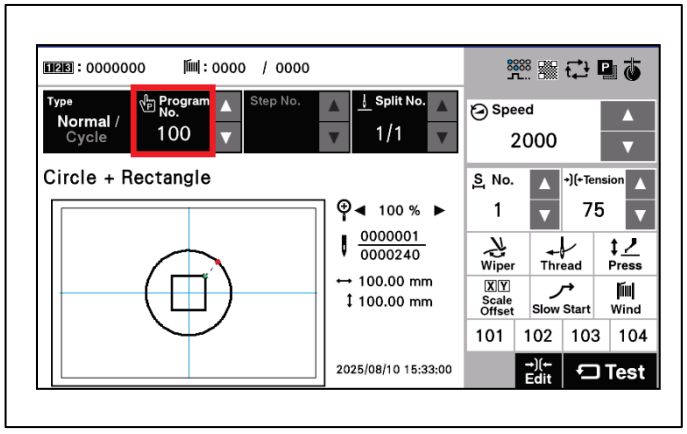
By selecting "TRIM" with the Section No. key, you can set the tension during thread cutting.
The values set here will be reflected in the memory switch No.589.

4-9. Starting up



Before turning on the power, check that the needle bar is at the needle up stop position.

Turn the pulley (1) in the direction of the arrow until the ridge at the bottom of the thread take-up (2) is aligned with the index mark.



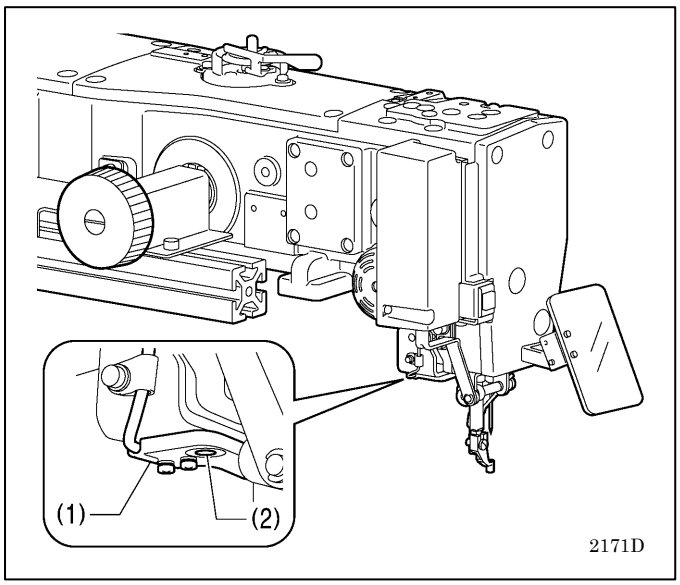
Turn on the power.
If a program has been registered, the program number and a preview of the sewing pattern will be displayed.
No programs are registered at the time of shipment from the factory, and so [---] is displayed as the program number (No.).

For details on the sewing data reading method, refer to "10. USING STORAGE MEDIA".

4-10. LED light operation method

⚠ CAUTION

Do not bring your hands close to moving parts such as the needle and the work clamp when adjusting the brightness of the LED light.
The sewing machine may operate if the start switch is pressed by mistake, which could result in serious injury.



There is an LED light at the back of the needle bar.
The brightness of the LED light (1) can be changed in six steps by pressing the switch (2).
It switches off during sewing.

5. SEWING

WARNING

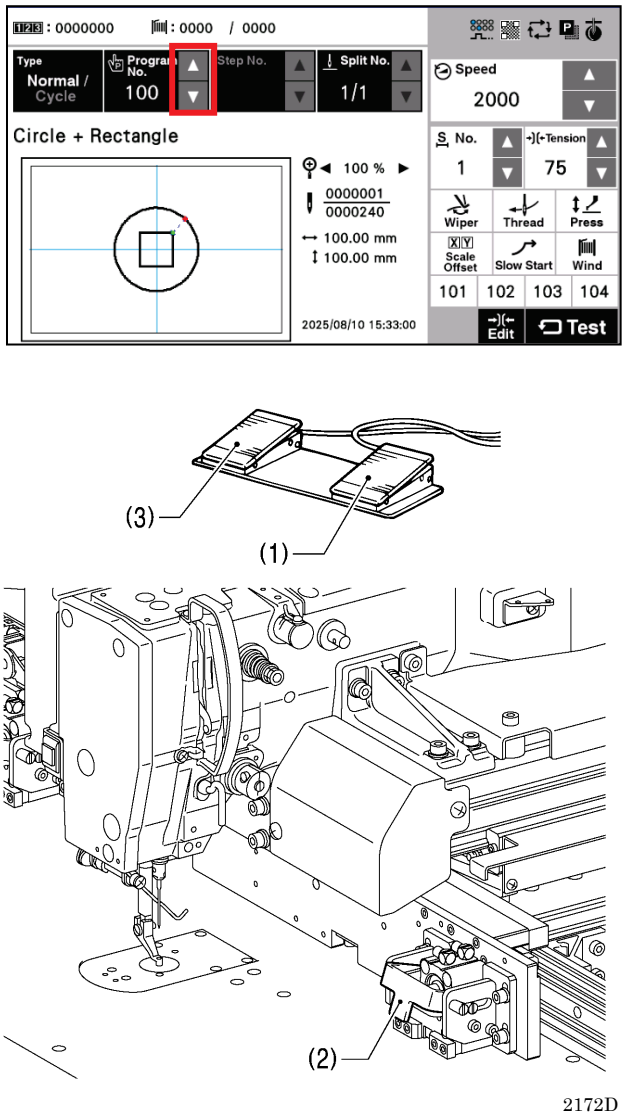
Do not allow any liquids to get onto this sewing machine, otherwise fire, electric shocks or operating problems may occur.
If any liquid gets inside the sewing machine (machine head or control box), immediately turn off the power and disconnect the power plug from the electrical outlet, and then contact the place of purchase or a qualified technician.

CAUTION

Turn off the power switch at the following times.
If the foot switch is depressed by mistake, the sewing machine might start operating and injury could result.
- **When replacing the bobbin and needle**
- **When not using the machine and when leaving the machine unattended**

Do not touch any of the moving parts or press any objects against the machine while sewing, as this may result in personal injury or damage to the machine.

5-1. Sewing



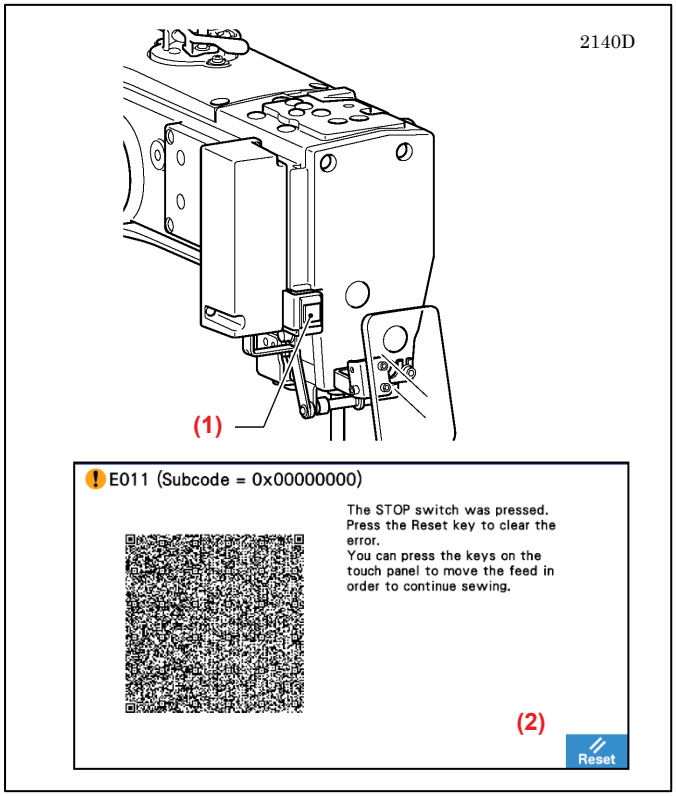
1. Turn on the power.
2. Touch the △ or ▽ key to select the number for theprogram to be sewn.
   * For details on reading sewing data from USB flashdrive, refer to "10-4. Importing items of sewing data separately" in the instruction manual.
3. Press the presser switch (3) to close the guide plate (2), then press the start switch (1). Origin detection will begin. When origin detection is completed, the guide plate (4) will open automatically.
4. Set the clamp.
5. Press the presser switch (3) to close the guide plate (2), then press the start switch (1) to start the sewing machine and begin sewing.
6. When sewing is finished, the guide plate (2) will open after thread trimming.

Please use a clamp that securely holds the material to prevent shifting.

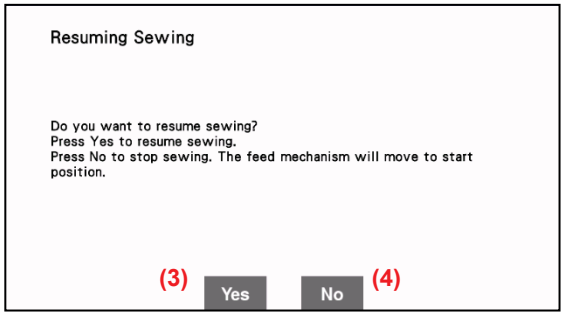
5-2. Using the STOP switch

If you press the pause switch (1) during sewing, an error dialog box will be displayed and the sewing machine will immediately stop.

< Clearing >

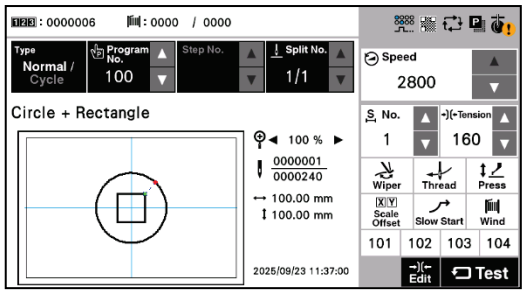
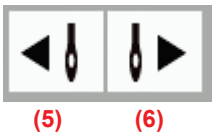
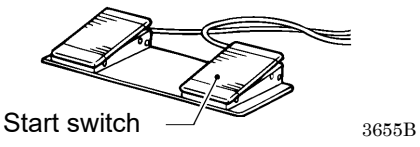


1. Touch the Reset key (2).
   - The thread will be trimmed, and then the error dialog box on the screen will disappear and the buzzer will stop.
2. A dialog box asking you to confirm if you want to continue sewing will be displayed.



< Continuing sewing from a stopping point >

If the thread breaks or the lower thread runs out during sewing, you can then continue sewing from the point where the thread broke or ran out.

1		Touch [Yes] (3) to return to the resewing standby screen.
2		Touch the ◀ ▶ keys (5) and (6) on the screen to return to the position where sewing is to be resumed. When you touch the ◀ key (5), the feed will move backward by 1 stitch, and when you touch the ▶ key (6), the feed will move forward by 1 stitch.
3		Depress the start switch. The sewing machine will start operating and sewing will start.

< Returning to the sewing start position without continuing sewing >

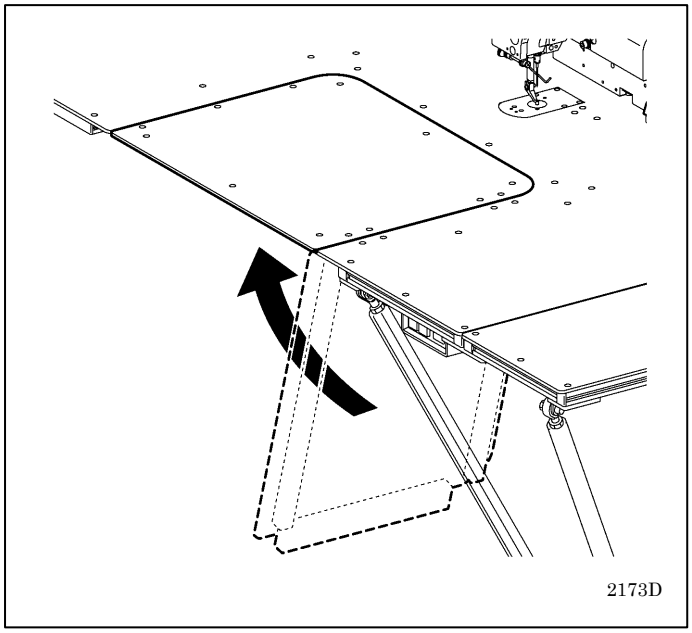
If you do not wish to continue sewing, touch [No] (4).

・ Returns to the sewing start position.

5-3. Opening and closing the auxiliary plate

If the front cover is opened during sewing, the sewing machine will stop immediately and an error dialog box will be displayed.

<Clearing>



1. Close the front cover.
2. Refer to "5-2. <Clearing>", "<Continuing sewing from a stopping point>" and "<Returning to the sewing start position without continuing sewing>"

[NOTE]

If you touch the Reset key without closing the front cover, the error will not be cleared.

6. CLEANING

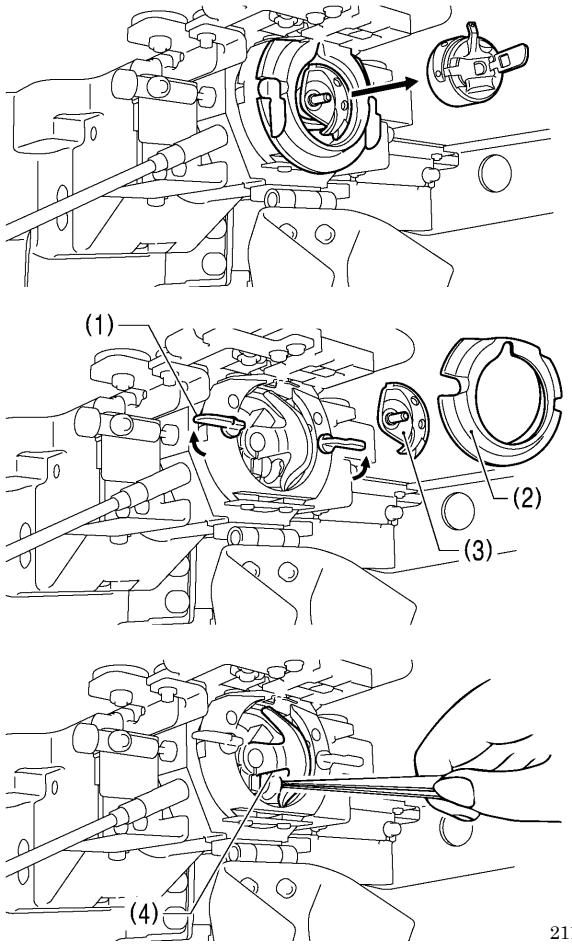
⚠ CAUTION

Turn off the power switch before carrying out cleaning.
If the foot switch is depressed by mistake, the sewing machine might start operating and injury could result.

Be sure to wear protective goggles and gloves when handling the lubricating oil and grease, so that they do not get into your eyes or onto your skin. If the oil and grease get into your eyes or onto your skin, inflammation can result.
Furthermore, do not drink or eat the lubricating oil or grease. They may cause diarrhea or vomiting. Keep the oil out of the reach of children.

Please be careful not to injure yourself on the sharp edges of the parts.

6-1. Cleaning the shuttle hook

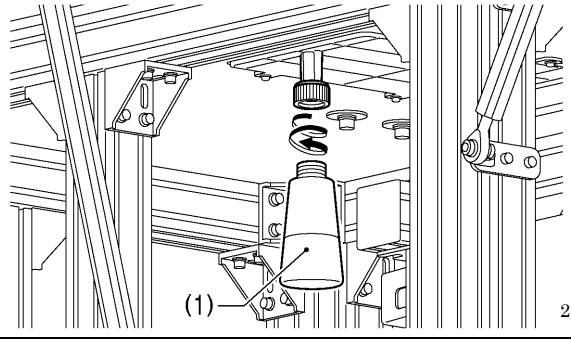


1. Pull the shuttle race cover downward to open it, and then remove the bobbin case.

2. Open the setting claw (1) in the direction indicated by the arrow, and then remove the shuttle race base (2) and the shuttle hook (3).

3. Clean all the dust and lint from around the driver (4), the top of the shuttle hook thread guide and the shuttle race.

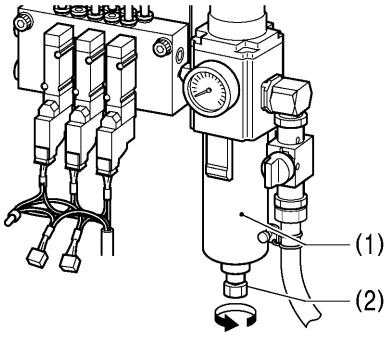
6-2. Draining the oil



1. Remove and empty the oiler (1) whenever it is full.
2. After emptying oiler (1), screw it back into its original position.

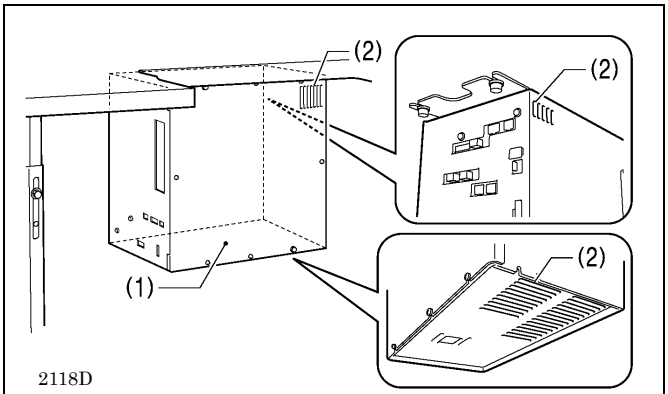
* Dispose of waste oil correctly in accordance with local regulations.

6-3. Checking the regulator



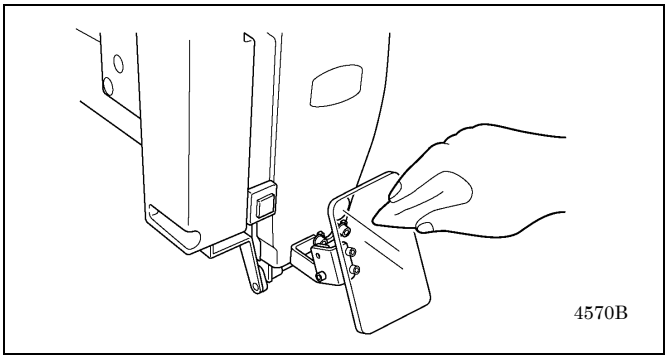
1. If water collects in the bottle of the regulator (1), turn the drain cock (2) in the direction of the arrow to drain the water.
2. After draining the water, tighten the drain cock (2).

6-4. Cleaning the control box air inlet ports



Use a vacuum cleaner to clean the filter in the air inlet ports (2) of the control box (1) at least once a month.

6-5. Cleaning the eye guard

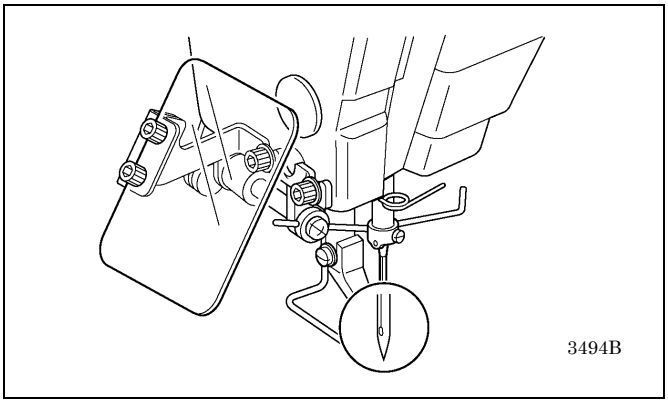


Wipe the eye guard clean with a soft cloth.

[NOTE]

Do not use solvents such as kerosene or thinner to clean the eye guard.

6-6. Checking the needle



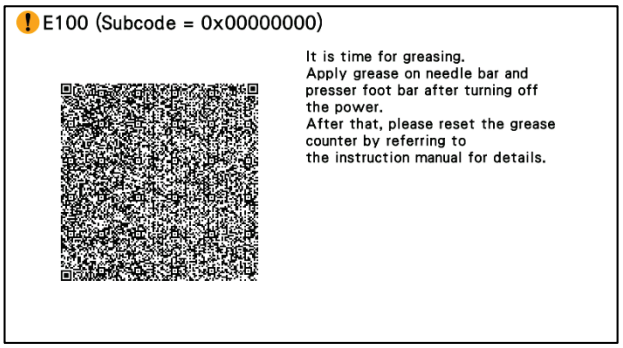
Always check that the tip of the needle is not broken and also that the needle is not bent before starting sewing.

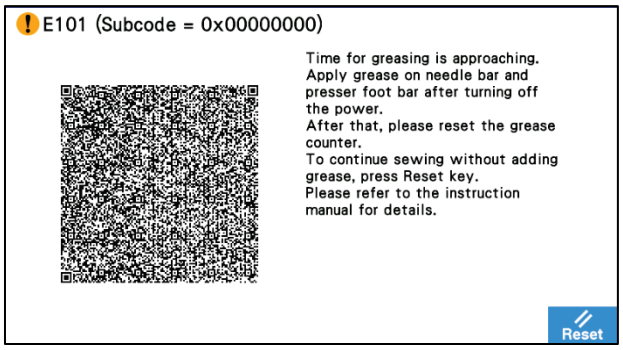
6-7. Lubrication

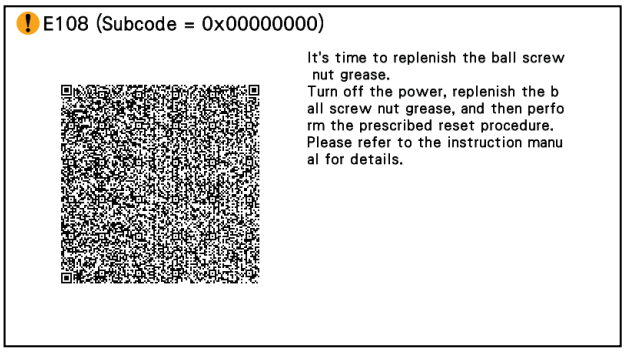
Lubricate the sewing machine while referring to "3-10. Lubrication".

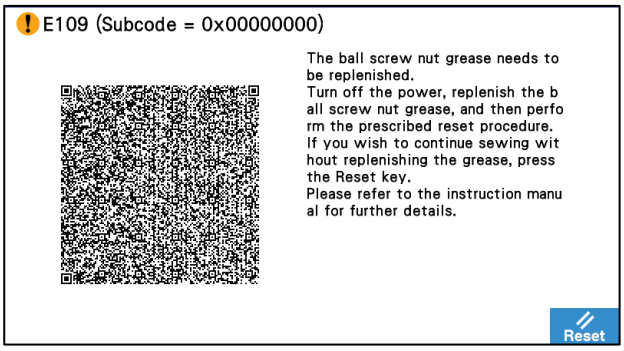
6-8. Applying grease

If the grease-up warnings [E100] or [E101] appear, apply grease to the needle bar bush.
If [E108] or [E109] is displayed, please add grease to the ball screw nut.







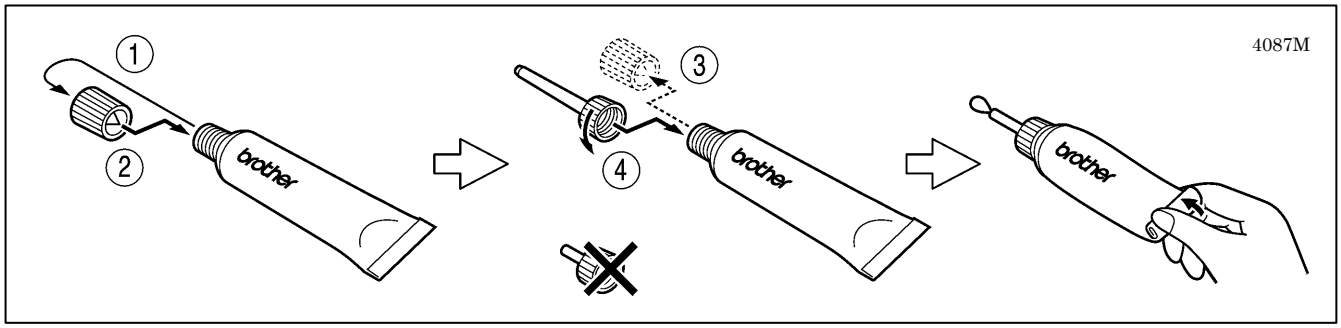


6-8-1. Applying grease to the needle bar bearing

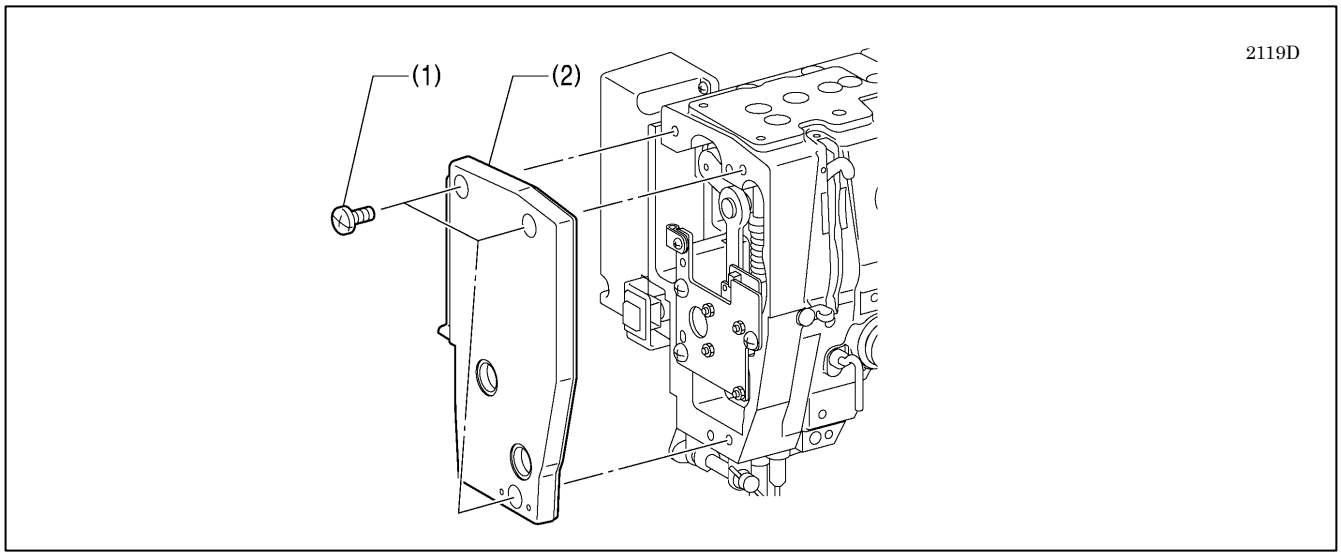
< Applying grease >

Use the Brother-specified <Grease unit (SC9170-001)>.
Ask the place of purchase for details on obtaining this item.

1. Using the tube

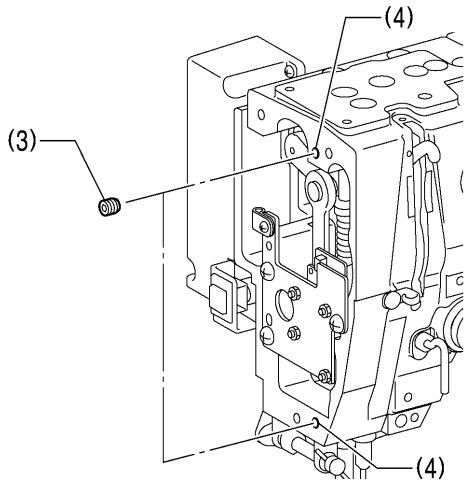


2. Removing the face plate



Remove the [three] screws (1), and then remove the face plate (2).

3. Applying grease



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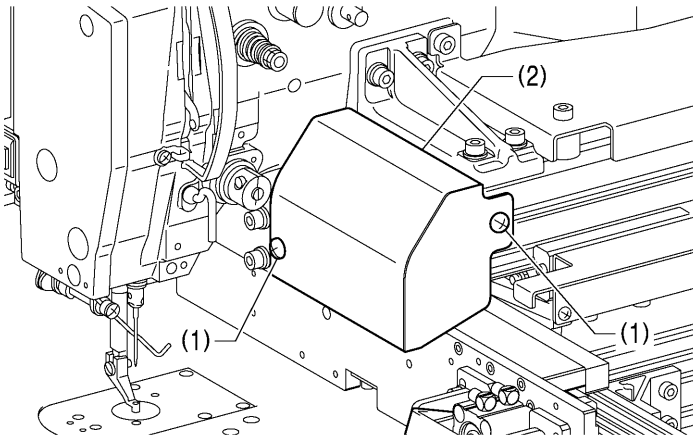
Remove the set screw (3), raise the needle bar to its highest position, and then apply grease to the [two] holes (4) until it overflows slightly.
Gently tighten the set screw (3) to a torque of about 1 N.m. If the set screws are tightened too firmly, it may damage the sewing machine.

6-8-2. Greasing the ball screw nut

< Applying grease >

It is recommended to use THK AFB-LF grease.
For the grease gun, it is recommended to use THK MG70 (H type nozzle).
Ask the place of purchase for details on obtaining this item.

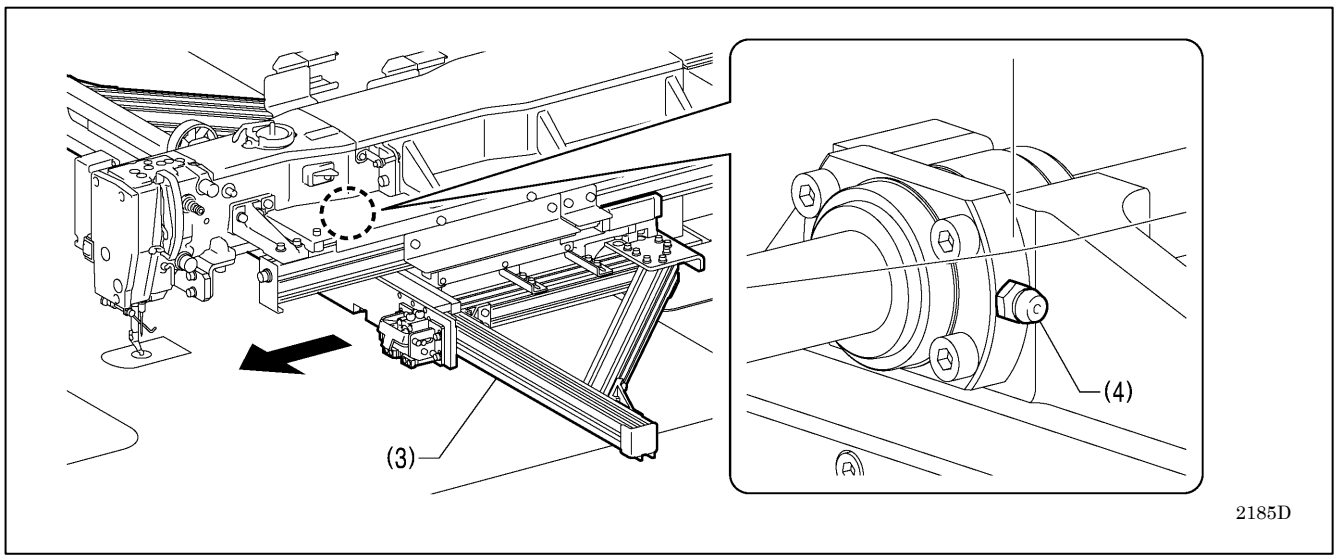
1. Removal of the front cover



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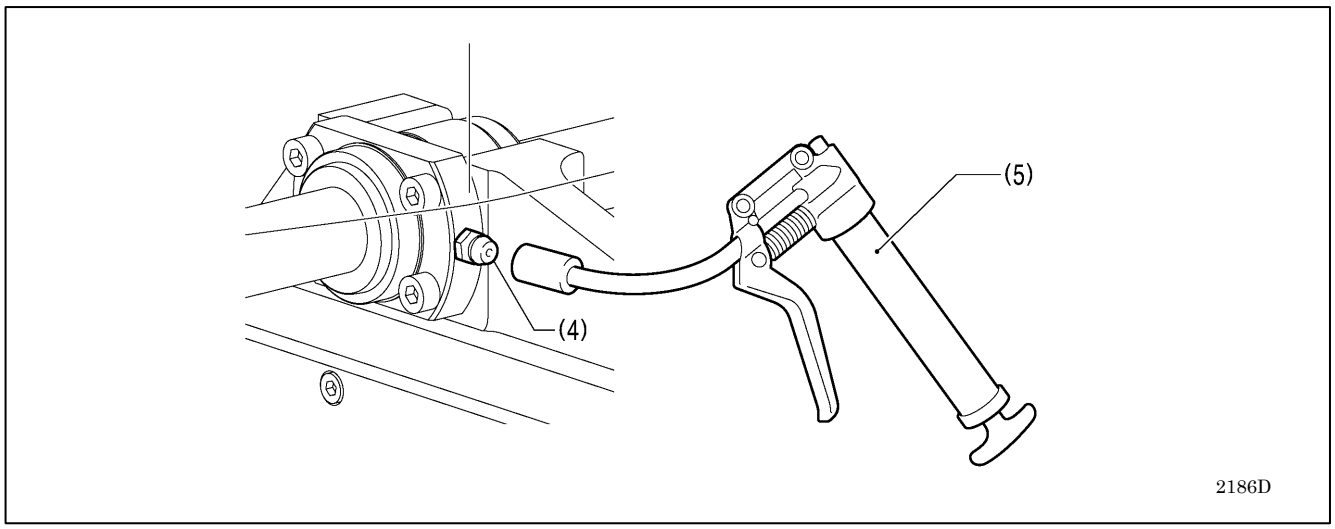
Remove screws (1) [2 pcs] and take off the front cover (2).

2. Feed movement



Move the feed mechanism (3) forward to access the ball screw nut (4).

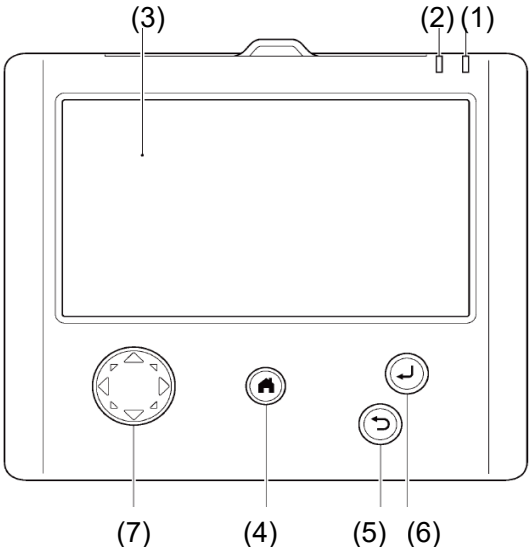
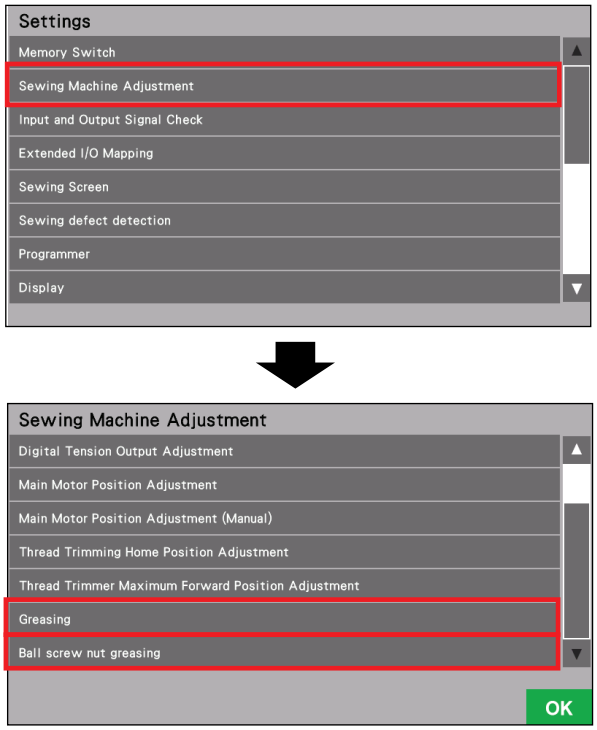
3. Greasing the ball screw nut



Press the tip of the grease gun (5) against the grease port (4) and supply more than 5 cc of grease. Since one stroke of the grease gun (MG70) injects 0.6 cc, make at least 9 strokes, ensuring grease comes out of the nozzle. After adding grease, move the head left and right several times while gradually adding grease.

< Grease-up counter initialization method >

After applying grease, carry out the procedure given below to initialize the cumulative number of stitches up to when the grease was applied.

1		Turn off the power for the sewing machine.
2		While pressing the HOME key (4) and the ENTER key (6), turn on the power switch. Keep holding down the HOME key (4) and the ENTER key (6) until the home screen is displayed.
3		When the screen shown at left appears, release the keys.
4		Touch Settings → Sewing Machine Adjustment → Tap "Greasing" or "Ball screw nut greasing".

5	  	If you touch OK in the screen shown at left, the grease up counter will be initialized.
6		After the initialization is complete, turn off the power.

7. STANDARD ADJUSTMENTS

⚠ CAUTION

Maintenance and inspection of the sewing machine should only be carried out by a qualified technician.

Ask your Brother dealer or a qualified electrician to carry out any maintenance and inspection of the electrical system.

Turn off the power switch and disconnect the power cord before carrying out the following operations.
If this is not done, the sewing machine may operate if a switch is pressed by mistake, which could result in serious injury.

- **Inspection, adjustment and maintenance**
- **Replacing consumable parts such as the shuttle hook**

Disconnect the air hoses from the air supply and wait for the needle on the pressure gauge to drop to "0" before carrying out inspection, adjustment and repair of any parts which use the pneumatic equipment.

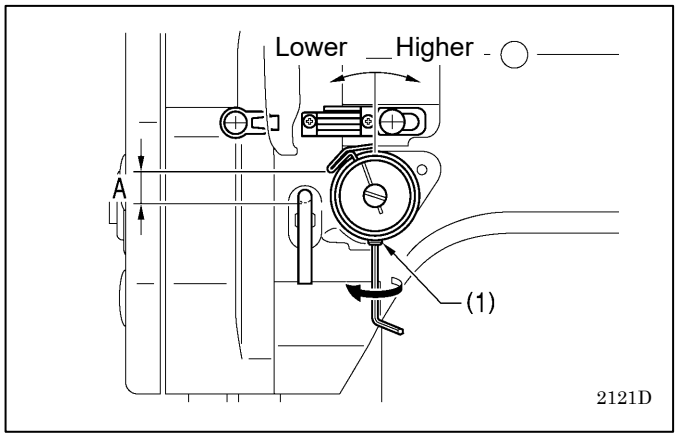
If the power switch and air need to be left on when carrying out some adjustment, be extremely careful to observe all safety precautions.

Be sure to wear protective goggles and gloves when handling the lubricating oil and grease, so that they do not get into your eyes or onto your skin. If the oil and grease get into your eyes or onto your skin, inflammation can result.
Furthermore, do not drink or eat the lubricating oil or grease. They may cause diarrhea or vomiting.
Keep the oil out of the reach of children.

If any safety devices have been removed, be absolutely sure to re-install them to their original positions and check that they operate correctly before using the machine.

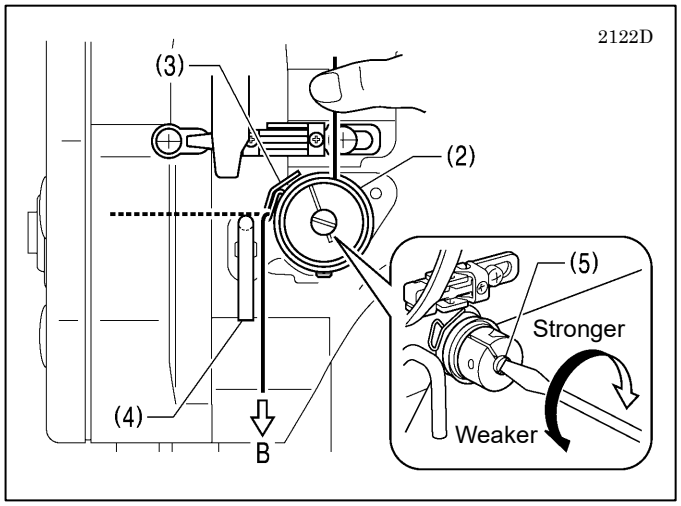
7-1. Thread take-up spring

Thread take-up spring height(mm) A	2 - 6
Thread take-up spring tension(N) B	0.6 - 1.2



< Thread take-up spring height >

Loosen the set screw (1) and turn the adjuster to adjust.



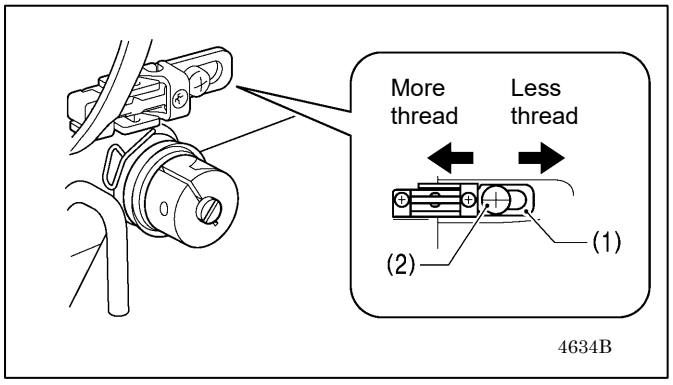
< Thread take-up spring tension >

1. Press the upper thread slightly above the tension bracket (2) with a finger to stop the thread spooling out.
2. Pull the upper thread downward so that the thread take-up spring (3) is extended to the same height as the base of the thread guide arm (4), and then measure the tension of the thread take-up spring (3).
3. Use a screwdriver to turn the tension stud (5) in order to adjust the tension of the thread take-up spring (3).

[NOTE]

If the thread tension spring (3) is not adjusted correctly, the upper thread trailing length will be uneven after thread trimming.

7-2. Adjustment of the defect detector position

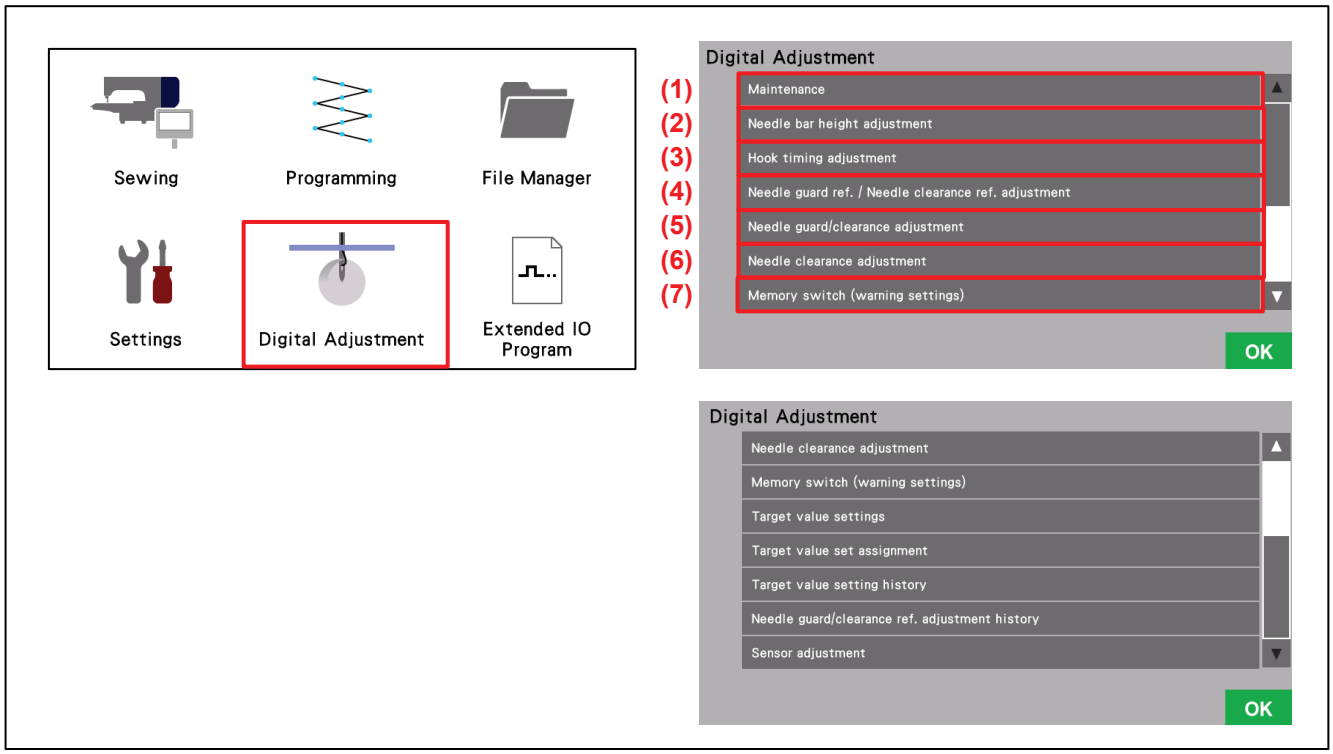


To adjust the position, loosen the screw (2) and then move the defect detector (1).

- When sewing heavy-weight material, move the defect detector (1) to the left. (The thread take-up amount will increase.)
- When sewing light-weight material, move the defect detector (1) to the right. (The thread take-up amount will decrease.)

7-3. Needle bar and shuttle hook adjustment using the digital adjustment function

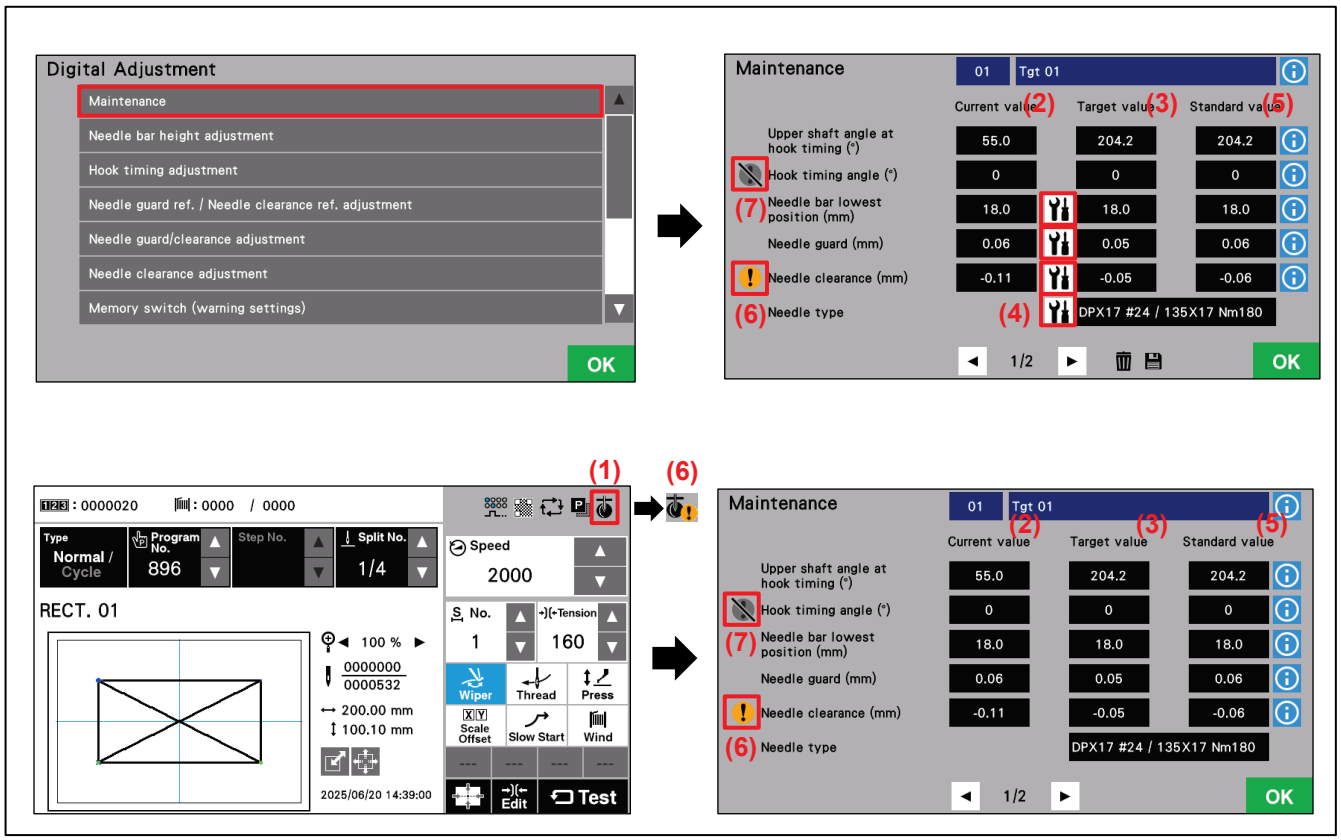
The needle bar and hook can be adjusted using the digital adjustment on the home screen.



(1) Maintenance	7-3-1. Checking method for adjustment status
(2) Needle bar position adjustment	7-3-2. Adjusting the needle bar position
(3) Standard timing adjustment	7-3-3. Adjusting the needle and shuttle hook timing
(4) Needle guard and needle clearance standard adjustment	7-3-4. Acquiring the reference position for the needle, driver and shuttle hook
(5) Needle guard and needle clearance adjustment	7-3-5. Adjusting the driver (needle guard) position 7-3-6. Adjusting the clearance (needle clearance) between the needle and shuttle hook tip
(6) Needle clearance adjustment	7-3-6. Adjusting the clearance (needle clearance) between the needle and shuttle hook tip
(7) Memory switch (Warning Setting)	9-2. List of memory switch settings

7-3-1. Checking method for adjustment status

You can check the adjustment condition of the needle bar and shuttle hook by looking at [Maintenance] under "Digital adjustment", or by touching the maintenance mark (1) on the sewing screen.



The current value (2) displays the current adjustment status based on sensor information.

* The values displayed by the maintenance mark show the information which was last obtained by the sensors since the machine was started.

* The sensor information is acquired when sewing is completed, when various adjustments are performed using digital adjustment, and when the maintenance screen is displayed from digital adjustment on the home screen.

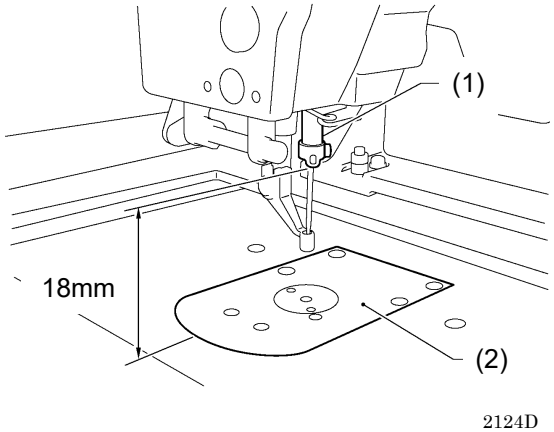
The target value (3) is a value that the user can set as desired. It can be changed using the change button (4). For how to change the target values for [Upper shaft angle when the needle and shuttle hook meet] and [The needle and shuttle hook timing standard angle], please refer to "7-3-3. Adjusting the needle and shuttle hook timing".

* If you move to the maintenance screen from the sewing screen, the change button will not be displayed on the maintenance screen.

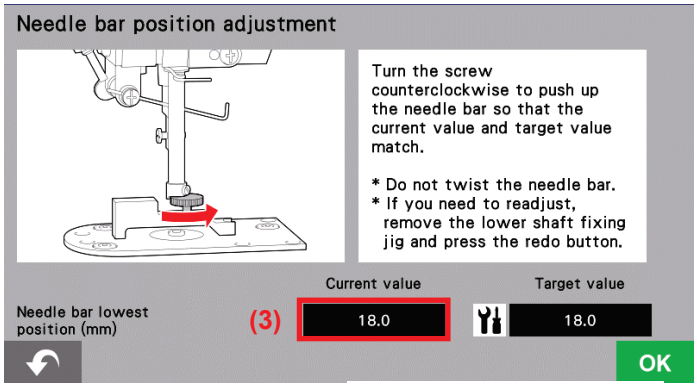
The standard value (5) is the target value recommended by the manufacturer and is displayed as a reference.
If the current values exceed the target value thresholds which have been set using the [memory switch setting], a warning icon (6) will be displayed.
If the sensing function is disabled in the [memory switch setting], the sensing disabled mark (7) will be displayed.

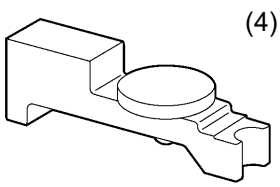
7-3-2. Needle bar position

Adjust the position of the needle bar while following the panel flowchart in "Needle bar position adjustment" under "Digital adjustment".

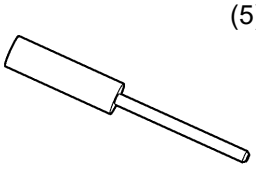


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4697B



4698B

The distance from the base of the needle bar to the needle plate (2) when the needle bar (1) is at its lowest position is displayed on the panel. The standard adjustment target value by the manufacturer is 18 mm (ORGAN DP×17). Use the <Needle bar adjustment tool assembly (SC5692-001)> (3) and <Upper shaft fixed shaft (SC5693-001)> (4) as the adjustment tools.

* If you carry out adjustment of the needle bar position without following the panel flowchart, damage may result.

If the lowest position for the needle bar diverges by more than ±0.4 mm (can be varied using memory switch) from the target value during sewing, a warning icon will be displayed on the sewing screen and the maintenance screen.

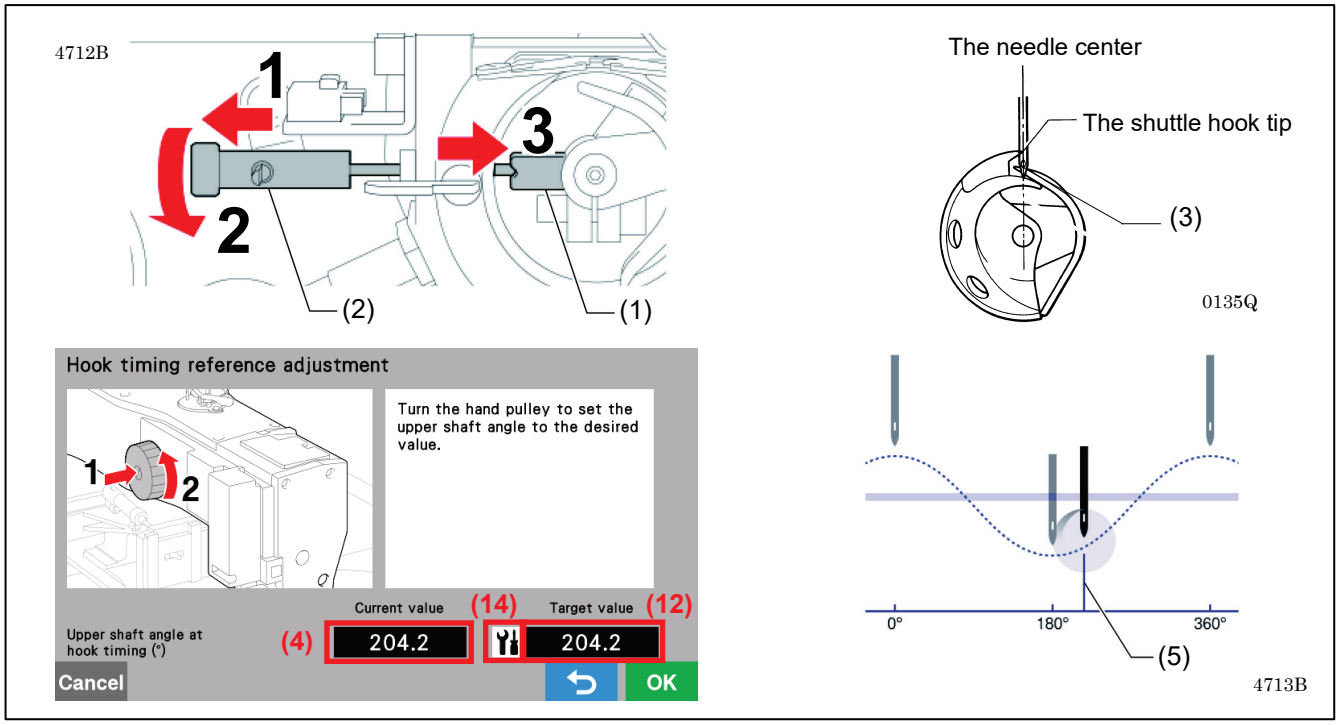
* If using a DPx5 needle, the warning mark display will not work when using the digital adjustment function to carry out [needle bar position adjustment].

[NOTE]

After adjusting the needle bar position, please refer to the next page and perform "7-3-3. Adjusting the needle and shuttle hook timing."

7-3-3. Adjusting the needle and shuttle hook timing

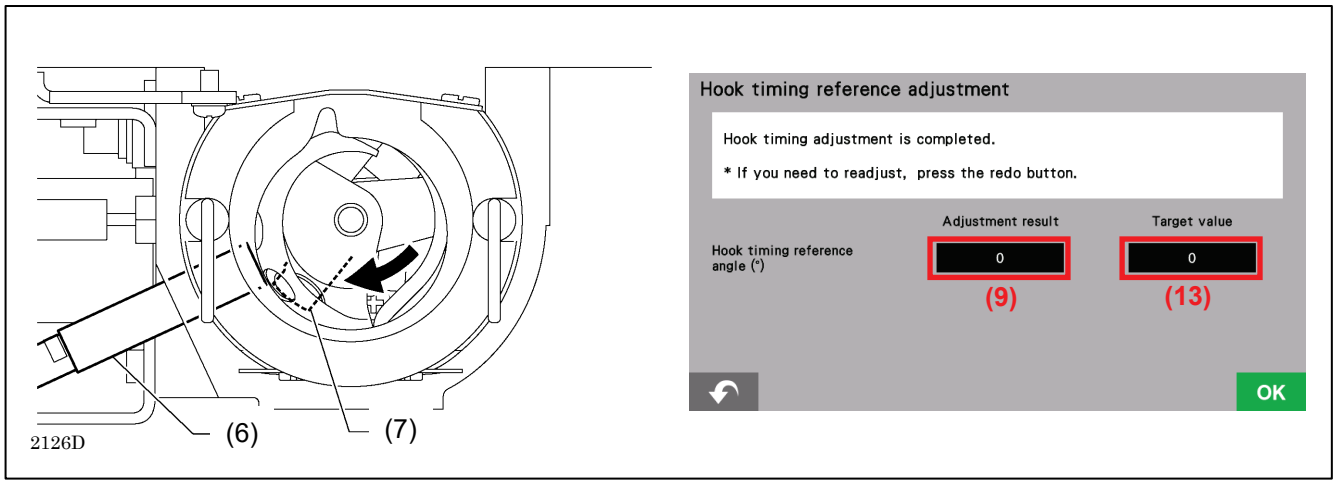
Adjust the timing of the needle and shuttle hook while following the panel flowchart in "Standard timing adjustment" under "Digital adjustment".



When the driver (1) is provisionally secured using the index plunger (2), the driver can be secured in the position where the needle center and the shuttle hook tip are aligned (needle and shuttle hook meet) (3). In this condition,
adjust the position of the needle when it meets the shuttle hook by changing the angle* (4) of the upper shaft.

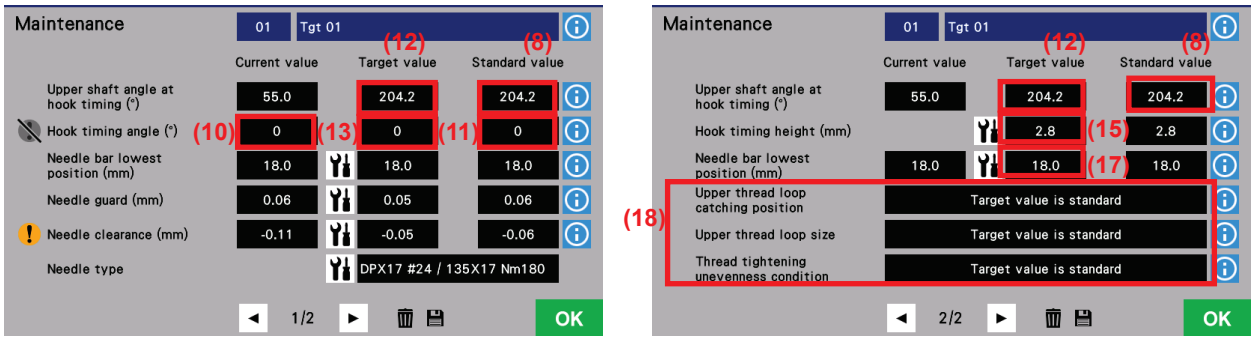
* Angle (5) of vertical needle movement position when highest needle position is 0°. The standard adjustment target value by the manufacturer is when the needle center is aligned with the shuttle hook tip when the upper shaft angle is 204.2° (ORGAN DPx17).

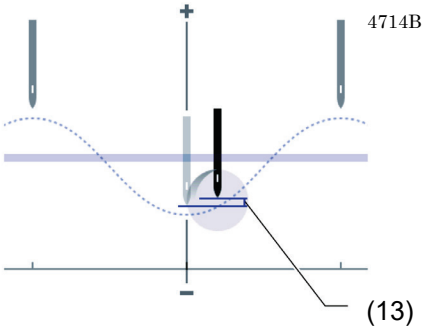
* If you are using anything other than <Shuttle hook LC (SC9654-101) for airbag specification> or <Shuttle hook LH (SA8197-201) for heavy material specification>, the adjustment of engagement timing using [Standard timing adjustment] is not supported. Set the upper shaft angle to 204.2°, and fix the driver so that the needle center and the tip of the shuttle hook are aligned.



Operate the sewing machine to rotate the driver, and make a note of the upper shaft angle at the point when the sensor (6) detects the projection (7) on the driver (when the sensor reacts).
The difference between [The upper shaft angle at the moment when the sensor (6) detects the protrusion (7) of the driver] and [Upper shaft angle at the time of sensor reaction when the upper shaft angle at hook timing has been adjusted to the standard value (204.2°) (8) (Pre-obtained in digital adjustment > sensor adjustment > hook timing reference sensor)] is displayed as the adjustment result of the hook timing reference angle (9) and the current value of hook timing reference angle on the maintenance screen (10).
The standard value for the hook timing reference angle is 0° (11). The standard state is the rotation phase of the hook when the target value (12) of the [Upper shaft angle at hook timing] on the upper shaft angle adjustment screen of the [hook timing reference adjustment] is set to the standard value (204.2°) (8).

The target value (13) for the hook timing reference angle is the amount of change from the standard state of the rotational phase of the hook when the target value (12) of the [upper shaft angle at hook timing] is altered.
If the standard needle and shuttle hook timing during sewing varies by more than ±2° (can be varied using memory switch) from the target value, a warning icon will be displayed on the sewing screen and the maintenance screen.

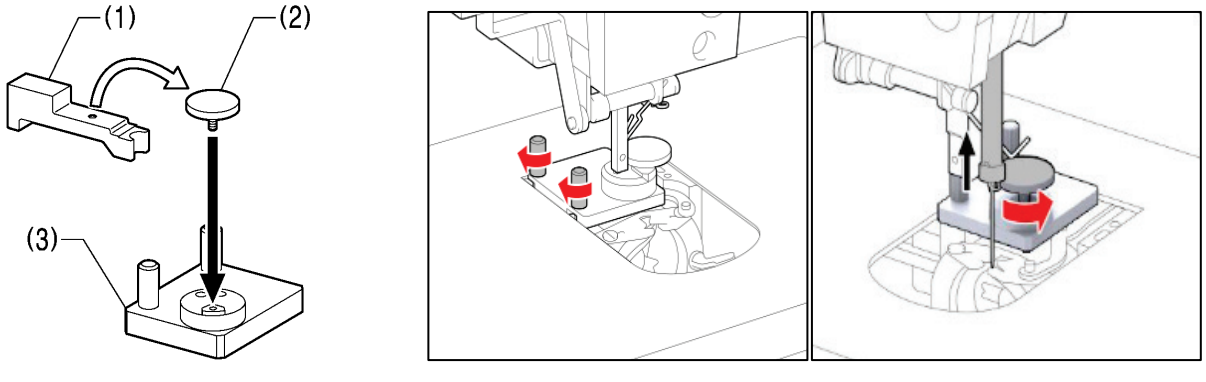




The target value (12) for the upper shaft angle when the needle and shuttle hook meet can be changed using the change button (14) in the upper shaft angle adjustment screen "when adjusting the standard timing", or by referring to page 2 of "Maintenance" under "Digital adjustment" (refer to "7-3-1. Checking method for adjustment status").
When the target value (15) for the meeting height* is changed, the target value (12) for the upper shaft angle at the meeting point and the target value (13) for the meeting timing reference angle are also changed in conjunction.

* The amount of needle rise from the lowest point of the needle bar to the meeting point (when the needle center and the shuttle hook tip are aligned) (16)

If you want to finely adjust the upper shaft angle at the timing, please adjust it using the following method.



As an adjustment jig, remove the knob part (2) from the separately sold < Needle Bar Adjustment Jig (SC5692-001) >(1), attach it to the < Adjusting Timing Jig (SD0926-101) >(3), and use it.
Remove the needle plate, attach the engagement angle adjustment jig, and turn the knob to move the needle bar and finely adjust the upper shaft angle.

The differences from when the adjustments have been made to the standard values for the supplementary position for the upper thread loops, the size of the upper thread loops and the upper thread tightening (18) can be checked by a combination of the target value (15) for the height of the needle bar and the target value (17) when the needle bar is at its lowest position. Refer to the following table when setting the target values.

Table: |Difference between target value and standard value for height when needle and shuttle hook meet| ≠ |Difference between target value and standard value for needle bar lowest position|

Height when needle and shuttle hook meet / Height at needle bar lowest position	High	Standard	Low
High	Loop: Large Supplementary position: Low Tightening: Weak	Loop: Standard Supplementary position: Standard Tightening: Standard	Loop: Small Supplementary position: High Tightening: Strong
Standard	Loop: Large Supplementary position: Low Tightening: Weak	Loop: Standard Supplementary position: Low Tightening: Standard	Loop: Small Supplementary position: High Tightening: Strong
Low	Loop: Large Supplementary position: Low Tightening: Weak	Loop: Standard Supplementary position: High Tightening: Standard	Loop: Small Supplementary position: High Tightening: Strong

Table: |Difference between target value and standard value for height when needle and shuttle hook meet| = |Difference between target value and standard value for needle bar lowest position|

Height when needle and shuttle hook meet / Height at needle bar lowest position	High	Low
High	Loop: Large Supplementary position: Low Tightening: Weak	Loop: Small Supplementary position: Standard Tightening: Strong
Low	Loop: Large Supplementary position: Standard Tightening: Weak	Loop: Small Supplementary position: High Tightening: Strong

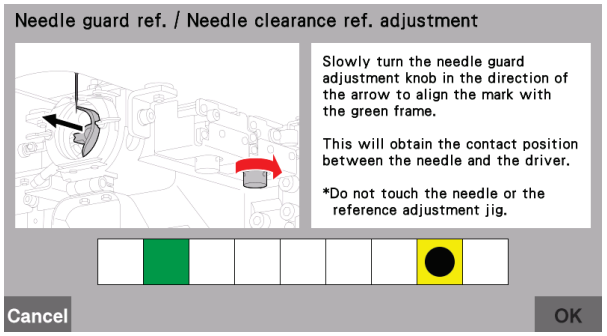
[NOTE]

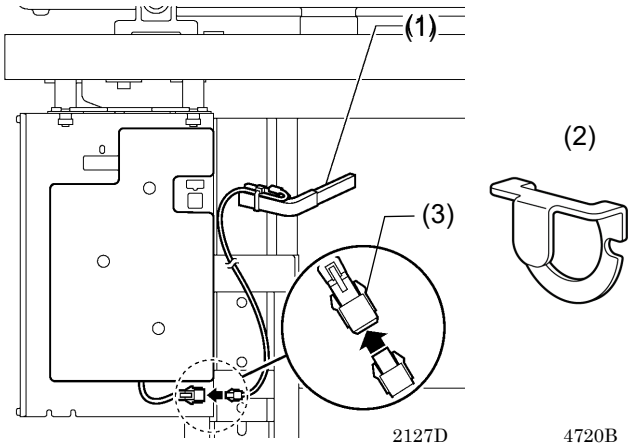
After adjusting the interaction between the needle and the hook, please refer to the following pages for "7-3-4. Acquiring the reference position for the needle, driver and shuttle hook", "7-3-5. Adjusting the driver (needle guard) position", and "7-3-6. Adjusting the clearance (needle clearance) between the needle and shuttle hook tip".

7-3-4. Acquiring the reference position for the needle, driver and shuttle hook

Obtain the contact position (standard position) for the needle and driver and the shuttle hook tip when the needle center and the shuttle hook tip are aligned while following the panel flowchart in [Needle guard and needle clearance standard adjustment] under "Digital adjustment".

* Note that if the following are not satisfied, the precision of the information obtained will drop.
- Needle bar position adjustment and timing standard adjustment have been completed.
- The needle has been inserted so that it faces correctly.
- The needle is not dirty or bent.
- The shuttle hook and driver are not dirty.





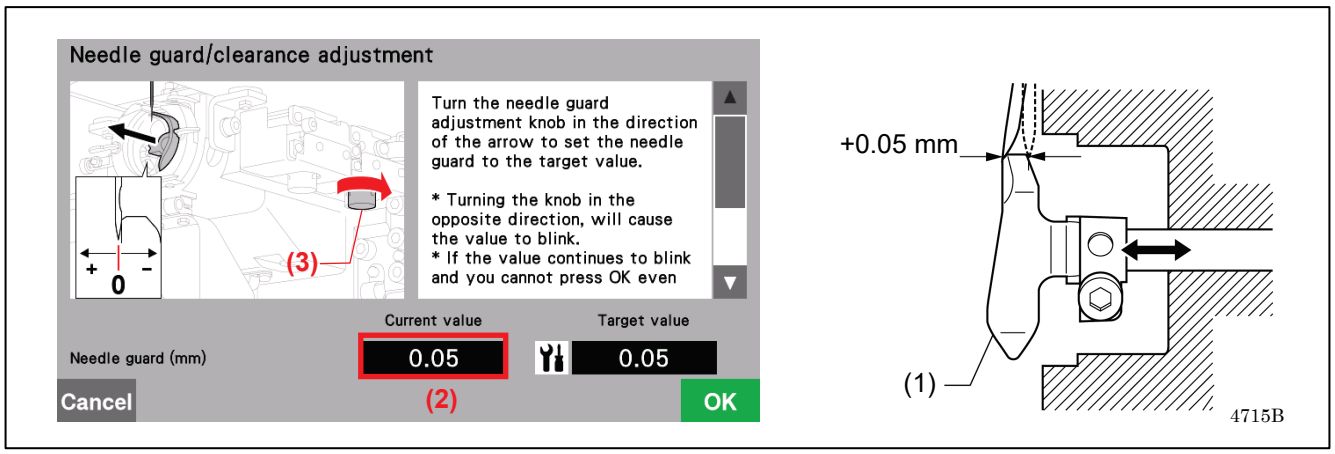
Use the separately sold <Standard timing adjustment tool (SC9094-101)> (1) and <Large shuttle hook tool (SC9046-101)> (2) as the adjustment tools.

* Always be sure to turn off the power for the sewing machine before connecting the standard timing adjustment tool to the connector (3) underneath the control box.

* If the following have been changed, carry out the [Needle guard and needle clearance standard adjustment] again. There will be a discrepancy between the current value of the needle guard and needle clearance displayed on the panel ("7-3-5. Adjusting the driver (needle guard) position" and "7-3-6. Adjusting the clearance (needle clearance) between the needle and shuttle hook tip") and the actual positions.
- Needle size
- Needle Manufacturer
- Needle bar position adjustment
- Standard timing adjustment (needle and shuttle hook timing)
- Digital adjustment > Sensor adjustment > Needle guard sensor, Needle clearance sensor

7-3-5. Adjusting the driver (needle guard) position

Adjust the position (needle guarding) of the driver (1) with respect to the needle when the needle center and the shuttle hook tip are aligned while following the panel flowchart in [Needle guard and needle clearance adjustment] under "Digital adjustment".



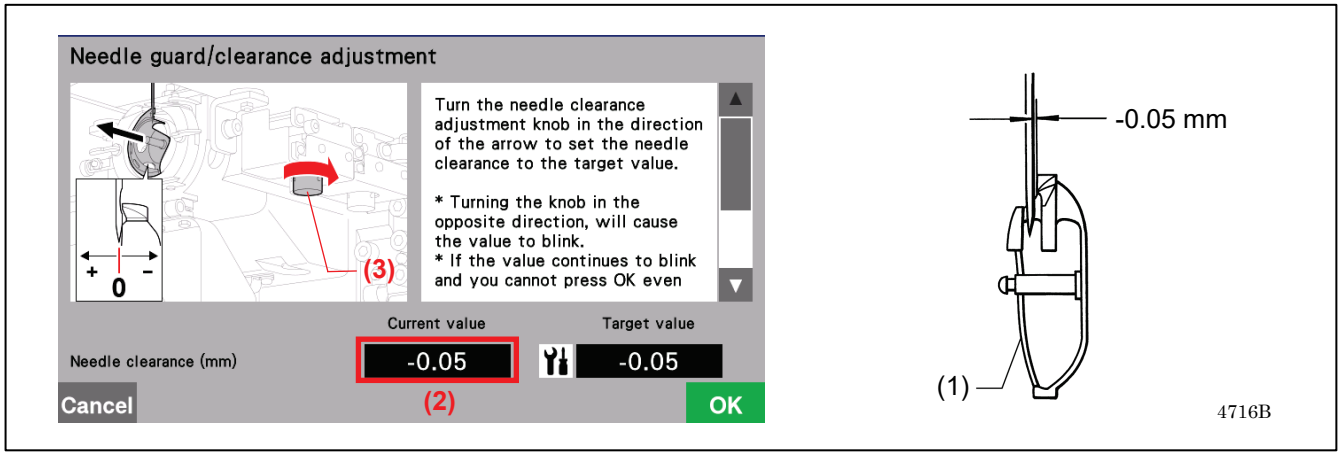
The position of the driver relative to the needle is shown in panel (2).
Turn the needle guard adjustment knob (3) to adjust the position of the driver.
The target value recommended by the manufacturer is when the driver contacts the needle by 0.05 mm.
If this value varies by more than ±0.03 mm (can be varied using memory switch setting) during sewing and when the sewing machine starts, a warning icon will be displayed on the sewing screen and the maintenance screen.

[NOTE]

If the driver crosses the needle more than necessary, it will cause problems with the thread tension. Furthermore, if it does not cross the needle at all, the tip of the shuttle hook will interfere with the needle and skipped stitches may occur.

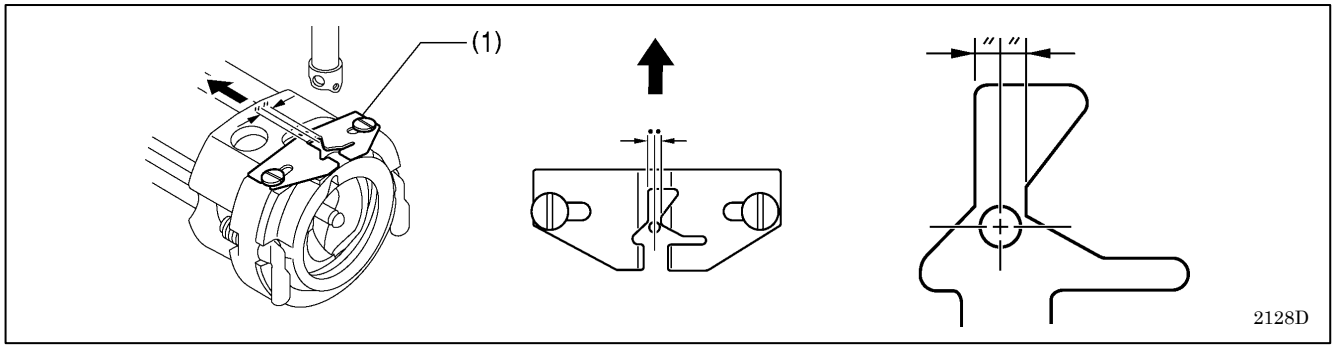
7-3-6. Adjusting the clearance (needle clearance) between the needle and shuttle hook tip

Adjust the gap (needle clearance) between the needle and the inner shuttle hook (1) when the needle center and the shuttle hook tip are aligned while following the panel flowchart in [Needle guard and needle clearance adjustment] (or [Needle clearance adjustment] if only adjusting the needle clearance) under "Digital adjustment".



The position of the inner shuttle hook relative to the needle is shown in panel (3).
Turn the needle clearance adjustment knob (3) to adjust the position of the inner shuttle hook.
The target value recommended by the manufacturer is when the clearance between the needle and the shuttle hook tip is 0.05 mm.
If this value varies by more than ±0.03 mm (can be varied using memory switch) during sewing and when the sewing machine starts, a warning icon will be displayed on the sewing screen and the maintenance screen.

7-4. Adjusting the shuttle race thread guide



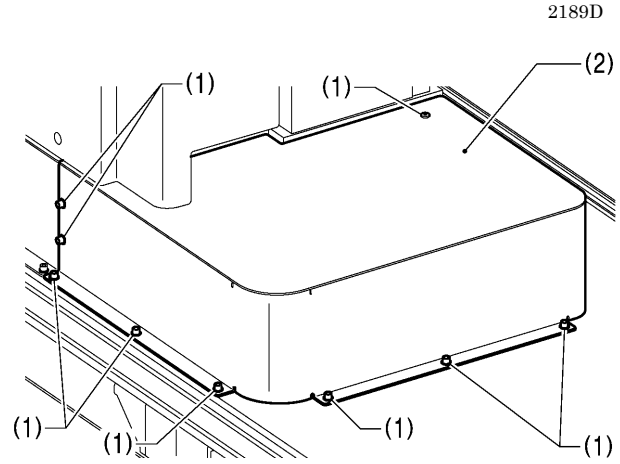
Install the shuttle race thread guide (1) by pushing it in the direction of the arrow so that the needle groove is aligned with the center of the needle plate hole.

[NOTE]

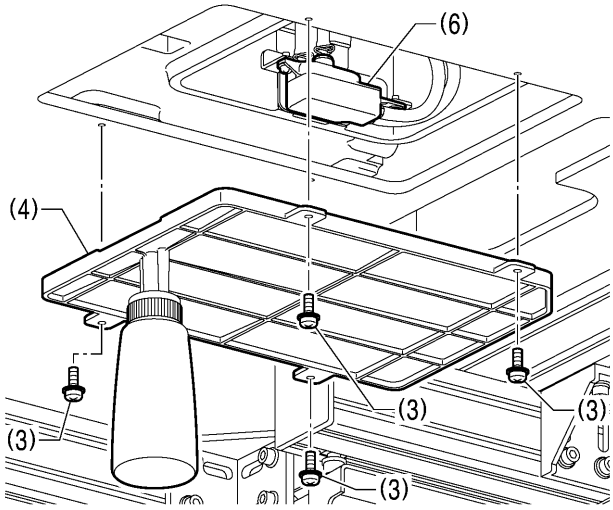
If the shuttle race thread guide (1) is in the wrong position, thread breakages, soiled thread or tangling of the thread may occur.

The position of the shuttle race thread guide (1) is adjusted at the time of shipment from the factory. It should not be changed if possible.

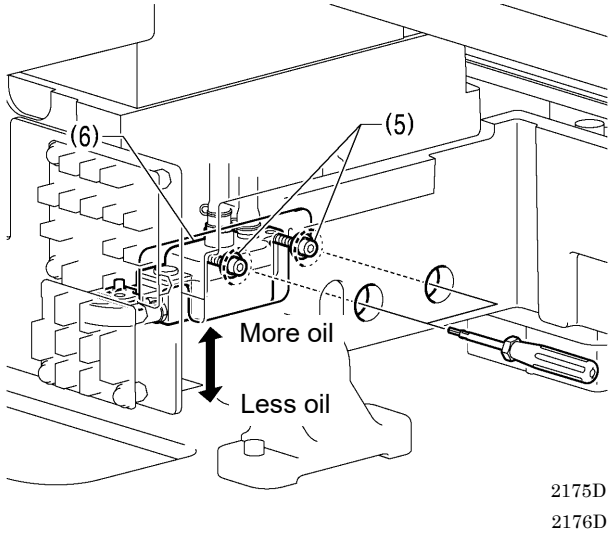
7-5. Shuttle hook lubrication amount



1. Remove screws (1) [9 pcs] and take off the right rear cover (2).



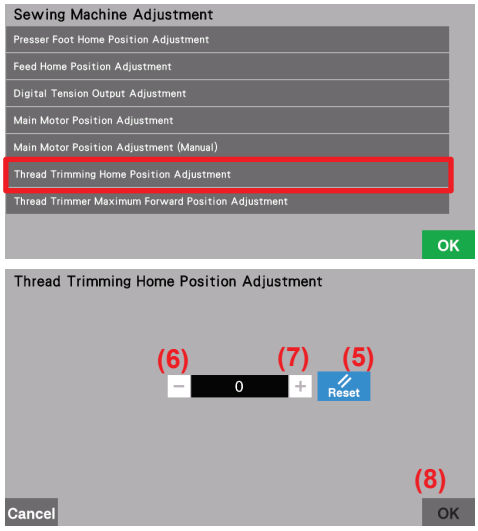
2. Remove screws (3) [4 pcs] and take off the oil pan (4).

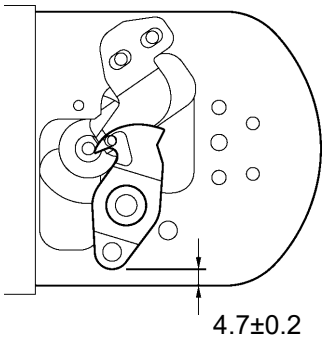


3. Insert a screwdriver into the holes in the left side of the sewing machine bed and loosen the bolts (5) [2 pcs].
4. Move the sub-tank (6) up or down to adjust its position, and then tighten the bolts (5) [2 pcs].
   - If the position of the sub-tank (6) is raised, the lubrication amount will increase.
   - If the position of the sub-tank (6) is lowered, the lubrication amount will decrease.
5. Attach the oil pan (4) with screws (3) [4 pcs].
6. Attach the right rear cover (2) with screws (1) [9 pcs].

7-6. Adjusting the thread trimming home position

7-6-1. Thread trimming home position adjustment

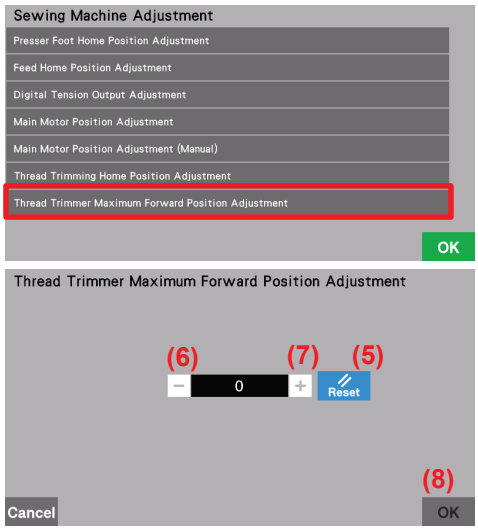


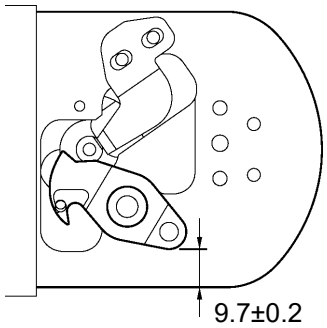


2177D

1. Select "Thread Trimming Home Position Adjustment" from the sewing machine adjustment mode.
2. First, press [Reset] (5), then press [−] (6) or [+] (7) several times until the movable blade reaches the home position.
   * The position of the movable blade in the above figure is the standard adjustment position.
3. Press [Reset] (5) at that position.
   * This position will be set as the home position of the movable blade.
4. Press [OK] (8) to complete the setting.

7-6-2. Thread trimmer maximum forward position adjustment





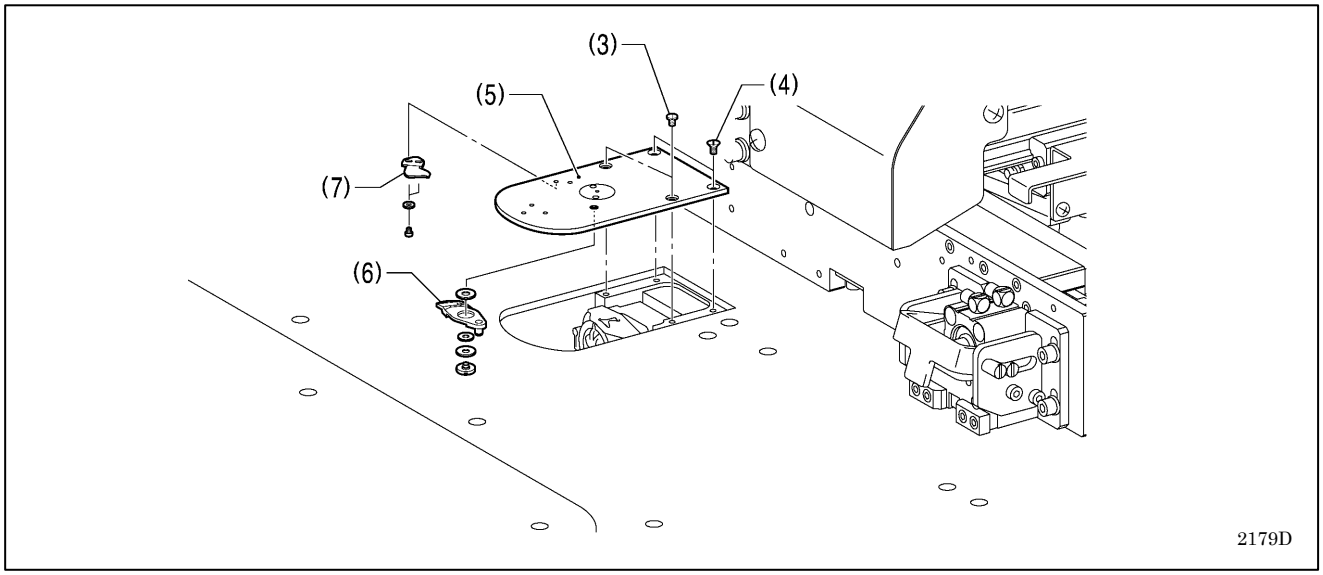
2178D

1. Select "Thread Trimmer Maximum Forward Position Adjustment" from the sewing machine adjustment mode.
2. First, press [Reset] (5), then press [−] (6) or [+] (7) several times until the movable knife reaches the thread trimmer maximum forward position.
   * The position of the movable blade in the above figure is the standard adjustment position.
3. At that position, press [Reset] (5).
   * This position will be set as the thread trimmer maximum forward position for the movable knife.
4. Press [OK] (8) to complete the setting.

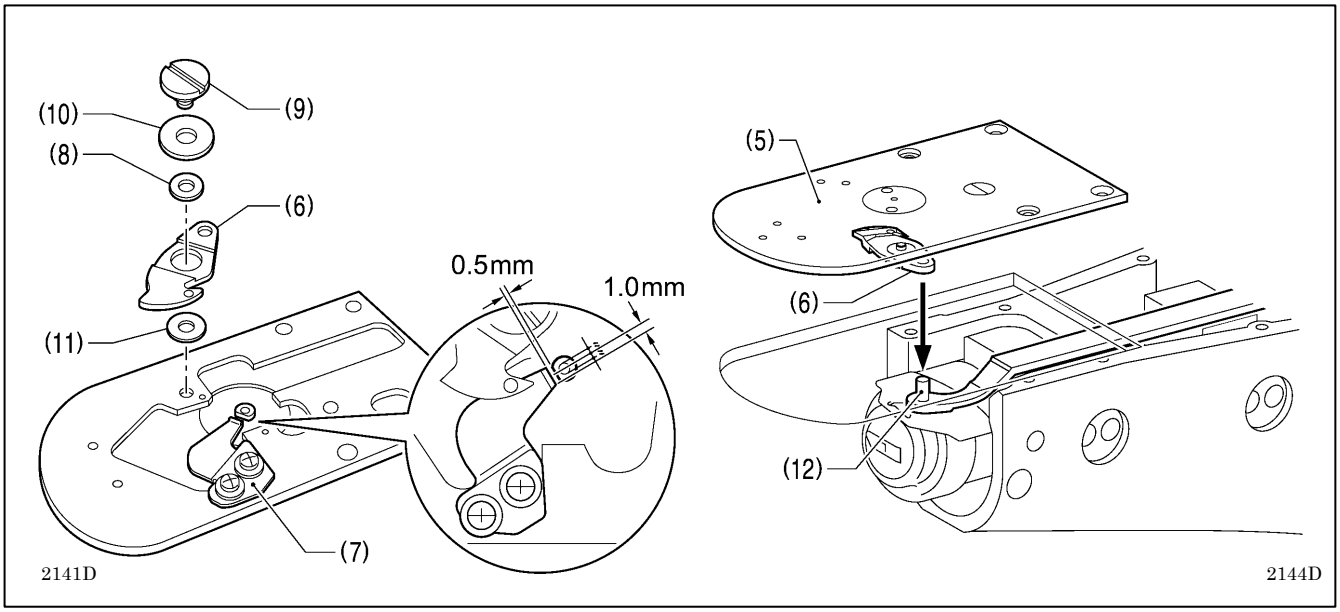
7-7. Replacing the movable and fixed knives

⚠ CAUTION

Please be careful not to injure yourself on the sharp edges of the parts.

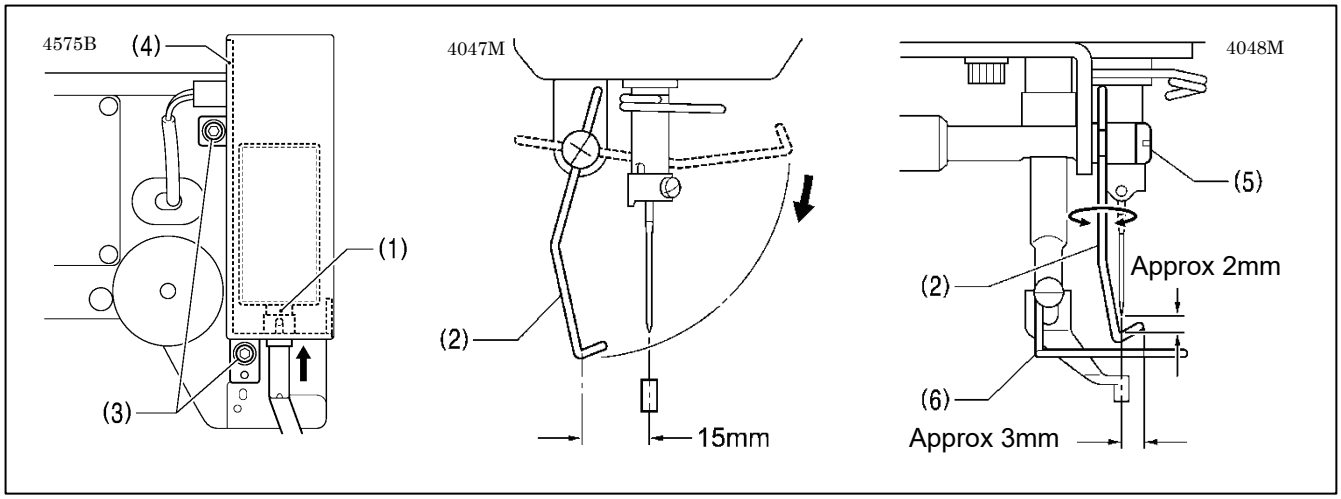


1. Open the shuttle race cover, remove the two screws (3) and the two flat screws (4), and then remove the needle plate (5).
2. Remove the movable knife (6) and the fixed knife (7).



3. Install the new fixed knife (7) in the position shown in the illustration.
4. Apply grease to the outside of the collar (8) and to the shoulder screw (9), and then install the new movable knife (6) together with the thrust washer (10) and the movable knife spacer (11).
5. Check that the movable knife (6) and fixed knife (7) cut the thread cleanly. Replace the movable knife spacer with accessory spacers (t=0.2, 0.3, 0.4) so that the knives trim the thread accurately.
   * If the knife pressure is too weak and the thread is not completely cut, use a thinner movable knife spacer.
   * If the knife pressure is too strong and the movable knife (1) turns stiffly, use a thicker movable knife spacer.
6. Apply grease to the pin (12) of the movable knife connecting plate, insert it into the hole in the movable knife (6), and then install the needle plate (5).
7. Check that the needle is aligned with the center of the needle hole.

7-8. Adjusting the thread wiper

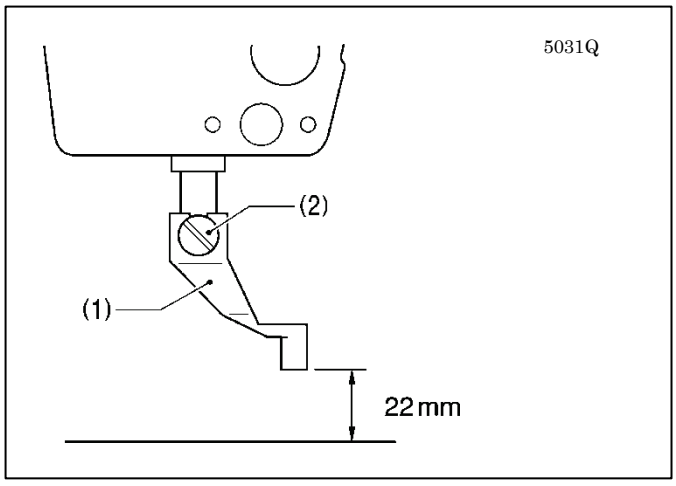


1. Loosen the [two] screws (3) and shift the entire setting plate (4) up or down to adjust so that the thread wiper (2) is 15 mm in front of the needle center when the plunger (1) of the thread wiper solenoid is driven to the full stroke.
2. Loosen the screw (5) and adjust the position of the thread wiper (2) so that the distance from the thread wiper to the tip of the needle is approximately 2 mm and the tip of the thread wiper (2) is approximately 3 mm from the center of the needle when the thread wiper (2) passes below the needle during operation.

[NOTE]

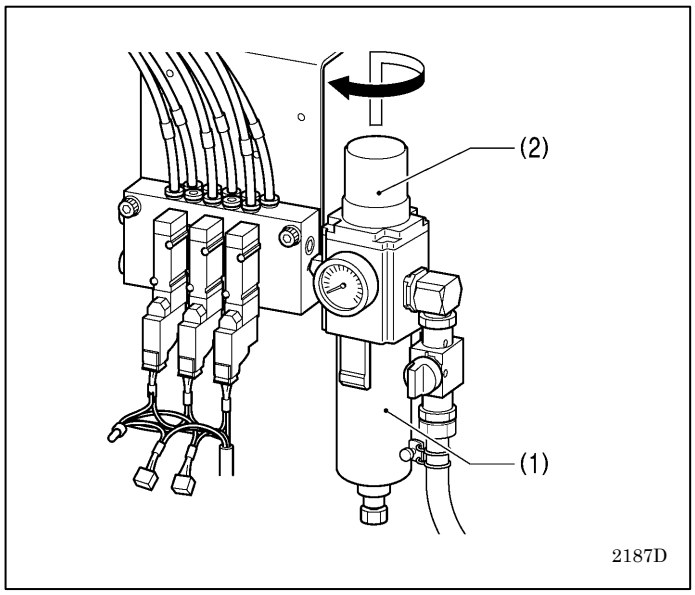
Check that the thread wiper (2) does not touch the finger guard (6).

7-9. Intermittent presser foot installation position



Install the intermittent presser foot (1) with the screw (2) so that the distance from the bottom of the intermittent presser foot (1) to the top of the needle plate is 22 mm when the sewing machine is stopped and the intermittent presser foot (1) is raised.

7-10. Adjusting the air pressure



Lift up the handle (2) of the regulator (1) and then turn it to adjust the air pressure to 0.5 MPa.
After adjustment is complete, push the handle (2) downward to lock it.

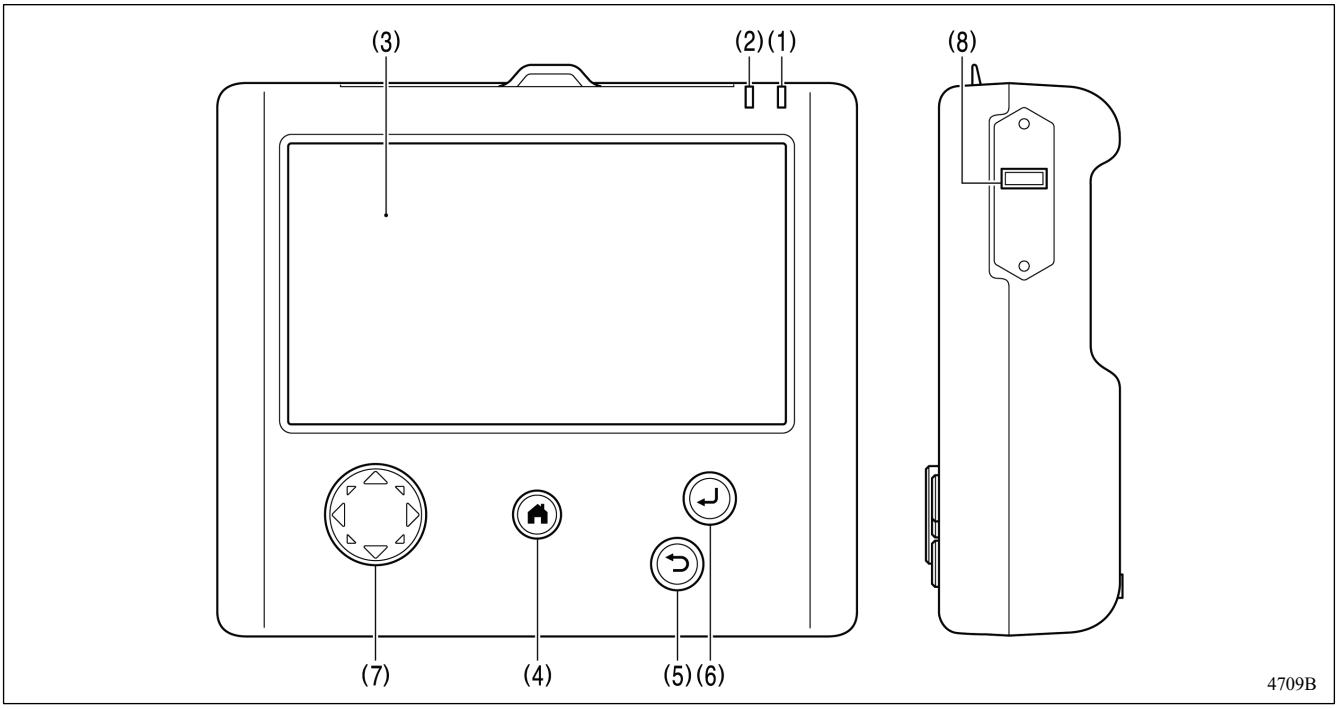
8. USING THE LCD PANEL (BASIC OPERATIONS)

CAUTION

To prevent problems, do not use objects with sharp points to operate the LCD panel.

8-1. Name and function of each LCD panel item

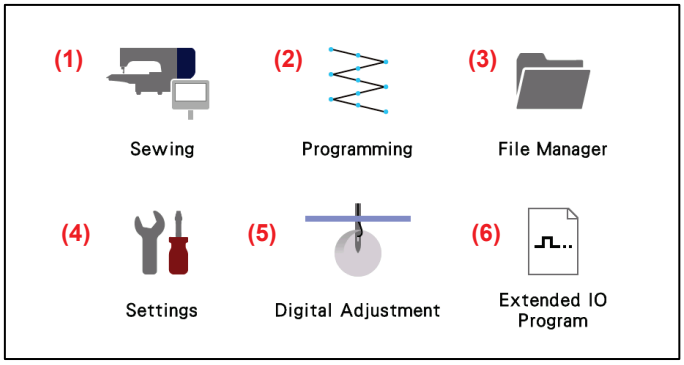
8-1-1. Main names and functions



(1) Power indicator	Illuminates when the power is turned on.
(2) Caution indicator	Illuminates when an error occurs.
(3) LCD/touch panel	This displays messages and touch keys (icons).
(4) HOME key	This key is used to return to the home screen.
(5) BACK key	This key is used for operations such as returning to the previous step and canceling settings.
(6) ENTER key	This key is used for operations such as confirming settings.
(7) JOG key	This key is used when programming sewing data.
(8) USB port	Connect a USB flash drive.

8-1-2. Home screen

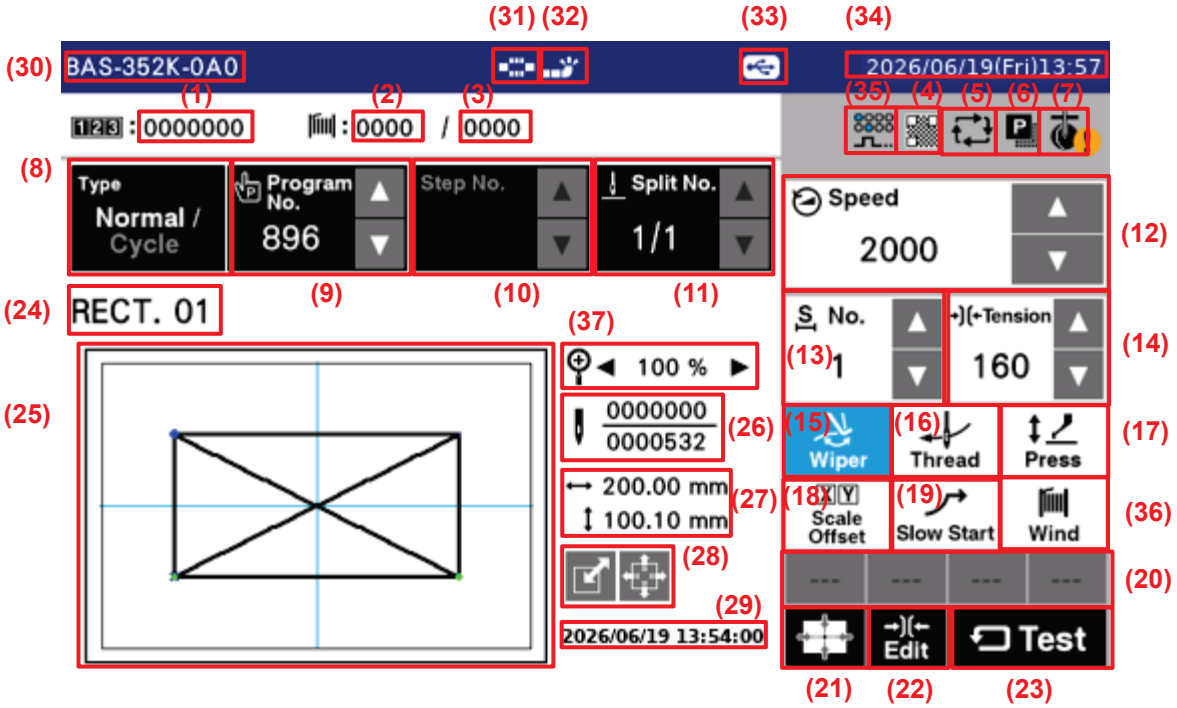
Press the HOME key to display the [home screen].



(1) Sewing key	Touch to switch to the [sewing operation screen].
(2) Programming key	Touch to switch to the [programming screen].
(3) File Manager key	Touch to switch to the [file manager screen].
(4) Settings key	Touch to switch to the [setting menu screen].
(5) Digital adjustment key	Touch to switch to the [digital adjustment setting screen].
(6) Extended I/O Program Key	Moves to the [Extended I/O Program Screen].

8-1-3. Sewing operation screen

- When the power is turned on while the LCD panel is connected to the sewing machine, this screen is displayed automatically.
- If any other screen is being displayed, touch the sewing key in the home screen to display this screen.



(1) Production counter key	This shows the production counter value. If you keep pressing this key, the display switches to the setting menu screen.
(2) Bobbin thread counter key	This shows the bobbin thread counter value. If you keep pressing this key, the display switches to the setting menu screen.
(3) Bobbin thread setting key	Displays the bobbin thread setting value. If you keep pressing this key, the display switches to the setting menu screen.
(4) QR code	Displays information on the sewing machine as a QR code. * QR Code is a registered trademark of DENSO WAVE.

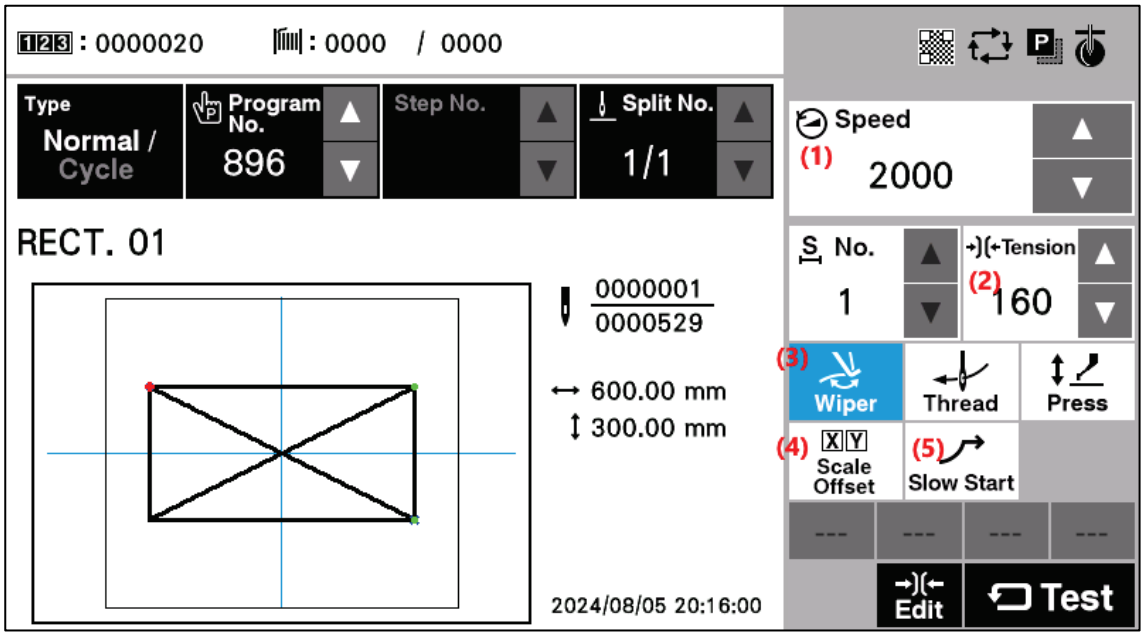
(5) Cycle program key	Touch to switch to the cycle program editing screen.
(6) Copy key	Touch to switch to the sewing program copying screen.
(7) Maintenance key	Changes the screen to the maintenance information screen.
(8) Type key	Touch to select the program type.
(9) Program No. keys	Touch to display/select the current program number.
(10) Step No. keys	Touch to display/select the current step number.
(11) Split No. keys	Touch to display/select the current split number.
(12) Speed keys	Touch to display/select the sewing speed.
(13) Section No. key	Touch to display/select the section number for the digital tension. These are not displayed when digital tension is not being used.
(14) Tension key	Touch to display/select the digital tension value. These are not displayed when digital tension is not being used.
(15) Wiper key	Touch to switch the thread wiper on/off.
(16) Thread key	Touch to switch to the threading screen.
(17) Press key	Touch to switch to the Adjust Press Height setting screen.
(18) Scale Offset key	Touch to switch to the Scale/Offset setting screen.
(19) Slow Start key	Touch to switch to the Slow Start setting screen.
(20) Direct selection key	You can register normal/cycle program numbers into each of these keys. When you press and hold a key, the program assigned to that key is selected.
(21) Start position move key	The feed moves to the start point of the sewing data.
(22) Edit key	Touch to switch to digital tension editing mode. This is not displayed when digital tension is not being used.
(23) Test key	Touch to switch to test mode.
(24) Comments	Shows comments about the sewing data.
(25) Preview	Shows a preview of the sewing data.
(26) Current stitch number / Total number of stitches	Shows the current stitch number and the total number of stitches.
(27) Sewing area size	Shows the size of the sewing data area.
(28) Scale/Offset key	This is displayed when the Scale/Offset setting values have been changed from the default setting values. Touch the key to display the setting value.
(29) Sewing data information	Shows information about the sewing data.
(30) Model name	Shows the model name and specifications.
(31) Skipped stitch detection function	Shows the skipped stitch detection function enabled or disabled.
(32) Thread breakage detection function	Shows the thread breakage detection function enabled or disabled.
(33) External media	Displayed when external media is connected to the USB port.
(34) Date and time	Shows the current date and time.
(35) Extended IO check key	Touch to switch to the extended IO check screen.
(36) Wind Key	Moves to the bobbin winding screen.
(37) Preview Zoom	Changes the zoom level of the preview display.

8-2. Parameter setting method

Parameter settings are made at the [sewing operation screen].

* For details on the sewing data reading method, refer to "10. Using storage media".

* For details on memory switch setting methods, refer to "9-1. Memory switch setting method".



Sewing speed

Use the “Speed” △ and ▽ keys (1) to make the setting.

- Setting range: 200 sti/min to the value shown below;
  Setting unit: 100 sti/min
  Initial value: 2,000 sti/min

Table: Maximum speed for each model

BAS-352K	2,100 sti/min

Digital tension

Touch the “Tension” △ or ▽ keys (2) to change the tension value.

- Setting range: 0 to 500 Initial value: 160

Thread wiping

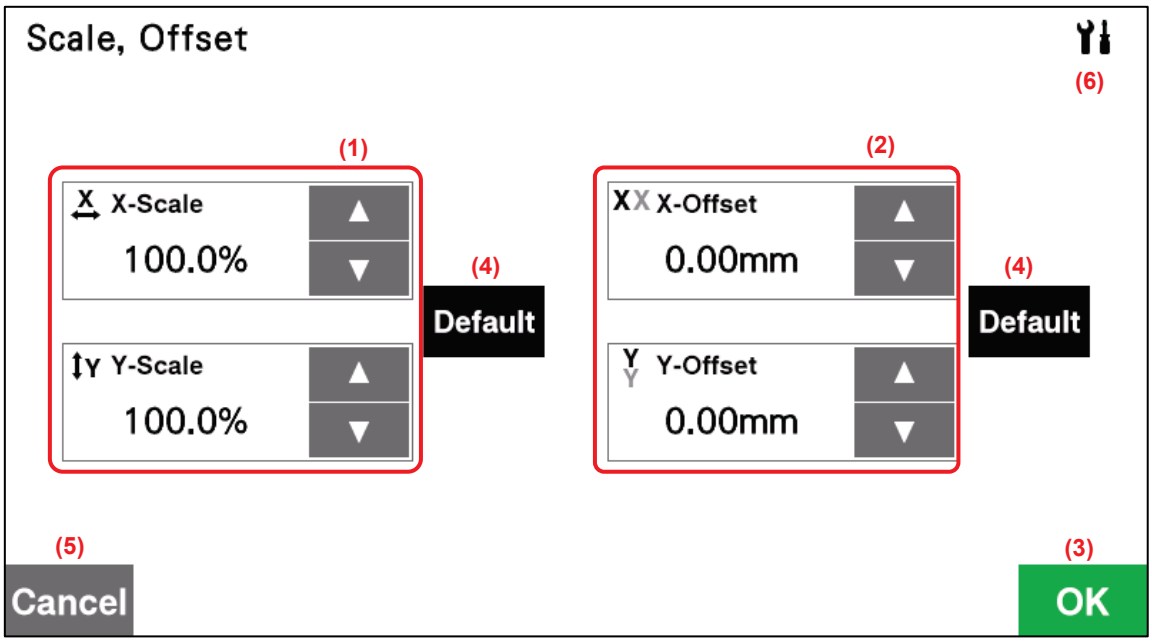
Touch the “Wiper” key (3) to turn the wiper on or off. (The initial value varies for each model and specification.)
When the setting is on, the key is displayed in blue.

8-2-1. X/Y-scale, X/Y-offset

Touch the “Scale Offset” key (4) in the sewing operation screen to display the X/Y-scale and X/Y-offset setting screen.
Use when you would like to enlarge, reduce or move the pattern without changing the sewing data.

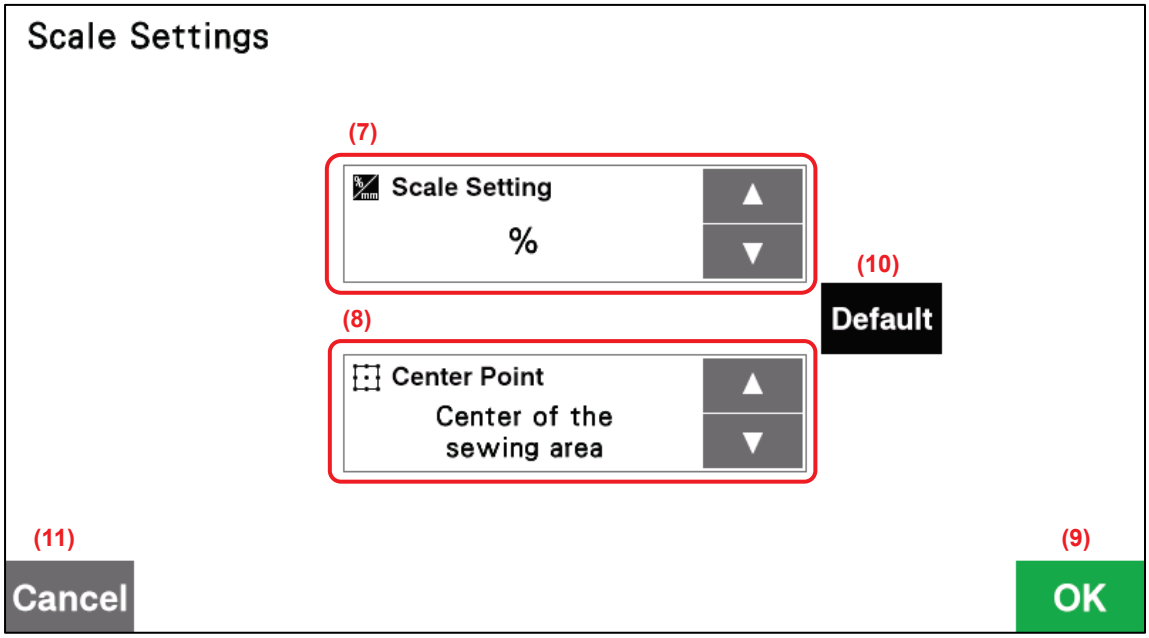
* When memory switch no. 400 is set to ON, the X-scale, Y-scale, sewing speed and work clamp height can be recorded separately for each program number.

[X/Y-scale and X/Y-offset screen]



(1) X/Y-scale (X-Scale, Y-Scale)	Limited by available sewing area. Setting range: 0 to 400%, 0.1% units, initial value: 100%
(2) Offset (X-Offset, Y-Offset)	Setting range: 0 to sewing machine area size, Setting unit: 0.05 mm Initial value: 0 mm
(3) OK key	Touch to confirm the setting and return the display to the previous screen. It cannot be touched if the data is outside the sewing area as a result of enlarging or moving it parallel.
(4) Default key	Touch to return the setting to the initial value.
(5) Cancel key	Touch to return to the previous screen without changing the setting.
(6) Setting key	Touch to display the screen for setting the center point for scaling and the display units (% or mm).

[Scale setting screen]

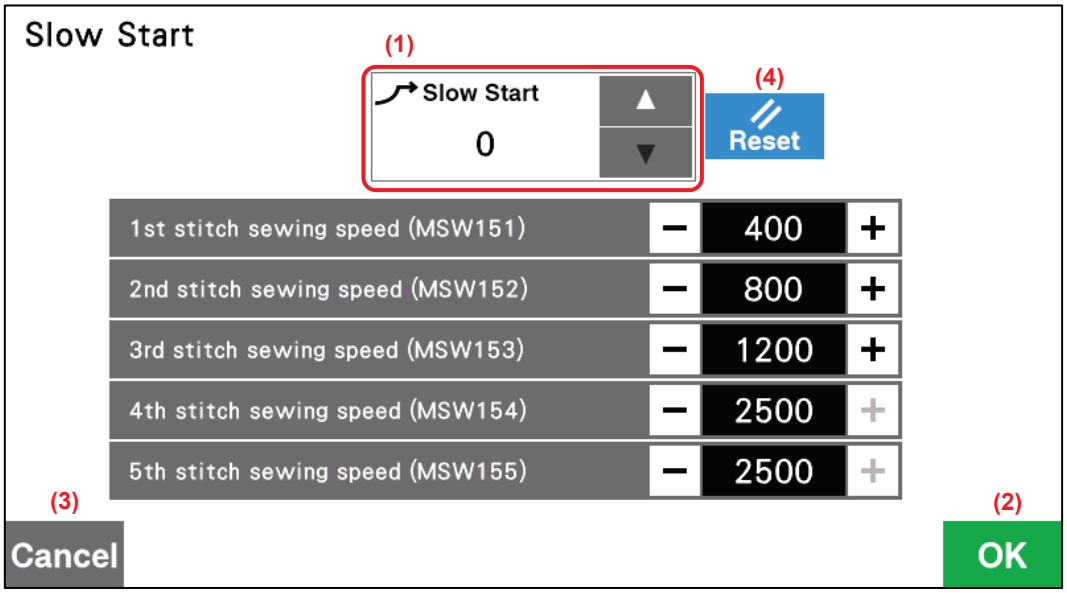


(7) Scale setting units	Touch to change the scaling units. Setting units: % or mm
(8) Scaling center point	Touch to change the scaling center point. Setting range: Center of sewing area, sewing start position, center of pattern, forward center of pattern, rear center of pattern, rear-left corner of sewing area, front-left corner of sewing area, rear-right corner of sewing area, front-right corner of sewing area Initial value: Center of sewing area
(9) OK key	Touch to confirm the setting and return the display to the previous screen.
(10) Default key	Touch to return the setting to the initial value.
(11) Cancel key	Touch to return to the previous screen without changing the setting.

8-2-2. Slow start pattern

Touch the “Slow Start” key (5) in the [sewing operation screen] to display the slow start setting screen.
This is used to stop the thread from pulling out at the sewing start, and at times when skipped stitches might easily occur.

* When memory switch no. 400 is set to ON, slow start patterns can be recorded separately for each program number.



(1) Slow Start	Touch the △ or ▽ key to adjust the starting-up speed at the sewing start. * The smaller the number, the slower the start. * Refer to the following table for the speed setting values.
(2) OK key	Touch to confirm the setting value and return to the [sewing operation screen.]
(3) Cancel key	Touch to return to the [sewing operation screen] without changing the setting value.
(4) Reset key	Touch to return the value to the value which was first displayed when you switched to the setting screen.
(5) Sewing start speed	Displays the speed for stitches 1 to 5. When the slow start is set to 0, you can change the speed using the + - keys.

Table Setting values and starting-up speeds

Lo	0	1	2	3	4	5	6	7	8	9
Sewing speed for 1st stitch	*2	200	200	300	400	400	400	400	600	800
Sewing speed for 2nd stitch	*2	200	300	400	400	500	600	800	1000	1200
Sewing speed for 3rd stitch	*2	300	400	500	600	800	1000	1200	1600	*1
Sewing speed for 4th stitch	*2	500	600	700	900	1200	1400	*1	*1	*1
Sewing speed for 5th stitch	*2	*1	*1	*1	*1	*1	*1	*1	*1	*1

*1 Sewing will be carried out at the sewing speed which is set by the “Sewing speed” parameter.
*2 Sewing is carried out at the speeds set in memory switch Nos. 151 to 155.

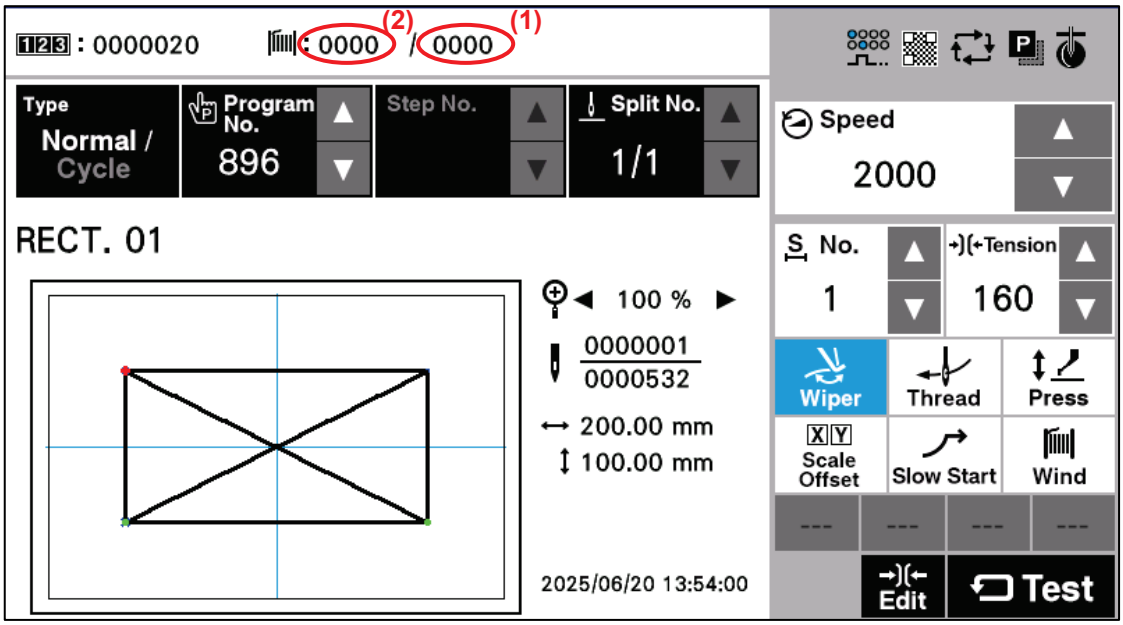
8-2-3. Using the bobbin thread counter

If you use the bobbin thread counter to set the number of articles which can be sewn with the amount of bobbin thread available, you can stop the bobbin thread running out in the middle of sewing a pattern.

<Setting the bobbin thread setting value>

If you keep pressing the “bobbin thread setting” key (1) in the [sewing operation screen], the screen will switch to the input screen for the bobbin thread setting value.

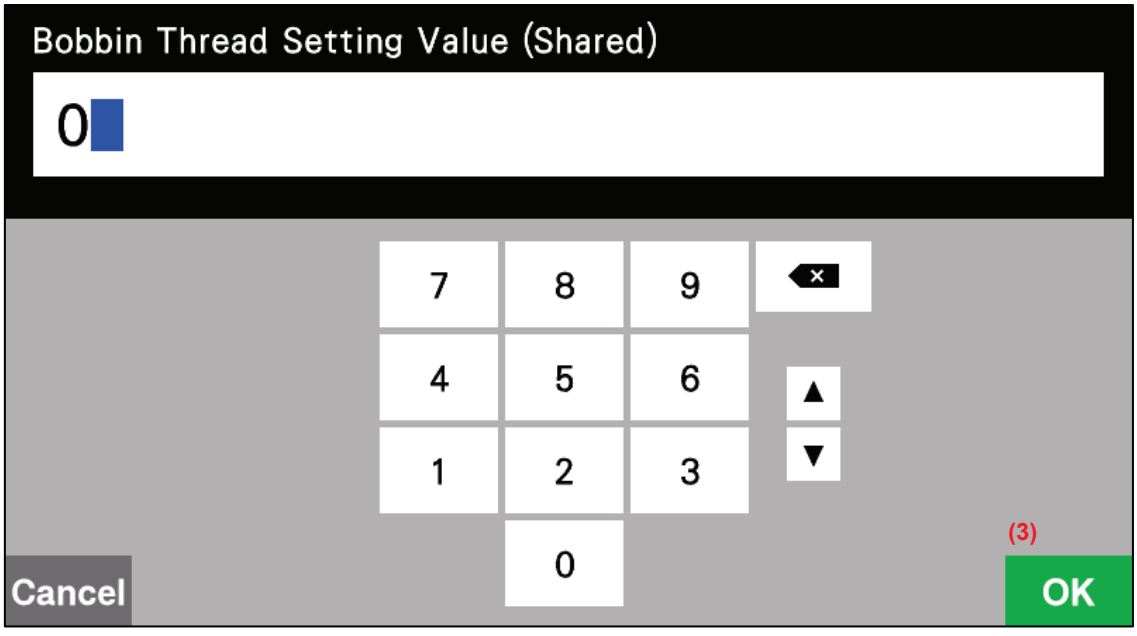
[Sewing operation screen]



Enter the value and then touch the “OK” key (3) to confirm the value.
When the bobbin thread setting value has been set, the same value will appear as the “bobbin thread counter value” (2).

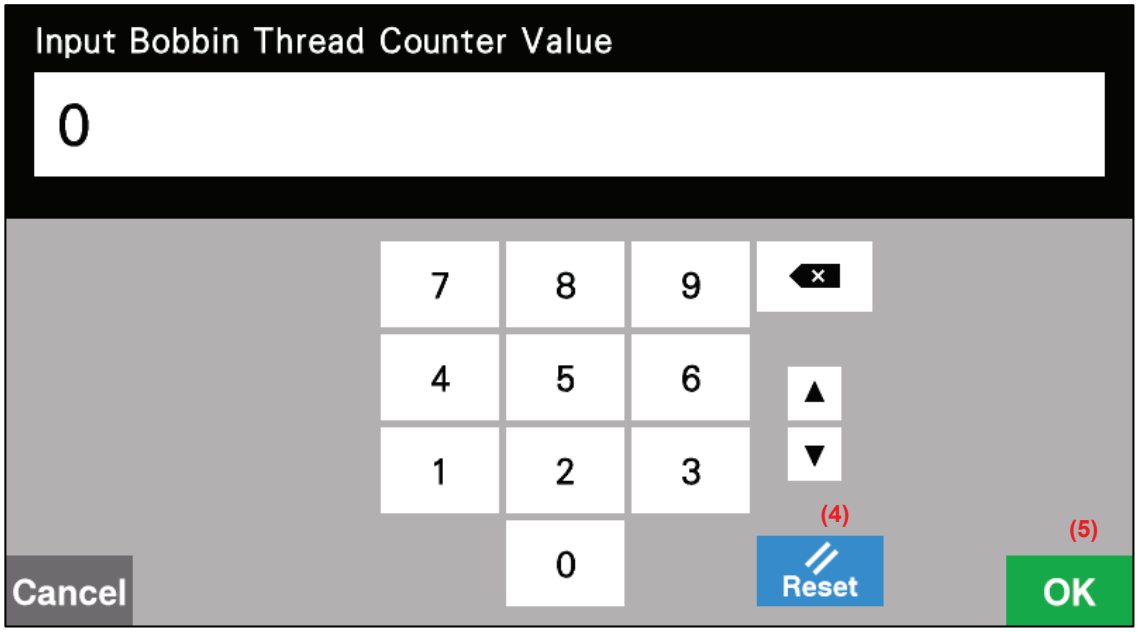
- If the value is set to [0000], the bobbin thread counter will not operate.

The bobbin thread setting value can be set to "0"-"9999".



<Setting the bobbin thread counter value>

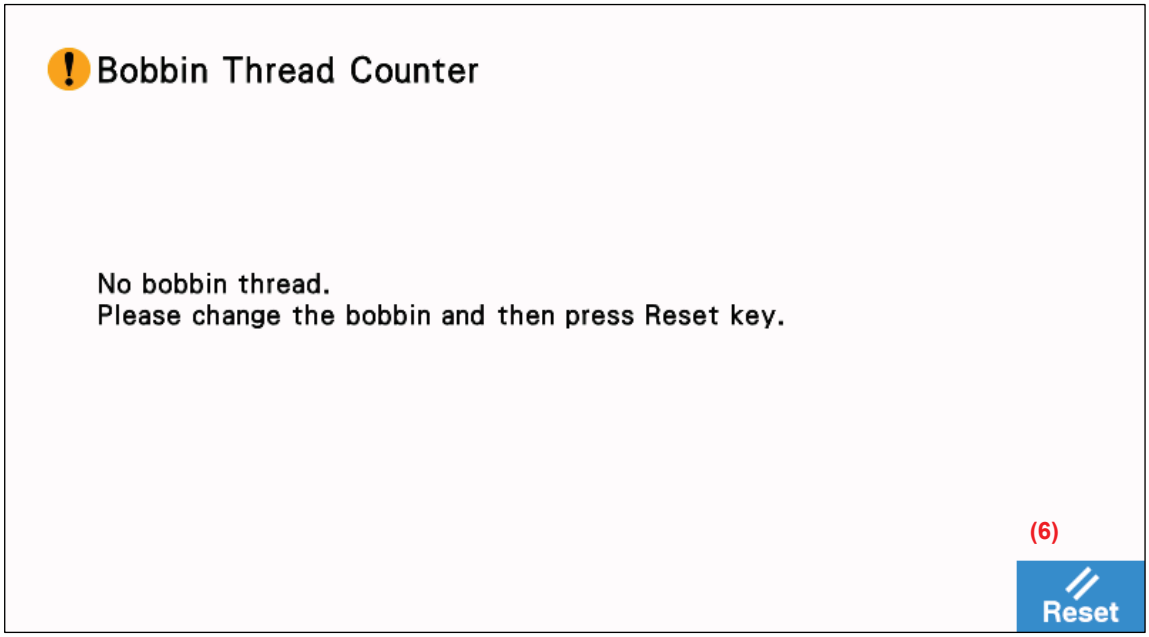
If you keep pressing the “bobbin thread counter” key (2) in the [sewing operation screen,] the screen will switch to the input screen for the bobbin thread counter value.
Enter the value and then touch the “OK” key (5) to confirm the value.
Touch the “Reset” key (4) to set the bobbin thread setting value as the bobbin thread counter value.
The bobbin thread counter value can be set from "0" to the (bobbin thread setting value.)



<Bobbin thread counter operation>

If the initial value for the bobbin thread counter is set to a value other than "0", the bobbin thread counter will operate.
The counter value decreases by 1 each time sewing of an item is completed, and when it reaches "0", a message screen is displayed and the buzzer sounds.
When this happens, the sewing machine cannot be operated.
Touch the “Reset” key (6) to return the bobbin thread counter value to the initial value, and then sewing will be possible again.

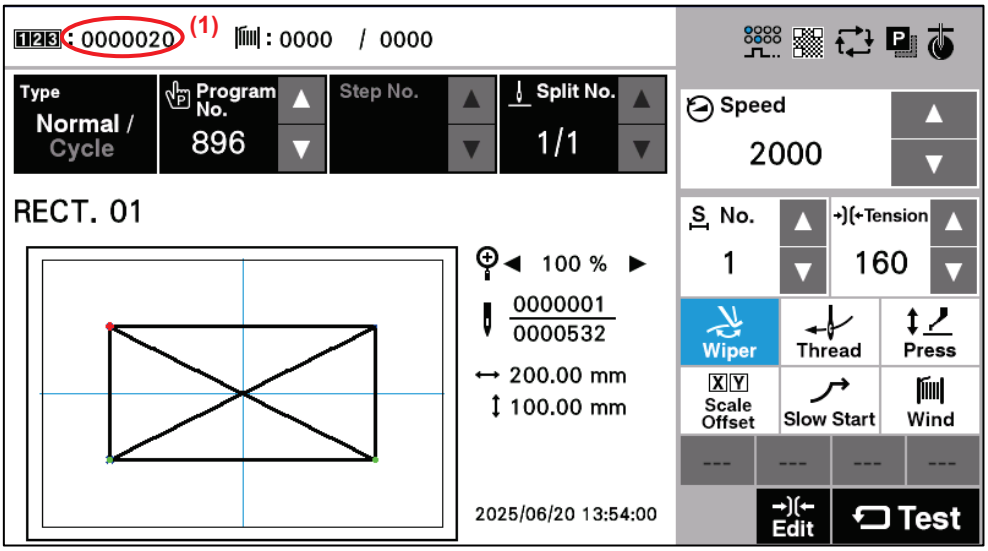
[Message screen]



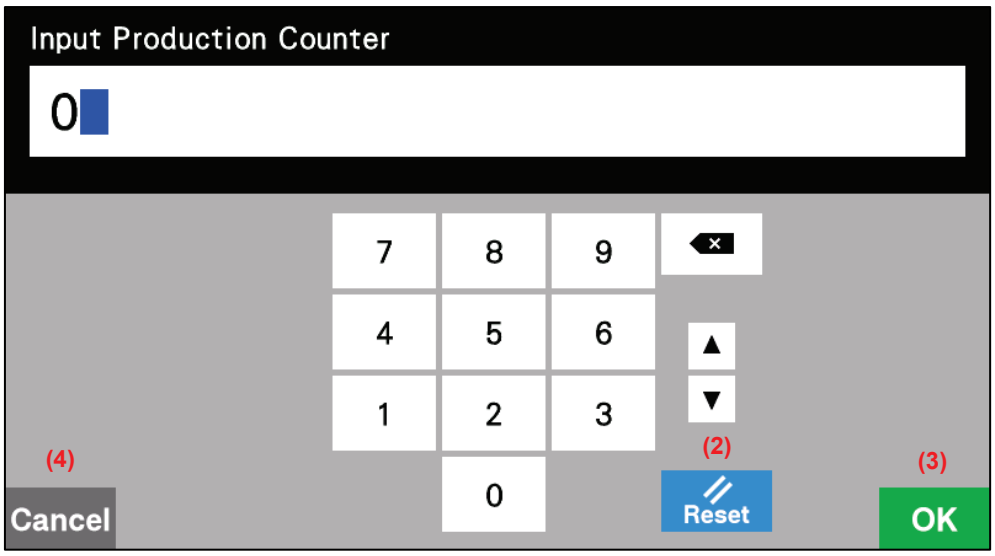
8-2-4. Using the production counter

<Setting the counter value>

If you keep pressing the “production counter” key (1) in the [sewing operation screen,] the screen will switch to the input screen for the production counter.



The counter value can be set to a value from "0" to "9999999".
If you would like to return the value to "0", touch the “Reset” key (2) and then touch the “OK” key (3).
After doing this, the display will return to the [sewing operation screen.]
Touch the “Cancel” key (4) to return to the [sewing operation screen] without changing the value.



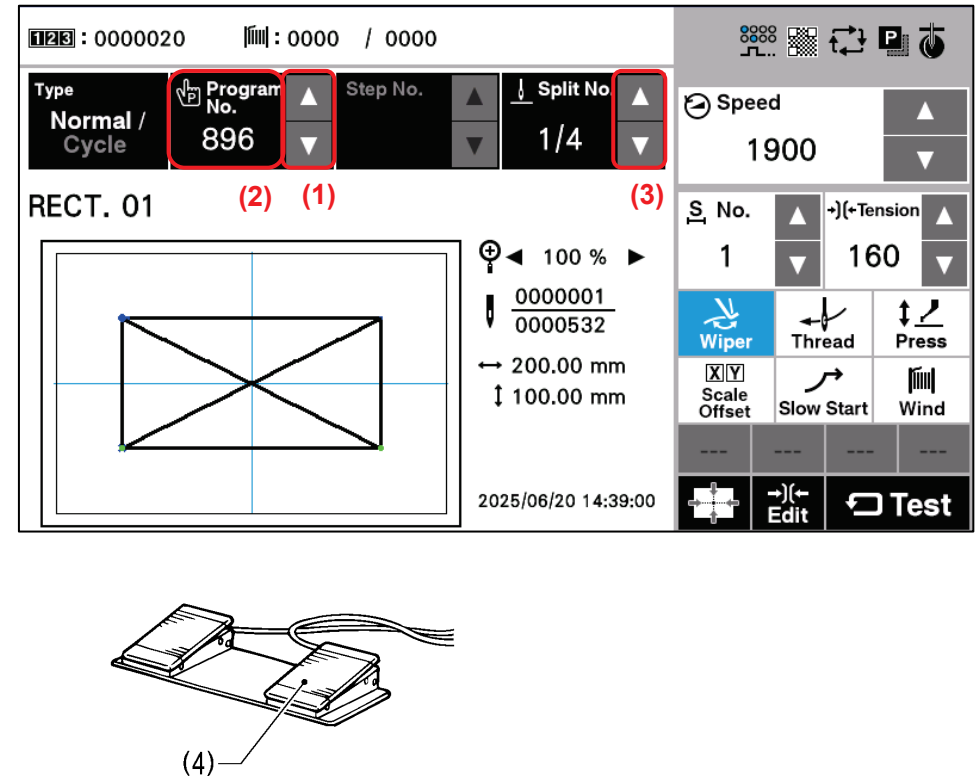
<Production counter operation>

The production counter always operates, and it increases by 1 each time sewing of an item is completed.

8-2-5. Split number setting method

If split codes (sewing interrupt data) exist in one program, the number which indicates the pattern which has been divided by the split codes is called the split number.

[Sewing operation screen]



2135D

1. Touch the "Program No." △ or ▽ key (1) to select the program number which includes the split code.
   - The "Program No." value (2) will flash.
2. Press the start switch (4) to perform origin detection.
   - The feed mechanism will move to the home position and the program number will be confirmed. (The “Program No.” setting (2) will stop flashing and illuminate steadily.)
3. Use the "Split No." △ or ▽ key (3) to select the split number.

The setting for memory switch No. 403 lets you select the split mode.

Continuous split

Memory switch No. 403 = 0

· Sewing is carried out each time in the order of steps 1 → 2 → 3 → 1 (for example, if there are two split codes).

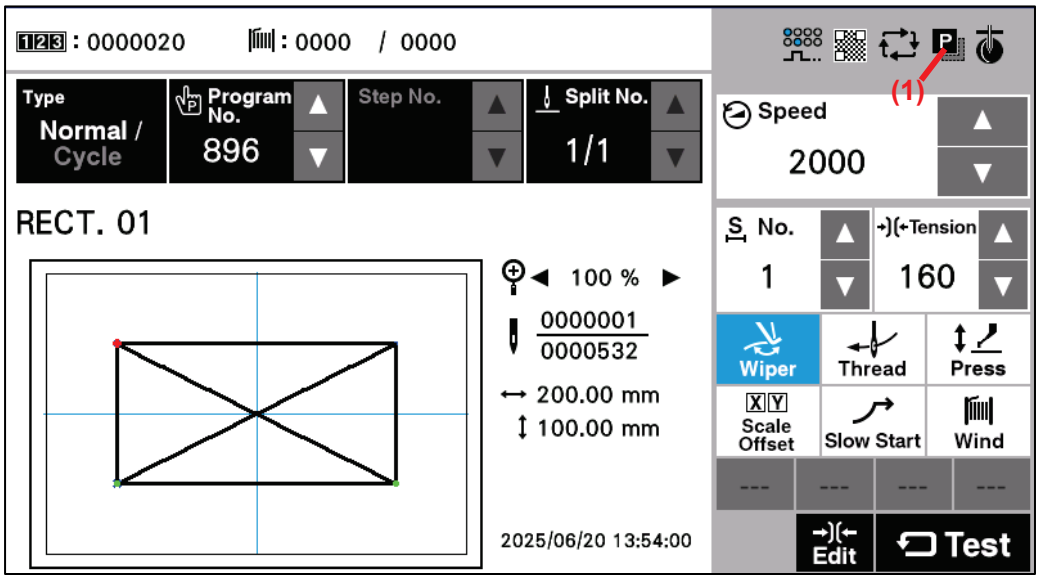
Independent split

Memory switch No. 403 = 1

· The pattern for the displayed split number is sewn independently.

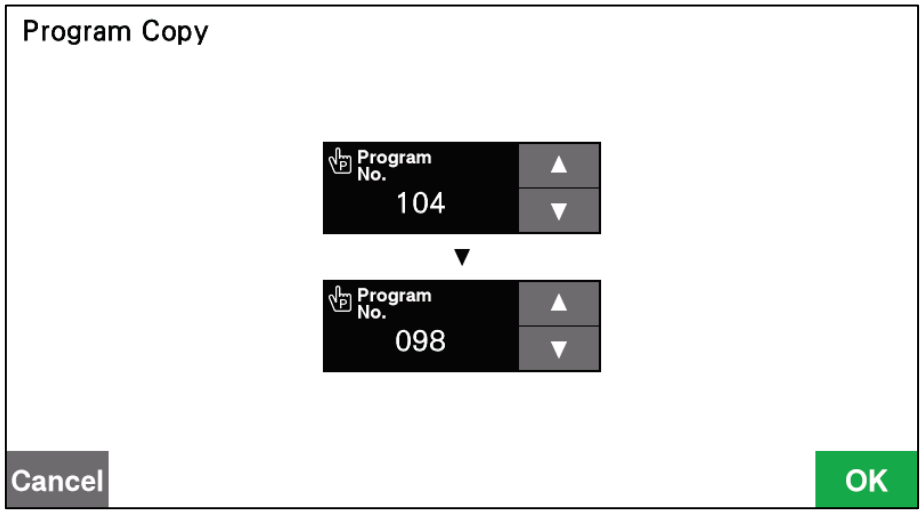
8-3. Copying programs

[Sewing operation screen]



Touch the Copy key (1) to switch to the [program copy screen.]

[Program copy screen]



Select the copy source program No. and the copy destination program No.
Touch the “OK” key to carry out copying. After copying, the display will return to the previous screen.
Touch the “Cancel” key to return to the previous screen without copying.

* The number which is selected as the copy destination program number will flash only if sewing data already exists in a program assigned to that number.

8-4. Checking the sewing pattern

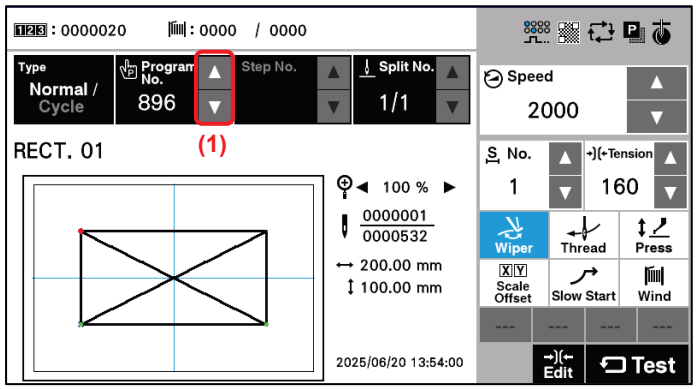
Use test feed mode to operate the feed mechanism in order to check the needle movement.
Check that the needle hole does not come out from the frame of the work clamp.

1



The “Test” key is displayed in blue.

[Sewing operation screen]

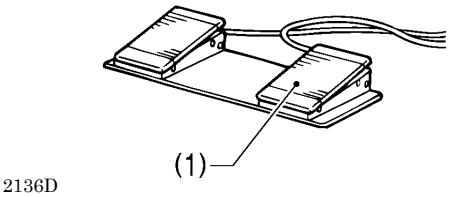


1. Touch the “Test” key at the [sewing operation screen.]

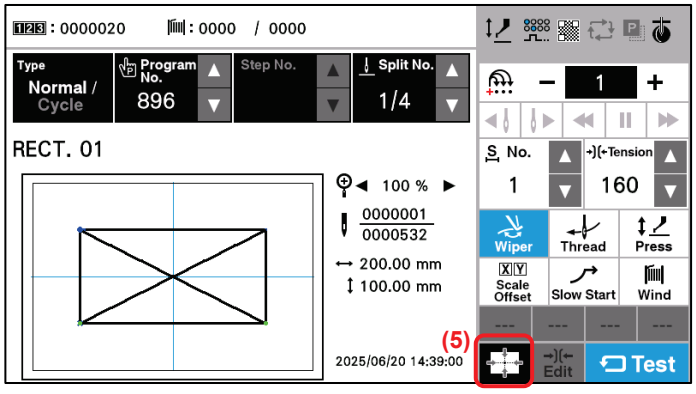
2. Press the △ or▽ key (1) to set the program number that you would like to check.

2

Continuous test feed



2136D

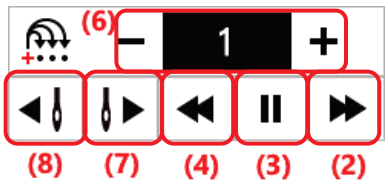


1. Lower the presser foot and then press the start switch (1). Alternatively, touch the continuous feed key (2) on the screen, and the feed will start moving continuously one stitch at a time.
(The “current stitch number” in the stitch number display will increase by 1 each time.)

2. When the feed reaches the end of the pattern, it stops.
   - If you would like to stop the feeding operation, touch the continuous feed stop key (3).
   - If you touch the continuous feed key (4), the feed mechanism will start moving continuously in the direction of the sewing start position one stitch at a time.
   - • Touch the Move to sewing start key (5) to return to the sewing start.

3

Checking the specified number of stitches

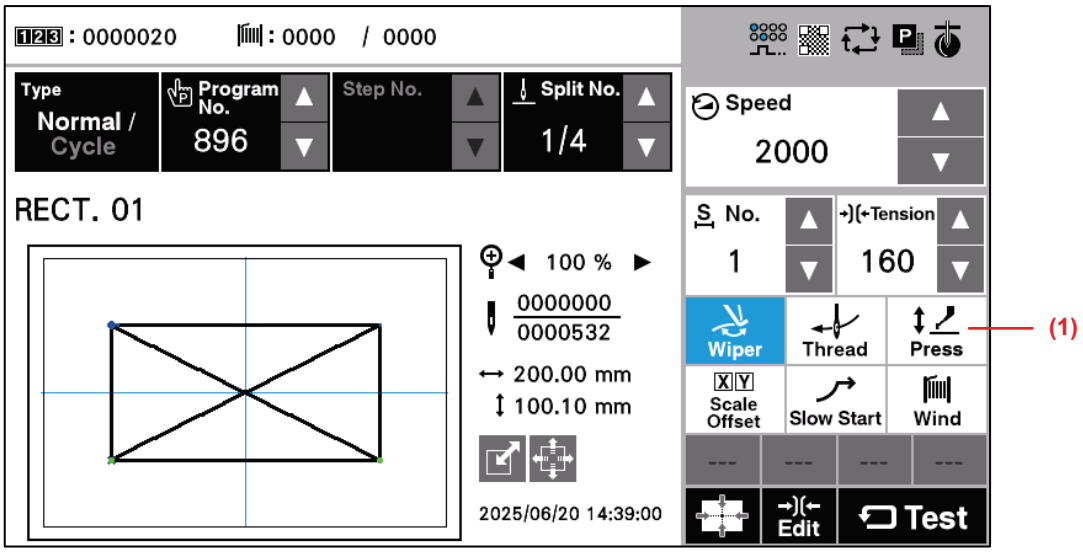


1. At the specified number of stitches, touch the + or - key (6) to specify the number of stitches to move.
2. If you touch the stitch forward key (7) or the stitch back key (8), the feed mechanism will move by the specified number of stitches
   - If you would like to stop the feeding operation, touch the continuous feed stop key (3).
   - Touch the Move to sewing start key (5) to return to the sewing start.

8-5. Setting the presser foot lift amount

The setting values for the presser plate and intermittent presser foot lift amount can be changed on the [Sewing Operation Screen].

[Stroke drop position setting]

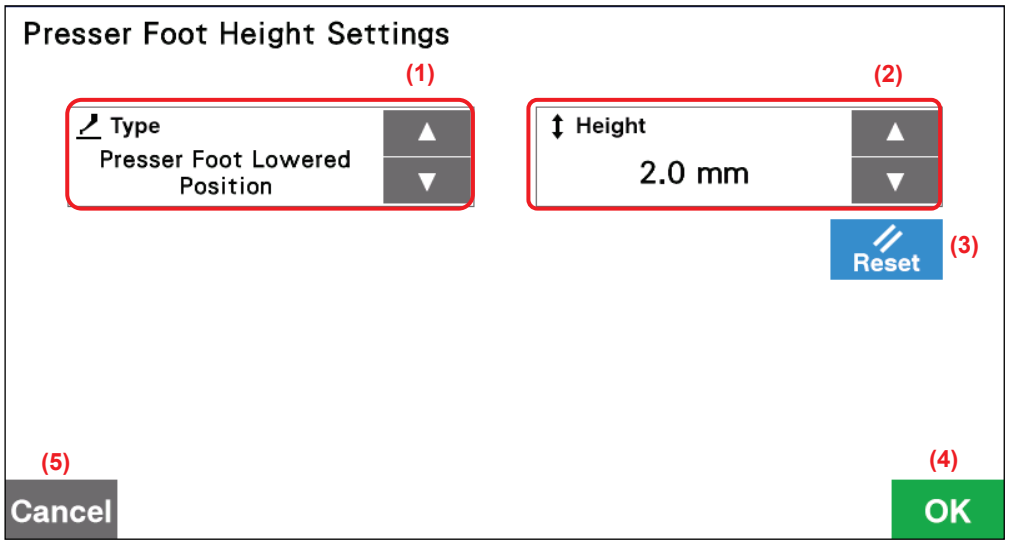




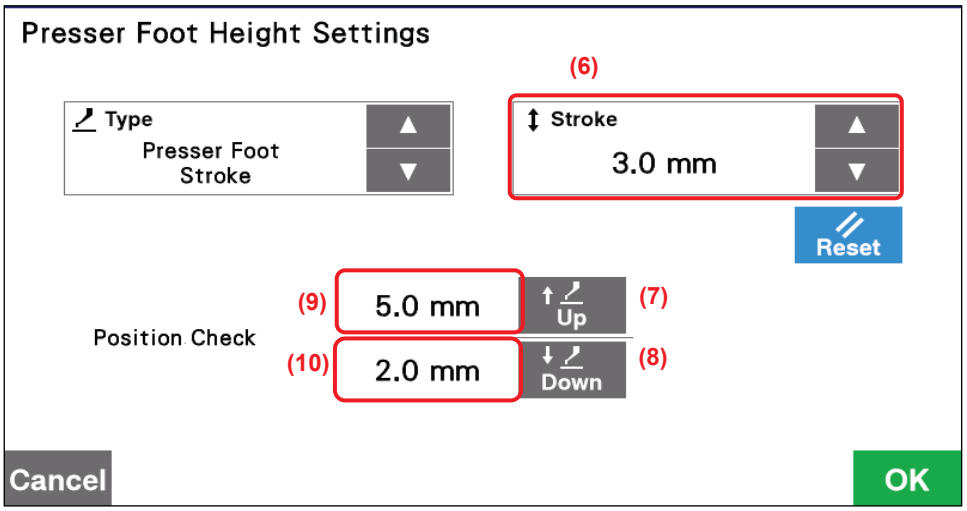
Touching the "Press" key (1) displays the presser lift setting screen.

Setting the intermittent presser stroke down position and stroke amount adjusts the intermittent presser height.

[Stroke drop position setting]

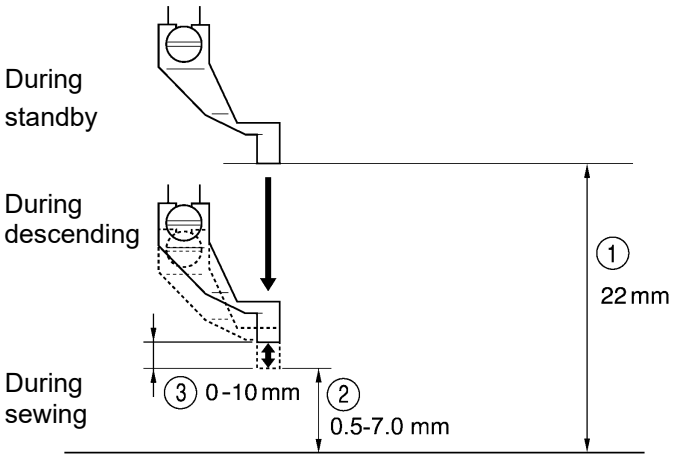


[Stroke amount setting]



Type (1)	Touch the △ or ▽ key (1) to select the item to change.
Height (2)	Touch the △ or ▽ key (2) to change the stroke drop position. If you change the value, the sewing machine's intermittent presser foot will move. Setting range: 0.5 to 7.0 mm, 0.1 mm units, initial value: 2.0 mm
Reset key (3)	Touch to return the value which currently appears in the display to the value which was first displayed when you switched to the setting screen. The sewing machine's intermittent presser foot will move according to this value.
OK key (4)	Touch to confirm the setting value and return to the [Sewing operation screen].
Cancel key (5)	Touch to discard the setting value and return to the [Sewing operation screen].
Stroke (6)	Touch the △ or ▽ key (6) to change the stroke amount. If you change the value, the sewing machine's intermittent presser foot will move. Setting range: 0.0 to 10.0 mm, 0.1mm units, initial value: 1.0 mm
Stroke UP key (7)	This raises the intermittent presser foot. However, the key is disabled while the intermittent presser foot is rising.
Stroke DOWN key (8)	This lowers the intermittent presser foot. However, the key is disabled while the intermittent presser foot is lowering.
Intermittent height (9)	Displays the sum of the value set for the stroke drop position and the value set for the stroke amount. ("Intermittent presser foot operation" ②)
Stroke drop position (10)	Displays the value set for the stroke drop position. ("Intermittent presser foot operation" ③)

Intermittent presser foot operation



4170B

① **Intermittent presser foot lift amount**
② **Intermittent presser foot stroke drop position**
③ **Intermittent presser foot stroke amount**

* After the presser foot has been replaced, it will be necessary to make corrections to the "Intermittent presser foot stroke drop position".
Ask the place of purchase for information on the correction method.

9. USING THE LCD PANEL (ADVANCED OPERATIONS)

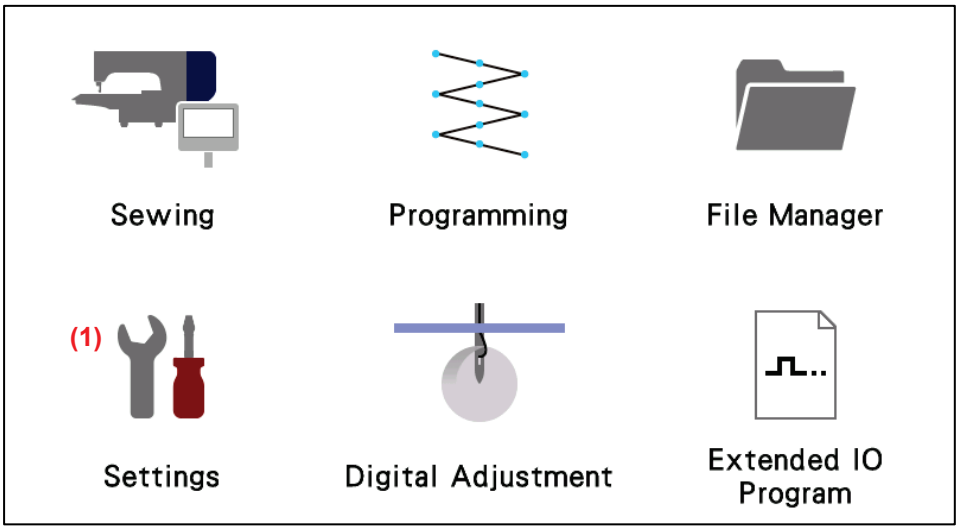
CAUTION

To prevent problems, do not use objects with sharp points to operate the LCD panel.

9-1. Memory switch setting method

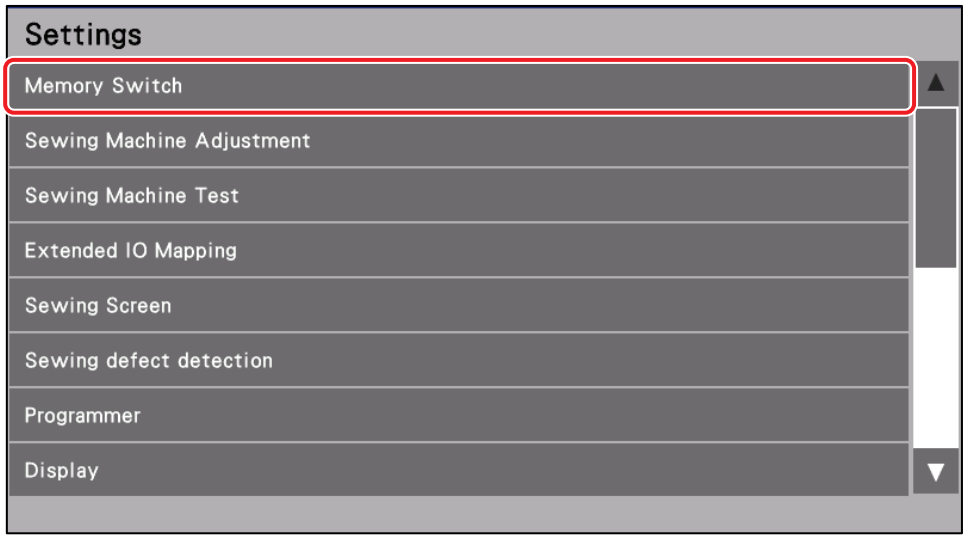
Press the HOME key to switch to the [Home screen].

[Home screen]



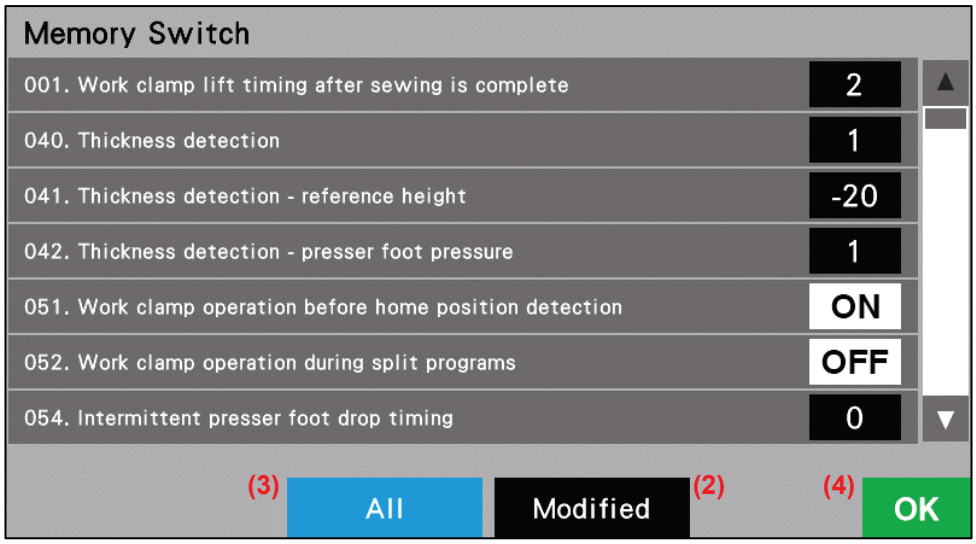
Touch the “Settings” key (1) to switch to the [Setting menu screen].

[Setting menu screen]



Select “Memory Switch”.

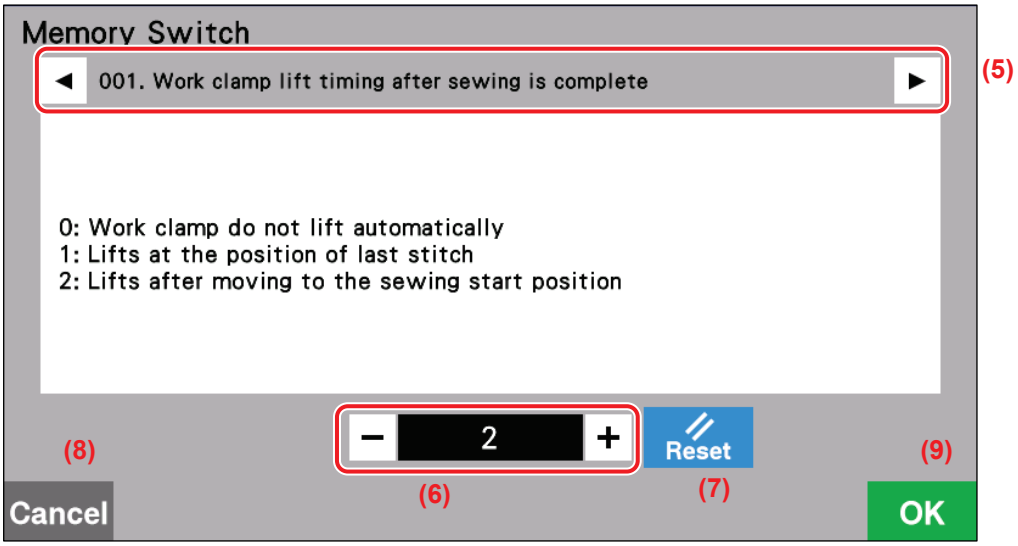
[Memory switch selection screen]



Select the number of the memory switch that you would like to change the setting for.

- When you touch the number of the memory switch you would like to change the setting for, the display will change to the [Memory switch editing screen].
- Touch the "OK" key (4) to return to the [Setting menu screen].
- "Modified" (2): This displays the numbers of memory switches that have been changed from default settings.
- "All" (3): This displays all memory switches.

[Memory switch editing screen]



This lets you change memory switch values.

- Number [◄ ►] keys (5): These change the memory switch number.
- Value [◄ ►] keys (6): These change the memory switch setting value display (ON/OFF, number).
- "Reset" key (7): This displays the initial value.
- "Cancel" key (8): This returns the display to the [Memory switch selection screen] without confirming the value.
- "OK" key (9): This confirms the value and then returns the display to the [Memory switch selection screen].

9-2. List of memory switch settings

No.	Function name		
	Setting range	Setting details	Initial value
001	Work clamp lift timing after sewing is complete		
	0	Work clamp does not lift automatically	2
	1	Lifts at the final stitch position	
	2	Lifts after moving to the sewing start position	
004	Use upper clamp		
	OFF	Not used	OFF
	ON	Used	
	*After changing to OFF, restart the sewing machine.		
040	Thickness detection		
	0	Disabled	1
	1	Use as common parameter (according to setting value of No. 41)	
	2	Measure reference height at the sewing start point	
	3	Measure reference height at reference height measurement code	
041	Thickness detection - reference height		
	-50 – 1700	-50 - 1700 mm (0.01 mm unit)	0
042	Thickness detection - presser foot pressure		
	1	Standard	1
	2	Weak	
051	Work clamp operation before moving to start point		
	OFF	Work clamp cannot be raised or lowered before moving to start point	ON
	ON	Work clamp can be raised and lowered before moving to start point	
052	Work clamp operation during split programs		
	OFF	Work clamp lifts automatically when sewing pauses due to a split program	OFF
	ON	Work clamp does not lift automatically when sewing pauses due to a split program	
054	Intermittent presser foot drop timing		
	0	Same movement as setting 1, but it does not drop at the feed retract position	0
	1	Presser foot drops at the sewing start, regardless of the work clamp switch operation	
056	Bobbin winding operation before origin detection		
	OFF	Bobbin winding not possible before origin detection	OFF
	ON	Bobbin winding possible before origin detection	
057	Work clamp operation when moving to sewing start position		
	OFF	Work clamp stays lowered after moving to start position	ON
	ON	Work clamp lifts automatically after moving to start position	
058	Work clamp operation during cycle program		
	OFF	Lift up automatically when completing sewing one step	OFF
	ON	Lift up only when completing sewing the last step in the cycle program	
060	Time between work clamp drops - upper shaft starts		
	0 - 3000	100 ms unit	0
061	Number of stitches to presser foot rise up at the sewing start		
	0	Disable drop down	3(-A) / 0(-5)
	1-3	Number of stitches in drop down condition	
062	Time between locking feed plate lock and dropping working clamp		
	0 - 1000	100 ms unit	100
063	Time until clamp descends		
	0 - 1000	100 ms unit	100

No.	Function name		
	Setting range	Setting details	Initial value
065	Length of the intermittent presser foot tube		
	0 - 100	By setting the actual length of the installed intermittent presser foot tube, you can adjust the intermittent descent timing relative to the main shaft and the maximum speed of the main shaft.	5.0
066	Drop down timing for presser foot stroke		
	-65 - 20	-65 (earlier) to 20 (slower) degree (1 degree unit)	0
067	Rise up timing for presser foot stroke		
	-20 - 65	-20 (earlier) to 65 (slower) degree (1 degree unit)	0
069	Intermittent presser foot stroke just before thread trimming		
	OFF	No stroke (keep the intermittent presser foot lowered)	OFF
	ON	Stroke even just before thread trimming	
070	Type of foot switch used		
	2	2 pedal foot switch	2
	3	3 pedal foot switch (Option)	
072	Presser operation of the 2 pedal foot switch		
	1	Standard	1
	2	No automatic presser lifting	
	3	Left-right presser → intermittent presser two-step presser	
093	Collision monitoring when presser foot drops		
	OFF	Disabled	ON
	ON	Enabled	
094	Intermittent presser foot waiting position offset		
	-10 - 5	1 mm unit	0
150	Highest needle position stop		
	OFF	Disabled	OFF
	ON	When the main shaft motor stops, the motor reverses and the needle bar returns to near the top dead center. (Because it stops with the thread take-up lever lowered more than usual, the lever rises at the start of sewing, which may cause thread slippage depending on sewing conditions.)	
151	1st stitch sewing speed at the sewing start		
	200 - 2800	100 sti/min unit	400
152	2nd stitch sewing speed at the sewing start		
	200 - 2800	100 sti/min unit	800
153	3rd stitch sewing speed at the sewing start		
	200 - 2800	100 sti/min unit	1200
154	4th stitch sewing speed at the sewing start		
	200 - 2100	100 sti/min unit	2100
155	5th stitch sewing speed at the sewing start		
	200 - 2100	100 sti/min unit	2100
156	Sewing speed for 5th stitch before the sewing end		
	400 - 2100	100 sti/min unit	2100
157	Sewing speed for 4th stitch before the sewing end		
	400 - 2000	100 sti/min unit	2000
158	Sewing speed for 3rd stitch before the sewing end		
	400 - 1700	100 sti/min unit	1700
159	Sewing speed for 2nd stitch before the sewing end		
	400 - 800	100 sti/min unit	800
163	Sewing speed limit value		
	1200-2100	Sewing speed limit value (100 sti/min unit) (Setting range will be different by setting memory switch No. 59)	2100
164	Thread trimming		
	OFF	All thread trimming operations are disabled	ON
	ON	Thread trimming is carried out in accordance with the sewing data	

No.	Function name		
	Setting range	Setting details	Initial value
165	Stop position at highest needle position		
	-20 - 20	Negative value --- needle bar height become high. (angle display)	0
166	Delay time until reverse operation starts		
	10 - 500	10 ms unit	150
167	Servo lock operation		
	OFF	Disabled	OFF
	ON	Enabled	
168	Servo lock timer setting		
	1 - 120	1 sec unit	1
172	Enable trimming position control error		
	OFF	Disabled	ON
	ON	Enabled	
173	Starting angle for needle up signal		
	0 - 40	1 degree unit	20
174	Stopping angle for needle up signal		
	40 - 80	1 degree unit	60
175	Starting angle for needle down signal		
	160 - 200	1 degree unit	180
176	Stopping angle for needle down signal		
	200 - 240	1 degree unit	220
185	Add extra stitch before trimming		
	OFF	Disable	OFF
	ON	Enable	
186	Extra stitch length		
	5 - 20	0.1 mm unit	1.0
187	Long thread trimming code		
	OFF	Normal thread trimming only	OFF
	ON	When the thread trimming code parameter is set to 1, long thread trimming is performed.	
188	Adjustment of standby position during long thread trimming		
	0 - 40	In 5° increments	0
194	Timing of the start of the movable knife movement at the sewing end		
	-50 - 0	In 5° increments	0
195	Upper thread catching timing at the end of sewing and thread trimming		
	-20 - 20	In 5° increments	0
196	Thread trimming timing just before thread cutting at the end of sewing		
	-20 - 10	In 5° increments	0
251	Feed speed		
	1	100 mm/s (Slow)	3
	2	200 mm/s	
	3	300 mm/s	
	4	400 mm/s	
	5	500 mm/s (Fast)	
252	High-speed test feed method		
	OFF	Normally slow, but becomes faster when the work clamp switch or left switch is depressed	OFF
	ON	High-speed feeding starts at the same time test feeding starts	
253	Moving method to the sewing start point		
	0	Depress the start switch or both the left and right switches when program No. is blinking	2
	1	Press the start position move key when program No. is blinking	
	2	Both 0 and 1 are valid	
	3	Turn on extended input when the program number is blinking (specified in the extended IO mapping settings)	

No.	Function name		
	Setting range	Setting details	Initial value
254	Movement path to start position from mechanical origin point		
	0	No specified routing	0
	1	To home position from X to Y, to starting point from Y to X	
	2	To home position from Y to X, to starting point from X to Y	
255	Feed speed during test mode		2
	1	50mm/s	
	2	100mm/s	
	3	200mm/s	
	4	300mm/s	
275	Second home position function		
	OFF	Disabled	OFF
	ON	Enabled * Use coordinates set by memory switch No. 276, 277	
276	2nd Origin X		
	-350 - 350	1 mm unit	0
277	2nd Origin Y		
	-225 - 225	1 mm unit	0
280	Changes the overall X feed timing		
	-80 - 80	-80 (earlier) to 80 (slower) 1 degree unit	0
281	X Feed timing for the 1st stitch at the sewing start		
	-80 - 80	-80 (earlier) to 80 (slower) 1 degree unit	0
282	X Feed timing for the 2nd stitch at the sewing start		
	-80 - 80	-80 (earlier) to 80 (slower) 1 degree unit	0
283	X Feed timing for the 3rd stitch at the sewing start		
	-80 - 80	-80 (earlier) to 80 (slower) 1 degree unit	0
284	X Feed timing for the 3rd stitch before the sewing end		
	-80 - 80	-80 (earlier) to 80 (slower) 1 degree unit	0
285	X Feed timing for the 2nd stitch before the sewing end		
	-80 - 80	-80 (earlier) to 80 (slower) 1 degree unit	0
286	X Feed timing for the 1st stitch before the sewing end		
	-80 - 80	-80 (earlier) to 80 (slower) 1 degree unit	0
290	Changes the overall Y feed timing		
	-80 - 80	-80 (earlier) to 80 (slower) 1 degree unit	0
291	Y Feed timing for the 1st stitch at the sewing start		
	-80 - 80	-80 (earlier) to 80 (slower) 1 degree unit	0
292	Y Feed timing for the 2nd stitch at the sewing start		
	-80 - 80	-80 (earlier) to 80 (slower) 1 degree unit	0
293	Y Feed timing for the 3rd stitch at the sewing start		
	-80 - 80	-80 (earlier) to 80 (slower) 1 degree unit	0
294	Y Feed timing for the 3rd stitch before the sewing end		
	-80 - 80	-80 (earlier) to 80 (slower) 1 degree unit	0
295	Y Feed timing for the 2nd stitch before the sewing end		
	-80 - 80	-80 (earlier) to 80 (slower) 1 degree unit	0
296	Y Feed timing for the 1st stitch before the sewing end		
	-80 - 80	-80 (earlier) to 80 (slower) 1 degree unit	0
301	Memory switch category display		
	OFF	Disabled	ON
	ON	Enabled	
351	Counting method for production counter		
	0	Counted for each item of sewing data	0
	1	Counted for each thread trimming operation	
	2	Counted when sewing data ends or when split stops	
352	Counting method for bobbin thread counter		
	0	Counted for each item of sewing data	0
	1	Counted for each thread trimming operation	
	2	Counted when sewing data ends or when split stops	
	3	Counted according per 10 needles	

No.	Function name		
	Setting range	Setting details	Initial value
353	Counter timing for bobbin thread counter		
	OFF	Counted at the end of sewing	OFF
	ON	Counted at the start of sewing	
354	Switching program/split numbers using an external switch		
	0	Function disabled	0
	1	Switch program number * Switching numbers via extended input. The hundreds digit of the program number is specified by memory switch No.355.	
	2	Switch split number	
355	Hundreds digit of program No. when switching with external switch		
	0 - 9	Hundreds digit of the program number * Valid only when memory switch No. 354 is 1	0
360	Increment of production counter		
	0 - 99	0 - 99	1
400	Detailed settings sewing condition		
	OFF	Use common parameter	OFF
	ON	Use parameter of each program	
403	Select split mode		
	0	Continuous split	0
	1	Independent split	
407	Program No. assigned to the direct selection key 1		
	OFF	Disable	OFF
	001 - 999	Single program No.	
	C01 - C30	Cycle program No.	
408	Program No. assigned to the direct selection key 2		
	OFF	Disable	OFF
	001 - 999	Single program No.	
	C01 - C30	Cycle program No.	
409	Program No. assigned to the direct selection key 3		
	OFF	Disable	OFF
	001 - 999	Single program No.	
	C01 - C30	Cycle program No.	
410	Program No. assigned to the direct selection key 4		
	OFF	Disable	OFF
	001 - 999	Single program No.	
	C01 - C30	Cycle program No.	
460	X direction sewing area limitation		
	0 - 700	mm	700
461	Y direction sewing area limitation		
	0 - 450	mm	450
469	Digital tension setting value		
	OFF	Use parameter of each program	ON
	ON	Use common parameter	
510	Needle bar LED light		
	OFF	Disabled	ON
	ON	Enabled	
511	Time until needle bar LED light turns off after sewing starts		
	0 - 1000	sec	0
550	Output continue time for needle cooler device		
	0	Disabled	0
	100 - 2000	Enabled for using needle cooler (Output time for after machine is stopped, Unit : 100 ms)	
551	Upper thread tension release at the sewing start		
	0	Not released	0
	1 - 3	Released during the specified number of stitches *Set tension value for first stitch using memory switch No. 587	

No.	Function name		
	Setting range	Setting details	Initial value
552	Tension release timing during thread trimming		
	-80 - 70	1 degree unit	0
558	External error monitoring input		
	OFF	Disabled	OFF
	ON	Enabled (Connector X32)	
559	Pedal operation via external switch		
	0	Use the main unit pedal	0
	1	Use extended input (specified in extended I/O assignment settings)	
560	Automatic ejector		
	0	Disabled	3
	1	Standard operation	
	2	Sewing starts when cassette sensor is ON	
	3	Start switch is enabled even if cassette sensor is OFF	
567	Tension disc status during feeding		
	OFF	Opened	OFF
	ON	Not opened	
568	Monitor pallet sensor during sewing		
	OFF	Disabled	OFF
	ON	If pallet sensors turn off during sewing, stop sewing and show error message.	
569	Timing for bobbin thread detector device		
	0	Disabled	0
	1	Detect before sewing	
	2	Detect before and after sewing	
577	On time of pneumatic-type thread wiper		
	100 - 990	10 ms unit	100
578	Sensor check when entering clamp or threading mode		
	OFF	Disabled	ON
	ON	Enabled	
580	Bobbin thread clamp function		
	OFF	Disable	OFF
	ON	Enable	
581	Stitch count for bobbin thread release		
	1-5	1-5 (stitches) Only activates when MSW580: Bobbin thread clamp function is ON. At the sewing start, the clamped bobbin thread will be released on stitch count P (=MSW581) · Q degree (=MSW582) (MSW582: upper shaft angle for bobbin thread release, use as a set)	1
582	Upper shaft angle for bobbin thread release		
	5-359	5-359(degree) Only activates when MSW580: Bobbin thread clamp function is ON At the sewing start, the clamped bobbin thread will be released on needle num P (=MSW581) · Q degree (=MSW582) (MSW581: number of needles for bobbin thread release, use as a set)	355
587	Tension value for first stitch		
	0 - 500	0 - 500 * Set Upper thread tension release at the sewing start using memory switch No. 551	0
589	Thread trimming tension		
	0 - 500	Tension value	-5 Specifications:100 -A Specifications:40

No.	Function name		
	Setting range	Setting details	Initial value
590	Bar-code reader device		
	OFF	Disabled	OFF
	ON	Enabled	
	* Please ask the place of purchase for details		
650	Error release method when operation has stopped		
	0	Press the Reset key	0
	1	Press the Reset key or the STOP switch	
651	Needle stops in the up position during temporary stop while sewing		
	0	When sewing is interrupted by the pause key, the needle stops in the down position	0
	1	When sewing is interrupted by the pause key, the needle stops in the up position	
652	Thread trimming after sewing pause is released		
	OFF	Always ask whether to trim the thread	ON
	ON	Trim automatically	
653	Resuming sewing after sewing is paused		
	OFF	Reset key → Yes key (one stitch move backward) → Wait for start	OFF
	ON	Reset key → Wait for start	
654	Ignore split No. when moving to start position after paused		
	OFF	Move to nearest split point before current position	OFF
	ON	Move to sewing start point regardless of split No.	
656	Start position return when sewing is paused		
	OFF	Mechanism moves to sewing start position directly	OFF
	ON	Mechanism steps back to the sewing start position along the sewing path	
657	Time from error occurring to buzzer stopping		
	0	Buzzer does not stop	0
	5 - 30	Buzzer stops after the specified time (sec)	
658	Raise the presser foot when the bobbin counter warning is cleared		
	OFF	Do not raise the presser foot when cleared	OFF
	ON	Raise the presser foot when cleared	
659	Pause method		
	0	Use the main unit pause switch	0
	1	Use extended input (specified in extended I/O assignment settings)	
750	Continuous operation mode		
	0	Disabled	0
	1	Enabled	
751	Continuous operation cycle time adjustment timer		
	0 - 30000	Interval of operation (Unit: 10ms)	200
752	Sewing machine ID code		
	0 - 99	0 to 99 (To specify folder name on storage media)	0
753	Number of login IDs		
	0	Login function disabled	0
	1 - 50	Available number of logins	
754	Login name type		
	0	Standard string	0
	1	Extended string	
756	Hook timing reference sensing		
	OFF	Disabled	ON
	ON	Enabled	
757	Hook timing reference angle tolerance threshold		
	1 - 20	In 1° increments	2
759	Needle bar height sensing		
	OFF	Disabled	ON
	ON	Enabled	

No.	Function name		
	Setting range	Setting details	Initial value
760	Needle bar position tolerance threshold		
	2 - 8	0.1 mm unit	4
762	Needle guard and needle clearance sensing		
	OFF	Disabled	ON
	ON	Enabled	
763	Needle guard upper limit tolerance threshold		
	0 - 10	0.01 mm unit	3
764	Needle guard lower limit tolerance threshold		
	-10 - 0	0.01 mm unit	-3
766	Needle clearance upper limit tolerance threshold		
	0 - 10	0.01 mm unit	3
767	Needle clearance lower limit tolerance threshold		
	-10 - 0	0.01 mm unit	-3
771	Hook oil supply sensor		
	OFF	Disabled	ON
	ON	Enabled	
772	Hook oil sensor warning time interval		
	1 - 60	1 hour unit	6
775	Needle bar operation method during maintenance		
	0	Manual	0
	1	Automatic	
777	Number of times to obtain the needle clearance reference for needle guard and needle clearance standard adjustment		
	1 - 5	Set number of times to obtain	3
780	Maintenance position		
	2	Center	2
	3	Set by memory switch No. 781 and 782	
781	X coordinate of maintenance position		
	-350 - 350	mm	0
782	Y coordinate of maintenance position		
	-225 - 225	mm	0

9-3. Using cycle programs

Sewing patterns that have been recorded in user programs can be saved in up to 30 cycle programs.
One cycle program can contain up to a maximum of 50 steps.
When sewing the sewing patterns in a certain order, it can be useful to save them in a cycle program beforehand.
* If memory switch No. 400 is set to OFF, cycle program setting and selection cannot be carried out.

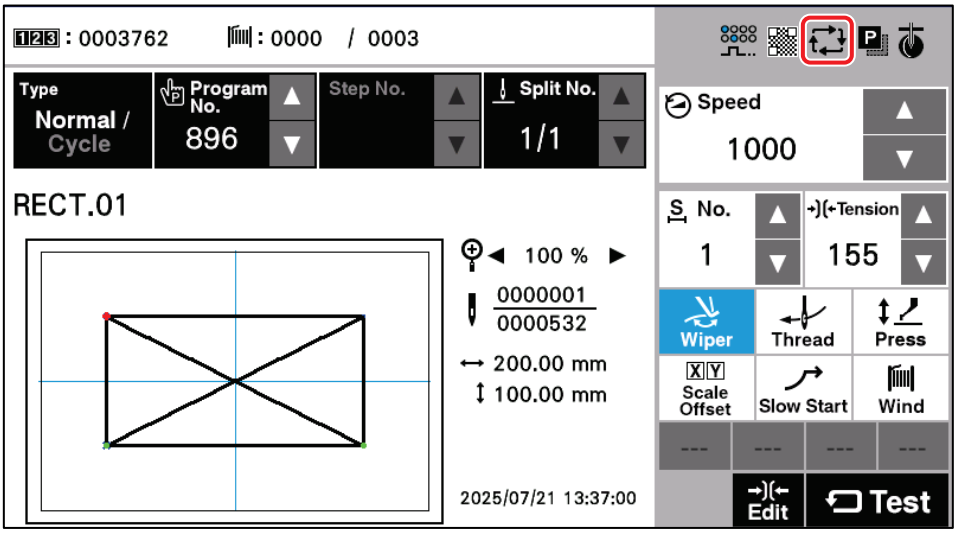
<Registration method>

Here, we explain an example in which a cycle program consisting of Step 1: Program No.001 and Step 2: Program No.003 is registered as No.C14.

1. Touch the “Cycle program” key in the [Sewing operation screen] to switch to the [Cycle program editing screen].

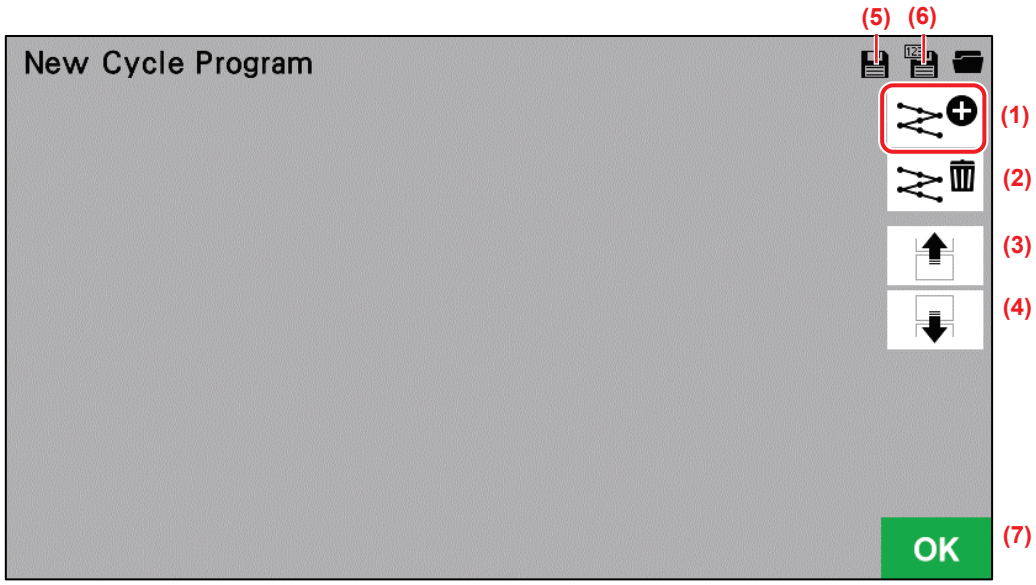
   * To edit a cycle program which has already been created, first select the desired cycle program number and then touch the “Cycle program” key.

[Sewing operation screen]



2. Touch the “Add step” key (1) in the [Cycle program editing screen] to switch to the [Add step screen].

[Cycle program editing screen]



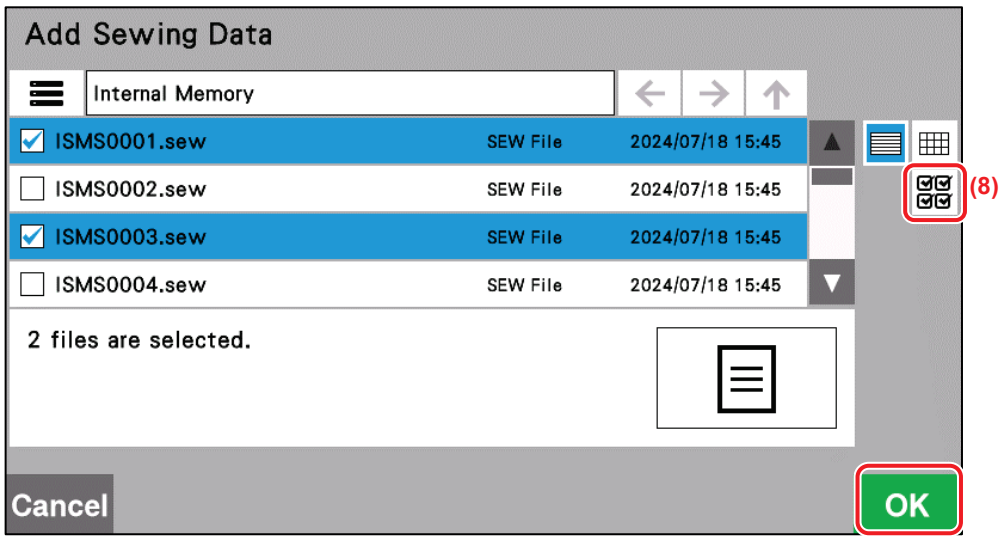
Descriptions of keys

(1)	Add step	Switches to the screen for selecting a program to add.
(2)	Delete step	Deletes the program which is currently selected.
(3)	Move step (forward)	Moves the currently-selected program one step toward the start.
(4)	Move step (backward)	Moves the currently-selected program one step toward the end.
(5)	Save	When saving a new program: Switches to the [Cycle program save screen]. When saving an existing cycle program that has been edited: The [Save program] dialog box is displayed.
(6)	Save as ...	Switches to the [Cycle program save] screen.
(7)	OK	Switches to the [Sewing operation screen].

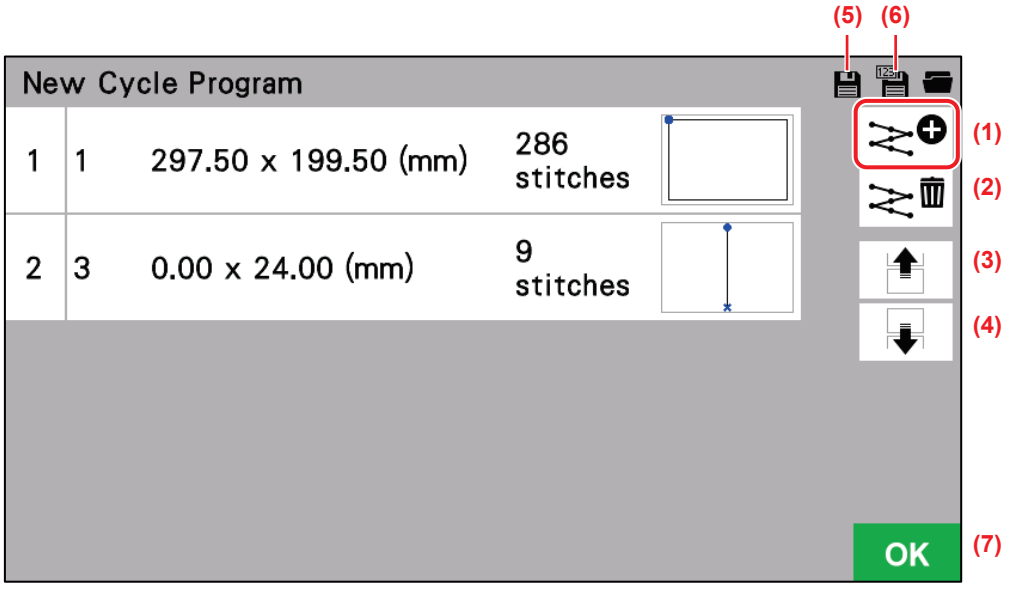
3. Select "Program No." in the [Add step screen] and then touch the “OK” key to add that program number. The display will then return to the [Cycle program editing screen].

   * If you touch the multiple select key (8), you can select multiple files.

[Add step screen]

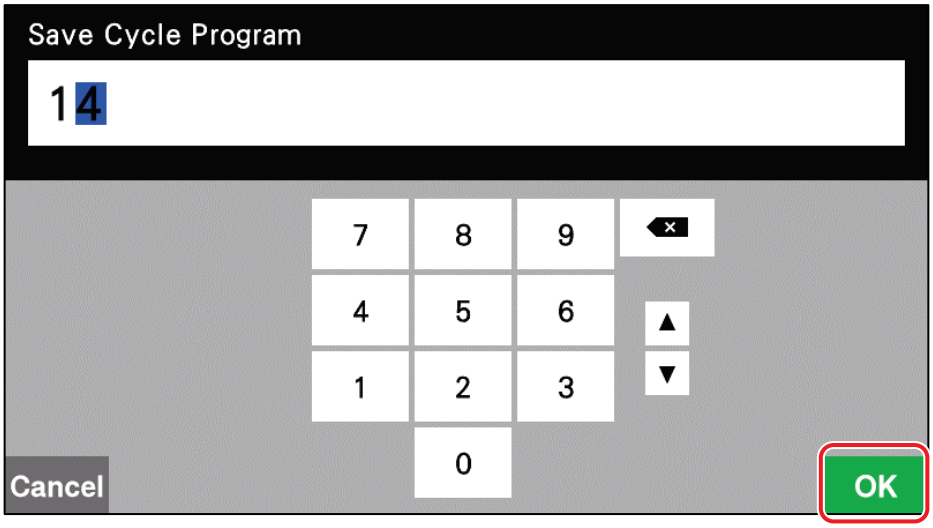


[Cycle program editing screen]



4. Repeat the operations in steps 2. and 3. to create the desired cycle program, and then touch the “Save” key (5) or “Save as ...” key (6) to switch to the [Cycle program save screen].
5. Enter the cycle program number, and then touch the “OK” key. The cycle program will be saved and the display will return to the [Cycle program editing screen]. Numbers from C01 to C30 can be saved.

[Cycle program save screen]

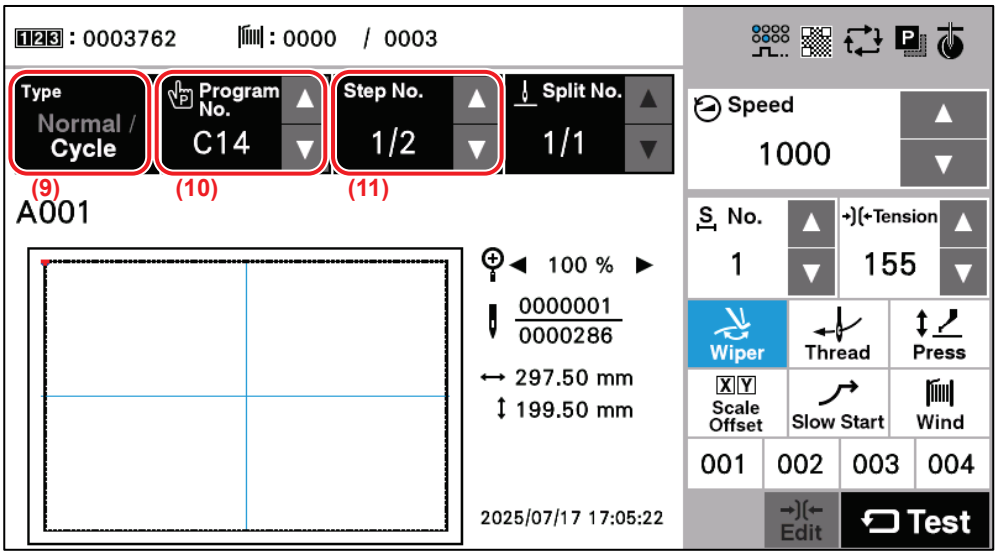


6. Touch the “OK” key (7) in the [Cycle program editing screen] to return to the [Sewing operation screen].

<Method of use>

When cycle programs have been registered, you can select the cycle program numbers from the [Sewing operation screen].

[Sewing operation screen]



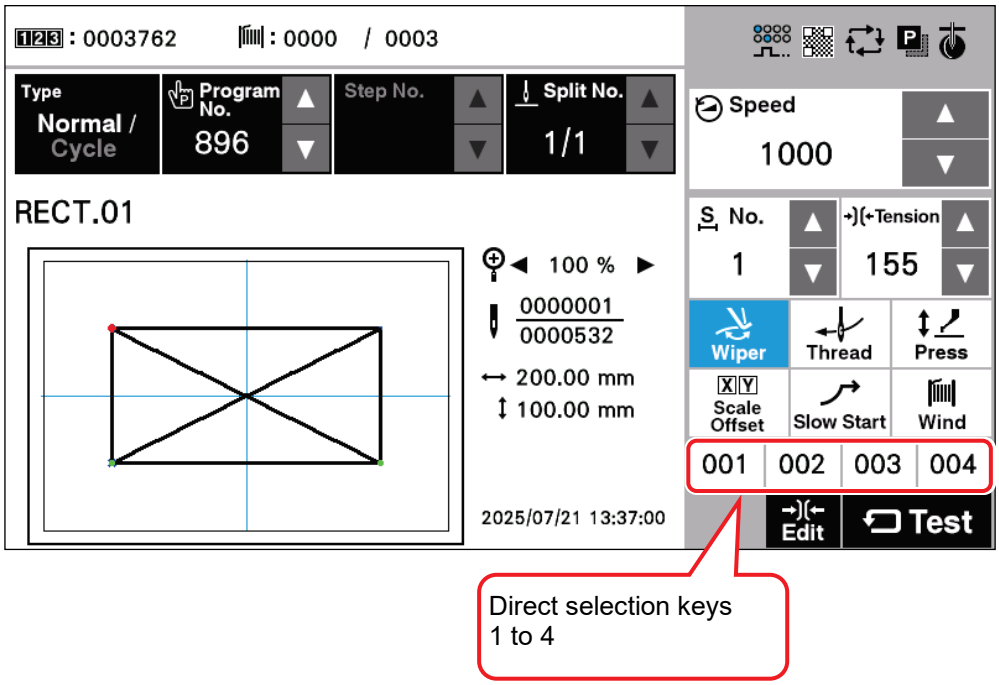
Descriptions of keys

(9)	Type key	Select Cycle.
(10)	Program No. keys	The currently selected cycle program number is displayed. Touch the ▽△ keys to select the cycle program number that you would like to use.
(11)	Step No. keys	The currently selected step number is displayed. Touch the ▽△ keys to select the step number.

9-4. Direct selection

You can use the direct selection keys to directly select program numbers and cycle program numbers.

[Sewing operation screen]



<Recording method>

This is carried out using memory switch Nos. 407 to 410.
Setting range: OFF, 001 - 999, C01 - C30

	Direct selection 1 key	Direct selection 2 key	Direct selection 3 key	Direct selection 4 key
Corresponding memory switch number	407	408	409	410
Initial value	No registration	No registration	No registration	No registration

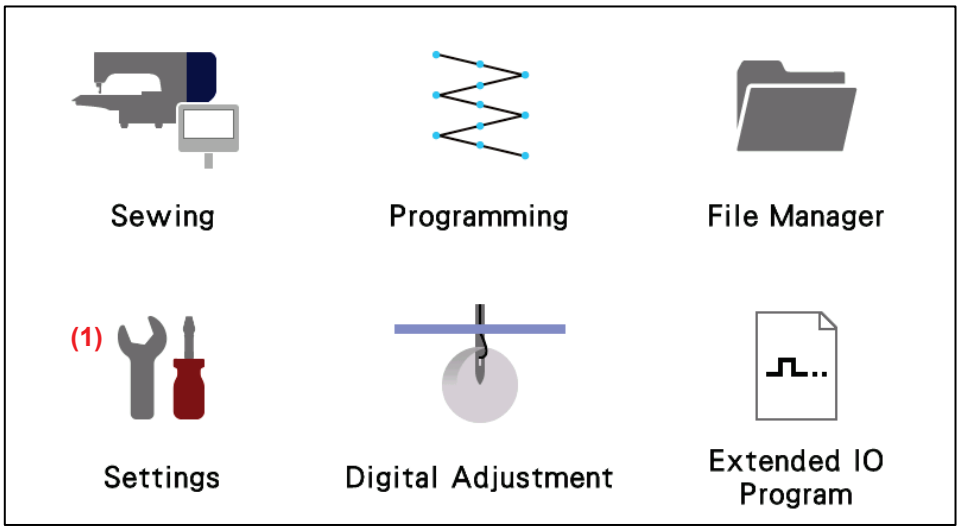
- If there are no program numbers registered in a direct selection key (i.e. it is OFF), "---" will be displayed and the display will become inactive.
- If a program number (sewing pattern) which has been registered in a direct selection key cannot be loaded, the display will be inactive and the key cannot be selected.
- If you keep pressing a direct selection key, the display will switch to the settings for the program number displayed with this key.

9-5. Setting the sewing screen display

This lets you set whether the codes which are displayed in the sewing screen preview are displayed or not displayed.

1. Press the HOME key to switch to the [Home screen].
   Touch the Settings key (1) to switch to the [Setting menu screen].

[Home screen]



2. Select "Sewing Screen".

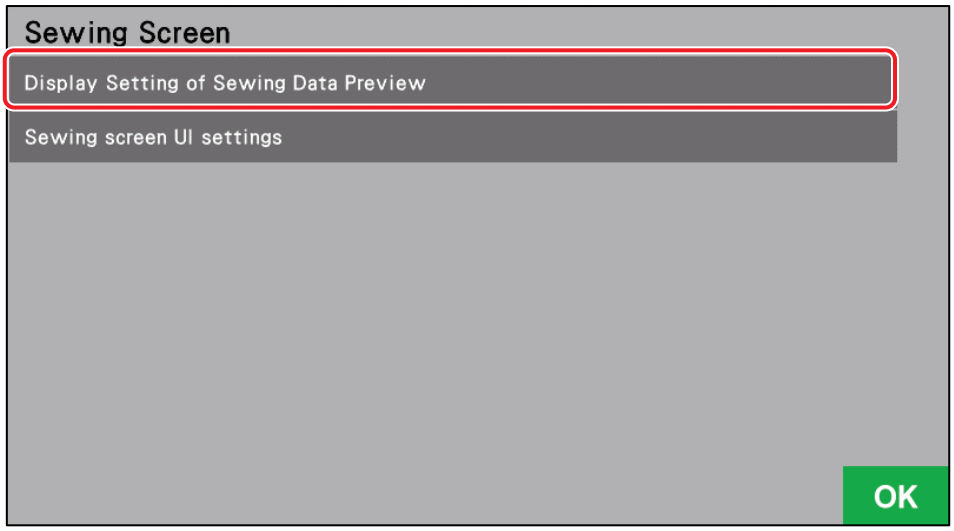
[Setting menu screen]



9-5-1. Display Setting of Sewing Data Preview

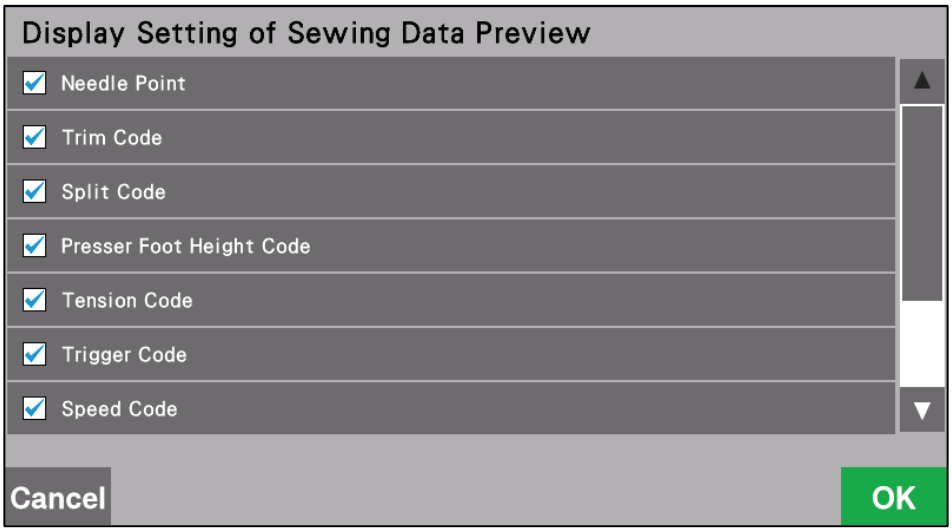
1. Select "Display Setting of Sewing Data Preview".

[Sewing Screen]



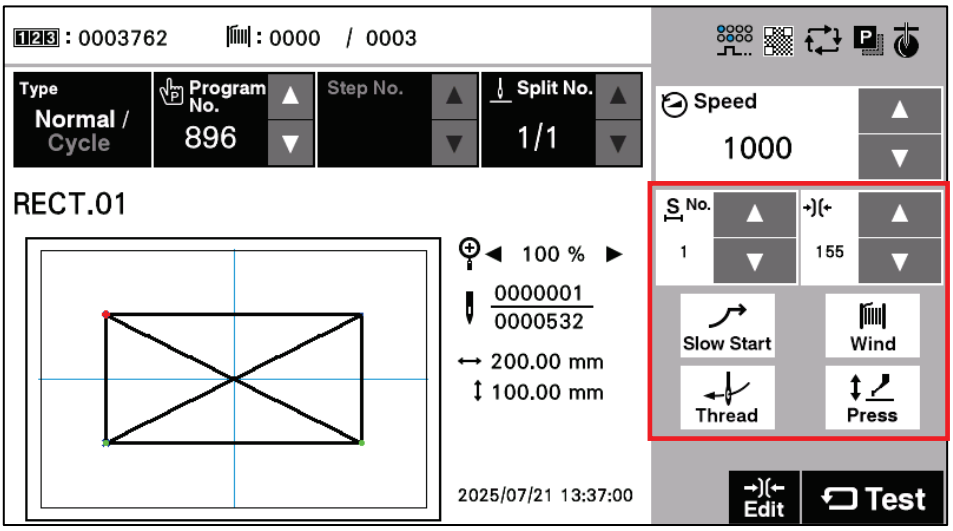
2. The codes which can be switched between displayed and not displayed in the sewing screen preview are displayed in a list.

   If you would like the codes to be displayed, select the corresponding check box.
   If you would like the codes to be not displayed, unselect the corresponding check box.



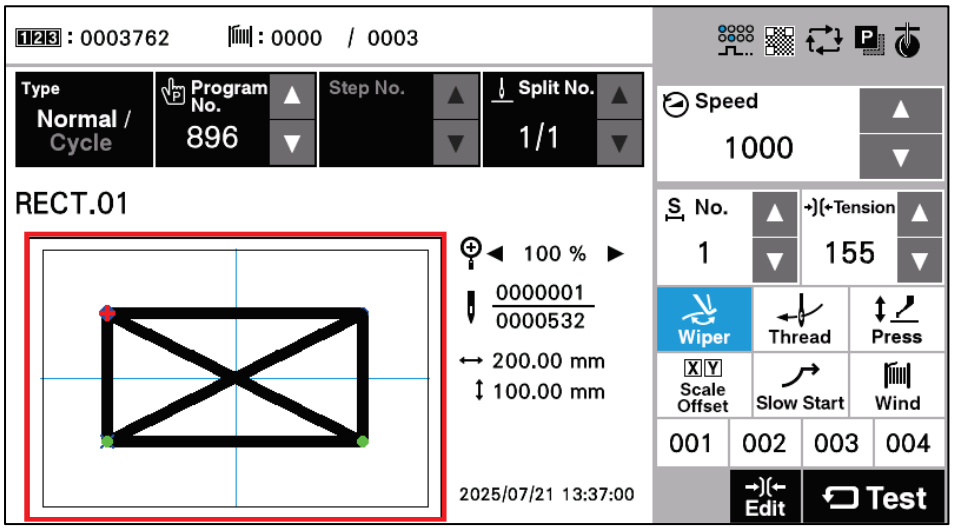
9-5-2. Sewing Mode Big Button Function

When "Big Icon in Sewing Mode" is turned on, some of the buttons in the sewing screen appear larger on the screen.



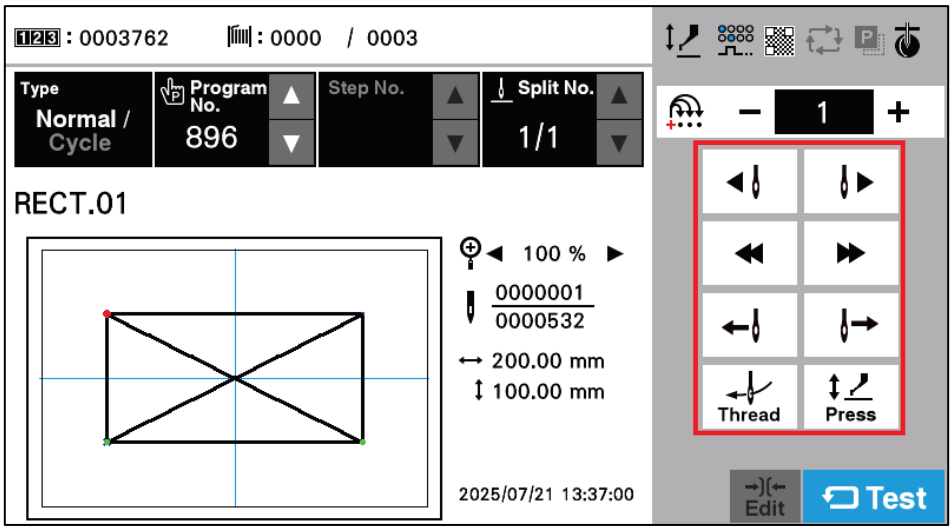
9-5-3. Preview Big Needle Point Function

When "Big Needle Point in Sewing Mode" is turned on, the cursors which indicate the sewing point and the current feed position in the preview display appear larger in the display.



9-5-4. Test Mode Big Button Function

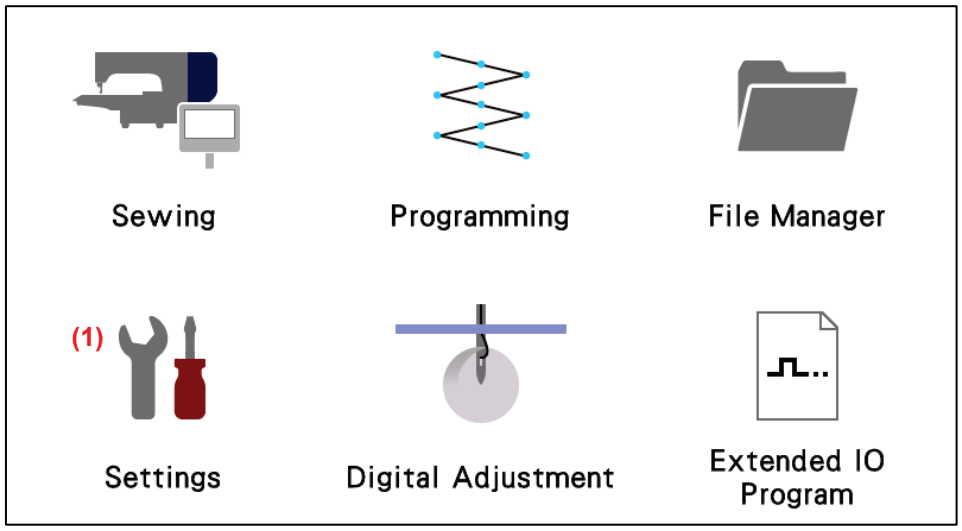
When "Big Icon in Test Mode" is turned on, some of the buttons in the sewing screen appear larger on the screen during test mode.



9-6. Initialization method

1. Press the HOME key to switch to the [Home screen].
   Touch the Settings key (1) to switch to the setting menu screen.

[Home screen]

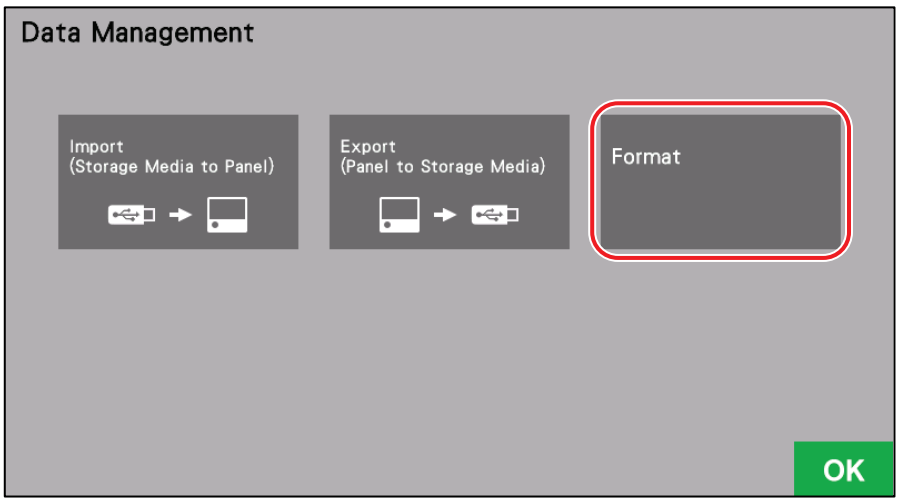


2. Select "Data Management".

[Setting menu screen]



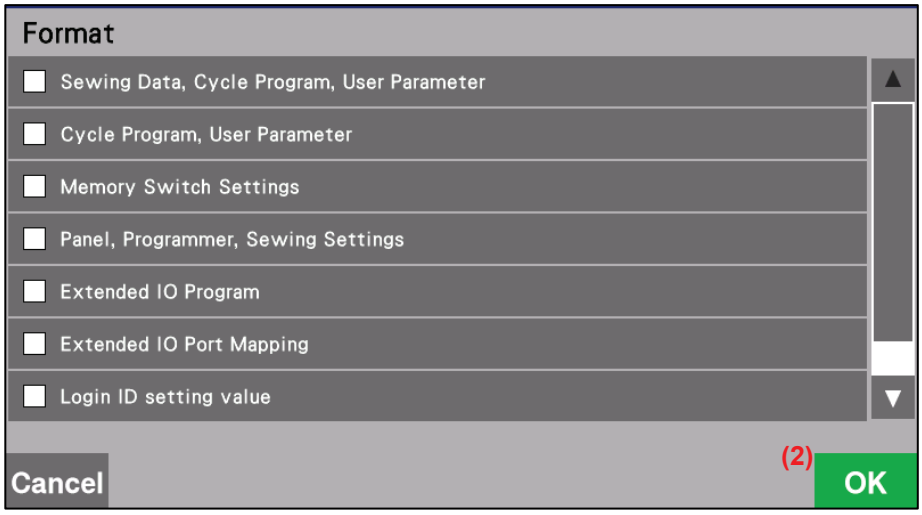
3. Select "Format".



4. The following four items will be displayed for initialization.

- Sewing data, cycle program, user parameter
- Cycle program, user parameter
- Memory Switch Settings
- Panel settings, programmer settings, sewing settings
- Extended IO Program
- Extended IO Port Mapping
- Login ID setting value
- Network reset
- Target value settings
- Target value set assignment

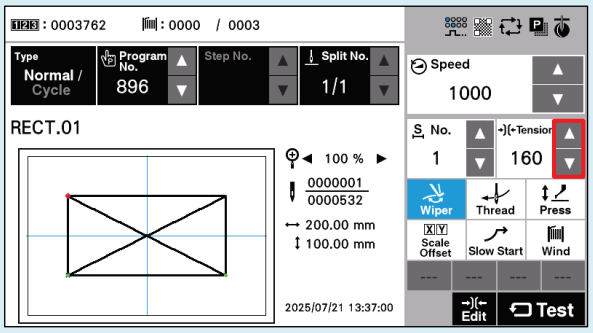
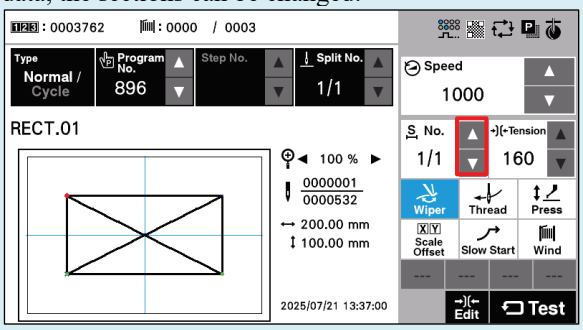
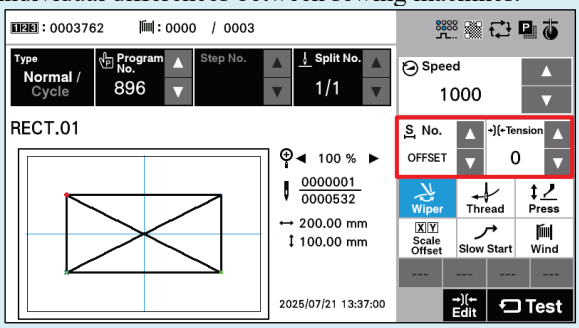
Place a check mark against the items you would like to initialize, and then touch the “OK” key (2) to start the initialization.



5. When initialization is finished, the finished message screen will be displayed.
   * The following memory switches will not be initialized.
   70,72,253,254, 275,276,277,460,461

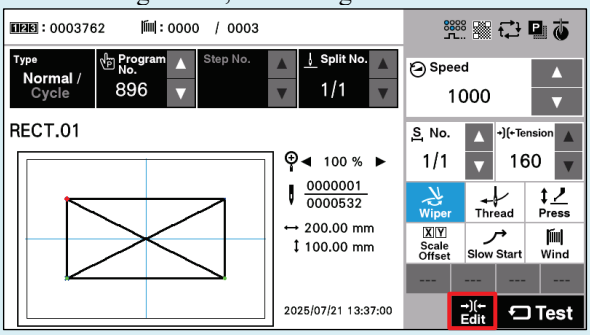
9-7. Using the digital tension

The dedicated tension (a mode which allows the tension value to be changed in the middle of sewing data) can be used by changing the setting for memory switch No. 469.

<table>
<tr><th>Memory switch No. 469=ON
For common tension</th><th>Memory switch No. 469＝OFF
For dedicated tension</th></tr>
<tr><td colspan="2">Sewing screen</td></tr>
<tr><td>Changing the tension values
The tension values can be changed at the sewing screen.
The entire program uses the same tension value, and so there are no sections and the tension value cannot be changed.

</td><td>Changing the tension values
The tension values cannot be changed at the sewing screen.
If multiple tension codes have been set in the sewing data, the sections can be changed.

</td></tr>
<tr><td>Changing the offset value
The entire program uses the same tension value, and so the offset value cannot be changed.
It is also not displayed.</td><td>Changing the offset value
The offset value can be changed at the sewing screen.
The offset value can be displayed by touching (if the smallest section number is being displayed in the section number display column) or (if the largest section number is being displayed).
* What is the offset number?
For example, if the tension value is 350 for section No. 1 and
the tension value is 200 for section No. 2 and the offset value is -10, the actual tension output value will be 340 for section 1 and 190 for section 2.
The offset value is the same for all programs.
The reason for using the offset value is to adjust for individual differences between sewing machines.

</td></tr>
</table>

Switching to digital tension editing mode

When you touch the [Edit] key at the sewing screen, the sewing machine will switch to digital tension editing mode.



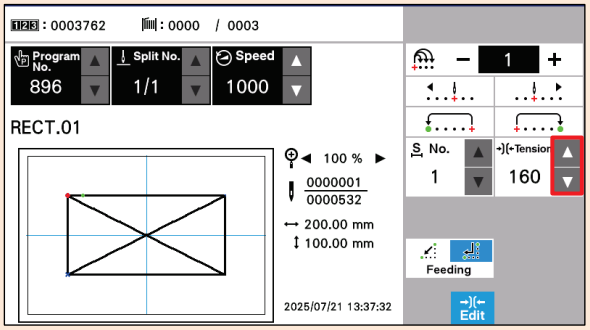
Digital tension editing mode

This is a mode that allows tension editing.

Changing the tension values

The tension values can be changed in digital tension editing mode.

The entire program uses the same tension value, and so there are no sections and the tension value cannot be changed.



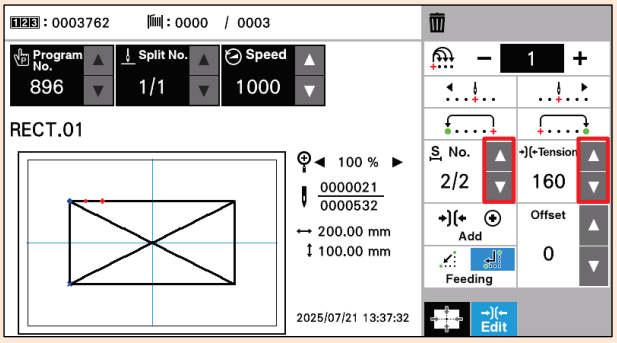
Adding tension codes

Not possible

Changing the tension values

The tension values can be changed in digital tension editing mode.

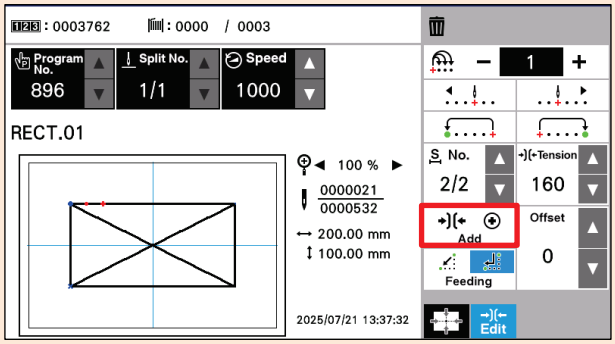
If multiple tension codes have been set in the sewing data, the sections can be changed.

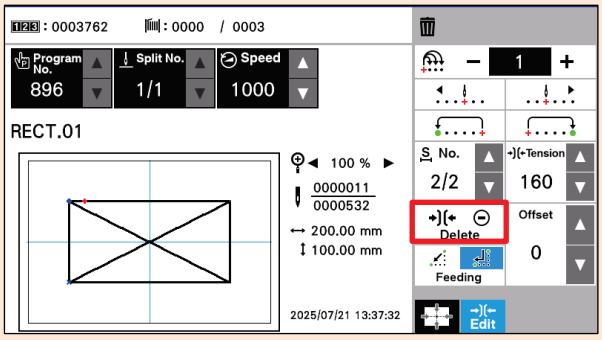
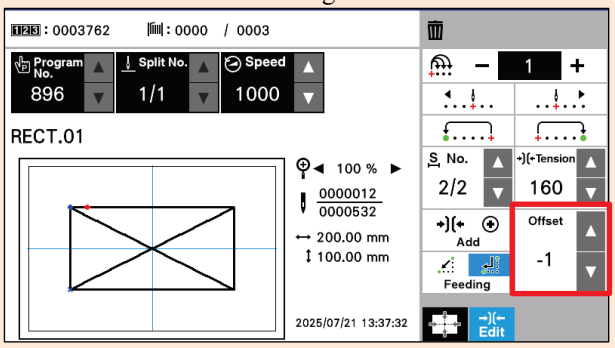


Adding tension codes

Move to the sewing point where you would like to add a tension code, and then touch the [Add] key to add the tension code.

The initial value is the same as the tension value for the previous section.

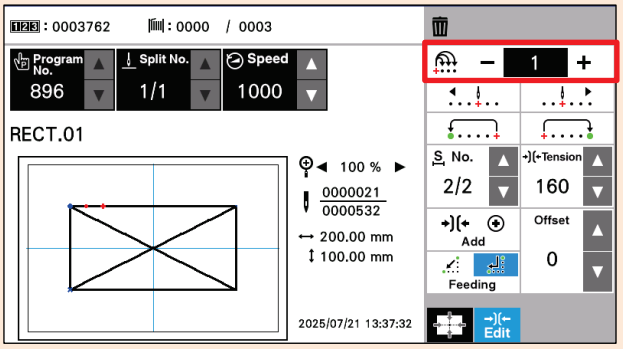


Deleting tension codes Not possible	**Deleting tension codes** Move to the sewing point where the tension code to be deleted is, and then touch the [Delete] key to delete the tension code. 
Changing the offset value Because a single tension value is used for all programs, the offset value cannot be changed. It is also not displayed.	**Changing the offset value** The offset value can be changed. 

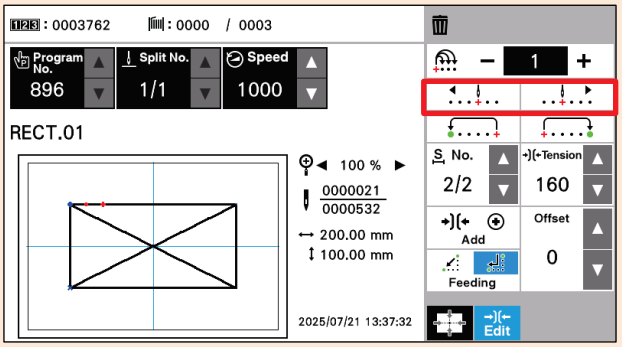
Feeding

Feeding by the specified number of stitches

You can set the number of stitches to move.

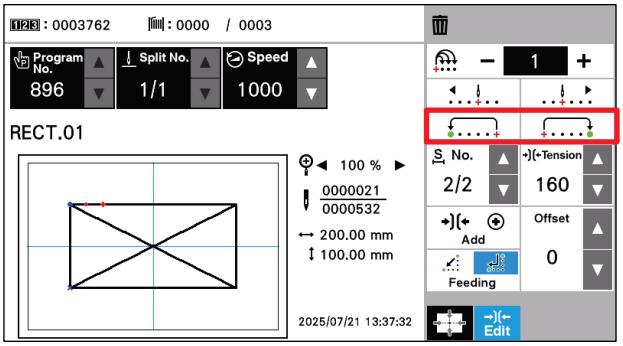


The feed moves forward or backward by the specified number of stitches. (It stops at split codes, and at start and end points.)



Moving to a tension code position

The feed moves from the current sewing position to the next forward or backward tension code. (It does not stop at split codes.)

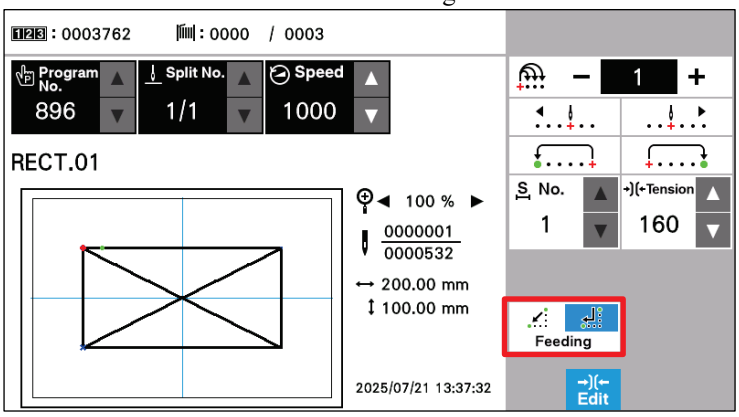


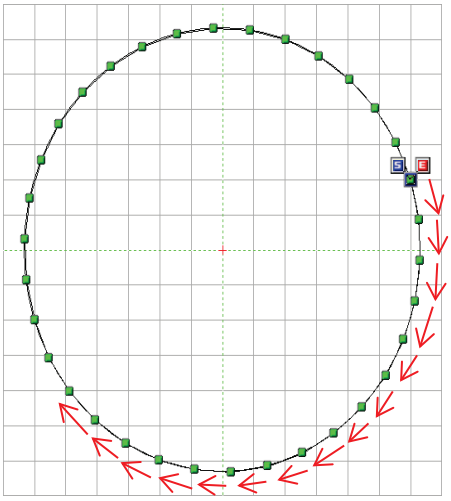
Feed movement method

The feed movement method can be changed. The movement method changes each time the [Feeding] key is touched.
The following two movement methods are available.

Following the sewing points

This is the same as the feed method during normal test mode.

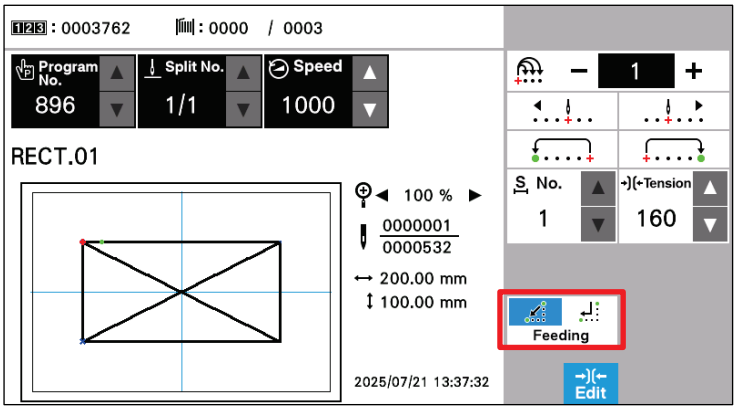


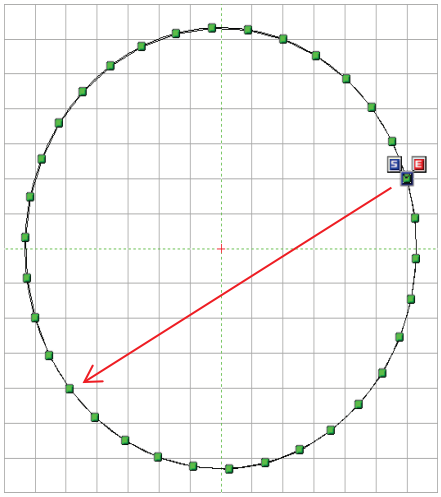


Moving along nearly the shortest path

The feed moves from the current sewing point to the target sewing point along a path that is close to the shortest path possible.

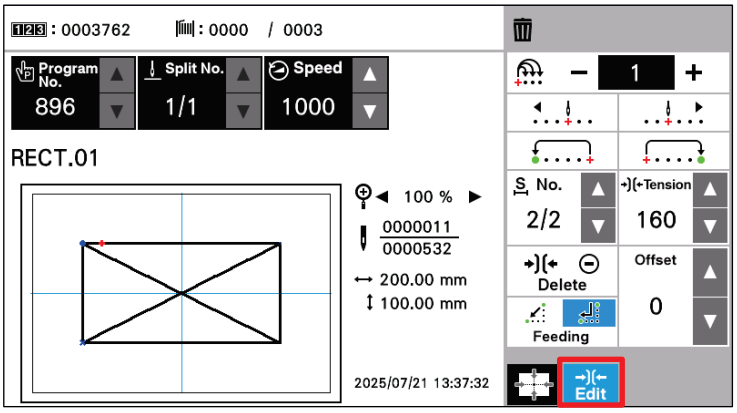
* Depending on factors such as the type of work clamp being used, the work clamp and the needle bar, etc. may collide if some paths are used.





Switching to the sewing screen (Exiting digital tension editing mode)

When you touch the [Edit] key in digital tension editing mode, the display changes to the sewing screen.
At this time, the edits (tension value changes and tension code additions and deletions) made in digital tension editing mode will be confirmed.
Furthermore, if test sewing is in progress, thread trimming will be carried out when digital tension editing mode is exited.



9-8. Using material thickness detection

The thickness of the material which has been measured using this function is only a guide, and is not a guarantee of measurement of accurate thickness.
When a material detection code which corresponds to the thickness of the material being sewn is set, material setting errors can be prevented.

[NOTE] Material thickness detection and reference height measurement codes operate only when they are set to the following positions:

- **The sewing start point**
- **The point immediately after the feed or basting**

9-8-1. Setting the reference height

The method of setting the reference height varies depending on the value for memory switch No. 40.

The value for memory switch No. 40	Setting method
1	The same reference height will be used for all programs
2	Measurement of reference height at sewing start
3	Measurement of reference height by position of reference height measurement code

<When memory switch No. 40 is set to "1">

If you would like to set a reference height that will be common to all programs, set memory switch No. 40 to "1". Refer to "11-6. Editing programs (Editing sewing points)" in the programmer Instruction Manual for details on the setting method for the reference height.

<When memory switch No. 40 is set to "2">

Measurement of the reference height is carried out at the sewing start. There is no need to set the reference height beforehand.

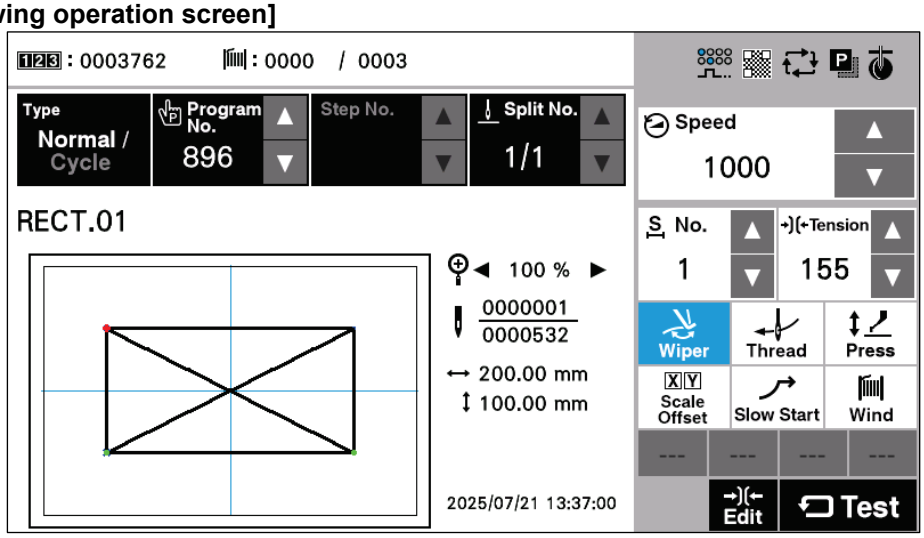
<When memory switch No. 40 is set to "3">

Measurement of the reference height is carried out by the position of the reference height measurement code during sewing. Set the reference height acquisition code at the position where you would like to acquire the reference height for the program. Refer to "11-6. Editing programs (Editing sewing points)" in the programmer Instruction Manual for details on the setting method for the code.
* The reference height measurement code must be set before the material thickness detection code.

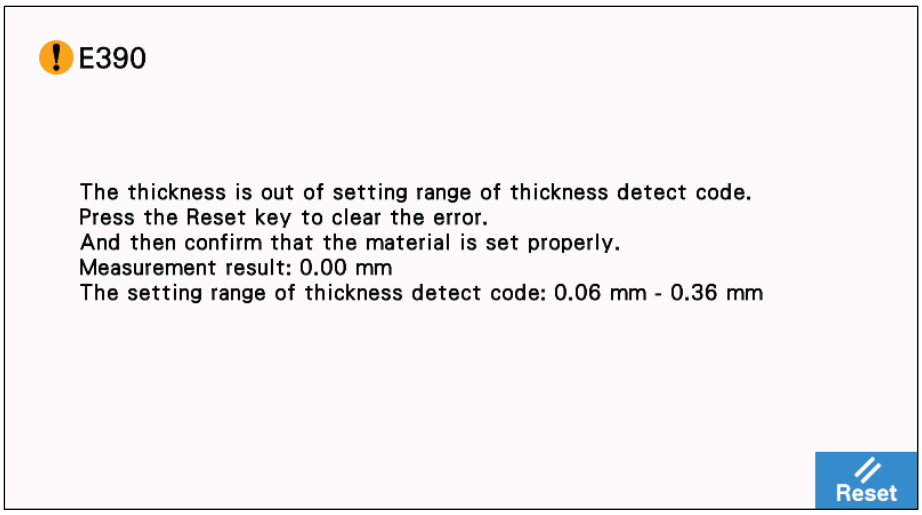
9-8-2. Measure the material thickness

In the sewing operation screen, open the program which contains the material thickness detection code. Refer to the section on adding material thickness detection codes in "11-6. Editing programs (Editing sewing points)" in the programmer Instruction Manual for details on the setting method for the material thickness detection code.

[Sewing operation screen]



When the feed reaches the material thickness detection code, the intermittent presser foot drops and the material thickness is measured. If the measurement result is not within the range of the upper limit and lower limit for the thickness which have been set for the material thickness detection code, the following error screen will be displayed.



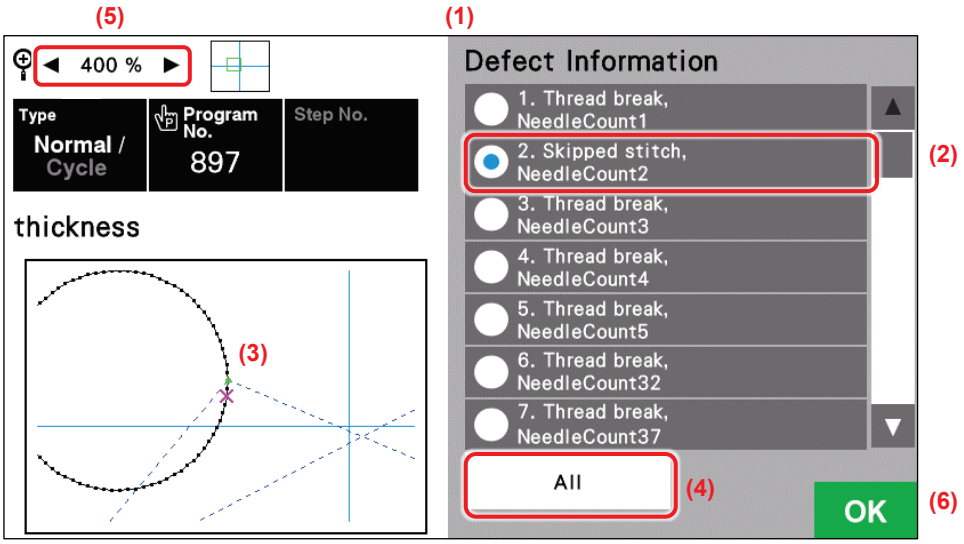
9-9. Using sewing defect detection

Sewing errors including “thread breakages” and “skipped stitches” are detected from position detection using the upper thread tension data and the sewing machine's main shaft motor encoder.

9-9-1. Error result display

When an error is detected during sewing, the sewing machine will stop and the result will be displayed. In addition, all of the problems which occurred during sewing will be displayed in a list at the sewing end. The reference standard for whether or not the sewing machine stops can be changed from the function setting menu. (Refer to "9-9-3. Function setting".)

[Sewing operation screen]

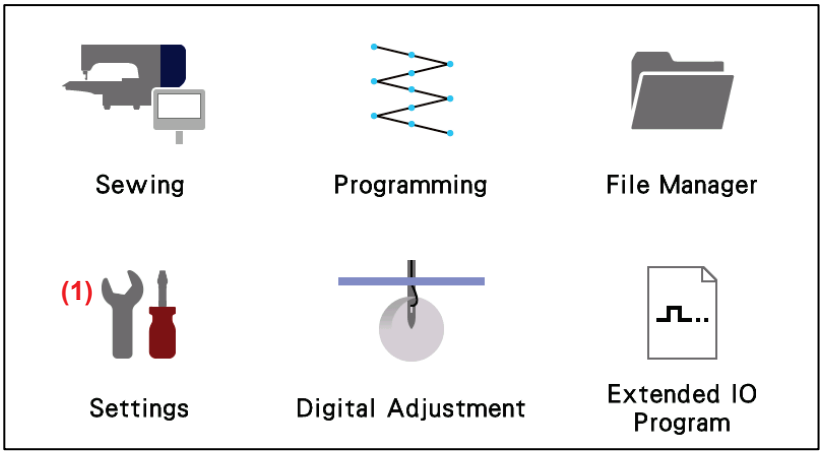


(1)	Error information list	The types of errors detected and the stitch number when they occurred are displayed in a list.
(2)	Selected error information	You can select items in the error information list by clicking on them.
(3)	Selected error position information	The currently-selected error information will be highlighted in the preview screen. * The color will vary depending on the type of error.
(4)	All key	This selects the entire error information list.
(5)	Zoom In/Out key	This zooms in and out of the preview of the sewing data.
(6)	OK key	The result display will close and the display will switch to the sewing screen.

9-9-2. Sewing defect detection menu

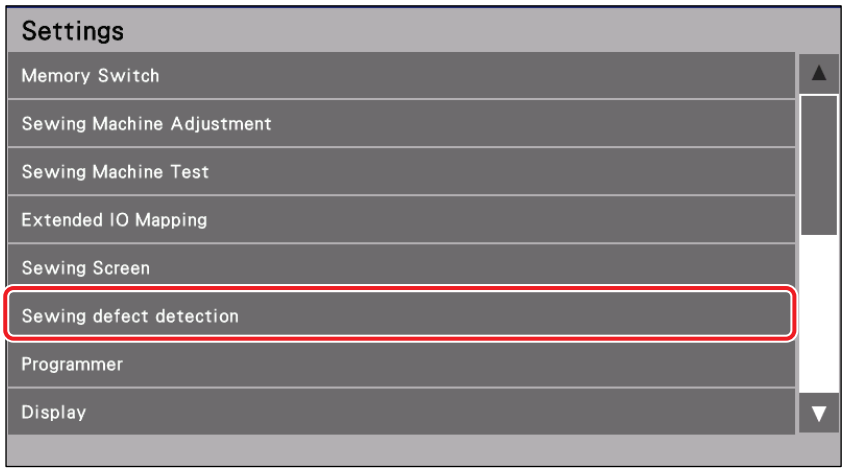
1. Press the HOME key to switch to the [Home screen].
   Touch the “Settings” key (1) to switch to the [Setting menu screen].

[Home screen]



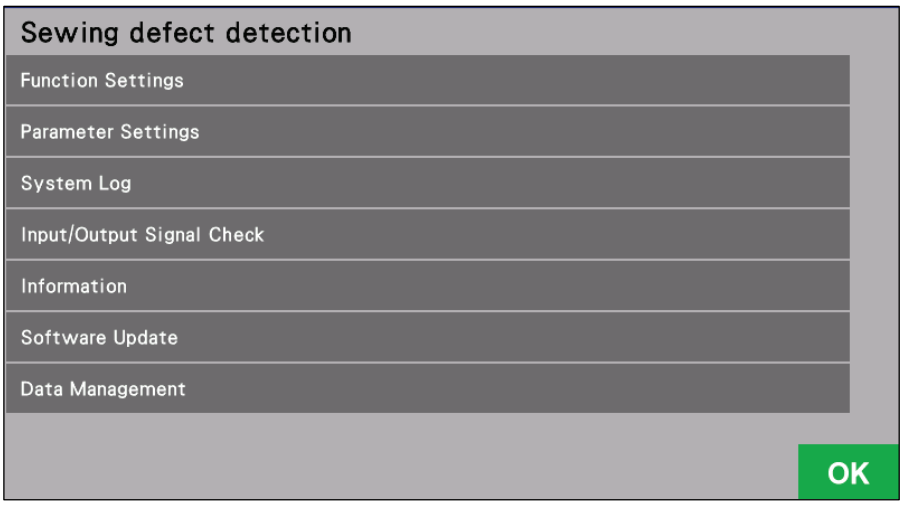
2. Select " Sewing detection function".

[Setting menu screen]



3. [Sewing Defect Detection menu screen] is displayed.

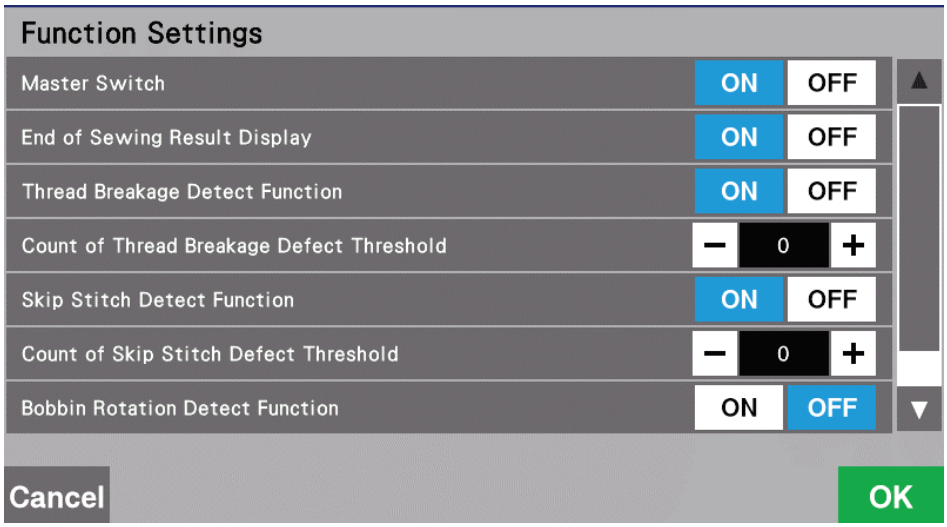
[Sewing Defect Detection menu screen]



9-9-3. Function Settings

Select “Function setting” on the [Sewing Defect Detection menu screen].

[Function Settings]



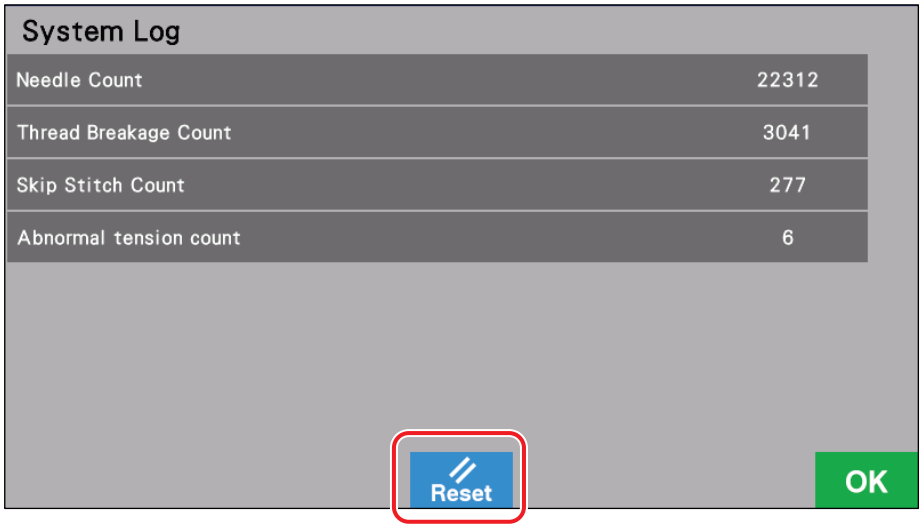
Master Switch	This selects whether the sewing defect detection function is enabled or disabled.
End of Sewing Result Display	This selects whether the sewing defect detection results are displayed or not at the sewing end.
Thread Breakage Detection Function	This selects whether the thread breakage detection function is enabled or disabled.
Thread Breakage Defect Threshold	1 - 100: The sewing machine stops after the set number of thread breakage errors is detected. 0: The sewing machine does not stop.
Skipped Stitch Detection Function	This selects whether the skipped stitch detection function is enabled or disabled.
Skip Stitch Defect Threshold	1 - 100: The sewing machine stops after the set number of skipped stitch errors is detected. 0: The sewing machine does not stop.
Outlier detection function	Select whether to enable or disable the outlier detection function.
Outlier defect count setting	1 - 100: The machine will stop when the set number of outlier defects is detected. 0: The machine will not stop.
Bobbin Rotation Detect Function	This selects whether the bobbin rotation detection function is enabled or disabled.
Bobbin Rotation Failure Count Setting	1 - 100: The sewing machine stops due to the detection of bobbin rotation failure during the setting count. 0: The sewing machine does not stop.

9-9-4. System Log

Select “System Log” on the [Sewing Defect Detection menu screen].

This displays the cumulative number of stitches and the number of errors. Press "Reset" to clear all of the counters and return them to "0".

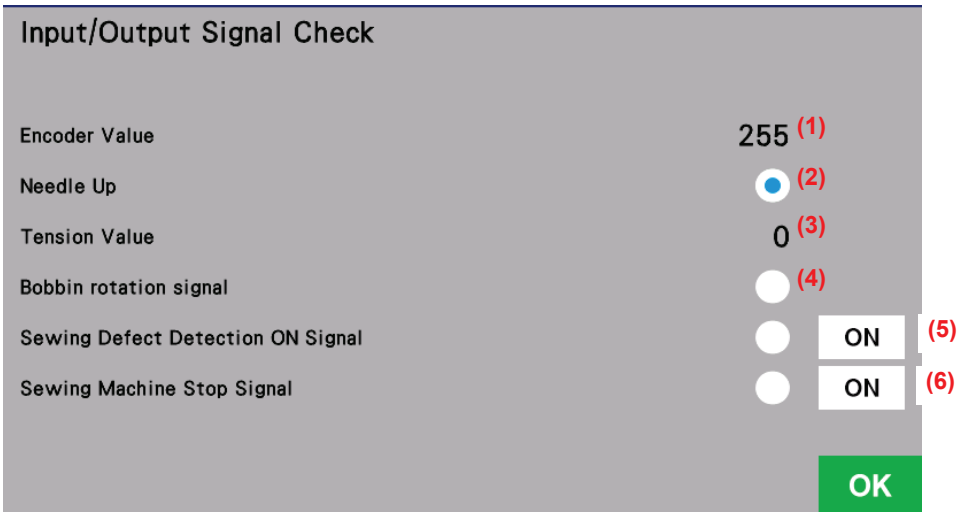
[System Log]



9-9-5. Input/Output Signal Check

In the [Sewing Defect Detection menu screen], select “Input/Output Signal Check”. This lets you check the input and output signals for the sewing defect detectors.

[Input/Output Signal Check]



(1)	Encoder Value	Main shaft motor encoder value
(2)	Needle Up	Needle up signal
(3)	Tension Value	Upper thread tension
(4)	Bobbin rotation signal	Signal for detecting bobbin rotation
(5)	Sewing Defect Detection ON Signal	This signal switches the defect detector to enable or disable defect detection.
(6)	Sewing Machine Stop Signal	This signal stops the sewing machine when an error occurs.

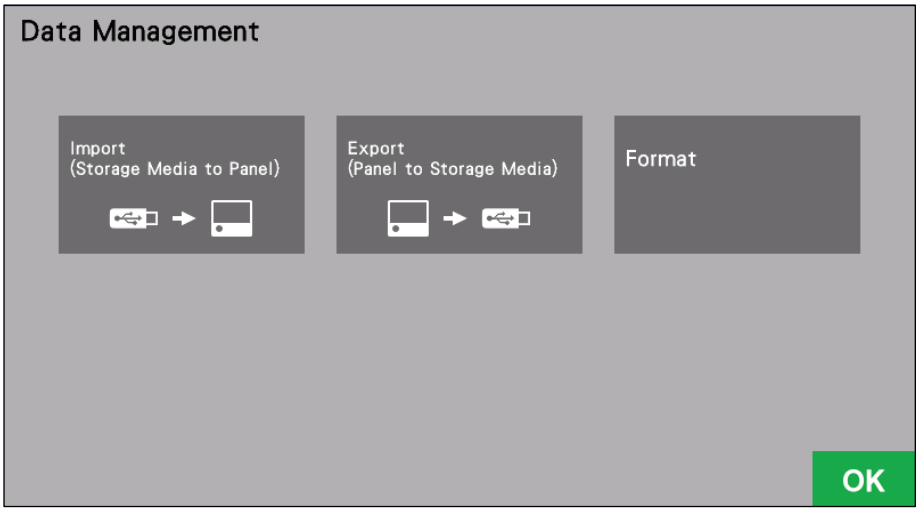
9-9-6. Information

In the [Sewing Defect Detection menu screen], select “Information”.
Displays the serial number, software version, etc. of the sewing defect detection device.

9-9-7. Data Management

In the [Sewing Defect Detection menu screen], select "Data Management". The following [Data Management] screen will be displayed.

[Data Management]



9-9-7-1. Import

In the [Data Management] screen, select "Import (Data Recording Media -> Panel)".

Items to be imported	File name	Folder name
Parameter setting values	sddsettings.ism	\BROTHER\ISM\ISMDK**\ (The sewing machine's ID code appears in the ** part. The ID code can be set using memory switch No. 752.)

The parameter setting values to be read will be displayed. Select the check box and then touch the "OK" key to start reading. When reading is finished, the finished message screen will be displayed.

9-9-7-2. Export

In the [Data Management] screen, select "Export (Panel -> Data Recording Media)".

The following item will be displayed for writing.

- parameter setting values

Select the check box and then touch the "OK" key to start writing. When writing is finished, the finished message screen will be displayed.

You can export the error detection data to the data recording media by selecting "Log".

Items to be exported	File name	Folder name
Parameter setting values	sddsettings.ism	\BROTHER\ISM\ISMDK**\ (The sewing machine's ID code appears in the ** part. The ID code can be set using memory switch No. 752.)

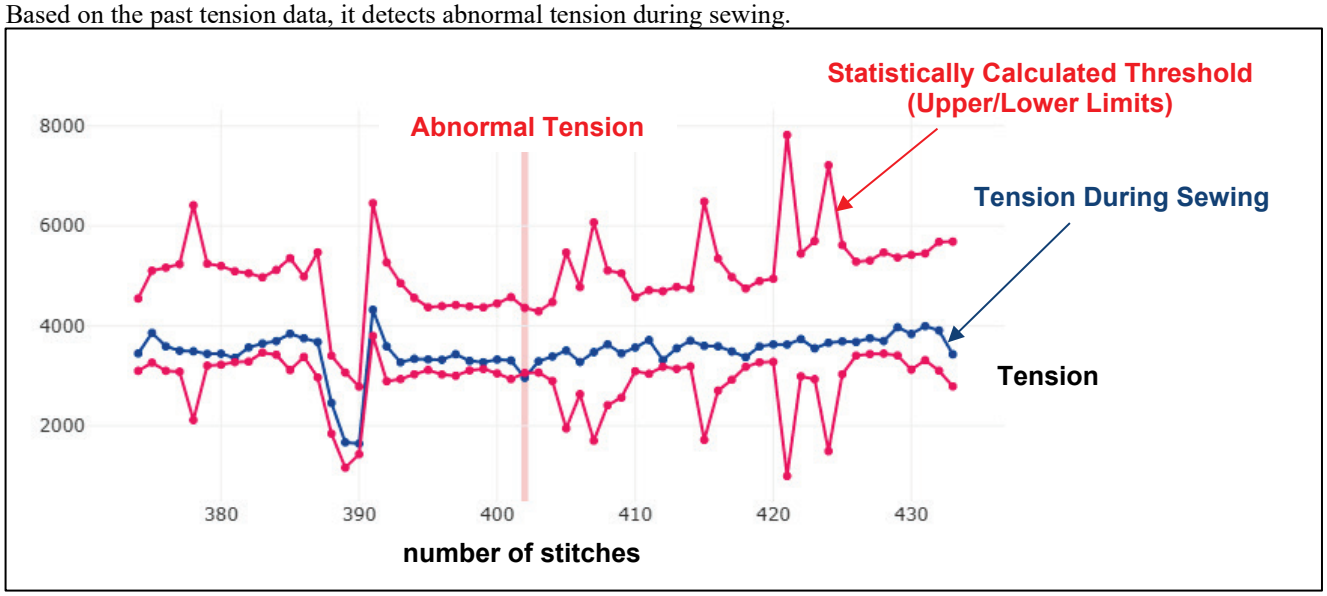
9-9-7-3. Initialization

In the [Data Management] screen, select “Format”.

The parameter setting values to be initialized will be displayed. Select the check box and then touch the "OK" key to start initialization. When initialization is finished, the finished message screen will be displayed.

9-9-8. Outlier Detection Function

Based on the past tension data, it detects abnormal tension during sewing.



- Sets statistical thresholds for each needle count.
- Thresholds are automatically set considering all sewing conditions such as tension code, sewing angle, and number of fabric layers.

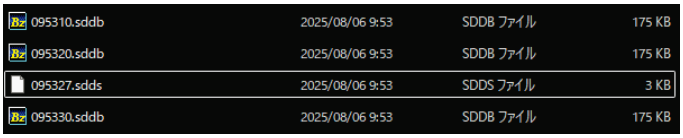
① USB flash drive connection



The USB port is located on the side of the sewing machine control box.

Please connect the USB flash drive to record log data from the sewing defect detection device.

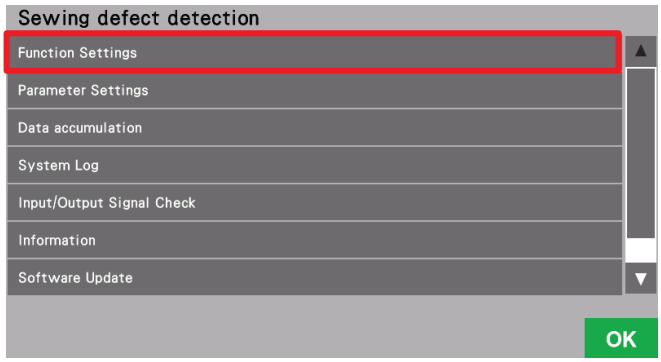
When the sewing defect detection device is ON, one log file is recorded for each program or split sewn.
File name: DateTime.sddb

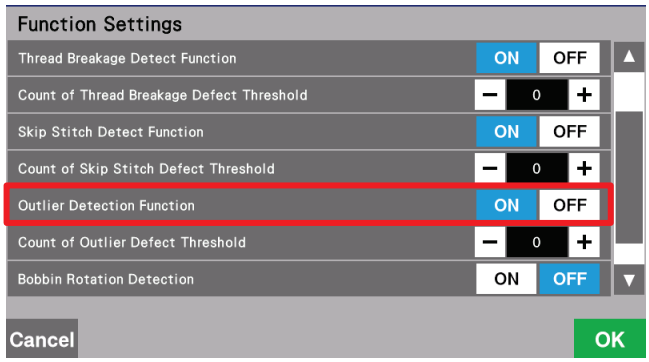


When outlier detection is ON, threshold information calculated every 10 cycles is also recorded.
File name: DateTime.sddb

② Outlier Detection ON

Turn on "Outlier Detection" from the Defect Detection Settings screen.

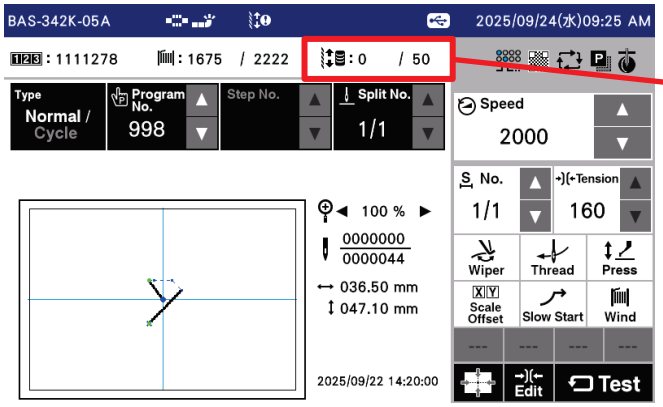




- If "Outlier Detection" is already enabled, reset the accumulated data (see ④) before performing the trial production (see ③).

③ Trial Production

Outlier detection requires a certain amount of tension data from past sewing to calculate the threshold.



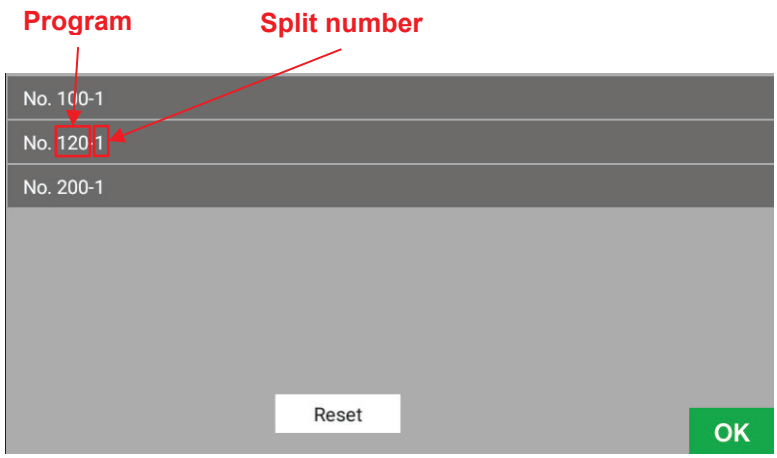


The count increases as you continue sewing.

- When outlier detection is ON, the accumulated count will be displayed on the sewing screen.
- Please continue sewing until the count reaches 50. *1, *2
  *1 Data must be accumulated for each program.
  *2 If there is skipped stitching, thread breakage, or the program does not finish, the count will not increase.

④ Reset Accumulated Data

The tension data used for outlier detection can be viewed in "Settings" → "Defect Detection" → "Accumulated Data Management."



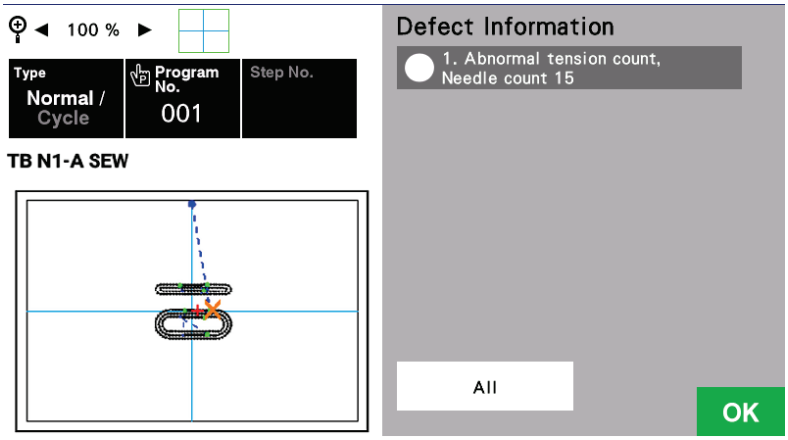
Please reset the data in the following cases:

- **When sewing conditions are changed**
- **When defective products are produced during trial sewing.**
  (If thread breaks, skipped stitches, or temporary stops occur, data is not accumulated, so no reset is needed.)

*** If the sewing data is edited, the data will be reset automatically. Program number Split number.**

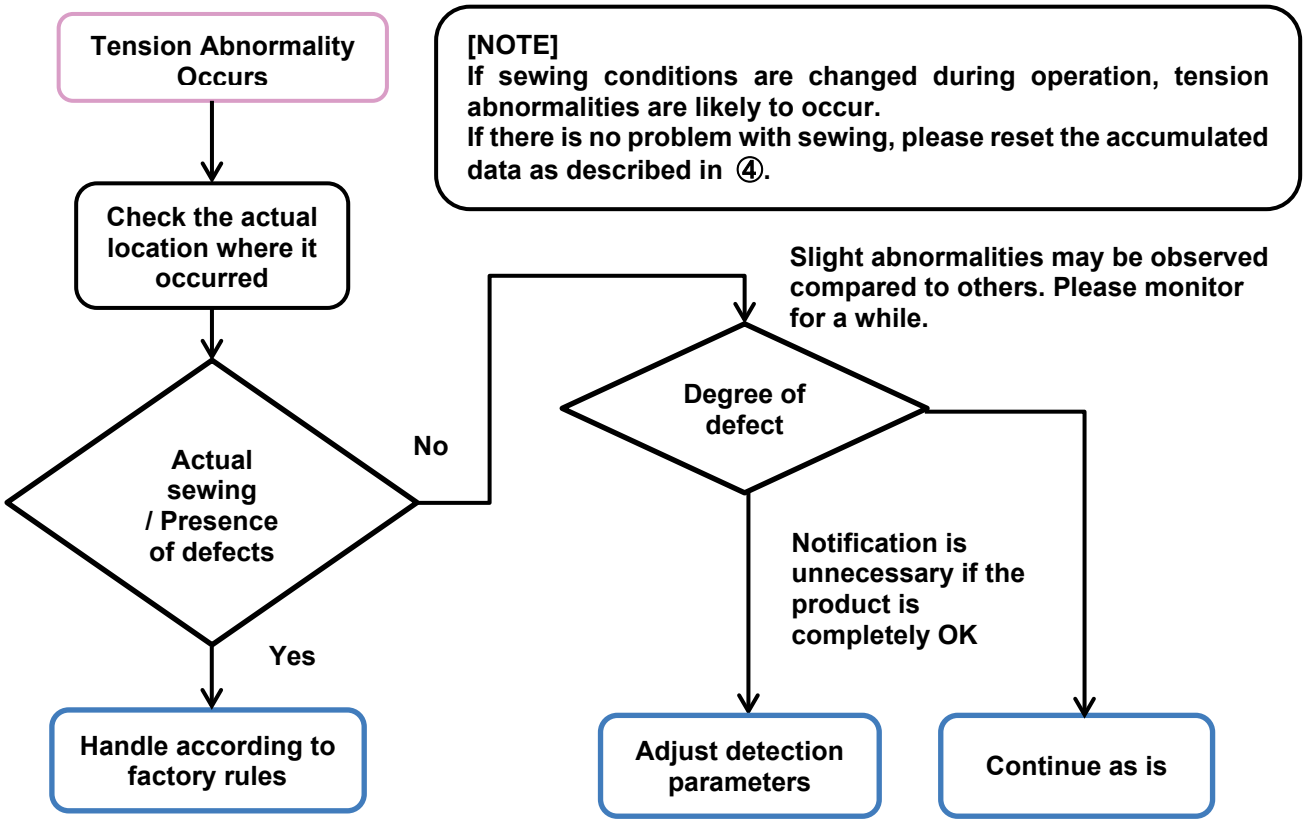
⑤ Detection

When enough data is accumulated, outlier detection becomes enabled, the icon changes to , and the count is no longer displayed.
If abnormal tension occurs while outlier detection is enabled, it will be detected as "Tension Abnormality" and displayed as a defect.



⑥ Checking Detection Results

[Flow when Tension Abnormality Occurs]



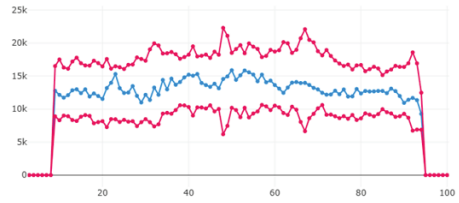
[When a sewing defect occurs but outlier detection does not notify tension abnormality]

A sewing defect occurs.

↓

Check the data at the time of defect occurrence using the dedicated app.*

Take-up lever lifting section



[Case 1]
Only the defective sewing area (or its surroundings) is close to the threshold.

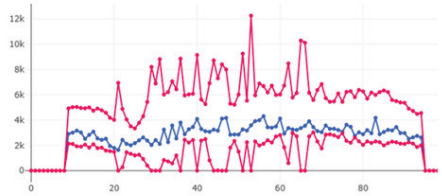
Make the threshold stricter.
*** Be careful not to cause false detection of tension abnormality in other normal data (no sewing defect + tension abnormality).**

Check the log data and create a user-defined section.
*** Collect OK and NG data and contact us via the inquiry form at https://sewingdefectdetection.brother.co.jp/contact**

*SDD Configurator
(https://sewingdefectdetection.brother.co.jp)

[Case 2]
The threshold is shifted overall.

Take-up lever pre-lifting section



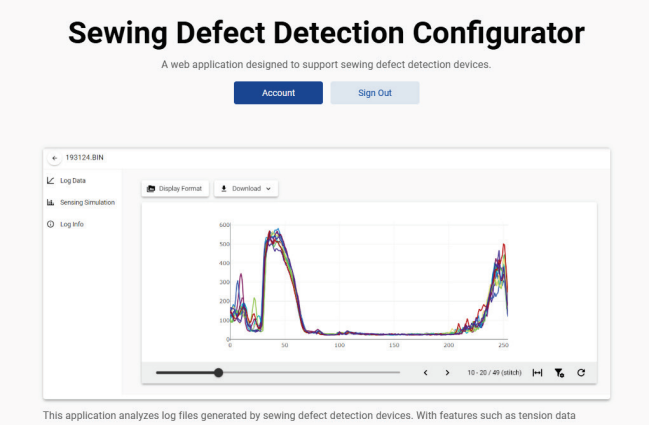
The sewing conditions have recently changed (including bobbin case replacement). ⇨ **Restore to the previous state and confirm that the data is centered on the threshold.**

Sewing conditions have not been changed / Sewing quality is also fine (the defect is sporadic). ⇨ **Data may have changed over the long term. If there is no quality problem, it is recommended to delete the accumulated data (see ④ Reset Accumulated Data).**

⑦ Detection parameter adjustment

The operation of outlier detection can be adjusted via the memory switch.

- Threshold can be loosened or tightened.
- Sewing machine can be stopped when more than XX tension errors occur, etc.

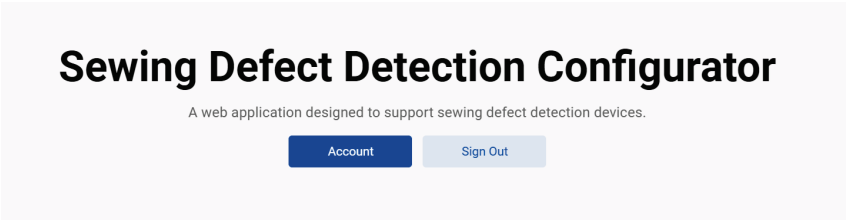


For displaying tension, threshold, or detailed MSW adjustment, use the dedicated application: SDD Configurator.
(https://sewingdefectdetection.brother.co.jp)

⑧ How to use SDDC

Site access

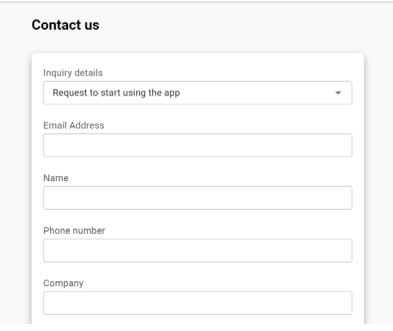
Access "Sewing Defect Detection Configurator" and click "Create Account".
(If necessary, change the language from the menu at the top right.)





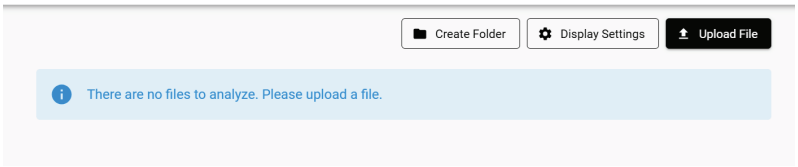
Sign up

The "Application for App Use" form should be filled in and submitted. After confirmation, an email containing the initial password will be sent. (Changing the initial password will be required at the first sign-in.)



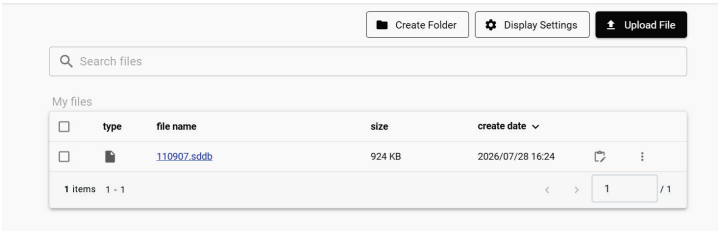
Upload

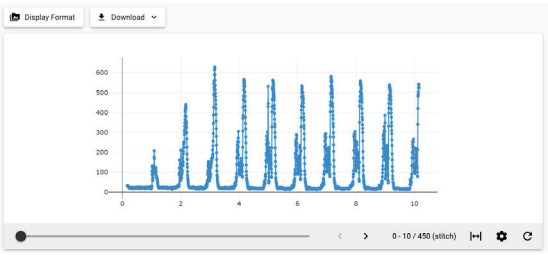
After signing in, the following screen will appear. Press the "Upload" button to upload the file generated by the sewing defect detection device.



Tension check

After uploading the file, items will be displayed. Click to view tension details.





Simulation

In the "Detection Simulation" tab, defect detection during sewing can be simulated.
By changing the MSW value shown on the left and repeating the simulation, adjustment can be made to capture the targeted defects without actual sewing on the machine.



⑨ Outlier Detection Memory Switch List

No.	Function name		
	Setting range	Setting details	Initial value
600	Outlier Detection		
	OFF	Disabled	OFF
	ON	Enabled	
601	Sewing Machine Stop Notification Setting		
	0	No Notification	0
	1 − 100	Machine stop notification when defects are detected the set number of times	
602	Outlier Detection: Number of stitches at start without judgment		
	0 - 9	In units of 1 stitch	9
610	Outlier Detection: Presser lifter section		
	OFF	Disabled (Judgment is skipped during this section)	ON
	ON	Enabled	
611	Outlier Detection: Hook swallowing section		
	OFF	Disabled (Judgment is skipped during this section)	ON
	ON	Enabled	
612	Outlier Detection: Section before thread take-up lever lifting		
	OFF	Disabled (Judgment is skipped during this section)	ON
	ON	Enabled	
613	Outlier Detection: User-defined section 1		
	OFF	Disabled (Judgment is skipped during this section)	ON
	ON	Enabled	
614	Outlier Detection: User-defined section 2		
	OFF	Disabled (Judgment is skipped during this section)	ON
	ON	Enabled	
615	Outlier Detection: Judgment coefficient (thread take-up lever lifting section)		
	20 - 80	20: Easy to judge as defective - 80: Difficult to judge as defective	40
616	Outlier Detection: Judgment coefficient (hook swallowing section)		
	20 - 80	20: Easy to judge as defective - 80: Difficult to judge as defective	40
617	Outlier Detection: Judgment coefficient (section before thread take-up lever lifting)		
	20 - 80	20: Easy to judge as defective - 80: Difficult to judge as defective	40
618	Outlier Detection: Judgment coefficient (user-defined section 1)		
	20 - 80	20: Easy to judge as defective - 80: Difficult to judge as defective	40
619	Outlier Detection: Judgment coefficient (user-defined section 2)		
	20 - 80	20: Easy to judge as defective - 80: Difficult to judge as defective	40
661	Data Accumulation: Start sewing during data loading		
	1	Sewing cannot be started until data loading is complete	1
	2	Sewing is possible with outlier detection disabled	
663	Data Accumulation: Number of non-judged works until standard deviation convergence		
	1 - 50	Outlier detection is turned off until the number of works reaches the MSW setting value	50
	The standard deviation is calculated after 10 sewing cycles, so outlier detection can be enabled, but 50 cycles are recommended for stable standard deviation.		
664	Data Accumulation: Maximum number of standard deviation updates		
	0 - 255	Set the maximum number of standard deviation updates every 10 cycles	255
	If MSW664 is set to 4, the 5th standard deviation update will not be performed, and the standard deviation at the 4th update (after 50 works) will continue to be used for detection.		
665	Data Accumulation: Delete accumulated data when program changes		
	0	Do not delete	1
	1	Delete	

No.	Function name		
	Setting range	Setting details	Initial value
670	Data Accumulation: Start phase of thread take-up lever lifting section		
	0 - 254	Each phase is set to the initial value by default, so there is basically no need to change it.	32
671	Data Accumulation: Phase range of thread take-up lever lifting section		
	0 - 255	Each phase is set to the initial value by default, so there is basically no need to change it.	28
672	Data Accumulation: Start phase of hook swallowing section		
	0 - 254	Each phase is set to the initial value by default, so there is basically no need to change it.	220
673	Data Accumulation: Phase range of hook swallowing section		
	0 - 255	Each phase is set to the initial value by default, so there is basically no need to change it.	28
674	Data Accumulation: Start phase of section before thread take-up lever lifting		
	0 - 254	Each phase is set to the initial value by default, so there is basically no need to change it.	0
675	Data Accumulation: Phase range of section before thread take-up lever lifting		
	0 - 255	Each phase is set to the initial value by default, so there is basically no need to change it.	28
676	Data Accumulation: Start phase of user-defined section 1		
	0 - 254	The detection section can be set freely. By default, the section is set to 0 and detection is not performed.	0
677	Data Accumulation: Phase range of user-defined section 1		
	0 - 255	The detection section can be set freely. By default, the section is set to 0 and detection is not performed.	0
678	Data Accumulation: Start phase of user-defined section 2		
	0 - 254	The detection section can be set freely. By default, the section is set to 0 and detection is not performed.	0
679	Data Accumulation: Phase range of user-defined section 2		
	0 - 255	The detection section can be set freely. By default, the section is set to 0 and detection is not performed.	0

⑩ About error code E932

The cause of error E932 varies depending on the subcode. As error details are not displayed on the BAS panel, refer to this information.

Subcode (Hexadecimal)	Subcode	Error content	Solution
0x72	114	Needle-up signal abnormality detected	Normally does not occur
0x1EA	490	Date and time not set	Normally does not occur
0x2EE	750	Amplifier not connected	Check amplifier connection
0x2EF	751	SD card not connected	Check the SD card on the sewing defect detection device 3G board

⑪ Q&A

No.	Question	Answer
1	Tension error occurs even though there is no defect.	The threshold may be too strict. Change MSW610–MSW614 (outlier detection: judgment coefficient) to a larger value. (20: easily judged as defective – 80: less likely to be judged as defective)
2	When sewing conditions are changed, tension error occurs even though there is no defect.	When the sewing environment such as fabric, thread, or speed changes, the existing threshold may cause false detections. Delete the relevant accumulated data from the accumulated data management screen and collect new data for the changed environment.
3	Is 50 sewing cycles always required to enable outlier detection?	Outlier detection can be started from a minimum of 10 sewing cycles. Change MSW663 (Data Accumulation: Number of non-judged works until standard deviation convergence). However, with fewer samples, the risk of false detections increases.
4	Once the threshold is set after the first 50 sewing cycles, does it remain unchanged regardless of further sewing?	The threshold continues to change even after 50 sewing cycles. The threshold is updated every 10 sewing cycles based on the latest data. Threshold updates continue until a total of 2,560 sewing cycles are completed.
5	Can the threshold be fixed after setting it with 50 sewing cycles?	To fix the threshold at a certain point, change MSW664 (Data Accumulation: Maximum number of standard deviation updates) from the default value of 255. For example, to fix the threshold after 50 cycles, set MSW664 to 4.
6	Accumulated data may be deleted automatically.	Tension data used for outlier detection is linked to sewing data, so it is automatically deleted when sewing data is edited. To prevent automatic deletion of accumulated data, change the setting of MSW665 (Data Accumulation: Deletion of accumulated data when program is changed). Sewing data is considered changed when it is overwritten by the programmer or when sewing data is imported.

10.USING STORAGE MEDIA

CAUTION

Do not connect anything to the USB port other than a USB flash drive. If this is not observed, problems with operation may result.
To prevent problems, do not use objects with sharp points to operate the LCD panel.

10-1. Notes on handling

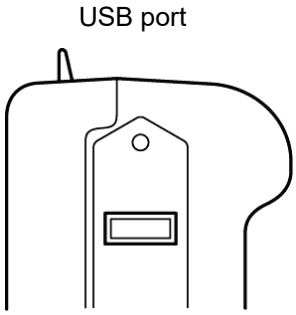
<USB flash drive>
- Compatible file formats: FAT16, FAT32
- Max. size: 32 GB

10-2. Folder structure

Data type	File name	Folder name
Sewing data	ISMS0***.SEW ISMS0***.EMB (*** is the program number.)	.SEW: \BROTHER\ISM\ISMDK**\sew .EMB: \BROTHER\ISM\ISMDK**\emb (The sewing machine's ID code appears in the ** part. The ID code can be set using memory switch No.752.)
Memory switch	memorysw.ism	\BROTHER\ISM\ISMDK**
User parameter	userparam.ism	\BROTHER\ISM\ISMDK**
Cycle program	ISMCYC**.SEW (** is the cycle program number.)	\BROTHER\ISM\ISMDK**\cyc
Extended I/O Program	ISMSEQ00.seq	\BROTHER\ISM\ISMDK**\seq
Extended I/O Port Allocation	portmap.ism	\BROTHER\ISM\ISMDK**
Panel setting values	settings.db	\BROTHER\ISM\ISMDK**
Error log	e*******. ism m*******. ism (******* is the serial number.)	\BROTHER\ISM\ISMLDT\
Login ID setting value	loginid.json	\BROTHER\ISM\ISMDS**
Target value setting	tgtdataset.ism	\BROTHER\ISM\ISMDS**
Target value set assignment	prgassign.ism	\BROTHER\ISM\ISMDS**

10-3. Importing and exporting data

1



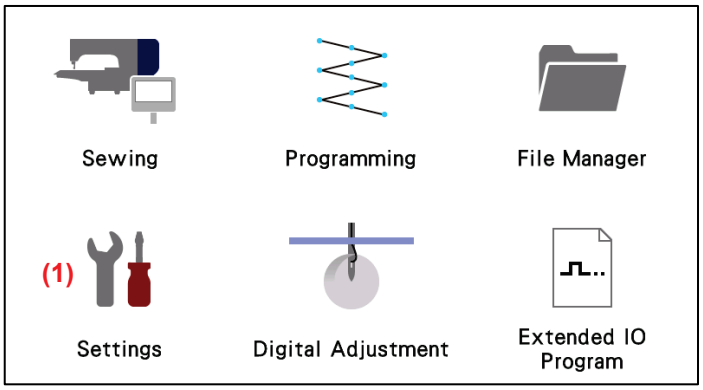
Insert a USB flash drive.

[NOTE]

- **Make sure that the media is facing the correct way when inserting it.**
- **Always be sure to keep the cover closed except when inserting and removing the media, otherwise dust may get inside and cause problems with operation.**

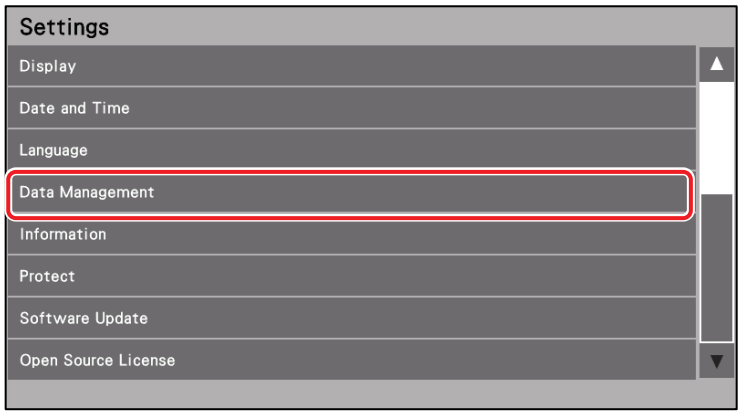
2

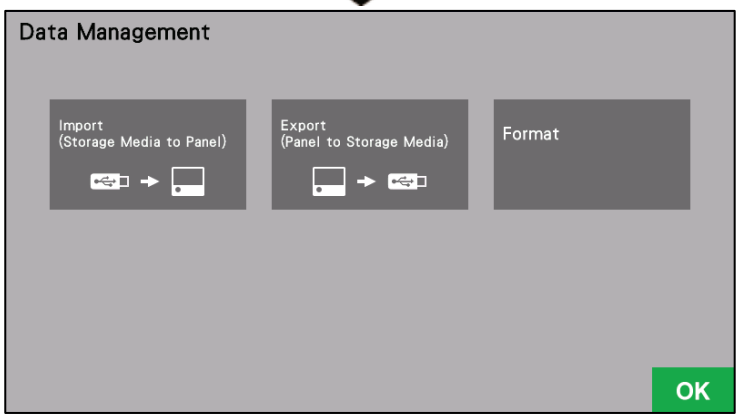
[Home screen]



- Press the HOME key to switch to the [Home screen].
- Touch the Settings key (1) to switch to the setting menu screen.

[Setting menu screen]





- If you select "Data Management" > "Import (Storage Media to Panel)", the display switches to the import screen. If you select "Data Management" > "Export (Panel to Storage Media)", it switches to the [Export screen].

3

Select the items to be imported or exported, and then touch the “OK” key (2).

10-4. Importing items of sewing data separately

If you would like to import sewing data separately, do it from the file manager screen.
For details, refer to "12. File management".

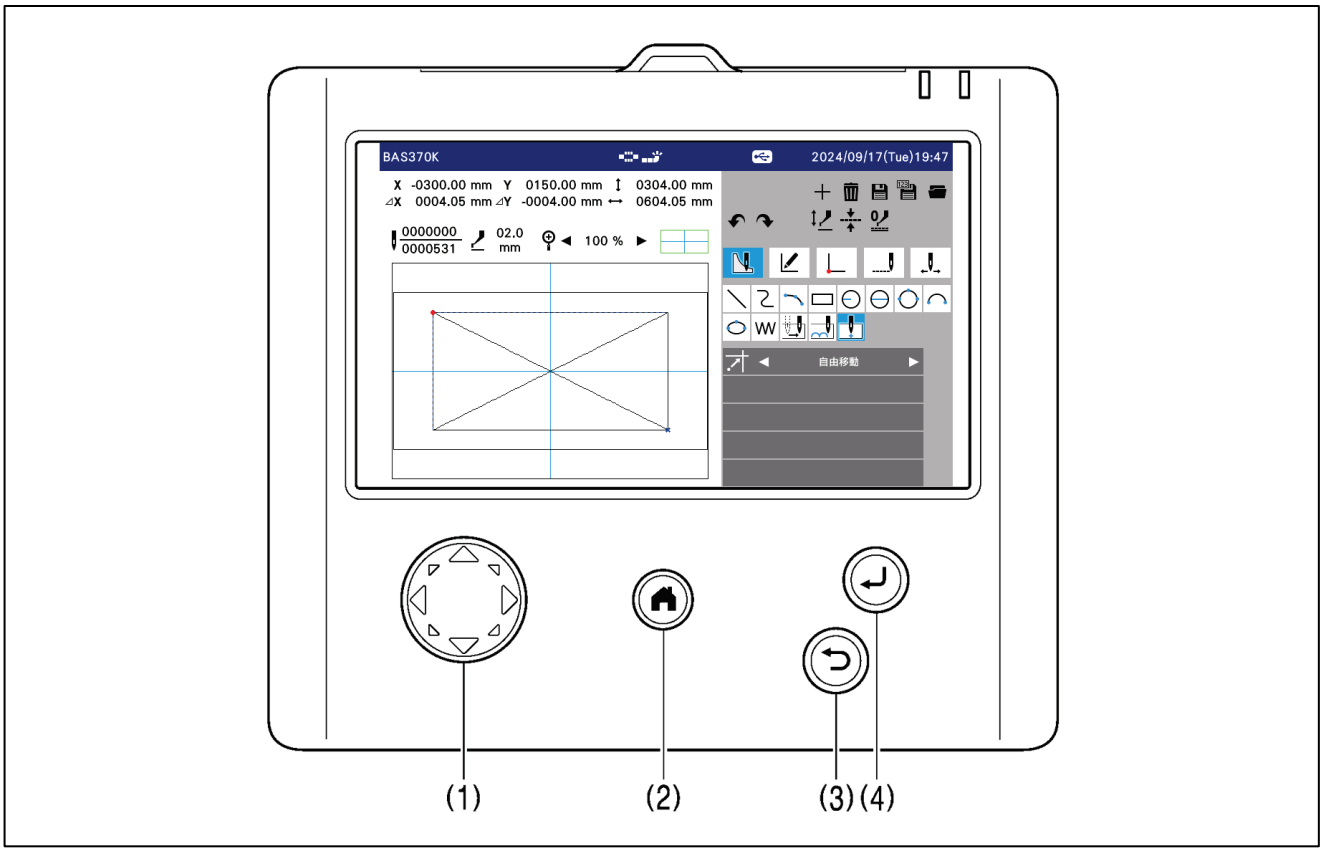
11.PROGRAM CREATION

11-1. How to create a program

While being operated by the programmer, a number of icons are displayed on the screen which illustrate its operations and functions.
This chapter describes the procedure for programming with icons.

11-1-1. Keys to be used

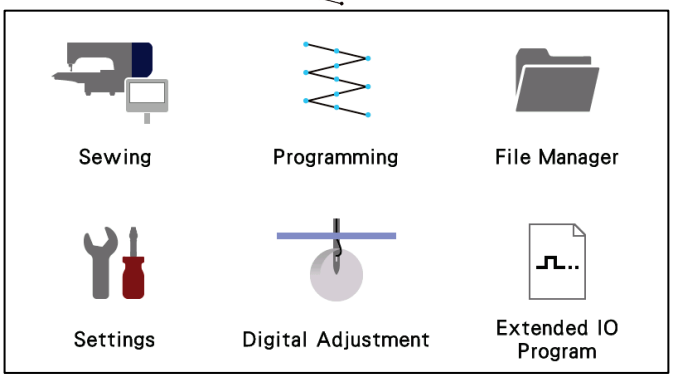
Below is an explanation of the keys which are used when programming.

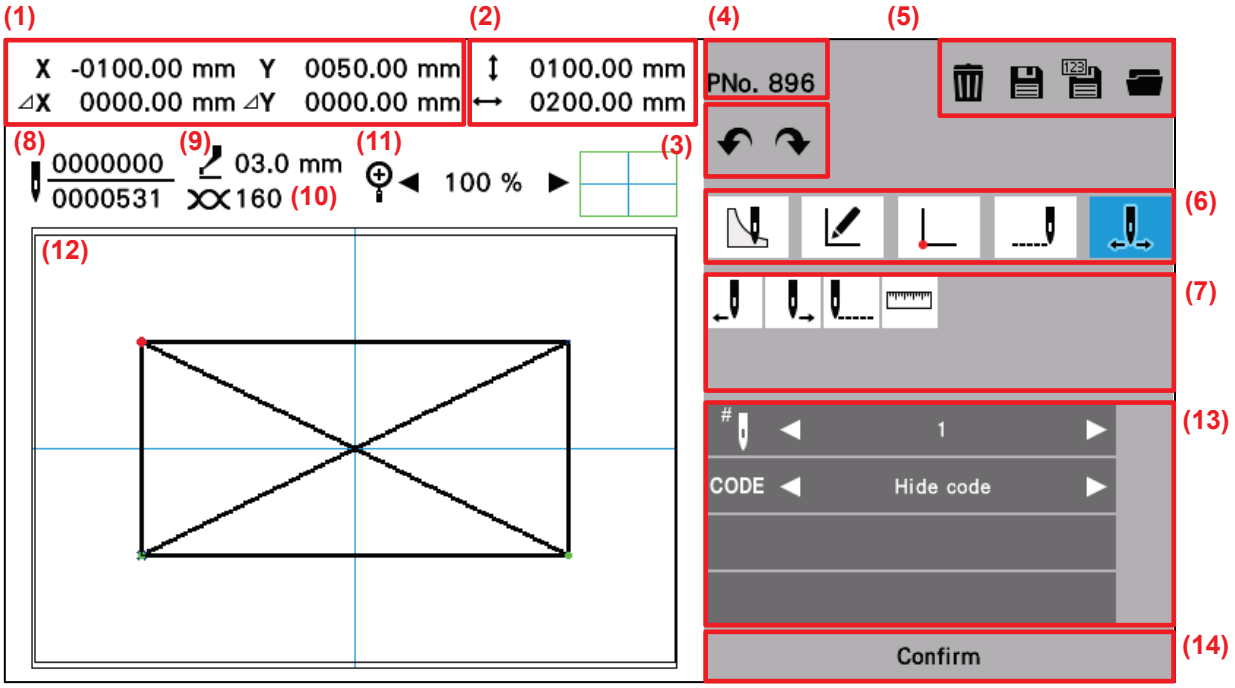


(1) JOG Key	This key is used when programming sewing data.
(2) HOME Key	This key is used to return to the home screen.
(3) BACK Key	This key is used to return to the previous step or to cancel the changed settings.
(4) ENTER Key	This key is used for operations such as confirming settings.

11-1-2. About the programming screen

At the Home screen, touch  to display the programming screen.





(1)	Shows the difference between the current cursor position and the position at the previous step.
(2)	Shows the size of the program.
(3)	Used to undo and redo changes to programs.
(4)	Displays the program number.
(5)	Used to delete all programs and to save and load programs.
(6)	Shows icons which can be used in the various modes.
(7)	Switches the mode.
(8)	Shows the current number of needle positions and the total number of stitches.
(9)	Show the height of the intermittent presser foot at the current needle position.
(10)	Show the digital tension setting value at the current needle position.
(11)	Use to display and change program zoom ratio and zoom position.
(12)	Shows an image of the program.
(13)	Sets the values used by the various functions.
(14)	Displays the function name.

11-1-3. Description of icons

Programming

Creating data	Creating a line
	Creating a curve
	Creating an arc
	Creating a rectangle
	Creating a circle of the specified radius (clockwise or counterclockwise)
	Creating a circle of the specified diameter (clockwise or counterclockwise)
	Creating a circle by specifying three points
	Creating a semicircle
	Creating an ellipse
	Creating needle drop data
	Creating feed data
	Creating basting data
	Specifying the sewing start point

Editing programs

Editing outlines	Deleting an outline
	Moving an outline
	Copying an outline
	Rotating an outline
	Moving an outline symmetrically
	Copying an outline symmetrically
	Moving an outline by an offset
	Copying an outline by an offset
	Resizing an outline
	Changing the line type of an outline
	Adding and deleting backtack stitches for an outline
	Switching the sewing start and end points for outlines
	Changing the connection method for an outline
	Combining outlines
	Changing the sewing order for an outline

Editing outline component points	Deleting an outline component point
	Moving an outline component point
	Adding an outline component point
	Changing curve shapes
	Changing the attributes of outline component points
	Separating an outline at a component point

Editing sewing points	Deleting a sewing point
	Moving a sewing point
	Adding a sewing point
	Changing the attributes of sewing points
	Separating an outline at a sewing point
	Setting bar tacking at a sewing point
	CODE Adding and deleting codes at sewing points

Checking programs

Checking	Moving backward one stitch at a time
	Moving forward one stitch at a time
	Moving to the start position
	Measuring distances

Buttons for running external functions

	Creating a new file
	Deleting all changes to the program being edited
	Saving
	Saving with a different filename
	Opening a file
	Operating the intermittent presser foot **[*1]**
	Measure the material thickness **[*1]**
	Set the reference height for material thickness **[*1]**

[*1] Displayed only when the sewing machine is operating.

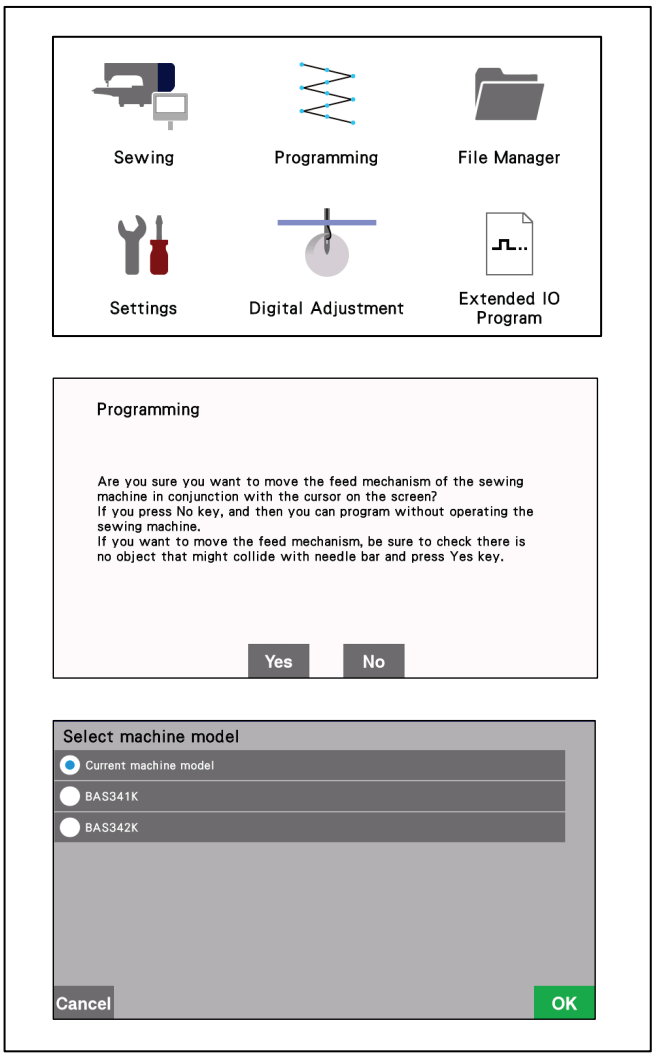
Other

	Undoing changes
	Redoing changes

11-2. Programming procedure

The procedure for programming with icons is as follows.

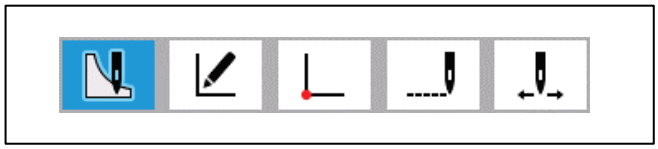
■1. Displaying the programming screen



1. At the Home screen, touch  .

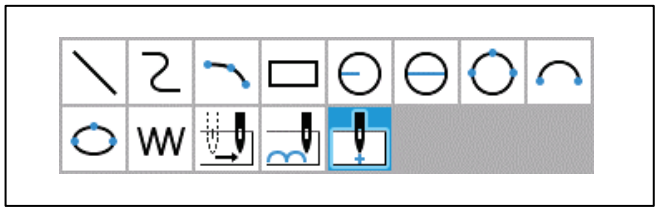
2. The programming screen will be displayed.
   If you press **Yes** when the following message is displayed, the sewing machine will operate and programs can then be created.
   Furthermore, if you press **No** on the screen, the model selection screen will be displayed, so select the applicable model and then touch **OK**. At this time, you can create programs without operating the sewing machine.
   If the message on the left is displayed, press **Yes** to start again from the program which was not saved when operation was last stopped.
   If a program is currently being created, the dialog screen shown on the left will be displayed.

■2. Starting program creation



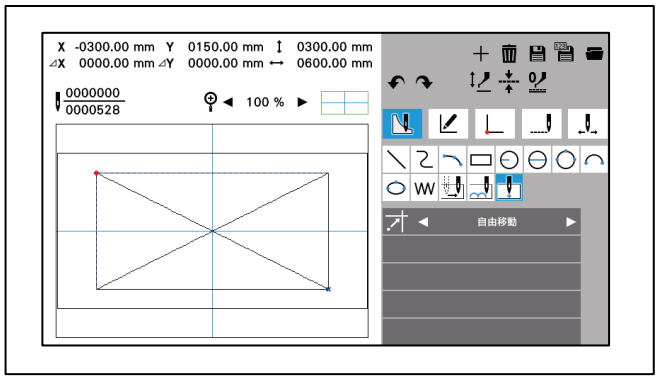
1. Touch .

■3. Set the sewing start position.



1. Touch .
2. Use the jog key to move the cursor in the + direction.
3. Once you have set the sewing start position, press .

■4. Creating program



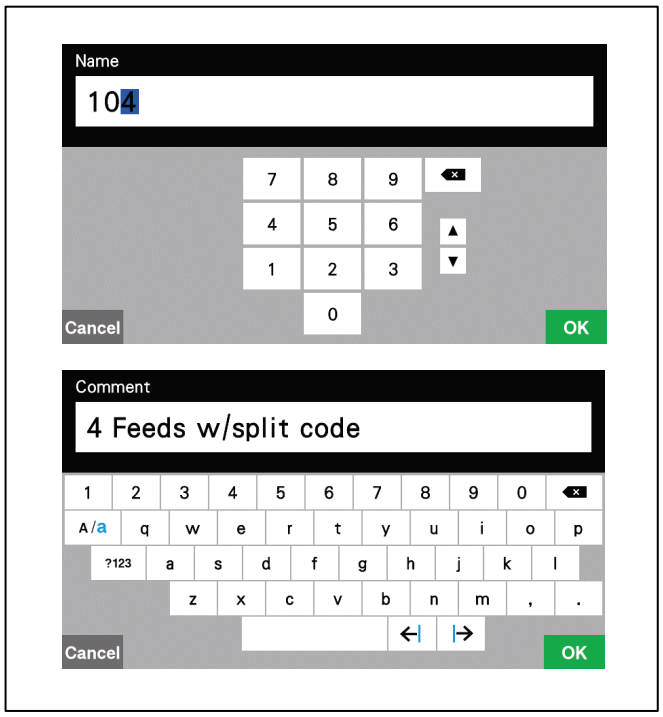
1. Select the desired icon from the icons in the top-right corner of the screen, and then create a program for the design you would like to sew. The programs you create are enabled until you delete them.
2. For detailed explanations on creating programs, refer to "11-3. Creating programs" and "11-8. Programming example".

■5. Saving the created program



1. For details on the operation method, refer to "Chapter 12. File management".
2. Touch .

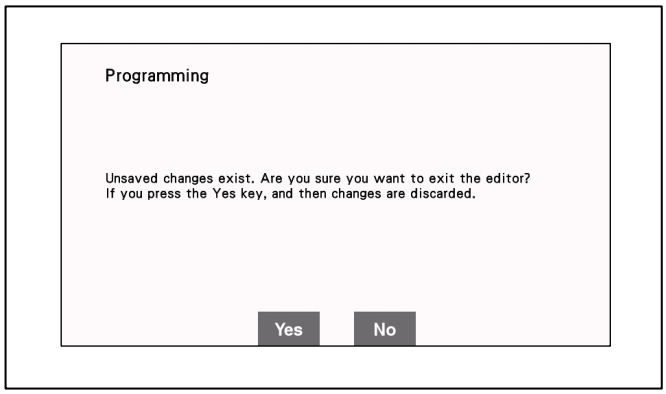
< When saving a new program >



1. The numeric keypad screen will be displayed, so touch the keys to enter the program number. Touch **OK** to continue to the comment entry screen. Touch **Cancel** to return to the programming screen without saving the changes.

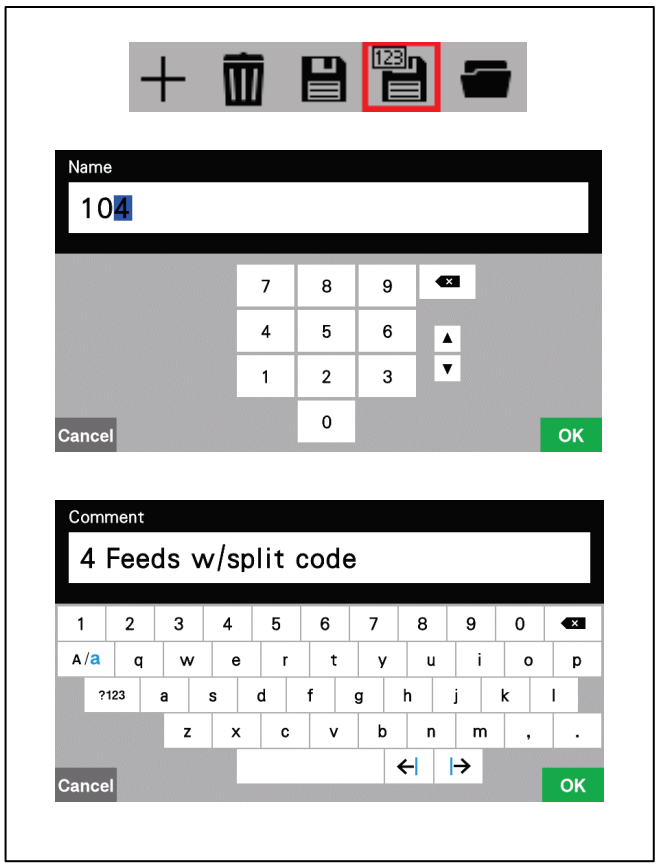
2. The keyboard screen will be displayed, so touch the keys to enter a comment. When you touch **OK**, the file will be saved in the panel internal memory and the display will return to the programming screen. Touch **Cancel** to return to the programming screen without saving the changes.

< When overwriting an existing program number >



1. The program saving dialog screen will be displayed, so touch **Yes** to overwrite the existing file.
   Touch **No** to return to the programming screen.

■6. Saving programs with a different name



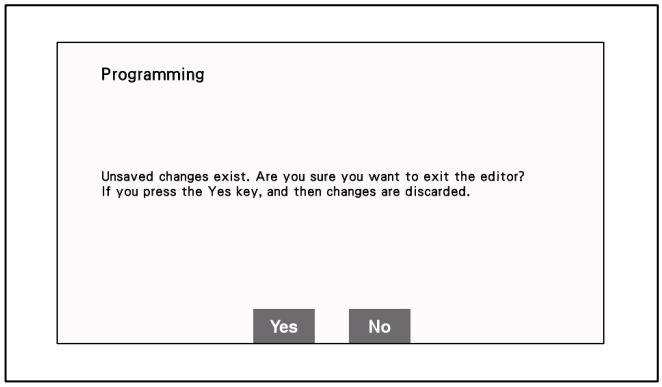
1. Touch  .

2. The numeric keypad screen will be displayed, so touch the keys to enter the program number. Touch **OK** to continue to the comment entry screen. Touch **Cancel** to return to the programming screen without saving the changes.

3. The keyboard screen will be displayed, so touch the keys to enter a comment. When you touch **OK**, the file will be saved in the panel internal memory and the display will return to the programming screen. Touch **Cancel** to return to the programming screen without saving the changes.

4. When you touch **OK** on the numeric keypad screen or the keyboard screen, the file will be saved in the panel internal memory and the display will return to the programming screen. Touch **Cancel** to return to the programming screen without saving the file.

■7. Ending programming



1. Press  at the programming screen. (The display will return to the Home screen.)
2. If a program is currently being created, the dialog screen shown on the left will be displayed.
   Touch **Yes** to discard the program which has been completed and end programming.
   Touch **No** to return to the programming screen.

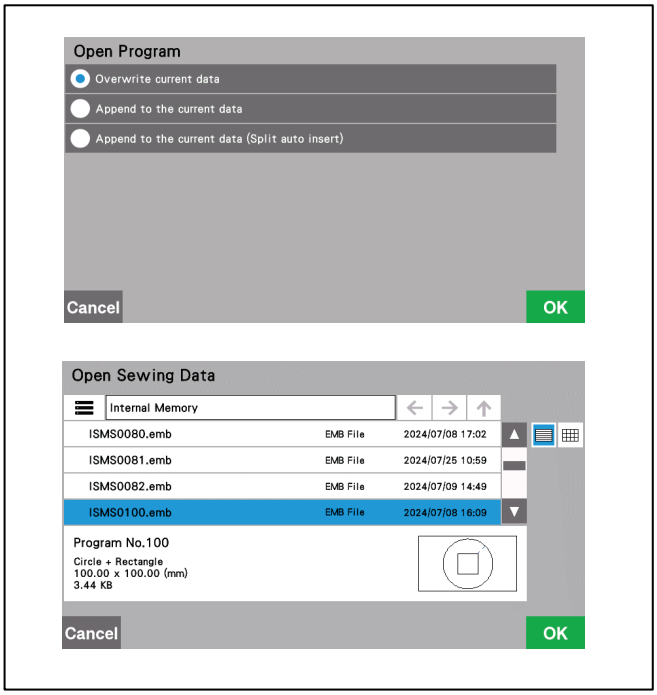
■8. Loading programs which have already been created



1. For details on the operation method, refer to "Chapter 12. File management".
2. Touch  .

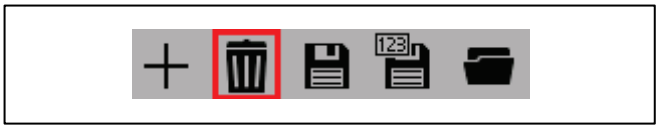
If there is a program which is currently being created, the following dialog screen will be displayed. Select either [Overwrite current data], [Append to the current data] or [Append to the current data (Split Auto Insert)], and then touch OK . Refer to the following for details on each selection item.

Selection item	Operation
Overwrite current data	Discard the data which is currently being created, and display the data which has been loaded.
Append to the current data	The data is connected via feeding to the end of the program which is currently being edited.
Append to the current data (Split Auto Insert)	The data is connected via feeding to the end of the program which is currently being edited, and a code (split) is inserted at the beginning of the loaded data.



3. Touch  to select the media to load the file from, and then navigate to the folder to load the file from.
4. Select the file to be loaded from the file list, and then touch OK .
5. The details of the file which have been loaded will appear in the programming screen.

■9. Deleting programs



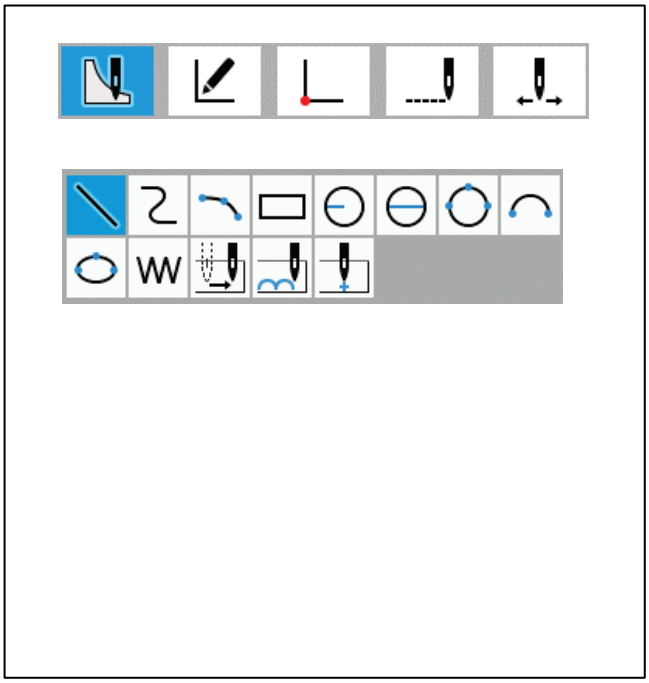
1. Touch .
2. The program which is currently being edited will be deleted and the display will return to the initial status.

11-3. Creating programs

This section describes icons used for creating and editing program and how to use them.

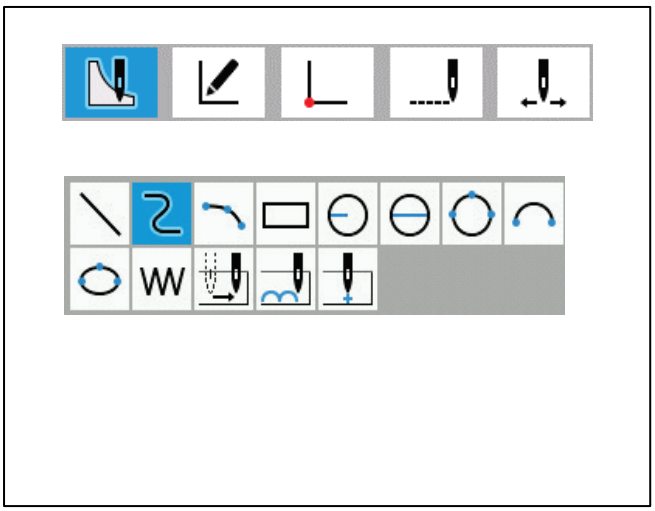
* For details about operations, refer to "11-8. Programming example".
* For details on the setting method for zigzag stitches, refer to "11-8-9. Zigzag stitch".
* In the program, ● indicates the sewing start point and × indicates the sewing end point.

11-3-1. Creating a line



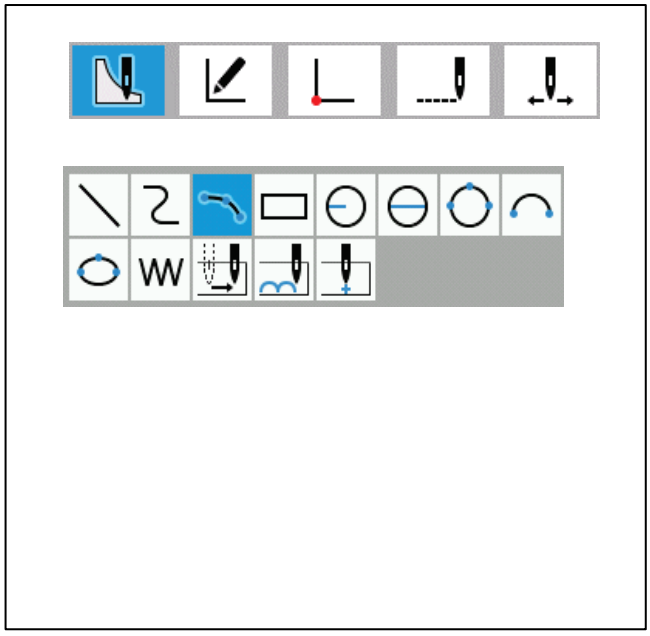
1. Touch .
2. Touch .
3. Make the settings for each item.
   * Refer to “11-3-11. Setting parameters” for details on the setting method.
4. Use the jog key to move the cursor + to the next point, and then press .
5. Repeat step 4 until the shape you would like to sew has been created. Move the cursor + to the end point, and then press twice.
   * You can connect straight lines, curves and arcs together.

11-3-2. Creating a curve



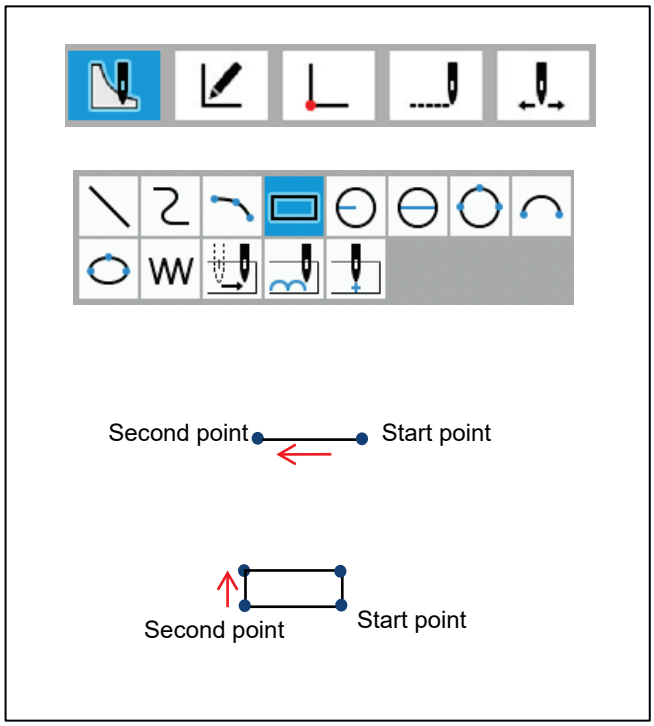
1. Touch .
2. Touch .
3. Make the settings for each item.
   * Refer to “11-3-11. Setting parameters” for details on the setting method.
4. Use the jog key to move the cursor + to the next point, and then press .
5. Repeat step 4 until the shape you would like to sew has been created. Move the cursor + to the end point, and then press twice.

11-3-3. Creating an arc



1. Touch .
2. Touch .
3. Make the settings for each item.
   * Refer to “11-3-11. Setting parameters” for details on the setting method.
4. Use the jog key to move the cursor to the second point, and then press .
5. Use the jog key to move the cursor to the third point, and then press .
   * If you would like to create more than three points for the arc, you can continue entering more points.

11-3-4. Creating a rectangle

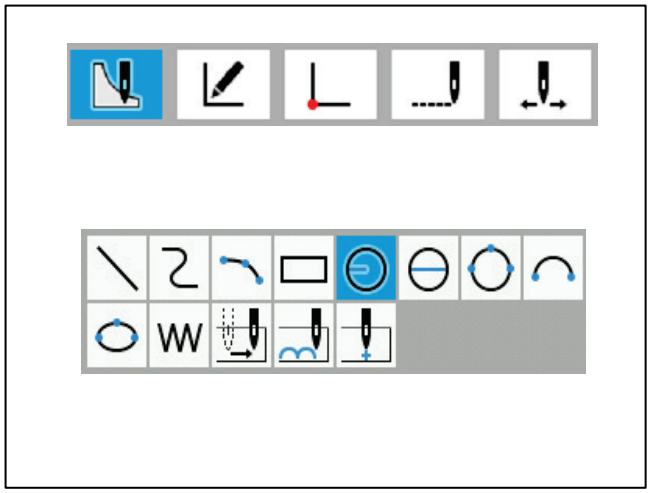


1. Touch .
2. Touch .
3. Make the settings for each item.
   * Refer to “11-3-11. Setting parameters” for details on the setting method.
4. Use the jog key to move the cursor to the second point, and then press .
5. Use the jog key to set the rectangle shape.
   To create the rectangle shape, move the cursor from the single side which was created in step 4 to the desired position for the rectangle, and then press .

11-3-5. Creating a circle

The following three options are available for creating a circle.

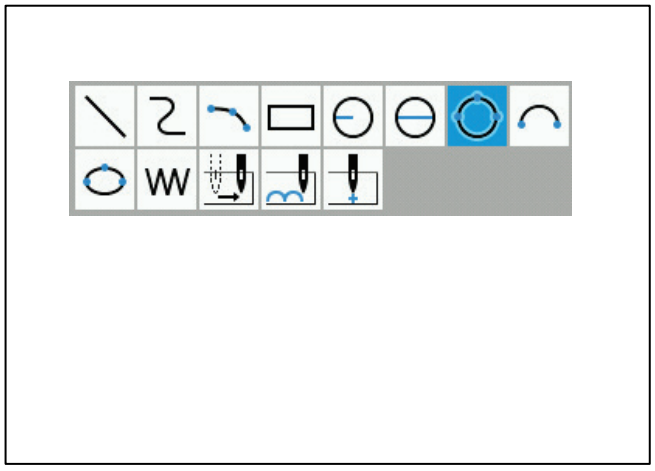
- Specify a radius to create a circle (clockwise or counterclockwise)
- Specify a diameter to create a circle (clockwise or counterclockwise)



1. Touch .

< If is selected >

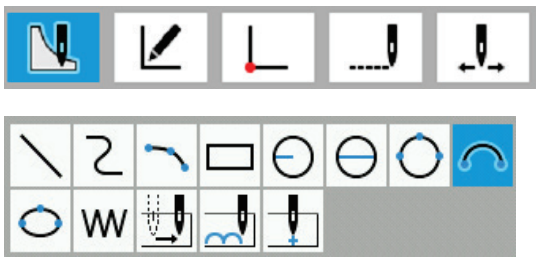
2. Touch or .
3. Make the settings for each item.
   * Refer to “11-3-11. Setting parameters” for details on the setting method.
4. Use the jog key to move the cursor to the second point, and then press .



< If is selected >

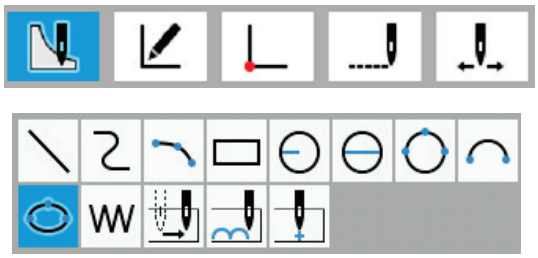
2. Touch .
3. Make the settings for each item.
   * Refer to “11-3-11. Setting parameters” for details on the setting method.
4. Use the jog key to move the cursor to the second point, and then press .
5. Use the jog key to move the cursor to the third point, and then press .

11-3-6. Creating a semicircle



1. Touch .
2. Touch .
3. Make the settings for each item.
   * Refer to “11-3-11. Setting parameters” for details on the setting method.
4. Use the jog key to move the cursor to the point which you would like to set, and then press .

11-3-7. Creating an ellipse



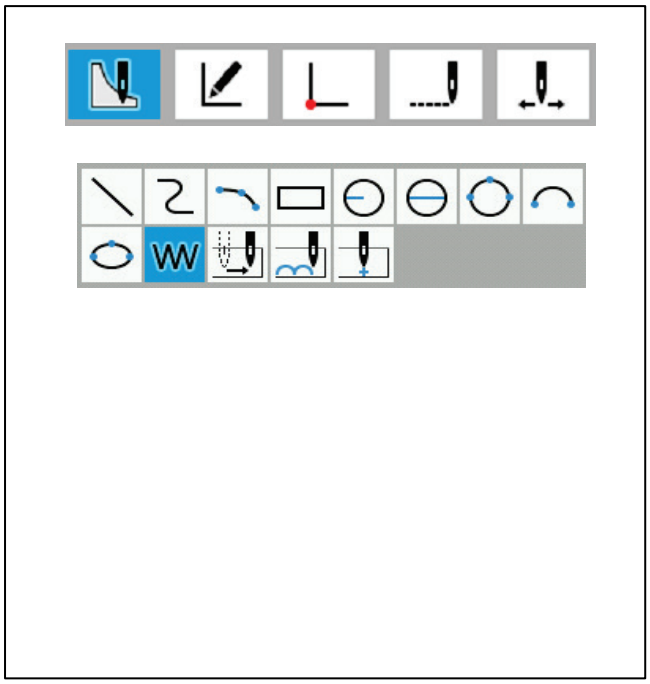




1. Touch .
2. Touch .
3. Make the settings for each item.
   * Refer to “11-3-11. Setting parameters” for details on the setting method.
4. Use the jog key to move the cursor to the second point on the long axis (short axis), and then press .
5. Use the jog key to move the cursor to the position for the short axis (long axis), and then press .

11-3-8. WW Creating needle drop data

Create needle drop data for the current needle position.



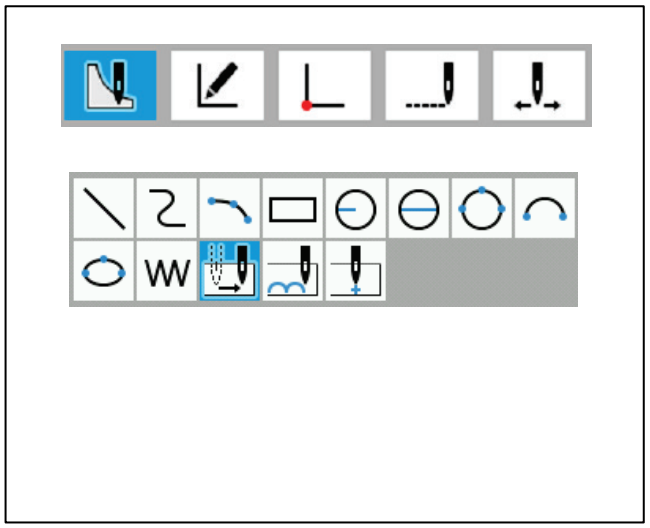
1. Touch .
2. Touch WW.
3. Make the settings for each item.
   * Refer to “11-3-11. Setting parameters” for details on the setting method.
4. Use the jog key to move the cursor + to the point where you would like to set the needle down position, and then press .

   To change the maximum pitch, carry out the same procedure as in step 3 to change the setting.
5. Repeat step 4 until the needle drop position can be set.

Move the cursor + to the end point, and then press twice.

11-3-9. Creating feed data

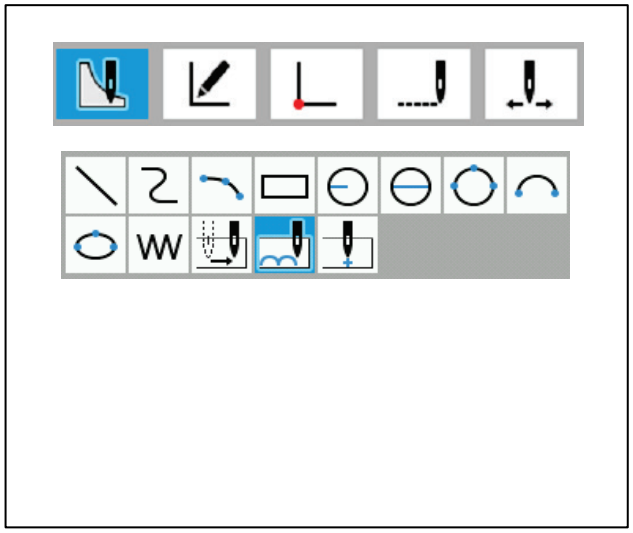
Create (feed) data to move the needle to the next position without needle drop at the current position.



1. Touch .
2. Touch .
3. Make the settings for each item.
   * Refer to “11-3-11. Setting parameters” for details on the setting method.
4. Use the jog key to move the cursor + to the point where you would like to set the feed, and then press twice.

11-3-10. Creating basting data

Create basting data.



1. Touch .
2. Touch .
3. Make the settings for each item.
   * Refer to “11-3-11. Setting parameters” for details on the setting method.
4. Use the jog key to move the cursor + to the point where you would like to set basting, and then press .
5. Repeat step 4 until the basting position can be set.

Move the cursor + to the end point, and then press twice.

11-3-11. Setting parameters

Operation method

Parameters are displayed in a list at the right edge of the screen, so touch ◄ ► to make the settings.

Details of parameter settings

Icon	Parameter	Choices
	Method for Appending **[*1]**	Insert, Append to beginning, Append to end
	Method for moving cursor	Move freely, Snap to needle point
	Rotation direction **[*2]**	Clockwise, Counterclockwise
	Line type	Running, V Zigzag, N Zigzag
	Running pitch **[*3]**	0.3 - 20.0 mm
	Zigzag pitch **[*4]**	0.1 - 25.5 mm
	Zigzag left width **[*4]**	0.0 - 25.5 mm
	Zigzag right width **[*4]**	
	Number of zigzag stitches **[*4]**	2 - 6 stitches
	Running generation mode **[*3]**	Equal Pitch, Prioritize Pitch

Icon	Parameter	Choices
	Backtack entry mode	No Back Tack, V Back, N Back, Overlap **[*6]**
	Backtack exit mode	
	Backtack Entry Number of Stitches **[*5]**	0 - 9 stitches
	Backtack Exit Number of Stitches **[*5]**	
	Maximum Pitch **[*7]**	0.3 - 20.0 mm
	Split Auto Insert **[*8]**	None, Split w/Needle Up
	Outline connection	Feed, Running, Stitch, Baste
	Single stitch･Multiple stitch mode	Single stitch･Multiple stitch Offset input
	Offset direction	Inside/Left side, Outside/Right side
	Offset width	0.0 - 25.5 mm
	No. of copies	1 - 99
	Route	Same direction, Return, Return + Stitch connection

[*1] When adding an existing pattern, you can select the method for appending the program (Insert, Append to end, Append to beginning).

[*2] This can only be set when drawing a circle (radius), circle (diameter), semicircle or ellipse.

[*3] This can only be set when the line type is set to "Running".

[*4] This can only be set when the line type is set to "V Zigzag" or "N Zigzag".

[*5] This can only be set when backtack start mode (backtack end mode) is set to a setting other than "No back Tack".

[*6] This can only be set when drawing a rectangle, circle (radius), circle (diameter), circle (3 points) or ellipse.

[*7] This can only be set when creating needle drop data.

[*8] This can only be set when creating feed data or basting data.

Parameter setting examples

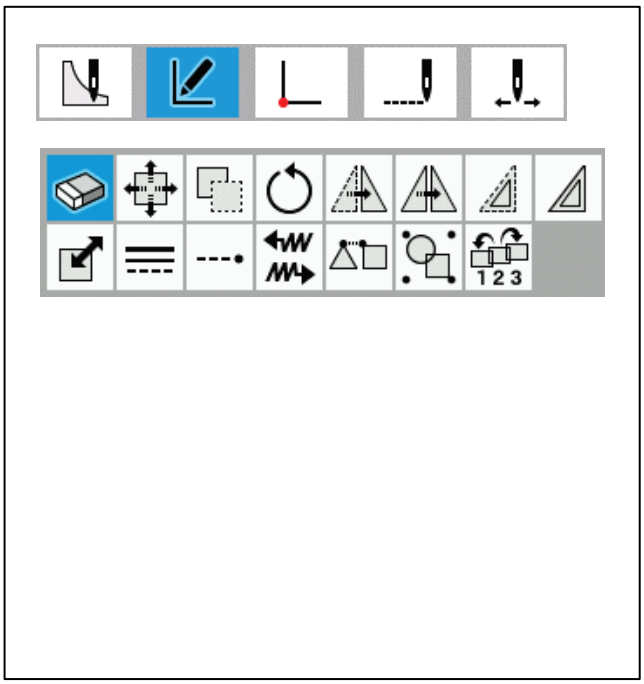
Example 1) To create sewing points which are as even as possible without exceeding the specified pitch: Set the running generation mode to [Equal Pitch].

Example 2) To connect the end point of the previous outline and the start point of the current outline by feeding: Set the outline connection to [Feed].

11-4. Editing programs (Editing outlines)

The procedure for editing programs using icons is as follows.

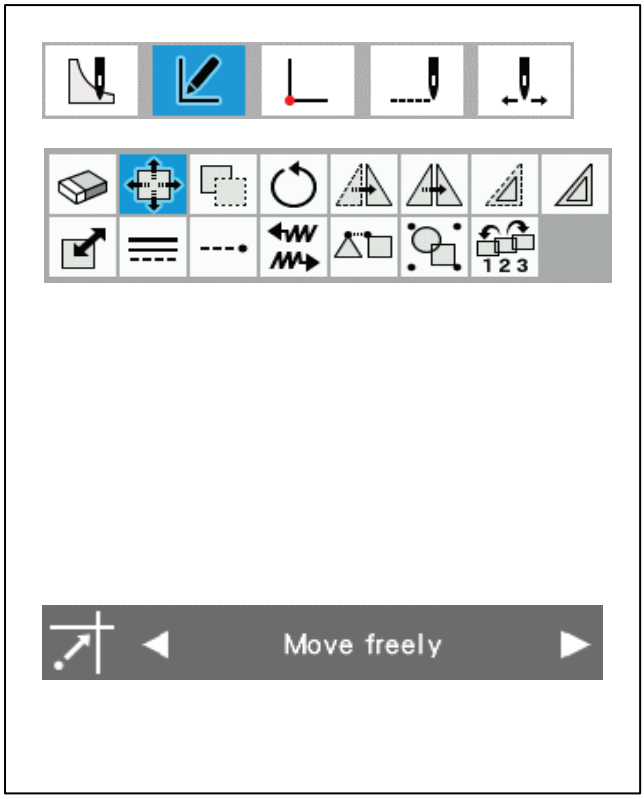
11-4-1. Deleting an outline



1. Touch .
2. Touch .
3. Use to position the cursor + at the outline which you would like to delete.
4. When you press the key once, the outline will change to red lines and it will be selected.
   When you press the key once, the selected outline will be unselected.
5. If there is more than one outline that you would like to delete, repeat steps 3 and 4.

   * To unselect all outlines
     Hold down to unselect all selected outlines.
6. Press .

11-4-2. Moving an outline

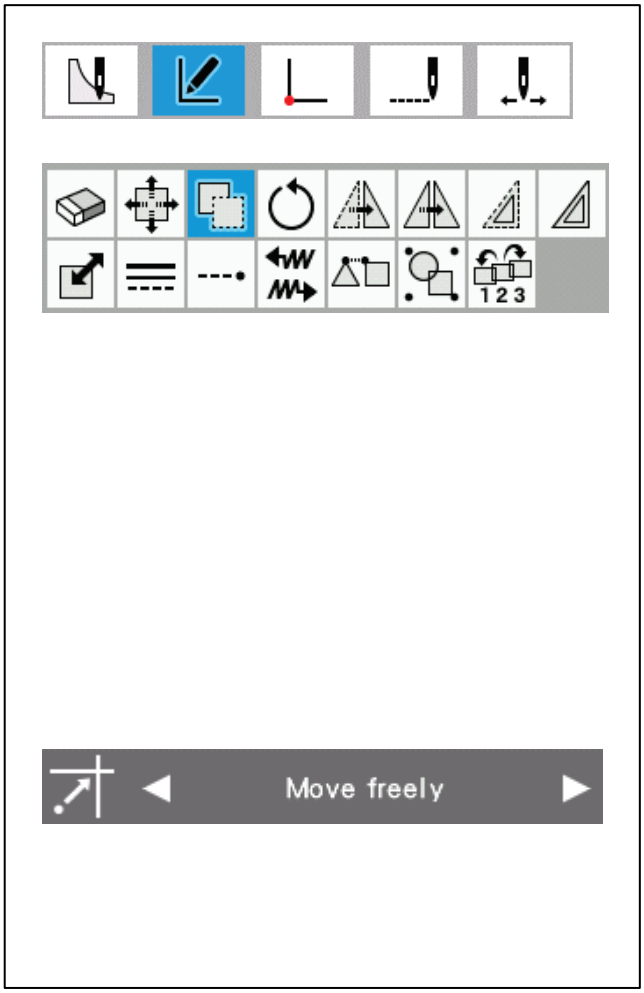


1. Touch .
2. Touch .
3. Use to position the cursor at the outline which you would like to move.
4. When you press the key once, the outline will change to red lines and it will be selected.
   When you press the key once, the selected outline will be unselected.
5. If there is more than one outline that you would like to move, repeat steps 3 and 4.

   * To select all outlines
     Hold down to select all outlines.

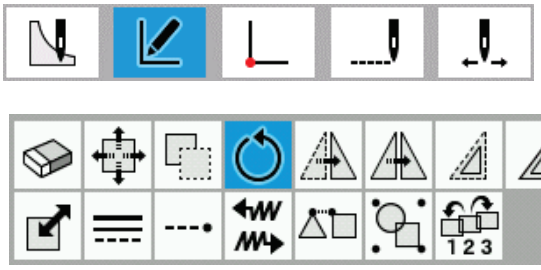
   * To unselect all outlines
     Hold down to unselect all selected outlines.
6. Press .
7. Touch ◄ ► to set the method for moving the cursor (Move freely, Snap to needle point).
8. Use the jog key to move the cursor to the place where you would like to move the outline.
9. Press .

11-4-3. Copying an outline



1. Touch .
2. Touch .
3. Use to position the cursor + at the outline which you would like to copy.
4. When you press the key once, the outline will change to red lines and it will be selected.
   When you press the key once, the selected outline will be unselected.
5. If there is more than one outline that you would like to copy, repeat steps 3 and 4.
   * To select all outlines
     Hold down to select all outlines.
   * To unselect all outlines
     Hold down to unselect all selected outlines.
6. Press .
7. Touch ◄ ► to set the method for moving the cursor (Move freely, Snap to needle point).
8. Use the jog key to move the cursor + to the place where you would like to copy the outline.
9. Press .

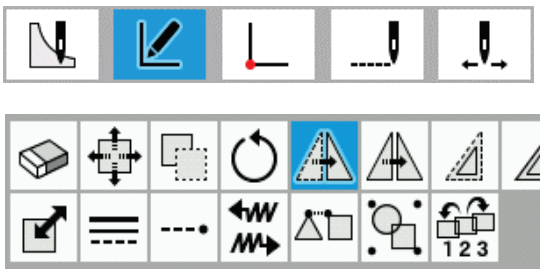
11-4-4. Rotating an outline





1. Touch .
2. Touch .
3. Use to position the cursor + at the outline which you would like to rotate.
4. When you press the key once, the outline will change to red lines and it will be selected.
   When you press the key once, the selected outline will be unselected.
5. If there is more than one outline that you would like to rotate, repeat steps 3 and 4.
   * To select all outlines
     Hold down to select all outlines.
   * To unselect all outlines
     Hold down to unselect all selected outlines.
6. Touch ◄ ► to set the rotation angle, rotation center point and method for moving the cursor (Move freely, Snap to needle point).
   * Rotation center ... Origin, Center of Mask, Mask top edge, Mask bottom edge, Mask top-left, Mask bottom-left, Mask top-right, Mask bottom-right, Specified point
   * The method for moving the cursor is set only when the rotation center point is set to "Specified point".
7. Press .
   * If the rotation center was set to "Specified point" in step 6, you can use the jog key to move the cursor + so that the current cursor position rotates around the center.
     In this case, after moving the cursor +, press once more. In addition, each time you change the rotation angle, the preview is displayed after the outline is rotated.

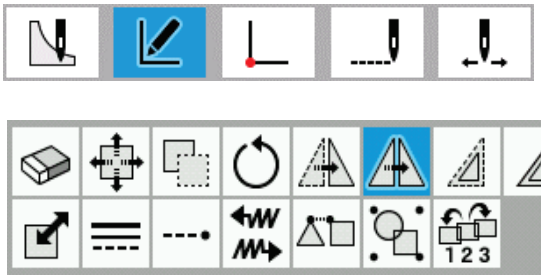
11-4-5. Moving an outline symmetrically





1. Touch .
2. Touch .
3. Use to position the cursor + at the outline which you would like to move symmetrically.
4. When you press the key once, the outline will change to red lines and it will be selected.
   When you press the key once, the selected outline will be unselected.
5. If there is more than one outline that you would like to move symmetrically, repeat steps 3 and 4.
   * To select all outlines
     Hold down to select all outlines.
   * To unselect all outlines
     Hold down to unselect all selected outlines.
6. Touch ◄ ► to set the symmetry mode and method for moving the cursor (Move freely, Snap to needle point).
   * Symmetry mode ... X-axis, Y-axis, Center of Mask (horizontal), Center of Mask (vertical), Mask top edge, Mask bottom edge, Mask left edge, Mask right edge, Specified axis
   * The method for moving the cursor is set only when the symmetry mode is set to “Specified axis”.
7. Press .
   * If the symmetry mode was set to “Specified axis” in step 6, you can use the jog key to move the cursor + so that the current cursor position moves symmetrically around the center.
     In this case, after moving the cursor +, press once more. When this is done, each time you change the cursor position, the preview is displayed after the cursor is moved.

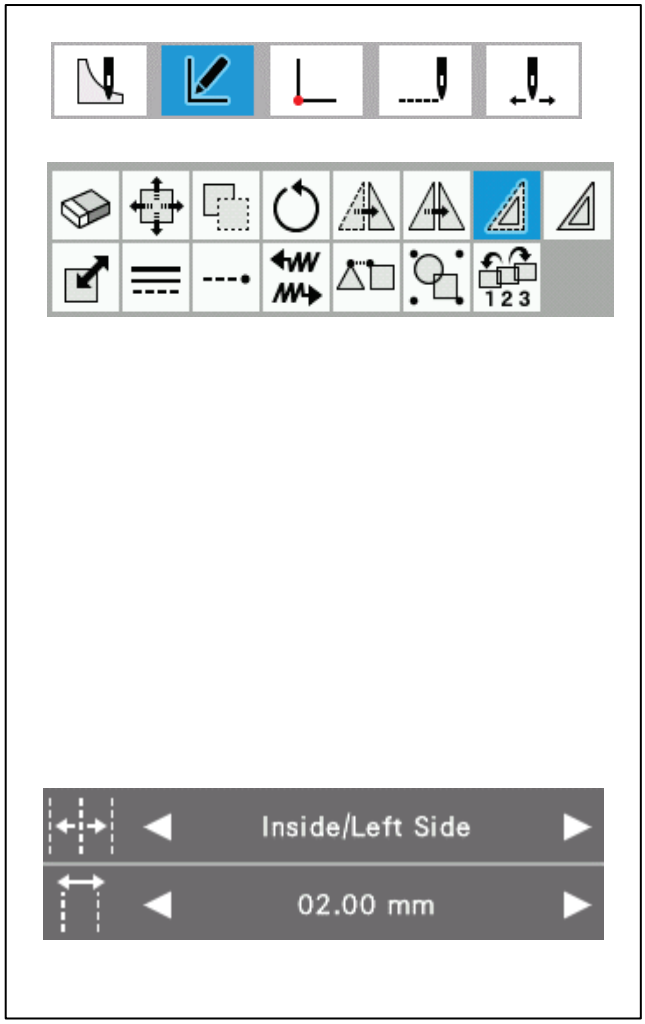
11-4-6. Copying an outline symmetrically





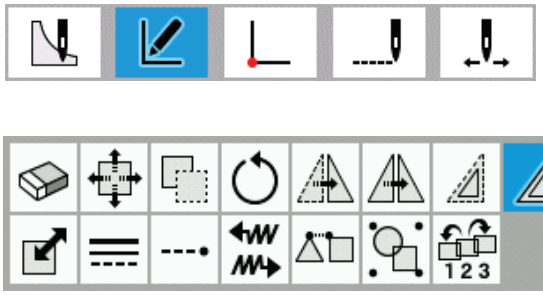
1. Touch .
2. Touch .
3. Use ◁ ▷ to position the cursor + at the outline which you would like to copy symmetrically.
4. When you press the △ key once, the outline will change to red lines and it will be selected.
   When you press the ▽ key once, the selected outline will be unselected.
5. If there is more than one outline that you would like to copy symmetrically, repeat steps 3 and 4.
   * To select all outlines
     Hold down △ to select all outlines.
   * To unselect all outlines
     Hold down ▽ to unselect all selected outlines.
6. Touch ◄ ► to set the symmetry mode and method for moving the cursor (Move freely, Snap to needle point)
   * Symmetry mode...X-axis, Y-axis, Center of Mask (horizontal), Center of Mask (vertical), Mask top edge, Mask bottom edge, Mask left edge, Mask right edge, Specified axis
   * The method for moving the cursor is set only when the symmetry mode is set to “Specified axis”.
7. Press .
   * If the symmetry mode was set to “Specified axis” in step 6, you can use the jog key to move the cursor + so that the current cursor position moves symmetrically around the center.
     In this case, after moving the cursor +, press once more. When this is done, each time you change the cursor position, the preview is displayed after the cursor is moved.

11-4-7. Moving an outline by an offset



1. Touch .
2. Touch .
3. Use to position the cursor at the outline which you would like to move by an offset.
4. When you press the key once, the outline will change to red lines and it will be selected.
   When you press the key once, the selected outline will be unselected.
   * Outlines which consist of stitches/feeding /basting and outlines which have been loaded from *.SEW files cannot be moved by an offset.
5. If there is more than one outline that you would like to move by an offset, repeat steps 3 and 4.
   * To select all outlines
     Hold down to select all outlines.
   * To unselect all outlines
     Hold down to unselect all selected outlines.
6. Touch ◄ ► to set the offset direction (Inside/Left Side, Outside/Right Side) and the offset width.
7. Press .

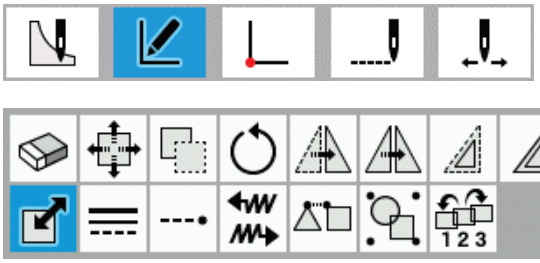
11-4-8. Copying an outline by an offset

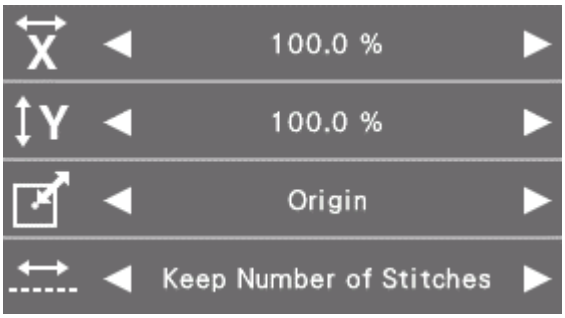




1. Touch .
2. Touch .
3. Use to position the cursor at the outline which you would like to copy by an offset.
4. When you press the key once, the outline will change to red lines and it will be selected.
   When you press the key once, the selected outline will be unselected.
   * Outlines which consist of stitches/feeding/ basting and outlines which have been loaded from *.SEW files cannot be copied by an offset.
5. If there is more than one outline that you would like to copy by an offset, repeat steps 3 and 4.
   * To select all outlines
     Hold down to select all outlines.
   * To unselect all outlines
     Hold down to unselect all selected outlines.
6. Touch ◄ ► to set the offset direction (Inside/Left Side, Outside/Right Side), the offset width, the number of offset copies (1 to 99) and the offset creation method (Same Direction, Return, Return + stitch connection).
7. Press .

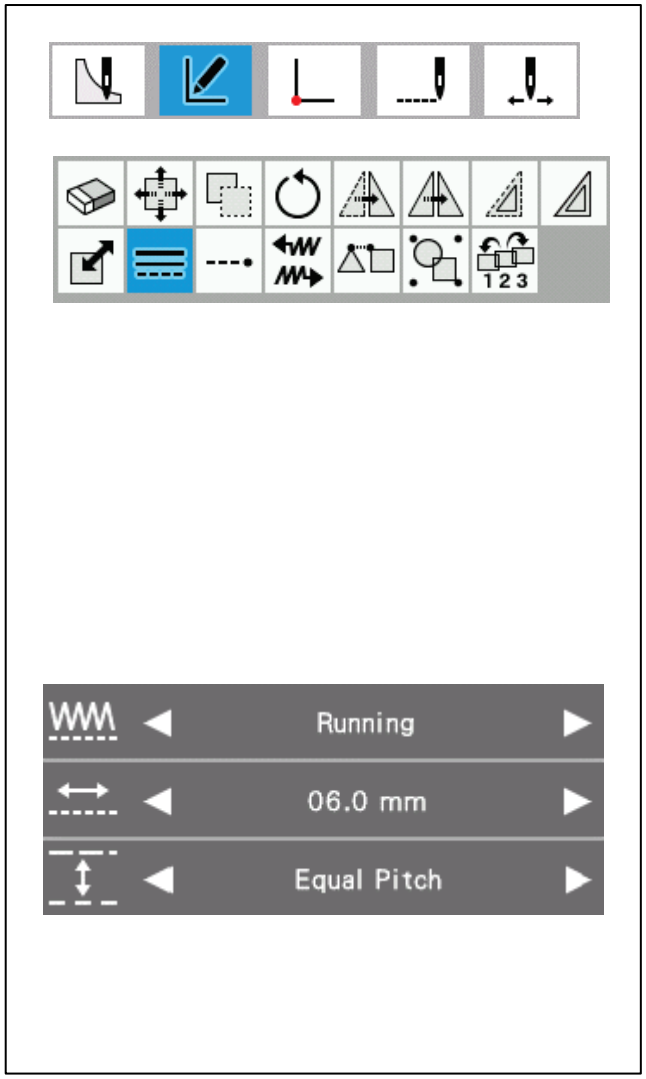
11-4-9. Resizing an outline





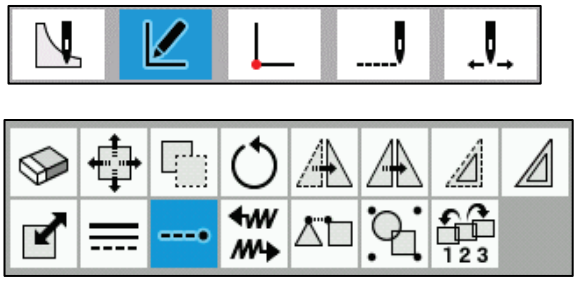
1. Touch .
2. Touch .
3. Use ◁▷ to position the cursor + at the outline which you would like to resize.
4. When you press the △ key once, the outline will change to red lines and it will be selected.
   When you press the ▽ key once, the selected outline will be unselected.
5. If there is more than one outline that you would like to resize, repeat steps 3 and 4.
   * To select all outlines
     Hold down △ to select all outlines.
   * To unselect all outlines
     Hold down ▽ to unselect all selected outlines.
6. Touch ◄ ► to set the X ratio, Y ratio, resize center, hold element (stitch number or sewing pitch) and method for moving the cursor (Move freely, Snap to needle point).
   * Resize center ... Origin, Center of Mask, Mask top edge, Mask bottom edge, Mask top-left, Mask bottom-left, Mask top-right, Mask bottom-right, Specified point
   * The method for moving the cursor is set only when the resize center is set to "Specified point".
7. Press .
   * If the resize center was set to "Specified point" in step 6, you can use the jog key to move the cursor + so that the outline is resized with the current cursor position as the resize center.
     In this case, after moving the cursor +, press once more. In addition, each time you change the X ratio or Y ratio, the preview is displayed after the outline is resized.
   * Outlines which consist of stitches/feeding /basting and outlines which have been loaded from *.SEW files normally have [Keep Number of Stitches] as their hold element.

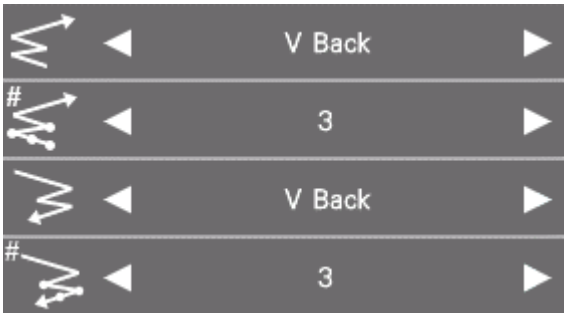
11-4-10. Changing the line type of an outline



1. Touch .
2. Touch .
3. Use to position the cursor at the outline which you would like to change the line type for.
4. When you press the key once, the outline will change to red lines and it will be selected.
   When you press the key once, the selected outline will be unselected.
5. If there is more than one outline that you would like to change the line type for, repeat steps 3 and 4.
   * To select all outlines
     Hold down to select all outlines.
   * To unselect all outlines
     Hold down to unselect all selected outlines.
6. Touch ◄ ► to set the line type (Running, V Zigzag, N Zigzag, Keep Current Shape), pitch and running generation mode (Equal Pitch, Prioritize Pitch).
   * For details on the setting method for zigzag stitches, refer to "11-8-9. Zigzag stitch".
   * Outlines which consist of stitches/feeding /basting and outlines which have been loaded from *.SEW files cannot have their line types changed.
7. Press .

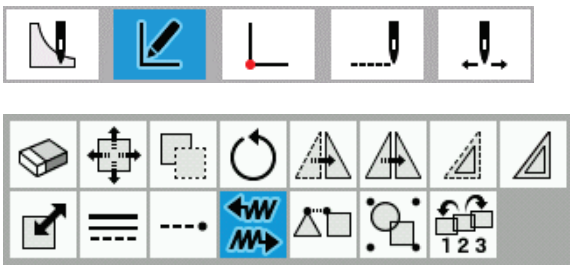
11-4-11. ---• Adding and deleting backtack stitches for an outline

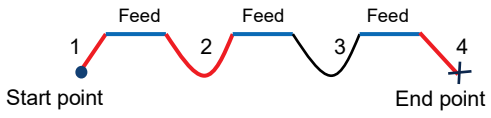


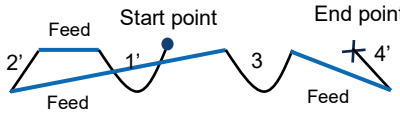


1. Touch .
2. Touch ---• .
3. Use ◁ ▷ to position the cursor + at the outline which you would like to add or delete backtacking for.
4. When you press the △ key once, the outline will change to red lines and it will be selected.
   When you press the ▽ key once, the selected outline will be unselected.
5. If there is more than one outline that you would like to add or delete backtacking for, repeat steps 3 and 4.
   * To select all outlines
     Hold down △ to select all outlines.
   * To unselect all outlines
     Hold down ▽ to unselect all selected outlines.
6. Touch ◄ ► to set the backtack type (start position), number of backtack stitches (0 to 9), backtack type (end position) and number of backtack stitches (0 to 9).
   * Backtack stitch type ...
     No Back Tack, V Back, N Back, Overlap
   * The "Overlap" setting can only be set for closed outlines (circles specified by radius, circles specified by diameter, circles specified by three points, ellipses, rectangles, etc.).
7. Press .

11-4-12. Switching the sewing start and end points for outlines



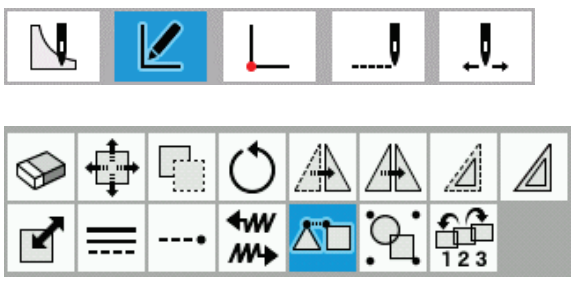




1. Touch .
2. Touch .
3. Use to position the cursor + at the outline which you would like to switch the outline start point or end point for.
4. When you press the key once, the outline will change to red lines and it will be selected.
   When you press the key once, the selected outline will be unselected.
5. If there is more than one outline that you would like to switch the start point or end point for, repeat steps 3 and 4.
   * To select all outlines
     Hold down to select all outlines.
   * To unselect all outlines
     Hold down to unselect all selected outlines.
6. Press .
   * When multiple continuous outlines are selected, the orders are also switched.

   Example: When outlines 1, 2, 3 and 4 have been created, and you select outlines 1, 2 and 4 (red lines) and switch the start and end points:
   The sewing order becomes 1', 2', 3, 4'.
   (The start and end point for 1', 2' and 4' are reversed.)

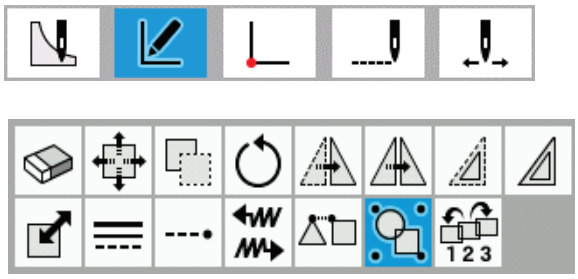
11-4-13. Changing the connection method for outlines



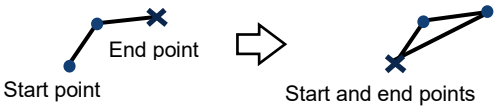


1. Touch .
2. Touch .
3. Use to position the cursor at the outline which you would like to change the outline connection method for.
4. When you press the key once, the outline will change to red lines and it will be selected.
   When you press the key once, the selected outline will be unselected.
5. If there is more than one outline that you would like to change the outline connection method for, repeat steps 3 and 4.
   * To select all outlines
     Hold down to select all outlines.
   * To unselect all outlines
     Hold down to unselect all selected outlines.
6. Touch ◄ ► to set the outline connection method (Stitch, Feed, Running, Baste).
   * If "Stitch" is set as the outline connection method: If the maximum pitch of the stitches exceeds 20.0mm, use the "Feed" setting to connect.
   * If "Running" is set as the outline connection method: The outline is connected by a straight line at the current outline running pitch.
7. Press .
   * The end point of the previous outline and the start point of the current outline are connected.

11-4-14. Combining outlines

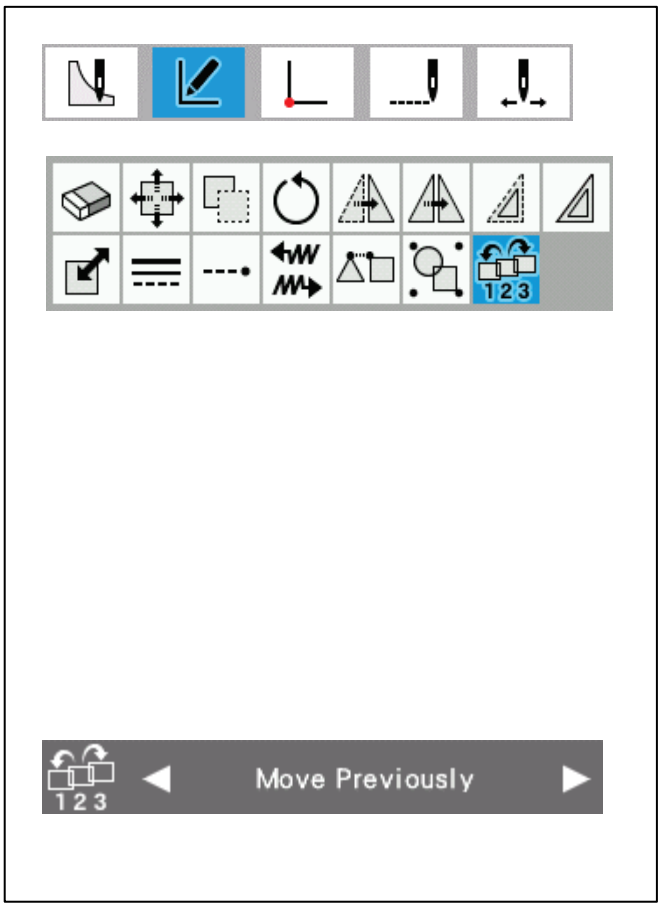


(Example)



1. Touch .
2. Touch .
3. Use to position the cursor + at an outline which you would like to combine.
4. When you press the key once, the outline will change to red lines and it will be selected.
   When you press the key once, the selected outline will be unselected.
5. If there is more than one outline that you would like to combine, repeat steps 3 and 4.
   * To select all outlines
     Hold down to select all outlines.
   * To unselect all outlines
     Hold down to unselect all selected outlines.
6. Press .
   * The following outlines cannot be combined.
     - Closed outlines (circles specified by radius, circles specified by diameter, circles specified by three points, ellipses, rectangles, etc.)
     - Outlines which consist of stitches/feeding /basting and other types of outlines
   * If only one outline is selected, it will become a closed outline.

11-4-15. Changing the sewing order for an outline

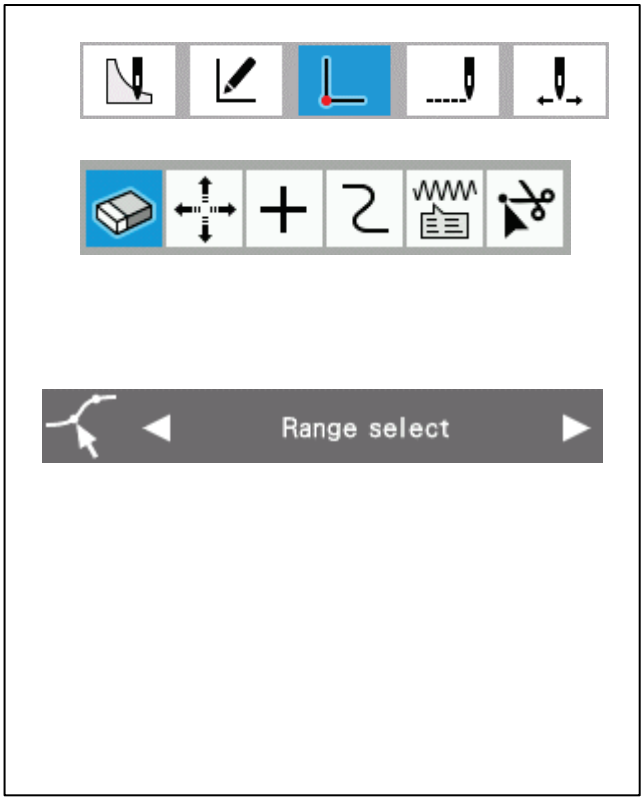


1. Touch .
2. Touch .
3. Use to position the cursor at the outline which you would like to change the outline sewing order for.
4. When you press the key once, the outline will change to red lines and it will be selected.
   When you press the key once, the selected outline will be unselected.
5. If there is more than one outline that you would like to change the outline sewing order for, repeat steps 3 and 4.
   * To select all outlines
     Hold down to select all outlines.
   * To unselect all outlines
     Hold down to unselect all selected outlines.
6. Touch ◄ ► to set the sewing order (Move Forward, Move Back, Move to start, Move to end).
7. Press .

11-5. Editing programs (Editing outline component points)

This section describes the icons which are used when editing outline component points and how to use them.
* You cannot edit the outline component points for outlines which have been loaded from *.SEW files.

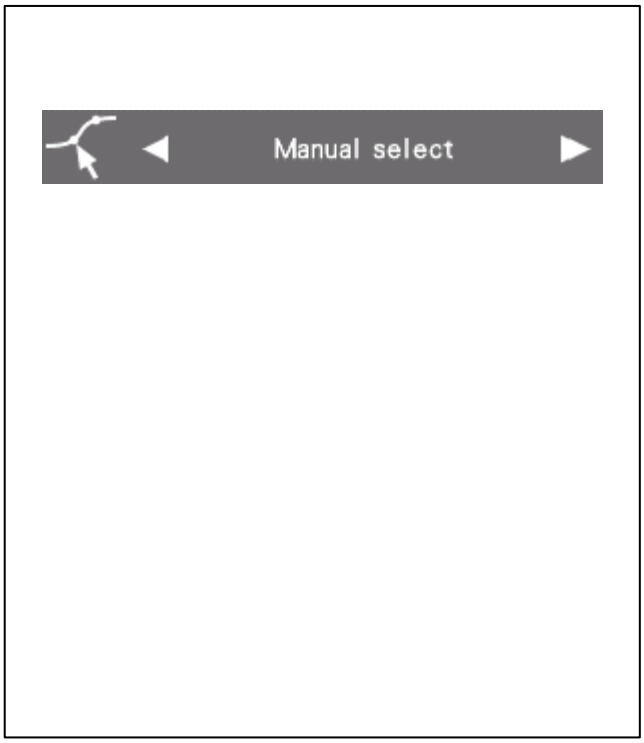
11-5-1. Deleting an outline component point



1. Touch .
2. Touch .
3. Touch ◄ ► to set the selection method.

< Selecting continuous component points for editing>

4. Touch ◄ ► to set the selection method to [Range select].
5. Use to move the cursor to the start point for the range that you would like to select.
   * You can move the cursor continuously by holding down the key.
6. Press .
7. Use to move the cursor to the end point of the range that you would like to select. The component points will change to red, and the points from the start point to the end point will be selected.
   * You can move the cursor continuously by holding down the key.
8. Press .



< Manually selecting component points for editing>

4. Touch ◄ ► to set the selection method to [Manual select].
5. Use to move the cursor to the component point that you would like to delete.
   * You can move the cursor continuously by holding down the key.
6. When you press the key once, the component point will change to red and it will be selected.
   When you press the key once, the selected component point will be unselected.
7. If there is more than one component point that you would like to delete, repeat steps 5 and 6.
   * To select all outlines
     Hold down to select all component points in an outline.
   * To unselect all outlines
     Hold down to unselect all selected component points.
8. Press .

11-5-2. Moving an outline component point

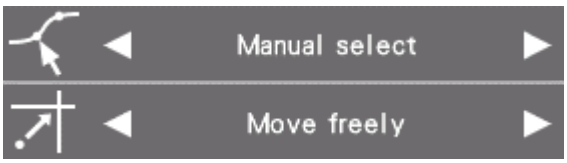




1. Touch .
2. Touch .
3. Touch ◄ ► to set the selection method (Manual select, Range select) and method for moving the cursor (Move freely, Snap to needle point).
   * If the method for moving the cursor is set to [Move freely], the cursor can be moved to any desired position.
   * If the method for moving the cursor is set to [Snap to needle point], the cursor will move to the sewing point.

< Selecting continuous component points for editing>

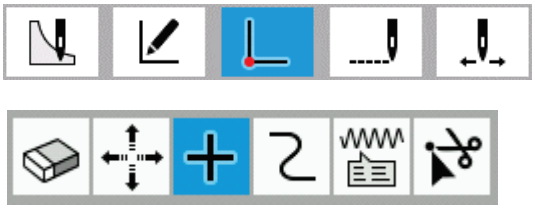
4. Touch ◄ ► to set the selection method to [Range select].
5. Use ◁▷ to move the cursor + to the start point for the range that you would like to select.
   * You can move the cursor continuously by holding down the key.
6. Press .
7. Use ◁▷ to move the cursor + to the end point of the range that you would like to select. The component points will change to red, and the points from the start point to the end point will be selected.
   * You can move the cursor continuously by holding down the key.
8. Press once, and then use the jog key to move the cursor + to the place where you would like to move the component point.
9. Press .



< Manually selecting component points for editing>

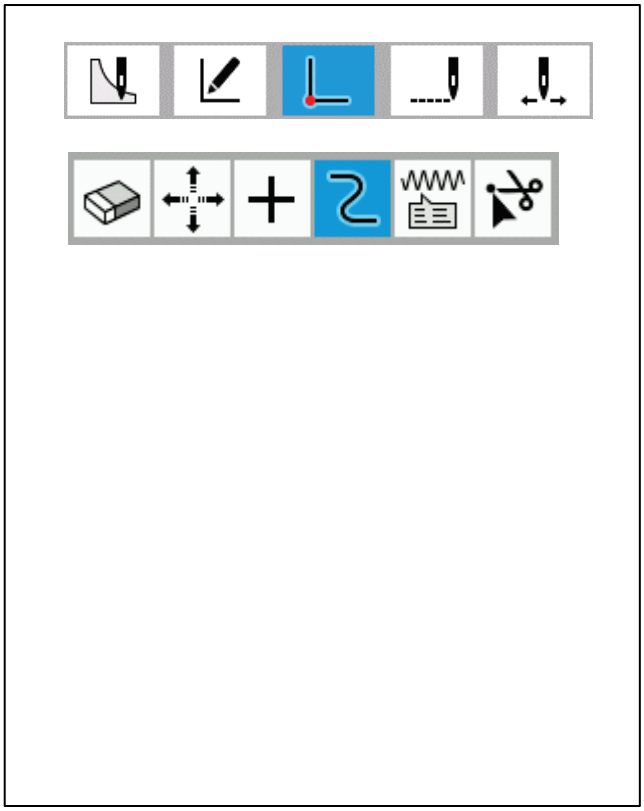
4. Touch ◄ ► to set the selection method to "Manual select".
5. Use ◁▷ to move the cursor + to the component point that you would like to move.
   * You can move the cursor continuously by holding down the key.
6. When you press the △ key once, the component point will change to red and it will be selected.
   When you press the ▽ key once, the selected component point will be unselected.
7. If there is more than one component point that you would like to move, repeat steps 5 and 6.
   * To select all outlines
     Hold down △ to select all component points in an outline.
   * To unselect all outlines
     Hold down ▽ to unselect all selected component points.
8. Press ↵ once, and then use the jog key to move the cursor + to the place where you would like to move the component point.
9. Press ↵.

11-5-3. + Adding an outline component point



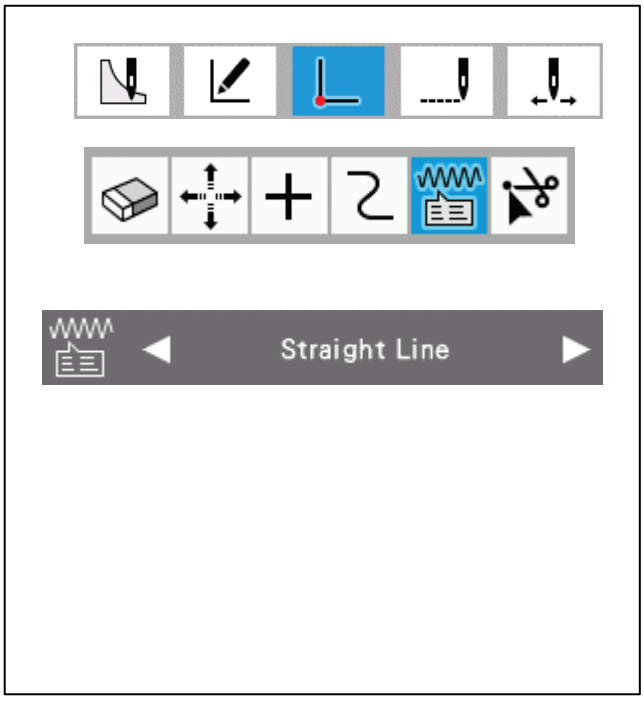
1. Touch ⌞ .
2. Touch + .
3. Use ◁▷ to move the cursor + to the component point where you would like to add a component point.
   * You can move the cursor continuously by holding down the key.
4. Press ↵.
   * The component point will be automatically added between the selected component point and the next component point.
   * You cannot add component points for circles (circles specified by radius, circles specified by diameter, circles specified by three points) and ellipses.

11-5-4. Changing curve shapes



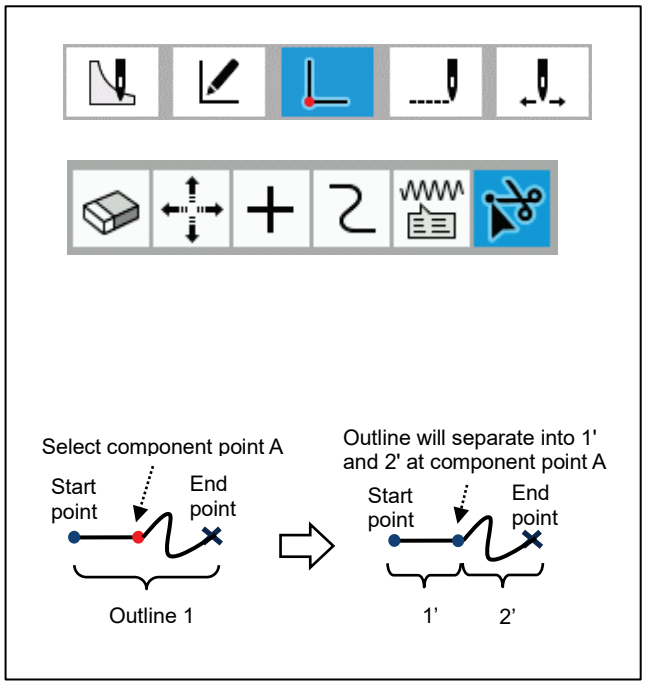
1. Touch .
2. Touch .
3. Use to move the cursor to the component point in the curve that you would like to edit.
   * You can move the cursor continuously by holding down the key.
4. Press .
   * You can only change the current component point if it and the component points immediately before and after it are part of a curve.
5. Use the jog key to edit the curve.
   * To rotate the curve clockwise
     Hold down to rotate the curve clockwise.
   * To rotate the curve counterclockwise
     Hold down to rotate the curve counterclockwise.
6. Press .

11-5-5. Changing the attributes of outline component points



1. Touch .
2. Touch .
3. Use to move the cursor to the component point that you would like to change the attributes for.
   * You can move the cursor continuously by holding down the key.
4. Touch ◄ ► to select the attribute (Straight line, Curve) to change. The attribute of the component point will then be changed.
   * You cannot change the attributes for component points in circles (circles specified by radius, circles specified by diameter, circles specified by three points) and ellipses.
   * It is possible to change arcs into straight lines or curves, but straight lines and curves cannot be changed into arcs.

11-5-6. Separating an outline at a component point

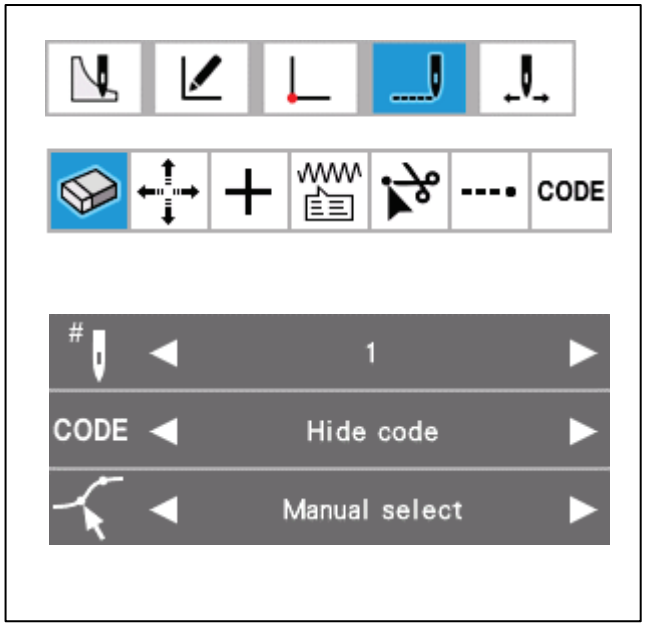


1. Touch .
2. Touch .
3. Use to move the cursor to the component point in the outline where you would like to separate the outline.
   * You can move the cursor continuously by holding down the key.
4. Press .
   * Circles (circles specified by radius, circles specified by diameter, circles specified by three points), ellipses and outlines which consist of stitches/feeding/basting cannot be separated.
   * The outline will be separated at the position of the selected component point.
     Example: To separate outline 1 at component point A

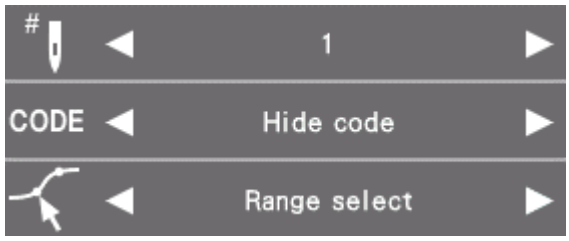
11-6. Editing programs (Editing sewing points)

This section describes the icons which are used when editing sewing points and how to use them.

11-6-1. Deleting a sewing point

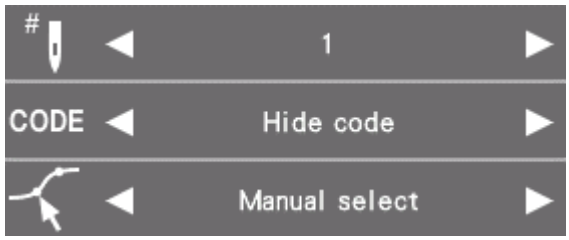


1. Touch .
2. Touch .
3. Touch ◄ ► to set the skipping units (1, 10, 50, 100, 500, 1000, 5000), code display switching (Hide code, Show code) and the selection method.



< Selecting continuous sewing points for editing >

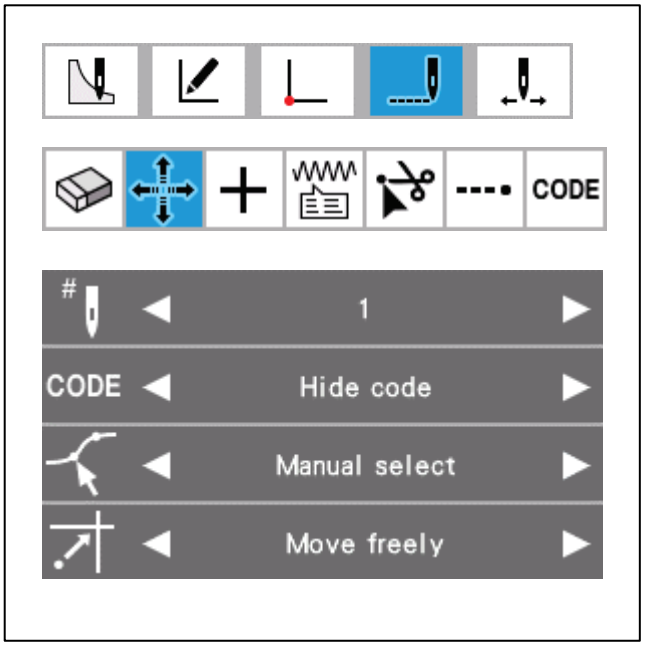
4. Touch ◄ ► to set the selection method to [Range select].
5. Use ◁▷ to move the cursor + to the start point for the range that you would like to select.
   * You can move the cursor according to the skipping units.
   * You can move the cursor continuously by holding down the key.
6. Press ↵.
7. Use ◁▷ to move the cursor + to the end point of the range that you would like to select. The sewing points will change to red, and the points from the start point to the end point will be selected.
   * You can move the cursor according to the skipping units.
   * You can move the cursor continuously by holding down the key.
8. Press ↵.



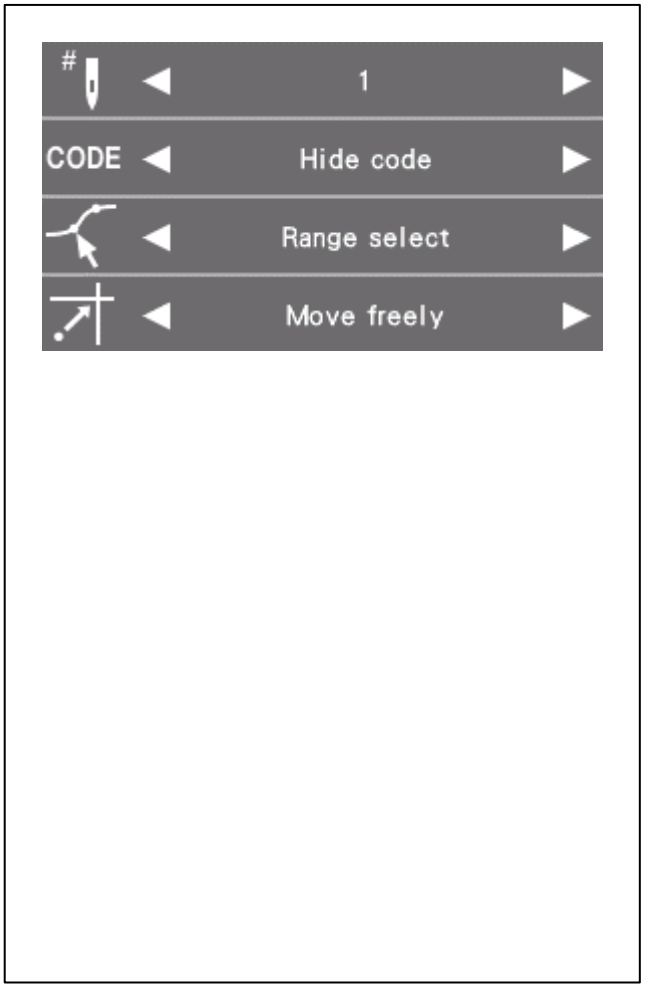
< Manually selecting sewing points for editing >

4. Touch ◄ ► to set the selection method to [Manual select].
5. Use ◁▷ to move the cursor + to the sewing point that you would like to delete.
   * You can move the cursor according to the skipping units.
   * You can move the cursor continuously by holding down the key.
6. When you press the △ key once, the sewing point will change to red and it will be selected.
   When you press the ▽ key once, the selected sewing point will be unselected.
7. If there is more than one sewing point that you would like to delete, repeat steps 5 and 6.
   * To select all outlines
     Hold down △ to select all sewing points in an outline.
   * To unselect all outlines
     Hold down ▽ to unselect all selected sewing points.
8. Press ↵.

11-6-2. Moving a sewing point

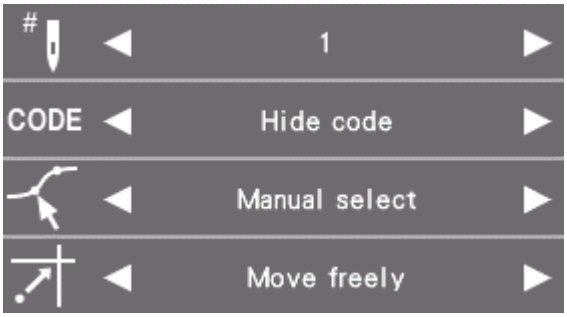


1. Touch .
2. Touch .
3. Touch ◄ ► to set the skipping units (1, 10, 50, 100, 500, 1000, 5000), code display switching (Hide code, Show code) and method for moving the cursor (Move freely, Snap to needle point).
   * If the method for moving the cursor is set to [Move freely], the cursor can be moved to any desired position.
   * If the method for moving the cursor is set to [Snap to needle point], the cursor will move to the sewing point.



< Selecting continuous sewing points for editing >

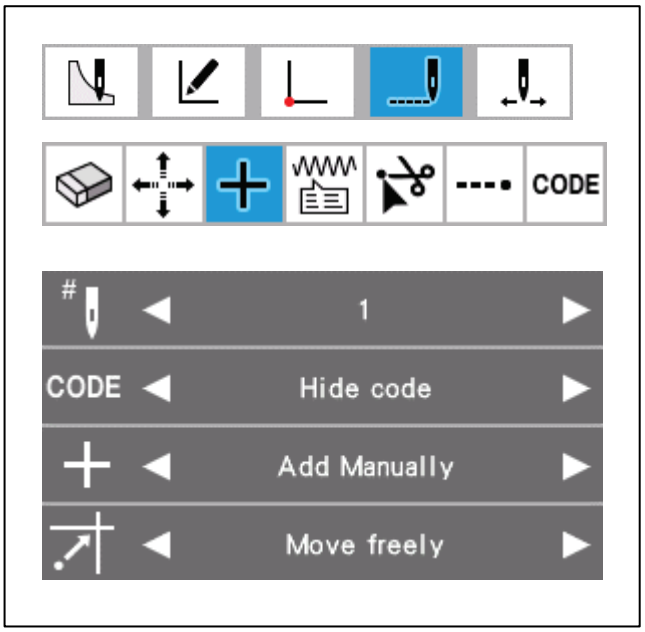
4. Touch ◄ ► to set the selection method to [Range select].
5. Use ◁▷ to move the cursor + to the start point for the range that you would like to select.
   * You can move the cursor according to the skipping units.
   * You can move the cursor continuously by holding down the key.
6. Press .
7. Use ◁▷ to move the cursor + to the end point of the range that you would like to select. The sewing points will change to red, and the points from the start point to the end point will be selected.
   * You can move the cursor according to the skipping units.
   * You can move the cursor continuously by holding down the key.
8. Press once, and then use the JOG key to move the cursor + to the place where you would like to move the component point.
9. Press .



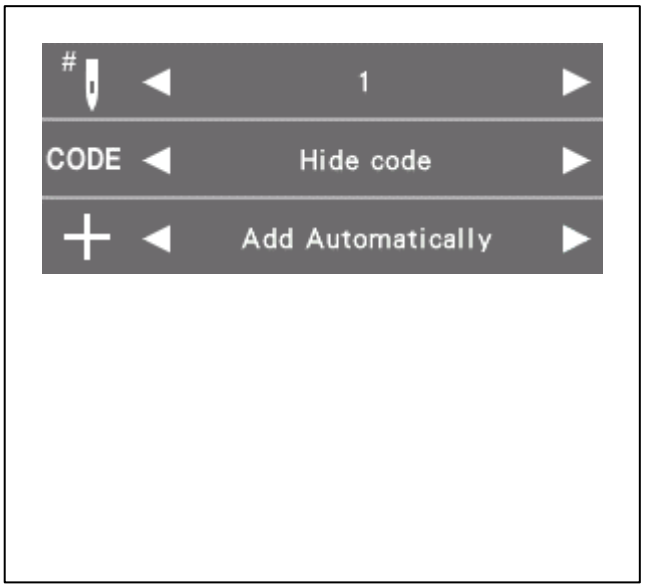
< Manually selecting component points for editing >

4. Touch ◄ ► to set the selection method to [Manual select].
5. Use ◁▷ to move the cursor + to the sewing point that you would like to move.
   * You can move the cursor according to the skipping units.
   * You can move the cursor continuously by holding down the key.
6. When you press the △ key once, the sewing point will change to red and it will be selected.
   When you press the ▽ key once, the selected sewing point will be unselected.
7. If there is more than one sewing point that you would like to move, repeat steps 5 and 6.
   * To select all outlines
     Hold down △ to select all sewing points in an outline.
   * To unselect all outlines
     Hold down ▽ to unselect all selected sewing points.
8. Press ↵ once, and then use the JOG key to move the cursor + to the place where you would like to move the component point.
9. Press ↵.

11-6-3. ┼ Adding a sewing point

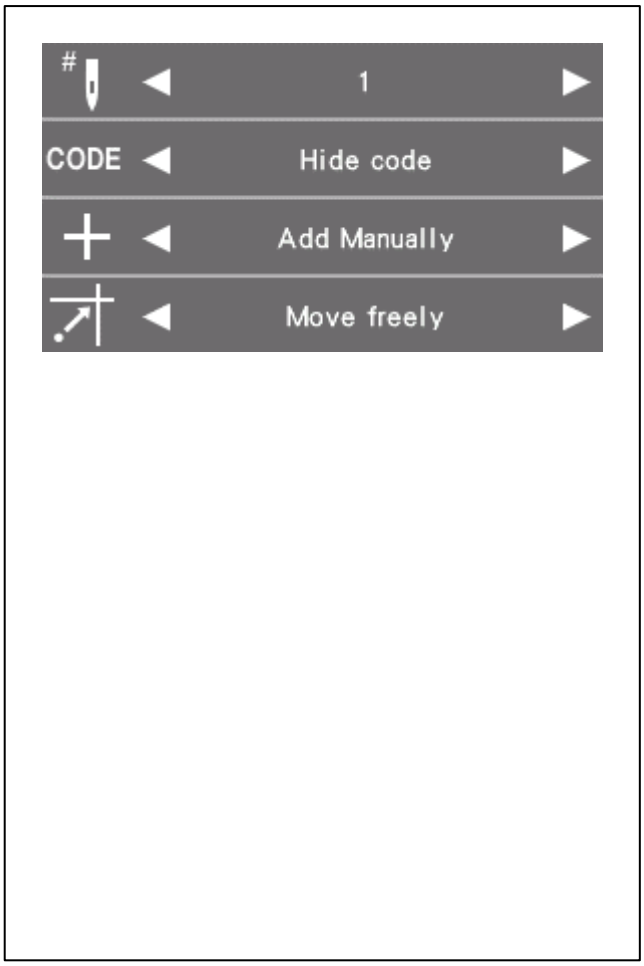


1. Touch .
2. Touch ┼.
3. Touch ◄ ► to set the skipping units (1, 10, 50, 100, 500, 1000, 5000), code display switching (Hide code, Show code), sewing point method for appending (Add Manually, Add Automatically) and method for moving the cursor (Move freely, Snap to needle point).



< Adding sewing points automatically >

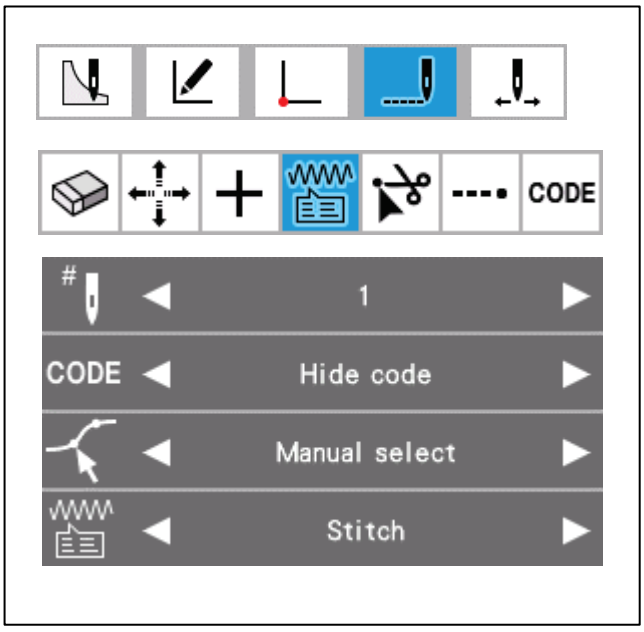
4. Touch ◄ ► to set the sewing point method for appending to [Add Automatically].
5. Use ◁▷ to move the cursor ┼ to the sewing point where you would like to add a sewing point.
   * You can move the cursor according to the skipping units.
   * You can move the cursor continuously by holding down the key.
6. Press ↵.
   * The sewing point will be automatically added between the selected sewing point and the next sewing point.



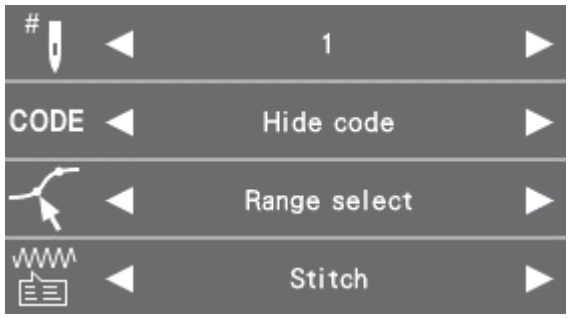
< Adding sewing points manually >

4. Touch ◄ ► to set the sewing point method for appending to [Add Manually].
5. Use ◁▷ to move the cursor + to the sewing point where you would like to add a sewing point.
   * You can move the cursor according to the skipping units.
   * You can move the cursor continuously by holding down the key.
6. Press ↵ once, and then use the jog key to move the cursor + to the place where you would like to add the sewing point.
   * If the method for moving the cursor is set to [Move freely], the cursor can be moved to any desired position.
   * If the method for moving the cursor is set to [Snap to needle point], the cursor will move to the sewing point.
7. Press ↵.
   * The sewing point will be added in between the selected sewing point and the next sewing point at the position where the cursor was moved to in step 6.

11-6-4. Changing the attributes of sewing points

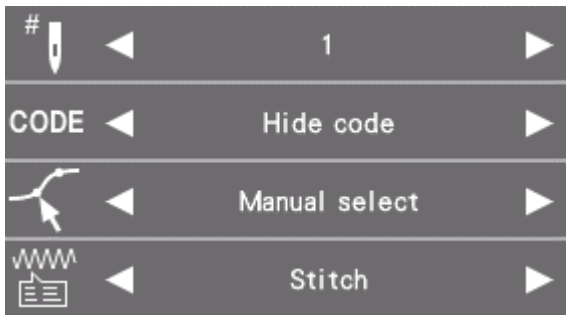


1. Touch .
2. Touch .
3. Touch ◄ ► to set the skipping units (1, 10, 50, 100, 500, 1000, 5000) and code display switching (Hide code, Show code).



< Selecting continuous sewing points for editing >

4. Touch ◄ ► to set the selection method to [Range select].
5. Use ◁▷ to move the cursor + to the start point for the range that you would like to select.
   * You can move the cursor according to the skipping units.
   * You can move the cursor continuously by holding down the key.
6. Press ↵.
7. Use ◁▷ to move the cursor + to the end point of the range that you would like to select. The sewing points will change to red, and the points from the start point to the end point will be selected.
   * You can move the cursor according to the skipping units.
   * You can move the cursor continuously by holding down the key.
8. Touch ◄ ► to set the attribute (Stitch, Feed, Baste).
9. Press ↵.

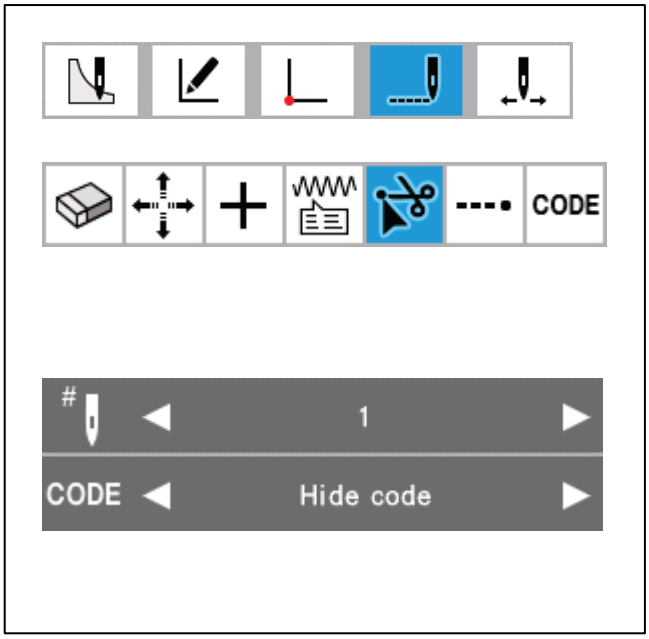


< Manually selecting component points for editing >

4. Touch ◄ ► to set the selection method to [Manual select].
5. Use ◁▷ to move the cursor + to the sewing point that you would like to move.
   * You can move the cursor according to the skipping units.
   * You can move the cursor continuously by holding down the key.
6. When you press the △ key once, the sewing point will change to red and it will be selected.
   When you press the ▽ key once, the selected sewing point will be unselected.
7. If there is more than one attribute that you would like to change, repeat steps 5 and 6.
   * To select all outlines
     Hold down △ to select all sewing points in an outline.
   * To unselect all outlines
     Hold down ▽ to unselect all selected sewing points.
8. Touch ◄ ► to set the attribute (Stitch, Feed, Baste).
9. Press ↵.
   * When switching from "Feed" to "Stitch" or from "Baste" to "Stitch", the sewing pitch must be 20.0mm or less for both X and Y. If the setting is outside the range, the buzzer will sound twice and processing will stop.

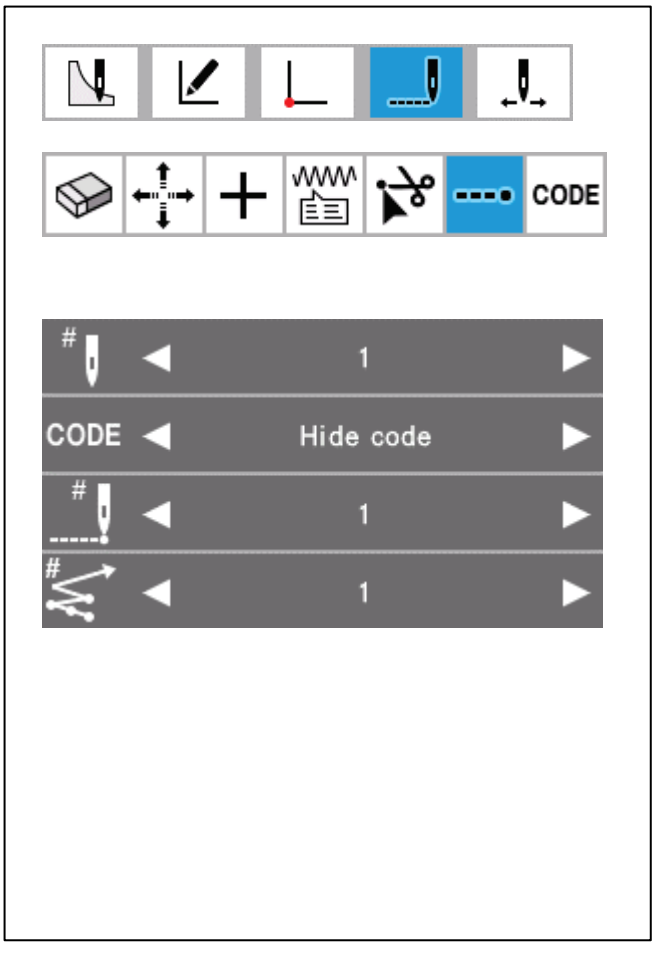
11-6-5. Separating an outline at a sewing point

* When separating outlines at sewing points when the outlines contain component point data, the component point data will be lost.



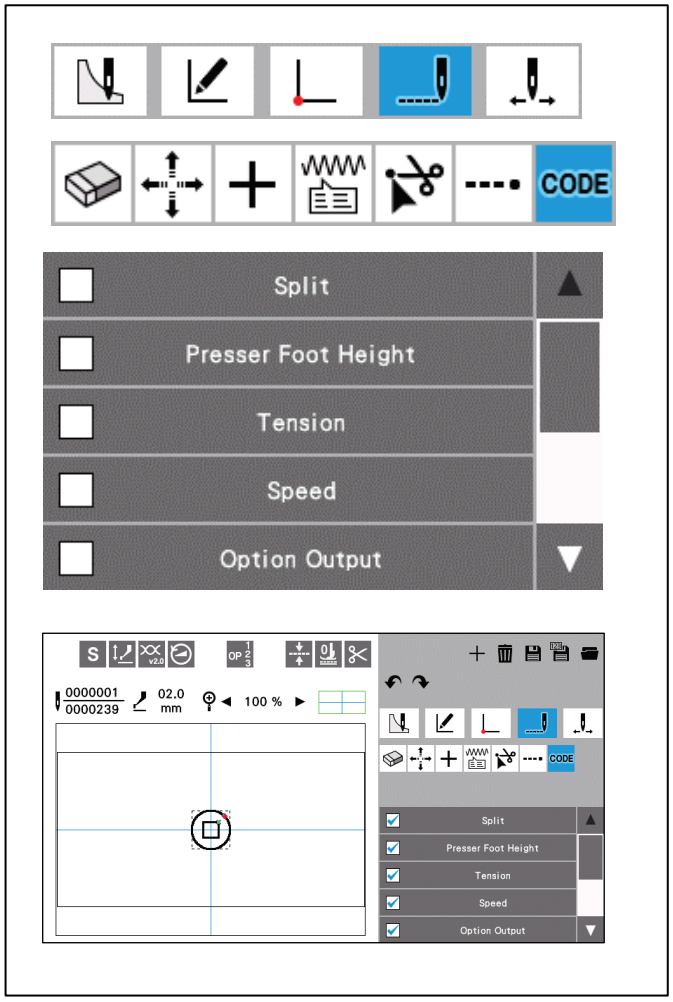
1. Touch .
2. Touch .
3. Touch ◄ ► to set the skipping units (1, 10, 50, 100, 500, 1000, 5000) and code display switching (Hide code, Show code).
4. Use ◄► to move the cursor + to the sewing point in the outline where you would like to separate the outline.
   * You can move the cursor continuously by holding down the key.
5. Press .

11-6-6. Setting bar tacking at a sewing point



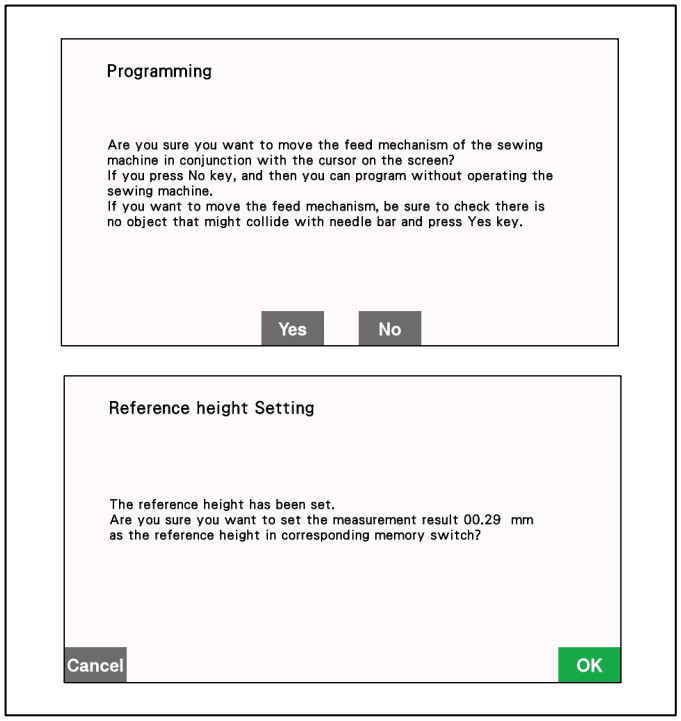
1. Touch .
2. Touch
3. Touch ◄ ► to set the skipping units (1, 10, 50, 100, 500, 1000, 5000) and code display switching (Hide code, Show code).
4. Use ◄► to move the cursor + to the sewing point where you would like to set backtacking.
   * You can move the cursor according to the skipping units.
   * You can move the cursor continuously by holding down the key.
5. Touch ◄ ► to set the number of backtack operations (1 to 9) and the number of backtack stitches (1 to 9).
   * You cannot set backtacking to cross from one outline to another, or set it at the sewing start point.
   If you would like to set backtacking at the sewing start point, refer to "11-4-11. Adding and deleting backtack stitches for an outline" on page 35.
6. Press .
   * Backtacking will be set in the return direction from the current sewing point.

11-6-7. CODE Adding and deleting codes at sewing points



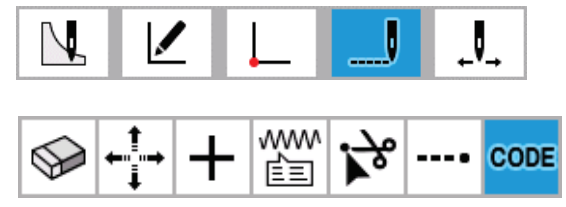
1. Touch .
2. Touch CODE
3. Use to move the cursor to the sewing point where you would like to add or delete a code.
   * You can move the cursor continuously by holding down the key.
4. Touch the place where you would like to add or delete a code. The code will be added or deleted.
   * Depending on the type of code, the selection of codes for adding and deleting may take place in the screen destination.
     To return to the previous screen, touch Back to Upper Layer
   * Refer to "11-6-8. List of code settings" for a list of the codes which can be set.
   * After touching the code, you can hold down the keys to move the cursor to the previous or next applicable point when a code is inserted. The cursor will move in a straight line from the current point to the applicable point.
5. If you touch the icons at the top of the screen, you can check the setting details for the codes.
   * Sewing points which have a code set will change to green.

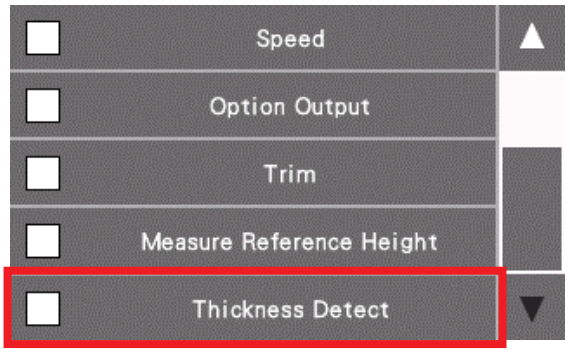
11-6-7-1. Set the reference height for material thickness detection

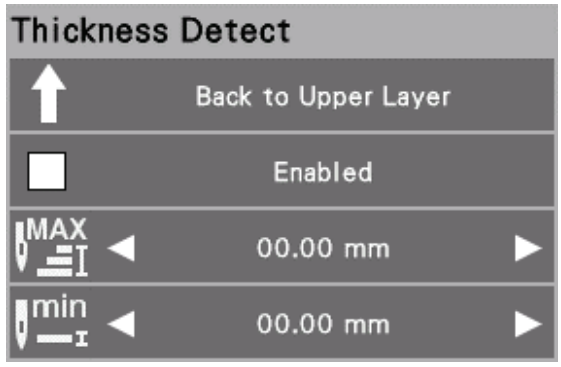


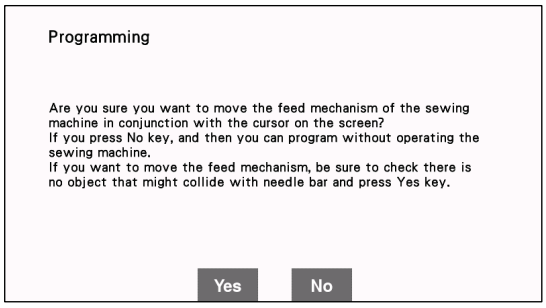
1. Use the JOG keys to move the cursor to the position where you would like to set the reference height.
2. Press the [Set reference height key].
   * When No is selected in the screen shown below, the [Set reference height key] will not be displayed.
3. The following message will be displayed.
4. To set measurement results for memory switch No. 41 (material thickness detection - reference height), touch Yes. Touch No to return to the programming screen without making the setting.

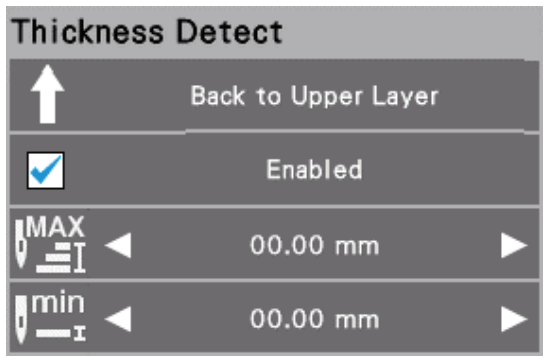
11-6-7-2. Add a material thickness detection code











1. Touch .
2. Touch CODE.
3. Use to move the cursor to the sewing point where you would like to add or delete a material thickness detection code.
   * You can move the cursor continuously by holding down the key.
4. Touch [Thickness Detection].
5. The parameter input screen for the material thickness detection code will be displayed.
6. Press the [Measure material thickness key].
   * When No is selected in the screen shown below, the [Measure material thickness key] will not be displayed.
7. The intermittent presser foot will drop at that point and the measurement result for the material thickness will be displayed.
   * While the material thickness detection code is being edited, the measurement results are automatically set in [Thickness upper limit] and [Thickness lower limit].
8. Set the [Thickness upper limit] and [Thickness lower limit] based on the displayed value, and then select the [Enable] check box.
   * The [Thickness upper limit] cannot be set to a value smaller than the [Thickness lower limit].

11-6-8. List of code settings

Name	Setting value	Icons [*2]	Notes
Split	Needle Up/Needle Down		
Intermittent presser foot height	-10.0 - 10.0mm (Setting units: 0.1mm)		
Tension	0 - 500		
Sewing speed	200 - 2800sti/min (Setting units: 100 sti/min) (The maximum sewing speed is limited to the above setting or less)		
Trigger	Option number 1 - 16		Up to 5 codes can be set for one needle. Used in combination with the extended I/O program.
Material thickness detection	Thickness upper limit: -17.00 - 17.00mm Thickness lower limit:-17.00 - 17.00mm (Setting units: 0.04mm)		* Values which are smaller than the "Thickness upper limit" and "Thickness lower limit" values cannot be set.
Measurement of the reference height	Enabled/Disabled		
Thread trimming	Standard thread trimming / long thread remaining trimming		* When the feed has been set, the end point of the stitch is set automatically.

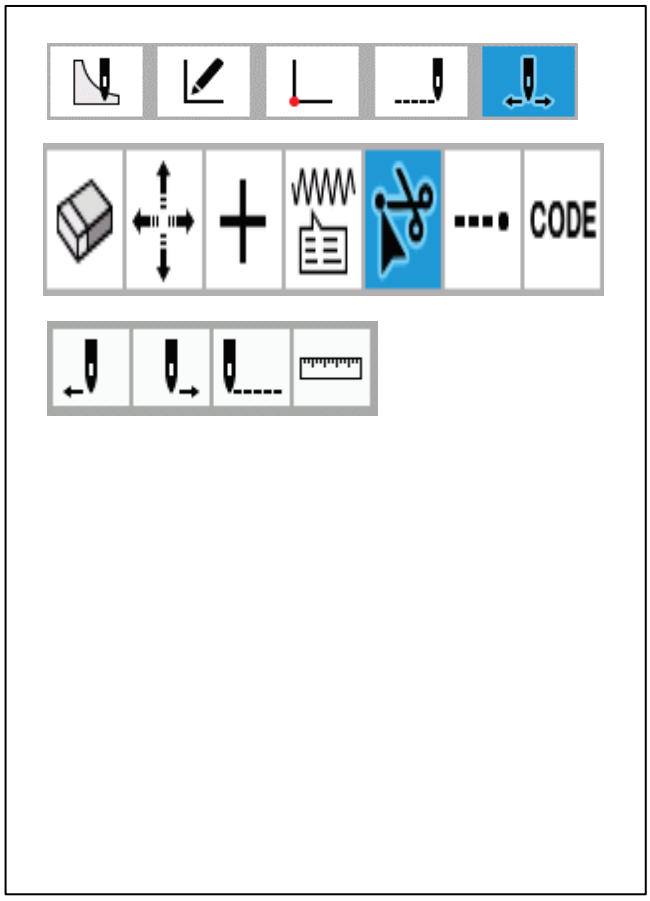
[*1] On when selected, off when not selected.

[*2] When code display is set to [Show code] during sewing editing or checking, the icons are displayed in the top-left of the screen.
The icons are always displayed during code setting.

11-7. Checking programs

This section describes the icons which are used when checking programs and how to use them.

11-7-1. Checking each stitch



1. Touch .

   Touch ◄ ► to set the skipping units (1, 10, 50, 100, 500, 1000, 5000) and code display switching (Hide code, Show code).

   * Refer to the "11-6-8. List of code settings" for a list of the codes which are displayed when code display switching is set to "Show code".

2. Touch or . (Or, operation is also possible using .)
   * To move backward

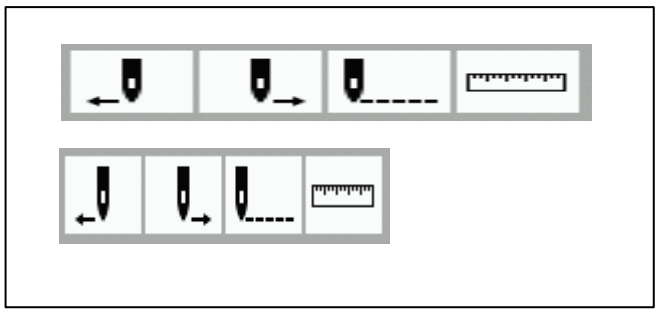
     Touch , or use .

     Hold down or . The cursor + will move back by the skipping units while the key is being pressed.
   * To move forward

     Touch , or use .

     Hold down or . The cursor + will move forward by the skipping units while the key is being pressed.

11-7-2. Moving to the start position

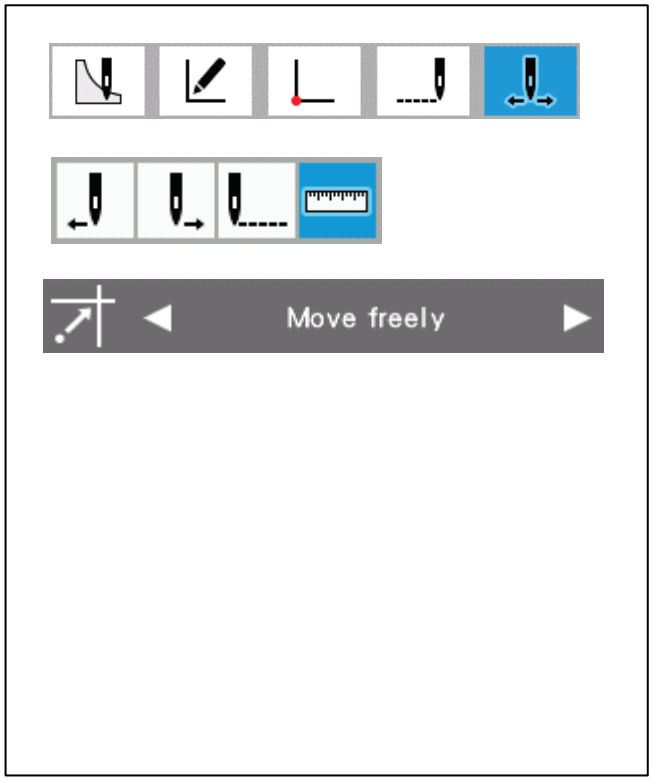


1. Touch .

2. Touch .

   The feed will return to the sewing start position.

11-7-3. Measuring distances



1. Touch .
2. Touch .
3. Touch ◄ ► to set the method for moving the cursor (Move freely, Snap to needle point).
4. Use the jog key to move the cursor + to the start point that you would like to measure.
5. Press .
6. Use the jog key to move the cursor + to the position that you would like to measure.
   * The distance between the measurement start position and the current cursor position is displayed as ΔX and ΔY.
   * The line linking the measurement start position and the current cursor position is displayed.

11-8. Programming example

This section describes how to create a program, using an actual program as an example.

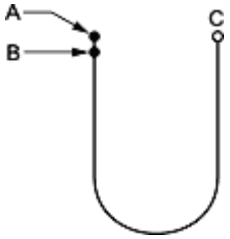
- Programming for each stitch : Page 161
- Pattern with lines : Page 162
- Pattern with curves : Page 163
- Double stitch and multiple stitch: Page 164
- Continuous sewing with the work clamp in position after thread trimming(feed): Page 165
- Basting : Page 166
- Symmetrical pattern : Page 167
- Programming while entering splits in different patterns: Page 168
- Zigzag stitch : Page 169

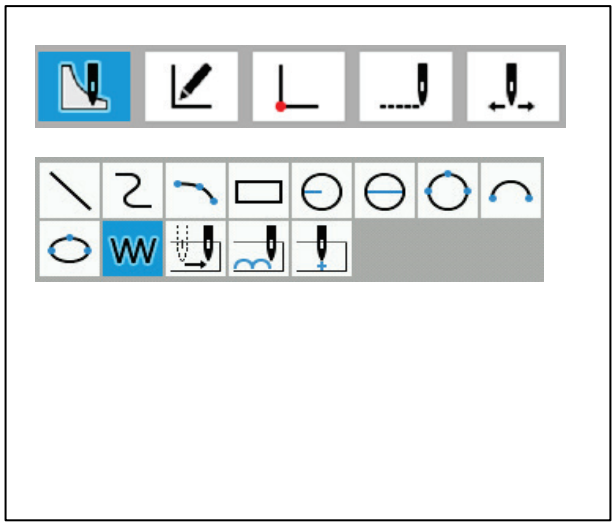
* For function and operating information about each icon, refer to "11-3. Creating programs".

* In the programming example, point A in the illustration is the first stitch.

11-8-1. W Programming for each stitch

The following describes how to perform programming for each stitch according to the pattern sheet.

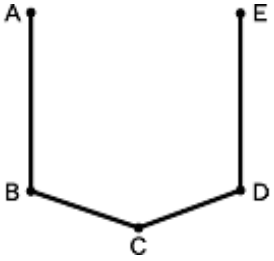


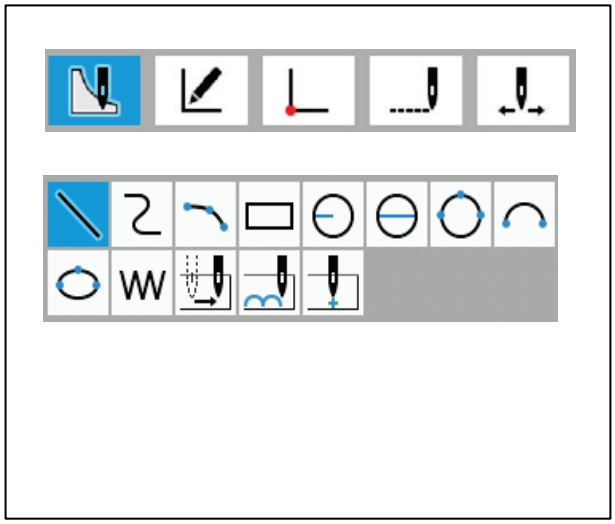


1. Carry out steps ■1 to ■3 in "11-2. Programming procedure".
2. Touch .
3. Touch W.
4. Use the JOG key to move the cursor + to B.
5. Press .
6. Repeat steps 4 and 5 to move the cursor to C.
7. Press .
8. Carry out steps ■5 and after in "11-2. Programming procedure".

11-8-2. ＼ Pattern with lines

This section describes how to program shapes which include straight lines, using an actual program as an example.

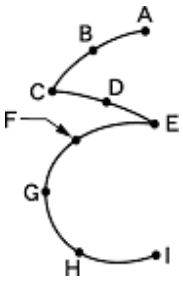




1. Carry out steps ■1 to ■3 in “11-2. Programming procedure”.
2. Touch .
3. Touch ＼.
4. Use the JOG key to move the cursor ＋ to B.
5. Press .
6. Carry out the same operation in steps 4 and 5 for C, D and E.
7. Press .
8. Carry out steps ■5 and after in “11-2. Programming procedure”.

11-8-3. Pattern with curves

This section describes how to program shapes which include curved lines, using an actual program as an example.



Be sure to press (↵) twice to make a split at corner points C or E. If a split is not made, the corner will be rounded.

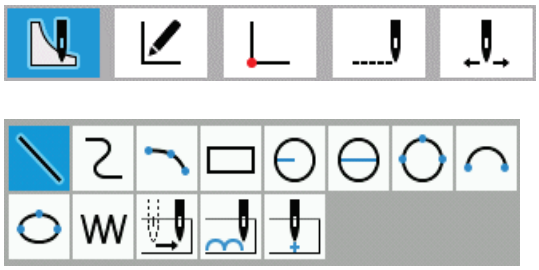
When a split is made



When a split is not made



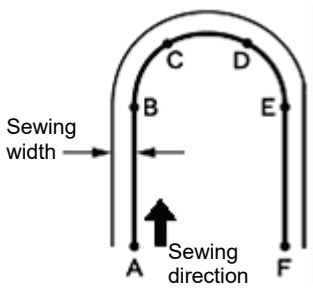
Making more intermediate points such as points B, D, F, G, and H creates smoother curves.



1. Carry out steps ■1 to ■3 in “11-2. Programming procedure”.
2. Touch .
3. Touch .
4. Use the JOG key to move the cursor + to B.
5. Press (↵).
6. Repeat steps 4 and 5 to move the cursor + to C.
7. Press (↵) twice to insert a split.
8. Move the cursor + to E.
9. Press (↵) twice to insert a split.
10. Move the cursor + to I.
11. Press (↵) twice.
12. Carry out steps ■5 and after in “11-2. Programming procedure”.

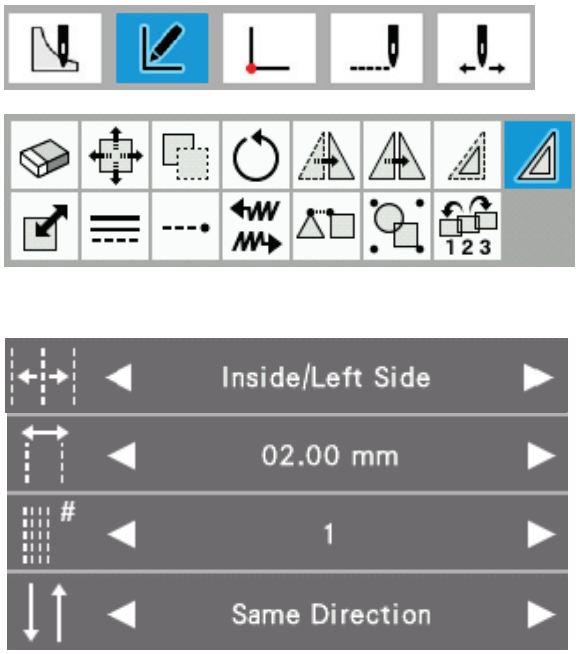
11-8-4. Double stitch and multiple stitch

If you would like to program multiple lines at a constant width away from another line, you can create the lines using offset copying.
This section describes how to program double stitches on the left side of another line in the sewing direction, using an actual program as an example.



Be sure to press (↵) twice to make a split at a point B or E where the line changes to the curve.

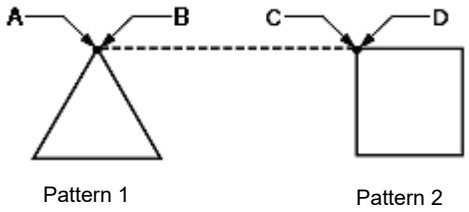
Placing more intermediate points such as points C and D creates smoother curves.



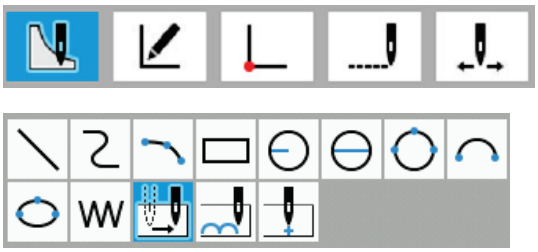
1. Carry out steps ■1 to ■3 in “11-2. Programming procedure”.
2. Use the functions for creating straight or curved lines to create an outline from A to F.
   * Refer to "11-8-2. Pattern with lines" or "11-8-3. Pattern with curves".
3. Touch .
4. Touch .
5. Touch ◄ ► to set whether the double stitch will be created to the left or the right of the sewing direction.
   To create the line to the left of the sewing direction:
   To create the line to the right of the sewing direction:
6. Touch ◄ ► to set the sewing width and the number of copies.
   Example: To sew a double stitch at a sewing width of 3.0 mm, set the sewing width to [03.00mm] and the number of copies to [1].
   * To sew multiple stitches, set the number of copies to the number of additional lines to be sewn.
7. Touch ◄ ► to set the offset method (Same Direction, Return, Return + Stitch Connection).
   Example: To copy in the same direction as the sewing direction, set the offset creation method to [Same Direction].
8. Use the JOG key to select the whole of the outline which was created in step 2.
   * The outline which is selected will be displayed in red.
9. Press (↵).
10. The selected outline will be copied in the specified sewing direction.
11. Carry out steps ■5 and after in “11-2. Programming procedure”.

11-8-5. Continuous sewing with the work clamp in position after thread trimming (feed)

Set "feed" to continue sewing with the work clamp in position after thread trimming.
The following describes how to program pattern 2 with a feed after pattern 1.



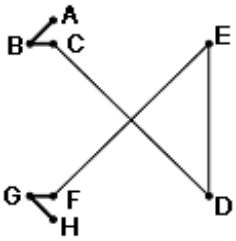
Pattern 1 Pattern 2

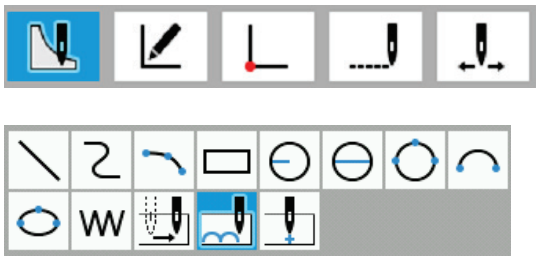


1. Carry out steps ■1 to ■3 in “11-2. Programming procedure”.
2. Create the outline for pattern 1.
   * Refer to "11-8-2. Pattern with lines".
3. Touch .
4. Touch .
5. Use the JOG key to move the cursor + to C.
6. Press twice.
7. Create the outline for pattern 2.
   * Refer to "11-8-2. Pattern with lines".
8. Carry out steps ■5 and after in “11-2. Programming procedure”.

11-8-6. Basting

The following describes how to program basting from point C to point F.

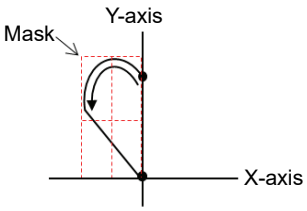


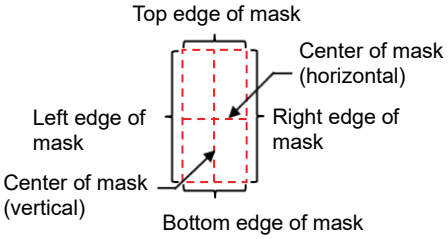


1. Carry out steps ■1 to ■3 in “11-2. Programming procedure”.
2. Use the function for creating straight lines to create an outline from A to C.
   * Refer to "11-8-2. Pattern with lines".
3. Touch .
4. Touch .
5. Use the JOG key to move the cursor + to D.
6. Press .
7. Repeat steps 5 and 6 to move the cursor + to F.
8. Press twice.
9. Repeat step 2 to create the outline from F to H.
   * Refer to "11-8-2. Pattern with lines".
10. Carry out steps ■5 and after in “11-2. Programming procedure”.

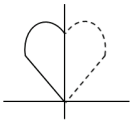
11-8-7. Symmetrical pattern

When programming a symmetrical pattern, program a target pattern and then select a symmetrical pattern type.
This section describes how to program shapes which are symmetrical along the Y axis, using an actual program as an example.

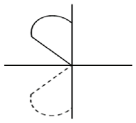




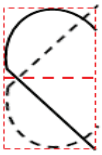
Symmetrical pattern type



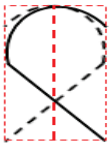
Symmetrical to Y-axis
Select [Symmetrical along Y axis].



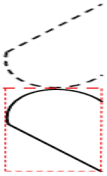
Symmetrical to X-axis
Select [Symmetrical along X axis].



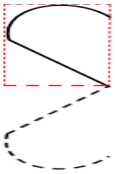
Center of mask (horizontal)
Select [Center of Mask (Horizontal)].



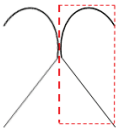
Center of mask (vertical)
Select [Center of Mask (Vertical)].



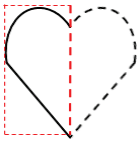
Top edge of mask
Select [Mask top edge].



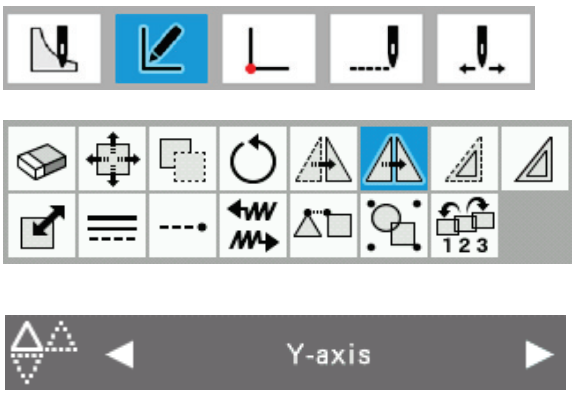
Bottom edge of mask
Select [Mask bottom edge].



Left edge of mask
Select [Mask Left Edge].



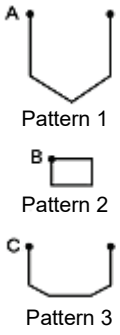
Right edge of mask
Select [Mask Right Edge].

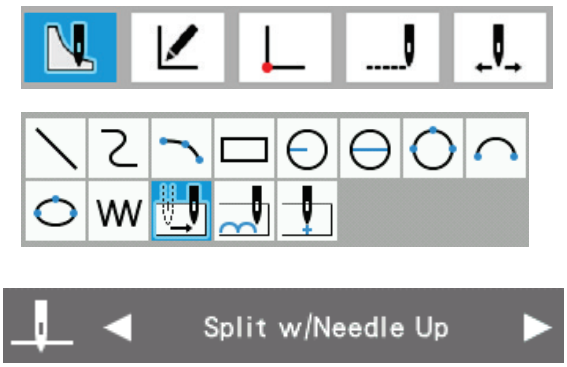


1. Carry out steps ■1 to ■3 in “11-2. Programming procedure”.
2. Use the functions for creating feed data or curved lines to create an outline from A to B.
   Refer to "11-8-1. Programming for each stitch" or "11-8-3. Pattern with curves".
3. Touch .
4. Touch .
5. Touch ◄ ► to select the symmetry mode.
   In the example, "Symmetrical along Y axis" is selected.
6. Use the JOG key to select the whole of the outline which was created in step 2.
   The outline which is selected will be displayed in red.
7. Press .
   The selected outline will be copied symmetrically along the Y axis.
8. Carry out steps ■5 and after in “11-2. Programming procedure”.

11-8-8. Programming while entering splits in different patterns

Multiple patterns are programmed splitting each pattern in sequence.
The following describes how to program 3 patterns in sequence.





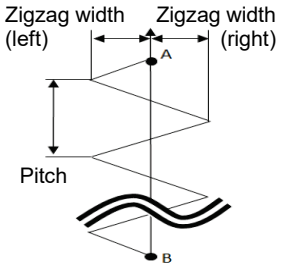
1. Carry out steps ■1 to ■3 in “11-2. Programming procedure”.
2. Create the outline for pattern 1.
   * Refer to "11-8-2. Pattern with lines".
3. Touch .
4. Touch .
5. Touch ◄ ► to set a split.
6. Use the JOG key to move the cursor + to B.
7. Press  twice.
8. Create the outline for pattern 2.
   * Refer to "11-8-2. Pattern with lines".
9. Carry out steps 3 to 5 once more.
10. Use the JOG key to move the cursor + to C.
11. Press  twice.
12. Create the outline for pattern 3.
    * Refer to "11-8-2. Pattern with lines".
13. Carry out steps ■5 and after in “11-2. Programming procedure”.

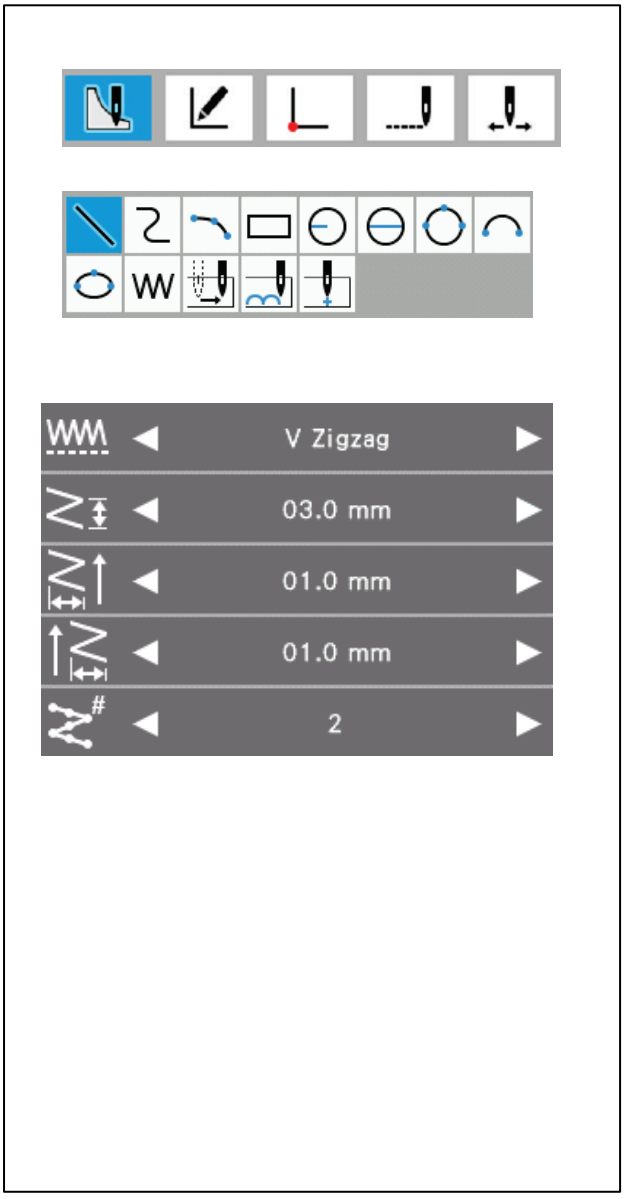
11-8-9. Zigzag stitch

This section describes how to program a zigzag stitch which moves to the left and right while centered on the sewing start point (A), using an actual program as an example.

Two types of zigzag sewing can be selected: V-type zigzag and N-type zigzag. The left and right zigzag widths can also be set separately for each type. In addition, zigzag stitches with curved lines can also be programmed.

(A description of the programming method using V-type zigzag sewing is given as an example.)





1. Carry out steps ■1 to ■3 in “11-2. Programming procedure”.
2. Touch .
3. Touch .
   * To program curved-line zigzag stitches, touch .
4. Touch ◄ ► to change to "V-type zigzag".
5. Set the running pitch and zigzag width for V-type zigzag stitches.
   Example) To set the running pitch to 3.0 mm: Touch ◄ ► to set the running pitch to "03.0mm".
6. Set the zigzag width (right) for V-type zigzag stitches.
   Example) To set the zigzag width (right) to 1.0 mm: Touch ◄ ► to set the zigzag width (right) to "01.0mm".
7. Set the zigzag width (left) for V-type zigzag stitches.
   Example) To set the zigzag width (left) to 1.0 mm: Touch ◄ ► to set the zigzag width (left) to "01.0mm".
8. Set the number of zigzags for V-type zigzag stitches.
   Example) To set the number of zigzag stitches to 2: Touch ◄ ► to set the number of zigzags to "2".
9. Use the JOG key to move the cursor + to B.
10. Press twice.
    * To program curved-line zigzag stitches, repeat this procedure.
11. Carry out steps ■5 and after in “11-2. Programming procedure”.

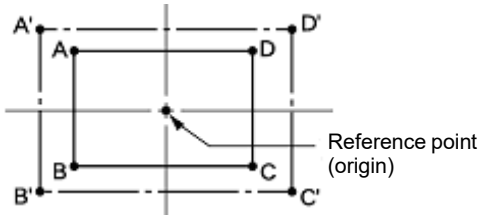
11-9. Example of modified program

This section describes the program modification methods using specific examples.

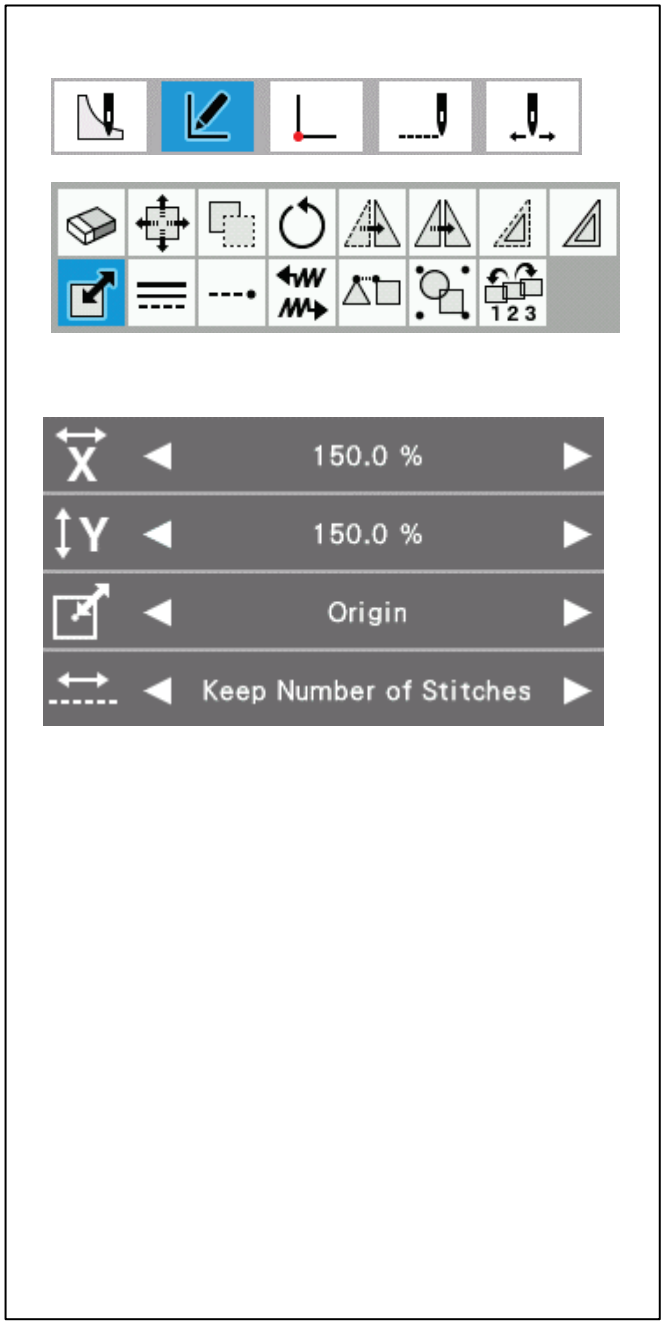
- Resizing a pattern: Page 171
- Modifying a part of pattern: Page 172
- Deleting the first stitch to change the sewing start point to the second stitch: Page 173
- Moving the sewing start point: Page 174
- Adding a new sewing start point before the first stitch: Page 175
- Adding an escape point before the sewing start point: Page 176
- Modifying a pattern by moving a component point: Page 177
- Modifying a pattern by adding a component point: Page 178
- Modifying a pattern by deleting a component point: Page 179
- Moving the pattern in parallel (when the first stitch is the sewing start point): Page 180
- Deleting a part of data during programming: Page 181
- Moving a part of a continuous program in parallel: Page 182
- Moving a part of a continuous program in parallel partially: Page 183
- Inserting a straight line into a pattern: Page 184 - 186

11-9-1. Resizing a pattern

The following describes how to resize a programmed pattern.



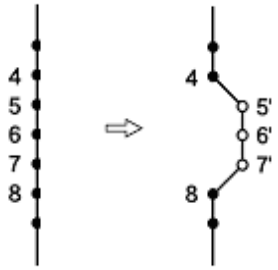
The reference point for resizing patterns is the center point for enlarging or reducing the pattern size.

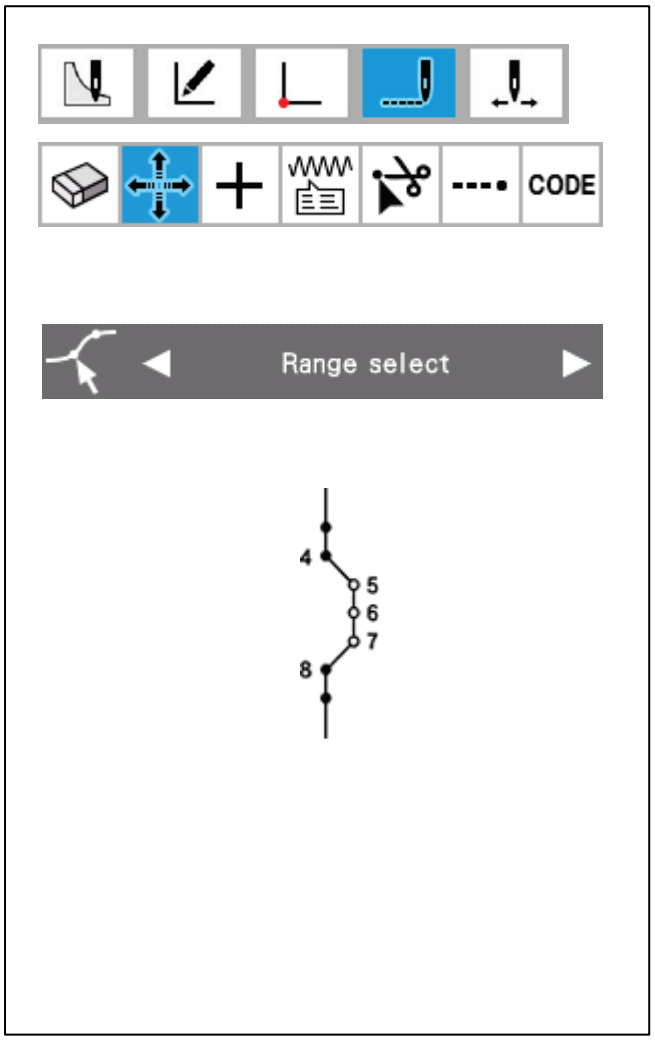


1. Carry out step ■8 in “11-2. Programming procedure”.
2. Touch .
3. Touch .
4. Use to select the pattern which you would like to resize.
5. When you press the key once, the pattern will change to red lines and it will be selected.
6. Touch ◄ ► and enter the resizing ratios for the X direction and Y direction.
   Example) To enlarge by 150%:
   Change the resize setting to [150.0%].
7. Touch ◄ ► to set the resize center.
   Example) To resize centering on the origin:
   Set the resize center to [Origin].
8. Touch ◄ ► to set the hold element.
   Example) To resize while maintaining the same number of stitches as in the original data:
   Set the hold element to [Keep Number of Stitches].
9. Press .
   The pattern will be resized.
   * If the resize center was set to [Specified point] in step 7, you can use the JOG key to move the cursor + so that the outline can be resized with the current cursor position as the resize center.
   In this case, after moving the cursor +, press once more.
10. Carry out steps ■6 and ■7 in “11-2. Programming procedure”.

11-9-2. Modifying a part of pattern

The part of the programmed pattern is changed. The following describes how to modify 5, 6 and 7 to 5', 6' and 7'.

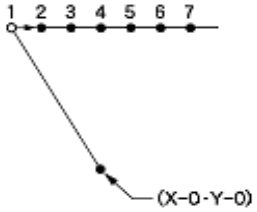


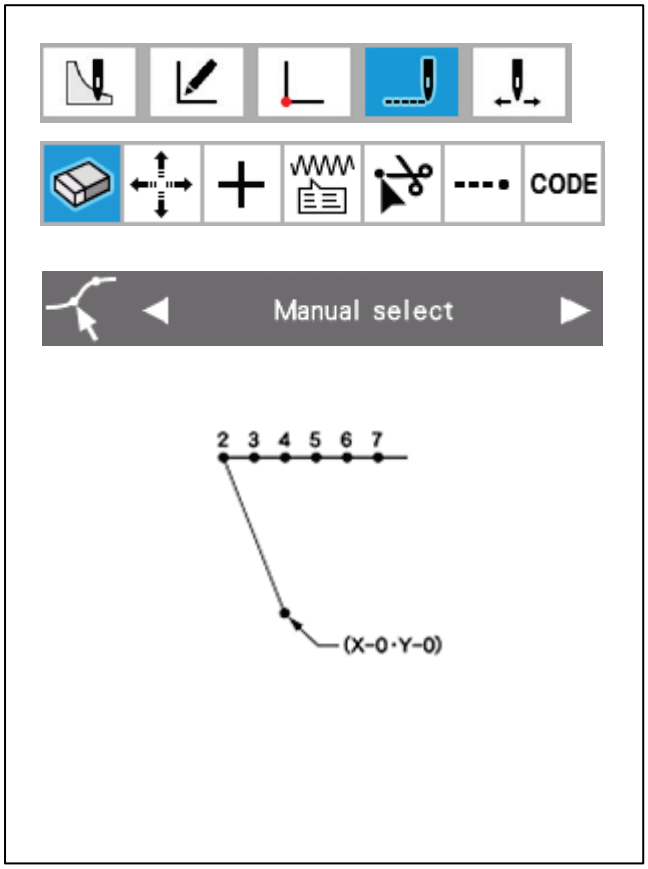


1. Carry out step ■8 in “11-2. Programming procedure”.
2. Touch .
3. Touch .
4. Touch ◄ ► to select [Range select].
5. Use to move the cursor + to 5.
   * You can move the cursor according to the skipping units.
   * You can move the cursor continuously by holding down the key.
6. Press .
7. Use to move the cursor + to 7. Sewing points 5 to 7 will all now be selected.
8. Press .
9. Use the JOG key to move the cursor + to 5', 6' and 7'.
10. Press .
    The sewing points will move to the 5', 6' and 7' positions.
11. Carry out steps ■6 and ■7 in “11-2. Programming procedure”.

11-9-3. Deleting the first stitch to change the sewing start point to the second stitch

The following describes how to delete the sewing start point of a programmed pattern to make the second stitch as the sewing start point.

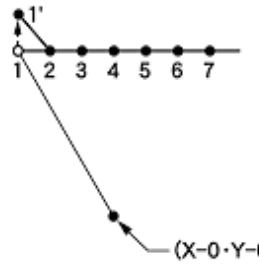


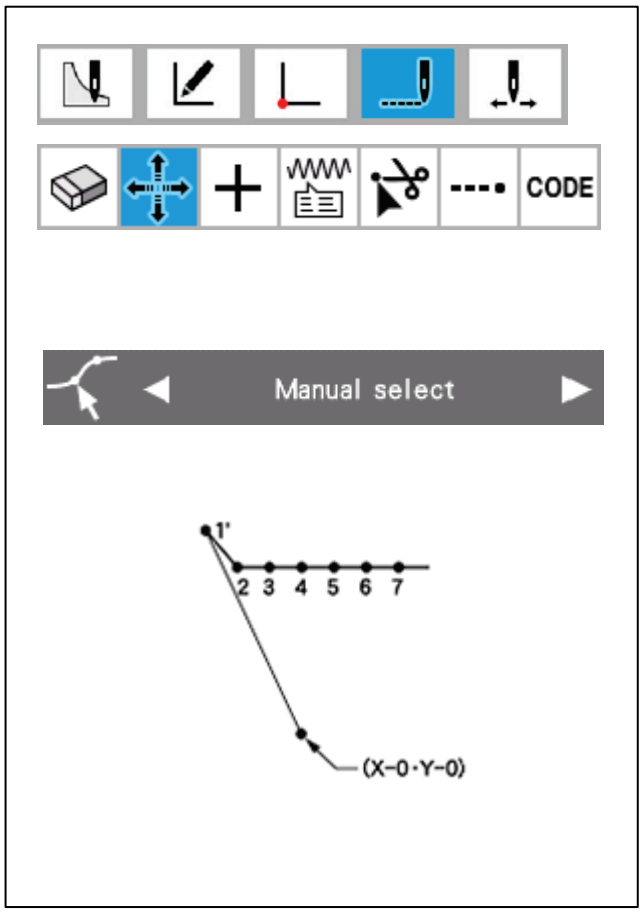


1. Carry out step ■8 in “11-2. Programming procedure”.
2. Touch .
3. Touch .
4. Touch ◄ ► to select [Manual select].
5. Use to move the cursor + to 1.
   * You can move the cursor according to the skipping units.
   * You can move the cursor continuously by holding down the key.
6. When you press the key once, the sewing point will change to red and it will be selected.
7. Press .
   The 1 at the white circle for the 1st stitch will be deleted, and the needle position for the sewing start point will move to the 2 for the 2nd stitch.
8. Carry out steps ■6 and ■7 in “11-2. Programming procedure”.

11-9-4. Moving the sewing start point

The following describes how to move the sewing start point from 1 to 1'.

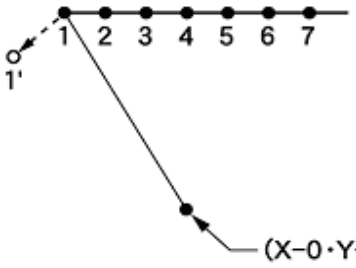


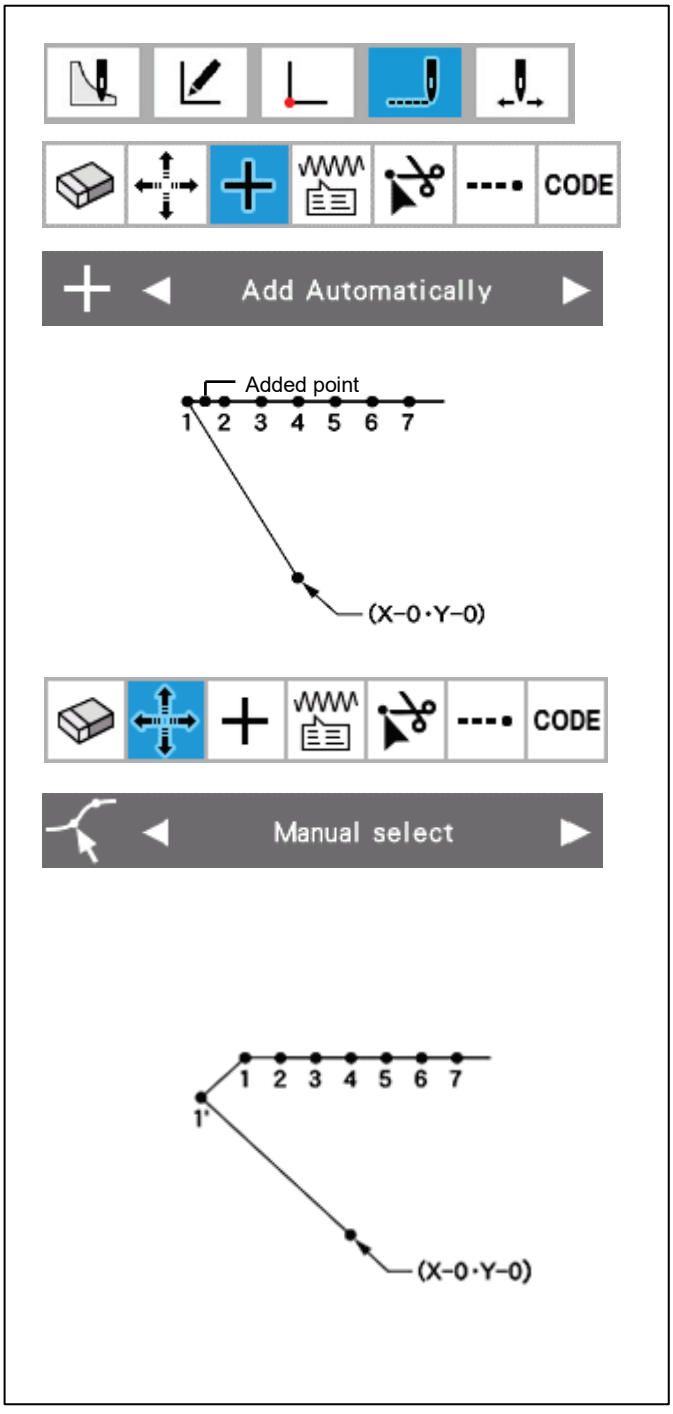


1. Carry out step ■8 in “11-2. Programming procedure”.
2. Touch .
3. Touch .
4. Touch ◄ ► to select [Manual select].
5. Use to move the cursor + to 1.
   * You can move the cursor according to the skipping units.
   * You can move the cursor continuously by holding down the key.
6. When you press the key once, the sewing point will change to red and it will be selected.
7. Press .
8. Use the JOG key to move the cursor + to 1'.
9. Press .
   The 1 at the white circle for the 1st stitch will move, and the needle position for the sewing start point will move to 1'.
10. Carry out steps ■6 and ■7 in “11-2. Programming procedure”.

11-9-5. Adding a new sewing start point before the first stitch

A point is added before the current sewing start point to make it as the sewing start point.
The following describes how to change the sewing start point from 1 to 1'.

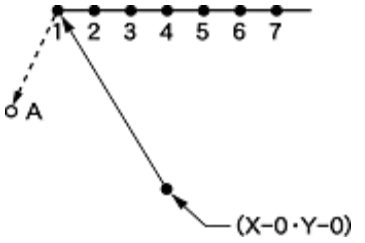




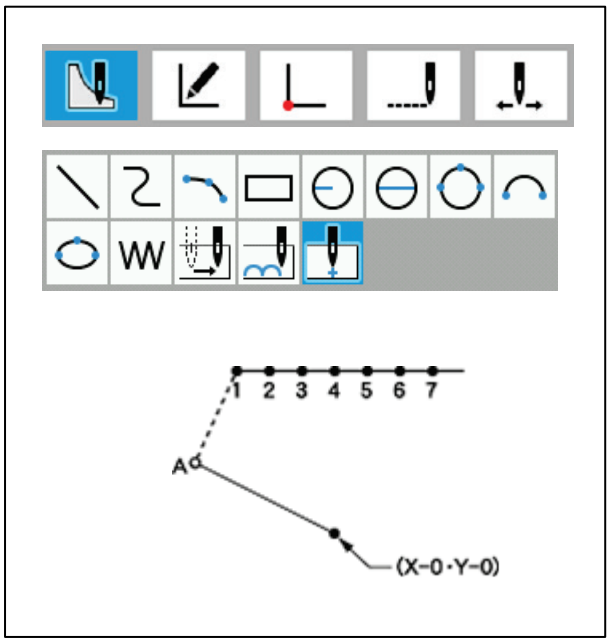
1. Carry out step ■8 in “11-2. Programming procedure”.
2. Touch .
3. Touch .
4. Touch ◄ ► to select [Add Automatically].
5. Use ◁▷ to move the cursor + to 1.
6. Press .
   * You can move the cursor according to the skipping units.
   * You can move the cursor continuously by holding down the key.
     A sewing point will be added to the outline between sewing points 1 and 2.
7. Touch .
8. Touch ◄ ► to select [Manual select].
9. Use ◁▷ to move the cursor + to 1.
10. When you press the △ key once, the sewing point will change to red and it will be selected.
11. Press .
12. Use the JOG key to move the cursor + to 1'.
13. Press .
    The 1 at the 1st stitch will move, and the needle position for the sewing start point will move to 1'.
14. Repeat steps 9 to 13 to move the sewing point which was added in step 6 to position 1.
15. Carry out steps ■6 and ■7 in “11-2. Programming procedure”.

11-9-6. Adding an escape point before the sewing start point

The following describes how to set the escape point A before the sewing start point.



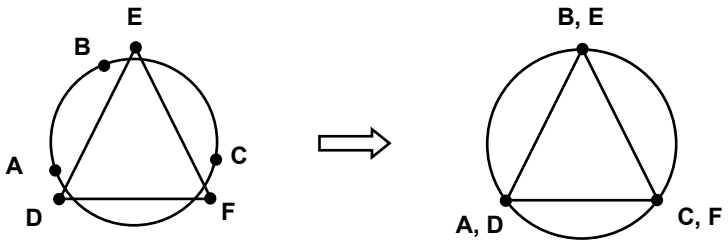
The escape point is a provisional point provided to preventing the work clamp from interfering with the needle or the presser foot when the work clamp is lifted at the start point.

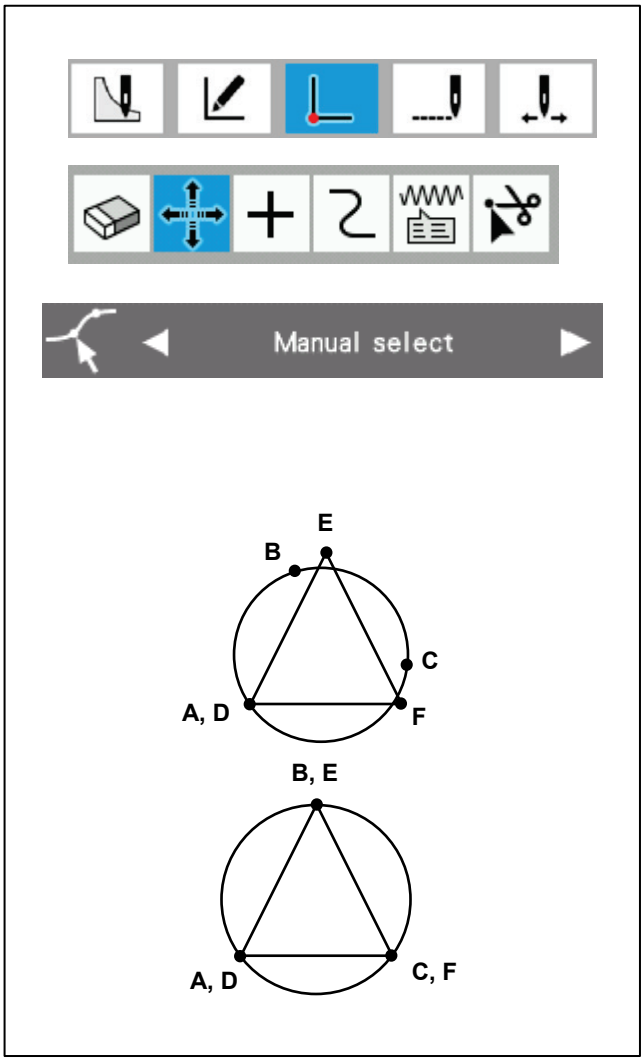


1. Carry out step ■8 in “11-2. Programming procedure”.
2. Touch .
3. Touch .
4. Use the JOG key to move the cursor + to A.
5. Press .
   The sewing start point at position 1 will be moved to position A. By shifting the position of the sewing start point, the point can be used as an escape point.
6. Carry out steps ■6 and ■7 in “11-2. Programming procedure”.

11-9-7. Modifying a pattern by moving a component point

This section describes how to change the outline component points in a pattern which has already been programmed.
This section describes how to modify a circle (A, B and C) so that it passes through the vertices of a triangle (D, E and F), using an actual program as an example.

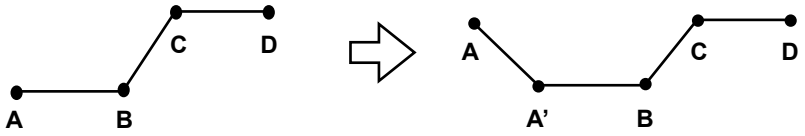


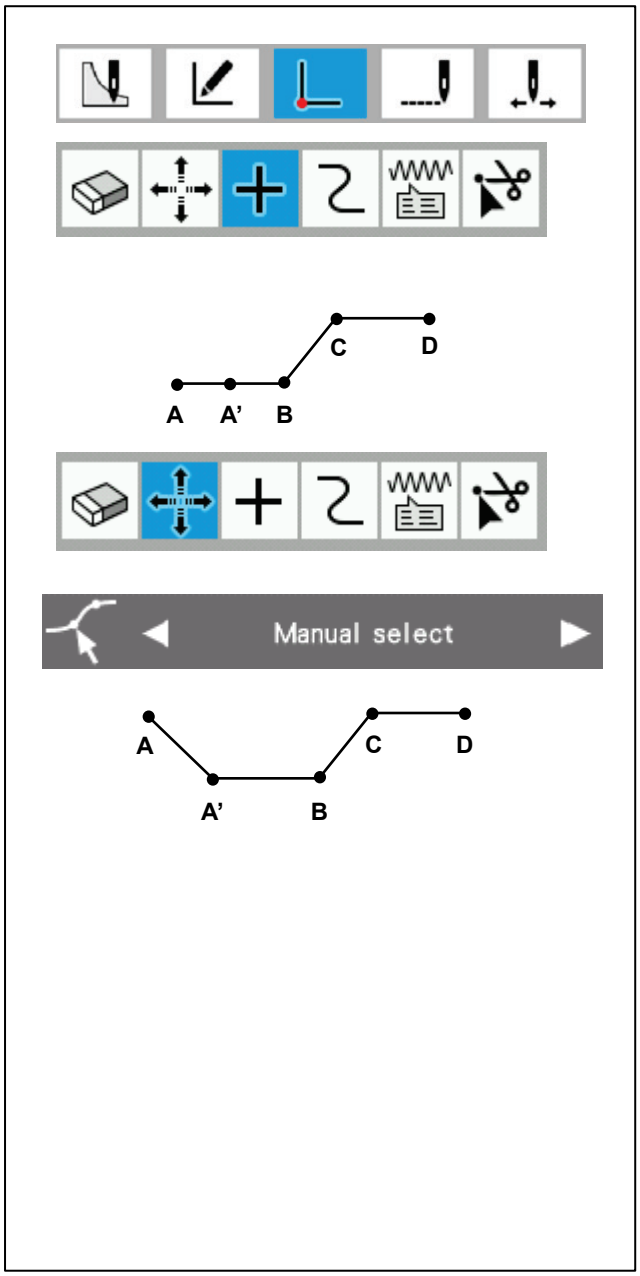


1. Carry out step ■8 in “11-2. Programming procedure”.
2. Touch .
3. Touch .
4. Touch ◄ ► to select [Manual select].
5. Use to move the cursor + to A.
   * You can move the cursor continuously by holding down the key.
6. When you press the △ key once, the component point will change to red and it will be selected.
7. Press .
8. Use the JOG key to move the cursor + to D.
9. Press .
   Point A will move to position D.
10. Repeat steps 8 and 9 to move B to E and C to F.
11. Carry out steps ■6 and ■7 in “11-2. Programming procedure”.

11-9-8. Modifying a pattern by adding a component point

This section describes how to add outline component points to a pattern which has already been programmed.
This section describes how to modify a pattern by adding component point A' and adjusting the positions of A and A', using an actual program as an example.





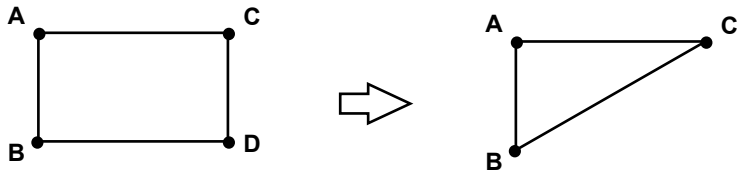
1. Carry out step ■8 in “11-2. Programming procedure”.
2. Touch .
3. Touch .
4. Use to move the cursor + to A.
5. Press .
   * You can move the cursor continuously by holding down the key.

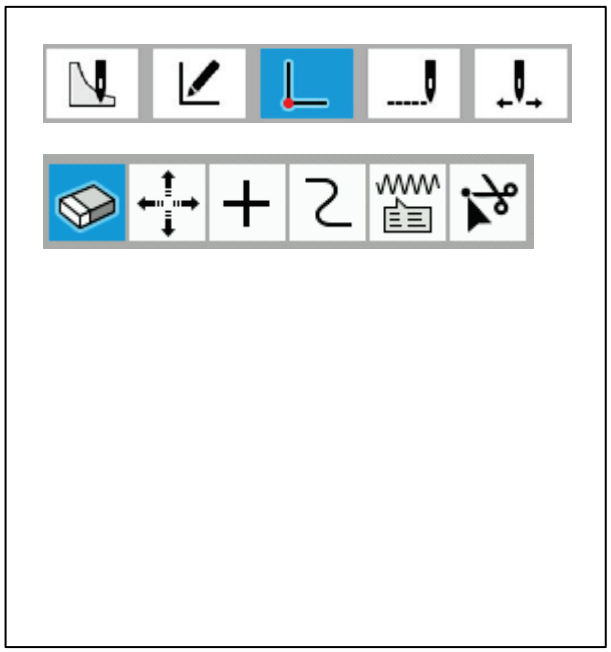
A component point A' will be added to the outline between component points A and B.

6. Touch .
7. Touch ◄ ► to select [Manual select].
8. Use to move the cursor + to A.
   * You can move the cursor continuously by holding down the key.
9. When you press the △ key once, the component point will change to red and it will be selected.
10. Press .
11. Use the JOG key to move the cursor + to A.
12. Press .
13. Repeat steps 8 to 11 to move component point A' which was added in step 5.
14. Carry out steps ■6 and ■7 in “11-2. Programming procedure”.

11-9-9. Modifying a pattern by deleting a component point

This section describes how to delete outline component points from a pattern which has already been programmed.
This section describes how to modify a pattern by deleting component point D, using the following program as an example.

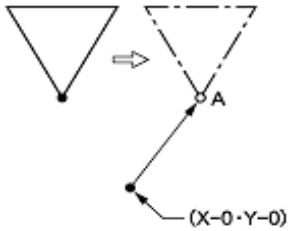


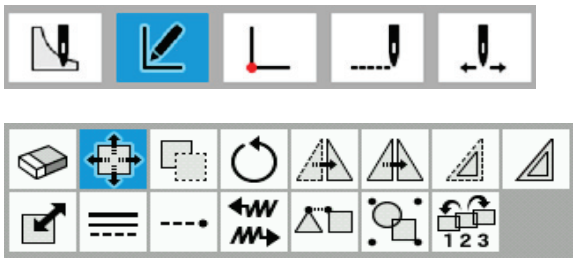


1. Carry out step ■8 in “11-2. Programming procedure”.
2. Touch  .
3. Touch  .
4. Use  to move the cursor + to D.
   * You can move the cursor continuously by holding down the key.
5. When you press the  key once, the component point will change to red and it will be selected.
6. Press  .
   The selected component point will be deleted. The outline will be reconstructed so that the component points before and after the selected component point are joined together.
7. Carry out steps ■6 and ■7 in “11-2. Programming procedure”.

11-9-10. Moving the pattern in parallel

The following describes how to move the pattern in parallel when the first stitch is the sewing start point.

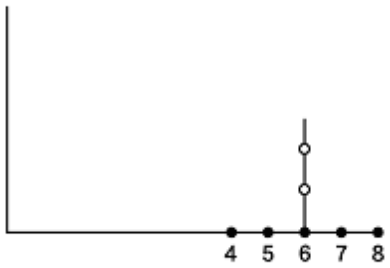


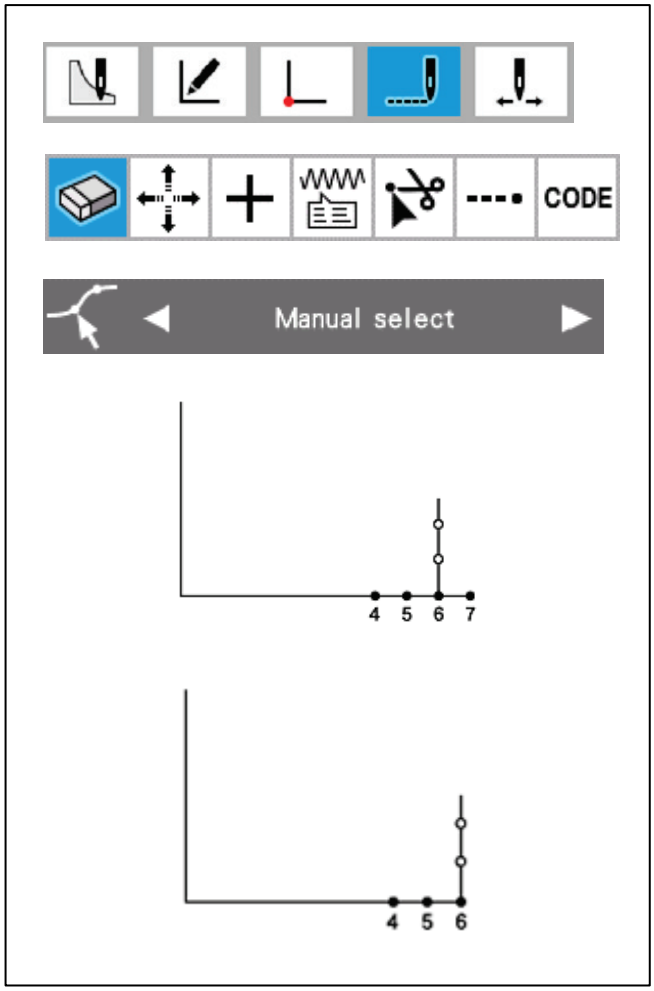


1. Carry out step ■8 in “11-2. Programming procedure”.
2. Touch .
3. Touch .
4. Use  to position the cursor + at the outline which you would like to edit.
5. When you press the  key once, the outline will change to red lines and it will be selected.
6. Press .
7. Use the JOG key to move the cursor + along the X-axis to position A.
8. Press .
   The 1st stitch will move to position A.
9. Carry out steps ■6 and ■7 in “11-2. Programming procedure”.

11-9-11. Deleting a part of data during programming

The following describes how to delete 2 stitches (7 and 8) at point 8 and creating a new program.

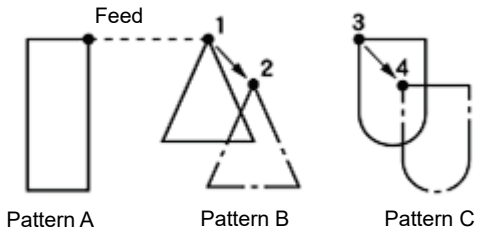


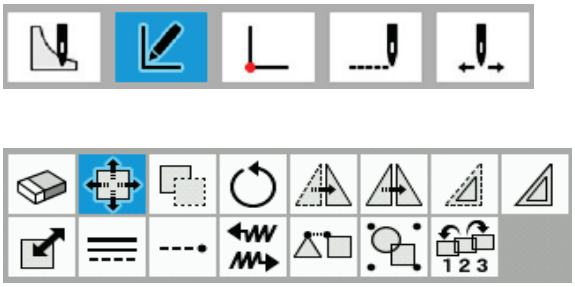


1. Touch ----- while programming.
2. Touch .
3. Touch ◄ ► to select [Manual select].
4. Use ◁ ▷ to move the cursor + to 8.
5. When you press the △ key once, the sewing point will change to red and it will be selected.
6. Press ↵.
   The sewing point at 8 will be deleted.
7. Repeat steps 4 to 6 to delete the sewing point at 7 also.
   The sewing point at 7 will be deleted and the cursor will move to 6.
8. Continue programming.

11-9-12. Moving a part of a continuous program in parallel

This section describes how to move part of a continuous program (patterns B and C) in parallel at the same time, using an actual program as an example.

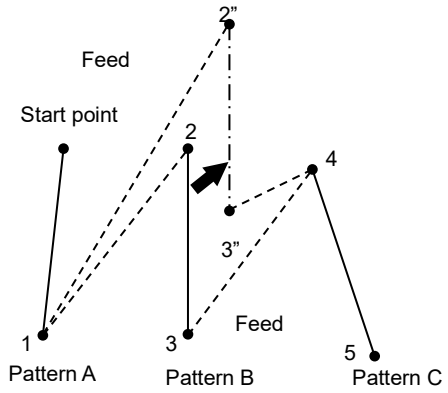


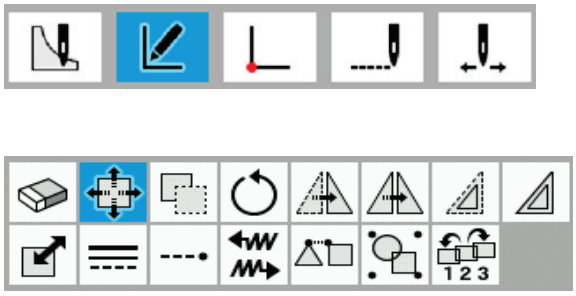


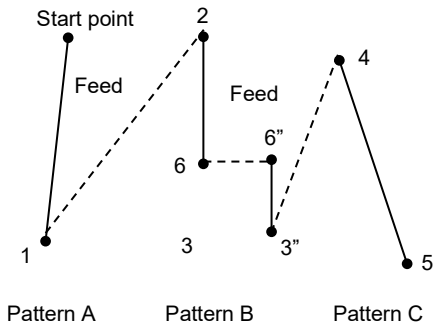
1. Carry out step ■8 in “11-2. Programming procedure”.
2. Touch  .
3. Touch  .
4. Use  to position the cursor + at the outline of pattern B.
5. When you press the  key once, the outline will change to red lines and it will be selected.
6. Repeat steps 4 and 5 to select pattern C as well. Patterns B and C will now be selected.
7. Press  .
8. Use the JOG key to move the cursor + to 2.
9. Press  .
   Pattern B will move to 2, and the pattern C will move to 4 in the same way.
10. Carry out steps ■6 and ■7 in “11-2. Programming procedure”.

11-9-13. Moving a part of a continuous program in parallel partially

Move a part of a continuous program in parallel to the position before the next feed is started. The following describes how to move only pattern B in parallel.







1. Carry out step ■8 in “11-2. Programming procedure”.
2. Touch  .
3. Touch  .
4. Use  to position the cursor + at the outline of pattern B.
5. When you press the  key once, the outline will change to red lines and it will be selected.
6. Press  .
7. Use the JOG key to move the cursor + to 2".
8. Press  .
   Pattern B will move to 2".
9. Carry out steps ■6 and ■7 in “11-2. Programming procedure”.
   To set parallel movement in the middle of stitch data, touch  , and then touch  , select the sewing points to move in parallel, and then move the sewing points.

   The sewing points which are moved are connected by feeding.

   (In the example on the left, 6-3 which are in between 2 and 4 are moved to 6"-3".)

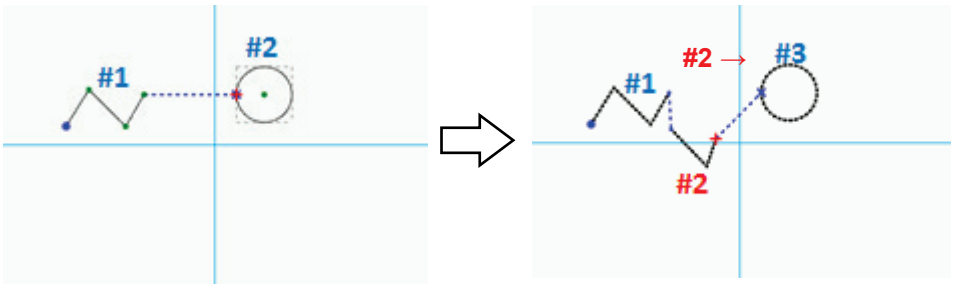
11-9-14. Inserting a straight line into a pattern

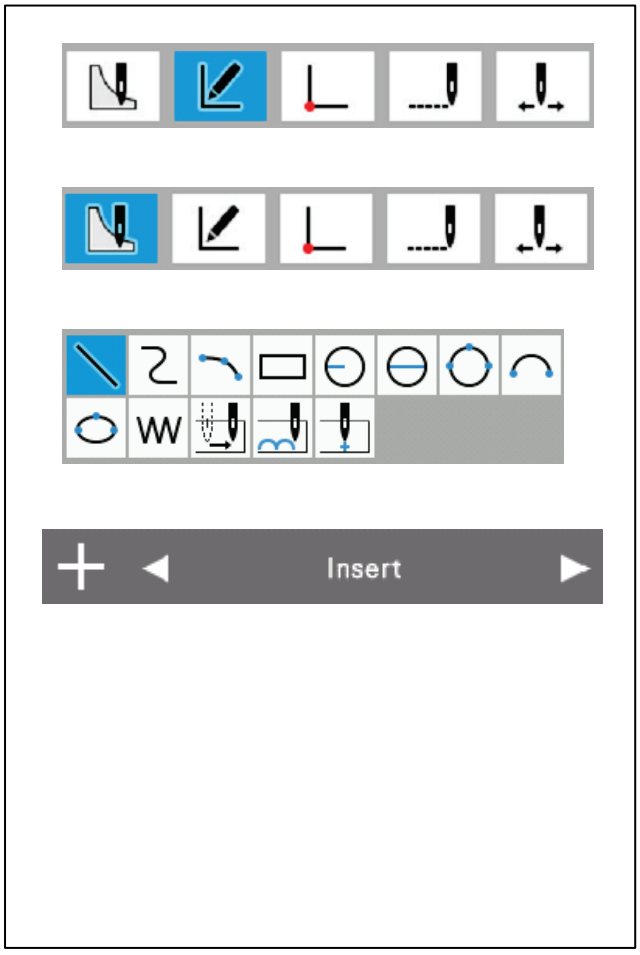
This describes how to add a new pattern to an existing program or pattern which has already been created.

* The procedure introduced here is the procedure when "Settings" -> "Programmer" -> "Consecutive Data Input" is set to "OFF".

1) When inserting a straight line before the selected pattern

[Before inserting straight line] [After inserting straight line]





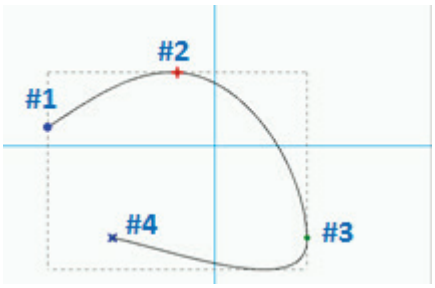
1. Touch  .
2. Use ◁ ▷ to move the cursor + to outline #2.
3. Touch  .
4. Touch  .
5. Touch ◄ ► to select [Insert].
6. Use the JOG key to move the cursor to the position where you would like to insert the pattern.
7. Press  to provisionally set the start point.
8. Use the JOG key to move the cursor + to the position for the end point of the new pattern to be created.
9. Press  to provisionally set the sewing points.

   * Repeat steps 8 and 9 until the shape of the pattern has been created.
10. Press  to confirm the pattern.

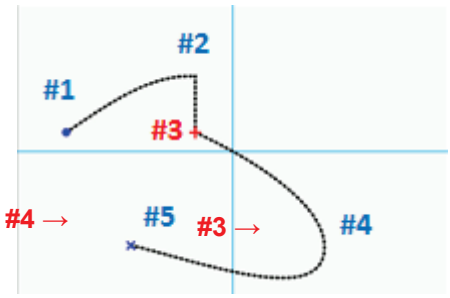
2) When inserting a straight line after a selected component point

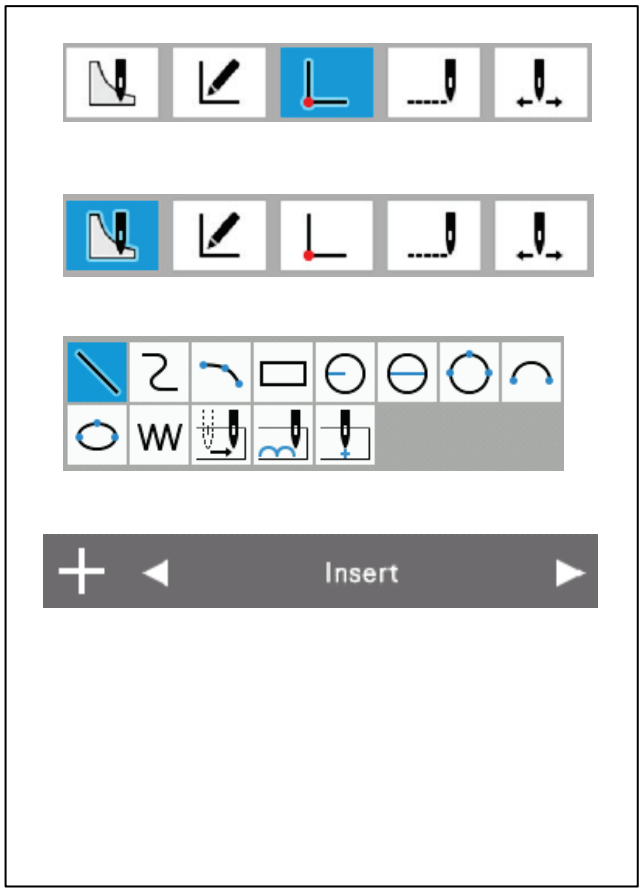
* The above operation is only enabled for straight lines, curves and arcs.

[Before inserting straight line]



[After inserting straight line]

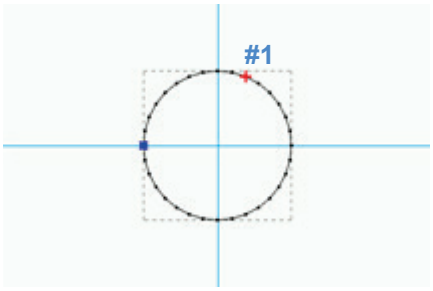




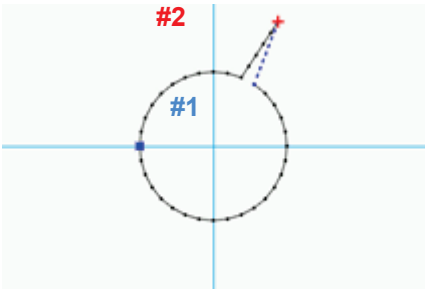
1. Touch  .
2. Use ◀ ▶ to move the cursor + to #2.
   * You can move the cursor continuously by holding down the key.
3. Touch  .
4. Touch  .
5. Touch ◀ ▶ to select [Insert].
6. Use the JOG key to move the cursor to the position where you would like to insert the pattern.
7. Press ↵ to provisionally set the start point.
8. Use the JOG key to move the cursor + to the end point.
9. Press ↵ to confirm the pattern.

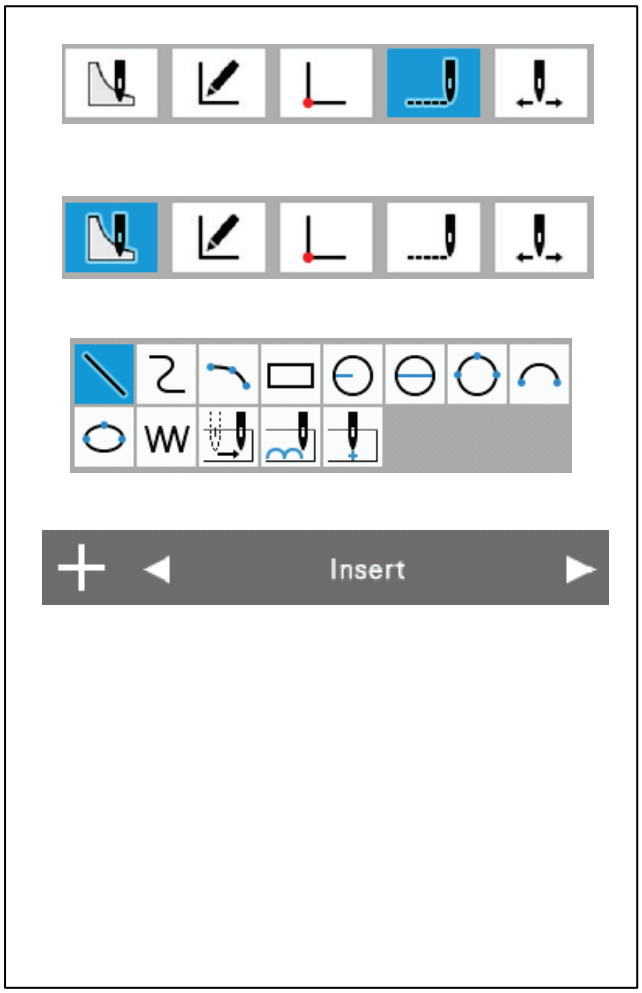
3) When inserting a line while drawing a circle

[Before inserting straight line]



[After inserting straight line]





1. Touch .
2. Use to move the cursor + to C.
   * You can move the cursor continuously by holding down the key.
3. Touch .
4. Touch .
5. Touch ◄ ► to select [Insert].
6. Use the jog key to move the cursor to #1.
7. Press to provisionally set the start point.
8. Use the jog key to move the cursor + to the position for the end point of the new pattern to be created.
9. Press to provisionally set the sewing points.
   * Repeat steps 8 and 9 until the shape of the pattern has been created.
10. Press to confirm the pattern.

12. FILE MANAGEMENT

12-1. About how to operate the file manager

12-1-1. Tasks that can be carried out using the File Manager

This chapter describes how to use the File Manager.

The File Manager can be used to carry out the following tasks for files which are saved in the panel internal memory or on storage media.

- Checking file information
- File operations such as loading, deleting and copying files and changing filenames
- Reading files from and writing files to storage media

Furthermore, the following file formats (extensions) can be handled by the programmer.

(Files other than those given below can be displayed and selected, but operations on these files are restricted to changing filenames, copying and moving.)

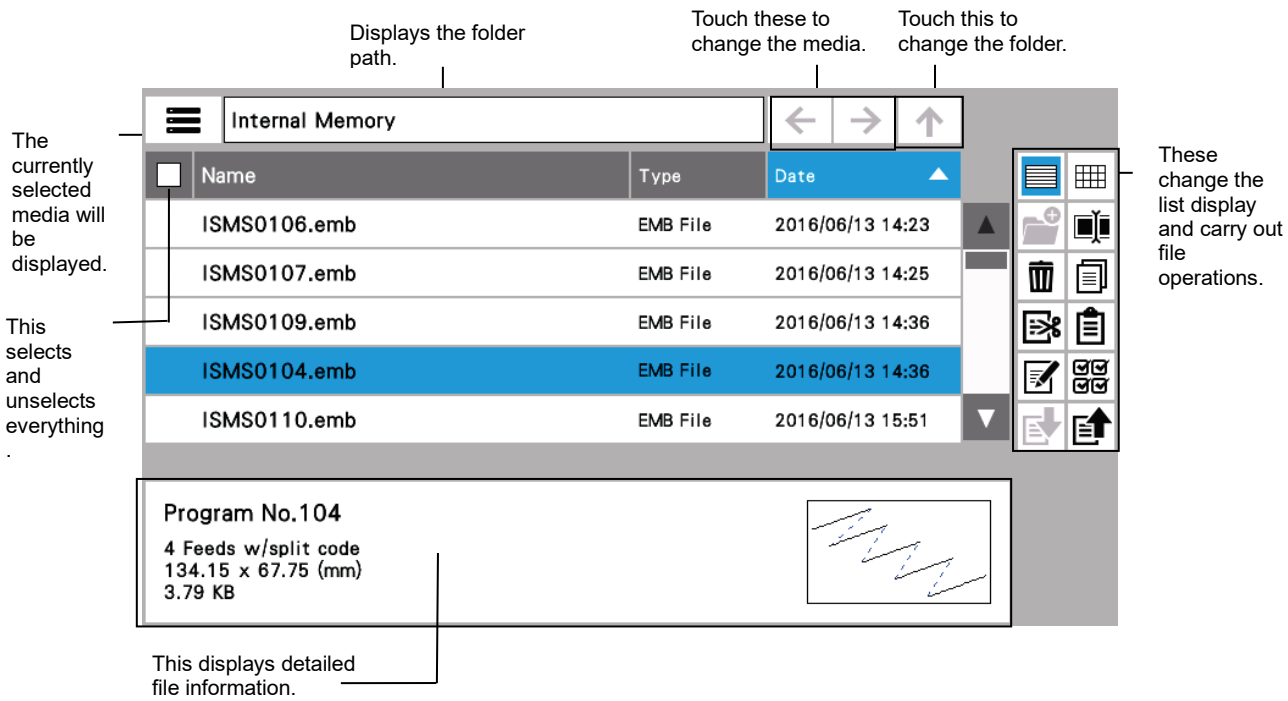
emb : Sewing data

sew : Sewing data, cycle programs and user parameters

For details on the folder structure of the USB flash drive, refer to "10-2. Folder Structure".

12-1-2. Description of icons

File Manager screen



Media selection, file selection, addresses, sorting

	Selecting media for browsing (Panel internal memory, USB flash drive)
	Changing media
	Moving to a higher folder
	Selecting/unselecting all items

Changing the display

	Switching to list display
	Switching to icon display

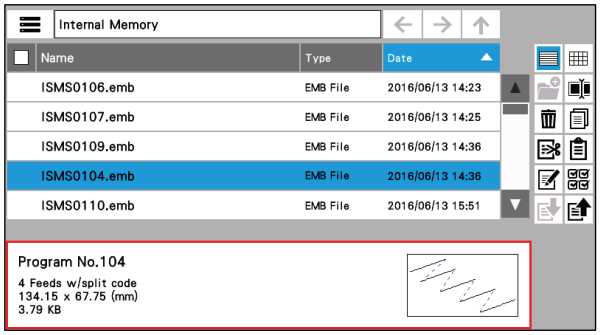
File and folder operations

	Adding folders
	Editing filenames and folder names
	Deleting files and folders
	Copying files and folders
	Cutting files and folders
	Pasting files and folders
	Editing files
	Switching between multiple select and single select mode
	Writing from the panel internal memory to other media (storage media)
	Reading from other media (storage media) to the panel internal memory

12-2. Displaying file lists

12-2-1. Checking file information

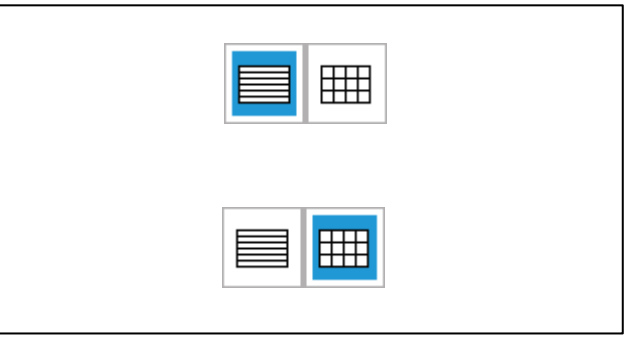
This displays the details of files and folders which are stored on the various media (panel internal memory and storage media).



1. Connect the media containing the files which you would like to check to the programmer.
2. At the screen, touch to display the File Manager.
3. Touch the icon in the top-left corner of the screen to switch to the media which contains the files you would like to check.
4. Select the file you would like to check. The detailed file information will be displayed at the bottom of the screen.

12-2-2. Changing the content display method to list format or icon format

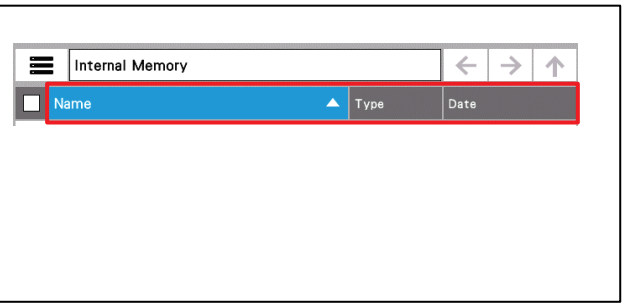
This switches the method used for displaying file contents.



1. At the screen, touch to display the File Manager.
2. Touch .
3. The file contents will be displayed in list format.
4. Touch .
5. The file contents will be displayed in icon format.

12-2-3. Sorting the display (applying sorting conditions)

You can sort the file content display according to a specified sort order.

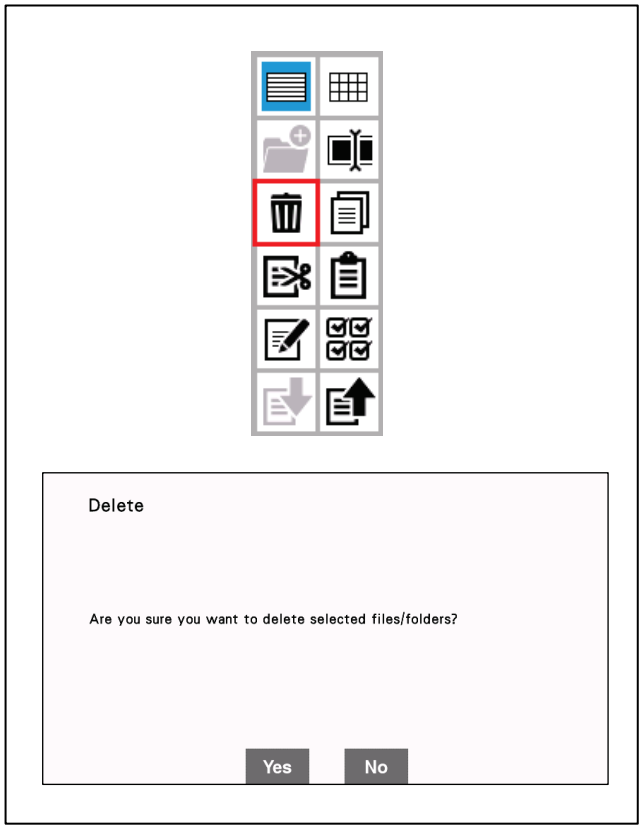


1. At the screen, touch to display the File Manager.
2. Touch the "Name", "Type" or "Date" tab at the top of the list.
3. The file contents will be sorted in ascending or descending order based on the item which you touched. (The order switches between ascending and descending each time you touch the same item.)

12-3. File operations

12-3-1. Deleting files and folders

This deletes files which are stored on the various media (panel internal memory and storage media).
It is possible to select more than one file for deleting at the same time.



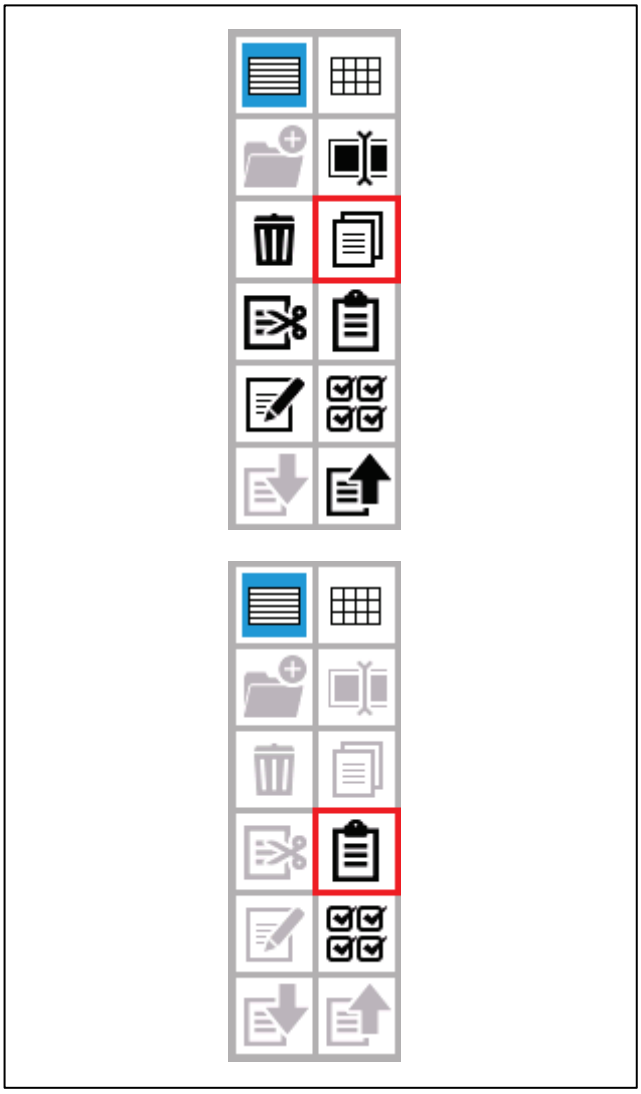
1. At the screen, touch to display the File Manager.
2. Select the file(s) or folder(s) which you would like to delete.
   (To delete more than one file or folder, use multiple select mode to select the files or folders which you would like to delete.)
3. Touch .
4. The delete confirmation dialog screen is displayed, so touch Yes.

Touch No to return to the file list screen.

5. The selected file(s) or folder(s) will be deleted.

12-3-2. Copying files and folders

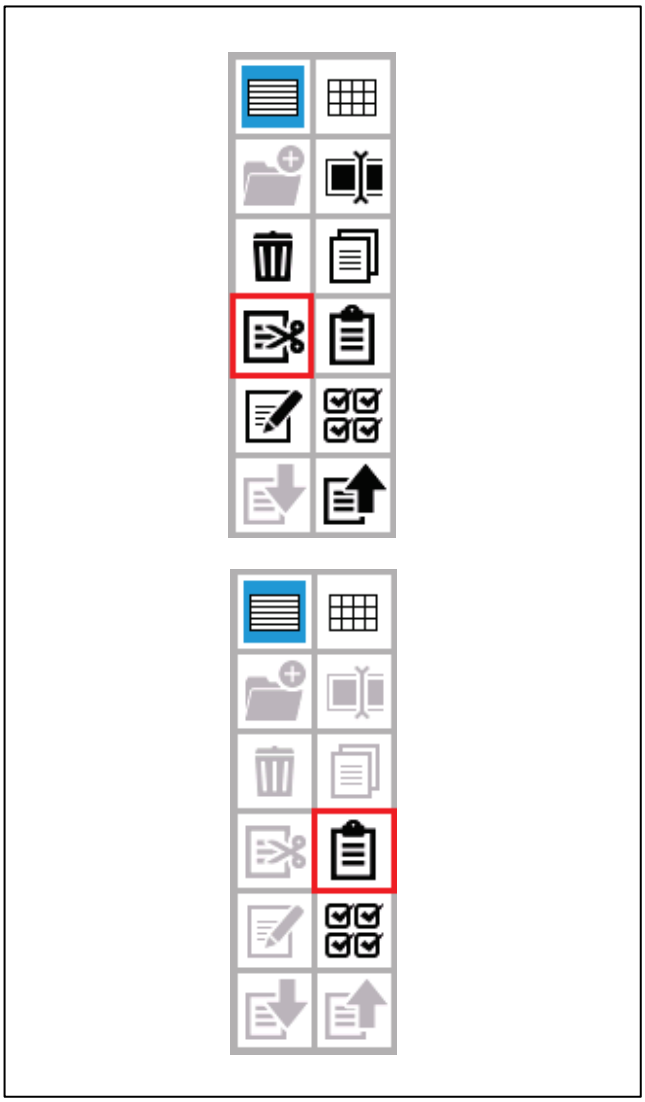
Files and folders which have been saved on media (panel internal memory and storage media) can be copied to the displayed folder. It is possible to select more than one file for copying at the same time.



1. At the screen, touch to display the File Manager.
2. Select the file(s) or folder(s) which you would like to copy. (To copy more than one file or folder, use multiple select mode to select the files or folders which you would like to copy.)
3. Touch .
4. Navigate to the destination folder for copying.
5. Touch .

12-3-3. Moving files and folders

Files and folders which have been saved on media (panel internal memory and storage media) can be moved to the displayed folder. It is possible to select more than one file for moving at the same time.

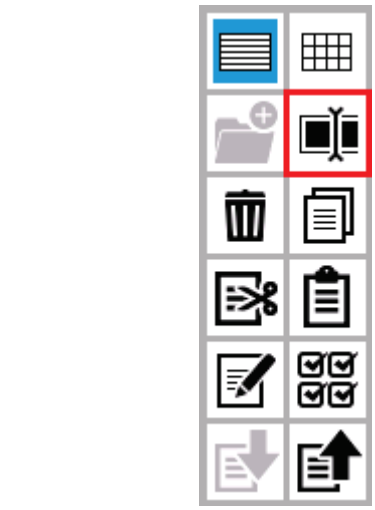


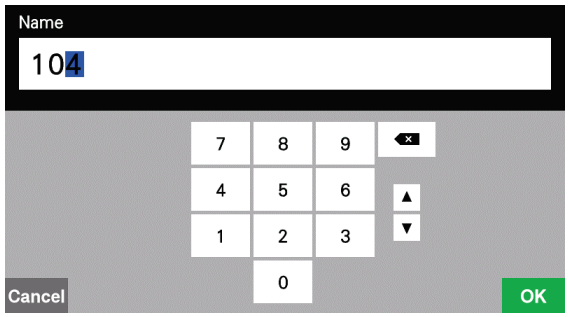
1. At the screen, touch to display the File Manager.
2. Select the file(s) or folder(s) which you would like to move.
   (To move more than one file or folder, use multiple select mode to select the files or folders which you would like to move.)
3. Touch .
4. Navigate to the destination folder for moving.
5. Touch .
6. The selected file(s) or folder(s) will be moved to the displayed folder.

12-3-4. Changing the names of files and folders

This changes the names of files and folders which are stored on the various media (panel internal memory and storage media).

Comments which are attached to files can be changed at the same time.



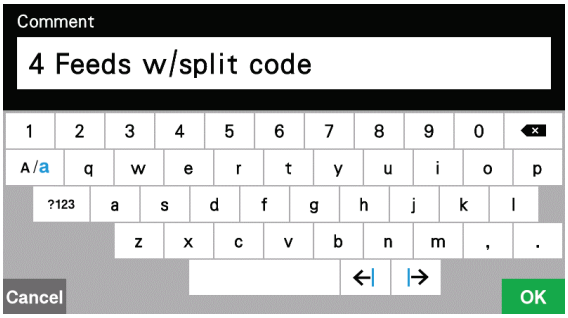


1. At the screen, touch to display the File Manager.
2. Select the file or folders which you would like to change the name of.
3. Touch .
4. The display will change to the filename/folder name editing screen so that you can edit the filename or folder name.
5. Touch OK.
6. The filename, folder name and/or comment will be changed to the contents which were edited in step 4.

12-3-5. Editing comments

The comments which have been added to sewing data files which have been saved in media (panel internal memory or storage media) can be changed.





1. Touch  on the  screen to display the File Manager.
2. Select the file containing the comment that you would like to change.
3. Touch .
4. The screen will change to the comment editing screen where you can edit the comment.
5. Touch OK.
6. The comment will be changed to that which was edited in step 4.

12-3-6. Creating folders

You can create new folders in the storage media.



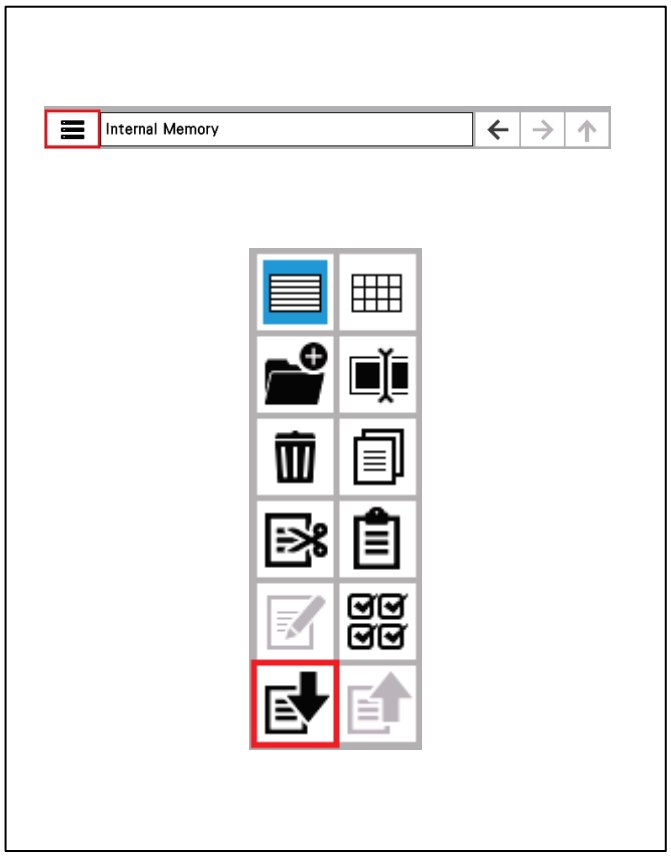


1. At the screen, touch to display the File Manager.
2. Touch the icon in the top-left corner of the screen to switch to the storage media.
3. Navigate to the folder where you would like to create a new sub-folder.
4. Touch .
5. The display will change to the folder name entry screen, so that you can enter the name of the folder.
6. Touch OK.
7. The folder will be created.

12-4. File operations using storage media

12-4-1. Importing files from storage media into the panel internal memory

Files which have been saved on storage media can be imported into the panel internal memory.
It is possible to select more than one file for importing at the same time.

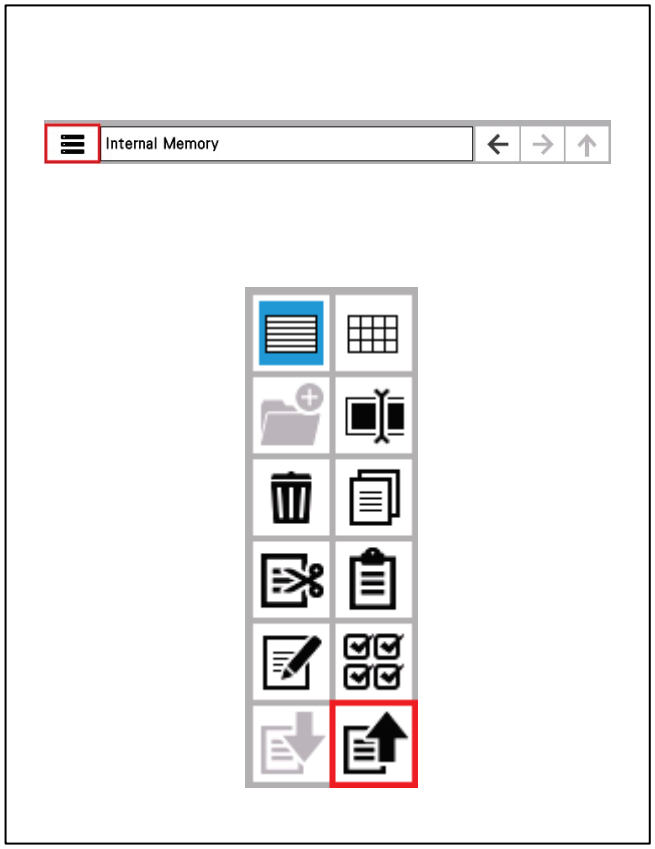


1. Insert the storage media containing the file that you wish to import into the programmer.
2. At the screen, touch to display the File Manager.
3. Touch the icon in the top-left of the screen to select the storage media which contains the file that you would like to import.
4. Touch the file which you would like to import in order to select it.
   (To import more than one file or folder, use multiple select mode to select the files or folders which you would like to import.)
5. Touch .
6. The selected file(s) will be imported into the panel internal memory.

12-4-2. Exporting files from the panel internal memory to storage media

Files which have been saved in the panel internal memory can be exported to storage media.

It is possible to select more than one file for exporting at the same time.



1. Insert the storage media that you wish to use for exporting the file from the programmer.
2. At the screen, touch to display the File Manager.
3. Touch the icon in the top-left corner of the screen to select the panel internal memory.
4. Touch the file which you would like to export in order to select it.
   (To export more than one file or folder, use multiple select mode to select the files or folders which you would like to export.)
5. Touch .
6. The selected file(s) will be exported to the storage media.

13. SETTING

13-1. Setting the programming functions

You can change the settings which relate to programming functions.

The changed settings will be applied when programming.

The procedure for changing the programming settings and the items which can be set are explained below.

1. At the screen, touch .
2. Touch ▲ ▼ to display the programming settings.
3. Touch the setting value for the setting item which you would like to change, and then change the setting value.

   * Refer to the following table for the setting items.
4. Touch OK at the bottom of the screen to apply the changed settings.

Setting item	Summary	Setting value
Continuous data input	ON: When entering data, it is automatically connected to the end point of the previous outline. OFF: When entering data, an outline start point is entered each time.	ON / OFF
X coordinate initial value (mm)	Changes the initial value for the cursor's X coordinate.	-999 - 999
Y coordinate initial value (mm)	Changes the initial value for the cursor's Y coordinate.	-999 - 999
Switching the home key and enter key	ON: The roles of the key and the key are switched, only when the Programmer screen is displayed. OFF: The roles of the key and the key are not switched.	ON / OFF
Marker display	ON: A marker is displayed at a fixed distance from the cursor + in the Programmer screen. OFF: A marker is not displayed.	ON / OFF
Marker X display position (movement amount from cursor) (mm)	Changes the X coordinate of the marker’s display position.	-999 - 999
Marker Y display position (movement amount from cursor) (mm)	Changes the Y coordinate of the marker’s display position.	-999 - 999
Preview area enlarged display	When turned on, the program image on the left side of the programming screen appears larger on the screen.	ON / OFF

13-2. Setting the display

You can change settings which relate to the display.

After a setting is changed, it is applied once it is confirmed.

The procedure for changing the display settings and the items which can be set are explained below.

1. At the  screen, touch  .
2. Use  to display the display settings, and then touch the desired setting item.
3. Touch the setting value for the setting item which you would like to change, and then change the setting value.

   * Refer to the following table for the setting items.
4. Touch  at the bottom of the screen to apply the changed settings.

Setting item	Summary	Setting value
Brightness	This changes the brightness of the LCD backlight.	1 – 6 Dark ... Bright

13-3. Setting the date and time

You can change settings which relate to the date and time.

After a setting is changed, it is applied once it is confirmed.

The procedure for changing the date and time settings and the items which can be set are explained below.

1. At the  screen, touch  .
2. Use  to display the date and time settings, and then touch the desired setting item.
3. Touch the setting value for the setting item which you would like to change, and then change the setting value.

   * Refer to the following table for the setting items.
4. Touch  at the bottom of the screen to apply the changed settings.

Setting item	Summary	Setting value
Year	This changes the year setting.	2024 – 2099
Month	This changes the month setting.	1 - 12
Day	This changes the day setting.	1 - 31
Hour	This changes the hour setting.	1 - 24
Minute	This changes the minute setting.	0 - 59
Date display format	This changes the date display format. Example: When set to YYYY/MM/DD , the date is displayed as [2015/01/01].	YYYY/MM/DD DD/MM/YYYY MM/DD/YYYY
Time display format	This changes the time display format.	12 hours/ 24 hours

13-4. Setting the language

You can change settings which relate to the language.

After a setting is changed, it is applied once it is confirmed.

The procedure for changing the language is explained below.

1. At the  screen, touch  .
2. Use  to scroll the screen, and select [Language setting] from the list.
3. Touch the language which you would like to select.
4. Touch  at the bottom of the screen to apply the changed settings.

13-5. Checking information

13-5-1. Viewing information

You can check information relating to the sewing machine and LCD panel.

The steps required in order to check the information are explained below.

1. At the  screen, touch  .
2. Use  to scroll the screen, and select [Information] from the list.
3. Touch [Information].

Item No.	Summary
18-digit code	Displays an 18-digit code.
Sewing machine serial number	This displays the serial number of the sewing machine.
Boot software version	This displays the version of the boot software.
Main software version	This displays the version of the main sewing machine software.
Expansion Microcontroller 0 Version (Boot)	Displays the version number of the boot software for Expansion Microcontroller 0.
Expansion Microcontroller 0 Version (Main)	Displays the version number of the main software for Expansion Microcontroller 0.
Expansion Microcontroller 1 Version (Boot)	Displays the version number of the boot software for Expansion Microcontroller 1.
Expansion Microcontroller 1 Version (Main)	Displays the version number of the main software for Expansion Microcontroller 1.
Maintenance information list	This displays the maintenance information for the sewing machine.
Error log list	This displays the error information for the sewing machine.

13-6. Checking the software license

You can check the software license.

The steps required in order to check the software license information are explained below.

1. At the  screen, touch  .
2. Use  to scroll the screen, and select [Open source license] from the list.
3. Touch [Open source license].

Item No.	Summary
Open source license	This displays the license for the open source software. * If you touch "Open source license", the license will be displayed.

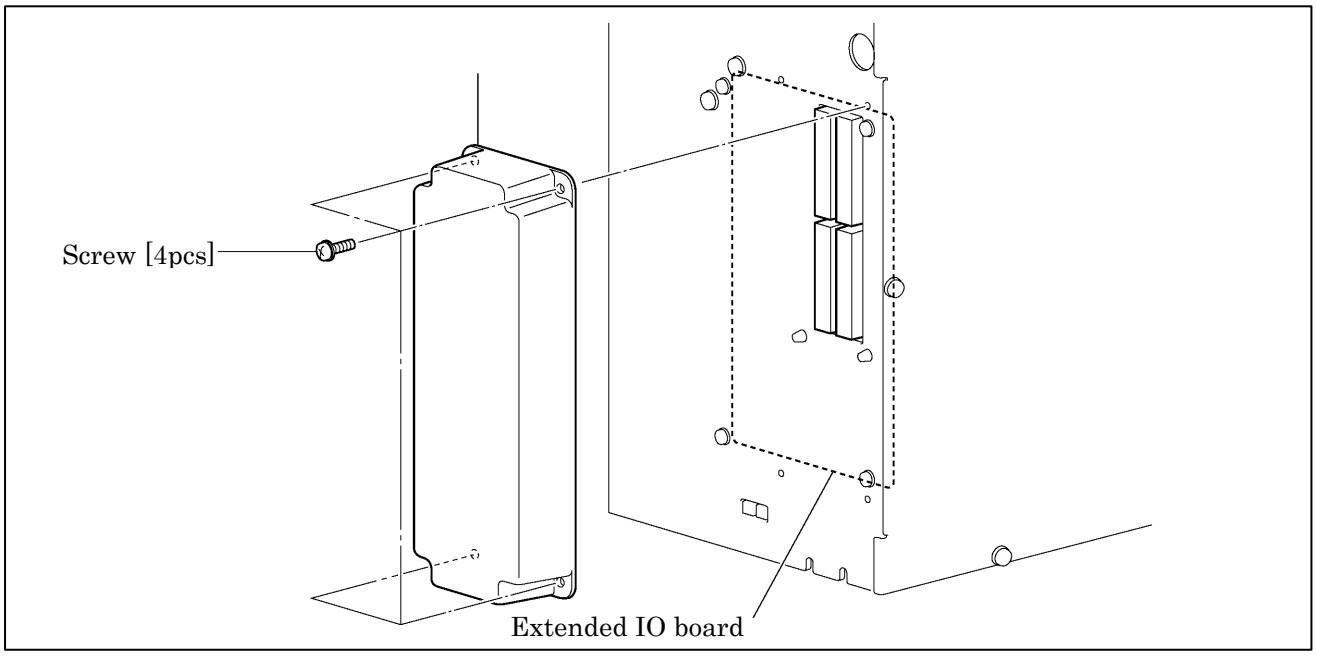
14. EXTENDED IO

Depending on the purpose, you can use extended input and extended output signals.

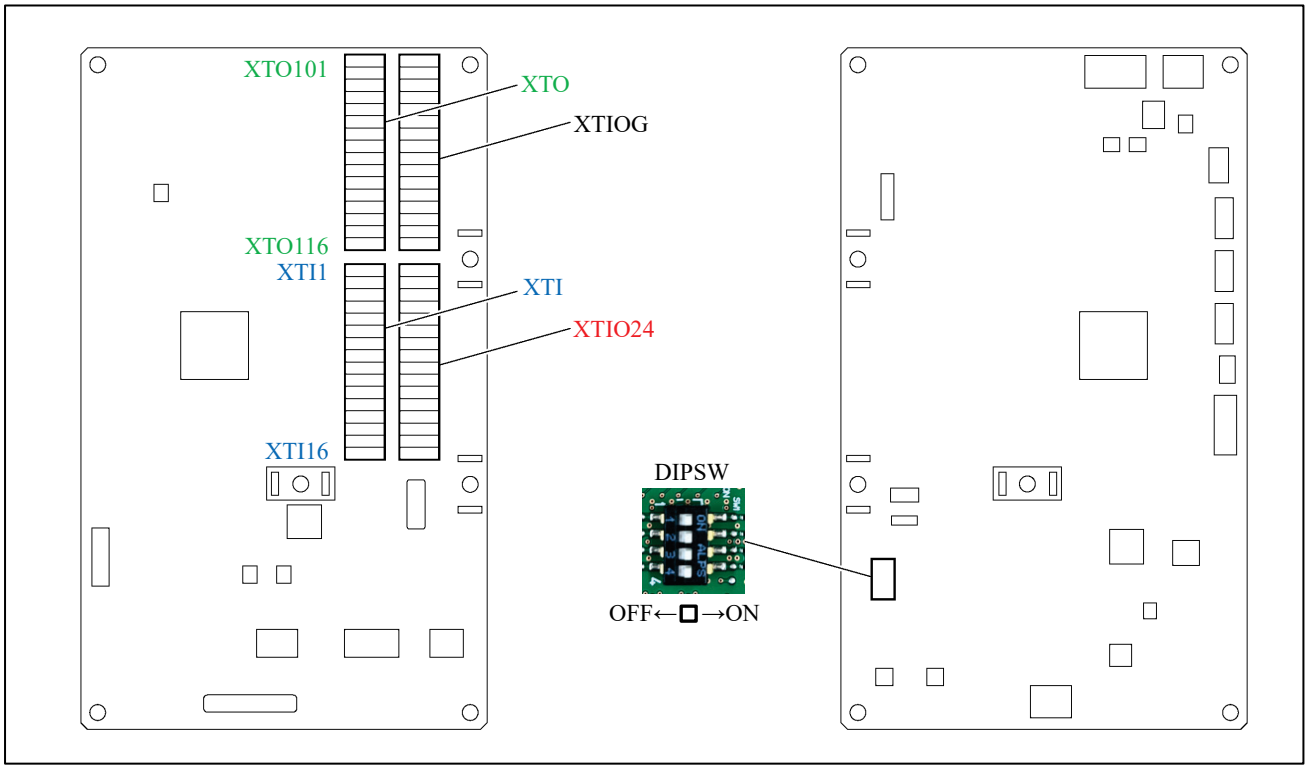
14-1. Hardware specifications

14-1-1. Configuration

When you remove the cover on the side of the control box, you will find the extended IO board.



The extended IO board is equipped with external input/output signals that can be switched between sink (NPN) and source (PNP) using the DIP switches on the board.



This section describes the terminal blocks XTI, XTO, XTIO24, and XTIOG on the extended IO board.

XTI is an external input terminal block, XTO is an external output terminal block, and XTIO24 and XTIOG are general-purpose power terminal blocks.

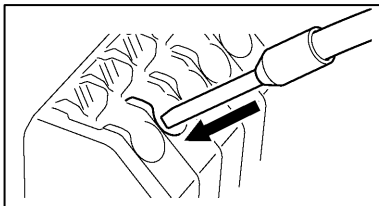
Please connect the input/output devices prepared by the customer.

Terminal Block Name	Symbol	Function
XTI1-XTI16	EXIN1-EXIN16	Used as a free-mapping input signal terminal block. Free-mapping allows you to freely assign NC internal function signals on the operation panel.
XTO101-XTO116	EXOUT1-EXOUT16	Used as a free-mapping output signal terminal block. Free-mapping allows you to freely assign NC internal function signals on the operation panel.
XTIO24	IO24	This is the COM terminal for the +24V DC power supply (24V) on the expansion IO board. It is used as the 24V power supply for any input/output devices. Please adhere to the maximum output current of 100mA per point and a total output current of 1000mA for all ports for external output, 24V power COM, and IOG power COM.
XTIOG	IOG	This is the COM terminal for the GND (0V) of the DC24V on the IO board. It is used as the GND power supply for any input/output devices. Please adhere to the maximum output current of 100mA per point and a total output current of 1000mA for all ports for external output, 24V power COM, and IOG power COM.

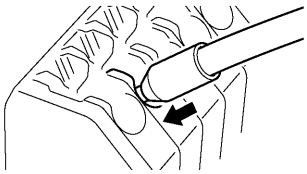
14-1-2. How to connect terminal blocks

Use the crimp terminals NF0.5-8 (Nichif) or FE-0.5-8N-WH (WAGO) for connection of the terminal blocks.
The wires that can be connected to the crimp terminals are 0.5 mm 2 (20 AWG) and the outer diameter size of φ2.4 mm.

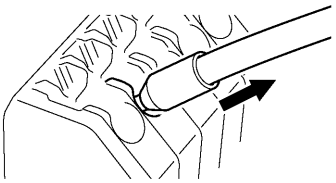
[Wiring work]



1. Insert the wire into the wire port.

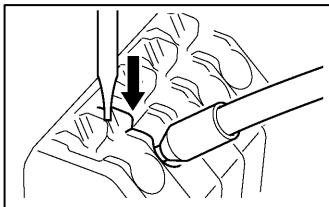


2. Push the wire firmly until it reaches the end.

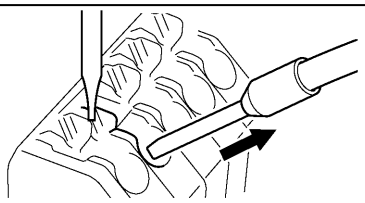


3. Lightly pull the wire to ensure it is securely connected.

[Removing the Wire]



1. Press the operation button using a screwdriver.



2. While holding down the operation button, pull the wire to disconnect it.

14-1-3. Switching input/output circuit type

External input and external output can be switched between sink (NPN) and source (PNP) using SW1 on the expansion IO board. Please set it according to the connected device.

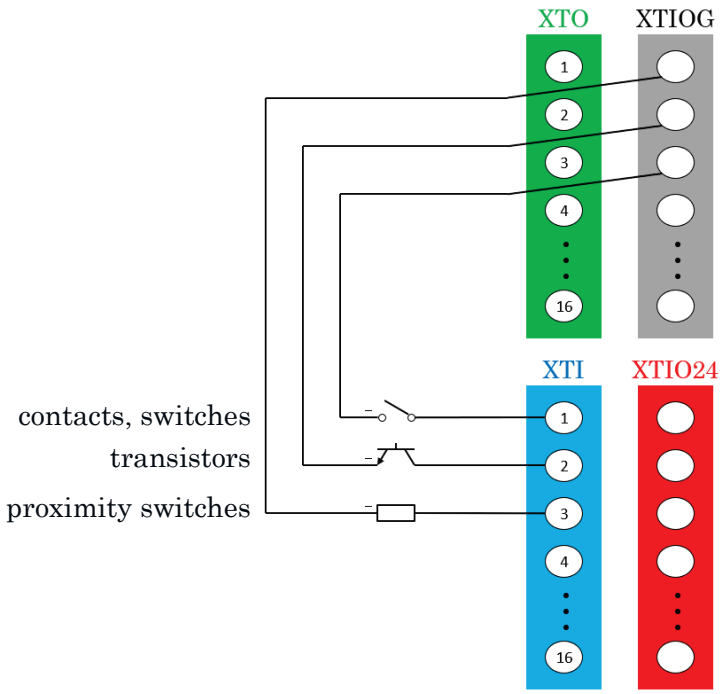
SW No.	Contents	ON	OFF
1	External Input Signal XTI_1-8	Sink (NPN)	Source (PNP)
2	External Input Signal XTI_9-16	Sink (NPN)	Source (PNP)
3	External Output Signal XTO_101-108	Sink (NPN)	Source (PNP)
4	External Output Signal XTO_109-116	Sink (NPN)	Source (PNP)

* All DIP switches are set to ON at the time of shipment.

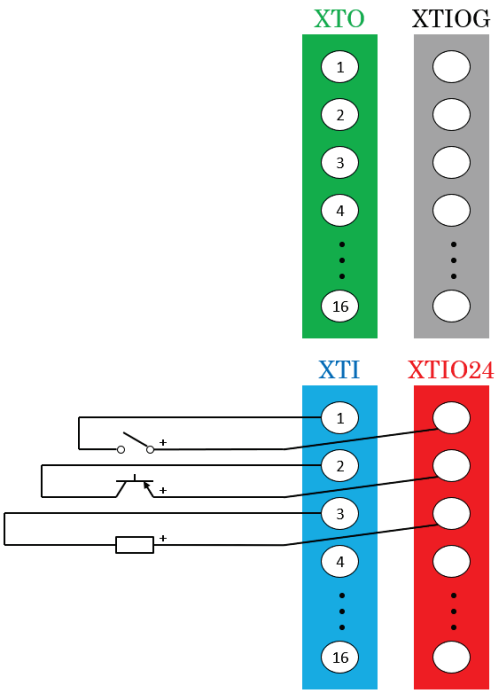
Notes for Sink (NPN) / Source (PNP) Input Circuits

1. The input contact current is DC24V 5mA. Please use devices that are suitable for this small current value. The input filter time constant for external input is 1ms (TYP) (CR filter only).
2. For the input circuit, connect contact inputs and NPN open-collector transistors in the sink (NPN) setting. For the source (PNP) setting, connect contact inputs and PNP open-collector transistors.
3. Use the power supply of the connected device with the COM (24V) of XTIO24 and the COM (IOG) of XTIOG.
4. Do not use an external power supply. It can cause malfunctions of the board and connected devices.
5. The off-state leakage current of a 2-wire proximity switch should be 1.3mA or less.

【Example of Sink (NPN) Input Connection】



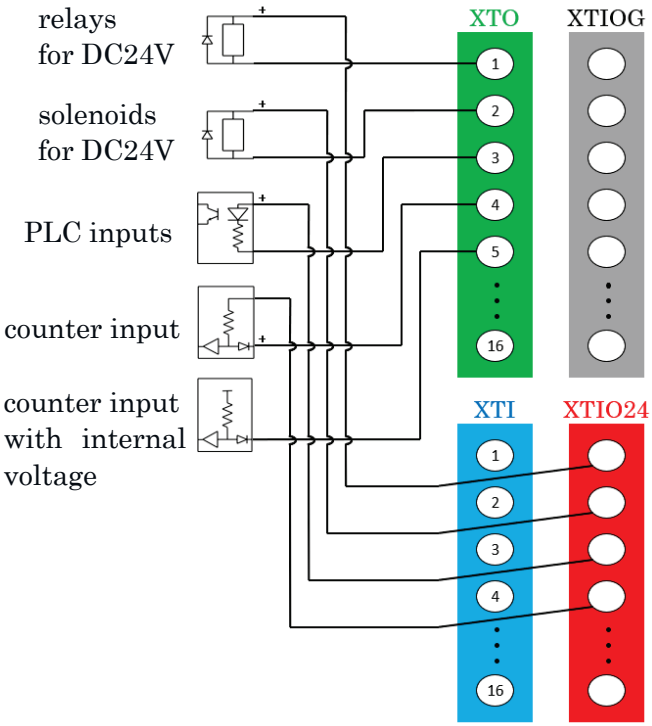
【Example of Source (PNP) Input Connection】



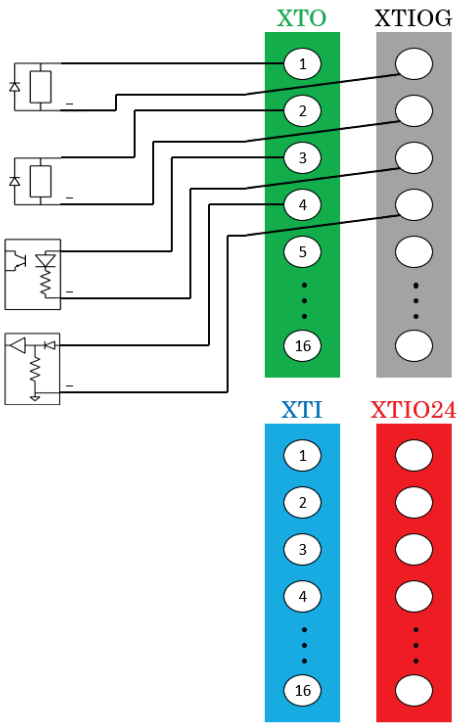
Notes for Sink (NPN) / Source (PNP) Output Circuits

1. The output terminal voltage is DC24V. For external output, 24V power COM, and IOG power COM, strictly adhere to the output current limit of 100mA per point and a total output current of 1000mA for all ports.
2. When connecting an inductive load to the output circuit, connect a surge suppression diode near the load.
3. In the sink (NPN) setting, do not connect the external output terminal directly to +24V. In the source (PNP) setting, do not connect the external output terminal directly to 0V. Doing so may short-circuit and damage the board.
4. The inrush current of the connected device occurring simultaneously should be 10A for 20μs or less.
5. Do not use an external power supply. It can cause malfunctions of the board and connected devices.

【Example of Sink (NPN) Output Connection】

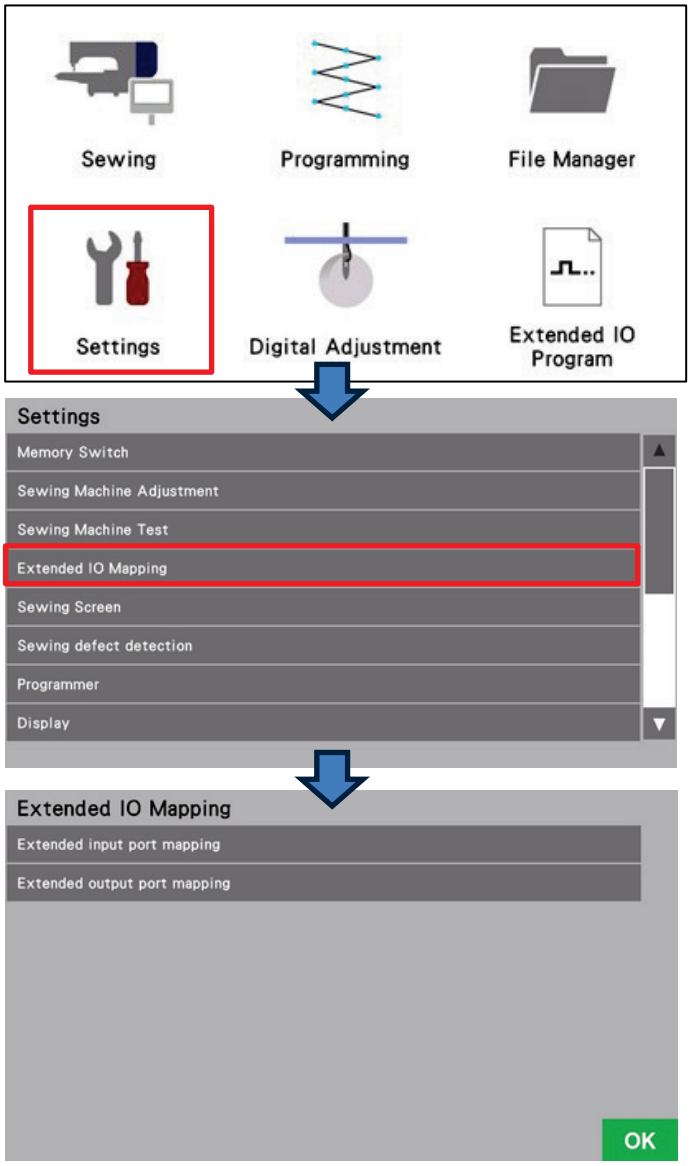


【Example of Source (PNP) Output Connection】



14-2. Extended IO mapping

You can assign the extended input and extended output ports to any function.
If the function allows selection of input/output destinations via MSW, you must change the setting to use extended I/O for the corresponding MSW. If the setting is not changed, assigning ports in the extended I/O assignment will not reflect the signals.
When you enter the settings screen, the extended IO program and functions using the extended IO will be temporarily disabled, and all signals from the extended output ports will be turned OFF.



14-2-1. Extended input port mapping

You can configure which functions to assign to each of the extended input ports (EXIN_1 to EXIN_16).
The configurable items are as follows:

Name	Description
Extended IO program	The port will be used in the extended IO program.
MSW354 Program No./split No. (bit 0)	In the sewing screen, you can change the program number or split number using the extended input. Bit 0 is the least significant bit, and bit 6 is the most significant bit, using 7 bits to represent values from 00 to 99. The entered number is reflected in real-time while waiting on the sewing screen. When Memory Switch No. 354 is set to 1, you can set the program number. The value of the hundreds place of the program number is determined by Memory Switch No. 355. When Memory Switch No. 354 is set to 2, you can set the split number.
MSW354 Program No./split No. (bit 1)	
MSW354 Program No./split No. (bit 2)	
MSW354 Program No./split No. (bit 3)	
MSW354 Program No./split No. (bit 4)	
MSW354 Program No./split No. (bit 5)	
MSW354 Program No./split No. (bit 6)	
MSW253 Start point move method (extended input)	When the program number is flashing on the sewing screen and the extended input is turned ON, the starting point will be moved. This is only valid when Memory Switch No. 253 is set to 3.
MSW650 Error stop state release method (extended input)	When an error screen is displayed and the extended input is turned ON, the error can be cleared. This is only valid when Memory Switch No. 650 is set to 1.
MSW659 Pause SW NO (Extended Input)	The standard pause switch is disabled, and the extended input signal is used as the pause switch. Under normal conditions, input the signals so that the NO signal is Off and the NC signal is On. This is valid only when Memory Switch No. 659 is set to 1.
MSW659 Pause SW NC (Extended Input)	
MSW559 Presser SW 1st Stage / Left Hand SW (Extended Input)	The standard presser SW, start SW, and hand SW are disabled, and the extended input signals are used as the presser SW, start SW, and hand SW. This is valid only when Memory Switch No. 559 is set to 1.
MSW559 Presser SW 2nd Stage (Extended Input)	
MSW559 Start SW / Right Hand SW (Extended Input)	

14-2-2. Extended output port mapping

Specify which function each extended output port (EXOUT_1 - EXOUT_16) is assigned to.
The items that can be set are as follows.

Name	Description
Extended IO program	The port will be used in the extended IO program.

14-3. Extended IO programs

You can program the extended output signals by combining conditions such as extended input, extended output, and the state of the sewing machine.
The extended IO program consists of the following elements:

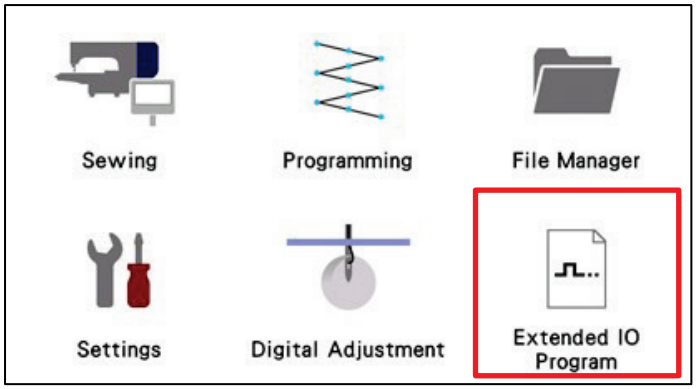
- Settings of virtual outputs (VOUT_1 to VOUT_32)
  - Input signal configuration (what triggers the change in output signal)
  - Output signal configuration (how the signal is output when triggered)
- Assignment of virtual outputs to extended outputs, operation instructions, and internal signals

Virtual outputs are internal software output signals that are not directly output as actual electrical signals. By assigning these to the extended output ports, you can obtain actual electrical signals. Additionally, by assigning virtual outputs to operation instructions, you can automatically perform actions such as starting sewing or raising/lowering the presser foot when certain conditions are met. Furthermore, by assigning virtual outputs to sewing permission signals, you can ensure that sewing does not start unless the specified conditions are met, even if the start switch is pressed.

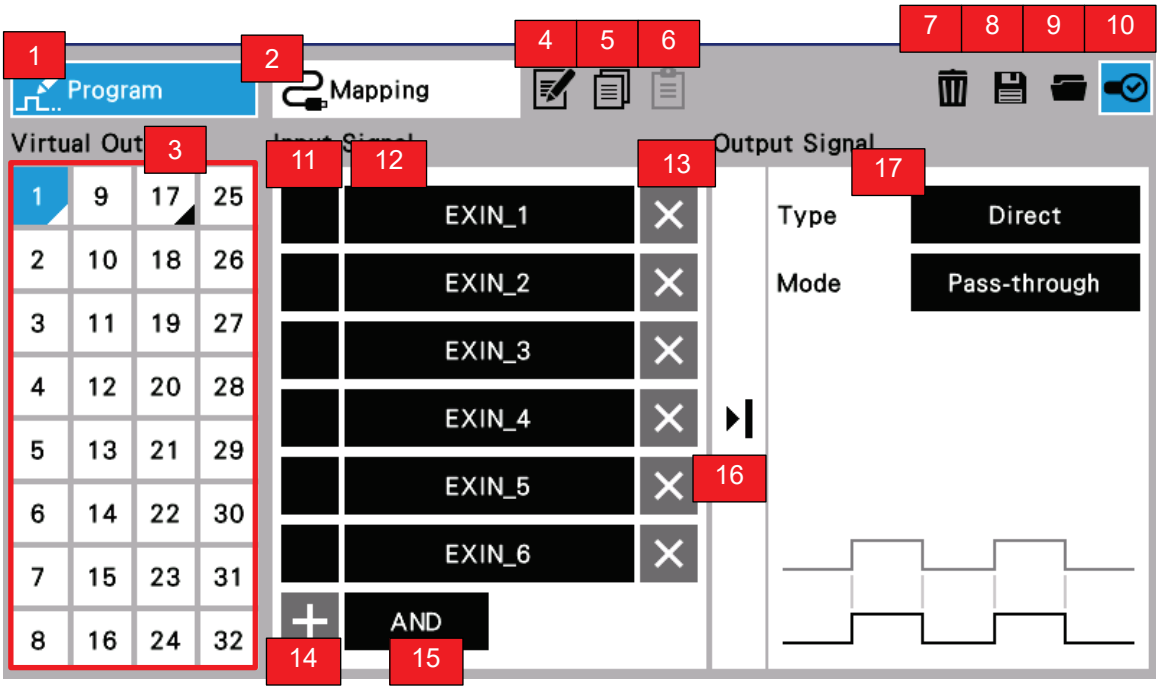
Only one extended IO program can be stored in the sewing machine.

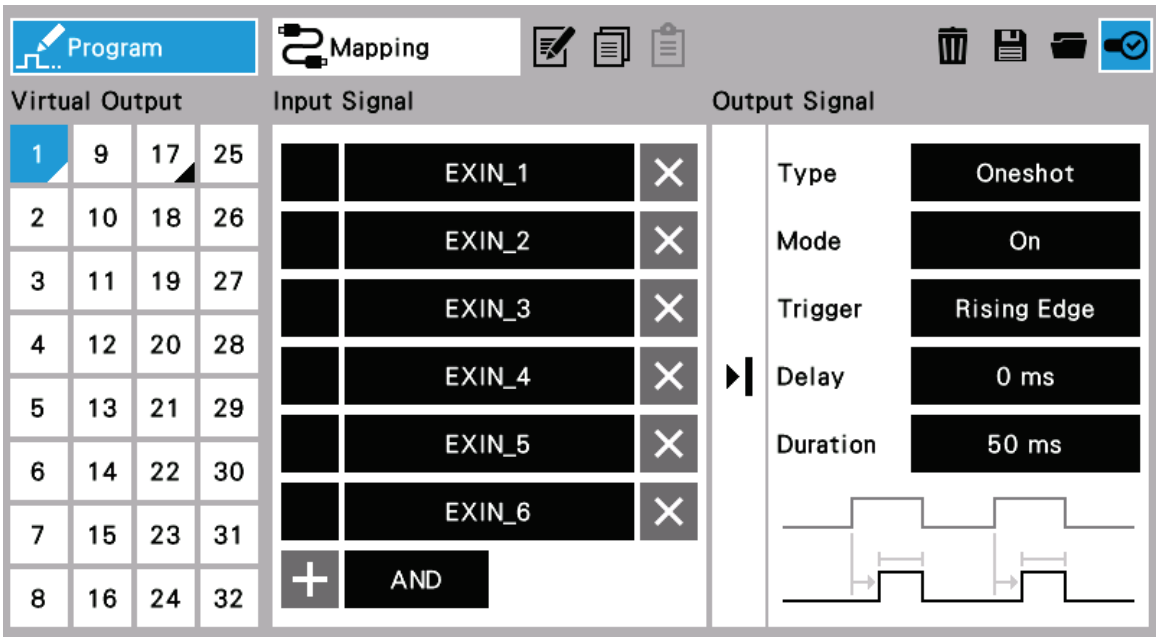
14-3-1. How to program

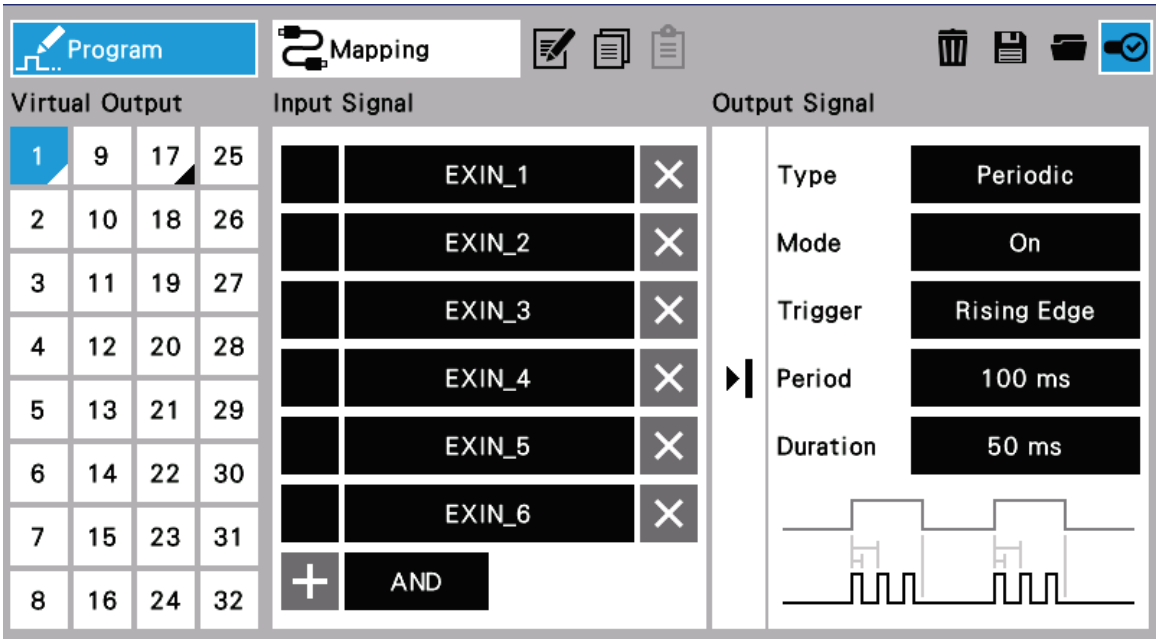
On the home screen, touch the extended IO program key.
When you enter the program screen, the extended IO program and functions using the extended IO are temporarily disabled, and all signals from the extended output ports are turned OFF.

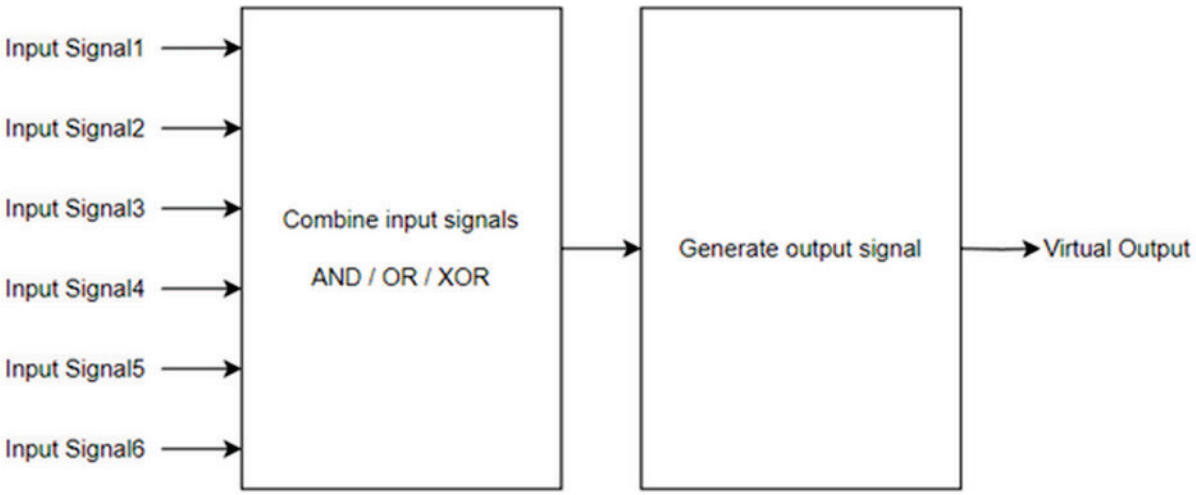


[Program Screen (Output Signal Type: Direct, OneShot, Periodic)]

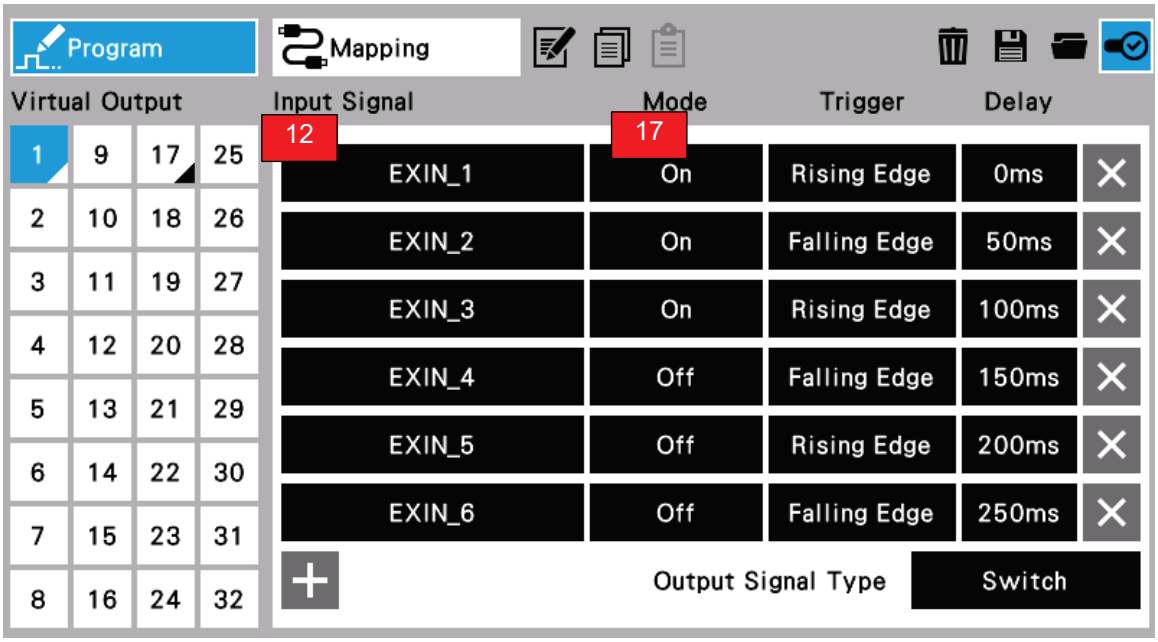


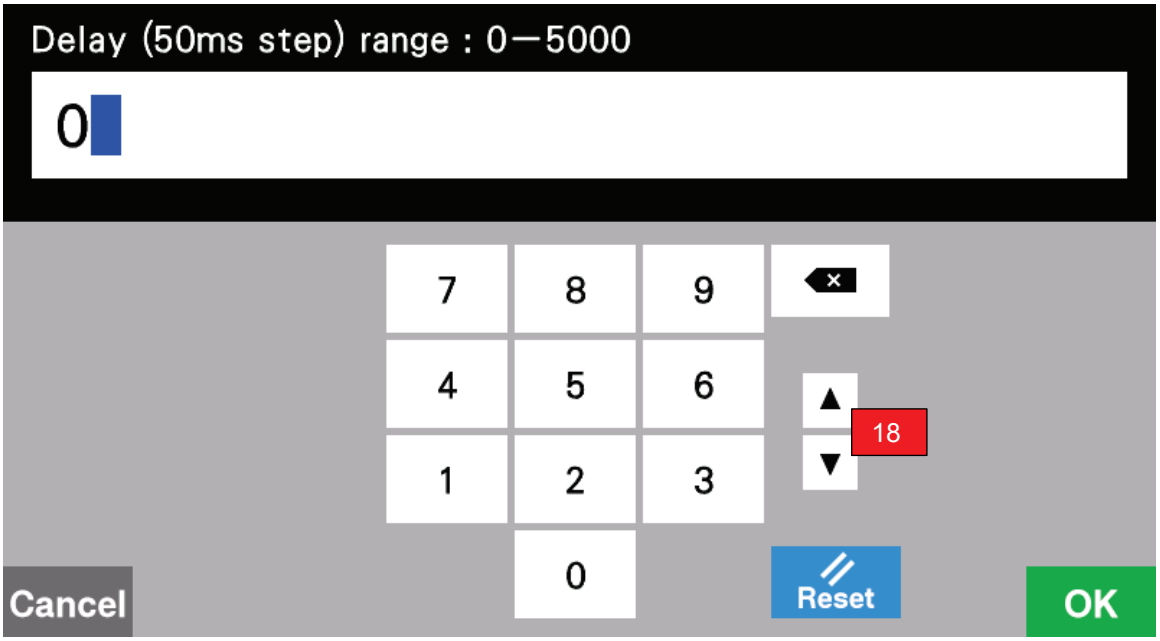


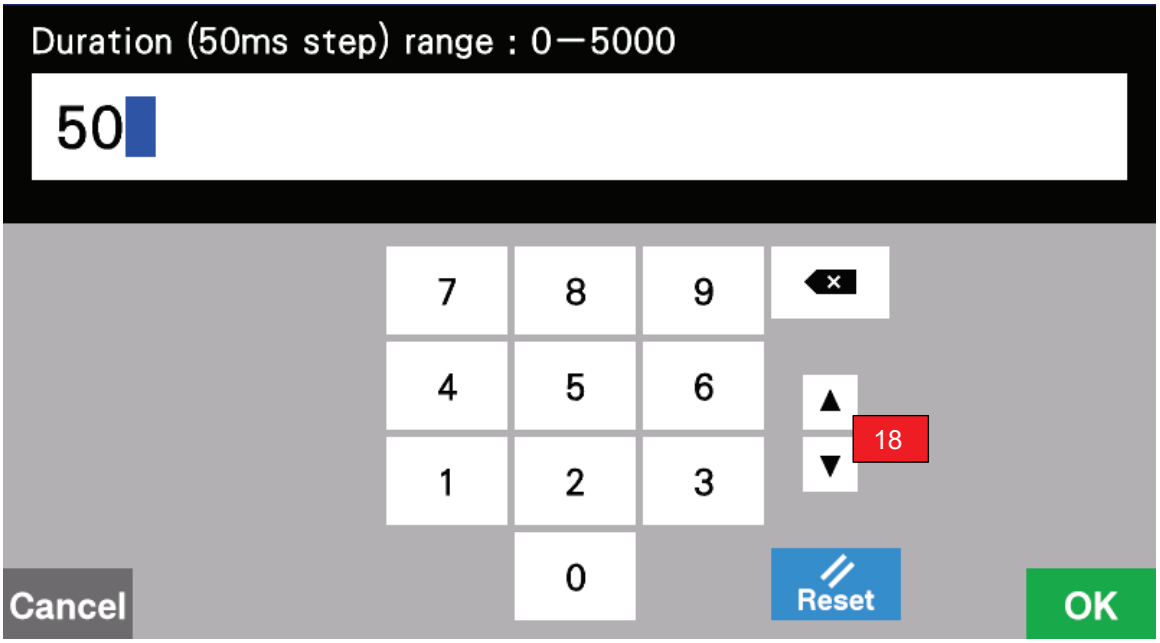

Program
Mapping
Virtual Output
Input Signal
Output Signal
1 9 17 25
2 10 18 26
3 11 19 27
4 12 20 28
5 13 21 29
6 14 22 30
7 15 23 31
8 16 24 32
EXIN_1
EXIN_2
EXIN_3
EXIN_4
EXIN_5
EXIN_6
AND
Type
Periodic
Mode
On
Trigger
Rising Edge
Period
100 ms
Duration
50 ms

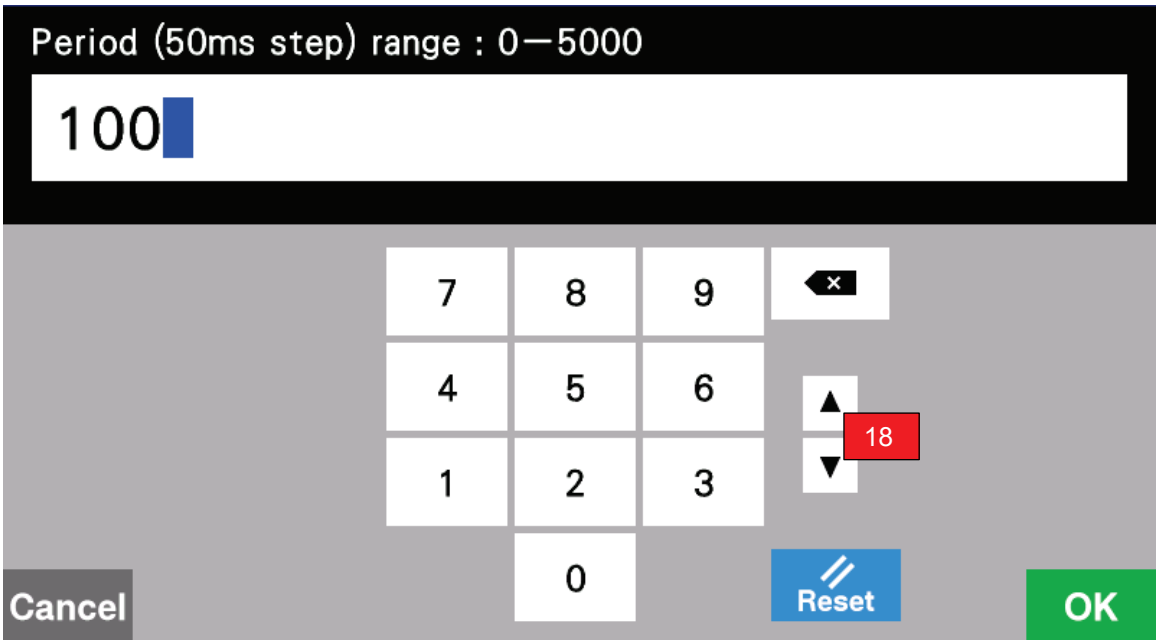

Input Signal1
Input Signal2
Input Signal3
Input Signal4
Input Signal5
Input Signal6
Combine input signals
AND / OR / XOR
Generate output signal
Virtual Output

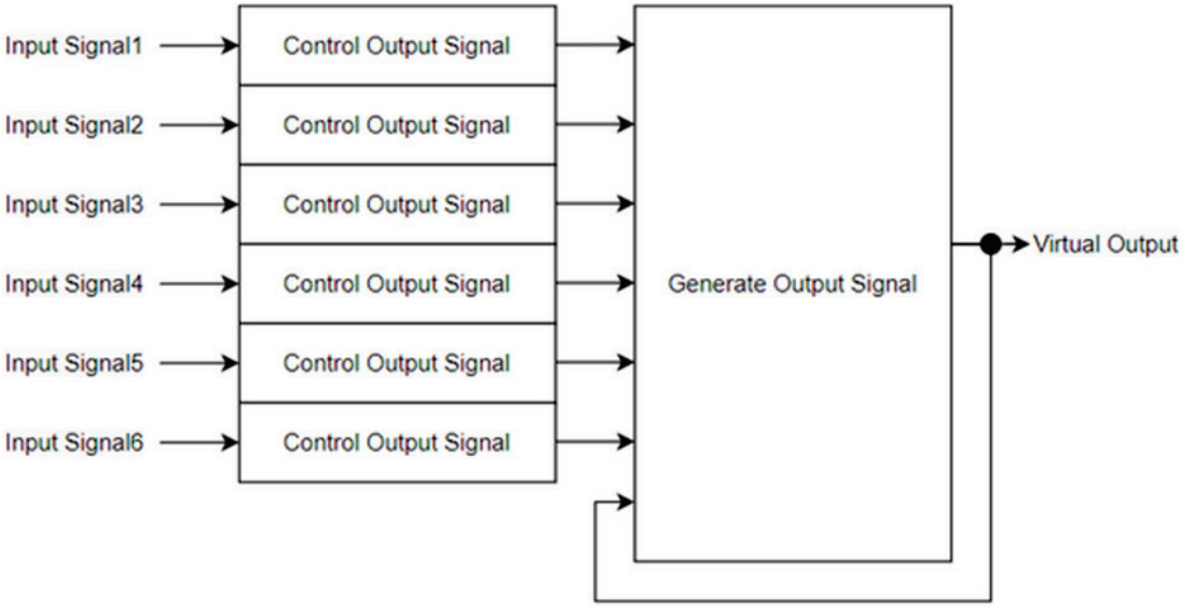
[Program Screen (Output Signal Type: Switch)]





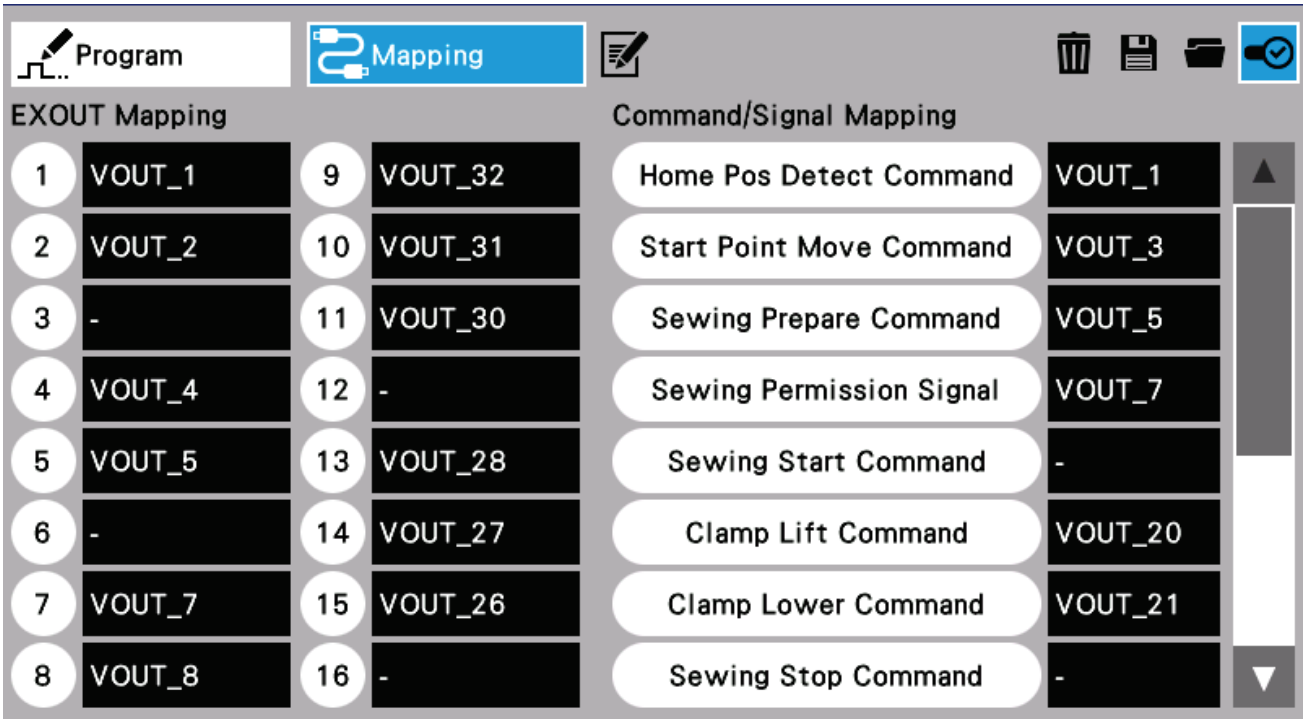

Duration (50ms step) range : 0—5000
50
7
8
9
4
5
6
1
2
3
0
18
Reset
Cancel
OK


Period (50ms step) range : 0—5000
100
7
8
9
4
5
6
1
2
3
0
18
Reset
Cancel
OK


Input Signal1
Input Signal2
Input Signal3
Input Signal4
Input Signal5
Input Signal6
Control Output Signal
Control Output Signal
Control Output Signal
Control Output Signal
Control Output Signal
Control Output Signal
Generate Output Signal
Virtual Output

(1) Program button	Displays the extended IO program screen.
(2) Assignment button	Displays the virtual output assignment screen.
(3) Virtual output	Selects the virtual output to be programmed. Programmed virtual outputs are marked as shown below. 
(4) Comment button	Inputs comments for the extended IO program.
(5) Copy button	Copies the input and output signal conditions set for the selected virtual output to memory.
(6) Paste button	Pastes the input and output signal conditions copied to memory to the selected virtual output. * Cannot paste if the selected virtual output is included in the input signals.
(7) Delete button	Deletes all extended IO programs and initializes them. * The program will not be deleted unless the save button is pressed after deletion.
(8) Save button	Saves the extended IO program.
(9) Open button	Opens the extended IO program file from external media.
(10) Enable program button	Toggles whether to enable the saved extended IO program. Enabled  Disabled 
(11) NOT button	Selects whether to use the NOT operator. Input signals with NOT displayed will have their ON/OFF states inverted.
(12) Input signal	Displays the input signals to be used. Touch the signal name to select an input signal.
(13) Delete signal button	Deletes an input signal.
(14) Add signal button	Adds an input signal.
(15) Combination method button	Selects how to combine multiple signals. AND, OR, and XOR can be selected.
(16) Expand input signal area button	Expands the input signal display area.
(17) Output signal	Displays the output signal settings. You can change the settings by touching each item. By touching delay, duration, or cycle, you can change the time on the numeric keypad input screen.
(18) Time Increase/Decrease Button	Pressing ▲/▼ increases or decreases the time in 50 ms increments.

Virtual Output Mapping Screen



* For details, please refer to "14-3-4. Virtual Output Mapping.

14-3-2. Input signal

Set the signals that trigger changes in the virtual output. You can combine multiple signals. You can set up to 6 different input signals for each virtual output.

Input signal list

Sewing machine status

No.	Abbreviation	Name	Description
001	HP_DETECTING	Origin detection in progress	It turns ON during origin detection operation. It turns OFF when the operation is completed.
002	HP_DET	Home position detected	It turns ON when the home position detection operation is completed. It will turn OFF when home position detection is required again due to changes in memory switch settings, etc.
003	SP_MOVING	Moving to start point	It turns ON during the start point movement operation. It turns OFF when the operation is completed.
004	SP_DONE	Start point move completed	It turns ON when moving to the start point or split start point after changing the program number is completed.
010	SEW_STANDBY	Sewing standby state	It turns OFF when the feed moves from the start point during test feed, sewing, etc.
011	SEWING	Sewing in progress	It turns ON during sewing. It turns OFF when sewing is finished.
012	STITCH	Sewing (Stitch Only)	It turns ON only during the stitching operation in sewing. It turns OFF during feeding.
013	TRIMMING	Thread trimming in progress	It turns ON only during the thread trimming operation in sewing.
014	WIPING	Thread wiping in progress	It turns ON only during the thread wiping operation in sewing.
020	SEW_DONE	Sewing completed	It turns ON for about 50 ms after sewing is completed.
021	SPLIT	Split stop state	It turns ON when moving to the start point or split start point is completed. It turns OFF when entering modes such as test feed or threading, but turns ON again when returning to the sewing mode.
022	SEW_RESEW	Waiting for resew	It turns ON when in the re-sewing standby state after pausing during sewing.
030	TEST_MOVING	Test feeding in progress	It turns ON during the test feeding operation.
031	TEST_DONE	Test feeding completed	It turns ON for about 50 ms after the test is completed.
040	PRG_MOVING	Program creation - Feeding movement in progress	It turns ON during the feeding operation on the program creation screen.
050	BBN_WARN	Bobbin Thread warning active	It turns ON while the bobbin thread warning screen is displayed.
051	BBN_CHANGING	Bobbin changer - Bobbin replacement in progress	When the bobbin changer is enabled, it turns ON during the bobbin replacement operation.
100	CLAMP_UP	Presser foot raised	It turns ON when the presser foot is raised. It turns OFF when lowered.
101	PFOOT_UP	Intermittent Presser Foot Raised	It turns ON when the intermittent presser foot is raised. It turns OFF when lowered.
102	NDLBASE_UP	Needle bar base raised	(Only for BAS370K) It turns ON when the needle bar base is raised. It turns OFF when lowered.
103	FEEDPLT_UNLOCK	Feed plate lock unlocked	(Only for BAS370K/365K) It turns ON when the feed plate lock mechanism is in the unlocked state.

No.	Abbreviation	Name	Description
110	PALETTE_SEN_LEFT	Pallet Sensor (Left)	It turns ON while the left pallet sensor is activated.
111	PALETTE_SEN_RIGHT	Pallet Sensor (Right)	It turns ON while the right pallet sensor is activated.
120	FT_SW_1/LEFT_SW	Presser switch 1st stage / Left switch	It turns ON while the switch is pressed.
121	START_SW/RIGHT_SW	Start switch / Right switch	It turns ON while the switch is pressed.
122	FT_SW_2	Presser switch 2nd stage	It turns ON while the switch is pressed.
130	ERR	Error occurred	It turns ON while the error screen is displayed.
131	ERR_FATAL	Non-recoverable error occurred	It turns ON while the error screen for an unrecoverable error is displayed.
132	SUSPEND	Sewing temporarily paused	It turns ON while the error screen for a temporary stop error (E011, E071, E081, E390, E393, E610) is displayed.
140	SUSPEND_SW	Temporary stop switch	It turns ON while the temporary stop switch is pressed.
141	FRONT_COV_OPEN	Front cover open/Close sensor	(Only for BAS370K/365K) It turns ON while the front cover is open.
142	SLIDE_COV_OPEN	Slide cover open/Close sensor	(Only for BAS370K/365K) It turns ON while the slide cover is open.
143	TILTE_SW	Head tilt switch	(Only for BAS341K/342K) It turns ON while the head is tilted.
144	ACC_TAB_OPEN	Front Cover Plate Sensor	(BAS352K only) Turns ON while the front cover plate is open.
150	PRG_NO_CHG	Program number change	It turns ON for about 20 ms each time the program number is changed.
151	SPLIT_NO_CHG	Split number change	It turns ON for about 20 ms each time the split number is changed.
152	CYCPRG_NO_CHG	Cycle program number change	It turns ON for about 20 ms each time the cycle program number is changed.
153	CYCPRG_STEP_NO_CHG	Cycle program step change	It turns ON for about 20 ms each time the step in the cycle program is changed.
200	SEW_MODE	Sewing mode	It turns ON while the sewing screen is displayed.
201	CYCPRG_MODE	Cycle program mode	It turns ON in cycle program mode. It turns OFF when displaying screens other than the sewing screen.
202	THREAD_MODE	Threading mode	It turns ON while the threading screen is displayed.
203	TEST_MODE	Test mode	It turns ON in test mode. It turns OFF when displaying screens other than the sewing screen.
204	WIND_MODE	Bobbin Winding Mode	(BAS341K/342K/352K only) Turns ON while the bobbin winding screen is displayed.
210	PRG_MODE	Programming mode	It turns ON when the program creation screen is displayed.
220	ADJUST_MODE	Adjustment mode	It turns ON when the adjustment screen in the settings menu is displayed.
290	KEY_HOME	HOME key	It turns ON while the HOME key on the LCD panel is pressed.
291	KEY_ENTER	ENTER Key	It turns ON while the ENTER key on the LCD panel is pressed.
292	KEY_BACK	BACK Key	It turns ON while the BACK key on the LCD panel is pressed.
293	KEY_JOG_UP	Jog (Up) Key	It turns ON while the jog (up) key on the LCD panel is pressed.
294	KEY_JOG_DOWN	Jog (Down) Key	It turns ON while the jog (down) key on the LCD panel is pressed.
295	KEY_JOG_LEFT	Jog (Left) Key	It turns ON while the jog (left) key on the LCD panel is pressed.

No.	Abbreviation	Name	Description
296	KEY_JOG_RIGHT	Jog (Right) Key	It turns ON while the jog (right) key on the LCD panel is pressed.

Extended Input

Abbreviation	Name	Description
EXIN_1-EXIN_16	Extended Input 1-16	Input from extended input ports 1 to 16.

Virtual Output

Abbreviation	Name	Description
VOUT_1-VOUT_32	Virtual Output 1-32	Output from virtual outputs 1 to 32.

Extended Output

Abbreviation	Name	Description
EXOUT_1-EXOUT_16	Extended Output 1-16	Output from extended output ports 1 to 16.

Trigger Code Option No.

Abbreviation	Name	Description
TRIGGER_1-TRIGGER_16	Trigger Code Option No. 1-16	It turns ON when the sewing point with the trigger code set is reached during sewing or test feeding. Regardless of the sewing speed, it turns ON for approximately 50ms and then turns OFF.

Error Number

Abbreviation	Name	Description
ERR_NO_BIT0-ERR_NO_BIT9	Error No.: bit 0-bit9	The error number is represented in binary when an error occurs. Bit 0 is the least significant bit, and bit 9 is the most significant bit. When no error occurs, all bits are OFF. Example: When E011 occurs bit 9: OFF bit 8: OFF bit 7: OFF bit 6: OFF bit 5: OFF bit 4: OFF bit 3: ON bit 2: OFF bit 1: ON bit 0: ON

Program No.

Abbreviation	Name	Description
PRG_NO_BIT0- PRG_NO_BIT9	Program No.: bit 0-bit9	The program number displayed on the sewing screen is represented in binary. Bit 0 is the least significant bit, and bit 9 is the most significant bit. Example: When program number 100 is selected bit 9: OFF bit 8: OFF bit 7: OFF bit 6: ON bit 5: ON bit 4: OFF bit 3: OFF bit 2: ON bit 1: OFF bit 0: OFF

Split No.

Abbreviation	Name	Description
SPLIT_NO_BIT0- SPLIT_NO_BIT6	Split No.: bit 0-bit6	The split number displayed on the sewing screen is represented in binary. Bit 0 is the least significant bit, and bit 6 is the most significant bit.

Cycle Program No.

Abbreviation	Name	Description
CYCPRG_NO_BIT0- CYCPRG_NO_BIT4	Cycle program No.: bit 0-bit4	The cycle program number displayed on the sewing screen is represented in binary. Bit 0 is the least significant bit, and bit 4 is the most significant bit. Not in cycle program mode.

Cycle Program Step No.

Abbreviation	Name	Description
CYCPRG_STEP_BIT0- CYCPRG_STEP _BIT5	Cycle Program Step No.: bit 0-bit5	The cycle program step number displayed on the sewing screen is represented in binary. Bit 0 is the least significant bit, and bit 5 is the most significant bit. All functions will be OFF when not in cycle program mode.

Combine Input Signals

When the output type is Direct, Oneshot, or Periodic signal, multiple input signals can be combined into a single signal. The combination method can be selected from the following three options.

- ✓ AND: Only when all inputs are ON, otherwise OFF
- ✓ OR: ON when one or more of all inputs are ON, otherwise OFF
- ✓ XOR: ON only when an odd number of inputs are ON, otherwise OFF

Additionally, by setting NOT for each input signal, the ON/OFF state can be inverted during combination.

14-3-3. Output signal

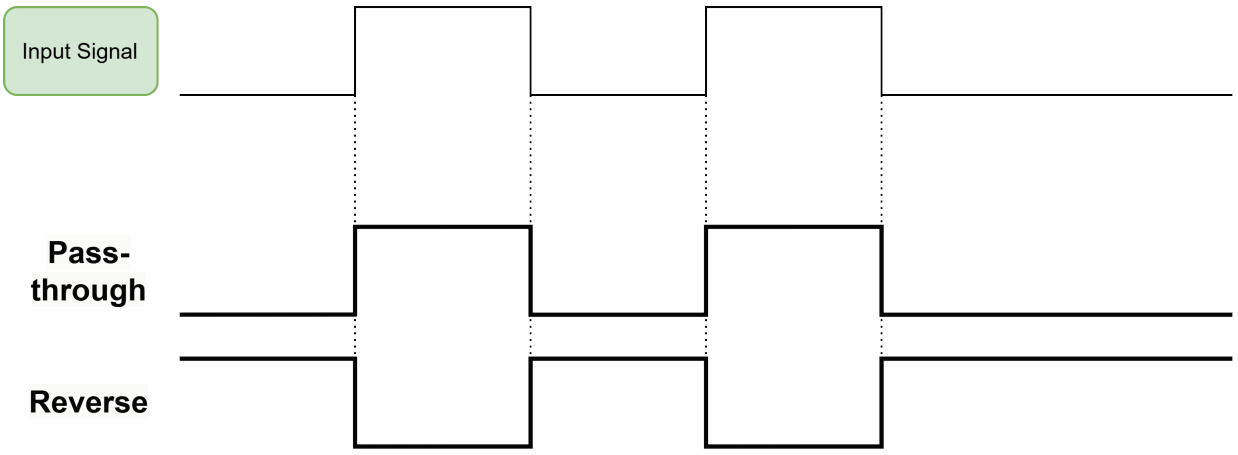
This section describes how to configure the behavior of the virtual output when a trigger is given by an input signal.

Output Signal Type List

Direct

The input signal can be output directly or inverted.

Item	Description
Mode	Pass-through: Outputs the input signal directly. Reverse: Outputs the input signal with ON/OFF inverted.

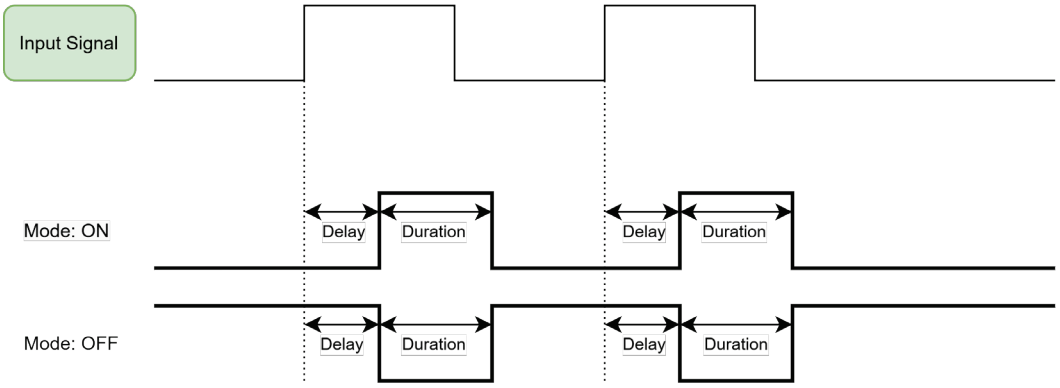


Oneshot

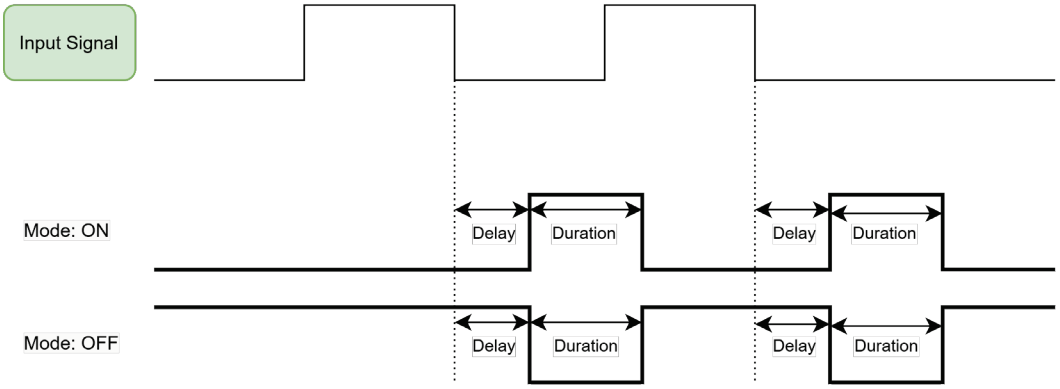
The signal is output only once after the trigger condition is met.

Item	Description
Mode	On: The normal output is OFF. When a trigger is given, the output is turned ON for a certain period and then turned OFF. Off: The normal output is ON. When a trigger is given, the signal is turned OFF for a certain period and then turned ON.
Trigger	Rising Edge: A trigger is given when the input changes from OFF to ON. Falling Edge: A trigger is given when the input changes from ON to OFF.
Delay	Delay time before changing the output signal after a trigger is given. Setting range: 0 - 5000ms Setting unit: 50ms
Duration	Time to maintain the output signal change after the delay time has elapsed following a trigger. Setting range: 0 - 5000ms Setting unit: 50ms

Trigger: Rising Edge



Trigger: Falling Edge

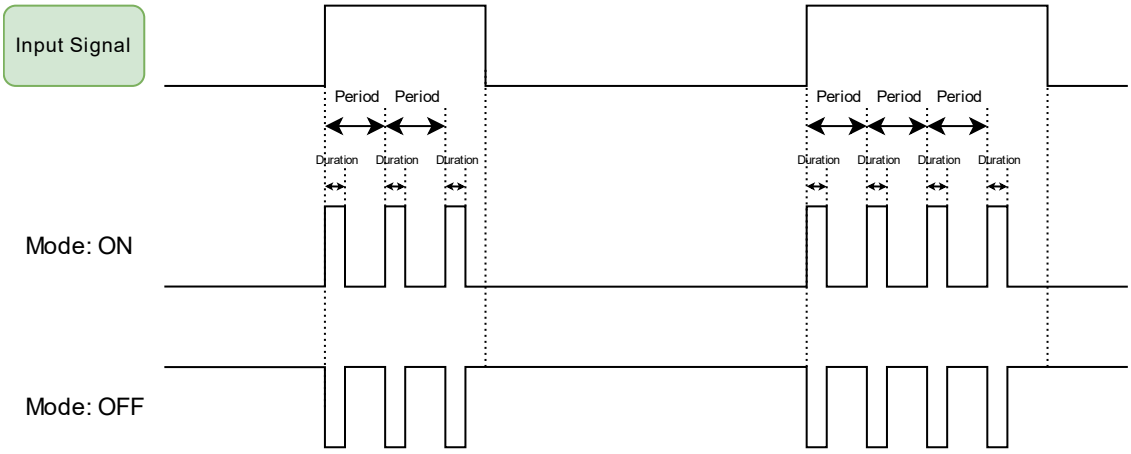


Periodic

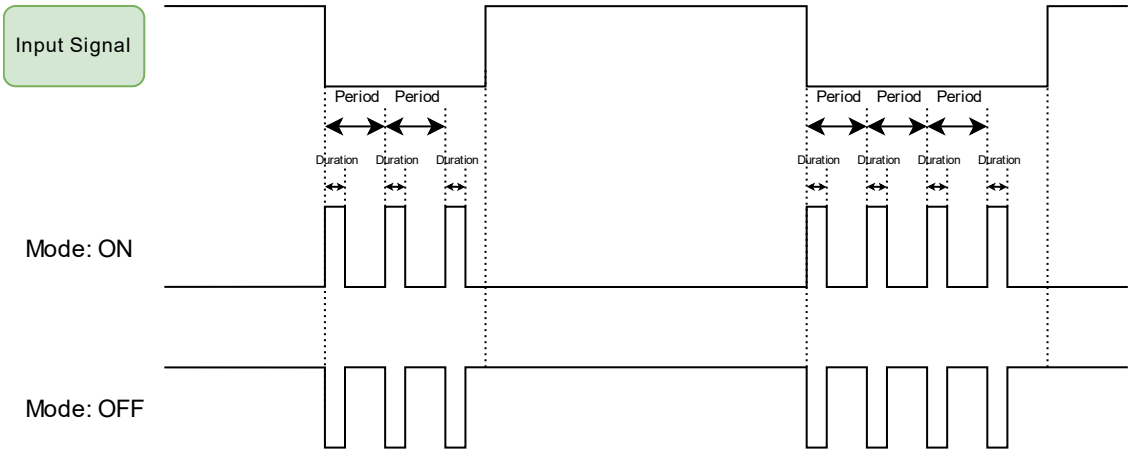
After the trigger condition is met, a periodic signal is output.

Item	Description
Mode	On: The normal output is OFF. When a start trigger is given, the output is turned ON for a certain period and then turned OFF, repeating this cycle. When an end trigger is given, the output is turned OFF. Off: The normal output is ON. When a start trigger is given, the output is turned OFF for a certain period and then turned ON, repeating this cycle. When an end trigger is given, the output is turned ON.
Trigger	Rising Edge: A start trigger is given when the input changes from OFF to ON, and an end trigger is given when the input changes from ON to OFF. Falling Edge: A start trigger is given when the input changes from ON to OFF, and an end trigger is given when the input changes from OFF to ON.
Period	The period of the output signal change after the start trigger is given. Setting range: 0 - 5000ms Setting unit: 50ms
Duration	The duration of the output signal change at the beginning of each cycle after the start trigger is given. This duration must be set shorter than the cycle period. Setting range: 50 - 4950ms Setting unit: 50ms

Trigger: Rising Edge



Trigger: Falling Edge

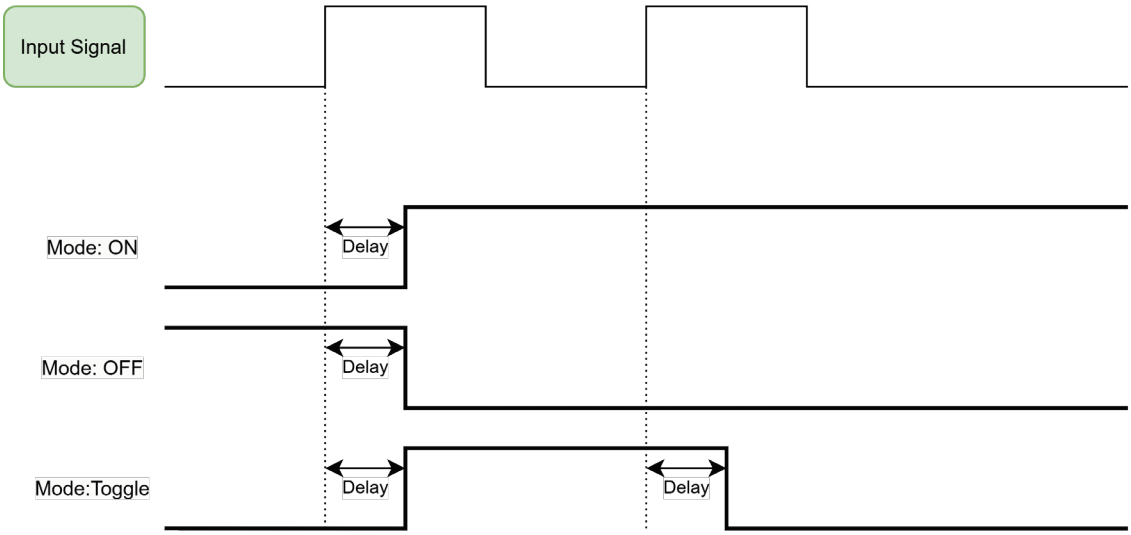


Switch

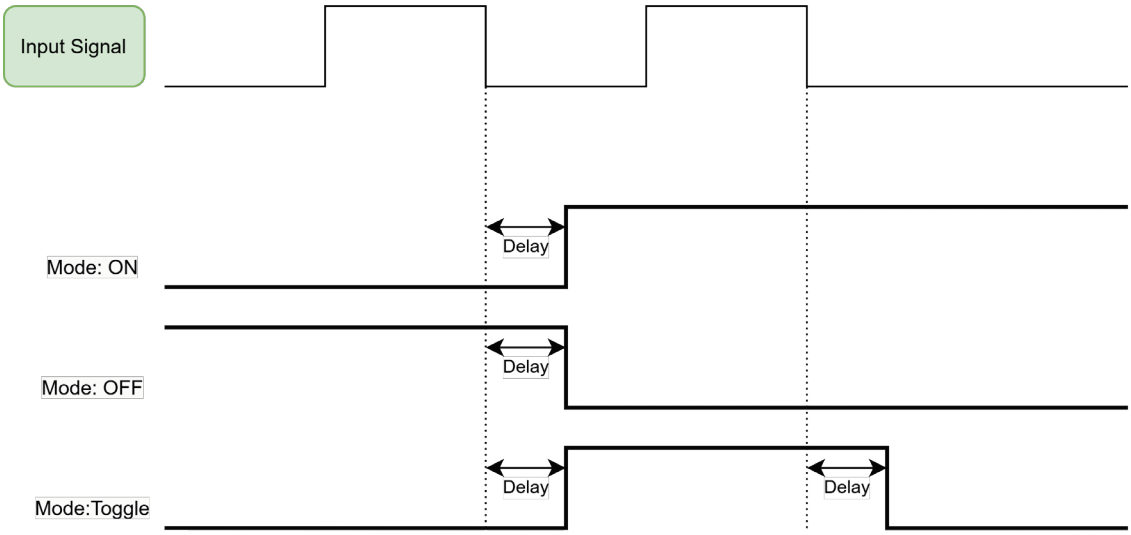
When a trigger is given, the output signal is turned OFF or ON. Unlike other output types, this can be set for individual input signals before synthesis.

Item	Description
Mode	On: When a trigger is given, the output is turned ON. Off: When a trigger is given, the output is turned OFF. Toggle: When a trigger is given, the output is turned ON if it is OFF, and turned OFF if it is ON. * Within a single virtual output, On/Off and Toggle cannot be mixed.
Trigger	Rising Edge: A trigger is given when the input changes from OFF to ON. Falling Edge: A trigger is given when the input changes from ON to OFF.
Delay	The time until the output signal changes after a trigger is given. Setting range: 0 - 5000ms Setting unit: 50ms

Trigger: Rising Edge

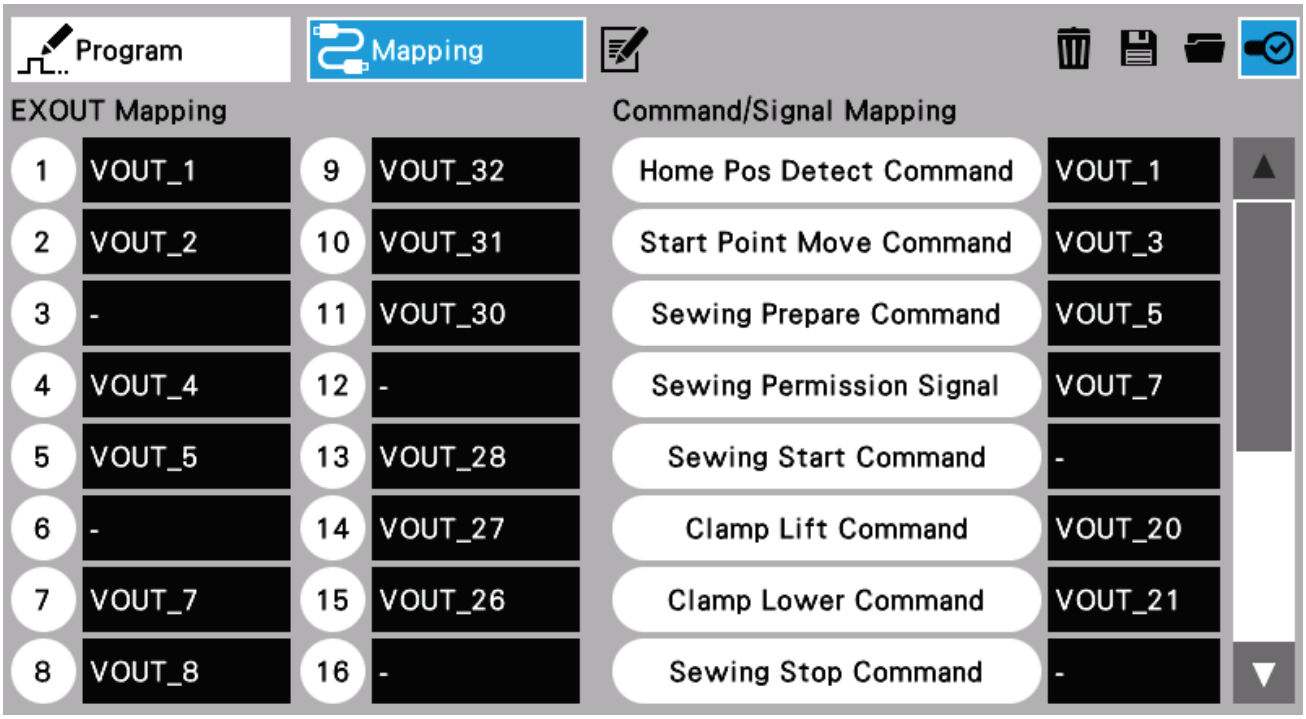


Trigger: Falling Edge



14-3-4. Virtual output mapping

Set how to assign the programmed virtual output to extended outputs, operation commands, and internal signals.



Operation Command / Internal Signal List

Name	Description
Origin Detection Command	Origin detection is performed when switching from OFF to ON. If origin detection cannot be performed, the command is ignored.
Start Point Move Command	Start point move is performed when switching from OFF to ON. If origin detection is incomplete, program number is not selected, or sewing is in progress, the command is ignored.
Sewing Preparation Command	When the start point has been moved, switching from OFF to ON performs preparations necessary to start sewing, such as lowering the presser. If the start point has not been moved, the command is ignored.
Sewing Permission Signal	When OFF, sewing cannot be started even if the start switch is pressed.
Sewing Start Command	Sewing starts when it changes from OFF to ON. If sewing cannot be started, it is ignored.
Clamp Lift Command	The clamp lifts when it changes from OFF to ON. If the clamp is already lifted or cannot be lifted, it is ignored.
Clamp Lower Command	The clamp lowers when it changes from OFF to ON. If the clamp is already lowered or cannot be lowered, it is ignored.
Sewing Stop Command	Sewing is stopped when switching from OFF to ON. If sewing is not in progress, the command is ignored.
Error Occurrence Command	When switching from OFF to ON, the machine operation stops and the error screen (E530) is displayed.
Error Reset Command	Error is reset when switching from OFF to ON. If no error is displayed or the error cannot be reset, the command is ignored.
Feed Plate Lock Command	The feed plate is locked when it changes from OFF to ON. If the feed plate is already locked or cannot be locked, it is ignored.
Feed Plate Unlock Command	The feed plate lock is released when it changes from OFF to ON. If the feed plate lock is already released or cannot be released, it is ignored.

Name	Description
Needle Bar Base Up Command	(Only for BAS370K) When switching from OFF to ON, the needle bar base is raised. If it is already raised or cannot be raised, the command is ignored.
Needle Bar Base Down Command	(Only for BAS370K) When switching from OFF to ON, the needle bar base is lowered. If it is already lowered or cannot be lowered, the command is ignored.
Operation Inhibit Signal Command	When ON, pedal and panel operations are disabled.

14-3-5. Example programs

Stacker control

Program the operation to extract the material and stack it simultaneously with the clamp lifting at the end of sewing.

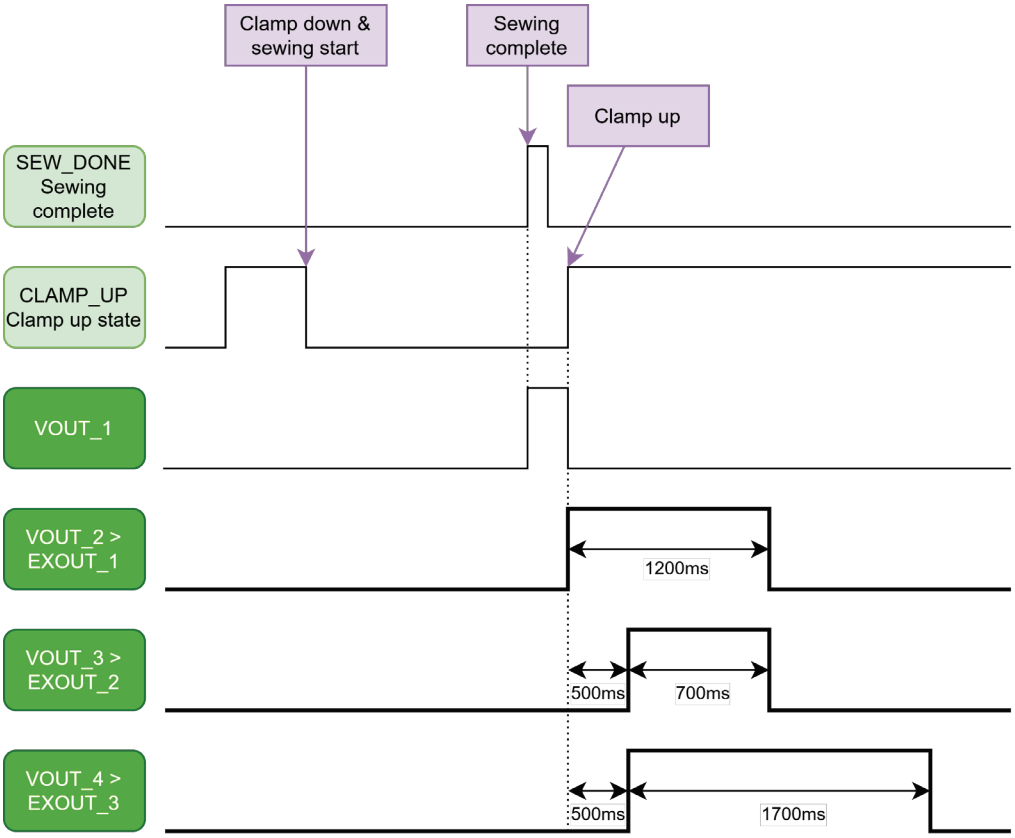
Mapping and Usage of Extended Outputs

Extended Output Port	Usage	Virtual Output
EXOUT 1	Material Presser	VOUT_2
EXOUT 2	Material Transport	VOUT_3
EXOUT 3	Air Blow	VOUT_4

Setting of Program

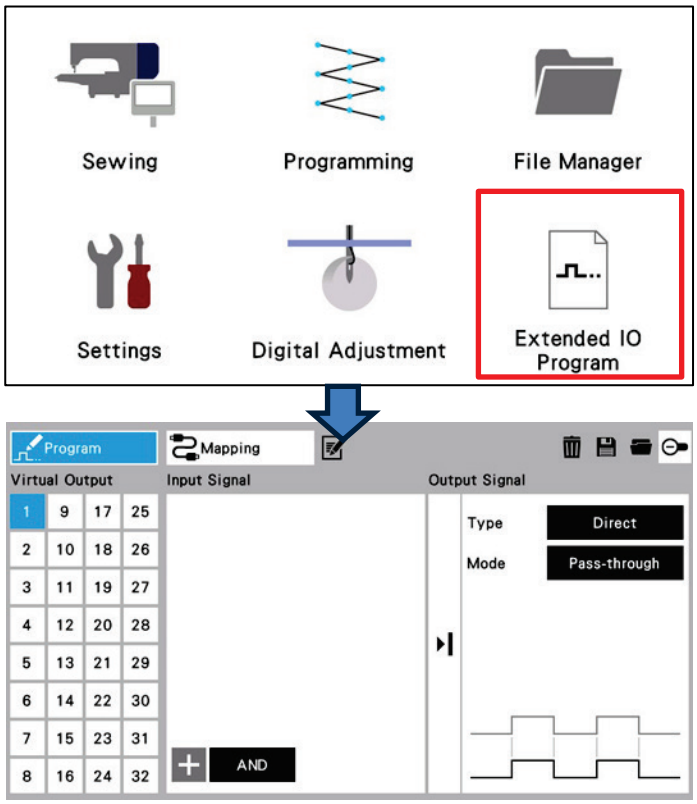
Virtual Output	Input Signal	Output Signal
VOUT_1	SEW_DONE: Sewing Complete	Type: Switch Mode: On Trigger: Rising edge Delay: 0ms
	CLAMP_UP: Clamp Up State	Type: Switch Mode: Off Trigger: Rising edge Delay: 0ms
VOUT_2	VOUT_1	Type: Oneshot Mode: On Trigger: Falling edge Delay: 0ms Duration: 1200ms
VOUT_3	VOUT_1	Type: Oneshot Mode: On Trigger: Falling edge Delay: 500ms Duration: 700ms
VOUT_4	VOUT_1	Type: Oneshot Mode: On Trigger: Falling edge Delay: 500ms Duration: 1700ms

Timing Chart

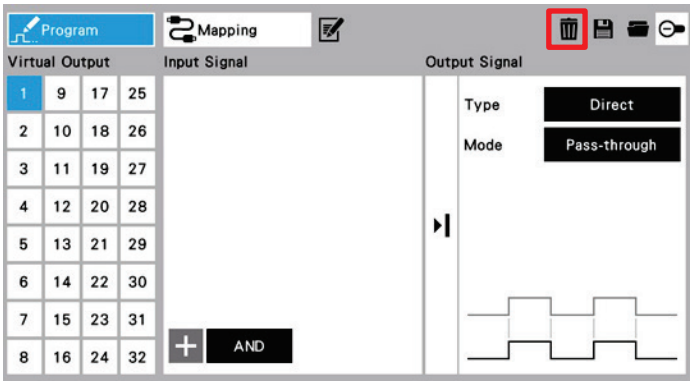


Program Steps

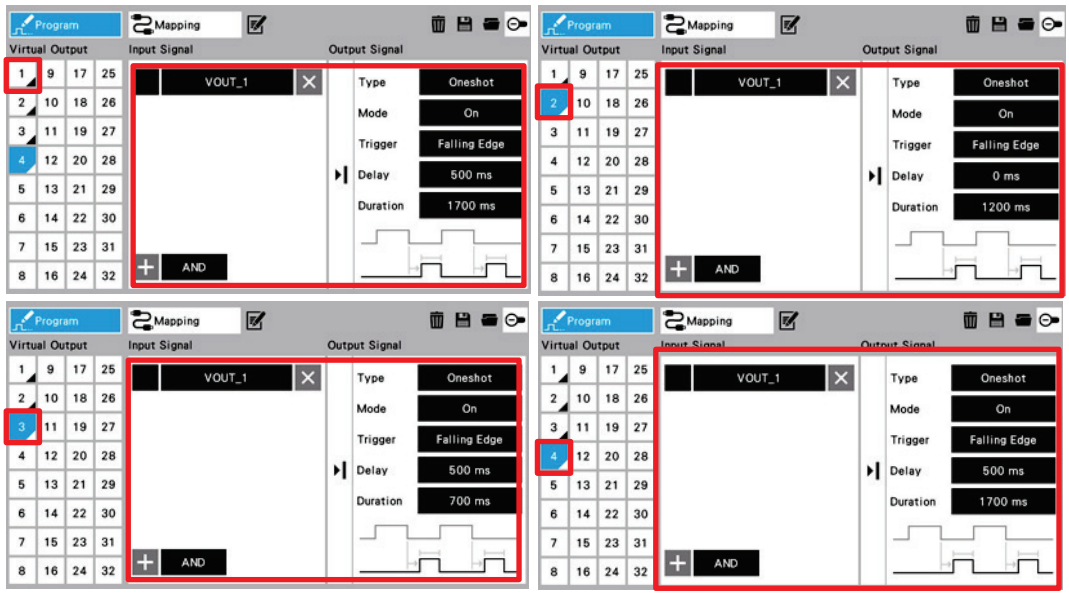
1. Displays the extended IO program screen.



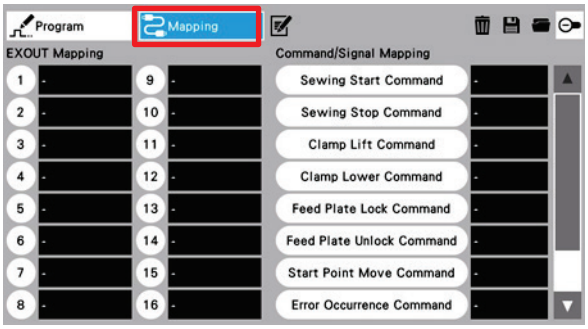
2. If there are already saved programs, press the delete button to initialize.



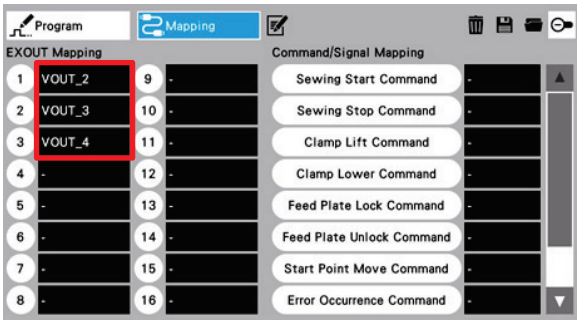
3. On the program screen, set the VOUT_1-VOUT_4 according to "Program Settings".



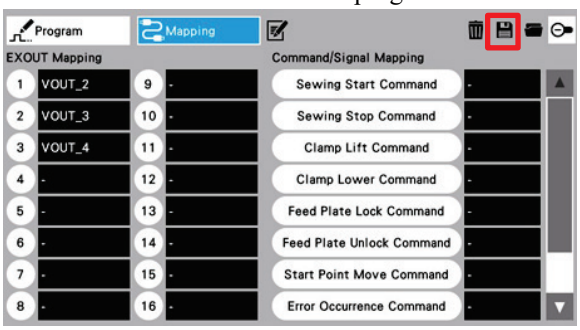
4. Display the mapping screen.



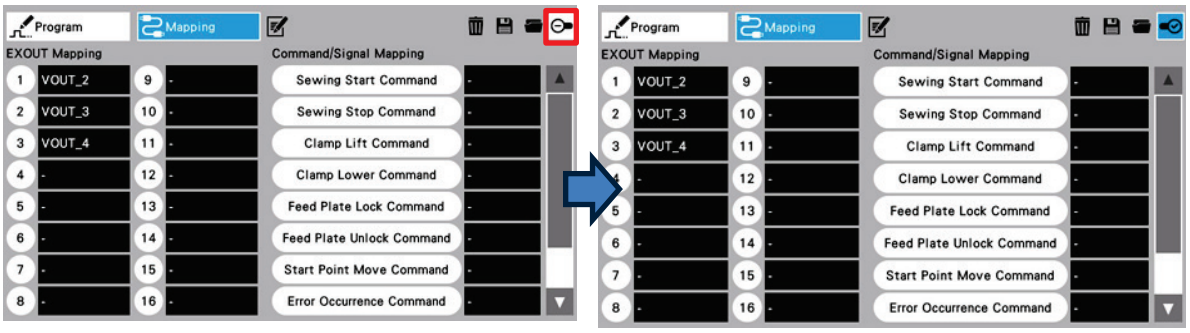
5. Set EXOUT_1-EXOUT_3 according to "Mapping and Usage of Extended Outputs".



6. Press the save button to save the program.



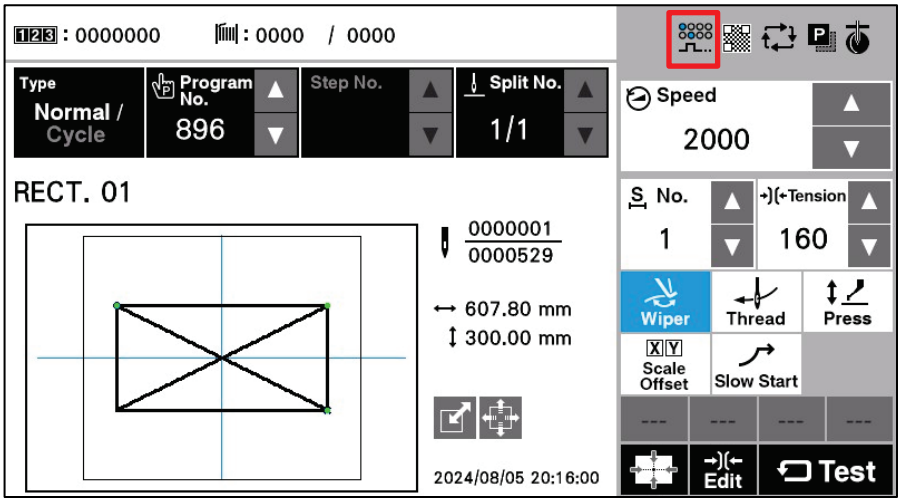
7. If the extended IO program is disabled, press the button to enable it.

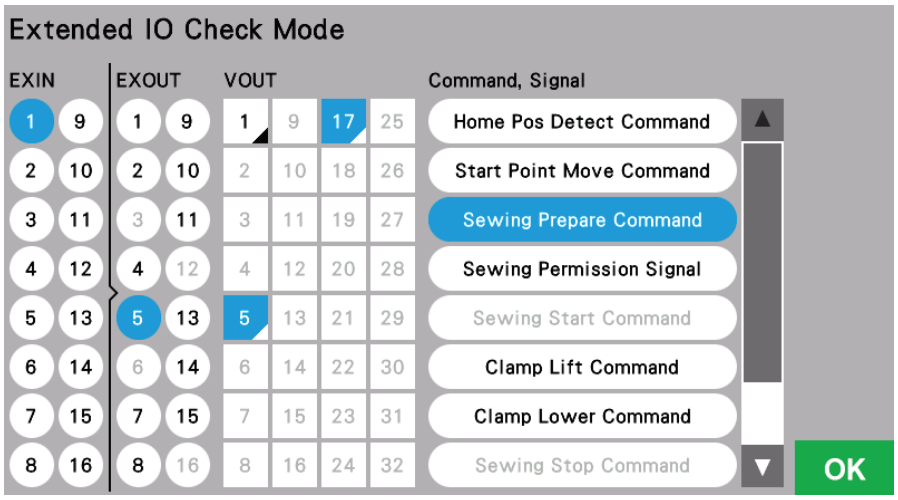


8. Press the key to exit.

14-3-6. Extended IO check mode

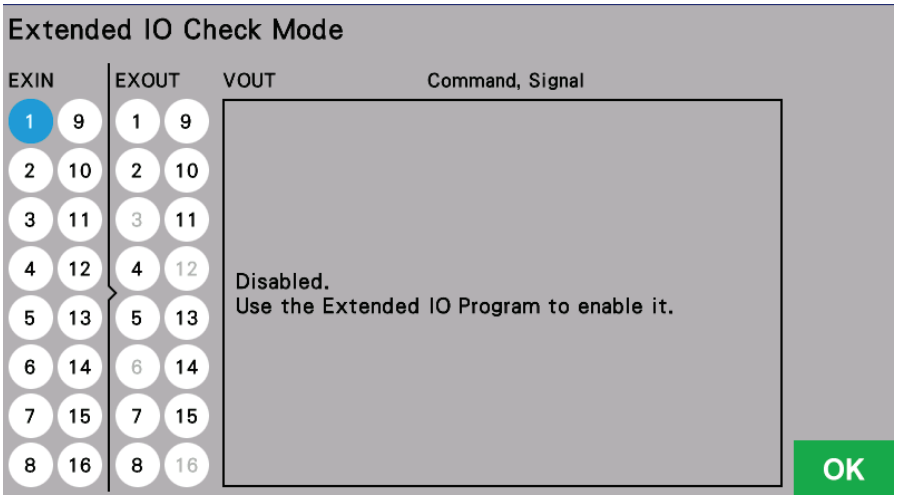
You can perform a simple operation check of the extended IO on the sewing screen.
Note: Signals that switch quickly may not be displayed correctly.





ON  OFF 

If the extended IO program is disabled, only checking of extended input and extended output is possible.



15. LIST OF ERROR CODES

⚠ DANGER

Wait at least 5 minutes after turning off the power switch and disconnecting the power cord from the wall outlet before opening the control box cover. Touching areas where high voltages are present can result in severe injury.

If a malfunction occurs with the sewing machine, a buzzer will sound and an error code will appear on the screen.
Follow the remedy procedure to eliminate the cause of the problem.

Switch-related errors

Code	Cause of error and remedy
E010	The STOP switch was pressed. Press the Reset key to clear the error.
E011	The STOP switch was pressed. Press the Reset key to clear the error. You can press the ◀ ▶ keys on the LCD panel to move the feed in order to continue sewing.
E012	The STOP switch was pressed. Press the Reset key to clear the error, and then depress the start switch or press both the left and right switches to move the feed mechanism to the home position.
E013	The STOP switch was pressed. Turn off the power, and then turn it back on again.
E015	Either the STOP switch is being pressed when the power is turned on or there is a connection failure with the pause switch. Turn off the power, Please check that connector X03 on the side of the control box, LX1, LX2, LX4, LX5, LX6, CN12 on the relay PCB SC7954 are plugged in.
E016	There is a connection failure with the STOP switch. Turn off the power, Please check that connector X03 on the side of the control box, LX1, LX2, LX4, LX5, LX6, CN12 on the relay PCB SC7954 are plugged in.
E020	The start switch was pressed without lowering the presser foot. Please lower the presser foot first.
E025	The start switch was pressed when the power was turned on. Please release the switch.
E035	The presser switch was pressed when the power was turned on. Please release the switch.
E050	The sewing machine head tilt was detected after power-on. Return the machine head to its original position and press the Reset key to clear the error. If the error cannot be cleared, turn off the power and check the connections of connector X03 on the control box side, connector LX3 on relay board SC7954, and connector CN12.
E051	The sewing machine head tilt was detected during operation. Return the machine head to its original position and press the Reset key to clear the error. If the error cannot be cleared, turn off the power and check the connections of connector X03 on the control box side, connector LX3 on the relay board SC7954, and connector CN12.
E055	The sewing machine head tilt was detected when the power was turned on. Return the machine head to its original position and clear the error. If the error cannot be cleared, turn off the power and check the connections of connector X03 on the control box side, connector LX3 on the relay board SC7954, and connector CN12.
E064	Touch panel was being touched when power was turned on. Turn off the power and then turn it back on again without touching the panel.
E065	A key on the LCD panel was still being pressed when the power was turned on, or key is defective. Turn off the power and then turn it back on again without touching panel.

Motor-related errors

Code	Cause of error and remedy
E100	It is time for grease up. Apply grease on needle bar and presser foot bar after turning off the power. After that, please reset the grease counter (Refer to "6-8. Applying grease")
E101	Time for grease up is approaching. Apply grease on needle bar and presser foot bar after turning off the power. After that, please reset the grease counter. To continue sewing without adding grease, press Reset key. (Refer to "6-8. Applying grease")
E106	The oil tank level is low. Press the Reset key to clear the error. Refill oil up to the upper reference line. (Refer to "3-10. Lubrication")
E107	The oil tank level is low. Press the Reset key to clear the error. Refill oil up to the upper reference line. (Refer to "3-10. Lubrication")
E110	The needle bar is not stopped in the needle up stop position. Turn the hand pulley until the point where the error display disappears.
E111	The upper shaft did not stop at the needle up stop position when the sewing machine stopped. Turn off the power and please check that connectors X11 and X13 on the side of the control box are plugged in.
E120	Return the index plunger to the original position.
E130	The main motor has stopped abnormally, or the main shaft encoder is defective. Turn off the power and turn the hand pulley to check if the sewing machine is locked. Please check that connectors X11 and X13 on the side of the control box are plugged in.
E131	There is a connection failure with the main shaft encoder. Turn off the power and please check that connector X13 on the side of the control box are plugged in.
E132	Abnormal rotation of the main motor was detected. Turn off the power and please check that connectors X11 and X13 on the side of the control box are plugged in.
E133	The stop position of the main motor is incorrect. Turn off the power and please check that connectors X11 and X13 on the side of the control box are plugged in.
E136	The current sensor of the main motor has detected an error. Please turn off the power and then turn it back on. If the same error occurs repeatedly, replace the power board SC7942.
E150	Main motor is overheating, or temperature sensor is defective. Turn off the power, and then check the main motor. (When sewing data with a small number of stitches (15 stitches or less) is sewn repeatedly, the main motor may overheat and this error code may be generated.)
E151	The main motor temperature sensor is defective. Turn off the power, and then check the main motor.
E161	The main motor has detected an overload. Please turn off the power and check for any abnormalities in the movement of the main motor.

Feed mechanism-related errors

Code	Cause of error and remedy
E200	The home position of the X feed motor cannot be detected. There is a problem with the X feed motor, or there is a connection failure with the home position sensor. Turn off the power and please check that connectors X03, X21, X23 on the side of the control box, connectors LX7, CN12 on the relay board SC7954 are plugged in.
E201	The X feed motor has stopped abnormally. Turn off the power and check if there is any abnormality in the X feed direction. Turn off the power and please check that connectors X21 and X23 on the side of the control box are plugged in.
E202	X-feed motor stopped abnormally due to encoder signal problem. Turn off the power, and then check that connector X23 on the side of the control box are properly plugged in.
E206	The current sensor of the X-feed motor has detected an error. Please turn off the power and then turn it back on. If the same error occurs repeatedly, replace the drive board SC7944.
E210	The home position of the Y feed motor cannot be detected. Either the Y feed motor is abnormal or there is a connection failure with the Y home position sensor. Turn off the power and please check that connectors X03, X22, and X24 on the side of the control box, and connectors LX10, CN12 on relay PCB SC7954 are plugged in.
E211	Y feed motor stopped abnormally. Turn off the power and check if there is any abnormality in the Y feed direction. Turn off the power and check that connectors X22 and X24 on the side of the control box are plugged in.
E212	Y-feed motor stopped abnormally due to encoder signal problem. Turn off the power, and then check that connector X24 on the side of the control box are properly plugged in.
E216	The current sensor of the Y-feed motor has detected an error. Please turn off the power and then turn it back on. If the same error occurs repeatedly, replace the drive board SC7944.
E250	X-feed motor is overheating. Turn off the power, and then check the X-feed motor.
E251	X-feed motor temperature sensor is defective. Turn off the power, and then check the X-feed motor.
E260	Y-feed motor is overheating. Turn off the power, and then check the Y-feed motor.
E261	Y-feed motor temperature sensor is defective. Turn off the power, and then check the Y-feed motor.

Work clamp-related errors

Code	Cause of error and remedy
E300	Presser foot home position cannot be detected. Problem with work clamp motor or there is a connection failure with the work clamp home position sensor. Turn off the power, and then check that connectors X12 and X14 on the side of the control box are plugged in.
E301	Work clamp raised or lowered position cannot be detected. Turn off the power, and then check if there is any problems in the work clamp vertical direction. Turn off the power, and then check that connectors X12 and X14 on the side of the control box are plugged in.
E306	The current sensor of the presser foot motor has detected an error. Please turn off the power and then turn it back on. If the same error occurs repeatedly, replace the power board SC7942.
E307	The presser foot home position adjustment may not have been performed, or the position may have shifted from the last adjustment. Please perform the presser foot home position adjustment again.
E390	The thickness is out of setting range of thickness detect code. Press the Reset key to clear the error. And then confirm that the material is set properly.
E391	Thickness detection code has been reached without obtaining reference height. Press the Reset key to clear the error, and then depress the start switch to move the feed mechanism to the home position. If the error occurs again, check the sewing data.
E392	The setting range of thickness detection exceeds the maximum presser foot height. Press the Reset key to clear the error, and then check the reference height and settings of thickness detection code.
E393	Thickness exceeds the maximum presser foot height. Press the Reset key to clear the error. And then confirm that the material is set properly.
E394	Thickness exceeds the maximum presser foot height. Press the Reset key to clear the error. And then confirm that the material is set properly.

Communication and memory-related errors

Code	Cause of error and remedy
E400	Communication error between the main PCB and the panel was detected when the power was turned on. Turn off the power, and then check that the connector CN4 on the main PCB inside the LCD panel, the connector X06 on the side of the control box are plugged in.
E402	Communication error detected between CPUs. Turn off the power, and then turn it back on again.
E415	Communication error detected between main PCB and the sewing defect detector PCB. Please check connection between main PCB and sewing defect detector PCB, after that please restart the sewing machine.
E416	Communication error detected between the main PCB and the sewing defect detector PCB. Press the Reset key to clear the error.
E420	No external media is inserted. Press the Reset key to clear the error. Insert the external media and then try again.
E421	The program number is invalid or it has no corresponding data. Press the Reset key to clear the error. Check that data for this program number is present.
E424	Error occurred while reading data. Press the Reset key to clear the error. Check the data.
E425	Error occurred while writing data. Press the Reset key to clear the error.
E426	Error occurred while initializing data. Press the Reset key to clear the error.
E427	A program included in the cycle program does not exist. Press the Reset key to clear the error.
E430	Cannot access the main PCB (flash memory). Turn off the power, and then turn it back on again.

Code	Cause of error and remedy
E440	Cannot access the main PCB (EEPROM). Turn off the power, and then turn it back on again.
E445	Cannot access the programmer main PCB (EEPROM). Turn off the power, and then turn it back on again.
E450	Unable to read the model selection from head detector. Turn off the power and please check that connector X05 on the side of the control box is plugged in.
E452	Head detector is not connected. Turn off the power and check that connector X05 on the side of the control box is plugged in. Pressing the Reset key will clear the error and start the machine using the backup data in the head detector.
E453	Problem with data in head detector. Turn off the power, and then turn it back on again.
E454	Problem with data in head detector. Turn off the power, and then turn it back on again.
E460	Communication error detected between the main CPU and the expansion microcontroller. Turn off the power, and then turn it back on again.
E461	Communication error detected between the main CPU and the expansion microcontroller. Turn off the power, and then turn it back on again.
E465	Communication error detected between the main CPU and the expansion microcontroller. Turn off the power, and then turn it back on again.
E466	Communication error detected between the main CPU and the expansion microcontroller. Turn off the power, and then turn it back on again.
E471	The program number is invalid or it has no corresponding data. Check that data for this program number is present on the internal memory.
E474	External media is full and copying is not possible. Press the Reset key to clear the error. Please ensure that the external media has enough capacity.
E475	SD card inside control box cannot be recognized. Turn off the power and check that the SD card is plugged in.
E480	No storage media is inserted. Press the Reset key to clear the error. Insert the storage media into sewing defect detector and then try again.

Data editing-related errors

Code	Cause of error and remedy
E500	The enlargement ratio setting or the offset setting caused the sewing data to extend outside the sewing area. Set the enlargement ratio or the offset again. Press the Reset key to clear the error.
E502	The enlargement ratio caused the stitch length to exceed the maximum stitch length of 20.0mm. Press the Reset key to clear the error. Set the enlargement ratio again.
E510	Error in data. Press the Reset key to clear the error. Please try again. If an error occurs while reading the data, revise the data.
E512	Number of stitches exceeds allowed maximum. Press the Reset key to clear the error.
E521	Failed to load the extended IO program. Starting with initial settings. Please reconfigure the extended IO program.
E522	The extended IO program contains invalid data. Discarding the loaded data.
E530	Stopped due to an error instructed by the extended IO program.
E540	Failed to load set of digital adjustment target value. The target value will be reset to default value. Please reset the set of target value again.

Code	Cause of error and remedy
E541	Failed to assign the target value set. The target value set will be reset to default value. Please reset the target value assignment.
E542	Failed to load digital adjustment reference values. The target value will be reset to default value. Please redo the needle bar height sensor, hook timing sensor, needle guard and needle clearance reference adjustment.
E543	Failed to load digital adjustment target value setting history. Starting up without history. Changing the target value settings will recreate the target value setting history.
E582	Memory switch file cannot be read correctly. Press the Reset key to clear the error.
E583	User parameter file cannot be read correctly. Press the Reset key to clear the error.

Device-related errors

Code	Cause of error and remedy
E610	Sewing defect has occurred. Press the Reset key to clear the error. After that, the details of the defect will appear. Re-sewing is possible.
E630	The needle bar position cannot be detected. Needle bar position sensor is defective or has a connection failure. Turn off the power, and then check that connector X04 on the side of the control box and connector UX6 on relay PCB SC7952 are plugged in.
E632	Driver rotation cannot be detected. Turn off the power and check if the hook timing is correct or not. Check the connections of connector X02 on the side of the control box, and connectors DX2 and CN8 on the relay board SC7956.
E634	The needle guard has exceeded the threshold. Please perform needle guard and needle clearance adjustments. Alternatively, turn off the power and check the connection of connector X34 on the side of the control box. If you have replaced the main board, driver board, VR board, or encoder board, please perform sensor adjustment in the order of "Needle guard sensor" and then "Needle clearance sensor". For details, refer to the service manual.
E635	The needle guard cannot be detected. Please perform sensor adjustment for the "Needle guard sensor". For details, refer to the service manual.
E636	The needle clearance has exceeded the threshold. Please perform needle clearance adjustment. Alternatively, turn off the power and check the connection of connector X44 on the side of the control box. If you have replaced the main board, driver board, VR board, or encoder board, please perform sensor adjustment in the order of "Needle guard sensor" and then "Needle clearance sensor". For details, refer to the service manual.
E637	The needle clearance cannot be detected. Please perform sensor adjustment for the "Needle clearance sensor". For details, refer to the service manual.
E690	The home position of the thread trimming motor cannot be detected. The thread trimming motor is defective or there is a connection failure. Turn off the power and check that there is no lint tangled behind the throat plate. Please check that connectors X42 and X45 on the side of the control box are plugged in.
E691	Thread trimming and releasing was not completed. Turn off the power, and then check if the cutting edges of the fixed knife and movable knife are not damaged or worn.
E692	The thread trimming motor has stopped abnormally. The thread trimming motor is defective or there is a connection failure. Turn off the power and check that there is no lint tangled below the needle plate. Please check that connectors X42 and X45 on the side of the control box are plugged in.

P.C. board-related errors

Code	Cause of error and remedy
E700	Abnormal rise in power supply voltage. Turn off the power, and then check the input voltage.
E701	Abnormal rise in main motor drive voltage. Turn off the power, and then check the voltage.
E705	Abnormal drop in power supply voltage. Turn off the power, and then check the input voltage.
E710	Abnormal current in the main motor was detected. Turn off the power and check for any abnormality in the sewing machine. Turn off the power and please check that connectors X11 and X13 on the side of the control box are plugged in.
E711	Abnormal current detected in X-feed motor. Turn off the power, and then check if there are any problems with the X-feed movement.
E712	Abnormal current detected in Y-feed motor. Turn off the power, and then check if there are any problems with the Y-feed movement.
E713	Abnormal current detected in X-feed or Y-feed motor. Turn off the power, and then check if there are any problems with the X-feed or Y-feed movement.
E714	Abnormal current detected in presser foot motor. Turn off the power, and then check if there are any problems with the presser foot operation.
E715	Abnormal current detected in thread trimming motor. Turn off the power, and then check if there are any problems with the thread trimmer movement.
E720	Abnormal drop in power supply voltage was detected. Turn off the power, and then turn it back on again.
E721	Abnormal drop in power supply voltage was detected. Turn off the power and check the connections of connectors X06, X13, X14, X23, X24, X34, X44, and X45 on the control box side.
E722	Abnormal drop in power supply voltage was detected. Turn off the power and check for any abnormality in the analog pedal or any sensor. Check the connections of connectors X01, X02, X04, X34, and X44 on the control box side.
E723	Abnormal drop in power supply voltage was detected. Turn off the power and check for any abnormality in the needle clearance sensor. Check the connection of connector X46 on the control box side.
E724	Abnormal drop in power supply voltage was detected. Turn off the power and check that connector X06 on the side of the control box is plugged in.
E725	Abnormal drop in power supply voltage was detected. Turn off the power and check that connector CN30, CN31, CN32, CN34 of main PCB are plugged in.
E726	Abnormal drop in power supply voltage was detected. Turn off the power and check for any abnormality in cable harness of connector X02, X03, X04 on the side of the control box.
E727	Abnormal drop in power supply voltage was detected. Turn off the power and check for any abnormality in cable harness of connector X02, X03, X04, X05 on the side of the control box.
E728	Abnormal drop in power supply voltage was detected. Turn off the power and check for any abnormality in the connection to the external general purpose IO PCB on the side of the control box.
E730	External error input (AIRSW) detected. Turn off the power, and then check the air pressure.
E740	The control box cooling fan is not working. Turn off the power and check that there is no tangled lint, etc. Please check that connector CN16 on the main PCB is plugged in.
E741	X-feed motor cooling fan does not operate. Turn off the power, and then check if the cooling fan is blocked with scraps of thread. Check the connections of connector X03 on the side of the control box, and connectors LX13 and CN12 on the relay board SC7954.

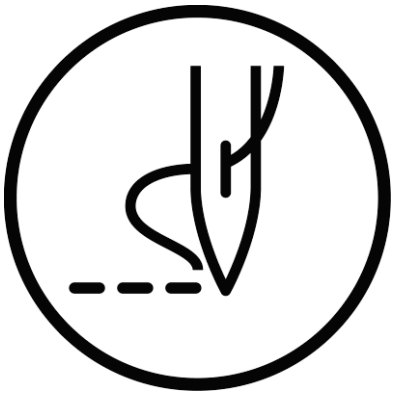
Code	Cause of error and remedy
E742	Y-feed motor cooling fan does not operate. Turn off the power, and then check if the cooling fan is blocked with scraps of thread. Check the connections of connector X04 on the side of the control box, and connectors UX1 and CN5 on the relay board SC7952.
E750	Abnormal drop in power supply voltage for internal clock backup power was detected. Please correct the date in the Date and Time Setting menu.
E751	The internal clock has become abnormal. Turn off the power and check for any abnormality in cable harness of connector X06 on the side of the control box.
E752	Panel has been replaced. Please set the date in the Date and Time Setting menu.
E760	A communication error has occurred with the needle guard encoder. Turn off the power and check that the connector X34 on the main PCB is properly inserted.

Version updating-related errors

Code	Cause of error and remedy
E882	Updating from the current version to an earlier version is not supported. Please stay with the latest version or update to a newer version.
E883	Software data is not present in the storage media. Check that the software data has been saved into the correct folder.
E884	There is a problem with the software data. Write the correct file into the storage media.
E885	Software data is not present in the storage media. Check that the software data has been saved into the correct folder in the storage media inserted into the sewing defect detector device.
E886	There is a problem with the software data. Write the correct data into the storage media inserted into the sewing defect detector device.
E887	Software updating was not completed. Turn off the power, and then turn it back on again.
E890	Software updating was not completed. Please try again.
E910	The combination of boot software and main software is incorrect. Please update to the correct version of the software.
E920	Failed to read bar-code. Press the Reset key to clear the error.
E930	Interface version of sewing defect detector is not supported. Please check the sewing defect detector software version.
E931	No user software is installed in sewing defect detector. Please install user software.
E932	Error is detected on the sewing defect detector. Please refer to the instruction manual for details.
E933	The accumulated data capacity has reached the limit of the sewing defect detector. Press Reset key to clear the error and delete unnecessary data from the data accumulation in the sewing defect detector settings.
E934	The data required for outlier detection is being loaded. Please wait until the loading is complete. (The behavior can be configured in sewing defect detection parameter No. 661.)
E935	An internal error occurred: Defect detector amplifier not connected. Turn off the power, then turn it on again.
E936	An internal error occurred: Defect detector SD card not connected. Turn off the power, then turn it on again.
E995	Failure was detected in the control program. Turn off the power, and then turn it back on again.

If an error code that is not listed above appears or if carrying out the specified remedy does not solve the problem, contact the place of purchase.

brother



INSTRUCTION MANUAL

* Please note that the contents of this manual may differ slightly from the actual product purchased as a result of product improvements.

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This is the original instructions.

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