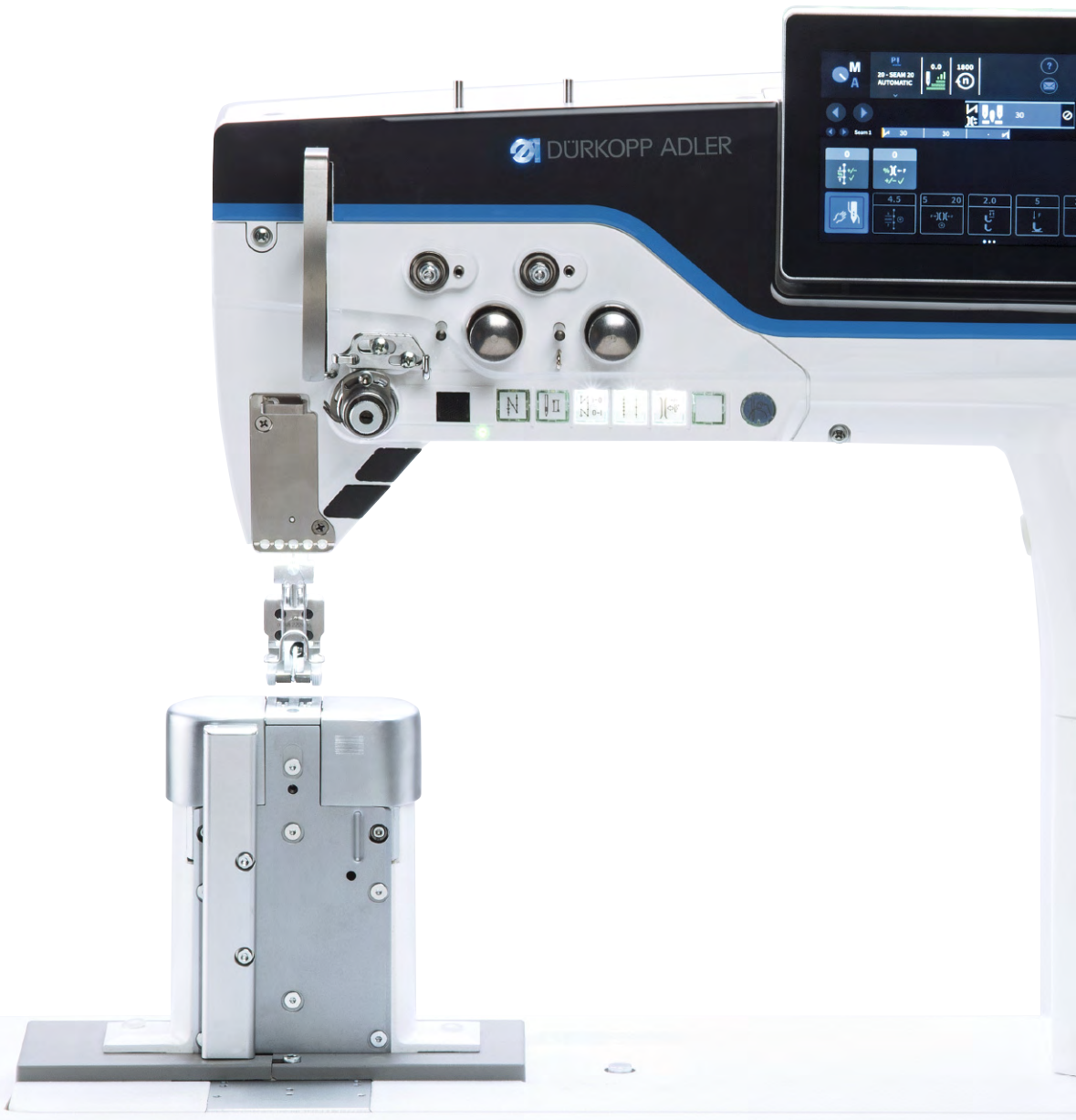
DÜRKOPP ADLER

D868

M-TYPE DELTA

Service Instructions



IMPORTANT
READ CAREFULLY BEFORE USE
KEEP FOR FUTURE REFERENCE

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1 About these instructions

These instructions have been prepared with utmost care. They contain information and notes intended to ensure long-term and reliable operation.

Should you notice any discrepancies or if you have improvement requests, then we would be glad to receive your feedback through **Customer Service** (📖 *p. 199*).

Consider these instructions as part of the product and keep it easily accessible.

1.1 For whom are these instructions intended?

These instructions are intended for:

- Specialists:
  This group has the appropriate technical training for performing maintenance or repairing malfunctions.

With regard to minimum qualification and other requirements to be met by personnel, please also follow the chapter **Safety** (📖 *p. 9*).

1.2 Representation conventions – symbols and characters

Various information in these instructions is represented or highlighted by the following characters in order to facilitate easy and quick understanding:

Proper setting

Specifies proper setting.

Disturbances

Specifies the disturbances that can occur from an incorrect adjustment.

Cover

Specifies which covers must be disassembled in order to access the components to be set.

Steps to be performed when operating the machine (sewing and equipping)

Steps to be performed for service, maintenance, and installation

Steps to be performed via the software control panel

The individual steps are numbered:

1. First step
2. Second step

… The steps must always be followed in the specified order.

- Lists are marked by bullet points.

Result of performing an operation

Change to the machine or on the display/control panel.

Important

Special attention must be paid to this point when performing a step.

Information

Additional information, e.g. on alternative operating options.

Order

Specifies the work to be performed before or after an adjustment.

References

🕮 Reference to another section in these instructions.

Safety Important warnings for the user of the machine are specifically marked. Since safety is of particular importance, hazard symbols, levels of danger and their signal words are described separately in the chapter **Safety** (🕮 *p. 9*).

Location information If no other clear location information is used in a figure, indications of **right** or **left** are always from the user's point of view.

1.3 Other documents

The machine includes components from other manufacturers. Each manufacturer has performed a hazard assessment for these purchased parts and confirmed their design compliance with applicable European and national regulations. The proper use of the built-in components is described in the corresponding manufacturer's instructions.

1.4 Liability

All information and notes in these instructions have been compiled in accordance with the latest technology and the applicable standards and regulations.

Dürkopp Adler cannot be held liable for any damage resulting from:

- Breakage and transport damages
- Failure to observe these instructions
- Improper use
- Unauthorized modifications to the machine
- Use of untrained personnel
- Use of unapproved parts

Transport

Dürkopp Adler cannot be held liable for breakage and transport damages. Inspect the delivery immediately upon receiving it. Report any damage to the last transport manager. This also applies if the packaging is not damaged.

Leave machines, equipment and packaging material in the condition in which they were found when the damage was discovered. This will ensure any claims against the transport company.

Report all other complaints to Dürkopp Adler immediately after receiving the product.

2 Safety

This chapter contains basic information for your safety. Read the instructions carefully before setting up or operating the machine. Failure to do so can result in serious injury and property damage.

2.1 Basic safety instructions

The machine may only be used as described in these instructions.

These instructions must be available at the machine's location at all times.

Work on live components and equipment is prohibited. Exceptions are defined in the DIN VDE 0105.

For the following work, switch off the machine at the main switch or disconnect the power plug:

- Replacing the needle or other sewing tools
- Leaving the workstation
- Performing maintenance work and repairs
- Threading

Missing or faulty parts could impair safety and damage the machine. Only use original parts from the manufacturer.

Transport

Use a lifting carriage or stacker to transport the machine. Raise the machine max. 20 mm and secure it to prevent it from slipping off.

Setup

The connecting cable must have a power plug approved in the relevant country. The power plug may only be assembled to the power cable by qualified specialists.

Obligations of the operator

Follow the country-specific safety and accident prevention regulations and the legal regulations concerning industrial safety and the protection of the environment.

All the warnings and safety signs on the machine must always be in legible condition. Do not remove!
Missing or damaged warnings and safety signs must be replaced immediately.

Requirements to be met by the personnel

Only qualified specialists may be used for:

- Setting up the machine/putting the machine into operation
- Performing maintenance work and repairs
- Performing work on electrical equipment

Only authorized persons may work on the machine and must first have understood these instructions.

Operation

Check the machine during operating for any externally visible damage. Stop working if you notice any changes to the machine. Report any changes to your supervisor. Do not use a damaged machine any further.

Safety equipment

Safety equipment should not be disassembled or deactivated. If it is essential to disassemble or deactivate safety equipment for a repair operation, it must be assembled and put back into operation immediately afterward.

2.2 Signal words and symbols used in warnings

Warnings in the text are distinguished by color bars. The color scheme is based on the severity of the danger. Signal words indicate the severity of the danger.

Signal words

Signal words and the hazard they describe:

Signal word	Meaning
DANGER	(with hazard symbol) If ignored, fatal or serious injury will result
WARNING	(with hazard symbol) If ignored, fatal or serious injury can result
CAUTION	(with hazard symbol) If ignored, moderate or minor injury can result
CAUTION	(with hazard symbol) If ignored, environmental damage can result
NOTICE	(without hazard symbol) If ignored, property damage can result

Symbols

The following symbols indicate the type of danger to personnel:

Symbol	Type of danger
	General
	Electric shock

Symbol	Type of danger
	Puncture
	Crushing
	Environmental damage

Examples Examples of the layout of warnings in the text:

DANGER

Type and source of danger!

Consequences of non-compliance.

Measures for avoiding the danger.

↳ This is what a warning looks like for a hazard that will result in serious injury or even death if ignored.

WARNING

Type and source of danger!

Consequences of non-compliance.

Measures for avoiding the danger.

↳ This is what a warning looks like for a hazard that could result in serious or even fatal injury if ignored.

CAUTION

Type and source of danger!

Consequences of non-compliance.

Measures for avoiding the danger.

↳ This is what a warning looks like for a hazard that could result in moderate or minor injury if the warning is ignored.

CAUTION

Type and source of danger!

Consequences of non-compliance.

Measures for avoiding the danger.

↳ This is what a warning looks like for a hazard that could result in environmental damage if ignored.

NOTICE

Type and source of danger!

Consequences of non-compliance.

Measures for avoiding the danger.

↳ This is what a warning looks like for a hazard that could result in property damage if ignored.

3 Working basis

3.1 Order of the adjustments

Order

The setting positions for the machine are interdependent.

Always comply with the order of individual adjustment steps as specified.

It is absolutely essential that you follow all notices regarding prerequisites and subsequent settings that are marked with  in the margin.

NOTICE

Property damage may occur!

Risk of machine damage from incorrect order.

It is essential to follow the working order specified in these instructions.

3.2 Laying the cables

Ensure that all cables are laid in the machine such that the function of moving parts is not hampered.

To lay the cables:

1. Lay any excess cables neatly in proper cable snakes.
2. Bind together the cable loops with cable ties.

Important

Tie loops wherever possible to fixed parts.
The cables must be secured firmly.

3. Cut off any overlapping cable ties.

NOTICE

Property damage may occur!

Excess cables can impair the functioning of moving machine parts. This impairs the sewing function and can result in damage.

Lay excess cables as described above.

3.3 Calling up the service routine

The machine must remain switched on for the following settings, as switching off will delete the required programmed values:

- Disassembling and assembling the feed dog
- Adjusting the feed dog
- Adjusting the feed dog feed movement
- Aligning the needle bar linkage
- Adjusting the looping stroke position
- Adjusting the needle bar height
- Adjusting an even sewing foot stroke
- Adjusting the feeding foot movement

Call up the corresponding service routine to be able to make settings on the active machine without any risk. In the service routine, the machine moves to the correct position and the power is switched off as soon as the **Service Stop** button is pressed. The settings are preprogrammed and changes are not possible.

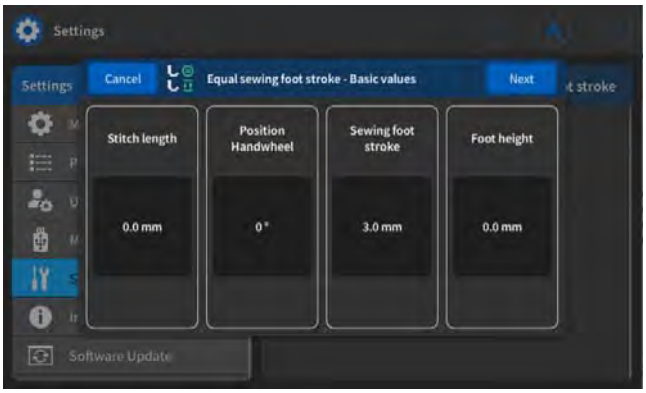
To activate the service routine:

1. Switch on the machine.
2. Log in as a technician (📖 *p. 107*).
3. Select the required service routine in the menu  *Navigation* >  *Adjustments* >  *Service* >  *Adjustments*.

Settings	
Feed dog	*Assemble* (disassembling and assembling the feed dog)
	Position to needle (adjusting the feed dog)
	Feed dog movement (setting the feed dog feed movement)
Needle-Hook	*Timing* (setting the looping stroke position)
	Needle bar (adjusting the needle bar)
Sewing foot stroke	*Equal sewing foot stroke* (setting an even sewing foot stroke)
	Feed Move (setting the feeding foot movement)

↳ The display shows all the values set in the selected service routine.

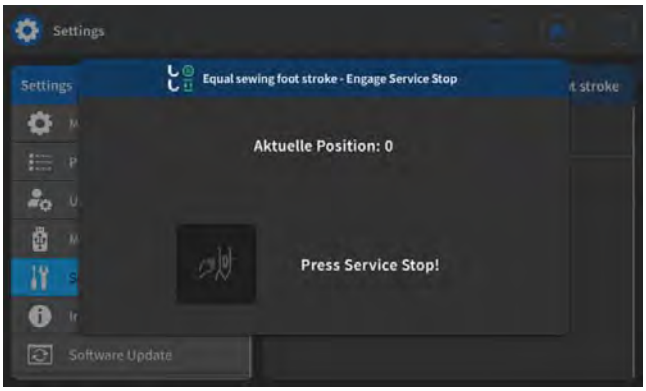
Fig. 1: Calling up the service routine (1)



4. Press the **Next** button.

↳ A request appears to press the **Service Stop** button.

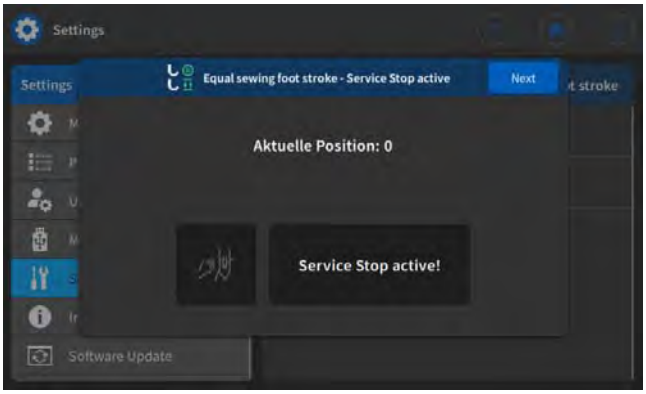
Fig. 2: Calling up the service routine (2)



5. Press the **Service Stop** button.

↳ The machine moves to the programmed position and is switched off.
The button lights up.
The display shows the information that the Service Stop is active:

Fig. 3: Calling up the service routine (3)



6. Make the required settings.

7. Press the Next button.

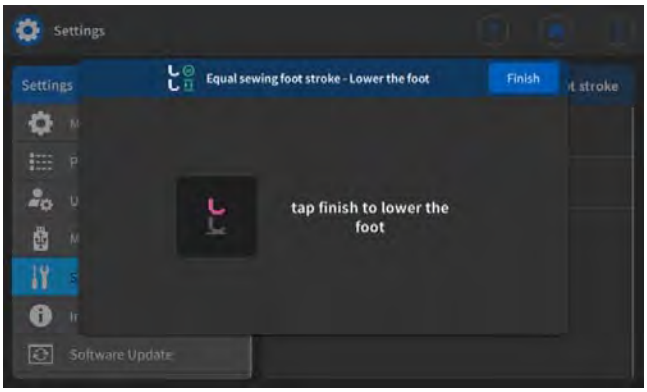
↳ A request appears on the display to deactivate the service stop:

Fig. 4: Calling up the service routine (4)

8. Press the **Service Stop** button.

↳ The power is switched on again.
The button turns off.

Fig. 5: Calling up the service routine (5)



9. Press the Finish button.

↳ You are now in the service menu again.

10. Press the button.

↳ The machine moves back to its initial position and is ready to sew.

3.4 Disassembling and assembling the covers

WARNING

Risk of injury from moving parts!

Crushing possible.

Move the machine to the service position or switch the machine off before disassembling the covers.

WARNING

Risk of injury from sharp parts!

Puncture possible.

Move the machine to the service position or switch the machine off before disassembling the covers.

For many types of adjustment work, you will have to disassemble the machine covers first in order to access the components.

This chapter describes how to disassemble and then assemble the individual covers again. The text for each type of adjustment work then specifies only the cover that needs to be disassembled at that particular time.

Information

Always apply **1 Nm** of tightening torque when tightening the screws that are used to attach the covers.

3.4.1 Tilting the machine head

Cover

In order to access the components on the underside of the machine, you must first tilt the machine head.

Fig. 6: Access to the underside of the machine

(1) - Locking mechanism

Tilting the machine head

To tilt the machine head:

1. Tilt the machine head as far as it will go.

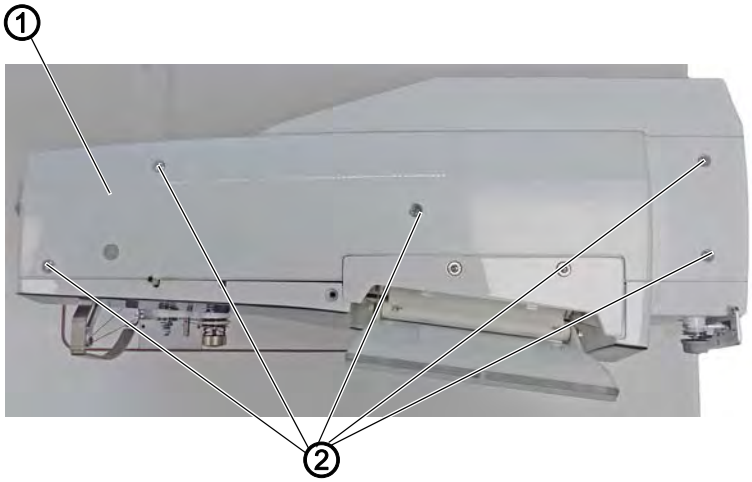
Erecting the machine head

To erect the machine head:

1. Push the locking mechanism (1) up with one hand.
2. Erect the machine head using your other hand.

3.4.2 Disassembling and assembling the arm cover

Fig. 7: Disassembling and assembling the arm cover



(1) - Arm cover

(2) - Screws

Disassembling the arm cover

To disassemble the arm cover:

1. Loosen the screws (2).
2. Disassemble the arm cover (1).

Assembling the arm cover

To assemble the arm cover:

1. Assemble the arm cover (1).
2. Tighten the screws (2).

3.4.3 Disassembling and assembling the front cover (service cover)

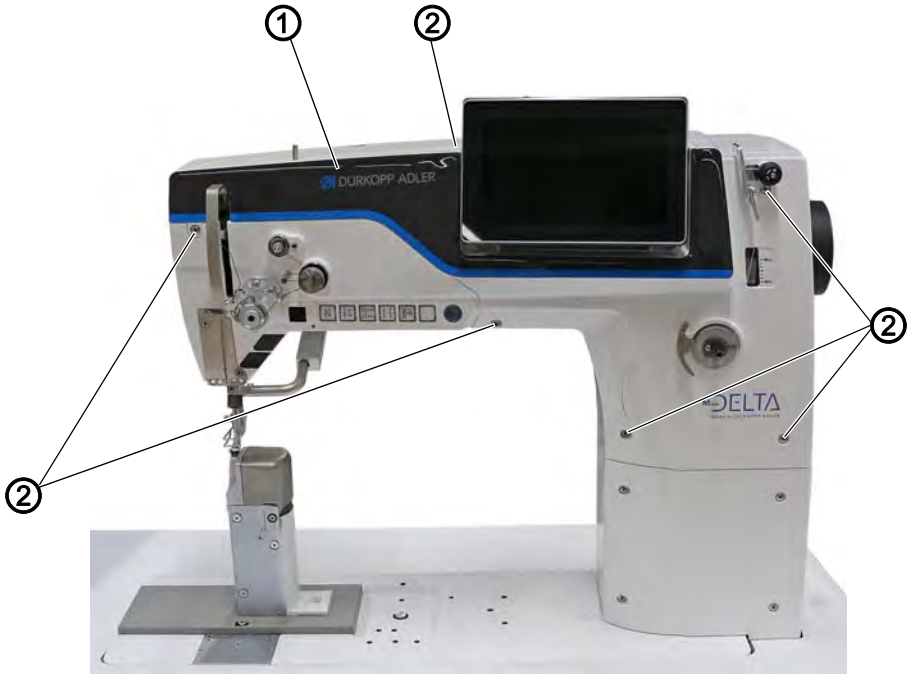
NOTICE

Property damage may occur!

Possible damage to the winder PCB.
If the winder PCB becomes damaged on account of a loose contact, winding will no longer be possible.

Switch off the machine before assembling and disassembling the front cover.

Fig. 8: Disassembling and assembling the front cover



(1) - Front cover *(2) - Screws*

Disassembling the front cover

To disassemble the front cover:

1. Switch off the machine.
2. Loosen the screws (2).
3. Remove the front cover (1).

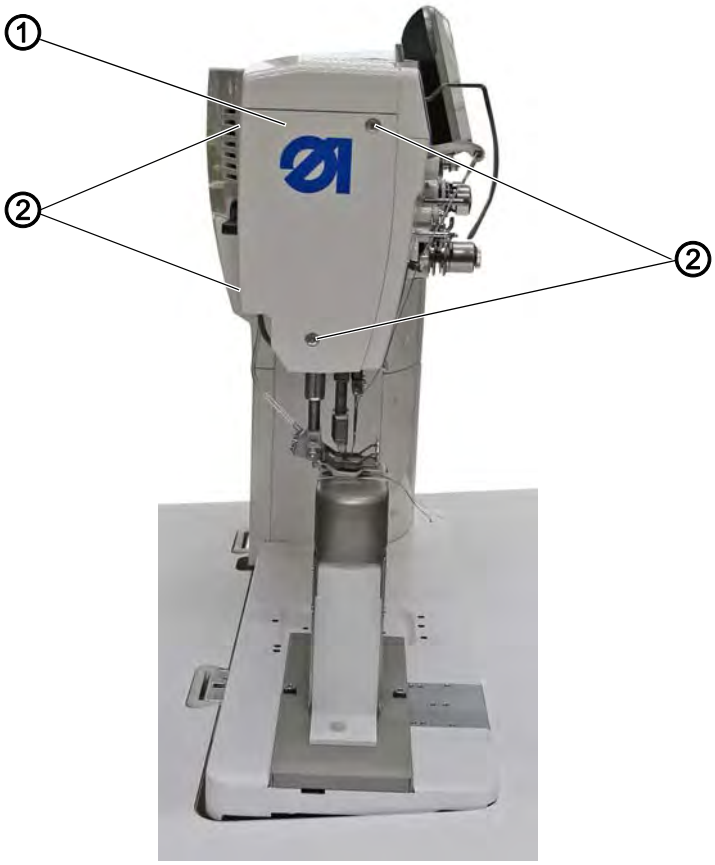
Assembling the front cover

To assemble the front cover:

1. Switching off the machine
2. Place the front cover (1).
   Make sure not to damage the thread lever.
3. Tighten the screws (2).

3.4.4 Disassembling and assembling the head cover

Fig. 9: Disassembling and assembling the head cover



(1) - Head cover *(2) - Screws*

Disassembling the head cover

To disassemble the head cover:

1. Loosen the screws (2).
   Caution: 2 screws at the front on the head cover, 2 screws on the rear of the machine.
2. Disassemble the head cover (1).

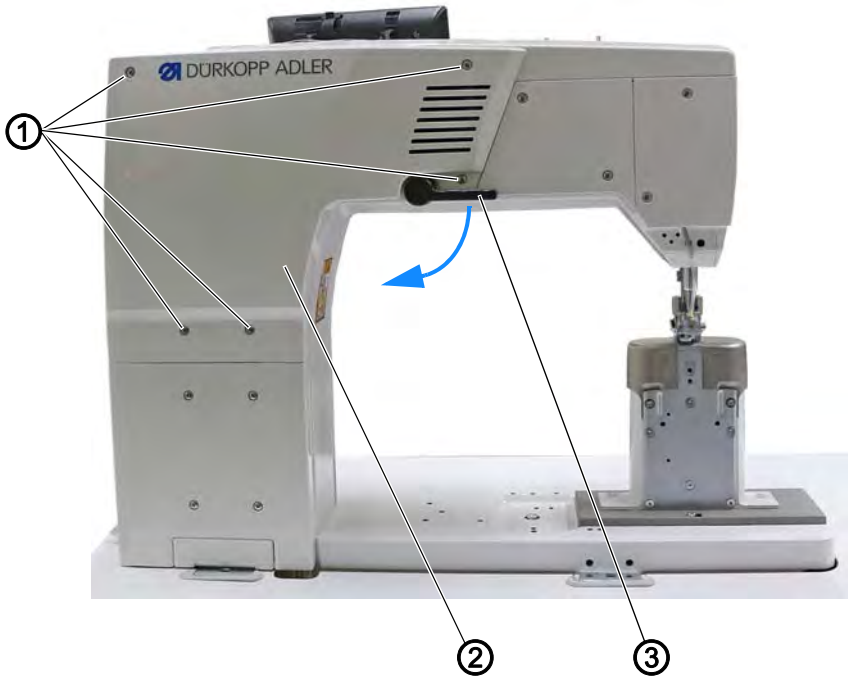
Assembling the head cover

To assemble the head cover:

1. Assemble the head cover (1).
2. Tighten the screws (2).

3.4.5 Disassembling and assembling the motor cover

Fig. 10: Disassembling and assembling the motor cover



(1) - Screws
(2) - Motor cover
(3) - Lever

Important

When disassembling and assembling the motor cover, be sure not to pull off any cables.

Disassembling the motor cover

To disassemble the motor cover:

1. Set the lever (3) vertical.
2. Loosen the screws (1).
3. Remove the motor cover (2).

Assembling the motor cover

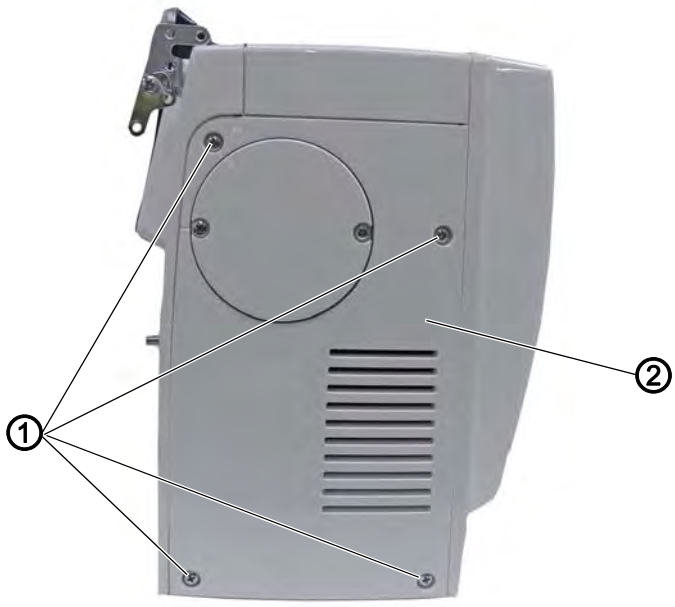
To assemble the motor cover:

1. Set the lever (3) vertical.
2. Place the motor cover (2).
3. Tighten the screws (1).

3.4.6 Disassembling and assembling the toothed belt cover

Toothed belt cover with handwheel cover

Fig. 11: Toothed belt cover with handwheel cover (1)



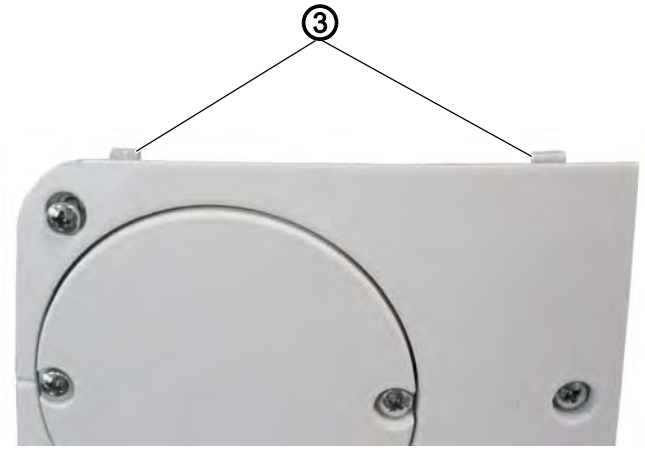
(1) - Screws *(2) - Toothed belt cover*

Disassembling the toothed belt cover

To disassemble the toothed belt cover:

1. Loosen the screws (1).
2. Remove the toothed belt cover (2); start by disassembling the cover from below.

Fig. 12: Toothed belt cover with handwheel cover (2)



(3) - Plates

Assembling the toothed belt cover

To assemble the toothed belt cover:

1. Place the toothed belt cover (2); start by placing the plates (3) first.
2. Tighten the screws (1).

Toothed belt cover with large handwheel

Fig. 13: Toothed belt cover with large handwheel (1)

(1) - Screws
(2) - Toothed belt cover
(4) - Handwheel
(5) - Screws

Disassembling the toothed belt cover

To disassemble the toothed belt cover:

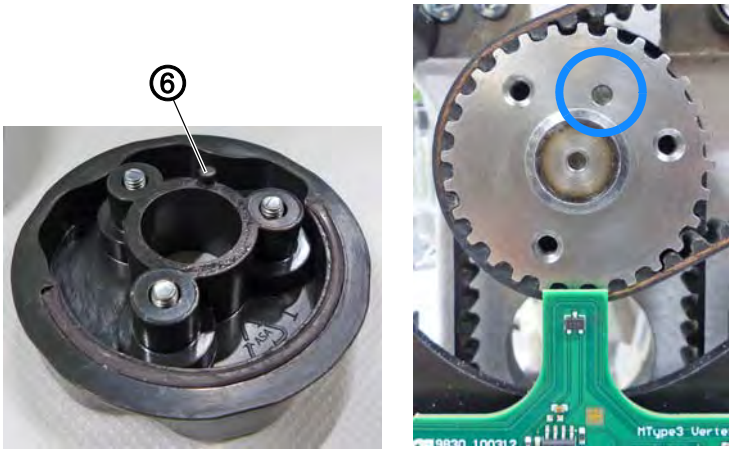
1. Loosen screws (5) on the handwheel (4).
2. Remove the handwheel (4).
3. Loosen the screws (1).
4. Remove the toothed belt cover (2); start by disassembling the cover from below.

Assembling the toothed belt cover

To assemble the toothed belt cover:

1. Place the toothed belt cover (2); start by placing the plates (3) first.
2. Tighten the screws (1).

Fig. 14: Toothed belt cover with large handwheel (4)

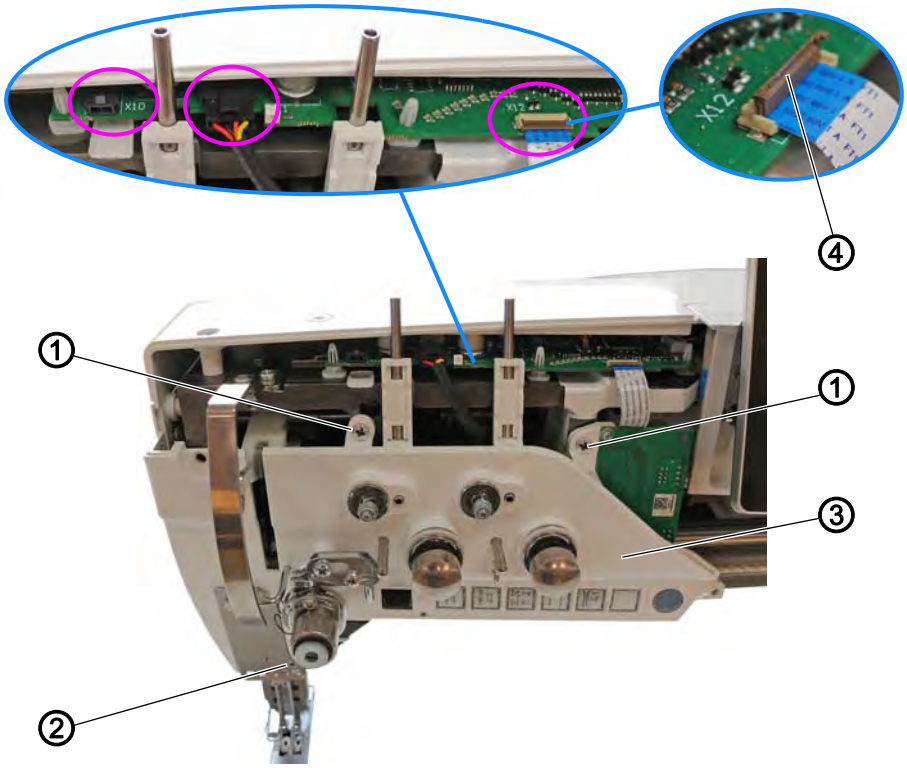


(6) - Centering pin

3. Place the handwheel (4), making sure that the centering pin (6) is positioned correctly (otherwise, referencing by the hall sensor will not work properly).
4. Tighten the screws (5).

3.4.7 Disassembling and assembling the thread tension plate

Fig. 15: Disassembling and assembling the thread tension plate (1)



(1) - Screws
(2) - Screw
(3) - Thread tension plate
(4) - Bobbin case retainer

Disassembling the thread tension plate

To disassemble the thread tension plate:

1. Switch off the machine.
2. Disassemble the front cover (📖 *p. 20*).
3. Pull plugs off the PCB:
   - Thread clamp: Connection **X10** (optional)
   - Thread tension: Connection **X11**
   - Push button: Connection **X12**

Important

To pull off connection **X12**, flip up the bobbin case retainer (4).
Make sure not to lose the bobbin case retainer (4) as it will otherwise no longer be possible to connect the push button.

4. Loosen screws (1) and (2).
5. Remove the thread tension plate (3).

Important

Fig. 16: Disassembling the thread tension plate (2)

On 2-needle machines the plug of connection **X103** must be detached from the PCB found behind the thread tension plate.

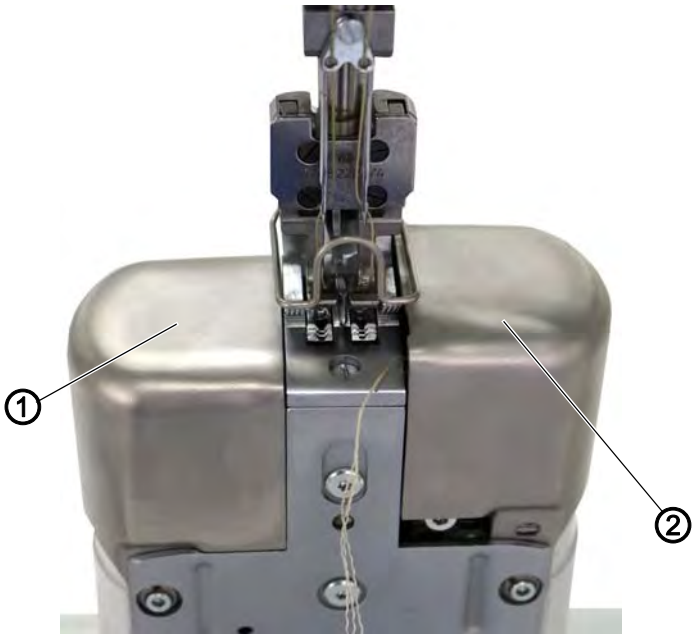
Assembling the thread tension plate

To assemble the thread tension plate:

1. On 2-needle machines: Connect the plug at connection **X103**.
2. Assemble the thread tension plate (3).
3. Tighten screws (1) and (2).
4. Slip plugs onto the PCB:
   - Thread clamp: Connection **X10** (optional)
   - Thread tension: Connection **X11**
   - Push button: Connection **X12**

3.5 Opening and closing the hook cover

Fig. 17: Opening and closing the hook cover



(1) - Left hook cover *(2) - Right hook cover*

To open the hook cover:

Opening the right hook cover

1. Pull the right hook cover (2) up by a few millimeters before pivoting it to the right.

Opening the left hook cover

1. Pull the left hook cover (1) up by a few millimeters before pivoting it to the left.

To close the hook cover:

Closing the right hook cover

1. Fold the right hook cover (2) to the left.
2. Press the right hook cover (2) downwards.

↳ The right hook cover (2) audibly clicks into place.

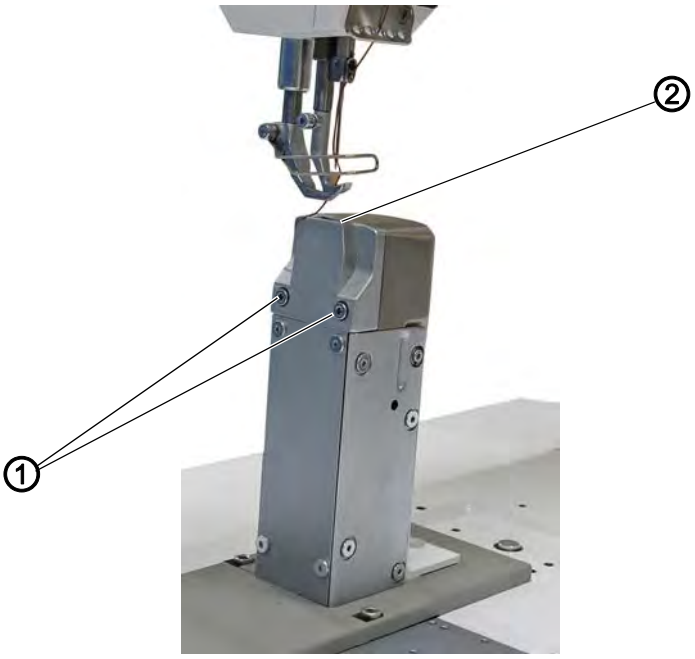
Closing the left hook cover

1. Fold the left hook cover (1) to the right.
2. Press the left hook cover (1) downwards.

↳ The left hook cover (1) audibly clicks into place.

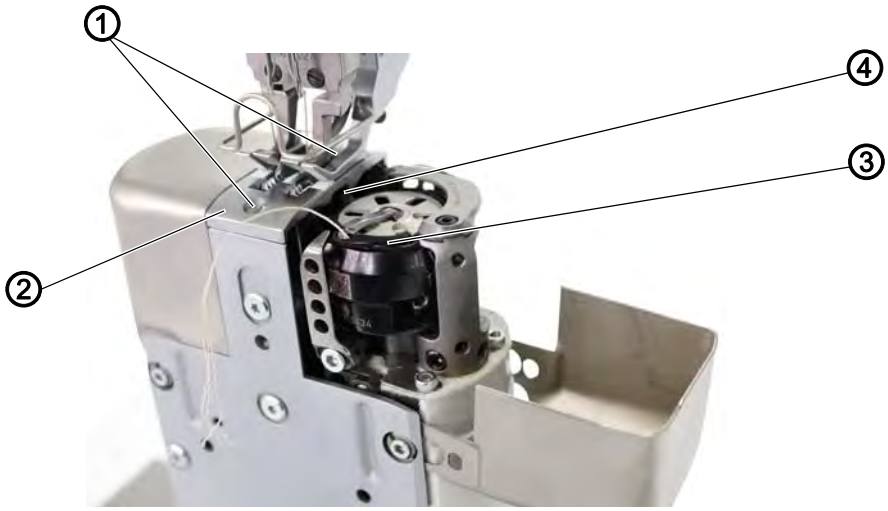
3.6 Assembling and disassembling the throat plate

Fig. 18: Assembling and disassembling the throat plate in a 1-needle machine (1)



(1) - Screw
(2) - Throat plate

Fig. 19: Assembling and disassembling the throat plate in a 2-needle machine (2)



(1) - Screws
(2) - Throat plate
(3) - Bobbin case
(4) - Nose

Disassembling the throat plate

To disassemble the throat plate:

1. Execute the service routine `Feed dog > Position to needle` (📖 *p. 14*).

↳ The software is used to define the necessary presettings on the machine.

2. Open the hook cover(s) (📖 *p. 28*).

3. Loosen the screws (1).

   For a 1-needle machine, the screws (1) are on the left side of the throat plate (2) or the column.

   For a 2-needle machine, the screws (1) are directly on top of the throat plate (2).
4. Disassemble the throat plate (2).
5. Finish the service routine.

Assembling the throat plate

To assemble the throat plate:

1. Execute the service routine `Feed dog > Position to needle` (📖 *p. 14*).

↳ The software is used to define the necessary presettings on the machine.

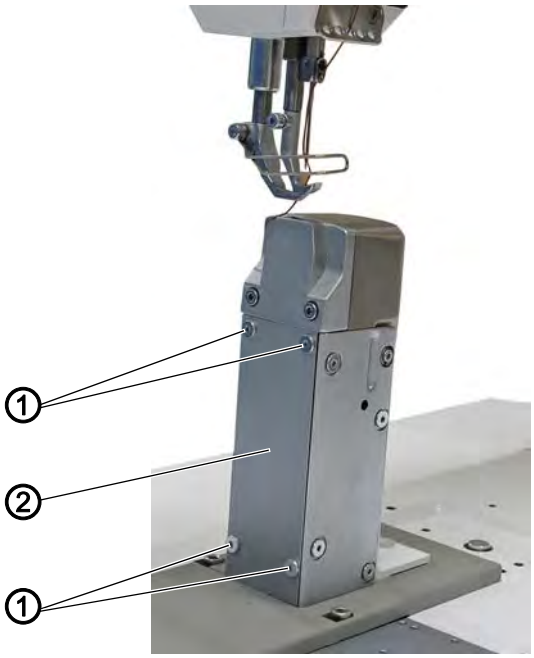
2. Insert the throat plate (2).

↳ Ensure that the nose (4) of the bobbin case (3) is in the cutout of the throat plate (2).

3. Tighten the screws (1).
4. Close the hook cover(s) (📖 *p. 28*).
5. Finish the service routine.

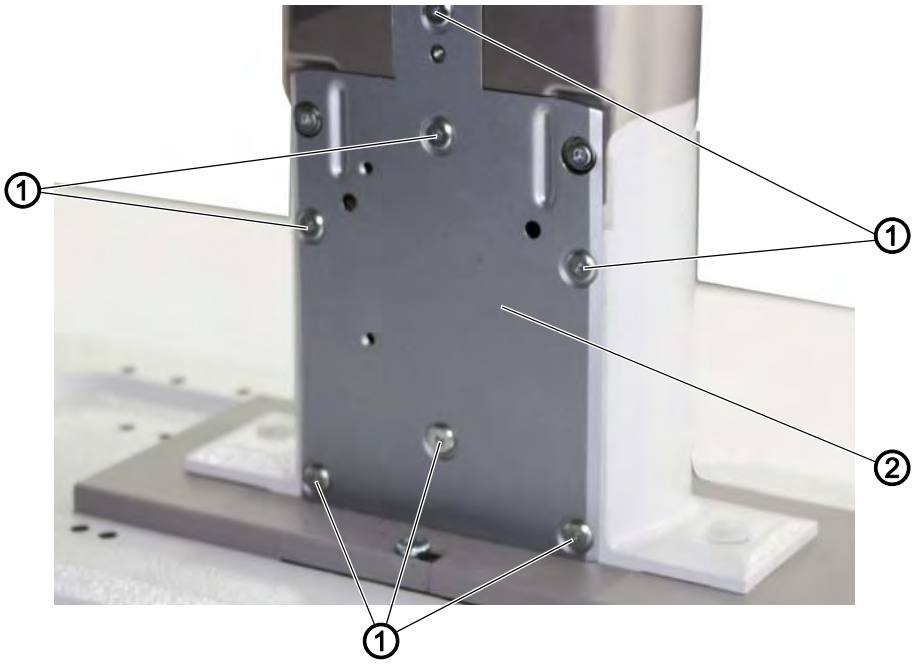
3.7 Assembling and disassembling the feed dog

Fig. 20: Assembling and disassembling the feed dog in a 1-needle machine (1)



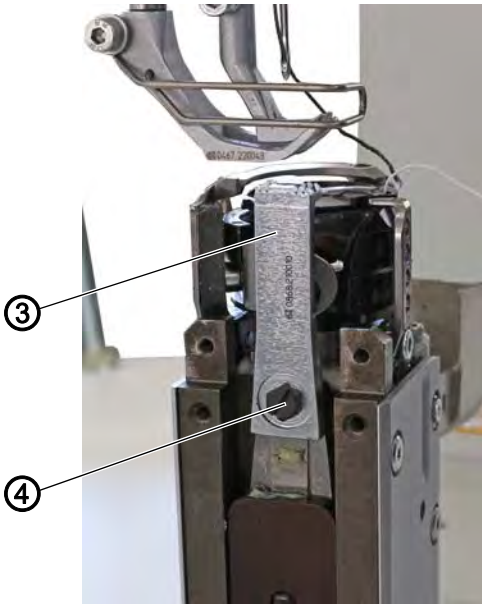
(1) - Screw *(2) - Cover*

Fig. 21: Assembling and disassembling the feed dog in a 2-needle machine (2)



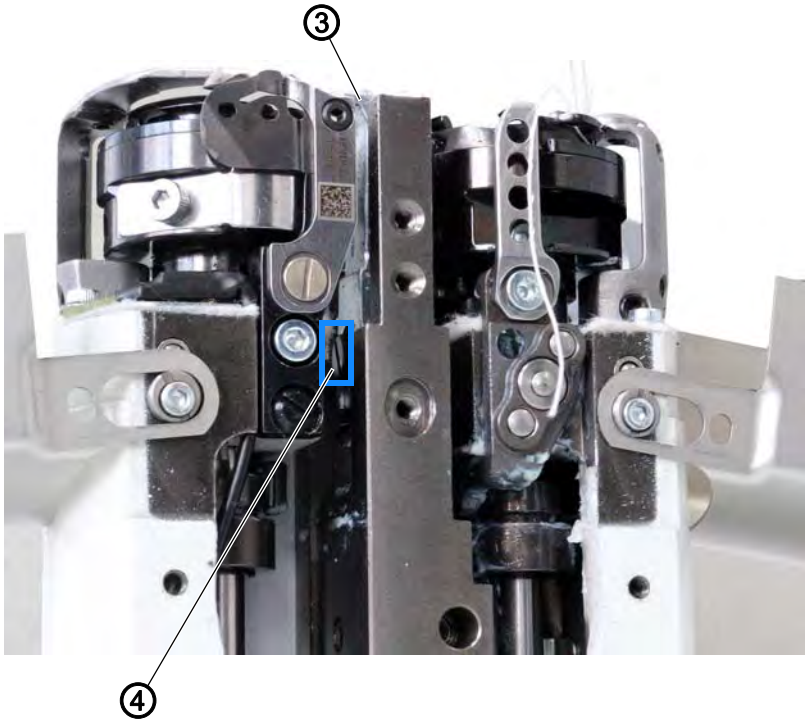
(1) - Screw *(2) - Cover*

Fig. 22: Assembling and disassembling the feed dog in a 1-needle machine (3)



(3) - Feed dog *(4) - Screw*

Fig. 23: Assembling and disassembling the feed dog in a 2-needle machine (4)



(3) - Feed dog

(4) - Screw

Proper setting

The feed dog does not touch the throat plate with the maximum permissible stitch length.

Disassembling the feed dog

To disassemble the feed dog:

1. Execute the service routine `Feed dog > Assemble` (📖 *p. 14*).

↳ The software is used to define the necessary presettings on the machine.

Important

The maximum permissible stitch length can be set in the service routine.

1. Disassemble the throat plate (📖 *p. 29*).
2. Loosen the screws (1).
3. Remove cover (2).
4. Loosen the screw (4).
5. Remove the feed dog (3).

Assemble feed dog

To assemble the feed dog:

1. Place the feed dog (3) onto the feed dog carrier.
2. Tighten the screw (4).
3. Tighten the cover (2) using the screws (1).
4. Insert the throat plate (📖 *p. 29*).
5. Finish the service routine.

Important

The machine needs to be restarted after a change of the maximum stitch length.
If necessary, set the maximum permissible stitch length via the software.

Check the feed dog position in its movement at maximum stitch length (depending on the equipment: 6, 7, 9 or 12) by turning the handwheel. The feed dog must not hit against the throat plate.

Order

Then check the following adjustment:

- Feed dog (📖 *p. 46*)

3.8 Flats on shafts

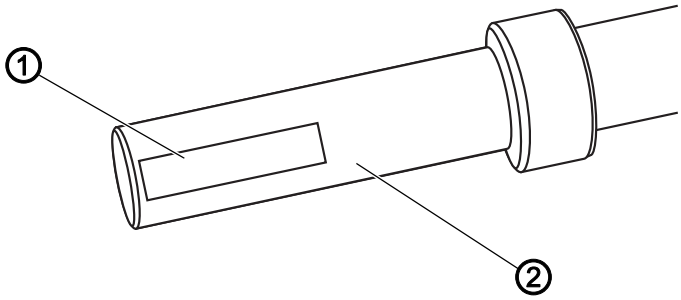
NOTICE

Property damage may occur!

An incorrect setting can result in damage to the machine.

Always place the first screw in rotational direction onto the flat.

Fig. 24: Flats on shafts



(1) - Flat *(2) - Shaft*

Some shafts have flat surfaces at the points where the components are screwed on. This stabilizes the connection and makes adjusting easier.

Important

Always ensure that the screws are completely flush with the surface.

The rule is to always place the **1st screw in rotational direction** onto the flat.

3.9 Locking the machine in place

For some adjustments, the machine must be locked in place at the looping stroke position. The position corresponds to handwheel position **202°**. To do this, insert the locking peg included in the accessories into the slot on the arm shaft crank, blocking the arm shaft.

Fig. 25: Locking the machine in place

(1) - Locking peg

Locking the machine in place

To lock the machine in place:

1. Press the **Service Stop** button.

↳ The machine is powered off.

2. Insert the locking peg (1) through the slot in the machine arm.
3. Turn the handwheel carefully until the locking peg (1) slides into the slot on the arm shaft crank.

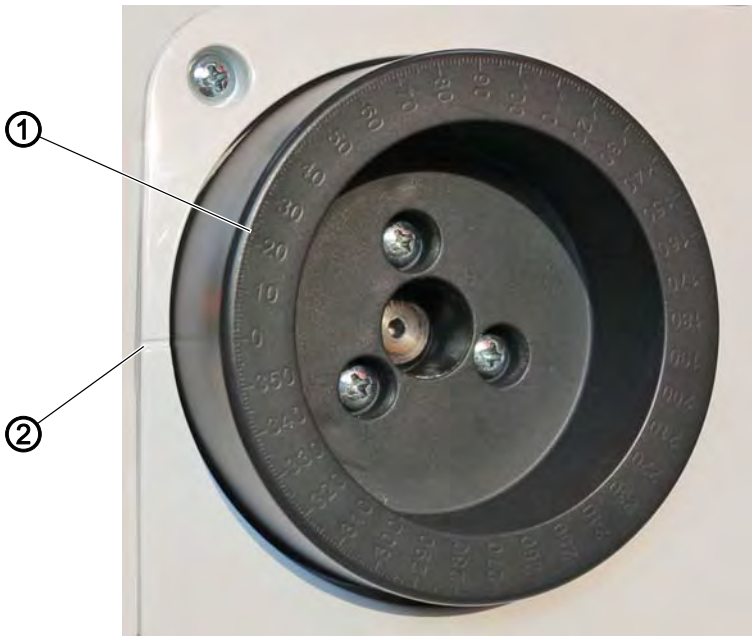
Removing the lock

To remove the lock:

1. Pull the locking peg (1) out of the slot in the machine arm.

3.10 Adjusting the handwheel into position

Fig. 26: Adjusting the handwheel into position



(1) - Graduated scale *(2) - Marking*

For some adjustments, the graduated scale on the handwheel has to be moved manually to a certain position.
In some setting programs, the handwheel is adjusted electronically.

To adjust the handwheel into position:

1. Turn the handwheel until the specified number on the graduated scale (1) is next to the marking (2).

4 Positioning the arm shaft crank on the arm shaft

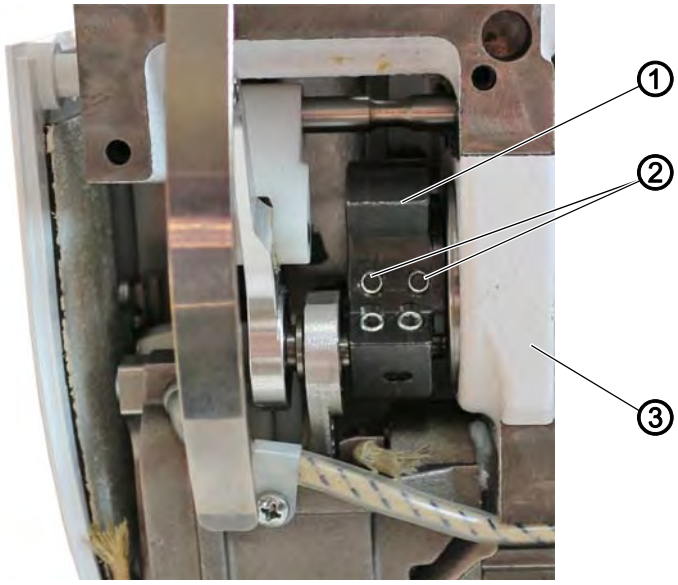
WARNING

Risk of injury from moving parts!

Crushing possible.

Switch off the machine before positioning the arm shaft.

Fig. 27: Positioning the arm shaft crank on the arm shaft



(1) - Arm shaft crank
(2) - Threaded pins
(3) - Bearing

Proper setting

The 2 threaded pins (2) on the arm shaft crank (1) are seated completely on the flat.
The arm shaft crank (1) is flush with the bearing (3).

To position the arm shaft crank on the arm shaft:

1. Switch off the machine.
2. Disassemble the front cover (📖 *p. 20*).
3. Disassemble the thread tension plate (📖 *p. 26*).
4. Loosen the threaded pins (2).
5. Turn the arm shaft crank (1) such that the threaded pins (2) are seated completely on the flat of the arm shaft.
6. Push the arm shaft to the right flush with the arm shaft crank (1) until it abuts on the bearing (3).
7. Tighten the threaded pins (2).

5 Performing the basic settings of the eccentrics

WARNING

Risk of injury from moving parts!

Crushing possible.

Switch off the machine before you adjust the eccentric.

NOTICE

Property damage may occur!

Improperly tightened screws can result in damage to the machine.

Always tighten both screws on the flats.

5.1 Adjusting the sewing foot stroke, feed dog lift and feed dog movement of the eccentric

Fig. 28: Adjusting the eccentrics - overview of eccentric positions

The *looping stroke* securing position allows you to define the basic settings for the **sewing foot stroke**, the **feed dog lift** and the **feed dog movement**.

Proper setting

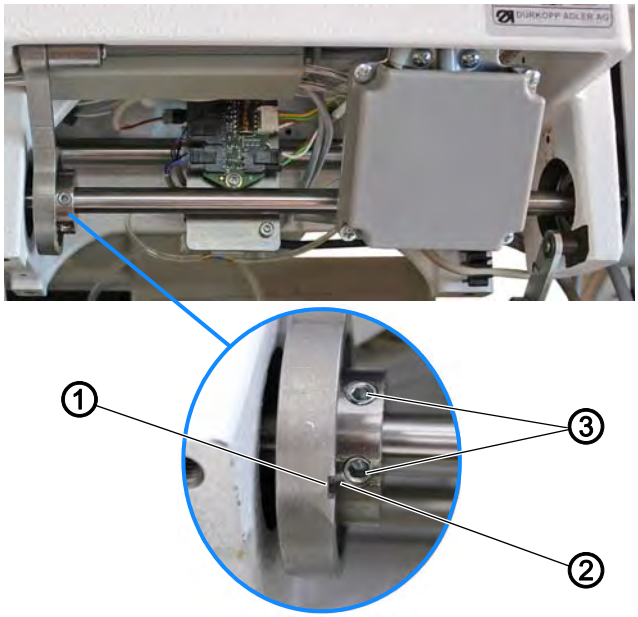
The markings on each eccentric are positioned correctly relative to one another.

Cover

- Disassemble the front cover (📖 p. 20)
- Disassemble the arm cover (📖 p. 19)

Adjusting the eccentric for the feed dog lift

Fig. 29: Adjusting the eccentric for the feed dog lift



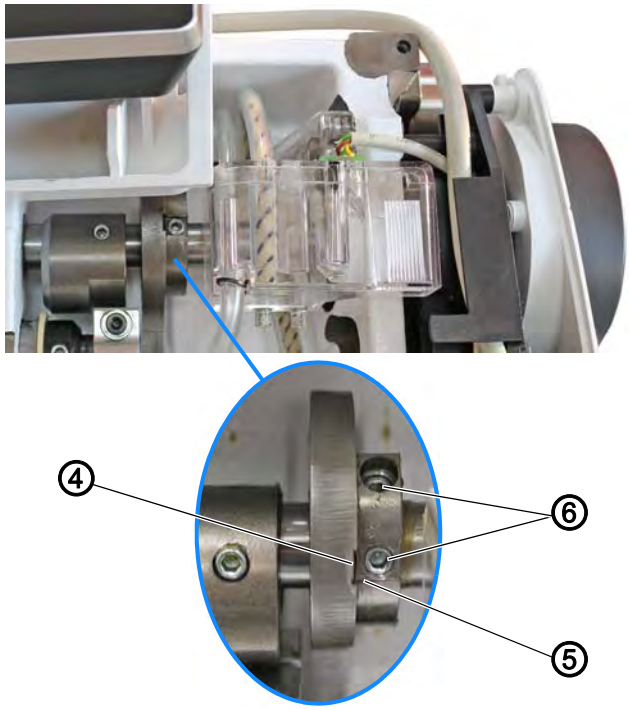
(1) - Slot
(2) - Slot
(3) - Screws

To adjust the eccentric for the feed dog lift:

1. Switch off the machine.
2. Lock the machine in place (📖 p. 35).
3. Tilt the machine head.
4. Loosen the screws (3).
5. Turn the eccentric such that slot (1) lines up with slot (2).
6. Tighten the screws (3).

Adjusting the eccentric for the feed dog movement

Fig. 30: Adjusting the eccentric for the feed dog movement



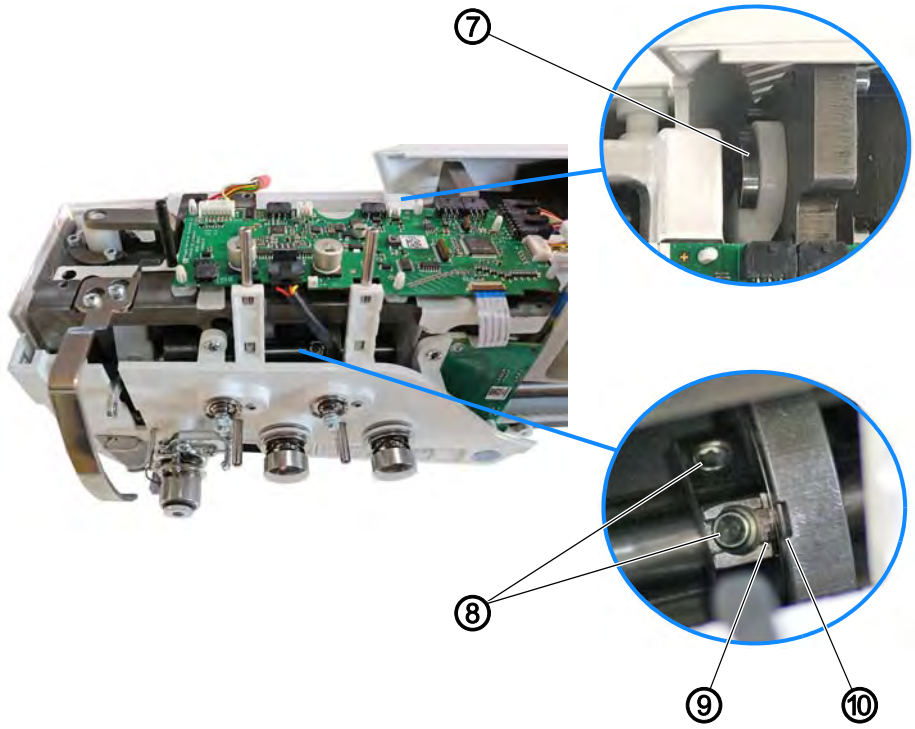
(4) - Slot
(5) - Slot
(6) - Screws

To adjust the eccentric for the feed dog movement:

7. Loosen the screws (6).
8. Turn the eccentric such that slot (4) lines up with slot (5).
9. Tighten the screws (6).

Adjusting the eccentric for the sewing foot stroke

Fig. 31: Adjusting the eccentric for the sewing foot stroke



(7) - Control cam
(8) - Screws
(9) - Slot
(10) - Slot

To adjust the eccentric for the sewing foot stroke:

Depending on the seam program, the control cam will come to a stop at the set stroke height.

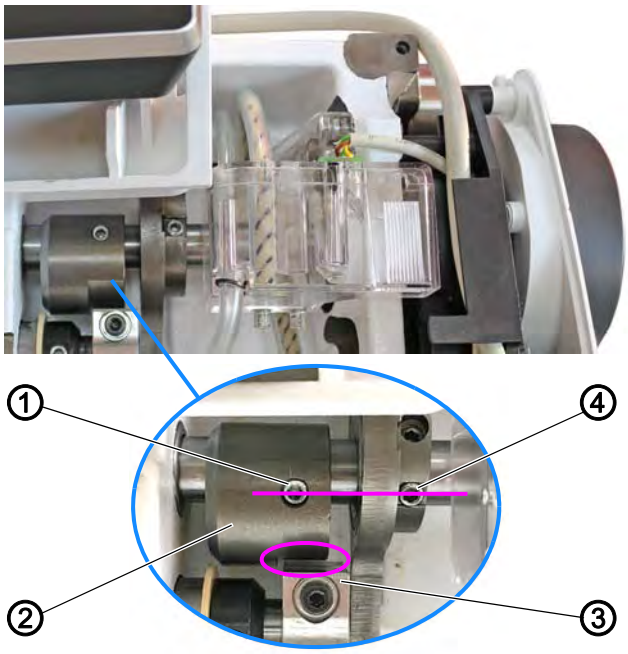
10. Switch on the machine.
11. Open the menu `Parameters > Additional values (+)` and set the sewing foot stroke to the smallest stroke of 0.5 mm.
12. Switch off the machine.
13. Lock the machine in place (📖 *p. 35*).
14. Manually press the control cam (7) into the end position.
15. Loosen the screws (8).
16. Turn the eccentric such that slot (9) lines up with slot (10).
17. Tighten the screws (8).

5.2 Adjusting the compensating weight

Proper setting

The screw of the compensating weight is level with the1st screw in the rotational direction of the eccentric that is used for the feed dog movement. The compensating weight does not collide with the transmission lever on the side.

Fig. 32: Adjusting the compensating weight



(1) - Screw
(2) - Compensating weight
(3) - Transmission lever
(4) - Screw

To adjust the compensating weight:

1. Loosen the screw (1).
2. Adjust the compensating weight (2) such that screw (1) and screw (4) are at the same height.
   Make sure there is a gap between the compensating weight (2) and the transmission lever (3).
3. Tighten the screw (1).

6 Adjusting the mechanical stitch adjustment

WARNING

Risk of injury from moving parts!

Crushing possible.

Switch off the machine before you set the mechanical stitch adjustment.

6.1 Presetting the stitch regulator gear mechanically

Proper setting

The stitch regulator gear is set to 0.

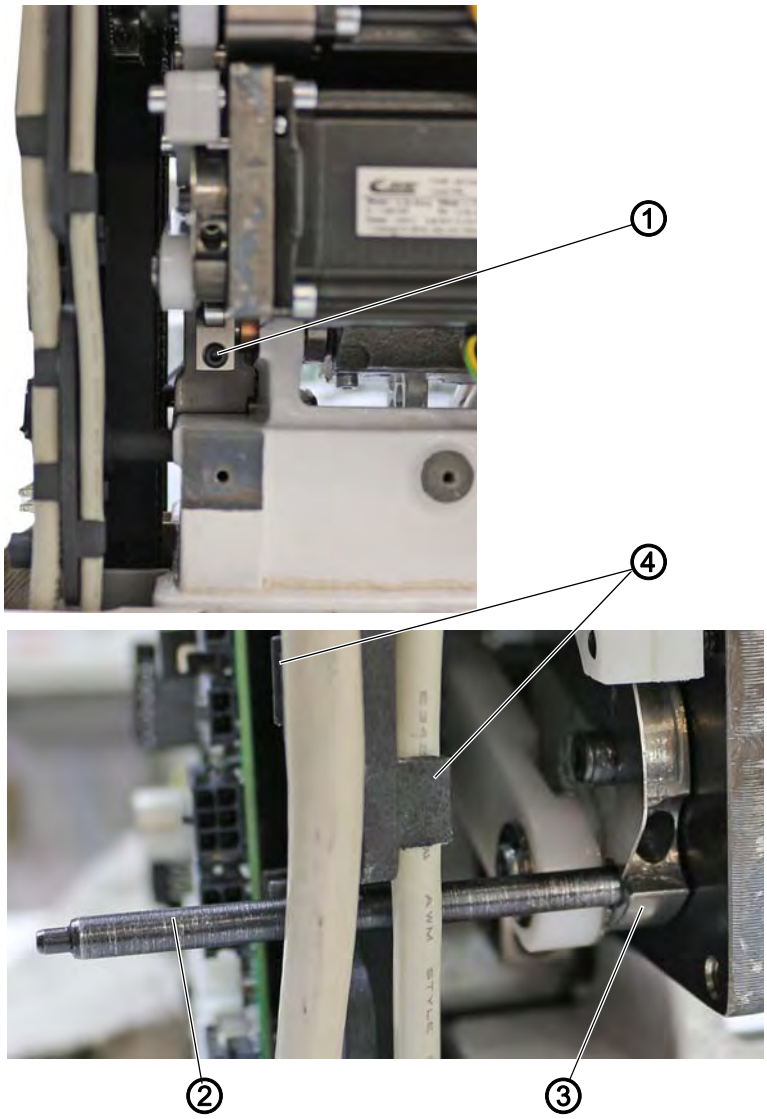
↳ The plates (5) are parallel to each other when the control cam is disconnected.
There must be no lateral play at the stitch regulator gear.

The stitch length is controlled by a stepper motor. The exact zero stitch (stitch length 0 = no feed) is determined by the *Calibration zero stitch* (📖 *p. 167*).

Cover

- Remove the toothed belt cover (📖 *p. 23*)
- Motor cover (📖 *p. 22*)
- Remove the front cover (📖 *p. 20*)

Fig. 33: Adjusting the mechanical stitch adjustment (1)

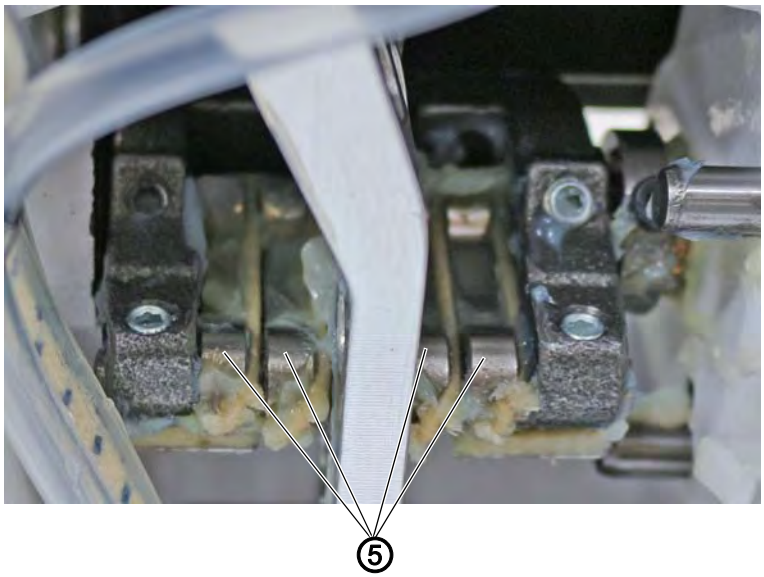


(1) - Screw
(2) - Locking peg
(3) - Hole
(4) - Cable holders

To preset the stitch regulator gear mechanically:

1. Switch off the machine.
2. Loosen the screw (1).
3. Pull the cables out of the cable holders (4).
   While doing so, make sure not to damage the cables.
4. Insert the locking peg (∅ 5 mm) (2) into the hole (3) on the motor bracket.

Fig. 34: Adjusting the mechanical stitch adjustment (2)



(5) - Plates

5. Manually position the plates (5) so that they are parallel.
6. Tighten the screw (1).
7. Check whether the plates (5) are still parallel; if not, repeat the setting.
8. Remove the locking peg (2).
9. Press the cables back into the cable holders (4).
   While doing so, make sure not to damage the cables.

6.2 Adjusting the forward and backward stitch

The forward and backward stitch are controlled by a stepper motor and adjusted via software.

The calibration is performed only in the software and does not require that you mechanically set an eccentric (📖 *p. 167*).

7 Adjusting feed dog and needle bar linkage

WARNING

Risk of injury from moving parts!

Crushing possible.

Move the machine into the service routine before adjusting the feed dog.

WARNING

Risk of injury from moving parts!

Crushing possible.

Move the machine into the service routine before aligning the needle bar linkage.

Proper setting

When the stitch length is set to **0**, the lateral position of the feed dog is in the center relative to the throat plate. The needle pierces in the center of the feed dog, both sideways and in the sewing direction.

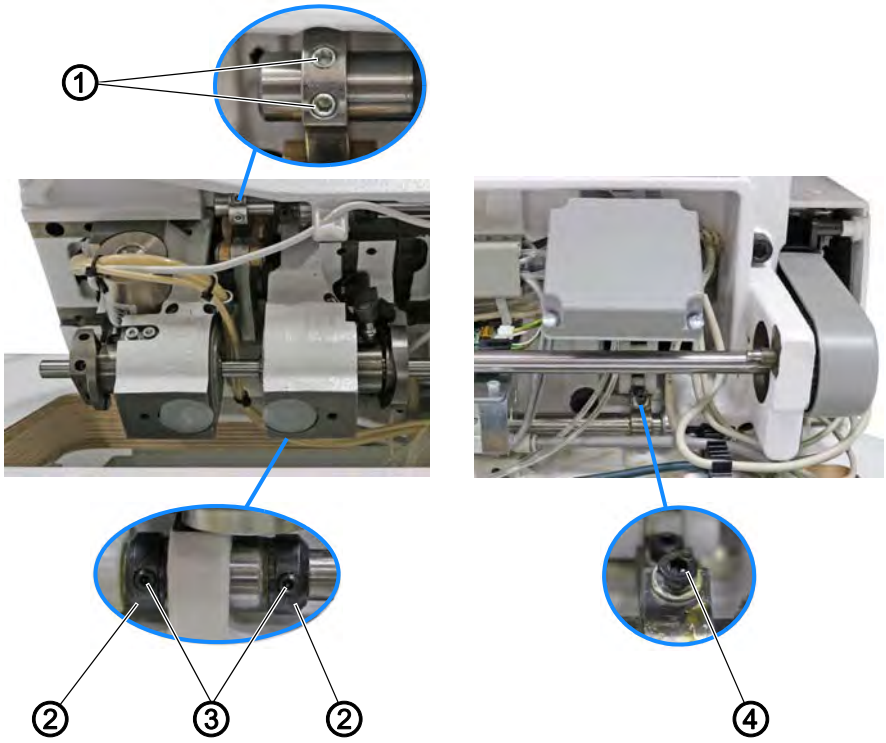
Information

Details on the settings of the **Feed dog feed movement**, the **feed dog lift movement** and the **compensating weight** are provided in the chapter **Basic settings of the eccentrics** (📖 *p. 38*).

7.1 Moving the feed dog carrier sideways

The feed dog carrier is connected to the stitch regulator gear via the pusher shaft, and can be moved on this shaft.

Fig. 35: Moving the feed dog carrier



(1) - Threaded pins
(2) - Set collars
(3) - Threaded pins
(4) - Screw

To move the feed dog carrier sideways:

1. Execute the service routine *Feed dog > Position to needle* (📖 *p. 14*).

↳ The software is used to define the necessary presettings on the machine.

2. Tilt the machine head (📖 *p. 18*).
3. Loosen the threaded pins (1).
4. Loosen the threaded pins (3).
5. Loosen the screw (4).
6. Move the feed dog carrier perpendicular to the sewing direction so that the feed dog is exactly in the center of the throat plate cutout.
7. Push the set collars (2) toward each other as far as they will go.

Important

Make sure that the pusher shaft is tightened by the set collars and does not have any axial play.

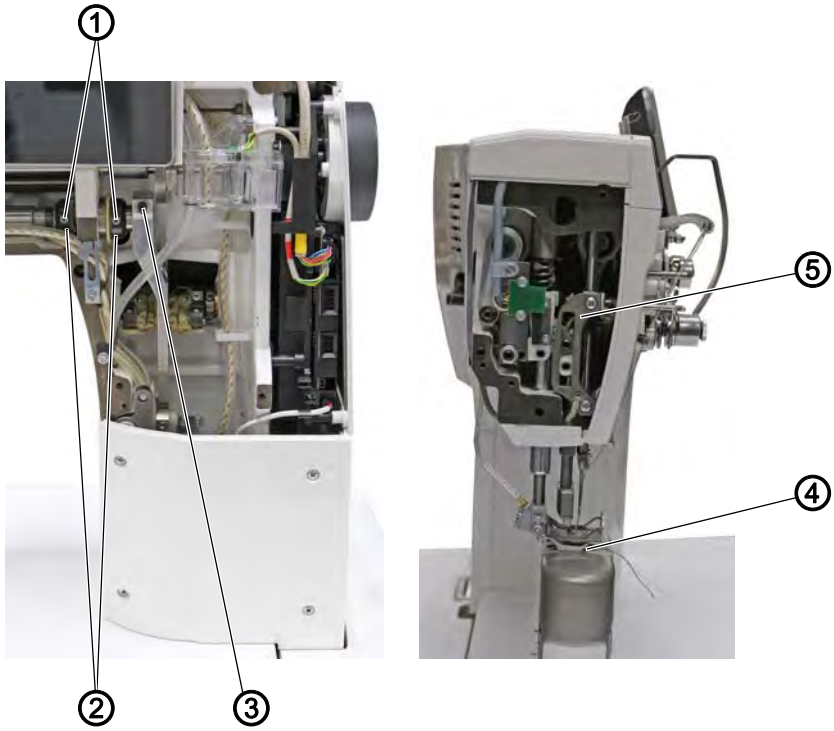
8. Tighten the screw (4).
9. Tighten the threaded pins (3).

10. Tighten the threaded pins (1).
    In the process, make sure that the feed dog height has the correct setting (📖 *p. 52*).

11. Finish the service routine.

7.2 Aligning the needle bar linkage sideways

Fig. 36: Aligning the needle bar linkage sideways (1)



(1) - Screws
(2) - Set collars
(3) - Screw
(4) - Needle hole
(5) - Needle bar linkage

Proper setting

If the stitch length is **0**, the needle pierces exactly in the center of the needle hole.

To align the needle bar linkage sideways:

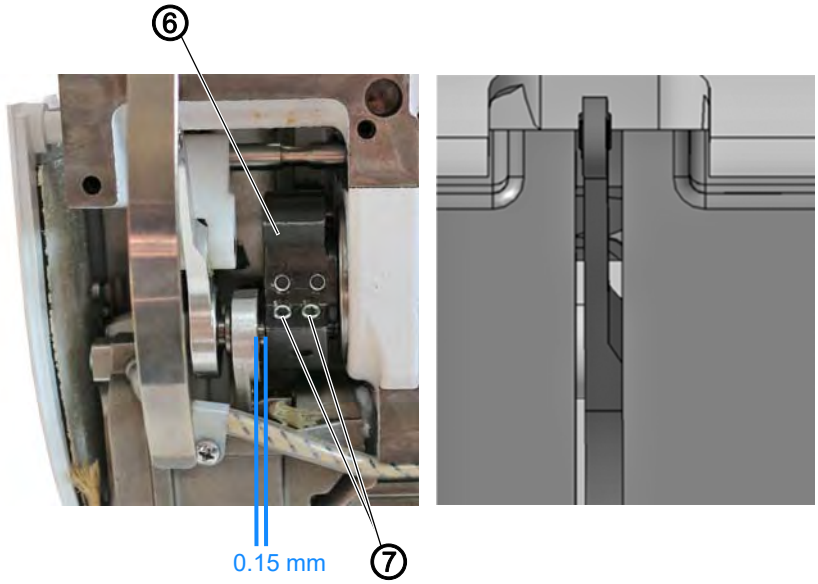
1. Switch off the machine.
2. Disassemble the front cover (📖 *p. 20*).
3. Disassemble the head cover (📖 *p. 21*).
4. Switch on the machine.

5. Execute the service routine `Needle-Hook > Needle bar` (📖 *p. 14*).

↳ The software is used to define the necessary presettings on the machine.

6. Loosen the threaded pins (1) on the set collars (2).
7. Loosen the screw (3).

Fig. 37: Aligning the needle bar linkage sideways (2)



(6) - Arm shaft crank *(7) - Threaded pins*

8. Loosen the threaded pins (7) on the arm shaft crank (6).
   Make sure that the threaded pins (7) stay on the surface.
9. Move the needle bar linkage (5) sideways such that the needle pierces exactly in the center of the needle hole (4) for the feed dog.
10. Push the set collars (2) up against one another so that there is no axial play.
11. Tighten the threaded pins (1).
12. Tighten the screw (3).
13. Set a distance of 0.15 mm between the arm shaft crank (6) and the eccentric.
14. Tighten the threaded pins (7).
15. Finish the service routine.

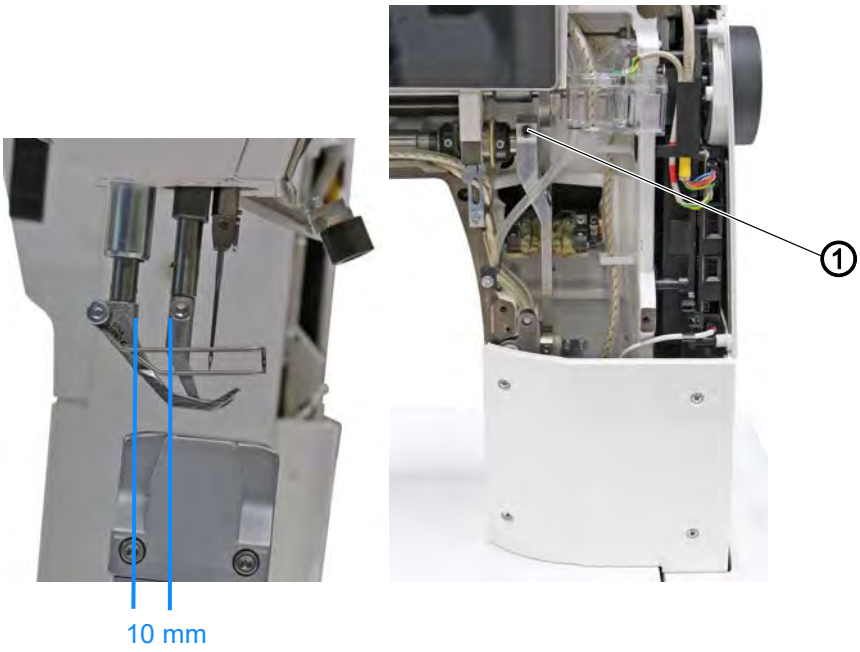
Order

Then, check the following settings:

- Distance between hook and needle (📖 *p. 55*)
- Looping stroke position (📖 *p. 53*)

7.3 Aligning the needle bar linkage in the sewing direction

Fig. 38: Aligning the needle bar linkage in the sewing direction



(1) - Screw

Proper setting

If the stitch length is **0**, the needle pierces exactly in the center of the needle hole.

To align the needle bar linkage in the sewing direction:

1. Switch off the machine.
2. Disassemble the front cover (📖 *p. 20*).
3. Switch on the machine.
4. Execute the service routine `Needle-Hook > Needle bar` (📖 *p. 14*).

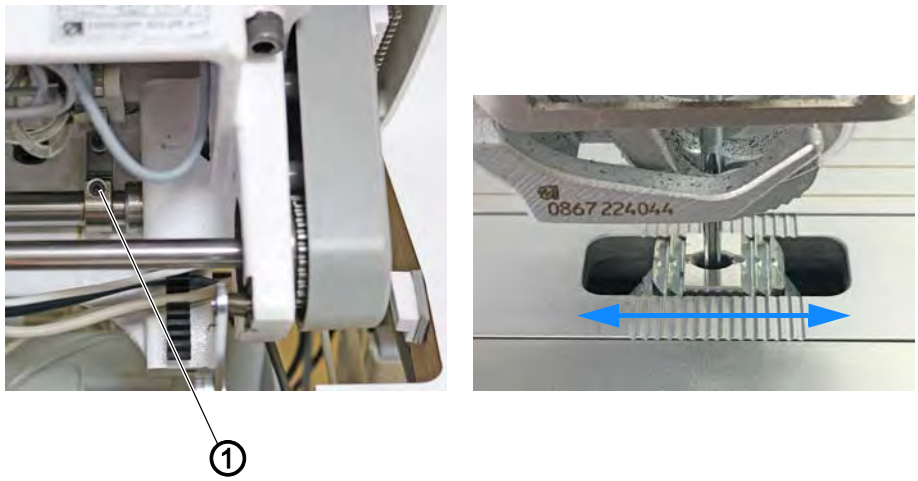
   ↳ The software is used to define the necessary presettings on the machine.
5. Loosen the screw (1).
6. Move the needle bar linkage until there is a distance of **10 mm** between presser bar and walking foot bar.
7. Tighten the screw (1).
8. Finish the service routine.

7.4 Aligning the feed dog in sewing direction

Order

Start by aligning the needle bar linkage in the sewing direction (📖 *p. 50*).

Fig. 39: Aligning the feed dog in sewing direction



(1) - Screw

To align the feed dog in the sewing direction:

1. Execute the service routine `Feed dog > Position to needle` (📖 *p. 14*).

↳ The software is used to define the necessary presettings on the machine.

2. Open the hook cover (📖 *p. 28*).
3. Tilt the machine head (📖 *p. 18*).
4. Loosen the screw (1).
5. Align the feed dog in the sewing direction such that the needle pierces in the center of the needle hole.
6. Tighten the screw (1).

Order

Next, check the feed movement to the throat plate cutout at the maximum stitch length.

7.5 Adjusting the feed dog height at top dead center

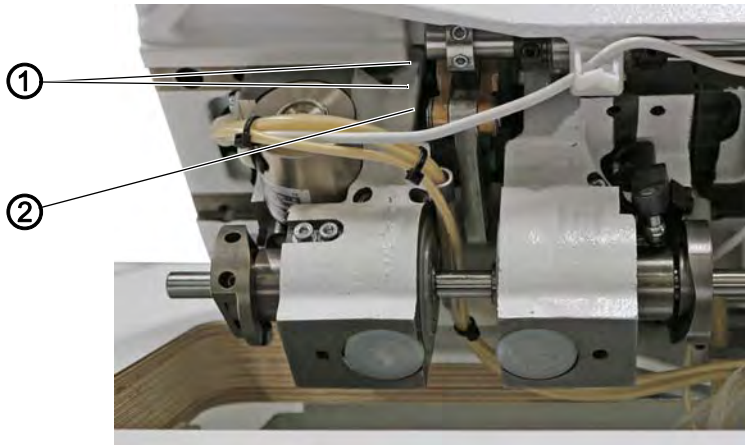
The feed dog reaches the maximum stroke height at top dead center when the handwheel is positioned at 190°.

Proper setting

Place the feed dog in the uppermost position by turning the handwheel.

↳ The upper edge of the feed dog protrudes 0.5 mm above the throat plate.
In machines with short thread cutters (KFA), the upper edge of the feed dog protrudes 0.8 mm above the throat plate.

Fig. 40: Adjusting the feed dog height at top dead center



(1) - Threaded pins *(2) - Lever*

To adjust the feed dog height at top dead center:

1. Execute the service routine `Feed dog > Feed dog movement` (📖 *p. 14*).

↳ The software is used to define the necessary presettings on the machine.

2. Check if the sewing drive is at 190°.
3. If needed, use the handwheel to correct the position manually.
4. Tilt the machine head (📖 *p. 18*).
5. Loosen the threaded pins (1).
6. Turn the lever (2) such that the upper edge of the feed dog protrudes 0.5 mm (KFA = 0.8 mm) above the throat plate.
7. Tighten the threaded pins (1).
8. Finish the service routine.

8 Position of the hook and needle

WARNING

Risk of injury from sharp and moving parts!

Puncture or crushing possible.

Move the machine into the service routine before adjusting the position of the hook and the needle.

NOTICE

Property damage may occur!

There is a risk of machine damage, needle breakage or damage to the thread if the distance between needle groove and hook tip is incorrect.

Check and, if necessary, readjust the distance to the hook tip after inserting a new needle with a different size.

8.1 Adjusting the loop stroke position

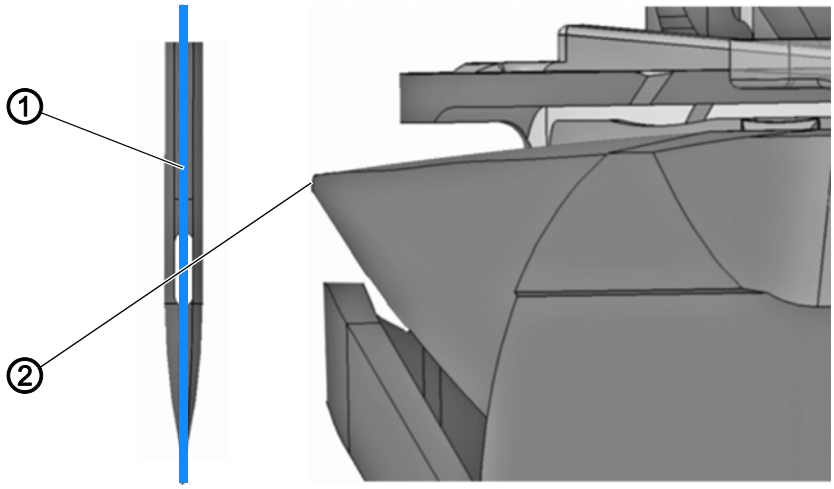
The looping stroke is the path length from the lower dead center of the needle bar up to the position where the hook tip is exactly on the vertical center line of the groove for the needle.

Order

First, check the following settings:

- Needle bar linkage is aligned correctly (📖 *p. 48*), (📖 *p. 50*)

Fig. 41: Adjusting the looping stroke position (1)



(1) - Vertical center line of the needle *(2) - Hook tip*

Proper setting

The hook tip (2) points exactly to the vertical center line of the needle (1).
The looping stroke is precisely 2 mm.
This setting corresponds to handwheel position 202°.

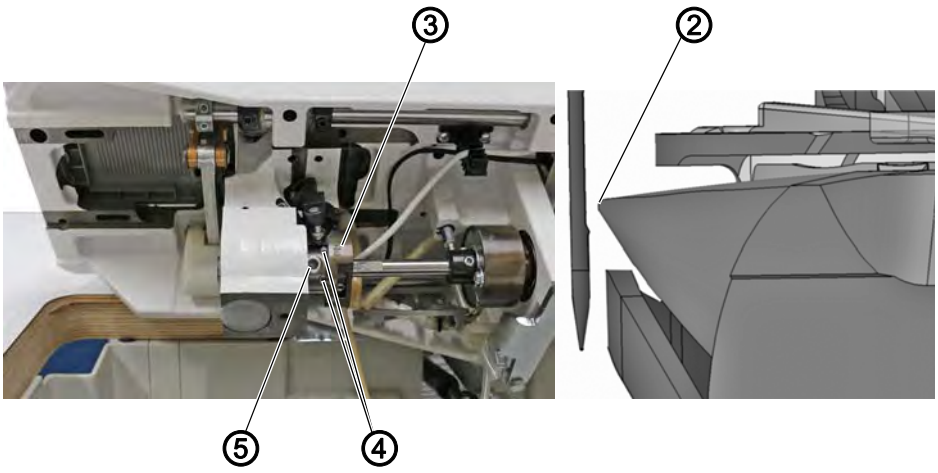
To adjust the looping stroke position:

1. Disassemble the throat plate (📖 *p. 29*).
2. Disassemble the feed dog (📖 *p. 30*) (only required on 2-needle machines).
3. Execute the service routine `Needle-Hook > Timing` (📖 *p. 14*).

↳ The software is used to define the necessary presettings on the machine.

4. Lock the machine in place to check the looping stroke position.
5. Tilt the machine head (📖 *p. 18*).

Fig. 42: Adjusting the looping stroke position (2)



(2) - Hook tip
(3) - Thread trimmer cam
(4) - Threaded pins
(5) - Threaded pin

6. Loosen the threaded pins (4).
7. Turn the thread trimmer cam (3).

↳ The hook tip (2) points to the vertical center line of the needle.

Information

You can slightly loosen the threaded pin (5) if the thread trimmer cam (3) can only be turned with difficulty.

---

8. Tighten the threaded pins (4).
9. Finish the service routine.

10. Assemble the feed dog.
11. Assemble the throat plate.

Order

Then, check the following settings:

- Position of the needle guard (📖 *p. 57*)
- Timing of cutting by the thread trimmer (📖 *p. 84*)
- A needle with the correct needle strength has been inserted

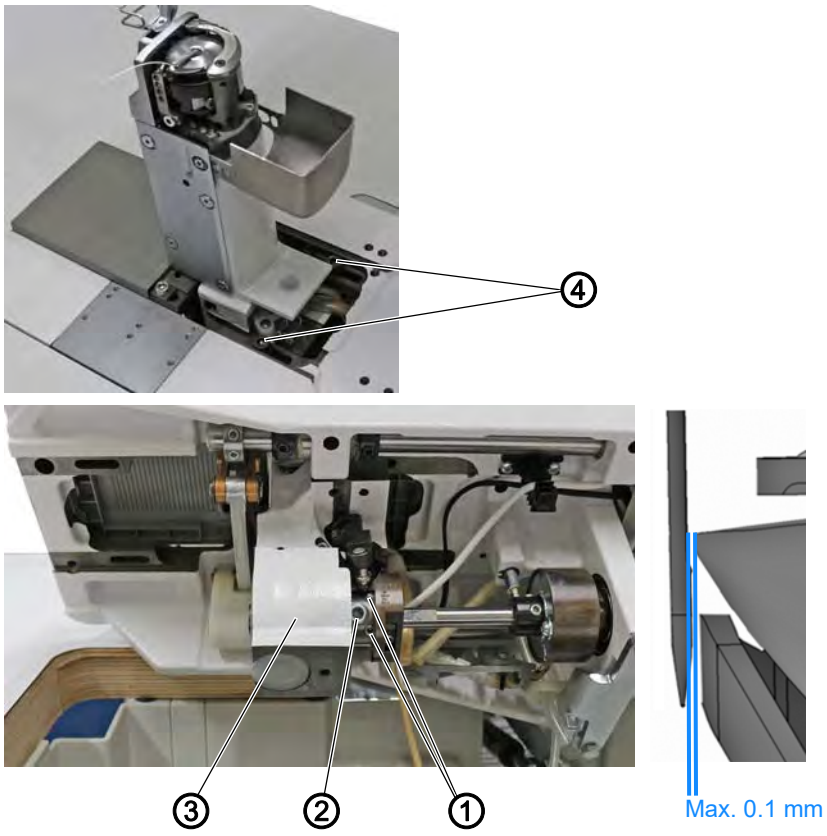
8.2 Adjusting the hook side clearance

Order

First, check the following settings:

- Needle bar linkage is aligned correctly (📖 *p. 48*), (📖 *p. 50*)
- Looping stroke position (📖 *p. 53*)

Fig. 43: Adjusting the hook side clearance



(1) - Threaded pins
(2) - Threaded pin
(3) - Hook support
(4) - Screws

Proper setting

The distance between the hook tip and the groove of the needle is no greater than 0.1 mm.

To adjust the hook side clearance:

1. Execute the service routine `Needle-Hook > Timing` (📖 *p. 14*).

↳ The software is used to define the necessary presettings on the machine.

2. Lock the machine in place (📖 *p. 35*).
3. Open the hook cover (📖 *p. 28*).
4. Tilt the machine head (📖 *p. 18*).
5. Loosen the screws (4).
6. Loosen the threaded pin (2).
7. Move the hook support (3) sideways such that the distance between the hook tip and the groove of the needle is no greater than 0.1 mm.

Information

You can slightly loosen the threaded pins (1) if the hook support can only be moved with difficulty.

---

8. Tighten the threaded pin (2).
9. Tighten the screws (4).
10. Finish the service routine.

Order

Then, check the following setting:

- Position of the needle guard (📖 *p. 57*)

8.3 Adjusting the needle bar height

Order

First, check the following settings:

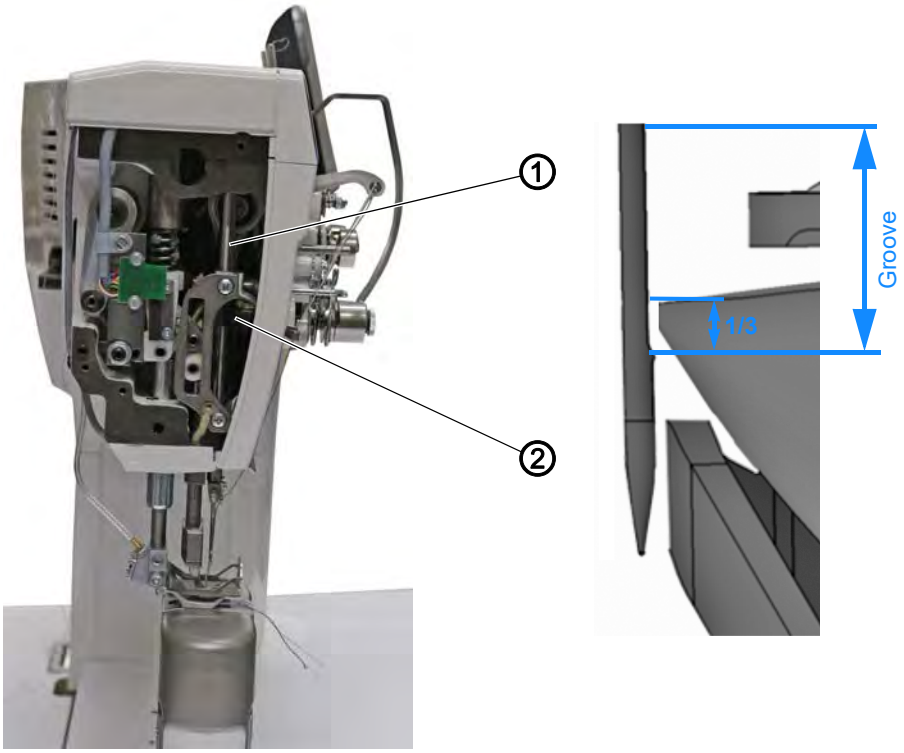
- Looping stroke position (📖 *p. 53*)

Disturbance

Disturbances caused by an incorrect needle bar height:

- Damage to the hook tip
- Jamming of the needle thread
- Skip stitches
- Thread breaking
- Needle breakage

Fig. 44: Adjusting the needle bar height



(1) - Needle bar *(2) - Screw*

Proper setting

The hook tip is level with the lower third of the groove on the needle.

To adjust the needle bar height:

1. Execute the service routine `Needle-Hook > Timing` (📖 *p. 14*).

↳ The software is used to define the necessary presettings on the machine.

2. Disassemble the head cover (p. 21).
3. Loosen the screw (2).
4. Move the height of the needle bar (1) such that the hook tip is in the middle of the lower third of the groove for the needle.
   When doing so, make sure that you do not twist the needle to the side.
   The groove of the needle must face the hook.
5. Tighten the screw (2).
6. Finish the service routine.

8.4 Adjusting the needle guard

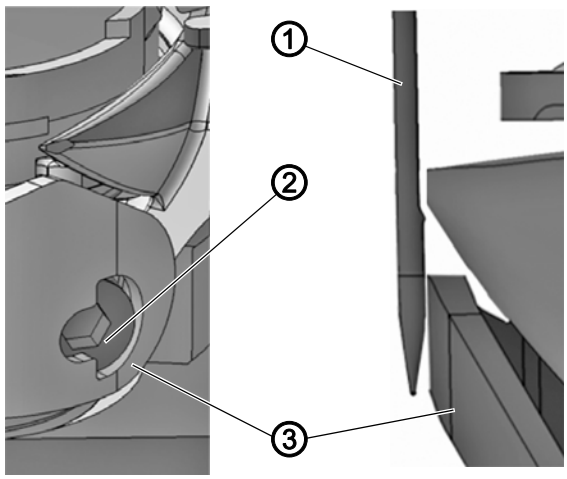
The needle guard prevents contact between needle and hook tip.

Order

First, check the following settings:

- Looping stroke position (p. 53)
- Hook side clearance (p. 55)
- Needle bar height (p. 57)

Fig. 45: Adjusting the needle guard



(1) - Needle
(2) - Screw
(3) - Needle guard

Proper setting

The needle guard (3) pushes the needle away just enough so that it cannot be touched by the hook tip.

To adjust the needle guard:

1. Disassemble the throat plate (p. 29).
2. Disassemble the feed dog (p. 30).

3. Execute the service routine *Needle-Hook > Timing* (📖 *p. 14*).

↳ The software is used to define the necessary presettings on the machine.

4. Turn the handwheel and check how far the needle guard (3) pushes the needle (1) away.
5. Turn the screw (2) such that the needle guard (3) just pushes the needle (1) far away enough so that it cannot be touched by the hook tip.
   - **for pushing away more:** Turn screw (2) counterclockwise
   - **for pushing away less:** Turn screw (2) clockwise
6. Finish the service routine.
7. Assemble the feed dog.
8. Assemble the throat plate.

9 Adjusting the bobbin case lifter

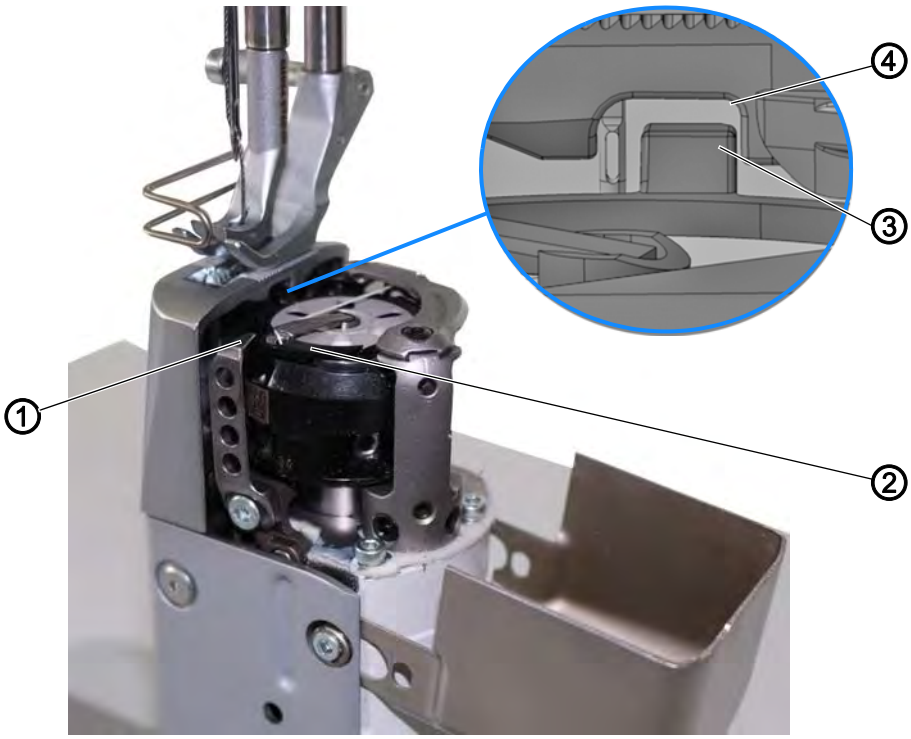
WARNING

Risk of injury from moving parts!

Crushing possible.

Switch off the machine before adjusting the bobbin case lifter.

Fig. 46: Adjusting the bobbin case lifter



(1) - Bobbin case lifter
(2) - Bobbin case
(3) - Nose of the bobbin case
(4) - Slot in the throat plate

The hook pulls the needle thread through between the nose of the bobbin case (3) and the slot in the throat plate (4).

The bobbin case lifter (2) now pushes the bobbin case (1) away so that a gap appears for the thread.

If the hook tip is located below the bobbin case lifter (2), the bobbin case lifter (2) must open so that the thread can also slide past in that position.

So that the thread can slip through without a problem, the width of the lifting gap and the timing of opening have to be adjusted.

Disturbance

Disturbances caused by an incorrect setting of the bobbin case lifter:

- Thread breaking
- Formation of loops on the bottom side of the seam
- Loud machine noise

9.1 Adjusting the lifting gap

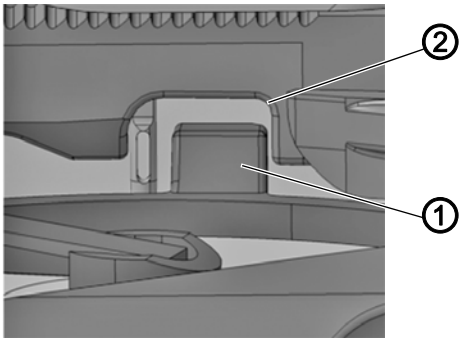
CAUTION

Risk of injury!

Crushing possible.

Check and set the lifting gap only when the machine is switched off.

Fig. 47: Adjusting the lifting gap (1)



(1) - Nose of the bobbin case *(2) - Slot in the throat plate*

Always check the width of the lifting gap after making changes to the needle thread size. The correct width of the lifting gap depends on the thickness of the needle thread.

Proper setting

The needle thread slides through unobstructed between the nose of the bobbin case (1) and the slot in the throat plate (2).

Fig. 48: Adjusting the lifting gap (2)

(3) - Bobbin case lifter
(4) - Threaded pin
(5) - Hook cover
(1) - Nose of the bobbin case

To adjust the lifting gap:

1. Open the hook cover (5) (📖 *p. 28*).
2. Turn the handwheel until the bobbin case lifter (3) reaches its maximum lifter path.
3. Loosen the threaded pin (4).
4. Set the bobbin case lifter (3) so that the gap between the nose of the bobbin case (1) and the slot in the throat plate (2) is just large enough to allow the needle thread to slip through without a problem. The nose of the bobbin case (1) should be centered in the slot of the throat plate (2).

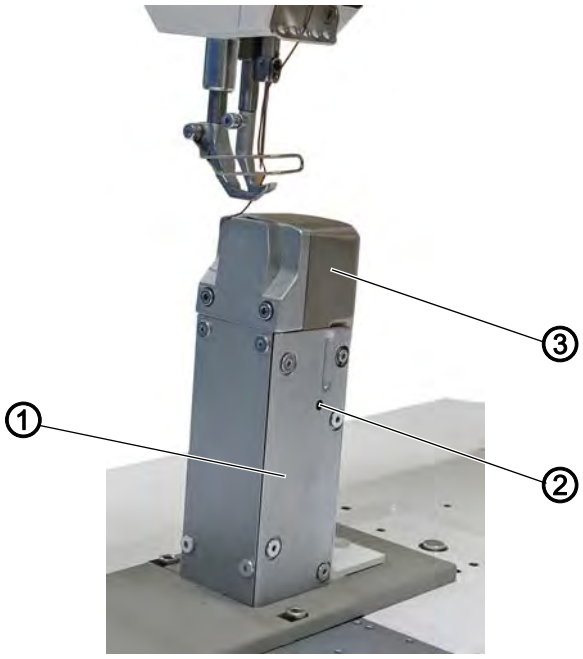
Important

Ensure that the gap is not so big that the middle part of the hook swings back and forth, hitting the slot in the throat plate.

5. Tighten the threaded pin (4).
6. Close the hook cover (5) (📖 *p. 28*).

9.2 Adjusting the timing for lifting

Fig. 49: Adjusting the timing for lifting (1)



(1) - Cover
(2) - Slot
(3) - Hook cover

Proper setting

The bobbin case lifter starts to open exactly at the point when the hook tip is located below the bobbin case lifter after the loop is taken up.

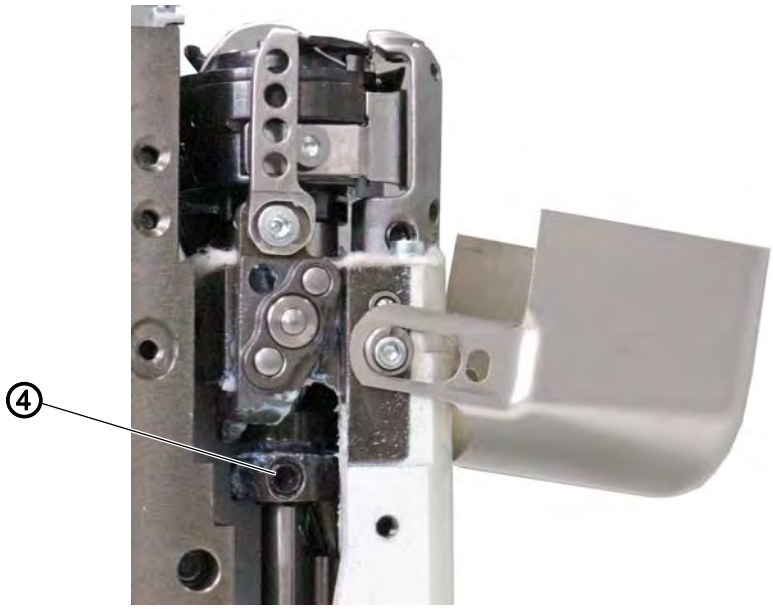
In 1-needle machines, this happens when the handwheel position is approx. 125° ± 5°.
In 2-needle machines, this happens when the handwheel position is approx. 125° ± 5° for the right-hand hook, and when the handwheel position is approx. 305° ± 5° for the left-hand hook.

For 125° or 305°, the threaded pin (4) is exactly in the center of the slot (insert allen key in the threaded pin for orientation).

To adjust the timing for lifting:

1. Open the hook cover (3) (📖 *p. 28*).

Fig. 50: Adjusting the timing for lifting (2)



(4) - Threaded pin

2. Loosen the threaded pin (4) through the slot (2) in the cover (1).

Information

The threaded pin (4) is accessible from the front for the right column, while it is accessible from behind for the left column.

3. Turn the handwheel until the hook tip is exactly below the bobbin case lifter.

   In 1-needle machines, this happens when the handwheel position is approx. 125° ± 5°.
   In 2-needle machines, this happens when the handwheel position is approx. 125° ± 5° for the right-hand hook, and when the handwheel position is approx. 305° ± 5° for the left-hand hook.
4. Tighten the threaded pin (4).
5. Close the hook cover (📖 *p. 28*).
6. Perform a sewing test.
7. If necessary, adjust the setting to the sewing material and to the needle thread and hook thread.

10 Sewing feet

WARNING

Risk of injury from sharp and moving parts!

Puncture or crushing possible.

Move the machine into the service routine before adjusting the sewing feet.

10.1 Adjusting the sewing foot lifting gear

NOTICE

Property damage may occur!

Possible damage to the PCB, impairing the full operational readiness of the machine.

Always wear an antistatic armband whenever you work on the PCB!

Proper setting

All shafts of the gear are seated on the flat.
The gear has no lateral play.

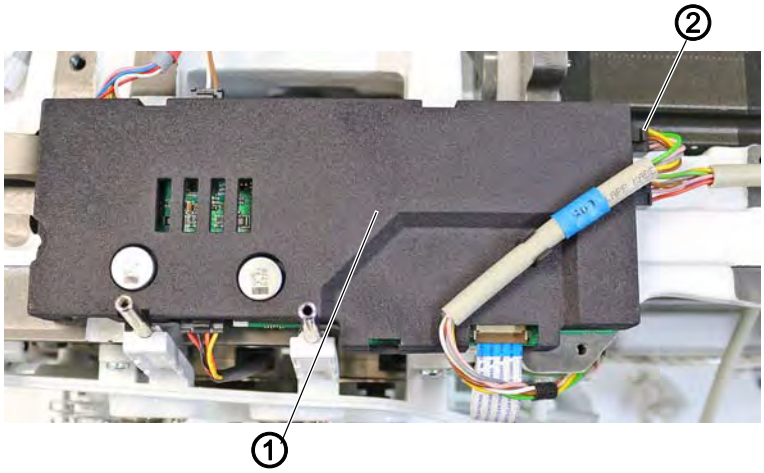
Spring pressure always keeps the gear securely in the zero position on the control cam.

Order

First, check the following setting:

- Basic setting of the eccentrics for sewing foot stroke, feed dog lift and feed dog movement (📖 *p. 38*)

Fig. 51: Adjusting the sewing foot lifting gear (1)

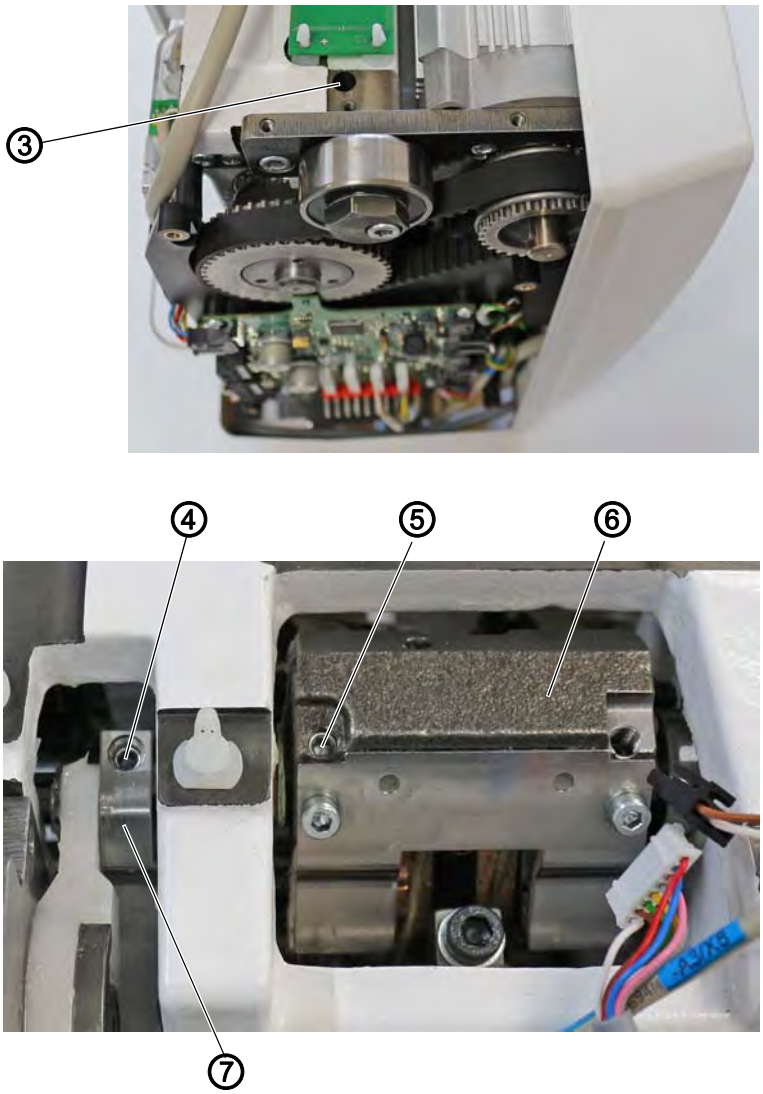


(1) - PCB *(2) - Plug*

To set the lifting gear of the sewing foot:

1. Switch off the machine.
2. Disassemble the handwheel.
3. Disassemble the toothed belt cover (📖 *p. 23*).
4. Disassemble the arm cover (📖 *p. 19*).
5. Disassemble the front cover (📖 *p. 20*).
6. Pull the plug (2) off the PCB (1) (only on 2-needle machines).
7. Loosen all plugs from the PCB (1).
8. Remove the PCB (1) CAREFULLY.

Fig. 52: Adjusting the sewing foot lifting gear (2)



(3) - Screw
(4) - Threaded pin
(5) - Threaded pin
(6) - Gear
(7) - Clamping block

9. Loosen the screw (3).

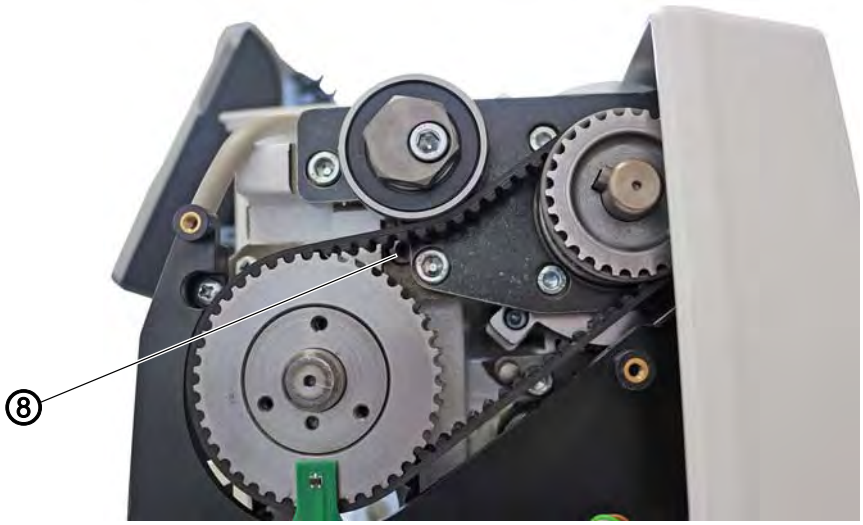
   The spring pushing the gear (6) back to the 0 position when the machine is switched off disengages.

10. Tighten the threaded pin (4) on the flat through the hole on the clamping block (7).

11. Loosen the threaded pin (5).
    Check if the threaded pin underneath is seated firmly on the flat.
    If not, tighten the threaded pin so that there is no play.

12. Tighten the threaded pin (5).

Fig. 53: Adjusting the sewing foot lifting gear (3)



(8) - Screw

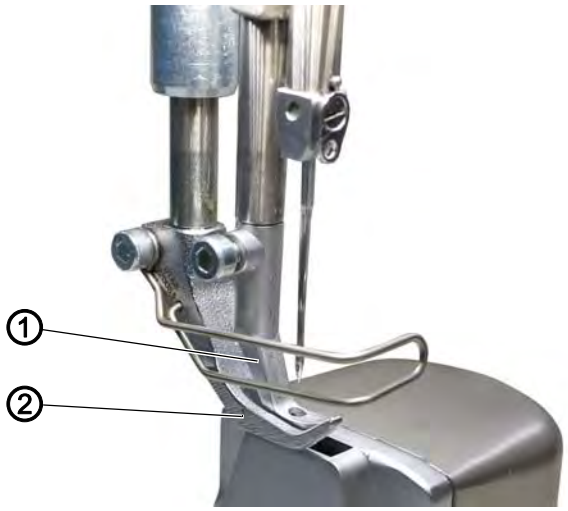
13. Turn the spring clockwise using the screw (8) until the gear (6) is at the 0 position.

↳ The plates of the lifting gear are parallel to one another.

14. Tension the spring clockwise by 45° using screw (8) before fixing it in place using screw (3).
15. Use your hand to test if the gear (6) is pushed to the 0 position by the spring.
16. Assemble the PCB (1) again.
17. Attach all plugs at the PCB (1).

10.2 Adjusting an even sewing foot stroke

Fig. 54: Adjusting an even sewing foot stroke (1)

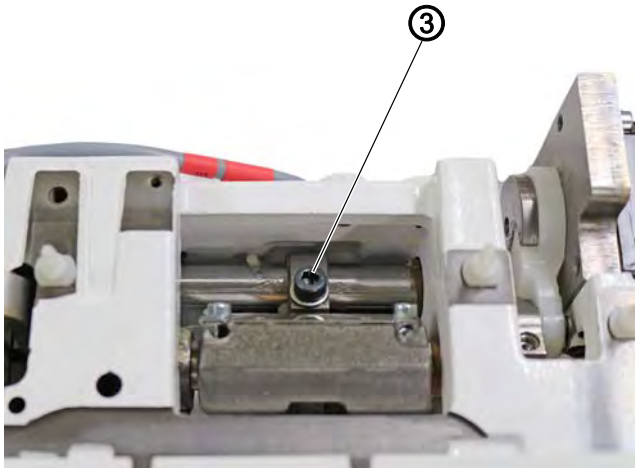


(1) - Walking foot *(2) - Presser foot*

Proper setting

Presser foot (2) and walking foot (1) are raised by the same height.

Fig. 55: Adjusting an even sewing foot stroke (2)



(3) - Screw

To set an even sewing foot stroke:

1. Switch off the machine.
2. Disassemble the arm cover (📖 *p. 19*).
3. Set the feed dog to the level of the throat plate.
4. Loosen the screw (3).
5. Lower presser foot (2) and walking foot (1) to the level of the throat plate.

↳ The handwheel position is 90°.

6. Re-tighten the screw (3).

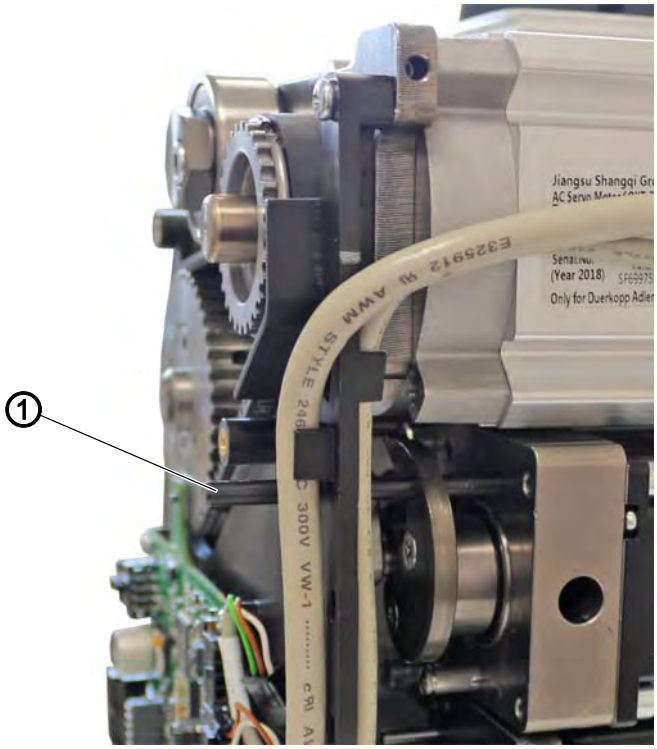
Checking the setting

To check the setting:

1. Set the sewing foot stroke to **3** in the seam program.
2. Press the **Service Stop** button.
3. Use a 3 mm allen key to check if the stroke is identical when the sewing foot is at the top dead center.
4. Readjust if necessary.

10.3 Adjusting the sewing foot pressure and sewing foot lift

Fig. 56: Adjusting the sewing foot pressure and sewing foot lift (1)



(1) - Locking peg

To adjust the sewing foot pressure and the sewing foot lift:

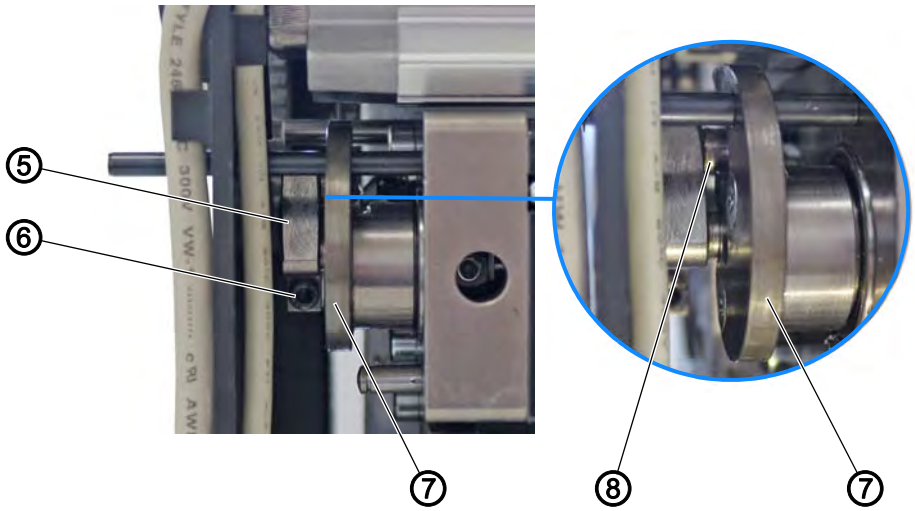
1. Switch off the machine.
2. Disassemble the handwheel.
3. Disassemble the toothed belt cover (📖 *p. 23*).
4. Disassemble the motor cover (📖 *p. 22*).
5. Insert the locking peg (∅ 5 mm) (1).

Fig. 57: Adjusting the sewing foot pressure and sewing foot lift (2)

(2) - Walking foot
(3) - Presser foot
(4) - Throat plate

6. Presser foot (3) and walking foot (2) must rest on the throat plate (4): if necessary, align using the handwheel.

Fig. 58: Adjusting the sewing foot pressure and sewing foot lift (3)



(5) - Lever
(6) - Screw
(7) - Curve
(8) - Roller

7. Loosen the screw (6).
8. Turn the curve (7) until the roller (8) is seated in the recess of the curve (7).
9. To align the lever (5) sideways: The roller (8) must be flush with the curve (7).
10. Tighten the screw (6).
11. Remove the locking peg (1).

Sewing foot pressure

Proper setting

The sewing material does not slip and is correctly transported. The correct sewing foot pressure depends on the sewing material:

- Lower pressure for soft materials, e.g. fabric
- Higher pressure for durable materials, e.g. leather or laminate

The sewing foot pressure is set via the program parameters (🕮 *p. 148*).

Height of the sewing foot lift

The height of the sewing foot lift is set via the program parameters (🕮 *p. 148*).

When the pedal is pressed back halfway, the sewing feet can be raised during sewing, e. g. to move the sewing material.
When the pedal is pressed completely back, the sewing feet will be raised after the thread is cut so that the sewing material can be removed.

11 Adjusting the needle thread tension

CAUTION

Risk of injury from sharp and moving parts!

Puncture or crushing possible.

Switch off the machine before adjusting the needle thread tension.

Information

Fig. 59: Adjusting the needle thread tension, spring balance

You can order a spring balance with thread hook from our sales offices using the following part numbers: 0APP 001503.

11.1 Adjusting the needle thread regulator

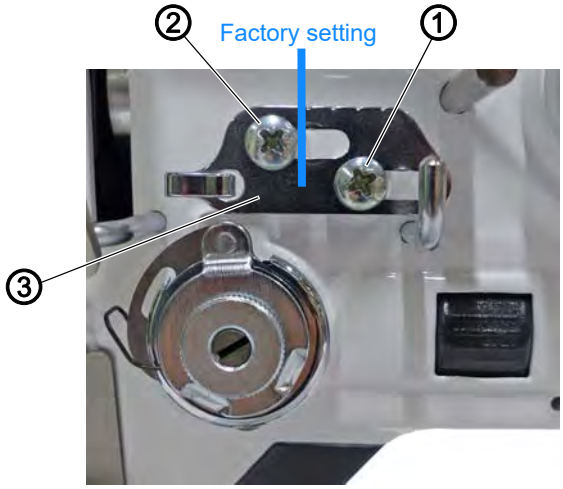
The needle thread regulator determines the tension applied to guide the needle thread around the hook. The required tension depends on the thickness of the sewing material, the thread strength, and the stitch length.

- Lower needle thread tension: thin sewing material, low thread strengths
- Higher needle thread tension: thick sewing material, high thread strengths

Proper setting

The loop of the needle thread slides at low tension over the thickest point of the hook, without forming loops or snagging.

Fig. 60: Adjusting the needle thread regulator



(1) - Screw
(2) - Screw
(3) - Needle thread regulator

To adjust the needle thread regulator:

1. Open the hook cover (📖 *p. 28*).
2. Turn the electronic handwheel and observe the cycle of the needle thread around the hook.
3. Loosen the screw (1).
4. Move the needle thread regulator (3)
   - **Reduce the needle thread tension:** Slide the needle thread regulator (3) to the left
   - **Increase the needle thread tension:** Slide the needle thread regulator (3) to the right
5. Tighten the screw (1).

Information

The screw (2) attaches a guide roller that serves as a spacer. Do NOT loosen the screw (2) or tighten it further.

The factory setting of the needle thread regulator (3) is such that the left notch of the needle thread regulator (3) is flush with the right side of the screw (2).

11.2 Adjusting the thread tensioning spring

The thread tensioning spring holds the needle thread under tension from the top dead center of the thread lever up to the point when the needle eye plunges into the sewing material.

Proper setting

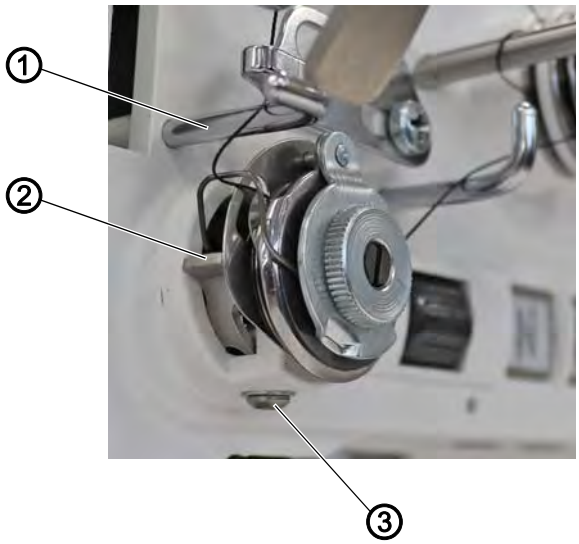
The thread tensioning spring does not contact the stop until the needle eye has plunged into the sewing material.

The adjustment for the thread tensioning spring must be varied according to the sewing material and the required sewing result.

11.2.1 Adjusting the spring travel

The factory setting for the spring travel is 17 mm between the thread guide (1) and the stop (2).

Fig. 61: Adjusting the spring travel



(1) - Thread guide
(2) - Stop
(3) - Screw

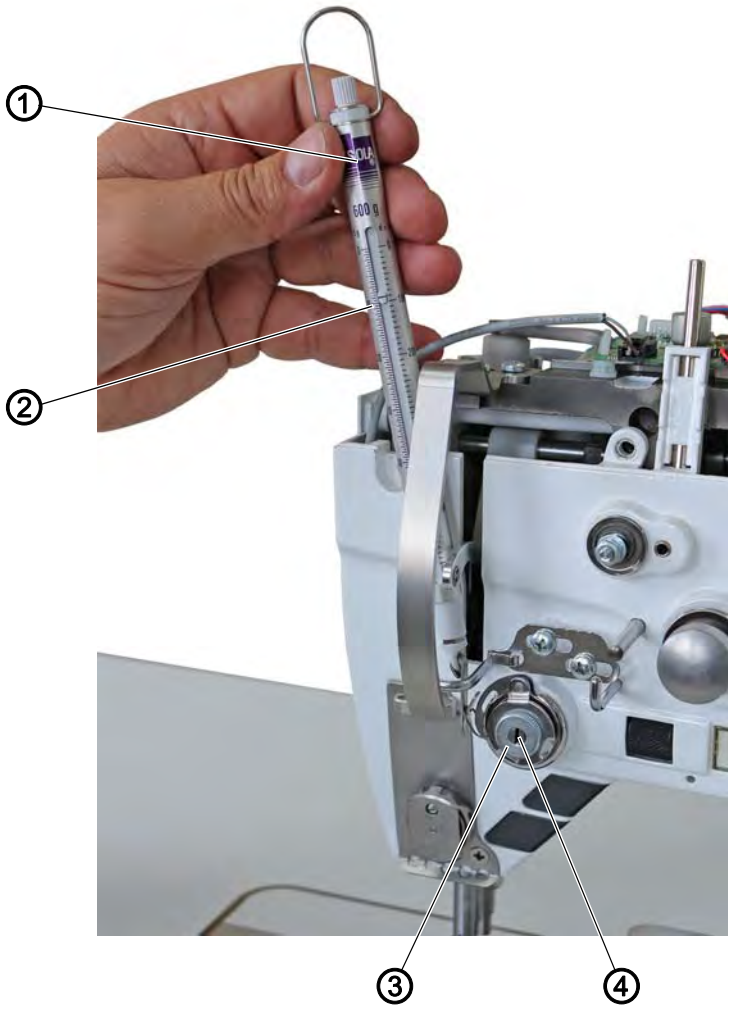
To adjust the spring travel:

1. Loosen the screw (3).
2. Turn the stop (2) to adjust the spring travel.
   - **longer spring travel:** Turn the stop (2) counterclockwise
   - **shorter spring travel:** Turn the stop (2) clockwise
3. Tighten the screw (3).

11.2.2 Adjusting the spring tension

The factory setting for the spring tension is 90 grams.

Fig. 62: Adjusting the spring tension



(1) - Spring balance
(2) - Scale
(3) - Knurled nut
(4) - Screw

To adjust the spring tension:

1. Hook the spring balance (1) into the thread tensioning spring.
2. Pull on the spring balance (1) until the thread tensioning spring starts moving.
3. Loosen the knurled nut (3).
4. Turn the screw (4) to adjust the spring tension:
   - **greater spring tension:** Turn screw (4) counterclockwise
   - **less spring tension:** Turn screw (4) clockwise

   ↳ The scale (2) of the spring balance (1) indicates the thread tension reading.
5. Tighten the knurled nut (3).

12 Winder

WARNING

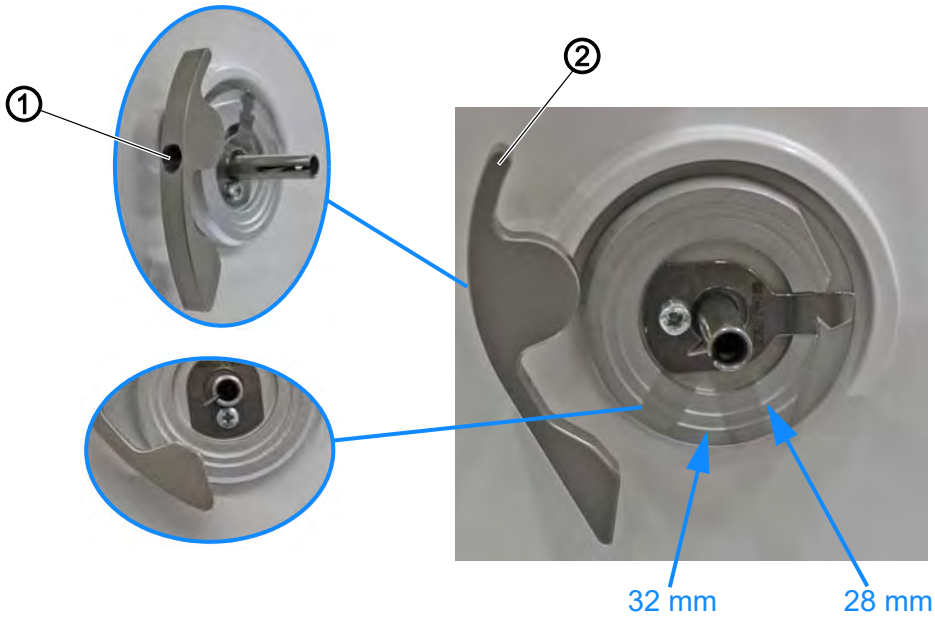
Risk of injury from moving parts!

Crushing possible.

Switch off the machine before adjusting the winder.

12.1 Adjusting the winder to a bobbin diameter

Fig. 63: Adjusting the winder to a bobbin diameter



(1) - Screw

(2) - Winder lever

To adjust the winder to a bobbin diameter:

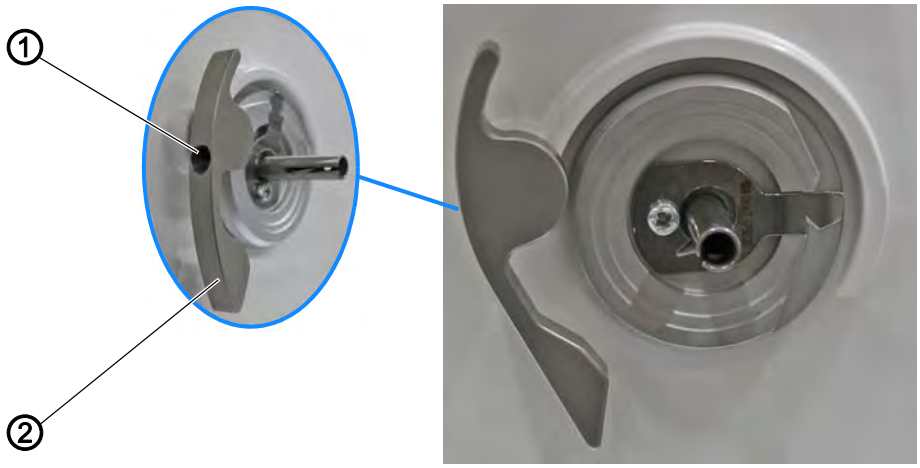
1. Loosen the screw (1).
2. Set the winder lever (2) to the ring that corresponds to the desired bobbin diameter.
3. Tighten the screw (1).
4. To fine-tune the setting, put a completely filled bobbin onto the winder.
5. Loosen the screw (1).
6. Press the winder lever (2) up to the thread as far as it will go.
7. Tighten the screw (1).

12.2 Adjusting the winder filling quantity

Proper setting

The winding process will stop automatically when the required filling quantity of the bobbin is reached.

Fig. 64: Adjusting the winder filling quantity



(1) - Screw

(2) - Winder lever

To adjust the winder filling quantity:

1. Loosen the screw (1).
2. Move the winder lever (2):
   - **Filling quantity too low:** Turn the winder lever (2) outward
   - **Filling quantity too high:** Turn the winder lever (2) inward
3. Re-tighten the screw (1).
4. Check the winder filling quantity by carrying out a winding process and correct the setting if necessary.

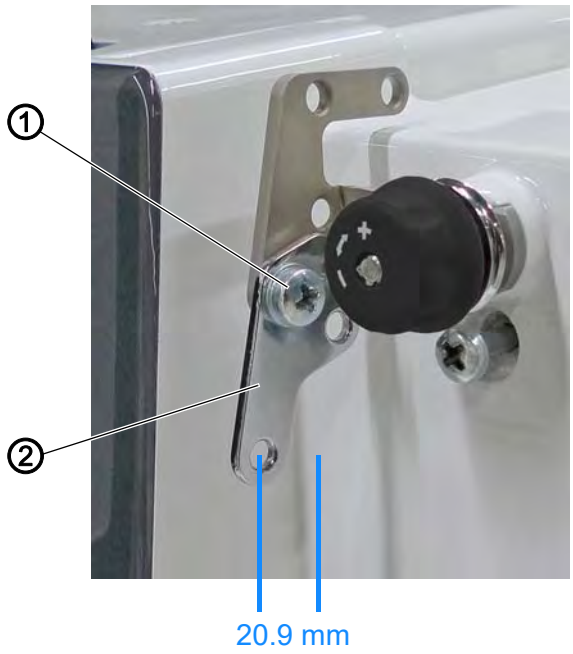
Information

To keep the thread from overflowing on the bobbin, observe the following setting tolerances:

- Bobbin Ø 32 mm: Ø 31 ± 0.5 mm
- Bobbin Ø 28 mm: Ø 27 ± 0.5 mm

12.3 Adjusting the bobbin thread guide

Fig. 65: Adjusting the bobbin thread guide



(1) - Screw *(2) - Bobbin thread guide*

The position of the bobbin thread guide determines how the bobbin thread is wound onto the bobbin.
The factory setting for the distance between bobbin thread guide and machine housing is **20.9 mm**

Proper setting

The bobbin thread is wound on evenly over the entire width of the bobbin.

To adjust the bobbin thread guide:

1. Loosen the screw (1).
2. Turn the bobbin thread guide (2):
   - **To wind on the bobbin thread further to the front:** Turn the bobbin thread guide (2) to the front
   - **To wind on the bobbin thread further to the rear:** Turn the bobbin thread guide (2) to the rear
3. Tighten the screw (1).

13 Thread trimmer (FA)

WARNING

Risk of injury from sharp parts!

Cutting injuries may be sustained.

Switch off the machine before adjusting the thread trimmer.

WARNING

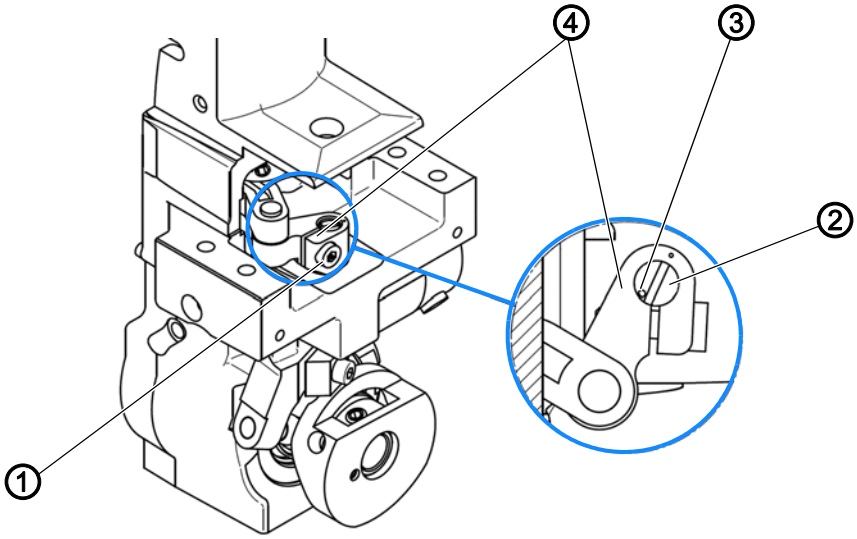
Risk of injury from moving parts!

Crushing possible.

Switch off the machine before adjusting the thread trimmer.

13.1 Adjusting the eccentric shaft

Fig. 66: Adjusting the eccentric shaft



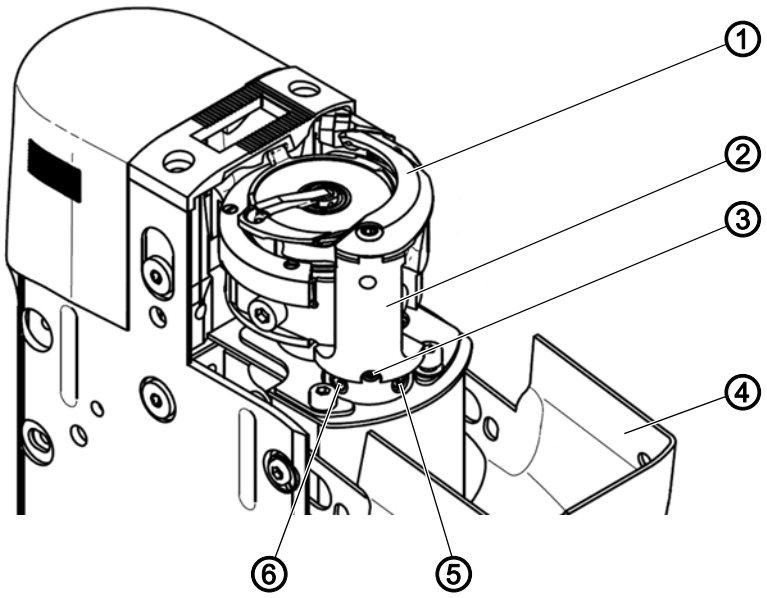
(1) - Screw
(2) - Eccentric shaft
(3) - Marking
(4) - Lever

To adjust the eccentric shaft:

1. Loosen the screw (1).
2. Turn the lever (4) against the eccentric shaft (2) as shown above. Observe the position of the marking (3) while doing so.
3. Tighten the screw (1).
4. Check the eccentric shaft (2) for axial play.
5. Readjust the setting if detecting axial play.

13.2 Adjusting the height of the thread-pulling knife

Fig. 67: Adjusting the height of the thread-pulling knife



(1) - Thread-pulling knife
(2) - Knife holder
(3) - Screw
(4) - Hook cover
(5) - Screw
(6) - Screw

Important

Make sure that the thread-pulling knife does not scrape on the hook or on the bobbin.

Proper setting

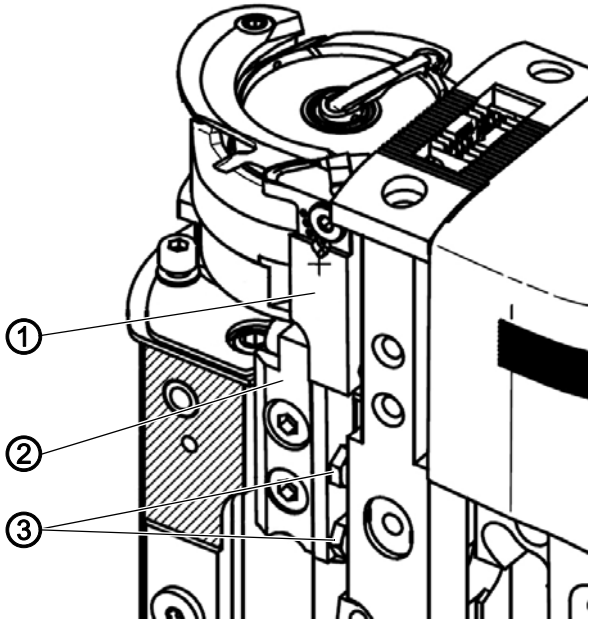
The thread-pulling knife pivots as closely as possible above the hook. The thread-pulling knife must not touch the hook and not be positioned more than 0.1 mm above the hook.

To adjust the height of the thread-pulling knife:

1. Open the hook cover (4).
2. Loosen screws (5) and (6).
3. To adjust the height of the knife holder (2), turn the screw (3).
   - **To set the knife holder (2) higher:** Turn screw (3) clockwise
   - **To set the knife holder (2) lower:** Turn screw (3) counterclockwise
4. Tighten the screw (5) on the surface.
5. Tighten the screw (6).

13.3 Adjusting the counter blade support

Fig. 68: Adjusting the counter blade support (1)

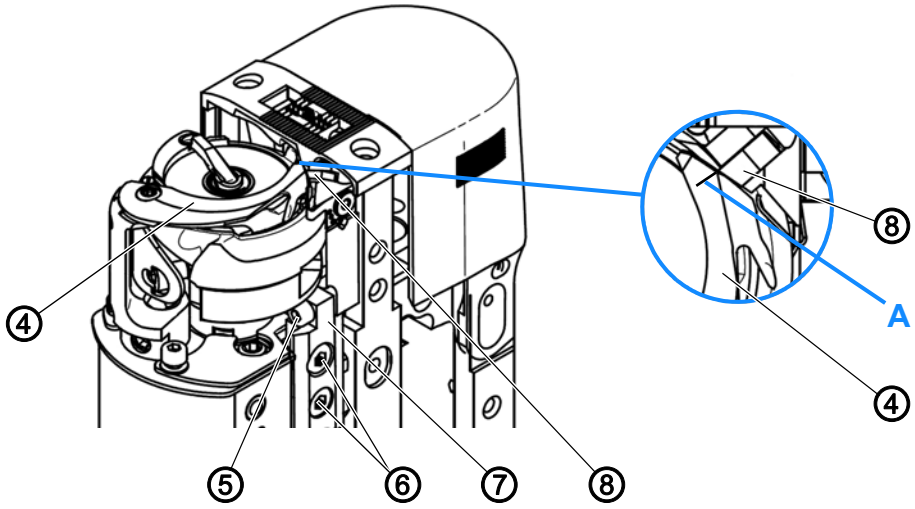


(1) - Counter blade support
(2) - Holder
(3) - Screws

To adjust the counter blade support:

1. Loosen the screws (3).
2. Position the counter blade support (1) and the holder (2) so that they are parallel.
3. Tighten the screws (3).

Fig. 69: Adjusting the counter blade support (2)



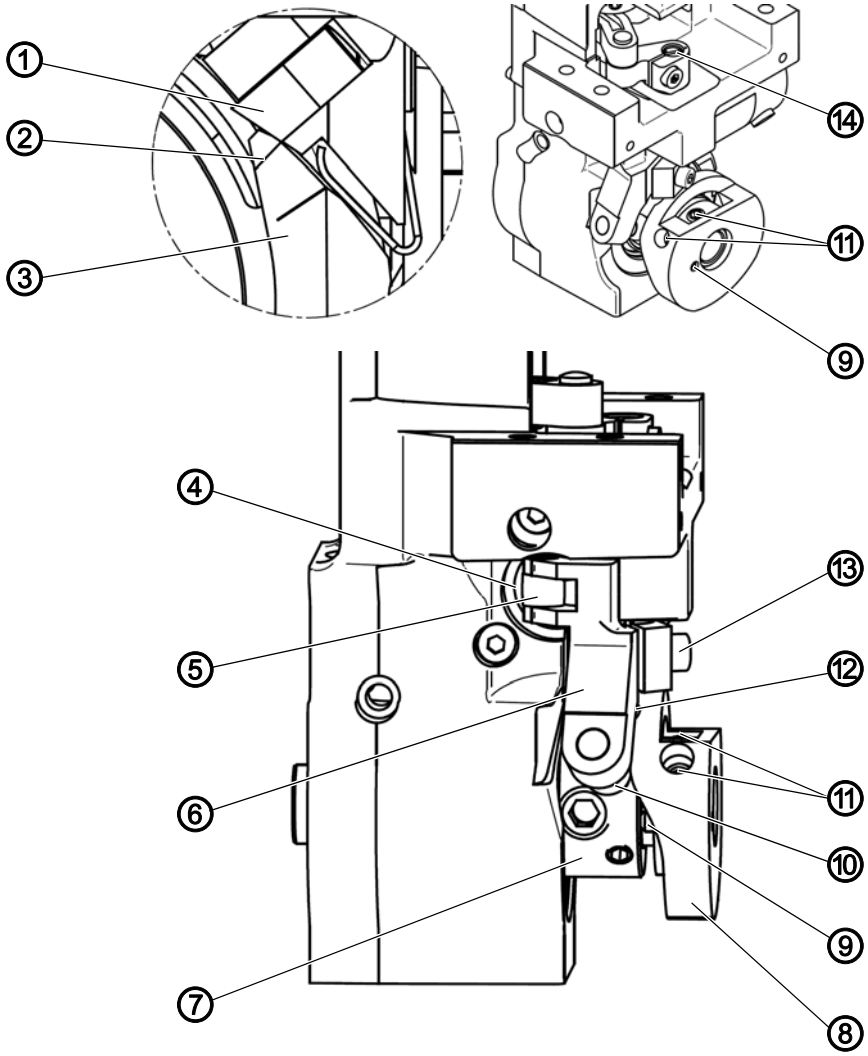
(4) - Thread-pulling knife
(5) - Screw
(6) - Screws
(7) - Holder
(8) - Counter blade

4. Loosen the screw (5) until the screw head no longer touches the holder (7).
5. Apply Loctite 222 to secure the screw (5).
6. Turn the cutoff curve such that the thread-pulling knife (4) can complete its movement.
7. Loosen the screws (6).
8. Set the thread-pulling knife (4) such that the counter blade (8) is flush with marking **A**.
9. Set the holder (7) such that the counter blade (8) makes contact with the thread-pulling knife (4) without any pressure being applied.

   ↳ The cutting pressure during cutting is generated by the shape of thread-pulling knife (4) and counter blade (8).
10. Tighten the screws (6).

13.4 Adjusting the end position of cutoff curve and thread-pulling knife

Fig. 70: Adjusting the end position of cutoff curve and thread-pulling knife



(1) - Counter blade
(2) - Edge
(3) - Thread-pulling knife
(4) - Electromagnet
(5) - Roller
(6) - Lever
(7) - Set collar
(8) - Cutoff curve
(9) - Screw
(10) - Roller
(11) - Threaded pins
(12) - Slot
(13) - Screw
(14) - Eccentric shaft

To adjust the end position of cutoff curve and thread-pulling knife.

1. Loosen the screw (13).
2. Turn the lever (6) counterclockwise until the roller (5) rests against the electromagnet (4).
3. Align the thread-pulling knife (3) so that the edge (2) is flush with the rear edge of the counter blade (1).

4. Tighten the screw (13).

↳ The eccentric shaft (14) must have no axial play.
The movement of the eccentric shaft (14) must be smooth.

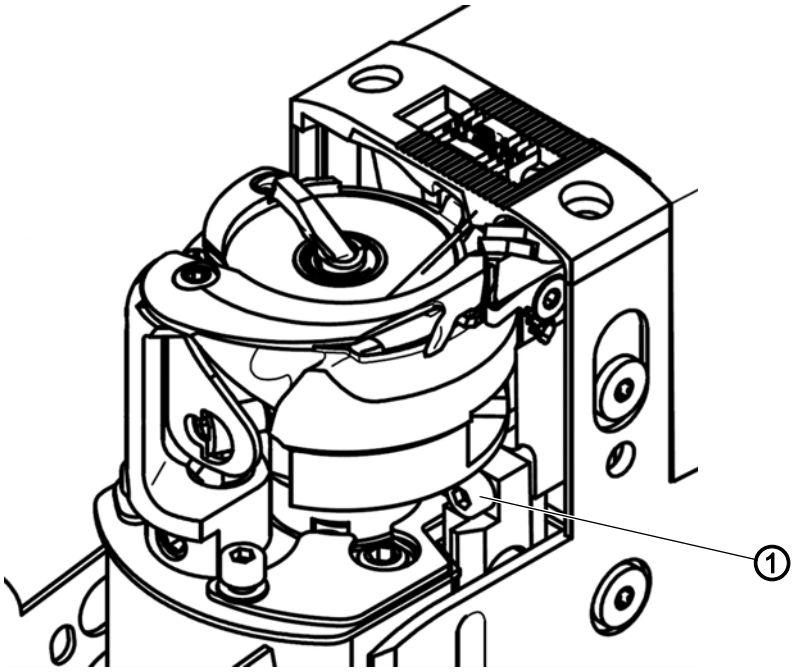
5. Loosen the threaded pins (11).
6. Turn the cutoff curve (8) to the highest point relative to the roller (10).
7. Turn the screw (9) to adjust the play between cutoff curve (8) and roller (10).
8. Set a play of 0.1 mm.
9. Turn the handwheel to 98° OR set 98° on the display.
10. Adjust the cutoff curve (8) until the roller (10) engages in the slot (12).
11. Turn the roller (10) counterclockwise so that the screw (9) is in constant contact with the set collar (7).
12. Tighten the threaded pins (11).
13. Check the play between cutoff curve (8) and roller (10) again.

↳ The play is 0.1 mm.

14. Check to ensure that the thread-pulling knife (3) makes contact in none of the end positions during the cutting cycle.

13.5 Adjusting the cutting pressure

Fig. 71: Adjusting the cutting pressure



(1) - Screw

Proper setting

2 threads with the greatest strength used for sewing must be cut safely at the same time with minimum pressure.

Disturbance

Disturbances caused by an incorrect setting:

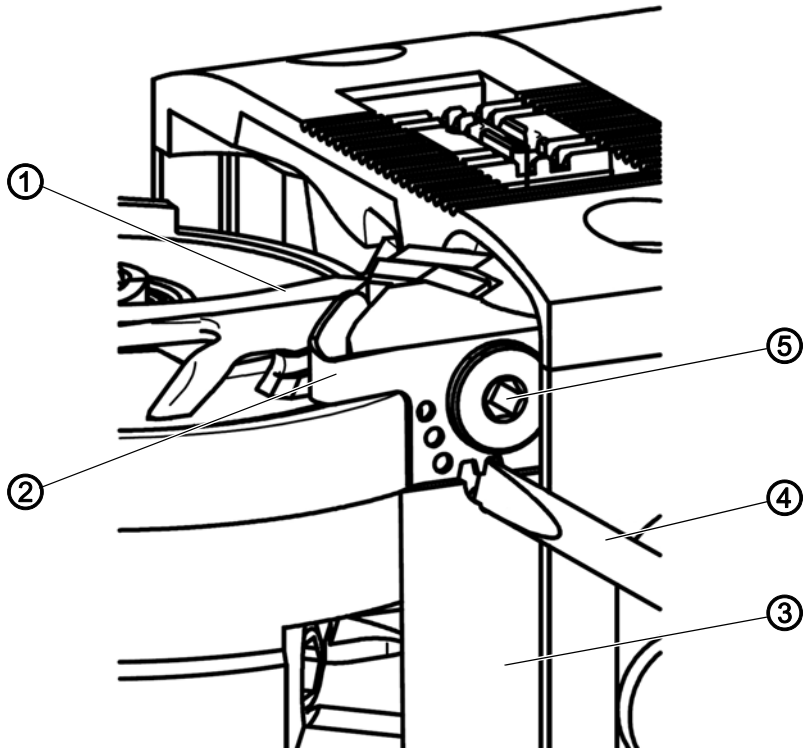
- Increased knife wear if the cutting pressure is too great
- Problems during sewing on
- Problems in cutting the thread

To adjust the cutting pressure:

1. Turn the screw (1).
   - **Increase the cutting pressure:** Turn screw (1) clockwise
   - **Reduce the cutting pressure:** Turn screw (1) counterclockwise

13.6 Adjusting the hook thread clamp

Fig. 72: Adjusting the hook thread clamp (1)



(1) - Thread-pulling knife
(2) - Hook thread clamp
(3) - Counter blade support
(4) - Slotted screw driver
(5) - Screw

To adjust the hook thread clamp:

1. Loosen the screw (5).
2. Slide a small slotted screw driver (4) between hook thread clamp (2) and counter blade support (3).
3. Use the screw driver (4) to adjust the hook thread clamp (2) such that the hook thread can be pulled out with a force between 160 and 180 grams.
4. Tighten the screw (5).
5. Check if the hook thread remains clamped after cutting between the hook thread clamp (2) and the thread-pulling knife (1).

Information

Fig. 73: Adjusting the hook thread clamp (2)

The holding force of the hook thread clamp is measured by looping the needle thread around the hook thread and pulling it through the needle hole. Next, the force is measured with the help of a spring balance.

14 Adjusting the safety release clutch

WARNING

Risk of injury from moving parts!

Crushing possible.

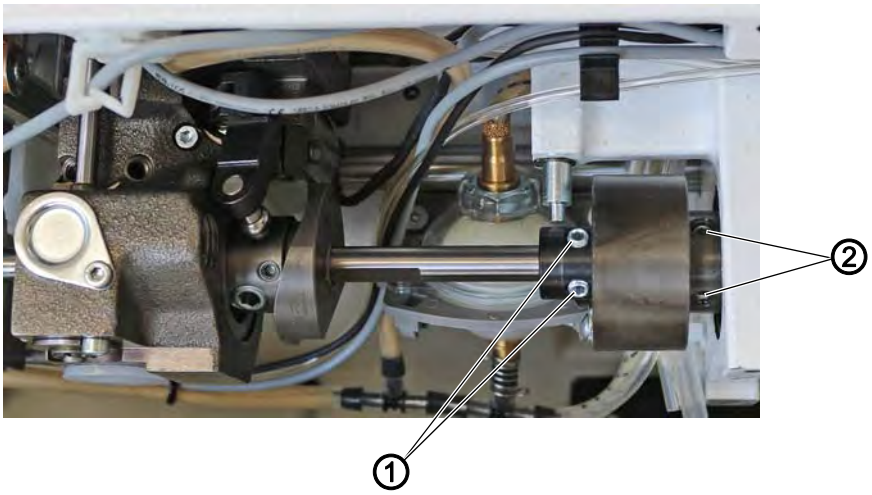
Switch off the machine before you adjust the safety release clutch.

The safety release clutch disengages in the event of the thread jamming and thus prevents the hook from being misadjusted or damaged.

14.1 Engaging the safety release clutch

Proper setting

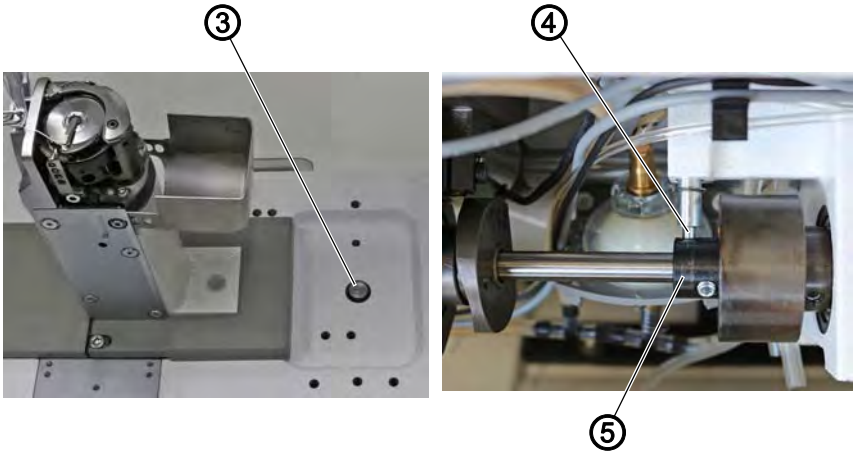
Fig. 74: Engaging the safety release clutch (1)



(1) - Threaded pins *(2) - Threaded pins*

When the safety release clutch is engaged, threaded pins (1) and (2) are parallel to each other (figure above).
When the safety release clutch is disengaged, threaded pins (1) and (2) are not parallel to each other.

Fig. 75: Engaging the safety release clutch (2)



(3) - Button
(4) - Pin
(5) - Set collar

To engage the safety release clutch:

1. Tilt the machine head (📖 *p. 18*).
2. Press the button (3).

↳ The pin (4) extends.

3. Turn the handwheel until the pin (4) slides into the slot on the set collar (5).
4. Continue to turn the handwheel until the safety release clutch engages with an audible click.

Information

When the machine is switched on, you can also use the jog dial instead of the handwheel.

14.2 Adjusting the torque

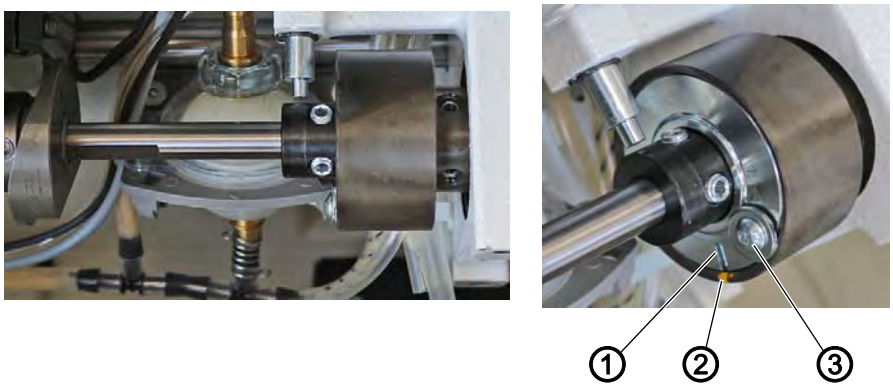
NOTICE

Property damage may occur!

If you change the torque, it could be that the safety release clutch will not disengage although this would be required.
This could cause machine damage, e.g. in the event of the thread jamming.

Do NOT change the factory adjustment.
Make sure that the torque remains at 8 Nm.

Fig. 76: Adjusting the torque



(1) - Slot
(2) - Marking point
(3) - Screw

Proper setting

The machine is set at the factory such that the torque is 8 Nm when the marking point (2) is exactly above the slot (1) of the washer.

To adjust the torque:

1. Tilt the machine head (📖 *p. 18*).
2. Loosen the screw (3).
3. Using the screw driver, turn the washer on the slot (1) so that 8 Nm is reached for the torque.
   - Increase force: turn in the + direction
   - Decrease force: turn in the - direction
4. Tighten the screw (3).

15 Toothed belt

WARNING

Risk of injury from moving parts!

Crushing possible.

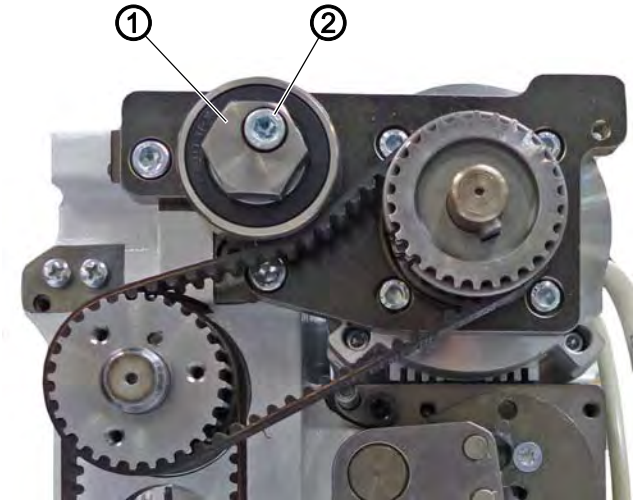
Switch off the machine before changing the toothed belt.

15.1 Changing the upper toothed belt

To change the upper toothed belt:

1. Switch off the machine.
2. Disassemble the front cover (📖 *p. 20*).
3. Disassemble the arm cover (📖 *p. 19*).
4. Disassemble handwheel and toothed belt cover (📖 *p. 23*).
5. Disassemble the motor cover (📖 *p. 22*).

Fig. 77: Changing the upper toothed belt (1)



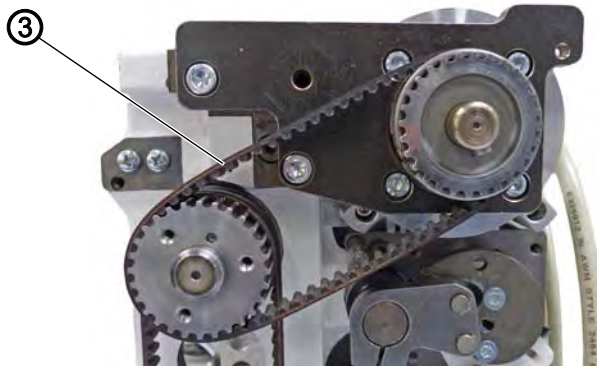
(1) - Tensioning roller *(2) - Screw*

6. Loosen the screw (2) on the tensioning roller (1).

↳ The toothed belt tension is slack.

7. Remove the tensioning roller (1).
   Make sure not to lose the washer.

Fig. 78: Changing the upper toothed belt (2)



(3) - Toothed belt

8. Remove the toothed belt (3).
9. Place a new toothed belt.
10. Fit the tensioning roller (1).
11. Use a wrench to tension the tensioning roller (1).

↳ It should not be possible to twist the toothed belt more than 45°.

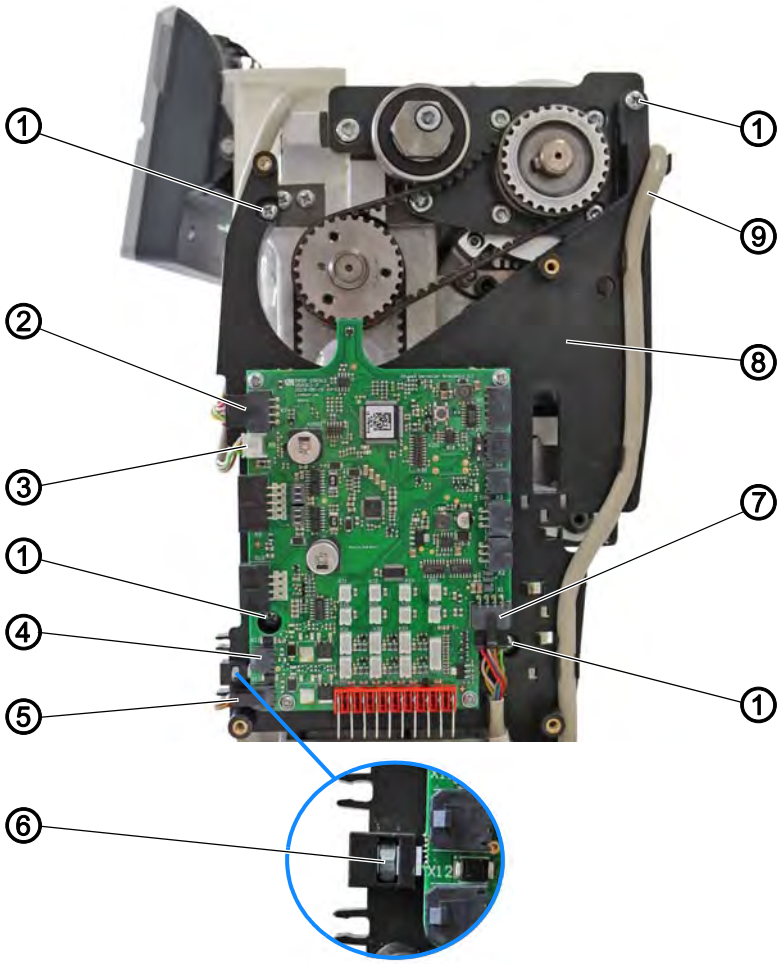
12. Tighten the screw (2).

15.2 Changing the lower toothed belt

To change the lower toothed belt:

1. Switch off the machine.
2. Disassemble the front cover (📖 *p. 20*).
3. Disassemble the arm cover (📖 *p. 19*).
4. Disassemble handwheel and toothed belt cover (📖 *p. 23*).
5. Disassemble the motor cover (📖 *p. 22*).

Fig. 79: Changing the lower toothed belt (1)



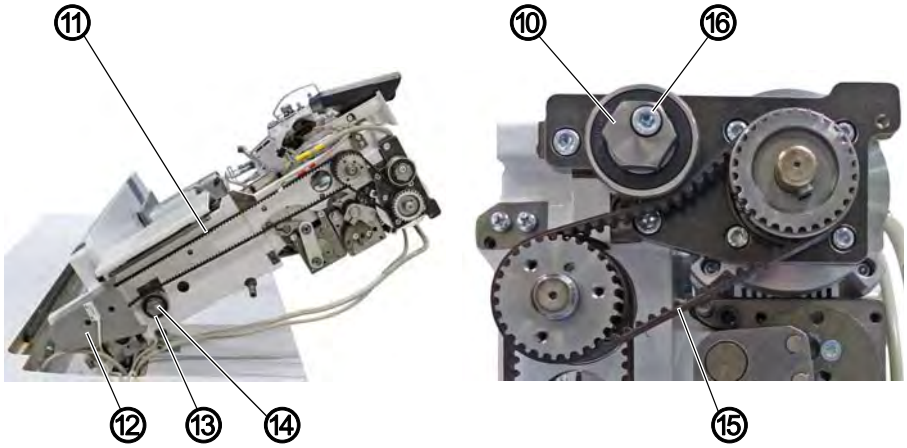
(1) - Screws
(2) - CAN cable
(3) - Cable oil level indicator lighting
(4) - Cable thread trimmer (optional, only on 2-needle machines)
(5) - Cable thread trimmer
(6) - Nut
(7) - CAN cable
(8) - Holder
(9) - Cable

6. Pull the cables off the PCB:
   - CAN cable (2)
   - Cable oil level indicator lighting (3)
   - Cable thread trimmer (4) (optional)
   - Cable thread trimmer (5)
   - CAN cable (7)
   - optional: Pull off the guard junction (slot **X5**)
7. Pull the cable (9) out of the terminals.
8. Loosen the screws (1).
9. Remove the holder (8) with the PCB.

Important

Make sure not to lose the nut (6).

Fig. 80: Changing the lower toothed belt (2)



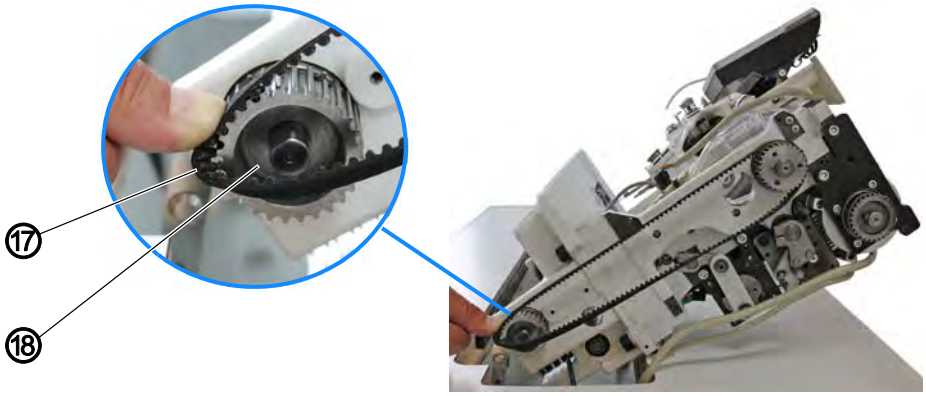
(10) - Tensioning roller
(11) - Toothed belt
(12) - Toothed belt cover
(13) - Tensioning roller
(14) - Screw
(15) - Toothed belt
(16) - Screw

10. Tilt the machine head.
11. Disassemble the toothed belt cover (12).
12. Erect the machine head.
13. Lock the machine in place (📖 *p. 35*).
14. Loosen the screw (16) on the tensioning roller (10).

    ↳ The toothed belt tension is slack.
15. Remove the tensioning roller (10).
    Make sure not to lose the washer.
16. Remove the toothed belt (15).
17. Tilt the machine head.
18. Loosen the screw (14) on the tensioning roller (13).

    ↳ The toothed belt tension is slack.
19. Remove the tensioning roller (13).
    Make sure not to lose the washer.
20. Remove the toothed belt (11).

Fig. 81: Changing the lower toothed belt (3)



(17) - Toothed belt

(18) - Gear wheel

21. Place a new toothed belt (17).
22. Insert the toothed belt (17) into the next accessible tooth of the gear wheel (18).

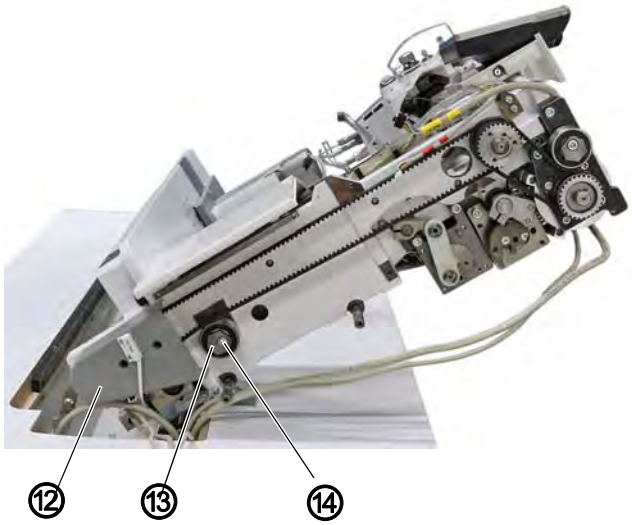
Information

Fig. 82: Changing the lower toothed belt (4)

The toothed belt is positioned correctly when the screw in the lower toothed belt wheel lines up with the screw in the eccentric and in the set collar AND when it is positioned next to the marking in the machine casting.

23. Remove the lock.
24. Screw the toothed belt (17) onto the gear wheel (18) by turning the gear wheel (18).
25. Continue to turn the gear wheel (18) until the toothed belt (17) rests completely on the gear wheel.

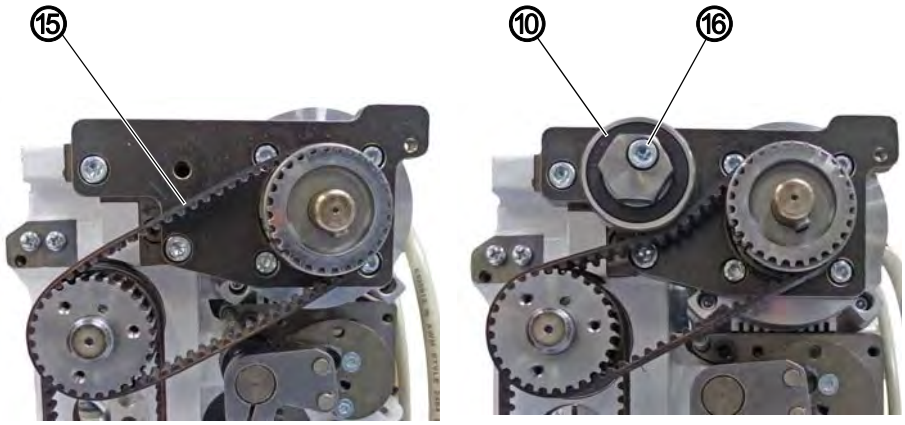
Fig. 83: Changing the lower toothed belt (5)



(12) - Toothed belt cover
(13) - Tensioning roller
(14) - Screw

26. Fit the tensioning roller (13).
27. Use a wrench to tension the tensioning roller (13).
    ↳ It should not be possible to twist the toothed belt more than 90° under the tensioning roller (13).
28. Tighten the screw (14).
29. Place the toothed belt cover (12).
30. Erect the machine head.

Fig. 84: Changing the lower toothed belt (6)

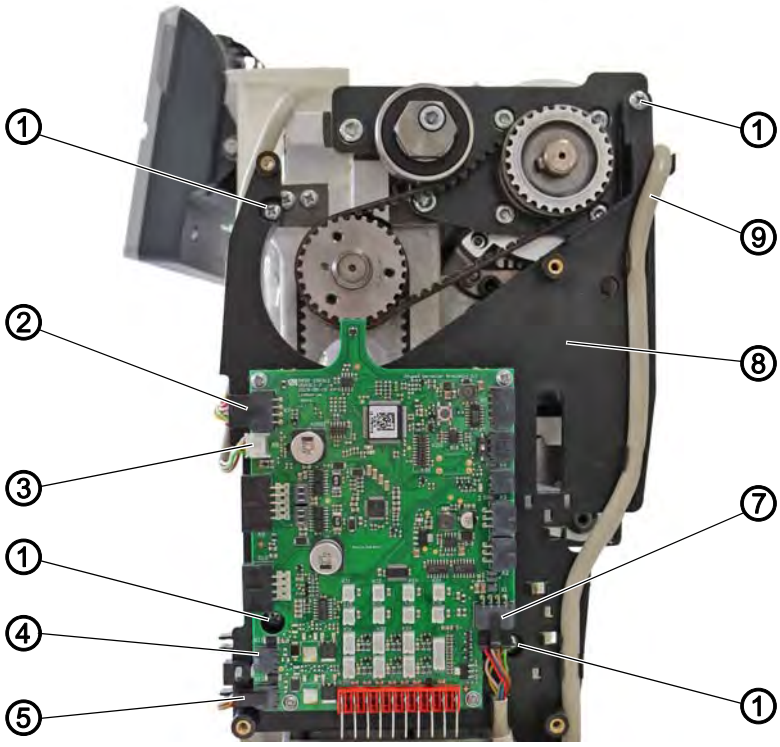


(10) - Tensioning roller
(15) - Toothed belt
(16) - Screw

31. Place the toothed belt (15).
32. Fit the tensioning roller (10).
33. Use a wrench to tension the tensioning roller (10).
    ↳ It should not be possible to twist the toothed belt more than 45°.
34. Tighten the screw (16).

35. Check and, if necessary, adjust the position of the hook tip relative to the needle (📖 *p. 53*).

Fig. 85: Changing the lower toothed belt (1)



(1) - Screws
(2) - CAN cable
(3) - Cable oil level indicator lighting
(4) - Cable thread trimmer (optional, only on 2-needle machines)
(5) - Cable thread trimmer
(7) - CAN cable
(8) - Holder
(9) - Cable

36. Place the holder (8) with the PCB.
37. Tighten the screws (1).
38. Slip the cables onto the PCB:
    - CAN cable (2), slot **X7**
    - Cable oil level indicator lighting (3), slot **X8**
    - Cable thread trimmer (4) (optional), slot **X11**
    - Cable thread trimmer (5), slot **X12**
    - CAN cable (7), slot **X1**
    - optional: Pull off the guard junction (slot **X5**)
39. Clamp the cable (9) into the terminals.
40. Assemble the covers.

16 Sewing motor

DANGER

Risk of injury from electricity!

Unprotected contact with electricity can result in serious injuries or death.

Work on the electrical system must ONLY be carried out by qualified electricians or appropriately trained and authorized personnel.
ALWAYS pull the power plug before working on the electrical equipment.

WARNING

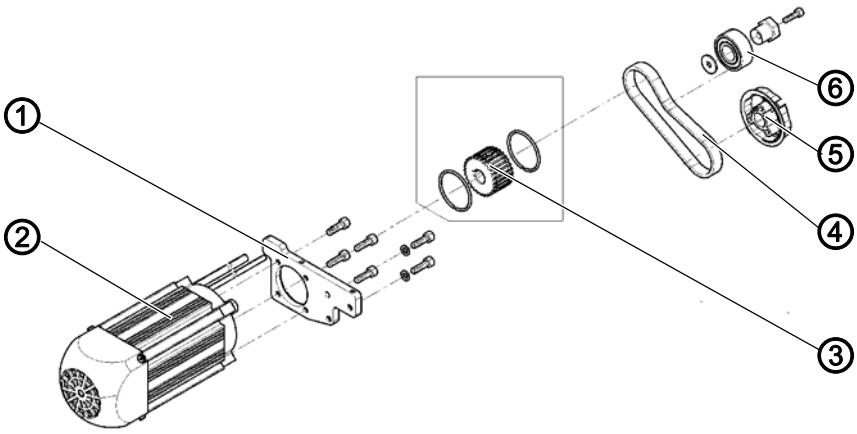
Risk of injury from moving parts!

Crushing possible.

The machine may only be disassembled and assembled by trained specialists.

16.1 Overview of the components

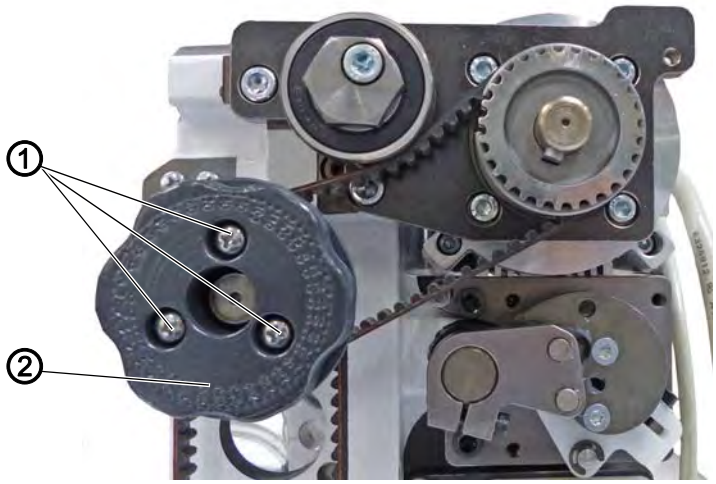
Fig. 86: Overview of the components



(1) - Support plate
(2) - Motor
(3) - Toothed belt wheel
(4) - Toothed belt
(5) - Handwheel
(6) - Tensioning roller

16.2 Disassembling the sewing motor

Fig. 87: Disassembling the sewing motor (1)

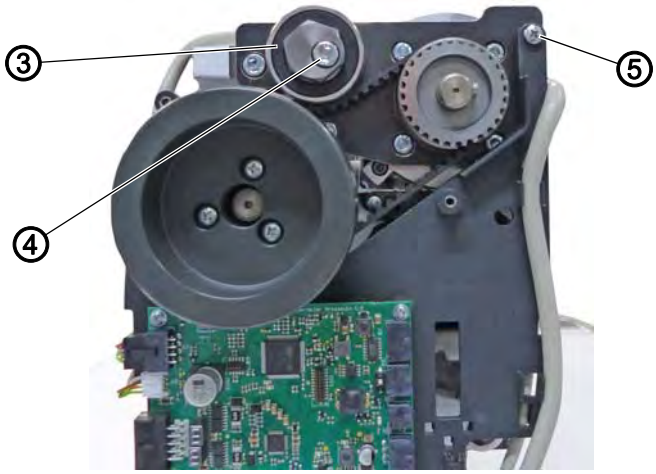


(1) - Screws *(2) - Handwheel*

To disassemble the sewing motor:

1. Switch off the machine.
2. Disassemble the arm cover (📖 *p. 19*).
3. Loosen screws (1) on the handwheel (2).
4. Remove the handwheel (2).
5. Disassemble the toothed belt cover (📖 *p. 23*).
6. Disassemble the motor cover (📖 *p. 22*).
7. Disassemble the front cover (📖 *p. 20*)

Fig. 88: Disassembling the sewing motor (2)



(3) - Tensioning roller *(5) - Screw*
(4) - Screw

8. Loosen the screw (5).
   The holder will not be removed.

9. Loosen the screw (4) on the tensioning roller (3)

↳ The toothed belt tension is slack.

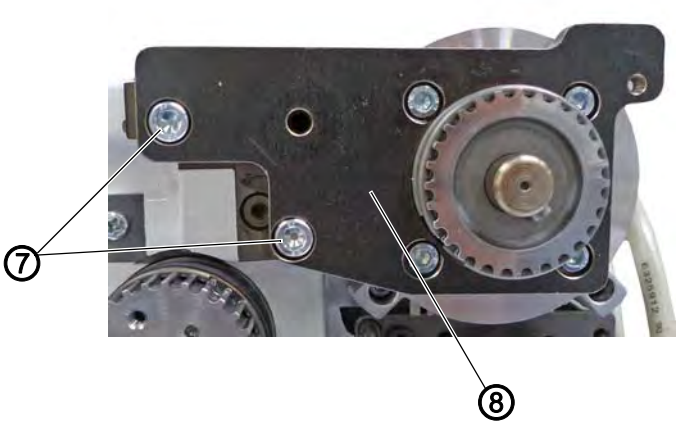
10. Remove the tensioning roller (3).
Make sure not to lose the washer.

Fig. 89: Disassembling the sewing motor (3)

(6) - Toothed belt

11. Remove the toothed belt (6).

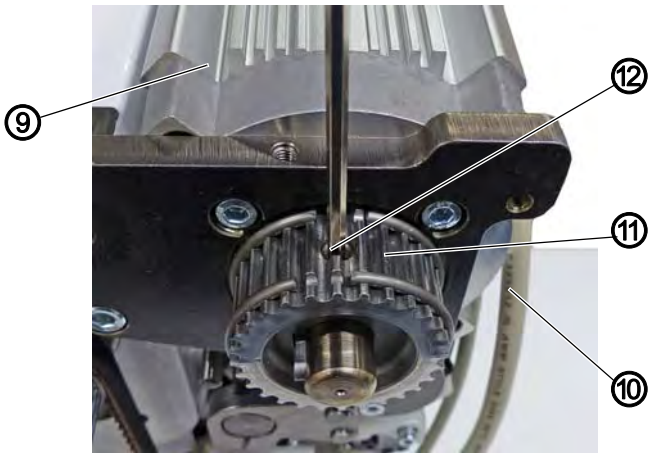
Fig. 90: Disassembling the sewing motor (4)



(7) - Screw *(8) - Support plate*

12. Loosen the screws (7) on the support plate (8).
13. Remove the support plate (8) together with the motor.

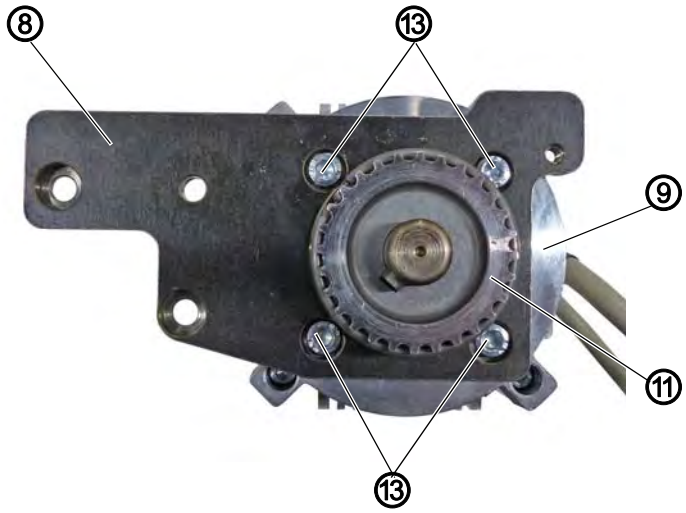
Fig. 91: Disassembling the sewing motor (5)



(9) - Motor
(10) - Cable
(11) - Toothed belt wheel
(12) - Threaded pin

14. Trace the cables (10) from the motor (9) to the control and pull the plug out of the control.
15. Loosen the threaded pin (12) on the toothed belt wheel (11).

Fig. 92: Disassembling the sewing motor (6)



(8) - Support plate
(9) - Motor
(11) - Toothed belt wheel
(13) - Screws

16. Pull off the toothed belt wheel (11).
17. Loosen the screws (13) on the support plate (8).
18. Pull off the motor (9) and replace it with a new one (📖 *p. 103*).

16.3 Assembling the sewing motor

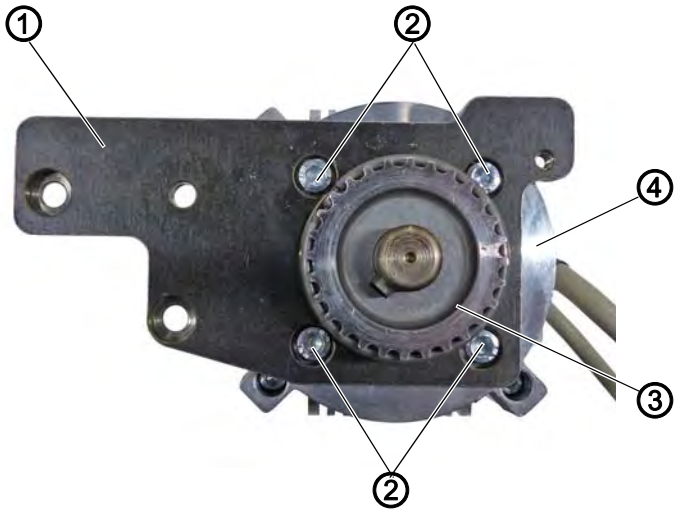
NOTICE

Property damage may occur!

Possible damage to the PCB.

Make sure the toothed belt runs straight and along the center of the toothed belt wheels.

Fig. 93: Assembling the sewing motor (1)

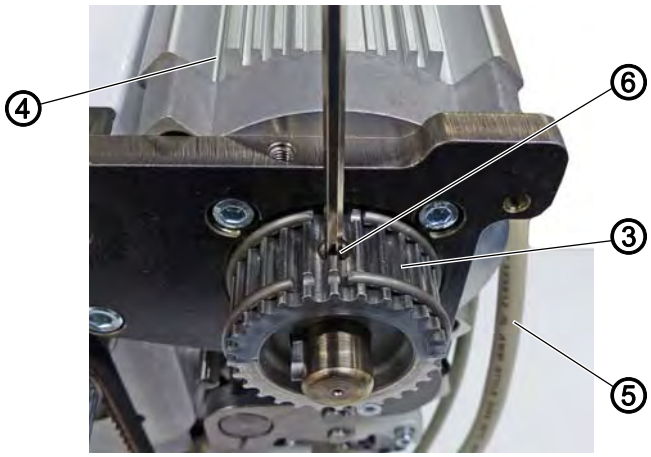


(1) - Support plate
(2) - Screws
(3) - Toothed belt wheel
(4) - Motor

To assemble the sewing motor:

1. Attach the motor (4) to the support plate (1) using 4 screws (2).
2. Fit the toothed belt wheel (3)

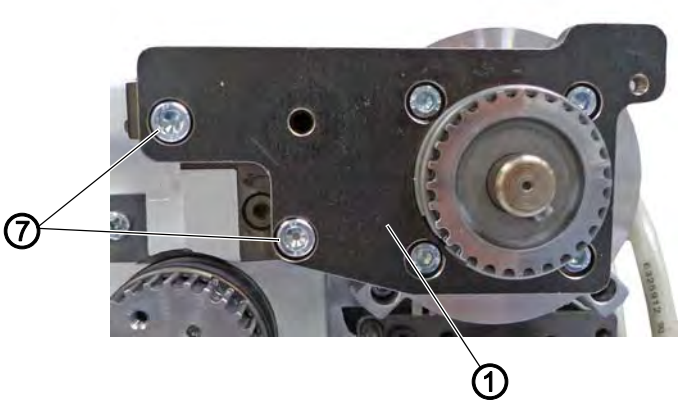
Fig. 94: Assembling the sewing motor (2)



(3) - Toothed belt wheel
(4) - Motor
(5) - Cable
(6) - Threaded pin

3. Tighten the toothed belt wheel (3) using the threaded pin (6).
4. Lay the cables (5) from the motor (4) through the tabletop and insert the plugs into the marked slots on the control.

Fig. 95: Assembling the sewing motor (3)

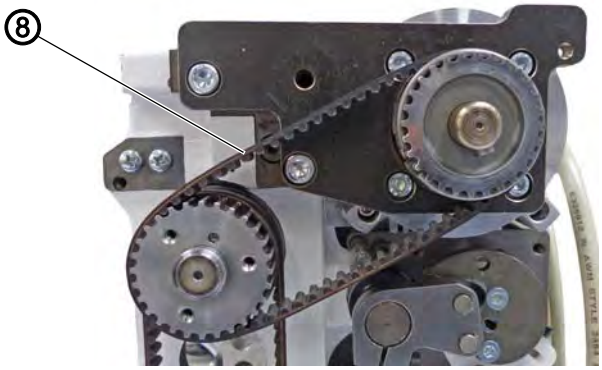


(7) - Screw

(1) - Support plate

5. Attach the support plate (1) along with the motor (4) using the two screws (7) on the left.

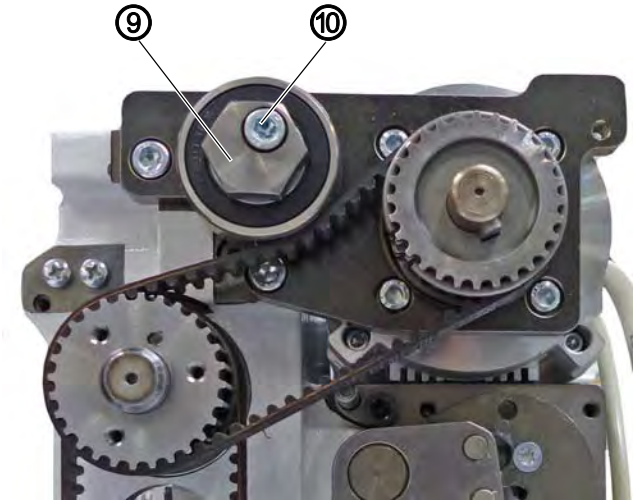
Fig. 96: Assembling the sewing motor (4)



(8) - Toothed belt

6. Place the toothed belt (8).

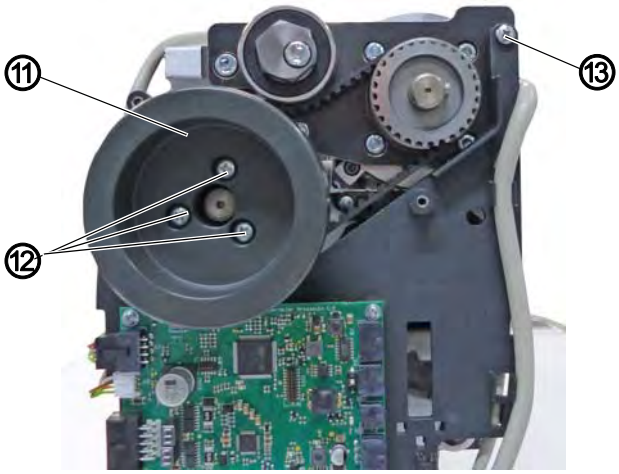
Fig. 97: Assembling the sewing motor (5)



(9) - Tensioning roller *(10) - Screw*

7. Fit the tensioning roller (9).
8. Use a wrench to tension the tensioning roller (9).
   ↳ It should not be possible to twist the toothed belt more than 45°.
9. Tighten the screw (10).

Fig. 98: Assembling the sewing motor (6)



(11) - Handwheel *(13) - Screw*
(12) - Screws

10. Tighten the screw (13) at the top right on the circuit board holder.
11. Fit the handwheel (11) - make sure the centering pin is seated firmly, as the hall sensor will otherwise not be able to complete referencing properly (📖 *p. 23*).
12. Tighten screws (12) on the handwheel (11).

17 Programming

17.1 Logging in as a technician

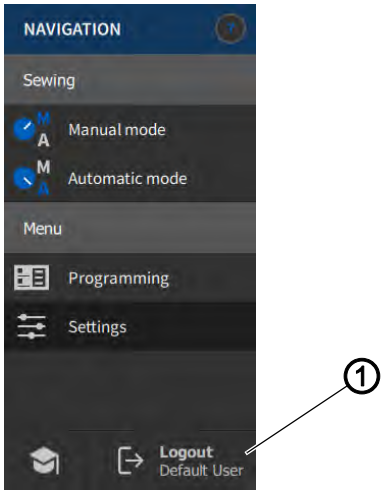
The factory setting of the software is such that the `Default User` will be logged in automatically when the machine is switched on. This neither requires the input of a password nor a USB key or an NFC chip.
The following explains how you can switch users.

To log in as a technician:

1. Press the symbol to bring up the navigation pane.

↳ This opens the navigation interface.

Fig. 99: Logging in as a technician (1)



(1) - Logout

2. Press `Logout` (1).

↳ This opens the Login interface.

Fig. 100: Logging in as a technician (2)

3. Enter the name technician in the `Username` field.
4. Enter the code 25483 in the Password field.

5. Press  .
6. You are logged in as a technician.

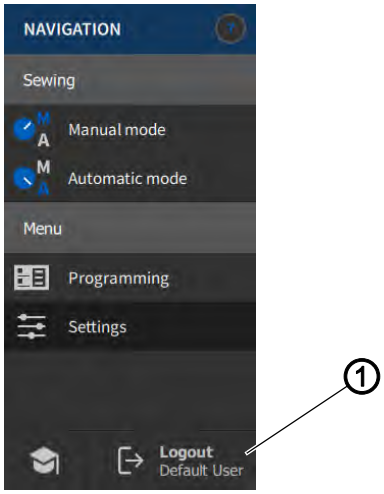
17.2 User login

To access User Management:

1. Press the symbol  to bring up the navigation pane.

↳ This opens the navigation interface.

Fig. 101: User login (1)

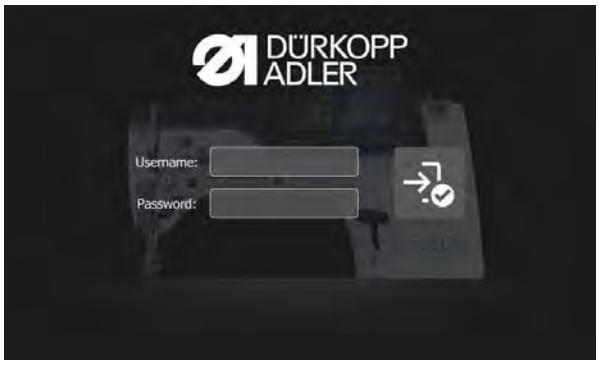


(1) - Logout

2. Press `Logout` (1).

↳ This opens the Login interface.

Fig. 102: User login (2)



There are three ways to log in. The three options - including the necessary settings in the software - are described below.

17.2.1 Logging in with username and password

Assigning a username and password

To assign a username and password:

1. Create a new user in *User Management* and assign this user a username and password.

↳ The user can log in immediately with this login information.

Logging in with username and password

To log in with username and password:

1. Enter *username* and *password*.
2. Press  .

↳ The user is logged in.

17.2.2 Logging in with a USB key

Assigning a USB key to a user

To assign a USB key to a user:

1. Select a user in *User Management* or create a new user.
2. Press the item *Login with USB key*.

↳ A new window opens.

3. Plug the USB key into one of the ports on the control panel.
4. Select the USB key you wish to assign to the user for login purposes.
5. To assign the USB key, press *Pair*.

↳ The window disappears, and the function *Login with USB key* is active.

Logging in with USB key

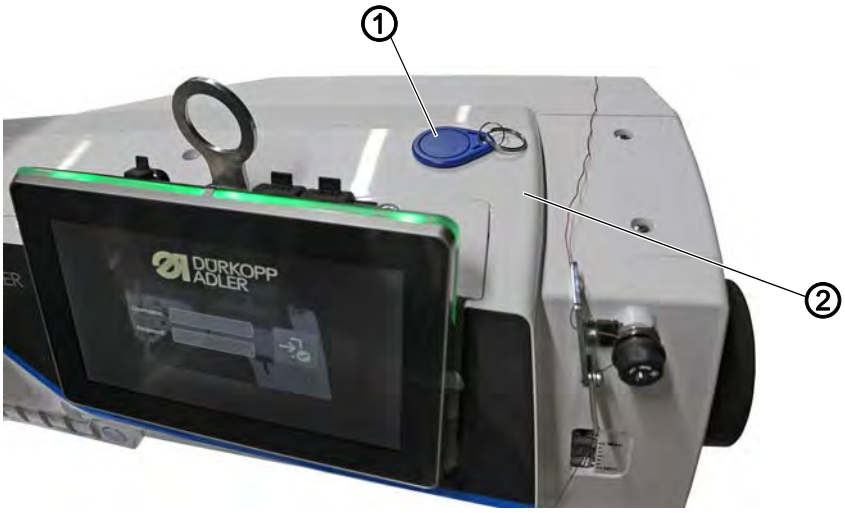
To log in with a USB key:

1. Plug the assigned USB key into the control panel.

↳ If the USB key has been assigned correctly, the user will be logged in.

17.2.3 Logging in with NFC chip (optional)

Fig. 103: Logging in with NFC chip



(1) - NFC chip *(2) - Arm cover*

Assigning an NFC chip to a user

To assign an NFC chip to a user:

1. Select a user in `User Management` or create a new user.
2. Press the item `Login with NFC chip`.

↳ A new window opens.

3. To assign the NFC chip (1), hold the NFC chip (1) up to the arm cover (2) on the right-hand side.

↳ The window disappears, and the function `Login with NFC chip` is active.

Logging in with NFC chip

To log in with an NFC chip:

1. Hold the assigned NFC chip (1) up to the right side of the arm cover (2).

↳ If the NFC chip has been assigned correctly, the user will be logged in.

17.3 Defining general settings (technician access)

The settings allow you to define various settings in different categories. The following description only explains the options available to the technician that has been set up as the default.

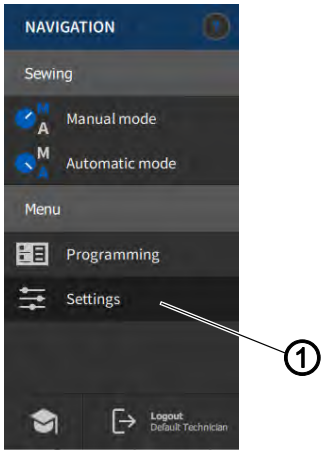
To access the settings:

Prerequisite: You have to be logged in as the Default Technician.

1. Press the symbol to bring up the navigation pane.

↳ This opens the navigation interface.

Fig. 104: Defining general settings (1)

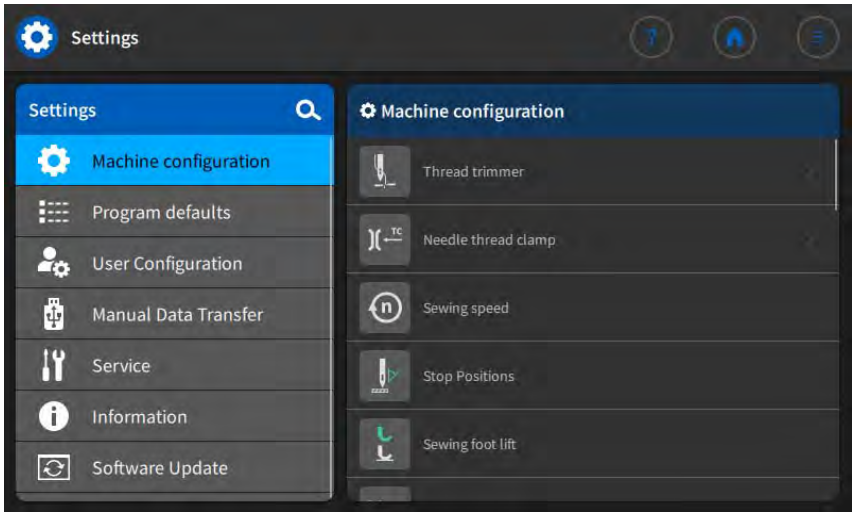


(1) - Settings

2. Press `Settings` (1).

↳ This opens the Settings interface.

Fig. 105: Settings



The table below lists the submenus of the settings. A detailed explanation is available in the specified chapter.

Symbol	Submenu	Reference
	*Machine configuration*	p. 113
	*Program defaults*	p. 148
	*User Configuration*	p. 150
	*Manual Data Transfer*	p. 160
	*Service*	p. 165
	*Information*	p. 179
	*Software update*	p. 181

17.4 Setting the *Machine configuration*

Settings on the machine that apply to all programs can be made here. These parameters are described in more detail below.

Menu items in the *Machine configuration*

Icon	Menu items	Explanations
	*Thread trimmer*	p. 115
	*Needle thread clamp*	p. 119
	*Sewing speed*	p. 122
	*Stop positions*	p. 123
	*Sewing foot lift*	p. 123
	*Needle thread tension*	p. 124
	*Sewing foot stroke*	p. 126
	*Stitch length*	p. 128
	*RFW/SSD*	p. 129
	*Holding force*	p. 130
	*Pedal*	p. 131
	*Needle cooling*	p. 132
	*Puller*	p. 132

Icon	Menu items	Explanations
	*Edge guide*	🕮 *p. 136*
	*Material thickness detection*	🕮 *p. 137*
	*Correction speed effect*	🕮 *p. 138*
	*Light barrier*	🕮 *p. 138*
	*Mode segment size*	🕮 *p. 139*
	*Threading mode*	🕮 *p. 139*
	*Operation lock*	🕮 *p. 139*
	*Manual bartack*	🕮 *p. 140*
	*Jog-Dial*	🕮 *p. 140*
	*Reference*	🕮 *p. 140*
	*Scanner*	🕮 *p. 141*
	*Interface*	🕮 *p. 141*
	*Input/Output Configuration*	🕮 *p. 142*
	*Additional I/O Configuration*	🕮 *p. 145*

17.4.1 Setting the *Thread trimmer* parameters

Various settings can be made for the thread trimmer. The possibilities are explained in more detail in the table.

Icon	Menu items	Value range
	*Thread trimmer* If deactivated here, the thread trimmer can no longer be selected in Manual or Automatic mode	• Value range On/Off
	*Sewing speed during thread trimming* Speed of the machine during thread cutting	• Value range 050 – 250 [rpm]
	*Start thread trim* Position when the magnet of the thread trimmer is activated.	• Value range 000 - 359
	*Stop thread trim* Position when the magnet of the thread trimmer is deactivated.	• Value range 000 - 359
	*Lower needle position* Needle stop position during the seam, specified in degrees	• Value range 000 - 359
	*Needle position after thread trimming* Needle position after thread cutting before reversal.	• Value range 000 - 359
	*Turn back* Reversal after cutting the thread is active or inactive.	• Value range On/Off
	*Needle position after turn back* Position of the needle after thread cutting (reversal position); the needle is set upward to reach the full lifting height, and the thread lever is then no longer at top dead center.	• Value range 000 - 359
	*Open needle thread tension* Needle position at which the needle thread tension switches to the value for thread cutting.	• Value range 000 - 359
	*Close needle thread tension* Position at which the standard needle thread tension is used again after thread cutting.	• Value range 000 - 359
	*Needle thread tension Thread trimmer* Needle thread tension during thread cutting	• Value range 00 – 50 [%]
	*t needle thread tension Thread trimmer* Delay, showing how long it takes until the standard needle thread tension is used again.	• Value range 000 – 200 [ms]

Icon	Menu items	Value range
	Short stitches	
		Number of short stitches at seam begin for neat starts to sewing • Value range 00 - 99
		Number of short stitches at seam end To ensure that the length difference between the needle thread and the hook thread is (visually) as small as possible. • Value range **00 - 99**
		Stitch length • Value range -12.0 - 12.0 recommended value range: 0.1 – 1.5 [mm]

Icon	Menu items	Value range
	*Change of stitch length* Optimization of the remaining thread length for the cutting systems KFA = 1, extra short LFA = 10, extra long	
		Change of stitch length • Value range On/Off
		Stitch length • Value range 01 - 10
		On Position of the needle when the change of stitch length is activated. • Value range 000 - 359 [°]
		Off Position of the needle when the change of stitch length is deactivated. • Value range 000-359 [°]
	*Thread trimming backward stitch*	• Value range On/Off

Icon	Menu items	Value range
	*PWM Configuration thread trimmer* Power supply to the magnet for the thread trimmer	
		Activation time t1 [ms] Activation duration of the thread trimmer in time period t1. • Value range 000 – 1000 [ms]
		Duty cycle t1 [%] Duty cycle in time period t1. • Value range 000 – 1000 [%]
		Time t2 Activation duration of the thread trimmer in time period t2. • Value range 000 – 1000 [ms]
		Duty cycle t2 Duty cycle in time period t2. • Value range 000 – 100 [%]
		Boost • Value range On/Off

17.4.2 Setting the *Needle thread clamp* parameters

Various settings can be made for the thread clamp. The possibilities are explained in more detail in the table.

Icon	Menu items	Value range
	*Needle thread clamp*	• Value range On/Off
	*Mode* Various modes (1 to 10) are available; explanations can be found in the 🕮 *Parameter list*	• Value range 1 - 10
	*Material thickness compensation*	• Value range On/Off
	*Thread clamp angle* Position for lifting/lowering the sewing feet to release a thread jammed underneath.	
		On • Value range 000 - 359
		Off • Value range 000 - 359
	*Sewing foot lift angle*	
		On • Value range 000-359
		Off • Value range 000-359
		Height • Value range 01.0 – 12.0 [mm]
		PrePressure • Value range 01-20
		PreStroke • Value range 0.0-9.0 [mm]

Icon	Menu items	Value range
	*Option* Mode of thread clamp 0 = at seam beginning only 1 = seam beginning + during turn back 2 = seam beginning + during sewing foot lift 3 = seam beginning + during turn back + sewing foot lift	• Value range 0, 1, 2, 3
	*PWM Configuration thread clamp* Power supply to the magnet for the thread clamp	
		Activation time t1 [ms] Activation duration of thread clamp in time period t1. • Value range 000 – 1000 [%]
		Duty cycle t1 [%] Duty cycle in time period t1. • Value range 000 – 1000 [%]
		Time t2 Activation duration of thread clamp in time period t2. • Value range 000 – 1000 [ms]
		Duty cycle t2 Duty cycle in time period t2. • Value range 000 – 1000 [%]
		Boost • Value range On/Off

Icon	Menu items	Value range
	*Neat Seam Beginning*	
		• Value range On/Off
		Time delay **only visible if Neat Seam Beginning is activated** • Value range 0000 – 1000 [ms]
		Knife Off **only visible if Neat Seam Beginning is activated** • Value range 000 - 359
		Clamp for knife Off **only visible if Neat Seam Beginning is activated** • Value range 000 - 359
		Exhaust On **only visible if Neat Seam Beginning is activated** • Value range 000 - 359
		Exhaust Off **only visible if Neat Seam Beginning is activated** • Value range 00000 – 99999 [ms]

17.4.3 Setting the *Sewing speed* parameters

Various settings can be made for the sewing speed. The possibilities are explained in more detail in the table.

Icon	Menu item	Value range
	*Max. Speed* Maximum permissible speed; it can no longer be exceeded on the operator level.	• Value range 0500 - 4000 [rpm], depending on subclass
	*Min. Speed* Minimum speed at which an individual stitch is made; a lower speed is no longer possible at operator level.	• Value range 050 - 400 [rpm])
	*Position speed* The last stitch is made slower during stopping of the sewing procedure.	• Value range 010 – 700 [rpm]
	*Soft start speed* Reduced sewing speed for the first stitches when sewing begins to sew on the material securely	• Value range 0010 - 1000 [rpm])
	*Number of soft start stitches*	• Value range 00 - 10
	*Acceleration* Slope of the acceleration ramp	• Value range 10 - 40 [rpm/ms]
	*Deceleration* Slope of the deceleration ramp	• Value range 10 - 40 [rpm/ms]
	*Speed limitation DB3000* Reduction of the speed to 3000 (rpm) in combination with an activated input signal	• Value range 150-9999 [rpm]
	*Speed limitation DB2000* Reduction of the speed to 2000 (rpm) in combination with an activated input signal	• Value range 150-9999 [rpm]

17.4.4 Setting the *Stop Positions* parameters

Various settings can be made for the stop positions. The possibilities are explained in more detail in the table.

Icon	Menu items	Value range
	*Lower needle position* Holding position of the needle in the material.	• Value range 000 - 359
	*Threading position* Position for the proper function of the threader, e.g. with thread lever at top dead center.	• Value range 000 - 359
	*Needle up position* Holding position of the needle outside of the material.	• Value range 000 - 359
	*Needle position after turn back* Stop position after thread cutting (reversal position).	• Value range 000 - 359

17.4.5 Setting the *Sewing foot lift* parameters

Various settings can be made for the sewing foot. The possibilities are explained in more detail in the table.

Icon	Menu items	Value range
	*Max. sewing foot lifting height*	• Value range with standard **FA** 01.0 – 20.0 [mm] • Value range with **KFA** 01.0 – 18.0 [mm]
	*Step motor speed* Speed at which the sewing feet will be lifted.	• Value range 01 - 60

17.4.6 Setting the *Needle thread tension* parameters

Various settings can be made for the needle thread tension. The possibilities are explained in more detail in the table.

Icon	Menu items	Value range
	*Mode needle thread tension at sewing foot lift* **Mode 0** Needle thread tension is not lifted **Mode 1** The needle thread tension is lifted as the sewing feet are lifted during sewing **Mode 2** The needle thread tension is lifted after thread cutting **Mode 3** The needle thread tension is lifted as the sewing feet are lifted during sewing and after thread cutting	• Value range 0, 1, 2, 3

Icon	Menu items	Value range
	*Pre-tension* Setting of the pretension during thread cutting.	
		• Value range On/Off
		Pre-tension **only visible if Pre-tension is activated** A value of 0 is recommended as the pretension is generated by a mechanical tension. • Value range 00 – 99 [%]
		Delay time **only visible if Pre-tension is activated** The needle thread tension remains closed for a defined period of time after thread cutting and prevents the needle thread from being pulled further when the sewing material is removed. Without a thread trimmer, this menu item should be set to a very low value. • Value range 0.1-7.5 [s]
		Tension close by needle movement **only visible if Pre-tension is activated** With this function, the needle thread tension is activated when sewing start is done with jog dial or via single stitch button. • Value range On/Off

Icon	Menu items	Value range
	*2nd needle thread tension*	
		State After Thread Trimming • Value range unchanged, off, on
		State After Power On • Value range unchanged, off, on

17.4.7 Setting the *Sewing foot stroke* parameters

NOTICE

Property damage may occur!

In the case of an excessive sewing foot stroke, the machine may be damaged and, thus, produce unsatisfactory sewing results.

If the machine is at the second sewing foot stroke height, do not allow it to sew at an excessive speed.

Various settings can be made for the sewing foot stroke. The possibilities are explained in more detail in the table.

Icon	Menu items	Value range
	*Additional thread tension* If the 2nd sewing foot stroke is switched on, the 2nd needle thread tension is automatically activated (except in the case of material thickness detection).	• Value range On/Off
	*Number of stitches 2. stroke off* Number of stitches after which the second sewing foot stroke is automatically deactivated.	• Value range 000 - 255
	*Automatic*	
		Speed level Speed up to which the second sewing foot stroke is automatically activated. • Value range 0000 - 4000 [rpm], depending on subclass

Icon	Menu items	Value range
	*Speed limitation sewing foot stroke*	
		Sewing speed As from the set value of the *Min. Sewing foot stroke*, the speed is reduced down to the desired value for the *Max. Sewing foot stroke*. • Value range 0050 - 3800 [rpm], depending on subclass
		Min. Sewing foot stroke Sewing foot stroke at which the speed reduction is initiated. • Value range 00.0 - 09.0
		Max. Sewing foot stroke Sewing foot stroke at which the reduced speed is reached. • Value range 00.0 - 09.0

17.4.8 Setting the *Stitch length* parameters

NOTICE

Property damage may occur!

The machine and the sewing equipment may be damaged.

ALWAYS enter the maximum possible stitch length after changing the sewing equipment.

Various settings can be made for the stitch length. The possibilities are explained in more detail in the table.

Icon	Menu items	Value range
	*Max. stitch length* Maximum stitch length possible during sewing; this will vary depending on the sewing equipment and MUST be adjusted when changing the sewing equipment.	• Value range 03.0 - 12.0 [mm], depending on subclass
	*Manual stitch length adjustment* Stitch regulator for manual adjustment of the stitch length active or inactive; optional equipment.	• Value range On/Off
	*Speed limitation stitch length*	
		Sewing speed Value for limiting the speed as from a defined, adjustable stitch length. • Value range 0050 - 4000 [rpm], depending on subclass
		Stitch length The speed is limited during sewing as from the set stitch length value. • Value range 1.0 - 12.0 [mm], depending on subclass

Icon	Menu items	Value range
	*2nd stitch length*	
		State After Thread Trimming • Value range unchanged, off, on
		State After Power On • Value range unchanged, off, on

17.4.9 Setting the *RFW/SSD* parameters

Various settings can be made for the remaining thread monitor and the bobbin rotation monitor. The possibilities are explained in more detail in the table.

Icon	Menu items	Value range
	*Remaining thread monitor (RFW)* With this function, the CAN PCB is activated. It is also necessary to select the desired remaining thread monitor in *Manual Mode* in the *Parameters* section (🕮 *Operating Instructions*)	• Value range On/Off
	*Repeat Message after trim* If an error is reported by the Loop Control, Bobbin Rotation Monitor or remaining thread monitor, the machine will indicate an error message during the seam, which must be confirmed. The error disappears. If the parameter is active, the error will be displayed again after the seam has been completed.	• Value range On/Off
	*Confirmation after sewing stop necessary* If an error is reported by the Loop Control, Bobbin Rotation Monitor or remaining thread monitor, the machine will indicate the error message and stop. You must confirm this error before you can resume sewing.	• Value range On/Off
	*Loop Control*	• Value range On/Off

Icon	Menu items	Value range
	*Bobbin rotation monitor*	
		• Value range On/Off
		Length Seam length before the bobbin rotation monitor starts. • Value range 000 – 255 [mm]
	*Remaining thread monitor limit*	• Value range 0.0-4.0 Values only apply to the remaining thread monitor, not the SSD.
	*Remaining thread monitor intensity*	• Value range 0.0-4.0 Values only apply to the remaining thread monitor, not the SSD.

17.4.10 Setting the *Holding force* parameters

Various settings can be made for the holding force of the motor.
The possibilities are explained in more detail in the table.

Icon	Menu items	Value range
	*Mode*	Holding Position • Value range On/Off/Holding Position **Holding Position:** the sewing motor is always regulated to this position. It is not possible to change the position by using the handwheel or setting additional parameters.
	*Max. Current* Holding current of the motor	**only visible if the parameter is activated** • Value range 00 - 50
	*Response* Response time for the continuous current	**only visible if the parameter is activated** • Value range 000 - 100

17.4.11 Setting the *Pedal* parameters

Various settings can be made for the pedal. The possibilities are explained in more detail in the table.

Icon	Menu items	Value range
	*Type* Choice between an analog and digital pedal.	• Value range Analog/Digital
	*Inverted* Inversion of the signals given by the pedal (possibly necessary for digital setpoint devices).	• Value range On/Off
	*Pedal steps* Number of speed steps processed by the pedal.	• Value range 00 - 64
	*Curve* Speed curve of the pedal	• Value range 0 - 7
	*t Position -1* Debouncing of position -1	• Value range 000 – 255 [ms]
	*t Position -2* Debouncing of position -2	• Value range 000 – 255 [ms]
	*t Position 0* Debouncing of position 0	• Value range 000 – 255 [ms]

17.4.12 Setting the *Needle cooling* parameters

Various settings can be made for the needle cooling. The possibilities are explained in more detail in the table.

Icon	Menu items	Value range
	*Mode*	• Value range Off, On, Related to sewing speed, Edge trimmer
	*t Delay* Lag time, after which the needle cooling is deactivated.	**only visible if the mode On, Related to sewing speed or Edge trimmer is activated** • Value range 00.0 - 10.0 [ms]
	*Cool Speed* Speed at which the needle cooling is activated.	**only visible if the mode On, Related to sewing speed or Edge trimmer is activated** • Value range 0000 - 3800 [rpm]

17.4.13 Setting the *Puller* parameters

The puller is a piece of optional additional equipment and designed to support the feed of the sewing material. When the puller is activated, the following settings can be made.

Icon	Menu items	Value range
	*Puller*	• Value range On/Off
	*Auto* Mode for raising the puller automatically	• Value range During sewing foot lift/ On Tack/ During bartacking and when sewing foot is lifted
	*Raise by quick stroke adjustment*	• Value range On/Off
	*Delay* Lowering of the roller after seam beginning; depends on stitch length and application.	• Value range 000.0 – 999.9 [mm]

Icon	Menu items	Value range
	*Mode* Setting defining which roller is supposed to run.	
		Not driven Both rollers freewheel passively; mechanical coupling only.
		Top The upper roller runs actively under power.
		Top + Bottom Both wheels run actively under power.
	Feeding method **only visible if option Top / Top + Bottom has been selected under *Mode***	*continuous* = even transport *intermittent* = transport adapted to the rhythm of the feed dog
	Start **only visible if the check box *Feeding method* has been turned on**	Setting of the start and stop angle under Start/ Stop has been adapted to the machine. The values should not be changed • Value range 0 - 359 [°]
	Stop **only visible if the check box *Feeding method* has been turned on**	Setting of the start and stop angle under Start/ Stop has been adapted to the machine. The values should not be changed • Value range 0 - 359 [°]
	*Pressure* Set the puller pressure	• Value range Yes/No/ No Pressure with HP (2nd foot stroke)
	*Switch off*	• Value range On/Off
	*Always on*	• Value range On/Off

Icon	Menu items	Value range
	*Top* **only visible if option Top / Top + Bottom has been selected under *Mode***	
		Transmission • Value range 00.0 - 65.0
		Current feed (active) • Value range 0.0 - 65.0 [A]
		Current feed (passive) • Value range 0.0 - 5.0 [A]
		Diameter, roller • Value range 0000 - 9999 [mm]
		Direction of rotation, roller 0 (X) = right 1 (✓) = left
		Closed Loop 0 (X) = non-regulated 1 (✓) = regulated

Icon	Menu items	Value range
	*Bottom* **only visible if option Top + Bottom has been selected under *Mode***	
		Transmission • Value range 00.0 - 65.0
		Current feed (active) • Value range 0.0 - 65.0 [A]
		Current feed (passive) • Value range 0.0 - 5.0 [A]
		Diameter, roller • Value range 0000 - 9999 [mm]
		Direction of rotation, roller 0 (X) = right 1 (✓) = left
		Closed Loop 0 (X) = non-regulated 1 (✓) = regulated

17.4.14 Setting the *Edge guide* parameters

NOTICE

Property damage may occur!

Sewing feet, needle, edge guide and sewing equipment can be damaged.

ALWAYS check the distance to the edge guide and input the correct value after changing the sewing equipment.

Various settings can be made for the edge guide (motor driven).
The possibilities are explained in more detail in the table

Icon	Menu items	Value range
	*Edge guide*	• Value range On/Off
	*Edge Guide Mode*	• Value range 1-axis Internal/ 1-axis External/ 2-axis External **Internal:** the stepper motor card of the edge guide is housed inside the control **External:** the stepper motor card of the edge guide is located on the component
	*Motor driven*	• Value range On/Off
	*Speed* Travel speed of the edge guide	• Value range 0500 - 60000 [Hz]

Icon	Menu items	Value range
	*Min. gap* Smallest possible gap between the sewing foot and the edge guide. The smallest possible distance depends on the sewing equipment and MUST be adapted after a change of the sewing equipment.	• Value range 01.0 - 36.0 [mm]
	*Speed (Height)* Travel speed of the edge guide for the height	**only visible if the 2-axis edge guide has been selected** • Value range 5000 - 60000 [Hz]
	*Min. Height* Smallest possible distance between throat plate and edge ruler / roller	**only visible if the 2-axis edge guide has been selected** • Value range 0.1 - 12 [mm]

17.4.15 Setting the *Material thickness detection* parameters

Various settings can be made for the material thickness detection.
The possibilities are explained in more detail in the table.

Icon	Menu items	Value range
	*Material thickness detection*	• Value range On/Off
	*Hysterese* Tolerance at which the material thickness detection based on the 2nd stitch length, the 2nd needle thread tension and/or the 2nd sewing foot stroke switches back. This tolerance is designed to ensure that there is no constant alternating between activation and deactivation in the boundary range.	• Value range 0.0 – 2.0 [mm]
	*Pressure compensation* With extremely thick material, the foot pressure increases above the standard set value due to the material thickness. To a certain extent, the machine can compensate itself for the influence of thick material.	**only visible if Material thickness detection is active** • Value range On/Off

17.4.16 Setting the *Correction speed effect* parameters

Various settings can be made for the correction of the effects of high speed. The possibilities are explained in more detail in the table.

Icon	Menu items	Value range
	*Hysterese* Tolerance at which the correction speed effect based on the 2nd stitch length, the 2nd needle thread tension and/or the 2nd sewing foot stroke switches back. This tolerance is designed to ensure that there is no constant alternating between activation and deactivation in the boundary range.	• Value range 0.0 – 2.0 [mm]

17.4.17 Setting the *Light barrier* parameters

Various settings can be made for the light barrier. The possibilities are explained in more detail in the table.

Icon	Menu items	Value range
	*Light barrier*	• Value range On/Off
	*Sewing speed* The last stitches after the detection of the end of the material (approx. 50 mm) can be sewn at a defined speed.	• Value range 0010 – 2000 [rpm]
	*Pedal start* Pedal can be pressed, and the machine sews as soon as the material breaks the light barrier.	• Value range On/Off
	*Sense* Depending on the setting, the signal is given when the light barrier is broken (Dark) or complete (Bright).	• Value range *Bright*/*Dark*
	*Automatic*	• Value range On/Off **On:** A seam is started with the pedal and then completed automatically at a defined sewing speed until the end of the material is detected

17.4.18 Setting the *Seam segment mode* parameters

Various settings can be made for the segment length. The possibilities are explained in more detail in the table.

Icon	Menu items	Value range
	*Length* Length = Seam sections are measured via the length specification (in mm) Stitch count = Seam sections are measured via the stitch count	• Value range Length/stitch count

17.4.19 Setting the *Threading mode* parameters

Various settings can be made for the threading mode. The possibilities are explained in more detail in the table.

Icon	Menu items	Value range
	*Sewing foot lift* Down = The sewing foot is lowered in threading mode. Up = The sewing foot is lifted in threading mode. Pedal related = The sewing foot can be lifted or lowered with the pedal in threading mode.	• Value range Down/ Up/ Pedal related

17.4.20 Setting the *Operation lock* parameters

Various settings can be made for the operation lock. The possibilities are explained in more detail in the table.

Icon	Menu items	Value range
	*Mode* Sewing feet remain at their last position and cannot be moved by the user (Off) or can be lifted using the pedal (On).	• Value range On/Off
	*Stitch length* Manual stitch length adjustment with active operation lock	• Value range On/Off
	All Inputs All inputs active during machine blockage.	• Value range On/Off

17.4.21 Setting the *Manual bartack* parameters

Icon	Menu items	Value range
	*Max. Speed* Speed limit in manual bartack	• Value range 150 - 4000
	*t Change* The waiting time at the turning points (e.g. for a change of sewing direction) is set at this point. A short waiting time ensures consistent seam quality.	• Value range 0 - 1000 [ms]

17.4.22 Setting the *Jog-Dial* parameters

The electronic handwheel can be activated or deactivated.

Icon	Menu items	Value range
	*Jog-Dial*	• Value range On/Off

17.4.23 Setting the *Referencing* parameters

After the machine was switched on, the stepper motors need to perform a reference run. Depending on the setting, referencing can be performed automatically or by pressing the pedal back all the way.

Icon	Menu items	Value range
	*User start referencing manual*	• Value range On/Off

17.4.24 Setting the *Scanner* parameters

The scanner can be activated or deactivated. A barcode scanner offers a way to directly select a seam program.

Icon	Menu items	Value range
	*Scanner*	• Value range On/Off

The following types of barcodes can be read using the scanner:

- Code 128
- UCC EAN 128
- Code 39

The barcode types can be created with freeware software.

Important

The barcode must be composed of 3 to 32 bars. The 3-digit number of the program (001 to 999) must be contained in the barcode.

Refer to the **Appendix** (📖 *p. 223*) for a few barcode examples that you can use.

Information

The scanner also supports other types of barcodes. For a list of all supported barcodes and information on how to configure them, refer to the 📖 *Operating Instructions* of the scanner manufacturer.

17.4.25 Setting the *Interface* parameters

The interfaces can be used for the scanner. The parameter is active if a scanner is connected.

It is possible to define additional settings for the interface. The possibilities are explained in more detail in the table.

Icon	Menu items	Value range
BDE		
	*Mode*	• Value range Off/Scanner
	*Baudrate* Transmission rate of the scanner	• Value range 9600 - 250000

17.4.26 Setting the *Input/Output Configuration* parameters

Input Configuration

Configure and allocate the inputs here.
Each input can be assigned one of the following modes.

- Bobbin Wind mode
- Bartack suppression/activation
- Manual bartack
- Half stitch
- Whole stitch
- Pointing Position
- Needle high
- Needle cooling
- Additional thread tension
- Stitch length switching
- Seam Center Guide
- Light barrier
- Operation lock active with contact open
- Quick stroke adjustment
- Switch to next segment
- 2nd edge guide position (gap)
- Foot lighten position
- Additional fullness
- Tape tension
- Puller
- Operation lock active with contact closed
- Operation lock in seam
- Trigger program selection
- Program selection Bit B0
- Program selection Bit B1
- Program selection Bit B2
- Program selection Bit B3
- Program selection Bit B4
- Program selection Bit B5
- Program selection Bit B6
- Program selection Bit B7
- Program selection Bit B8
- Program selection Bit B9
- Short stitch
- 2nd edge guide position (height)

- 2nd edge guide position (gap and height)
- DB3000
- DB2000
- Function module 1
- Function module 2
- Function module 3
- Function module 4
- Function module 5
- Function module 6
- Function module 7
- Function module 8
- Sewing light
- Machine head lighting
- Sewing foot lift
- 2nd position sewing foot lift

Each input can be switched to *Latching* or *Hold to run*.

Output Configuration

Configure and allocate the outputs here. The table shows the outputs and their allocation. The pins on the PCB are labeled and must be allocated according to the table, depending on what was connected to the pin.

Each output can be assigned one of the following modes.

- Sewing foot lift
- Needle thread tension
- Thread trimmer
- Needle cooling
- NSB knife
- NSB block
- Pos. 1
- Pos. 2
- Clean remaining thread monitor
- Bartack suppression LED
- 2nd stitch length LED
- 2nd needle thread tension LED
- 2nd sewing foot stroke LED
- Center guide LED
- Raise/lower center guide
- Motor running

- 2nd edge Guide Position
- NSB exhaust
- Puller LED
- Pressure Puller
- Raise/lower puller
- Bartacking in process
- In seam
- Segment Output 01
- Segment Output 02
- Segment Output 03
- Segment Output 04
- Segment Output 05
- Segment Output 06
- Segment Output 07
- Segment Output 08
- Segment Output 09
- Segment Output 10
- Segment Output 11
- Segment Output 12
- Segment Output 13
- Segment Output 14
- Segment Output 15
- Segment Output 16
- Manual bartack
- Stitch done
- Motor blockage (operation lock)
- Short stitch
- Edge guide
- Machine arm lighting
- Function module output 1
- Function module output 2
- Function module output 3
- Function module output 4
- Function module output 5
- Function module output 6
- Function module output 7
- Function module output 8
- 2nd edge Guide Height
- Clean SSD

17.4.27 Setting the *Additional I/O Configuration* parameters

The additional DAC flex module makes it possible to implement customer-specific applications.

Input Configuration

Configure and allocate the inputs here.
Each input can be assigned one of the following modes.

- Bobbin Wind mode
- Bartack suppression/activation
- Manual bartack
- Half stitch
- Whole stitch
- Pointing Position
- Needle high
- Needle cooling
- Additional thread tension
- Stitch length switching
- Seam Center Guide
- Light barrier
- Operation lock active with contact open
- Quick stroke adjustment
- Switch to next segment
- 2nd edge guide position (gap)
- Foot lighten position
- Additional fullness
- Tape tension
- Puller
- Operation lock active with contact closed
- Operation lock in seam
- Trigger program selection
- Program selection Bit B0
- Program selection Bit B1
- Program selection Bit B2
- Program selection Bit B3
- Program selection Bit B4
- Program selection Bit B5
- Program selection Bit B6

- Program selection Bit B7
- Program selection Bit B8
- Program selection Bit B9
- Short stitch
- 2nd edge guide position (height)
- 2nd edge guide position (gap and height)
- DB3000
- DB2000
- Function module 1
- Function module 2
- Function module 3
- Function module 4
- Function module 5
- Function module 6
- Function module 7
- Function module 8
- Sewing light
- Machine head lighting
- Sewing foot lift
- 2nd position sewing foot lift

Each input can be switched to *Latching* or *Hold to run*.

Output Configuration

Configure and allocate the outputs here. The table shows the outputs and their allocation. The pins on the PCB are labeled and must be allocated according to the table, depending on what was connected to the pin.

Each output can be assigned one of the following modes.

- Sewing foot lift
- Needle thread tension
- Thread trimmer
- Needle cooling
- NSB knife
- NSB block
- Pos. 1
- Pos. 2

- Clean remaining thread monitor
- Bartack suppression LED
- 2nd stitch length LED
- 2nd needle thread tension LED
- 2nd sewing foot stroke LED
- Center guide LED
- Raise/lower center guide
- Motor running
- 2nd edge Guide Position
- NSB exhaust
- Puller LED
- Pressure Puller
- Raise/lower puller
- Bartacking in process
- In seam
- Segment Output 01
- Segment Output 02
- Segment Output 03
- Segment Output 04
- Segment Output 05
- Segment Output 06
- Segment Output 07
- Segment Output 08
- Segment Output 09
- Segment Output 10
- Segment Output 11
- Segment Output 12
- Segment Output 13
- Segment Output 14
- Segment Output 15
- Segment Output 16
- Manual bartack
- Stitch done
- Motor blockage (operation lock)
- Short stitch
- Edge guide
- Machine arm lighting
- Function module output 1
- Function module output 2

- Function module output 3
- Function module output 4
- Function module output 5
- Function module output 6
- Function module output 7
- Function module output 8
- 2nd edge Guide Height
- Clean SSD

17.5 Setting *Program defaults*

Customer-specific settings can be made here, which are automatically used as preset values for the first seam section during the creation of a new program. Select the values so that they can be retained for as many programs as possible.

Menu items in the *Program defaults*

Icon	Menu item	Value range
	*Stitch length* *Default value*	• Value range 00.0 - 12.0 (depending on sewing equipment and subclass)
	*Sewing foot pressure* *Default value*	• Value range 01 - 20
	*Needle thread tension* *Default value*	• Value range 01 - 99 [%]
	*Sewing foot stroke*	• Value range 0.5 - 9.0 [mm]
	*Bartack at seam begin*	• Value range On/Off
	*Bartack at seam end*	• Value range On/Off
	*Thread trimmer*	• Value range On/Off

Icon	Menu item	Value range
Σ:0000	*Daily piece counter*	
		Counter Mode • Value range Off/Up/Down
		Reset Enter the value to which the daily piece counter is set when a reset is performed. • Value range -999 - 999
Stitch functions		
+n	*Count stitches*	• Value range On/Off
+/− ✓	*Correction Backward stitches*	• Value range On/Off
Default Program Parameters		
	Forward Sound	• Value range On/Off
-2	*Segment switch by pedal*	• Value range On/Off
Program Abort		
X	*Mode*	**Position** = after the cancellation, the needle is merely brought to its end position and the thread is cut **Segment End** = ending of the program with all configurations that are set for this seam section
X	*Thread trimmer*	• Value range On/Off
2x	*Pedal Abort*	• Value range On/Off

17.6 Setting the *User Configuration*

Settings can be made here that are designed to make working on the machine in various external conditions easier for the user.

Menu items in the *User Configuration*

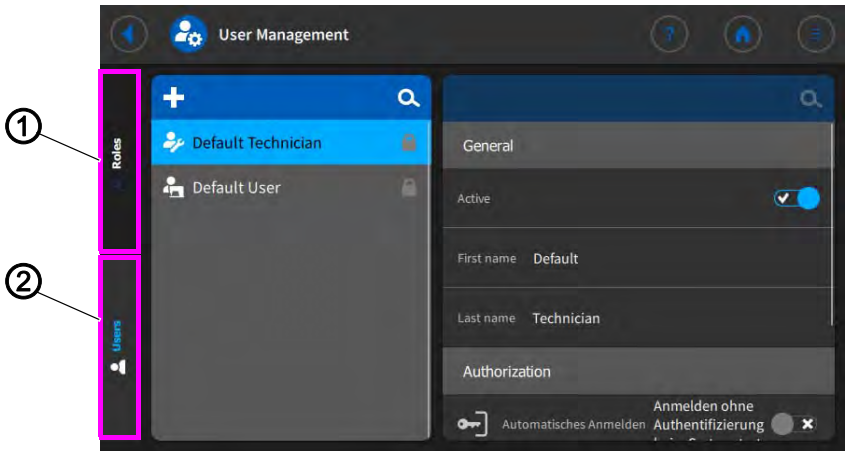
Icon	Menu item	Explanation
	*Language*	Set the language
	*Brightness*	Adjust the control panel brightness
	*Panel Audio Volume*	Adjust the audio volume of the control panel
	*User Management*	🕮 *p. 151*
Machine		
	Machine head light brightness	
	Sewing light brightness (integrated LED sewing light)	
	Smart keys configuration	🕮 *p. 156*
Screen configuration		
	*Manual mode* *Main screen configuration*	🕮 *Operating Instructions*
	*Manual mode* *Status bar configuration*	🕮 *Operating Instructions*
	Role Main Screen Configuration	🕮 *p. 158*
	Role Status Bar Configuration	🕮 *p. 159*

17.6.1 User Management

You can use User Management to create a new user and assign this user a username and password.

The users *Default Technician* and *Default User* have been preset. While they cannot be deleted, these users can be deactivated if necessary.

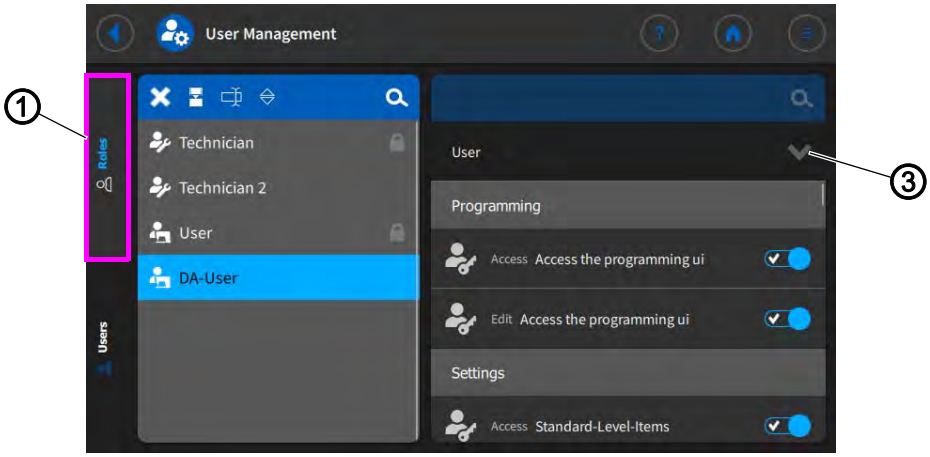
Fig. 106: User Management (1)



(1) - Roles *(2) - Users*

Defining roles

Fig. 107: User Management (2)



(1) - Roles *(3) - Drop-down menu*

Information

New roles are derived from roles that already exist.

If, for instance, a role is derived from a Technician (default role), the new role will initially have all of the same authorizations as the original role. You will afterwards be able to adjust the authorizations for the new role using the drop-down menu.

To define the roles for the respective users:

1. Use the button in the Roles (1) section to derive a new role.
2. Use the drop-down menu (3) to assign the desired authorizations.

Value	Description
Programming	
Access	Activate/deactivate Access the programming ui
Edit	Activate/deactivate Access the programming ui
Settings	
Access	Activate/deactivate access to Standard-Level-Items
Access	Activate/deactivate access to technician level
Manual mode	
Edit	Activate/deactivate Edit the *Bartack enabled* function
Edit	Activate/deactivate Edit the status bar
Edit	Activate/deactivate Edit the main screen
Access	Activate/deactivate access to the *Role Main Screen* function
Access	Activate/deactivate access to the *Role Status Bar* function
Edit	Activate/deactivate Edit the sewing parameters
Access	Activate/deactivate access to the *Switch to automatic mode* function
Access	Activate/deactivate access to the *Parameter View* function
Edit	Activate/deactivate Edit the manual bartack

Value	Description
 Edit	Activate/deactivate Edit the *Sewing foot lifted* function
 Edit	Activate/deactivate Edit the needle stop position
 Edit	Activate/deactivate Edit Bobbin Wind mode
 Edit	Activate/deactivate Edit the *Segment abort* function
 Edit	Activate/deactivate Edit the edge trimmer
 Edit	Activate/deactivate Edit the additional edge guide value
 Edit	Activate/deactivate Edit the 2nd Edge Guide Height
 Edit	Activate/deactivate Edit the Edge Guide reference position
 Edit	Activate/deactivate Edit the stitch length
 Edit	Activate/deactivate Edit the *Switch Stitch Length* function
 Edit	Activate/deactivate Edit the needle tension
 Edit	Activate/deactivate Edit the *Switch Thread Tension* function
 Edit	Activate/deactivate Edit the sewing foot pressure
 Edit	Activate/deactivate Edit the sewing foot stroke
 Edit	Activate/deactivate Edit the *Switch Foot Stroke Alternation* function
 Edit	Activate/deactivate Edit the Bartack Toggle

Value	Description
 Edit	Activate/deactivate Edit the maximum sewing speed
 Edit	Activate/deactivate Edit the Bartack at seam begin
 Edit	Activate/deactivate Edit the Bartack at seam end
 Edit	Activate/deactivate Edit the Needle Half Stitch
 Edit	Activate/deactivate Edit the *Enabled Thread Trim* function
 Edit	Activate/deactivate Edit the needle thread clamp
 Edit	Activate/deactivate Edit the Threading Mode
 Edit	Activate/deactivate Edit the light barrier
 Edit	Activate/deactivate Edit the *Reset Bobbin Counter* function
 Edit	Activate/deactivate Edit the seam center guide
Automatic mode	
 Access	Activate/deactivate Access the program selection
 Edit	Activate/deactivate Edit the program
 Edit	Activate/deactivate Edit the stitch length correction factor
 Edit	Activate/deactivate Edit the needle thread tension correction factor
Sewing	
 Edit	Activate/deactivate Edit the *Enable multi functional tiles* function
User Management	

Value	Description
 Edit	Activate/deactivate Edit the *Current user* role
 Edit	Activate/deactivate Edit the *Roles up to technician*
 Edit	Activate/deactivate Edit the *Users up to technician* role
 Edit	Activate/deactivate Edit the *Auto Login Editable* function

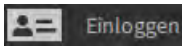
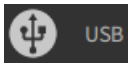
Creating new users

To create new users:

1. Go to the `Users` (2) section and press  .

↳ A new user with the name *New User* is created.

2. Enter a username by which the user can be clearly identified.
3. Enter values of your choice to personalize the new user:

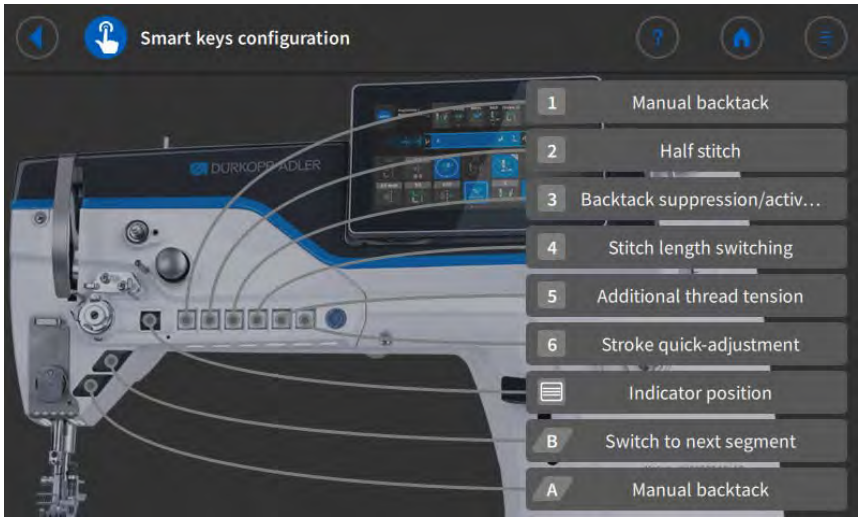
Value	Description
General	
Active	Check the box to activate the user Turn the check box off to deactivate the user
First name	Enter the first name using the touch screen keypad
Last name	Enter the last name using the touch screen keypad
Authorization	
	Login with username and password Use  to enter the username and the password (optional).
	login with NFC tag
	login with USB key
	Login without authentication at startup
Roles	

Value	Description
Technician	Technician role (default)
User	User role (default)
...	additional roles that can be created as needed
↳ You need to assign the new user one or several matching roles. If assigning multiple roles to the same user, you must define one role as the *primary role*. The *primary role* is highlighted with a blue font.	

17.6.2 Smart keys configuration

The smart keys configuration section allows you to assign a function to all push buttons on the machine arm.

Fig. 108: Smart keys configuration



To assign a function to a push button on the machine arm:

1. Press the button of the desired push button.
2. Select from the list the function you wish to assign to the push button (📖 *p. 157*).
3. Select if the function is supposed to be *Hold to run* or *Latching*.

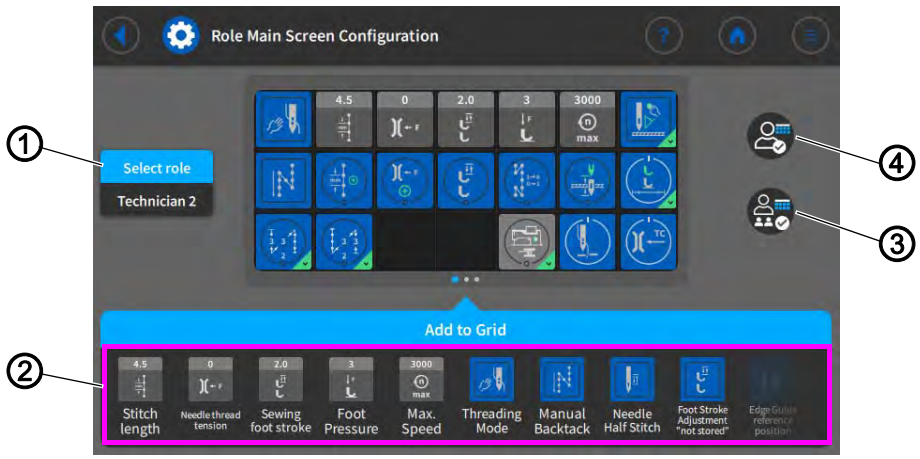
List of possible button functions:

- Bobbin Wind mode
- Bartack suppression/activation
- Manual bartack
- Half stitch
- Whole stitch
- Pointing Position
- Needle high
- Additional thread tension
- Stitch length switching
- Seam Center Guide
- Light barrier
- Operation lock active with contact open
- Quick stroke adjustment
- Switch to next segment
- 2nd edge guide position (gap)
- Foot lighten position
- Additional fullness
- Tape tension
- Puller
- Operation lock active with contact closed
- Operation lock in seam
- Trigger program selection
- Program selection Bit B0
- Program selection Bit B1
- Program selection Bit B2
- Program selection Bit B3
- Program selection Bit B4
- Program selection Bit B5
- Program selection Bit B6
- Program selection Bit B7
- Program selection Bit B8
- Program selection Bit B9
- Short stitch
- 2nd edge guide position (height)
- 2nd edge guide position (gap and height)
- DB3000
- DB2000
- Function module 1
- Function module 2

- Function module 3
- Function module 4
- Function module 5
- Function module 6
- Function module 7
- Function module 8
- Sewing light
- Machine head lighting

17.6.3 Role Main Screen Configuration

Fig. 109: Role Main Screen Configuration (1)



(1) - Button Select role
(2) - Bar
(3) - Button Role
(4) - Button Users + Role

To configure the main screen for a role:

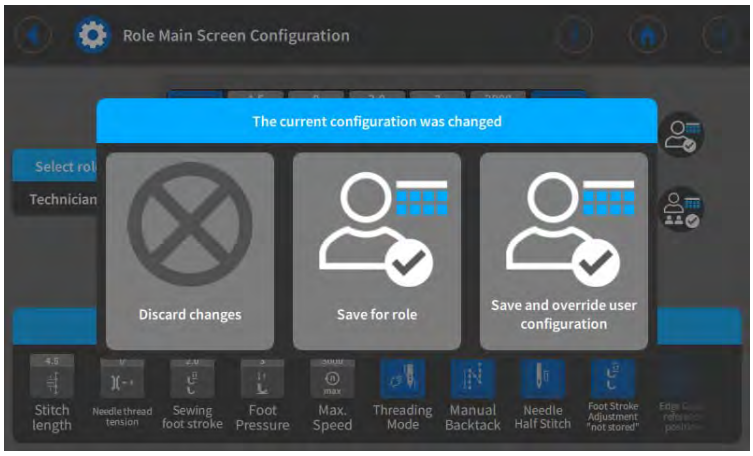
1. Press the **Select role** button to select the desired role.
2. Press the **Role** / **Users + Role** button.

↳ Button **Role**: Changes only apply to the role.
Button **Users + Role:** the changes apply to the role and all users that have been assigned this role.

3. Pick the desired tile from the bar (2) and add it to the grid.
4. To save the settings, press the button.

↳ The display switches to:

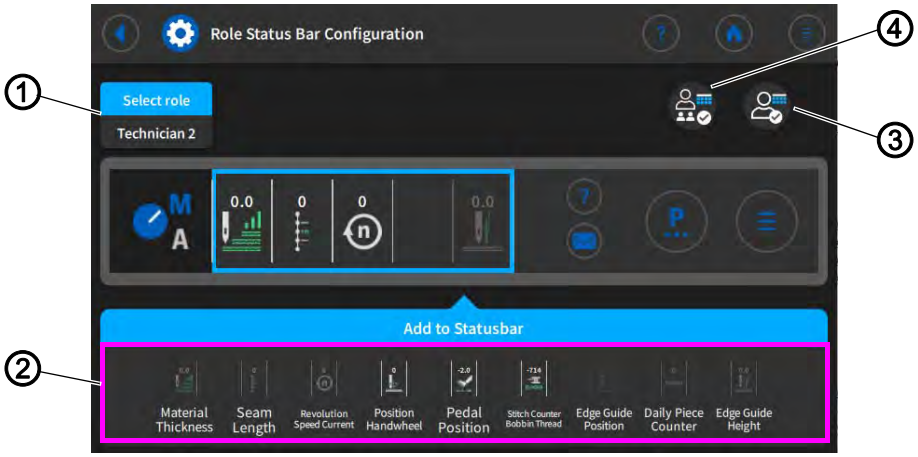
Fig. 110: Role Main Screen Configuration (2)



5. Select if you wish to discard or save the changes.

17.6.4 Role Status Bar Configuration

Fig. 111: Role Main Screen Configuration (1)



(1) - Button Select role
(2) - Bar
(3) - Button Role
(4) - Button Users + Role

To configure the main screen for a role:

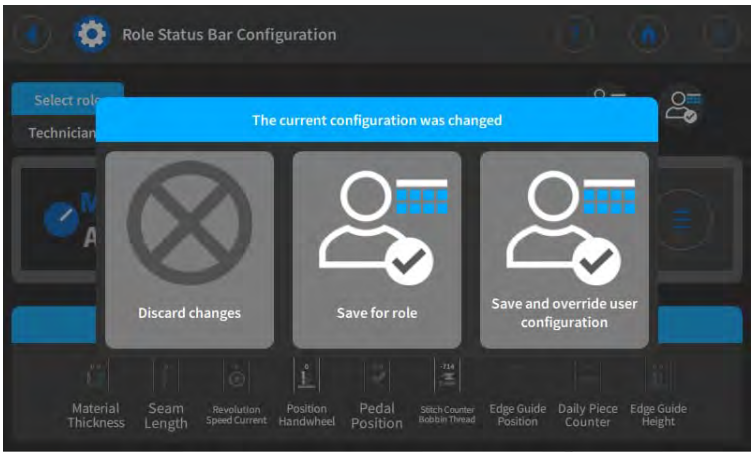
1. Press the **Select role** button to select the desired role.
2. Press the **Role** / **Users + Role** button.

↳ Button **Role**: Changes only apply to the role.
Button **Users + Role:** the changes apply to the role and all users that have been assigned this role.

3. Pick the desired tile from the bar (2) and add it to the grid.
4. To save the settings, press the button.

↳ The display switches to:

Fig. 112: Role Status Bar Configuration (2)



5. Select if you wish to discard or save the changes.

Information

For a detailed explanation of the screen configuration, refer to the 🕮 *Operating Instructions*.

17.7 Using *Manual Data Transfer*

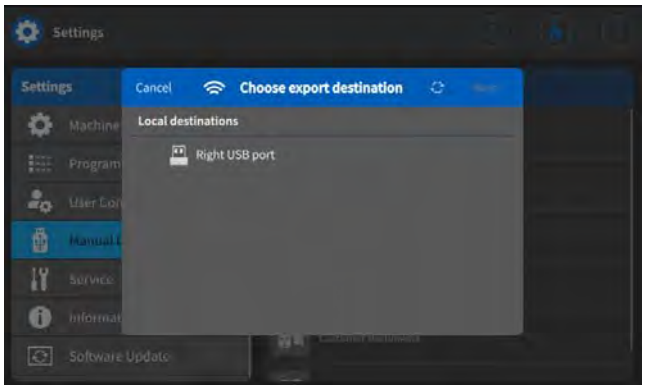
Use this submenu to transfer data between the machine – or, more precisely, the control panel – and a USB key. Various options are available for the data transfer, which are explained in the subchapters.

17.7.1 Exporting data

To export data:

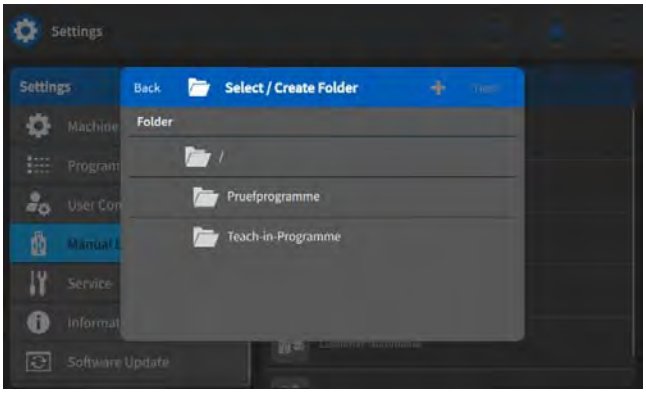
1. Connect the USB key at the control panel.
2. Press the **Export** button.

Fig. 113: Exporting data (1)



3. Select the export destination.
   E.g.: Right USB port.

Fig. 114: Exporting data (2)

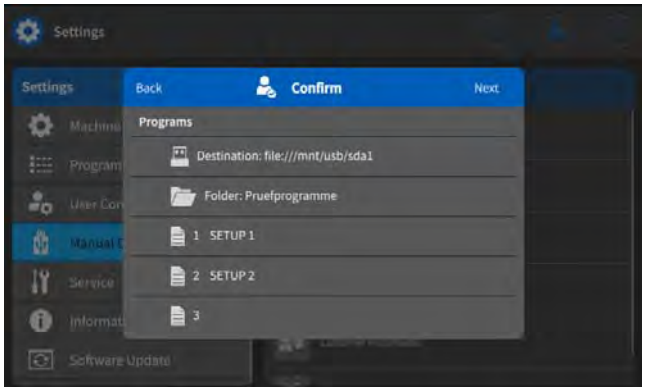


4. Select a folder that already exists or create a new folder.
5. Press the desired export option.

Icon	Menu item	Explanation
	*System Image*	Figure of all machine settings
	*Only Parameter*	Machine configuration: • Default Program • Machine Data • Motor Data • Operation Library • Sewing Global • Sewing Manual • Global Control User Data • User Settings

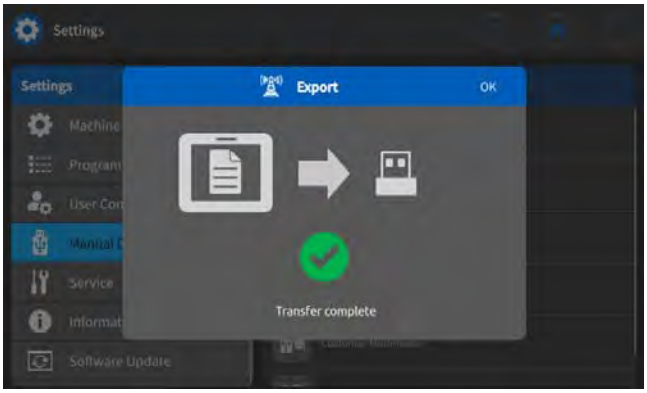
Icon	Menu item	Explanation
	*Log files*	Messages of the machine: • Most Recent Logs • All Available Logs
	*Programs*	Seam programs: all created seam programs, e.g.: • 1 SETUP 1 • 2 SETUP 2 • 10 SEAM MANUAL • 20 SEAM 20 AUTOMATIC • 21 SQUARE • 100 ORNAMENTAL SEAM • 101 ORNAMENTAL SEAM • 110 ORNAMENTAL SEAM
	*Customer Multimedia*	Own PDFs and videos

Fig. 115: Exporting data (3)



6. Confirm selection.

Fig. 116: Exporting data (4)



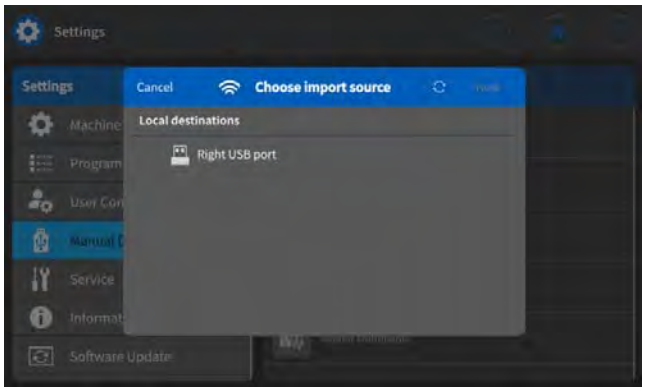
↳ The data is exported.

17.7.2 Importing data

To import data:

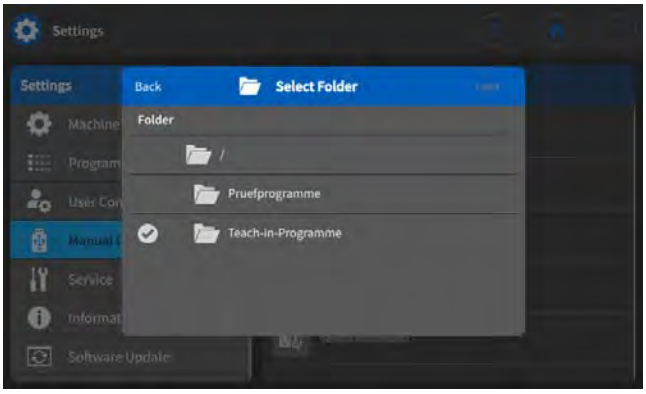
1. Connect the USB key at the control panel.
2. Press the **Import** button.

Fig. 117: Importing data (1)



3. Select the import source.
   E.g.: Right USB port.

Fig. 118: Importing data (2)

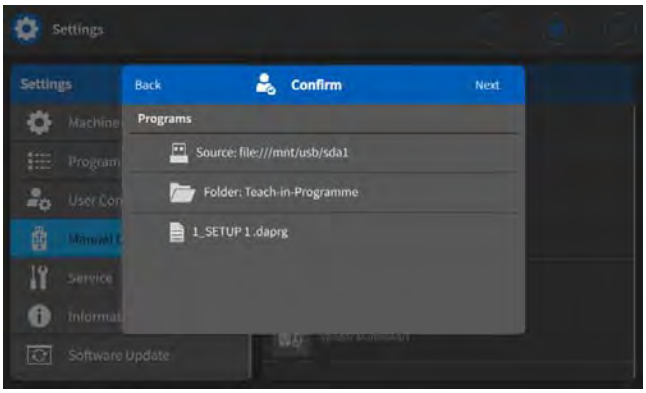


4. Select the desired folder.

5. Press the desired import option.

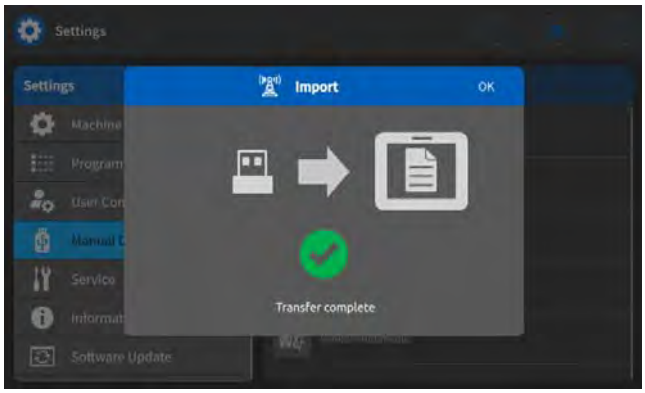
Icon	Menu item	Explanation
	*System Image*	Figure of all machine settings **CAUTION:** importing will overwrite ALL data stored on the machine
	*Only Parameter*	Machine configuration: • Default Program • Machine Data • Motor Data • Operation Library • Sewing Global • Sewing Manual • Global Control User Data • User Settings **CAUTION:** importing will overwrite ALL data stored on the machine
	*Programs*	Seam programs: all created seam programs, e.g.: • 1 SETUP 1 • 2 SETUP 2 • 10 SEAM MANUAL • 20 SEAM 20 AUTOMATIC • 21 SQUARE • 100 ORNAMENTAL SEAM • 101 ORNAMENTAL SEAM • 110 ORNAMENTAL SEAM
	*Customer Multimedia*	Own PDFs and videos • **CAUTION:** The format of the videos must be *webm plus VP8 coding*. For instructions on how to convert videos, refer to the **Appendix** (📖 *p. 224*)

Fig. 119: Importing data (3)



6. Confirm selection.

Fig. 120: Importing data (4)



↳ The data is imported.
The machine will be restarted if necessary.

17.8 *Service*

Make technical settings here, so that the machine runs without any problems. The parameters are explained in more detail in the subchapters.

Menu items under *Service*

Icon	Menu item	Explanation
	Calibration	🕮 *p. 166*
	Settings	🕮 *p. 170*
	Multitest	🕮 *p. 170*
	Maintenance Management	🕮 *p. 174*
	QONDAC	🕮 *p. 176*
	Reset	🕮 *p. 177*
	Network	🕮 *p. 178*
	Logging	🕮 *p. 178*

17.8.1 *Calibration*

Various parameters need to be calibrated – they are listed in the table. A detailed description of the calibration is given after the table.

Icon	Menu item	Explanation
	*Feed calibration*	🕮 *p. 167*
	*Material thickness detection*	🕮 *p. 168*
	*Edge guide* **only visible if the 1-axis or the 2-axis edge guide has been activated** 🕮 *p. 136*	🕮 *p. 168*
	*Edge Guide Height* **only visible if the 2-axis edge guide has been activated** 🕮 *p. 136*	🕮 *p. 169*
	*Needle thread tension*	🕮 *p. 169*

Calibration of the *Feed calibration*

The stitch length must be the same in forward and backward stitches. As a test, sew a seam forward on paper, stop, and sew a seam backward. The punctures of the forward and backward stitches have to lie within one another. If this is not the case, then calibration is necessary.

WARNING

Risk of injury from the heavy machine head!

Crushing possible.

Tilt the machine carefully and in a controlled manner. Never reach with the hands under the machine.

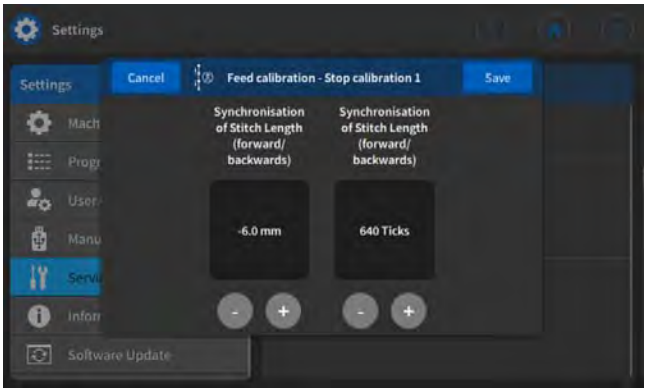
To calibrate the stitch length:

1. Set the stitch length mechanically (📖 *p. 43*).
2. Call up the *Service > Calibration > Feed calibration* menu item.
3. Select the stitch length (-6/0/6) and confirm with **OK**.
4. Start the sewing test on paper with the pedal and then check the stitch length:

Stitch length	Length of test run
-6	Test run must be 60 mm. ↳The test run is sewn backwards.
0	Test run must be almost 0 mm, and the penetration hole is round, not oval.
6	Test run must be 60 mm.

5. If the test run is not the correct length, the values must be adjusted accordingly:

Fig. 121: Calibration of the Feed calibration



Stitch length	Synchronization of the stitch length (ticks)
-6	Reduce value – stitch length becomes smaller Increase value – stitch length becomes larger
0	Reduce value – stitch length becomes larger Increase value – stitch length becomes smaller
6	Reduce value – stitch length becomes larger Increase value – stitch length becomes smaller

6. Perform sewing test again and check the stitch length.
7. If the test run is the correct length, confirm with the **Close** button.

After calibrating the stitch length, it is advisable to perform another test in standard sewing mode. Select a program that has an ornamental-stitch bartack. Perform the test on paper again. The stitches should run neatly into each other; if this is not the case, calibrate again.

Calibration of the *Material thickness detection*

Only one value needs to be checked when calibrating the material thickness detection.

To calibrate the material thickness detection:

1. Call up the *Service > Calibration > Material thickness detection* menu item.
2. Follow the instructions on the display.

Calibration of the edge guide

To calibrate the lateral distance of the edge guide:

1. Flip up the edge guide.
2. Call up the *Service > Calibration > Edge Guide* menu item.
3. Confirm the selection with **OK**.

↳ The edge guide moves to the reference position.

4. Fold the edge guide down.
5. Measure the distance between the needle and the edge guide.
6. Enter the value with the **-/+** buttons.
7. Confirm the entry with **Next**.

↳ The calibration is complete.

Height Calibration of Edge Guide (only for 2-axis edge guide)

To calibrate the height of the edge guide:

1. Call up the *Service > Calibration > Edge Guide Height* menu item.
   ↳ The control panel displays the value **5 mm**.
2. Place the locking peg included in the accessory pack under the edge guide.
3. Use the **-/+** buttons to move the edge guide until the edge guide slightly clamps the locking peg.
   The value on the display will NOT change.
4. Confirm the entry with **Next**.
   ↳ The calibration is complete.

Calibration of the *Needle thread tension*

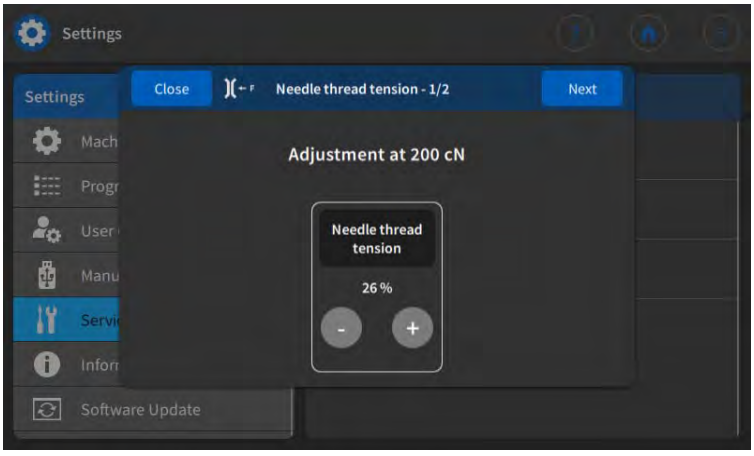
Proper setting

The calibration is performed with the following thread: Serafil 30/3 black.
The measurement is taken with a thread scale (range up to 300cN).
The thread tension is set to 50 cN.

To calibrate the needle thread tension:

1. Insert the needle thread and guide it up to the thread lever.
2. Take the thread tensioning spring out of operation.
3. Call up the *Service > Calibration > Needle thread tension* menu.
   ↳ The thread tension is activated, and a percentage value is displayed (e.g. 26%):

Fig. 122: Calibration of the needle thread tension



4. Pull off the thread with the thread scale.
5. Change the percentage value (plus or minus) until the scale reads 200 cN.
6. Save the value and exit the menu.

17.8.2 *Settings*

The *Settings* parameter is not explained in greater detail here, because it is closely related to the area of the mechanics. Details on that area can be found in the Service routine chapter (📖 *p. 14*) .

Icon	Menu item	Value range
	Feed dog	*Assemble*
		Position to needle
		Feed dog movement
	Hook-Needle	*Timing*
		Needle bar
	Sewing foot stroke	*Equal sewing foot stroke*
		Feed Move

17.8.3 *Multi test*

This parameter makes it possible to test whether, for example, magnets, drives, and inputs or outputs are functioning correctly. A list of the necessary allocations can be found in the 📖 *Parameter list* of the machine.

Icon	Menu items	Value range
	Test Output	📖 *p. 171*
	Test Input	📖 *p. 171*
	Test Sewing Motor	📖 *p. 172*

Icon	Menu items	Value range
	*Test Stepper Motor*	📖 p. 172
	*Test Pedal*	📖 p. 172
	*Test Material Thickness Sensor*	📖 p. 173

Test Output sub-item

Test of the outputs according to the wiring diagram.

To test the outputs:

1. Turn on the check box (✓) at the desired output.

↳ The output is activated.

Test Input sub-item

Test of the inputs according to the wiring diagram.

To check the inputs:

1. Press the input.

↳ The display switches automatically to the corresponding input in the pick list on the control panel.
The status (on/off) is highlighted with a color.

Test Sew. Motor sub-item

Use this sub-item to test the functionality of the sewing motor.

To check the sewing motor:

1. Turn on the check box (✓) in the *Test Active* section.
2. Enter the desired speed in the *Test Speed* section.

↳ The sewing motor runs at the entered speed.

Test Stepper Motor sub-item

You use this sub-item to test stepper motors for stitch length adjustment, sewing foot lifting/sewing foot pressure and stroke adjustment.

To test the stepper motors:

1. Turn on the check box (✓) in the *Test Active* section of the desired stepper motor.
2. Enter the desired position in the *Test Position* section.

Information

There is no specific procedure for testing the stepper motor encoders. The encoders are tested along with the stepper motors. If the result for the stepper motors is OK, the encoders will be functional as well.

Test Pedal sub-item

This sub-item is used to check the various pedal positions.

To test the pedal:

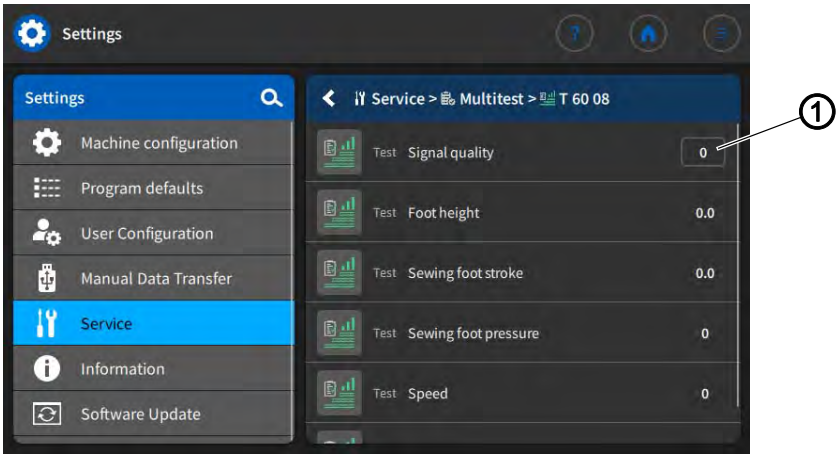
1. Press the pedal.

↳ The corresponding positions or steps are displayed in the menu. Depending on the version (analog or digital), the values are displayed directly or as a status indicator (0/1).

Test Material Thickness Sensor sub-item

Use this sub-item to test the functionality of the material thickness sensor.

Fig. 123: Test Material Thickness Sensor sub-item



(1) - Signal quality

Parameter	Description
Signal quality	Signal quality of the sensor
Height of the sewing foot lift	indicates the height of the sewing foot lift for the current sewing material
Sewing foot stroke	indicates the sewing foot stroke for the current sewing material
Sewing foot pressure	indicates the sewing foot pressure for the current sewing material
Speed	indicates the set speed
Needle thread tension	indicates the needle thread tension for the current sewing material

To test the material thickness detection:

1. Open the menu *Service > Multi test > Test Material Thickness Sensor*.
2. Lift the sewing feet.
3. Place the sewing material under the sewing feet.
4. Lift the sewing feet.

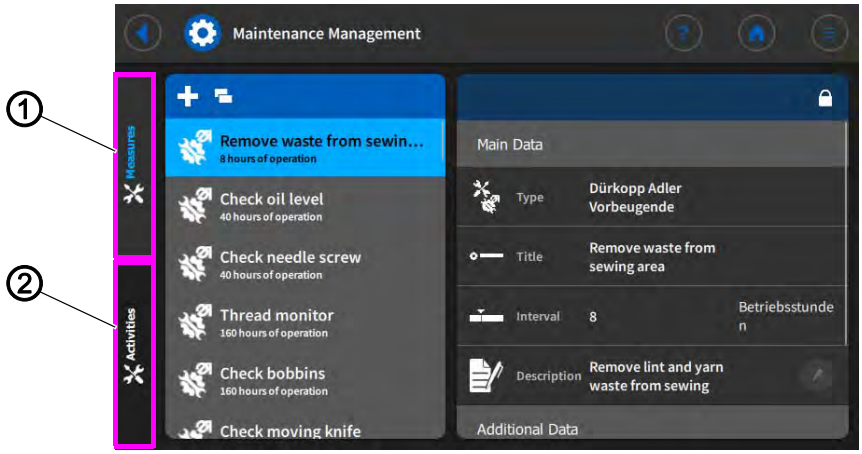
↳ The signal quality (1) must display the value *1*.

If the signal quality (1) does not display the value `1`:

- Check the position of the sensor and adjust it if necessary
- Calibrate the adjusted sensor in the menu `Service > Calibration > Material thickness detection` (📖 p. 166)

17.8.4 `Maintenance Management`

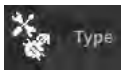
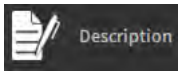
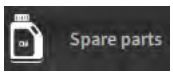
Fig. 124: Maintenance Management (1)



(1) - Measures *(2) - Activities*

The `Measures` (1) section houses a list of preventive maintenance measures recommended by Dürkopp Adler.

All listed measures contain the following information:

Icon	Description
Main Data	
	Dürkopp Adler Preventive Maintenance Measure
	Title of the measure
	Interval in hours of operation
	Task that needs to be performed
Additional Data	
	Reference to the PDF instructions
	List of spare parts that can be ordered and are required for the maintenance measure

Creating a maintenance activity

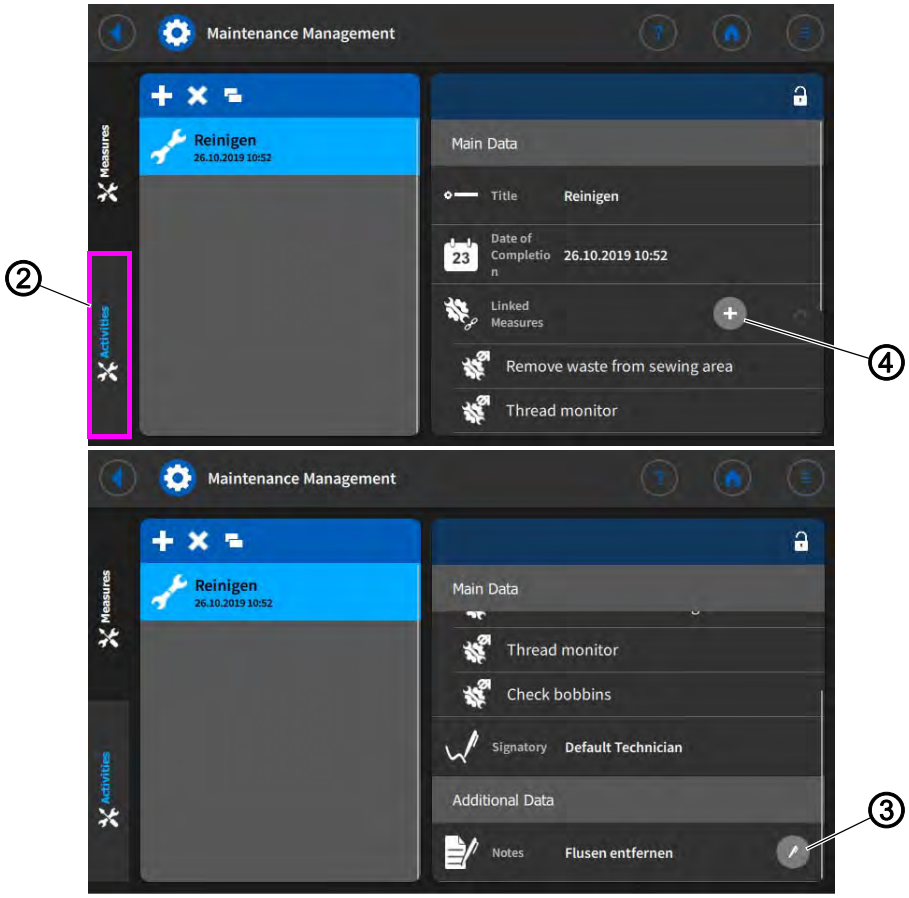
You can use the *Activities* (2) section to create your own maintenance activities.

To create a maintenance activity:

1. Go to the *Activities* (2) section and press +.

↳ A new activity with the name *New Activity* is created.

Fig. 125: Maintenance Management (2)



(2) - Activities
(3) - Icon Edit
(4) - Icon Add

2. Enter the desired title in the *Title* section using the touch screen keypad.
3. Select the desired date in the *Date of Completion* section.
4. Press the icon Add (4) in the *Linked Measures* section.

↳ The list of maintenance measures recommended by Dürkopp Adler opens.

5. Check the box for the desired maintenance measure.
6. Add maintenance measures using the Done button.
7. To add a note, press the icon Edit (3) in the *Notes* section and enter the desired text using the touch screen keypad.

17.8.5 *QONDAC*

Machines can be interlinked to allow for networked operation.
Various settings can be made for the networking of the machines.
The possibilities are explained in more detail in the table.

Icon	Menu item	
	Communication	Value range Commander/Disabled
	*Customer ID*	Enter the customer ID using the touch screen keypad
	Server address	Enter the server address using the touch screen keypad
	Server Identification	Enter the server identification number using the touch screen keypad
	Client Identification	Enter the client identification number using the touch screen keypad

Information

For detailed information on how to network machines, refer to the documentation of the QONDAC.

17.8.6 *Reset*

Use this submenu to reset the data of the machine. Various settings can be made for resetting the data. The possibilities are explained in more detail in the table.

NOTICE

Property damage may occur!

Data and settings of the machines may be irretrievably lost.

Consider BEFORE the reset exactly which data need to be deleted.

Options for initializing the data

Icon	Menu item
	*Reset Parameter* All parameters are reset to the factory settings; this does not apply to the programs and the calibration values.
	*Reset Programs* All created programs are erased.
	*Reset calibration* All calibration values are reset to the factory settings.
	*Reset all* All parameters, programs, and calibration values are reset to the factory settings.
	*Remove User Tutorials*

17.8.7 *Network*

The Dynamic Host Configuration Protocol (DHCP) makes it possible to assign the network configuration to the server.

You need to set up the network if you wish to connect the machine to the QONDAC.

To set up the network:

1. Activate DHCP.

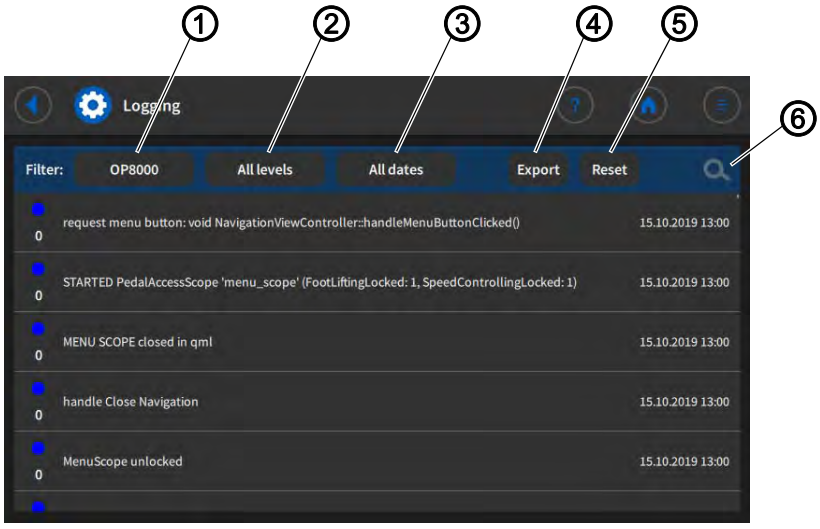
↳ The drop-down menu is enabled.

2. Enter the following information in the drop-down menu:
   - IP-Address for QONDAC
   - Subnet Mask for QONDAC
   - Gateway for QONDAC
   - Nameserver

17.8.8 *Logging*

Logging is used to store all messages relating to the activities of the machine.

Fig. 126: Logging



(1) - Control panel
(2) - Levels
(3) - Data
(4) - Export
(5) - Reset
(6) - Magnifier

Button	Filter options/meaning
Control panel (1)	installed control panel
Levels (2)	• All levels • Debug • Warning notice • Assert
Data (3)	• All data • Today • Yesterday • Last two days • Last week
Export (4)	Export logging
Reset (5)	Delete logging
Magnifier (6)	search for specific logs

17.9 *Information*

The *Information* section allows you to set the data and time and call up information about machine components.

Menu items under *Information*

Icon	Menu item	Explanation
	*Date and time*	Setting date and time
	*Copyright*	
	*Software version*	
		Application Software version of the application
		Machine Software version of the connected machine
	*Software licenses*	List of all active software licenses

Icon	Menu item	Explanation
	*Counter*	
		Total counter Number of workpieces that the machine has sewn so far.
		Daily Piece Counter Number of workpieces that the machine has sewn since the last reset.
		Stitch counter total Number of stitches that the machine has sewn so far.
		Stitch counter bobbin thread Number of stitches that have been sewn with the bobbin since the last reset.
	*Control*	
		Control Type of the connected control
		Serial number Serial number of the connected control
	*Control panel*	Type of the connected control panel
	*Machine*	
		Class selected class
		Machine subclass selected subclass
		Serial number Serial number of the machine
		Production date Production date of the machine

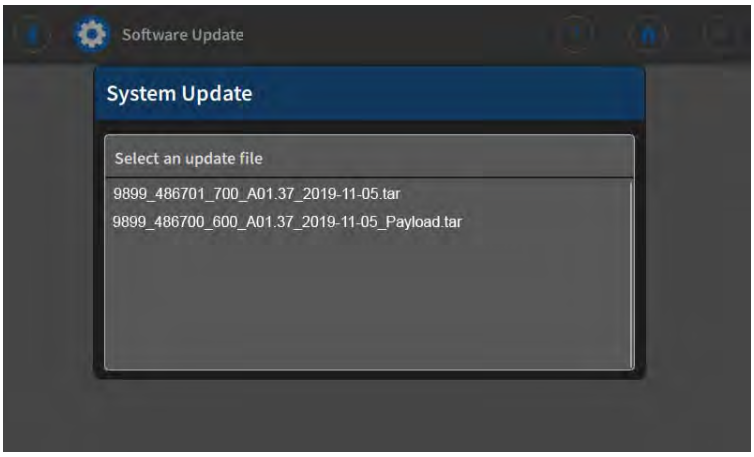
17.10 Performing a *software update*

When a new software version is available, it can be downloaded from Dürkopp Adler's software shop (https://software.duerkopp-adler.com/maschinenprogramme.html) and be uploaded from a USB key. All settings on the machine are retained.

To perform a software update:

1. Download the latest software version from Dürkopp Adler's website.
2. Save the software to a USB key.
3. Connect the USB key at the control panel.
4. Press the **Software update** button.

Fig. 127: Performing a software update



5. Select the update file.

↳ The software update is performed.

6. Remove the USB key when the software update is complete.

↳ The machine restarts and is ready for sewing.

18 Maintenance

WARNING

Risk of injury from sharp parts!

Punctures and cutting possible.

Prior to any maintenance work, switch off the machine or set the machine to threading mode.

WARNING

Risk of injury from moving parts!

Crushing possible.

Prior to any maintenance work, switch off the machine or set the machine to threading mode.

This chapter describes maintenance work that needs to be carried out on a regular basis to extend the service life of the machine and achieve the desired seam quality.

Maintenance intervals

Work to be carried out	Operating hours			
	8	40	160	500
Check the bobbins for wear and damage and replace them if necessary			●	
Cleaning				
Removing sewing dust and thread residues	●			
Lubricating				
Lubricating the machine head	●			
Lubricating the hook		●		
Servicing the pneumatic system (optional)				
Adjusting the operating pressure	●			
Draining the water-oil mixture	●			
Cleaning the filter element		●		
Servicing specific components				
Cleaning the thread clamp			●	
Checking the toothed belt				●

18.1 Cleaning

WARNING

Risk of injury from flying particles!

Flying particles can enter the eyes, causing injury.

Wear safety goggles.
Hold the compressed air gun so that the particles do not fly close to people.
Make sure no particles fly into the oil pan.

NOTICE

Property damage from soiling!

Sewing dust and thread residues can impair the operation of the machine.

Clean the machine as described.

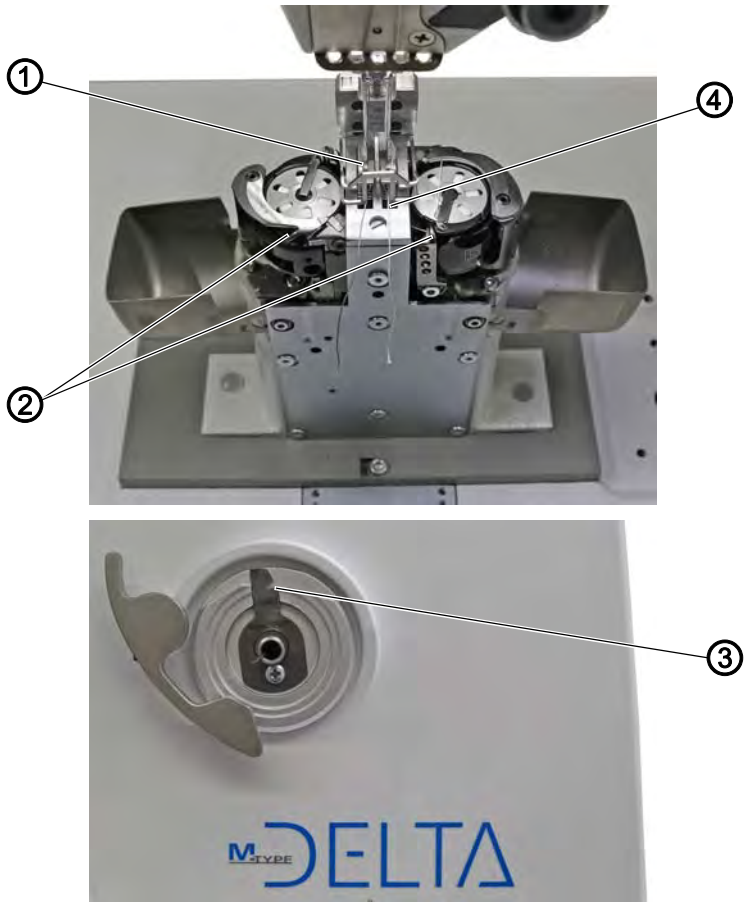
NOTICE

Property damage from solvent-based cleaners!

Solvent-based cleaners will damage paintwork.

Use only solvent-free substances for cleaning.

Fig. 128: Cleaning



(1) - Area around the needle(s)
(2) - Hook
(3) - Knife on the winder
(4) - Area under the throat plate (not visible)

Areas particularly susceptible to soiling:

- Knife on the winder (3)
- Area under the throat plate (4)
- Hook (2)
- Area around the needle (1)

To clean the machine:

1. Switch off the machine.
2. Remove any sewing dust and thread residues using a compressed air gun or a brush.

Important

If you wish to clean the machine with cleaning agents, do not use just any cleaner. To prevent damage to the surfaces, use the cleaner MONOCLEAN X400.
Follow the instructions on how to use this cleaning agent to prevent damage to the machine.

18.2 Lubricating

CAUTION

Risk of injury from contact with oil!

Oil can cause a rash if it comes into contact with skin.

Avoid skin contact with oil.
If oil has come into contact with your skin, wash the affected areas thoroughly.

NOTICE

Property damage from incorrect oil!

Incorrect oil types can result in damage to the machine.

Only use oil that complies with the data in the instructions.

CAUTION

Risk of environmental damage from oil!

Oil is a pollutant and must not enter the sewage system or the soil.

Carefully collect up used oil.
Dispose of used oil and oily machine parts in accordance with national regulations.

The machine is equipped with a central oil-wick lubrication system.
The bearings are supplied from the oil reservoir.

For topping off the oil reservoir, use only lubricating oil **DA 10** or oil of equivalent quality with the following specifications:

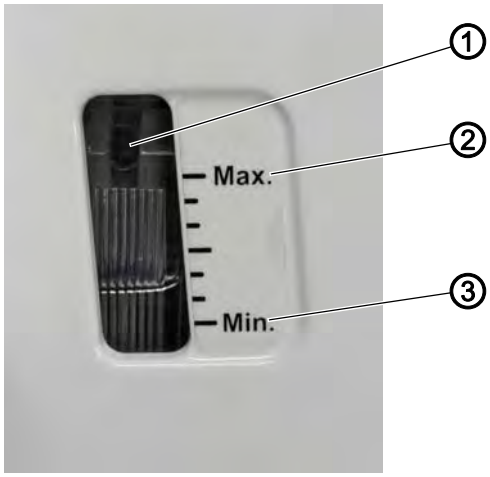
- Viscosity at 40 °C: 10 mm²/s
- Flash point: 150 °C

You can order the lubricating oil from our sales offices using the following part numbers:

Container	Part no.
250 ml	9047 000011
1 l	9047 000012
2 l	9047 000013
5 l	9047 000014

18.2.1 Lubricating the machine head

Fig. 129: Lubricating the machine head



(1) - Refill opening
(2) - Maximum level marking
(3) - Minimum level marking

Proper setting

The oil level is between the minimum level marking (3) and the maximum level marking (2).

To lubricate the machine head:

1. Check the oil level indicator at the inspection glass every day.
2. If the inspection glass lights up red, the machine is not sufficiently supplied with oil.
3. If the oil level is below the minimum level marking (3): Pour oil through the refill opening (1) but no higher than the maximum level marking (2).

18.2.2 Lubricating the hook

CAUTION

Risk of injury from sharp and moving parts!

Puncture or crushing possible.

Switch off the machine before lubricating the hook. Carry out function tests with utmost caution when the sewing machine is switched on.

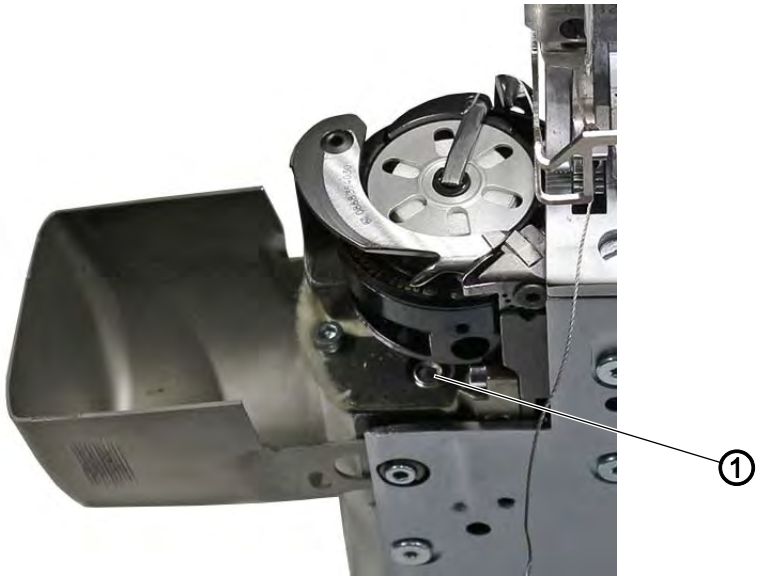
The approved oil quantity for hook lubrication is a factory specification.

Proper setting

1. Hold a piece of blotting paper next to the hook.
2. Allow the machine to run without thread and sewing material for 10 seconds with the sewing feet lifted and at a high speed.

↳ The blotting paper will show a thin strip of oil when sewing is complete.

Fig. 130: Lubricating the hook



(1) - Screw

To lubricate the hook:

1. Turn the screw (1):
   - **release more oil:** Turn screw (1) counterclockwise
   - **release less oil:** Turn screw (1) clockwise

Important

The released amount of oil does not change until the operating time has run a few minutes. Sew for several minutes before you check the setting again.

18.3 Servicing the pneumatic system (optional)

18.3.1 Adjusting the operating pressure

NOTICE

Property damage from incorrect adjustment!

Incorrect operating pressure can result in damage to the machine.

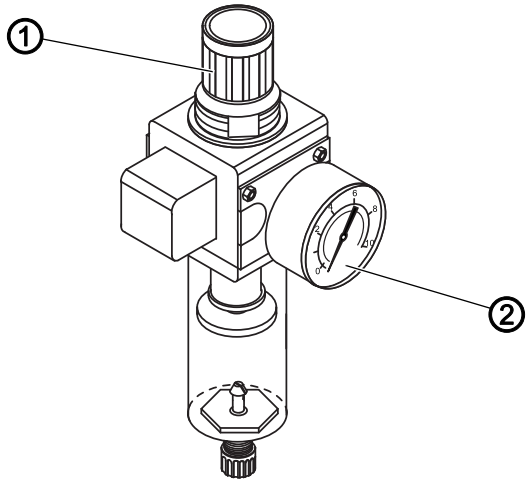
Ensure that the machine is only used when the operating pressure is set correctly.

Proper setting

Refer to the **Technical Data** (📖 *p. 221*) chapter for the permissible operating pressure. The operating pressure cannot deviate by more than ± 0.5 bar.

Check the operating pressure on a daily basis.

Fig. 131: Adjusting the operating pressure



(1) - Pressure regulator *(2) - Pressure gage*

To adjust the operating pressure:

1. Pull the pressure regulator (1) up.
2. Turn the pressure regulator until the pressure gage (2) indicates the proper setting:
   - Increase pressure = turn clockwise
   - Reduce pressure = turn counterclockwise
3. Push the pressure regulator (1) down.

18.3.2 Draining the water-oil mixture

NOTICE

Property damage from excess liquid!

Too much liquid can result in damage to the machine.

Drain liquid as required.

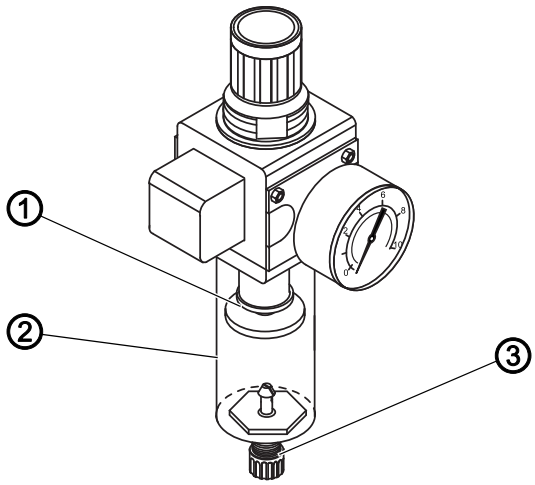
The collection tray (2) of the pressure regulator will show accumulation of a water-oil mixture.

Proper setting

The water-oil mixture must not rise up to the level of the filter element (1).

Check the level of the water-oil mixture in the collection tray (2).

Fig. 132: Draining the water-oil mixture



(1) - Filter element
(2) - Collection tray
(3) - Drain screw

To drain the water-oil mixture:

1. Disconnect the machine from the compressed air supply.
2. Place the vessel under the drain screw (3).
3. Loosen the drain screw (3) completely.
4. Allow the water-oil mixture to drain into the vessel.
5. Tighten the drain screw (3).
6. Connect the machine to the compressed air supply.

18.3.3 Cleaning the filter element

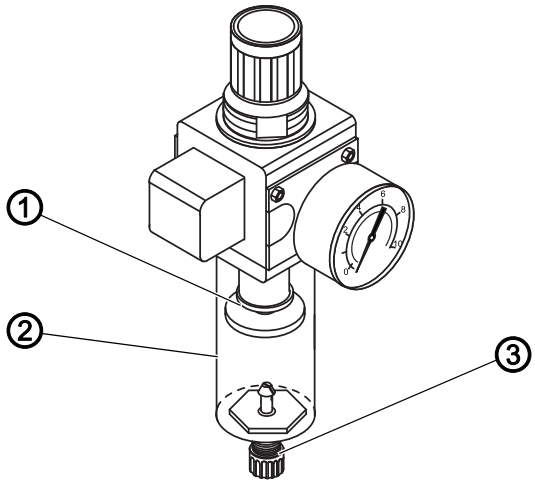
NOTICE

Damage to the paintwork from solvent-based cleaners!

Solvent-based cleaners damage the filter.

Use only solvent-free substances for washing out the filter tray.

Fig. 133: Cleaning the filter element



(1) - Filter element
(2) - Collection tray
(3) - Drain screw

To clean the filter element:

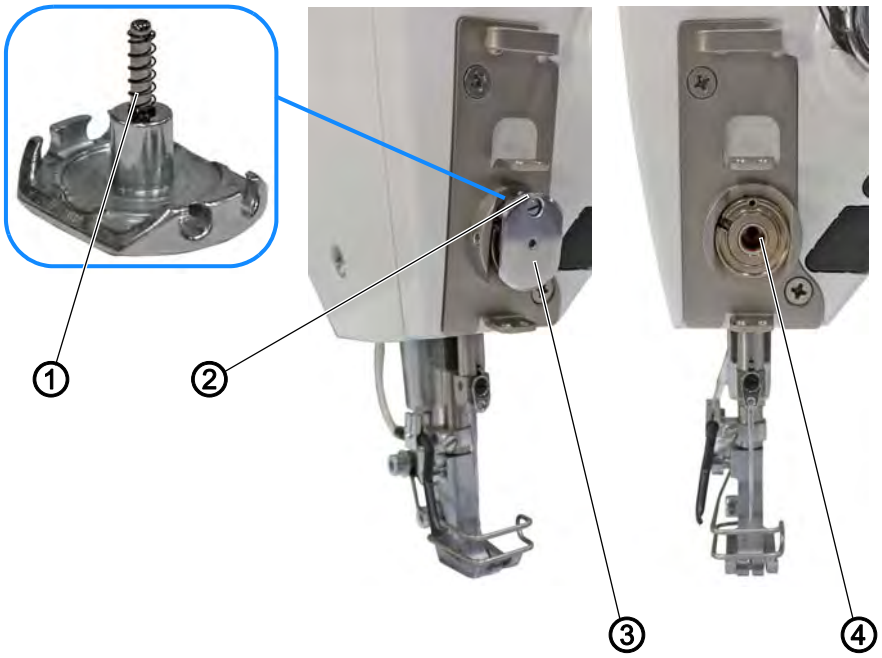
1. Disconnect the machine from the compressed air supply.
2. Drain the water-oil mixture (📖 *p. 190*).
3. Unscrew the collection tray (2).
4. Unscrew the filter element (1).
5. Blow out the filter element (1) using the compressed air gun.
6. Wash out the filter tray using benzine.
7. Tighten the filter element (1).
8. Tighten the collection tray (2).
9. Tighten the drain screw (3).
10. Connect the machine to the compressed air supply.

18.4 Servicing specific components

18.4.1 Cleaning the thread clamp

Cleaning the thread clamp

Fig. 134: Cleaning the thread clamp (1)



(1) - Spring
(2) - Screw
(3) - Thread clamp
(4) - Magnet

To clean the thread clamp:

1. Loosen the screw (2).
2. Disassemble the thread clamp (3).

Important

Make sure not to lose the spring (1).

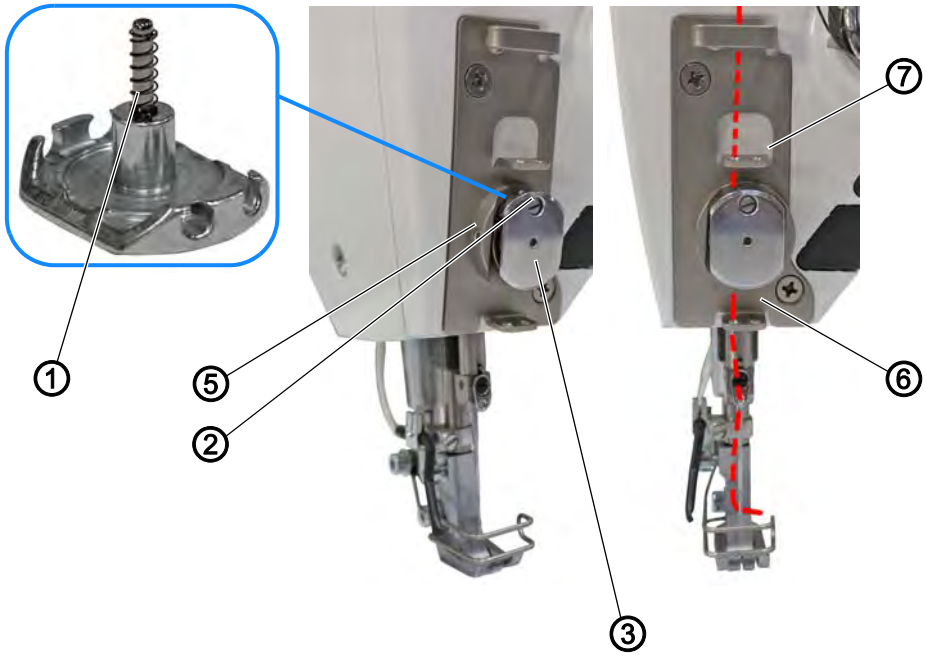
3. Blow out the magnet (4) using a compressed air gun.
4. Check the thread clamp (3) for sharp edges.

If the thread clamp (3) has sharp edges:

5. Polish or change the thread clamp (3).
6. Assemble and align the thread clamp (📖 *p. 193*).

Assembling and aligning the thread clamp

Fig. 135: Cleaning the thread clamp (2)



(1) - Spring
(2) - Screw
(3) - Thread clamp
(5) - Threaded pin
(6) - Thread guide
(7) - Thread guide

To assemble the thread clamp and align it:

1. Slip the spring (1) onto the thread clamp (3).
2. Assemble the thread clamp (3).
3. Tighten the screw (2).
4. Loosen the threaded pin (5).
5. Press on the thread clamp (3) and align it at thread guides (7) and (6). Turn the thread clamp (3) to align it.

   The thread is guided straight from thread guide (7) through the thread clamp (3) to thread guide (6).
6. Tighten the threaded pin (5).

18.5 Parts list

A parts list can be ordered from Dürkopp Adler. Or visit our website for further information at:

www.duerkopp-adler.com

19 Decommissioning

WARNING

Risk of injury from a lack of care!

Serious injuries may occur.

ONLY clean the machine when it is switched off.
Allow ONLY trained personnel to disconnect the machine.

CAUTION

Risk of injury from contact with oil!

Oil can cause a rash if it comes into contact with skin.

Avoid skin contact with oil.
If oil has come into contact with your skin, wash the affected areas thoroughly.

To decommission the machine:

1. Switch off the machine.
2. Unplug the power plug.
3. If applicable, disconnect the machine from the compressed air supply.
4. Remove residual oil from the oil pan using a cloth.
5. Cover the control panel to protect it from soiling.
6. Cover the control to protect it from soiling.
7. Cover the entire machine if possible to protect it from contamination and damage.

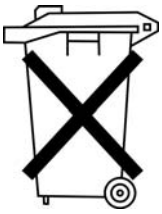
20 Disposal

CAUTION

Risk of environmental damage from improper disposal!

Improper disposal of the machine can result in serious environmental damage.

ALWAYS comply with the national regulations regarding disposal.



The machine must not be disposed of in the normal household waste.

The machine must be disposed of in a suitable manner in accordance with all applicable national regulations.

When disposing of the machine, be aware that it consists of a range of different materials (steel, plastic, electronic components, etc.). Follow the national regulations when disposing these materials.

21 Troubleshooting

21.1 Customer Service

Contact for repairs and issues with the machine:

Dürkopp Adler AG

Potsdamer Str. 190
33719 Bielefeld, Germany

Tel. +49 (0) 180 5 383 756
Fax +49 (0) 521 925 2594
Email: service@duerkopp-adler.com
Internet: www.duerkopp-adler.com

21.2 Messages of the software

Please contact customer service if an error occurs that is not described here. Do not attempt to correct the error yourself.

Code	Type	Meaning	Remedial action
1000	Error	Sewing motor encoder plug (Sub-D, 9-pin) not connected	• Connect encoder cable to the control, • use correct connection
1001	Error	Sewing motor error Sewing motor plug (AMP) not connected	• Check connection and plug in • Test sewing motor phases (R = 2.8Ω, high impedance to PE) • Replace encoder • Replace sewing motor • Replace control
1002	Error	Sewing motor insulation error	• Check motor phase and PE for low-impedance connection • Replace encoder • Replace sewing motor

Code	Type	Meaning	Remedial action
1004	Error	Incorrect sewing motor direction of rotation	• Replace encoder • Check motor plug assignment and change it if necessary • Check wiring in machine distributor and change it, if necessary • Test motor phases and check for correct value
1005	Error	Motor blocked	• Check for stiff movement • Replace encoder • Replace sewing motor
1006	Error	Maximum speed exceeded	• Replace encoder • Perform reset • Check class (*t 51 04*)
1007	Error	Error in the reference run	• Replace encoder • Check for stiff movement
1008	Error	Sewing motor encoder error	• Replace encoder
1010	Error	External synchronizer plug (Sub-D, 9-pin) not connected	• Connect cable of external synchronizer to control, make sure that interface (Sync) is correct • Only recommended for machines with transmission!
1011	Error	Encoder Z pulse missing	• Switch off the control, use handwheel to turn, and switch on the control again • If error is not corrected, check encoder
1012	Error	Synchronizer fault	• Replace synchronizer
1054	Error	Internal short circuit	• Replace control
1055	Error	Sewing motor overload	• Check for stiff movement • Replace encoder • Replace sewing motor
1060	Error	Sewing motor overload / overvoltage /overcurrent	• Check selection of class • Replace control • Replace motor • Replace encoder
1061	Error	Sewing motor overload / overvoltage /overcurrent	• Check selection of class • Replace control • Replace motor • Replace encoder

Code	Type	Meaning	Remedial action
1120	Error	Sewing motor Init fault	• Perform a software update • Check selection of class
1121	Error	Sewing motor watchdog	• Perform a software update • Check selection of class
1203	Error	Position not reached (during thread cutting, reversal, etc.)	• Check the controller settings and change them if necessary (e.g. thread trimmer setting, belt tension, etc.) • Check position **thread lever at top dead center**
1302	Error	Failure with sewing motor current	• Check Service Stop • Check for stiff movement • Replace encoder • Replace motor
1330	Error	No response from sewing motor	• Perform a software update • Replace control
2101	Error	Stepper motor X30 reference run timeout	• Check reference sensor
2105	Error	Stepper motor card X30 blockage	• Check for stiff movement
2121	Error	Stepper motor card X30 encoder plug (Sub-D, 9-pin) not connected	• Connect encoder cable to the control, use the correct interface
2122	Error	Stepper motor card X30 flywheel position not found	• Check stepper motor 1 for stiff movement
2130	Error	Stepper motor card X30 not responding	• Perform a software update • Replace control
2131	Error	Stepper motor card X30 parameter init error	• Perform a software update • Check selection of class
2152	Error	Stepper motor card X30 overcurrent	• Check for stiff movement
2171	Error	Stepper motor card X30 Watchdog (Stitch length)	• Perform a software update • Check selection of class
2172	Error	Stepper motor card X30 motor overload / overvoltage /overcurrent (Stitch length)	• Check selection of class • Replace control • Replace encoder • Replace stepper motor

Code	Type	Meaning	Remedial action
2173	Error	Stepper motor card X30 Sewing motor encoder not connected (Stitch length)	• Replace control
2174	Error	Stepper motor card X30 Sewing motor encoder not init (Stitch length)	• Perform a software update • Check selection of class
2175	Error	Stepper motor card X30 Init Position not found (Stitch length)	• Check for stiff movement • Replace encoder • Replace motor
2176	Error	Stepper motor card X30 not Enabled (Stitch length)	• Replace control
2177	Error	Stepper motor card X30 Overload (Stitch length)	• Check for stiff movement • Replace encoder • Replace motor
2178	Error	Stepper motor card X30 Encoder failure (Stitch length)	• Replace encoder
2179	Error	Stepper motor card X30 Current sensor failure (Stitch length)	• Replace control
2180	Error	Stepper motor card X30 Incorrect stepping motor direction of rotation (Stitch length)	• Replace encoder • Check if plugs have been mixed up • Check the wiring in the machine distributor and change it if necessary
2181	Error	Stepper motor card X30 Reference drive failure (Stitch length)	• Check for stiff movement • Replace encoder • Replace motor
2183	Error	Stepper motor card X30 overcurrent (Stitch length)	• Replace control
2184	Error	Stepper motor card X30 parameter init (Stitch length)	• Perform a software update • Check selection of class
2185	Error	Stepper motor card X30 insulation error (Stitch length)	• Check motor phase and PE for low-impedance connection • Replace encoder • Replace sewing motor
2187	Error	Stepper motor card X30 transport interval failure(Stitch length)	• Perform a software update • Check selection of class

Code	Type	Meaning	Remedial action
2188	Error	Stepper motor card X30 Reference drive failure (Stitch length)	• Check for stiff movement • Replace encoder • Replace motor
2201	Error	Stepper motor X40 reference run timeout	• Check reference sensor
2205	Error	Stepper motor card X40 stepper motor blockage	• Check for stiff movement
2221	Error	Stepper motor card X40 encoder plug (Sub-D, 9-pin) not connected	• Connect encoder cable to the control, use the correct interface
2222	Error	Stepper motor card X40 flywheel position not found	• Check stepper motor 1 for stiff movement
2230	Error	Stepper motor card X40 not responding	• Perform a software update • Replace control
2231	Error	Stepper motor card X40 parameter init error	• Perform a software update • Check selection of class
2252	Error	Stepper motor card X40 overcurrent	• Check for stiff movement
2271	Error	Stepper motor card X40 Watchdog (sewing foot lift)	• Perform a software update • Check selection of class
2272	Error	Stepper motor card X40 motor overload / overvoltage /overcurrent (Sewing foot lift)	• Check selection of class • Replace control • Replace encoder • Replace stepper motor
2273	Error	Stepper motor card X40 Sewing motor encoder not connected (Sewing foot lift)	• Replace control
2274	Error	Stepper motor card X40 Sewing motor encoder not init (Sewing foot lift)	• Perform a software update • Check selection of class
2275	Error	Stepper motor card X40 Init Position not found (Sewing foot lift)	• Check for stiff movement • Replace encoder • Replace motor
2276	Error	Stepper motor card X40 not Enabled (Sewing foot lift)	• Replace control
2277	Error	Stepper motor card X40 I^2t (Sewing foot lift)	• Check for stiff movement • Replace encoder • Replace motor

Code	Type	Meaning	Remedial action
2278	Error	Stepper motor card X40 Encoder failure (Sewing foot lift)	• Replace encoder
2279	Error	Stepper motor card X40 Current sensor failure (Sewing foot lift)	• Replace control
2280	Error	Stepper motor card X40 Incorrect stepper motor direction of rotation (Sewing foot lift)	• Replace encoder • Check if plugs have been mixed up • Check the wiring in the machine distributor and change it if necessary
2281	Error	Stepper motor card X40 Reference drive failure (Sewing foot lift)	• Check for stiff movement • Replace encoder • Replace motor
2283	Error	Stepper motor card X40 overcurrent (Sewing foot lift)	• Replace control
2284	Error	Stepper motor card X40 parameter init (Sewing foot lift)	• Perform a software update • Check selection of class
2285	Error	Stepper motor card X40 insulation error (Sewing foot lift)	• Check motor phase and PE for low-impedance connection • Replace encoder • Replace sewing motor
2287	Error	Stepper motor card X40 transport interval failure (Sewing foot lift)	• Perform a software update • Check selection of class
2288	Error	Stepper motor card X40 Reference drive failure (Sewing foot lift)	• Check for stiff movement • Replace encoder • Replace motor
2301	Error	Stepper motor card X50 Reference drive failure (Stitch length)	• Check reference sensor
2305	Error	Stepper motor card X50 stepper motor blockage	• Check for stiff movement
2321	Error	Stepper motor card X50 encoder plug (Sub-D, 9-pin) not connected	• Connect encoder cable to the control, use the correct interface

Code	Type	Meaning	Remedial action
2322	Error	Stepper motor card X50 flywheel position not found	• Check stepper motor 1 for stiff movement
2330	Error	Stepper motor card X50 not responding	• Perform a software update • Replace control
2331	Error	Stepper motor card X50 parameter init error	• Perform a software update • Check selection of class
2352	Error	Stepper motor card X50 overcurrent	• Check for stiff movement
2371	Error	Stepper motor card X50 Watchdog (sewing foot lift)	• Perform a software update • Check selection of class
2372	Error	Stepper motor card X50 motor overload / overvoltage / overcurrent (Sewing foot stroke)	• Check selection of class • Replace control • Replace encoder • Replace stepper motor
2373	Error	Stepper motor card X50 Sewing motor encoder not connected (Sewing foot stroke)	• Replace control
2374	Error	Stepper motor card X50 Sewing motor encoder not init (Sewing foot stroke)	• Perform a software update • Check selection of class
2375	Error	Stepper motor card X50 Init Position not found (Sewing foot stroke)	• Check for stiff movement • Replace encoder • Replace motor
2376	Error	Stepper motor card X50 not Enabled (Sewing foot stroke)	• Replace control
2377	Error	Stepper motor card X50 Overload (Sewing foot stroke)	• Check for stiff movement • Replace encoder • Replace motor
2378	Error	Stepper motor card X50 Encoder failure (Sewing foot stroke)	• Replace encoder
2379	Error	Stepper motor card X50 Current sensor failure (Sewing foot stroke)	• Replace control
2380	Error	Stepper motor card X50 Incorrect stepper motor direction of rotation (Sewing foot stroke)	• Replace encoder • Check if plugs have been mixed up • Check the wiring in the machine distributor and change it if necessary

Code	Type	Meaning	Remedial action
2381	Error	Stepper motor card X50 Reference drive failure (Sewing foot stroke)	• Check for stiff movement • Replace encoder • Replace motor
2383	Error	Stepper motor card X50 overcurrent (Sewing foot stroke)	• Replace control
2384	Error	Stepper motor card X50 parameter init (Sewing foot stroke)	• Perform a software update • Check selection of class
2385	Error	Stepper motor card X50 insulation error (Sewing foot stroke)	• Check motor phase and PE for low-impedance connection • Replace encoder • Replace sewing motor
2387	Error	Stepper motor card X50 transport interval failure (Sewing foot stroke)	• Perform a software update • Check selection of class
2388	Error	Stepper motor card X50 Reference drive failure (Sewing foot stroke)	• Check for stiff movement • Replace encoder • Replace motor
2401	Error	Stepper motor card X60 reference run timeout (Edge guide)	• Check reference sensor
2405	Error	Stepper motor card X60 stepper motor blockage (Edge guide)	• Check for stiff movement
2421	Error	Stepper motor card X60 encoder plug (Sub-D, 9-pin) not connected	• Connect encoder cable to the control, use the correct interface
2422	Error	Stepper motor card X60 flywheel position not found	• Check stepper motor 1 for stiff movement
2430	Error	Stepper motor card X60 not responding	• Perform a software update • Replace control
2431	Error	Stepper motor card X60 parameter init error	• Perform a software update • Check selection of class
2471	Error	Stepper motor card X60 Watchdog (Edge guide)	• Perform a software update • Check selection of class

Code	Type	Meaning	Remedial action
2472	Error	Stepper motor card X60 motor overload / overvoltage /overcurrent (Edge guide)	• Check selection of class • Replace control • Replace encoder • Replace stepper motor
2473	Error	Stepper motor card X60 Sewing motor encoder not connected (Edge guide)	• Replace control
2474	Error	Stepper motor card X60 Sewing motor encoder not init (Edge guide)	• Perform a software update • Check selection of class
2475	Error	Stepper motor card X60 Init Position not found (Edge guide)	• Check for stiff movement • Replace encoder • Replace motor
2476	Error	Stepper motor card X60 not Enabled (Edge guide)	• Replace control
2477	Error	Stepper motor card X60 Overload (Edge guide)	• Check for stiff movement • Replace encoder • Replace motor
2478	Error	Stepper motor card X60 Encoder failure (Edge guide)	• Replace encoder
2479	Error	Stepper motor card X60 Current sensor failure (Edge guide)	• Replace control
2480	Error	Stepper motor card X60 Incorrect stepper motor direction of rotation (Edge guide)	• Replace encoder • Check if plugs have been mixed up • Check the wiring in the machine distributor and change it if necessary
2481	Error	Stepper motor card X60 Reference drive failure (Edge guide)	• Check for stiff movement • Replace encoder • Replace motor
2483	Error	Stepper motor card X60 overcurrent (Edge guide)	• Replace control
2484	Error	Stepper motor card X60 parameter init (Edge guide)	• Perform a software update • Check selection of class

Code	Type	Meaning	Remedial action
2485	Error	Stepper motor card X60 insulation error (Edge guide)	• Check motor phase and PE for low-impedance connection • Replace encoder • Replace sewing motor
2487	Error	Stepper motor card X60 transport interval failure(Edge guide)	• Perform a software update • Check selection of class
2488	Error	Stepper motor card X60 Reference drive failure (Edge guide)	• Check for stiff movement • Replace encoder • Replace motor
2501	Error	Stepper motor card X70 reference run timeout (upper Puller)	• Check reference sensor
2505	Error	Stepper motor card X70 stepper motor blockage (upper Puller)	• Check for stiff movement
2521	Error	Stepper motor card X70 encoder plug (Sub-D, 9-pin) not connected	• Connect encoder cable to the control, use the correct interface
2522	Error	Stepper motor card X70 flywheel position not found	• Check stepper motor 1 for stiff movement
2530	Error	Stepper motor card X70 not responding	• Perform a software update • Replace control
2531	Error	Stepper motor card X70 parameter init error	• Perform a software update • Check selection of class
2571	Error	Stepper motor card X70 Watchdog (upper Puller)	• Perform a software update • Check selection of class
2572	Error	Stepper motor card X70 motor overload / overvoltage /overcurrent (upper Puller)	• Check selection of class • Replace control • Replace encoder • Replace stepper motor
2573	Error	Stepper motor card X70 Sewing motor encoder not connected(upper Puller)	• Replace control
2574	Error	Stepper motor card X70 Sewing motor encoder not init (upper Puller)	• Perform a software update • Check selection of class

Code	Type	Meaning	Remedial action
2575	Error	Stepper motor card X70 Init Position not found (upper Puller)	• Check for stiff movement • Replace encoder • Replace motor
2576	Error	Stepper motor card X70 not Enabled (upper Puller)	• Replace control
2577	Error	Stepper motor card X70 Overload (upper Puller)	• Check for stiff movement • Replace encoder • Replace motor
2578	Error	Stepper motor card X70 Encoder failure (upper Puller)	• Replace encoder
2579	Error	Stepper motor card X70 Current sensor failure (upper Puller)	• Replace control
2580	Error	Stepper motor card X70 Incorrect stepper motor direction of rotation (upper Puller)	• Replace encoder • Check if plugs have been mixed up • Check the wiring in the machine distributor and change it if necessary
2581	Error	Stepper motor card X70 Reference drive failure (upper Puller)	• Check for stiff movement • Replace encoder • Replace motor
2583	Error	Stepper motor card X70 overcurrent (upper Puller)	• Replace control
2584	Error	Stepper motor card X70 parameter init (upper Puller)	• Perform a software update • Check selection of class
2585	Error	Stepper motor card X70 insulation error (upper Puller)	• Check motor phase and PE for low-impedance connection • Replace encoder • Replace sewing motor
2587	Error	Stepper motor card X70 transport interval failure (upper Puller)	• Perform a software update • Check selection of class
2588	Error	Stepper motor card X70 Reference drive failure (upper Puller)	• Check for stiff movement • Replace encoder • Replace motor
2601	Error	Stepper motor X80 reference run timeout (bottom puller)	• Check reference sensor

Code	Type	Meaning	Remedial action
2605	Error	Stepper motor card X80 stepper motor blockage (bottom puller)	• Check for stiff movement
2621	Error	Stepper motor card X82 encoder plug (Sub-D, 9-pin) not connected (bottom puller)	• Connect encoder cable to the control, use the correct interface
2622	Error	Stepper motor card X80 flywheel position not found (bottom puller)	• Check stepper motor 6 for stiff movement
2630	Error	Stepper motor card X80 not responding (bottom puller)	• Perform a software update • Replace control
2631	Error	Stepper motor card X80 init failure (bottom puller)	• Perform a software update • Check selection of class
2671	Error	Stepper motor card X80 Watchdog (bottom puller)	• Perform a software update • Check selection of class
2672	Error	Stepper motor card X80 motor overload / overvoltage /overcurrent (bottom puller)	• Check selection of class • Replace control • Replace encoder • Replace stepper motor
2673	Error	Stepper motor card X80 Sewing motor encoder not connected (bottom puller)	• Replace control
2674	Error	Stepper motor card X80 Sewing motor encoder not init (bottom puller)	• Perform a software update • Check selection of class
2675	Error	Stepper motor card X80 Init Position not found (bottom puller)	• Check for stiff movement • Replace encoder • Replace motor
2676	Error	Stepper motor card X80 not Enabled (bottom puller)	• Replace control
2677	Error	Stepper motor card X80 I²t (bottom puller)	• Check for stiff movement • Replace encoder • Replace motor
2678	Error	Stepper motor card X80 Encoder failure (bottom puller)	• Replace encoder

Code	Type	Meaning	Remedial action
2679	Error	Stepper motor card X80 Current sensor failure (bottom puller)	• Replace control
2680	Error	Stepper motor card X80 Incorrect stepper motor direction of rotation (bottom puller)	• Replace encoder • Check if plugs have been mixed up • Check the wiring in the machine distributor and change it if necessary
2681	Error	Stepper motor card X80 Reference drive failure (bottom puller)	• Check for stiff movement • Replace encoder • Replace motor
2683	Error	Stepper motor card X80 overcurrent (bottom puller)	• Replace control
2684	Error	Stepper motor card X80 parameter init (bottom puller)	• Perform a software update • Check selection of class
2685	Error	Stepper motor card X80 insulation error (bottom puller)	• Check motor phase and PE for low-impedance connection • Replace encoder • Replace sewing motor
2687	Error	Stepper motor card X80 transport interval failure (bottom puller)	• Perform a software update • Check selection of class
2688	Error	Stepper motor card X80 Reference drive failure (bottom puller)	• Check for stiff movement • Replace encoder • Replace motor
2901	Error	General Reference Timeout of the stepper motors	• Check the reference sensors
3010	Error	U100 V start-up error	• Disconnect the stepper motor plugs; if error persists, replace control
3011	Error	U100 V short circuit	• Disconnect motor plug; replace control if error is not corrected: Replace control
3012	Error	U100 V (I^2T) overload	• one or several stepper motors defective
3020	Error	U24 V start-up error	• Disconnect magnet plug; replace control if error is not corrected: Replace control
3021	Error	U24 V short circuit	• Disconnect magnet plug; replace control if error is not corrected: Replace control
3022	Error	U24 V (I^2T) overload	• One or several magnets defective

Code	Type	Meaning	Remedial action
3023	Error	U 48 V start error	• Disconnect magnetic switch; replace control if error is not corrected: Replace control
3024	Error	U 48 V short circuit	• Disconnect magnetic switch; replace control if error is not corrected: Replace control
3025	Error	U 48V (I^2T) overload	• One or more magnets defective
3030	Error	Motor phase failure	• Replace control
3104	Warning	Pedal is not in position 0	• When switching the control on, take your foot off the pedal
3109	Warning	Operation lock	• Check tilt sensor on machine
3110	Information	Right thread tension magnet is not connected	• Check the connection of right thread tension magnet
3111	Information	Left thread tension magnet is not connected	• Check the connection of left thread tension magnet
3150	Information	Maintenance necessary	• For information on maintenance of the machine, see the service instructions for the machine
3223	Information	Skip stitch detection	• -
3224	Information	Bobbin rotation monitor	• The bobbin is not rotating • Check the bobbin, advance the initial thread
3225	Information	SSD sensor is soiled	• Use compressed air or a soft cotton cloth to clean the sensor
3354	Information	Failure in thread trimmer process	• Perform a software update
3383	Information	Failure in with the motor referencing process	• Check motor • Perform a software update
4201	Warning	Failure SD-Card	• Insert SD card • Replace control

Code	Type	Meaning	Remedial action
4430	Warning	OP3000: Connection lost	• Check connection to OP3000 • Replace OP3000 • Replace control
4460	Warning	OP7000 connection lost	• Check connection to OP7000 • Replace OP7000 • Replace control
4905	Information	New machine is connected	• New machine is connected • Set the class in the Service menu
4906	Information		• Check machine ID port • Reset or machine class change necessary
4907	Information		• Reset or machine class change necessary
4908	Information		• Reset necessary
4911	Information		• Reset necessary
4918	Warning	Invalid update file	• Contact DA Service
4919	Warning	Reset failed	• Contact DA Service
4920	Warning	Error in update log	• Contact DA Service
4921	Warning	The update was interrupted	• Contact DA Service
4922	Error	Unable to find user database	• Contact DA Service
4923	Error	Synchronization failed	• Contact DA Service
4924	Warning	Control not responding	• Perform a software update
4930	Information	Control replaced	• Data transfer from control panel to control
4931	Information	Checksum error of the control	• Data transfer from control panel to control
6070	Error	Internal CAN	• Perform a software update • Replace control

Code	Type	Meaning	Remedial action
6353	Error	EEprom Timeout	• Switch off the control, wait until the LEDs are off, check connection for machine ID, and switch on control again
6360	Information	No valid data on external EEprom (internal data structures are not compatible with the external data storage device)	• Software update
6361	Information	No external EEprom connected	• Connect machine ID
6362	Information	No valid data on internal EEprom (internal data structures are not compatible with the external data storage device)	• Check machine ID connection • Switch off the control, wait until the LEDs have gone out, and then switch on the control again • Software update
6363	Information	No valid data on internal and external EEprom (software version is not compatible with the internal data storage device, emergency operating features only)	• Check machine ID connection • Switch off the control, wait until the LEDs have gone out, and then switch on the control again • Software update
6364	Information	No valid data on internal EEprom and no external EEprom connected (the internal data structures are not compatible with the external data storage device)	• Check machine ID connection • Switch off the control, wait until the LEDs have gone out, and then switch on the control again • Software update
6365	Information	Internal EEprom defective	• Replace control
6366	Information	Internal EEprom defective and external data not valid (emergency operating features only)	• Replace control
6367	Information	Internal EEprom defective and external data not valid (emergency operating features only)	• Replace control
7270	Information	External CAN	• Check connection cables • Perform a software update • Replace CAN slaves
9300	Error	CAN cable not connected	• Check CAN cable

Code	Type	Meaning	Remedial action
9310	Error	Tape feeder not connected	• Check connection cables • Perform a software update • Replace the control of the tape feeder
9320	Error	Tape feeder in lowered position	•
9330	Information	Material thickness sensor not connected	• Check connection cables • Perform a software update • Replace material thickness sensor
9340	Error	Remaining thread monitor not connected	• Check connection cables • Perform a software update • Replace remaining thread monitor
9350	Error	Upper machine head pcb is not connected	• Check cable • Perform a software update • Replacing the PCB
9351	Error	Lower machine head pcb is not connected	• Check cable • Perform a software update • Replacing the PCB
9352	Error	Left thread tension pcb is not connected	• Check cable • Perform a software update • Replacing the PCB
9360	Error	Edge guide pcb is not connected	• Check cable • Perform a software update • Replacing the PCB
9361	Error	Edge guide x-axis pcb is not connected	• Check cable • Perform a software update • Replacing the PCB
9362	Error	Edge guide y-axis pcb is not connected	• Check cable • Perform a software update • Replacing the PCB
9910	Warning	Sewing stop	• Check tilt sensor on machine • Check 24V • Replace control
9911	Warning	Power down	• The control is switched off

Code	Type	Meaning	Remedial action
9912	Warning	Restart necessary	• Switch off the control
9913	Warning	Empty bobbin	• Please insert a full bobbin
9914	Warning	Reset	• Remove USB key!
9915	Warning	Please Wait!	• Please wait and do not remove USB key
9916	Warning	Erase internal Memory	• Delete the SD card. Continue with OK; cancel with ESC
9917	Warning	Erase USB key	• Delete the USB key. Continue with OK; cancel with ESC
9918	Warning	No USB key present	• Please insert USB key
9919	Warning	Sewing stop	• Machine in stop mode for threading the thread
9920	Warning	Referencing	• Please wait for motor referencing
9921	Warning	Show Message from QONDAC	• Show Message
9922	Warning	Service Stop	• Check the Service Stop button • Check 24V • Replace control
9923	Warning	Update required	• Press OK for Restart or ESC for cancel
9924	Warning	Security key generated	• Creation of a security key on a USB key
9925	Warning	Security Key changed!	• Overwrite Security Key?
9926	Warning	Please Confirm Reset	• Really reset?
9927	Warning	Reset	• Reset successfully
9928	Warning	Referencing?	• Press pedal backwards (pedal position-2)
9929	Warning	Not enough thread available	• Please insert a full bobbin
9930	Warning	Empty bobbin	• Please insert a full bobbin
9931	Information	Bobbin Wind mode	• Press pedal backwards exit bobbin wind mode

Code	Type	Meaning	Remedial action
9932	Information	No program available	• Automatic mode is not available without a program. Please use programming mode to define a program.
9933	Information	Continue with actual value?	• Continue winder with current value (YES) • Start winder with new value (NO)
9934	Warning	Tilt sensor active	• Erect the machine head
9935	Warning	Right hook cover open	• Close the hook cover
9936	Warning	Left hook cover open	• Close the hook cover
9937	Warning	Needle area cover open	• Close needle area cover
9938	Warning	ENG ON 4	• -

21.3 Errors in sewing process

Error	Possible causes	Remedial action
Unthreading at seam beginning	Needle thread tension is too firm	Check needle thread tension
Thread breaking	Needle thread and hook thread have not been threaded correctly	Check threading path
	Needle is bent or sharp-edged	Replace needle
	Needle is not inserted correctly into the needle bar	Insert the needle correctly into the needle bar
	The thread used is unsuitable	Use recommended thread
	Thread tensions are too tight for the thread used	Check thread tensions
	Thread-guiding parts, such as thread tube, thread guide or thread take-up disk, are sharp-edged	Check threading path
	Throat plate, hook or spread have been damaged by the needle	Have parts reworked by qualified specialists
Skip stitches	Needle thread and hook thread have not been threaded correctly	Check threading path
	Needle is blunt or bent	Replace needle
	Needle is not inserted correctly into the needle bar	Insert the needle correctly into the needle bar
	The needle thickness used is unsuitable	Use recommended needle thickness
	The reel stand is assembled incorrectly	Check the assembly of the reel stand
	Thread tensions are too tight	Check thread tensions
	Throat plate, hook or spread have been damaged by the needle	Have parts reworked by qualified specialists

Error	Possible causes	Remedial action
Loose stitches	Thread tensions are not adjusted to the sewing material, the sewing material thickness or the thread used	Check thread tensions
	Needle thread and hook thread have not been threaded correctly	Check threading path
Needle breakage	Needle thickness is unsuitable for the sewing material or the thread	Use recommended needle thickness

22 Technical data

22.1 Data and characteristic values

Technical data	Unit	D868-190922	D868-290922
Type of stitches		Double lockstitch 301	
Hook type		vertical (L), large (28mm)	
Number of needles		1	2
Needle system		134-35	
Needle strength	[Nm]	90 - 180	
Thread strength	[Nm]	120/3 - 10/3 (Short thread cutter, up to 10/3)	
Stitch length	[mm]	12/12	
Maximum stitch count	[mm^{-1}]	2500	
Stitch count on delivery	[mm^{-1}]	2500	
Sewing foot stroke	[mm]	9	
Lifting height	[mm]	20	
Mains voltage	[V]	230 V	
Mains frequency	[Hz]	50/60	
Operating pressure	[bar]	6 (Compressed air only required in combination with optional additional equipment)	
Length	[mm]	690	
Width	[mm]	220	
Height	[mm]	480	
Weight	[kg]	74	76

22.2 Requirements for fault-free operation

Compressed air quality must conform to ISO 8573-1: 2010 [7:4:4].

23 Appendix

23.1 Barcode examples

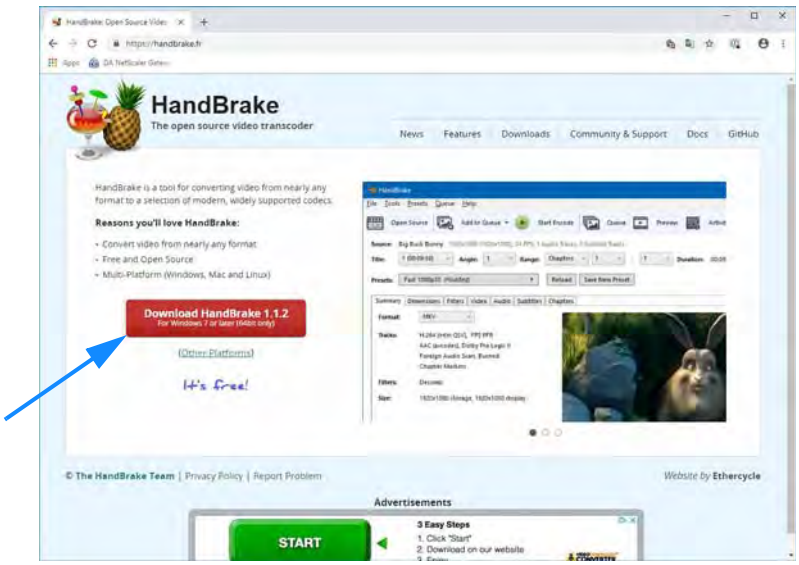
Fig. 136: Barcode examples

23.2 Converting videos for playback on the control panel

Information

The format of videos you wish to upload to the control panel must be *.webm plus VP8 coding*.
Conversion tools are available for free download on the Internet. Dürkopp Adler recommends that you use the program **HandBrake**.

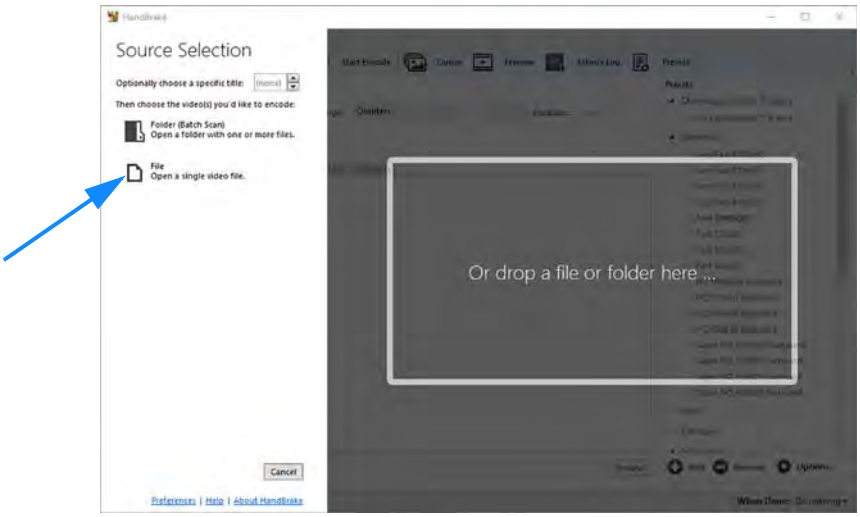
Fig. 137: Converting videos (1)



To convert videos for playback on the control panel:

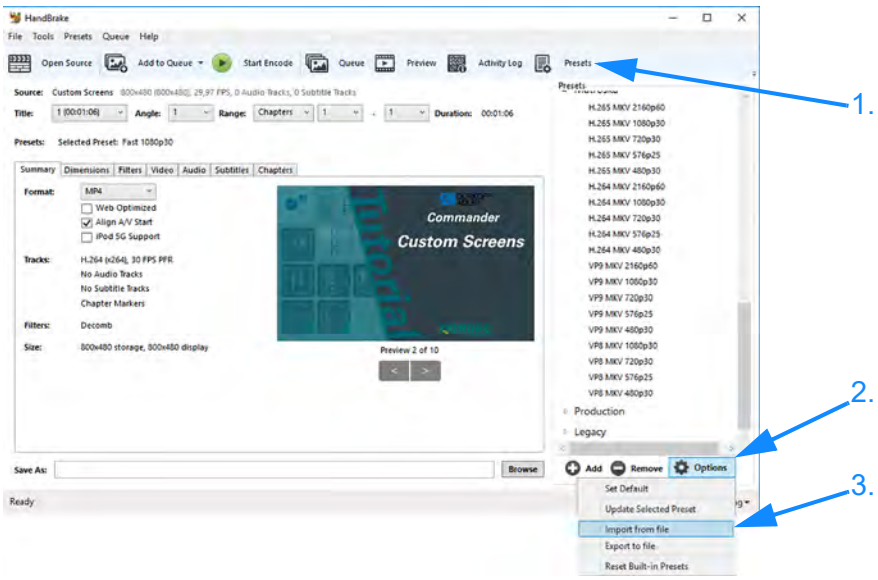
1. Download the **HandBrake** program from the website `handbrake.fr` and install it on your computer.

Fig. 138: Converting videos (2)



2. Start **HandBrake**.
3. Click on *File - Open a single video file*.

Fig. 139: Converting videos (3)

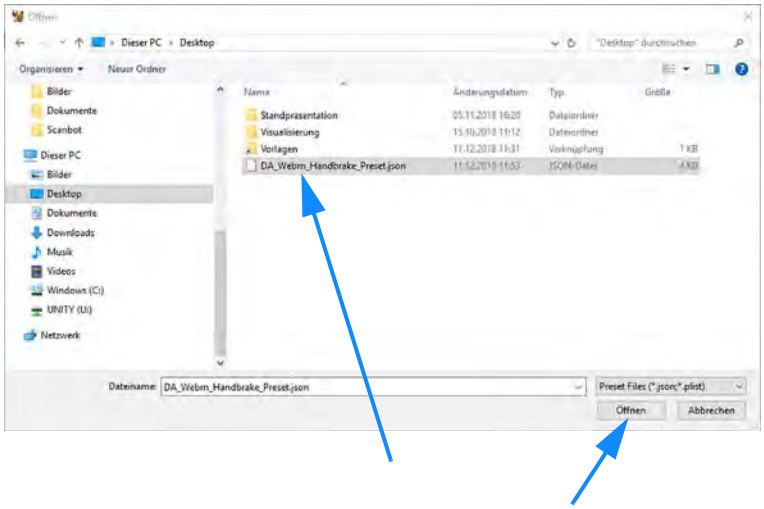


4. Click on *Presets*.

↳ The *Presets* window opens.

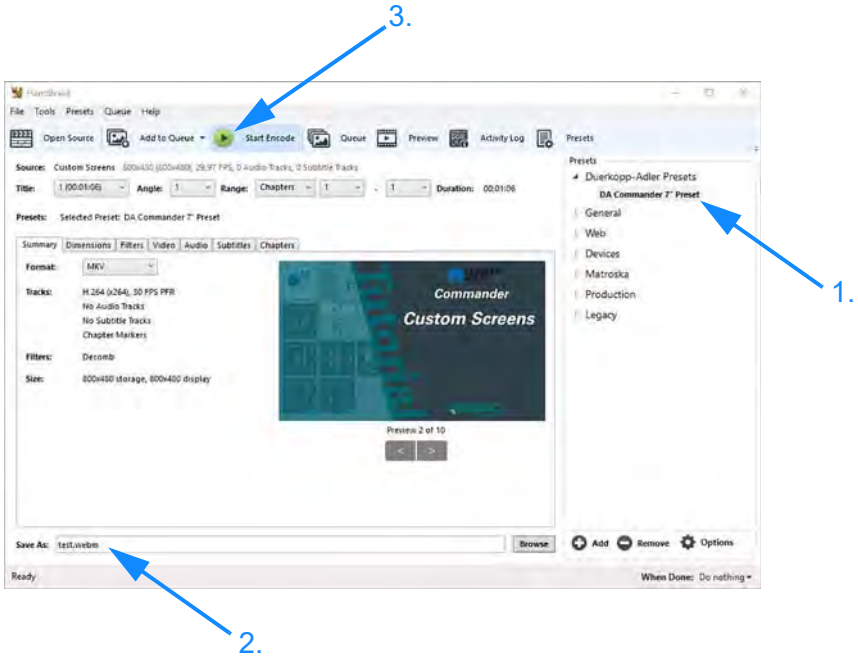
5. Click on *Tools > Import from file*.

Fig. 140: Converting videos (4)



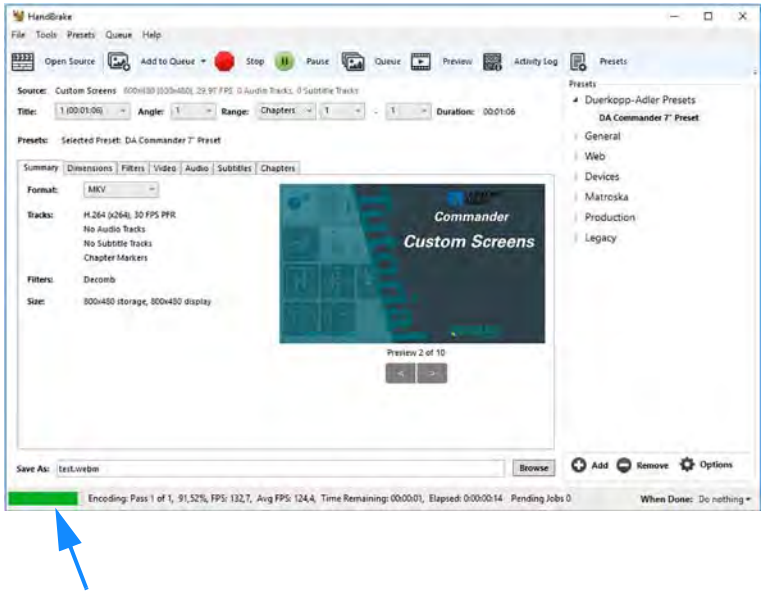
6. Select the Dürkopp Adler preset file **DA_WebM_Handbrake_Preset.json** to import it.
   You can obtain the preset file from Dürkopp Adler's website or from customer service.
7. Click on *Open*.

Fig. 141: Converting videos (5)



8. Select the Dürkopp Adler preset.
9. Enter the name of the video and add the file extension `.webm`.
10. Click on `Start Encode` to start encoding.

Fig. 142: Converting videos (6)



↳ The conversion process is indicated by a progress bar.

23.3 Basic settings of the machine

If you want to perform a complete recalibration of the machine, use the values below for reference:

Setting	Preset value	Customer specification	Current machine
mechanical			
Stitch regulator gear	🕮 *p. 43*		
Sewing foot lift	🕮 *p. 70*		
Sewing foot pressure	🕮 *p. 148*		
Looping stroke	2 mm		
Needle guard	🕮 *p. 58*		
Feed dog stroke eccentric	🕮 *p. 39*		
Feed dog pusher eccentric	🕮 *p. 40*		
Sewing foot stroke eccentric	🕮 *p. 41*		
Feed dog height	0.9 mm		
Compensating feet	🕮 *p. 65*		
Needle thread regulator	🕮 *p. 73*		
Travel of thread tensioning spring	🕮 *p. 75*		
Tension of thread tensioning spring	90 gr. 🕮 *p. 76*		
Hook thread tension*	100 gr.		
Needle thread pretension (with the main tension open) [1, 3]	60 gr.		
electronic			
Stitch length V/O/R	🕮 *p. 128*		
Needle thread tension [2, 3]	200 gr. [1]		
Material thickness detection	🕮 *p. 137*		

* Calibration at the factory depending on the equipment with Serafil white 40 Nm, 30 Nm or 20 Nm

[1] Calibration at the factory always with Serafil black 30 Nm

[2] Pretension must always be adjusted mechanically first!

[3] measured without needle thread regulator and thread tensioning spring

Required tools:
- Locking peg (included in the scope of delivery, part number 0867 104950)
- Spring balance 600 gr. (part number 0APP 001503)

23.4 Wiring diagram

Fig. 143: Wiring diagram (1)

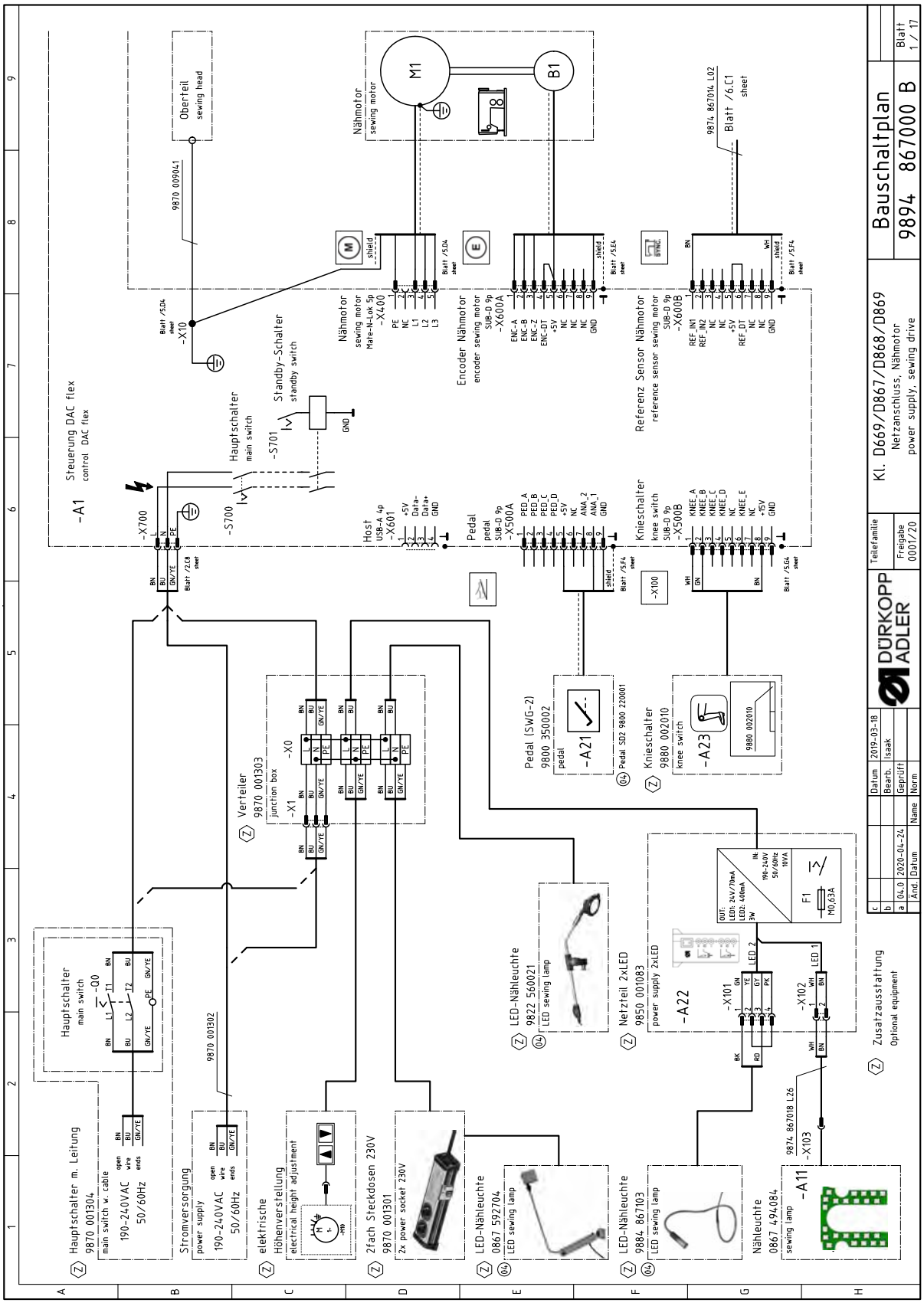


Fig. 144: Wiring diagram (2)

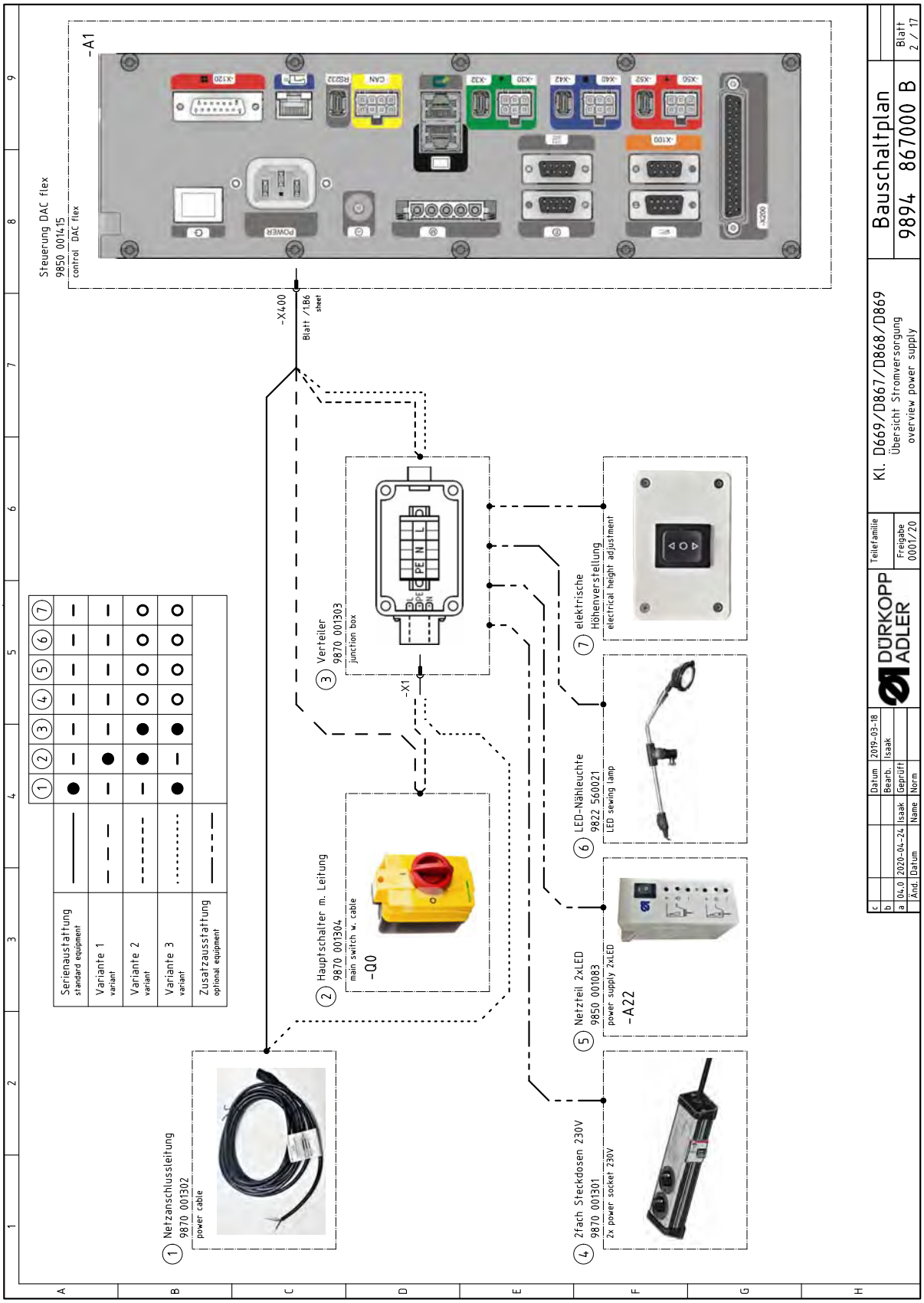


Fig. 145: Wiring diagram (3)

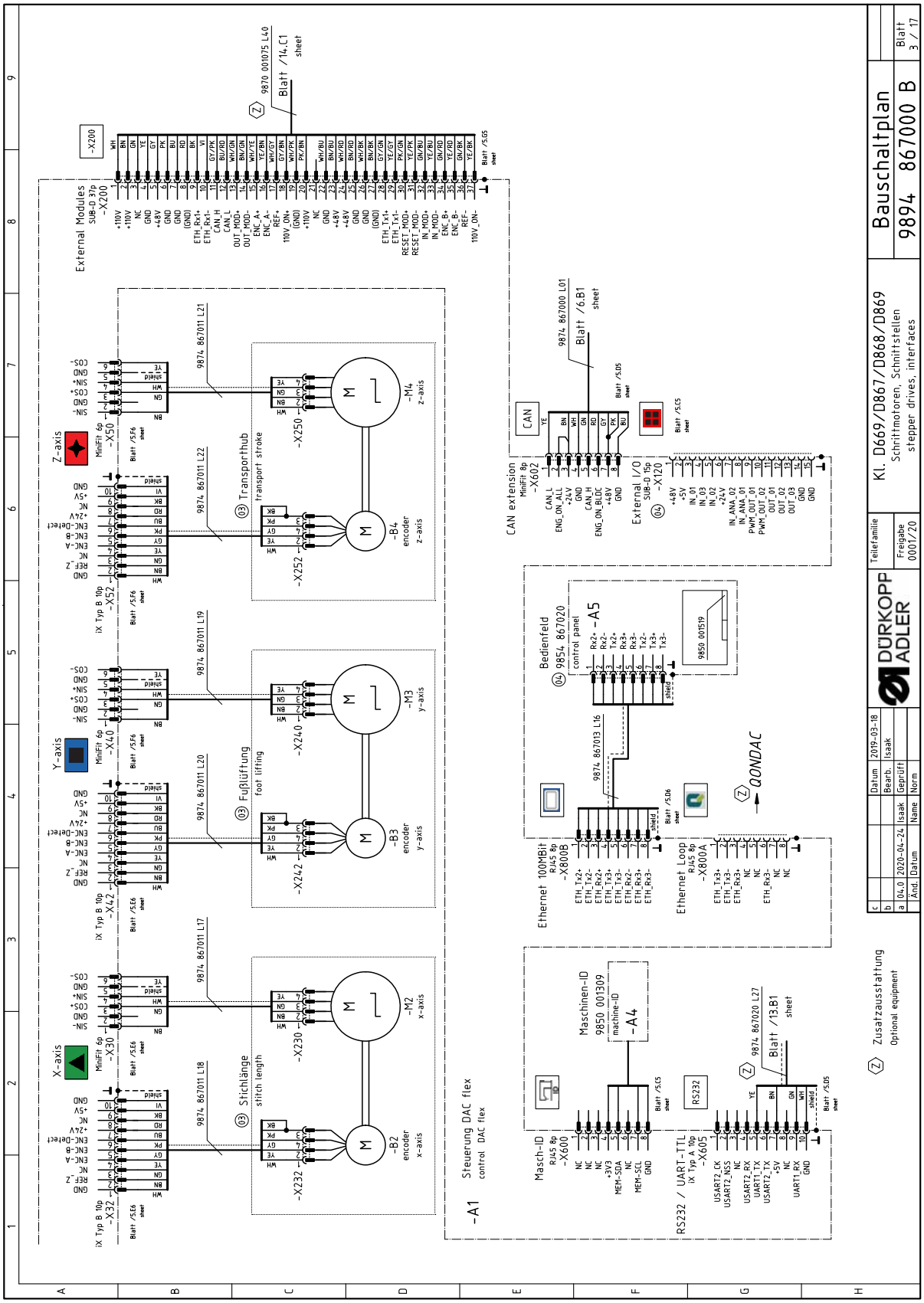


Fig. 146: Wiring diagram (4)

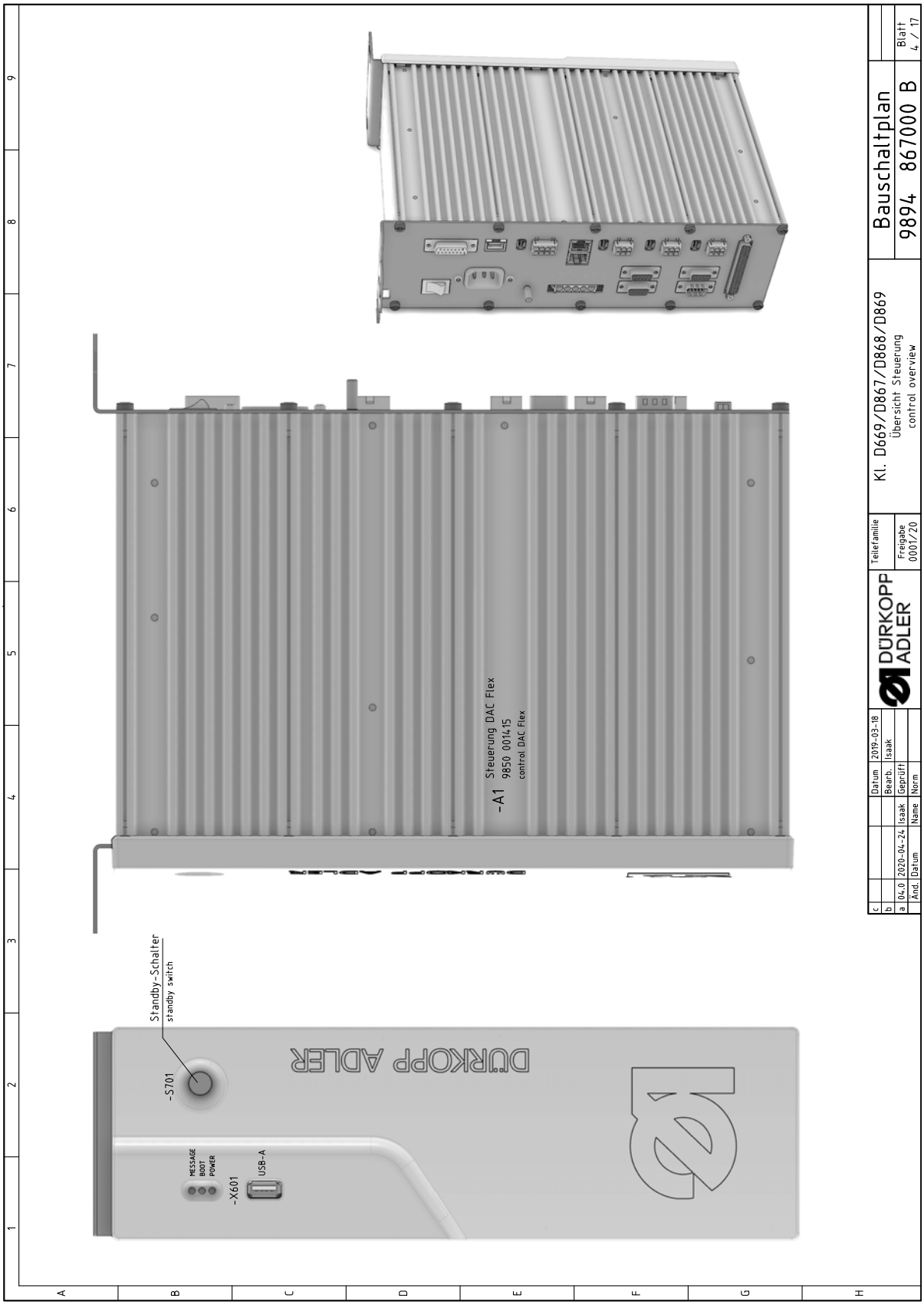


Fig. 147: Wiring diagram (5)

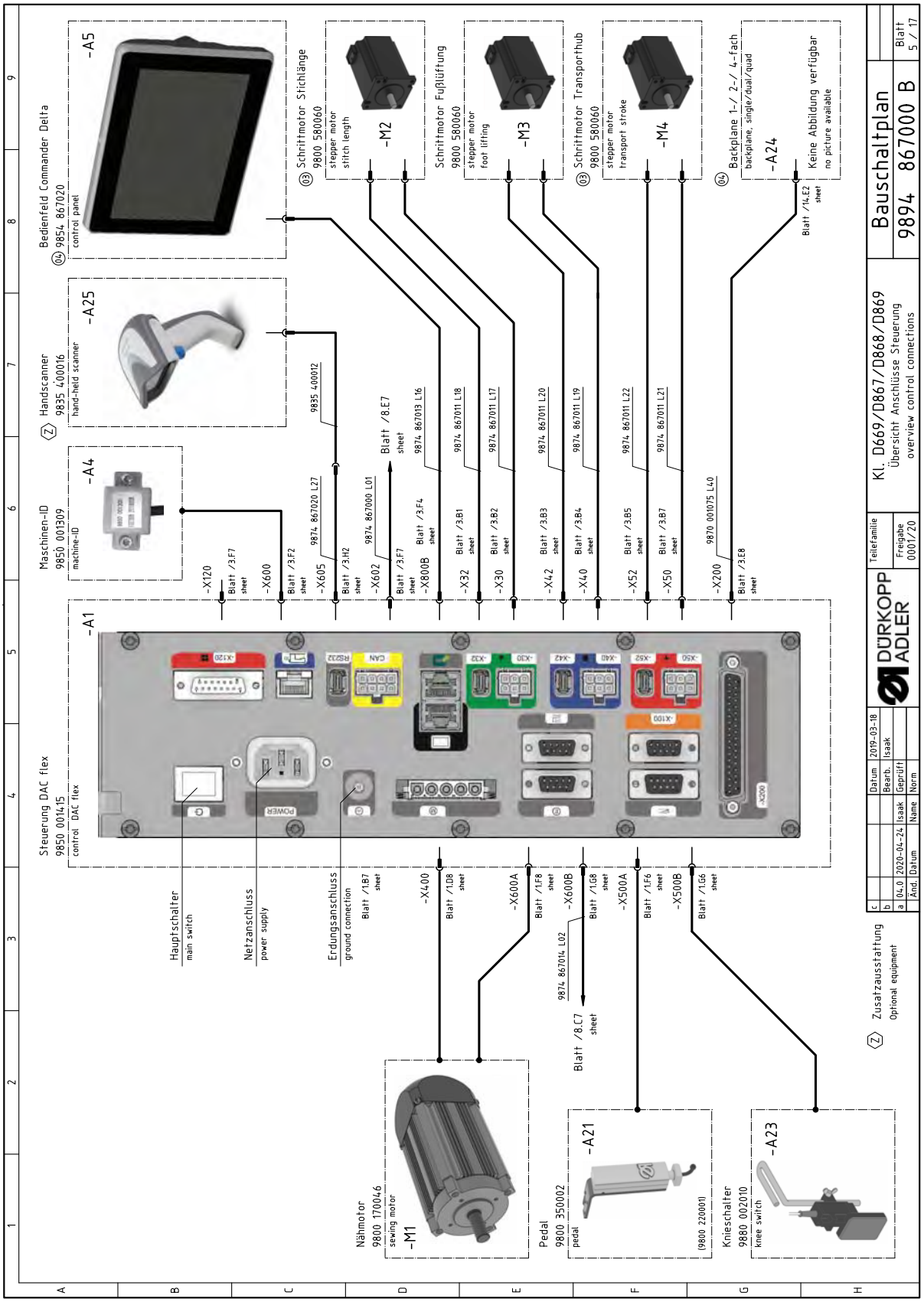


Fig. 148: Wiring diagram (6)

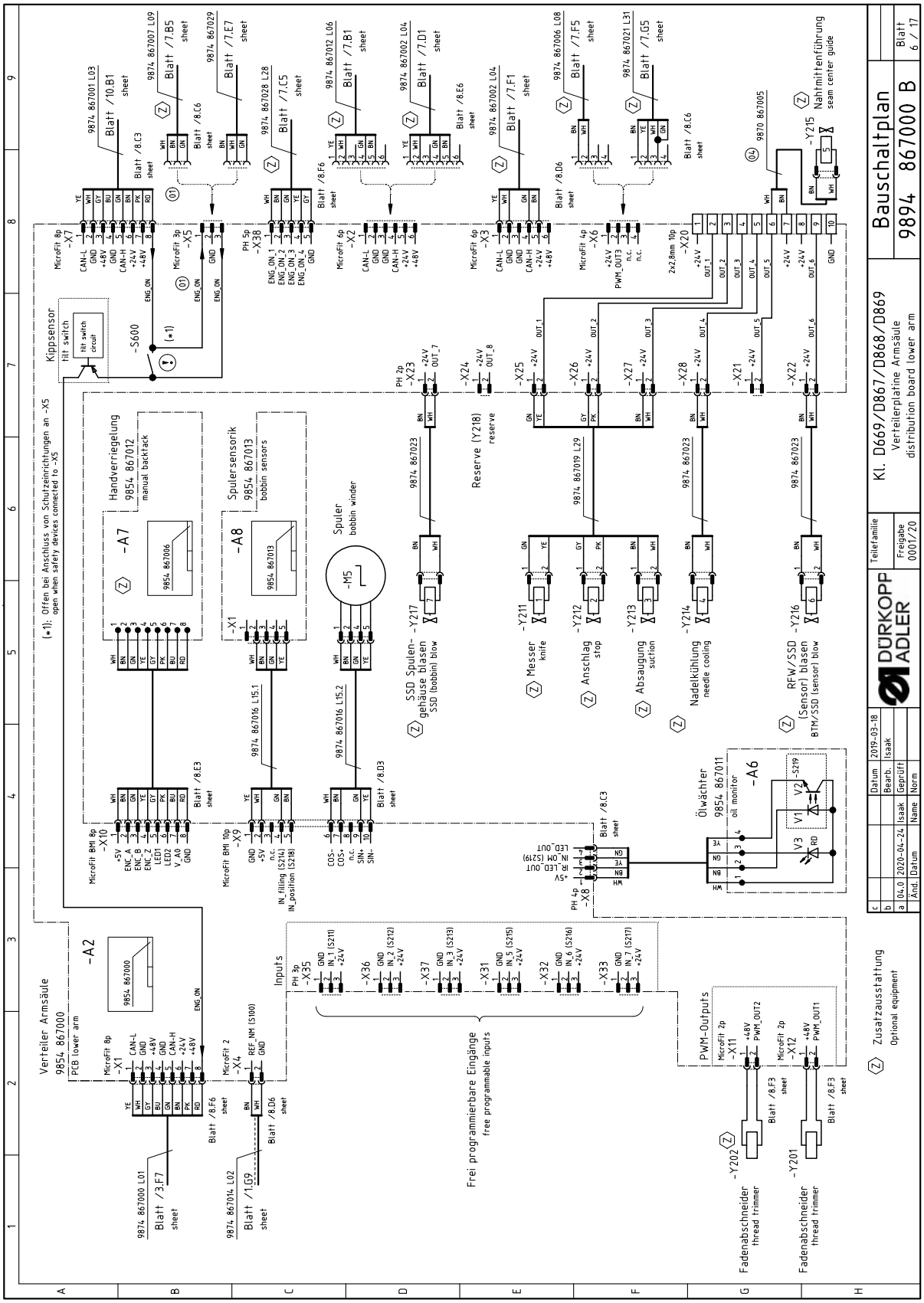


Fig. 149: Wiring diagram (7)

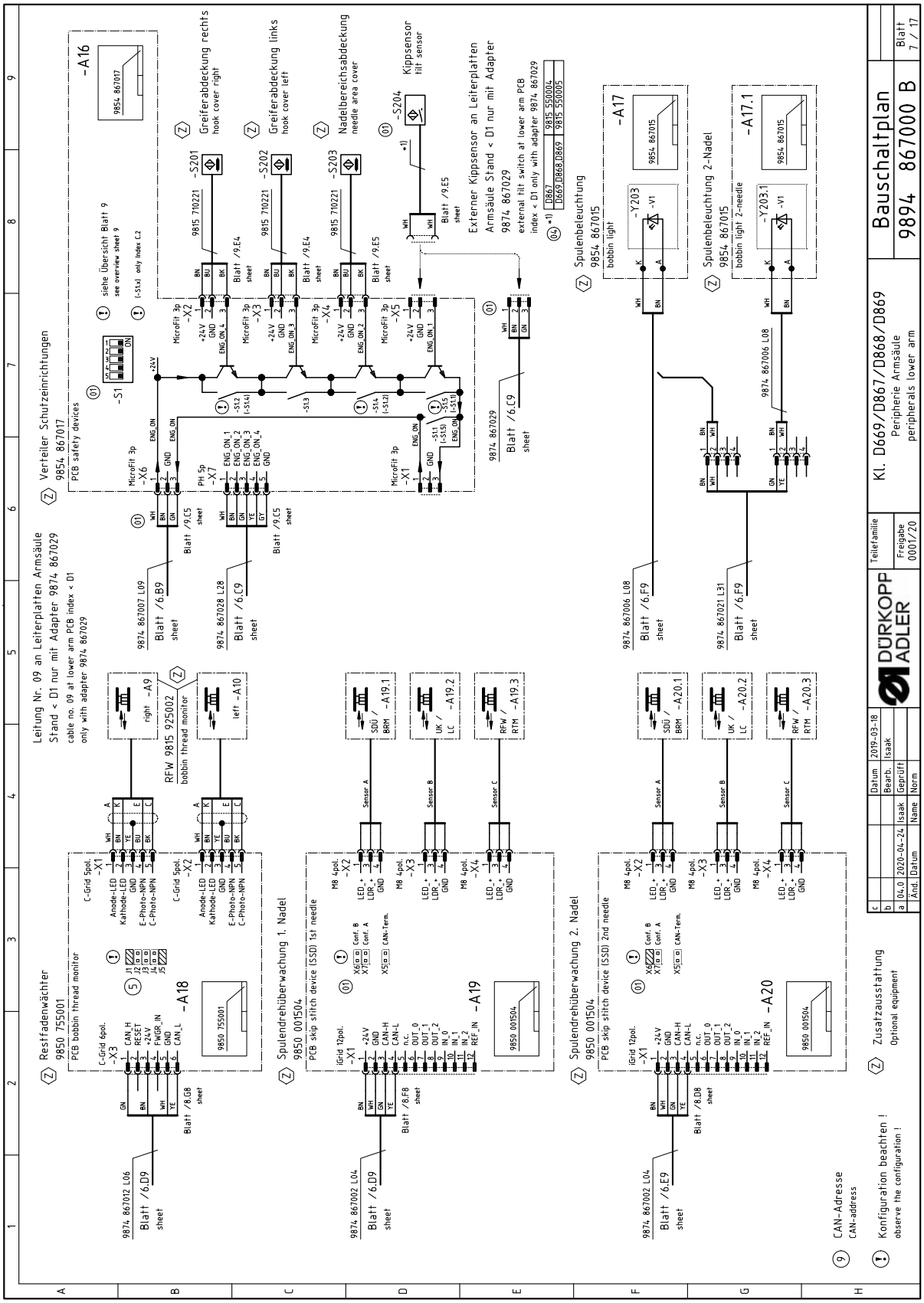


Fig. 150: Wiring diagram (8)

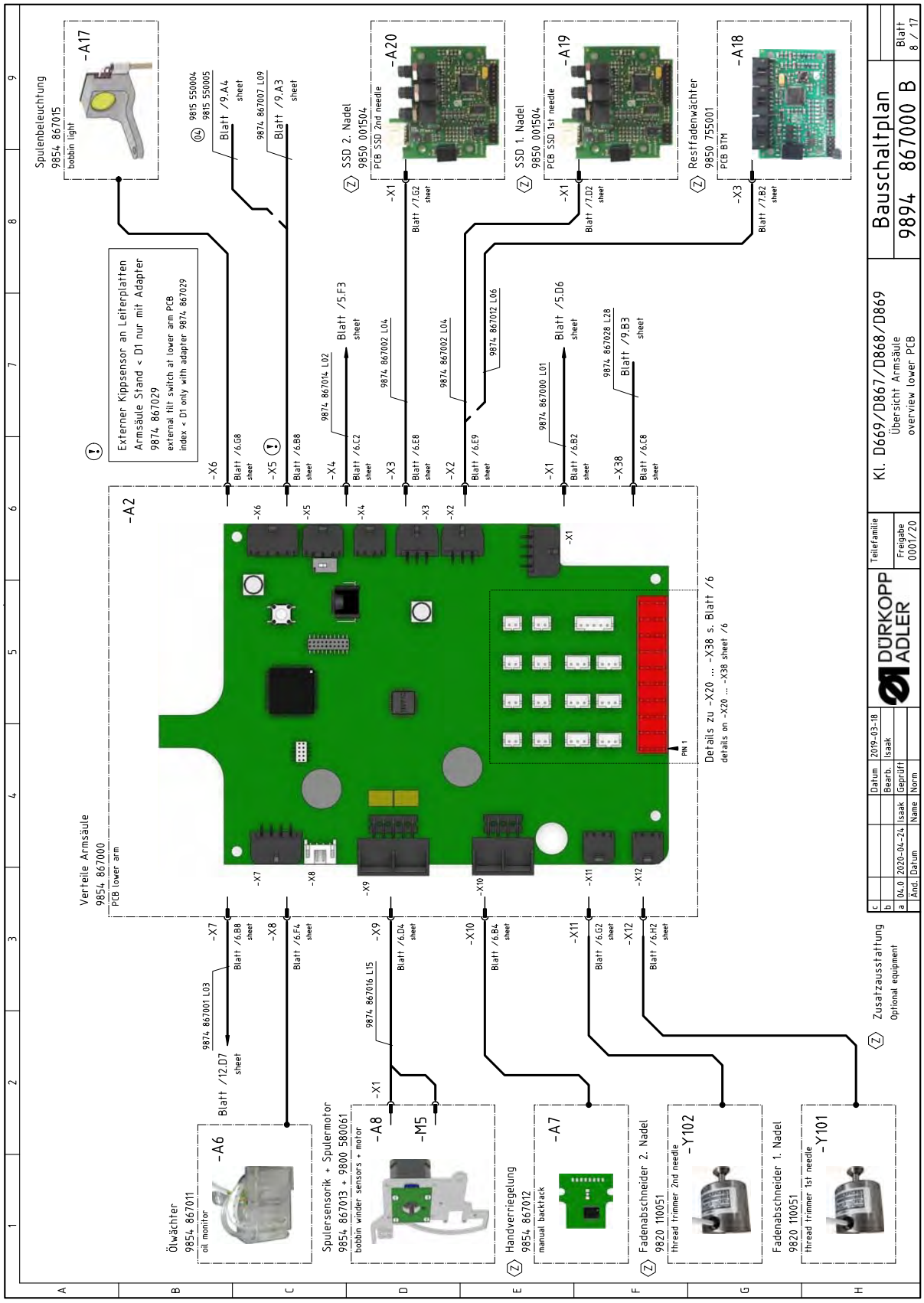


Fig. 151: Wiring diagram (9)

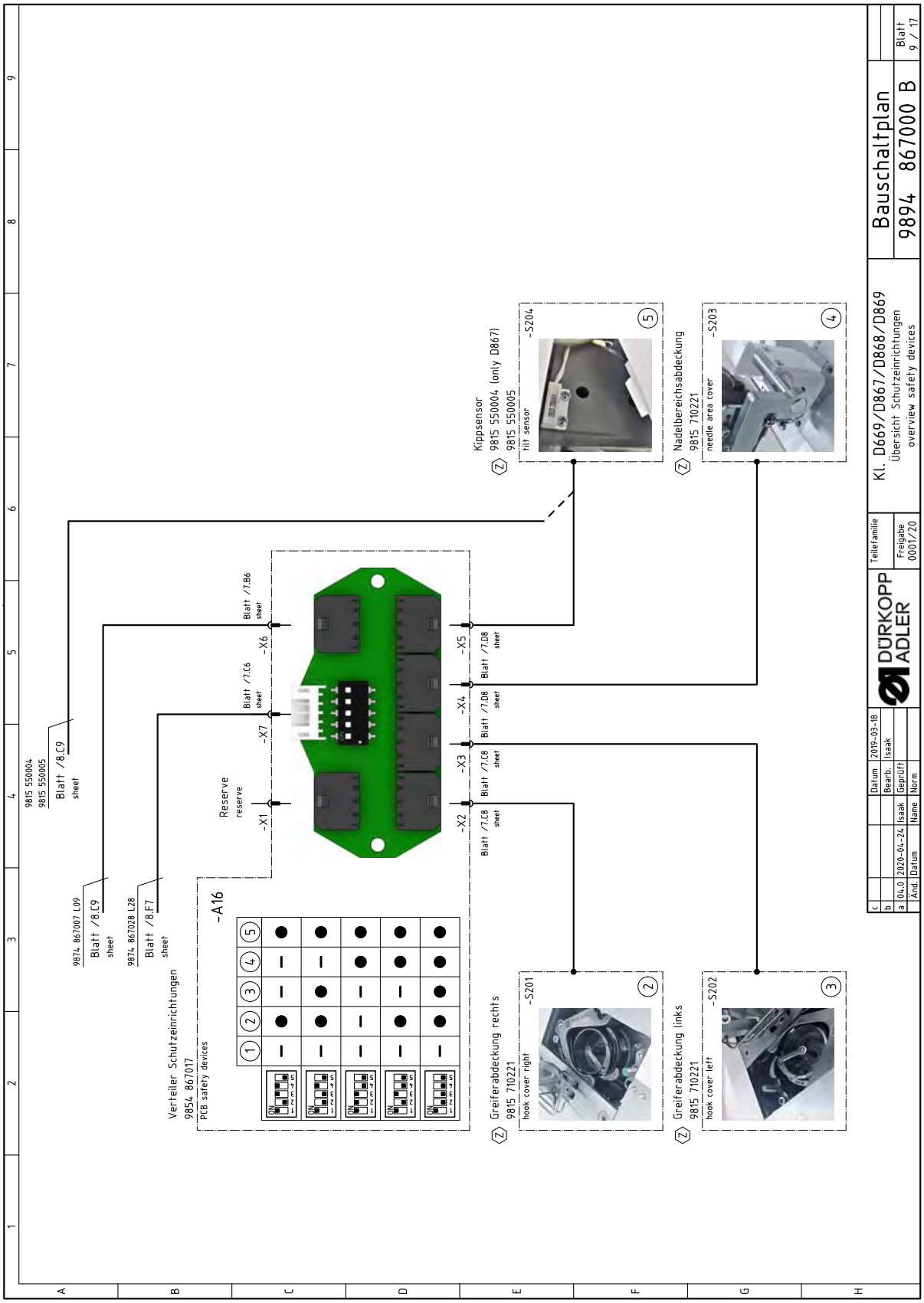


Fig. 152: Wiring diagram (10)

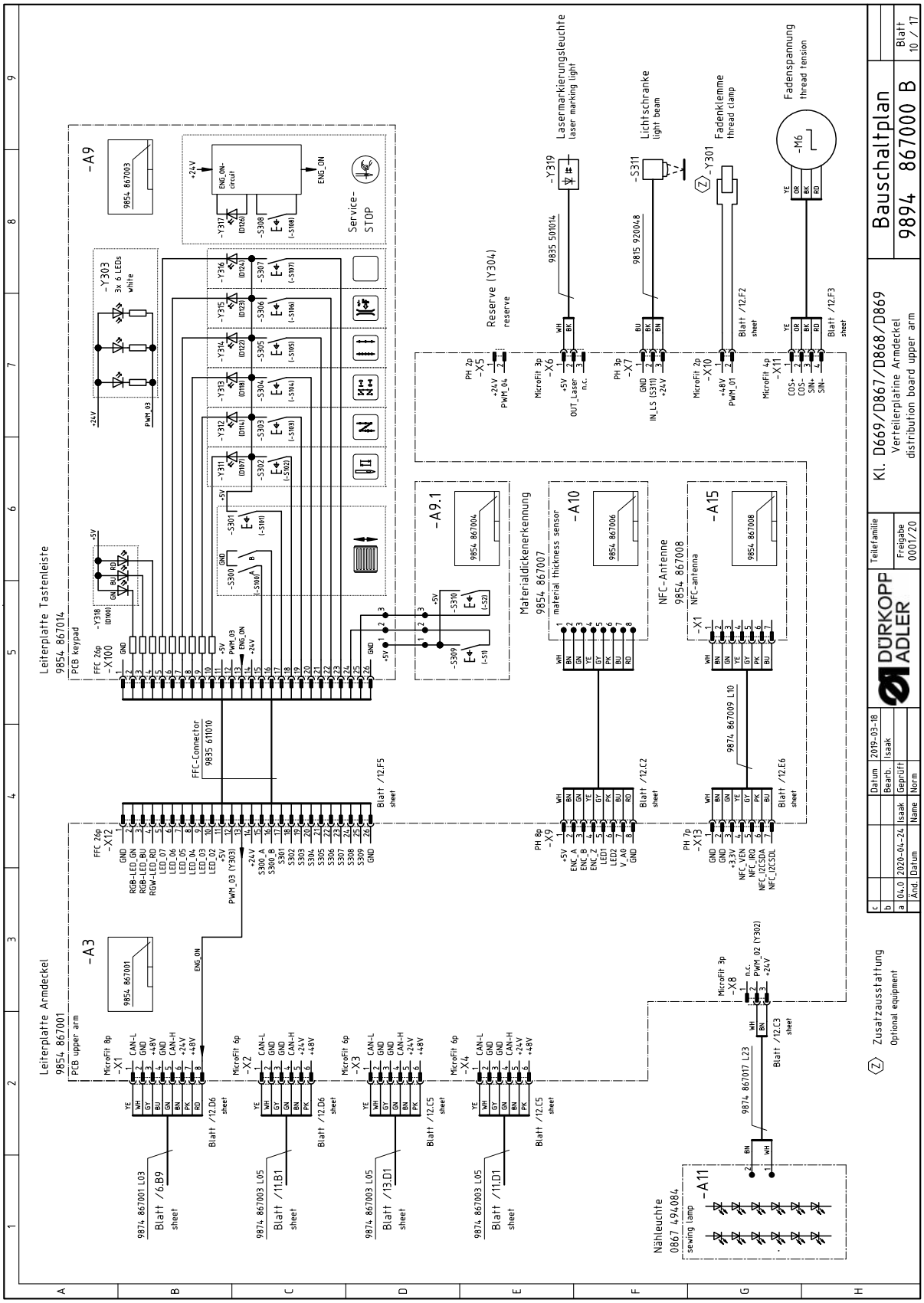


Fig. 153: Wiring diagram (11)

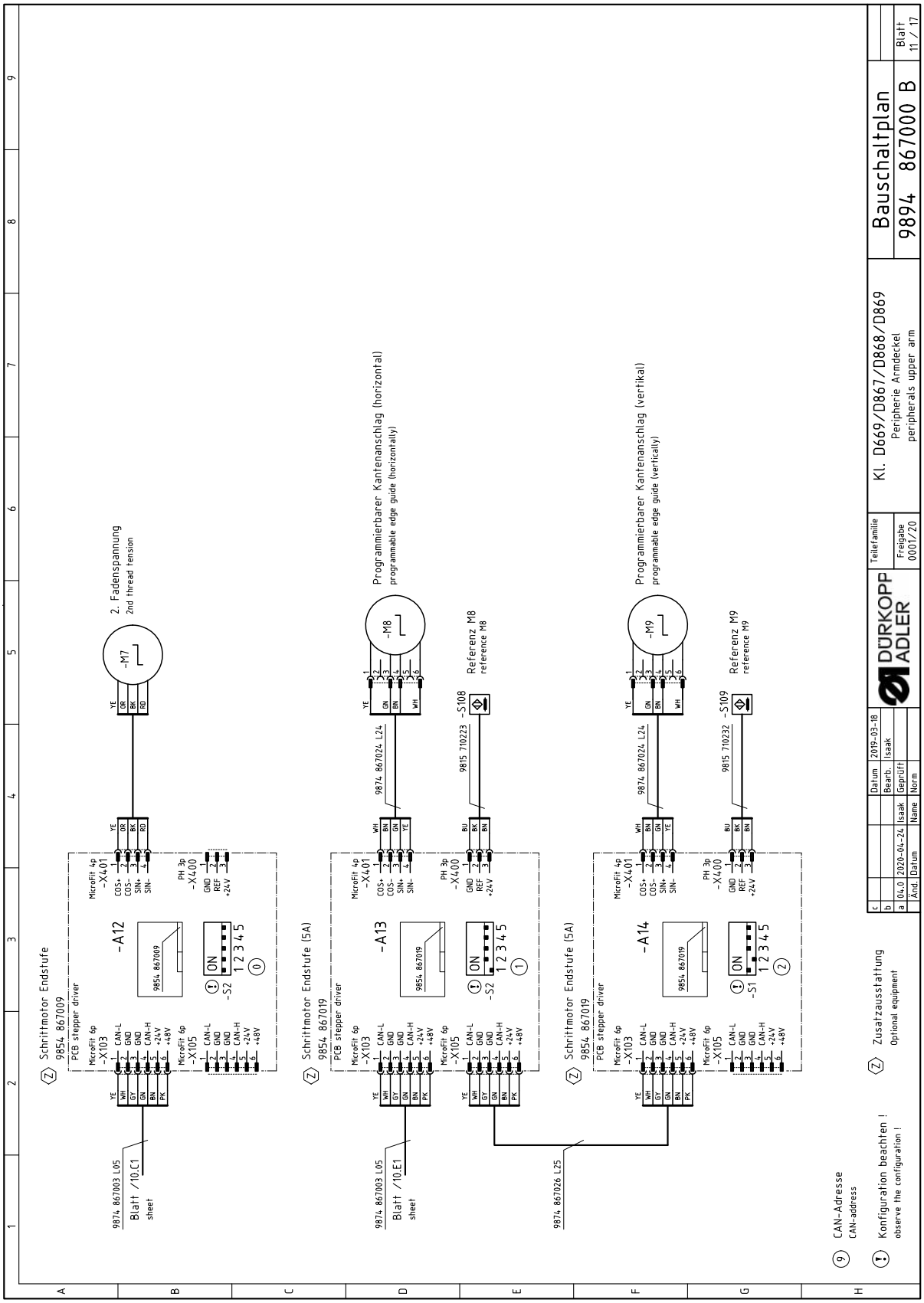


Fig. 154: Wiring diagram (12)

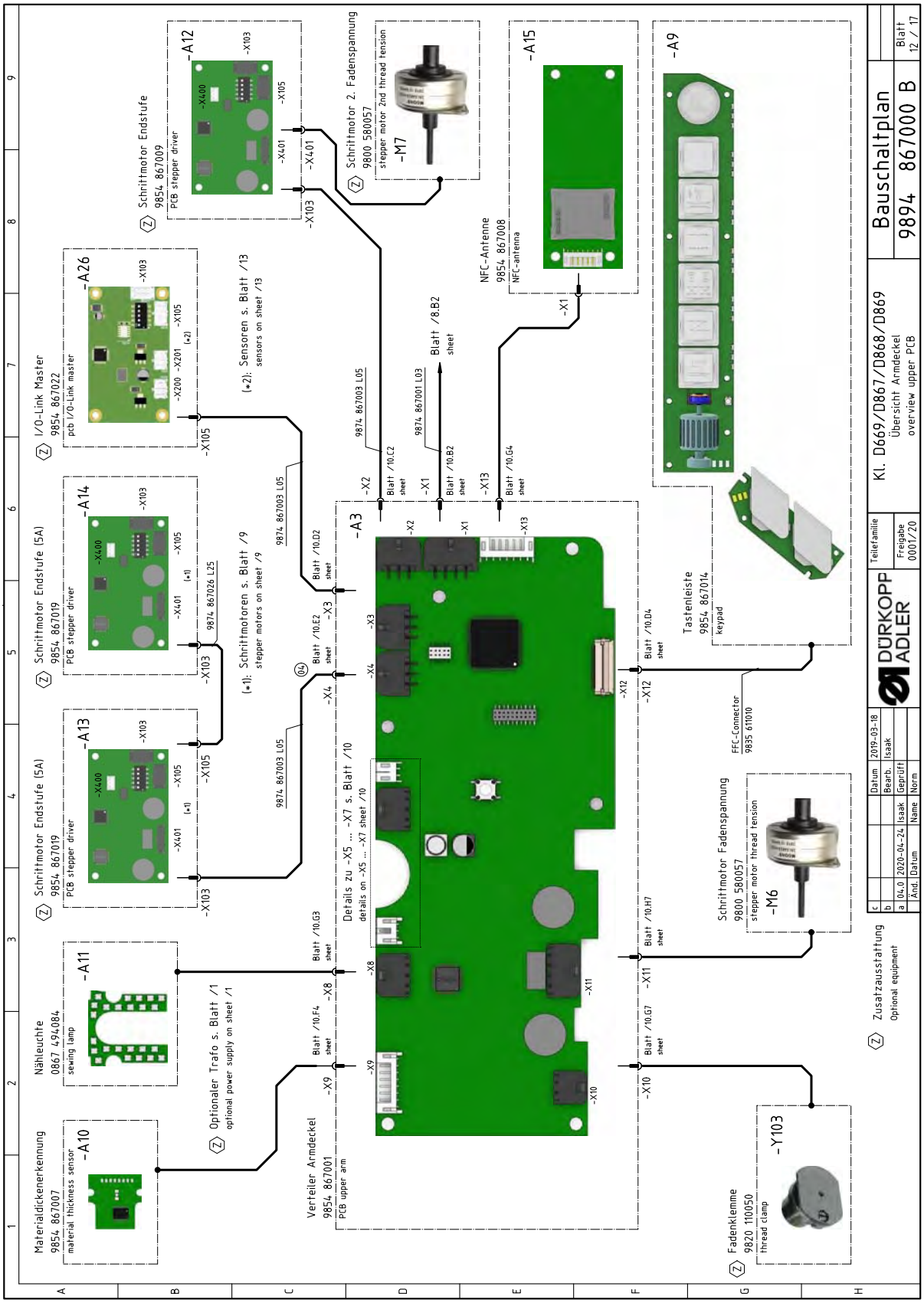


Fig. 155: Wiring diagram (13)

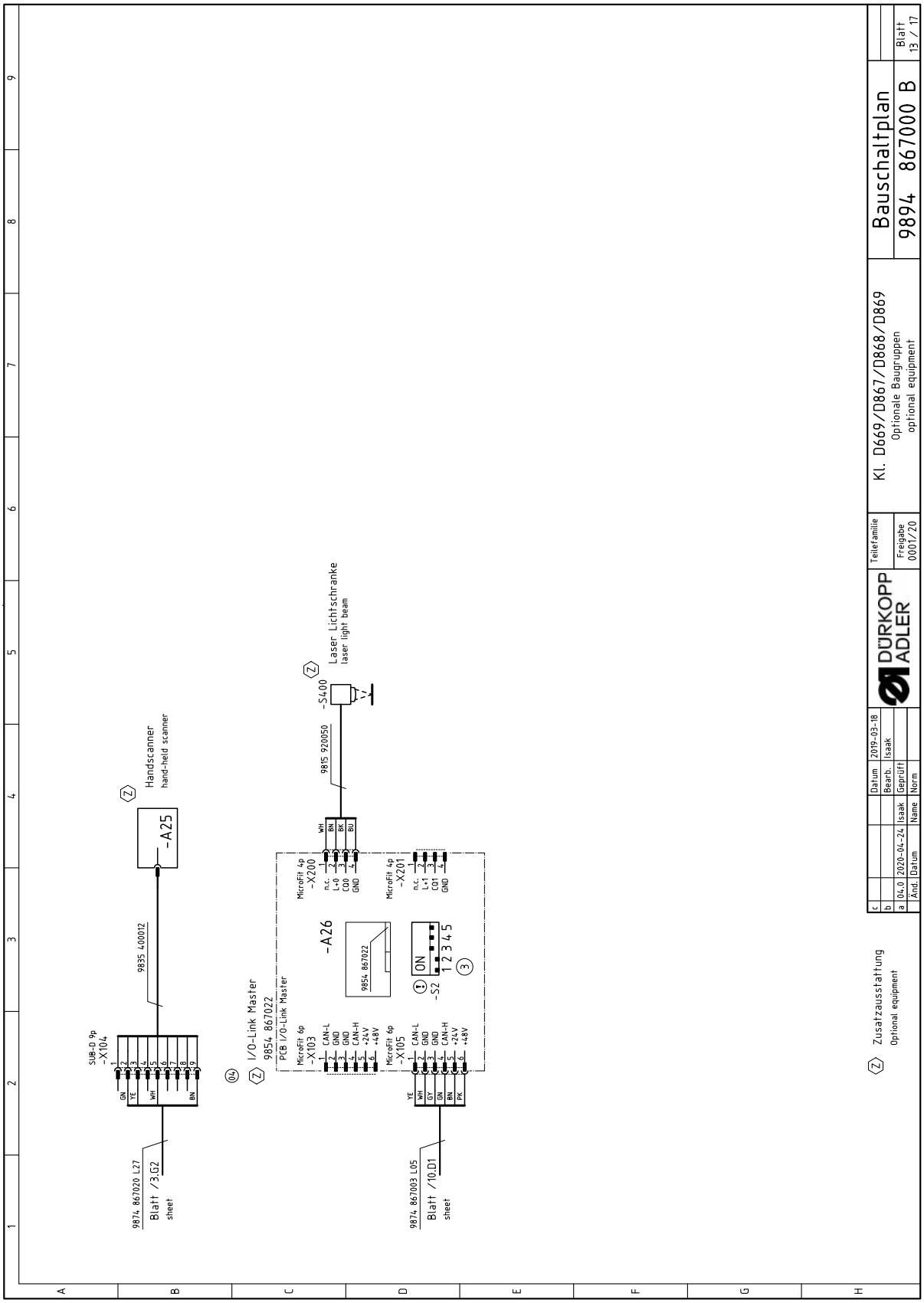


Fig. 156: Wiring diagram (14)

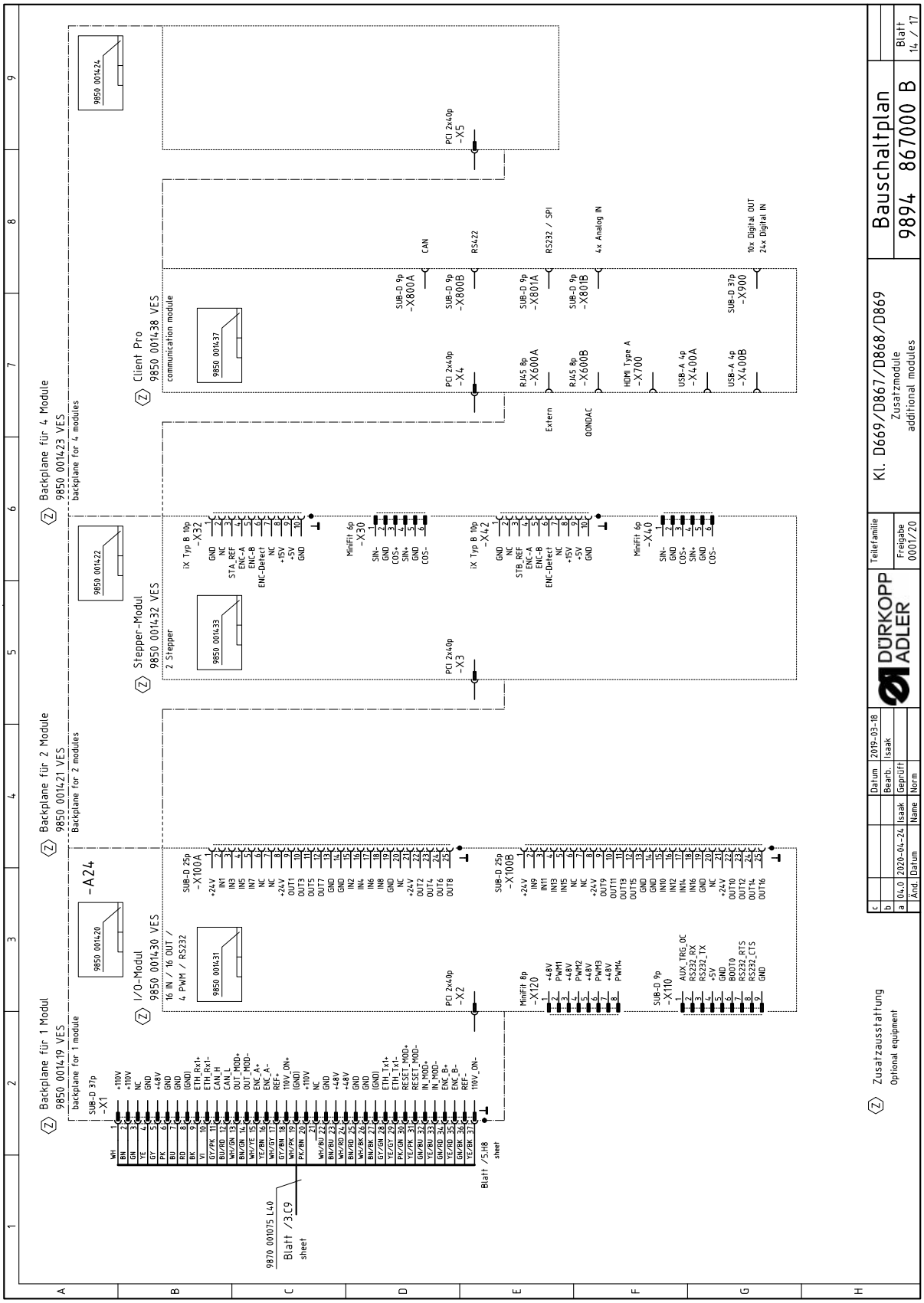


Fig. 157: Wiring diagram (15)

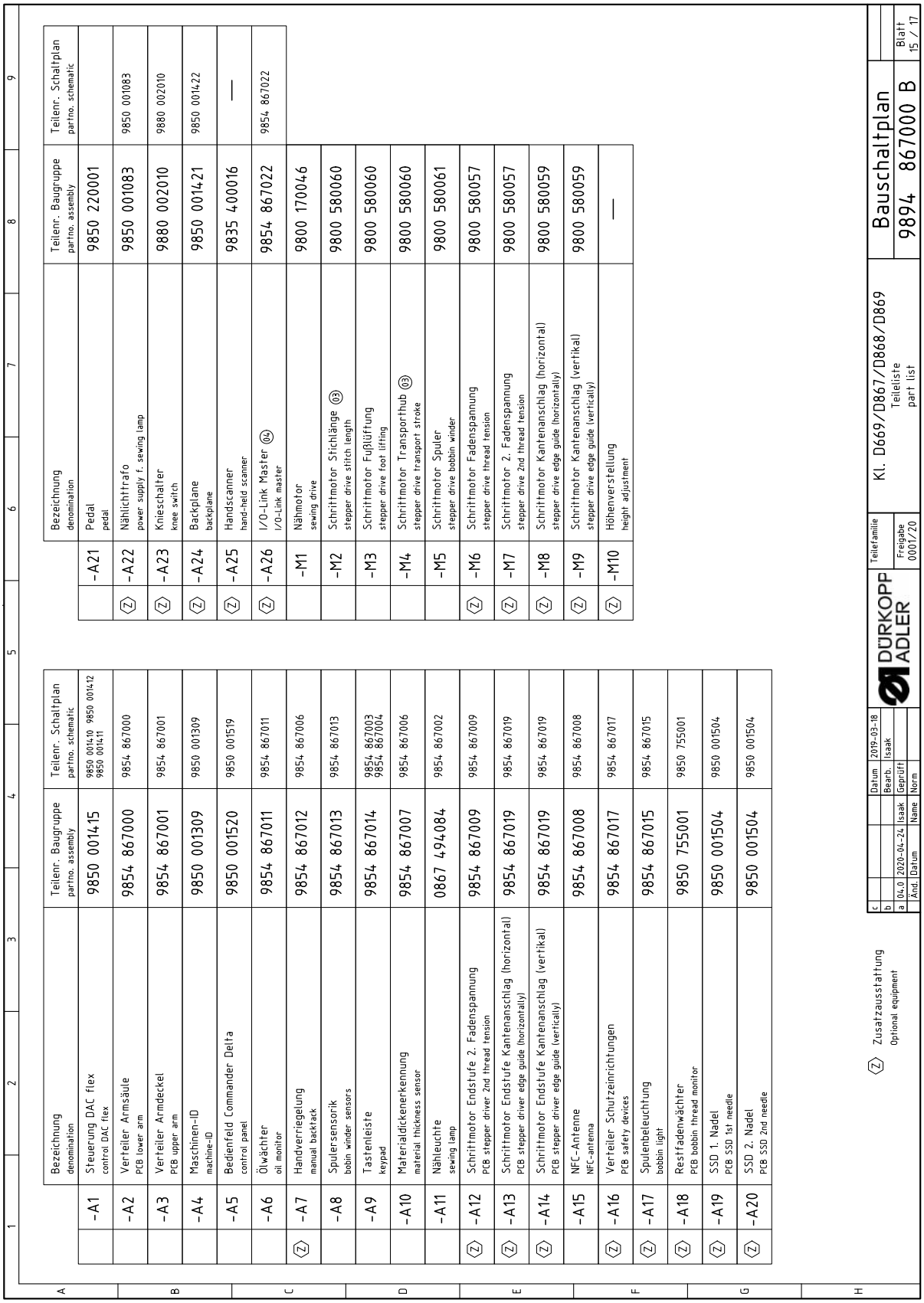


Fig. 158: Wiring diagram (16)

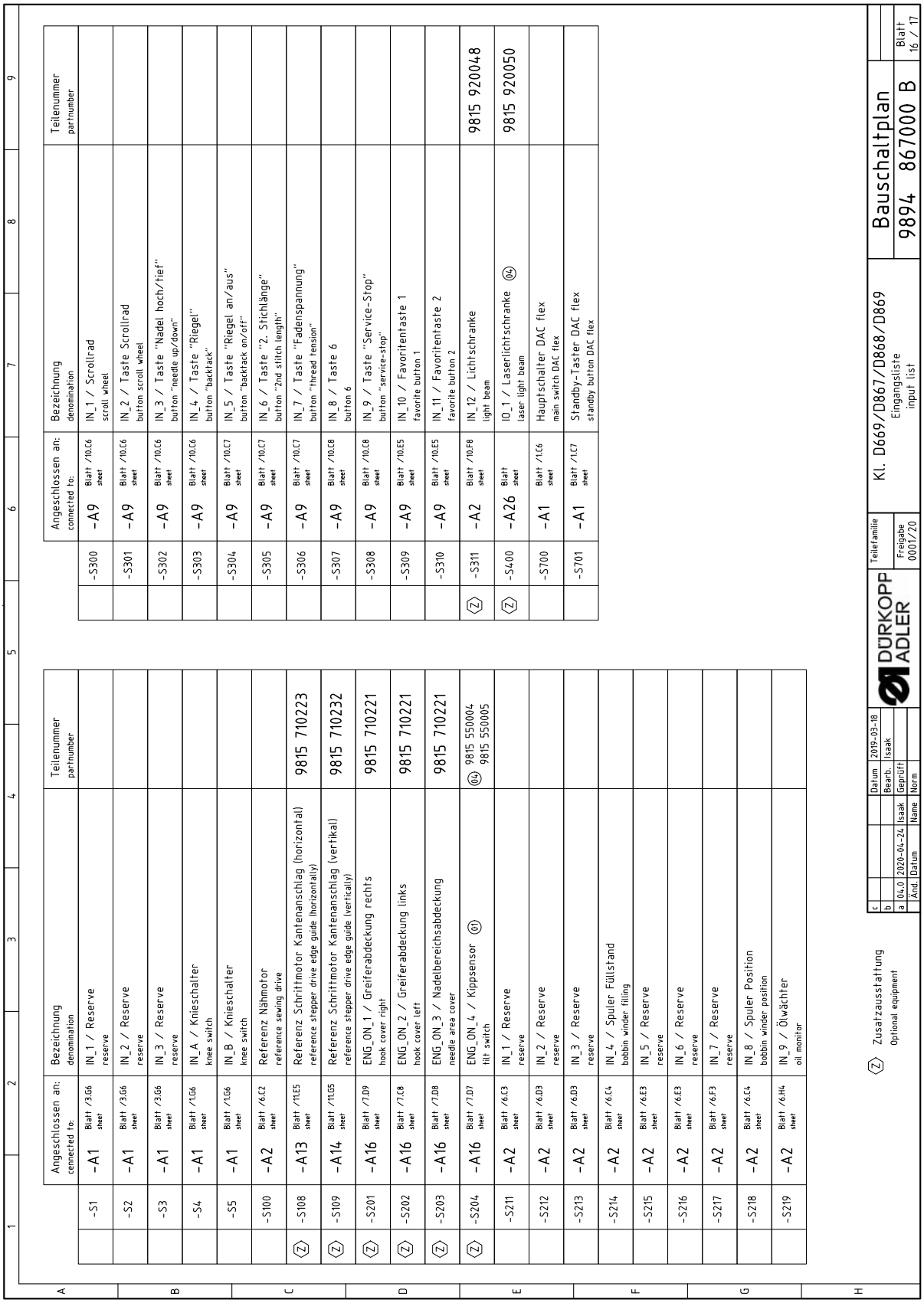
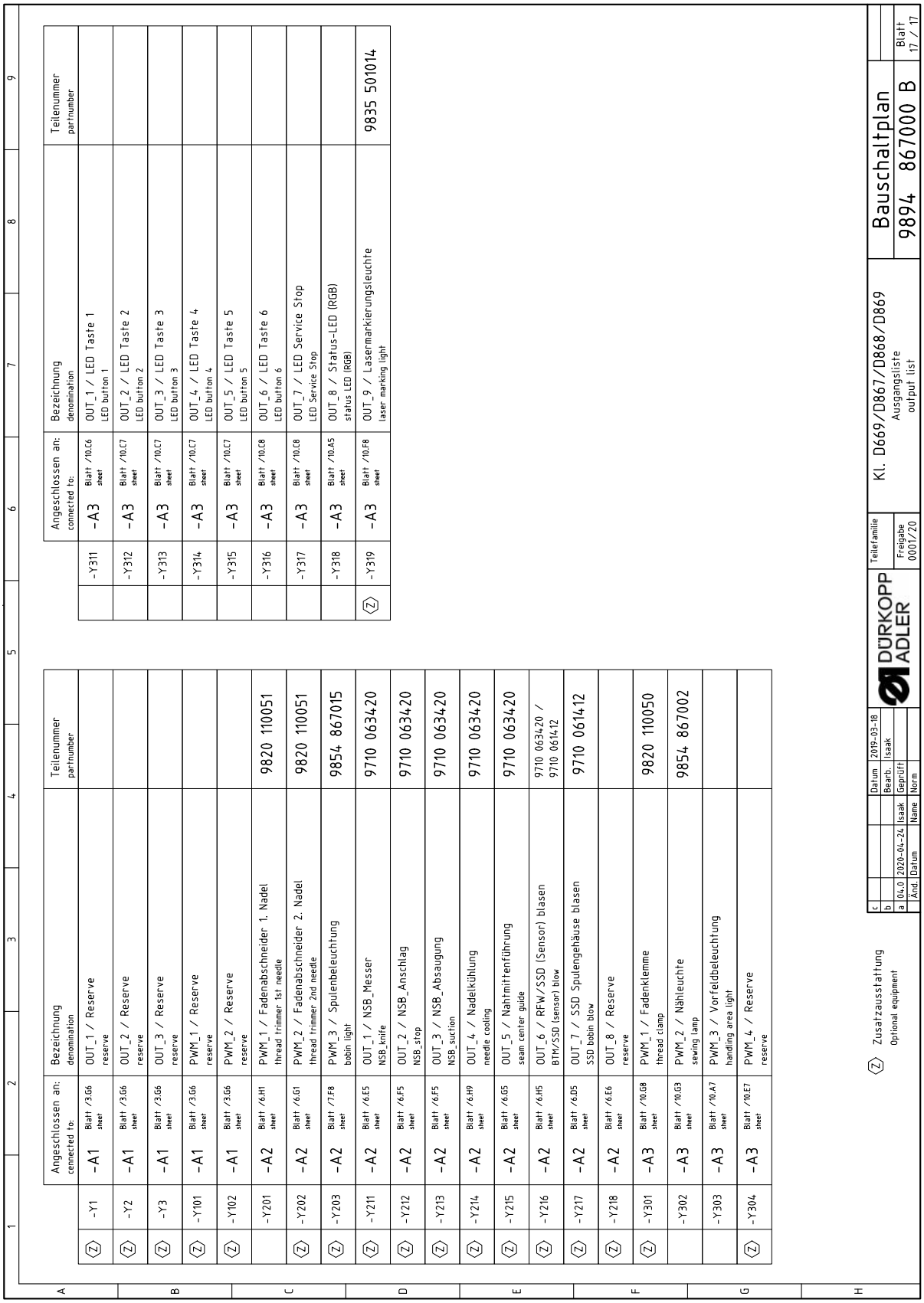


Fig. 159: Wiring diagram 17



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