DÜRKOPP ADLER

281

Service instructions

IMPORTANT
READ CAREFULLY BEFORE USE
KEEP TO CONSULT LATER

1 About these service instructions

This manual for special sewing machine 281 was compiled with the utmost care. It contains information and notes to enable the machine to give many years of reliable service.

Should you notice any discrepancies or if you have improvement requests, then we would be glad to receive your feedback, 🕮 *3.6 Customer service.*

Consider this service instructions part of the product and keep it on hand at all times. Be sure to read the service instructions completely before using the product for the first time. If you pass the product on to someone else, please be sure to give them these service instructions.

1.1 Scope of these service instructions

These service instructions describe the setting and maintenance work on the 281 sewing machine. These instructions apply to all subclasses.
The intended use and set-up is described in the 🕮 O*perating instructions*.

1.2 For whom are these service instructions intended?

These service instructions are intended for:

- Technicians:
  This group has the appropriate technical training for performing maintenance on the sewing unit or repairing malfunctions.

With regard to minimum qualifications and other requirements to be met by the personnel, please also observe 🕮 *2 Safety.*

1.3 Representation conventions – symbols and characters

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

Correct setting
Indicates proper setting.

Malfunctions
Specifies the faults that can occur due to an incorrect setting.

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

Steps to be performed for servicing, maintenance, and installation

Steps to be performed via the software control panel

The individual steps are numbered:

1. First step
2. Second step

... The sequence of the steps must always be followed.

- Lists are identified by bullet points.

Result of performing an operation
Change to the machine or in the display.

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

Information
Additional information, e.g. on alternative operating possibilities.

Note
Specifies the work to be performed before or after a setting.

References
📖 Reference to another section in the manual.

Safety Important warnings for the machine operator are specially designated. Since safety is of particular importance, hazard symbols, levels of danger and their signal words are described separately in 📖 *3 Safety Information*.

Orientation If the figure is unclear, indications of "right" and "left" are always from the operator's point of view.

1.4 Other documents

This equipment 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 these components is described in each manufacturer's manual.

1.5 Liability

All information in this service instructions was compiled with consideration to the state of the art, and applicable standards and regulations.

The manufacturer cannot be held liable for damages resulting from:

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

2 Safety information

This section contains basic information for your safety. Read the instructions carefully before setting up or operating the machine. Make sure to follow the information included in this section. Failure to do so can result in serious injury and damage to the machine.

2.1 Basic safety instructions

The machine may only be used as described in this manual.

The operating instructions should be available at the machine's location at all times.

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

For the following work, the machine must be disconnected from the power supply using the main switch or by disconnecting the power plug:

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

Missing or faulty spare parts could impair safety and damage the machine. Make sure you only use original replacement parts from the manufacturer.

Transport

Use a sturdy lifting carriage or stacker for transporting the machine. Raise the machine max. 20 mm and secure it against slipping off.

Installation

The power cable must have a plug authorized for the country in which the machine is being used. The power plug may only be connected to the power cable by a qualified specialist.

Obligations of the operator

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

All warnings and safety signs on the machine must always be in legible condition and may not be removed. Missing or damaged labels should be replaced immediately.

Requirements to be met by the personnel

The machine may only be set up by qualified technicians.

Maintenance work and repairs may only be carried out by qualified technicians.

Work on electrical equipment may only be carried out by qualified specialists.

Only authorized persons may work on the machine. Every person who works on the machine must first have understood the operating instructions.

Operation Inspect the machine while in use for any externally visible damage. Stop working if you notice any changes to the machine. Report any changes to your supervisor. A damaged machine must no longer be used.

Safety equipment Safety equipment should not be removed or deactivated. If this cannot be avoided for a repair operation, the safety equipment must be refitted and put back into service immediately afterwards.

2.2 Signal words and symbols used in warnings

Warnings in the text are distinguished by color bars. The color scheme is oriented towards the severity of the danger. Signal words indicate the degree of risk:

Signal words Signal words and the hazard that they describe:

Signal word	Hazard
DANGER	Will result in serious injury or death.
WARNING	Can result in serious injury or death.
CAUTION	Can result in minor or moderate injury.
NOTE	Can result in property damage.
ATTENTION	Environmental damage can result.

Symbols The following symbols indicate the type of risk to personnel:

Symbol	Type of danger
	General risk
	Risk of electric shock
	Risk of puncturing
	Risk of crushing
	Risk of environmental damage

Examples Examples of the layout of the warnings in the text:

DANGER

Type and source of risk!

Consequences of non-observance.

Measures for avoiding the risk.

↳ 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 risk!

Consequences of non-observance.

Measures for avoiding the risk.

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

CAUTION

Type and source of risk!

Consequences of non-observance.

Measures for avoiding the risk.

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

ATTENTION

Type and source of risk!

Measures for avoiding the risk.

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

NOTE

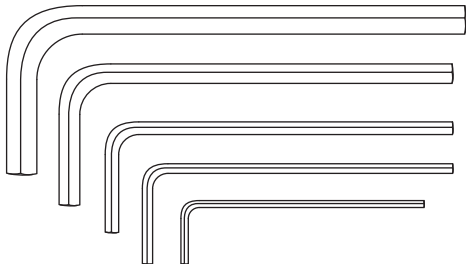
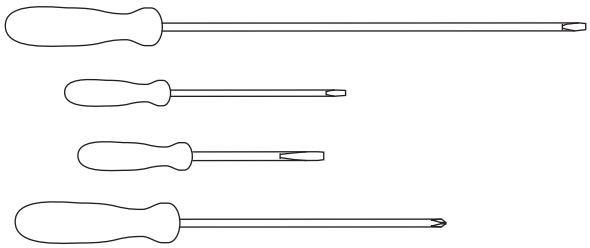
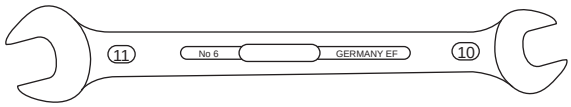
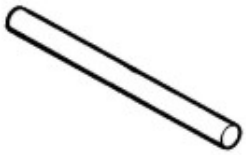
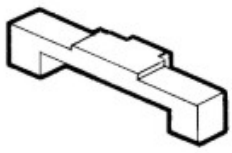
Type and source of risk!

Measures for avoiding the risk.

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

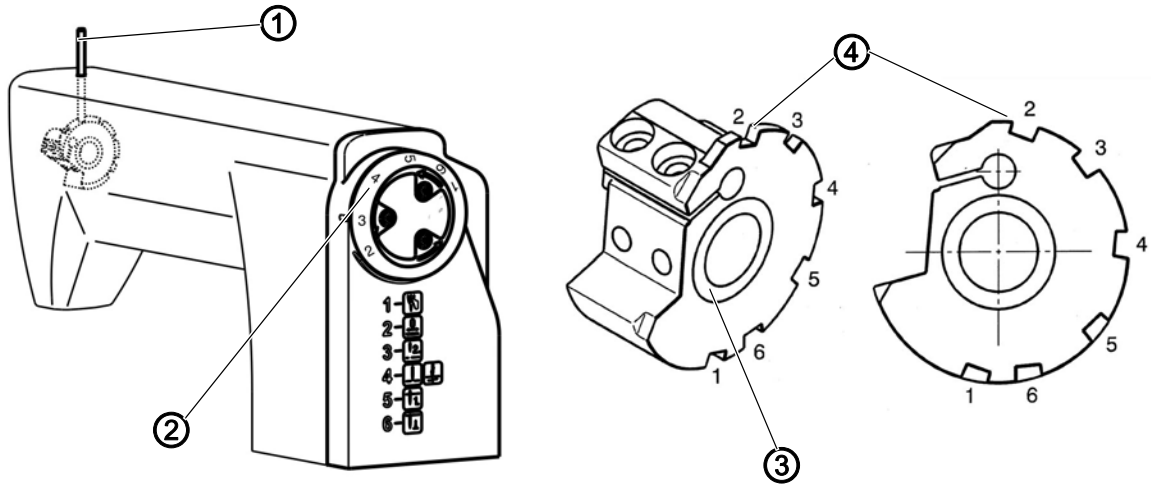
3 Working basis

3.1 Tools and gages

Type	Size/use	Figure
Hexagon screw	5 4 3 2.5 2 1.5	
Screwdriver	Slot – 0.7 x 4.7 Slot – 0.4 x 3 Slot – 0.7 x 4.7 Cross slot – B2-H	
Wrench	10	
Gage 0281 801890	Needle bar height for needle diameters of 1.62 mm	
Gage 0281 800300	Needle bar height for needle diameters of 2.00 mm	
Locking peg 9301 022608	Locking machine positions 1 - 6	
Gage 0281 800290	Setting the feed dog height/ needle bar height	

3.2 Adjustment aid

Figure. 1: Adjustment aid



(1) - Locking peg
(2) - Marking
(3) - Arm shaft crank
(4) - Arresting groove

The machine can be locked in 6 different setting positions using the locking peg (1) and the arresting grooves (4) in the arm shaft crank (3).

The crank is equipped with six grooves, which are identified on the handwheel by the numbers 1 to 6. In conjunction with the marking (2), the numbers indicate the position of the slots in which the machine can be locked in place using the locking peg (1).

Precise settings are ensured only while the machine is locked.

You can set the following positions:

Position – symbol	Description
1 –	Loop stroke Distance of hook tip to needle
2 –	Feed dog standstill when the stitch adjustment linkage is moved Feed-dog height
3 –	2. Needle position, raised position (Thread lever top dead center)
4 –	Upper section/controller reference positon Control cam for the thread cutter
5 –	1. Needle position
6 –	Needle in the low position (lower dead center)

3.3 Sequence of the settings

Note sequence

Always adhere to the specified sequence for the individual setting steps.

Always observe all information on requirements and following settings marked at the side with  .

NOTE

Machine damage possible due to incorrect sequence.
It is essential to adhere to the working sequence specified in this manual.

3.4 Cable routing

Bind cables together

Ensure that all cables in the machine are laid such that moving parts are not impaired in their ability to function correctly.

1. Lay any cable that is too long neatly in proper cable snakes.
2. Tie the snakes together using a cable tie.

Important

If possible, bind the snakes to fixed parts.
The cables must be fixed firmly in place.

3. Cut off any overlapping cable ties.

NOTE

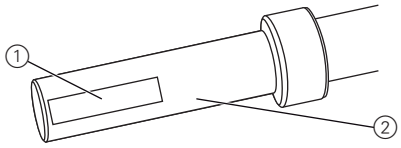
Machine damage and malfunctions can be caused by laying the cables incorrectly.
Excess cabling may obstruct moving machine parts in their ability to function correctly. This will affect the sewing function and may cause damage.

Lay excess cable as described above.

3.5 Flats on shafts

Screw the screw on to the flat

Figure. 2: Flats on shafts



(1) - Surface *(2) - Shaft*

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

Important

Always ensure that the screws lie completely on the surface.

3.6 Customer service

Contact is you find any discrepancies or have any suggestions:

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Potsdamer Str. 190
33719 Bielefeld, Germany

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Fax +49 (0) 521 925 2594

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Internet: www.duerkopp-adler.com

4 Transport and sewing direction

4.1 Setting the pusher eccentric time

WARNING

Risk of injury!

Crushing injuries from moving parts.

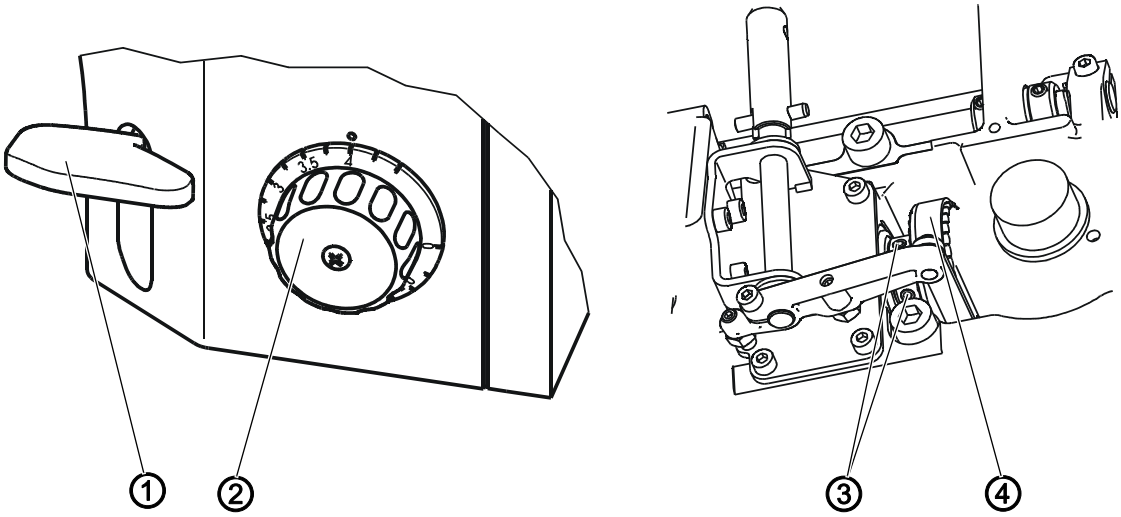
Switch off the machine before setting the pusher eccentric time.

The pusher eccentric is factory-set to the optimal value. The pusher setting should not be changed if possible.

Checking the correct setting

If the machine is locked in position 2, no pusher movement may be visible on the feed dog when moving the stitch adjustment hand lever at the longest stitch length.

Figure. 3: Setting the pusher eccentric time



(1) - Stitch adjustment hand lever
(2) - Adjusting wheel
(3) - Screws
(4) - Toothed belt wheel

Setting steps

1. Set the maximum stitch length on the adjusting wheel (2).
2. Check that the setting is correct by moving the stitch adjustment hand lever. If correction is necessary, continue to step 3.
3. Undo the screws (3) on the lower toothed belt (4).
4. Rotate the lower shaft as appropriate.
5. Tighten the screws (3) on the lower toothed belt (4).

Note

If the lower shaft has been adjusted, adjust the following items:

- Hook (📖 *8 Hook*, page 38)
- Control cam (📖 *9.1 Control cam for cutter movement*, page 41)
- Stroke eccentric (📖 *4.2 Setting the stroke eccentric time*, page 16)

4.2 Setting the stroke eccentric time

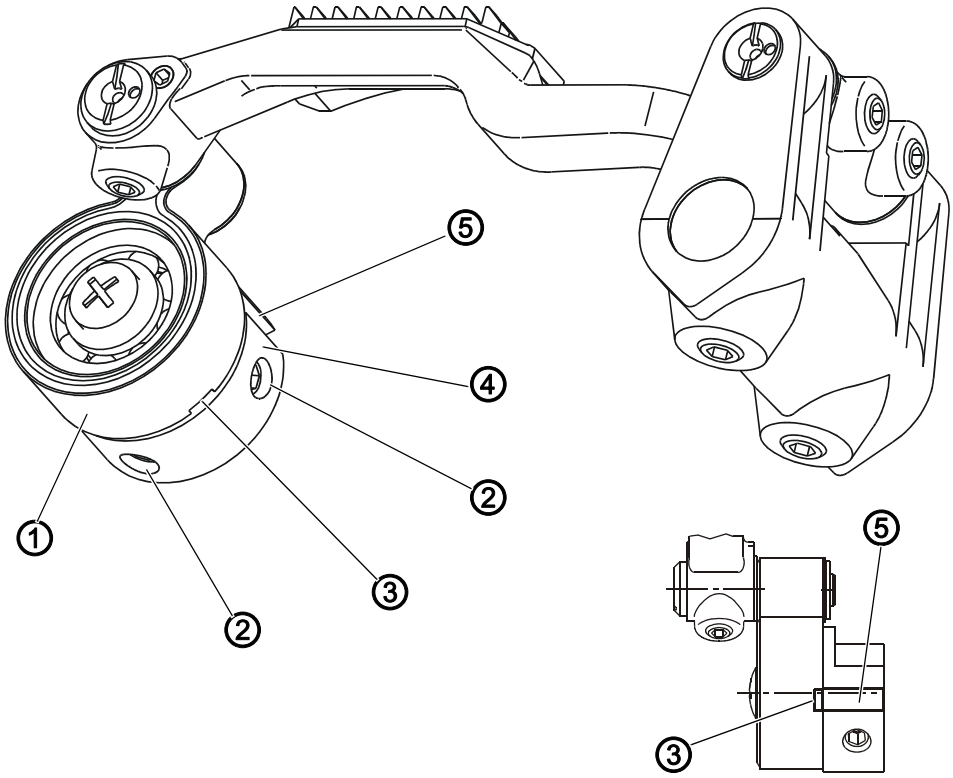
WARNING

Risk of injury!

Crushing injuries from moving parts.

Switch off the machine before setting the stroke eccentric time.

Figure. 4: Setting the stroke eccentric time



(1) - Connecting rod
(2) - Screws
(3) - Connecting rod groove
(4) - Stroke eccentric
(5) - Eccentric groove

Checking the correct setting

If the machine is locked in position 2, the grooves (3, 5) of the stroke eccentric (4) and the connecting rod (1) must be in a line.

Setting steps

1. Lock the machine in place at position 2.
2. Undo both screws (2) of the stroke eccentric (4).

Important

Do not move the eccentric axially while doing this.

3. Turn the stroke eccentric (4) so that the grooves (3 and 5) are in a line.
4. Tighten both stroke eccentric (4) screws (2).

4.3 Setting the feed dog height and inclination

WARNING

Risk of injury!

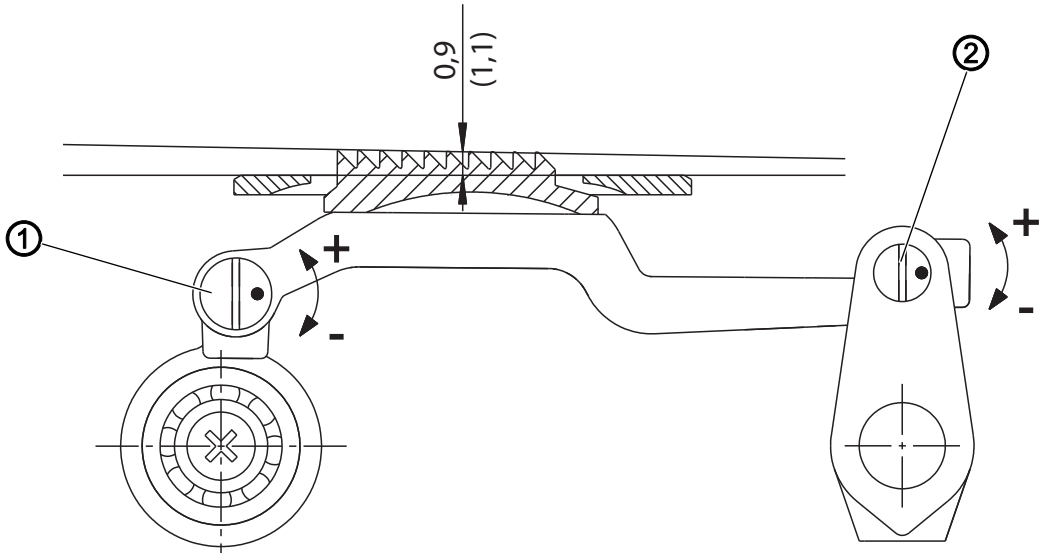
Crushing injuries from moving parts.

Switch off the machine before you set the feed dog height and inclination.

The following are set via the eccentric:

- Emergence height of the feed dog above the throat plate
- Gradient angle
- Parallelism with the throat plate

Figure. 5: Setting the feed dog height and inclination I



(1) - Eccentric

(2) - Eccentric

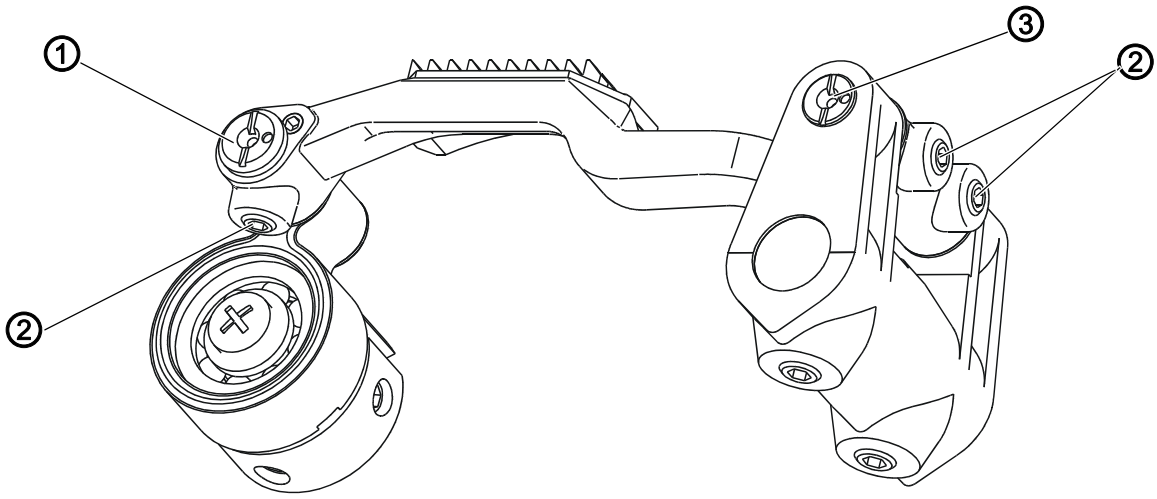
Checking the correct setting

The height in the middle of the feed dog (at the needle hole) is factory set in position 2 as follows:

- 0.9 mm for fine toothing (281-140342)
- 1.1 mm for rough toothing (281-160362)

This makes the feed dog rise slightly from front to back.

Figure. 6: Setting the feed dog height and inclination II



(1) - Eccentric bolts
(2) - Fastening screws
(3) - Eccentric bolts

Setting steps

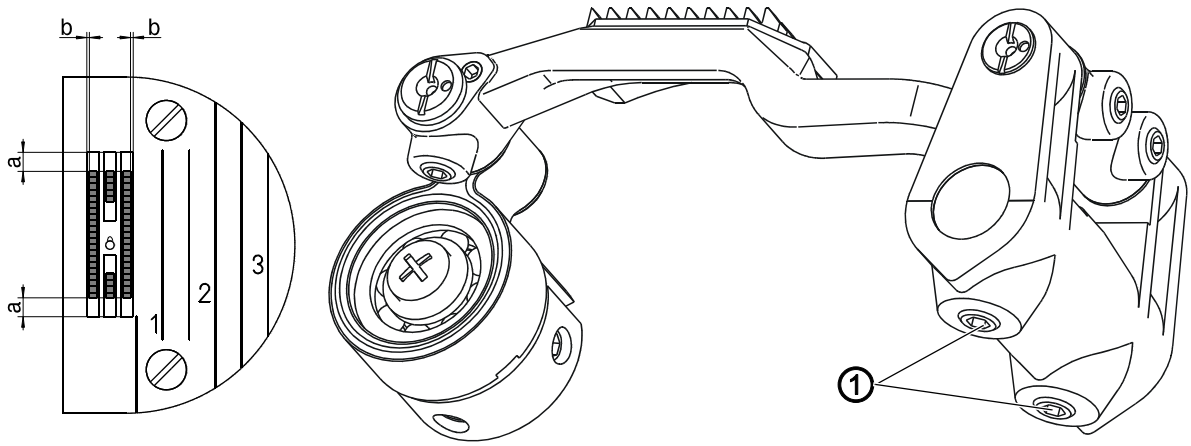
1. Lock the machine in place at position 2.
2. Loosen the screws (2).
3. Rotate the eccentric bolts (1, 3) and set the height and inclination. The feed dog should protrude out of the throat plate by 0.9 or 1.1 mm in the highest position in the needle hole area. Always adjust both eccentrics in reference to each other.
4. Tighten the screws (2).

4.4 Setting the feed dog position in the throat plate

Checking the correct setting

In position 2, the feed dog must stand symmetrically in the throat plate. The distance is the same at the front and at the rear.

Figure. 7: Setting the feed dog position in the throat plate



(1) - Screws

Setting steps

1. Lock the machine in place at position 2.
2. Loosen both screws (1).
3. Setting the symmetry.
   Make sure that the lateral distance b remains unchanged.
4. Tighten the screws (1).

4.5 Setting the stitch length limit

WARNING

Risk of injury!

Crushing injuries from moving parts.

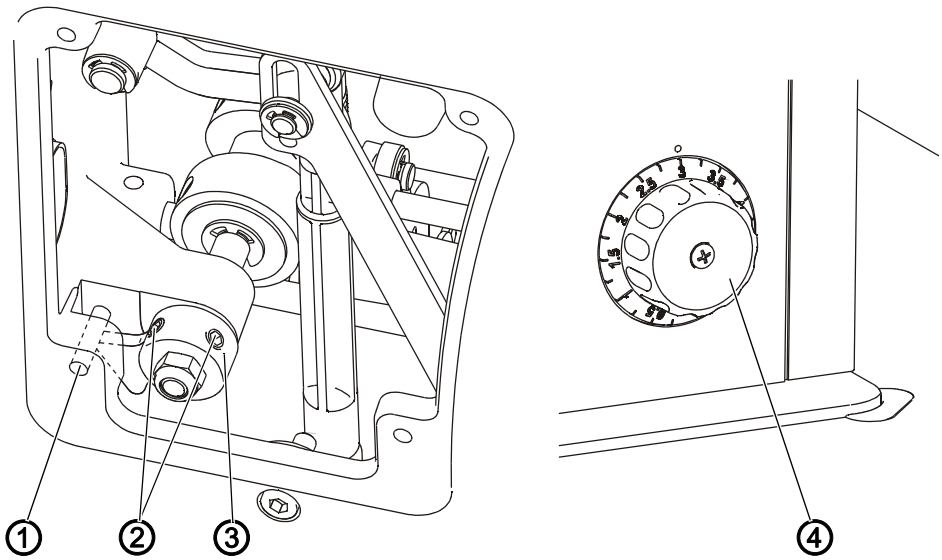
Switch off the machine before you set the stitch length limit.

The maximum stitch length is:

- for class 281-140342: 4.25 mm
- for class 281-160362: 6.00 mm

For sewing equipment that has been designed for smaller stitch lengths, limit the stitch length to prevent damage.

Figure. 8: Setting the stitch length limit



(1) - Setscrew
(2) - Screws
(3) - Limiting clamp
(4) - Adjusting wheel

Setting steps

1. Use the adjusting wheel (4) to set the maximum stitch length.
2. Undo the screws (2) of the limiting clamp (3).
3. Turn the limiting clamp (3) clockwise against the setscrew (1).
4. Tighten the screws (2).

4.6 Setting the stitch length symmetry

WARNING

Risk of injury!

Risk of crushing injuries and stab wounds from moving and sharp parts.

Switch off the machine before you set the stitch length symmetry.

Checking the correct setting

Stitch length symmetrical adjustment is factory-set as follows:

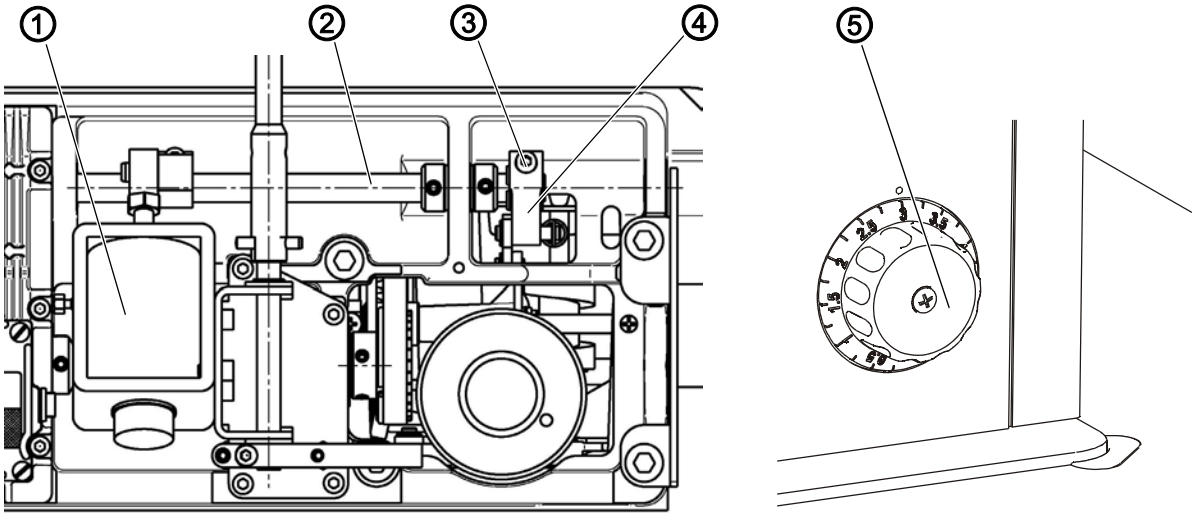
- for class 281-140342: 3.0 mm
- for class 281-160362: 4.5 mm

After repairs, it may be necessary to readjust the stitch length symmetry.

1. On strong paper, cut 10 random stitch lengths (11 points of penetration) in the forwards direction.
2. In addition to the forward stitches, cut off 10 stitch lengths (11 points of penetration) in the backwards direction without thread at minimum speeds.

↳ The total length of both lines should be the same. If they are not, set the stitch length symmetry.

Figure. 9: Setting the stitch length symmetry



(1) - Bartack magnet
(2) - Stitch adjustment setting shaft
(3) - Screw
(4) - Clamp
(5) - Adjusting wheel

Important

Even small shaft rotations lead to significant stitch length changes. Also make sure that the bartack magnet (1) does not strike its inner and outer stop position at maximum stitch length during tacking. This can cause undesirable impact noise or wear.

Setting steps

1. Use the adjusting wheel (5) to set the maximum stitch length.
2. Loosen the screw (3) in the clamp (4).
3. Turn the stitch adjustment setting shaft (2).
4. Tighten the screw (3).
5. Check stitch length and adjust if necessary.

5 Sewing foot height and sewing foot lifting

The maximum sewing foot lift stroke on machines is as follows:

- Electromagnetic sewing foot lifting: 12 mm
- Knee lever: 14 mm
- Factory default settings: 9 mm

5.1 Setting the height of the material presser foot bar

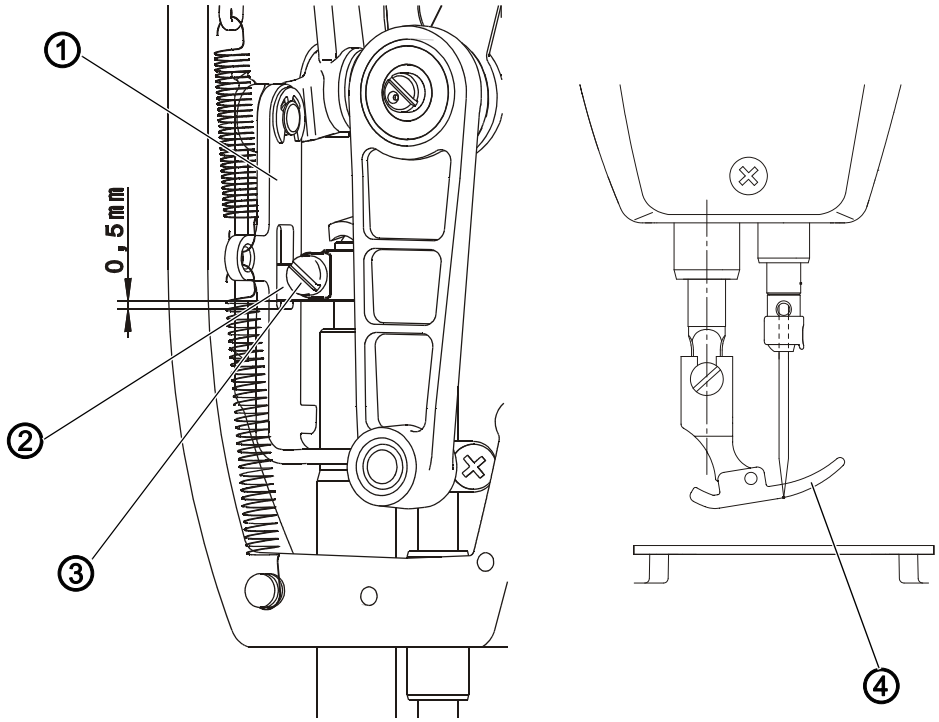
WARNING

Risk of injury!

Risk of crushing injuries and stab wounds from moving and sharp parts.

Switch off the machine before you set the material presser foot bar height.

Figure. 10: Setting the height of the material presser foot bar



(1) - Angle of traction
(2) - Clamp
(3) - Screw
(4) - Foot sole

Checking the correct setting

If the foot sole (4) is resting on the throat plate, there should be a distance of 0.5 mm between the clamp (2) and angle of traction (1).

Cover

- Open the head cover.

Setting steps

1. Loosen the screw (3).
2. Press the sewing foot downwards onto the throat plate. Ensure that this is not done against the emerged feed dog.
3. Push the clamp (2) so that there is a distance of 0.5 mm between the clamp (2) and the angle of traction (1).
4. Align the sewing foot so that the needle enters the center of the sewing foot slot.
5. Tighten the screw (3).

5.2 Setting sewing foot lifting mechanically

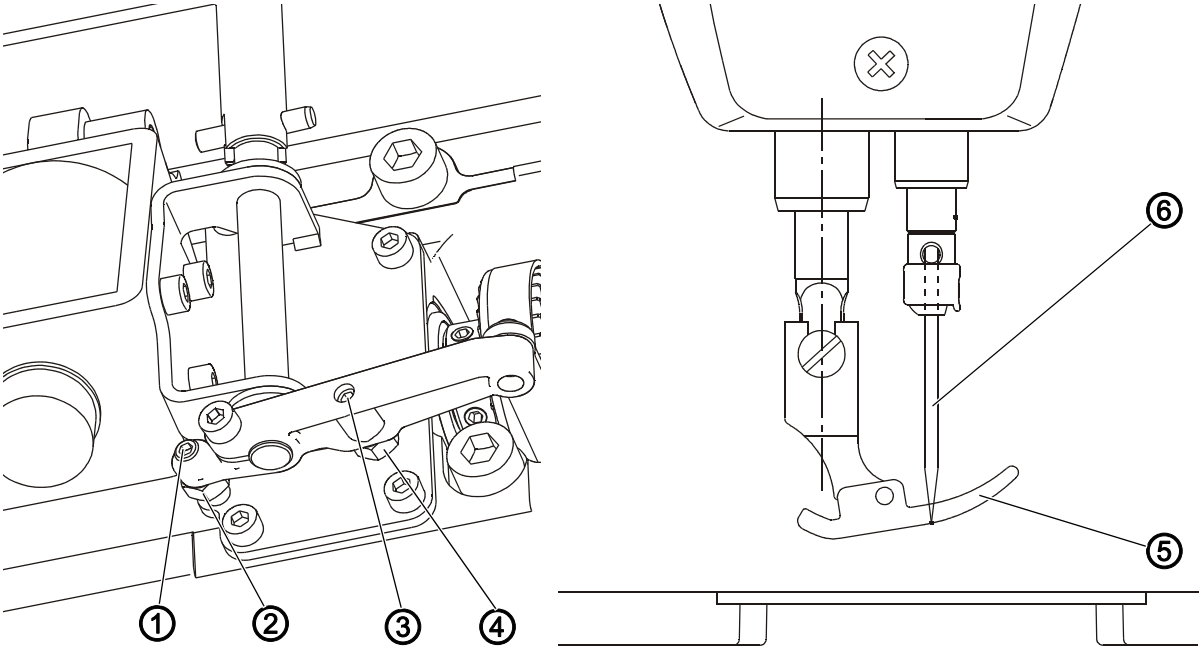
WARNING

Risk of injury!

Risk of crushing injuries and stab wounds from moving and sharp parts.

Switch off the machine before you set the sewing foot lifting.

Figure. 11: Setting sewing foot lifting mechanically



(1) - Stop screw
(2) - Nut
(3) - Stop screw
(4) - Nut
(5) - Sewing foot
(6) - Needle

Checking the correct setting

When the sewing foot (5) is resting on the throat plate, a small backlash must be felt in the knee lever before the lifter movement starts. Make sure that the feed dog is pitched during this process.

The sewing foot lifting should be set at a maximum height so that the tip of the needle (6) does not stick out of the slot of the sewing foot (5) in machine position 3.

Lifter movement setting steps

1. Release the nut (2).
2. Set the stop screw (1). When the sewing foot is resting on the throat plate, a small backlash must be felt in the knee lever.
3. Tighten the nut (2).

Sewing foot height setting steps

1. Lock the machine in place at position 3.
2. Release the nut (4).
3. Use the stop screw (3) to set the maximum stroke height.
4. Tighten the nut (4).

5.3 Setting sewing foot lifting electromagnetically

5.3.1 Magnet for sewing foot lifting – position setting

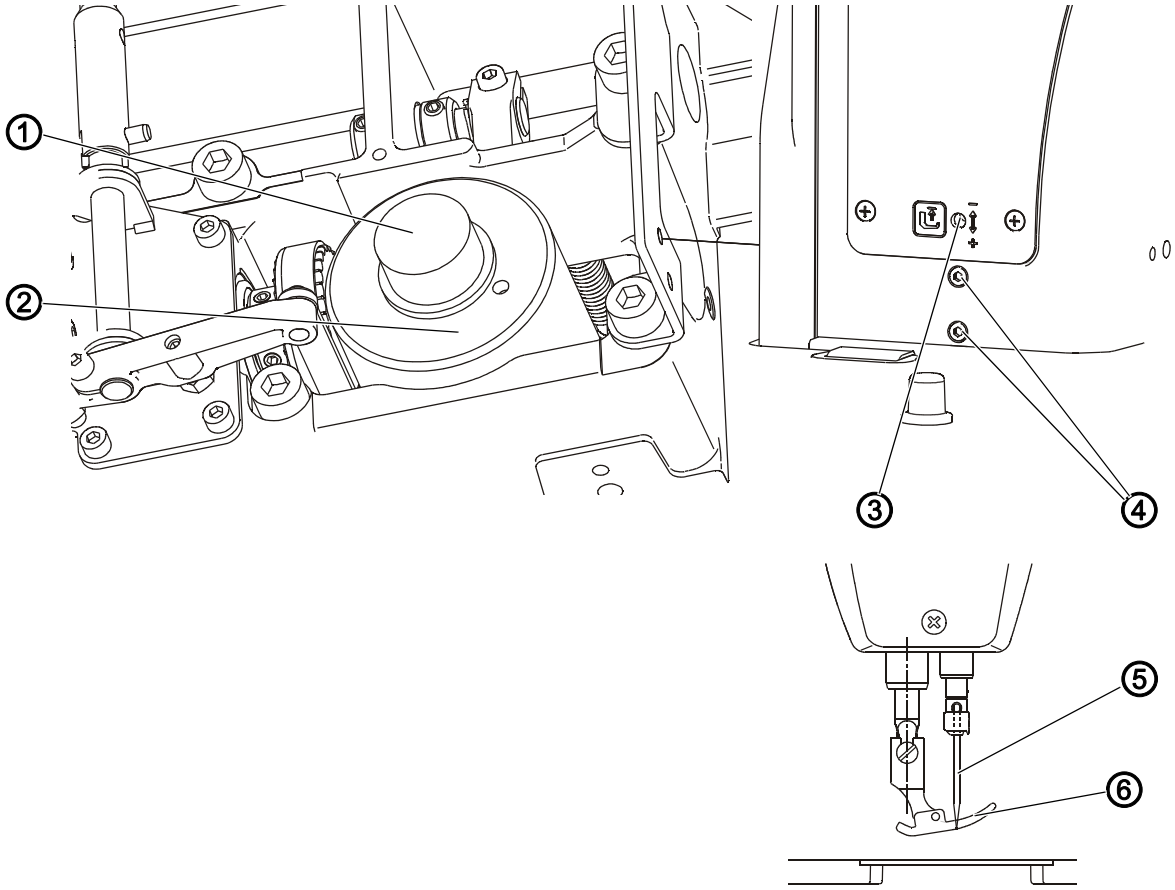
WARNING

Risk of injury!

Risk of crushing injuries and stab wounds from moving and sharp parts.

Switch off the machine before you set the sewing foot lifting.

Figure. 12: Setting sewing foot lifting electromagnetically



(1) - Magnet armature
(2) - Magnet for sewing foot lifting
(3) - Hole
(4) - Screws
(5) - Needle
(6) - Sewing foot

Checking the correct setting

The magnet armature (1) for sewing foot lifting (2) always reaches its internal end position when activated, since its power consumption is reduced to 30 % after completion of sewing foot lifting.

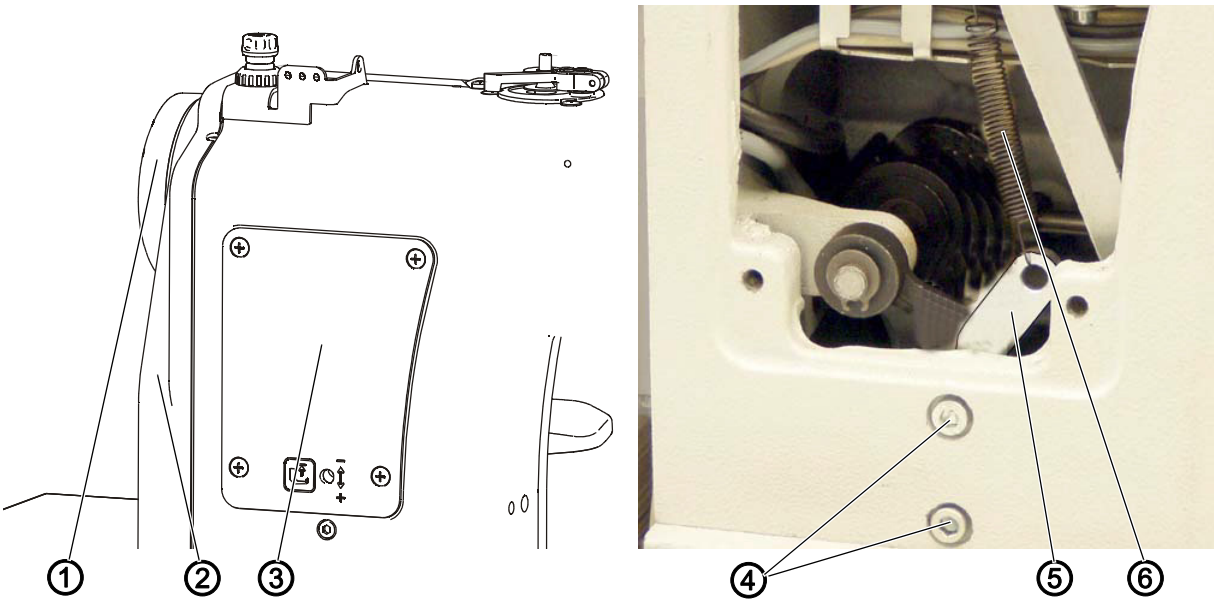
The sewing foot lifting should be set at a maximum height so that the tip of the needle (5) does not stick out of the slot of the sewing foot (6) in machine position 3.

Setting steps

1. Loosen the screws (4).
2. Insert the shank of a screwdriver through hole (3) into the mounting bracket of the sewing foot magnet.
3. Turn the screwdriver to change the magnet position:
   - Screwdriver handle **up** = smaller stroke
   - Screwdriver handle **down** = larger stroke
4. Tighten the screws (4).

5.3.2 Installing magnet for sewing foot lifting

Figure. 13: Installing magnet for sewing foot lifting I

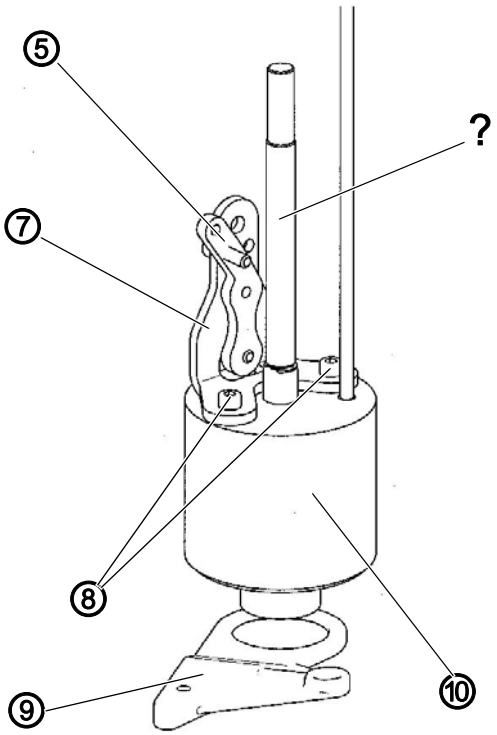


(1) - Handwheel
(2) - Cover
(3) - Cover
(4) - Screws
(5) - Mounting flange
(6) - Spring

Installation steps

1. Unscrew handwheel (1), covering (2) and cover (3).
2. Remove the spring (6).
3. Remove the mounting flange (5) and screws (4).
4. Remove the mounting flange (5).

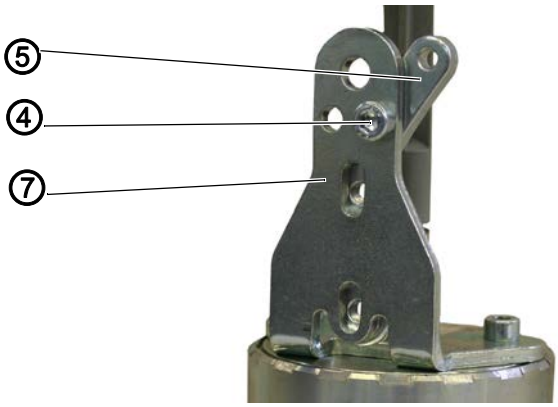
Figure. 14: Installing magnet for sewing foot lifting II



(5) - Mounting flange
(7) - Retainer
(8) - Screws
(9) - Mounting aid
(10) - Magnet
(11) - Push rod

5. Screw the holder (7) onto the magnet (10) using the screws (8) provided.
6. Fit the push rod (11) on the magnet (10).

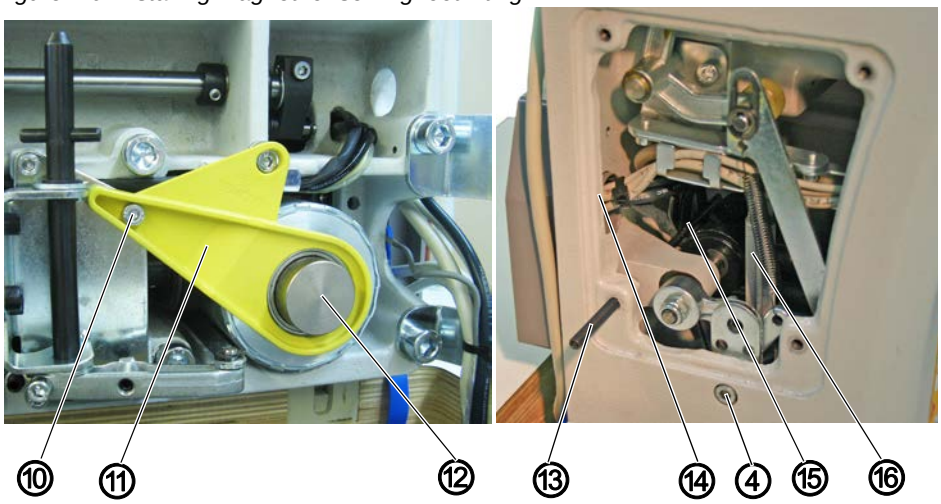
Figure. 15: Installing magnet for sewing foot lifting III



(4) - Screw
(5) - Mounting flange
(7) - Retainer

7. Screw the mounting flange (5) to the holder (7) using one of the two screws (4).

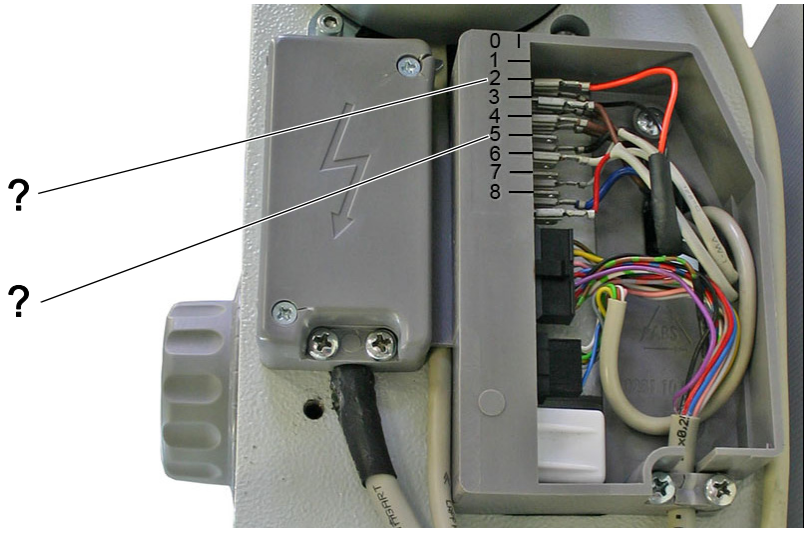
Figure. 16: Installing magnet for sewing foot lifting IV



(4) - Screw
(10) - Screw
(11) - Mounting aid
(12) - Magnet
(13) - Setscrew
(14) - Housing bore
(15) - Shank
(16) - Push rod

8. Tilting the machine upper section.
9. Loosen the screw (10).
10. Insert the magnet (12) in an upward direction using the mounting aid (11) so that the push rod (16) engages in the upper guide drill hole.
11. Screw down the mounting aid (11) using screw (10).
12. Unscrew the setscrew (13).
13. Press all cables to the left behind the shank (15) of the setscrew (13) and fully tighten the screw.
14. Feed the cable of the magnet through the housing bore (14) to the rear of the machine.
15. Raise the machine upper section.
16. Use the other screw (4) to screw the mounting flange (5) and holder (7) onto the housing.
17. Loosen the screw (4) into the upper hole of the mounting flange (5) and loosen the holder (7).
18. Use the screw (4) to screw the mounting flange (5) and holder (7) onto the housing in the open hole.
19. Loosen the screw (10).
20. Remove the mounting aid (11) and tighten screw (10).
21. Attach the spring (6).

Figure. 17: Installing magnet for sewing foot lifting V



(17) - Clamp 1 to 3 *(18) - Clamp 5*

22. Connect the connecting cable to one of the clamps 1 to 3 (17) and to clamp 5 (18).
23. Check sewing foot height and adjust if necessary (📖 *5 Sewing foot height and sewing foot lifting*, page 23).

Disassembly takes place in reverse order.

5.3.3 Magnet for sewing foot lifting – replacing the damping washer

WARNING

Risk of injury!

Risk of crushing injuries and stab wounds from moving and sharp parts.

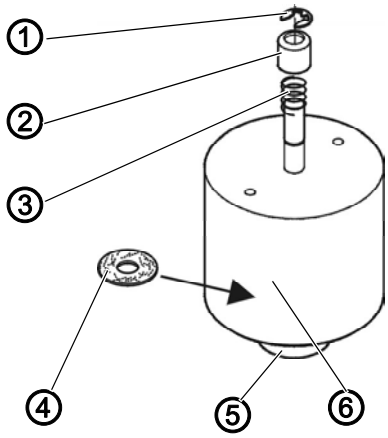
Switch off the machine before you replace the damping washer.

After several years of intensive use the damping washer dimensions may have changed.

This manifests itself as a slow lowering of the sewing foot or impact noise during tightening of the magnet.

This may mean that several stitches were done when the machine started up before the foot had fully reached the sewing material (there is a risk of skip stitches at the start of the seam).

Figure. 18: Magnet for sewing foot lifting – replacing the damping washer

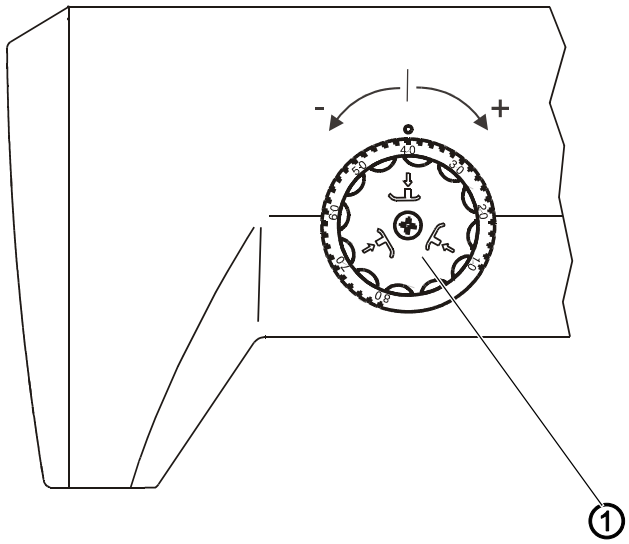


(1) - Locking washer
(2) - Socket
(3) - Spring
(4) - Damping washer (inside the magnet)
(5) - Magnet armature
(6) - Magnet for sewing foot lifting

1. Remove the magnet for sewing foot lifting (6)
2. Remove locking washer (1).
3. Remove the spring (3) and socket (2).
4. Take magnet armature (5) out of the housing.
5. Replace the damping washer (4).
6. Fit spring (3) and socket (2).
7. Attach locking washer (1).
8. Install the magnet for sewing foot lifting (6)
   (📖 *5.3.2 Installing magnet for sewing foot lifting*, page 27).

5.4 Adjusting the sewing foot pressure

Figure. 19: Adjusting the sewing foot pressure



(1) - Adjusting wheel

The numbers on the adjusting wheel (1) indicate the sewing foot pressure in N to (1 kg = approx. 10 N). The required sewing foot pressure required depends on the following parameters:

- Sewing speed
- Damping properties of the sewing material
- Number of layers of sewing material

Checking the correct setting

The sewing material may not drift during sewing at maximum speed. Do not set the sewing foot pressure higher than necessary, since otherwise the positions of the fabric layers in relation to each other may shift.

Setting steps

1. Use the adjusting wheel (1) to set the sewing foot pressure.
   - **To increase the sewing foot pressure**: Turn clockwise:
   - **To reduce the sewing foot pressure**: Turn counterclockwise:

6 Thread-guiding components

6.1 Setting the needle thread tension release

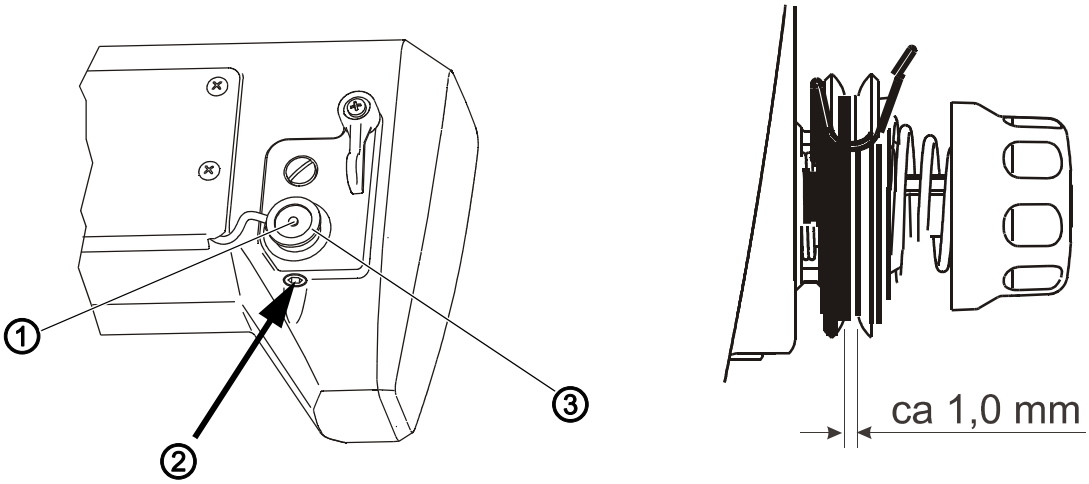
WARNING

Risk of injury!

Risk of crushing injuries and stab wounds from moving and sharp parts.

Switch off the machine before you set the needle thread tension release.

Figure. 20: Setting the needle thread tension release



(1) - Axis
(2) - Setscrew
(3) - Magnet

Checking the correct setting

Applying pressure to the axis (1) opens the tensioning discs by approximately 1 mm.

When the needle thread tensioner is closed and there is no thread between the tension discs, the axis (1) should have axial play of approximately 0.3 mm.

Setting steps

1. Loosen the setscrew (2).
2. Move the magnet (3) axially. When doing so, comply with the following:: Lifting approx. $1^{+0.3}$ mm.
3. Tighten the setscrew (2).

6.2 Setting the thread tensioning spring

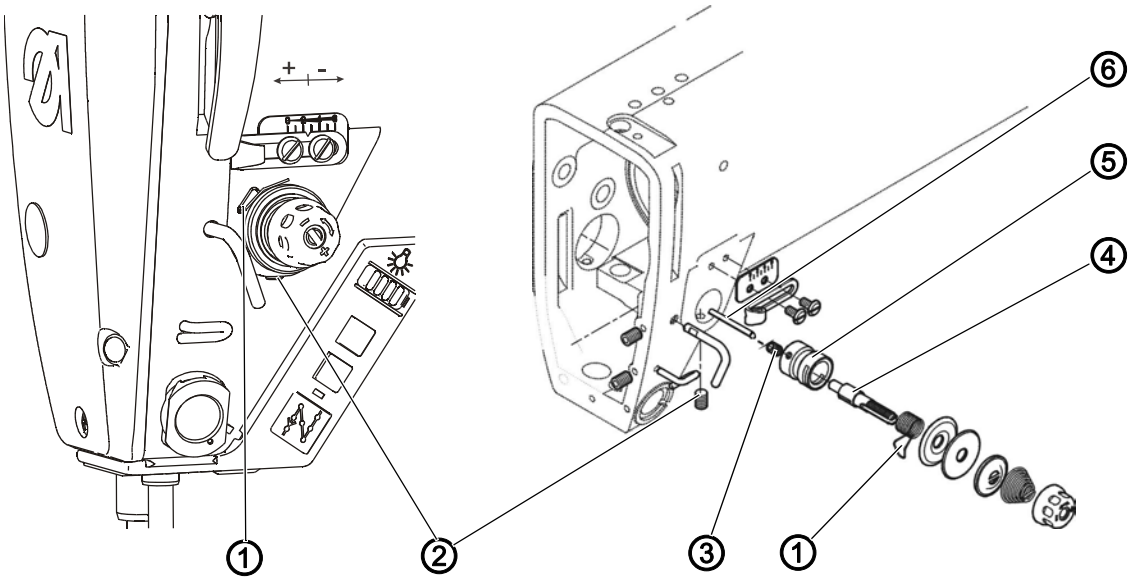
WARNING

Risk of injury!

Risk of crushing injuries and stab wounds from moving and sharp parts.

Switch off the machine before you set the thread tensioning spring.

Figure. 21: Setting the thread tensioning spring



(1) - Thread tensioning spring
(2) - Setscrew
(3) - Setscrew
(4) - Thread tensioning bolts
(5) - Socket
(6) - Release pin

Checking the correct setting

The thread tensioning spring (1) is supposed to hold the needle thread clamped at least until the tip of the needle has penetrated the material being sewn.

Spring tension setting steps

When removing the complete thread tension unit, ensure that the release pin (6) is not lost and that it is used again when the unit is re-installed.

1. Loosen the setscrew (2).
2. Pull out the complete thread tension unit.
3. Loosen the setscrew (3).
4. Set the spring tension by twisting the thread tensioning bolt (4).
   The force of the thread tensioning spring must be set according to the

quality and thickness of the sewing material.
It should be between 20 and 50 cN (1 cN = 1 g).

5. Tighten the setscrew (3).
6. Insert the thread tension unit together with the release pin (6).

Spring travel setting steps

1. Loosen the setscrew (2).
2. Turn the socket (5).
   The thread tensioning spring (1) must pretension the needle thread at least up to the point where the needle tip enters the sewing material.
   Recommended spring travel: 6.5 mm.
3. Tighten the setscrew (2).

6.3 Setting the thread regulator

WARNING

Risk of injury!

Risk of crushing injuries and stab wounds from moving and sharp parts.

Switch off the machine before setting the thread regulator.

The thread regulator determines the needle thread quantity to be guided around the hook. The required thread quantity depends on the thickness of the material to be sewn, thread strength, and stitch length.

Larger thread quantity for

- thick sewing material
- high thread strengths
- large stitch lengths

Smaller thread quantity for:

- thin sewing material
- low thread strengths
- small stitch lengths

Checking the correct setting

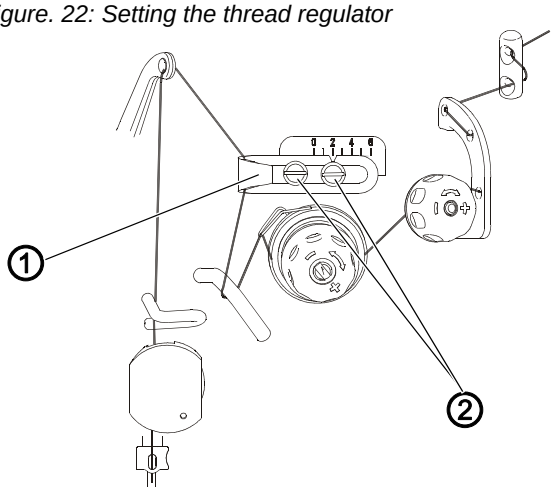
Tilt the machine and observe the thread cycle around the hook:

↳ The needle thread loop runs without surplus and without jumping over the largest hook diameter.

Faults caused by an incorrect setting

- Incorrect stitch pattern

Figure. 22: Setting the thread regulator



(1) - Thread regulator
(2) - Screws

Setting steps

1. Turn the handwheel and observe the cycle of the thread around the hook.
2. Loosen the screws (2).
3. Move the thread regulator (1):
   - **Larger thread quantity:** Slide the regulator to the left.
   - **Lower thread quantity:** Slide the regulator to the right.
4. Tighten the screws (2).

7 Setting the needle bar height

WARNING

Risk of injury!

Risk of crushing injuries and stab wounds from moving and sharp parts.

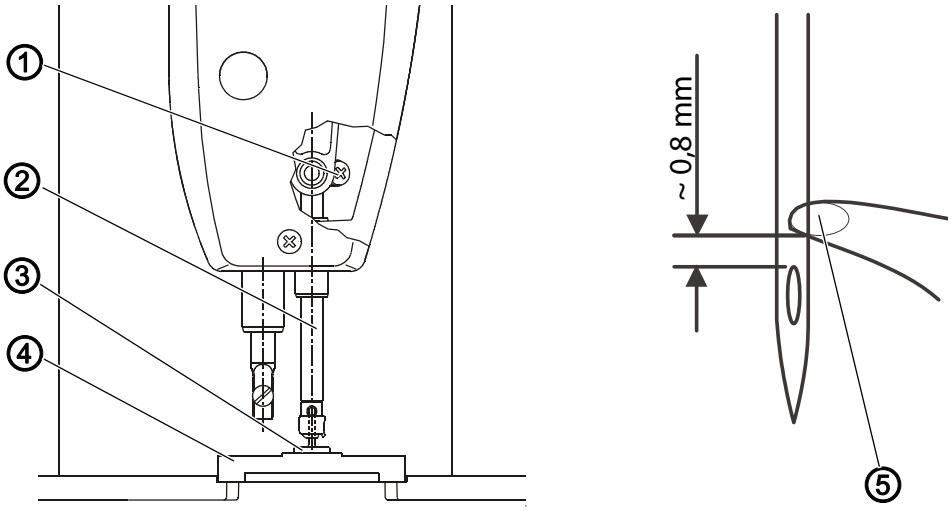
Switch off the machine before you set the needle bar height.

NOTE

Damage caused by the setting clamp is possible.

Never install a clamping block (loop stroke gage) on the coated needle bar.

Figure. 23: Setting the needle bar height



(1) - Screw
(2) - Needle bar
(3) - Gage
(4) - Gage
(5) - Hook tip

Checking the correct setting

There are two different needle bars for Class 281:

- Needle piston diameter of 1.62 mm, needle system DB x1
- Needle piston diameter of 2.0 mm, needle system 134

If the needle bar height must be set without using gages, a distance of ~0.8 mm between the bottom edge of the hook tip and the top edge of the needle eye must be used as a reference value.

Setting steps

1. Remove the throat plate and sewing foot.
2. Place the gage (4) on the throat plate support.

3. Insert the gage (3) in place of a needle into the needle bar needle until it reaches the limit stop. Ensure that the correct gage is used while doing so.
4. Lock the machine in place at position 6.
5. Loosen the screw (1).
6. Push the needle bar (2) downwards.
7. The gage (3) foot must be resting flush on the gage (4).
8. Tighten the screw (1).

Important

The needle attachment screw must be pointing to the right from the operator position.

9. Mount the throat plate and sewing foot.

8 Hook

8.1 Setting the loop stroke and hook tip distance

WARNING

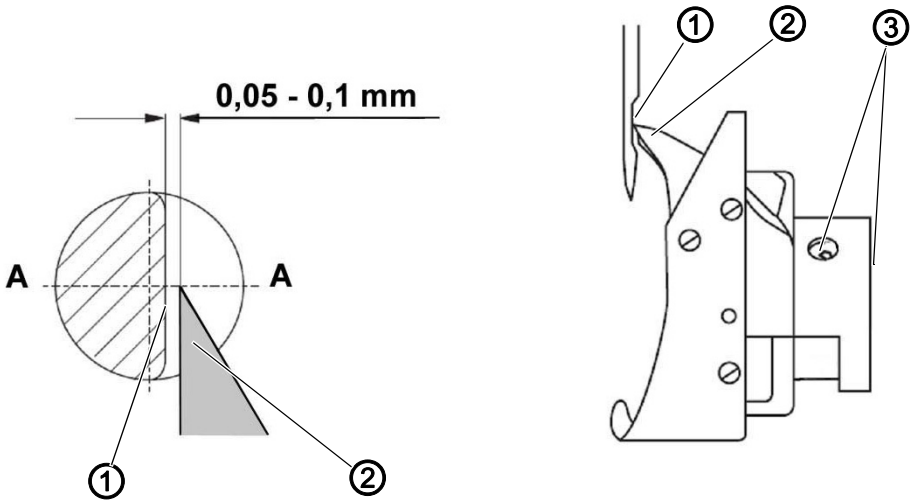
Risk of injury!

Risk of crushing injuries and stab wounds from moving and sharp parts.

Switch off the machine before you set the loop stroke and hook tip distance.

The loop stroke is the path of the needle bar from the lower dead center to the point where the hook tip (2) is at the center of the needle (line A-A). The loop stroke is 1.8 mm.

Figure. 24: Setting the loop stroke and hook tip distance



(1) - Groove for the needle
(2) - Hook tip
(3) - Screws

Checking the correct setting

When the machine is locked in position 1, the hook tip (2) is in the center of the needle. The lateral distance between the hook tip (2) and the groove for the needle (1) must be 0.05 to 0.1 mm.

Setting steps

1. Remove the sewing foot, throat plate and feed dog.
2. Insert the new needle.
3. Lock the machine in place at position 1.
4. Loosen the screws (3).
5. Set the hook tip (2) to the center of the needle.
   The distance between the hook tip (2) and the groove for the needle (1) must be 0.05 to 0.1 mm.
6. Tighten the screws (3).
7. Mount the sewing foot, throat plate and feed dog.

8.2 Aligning the bobbin housing support

WARNING

Risk of injury!

Risk of crushing injuries and stab wounds from moving and sharp parts.

Switch off the machine before you set the bobbin housing support.

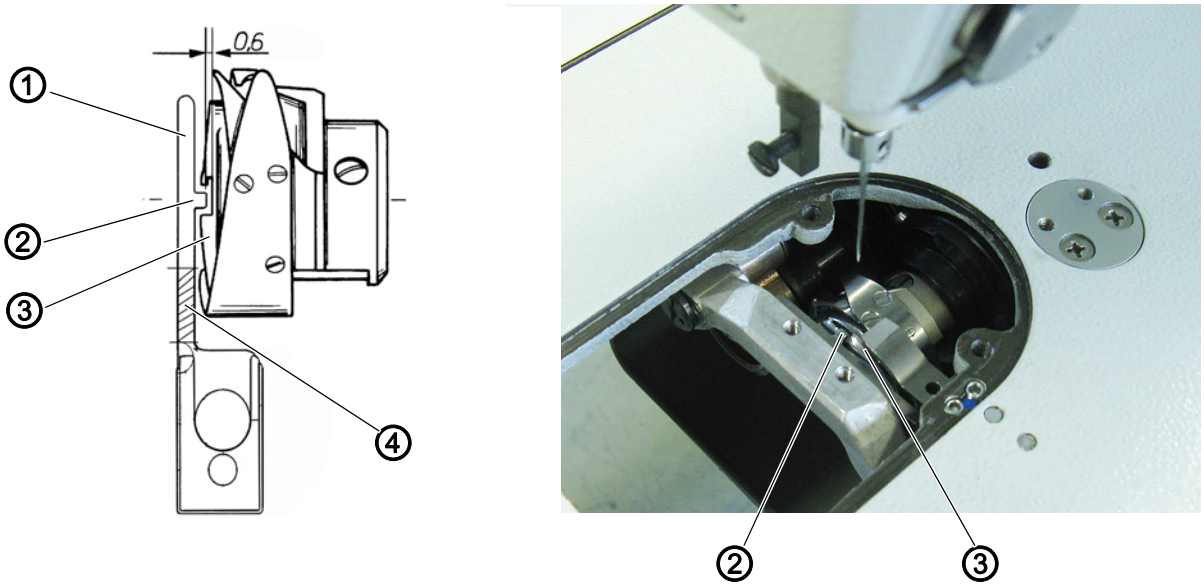
NOTE

There is a risk of breakage in the retaining collar area.

Only align the bobbin housing support in the shaded area.
Take great care while carrying out the alignment!

The bobbin housing support has been aligned accordingly at the factory. When the support is replaced, the new support must be set if required.

Figure. 25: Aligning the bobbin housing support



(1) - Bobbin housing support
(2) - Retaining collar
(3) - Bottom part of the bobbin housing
(4) - Alignment area

Setting steps

1. Remove the bobbin housing support (1).
2. Carefully align the bobbin housing support (1).
   The distance between the retaining collar (2) and the bottom part of the bobbin housing (3) should be 0.6 mm.
3. Align the bobbin housing support (1).

9 Thread cutter

The control cam determines the stroke and timing of the cutter movement. As a result, the timing is coordinated with the movement sequence of the needle.

The thread cutter is switched on electromagnetically.

9.1 Control cam for cutter movement

9.1.1 Setting the control cam position

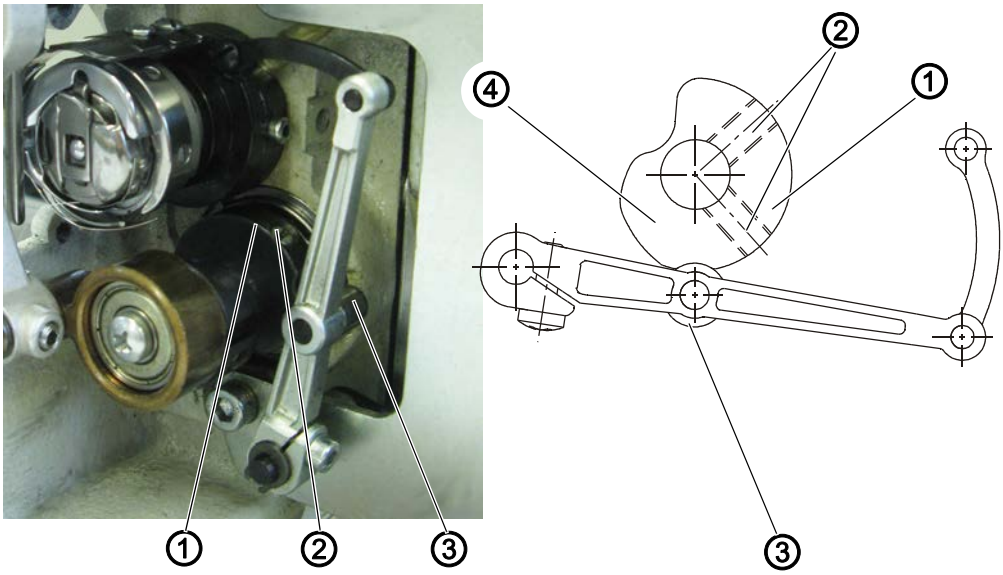
WARNING

Risk of injury!

Risk of crushing injuries and stab wounds from moving and sharp parts.

Switch off the machine before you set the control cam.

Figure. 26: Setting the control cam



(1) - Control cam
(2) - Screw
(3) - Roller
(4) - Recess

Checking the correct setting

In Position 4, the roller (3) must engage when pressed manually into the recess (4) of the control cam (1).

Setting steps

1. Lock the machine in place at position 4.
2. Loosen the screws (2).
3. Rotate the control cam (1) on the lower shaft.
   The roller (3) must engage when pressed manually into the recess (4) of the control cam (1).
4. Tighten the screws (2).

9.1.2 Setting the roller distance to the thread cutter curve

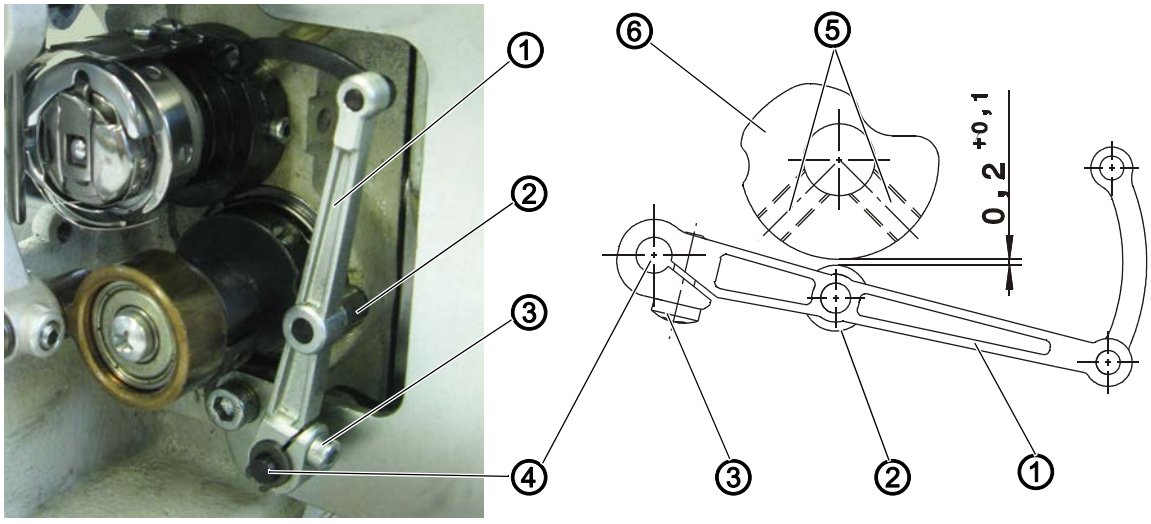
WARNING

Risk of injury!

Risk of crushing injuries and stab wounds from moving and sharp parts.

Switch off the machine before you set the control cam.

Figure. 27: Setting the roller distance to the thread cutter curve



(1) - Thread cutter lever
(2) - Roller
(3) - Screw
(4) - Shaft
(5) - Screws
(6) - Control cam

Checking the correct setting

In the outer stop position of the thread cutter lever (1), the roller (2) must have the following distance to the outer diameter of the control cam (6): $0.2^{+0.1}$ mm.
To do this, select the position of the curve between the two screws (5).

Faults caused by an incorrect setting

- Threads are not caught
- Threads are not cut

Setting steps

1. Turn the handwheel until the roller (2) is between the two screws (5) of the thread cutter curve.
2. Loosen the screw (3).
3. Rotate the thread cutter lever (1) on the shaft (4) so that the roller (2) has a distance of $0.2^{+0.1}$ mm to the outer diameter of the control cam (6).
4. Tighten the screw (3).

9.2 Setting the thread-pulling knife

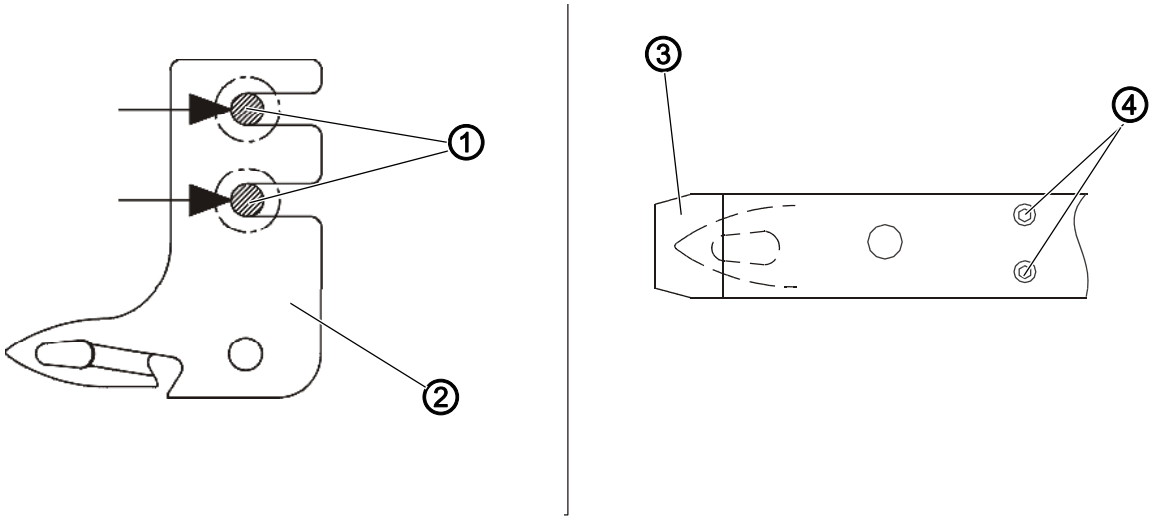
WARNING

Risk of injury!

Risk of crushing injuries and stab wounds from moving and sharp parts.

Switch off the machine before you set the cutter.

Figure. 28: Setting the thread-pulling knife



(1) - Screws
(2) - Thread-pulling knife
(3) - Counter-blade
(4) - Adjusting screws

Checking the correct setting

The thread pulling knife is resting on the two screws. At the same time, the thread pulling knife point has the correct position in the axial direction. An imaginary line in extension of the knife point is located in the middle of the center of needle and the hook tip.

Setting steps

1. Use the adjusting screws (4) to release the downforce pressure of the counter blade (3) against the thread pulling knife (2).
2. Swivel in the thread-pulling knife (2).
3. Loosen the screws (1).
4. Push the thread pulling knife (2) in against the screws (1) in the arrow direction.
5. Tighten the screws (1).
6. Check eccentric increase of the thread pulling knife (2).
7. Setting the counter-blade (📖 *9.3 Setting the counter-blade*, page 44).

9.3 Setting the counter-blade

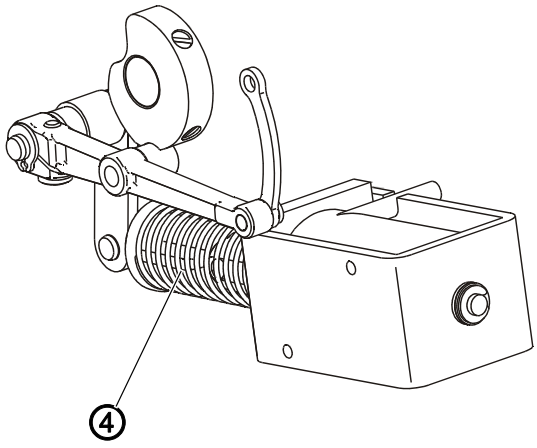
WARNING

Risk of injury!

Risk of crushing injuries and stab wounds from moving and sharp parts.

Switch off the machine before you set the cutters.

Figure. 29: Setting the counter-blade



(1) - Adjusting screws
(2) - Counter-blade
(3) - Thread-pulling knife
(4) - Spring

As far as possible, leave both knives in the machine while working on settings in the hook area. This saves unnecessary adjustments.

Resharpening the counter blade is only permissible under very restricted conditions. If the cutter loses too much length, no more cutting takes place. This **cannot** be compensated for by adjusting the thread-pulling knife.

Checking the correct setting

- The threads must be reliably cut using as little pressure as possible.

  ↳ Low cutting pressure reduces wear.

- Two of the thickest sewing threads are cut simultaneously.

Setting steps

1. Release the adjusting screws (1).
2. Manually swivel the thread pulling knife (3) forwards.
3. Position the counter blade (2) by screwing the screws (1) in against the thread pulling knife (3).
4. Place thread to be cut alternately to left and right.
5. Adjust the corresponding screw.
   If the built-in spring (4) no longer moves the cutting mechanism into the initial position, the cutting pressure is too high.
   In this case, replace the counter blade.

10 Setting the winder

WARNING

Risk of injury!

Risk of crushing injuries and stab wounds from moving and sharp parts.

Switch off the machine before setting the winder.

NOTE

Possible damage through moving the bobbin without performing sewing.

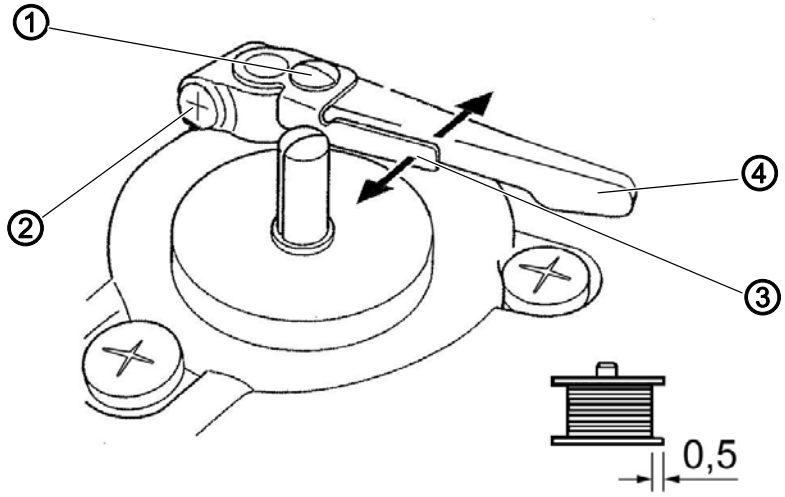
When running without sewing material, sewing feet and the bobbin capsule can be damaged in the hook.
Activate winder mode (🕮 *Operating Instructions*) a take the bobbin capsule out of the hook when you run the test winding process.

Correct setting

1. Winding empty bobbins (🕮 *Operating Instructions*).

↳ The winding process stops automatically if the bobbin is filled to approx. 0.5 mm under the edge of the winder.

Figure. 30: Setting the winder



(1) - Adjusting screw
(2) - Clamping screw
(3) - Thread guide plate
(4) - Actuating lever

Setting steps

Rough setting

1. Loosen the clamping screw (2).
2. Actuating lever (4) alignment:
   - **Smaller filling quantity:** Push towards the bobbin.
   - **Larger filling quantity:** Push away from the bobbin.
3. Tighten the clamping screw (2).

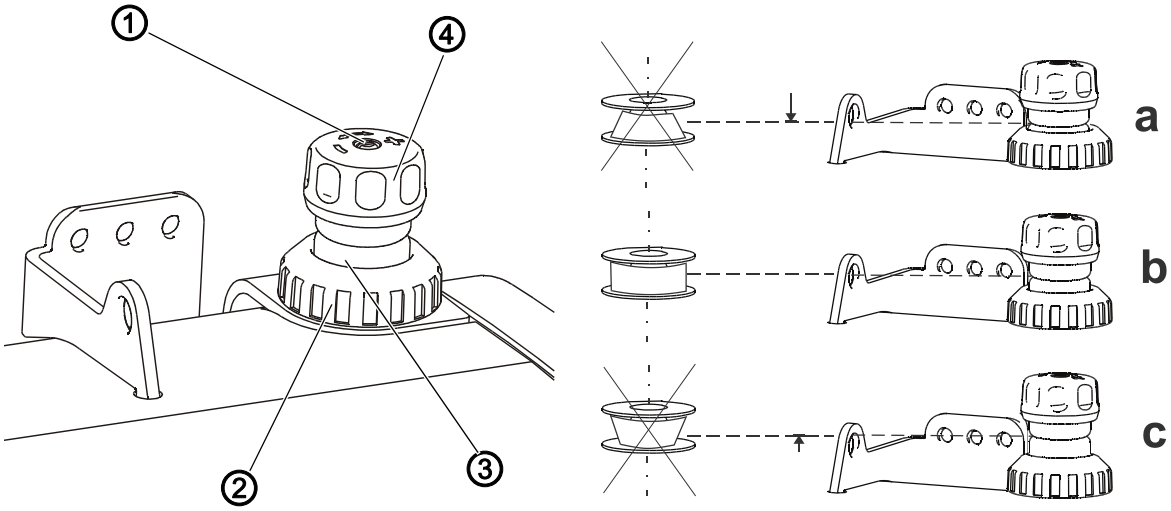
Fine adjustment

4. Loosen the adjusting screw (1).
5. Move the thread guide plate (3):
   - **Smaller filling quantity:** Push towards the bobbin.
   - **Larger filling quantity:** Push away from the bobbin.
6. Tighten the adjusting screw (1).

After disassembly of the actuating lever, presetting must be performed via the clamping screw.

10.1 Setting the winder winding form

Figure. 31: Setting the winder winding form



(1) - Guide pins
(2) - Knurled nuts
(3) - Gap
(4) - Setting button

Correct setting

The winding form is determined by the position of the gap (3) between the thread guide sleeves. It must be cylindrical in order to reach a maximum fill level.

- In case a, the gap is set too low.
- In case c, the gap is set too high.

Setting steps

1. Loosen the knurled nut (2).
2. Adjust the guide pins (1) by turning them axially using a screwdriver. When doing so, do not adjust the setting button (4).
3. Tighten the knurled nut (2).

10.2 Setting the winding tension

Correct setting

The correct tension during winding depends on the sliding properties and the thickness of the thread.

Faults caused by an incorrect setting

- Crimped seams
- Incorrect stitch pattern

Setting steps

1. Turn the setting button:
   - **Higher tension**: Turn it clockwise
   - **Lower tension**: Turn it counterclockwise

11 Setting the fan

The fan parameter is factory-set to 1 =

11.1 Activating/deactivating the fan

You activate/deactivate the fan as follows:

1. Use the control panel to select the parameter `o 13 00`, 🕮 *DAC basic/classic Operating Instructions*.

↳ 0 or 1 appears on the display.

2. Set the value to 0/1 = off/on.

↳ The fan is activated/deactivated.

11.2 Setting the fan

The fan can run in different operating modes:

- constant
- speed-dependent

Set the operating mode as follows:

Parameters	Specified value	Unit	Description
t 13 00	0	-	0 = fan runs continuously 1 = fan runs speed-dependently (t 13 01 and t 13 02 should then also be set)
t 13 01	2.5	s	Lag time of the fan
t 13 02	100	rpm	Speed for switching on the fan

12 Maintenance

12.1 Lubrication

WARNING

Risk of injuries due to contact with oil.

Contact with oil can cause irritation, rashes, allergies or skin injuries.

ALWAYS avoid long-term contact with oil.

ALWAYS thoroughly wash the affected areas if contact with oil occurs.

ATTENTION

Risk of environmental damage from oil.

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

Carefully collect waste oil and dispose of the waste oil and oil-contaminated machine parts in the legally prescribed manner.

12.1.1 Hook lubrication

Check the hook lubrication oil level once every week.

Required oil:

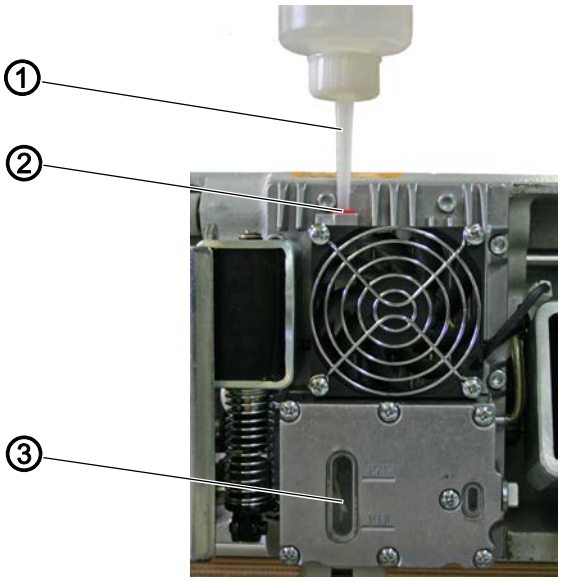
Only DA 10 or equivalent oil should be used for the hook, which has the following properties:

- Viscosity at 40°C: 10 mm²/s – ISO VG10

DA 10 can be obtained under the following part number at DA sales offices:

- 9047 000011 – 250 ml
- 9047 000012 – 1 l
- 9047 000013 – 2 l
- 9047 000014 – 5 l

Figure. 32: Hook lubrication



(1) - Oil filling vessel
(2) - Oil filling opening
(3) - Hook oil inspection glass

Correct setting

The oil level is centered between MIN and MAX on the oil inspection glass (3), which corresponds to approximately 60 ml of hook oil.

Checking the oil level

1. Switch off the machine at the main switch.
2. Dismantle the knee lever (see 🕮 *Operating Instructions*).
3. Tilt the machine upper section backwards.
4. Check the oil level in the inspection window (3).
5. Pour in oil through the filler opening (2) as required:

12.1.2 Setting the hook lubrication oil quantity

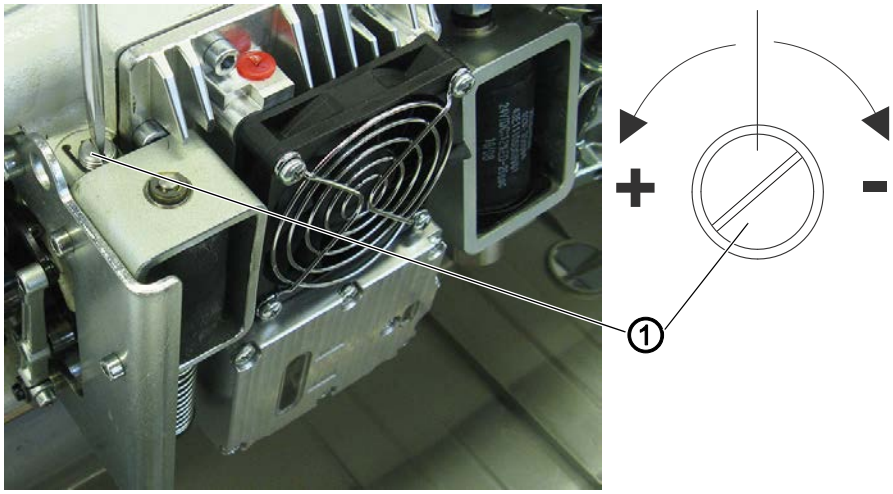
The hook is lubricated using an oil wick in a silicone hose, which leads from the hook oil reservoir to the spraying cone on the back of the hook.

A regulating screw is used to reduce the oil quantity. The regulating screw presses on the hose and restricts the oil quantity.

Correct setting

At maximum speed, a fine oil trace appears after 15 s above the hook on a strip of paper, which is placed over the throat plate cutout in place of the throat plate.

Figure. 33: Setting the hook lubrication oil quantity



(1) - Regulating screw

Setting steps

1. Dismantle the throat plate.
2. Dismantle the feed dog.
3. Remove the bobbin capsule.
4. Check the correct setting and adjust if necessary.

   Important

   The oil quantity is not reduced immediately after the screw has been turned, since the oil quantity that is located in the wick segment between the throttle point and the hook is consumed first.
   Meaningful testing cannot be performed until a few hours later.
5. Turn the regulating screw (1):
   Clockwise = less hook oil
   Anticlockwise = more hook oil
6. Install the throat plate, feed dog and bobbin capsules.

12.1.3 Gear lubrication

When the machine is delivered, the oil level is in the middle of the inspection glass (2). This filling is intended as a service life filling. Top up with gear oil in exceptional cases only.

Required oil:

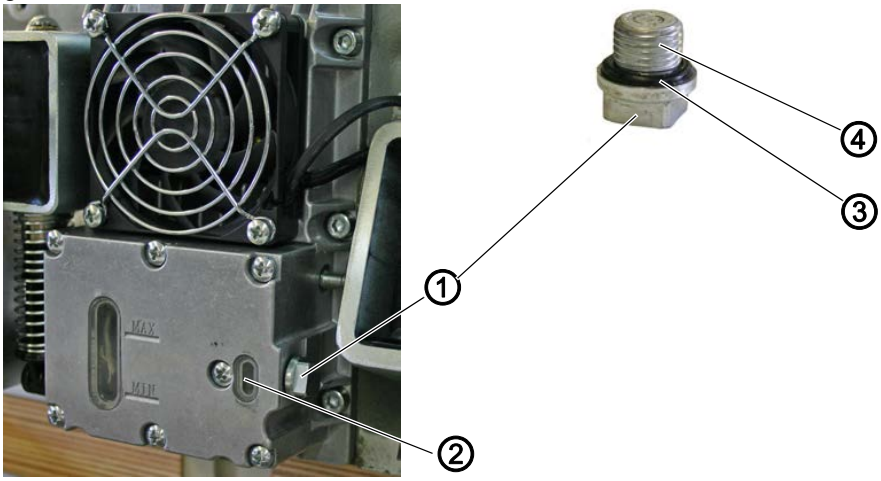
Only DA 32 gear oil with the following properties or an oil of equivalent quality may be used for the gear unit:

- Viscosity at 40°C: 32 mm²/s – ISO VG32

DA 32 can be obtained under the following part number at DA sales offices:

- 9047 000032 – 90 ml

Figure. 34: Gear lubrication



(1) - Locking bolt
(2) - Inspection glass
(3) - O-ring
(4) - Magnet

Correct setting

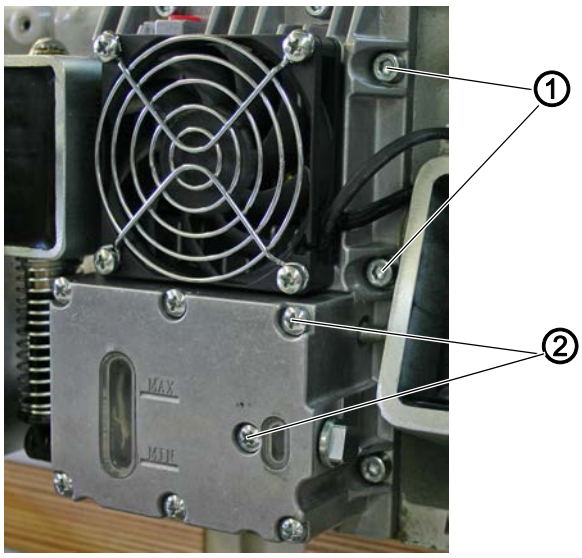
The oil level must be around the middle of the inspection glass (2).

Checking the oil level

1. Switch off the machine at the main switch.
2. Dismantle the knee lever (see 🕮 *Operating Instructions*).
3. Tilt the machine upper section backwards.
4. Check the oil level in the inspection window (2).
5. Unscrew locking bolt (1) together with O-ring (3) and check that the O-ring is still seated correctly on the locking bolt.
6. Clean any soling off the magnet (4).
7. Allow the oil to flow in slowly until it is visible in the center of the inspection glass (2), corresponding to approximately 100 ml of gear oil. If necessary, extend the filling tip with a hose section.
8. Screw in the locking bolt (1) and tighten.

12.1.4 Screw torques

Figure. 35: Screw torques



(1) - Gear unit cover screws (10x)

(2) - Hook oil cover screws (7x)

- Maximum torque for screws on the gear unit cover: 3 Nm
- Maximum torque for screws on the hook oil cover: 1.5 Nm

12.2 Cleaning

Remove lint and thread remnants after every 8 hours of operation using a compressed air gun or a brush.

Areas that need to be cleaned particularly thoroughly:

- Hook
- Throat plate
- Handwheel
- Fan (on the gear unit cover)

The 🕮 *Operating Instructions* describes this cleaning work.

NOTE

Damage to the paintwork due to solvent-based cleaners.
Only use solvent-free substances for cleaning.

13 Appendix

Figure. 36: Circuit diagram 281

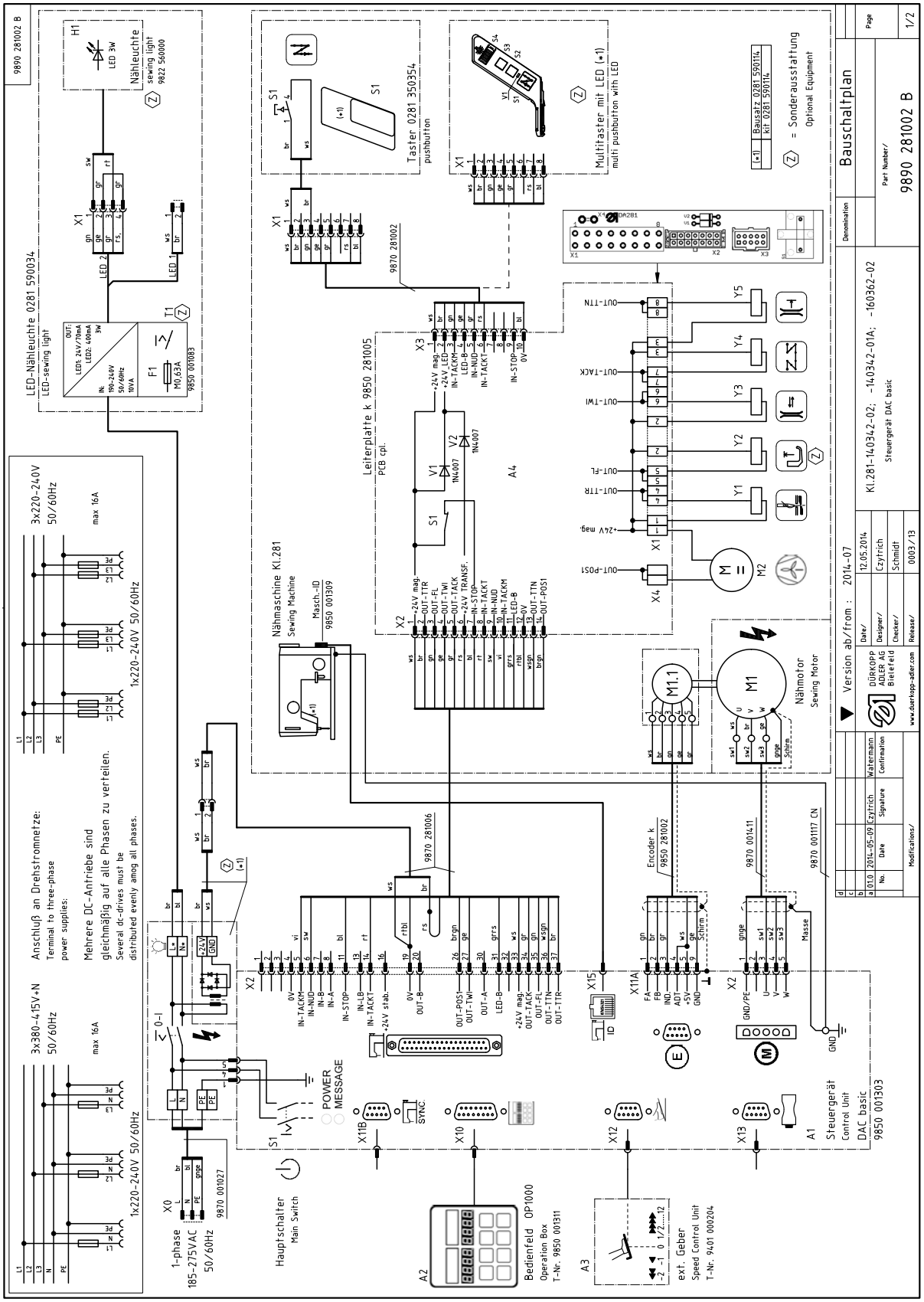
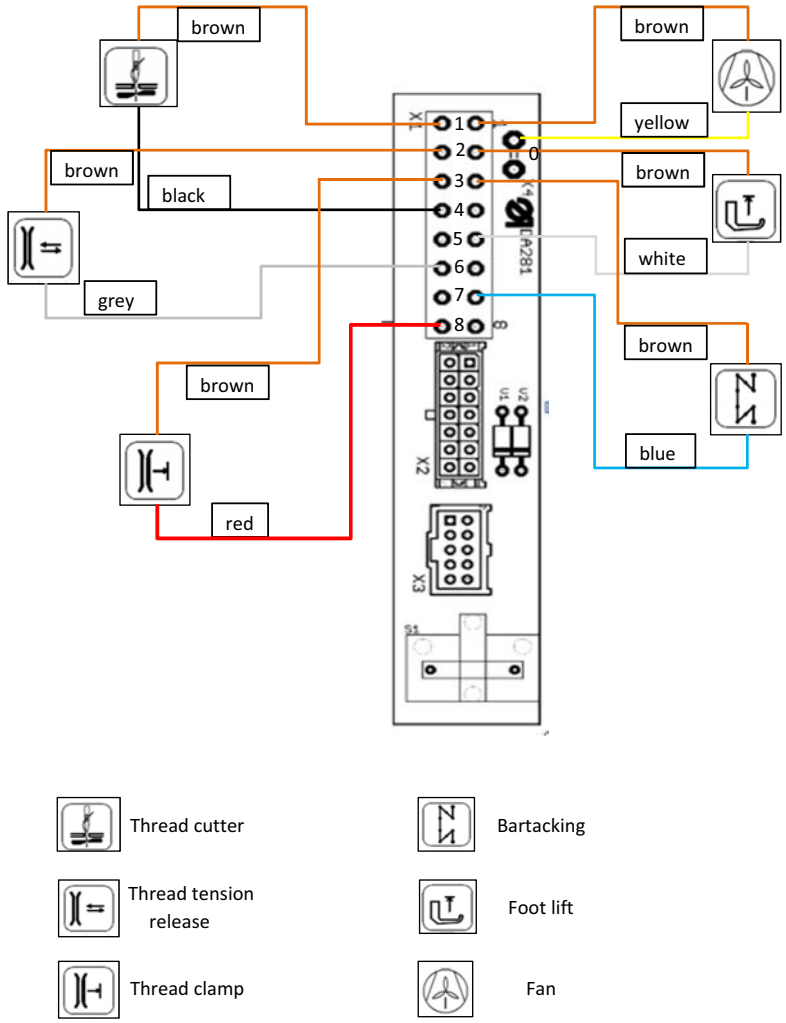


Figure. 37: Circuit diagram 281 in detail



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