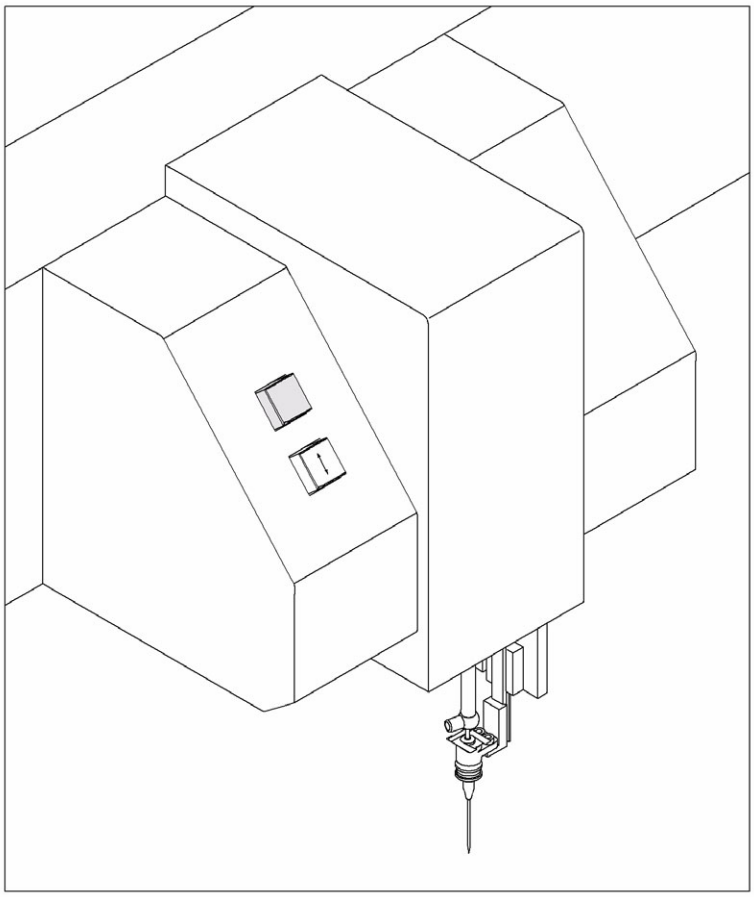
Operator’s guide



K head

for Chain and Moss Stitch

Version 1.5

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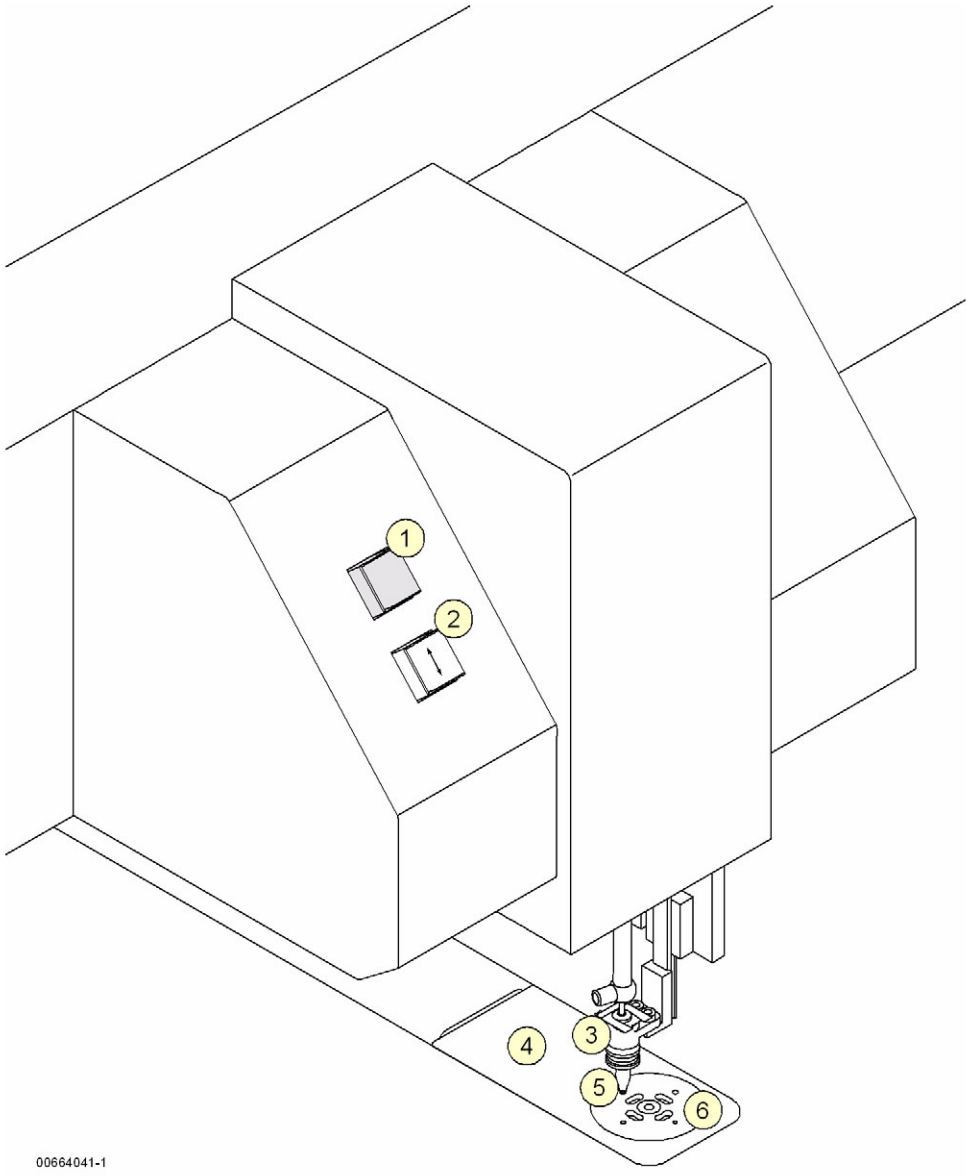
Contents

1. Embroidery head diagram

1.1 K head and stitch plate

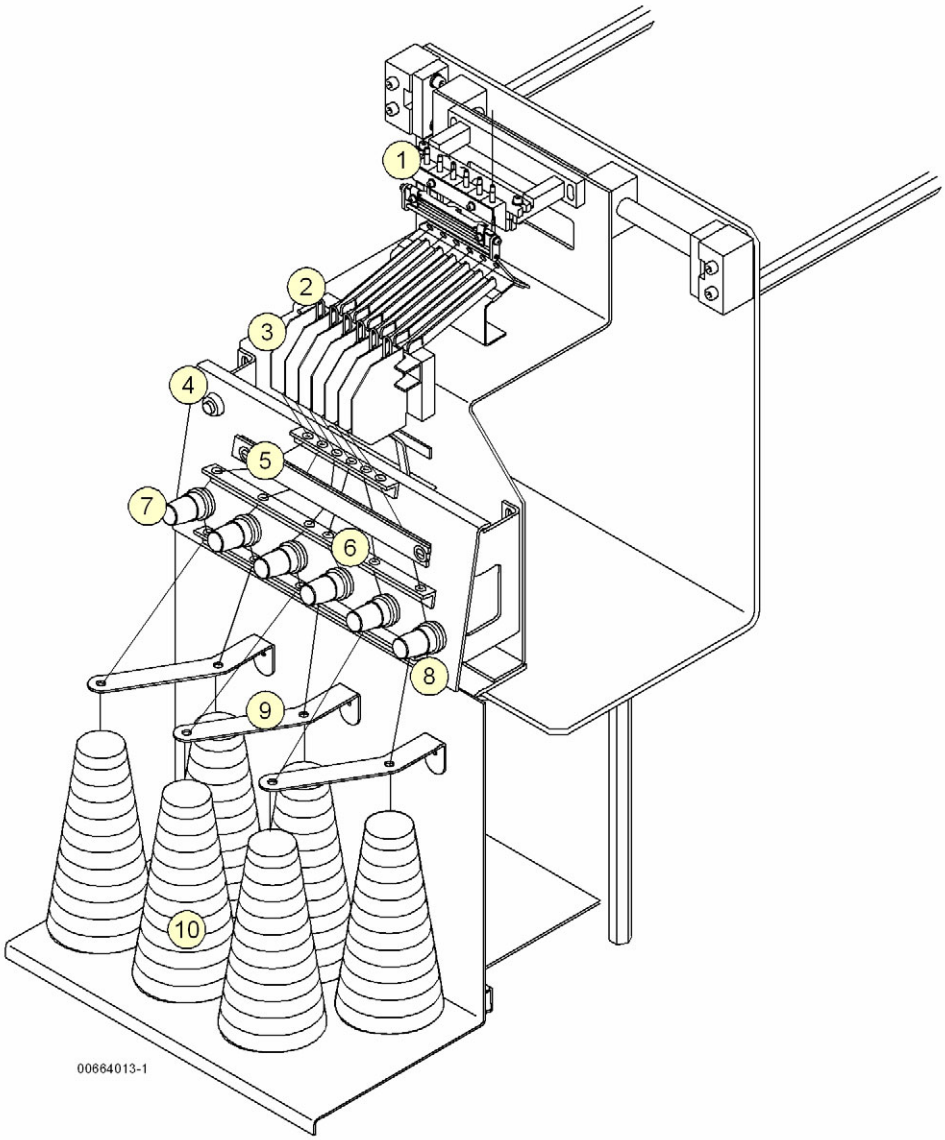
Figure 1.1:
K head and stitch plate
(illustrated:
JCK 0100-500)



(1) Embroidery head button
(2) Arrow button
(3) Presser foot
(4) Stitch plate
(5) Presser foot insert with needle
(6) Stitch plate insert

1.2 Yarn rack and color changer

Figure 1.2:
K head, threading
(illustrated:
JCK 0100-500)



(1) Injector nozzles
(2) Thread extractor
(3) Separators
(4) Jet button
(5) Plush strip
(6) Guide rail (top)
(7) Tension regulator
(8) Guide rail (bottom)
(9) Thread guide
(10) Cone

2. Operation

2.1 Operating elements

NOTE

The operating elements described in this chapter are illustrated and their locations are shown in the chapter entitled Embroidery head diagram.

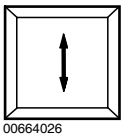
This chapter provides an overview of the embroidery machine's operating elements.

2.2 Head buttons

Arrow button

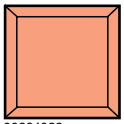
DANGER

When the arrow button is pressed, all the components move at high speed to the embroidery position.


00664026

Pressing this button switches off all the motors, so that the needle and presser foot etc. can be moved as desired, typically if the needle or presser foot insert is to be changed . Once the arrow button has been pressed, the lamp in the embroidery head button flashes and the machine cannot be started.

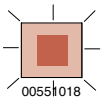
Embroidery head button


00664032

Pressing this button switches the embroidery head on and off.

Switching embroidery head on and off (K head)

- Press the embroidery head button only when the machine is stationary.

Embroidery head switched on	Embroidery head button illuminated	 00551018
Embroidery head switched off	Embroidery head button not illuminated	 00551019

When the embroidery head is switched off, the needle remains in the rest position (needle fully raised) while embroidering is taking place.

Indication of a thread break

A thread break at an embroidery head is indicated by the lamp in the embroidery head button flashing:


00264096

The thread break indicator is cancelled once the fault has been repaired and the machine is restarted with the Start key. The embroidery head buttons are again illuminated at all the heads that are switched on.

3. Preparing for embroidering

This chapter describes all the general tasks that are to be performed before embroidering. These are the fundamental operations that the user performs after faults as well (e.g. needle changes and threading the machine).

DANGER

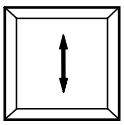
To prevent injury, use pliers or a needle inserter to insert the embroidery needle!

DANGER

To prevent injury, use a tool (e.g. tweezers) to thread the embroidery needle!

3.1 General

CAUTION



00664026

For safety reasons when working on the K head (e.g. exchanging the needle or presser foot insert, rotating the stitch plate etc.), it is essential that you press the arrow button on the head so that all the motors are switched off and the machine cannot be started inadvertently.

Check: the lamp in the embroidery head button flashes when the arrow button is switched on.

3.1.1 Before embroidering for the first time

Check operating pressures

The pneumatic system is set at the factory to operating pressures of 4.0 bar and 6.0 bar. In the unlikely event of the two pressure gauges on the conditioning unit showing other values once the machine is installed and switched on, reset the pressures.

Adjusting operating pressures

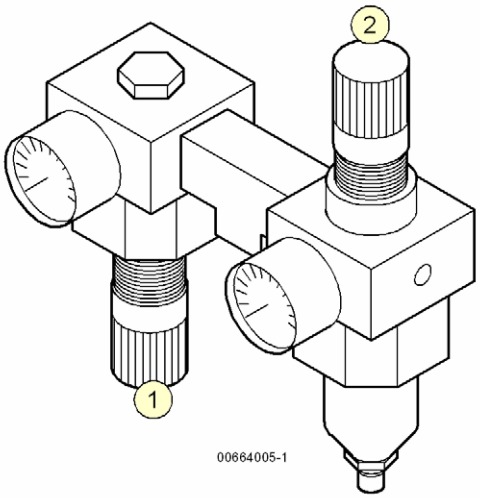


Figure 3.1: Adjusting operating pressures

- Pull out knob (2) until the orange marking becomes visible.
- Rotate knob (2) clockwise to increase the pressure.
- Push knob (2) back in to lock it.
- Repeat the procedure with knob (1).

Draining off condensate

CAUTION

Draining the condensate is a manual operation.

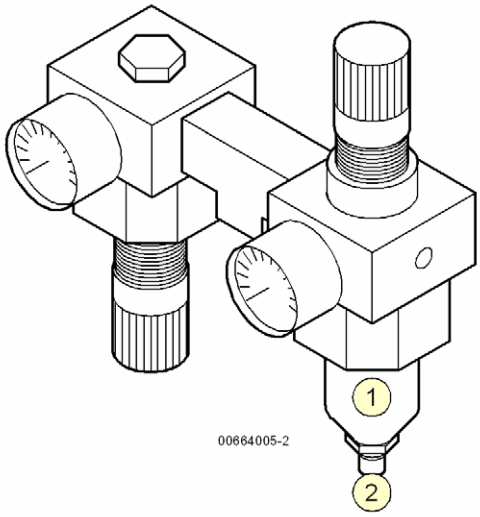


Figure 3.2:
Condensate, draining off

The bottom part of the conditioning unit consists of a transparent collecting vessel (1) for expelled water. This condensate is automatically expelled and has to be let off via the drain screw (2) at the lowest point of the vessel; water otherwise allowed to enter the solenoids and cylinders would cause malfunctions and severe corrosion.

3.2 Exchanging needle

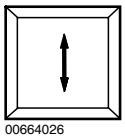
CAUTION

If the needle bar does not come to rest in a suitably high position, please notify the ZSK customer service department.

Removing needle

NOTE

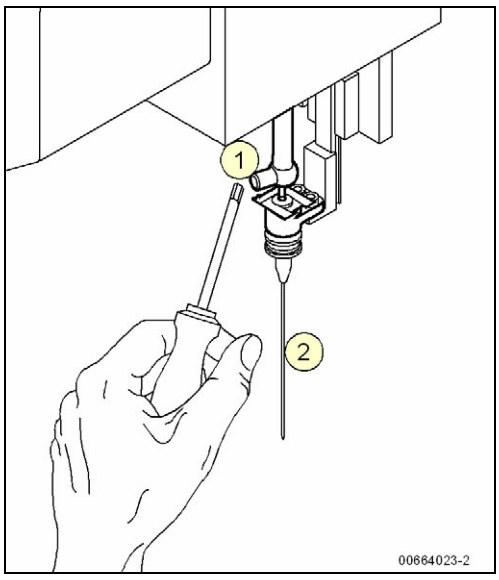
A needle can be removed from the needle bar only if it is positioned at a sufficient height above the stitch plate. If the machine is stationary, the needle bar is automatically in a suitable position for changing the needle.



- Press the arrow button on the K head.

  ⇒ The lamp in the embroidery head button flashes; the machine **cannot** be started inadvertently.

Figure 3.3:
Fitting the needle



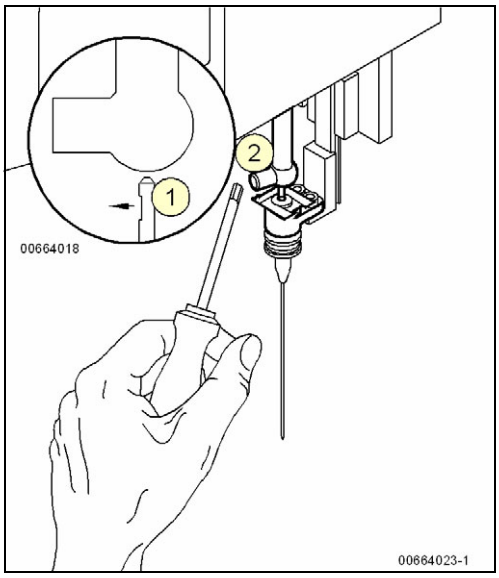
- Slacken off the screw in needle holder (1).
- Remove needle (2).

Needle, inserting

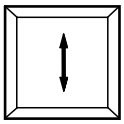
NOTE

When inserting the needle, make sure that the flat face of needle (1) is facing the screw in needle holder (2).

Figure 3.4:
Needle holder with needle



- Insert needle.
- Tighten screw (approx. 70 cNm).


00664026

- Press the arrow button on the K head.

  ⇨ The lamp in the embroidery head button stops flashing; the machine can be restarted.

3.2.1 Using a different needle size

If you intend to work with a different sized needle, you may have to exchange the presser foot insert as well.

Exchanging presser foot insert

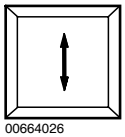
NOTE

Select the presser foot insert that matches the needle size. (e.g. needle 100 Nm – presser foot insert 1.0 mm)

Presser foot insert/needle combination

Figure 3.5:
Combination of presser foot insert/needle

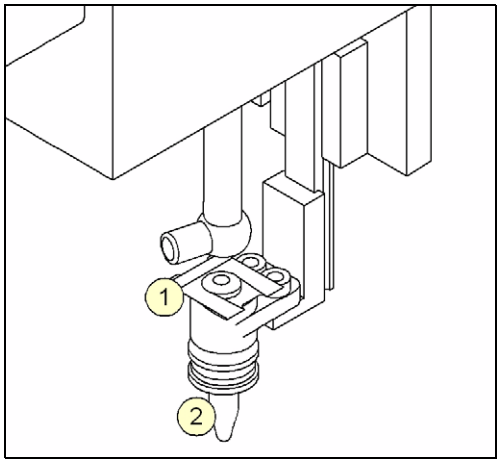
Needle / Insert	70 Nm	80 Nm	90 Nm	100 Nm	110 Nm	120 Nm
0,8	X	X				
1,0			X	X		
1,2					X	X



- Press the arrow button on the K head.

  ⇒ The lamp in the embroidery head button flashes; the machine **cannot** be started inadvertently.

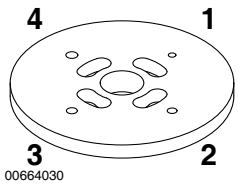
Figure 3.6:
Exchanging presser foot insert



- Remove needle.
- Lift the raised side of keeper (1) and remove.
- Remove presser foot insert (2).
- Insert a different sized presser foot insert.
- Reengage the keeper.
- Insert the new needle as described above.

Stitch plate insert – selecting hole size

NOTE



Select the appropriate stitch plate insert hole size to suit the material and design.

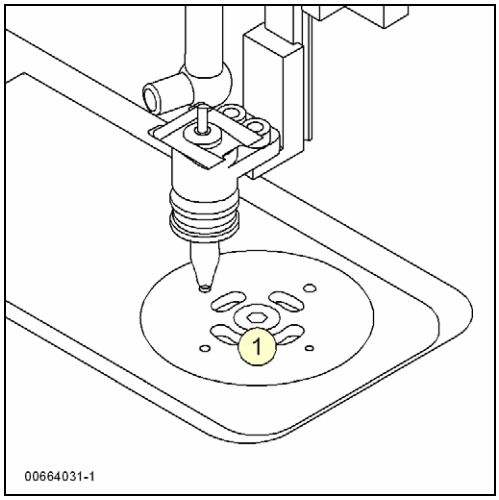
Rudimentary designs and coarse materials – large hole size
Delicate designs and fine materials – small hole size

Hole size 2 (ø 1.8 mm) is suitable for most applications.
In order to use the selected stitch plate hole size, you may have to rotate the stitch plate insert to the correct position.

Hole	ø in mm
1	1,4
2	1,8
3	2,0
4	2,2

Rotating stitch plate insert

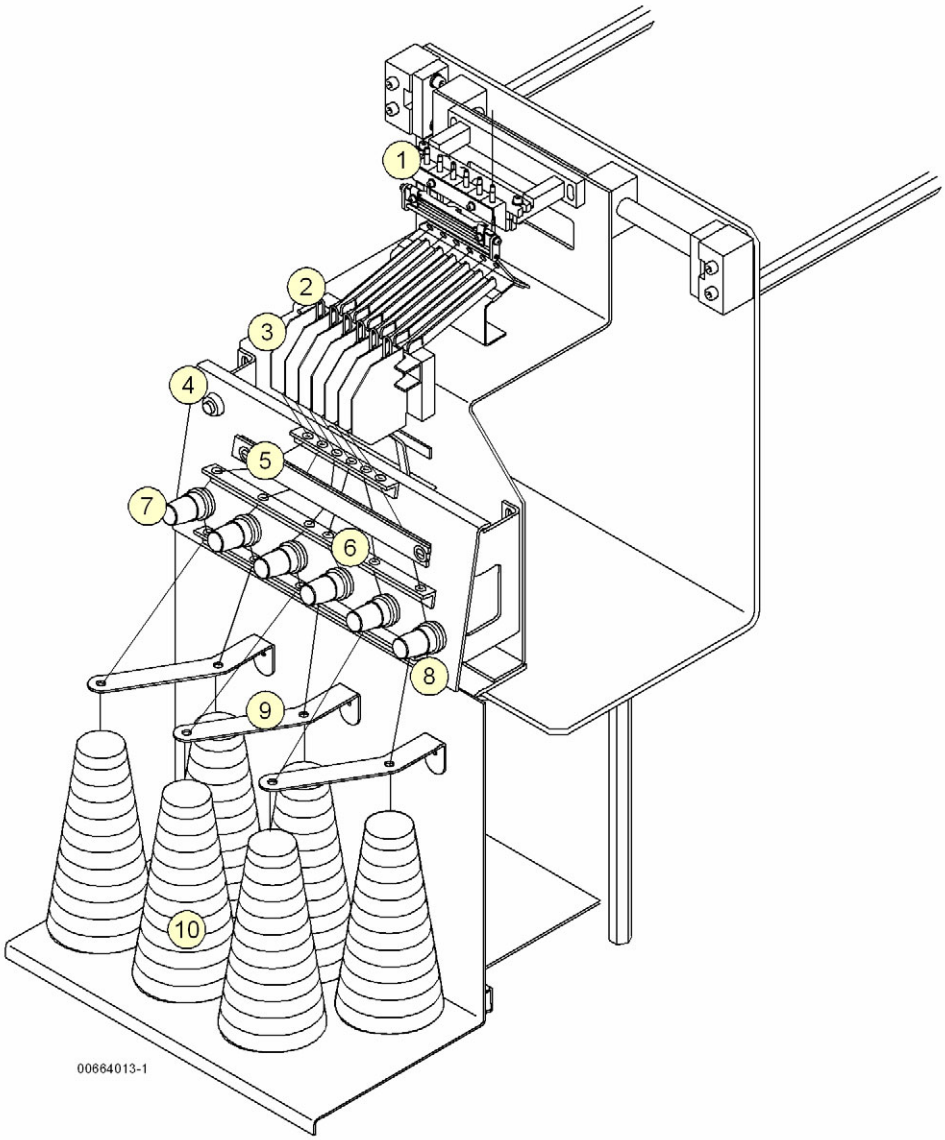
Figure 3.7:
Rotating stitch plate insert



- Slacken off screw (1).
- Rotate the stitch plate insert until the desired hole is at the back.
- Center the hole underneath the needle.
- Tighten the screw.

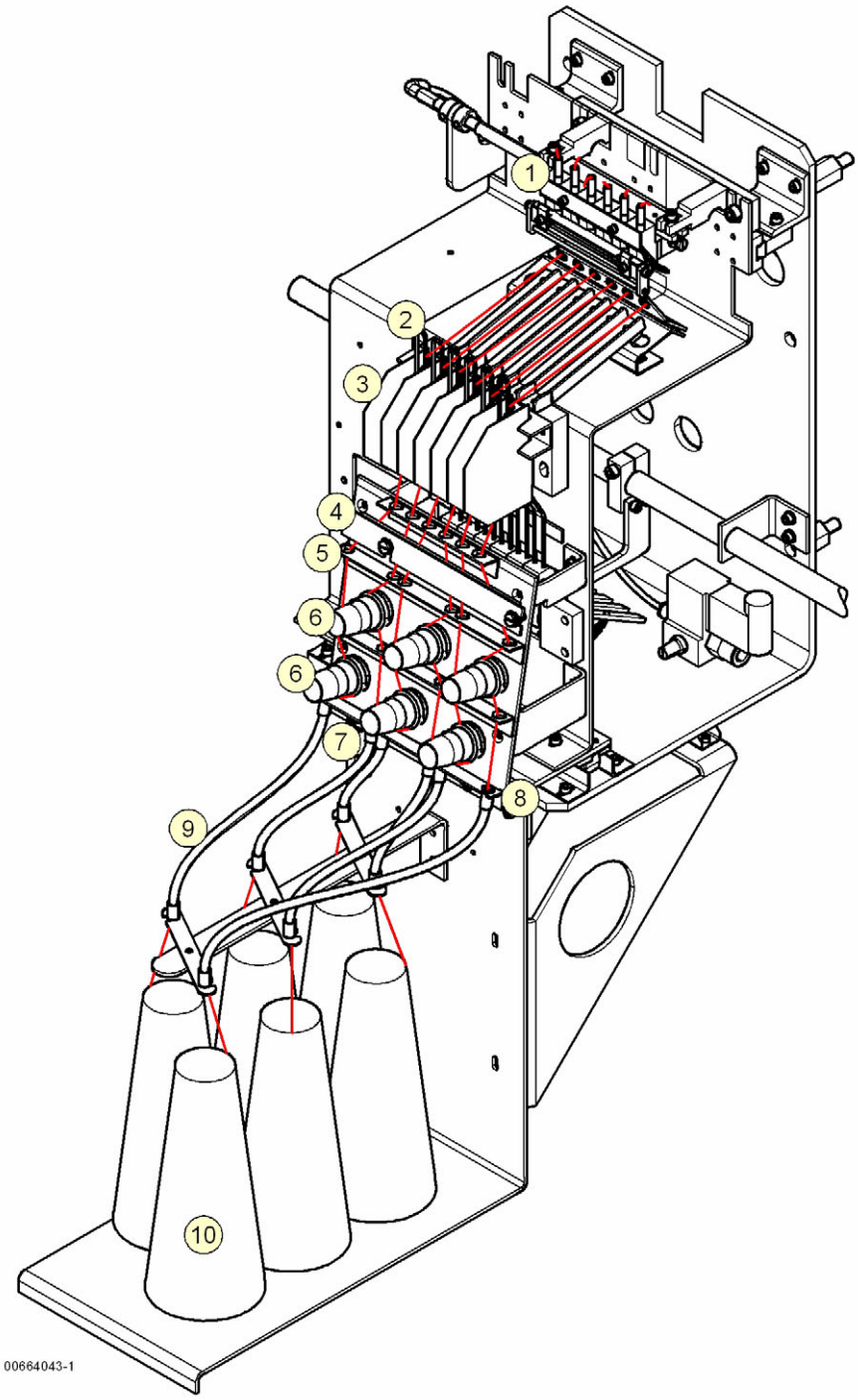
3.3 Threading

Figure 3.8:
K head,
threading (illustrated:
JCK 0100-500)



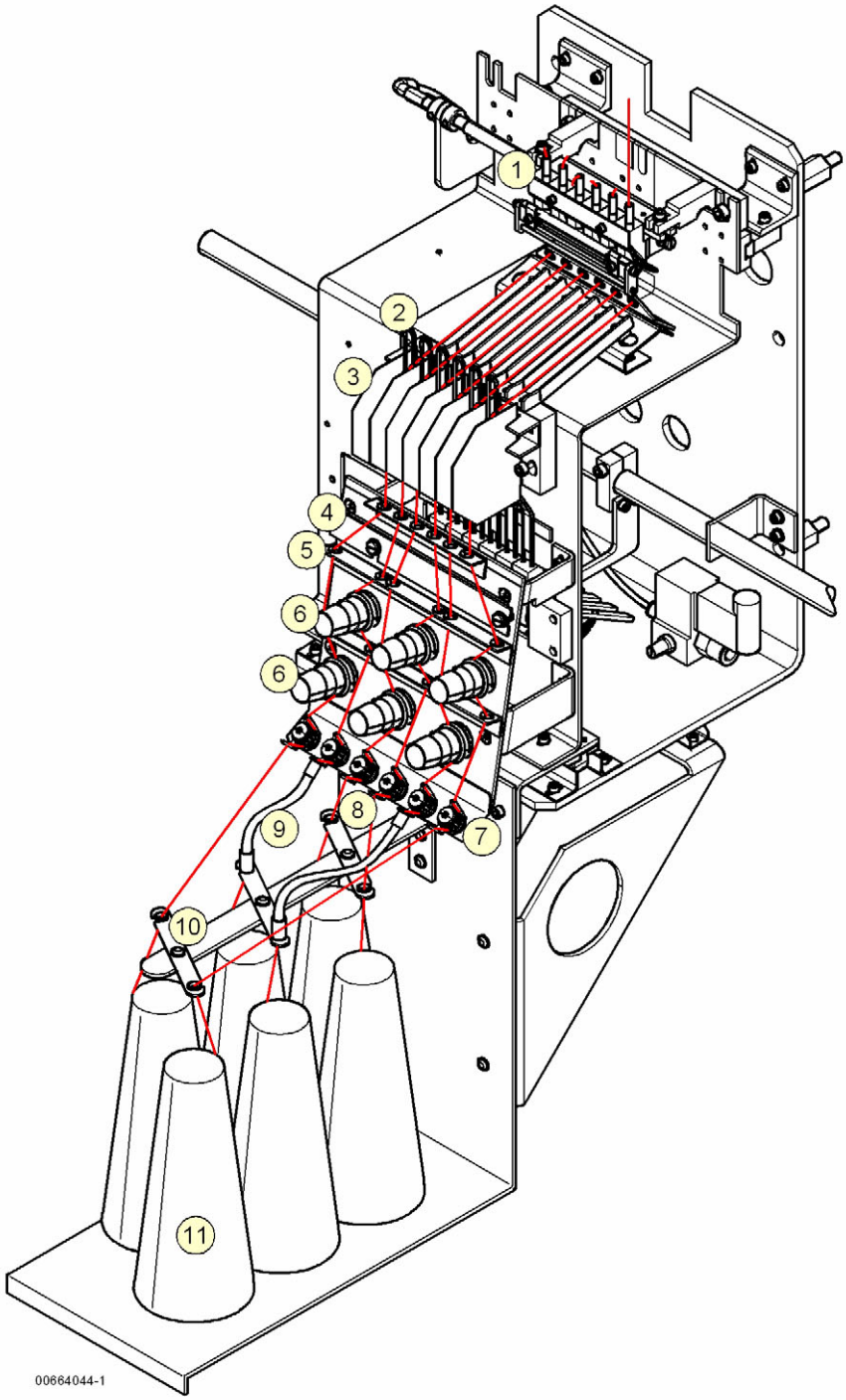
(1) Injector nozzles
(2) Thread extractor
(3) Separators
(4) Jet button
(5) Plush strip
(6) Guide rail (top)
(7) Tension regulator
(8) Guide rail (bottom)
(9) Thread guide
(10) Cone

Figure 3.9:
K head,
threading (illustrated:
JCH 0309-550)



(1) Injector nozzles
(2) Thread extractor
(3) Separators
(4) Plush strip
(5) Guide rail (top)
(6) Tension regulator
(7) Jet button
(8) Guide rail (bottom)
(9) Thread guide
(10) Cone

Figure 3.10:
K head,
threading with pretension regulator
(illustrated JCH 0309-550)



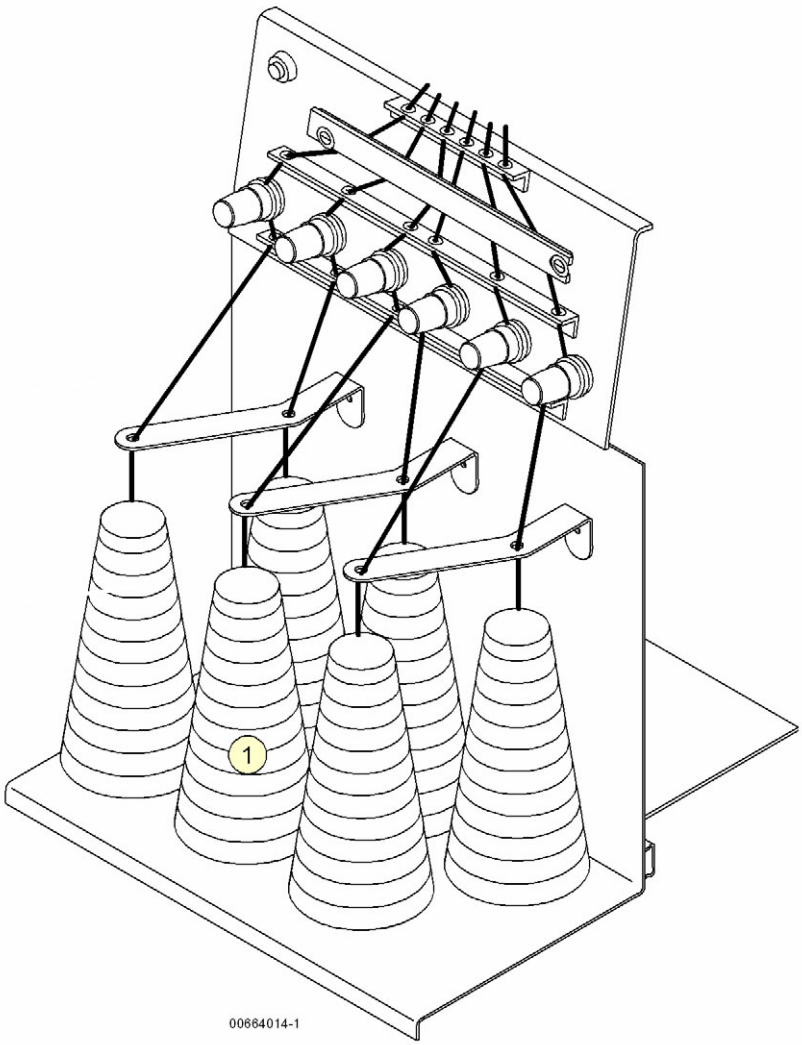
(1) Injector nozzles
(2) Thread extractor
(3) Separators
(4) Plush strip
(5) Guide rail (top)
(6) Tension regulator
(7) Pre-tension regulator
(8) Jet button
(9) Guide tube
(10) Thread guide
(11) Cone

3.4 Filling yarn rack

The yarn rack accepts up to 6 cones per embroidery head. Arrange the train of guide elements according to *Fig. 3.11* so that the thread is taken off with as little abrasion as possible. Like the embroidery heads, the pegs on the yarn rack are counted from right to left.

3.4.1 Variant 1:

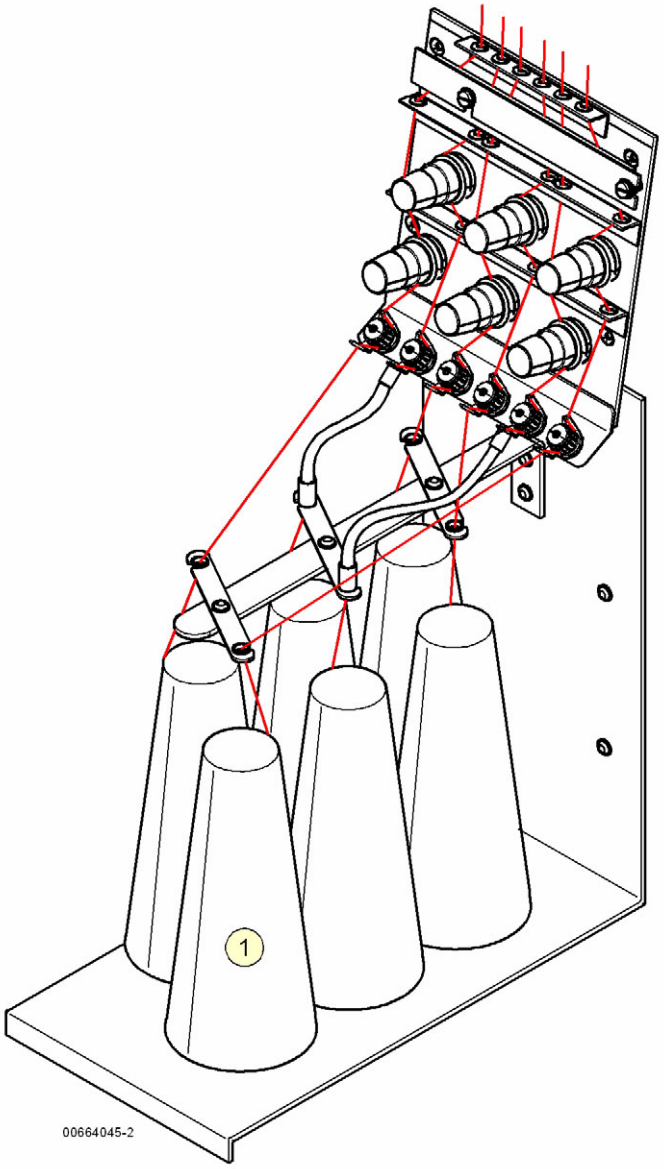
Figure 3.11:
Filling yarn rack
(illustrated: JCK 0100-500)



- Place cones (1) on the relevant pegs of the yarn rack.

3.4.2 Variant 2:

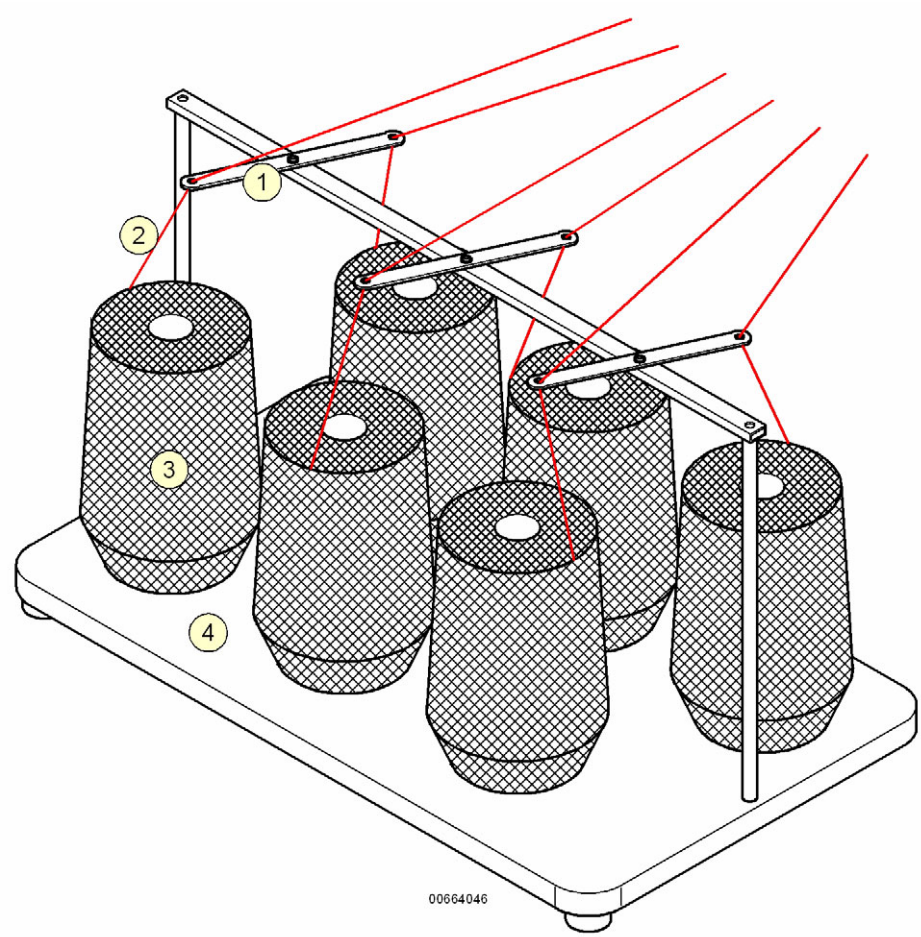
Figure 3.12:
Filling yarn rack
(illustrated: JCH 0309-550)



- Place cones (1) on the relevant pegs of the yarn rack.

3.4.3 Variant 3: Optional yarn rack for large cones up to D=200 mm

Figure 3.13:
Filling optional yarn rack



(1) Thread guide
(2) Embroidery yarn
(3) Cone
(4) Base plate

- Place cones (3) on the relevant pegs of the yarn rack.

NOTE

A further description of threading the embroidery yard in conjunction with the optional yarn rack are contained in Chapter 3.5.2 Threading main tension regulator (variant 2), starting at section Threads 1-3-5.

3.5 Threading embroidery yarn

The yarn is threaded first through the main tension regulator, and then through the yarn extractor; from here it is forced through the injector nozzles by air once the jet button is pressed.

3.5.1 Threading main tension regulator (variant 1)

- Run the ends of the threads off the cone and up vertically before passing them through the appropriate eyes (6).
- Pass the end of the thread through the bottom guide rail (5).

Figure 3.14:
Embroidery yarn, threading main tension regulator

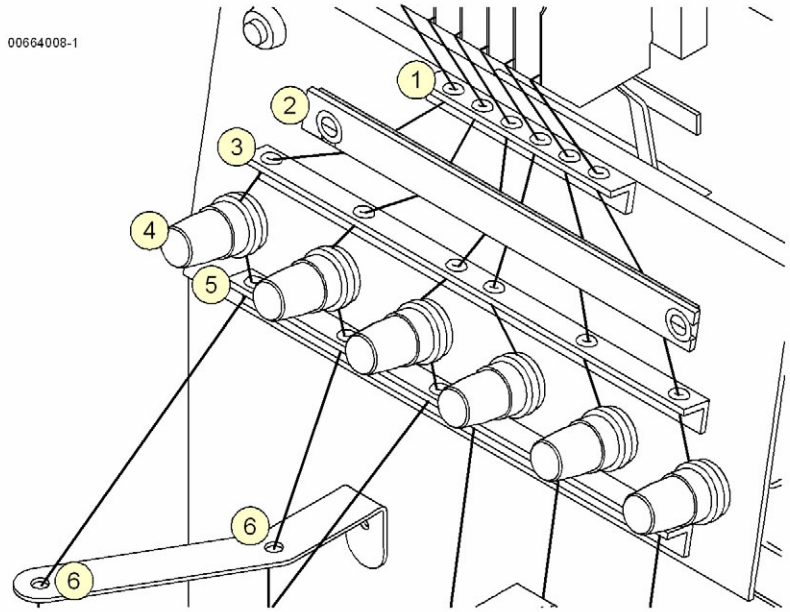
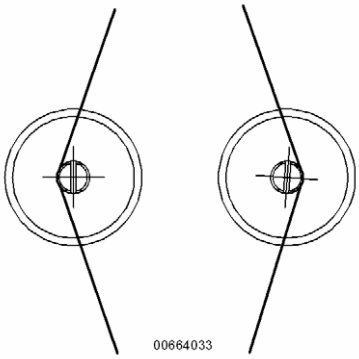


Figure 3.15:
Tension regulator, schematic



- Run threads 1-2-3 clockwise and threads 4-5-6 counter-clockwise around tension regulator (4).

- Run the threads up through the eyes in center guide rail (3).
- Pass the threads behind plush strip (2).
- Pass the threads through the eyes in top guide rail (1).

3.5.2 Threading main tension regulator (variant 2)

- Run the ends of the threads off cones 1-3-4-6 and up vertically before passing them through the appropriate eyes (8).
- Run the ends of the threads off cones 2-5 and up vertically before passing them through the appropriate tube inlets (7).

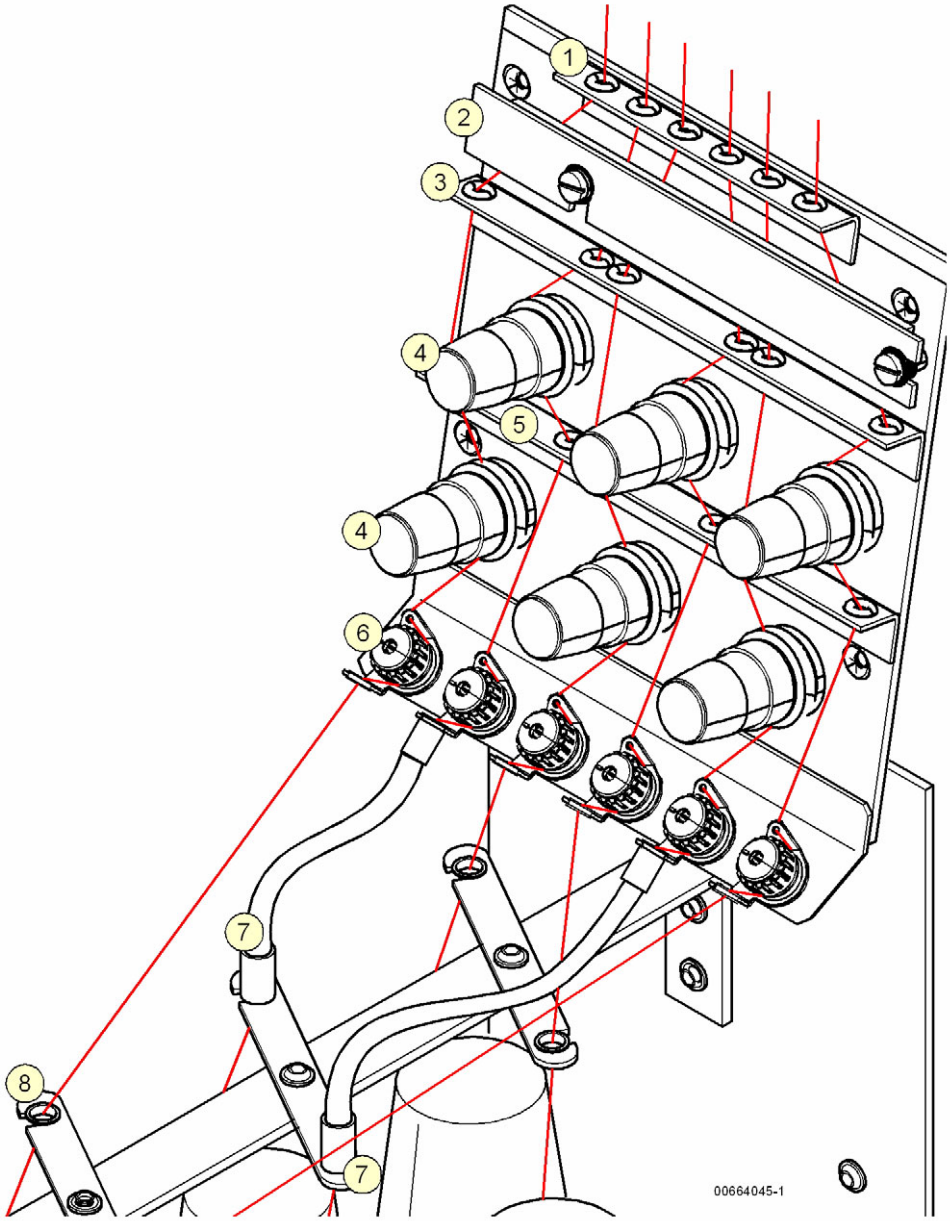
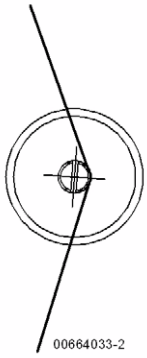


Figure 3.16:
Threading main tension regulator (illustrated JCH 0309-550)

Threads 1-3-5

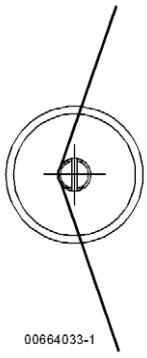
Figure 3.17:
Pretension regulator, schematic



- Feed the ends of the threads through the bottom deflector of pretension regulator (6).
- Run the threads **clockwise** around pretension regulator (6).
- Feed the ends of the threads through the top deflector of pretension regulator (6).

- Pass threads 1-3-5 through bottom guide rail (5).

Figure 3.18:
Tension regulator, schematic

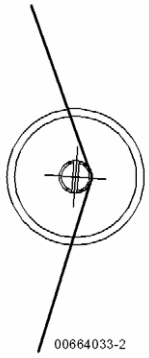


- Run the threads **counter-clockwise** around tension regulator (4).

- Pass threads 1-3-5 through top guide rail (3).
- Pass threads 1-3-5 behind plush strip (2).
- Pass threads 1-3-5 through the eyes in top guide rail (1).

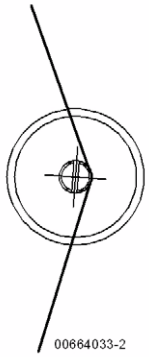
Threads 2-4-6

Figure 3.19:
Pretension regulator, schematic



- Feed the ends of the threads through the bottom deflector of pretension regulator (6).
- Run the threads clockwise around pretension regulator (6).
- Feed the ends of the threads through the top deflector of pretension regulator (6).

Figure 3.20:
Tension regulator, schematic



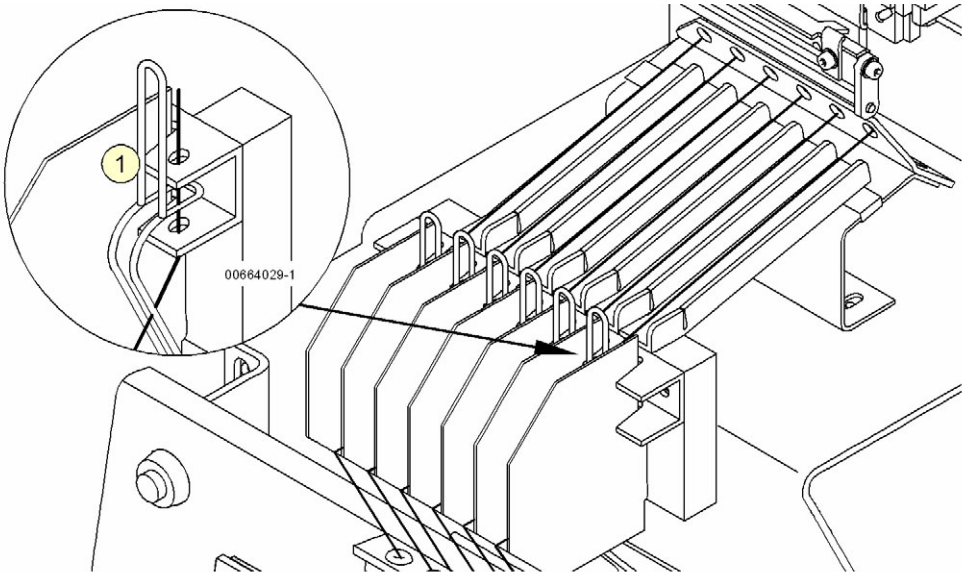
- Run the threads clockwise around tension regulator (4).

- Pass threads 2-4-6 through bottom guide rail (5).
- Pass threads 2-4-6 through top guide rail (3).
- Pass threads 2-4-6 behind plush strip (2).
- Pass threads 2-4-6 through the eyes in top guide rail (1).

3.5.3 Threading thread extractor

- Run the thread coming from the top guide rail through the threading wire.

Figure 3.21:
Left:
Threading thread extractor

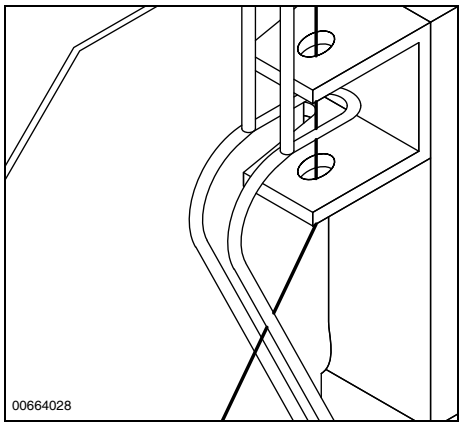


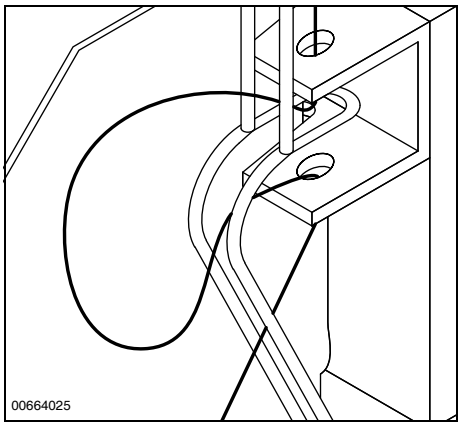
(1) Thread extractor

- Pass the threading aid with the yarn through all the eyes and take it to just in front of the injectors.

Figure 3.22:
Left:
Run of a thread that is being embroidered

Right:
Run of a thread that is not in use



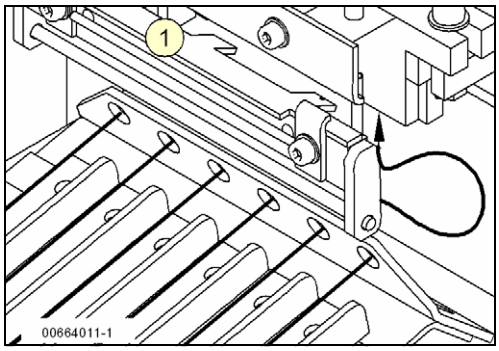


3.5.4 Blowing thread through injector nozzles

NOTE

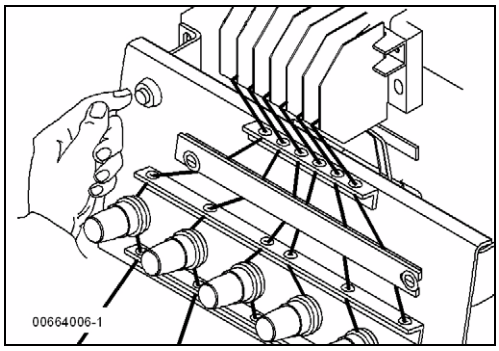
Ensure compliance with the prescribed pneumatic system operating pressures of 4.0 and 6.0 bar.

Figure 3.23:
Injector nozzles



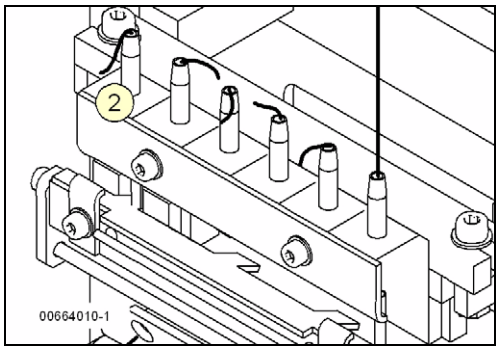
- Discard the threading wire.
- Engage locking plate (1) in bottom position.
- Run the end of the thread to underneath the bottom injector nozzle aperture.

Figure 3.24:
Jet button



- Press the jet button and release the thread.

Figure 3.25:
Injector nozzles



⇨ The end of the thread is drawn in by air and pushed through injector nozzle (2).

After the blowing operation:

- Engage locking plate (1) in top position.
- Pull out a **long length** of thread.
- Manually pull forward the thread extractor to the travel limit.
- Trim the thread just above the injector nozzle.

- Perform a **manual color change** and repeat the steps described above until all the threads have been threaded.

3.6 Threading in case of a thread break

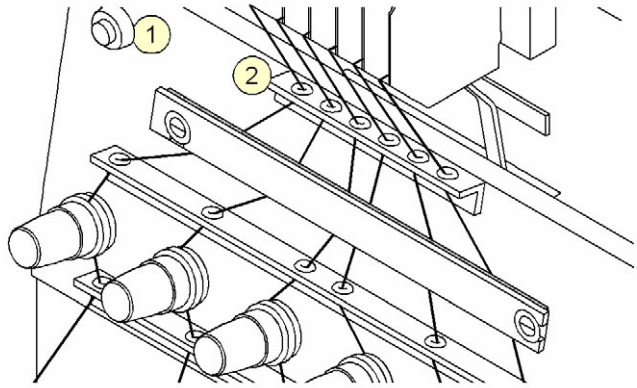


Figure 3.26:
Threading in case of a thread break

- From above top guide rail (2), pull a short length of the broken thread off the cone by hand.
- Let go of the loop you pulled off.
- Press jet button (1).

⇨ The thread is blown through the injector nozzle.

4. Stitch types

The K heads are fitted with a hook-eye needle and use just one embroidery thread. This configuration gives rise to the following stitch types:

- **Chain stitch** – a continuous sequence of interlaced stitches that form a chain

- **Moss stitch** – a sequence of open loops of thread

NOTE

The quality of the embroidery depends on the appropriate definition of machine parameters and compliance with special punching rules for chain and moss stitch embroidery.

4.1 Stitch formation

Chain and moss stitch are executed with the same needle and thread layer. When you change between the two stitch types, the yarn does not have to be rethreaded, and the needle bar does not have to be manually rotated in the bushing.

4.2 Chain stitch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Chain stitch can be used to create lines or contours, or to fill areas.

Stitch formation

With chain stitch, the needle hook **faces in the direction of embroidery as a general rule** (in other words, away from the sequence of stitches). The loop of thread suspended on the needle hook underneath the stitch plate is pulled through the stitch plate, the material, and the previously formed loop of thread wrapped around the needle shank. This gives rise to a **continuous sequence of interlaced stitches**.

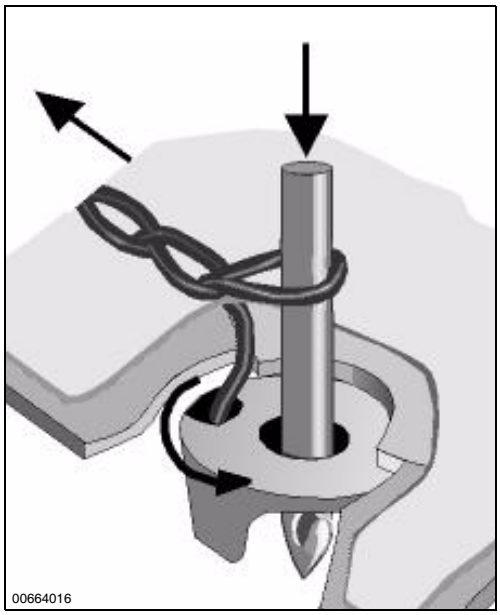
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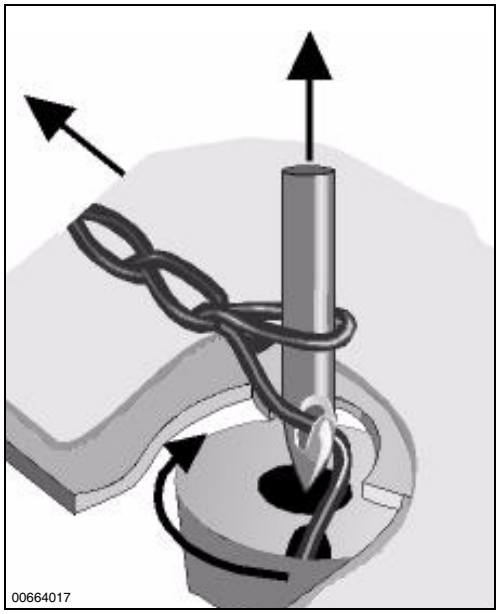
Figure 4.1:
Chain stitch,
starting position

As the thread layer rotates, the needle penetrates the material and moves down.

Figure 4.2:
Chain stitch,
End position



After one revolution of the thread layer, the thread is resting in the needle hook. The needle moves up and pulls the thread through the loop that is wrapped around the needle shaft. The loop is secured by the presser foot (not illustrated). The thread layer rotates back to the starting position.

Typical applications

Figure 4.3:
Chain stitch, typical applications

Left: lines

Right: outlining an area filled with moss stitch

4.3 Moss stitch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Moss stitch is used exclusively to fill areas.

Stitch formation

With moss stitch, the needle hook **faces away from the direction of embroidery** (in other words, towards the sequence of stitches). The moss stitch is formed by the loop of thread resting on the needle hook underneath the stitch plate being pulled through the stitch plate and the material. As the needle moves down, the loop drops off the hook, giving rise to individual **open loops of thread**.

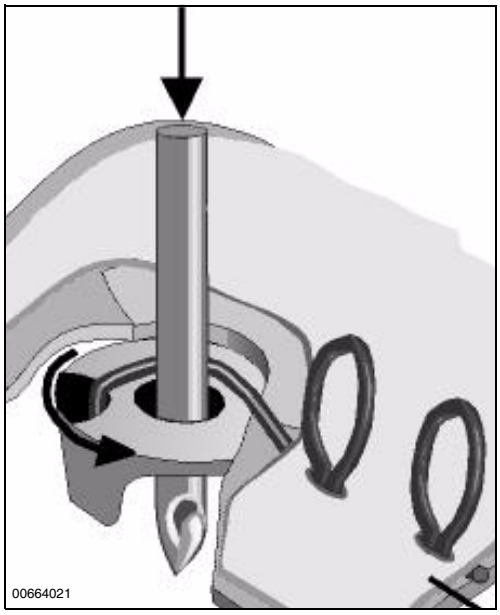
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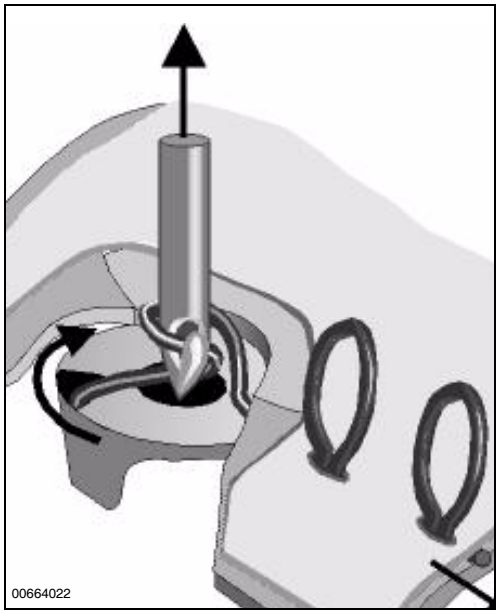
Figure 4.4:
Moss stitch,
starting position

The thread runs behind the needle as the needle moves down. The thread layer is rotating.

Figure 4.5:
Moss stitch,
End position



After one revolution of the thread layer, the thread is resting in the needle hook. The needle moves up and pulls the thread through the material. The length of thread wrapped around the back of the needle slips off underneath the material. The thread layer rotates back to the starting position.

Typical applications

Figure 4.6:
Moss stitch, typical applications

4.4 Presser foot

Presser foot functions

The presser foot holds the material steady on the stitch plate while the needle is being pulled through the material.

- **With chain stitch,** the foot holds the loop of thread that is wrapped around the needle shaft steady on the stitch plate while the next loop is being pulled through.
- **With moss stitch,** the foot secures the loop that has just been embroidered.

Default setting of the presser foot

The presser foot is set at the factory so that the insert, when in its lowest position, is positioned 0.05 mm above the stitch plate when the presser foot is set to its minimum height.

5. Embroidery materials and needles

As a general rule, all conventional embroidery materials can be used with the ZSK single and multi-head embroidery machines. The embroidery backing, yarn and needle must, however, be matched to each other. Not every combination results in optimum embroidered work. Besides coordinated materials and the correct choice of needles, the thread tension and the design have a major influence on the quality of the embroidery as well.

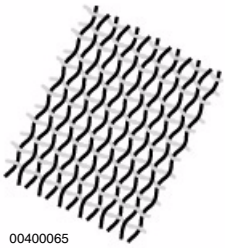
Owing to the large number of possible material combinations, we are able to provide only general guidelines on the choice of embroidery material and needles. On principle, you are recommended to test any new combination of materials by embroidering a sample first.

Consult our customer service organization in case of any doubt. We will gladly advise you and try out unusual material combinations on your behalf if you submit samples.

5.1 Embroidery backing and underlay materials

CAUTION

Adhesive sprays *are not be used in the vicinity of the embroidery machine*, but *only* on separate tables – the adhesive mist can cause the embroidery machine to malfunction.



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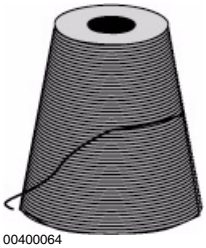
The following materials are typical of suitable embroidery backings:
- Natural and synthetic wovens
- Knitted fabrics
- Plush fabric, velvet, terry cloth
- Felts
- Leather, imitation leather
- Plastic films.

With lightweight and elastic fabrics, it is often advisable to place an underlay underneath the embroidery material in order to avoid puckering when embroidering. Nonwoven fabric or ironing cloth are examples of suitable underlay materials.

The underlay can be clamped in the frame, fused on by ironing or simply placed underneath the embroidery material. Whichever method is chosen, the underlay must be removed after embroidering.

5.2 Yarns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Among the conventional yarns are:
- Cotton embroidery yarns
- Rayon embroidery yarns
- Polyester embroidery yarns
- Metallized twisted yarns

5.3 Needles

ZSK supplies its K-head embroidery machines with CEX3 hook-eye needles. Replacement needles in sizes **70 Nm - 120 Nm** are available from ZSK. See *Using a different needle size*.


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Figure 5.1:
Hook-eye needle

6. Troubleshooting

NOTE

In case of frequent malfunctions, note whether the same problem always occurs at the same embroidery head or same needle. If customer service is required, this information is important to ensure a quick remedy.

Check that the selected design is suitable for the desired materials. If applicable, note the contents of the chapter entitled Punching advice.

6.1 K head, general troubleshooting

Fault	Cause	Remedy
Machine does not start	Faulty switches, connectors or leads	• Check condition of switches, connectors and leads, and have repairs carried out by an expert if necessary
	Error message on screen	• More detailed information on error messages is contained in the manual for the *T8 control unit*
Thread break	Damaged needle	• Insert new needle; see *Exchanging needle*
	Needle not suitable for yarn	• Match needle size to yarn; see *Exchanging needle*
	Incorrect thread tension	• Set correct thread tension
	Incorrect yarn size in relation to stitch density	• Use finer yarn • Slightly enlarge design if possible • Reduce stitch density in design/part of design
	Thread guide mechanism not moving freely	• Check threading and thread tension
	Needle inserted incorrectly	• Insert needle correctly
	Embroidery material is clamped to slackly	• Clamp material taut
	Punching error in design (e.g. stitch density too high)	• Reduce stitch density in design/part of design • Notify ZSK customer service
	Needle not running true	• Install new needle • Notify ZSK customer service

Fault	Cause	Remedy
Thread break	Incorrect machine parameters	• Modify machine parameters • Notify ZSK customer service
	Stitch plate hole to small	• Select stitch plate with correct hole size
	Incorrect needle height for this stitch length	• Set correct needle height See control unit, *Machine setup for K heads*.
Needle break	Embroidery material to firm	• Use a stronger needle
	Excessive thread tension	• Reduce thread tension
	Thread layer or presser foot dirty	• Clean thread layer or presser foot
	Piston too small	• Install larger piston
	Needle collides with stitch plate	• Install new needle • Check that stitch plate hole is large enough • Notify ZSK customer service
	Faulty needle	• Install new needle
Inconsistent thread tension	Tension regulator dirty	• Clean thread tension device
	Thread running over sharp edge	• Adjust run of thread
	Plush strip missing or incorrectly installed	• Install plush strip
Needle jamming	Incorrect needle/piston combination	• Select correct needle/piston combination

6.2 Chain stitch type

Fault	Cause	Remedy
Chain stitches too taut and thin	Needle height value to low	• Enter correct needle height; see control unit, *Machine setup for K heads*.
	Excessive thread tension	• Reduce thread tension
Thread is torn; several thread ends suspended from needle hook	The preceding loop is slipping off the needle shank onto the needle hook	• Reduce presser foot height
Loops are erect, stitches are omitted	Thread is not placed on the needle hook because of insufficient tension	• Increase thread tension

6.3 Moss stitch type

Fault	Cause	Remedy
No moss stitch loops	Thread tension to low	• Increase thread tension
Moss stitch loops too small	Needle height value to low	• Set larger needle height; see control unit, *Machine setup for K heads*.
	Stitch length to great	• Reduce stitch length in design
	Excessive thread tension	• Reduce thread tension
	Insufficient thread friction in embroidery material	• Place nonwoven fabric underneath embroidery material
Yarn forms loops or felt on back of embroidery material	Thread not completely engaged on needle hook	• Increase thread tension • Select stronger needle
	Incorrect presser foot height	• Set correct presser foot height
Inconsistent loop height	Presser foot set to high	• Reduce presser foot height

7. Punching advice

The following advice does not constitute punching instructions, but merely describes various key points from the perspective of the embroidery machine manufacturer. The advice is not to be regarded as exhaustive; complying with general rules does not always give rise to a good punching result. Machine-specific factors often play a crucial role and therefore need to be taken into account.

New developments and machine functions, as well as modifications, are continuously giving rise to new issues, so that any advice is in need of constant revision.

7.1 General rules

- The **ideal stitch length** depends on the **type of design** and the **yarn count.**

  Examples:
  For a **chain stitch design with fine lines,** you are recommended to use a **fine count embroidery yarn** and **small stitches** (approx. 1.3 mm).

- In contrast to the practice with multi-needle heads, **fixing sequences at the design start and end** are **to be avoided**.

- Stitches that are **shorter than 0.5 mm** and **blank stitches** (no movement in X or Y direction) give rise to **thread breaks**.

- **Corners** in the design that are **more acute than 90** give rise to **untidy work with chain embroidery**.

- The **stitch density for filling areas with moss stitch** is to be determined according to the **yarn type and count,** as well as the **fabric**.

  Examples:
  A **moss stitch area embroidered with Burmilana No. 12** should be punched on **tight textured cotton with a density of 25 - 30** and a **stitch length of 1.5 mm - 1.8 mm**.

7.2 Punching methods for moss stitch embroidery

7.2.1 Circular punching

With circular punching, note that the **stitch density** is determined by the **spacing**between the **start and end point**of the coil.

Figure 7.1:
Circular punching, example

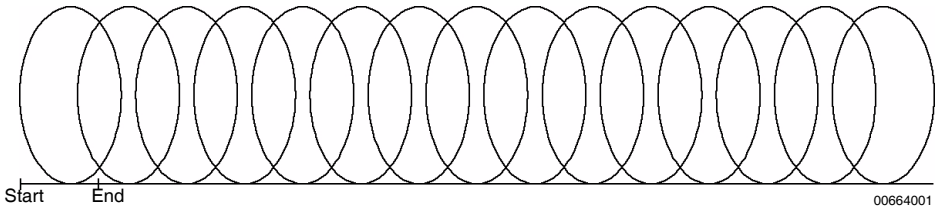
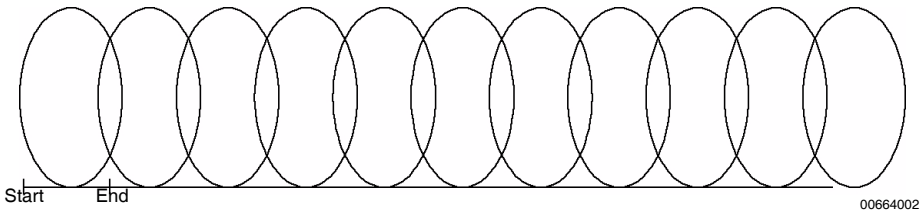


Figure 7.2:
Circular punching, example



Pros: Since several stitches are applied on top of each other, the **moss stitch area is firm** and **resists unraveling**.

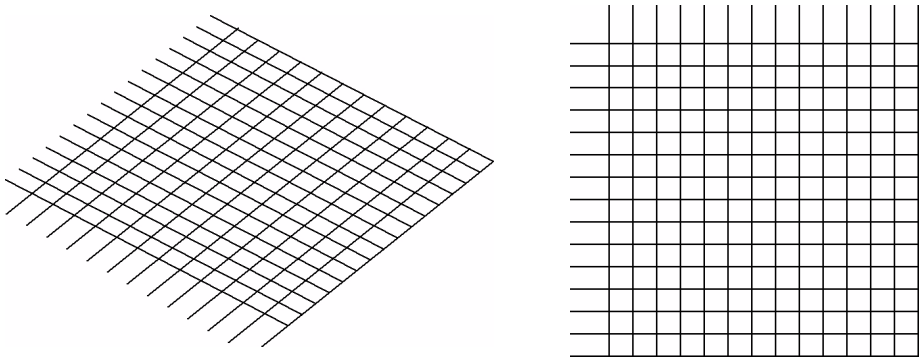
Cons: An **unfavorable arrangement of the coils** gives rise to **directional marks** in the embroidery. This type of filling **also generates a lot of stitches** and can cause **severe puckering** or even **deformation** with many materials.

7.2.2 Grid punching

A **uniform moss stitch area** can be obtained by filling the area **with intersecting step stitch lines**. It is good practice initially to punch **a step stitch area** in which the **first direction of embroidery** is defined.
In a second pass the same step stitch area is punched again, but with the direction of embroidery **perpendicular to the step stitch lines created by the first pass**.
When **setting the parameters,** make sure that **no sharp points** occur at the turning points.

The recommended **stitch length** is **1.5 - 2.0 mm**, and the recommended **density is approx. 20 - 30** (depending on the type and count of the yarn, as well as the embroidery material).

Figure 7.3:
Grid punching, example



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Pros: **Uniform embroidery**; by having the punch system recalculate the design, it can be modified for use with a different type and count of yarn or a different embroidery material.

Cons: **Not all of the loops** are linked.

7.3 Punching methods for chain embroidery

There are **no special factors** to consider with chain embroidery; punching follows the pattern of a **step stitch line**. Depending on the yarn material, the **punching length** is **1.3 mm - 2.0 mm**.

NOTE

When executing a sequence of chain stitches, take the ends of the sewing threads *underneath the embroidery material* for fixing.

Index