

**Translation of the original operating manual**

No. FRT-MKIII-bed-0609

**SIEBECK****JET 2000 tying machine****MK III series****Model series FRT-M, FRT-MF and FRT-S**

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## Hazard warnings

Hazard warnings are found in the respective position in the text.



**They are denoted by this warning triangle and an information text.**



### **Caution!**

The technical manual must have been read and understood before using the machine for the first time. For personal safety it is important to follow all the instructions listed in it. The manual must be kept by the customer and must be handed over in case the machine is passed on to third parties or a new user.



### **Caution!**

Installation and repair must only be performed by qualified persons who have the necessary experience and knowledge of occupational and industrial safety and risks of accidents. If the available staff do not have one or more of these qualifications, specialist staff must be contracted.



### **Caution!**

If it is necessary to replace a components, you must make sure that only original spare parts are used. Improper repairs or the use of non-original spare parts can cause considerable damage and hazards for the user.

In case of damage which has be caused by failure to observe this operating manual, the warranty will be rendered null and void. No liability will be assumed for consequential damages.

No liability will be assumed in case of material damages or personal injuries which are caused by improper use or failure to adhere to the safety instructions.

## Introduction

This machine has been engineered in accordance with the recognised rules of technology and in adherence to the regulations for occupational safety and the prevention of accidents so that **proper use cannot not cause any hazards** for the life and limb of the user or third parties.

Information on **incorrect use and residual risks**, which are still in place or possible despite the integrated safety and technical protective equipment, are described and illustrated on pages 39 - 42. These risks are documented in a risk analysis and filed by the manufacturer.



**Every person on the user's premises given the task of setting up, commissioning, operating, maintaining and repairing this machine must have read and understood this operating manual, and in particular the chapter "Safety".**

The customer's own changes, restrictions or upgrades and the resultant safety-related consequences are at the expense and risk of the user.



If this machine is sold or set up at another location, this operating manual must be handed over to the new owner or the new user. Additional copies can be ordered from the address given below, quoting article number 0709 FRT-M-MKIIIbed.

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## **WARRANTY**

All machines which have been manufactured at our production facilities are covered by a warranty of 12 months, starting from the date of commissioning, or 18 months from the date of delivery. This warranty covers material and manufacturing faults.

The warranty covers all parts, with the exception of expendable parts and parts which are replaced due to normal wear during maintenance. Under the terms and conditions of the warranty we are not liable for working hours and downtimes.

If machine damage is caused due to the use of unsuitable tying material or material not expressly recommended by us, the warranty will be rendered null and void.

All claims must be asserted in writing. An exact description of the cause of damage, the part number and machine number must be enclosed. Once we have accepted your warranty claim, the faulty part must be returned to us.



**This warranty is only valid if**

**SIEBECK**

**original parts without any form of modification are used.**

## EC declaration of conformity

We hereby declare that the machine described as follows

Manufacturer: SIEBECK  
Model:  
Serial No.:

,in its delivered condition, complies with the following valid stipulations:

**EC Machinery Directive 98/37/EG** (valid until 28.12.2009)

**EC Machinery Directive 2006/42/EG** (valid from 28.12.2009)

Applied harmonised standards, in particular

EN ISO 12100 Part 1 & 2 "Safety of Machinery"  
EN 60204-1 "Electrical Equipment of Machines"  
89/336/EEC including amendments from 92/31/EEC "EMC Guideline"

### For the FRT and FRS series machines only

DIN EN 1672-2 "Food Processing Machinery / Basic Concepts / Part 2: Hygiene Requirements".

1935/2004/EC / GS-FW 01/01 Declaration of compliance with the requirements of food law

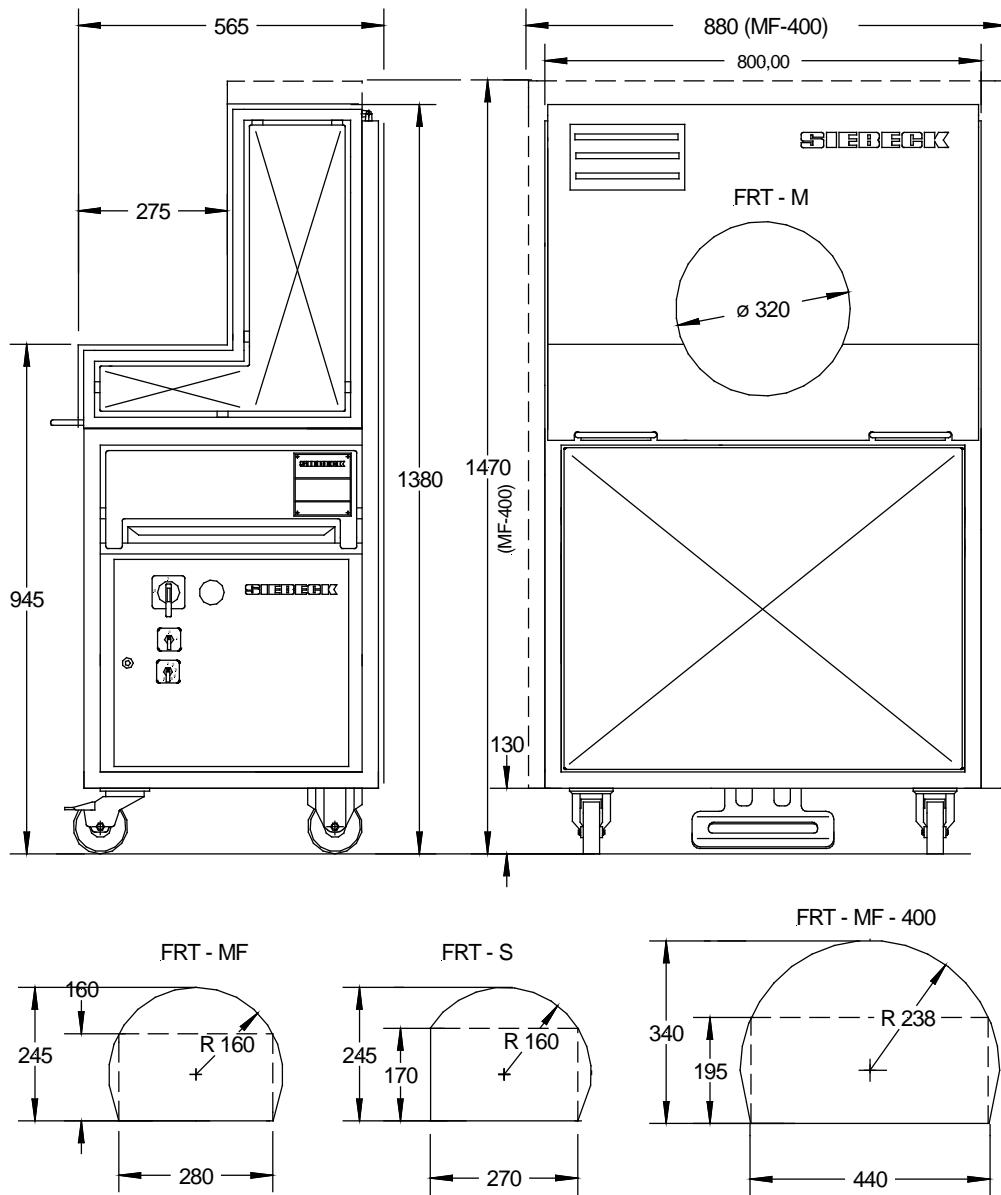
Eberbach, 10.06.09

Siebeck GmbH

## Technical data

### Machine and tunnel dimensions:

All dimensions are in mm, subject to changes



#### Machine performance:

60 cycles per minute for single tying

#### Machine weight:

160 Kg / FRT-MF-400: 165 Kg

#### Noise pressure level:

78 dB (A) as per EN11204 (without product/without string)

#### Connected electrical load:

230 volts /1 ph. alternating current 50/60 Hz,  
1.6 kW

#### Proper use:

Tying food, in particular meat, fish, poultry, vegetables etc.

## Safety !



The European standard EN 60204-1 requires the power supply connection to be established by a suitable plug device. The power supply cable must not be connected to a power distributor directly by way of a terminal connection, without a plug connector.



Safety limit switch S1 prevents the machine from starting up when the machine hood is open. This safety device must be checked before putting the machine into operation each time to make sure it is fully functional.

### Procedure:

First switch on the machine and wait for the reference run to be performed (see last paragraph below), open the hood, do not reach into the machine (!), then press the foot pedal. The machine must not start up.



Monitoring switch B2 prevents the machine from starting up if the dirt pan is removed or not fully inserted. This monitoring device must be checked before putting the machine into operation each time to make sure it is fully functional. Procedure as described above.



Always pull the mains plug before all maintenance and cleaning work!



When inserting a new string bobbin, and when threading the string, **always** pull the mains plug.

### Reference run

Once the machine has been switched on using the master switch (Q1), a check is automatically performed to determine whether the preset reference points for the ring and knotting aggregate drives are positioned correctly. This run (duration approx. 10 seconds) is performed at reduced speed and ensures that both drives are ideally synchronised with each other. The machine is ready for operation on completion of this reference run.



A minimum of 500 lux is required for local lighting.

## Set-up and commissioning

### **Mechanics:**

Erect the machine in the designated location and press the wheel locks down so that the machine is stable (see page 11, fig. 2). In order to transport the machine safely using a fork lift or lift truck, the foot pedal is moved up into the machine frame before delivery.

See pages 12 and 13 for the procedure for installing the foot pedal.

Open the machine hood and check it to make sure it moves freely. Fig. A on page 11 shows the machine hood open. Fig. B shows the machine hood closed. When the machine hood is open, lug C engages with bolt D and thus prevents the machine hood from falling uncontrollably in case of a faulty pneumatic pressure spring.



You must make sure at all times and check that lug C moves freely and engages with bolt D after opening the machine hood.

When closing the machine hood the lug has to be pushed upwards in the direction of arrow 1. The machine hood cannot be closed until you have done so.



Never attempt to close the machine hood by force without releasing the lug from the locking mechanism. This may otherwise cause considerable machine damage.



Check that the M8 ball heads on the pneumatic pressure spring are firmly in place and check that the securing wires on the pneumatic pressure springs are properly in place (see page 11, Fig. 3).



Make sure that the wing nut which fastens the string bobbin on the bobbin holder, is tightened sufficiently firmly (see page 11, Fig. 4).



When closing the hood, make sure that the safety sensor is positioned correctly to the actuator (4-5mm) (see page 11, Fig. 5).



To avoid collisions with other machines and to ensure operating and maintenance staff have sufficient access, there must be minimum of 1.5 metres of clearance around the entire machine.

### **Electrical system:**

If not otherwise stipulated, the machine is designed for 230 V 1-phase alternating current 50/60 Hz when supplied from the factory. Measure the local mains voltage and compare the measurement with the value specified on the type plate.



Check that the machine is correctly grounded. Adhere to the local electrical engineering regulations. Maximum fuse protection 16 amperes. Connect the machine to the supply mains using a plug connector. Switch on the master switch (Q1). The indicator lamp lights up.

Once the reference run has been completed (see last paragraph on page 8), the machine is ready for operation.

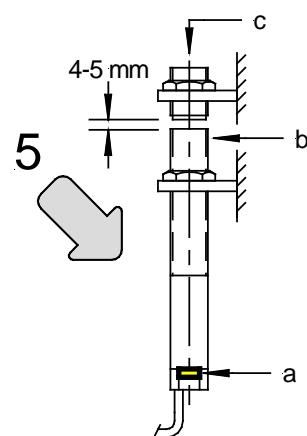
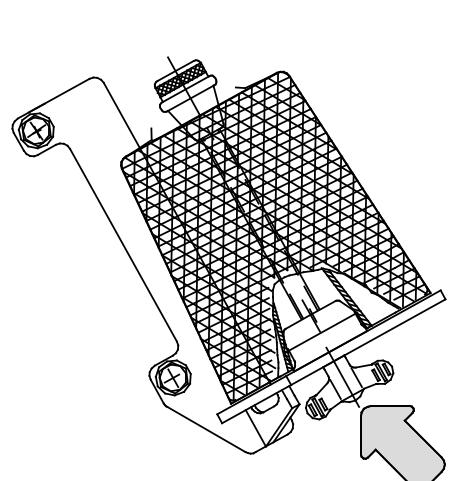
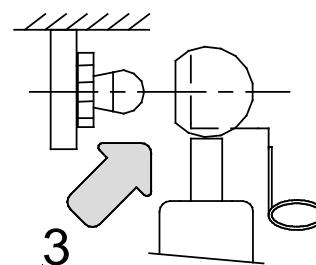
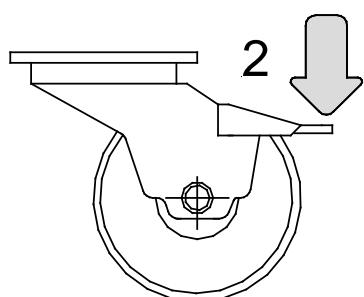
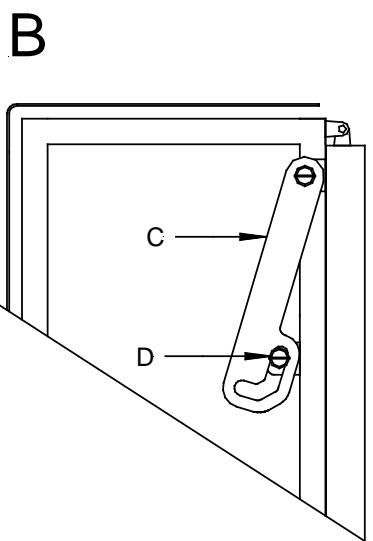
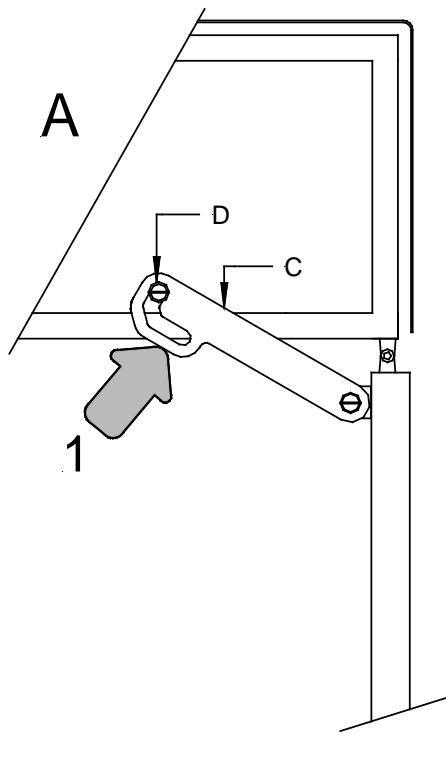
### **Mode of operation of the diagnostic LED**

The green LED signals that the sensor is ready for operation. The sensor is not actuated.

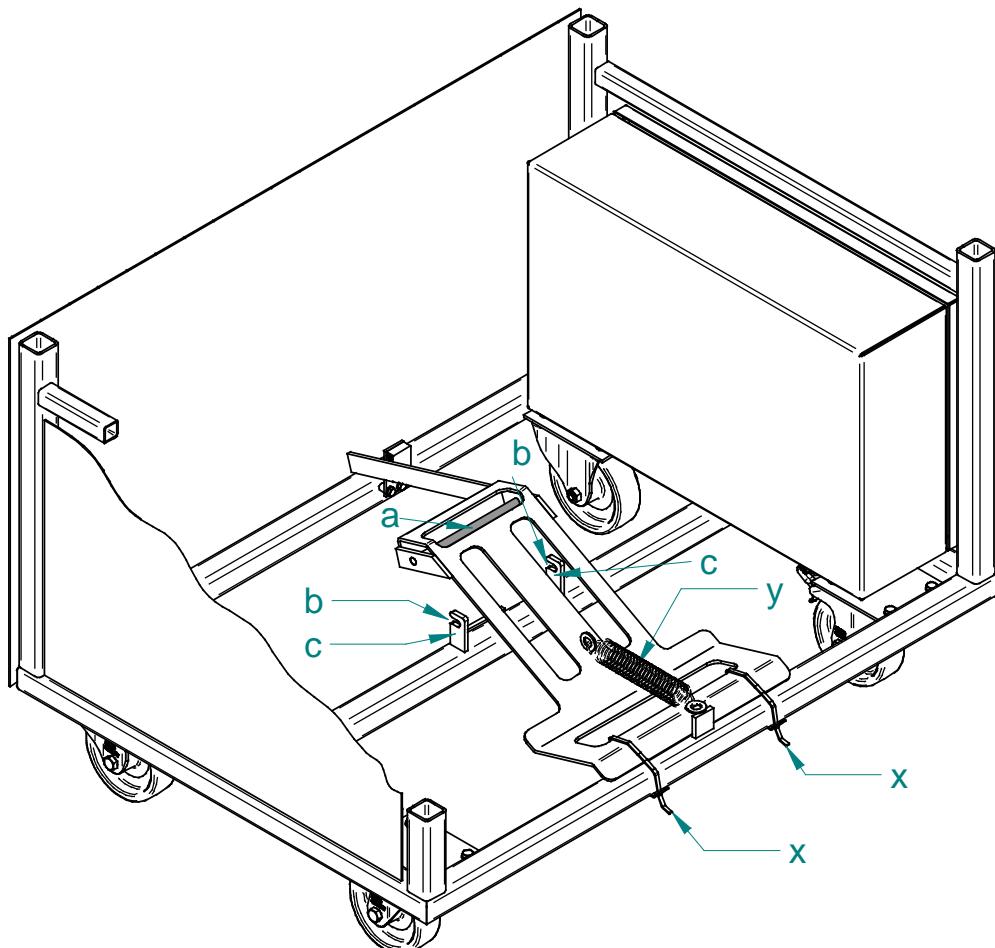
When the CSS 180 sensor is actuated by the CST 180 actuator, the LED changes from green to yellow. The safety outputs switch to enable. If the actuator is near of the limit of the sensor switching distance, the yellow LED flashes.

The safety outputs remain enabled. The sensor can be readjusted before the safety outputs will be switched off and stop the machine. Errors in the actuator coding or the sensor outputs are signaled by a red flashing LED.

The safe outputs then switch off after a delay of 1 minute. An internal fault is indicated by a continuous red LED and, if safe operation is not ensured, results in an immediate disabling of the safety outputs.



## Fitting the foot pedal

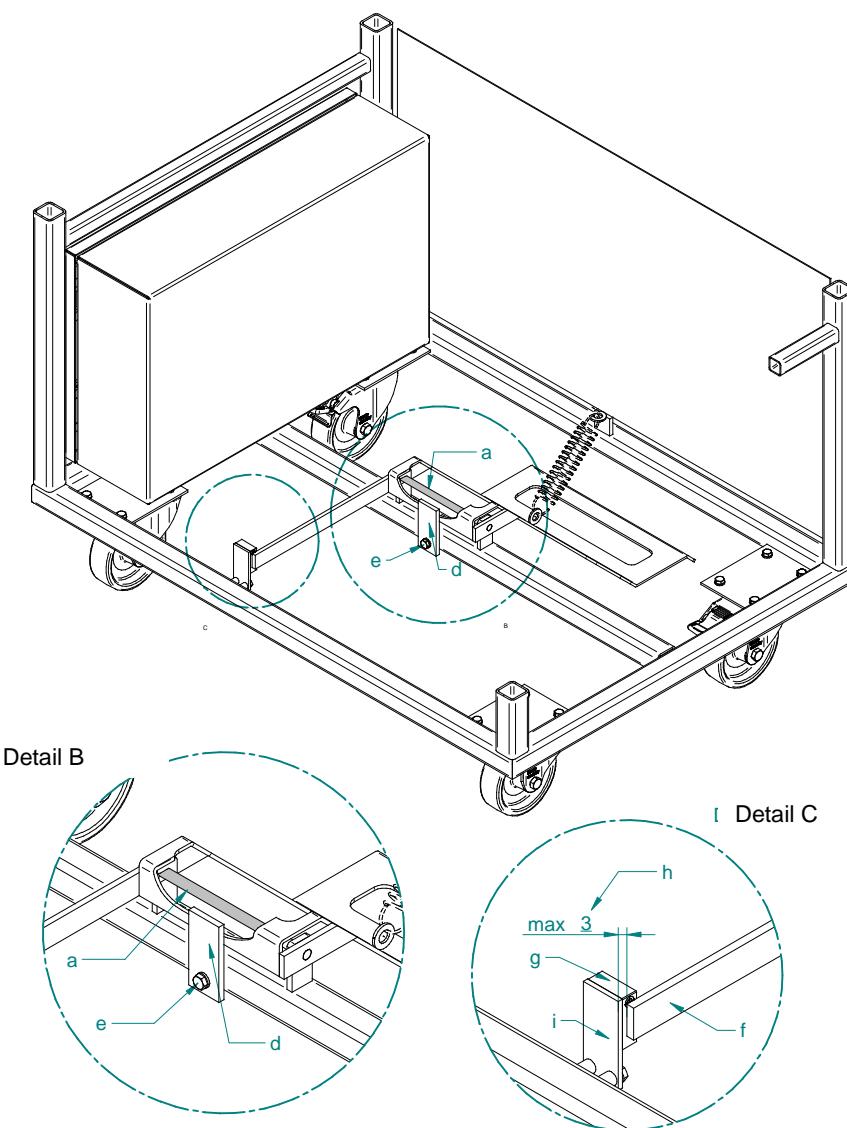


1. Unscrew the panelling from the front.
2. Remove both cable ties (x).
3. Insert the rotary axle (a) on the foot pedal into the elongated holes (b) of both lugs (c). The tension spring (y) does not need to be removed for this process.
4. Unfasten the hexagon screw (e) and move the lug (d) into the vertical position and tighten the hexagon screw (e) again.



After fitting, check whether the limit switch (g) is correctly actuated by the lug (f). When the foot pedal is actuated, the inner circle (h) of the cross hairs must be covered. The gap between the limit switch (g) and the lug (f) should not be greater than 3mm. Adjust the position of the limit switch using the lug (i) as necessary.

5. Screw the panelling back on.



## Inserting the string

When the machine leaves our premises, it includes a piece of string completely threaded. Study the course of the string exactly to make understanding the following description easier.

Proceed as follows in accordance with the threading diagram opposite:



Pull the mains plug and open the machine hood

- Remove the wing nut (B) and the threaded rod (E).
- Insert the threaded rod (E) through the string bobbin (D) from above. Place the string bobbin (D) together with the threaded rod (E) on the bobbin holder (A). Guide the bottom end of the threaded rod (E) through the drilled hole on the mandrel (C) and screw on and tighten the wing nut (B). You must make sure that the string bobbin's cardboard tube rests firmly on the mandrel (C) and that the net which surrounds the string bobbin is securely clamped between the cardboard tube and the mandrel (C).
- Feed the lead end of the string through the drilled hole (F).
- Insert the string in the thread brake (G). Make sure that the string comes to rest between both pins (H) and the shaft of the hexagon screw (I) (see figure).
- The next string guides are rollers. Thread the string in numerical order:

- 2      Roller on the take-up lever arm mount
- 3      First roller on the tying arm mount
- 4      First roller on the take-up leaver arm
- 5      Second roller on the tying arm mount
- 6      Second roller on the take-up leaver arm
- 7      Last roller on the tying arm mount

Guide the string through the insert (K) at the end of the tying arm tube.  
Inserting the string in the knotting aggregate:

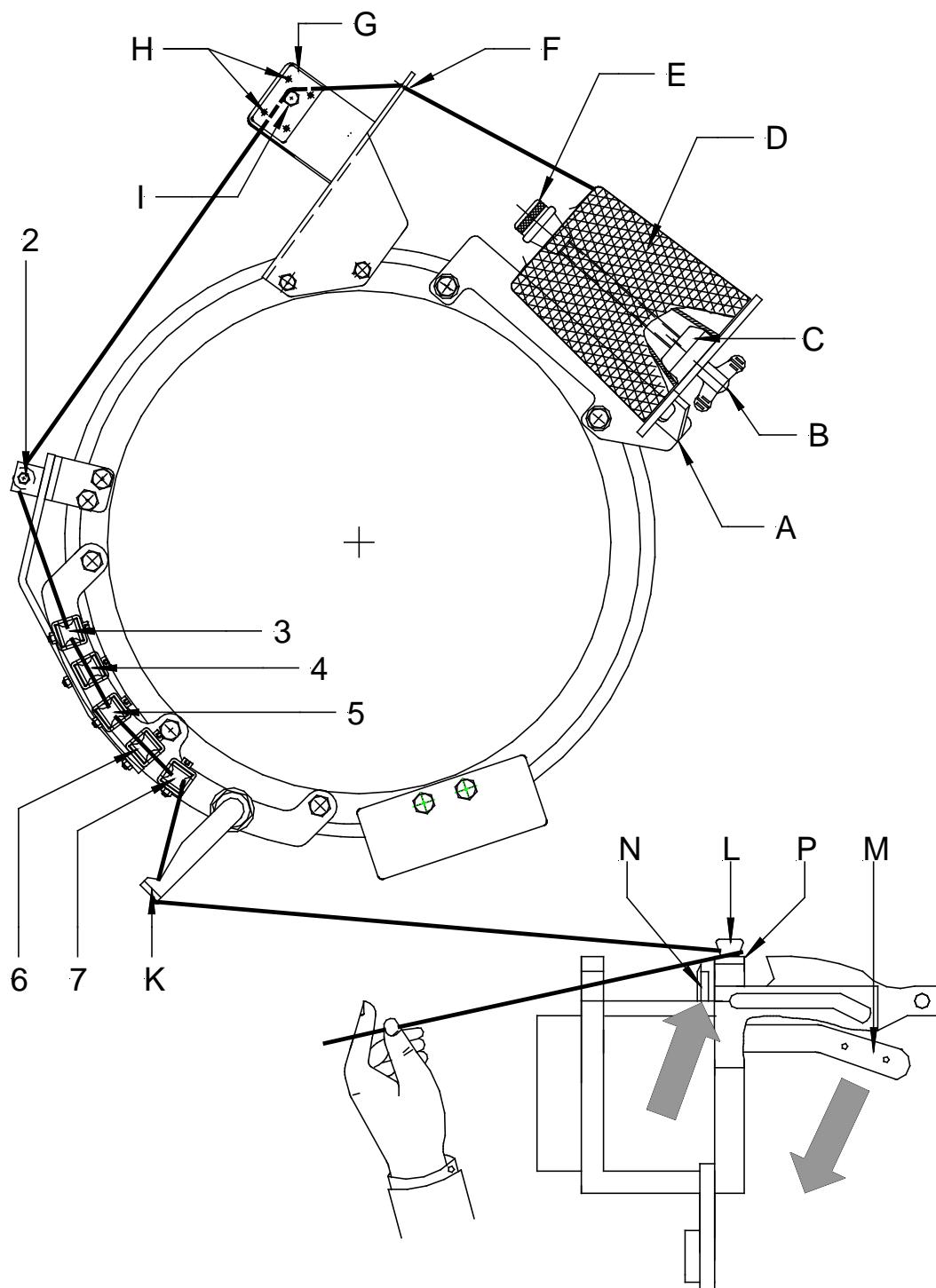
Use your left hand to wrap the string around the twine holder button (L) upwards from below. Use the right hand to actuate the twine holder button lifting lever in the direction of the arrow. Whilst you hold the string tight with the left hand, the string enters between the twine holder button (L) and the twine holder button housing (P). The string is clamped once you release twine holder button lifting lever (M). Use your right hand to push the knife trap lever (N) forwards in the direction of the arrow; the string is cut off.

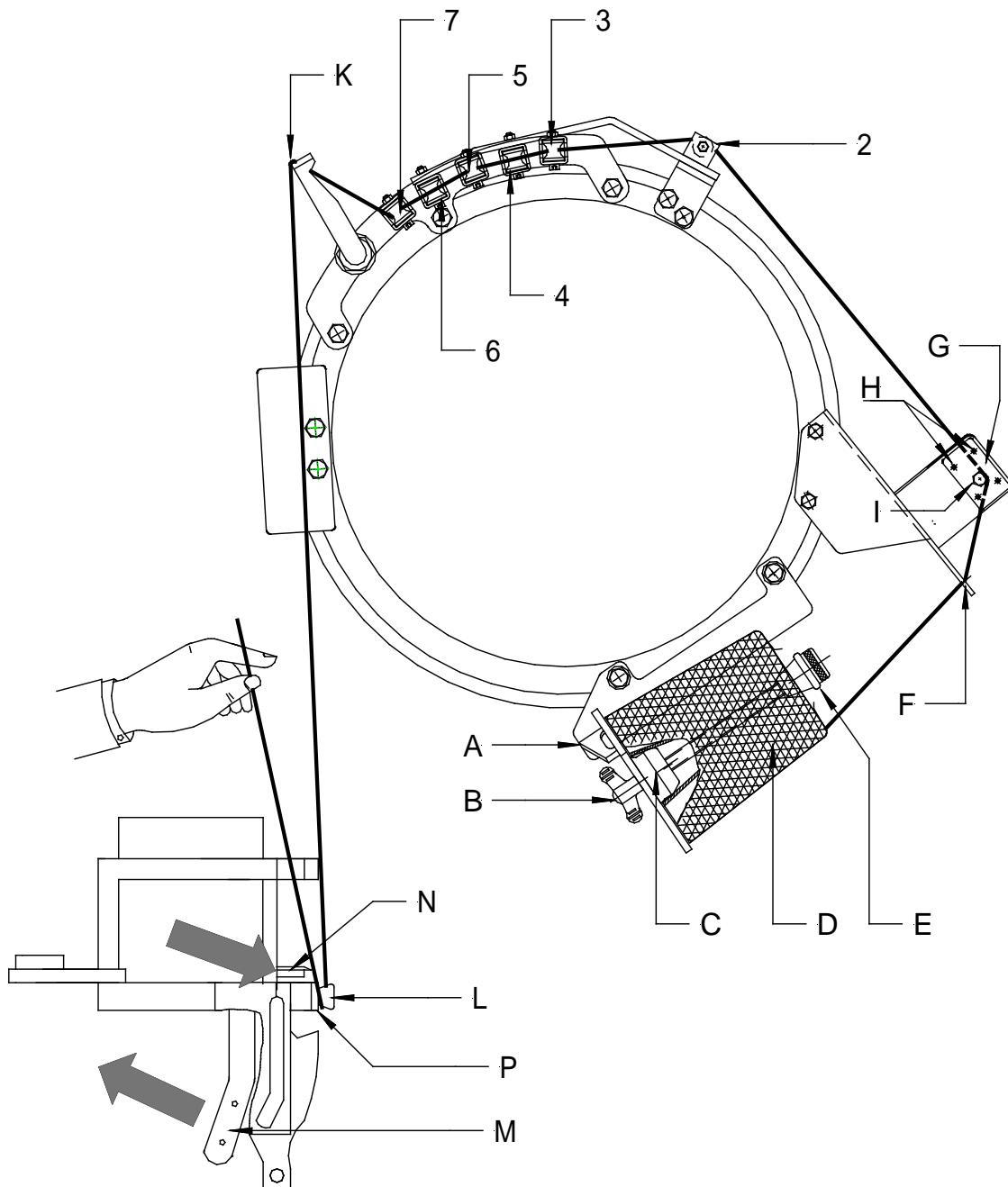
Close the machine hood, switch on the master switch. After the reference run, the machine is ready for operation.



Check that the string rollers and the take-up lever move freely and oil them as necessary.

**Only use lubricants which are approved for the food sector  
(see the chapter "Maintenance").**

**Threading diagram ( models FRT-M , MF and MF 400 )**

**Threading diagram ( model FRT-S )**

## Inserting the string ( F - take-up lever )

When the machine leaves our premises, it includes a piece of string completely threaded. Study the course of the string exactly to make understanding the following description easier.

Proceed as follows in accordance with the threading diagram opposite:



Pull the mains plug and open the machine hood

- Remove the wing nut (B) and the threaded rod (E).
- Insert the threaded rod (E) through the string bobbin (D) from above. Place the string bobbin (D) together with the threaded rod (E) on the bobbin holder (A). Guide the bottom end of the threaded rod (E) through the drilled hole on the mandrel (C) and screw on and tighten the wing nut (B). You must make sure that the string bobbin's cardboard tube rests firmly on the mandrel (C) and that the net which surrounds the string bobbin is securely clamped between the cardboard tube and the mandrel (C).
- Feed the lead end of the string through the drilled hole (F).
- Insert the string in the thread brake (G). Make sure that the string comes to rest between both pins (H) and the shaft of the hexagon screw (I) (see figure).
- The next string guides are rollers. Thread the string in numerical order:

L1 - K2 - L3 - K4 - L5 - K6 - L7 - M

Guide the string through the insert (K) at the end of the tying arm tube.

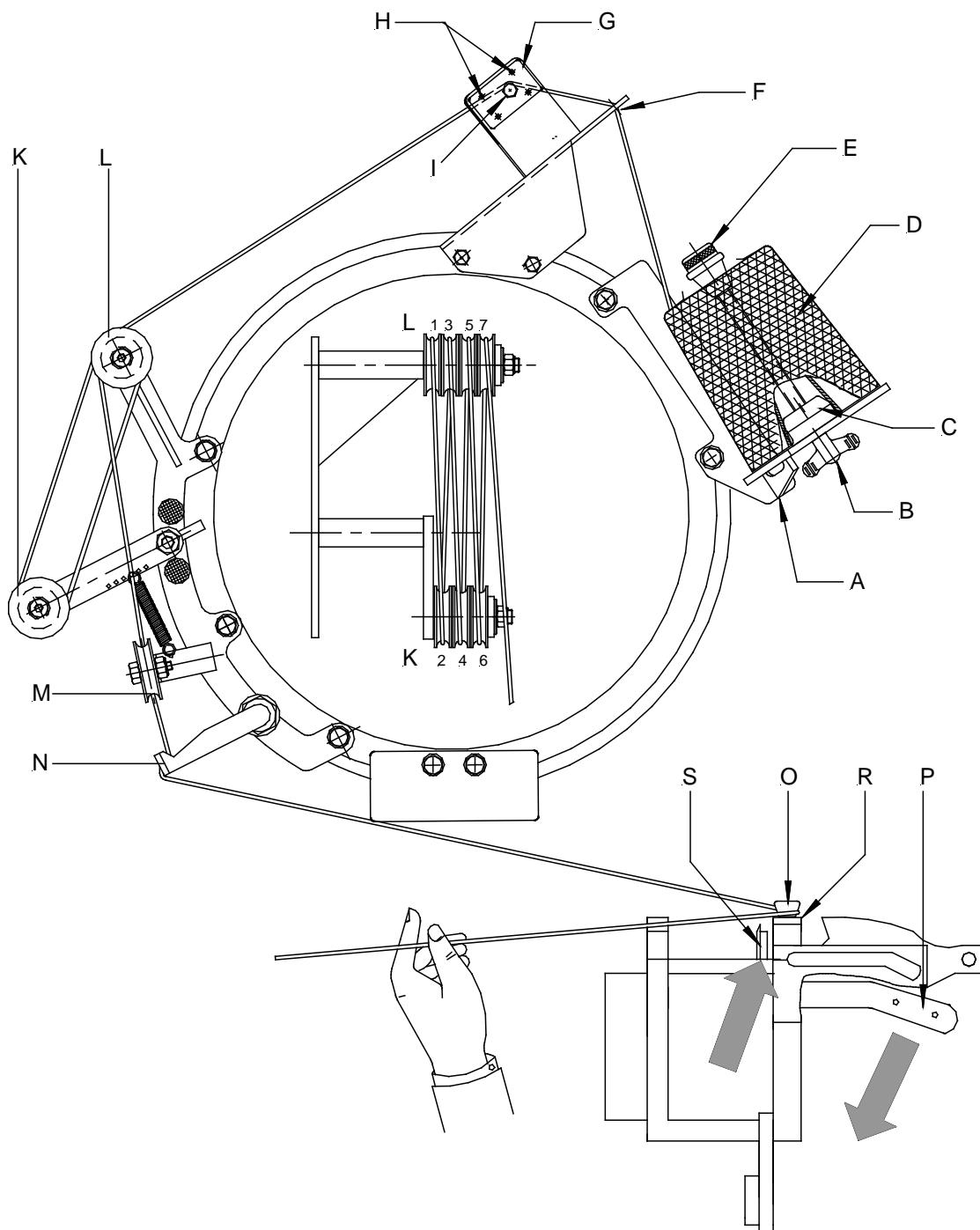
Inserting the string in the knotting aggregate:

Use your left hand to wrap the string around the twine holder button (L) upwards from below. Use the right hand to actuate the twine holder button lifting lever in the direction of the arrow. Whilst you hold the string tight with the left hand, the string enters between the twine holder button (L) and the twine holder button housing (P). The string is clamped once you release twine holder button lifting lever (M). Use your right hand to push the knife trap lever (N) forwards in the direction of the arrow; the string is cut off. Close the machine hood, switch on the master switch. After the reference run, the machine is ready for operation.



Check that the string rollers and the take-up lever move freely and oil them as necessary.

**Only use lubricants which are approved for the food sector  
(see the chapter "Maintenance").**

**Inserting the string (F - take-up lever)**

## Net length

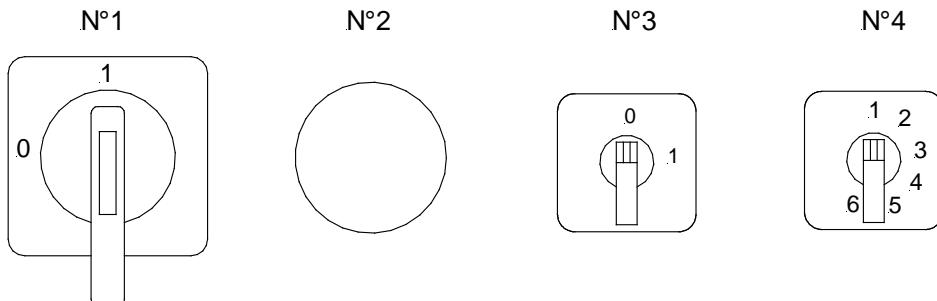


For small (850g) conical and cylindrical bobbins - net length approx. 280mm

For large (1500g) conical and cylindrical bobbins - net length approx. 350mm

## Operating controls

The following operating controls are situated on the control cabinet:



### N°1 Master switch

### N°2 Indicator lamp

Indicates the presence of mains voltage.

### N°3 Selector switch 3 (interval switch)

In switch position "0" the machine runs at 63 cycles per minute whilst the foot pedal remains actuated. Experienced operating staff will work in this operating mode. If the cycle rate is too high, set the selector switch to "1". When the foot pedal is actuated continuously, the cycle rate reduces by the machine stopping 0.5 seconds between each cycle. This enables the operator to move the product into the desired, new position.

### N°4 Selector switch 4 (Number of wraps, cross-wrap ping and continuous tying)

The numbers 1 to 4 indicate the number of wraps per cycle.

1 = one wrap = standard

2 = two wraps = medium to strong wrap

3 = three wraps = strong wrap

4 = four wraps

5 = **Cross wrap**

a) Selector switch 4 to position "5" and selector switch 3 to position "0". Place the product on the machine table and press the foot switch. The product is wrapped once without knotting. The operator turns the product clockwise 90° and triggers the machine with the foot switch again. A second "crossways" wrap is formed and the ends are knotted.

b) Selector switch 4 to position "5" and selector switch 3 to position "1"

When the foot switch is pressed continuously, two wraps are performed per cycle with an intermediate stop of 0.5 seconds.

6 = **Continuous tying**

Press the foot pedal 1x, the ring stops after two turns without knotting

Press and hold the foot pedal

Whilst the ring is revolving, the product is shifted backwards or forwards and the product is wound in a spiral-shaped wrap.

At the end of the product, deactivate the foot switch. The knotting procedure is started and the ring stops.

## Cleaning and maintenance

This machine comes into contact with food products. As a result there may be residual organic materials which represent a source of contamination.



**It is therefore absolutely imperative that the machine is cleaned thoroughly after every working shift. The recommended maintenance tasks must then also be performed.**



The appropriate protective clothing must be worn for the cleaning process. If cleaning or maintenance staff become injured, provide medical help immediately. The sterility of the machine must be maintained.

### Cleaning



**Important !** Pull the mains plug!



**Important !**

The string bobbin has to be removed from the machine (and stored in a sealable plastic bag for further use) before each cleaning procedure.

The drip tray (assembly M10 / No. 24) and all sections of panelling must be removed for cleaning. They can be cleaned separately from the machine using a high-pressure jet device and then dried with compressed air.

Spray the machine housing (with the sections of panelling removed) and the individual fitted assembly groups with clear water. Do not use high-pressure or compressed air to perform these cleaning tasks.



Never use trichloroethylene, perchloroethylene, benzene, nitro cellulose thinners, petroleum or similar liquids for cleaning. These agents create dangerous vapours. **Risk of explosion and poisoning !**



The machine must be cleaned thoroughly after **every** use. When using cleaning agents and disinfectants (max. pH value 8), you must make sure that these agents are rinsed off completely (leaving no residue) with clear water.

**Do not use cleaning agents which contain chlorine !**



**Remove the string bobbin before cleaning !**

See pages 14 to 19

Adhere to the following when using high-pressure cleaners:

- max. pressure 60 bar
- only use a fan jet, i.e. not a solid jet
- do not point the jet directly at
  - the knotting aggregate,
  - the drive motors,
  - the joints on the control cabinet,
  - the operating panel,
  - exposed ball bearings and
  - sealing surfaces.

#### **Procedure:**

1. Disconnect the machine from the power supply. Pull the mains plug!
2. First clean the machine from outside
3. Internal cleaning
  - a) Open the machine hood
  - b) Clean and rinse the knotting aggregate preferably with a brush and hot water
  - c) For further internal cleaning the knotting aggregate should be covered with a suitable protective foil
  - d) Remove and clean the drip tray

- e) Clean the remaining internal surfaces of the machine in accordance with paragraph 3(remove the string bobbin) on this page
- f) Close the hood and clean the external surfaces again
- g) Replace the cleaned drip tray



When processing cured, tumbled and/or marinated products, intermediate cleaning will be required depending on the level of soiling.

**Intermediate cleaning:** Rinse the machine hood inside and outside, the knotting aggregate and dirt pan **with clear, hot water.**



**After each cleaning procedure the cleaned assembly groups have to be lubricated in accordance with the maintenance stipulations.**

## Maintenance

Lubrication is absolutely essential in order for the machine to achieve maximum performance. Lubricants which can come into contact with food must be approved by the respective official monitoring authority.



Recommended lubricants are edible fat (EF), machine oil without detergents (O-10) and water-resistant lubricant grease (WRLG).

Examples:

**OKS 470 high performance lubricating  
grease or OPTIMOL long time  
balance**



**Important !** Pull the mains plug!

The machine is easily accessible for all maintenance work when the panelling is removed and the machine hood is open. We recommend you proceed as per the following steps:

First proceed as described on pages 9 to 11 (points 1 to 5). Check that all ring components are firmly in place. Check the ring rollers for wear and replace them as necessary. Check the tension of the V-belt (ring drive) and the roller chain (aggregate drive). The inside of the drive belt and the profile of both belt pulleys must be clean and free of grease. Grease the roller chain sufficiently as necessary. Oil the knotting aggregate at the designated points (marked red). Grease the bevel wheel drive (knotter), toothed wheels (toothed segment), all cams and cam rollers. Sufficiently lubricate the knotting roller, knotting dome and knotting lock, knife lever and knife lever lug, lifter and lifter lug, link rod joints, stripper axle and knotting shafts. Check all springs and replace them as necessary. Check the sharpness of the string knife. The string must be severed cleanly during the cutting process. There must be no individual threads protruding from the cuts. Clean the twine button and check for sharp edges. First screw out the countersunk screw M3x6 then actuate the twine button lever (see chapter "Inserting the string"). This causes the twine button to be pushed backwards (away from the twine button housing). Then shift the twine button (leave the twine button lever actuated at all times) to the twine button housing with your left hand. This frees up the setting screw No. 15 (assembly M3) so that it can be unscrewed and removed. The twine button can then be removed. The twine button must not have any signs of damage on any part of the surface. The same applies to the surface of the twine button housing. Even the smallest crack or other unevenness in

the aforementioned places will cause abrasion on the string which will then collect in the drilled hole on the twine button housing and have a negative effect on the clamping function of these parts within a short space of time. This will cause incorrect knotting. Thoroughly clean the twine button and the twine button housing and polish them as necessary. Do not use any pointed or sharp-edged objects for cleaning. Assembly is performed by repeating the steps described above in reverse order.

Check the setting of the stripper as described on page 26. Oil the string rollers and take-up lever (see chapter "Inserting the string").



When performing the aforementioned tasks, constantly check for residual soiling and remove any soiling you find.

Further procedure: Screw on the sections of panelling, push in the drip tray and close the machine hood. Plug in the mains plug. Switch on the master switch. The automatic reference run follows (see page 8 "Reference run"). Open the hood. The safety sensor S1 (see page 10 for description) must light up constantly in green. Actuate the foot pedal - The machine must not start up.

Actuate the jogging pushbutton on the right of the aggregate pulsatingly. This advances the knotting aggregate step by step at reduced speed. The individual movement sequences can thus be observed more easily. After one or two revolutions press and hold the pushbutton. The knotting aggregate then runs into the final position. Then release the pushbutton. In the process, check the lubrication again and re-oil as necessary.

Open the hood again. Actuate the foot switch - The machine must not start up.

**Important!** The inside (profile side) of the drive belt and both belt pulleys must be dry and free of grease. Clean as necessary.

Turn the ring by hand. Check that it runs freely and check the belt tension. Adjust the ring rollers as necessary. Close the hood. The reference run follows (see above).

Thread the string (see chapter "Inserting the string") but only proceed as far as item "K", drilled hole in the tying arm tube. Now pull off a few metres of string, testing the function of the retriever arm and checking that the string runs properly in the process. Re-oil the rollers as necessary.

Insert the string on the aggregate (see chapter "Inserting the string"). Close the hood. Carry out a few test tying procedures. Check the knot shape and adjust as necessary (see chapter "The story of knots").

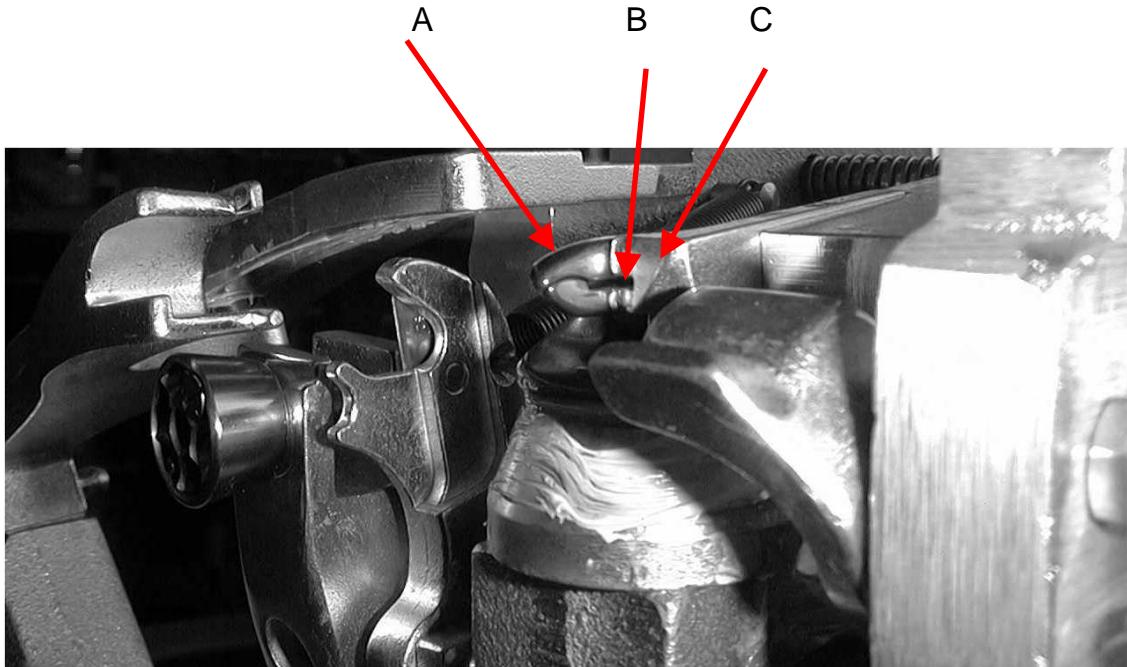
## Stripper setting

The side setting for the stripper "C" is made using the threaded pin No. 9 (group M4).

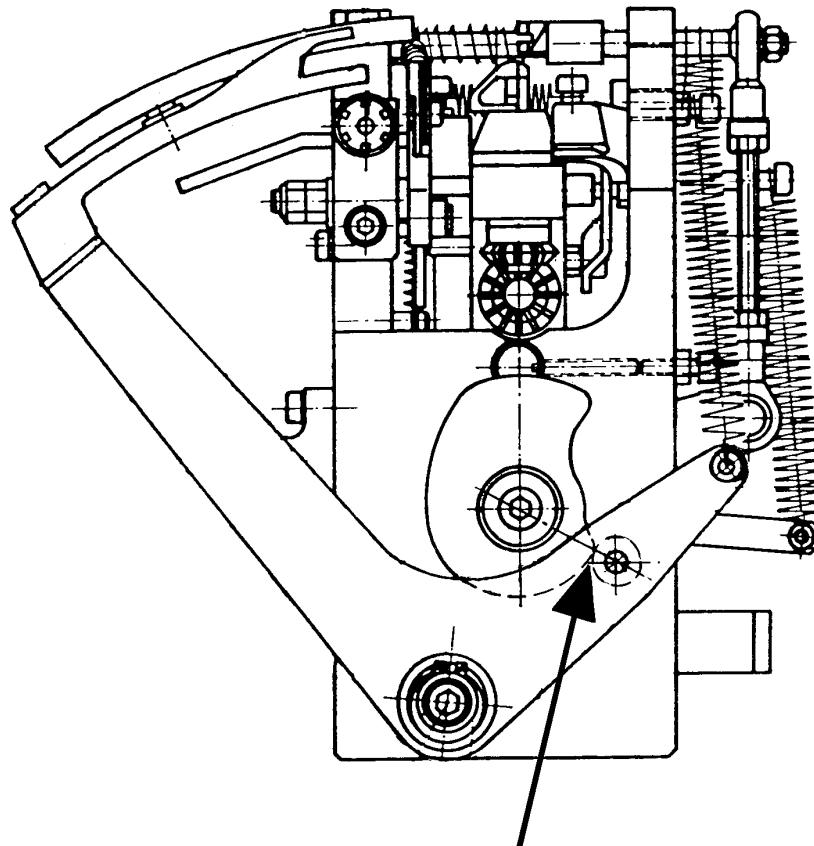
When the knotter "A" moves back, stripper "C" must rest on knotter "A" with pressure.

The height setting is made using the toggle link socket No. 2 (group M4).

The correct height of the stripper slot "B" to the knotter is shown in the figure below.



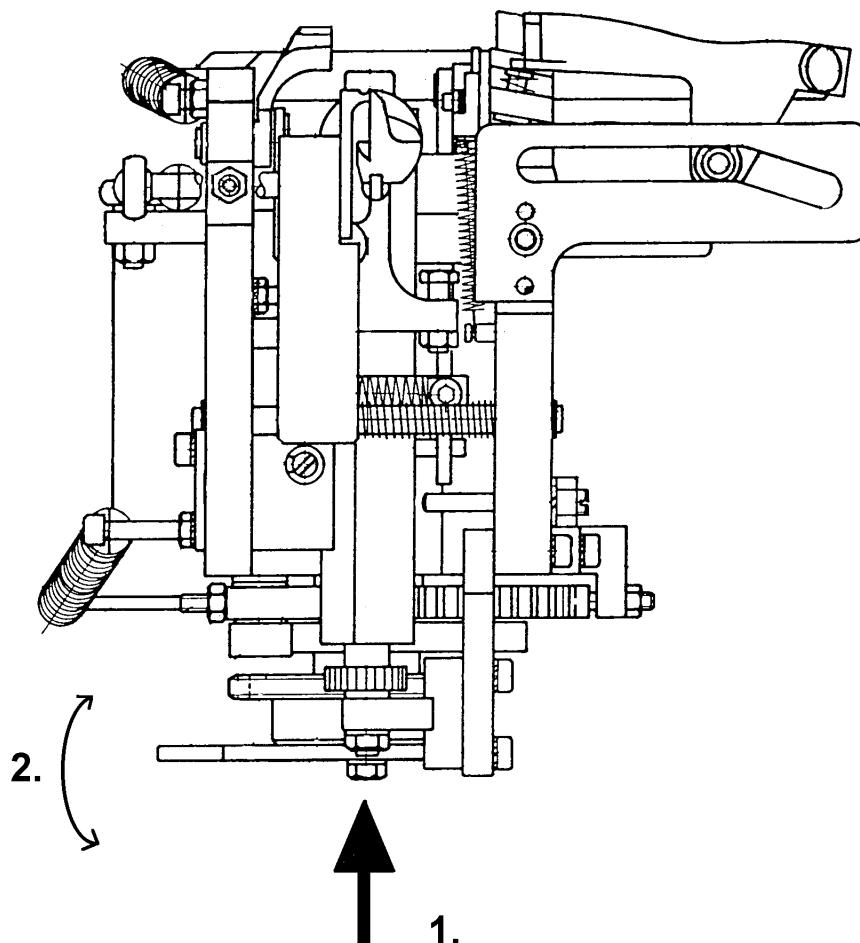
## Checking the zero position on the knotting aggregate



The correct zero position for the knotting aggregate is achieved when the draw slide lever's cam roller is positioned 2-4mm in front of the drop of the cam.

See the next page for details on adjusting.

## Adjusting the zero position



Unfasten the hexagon screw marked in the drawing above.

Adjust lever which activates limit switch

- turn clockwise to stop later
- turn anticlockwise to stop unit earlier

Tighten the hexagon screw.

Press and hold the "jogging" button. The aggregate performs a full turn at reduced speed. The controller saves the newly set zero position.

## Setting the tying arm zero position and the aggregate's starting position

### Teaching Smart Motion Controller (SMC) A1

When replacing the controller A1, the following settings must be made:



**It is imperative that you adhere to the order of steps described here!**

1. Switch off the machine and close the hood. Set the selector switch №4 to position "6".
2. Bypass terminal 9 and terminal 10 with the prepared jumper on the control cabinet door.
3. Open the hood and switch on the master switch.  
Check whether the switch lever on the aggregate is positioned on the left next to the proximity switch (viewed in the anti-clockwise direction) without activating the proximity switch.  
Unfasten the hexagon screw as necessary and turn the switch lever into the described position. Re-tighten the hexagon screw.
4. Close the hood.
5. The machine performs a reference run for the ring and aggregate, with the ring moving into a programmed initial position.
6. Open the hood.  
The switch lever on the rear of the ring should now be positioned a little short of the proximity switch to the left without activating the proximity switch. If the ring is in another position, switch off the machine for at least 10 seconds and return to step 5.
7. Turn the ring clockwise manually into the "Aggregate start" position. This position has been reached when the marker "1" on the ring is positioned in line with the welded seam on the tunnel.

Additional help for correct positioning:

Figure 1            for FRT-MF and FRT-MF 400

Figure 2            for FRT-S and FRT-S 400

Figure 3            for FRT-M

8. To store the position, press the foot pedal once.

9. Turn the ring further clockwise into the "Ring start/stop" position.  
Ring marker "2" in line with the welded seam on the tunnel.

Figure 4 provides additional help for correct positioning. Ideally the string will be positioned diagonally to the knotting block.

10. To store the position, press the foot pedal once.
11. Close the hood and wait approximately 3 seconds until the drives have been initialised.
12. Press the foot pedal once.  
The ring performs 10 turns to calculate the circumference.
13. Open the hood.  
Set the knotting aggregate to the correct zero position as necessary. Unfasten the hexagon screw.  
If the aggregate shuts off earlier, the switch lever must be moved upwards.  
If the aggregate shuts off later, the switch lever must be moved downwards. Tighten the hexagon screw.  
Press and hold the "jogging" button. The aggregate performs a full turn at reduced speed. The controller saves the newly set zero position.
14. Set selector switch N°4 to position "1"
15. Close the hood and check that the machine is functioning properly in switch position "1" (single wrap + knotting)
16. Remove the jumber from between terminal 9 and 10 and keep it safe on the control cabinet door for future use.

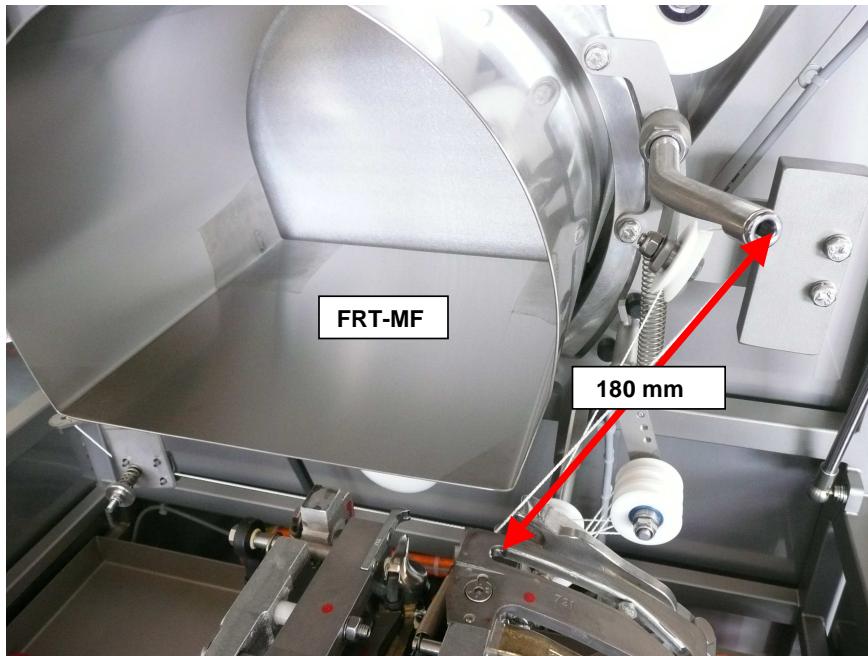


**Only authorised and trained staff is allowed to perform this procedure.**

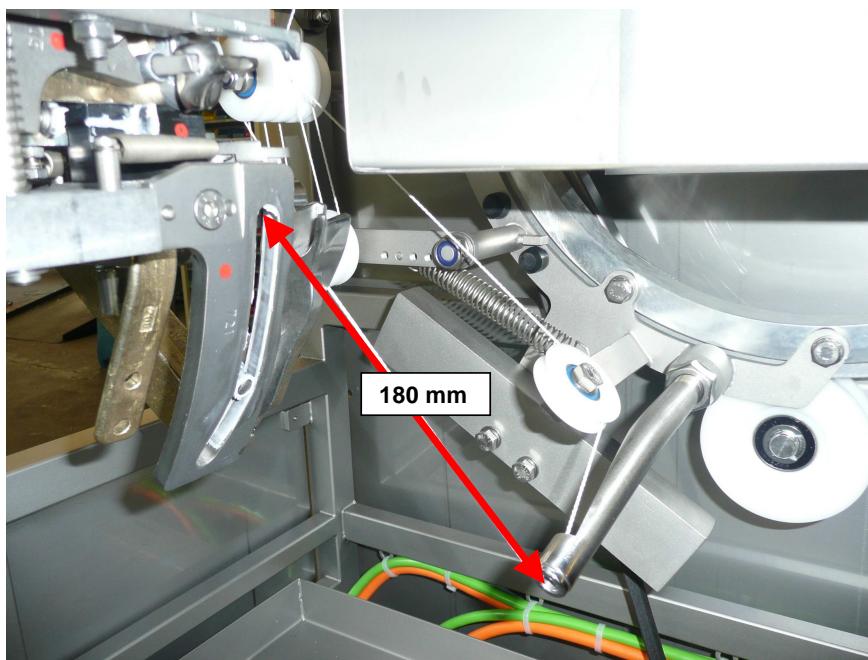
**Figure 1**

FRT-MF = 180 mm

FRT-MF 400 = 165 mm

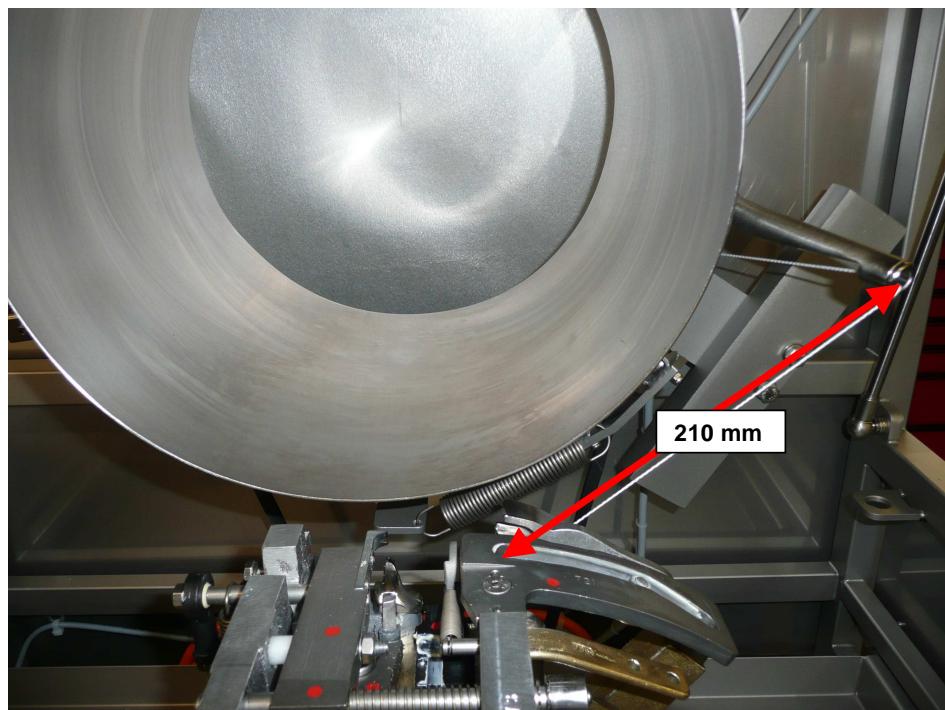
**Figure 2**

FRT-S = 180 mm

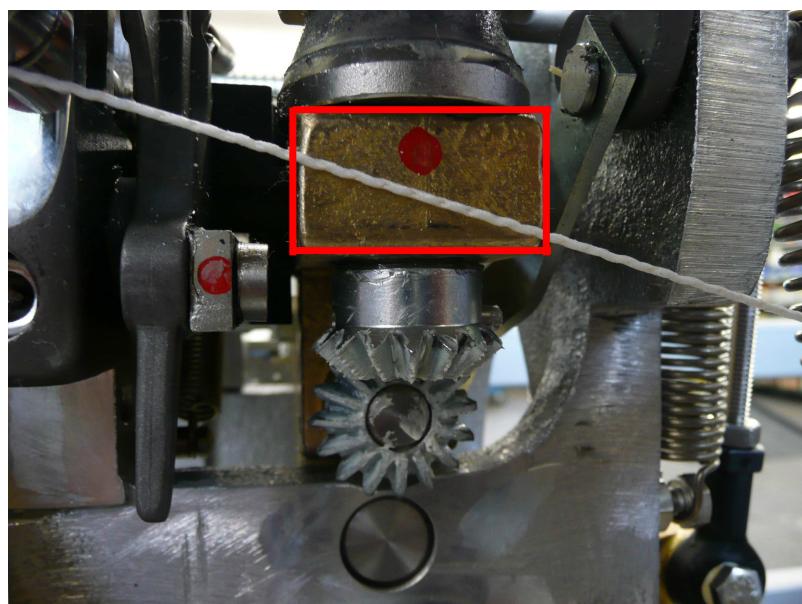


**Figure 3**

FRT-M = 210 mm

**Figure 4**

String approximately diagonal to the knotting block



# The story of knots

Incorrect knotting  
patterns and their  
causes

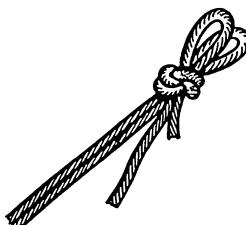
## Short loops

The knotter opens too early. Shift the mount for the cam roller for opening the knotter backwards towards the chain wheel. The stripper does not rest on the knotter. The string is too thin.



## Knots not strong enough

Stripper slot too large. The knotter opens too early. The string is too thin.



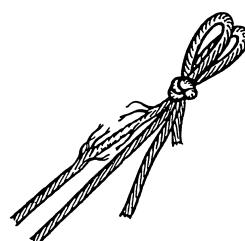
## String not cut cleanly

The string knife is blunt. Flip or replace the knife.



## String break before the knot

Sharp edges on the stripper, drawslide head, tip up lever or knife lever.

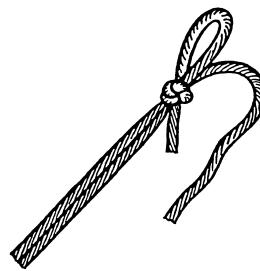


**One loop of normal length, one loop which is too short**

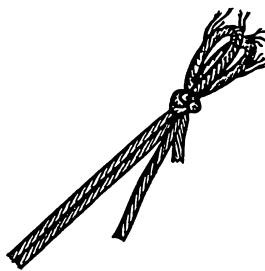
The knitter is not closing properly. Tension spring for the knotting lock is too weak. The stripper does not rest on the knitter.

**Single loop**

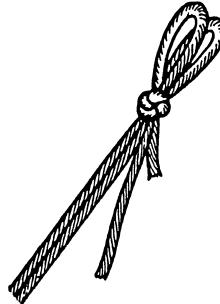
The knot has only a single loop. The second loop is drawn through. Increase the spring pressure on the twine button. The lead end of the string which protrudes from the twine button must not move when the tying arm starts up.

**Loop ends torn**

Upper or lower finger of knitter or stripper has sharp-edges.

**The perfect knot**

A correct knot has two loops of equal length and one short and one long end of string. The knot is tight and hard.



## Faults and their causes



Never rework the surface of the twine button housing! This surface has an exactly specified contour. The notch is intentional and has not been created by wear. Only ever make the necessary settings by adjusting the string brake and twine button spring.

### 1. Threading:

Make sure that threading has been performed properly.

The string taking the wrong course is the most common cause of string breaks (see "Threading diagram" on pages 14-19).

### 2. String:

The machine is set to a certain string thickness. Always use the same quality and thickness of string in order to achieve the best results.

- a) String which is too weak often breaks on the twine button instead of being pulled out without hindrance
- b) If the string is too thick, it will not be released by the knotter
- c) String which is too thin causes a loose knot

### 3. Twine button:

If you are using a good quality of string of the correct thickness and it still breaks and leaves behind residual fibres in the twine button, this is generally caused by excessive spring tension on the twine button.

Reduce the spring tension. Make sure that the setting wheel re-engages properly and the retainer screw is tightened.

### 4. String tension:

You achieve the best results with an even, smooth string brake setting. Check the setting by pulling out a few metres of string from the tying arm tube. You can change the string tension by turning the knurled nut on the string brake.



**Every person on the user's premises given the task of setting up, commissioning, operating, maintaining and repairing this machine must have read and understood this operating manual, and in particular the chapter "Safety".**

## **MAINTENANCE INSTRUCTIONS**

<b>Assembly group</b>	<b>Interval for single-shift operation</b>	<b>Measure / procedure</b>
M6 Knotting aggregate	daily after cleaning	<p>Spray all around with water-repellent spraying oil, apart from the twine button area</p> <p>Pay particular attention to the bearing on the front of the main shaft</p> <p>Grease all sliding and rotating parts</p> <p>Repeat the above procedure after several turns of the aggregate (jog mode)</p>
M40 Ring	weekly	<p>Lubricate the lubricating nipples (1x on the drawslide head, 1x on the pivot pin for the toothed segment) with a suitable grease gun</p> <p>Check the knife for wear. Flip or replace it as necessary.</p> <p>Check that the cam rollers move freely</p> <p>Check the tension and pressure springs for breakages</p> <p>Check the clamping surfaces on the twine button for damage</p> <p>Check the aggregate's zero position</p> <p>Pages 27-28</p> <p>Check the stripper setting</p> <p>Page 26</p> <p>Check the knotter housing play and adjust guide piece as necessary</p> <p>Check that the drive chain is sufficiently tensioned and re-tension as necessary</p> <p>Oil the twine rollers and take-up lever bearing unit and check that they move freely</p> <p>Check the smoothness of the tying arm insert and clean it</p>

	monthly	Check the ring for play Adjust the ring rollers as necessary
Machine hood	daily	Check that the hood locking mechanism is functional, pages 9-11
<b>M50 Electrical system</b>	daily	Check that the safety sensor S1 is functional, page 8 and page 10 Check that the monitoring switch B2 is functional, page 8
	monthly	Check that the cable glands on the control cabinet are leak-tight, check the control cabinet for leaks

**TROUBLESHOOTING**

Cause	Remedy
Knot pattern is not correct	see "The story of knots" on pages 29-30,
String break	string taking the wrong course, page 14-19
Machine does not start up	<ol style="list-style-type: none"><li>1. Refer to the chapter "Set-up and commissioning, pages 9-11</li><li>2. Check the foot switch B1</li><li>3. Check the ring and knotter motor</li><li>4. Check the fuse F1</li><li>5. Check the safety sensor (S1) on the hood and monitoring switch (B2) on the drip tray</li></ol>
Knotting aggregate does not start up	Check the spacing between the trigger and the proximity switch B5, switching distance = 2mm
Ring does not switch off in accordance with set preselection	Check the spacing between the trigger and the proximity switch B4, switching distance = 2mm
Knotting aggregate does not switch off after one turn	Check the spacing between the trigger and the proximity switch B5, switching distance = 2mm
The knotting aggregate cannot be moved in jog mode	Check the fuse F1

## Residual risks and incorrect operation

Residual risks and incorrect operation which exist despite measures for integrated safety and technical protective equipment, are described and illustrated in the following. These risks are documented in a risk analysis and filed by the manufacturer.

In the following figure the knotting aggregate is shown in the normal position and side position (FRT-S) for the sake of simplicity.

When the machine hood is open, the Ring R can be turned by hand (without electrical power) with all fitted parts in direction A and direction B. There is a risk of crushing between the ring rollers L and the ring R, and between the V-belt U and ring R. The positions are marked with a yellow dot.

When inserting the drip tray M there is a risk of crushing between the drip tray and the machine frame (see yellow dot).

When the machine hood is open, the knotting aggregate can be driven using jog button D at reduced speed, step by step, in the direction of rotation C (jog mode). The individual movement sequences can thus be observed more easily.

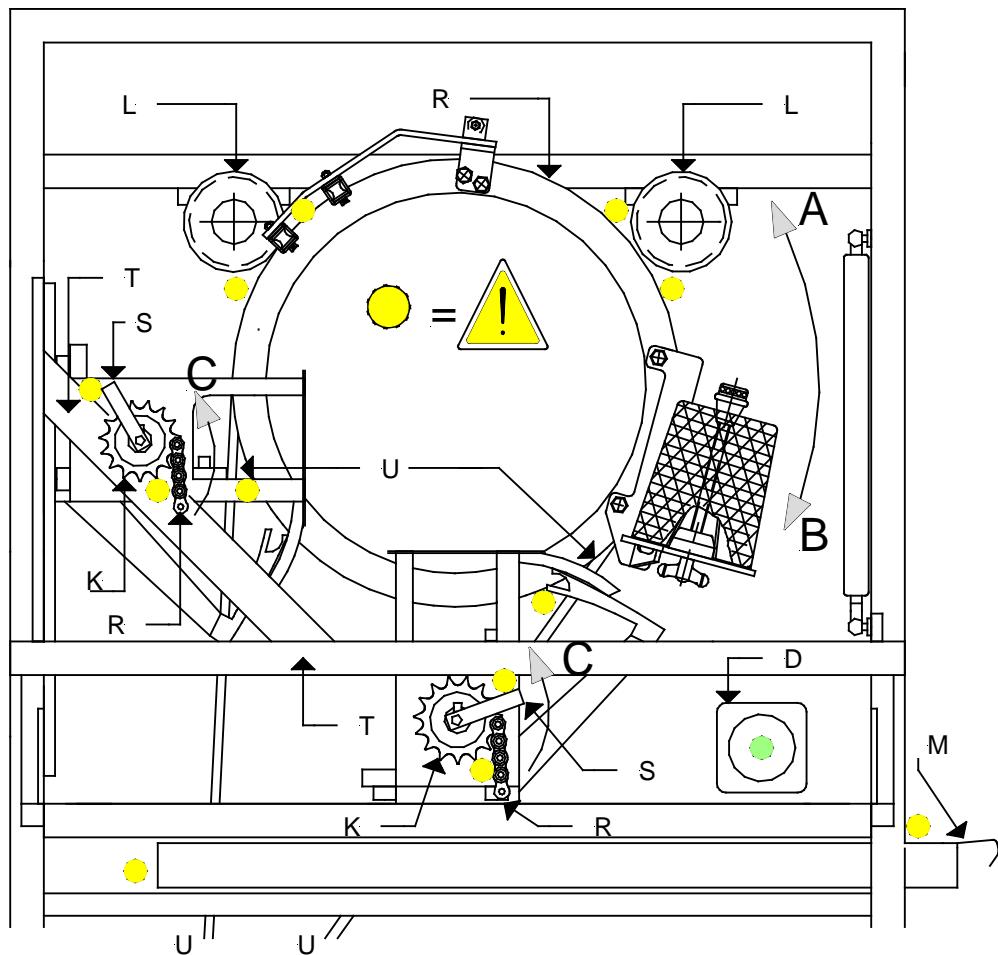


### Jog mode:

**Only authorised and trained staff is allowed to perform this procedure.**



In the entire area of the knotting aggregate, in particular on its drive elements, between the chain wheel K and roller chain R, and between the trigger S and the frame T (see yellow dot), there is a **considerable risk of crushing**.



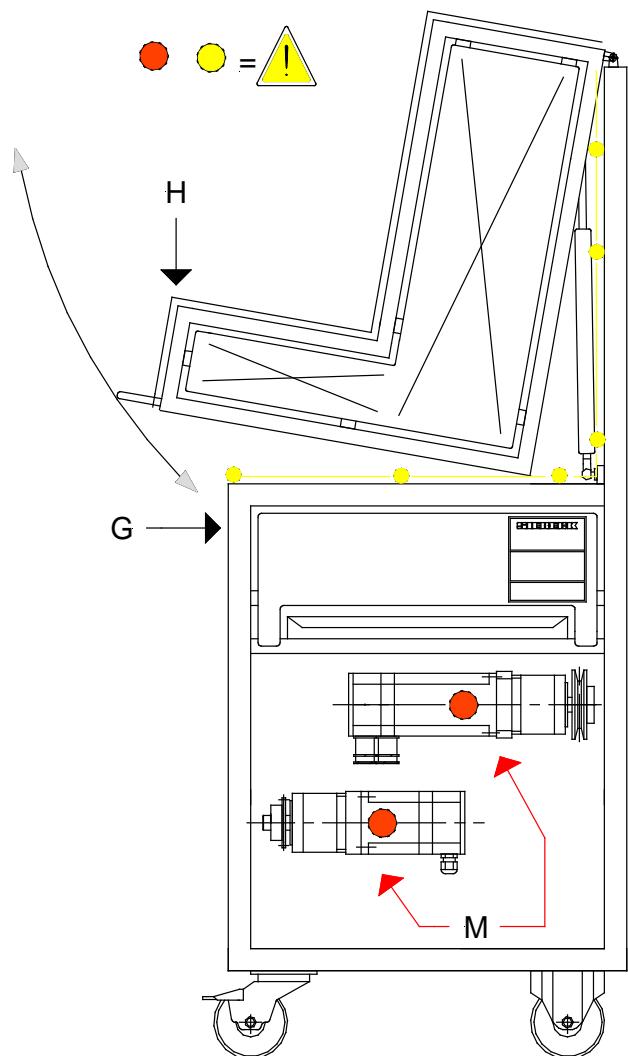


**Risk of crushing** between the protective hood H and the machine housing G (see yellow dots), e.g. due to pivoting the protective hood or due to wear on the pneumatic pressure spring.



### Thermal hazard!

The drive motors M can reach temperatures of up to 80°C (see red dots). When the sections of panelling are removed, contact can cause injuries.

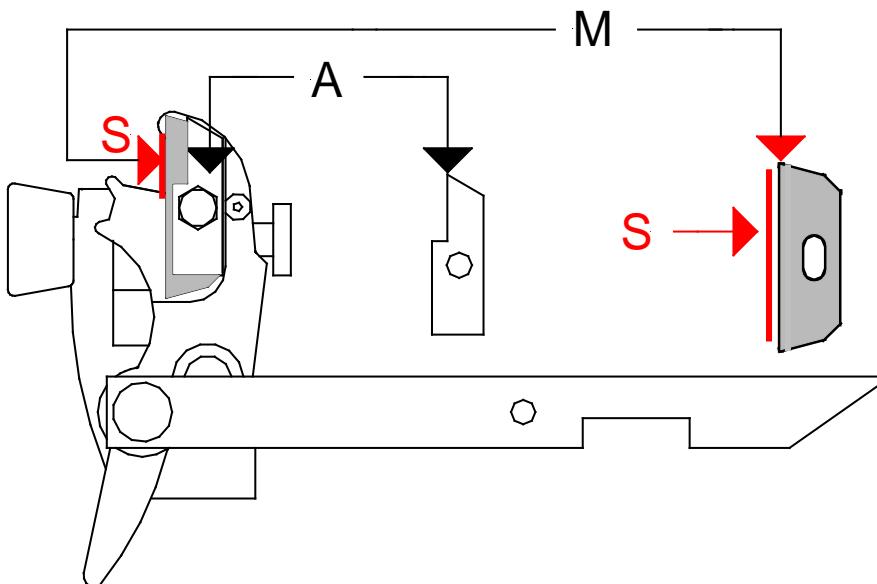


**Risk of cuts.**

When installing and removing the knife M.

When installing and removing the knife M, you must adhere to the following:

- Do not touch the knife blade S
- Risk of injury!**
- The cover plate A must be fitted as illustrated.  
If the cover plate is missing the knife M will wear quickly.



**Only authorised and trained staff is allowed to perform this procedure.**



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