



FORMICA CZ, s.r.o.

**Machines for one-sided paper lamination in the
printing and copying industry**

**FOLIANT 370T
FOLIANT 520T
FOLIANT 520HP
FOLIANT 720HP**

Instruction Manual

(Version 1/2002)

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1 Introduction

This instruction manual describes working with the FOLIANT 370T, FOLIANT 520T, FOLIANT 520HP, FOLIANT 720HP roll laminators. These machines have identical construction, they differ only in working width or operating performance. The only differences are as follows: absence of the cooling ventilator for the roller for the FOLIANT 370T machine, differing diameters of the main rollers and different power consumption of the element for heating the working roller. These differences are mentioned in the text.

1.1 Liability for damage

The manufacturer and the distributor are not liable for damage caused by operation that does not comply with the instruction manual and safety instructions. In particular, the manufacturer or the distributor is not liable for damage caused by applying various kinds of lamination foil to various kinds of paper. Every combination of materials should be tested prior to standard use.

1.2 Work safety

This machine is fitted with a range of safety elements to protect the operating staff and to protect the equipment during its normal use. The safety measures do not, however, cover all safety aspects. Therefore, the operating staff should read and understand this instruction manual or the staff should be duly trained by responsible persons before starting to use the equipment. This will prevent mistakes during the installation and operation of the equipment. Please do not try to install the equipment before thoroughly reading all the instruction manuals supplied with the equipment and understanding all functions and procedures.

Three categories of safety instructions are used in the instruction manual

DANGER



Ignoring these instructions may result in loss of life

WARNING



Ignoring these instructions may result in serious injury or serious damage to the equipment

NOTICE



Ignoring these instructions may result in damage to the equipment or an injury



Important notice:

The FOLIANT laminating machines are equipped with a "Y" type connection, therefore only a trained technician from the distribution or service organization may install the equipment. Please follow safety instructions printed on the labels on the equipment. Please do not remove or tamper with these labels. If damage is done to the label, please contact your supplier.



SAFETY ELEMENTS

This equipment is fitted with safety elements protecting the operating staff and the equipment. The safety elements include the main switch, protective covers, overheating fuse, overload fuse, and back operation. When working with the machine (lamination), the production instructions, safety measures, and health protection during work should be complied with. It is prohibited that the operating staff has loose sleeves or other parts of the clothing during the lamination. During work, it is prohibited to eat, drink, or smoke. There are information labels on the machine and labels warning against various dangers.



Please make sure to follow the safety instructions printed on the labels on the equipment. Do not remove or tamper with these labels. If the label is damaged, please contact the distribution company.

1.3 General description of the machine

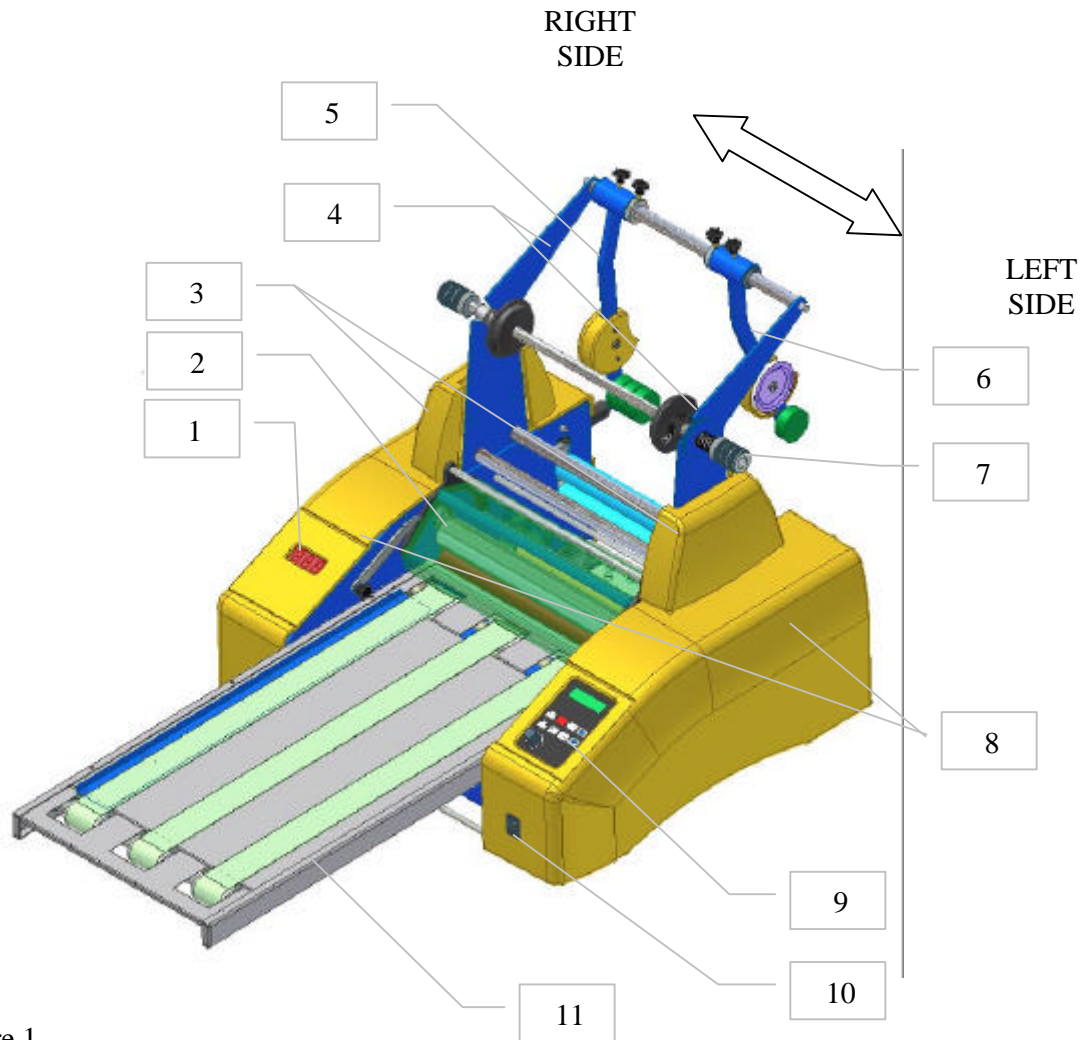


Figure 1

- 1) Indicator of lamination temperature
- 2) Cover of the main roller
- 3) Covers of pylons
- 4) Pylons
- 5) Perforation arm
- 6) Cutter arm
- 7) Roll carrier
- 8) Side plates
- 9) Control panel
- 10) Main switch
- 11) Feeding table



1.4 Use:

The FOLIANT laminating machines is designed for small and medium printing houses, which require swift lamination of paper sheets printed on offset machine or by the digital printing technology such as printed book covers, envelopes for booklets and magazines, postcards, file folders and boxes before cutting and the like. The machines may be equipped with the FOLIANT 520 automatic feeding machine and the FOLIANT product line automatic separator for automatic separation of laminated arches. The feeding machine will hand the sheets into the laminator with technological overhang, the laminator will cover the paper sheets with polypropylene or nylon foil. The separator will separate the laminated sheets, it will count them and will store them in the container.

Glue applied on the polypropylene foil is heated by the heated roller and in the point of contact it is pressed to stick perfectly to the print. For lamination, the manufacturer recommends to use foils in rolls with inner diameter of 75 mm and with widths depending on the material being processed.

Lamination temperatures are regulated from 80 till 140°C. The maximum operating width for the equipment and the speed of the lamination depend on the type of the equipment.

2. TECHNICAL DATA:

Derived alternatives of the equipment:

Derived alternatives of the equipment have the same construction, they vary only in the operating width, performance, presence or absence of the front conveyor and number of processed sheets per hour.

Technical parameters for the installation of the machine

	DIMENSIONS	WEIGHT [Kg]	
		Without carriers	TOTAL
FOLIANT 370 T	590x1170x630	60	75
FOLIANT 520 T/HP	780x1170x630	68/77	85/95
FOLIANT 720 T	980x1170x630	90	110

Type	Power consumption of the machine [W]	Front conveyor	Operating width [mm]	Sheets * B3/hour	Maximum format [cm]	Minimum format [cm]
Foliant 370	750	Yes	370	850	37 x 51	20 x 25
Foliant 520T	1000	Yes	520	1200	52 x 71	35 x 25
Foliant 520 HP	2000	Yes	520	2600 **	52 x 71	35 x 25
Foliant 720T	2500	Yes	720	1800 B2 **	72 x 100	50 x 35

* Information concerning the number of laminated sheets is applicable for lamination of white paper 135 g/m²

** Information concerning the number of laminated sheets is applicable for lamination of white paper 135 g/m² using automatic feeding machine

2.2 The following standards and regulations have been used for the construction of the equipment.

Machinery

N V no. 170/1997 Sb. (Directive 98/37/EC)

stipulating technical requirements for machinery, as amended by government regulation no. 15/1999 Sb. and government regulation no. 283/2000 Sb.

CSN (Czech National Standard) EN 292-1:1994 (EN 292-1:1991)

Safety of machinery. Basic terms, general principles for designing

Part 1: Basic terminology, methodology.

CSN EN 292-2:1994+A1:2000 (EN 292-2:1991+A1:1995)

Safety of machinery. Basic terms, general principles for designing

Part 2: Technical principles and specifications.

CSN EN 294:1993 (EN 294:1992)

Safety of machinery. Safe distances for avoiding contact of upper limbs with dangerous points.

CSN EN 953:1998 (EN 953:1997)

Safety of machinery. General requirements for design and construction of protective covers (fixed, movable).

CSN EN 954-1:1998 (EN 954-1:1996)

Safety of machinery. Safety elements of control systems. Part 1: General principles for construction.

CSN EN 1050:1998 (EN 1050:1996)

Safety of machinery. Principles for stipulating rate of risk.

CSN EN 563:996 (EN 563:1994)

Safety of machinery. Temperatures of surfaces accessible to contact. Ergonomic parameters for determining temperature limits of hot surfaces.

CSN ISO 7000:1996 (ISO 7000:1989)

Pictograms replacing notices on equipment. Glossary and comprehensive table of pictograms.

Electrical equipment

N V c. 169/1997 Sb. (Directive 89/336 EWG)

stipulating technical requirements on products for electromagnetic compatibility, as amended by government regulation no. 282/2000 Sb.

N V c. 168/1997 Sb. (Directive 73/23 EWG)

stipulating technical requirements on low-voltage electrical equipment, as amended by government regulation no. 281/2000 Sb.

CSN EN 60335-1:1997 (EN 60335-1:1994)

Safety of electrical household appliances and appliances with similar purpose. Part 1: General requirements

CSN EN 61000-3-2+A12:97 (EN 61000-3-2+A12:1996)

Electromagnetic compatibility (EMC) – Part 3: Limits – Section 2: Limits for emissions of harmonic current (equipment with input phase current ≤ 16 A)

CSN EN 61000-3-3:1997 (EN 61000-3-3:1995)

Electromagnetic compatibility (EMC) – Part 3: Limits – Section 3: Reducing voltage oscillation and flickering in low-voltage distribution networks for equipment with nominal current ≤ 16 A

CSN 33 0120:2001 (IEC 38:1983)

Electromagnetic regulations. IEC standardized voltage.

CSN EN 1037:1997 (EN 1037:1995)

Safety **CSN EN 50081-1:1994** (EN 55081:1992)

Electromagnetic compatibility. General standards for radiation. Part one: Residential, retail and light industry premises.

CSN EN 55014-1:1995 (EN 55014-1:1993)

Electromagnetic compatibility – Requirements on household appliances, electrical equipment and similar equipment – Part 1: Radiation – Standards for product group.

CSN EN 55014-2:1998 (EN 55014-2:1997)

Electromagnetic compatibility – Requirements on household appliances, electrical equipment and similar equipment – Part 2: Resistance – Standards for product group.

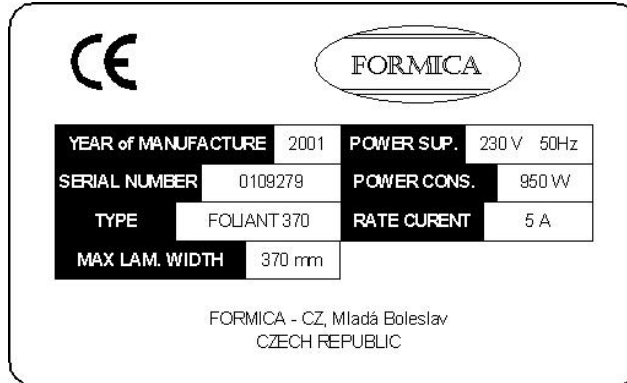
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2.3 List of labels:

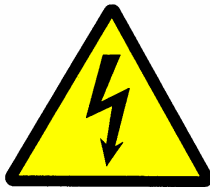
1. Type model label
2. Warning when removing the cover – danger of injury by electric current
3. Warning when removing the cover – mechanical danger
4. Caution – equipment under operation

The production label is OK, only weight needs to be added and the label should be in several languages (universal) or specific for the destination country. E.g.:

1.



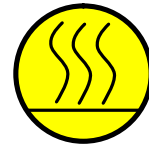
2.



3.



4.



Labels 2 and 3 must look like this (only black and yellow):

2.4 Electrical installation



The 220 - 230V, 50 Hz sockets for the connection of the equipment must be located in the vicinity of the equipment and must remain freely accessible. The socket and the breaker must be dimensioned properly, see the chart of breakers. It is prohibited to use extension cables and Y-branches. Adjusting the connection of the equipment to the network to comply with national standards must be performed by a person with appropriate electro-technical skills.

Table of breakers

FOLIANT 370T	10A
FOLIANT 520T	10A
FOLIANT 520HP	16A
FOLIANT 720HP	16A

3. Transporting and handling the equipment

3.1 Transporting and handling the equipment



The weight of the equipment is designed so that two persons may install the equipment and perform any necessary manipulation. Two expanding sticks (A) are used to lift the machine. After the machine is installed in place, it is necessary to install the arms holding the foil, the perforation wheel, and the knife.

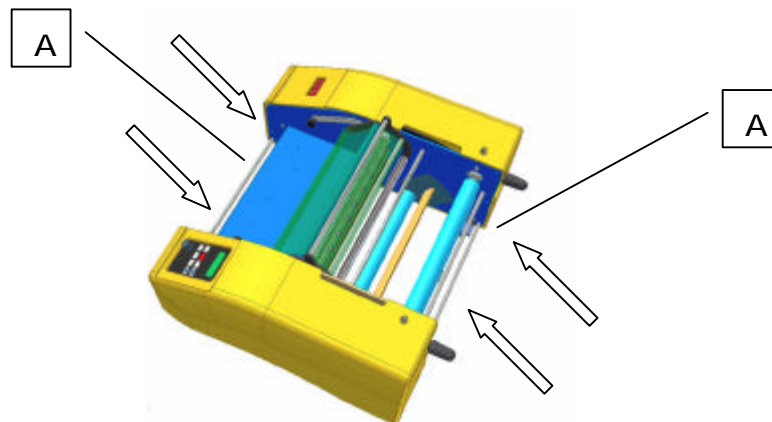


Figure 2

3.2 Storage of the equipment

The equipment must be placed on a solid and even surface
(Recommended accessories – the FOLIANT table with appropriate width)
Temperature for storing -10°C to 60 °C (-10°F to 140°F)
Relative humidity: 20 to 80%, non-condensing relative humidity

3.3 Location of the equipment

The equipment must be situated on a solid and flat surface (working plate) dimensioned for the weight of the equipment and must not be placed in the vicinity of other heat sources, including direct sunlight. All control elements must be freely accessible. The equipment must have free handling space around it [at least 1 meter]. The main switch (Figure 1 to 10), serving also as the emergency switch for emergency situations, must also be freely accessible.

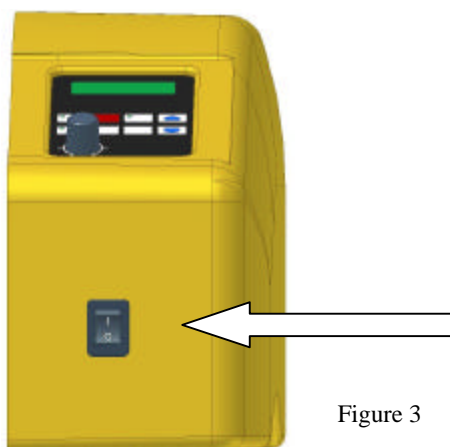


Figure 3

3.4 Installing and assembling the equipment

The equipment is shipped in a wooden pallet, partially dismantled. It is therefore necessary to assemble the equipment before installation. Assembling the machine is an easy installation work. The equipment must be disconnected from the power network during installation.

Installation procedure:

1. Placing the foundation of the equipment on the working place
2. Removing side protective covers

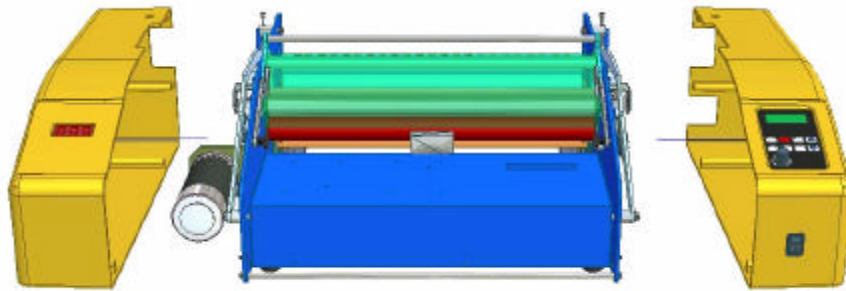
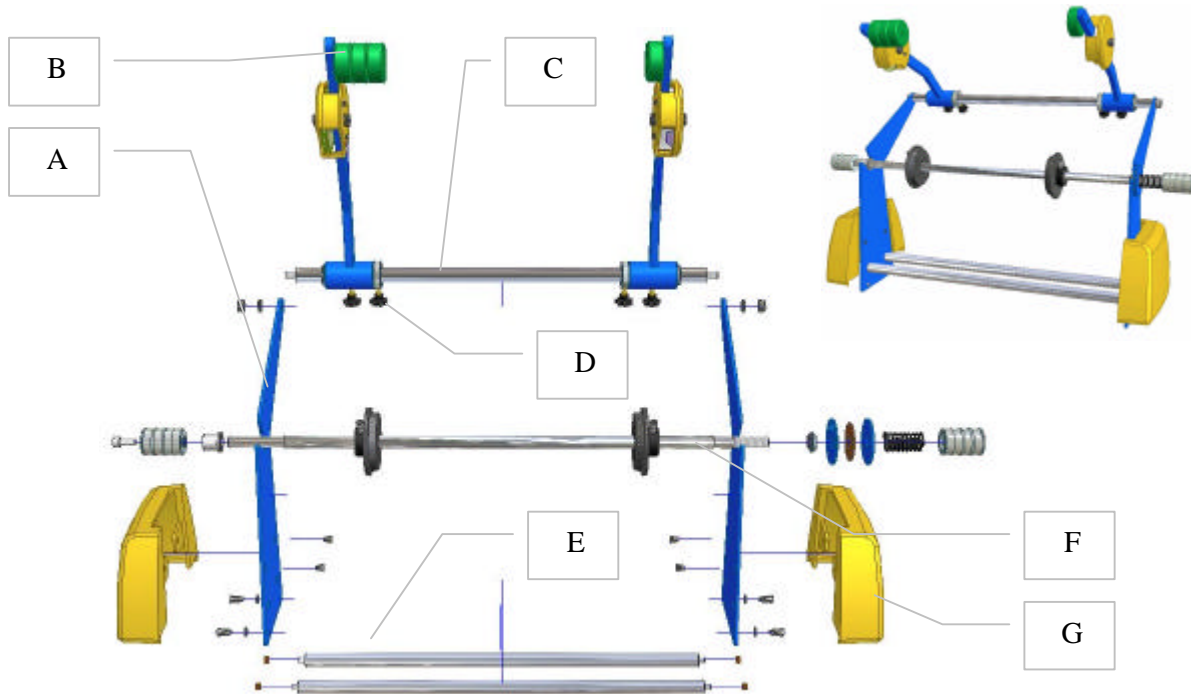


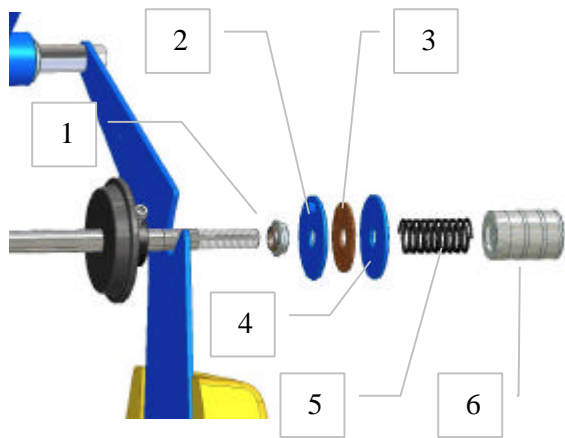
Figure 4

3. Installation of the carriers of the roll with equalizing rollers



Figure

- | | |
|-----------------------|------------------------|
| A) Pylon | B) Weights |
| C) Additional shaft | D) Arrest screws |
| E) Equalizing rollers | F) Carrier of the roll |
| G) Cover of the pylon | |



- 1) Bearing
- 2) Brake wheel with pin
- 3) Lamella
- 4) Brake wheel
- 5) Brake spring
- 6) Regulation nut

Figure 6

- 4. Back installation of side protective covers and covers for the carriers of the roll
- 5. Assembly of the axial shaft with arms of perforation wheel and knife
- 6. Assembly of the main shaft
- 7. assembly of the feeding table

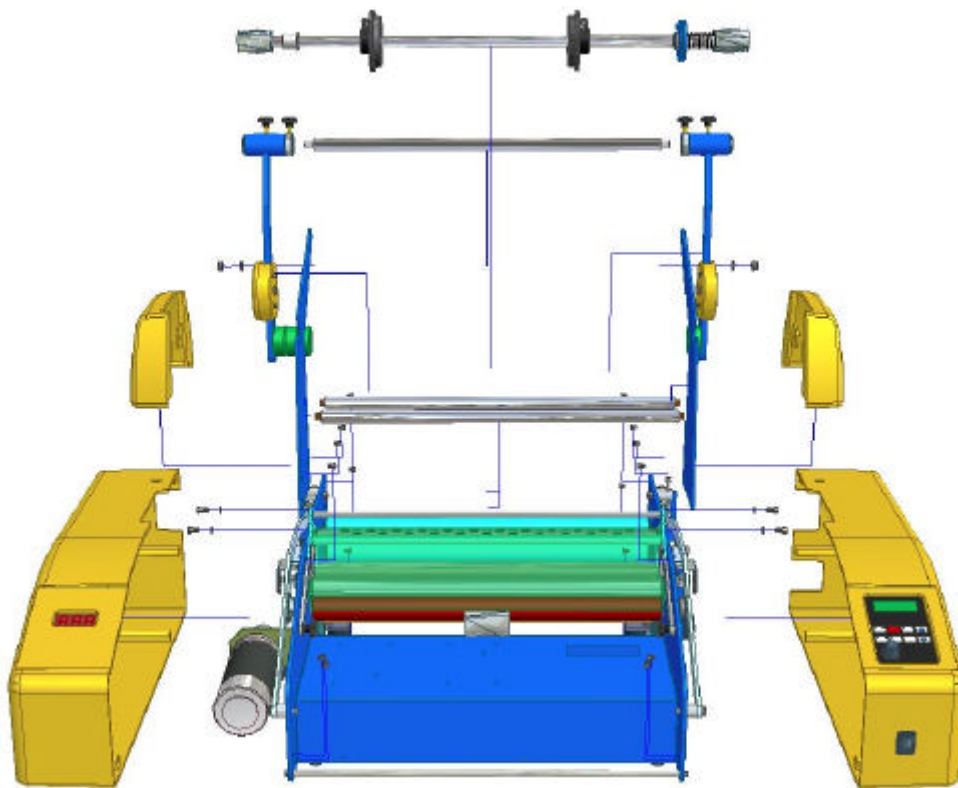


Figure7

3.5. Operating conditions



Working environment requirements:

1. Operating temperature 15° to 40°C (41°F to 104°F)
2. Dust-free working environment
3. Relative air humidity – 20 to 80%, non-condensing relative humidity

3.6 Protective elements of the equipment

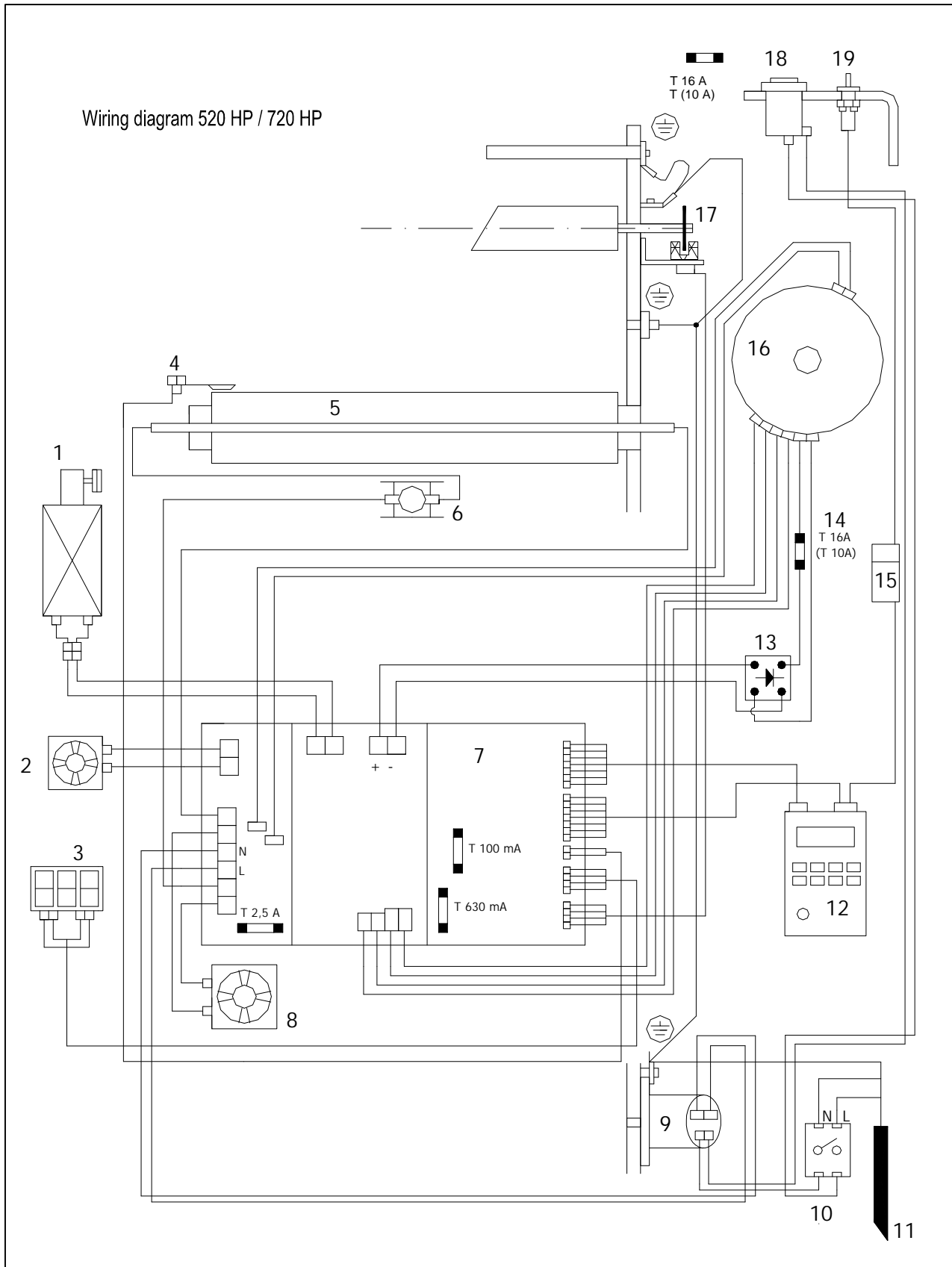


- Side covers
- Covers for roll carrier
- Cover of perforation wheel
- Cover of the knife (the knife is uncovered only in the working position – when cutting the foil; if the lamination does not require the cutting of the foil, do not remove the cover !!!)
- Cover of the working area of the heated roller – during lamination, it tightens the foil, therefore it must always be tilted down in the working position, and safeguarded by latches with eccentric screws.
- Cover of back rollers - transparent

3.7 Liquidation of the equipment

When the product can no longer be used, it becomes waste and, as such, its removal is subject to the provisions of the Act on Waste applicable in the country of the operator. Removal of the product when it may no longer be used may be performed only by handing the product over to a person authorized pursuant to the Act on Waste. Please do not dispose of the product in any other manner and do not discard it in communal waste.

4. Electrical elements



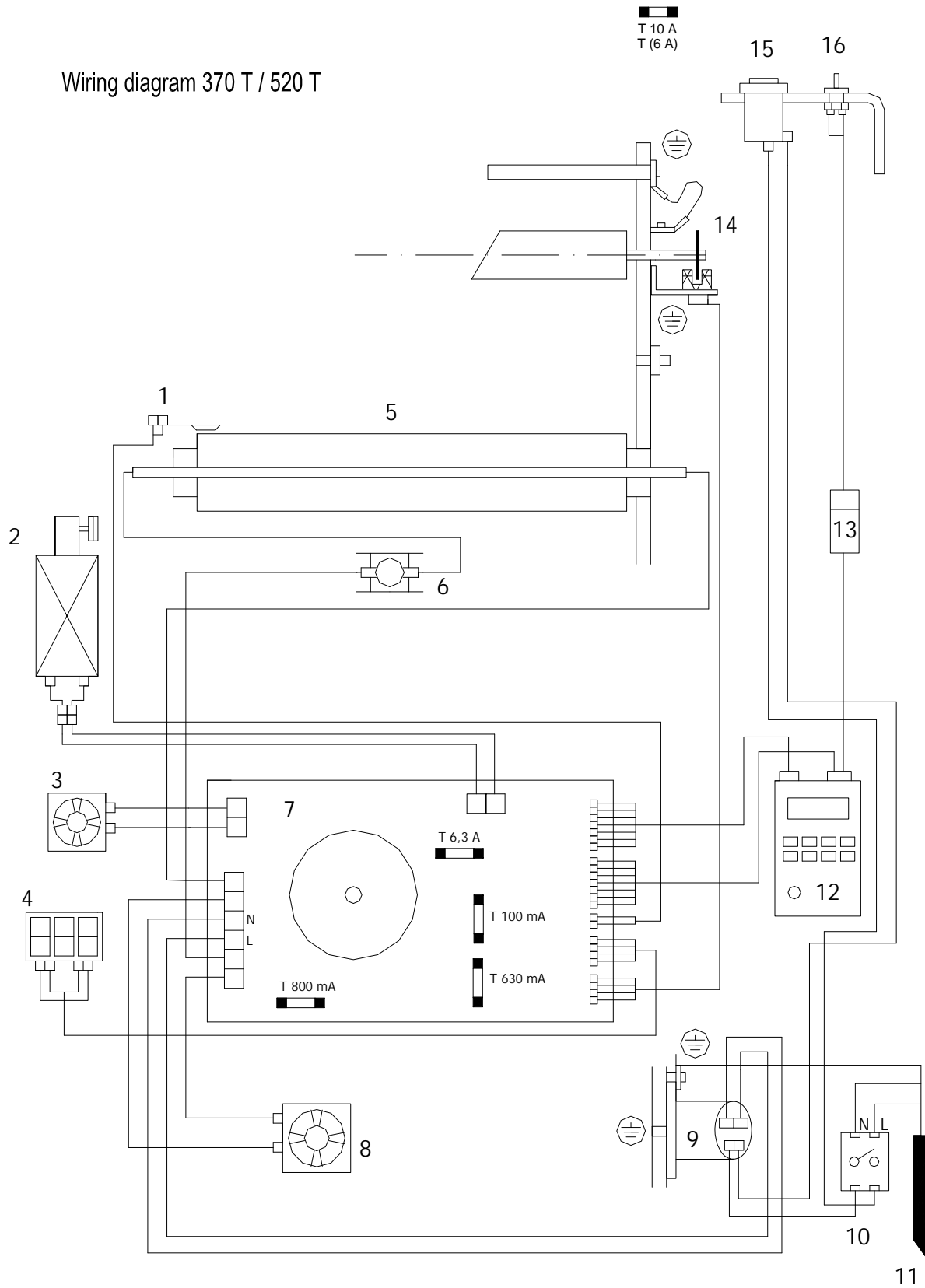
Wiring diagram - Laminator HP

- 1) Motor
- 2) Fan – PC board cooling
- 3) Temperature display
- 4) Temperature sensor
- 5) Chrom roller with heating element
- 6) Thermofuse
- 7) Main PC Board
- 8) Fan – Roller cooling
- 9) Main filter
- 10) Main switch
- 11) Cable
- 12) Processor PC Board with main display
- 13) Rectifier
- 14) Motor fuse
- 15) Sensor filter
- 16) Transformer
- 17) Speed sensor
- 18) Main fuse
- 19) Sheets counter connector

Wiring diagram - Laminator T

- 1) Temperature sensor
- 2) Motor
- 3) Fan – PC board cooling
- 4) Temperature display
- 5) Chrom roller with heating element
- 6) Thermofuse
- 7) Main PC Board with transformer
- 8) Fan – Roller cooling
- 9) Main filter
- 10) Main switch
- 11) Cable
- 12) Processor PC Board with main display
- 13) Sensor filter
- 14) Speed sensor
- 15) Main fuse
- 16) Sheets counter connector

Wiring diagram 370 T / 520 T



4.1 Description and function

Electrical circuits are located under the side cover. On the right side, there are all regulating circuits, the main switch with the breaker, with cooling and speed regulation switches and the main switch. On the left side, there are circuits of temperature regulation and the actuator drive. In the connecting tunnel at the bottom below the conveyor (or the feeding table, for the FOLIANT 370 model), there are circuits with transformer and breakers. These elements are accessible after the front section of the equipment is lifted, supported and held with a suitable solid prism and after the lower protective cover is disassembled.

By turning on the main switch, power and control circuits of the equipment are started. For the control of the equipment, the "MOTOR & PAUSE" button is used (5). The revolving "SPEED" (1) potentiometer changes the speed of the engine. The red "EMERG. REVERSE" (8) button changes immediately the direction of the turning of the motion engine; by its repeated pressing, the engine starts turning again in the direction of work. The button serves especially the resolution of emergencies; i.e. if sleeves, hair, or other items are pulled between the working rollers.

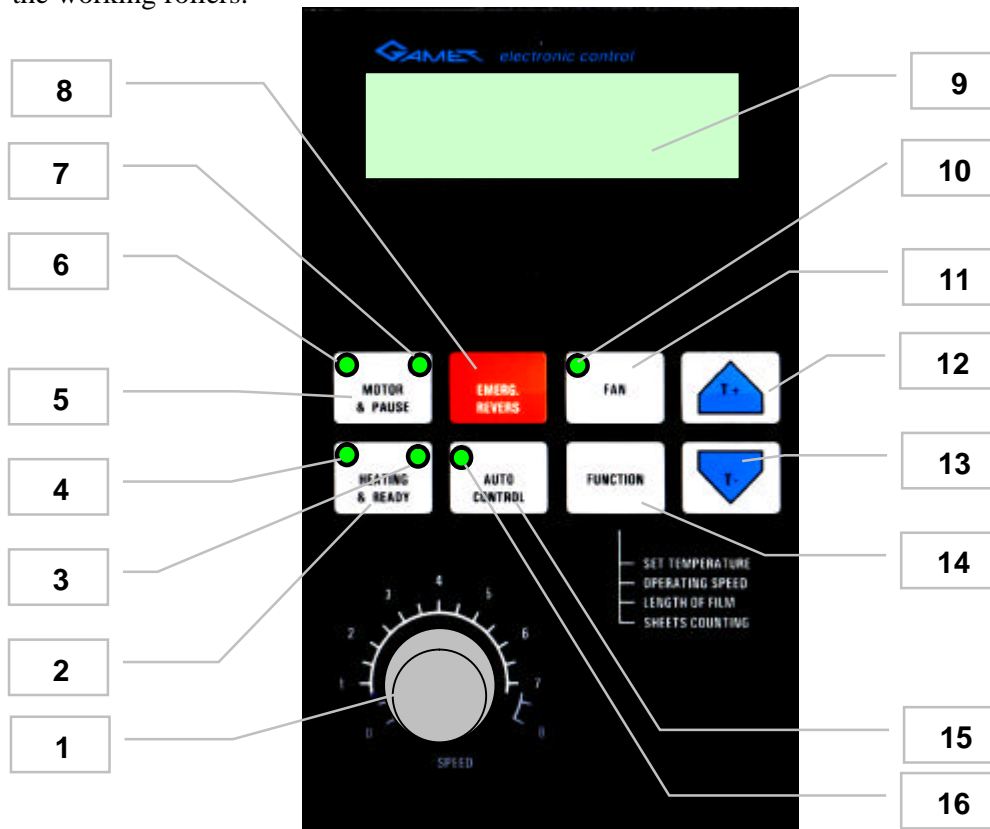
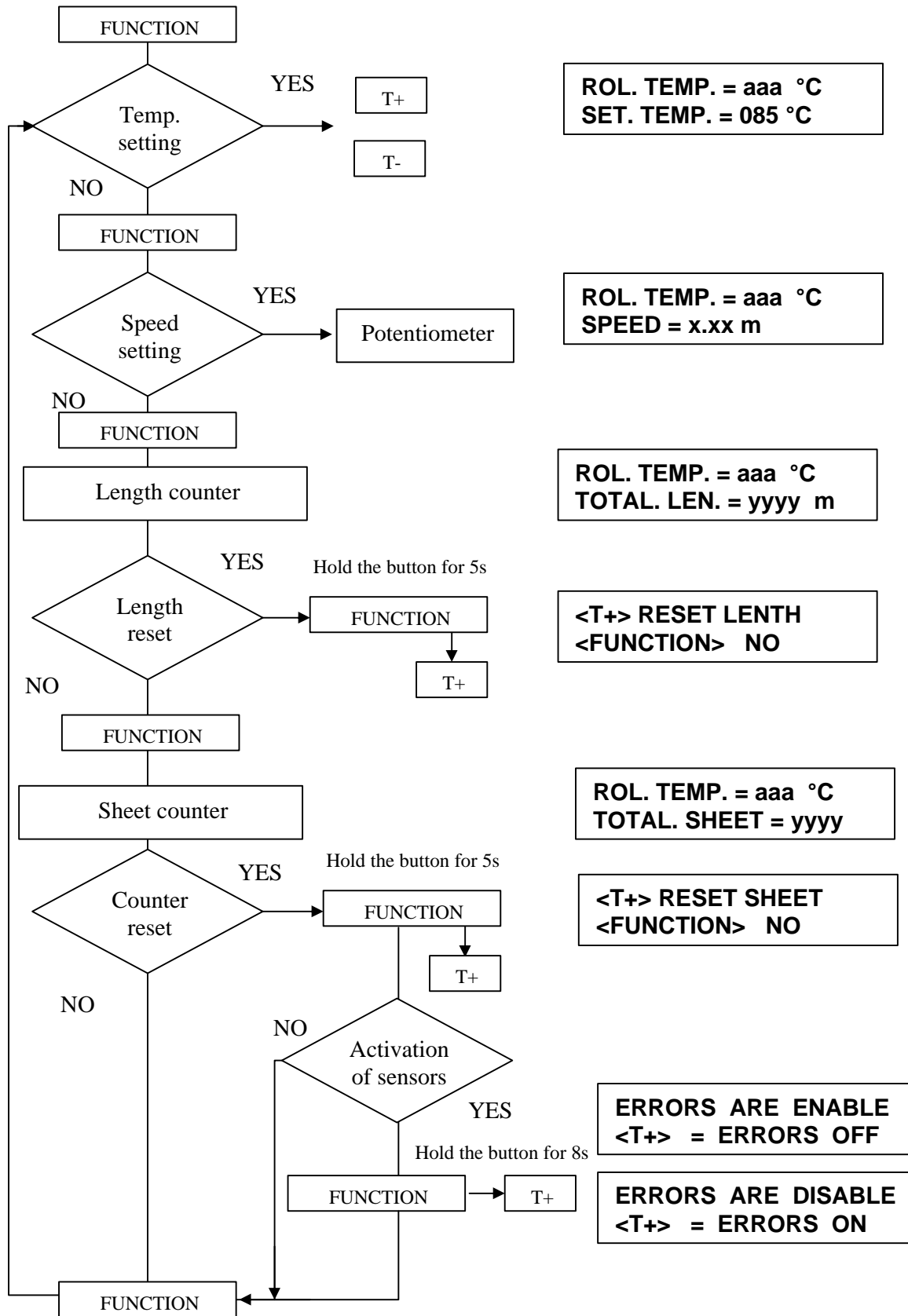


Figure 8

- | | |
|--------------------------------------|--|
| 1. Lamination speed control | 2. Heating on/off button |
| 3. Required temperature achieved LED | 4. Working roller heating LED |
| 5. Motor on/off button | 6. Engine operation LED |
| 7. Idle mode LED | 8. Reverse operation button |
| 9. Two-line display | 10. Roller cooling ventilator operation LED |
| 11. Roller cooling button | 12. Temperature increase button |
| 13. Temperature reduction button | 14. Function switching button |
| 15. Automatic speed control button | 16. LED for on/off of automatic speed control depending on the temperature of the roller |

4.2 FUNCTION key (for versions 5.32.X and 5.22.Y)



The **FUNCTION** key is used to change between five possible display options (see the development chart).

Step 1) Setting the lamination temperature – the initially set temperature upon switching on the equipment is 85°C. The setting may be changed by T+ button to increase the temperature and T- to reduce the temperature on the main roller.

Step 2) Setting the lamination speed – the speed of the lamination is regulated by potentiometer on the control panel, the control of the speed is independent of the FUNCTION key; this display option shows the real speed of the lamination.

Step 3) Length counter (length of the foil used up) – To reset the length, it is necessary to hold the FUNCTION key for approx. 5 sec. Menu for resetting the length appears on the display, the value of the length may be reset by the T+ button.

Step 4) Sheet counter (the number of separated laminated sheets) – To reset this value, it is necessary to hold the FUNCTION key for approx. 5s. Menu for resetting the number of sheets appears on the display, the number of sheets may be reset by the T+ button.

Step 5) Activation or deactivation of the sensors – this menu may be accessed only from the sheet number reset setting. Here, we press the FUNCTION key instead of the T+ button for approx. 8 sec. The display will show the current sensor setting. This setting can be changed by pressing the T+ button.

4.3 FUNCTION key (for older versions)

Using the **FUNCTION** key, we may change between five display options (see the development chart).

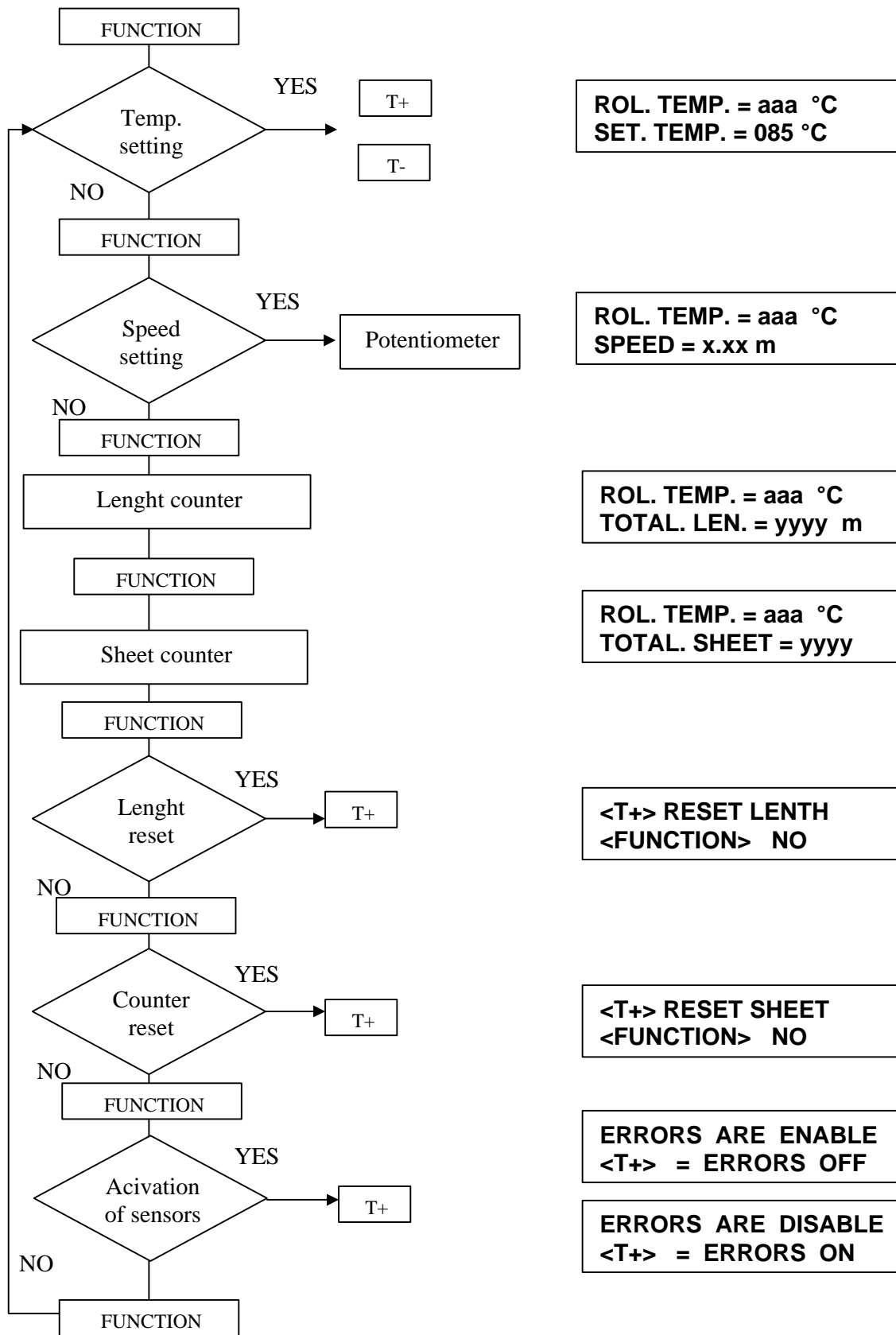
Step 1) Lamination temperature setting – The initially set temperature upon switching on the machine is 85°C, the setting may be changed by the T+ button to increase the temperature and by the T- button to reduce the temperature on the main roller.

Step 2) Lamination speed setting – the speed of the lamination is regulated by the potentiometer on the control panel, the speed control is independent of the FUNCTION key, this display shows us the real lamination speed.

Step 3) Length counter (length of used up foil) – to reset the length, it is necessary to press the FUNCTION key twice. Menu for resetting the length appears on the display, by the T+ button, we reset the length value. To control the state of the resetting, it is necessary to run the entire FUNCTION key program again.

Step 4) Sheet counter (number of separated laminated sheets) – To reset the number of sheets, it is necessary to press the FUNCTION key twice. Menu for resetting the number of sheets appears, by pressing the T+ button, we reset the number of sheets. To control the state of resetting, it is necessary to run the entire FUNCTION key program again.

Step 5) Activation or deactivation of the sensors – the display shows the current setting of the sensors. This setting may be changed by pressing the T+ button.





5. Working with laminator

5.1 Selecting suitable foils

The manufacturer and the distributor recommend using foils in rolls with internal diameter of 75 mm and with width depending on the width of the processed (laminated) material. When selecting the foil, it is necessary to comply with the recommendations of the distributor. Commonly supplied widths of foil are included in the price list of the distribution company. All machines may be used for lamination of rolls narrower than the maximum working width of the equipment. In this case, it is necessary to comply with the principle that the left edge of the lamination foil is closest to the left margin of the heated rollers, because in these places (on the left side of the heated roller), heat sensors are located. Only when laminating very thick paper sheets (exceeding 350 g/m²) and smaller width than the width of the roller, we recommend to move the foil roll to the center of the roller and laminate along the axis of the equipment. This will enable equal pressure of the roller along the entire width of the laminated sheet. Also, for lamination of narrower foils and sheets of paper on the laminator*.

Material – polypropylene of width of 24 – 30 µm, or nylon of width of 32 µm. Polyester of width up to 125 µm may also be laminated on the equipment, but with reduced output and when it is not possible to use the separator. Separation of sheets is possible only by manual cutting.

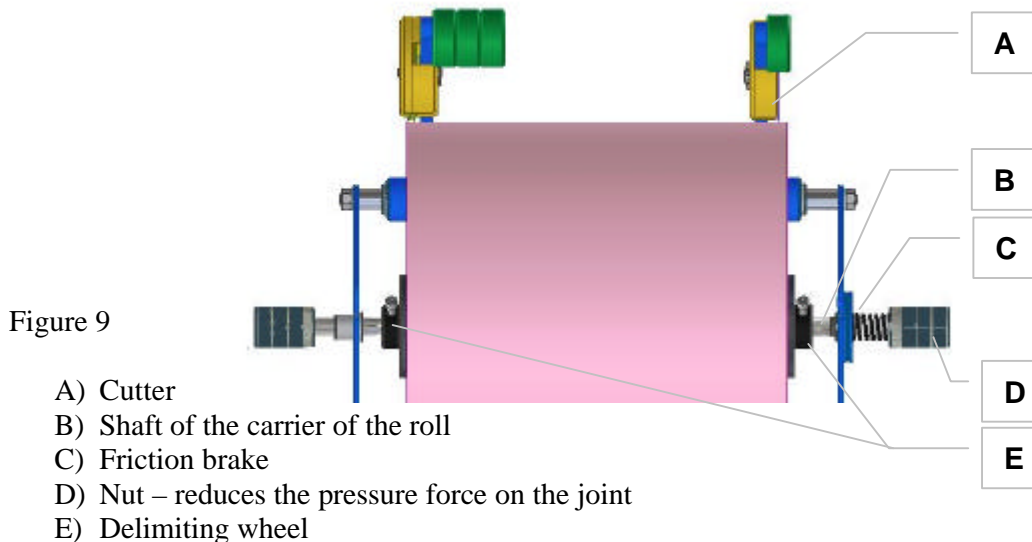


Installation of the foil

Install the foil in accordance with the figure in the instruction manual. Before installing the foil, it is necessary to make sure where the glue is placed on the foil. On the heated rollers, the foil roll must be inserted in such a manner so that the glue does not enter in contact with the heated roller.

POLY IN – the glue is on the inside side of the foil

POLY OUT – the glue is on the outside side of the foil



Before installing the foil on the arbor, it is necessary to dismantle the friction brake (C) and, after the installation of the foil, it is necessary to install it back. Safeguard the delimitation wheels (E).

* FOLIANT 720HP – the roll with foil must be placed in the longitudinal axis of the equipment, the uncovered rollers must be cooled by ventilators.

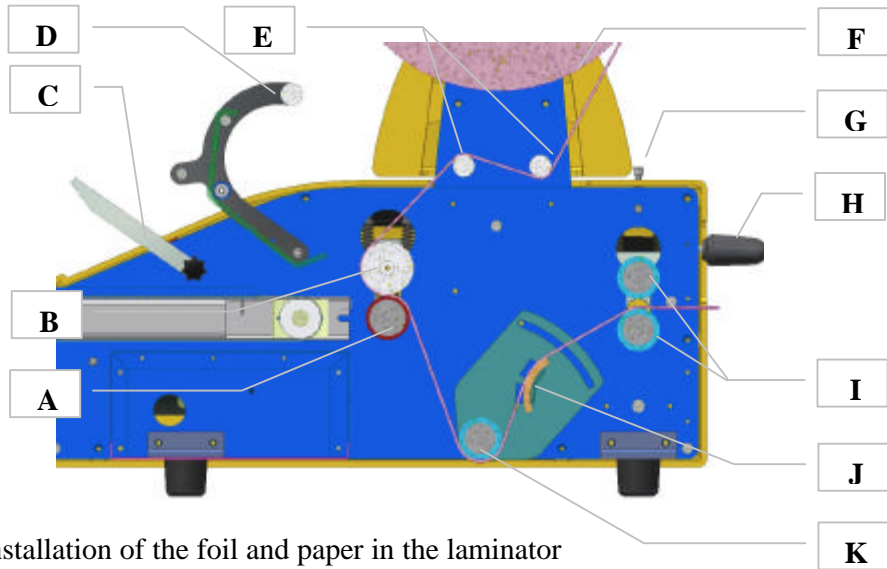
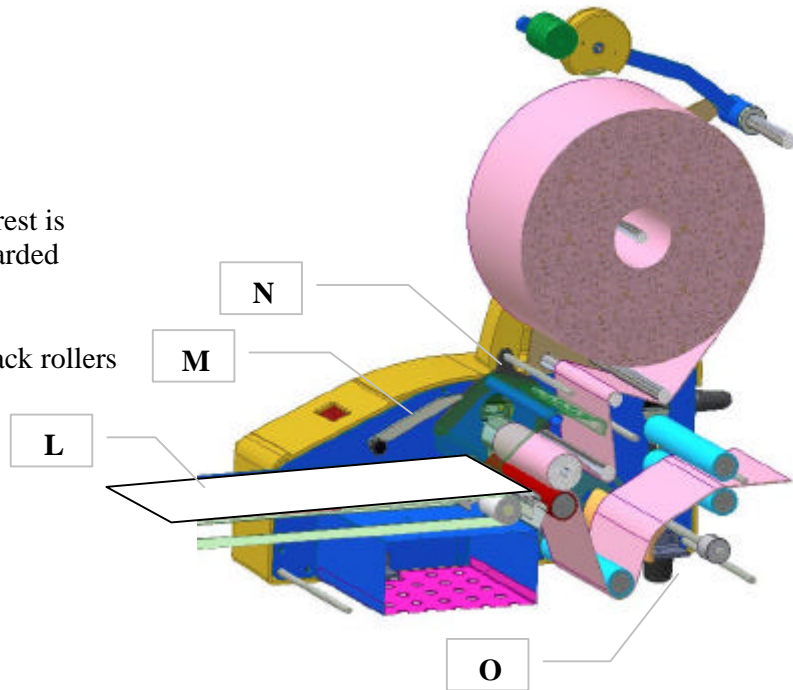


Figure 10 – Installation of the foil and paper in the laminator

- A) Silicon roller
- B) Heated roller
- C) Arrest of the tilting-over lever – tilted up
- D) Tilting equalizing roller – tilted up
- E) Equalizing rollers
- F) Foil
- G) Setting the pressure of main rollers
- H) Pressure arm
- I) Back stretching rollers
- J) Equalizing bar
- K) Bottom additional roller

Figure 11

- L) Paper
- M) Lever of tilting over arrest is tilted down and safeguarded
- N) Tilting-over roller in working position
- O) Arrest of pressure of back rollers



Perform the installation of the selected foil when the heating is turned off (the HEATING & READY button, control panel), both LEDs (3, 4) are turned off and the equipment is cooled and the foil roll is inserted. Insert sufficiently large format of paper along with the end of the lamination foil taped onto it into the area between the first pair of rollers (A, B). Then, set the lowest speed of motion on the equipment. Then turn on the main switch (10). After turning on the engine of the motion (the "MOTOR & PAUSE" button (Figure 8-15)), the foil roll with the sheet of paper starts moving and winding off. It is necessary to direct the paper with the foil so that it winds around the additional roller (K), over the moving equalizing bar (J) up to between the back pair of the stretching rollers (I). For this, the switch for the engine operation, regulator of the motion speed, or back operation of the rollers may be used as help. When the sheet of paper with foil glued on it exits the equipment, turn off the motion engine, release the pressure on the back rollers (I) by releasing the arrest (O) and stretch the foil by pulling it inside the equipment. When stretching the foil, errors in the side motion may also appear. After balancing the foil, pull both back rollers towards you by the arrest (O). Expert care is necessary to perform this work.

5.3 Setting the stretch of the winding off of the foil

Setting the stretch (pull) on the winding foil may be set using the regulation nut (Figure 9-D). Any unevenness on the foil, especially at the point of contact of the foil with the lamination roller may be removed by gradual tightening of the spring of the friction brake (Figure 9-C). By applying more force on the brake, some errors during lamination may also be resolved – higher resistance of the winding causes better sticking of the foil to the heated roller, and thus even better heating of the foil. The foil may thus better stick to uneven, or dark surfaces.

5.4 Setting the correct temperature

The upper heated roller is equipped with precise temperature regulation. For most applications, we recommend to set the temperature on the roller between 100 and 120°C. Optimum temperature differs depending on what kind of foil is used. Therefore, the minimum temperature must be tested on samples. Set the temperature by pressing the "T+" button (Figure 8-12) (increasing the temperature), or "T-" (Figure 8-13) (reducing the temperature). Achieving the correct temperature is signaled by the READY LED (Figure 8-3) and the temperature may be read on both displays (Figure 1-1, Figure 8-9). After the equipment is turned on, the value of +85°C is displayed as the set temperature. The highest temperature which may be set on the equipment is limited by the program to amount to 155°C.

During the lamination itself, after several sheets are laminated, the temperature on the rollers may drop by 5 or 10 degrees. This may be prevented by setting slightly lower initial speed of lamination on the equipment than usual. After having laminated several sheets of paper, the speed of the lamination may be gradually increased and the temperature will settle to amount to the required temperature *. If the working rollers are still getting cooler, please check whether the heating is turned on (LED (Figure 8-4) in the "HEATING & READY" button). If this is the case, it is necessary to lower the speed of the motion again, which will balance the heat losses with the capacity of the heating and the temperature will settle at the required level.

5.5 Setting the correct lamination speed

Setting the optimum speed of the lamination depends especially on the laminated material, or its thickness. It is performed by the SPEED regulator (Figure 8-1) and, for most applications, speeds between 2 and 4 will suffice.

If it is necessary to laminate under temperature higher than 120 °C, the temperature must be increased during the lamination process at a very low speed.

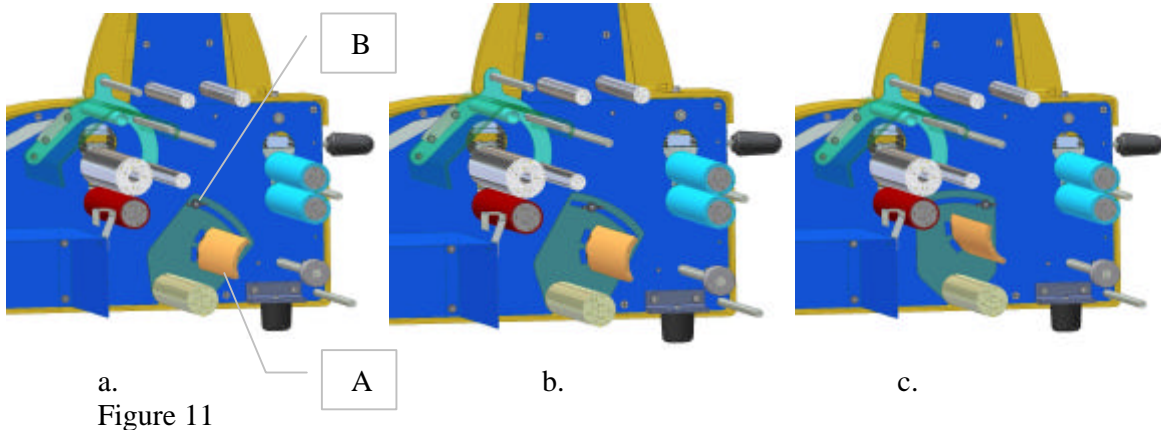
Set the temperature at 120 °C and wait until the indicator of the real temperature of the rollers (red display) reaches the value of 115 °C. At that moment, start laminating with speed of 2- 4 m/min. Simultaneously, set the required temperature using the T+ button to amount to 120-135 °C. As soon as the actual temperature of the roller exceeds the value of 120 °C, gradually increase the speed of the lamination. The speed may be increased until the roller maintains the required temperature if the quality of the lamination is sufficient. The above-mentioned values are listed only as demonstrative examples and may vary according to the type of foil used. To increase the temperature, it is necessary to follow the instructions very closely step by step.



To achieve good quality of lamination, a principle applies that the speed must be increased gradually.

5.6 Setting the rate of equalization for curling

The already laminated sheet moves between both pairs of rollers over additional roller and equalizing tilting bar, serving to equalize the paper after lamination. (If paper up to 200 g/m² was laminated without this bar, curling would occur) of the resulting product when the foil is cooled down. The position (Figure 11b) is suitable for weight around 250 g/m², other positions are suitable for thinner paper. The optimum position must be tested. The weight of approx. 350 g/m² does not usually require the equalizing tilting bar at all (Figure 11a). If you wish to laminate sheets from both sides in two stages, you need not use the equalizing tilting bar.



5.7 Setting the correct width of the lamination foil

The foil is usually available in all standard widths, see the price list of your distributor. On both sides of the laminated material, the foil must end in the area between the cutter marks and the edge of the sheet. If you wish to have foil of a different width, you may narrow the foil using the cutter (Figure 9-A). Before using the cutter, dismantle the protective cover. The pressure of the cutter wheel may be regulated by adding weights at the end of the arm. Usually, one piece of weight is sufficient for the cutting. Note: the cutter knife does not turn during operation!

Do not set the pressure of the cutting too high, because the cutting wheel brakes the motion of the roll.

The side movement of the wheel must also be prevented during the cutting – therefore, arrest the wheel by arrest screws properly (Figure 5-D) on the motion cover and remove the remaining space by slight tightening the second arrest screw *. After completing the operation, it is necessary to install the protective cover back on the arm with the cutter wheel – you will thus prevent injuries caused by sharp edges.

To laminate paper with foil of width of 320 and 340 mm on the FOLIANT 520 laminator, it is necessary to turn on the cooling ventilator (the "FAN" button (Figure 8-11)). The ventilator cools the part of the roller which is not cooled by paper and by the foil. The cooling thus safeguards the edge of the foil after lamination **.

When correct width of the roll is selected, it is necessary to bear in mind that especially for lamination of thinner paper sheets (around 115 g/m²), the selection of a too thin foil may result in longitudinal curling of the edges of the paper between the front rollers. For all cases, it is best for the paper not to be thicker than the foil anywhere by more than 10 mm.

* Both screws must be in one place, see Figure 12

** During lamination of paper using foil of widths of 47 to 49 cm on the FOLIANT 720HP laminator, the foil must be installed in the axis of the equipment and the ventilators cooling the edges of the rollers must be turned on by the "FAN" button.

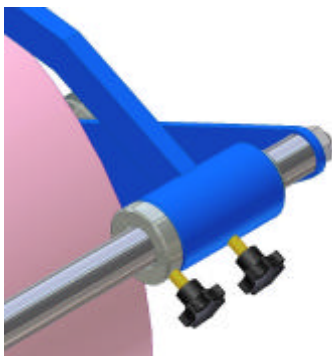


Figure 12

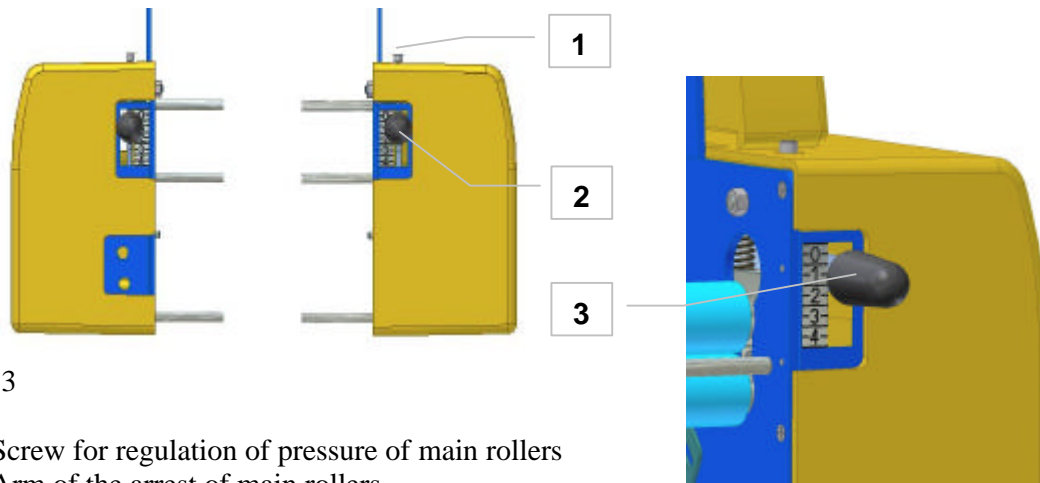


Figure 13

- 1) Screw for regulation of pressure of main rollers
- 2) Arm of the arrest of main rollers
- 3) Rail



Setting the pressure on the main (lamination) rollers

The pressure of the main rollers is factory-set and it is universal for sheets of weight between 135 and 350 g/m² – the screws at the back side of the equipment are in the working position when they are at the level of 1.5. For lamination of thinner sheets (115 to 135 g/m²), the pressure of the rollers may be released slightly (1) so that the rollers do not wrinkle the paper (position 1 to 1.5). On the contrary, when continuous dark surfaces or uneven paper etc. are laminated, the pressure of the rollers may be increased slightly (maximally to position 2), on both sides in the same manner.

When regulating the pressure, it is necessary to regulate evenly on both sides, i.e. it is necessary to count the revolutions of the regulation screw and check the position of both pulling elements on the scale. Only when the cutter is used, it is good to have higher pressure on the side of the perforation.

After completing work with the laminator, release the arm of the pressure from the regulation screw.



Important notice – high pressure of the rollers causes the engine to overload, which may further cause damage on the electrical circuits of the laminator

The circuits of the engine are protected against overload by the program. If permanent overload occurs, first the emergency sound signal sounds and a “MOTOR OVERFLOW” warning appears on the display. Unless the servicing staff decreases the speed of the motion immediately and significantly, and stops the equipment within 30 seconds, the processor will stop the equipment after 30 seconds automatically and a warning "MOTOR SYSTEM OVERFLOW" will appear on the display. The operation may continue after approx. 30 minutes and after the pressure on the rollers is decreased. The sound alarm of overload may be turned off by pressing any of the buttons. If you wish to complete the lamination without any losses within the subsequent 30 seconds, do not turn off the sound alarm using the MOTOR & PAUSE or HEATING & READY buttons.



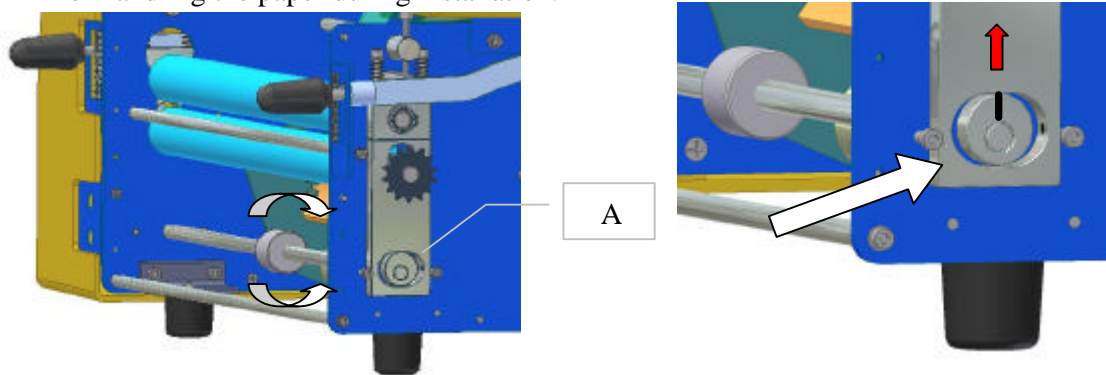
Pressure of the rollers after the operation – work shift – is completed

During the lamination, both couples of the rollers are tightened. After you finish working, release the pressure on the front rollers entirely – you will save the surface of the silicon cover of the rollers. The releasing is performed using the rails (3) by releasing them from the top of the tightening screws. Before starting the operation again, they are fastened by reverse movements of the tightening element in the working position. It is necessary to verify the correct position of the tilting arm in the tops of regulation screws.

5.10 Setting the pressure on back (pull-out) rollers

Using the cam (A), you may set the pressure on the back rollers. The back roller has 3 positions:

1. **Position (upper)** – in the upper position, there is a gap between the rollers of approx. 4 mm for handling the paper during installation.



Figure

2. **Middle position** – when the cam is in the middle position, the back upper roller rests on the bottom roller only with its own weight. This position is suitable for the operation of the laminator. Using your hand, you may turn the back roller in this position and the cam is free on both sides.

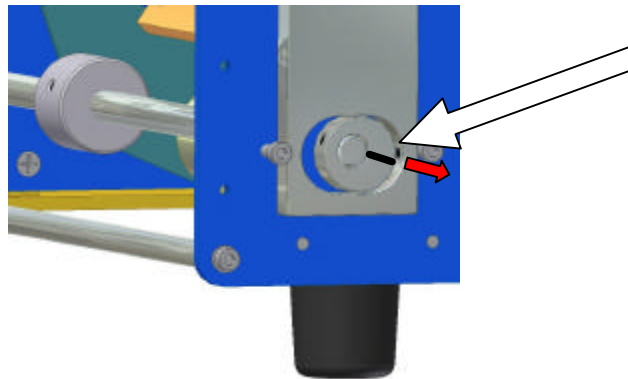


Figure 15

3. **Position.** This is the bottom position of the cam when the rollers are pressed against each other by springs. During ordinary operation in this mode, the foil is usually torn inside the equipment due to too high tension of the back rollers.

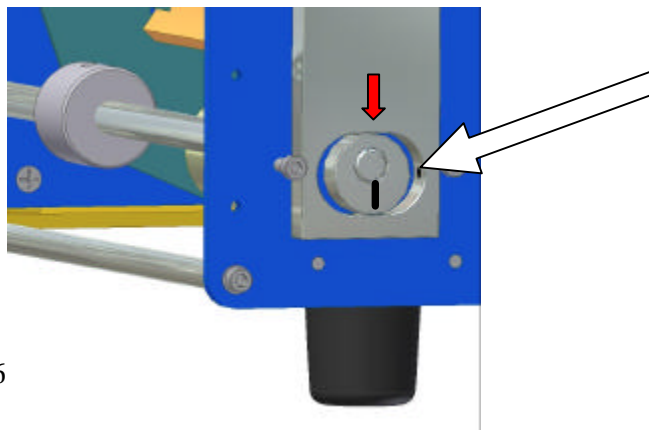


Figure16

5.11 Perforation of the edges

The edges of the foil may be perforated, to make the separation of the individual sheets out of the equipment easier. The perforation tooth wheel (2) runs on the foil roll approximately 5 mm from the edge of the foil. The strength of the perforation may be set by adding weights (1) to the arm of the perforator. Three weights are usual. If problems with tearing of the foil before the back rollers inside the laminator occur, one line of the teeth of the perforation wheel may be set out of operation.

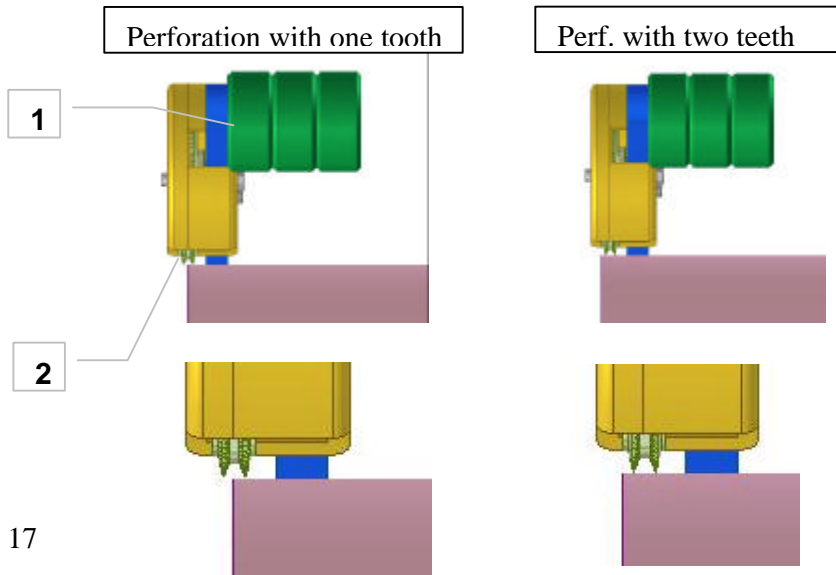


Figure 17

- 1) Weight
- 2) Perforation wheel

5.12 Changing the foil

The foil on a cooled equipment is changed in the same manner you have installed it. Replacing the foil may be performed when you clean the main rollers. Important notice: Due to safety reasons, it is strictly prohibited to replace the foil on the roller heated to more than 50°C. Burns when touching the chrome-covered roller may occur

5.13 Changing the format

During long lamination of sheets with weight of 250 to 350 g/m², the profile of the paper may be embossed into the silicon roller (Figure 18-a; b)(especially due to high pressure). When changing the format or the thickness of laminated sheets, it is necessary to achieve faultless surface of the silicon roller. This may be achieved by turning on the laminator with “IDLE OPERATION”, i.e. without the foil and paper (Figure 18-c), at temperature of 120°C and pressure amounting to 2 to 2.5.

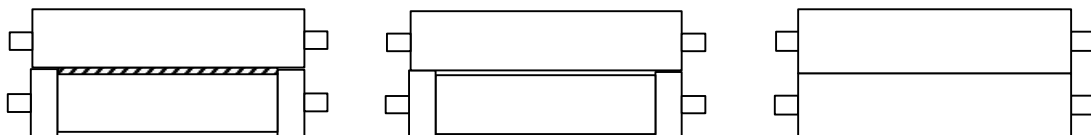


Figure 18

a.

b.

c.



6. OPERATION OF THE LAMINATOR

6.1 Lamination

The lamination may start only after the foil is installed, the pressure of the winding is set, the temperature and the speed are set and the tilting over equalizing roller (Figure 10-D) is secured in the working position by the arrest lever (Figure 10-C).

Turn on the main switch and press the HEATING & READY button on the control panel and wait until the set temperature is achieved. After that, turn on the switch of the motion (Figure 7-5). When the foil and laminated format are released, it is necessary to take care that the laminated formats are always overlapping (the overlap must be between the cutter marks and edges of paper) and that the foil is always thinner than the paper. Place the left edge of the paper onto the sliding side rail (B) on the feeding table.

- A) Feeding table
- B) Sliding si

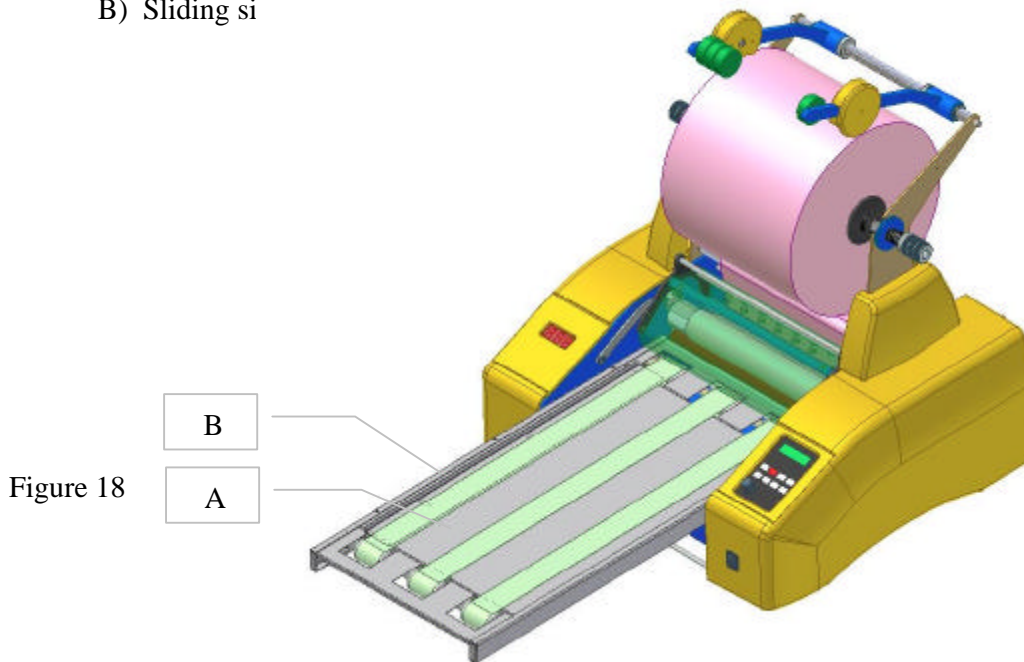


Figure 18

It is suitable to place a working board behind the laminator and separate the formats immediately by tearing them apart, place them on top of each other with the foil facing down. Then, it is recommended that the pile of sheets is covered with a flat board and loaded properly for several hours. Recommended accessories – automatic sheet separator FOLIANT SEPARATOR 520/720 with a container for laminated sheets.

6.1.1 Two-sided lamination

If required, the two-sided lamination is to be performed in two stages.

1. Step – standard one-sided lamination setting the bar against curling of sheets lower.
Sheets exceeding 200g/m² may be laminated without using the bar for sheet curling in the first stage.
2. Step – lamination from the other side without using the bar against curling of sheets.

This procedure offers even, two-side laminated paper sheets.

6.3 Automatic mode of temperature and speed control

After finding the correct combination for speed and temperature of lamination, these values may be stored in short-term memory by pressing the "AUTO CONTROL" button (Figure 7-15). Operation in this mode is signaled by the LED (Figure 7-16). The automatic operation mode may be terminated by repeated pressing of the "AUTO CONTROL" button. The processor of the control of the equipment responds to gradual and sudden loss of temperature on the roller (caused by draught or by accident on the bearing or by too high speed when the heating body does not have sufficient time to heat the roller) by lowering the speed of the motion. The automatic operation decreases the speed until the heating body equalizes the heat losses and the temperature starts to increase. Then, automatically, the speed of the lamination increases again. The automatic mode should be used primarily when connecting the laminator to automatic feeding machine.

A typical situation for using the AUTO CONTROL button is an accident on the heating spiral within lamination roller or on the breaker of the hearing body. During lamination in the AUTO CONTROL mode with the feeding machine, the laminator (when the heating is not functional) stops automatically sooner than any damage on the laminated sheets or on the laminator occurs.

Relationship of the speed of the lamination and the difference between temperatures is listed in the chart and is calculated in line with the following formula:

$$V = V_p * \left(1 - \frac{\Delta T^2}{400} \right)$$

? V = Vp-V... difference in speed [%]

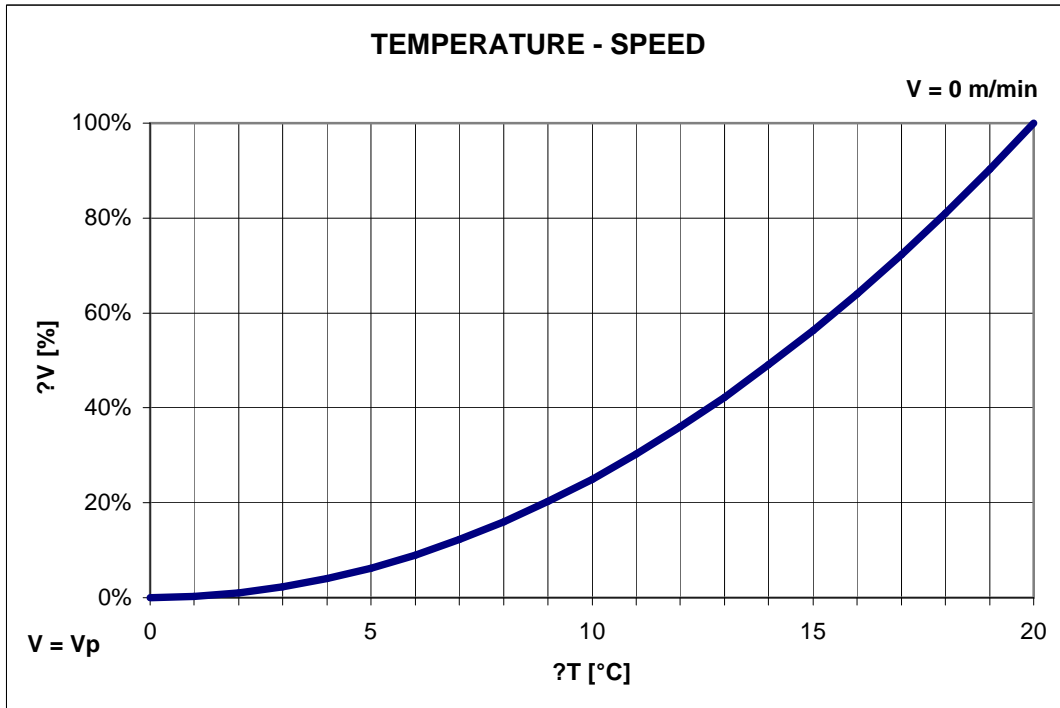
? T = Tn-Ts... difference in temperatures [°C]

V.....actual speed

Vp.....set speed

Tn..... set temperature

Ts..... temperature on the roller





6.4 Defects during lamination

The film is not pure after lamination – the most frequent defect with many possible causes:

- Probably low temperature or high temperature of lamination. Set the temperature on the heated rollers. Reducing the speed of motion usually has the same effect.
- The paper used does not have even surface – in the holes, the glue does not enter in contact with the paper. This may be partially removed by increasing the pressure on working rollers.
- Excessive amount of powder from the printing machine. Even before printing, it is necessary to have in mind that the sheets are designed for subsequent lamination. The selection of paper and technology of the printing should be tailored to that.
- Insufficient braking of the foil when the foil is released. Increase the force for releasing by the tightening nut.

Laminated formats curl in the direction following the foil – probably unsuitable combination of the thickness of material and the angle of equalizing bar. The bar should be tilted by several degrees in the direction of the motion (towards the main rollers).

The working rollers wrinkle the paper on the edges – reduce the pressure of the working rollers. Another cause may be huge difference between the width of the foil and the width of the sheet – see point 7 of this manual.

The foil tears in the area before the back rollers – too high pressure of the back rollers – see Section 9 of the manual. Another cause may be excessive perforation by the perforation wheel. This perforation may be reduced by removing certain weights, or by setting only one line of teeth of the perforation wheel for perforation.

The edge of the foil on the paper is wrinkled – too high temperature of the lamination, the foil is glued onto the roller

During the lamination, this changes after a few sheets (10 to 15) are laminated

Longitudinal folds on the paper – this occurs when thin paper is used, the cause is excessive pressure on the main rollers. Reduce pressure on the rollers to amount to the same value on both sides of the roller.

Laminator shifts the paper sideways – uneven pressure on the main rollers, the pre-tension of the pressure springs must be adjusted



Accidents

If an accident occurs on the equipment, it is necessary to disconnect the equipment from the main power source. To remove the accident, please contact an authorized repair shop.



MOST IMPORTANT INSTRUCTIONS:

- At temperatures above 130°C, certain types of foil are melted when the roller is not running.
- High pressure of the front rollers results in overload of the engine. When permanent overload of the engine occurs, the safety circuits may stop the equipment immediately. A warning "MOTOR SYSTEM OVERFLOW" appears on the display. Then, it is necessary to set lower pressure of the rollers and wait approx. 30 minutes for the safety circuits to cool down.
- Unless the cutter wheel is in working position, cover its blade with a cover. Otherwise injuries may occur.
- The laminator is safeguarded against overheating by a heat breaker. The breaker puts the electrical heating of the roller out of operation when the roller is overheated above approx. 200°C. The heat breaker switches on again when the equipment is cooled down to a standard temperature. Before turning the equipment on again, please verify that the thermal regulation is functional. To remove potential errors, please contact a repair shop.



Cleaning the equipment and maintenance

Cleaning the equipment

It is necessary to keep the equipment clean, i.e. to dust the equipment regularly because it could set on fire. It is necessary to check regularly whether any remains of material were left in the working space (paper, foil etc.).

Perform any cleaning and handling only when the connecting cable is disconnected. The silicon rollers are best cleaned with the rough side of a sponge for dishwashing (SOKE etc.) with the rollers cooled off and the laminator disconnected from the main power source. For cleaning the metal surfaces of the working roller, a dry cloth must be used and impurities from the cleaning must be regularly sucked using a vacuum cleaner. Remains of print colors and remains of glue from the foil may be removed from the rollers using a cotton cloth slightly impregnated with toluene, serving as a solvent. This may be performed only when the equipment is turned off and the rollers are cooled down to a temperature of the ambient environment. When working with this solvent, fire safety regulations must be strictly complied with, the work must be performed with the equipment cooled down and disconnected from the main power source. Solvents must not enter into contact with plastic covers (side plates) of the equipment.

Plastic covers (side plates) may be cleaned using a moist cloth, slightly impregnated with detergents for furniture polishing. The equipment must be turned off and disconnected from the power supply.

The heat sensor must be cleaned regularly (once a week) of dust from paper, preferably by a powerful vacuum cleaner.

Additional diagram of the machine

- A. Two arrest screws of the cutter
- B. Two arrest screws of the perforation
- C. Screws of the regulation of pressure of main rollers
- D. Rails for release of pressure of main rollers on a 0 – 4 scale
- E. Cam for setting the pressure on back rollers
- F. Foil roll
- G. Moving bar of side stop of print sheets – 2 basic positions with regulation and arrest
- H. Extension for the format of 700x1000 mm for 720 HP

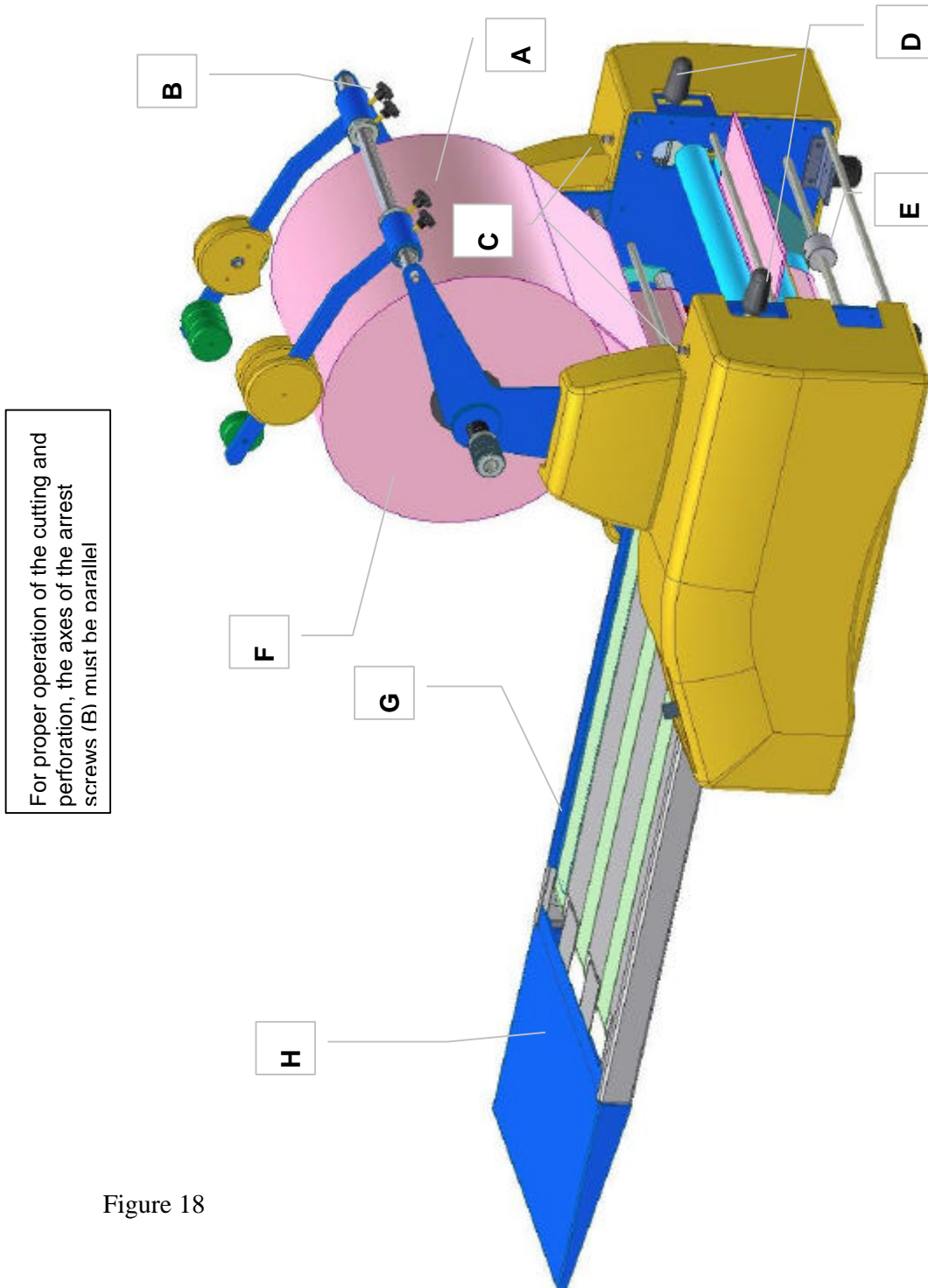


Figure 18