

# FORMAX<sup>®</sup>

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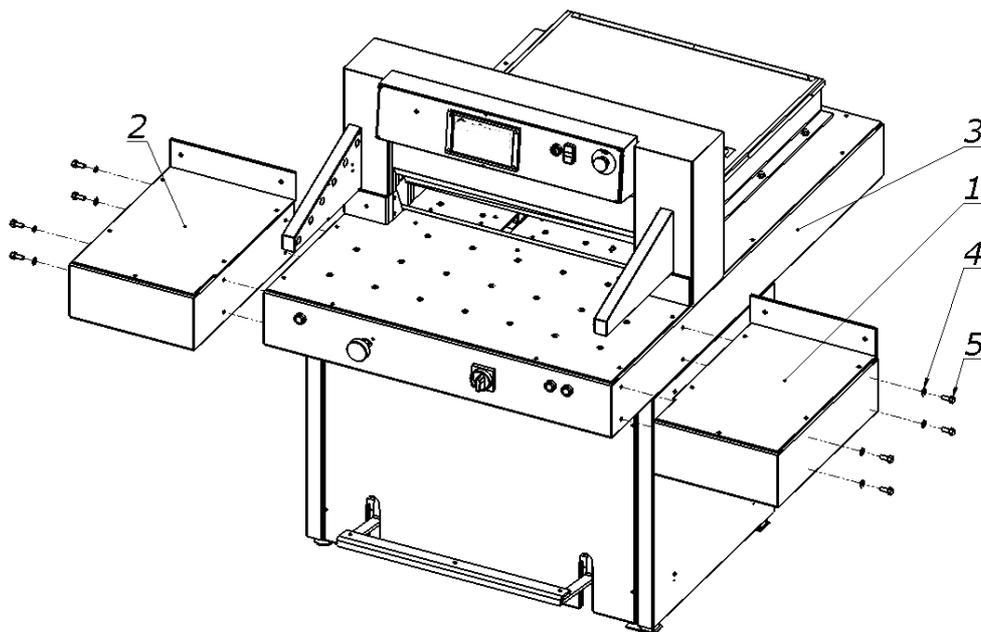
Cut-True 31A  
Electric Guillotine Cutter

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# 1. TRANSPORTATION AND STORAGE

## 1.1.State of delivery

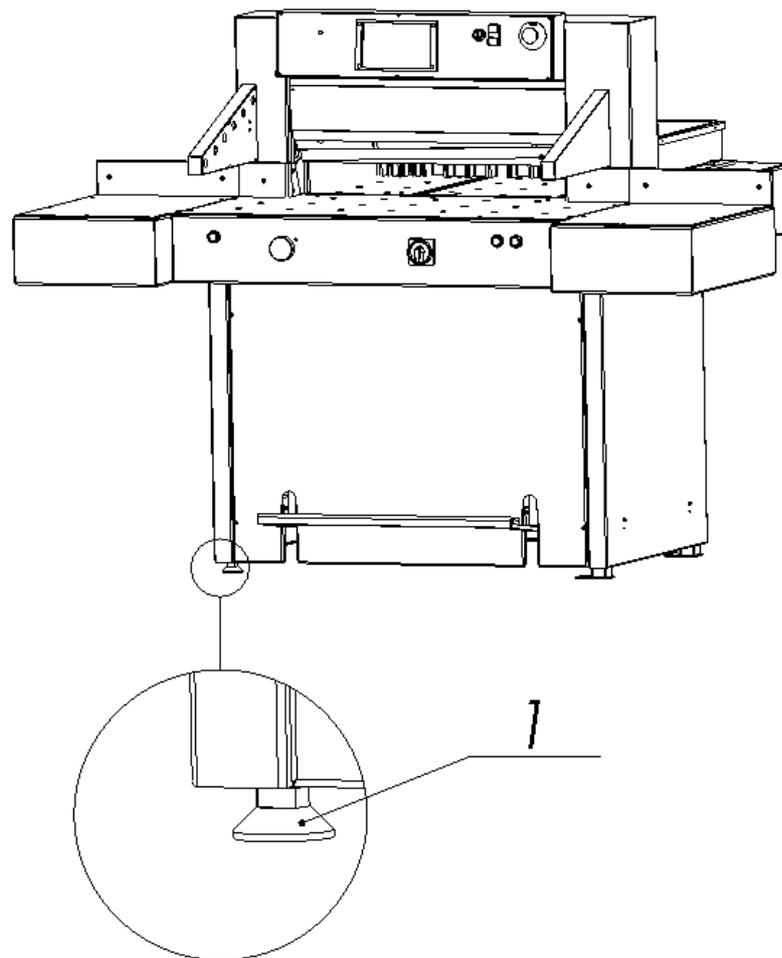
The Cut-True 31A is delivered assembled and ready to operate. The cutter also includes side tables which can be installed according to the drawing below.



Drawing 1. Side tables installation

1. Right side table
2. Left side table
3. Cutter body
4. Rings ( 8 pieces.)
5. Fixing screws( 8 pieces.)

## 1.2. Cutter leveling



Drawing 2. Leveling the cutter

The cutter is not required to be attached to the floor. To ensure the cutter is level, adjust the front left foot.

## 2. MACHINE TECHNICAL INFORMATION

### 2.1. Destination

The cutter is designed to cut paper stacks up to 4" high. It's ideal for use in on-demand print shops, printing houses, bookbinders and more.

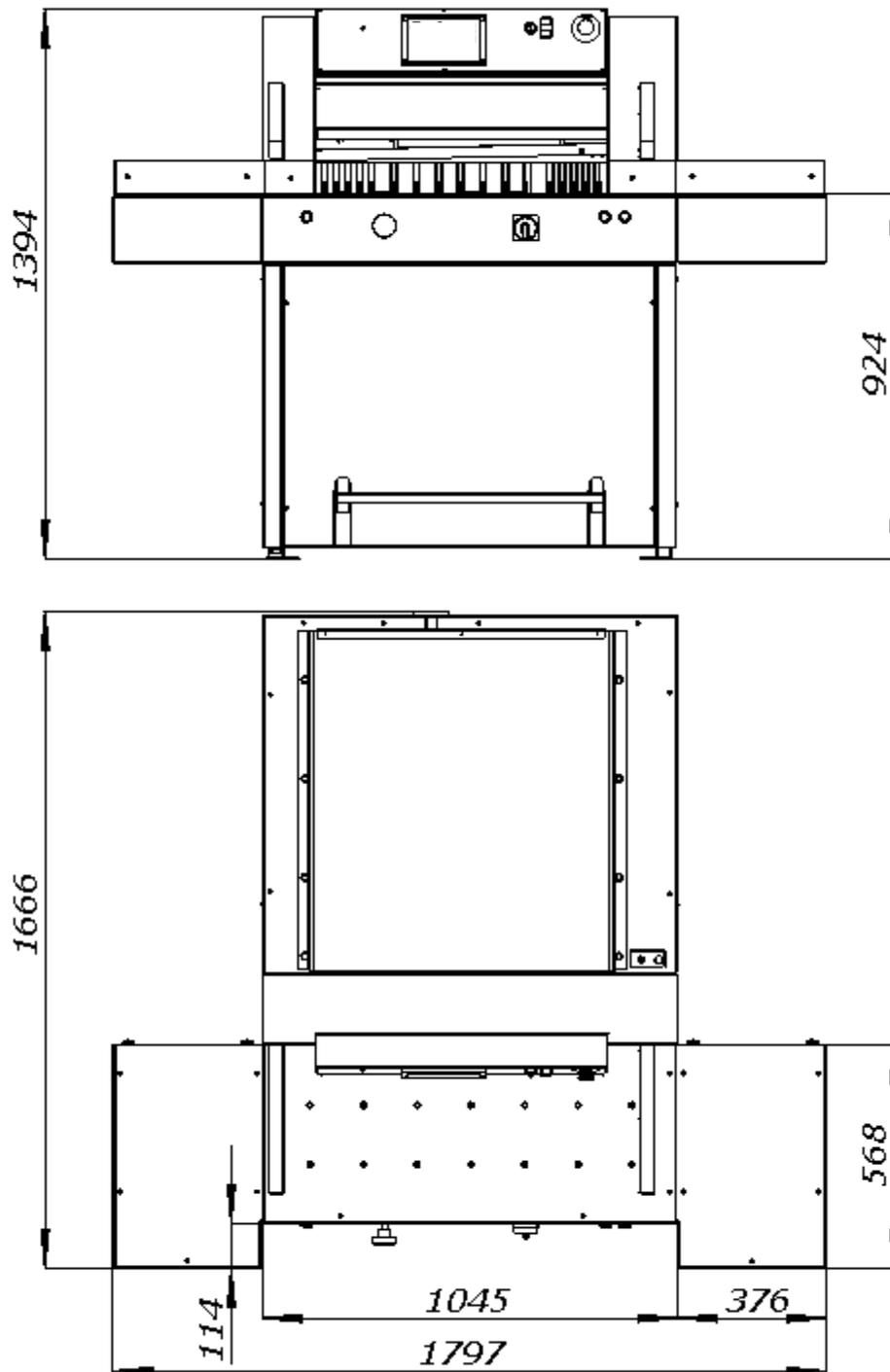
### 2.2. Main parameters

#### 2.2.1. Technical Data

Table 1.

<b>Parameters</b>	
Maximum paper width	<b>28.7" (730mm)</b>
Maximum paper height	<b>3.94" (100mm)</b>
Back table length	<b>26.5" (673mm)</b>

## 2.2.2 Machine dimensions

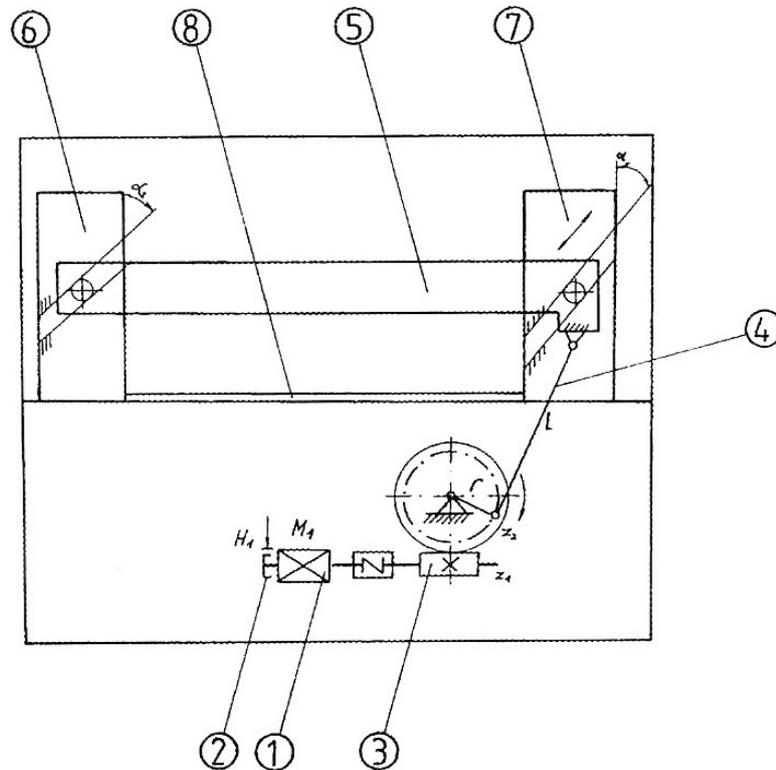


Drawing 3. External dimensions

## 2.3. Construction of the machine

The cutter consists of three main mechanisms: knife, clamp and back gauge drive

### 2.3.1. Knife mechanism



Drawing 4. Kinematic diagram of the knife driving mechanism (front view)

The driving mechanism for the knife is shown on Drawing 4.

1 Electric motor

2 Emergency electromagnetic brake

3 Worm reducer

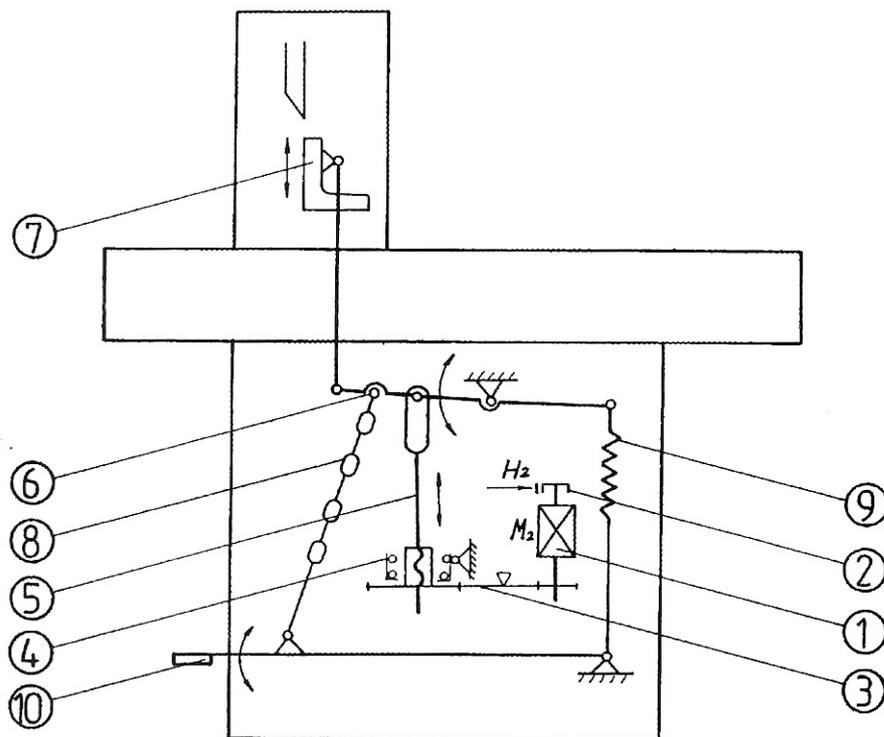
4 The reducer output shaft is connected with the crank system that pulls the knife bar, together with the knife.

5 The knife bar is shifted between the slideways (6 and 7), in a perpendicular plane to the work table plane.

The angle of the each slideway is parallel, so when the knife moves down, it decreases the force required for cutting, and the cutting accuracy is increased.

The knife is guided so in the bottom position the blade is parallel to the cutting stick, and it penetrates into the stick up to 0.5 mm depth. After cutting, the knife is raised and stops in its upper position.

### 2.3.2 Clamp bar mechanism



Drawing 5. Kinematic diagram for the clamping bar drive mechanism (side view)

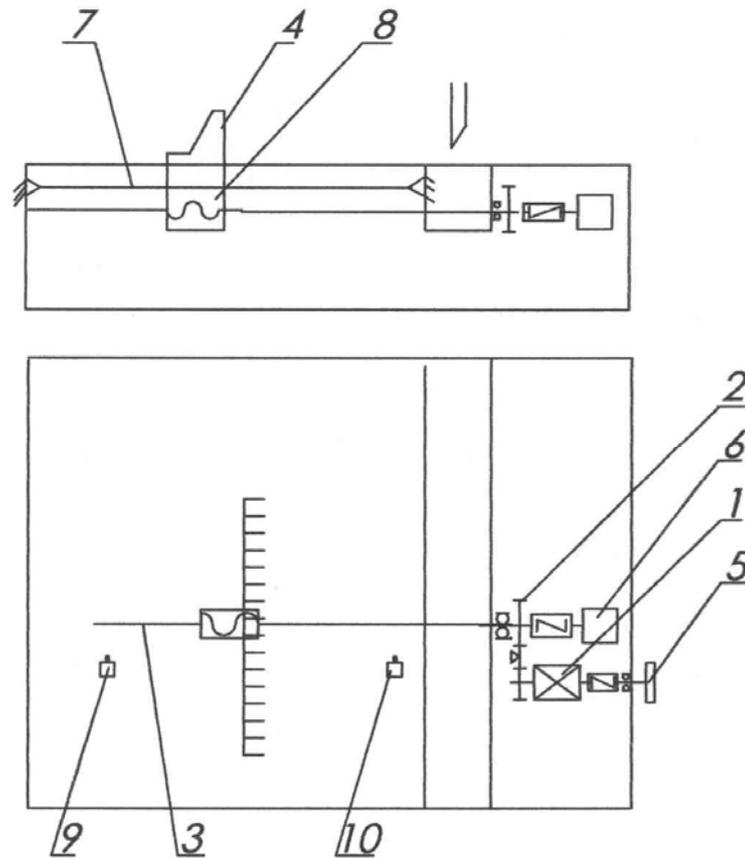
The drive mechanism for the clamping bar is shown on Drawing 5.

The electric motor (1), is stopped by emergency electromagnetic brake (2), which is driven via the belt transmission (3), and the mechanism (4) and the clamping mechanism screw (5). The clamping mechanism screw (5) draws the clamping bar (7) by the means of the leverages (6), guided in the guideways (not shown on the diagram) perpendicularly to cutting line.

Using the pre-clamp foot pedal (10) allows users to lower the clamp without using the motor.

The clamping bar (7) movement is then directly forced by the foot pedal (10) and the strands (8). The clamping bar returns to its upright position via the spring (9).

### 2.3.3 Back gauge mechanism



Drawing 6. Kinematic diagram for back gauge mechanism (side and top view)

The electric motor (1) drives the feed screw (3) through the belt transmission (2), the feed screw by the nut forces the back gauge bar to its base motion.

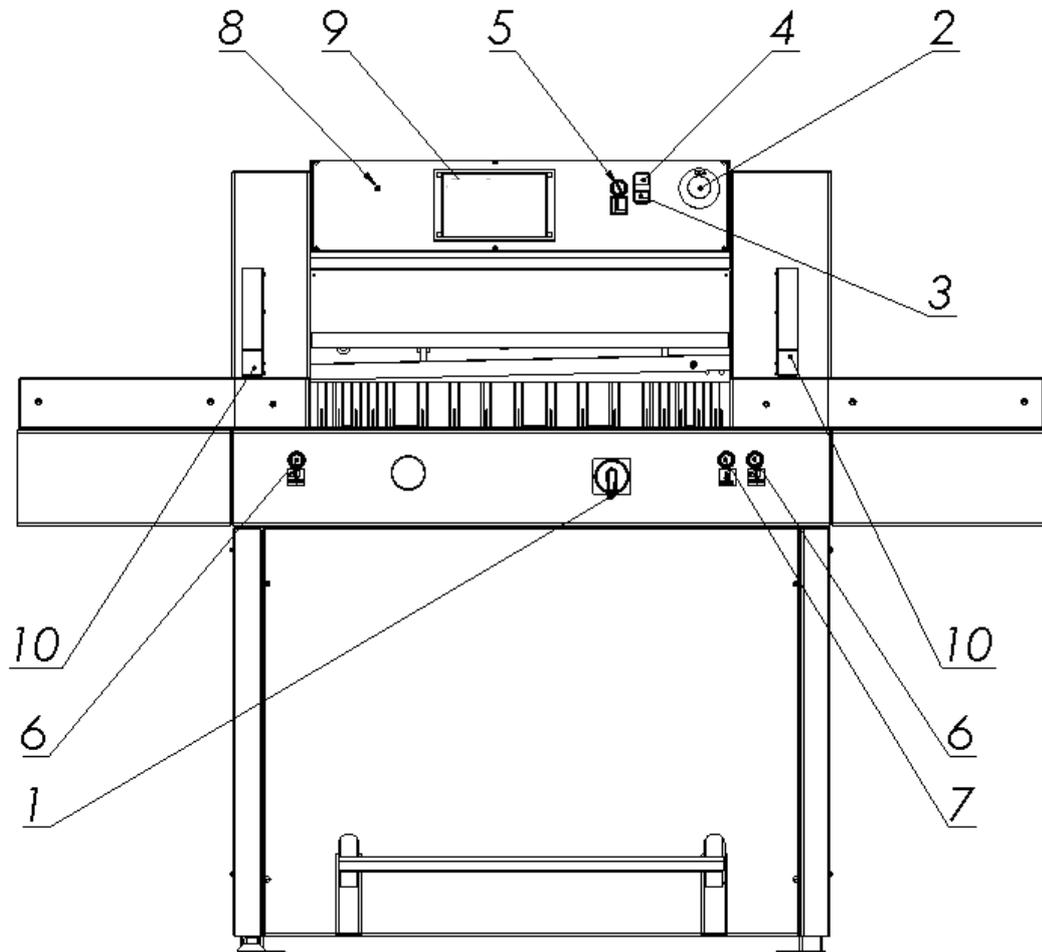
The base (8), together with the attached back gauge bar (4), is guided on the guiding shaft (7).

The limit switches (9, 10) cause the back gauge bar (4) to stop in its extreme positions.

An accurate setting of the backgauge bar is by the knob (5). The pulse-rotary

converter (6) is connected with the feed screw (3), which allows measuring and displaying positions of the back gauge bar (4).

### 2.3.4 Control system

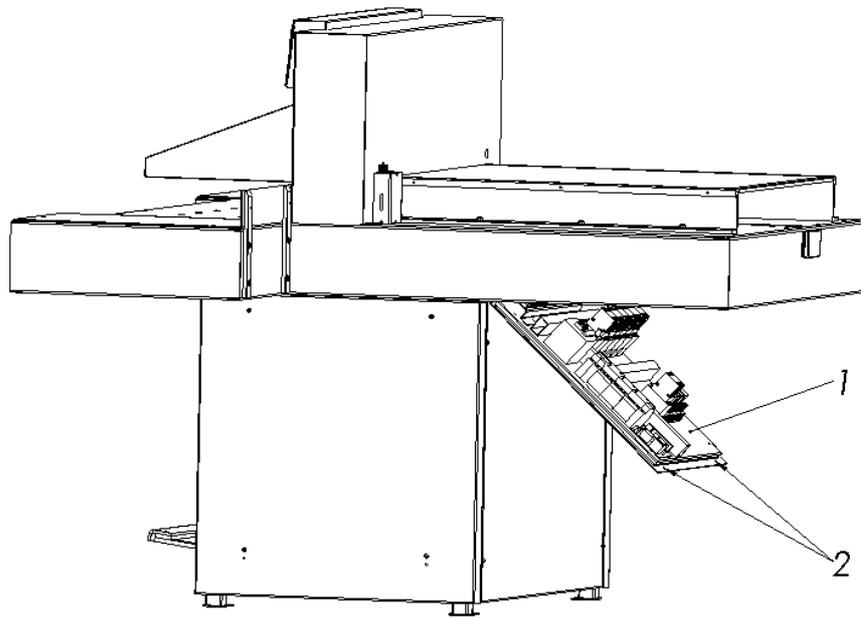


Drawing 7. Operating controls

1. Red/yellow main power knob
2. Red emergency stop button, with key lock
3. Red push button, used for locking the cutter system which prevents the cutter start.
4. Green push button, starts the cutter system
- 5.
6. Push both buttons to activate cutting cycle
7. Push button to activate clamp only
8. LED - red: system switched off, green: system switched on
9. Color touchscreen control panel
10. Infrared light beam safety curtain

Electric board with equipment /contactors, relays, over current switches, is mounted on the hinged cover (1) as shown below.

The cover 1 is fixed by the nuts 2 in the closed position.



Drawing 8. Electric board

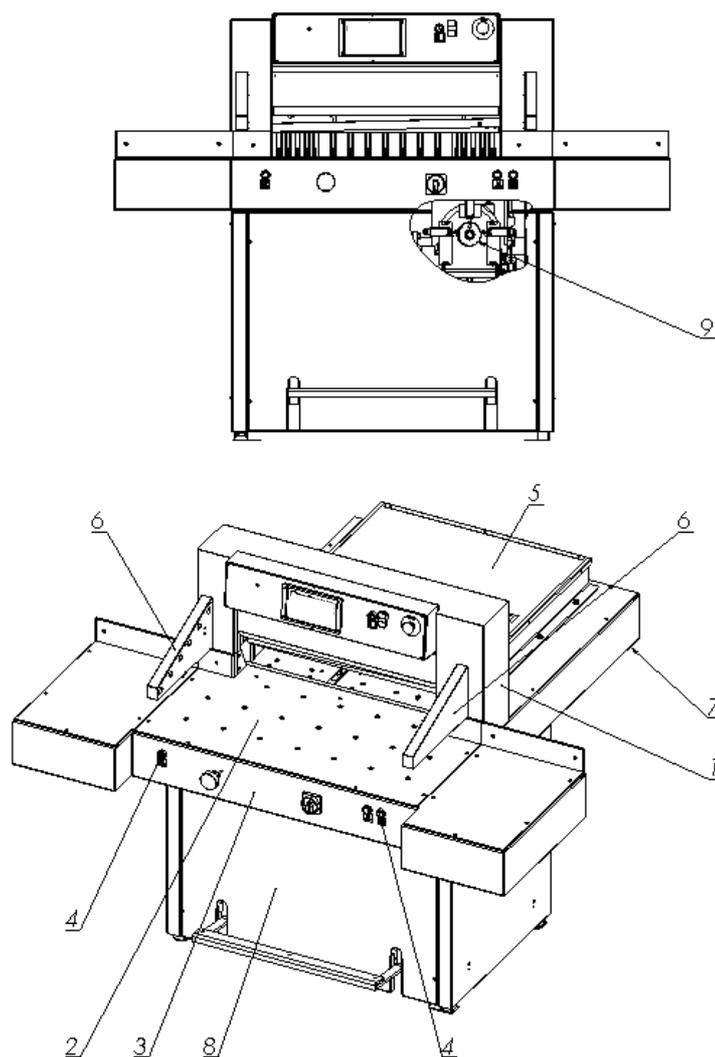
### 3. PROTECTION AGAINST HAZARDS

#### 3.1. Potential Hazards

The potential hazards of using the Cut-True 29A are listed in the table on page 13, along with methods to eliminate such hazards.

The safety features are shown in drawing 9, below.

In order to ensure operator safety, the cutter is equipped with two-hand safety devices and additionally with the infrared safety curtain.



Drawing 9

Table 2.

	Factors and / or danger places	Identification		
			Item	Drawing
<b>MECHANICAL</b>				
1.	Levers unit of the clamping bar drive mechanism	- permanent shield	1,3,8	03.00.00 01.00.00 10.00.00
2.	Motor, belt transmission of the clamping bar drive mechanism	- permanent shield	8	10.00.00
3.	Motor, belt transmission of the pushing bar drive mechanism	- permanent shield	3	01.00.00
		- front table	2	08.00.01
4.	Motor and levers unit of knife driver mechanism	- permanent shield	3	01.01.00
			1	03.00.00
			8	10.00.00
		- front table	2	08.00.00
5.	Approaching movement of the clamping bar	- permanent shield	1	03.00.00
		- light barrier	6	14.00.00
6.	Approaching movement of the pushing bar	- permanent shield	5	00.00.30
7.	Cutting zone	- double-hand protective device		
		- light barrier	4	
		- cam device supervising the knife stopping In upper dead centre	6 9	00.00.14 00.00.40
8.	Handling of the knife during its change	- transport clamps - special protective package		
9.	Sharp edges and corners of the cutter elements	- breakdowns, dulls, roundings		

10.	Uneven or rough surfaces	- precise machining of piece - varnish coatings		
<b>ELECTRICAL</b>				
1.	Direct contact of the active elements	- basic protection, electrical gear in the closed recess	8 12.	00.00
2.	Intermediate contact	- additional protection, continuity of protective conduit		

### 3.2. Safety Rules

Safe operation of the cutter depends on the following conditions:

Operator(s) must be trained and made aware of all potential hazards in using the cutter. Children and untrained personnel must not be allowed to operate the cutter.

The cutter must NOT be used if:

- \* The cutter is non-operational
- \* Any shield has been removed from moving parts of the cutter

Every time, before using the cutter, the protective devices must be checked for proper operation: two-hand buttons, infrared light curtain, emergency stop button.

The power supply must be switched OFF before any maintenance is performed.

## 4. INSTALLATION OF PAPER CUTTER

The cutter must be installed in a proper location to prevent hazards to the operator, including uneven floor surface, power cord tripping hazards, or inconvenient/inappropriate access to the machine.

The paper cutter is delivered with 5-wire copper cable with diameter 2.5 mm.

The machine must be installed to electric system having 3 x 20A protection. The copper wire 2.5 mm<sup>2</sup> must be used.

The power supply fluctuation of voltage should be in the range of 90-110%, with frequency 50 Hz  $\pm$  2%.

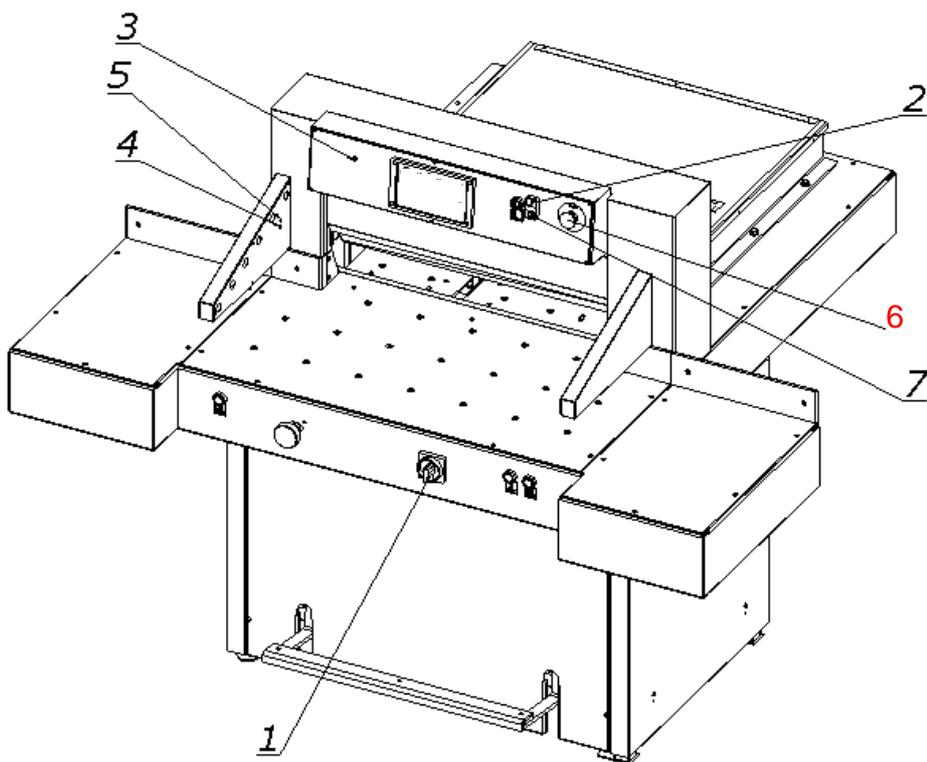
The cutter can be connected to 5-wires L1, L2, L3, N, PE power supply.

**Please mind the correct power supply during the first machine start up.**

If after the machine start by main switch 1 (drawing 7) and pressing the green button (4) the diode (8) lights green the connection is correct (correct rotation of motor).

If the diode (8) lights red then the connection is incorrect and 2 of 3 phase wires must be swapped in the power supply socket.

## 5. USING THE PAPER CUTTER



Drawing 10. Signaling elements on the machine's panel.

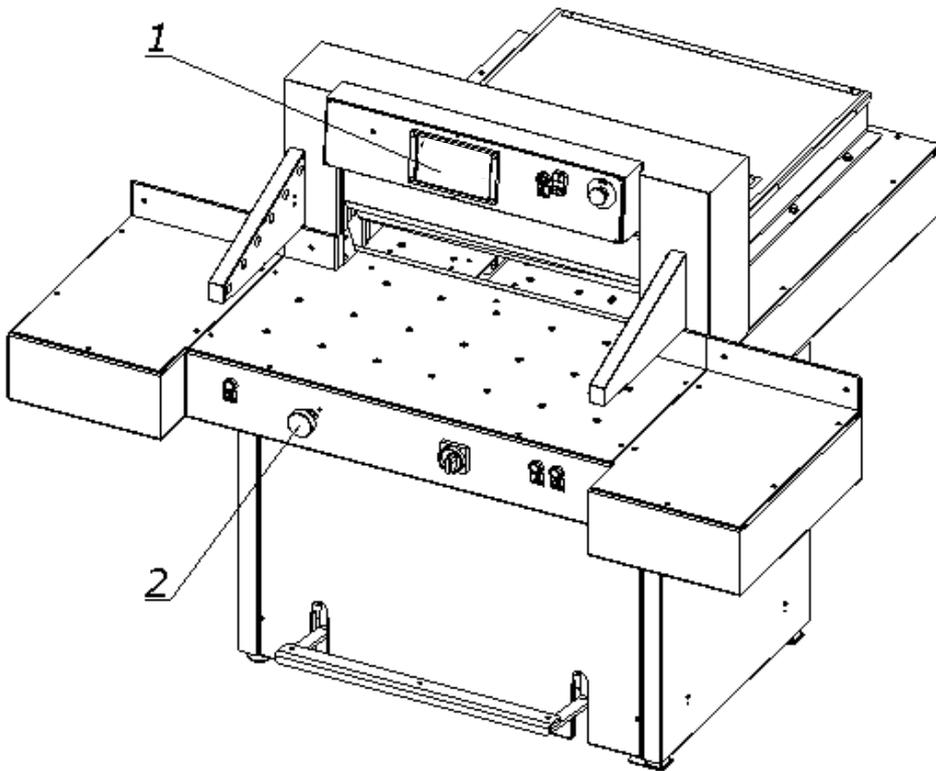
Put the main switch (1) into the "active" position one to switch on the machine.  
Press the green button (2) "I" starting the cutter system (green diode (3) lights).  
If there is no obstacle in the infrared light barrier zone the green diode (4) lights.  
If there is any obstacle, the red diode (5) lights.  
In case of an emergency, stop the cutter by pressing the red button (6).  
To resume working, release the stop button (6) by rotating it press button 2 "I".  
If the control system is switched off by button 7 "O" to activate it press the button 2 "I"

## 5.1. Back gauge

Setting the position of backgauge is done by program module (1) or manual crank (2).  
Drawing 11.

The positioning and operation of back gauge is described in the separate **program module manual**.

For manual movement of back gauge, press crank (2) and rotate it forward or backward. Current dimension is shown on the display.

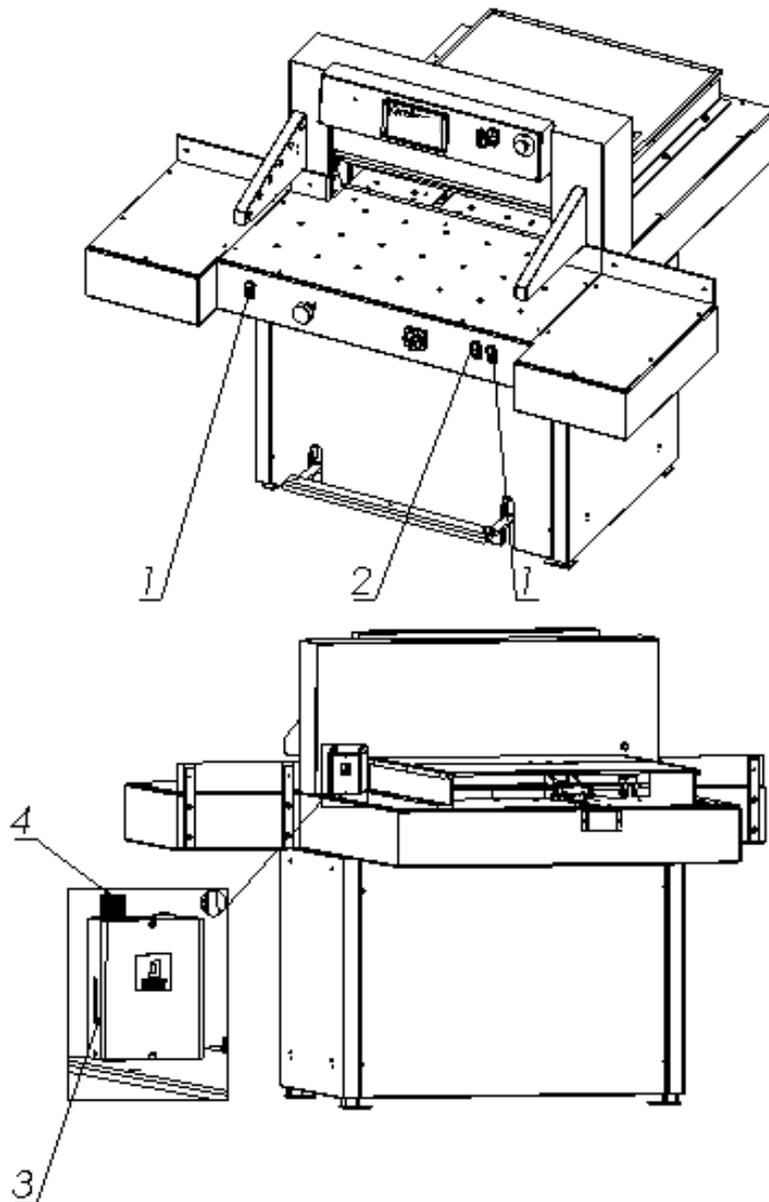


The cut material is being clamped automatically after pressing cut cycle buttons 1 (drawing 12, following page) .

To press the material without cutting, press left cut button (1) and button (2) on the right side which is for clamping only. The material is pressed as long as both buttons are held by operator. The clamp will release if either button is released.

The clamp force is adjusted by knob (4) of force regulator (3) (drawing 12)

Rotating the knob moves the indicator (3) in the box up when increased and down when decreased.



Drawing 12. Clamp force adjustment.

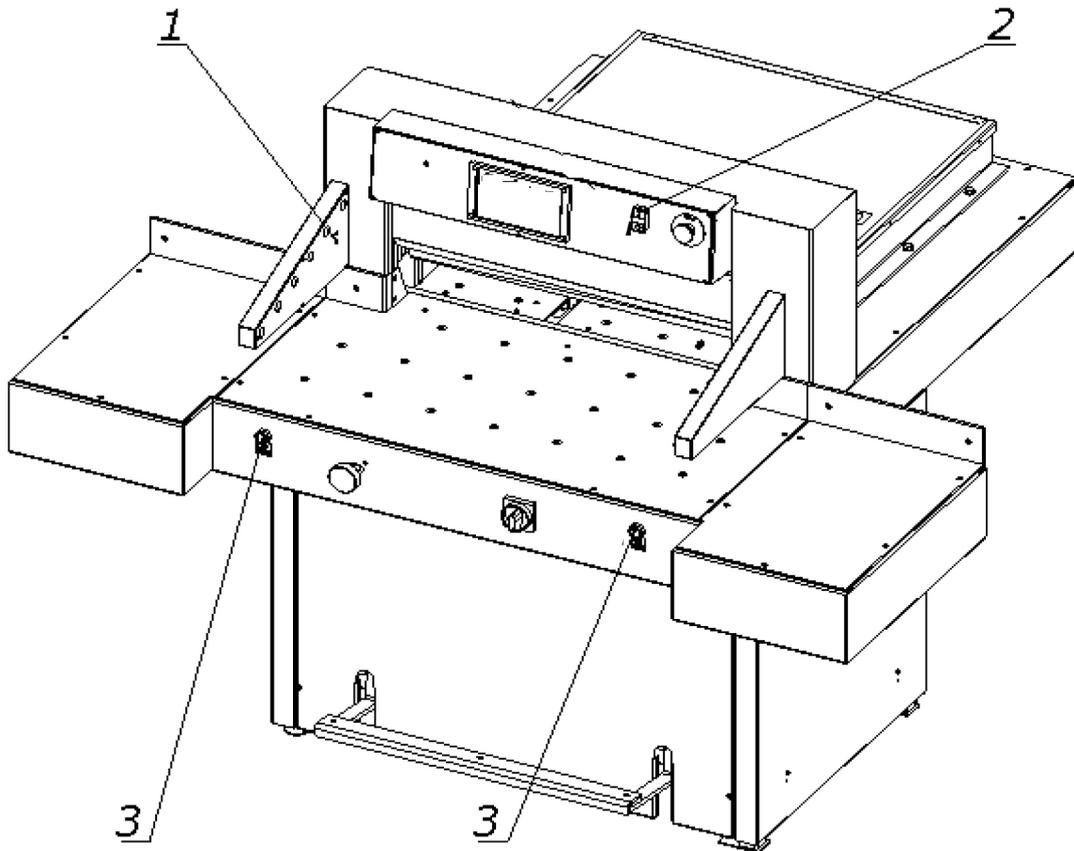
The clamping force should be selected experimentally by operator according to paper weight, size and pile height.

Please mind following rules:

- The higher the pile the bigger the force needed to clamp
- The wider the pile size the bigger the force needed to clamp
- The heavier the paper pile the bigger the force needed to clamp

### 5.3 Cutting

Elements of operating and signalization used during cutting shown on drawing 13.



Drawing 13. Operation and signalization during cutting

Before cutting, check to make sure there are no objects in the working area and if the in addition make sure the green button 2 is pressed.

Push-buttons 3 simultaneously to engage the cutting cycle starts.

The clamp bar will and compressing the material, followed the cutting action.

Both push-buttons 3 must be kept pressed down as long as the material is cut down. Return of the knife to its stop position, and movement of the clamp bar upward are done automatically.

Note: If the push-buttons 4 are released during the downward movement of the clamp bar and knife, then the movement will be stopped.

The Introduction of any object /ex. hand/ into the protected area by the no-contact protective device /light barrier/ 3 cause stopping of the clamp bar and knife down movement.

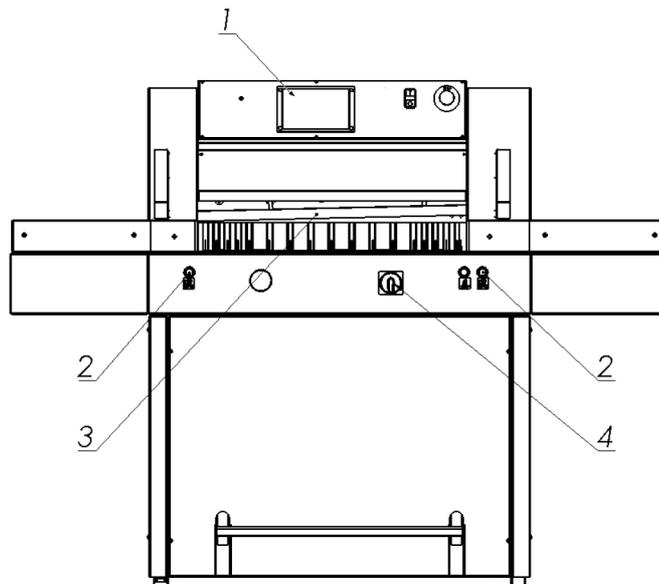
To continue the cutting cycle, the object should be removed from this protected area and again switching-on both push-buttons 4.

## 6. KNIFE CHANGE, CUTTING STICK CHANGE, BACKGAUGE ADJUSTMENT

### 6.1 Knife change

It is recommended, basing on experience, to change the knife, after approximately 8 hours of effective working.

#### 6.1.1 Removing the knife

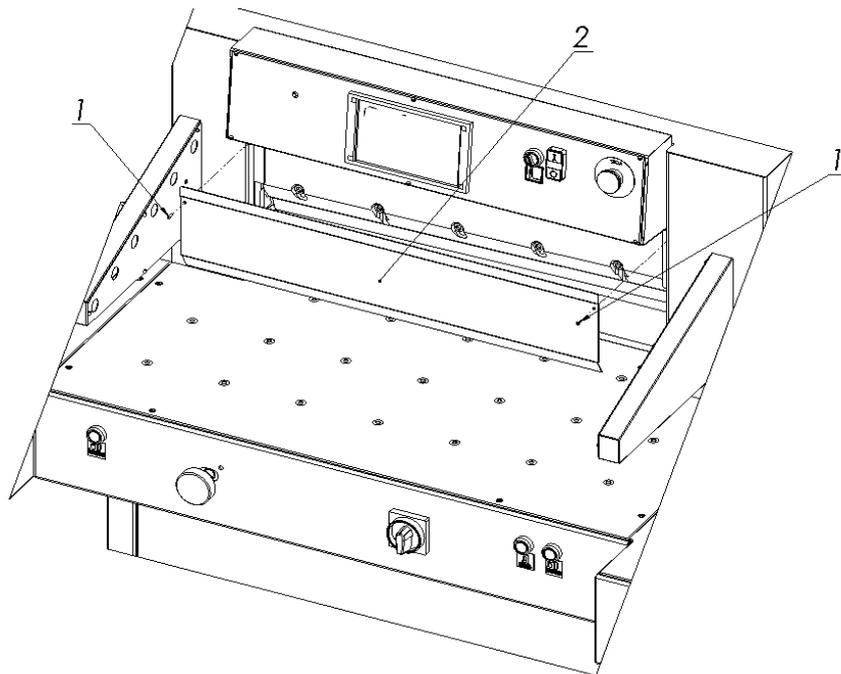


Drawing 14.

6.1.1.1 Press the "Options" button to the control panel and then select "Knife Change". Select yees to turn the change knife mod on.

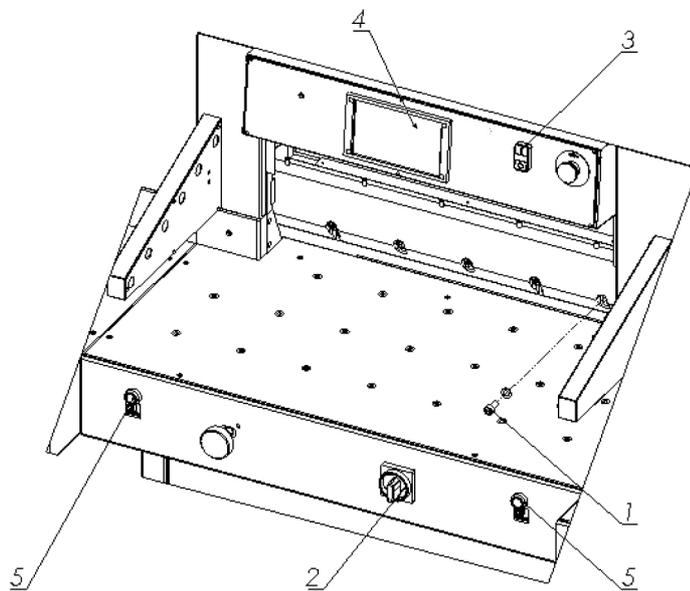
6.1.1.2 Press simultaneously both push-buttons 2 (drawing 14), starting the cutting cycle. The knife stops in the lower position.

6.1.1.3 Switch-off the electric supply by rotating the main switch 4 (drawing 14) to "O" position.



Drawing.15

6.1.1.4 Unscrew screws 1(drawing 15) mounting the cover 2 and remove the cover 2.



Drawing.16

6.1.1.5 Unscrew and remove the screw 1, the first one to right side of the knife bar.

6.1.1.6 Turn on electric system by rotating the main switch 2 (drawing 16) into

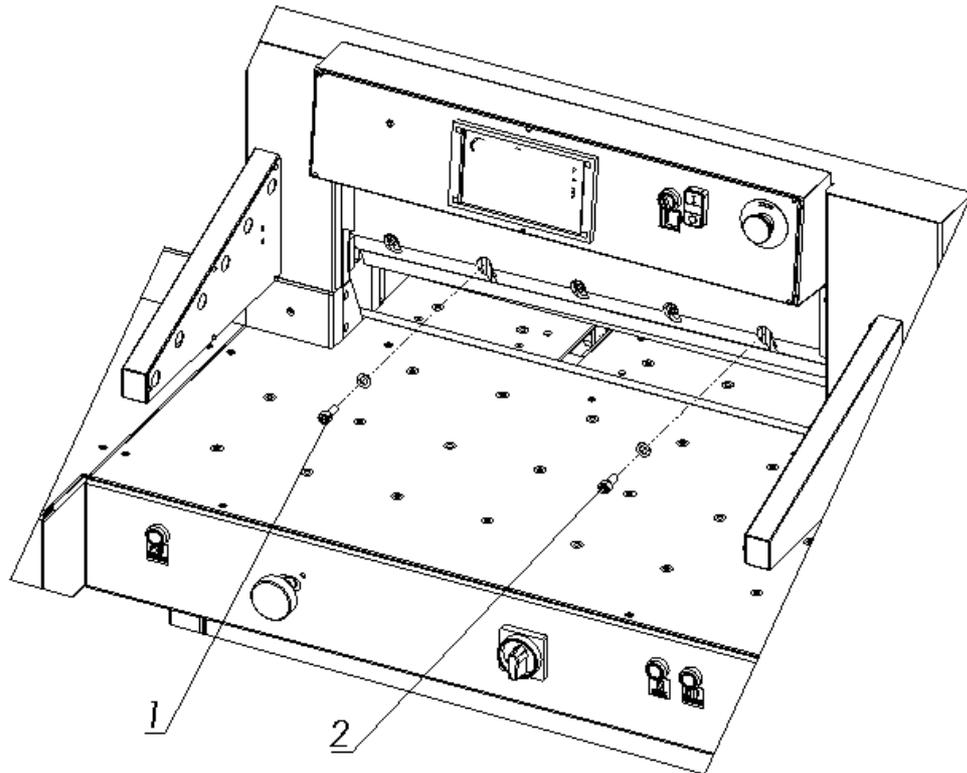
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position „I”.

6.1.1.7 Turn on cutter system by pressing the green button 3.

6.1.1.8 Turn the Knife change mode off 4, following 6.1.1.1 directions.

Press simultaneously buttons 5. Knife moves to its upper position (drawing 16).

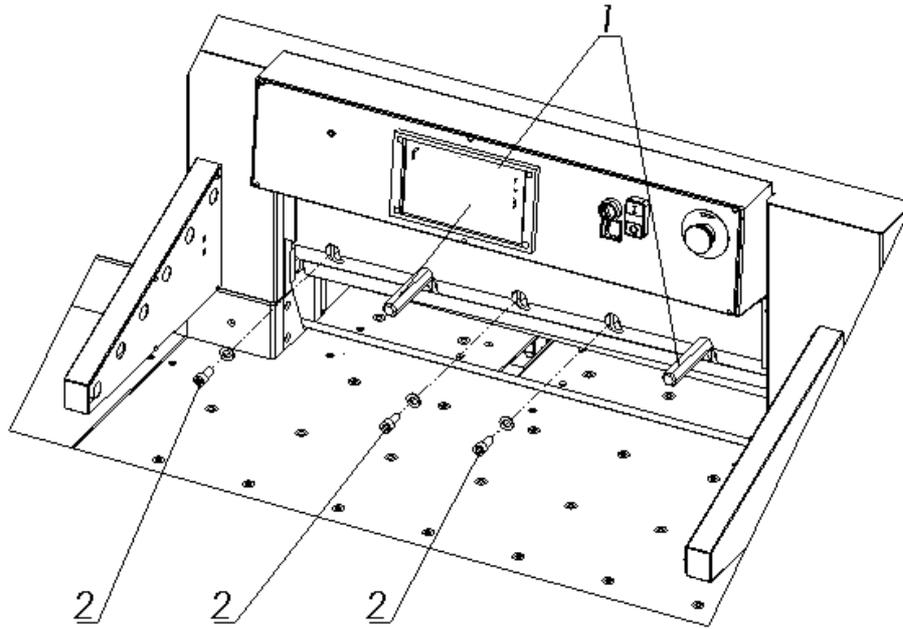


Drawing 17.

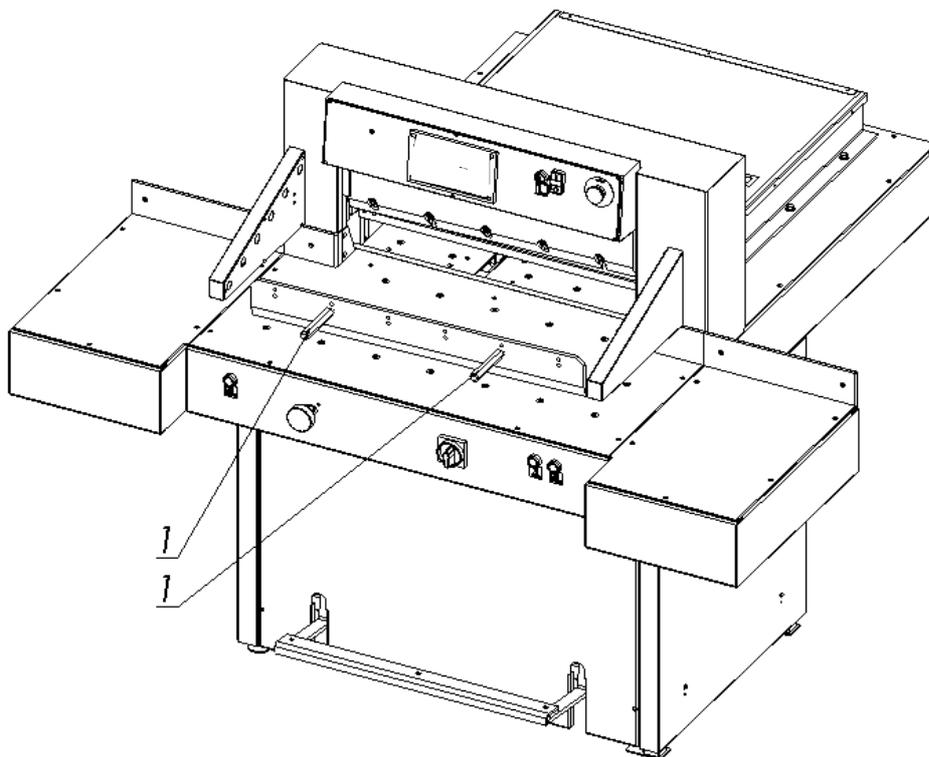
6.1.1.9 Unscrew and remove screws 1,2 (drawing.17).

6.1.1.10 After removing screws, 1 and 2), screw the blade change safety tool (drawing 18) so as to fix the change tool and knife to the knife bar.

6.1.1.11 Unscrew and remove the remaining clamping screws 2 from the knife bar



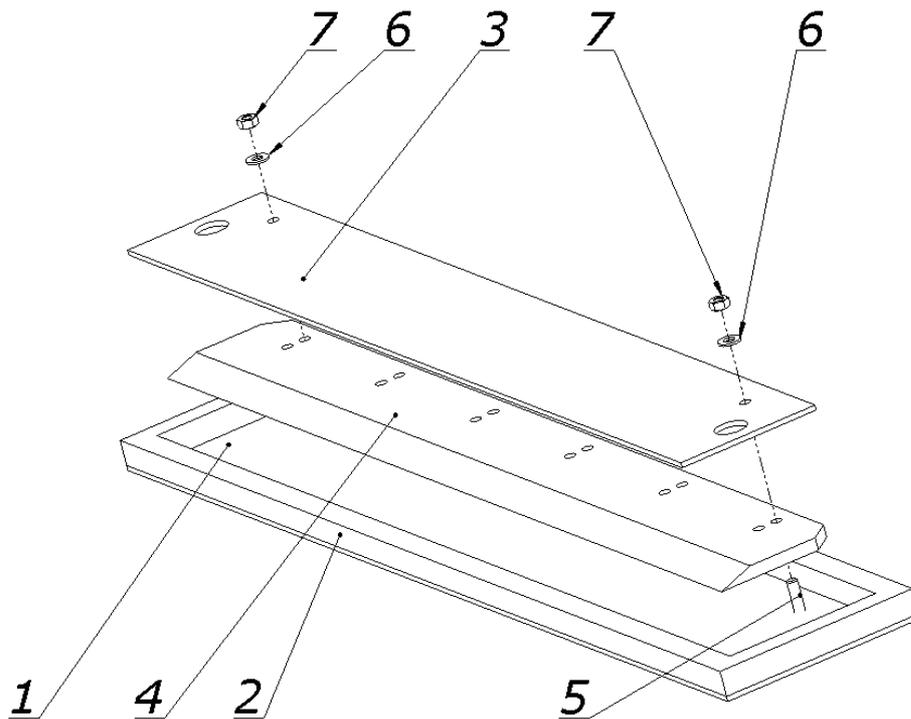
Drawing 18.



Drawing 19.

6.1.1.12 Holding the blade change tool 1, release from the bar by rotating the handles by  $\frac{1}{2}$  turn to left simultaneously, and carefully guide the knife downward and out (drawing 19). Place the removed knife into the special protective package (drawing 20), with a

cutting edge to the inside, fix with two bolts, and unscrew the blade change tool 1.



Drawing 20. Knife package

- 1 - Board
- 2 - Frame
- 3 - cover
- 4 - knife
- 5 - screws
- 6 – washer
- 7 - nut

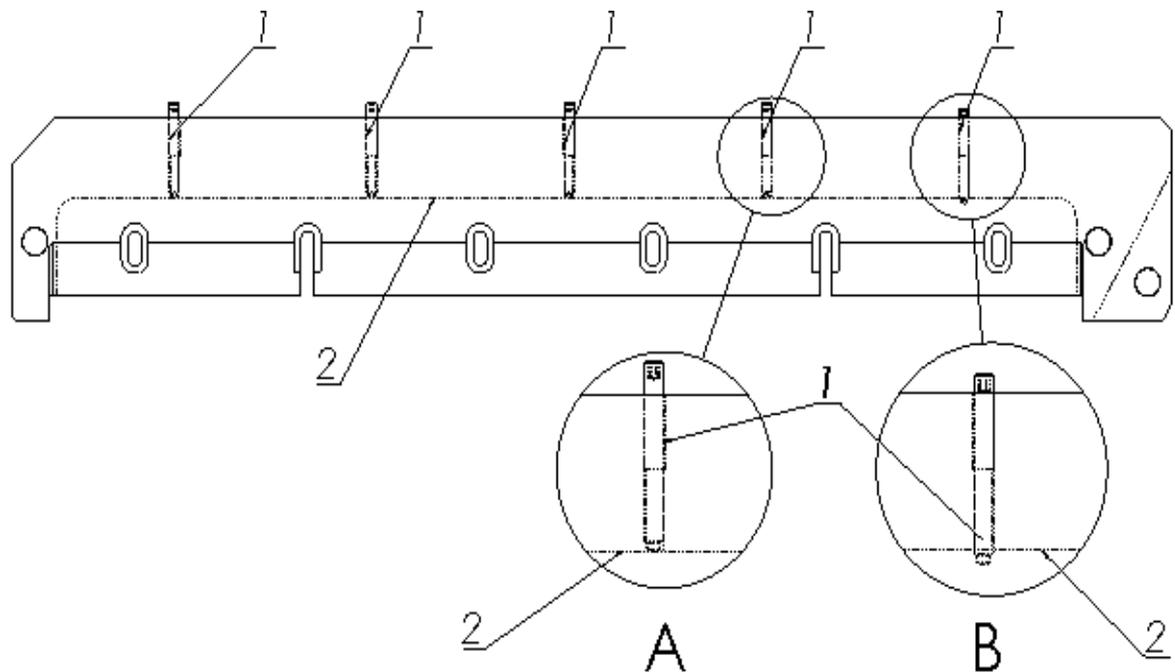
### 6.1.2. Knife installation

6.1.2.1. Unscrew all adjusting screws 1 /Drawing 21/, so that their faces are hidden into the knife bar body.

Drawing 21A – adjusting screw 1 is Lower then knife bar lobe 2 – **correct position**

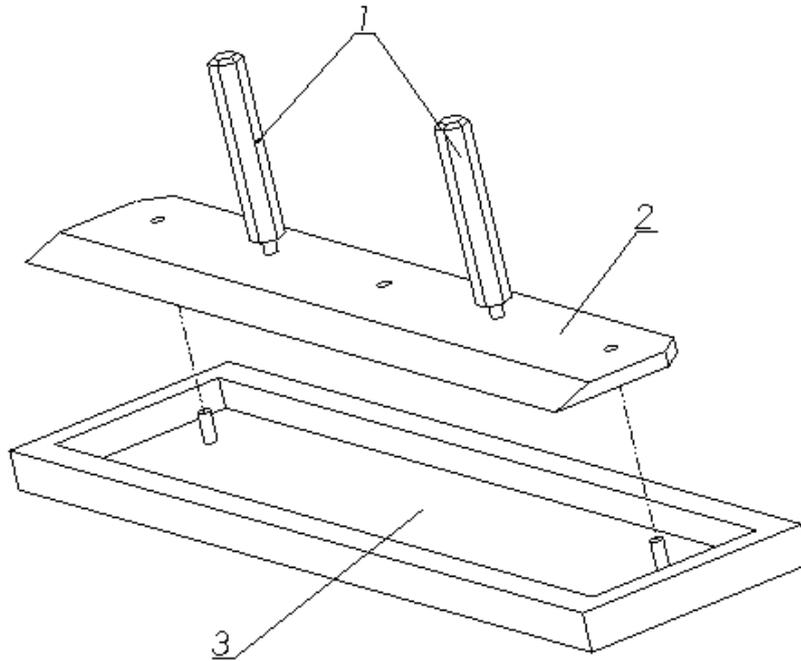
Drawing 21B- adjusting screw 1 is higher then knife bar lobe 2 – **incorrect position, screw must be unscrewed.**

**WARNING: The new knife must be supported by its up edge on the knife bar. Not obeying this rule may cause machine overload and possible damage if the new knife is higher than the old one.**



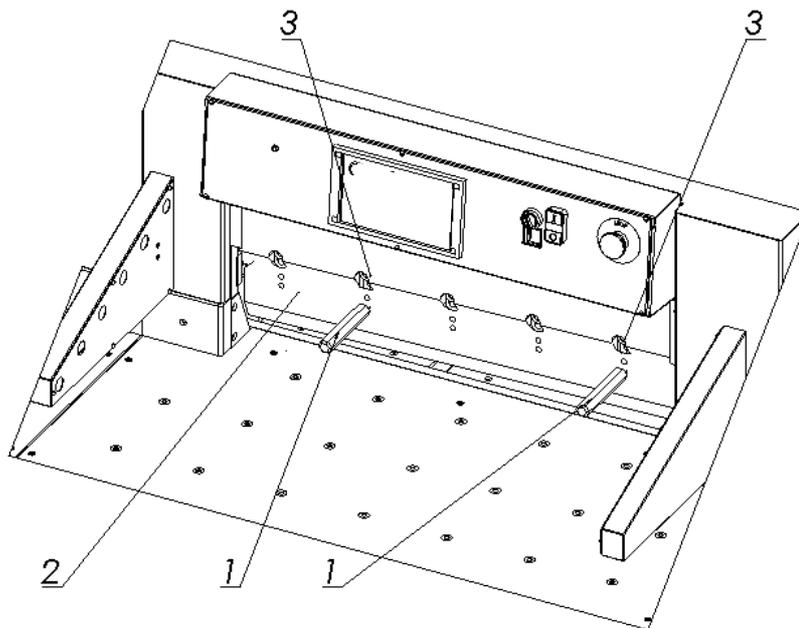
Drawing 21. Adjusting screws position.

6.1.2.2. Screw the screws 1 into holes of knife 2, second from left and second from right side. Take the knife from the package 3 (drawing 22).



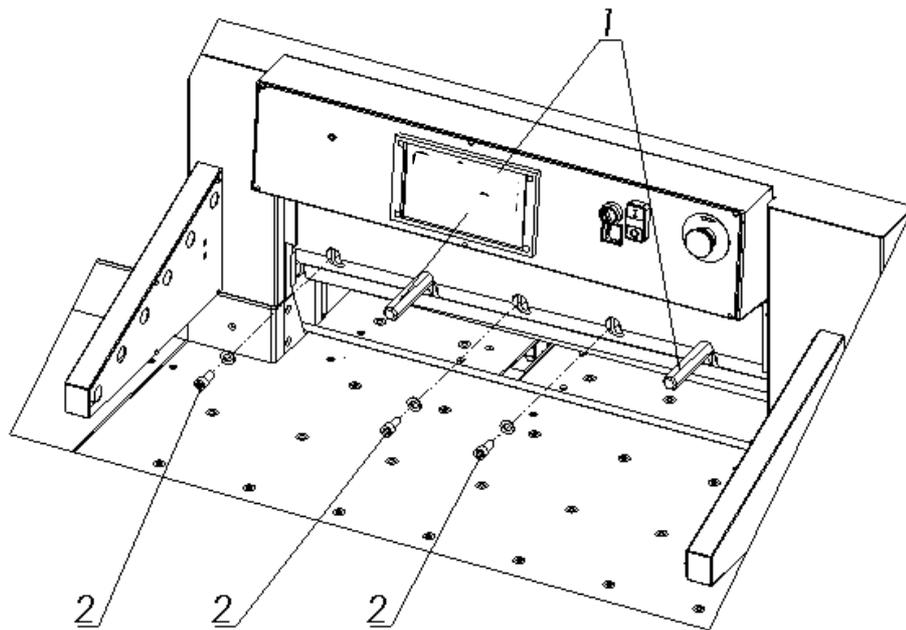
Drawing 22.

6.1.2.3. Holding the screws 1 put the knife 2 into the cutter, and match the blade change tool screws into the knife bar gaps 3. (drawing 23)



Drawing 23.

Put the knife to upper position until its up edge touches the bar lobe 2 (drawing 21).

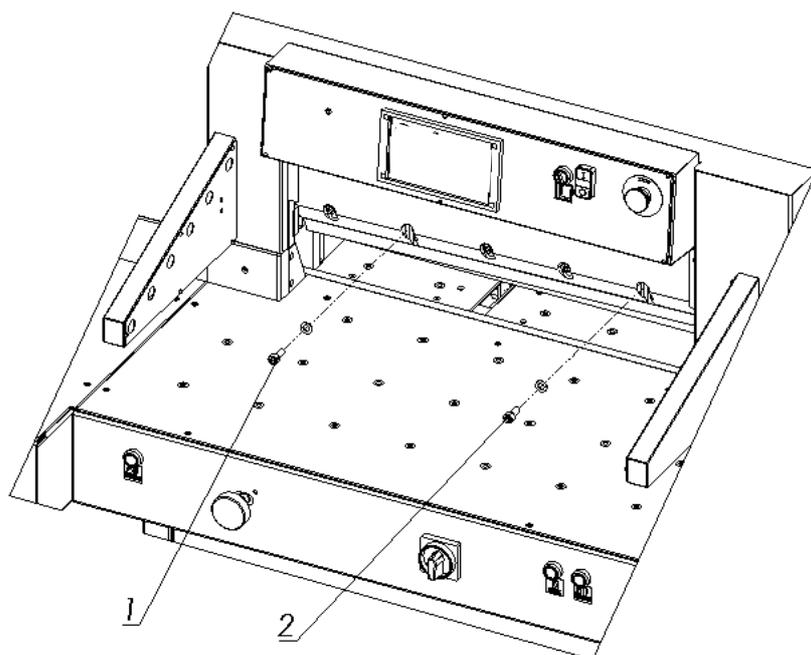


Drawing 24

6.1.2.4 Mount the knife by rotating right with force both screws 1 (drawing 24)

6.1.2.5 Input the mounting screws 2 (drawing 24)

6.1.2.6 Unscrew both screws 1 (drawing 24) and put into its position mounting screws 1,2 (drawing 25)



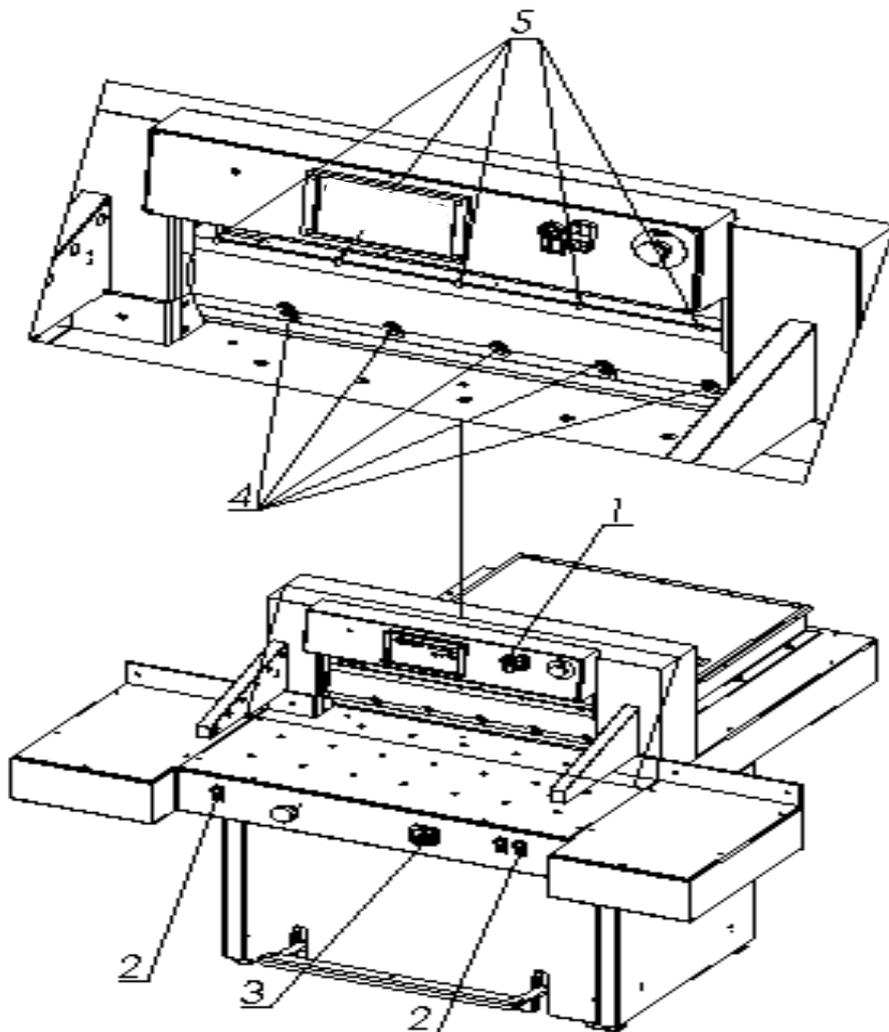
Drawing 25.

6.1.2.7 Unscrew gently first screw from left 2 (drawing 24) paying attention the head of screw does not stick out the knife bar slide.

6.1.2.8 Activate the "Knife Change" mode from the control panel..

6.1.2.9 Press simultaneously cutting buttons 2 (drawing 26) to start cut. Knife stops in lower position.

6.1.2.10. Turn off the power supply by rotating the main switch 3 (drawing 26) to „O” position.



Drawing 26.

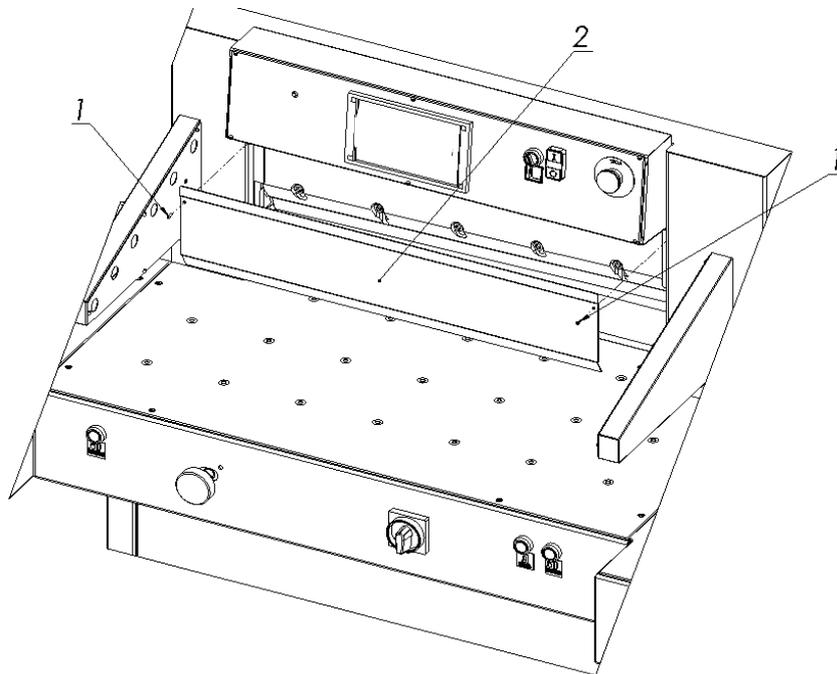
6.1.2.11. Loosen screws 4 (drawing 26) so the knife drops down with its weight into the full length of the cutting stick.

6.1.2.12. Mount the screws 5 (drawing 26) to maximum, until the knife blade cuts the stick by 0,3 mm.

6.1.2.13. Fasten the screws 4 (drawing 26)

6.1.2.14. Turn on power supply by rotating button 3 into position "I"

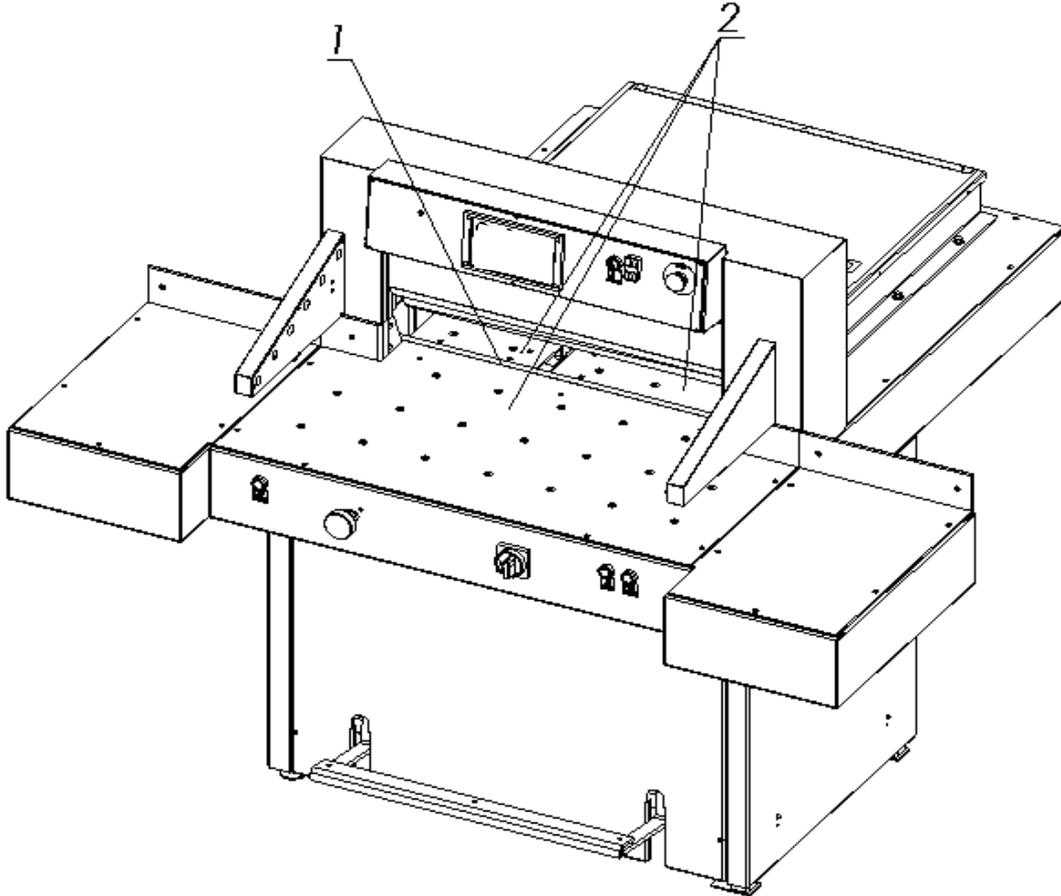
- 6.1.2.15. Turn the "Knife Change" mode off from the control panel.
- 6.1.2.16. Press simultaneously buttons 2. Knife moves into its upper position.
- 6.1.2.17. Turn off the Power supply by rotating button 5 into "O"
- 6.1.2.18. Strongly fasten the first screw from the left side 2 (drawing 24)
- 6.1.2.19. Turn on Power supply by rotating button 3 into position "I"
- 6.1.2.20 Turn on electric system by pressing Green button 3 (drawing 16)
- 6.1.2.21 Make trial cut. If knife does not correctly cut the last page of paper pile repeat point 6.1.2.7.
- 6.1.2.22 Mount cover 2, screws 1 (drawing. 27)



Drawing 27

## 6.2 Cutting stick change

The cutting quality of the stack bottom sheets and rate of the knife effectiveness, depends largely the quality of the cutting stick. Changing or rotating the stick is recommended after each knife change, or when the bottom sheets are found to be ripped /not completely cut/.

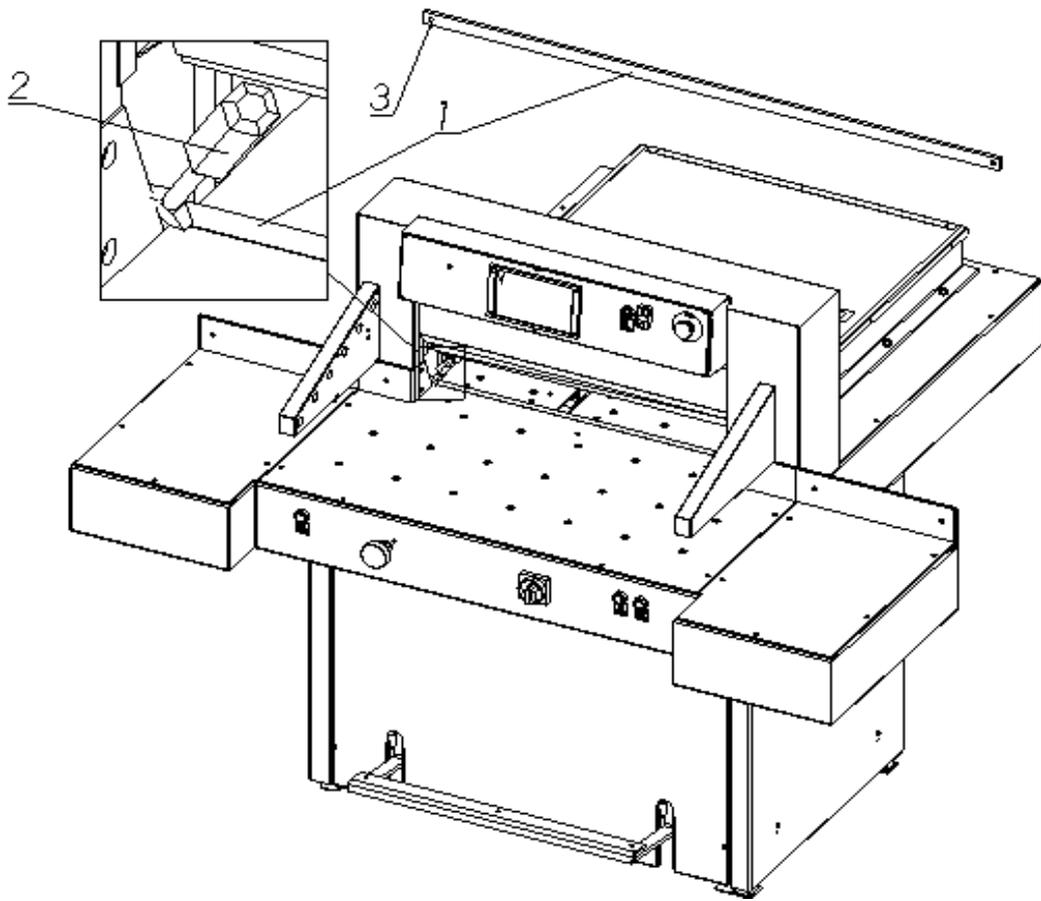


Drawing 28. Cutting stick change

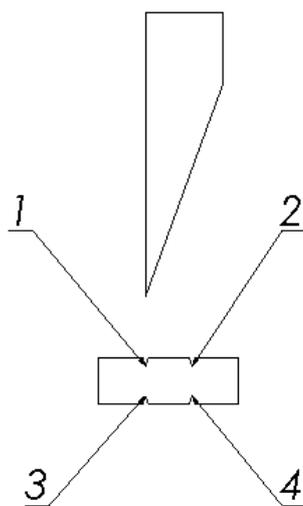
Cutting stick 1 is introduced to a rectangular channel between the cutter tables 2 (drawing 28) and locked in position by a pin.

To make the stick 1 change easier use screwdriver 2 (drawing 29)

The stick 1 should be place with its hole 3 on the pin in the underknife bar to prevent sliding.



Drawing 29. Cutting stick removal



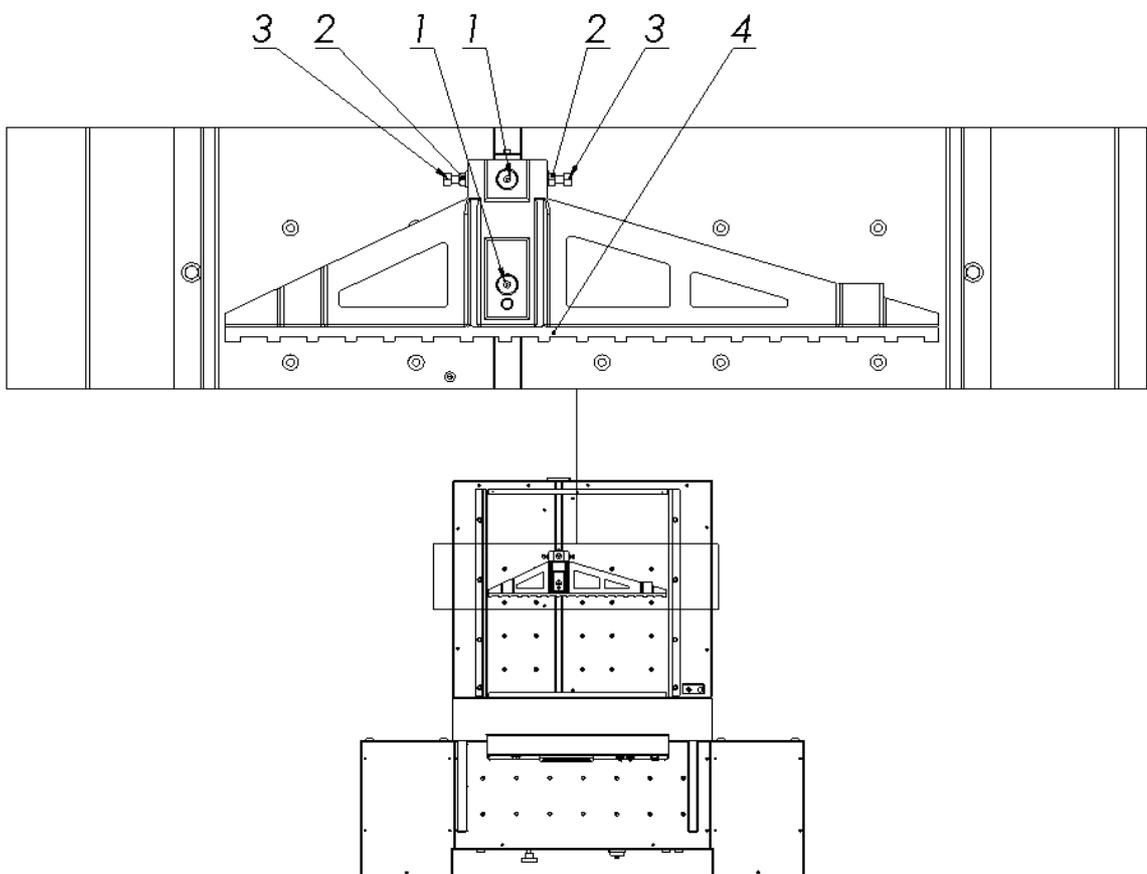
Drawing 30. Stick usage

The stick can be turned in both directions and can be used in four positions as shown on drawing 30.

**IMPORTANT:** The chanel between the tables where the stick is assembled has to be clean.

### 6.3 Parallelism of the backgauge

Depending on the required deviation of the pushing bar 1, it is necessary to perform adjustments shown on drawing 31.



Drawing 31 Backgauge parallelism adjustment

To adjust the pushing bar, it is necessary to:

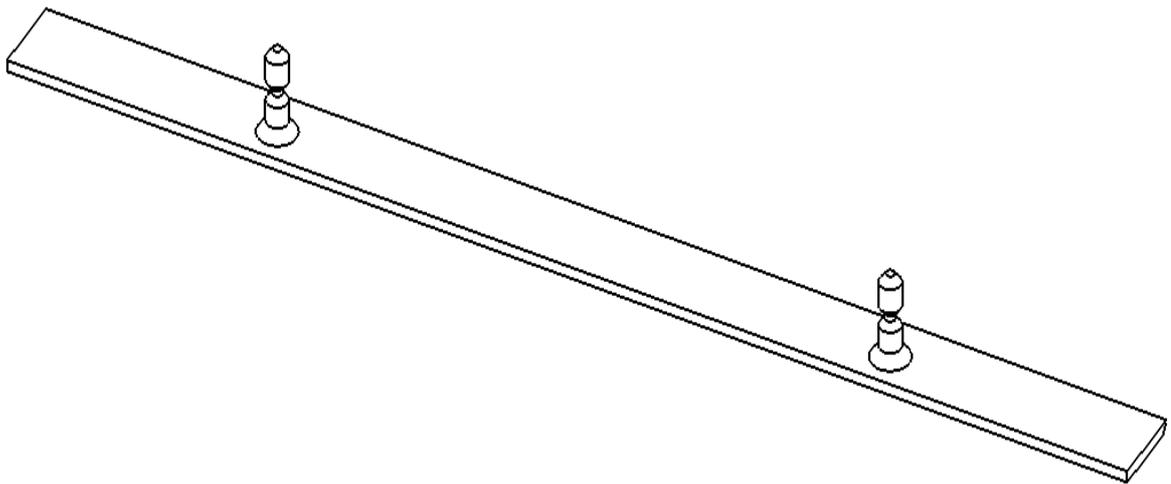
- loose both screws 1, fastening the pushing bar 4 to a slide;
- loose nuts 2
- turning with adjusting screws 3, set the pushing bar at the appropriate angle;

- lock the adjusting screws 3 with nuts 2;
- tight with force screws 1.

After a trial cutting, repeat adjusting, if it is necessary, until the cutting parallelism is obtained.

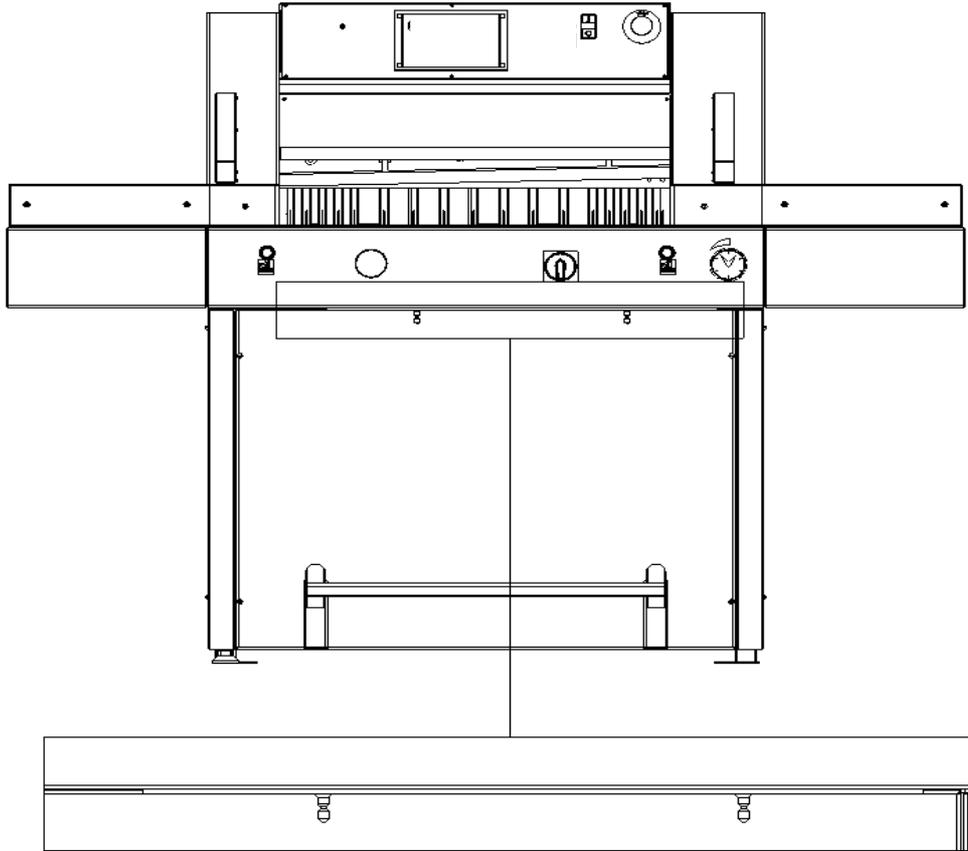
## 6.4 False clamp

The false clamp prevents against arising imprints from the down part of the clamp on the cut material



Drawing 32. False clamp

The false clamp is inserted under the front table as shown on the drawing 33.

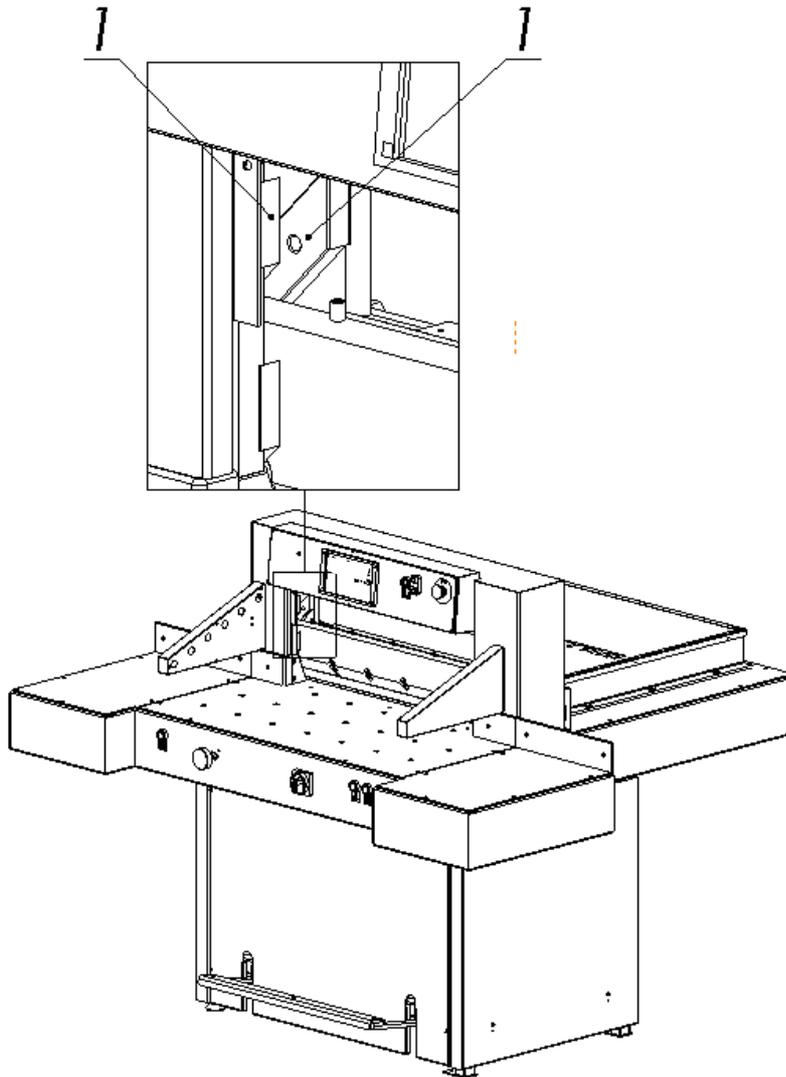


Drawing 33. False clamp location (before fixing on the clamping beam)

In order to fix the false clamp on the clamping beam:

- lay the false clamp 1 on the cutting stick 2 - radius defining the line should cover the front false clamp surface (drawing 34)
- softly press the clamping pedal 3 (drawing 34) to push the clamping a little bit down (false clamp rods should come into the holes on the clamping beam, whole false clamp should adhere to the clamping beam)
- Use the allen key with 3 mm setting and strongly screw the screws 1 (clamping pedal should be still pressed, drawing 35) into holes on the clamping beam to lock the false clamp on the beam.
- release the clamping pedal

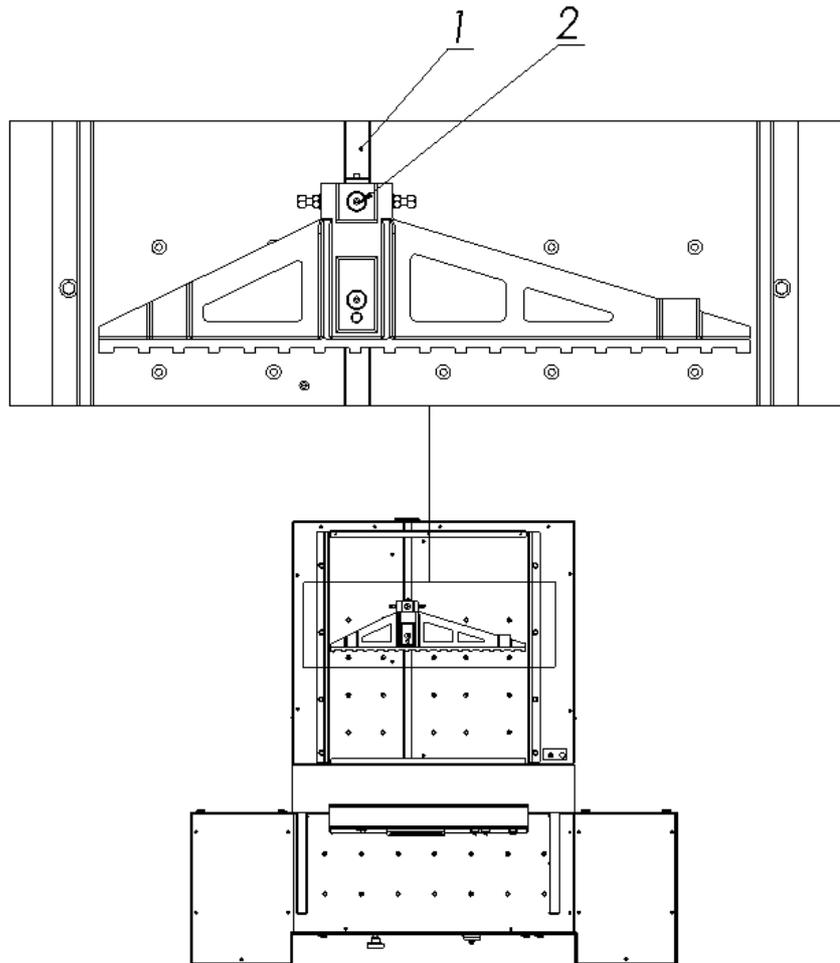
When the false clamp is installed, the minimum cut will be bigger than without the clamp.



Drawing 34 . Locations of the knife lubrication locations (knife in lower position)

#### 7.1.2 Backgauge lubrication

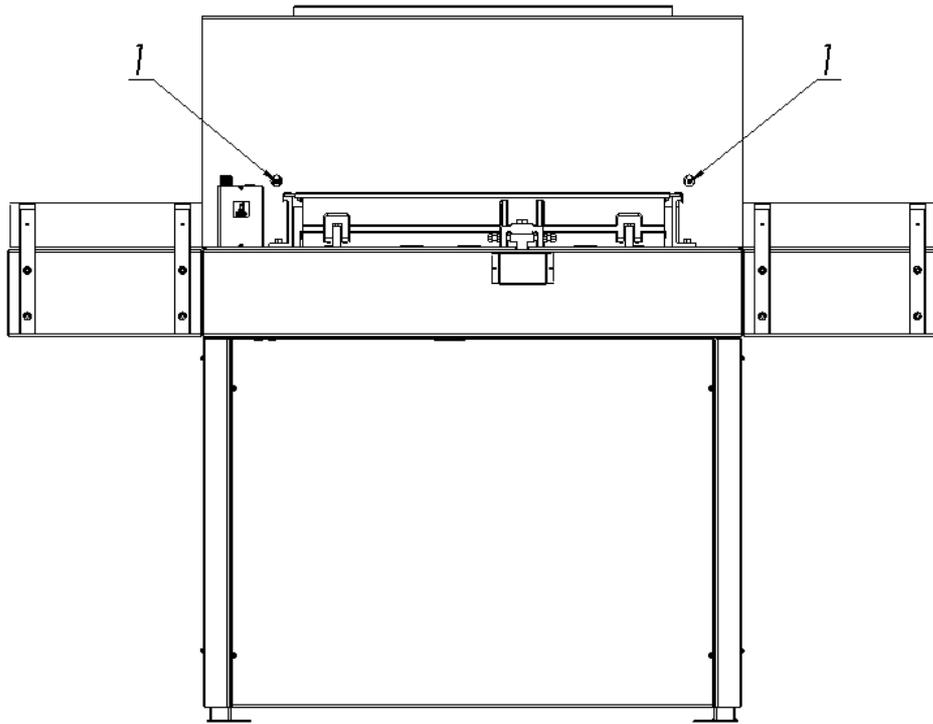
In backgauge mechanism the following parts have to be lubricated: guiding roller (drawing 35) and located under the roller screw (not marked on the drawing). The screw should be lubricated with the non-liquid grease, on the guiding roller thin coat of the grease should be put. Sleeves guiding the base of the backgauge grease pouring small amount of the grease into to hole in the screw 2.



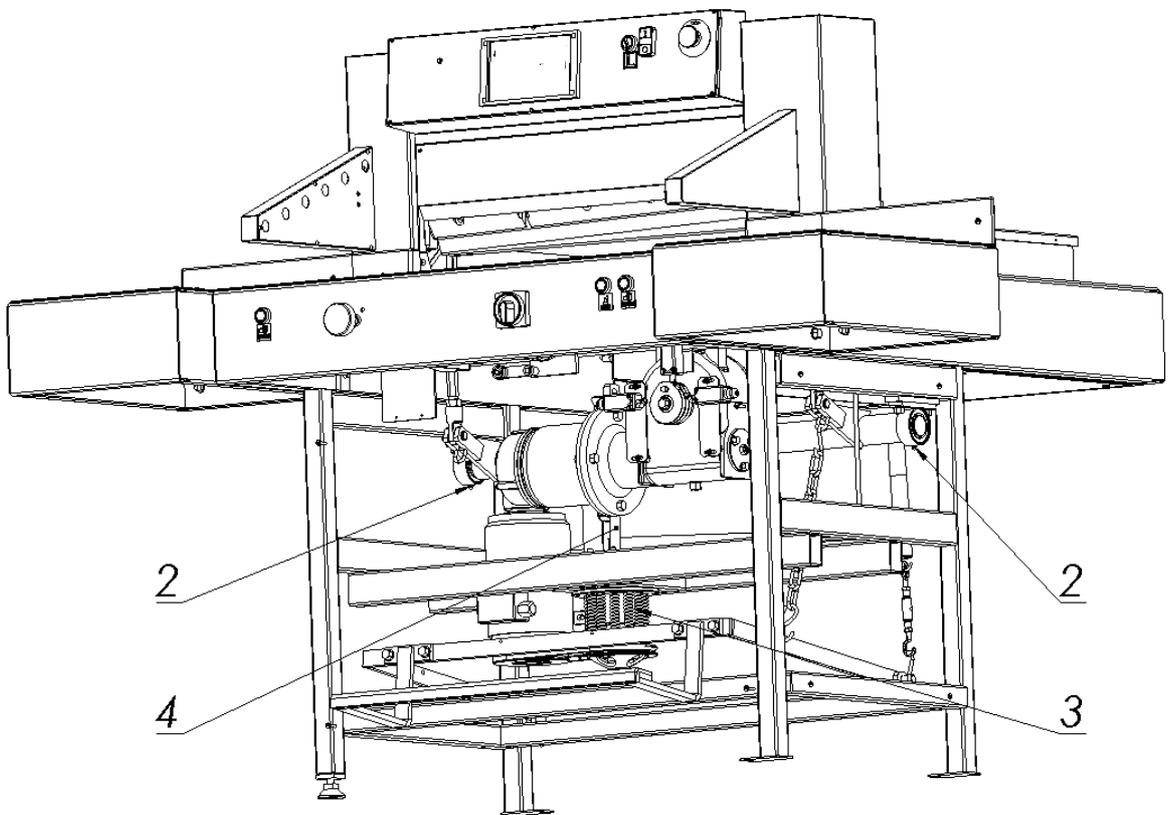
Drawing 35 Backauge lubrication points location

### 7.1.3.Clamp mechanism lubrication

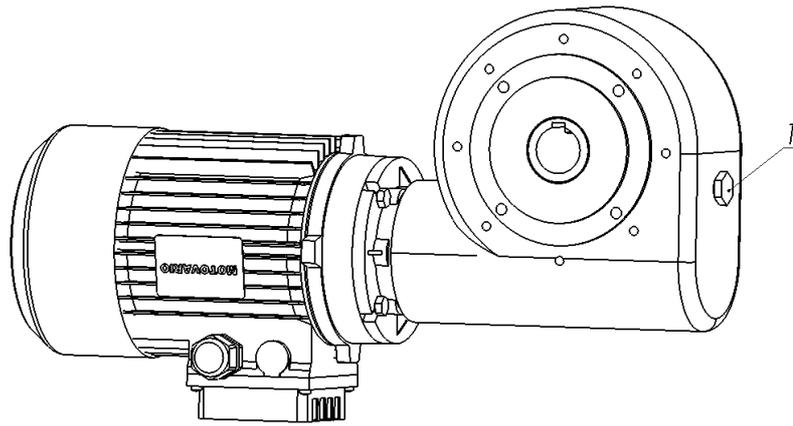
The parts of the clamping mechanism have to be lubricated with non-liquid grease. In the clamping mechanism the following parts should be lubricated: clamp bar runners 1 (drawing 36), roller bearing 2, running sleeves clamp mechanism 3, screw 4 (drawing 37) .



Drawing 36 Clamp bar lubrication points location



Drawing 37. Roller bearing, running sleeves clamp mechanism and pulling screw lubrication points location



Drawing 38. Oil change in the reduction gear.

The reduction gear of the knife driving mechanism, shown on Drawing 38, is filled with an oil, and such oil should be changed.

The change should be made after 5 years of intensive working.

It is recommended to use the oil (class GL-5 or MIL-L-2105D). If the other greasing substance would be used it is necessary to observe the time of change. The old substance should be removed by unscrewing the screw 1 (drawing 38).

## 7.2. Inspections

### 7.2.1. General recommendation

- Clean carefully machine after each work-shift /paper dust/.
- Pay attention to cleanness of the control element contacts /contactors, switches/.
- **Check correctness of the cutter screw connections, and tight them, if necessary.**

## 7.3. Regeneration of knife

Quality and accuracy of the cutting depends totally on the knife sharpness and the correct choice of the cutting edge angle.

### 7.3.1 The features of the blunt knife:

- rough and uneven plane of stack to be cut;
- edges seizing of material to be cut;
- inaccurate cutting;
- increased accumulation of the paper dust;

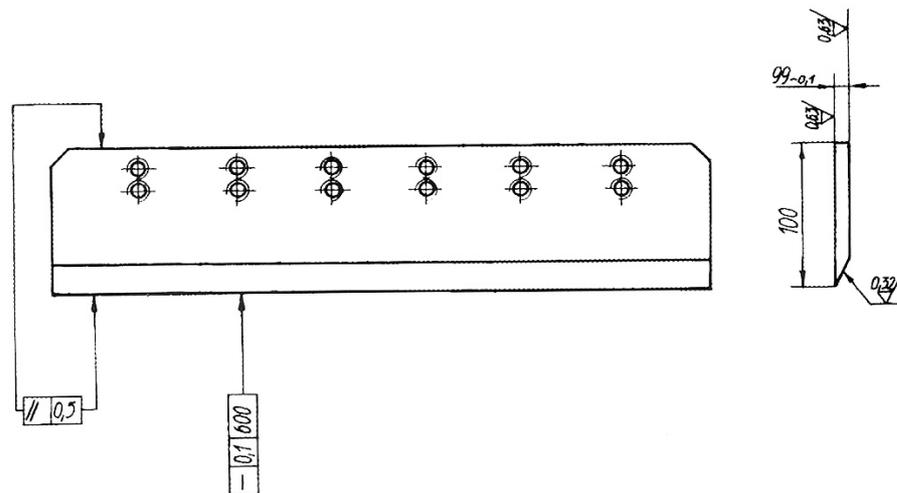
### 7.3.2. Grinding conditions of the cutter nife:

- grinding machine of correct operation;
- appropriate chosen grinding wheel
- clean and sharp grinding wheel /"sparked out"/
- appropriate coolant
- correct chosen grinding parameters
- even fixing of the knife

The manufacturer of knives used in the cutter re commend the cup-type grinding wheel or grinding segments, "J" hardness, 60-80 grain size, with keeping:

- 500 m/min grinding peripheral speed;
- 8-10 m/min traveling speed;
- max. Grinding Wheel stroke per 1 feed: 0,005 mm;
- cooling with water-oil emulsion, 60 l/min., at least;

The correct sharpen knife is shown on drawing 39.



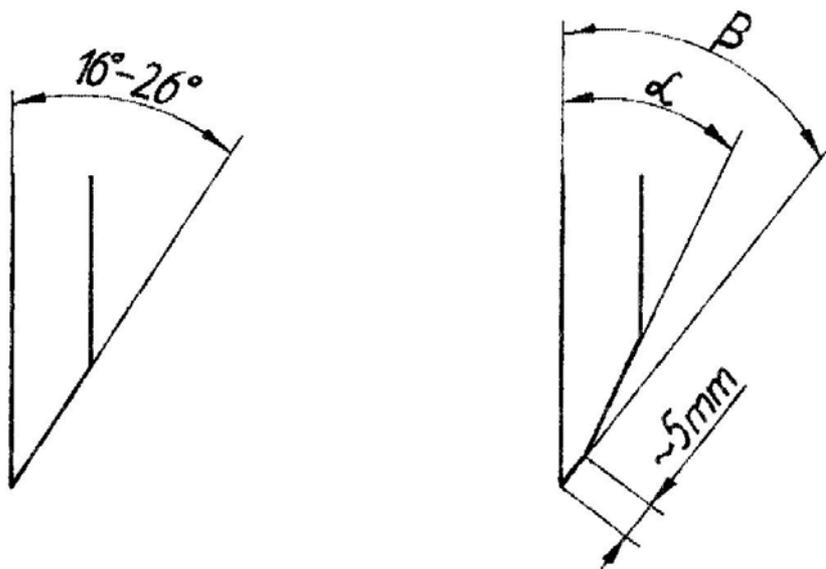
Drawing 39. Deviations and roughness of the knife.

### 7.3.3. Selection of the grinding angle

Depending on the cut down material, a ground off angles are between  $16^\circ$  and  $26^\circ$ .

Soft material needs a smaller grinding angle, whereas a hard material, a larger grinding angle.

If the cut materials are of different hardness, then a larger grinding angle is favorable.



Drawing 41. The cutting edge angles.

The double-chamfered cutting angle /Drawing 41 right side/, for example 20/24 °, in an auxiliary mean and advantages the better material discharge after cutting.

## 8.ELECTRIC DOCUMENTATION

### 8.1 Electrical equipment

#### 8.1.1 Electric board

Nr	Symbol	Quantity	Name	Type	Manufacturer
01	K1, K2, K3, K4, K7, K8	6	Contactora 9A	LC1D09B7 – contactora LADC22 – contacts block	Schneider
02	T1 1		Transformer	Tma 100VA 220/24V	BREVE – TUFVASSO NS
03	F1 1		Fuse	1A	PL
04	F2 F7 F8	3	Over current release	C60N 2A S301 6A S301 4A	Schneider / Legrand
05	F4	1	Motor circuit-breaker	M250 In 6,3A	Legrand
06	F5	1	Motor circuit-breaker	M250 In 2,5A	Legrand
07	CKF	1	Phase asymmetry and sequence sensor	CKF - 316	F&F Filipowski
08	ZS GOT	1	Power supply of GOT control panel	MDR-20-24 MITSUBISHI	
09	FX	1	Controller	FX3G-40MR/ES	MITSUBISHI
10	INV	1	Inverter	FR-D720S-025- EC	MITSUBISHI

### 8.1.2 Cutter

Nr	Symbol	Quantity	Name	Type	Manufacturer
01	Q1	1	Cam switch 25A	4G25-10-US25	Apator
02	S1F S2F	2	Emergency button	L61QA21 Adapter Z33E Close contact module . 33E01 .33E10	BACO
03	S3B S4B S5B	3	Button connector	L21AA03 Adapter 33E01 Close contact module 33E01 – 1 pc Open contact module – 2pcs.	BACO
04	S7M	1	Rotary switch	LZ1KA03 Adapter 333E Close contsct module 33E10 – 2 pcs	BACO
05	S8B S9B S15B	3	Limit switch	XCKP2102G11	Schneider
06	S11N S16N S18N	3	Limit switch	MAC6C	Hartmann
07	CZ1 CZ4 CZ5	3	Inductive sensor	PCID – 4ZP	SELS
08	M1	1	Electric motor 2,2kW/1400 rev/min	Skg 90 L4 PC	Indukta
09	M2	1	Electric motor 0,75kW/1400 rev/min	Sg 80 – 4B	Tamel
10	M3	1	Electric motor 0,18kW/1400 rev/min	Sg63 – 4B	Tamel
11	Y1F	1	Emergency brake	BKF458 – 12N 24V DC 32 NM 40W	INTORQ
12	Y2V	1	Emergency brake	BKF457 – 06 24V DC 6 NM 20W	INTORQ
13	H1	1	LED diode - red		PL
14	H3	1	LED diode - green		PL
15	LS	1	Laser line indicator	LLM635003- D11L32AM20	PL
16	ZSF	1	Photocell Power supply	CMP 07 Z - 4	KRONOS
17	GOT 1	1	Panel	GT 10055-QSBD	mitsubishi



