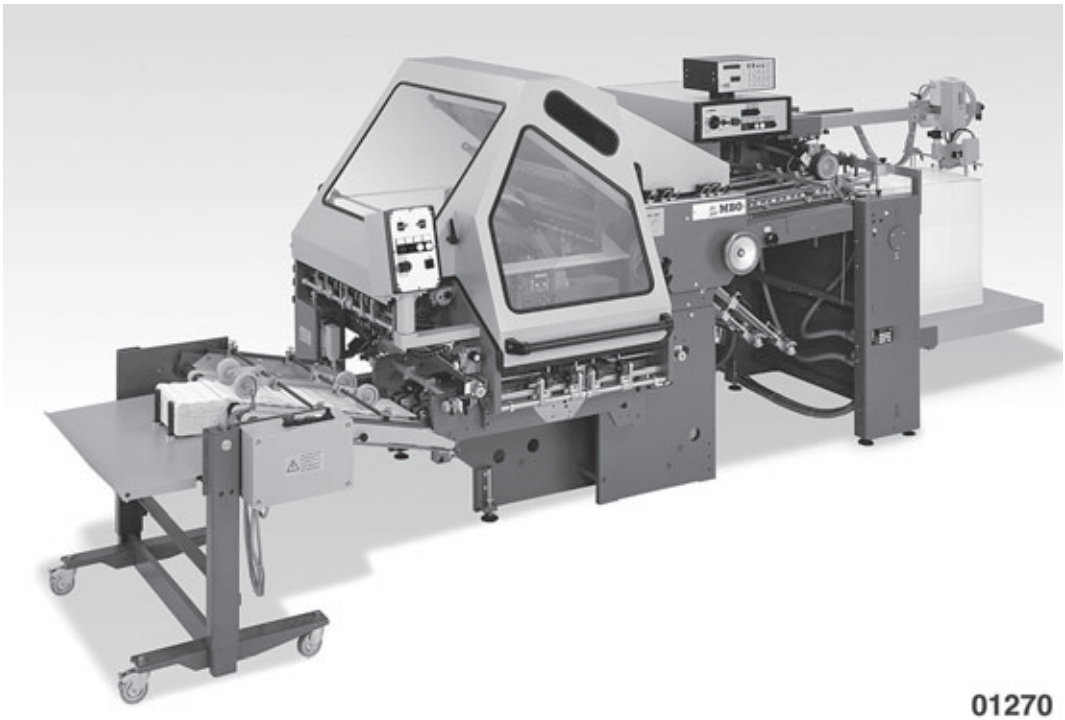
MBO
Folding Technology

Operating Manual

Combination Folding Machine
K 660 and K 760
Versions: KL and Super KTL



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Prologue

With the MBO folding machine you have purchased a valuable product. However, it is absolutely imperative to comply with all Safety Regulations and Safety Instructions. This Operating Manual should also instruct you to correctly operate the MBO folding machine and to comply with the Safety Regulations and to maintain the machine properly.

1.0 Specifications

1.1 Manufacturer

MBO Binder & Co., Maschinenbau Oppenweiler
Grabenstrasse 4, 71570 Oppenweiler
P.O. Box 1169, 71567 Oppenweiler
Tel.: 07191/46-0
Fax.: 07191/4634

1.2 Type:

Combination folding machine K 660 and K 760
Configurations: KL and S-KTL with 4 or 6 buckle plates

1.3 Technical Data

1.3.1 Sizes

	K 660	K 760
Maximum sheeet size:	66 x 102 cm (26 x 39 ½“)	76 x 108 cm (30 x 43”)
Minimum sheet sizes:		
Crossfold unit:	15 x 20 cm (6 x 8“)	15 x 20 cm (6 x 8“)
Threefold unit:	20 x 30 cm (8 x 12”)	20 x 30 cm (8 x 12”)
Fourfold unit (additional unit):	30 x 40 cm (12 x 16")	30 x 40 cm (12 x 16")

1.3.2 Electrical data

Folding unit:	1,50 kW	1,50 kW

1.3.3 Speed

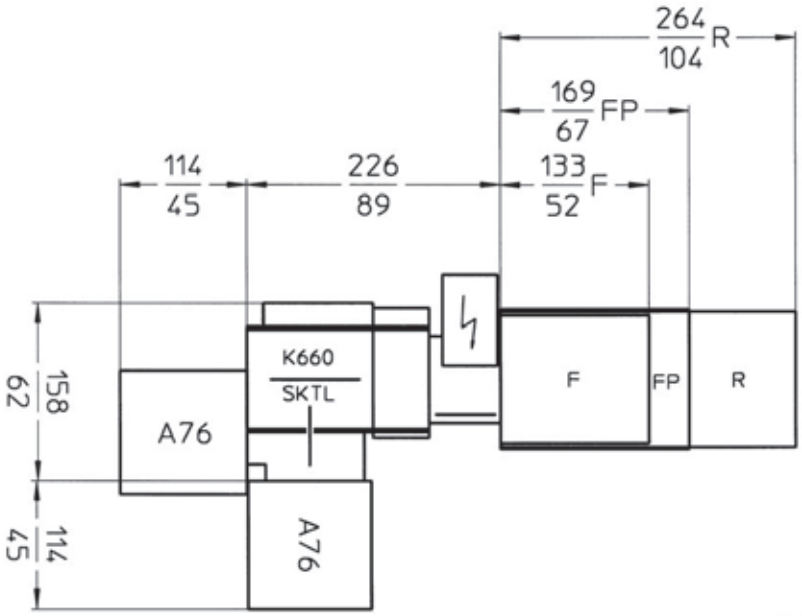
	10 - 180 m/min	10 - 180 m/min

1.3.4 Weights in kg

	Net/Gross	Net/Gross
Machine KL	1.200/1.600	1.200/1.600
Machine S-KTL	1.300/1.700	1.300/1.700

1.3.5 Floor plan

K 660



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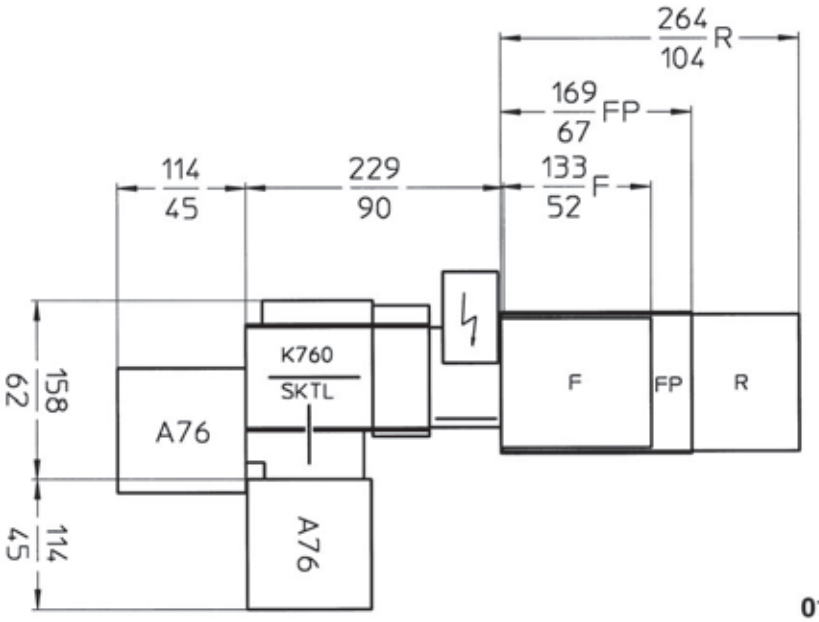
K 760



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1.4 Documentation:

Customer: _____

Machine configuration: _____

Machine-/Serial No.: _____

Electrical data: _____

Wiring diagram no.: _____

Folding unit: _____

Delivery: _____

Operating voltage (V/Hz): _____

Control voltage (V/A): _____

Control voltage (V/A): _____

Total rated current (A): _____

Fuse at power supply (A): _____

Conformity Certificate: _____

Noise level (dB/AI): _____

GS Certificate No.: _____

1.5 Supplementary Documents:

batch counter: _____

auxiliary units: _____

auxiliary units: _____

other manufacturers: _____

Spare parts lists machine: _____

delivery: _____

peripherical units: _____

other manufacturers: _____

Knife list: **TM 32/2**

1.6 User information/Description of functions

FOLDING MACHINE TO FOLD FLAT SHEETS

This folding machine is designed to fold flat sheets only. The folding of any other material should not be attempted. The manufacturer or supplier is not liable for any damage caused as a result.

Furthermore, the manufacturer would also not be liable for any malfunctions or damage of additional installations or alterations not delivered or installed by him.

The construction of your machine may differ from the photographs/diagrams in some details. However, this does not have any influence as to its safe operation. Since we are continuously working on further developments, we reserve the right to make alterations.

The production speed can be varied between 10 and 180 mtrs./min. However, the efficiency depends on the type of paper, size and type of fold, as well as to the different circumstances of the user that cannot be influenced by the manufacturer.

In order to provide the operator with a general understanding of the machine functions the following descriptions cover the machine operation from the feeder onwards.

Please be advised that due to technical reasons, and for better understanding, **certain options have** already been described in the standard machine description.

The MBO Combination Folding Machine works exclusively in accordance with the principle of buckle folding as well as knife folding.

The basic machine consists of a combination of parallel fold, crossfold and threefold units with feeder, register table and stream delivery.

The parallel unit consists of 4 or 6 buckle plates with swing deflectors, spiral fold rollers which can be adjusted through quick setting elements, and quickly removable slitter shafts with plug bearings.

The K 660 and K 760 are available in two versions:

KL version: The crossfold and threefold units (left) consist of transport tapes, electronically controlled knife and two fold rollers, each with adjustable sheet stop. Solid and quickly removable slitter shafts at the crossfold unit are standard equipment, however, and optional at the threefold unit.

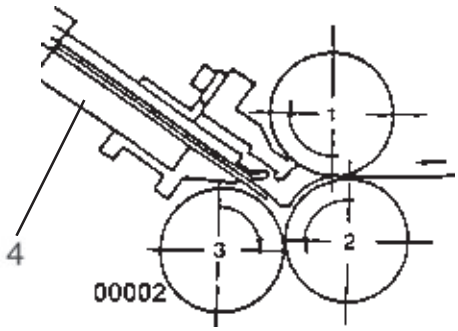
S-KTL version: The crossfold unit consists of transport tapes, an electronically controlled knife, five fold rollers and a buckle plate for various types of folds parallel to the crossfold. Solid and quickly removable slitter shafts through plug bearings are standard. The threefold unit consists of transport tapes, an electronically controlled knife and two fold rollers. Solid and quickly removable slitter shafts through plug bearings are optional.

1.7 Buckle fold:

The principle of buckle fold is that the sheet is always pushed into the buckle plate.

Three foldrollers and one buckle plate are necessary to prepare a buckle fold. Foldrollers **1** and **2** carry the sheet into the buckle plate **4** to the sheet stop.

A buckle occurs during transporation through these foldrollers to the direction of foldrollers **2** and **3** by which the sheet is folded through its passage.

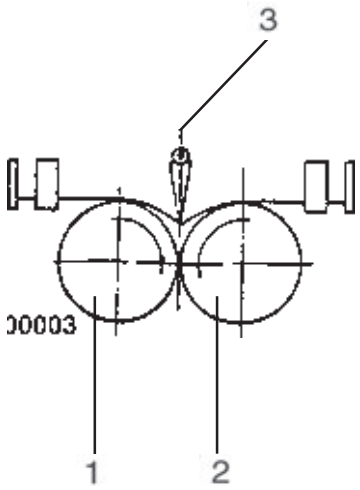


1.8 Knife fold:

Two foldrollers **1** and **2** as well as one knife **3** are necessary to prepare a knife fold.

The sheet is transported under the knife to a sheet stop and aligned.

After the knife has been released it moves the sheet between the foldrollers where it is folded during its passage



2.0 BASIC SAFETY INSTRUCTIONS

2.1 Warnings and symbols

The following designations respectively signs are used for very special instructions

>NOTICE< Special instructions with respect to the economical use of the machine.

>ATTENTION< Special instructions and requirements to avoid injuries and damage.

>DANGER< Instructions and requirements to prevent personal injuries or extensive damage.

2.2 Safety at working place - destined use of the folding machine

2.2.1 MBO folding machines correspond to their stipulated Safety Technical Requirement at the time of their shipment. Therefore, any moveable and rotating parts are covered with protective hoods and are mechanically and electrically interlocked to such an extent as to not unreasonably detract from the operation.

Only one-person operation (unfavourable machine view at drive side)

2.2.2 At all safety technical preventions it is extremely important that the operating personnel achieves sufficient safety experience and is advised of all dangerous sources. The use of the delivery does not exclude danger to life and limb of the operator or third parties, respectively does not exclude the detraction of the machine and any other material assets.

2.2.3 The machine should only be operated when in good working order. Any malfunctions which may impair the safety must be removed immediately by trained personnel or the manufacturer/supplier.

2.2.4 The folding machine is designed to fold flat sheets only. Folding of any other material should not be attempted. The manufacturer or supplier would not be liable for any damage caused as a result.

2.2.5 Carefully read the complete Operating Manual before you operate the machine, including the Safety and Service Requirements.

2.2.6 The Operating Manual should be kept with the machine at all times.

2.2.7 Complete the Operating Manual, if necessary with internal Safety Instructions as well as with the legal Regulations for Prevention of Accidents.

2.2.8 If more than one operator, ensure that all operators are trained and informed.

2.2.9 Never remove guards or safety interlocks as the machine will no longer be protected.

2.2.10 **>DANGER<** Never use any tools which are not in a perfect condition and make sure that no tools are left on the machine after completion of settings and maintenance. Tools which fall into the machine may cause serious injuries and damage.

2.2.11 Note that all Safety Instructions are kept in a legible and visible condition.

2.2.12 Any audible and visible change on the machine in relation to the safety must be reported to the supervisor or manager of your company immediately.

2.2.13 The operating personnel should be aware that loose clothing, jewellery or hair can cause serious injuries if caught in the machine.

2.2.14 It is absolutely prohibited to clean rollers, eliminate malfunctions, or to undertake adjustments while the machine is on operation.

>DANGER< Always activate the **EMERGENCY-STOP button.**

2.2.15 Make sure that no other person starts the machine while you are working on it.

>DANGER< Always activate the **EMERGENCY-STOP button** or turn OFF the main switch.

2.2.16 Check all the machine stoppages prior to starting the machine. You should never switch on the machine without first checking that the machine is in good working order and that no other person is making adjustments.

2.2.17 Turn off the main switch and secure it, if necessary, with a lock if you are required to undertake extensive mechanical or electrical maintenance and repair work.

2.2.18 Never open the main or sub-control panel! Only authorized personnel should gain accesss to the electronic control cabinets as there are no user serviceable parts.

>DANGER< if control cabinet is open! All main terminals could be alive even though the main switch has been turned off.

2.2.19 Any damaged cables or electrical connections must be reported to the competent authorities of your company.

2.2.20 According to the latest Safety Regulations the machine must stop if one of the protective hoods is being opened. The hoods, also serving as protection and noise reduction, contain electric switches.

>DANGER< exists to life and limb if one of these switches is overbridged or removed.
A ”set-up” mode allows you to undertake certain adjustments while the protective hoods are open. This mode is briefly described under ”Operation”. **>DANGER<** also exists by moving or rotating machine parts. Only machines with electronic speed control are capable for the ” set-up mode ” while the protective hoods are opened. Machines with mechanical speed control can only be adjusted through the safety handwheel while the protective hoods are open. **>DANGER<** During the work with opened protective hoods make sure that they are completely open to avoid self-locking.

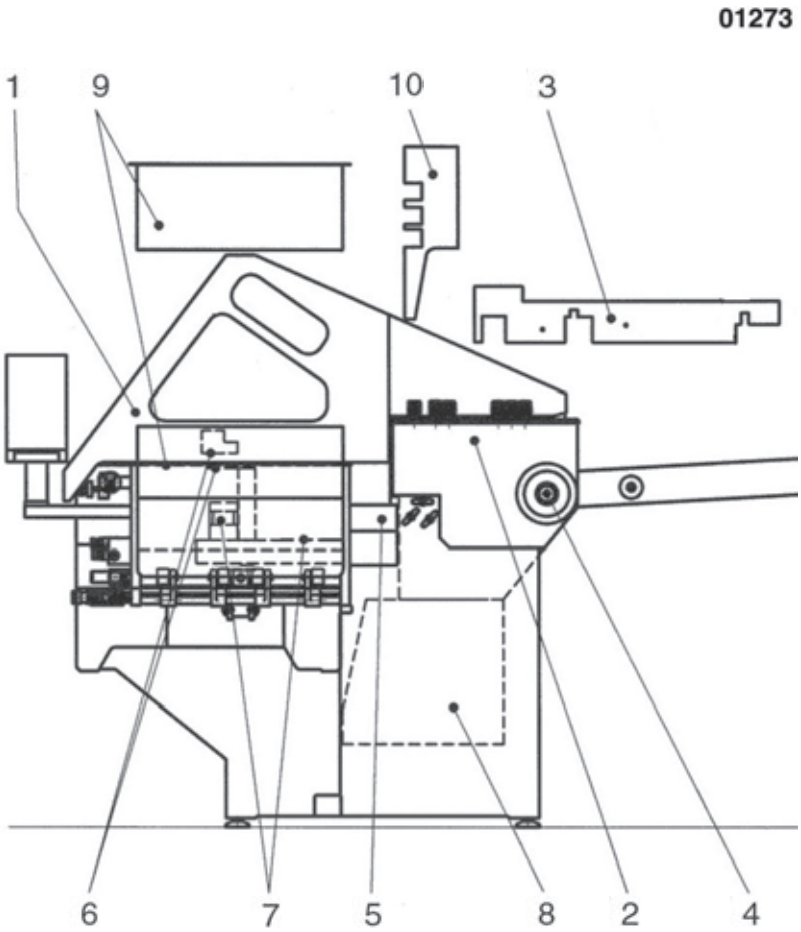
2.2.21 Machine connections must be installed in such a manner that no cables, tubes or hoses are left trailing.

2.3 Safety devices - machine

2.3.1 Machine / Check List

POS.	Designation	Function. - control	Visible control	Result	Remarks
1	Protective hood over the complete combi area				Electrically locked when hood is opened, no tipping mode
2	Protective hood over the parallel fold				At drive- and operator side
3	Protective hood over the drive of the register table and suction wheel				At drive side
4	Cap, hand wheel Protective sleeve behind hand wheel				At drive- and operator side
5	Protective hood over the knife drive at threefold unit				At operator side
6	2 protective hoods over the knife coupling at crossfold unit				
7	2 protective hoods over the knife drive at threefold unit				
8	Guard on drive combination part				
9	Belt guard at crossfold				
10	Belt guard				Drive side
	Date	**Name**			**Signature**

2.3.2 Chart for protection hoods of machine



3.0 Transportation / Erection / Installation

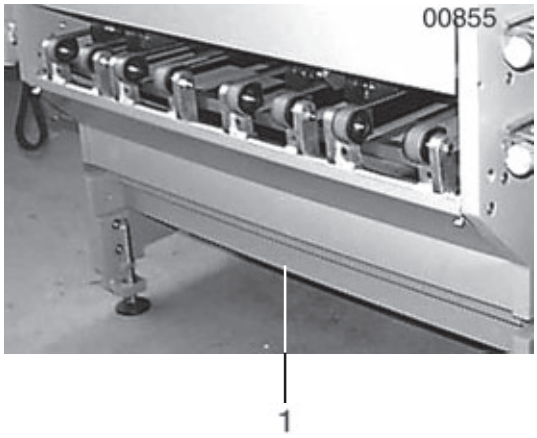
This part of the Operating Manual is directed to the competent service personnel and internal authorized personnel.

3.1 Transportation

3.1.1 Folding unit

The folding unit is delivered on a pallet. Carry the pallet as close as possible to its final position.

Unscrew the unit off the pallet and move it with a fork lift.Set fork lift onto the cross bars **1** to the final position.

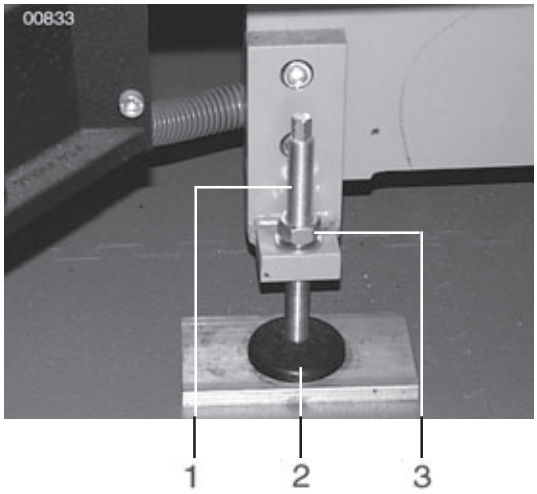


3.2 Erection/Installation of machine

3.2.1 Folding unit

Carry the folding unit to its final position.

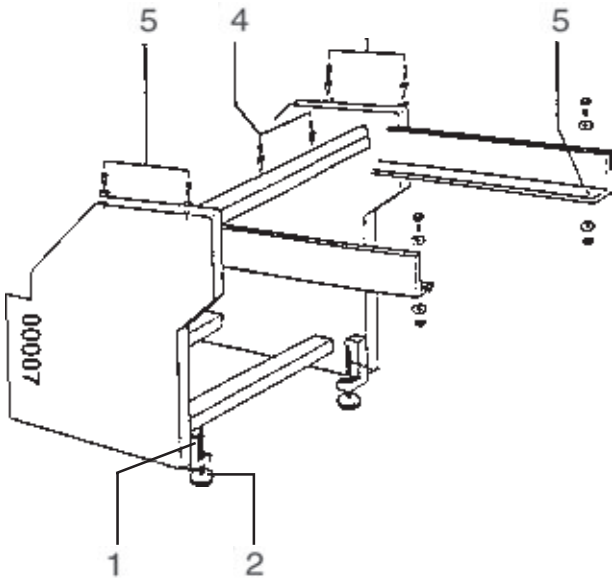
Place plastic feet **2** under the levelling screw **1** and adjust the folding unit by means of these leveling screws.



For <u>vertical alignment</u>:
Place spirit level onto the pins **5**.

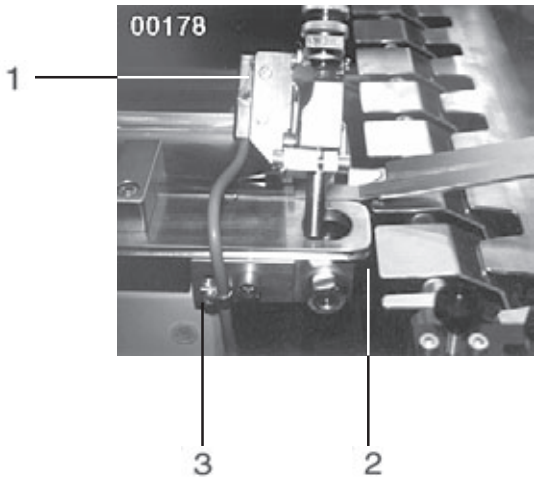
For <u>horizontal alignment</u>:
Use top foldroller **4**.

Refasten distance piece **1** individually with nut **3** after work has been completed.



3.2.2 Double sheet control

Attach the double sheet control **1** with screw **2** and the cable with screw **3**.



Attach all protective hoods!

Insert the buckle plates, place the guide rails on, place the slitters onto the slitter shafts, tension the transport tapes etc. All these works are described under the following paragraph „ Operation of the Machine“.

3.3 Electrical connection

>DANGER - MAY BE HAZARDOUS TO YOUR LIFE<
These works are only to be carried out by authorized or skilled personnel!

3.3.1 Installation of main control panel

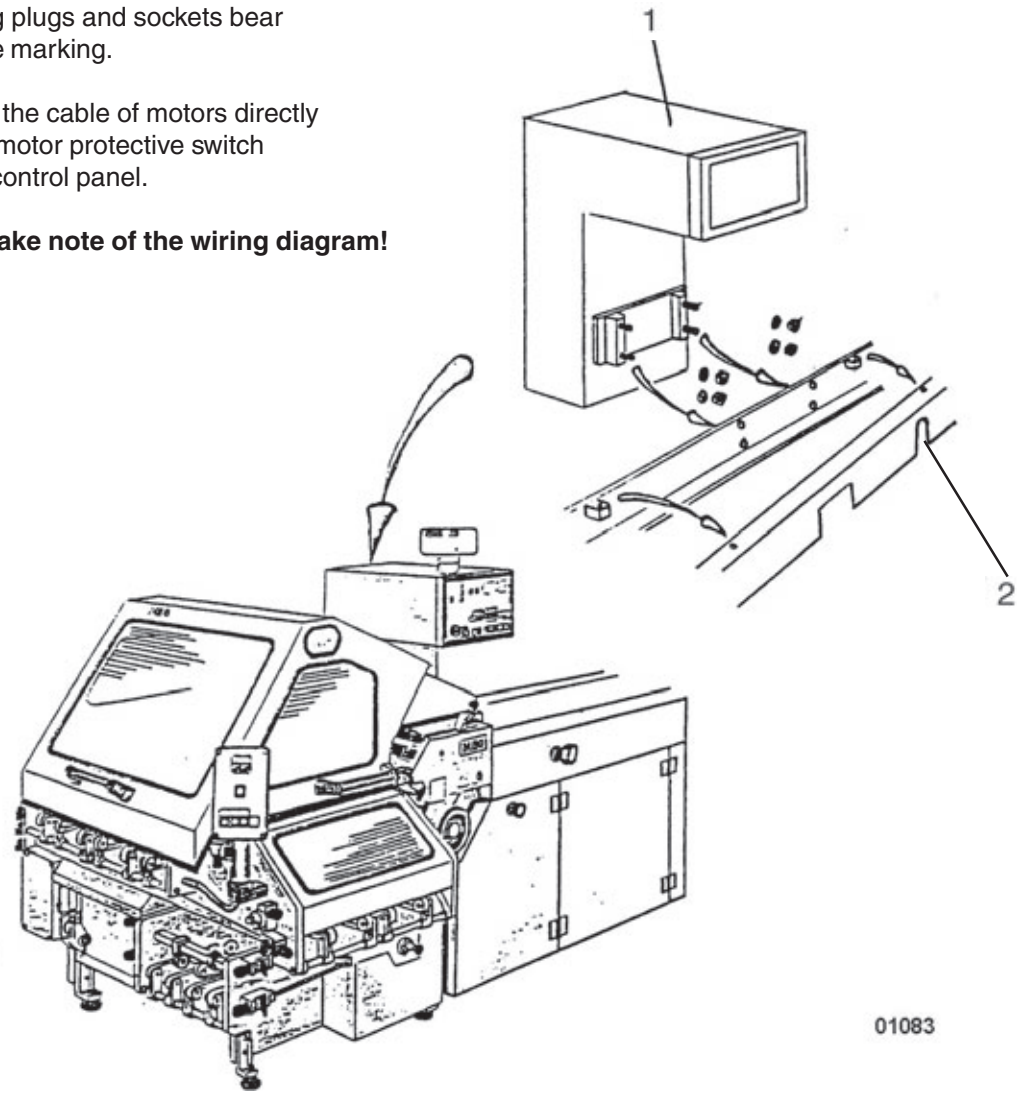
Fasten the main control panel **1** onto the side panel of the register table **2**.

Insert the plugs of machine and feeder into the corresponding sockets.

Matching plugs and sockets bear the same marking.

Connect the cable of motors directly with the motor protective switch at main control panel.

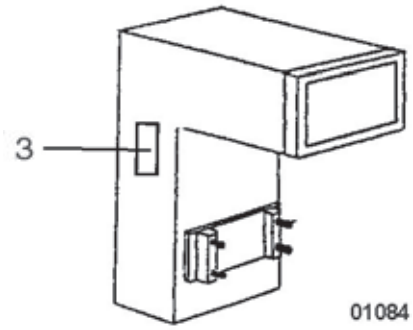
Please take note of the wiring diagram!



3.3.2 Main current connection

>DANGER - MAY BE HAZARDOUS TO YOUR LIFE<
These works are only to be carried out by authorized or skilled personnel!

>ATTENTION< Check whether the supply voltage and frequency correspond to the data indicated on the machine label **3**.



Enter the connecting cable from the base of the control panel, connect the wires to the main terminals provided and secure it with protective plates.
Please note wiring diagram!

>ATTENTION< Check clockwise rotating field!

>ATTENTION< Check the rotating field of the motors! If necessary, alter the terminal strip in the main control panel. **Turn the machine immediately OFF**, if the rotating field of the pile table does not correspond with the switch position at main control panel. In this case the final switch control is not properly functioning. This may cause essential damages to the feeder!

4.0 Maintenance

This part is directed to the competent service personnel or internal authorized personnel.

>DANGER< No cleanings nor maintenance works should be carried out unless the electrical supply is isolated. Always turn OFF the isolator on the control cabinet and secure it with a safety lock! If you manually turn the handwheel the foldrollers cannot be stopped by hand.

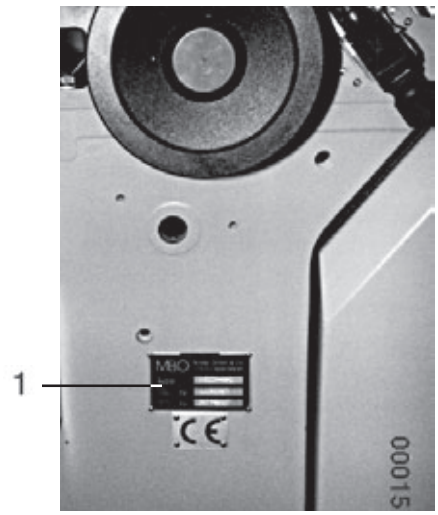
>NOTICE< The tensioning of the tapes for the foldrollers at parallel fold as well as for the crossfold drive for version KL occurs through self-tensioning elements. Rollers to center the tape running are marked red. Other drive belts should be checked monthly.

>DANGER< These as well as the following described work should be carried out by one person only! Danger of squeezing!

Procurement of spare parts

>ATTENTION< Only use the spare parts which are supplied or recommended by the manufacturer.

For inquiries and spare parts orders it is necessary to provide the machine and serial number, which may be read-off from the label **1**.



4.1 Exchange and / or tensioning of belts / tapes

4.1.1 Register belt at register table

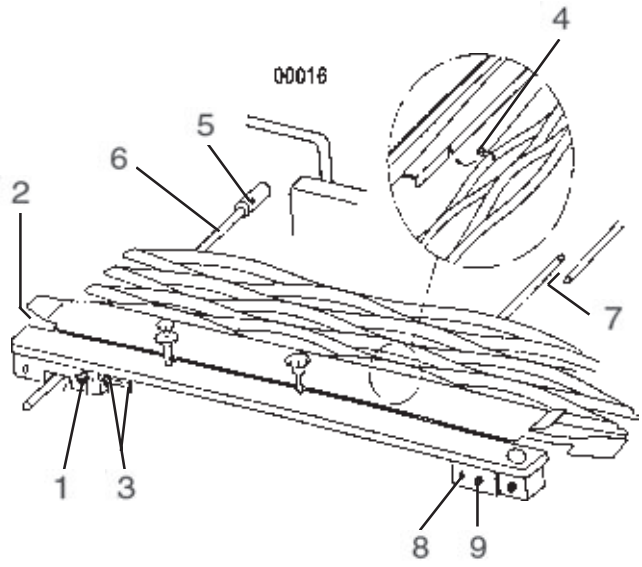
Exchange of register belt:
Loosen the screw **1** and release tension of register belt **2** through screws **3**. Unhinge the latticetype alignment table at **4**.

Loosen the screw **5** and remove rod **6**.
Take the register belt off the rollers and thread out at **7**.

Insert the new register belt in the opposite sequence.

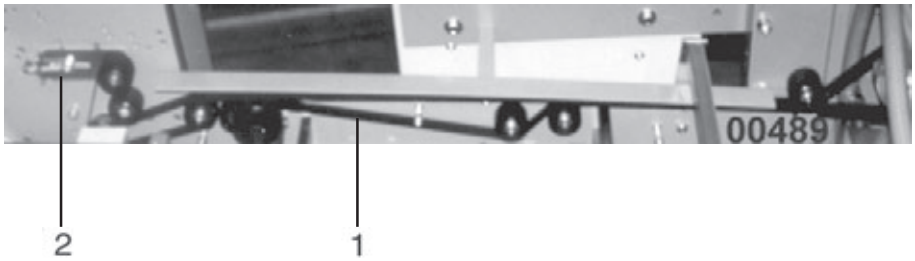
Adjust for centre running of the tape with screw **8**.

Prior thereto, loosen the screw **9** and retension after completion of work.
Screws **8** and **9** are located at the internal side!



4.1.2 Drive belt for the suction wheel

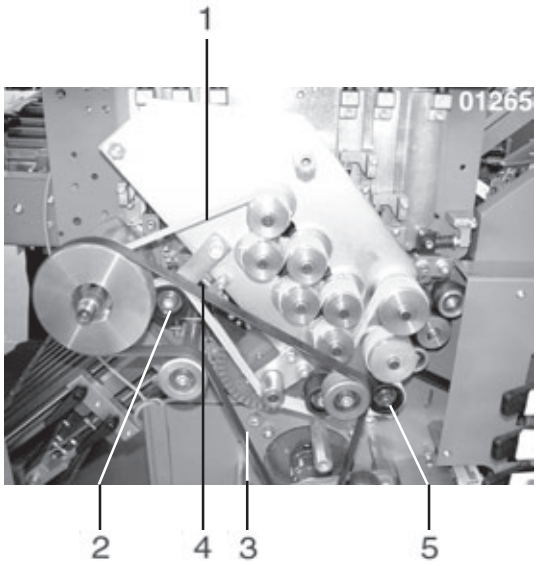
Put on the flat belt **1** for the drive of the suction wheel/Vacubelt and tension it with the tensioning roller **2**.



4.1.3 Drive tape for the fold rollers at the parallel unit

The drive tape **1** is automatically tensioned through the roller **2**. It is necessary to re-tension it through the screw **4** every 3 - 4 months.

Exchange of tape:
Release the tension of the tape **1** through the roller **2**, and remove the Poly-V belt **3**. Remove the drive tape **1** and put on a new drive tape.

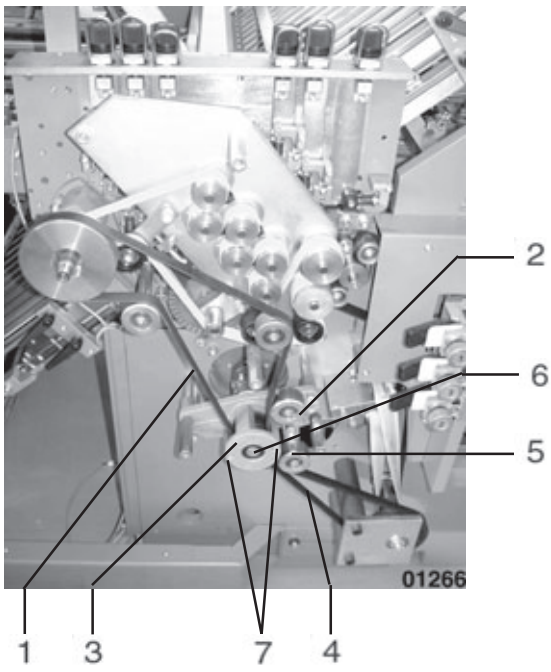


>ATTENTION< Centre the new tape for its centric running: the eccentric pulley **7** has been marked red.

4.1.4 Main drive (Version S-KTL)

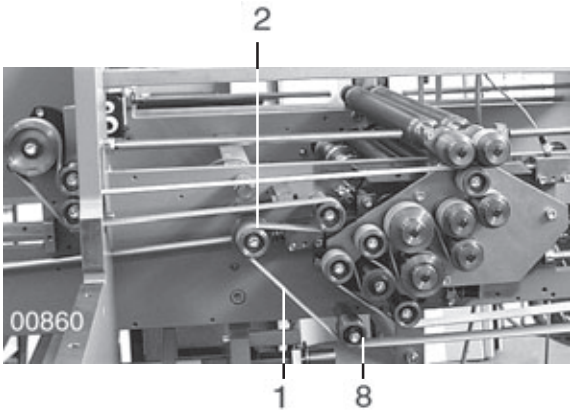
The Poly V-belt **1** for the drive of the parallel unit is automatically tensioned with the tensioning roller **2**. To exchange, unscrew the screw **6** and the screws **7** and remove the flange **3**.

The Poly V-belt **4** for the drive of the crossfold and threefold units is automatically tensioned with the tensioning roller **5**.

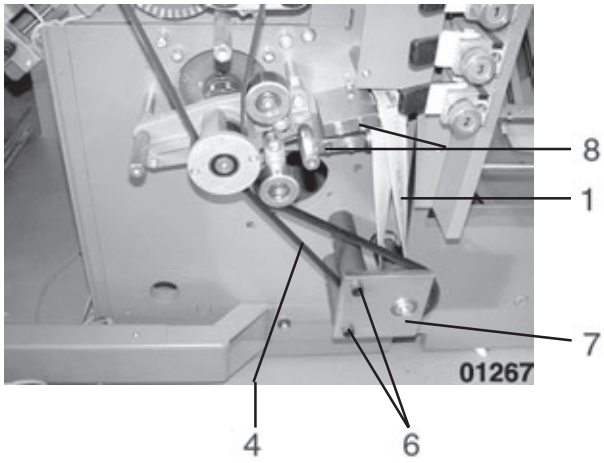


4.1.5 Drive of the fold rollers at the crossfold unit (S-KTL version)

Remove the protective hood under the parallel unit. The tape **1** is automatically tensioned by the tensioning roller **2**.
To exchange, release the tension of the belt through the tensioning roller **8**.



Re-tension the Poly-V belt **4** and remove the screws **6**, rotate the flange **7** and re-thread the tape **1**.



>ATTENTION< Centre the new tape for centric running: eccentric rollers **8** are marked red.

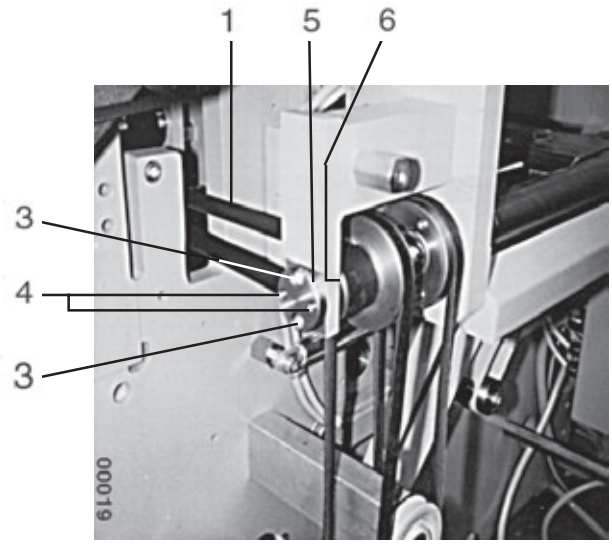
4.1.6 Drive of foldrollers at crossfold unit (Version KL)

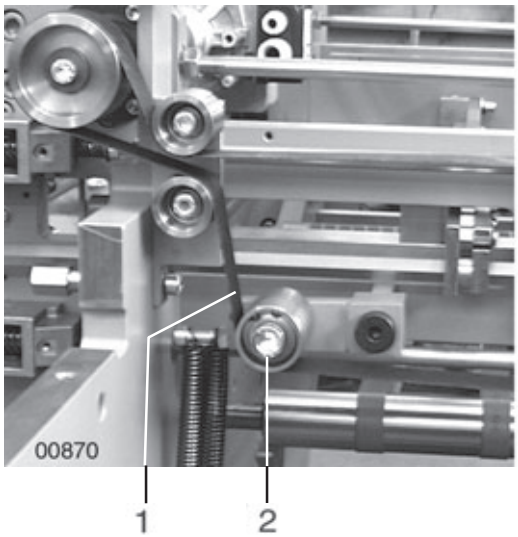
The drive tape **1** is automatically tensioned through the tensioning roller **2**.

Exchanging the tape:
remove protective plate under the parallel unit, release the tape **1** and remove the two screws **3**.

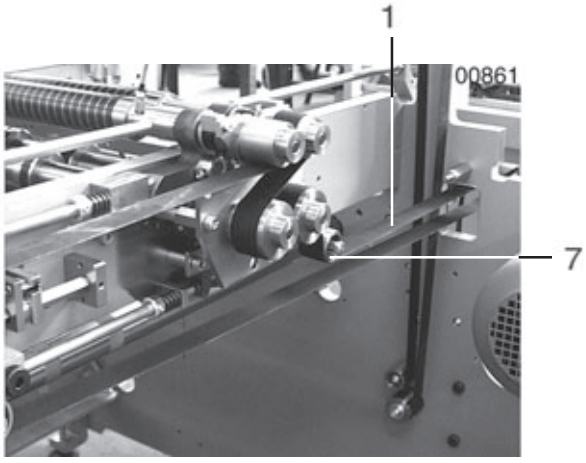
Insert into the threaded bore hole **4**, pull off the bearing bolt and re-thread the tape **1** at position **6**.

Put on the new tape and proceed in the opposite sequence.





>ATTENTION< Centre the newly installed tape **1** for centric running: use the eccentric roller **7**.
This tape roller is marked red.

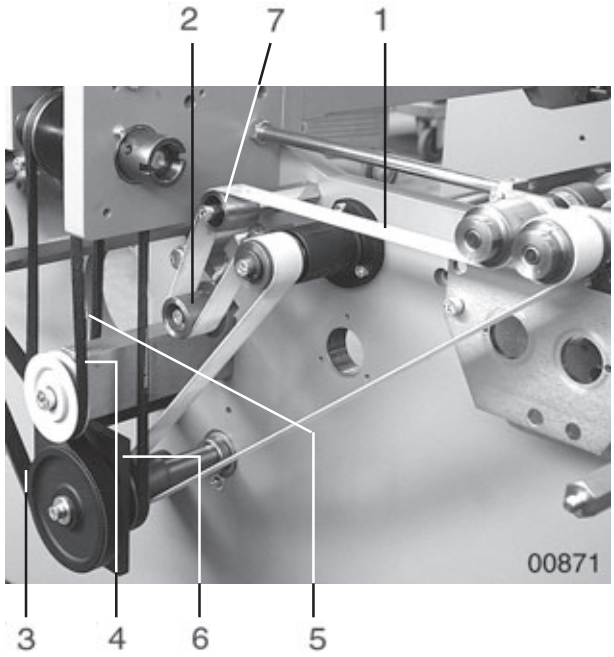


4.1.7 Drive for foldrollers at threefold unit (Version KL)

Tape **1** is tensioned with tensioning roller **2**.

Exchange of tape: Remove Poly V-belt **3** and release the tension of the V-belt **4** through screw **5**; remove two screws **6**. Swivel the plate **6** and re-thread the tape **1**.

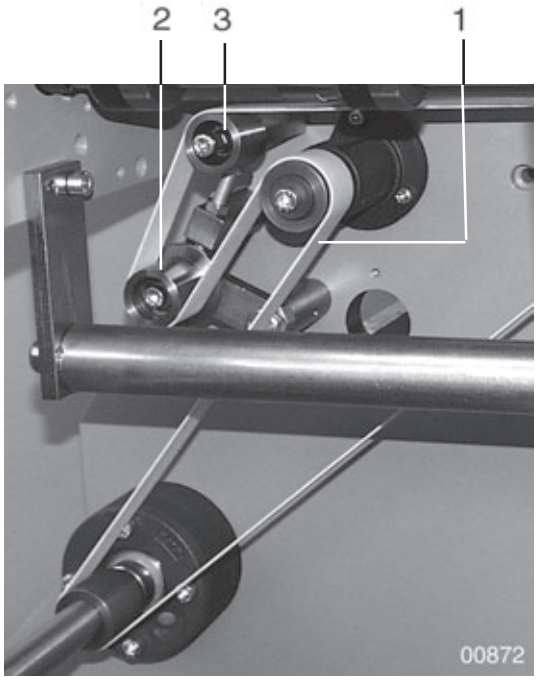
The installation occurs in the opposite sequence.



>ATTENTION<
Centre the new installed tape **1** for centric running: use excentric roller **7**. This roller is marked red.

4.1.8 Drive for foldrollers at threefold unit (Version S-KTL)

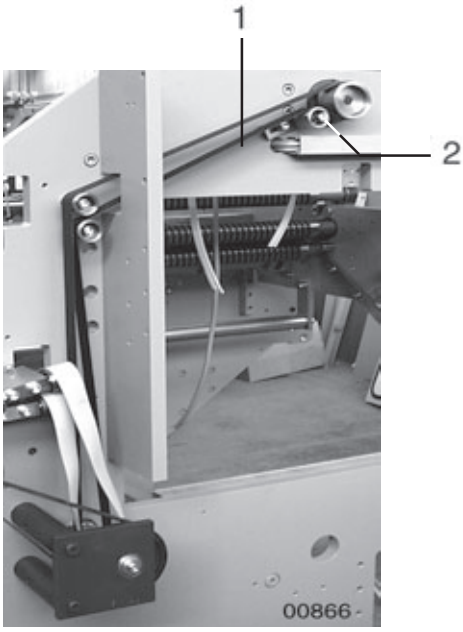
Take off the crossfold buckle plate and remove the protective hood below it. Tape **1** is tensioned with tensioning roller **2**.



>ATTENTION< After replacement of tape, centre the new tape for centric running through excenter rollers **3** (marked red).

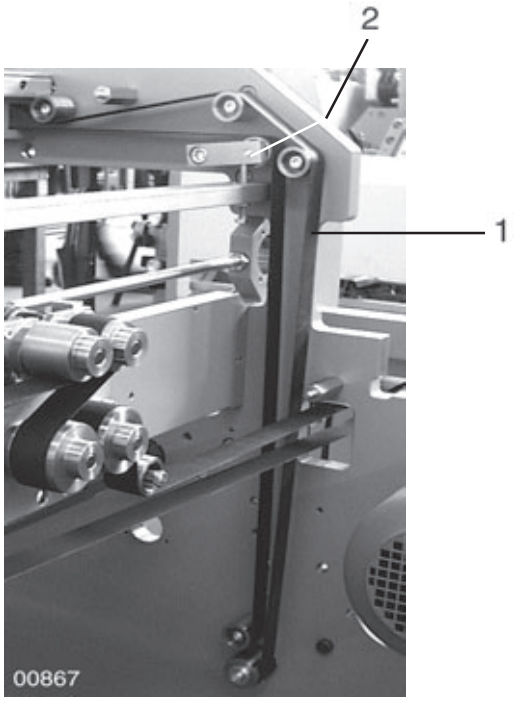
4.1.9 Drive of knife coupling for crossfold unit (Version S-KTL)

The Poly V-belt **1** for coupling is tensioned with tensioning roller **2**.



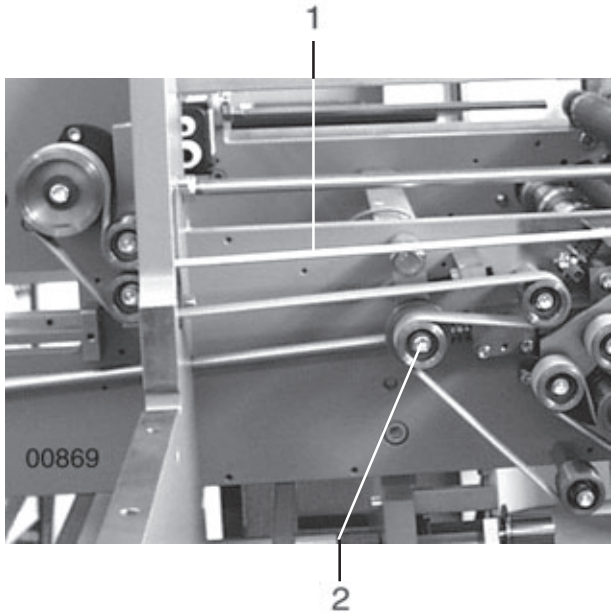
4.1.10 Drive of knife coupling for crossfold unit (Version KL)

The Poly V-belt **1** for coupling is tensioned with tensioning roller **2**.



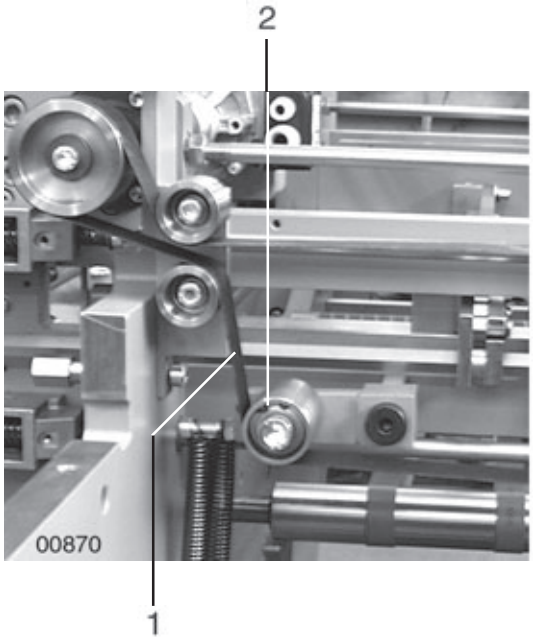
4.1.11 Drive of knife coupling for threefold unit (version S-KTL)

The Poly V-belt **1** for coupling is tensioned with tensioning roller **2**.



4.1.12 Drive for knife coupling threefold unit left (version KL)

The Poly V-belt **1** for the drive of coupling is automatically tensioned by the tensioning roller **2.**

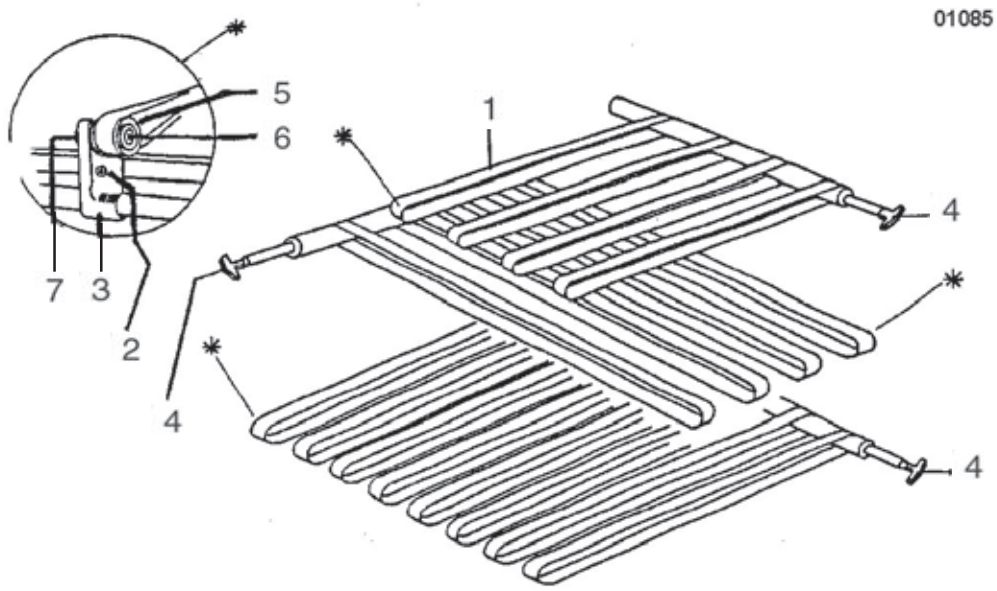


4.1.13 Transport tapes at cross- and threefold unit (8- and 16-page unit)

Retension all tapes **1** of one group through screw **2** at tensioning lever **3**.
Loosen the plug bearing **4** and pull it off, re-thread tapes.
The installation occurs in the opposite sequence.

>ATTENTION< Do not tension the tapes too tight, may damage the bearings!

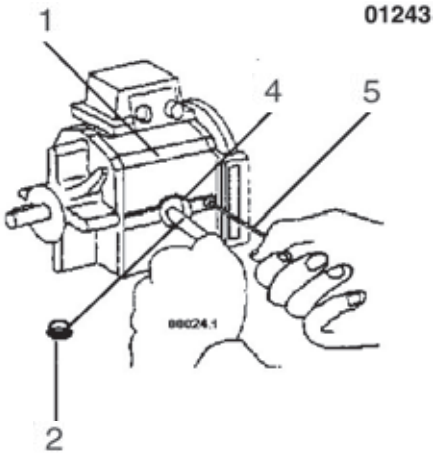
Centering of tape running: Loosen the nut **6**, turn the excenter through screw **7** to such and extend until tape is running in center.



4.2 Setting of gap at knife couplings

How to set the desired gap
of combi box **1** without dismantling:
remove both dummy plugs **2**
also at rear side and
loosen both counter nuts **3**.

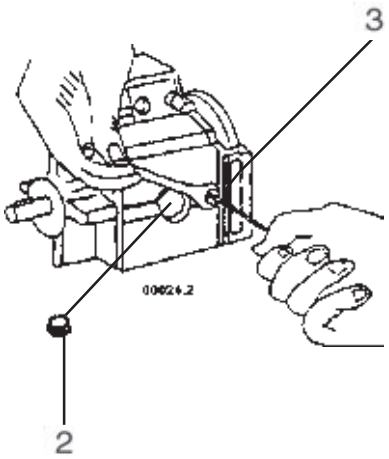
Place feeler gauge between rotor
and anchor **4**. Insert screws **5**
until the desired gap of 0.15 - 0.20 mm
has been reached.



Check: desired gap must be absolutely equal at both sides!

Retension counter nuts **3**.
Make sure that screws are not distorted!
Replace dummy plug **2**.

Your attention is drawn to the attached
Operating Manual of the manufacturer.

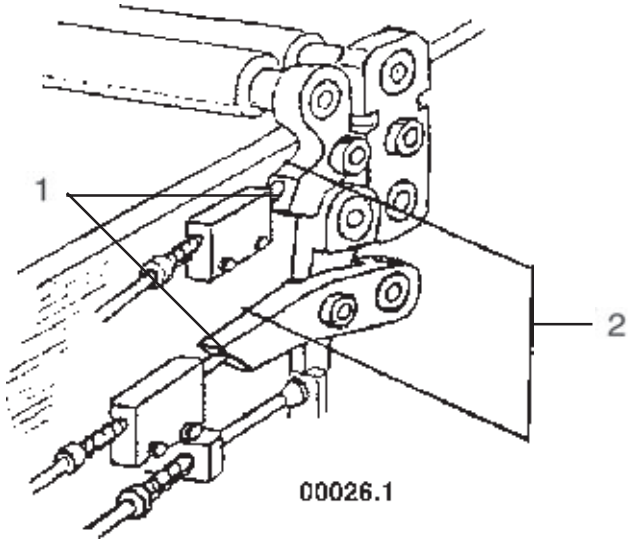


4.3 Lubrication / Cleaning

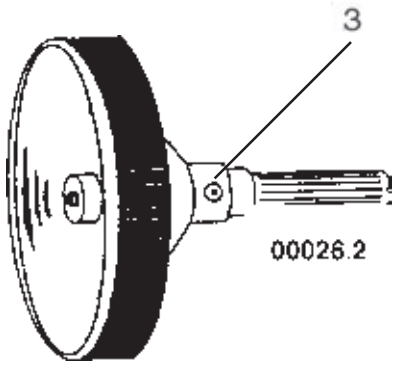
>NOTICE< Generally, the machine should be cleaned after each job, particularly moveable parts which have been changed due to change of sheet size, because heavy dust may cause reduction of function.

4.3.1 Main machine

All folding units:
Provide the guides of pressure bars **1** for foldrollers and slitter shafts as well as between the machine frame and bearing lever **2** with a slight touch of oil monthly.

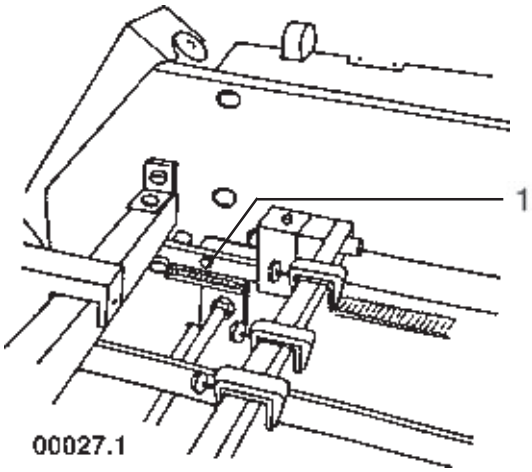


Lubricate the nipples of safety handwheels **3** occasionally.



4.3.2 Sheet stop at crossfold unit

Clean off the guide rails of the sheet stop **1** to ensure a perfect condition of the sheet stop.



4.3.3 Cleaning of foldrollers

>DANGER< Foldrollers should be cleaned **only** if the machine is not in motion!
Push the **EMERGENCY STOP button** and/or turn OFF the main switch.
Ensure that the machine cannot be restarted!

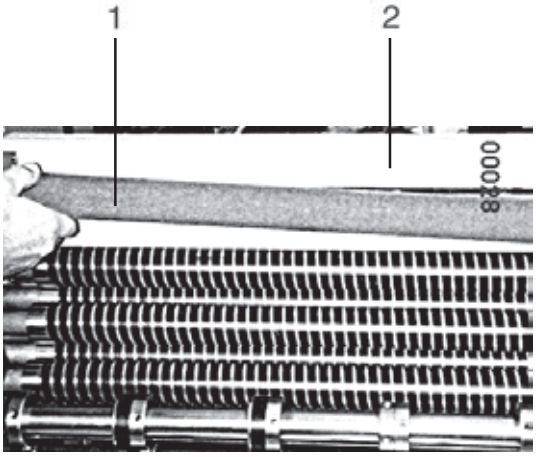
>NOTICE< Depending on the extent of ink build-up, the foldrollers must be cleaned from time to time. The affect of printing powder or ink build-up on the foldrollers may decrease the quality of the folding. The foldrollers must be cleaned with a cleansing agent suitable for synthetic material. Please contact your machine supplier. Improper cleaner may cause decomposure or swelling of the foldroller coating.

MBO the manufacturer of this folding machine recommends a cleaning material for the foldrollers made by VARN, bearing the no. VARN-Wash VM 111 or VWM. Our recommendation is on a label near the foldrollers. The VARN company is a worldwide supplier for the printing industry. Therefore, it cannot be excluded that in certain other countries different indications are used. Please take the individual order no. from the technical data sheets of VARN.

>DANGER< No chemical aggressive cleaner must be used. Protective gloves should be worn while you are cleaning. Protect yourself against splashes or contact with the cleaning material with uncovered parts of your body. Dispose of the soiled cleaning material in the correct manner (environmentally friendly). Consider the flammability of the cleansing agent.
Make sure if any residual danger could eventually exist. Check the technical data sheet from the cleansing agent manufacturer.

>DANGER< It is absolutely imperative to clean the HIGH-GRIP fold rollers only with linens by using the washing agent **VARN-WASH VM 111** or **VWM** by VARN. Make sure to apply only a slight pressure onto the fold rollers

4.3.4 Cleaning roller



The cleaning roller **1** under the flap **2** is stripping off the powder of the upper foldroller.

Depending on the level of pollution you should take-off this cleaning roller and clean it. Make sure that powder deposits under the flap **2** are being extracted!

>DANGER<
It may cause you bodily harm!
Turn OFF the machine!

4.3.5 Maintenance Report

This page may be attached to the Maintenance and Check Lits with the machine, whereby all items described under para. 4.3 should be considered!

Working cycle	Interval	Date	Signature
Guides for pressure bars (4.3.1)	monthly		
Bearing levers (4.3.1)	monthly		
Guides for pressure bars (4.3.1)	monthly		
Bearing levers (4.3.1)	monthly		
Guides for pressure bars (4.3.1)	monthly		
Bearing levers (4.3.1)	monthly		

5.0 Register table

5.1 Ball rail

Set the sidelay **1** through the knurled grip **2** to 1/2 of sheet width at mm-scale.
Fine adjustments should be made through knurled grip **3**.

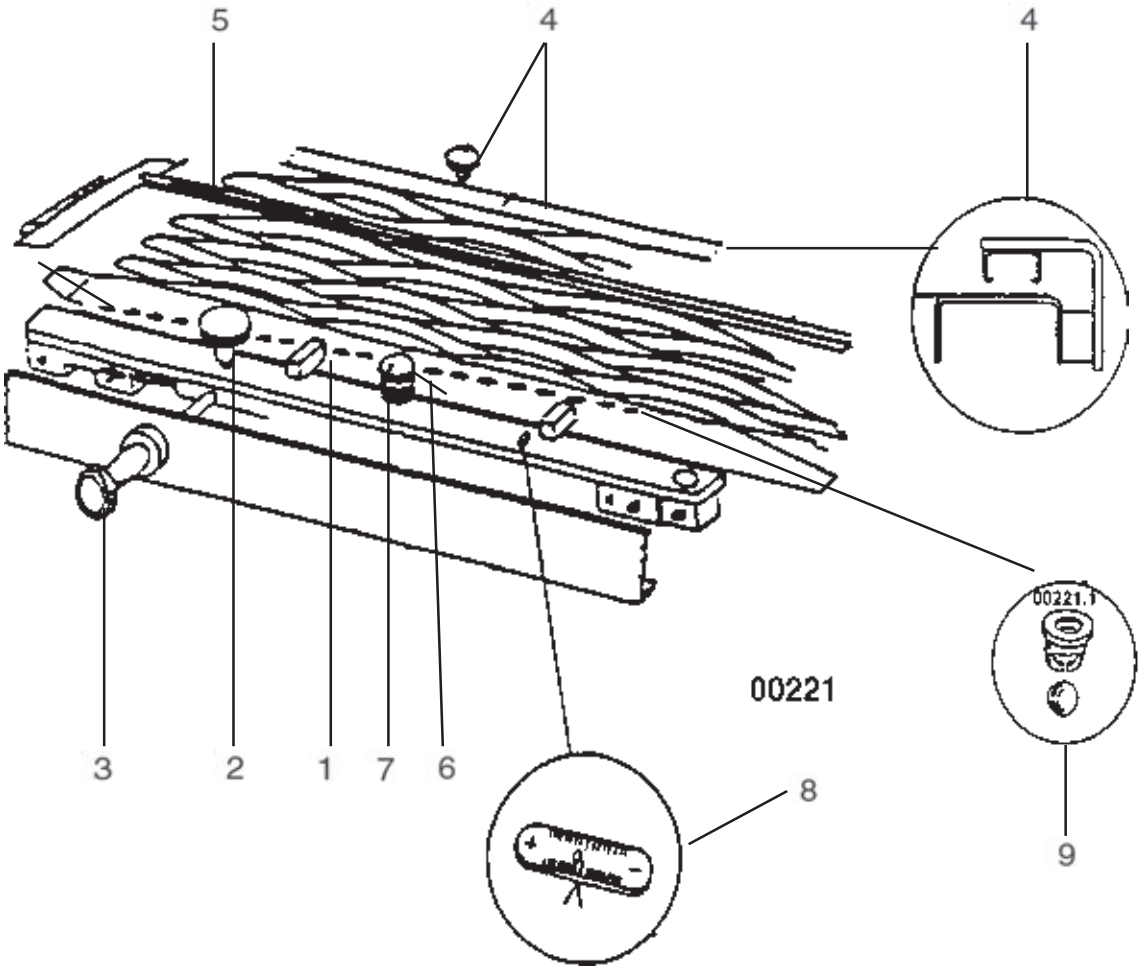
Set the guide plate as well as the rail **4** above it so as to control the outside edge of the transported sheet.

Depending on the sheet width you may add additional smoother bars **5**.

The angle of the sidelay to the foldrollers may be adjusted as follows:
loosen the knurled screw **6,** make your settings at cam **7**;
values may be read-off at setting indicator **8**.

The use of balls in the rail **9** depend on the quality of paper. Please bear in mind:
Light paper sheets = use plastic balls
Heavy paper sheets = use steel balls (or plastic and steel balls mixed)

Lesser balls are required if you run standard sheets. Oblong and very heavy sheets require more balls. The first three holes (at infeed) should be equipped with steel balls to ensure a safe transfer of the sheets.



5.1.1 Double sheet control

Press the lever **1** and insert a single paper strip (of the running paper) to the gap **2** between the bolt **3** and the knurled screw **4**.

(Machine running) Insert a double paper strip under the segment **5**. Turn the knurled screw **4** until the segment **5** has switched and tighten the knurled nut **6** after the adjustment of the double sheet control has been completed.

If you check with a single paper strip the machine must continue to run.

Please note that the double sheet control stops only the sheet infeed, but not the machine !

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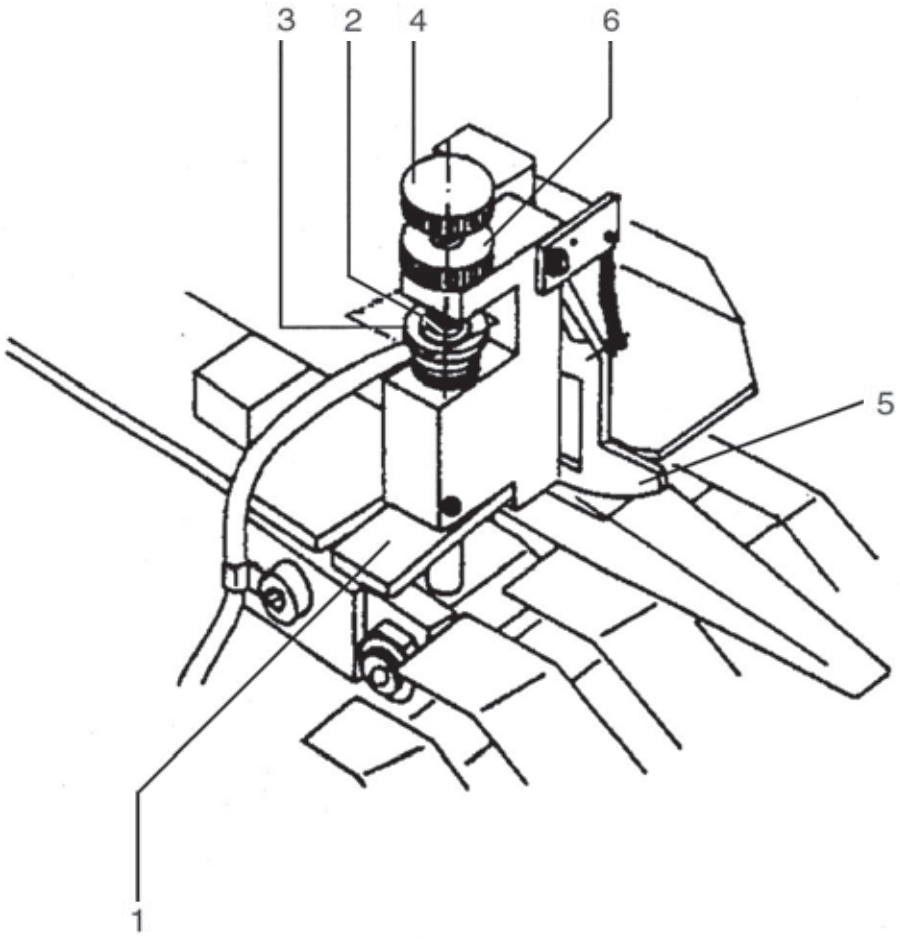


5.2 Sheet infeed control

5.2.1 Learning of suction length and sheet monitoring

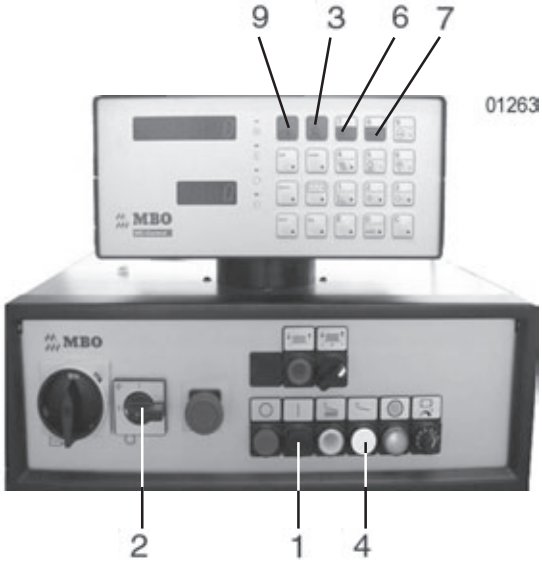
START the machine **1** and
turn ON the pump **2**.

Learning of suction length:
Keep the button SUCTION LENGTH **3** pushed and activate the SINGLE SHEET **4** button. A „ learning „ sheet is entered with a basic suction length.

It is measured by the photocell **5** whereby 1/3 of the sheet length is automatically determined.

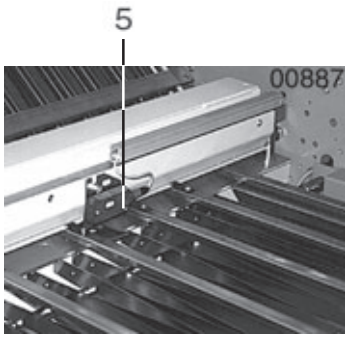
If necessary, you may increase or decrease the suction length by pushing the buttons **3** and **6** (**+**) or **3** and **7** (**-**) simultaneously.

Adjust the machine.
Set photocell **8** above the sheet exit.



Calibrate sheet monitoring:
Keep the button SHEET GAP **9** pushed and activate the SINGLE SHEET **4** button.

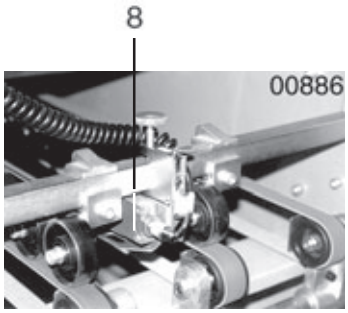
All photocells are calibrated by one „learning“ sheet, so that the machine will turn off at paper jams and other mal-functions.



The (minimum) **sheet gap** is determined for 2 cm.

If necessary, increase sheet gap as follows: Push buttons SHEET GAP **9** and **6** (**+**).

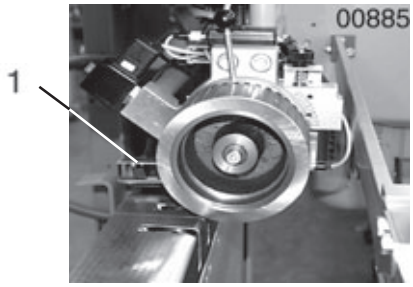
Sheet gaps of more than 2 cm may be reduced with buttons **9** and **7 (-).**



Please also consider the attached Operating Manual „MC“.

5.2.2 Photocells

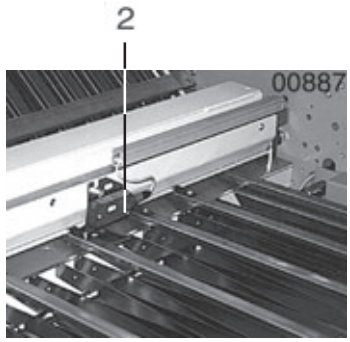
1 Controls the sheet infeed at suction wheel and counts the infeed sheets.



2 Controls the infeed of parallel section and calculates the sheet or suction length.

3 Controls the exit of parallel section and activates the crossfold knife.

4 Controls the exit of crossfold section and activates the threefold knife.

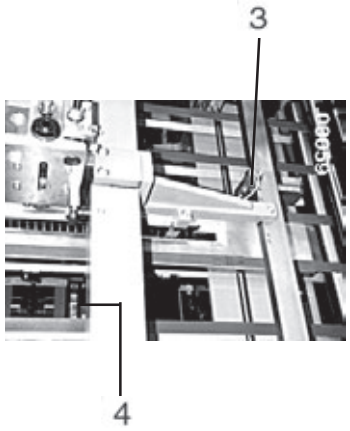


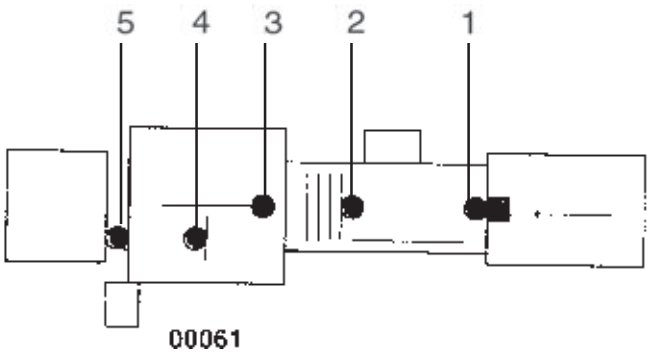
5 Controls the exit of the machine or transfer to the subsequent unit and counts the exit sheets. **Always place photocell 5 at the exit.**

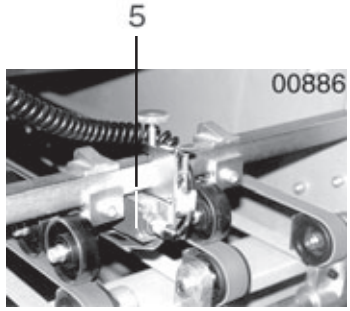
The photocells will stop the machine, if a sheet

a) is not exactly passing **1**, **2**, or **3** at the time calculated, or

b) the sheet is passing **1 - 5** longer than calculated





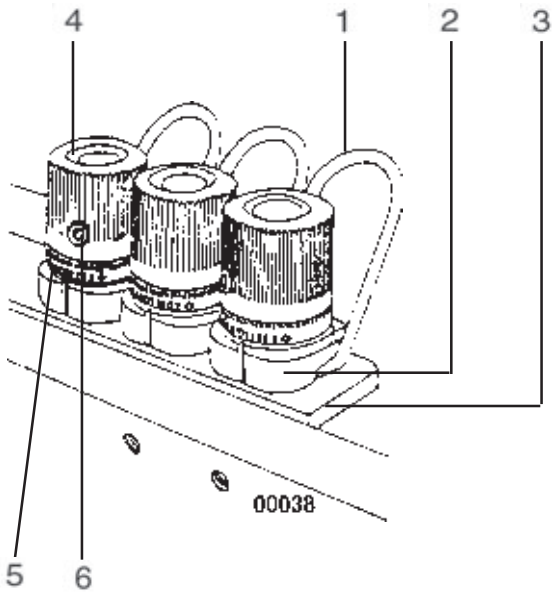


5.3 Parallel folding unit

5.3.1 Setting of foldrollers and slitter shafts

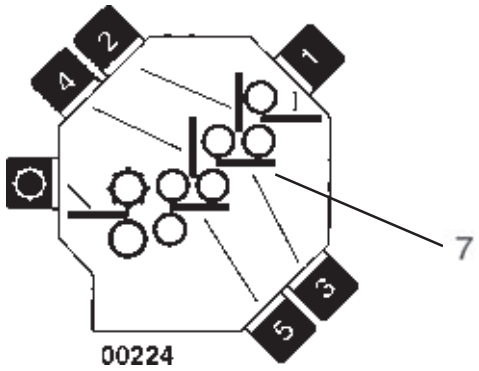
>DANGER< Never carry out foldroller settings while machine is still running! Machine must be turned OFF! Use EMERGENCY-STOP switch! Even manual foldroller settings by the handwheel may cause injuries by the foldrollers.

Press the lever **1** and insert a paper strip (of the running paper) between the pressure plate **2** and the counter pressure plate **3**. Check with a paper strip whether it goes through the foldrollers.



Turn the handwheel and adjust the pressure at both sides of the foldroller through the adjustment knob **4**,i.e.
<u>if you turn clockwise (+)</u>
= pressure on foldrollers becomes less
<u>if you turn counter-clockwise</u> (-)
= pressure on foldrollers has increased

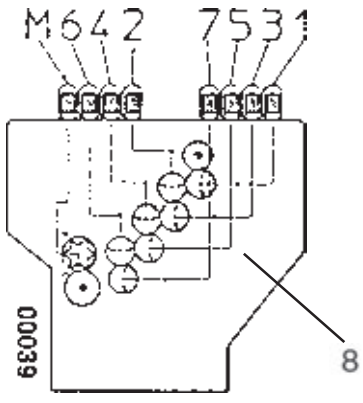
Set the adjusting ring **5** into 0-position in order to enable a quick readjustment of the foldrollers into their original position. Secure with screw **6** to prevent ditsortion; do not over-tighten the nut!



Depending on the type of fold, thickness and quantity of sheets, insert paper strip between pressure plate **2** and angle **3**.

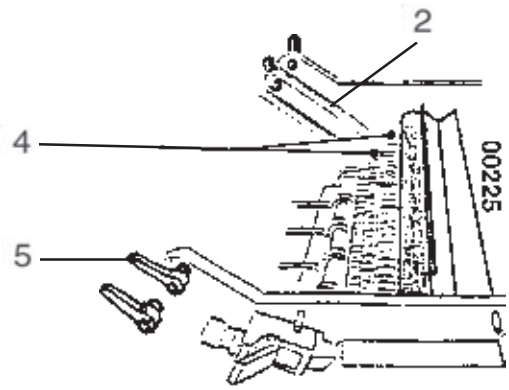
Read para. 6.0 for setting instructions of the most important parallel folds.

The diagrams **7** (for folding unit I) and **8** (for folding units II - IV) on the machine's side panel represent the fold rollers and setting elements.

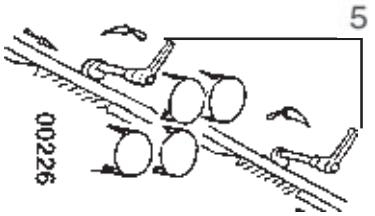


5.3.2 Buckle plates

Insert the buckle plates **1** into the lateral support rails **2**. The buckle plate (or deflector) will bump with their stop screw **3** against the stop bolt **4** in its deepest (basic) position. Lock buckle plates on both sides with clamping lever **5**.



>NOTICE< Make sure that the buckle plates are pushed against the foldrollers and rest on the stop bolts **4**.

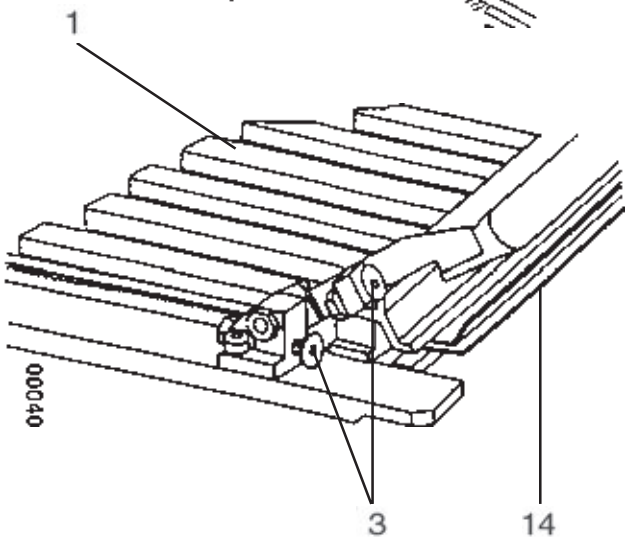


Setting of folding length: Loosen metal knurled screw **6** and adjust with adjustment ring **7**. The necessary size can be read-off at toothed belt with mm-indicator **8** and red indicator **9**.

Change of stop angle **10**:
When folding out-of-square sheets loosen plastic knurled screw **11** and turn the frontal adjustment ring **12**. The O-position is shown by two marks on the adjustment rings.

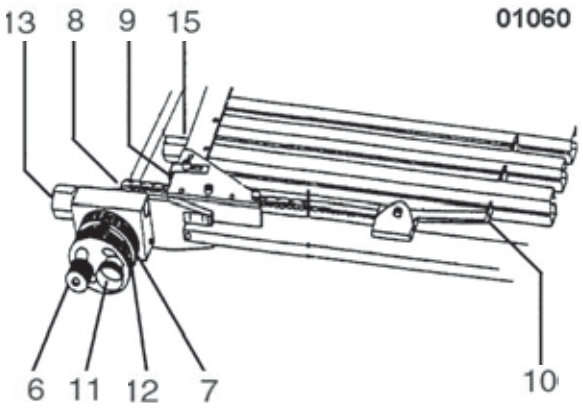
Twist screw **13** for fine adjustments.

How to change the lower plate lip **14** :
Turn hexagon nuts **15 simultaneously at both sides**: Basic adjustment = consider 0-markings **16**.

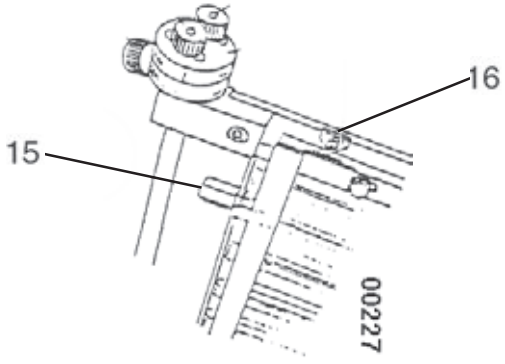


Heavy papers:
remove the lower plate lip **14** off the foldrollers.

Thin papers:
move the lower plate lip **14** to the foldrollers.

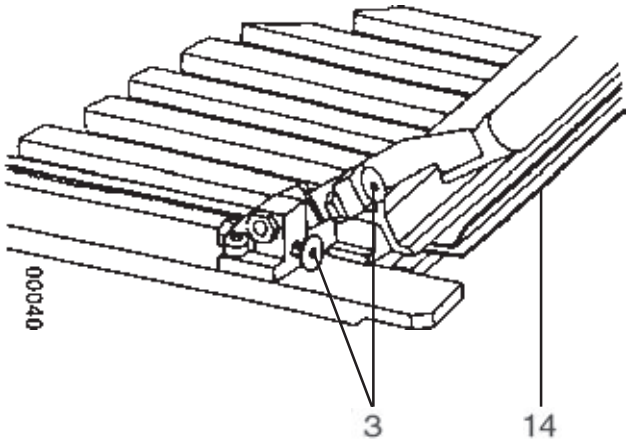


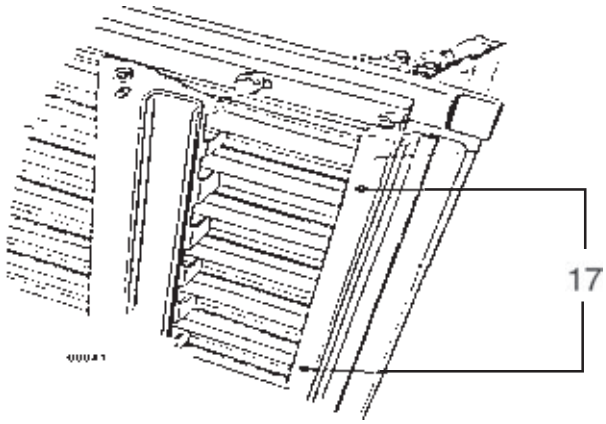
Continuation



Continuation

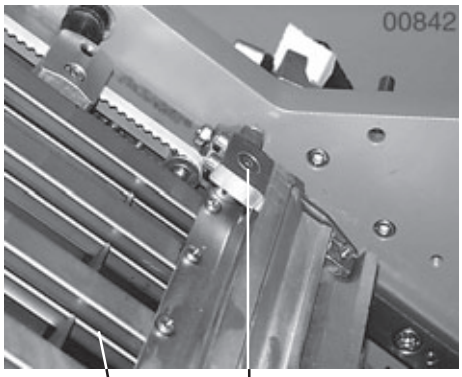
Pretensioning of lower plate lip **14**:
In case you have unsteady perforations, dog-ears or slightly bowed folding lines (paper tensionings) you should proceed as follows:
Insert both screws **17** simultaneously.
Eventually extend the inner width.





Inner width: The inner width of the buckle plate must eventually be changed for certain thicknesses of the product. (Distance between the upper and lower buckle rails **1**): Clockwise turning of the screws **2** = increase of inner width
Counter-clockwise turning of the screws **2** = decrease of inner width,

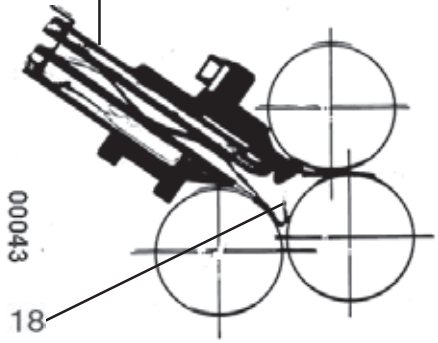
Make sure that screws 2 are turned simultaneously



Change of folding space **18**:
Insert strips of cartons or multiple paper strips between **3** and **4**.

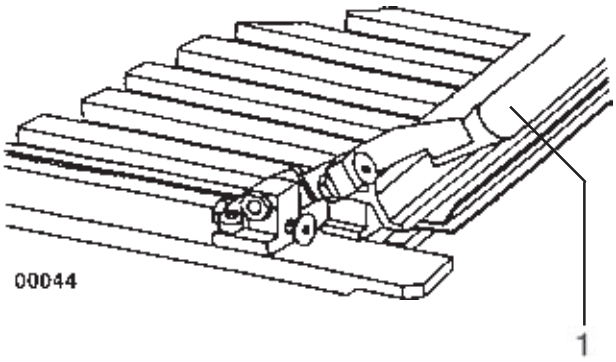
>Danger< This work is to be carried out only while the machine is OFF operation. Danger of injuries.

>ATTENTION< Never alter or displace stop screws **3**! It may cause damages to the buckle plates or foldrollers!

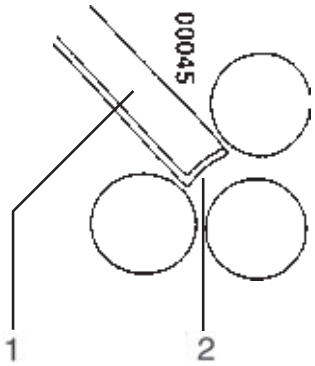


5.3.3 Sheet deflectors

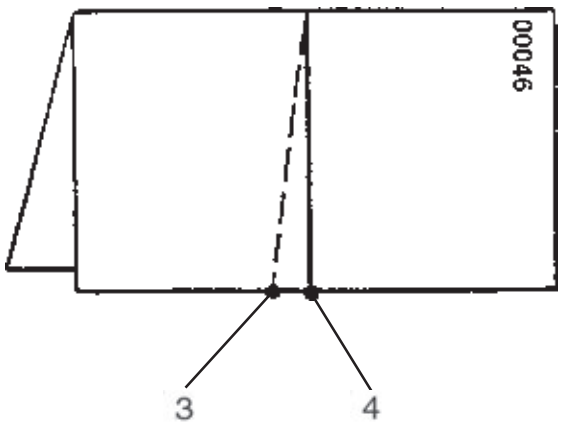
Buckle plates which are not used should be pulled out and the deflector be shifted **1**.
Replace the buckle plates and tighten them with the clamping levers.



Heavy or multiple folded sheets may require an increase of the folding space **2**, for this purpose remove the deflector a little bit.

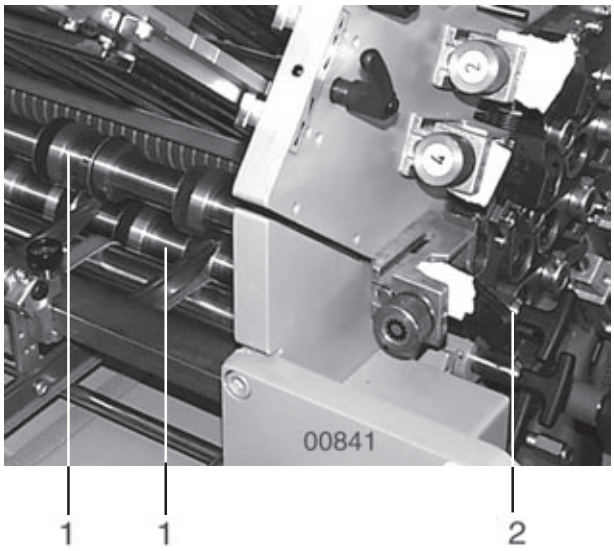


Crooked perforations **3**, scoring or cutting may be straightened out **4** by pulling out the last deflector at one side.



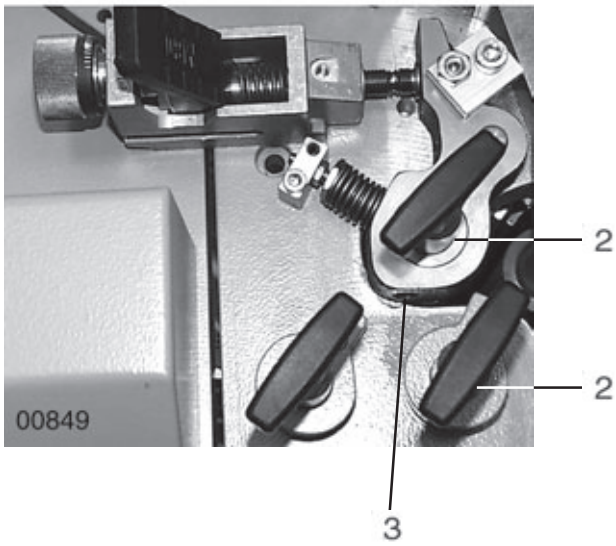
5.3.4 Slitter shafts

Each folding unit is equipped with two slitter shafts **1** to enable the insertion of tools for perforation, scoring or cutting.



They can easily be mounted and removed by plug bearings **2**.
For that purpose loosen the screw **3** and pull out the plug bearing **2**.
Keep the slitter shafts!

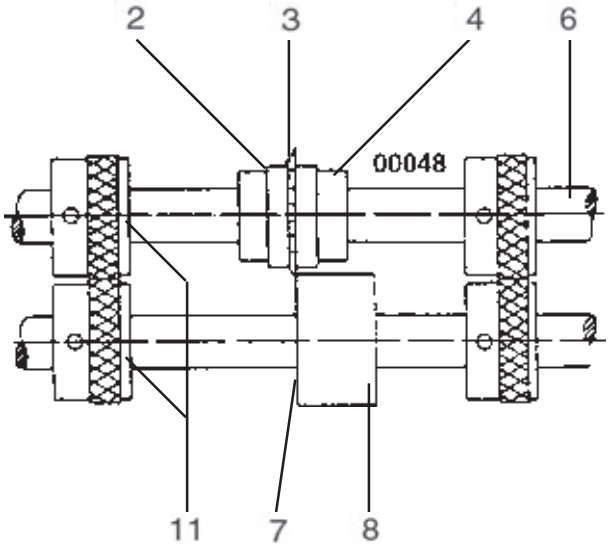
When installing them, proceed in the opposite sequence.
When locking the screw **3** make sure that plug bearing **2** is pushed against the slitter shaft **1**.
Avoid any end play !



5.3.5 Perforating

To avoid creasing you perforate crossfolds at „head“. However, perforating at „spine“ should only be made when perfect binding!

Loosen with hooked wrench **1** nut **2**. Insert perforating knife **3** into knife holder **4**; some knives are slotted **5**. The slitter shaft **6** does not have to be removed.



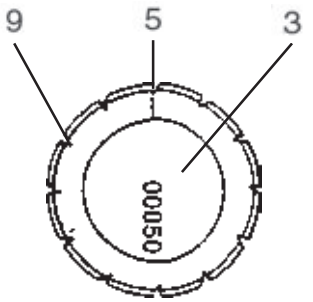
Installation of perforating knife **3**: The straight side of the knife must be adjacent to the grinded side **7** of the counter knife **8**. It must enter with the obtuse angle **9** first into the sheet. You avoid jam-up of sheets. In addition thereto use stripper **10**.

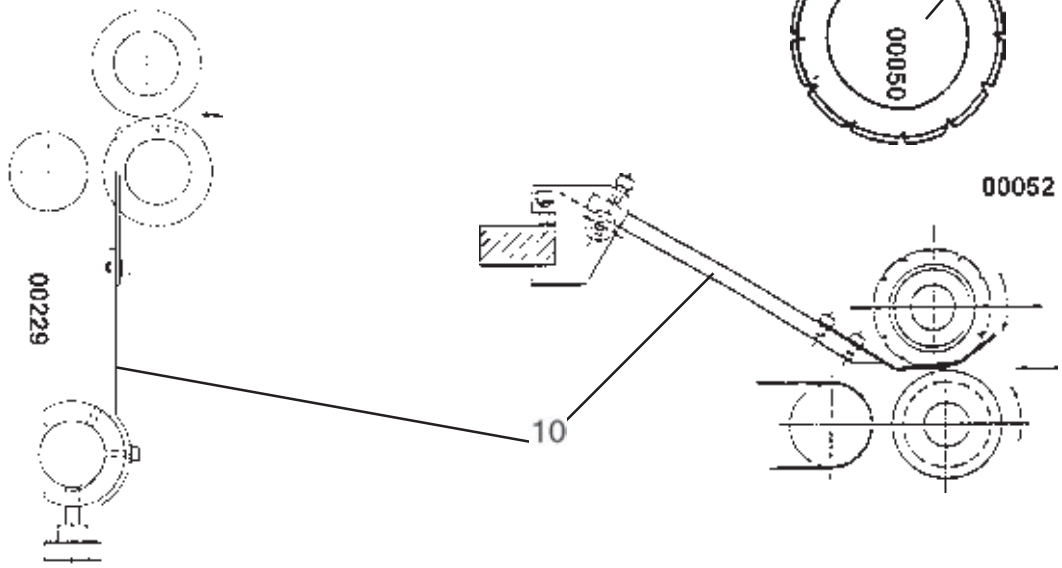
>ATTENTION< When you install the knife holder **4** make sure that you turn the nut **2** counter-clockwise. Wrong installation will cause opening while the machine is running!

Use sufficient transport rollers **11** for exact sheet transportation.

>NOTICE< Please bear in mind that you require different perforating knives for certain types of papers.

It is absolutely imperative that you consider the attached Knive List **TM 32/2.**

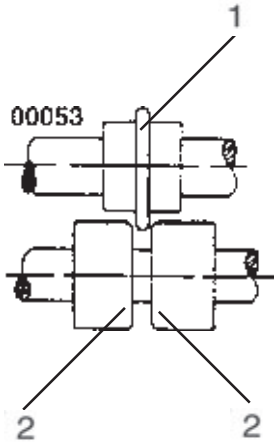




5.3.6 Scoring

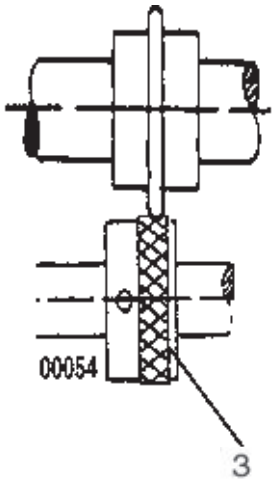
>NOTICE< Basically, crossfolds with buckle plate (KTL version) should be pre-scored if you shouldn‘t perforate! Without scoring it is not ensured that the fold will always be in the desired place.

The scoring blade **1** is placed between two transport rollers or between the smoothed sides of two counter blades **2**.



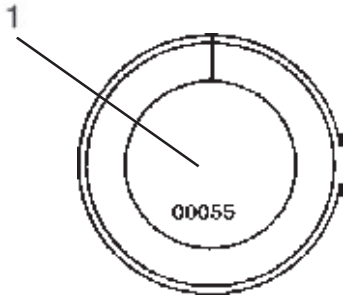
When running pulp board sheets you should score on the rubber part of the transport roller **3**.
For this purpose use a scoring knife with a smaller outer diametre!

Special scoring devices may also be used upon request.



5.3.7 Cutting

For separation of multiple-up production you should use one (or multiple) knives **1**.
The installation occurs in the same way as perforating knife.

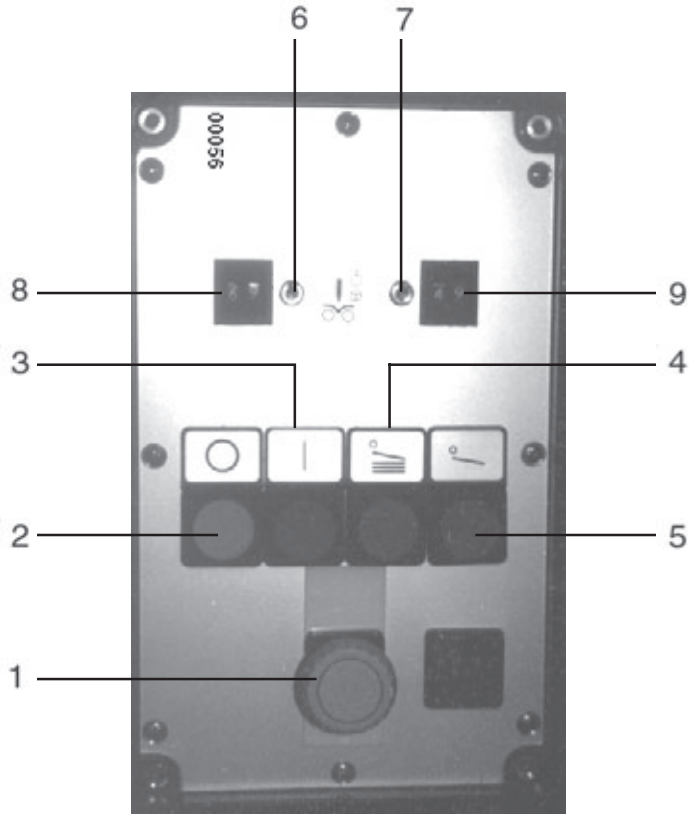


5.4 Crossfold and threefold section

5.4.1 Manual Operating Terminal MC (Standard)

The following description deals with the standard machine control "MC". If your machine is equipped with the optional Micro-Processor-Control MPC you will find its description in the attached Operating Manual "MPC".

1 Red mushroom button with locking for EMERGENCY STOP
2 Button machine STOP
3 Button machine START
4 Button SHEET INFEED during production
5 Button SINGLE SHEET INFEED during set-up
6 Toggle switch crossfold Top position: production ON
Middle position: OFF (during set-up works or works without corresponding knife
Bottom position: Activation of one knife impulse only during set-up works by shortly tipping downward. Thereafter, switch upward.
7 Toggle switch threefold (as **6**)
8 Decadic switch crossfold
9 Decadic switch threefold

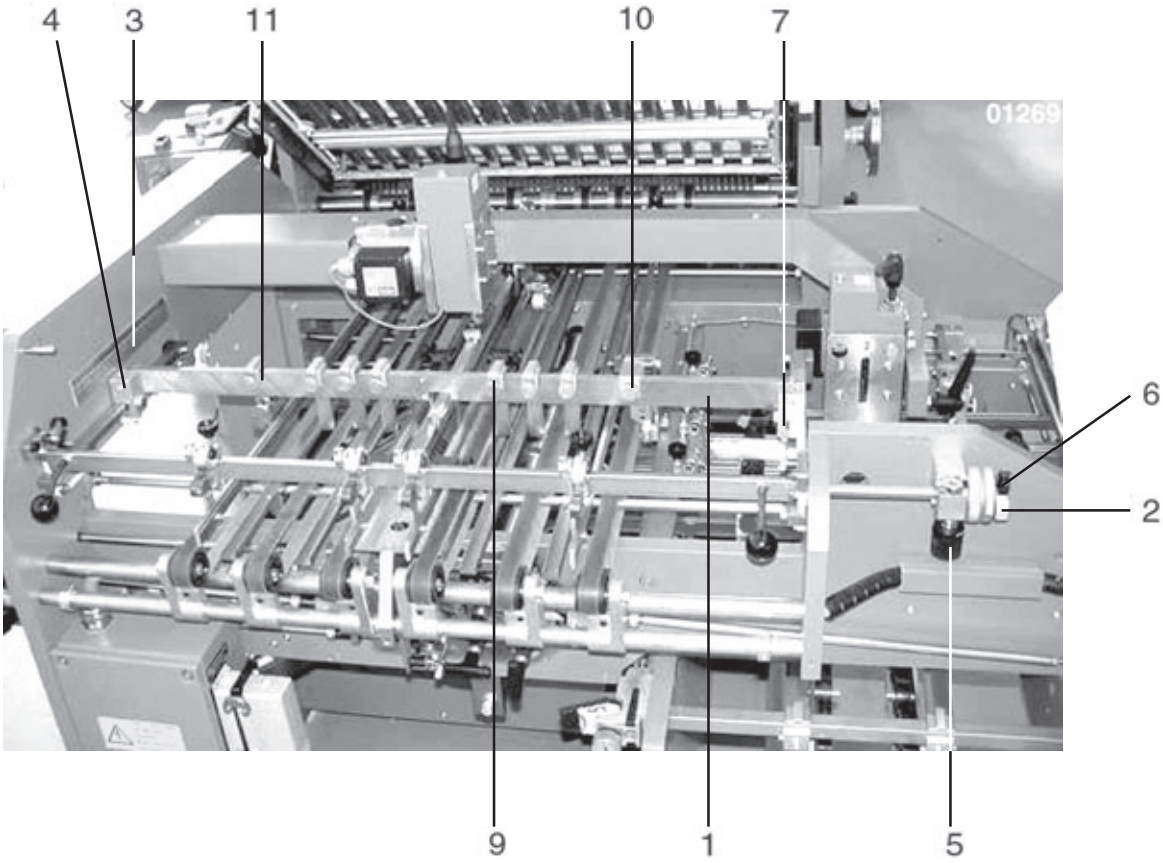


5.4.2 Sheet transportation at cross- and threefold section

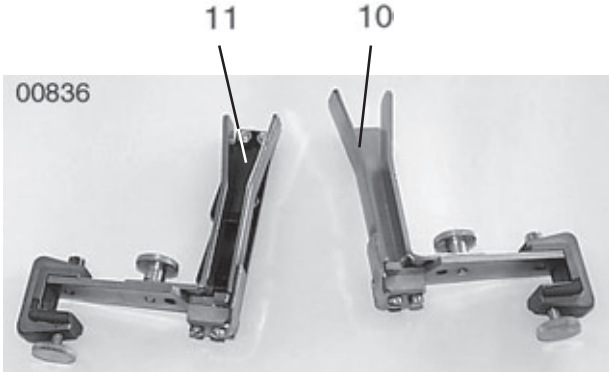
Set the crossfold sheet stop **1** with central adjustment **2** to 1/2 of the oncoming sheet.
Values may be read-off at scale **3** and red marking **4**. Proceed with fine **5** and angle adjustment **6** as with buckle plate. Crossfold sheet stop **1** is locked with screws **7** if heavy sheets are processed.

Move the sheet to the crossfold sheet stop.

Insert sufficient stop fingers **9**. Place the solid sidelay **10** to the edge of sheet.
Move the spring sidelay **11** with a light pressure to the opposite edge of sheet.



Continuation

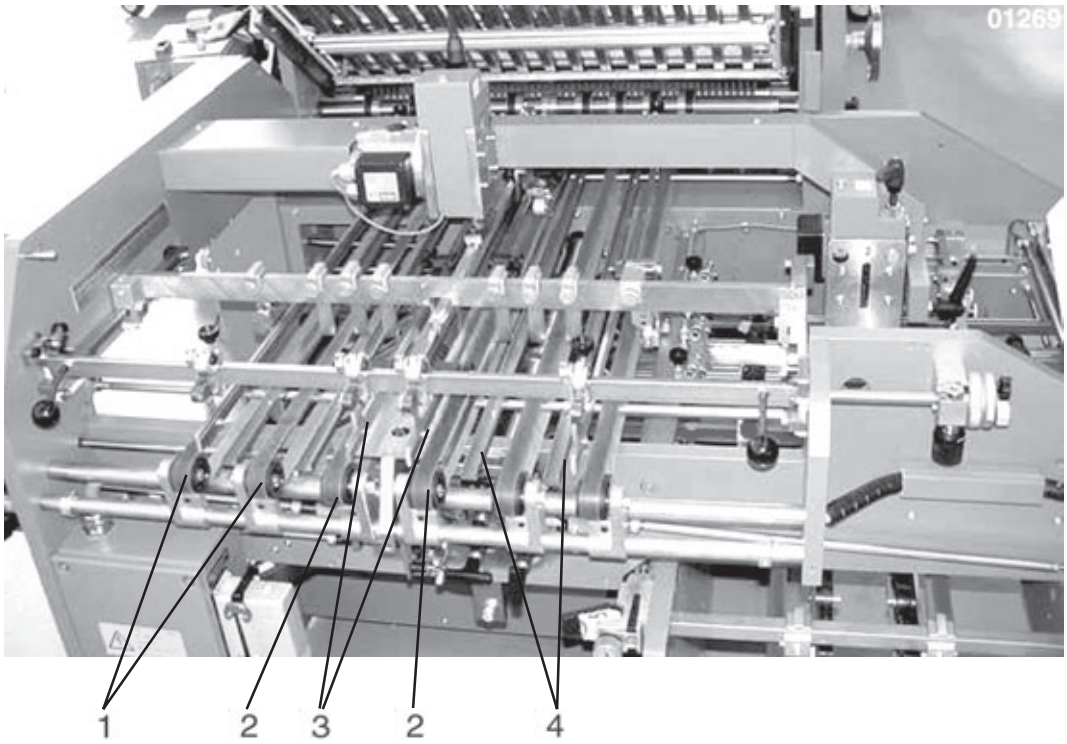


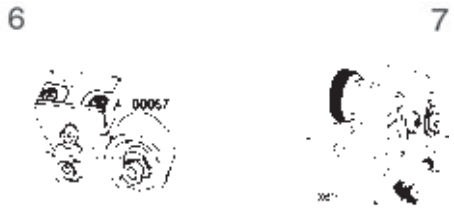
Continuation

At infeed of crossfold section: Align the transport tapes **1** to the sheet size and place the external tapes as close as possible to the sidelays. Do not displace the internal tapes beneath the ball rail **3**. Place guide rails between the tapes **4**; use ball holders **5** in case you process larger sheet sizes. The quantity of light or heavy balls depend on the paper quality and production speed.

>NOTICE< Balls should be used as less as possible to save tapes and folding products.

Continuation





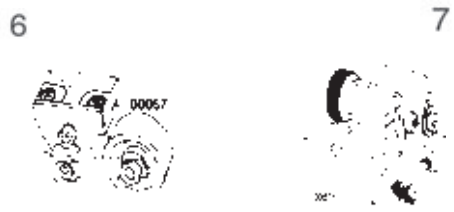
Continuation

The sheet should not rebounce from the sidelay! Place single **6** transport rollers exactly to the rear end of sheet.

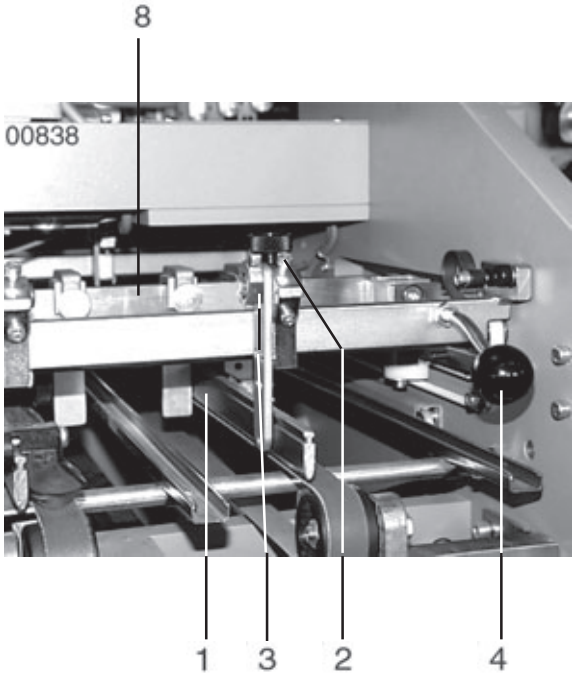
Do not wedge the rear end of the sheet!

Place the ball holders **7** to the external smoother bars so that the rear edge of the sheet is held by the brushes.

If larger sheets are processed use multiple smoother bars **1** for safe sheet running.



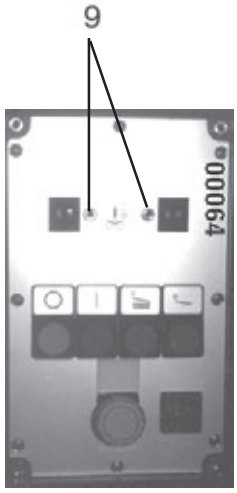
Setting for sheet transportation at threefold section correspond to those at crossfold section.



>NOTICE< Avoid unnecessary swelling of the sheet by smoother bars: loosen the screw **2** and adjust the ditsance with the excentre **3** between the tapes and the rails.

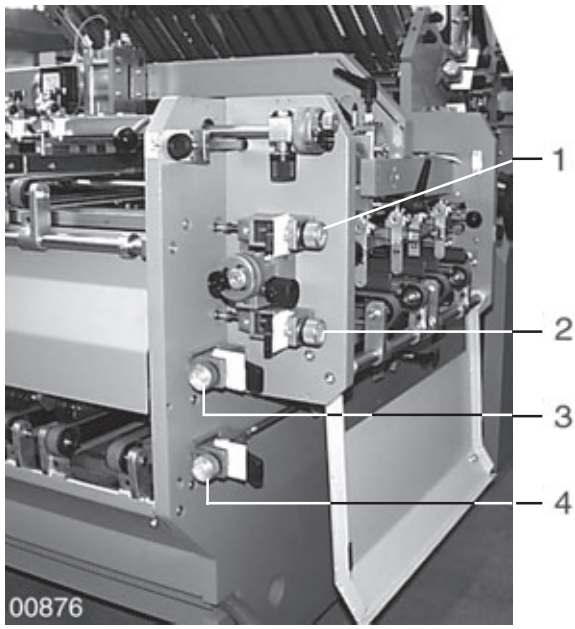
Lift all smoother bars through lever **4** for free access to the slitter shafts. This enables you to remove easier possible jam-ups at cross- and threefold section.

If crossfold sheet stop **8** is not used lift it up and turn OFF corresponding knife coupling for crossfold section. Turn toggle switch **9** into middle position.



5.4.3 Foldrollers and slitter shafts at cross- and threefold section of versions KL

Adjust the setting elements
in accordance to the passing quantity
of sheets (see para. 5.6.1).



Foldrollers at crossfold section **1**,
Slitter shafts in the crossfold section **2**
Foldrollers at threefold section **3**.

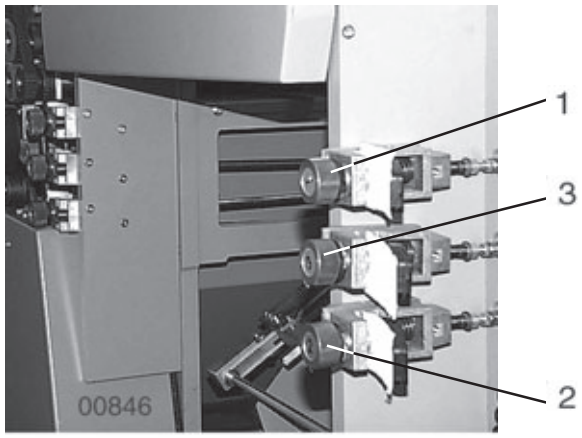
Option: quickly removeable
slitter shafts through plug bearings
at threefold section **4**.

See para. 6.0 for Setting Instructions of
the most commonly types of crossfolds.

See paras. 5.3.5 thru 5.3.7
for Perforating, Scoring and Cutting.

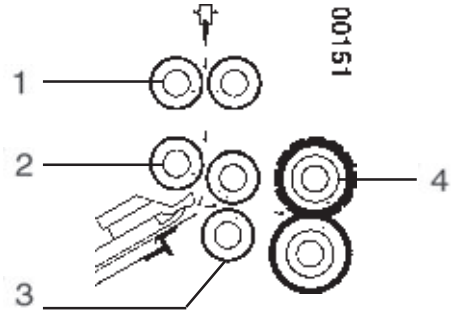
5.4.4 Foldrollers and slitter shafts at cross- and threefold section of S-KTL version

Adjust the setting elements in accordance to the passing quantity of sheets (see para. 5.6.1).



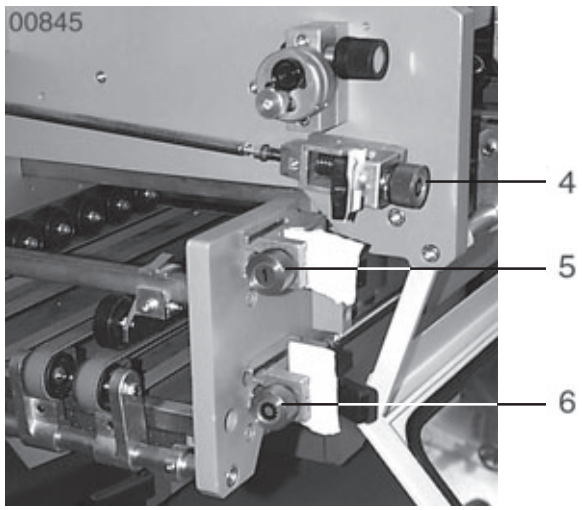
Foldrollers at crossfold section **1**,
Infeed roller **2** of crossfold buckle plate
Exit roller **3** of crossfold buckle plate.

Slitter shaft at crossfold section **4** (quickly removeable through plug bearings)



Foldroller at threefold section **5**.

Option: Quickly removable slitter shafts through plug bearings at threefold section **6**.

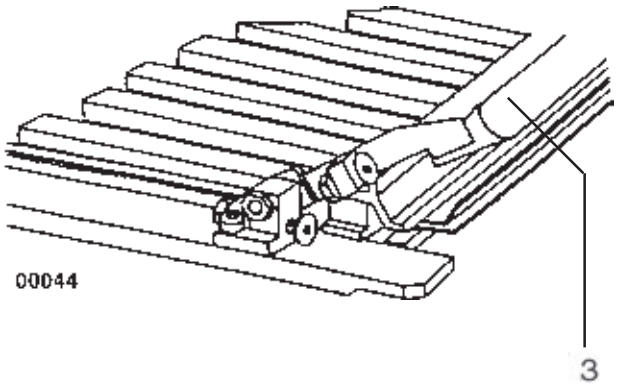


See para. 6.0 for Setting Instructions of the most commonl types of crossfolds.

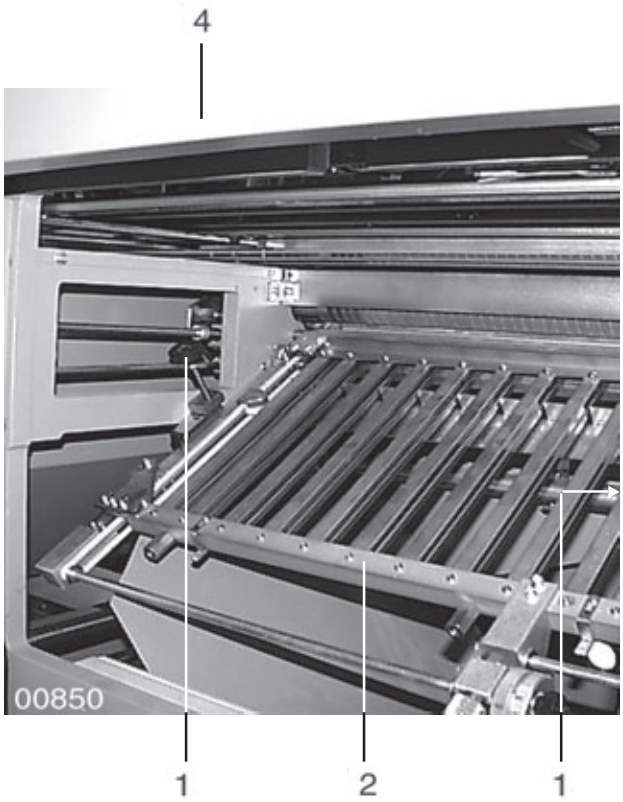
5.4.5 Buckle plate at crossfold section (Version S-KTL)

Change of function „Buckle plate„ to „Sheet deflector„ or vice versa:

Pull the lateral protective hood **4** upwards.

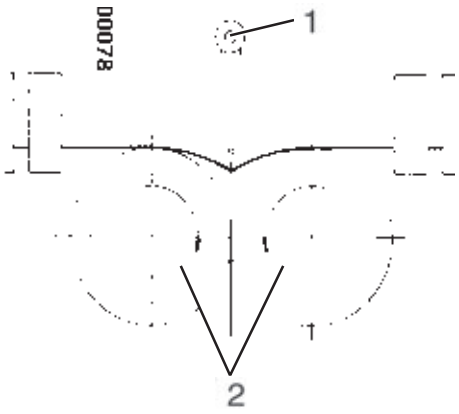


Loosen two screws **1**, slightly pull out buckle plate **2**, swing open or close the affixed sheet deflector **3**, push the buckle plate **2** to its limit stop and refasten the screws **1** again.



5.4.6 Setting of folding knife

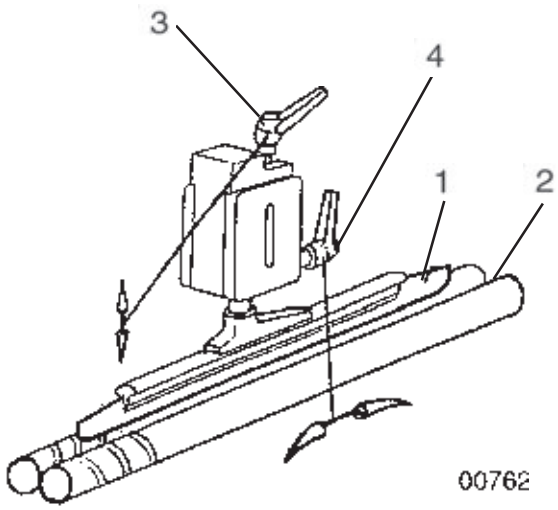
Lowering of the folding knives 1:
If the machine is turned manually a sheet **1** is pressed between the foldrollers **2**.



Height corrections through the head spindle **3**:
Heightening of knife = clockwise turning of the head spindle.
Lowering of knife = counter-clockwise turning of the head spindle

>NOTICE<
The knife **1** should be at its lowest point when the sheet is taken over, and the sheet must be transfered exactly.

Horizontal position
of the folding knives influences not only the precise transfer of the sheet but also the subsequent perforating (scoring and cutting).



How to set the knives horizontally with head spindle **4**:

Lowering the knife at stop side = turning clockwise: the sheet is pushed much stronger against the stop.

Heightening the knife at stop side = turning counter-clockwise: the sheet is pushed slightly against the stop or it is pulled off.

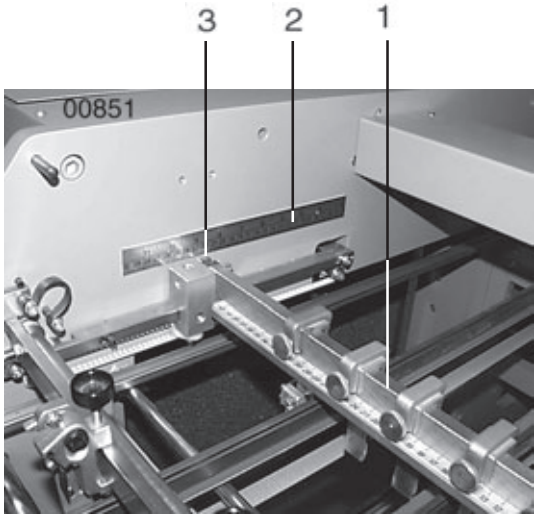
>ATTENTION< In case of extreme horizontal adjustment you should, if necessary, increase the height of the folding knife!

5.4.7 Knife control

The functions at cross- and threefold sections are the same.

The timing pulse of the folding knife operates independently.

The knife motion is released by a photocell through the oncoming sheet.



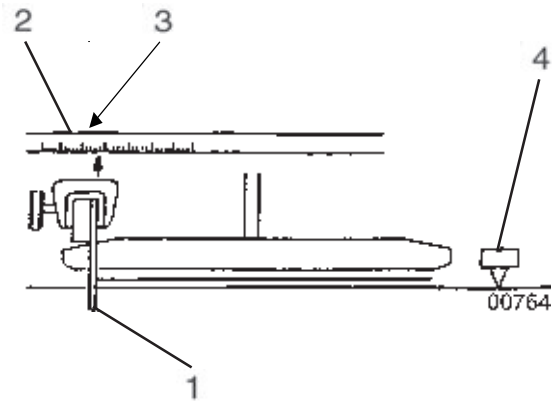
Setting of knife release:

The sheet stop **1** is set to the desired measurement. A centrimetre value **3** is shown at scale **2** and point of intersection **1**.

This corresponds to the path between photocell **4** and sheet stop **1**.

Enter this value into the push button switch **5**.

The value may be increased (e.g. to align the sheets under the knife) or decreased to achieve a higher rate of production (e.g. on perforated sheets).



If you decrease the value please check whether the sheet is still exactly aligned and that it does not collide with the subsequent sheet.

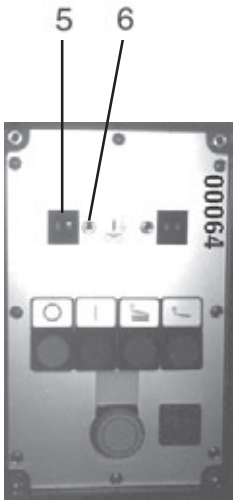
Photocell as jam control:

If a sheet remains under the photocell, the machine will automatically turn OFF.

Photocell as sheet length control:

The length of the sheet must be entered into the decadic switch. Should, however, the sheet be longer than the value entered, the machine will turn OFF automatically.

Toggle switch **6** see para. 5.4.1



5.5 Noise damping device (option)

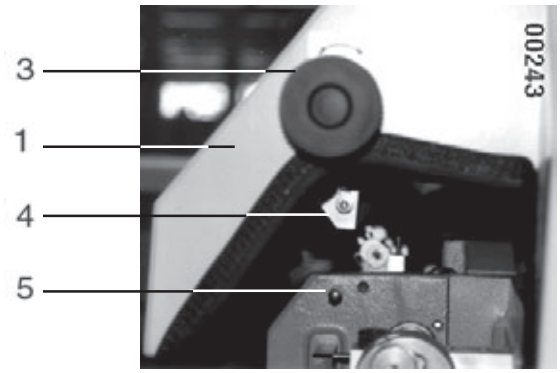
The noise damping device corresponds to the requirements of the legislator and has been approved by the Professional Trade Association. This device is not stipulated in certain countries, i.e. in such cases it may be delivered upon request.

For insertion of the upper buckle plates lift the noise hood **1** to its limit stop.

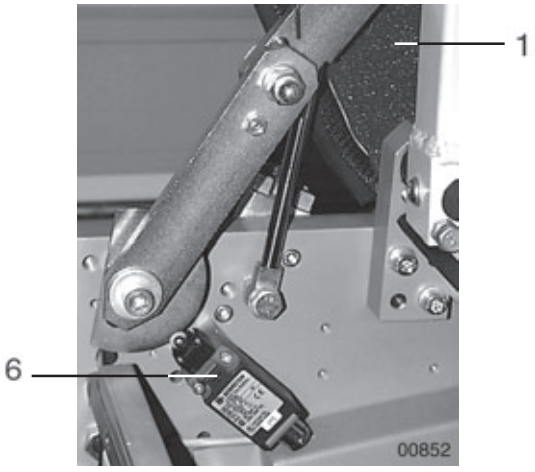
>DANGER< In order to avoid self-locking always open the hood to its limit stop!

The upper buckle plates may be adjusted through the opening **2**.

Lock the noise hood **1** while the machine is in operation: lock **4** must latch into pin **5** through twist-grip **3**.



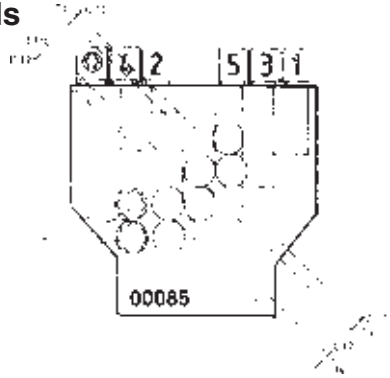
The switch **6** will stop the machine if the hood **1** is being opened.



>DANGER< It is absolutely prohibited to remove or over-bridge the switch 6. It may cause serious injuries to the operator!

6.0 Instructions to the user

6.1 Setting instruction for the most commonly folds

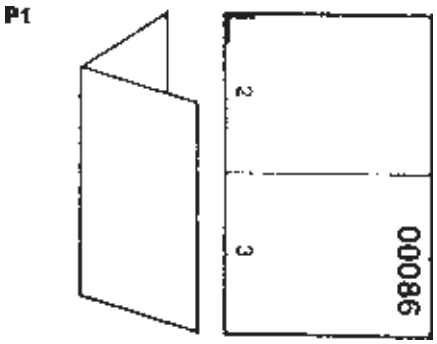


6.1.1 Parallelfold

1 - 5 = 1st - 5th set of foldrollers
8 = set of slitter shafts

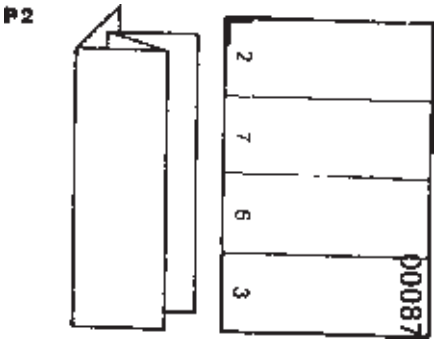
P 1 **1 x parallel fold, i.e. 4 pages**

At 1, set for single paper thickness, and from 2 thru 8 set to double paper thickness.
Set sheet stop C 12 at 1st buckle plate to 1/2 of sheet length. The buckle plates 2- 4 are replaced by **sheet deflectors.**



P 2 **2 x parallel fold, i.e. 8 pages**

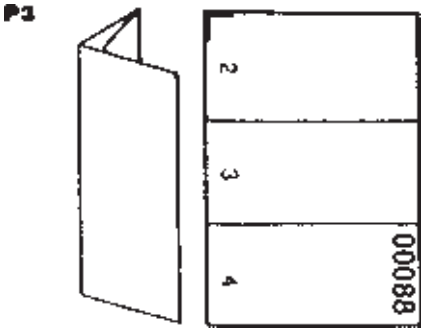
At 1 set for single, and at 2 set for double paper thickness, and at 3 to 8 set to quadruple paper thickness.
Set sheet stop C 12 to 1/2 of sheet length at 1st buckle plate and 1/4 of sheet length at 2nd buckle plate.
Buckle plates 3 and 4 are replaced by **sheet deflectors.**



P 3 **2 x parallel fold (letter fold), i.e. 6 pages**

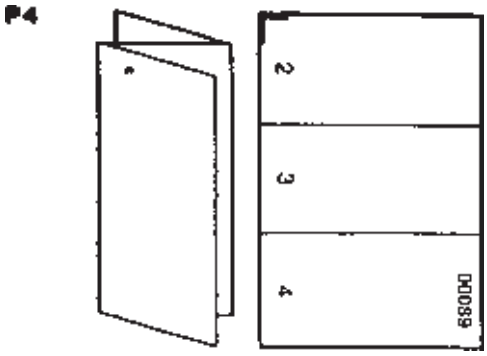
I. With two top buckle plates (T1 and T3), set foldrollers 1-3 to single and foldrollers 4-8 to triple thickness of paper. Set sheet stop C 12 at 1st and 3rd buckle plate to 1/3 of sheet length. Buckle plates 2 and 4 are replaced by **sheet deflectors**.

II. With one top (T1) and one bottom (T2) buckle plate set the foldrollers 1 and 2 for single and foldrollers 3-8 for triple thickness of paper. Set sheet stop C 12 at 1st buckle plate to 2/3 of sheet length, at 2nd plate to 1/3 of sheet length. Buckle plates 3 and 4 are replaced by **sheet deflectors.**



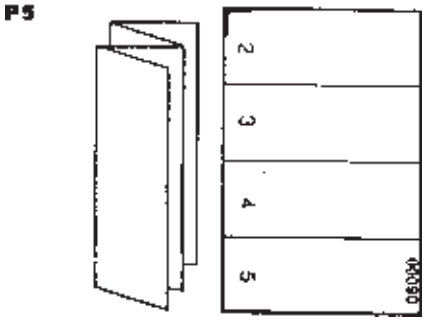
P 4 **2 x parallel fold (accordian fold), i.e. 6 pages**

Set of foldrollers 1 and 2 to single thickness of paper, and foldrollers 3-8 to triple thickness of paper.
Set sheet stop C 12 at 1st and 2nd buckle plate to 1/3 of sheet length.
Buckle plates 3 and 4 are replaced by **sheet deflectors.**



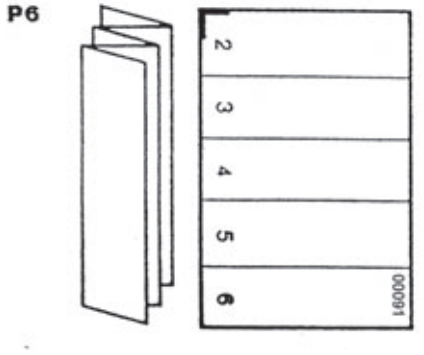
P 5 **3 x parallel fold (accordian fold), i.e. 8 pages**

Set foldrollers 1-3 for single thickness and foldrollers 4-8 to quadruple thickness of paper. Sheet stop C 12 should be set to 1/4 of sheet length at 1st, 2nd and 3rd buckle plate.
The 4th buckle plate is replaced by a **sheet deflector.**



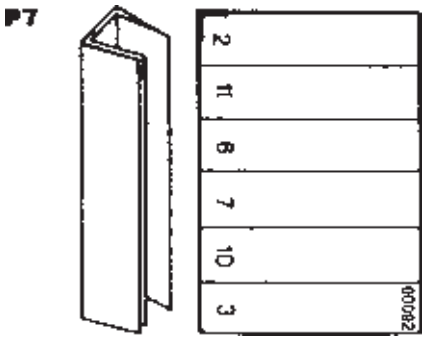
P 6 **4 x parallel fold (accordian fold), i.e. 10 pages**

Set foldrollers 1-4 to single paper thickness, foldrollers 5-8 to fivefold thickness of paper.
Set sheet stop C 12 to 1/5 of sheet length at all 4 buckle plates.



P 7 **3 x parallel fold (1 parallel + 2 letter folds), i.e. 12 pages**

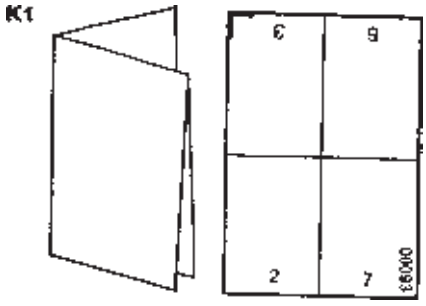
Set foldroller 1 to single paper thickness, foldrollers 2-4 to double thickness of paper,
and foldrollers 5-8 to sixfold thickness of paper. Sheet stop C 12 should be set to 1/2 of sheet length at 1st buckle plate, and to 1/6 of sheet length at 2nd and 4th buckle plate. The 3rd buckle plate is replaced by the **sheet deflector.**



6.1.2 Crossfold

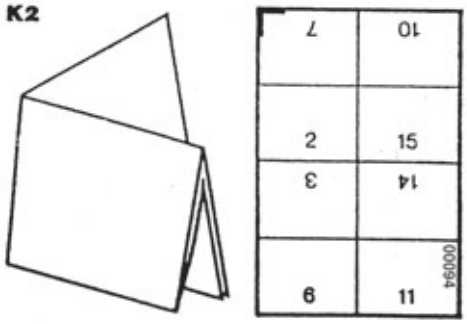
K 1 **1 x parallel and 1 x crossfold (double folding), i.e. 8 pages**

See item **P 1** for set of parallel fold.
Set of crossfold:
Adjust foldrollers and slitter shafts to quadruple thickness of paper and set sheet stop at crossfold to 1/4 of sheet length.



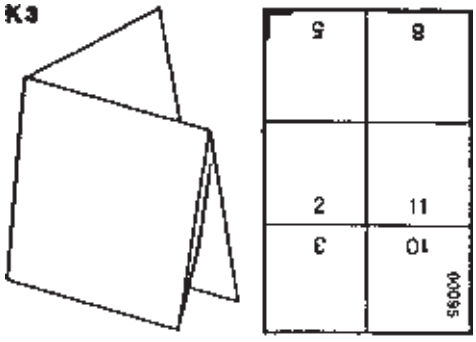
K 2 **2 x parallel and 1 x crossfold, i.e. 16 pages**

See item **P 2** for set of parallel fold.
Set of crossfold:
Adjust foldrollers and slitter shafts to eightfold thickness of paper and set sheet stop at crossfold to 1/8 of sheet length.



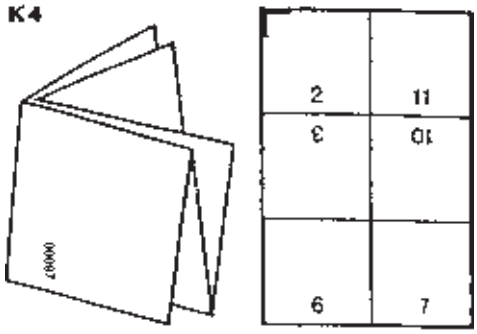
K 3 **2 x parallel (letter fold) and 1 x crossfold, i.e. 12 pages**

See item **P 3** for setting of parallel fold.
Setting of crossfold:
Adjust foldrollers and slitter shafts to sixfold thickness of paper and set sheet stop at crossfold to 1/6 of sheet length.



K 4 **2 x parallel fold (accordian) and 1 x crossfold, i.e. 12 pages**

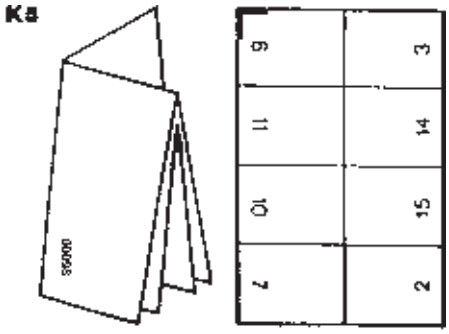
See item **P 4** for setting of parallel fold.
Setting of crossfold:
Adjust foldrollers and slitter shafts to sixfold thickness of paper and set sheet stop at crossfold to 1/6 of sheet length.



6.1.3 **Threefold**

K 5 **1 x parallel, 1 x cross and 1 x threefold, i.e. 16 pages**

See item **K 1** for setting of parallel and crossfold.
Setting of threefold:
Adjust foldrollers and slitter shafts to eightfold thickness of paper and set sheet stop at threefold to 1/4 of sheet width.



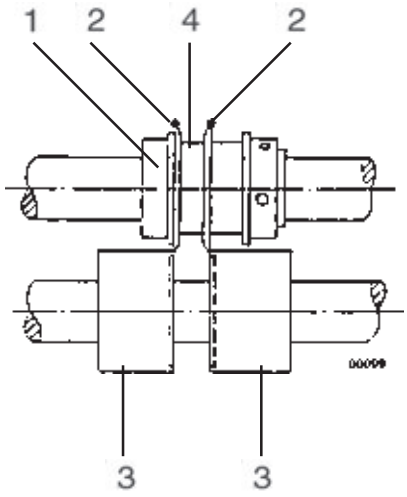
7.0 Options

7.1 Batch counter

The counting functions of the standard batch counter MCC 3 are integrated into the „MC Control„ and are described as „MC Control„ in the attached Operating Manual. Should, however, another counter have been installed by the manufacturer, its Operating Manual is also attached separately.

7.2 Gully cut

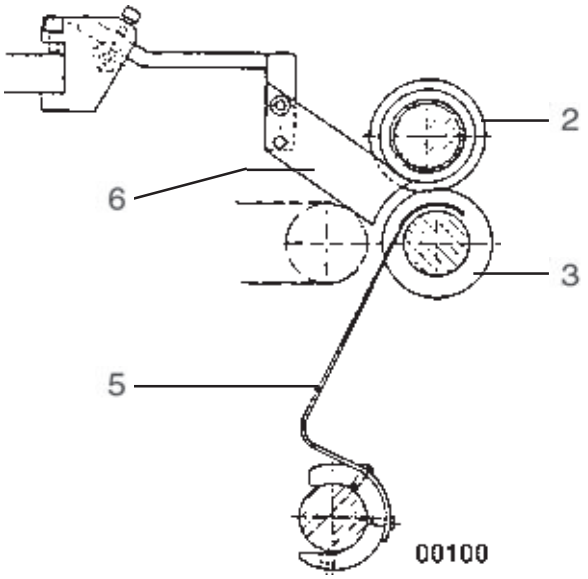
Place the knife holder **1** onto the upper slitter shaft.
Insert two knives **2** with their cutting edge to the outside and place two counter knives **3** against them on the lower slitter shaft.



Width of cut:
Minimum = 4 mm,
maximum = 15 mm

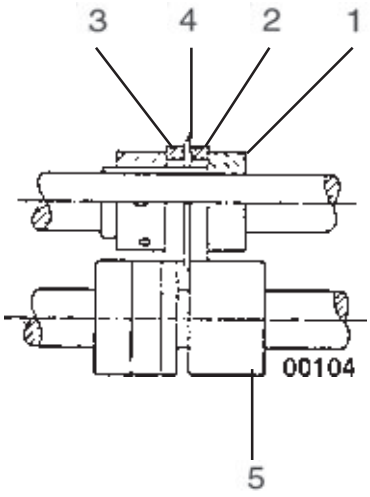
The thicker the product the wider the cut!
Combine distance washers **4** of 0.3 - 5 mm.

Always insert a stripper **5** between the counter knives **3**.
Use a stripper **6** between the cutting knives only when you process bulky products.

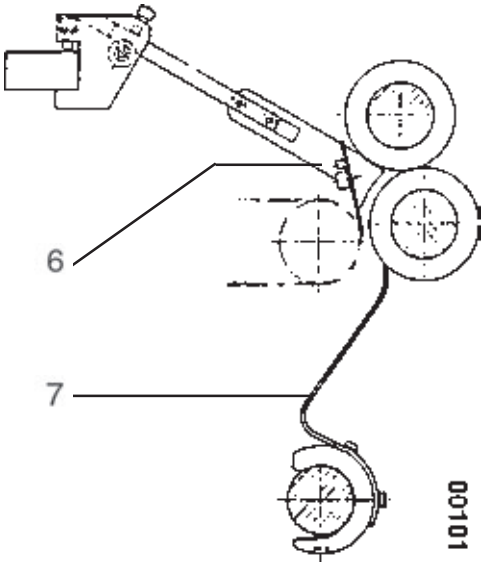


7.3 Edge trim

Install the knife holder **1** with rubber rings **2** and **3** and cutting knife **4** onto the upper slitter shaft. Place a distance washer (0.5 mm) between rubber rings **2** and cutting knife **4**. Place the counter knife **5** at bottom against it.



Paper cutoff is guided between **2** and stripper **6,** use also stripper **7**.



>NOTICE< If you obtain an angled cut or badly guided paper trim-off you may also install the knife holder **1** onto the lower slitter shaft; the cutting knife **4** into the direction of the folding product. It mostly depends on the paper thickness and paper fibre.

Experiences shows that the following alternative of installation reveals in the best result: knife holder 1 top , counter knife bottom 5, cut edge of top knife 4 into direction of paper cutoff. Paper cutoff is guided by rubber ring 2.

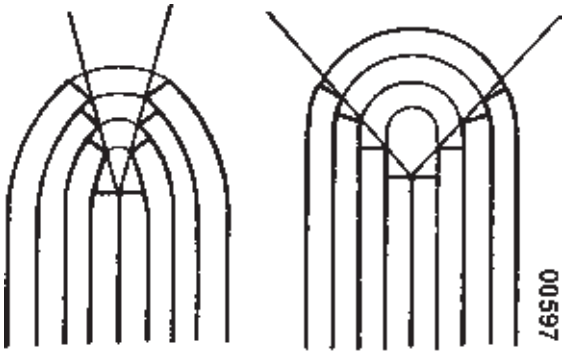
7.4 Punch Perforation

The trend to produce more and more books by the perfect-binding method at lower cost places an ever increasing demand on manufacturers to develop machinery and ancillary equipment to make further progress towards this end.

The new MBO-punch perforating device fulfils the requirement by providing a considerably improved adhesive surface for perfect-bining.

Instead of the commonly used type of perforation, slots are punched into the folded sheets, i. e. just before the last fold.

folded section



These slots provide a larger opening in the spine of the collated sections and allow the glue to penetrate easily and reach every single sheet.

spine of sheet not punched

spine of heet after punch perforation

The folded sheets are gathered and fed into hte perfect binder in the usual manner.
The spine will not be roughened and grooved, however, only the adhesive will be applied.

Present perfect binding methods, where the spine is completely removed, have the desadvantage that the adhesive reaches only the very top area of the sheet edge and, therefore, has only a limited strength.

gathered sheets

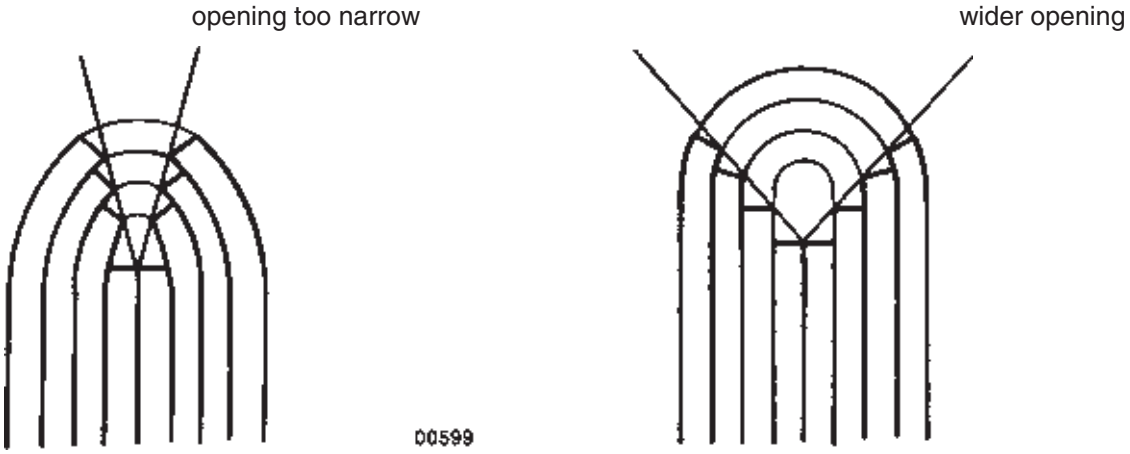
fold completely removed

adhesive reaches only top area of sheets

In the perfo-binding process, where folded sheets have standard perforations in the spine, the openings are too small to allow the glue to penetrate thoroughly, and it does not always reach the inner sheets.

Continuation

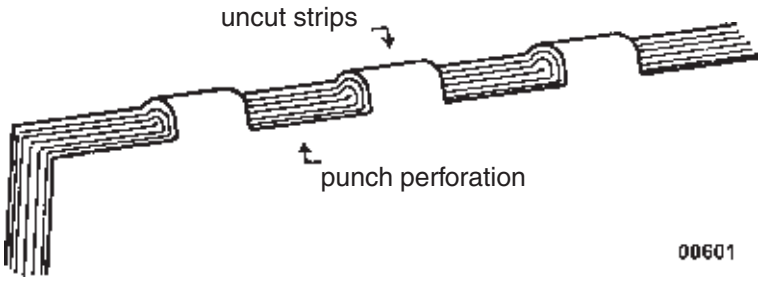
Continuation



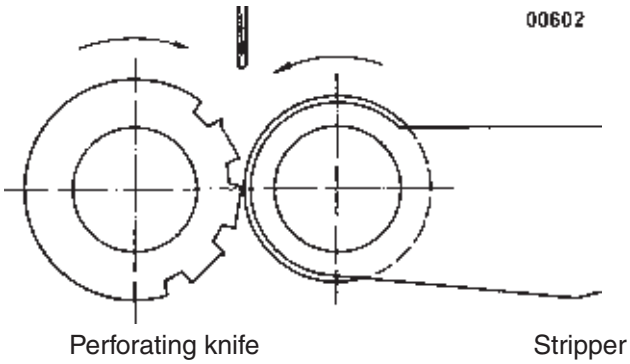
With punch-perforation the opening is larger and the angle wider, therefore the glue can definitely reach all sheets.

Contrary to the existing perfect binding methods, where the glue reaches the top edge of the sheet only, the punch-perforation method enables the glue to bind the sheets not only on the edge but also at the sides, resulting in far stronger perfect binding than has been possible in the past.

Furthermore, the sheets are still attached to each other between the slots by the uncut strips which guarantees a more secure binding.



When using the new punch-perforation device, it is of the utmost importance that the punched out pieces are separated and stripped from the folded sheets. A new design of perforating knife ensures this in conjunction with a specially manufactured stripping unit.

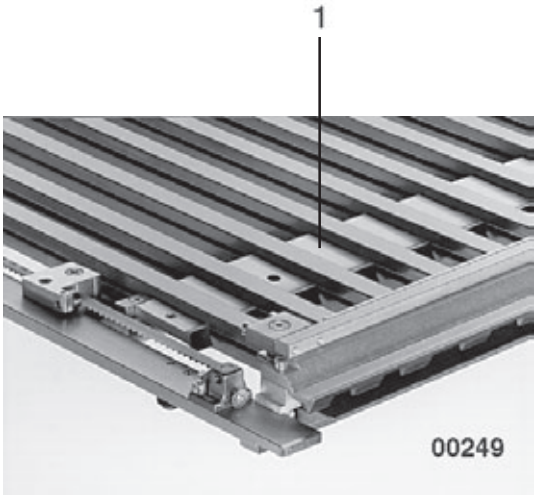


7.5 Special buckle plates

7.5.1 Combination buckle plate FTK (optional)

This type of buckle plate does not require the separate or swiveable sheet deflector.
The buckle plate/deflector does not require to be pulled-off or swivelled for retrofitting.

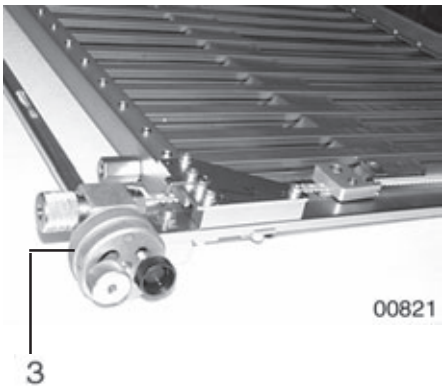
The sheet stop **1** also serves as sheet deflector **2**.



Function of „Buckle plate“:

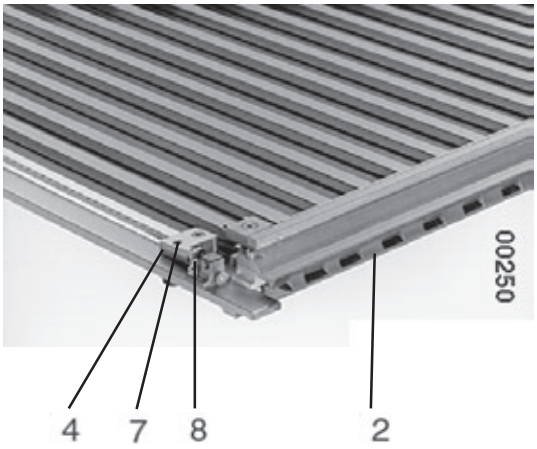
Function „Sheet deflector“:
Turn (clockwise) the sheet stop **1** through the adjustment ring **3** into its deepest position **4**.

One-sided pull of the sheet deflector
to influence out-of square perforations, scorings and cuttings



>ATTENTION< The deflector **2** shall not touch the foldrollers!

>ATTENTION< Do not change the position of screws **7** and **8**!



7.5.2 Gatefold devices

See separate attached Operating Manual.

7.6 Other options

If this machine includes other options not described, separate Operating Manuals are attached.

8.0 Peripherical units

Operating Manuals pertaining to mobile peripherical units are attached separately, if these units are part of the order at the time of shipment.

9.0 Final remarks

We wish you much pleasure and success with this machine. Should you, however, still have problems with it, please do not hesitate to contact our technicians or supervisors who will be able to further assist you. Any recommendations to improve this Operating Manual are greatly appreciated.

Änderungen vorbehalten
Alterations reserved
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