

Folding unit I

Translation of original operating manual



D01697



T 535
EFFICIENCY

Machine type:	Folding unit I		
Configuration:	T 535, EFFICIENCY,		
Type of document:	Translation of original operating manual		
Version:	V1.4	Official in charge:	Mr. Matzner
As at (date):	2010-26-10	Machine no.:	
Language:	English	File name:	BA_T535_E_FW1_MS_V1.4_us_en
Manufacturer:	MBO Maschinenbau Oppenweiler Binder GmbH & Co. KG Postfach 1169 71567 Oppenweiler GERMANY Tel.: +49 7191 46 0 Fax: +49 7191 46 34 http://www.mbo-folder.com info@mbo-folder.com		

Subject to alterations!

Copyright: This documentation is subject to copyright law. The claimed copyright includes all forms and types of copyright-protected materials and information that are currently permitted. No part of the documentation may be copied, otherwise duplicated, edited or translated into other languages, regardless of the manner in which or with which tools this takes place.

Electronically-stored information provided by the manufacturer (CD-ROM, Internet) may be printed out by the user if the created print medium serves the purpose of use or service of the product described.

Label and CE Mark: For all questions relating to your machine, please contact your MBO agency.

You can find the address on our home page: www.mbo-folder.com.

Please gather the significant data for identification of the machine from the label on the machine.

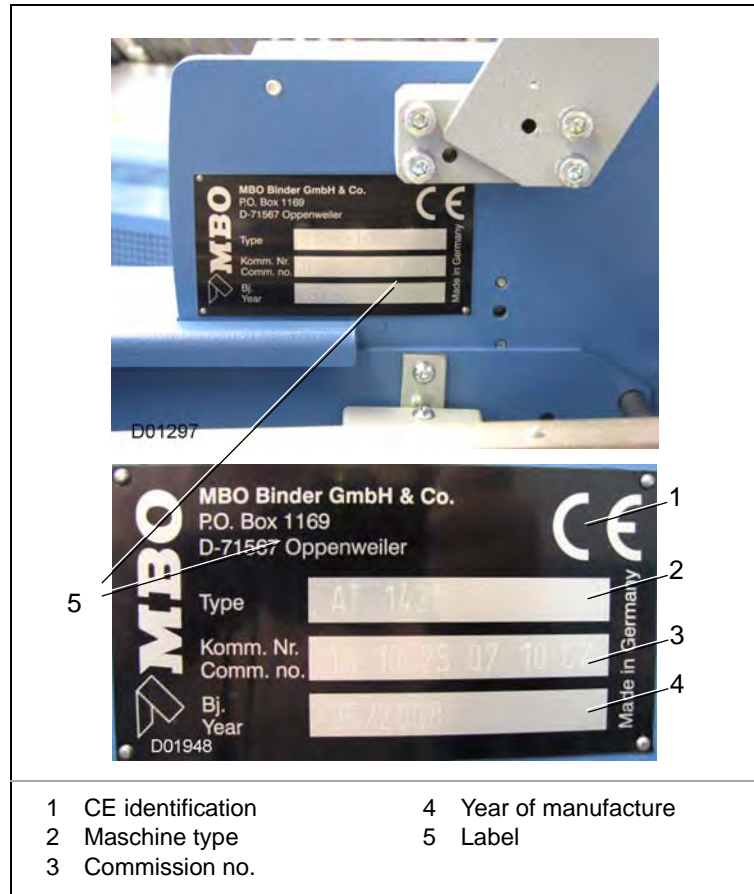


Figure 1: Label

Always specify these details for inquiries, service and spare parts orders:

- Commission no.
- Maschine type

EC Declaration of Conformity

according to EC Machinery Directive (2006/42/EC), Annex IIA.

The manufacturer

MBO Maschinenbau Oppenweiler Binder GmbH & Co. KG
Grabenstraße 4-6
71570 Oppenweiler
GERMANY

hereby declares that the machinery described below

Commission no.

Designation Folding unit I

Type T 535 EFFICIENCY

Year of manufacture

conforms to the requirements of the following directives:

Machinery Directive 2006/42/EC

Low Voltage Directive 2006/95/EC

EMC Directive 2004/108/EC

Harmonized standards applied:

DIN EN ISO 12100-1/A1:2009 DIN EN ISO 12100-2/A1:2009

DIN EN 1010-4:01/2004

Authorized representative for compiling the technical file:

Name Wolfgang Matzner

Address Grabenstrasse 4-6
71570 Oppenweiler
GERMANY

Oppenweiler, 26 October 2010

Stefano Palamides- Managing Director

Table of contents

1	General remarks	
1.1	Important notes about the operating manual	7
1.2	Structure of the operating manual	8
1.3	Symbols, terms, and abbreviations	9
1.4	Description of safety instructions	10
1.4.1	Signal words	10
1.4.2	Structure of safety instructions	10
1.4.3	Safety sign	11
1.4.4	Warning triangle	12
1.5	User assessment of the operating manual	13
2	Basic safety instructions	
2.1	Intended use	15
2.2	Reasonably foreseeable misuse	16
2.3	Warranty and liability	17
2.4	Risks in handling the machine	18
2.5	Residual risks	19
2.5.1	Transport, interim storage	19
2.5.2	Installation, initial operation	19
2.5.3	Adjustment and operation	19
2.5.4	Maintenance	20
2.5.5	Shutdown, storage	20
2.5.6	Disposal	20
2.6	Life time of the machine	21
2.7	General safety instructions	21
2.7.1	Transport, interim storage	21
2.7.2	Installation, initial operation	21
2.7.3	Normal operation	21
2.7.4	Setting up/equipping	21
2.7.5	Maintenance and repair	22
2.7.6	Work on electrical equipment	22
2.8	Obligations of the owner/operator	23
2.9	Obligations of the personnel	24
2.9.1	Operating personnel	24
2.9.2	maintenance personnel	24

2.10	Qualification of personnel	25
2.11	Personal protective kit	27
2.11.1	Operating personnel	27
2.12	Safety and protective devices	28
2.12.1	Overview	28
2.12.2	Main switch	29
2.12.3	EMERGENCY STOP palm button	30
2.12.4	Noise damping hood	31
2.12.5	Slitter shaft guard	32
2.12.6	Additional protective devices	33
2.12.7	Faulty safety and protective devices	33
2.12.8	Checking safety and protective devices	33
2.12.9	Checklist for safety and protective devices	34
2.13	Warnings and safety instructions on the machine.	36
2.13.1	Overview	36
2.13.2	Position and meaning	37
2.14	Workstations and space requirements for operating personnel	39
2.15	Directions for emergencies	39
3	Product description	
3.1	Important notices about the product	41
3.1.1	Overall view	41
3.2	Technical data	42
3.2.1	Floor plan, configuration 44X	42
3.2.2	Characteristics	43
3.2.3	Emissions	44
3.2.4	Weights, fork lifts, and floor requirements	44
3.2.5	Supply	45
3.2.6	Ambient conditions	46
4	Structure and function	
4.1	Introduction	47
4.1.1	What is folding?	47
4.1.2	Folding principles	47
4.1.3	Buckle folding machine	49
4.2	Structure.	50
4.2.1	Overall view	50
4.2.2	Feeder	50
4.2.3	Register table	51
4.2.4	Parallel folding unit I and II	52
4.2.5	Delivery systems	52

4.3	Models	53
4.3.1	Variants 4 and 6	53
4.3.2	Variants 4X and 6X	54
4.3.3	Variants 44, 46, 64 and 66	55
4.3.4	Variants 44X, 46X, 64X and 66X	56
4.4	Machine control	57
4.4.1	MS-Control	57
5	Operating and display elements, operating modes	
5.1	Main control console	59
5.2	MS-Control	60
5.2.1	Operating	60
5.2.2	Error messages	60
5.3	Operating modes	61
5.3.1	Machine controller operating mode	61
5.3.2	Adapter box operating mode	62
6	Transport/Installation/Initial operation	
6.1	Introduction	63
6.1.1	Qualification of personnel	63
6.1.2	Safety instructions	64
6.2	Machine with pile feeder	65
6.3	Machine with continuous feeder	65
6.4	Brief instructions	66
6.5	Transporting the machine without feeder	67
6.6	Installation	68
6.6.1	Unpack the machine	69
6.6.2	Installing the machine	70
6.6.3	Leveling out and connecting the machine to the feeder	72
6.6.4	Register table	77
6.6.5	Noise damping hood	80
6.6.6	Unpacking buckle plates	81
6.7	Removing the rust preventing agents	81
6.8	Electric connection	82
6.8.1	Assembly of the main control cabinet	83
6.8.2	Connecting MS-Control	85
6.8.3	Power supply prerequisites	86
6.8.4	Power supply configuration	88
6.8.5	Power supply to the main control cabinet	89
6.8.6	Additional equipotential bonding strips	90
6.8.7	Checking the ground wire connections	91
6.8.8	Electrical connections between the folding units	91

6.9	Starting up	92
6.9.1	Brief instructions	92
6.9.2	Check the supply voltage.	93
6.9.3	Check rotating field of the power socket.	93
6.9.4	Check rotation direction of pumps.	94
6.9.5	Check rotation direction of feeder motor.	94
6.9.6	Checking rotation direction drive motor of the folding machine.	94
6.9.7	Checking the control cabinet cover	95
6.9.8	Checking machine functions	95
6.10	Final check of the protective devices	95
6.11	Inspection after first start-up	95
7	Adjustment and operation	
7.1	Introduction	97
7.1.1	Qualification of personnel	97
7.1.2	Safety instructions	97
7.2	Operating	101
7.2.1	Switching the main switch on/off	101
7.2.2	EMERGENCY STOP palm button	102
7.2.3	Starting/stopping the machine	103
7.2.4	Switching the air supply on/off	104
7.2.5	Starting/stopping the sheet feed	105
7.2.6	Setting the speed	106
7.3	Brief instructions for adjusting the machine	107
7.4	Adjusting the feeder	108
7.5	Adjusting the suction wheel	108
7.6	Setting of the register table	109
7.6.1	Sheet size adjustments	110
7.6.2	Equipping the marble rail	112
7.6.3	Double-sheet control	113
7.7	Adjusting the sheet feed control	115
7.7.1	Teaching in the suction length and sheet gap	115
7.7.2	Default counter settings	116
7.8	Adjusting the parallel fold	117
7.8.1	Roller diagram	117
7.8.2	Adjusting the pressure of foldrollers and slitter shafts	118
7.9	Adjusting the buckle plates	121
7.9.1	Buckle plate positions	121
7.9.2	Buckle plate 1 FTD	121
7.9.3	Buckle plates 2 to 4 (6) as standard buckle plates FT	121
7.9.4	Buckle plates 2 to 4 (6) as combination buckle plates FTK	122
7.9.5	Inserting buckle plates FTD/FT	124
7.9.6	Inserting the buckle plates FTK	125

7.9.7	Adjusting the folding length	126
7.9.8	Adjusting the sheet stop angle:	127
7.9.9	Adjusting the lower plate lip	128
7.9.10	Setting of the inner width	129
7.9.11	Enlarging the buckling area	130
7.9.12	Enlarging the deflecting area	131
7.10	Placing the slitters on the slitter shafts	133
7.10.1	Single rear slitter shafts (standard)	133
7.10.2	Perforating device	135
7.10.3	V-shaped special perforating knife (option)	137
7.10.4	Punch perforating device	138
7.10.5	Creaser	140
7.10.6	Super-Score device	141
7.10.7	Slitting device	142
7.10.8	Strip trim device	143
7.11	Options	145
7.11.1	Stopper switch S31 at the exit of the folding unit	145
7.12	Troubleshooting	146
7.12.1	Sensor positions on folding unit I, MS-Control	146
7.12.2	Display of error messages, MS-Control	146
7.12.3	Error messages	147
7.12.4	Resetting the error messages	147
7.13	Removing the paper jam	148
7.14	Adjustment data of standard folding impositions	149
7.14.1	Parallel fold (using 4 buckle plates as an example)	150

8 Maintenance

8.1	Introduction	153
8.1.1	Qualification of personnel	153
8.1.2	Safety instructions	153
8.2	Service	156
8.2.1	Ordering spare and wear parts	156
8.3	Operational maintenance	157
8.3.1	Checking the safety devices	157
8.3.2	Cleaning	160
8.3.3	Recommendation of cleansing agents	161
8.3.4	Cleaning of the machine	161
8.3.5	Cleaning the foldrollers	162
8.3.6	Cleaning the lower buckle plates	163
8.3.7	Cleaning the optical sensors	163
8.3.8	Cleaning the pressure vacuum pump, filter cartridges	164
8.4	Maintenance	166
8.4.1	Checking the drive belt for the suction wheel/suction tape	167

8.4.2	Checking the alignment tape	168
8.4.3	Check/exchange main drive belt	170
8.4.4	Checking the drive belt for foldrollers and slitter shafts	171
8.5	Maintenance, lubrication and cleaning schedule	172
9	Shutdown, storage	
9.1	Introduction	173
9.1.1	Qualification of personnel	173
9.1.2	Safety instructions	173
9.2	Shutdown	173
9.2.1	Temporary shutdown:	173
9.2.2	Final decommissioning	174
9.3	Bearing assembly	174
10	Disposal	
10.1	Introduction	175
10.1.1	Qualification of personnel	175
10.1.2	Safety instructions	175
10.2	Disposal/recycling	175

1 General remarks

With this MBO product, you have acquired a high-quality industrial product with which you, if you follow the operating manual carefully, can achieve the highest reliability and productivity.

1.1 Important notes about the operating manual

This operating manual must be read by everybody who transports, installs, connects, operates, maintains, repairs or dismantles this machine.

Only if the contents of the operating manual have been understood and followed in all points by all people is safe use of the machine possible. This applies especially for the chapter about safety.

This operating manual contains important notes about operating the machine safely, properly, and economically.

Following these notes helps:

- To avoid hazards.
- To minimize repair costs and downtimes.
- To increase the reliability and service life of the machine.

Completion:

- The owner/operator must complete this operating manual with information with respect to federal and national regulations concerning accident control and prevention.

Keep:

- This operating manual is part of the machine. It must be available on the machine throughout the machine's entire service life.

If you sell the machine:

- Be sure to give this operating manual to any subsequent owner or user of the machine.

We reserve the right to make technical modifications to improve the machine, even if they are not taken into account in this operating manual.

1.2 Structure of the operating manual

The chapters of the operating manual are listed in the table. It also describes the essential content of these chapters as well as the target groups at whom the chapters are directed.

No.	Chapter	Contents	Target group
	Table of contents	The detailed table of contents serves as a search tool.	Owner/operator Operating personnel Maintenance personnel Service technicians
1	General	General instructions	Owner/operator Operating personnel Maintenance personnel Service technicians
2	Safety instructions	Safe handling, notes about hazards	Owner/operator Operating personnel Maintenance personnel Service technicians
3	Product description and product data	Machine description/technical data	Owner/operator, operating personnel, maintenance personnel
4	Structure and function	Structure and function	Operating personnel, maintenance personnel, service technicians
5	Operating and display elements, operating modes	Operating elements and operating modes	Operating personnel, maintenance personnel, service technicians
6	Transport, interim storage, setup and commissioning	Specifications for transport, interim storage, setup and commissioning.	Transport personnel, maintenance personnel Service technicians
7	Adjustment and operation	Preparation for production	Operating personnel, maintenance personnel, service technicians
8	Maintenance	Maintenance and service	Operating personnel, maintenance personnel, service technicians
9	Shutdown, storage and putting the machine back into operation	Shutdown, storage conditions	Owner/operator Operating personnel, maintenance personnel, service technicians
10	Disposal	Dismantlement, environmentally-friendly disposal	Owner/operator Maintenance personnel Service technicians

Table 1: Structure of the operating manual

1.3 Symbols, terms, and abbreviations



Symbol	Explanation
▷	Symbol indicates an instruction for action; sequence is not specified.
1) 2)	Numbered instruction for action; adhere to sequence.
< STOP >	Pushbutton with the label that is between the brackets (e.g. Stop).
	Additional information for use of the machine.
	Important notice, please observe.

Table 2: Symbols, terms, and abbreviations

1.4 Description of safety messages

Safety messages are marked by a safety symbol and a signal word.

1.4.1 Signal words

The signal words draw your attention to the severity of the hazard. They are structured according to a classification system.

Signal word	Significance
DANGER	Indicates a hazardous situation which, if not avoided, will result in death or serious injury.
WARNING	Indicates a hazardous situation which, if not avoided, could result in death or serious injury.
CAUTION	Indicates a hazardous situation which, if not avoided, could result in minor or moderate injury or to property damage.

Table 3: Definition of signal words

1.4.2 Structure of safety messages

Each safety message is structured as follows:

- Safety symbol.
- Signal word to identify the risk level.
- Type and source of the hazard.
- Possible consequences of the hazard.
- Measure(s) for avoiding the hazard.

Example:



DANGER! WARNING! CAUTION! (signal word)

Type and source of the hazard.

Possible consequences of the hazard.

Measure(s) for avoiding the hazard.

1.4.3 Safety symbols

Description	Significance
	<p>Prohibition symbol Red border, white background, black symbol</p> <p>Safety symbol that forbids a behavior that could cause hazard.</p>
	<p>Warning triangle Yellow background, black symbol</p> <p>Safety symbol that warns about a hazard.</p>
	<p>Mandatory symbol Blue background, white symbol</p> <p>Safety symbol that prescribes a particular behavior.</p>
	<p>Rescue symbol Green background, white symbol</p> <p>Safety symbol that identifies the rescue path or the path to a place where you can get help or find rescue equipment in case of an emergency.</p>
	<p>Fire protection symbol Red background, white symbol</p> <p>Safety symbol that identifies the location of fire alarm or fire extinguishing equipment and/or the path to this equipment in case of an emergency.</p>

Table 4: Safety symbols

1.4.4 Warning triangle



Description	Significance
	Warning of a hazardous area, general.
	Warning of hazardous electric voltage.
	Warning of crushing of body parts
	Warning of rotating rollers.
	Warning of hand injuries due to moving rollers.
	Warning of crushing of hand.
	Warning of crushing injuries due to noise damping hoods.
	Warning of rotating machine parts.
	Warning of lifting heavy machine parts.

Table 5: Warning triangle

Description	Significance
	Warning of tipping machine parts.
	Warning of infeed points.
	Warning of sharp knives on the slitter shafts.
	Warning of falling tools.
	Warning of substances detrimental to health.
	Warning of oxidizing substances
	Warning of hot surface.
	Warning of tripping hazards.

Table 5: Warning triangle

1.5 User assessment of the operating manual

Our operating manuals are updated regularly. You are kindly requested to recommend any improvements to make the instructions user-friendly.

2 Basic safety instructions



The absolute prerequisite for the proper handling and trouble-free operation of this machine is knowledge of the elementary safety instructions and safety regulations.

- The operating manual must be heeded by all people who work on or at the machine.
- Read and understand the operating manual before working with the machine.
- Always keep the operating manual where the machine is being used.
- The operating manual must always be freely accessible for the operating and maintenance personnel.
- In addition, observe the rules and regulations for accident prevention and environmental protection applicable for the final destination.

2.1 Intended use

- The machine is intended exclusively for processing flat paper. The specifications relative to format and grammage in the "Specifications" chapter must be complied with.
- The machine is intended exclusively for one-man operation.
- The machine is intended exclusively for operation in a flawless technical state. Any failures that may endanger safety must be remedied immediately by trained personnel, or a specialist from the manufacturer or supplier.
- The machine must be operated by specially trained and instructed personnel only.
- Troubleshooting, maintenance and service must be carried out by trained maintenance personnel only.
- Observe all instructions in this operating manual.
- Observe the local safety and accident prevention regulations.
- Adhere to the inspection and maintenance intervals.
- Use only original wear and spare parts.



IMPORTANT!

Use the machine only as intended and with the safety system in a flawless state.

This is the only way to guarantee the machine's operating safety.

2.2 Reasonably foreseeable misuse

Any use other than that defined under the "intended use" or extending beyond this shall be considered non-intended use!

The owner/operator bears sole responsibility

- for damage resulting from non-intended use;
- the manufacturer assumes no liability.



IMPORTANT!

Non-intended use may result in risks.

Non-intended uses are, e.g.,

- operation in an explosive environment
- exceeding the technical values defined for normal operation.

Modifications and changes:

In the event of any unauthorized modifications and changes to the machine, the manufacturer is cleared of all liability and warranty!

The electromagnetic compatibility (EMC) of the machine can be impaired by additions or changes of any kind.

Therefore do not undertake any changes or additions to the machine without consultation and written approval of the manufacturer.

Spare and wear parts:

Use of spare and wear parts from third-party manufacturers can lead to risks. Use only original parts or parts approved by the manufacturer.

The manufacturer assumes no liability for damage resulting from use of any spare and wear parts not approved by the manufacturer.

2.3 Warranty and liability

Our "General terms and conditions" apply here.

Any claims based on warranty and liability for personal injuries and damage to property shall be excluded if they are attributable to one or several causes as follows:

- Non-intended use of the machine.
- Improper assembly, start-up, operation or maintenance of the machine.
- Operation of the machine with safety and protective devices that are not attached or defective.
- Failure to comply with the instructions in the operating manual regarding transport, installation, initial operation, operation, installation, maintenance, and storage of the machine.
- Individual constructional changes to the machine.
- Non-observance of maintenance and cleaning intervals which exclude a machine downtime
- Insufficient monitoring of machine parts that are subject to wear, such as belts, tapes, brushes, and couplings.
- Installation of spare and wear parts that have not been provided by the manufacturer.
- Cases of catastrophe and acts of God.

2.4 Risks in handling the machine

The machine is built using the latest technology and according to acknowledged safety rules.

Nonetheless risks and damage can occur when using it:



- to the body and life of the operator or third parties,
- to the machine itself,
- to other property.

If the machine is:

- operated by untrained or uninstructed personnel,
- not used according to its intended use,
- not or improperly maintained or serviced.

The machine must only be used:

- For the intended use.
- If it is in perfect condition with respect to safety.
Any interference that may have a negative effect on safety shall be eliminated immediately.

2.5 Residual risks

A risk analysis with risk assessment (DIN EN ISO 14121) was carried out for this machine.

The existing residual risks, corresponding to the various lifecycle phases of the machine, are listed in the following chapters.

Avoid existing residual risks by observing and implementing the:



- warnings and safety messages on the machine,
- general safety instructions and special warnings in this operating manual,
- operating instructions of the owner/operator.

2.5.1 Transport, interim storage



- Danger due to the use of unsuitable fork lifts.
- Danger from tipping machine parts while unloading and installing the machine.
- Danger due to insufficient properties and condition of the underfloor.
- Danger from incorrect storage.

2.5.2 Installation, initial operation



- Danger due to the use of unsuitable fork lifts.
- Danger of tipping machine parts during unloading and installation.
- Danger due to insufficient properties and condition of the underfloor.
- Danger due to improper alignment of the machine components.
- Danger when lifting heavy machine parts (control cabinet, pumps, buckle plates, slitter shafts, etc.).
- Danger due to electrical voltage.
- Danger due to incorrect power supply voltage.
- Danger from leakage currents greater than 10 mA.
- Danger from disconnected ground wire connections.
- Danger due to incorrect direction of rotation of the main drive motor.
- Danger due to improper initial operation.
- Danger of tripping on cables lying about.

2.5.3 Adjustment and operation



- Danger when dismantling, bridging or avoiding safety and protective devices.
- Danger when moving the pile table.
- Danger due to rotating machine element
- Danger from incorrect handling of the safety handwheels.
- Danger due to sound pressure
- Danger due to paper jam.
- Danger of tripping on cables lying about.

- Danger through using several adapter boxes in one machine assembly.

2.5.4 Maintenance



Cleaning:

- Danger due to heavy contamination.
- Danger when lifting heavy machine parts (buckle plates, slitter shafts, etc.)
- Danger due to improper use of cleaning agents.
- Danger due to cleaning cloths used.
- Danger due to improper cleaning.
- Danger due to wrong maintenance, greasing and cleaning intervals at multishift operation.



Maintenance:

- Danger due to electrical voltage.
- Danger when dismantling, bridging or avoiding safety and protective devices.
- Danger due to improper maintenance.
- Danger due to running machine parts during maintenance and repair.
- Danger of crushing injuries during maintenance and repair work
- Danger due to maintenance tools.
- Danger of being drawn in.
- Danger due to wrong maintenance, greasing and cleaning intervals at multishift operation.

2.5.5 Shutdown, storage



- Danger from incorrect storage.

2.5.6 Disposal



- Danger from incorrect disposal.

2.6 Life time of the machine

The life time of this machine is designed for 20 years.

2.7 General safety instructions

2.7.1 Transport, interim storage

- Only specially-trained and authorized personnel may transport the machine.



2.7.2 Installation, initial operation

- Only specially-trained and authorized personnel may install and commission the machine.



2.7.3 Normal operation

- Only instructed operating personnel may operate the machine.
- The machine may be operated only if all safety devices, such as protective hoods and EMERGENCY STOP palm buttons, are present and fully functional.
- At least once per shift, the machine must also be checked for externally-visible damage. Changes, including to the operating behavior, must be reported immediately.
- Machine parts may not be used as climbing aids. If higher parts of the machine must be reached, a suitable working stage or other platform must be used, it must correspond to the safety requirements, e.g. with respect to height, stability, etc.



2.7.4 Setting up/equipping

- Only specially-trained and authorized personnel may set up the machine.
- Inform the operating personnel before beginning set-up.
- If the machine is switched off for set-up, it must be secured against being switched on again without authorization or inadvertently. Use a padlock to secure the main switch against switching-on. If necessary, attach a danger sign on the main switch.
- Machine parts may not be used as climbing aids. If you need to reach higher-up machine parts, use a suitable working stage or other platform. Make sure that it corresponds to the safety requirements, e.g. with respect to height, stability, etc.



- If larger components or parts are replaced, corresponding lift equipment must be used to transport the components. Only use suitable and technically-perfect lift equipment and load suspension devices with sufficient carrying capacity. Secure components or parts so that they present no hazard.
Do not linger or work under hanging loads.
- After completion of the work, do not leave any tools or other loose objects lying on the machine.

2.7.5 Maintenance and repair



- Maintenance and repair work must be carried out by specially trained personnel only.
- Inform operating personnel before beginning maintenance and service work. Secure the service area if necessary.
- For all maintenance and service work, observe the switch-on and off procedures according to the operating manual.
- Observe prescribed maintenance and service intervals according to the operating manual.
- If the machine is switched off for maintenance and/or repair work, it must be secured against being switched on again without authorization or inadvertently. Use a padlock to secure the main switch against switching-on. If necessary, attach a danger sign on the main switch.
- If it is necessary to dismantle safety devices for maintenance and service work, the safety devices must be reattached immediately after the work is completed and their function checked.
- After completion of the work, do not leave any tools or other loose objects lying on the machine.
- All operating materials and consumables as well as spare parts that are no longer required must be disposed of safely and in an environmentally friendly manner.

2.7.6 Work on electrical equipment



- Work on electrical machines or controls may only, in accordance with electrotechnical rules, be performed by a qualified electrician or by trained people under the direction and supervision of a qualified electrician.
- In case of disturbances in the electrical power supply, switch the machine off immediately.
- Only use original fuses with the prescribed amperage.
- Machine parts on which maintenance or service work must be performed must - if prescribed - be de-energized. Check the isolated parts to make sure they are de-energized, then ground and short-circuit them. Isolate adjacent parts that are energized.
- The electrical equipment of a machine must be checked regularly. Defects such as loose connections or singed cable must be eliminated immediately. If work on voltage-conducting parts is necessary, a person must be brought in who can activate the main switch in case of emergency.
- Only use insulated tools.

2.8 Obligations of the owner/operator

The owner/operator is responsible for

- the machine being operated only as intended,
- the machine being operated only when it is fully functional, safe and reliable,
- the machine being maintained and cleaned according to the specifications in the maintenance and cleaning schedule,
- the machine being protected from unauthorized use,
- the necessary personal protective equipment being available,
- the necessary personal protective equipment being worn,
- only authorized personnel having access to the machine,
- the authorized personnel being adequately qualified,
- the authorized personnel being instructed in all applicable questions of workplace safety, accident prevention, and environmental protection,
- the authorized personnel having read and understood the operating manual,
- the operating manual always being kept at the machine's final destination and being freely accessible for the operating and maintenance personnel,
- the safety and information symbols on the machine being in a legible state,
- a risk assessment of the entire machine system being carried out and its results being summarized in operating instructions,
- identified defects or abnormal operating states/malfunctions being remedied immediately,
- operation of the machine being ceased during troubleshooting.

The requirements of the EC Directive for use of equipment 2007/30/EC must be complied with.

2.9 Obligations of the personnel

2.9.1 Operating personnel

The operating personnel must:

- be trained and instructed,
- use the machine as intended,
- wear the necessary personal protective equipment,
- observe the basic regulations regarding workplace safety and accident prevention,
- read and observe the safety chapter and the safety instructions in this operating manual,
- immediately put the machine out of operation in the event of defects or abnormal operating states/malfunctions,
- immediately report any identified defects or abnormal operating states/malfunctions.

The operating personnel is responsible for

- the machine being protected from unauthorized use,
- the machine being operated only when it is fully functional, safe and reliable,
- the cleaning being carried out according to the cleaning schedule.

2.9.2 Maintenance personnel

The maintenance personnel must:

- be trained and instructed,
- use the machine as intended,
- wear the necessary personal protective equipment.

The maintenance personnel is responsible for

- the machine being protected from unauthorized use,
- the maintenance being carried out according to the maintenance schedule.

2.10 Qualification of personnel

All activities at or on the machine must be carried out by authorized personnel only.

The authorized personnel must:

- have reached the age of 16,
- know and be able to apply the accident prevention regulations and safety instructions for the machine,
- have read Chapter "2 Basic safety instructions" and be able to apply and implement it in practice,
- be trained and instructed according to the rules of conduct in the event of a fault,
- have the physical and mental abilities to carry out his or her responsibilities, tasks, and activities at or on the machine,
- be trained and instructed in accordance with his or her responsibilities, tasks, and activities at or on the machine,
- have understood the operating manual and be able to implement it in practice with respect to his or her responsibilities, tasks, and activities at or on the machine.

This table lists the necessary qualification of the personnel related to the various activities at or on the machine.

	Specially trained personnel	Instructed operating personnel	Instructed personnel with specialized training (mechanical/electrical engineering)
Transportation	X	-	-
Interim storage	X	-	-
Installation	-	-	X
Electrical connections	-	-	X
Network connection	-	-	X

Table 6: Qualification of personnel
 Legend: X permitted, - not permitted

	Specially trained personnel	Instructed operating personnel	Instructed personnel with specialized training (mechanical/electrical engineering)
Starting up	-	-	X
Troubleshooting (mechanical/electrical)	-	-	X
Installation, retrofiting	X	X	-
Operating	-	X	-
Operational maintenance	-	X	-
Maintenance	X	-	X
Repair	-	-	X
Shutdown	-	-	X
Storage	X	-	-
Disposal	X	-	-

Table 6: Qualification of personnel
 Legend: X permitted, - not permitted

2.11 Personal protective kit

2.11.1 Operating personnel

The owner/operator must provide the operating personnel with the following personal protective equipment:



- Hearing protection
- Cut-resistant safety gloves
- Safety shoes

2.12 Safety and protective devices

2.12.1 Overview

The following safety and protective devices are present at or on the machine.



IMPORTANT!

Operate the machine only if all safety and protective devices are completely present and fully functional!



Figure 2: Overview

2.12.2 Main switch

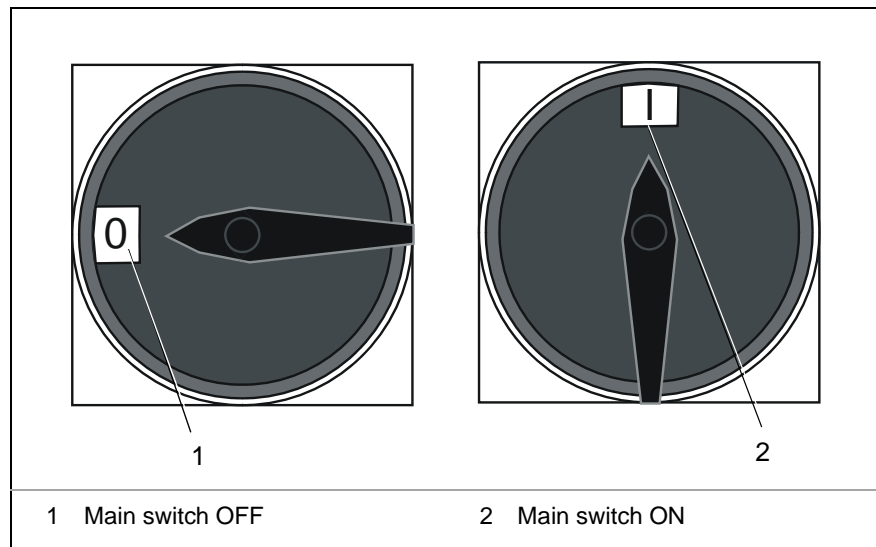


Figure 3: Main switch

The main switch has the following properties:

- it disconnects the machine from the electrical supply,
- it has only one OFF and one ON position, labeled as 0 and I,
- it is equipped with a device that enables it to be locked in the OFF position (e.g. by a padlock).



When the main switch is switched OFF during production:

- the machine is stopped,
- the drives gradually run down,
- no emptying of the sheets takes place.

2.12.3 EMERGENCY STOP palm button

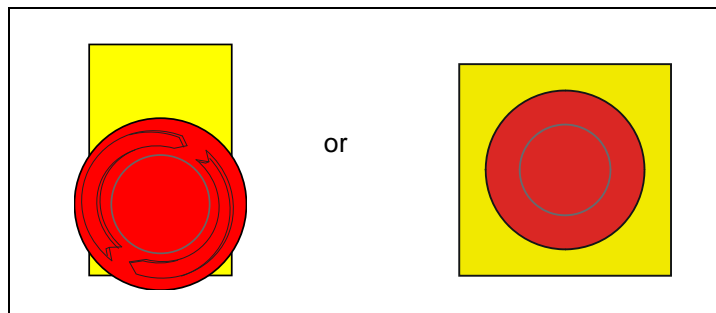


Figure 4: EMERGENCY STOP palm button

The machine is in operation.



IMPORTANT!

To prevent immediate or potential hazards, the machine is equipped with an EMERGENCY STOP shut-off device. After the <EMERGENCY STOP> palm button is pressed, all electrical drives are switched off. EMERGENCY STOP does not disconnect the machine from the electrical supply.

There is a hazardous situation and the machine must be stopped quickly.

Procedure:

- ▷ Press the EMERGENCY STOP palm button (1).
- ▷ Eliminate the failure.
 - Ensure that in this situation, the machine is not switched on again accidentally.
- ▷ Disengage the EMERGENCY STOP palm button by turning it towards the right.
 - The machine is ready for operation.



When the EMERGENCY STOP palm button is pressed, the machine is stopped immediately.
No emptying of the sheets takes place!

2.12.4 Noise damping hood



CAUTION!

Danger due to sound pressure

Non-observance may cause hearing problems.

- Always wear hearing protection whenever you work at or on the machine.
- Always close the noise damping hoods whenever you work at or on the machine.

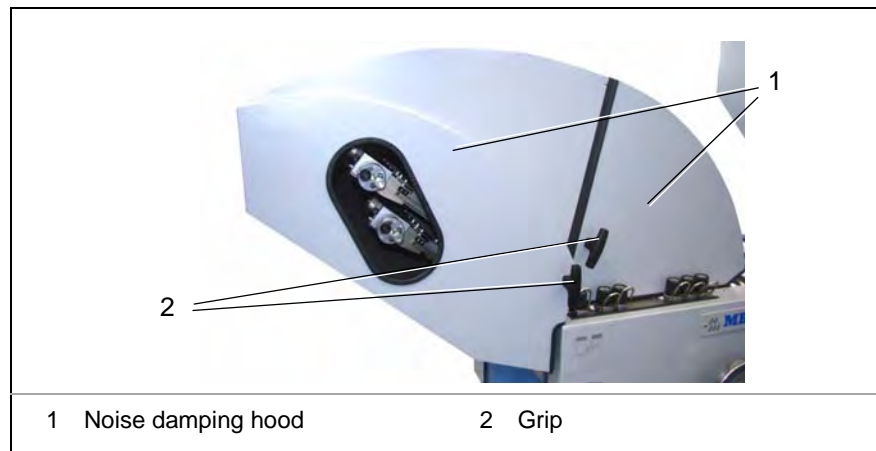


Figure 5: Noise damping hood



IMPORTANT!

The noise damping hoods have the following function:

- they cover the entire parallel fold,
- they reduce the noise to the values specified in the "Specifications".

During the folding process a high sound pressure develops in the folding machine.

This high sound pressure can lead to hearing loss.

In order to avoid hearing loss:

- ▷ Always wear hearing protection whenever you work at or on the machine.
- ▷ Always close the noise damping hoods whenever you work at or on the machine.

Handling

Procedure:

- ▷ When opening and closing the noise damping hoods, always do so using the handle (2).
- ▷ Always open the noise damping hoods up to the limit stop.

2.12.5 Slitter shaft guard



WARNING!

Danger at the slitter shaft guard.

Non-observance may possibly cause serious personal injuries or even death.

Even when closed, the slitter shaft guard does not provide 100% protection against the sharp knives touching the slitter shafts.

Never reach into the slitter shafts while the machine is running!

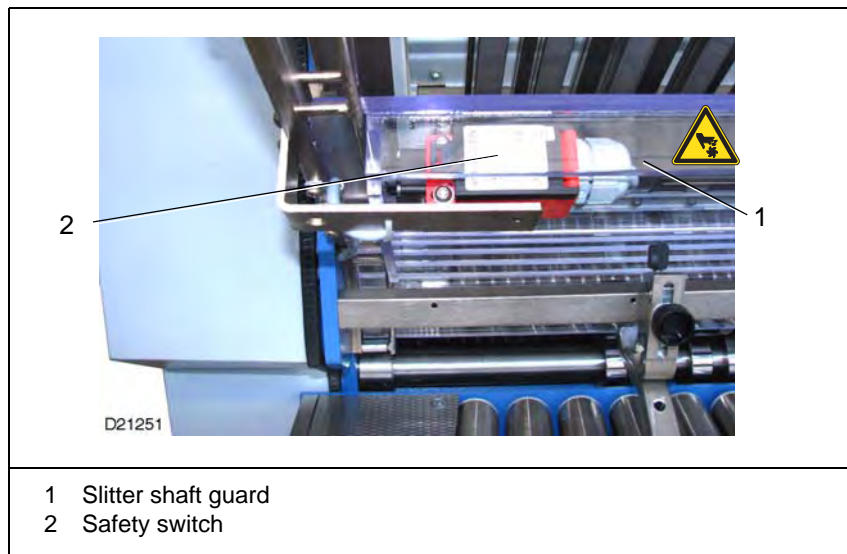


Figure 6: Safety switch for slitter shaft guard



IMPORTANT!

The slitter shaft guard has the following function:

- it prevents access to the hazardous infeed points of the foldrollers while the machine is running,
- it prevents access to the sharp knives on the slitter shafts only partially while the machine is running.

Check that the safety switch (2) functions correctly:

- When opening the slitter shaft guard (1) during production mode, the safety switch (2) stops the drive of the machine.
- When the slitter shaft guard is open, the machine cannot be started.

2.12.6 Additional protective devices

Additional protective devices are present on the machine.

These protect the operator from hazard areas such as:

- rotating machine parts, e.g., drives, shafts
- infeed points
- pinch points
- etc.

The function and position of the corresponding protective device is listed in the "Safety and protective devices" checklist.

See Chapter "2.12.9 Checklist for safety and protective devices".

2.12.7 Faulty safety and protective devices

Faulty safety and protective devices can lead to hazardous situations.

For this reason:

- ▷ Switch off the machine at the main switch immediately,
- ▷ secure it against being switched on again,
- ▷ if necessary, disconnect the supply of compressed air and electrical current.
- ▷ Immediately repair faulty safety and protective devices.

2.12.8 Checking safety and protective devices

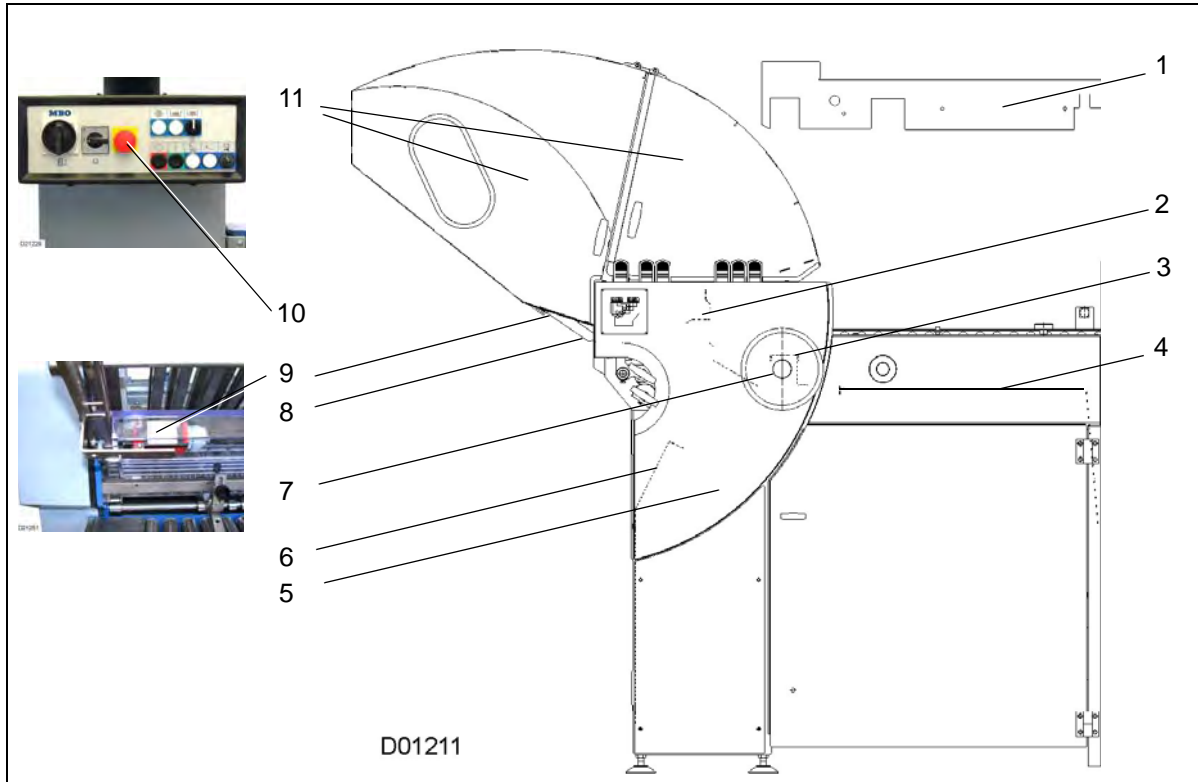
All safety and protective devices must be checked regularly.

For the corresponding inspection intervals, see Chapter "2.12.9 Checklist for safety and protective devices"

For the corresponding procedure, see the Maintenance chapter

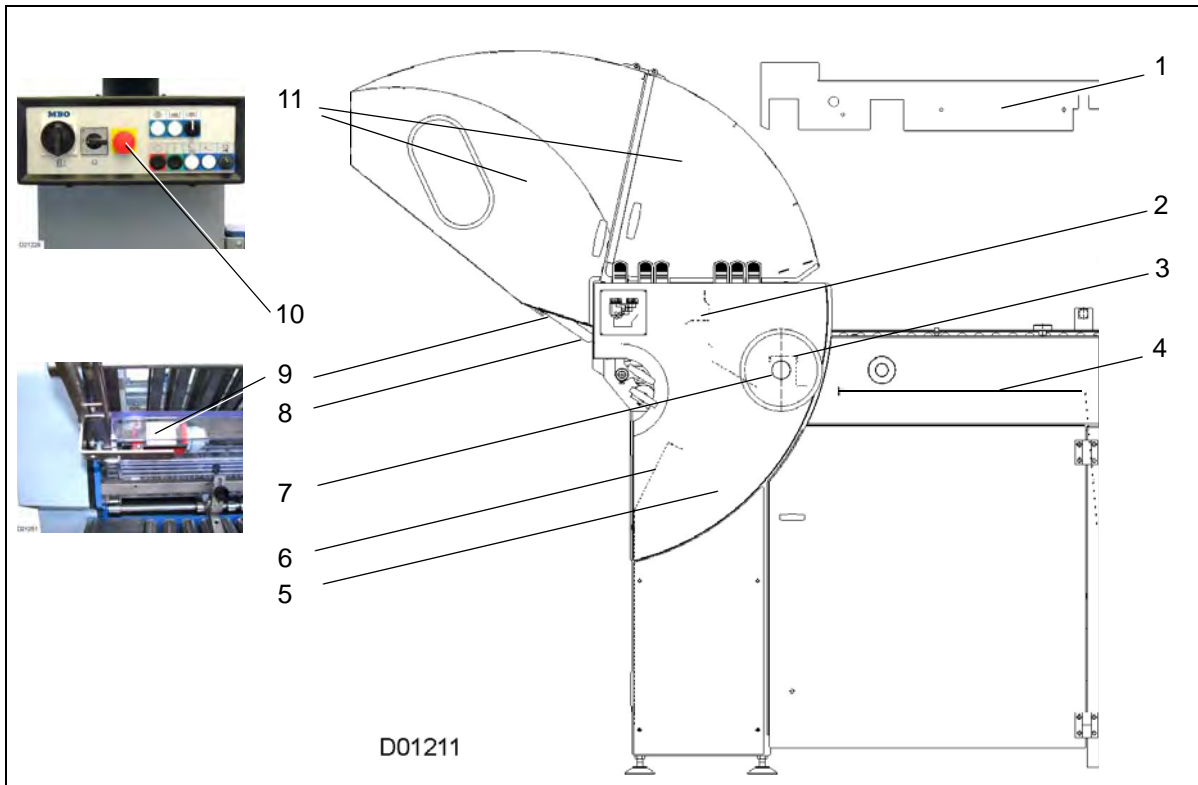
2.12.9 Checklist for safety and protective devices

Use this checklist to check the safety and protective devices of the machine regularly



Pos.	Description	Functionng control	Visual inspection	Result	Inspection interval
1	Guard above the suction wheel drive belt				Weekly
2	Guard above the foldrollers				Weekly
3	Guard above the handwheel shaft in the register table (2-piece).				Weekly
4	Guard below register table				Weekly
5	Guard of parallel fold (drive side, operator side)				Weekly
6	Guard below parallel fold				Weekly
7	Protective bushing above hand-wheel shaft				Weekly
7	Safety handwheel (drive side, operator side)				Weekly

Table 7: Checklist for safety and protective devices



D01211

Pos.	Description	Functioning control	Visual inspection	Result	Inspection interval
8	Guard on slitter shafts (All fastening and stop screws must be safety screws.)				Daily
9	Safety switch on the slitter shaft guard				Daily
	All safety screws are secured with screw locking (e.g. Loctite 222). Not marked in the figure				
10	EMERGENCY STOP palm button on the control console				Daily
11	Noise damping hood (2-piece) above parallel fold				Daily
Date::		Name:		Signature::	

Table 7: Checklist for safety and protective devices

2.13 Warnings and safety instructions on the machine

Warnings and safety instructions for observing the residual risks are attached to the machine.

- If warning and safety labels become damaged or illegible, they must be replaced.
- For the corresponding MBO part number, refer to Chapter "2.13.2 Position and meaning".

2.13.1 Overview

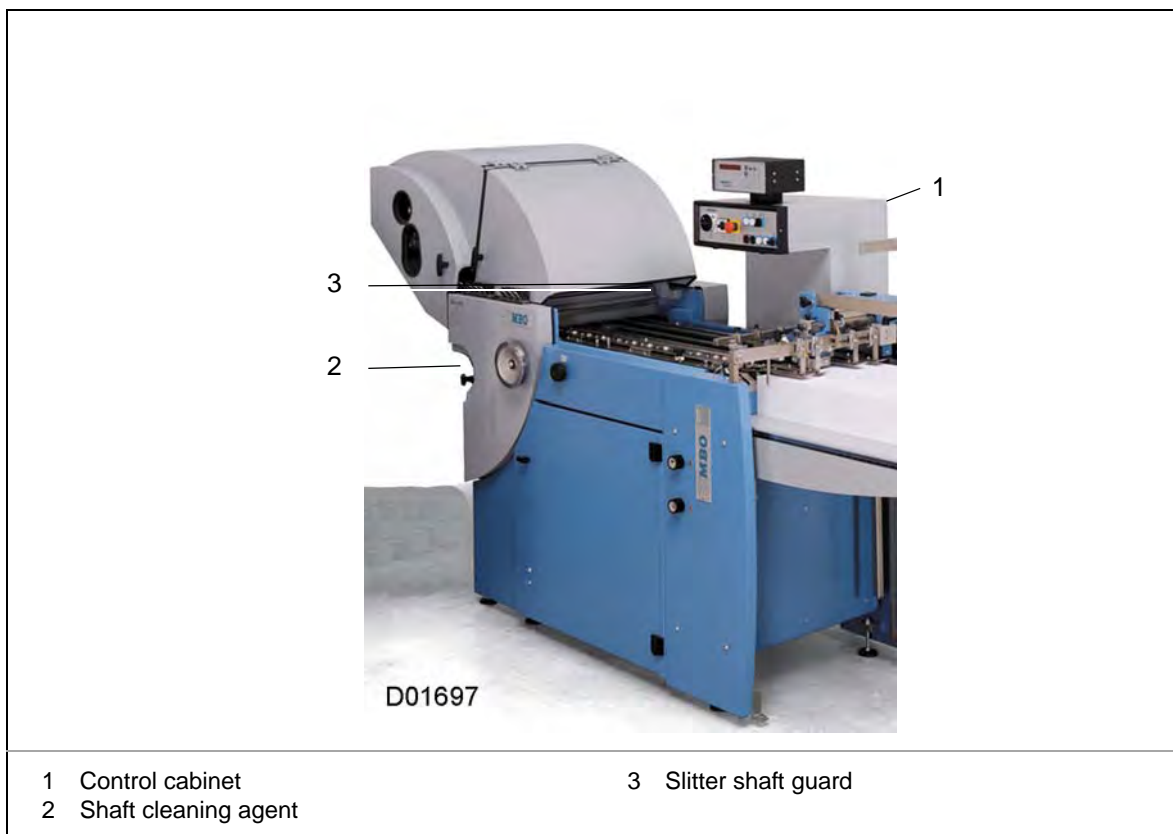

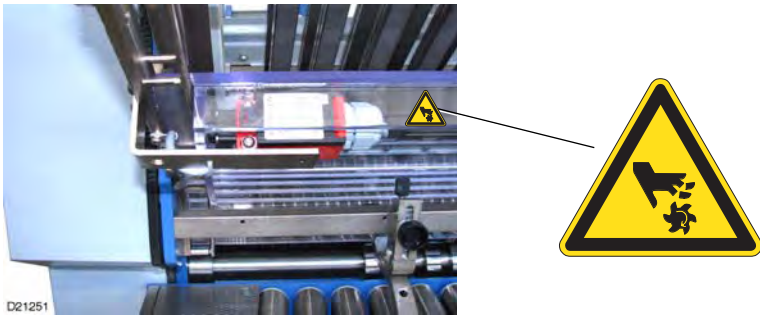


Figure 7: Overview of warnings

2.13.2 Position and meaning

Pos. 01 Control cabinet	MBO part No.: 018301
	
<p>Meaning: Danger due to electrical voltage. Non-observance may cause serious injuries or even death.</p> <ul style="list-style-type: none"> • Work on the electric components of the machine may only be performed by a qualified electrician. • Observe the local occupational safety regulations and electrotechnical regulations. • Even when the main switch is switched off, hazardous electrical voltage is present at the power supply terminals and/or the terminals of the main switch. (See wiring diagram) • There is hazardous electric residual voltage on the supply terminals of the frequency inverter even when the main switch is switched off. (Observe the capacitor discharge time (KEB 5 min, Telemecanique 15 min)). 	

Pos. 02 Slitter shaft guard	MBO part No.: 0100700
	
<p>Meaning: Danger due to slitter shafts. Even when closed, the slitter shaft guard does not provide 100% protection against the sharp knives touching the slitter shafts. Non-observance may possibly cause serious personal injuries or even death Never reach into the slitter shafts while the machine is running!</p>	

Pos. 03 Shaft cleaning agent

MBO part No.: 0751412



Meaning:

Danger from incorrect cleaning agents for the foldrollers.

Non-observance may cause property damage.

To clean the foldrollers, use Varn-wash VM-111 or VWM only.

2.14 Workplaces and space requirements for operating personnel

The machine is intended exclusively for operation by one person.

The illustration shows the most important workplaces and the work and service area of the machine.

The most important workplaces are:

- Workplace at the feeder
- Workplace at the delivery

The work areas necessary for operation, installation, initial operation, and maintenance are shaded gray and should be at least 100 cm (3ft 4 in.).

The additional work area needed for service is shaded with hatching.

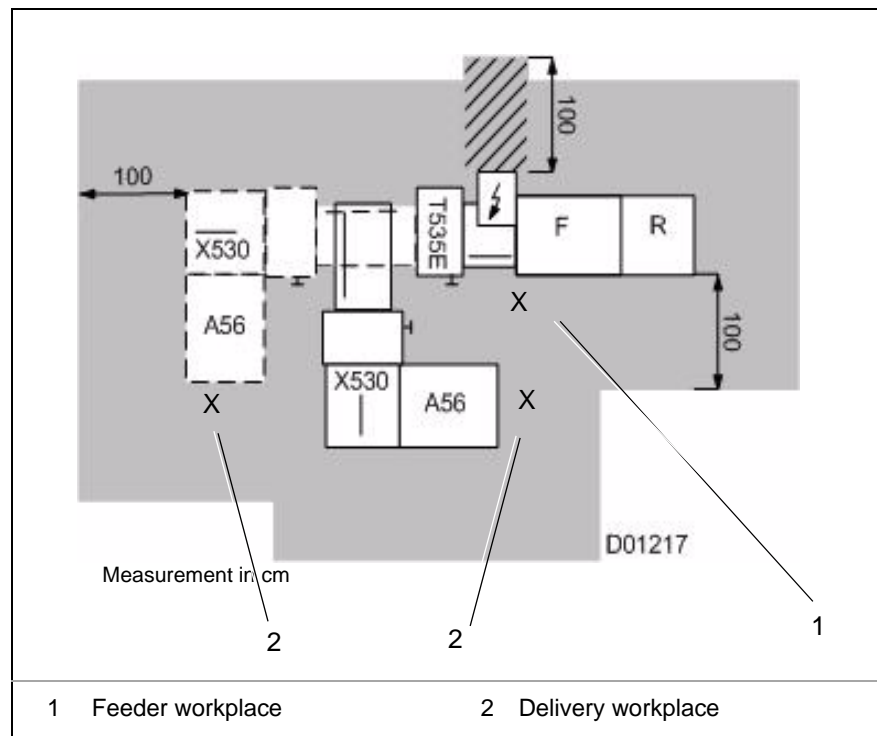


Figure 8: Work and service area

2.15 Directions for emergencies

The owner/operator must complete this operating manual with information with respect to federal and national regulations concerning accident control and prevention.

3 Product description

3.1 Important notices about the product

3.1.1 Overall view

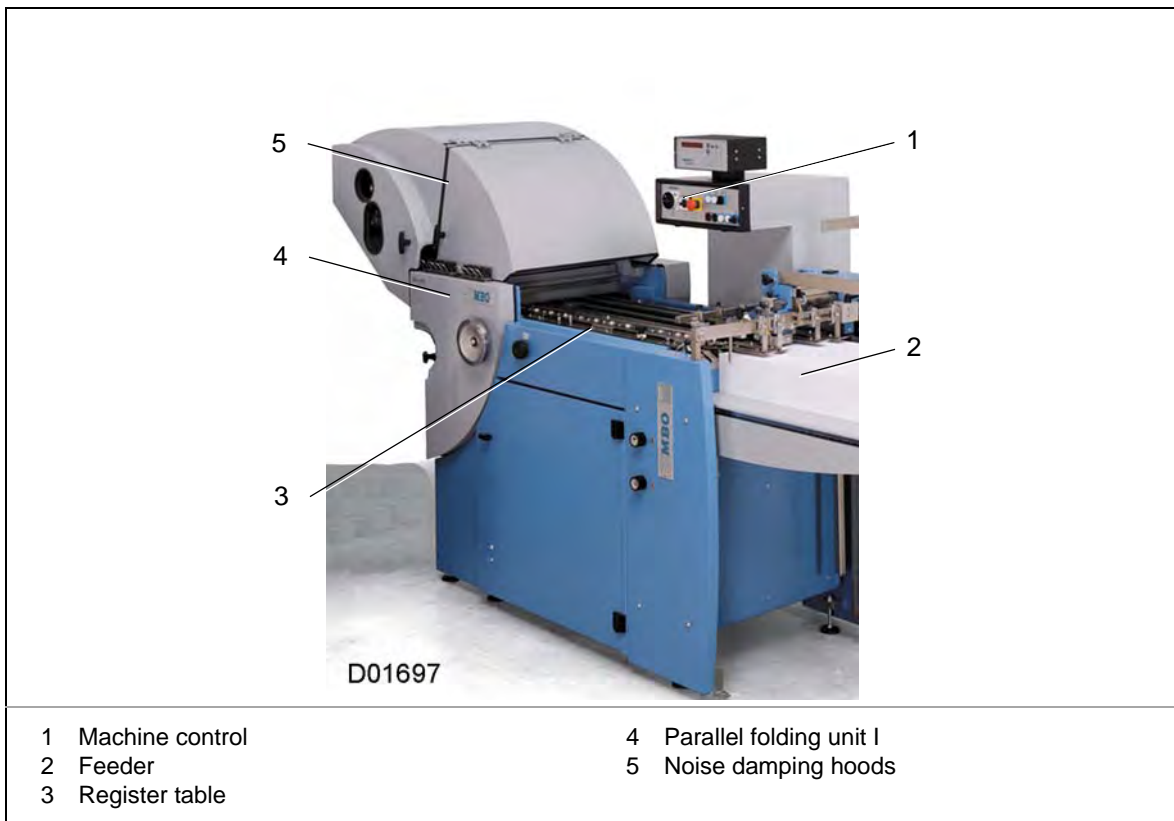


Figure 9: Overall view

Standard equipment

- MS machine control system
- Sheet feed via suction wheel
- Register table with lattice
- Sheet alignment via marble rail
- 4 stainless steel buckle plates with swing deflectors
- Belt drive system, low maintenance, quiet
- Spiral foldrollers with standard PU roller surface covering
- Slitter shafts, stainless, easily replaced with plug bearings.
- Scoring, perforating and slitting devices for standard jobs

3.2 Technical data

3.2.1 Floor plan, configuration 44X

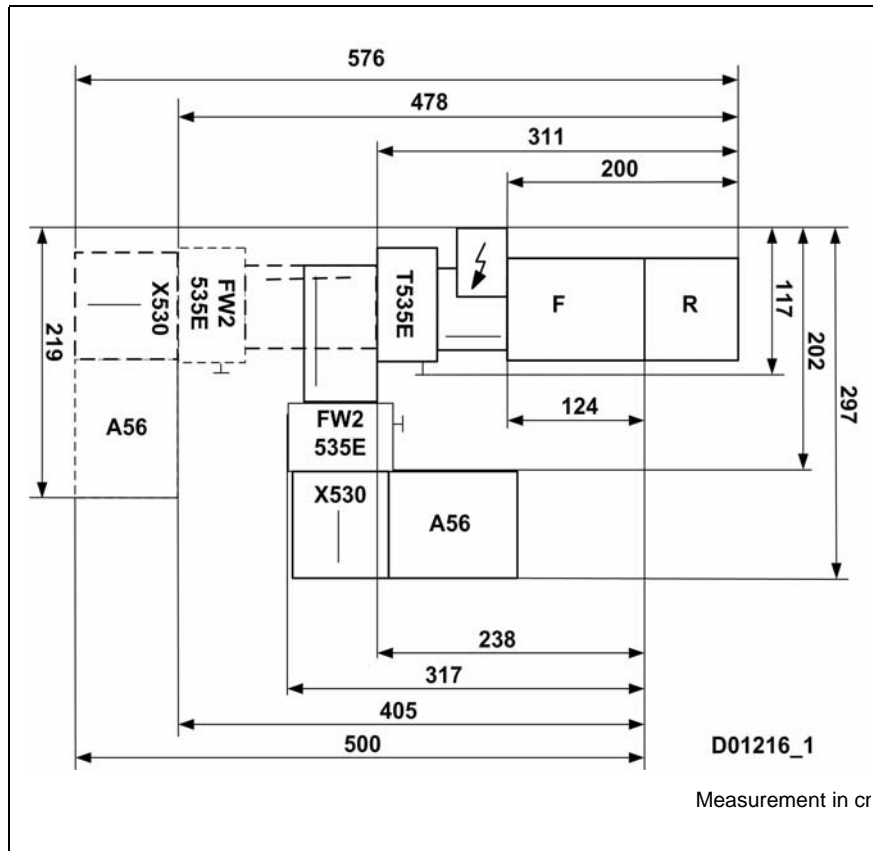


Figure 10: Floor plan T535 E 44X

3.2.2 Characteristics

Speed		Minimum	¹⁾Maximum
	MS-Control	10 m/min	205 m/min
Sheet paper	Format (length x width)	Minimum	Maximum
	pile feeder	10.5 cm x 10.5 cm	53 cm x 84 cm
	Pile feeder with VACUSTAR	15 cm x 15 cm	53 cm x 84 cm
	Continuous feeder:	15 cm x 18 cm	53 cm x 84 (100) cm
	Grammage ²⁾	Minimum	Maximum
		50 g/m ²	250 g/m ² 1st fold 200 g/m ² 2nd fold 175 g/m ² 3rd fold 130 g/m ² 4th fold
Buckle plates	Fold length	Minimum	Maximum
	Standard buckle plate 1+2	3.6 cm	55 cm
	Standard buckle plate 3-6	3.6 cm	47 cm
	Combi buckle plate 1+2	3.6 cm	50 cm
	Combi buckle plate 3-6	3.6 cm	42 cm
	Gatefold plate	3.6 cm	38.5 cm
Slitter shafts	Diameter:		30 mm
	Minimal cutting and perforation length	6.2 cm	
Foldrollers	Diameter:		39.7 mm

Table 8: Characteristics

1) The maximum work speed is influenced by paper properties, format, fold type, temperature, and humidity as well as various circumstances by the operator that the manufacturer cannot influence.

2) All values refer to simple volume paper.

3.2.3 Emissions

Airborne sound emission	Emission sound pressure level (L_{pA}) ¹⁾	Workplace at the register table	87 dB
		Workplace at the delivery	86 dB
	Sound power level (L_{WA}) ²⁾	-	104 dB

Table 9: Emissions

1) Noise measurement procedure according to EN 13023:2004

2) Determination of the sound power level according to EN ISO 3746:1995.

3.2.4 Weights, fork lifts, and floor requirements

Weight		Net	Gross¹⁾
	T535/4 with pile feeder ²⁾	750 kg	1030 kg
	T535/6 with pile feeder ³⁾	800 kg	1080 kg
	T535/4 without feeder ⁴⁾	460 kg	740 kg
	T535/6 without feeder ⁵⁾	500 kg	780 kg
Dimensions	Pallet/shipping crate		
	T535 with pile feeder	275 x 120 x 145 (cm)	
	T535 without feeder	200 x 120 x 150 (cm)	
Fork lift⁶⁾		T535 with pile feeder	T535 without feeder
	Carrying capacity / load (Q) ⁷⁾	Min. 2500 kg	Min. 1500 kg
	Fork tine length	Min. 200 cm	Min. 120 cm
Floor requirements	Cargo ⁸⁾	> 11 kN/m ²	
	Levelness ⁹⁾	< 10 mm/m	

Table 10: Weights, fork lifts, and floor requirements

1) Machine with pallet/with shipping crate + 50 kg

2) With noise damping hood and 4 buckle plates

3) With noise damping hood and 6 buckle plates

4) With noise damping hood and 4 buckle plates

5) With noise damping hood and 6 buckle plates

6) Minimum requirements of the fork lift

7) Observe the operating manual of the fork lift; load capacity depends on the load center (c)

8) Minimum carrying capacity of the floor in the installation location

9) In the area of the machine, the total height difference may not exceed 10 mm.

3.2.5 Supply



- The machine was designed for one of the nominal voltages listed below.
- Even under load, the actual supply voltage must not deviate from the nominal voltage by more than the permitted tolerance.

Power supply	Wiring diagram no.:		
Nominal voltage 3 x 400 V + N + PE ¹⁾	Required power system: ²⁾	TN - C - S - network TN - S - network	Clockwise rotating field required.
	Voltage:	400 V AC	+/-10 %
	Frequency:	50 Hz	+/-1 %
Power ratings:	Fuse: ³⁾	32 A	
	Folding unit 1 ⁴⁾	5 kW	
	Folding unit 1 ⁵⁾	4.5 W	

Table 11: Electrical supply 400 V power supply

1) If the existing nominal voltage deviates from the supply voltage specified above, an isolating transformer must be installed.

If the nominal voltage is 380 V or 415 V at 50 Hz, the tolerance of the power supply must be checked.

If the tolerance is between 360 V – 440 V, an isolating transformer is not required.

2) Stationary power supply, N conductor is loaded; a ground fault circuit interrupter (GFCI) must not be used.

3) Maximum fuse protection of the supply cable at 400 V

4) With pile feeder

5) With continuous feeder

Power supply	Wiring diagram no.:		
Nominal voltage 3 x 220 V + PE ¹⁾	Required network configuration ²⁾	TN - C - power mains	Clockwise rotating field required
	Voltage	220 V AC	+/-10 %
	Frequency	60 Hz	+/-1 %
Power ratings:	Fuse: ³⁾	32 A	
	Folding unit 1 ⁴⁾	5 kW	
	Folding unit 1 ⁵⁾	4.5 W	

Table 12: Electrical supply 220 V power supply

1) If the existing nominal voltage deviates from the supply voltage specified above, an isolating transformer must be installed.

If the nominal voltage is 210 V or 230 V at 60 Hz, the tolerance of the power supply must be checked.

If the tolerance is between 200 V – 240 V, an isolating transformer is not required.

2) Stationary power supply, a ground fault circuit interrupter (GFCI) must not be used.

3) Maximum fuse protection of the supply cable at 220 V

4) With pile feeder

5) With continuous feeder

Compressed air supply	-	-
Power ratings	Necessary network pressure:	-
	Average consumption: ¹⁾	

Table 13: Compressed air supply

1) Required volume flow according to ISO 1217 or DIN 1945

3.2.6 Ambient conditions

Operating temperature:		17 – 35 °C
Storage temperature:		10 – 35 °C
Relative humidity	Optimal Minimum Maximum	40 - 60 % 30 % 80 % (non-condensing)
Installation altitude¹⁾		Max. 1500 m over N. N.

Table 14: Ambient conditions

1) For installation at an altitude of 1500 m above sea level or higher, special measures are necessary. Learn more about this from the manufacturer.

4 Structure and function

4.1 Introduction

4.1.1 What is folding?

Folding is to bend a prepared or unprepared bend location along a straight line with a sharp edge according to the defined measurements and a pre-determined pattern using pressure.

According to bookbinding terminology, the folding line is called fold.

4.1.2 Folding principles

Buckle folding principle

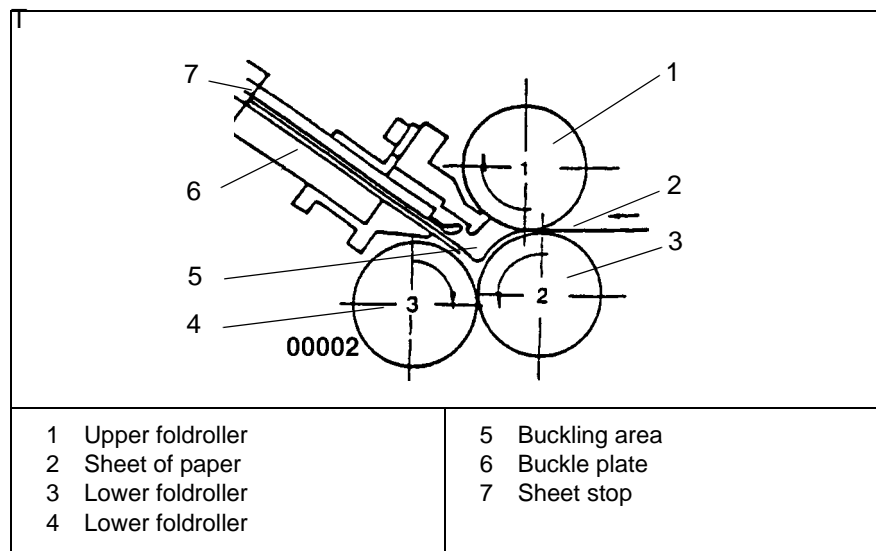


Figure 11: Buckle folding principle

To create a buckle fold, 3 foldrollers and a buckle plate are necessary.

- The foldrollers (1) and (3) transport the sheet of paper (2) into the buckle plate (6) up to the sheet stop (7).
- During further transport through the foldrollers (1) and (3) a buckle arises in the buckling area (5).
- The sheet of paper (2) is grasped on the buckle fold by the foldrollers (3) and (4) folded during its passage.

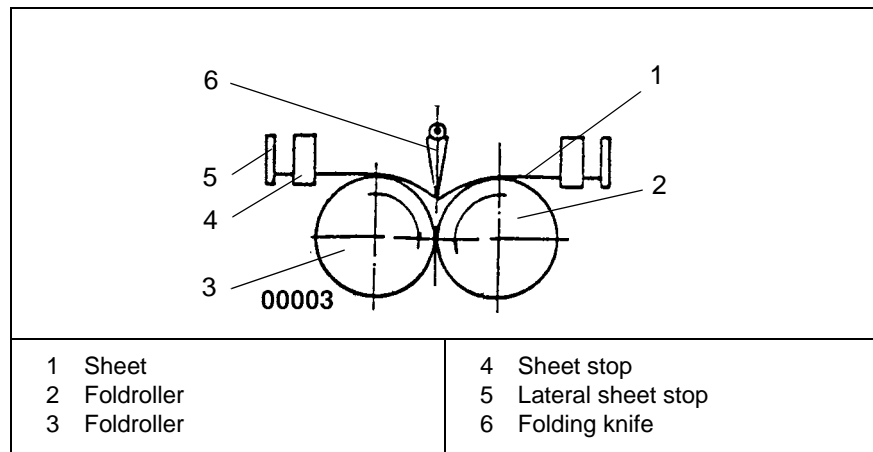
Knife folding principle:


Figure 12: Knife folding principle

To create a knife fold, two foldrollers rotating in opposite directions and a folding knife that can be moved vertically are required.

- The sheet of paper (1) is transported under the folding knife (6) to the sheet stop (4) and aligned by the lateral sheet stop (5).
- After triggering the knife movement, the folding knife conveys (4) the sheet of paper (1) in the direction of the foldrollers (2) and (3).
- The sheet of paper (1) is grasped by the foldrollers (2) and (3) folded during its passage.

4.1.3 Buckle folding machine

Buckle folding machines operate exclusively according to the buckle fold principle.

This results in the following advantages:

- Great versatility of the machine
- Large number of fold variants
- Increasing of effective output.

Structure:

- Buckle folding machines are designed according to a modular system.
- Common configurations have two to four movable folding units that can be alternatively set into the cross fold or parallel fold position.
- Each folding unit has two to six buckle plates which are aligned upwards and downwards in alternation.
- For special jobs (e. g. folding maps), there are also folding stations with up to 12 buckle plates.
- All buckle plates can be closed or replaced via sheet deflectors, which means that there is no folding taking place at this location.
- The position of the fold is defined by adjusting the sheet stop.
- The foldroller distance, inner width, buckling area and stop angle are adjustable. They can be adapted according to the particular circumstances.

The sheet is transported between the folding units via:

- Corner-conveyor tables with inclined transport rollers and marble rails/ conical rails.
- The sheet is aligned by force on the side limit stop rails.

Delivery:

- After each folding unit.

Buckle folding machines can be used for:

- Book and booklet production
- Mailings, brochure folding and maps.

4.2 Structure

4.2.1 Overall view

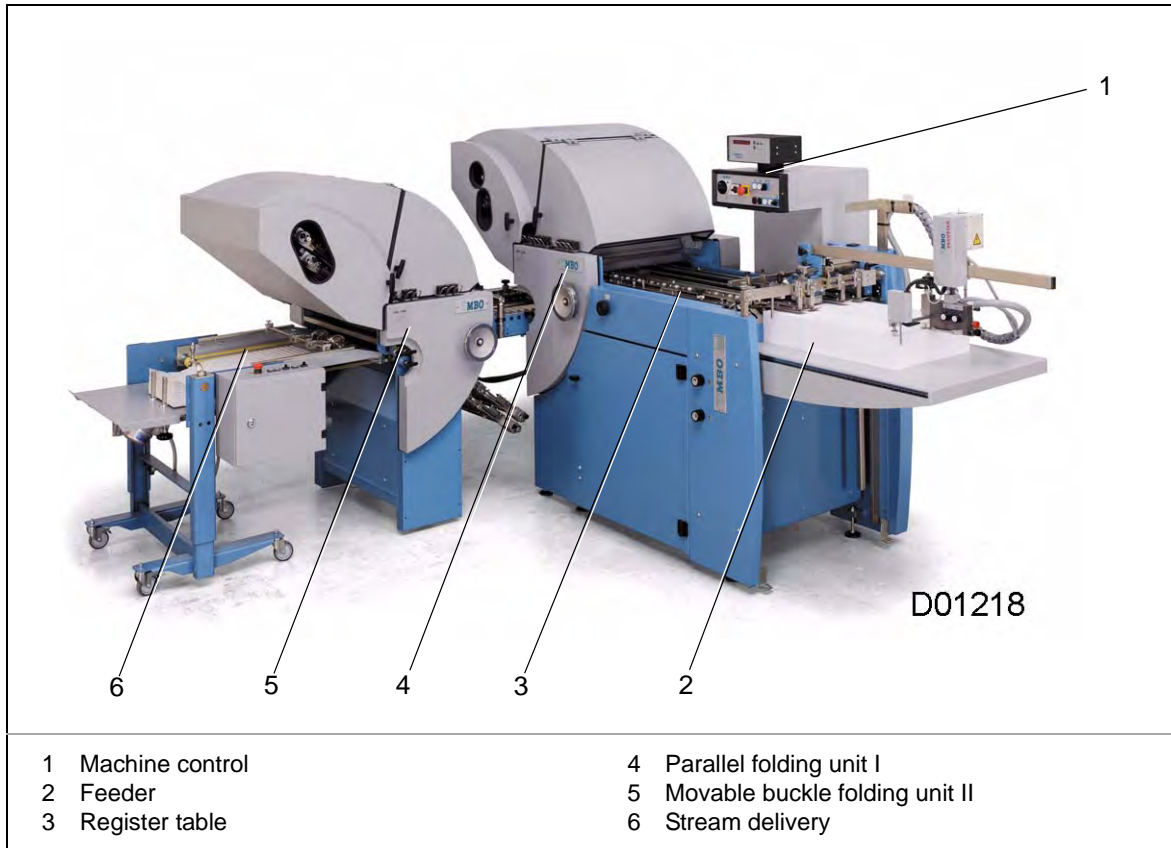


Figure 13: Overall view

4.2.2 Feeder

Pile feeder For continuously changing folding jobs with small to medium runs, the pile feeder has the following advantages:

- Easy functioning
- Quick and easy setup and changeover
- Relatively great lack of sensitivity to difficult paper qualities
- Small space requirement.

The feeding of the pile occurs manually.

The feeder head height adjustment guarantees a constant distance between the feeder head and the back edge of the pile and thus reliable operation even in case of height differences among the paper pile.

The sheets are conveyed directly on the register table and pass leveled from there into the first folding unit.

There are particular downtimes associated with the sheet feeding of the pile table, and thus no continuous working is possible.

Continuous feeder The continuous feeder is suitable for processing large to the very largest editions and medium-large sheets.

In contrast to the pile feeder, with the continuous feeder somewhat more effort is required for setup and adjustment work, and more space is required.

Thanks to the low feeder table, the sheet feeding is much easier.

The sheets are laid on the feeder table and spread out a bit there, so that they pass continuously over the reversing drum to the suction wheel, at which point they are transferred to the register table.

The sheet feed takes place at regular intervals.

Production advantages are the high stack volume and the sheet feeding without production interruption.

4.2.3 Register table

Before infeed into the parallel folding unit, the sheet must be leveled out laterally.

This takes place via a belt running on an incline, which aligns the sheet to a sidelay via a marble rail.

Various adjusting elements serve to adapt to the paper to be processed.

4.2.4 Parallel folding unit I and II

The parallel folding unit operates according to the buckle fold principle.

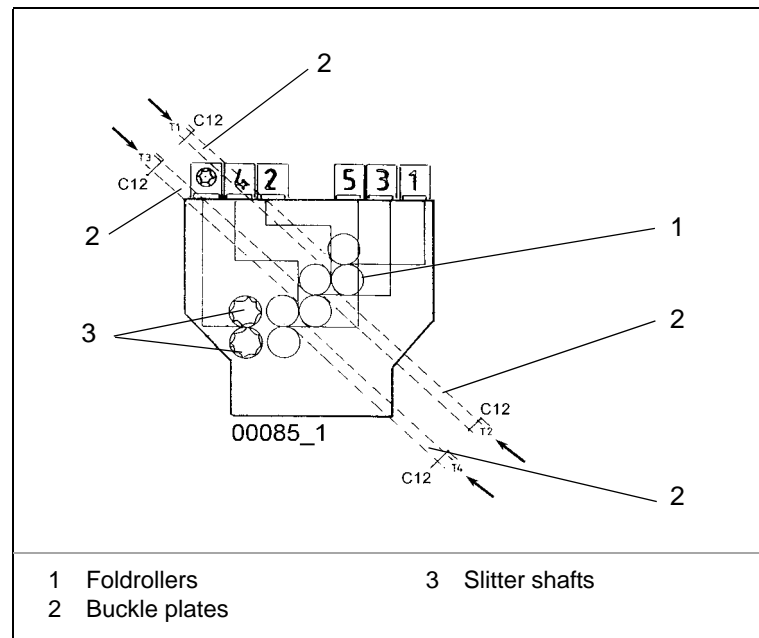


Figure 14: Overview of parallel folding unit I and II

The parallel folding unit alternatively has:

- 4 or 6 buckle plates with swing deflectors,
- Spiral foldrollers, adjustable via quick setting controls.
- Slitter shafts.

4.2.5 Delivery systems

For the various demands with respect to format, fold type, and performance, MBO offers different delivery systems. For the corresponding descriptions, please see the operating manuals included with the delivery systems.

4.3 Models

The buckle folding machine T535 is available in the following variants:

- Variants 4 and 6
- Variants 4X and 6X
- Variants 44, 46, 64 and 66
- Variants 44X, 46X, 64X and 66X

4.3.1 Variants 4 and 6

Explanation of term

The designation "T 535 E/4" means:	
T	Buckle folding machine
535	Designation of type
E	EFFICIENCY
4 (6)	Number of buckle plates of Folding unit I

Schematic depiction

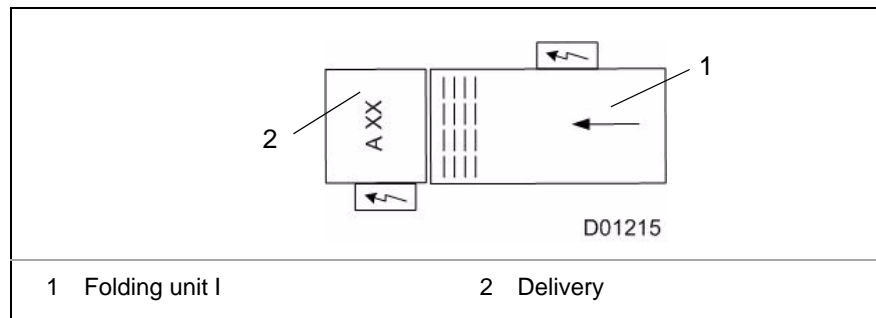


Figure 15: Variants 4 and 6

4.3.2 Variants 4X and 6X

Explanation of term

The designation "T 535 E/4X" means:	
T	Buckle folding machine
535	Designation of type
E	EFFICIENCY
4 (6)	Number of buckle plates of Folding unit I
X	X folding unit

Schematic depiction

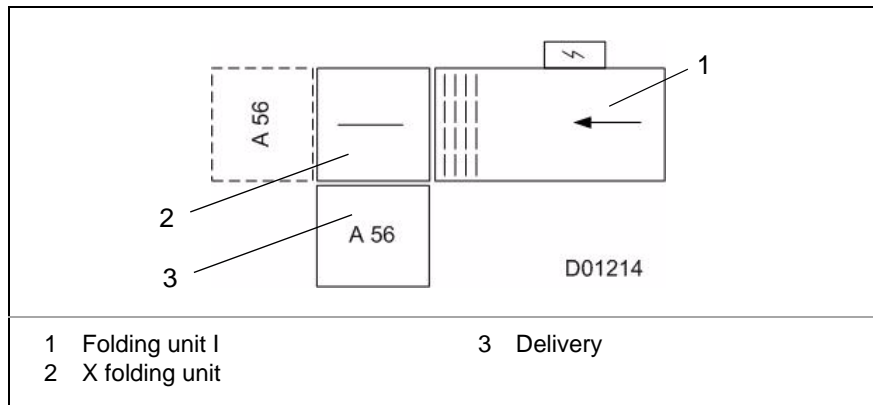


Figure 16: Variants 4X and 6X

4.3.3 Variants 44, 46, 64 and 66

Explanation of term

The designation "T 535 E/44" means:	
T	Buckle folding machine
535	Designation of type
E	EFFICIENCY
4 (6)	Number of buckle plates of Folding unit I
4 (6)	Number of buckle plates of Folding unit II

Schematic depiction

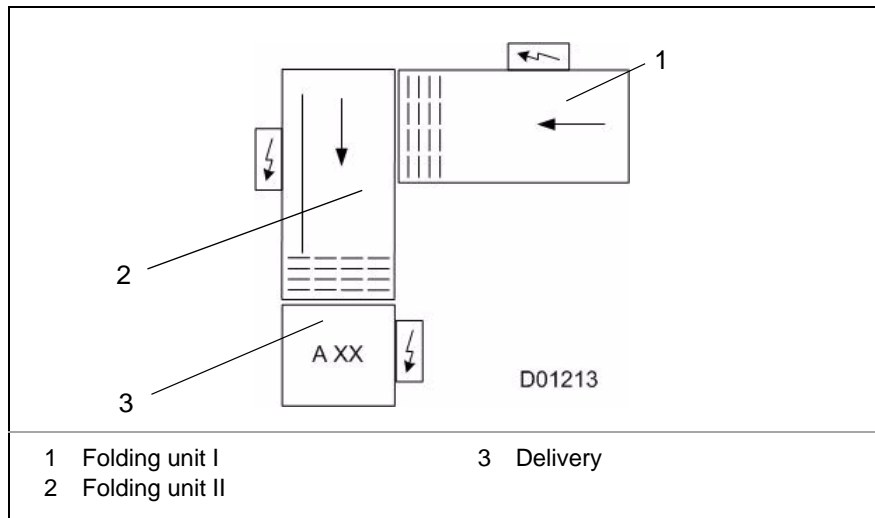


Figure 17: Variants 44, 46, 64 and 66

4.3.4 Variants 44X, 46X, 64X and 66X

Explanation of term

The designation "T 535 E/44X" means:	
T	Buckle folding machine
535	Designation of type
E	EFFICIENCY
4 (6)	Number of buckle plates of Folding unit I
4 (6)	Number of buckle plates of Folding unit II
X	X folding unit

Schematic depiction

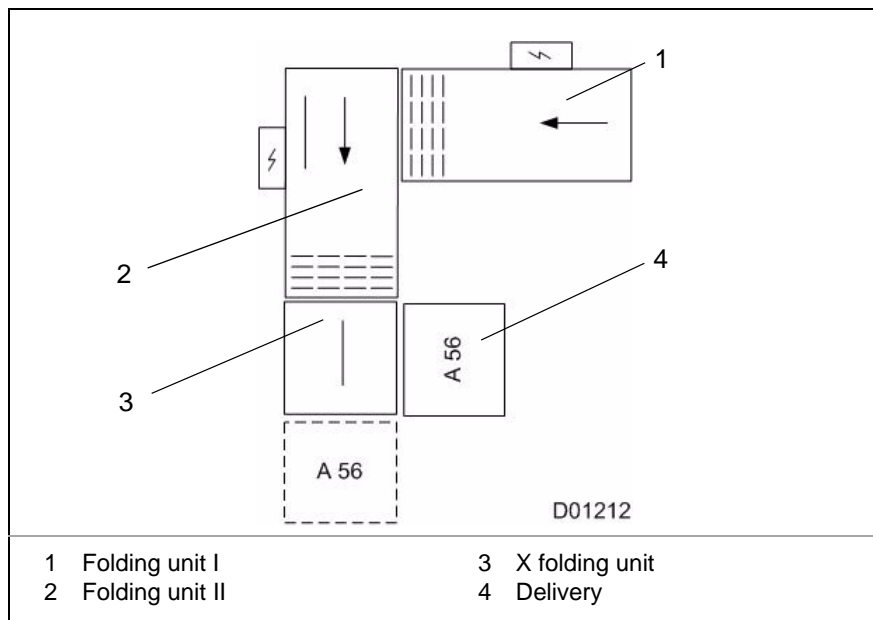


Figure 18: Variants 44X, 46X, 64X and 66X

4.4 Machine control

4.4.1 MS-Control

Microprocessor control system for:

- Sheet feed (suction length and sheet gap)
Suction length is automatically determined
Sheet gap (default setting = 1 cm)
- Integrated impression preselection counter
- Operator and service diagnostics
- User and country-specific setting possibilities

Refer also to the separate MS-Control operating manual

5 Operating and display elements, operating modes

5.1 Main control panel

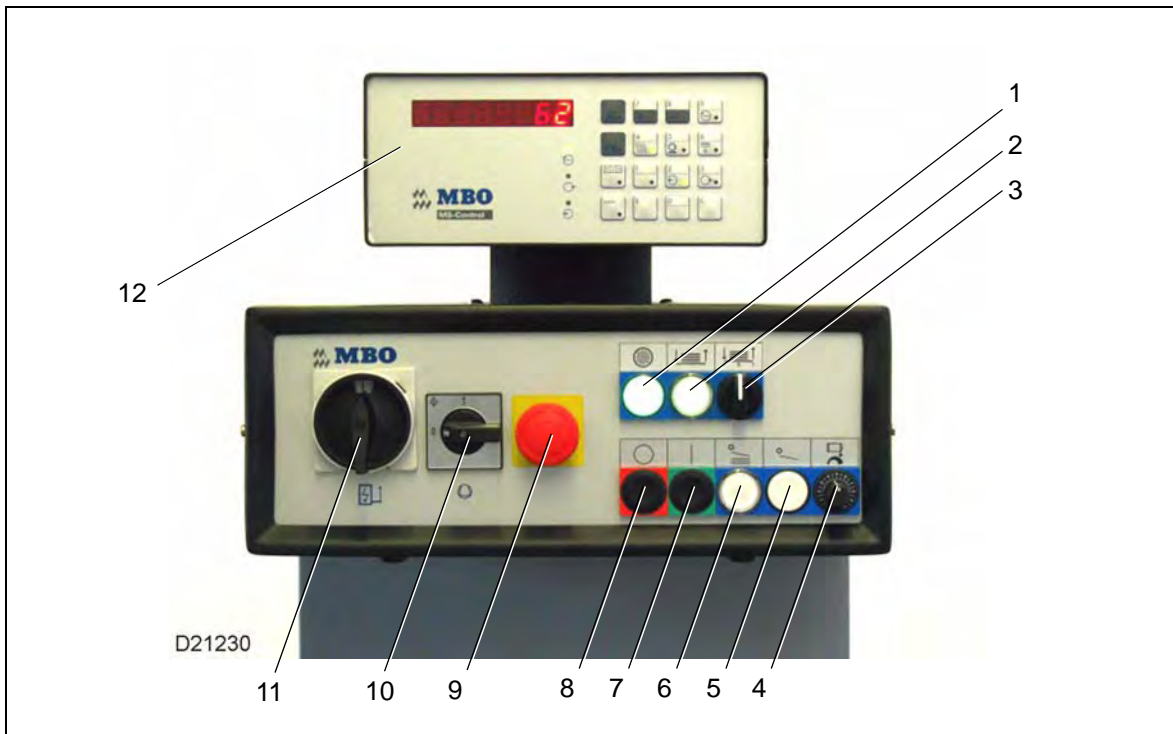


Figure 19: Main control panel with MS-Control

- 1 Indicator lamp <Release machine>
- 2 Indicator lamp <Release feeder>
- 3 Selecting switch <Pile table up/down>
- 4 Potentiometer <Speed setting>
- 5 Pushbutton <Sheet infeed single sheet>
- 6 Pushbutton <Production sheet infeed and feeder start/stop>
- 7 Pushbutton <Start machine>
- 8 Pushbutton <Stop machine>
- 9 Palm button <EMERGENCY STOP>
- 10 Rotary switch <Pressure vacuum pump on/off>
- 11 Main switch
- 12 MS-Control with integrated impression preselection counter.

5.2 MS-Control

Refer also to the separate "MS-Control" operating manual.

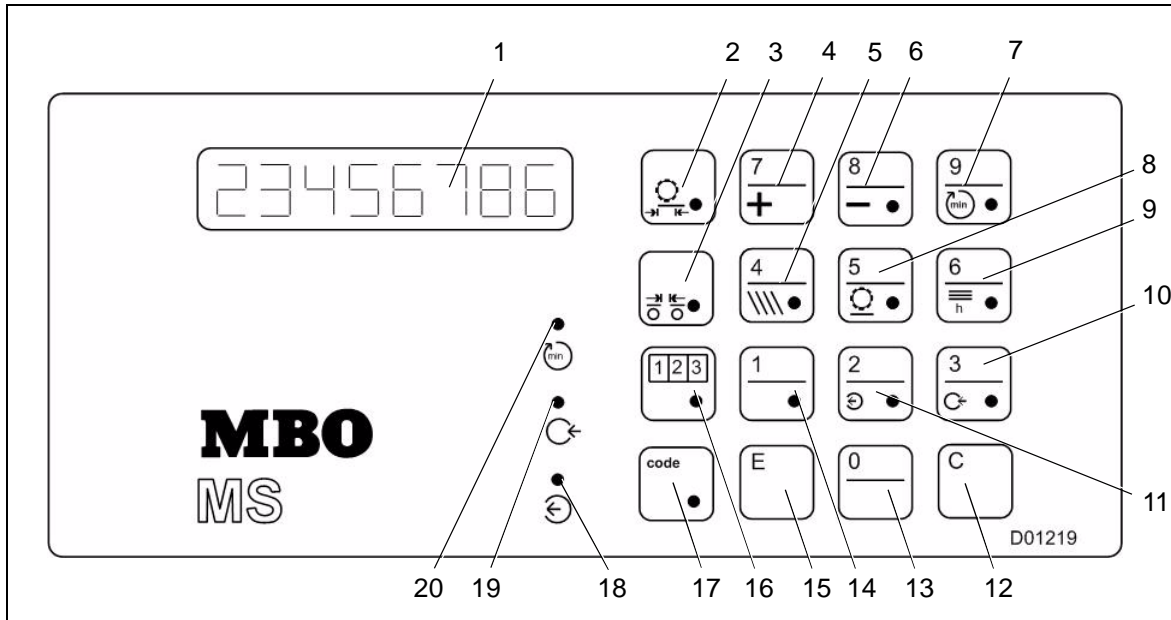


Figure 20: MS-Control

- 1 8-digit display
- 2 Suction length button
- 3 Sheet gap button
- 4 Dual-function button "7" / "+" (Plus)
- 5 Multifunction button "4" / acceleration of stream delivery / kicker / dual-function marking device "8" / "-" (minus)
- 6 Dual-function button "9" / speed display
- 7 Dual-function button "5" / suction wheel intake interruption
- 8 Dual-function button "6" / productivity in sheets/hour
- 9 Dual-function button "3" / total counter at infeed
- 10 Dual-function button "2" / total counter at outlet
- 11 Clear button (delete)
- 12 "0" button
- 13 "1" button
- 14 E button (confirm)
- 15 Current batch counter / batch preselection button
- 16 Code button
- 17 Diagnostics LED photocell at outlet B 43 (option)
- 18 Diagnostics LED photocell at suction wheel B 2
- 19 Diagnostics LED for incremental transducer B 1

5.2.1 Operating

See Chapter "7.7 Adjusting the sheet feed control"
Refer also to the separate "MS-Control" operating manual.

5.2.2 Error messages

See Chapter "7.12.2 Display of error messages, MS-Control"

5.3 Operating modes



WARNING!

Danger from incorrect use of the sockets.

Non-observance may cause serious injuries or even death.

- The machine sockets of the MBO machines may be used exclusively for the connection of MBO folding units, units or deliveries.
- The 230 VAC sockets of the MBO machines may be used exclusively for connecting auxiliary devices intended for this purpose, such as gluing devices.
- All sockets (400 VAC and 230 VAC sockets) of the MBO machines must be monitored at all times according to the corresponding federal and local codes, guidelines and other regulations.



CAUTION!

Danger of tripping on cables lying about.

Non-observance may cause personal injuries and damage to property.

- Lay the machine connections (cables, hoses, pipes) so that they do not form any stumbling blocks.
- For folding units that are not in use, place the cable on the hook.

5.3.1 Machine controller operating mode

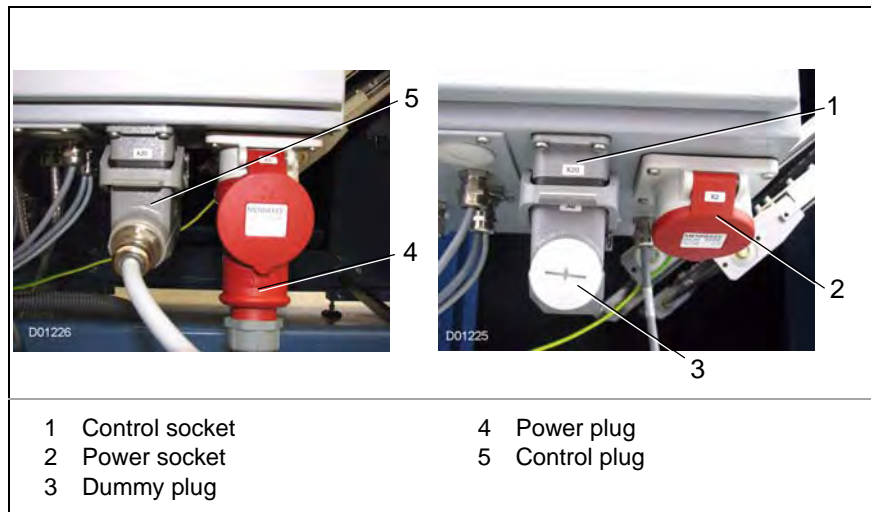


Figure 21: Machine controller operating mode

Connecting subsequent folding units or delivery

Procedure:

- ▷ Plug the power plug (4) of the subsequent folding unit into the power socket (2) of folding unit I.
- ▷ Plug the control plug (5) of the subsequent folding unit into the control socket (1) of folding unit I.

Working without subsequent folding unit or delivery:

Procedure:

- ▷ Plug the dummy plug (3) into the control socket (1) of folding unit I.

5.3.2 Adapter box operating mode



WARNING!

Danger through using several adapter boxes in one machine assembly.

Non-observance may possibly cause serious personal injuries or even death

Use a maximum of one **adapter box** per machine assembly for technical safety reasons.

It is possible to connect subsequent MBO folding units with different control systems into one machine assembly. This requires corresponding adapter boxes.

Which adapter boxes to use can be learned from MBO service or the authorized customer service.



Use a maximum of one **adapter box** per machine assembly for technical safety reasons.

Make exceptions exclusively after consulting MBO-Elektrokonstruktion.

6 Transport/Installation/Initial operation

6.1 Introduction

6.1.1 Qualification of personnel

This table lists the necessary qualification of the personnel related to "Transport and interim storage" of the machine.

	Specially trained personnel	Instructed operating personnel	Instructed personnel with specialized training (mechanical/electrical engineering)
Transportation	X	-	-
Interim storage	X	-	-
Installation	-	-	X
Electrical connections	-	-	X
Network connection	-	-	X
Starting up	-	-	X

Table 15: Qualification of personnel; Transport, interim storage
 Legend: X permitted, - not permitted

6.1.2 Safety instructions



DANGER!

Danger due to dangerous electrical voltage.

Non-observance may cause serious injuries or even death.

- Work on the electric components of the machine may only be performed by a qualified electrician.
 - Observe the local occupational safety regulations and electrotechnical regulations.
 - On the supply terminals and on the terminals of the main switch, there is dangerous electric voltage even when the main switch is switched off. (See wiring diagram)
 - There is dangerous electric residual voltage on the supply terminals of the frequency inverter even when the main switch is switched off. (Observe the capacitor discharge time (KEB 5 min, Telemecanique 15 min)).
-



DANGER!

Danger due to dangerous electrical voltage during power supply connection.

Non-observance may cause serious injuries or even death.

- The power supply connection of the machine may only be performed by a qualified electrician.
 - Observe the local occupational safety regulations and electrotechnical regulations.
 - 400 V power supply. If there is no neutral conductor, electronic components such as frequency inverters can be destroyed.
 - Due to the leakage currents of the controlled drives (frequency inverters), an equipotential bonding cable must be connected. See Chapter "6.8.4 Power supply configuration" and "6.8.5 Power supply to the main control cabinet."
-



WARNING!

Danger due to incorrect power supply voltage.

Non-observance may cause severe property damage.

- If the existing nominal voltage deviates from the details on the label, wiring diagram, and "the "Technical data" in the operating manual, an isolating transformer must be used.
 - You can get the necessary information from the manufacturer.
-



WARNING!

Danger due to the use of unsuitable fork lifts.

Non-observance may possibly cause serious personal injuries and damage to property.

- When selecting a fork lift, observe the relevant data such as load-bearing capacity, load center of gravity, width of forklift carrier and length of forks.
 - For details about the minimum requirements, please see the "Technical data" chapter.
-

**WARNING!**

Danger of parts falling over during unloading and installation.

Non-observance may possibly cause serious personal injuries and damage to property.

- Use a fork lift for transportation.
- Have additional personnel available for unloading and installation. Various machine subassemblies also require additional support and safeguards.

**WARNING!**

Danger due to insufficient properties and condition of the under-floor.

Non-observance may cause serious personal injuries and damage to property.

- Check the properties and condition and carrying capacity of the underfloor in the installation location.
- For the necessary minimum requirements, see "Specifications" chapter.

6.2 Machine with pile feeder

A machine with a pile feeder is delivered completely assembled on a pallet / in a crate.

Transport/installation/initial operation is described in the separate operating manual for the pile feeder.

6.3 Machine with continuous feeder

For a machine with a continuous feeder, the continuous feeder and the machine are delivered separately, each on a pallet / in a crate.

Transport/installation/initial operation is described in the separate operating manual for the continuous feeder.

6.4 Brief instructions

The machine is transported, installed, and put into operation in these work steps:

- Transporting the machine.
See Chapter "6.5 Transporting the machine without feeder"
- Unpack the machine.
See Chapter "6.6.1 Unpack the machine"
- Installing the machine.
See Chapter "6.6.2 Installing the machine"
- Leveling out the machine
See Chapter "6.6.3 Leveling out and connecting the machine to the feeder".
- Remove the rust preventing agents.
See Chapter "6.7 Removing the rust preventing agents"
- Make the electrical connection.
See Chapter "6.8 Electric connection"
- Carrying out initial operation.
See Chapter "6.9 Starting up"
- Carrying out inspection after initial operation.
See Chapter "6.11 Inspection after first start-up".

6.5 Transporting the machine without feeder



WARNING!

Danger due to the use of unsuitable fork lifts.

Non-observance may possibly cause serious personal injuries and damage to property.

- When selecting a fork lift, observe the relevant data such as load-bearing capacity, load center of gravity, width of forklift carrier and length of forks.
- For details about the minimum requirements, please see the "Technical data" chapter.

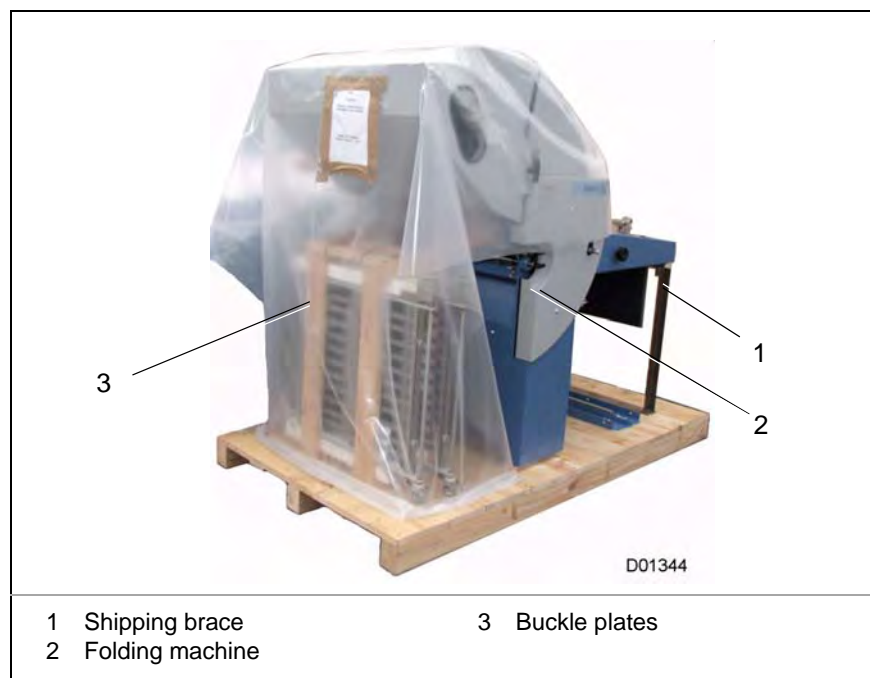


Figure 22: Transportation

Procedure:

- ▷ Use a suitable fork lift. (For requirements, see Chapter "3.2.4 Weights, fork lifts, and floor requirements")
- ▷ Lift the pallet with the folding unit only as far as absolutely necessary for the transport.
- ▷ Transport the pallet as close as possible to the intended location.
- ▷ Lower the pallet carefully.

6.6 Installation



WARNING!

Danger due to insufficient properties and condition of the under-floor.

Non-observance may cause serious personal injuries and damage to property.

Check the properties and condition and carrying capacity of the under-floor in the installation location.

For the necessary minimum requirements, see "Specifications" chapter.



CAUTION!

Danger due to improper alignment of the machine components.

Disregard can lead to serious damage to property

When aligning the machine components, be sure to adhere to the details specified by the manufacturer.

6.6.1 Unpack the machine



WARNING!

Danger of tilting the machine.

Non-observance may cause serious personal injuries and damage to property.

- Remove the shipping brace on the register table only when connecting the machine to the feeder.
- Secure and support the machine when connecting it to the feeder.

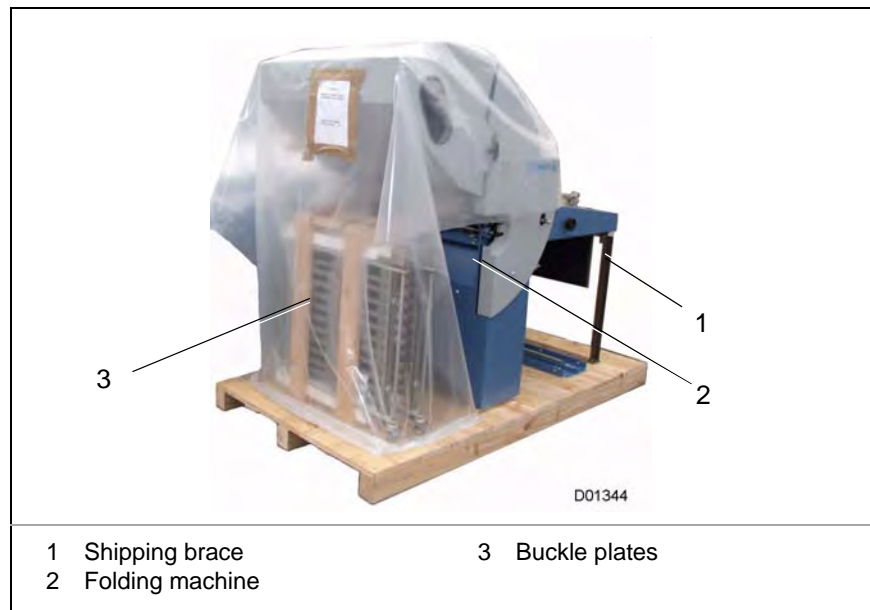


Figure 23: Unpacking

Procedure:

- ▷ Remove the packing material from the machine
- ▷ Dispose of the packing material in an environmentally friendly manner.
- ▷ Unpack the buckle plates (3) and store them properly.
- ▷ Unpack the control cabinet and mount it properly.
- ▷ Remove the screws that fasten the machine to the pallet.
- ▷ Remove the transport brackets.
- ▷ Remove the screws fastening the shipping brace (1) to the pallet.



- Remove the shipping brace (1) on the register table only when connecting the machine to the feeder.
- Secure and support the machine when connecting it to the feeder.

6.6.2 Installing the machine



WARNING!

Danger of tilting the machine.

Non-observance may cause serious personal injuries and damage to property.

- Remove the shipping brace on the register table only when connecting the machine to the feeder.
- Secure and support the machine when connecting it to the feeder.

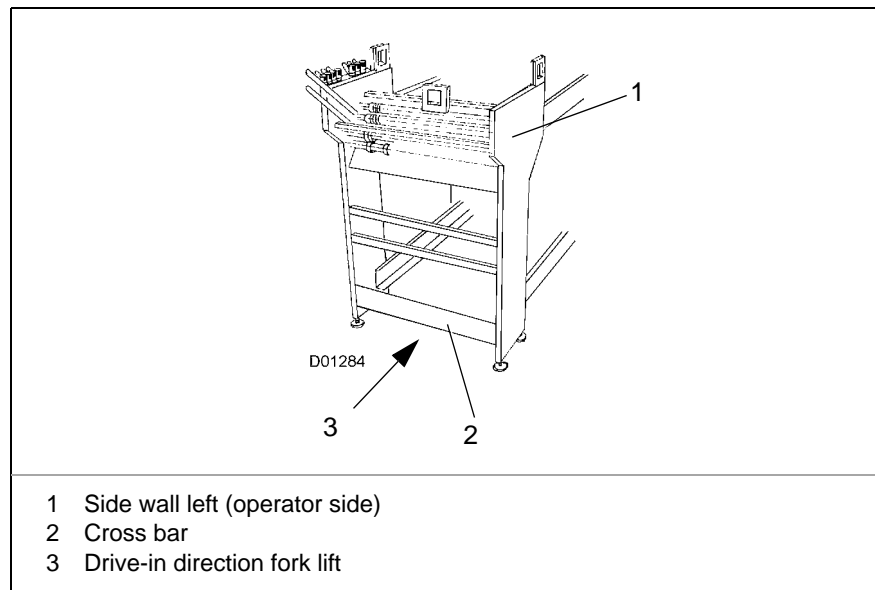


Figure 24: Transportation of folding machine

Procedure:

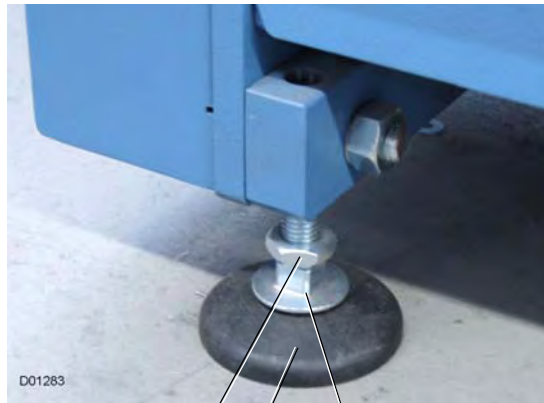
- ▷ Use a suitable fork lift. (For requirements, see Chapter "3.2.4 Weights, fork lifts, and floor requirements")
- ▷ Drive the fork lift under the cross bar (1). (See the drive-in direction for the fork lift (3).)
- ▷ Secure the machine against tipping.
- ▷ Lift the machine carefully.
- ▷ Screw the leveling screws into the corresponding retainers.
- ▷ Transport the machine carefully to your intended location.

**WARNING!**

Danger due to insufficient properties and condition of the under-floor.

Non-observance may cause serious personal injuries and damage to property.

- Check the properties and condition and carrying capacity of the underfloor in the installation location.
- For the necessary minimum requirements, see "Specifications" chapter.



1 Adjusting screw
2 Plate feet

3 Hexagon nut

Figure 25: Installing the machine

Procedure:

- ▷ Place the plate feet (2) under the position of the leveling screws (1).
- ▷ Set the machine carefully down with the leveling screws (1) on the plate feet (2).
- ▷ Secure the machine against tipping by using a shipping brace on the register table.



- Remove the shipping brace on the register table only when connecting the machine to the feeder.
- Secure and support the machine when connecting it to the feeder.

6.6.3 Leveling out and connecting the machine to the feeder



WARNING!

Danger of tilting the machine.

Non-observance may cause serious personal injuries and damage to property.

- Remove the shipping brace on the register table only when connecting the machine to the feeder.
 - Secure and support the machine when connecting it to the feeder.
-



CAUTION!

Danger due to improper alignment of the machine components.

Disregard can lead to serious damage to property

When aligning the machine components, be sure to adhere to the details specified by the manufacturer.

Positioning the feeder: ▷ Position the feeder at the intended site.

Adjusting the exit height:

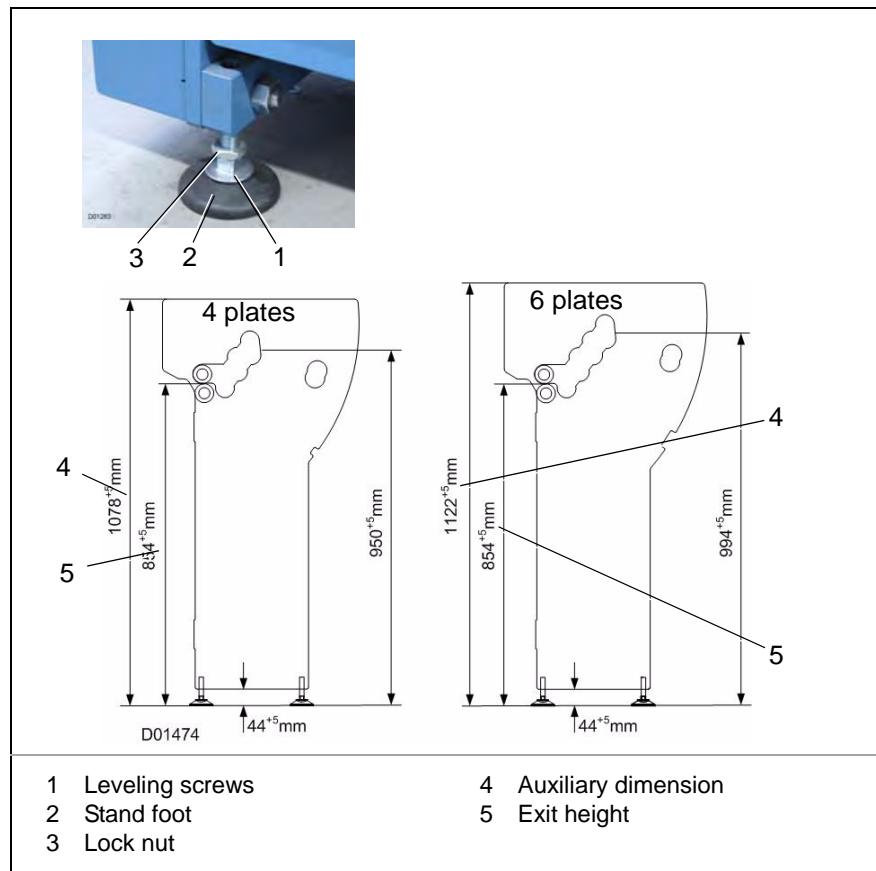


Figure 26: Adjusting the exit height

Adjusting the exit height (5) guarantees that folding unit II can be positioned horizontally behind folding unit I.

In doing so, pay attention to the levelness of the floor.

Procedure:

▷ Use the leveling screws (1) to adjust the machine to the exact exit height (5).

Exit height (5) = distance between the top edge of the lower slitter shaft/ tape roller and the floor = 854 mm +5 mm.

As an auxiliary dimension (4), you can also use the distance between the bottom edge of the side plate and the floor.

▷ Align the machine approximately.

Removing the shipping brace:

▷ Remove the shipping brace on the register table. Secure and support the machine when doing so.

Moving the machine up to the feeder:

▷ Lift the machine with a fork lift only enough so that the leveling screws are exposed. Secure and support the machine when doing so.

▷ Move the machine up to the continuous feeder.

▷ Position the machine carefully so that the infeed of the register table is located between the cross bar and the transfer plate of the feeder. Make sure that no parts collide and get damaged while doing so.

- ▷ Set the machine down carefully.
Make sure that
 - the bottom edge of the register table is higher than the top edge of the cross bar on the feeder.
 - the plate feet are located under the leveling screws.

Leveling out the machine:

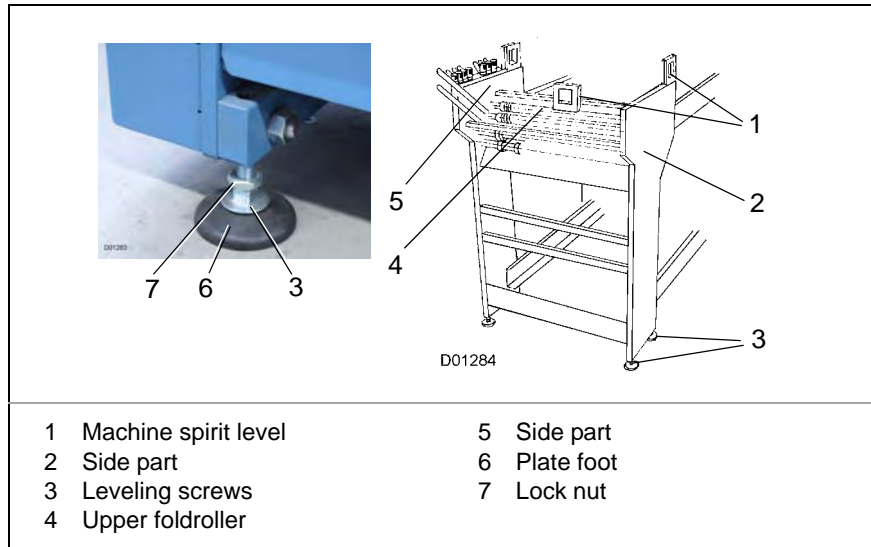


Figure 27: Leveling out the machine

- ▷ Align the machine using the leveling screws (3) and a machine level (1).
Alignment tolerance at an
 - accuracy of 0.3 mm/m = exact in the bubble of the level.
 - accuracy of 0.1 mm/m = +/- 0.1 mm/m.

Lengthwise alignment:

- ▷ Set the machine level (1) on the side plates (2 + 5).

Crosswise alignment:

- ▷ Set the machine level (1) on the top foldroller (4).

Checking the exit height:

- ▷ Check the exit height of the machine and correct it where appropriate.

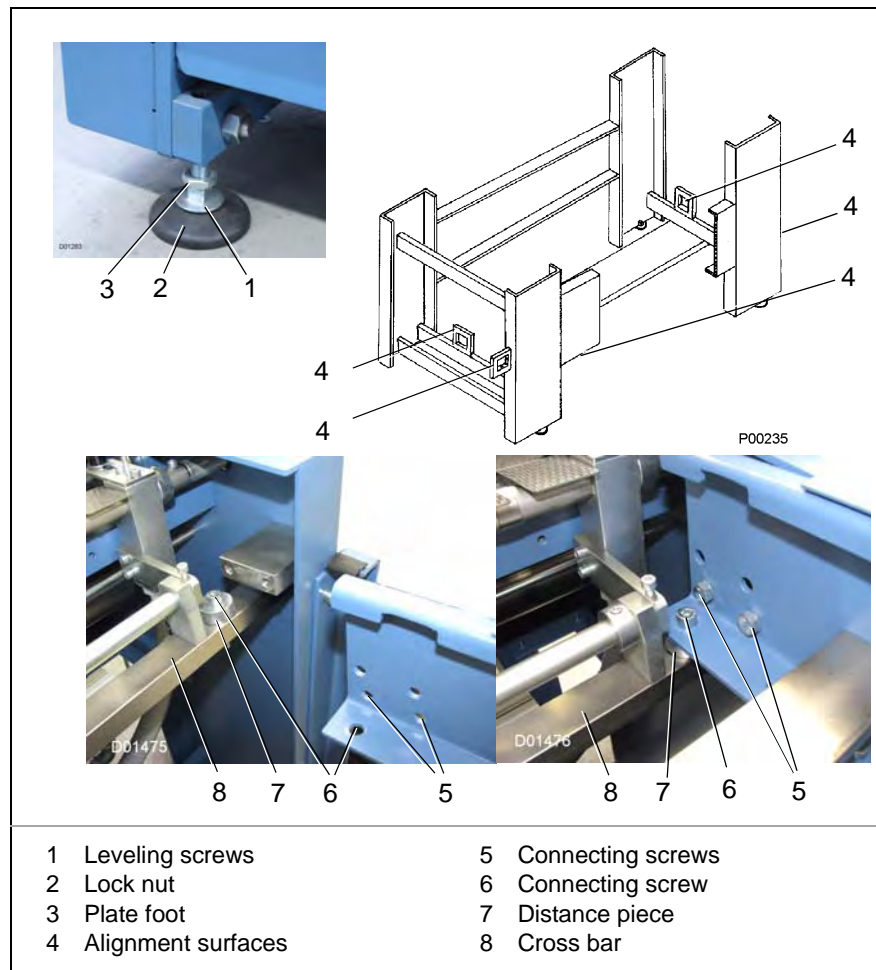
Aligning the feeder:


Figure 28: Aligning the feeder

- ▷ A distance piece (7) is attached on each side between the bottom edge of the register table and the cross bar (8) of the feeder.
- ▷ Use the leveling screws (1) to adjust the correct height of the feeder so that:
 - The distance piece (7) can still be moved by hand.
 - The connecting screws (5 + 6) can be inserted easily.
 - No tension arises between the feeder and the register table.
- ▷ Align the feeder using a machine level on the alignment surfaces (8).
 Accuracy of the machine level = 0.3 mm/m
 Alignment tolerance at an
 accuracy of 0.3 mm/m = +/- 0.15 mm/m
 Accuracy of 0.1 mm/m = +/- 0.15 mm/m

Connecting the machine to the feeder:

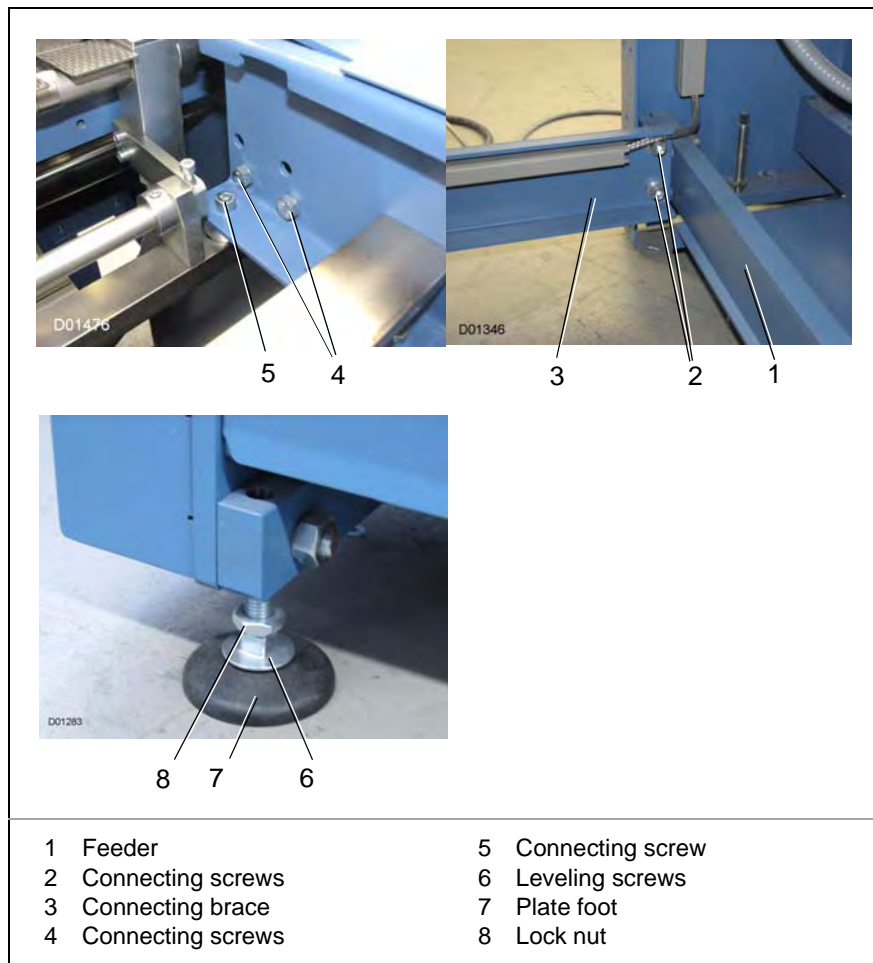


Figure 29: Screwing the feeder to the machine

Locking the leveling screws:

- ▷ Lock the leveling screws (6) on the feeder and the machine using the lock nuts. (8)
- ▷ After locking the screws, recheck the alignment and exit height. Correct them if necessary.

6.6.4 Register table

6.6.4.1 Installing the drive belt

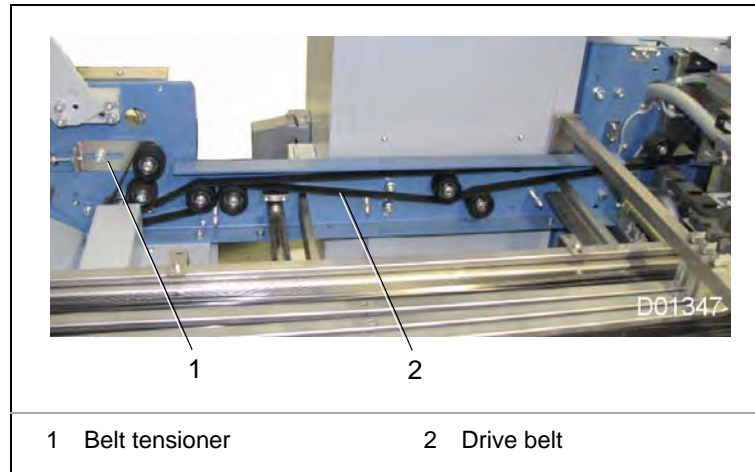


Figure 30: Installing the drive belt

Procedure:

- ▷ Install the drive belt (2) according to the belt course in the illustration.
- ▷ Tension the drive belt with the belt tensioner (1).

6.6.4.2 Hinge-up the lattice grate

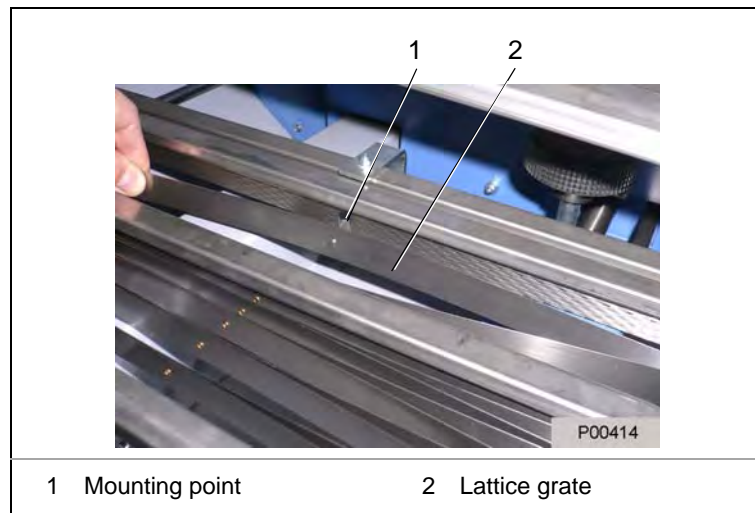


Figure 31: Hinge-up the lattice grate

Procedure:

- ▷ Set the lattice (2) into the register table.
When doing so, pay attention to the mounting direction
- ▷ Hook the lattice (2) on all four mounting points (1).

6.6.4.3 Checking the guide plate, height adjustment

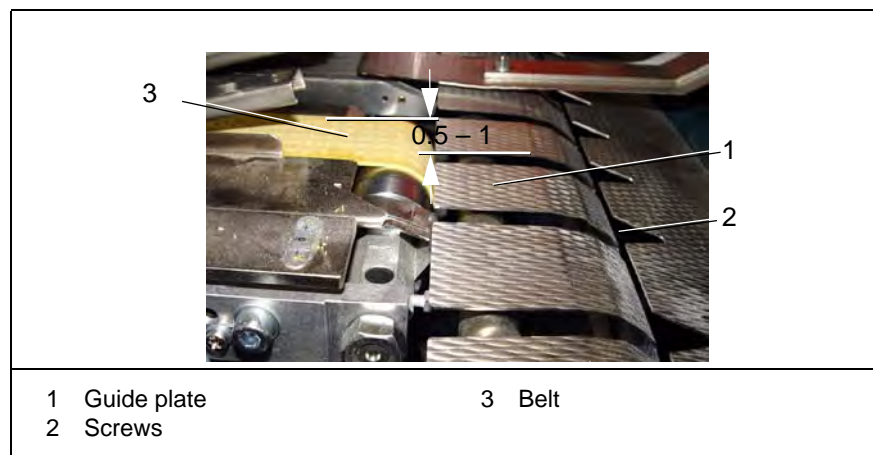


Figure 32: Checking the height adjustment of the guide plate

Procedure:

- ▷ The top edge of the guide plate (1) should lie 0.5 – 1 mm (0.02 – 0.04 in) lower than the top edge of the belt (3).
- ▷ Correct if necessary.

6.6.4.4 Assembling double sheet detector

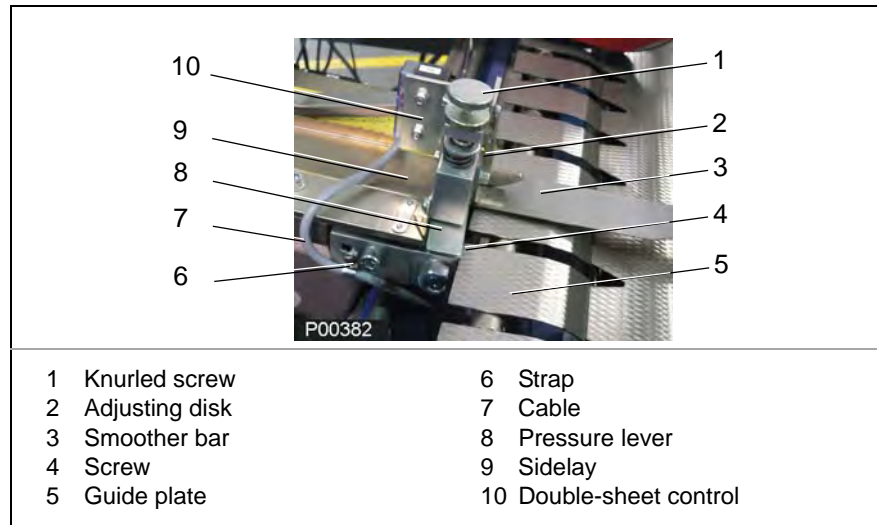


Figure 33: Assembling double sheet detector

Procedure:

- ▷ Remove the retainer (3)
- ▷ Turn the knurled screw (1) counterclockwise until the pressure lever (8) lies flat.
- ▷ Insert the double sheet detector (10) in the locating hole.
- ▷ Activate the adjusting disk (2). It must clamp in the activated position by itself.
- ▷ Fix the double sheet detector (10) with the screw (4).
- ▷ Turn the knurled screw (1) clockwise until the adjusting disk (2) becomes free again.
- ▷ Assemble the retainer (3) so that it snaps into the u-beam of the sidelay (9).
The distance to the guide plate (5) should be 1 to 2 mm (0.04 to 0.08 in), so that there is no jamming point for the sheet running through.
- ▷ Fix the cable (7) with the strap (6).

6.6.4.5 Hooking in the door with compartment for tools

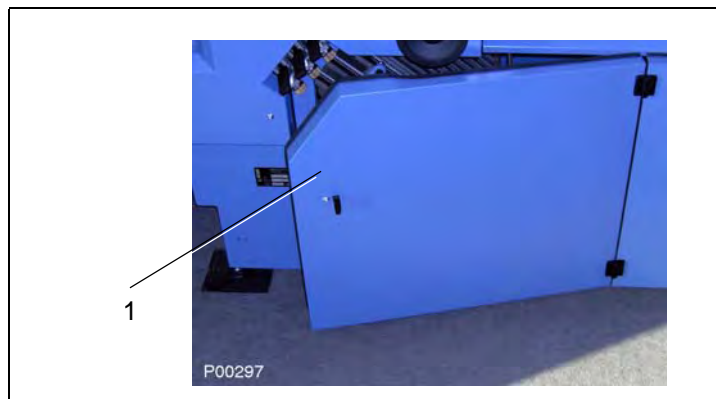


Figure 34: Door with compartment for tools

Procedure:

- ▷ Hang the compartment door (1) on the hinges.

6.6.5 Noise damping hood

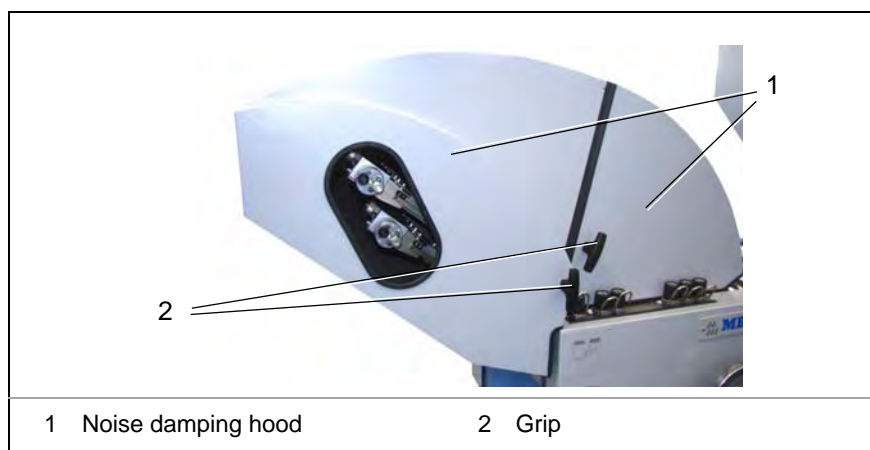


Figure 35: Noise damping hood

The noise damping hood is mounted at the factory.

6.6.6 Unpacking buckle plates

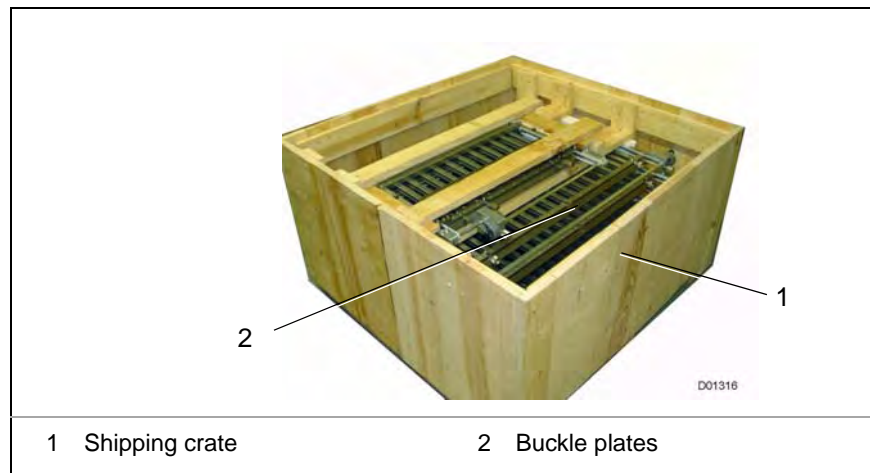


Figure 36: Unpacking

Procedure:

- ▷ Open the shipping crate.
- ▷ Remove the buckle plates
- ▷ Insert the buckle plates in their corresponding position.
See Chapter "7.9.1 Buckle plate positions"
- ▷ Dispose of the shipping crate in an environmentally friendly manner.

6.7 Removing the rust preventing agents

After installing the machine, clean all machine parts thoroughly to remove the rust preventing agents.

Heed the cleaning agent recommendation in the following table and the detailed instructions for the roller cleaner "Varn" in the "Cleaning" chapter.

Part of machine	Cleansing agent
Lacquered surfaces	Solvent-free cleansing agent
Foldrollers	"Varn-Wash VM 111". Refer also to the "Cleaning" chapter.
Unpainted plates	Degreaser of your choice

Table 16: Cleaning recommendation

6.8 Electric connection



DANGER!

Danger due to dangerous electrical voltage.

Non-observance may cause serious injuries or even death.

- Work on the electric components of the machine may only be performed by a qualified electrician.
 - Observe the local occupational safety regulations and electrotechnical regulations.
 - On the supply terminals and on the terminals of the main switch, there is dangerous electric voltage even when the main switch is switched off. (See wiring diagram)
 - There is dangerous electric residual voltage on the supply terminals of the frequency inverter even when the main switch is switched off. (Observe the capacitor discharge time (KEB 5 min, Telemecanique 15 min)).
-



WARNING!

Danger due to incorrect power supply voltage.

Non-observance may cause severe property damage.

- If the existing nominal voltage deviates from the details on the label, wiring diagram, and "the "Technical data" in the operating manual, an isolating transformer must be used.
 - You can get the necessary information from the manufacturer.
-



CAUTION

Danger from leakage currents greater than 10 mA.

Non-observance may result in property damage.

- Connect an additional protective equalization bonding strip to the PE terminals.
 - Minimum cross-section = cross-section of the PE conductor of the power cable.
Optimal = cross-section of 10 mm².
-

6.8.1 Assembly of the main control cabinet



CAUTION!

Danger when lifting heavy machine parts (buckle plates, slitter shafts, etc.)

Non-observance may cause personal injuries and damage to property.

To lift heavy machine parts such as buckle plates, slitter shafts, etc., request the help of another person or people.

- ▷ Unpack the control cabinet and mount it properly.

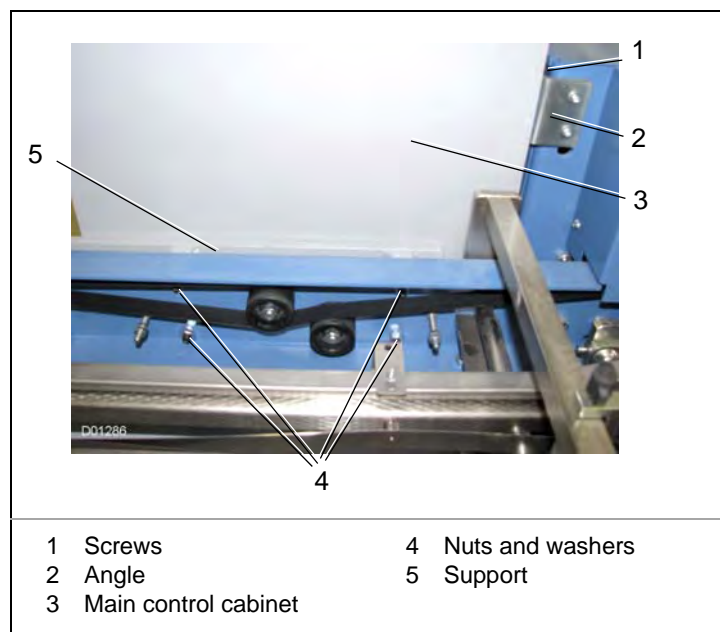


Figure 37: Assembly of the main control cabinet

Procedure:

- ▷ Transport the main control cabinet (3) to the assembly location on the pallet.
- ▷ Remove the four nuts with the washers (4).
- ▷ Summon at least 3 people to lift the main control cabinet (3).
- ▷ Feed the four threaded bolts on the support (5) through the holes on the register table.
The angle (2) serves as the limit stop.
- ▷ Slide a washer (4) over each of the threaded bolts.
- ▷ Turn the four nuts (4) onto the threaded bolts and tighten them.

- With the pile feeder:**
- ▷ Remove the guard on the feeder (A-side).
 - ▷ Fasten the main control cabinet (3) to the angle (2) using two screws.
 - ▷ Reattach the guard on the feeder (A-side).

- With the continuous feeder:**
- ▷ Fasten the main control cabinet (3) to the angle (2) using two screws.

- Connecting plugs and connecting lines:**
- ▷ All plugs and connecting lines are marked with their specific control identifier.
 - ▷ Plug the plugs into the identically marked sockets on the main control cabinet.
 - ▷ Insert the connecting lines into the main control cabinet through the cable glands with the same marking.
 - ▷ Connect the connecting lines in the main control cabinet according to the specifications of the EID label and the wiring diagram.

6.8.2 Connecting MS-Control

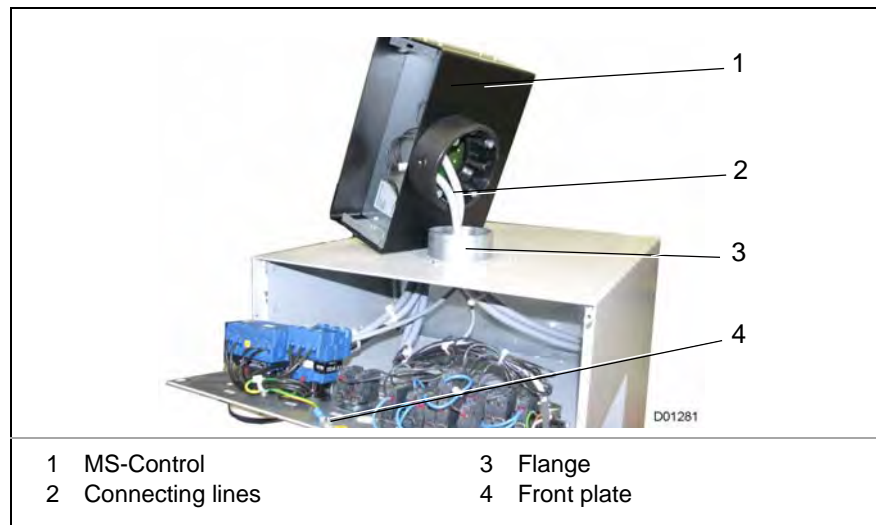


Figure 38: MS-Control

Procedure:

- ▷ Remove the frame around the front plate (4).
- ▷ Open the front plate (4) on the main control cabinet.
- ▷ Remove the backplane of the MS-Control (1).
- ▷ Pull the connecting lines (2) through the opening of the flange (3) and the MS-Control (1).
- ▷ Set the MS-Control (1) onto the flange (3).
- ▷ Close the front plate (4) on the main control cabinet.

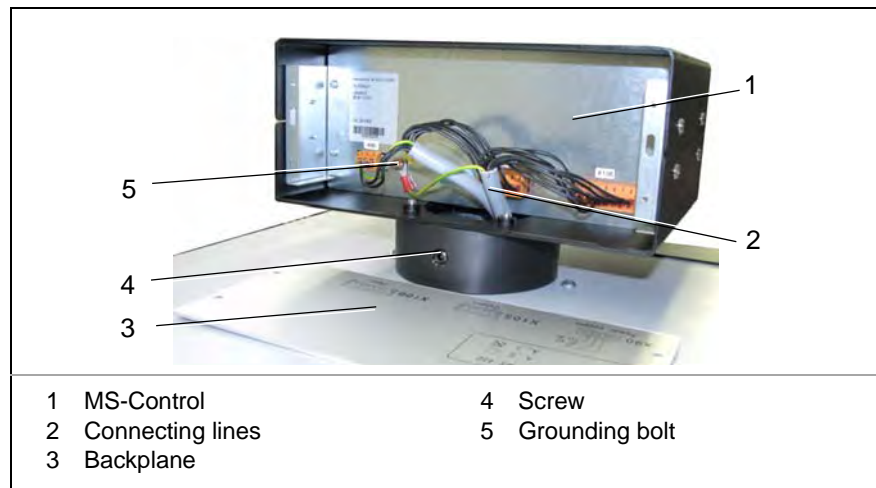


Figure 39: MS-Control cable connection

- ▷ Plug the plugs of the connecting lines (2) into the identically marked sockets of the MS-Control (1).
- ▷ Connect the grounding conductor to the grounding bolt (5).
- ▷ Connect the MS-Control (1) to the backplane (3).
- ▷ Fix the MS-Control (1) into position with the screw (4).
Make sure that the MS-Control (1) can still be turned.

6.8.3 Power supply prerequisites



CAUTION

Danger due to incorrect power supply voltage.

Non-observance may cause severe property damage.

- If the existing nominal voltage deviates from the details on the label, wiring diagram, and "the "Technical data" in the operating manual, an isolating transformer must be used.
- You can get the necessary information from the manufacturer.

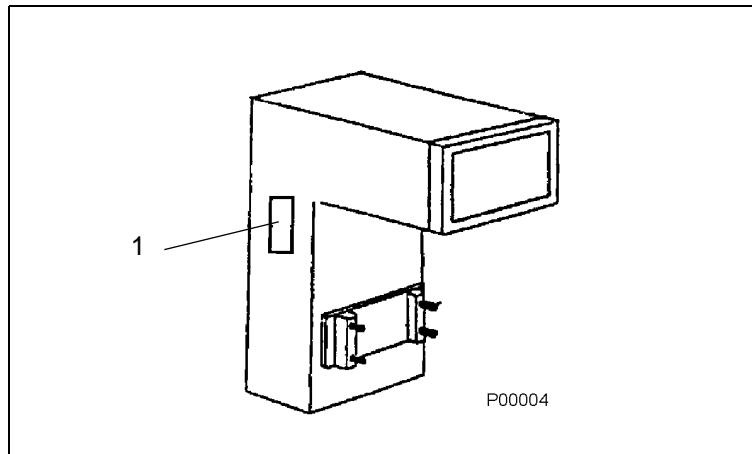


Figure 40: Label

With regard to the power supply, make sure that:



- The power supply for this machine must generally be connected by a trained electrician.
This electrician must be well versed in the VDE guidelines (in Germany), especially IEC 36 (DIN 57100, VDE 0100 Part 410), and the technical connection requirements of the local power supply company (power station).
- The power supply may **not** be connected by an MBO technician or a customer service technician.
- For the electrical installation, EN 60204-1, Clause 6.3.3. "Protection through automatic switching off of the supply" is adhered to.
- The loop impedance and the suitability of the assigned overcurrent protection device are checked according to EN 60204-1, Clause 18.2.2.
- power system, voltage, frequency, power cable cross-section, and power line fuse must comply with the specifications on the label, wiring diagram, and "Specifications" of the operating manual.
- Due to the leakage currents of the EMC filter, the power supply must be permanently connected.
- Due to the leakage currents of the EMC filter, no power supply with a ground fault circuit interrupter (GFCI) or a voltage fluctuation relay can be used.

- Due to the leakage currents of the EMC filter, an additional protective equipotential bonding system according to EN 60204-1, Clause 8.2.8 must be connected.
- The customer's grounding system should have as small a grounding resistance as possible (optimal would be a value < 2), since with relatively high grounding resistance levels (> 50 Ohm) the EMC filters hardly have any more filter effect.
- The N conductor is loaded (for 400 VAC power supply).
- A right rotating field is absolutely necessary.
- The machine sockets of the MBO machines may be used exclusively for the connection of MBO folding units, units, or deliveries.
- The 230 VAC sockets of the MBO machines may be used exclusively for connecting auxiliary devices intended for this purpose, such as gluing devices.
- All sockets (400 VAC and 230 VAC sockets) of the MBO machines must be monitored at all times according to the corresponding federal and local codes, guidelines and other regulations.

6.8.4 Power supply configuration

Electrical power supply:	Connecting line		
Nominal voltage 3 x 400 V + N + PE	Cabling	Diameter	PE conductor
Construction according to DIN EN 60204-1, Clause 4.3.1	Five-pin copper cable (L1, L2, L3, N, PE): One or more wires with connector sleeve, make connection with protection against direct contact, right rotating field.	Layout according to VDE 0100 Part 430 (IEC 60364-4-47)	Layout according to VDE 0100 Part 540 (IEC 60364-5-54)
Nominal voltage 3 x 220 V + PE	Cabling	Diameter	PE conductor
Construction according to DIN EN 60204-1, Clause 4.3.1	four-pole copper cable (L1, L2, L3, PE): One or more wires with connector sleeve, make connection with protection against direct contact, right rotating field.	Layout according to VDE 0100 Part 430 (IEC 60364-4-47)	Layout according to VDE 0100 Part 540 (IEC 60364-5-54)
	Protective equipotential bonding strip (second, auxiliary PE conductor)		
		Diameter	
		Layout according to VDE 0100 Part 540 (IEC 60364-5-54) and EN 60204-1, Clause 8.2.8 - Minimum cross-section of the PE conductor (Cu). - Optimal 10 mm ² (Cu).	

Table 17: Electrical connection

6.8.5 Power supply to the main control cabinet.



DANGER!

Danger due to dangerous electrical voltage during power supply connection.

Non-observance may cause serious injuries or even death.

- The power supply connection of the machine may only be performed by a qualified electrician.
- Observe the local occupational safety regulations and electrotechnical regulations.
- 400 V power supply. If there is no neutral conductor, electronic components such as frequency inverters can be destroyed.
- Secure the power supply connection terminals with the included yellow cover plate.

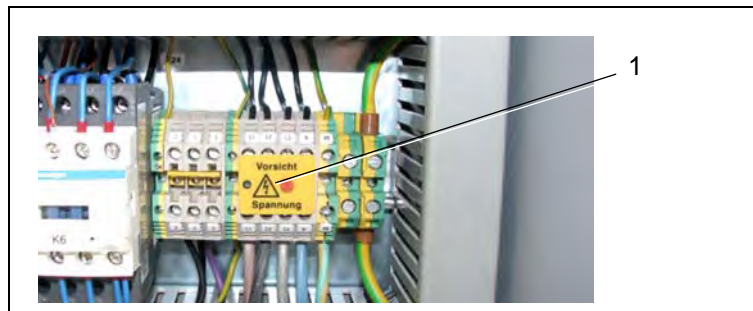


Figure 41: Network connection

Procedure:

- ▷ Feed the power cable through the union joint for the cable (marked with a voltage indicator) in the main control cabinet.
- ▷ Connect the power cable to the power supply connection terminal bar (1) according to the wiring diagram.
- ▷ Secure the power supply connection terminals with the included yellow cover plate.

6.8.6 Additional equipotential bonding strips



CAUTION

Danger from leakage currents greater than 10 mA.

Non-observance may result in property damage.

- Connect an additional protective equipotential bonding strip to the PE terminals.
- Minimum cross-section = cross-section of the PE conductor of the power cable (Cu).
Optimal = cross-section of 10 mm² (Cu).

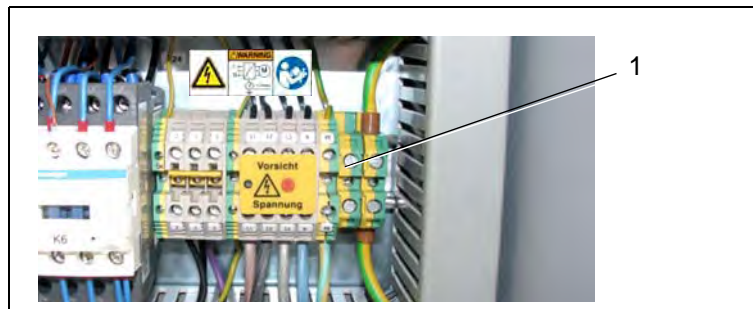


Figure 42: PE connection terminal strip

The RFI filters of the frequency inverters used generate a system-conditioned grounding leakage current.

Since this can be greater than 10 mA, an additional protective equipotential bonding strip is necessary according to EN 60204-1 Clause 8.2.8.

This should have at least the same cross-section as the PE conductor of the connecting line (Cu).

Optimal would be a minimum cross-section of 10 mm² (Cu).

The additional protective equipotential bonding strip is connected to the PE connection terminal strip (1) in the control cabinet.

6.8.7 Checking the ground wire connections

**WARNING!**

Danger from disconnected ground wire connections.

Non-observance may result in injury.

Reconnect all ground wire connections that were disconnected for transport.

Check that all ground wire connections that were disconnected for transport are reconnected correctly.

Procedure:

- ▷ Check this by visual inspection.

6.8.8 Electrical connections between the folding units

See Chapter "5.3 Operating modes"

6.9 Starting up



DANGER!

Danger due to dangerous electrical voltage.

Non-observance may cause serious injuries or even death.

- Work on the electric components of the machine may only be performed by a qualified electrician.
- Observe the local occupational safety regulations and electrotechnical regulations.
- On the supply terminals and on the terminals of the main switch, there is dangerous electric voltage even when the main switch is switched off. (See wiring diagram)
- There is dangerous electric residual voltage on the supply terminals of the frequency inverter even when the main switch is switched off. (Observe the capacitor discharge time (KEB 5 min, Telemecanique 15 min)).

6.9.1 Brief instructions

- Check the supply voltage.
See Chapter "6.9.2 Check the supply voltage."
- Switch on the main switch.
See Chapter "7.2.1 Switching the main switch on/off"
- Check rotating field of the power socket.
See Chapter "6.9.3 Check rotating field of the power socket."
- Check rotation direction of pumps.
See Chapter "6.9.4 Check rotation direction of pumps."
- Check rotation direction of feeder motor.
See Chapter "6.9.5 Check rotation direction of feeder motor."
- Check turning direction drive motor folding machine.
See Chapter "6.9.6 Checking rotation direction drive motor of the folding machine."
- Checking machine functions
See Chapter "6.9.8 Checking machine functions"

6.9.2 Check the supply voltage.



CAUTION

Danger due to incorrect power supply voltage.

Non-observance may cause severe property damage.

- If the existing nominal voltage deviates from the details on the label, wiring diagram, and "the "Technical data" in the operating manual, an isolating transformer must be used.
- You can get the necessary information from the manufacturer.

Procedure:

- ▷ Check on the main terminal bar that the correct supply voltage is present.

6.9.3 Check rotating field of the power socket.



DANGER!

Danger due to dangerous electrical voltage.

Non-observance may cause serious injuries or even death.

- Work on the electric components of the machine may only be performed by a qualified electrician.
- Observe the local occupational safety regulations and electrotechnical regulations.
- On the supply terminals and on the terminals of the main switch, there is dangerous electric voltage even when the main switch is switched off. (See wiring diagram)
- There is dangerous electric residual voltage on the supply terminals of the frequency inverter even when the main switch is switched off. (Observe the capacitor discharge time (KEB 5 min, Telemecanique 15 min)).

Procedure:

- ▷ Check with a rotating field device that there is a right rotating field.



If there is no right rotating field, during connection of a subsequent folding unit with AC drive, its rotation direction is incorrect.

6.9.4 Check rotation direction of pumps.

Refer to the operating manual for the pile feeder/continuous feeder.

6.9.5 Check rotation direction of feeder motor.

Refer to the operating manual for the pile feeder/continuous feeder.

6.9.6 Checking rotation direction drive motor of the folding machine.



CAUTION!

Danger due to incorrect rotation direction of the drive motor.

Non-observance may possibly cause property damage.

On start-up, check the correct rotation direction of the drive motor of the folding machine.

- The suction wheel/suction tape must turn clockwise.
- If necessary, change the 2 phases of the motor connecting line in the main control cabinet.

Procedure:

- ▷ Press the <Machine start > button.
The suction wheel/suction tape must turn clockwise.
- ▷ When you have detected the motion direction of the suction tape, stop the machine by pressing the <Machine stop> button.
- ▷ If the suction tape is turning counterclockwise, the two phases of the connecting line of the drive motor in the control cabinet must be exchanged by a licensed electrician.
- ▷ Then repeat check of the rotation direction.

6.9.7 Checking the control cabinet cover

Check that the covers on all control cabinets are grounded and closed according to regulations.

Procedure:

- ▷ Check this by visual inspection.

6.9.8 Checking machine functions

Procedure:

- ▷ Check the complete machine function by setting up a customer job/test job.

6.10 Final check of the protective devices

After installing the machine, be absolutely certain to carry out a final check of the protective devices.

Procedure:

- ▷ Check that all covers and safety and protective devices are installed and fully functional.
For this purpose, use the checklist for the safety and protective devices. See Chapter "2.12.9 Checklist for safety and protective devices".

6.11 Inspection after first start-up

20 operating hours after the initial start-up, it is necessary to check all belts and tapes.

Procedure:

- ▷ Check the belts and tapes on correct center running and on correct tension.
If required, readjust these.
See Service/Maintenance schedule chapter.

7 Adjustment and operation

7.1 Introduction

For the operation of the machine, also observe:

- The safety instructions
See chapter "7.1.2 Safety instructions".
- The intended use
See chapter "2.1 Intended use"
- Qualification of the operating personnel
See chapter "2.10 Qualification of personnel".

7.1.1 Qualification of personnel

This table lists the necessary qualification of the personnel related to "Adjustment and operation" of the machine.

	Specially trained personnel	Instructed operating personnel	Instructed personnel with specialized training (mechanical/electrical engineering)
Installation, retrofiting	X	X	-
Operating	-	X	-

Table 18: Qualification of personnel, adjustment and operation
Legend: X permitted, - not permitted

7.1.2 Safety instructions

**DANGER!**

Danger when dismantling, bridging or avoiding safety and protective devices.

Non-observance may cause serious injuries or even death.

- No safety or protective devices of the machine may be dismantled, bridged or avoided.
- Using the checklist for protective equipment and safety devices, check that all protective devices are on the machine.
- Report any audible/visible safety-relevant change to the machine to the person responsible for the system in your operation.

**WARNING!**

Danger from automatic lowering of the open noise damping hood induced by a pressure drop of the pneumatic springs.

Non-observance may possibly cause severe or fatal injuries due to squeezing of body parts.

You can recognize a pressure loss of the pneumatic springs as follows: Noise damping hood lowers itself automatically from the opened position.

- Check the pneumatic springs after each production / daily to ensure they are functioning properly
- Replace the pneumatic springs immediately if there are any signs of pressure loss.
- When opening the noise damping hood, make sure to open it all the way to the limit stop.

**WARNING!**

Danger due to rotating machine element

Non-observance may possibly cause serious personal injuries or even death

- Make sure that you always tie back your hair and keep it protected.
- Remove your jewelry during operation and maintenance of the machine.
- Make sure of wearing only close fitting clothes while you operate or maintain the machine.

**WARNING!**

Danger due to rotating machine element

Non-observance may possibly cause serious personal injuries and damage to property.

With sudden machine stops and before you reconnect the machine, make sure that:

- That there is no other person on the machine.
- The machine is working perfectly.

**WARNING!**

Danger due to slitter shafts.

The built-in knives are very sharp!

Non-observance may possibly cause serious personal injuries or even death

- For all work with the slitter shafts, wear cut-proof safety gloves and safety shoes.
- The slitter shafts may only be mounted/dismantled when the machine is stopped and secured against switching on.
- Always hold the slitter shafts at the shaft and not at the tool.

**WARNING!**

Danger due to slitter shafts.

Non-observance may possibly cause serious personal injuries or even death

Even when closed, the slitter shaft guard does not provide 100% protection against the sharp knives touching the slitter shafts.

Never reach into the slitter shafts while the machine is running!

**WARNING!**

Danger from incorrect handling of the safety handwheels.

Non-observance may cause severe personal injuries.

- Turn the safety handwheel only when the machine is not moving.
- Press the EMERGENCY STOP palm button.
- Operate the machine with safety handwheels only (otherwise, there is a danger of being drawn in).

**WARNING!**

Danger from incorrect use of the sockets.

Non-observance may cause serious injuries or even death.

- The machine sockets of the MBO machines may be used exclusively for the connection of MBO folding units, units or deliveries.
- The 230 VAC sockets of the MBO machines may be used exclusively for connecting auxiliary devices intended for this purpose, such as gluing devices.
- All sockets (400 VAC and 230 VAC sockets) of the MBO machines must be monitored at all times according to the corresponding federal and local codes, guidelines and other regulations.

**CAUTION!**

Danger when lifting heavy machine parts (buckle plates, slitter shafts, etc.)

Non-observance may cause personal injuries and damage to property.



To lift heavy machine parts such as buckle plates, slitter shafts, etc., request the help of another person or people.

**CAUTION!**

Danger due to sound pressure

Non-observance may cause hearing problems.

- Always wear hearing protection whenever you work at or on the machine.
- Always close the noise damping hoods whenever you work at or on the machine.

**CAUTION!**

Danger due to infeed point.

The tape roller at the end of the register table for infeed into the buckle folding unit is a dangerous infeed point.

Non-observance may cause personal injuries and damage to property.

Never reach into the register table while the machine is running.

**CAUTION!**

Danger due to paper jam.

The machine may be restarted only after removing the paper jam.

Non-observance may damage/destroy the drive belts.

When removing the paper jam, turn the machine using the safety hand-wheel only.

7.2 Operating

7.2.1 Switching the main switch on/off

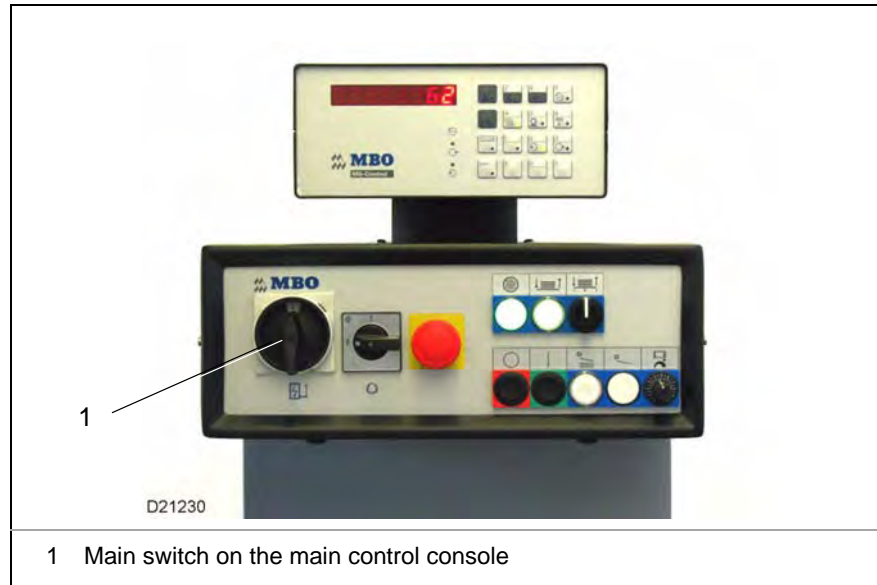


Figure 43: Switching on the machine

Switching on: Procedure:
 ▷ Turn the main switch (1) to switch position 1
 The machine is now ready for operation.

Switching off: Procedure:
 ▷ Turn the main switch (1) to switch position 0.
 The display of the MS-Control goes out.



To save energy, a machine that is not being used should be switched off.

7.2.2 EMERGENCY STOP palm button

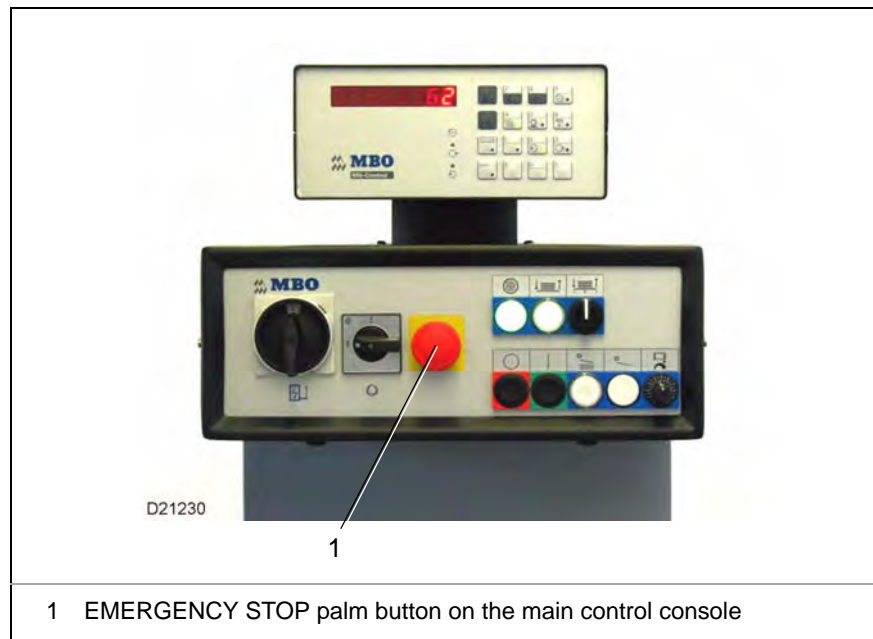


Figure 44: EMERGENCY STOP palm button



To prevent immediate or potential hazards, the machine is equipped with an EMERGENCY STOP shut-off device. After the <EMERGENCY STOP> palm button is pressed, all electrical drives are switched off. EMERGENCY STOP does not disconnect the machine from the electrical supply.

The machine is in operation.
There is a hazardous situation and the machine must be stopped quickly.
Procedure:

- ▷ Press the EMERGENCY STOP palm button (1).
- ▷ Eliminate the failure.
Ensure that in this situation, the machine is not switched on again accidentally.
- ▷ Disengage the EMERGENCY STOP palm button by turning it towards the right.
The machine is ready for operation.



When the EMERGENCY STOP palm button is pressed, the machine is stopped immediately.
No emptying of the sheets takes place!

7.2.3 Starting/stopping the machine

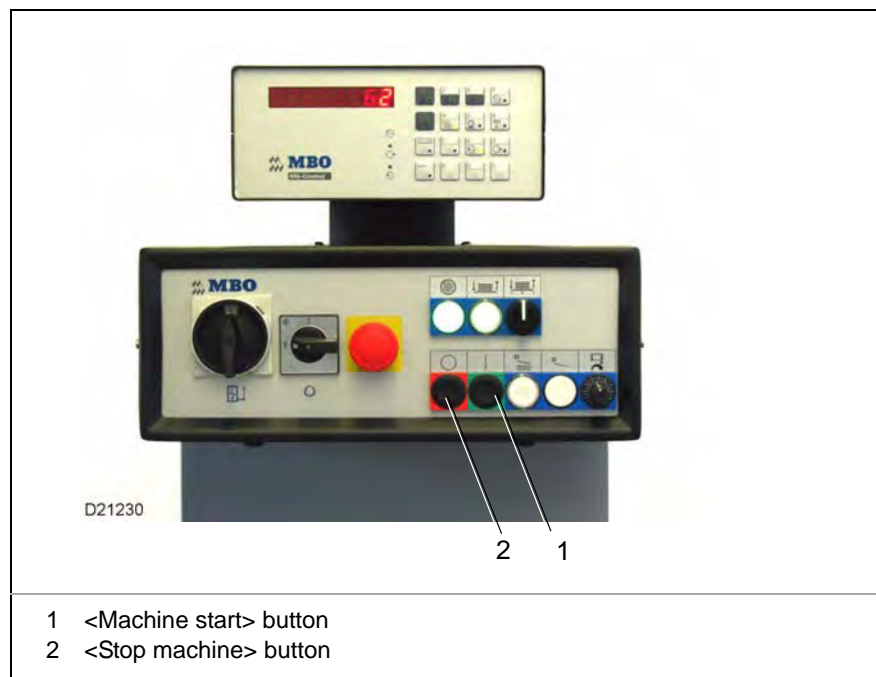


Figure 45: Starting/stopping the machine

- Starting the machine:** Procedure:
▷ Press the <Machine start> button (1).
- Stopping the machine:** Procedure:
▷ Press the <Stop machine> button (2).

7.2.4 Switching the air supply on/off

The supply of blast air and suction air is provided by a pressure vacuum pump.

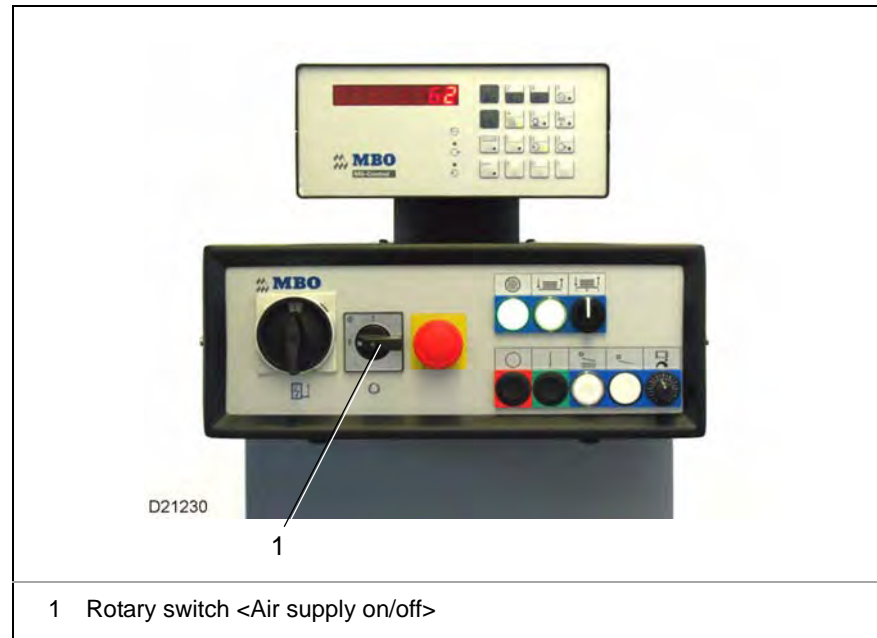


Figure 46: Switching the air supply on/off

The air supply is turned on/off by the rotary switch (1) on the main control panel.

- Switch on air supply:** Procedure:
- ▷ Turn the rotary switch (1) from position 0 to position 1.
- Switching off the air supply:** Procedure:
- ▷ Turn the rotary switch (1) from position 1 to position 0.

7.2.5 Starting/stopping the sheet feed

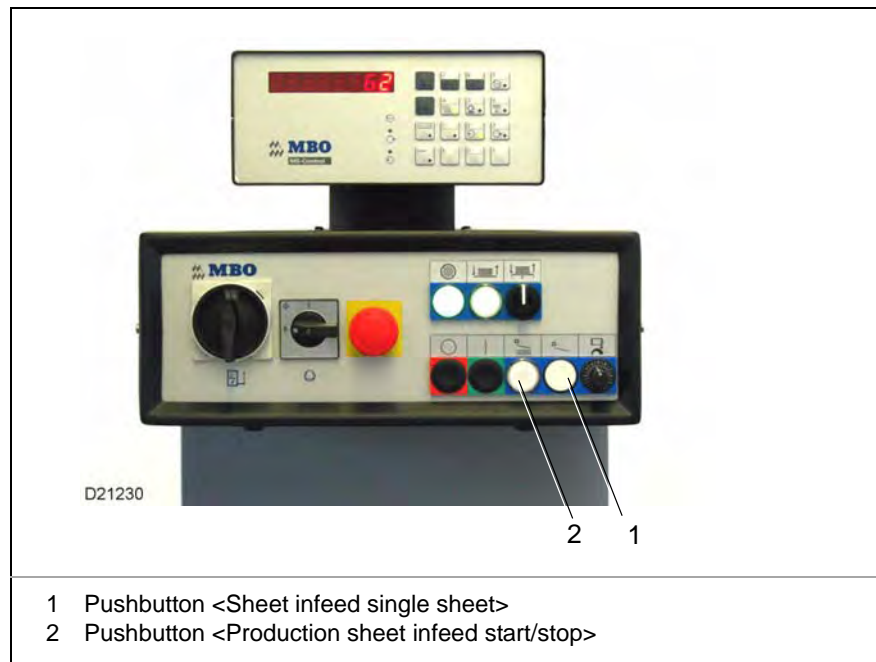


Figure 47: Switching the sheet feed on/off



Before the sheet feed is started, the air supply must be switched on.

- | | |
|----------------------------------|--|
| Calling up single sheets: | Procedure:
▷ Press the <Single sheet infeed> pushbutton (1).
A single sheet is fed. |
| Starting production: | Procedure:
▷ Press the <Production sheet infeed start/stop> pushbutton (2).
Sheets are fed continuously. |
| Stopping production: | Procedure:
▷ Press the <Production sheet infeed start/stop> pushbutton (2) again.
The sheet feed stops. |

7.2.6 Setting the speed

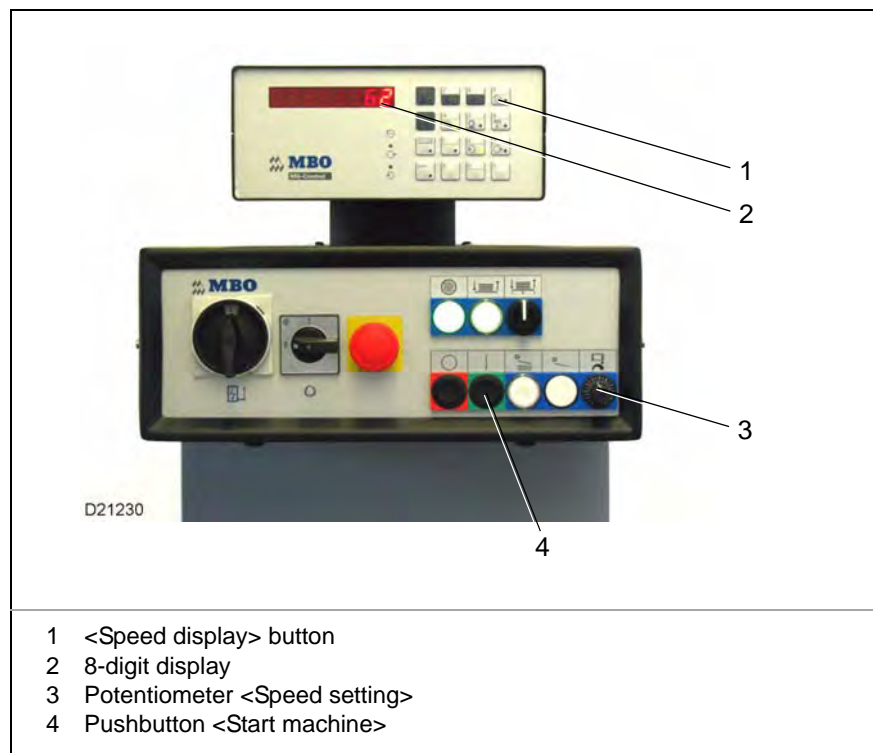


Figure 48: Speed setting

Adjustment: Setting the desired work speed on the control console of folding unit I.

Procedure:

- ▷ Start the machine by pressing the pushbutton (4).
- ▷ Press the pushbutton (1).
The 8-digit display (2) shows the speed in m/min.
- ▷ Increasing the speed:
Turn the potentiometer (3) clockwise until the desired speed is reached.
- ▷ Decreasing the speed:
Turn the potentiometer (3) counterclockwise until the desired speed is reached.

Setting the speed of all folding units: The folding units must have their speed set locally at each control console using a potentiometer.



Setting the speed according to the

- Type of fold
- Paper quality

7.3 Brief instructions for adjusting the machine

The machine is adjusted in these work steps:

- Adjusting the feeder.
See Chapter "7.4 Adjusting the feeder"
- Adjusting the suction wheel
See chapter "7.5 Adjusting the suction wheel"
- Adjusting the register table.
See Chapter "7.6 Setting of the register table"
- Adjusting the sheet feed control.
See Chapter "7.7 Adjusting the sheet feed control"
- Adjusting the parallel fold.
See chapter "7.8 Adjusting the parallel fold"
See chapter "7.14 Adjustment data of standard folding impositions"
- Adjusting the buckle plates
See chapter "7.9 Adjusting the buckle plates"
See chapter "7.14 Adjustment data of standard folding impositions"
- Placing the slitters on the slitter shafts.
See Chapter "7.10 Placing the slitters on the slitter shafts"
- Adjusting the options.
See Chapter "7.11 Options"
- Troubleshooting
See chapter "7.12 Troubleshooting"
- Removing the paper jam.
See Chapter "7.13 Removing the paper jam"

7.4 Adjusting the feeder

See separate operating manual for the feeder.

7.5 Adjusting the suction wheel

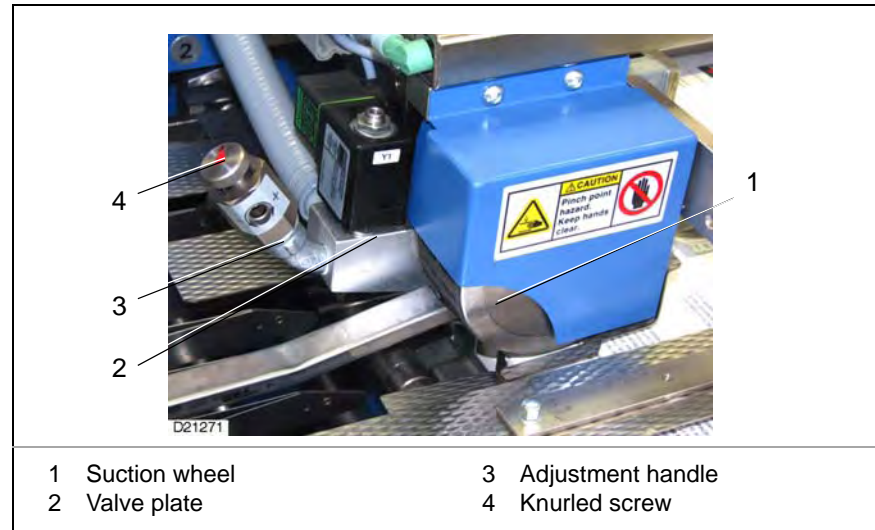


Figure 49: Suction wheel

Adjusting the suction force:

The suction force has to be adjusted depending on the properties of the paper to be processed.

Procedure:

- ▷ The suction force is adjusted using the knurled screw (4).

Minimum suction power:

Set the knurled screw to the left stop.

Maximum suction power:

Set the knurled screw to the right stop.



Reducing the suction force:

- For sensitive paper stock (lightweight printing stock) that tends to develop markings.
- For porous papers (double sheet)

Increasing the suction force:

- For heavy papers

Adjusting the infeed point:

The infeed point is adjusted, depending on the sheet curling of the paper, using the adjustment handle (3).

Procedure:

For straight or upwards-rolled paper:

- ▷ Adjust the adjustment handle (3) so that the top edge of the valve plate (2) is horizontal = neutral position.

With paper rolled towards the bottom:

- ▷ Pull the adjustment handle (3) upwards. This shifts the infeed point in the direction of the register table.

For porous papers, by moving the infeed point in the direction of the feeder, it is possible to prevent double sheets from occurring.

Procedure:

- ▷ Push the adjustment handle (3) downwards.

7.6 Setting of the register table

The register table aligns incoming paper sheets left-aligned through the angular position of the transport belt.


CAUTION!

Danger due to infeed point.

The tape roller at the end of the register table for infeed into the buckle folding unit is a dangerous infeed point.

Non-observance may cause personal injuries and damage to property.

Never reach into the register table while the machine is running.

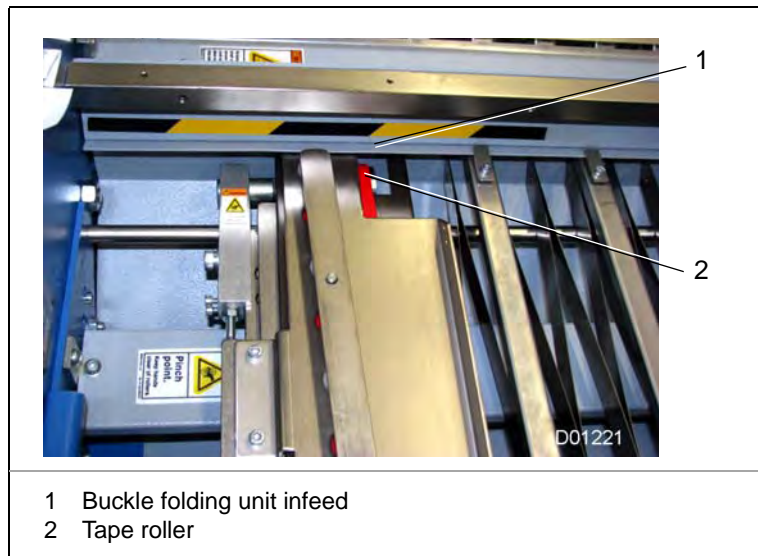


Figure 50: Tape roller hazard area

7.6.1 Sheet size adjustments

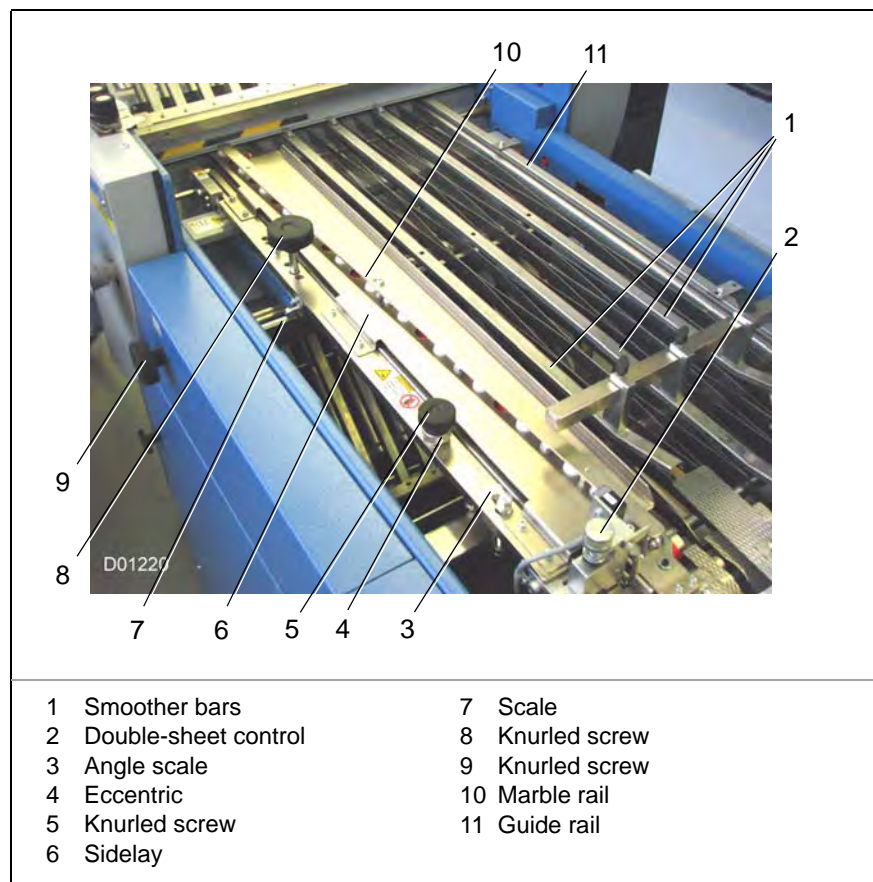


Figure 51: Register table

Adjusting sidelay:

Procedure:

- ▷ Remove the smoother bars (1), which get in the way during adjustment.
- ▷ Loosen the knurled screw (8).
- ▷ Adjust the sidelay (6) to one-half the paper width using the scale (7).
- ▷ Tighten the knurled screw (8).

Adjusting the guide rail:

Procedure:

- ▷ Adjust the guide rail (11) such that the edge of the sheets that are drawn in are centered on the guide rail.



The clamping of the guide rail is self-locking.

The self-locking can be changed by a grub screw in the guide:

- Clockwise direction of rotation: self-locking increases.
- Counterclockwise direction of rotation: self-locking decreases.

Carrying out precise adjustment:

This is necessary if the downline fold or perforation is not correct.

Procedure:

- ▷ The knurled screw (5) remains closed

- ▷ Carry out precise adjustment by turning the knurled handle (9).
- Clockwise direction of rotation (+):**
The sidelay and guide rail are shifted parallel to the operator side.
- Counterclockwise direction of rotation (-):**
The sidelay and guide rail are shifted parallel to the drive side.

Inserting the smoother bars:

Procedure:

- ▷ Select the number of smoother bars (1) according to the paper format.
- ▷ Open the wing screws on the smoother bars (1).
- ▷ Distribute the smoother bars evenly (1).
- ▷ Hook the smoother bars (1) into the sheet guide plate of the parallel fold using the plate springs.
- ▷ Tighten the wing screws on the smoother bars (1).

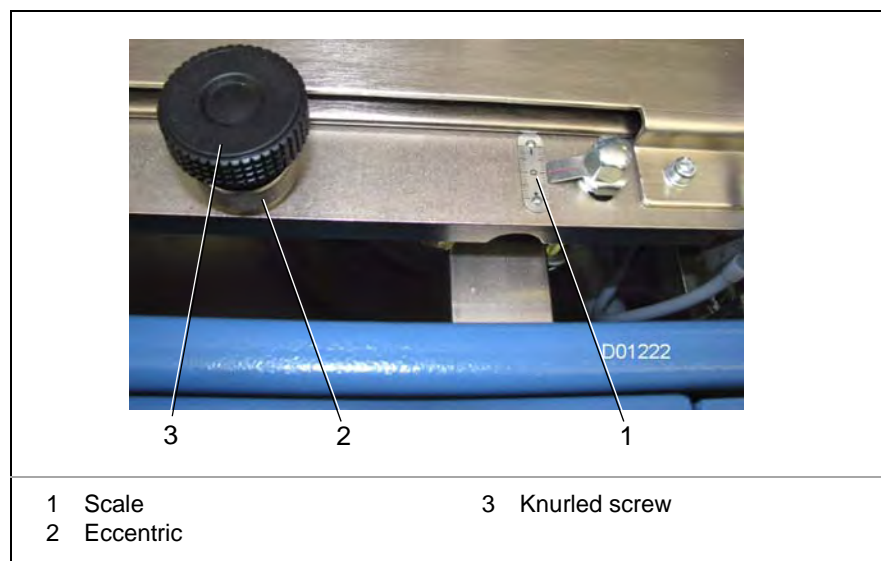


Figure 52: Adjusting the angle for the foldrollers

Basic setting of the angle

Procedure:

- ▷ Loosen the knurled screw (3).
- ▷ Adjust the eccentric (2) so that the pointer of the scale (1) points to zero.
- ▷ Tighten the knurled screw (3).

Adjustment for tilt of the fold

Procedure:

- ▷ Loosen the knurled screw (3).
- ▷ Adjust the eccentric (2) using the scale (1) according to the tilt of the fold.
- ▷ Tighten the knurled screw (3).
- ▷ Check the fold.
- ▷ Correct if necessary.

7.6.2 Equipping the marble rail

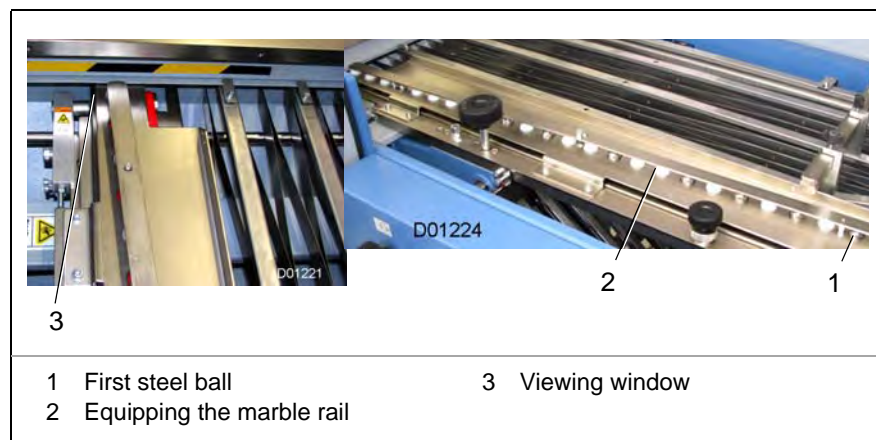


Figure 53: Marble rail

To align the sheets with the stop rail accurately, the marble rail must be equipped with steel or plastic balls ("marbles"). The choice of balls to be used depends on the paper weight and format.

Selecting the ball type:

For portrait format and landscape format:

- Less than 50 g/m² = Plastic balls only
- 50 to 130 g/m² = Mix of steel and plastic balls
- Greater than 130 g/m² = Primarily steel balls

For landscape format only:

- Greater than 130 g/m² = Only steel balls



Example for equipping the marble rail (2):

Beginning with a steel ball (1), the following should be true:

- In the first one-third, every second ball should be a steel ball.
- In the second one-third, every third ball should be a steel ball.
- In the third one-third, every fourth ball should be a steel ball.

Checking the alignment:

The end of the sidelay contains the viewing window (3).

There, you can check the alignment of the sheets.

Procedure:

- If the sheets run accurately along the sidelay:
The equipment of the marble rail is OK.
- If the sheets run away from the sidelay:
Too few balls or steel balls.
- If the sheets run up along the sidelay:
Too many balls or steel balls.

7.6.3 Double-sheet control

The double sheet detector works electromechanically and detects multiple paper sheets that stick to one another.

If a double sheet occurs, it is held by this control segment.

At the same time, an electrical signal is generated by the microswitch that stops the sheet feed immediately.

The sheets in the machine are folded to completion.

As soon as the last sheet has left the machine, the machine's drive is stopped.

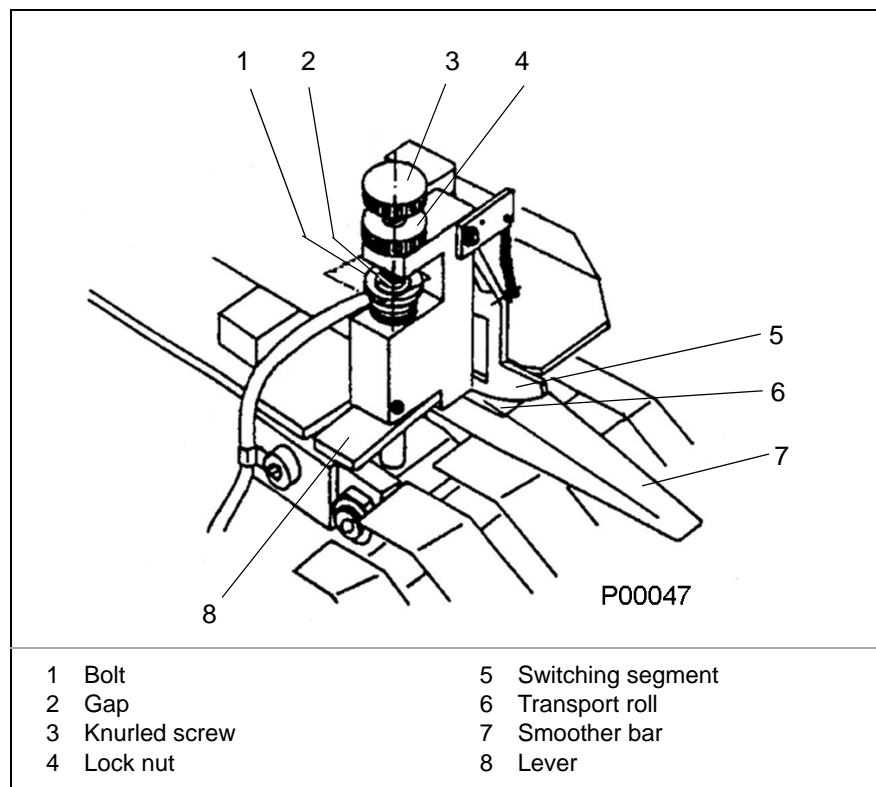


Figure 54: Double-sheet control

- Adjustment:** Procedure:
- ▷ Press the lever (8) downwards.
 - ▷ Insert a strip (simple paper thickness) of the paper to be processed in the gap (2) between bolts (1) and knurled screw (3).
 - ▷ Release the lever (8) again.

- Checking the function:** Procedure:
- ▷ Start the machine
 - ▷ Push a strip of simple paper thickness under the retainer (7) until it is between the control segment (5) and the transport roll (6).
The double sheet detector may not switch.
 - ▷ Push a strip of double paper thickness under the retainer (7) until it is between the control segment (5) and the transport roll (6).
The double sheet detector must switch.

- ▷ If one of the two points above does not apply, the double sheet detector must be adjusted using the knurled screw (3).

Readjustment Procedure:

- ▷ Loosen the lock nut (4).
- ▷ Adjust the gap (2) between the control segment and idler roller with the knurled screw (3).
 - Turn to the right = gap is increased.
 - Turn to the left = gap is decreased.
- ▷ Tighten the lock nut (4).
 - Hold onto the knurled screw (3) while doing this.
- ▷ After securing, check the function of the double sheet detector again and readjust if necessary.



To account for paper differences:

- Turn the knurled screw (3) up to 1/4 turn to the right (clockwise).
-

7.7 Adjusting the sheet feed control

Refer also to the separate "MS-Control" operating manual.

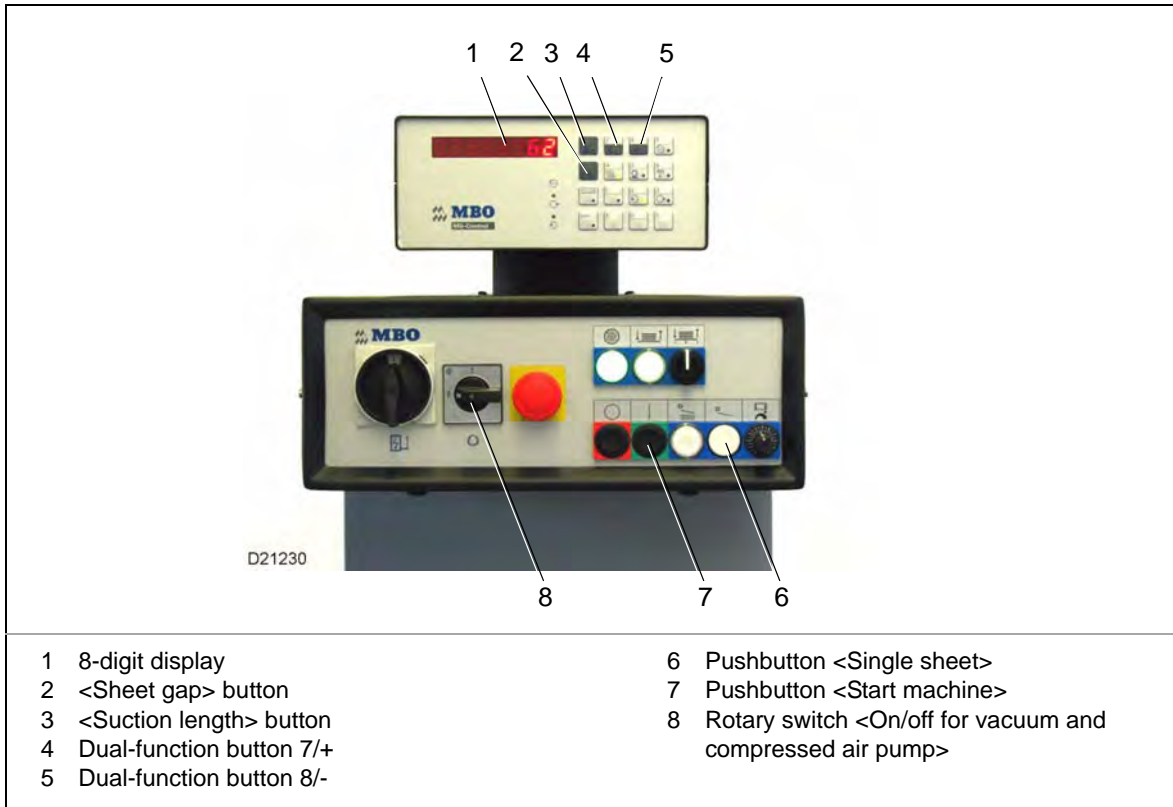


Figure 55: Sheet feed control

Prerequisite for setting up the sheet feed control:

The machine must be set up mechanically.

Procedure:

- ▷ Start the machine by pressing the button (7).
- ▷ Switch on the pump using the rotary switch (8).
- ▷ Begin now with teaching in the suction length and sheet gap.

7.7.1 Teaching in the suction length and sheet gap

To convey the sheet reliably from the feeder to the register table, a corresponding suction length is necessary.

This suction length is determined by teaching in sheets.

Teaching in the suction length:

Procedure:

- ▷ Press and hold the suction length button (3) and simultaneously activate the single sheet button (6).

A single sheet is drawn in with a machine-specific basic suction length.

The length of the sheet is measured by the photo cell B 2 on the suction wheel.

The required suction length is automatically set to approx. 1/3 of the sheet length.

- Changing the basic suction length:** The basic suction length (15 cm) can be changed, if necessary.
Setting range: 0.1 cm to 34 cm.
Procedure:
Increasing the basic suction length
▷ Press and hold the suction length button (3) and simultaneously activate the + button (4).
Decreasing the basic suction length
▷ Press and hold the suction length button (3) and simultaneously activate the - button (5).
- Changing the suction length:** The suction length can be changed, if necessary.
Setting range: 3 cm to 99 cm:
Procedure:
Increasing the suction length:
▷ Press and hold the suction length button (3) and simultaneously activate the + button (4).
Decreasing the suction length:
▷ Press and hold the suction length button (3) and simultaneously activate the - button (5).
- Sheet gap:** Corresponding to the operating mode, the sheet gap is set to 1 cm when teaching in the suction length.
- Changing the sheet gap:** Corresponding to the type of fold and the sheet format, the sheet gap has to be adapted manually.
Setting range: 0 cm to 250 cm
Procedure:
Increasing the sheet gap:
▷ Press and hold the sheet gap button (2) and simultaneously activate the + button (3).
Decreasing the sheet gap:
▷ Press and hold the sheet gap button (5) and simultaneously activate the - button (5).

7.7.2 Default counter settings

"Refer to the separate MS-Control operating manual."

7.8 Adjusting the parallel fold

The parallel fold takes over the aligned sheets of paper from the register table and makes the first fold.

The folding sheet passing through can also be processed with the rear slitter shafts.

7.8.1 Roller diagram

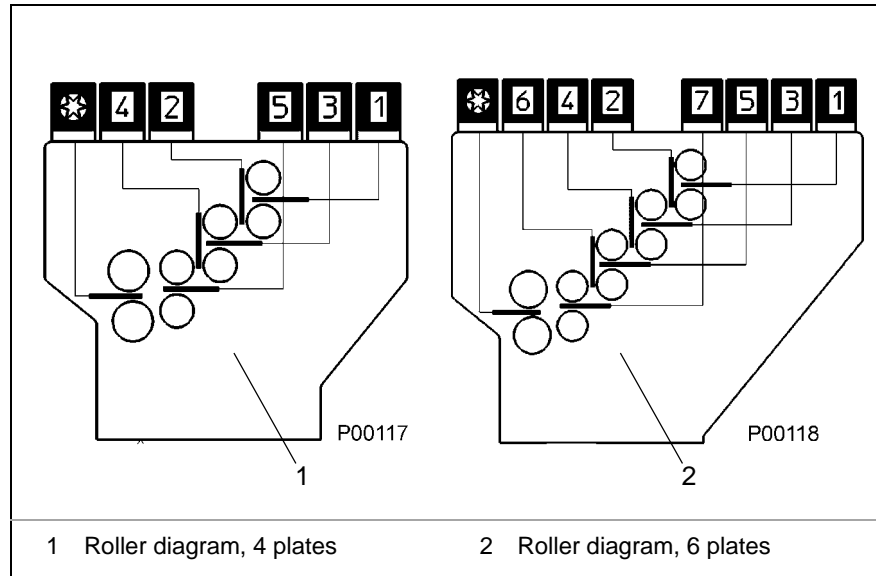


Figure 56: Parallel fold roller diagram

The roller scheme is on the side wall of the parallel fold and serves as an adjustment aid.

It shows the foldrollers and slitter shafts with the associated setting elements.

7.8.2 Adjusting the pressure of foldrollers and slitter shafts



WARNING!

Danger from rotating foldrollers and slitter shafts.

Non-observance may possibly cause serious personal injuries or even death

- Test and adjust the pressure of foldrollers only when the machine is not moving.
- Press the EMERGENCY STOP palm button.
- Always have the test and adjustment of the pressure of foldrollers carried out by one person only.
- Test and adjust the pressure of foldrollers by turning the safety handwheel. This also presents a crush hazard and danger of injuries.



WARNING!

Danger due to slitter shafts.

The built-in knives are very sharp!

Non-observance may possibly cause serious personal injuries or even death



- For all work with the slitter shafts, wear cut-proof safety gloves and safety shoes.
- The slitter shafts may only be mounted/dismantled when the machine is stopped and secured against switching on.
- Always hold the slitter shafts at the shaft and not at the tool.



WARNING!

Danger due to slitter shafts.

Even when closed, the slitter shaft guard does not provide 100% protection against the sharp knives touching the slitter shafts.

Non-observance may possibly cause serious personal injuries or even death

Never reach into the slitter shafts while the machine is running!



WARNING!

Danger from incorrect handling of the safety handwheels.

Non-observance may cause severe personal injuries.

- Turn the safety handwheel only when the machine is not moving.
- Press the EMERGENCY STOP palm button.
- Operate the machine with safety handwheels only (otherwise, there is a danger of being drawn in).

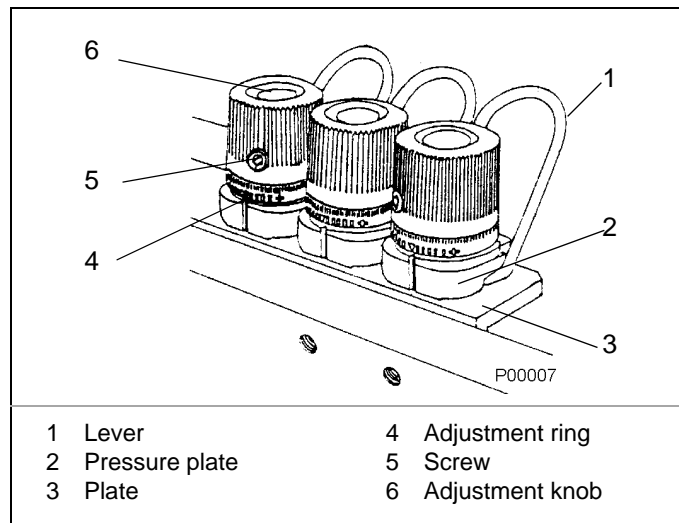


Figure 57: Setting of foldrollers and slitter shafts

To achieve an exact fold, the pressure on the foldrollers and the slitter shafts must be set correctly.

Basic setting pressure of foldrollers:

Procedure:

- ▷ Pull all upper buckle plates up to the end stop.
- ▷ Use the <Parallel fold> folding scheme to orient yourself.
- ▷ Begin with the 1st roller pair.
- ▷ Press the lever (1) downwards.
- ▷ Place a strip of the paper to be processed between the thrust piece (2) and plate (3).
Place under both sides equally.



The paper strip must be large enough to cover the entire thrust piece. If the paper strip is pushed in only partially or is too small, it can falsify the pressure of foldrollers.

- ▷ Place a longer strip of paper (format approx. 5 x 20 cm) on the roller gap to be set.
- ▷ Hold the strip of paper fast with your hand.
- ▷ Use the safety handwheel to turn the machine forwards.
- ▷ Check the pressure of foldrollers across the entire roller width.
- ▷ Set the required pressure of foldrollers across the entire roller width by turning the adjustment knobs (6) on both sides of the parallel fold equally.
Turning clockwise (+) = pressure of foldrollers is lower.
Turning counterclockwise (-) = pressure of foldrollers is higher.
- ▷ Adjust the other roller pairs and the slitter shaft in the same way.



Always complete settings with a turn of the adjustment knob (6) clockwise (+). (pressure of foldrollers is looser). This way, an even pressure of foldrollers is guaranteed with the next paper change.

Marking the basic setting:

For faster recreation of the basic setting, the set collar (4) should be put in the zero position.

Procedure

- ▷ Turn the set collar (4) until its arrow matches the marking on the thrust piece (2).

Adjusting for fold type:

You can do this by placing the number of paper strips corresponding to the fold type of the sheet to be processed under the setting elements. You must place underneath the setting elements on both sides equally.

Procedure:

- ▷ Use the <Parallel fold> folding scheme to orient yourself.
- ▷ Begin with the 1st roller pair.
- ▷ Press the lever (1) downwards.
- ▷ Place as many strips of the paper to be processed between the thrust piece (2) and plate (3) as the fold type requires. Place under both sides equally.



The paper strip must be large enough to cover the entire thrust piece. If the paper strips are pushed in only partially or are too small, this can falsify the pressure of foldrollers.

-
- ▷ Adjust the other roller pairs and the slitter shaft in the same way.
-



The number of paper strips to place underneath depends on the fold type.

Securing setting elements against contortion:

By tightening the screw (5) it is possible to secure the adjustment knob (6) against contortion.



CAUTION!

Danger of damage.

Non-observance may result in property damage.

Do not tighten the screw too much.

7.9 Adjusting the buckle plates

7.9.1 Buckle plate positions

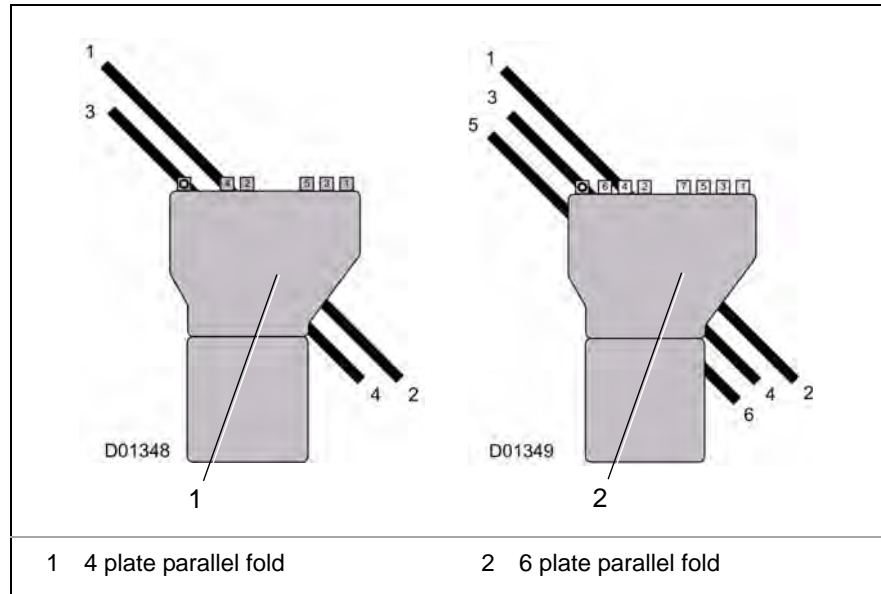


Figure 58: Buckle plate positions

The upper buckle plates have an uneven numbering.

The lower buckle plates have an even numbering.

7.9.2 Buckle plate 1 FTD

The first buckle plate in folding unit 1 is equipped with a swing deflector and a through sheet stop.

See Chapter "7.9.3.1 Sheet deflector function of buckle plates FTD/FT"

7.9.3 Buckle plates 2 to 4 (6) as standard buckle plates FT

Buckle plates 2 to 4 (6) are equipped as standard buckle plates FT with swing deflector.

See Chapter "7.9.3.1 Sheet deflector function of buckle plates FTD/FT"

7.9.3.1 Sheet deflector function of buckle plates FTD/FT

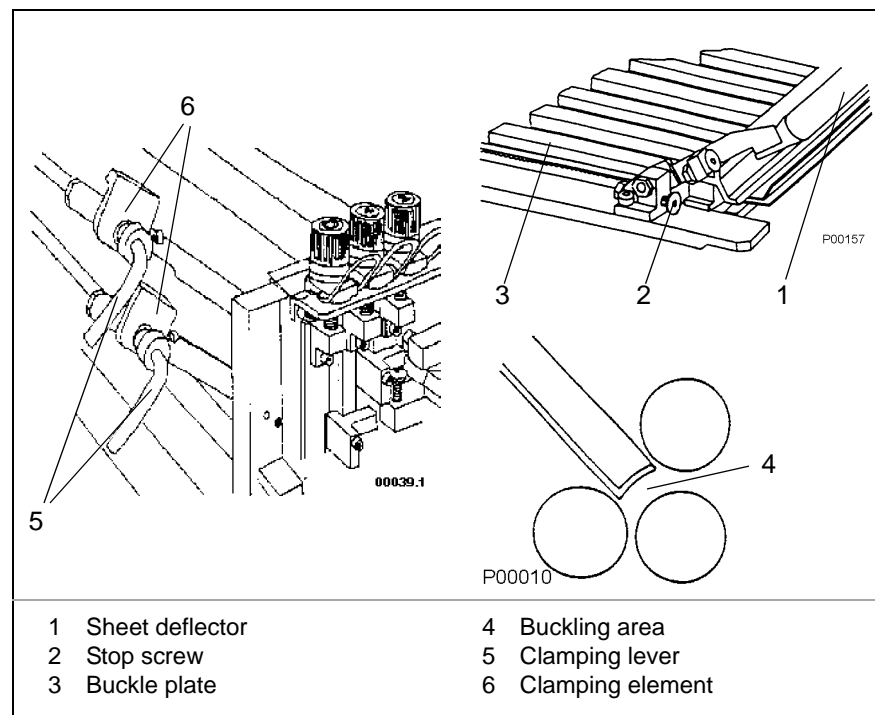


Figure 59: Sheet deflector

Sheet deflector function:

If a buckle plate is not needed, the sheet deflector has to be folded over.
Procedure:

- ▷ Release the clamping lever (5) by turning counterclockwise.
- ▷ Retract the unneeded buckle plate (3) by approx. 25 cm (9.843 in.).
- ▷ Fold the attached sheet deflector (1) forwards.
- ▷ Carefully push the buckle plate (3) back forwards.
- ▷ Clamp the buckle plate (3) by turning the clamping lever (5) clockwise.



CAUTION!

Danger due to displacement of the stop screws.

Non-observance may cause serious property damage to the buckle plates and folding units.

The adjustment of the stop screws must not be changed.

7.9.4 Buckle plates 2 to 4 (6) as combination buckle plates FTK

Buckle plates 2 to 4 (6) can be designed optionally as combination buckle plates FTK.

See Chapter "7.9.4.1 Combination buckle plate FTK sheet deflector function".

7.9.4.1 Combination buckle plate FTK sheet deflector function

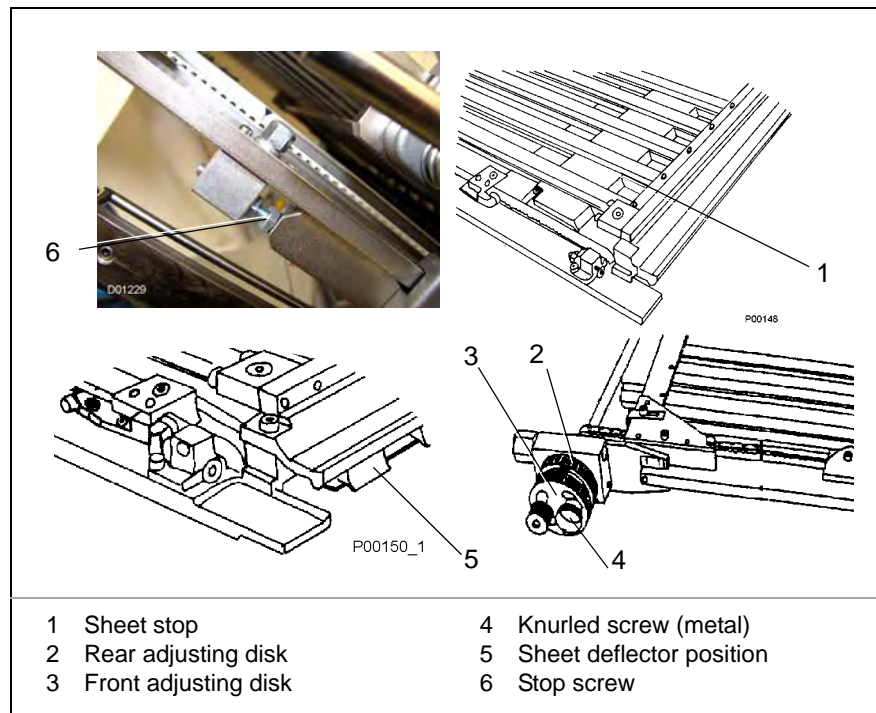


Figure 60: Combination buckle plate

With this fold type, the reversible swing deflector is omitted. The sheet stop can be moved far enough in the direction of the foldrollers that it assumes the sheet deflector function. This means that the buckle plate does not have to be involved during the changeover to the sheet deflector.

Buckle plate function: The various setting possibilities of the combination buckle plates are largely identical to those of the standard buckle plates FT.

Sheet deflector function: Move the sheet stop (1) all the way to the sheet deflector position (5).
 Procedure:

- ▷ Loosen the knurled screw (4) made of metal.
- ▷ Turn the adjusting disc (2) until the sheet stop (1) is in the sheet deflector position (5).
 Upper buckle plates 1, 3, 5. = turn right
 Lower buckle plates 2, 4, 6. = turn left
- ▷ Retighten the metal knurled screw (4).


CAUTION!

Danger due to displacement of the stop screws.
Non-observance may cause serious property damage to the buckle plates and folding units.

The adjustment of the stop screws must not be changed.

7.9.5 Inserting buckle plates FTD/FT



CAUTION!

Danger when inserting the buckle plates.

Non-observance may cause serious property damage to the buckle plates and folding units.

- Insert the buckle plates slowly and carefully all the way to the stop screws.
- Clamp the buckle plates securely after reinserting them.



CAUTION!

Danger due to displacement of the stop screws.

Non-observance may cause serious property damage to the buckle plates and folding units.

The adjustment of the stop screws must not be changed.

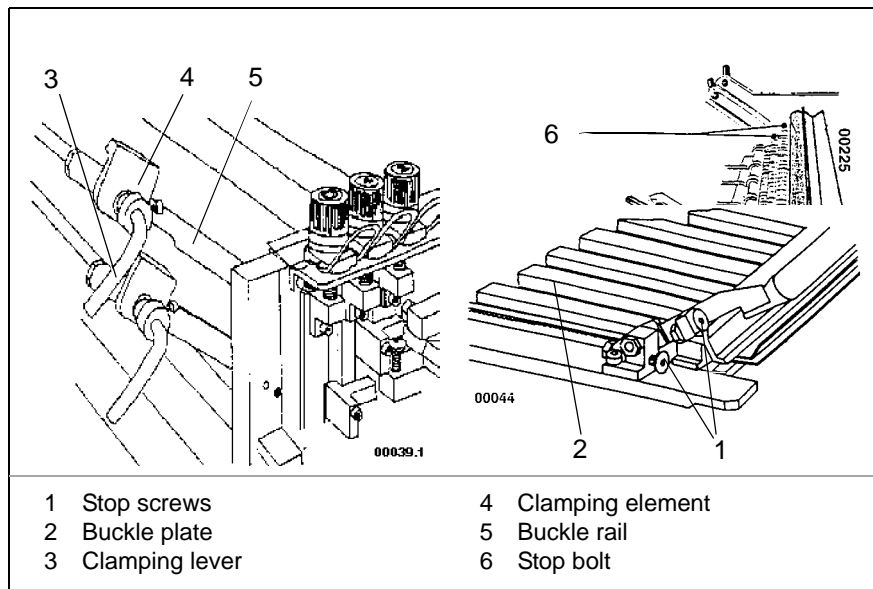


Figure 61: Inserting buckle plate 1

Procedure:

- Installation:**
- ▷ Release the clamping lever (3) by turning counterclockwise.
 - ▷ Rotate the clamping element (4) by 180°.
 - ▷ Push the buckle plate (2) on the buckle rails (5) towards the rear until the stop screws (1) touch the stop bolts (6).
 - ▷ Turn the clamping element (4) back to its original position.
 - ▷ Clamp the buckle plate (2) by turning the clamping lever (3) clockwise.



When clamping the buckle plate (2), this must be pressed towards the rollers so that the stop screws (1) rest securely on the stop pins.

Removal: ▷ Remove the buckle plates in the opposite sequence.

7.9.6 Inserting the buckle plates FTK



CAUTION!

Danger when inserting the buckle plates.

Non-observance may cause serious property damage to the buckle plates and folding units.

- Insert the buckle plates slowly and carefully all the way to the stop screws.
- Clamp the buckle plates securely after reinserting them.



CAUTION!

Danger due to displacement of the stop screws.

Non-observance may cause serious property damage to the buckle plates and folding units.

The adjustment of the stop screws must not be changed.

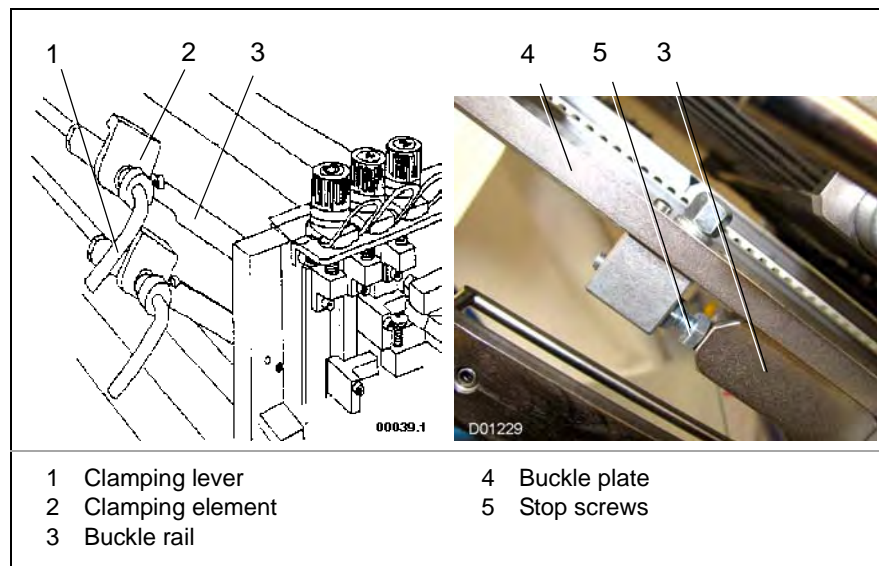


Figure 62: Inserting buckle plate 1

Procedure:

- ▷ Release the clamping lever (1) by turning counterclockwise.
- ▷ Rotate the clamping element (2) by 180°.
- ▷ Push the buckle plates (4) on the buckle rails (3) towards the rear until the stop screws (5) touch the buckle rails (3).
- ▷ Turn the clamping element (2) back to its original position.
- ▷ Clamp the buckle plate (4) by turning the clamping lever (1) clockwise.



When clamping the buckle plate (4), this must be pressed towards the rollers so that the stop screws (5) rest securely on the buckle rails (3).

7.9.7 Adjusting the folding length

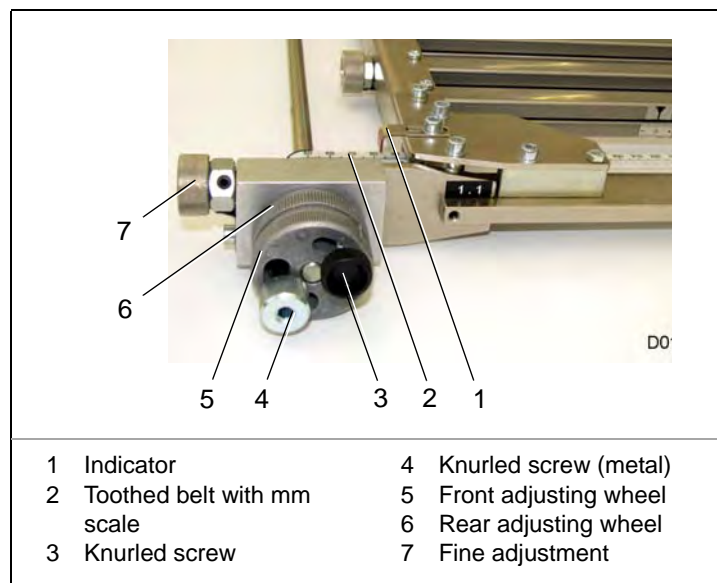


Figure 63: Adjusting the folding length

Adjusting the folding length:

Procedure:

- ▷ Loosen the knurled screw (4) made of metal.
- ▷ Adjust the folding length by turning the adjusting wheel (5, 6).

Upper buckle plates 1, 3, 5.

Turn to the right = folding length is decreased.

Turn to the left = folding length is increased.

Lower buckle plates 2, 4, 6

Turn to the right = folding length is increased.

Turn to the left = folding length is decreased.

- ▷ Turn the adjusting wheel (5, 6) until the red pointer (1) indicates the desired folding length on the scale (2) of the toothed belt.
- ▷ Retighten the metal knurled screw (4).

Precise adjustment:

Procedure:

- ▷ Leave the metal knurled screw (4) on tight.
- ▷ Turn the precise adjustment (7).
 - Turn to the right = folding length is increased.
 - Turn to the left = folding length is decreased.

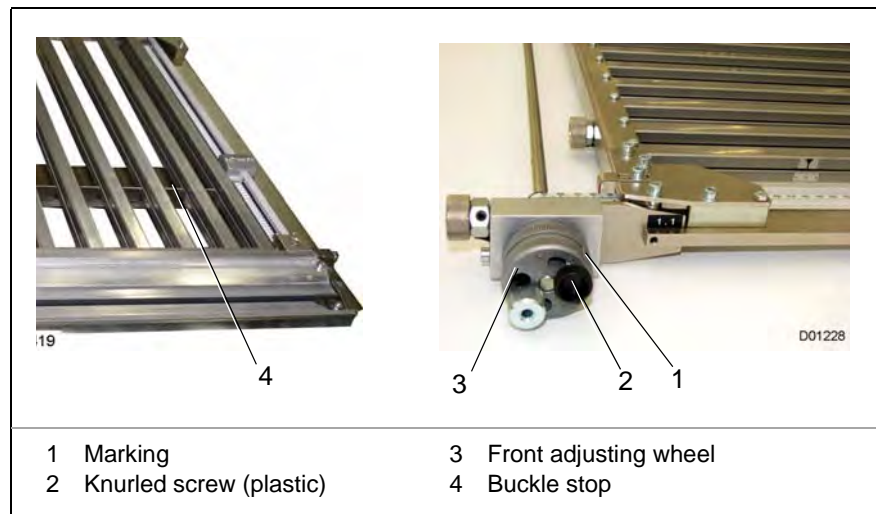
7.9.8 Adjusting the sheet stop angle:


Figure 64: Adjusting the sheet stop angle:

Adjusting the angle: By setting the sheet stop angle, it is possible to process some sheets that are not rectangular.

Procedure:

- ▷ Loosen the plastic knurled screw (2).
- ▷ By turning the front adjusting wheel (3), only the sheet stop on the drive side is adjusted.

Upper buckle plates 1, 3, 5.

Turn to the right = folding length on drive side is decreased.

Turn to the left = folding length on drive side is increased.

Lower buckle plates 2, 4, 6

Turn to the right = folding length on drive side is increased.

Turn to the left = folding length on drive side is decreased.

- ▷ The markings (1) on the adjusting wheels provide a reference point for how far the adjustment was.
- ▷ Retighten the plastic knurled screw (2).

Angle basic setting Procedure:

- ▷ Loosen the plastic knurled screw (2).
- ▷ Align the markings (1) of the two adjusting wheels by turning the front adjusting wheel (3).
- ▷ Retighten the plastic knurled screw (2).



Depending on the print mark, it may also be necessary to change the angle of the register table.

7.9.9 Adjusting the lower plate lip

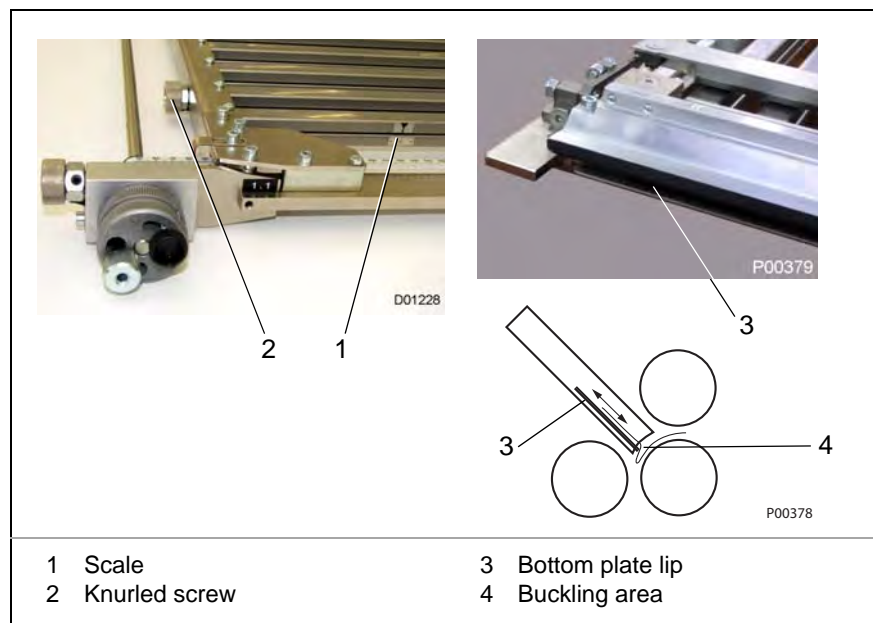


Figure 65: Bottom plate lip

Lower plate lip position:

Depending on the paper thickness, fold type, and properties of the front edge of the sheet, it may be necessary to enlarge or reduce the size of the buckling area (4).

This is done by adjusting the position of the lower plate lip (3).

Procedure:

- ▷ The adjustment must be undertaken in small steps on both sides equally.
- ▷ Check this using the two scales (1).
- ▷ Turn the knurled screws (2).

Turn to the right = buckling area (4) becomes larger.

Turn to the left = buckling area (4) becomes smaller.



Adjustment for thick paper:

- Reset lower plate lip (3) (away from the rollers)

Adjustment for thin paper and front edges of sheet bent downwards:

- Move lower plate lip (3) forward (towards the rollers).

Basic setting

Procedure:

- ▷ The adjustment must be undertaken in small steps on both sides equally.
- ▷ Turn the knurled screws (2) until both scales (1) are at zero.

7.9.10 Setting of the inner width

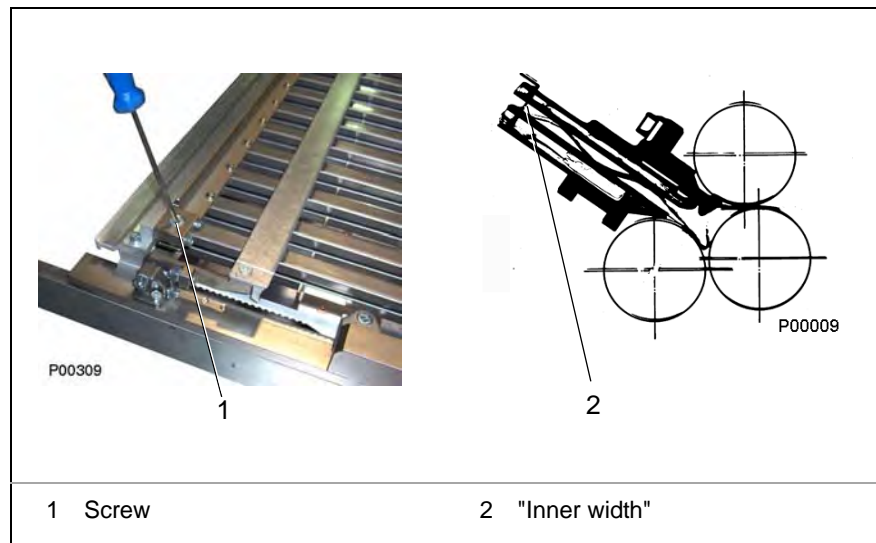


Figure 66: Setting of the inner width.

Depending on the characteristics of the paper, paper thickness, type of fold and work speed, the "inner width" of the buckle plates has to be adjusted. The "inner width" (2) is the distance between the upper and lower buckle rails.

Procedure:

- ▷ The adjustment must be made on both sides equally.
- ▷ Turn both screws (1).

Turn clockwise = "Inner width" (2) becomes larger.

Turn counterclockwise = "Inner width" (2) becomes smaller.

Basic setting A basic setting is not required since the setting of the "inner width" must be made individually according to the properties of the paper to be processed.

7.9.11 Enlarging the buckling area

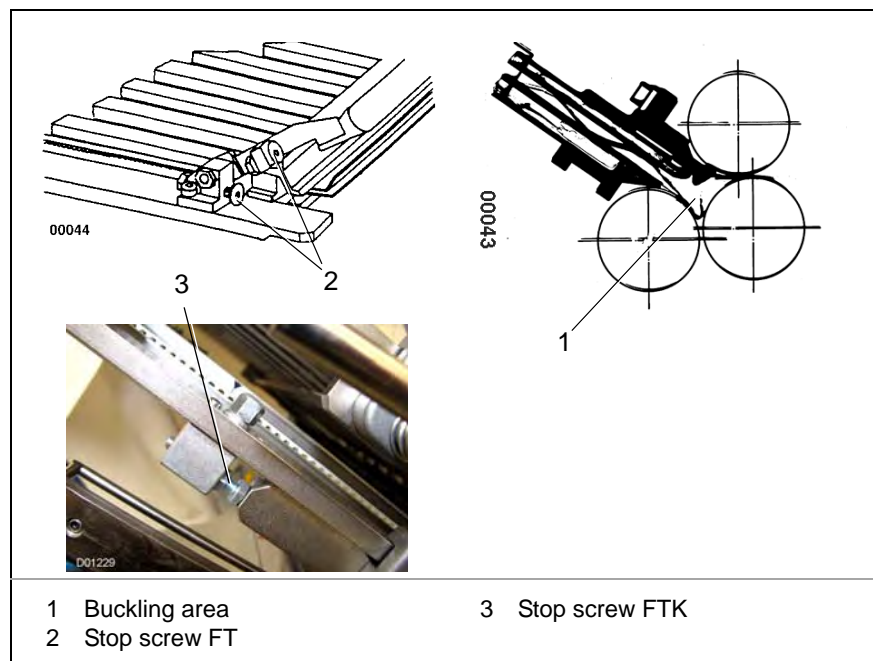


Figure 67: Enlarging buckling area.

Depending on the product thickness, it is possible that the buckling area must be enlarged.



The adjustment of the stop screw (2 + 3) must never be changed.



CAUTION!

Danger due to displacement of the stop screws.

Non-observance may cause serious property damage to the buckle plates and folding units.

The adjustment of the stop screws may not be changed (factory setting).

Enlarging the buckling area:

Procedure:

- ▷ Clamp a strip of cartons or multiple paper thicknesses between the stop pin and stop screw (2, 3).
- ▷ Adjust both sides equally.

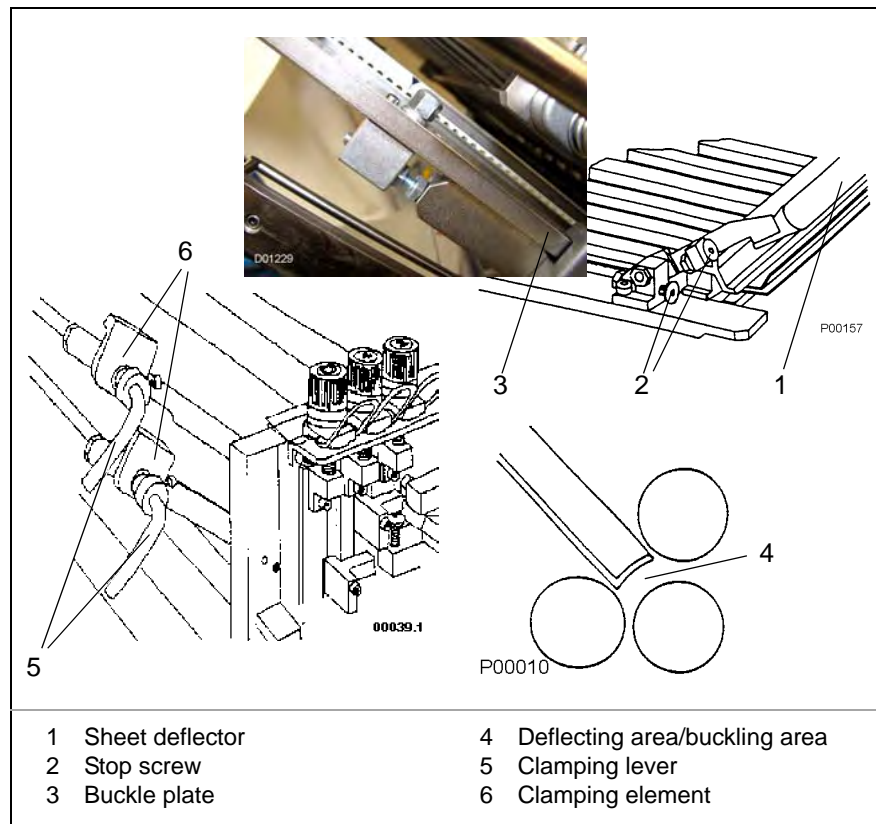
7.9.12 Enlarging the deflecting area


Figure 68: Sheet deflector

When the sheet deflector is active:

Thicker papers may need a larger deflecting area (4).

Procedure:

- ▷ Release the clamping lever (5) by turning counterclockwise.
- ▷ Retract the sheet deflector (1) / buckle plate (3) slightly. The adjustment must be made on both sides equally.
- ▷ Clamp the sheet deflector (1) / buckle plate (3) by turning the clamping lever (5) clockwise.



The adjustment of the stop screw (2) must never be changed.


CAUTION!

Danger due to displacement of the stop screws.

Non-observance may cause serious property damage to the buckle plates and folding units.

The adjustment of the stop screws must not be changed.

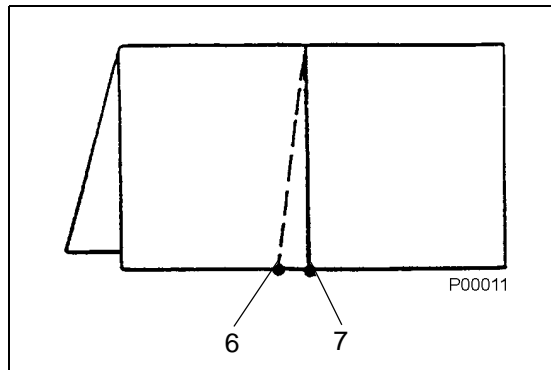


Figure 69: Correcting skewed perforations

Correcting skewed perforations:

Pulling out the sheet deflector/buckle plate on one side has an effect on the perforations (7), scores (7) or cuts (7), which deviate from the desired direction (6).

Procedure:

- ▷ Release the clamping lever (5) by turning counterclockwise.
- ▷ Retract the last sheet deflector (1) / buckle plate (3) slightly on one side. Clamp the sheet deflector (1) / buckle plate (3) by turning the clamping lever (5) clockwise.
- ▷ Using a new sheet, check the result and make any necessary corrections.



In case of deviations greater than 5 mm (0.0197 in.), distribute the setting across 2 sheet deflectors.

7.10 Placing the slitters on the slitter shafts



WARNING!

Danger due to slitter shafts.

The built-in knives are very sharp!

Non-observance may possibly cause serious personal injuries or even death

- For all work with the slitter shafts, wear cut-proof safety gloves and safety shoes.
- The slitter shafts may only be mounted/dismantled when the machine is stopped and secured against switching on.
- Always hold the slitter shafts at the shaft and not at the tool.

7.10.1 Single rear slitter shafts (standard)

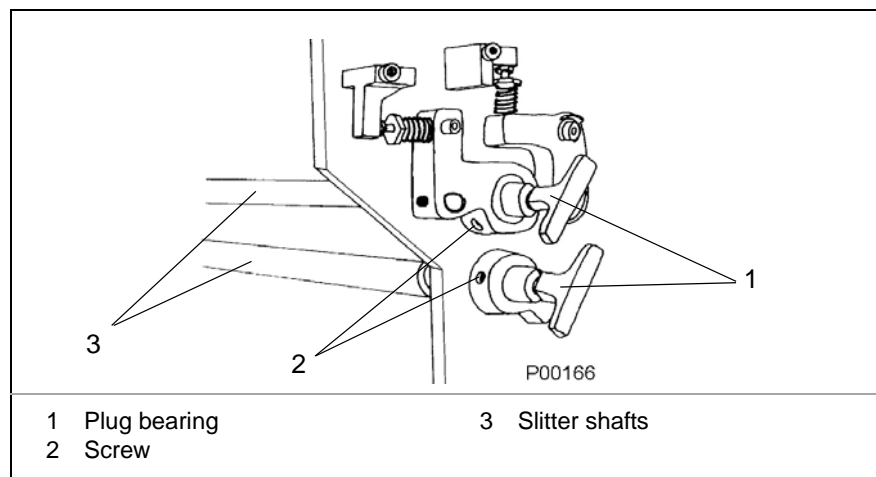


Figure 70: Pair of slitter shafts

Each folding unit has two downstream slitter shafts (3) for accommodating tools for perforating, creasing or cutting.

They can be installed and removed quickly using the plug bearings (1).

Removing slitter shafts:

Procedure:

- ▷ Remove the strippers that get in the way of removal.
- ▷ Remove stopper switch S31.
- ▷ Loosen the screws (2).
- ▷ Disengage the plug bearings (1).
- ▷ Hold the slitter shafts (3) securely.
If necessary, a second person should assist you.
- ▷ Withdraw the plug bearings (1).
- ▷ Take-out the slitter shafts (3).

Installing the slitter shafts:

Procedure:

- ▷ Return the slitter shafts (3) to their original position.
- ▷ Engage the plug bearings (1) in the bore of the slitter shafts.

- ▷ Press the plug bearings (1) against the slitter shafts.
This will prevent end play.
- ▷ Tighten the screws (2).
- ▷ Reinstall the necessary strippers.
- ▷ Reinstall stopper switch S31.

7.10.2 Perforating device

The perforation is used for cross folds to prevent wrinkles on the "head". "Back spine" perforations are only applied for perfect binding. The slitter shaft must be equipped with the necessary tools for perforating.

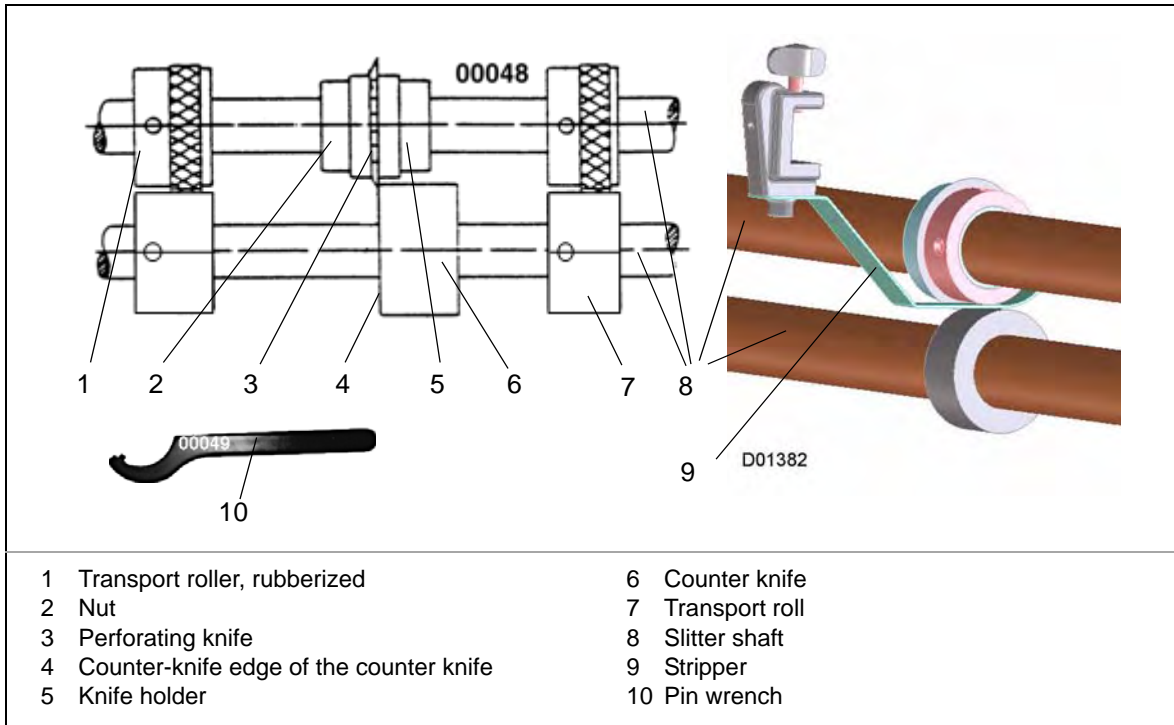


Figure 71: Perforating device

Procedure:

- ▷ Loosen the nut (2) with the hook wrench (9).
- ▷ Insert the perforating knife (3) into the knife holder (5).

The slotted knives need not be taken off the slitter shaft.

When mounting the perforating knives (3) the smooth side of the knife must be directed towards the beveled edges (4).

The blunted angle of the tooth must get into the paper first.



CAUTION!

Danger from incorrect mounting of the knife holder (5).

Non-observance may cause the nut to come loose while the machine is running. Danger of material damage.

Make sure that the nut (2) is turned towards the running direction of the machine.

- ▷ Insert the stripper (8).
- ▷ Use a sufficient number of transport roller pairs (1) for the perforation. This ensures an accurate paper transport.



Different types of perforating knives are required for certain types of paper and folding impositions.

- For this purpose, observe the list of knives TM 35/2.

Tooth forms

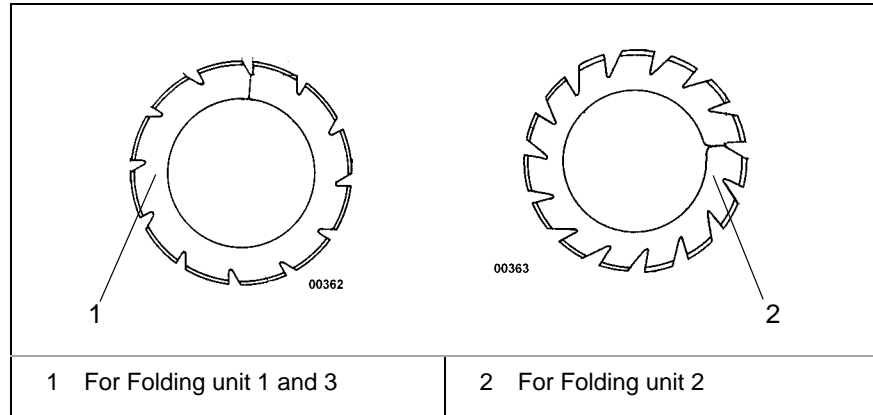


Figure 72: Tooth forms

- ▷ Use the tooth form (1) for the 1st and 3rd folding units.
- ▷ Use the tooth form (2) for the 2nd folding unit.

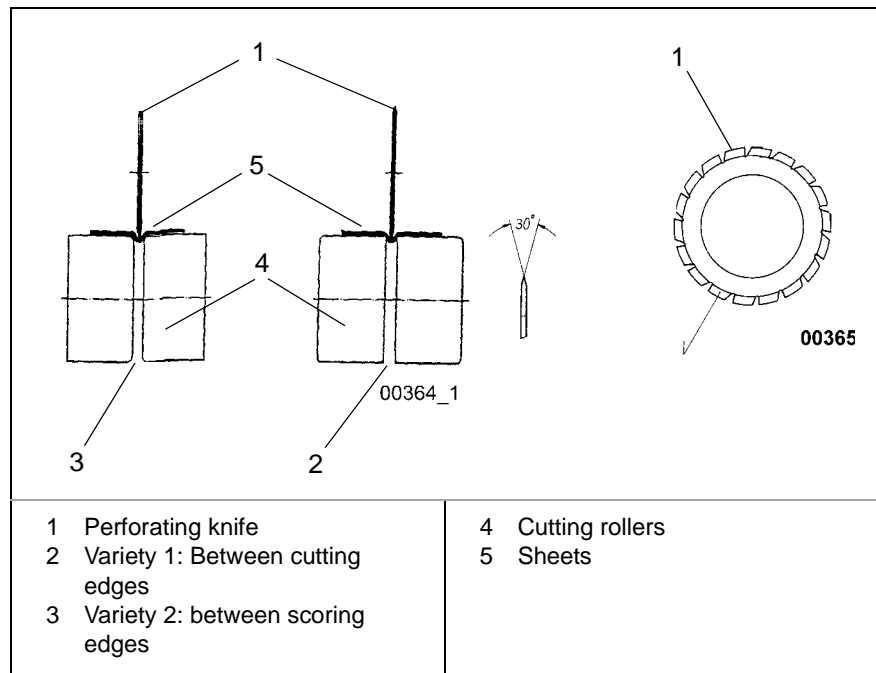
7.10.3 V-shaped special perforating knife (option)


Figure 73: V-shaped special perforating knives

V-shaped special perforating knives are used in buckle folding machines on the slitter shafts in folding unit I.

The perforating knife (1) is 1.6 mm (0.063 in.) thick, non-slotted and ground in a wedge shape on both sides.

The sheet is simultaneously pre-scored during perforating.

This avoids dog-ears on the edges of the head side in the cross fold (2nd folding unit).

However, the perforation cut will not be as sharp as a normal perforation.

1st mounting variant: Between cutting edges (2).

2nd mounting variant: Between scoring edges (3).



- Coordinate the gap and the mounting method to the product to be processed.
- Cutting and scoring edges must never touch the perforating knives. The cut of these perforating knives is not as sharp as a "normal" perforation.

7.10.4 Punch perforating device

The trend towards producing an increasing number of books in the more cost-effective perfect binding process imposes ever higher requirements for finishing companies.

The MBO punch perforating device fulfills the requirements for a reliable perfect or notch binding.

Perfect binding process, spine ground away in the perfect binder

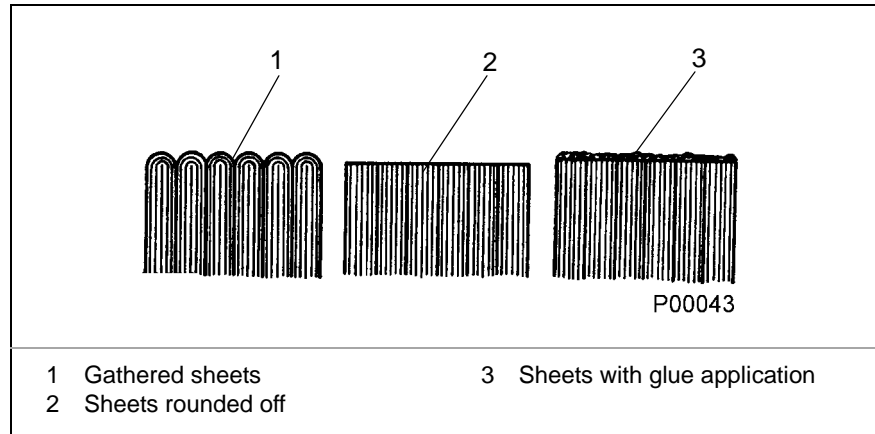


Figure 74: Previous perfect binding process

In the familiar, conventional perfect binding process, the spine is completely ground away in the perfect binder. The disadvantage of this is that the glue reaches the upper surface of the sheet edges only, thus providing only little adhesion.

Notch binding process with cut perforation

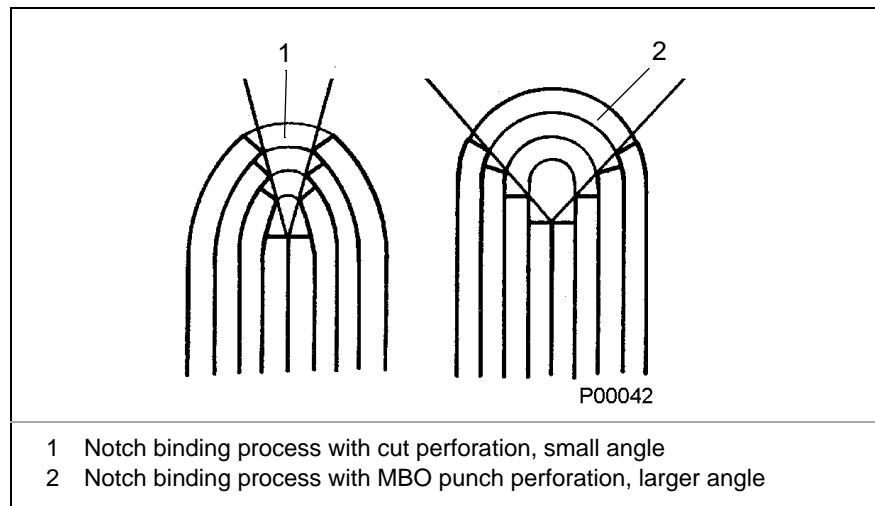


Figure 75: Cut perforation and MBO punch perforation

The familiar, conventional notch binding process (1) applies a cut perforation to the sheets in the spine (small angle). Because the pages are too close together, the glue cannot reach all the inside pages reliably.

MBO punch perforation

MBO's punch perforating device (2) punches out slots. The punched slots produce a larger opening in the back of the folded sheet. This way, the glue can reach and bind all sheets above as well as on the side. Optimal adhesion of the individual sheets is achieved with this method.

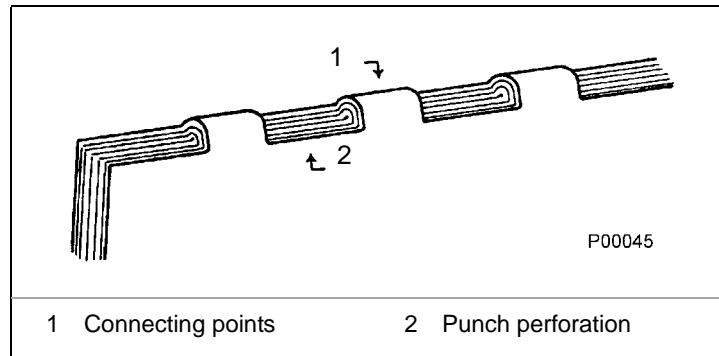


Figure 76: MBO punch perforation

An additional factor is that the sheets are interconnected by the plates (1) between the slots and thus guarantee an absolutely reliable connection.

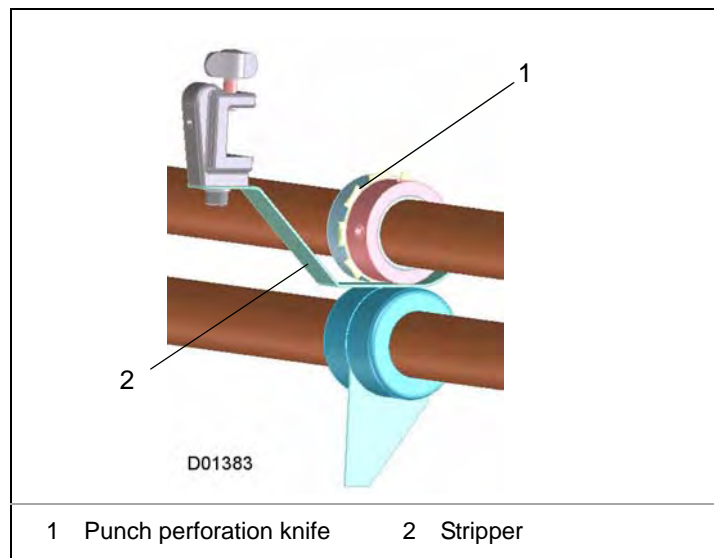
Installation of punch perforation equipment


Figure 77: MBO punch perforating device

It is very important when punch perforating that the punched-out pieces are separated safely from the folding sheet and stripped away.

For this purpose, the punch perforating knife separates the punched-out pieces reliably from the sheet.

A special stripper guides the punched-out pieces reliably from the die. If problems occur, a second stripper should be used.

The punch perforating device is available for all machines with 30 and 35 mm (1.181 and 1.378 in.) slitter shafts.

7.10.5 Creaser

Pre-scoring will be applied at cross folding with buckle plates if no perforating is required. Such scoring ensures that the fold is established exactly in its predetermined folding point. Special scoring devices may also be applied on request.

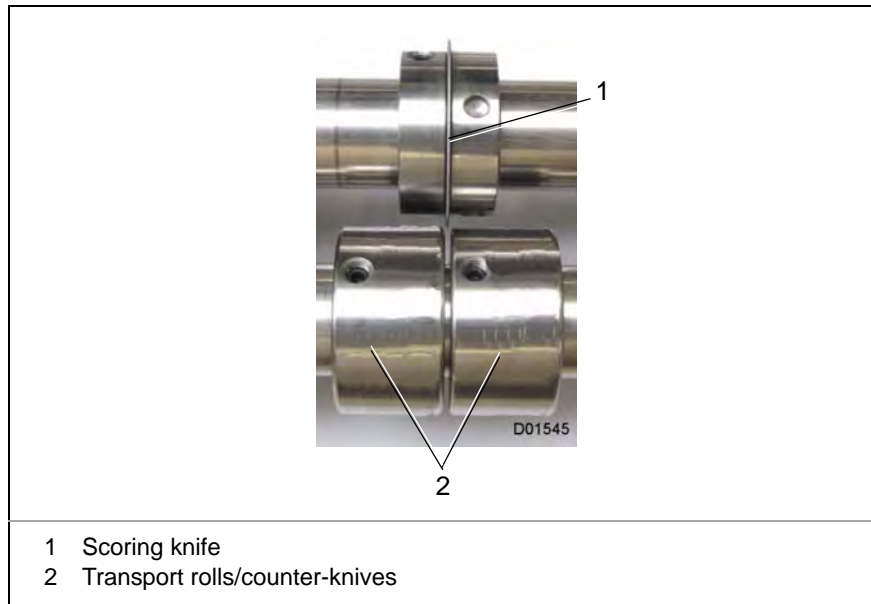


Figure 78: Creaser

Procedure:

- Setting up:**
- ▷ Set up the scoring knives (1) on the slitter shaft such that they are positioned between two transport rolls (2) or between the rounded sides of two counter-knives.

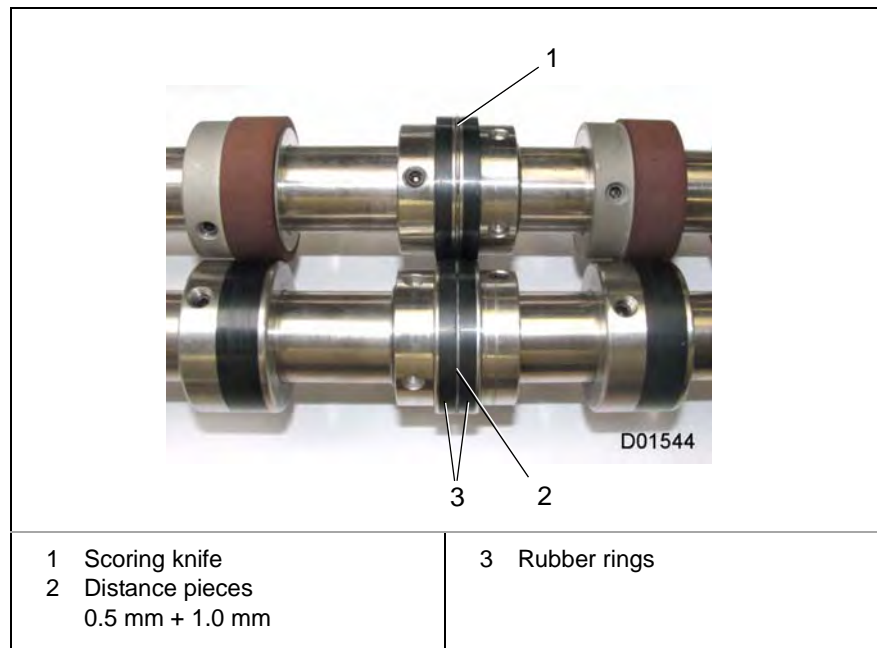
7.10.6 Super-Score device


Figure 79: Super-Score device

Procedure:

- ▷ Set up the Super-Score device as shown in Figure 108.



- Use fewer distance pieces (2) if the rubber rings (3) are worn.
- Use more distance pieces (2) if the paper is cut during scoring.

7.10.7 Slitting device

Folded sheets can be cut with the slitting device.

Separator cut for multiple-up production

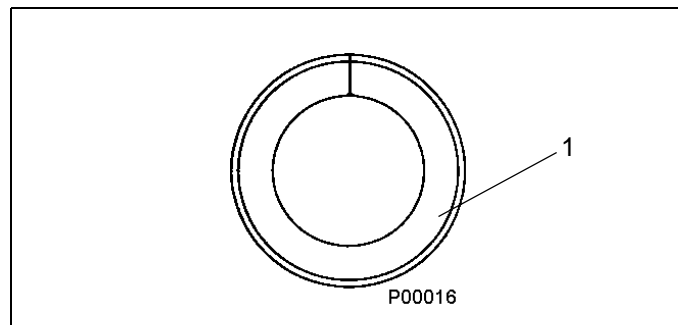


Figure 80: Cutting knives

Procedure:

- ▷ For separating multiple-up production, use one or more cutting knives (1).
- ▷ Install the cutting knives (1) following the same principle as that for the perforating knives.

Edge trim

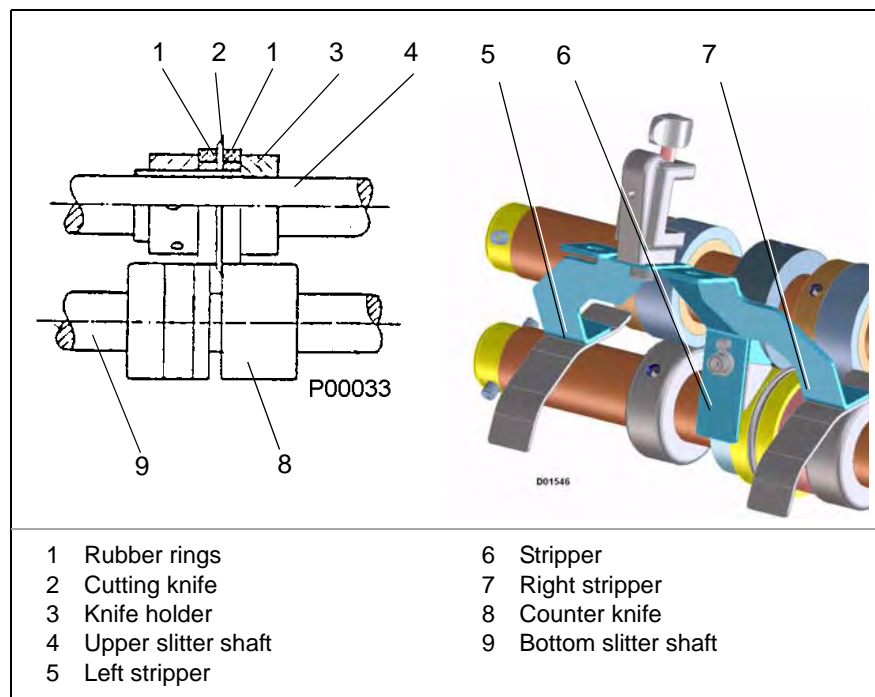


Figure 81: Edge trim

Procedure:

- ▷ Push the knife holder (3) with the rubber rings (1) and the cutting knives (2) onto the upper (4) and lower (6) slitter shaft.
- ▷ Adjust the counter-knives (7) on the lower (6) and upper (4) slitter shaft. Please follow the illustration for the proper position.
- ▷ Insert the strippers (5).



- Depending on the application, the edge trim device can also be used on the lower slitter shaft.
- The exact installation position depends on the paper thickness and running direction.
- Depending on the paper format and paper thickness, the installation method of the edge trim device must be varied accordingly.

7.10.8 Strip trim device

Folded sheets can be separated using the strip trim device.

Strip trim for multiple-up production

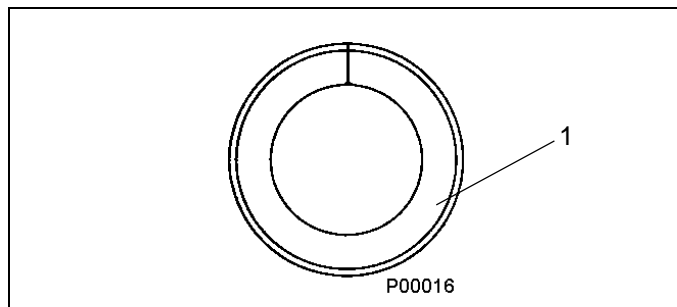


Figure 82: Cutting knives

Procedure:

- ▷ For separating multiple-up production, use two cutting knives (1).
- ▷ Install the cutting knives (1) so that each of the straight cutting edges are pointing outwards.

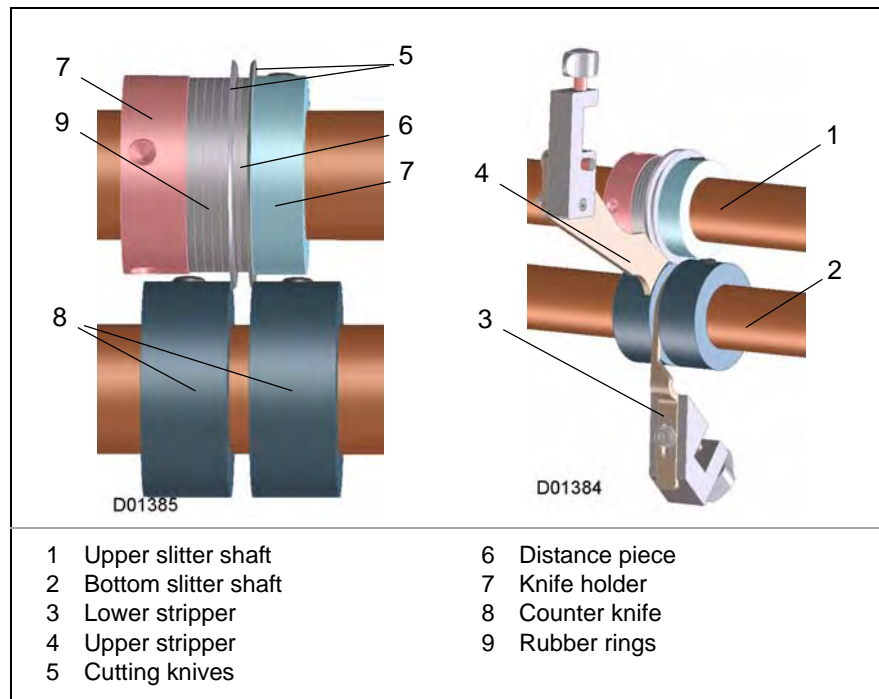


Figure 83: Strip trim device

Procedure:

- ▷ Push the knife holder (7) with the rubber rings (9), the distance piece (6) and the cutting knives (5) onto the upper slitter shaft (1).
- ▷ Adjust the counter-knives (8) on the lower slitter shaft (2).
- ▷ Insert the lower (3) and upper (4) stripper.



Adapt the width of the stripper to the width of the cutout.

7.11 Options

7.11.1 Stopper switch S31 at the exit of the folding unit



Figure 84: Stopper switch S31 at the exit of the folding unit

Functioning description: The stopper switch (1) stops the machine if the sheet running jams.

Adjusting the height: Procedure:

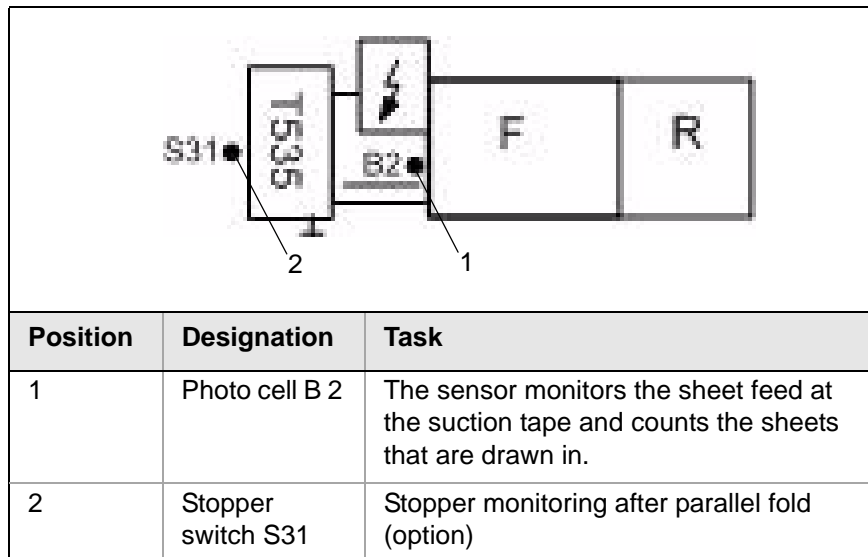
- ▷ Open the height adjustment screw (2).
- ▷ Adapt the height to the corresponding requirements.
Make sure that the stopper switch (1) does not scrape against any neighboring components.
- ▷ Re-tighten the height adjustment screw (2).

Repositioning the limit switch: Procedure:

- ▷ Open the wing screw (4).
- ▷ Position the stopper switch according to the requirements. Make sure that the stopper switch (1) does not scrape against any neighboring components.
- ▷ Re-tighten the wing screw (4).

7.12 Troubleshooting

7.12.1 Sensor positions on folding unit I, MS-Control



Checking the sensor function: Green light-emitting diode illuminated = Photo cell is ready to operate.
Green and yellow light-emitting diodes illuminated = Photo cell is covered. A fault is present.

Changing the sensor position:

- ▷ The position of the photo cell (1) cannot be changed.
- ▷ The position of the stopper switch (2) must be changed according to the paper format.

7.12.2 Display of error messages, MS-Control

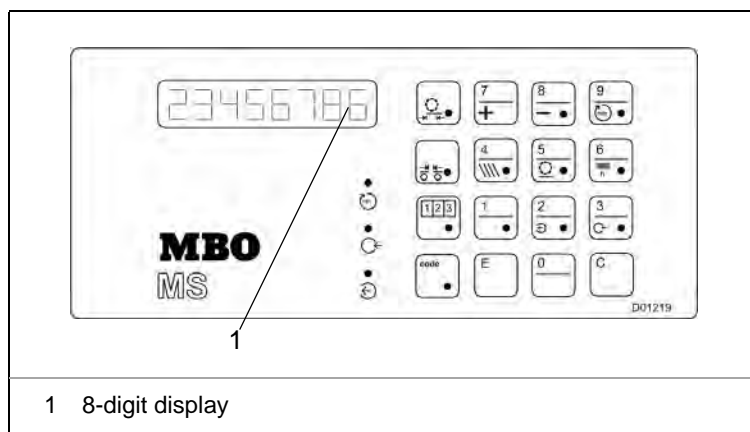


Figure 85: MS-Control error message

If an error is detected in the machine, the machine stops.

The word <ERROR> and the corresponding error number appear in the 8-digit display (1).

7.12.3 Error messages

Display	Sensor	Error description
Error 20	S31	Stopper switch has tripped. Jam in the subsequent stations
Error 21	S9	The double sheet detector at the register table has tripped. The sheet feed is stopped immediately, the machine continues running.
Error 24		Jam in palletized feeder, pile feeder After 4 suction attempts, the suction wheel was unable to suck in any sheets. (Only for operating mode 0) The sheet feed is stopped immediately, the machine continues running.
Error 30		Faulty write access to EEPROM
Error 31		Control system error See the separate MS operating manual
Error 90		Control system error See the separate MS operating manual

Figure 86: MS-Control error list

7.12.4 Resetting the error messages

The error messages are reset by remedying the cause of the error and activating the "Machine stop" button.
The machine is ready for operation.

In the case of Error 21 and 24, a reset can also be activated via the "Continuous sheet" or "Single sheet" button.

7.13 Removing the paper jam



CAUTION!

Danger due to paper jam.

The machine may be restarted only after removing the paper jam.

Non-observance may damage/destroy the drive belts.

When removing the paper jam, turn the machine using the safety hand-wheel only.

Procedure:

- ▷ Press the EMERGENCY STOP palm button.
 - ▷ Try to determine the cause of the paper jam and eliminate it (to prevent other malfunctions downline).
 - ▷ If necessary, remove any smoother bars, strippers etc. that get in the way.
 - ▷ Carefully remove the jammed paper.
 - ▷ Check that no torn-off pieces of paper remain in the machine (to prevent other malfunctions downline).
 - ▷ Reinstall the removed smoother bars, strippers etc.
 - ▷ Disengage the EMERGENCY STOP palm button.
 - ▷ Start the machine
 - ▷ Feed a single sheet to check the correct function of the machine.
 - ▷ If OK, start production.
 - ▷ If not OK, determine and eliminate the cause.
-



Turning the machine forwards/backwards using the safety handwheel makes it easier to remove the jammed paper.

7.14 Adjustment data of standard folding impositions

This chapter includes the most common folding impositions, which are subdivided into:

- Parallel fold

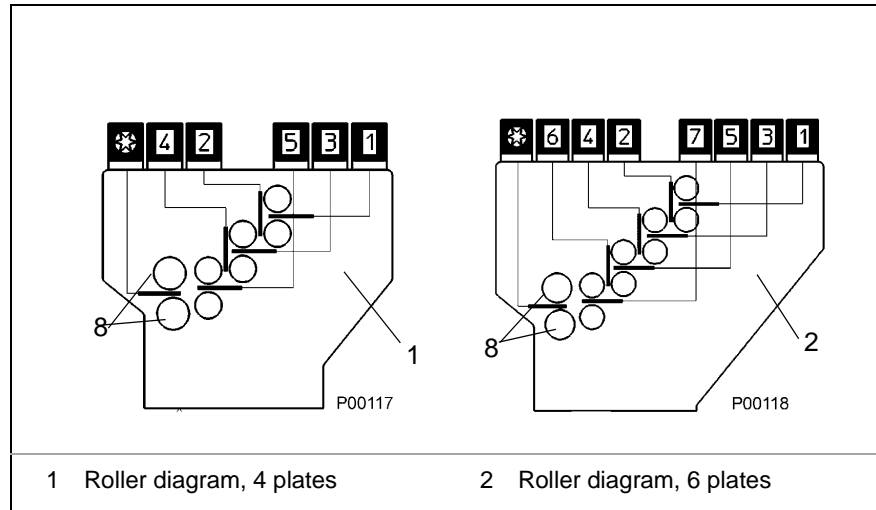
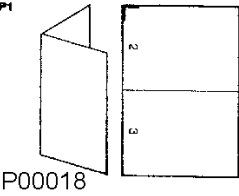
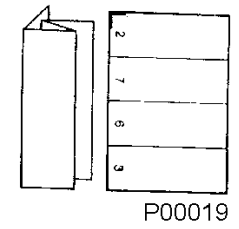
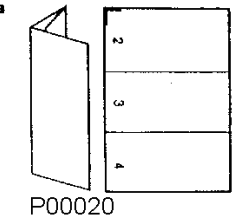
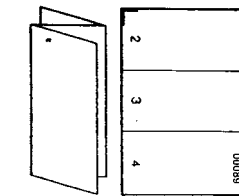


Figure 87: Adjustment data of standard folding impositions

	4 plates	6 plates
1	Pair of foldrollers 1	Pair of foldrollers 1
2	Pair of foldrollers 2	Pair of foldrollers 2
3	Pair of foldrollers 3	Pair of foldrollers 3
4	Pair of foldrollers 4	Pair of foldrollers 4
5	Pair of foldrollers 5	Pair of foldrollers 5
6	-	Pair of foldrollers 6
7	-	Pair of foldrollers 7
8	Pair of slitter shafts	Pair of slitter shafts

7.14.1 Parallel fold (using 4 buckle plates as an example)

P1	1 x parallel middle fold = 4 pages		<ul style="list-style-type: none"> ▷ Set roller pair 1 for simple paper thickness. ▷ Set roller pairs 2 to 8 to double paper thickness. ▷ Set the sheet stop at the 1st buckle plate to 1/2 of the sheet length. ▷ The buckle plates 2 to 4 are replaced by sheet deflectors (buckle plates are closed).
P2	2 x parallel middle fold = 8 pages		<ul style="list-style-type: none"> ▷ Set roller pair 1 for simple paper thickness. ▷ Set roller pair 2 to double paper thickness. ▷ Set roller pairs 3 to 8 for fourfold paper thickness. ▷ Set the sheet stop at the 1st buckle plate to 1/2 of the sheet length. ▷ Set the sheet stop at the 2nd buckle plate to 1/4 of the sheet length. ▷ The buckle plates 3 and 4 are replaced by sheet deflectors (buckle plates are closed).
P3	2 x parallel fold (letter fold) = 6 pages		<ol style="list-style-type: none"> 1) With two top buckle plates (T1 and T3) <ul style="list-style-type: none"> ▷ Set roller pairs 1 to 3 to single paper thickness. ▷ Set roller pairs 4 to 8 to triple paper thickness. ▷ Set the sheet stop at the 1st and 3rd buckle plates to 1/3 of the sheet length. ▷ The buckle plates 2 and 4 are replaced by sheet deflectors (buckle plates are closed). 2) With one top (T1) and one bottom (T2) buckle plate: <ul style="list-style-type: none"> ▷ Set roller pairs 1 to 2 to single paper thickness. ▷ Set roller pairs 3 to 8 to triple paper thickness. ▷ Set the sheet stop at the 1st buckle plate to 2/3 of the sheet length. ▷ Set the sheet stop at the 2nd buckle plate to 1/3 of the sheet length. ▷ The buckle plates 3 and 4 are replaced by sheet deflectors (buckle plates are closed). ▷ Increase the sheet gap.
P4	2 x parallel fold (accordion fold) = 6 pages		<ul style="list-style-type: none"> ▷ Set roller pairs 1 to 2 to single paper thickness. ▷ Set roller pairs 3 to 8 to triple paper thickness. ▷ Set the sheet stop at the 1st and 2nd buckle plates to 1/3 of the sheet length. ▷ The buckle plates 3 and 4 are replaced by sheet deflectors (buckle plates are closed).

P5 3 x parallel fold (accordion fold) = 8 pages	
<p>P5</p> <p>P00022</p>	<ul style="list-style-type: none"> ▷ Set roller pairs 1 to 3 to single paper thickness. ▷ Set roller pairs 4 to 8 to fourfold paper thickness. ▷ Set the sheet stop at the 1st, 2nd, and 3rd buckle plates to 1/4 of the sheet length. ▷ The buckle plate 4 is replaced by the sheet deflector (buckle plates are closed).
P6 4 x parallel fold (accordion fold) = 10 pages	
<p>P6</p> <p>P00023</p>	<ul style="list-style-type: none"> ▷ Set roller pairs 1 to 4 to single paper thickness. ▷ Set roller pairs 5 to 8 to fivefold paper thickness. ▷ Set the sheet stop at the 1st to 4th buckle plates to 1/5 of the sheet length.
P7 3 x parallel fold (1 x parallel middle fold + 2 x letter folds) = 12 pages	
<p>P7</p> <p>P00024</p>	<ul style="list-style-type: none"> ▷ Set roller pair 1 for simple paper thickness. ▷ Set roller pairs 2 to 4 to double paper thickness. ▷ Set roller pairs 5 to 8 to sixfold paper thickness. ▷ Set the sheet stop at the 1st buckle plate to 1/2 of the sheet length. ▷ Set the sheet stop at the 2nd and 4th buckle plates to 1/6 of the sheet length. ▷ The 3rd buckle plate is replaced by the sheet deflector (buckle plates are closed).

8 Maintenance

8.1 Introduction

The following provides information on maintenance of the machine. Regular maintenance according to the maintenance schedule is an essential prerequisite for efficient use of the machine.

8.1.1 Qualification of personnel

This table lists the necessary qualification of the personnel related to "Maintenance" of the machine.

	Specially trained personnel	Instructed operating personnel	Instructed personnel with specialized training (mechanical/electrical engineering)
Operational maintenance	-	X	-
Maintenance	X	-	X
Repair	-	-	X

Table 19: Qualification of personnel; Maintenance
Legend: X permitted, - not permitted

8.1.2 Safety instructions

**DANGER!**

Danger due to dangerous electrical voltage.

Non-observance may cause serious injuries or even death.

- Work on the electric components of the machine may only be performed by a qualified electrician.
 - Observe the local occupational safety regulations and electrotechnical regulations.
 - On the supply terminals and on the terminals of the main switch, there is dangerous electric voltage even when the main switch is switched off. (See wiring diagram)
 - There is dangerous electric residual voltage on the supply terminals of the frequency inverter even when the main switch is switched off. (Observe the capacitor discharge time (KEB 5 min, Telemecanique 15 min)).
-

**DANGER!**

Danger when dismantling, bridging or avoiding safety and protective devices.

Non-observance may cause serious injuries or even death.

- No safety or protective devices of the machine may be dismantled, bridged or avoided.
 - Using the checklist for protective equipment and safety devices, check that all protective devices are on the machine.
 - Report any audible/visible safety-relevant change to the machine to the person responsible for the system in your operation.
-

**WARNING!**

Danger due to improper initial operation and maintenance.

Non-observance may possibly cause serious personal injuries and damage to property.

- Initial operation and maintenance work must be carried out by specially trained and authorized personnel only.
 - Heed the local occupational safety regulations.
 - Heed the maintenance, service, and cleaning plan.
 - The manufacturer shall not be liable for any damage caused by improper maintenance, lubrication and cleaning.
-

**WARNING!**

Danger due to running machine parts during initial operation, maintenance and repair.

Non-observance may possibly cause serious personal injuries or even death

- Work at or on the machine must be carried out by trained and authorized personnel only.
 - De-energize the machine and secure it against being switched on again by a third party.
 - Observe the local occupational safety regulations and electrotechnical regulations.
-

**WARNING!**

**Danger of crushing injuries during maintenance and repair work
Non-observance may cause serious injuries.**

Maintenance and cleaning work must be carried out by one person only.

**WARNING!**

Danger from maintenance tools.

Non-observance may possibly cause serious personal injuries and damage to property.

- You should only use tools that are in perfect condition.
 - Make sure that after adjustment or maintenance work, there are no tools left on or in the machine.
-

**WARNING!**

Danger of being drawn in.

Non-observance may cause severe personal injuries.

If the safety handwheel is removed when the machine is running, there is a danger of being drawn in by the groove in the handwheel shaft.

Shut down the machine and secure it against starting up again unintentionally.

8.2 Service

You can find the address on our home page: www.mbo-folder.com.

8.2.1 Ordering spare and wear parts

You can obtain the spare and wear parts worldwide via the corresponding MBO agency near you.

For all questions relating to your machine, please also contact your MBO agency.

You can find the address on our home page: www.mbo-folder.com.

Please gather the significant data for identification of the machine from the label on the machine.



Figure 88: Label

Always provide this information for service requirements and procurement of spare parts:

- Commission no.
- Machine type



Please use only spare parts that are delivered and recommend by the manufacturer!

8.3 Operational maintenance

8.3.1 Checking the safety devices



IMPORTANT!

All devices for shutting down the machine in an emergency and all protecting doors must be checked individually and separately from each other.

If any safety devices malfunction, shut down the machine immediately and secure it against being switched on again.

8.3.1.1 Functional test of the EMERGENCY STOP palm button

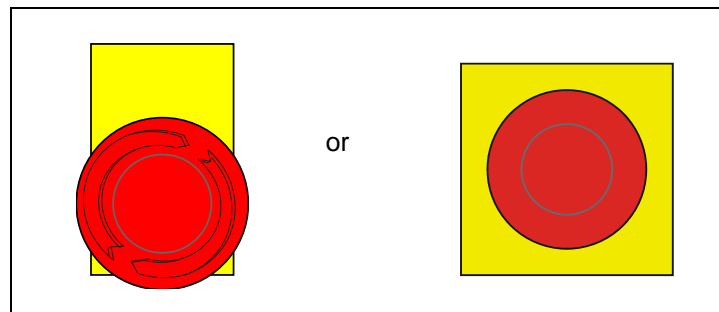


Figure 89: EMERGENCY STOP palm button

Procedure:



IMPORTANT!

To prevent immediate or potential hazards, the machine is equipped with an EMERGENCY STOP shut-off device.

After the <EMERGENCY STOP> palm button is pressed, all electrical drives are switched off.

EMERGENCY STOP does not disconnect the machine from the electrical supply.

- Switch the machine on.
- Press the EMERGENCY STOP palm button so that it remains engaged and in an actuated state.
Pressing the EMERGENCY STOP palm button must cause all machine functions to shut down.
- Disengage the EMERGENCY STOP palm button when the test is finished.

8.3.1.2 Functional test of the slitter shaft guard



WARNING!

Danger due to rotating slitter shafts.

Non-observance may possibly cause serious personal injuries or even death

- Never bypass or remove the safety switch.
- Ensure the proper function of the slitter shaft guard and safety switch.
- Never reach under the slitter shaft guard while the machine is running!



WARNING!

Danger due to slitter shafts.

Even when closed, the slitter shaft guard does not provide 100% protection against the sharp knives touching the slitter shafts.

Non-observance may possibly cause serious personal injuries or even death

Never reach into the slitter shafts while the machine is running!

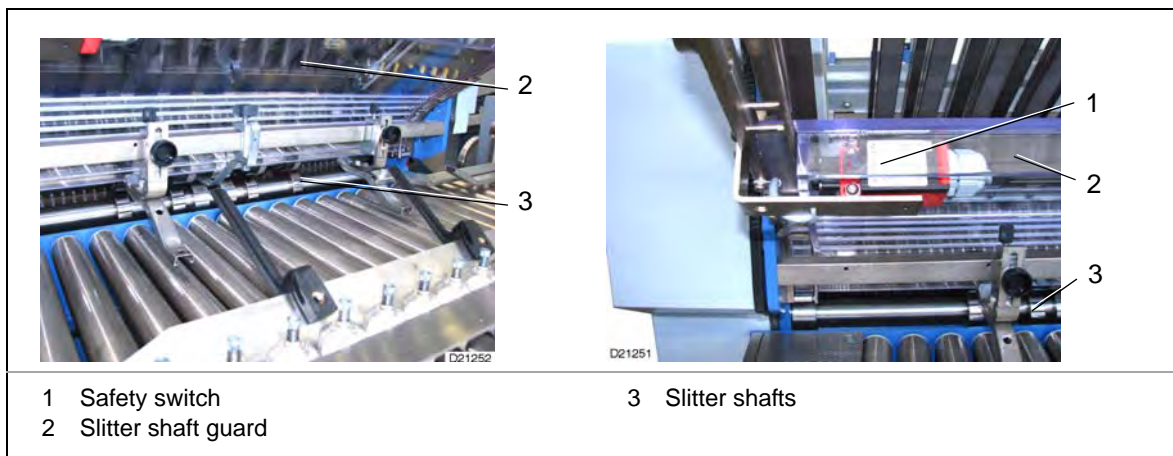


Figure 90: Slitter shaft guard

For technical safety reasons, the function of the slitter shaft guard must be checked monthly.

Functional test of the safety switch:

Procedure:

Shutoff function:

- ▷ Start the machine
- ▷ Slowly pull the slitter shaft guard (2) upwards. The safety switch (1) must shut off the machine after a maximum of one centimeter (0.394 in.).

Switch-on function:

- ▷ Close the slitter shaft guard (2) slowly. The safety switch (1) must switch back on a maximum of one centimeter (0.394 in.) before reaching the lower end position.



If the safe switch-on/switch-off of the safety switch no longer functions, MBO Service or an authorized customer service agent must be notified.

8.3.1.3 Functional test of the noise damping hood



WARNING!

Danger from automatic lowering of the open noise damping hood induced by a pressure drop of the pneumatic springs.

Non-observance may possibly cause severe or fatal injuries due to squeezing of body parts.

You can recognize a pressure loss of the pneumatic springs as follows: The noise damping hood lowers itself automatically from the fully opened position.

- Check the pneumatic springs after each production / daily to ensure they are functioning properly
 - Replace the pneumatic springs immediately if there are any signs of pressure loss.
 - When opening the noise damping hood, make sure to open it all the way to the limit stop.
-

Check the pneumatic springs daily for correct function. A pressure drop often becomes noticeable only very gradually.

You can recognize a pressure loss as follows:

- ▷ The noise damping hood lowers itself automatically from the fully opened position.
 - ▷ You need more force to open the noise damping hoods all the way.
 - ▷ Replace the pneumatic springs immediately if there are any signs of pressure loss.
-



Only have the pneumatic springs replaced by MBO Service or by an authorized customer service agent.

8.3.2 Cleaning



WARNING!

Danger due to running machine parts during initial operation, maintenance and repair.

Non-observance may possibly cause serious personal injuries or even death

- Work at or on the machine must be carried out by trained and authorized personnel only.
- De-energize the machine and secure it against being switched on again by a third party:
- Observe the local occupational safety regulations and electrotechnical regulations.



ATTENTION!

Danger due to heavy contamination.

Heavy contamination can impair the functioning of the machine.

Non-observance may result in property damage.

- Clean the machine after each job (at least once per week).
- Especially clean dirt (paper dust, printing powder, etc.) from moving parts.
- Do not use any aggressive chemical detergents or cleaning agents. If unsuitable detergents or cleaning agents are used, they can attack lacquered surfaces or cause the folding unit coating to swell.
- Never clean the machine using compressed air. (Bearing damage)



ATTENTION!

Danger when lifting heavy machine parts (buckle plates, slitter shafts, etc.)

Non-observance may possibly cause serious personal injuries and damage to property.

To lift heavy machine parts such as buckle plates, slitter shafts, etc., request the help of another person or people.



ATTENTION!

Danger due to improper use of cleaning agents.

Non-observance may result in injuries.

- Avoid any skin contact.
- Wear safety gloves for cleaning tasks.
- Protect your eyes from splashes.
- Check each manufacturer's information to ensure that you are totally informed about the residual dangers in respect to their non-irritant cleansing agents.

**ATTENTION!**

Danger due to cleaning cloths used.

Non-observance may possibly cause serious personal injuries and damage to property.

- Observe fire hazards resulting from the inflammability of the cleansing agent.
- Dispose of the cleaning cloths in an environmentally friendly manner.
- Inform yourself by asking the cleanser manufacturer about what to do with leftovers and about environmentally friendly disposal.

8.3.3 Recommendation of cleansing agents

Flat surfaces and cavities	Suction clean or sweep out
For deposits that adhere to finished surfaces	Solvent-free cleansing agent
Cleaning rollers	<p>MBO Binder GmbH & Co. KG recommends the cleaning solution from the "Varn" company with the No.: "Varn-Wash VM 111 or VWM".</p> <p>A sticker regarding this recommendation can be found in the foldroller area. The "Varn" company is a worldwide supplier for the printing industry. Therefore, it cannot be excluded that in certain other countries different designations are used.</p> <p>Please take the respective order number from the "VARN" technical data sheets.</p>

8.3.4 Cleaning of the machine

Clean the machine at least once per week.

The dust layer must never exceed 1 mm (0.039 in.).

Especially clean dirt (paper dust, printing powder, etc.) from moving parts. Heavy contamination can impair the functioning of the machine.

Procedure:

- ▷ Suck up the dirt.
- ▷ Use a brush for hard-to-reach areas.
- ▷ Wipe down the surfaces using a dry cloth.
- ▷ Do not use any aggressive chemical detergents or cleaning agents.
- ▷ Never clean the machine using compressed air, as ingress of dirt destroys the bearings.

8.3.5 Cleaning the foldrollers



Deposits of printing powder and/or printing ink on the foldrollers can lead to a reduction in quality of folding products.

Clean the foldrollers weekly and as needed.

Spiral foldrollers

Procedure:

- ▷ Before cleaning the foldrollers, switch off the machine at the main switch and secure it from being switched on again.
- ▷ To clean the foldrollers, use the roller cleaning agent "Varn-Wash VM 111" or "VWM" only.
- ▷ Use only linen cloths as cleaning cloths.
- ▷ Moisten the linen cloth using the roller cleaning agent.
Never immerse the foldrollers in the roller cleaning agent.
Penetrating roller cleaning agent can destroy the bearings.
- ▷ Use the linen cloth to remove the deposits on the foldrollers.
- ▷ Apply only a little pressure when rubbing.
- ▷ Dry the foldrollers with a dry linen cloth.



CAUTION!

Danger caused by incorrect cleaning of high-grip foldrollers.

Non-observance may possibly cause property damage.

Note especially the special cleaning instructions for high-grip foldrollers.

High-grip foldrollers

High-grip foldrollers have an open-pored surface.

If small particles or partially dissolved printing ink or printing powder are absorbed by this surface, they harden and the high-grip foldrollers become unusable.

Procedure:

- ▷ Before cleaning the foldrollers, switch off the machine at the main switch and secure it from being switched on again.
- ▷ To clean the high-grip foldrollers, use the roller cleaning agent "Varn-Wash VM 111" or "VWM" only.
- ▷ Use only linen cloths as cleaning cloths.
- ▷ Moisten the linen cloth using the roller cleaning agent.
Never soak the high-grip foldrollers with the roller soap.
- ▷ Use the linen cloth to remove the deposits on the high-grip foldrollers.
Exert only slight pressure.
- ▷ After cleaning the high-grip foldrollers, switch on the folding machine at the main switch.
- ▷ Ensure that no other persons are near the machine.
- ▷ Start the folding machine and set the speed to the maximum value.
- ▷ The centrifugal force produced will fling the partially dissolved ink and powder particles as well as absorbed roller soap from the roller surface covering.
- ▷ Stop the machine and switch off the main switch and secure it from being switched on again.
- ▷ Wipe the high-grip foldrollers with a dry linen cloth. Exert only slight pressure.
- ▷ Remove the ink and powder particles thus flung out from the machine.

8.3.6 Cleaning the lower buckle plates



ATTENTION!

Danger when lifting heavy machine parts (buckle plates, slitter shafts, etc.)

Non-observance may possibly cause serious personal injuries and damage to property.

To lift heavy machine parts such as buckle plates, slitter shafts, etc., request the help of another person or people.



Clean the lower buckle plates at least once per week.
Especially clean dirt (paper dust, printing powder, etc.) from moving parts.
Heavy contamination can impair the functioning of the machine.

Procedure:

- ▷ Remove the lower buckle plates.
- ▷ Vacuum these using an industrial vacuum cleaner.
- ▷ Reinstall the lower buckle plates.

8.3.7 Cleaning the optical sensors

The optical sensors of the machine get dirty during production due to paper dust and printing powder.

Therefore, they should be cleaned after each job (at least once per week).

Procedure.

- ▷ Clean the optical elements of the sensors with a dry, lint-free cloth.

8.3.8 Cleaning the pressure vacuum pump, filter cartridges



WARNING!

Danger due to improper maintenance.

Non-observance may possibly cause serious personal injuries and damage to property.

- Maintenance work must be carried out by a qualified specialist only.
- Observe the local occupational safety regulations and electrotechnical regulations.
- To do so, refer to the separate operating manual of the pressure vacuum pump.



ATTENTION!

Danger due to penetration of foreign substances.

Non-observance may result in property damage.

Do not start up the pressure vacuum pump without filter cartridges.

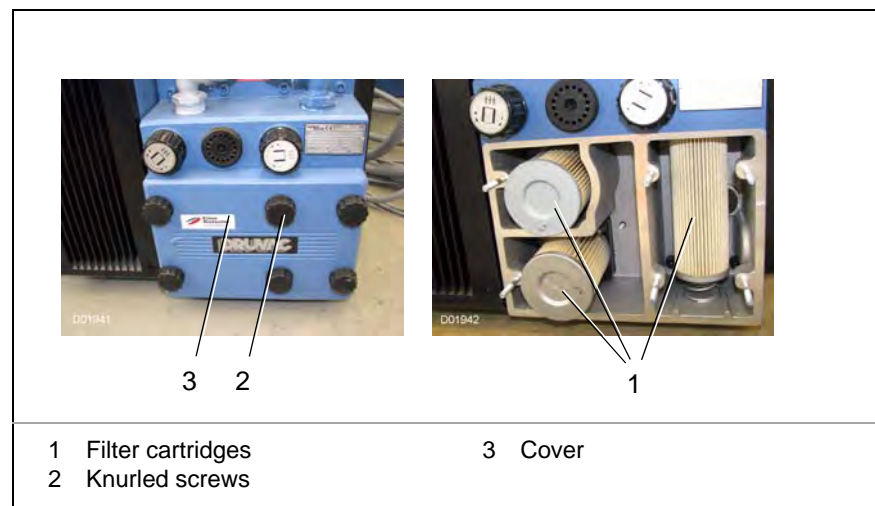


Figure 91: Vacuum pump filter

The following time specifications apply for single-shift operation!

To ensure the best performance, the filter cartridges must be checked and cleaned every 50 operating hours.

Despite cleaning, their filtering efficiency will become worse with time.

Therefore, replace the filter cartridges (1) every six months.

Cleaning the filter cartridges:

Procedure:

- ▷ Remove the knurled screws (2).
- ▷ Remove the cover (3).
- ▷ Remove the filter cartridges (1).
- ▷ Remove the coarsest dust with a brush.
- ▷ Remove the remaining dust by blowing it out with compressed air from the inside to the outside.
- ▷ Insert the filter cartridges (1).
- ▷ Reattach the cover (3).
- ▷ Reattach the knurled screws (2).

- ▷ Tighten the knurled screws (2) manually only.

Replacing the filter cartridges:

Replace the filter cartridges (1) every six months.

Procedure:

- ▷ Remove the knurled screws (2).
 - ▷ Remove the cover (3).
 - ▷ Remove the filter cartridges (1).
 - ▷ Reinsert the new filter cartridges (1).
 - ▷ Reattach the cover (3).
 - ▷ Reattach the knurled screws (2).
- Tighten the knurled screws (2) manually only.

8.4 Maintenance



WARNING!

Danger of being drawn in.

Non-observance may cause severe personal injuries.

If the safety handwheel is removed when the machine is running, there is a danger of being drawn in by the groove in the handwheel shaft.

Shut down the machine and secure it against starting up again unintentionally.

8.4.1 Checking the drive belt for the suction wheel/suction tape

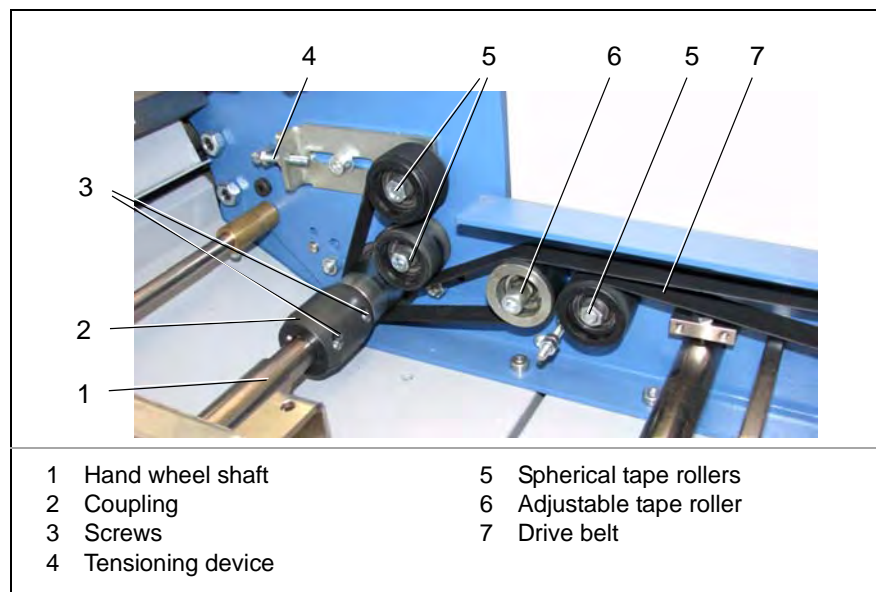


Figure 92: Drive belt for the suction wheel/suction tape

Check the drive belt monthly for its running properties, tension and condition.

If it is no longer possible to adjust centered running or achieve the necessary tension or if the general condition of the belt is poor, it must be replaced.

Procedure:

- Removing the guard:** ▷ Remove the guards from the drive belt (7) and handwheel shaft (1)
- Centering the belt:** ▷ The centering occurs automatically thanks to the powerful tape rollers (5).
- Tensioning the belt:** ▷ Tighten the drive belt (7) using the tensioning device (4).
- Replacing the belt:**
- ▷ Loosen the drive belt (7) using the tensioning device (4).
 - ▷ Loosen both screws (3) at the coupling (2).
 - ▷ Move the coupling (2) towards the operator side and pull out the drive belt (7).
 - ▷ Insert the new drive belt (7).
 - ▷ Place the coupling (2) in its position.
 - ▷ Fix the coupling (2) with the screws (3).
 - ▷ Tighten the drive belt (7) using the tensioning device (4).
 - ▷ Check that the belt is running on center.
- Attaching the guard:** ▷ Reinstall the guards on the drive belt (7) and handwheel shaft (1).

8.4.2 Checking the alignment tape

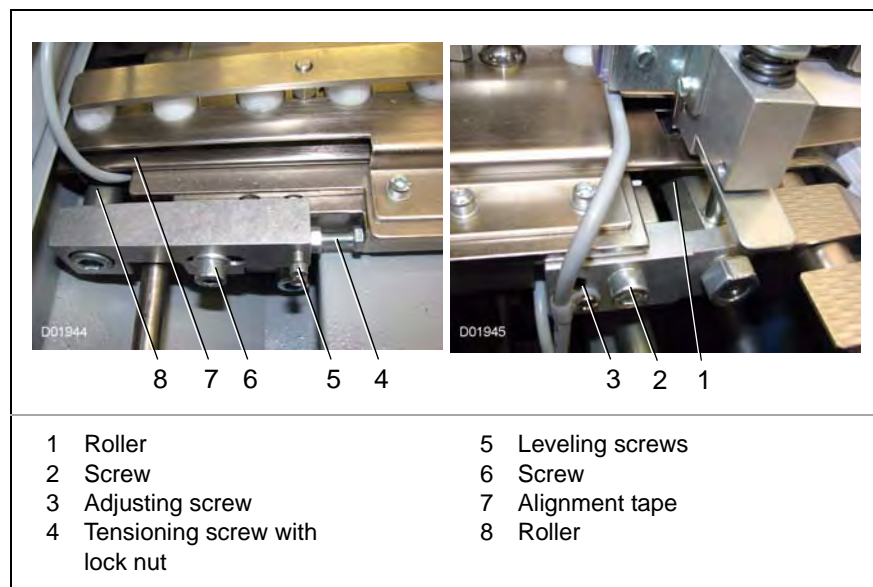


Figure 93: Marble rail alignment tape

Check the alignment tape monthly for its running properties, tension and condition.

If it is no longer possible to adjust centered running or achieve the necessary tension or if the general condition of the belt is poor, it must be replaced.

Procedure:

Adjusting the alignment tape on the roller (1):

- ▷ Loosen the fastening screw (2).
- ▷ Using the adjustment screw (3), adjust the position of the alignment tape so that it runs with a distance of approx. 2-3 mm (0.078 in.-0.118 in.) to the right edge of the roller (1).
- ▷ Tighten the fastening screw (2).
- ▷ Check the position of the alignment tape once again and readjust if necessary.

Adjusting the alignment tape on the roller (8):

- ▷ Loosen the fastening screw (6).
- ▷ Using the adjustment screws (5), adjust the position of the alignment tape (7) so that it runs with a distance of approx. 2-3 mm to the left edge of the roller (8).
Tighten the fastening screw (6).
- ▷ Check the position of the alignment tape once again and readjust if necessary.

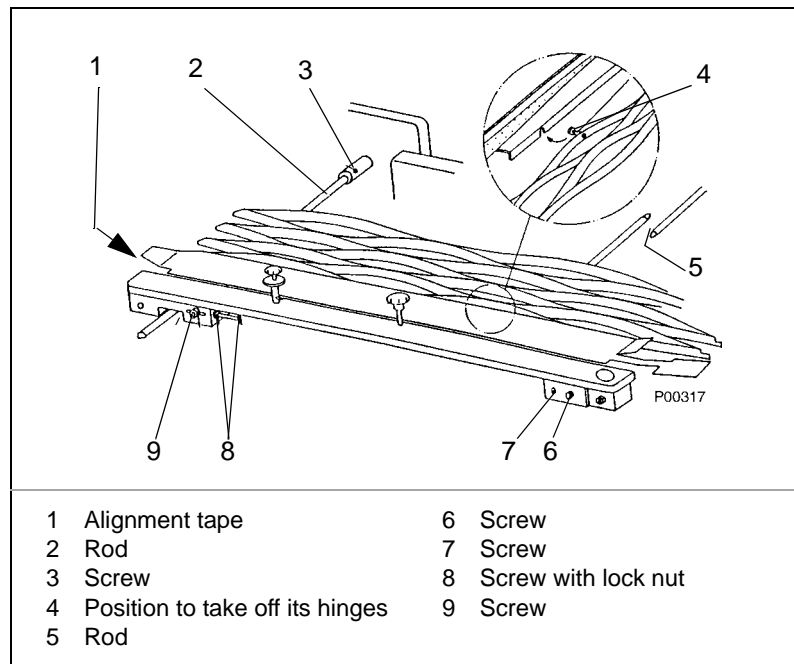
Replacing the alignment tape


Figure 94: Replacing the alignment tape

Procedure:
Removing the alignment tape:

- ▷ Loosen the screw (9).
- ▷ Relax the tension on the alignment tape (1) by loosening the screw (8).
- ▷ Unhook the lattice from the hooking points (4).
- ▷ Loosen the screw (3).
- ▷ Take out the rod (2).
- ▷ Remove the alignment tape (1).

Mounting the alignment tape:

- ▷ Fit the new alignment tape (1).
 - ▷ Insert the rod (2).
 - ▷ Tighten the screw (3).
 - ▷ Tension the alignment tape (1) by tightening the screw (8).
 - ▷ Hook the lattice into the hooking points (4).
 - ▷ Adjust the alignment tape (1).
- See Chapter "8.4.2 Checking the alignment tape"

8.4.3 Check/exchange main drive belt

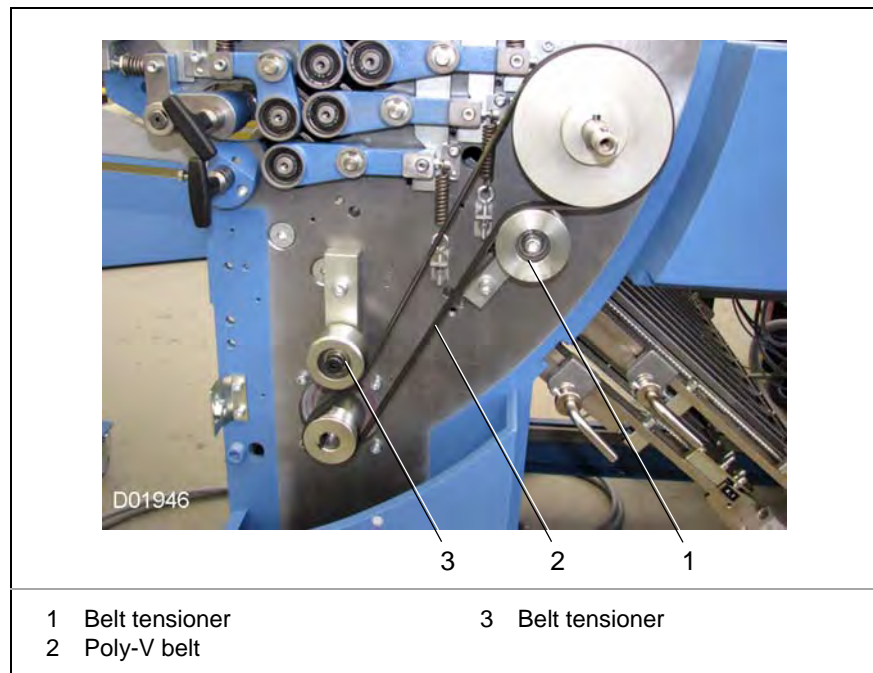


Figure 95: Check/exchange main drive belt

Check the main drive belt monthly for its running properties, tension and condition.

If it is no longer possible to adjust centered running or achieve the necessary tension or if the general condition of the belt is poor, it must be replaced.

Procedure:

- Removing the guard:**
- ▷ Remove the safety handwheel (be careful of the key).
 - ▷ Remove the guard above the main drive.
- Tensioning the belt:**
- ▷ Tension the Poly-V belt (2) with the belt tensioner (3).
- Replacing the belt:**
- ▷ Loosen the belt tensioner (3).
 - ▷ Remove the Poly-V belt (2).
 - ▷ Insert the new Poly-V belt (2).
 - ▷ Tension the Poly-V belt (2) with the belt tensioner (3).
- Attaching the guard:**
- ▷ Reattach the guard above the main drive.
 - ▷ Reattach the safety handwheel (be careful of the key).

8.4.4 Checking the drive belt for foldrollers and slitter shafts

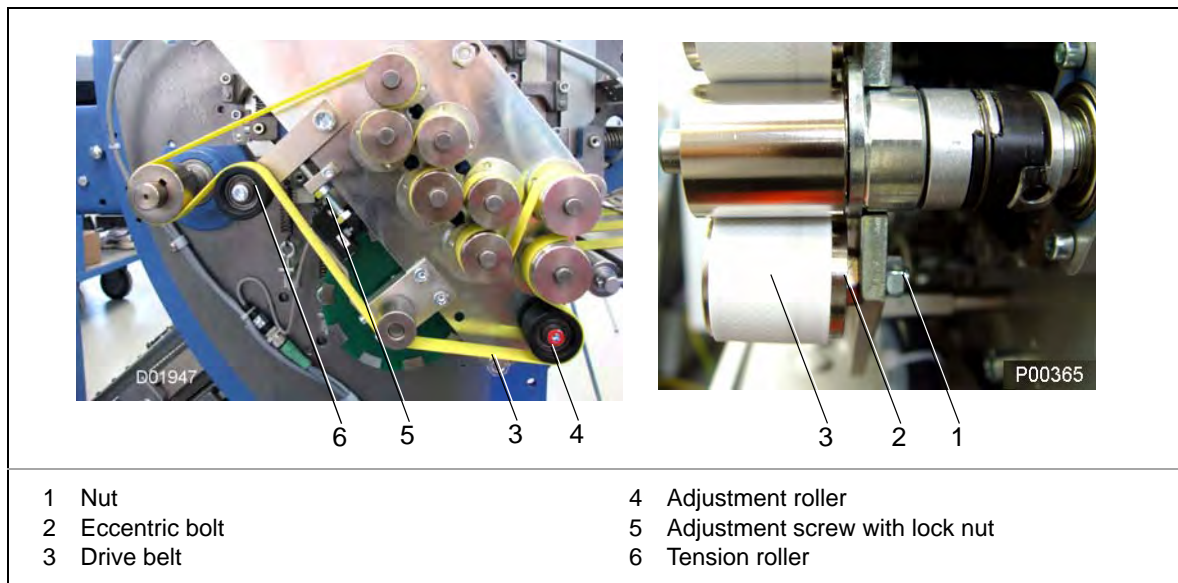


Figure 96: Drive belt for foldrollers and slitter shafts

Check the drive belt monthly for its running properties, tension and condition.

If it is no longer possible to adjust centered running or achieve the necessary tension or if the general condition of the belt is poor, it must be replaced.

Procedure:

- Removing the guard:**
- ▷ Remove the safety handwheel (be careful of the key).
 - ▷ Remove the guard above the drive belt.

- Adjusting the drive belt:** (The adjustment roller is marked red).
- ▷ Loosen the nut (1).
 - ▷ Adjust the centric running of the drive belt (3) by turning the eccentric bolt (2).
To do so, use a 17 mm flat open-end wrench.
 - ▷ Tighten the nut (1) again.

- Replacing the drive belt:**
- ▷ Loosen the lock nut at the adjusting screw (5).
 - ▷ Turn the adjustment screw (5) counterclockwise until the tension roller (6) is free.
 - ▷ Note the belt course and remove the old drive belt (3).
 - ▷ Insert the new drive belt (3) according to the belt course.
 - ▷ Tighten the belt (3) using the tension roller (6) and the adjustment screw (5).
 - ▷ Counter the adjustment screw (5).
 - ▷ Adjust the centric running of the drive belt (3).
Refer to the item "Adjusting the drive belt".

- Attaching the guard:**
- ▷ Reattach the guard over the drive belt (3).
 - ▷ Reattach the safety handwheel (be careful of the key).

8.5 Maintenance, lubrication and cleaning schedule



ATTENTION!

Danger of wrong maintenance, greasing and cleaning intervals at multishift operation.

Non-observance may result in property damage.

- All specified maintenance, lubrication and cleaning intervals apply to single-shift operation.
- Convert the indicated intervals for multishift operation accordingly

	Chapter No.:	Working process	Interval	Date	Signature
Operational maintenance	8.3.1	“Checking the safety devices”	Daily		
	8.3.4	“Cleaning of the machine”	Weekly		
	8.3.5	“Cleaning the foldrollers”	Weekly		
	8.3.6	“Cleaning the lower buckle plates”	Weekly		
	8.3.7	“Cleaning the optical sensors”	Weekly		
	8.3.8	“Cleaning the pressure vacuum pump, filter cartridges”	Every 50 operating hours		
Lubrication		See Chapter "8.3 Operational maintenance"			
Maintenance	8.4.1	“Checking the drive belt for the suction wheel/suction tape”	Monthly		
	8.4.2	“Checking the alignment tape”	Monthly		
	8.4.3	“Check/exchange main drive belt”.	Monthly		
	8.4.4	“Checking the drive belt for foldrollers and slitter shafts”	Monthly		
	8.3.8	“Cleaning the pressure vacuum pump, filter cartridges”	Every 6 months		

Table 20: Maintenance, greasing, and cleaning plan

9 Shutdown, storage

9.1 Introduction

9.1.1 Qualification of personnel

This table lists the necessary qualification of the personnel related to "Shutdown and storage" of the machine.

	Specially trained personnel	Instructed operating personnel	Instructed personnel with specialized training (mechanical/electrical engineering)
Shutdown	-	-	X
Storage	X	-	-
Putting the machine back into operation	-	-	X

Table 21: Qualification of personnel; Shutdown, storage
Key: X permitted, - not permitted

9.1.2 Safety instructions



WARNING!

Danger from incorrect storage.

Disregard can lead to serious damage to property

Observe the corresponding storage conditions.

9.2 Shutdown

9.2.1 Temporary shutdown:

Procedure:

- ▷ Shut down machine.

- ▷ Stop compressed air supply to the machine.
- ▷ Remove products, tools from the machine.
- ▷ Clean and maintain machine.
See Chapter "8 Maintenance".



After a temporary shutdown, the machine must be commissioned again.
See Chapter "6 Transport/Installation/Initial operation"

9.2.2 Final decommissioning

Procedure:

- ▷ Shut down machine.
- ▷ Have the machine disconnected from the power supply by a licensed electrician.
- ▷ Disconnect the machine from the compressed air supply.
- ▷ Remove products, tools from the machine.
- ▷ Dismantle the machine by following the installation steps in the opposite sequence.
 - For transport, observe the instructions in Chapter "6 Transport/Installation/Initial operation".

9.3 Storage



WARNING!

Danger from incorrect storage.

Disregard can lead to serious damage to property

Observe the corresponding storage conditions.

- ▷ Check the premises in respect of temperature and humidity. See Chapter "3.2.6 Ambient conditions".
The higher the humidity, the greater the danger of corrosion.
- ▷ For long-term storage, measures for corrosion protection must be taken.
- ▷ Observe the specifications regarding the weight and size of the machine when selecting the premises.
See Chapter "3.2 Technical data"
- ▷ Prepare the gears/transmission for storage. You should also take into consideration that the prerequisites vary from case to case. Therefore, please contact the supplier of the gears/transmission and motor and follow the respective manual.
- ▷ Use a suitable fork lift for transport.
See Chapter "3.2.4 Weights, fork lifts, and floor requirements".
- ▷ Cover the machine with foil.

10 Disposal

10.1 Introduction

10.1.1 Qualification of personnel

This table lists the necessary qualification of the personnel related to "Disposal" of the machine.

	Specially trained personnel	Instructed operating personnel	Instructed personnel with specialized training (mechanical/electrical engineering)
Disposal	X	-	-

Table 22: Qualification of personnel; Disposal
Legend: X permitted, - not permitted

10.1.2 Safety instructions



CAUTION!

Danger from incorrect disposal.

Non-observance may cause environmental damage.

Comply with the corresponding federal and regional regulations, laws and directives.

10.2 Disposal/recycling

The environmentally compatible and professional disassembly and disposal of the machine is the responsibility of the owner/operator.

European Community member countries:

- Comply with the corresponding European directives.
- Comply with the corresponding federal and regional laws and regulations.

Non-EU countries:

- Comply with the corresponding federal and regional regulations, laws and directives.

Procedure:

- Decommission the machine prior to disposal. See Chapter "9.2 Shutdown".
- For transport, observe the instructions in Chapter "6 Transport/Installation/Initial operation"
- Separate machine parts and electrical components by type and dispose of them properly.



All parts, consumables, and supplies of the machine:

- Separate by type
- Dispose of in accordance with local regulations, laws, and directives.



If you have any further questions regarding disposal, please contact the manufacturer!

The MBO group worldwide:

MBO Germany



MBO Maschinenbau Oppenweiler Binder GmbH & Co. KG
Postfach 1169
71567 Oppenweiler
GERMANY
Tel.: +49 7191 46 0
Fax: +49 7191 46 34
<http://www.mbo-folder.com>
info@mbo-folder.com

MBO Portugal



MBO Binder-Maquinas Graficas, S.A.
Rua Joaquim Alves da Silva 240
4456-473 Perafita
PORTUGAL
Tel.: +351 22 99822 00
Fax: +351 22 99822 01
<http://www.mbo-folder.com>
info@mbo-folder.com

MBO America



MBO Binder & Co. of America
400 Highland Drive
Westampton, NJ 08060
USA
Tel.: +1 609 267 2900
Fax: +1 609 267 1477
<http://www.mboamerica.com>
info@mboamerica.com

MBO France



MBO France SAS
Z. A. Burospace N° 3
Route de Gisy B.P. 33
91571 Bievres Cedex
FRANCE
Tel.: +33 1 6935 5090
Fax: +33 1 6935 5099
<http://www.mbo-folder.com>
info@mbofrance.fr

MBO China



MBO Binder Graphic Systems (Beijing) Co. Ltd.
Rm 201, Haishunde Building, No.A1,
Donghuanbei Road, BDA,
Beijing 100176
P.R. CHINA
Tel.: +86 10 6786 4021
Fax: +86 10 6787 3502
<http://www.mbo-folder.com.cn>

Herzog & Heymann



Herzog & Heymann GmbH + Co. KG
Postfach 110355
33663 Bielefeld
GERMANY
Tel.: +49 5205 7509 0
Fax: +49 5205 7509 20
<http://www.herzog-heyman.com>
info@herzog-heyman.com

Folding unit II

Translation of original operating manual



D01380



535
EFFICIENCY

Machine type:	Folding unit II		
Configuration:	535, EFFICIENCY,		
Type of document:	Translation of original operating manual		
Version:	V1.2	Official in charge:	Mr. Matzner
As at (date):	2010-26-10	Machine no.:	
Language:	English	File name:	BA_T535_E_FW2_MS_V1.3_us_en
Manufacturer:	MBO Maschinenbau Oppenweiler Binder GmbH & Co. KG Postfach 1169 71567 Oppenweiler GERMANY Tel.: +49 7191 46 0 Fax: +49 7191 46 34 http://www.mbo-folder.com info@mbo-folder.com		

Subject to alterations!

Copyright: This documentation is subject to copyright law. The claimed copyright includes all forms and types of copyright-protected materials and information that are currently permitted. No part of the documentation may be copied, otherwise duplicated, edited or translated into other languages, regardless of the manner in which or with which tools this takes place.

Electronically-stored information provided by the manufacturer (CD-ROM, Internet) may be printed out by the user if the created print medium serves the purpose of use or service of the product described.

Label and CE Mark: For all questions relating to your machine, please contact your MBO agency.

You can find the address on our home page: www.mbo-folder.com.

Please gather the significant data for identification of the machine from the label on the machine.

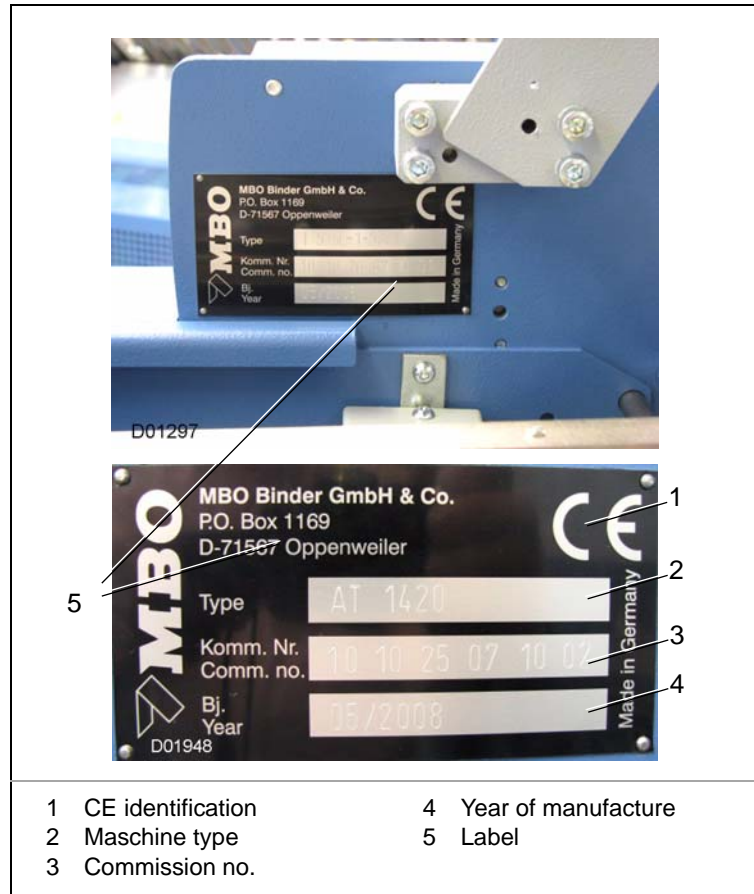


Figure 1: Label

Always specify these details for inquiries, service and spare parts orders:

- Commission no.
- Maschine type

EC Declaration of Conformity

according to the EC Machinery Directive (2006/42/EC), Appendix IIA.

The manufacturer

MBO Maschinenbau Oppenweiler Binder GmbH & Co. KG
Grabenstraße 4-6
71570 Oppenweiler
GERMANY

herewith declares that the machine described below

Commission no.

Designation Folding unit II

Type 535 EFFICIENCY

Year of manufacture

complies with the provisions of the following EC directives

Machinery Directive 2006/42/EC

Low Voltage Directive 2006/95/EC

EMC Directive 2004/108/EC

Applied harmonized standards:

DIN EN ISO 12100-1/A1:2009 DIN EN ISO 12100-2/A1:2009

DIN EN 1010-4:01/2004

Authorized representative for compiling the technical files:

Name Wolfgang Matzner

Address Grabenstrasse 4-6
71570 Oppenweiler
GERMANY

Oppenweiler, 26 October 2010

Stefano Palamides- Managing Director

Table of contents

1	General remarks	
1.1	Important notes about the operating manual	7
1.2	Structure of the operating manual	8
1.3	Symbols, terms, and abbreviations	9
1.4	Description of safety instructions	10
1.4.1	Signal words	10
1.4.2	Structure of safety instructions	10
1.4.3	Safety sign	11
1.4.4	Warning triangle	12
1.5	User assessment of the operating manual	13
2	Basic safety instructions	
2.1	Intended use	15
2.2	Reasonably foreseeable misuse	16
2.3	Warranty and liability	17
2.4	Risks in handling the machine	18
2.5	Residual risks	19
2.5.1	Transport, interim storage	19
2.5.2	Installation, initial operation	19
2.5.3	Adjustment and operation	19
2.5.4	Maintenance	19
2.5.5	Shutdown, storage	20
2.5.6	Disposal	20
2.6	Life time of the machine	21
2.7	General safety instructions	21
2.7.1	Transport, interim storage	21
2.7.2	Installation, initial operation	21
2.7.3	Normal operation	21
2.7.4	Setting up/equipping	21
2.7.5	Maintenance and repair	22
2.7.6	Work on electrical equipment	22
2.8	Obligations of the owner/operator	23
2.9	Obligations of the personnel	24
2.9.1	Operating personnel	24
2.9.2	maintenance personnel	24

2.10	Qualification of personnel	25
2.11	Personal protective kit	27
2.11.1	Operating personnel	27
2.12	Safety and protective devices	28
2.12.1	Overview	28
2.12.2	EMERGENCY STOP palm button	29
2.12.3	Noise damping hood	30
2.12.4	Slitter shaft guard	31
2.12.5	Additional protective devices	32
2.12.6	Faulty safety and protective devices	32
2.12.7	Checking safety and protective devices	32
2.12.8	Checklist for safety and protective devices	33
2.13	Warnings and safety instructions on the machine	35
2.13.1	Overview	35
2.13.2	Position and meaning	36
2.14	Workstations and space requirements	38
2.15	Directions for emergencies	38
3	Product description	
3.1	Important notices about the product	39
3.1.1	Overall view	39
3.2	Technical data	40
3.2.1	Floor plan, configuration 44(46X)	40
3.2.2	Characteristics	41
3.2.3	Emissions	41
3.2.4	Weights, fork lifts, and floor requirements	42
3.2.5	Supply	43
3.2.6	Ambient conditions	44
4	Structure and function	
4.1	Introduction	45
4.1.1	What is folding?	45
4.1.2	Folding principles	45
4.1.3	Buckle folding machine	47
4.2	Structure	48
4.2.1	Overall view	48
4.2.2	Register table	49
4.2.3	Parallel folding unit I and II	49
4.3	Models	50
4.3.1	Variants 44, 64, 46 and 66.	50
4.3.2	Variants 44X, 64X, 46X and 66X.	51

5	Operating and display elements, operating modes	
5.1	Control console	53
5.1.1	Operating	53
5.2	Operating modes	54
5.2.1	Machine controller operating mode	55
5.2.2	Self-control operating mode (optional)	56
5.2.3	Adapter box operating mode	57
6	Transport/Installation/Initial operation	
6.1	Introduction	59
6.1.1	Qualification of personnel	59
6.1.2	Safety instructions	59
6.2	Brief instructions	61
6.3	Transporting folding unit II	62
6.4	Installing folding unit II	63
6.4.1	Unpacking folding unit II	63
6.4.2	Installing folding unit II	64
6.4.3	Completing folding unit II	65
6.5	Removing the rust preventing agents	65
6.6	Electric connection	66
6.6.1	Power supply prerequisites	66
6.6.2	Electrical connections between the folding units	67
6.7	Starting up	67
6.7.1	Brief instructions	67
6.7.2	Check the supply voltage	68
6.7.3	Check rotating field of the power socket	68
6.7.4	Checking the control cabinet cover	69
6.7.5	Checking machine functions	69
6.8	Final check of the protective devices	69
6.9	Inspection after first start-up	69
7	Adjustment and operation	
7.1	Introduction	71
7.1.1	Qualification of personnel	71
7.1.2	Safety instructions	71
7.2	Operating	75
7.2.1	EMERGENCY STOP palm button	75
7.2.2	Starting/stopping the machine	76
7.2.3	Starting/stopping the sheet feed	77
7.2.4	Setting the speed	78

7.3	Brief instructions for adjusting the folding unit	79
7.4	Positioning folding unit II	80
7.5	Electrical connection between the folding units	80
7.6	Adjusting the alignment table	81
7.6.1	Sheet size adjustments	81
7.6.2	Equipping the marble rail	83
7.6.3	Inserting the smoother bars	85
7.7	Adjusting the parallel fold	86
7.7.1	Roller diagram	86
7.7.2	Adjusting the pressure of foldrollers and slitter shafts	87
7.8	Adjusting the buckle plates	90
7.8.1	Buckle plate positions	90
7.8.2	Buckle plates 1 to 4 (6) as standard buckle plates FT	90
7.8.3	Buckle plates 1 to 4 (6) as combination buckle plates FTK	91
7.8.4	Inserting the buckle plates FT	93
7.8.5	Inserting the buckle plates FTK	94
7.8.6	Adjusting the folding length	95
7.8.7	Adjusting the sheet stop angle:	96
7.8.8	Adjusting the lower plate lip	97
7.8.9	Setting of the inner width	98
7.8.10	Enlarging the buckling area	99
7.8.11	Enlarging the deflecting area	100
7.9	Placing the slitters on the slitter shafts	102
7.9.1	Single rear slitter shafts (standard)	102
7.9.2	Perforating device	104
7.9.3	V-shaped special perforating knife (option)	106
7.9.4	Punch perforating device	107
7.9.5	Creaser	109
7.9.6	Super-Score device	110
7.9.7	Slitting device	111
7.9.8	Strip trim device	112
7.10	Options	114
7.10.1	Stopper switch S31 at the exit of the folding unit	114
7.11	Error messages	115
7.12	Removing the paper jam	115
7.13	Adjustment data of standard folding impositions	116
7.13.1	Parallel fold	117
8	Maintenance	
8.1	Introduction	119
8.1.1	Qualification of personnel	119
8.1.2	Safety instructions	119

8.2	Service	122
8.2.1	Ordering spare parts.	122
8.3	Operational maintenance	123
8.3.1	Checking the safety devices.	123
8.3.2	Cleaning	126
8.3.3	Recommendation of cleansing agents	127
8.3.4	Cleaning of the machine.	127
8.3.5	Cleaning the foldrollers.	128
8.3.6	Cleaning the lower buckle plates	129
8.3.7	Cleaning the optical sensors	129
8.4	Maintenance	130
8.4.1	Checking the drive belt for the rollers for register table	131
8.4.2	Check/exchange main drive belt	132
8.4.3	Checking the drive belt for foldrollers and slitter shafts	133
8.5	Maintenance, lubrication and cleaning schedule	134
9	Shutdown, storage	
9.1	Introduction	135
9.1.1	Qualification of personnel.	135
9.1.2	Safety instructions	135
9.2	Shutdown	135
9.2.1	Temporary shutdown:	135
9.2.2	Final decommissioning.	136
9.3	Bearing assembly	136
10	Disposal	
10.1	Introduction	137
10.1.1	Qualification of personnel.	137
10.1.2	Safety instructions	137
10.2	Disposal/recycling	137

1 General remarks

With this MBO product, you have acquired a high-quality industrial product with which you, if you follow the operating manual carefully, can achieve the highest reliability and productivity.

1.1 Important notes about the operating manual

This operating manual must be read by everybody who transports, installs, connects, operates, maintains, repairs or dismantles this machine.

Only if the contents of the operating manual have been understood and followed in all points by all people is safe use of the machine possible. This applies especially for the chapter about safety.

This operating manual contains important notes about operating the machine safely, properly, and economically.

Following these notes helps:

- To avoid dangers.
- To minimize repair costs and downtimes.
- To increase the reliability and service life of the machine.

Completion:

- The owner/operator must complete this operating manual with information with respect to federal and national regulations concerning accident control and prevention.

Keep:

- This operating manual is part of the machine. It must be available on the machine throughout the machine's entire service life.

If you sell the machine

- Be sure to give this operating manual to any subsequent owner or user of the machine.

We reserve the right to make technical modifications to improve the machine, even if they are not taken into account in this operating manual

1.2 Structure of the operating manual

The chapters of the operating manual are listed in the table. It also describes the essential content of these chapters as well as the target groups at whom the chapters are directed.

No.	Chapter	Contents	Target group
	Table of contents	The detailed table of contents serves as a search tool.	Owner/operator Operating personnel Maintenance personnel Service technicians
1	General	General instructions	Owner/operator Operating personnel Maintenance personnel Service technicians
2	Safety instructions	Safe handling, notes about dangers	Owner/operator Operating personnel Maintenance personnel Service technicians
3	Product description and product data	Machine description/technical data	Operator, operating personnel, maintenance personnel
4	Structure and function	Structure and function	Operating personnel, maintenance personnel, service technicians
5	Operating and display elements, operating modes	Operating elements and operating modes	Operating personnel, maintenance personnel, service technicians
6	Transport, interim storage, installation and commissioning	Specifications for transport, interim storage, installation and commissioning.	Transport personnel, maintenance personnel Service technicians
7	Adjustment and operation	Preparation for production	Operating personnel, maintenance personnel, service technicians

Table 1: Structure of the operating manual

No.	Chapter	Contents	Target group
8	Maintenance	Maintenance and service	Operating personnel, maintenance personnel, service technicians
9	Shutdown, storage and putting the machine back into operation	Shutdown, storage conditions	Owner/operator Operating personnel, maintenance personnel, service technicians
10	Disposal	Dismantlement, environmentally friendly disposal	Owner/operator Maintenance personnel Service technicians

Table 1: Structure of the operating manual

1.3 Symbols, terms, and abbreviations



Symbol	Explanation
▷	Symbol indicates an instruction for action; sequence is not specified.
1) 2)	Numbered instruction for action; adhere to sequence.
< STOP >	Pushbutton with the label that is between the brackets (e.g. Stop).
	Additional information for use of the machine.
	Important notice, please observe.

Table 2: Symbols, terms, and abbreviations

1.4 Description of safety instructions

Safety instructions are marked by a safety sign and a signal word.

1.4.1 Signal words

The signal words draw your attention to the severity of the danger. They are structured according to a classification system.

Signal word	Significance
DANGER	Meaning a direct imminent danger that leads to serious bodily injuries or even to death.
WARNING	Meaning a possibly dangerous situation that may lead to serious bodily injuries or even to death.
CAUTION	Meaning a possibly dangerous situation that may lead to slight bodily injuries or to property damage

Table 3: Signal word meanings

1.4.2 Structure of safety instructions

Each safety instruction is structured as follows:

- Safety sign
- Signal word to identify the danger level
- Type and source of the danger
- Possible consequences of the danger
- Measure(s) for avoiding the danger

Example:



DANGER! WARNING! CAUTION! (signal word)

Type and source of the danger.

Possible consequences of the danger.

Measure(s) for avoiding the danger

1.4.3 Safety sign






Plotting	Significance
	<p>Prohibition sign Red border, white background, black symbol</p> <p>Safety sign that forbids a behavior that could cause danger.</p>
	<p>Warning triangle Yellow background, black symbol</p> <p>Safety sign that warns about a danger.</p>
	<p>Command sign Blue background, white symbol</p> <p>Safety sign that prescribes a particular behavior.</p>
	<p>Rescue sign Green background, white symbol</p> <p>Safety sign that identifies the rescue path or the path to a place where you can get help or find rescue equipment in case of an emergency.</p>
	<p>Fire protection sign Red background, white symbol</p> <p>Safety sign that identifies the location of fire alarm or fire extinguishing equipment and/or the path to this equipment in case of an emergency.</p>

Table 4: Safety sign

1.4.4 Warning triangle






Plotting	Significance
	Warning of a hazard area, general.
	Warning of dangerous electric voltage.
	Warning of crushing of body parts
	Warning of rotating rollers.
	Warning of hand injuries due to moving rollers.
	Warning of crushing of hand.
	Warning of crushing injuries due to noise damping hoods.
	Warning of rotating machine parts.
	Warning of lifting heavy machine parts.

Table 5: Warning triangle






Plotting	Significance
	Warning of tipping machine parts.
	Warning of infeed points.
	Warning of sharp knives on the slitter shafts.
	Warning of falling tools.
	Warning of substances detrimental to health.
	Warning of oxidizing substances
	Warning of hot surface.
	Warning of tripping hazards.

Table 5: Warning triangle

1.5 User assessment of the operating manual

Our operating manuals are updated regularly. You are kindly requested to recommend any improvements to make the instructions user-friendly.

2 Basic safety instructions



The absolute prerequisite for the proper handling and trouble-free operation of this machine is knowledge of the elementary safety instructions and safety regulations.

- The operating manual must be heeded by all people who work on or at the machine.
- Read and understand the operating manual before working with the machine.
- Always keep the operating manual where the machine is being used.
- The operating manual must always be freely accessible for the operating and maintenance personnel.
- In addition, observe the rules and regulations for accident prevention and environmental protection applicable for the final destination.

2.1 Intended use

- The machine is intended exclusively for processing flat paper. The specifications relative to format and grammage in the "Specifications" chapter must be complied with.
- The machine is intended exclusively for one-man operation.
- The machine is intended exclusively for operation in a flawless technical state. Any failures that may endanger safety must be remedied immediately by trained personnel, or a specialist from the manufacturer or supplier.
- The machine must be operated by specially trained and instructed technicians only.
- Troubleshooting, maintenance and service must be carried out by trained maintenance personnel only.
- Observe all instructions in this operating manual.
- Observe the local safety and accident prevention regulations.
- Adhere to the inspection and maintenance intervals.
- Use only original wear and spare parts.



IMPORTANT!

Use the machine only as intended and with the safety system in a flawless state.

This is the only way to guarantee the machine's operating safety.

2.2 Reasonably foreseeable misuse

Any use other than that defined under the "intended use" or extending beyond this shall be considered non-intended use!

The owner/operator bears sole responsibility

- for damage resulting from non-intended use;
- the manufacturer assumes no liability.



IMPORTANT!

Non-intended use may result in risks.

Non-intended uses are, e.g.,

- operation in an explosive environment
 - exceeding the technical values defined for normal operation.
-

Modifications and changes

In the event of any unauthorized modifications and changes to the machine, the manufacturer is cleared of all liability and warranty!

The electromagnetic compatibility (EMC) of the machine can be impaired by additions or changes of any kind.

Therefore do not undertake any changes or additions to the machine without consultation and written approval of the manufacturer.

Spare and wear parts

Use of spare and wear parts from third-party manufacturers can lead to risks. Use only original parts or parts approved by the manufacturer.

The manufacturer assumes no liability for damage resulting from use of any spare and wear parts not approved by the manufacturer.

2.3 Warranty and liability

Our "General terms and conditions" apply here.

Any claims based on warranty and liability for personal injuries and damage to property shall be excluded if they are attributable to one or several causes as follows:

- Non-intended use of the machine.
- Improper assembly, start-up, operation or maintenance of the machine.
- Operation of the machine with safety and protective devices that are not attached or defective.
- Failure to comply with the instructions in the operating manual regarding transport, installation, initial operation, operation, installation, maintenance, and storage of the machine.
- Individual constructional changes to the machine.
- Non-observance of maintenance and cleaning intervals which exclude a machine downtime
- Insufficient monitoring of machine parts that are subject to wear, such as tapes, belts, and couplings.
- Installation of spare and wear parts that have not been provided by the manufacturer.
- Cases of catastrophe and acts of God.

2.4 Risks in handling the machine

The machine is built using the latest technology and according to acknowledged safety rules.

Nonetheless risks and damage can occur when using it:



- to the body and life of the operator or third parties,
- to the machine itself,
- to other property.

If the machine is:

- operated by untrained or uninstructed personnel,
- not used according to its intended use,
- not or improperly maintained or serviced.

The machine must only be used:

- For the intended use.
- If it is in perfect condition with respect to safety.
Any interference that may have a negative effect on safety shall be eliminated immediately.

2.5 Residual risks

A risk analysis with risk assessment (DIN EN ISO 14121) was carried out for this machine.

The existing residual risks, corresponding to the various lifecycle phases of the machine, are listed in the following chapters.

Avoid existing residual risks by observing and implementing the:



- warnings and safety instructions on the machine,
- general safety instructions and special warnings in this operating manual,
- operating instructions of the owner/operator.

2.5.1 Transport, interim storage



- Danger due to the use of unsuitable fork lifts.
- Danger from machine parts falling over while unloading and installing the machine.
- Danger due to insufficient properties and condition of the underfloor.
- Danger from incorrect storage.

2.5.2 Installation, initial operation



- Danger due to the use of unsuitable fork lifts.
- Danger of machine parts falling over during unloading and installation.
- Danger due to insufficient properties and condition of the underfloor.
- Danger when lifting heavy machine parts (control cabinet, pumps, buckle plates, slitter shafts, etc.).
- Danger due to dangerous electrical voltage.
- Danger due to incorrect power supply voltage.
- Danger due to improper initial operation.
- Danger of tripping on cables lying about.

2.5.3 Adjustment and operation



- Danger when dismantling, bridging or avoiding safety and protective devices.
- Danger when moving the pile table.
- Danger due to rotating machine element
- Danger from incorrect handling of the safety handwheels.
- Danger due to acoustic pressure
- Danger due to paper jam.
- Danger of tripping on cables lying about.
- Danger through using several adapter boxes in one machine assembly.

2.5.4 Maintenance



Cleaning:

- Danger due to heavy contamination.
- Danger when lifting heavy machine parts (buckle plates, slitter shafts, etc.)
- Danger due to improper use of cleaning agents.
- Danger due to cleaning cloths used.
- Danger due to improper cleaning.
- Danger due to wrong maintenance, greasing and cleaning intervals at multishift operation.



Maintenance:

- Danger due to dangerous electrical voltage.
- Danger when dismantling, bridging or avoiding safety and protective devices.
- Danger due to improper maintenance.
- Danger due to running machine parts during maintenance and repair.
- Danger of crushing injuries during maintenance and repair work
- Danger due to maintenance tools.
- Danger of being drawn in.
- Danger due to wrong maintenance, greasing and cleaning intervals at multishift operation.

2.5.5 Shutdown, storage



- Danger from incorrect storage.

2.5.6 Disposal



- Danger from incorrect disposal.

2.6 Life time of the machine

The life time of this machine is designed for 20 years.

2.7 General safety instructions

2.7.1 Transport, interim storage

- Only specially-trained and authorized personnel may transport the machine.



2.7.2 Installation, initial operation

- Only specially-trained and authorized personnel may install and commission the machine.



2.7.3 Normal operation

- Only instructed operating personnel may operate the machine.
- The machine may be operated only if all safety devices, such as protective hoods and EMERGENCY STOP palm buttons, are present and fully functional.
- At least once per shift, the machine must also be checked for externally-visible damage. Changes, including to the operating behavior, must be reported immediately.
- Machine parts may not be used as climbing aids. If higher parts of the machine must be reached, a suitable working stage or other platform must be used, it must correspond to the safety requirements, e.g. with respect to height, stability, etc.



2.7.4 Setting up/equipping

- Only specially-trained and authorized personnel may set up the machine.
- Inform the operating personnel before beginning set-up.
- If the machine is switched off for set-up, it must be secured against being switched on again without authorization or inadvertently. Use a padlock to secure the main switch against switching-on. If necessary, attach a danger sign on the main switch.
- Machine parts may not be used as climbing aids. If you need to reach higher-up machine parts, use a suitable working stage or other platform. Make sure that it corresponds to the safety requirements, e.g. with respect to height, stability, etc.



- If larger components or parts are replaced, corresponding lift equipment must be used to transport the components. Only use suitable and technically-perfect lift equipment and load suspension devices with sufficient carrying capacity. Secure components or parts so that they present no danger. Do not linger or work under hanging loads.
- After completion of the work, do not leave any tools or other loose objects lying on the machine.

2.7.5 Maintenance and repair



- Maintenance and repair work must be carried out by specially trained personnel only.
- Inform operating personnel before beginning maintenance and service work. Secure the service area if necessary.
- For all maintenance and service work, observe the switch-on and off procedures according to the operating manual.
- Observe prescribed maintenance and service intervals according to the operating manual.
- If the machine is switched off for maintenance and/or repair work, it must be secured against being switched on again without authorization or inadvertently. Use a padlock to secure the main switch against switching-on. If necessary, attach a danger sign on the main switch.
- If it is necessary to dismantle safety devices for maintenance and service work, the safety devices must be reattached immediately after the work is completed and their function checked.
- After completion of the work, do not leave any tools or other loose objects lying on the machine.
- All operating materials and consumables as well as spare parts that are no longer required must be disposed of safely and in an environmentally friendly manner.

2.7.6 Work on electrical equipment



- Work on electrical machines or controls may only, in accordance with electrotechnical rules, be performed by a qualified electrician or by trained people under the direction and supervision of a qualified electrician.
- In case of disturbances in the electrical power supply, switch the machine off immediately.
- Only use original fuses with the prescribed amperage.
- Machine parts on which maintenance or service work must be performed must - if prescribed - be de-energized. Check the isolated parts to make sure they are de-energized, then ground and short-circuit them. Isolate adjacent parts that are energized.
- The electrical equipment of a machine must be checked regularly. Defects such as loose connections or singed cable must be eliminated immediately. If work on voltage-conducting parts is necessary, a person must be brought in who can activate the main switch in case of emergency.
- Only use insulated tools.

2.8 Obligations of the owner/operator

The owner/operator is responsible for

- the machine being operated only as intended,
- the machine being operated only when it is fully functional, safe and reliable,
- the machine being maintained and cleaned according to the specifications in the maintenance and cleaning schedule,
- the machine being protected from unauthorized use,
- the necessary personal protective equipment being available,
- the necessary personal protective equipment being worn,
- only authorized personnel having access to the machine,
- the authorized personnel being adequately qualified,
- the authorized personnel being instructed in all applicable questions of workplace safety, accident prevention, and environmental protection,
- the authorized personnel having read and understood the operating manual,
- the operating manual always being kept at the machine's final destination and being freely accessible for the operating and maintenance personnel,
- the safety and information symbols on the machine being in a legible state,
- a risk assessment of the entire machine system being carried out and its results being summarized in operating instructions,
- identified defects or abnormal operating states/malfunctions being remedied immediately,
- operation of the machine being ceased during troubleshooting.

The requirements of the EC Directive for use of equipment 2007/30/EC must be complied with.

2.9 Obligations of the personnel

2.9.1 Operating personnel

The operating personnel must:

- be trained and instructed,
- use the machine as intended,
- wear the necessary personal protective equipment,
- observe the basic regulations regarding workplace safety and accident prevention,
- read and observe the safety chapter and the safety instructions in this operating manual,
- immediately put the machine out of operation in the event of defects or abnormal operating states/malfunctions,
- immediately report any identified defects or abnormal operating states/malfunctions.

The operating personnel is responsible for

- the machine being protected from unauthorized use,
- the machine being operated only when it is fully functional, safe and reliable,
- the cleaning being carried out according to the cleaning schedule.

2.9.2 maintenance personnel

The maintenance personnel must:

- be trained and instructed,
- use the machine as intended,
- wear the necessary personal protective equipment.

The maintenance personnel is responsible for

- the machine being protected from unauthorized use,
- the maintenance being carried out according to the maintenance schedule.

2.10 Qualification of personnel

All activities at or on the machine must be carried out by authorized personnel only.

The authorized personnel must:

- have reached the age of 16,
- know and be able to apply the accident prevention regulations and safety instructions for the machine,
- have read Chapter "2 Basic safety instructions" and be able to apply and implement it in practice,
- be trained and instructed according to the rules of conduct in the event of a fault,
- have the physical and mental abilities to carry out his or her responsibilities, tasks, and activities at or on the machine,
- be trained and instructed in accordance with his or her responsibilities, tasks, and activities at or on the machine,
- have understood the operating manual and be able to implement it in practice with respect to his or her responsibilities, tasks, and activities at or on the machine.

This table lists the necessary qualification of the personnel related to the various activities at or on the machine.

	Specially trained personnel	Instructed operating personnel	Instructed personnel with specialized training (mechanical/electrical engineering)
Transportation	X	-	-
Interim storage	X	-	-
Installation	-	-	X
Electrical connections	-	-	X
Network connection	-	-	X

Table 6: Qualification of personnel
 Legend: X permitted, - not permitted

	Specially trained personnel	Instructed operating personnel	Instructed personnel with specialized training (mechanical/electrical engineering)
Starting up	-	-	X
Troubleshooting (mechanical/electrical)	-	-	X
Installation, retrofiting	X	X	-
Operating	-	X	-
Operational maintenance	-	X	-
Maintenance	X	-	X
Repair	-	-	X
Shutdown	-	-	X
Bearing assembly	X	-	-
Disposal	X	-	-

Table 6: Qualification of personnel
 Legend: X permitted, - not permitted

2.11 Personal protective kit

2.11.1 Operating personnel

The owner/operator must provide the operating personnel with the following personal protective equipment:



- Hearing protection
- Cut-resistant safety gloves
- Safety shoes



2.12 Safety and protective devices

2.12.1 Overview

The following safety and protective devices are present at or on the machine.



IMPORTANT!

Operate the machine only if all safety and protective devices are completely present and fully functional!

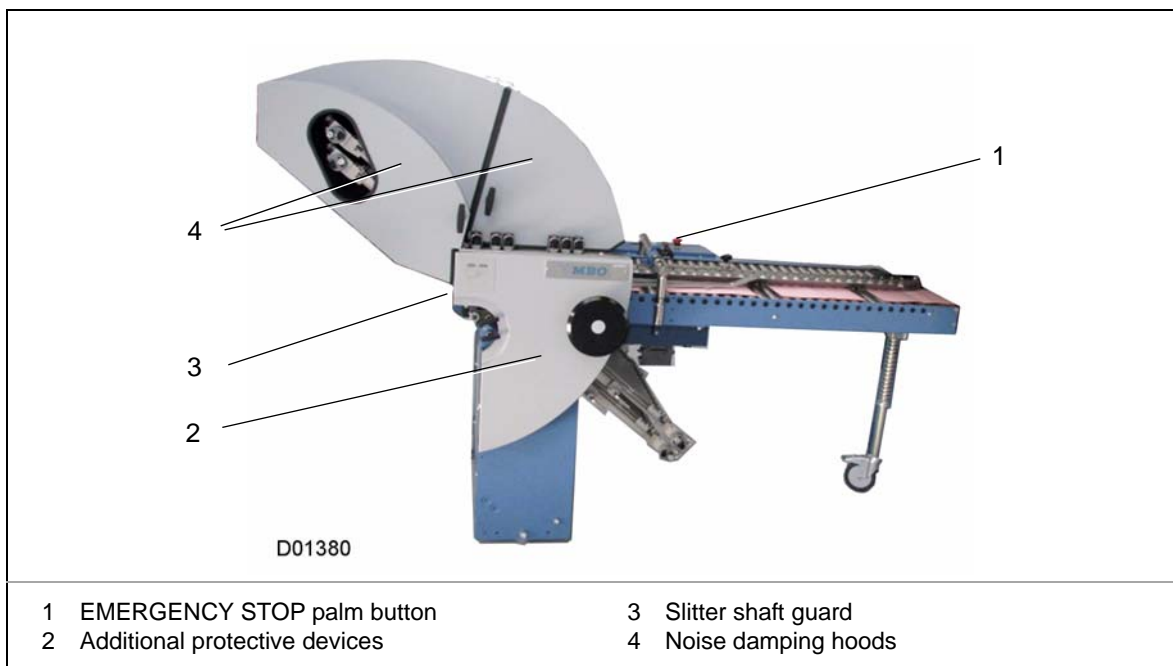


Figure 2: Overview

2.12.2 EMERGENCY STOP palm button

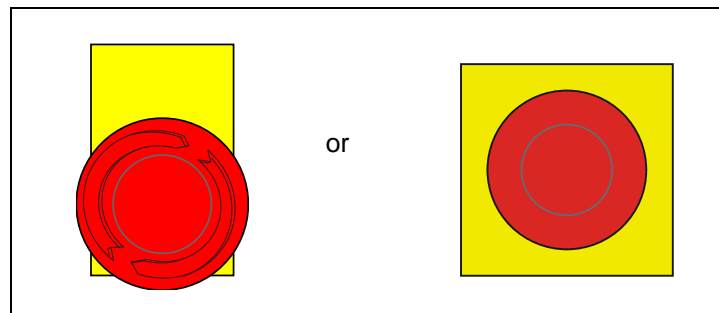


Figure 3: EMERGENCY STOP palm button

The machine is in operation.



IMPORTANT!

To prevent immediate or potential hazards, the machine is equipped with an EMERGENCY STOP shut-off device.

After the <EMERGENCY STOP> palm button is pressed, all electrical drives are switched off.

EMERGENCY STOP does not disconnect the machine from the electrical supply.

There is a dangerous situation and the machine must be stopped quickly.

Procedure:

- ▷ Press the EMERGENCY STOP palm button (1).
- ▷ Eliminate the failure.
Ensure that in this situation, the machine is not switched on again accidentally.
- ▷ Disengage the EMERGENCY STOP palm button by turning it towards the right.
The machine is ready for operation.



When the EMERGENCY STOP palm button is pressed, the machine is stopped immediately.

No emptying of the sheets takes place!

2.12.3 Noise damping hood



CAUTION!

Danger due to acoustic pressure

Non-observance may cause hearing problems.

- Always wear hearing protection whenever you work at or on the machine.
- Always close the noise damping hoods whenever you work at or on the machine.

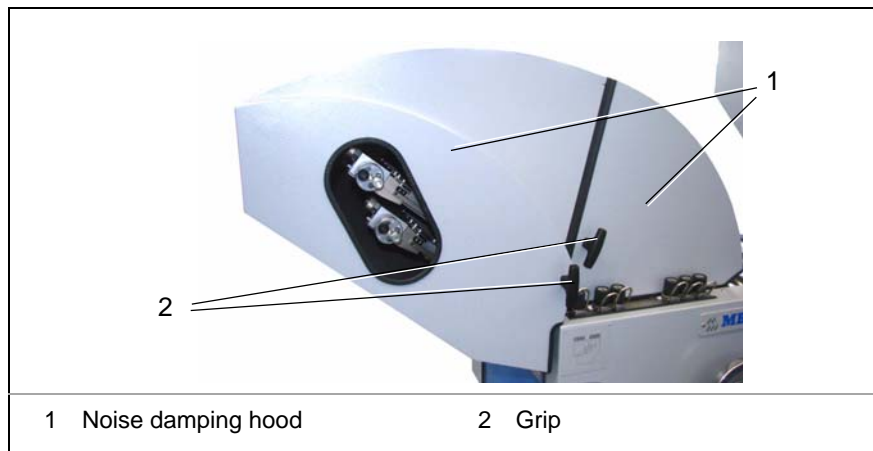


Figure 4: Noise damping hood



IMPORTANT!

The noise damping hoods have the following function:

- they cover the entire parallel fold,
- they reduce the noise to the values specified in the "Specifications".

During the folding process a high sound pressure develops in the folding machine.

This high sound pressure can lead to hearing loss.

In order to avoid hearing loss:

- ▷ Always wear hearing protection whenever you work at or on the machine.
- ▷ Always close the noise damping hoods whenever you work at or on the machine.

Handling

Procedure:

- ▷ When opening and closing the noise damping hoods, always do so using the handle (2).
- ▷ Always open the noise damping hoods up to the limit stop.

2.12.4 Slitter shaft guard



WARNING!

Danger at the slitter shaft guard.

Non-observance may possibly cause serious personal injuries or even death

Even when closed, the slitter shaft guard does not provide 100% protection against the sharp knives touching the slitter shafts.

Never reach into the slitter shafts while the machine is running!

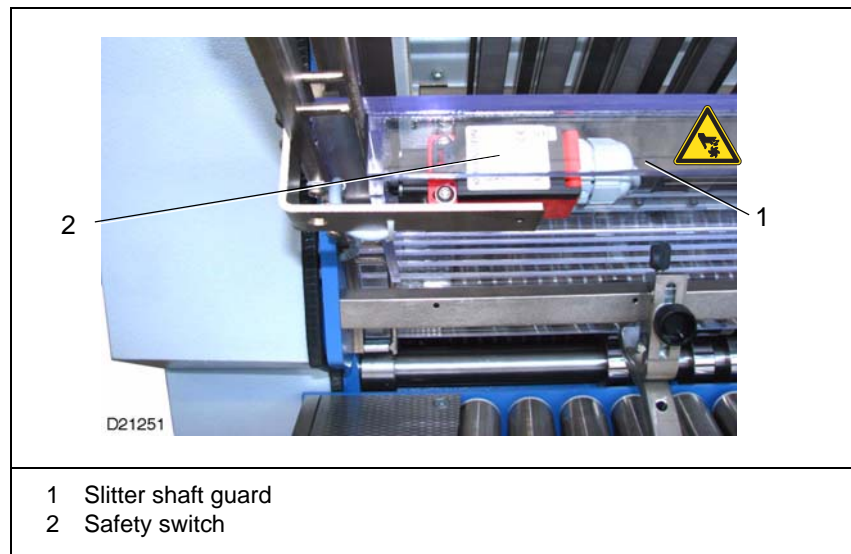


Figure 5: Safety switch for slitter shaft guard



IMPORTANT!

The slitter shaft guard has the following function:

- it prevents access to the dangerous infeed points of the foldrollers while the machine is running,
- it prevents access to the sharp knives on the slitter shafts only partially while the machine is running.

Check that the safety switch (2) functions correctly:

- When opening the slitter shaft guard (1) during production mode, the safety switch (2) stops the drive of the machine.
- When the slitter shaft guard is open, the machine cannot be started.

2.12.5 Additional protective devices

Additional disconnect safety devices are present on the machine.

These protect the operator from hazard areas such as:

- rotating machine parts, e.g., drives, shafts
- infeed points
- pinch points
- etc.

The function and position of the corresponding protective device is listed in the "Safety and protective devices" checklist.

See Chapter "2.12.8 Checklist for safety and protective devices".

2.12.6 Faulty safety and protective devices

Faulty safety and protective devices can lead to hazardous situations.

For this reason:

- ▷ Switch off the machine at the main switch immediately,
- ▷ secure it against being switched on again,
- ▷ if necessary, disconnect the supply of compressed air and electrical current.
- ▷ Immediately repair faulty safety and protective devices.

2.12.7 Checking safety and protective devices

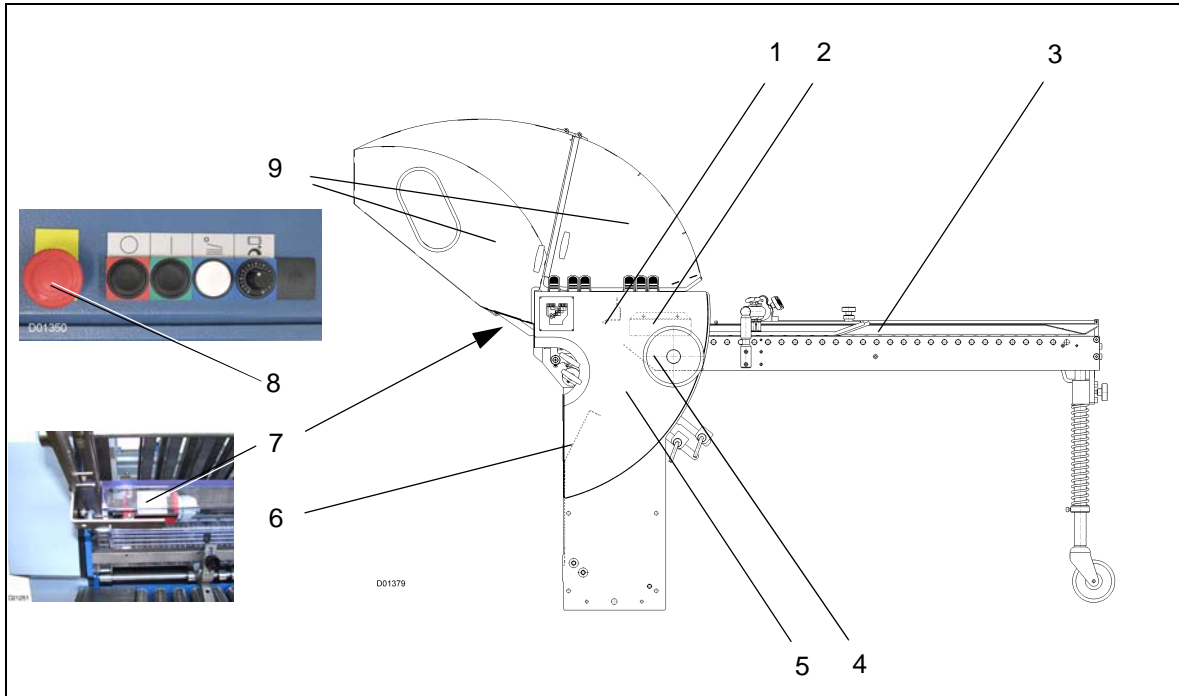
All safety and protective devices must be checked regularly.

For the corresponding inspection intervals, see Chapter "2.12.8 Checklist for safety and protective devices"

For the corresponding procedure, see the Maintenance chapter

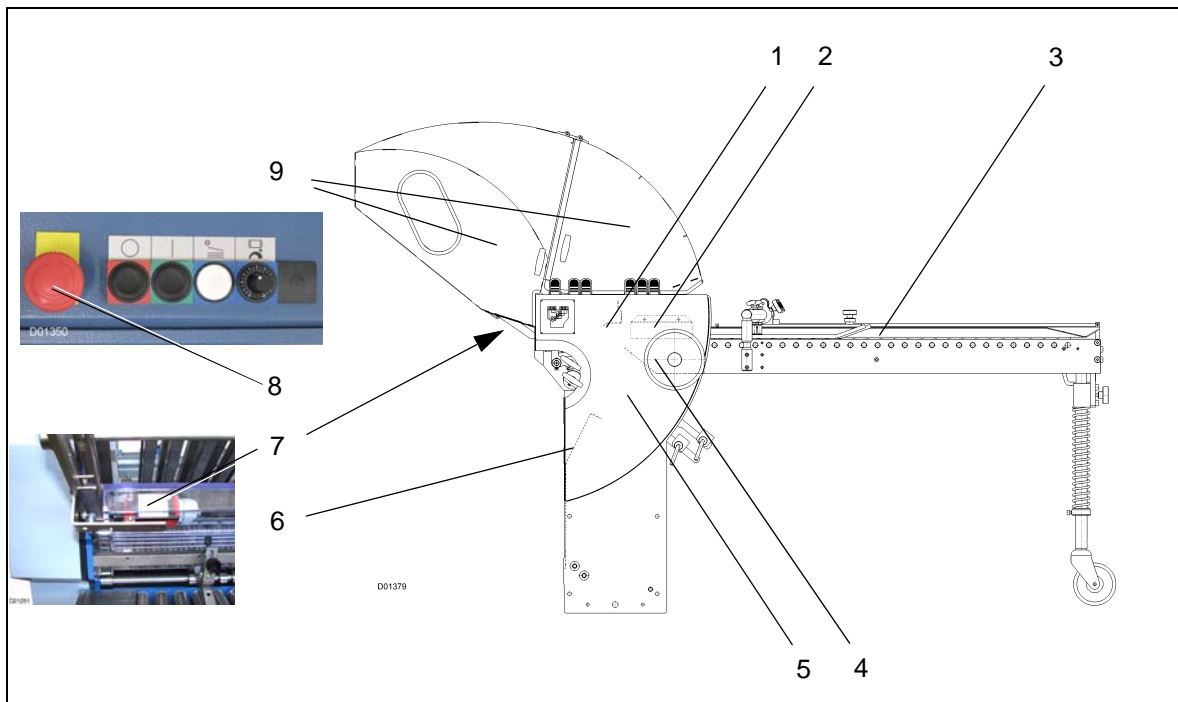
2.12.8 Checklist for safety and protective devices

Use this checklist to check the safety and protective devices of the machine regularly



Pos.	Description	Functioning control	Visual inspection	Result	Inspection interval
1	Guard above the top foldroller				Weekly
2	Guard above the belt tensioner				Weekly
3	Guard above the alignment table drive belt				Weekly
4	Guard below handwheel shaft				Weekly
5	Guard of parallel fold, drive side and operator side				Weekly
6	Guard below parallel fold				Weekly
7	Guard above slitter shafts with safety switch. All fastening and stop screws must be safety screws.				Daily
8	EMERGENCY STOP palm button on the control console				Daily
9	Noise damping hood (2-piece) above parallel fold				Daily

Table 7: Checklist for safety and protective devices



Pos.	Description	Functioning control	Visual inspection	Result	Inspection interval
	All safety screws are secured with screw locking (e.g. Loctite 222). Without drawing.				
Date::		Name:		Signature::	

Table 7: Checklist for safety and protective devices

2.13 Warnings and safety instructions on the machine

Warnings and safety instructions for observing the residual risks are attached to the machine.

- If warning and safety labels become damaged or illegible, they must be replaced.
- For the corresponding MBO part number, refer to Chapter "2.13.2 Position and meaning".

2.13.1 Overview

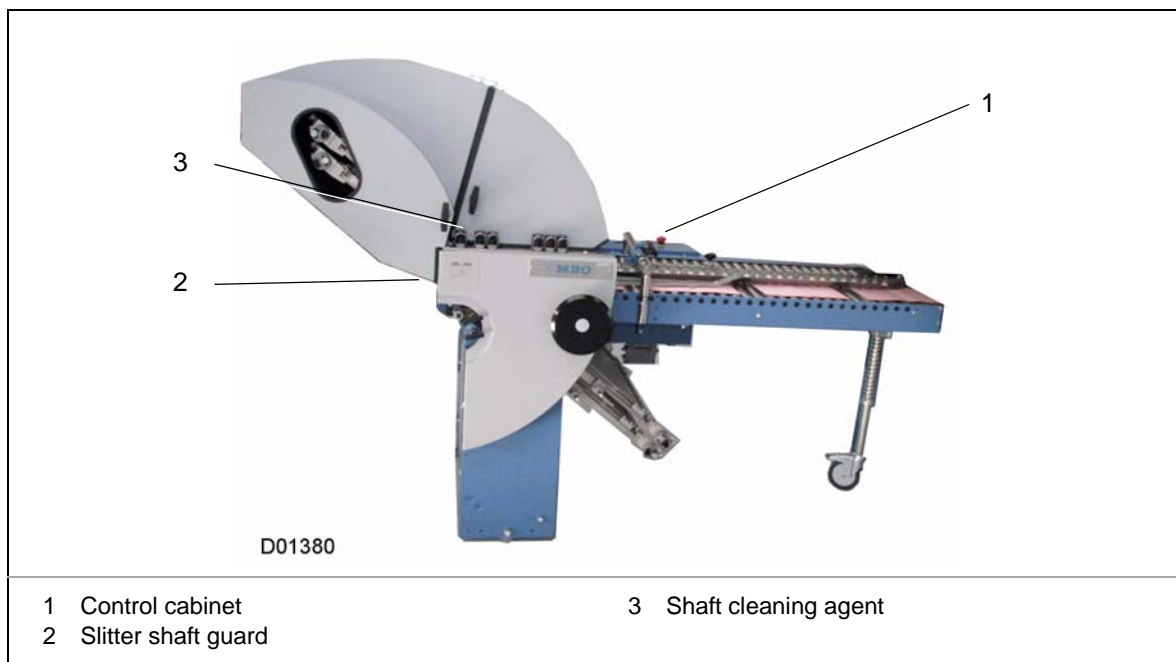
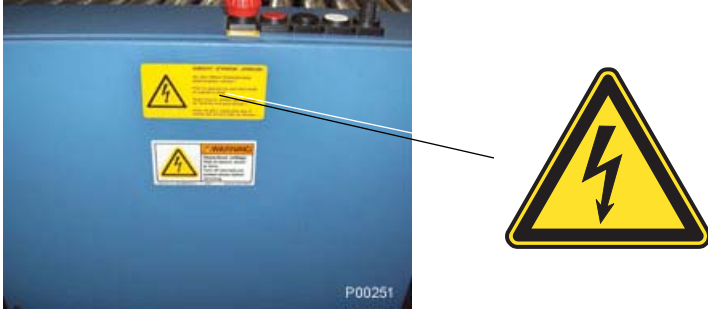
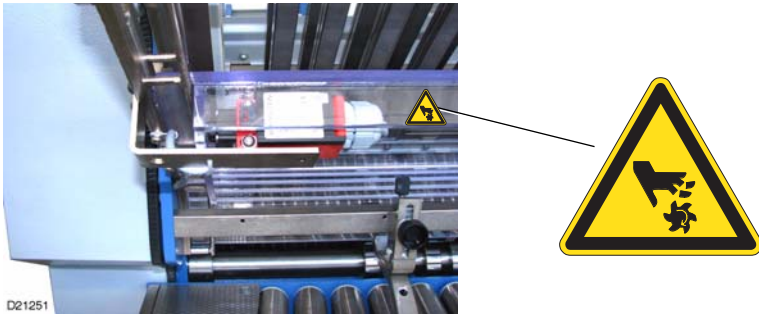


Figure 6: Overview of warnings

2.13.2 Position and meaning

Pos. 01 Control cabinet	MBO part No.:
	
<p>Meaning: Danger due to electrical voltage. Non-observance may cause serious injuries or even death.</p> <ul style="list-style-type: none"> • Work on the electric components of the machine may only be performed by a qualified electrician. • Observe the local occupational safety regulations and electrotechnical regulations. • Even when the main switch is switched off, hazardous electrical voltage is present at the power supply terminals and/or the terminals of the main switch. (See wiring diagram) • There is dangerous electric residual voltage on the supply terminals of the frequency inverter even when the main switch is switched off. (Observe the capacitor discharge time (KEB 5 min, Telemecanique 15 min)). 	

Pos. 02 Slitter shaft guard	MBO part No.:
	
<p>Meaning: Danger due to slitter shafts. Even when closed, the slitter shaft guard does not provide 100% protection against the sharp knives touching the slitter shafts. Non-observance may possibly cause serious personal injuries or even death Never reach into the slitter shafts while the machine is running!</p>	

Pos. 03 Shaft cleaning agent
MBO part No.:

Meaning:
Danger from incorrect cleaning agents for the foldrollers.
Non-observance may cause property damage.

To clean the foldrollers, use Varn-wash VM-111 or VWM only.

2.14 Workstations and space requirements

The machine is intended exclusively for operation by one person.

The illustration shows the most important workstations and the work and service area of the machine.

The most important workstations are:

- Workstation at the feeder
- Workstation at the delivery

The work areas necessary for operation, installation, initial operation, and maintenance are shaded gray and should be at least 100 cm (3ft 4 in.).

The additional work area needed for service is shaded with hatching.

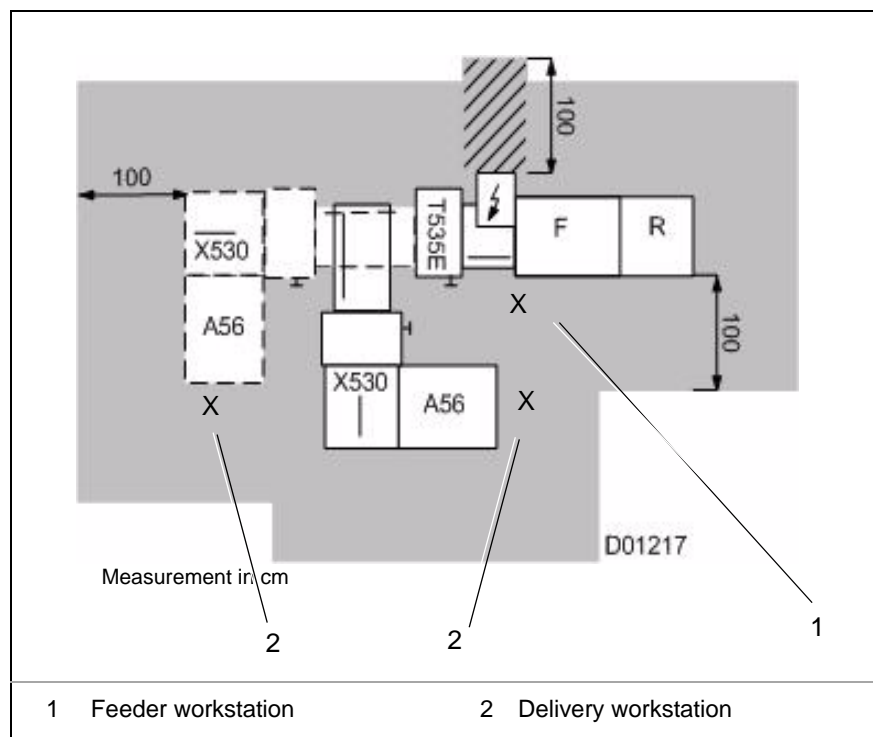


Figure 7: Work and service area

2.15 Directions for emergencies

The owner/operator must complete this operating manual with information with respect to federal and national regulations concerning accident control and prevention.

3 Product description

3.1 Important notices about the product

3.1.1 Overall view

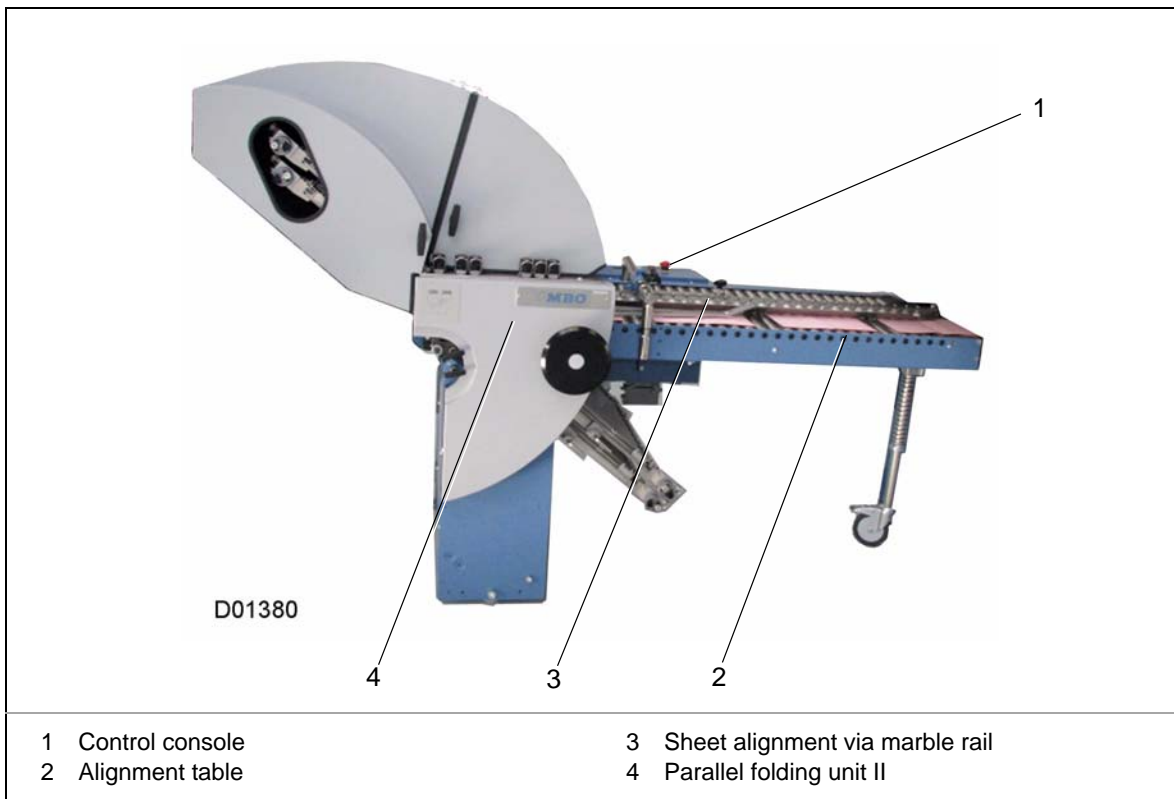


Figure 8: Overall view of folding unit II

Standard equipment

- Alignment table
- Sheet alignment via marble rail
- 4 stainless steel buckle plates with swing deflectors
- Through sheet stop in plate 1
- Belt drive system, low maintenance, quiet
- Spiral foldrollers with standard PU roller surface covering
- Slitter shafts, stainless, easily replaced with plug bearings.

3.2 Technical data

3.2.1 Floor plan, configuration 44(46X)

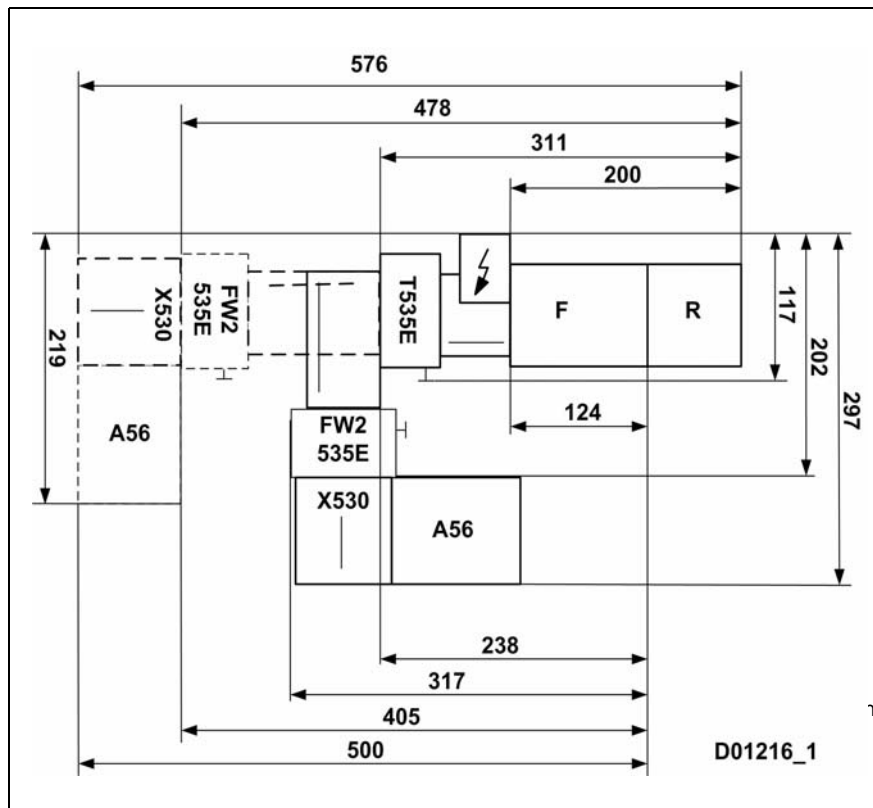


Figure 9: Floor plan T535 44X (46X)

3.2.2 Characteristics

Speed		Minimum	¹⁾ Maximum
	MS-Control	10 m/min	205 m/min
Sheet paper	Format (length x width)	Minimum	Maximum
	Infeed width		53 cm
	Grammage ²⁾	Minimum	Maximum
		50 g/m ²	250 g/m ² 1st fold 200 g/m ² 2nd fold 175 g/m ² 3rd fold
Buckle plates	Fold length	Minimum	Maximum
	Standard buckle plate 1+2	3.6 cm	55 cm
	Standard buckle plate 3-6	3.6 cm	47 cm
	Combi buckle plate 1+2	3.6 cm	50 cm
	Combi buckle plate 3-6	3.6 cm	42 cm
	Gatefold plate	3.6 cm	38.5 cm
Slitter shafts	Diameter:		30 mm
	Minimal cutting and perforation length	6.2 cm	
Foldrollers	Diameter:		39.7 mm

Table 8: Characteristics

- 1) The maximum work speed is influenced by paper properties, format, fold type, temperature, and humidity as well as various circumstances by the operator that the manufacturer cannot influence.
- 2) All values refer to simple volume paper.

3.2.3 Emissions

Airborne sound emission	Emission sound pressure level (L_{pA}) ¹⁾	Workstation at the register table	85.5 dB
		Workstation at the delivery	86.8 dB
	Sound power level (L_{WA}) ²⁾	-	104 dB

Table 9: Emissions

- 1) Noise measurement procedure according to EN 13023:2004
- 2) Determination of the sound power level according to EN ISO 3746:1995.

3.2.4 Weights, fork lifts, and floor requirements

Weight		Net	Gross ¹⁾
	Folding unit II 535/4 ²⁾	450 kg	1030 kg
	Folding unit II 535/6 ³⁾	500 kg	1080 kg
Dimensions			
	Shipping crate/pallet	215 x 120 x 125 (cm)	
Fork lift ⁴⁾			
	Carrying capacity / load (Q) ⁵⁾	Min. 1500 kg	
	Fork tine length	Min. 120 cm	
Floor requirements			
	Cargo ⁶⁾	> 11 kN/m ²	
	Levelness ⁷⁾	< 10 mm/m	

Table 10: Weights, fork lifts, and floor requirements

- 1) Machine with pallet/shipping crate + 50 kg
- 2) With noise damping hood and 4 buckle plates
- 3) With noise damping hood and 6 buckle plates
- 4) Minimum requirements of the fork lift
- 5) Observe the operating manual of the fork lift; load capacity depends on the load center (c)
- 6) Minimum carrying capacity of the floor in the installation location
- 7) In the area of the machine, the total height difference may not exceed 10 mm.

3.2.5 Supply



- The machine was designed for one of the nominal voltages listed below.
- Even under load, the actual supply voltage must not deviate from the nominal voltage by more than the permitted tolerance.

Power supply	Wiring diagram no.:		
Nominal voltage 3 x 400 V + N + PE ¹⁾	Required power system: ²⁾	TN - C - S - network TN - S - network	Clockwise rotating field required.
	Voltage:	400 V AC	+/-10 %
	Frequency:	50 Hz	+/-1 %
	Fuse: ³⁾	16 A	
Power ratings:	Folding unit 2	0.8 kW	

Table 11: Electrical supply 400 V power supply

1) If the existing nominal voltage deviates from the supply voltage specified above, an isolating transformer must be installed.

If the nominal voltage is 380 V or 415 V at 50 Hz, the tolerance of the power supply must be checked.

If the tolerance is between 360 V – 440 V, an isolating transformer is not required.

2) N - conductor is loaded; a ground fault circuit interrupter (GFCI) must not be used.

3) Maximum fuse protection of the supply cable at 400 V

Power supply	Wiring diagram no.:		
Nominal voltage 3 x 220 V + PE ¹⁾	Required network configuration ²⁾	TN - C - power mains	Clockwise rotating field required
	Voltage	220 V AC	+/-10 %
	Frequency	60 Hz	+/-1 %
	Fuse: ³⁾	16 A	
Power ratings:	Folding unit 2	0.8 kW	

Table 12: Electrical supply 220 V power supply

1) If the existing nominal voltage deviates from the supply voltage specified above, an isolating transformer must be installed.

If the nominal voltage is 210 V or 230 V at 60 Hz, the tolerance of the power supply must be checked.

If the tolerance is between 200 V – 240 V, an isolating transformer is not required.

2) A ground fault circuit interrupter (GFCI) must not be used.

3) Maximum fuse protection of the supply cable at 220 V

Compressed air supply		
Power ratings	Necessary network pressure:	-
	Average consumption: ¹⁾	-

Table 13: Compressed air supply

1) Required volume flow according to ISO 1217 or DIN 1945

3.2.6 Ambient conditions

Operating temperature:		17 – 35 °C
Storage temperature:		10 – 35 °C
Relative humidity	Optimal Minimum Maximum	40 - 60 % 30 % 80 % (non-condensing)
Installation altitude¹⁾		Max. 800 m over N. N.

Table 14: Ambient conditions

1) For installation at an altitude of 800 m above sea level or higher, special measures are necessary. Learn more about this from the manufacturer.

4 Structure and function

4.1 Introduction

4.1.1 What is folding?

Folding is to bend a prepared or unprepared bend location along a straight line with a sharp edge according to the defined measurements and a pre-determined pattern using pressure.

According to bookbinding terminology, the folding line is called fold.

4.1.2 Folding principles

Buckle folding principle:

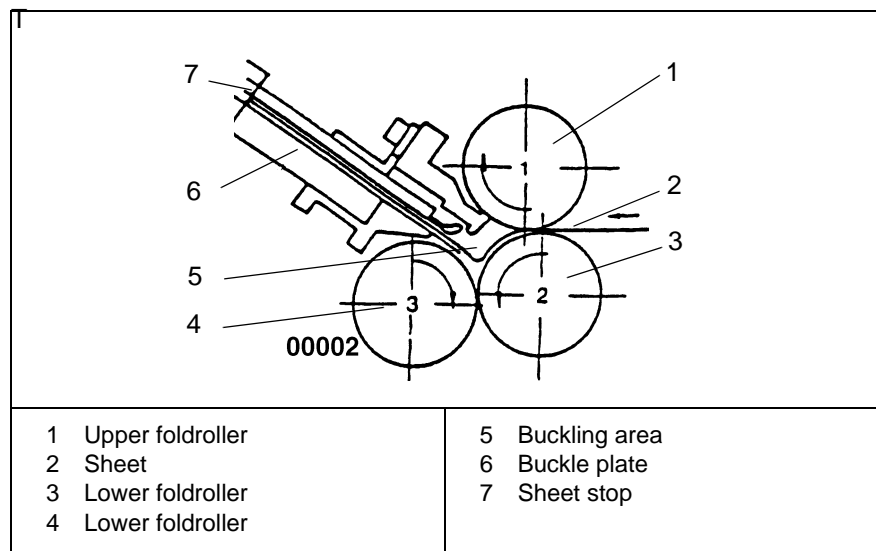


Figure 10: Buckle folding principle

To create a buckle fold, 3 foldrollers and a buckle plate are necessary.

- The foldrollers (1) and (3) transport the sheet of paper (2) into the buckle plate (6) up to the sheet stop (7).
- During further transport through the foldrollers (1) and (3) a buckle arises in the buckling area (5).
- The sheet of paper (2) is grasped on the buckle fold by the foldrollers (3) and (4) folded during its passage.

Knife folding principle:

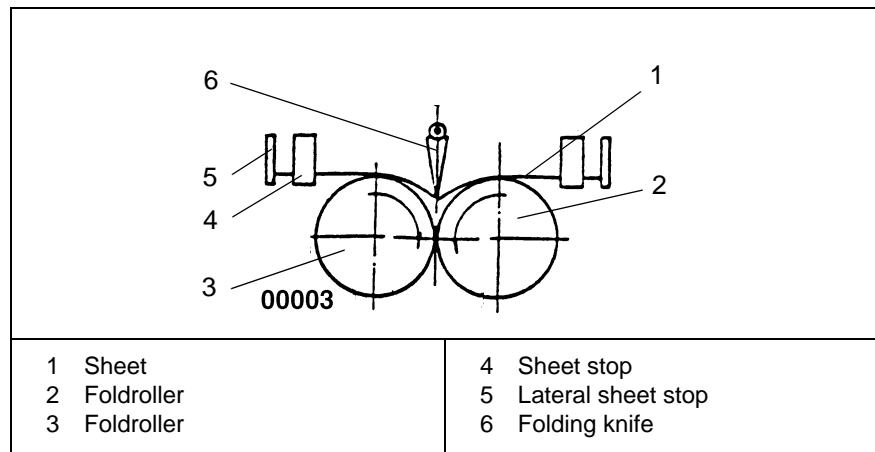


Figure 11: Knife folding principle

To create a knife fold, two foldrollers rotating in opposite directions and a folding knife that can be moved vertically are required.

- The sheet of paper (1) is transported under the folding knife (6) to the sheet stop (4) and aligned by the lateral sheet stop (5).
- After triggering the knife movement, the folding knife conveys (4) the sheet of paper (1) in the direction of the foldrollers (2) and (3).
- The sheet of paper (1) is grasped by the foldrollers (2) and (3) folded during its passage.

4.1.3 Buckle folding machine

Buckle folding machines operate exclusively according to the buckle fold principle.

This results in the following advantages:

- Great versatility of the machine
- Large number of fold variants
- Increasing of effective output.

Structure:

- Buckle folding machines are designed according to a modular system.
- Common configurations have two to four movable folding units that can be alternatively set into the cross fold or parallel fold position.
- Each folding unit has two to six buckle plates which are aligned upwards and downwards in alternation.
- For special jobs (e. g. folding maps), there are also folding stations with up to 12 buckle plates.
- All buckle plates can be closed or replaced via sheet deflectors, which means that there is no folding taking place at this location.
- The position of the fold is defined by adjusting the sheet stop.
- The foldroller distance, inner width, buckling area and stop angle are adjustable. They can be adapted according to the particular circumstances.

The sheet is transported between the folding units via:

- Corner-conveyor tables with inclined transport rollers and marble rails/ conical rails.
- The sheet is aligned by force on the side limit stop rails.

Delivery:

- After each folding unit.

Buckle folding machines can be used for:

- Book and booklet production
- Mailings, brochure folding and maps.

4.2 Structure

4.2.1 Overall view

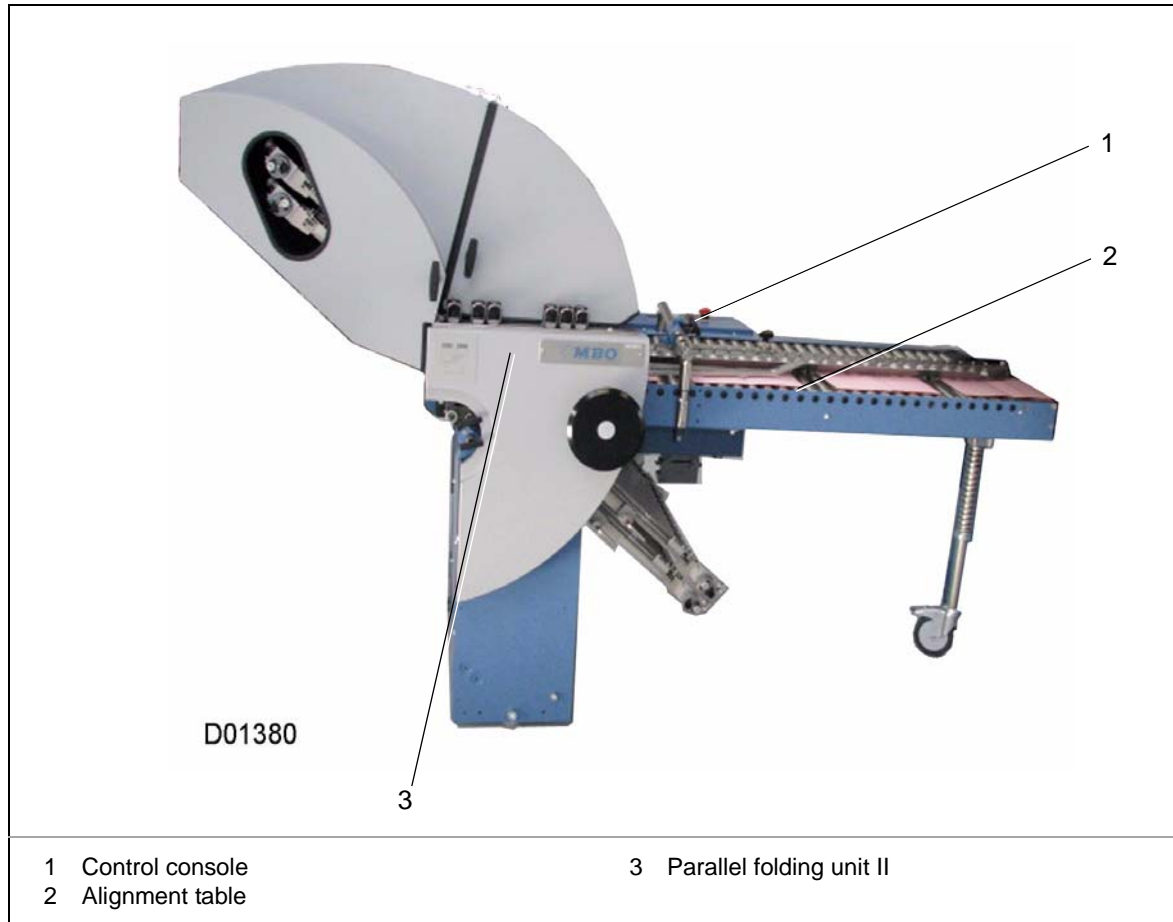


Figure 12: Overall view of folding unit II

4.2.2 Register table

Before infeed into the parallel fold, the sheet must be leveled out laterally. This takes place via rollers for register table, which align the sheet to a side-lay via a marble rail.

Various adjusting elements serve to adapt to the paper to be processed.

4.2.3 Parallel folding unit I and II

The parallel folding unit operates according to the buckle fold principle.

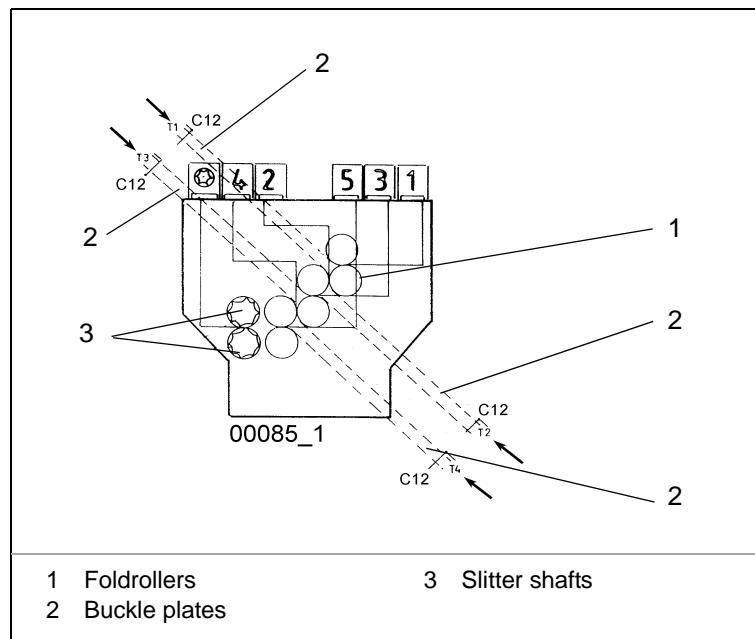


Figure 13: Overview of parallel folding unit I and II

The parallel folding unit alternatively has:

- 4 or 6 buckle plates with swing deflectors,
- Spiral foldrollers, adjustable via quick setting controls.
- Slitter shafts.

4.3 Models

From the combination:

- Folding unit I
- Folding unit II
- X folding unit

Result these variants:

- 44, 46, 64 and 64
- 44X, 46X, 64X and 64X

4.3.1 Variants 44, 64, 46 and 66

Explanation of term

The designation "T 535 E/44" means:	
T	Buckle folding machine
535	Designation of type
E	EFFICIENCY
4 (6)	Number of buckle plates of Folding unit I
4 (6)	Number of buckle plates of Folding unit II

Schematic depiction

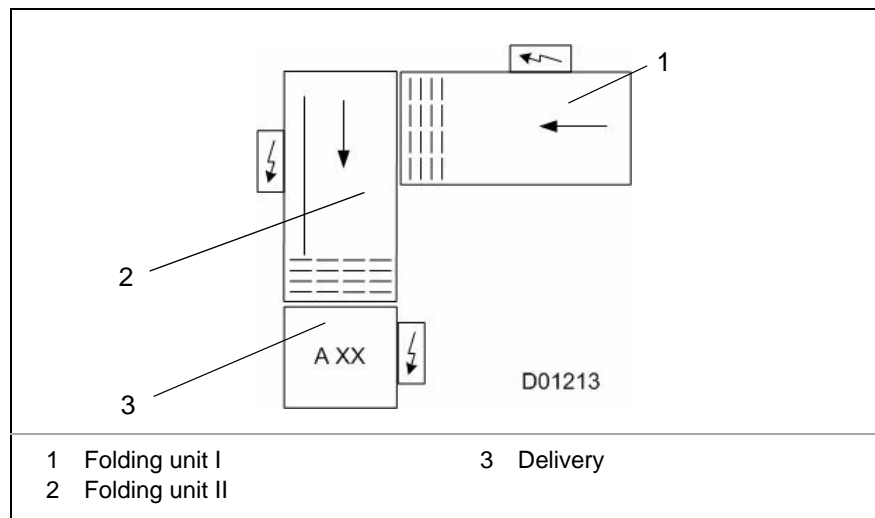


Figure 14: Variants 44, 64, 46 and 66

4.3.2 Variants 44X, 64X, 46X and 66X
Explanation of term

The designation "T 535 E/44X" means:	
T	Buckle folding machine
535	Designation of type
E	EFFICIENCY
4 (6)	Number of buckle plates of Folding unit I
4 (6)	Number of buckle plates of Folding unit II
X	X folding unit

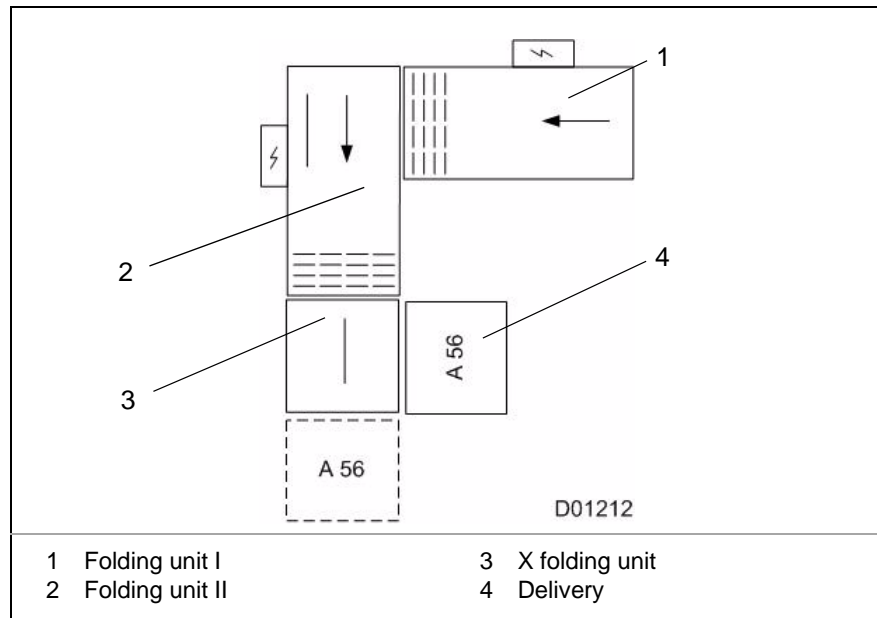
Schematic depiction


Figure 15: Variants 44X, 64X, 46X and 66X

5 Operating and display elements, operating modes

5.1 Control console

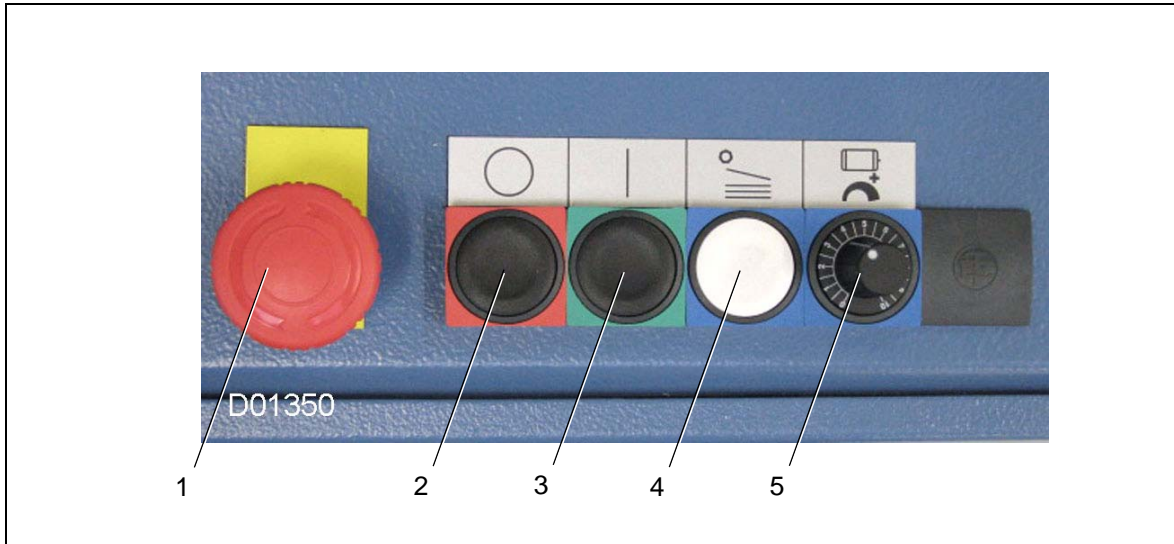


Figure 16: Control console

- 1 Palm button <EMERGENCY STOP>
- 2 <Stop machine> button
- 3 Button <Start machine>
- 4 <Production sheet infeed> button
- 5 Potentiometer <Speed setting>

5.1.1 Operating

See Chapter "7.2 Operating"

5.2 Operating modes



WARNING!

Danger from incorrect use of the sockets.

Non-observance may cause serious injuries or even death.

- The machine sockets of the MBO machines may be used exclusively for the connection of MBO folding units, units or deliveries.
- The 230 VAC sockets of the MBO machines may be used exclusively for connecting auxiliary devices intended for this purpose, such as gluing devices.
- All sockets (400 VAC and 230 VAC sockets) of the MBO machines must be monitored at all times according to the corresponding federal and local codes, guidelines and other regulations.



CAUTION!

Danger of tripping on cables lying about.

Non-observance may cause personal injuries and damage to property.

- Lay the machine connections (cables, hoses, pipes) so that they do not form any stumbling blocks.
 - For folding units that are not in use, place the cable on the hook.
-

5.2.1 Machine controller operating mode

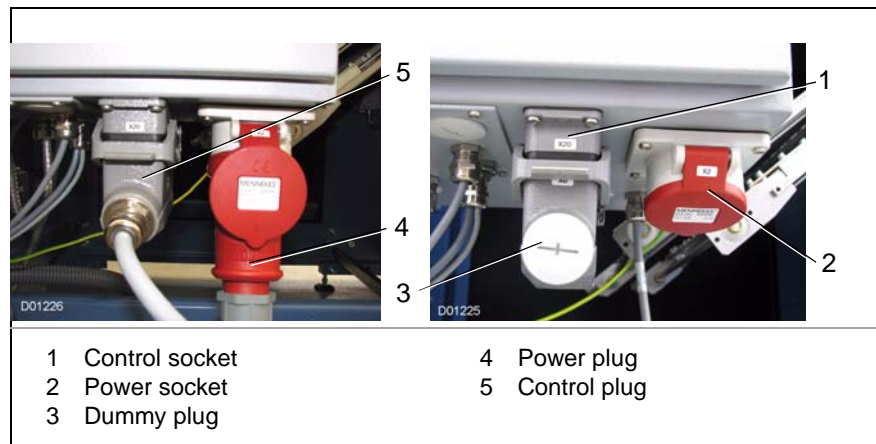


Figure 17: Connection to folding unit I

Connection to folding unit I:

Procedure:

- ▷ Plug the power plug (4) of folding unit II into the power socket (2) of folding unit I.
- ▷ Plug the control plug (5) of folding unit II into the control socket (1) of folding unit I.

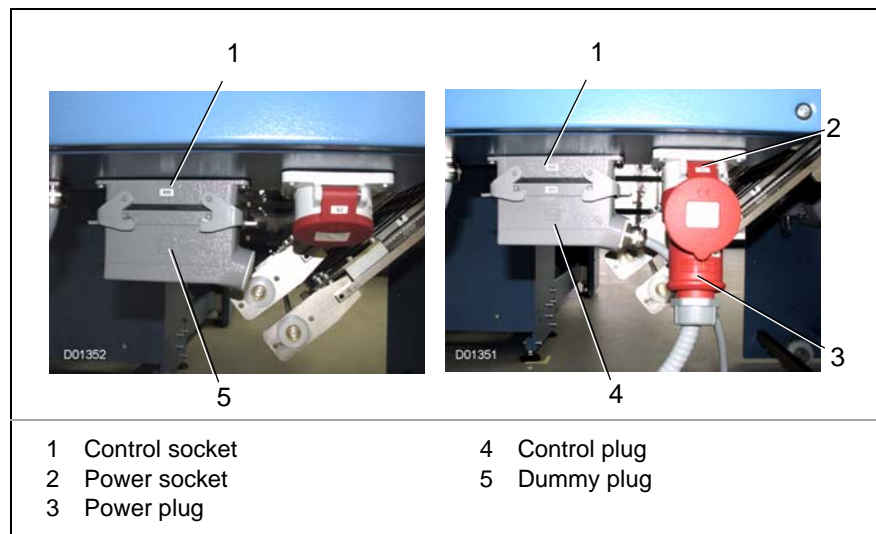


Figure 18: Connecting subsequent folding units or deliveries

Connecting subsequent folding units or deliveries:

Procedure:

- ▷ Plug the power plug (3) of the subsequent folding unit into the power socket (2) of folding unit II.
- ▷ Plug the control plug (4) of the subsequent folding unit into the control socket (1) of folding unit II.

Working without subsequent folding unit or delivery:

Procedure:

- ▷ Plug the dummy plug (5) into the control socket (1) of folding unit II.

5.2.2 Self-control operating mode (optional)

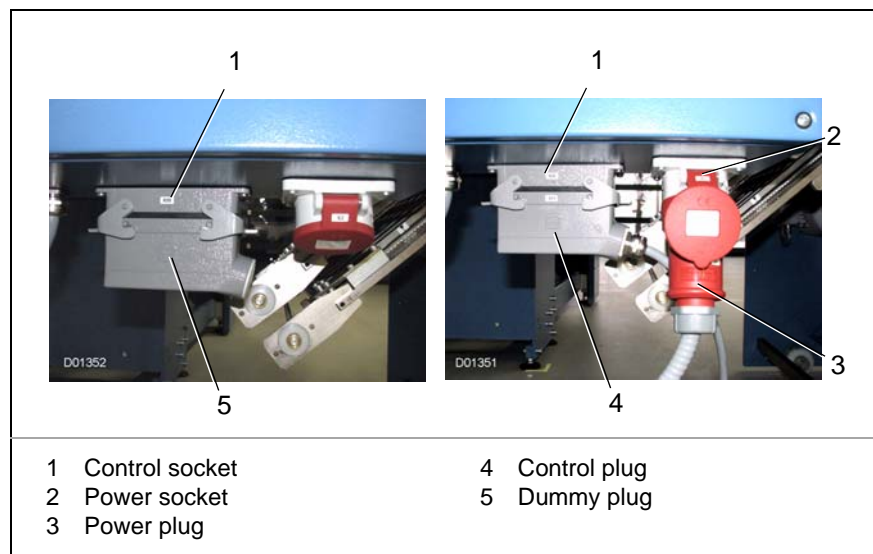


Figure 19: Connecting subsequent folding units or deliveries

Connecting subsequent folding units

Procedure:

- ▷ Plug the power plug (4) of the subsequent folding unit into the power socket (2) of folding unit I.
- ▷ Plug the control plug (5) of the subsequent folding unit into the control socket (1) of folding unit I.

Working without subsequent folding unit or delivery:

Procedure:

- ▷ Plug the dummy plug (3) into the control socket (1) of folding unit I.

5.2.3 Adapter box operating mode

**WARNING!**

Danger through using several adapter boxes in one machine assembly.

Non-observance may possibly cause serious personal injuries or even death

Use a maximum of one **adapter box** per machine assembly for technical safety reasons.

It is possible to connect subsequent MBO folding units with different control systems into one machine assembly. This requires corresponding adapter boxes.

Which adapter boxes to use can be learned from MBO service or the authorized customer service.



Use a maximum of one **adapter box** per machine assembly for technical safety reasons.

Make exceptions exclusively after consulting MBO-Elektrokonstruktion.

6 Transport/Installation/Initial operation

6.1 Introduction

6.1.1 Qualification of personnel

This table lists the necessary qualification of the personnel related to "Transport and interim storage" of the machine.

	Specially trained personnel	Instructed operating personnel	Instructed personnel with specialized training (mechanical/electrical engineering)
Transportation	X	-	-
Interim storage	X	-	-
Installation	-	-	X
Electrical connections	-	-	X
Network connection	-	-	X
Starting up	-	-	X

Table 15: Qualification of personnel; Transport, interim storage
Legend: X permitted, - not permitted

6.1.2 Safety instructions



DANGER!

Danger due to dangerous electrical voltage.

Non-observance may cause serious injuries or even death.

- Work on the electric components of the machine may only be performed by a qualified electrician.
- Observe the local occupational safety regulations and electrotechnical regulations.
- There is dangerous electric residual voltage on the supply terminals of the frequency inverter even when the main switch is switched off. (Observe the capacitor discharge time (KEB 5 min, Telemecanique 15 min)).



WARNING

Danger due to incorrect power supply voltage.

Non-observance may cause severe property damage.

- If the existing nominal voltage deviates from the details on the label, wiring diagram, and "the "Technical data" in the operating manual, an isolating transformer must be used.
- You can get the necessary information from the manufacturer.



WARNING!

Danger due to the use of unsuitable fork lifts.

Non-observance may possibly cause serious personal injuries and damage to property.

- When selecting a fork lift, observe the relevant data such as load-bearing capacity, load center of gravity, width of forklift carrier and length of forks.
- For details about the minimum requirements, please see the "Technical data" chapter.



WARNING!

Danger of parts falling over during unloading and installation.

Non-observance may possibly cause serious personal injuries and damage to property.

- Use a fork lift for transportation.
- Make sure that additional personnel are available to assist if required during the unloading and installation process. Certain parts of the machine must additionally be supported and secured.



WARNING!

Danger due to insufficient properties and condition of the under-floor.

Non-observance may cause serious personal injuries and damage to property.

Check the properties and condition and carrying capacity of the under-floor in the installation location.

For the necessary minimum requirements, see "Specifications" chapter.

6.2 Brief instructions

The folding unit II is transported, installed, and put into operation in these work steps:

- Transporting folding unit II.
See Chapter "6.3 Transporting folding unit II"
- Unpacking folding unit II.
See Chapter "6.4.1 Unpacking folding unit II"
- Installing folding unit II.
See Chapter "6.4.2 Installing folding unit II."
- Completing folding unit II.
See Chapter "6.4.3 Completing folding unit II"
- Remove the rust preventing agents.
See Chapter "6.5 Removing the rust preventing agents"
- Make the electrical connection.
See Chapter "6.6 Electric connection"
- Carrying out initial operation.
See Chapter "6.7 Starting up"
- Carrying out inspection after initial operation.
See Chapter "6.9 Inspection after first start-up"

6.3 Transporting folding unit II



WARNING!

Danger due to the use of unsuitable fork lifts.

Non-observance may possibly cause serious personal injuries and damage to property.

- When selecting a fork lift, observe the relevant data such as load-bearing capacity, load center of gravity, width of forklift carrier and length of forks.
- For details about the minimum requirements, please see the "Technical data" chapter.

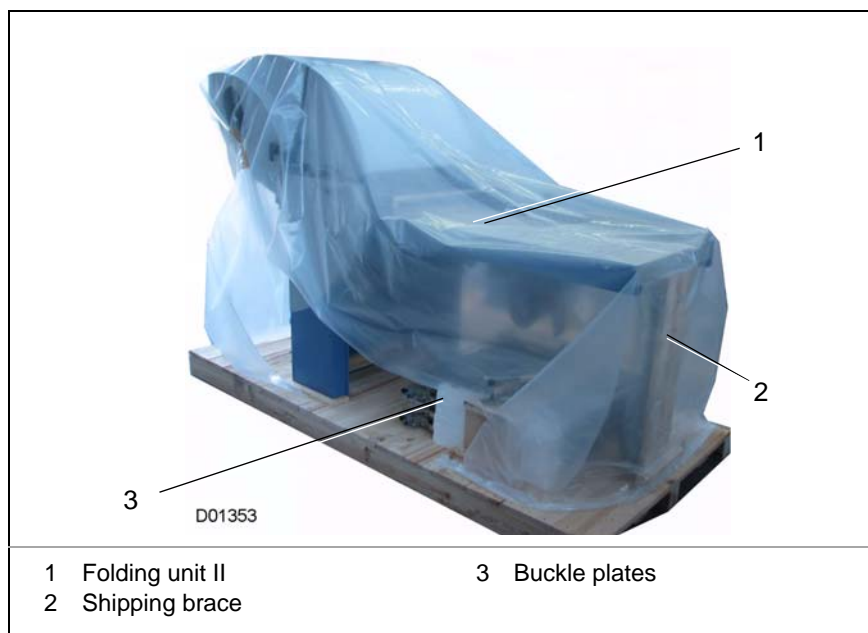


Figure 20: Transportation

Procedure:

- ▷ Use a suitable fork lift. (For requirements, see Chapter "3.2.4 Weights, fork lifts, and floor requirements")
- ▷ Lift the pallet with folding unit II only as much as is absolutely necessary for the transport.
- ▷ Transport the pallet as close as possible to the intended location.
- ▷ Lower the pallet carefully.

6.4 Installing folding unit II



WARNING!

Danger due to insufficient properties and condition of the under-floor.

Non-observance may cause serious personal injuries and damage to property.

Check the properties and condition and carrying capacity of the under-floor in the installation location.

For the necessary minimum requirements, see "Specifications" chapter.



CAUTION!

Danger due to improper alignment of the machine components.

Disregard can lead to serious damage to property

When aligning the machine components, be sure to adhere to the details specified by the manufacturer.

6.4.1 Unpacking folding unit II

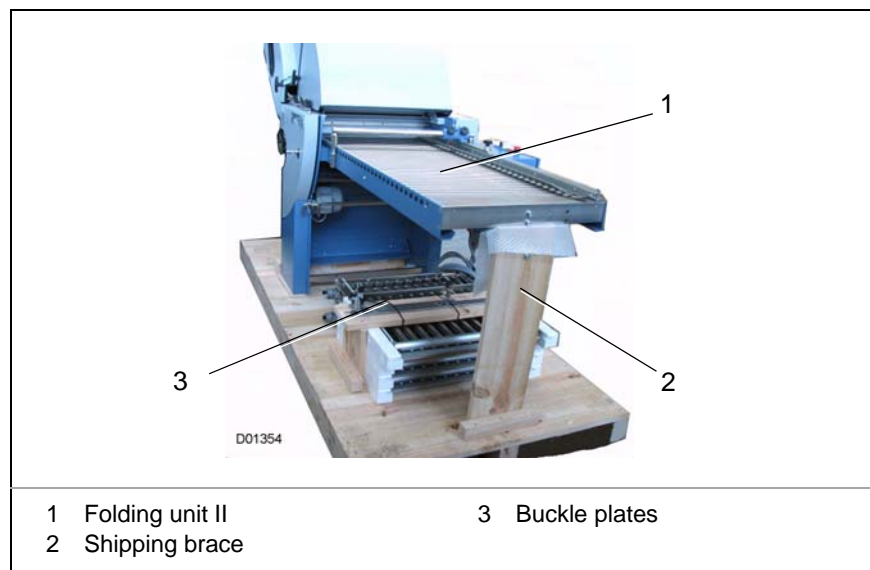


Figure 21: Unpacking

Procedure:

- ▷ Remove the packaging material from folding unit II.
- ▷ Dispose of the packing material in an environmentally friendly manner.
- ▷ Unpack the buckle plates (3) and store them properly.
- ▷ Remove the screws that fasten folding unit II to the pallet.
- ▷ Remove the transport brackets.
- ▷ Remove the shipping brace (2) that fasten the folding unit to the pallet.

6.4.2 Installing folding unit II.

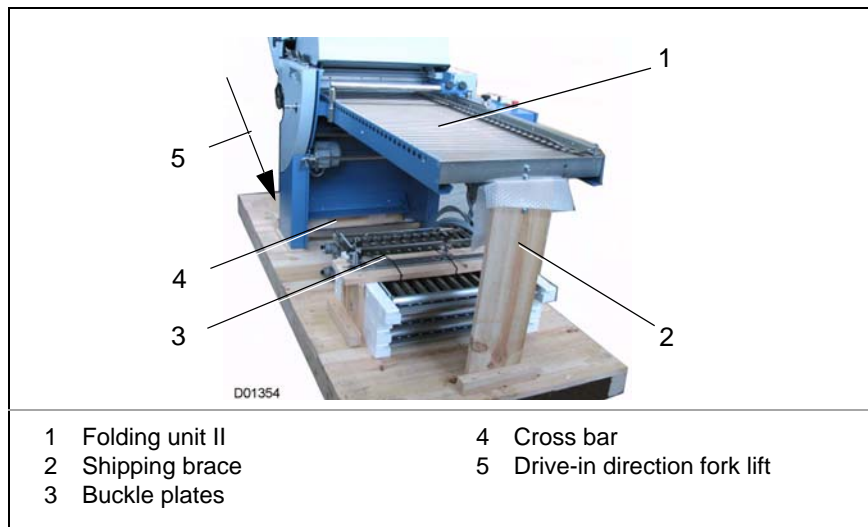


Figure 22: Unpacking

Procedure:

- ▷ Use a suitable fork lift. (For requirements, see Chapter "3.2.4 Weights, fork lifts, and floor requirements")
- ▷ Drive the fork lift under the cross bar (4). (See the drive-in direction for the fork lift (5).)
- ▷ Secure folding unit II against tipping.
- ▷ Carefully lift folding unit II using the fork lift.
- ▷ Have at least two persons lift the alignment table.
- ▷ Remove the pallet.
- ▷ Carefully lower folding unit II.
- ▷ Transport folding unit II carefully to the intended location.

6.4.3 Completing folding unit II

Folding unit II is delivered in assembled form.

All that remains to be done is to assemble the buckle plates, smoother bars and options such as the slitting device etc.

6.4.3.1 Inserting the buckle plates

Procedure:

- ▷ Insert the buckle plates in their corresponding position.
See Chapter "7.8.1 Buckle plate positions"

6.4.3.2 Equipping the marble rail

See Chapter "7.6.2 Equipping the marble rail"

6.4.3.3 Inserting the smoother bars

See Chapter "7.6.3 Inserting the smoother bars"

6.5 Removing the rust preventing agents

After installing the machine, clean all machine parts thoroughly to remove the rust preventing agents.

Heed the cleaning agent recommendation in the following table and the detailed instructions for the roller cleaner "Varn" in the "Cleaning" chapter.

Part of machine	Cleansing agent
Lacquered surfaces	Solvent-free cleansing agent
Foldrollers	"Varn-Wash VM 111". Refer also to the "Cleaning" chapter.
Unpainted plates	Degreaser of your choice

Table 16: Cleaning recommendation

6.6 Electric connection

The folding unit II does not require any electrical work.



DANGER!

Danger due to dangerous electrical voltage.

Non-observance may cause serious injuries or even death.

- Work on the electric components of the machine may only be performed by a qualified electrician.
- Observe the local occupational safety regulations and electrotechnical regulations.
- There is dangerous electric residual voltage on the supply terminals of the frequency inverter even when the main switch is switched off. (Observe the capacitor discharge time (KEB 5 min, Telemecanique 15 min)).

6.6.1 Power supply prerequisites



WARNING!

Danger due to incorrect power supply voltage.

Non-observance may cause severe property damage.

- If the existing nominal voltage deviates from the details on the label, wiring diagram, and "the "Technical data" in the operating manual, an isolating transformer must be used.
- You can get the necessary information from the manufacturer.

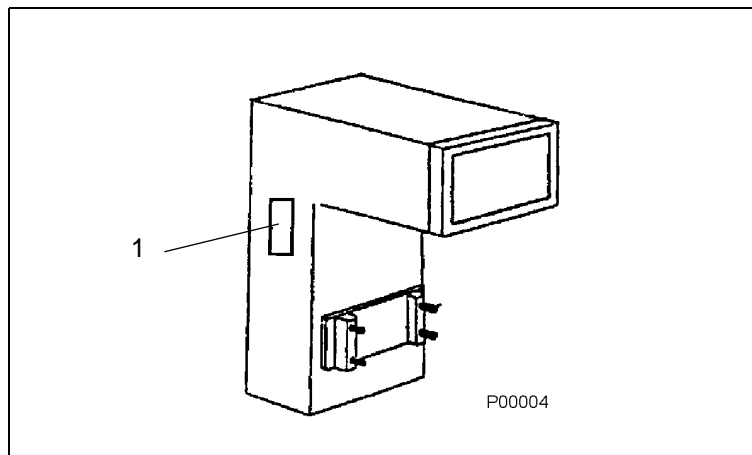


Figure 23: Label

Observe the following power supply prerequisites:

- A TN-S power system or TN-C-S power system is mandatory as the power supply.
- Voltage, frequency, cable cross-section and fuse protection must comply with the specifications on the label (1), wiring diagram, and "Specifications" of the operating manual.
- The N - conductor is loaded.

- No ground fault circuit interrupter (GFCI) or voltage fluctuation relays may be used. (Problems with radio frequency interference filters, EMC)
- A right rotating field is absolutely necessary.

6.6.2 Electrical connections between the folding units

See Chapter "5.2 Operating modes"

6.7 Starting up



DANGER!

Danger due to dangerous electrical voltage.

Non-observance may cause serious injuries or even death.

- Work on the electric components of the machine may only be performed by a qualified electrician.
 - Observe the local occupational safety regulations and electrotechnical regulations.
 - There is dangerous electric residual voltage on the supply terminals of the frequency inverter even when the main switch is switched off. (Observe the capacitor discharge time (KEB 5 min, Telemecanique 15 min)).
-

6.7.1 Brief instructions

- Check the supply voltage.
See Chapter "6.7.2 Check the supply voltage."
- Check rotating field of the power socket.
See Chapter "6.7.3 Check rotating field of the power socket."
- Checking machine functions
See Chapter "6.7.5 Checking machine functions"

6.7.2 Check the supply voltage.



CAUTION

Danger due to incorrect power supply voltage.

Non-observance may cause severe property damage.

- If the existing nominal voltage deviates from the details on the label, wiring diagram, and "the "Technical data" in the operating manual, an isolating transformer must be used.
- You can get the necessary information from the manufacturer.

Procedure:

- ▷ First check that the correct supply voltage is present.
See Chapter "6.6.1 Power supply prerequisites".
See Chapter "3.2.5 Supply"
- ▷ Only then plug the power plug into the preceding folding unit.

6.7.3 Check rotating field of the power socket.

Procedure:

- ▷ Using a rotating field device, check to ensure that a right rotating field is present at the power socket of folding unit II.



- If there is no right rotating field, during connection of a subsequent folding unit with AC drive, its rotation direction is incorrect.
- Check that a right rotating field is present at the power socket of the preceding folding unit.

6.7.4 Checking the control cabinet cover

Check that the covers on all control cabinets are grounded and closed according to regulations.

Procedure:

- ▷ Check this by visual inspection.

6.7.5 Checking machine functions

Procedure:

- ▷ Check the complete machine function by setting up a customer job/test job.

6.8 Final check of the protective devices

After installing the machine, be absolutely certain to carry out a final check of the protective devices.

Procedure:

- ▷ Check that all covers and safety and protective devices are installed and fully functional.

For this purpose, use the checklist for the safety and protective devices. See Chapter "2.12.8 Checklist for safety and protective devices".

6.9 Inspection after first start-up

20 operating hours after the initial start-up, it is necessary to check all belts and tapes.

Procedure:

- ▷ Check the belts and tapes on correct center running and on correct tension.

If required, readjust these.

See Service/Maintenance schedule chapter.

7 Adjustment and operation

7.1 Introduction

For the operation of the machine, also observe:

- The safety instructions.
See Chapter "7.1.2 Safety instructions".
- The intended use.
See Chapter "2.1 Intended use"
- Qualification of the operating personnel.
See Chapter "7.1.1 Qualification of personnel".

7.1.1 Qualification of personnel

This table lists the necessary qualification of the personnel related to "Adjustment and operation" of the machine.

	Specially trained personnel	Instructed operating personnel	Instructed personnel with specialized training (mechanical/electrical engineering)
Installation, retrofiting	X	X	-
Operating	-	X	-

Table 17: Qualification of personnel, adjustment and operation
Legend: X permitted, - not permitted

7.1.2 Safety instructions

**DANGER!**

Danger when dismantling, bridging or avoiding safety and protective devices.

Non-observance may cause serious injuries or even death.

- No safety or protective devices of the machine may be dismantled, bridged or avoided.
- Using the checklist for protective equipment and safety devices, check that all protective devices are on the machine.
- Report any audible/visible safety-relevant change to the machine to the person responsible for the system in your operation.

**WARNING!**

Danger from automatic lowering of the open noise damping hood induced by a pressure drop of the pneumatic springs.

Non-observance may possibly cause severe or fatal injuries due to squeezing of body parts.

You can recognize a pressure loss of the pneumatic springs as follows: Noise damping hood lowers itself automatically from the opened position.

- Check the pneumatic springs after each production / daily to ensure they are functioning properly
- Replace the pneumatic springs immediately if there are any signs of pressure loss.
- When opening the noise damping hood, make sure to open it all the way to the limit stop.

**WARNING!**

Danger due to rotating machine element

Non-observance may possibly cause serious personal injuries or even death

- Make sure that you always tie back your hair and keep it protected.
- Remove your jewelry during operation and maintenance of the machine.
- Make sure of wearing only close fitting clothes while you operate or maintain the machine.

**WARNING!**

Danger due to rotating machine element

Non-observance may possibly cause serious personal injuries and damage to property.

With sudden machine stops and before you reconnect the machine, make sure that:

- That there is no other person on the machine.
- The machine is working perfectly.

**WARNING!**

Danger due to slitter shafts.

The built-in knives are very sharp!

Non-observance may possibly cause serious personal injuries or even death



- For all work with the slitter shafts, wear cut-proof safety gloves and safety shoes.



- The slitter shafts may only be mounted/dismantled when the machine is stopped and secured against switching on.
- Always hold the slitter shafts at the shaft and not at the tool.

**WARNING!**

Danger due to slitter shafts.

Non-observance may possibly cause serious personal injuries or even death

Even when closed, the slitter shaft guard does not provide 100% protection against the sharp knives touching the slitter shafts.

Never reach into the slitter shafts while the machine is running!

**WARNING!**

Danger from incorrect handling of the safety handwheels.

Non-observance may cause severe personal injuries.

- Turn the safety handwheel only when the machine is not moving.
- Press the EMERGENCY STOP palm button.
- Operate the machine with safety handwheels only (otherwise, there is a danger of being drawn in).

**WARNING!**

Danger from incorrect use of the sockets.

Non-observance may cause serious injuries or even death.

- The machine sockets of the MBO machines may be used exclusively for the connection of MBO folding units, units or deliveries.
- The 230 VAC sockets of the MBO machines may be used exclusively for connecting auxiliary devices intended for this purpose, such as gluing devices.
- All sockets (400 VAC and 230 VAC sockets) of the MBO machines must be monitored at all times according to the corresponding federal and local codes, guidelines and other regulations.



CAUTION!

Danger when lifting heavy machine parts (buckle plates, slitter shafts, etc.)

Non-observance may cause personal injuries and damage to property.



To lift heavy machine parts such as buckle plates, slitter shafts, etc., request the help of another person or people.



CAUTION!

Danger due to acoustic pressure

Non-observance may cause hearing problems.

- Always wear hearing protection whenever you work at or on the machine.
- Always close the noise damping hoods whenever you work at or on the machine.



CAUTION!

Danger due to paper jam.

The machine may be restarted only after removing the paper jam.

Non-observance may damage/destroy the drive belts.

When removing the paper jam, turn the machine using the safety hand-wheel only.

7.2 Operating

7.2.1 EMERGENCY STOP palm button

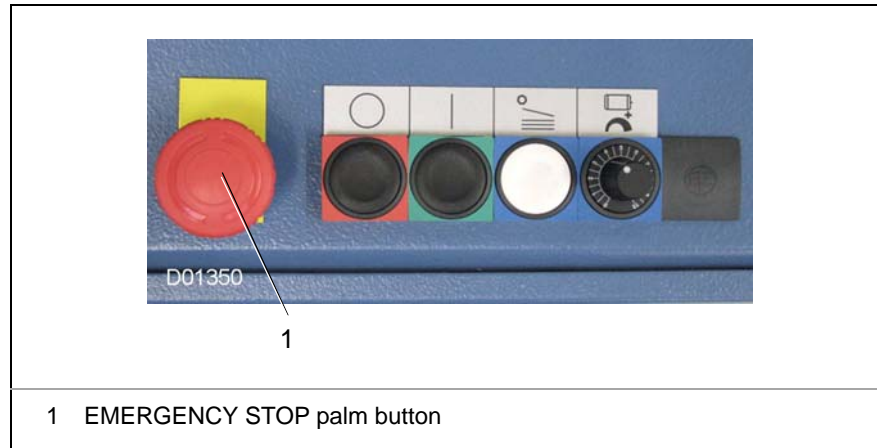


Figure 24: EMERGENCY STOP palm button



To prevent immediate or potential hazards, the machine is equipped with an EMERGENCY STOP shut-off device. After the <EMERGENCY STOP> palm button is pressed, all electrical drives are switched off. EMERGENCY STOP does not disconnect the machine from the electrical supply.

The machine is in operation.

There is a dangerous situation and the machine must be stopped quickly.

Procedure:

- ▷ Press the EMERGENCY STOP palm button (1).
- ▷ Eliminate the failure.
 - Ensure that in this situation, the machine is not switched on again accidentally.
- ▷ Disengage the EMERGENCY STOP palm button by turning it towards the right.
 - The machine is ready for operation.



When the EMERGENCY STOP palm button is pressed, the machine is stopped immediately. No emptying of the sheets takes place!

7.2.2 Starting/stopping the machine

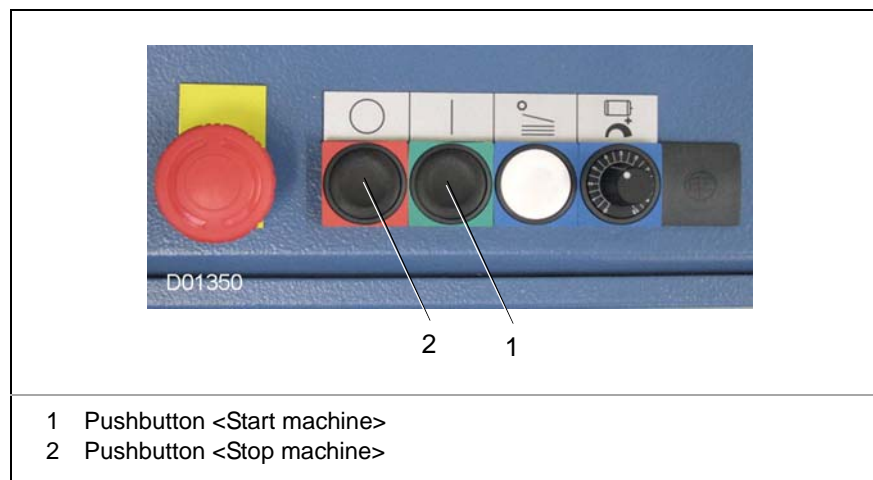


Figure 25: Starting/stopping the machine

- Starting the machine:** Procedure:
▷ Press the <Start machine> pushbutton (1).
- Stopping the machine:** Procedure:
▷ Press the <Stop machine> pushbutton (2).

7.2.3 Starting/stopping the sheet feed

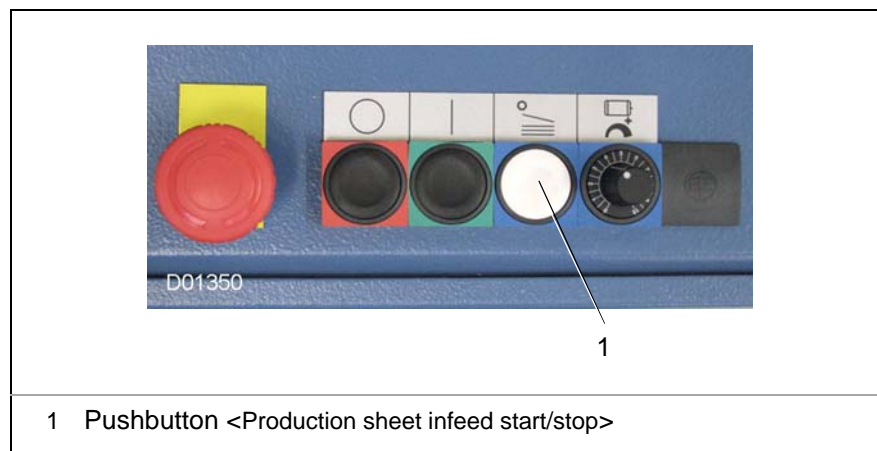


Figure 26: Starting/stopping the sheet feed



Before the sheet feed is started, the air supply must be switched on at folding unit I.

Starting production:

Procedure:

- ▷ Press the <Production sheet infeed start/stop> pushbutton (2). Sheets are fed continuously.

Stopping production:

Procedure:

- ▷ Press the <Production sheet infeed start/stop> pushbutton (2) again. The sheet feed stops.

7.2.4 Setting the speed

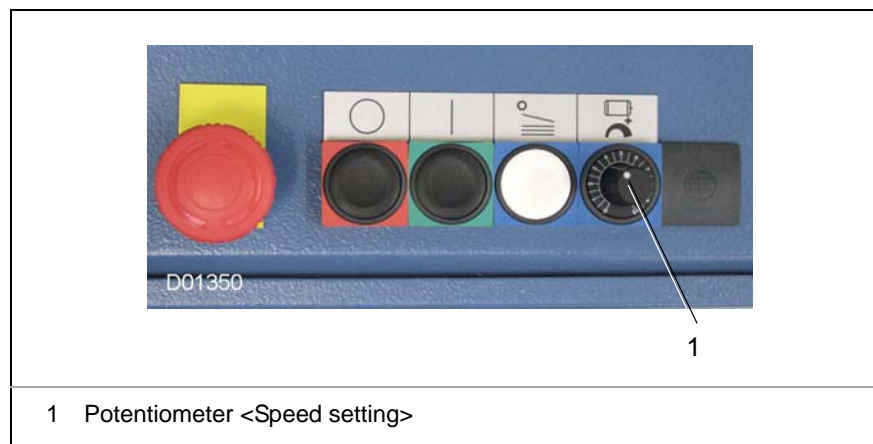


Figure 27: Speed setting

Adjustment: Setting the desired work speed on the control console of folding unit II.

Procedure:

- ▷ Start the folding unit.
- ▷ Increasing the speed:
 - Turn the potentiometer (1) clockwise until the desired speed is reached.
- ▷ Decreasing the speed:
 - Turn the potentiometer (1) counterclockwise until the desired speed is reached.

Setting the speed of all folding units: The folding units must have their speed set locally at each control console using a potentiometer.



Adjust the speed according to the:

- Type of fold
- Paper quality
- Speed of the preceding folding unit.

7.3 Brief instructions for adjusting the folding unit

Folding unit II is adjusted in these work steps:

- Positioning folding unit II.
See Chapter "7.4 Positioning folding unit II"
- Electrical connection between the folding units.
See Chapter "5.2 Operating modes"
- Adjusting the alignment table.
See Chapter "7.6 Adjusting the alignment table"
- Adjusting the parallel fold.
See Chapter "7.7 Adjusting the parallel fold"
- Placing the slitters on the slitter shafts.
See Chapter "7.9 Placing the slitters on the slitter shafts"
- Adjusting the options.
See Chapter "7.10 Options"
- Paying attention to error messages.
See Chapter "7.11 Error messages"
- Removing the paper jam.
See Chapter "7.12 Removing the paper jam"

7.4 Positioning folding unit II

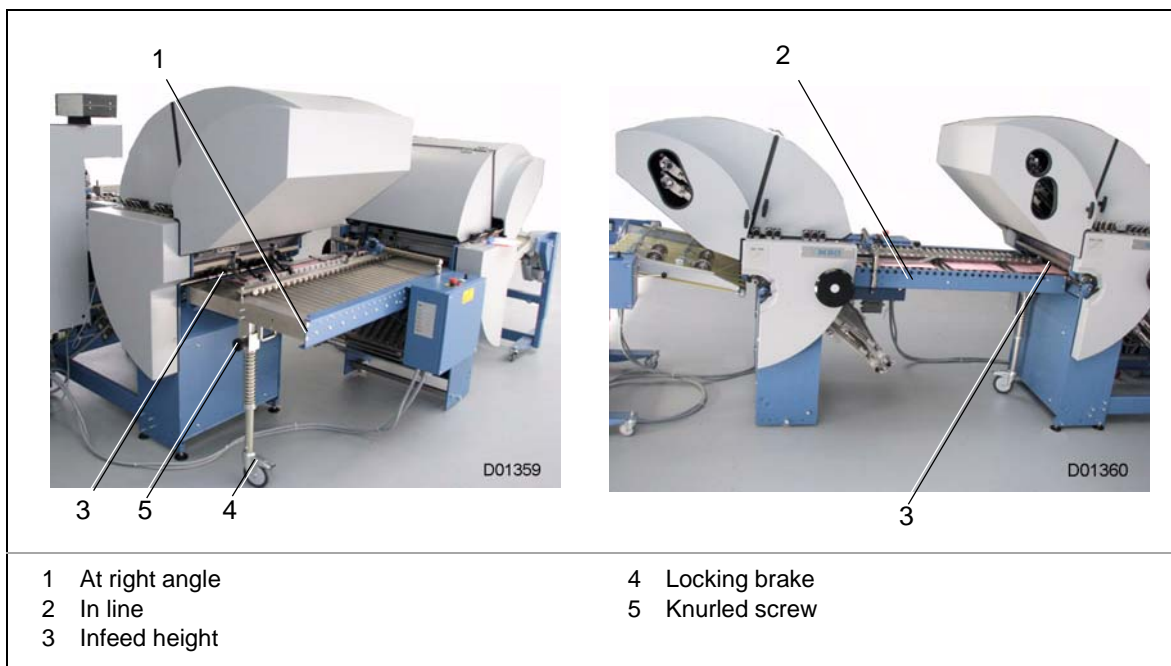


Figure 28: Arranging folding unit II

At a right angle (1): For most types of fold, the folding units are arranged at a right angle (1) to each other.

In line (2): For types of fold for which the number of buckles of folding unit I is not sufficient, folding unit II can be placed in line (2) behind folding unit I.



For this installation variant, carry out as few folds as possible in folding unit I and as many folds as possible in folding unit II. The speeds of both folding units should be identical.

Procedure

- ▷ Move folding unit II into position.
- ▷ Engage the locking brake (4).
- ▷ Loosen the knurled screw (5).
- ▷ Adjust the correct transfer height of the infeed (3) to the preceding folding unit.
- ▷ Re-tighten the knurled screw (5).
- ▷ After connecting the electrical connection, use a test run to check the adjusted transfer height.

7.5 Electrical connection between the folding units

See Chapter "5.2 Operating modes"

7.6 Adjusting the alignment table

The alignment table aligns incoming paper sheets right-aligned through the angular position of the transport rolls.

7.6.1 Sheet size adjustments

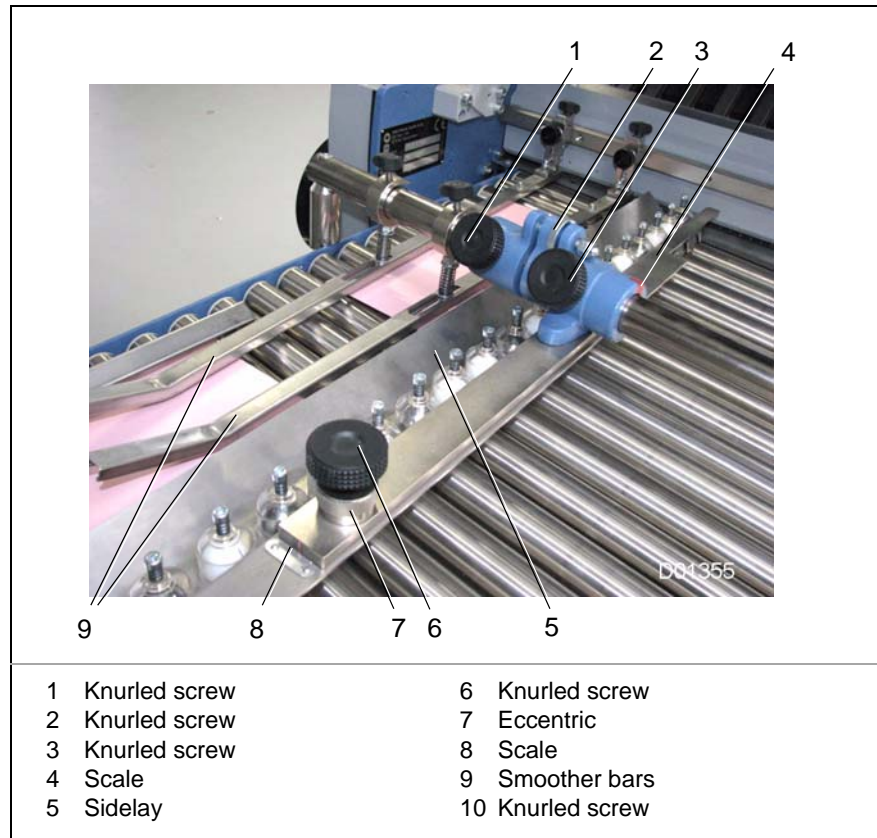


Figure 29: Register table

Adjusting sidelay: Procedure:

- ▷ Remove the smoother bars (9), which get in the way during adjustment.
- ▷ Loosen the knurled screws (1 + 3).
- ▷ Adjust the sidelay (5) to the exit sheet length of folding unit I using the scale (4).
- ▷ Tighten the knurled screws (1 + 3).



The sheets should run as close as possible along the lateral edge of the alignment table.

Carrying out precise adjustment:

Procedure:

- ▷ Loosen the knurled screw (3).
- ▷ Carry out precise adjustment by turning the knurled screw (2).

Clockwise direction of rotation (+):

The sidelay is shifted parallel to the drive side.

Counterclockwise direction of rotation (-):

The sidelay is shifted parallel to the operator side.

Basic setting of the angle:

Procedure:

- ▷ Loosen the knurled screw (6).
- ▷ Adjust the eccentric (7) so that the mark (8) points to zero.
- ▷ Tighten the knurled screw (6).

Adjustment for tilt of the fold:

Procedure:

- ▷ Loosen the knurled screw (6).
- ▷ Adjust the eccentric (7) using the scale (8) according to the tilt of the fold.
- ▷ Tighten the knurled screw (6).
- ▷ Check the fold.
- ▷ Correct if necessary.

7.6.2 Equipping the marble rail

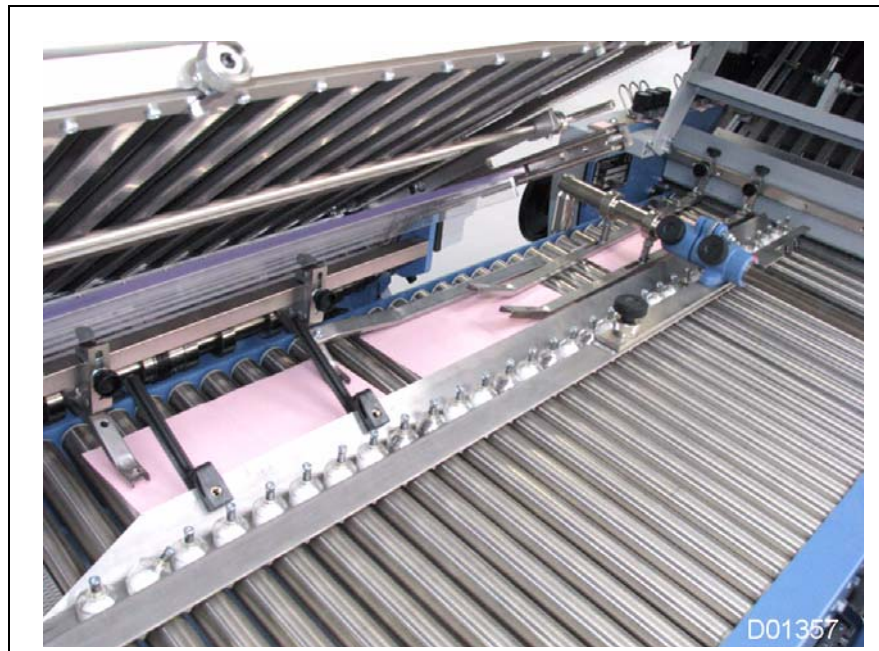


Figure 30: Equipping the marble rail

To align the sheets with the stop rail accurately, the marble rail must be equipped with plastic or steel balls.
The choice and number of balls to be used depends on the paper quality.

Selecting the ball type:

Lightweight paper = plastic balls and/or fewer balls
Heavy paper = steel balls and/or more balls

Checking the alignment:

You can check the correct alignment of the sheet:

- At the end of the sidelay
- By the folding results

überprüft werden.

Procedure:

- If the sheets run accurately along the sidelay:
The equipment of the marble rail is OK.
- If the sheets run away from the sidelay:
Too few balls or steel balls.
- If the sheets run up along the sidelay:
Too many balls or steel balls.

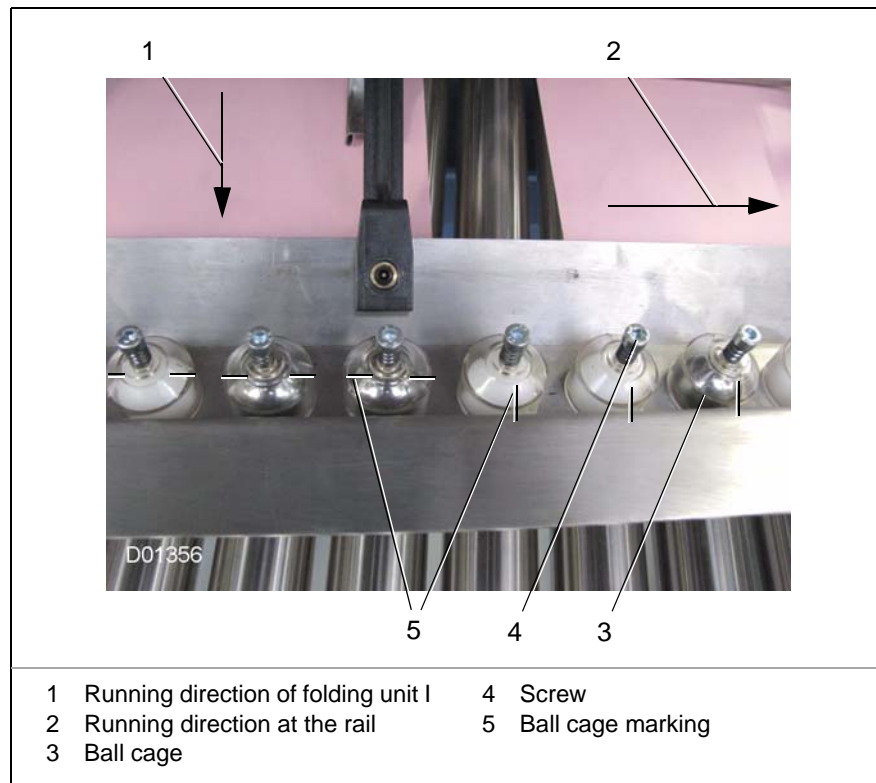


Figure 31: Leveling out the ball cages

Leveling out the ball cages:

When clipped, the ball cages (3) below the rail protrude slightly. This can influence the sheet transport.

Therefore, each ball cage (3) has two markings in the upper area (4). The ball cages (3) have to be aligned based on these marks (4).

Procedure:

- ▷ Rotate the ball cages (3) such that the markings (5) are always perpendicular to the running direction of the sheets (1 + 2).

Adjusting the ball cages to the product thickness:

There is a screw (4) on the ball cages (3).

Using this screw (4), the raceway (in which the balls move) can be adjusted to the product thickness.

Procedure:

- ▷ Turn the screw (4) clockwise:
 - The room in which the balls move becomes smaller:
 - Advantage: The conveying of the sheet at corners is improved.
 - Disadvantage: The ball can become blocked.
- ▷ Turn the screw (4) counter-clockwise.
 - The room in which the balls move becomes larger.
 - Disadvantage: The ball can jump, resulting in poorer conveying at corners.

7.6.3 Inserting the smoother bars

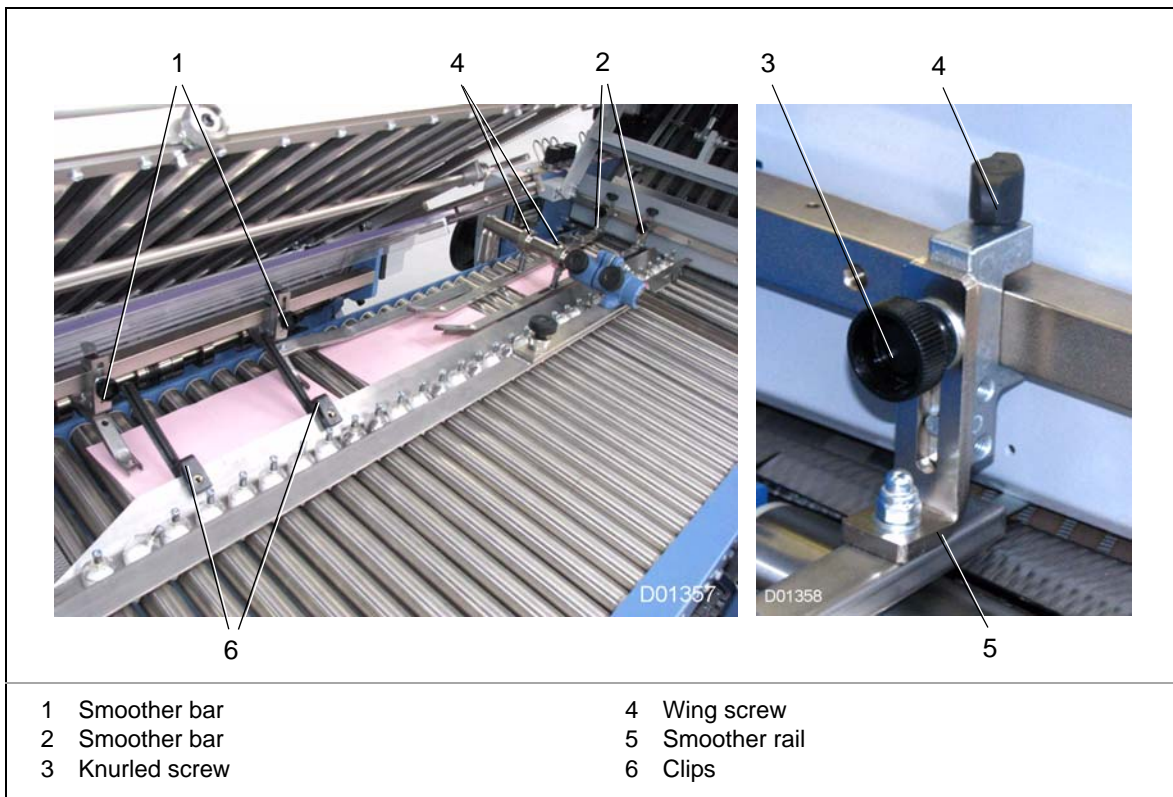


Figure 32: Inserting the smoother bars

Inserting the smoother bars (1):

The smoother bars (1) are used to prevent the sheets from jumping out when exiting the preceding folding unit.

Procedure:

- ▷ Open the wing screws (4) on the smoother bars (1).
- ▷ Distribute the smoother bars (1) according to the illustration.
- ▷ Tighten the wing screws (4) on the smoother bars (1).

Inserting the smoother bars (2):

The smoother bars (2) are used to:

- Prevent the sheets from jumping out on the alignment table
- Provide reliable infeed of the sheets into the foldrollers

Procedure:

- ▷ Open the wing screws (4) on the smoother bars (2).
- ▷ Distribute the smoother bars (2) according to the illustration.
- ▷ Hook the smoother bars (2) into the sheet guide plate of the parallel fold using the plate springs.
- ▷ Tighten the wing screws (4) on the smoother bars (2).

Adjusting the height of the smoother bars

Procedure:

- ▷ Loosen the knurled screw (3).
- ▷ Adjust the smoother bar (5) to the necessary height.
- ▷ Tighten the knurled screw (3).

Inserting the clips (6): The clips (6) are used to provide reliable infeed of the sheets into the side-lay or under the transport balls.

Procedure:

- ▷ Open the screws on the clips (6).
- ▷ Distribute the clips (6) according to the illustration.
- ▷ Tighten the screws on the clips (6).

7.7 Adjusting the parallel fold

The parallel fold takes over the aligned sheets of paper from the alignment table and makes the second fold.

The folding sheet passing through can also be processed with the rear slitter shafts.

7.7.1 Roller diagram

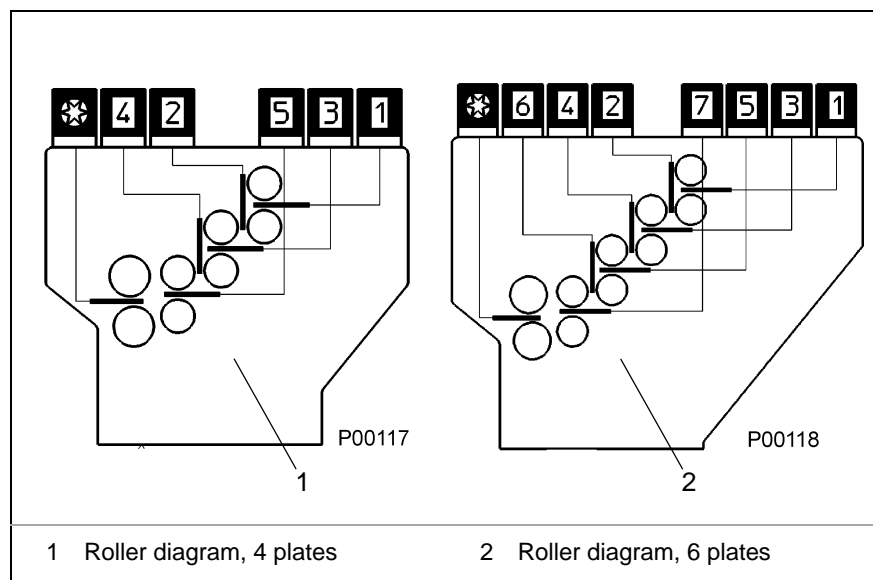


Figure 33: Parallel fold roller diagram

The roller scheme is on the side wall of the parallel fold and serves as an adjustment aid.

It shows the foldrollers and slitter shafts with the associated setting elements.

7.7.2 Adjusting the pressure of foldrollers and slitter shafts



WARNING!

Danger due to rotating machine element

Non-observance may possibly cause serious personal injuries or even death

- Test and adjust the pressure of foldrollers only when the machine is not moving.
- Press the EMERGENCY STOP palm button.
- Always have the pressure adjustment of foldrollers carried out by one individual person only.
- Test and adjust the pressure of foldrollers by turning the safety handwheel. This also presents a crush hazard and danger of injuries.



WARNING!

Danger due to slitter shafts.

The built-in knives are very sharp!

Non-observance may possibly cause serious personal injuries or even death

- For all work with the slitter shafts, wear cut-proof safety gloves and safety shoes.
- The slitter shafts may only be mounted/dismantled when the machine is stopped and secured against switching on.
- Always hold the slitter shafts at the shaft and not at the tool.



WARNING!

Residual danger from slitter shaft guard.

Non-observance may possibly cause serious personal injuries or even death

Even when closed, the slitter shaft guard does not provide 100% protection against the sharp knives touching the slitter shafts.

Never reach into the slitter shafts while the machine is running!



WARNING!

Danger from incorrect handling of the safety handwheels.

Non-observance may cause severe personal injuries.

- Turn the safety handwheel only when the machine is not moving.
- Press the EMERGENCY STOP palm button.
- Operate the machine with safety handwheels only (otherwise, there is a danger of being drawn in).

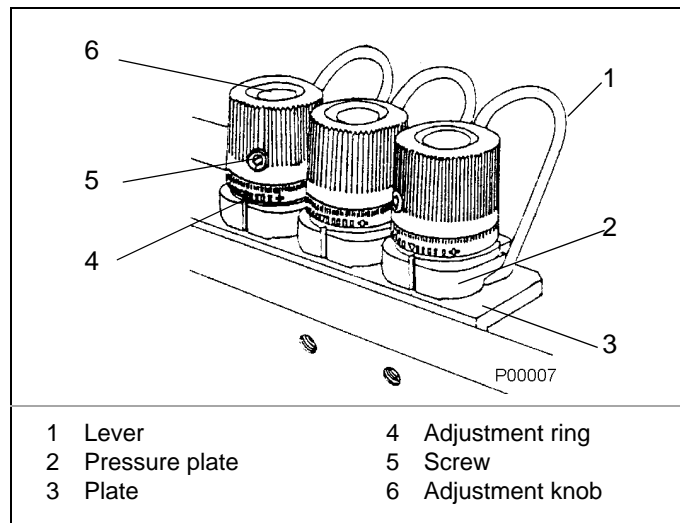


Figure 34: Setting of foldrollers and slitter shafts

To achieve an exact fold, the pressure on the foldrollers and the slitter shafts must be set correctly.

Basic setting pressure of foldrollers:

Procedure:

- ▷ Pull all upper buckle plates up to the end stop.
- ▷ Use the <Parallel fold> folding scheme to orient yourself.
- ▷ Begin with the 1st roller pair.
- ▷ Press the lever (1) downwards.
- ▷ Place a strip of the paper to be processed between the thrust piece (2) and plate (3).
Place under both sides equally.



The paper strip must be large enough to cover the entire thrust piece. If the paper strip is pushed in only partially or is too small, it can falsify the pressure of foldrollers.

- ▷ Place a longer strip of paper (format approx. 5 x 20 cm) on the roller gap to be set.
- ▷ Hold the strip of paper fast with your hand.
- ▷ Use the safety handwheel to turn the machine forwards.
- ▷ Check the pressure of foldrollers across the entire roller width.
- ▷ Set the required pressure of foldrollers across the entire roller width by turning the adjustment knobs (6) on both sides of the parallel fold equally.

Turning clockwise (+) = pressure of foldrollers is lower.

Turning counterclockwise (-) = pressure of foldrollers is higher.

- ▷ Adjust the other roller pairs and the slitter shaft in the same way.



Always complete settings with a turn of the adjustment knob (6) clockwise (+). (pressure of foldrollers is looser).

This way, an even pressure of foldrollers is guaranteed with the next paper change.

Marking the basic setting: For faster recreation of the basic setting, the set collar (4) should be put in the zero position.

Procedure

- ▷ Turn the set collar (4) until its arrow matches the marking on the thrust piece (2).

Adjusting for fold type: You can do this by placing the number of paper strips corresponding to the fold type of the sheet to be processed under the setting elements. You must place underneath the setting elements on both sides equally.

Procedure:

- ▷ Use the <Parallel fold> folding scheme to orient yourself.
- ▷ Begin with the 1st roller pair.
- ▷ Press the lever (1) downwards.
- ▷ Place as many strips of the paper to be processed between the thrust piece (2) and plate (3) as the fold type requires.
Place under both sides equally.



The paper strip must be large enough to cover the entire thrust piece. If the paper strips are pushed in only partially or are too small, this can falsify the pressure of foldrollers.

- ▷ Adjust the other roller pairs and the slitter shaft in the same way.



The number of paper strips to place underneath depends on the fold type.

Securing setting elements against contortion: By tightening the screw (5) it is possible to secure the adjustment knob (6) against contortion.



CAUTION!

Danger of damage.

Non-observance may result in property damage.

Do not tighten the screw too much.

7.8 Adjusting the buckle plates

7.8.1 Buckle plate positions

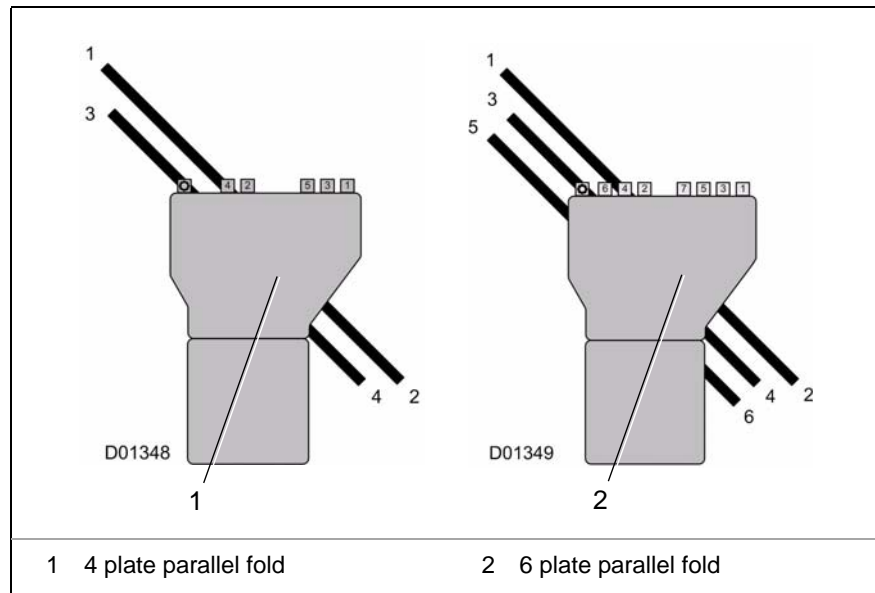


Figure 35: Buckle plate positions

The upper buckle plates have an uneven numbering.
The lower buckle plates have an even numbering.

7.8.2 Buckle plates 1 to 4 (6) as standard buckle plates FT

Buckle plates 1 to 4 (6) are equipped as standard buckle plates FT with swing deflector.

See Chapter "7.8.2.1 Sheet deflector function of buckle plates FT"

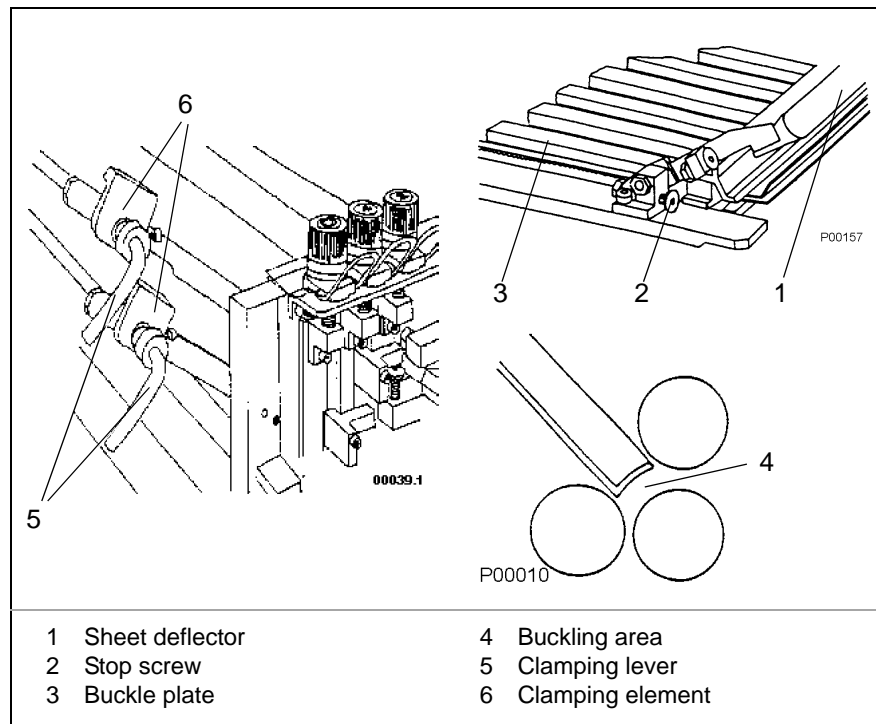
7.8.2.1 Sheet deflector function of buckle plates FT


Figure 36: Sheet deflector

Sheet deflector function:

If a buckle plate is not needed, the sheet deflector has to be folded over.
Procedure:

- ▷ Release the clamping lever (5) by turning counterclockwise.
- ▷ Retract the unneeded buckle plate (3) by approx. 25 cm (9.843 in.).
- ▷ Fold the attached sheet deflector (1) forwards.
- ▷ Carefully push the buckle plate (3) back forwards.
- ▷ Clamp the buckle plate (3) by turning the clamping lever (5) clockwise.


CAUTION!

Danger due to displacement of the stop screws.

Non-observance may cause serious property damage to the buckle plates and folding units.

The adjustment of the stop screws must not be changed.

7.8.3 Buckle plates 1 to 4 (6) as combination buckle plates FTK

- Buckle plates 1 to 4 (6) can be designed optionally as combination buckle plates FTK.
See Chapter "7.8.3.1 Combination buckle plate FTK sheet deflector function".

7.8.3.1 Combination buckle plate FTK sheet deflector function

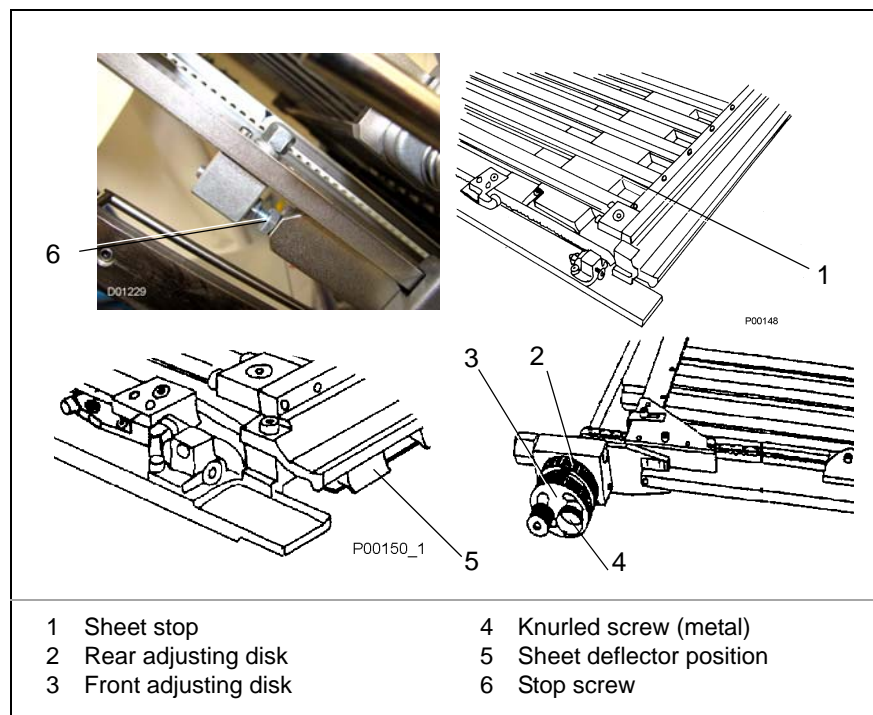


Figure 37: Combination buckle plate

With this fold type, the reversible swing deflector is omitted. The sheet stop can be moved far enough in the direction of the foldrollers that it assumes the sheet deflector function. This means that the buckle plate does not have to be involved during the changeover to the sheet deflector.

Buckle plate function: The various setting possibilities of the combination buckle plates are largely identical to those of the standard buckle plates FT.

Sheet deflector function: Move the sheet stop (1) all the way to the sheet deflector position (5).
Procedure:

- ▷ Loosen the knurled screw (4) made of metal.
- ▷ Turn the adjusting disc (2) until the sheet stop (1) is in the sheet deflector position (5).
 - Upper buckle plates 1, 3, 5. = turn right
 - Lower buckle plates 2, 4, 6. = turn left
- ▷ Retighten the metal knurled screw (4).

**CAUTION!**

Danger due to displacement of the stop screws.
Non-observance may cause serious property damage to the buckle plates and folding units.

The adjustment of the stop screws must not be changed.

7.8.4 Inserting the buckle plates FT

CAUTION!

Danger when inserting the buckle plates.

Non-observance may cause serious property damage to the buckle plates and folding units.

- Insert the buckle plates slowly and carefully all the way to the stop screws.
- Clamp the buckle plates securely after reinserting them.


CAUTION!

Danger due to displacement of the stop screws.

Non-observance may cause serious property damage to the buckle plates and folding units.

The adjustment of the stop screws must not be changed.

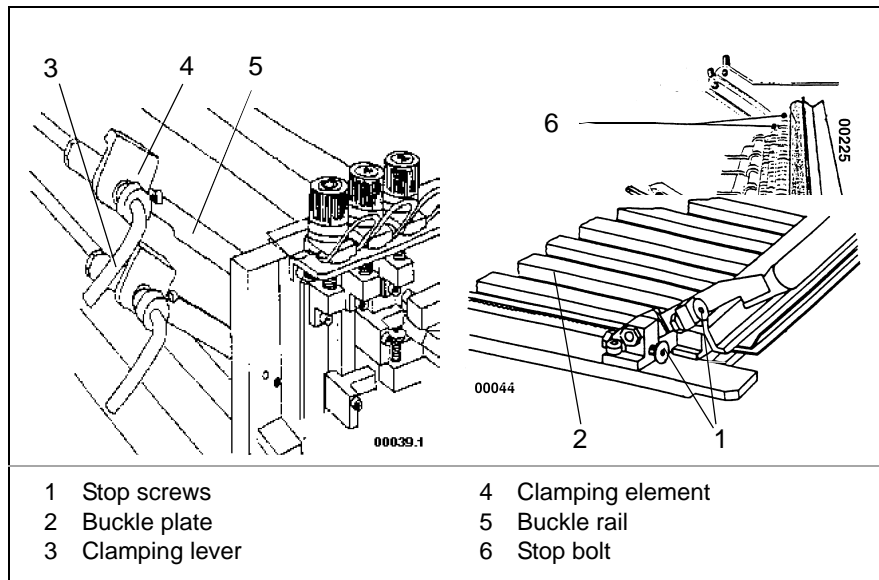


Figure 38: Inserting buckle plate 1

Procedure:

- ▷ Release the clamping lever (3) by turning counterclockwise.
- ▷ Rotate the clamping element (4) by 180°.
- ▷ Push the buckle plate (2) on the buckle rails (5) towards the rear until the stop screws (1) touch the stop bolts (6).
- ▷ Turn the clamping element (4) back to its original position.
- ▷ Clamp the buckle plate (2) by turning the clamping lever (3) clockwise.



When clamping the buckle plate (2), this must be pressed towards the rollers so that the stop screws (1) rest securely on the stop pins.

7.8.5 Inserting the buckle plates FTK



CAUTION!

Danger when inserting the buckle plates.

Non-observance may cause serious property damage to the buckle plates and folding units.

- Insert the buckle plates slowly and carefully all the way to the stop screws.
- Clamp the buckle plates securely after reinserting them.



CAUTION!

Danger due to displacement of the stop screws.

Non-observance may cause serious property damage to the buckle plates and folding units.

The adjustment of the stop screws must not be changed.

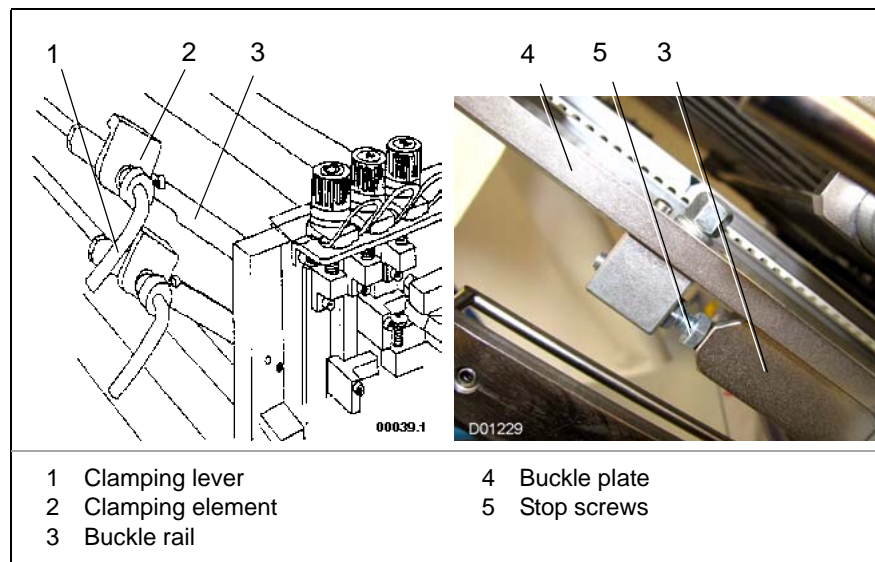


Figure 39: Inserting buckle plate 1

Procedure:

- ▷ Release the clamping lever (1) by turning counterclockwise.
- ▷ Rotate the clamping element (2) by 180°.
- ▷ Push the buckle plates (4) on the buckle rails (3) towards the rear until the stop screws (5) touch the buckle rails (3).
- ▷ Turn the clamping element (2) back to its original position.
- ▷ Clamp the buckle plate (4) by turning the clamping lever (1) clockwise.



When clamping the buckle plate (4), this must be pressed towards the rollers so that the stop screws (5) rest securely on the buckle rails (3).

7.8.6 Adjusting the folding length

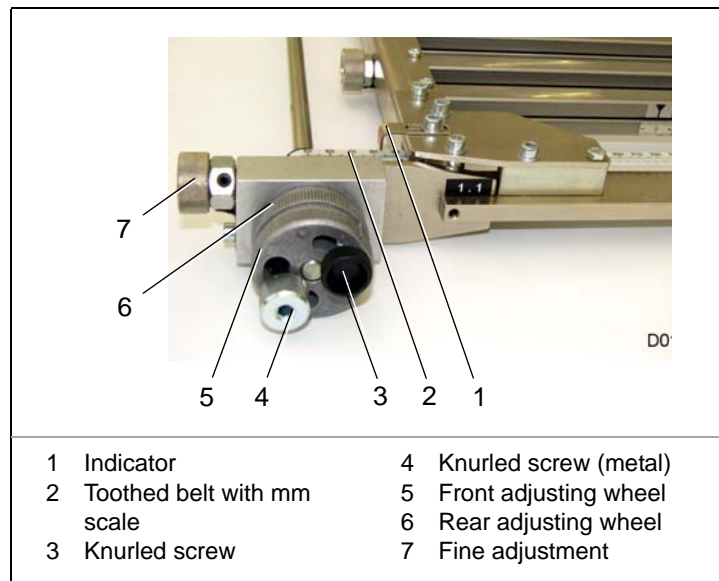


Figure 40: Adjusting the folding length

Adjusting the folding length:

Procedure:

- ▷ Loosen the knurled screw (4) made of metal.
- ▷ Adjust the folding length by turning the adjusting wheel (5, 6).

Upper buckle plates 1, 3, 5.

Turn to the right = folding length is decreased.

Turn to the left = folding length is increased.

Lower buckle plates 2, 4, 6

Turn to the right = folding length is increased.

Turn to the left = folding length is decreased.

- ▷ Turn the adjusting wheel (5, 6) until the red pointer (1) indicates the desired folding length on the scale (2) of the toothed belt.
- ▷ Retighten the metal knurled screw (4).

Precise adjustment:

Procedure:

- ▷ Leave the metal knurled screw (4) on tight.
- ▷ Turn the precise adjustment (7).
- Turn to the right = folding length is increased.
- Turn to the left = folding length is decreased.

7.8.7 Adjusting the sheet stop angle:

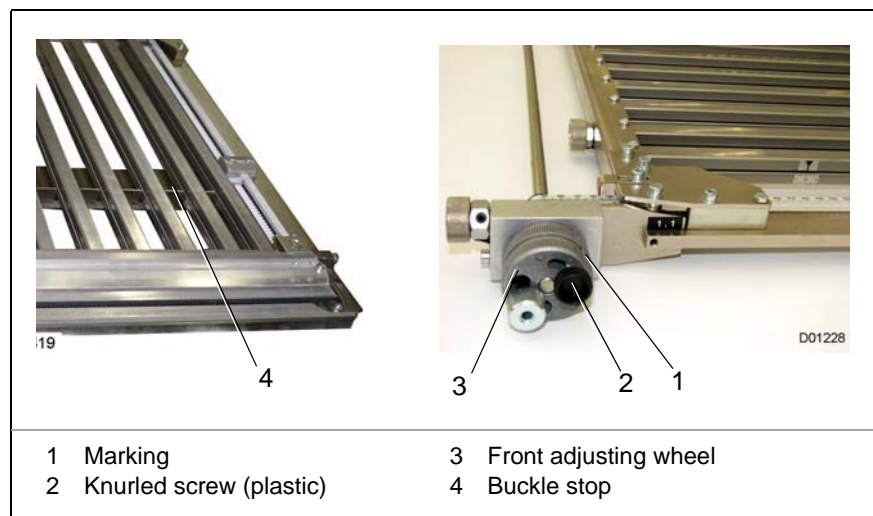


Figure 41: Adjusting the sheet stop angle:

Adjusting the angle: By setting the sheet stop angle, it is possible to process some sheets that are not rectangular.

Procedure:

- ▷ Loosen the plastic knurled screw (2).
- ▷ By turning the front adjusting wheel (3), only the sheet stop on the drive side is adjusted.

Upper buckle plates 1, 3, 5.

Turn to the right = folding length on drive side is decreased.

Turn to the left = folding length on drive side is increased.

Lower buckle plates 2, 4, 6

Turn to the right = folding length on drive side is increased.

Turn to the left = folding length on drive side is decreased.

- ▷ The markings (1) on the adjusting wheels provide a reference point for how far the adjustment was.
- ▷ Retighten the plastic knurled screw (2).

Angle basic setting Procedure:

- ▷ Loosen the plastic knurled screw (2).
- ▷ Align the markings (1) of the two adjusting wheels by turning the front adjusting wheel (3).
- ▷ Retighten the plastic knurled screw (2).



Depending on the print mark, it may also be necessary to change the angle of the register table.

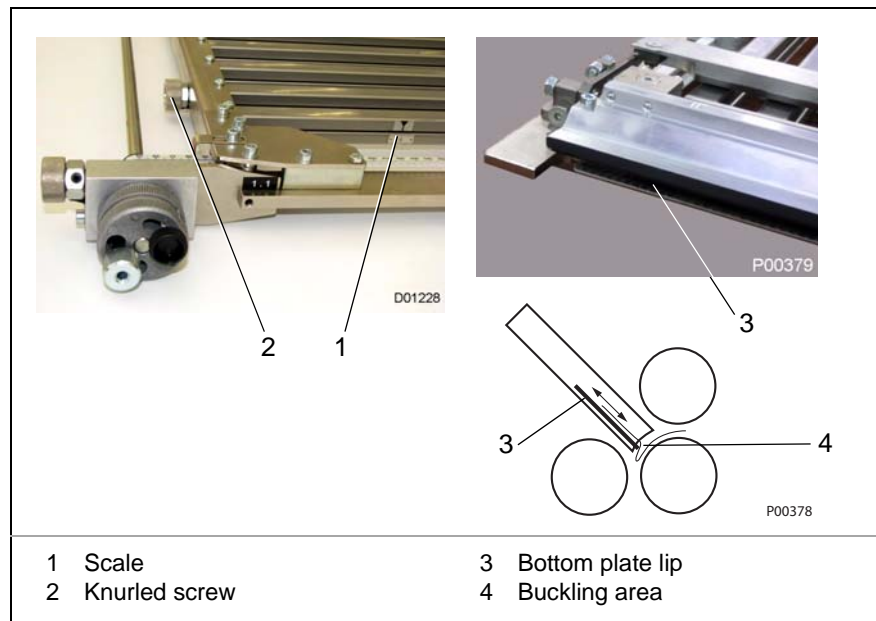
7.8.8 Adjusting the lower plate lip


Figure 42: Bottom plate lip

Lower plate lip position:

Depending on the paper thickness, fold type, and properties of the front edge of the sheet, it may be necessary to enlarge or reduce the size of the buckling area (4).

This is done by adjusting the position of the lower plate lip (3).

Procedure:

- ▷ The adjustment must be undertaken in small steps on both sides equally.
- ▷ Check this using the two scales (1).
- ▷ Turn the knurled screws (2).
 - Turn to the right = buckling area (4) becomes larger.
 - Turn to the left = buckling area (4) becomes smaller.


Adjustment for thick paper:

Reset lower plate lip (3) (away from the rollers).

Adjustment for thin paper and front edges of sheet bent downwards:

Move lower plate lip (3) forward (towards the rollers).

Basic setting

Procedure:

- ▷ The adjustment must be undertaken in small steps on both sides equally.
- ▷ Turn the knurled screws (2) until both scales (1) are at zero.

7.8.9 Setting of the inner width

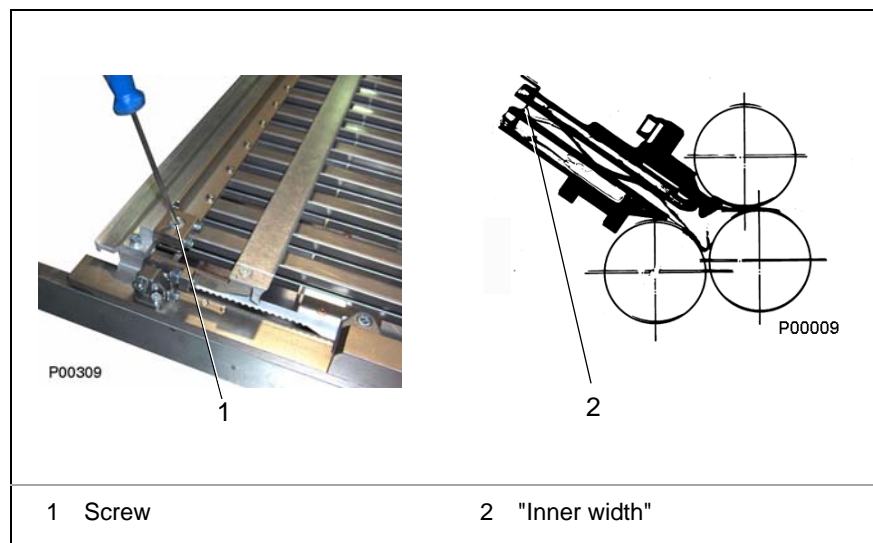


Figure 43: Setting of the inner width.

Depending on the characteristics of the paper, paper thickness, type of fold and work speed, the "inner width" of the buckle plates has to be adjusted. The "inner width" (2) is the distance between the upper and lower buckle rails.

Procedure:

- ▷ The adjustment must be made on both sides equally.
- ▷ Turn both screws (1).
 - Turn clockwise = "Inner width" (2) becomes larger.
 - Turn counterclockwise = "Inner width" (2) becomes smaller.

Basic setting A basic setting is not required since the setting of the "inner width" must be made individually according to the properties of the paper to be processed.

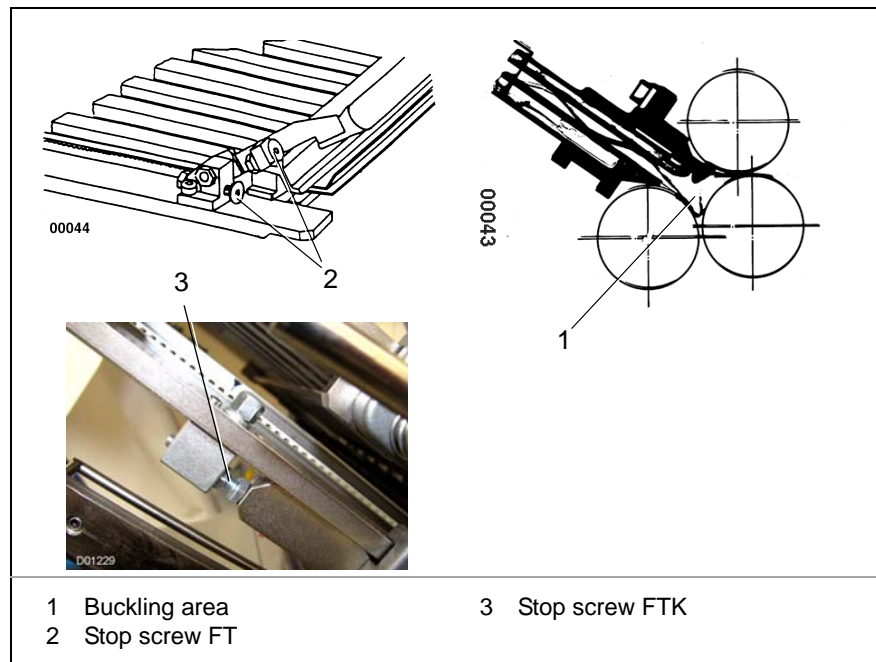
7.8.10 Enlarging the buckling area


Figure 44: Enlarging buckling area.

Depending on the product thickness, it is possible that the buckling area must be enlarged.



The adjustment of the stop screw (2 + 3) must never be changed.


CAUTION!

Danger due to displacement of the stop screws.

Non-observance may cause serious property damage to the buckle plates and folding units.

The adjustment of the stop screws may not be changed (factory setting).

Enlarging the buckling area:

Procedure:

- ▷ Clamp a strip of cartons or multiple paper thicknesses between the stop pin and stop screw (2, 3).
- ▷ Adjust both sides equally.

7.8.11 Enlarging the deflecting area

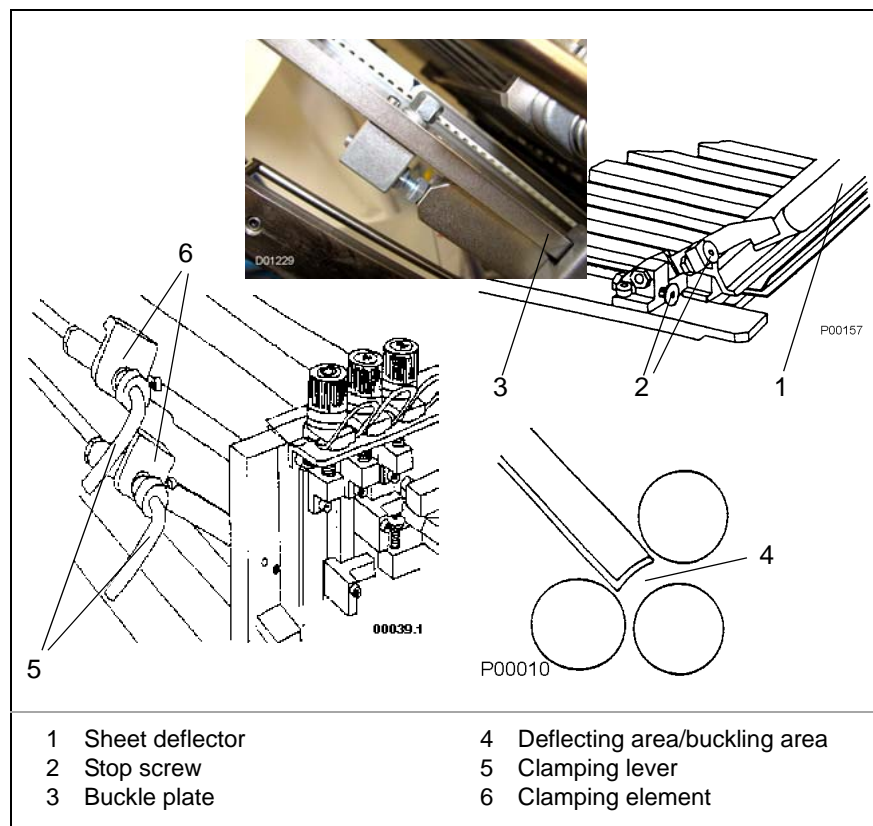


Figure 45: Sheet deflector

When the sheet deflector is active:

Thicker papers may need a larger deflecting area (4).

Procedure:

- ▷ Release the clamping lever (5) by turning counterclockwise.
- ▷ Retract the sheet deflector (1) / buckle plate (3) slightly.
The adjustment must be made on both sides equally.
- ▷ Clamp the sheet deflector (1) / buckle plate (3) by turning the clamping lever (5) clockwise.



The adjustment of the stop screw (2) must absolutely not be changed.



CAUTION!

Danger due to displacement of the stop screws.

Non-observance may cause serious property damage to the buckle plates and folding units.

The adjustment of the stop screws must not be changed.

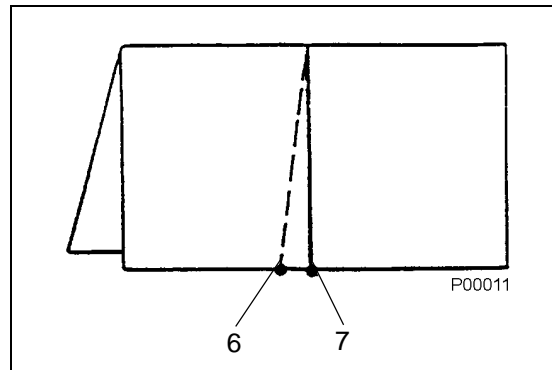


Figure 46: Correcting skewed perforations

Correcting skewed perforations:

Pulling out the sheet deflector/buckle plate on one side has an effect on the perforations (7), scores (7) or cuts (7), which deviate from the desired direction (6).

Procedure:

- ▷ Release the clamping lever (5) by turning counterclockwise.
- ▷ Retract the last sheet deflector (1) / buckle plate (3) slightly on one side. Clamp the sheet deflector (1) / buckle plate (3) by turning the clamping lever (5) clockwise.
- ▷ Using a new sheet, check the result and make any necessary corrections.

7.9 Placing the slitters on the slitter shafts



WARNING!

Danger due to slitter shafts.

The built-in knives are very sharp!

Non-observance may possibly cause serious personal injuries or even death

- For all work with the slitter shafts, wear cut-proof safety gloves and safety shoes.
- The slitter shafts may only be mounted/dismantled when the machine is stopped and secured against switching on.
- Always hold the slitter shafts at the shaft and not at the tool.

7.9.1 Single rear slitter shafts (standard)

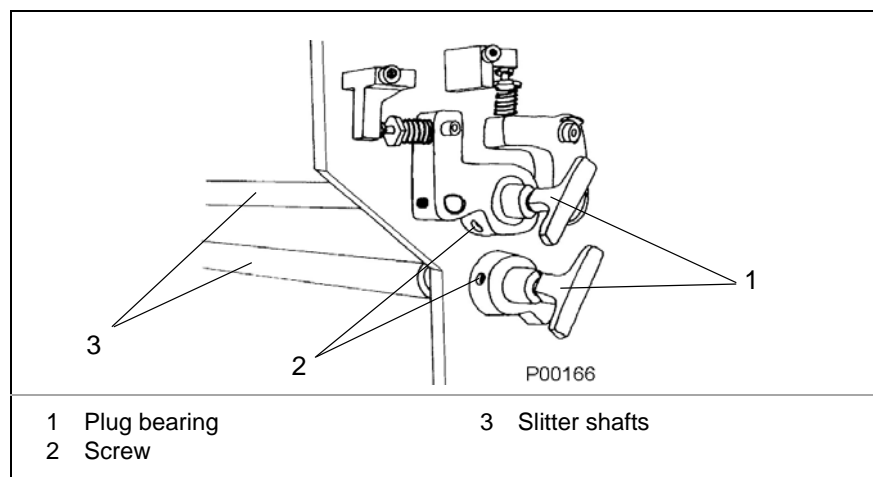


Figure 47: Pair of slitter shafts

Each folding unit has two downstream slitter shafts (3) for accommodating tools for perforating, creasing or cutting.

They can be installed and removed quickly using the plug bearings (1).

Removing slitter shafts:

Procedure:

- ▷ Remove the strippers that get in the way of removal.
- ▷ Remove stopper switch S31.
- ▷ Loosen the screws (2).
- ▷ Disengage the plug bearings (1).
- ▷ Hold the slitter shafts (3) securely.
If necessary, a second person should assist you.
- ▷ Withdraw the plug bearings (1).
- ▷ Take-out the slitter shafts (3).

Installing the slitter shafts:

Procedure:

- ▷ Return the slitter shafts (3) to their original position.
- ▷ Engage the plug bearings (1) in the bore of the slitter shafts.

- ▷ Press the plug bearings (1) against the slitter shafts.
This will prevent end play.
- ▷ Tighten the screws (2).
- ▷ Reinstall the necessary strippers.
- ▷ Reinstall stopper switch S31.

7.9.2 Perforating device

The perforation is used for cross folds to prevent wrinkles on the "head". "Back spine" perforations are only applied for perfect binding. The slitter shaft must be equipped with the necessary tools for perforating.

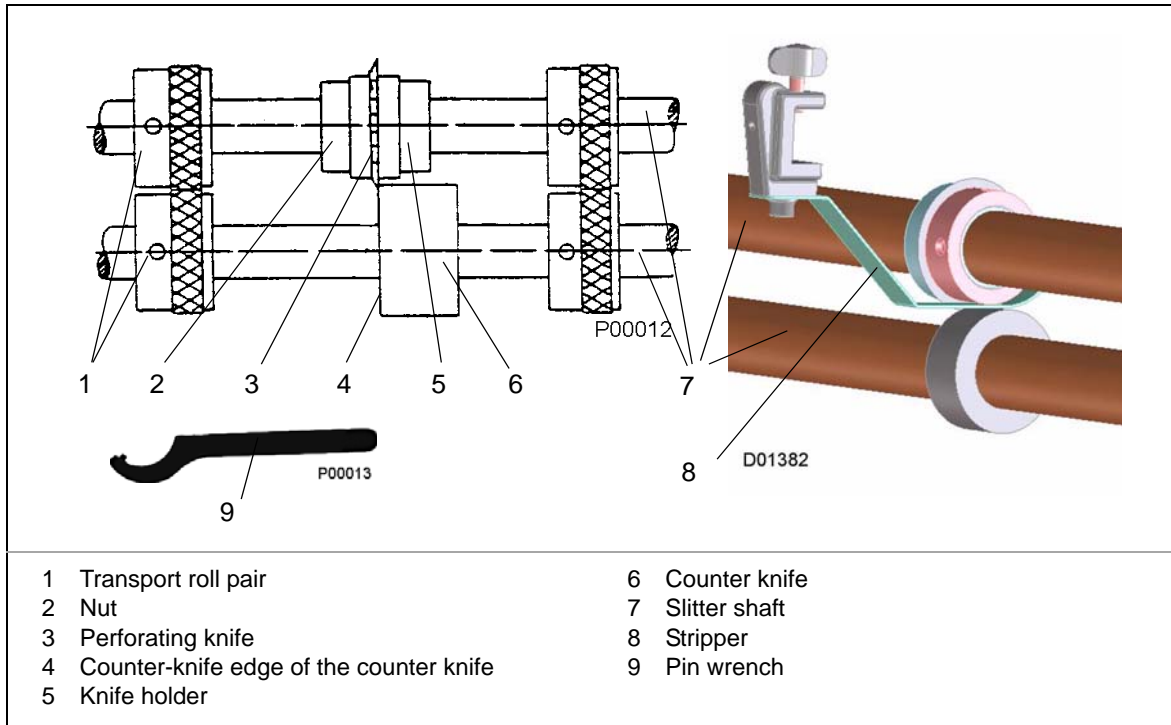


Figure 48: Perforating device

Procedure:

- ▷ Loosen the nut (2) with the hook wrench (9).
- ▷ Insert the perforating knife (3) into the knife holder (5).

The slotted knives need not be taken off the slitter shaft.

When mounting the perforating knives (3) the smooth side of the knife must be directed towards the beveled edges (4).

The blunted angle of the tooth must get into the paper first.



CAUTION!

Danger from incorrect mounting of the knife holder (5).

Non-observance may cause the nut to come loose while the machine is running. Danger of material damage.

Make sure that the nut (2) is turned towards the running direction of the machine.

- ▷ Insert the stripper (8).
- ▷ Use a sufficient number of transport roller pairs (1) for the perforation. This ensures an accurate paper transport.



Different types of perforating knives are required for certain types of paper and folding impositions.
 For this purpose, observe the list of knives TM 32/2.

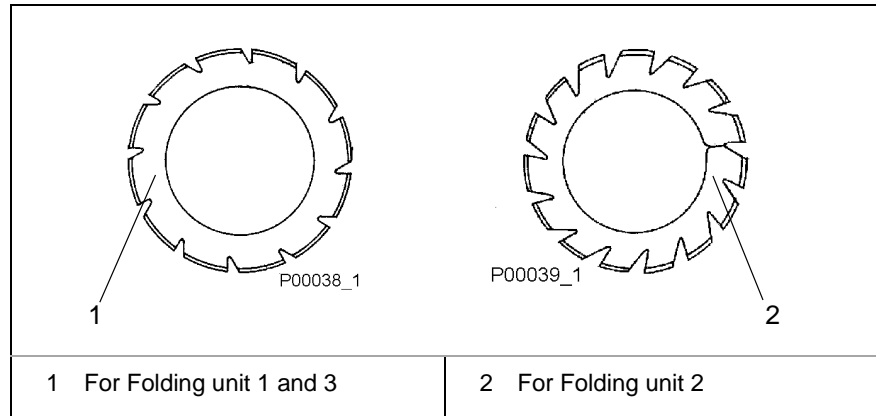
Tooth forms


Figure 49: Tooth forms

- ▷ Use the tooth form (1) for the 1st and 3rd folding units.
- ▷ Use the tooth form (2) for the 2nd folding unit.

7.9.3 V-shaped special perforating knife (option)

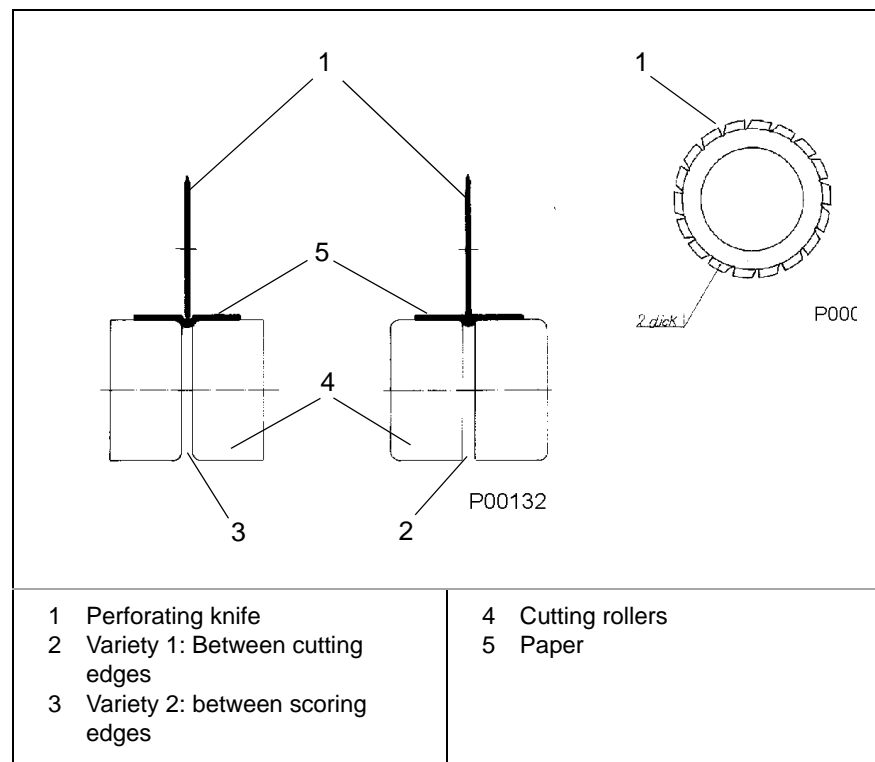


Figure 50: V-shaped special perforating knives

V-shaped special perforating knives are used in buckle folding machines on the slitter shafts in folding unit I.

The perforating knife (1) is 1.6 mm (0.063 in.) thick, non-slotted and ground in a wedge shape on both sides. The sheet is simultaneously pre-scored during perforating.

This avoids dog-ears on the edges of the head side in the cross fold (2nd folding unit). However, the perforation cut will not be as sharp as a normal perforation.

1st mounting variant: Between cutting edges (2).

2nd mounting variant: Between scoring edges (3).



- Coordinate the gap and the mounting method to the product to be processed.
- Cutting and scoring edges must never touch the perforating knives. The cut of these perforating knives is not as sharp as a "normal" perforation.

7.9.4 Punch perforating device

The trend towards producing an increasing number of books in the more cost-effective perfect binding process imposes ever higher requirements for finishing companies.

The MBO punch perforating device fulfills the requirements for a reliable perfect or notch binding.

Perfect binding process, spine ground away in the perfect binder

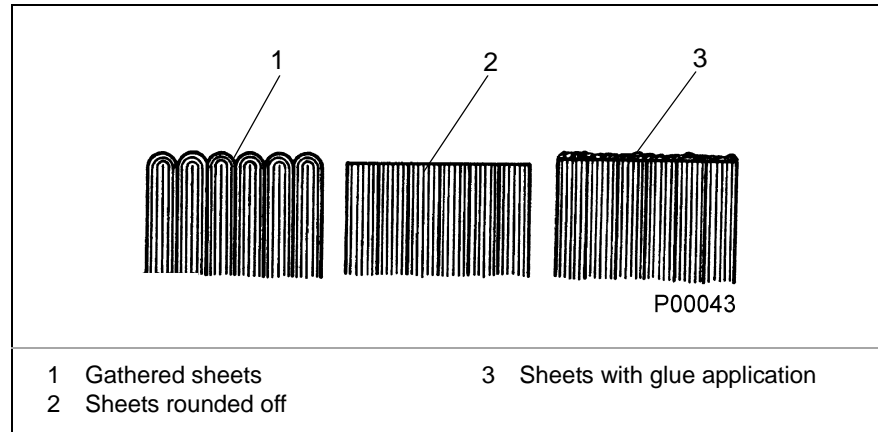


Figure 51: Previous perfect binding process

In the familiar, conventional perfect binding process, the spine is completely ground away in the perfect binder. The disadvantage of this is that the glue reaches the upper surface of the sheet edges only, thus providing only little adhesion.

Notch binding process with cut perforation

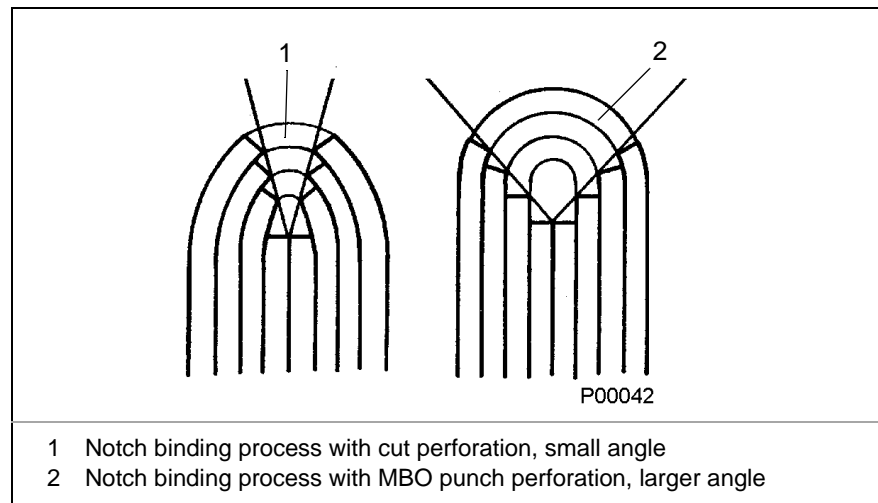


Figure 52: Cut perforation and MBO punch perforation

The familiar, conventional notch binding process (1) applies a cut perforation to the sheets in the spine (small angle). Because the pages are too close together, the glue cannot reach all the inside pages reliably.

MBO punch perforation

MBO's punch perforating device (2) punches out slots. The punched slots produce a larger opening in the back of the folded sheet. This way, the glue can reach and bind all sheets above as well as on the side. Optimal adhesion of the individual sheets is achieved with this method.

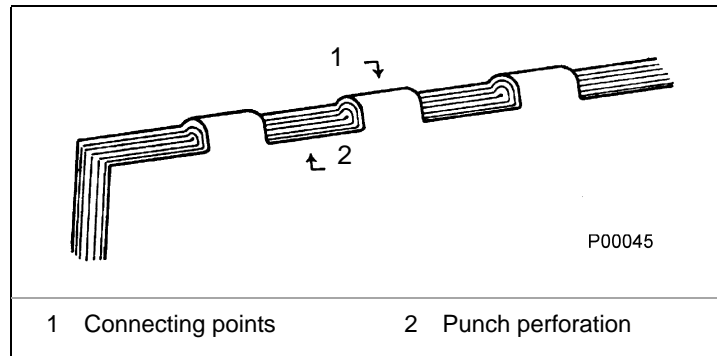


Figure 53: MBO punch perforation

An additional factor is that the sheets are interconnected by the plates (1) between the slots and thus guarantee an absolutely reliable connection.

Installation of punch perforation equipment

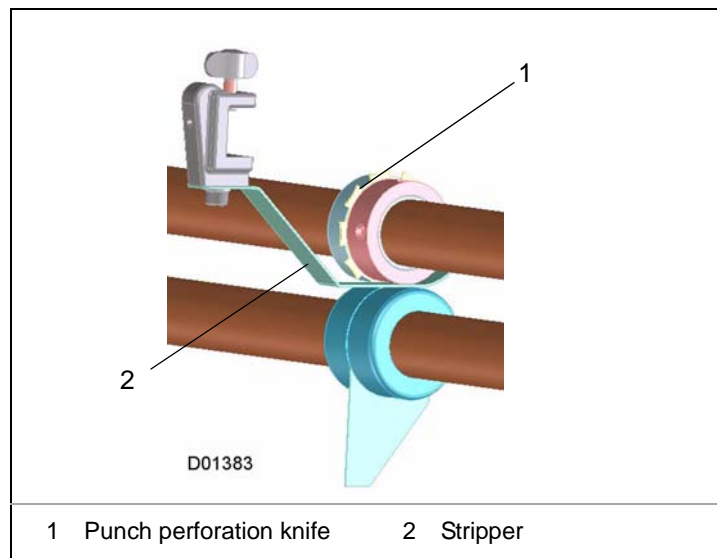


Figure 54: MBO punch perforating device

It is very important when punch perforating that the punched-out pieces are separated safely from the folding sheet and stripped away. To this end, the punch perforating knife separates the punched-out pieces reliably from the sheet, and a special stripper guides the pieces out of the tool.

The punch perforating device is available for all machines with 30 and 35 mm (1.181 and 1.378 in.) slitter shafts.

7.9.5 Creaser

Pre-scoring will be applied at cross folding with buckle plates if no perforating is required. Such scoring ensures that the fold is established exactly in its predetermined folding point. Special scoring devices may also be applied on request.

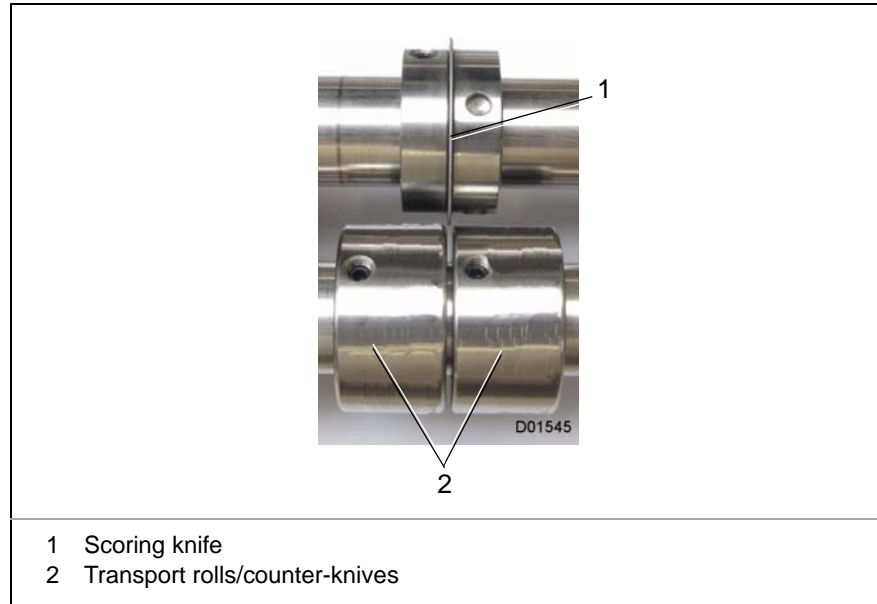


Figure 55: Creaser

Procedure:

- Setting up:** ▷ Set up the scoring knives (1) on the slitter shaft such that they are positioned between two transport rolls (2) or between the rounded sides of two counter-knives.

7.9.6 Super-Score device

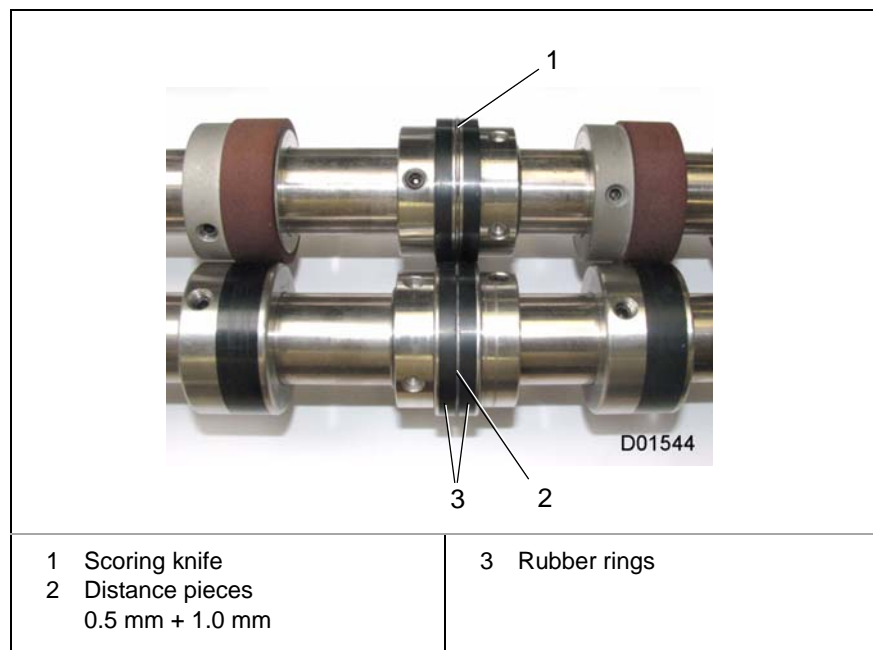


Figure 56: Super-Score device

Procedure:

▷ Set up the Super-Score device as shown in Figure 108.



- Use fewer distance pieces (2) if the rubber rings (3) are worn.
- Use more distance pieces (2) if the paper is cut during scoring.

7.9.7 Slitting device

Folded sheets can be cut with the slitting device.

Separator cut for multiple-up production

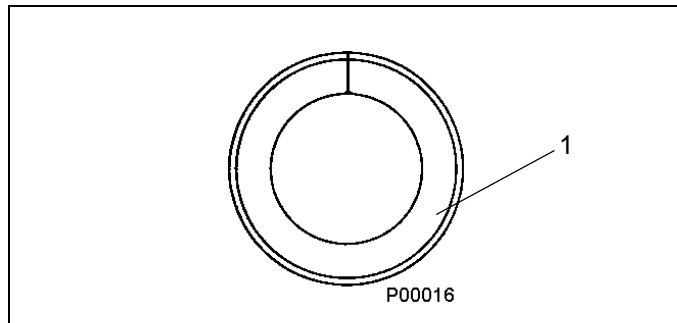


Figure 57: Cutting knives

Procedure:

- ▷ For separating multiple-up production, use one or more cutting knives (1).
- ▷ Install the cutting knives (1) following the same principle as that for the perforating knives.

Edge trim

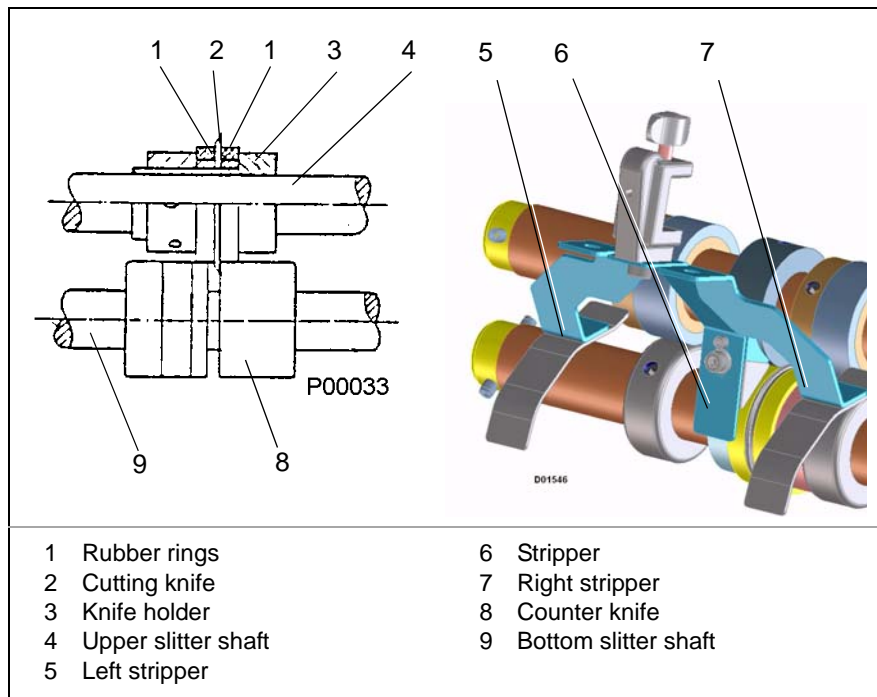


Figure 58: Edge trim

Procedure:

- ▷ Push the knife holder (3) with the rubber rings (1) and the cutting knives (2) onto the upper (4) and lower (6) slitter shaft.
- ▷ Adjust the counter-knives (7) on the lower (6) and upper (4) slitter shaft. Please follow the illustration for the proper position.
- ▷ Insert the strippers (5, 6 and 7).



- Depending on the application, the edge trim device can also be used on the lower slitter shaft.
- The exact installation position depends on the paper thickness and running direction.
- Depending on the paper format and paper thickness, the installation method of the edge trim device must be varied accordingly.

7.9.8 Strip trim device

Folded sheets can be separated using the strip trim device.

Strip trim for multiple-up production

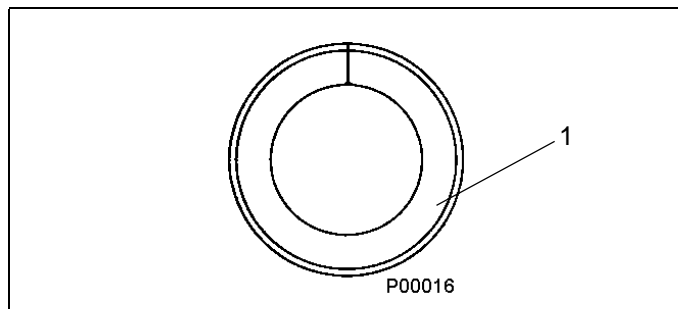


Figure 59: Cutting knives

Procedure:

- ▷ For separating multiple-up production, use two cutting knives (1).
- ▷ Install the cutting knives (1) so that each of the straight cutting edges are pointing outwards.

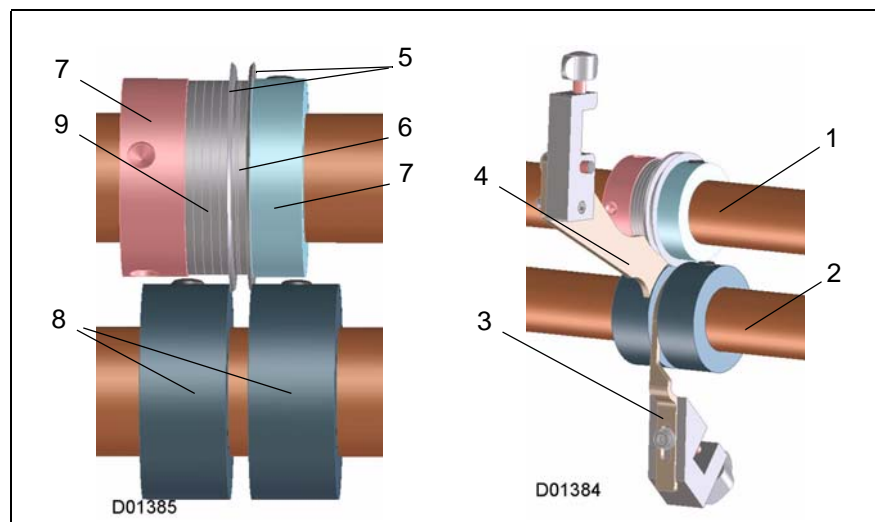


Figure 60: Strip trim device

1	Upper slitter shaft	6	Distance piece
2	Bottom slitter shaft	7	Knife holder
3	Lower stripper	8	Counter knife
4	Upper stripper	9	Rubber rings
5	Cutting knife		

Figure 60: Strip trim device

Procedure:

- ▷ Push the knife holder (7) with the rubber rings (9), the distance piece (6) and the cutting knives (5) onto the upper slitter shaft (1).
- ▷ Adjust the counter-knives (8) on the lower slitter shaft (2).
- ▷ Insert the lower (3) and upper (4) stripper.



Adapt the width of the stripper to the width of the cutout.

7.10 Options

7.10.1 Stopper switch S31 at the exit of the folding unit



Figure 61: Stopper switch S31 at the exit of the folding unit

Functioning description:

The stopper switch (1) stops the machine if the sheet running jams.

Adjusting the height:

Procedure:

- ▷ Open the height adjustment screw (2).
- ▷ Adapt the height to the corresponding requirements.
Make sure that the stopper switch (1) does not scrape against any neighboring components.
- ▷ Re-tighten the height adjustment screw (2).

Repositioning the limit switch:

Procedure:

- ▷ Open the wing screw (4).
- ▷ Position the stopper switch according to the requirements. Make sure that the stopper switch (1) does not scrape against any neighboring components.
- ▷ Re-tighten the wing screw (4).

7.11 Error messages

The error messages of folding unit II are displayed on the MS-Control of folding unit I.

See operating manual for folding unit 1.

7.12 Removing the paper jam



CAUTION!

Danger due to paper jam.

The machine may be restarted only after removing the paper jam.

Non-observance may damage/destroy the drive belts.

When removing the paper jam, turn the machine using the safety hand-wheel only.

Procedure:

- ▷ Press the EMERGENCY STOP palm button.
- ▷ Try to determine the cause of the paper jam and eliminate it (to prevent other malfunctions downline).
- ▷ If necessary, remove any smoother bars, strippers etc. that get in the way.
- ▷ Carefully remove the jammed paper.
- ▷ Check that no torn-off pieces of paper remain in the machine (to prevent other malfunctions downline).
- ▷ Reinstall the removed smoother bars, strippers etc.
- ▷ Disengage the EMERGENCY STOP palm button.
- ▷ Start the machine
- ▷ Feed a single sheet to check the correct function of the machine.
- ▷ If OK, start production.
- ▷ If not OK, determine and eliminate the cause.



Turning the machine forwards/backwards using the handwheel makes it easier to remove the jammed paper.

7.13 Adjustment data of standard folding impositions

This chapter includes the most common folding impositions, which are subdivided into:

- Parallel fold

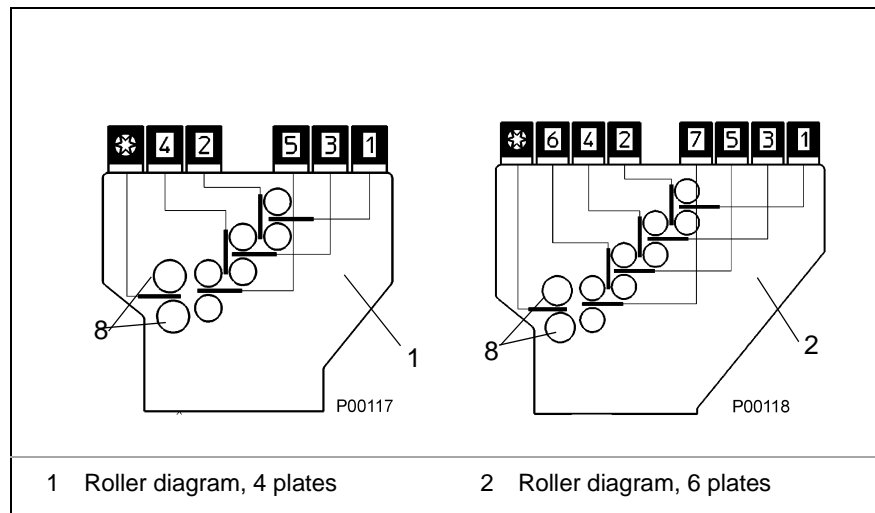
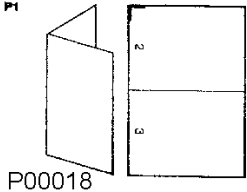
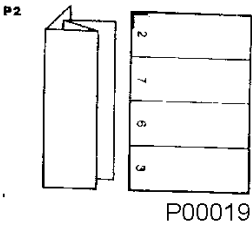
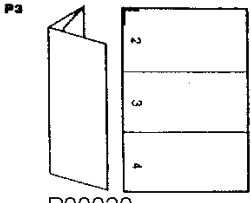
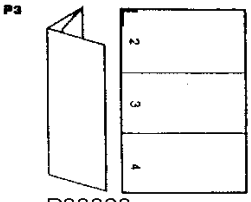
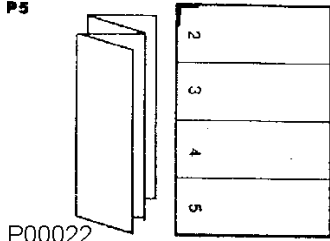
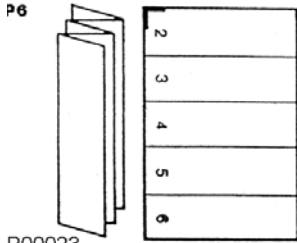
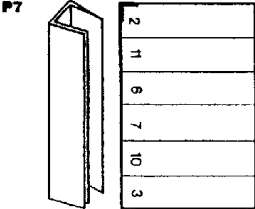


Figure 62: Adjustment data of standard folding impositions

	4 plates	6 plates
1	Pair of foldrollers 1	Pair of foldrollers 1
2	Pair of foldrollers 2	Pair of foldrollers 2
3	Pair of foldrollers 3	Pair of foldrollers 3
4	Pair of foldrollers 4	Pair of foldrollers 4
5	Pair of foldrollers 5	Pair of foldrollers 5
6	-	Pair of foldrollers 6
7	-	Pair of foldrollers 7
8	Pair of slitter shafts	Pair of slitter shafts

7.13.1 Parallel fold

P1 1 x parallel fold = 4 pages	 <ul style="list-style-type: none"> ▷ Set roller pair 1 for simple paper thickness. ▷ Set roller pairs 2 to 8 to double paper thickness. ▷ Set the sheet stop at the 1st buckle plate to 1/2 of the sheet length. ▷ The buckle plates 2 to 4 are replaced by sheet deflectors (buckle plates are closed).
P2 2 x parallel middle fold = 8 pages	 <ul style="list-style-type: none"> ▷ Set roller pair 1 for simple paper thickness. ▷ Set roller pair 2 to double paper thickness. ▷ Set roller pairs 3 to 8 for fourfold paper thickness. ▷ Set the sheet stop at the 1st buckle plate to 1/2 of the sheet length. ▷ Set the sheet stop at the 2nd buckle plate to 1/4 of the sheet length. ▷ The buckle plates 3 and 4 are replaced by sheet deflectors (buckle plates are closed).
P3 2 x parallel fold (letter fold) = 6 pages	 <ol style="list-style-type: none"> 1) With two top buckle plates (T1 and T3) <ul style="list-style-type: none"> ▷ Set roller pairs 1 to 3 to single paper thickness. ▷ Set roller pairs 4 to 8 to triple paper thickness. ▷ Set the sheet stop at the 1st and 3rd buckle plates to 1/3 of the sheet length. ▷ The buckle plates 2 and 4 are replaced by sheet deflectors (buckle plates are closed). 2) With one top (T1) and one bottom (T2) buckle plate: <ul style="list-style-type: none"> ▷ Set roller pairs 1 to 2 to single paper thickness. ▷ Set roller pairs 3 to 8 to triple paper thickness. ▷ Set the sheet stop at the 1st buckle plate to 2/3 of the sheet length. ▷ Set the sheet stop at the 2nd buckle plate to 1/3 of the sheet length. ▷ The buckle plates 3 and 4 are replaced by sheet deflectors (buckle plates are closed). ▷ Increase the sheet gap. ▷
P4 2 x parallel fold (accordion fold) = 6 pages	 <ul style="list-style-type: none"> ▷ Set roller pairs 1 to 2 to single paper thickness. ▷ Set roller pairs 3 to 8 to triple paper thickness. ▷ Set the sheet stop at the 1st and 2nd buckle plates to 1/3 of the sheet length. ▷ The buckle plates 3 and 4 are replaced by sheet deflectors (buckle plates are closed).

<p>P5 3 x parallel fold (accordion fold) = 8 pages</p>  <p>P00022</p>	<ul style="list-style-type: none"> ▷ Set roller pairs 1 to 3 to single paper thickness. ▷ Set roller pairs 4 to 8 to fourfold paper thickness. ▷ Set the sheet stop at the 1st, 2nd, and 3rd buckle plates to 1/4 of the sheet length. ▷ The buckle plate 4 is replaced by the sheet deflector (buckle plates are closed).
<p>P6</p>  <p>P00023</p>	<ul style="list-style-type: none"> ▷ Set roller pairs 1 to 4 to single paper thickness. ▷ Set roller pairs 5 to 8 to fivefold paper thickness. ▷ Set the sheet stop at the 1st to 4th buckle plates to 1/5 of the sheet length.
<p>P7</p>  <p>P00024</p>	<ul style="list-style-type: none"> ▷ Set roller pair 1 for simple paper thickness. ▷ Set roller pairs 2 to 4 to double paper thickness. ▷ Set roller pairs 5 to 8 to sixfold paper thickness. ▷ Set the sheet stop at the 1st buckle plate to 1/2 of the sheet length. ▷ Set the sheet stop at the 2nd and 4th buckle plates to 1/6 of the sheet length. ▷ The 3rd buckle plate is replaced by the sheet deflector (buckle plates are closed).

8 Maintenance

8.1 Introduction

8.1.1 Qualification of personnel

This table lists the necessary qualification of the personnel related to "Maintenance" of the machine.

	Specially trained personnel	Instructed operating personnel	Instructed personnel with specialized training (mechanical/electrical engineering)
Operational maintenance	-	X	-
Maintenance	X	-	X
Repair	-	-	X

Table 18: Qualification of personnel; Maintenance
Legend: X permitted, - not permitted

8.1.2 Safety instructions



DANGER!

Danger due to dangerous electrical voltage.

Non-observance may cause serious injuries or even death.

- Work on the electric components of the machine may only be performed by a qualified electrician.
- Observe the local occupational safety regulations and electrotechnical regulations.
- There is dangerous electric residual voltage on the supply terminals of the frequency inverter even when the main switch is switched off. (Observe the capacitor discharge time (KEB 5 min, Telemecanique 15 min)).

**DANGER!**

Danger when dismantling, bridging or avoiding safety and protective devices.

Non-observance may cause serious injuries or even death.

- No safety or protective devices of the machine may be dismantled, bridged or avoided.
 - Using the checklist for protective equipment and safety devices, check that all protective devices are on the machine.
 - Report any audible/visible safety-relevant change to the machine to the person responsible for the system in your operation.
-

**WARNING!**

Danger due to improper initial operation and maintenance.

Non-observance may possibly cause serious personal injuries and damage to property.

- Initial operation and maintenance work must be carried out by specially trained and authorized personnel only.
 - Heed the local occupational safety regulations.
 - Heed the maintenance, service, and cleaning plan.
 - The manufacturer shall not be liable for any damage caused by improper maintenance, lubrication and cleaning.
-

**WARNING!**

Danger due to running machine parts during initial operation, maintenance and repair.

Non-observance may possibly cause serious personal injuries or even death

- Work at or on the machine must be carried out by trained and authorized personnel only.
 - De-energize the machine and secure it against being switched on again by a third party:
 - Observe the local occupational safety regulations and electrotechnical regulations.
-

**WARNING!**

Danger of crushing injuries during maintenance and repair work

Non-observance may cause serious injuries.

Maintenance and cleaning work must be carried out by one person only.

**WARNING!**

Danger from maintenance tools.

Non-observance may possibly cause serious personal injuries and damage to property.

- You should only use tools that are in perfect condition.
 - Make sure that after adjustment or maintenance work, there are no tools left on or in the machine.
-



WARNING!

Danger of being drawn in.

Non-observance may cause severe personal injuries.

If the handwheel is removed when the machine is running, there is a danger of being drawn in by the groove in the handwheel shaft.

Shut down the machine and secure it against starting up again unintentionally.

8.2 Service

You can find the address on our home page: www.mbo-folder.com.

8.2.1 Ordering spare parts

You can obtain the spare and wear parts worldwide via the corresponding MBO agency near you.

For all questions relating to your machine, please also contact your MBO agency.

You can find the address on our home page: www.mbo-folder.com.

Please gather the significant data for identification of the machine from the label on the machine.

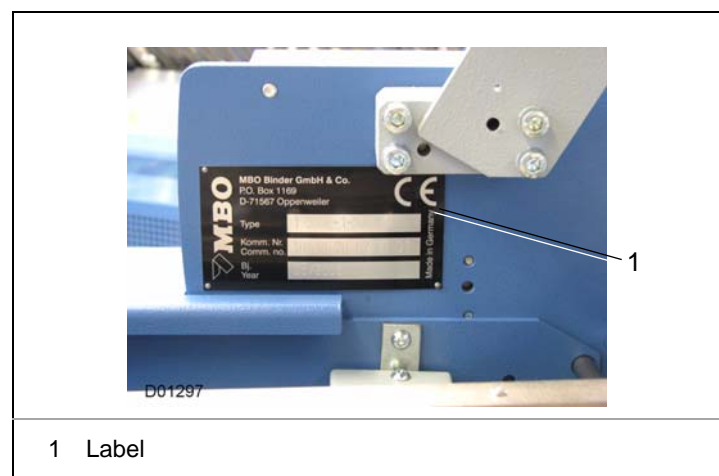


Figure 63: Label

Always provide this information for service requirements and procurement of spare parts:

- Commission no.
- Machine type



Please use only spare parts that are delivered and recommend by the manufacturer!

8.3 Operational maintenance

8.3.1 Checking the safety devices



IMPORTANT!

All devices for shutting down the machine in an emergency and all protecting doors must be checked individually and separately from each other.

If any safety devices malfunction, shut down the machine immediately and secure it against being switched on again.

8.3.1.1 Functional test of the EMERGENCY STOP palm button

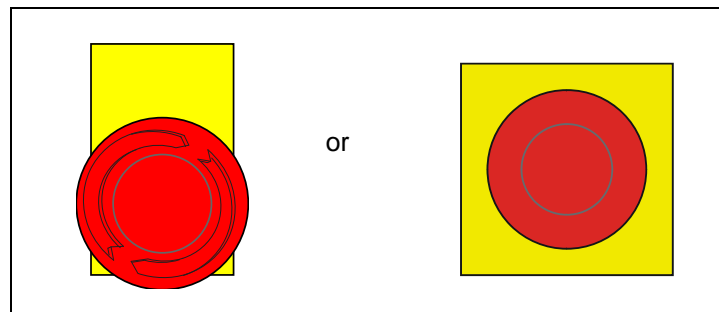


Figure 64: EMERGENCY STOP palm button

Procedure:



IMPORTANT!

To prevent immediate or potential hazards, the machine is equipped with an EMERGENCY STOP shut-off device.

After the <EMERGENCY STOP> palm button is pressed, all electrical drives are switched off.

EMERGENCY STOP does not disconnect the machine from the electrical supply.

- Switch the machine on.
- Press the EMERGENCY STOP palm button so that it remains engaged and in an actuated state.
Pressing the EMERGENCY STOP palm button must cause all machine functions to shut down.
- Disengage the EMERGENCY STOP palm button when the test is finished.

8.3.1.2 Functional test of the slitter shaft guard



WARNING!

Danger due to rotating slitter shafts.

Non-observance may possibly cause serious personal injuries or even death

- Never bypass or remove the safety switch.
- Ensure the proper function of the slitter shaft guard and safety switch.
- Never reach under the slitter shaft guard while the machine is running!



WARNING!

Danger due to slitter shafts.

Even when closed, the slitter shaft guard does not provide 100% protection against the sharp knives touching the slitter shafts.

Non-observance may possibly cause serious personal injuries or even death

Never reach into the slitter shafts while the machine is running!

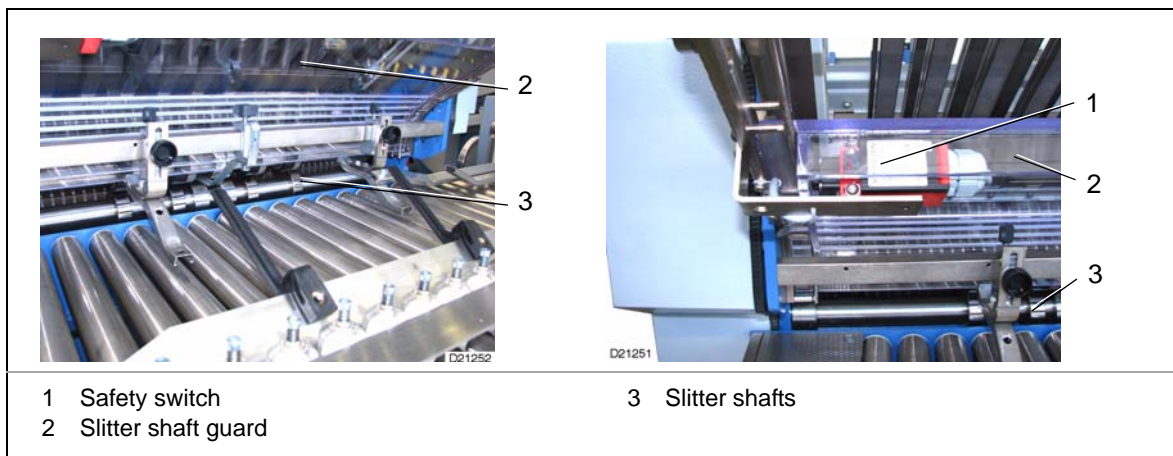


Figure 65: Slitter shaft guard

For technical safety reasons, the function of the slitter shaft guard must be checked monthly.

Functional test of the safety switch:

Procedure:

Shutoff function:

- ▷ Start the machine
- ▷ Slowly pull the slitter shaft guard (2) upwards.
The safety switch (1) must shut off the machine after a maximum of one centimeter (0.394 in.).

Switch-on function:

- ▷ Close the slitter shaft guard (2) slowly.
The safety switch (1) must switch back on a maximum of one centimeter (0.394 in.) before reaching the lower end position.



If the safe switch-on/switch-off of the safety switch no longer functions, MBO Service or an authorized customer service agent must be notified.

8.3.1.3 Functional test of the noise damping hood

**WARNING!**

Danger from automatic lowering of the open noise damping hood induced by a pressure drop of the pneumatic springs.

Non-observance may possibly cause severe or fatal injuries due to squeezing of body parts.

You can recognize a pressure loss of the pneumatic springs as follows:
The noise damping hood lowers itself automatically from the fully opened position.

- Check the pneumatic springs after each production / daily to ensure they are functioning properly
- Replace the pneumatic springs immediately if there are any signs of pressure loss.
- When opening the noise damping hood, make sure to open it all the way to the limit stop.

Check the pneumatic springs daily for correct function. A pressure drop of ten becomes noticeable only very gradually.

You can recognize a pressure loss as follows:

- ▷ The noise damping hood lowers itself automatically from the fully opened position.
- ▷ You need more force to open the noise damping hoods all the way.
- ▷ Replace the pneumatic springs immediately if there are any signs of pressure loss.



Only have the pneumatic springs replaced by MBO Service or by an authorized customer service agent.

8.3.2 Cleaning



WARNING!

Danger due to running machine parts during initial operation, maintenance and repair.

Non-observance may possibly cause serious personal injuries or even death

- Work at or on the machine must be carried out by trained and authorized personnel only.
- De-energize the machine and secure it against being switched on again by a third party:
- Observe the local occupational safety regulations and electrotechnical regulations.



ATTENTION!

Danger due to heavy contamination.

Heavy contamination can impair the functioning of the machine.

Non-observance may result in property damage.

- Clean the machine after each job (at least once per week).
- Especially clean dirt (paper dust, printing powder, etc.) from moving parts.
- Do not use any aggressive chemical detergents or cleaning agents. If unsuitable detergents or cleaning agents are used, they can attack lacquered surfaces or cause the folding unit coating to swell.
- Never clean the machine using compressed air. (Bearing damage)



ATTENTION!

Danger when lifting heavy machine parts (buckle plates, slitter shafts, etc.)

Non-observance may possibly cause serious personal injuries and damage to property.

To lift heavy machine parts such as buckle plates, slitter shafts, etc., request the help of another person or people.



ATTENTION!

Danger due to improper use of cleaning agents.

Non-observance may result in injuries.

- Avoid any skin contact.
- Wear safety gloves for cleaning tasks.
- Protect your eyes from splashes.
- Check each manufacturer's information to ensure that you are totally informed about the residual dangers in respect to their non-irritant cleansing agents.

**ATTENTION!**

Danger due to cleaning cloths used.

Non-observance may possibly cause serious personal injuries and damage to property.

- Observe fire hazards resulting from the inflammability of the cleansing agent.
- Dispose of the cleaning cloths in an environmentally friendly manner.
- Inform yourself by asking the cleanser manufacturer about what to do with leftovers and about environmentally friendly disposal.

8.3.3 Recommendation of cleansing agents

Flat surfaces and cavities	Suction clean or sweep out
For deposits that adhere to finished surfaces	Solvent-free cleansing agent
Cleaning rollers	<p>MBO Binder GmbH & Co. KG recommends the cleaning solution from the "Varn" company with the No.: "Varn-Wash VM 111 or VWM".</p> <p>A sticker regarding this recommendation can be found in the foldroller area. The "Varn" company is a worldwide supplier for the printing industry. Therefore, it cannot be excluded that in certain other countries different designations are used.</p> <p>Please take the respective order number from the "VARN" technical data sheets.</p>

8.3.4 Cleaning of the machine

Clean the machine at least once per week.

The dust layer must never exceed 1 mm (0.039 in.).

Especially clean dirt (paper dust, printing powder, etc.) from moving parts. Heavy contamination can impair the functioning of the machine.

Procedure:

- ▷ Suck up the dirt.
- ▷ Use a brush for hard-to-reach areas.
- ▷ Wipe down the surfaces using a dry cloth.
- ▷ Do not use any aggressive chemical detergents or cleaning agents.
- ▷ Never clean the machine using compressed air, as ingress of dirt destroys the bearings.

8.3.5 Cleaning the foldrollers



Deposits of printing powder and/or printing ink on the foldrollers can lead to a reduction in quality of folding products.

Clean the foldrollers weekly and as needed.

Spiral foldrollers

Procedure:

- ▷ Before cleaning the foldrollers, switch off the machine at the main switch and secure it from being switched on again.
- ▷ To clean the foldrollers, use the roller cleaning agent "Varn-Wash VM 111" or "VWM" only.
- ▷ Use only linen cloths as cleaning cloths.
- ▷ Moisten the linen cloth using the roller cleaning agent.
Never immerse the foldrollers in the roller cleaning agent.
Penetrating roller cleaning agent can destroy the bearings.
- ▷ Use the linen cloth to remove the deposits on the foldrollers.
- ▷ Apply only a little pressure when rubbing.
- ▷ Dry the foldrollers with a dry linen cloth.



CAUTION!

Danger caused by incorrect cleaning of high-grip foldrollers.

Non-observance may possibly cause property damage.

Note especially the special cleaning instructions for high-grip foldrollers.

High-grip foldrollers

High-grip foldrollers have an open-pored surface.

If small particles or partially dissolved printing ink or printing powder are absorbed by this surface, they harden and the high-grip foldrollers become unusable.

Procedure:

- ▷ Before cleaning the foldrollers, switch off the machine at the main switch and secure it from being switched on again.
- ▷ To clean the high-grip foldrollers, use the roller cleaning agent "Varn-Wash VM 111" or "VWM" only.
- ▷ Use only linen cloths as cleaning cloths.
- ▷ Moisten the linen cloth using the roller cleaning agent.
Never soak the high-grip foldrollers with the roller soap.
- ▷ Use the linen cloth to remove the deposits on the high-grip foldrollers.
Exert only slight pressure.
- ▷ After cleaning the high-grip foldrollers, switch on the folding machine at the main switch.
- ▷ Ensure that no other persons are near the machine.
- ▷ Start the folding machine and set the speed to the maximum value.
- ▷ The centrifugal force produced will fling the partially dissolved ink and powder particles as well as absorbed roller soap from the roller surface covering.
- ▷ Stop the machine and switch off the main switch and secure it from being switched on again.
- ▷ Wipe the high-grip foldrollers with a dry linen cloth. Exert only slight pressure.
- ▷ Remove the ink and powder particles thus flung out from the machine.

8.3.6 Cleaning the lower buckle plates



ATTENTION!

Danger when lifting heavy machine parts (buckle plates, slitter shafts, etc.)

Non-observance may possibly cause serious personal injuries and damage to property.

To lift heavy machine parts such as buckle plates, slitter shafts, etc., request the help of another person or people.



Clean the lower buckle plates at least once per week.
Especially clean dirt (paper dust, printing powder, etc.) from moving parts.
Heavy contamination can impair the functioning of the machine.

Procedure:

- ▷ Remove the lower buckle plates.
- ▷ Vacuum these using an industrial vacuum cleaner.
- ▷ Reinstall the lower buckle plates.

8.3.7 Cleaning the optical sensors

The optical sensors of the machine get dirty during production due to paper dust and printing powder.

Therefore, they should be cleaned after each job (at least once per week).

Procedure.

Clean the optical elements of the sensors with a dry, lint-free cloth.

8.4 Maintenance



WARNING!

Danger of being drawn in.

Non-observance may cause severe personal injuries.

If the safety handwheel is removed when the machine is running, there is a danger of being drawn in by the groove in the handwheel shaft.

Shut down the machine and secure it against starting up again unintentionally.

8.4.1 Checking the drive belt for the rollers for register table

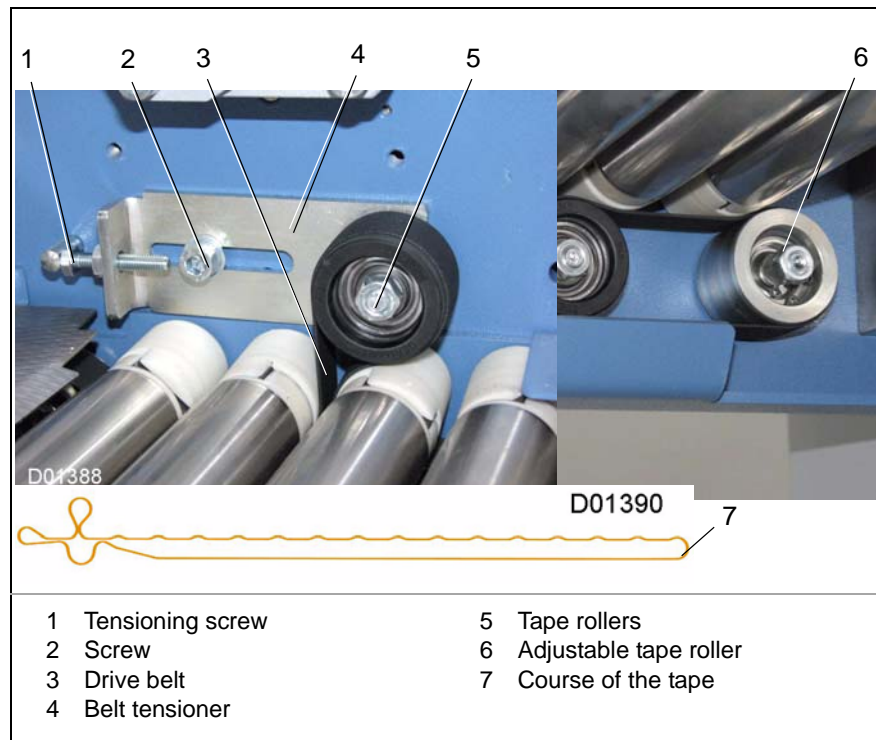


Figure 66: Drive belt for alignment table

Check the drive belt monthly for its running properties, tension and condition.

If it is no longer possible to adjust centered running or achieve the necessary tension or if the general condition of the belt is poor, it must be replaced.

Procedure:

- Removing the guard:** ▷ Remove the guard over the belt tensioner (4).
- Centering the belt:** ▷ It is centered using the adjustable tape roller (6).
This is located in the infeed area below the rollers for register table.
- Tensioning the belt:**
 - ▷ Loosen the screw (2).
 - ▷ Tension the drive belt (3) using the tensioning screw (1).
 - ▷ Tighten the screw (2).
- Replacing the belt:**
 - ▷ Loosen the screw (2).
 - ▷ Release the drive belt (3) using the tensioning screw (1).
 - ▷ Insert the new drive belt (3) according to the belt course (7).
 - ▷ Tension the drive belt (3) using the tensioning screw (1).
 - ▷ Check the centric running of the drive belt (3).
 - ▷ Tighten the screw (2).
- Attaching the guard:** ▷ Reattach the guard over the belt tensioner (4).

8.4.2 Check/exchange main drive belt

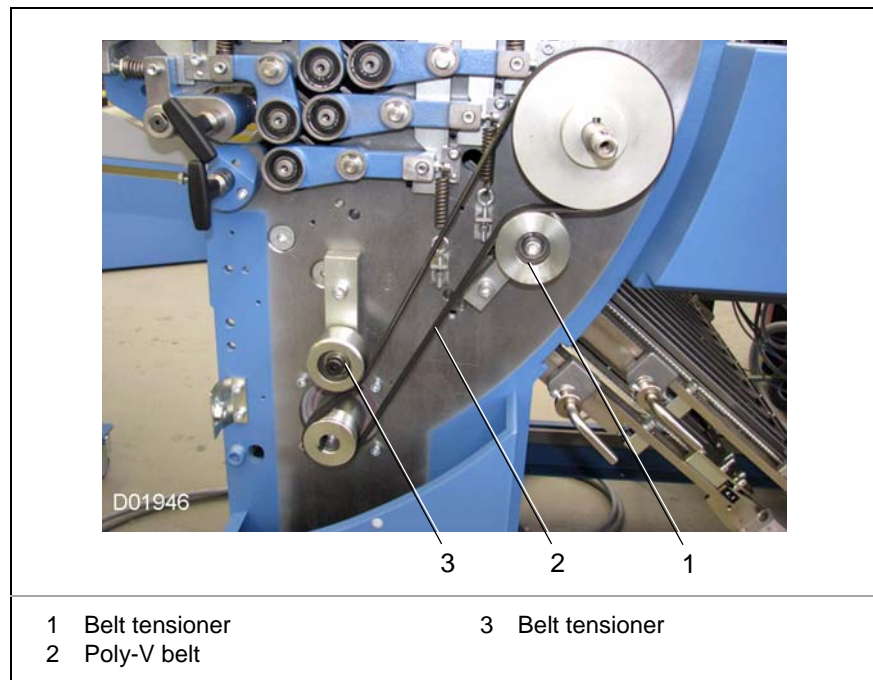


Figure 67: Check/exchange main drive belt

Check the main drive belt monthly for its running properties, tension and condition.

If it is no longer possible to adjust centered running or achieve the necessary tension or if the general condition of the belt is poor, it must be replaced.

Procedure:

- Removing the guard:**
- ▷ Remove the handwheel (be careful of the key).
 - ▷ Remove the guard above the main drive.
- Tensioning the belt:**
- ▷ Tension the Poly-V belt (2) with the belt tensioner (3).
- Replacing the belt:**
- ▷ Loosen the belt tensioner (3).
 - ▷ Remove the Poly-V belt (2).
 - ▷ Insert the new Poly-V belt (2).
 - ▷ Tension the Poly-V belt (2) with the belt tensioner (3).
- Attaching the guard:**
- ▷ Reattach the guard above the main drive.
 - ▷ Reattach the handwheel (be careful of the key).

8.4.3 Checking the drive belt for foldrollers and slitter shafts

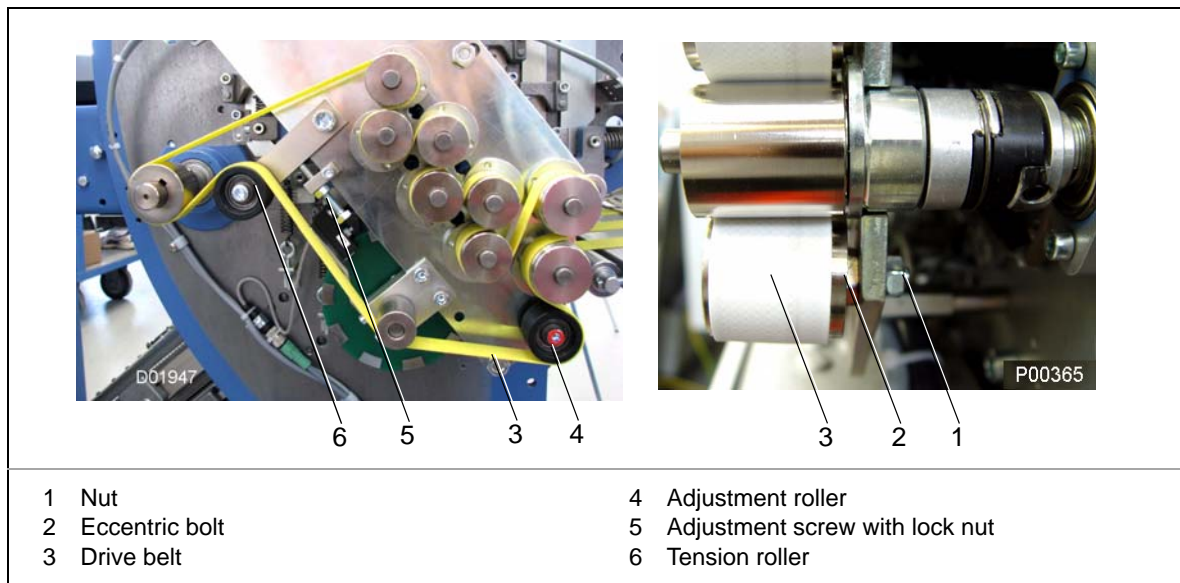


Figure 68: Drive belt for foldrollers and slitter shafts

Check the drive belt monthly for its running properties, tension and condition.

If it is no longer possible to adjust centered running or achieve the necessary tension or if the general condition of the belt is poor, it must be replaced.

Procedure:

- Removing the guard:**
- ▷ Remove the handwheel (be careful of the key).
 - ▷ Remove the guard above the drive belt.

- Adjusting the drive belt:** (The adjustment roller is marked red).
- ▷ Loosen the nut (1).
 - ▷ Adjust the centric running of the drive belt (3) by turning the eccentric bolt (2).
To do so, use a 17 mm flat open-end wrench.
 - ▷ Tighten the nut (1) again.

- Replacing the drive belt:**
- ▷ Loosen the lock nut at the adjusting screw (5).
 - ▷ Turn the adjustment screw (5) counterclockwise until the tension roller (6) is free.
 - ▷ Note the belt course and remove the old drive belt (3).
 - ▷ Insert the new drive belt (3) according to the belt course.
 - ▷ Tighten the belt (3) using the tension roller (6) and the adjustment screw (5).
 - ▷ Counter the adjustment screw (5).
 - ▷ Adjust the centric running of the drive belt (3).
Refer to the item "Adjusting the drive belt".

- Attaching the guard:**
- ▷ Reattach the guard over the drive belt (3).
 - ▷ Reattach the handwheel (be careful of the key).

8.5 Maintenance, lubrication and cleaning schedule



ATTENTION!

Danger of wrong maintenance, greasing and cleaning intervals at multishift operation.

Non-observance may result in property damage.

- All specified maintenance, lubrication and cleaning intervals apply to single-shift operation.
- Convert the indicated intervals for multishift operation accordingly

	Chapter No.:	Working process	Interval	Date	Signature
Operational maintenance	8.3.1	“Checking the safety devices”	Daily		
	8.3.4	“Cleaning of the machine”	Weekly		
	8.3.5	“Cleaning the foldrollers”	Weekly		
	8.3.6	“Cleaning the lower buckle plates”	Weekly		
	8.3.7	“Cleaning the optical sensors”	Weekly		
Lubrication		See Chapter "8.3 Operational maintenance"			
Maintenance	8.4.1	“Checking the drive belt for the rollers for register table”	Monthly		
	8.4.2	“Check/exchange main drive belt”.	Monthly		
	8.4.3	“Checking the drive belt for foldrollers and slitter shafts”	Monthly		

Table 19: Maintenance, greasing, and cleaning plan



MBO recommends attaching a copy of this maintenance, greasing, and cleaning plan to the machine.

9 Shutdown, storage

9.1 Introduction

9.1.1 Qualification of personnel

This table lists the necessary qualification of the personnel related to "Shutdown and storage" of the machine.

	Specially trained personnel	Instructed operating personnel	Instructed personnel with specialized training (mechanical/electrical engineering)
Shutdown	-	-	X
Bearing assembly	X	-	-
Putting the machine back into operation	-	-	X

Table 20: Qualification of personnel; Shutdown, storage
Key: X permitted, - not permitted

9.1.2 Safety instructions



WARNING!

Danger from incorrect storage.

Disregard can lead to serious damage to property

Observe the corresponding storage conditions.

9.2 Shutdown

9.2.1 Temporary shutdown:

Procedure:

- ▷ Shut down machine.

- ▷ Stop compressed air supply to the machine.
 - ▷ Remove products, tools from the machine.
 - ▷ Clean and maintain machine.
See Chapter "8 Maintenance".
-



After a temporary shutdown, the machine must be commissioned again.
See Chapter "6 Transport/Installation/Initial operation"

9.2.2 Final decommissioning

Procedure:

- ▷ Shut down machine.
- ▷ Have the machine disconnected from the power supply by a licensed electrician.
- ▷ Disconnect the machine from the compressed air supply.
- ▷ Remove products, tools from the machine.
- ▷ Dismantle the machine by following the installation steps in the opposite sequence.
 - For transport, observe the instructions in Chapter "6 Transport/Installation/Initial operation".

9.3 Bearing assembly



WARNING!

Danger from incorrect storage.

Disregard can lead to serious damage to property

Observe the corresponding storage conditions.

- ▷ Check the premises in respect of temperature and humidity. See Chapter "3.2.6 Ambient conditions".
The higher the humidity, the greater the danger of corrosion.
- ▷ For long-term storage, measures for corrosion protection must be taken.
- ▷ Observe the specifications regarding the weight and size of the machine when selecting the premises.
See Chapter "3.2 Technical data"
- ▷ Prepare the gears/transmission for storage. You should also take into consideration that the prerequisites vary from case to case. Therefore, please contact the supplier of the gears/transmission and motor and follow the respective manual.
- ▷ Use a suitable fork lift for transport.
See Chapter "3.2.4 Weights, fork lifts, and floor requirements".
- ▷ Cover the machine with foil.

10 Disposal

10.1 Introduction

10.1.1 Qualification of personnel

This table lists the necessary qualification of the personnel related to "Disposal" of the machine.

	Specially trained personnel	Instructed operating personnel	Instructed personnel with specialized training (mechanical/electrical engineering)
Disposal	X	-	-

Table 21: Qualification of personnel; Disposal
Legend: X permitted, - not permitted

10.1.2 Safety instructions



CAUTION!

Danger from incorrect disposal.

Non-observance may cause environmental damage.

Comply with the corresponding federal and regional regulations, laws and directives.

10.2 Disposal/recycling

The environmentally compatible and professional disassembly and disposal of the machine is the responsibility of the owner/operator.

European Community member countries:

- Comply with the corresponding European directives.
- Comply with the corresponding federal and regional laws and regulations.

Non-EU countries:

- Comply with the corresponding federal and regional regulations, laws and directives.

Procedure:

- Decommission the machine prior to disposal. See Chapter "9.2 Shutdown".
- For transport, observe the instructions in Chapter "6 Transport/Installation/Initial operation"
- Separate machine parts and electrical components by type and dispose of them properly.



All parts, consumables, and supplies of the machine:

- Separate by type
- Dispose of in accordance with local regulations, laws, and directives.



If you have any further questions regarding disposal, please contact the manufacturer!

The MBO group worldwide:

MBO Germany



MBO Maschinenbau Oppenweiler Binder GmbH & Co. KG
Postfach 1169
71567 Oppenweiler
GERMANY
Tel.: +49 7191 46 0
Fax: +49 7191 46 34
<http://www.mbo-folder.com>
info@mbo-folder.com

MBO Portugal



MBO Binder-Maquinas Graficas, S.A.
Rua Joaquim Alves da Silva 240
4456-473 Perafita
PORTUGAL
Tel.: +351 22 99822 00
Fax: +351 22 99822 01
<http://www.mbo-folder.com>
info@mbo-folder.com

MBO America



MBO Binder & Co. of America
400 Highland Drive
Westampton, NJ 08060
USA
Tel.: +1 609 267 2900
Fax: +1 609 267 1477
<http://www.mboamerica.com>
info@mboamerica.com

MBO France



MBO France SAS
Z. A. Burospace N° 3
Route de Gisy B.P. 33
91571 Bievres Cedex
FRANCE
Tel.: +33 1 6935 5090
Fax: +33 1 6935 5099
<http://www.mbo-folder.com>
info@mbofrance.fr

MBO China



MBO Binder Graphic Systems (Beijing) Co. Ltd.
Rm 201, Haishunde Building, No.A1,
Donghuanbei Road, BDA,
Beijing 100176
P.R. CHINA
Tel.: +86 10 6786 4021
Fax: +86 10 6787 3502
<http://www.mbo-folder.com.cn>

Herzog & Heymann



Herzog & Heymann GmbH + Co. KG
Postfach 110355
33663 Bielefeld
GERMANY
Tel.: +49 5205 7509 0
Fax: +49 5205 7509 20
<http://www.herzog-heyman.com>
info@herzog-heyman.com
