Folding unit I

Translation of the original operating manual

T 535
EFFICIENCY
AUTOMATIC

Preserve for future apply!

Machine type:	Folding unit I		
Configuration:	T 535, EFFICIENCY, AUTOMATIC		
Type of document:	Translation of the original operating manual		
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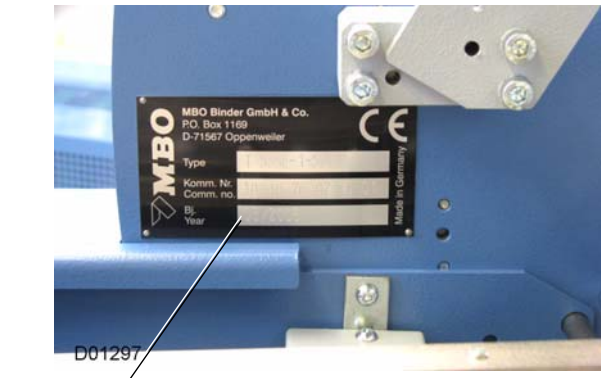
Manufacturer:	MBO Maschinenbau Oppenweiler Binder GmbH & Co. KG Postfach 1169 71567 Oppenweiler GERMANY Tel.: +49 7191 46 0 Fax: +49 7191 46 34 http://www.mbo-folder.com info@mbo-folder.com		

Subject to modifications!

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.



1	CE identification	4	Year of construction
2	Press model	5	Label
3	Order number		

Figure 1: Label

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

- Order number
- Press model

EC Declaration of Conformity

in according with 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 I
Type	T 535 EFFICIENCY AUTOMATIC
Year of manufacture	

complies with the provisions specified by the following EC 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

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Oppenweiler, 28 April 2010

_____

Eberhard Krieger - Manager director

_____

Siegfried Wentsch - Design Director

Table of contents

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, sets up, 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	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 Explanation of safety messages

1.4.1 Safety messages

Word messages that provide information primarily about the nature of a hazardous situation, the consequences of not avoiding a hazardous situation, and/or method(s) for avoiding a hazardous situation.

1.4.2 Safety alert symbol

This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.

1.4.3 Signal words

A signal word calls attention to a safety message or messages, or a property damage message or messages, and designates a degree or level of hazard severity.

Signal word panel	Definition	Objective
DANGER	DANGER indicates a hazardous situation which, if not avoided, will result in death or serious injury.	Avoidance of personal injury.
WARNING	WARNING indicates a hazardous situation which, if not avoided, could result in death or serious injury.	Avoidance of personal injury.
CAUTION	CAUTION indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.	Avoidance of personal injury.
NOTICE	NOTICE indicates a property damage message.	Avoidance of property damage.

Table 3: Definition of signal words

1.4.4 Components of a safety message

A safety message contains the following components:

- Signal word panel.
- Type of hazard.
- Potential consequences of the hazard.
- Evasive/avoidance actions to be taken.

Example:

Safety message:

Type of hazard.
Potential consequences of the hazard.
Evasive/avoidance actions to be taken.

1.4.5 Components of a property damage message

A property damage message contains the following components:

- Signal word.
- Type of hazard.
- Potential consequences of the hazard.
- Evasive/avoidance actions to be taken.

Example:

Property damage message:

Type of hazard.
Potential consequences of the hazard.
Evasive/avoidance actions to be taken.

1.4.6 Safety symbols

A safety symbol representation intended to convey a message without the use of words.
It may represent a hazard, a hazardous situation, a precaution to avoid a hazard, a result of not avoiding a hazard, or any combination of these messages.

Plotting	Significance
	**Prohibition safety symbol** Red border, white background, black symbol Safety sign that forbids a behavior that could cause danger.
	**Warning safety symbol** Yellow background, black symbol Safety sign that warns about a danger.
	**Mandatory safety symbol** Blue background, white symbol Safety sign that prescribes a particular behavior.
	**Rescue symbol** Green background, white symbol 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.
	**Fire protection symbol** Red background, white symbol 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.

Table 4: Safety symbols

1.4.7 Warning safety symbols

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 basic prerequisite for trouble-free operation of this machine and handling it according to safety standards is knowledge of the basic safety instructions and the safety regulations.

- Read and understand this manual before using this machine to avoid injury.
- Improper use of the product can result in serious injury or death.
- Follow the safety information in this manual.
- Follow the local accident prevention regulations and environmental regulations.
- Keep this manual.

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.

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.

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:

- Improper 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, setup, maintenance, and storage of the machine.
- Individual constructional changes to the machine.
- Non-compliance of maintenance and cleaning intervals which exclude a machine down-time.
- 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 must 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 tipping machine parts while unloading and installing the machine.
- Danger due to insufficient properties and condition of the underfloor.

2.5.2 Installation, initial operation

- 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 when lifting heavy machine parts (control cabinet, pumps, buckle plates, slitter shafts, etc.).
- Danger of electric voltage.
- Danger from incorrect use of the sockets.
- Danger from leakage currents greater than 10 mA.
- Danger from disconnected ground wire connections.
- Danger of tripping on cables lying about.

2.5.3 Adjustment and operation

- Danger when dismantling, bridging or avoiding safety and protective devices.
- Danger from automatic lowering of the open noise damping hood.
- Danger from incorrectly configured safety switches on the slitter shaft guard.
- Danger from rotating machine parts.
- Danger from rotating knives and slitter shafts.
- Danger when adjusting the compactor.
- Danger when pulling out/removing the buckle plates.
- Danger when lifting heavy machine parts.
- Danger from incorrect handling of the safety handwheels.

- Danger due to acoustic pressure
- Danger from incorrect use of the sockets.
- Danger of tripping on cables lying about.
- Danger through using several coupling modules in one machine assembly.

2.5.4 Maintenance

Cleaning:

- Danger from rotating machine parts during operational maintenance.
- 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.

Maintenance:

- Danger of electric voltage.
- Danger when dismantling, bridging or avoiding safety and protective devices.
- Danger due to operation without protective covers.
- Danger from rotating machine parts during maintenance.
- Danger from improper maintenance of the pressure vacuum pump.
- Danger due to maintenance tools.
- Danger of being drawn in.

Repair:

- Danger from improper repair

2.6 Life time

2.6.1 Life time of the machine

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

2.6.2 Life time of the operating manual

If handled with care, a life time of 20 years can be expected.

If the operating manual is no longer present or is illegible, it must be replaced.

For the necessary order information, refer to the type plate of the machine. See Chapter "8.2.1 Ordering spare and wear parts".

2.6.3 Life time of product safety labels

If handled with care, a life time of 20 years can be expected.

If product safety labels become damaged or illegible, they must be replaced.

For the corresponding MBO part number, refer to Chapter "2.13.2 Location and content".

2.7 General safety instructions

2.7.1 Transport, interim storage

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

2.7.2 Installation, initial operation

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

2.7.3 Normal operation

- Only instructed operating personnel may operate the machine.
- The operating personnel must have reached the age of 18.
- 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. If 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 unauthorized or inadvertent switching-on. 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 technicians 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 to be switched off for maintenance and/or service work, it must be secured against unauthorized or inadvertent switching-on. 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 electrically operated machines or equipment must be done only in accordance with the electrotechnical regulations by a licensed electrician or instructed personnel under guidance and supervision of a licensed 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 18,
- 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	-	-
Set-up	-	-	X
Electrical connections	-	-	X
Network connection	-	-	X
Starting up	-	-	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)
Troubleshooting (mechanical/electrical	-	-	X
Set-up, retrofitting	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

2.11.2 Operational maintenance (cleaning)



The owner/operator must provide the following personal protective equipment for operational maintenance (cleaning):

- Safety glasses
- Suitable safety gloves
- Safety shoes

2.12 Safety and protective devices

2.12.1 Overview

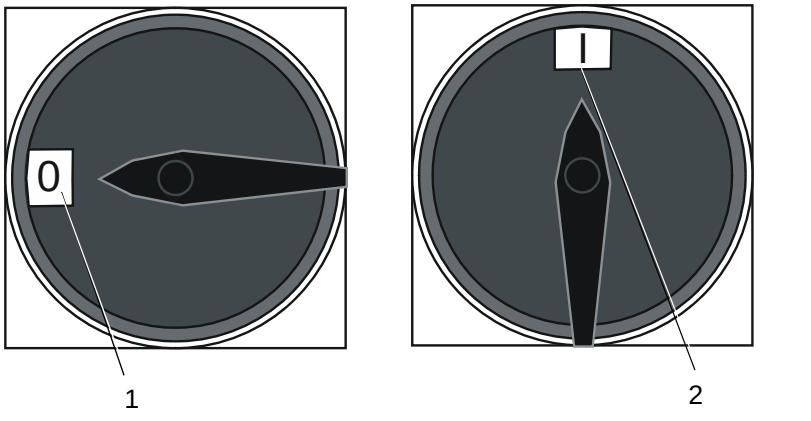
The following safety and protective devices are present at or on the machine.

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

1	Main switch	4	Safety handwheel
2	EMERGENCY STOP palm button	5	Slitter shaft guard
3	Additional protective devices	6	Noise damping hoods

Figure 2: Overview

2.12.2 Main switch



1	Main switch OFF	2	Main switch ON

Figure 3: Main switch

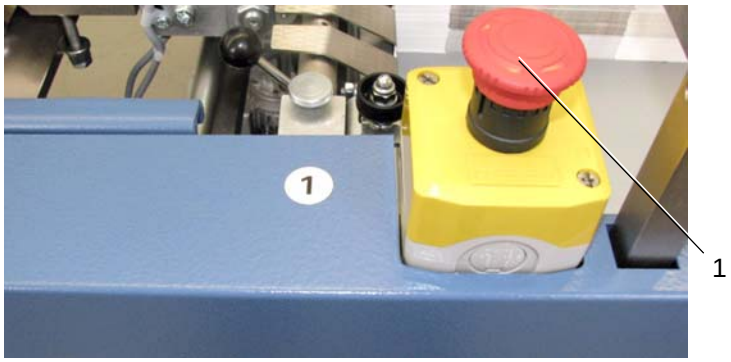
The main switch has the following properties:

- 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 switching off the main switch 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



1 EMERGENCY STOP palm button

Figure 4: 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!

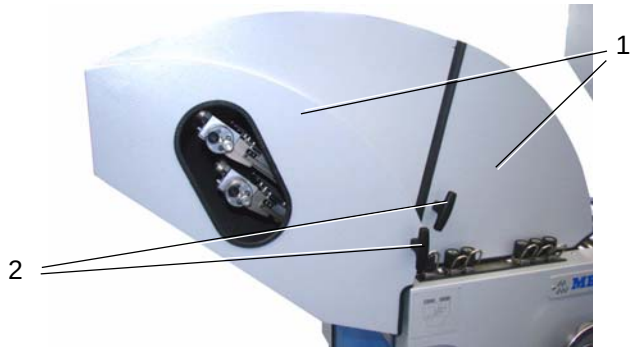
2.12.4 Noise damping hood

WARNING

Loud noise emission.

Hearing damage hazard.

- 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.



1 Noise damping hood 2 Grip

Figure 5: Noise damping hood

The noise damping hoods have the following functions:
- 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

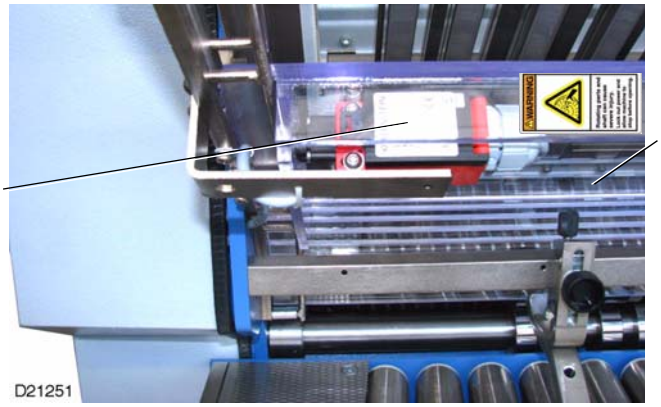
Procedure:

▷ 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

Rotating knives and slitter shafts.
Drawing-in and cut and crush hazard.
Never reach into the slitter shafts while the machine is running.



1 Slitter shaft guard
2 Safety switch

Figure 6: Safety switch for slitter shaft guard

The slitter shaft guard has the following functions while the machine is running:

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

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.

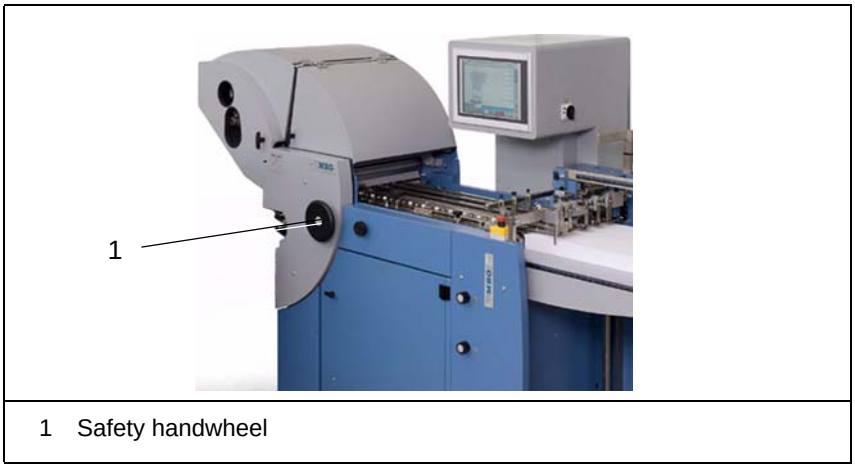
2.12.6 Safety handwheel

WARNING

Incorrect handling of the safety handwheels.

Non-compliance may cause serious personal injuries or even death

- Turn the safety handwheel only when the machine is not moving.
- Press the EMERGENCY STOP palm button.
- Operate the machine only with safety handwheels installed. Otherwise there is danger of being drawn in.
- Replace defective safety handwheels only with new safety handwheels with an overrunning clutch.



1 Safety handwheel

Figure 7: Safety handwheel

The safety handwheel has an overrunning clutch and is intended for turning the machine manually:

- during setup tasks
- when there is a paper jam.

Procedure:

▷ Stop the machine.
▷ Press the EMERGENCY STOP palm button.
▷ Pull the safety handwheel towards you.
The overrunning clutch is released.
▷ Turn the safety handwheel.
Direction of rotation:
Clockwise = Machine rotates forwards.
Counterclockwise = Machine rotates backwards.

2.12.7 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 "2.12.10 Checklist for safety and protective devices".

2.12.8 Faulty safety and protective devices

Faulty safety and protective devices can lead to hazardous situations.

For this reason:

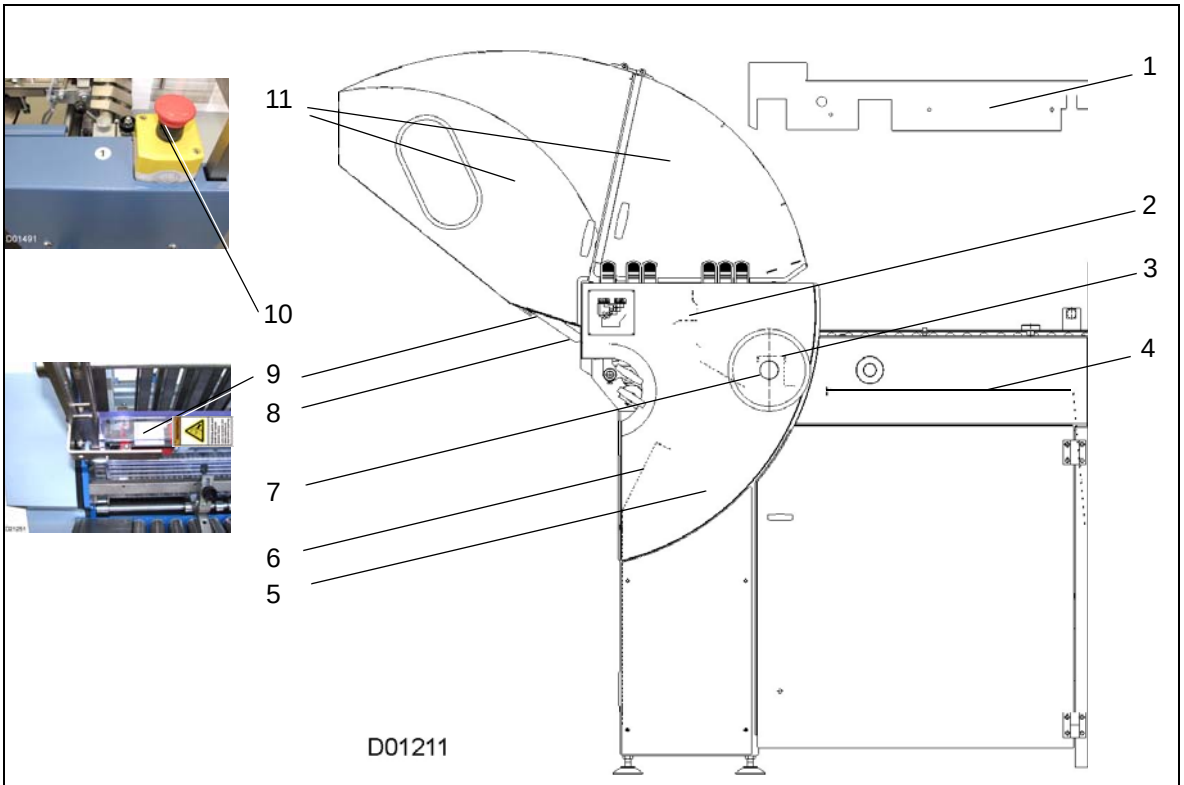
▷ switch off the main switch,
▷ use a padlock to secure it from being switched on again,
▷ if necessary, disconnect the supply of compressed air and electrical current.
▷ Immediately repair faulty safety and protective devices.

2.12.9 Checking safety and protective devices

All safety and protective devices must be checked regularly.
For the corresponding inspection intervals, see Chapter "2.12.10 Checklist for safety and protective devices"
For the corresponding procedure, see the Maintenance chapter.

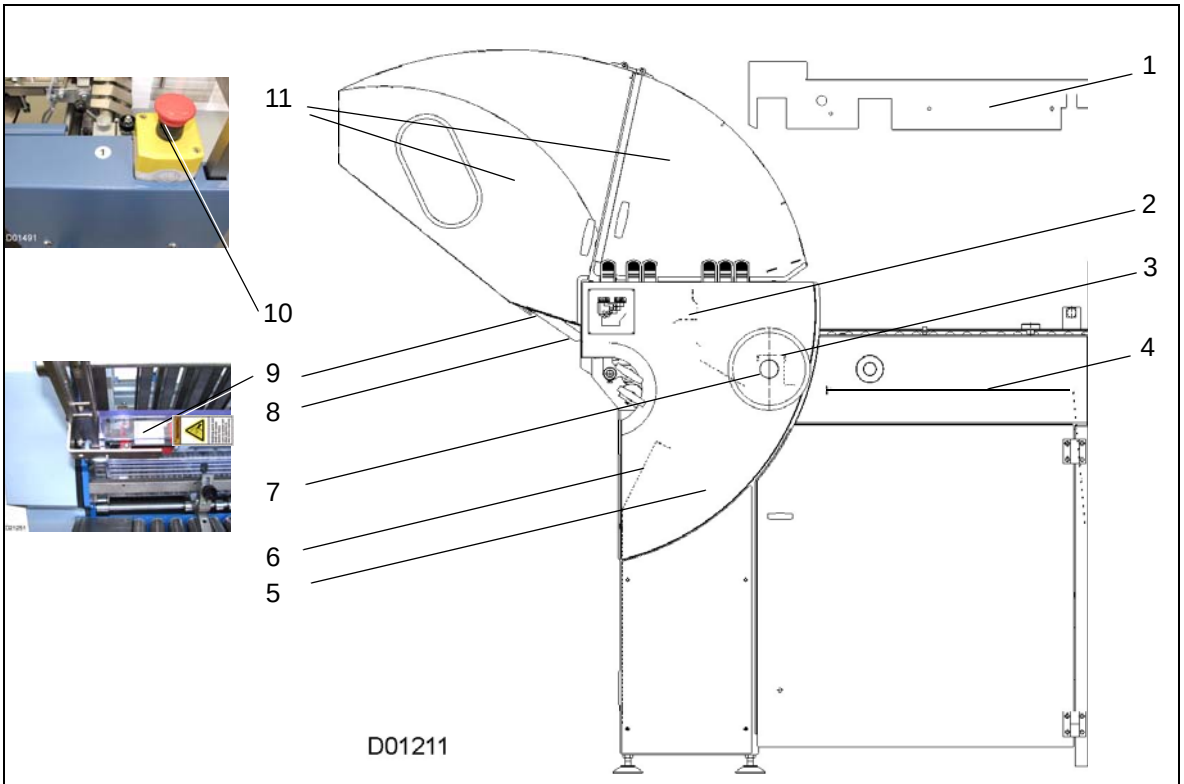
2.12.10 Checklist for safety and protective devices

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 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 handwheel shaft				Weekly
7	Safety handwheel (drive side, operator side)				Weekly

Table 7: Checklist for safety and protective devices



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::	

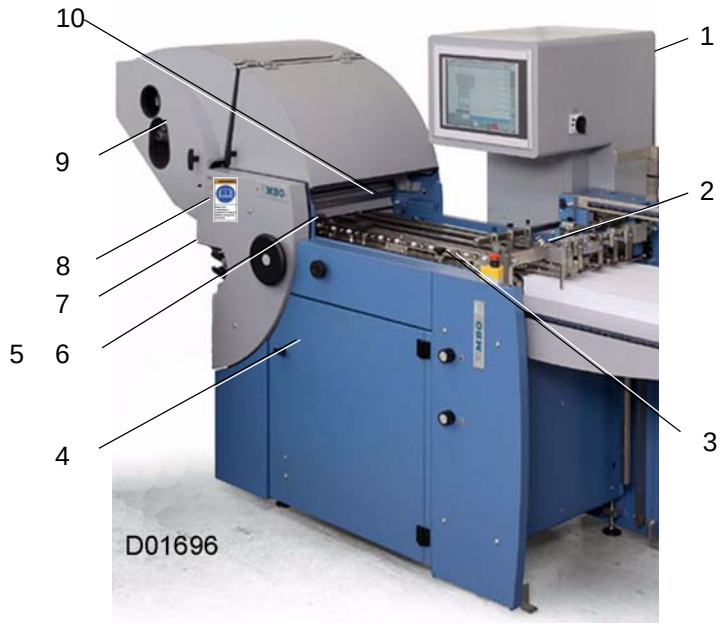
Table 7: Checklist for safety and protective devices

2.13 Product safety signs or labels

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 numbers, refer to Chapter "2.13.2 Location and content".

2.13.1 Overview



1	Control cabinet	6	Parallel fold transfer
2	Suction wheel	7	Slitter shaft guard
3	Marble rail	8	Guard of parallel fold
4	Lower buckle plates	9	Upper buckle plates
5	Handwheel shaft	10	Shaft cleaning agent

Figure 8: Overview of warnings

2.13.2 Location and content

Pos. 01 Control cabinet	MBO part No.:

1313998

Meaning:

Hazardous voltage.

Risk of electrical shock or burn.

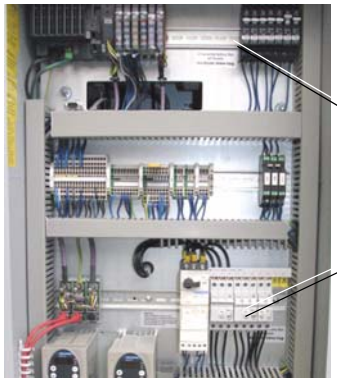
- Work on the electric components of the machine may be performed by a licensed electrician only.
- Observe the local occupational safety regulations and electrotechnical regulations.
- Turn the main switch to the position <0>.
- Use a padlock to secure the main switch from unintentionally switching on again.
- Even when the main switch is switched off, hazardous voltage is present at the power supply terminals and/or the terminals of the main switch. (See wiring diagram)
- Even when the main switch is switched off, hazardous residual voltage is present at the terminals of the frequency converter. (Observe the capacitor discharge time (KEB 5 min, Telemecanique 15 min)).

1316728

Meaning:

- Use the 220 VAC socket exclusively for options such as glue units.
- Before connecting it, observe the indicated nominal voltage, nominal frequency, and nominal current.

Pos. 01 Control cabinet	**MBO part No.:**



Characteristic for all fuses medium time-lag

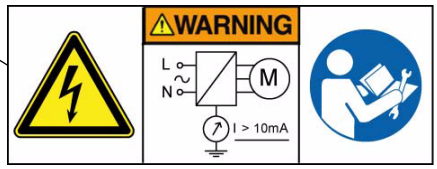
1318948

Meaning:
Replace any defective fuses only with fuses that have the same properties.

USE COPPER WIRE ONLY!

1318955

Meaning:
Use only copper cables for the power supply.



1711183

Meaning:

Leakage currents are greater than 10 mA.

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

- 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).
  Optimum = AWG 7 (Cu)
  (see Chapter "6.8.6 Additional equipotential bonding strip").

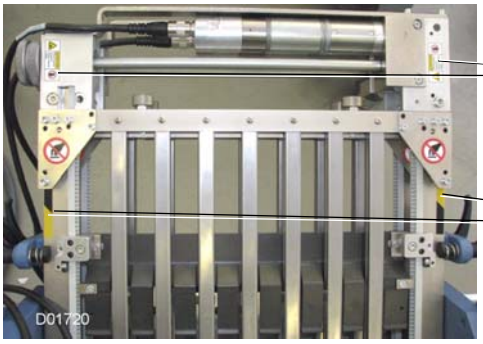
Pos. 02 Suction wheel	MBO part No.: 1310960

Meaning:
Pinch point, moving parts.
Drawing-in and crush hazard.
Never reach below the suction wheel while the machine is running.

Pos. 03 Marble rail	MBO part No.: 1310960

Meaning:
Pinch point, moving parts.
Crush hazard.
Never reach into the holes of the marble rail while the machine is running.

Pos. 04 Pos. 09	Buckle plates	MBO part No.:



1310960

1310952

Meaning:

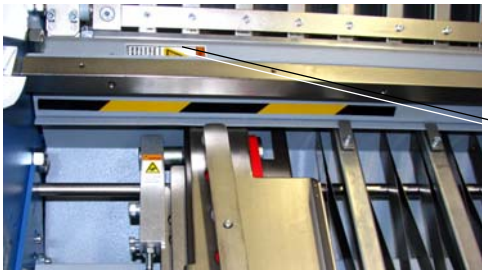
Pinch point, moving parts.

Crush hazard.

When starting the automated format change, observe the following precautions:

- Do not reach into the buckle plates.
- Make absolutely sure that there are **no** other people on the machine.

Pos. 04 Pos. 09	Buckle plates	MBO part No.: 1310911



Meaning:

Pulling out/removing the buckle plates.

The exposed, rotating foldrollers and slitter shafts make up hazardous infeed points.

Non-compliance may cause serious personal injuries or even death

- All adjustment or testing/inspection work may be carried out only when the machine is stopped and secured against switching on.
- Press the EMERGENCY STOP palm button.
- Always have the adjustment or testing/inspection work carried out by one individual person only.
- A crush hazard and danger of injuries is also present when turning the machine using the safety handwheel.

Pos. 05 Hand wheel shaft	MBO part No.: 1310945

Meaning:
Pinch point, rotating roller.
Drawing-in and crush hazard.
Never reach towards the shaft while the machine is running.

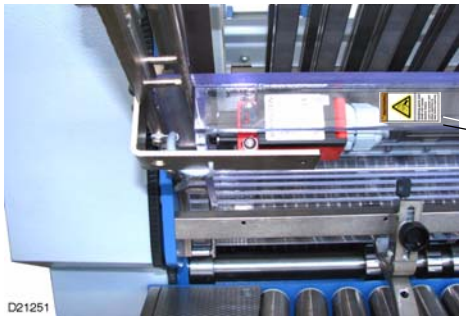
Pos. 06 Parallel fold transfer	MBO part No.:

1310952

1310937

Meaning:
Pinch point, rotating roller.
Drawing-in and crush hazard
Never reach towards the tape roller while the machine is running.

Pos. 07 Slitter shaft guard	MBO part No.: 1310911



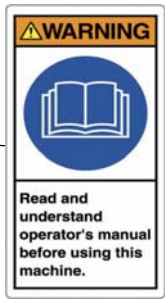
Meaning:

Rotating knives and slitter shafts.

Non-compliance may cause serious cutting injuries or even death.

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

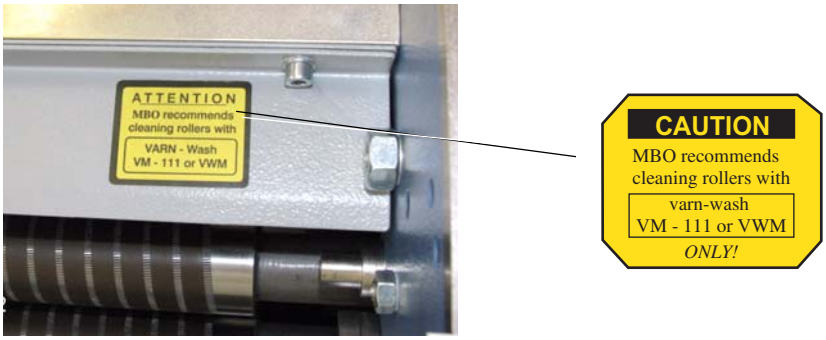
Pos. 08 Read the operating manual	MBO part No.: 1310986



Meaning:

- Read and understand this manual before using this machine to avoid injury.
- Improper use of the machine can result in serious injury or death.
- Follow the safety information in this manual.
- Follow the local accident prevention regulations and environmental regulations.
- Keep this manual.

Pos. 10 Shaft cleaning agent	MBO part No.: 0751438



Meaning:
Danger from incorrect cleaning agent for the foldrollers.
Non-compliance may cause the foldroller coatings to swell.
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.

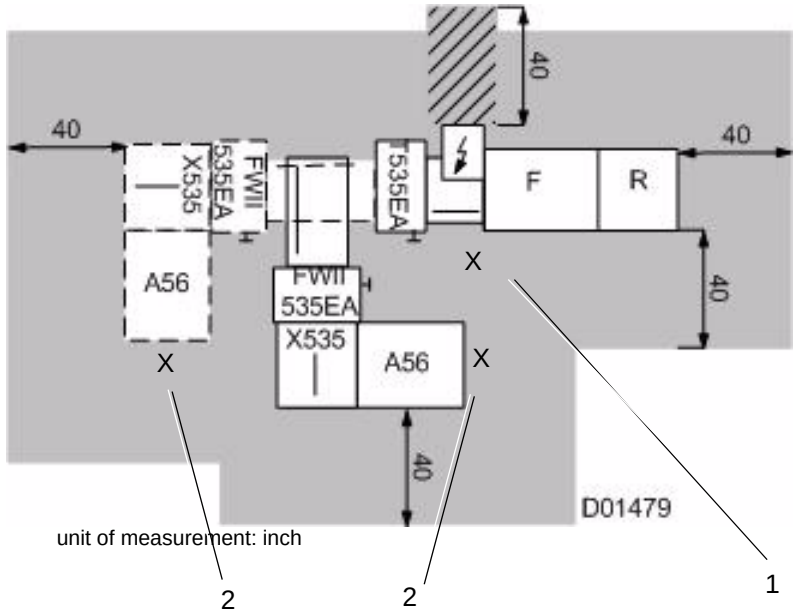
The illustration shows the most important workstations and the work and service area of the machine.

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.



1	Feeder workstation	2	Delivery workstation

Figure 9: 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

1 Machine control
2 Feeder
3 Register table
4 Parallel fold folding unit I
5 Noise damping hoods

Figure 10: Overall view

Standard equipment

- VARIO Control machine control system incl. TOUCHSCREEN.
- Sheet feed via suction wheel
- Register table with lattice.
- Sheet alignment via marble rail
- RAPIDSET, automatic plate and sheet deflector adjustment incl. COMBIPLATE.
- RAPIDSET, automatic slitter shaft and foldroller adjustment.
- Continuous sheet stop in plate 1
- Belt drive system, low maintenance, quiet
- Spiral foldrollers with standard PU roller surface covering
- Slitter shafts, stainless, easily replaced via plug bearings.
- Scoring, perforating and cutting devices for standard jobs

3.2 Technical data

3.2.1 Floor plan, configuration 44X

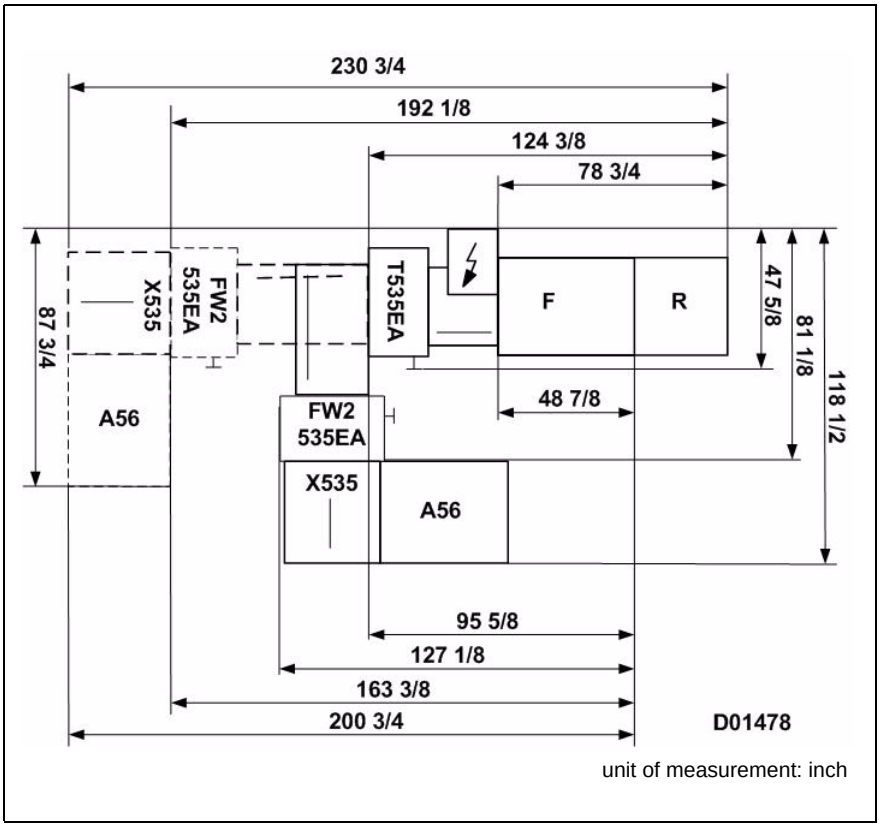


Figure 11: Floor plan T 535EA 44X

3.2.2 Characteristics

Work speed		**Minimum**	**Maximum[1)]**
	VARIO control	1180 in/min	8071 in/min
Sheet paper	**Format (length x width)**	**Minimum (in)**	**Maximum (in)**
	Pile feeder	4 1/8 x 4 1/8	20 7/8 x 33 1/8
	Pile feeder with VACUS-TAR	5 7/8 x 5 7/8	20 7/8 x 33 1/8
	Continuous feeder:	5 7/8 x 7 1/8	20 7/8 x 33 1/8 (39 3/8)
	Basis weight[2)]	**Minimum**	**Maximum**
		33.77 lbs	168.86 lbs first fold 135.09 lbs second fold 118.20 lbs third fold 87.81 lbs fourth fold
Buckle plates	**Fold length**	**Minimum**	**Maximum**
	Combi buckle plate 1+3	1 3/8 in	19 5/8 in
	Combi buckle plate 3-6	1 3/8 in	16 1/2 in
	Gatefold plate	1 3/8 in	15 1/8 in
Slitter shafts	Diameter:		1 1/8 in
	Minimal cutting and perforation length	2 1/2 in	
Foldrollers	Diameter:		1 5/8 in

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 book/offset.

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 EN13023:2004
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)]**
	T535/4 with pile feeder[2)]	1654 lbs	2271 lbs
	T535/6 with pile feeder[3)]	1764 lbs	1080 kg
	T535/4 without feeder[4)]	1014 lbs	1631 lbs
	T535/6 without feeder[5)]	1102 lbs	1720 lbs
Dimensions	**Transport pallet/transportation crate**		
	T535 with pile feeder	100 1/4 x 47 1/4 x 57 1/8 (in)	
	T535 without feeder	78 3/4x 47 1/4 x 59 (in)	
Fork lift[6)]		**T535 with pile feeder**	**T535 without feeder**
	Carrying capacity / load (Q) [7)]	Min. 5511 lbs	Min. 3300 lbs
	Fork tine length	Min. 78 3/4 in	Min. 47 1/4 in
Floor requirements	Cargo[8)]	> 11 kN/m²	
	Levelness[9)]	< 3/8 in/yard	

Table 10: Weights, fork lifts, and floor requirements

1) Machine with transport pallet/with transportation crate + 110 lbs
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 location where the machine is set up
9) In the area of the machine, the total difference in height of 3/8 in must not be exceeded.

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)]	32 A	
Power ratings:	Folding unit 1 [4)]	5 kW	
	Folding unit 1 [5)]	4.5 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) Stationary power supply, N conductor is loaded; a fault-current circuit breaker (FI) must not beused. See Chapter
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 %
	Fuse: [3)]	32 A	
Power ratings:	Folding unit 1 [4)]	5 kW	
	Folding unit 1 [5)]	4.5 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) Stationary power supply, a fault-current circuit breaker (FI) 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:		63 – 95 °F
Storage temperature:		50 – 55 °F
Relative humidity	Optimal Minimum Maximum	40 - 60 % 30 % 80 % (non-condensing)
Installation altitude[1)]		Max. 2625 ft elevation.

Table 14: Ambient conditions

1) Starting at an installation altitude of 2625 ft elevation, special measures must be taken for the pumps. Refer to the manufacturer regarding this issue.

4 Structure and function

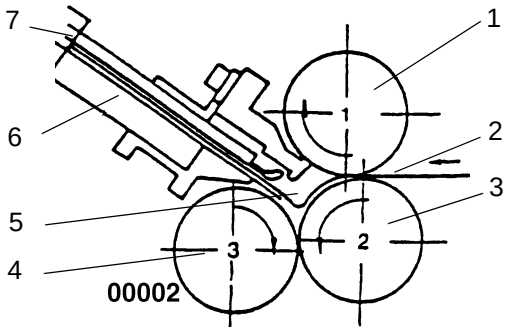
4.1 Introduction

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 predetermined pattern using pressure.
According to bookbinding terminology, the folding line is called fold.

4.1.2 Folding principles

Buckle fold principle:



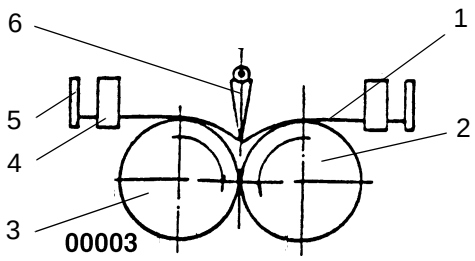
1 Upper foldroller	5 Buckling area
2 Sheet of paper	6 Buckle plate
3 Lower foldroller	7 Sheet stop
4 Lower foldroller	

Figure 12: Buckle fold 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 fold principle



1 Sheet 2 Foldroller 3 Foldroller	4 Sheet stop 5 Lateral sheet stop 6 Folding knife

Figure 13: Knife fold principle

To create a knife fold, two counter-rotating foldrollers and a vertically movable folding knife 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 the knife movement is triggered, the folding knife (4) transports the sheet of paper (1) towards 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 according to the buckle fold principle exclusively.
This results in the following advantages:

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

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 crossfold 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 no folding takes place at this location.
- The position of the break 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:

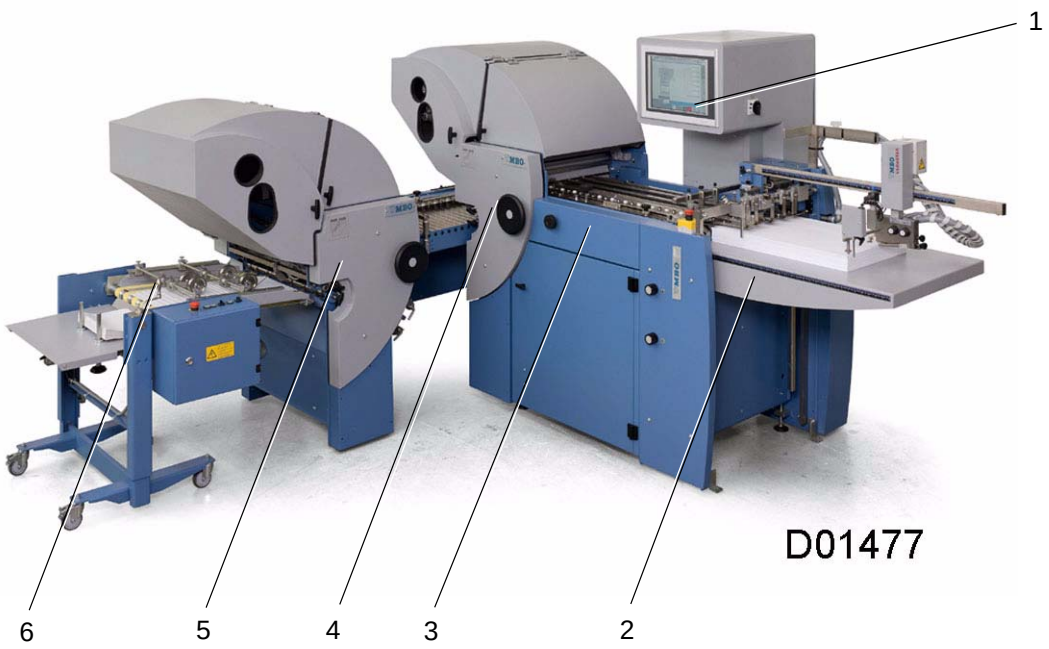
- After each folding unit.

Buckle folding machines can be used for:

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

4.2 Structure

4.2.1 Overall view



1	Machine control	4	Parallel fold folding unit I
2	Feeder	5	Movable buckle folding unit II
3	Register table	6	Stream delivery

Figure 14: 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.

Round stack feeder

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

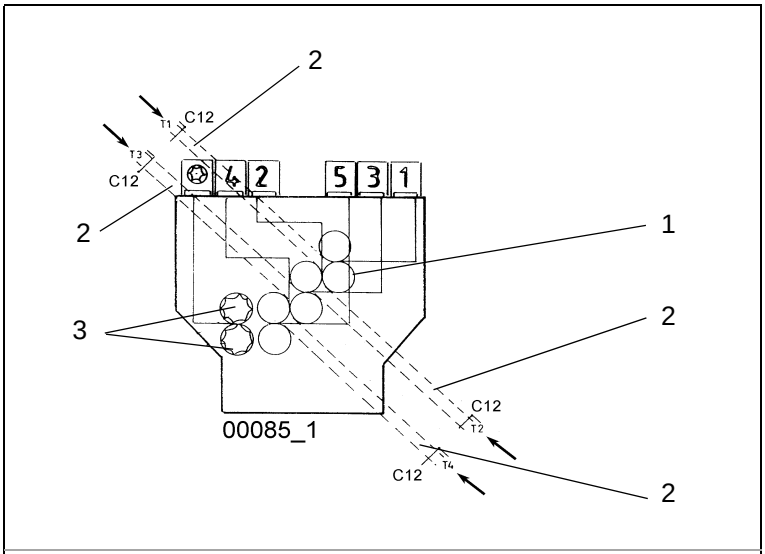
In contrast to the pile feeder, with the round stack feeder somewhat more effort is required for setup and adjustment work, and more space is required.
Thanks to the low feeder table, the sheet feeding is much easier.
The sheets are laid on the feeder table and spread out a bit there, so that they pass 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 fold 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 fold folding unit I and II

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



1 Foldrollers
2 Buckle plates
3 Slitter shafts

Figure 15: Overview of parallel fold 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:

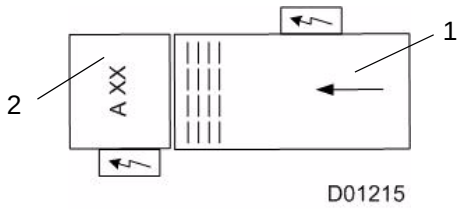
- Variants 4 and 6
- Variants 4X and 6X
- Variants 44, 46, 64 and 66
- Variants 44X, 46X, 64X and 66X

4.3.1 Variants 4 and 6

Explanation of term

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

Schematic depiction



1 Folding unit I 2 Delivery

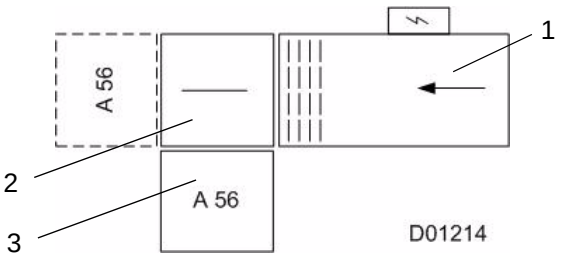
Figure 16: Variants 4 and 6

4.3.2 Variants 4X and 6X

Explanation of term

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

Schematic depiction



1 Folding unit I
2 X folding unit
3 Delivery

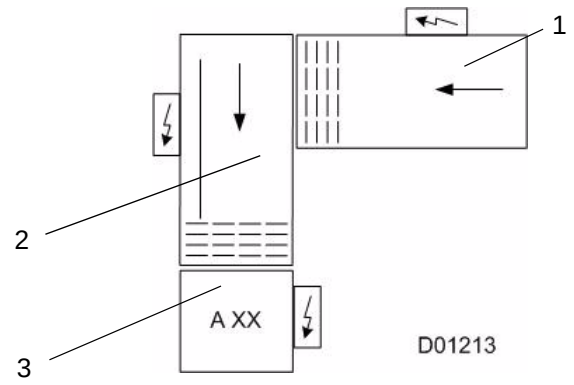
Figure 17: Variants 4X and 6X

4.3.3 Variants 44, 46, 64 and 66

Explanation of term

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

Schematic depiction



1 Folding unit I
2 Folding unit II
3 Delivery

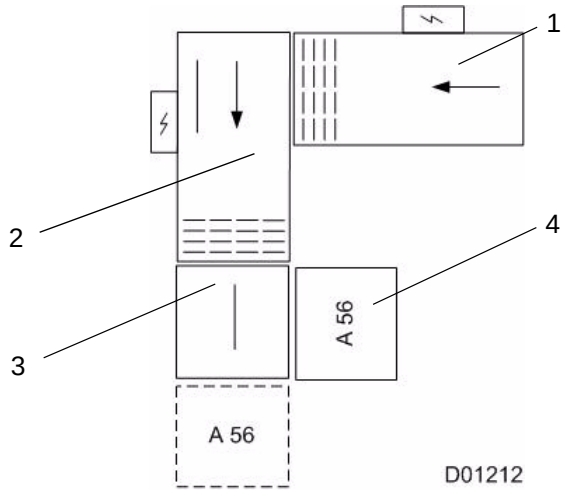
Figure 18: Variants 44, 46, 64 and 66

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

Explanation of term

The designation "T 535EA/44X" means:	
T	Buckle folding machine
535	Designation of type
E	EFFICIENCY
A	AUTOMATIC
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



1 Folding unit I
2 Folding unit II
3 X folding unit
4 Delivery

Figure 19: Variants 44X, 46X, 64X and 66X

4.4 Machine control

4.4.1 VARIO control

4.4.1.1 Standard equipment

- Intuitive graphical user interface
- Integrated catalog of fold types
- Automatic adjustment of sheet gap, sheet feed and folding speed
- Cleanly stepped speed profile (with readjustment of all folding units)
- Plain text display of errors and error location
- Operator and service diagnostics

4.4.1.2 Optional

- Connection to MBO-DATAMANAGER
- Connection to MBO-RAS (Remote Access Service)
- Window fold control system
- Folding unit-independent sheet monitoring with length control, target tracking throughout the entire machine and calibration sheet cycle during setup

4.4.2 RAPIDSET automation

The RAPIDSET electronic setup system allows partial automation of the folding machine.

It is possible to set the following automatically resp. motorized:

- Buckle plates/sheet deflector at parallel fold.
- Foldrollers/slitter shafts at parallel fold.

4.4.3 DATAMANAGER (option)

The DATAMANAGER also enables:

- Job management and machine pre-setting from an external PC.
- Integration into superior operating and adjustment data systems using CIP3/4 or JDF for the integration into a digital workflow.

4.4.4 MBO-RAS (option)

MBO-RAS (Remote Access Service) also enables remote diagnostics.

5 Operating and display elements, operating modes

5.1 Main control console

Figure 20: VARIO Control main control console

1 Main switch
2 TOUCHSCREEN

5.1.1 Handling the TOUCHSCREEN

NOTICE

Improper use of TOUCHSCREEN.

Non-observance may possibly cause property damage.

- Only use your finger or a stylus pen to operate the TOUCHSCREEN.
- Ball-point pens or other metallic objects may damage the surface of the TOUCHSCREEN.

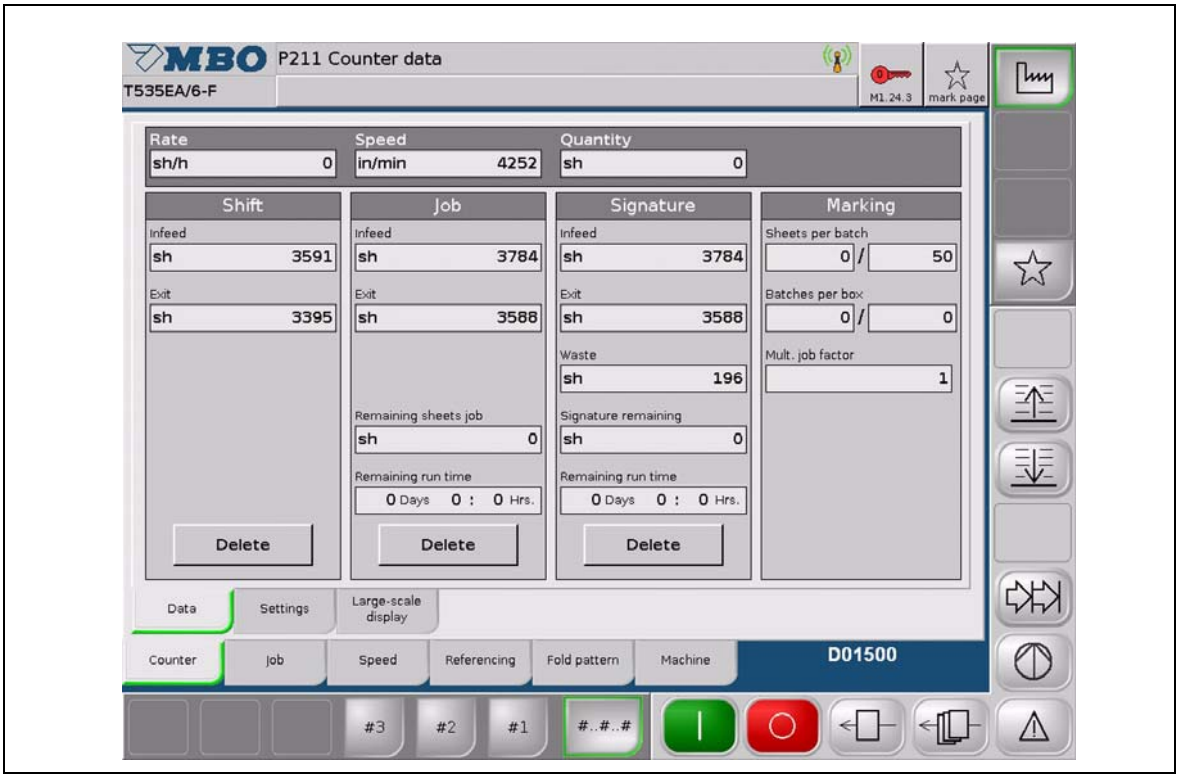


Figure 21: Handling the TOUCHSCREEN

Only use your finger or a stylus pen (MBO part number 0131900) to operate the TOUCHSCREEN.

5.1.2 <Start> menu

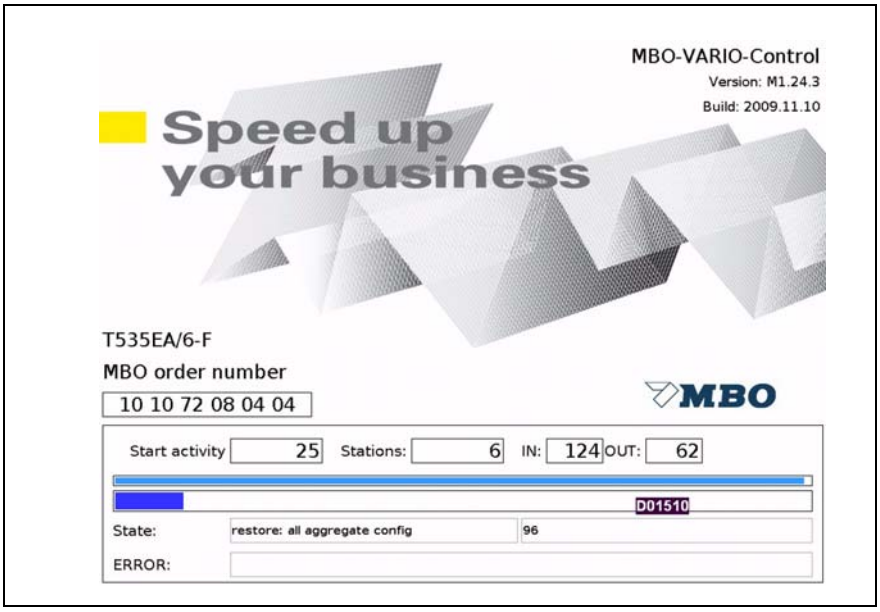


Figure 22: <Start> menu

The <Start> menu appears after the main switch is switched on and when the machine network is modified.

- The machine configuration is checked for its constellation.
- If no error is detected, the system automatically switches to the <Counter data> menu. See Chapter "7.4.1 Counter data"

5.1.3 Carry out calibration

⚠CAUTION

Pinch point, moving parts.

Crush hazard.

When starting the automated format change, observe the following precautions:

- Do not reach into the machine.
- Make absolutely sure that there are no other people at the machine.

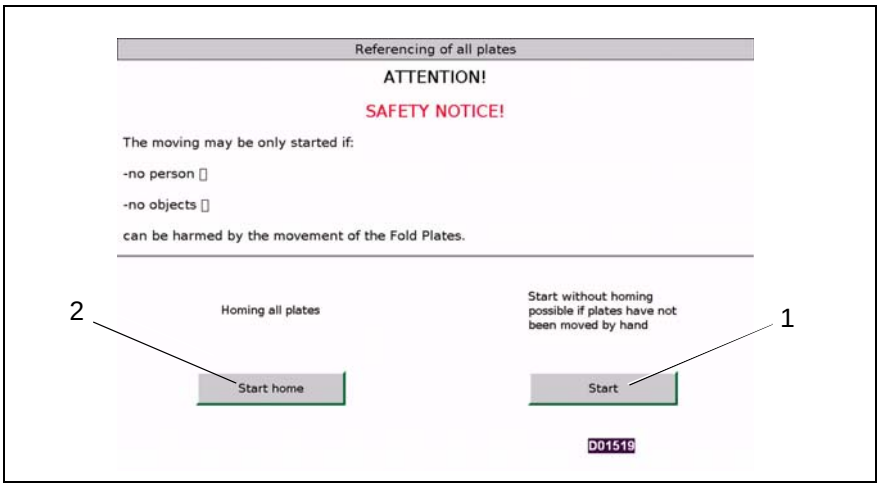


Figure 23: Carry out calibration

The <Calibration of all plates> menu appears after the <Start> menu.

If the position of the sheet stops was modified manually since the main switch was switched off, a calibration must be carried out.

Procedure:

▷ Press the <Start calibration> button (2).
All buckle plates are calibrated.
The process takes approx. 2.5 min.
Then, the display switches to the <Start> menu.
See Chapter "5.1.2 <Start> menu".

If the position of the sheet stops was not modified manually since the main switch was switched off, a calibration is **not** required.

Procedure:

▷ Press the <Start> button (1).
The display switches to the <Start> menu.
See Chapter "5.1.2 <Start> menu".

5.1.4 Overview of TOUCHSCREEN functions

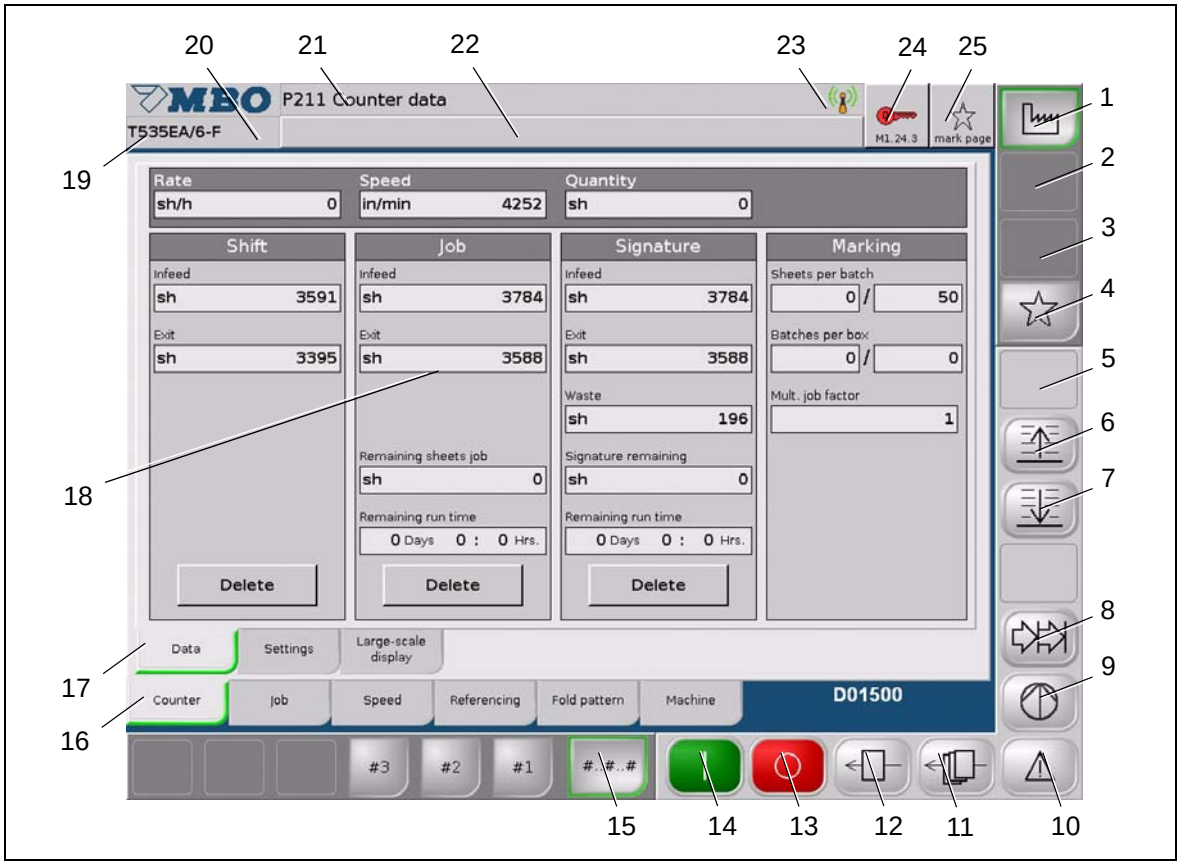


Figure 24: Overview of TOUCHSCREEN functions

1 <Production> button
2 <Service> button (password-dependent)
3 <Diagnostics> button (password-dependent)
4 <Switch favorite menus> button
5 <Automatic pile mechanism> button (option)
6 <Pile up> button
7 <Pile down> button
8 < Inching mode> button
9 <Air supply on/off> button
10 <Delete error message / Quality control> button with double function
11 <Production sheet infeed> button
12 <Single sheet infeed> button
13 <Machine stop> button
14 <Machine start> button
15 <Machine configuration> selection bar
16 <Functional groups> selection bar
17 <Functional menus> selection bar
18 <Current menu contents> selection bar
19 <Machine designation/output level> information field
20 <Roller and plate adjustment> information field
21 <Menu number and menu designation> information field
22 <Error messages / status information> information field
23 <Remote maintenance> information field
24 <Password input> button
25 <Select favorite menus> button

5.1.5 TOUCHSCREEN design

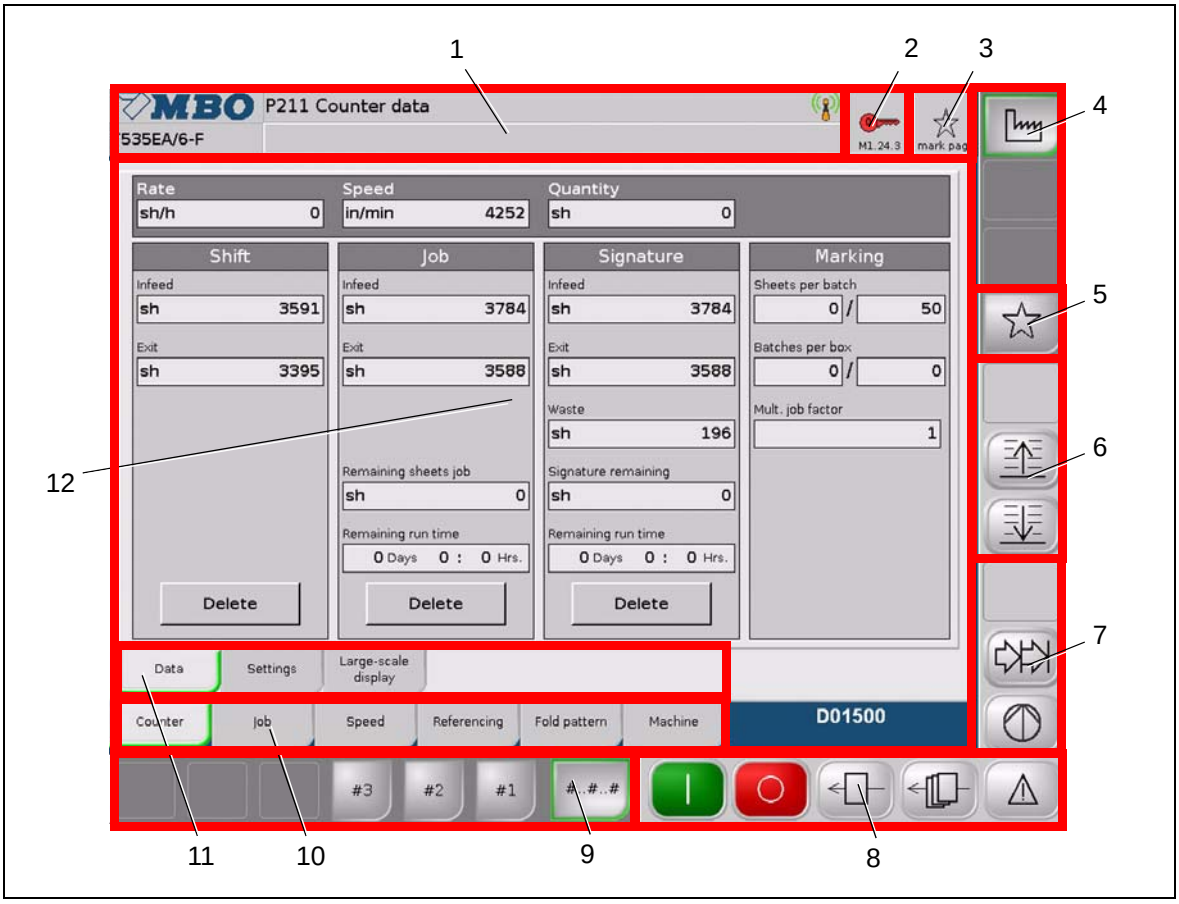


Figure 25: TOUCHSCREEN design

The TOUCHSCREEN is divided into the following functional groups:

1 <Information fields> (see Chapter "5.1.6.2 <Information fields>")
2 <Password> (see Chapter "6.12 Changing the password level"
3 <Select favorite menus> (see Chapter
4 <Select operating modes> (see Chapter "5.1.6.1 ")
5 <Switch favorite menus> (see Chapter
6 <Feeder control system> (see operating manual of feeder)
7 <Auxiliary functions> (see Chapter
8 <Machine control system> (see Chapter "7.2.3 ")
9 <Machine configuration> selection bar (see Chapter "5.1.6 ")
10 <Functional groups> selection bar (see Chapter "5.1.6 ")
11 <Functional menus> selection bar (see Chapter "5.1.6 ")
12 <Work area, shows contents of the current functional menu> (see Chapter "5.1.6 ")

5.1.6 TOUCHSCREEN navigation

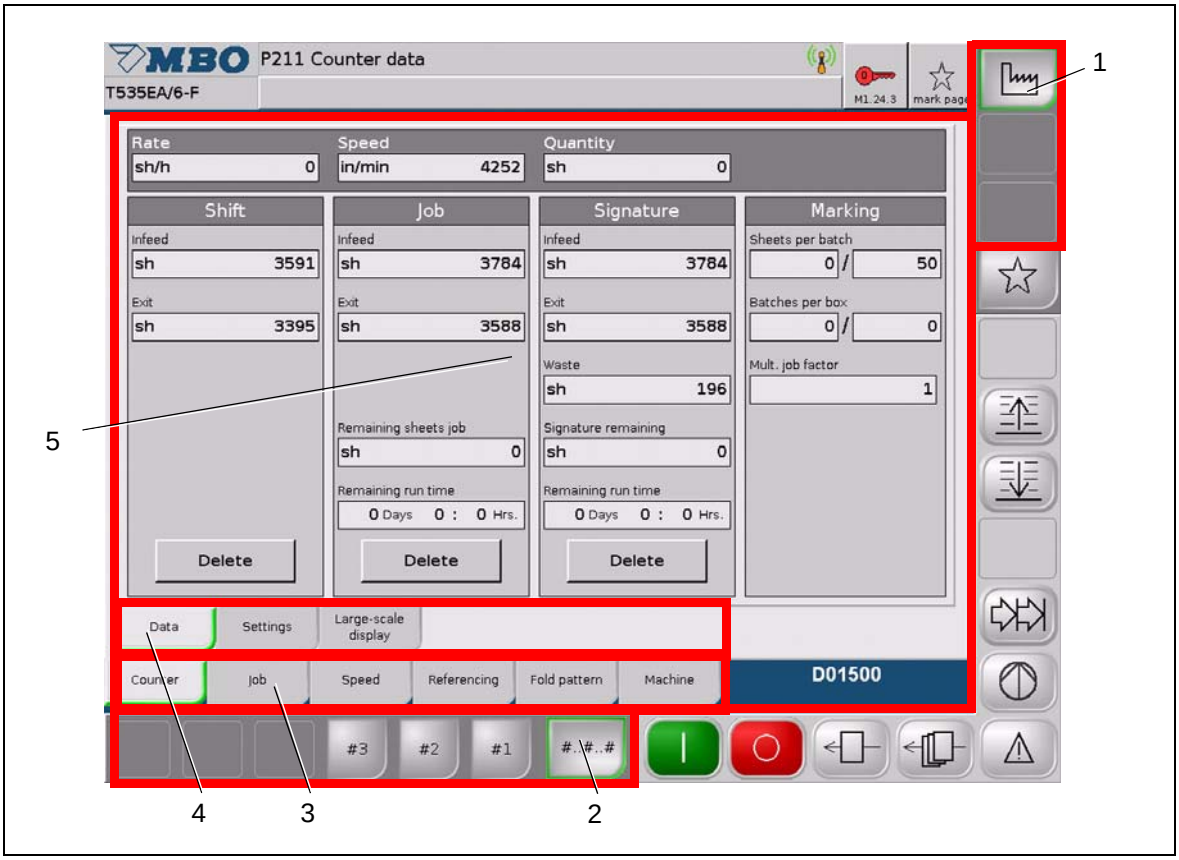


Figure 26: Navigation

The user navigates to the individual menus by means of four selection criteria.

Procedure:

First selection criterion:

<Operating mode> (1)

- Production (always visible), frame color = green
- Service (visibility is password-dependent), frame color = brown
- Diagnostics (visibility is password-dependent), frame color = blue

Second selection criterion:

<Machine configuration> (2)

- # # # = entire machine configuration.
  The global functional groups are displayed in the selection bar (3).
- # 1 = Unit 1.
  In the selection bar (3), the local functional groups of unit 1 are displayed.
- # 2 = Unit 2.
  In the selection bar (3), the local functional groups of unit 2 are displayed.
- Select the desired unit.
  The frame of the button turns the color that corresponds to the selected operating mode (1).

Third selection criterion:

<Functional groups> (3)

The present functional groups are displayed depending on the <Machine configuration> selection criterion.

▷ Select the desired functional group.
The frame of the button turns the color that corresponds to the selected operating mode (1).

Fourth selection criterion:

<Functional menus> (4)

The present functional menus are displayed depending on the <Functional groups> selection criterion.

▷ Select the desired menu.
The frame of the button turns the color that corresponds to the selected operating mode (1).

Display of menu contents:

In the work area (5), the contents of the current functional menu are displayed.

It consists of:

- Information fields = information/specifications
- Input fields = settings
- Buttons = actions

5.1.6.1 <Operating modes>

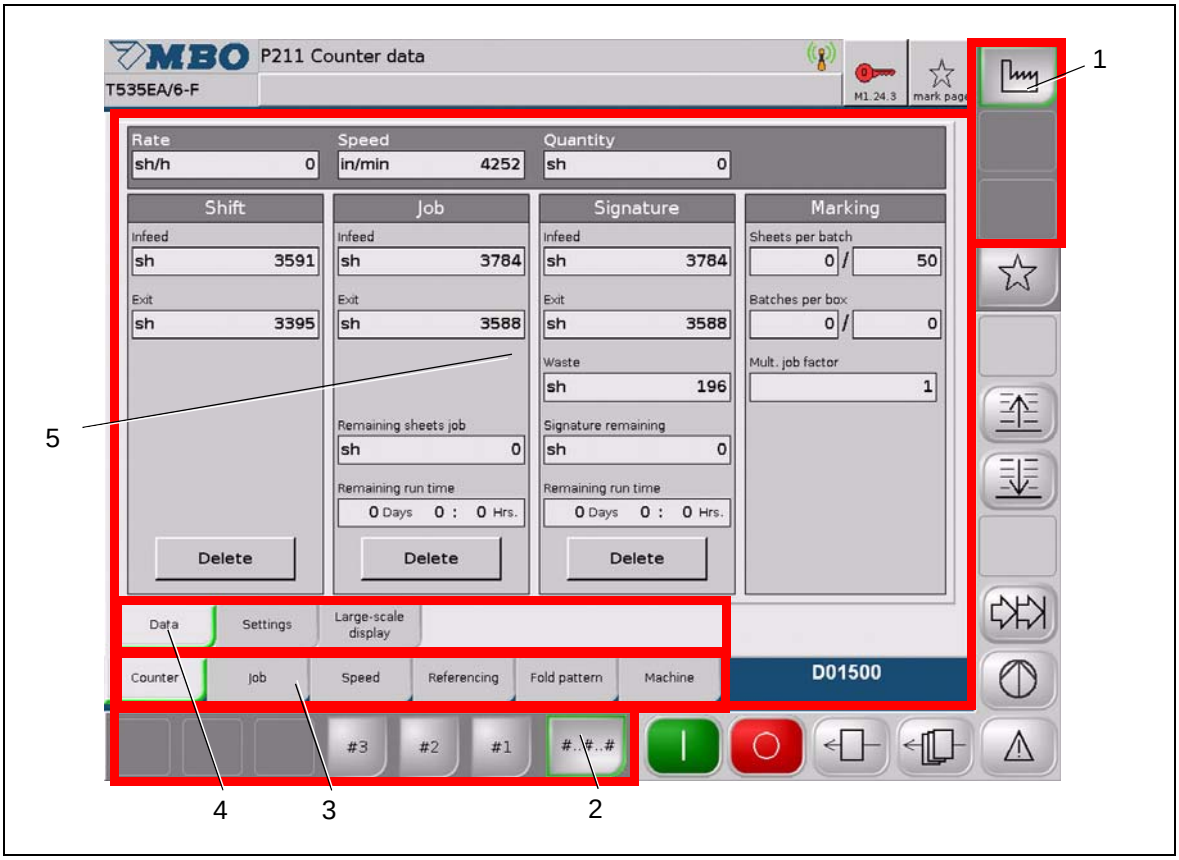


Figure 27: Operating modes

- In normal operation, the operating mode <Production> (1) is active. The button (1) is framed in green.
- The active buttons in the Machine configuration/units (2), Functional groups (3) and Functional menus (4) selection bars are also framed in green.
  The color depends on the active operating mode.
- In the work area (5), the contents of the selected functional menu (4) are displayed.

The operating modes <Diagnostics> and <Service> are not displayed unless the correct password is entered.
See Chapter "6.12 Changing the password level"

Color assignment of operating modes (1) and selection bars (2, 3, and 4)

- Production = green
- Diagnostics = blue
- Service = brown
- Error messages / status information = red

5.1.6.2 <Information fields>

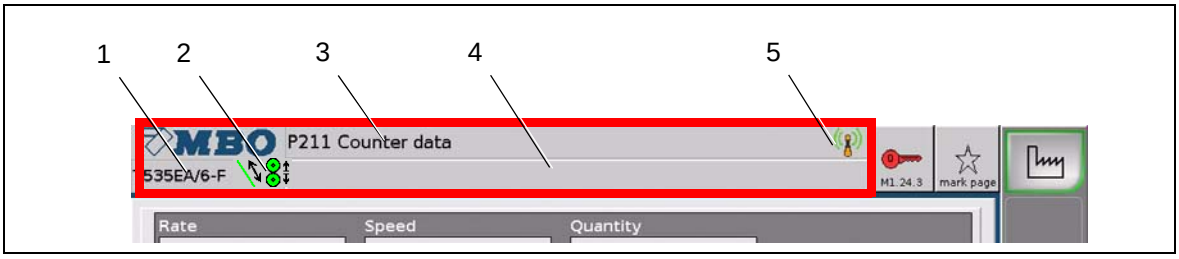


Figure 28: Information fields

1 **<Machine designation/output level> information field.**
(Hidden during roller and plate adjustment.)
While the machine is running:
Alternating display of speed and production speed.
When machine is stopped:
Display of machine designation.^

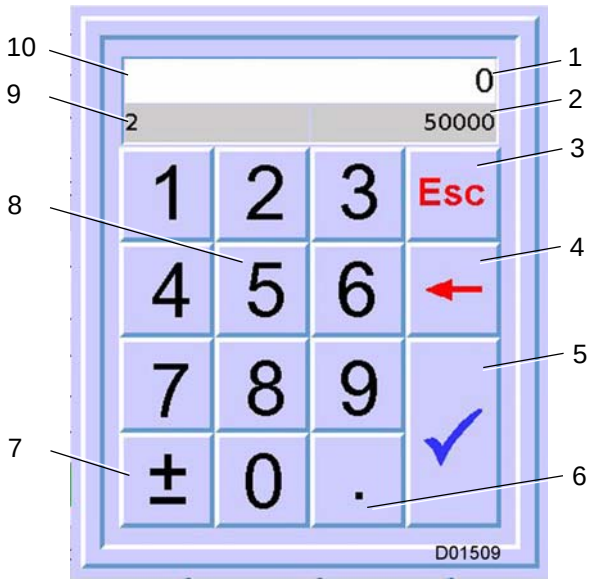
2 **<Roller and plate adjustment> information field**
Display of the corresponding symbol during the roller and plate adjustment:
Symbol flashes blue = querying the drives.
Symbol flashes green = adjusting the drives.
See Chapter "7.3.8 Starting the positioning of the buckle plates" and "7.3.9 .Positioning the foldrollers"

3 **<Menu number and menu designation> information field**
Display of the current menu number and designation.

4 **<Error messages / status information> information field**
Color scheme of current error messages or status information:
Error messages = red.
Status information = blue.
Touching this line opens a list with all current messages.
See Chapter

5 **<Remote maintenance> information field**
Symbol present = remote maintenance is switched on.
Symbol flashes in color = remote maintenance is carried out.

5.1.7 Numeric input field



1	Current value	6	Input comma
2	Upper input limit	7	Sign
3	Cancel	8	Number field 0-9
4	Delete last digit	9	Lower input limit
5	Enter	10	Display of unit

Figure 29: Numeric input field

Depending on the function, the structure of the input field may vary slightly.

5.1.8 Select favorite menus

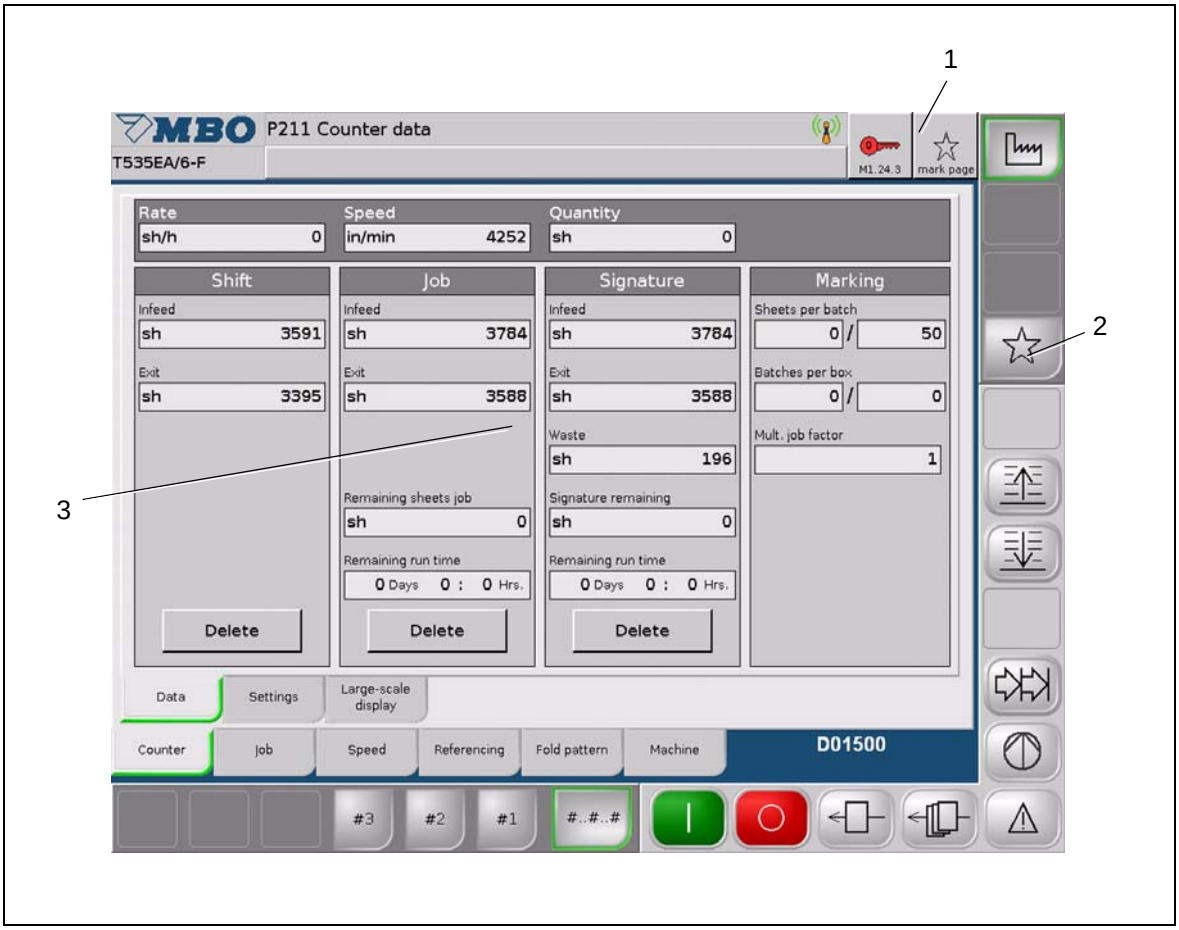


Figure 30: Select favorite menus

Switching between favorites is used to quickly switch between two favorite menus.

Procedure:

▷ Navigate via <Operating mode>, the <Machine configuration> selection bar, the <Functional groups> selection bar and the <Functional menus> selection bar to the first menu that you would like to define as a favorite menu.

▷ Press the <Select favorite menus> button (1) when the contents of the desired menu are displayed in the work area (3).
The symbol in the button (1) turns blue.

▷ Navigate via <Operating mode>, the <Machine configuration> selection bar, the <Functional groups> selection bar and the <Functional menus> selection bar to the second menu that you would like to define as a favorite menu.

▷ Press the <Select favorite menus> button (1) when the contents of the desired menu are displayed in the work area (3).
The symbol in the button (1) turns blue.

▷ By pressing the <Switch favorite menus> button (2), you can switch between these two favorite menus.

5.2 Operating modes

⚠WARNING

Incorrect use of the sockets.

Non-observance may possibly cause serious personal 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 glue units.
- 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.

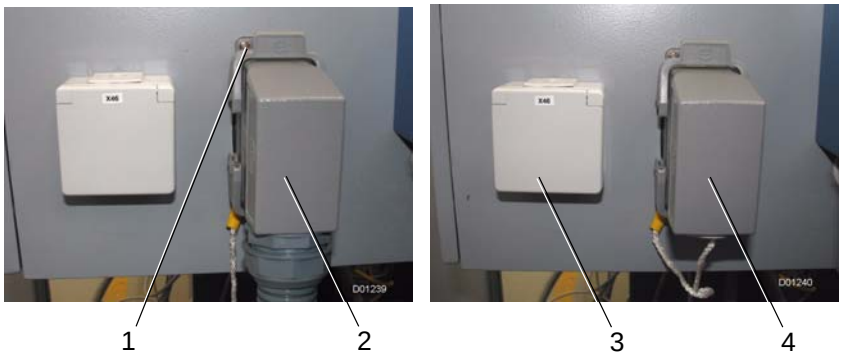
⚠CAUTION

Tripping hazards due to cables lying around.

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

Lay the machine connections (cables, hoses, pipes) so that they do not form any tripping hazards.

5.2.1 Machine controller operating mode



1	Control socket	3	Socket 230 VAC (optional)
2	Control plug	4	Dummy plug

Figure 31: Machine controller operating mode

Connecting subsequent folding units

Procedure:

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

5.2.2 Coupling module operating mode

WARNING

Using several coupling modules in one machine network.

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

For technical safety reasons, use a maximum of one coupling module in one machine network.

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

Which coupling modules to use can be learned from MBO service or the authorized customer service.

Use a maximum of one **coupling module** per machine assembly for technical safety reasons.
Make exceptions exclusively after consulting MBO-Elektrokonstruktion.

6 Transport/Set-up/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	-	-
Set-up	-	-	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 messages

DANGER

Hazardous voltage.

Risk of electrical shock or burn.

- Work on the electric components of the machine may only be performed by a licensed electrician.
- Observe the local occupational safety regulations and electrotechnical regulations.
- Turn the main switch to the position <0>.
- Use a padlock to secure the main switch from unintentionally switching on again.
- Even when the main switch is switched off, hazardous voltage is present at the terminals of the main switch. (See wiring diagram)
- Even when the main switch is switched off, hazardous residual voltage is present at the terminals of the frequency converter. (Observe the capacitor discharge time (KEB 5 min, Telemecanique 15 min)).

DANGER

Hazardous voltage at the power supply.

Non-compliance may cause serious injuries or even death.

- The power supply connection of the machine may only be performed by a licensed 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 converters can be destroyed.
- Due to the leakage currents of the controlled drives (frequency converters), a protective equipotential bonding system must be connected. See Chapter "6.8.4 Power supply configuration" and "6.9 Starting up"

WARNING

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

Tipping machine parts while unloading and installing the machine.

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 set-up process. Certain parts of the machine must additionally be supported and secured.

⚠WARNING

Insufficient properties and condition of the underfloor.

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

- Check the properties and condition and carrying capacity of the underfloor in the set-up location.
- Observe the necessary minimum requirements; see the "Specifications" chapter.

6.1.3 Property damage messages

NOTICE

Connection to an incorrect supply voltage.

Non-observance may cause severe property damage.

- Verify that the specifications for supply voltage and frequency on the label match the power data for the current source.
- Connect the machine only if the supply voltage and frequency match.
- 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.

6.2 Machine with pile feeder

A machine with a pile feeder is delivered completely assembled on a transport pallet / in a transportation 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 transport pallet / in a transportation crate.
Transport/installation/initial operation of the continuous feeder 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 Transportation"
- Unpack the machine.
  See Chapter "6.6.1 Unpack the machine"
- Setting up the machine.
  See Chapter "6.6.2 Setting up 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 Transportation

WARNING

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.

1 Shipping brace 2 Folding machine

Figure 32: Transportation

Procedure:

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

6.6 Set-up

6.6.1 Unpack the machine

⚠WARNING

Tipping machine parts while unloading and installing the machine.

Non-observance may possibly 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.

1 Shipping brace
2 Folding machine
3 Buckle plates

Figure 33: 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 store it properly.
▷ Remove the screws fastening the machine to the transport pallet.
▷ Remove the transport brackets.
▷ Remove the screws fastening the shipping brace (1) to the transport pallet.

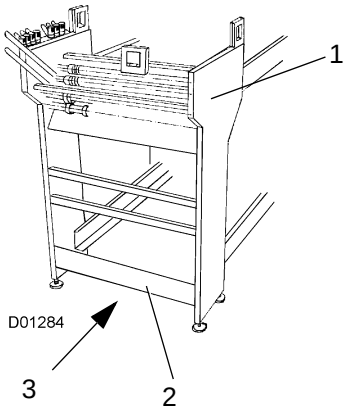
6.6.2 Setting up the machine

WARNING

Tipping machine parts.

Non-observance may possibly 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.



1 Side wall left (operator side)
2 Cross bar
3 Drive-in direction fork lift

Figure 34: 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.

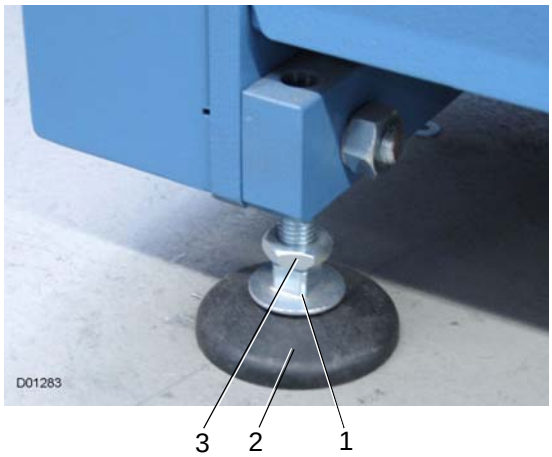
WARNING

Insufficient properties and condition of the underfloor.

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

Check the properties and condition and carrying capacity of the underfloor in the set-up location.

Observe the necessary minimum requirements; see the "Specifications" chapter.



1	Adjusting screw	3	Hexagon nut
2	Plate feet		

Figure 35: Setting up 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

Tipping machine parts.

Non-observance may possibly 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.

NOTICE

Improper leveling of the machine components.

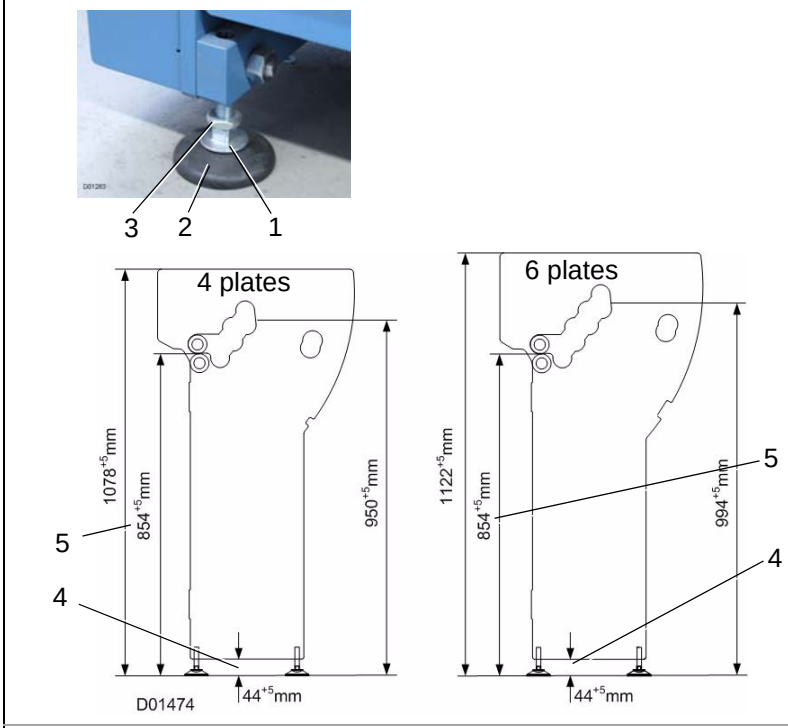
Disregard can lead to serious damage to property

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:



1	Leveling screws	4	Auxiliary dimension
2	Plate foot	5	Exit height
3	Lock nut		

Figure 36: 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 from top edge of lower slitter shaft/tape roller to the floor = 854 mm + 5 mm (33.6 in + 0.2 in).
As an auxiliary dimension (4), you can also use the distance from the bottom edge of the side plate to the floor = 44 mm + 5 mm (1.7 in + 0.2 in).

▷ Align the machine approximately.

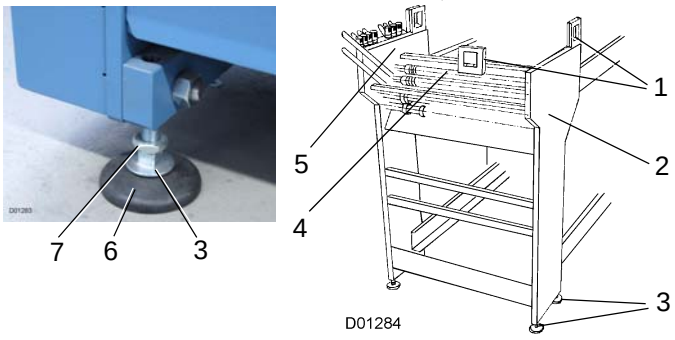
Removing the shipping brace:

▷ 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:



1	Machine spirit level	5	Side part
2	Side part	6	Plate foot
3	Leveling screws	7	Lock nut
4	Upper foldroller		

Figure 37: 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).

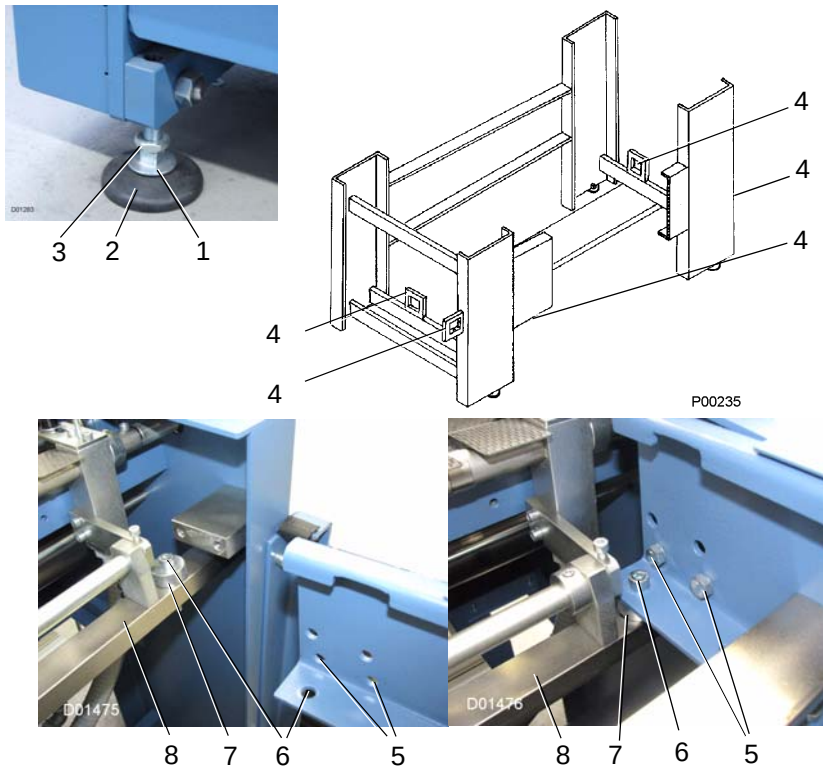
Crosswise alignment:

▷ 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:



1	Leveling screws	5	Connecting screws
2	Lock nut	6	Connecting screw
3	Plate foot	7	Distance piece
4	Alignment surfaces	8	Cross bar

Figure 38: 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.

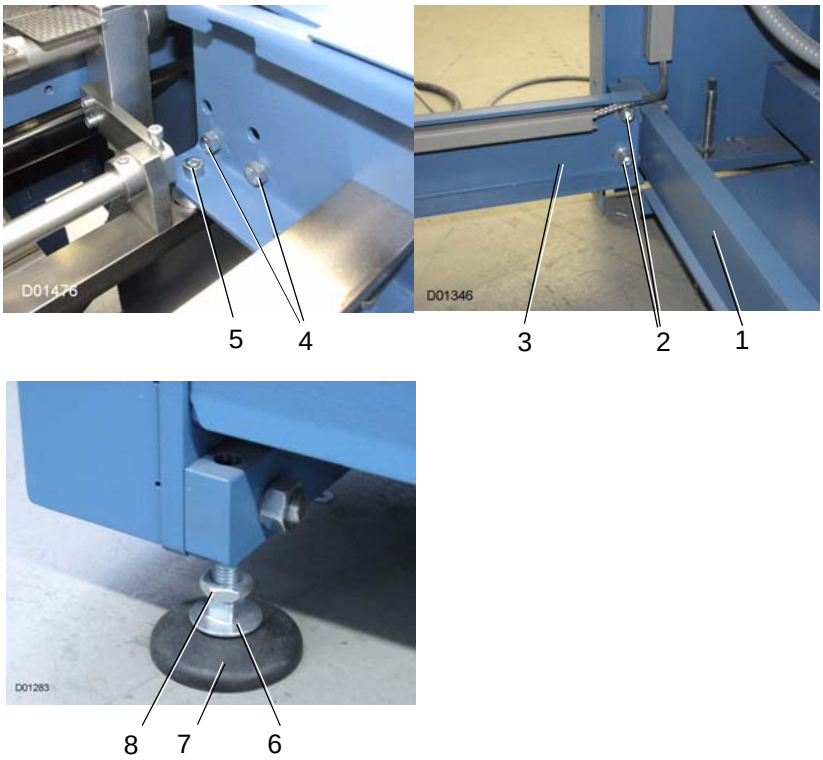
▷ Use the leveling screws (1) to adjust the correct height of the feeder so that:

- 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 with an accuracy of
0.3 mm/m =+/- 0.15 mm/m.
0.1 mm/m = +/- 0.15 mm/m.

Connecting the machine to the feeder:



1	Feeder	5	Connecting screw
2	Connecting screws	6	Leveling screws
3	Connecting brace	7	Plate foot
4	Connecting screws	8	Lock nut

Figure 39: Screwing the feeder to the machine

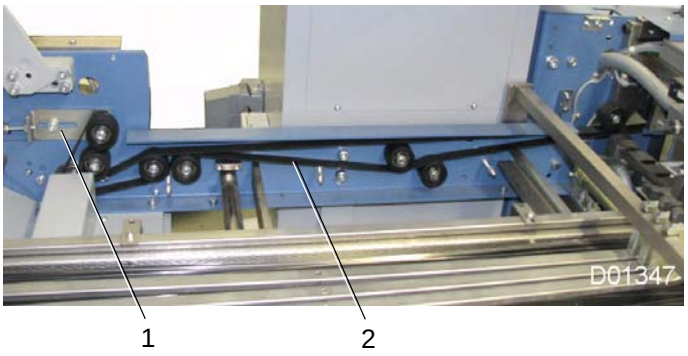
- ▷ Use the connecting screws (4) to screw the machine to the feeder so that it is free of tension.
- ▷ Use the connecting screws (5) to screw the machine to the feeder so that it is free of tension.
- ▷ Use the connecting screws (2) to screw the machine to the feeder so that it is free of tension.

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 Alignment table

6.6.4.1 Installing the drive belt



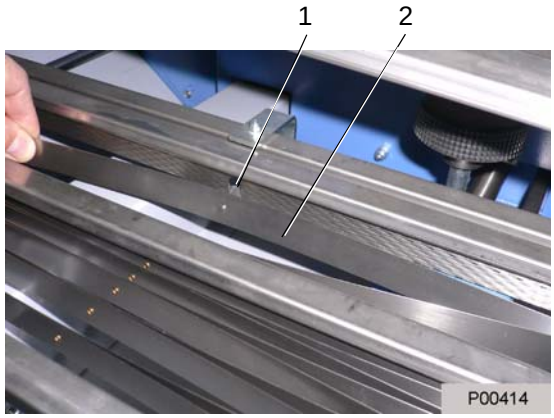
1	Belt tensioner	2	Drive belt

Figure 40: 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



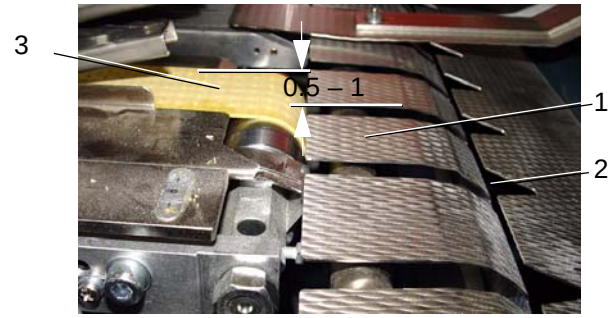
1	Mounting point	2	Lattice grate

Figure 41: 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



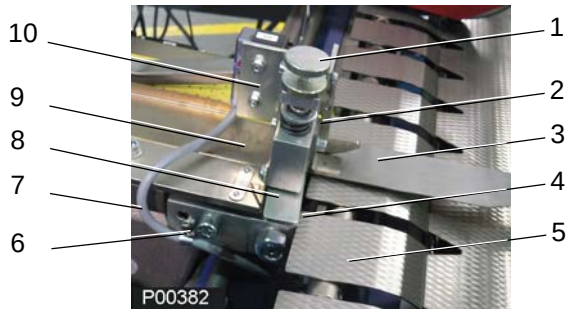
1 Guide plate
2 Screws
3 Belt

Figure 42: 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



1	Knurled screw	6	Strap
2	Adjusting disk	7	Cable
3	Smoother bar	8	Pressure lever
4	Screw	9	Sidelay
5	Guide plate	10	Double-sheet control

Figure 43: 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

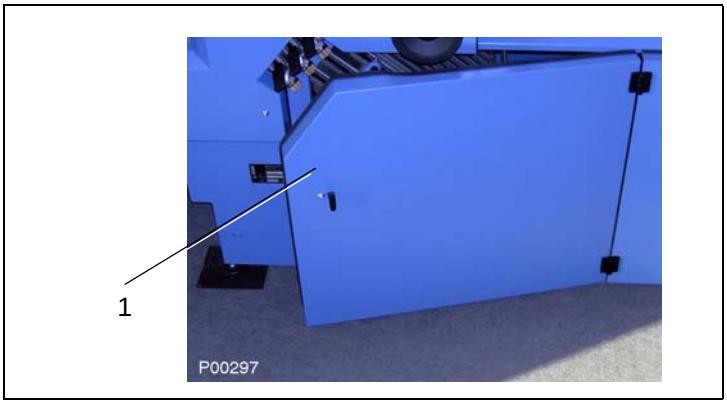
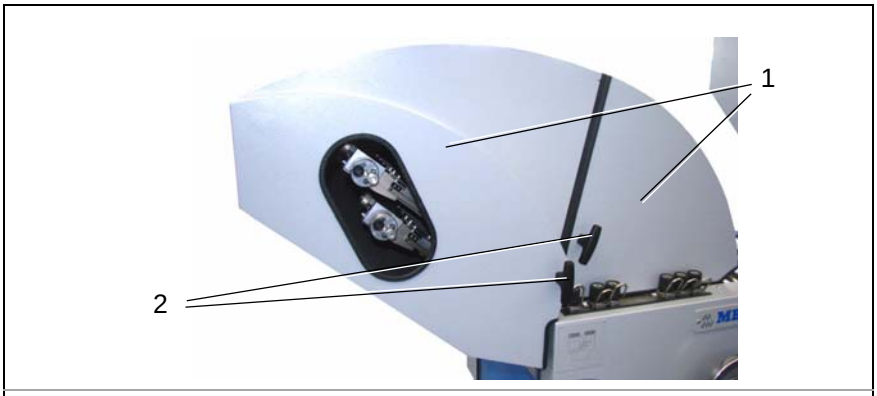


Figure 44: Door with compartment for tools

Procedure:

▷ Hang the compartment door (1) on the hinges

6.6.5 Noise damping hood

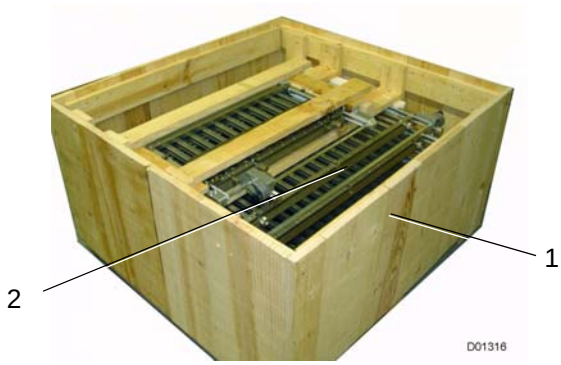


1 Noise damping hood 2 Grip

Figure 45: Noise damping hood

The noise damping hood is mounted at the factory.

6.6.6 Unpacking buckle plates



1 Transportation crate 2 Buckle plates

Figure 46: Unpacking

Procedure:

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

6.7 Removing the rust preventing agents

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

Observe 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

Hazardous voltage.

Risk of electrical shock or burn.

- Work on the electric components of the machine may only be performed by a licensed electrician.
- Observe the local occupational safety regulations and electrotechnical regulations.
- Turn the main switch to the position <0>.
- Use a padlock to secure the main switch from unintentionally switching on again.
- Even when the main switch is switched off, hazardous voltage is present at the terminals of the main switch. (See wiring diagram)
- Even when the main switch is switched off, hazardous residual voltage is present at the terminals of the frequency converter. (Observe the capacitor discharge time (KEB 5 min, Telemecanique 15 min)).

6.8.1 Assembly of the main control panel

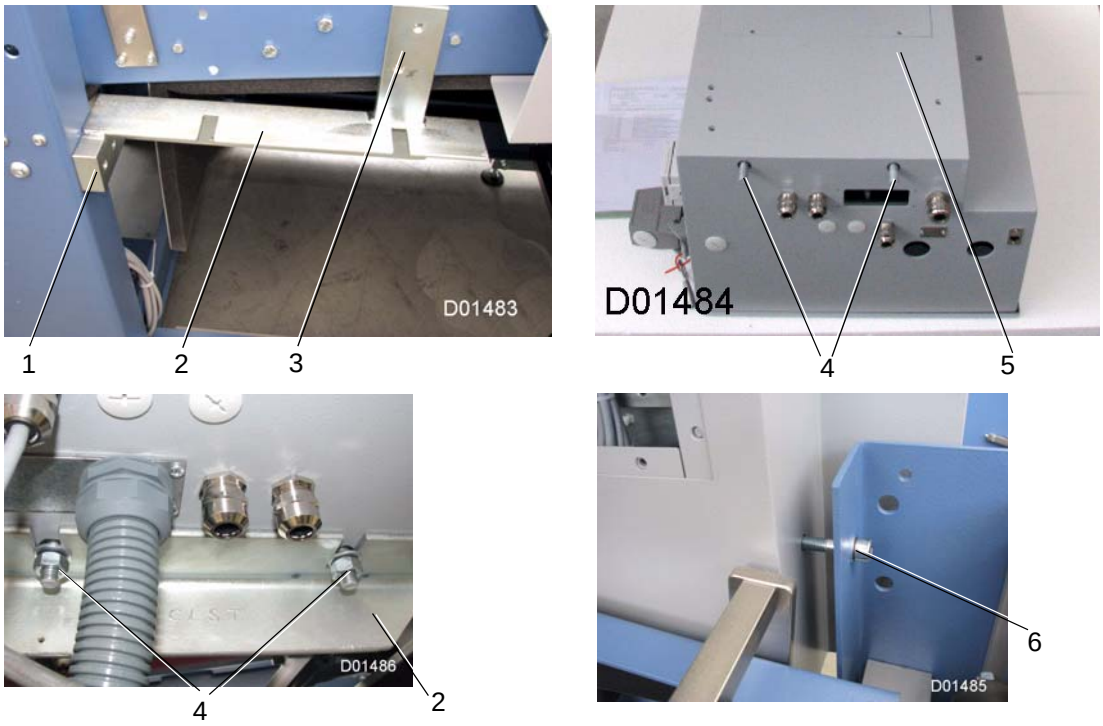
⚠CAUTION

Lifting heavy machine parts.

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.

▷ Unpack the control cabinet and mount it properly.



1	Grounding conductor, power supply	6	Power cable
2	Grounding conductor, pile feeder	7	Socket, fan motor
3	Connecting line, pump	8	Connecting line, feeder motor
4	Control lines, feeder	9	Socket, network
5	Connecting line, main drive motor		

Figure 47: Assembly of the main control panel

With the continuous feeder:

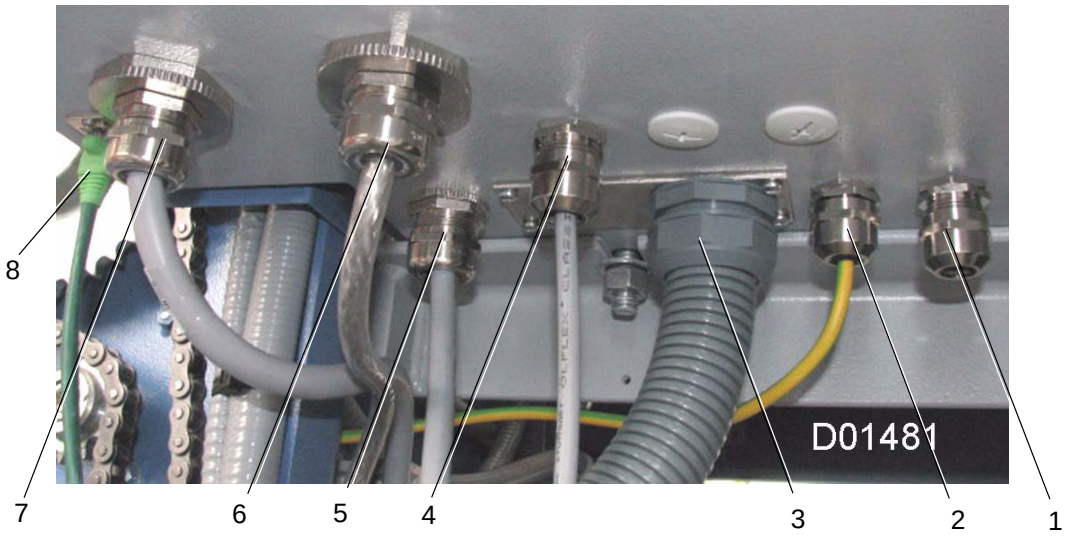
Procedure:

- ▷ Fasten the fastening angle (2) to the feeder (1) and the register table (3).
- ▷ Transport the main control cabinet (5) to the assembly location on the pallet.
- ▷ Remove the nuts with the washers.)
- ▷ Summon at least 3 people to lift the main control cabinet (5).
- ▷ Insert the two threaded bolts (4) into the slots of the fastening angle (2).
- ▷ Slide a washer over each of the threaded bolts (4).
- ▷ Turn the nuts onto the threaded bolts (4) and tighten them.
- ▷ Fasten the main control cabinet (5) to the feeder using the screw (6).

With the flat pile feeder:

- ▷ The main control cabinet is not dismantled for transport.

6.8.2 Connecting cables



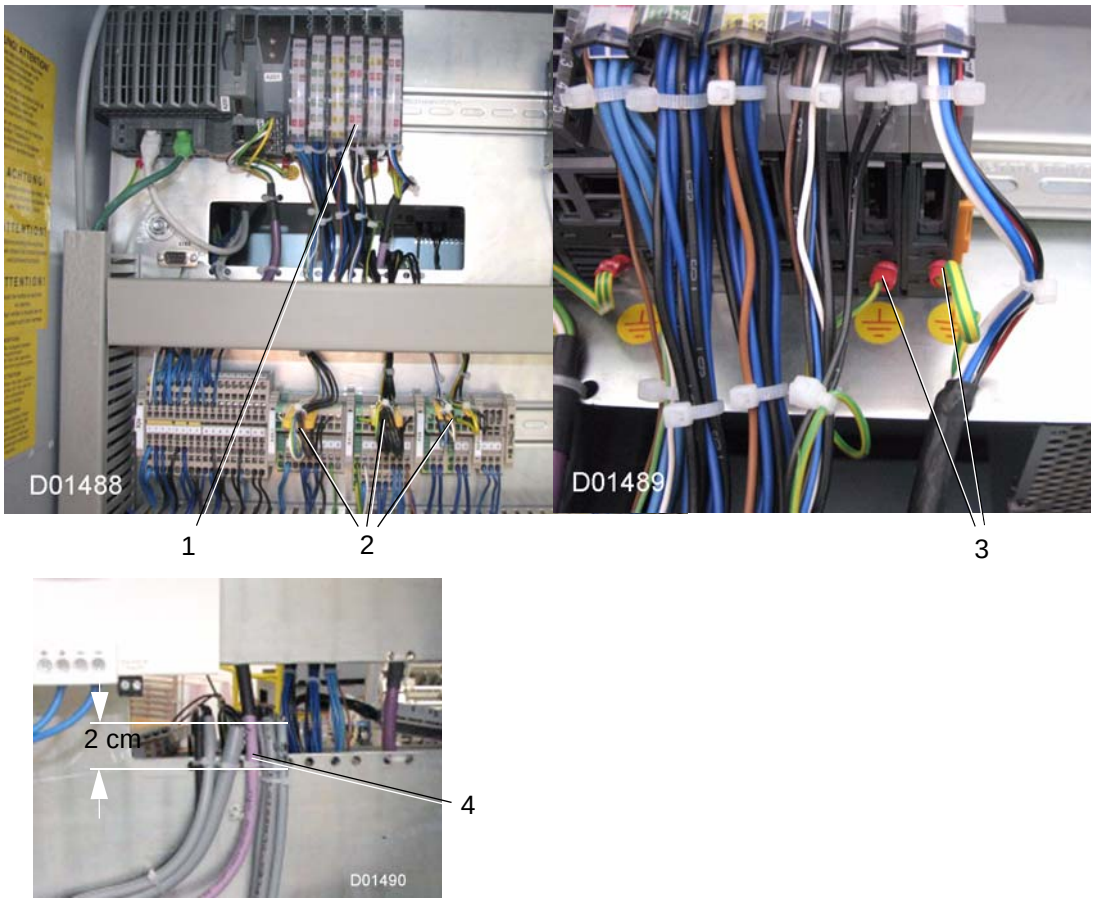
1	Equipotential bonding cable, power supply	5	Power cable
2	Equipotential bonding cable, feeder	6	Connecting line, main drive motor M2
3	Control lines, feeder	7	Connecting line, feeder motor M3
4	Connecting line, pump M1	8	Network socket, RAS X99

Figure 48: Main control cabinet, bottom, connection overview

Connecting the connecting lines:

Procedure:

- ▷ Open the cover on the rear of the main control cabinet.
- ▷ All connecting lines are marked with their specific equipment identifier (EID).
- ▷ 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.



1	Control lines, PLC	3	Grounding conductors
2	Control lines, clamping bar	4	Strain relief by means of cable ties

Figure 49: Main control cabinet, control lines, connection overview

Connecting control lines:

Procedure:

- ▷ All control lines are marked with their specific equipment identifier (EID).
- ▷ Insert the control lines into the main control cabinet through the cable glands with the same marking.
- ▷ Plug in the plugs of the control lines (1) according to the EID label and the wiring diagram on the PLC.
  Make sure that the grounding conductors (3) are also plugged in correctly.
- ▷ Plug in the plugs of the control lines (2) according to the EID label and the wiring diagram on the clamping bar.
- ▷ Use cable ties to fasten the control lines (4) to the partition of the main control cabinet.
  When doing so, let the cable ends stick out approx. 2 cm (0.8 in) over the edge.

6.8.3 Power supply prerequisites

NOTICE

Connection to an incorrect supply voltage.

Non-observance may cause severe property damage.

- Verify that the specifications for supply voltage and frequency on the label match the power data for the current source.
- Connect the machine only if the supply voltage and frequency match.
- 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.

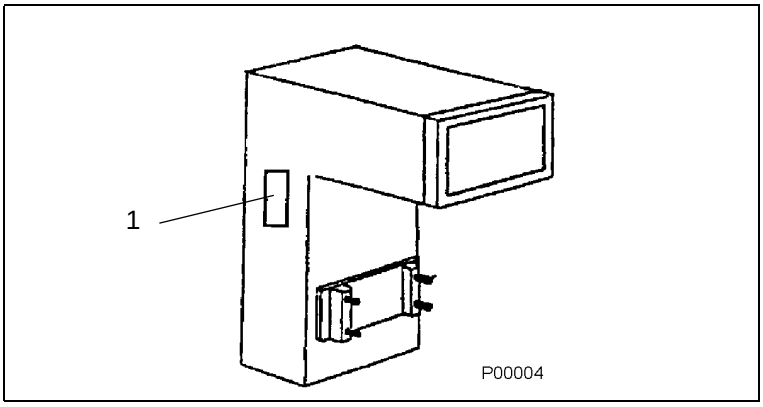


Figure 50: Label

With regard to the power supply, make sure that:

- the supply of this machine must generally be made 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 connection may ***not*** be made by a 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 agree with the specifications on the label, wiring diagram, and "Specifications" of the operating manual.
- due to the leakage currents of the EMC filter, the mains connection must be made so that it is fixed.
- due to the leakage currents of the EMC filter, no power mains with fault-current circuit breakers (FI) or a voltage fluctuation relay can be used.

- due to the leakage currents of the EMC filter, an additional protective equipotential bonding strip 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 resistances (> 50 Ohm) there is hardly any more filter effect of the EMC filter.
- the N conductor is loaded (for 400 VAC power mains).
- 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.

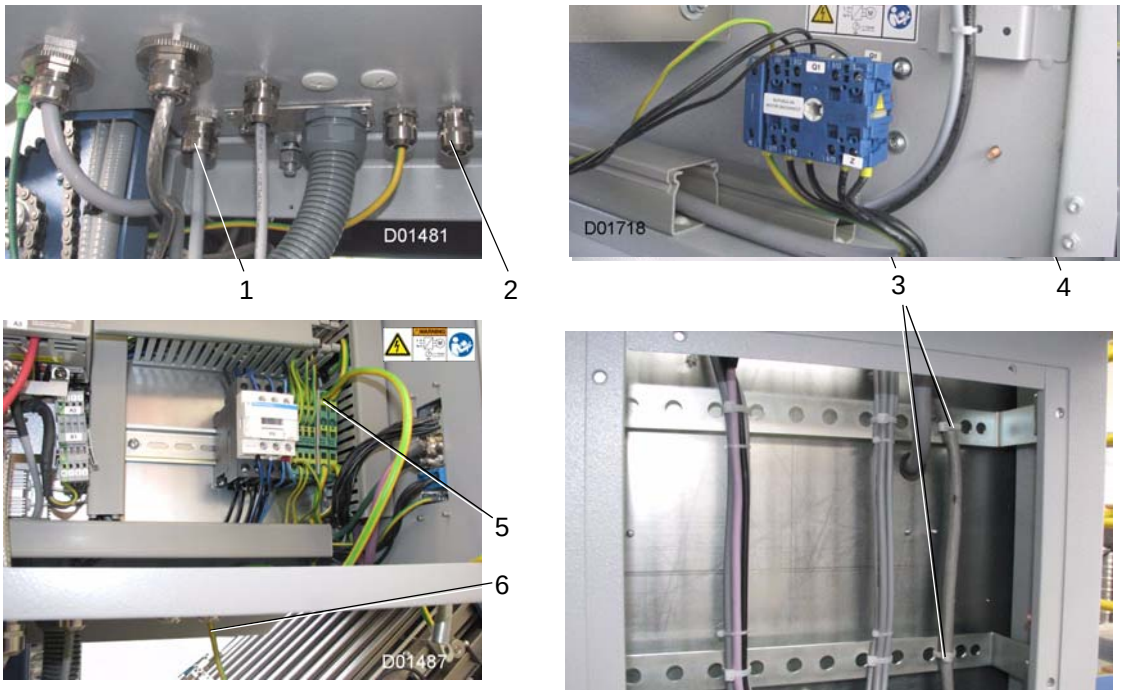
- the 230 VAC sockets of the MBO machines may be used exclusively for connecting auxiliary devices intended for this purpose, such as glue units.
- all sockets (400 VAC and 230 VAC sockets) of the MBO machines must be monitored at all times according to the corresponding federal and local codes, guidelines 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 accor-ding 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). - Optimum AWG 7 (Cu).	

Table 17: Electrical connection

6.8.5 Power supply to the main control cabinet



1 Cable gland, power supply
2 Cable gland, protective equipotential bonding cable
3 Fastening points
4 Power supply to the main switch
5 Ground terminal strip
6 Protective equipotential bonding cable

Figure 51: Network connection

Procedure:

- ▷ Open the cover under the TOUCHSCREEN.
- ▷ Open the control cabinet lock to the left of the TOUCHSCREEN and swivel this off to the side.
- ▷ Insert the power cable into the main control cabinet through the cable gland (1).
- ▷ Connect the power cable to the main switch (4) according to the wiring diagram.
- ▷ Use cable ties to fasten the power cable to the fastening points (3).
- ▷ Insert the protective equipotential bonding cable (6) into the main control cabinet through the cable gland (2).
- ▷ Connect the protective equipotential bonding cable (6) to the PE connection terminal strip (5).
- ▷ Close the cover under the TOUCHSCREEN.
- ▷ Swivel the TOUCHSCREEN back to its original position and lock it using the control cabinet lock.

6.8.6 Additional equipotential bonding strip

WARNING

Leakage currents are greater than 10 mA.

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

- 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).
  Optimum = AWG 7 (Cu)

Figure 52: PE connection terminal strip

The RFI filters of the frequency converters 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).
Optimum would be AWG 7 (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

Open protective ground connections.

Risk of electrical shock or burn.

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 "5.2 Operating modes"

6.9 Starting up

DANGER

Hazardous voltage.

Risk of electrical shock or burn.

- Work on the electric components of the machine may only be performed by a licensed electrician.
- Observe the local occupational safety regulations and electrotechnical regulations.
- Turn the main switch to the position <0>.
- Use a padlock to secure the main switch from unintentionally switching on again.
- Even when the main switch is switched off, hazardous voltage is present at the terminals of the main switch. (See wiring diagram)
- Even when the main switch is switched off, hazardous residual voltage is present at the terminals of the frequency converter. (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 Checking the supply voltage."
- Switch on the main switch.
  See Chapter "7.2.1 Switching the main switch on/off"
- Check rotation direction of pumps.
  See Chapter "6.9.3 Checking rotation direction of pumps"
- Check rotation direction of feeder motor.
  See Chapter "6.9.4 Checking rotation direction of feeder motor"
- Check turning direction drive motor folding machine.
  See Chapter "6.9.5 Checking rotation direction drive motor of the folding machine."
- Checking machine functions
  See Chapter "6.9.7 Checking machine functions"

6.9.2 Checking the supply voltage.

NOTICE

Connection to an incorrect supply voltage.

Non-observance may cause severe property damage.

- Verify that the specifications for supply voltage and frequency on the label match the power data for the current source.
- Connect the machine only if the supply voltage and frequency match.
- 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 the power supply terminals of the main switch to ensure that the correct supply voltage is present.

6.9.3 Checking rotation direction of pumps

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

6.9.4 Checking rotation direction of feeder motor

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

6.9.5 Checking rotation direction drive motor of the folding machine.

NOTICE

Incorrect direction of rotation of the driving 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.

6.9.6 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.

6.9.7 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 "2.12.10 Checklist for safety and protective devices"

6.11 Inspection after first start-up

20 operating house 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.

6.12 Changing the password level

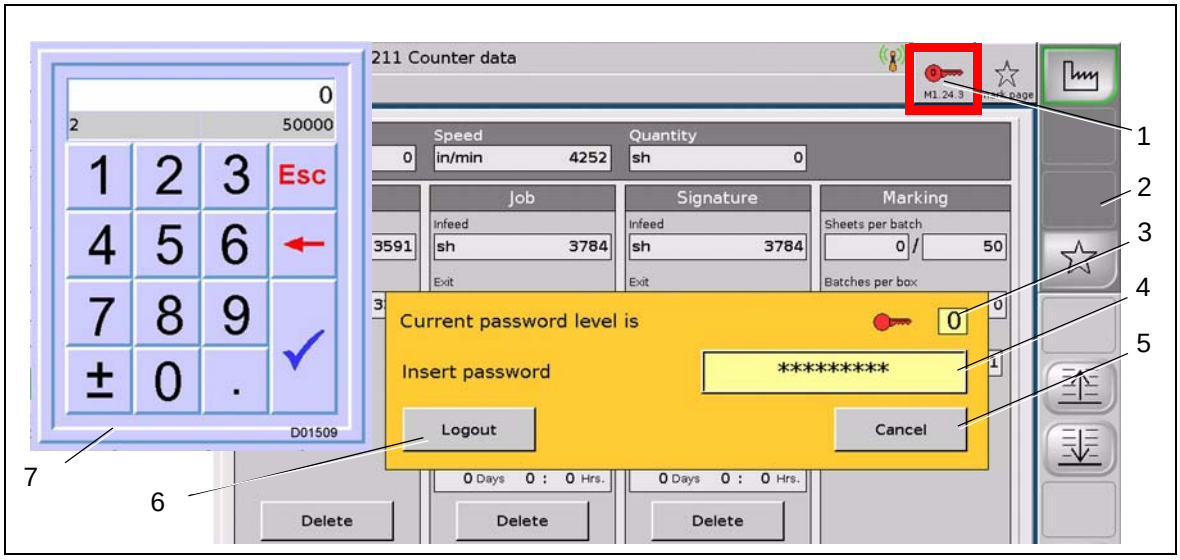


Figure 53: Changing the password level

Special diagnostic and service menus can be unlocked by entering passwords.

Procedure:

▷ Touch the password key symbol (1).
The password input window is opened.

Current password level (3):

- 0 = default setting.
  The password key symbol (1) is red.
- 1 = operator password 1 = **4712.**
  The password key symbol (1) is blue.

Enter the password:

▷ Press the password input field (4).
A numeric input field (7) opens.

▷ Enter the password <**4712**>.

- Confirm the input with the <Enter> button.
  The password key symbol (1) turns blue.
  The <Diagnostics> button (2) appears.

Canceling password input:

▷ Press the <Cancel> button (5).
The password input window is closed.

Resetting password level to 0:

▷ Press the <Logout> button (6).
The password key symbol (1) turns red.
The <Diagnostics> button (2) disappears.

6.13 Setting the language

Figure 54: Setting the language

The texts of the VARIO Control can be displayed in a wide variety of languages.

Procedure:

- Enter the operator password (1). See Chapter "6.12 "
- ▷ Press the <Diagnostics> button (2).
- ▷ In the <Machine configuration> selection bar, press the <Network> button (3).
- ▷ In the <Functional group> selection bar, press the <Languages> button (4).
- ▷ In the <Function> selection bar, press the <Languages> button (5).
- ▷ Select the desired language in the work area (6) by touching the corresponding flag.
- ▷ Reset the password level to 0.
  See Chapter "6.12 "

Changing the language means that:

- The screen texts are displayed in the selected language.
- The length and temperature numbers are displayed in the local units of measurement.

7 Adjustment and operation

7.1 Introduction

For the operation of the machine, also observe:

- The safety instructions.
  See Chapter "7.1.2 Safety messages".
- 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)
Set-up, retrofitting	X	X	-
Operating	-	X	-

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

7.1.2 Safety messages

DANGER

Dismantling, bridging or bypassing safety and protective devices.

Non-compliance may cause serious injuries or death.

- No safety or protective devices of the machine may be dismantled, bridged or bypassed.
- 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

Automatic lowering of the open noise damping hood.

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

Check the pneumatic springs for correct function after each production/ daily!

WARNING

Moving machine parts

Drawing-in and crush hazard

- Make sure that you always tie back your hair and keep it protected.
- Do not wear jewelry.
- Wear close-fitting clothing only.

WARNING

Moving machine parts

Drawing-in and crush hazard

With sudden machine stops and before you re-connect the machine, make sure:

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

WARNING

Rotating knives and slitter shafts.

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

- Never reach into the slitter shafts while the machine is running.
- 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

Pulling out/removing the buckle plates.

The exposed, rotating foldrollers and slitter shafts make up hazardous infeed points.

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

- All adjustment or testing/inspection work may be carried out only when the machine is stopped and secured against switching on.
- Press the EMERGENCY STOP palm button.
- Always have the adjustment or testing/inspection work carried out by one individual person only.
- A crush hazard and danger of injuries is also present when turning the machine using the safety handwheel.

WARNING

Incorrect handling of the safety handwheels.

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

- 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

Incorrect use of the sockets.

Non-observance may possibly cause serious personal 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 glue units.
- 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.

WARNING

Lifting heavy machine parts.

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.

⚠WARNING

Loud noise emission.

Hearing damage hazard.

- 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.

7.1.3 Property damage message

NOTICE

Paper jam.

Non-compliance can cause consequential property damage (drive belts, transport tapes, foldrollers etc.).

- When removing the paper jam, turn the machine using the safety hand-wheel only.
- The machine may be restarted only after removing the paper jam.

7.2 Operating

7.2.1 Switching the main switch on/off

1 Main switch

Figure 55: Switching the main switch on/off

Switching on: Procedure:

▷ Turn the main switch (1) to switch position 1

The machine control system boots up.

Switching off: Procedure:

▷ Turn the main switch (1) to switch position 0.

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

7.2.2 EMERGENCY STOP palm button

1 EMERGENCY STOP palm button

Figure 56: 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!

7.2.3 Starting/stopping the machine

Figure 57: Starting/stopping the machine

Starting the machine:

Procedure:

▷ Press the <Machine start> button (1).
The <Machine start> button (1) turns light green.

Stopping the machine:

Procedure:

▷ Press the <Machine stop> button (2).
The <Machine start> button (1) turns dark green.

When the machine is stopped using the <Machine stop> button, the sheet feed is stopped first.
The machine stops only after the sheets are emptied!

7.2.4 Starting/stopping the sheet feed

Figure 58: Starting/stopping the sheet feed

When the sheet feed (1 + 2) is switched on, the air supply is started automatically.

Calling up single sheets:

Procedure:

▷ Press the <Single sheet infeed> (1).
As long as the button is pressed, the frame is illuminated in green.
A single sheet is fed.

Starting production:

Procedure:

▷ Press the <Production sheet infeed start/stop> button (2).
The frame of the button turns green.
Sheets are fed continuously.

Stopping production:

Procedure:

▷ Press the <Production sheet infeed> (2) button again.
The frame of the button turns gray.
The sheet feed stops.

7.2.5 Switching the air supply on/off

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

Figure 59: Switching the air supply on/off

Switch on air supply:

Procedure:

▷ Press the button (1).
The frame of the button turns green.

Switching off the air supply:

Procedure:

▷ Press the button (1).
The frame of the button turns gray.

The air supply is switched on automatically when the sheet feed (2 + 3) starts.

7.3 Brief instructions for adjusting the machine

The machine is adjusted in these work steps.

- Calibrating the machine.
  See Chapter "7.3.1 "Calibrate" machine, activating automatically."
- Adjusting the folding imposition.
  See Chapter "7.3.2 Adjusting the folding imposition"
- Deleting the counter data.
  See Chapter "7.4.2 Deleting the counter data"
- Adjusting the counter.
  See Chapter "7.4.3 Counter settings"
- Adjusting the feeder.
  See Chapter "7.5 Adjusting the feeder"
- Adjusting the suction wheel.
  See Chapter "7.6 Adjusting the suction wheel"
- Adjusting the register table.
  See Chapter "7.7 Setting of the alignment table"
- Changing the sheet feed data if necessary.
  See Chapter "7.4.7 Changing sheet infeed data."
- Adjusting the foldrollers/slitter shafts.
  See Chapter "7.8 Adjusting the foldrollers/slitter shafts."
- Carrying out precise adjustment of the buckle plates.
  See Chapter "7.9 Adjusting the buckle plates"
- Placing the slitters on the slitter shafts.
  See Chapter "7.10 Placing the slitters on the slitter shafts"
- Paying attention to error messages.
  See Chapter "7.11 Error messages"
- Removing the paper jam.
  See Chapter "7.12 Removing the paper jam"

7.3.1 "Calibrate" machine, activating automatically.

The prerequisite for the adjustment of the folding machine is that the machine controller is put into the state "calibrate" machine.
- All sheet feed data is deleted here.
- Note required data in advance.

"Calibrate" machine is activated automatically if:

- A new folding imposition is selected.
  See Chapter "7.3.2 Adjusting the folding imposition"
- A job is activated in the job management system (optional).
  (See separate operating manual for the DATAMANAGER).

"Calibrate" machine can also be activated manually.
See Chapter "7.4.6 Calibrating"

For "Calibrate" machine, the following data are measured automatically:

- Sheet length
- Optimal suction length
- Minimal sheet gaps
- Speeds of all folding units
- Sheet monitoring of all folding units (optional)

These can be changed manually.
See Chapter "7.4.6 Calibrating".

"Calibrate" machine is ended automatically after the first sheet passes through all photo cells of the completely-adjusted Navigator combination.

7.3.2 Adjusting the folding imposition

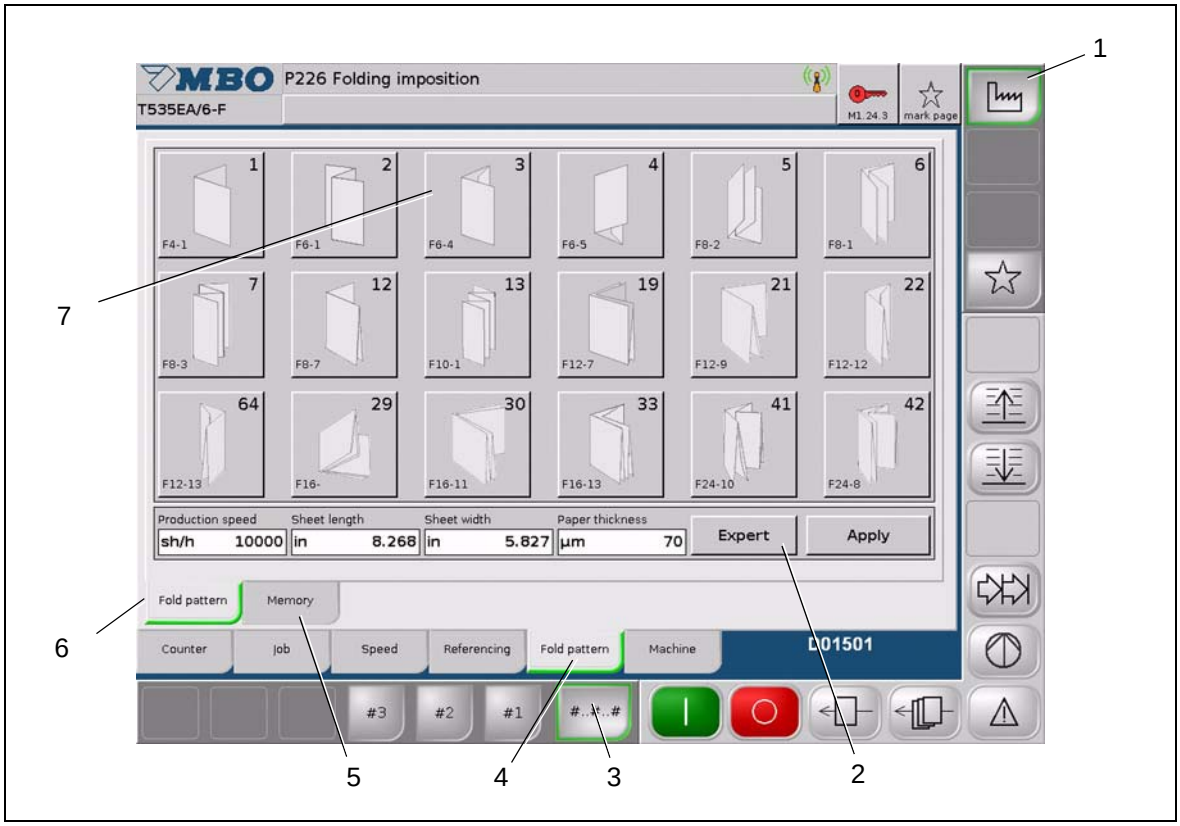


Figure 60: Adjusting the folding imposition

Procedure:

▷ Press the <Production> button (1).
▷ In the <Machine configuration> selection bar, press the <Network> button (3).
▷ In the <Functional group> selection bar, press the <Folding imposition> button (4).
▷ In the <Function> selection bar, press the <Folding imposition> button (6).
A folding imposition can be selected in <Quick mode> (7).
See Chapter "7.3.4 Quick mode".
A folding imposition can be selected in <Expert mode> (2).
See Chapter "7.3.5 Expert mode".
▷ In the <Function> selection bar, press the <Memory> button (5).
A stored folding imposition can be selected.
See Chapter "7.3.7 Folding imposition memory".

A folding imposition change means that:

- The new folding imposition data is calculated and the previous folding imposition data is deleted.
Back up the old folding imposition data beforehand.
- The machine enters the "Calibrate" machine state automatically.

7.3.3 Measuring the paper thickness

Figure 61: Measuring the paper thickness

The paper thickness is measured using the built-in digital outside micrometer.

Procedure:

▷ Set the outside micrometer to zero.
▷ Clamp 10 sheets of the paper to be processed into the outside micrometer using the knurled screw (1).
▷ Divide the value displayed by ten.
(Example: 1.133 mm / 10 = 0.113 mm = 113 microns).
▷ Enter the value <113> into the <Paper thickness> field.

7.3.4 Quick mode

Figure 62: Quick mode

In <Quick mode>, you can select predefined folding impositions.

Procedure:

- ▷ Enter the desired production speed (5).
- ▷ Enter the measured sheet length (4).
- ▷ Enter the measured sheet width (3).
- ▷ Enter the measured paper thickness (2).
  See Chapter "7.3.3 Measuring the paper thickness".
- ▷ Select the corresponding folding imposition (6).
- ▷ Press the <Apply> button (1).
  The display in the work area switches to the <Plates> menu.
  See Chapter "7.3.8 Starting the positioning of the buckle plates".

7.3.5 Expert mode

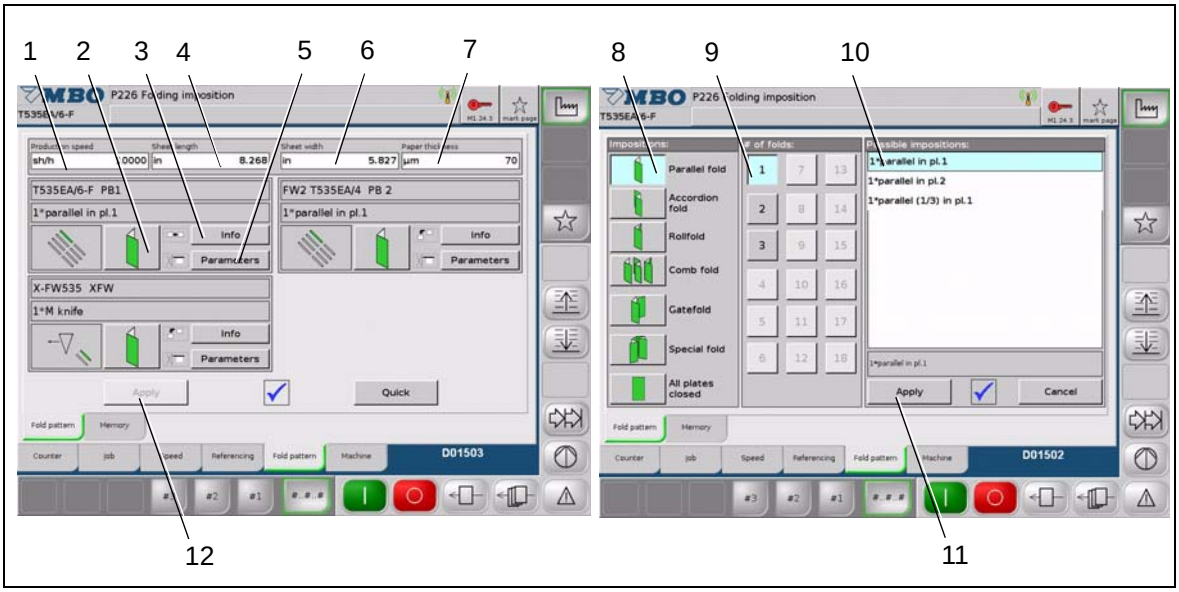


Figure 63: Expert mode

In <Expert mode>, you can select a wide variety of folding impositions.

Procedure:

- ▷ Enter the desired production speed (1).
- ▷ Enter the measured sheet length (4).
- ▷ Enter the measured sheet width (6).
- ▷ Enter the measured paper thickness (7).
  See Chapter "7.3.3 Measuring the paper thickness".
- ▷ Press the <Folding imposition> button (2).
  The folding impositions are displayed in Expert mode.
- ▷ Select a fold type (8).
- ▷ Select the number of folds (9).
- ▷ Select one of the possible folding impositions (10).
- ▷ Press the <Apply> button (11).
- ▷ Press the <Info> button (3) to display the calculated values in a submenu.
- ▷ Press the <Parameters> button (5) to open a submenu in which you can enter the sheet running, the number of rails and multiple job factor.
  See Chapter "7.3.6 Submenu folding imposition selection/Parameters"
- ▷ Press the <Apply> button (12).
  The display in the work area switches to the menu <Parameter Plates PB1>.
  See Chapter "7.3.8 Starting the positioning of the buckle plates".

7.3.6 Submenu folding imposition selection/Parameters

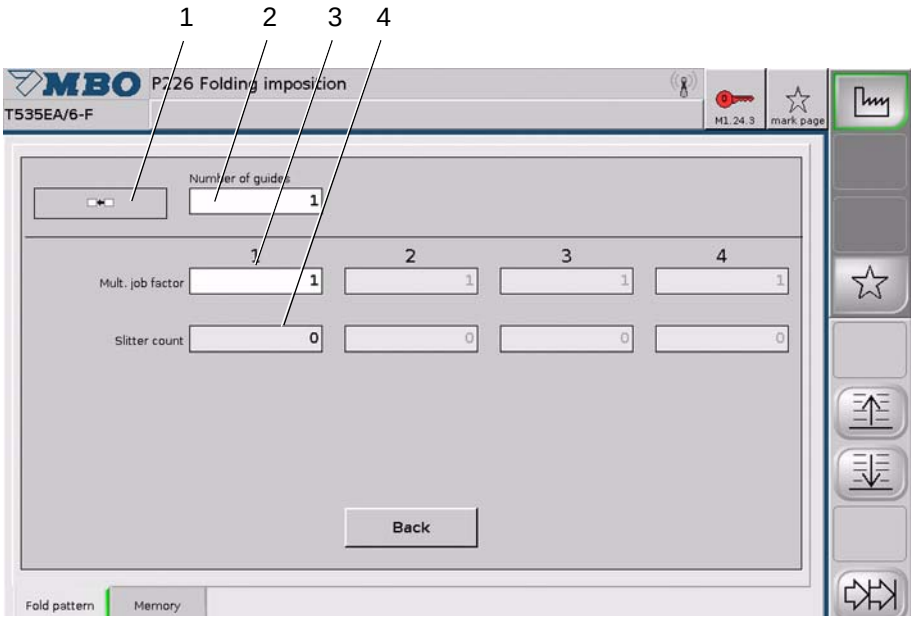


Figure 64: Submenu <Folding imposition selection/Parameters>

In the <Parameters> submenu, you can configure the following settings.
Procedure:

Display/ specification of the sheet running (1):

For certain folding impositions and suitable units, the sheet running/direction can be changed.

- 90° across a corner (default)
- In line with folding unit I

See Chapter "7.4.9 Displaying machine configuration".

Number of rails (2):

▷ Enter the <Number of rails/Sheet streams> of the current unit.

Multiple job factor (3):

▷ Enter the <Multiple job factor per rail/Sheet stream>.

Slitter count (4):

The number of cutting knives required is displayed.

The input of <Number of rails/Sheet streams> and <Multiple job factor per rail/Sheet stream> has an effect on the speed, sheet monitoring and counter data.

7.3.7 Folding imposition memory

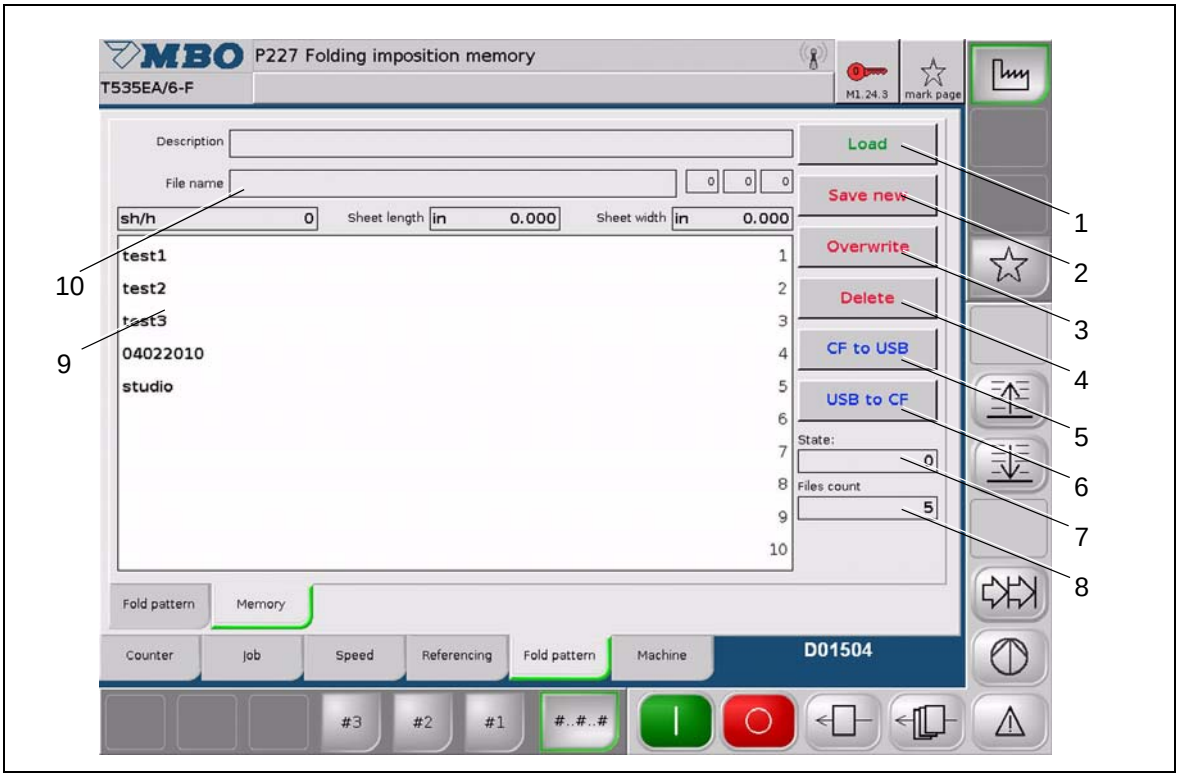


Figure 65: Folding imposition memory

In the <Folding imposition memory> menu, you can carry out various actions.

Load (1): The folding imposition selected in the selection window (9) is loaded as the current folding imposition.

Save new (2): The current folding imposition is saved in the folding imposition memory. See Chapter "7.3.7.1 Save new folding imposition".

Overwrite (3): The folding imposition selected in the selection window (9) is overwritten with the current folding imposition data.

Delete (4): The folding imposition selected in the selection window (9) is deleted from the folding imposition memory.

CF to USB (5): The folding impositions displayed in the selection window (9) are stored on an external USB stick.

USB to CF (6): The folding impositions displayed on an external USB stick are loaded into the VC control system.

7.3.7.1 Save new folding imposition

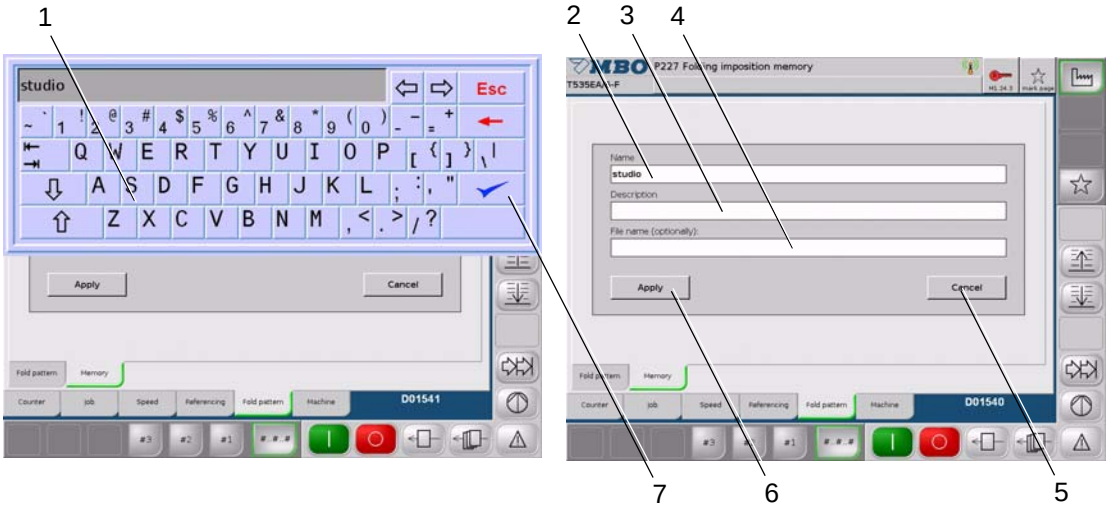


Figure 66: Save new folding imposition

In the menu <Save new folding imposition>, the texts for the name (2) of the folding imposition, the information text (3) and the file name (4) can be selected as desired.

- <Name> (2).
  If no name is entered, the file name is entered automatically.
- <Information text> (3).
  Entering the information text is optional.
- <File name> (4).
  If no file name is entered, the current date and time are entered automatically.
  We recommend entering a file name for better orientation when storing the folding impositions to a USB stick or importing them to another, VARIO controlled, machine.

Procedure:

▷ Press the desired input field to make an entry.
A submenu with an input keyboard (1) is opened. Type on the keyboard as you would a regular computer keyboard.
▷ Enter the desired text.
Confirm the input with the <Enter> button (7).
▷ Follow the same procedure to enter the texts for the additional fields.
▷ Press the <Apply> button (6) to finish the process of saving the folding imposition.
▷ Press the <Cancel> button (5) to cancel the <Save new folding imposition> process.

7.3.8 Starting the positioning of the buckle plates

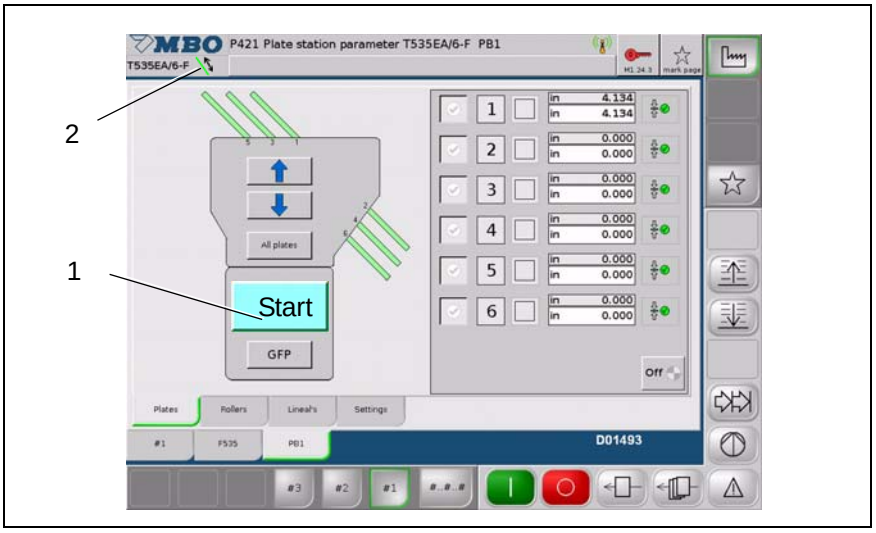


Figure 67: Changing calculated folding lengths manually

After selecting a new folding imposition, for safety reasons, the positioning of the buckle plates must be started manually.

Procedure:

⚠CAUTION

Pinch point, moving parts.

Crush hazard.

When starting the automated format change, observe the following precautions:

- Do not reach into the machine.
- Make absolutely sure that there are no other people at the machine.

Starting positioning:

▷ Press the <Start> button (1).
The sheet stops are positioned.
During the plate adjustment process, the symbol (2) flashes.

The various states of the push button (1) have the following meanings:

- The button is blue and labeled with <Start>.
  Starts the positioning.
- The button is red and labeled with <Stop>.
  The positioning can be canceled.
- The button is yellow and labeled with <Homing>.
  Starts the reference run (homing) for the selected buckle plates.
  See Chapter "7.9.8 Reference run of the buckle plates".
- The button is green and labeled with <Position OK>.
  The positioning is finished.

7.3.9 .Positioning the foldrollers

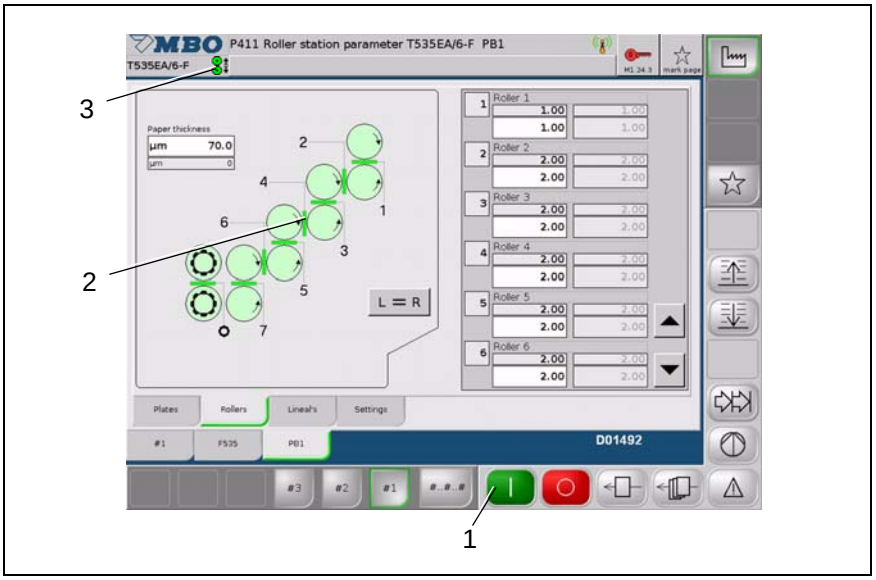


Figure 68: Positioning the foldrollers

After selecting a new folding imposition, the positioning of the foldrollers is carried out automatically when the machine starts.

Procedure:

▷ Start the machine by pressing the <Start> button (1).
The positioning takes place.
This is indicated by the flashing gray roller gap in the roller diagram (2) and the flashing green symbol (3).
The positioning is ended when the symbol (3) is no longer visible.

See also Chapter "7.8.1 Correcting the foldroller/slitter shaft adjustment".

7.4 Counter

7.4.1 Counter data

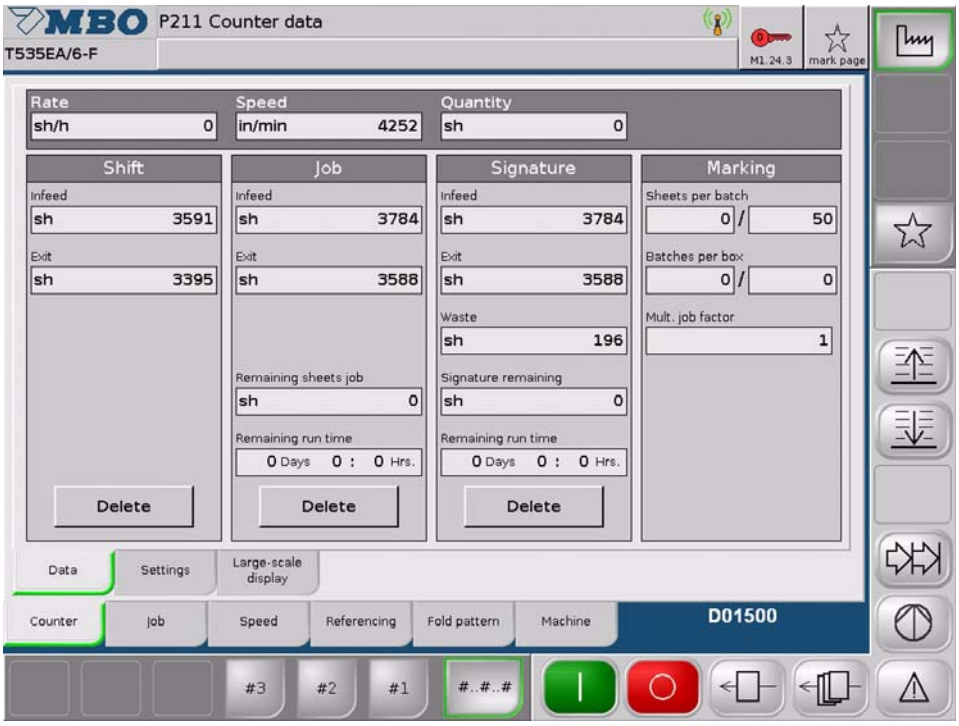


Figure 69: Deleting the counter data

The <Counter data> menu displays the current counter data divided into signature, job and shift.

The counter data of the job are displayed only if a number greater than 1 is entered in the <Number of signatures> display in the <Settings> menu. See Chapter "7.4.3 Counter settings".

7.4.2 Deleting the counter data

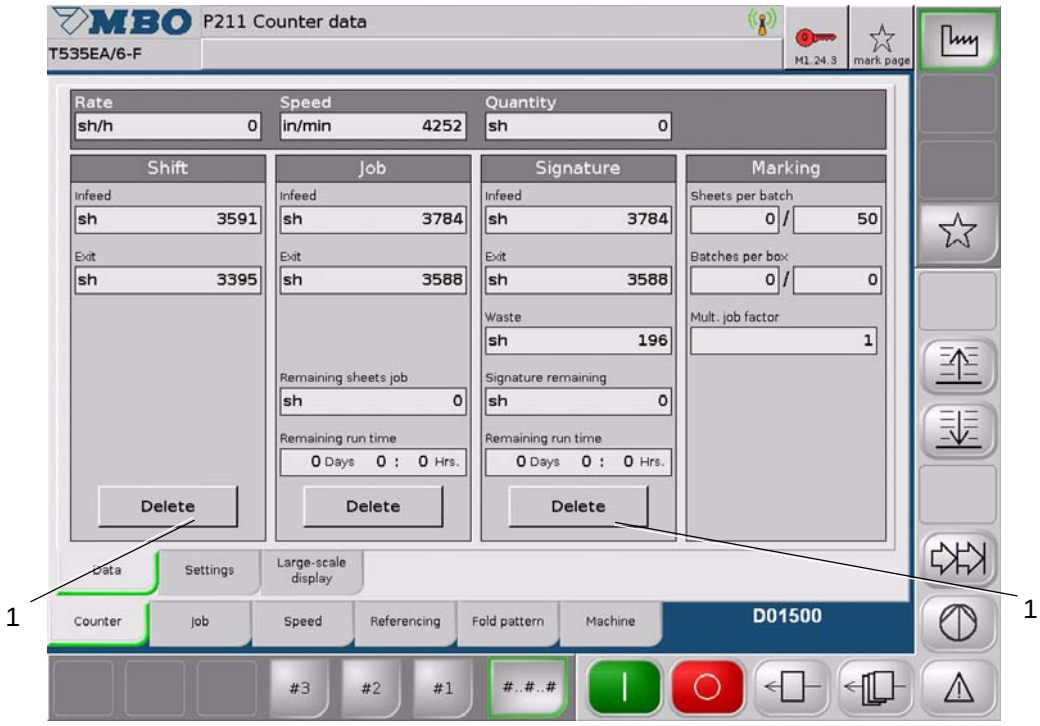


Figure 70: Deleting the counter data

The <Counter data> menu displays the current counter data divided into signature, job and shift.

When the signature, job or shift are changed, the corresponding counter data must be deleted.

Procedure:

▷ Press the corresponding <Delete> button (1).

- Deleting the counter data has no effect on any machine function.
- The counter data of the job are displayed only if a number greater than 1 is entered in the <Number of signatures> display in the <Settings> menu.
  See Chapter "7.4.3 Counter settings".

7.4.3 Counter settings

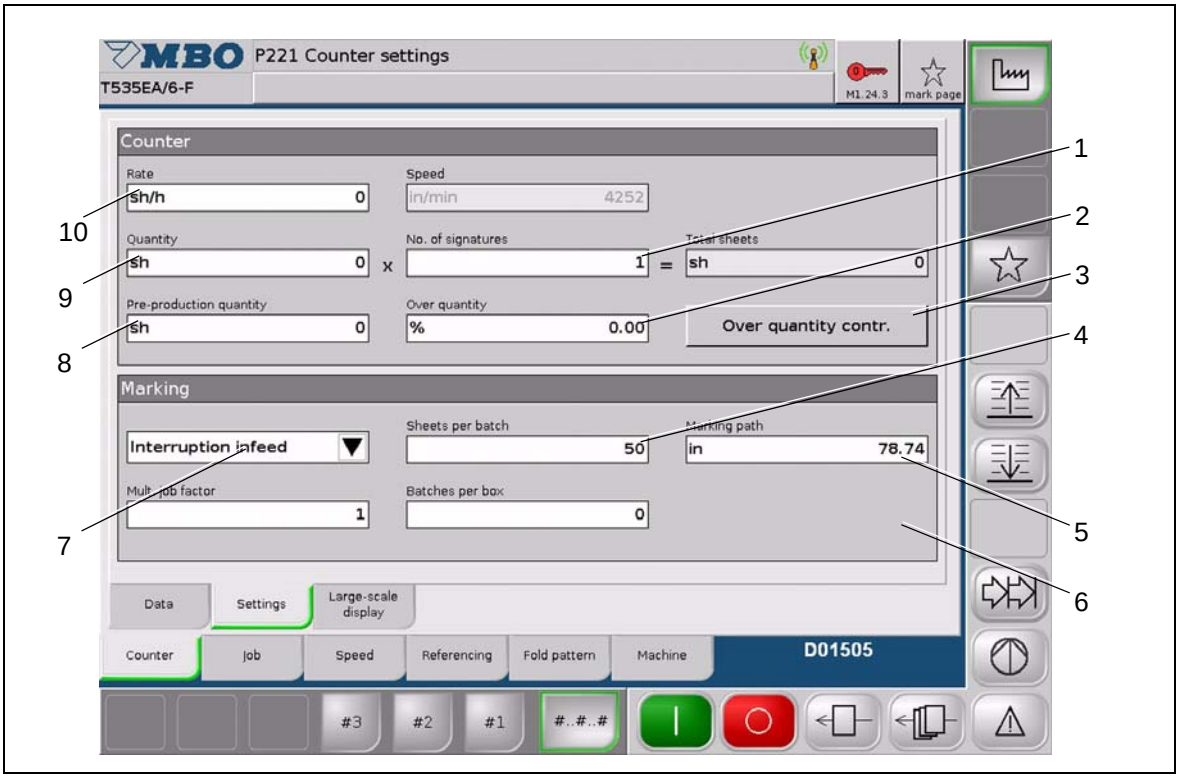


Figure 71: Counter settings

The Counter settings menu is used to configure the default counter settings.

Procedure:

▷ Enter the desired production speed (10).
▷ Enter the quantity (9).
▷ Enter the number of signatures (1).
  If you enter a number greater than 1, the job data are entered in the <Counter data> menu.
▷ Enter the desired pre-production quantity (8).
▷ Enter the desired over quantity in percent (2).
▷ If desired, enable the over quantity control (3).
  The <Over quantity contr.> button (3) turns green.
▷ Select the desired marking (7) by double-clicking.
▷ Enter the multiple job factor (4).
▷ Enter the desired number of sheets per batch (5).
▷ Enter the desired number of batches per box (6).

7.4.4 Adjusting the large-scale display

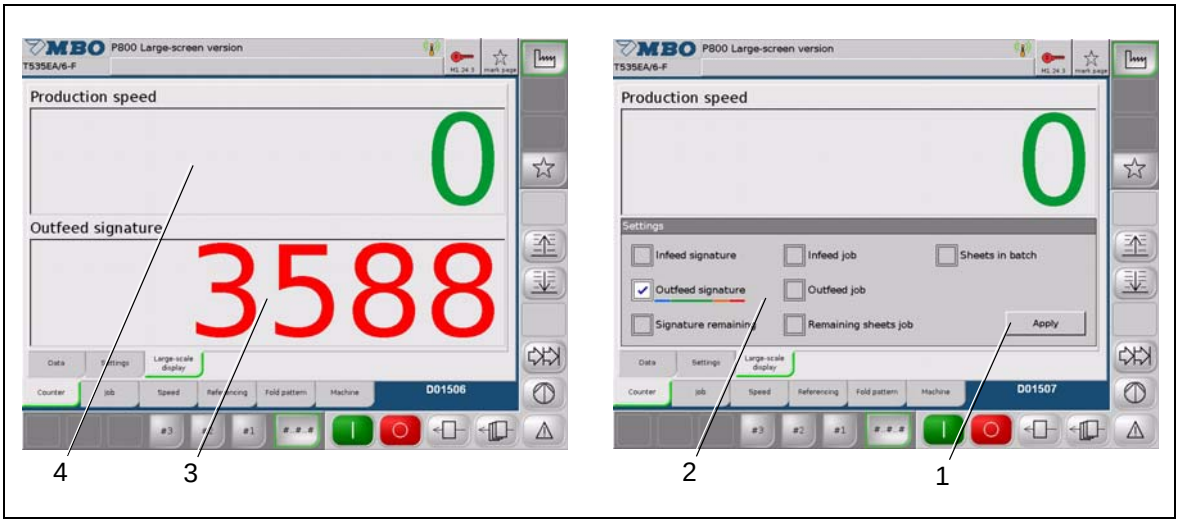


Figure 72: Adjusting the large-scale display

In the <Large-scale display> menu, the top display field (4) always displays the production speed and the lower display field (3) shows a selectable counter.

Selecting the counter

Procedure:

▷ Click the bottom display field (3).
A selection field opens.
▷ Select the desired counter (2).
▷ Press the Apply button (1).
The selection field is closed.
The selected counter is shown in the display field (3).

If the <Outfeed signature> counter is selected, the color of the display changes according to the status of the activated over quantity control. See Chapter "7.4.3 Counter settings".

- Blue until pre-production quantity is reached.
- Green until quantity is reached.
- Orange until over quantity is reached.
- Red after over quantity is reached.

7.4.5 Job

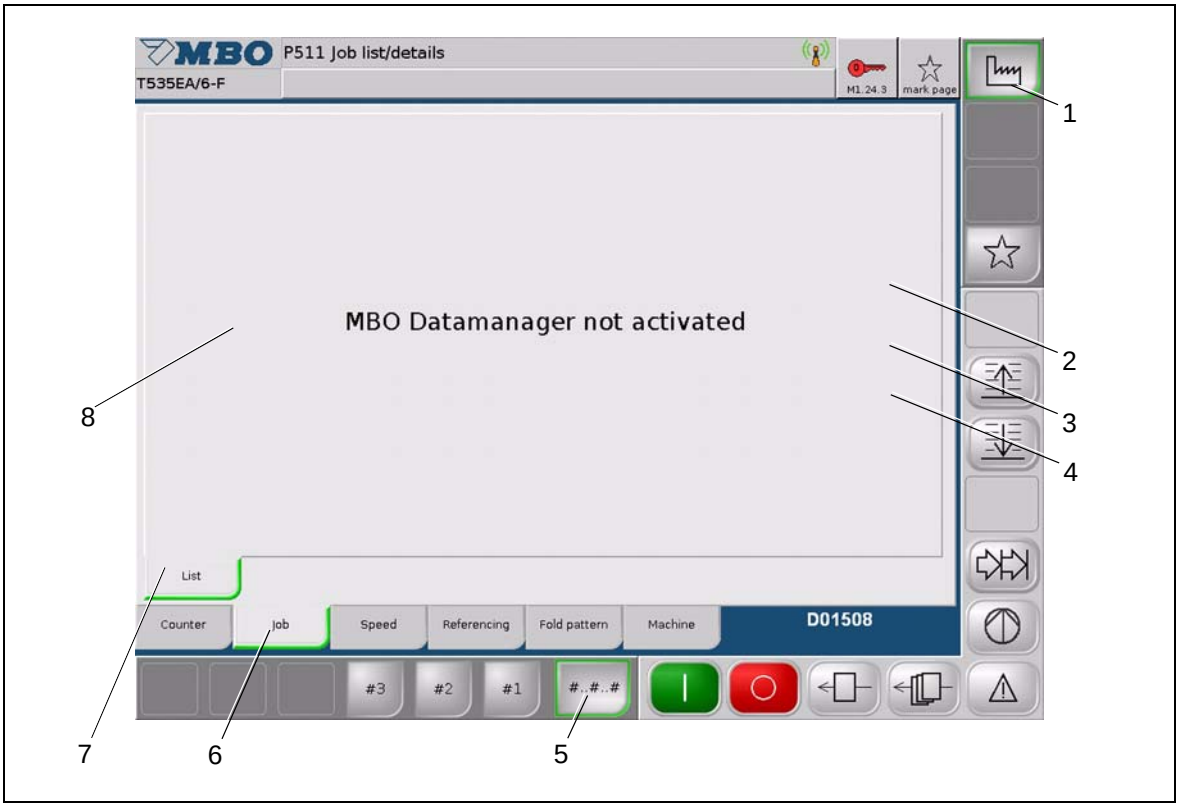


Figure 73: Job

In the <Job list/details> menu, in conjunction with the MBO-DATAMANAGER (optional), you can load prepared or stored jobs.

Procedure:

▷ Press the <Production> button (1).
▷ In the <Machine configuration> selection bar, press the <Network> button (5).
▷ In the <Functional group> selection bar, press the <Job> button (6).
If no MBO-DATAMANAGER is connected, the message <MBO DATAMANAGER not activated> appears.
For the functioning description, refer to the separate operating manual for the <MBO-DATAMANAGER>.

7.4.6 Calibrating

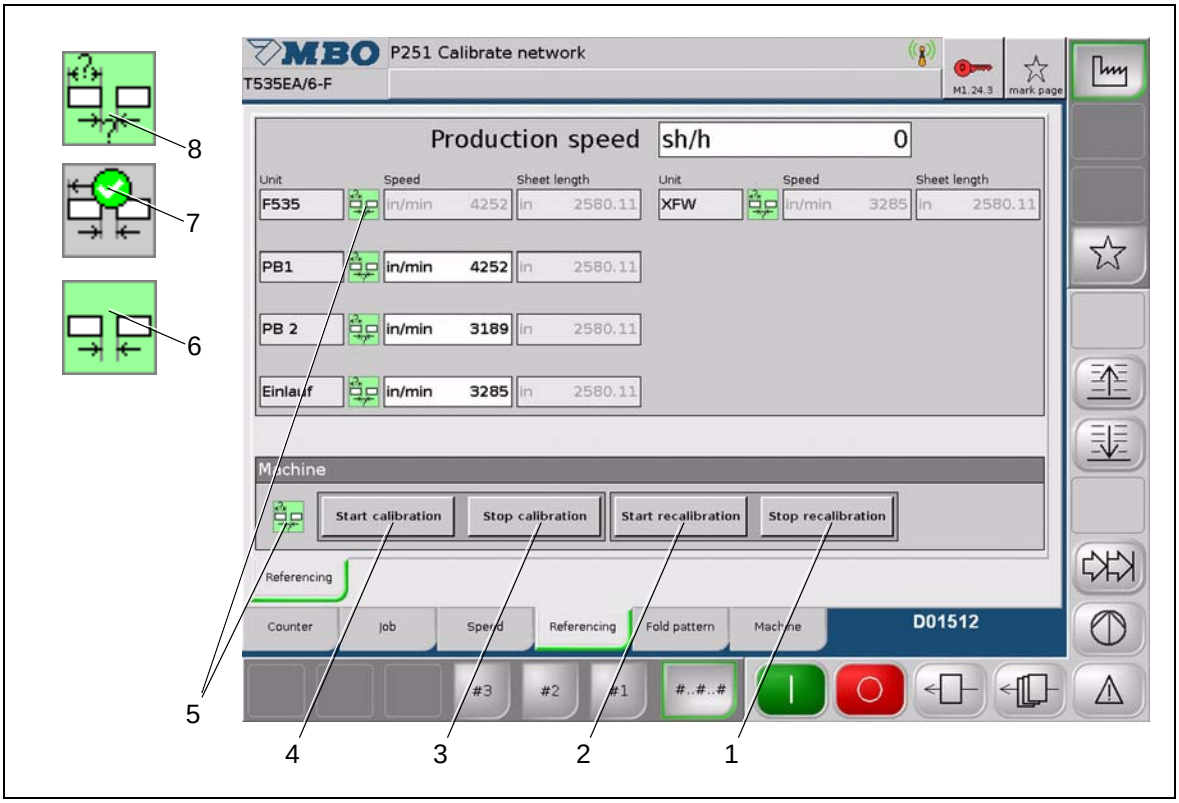


Figure 74: Calibrate network

In the <Calibrate network> menu, you can carry out various calibration functions manually.

During the calibration process, the following parameters are measured and optimized:

- Sheet length
- Optimal suction length
- Minimal sheet gap
- Speed of all folding units in the combination
- Sheet monitoring of all folding units in the network (optional)

These newly-determined parameters can be changed manually if desired.

- See Chapter "7.4.7 Changing sheet infeed data.".

Start calibration (4): Pressing the <Start calibration> button (4) activates the calibration process for the sheet feed data and the sheet monitoring.
The symbols (5) change from <calibrated> (7) to <Calibrate> (8).

The "Calibrate" process is ended automatically after the first sheet passes through all photo cells of the completely-adjusted VARIO network.
The symbols (5) change from <Calibrate> (8) to <calibrated> (7).

Stop calibration (3): No function:

Start recalibration (2): During <Recalibration> (2), only the values for the sheet monitoring are remeasured.
Manually changed sheet feed parameters remain intact.
The symbols (5) change from <calibrated> (7) to <Recalibration> (6).

Stop recalibration (1): No function:

7.4.7 Changing sheet infeed data.

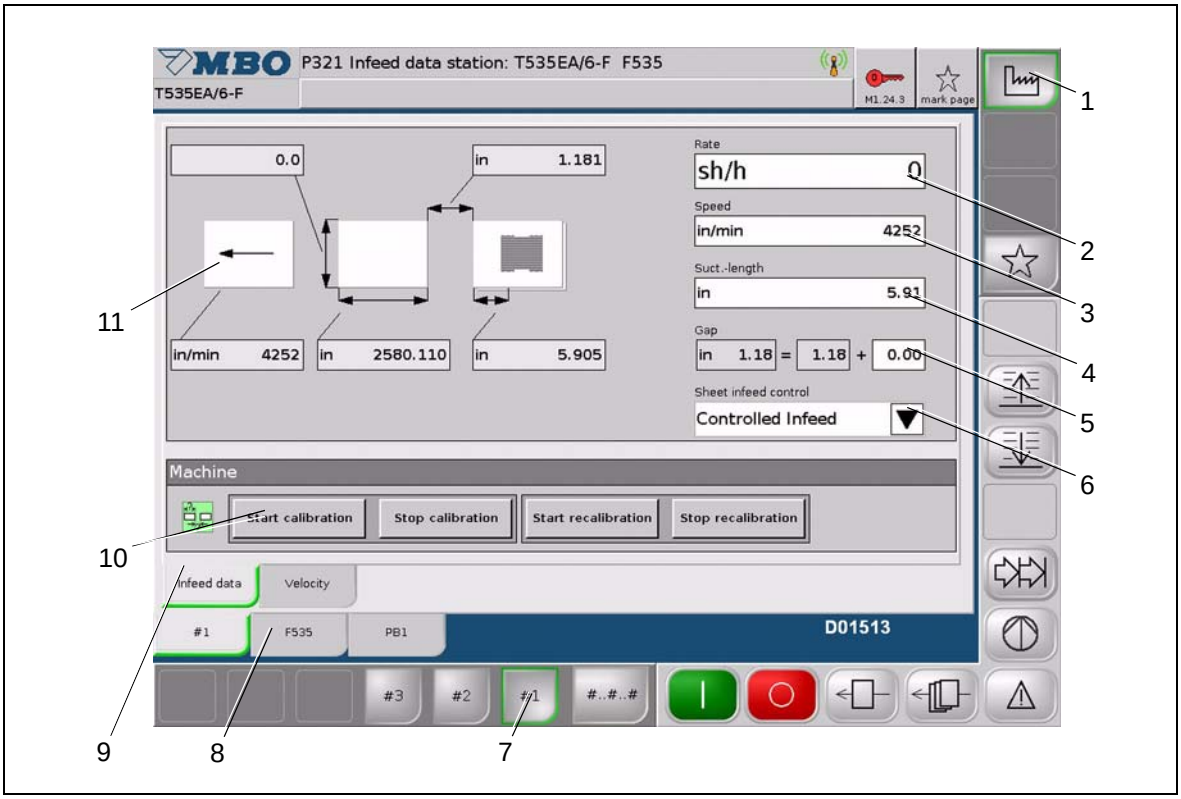


Figure 75: Changing sheet infeed data.

Procedure:

▷ Press the <Production> button (1).
▷ In the <Machine configuration> selection bar, press the <Unit 1> button (7).
▷ In the <Functional group> selection bar, press the <F535> button (8).
▷ In the <Functional menus> selection bar, press the <Infeed data> button (9).
The <Infeed data> menu is displayed.

Procedure for changes:

▷ Press the corresponding display field.
A numeric input field appears.
You can enter the new values there.

Rate (2):
- Displays the specified or calculated sheet rate per hour.
- Can be increased and decreased.
This causes a change in the speed of the network.

Speed (3):
- Shows specified speed of the machine.
Can only be increased.
The sheet gap is increased.
The production speed is not changed.

Suction length (4):
- Is calculated automatically during <Calibrate> (approximately 1/3 of the sheet length).
- Can be increased and decreased.

Sheet gap (5):
- Is calculated automatically.
- Depends on the sheet format and type of fold.
- Can only be increased.
  The speed is not changed this way.
  The production speed is reduced.

Sheet feed control (6):
Selection window for the desired type of sheet infeed control.
- Default setting is <Automatic>.
- Cycle
- None

<Calibrate> button group (10):
- A <Calibration> and a <Recalibration> can be carried out.
  See Chapter "7.4.6 Calibrating".

7.4.8 Changing the production speed

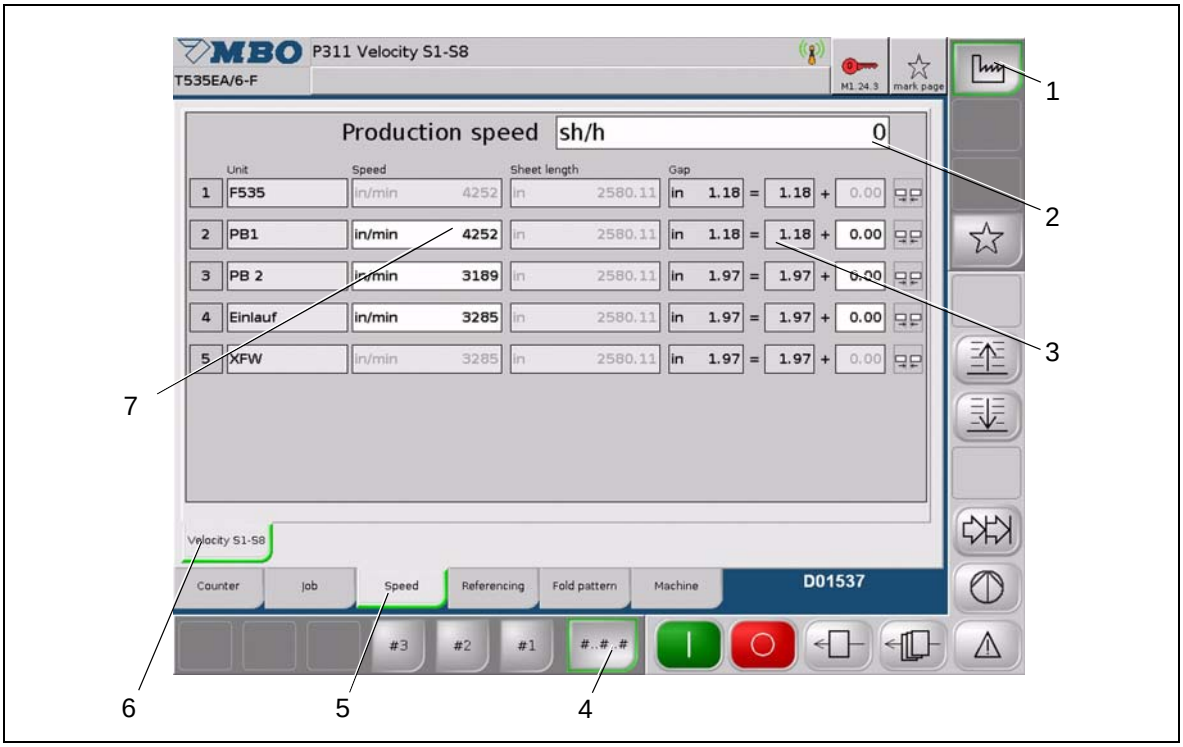


Figure 76: Speed

In the <Speed> menu, you can change the production speed for the entire machine configuration, the local speed and the local sheet gap.
The default values (set point values) are displayed.

The current values are displayed in the <Network> menu. See Chapter "7.4.9 Displaying machine configuration".

Production speed: A change of the production speed (2) causes a change in the speed of the entire machine configuration.
The sheet gap remains the same.

Speed A change of the speed (7) causes a local change in speed, i. e. the sheet gap changes locally.
The production speed remains the same.

Sheet gap: **Feeder:**

A change of the sheet gap (3) on the feeder causes a change of the production speed.
The speed of the feeder remains the same.

Subsequent folding units

A change of the sheet gap (3) on subsequent folding units causes a local change in speed.
The production speed remains the same.

Procedure for changes:

▷ Press the corresponding display field.
The numeric input field appears.

▷ Enter the new value.

If the values entered are too small, these are corrected automatically when the <Enter> button is pressed and accepted when the <Enter> button is pressed again.

7.4.9 Displaying machine configuration

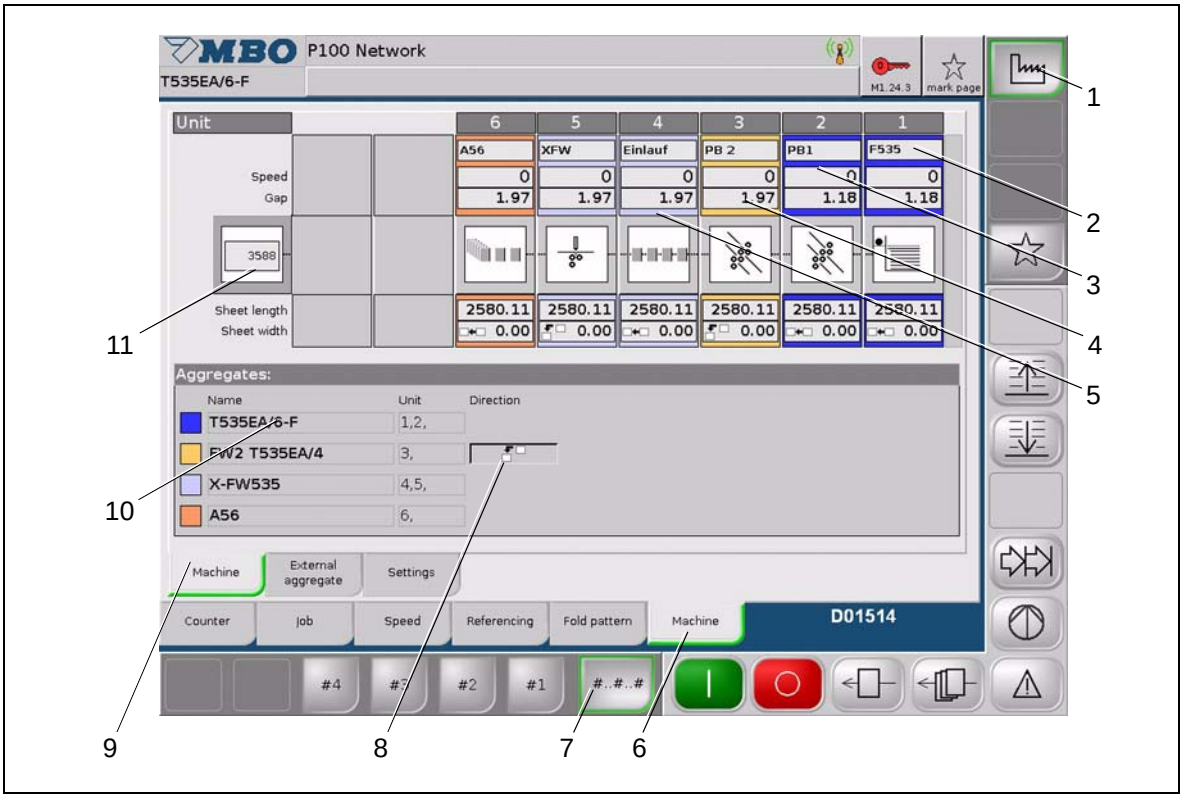


Figure 77: Displaying network

Intelligent units with Powerlink, e. g. folding unit II (PB2), are automatically detected in the network and assigned to the correct position when coupled/ uncoupled.

Procedure:

▷ Press the <Production> button (1).

▷ In the <Machine configuration> selection bar, press the <Machine configuration> button (7).

▷ In the <Functional group> selection bar, press the <Network> button (6).

▷ In the <Functional menus> selection bar, press the <Network> button (9).
The <Network> menu is displayed.
It shows the units in the network, specifying the most important folding data.

- Unit T535EA/6-F consists of
  Station1 = F535 = Feeder
  Station 2 = PB1 = FW1
- Unit FW2 T535EA/4 consists of
  Station 3 = PB2 = FW2
- Unit A56 consists of
  Station 4 = A56 = Delivery (CAN unit).

Display/ specification of the sheet running (8):

For certain folding impositions and suitable units, the sheet running/direction can be changed.

- 90° across a corner (default)
- In line with folding unit I

Procedure:

▷ Change the direction by pressing the <Direction> button (8).
The selected direction is shown in the button.
Depending on this, the sheet feed data and the selection of folding impositions change.

7.4.10 Selecting the CAN unit

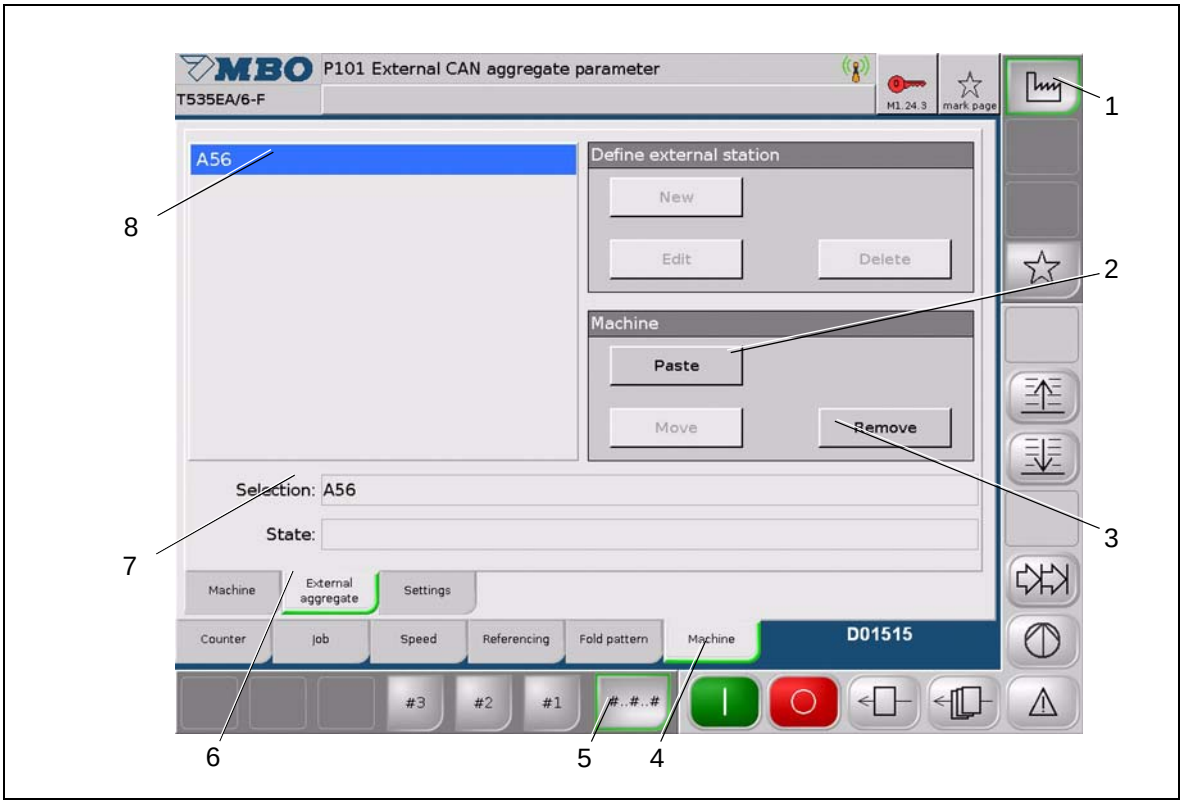


Figure 78: Changing sheet infeed data.

CAN units must be assigned manually to the network in the correct position or removed from the network, e.g. Delivery A56.

▷ Press the <Production> button (1).
▷ In the <Machine configuration> selection bar, press the <Machine configuration> button (5).
▷ In the <Functional group> selection bar, press the <Network> button (4).
▷ In the <Functional menus> selection bar, press the <CAN unit> button (6).
The <CAN unit parameters> menu is displayed.

Adding a CAN unit:

Procedure:
▷ Select the corresponding CAN unit in the selection list (8).
▷ Press the <Paste> button (2).
▷ Select the paste position.
▷ Press the <Paste> button.
The selected CAN unit is pasted into the network.

Removing a CAN unit:

Procedure:
▷ Select the corresponding CAN unit in the selection list (8).
▷ Press the <Remove> button (3).
The selected CAN unit is removed from the network.

7.4.10.1 Creating new CAN units

New CAN units can be created by MBO Service or by an authorized customer service agent only.

7.4.11 Inching mode

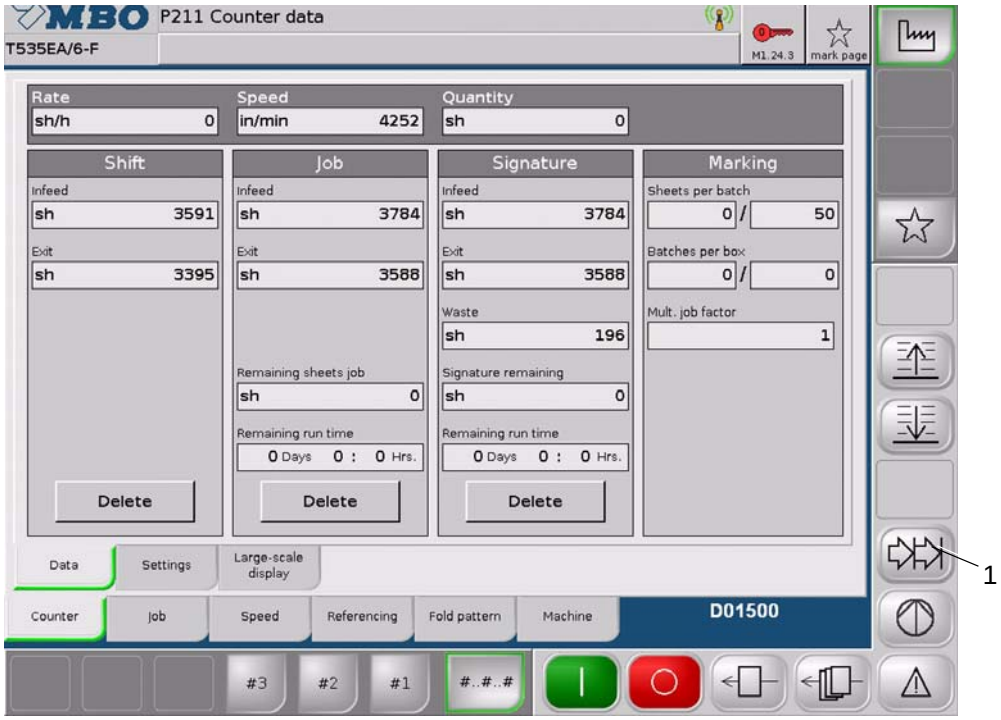


Figure 79: Inching mode

In inching mode, the machine can be operated at a reduced speed (50 m/min). However, no error messages may be pending.

Procedure:

▷ Press the <Inching> button (1).
The machine rotates at a reduced speed (50 m/min).

- If quality control is deactivated, all units in the machine network rotate.
- If quality control is activated, only the units not included in the quality control rotate.

7.4.12 Quality control

Figure 80: Quality control

The <Quality control> function is used to safely remove sheets for inspection. For this purpose, subsequent folding units can be stopped specifically.

The <Quality control> is always switched on locally on the folding unit on which the sheets are to be withdrawn.
The only exception is folding unit I.
If the <Quality control> is switched on there, folding unit II does not move.

Procedure:

Switching on:

- ▷ Press the <Quality control> button (1).
  The information field (5) shows the blue information message <324 FW2 T535EA PB2 Quality control active>.
- ▷ Start the machine (4).
  Folding unit I runs, while folding unit II stops.
- ▷ Start the folding sheet infeed as single sheets (3)/production (4).

Switching off:

- ▷ Press the <Quality control> button (1) once again.
  The blue information message lights up in the information field (5).

7.5 Adjusting the feeder

See separate operating manual for the feeder.

7.5.1 Displaying the calculated configuration values for the feeder

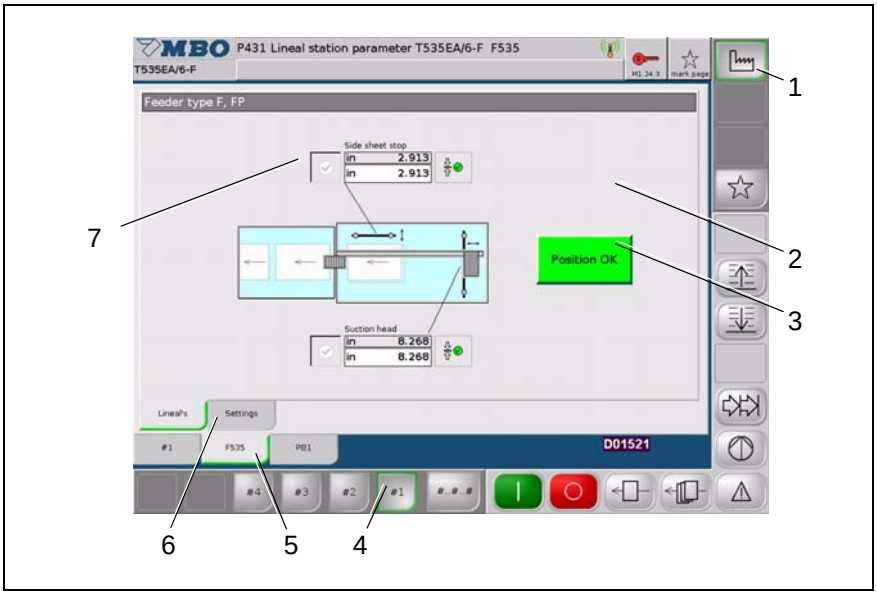


Figure 81: Displaying the calculated configuration values for the feeder

When a new folding imposition has been calculated, the setting values for the side stop (7) and the feeder head (2) are displayed in the <Rail parameters> menu.

Procedure:

▷ Press the <Production> button (1).
▷ In the <Machine configuration> selection bar, press the <Unit 1> button (4).
▷ In the <Functional group> selection bar, press the <F535> button (5).
▷ In the <Functional menus> selection bar, press the <Rails> button (6). The <Rail parameters> menu is displayed.
▷ Set the side stop according to the specified value (7).
▷ Set the feeder head according to the specified value (2).

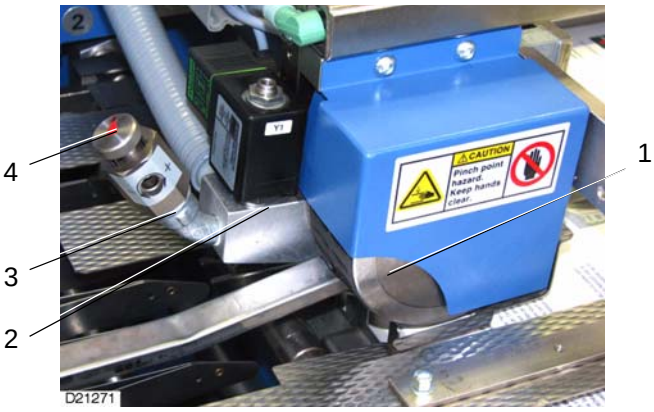
7.6 Adjusting the suction wheel

⚠CAUTION

Pinch point, moving parts.

Drawing-in and crush hazard.

Never reach below the suction wheel while the machine is running.



1	Suction wheel	3	Adjustment handle
2	Valve plate	4	Knurled screw

Figure 82: 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.

7.7 Setting of the alignment table

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

WARNING

Pinch point, rotating roller.

Drawing-in and crush hazard.

Never reach towards the shaft while the machine is running.

WARNING

Pinch point, rotating roller.

Drawing-in and crush hazard

Never reach towards the tape rollers while the machine is running.

1 Tape rollers 2 Shaft

Figure 83: Hazard areas of the register table

7.7.1 Displaying the calculated configuration values

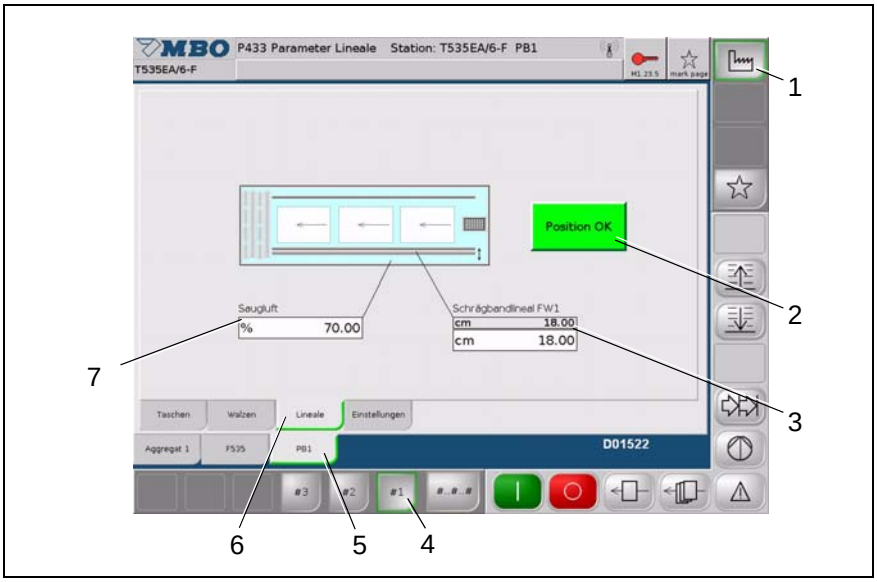


Figure 84: Displaying the calculated values

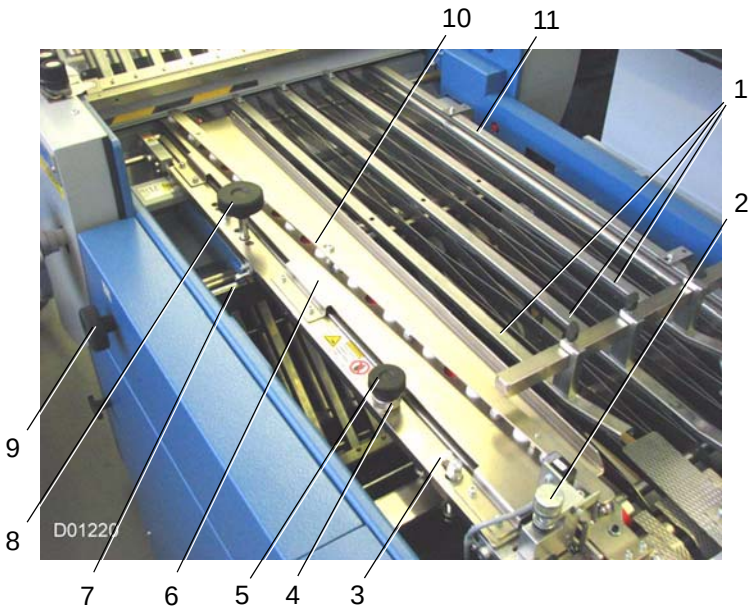
When a new folding imposition has been calculated, the setting values for the sidelay (3) are displayed in the <Rail parameters> menu.

Procedure:

▷ Press the <Production> button (1).
▷ In the <Machine configuration> selection bar, press the <Unit 1> button (4).
▷ In the <Functional group> selection bar, press the <PB1> button (5).
▷ In the <Functional menus> selection bar, press the <Rails> button (6). The <Rail parameters> menu is displayed.
▷ Set the sidelay according to the specified value (3).

The <Suction air> setting value (7) is required only for the version T535 PERFECTION with VIVAS.

7.7.2 Sheet size adjustments



1	Smoother bars	8	Knurled screw
2	Double-sheet control	9	Knurled screw
3	Angle scale	10	Marble rail
4	Eccentric	11	Guide rail
5	Knurled screw		
6	Sidelay		
7	Scale		

Figure 85: 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:

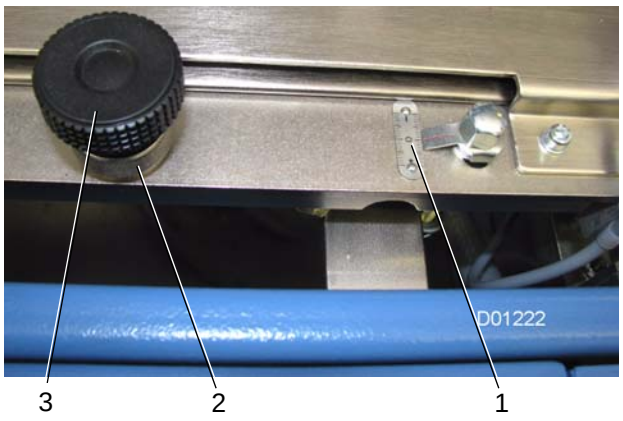
▷ Select the number of smoother bars (1) according to the paper format.

▷ 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).



1 Scale
2 Eccentric
3 Knurled screw

Figure 86: 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.

7.7.3 Equipping the marble rail

⚠CAUTION

Pinch point, moving parts.

Crush hazard.

Never reach into the holes of the marble rail while the machine is running.

1	First steel ball	3	Viewing window
2	Equipping the marble rail		

Figure 87: 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.

7.7.4 Double-sheet control

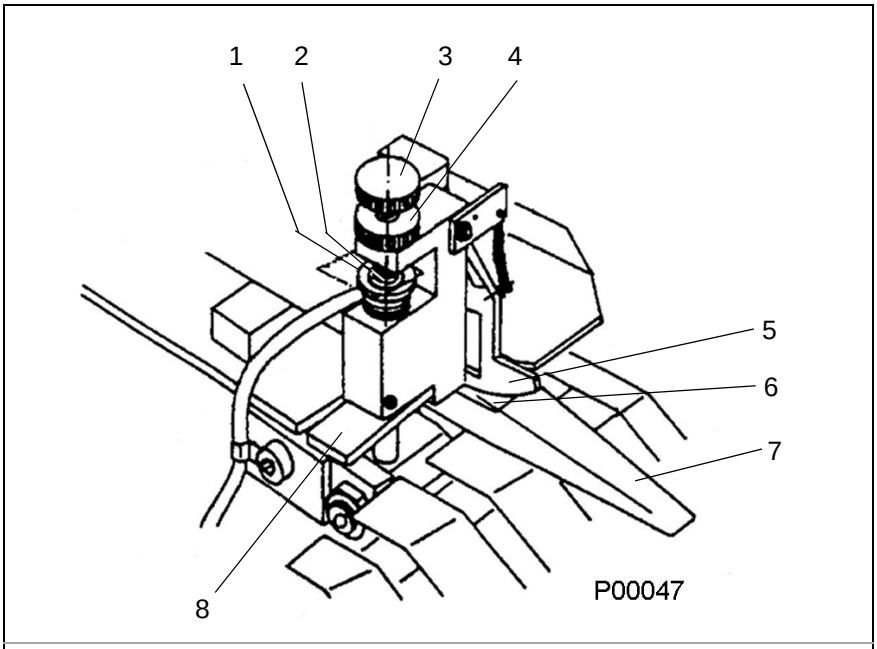
The double sheet detector works electromechanically and detects multiple paper sheets that stick to one another.

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.



1	Bolt	5	Switching segment
2	Gap	6	Transport roll
3	Knurled screw	7	Smoother bar
4	Lock nut	8	Lever

Figure 88: 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).

7.8 Adjusting the foldrollers/slitter shafts.

WARNING

Pulling out/removing the buckle plates.

The exposed, rotating foldrollers and slitter shafts make up hazardous infeed points.

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

- All adjustment or testing/inspection work may be carried out only when the machine is stopped and secured against switching on.
- Press the EMERGENCY STOP palm button.
- Always have the adjustment or testing/inspection work carried out by one individual person only.
- A crush hazard and danger of injuries is also present when turning the machine using the safety handwheel.

The foldrollers take up the aligned sheet of paper from the register table. Using the slitter shafts, additional processing of the sheet can be carried out as it passes through.

7.8.1 Correcting the foldroller/slitter shaft adjustment

After the adjustment is corrected, the positioning takes place automatically when the machine is started.

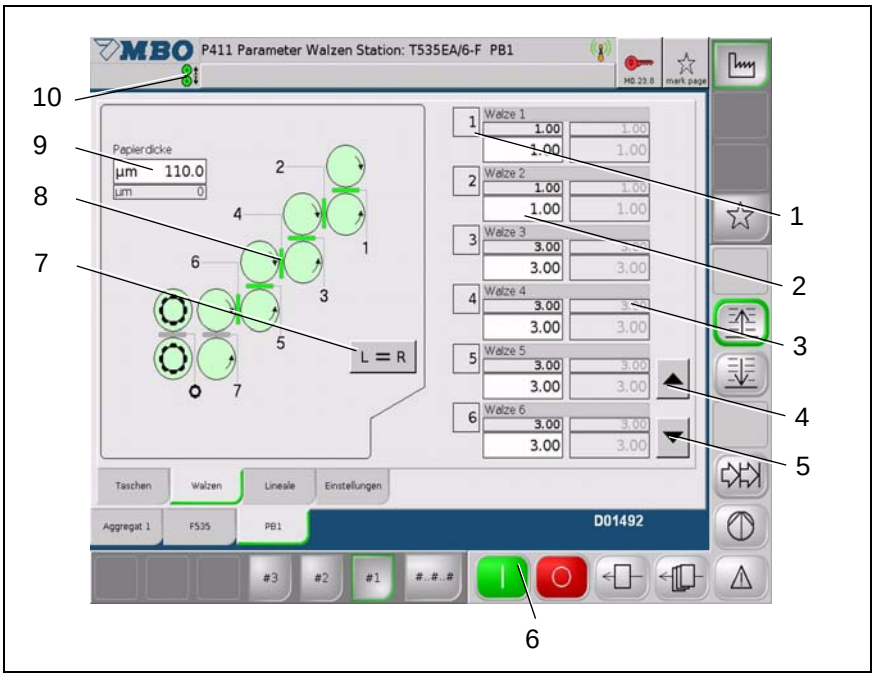


Figure 89: Correcting the adjustment of the foldrollers and slitter shafts

Procedure:

▷ Using the button (7), select whether both sides are to be changed symmetrically or the left and right side are to be changed separately.
▷ Scroll the display area (1) of the rollers upwards using button (4) or downwards using button (5).
▷ Press the display field (2) of the roller gap to be changed.
A numeric input field appears. You can enter changes in values of 1/100 paper thickness.
▷ Start the machine by pressing the button (6).
The positioning to the new values takes place automatically when the machine is running.
This is indicated by the flashing gray roller gap in the roller diagram (8) and the flashing green symbol (10).

<Paper thickness> input field (9):

If the paper thickness changes during a job/signature, the foldroller adjustment can be adapted for multiple folding units.

Procedure:

▷ Measure the paper thickness.
See Chapter "7.3.3 Measuring the paper thickness"
▷ Press the input field (9).
▷ Enter the measured value.

7.9 Adjusting the buckle plates

WARNING

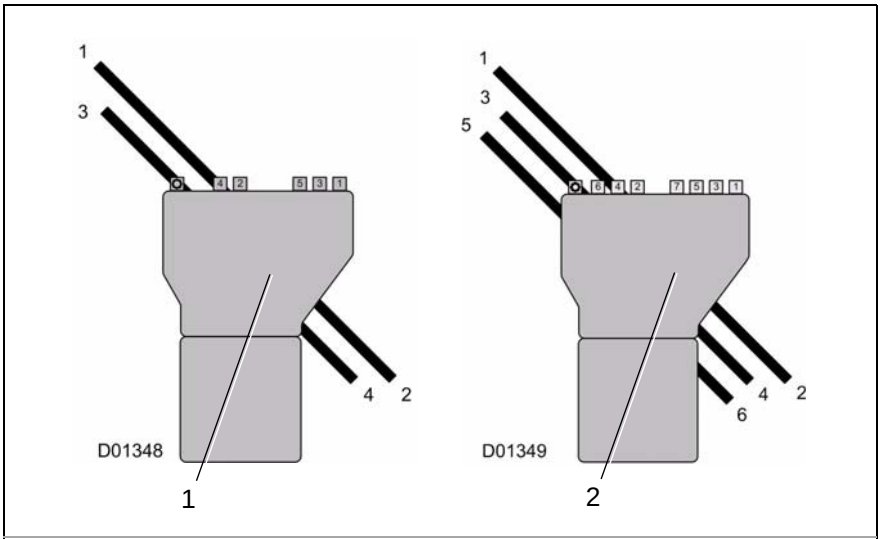
Pulling out/removing the buckle plates.

The exposed, rotating foldrollers and slitter shafts make up hazardous infeed points.

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

- All adjustment or testing/inspection work may be carried out only when the machine is stopped and secured against switching on.
- Press the EMERGENCY STOP palm button.
- Always have the adjustment or testing/inspection work carried out by one individual person only.
- A crush hazard and danger of injuries is also present when turning the machine using the safety handwheel.

7.9.1 Buckle plate positions



1 4 plate parallel fold

2 6 plate parallel fold

Figure 90: Buckle plate positions

The upper buckle plates have an uneven numbering.
The lower buckle plates have an even numbering.

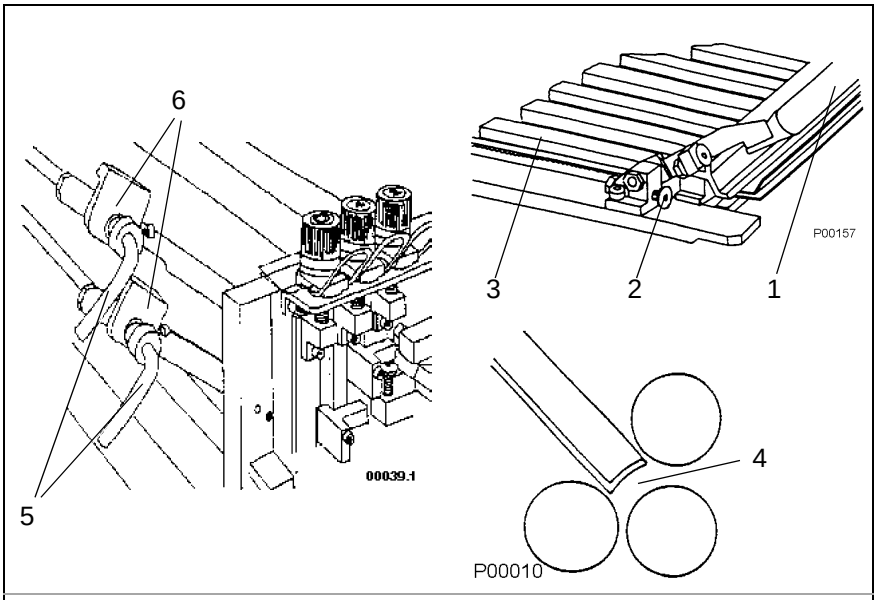
7.9.2 Buckle plate 1 (FTA3D)

The first buckle plate in Folding unit 1 is equipped with a swing deflector and a continuous sheet stop.
See Chapter "7.9.4 Sheet deflector function of buckle plate FTA3D".

7.9.3 Buckle plates 2 to 4 (6) (FTA3)

Buckle plates 2 to 4 (6) are designed as combination buckle plates FTA3.
See Chapter "7.9.5 Sheet deflector function of buckle plate FTA3".

7.9.4 Sheet deflector function of buckle plate FTA3D



1	Sheet deflector	4	Buckling area
2	Stop screw	5	Clamping lever
3	Buckle plate	6	Clamping element

Figure 91: Sheet deflector

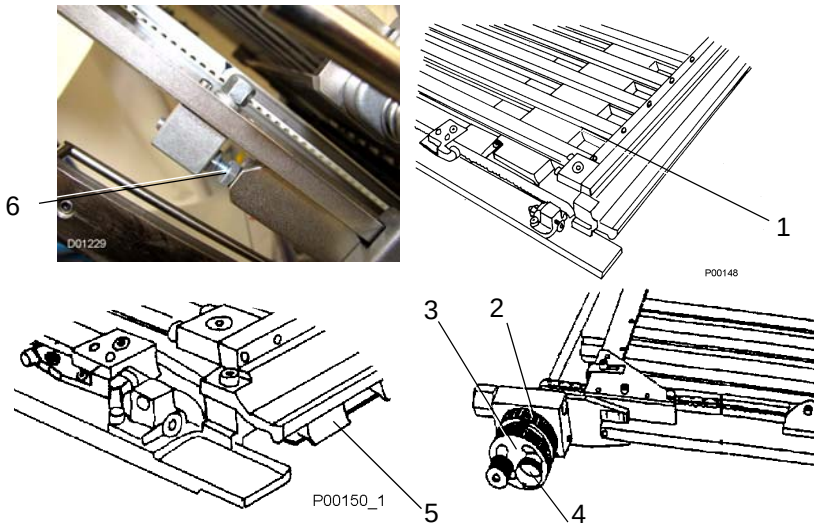
Sheet deflector function:

If the buckle plate is not needed, the sheet deflector has to be turned over.

Procedure:

▷ Release the clamping lever (5) by turning counterclockwise.
▷ Retract the unneeded buckle plate (3) by approx. 25 cm (9.843 in.).
▷ Turn 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.

7.9.5 Sheet deflector function of buckle plate FTA3



1	Sheet stop	4	Knurled screw (metal)
2	Rear adjusting disk	5	Sheet deflector position
3	Front adjusting disk	6	Stop screw

Figure 92: 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).

NOTICE

Stop screws adjusted.

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

The adjustment of the stop screws must not be changed.

7.9.6 Inserting/removing buckle plates

WARNING

Pulling out/removing the buckle plates.

The exposed, rotating foldrollers and slitter shafts make up hazardous infeed points.

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

- All adjustment or testing/inspection work may be carried out only when the machine is stopped and secured against switching on.
- Press the EMERGENCY STOP palm button.
- Always have the adjustment or testing/inspection work carried out by one individual person only.
- A crush hazard and danger of injuries is also present when turning the machine using the safety handwheel.

NOTICE

Buckle plates inserted incorrectly.

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

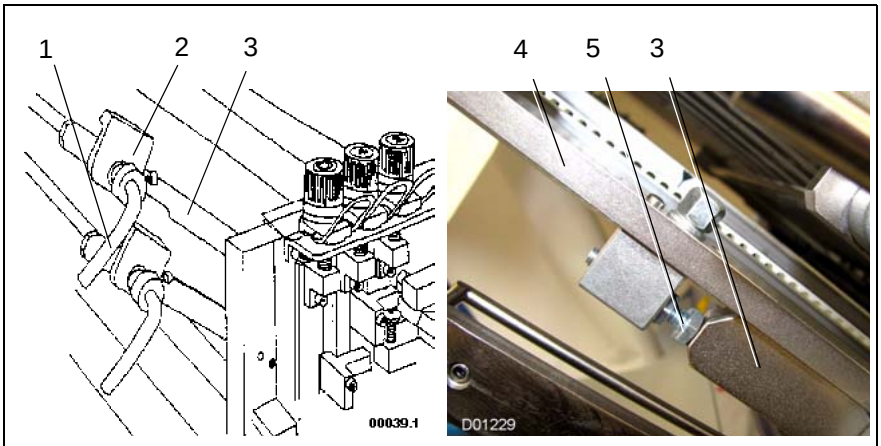
- Insert the buckle plates slowly and carefully all the way to the stop screws.
- Clamp the buckle plates securely after reinserting them.

NOTICE

Stop screws adjusted.

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

The adjustment of the stop screws must not be changed.



1 Clamping lever
2 Clamping element
3 Buckle rail
4 Buckle plate
5 Stop screws

Figure 93: Inserting buckle plate 1

Procedure:

Installation:

▷ 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.
▷ Connect the connecting lines to the buckle plate motors.

Removal:

▷ Remove the buckle plates in the opposite sequence.

7.9.7 Changing calculated folding lengths manually

The folding lengths of the buckle plates are calculated automatically when selecting a new folding imposition.
See Chapter "7.3.2 Adjusting the folding imposition".

⚠CAUTION

Pinch point, moving parts.

Crush hazard.

When starting the automated format change, observe the following precautions:

- Do not reach into the machine.
- Make absolutely sure that there are no other people on the machine.

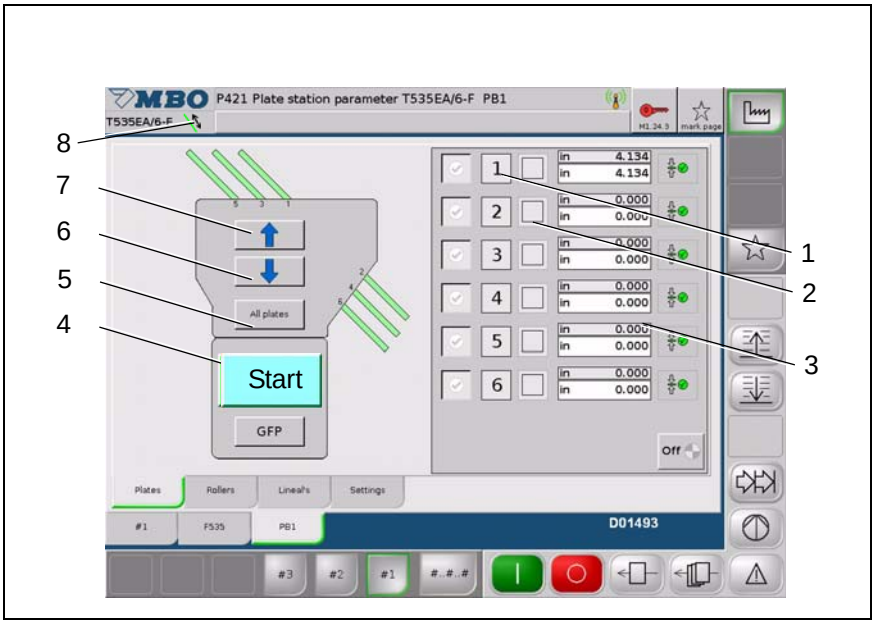


Figure 94: Changing calculated folding lengths manually

Depending on the speed, inner width adjustment and the characteristics of the paper, the folding results can deviate from the calculated values.

For this reason, the folding lengths can be adapted manually.

Procedure:

Selecting the buckle plate to be changed:

▷ Select a buckle plate in field (2) or use button (5) to select all buckle plates for a correction.

Reducing the set value

▷ Press the button (6). Each time you press the button (6), the value in field (3) is decreased by 0.1 mm (0.003 in.).

Increasing the set value:

▷ Press the button (7). Each time you press the button (7), the value in field (3) is increased by 0.1 mm (0.003 in.).

Large changes: ▷ Press the field (3). A numeric input field appears. Here you can make larger changes.

Reposition sheet stops: ▷ Press the <Start> button (4).
The sheet stops are positioned to the modified values.
During the plate adjustment process, the symbol (4) flashes.

The various states of the push button (4) have the following meanings:

- The button is blue and labeled with <Start>.
  Starts the positioning.
- The button is red and labeled with <Stop>.
  The positioning can be canceled.
- The button is yellow and labeled with <Homing>.
  Starts the reference run (homing) for the selected buckle plates.
  See Chapter "7.9.8 Reference run of the buckle plates".
- The button is green and labeled with <Position OK>.
  The positioning is finished.

7.9.8 Reference run of the buckle plates

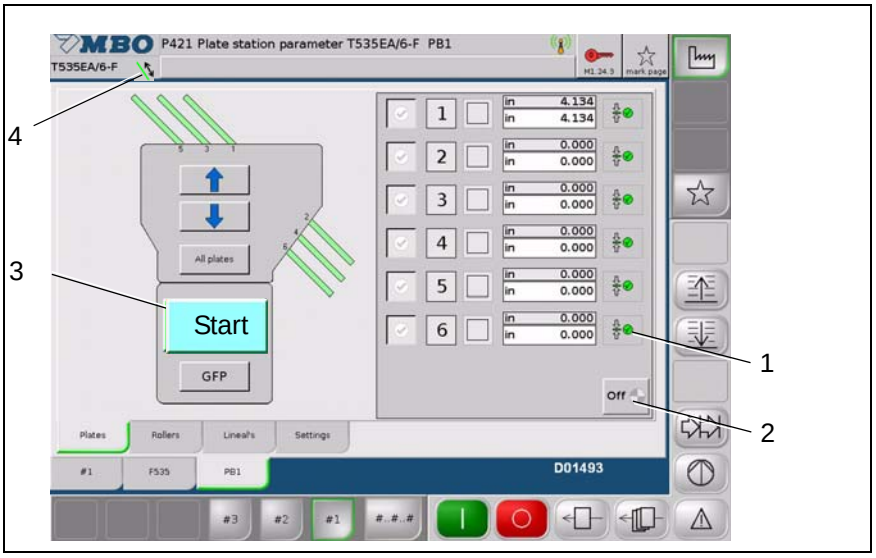


Figure 95: Changing the folding length manually

If a buckle plate has been adjusted manually on the handwheel, e.g. when the machine is de-energized, the actual sheet stop position no longer matches the configured value.

A new reference run of the sheet stop must be carried out.

Procedure:

▷ Press the button (2).
The text on the button changes from <off> to <on> and the button fields (1) of all plates are enabled.
▷ Press the button field (1) of the corresponding plate or select multiple plates.
Button (3) flashes yellow and the text <Homing> appears.
▷ Press the <Homing> button (3).
The sheet stops of the selected plates move automatically to the respective upper end position.
During the plate adjustment process, the symbol (4) flashes.
The sheet stops are positioned.
▷ When all sheet stops have reached the upper end position, button (3) turns blue and the <Start> text appears.
▷ Press the button (3).
The sheet stops retract to the displayed value.
During the plate adjustment process, the symbol (4) flashes.
▷ Call up a single sheet and check the fold.
Correct it if necessary.

7.9.9 Adjusting the sheet stop angle:

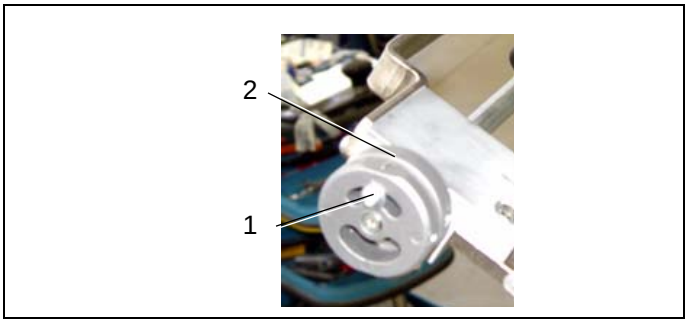


Figure 96: Modification of the sheet stop angle

Adjusting the angle:

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

Procedure:

▷ Loosen the screw (1).
▷ By turning the rear adjusting wheel (2), only the sheet stop on the operator side is moved.

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.

▷ The markings on the adjusting wheels provide a reference point for how far the adjustment was.
▷ Tighten the screw (1).

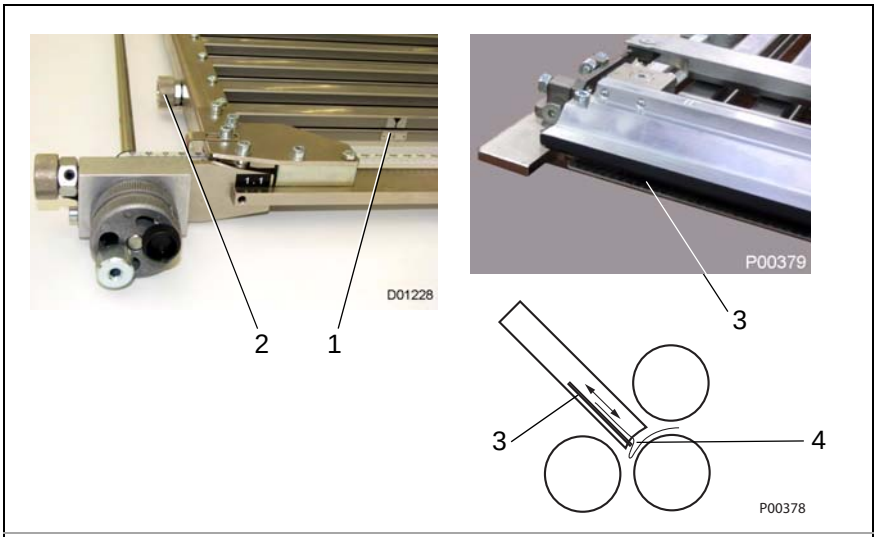
Angle basic setting

Procedure:

▷ Loosen the screw (1).
▷ Turn the rear adjusting wheel (2) so that the markings on the two adjusting wheels are above one another.
▷ Tighten the screw (1).

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

7.9.10 Adjusting the lower plate lip



1	Scale	3	Bottom plate lip
2	Knurled screw	4	Buckling area

Figure 97: 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:

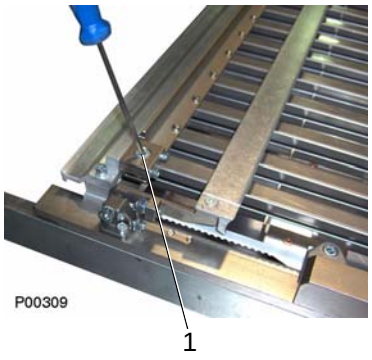
- Move lower plate lip (3) forward (towards the rollers).

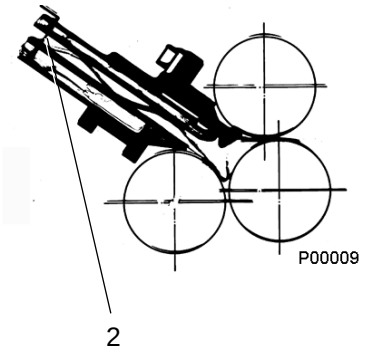
Basic setting

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.

7.9.11 Setting of the inner width





1 Screw	2 "Inner width"

Figure 98: 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.

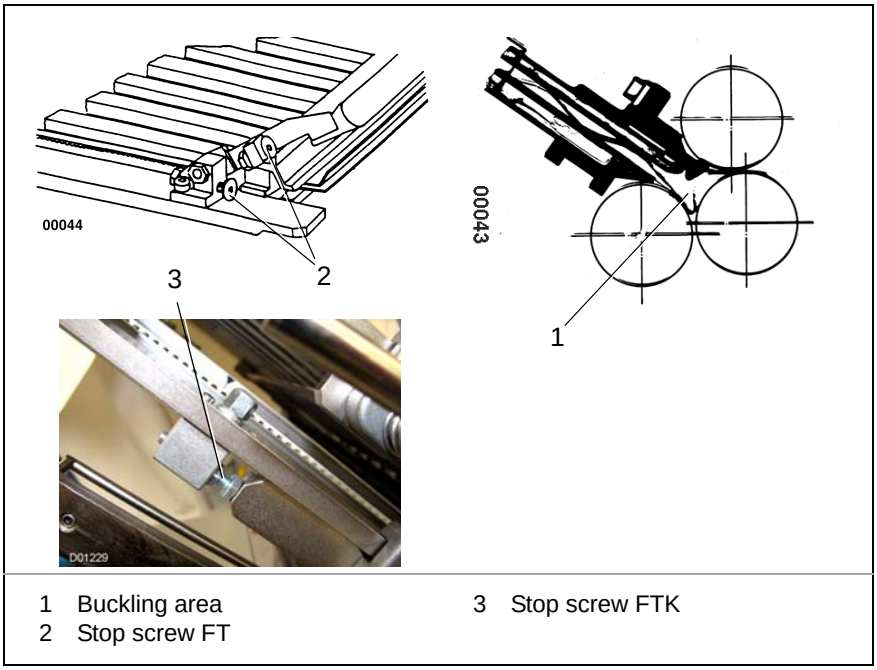
7.9.12 Enlarging the buckling area

NOTICE

Stop screws adjusted.

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

The adjustment of the stop screws must not be changed.



1 Buckling area	3 Stop screw FTK
2 Stop screw FT	

Figure 99: 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.

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.

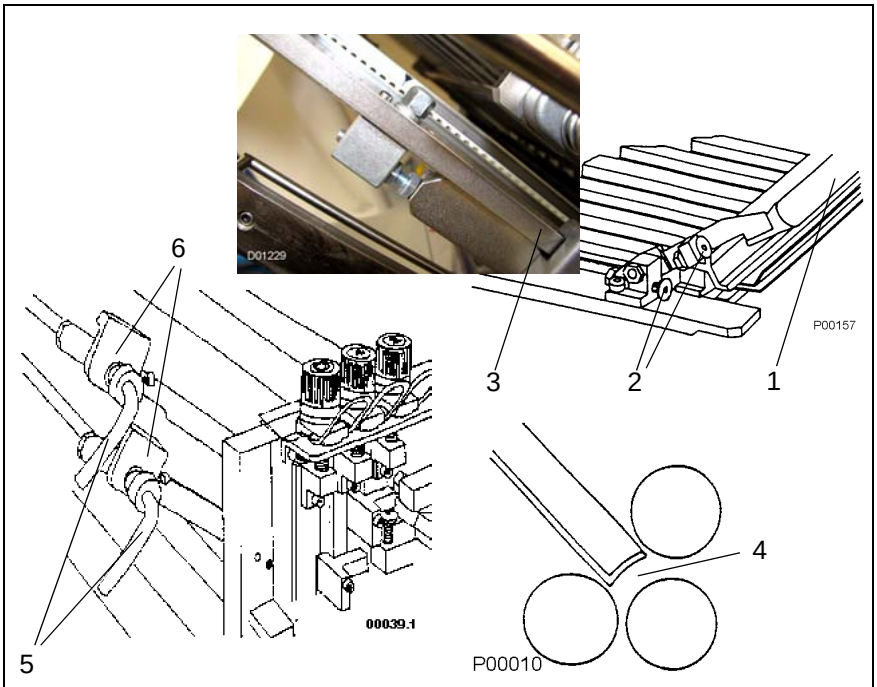
7.9.13 Enlarging the deflecting area

NOTICE

Stop screws adjusted.

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

The adjustment of the stop screws must not be changed.



1	Sheet deflector	4	Deflecting area/buckling area
2	Stop screw	5	Clamping lever
3	Buckle plate	6	Clamping element

Figure 100: 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.

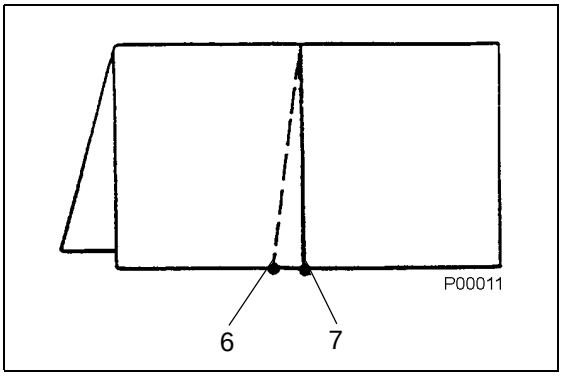


Figure 101: Correcting skewed perforations

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

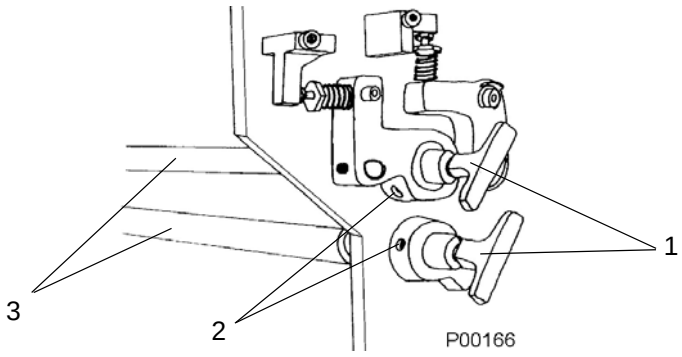
Rotating knives and slitter shafts.

The built-in knives are very sharp!

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

- Never reach into the slitter shafts while the machine is running.
- 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)



1 Plug bearing
2 Screw
3 Slitter shafts

Figure 102: Set 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

NOTICE

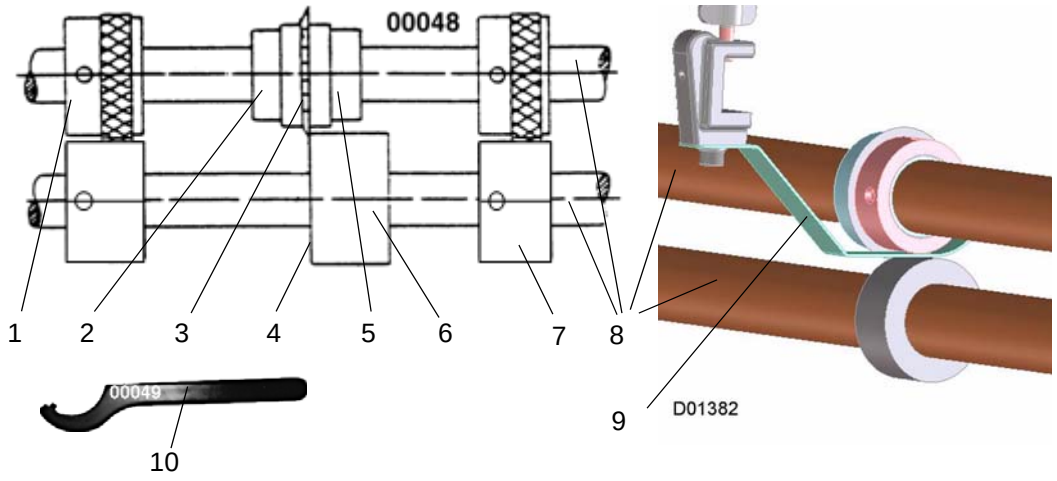
Knife holder installed incorrectly.

The nut can come loose while the machine is running.

Non-observance may possibly cause property damage.

Ensure that the nut tightens opposite to the direction of the machine.

The perforation is used for crossfolds 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.



1	Transport roller, rubberized	6	Counter knife
2	Nut	7	Transport roll
3	Perforating knife	8	Slitter shaft
4	Counter-knife edge of the counter knife	9	Stripper
5	Knife holder	10	Pin wrench

Figure 103: 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).

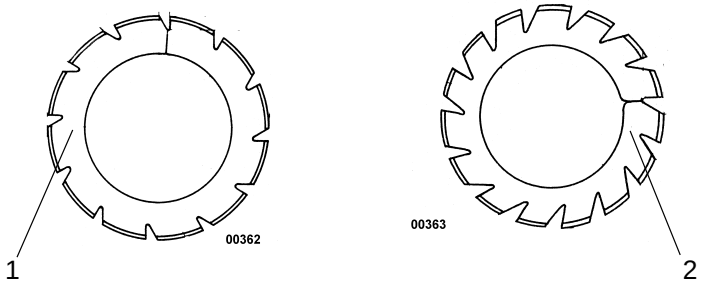
The blunted angle of the tooth must get into the paper first.

▷ 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

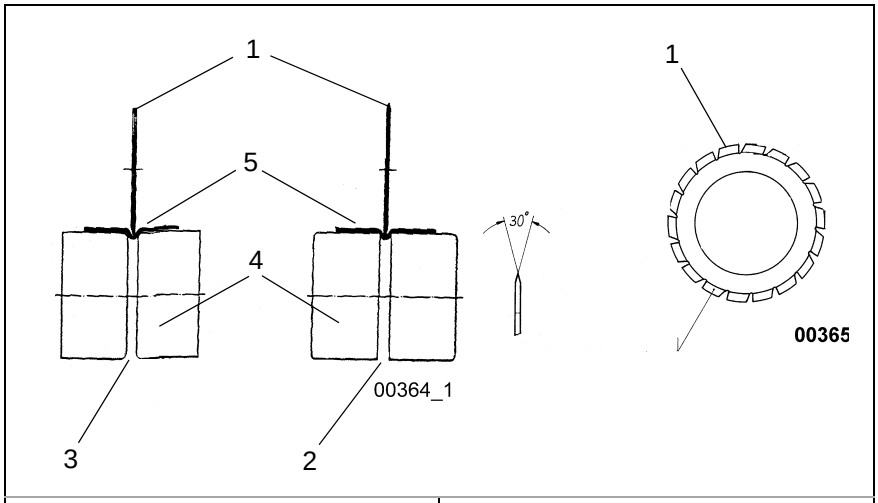


1 For Folding unit 1 and 3	2 For Folding unit 2

Figure 104: 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)



1 Perforating knife 2 Variety 1: Between cutting edges 3 Variety 2: between scoring edges	4 Cutting rollers 5 Sheets

Figure 105: V-shaped special perforating knives

V-shaped special perforating knifes 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 crossfold (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).

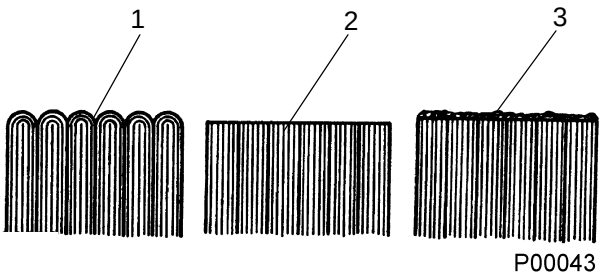
- Coordinate the gap and the mounting method to the product to be processed.
- Cutting and scoring edges must never touch the perforating knives.

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

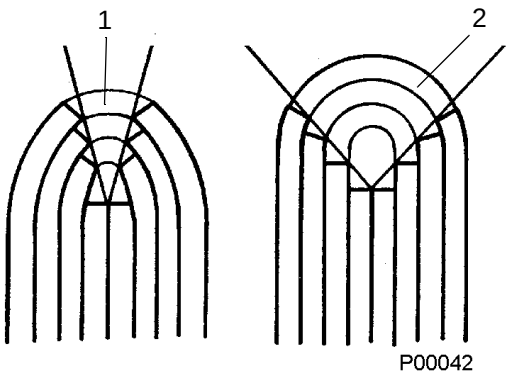


1 Gathered sheets
2 Sheets rounded off
3 Sheets with glue application

Figure 106: 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



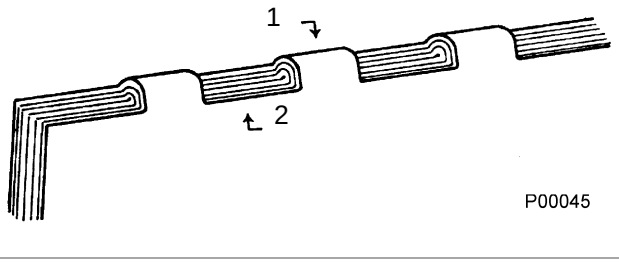
1 Notch binding process with cut perforation, small angle
2 Notch binding process with MBO punch perforation, larger angle

Table 19: 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.

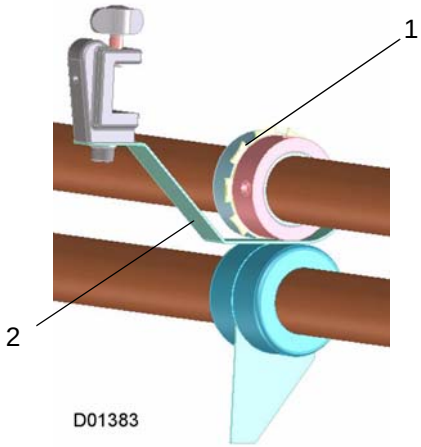


1	Connecting points	2	Punch perforation

Table 20: 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



1	Punch perforation knife	2	Stripper

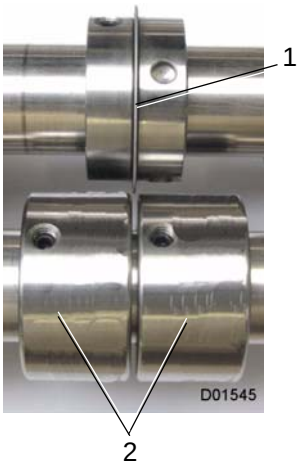
Figure 107: MBO punch perforating device

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.



1 Scoring knife
2 Transport rolls/counter-knives

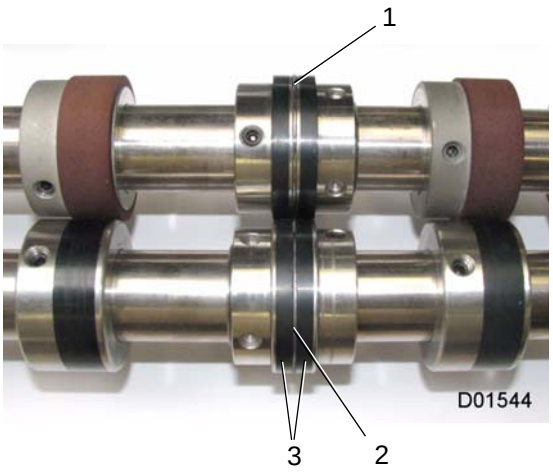
Figure 108: Creaser

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



1 Scoring knife 2 Distance pieces 0.5 mm + 1.0 mm	3 Rubber rings

Figure 109: Super-Score device

Procedure:

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

- 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 Cutting device

Folded sheets can be cut with the cutting device.

Separator cut for multiple-up production

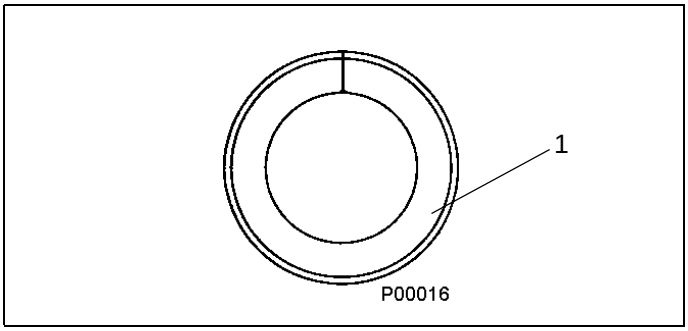
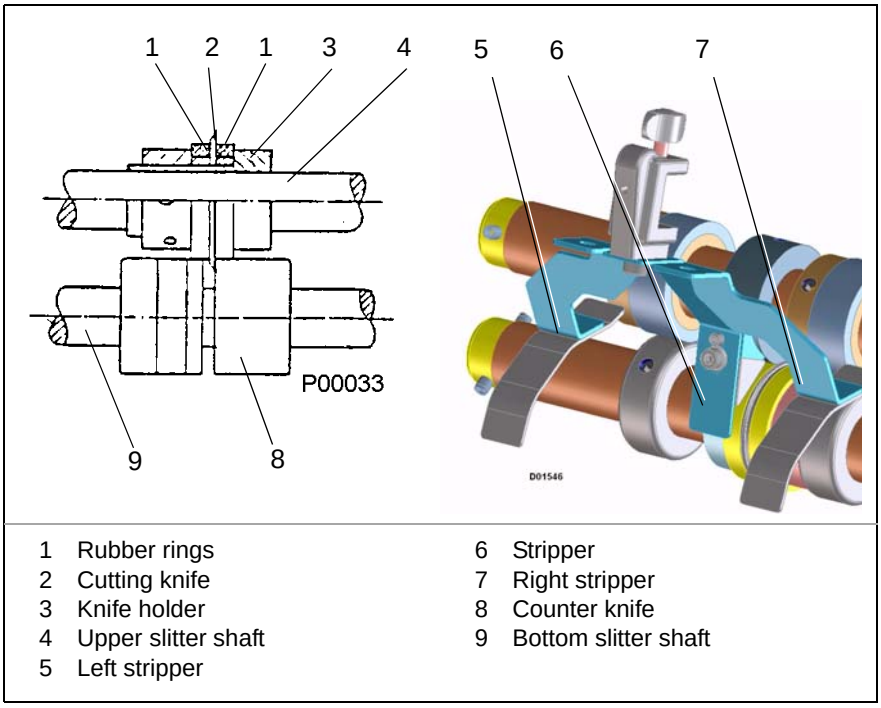


Figure 110: Cutting knives

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



1	Rubber rings	6	Stripper
2	Cutting knife	7	Right stripper
3	Knife holder	8	Counter knife
4	Upper slitter shaft	9	Bottom slitter shaft
5	Left stripper		

Figure 111: 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.

7.10.8 Strip trimming device

Folded sheets can be separated using the strip trimming device.

Strip trim for multiple-up production

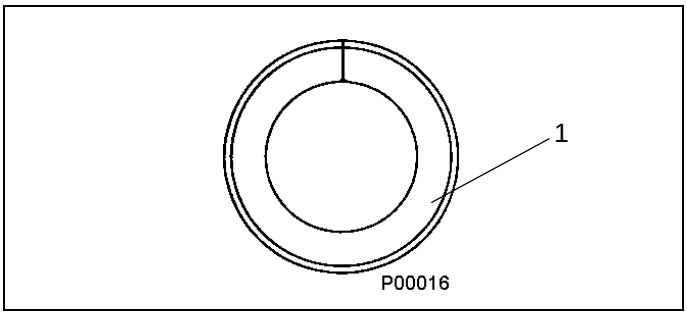
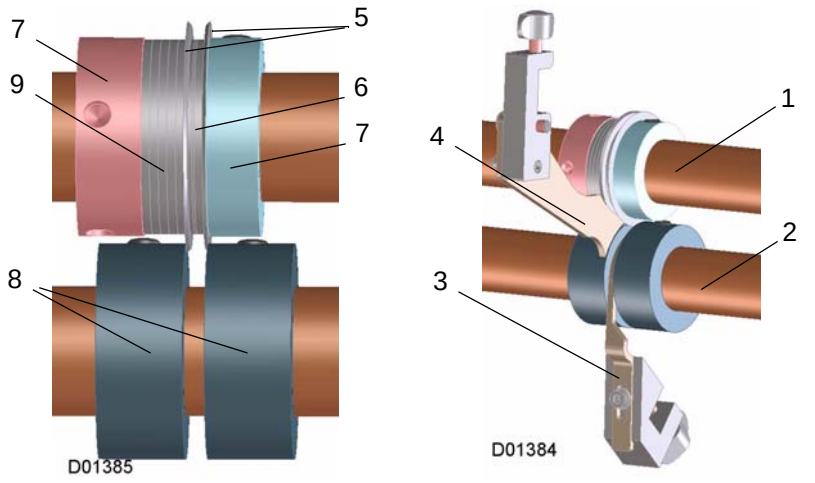


Figure 112: Cutting knives

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.



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 knives		

Figure 113: Strip trimming device

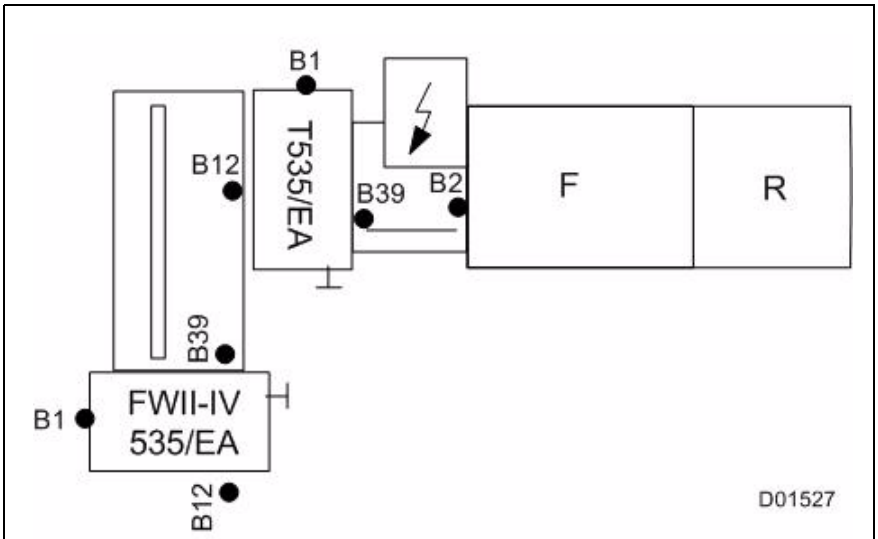
Procedure:

▷ 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 Error messages

7.11.1 Sensor positions of folding unit I and II, VC control



Position	Designation	Task
Folding unit I	Photo cell B2	Sheet feed, counting functions and sheet monitoring.
	Photo cell B39	Sheet feed, sheet monitoring
	Photo cell B12	Sheet monitoring
	Encoder B1	Rotary pulse encoder
Folding unit II	Photo cell B39	Sheet monitoring
	Photo cell B12	Sheet monitoring
	Encoder B1	Rotary pulse encoder

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.

7.11.2 Displaying error/informational messages

- Error messages = White text on red background.
  These have an effect on the machine function, e.g.: machine stop.
- Informational messages = White text on blue background.
  These have no effect on the machine function.

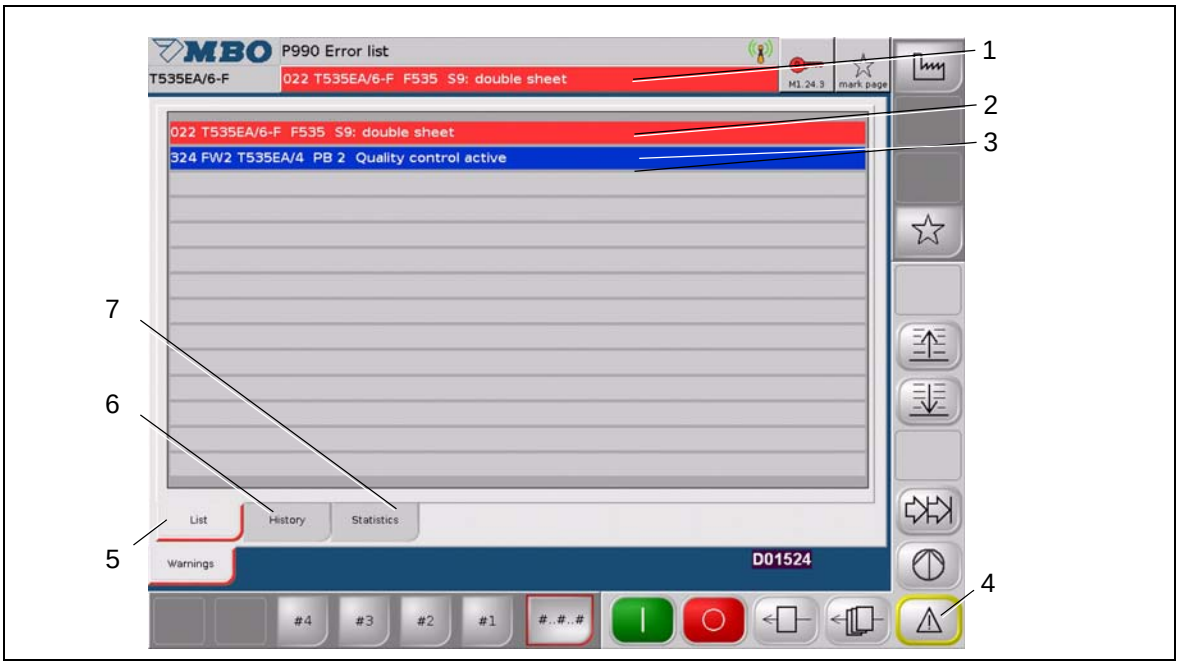


Figure 114: Error messages

Displaying error/ informational messages:

The error/informational messages are displayed in the information area of the TOUCHSCREEN.

The frame of the <Clear error message> button (4) turns yellow.

The error/informational message consists of the following:
- The error/information number
- The unit designation
- The error/information text.

If multiple error messages are pending, the one with the highest priority is displayed.

Displaying the error/ information list:

Touching the error message (1) opens an error list (5) with all currently pending error messages (2) or informational messages (3) of the machine configuration.

The frames of the buttons for:
- Selection bars <Machine configuration>, <Functional groups> and <Functional menus> are red.

Displaying history:

Pressing the History button (6) opens a list with all previous error messages (2) or informational messages (3).

Displaying statistics:

Pressing the Statistics button (7) opens a list with all previous error messages (2) and their frequency.

7.11.3 Resetting error/informational messages

NOTICE

Paper jam.

Non-compliance can cause consequential property damage (drive belts, transport tapes, foldrollers etc.).

- When removing the paper jam, turn the machine using the safety hand-wheel only.
- The machine may be restarted only after removing the paper jam.

Figure 115: Resetting error messages

The error messages can be reset after the cause of the fault is eliminated.

Eliminating the cause of the fault:

Procedure:

▷ Eliminate the cause of the fault.
See also Chapter "7.12 Removing the paper jam".

Resetting the error message:

Procedure:

▷ Press the <Clear error message> button (1).
The frame of the button turns gray.
The error message disappears.
The machine is ready for operation.

Resetting the informational message:

Procedure:

▷ Informational messages are displayed only for as long as they are current.
They do not have to be reset manually.

7.12 Removing the paper jam

NOTICE

Paper jam.

Non-compliance can cause consequential property damage (drive belts, transport tapes, foldrollers etc.).

- When removing the paper jam, turn the machine using the safety handwheel only.
- The machine may be restarted only after removing the paper jam.

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 paper jam.

8 Maintenance

8.1 Introduction

This chapter 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 21: Qualification of personnel; Maintenance
Legend: X permitted, - not permitted

8.1.2 Safety messages

DANGER

Hazardous voltage.

Risk of electrical shock or burn.

- Work on the electric components of the machine may only be performed by a licensed electrician.
- Observe the local occupational safety regulations and electrotechnical regulations.
- Turn the main switch to the position <0>.
- Use a padlock to secure the main switch from unintentionally switching on again.
- Even when the main switch is switched off, a hazardous voltage is present at the terminals of the main switch. (See wiring diagram)
- Even when the main switch is switched off, a hazardous residual voltage is present at the terminals of the frequency converter. (Observe the capacitor discharge time (KEB 5 min, Telemecanique 15 min)).

DANGER

Dismantling, bridging or bypassing safety and protective devices.

Non-compliance may cause serious injuries or 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

Operation without protective covers.

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

The protective covers protect against danger spots.

- Operating the machine without protective covers is not permitted.
- Note that after maintenance or repair work, all protective covers have to be reinstalled.

WARNING

Rotating machine parts during maintenance and cleaning work.

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

- Maintenance and cleaning work must be carried out by one person only.
- Turn the main switch to the position <0>.
- Use a padlock to secure the main switch from unintentionally switching on again.
- Make absolutely sure that before the machine is switched back on, all persons are in the secured area.

WARNING

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.

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.

1 Label

Figure 116: Label

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

- Order number
- Machine type

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

8.3 Operational maintenance

8.3.1 Safety messages

WARNING

Rotating machine parts during operational maintenance.

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

Operational maintenance must be carried out only by:

- Trained and authorized personnel
- By one person

- Turn the main switch to the position <0>.
- Use a padlock to secure the main switch from unintentionally switching on again.
- Make absolutely sure that before the machine is switched back on, all persons are in the secured area.

8.3.2 Property damage messages

NOTICE

Improper cleaning.

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 cleaning agents.
- Never clean the machine using compressed air (bearing damage).

8.3.3 Checking the safety devices

- 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.

8.3.3.1 Functional test of the EMERGENCY STOP palm button

1 EMERGENCY STOP palm button

Figure 117: 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.

Procedure:

- 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.

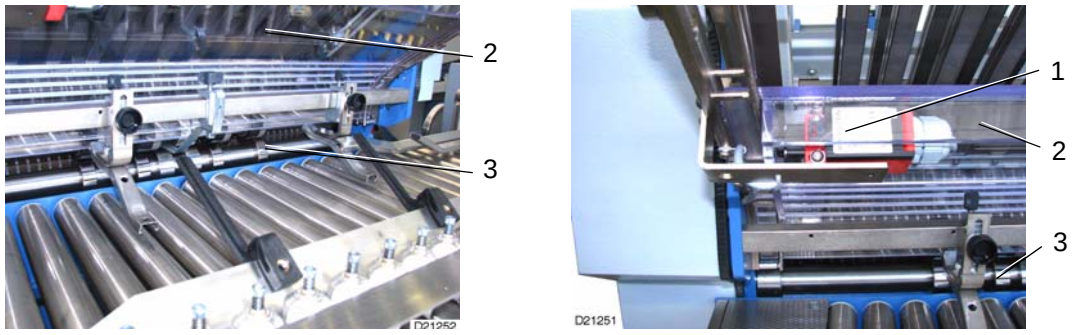
8.3.3.2 Functional test of the slitter shaft guard

WARNING

Incorrectly adjusted safety switch on the slitter shaft guard.

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

- Never reach under the slitter shaft guard while the machine is running!
- Make sure that the opening angle of the guard stays as small as possible until the safety switch switches.
- Never dismantle, bridge or bypass safety switches.
- Ensure the proper function of the slitter shaft guard and safety switch.



1 Safety switch
2 Slitter shaft guard
3 Slitter shafts

Figure 118: 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.

8.3.3.3 Checking the pneumatic springs of the noise damping hoods

WARNING

Automatic lowering of the open noise damping hood.

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

Check the pneumatic springs for correct function after each production/ daily!

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 gas struts immediately if there are any signs of pressure loss.

Only have the gas struts replaced by MBO Service or by an authorized customer service agent.

8.3.4 Recommendation of cleansing agents

Flat surfaces and cavities	Vacuum cleaner and brush
For deposits that adhere to finished surfaces	Solvent-free cleansing agent
Cleaning rollers	MBO Binder GmbH & Co. KG recommends the cleaning solution from the "Varn" company with the No.: "Varn-Wash VM 111 or VWM". 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. Please take the respective order number from the "VARN" technical data sheets.

8.3.5 Cleaning of the machine

NOTICE

Heavy contamination.

Non-observance may result in property damage.

- Clean the machine after each job (at least once per week).
- The dust layer must never exceed 1 mm (0.039 in.).

NOTICE

Unsuitable cleaning agents.

Non-observance may result in property damage.

Do not use any aggressive chemical cleaning agents.

NOTICE

Use of compressed air.

Non-observance may result in bearing damage.

Never clean the machine using compressed air.

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:

▷ Remove the dirt using a vacuum cleaner.
▷ Use a brush for hard-to-reach areas.
▷ Wipe down the surfaces using a dry cloth.

8.3.6 Cleaning the foldrollers

⚠CAUTION

Incorrect use of cleaning agents.

Non-observance may result in injuries.

- Avoid any skin contact.
- Wear suitable safety gloves.
- Wear safety glasses.
- Check each manufacturer's information to ensure that you are totally informed about the residual dangers in respect to their nonirritant cleansing agents.

⚠CAUTION

Used cleaning cloths.

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.

NOTICE

Unsuitable cleaning agents.

Non-observance may result in property damage.

Use the roller cleaning agent "Varn-Wash VM 111" or "VWM" only.

NOTICE

Spiral foldrollers cleaned incorrectly.

Non-observance may result in property damage.

Be absolutely certain to observe the special cleaning instructions for the spiral foldrollers.

NOTICE

HIGH-GRIP foldrollers cleaned incorrectly.

Non-observance may result in property damage.

Note especially the special cleaning instructions for HIGH-GRIP 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:


▷ WARNING! Turn the main switch to the position <0>.
Use a padlock to secure the main switch from unintentionally switching on again.
▷ NOTICE! To clean the foldrollers, use the roller cleaning agent "Varn-Wash VM 111" or "VWM" only.
▷ NOTICE! Use only linen cloths as cleaning cloths.
▷ Moisten the linen cloth using the roller cleaning agent.
NOTICE! 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.
NOTICE! Apply only a little pressure when rubbing.
▷ Dry the foldrollers with a dry linen cloth.
▷ WARNING! Remove the padlock on the main switch.
Ensure that all persons are in the secured area.
Turn the main switch to the position <1>.

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:


▷ WARNING! Turn the main switch to the position <0>.
Use a padlock to secure the main switch from unintentionally switching on again.
▷ NOTICE! To clean the HIGH-GRIP foldrollers, use the roller cleaning agent "Varn-Wash VM 111" or "VWM" only.
▷ NOTICE! Use only linen cloths as cleaning cloths.
▷ Moisten the linen cloth using the roller cleaning agent.
NOTICE! Never soak the HIGH-GRIP foldrollers with the roller soap. Penetrating roller cleaning agent can destroy the bearings.
▷ Use the linen cloth to remove the deposits on the HIGH-GRIP foldrollers.
NOTICE! Exert only slight pressure.
▷ WARNING! Remove the padlock on the main switch.
Ensure that all persons are in the secured area.
Turn the main switch to the position <1>.
▷ After cleaning the HIGH-GRIP foldrollers, switch on the machine at the main switch.
Ensure that no other persons are near the machine.
Keep hands clear.
▷ Start the machine and set the work 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.
WARNING! Turn the main switch to the position <0>.
Use a padlock to secure the main switch from unintentionally switching on again.
▷ Wipe the HIGH-GRIP foldrollers with a dry linen cloth.
NOTICE! Exert only slight pressure.
▷ Remove the ink and powder particles thus flung out from the machine.
▷ WARNING! Remove the padlock on the main switch.
Ensure that all persons are in the secured area.
Turn the main switch to the position <1>.

8.3.7 Cleaning the lower buckle plates

⚠CAUTION

Lifting heavy machine parts.

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:

▷ Unplug the connecting lines of the servomotors.
▷ Remove the lower buckle plates.
▷ Vacuum these using an industrial vacuum cleaner.
▷ Reinstall the lower buckle plates.
▷ Reinsert the connecting lines of the servomotors according to the labels.

8.3.8 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.

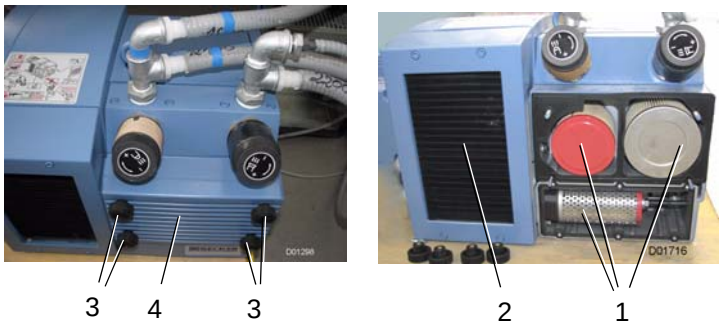
8.3.9 Cleaning/replacing the pressure vacuum pump, filter cartridges

NOTICE

Ingress of foreign objects.

Non-observance may result in property damage.

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



1	Filter cartridges	3	Knurled screws
2	Filter	4	Cover

Figure 119: Vacuum pump filter

Due to the high loads resulting from the paper dust and printing powder, the pressure vacuum pump must be cleaned regularly.

The following time specifications apply for single-shift operation!

Procedure:

▷ Clean the filter and filter cartridges every 50 operating hours.
▷ Replace the filter cartridges every six months.

Cleaning the filter cartridges:

Procedure:
Refer also to the separate operating manual of the pressure vacuum pump.

▷ Remove the knurled screws (3).
▷ Remove the cover (4).
▷ 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 (4).
▷ Reattach the knurled screws (3).
▷ Tighten the knurled screws (3) manually only.

Replacing the filter cartridges:

Procedure:
Refer also to the separate operating manual of the pressure vacuum pump.

- ▷ Remove the knurled screws (2).
- ▷ Remove the cover (3).
- ▷ Remove the old 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.
- ▷ Reinsert the new filter cartridges (1).
- ▷ Reattach the cover (3).
- ▷ Reattach the knurled screws (2).
- ▷ Tighten the knurled screws (2) manually only.
- ▷ Dispose of the old filters in an environmentally-friendly manner.
- ▷ Maintain the pressure vacuum pump.

8.4 Maintenance

8.4.1 Safety messages

WARNING

Improper maintenance.

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

- Maintenance work must be carried out by trained and authorized personnel with specialized technical skills and knowledge only.
- Maintenance work must be carried out by one person only.
- Observe the local occupational safety regulations.
- Observe the maintenance, service, and cleaning plan.

WARNING

Rotating machine parts during maintenance.

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

- Maintenance work must be carried out by trained and authorized personnel with specialized technical skills and knowledge only.
- Observe all local work safety regulations and electrical engineering rules
- Turn the main switch to the position <0>.
- Use a padlock to secure the main switch from unintentionally switching on again.

WARNING

Removing the safety handwheel.

Danger of being drawn in by the rotating shaft.

- Turn the main switch to the position <0>.
- Use a padlock to secure the main switch from unintentionally switching on again.

8.4.2 Maintenance intervals

The VARIO Control provides the following maintenance monitoring functions, which are specific to each unit:

- <Unit> maintenance interval.
- <Pump> maintenance interval. (Only for Unit 1)
- <Slitter shaft cassette> maintenance interval (for T535/P only).

If the defined number of hours of the maintenance interval is reached, the corresponding message appears in the information line of the TOUCHSCREEN.

To reset the message, see chapter "8.4.3 Resetting maintenance intervals".

The <Unit> maintenance interval includes all maintenance work described in the chapter "8.4 Maintenance".

The <Pump> maintenance interval includes cleaning the pump filters. See Chapter ""8.3.9 Cleaning/replacing the pressure vacuum pump, filter cartridges".

The <Slitter shaft cassette> maintenance interval includes cleaning the slitter shaft cassette (only for T535/P).

8.4.3 Resetting maintenance intervals

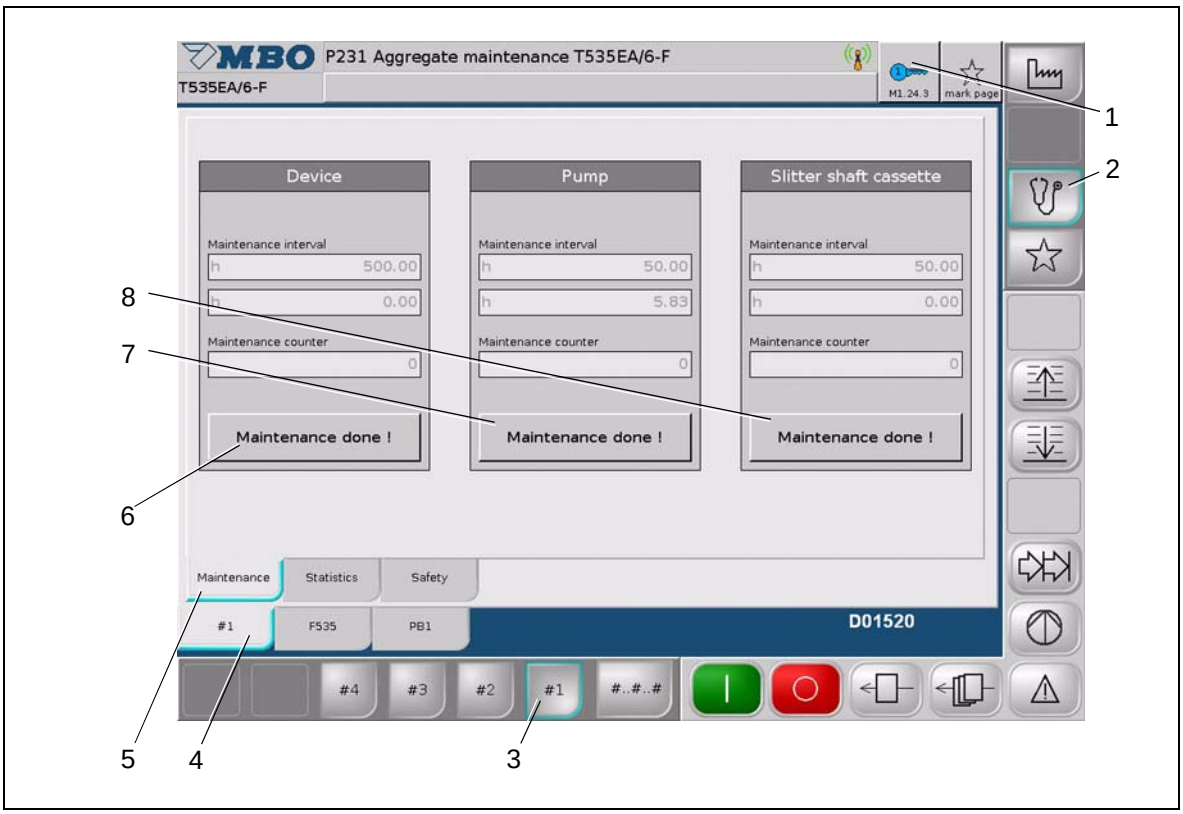


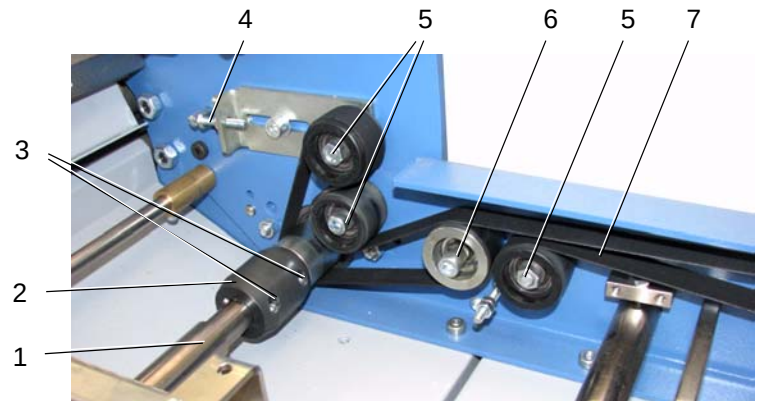
Figure 120: Resetting maintenance intervals

After the respective maintenance is carried out, this must be confirmed. This resets the internal hours counter.

Procedure:

- ▷ Enter the operator password (1). See Chapter "6.12 Changing the password level"
- ▷ Press the <Diagnostics> button (2).
- ▷ In the <Machine configuration> selection bar, press the <Unit 1> button (3).
- ▷ In the <Functional group> selection bar, press the <Unit 1> button (4).
- ▷ In the <Function> selection bar, press the <Maintenance> button (5).
- ▷ Press the respective <Maintenance done> button (6, 7 + 8).
  The corresponding hours counters are set to <zero>.
- ▷ Reset the password level.
  See Chapter "6.12 Changing the password level".

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



1	Hand wheel shaft	5	Spherical tape rollers
2	Coupling	6	Adjustable tape roller
3	Screws	7	Drive belt
4	Clamping element		

Figure 121: 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)

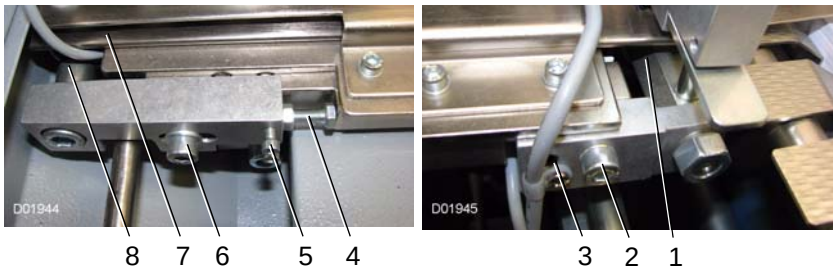
Centering the belt:
- ▷ The centering occurs automatically thanks to the powerful tape rollers (5).

Tensioning the belt:
- ▷ Tighten the drive belt (7) using the clamping element (4).

Replacing the belt:
- ▷ Loosen the drive belt (7) using the clamping element (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 clamping element (4).
- ▷ Check that the belt is running on center.

Attaching the guard:
- ▷ Reinstall the guards on the drive belt (7) and handwheel shaft (1).

8.4.5 Checking the alignment belt of the register table



1	Roller	5	Leveling screws
2	Screw	6	Screw
3	Adjusting screw	7	Sidelay
4	Clamp bolt with lock nut	8	Roller

Figure 122: Marble rail alignment belt

Check the alignment 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:

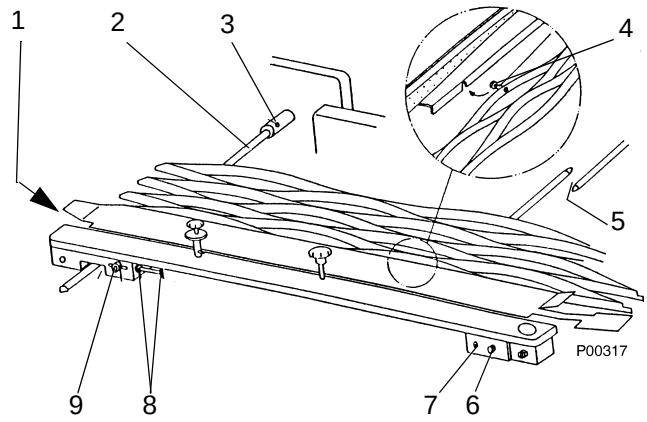
Adjusting the alignment belt on the roller (1):

- ▷ Loosen the fastening screw (2).
- ▷ Using the adjustment screw (3), adjust the position of the alignment belt 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 belt once again and readjust if necessary.

Adjusting the alignment belt on the roller (8):

- ▷ Loosen the fastening screw (6).
- ▷ Using the adjustment screws (5), adjust the position of the alignment belt (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 belt once again and readjust if necessary.

Replacing the alignment belt



1	Sidelay	6	Screw
2	Rod	7	Screw
3	Screw	8	Screw with lock nut
4	Position to take off its hinges	9	Screw
5	Rod		

Figure 123: Replacing the alignment belt

Procedure:

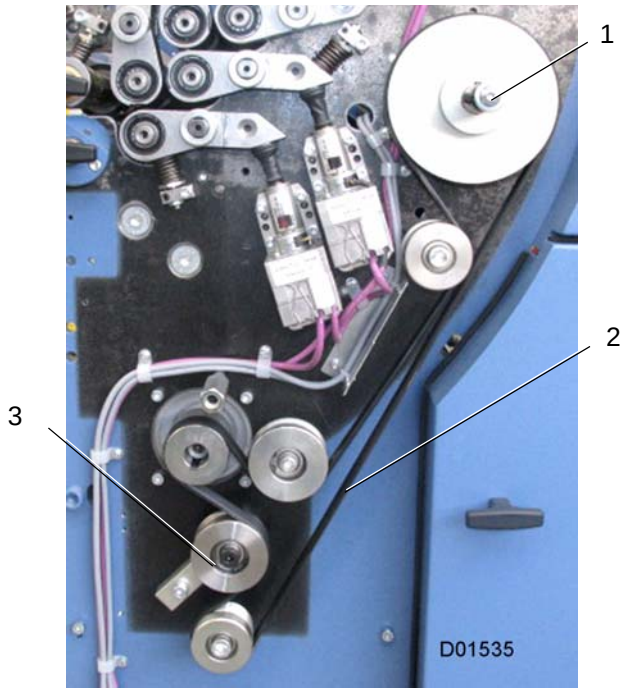
Removing the alignment belt:

- ▷ Loosen the screw (9).
- ▷ Relax the tension on the alignment belt (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 belt (1).

Mounting the alignment belt:

- ▷ Fit the new alignment belt (1).
- ▷ Insert the rod (2).
- ▷ Tighten the screw (3).
- ▷ Tension the alignment belt (1) by tightening the screw (8).
- ▷ Hook the lattice into the hooking points (4).
- ▷ Adjust the alignment belt (1).
  See Chapter "8.4.5 Checking the alignment belt of the register table"

8.4.6 Check/exchange main drive belt



1 Key
2 Poly-V belt
3 Belt tightener

Figure 124: 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:

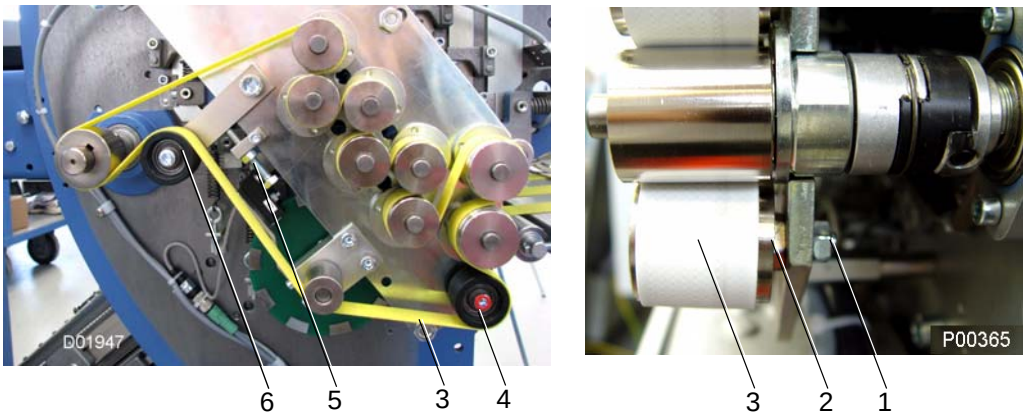
Removing the guard:
- ▷ Remove the safety handwheel (be careful of key (1)).
- ▷ Remove the guards above the main drive.

Tensioning the belt:
- ▷ Tension the Poly-V belt (2) with the belt tightener (3).

Replacing the belt:
- ▷ Loosen the belt tightener (3).
- ▷ Remove the Poly-V belt (2).
- ▷ Insert the new Poly-V belt (2).
- ▷ Tension the Poly-V belt (2) with the belt tightener (3).

Attaching the guard:
- ▷ Reattach the guards above the main drive.
- ▷ Reattach the safety handwheel (be careful of key (1)).

8.4.7 Checking the drive belt for foldrollers and slitter shafts



1	Nut	4	Adjustment roller
2	Eccentric bolt	5	Adjustment screw with lock nut
3	Drive belt	6	Tension roller

Figure 125: 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).

8.4.8 Checking the foldrollers

Procedure:

▷ Check the foldrollers weekly for contamination and damage.
▷ Check the foldrollers every six months for tension and wear.

8.4.9 Checking the buckle plates

⚠CAUTION

Lifting heavy machine parts.

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.

Procedure:

▷ Check the sheet stop and the upper and lower plate lip weekly for wear and damage.
▷ Visually inspect all screws.

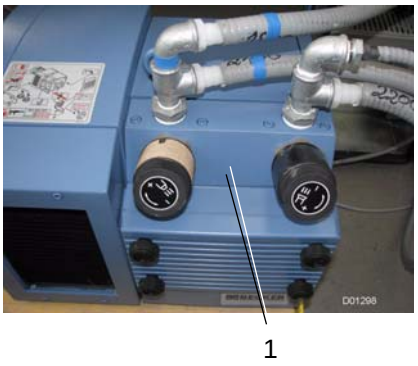
8.4.10 Maintaining the pressure vacuum pump

WARNING

Improper maintenance of the pressure vacuum pump

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

- Maintenance work may be carried out by an authorized and trained specialist only.
- Observe the local occupational safety regulations and electrotechnical regulations.
- Refer to the separate operating manual of the pressure vacuum pump.



1 Pressure vacuum pump

Figure 126: Vacuum pump filter

Due to the high loads resulting from the paper dust and printing powder, the pressure vacuum pump must be maintained regularly.

For the procedure and corresponding maintenance intervals, refer to the separate operating manual for the pressure vacuum pump.

- The time specifications apply for single-shift operation.
- Convert the time specifications for multishift operation accordingly.

8.5 Maintenance, lubrication and cleaning schedule

NOTICE

Incorrect maintenance, lubrication and cleaning intervals for 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	8.3.3	"Checking the safety devices"	Daily		
	8.3.5	"Cleaning of the machine"	Weekly		
	8.3.6	"Cleaning the foldrollers"	Weekly		
	8.3.7	"Cleaning the lower buckle plates"	Weekly		
	8.3.8	"Cleaning the optical sensors"	Weekly		
	8.3.9	Cleaning the pressure vacuum pump, filter.	Every 50 operating hours		
Maintenance	8.4.4	"Checking the drive belt for the suction wheel/suction tape"	Monthly		
	8.4.5	"Checking the alignment belt of the register table"	Monthly		
	8.4.6	"Check/exchange main drive belt".	Monthly		
	8.4.7	"Checking the drive belt for foldrollers and slitter shafts"	Monthly		
	8.3.9	Replacing the pressure vacuum pump, filter cartridges.	Every 6 months		
		Maintaining the pressure vacuum pump. See separate operating manual.			

Table 22: Maintenance, lubrication and cleaning schedule

8.6 Repair

WARNING

Improper repair.

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

- Repair work must be carried out by trained and authorized personnel with specialized technical skills and knowledge only.
- Observe the local occupational safety regulations.
- Carry out a function test after the repair.

Only have repair work performed by MBO Service or by an authorized customer service agent.

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

9.1.2 Property damage messages

NOTICE

Incorrect storage.

Disregard can lead to serious damage to property

Observe the specified 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/Set-up/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/Set-up/ Initial operation".

9.3 Bearing assembly

▷ Check the premises with respect to 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 24: Qualification of personnel; Disposal
Legend: X permitted, - not permitted

10.1.2 Property damage messages

NOTICE

Improper disposal.

Non-compliance 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.

Disposal/recycling:

Procedure:

- Decommission the machine prior to disposal.
  See Chapter "9.2 Shutdown".
- For transport, observe the instructions in Chapter "6 Transport/Set-up/ 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:

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http://www.mbo-folder.com
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Folding unit I

Translation of the original operating manual

T 535
EFFICIENCY
AUTOMATIC

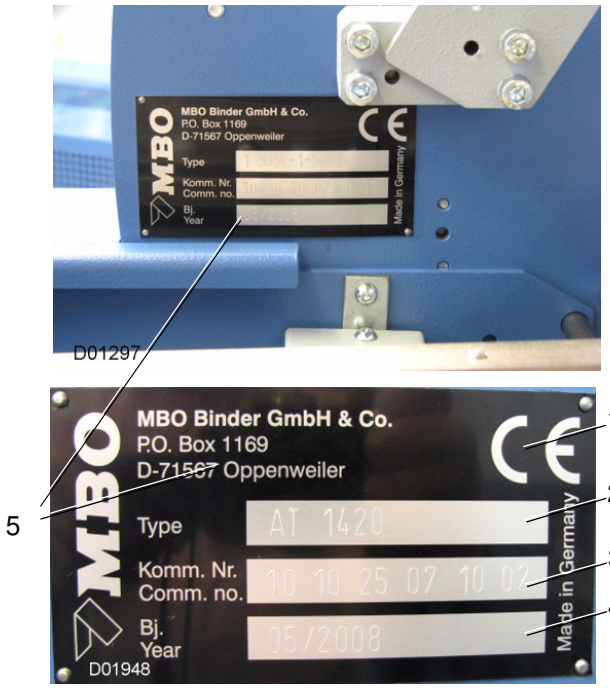
Preserve for future apply!

Machine type:	Folding unit I		
Configuration:	T 535, EFFICIENCY, AUTOMATIC		
Type of document:	Translation of the original operating manual		
Version:	V1.4	**Official in charge:**	Mr. Matzner
As at (date):	2012-03-22	**Machine no.:**	
Language:	English	**File name:**	BA_T535_EA_FW1_VC_V1.4_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 modifications!

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.



1	CE identification	4	Year of manufacture
2	Machine type	5	Label
3	Commission no.		

Figure 1: Label

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

- Commission no.
- Machine type

EC Declaration of Conformity

in according with 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 I
Type	T 535 EFFICIENCY AUTOMATIC
Year of manufacture	

complies with the provisions specified by the following EC Directives

Machinery Directive	2006/42/EC
Low Voltage Directive	2006/95/EC
EMC Directive	2004/108/EC

Harmonized standards applied:

DIN EN ISO 12100:2011-03	DIN EN 1010-1:2011-06
DIN EN 1010-4:2010-12	DIN EN 1010-5/A1:2010-11
DIN EN 60204-1/2007	

Authorized representative for compiling the technical files:

Name	Wolfgang Matzner
Address	Grabenstrasse 4-6 71570 Oppenweiler GERMANY

Oppenweiler, 22 March 2012

_____

Frank Eckert - Managing Director

Table of contents

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, sets up, 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, installation and initial operation.	Specifications for transport, interim storage, installation and initial operation.	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
	**Prohibition symbol** Red border, white background, black symbol Safety symbol that forbids a behavior that could cause hazard.
	**Warning triangle** Yellow background, black symbol Safety symbol that warns about a hazard.
	**Mandatory symbol** Blue background, white symbol Safety symbol that prescribes a particular behavior.
	**Rescue symbol** Green background, white symbol 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.
	**Fire protection symbol** Red background, white symbol 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.

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 basic prerequisite for trouble-free operation of this machine and handling it according to safety standards is knowledge of the basic safety instructions and the 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, setup, maintenance, and storage of the machine.
- Individual constructional changes to the machine.
- Non-observance of maintenance and cleaning intervals which exclude a machine down-time.
- 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 must 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 from tipping machine parts while unloading and installing the machine.
- 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 hazardous 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 from automatic lowering of the open noise damping hood.
- Danger from incorrectly configured safety switches on the slitter shaft guard.
- Danger from rotating machine parts.
- Danger from rotating knives and slitter shafts.

- Danger when adjusting the pressure of foldrollers.
- Danger when pulling out/removing the buckle plates.
- Danger when lifting heavy machine parts.
- Danger from incorrect handling of the safety handwheels.
- Danger due to sound pressure.
- Danger from incorrect use of the sockets.
- Danger of tripping on cables lying about.
- Danger through using several adapter boxes in one machine assembly.

2.5.4 Maintenance

Cleaning:

- Danger from rotating machine parts during operational maintenance.
- 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.

Maintenance:

- Danger due to hazardous electrical voltage.
- Danger when dismantling, bridging or avoiding safety and protective devices.
- Danger due to improper maintenance
- Danger due to operation without protective covers.
- Danger from rotating machine parts during maintenance.
- Danger from improper maintenance of the pressure vacuum pump.
- Danger due to maintenance tools.
- Danger of being drawn in.
- Danger due to wrong maintenance, greasing and cleaning intervals at multishift operation.

Repair:

- Danger from improper repair.

2.5.5 Shutdown,storage

- Danger from improper storage.

2.5.6 Disposal

- Danger from improper disposal.

2.6 Life time

2.6.1 Life time of the machine

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

2.6.2 Life time of the operating manual

If handled with care, a life time of 20 years can be expected.

If the operating manual is no longer present or is illegible, it must be replaced.

For the necessary order information, refer to the type plate of the machine. See Chapter "8.2.1 Ordering spare and wear parts".

2.6.3 Life time of product safety labels

If handled with care, a life time of 20 years can be expected.

If product 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".

2.7 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 operating personnel must have reached the age of 18.
- 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. If 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 unauthorized or inadvertent switching-on. 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 technicians 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 to be switched off for maintenance and/or service work, it must be secured against unauthorized or inadvertent switching-on. Use a padlock to secure the main switch against switching-on. If necessary, attach a danger symbol 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 electrically operated machines or equipment must be done only in accordance with the electrotechnical regulations by a licensed electrician or instructed personnel under guidance and supervision of a licensed 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	-	-
Set-up	-	-	X
Electrical connections	-	-	X
Power supply connection	-	-	X
Initial operation	-	-	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)
Troubleshooting (mechanical/electrical	-	-	X
Adjusting	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

2.11.2 Operational maintenance (cleaning)



The owner/operator must provide the following personal protective equipment for operational maintenance (cleaning):

- Safety glasses
- Suitable safety gloves
- Safety shoes

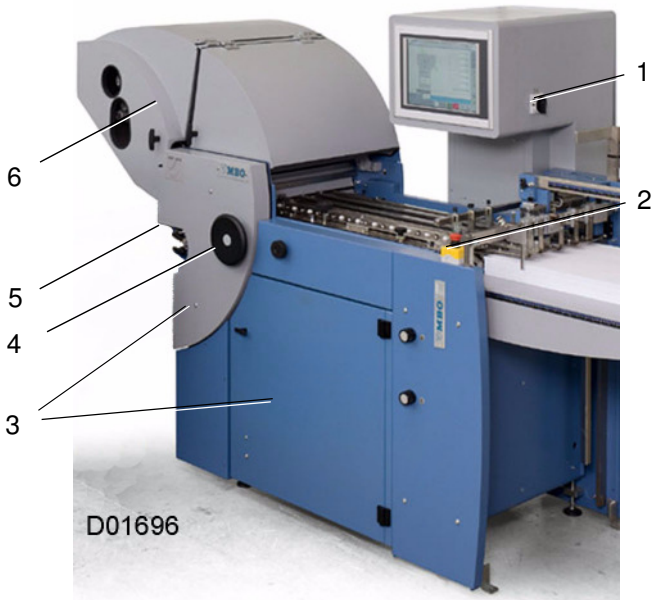
2.12 Safety and protective devices

2.12.1 Overview

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

IMPORTANT!

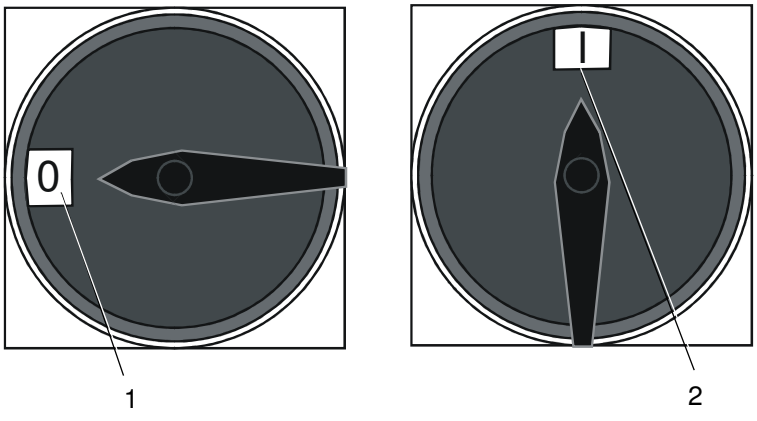
Operate the machine only if all safety and protective devices are completely present and fully functional



1	Main switch	4	Safety handwheel
2	EMERGENCY STOP palm button	5	Slitter shaft guard
3	Additional protective devices	6	Noise damping hoods

Figure 2: Overview

2.12.2 Main switch



1 Main switch OFF 2 Main switch ON

Figure 3: Main switch

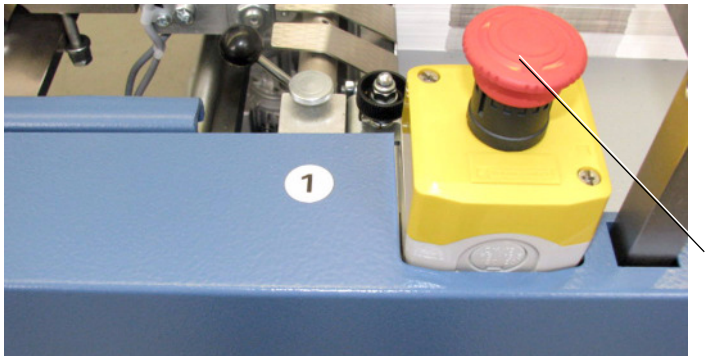
The main switch has the following properties:

- 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



1 EMERGENCY STOP palm button

Figure 4: EMERGENCY STOP palm button

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.

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

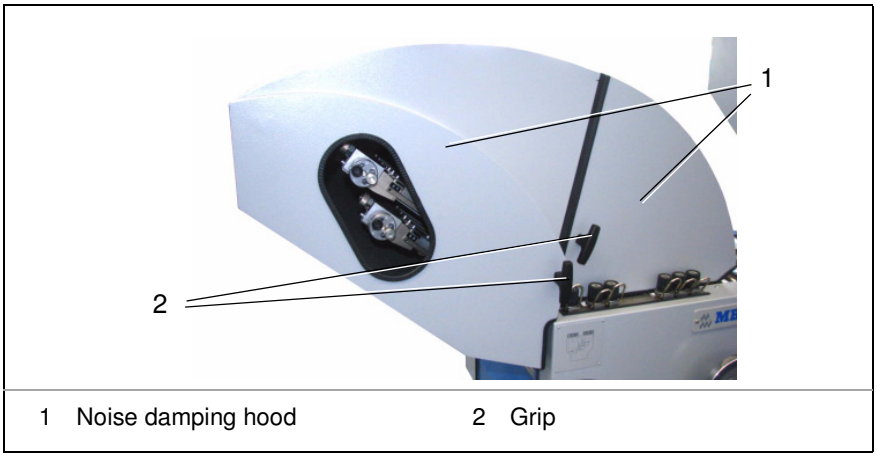
2.12.4 Noise damping hood

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.



1 Noise damping hood 2 Grip

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

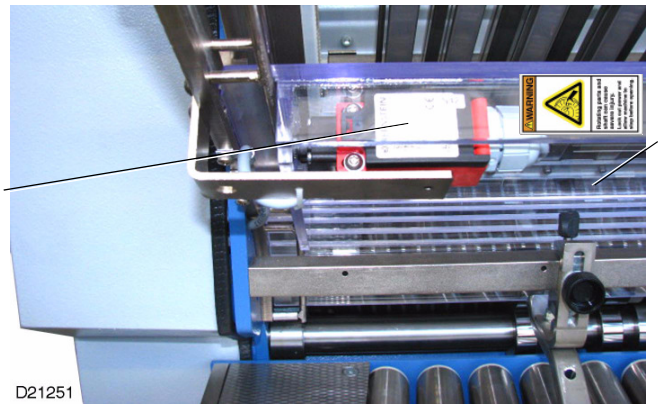
WARNING!

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!



1 Slitter shaft guard
2 Safety switch

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.
- it prevents access to the sharp knives on the slitter shafts only partially.

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 Safety handwheel

WARNING!

Incorrect handling of the safety handwheels.

Non-compliance may cause serious personal injuries or even death

- Turn the safety handwheel only when the machine is not moving.
- Press the EMERGENCY STOP palm button.
- Operate the machine only with safety handwheels installed. Otherwise there is hazard of being drawn in.
- Replace defective safety handwheels only with new safety handwheels with an overrunning clutch.!

1 Safety handwheel

Figure 7: Safety handwheel

IMPORTANT!

The safety handwheel has an overrunning clutch and is intended for turning the machine manually:

- during setup tasks
- when there is a paper jam

Procedure:

▷ Stop the machine.
▷ Press the EMERGENCY STOP palm button.
▷ Pull the safety handwheel towards you.
The overrunning clutch is released.
▷ Turn the safety handwheel.
Direction of rotation:
Clockwise = Machine rotates forwards.
Counterclockwise = Machine rotates backwards.

2.12.7 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 "2.12.10 Checklist for safety and protective devices".

2.12.8 Faulty safety and protective devices

Faulty safety and protective devices can lead to hazardous situations.

For this reason:

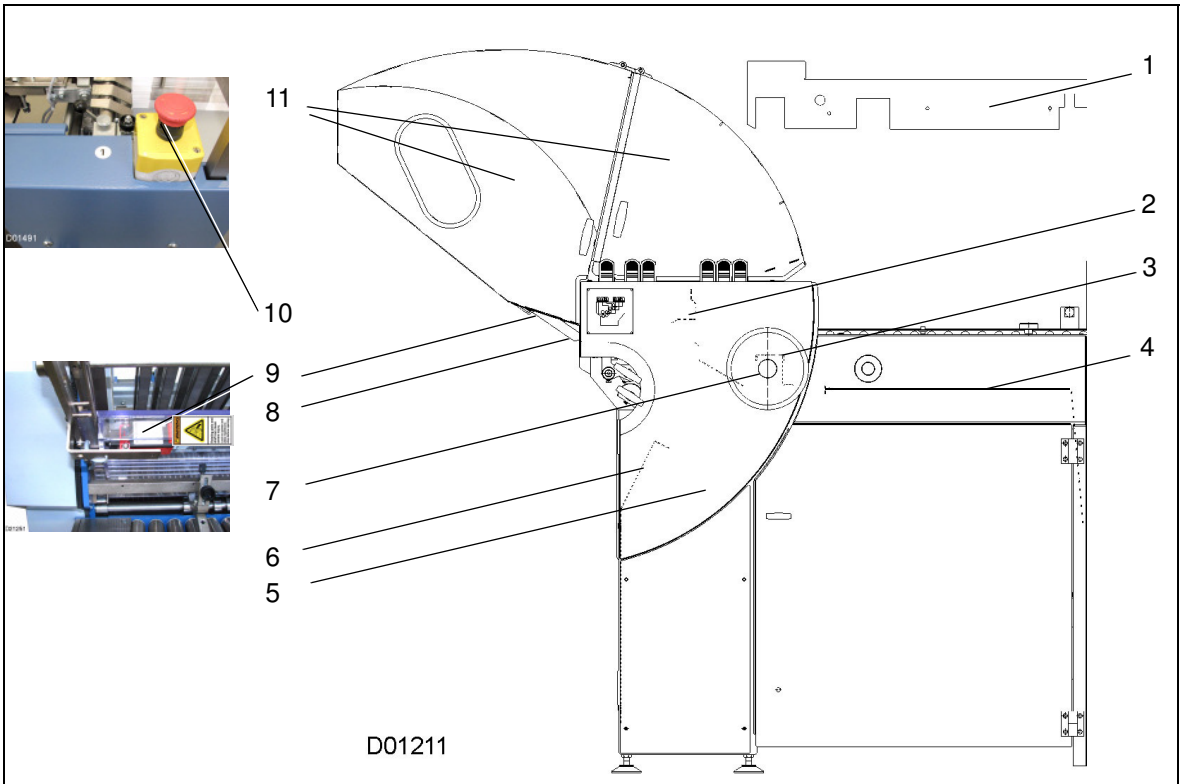
▷ switch off the main switch,
▷ use a padlock to secure it from being switched on again,
▷ if necessary, disconnect the supply of compressed air and electrical current.
▷ Immediately repair faulty safety and protective devices.

2.12.9 Checking safety and protective devices

All safety and protective devices must be checked regularly.
For the corresponding inspection intervals, see Chapter "2.12.10 Checklist for safety and protective devices"
For the corresponding procedure, see the Maintenance chapter.

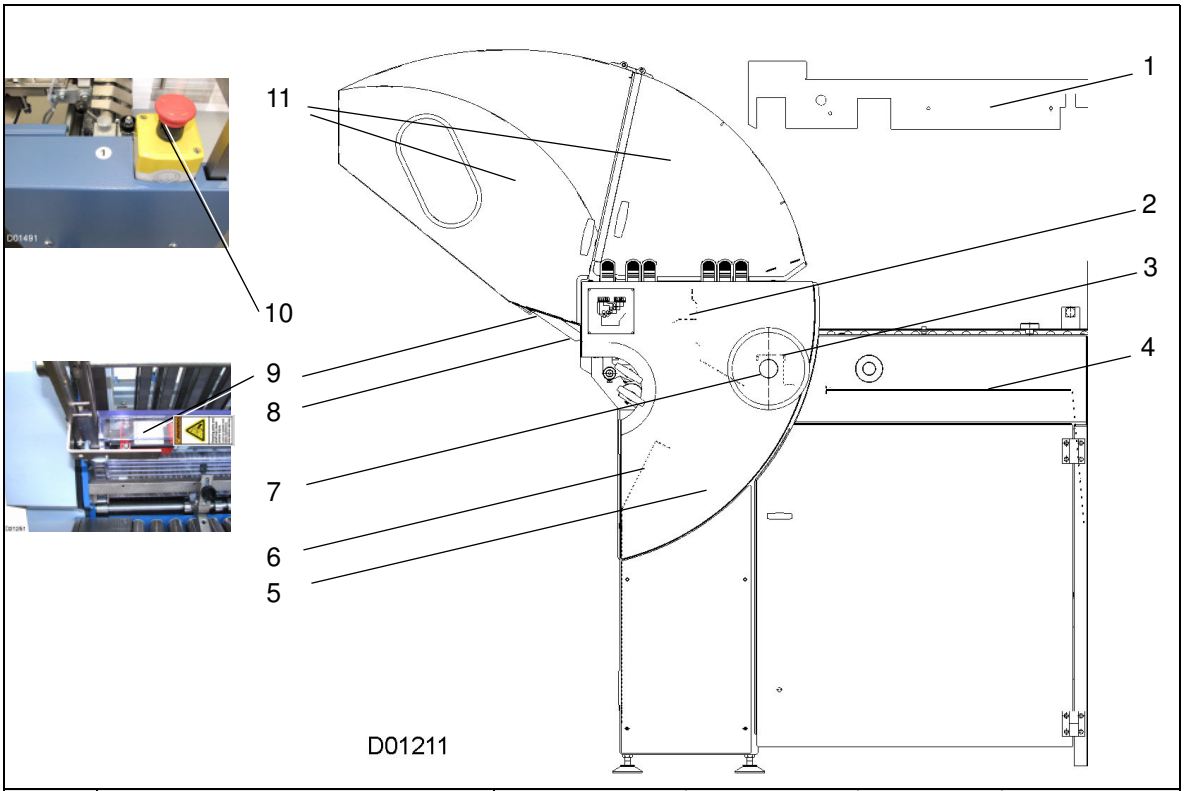
2.12.10 Checklist for safety and protective devices

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 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 handwheel shaft				Weekly
7	Safety handwheel (drive side, operator side)				Weekly

Table 7: Checklist for safety and protective devices



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 panel				Daily
11	Noise damping hood (2-piece) above parallel fold				Daily
Date::		Name:		Signature::	

Table 7: Checklist for safety and protective devices

2.13 Product safety signs or labels

Warnings and safety messages 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 numbers, refer to Chapter "2.13.2 Position and meaning".

2.13.1 Overview

1 Control cabinet
2 Lower buckle plates
3 Roller cleaning agent
4 Slitter shaft guard
5 Upper buckle plates

Figure 8: Overview of warnings

2.13.2 Position and meaning

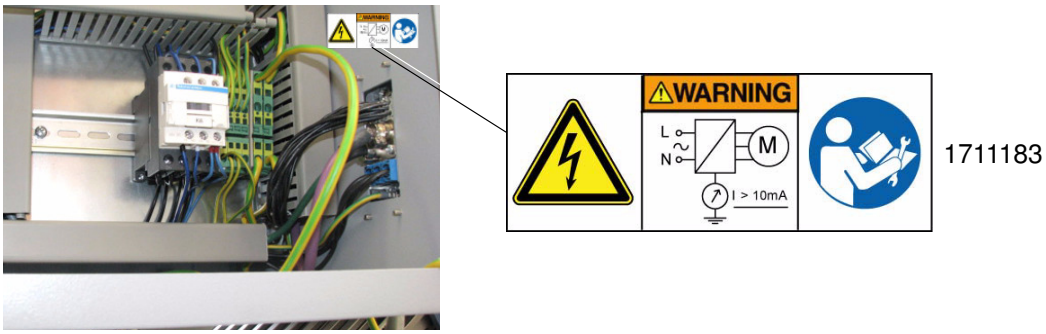
Pos. 1 Control cabinet	MBO part No.: 018301

Meaning:

Hazard due to hazardous 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.
- 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)).



1711183

Meaning:

Leakage currents are greater than 10 mA.

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

- 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). Optimum = 10 mm² (Cu)
  (see Chapter "6.8.6 Additional equipotential bonding strip").

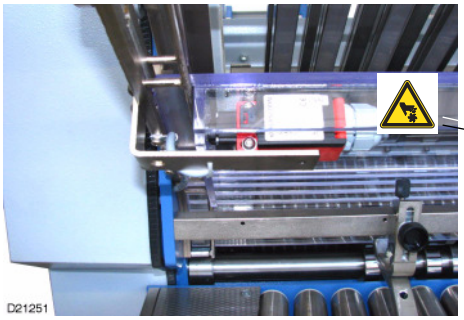
Pos. 2 Lower buckle plates	MBO part No.:

Meaning:
Pinch point, moving parts.
Crush hazard.
When starting the automated format change, observe the following precautions:
- Do not reach into the buckle plates.
- Make absolutely sure that there are **no** other people on the machine.

Pos. 3 Roller cleaning agent	MBO part No.: 0751438

Meaning:
Danger from incorrect cleaning agent for the foldrollers.
Non-compliance may cause the foldroller coatings to swell.
To clean the foldrollers, use Varn-wash VM-111 or VWM only.

Pos. 4 Slitter shaft guard	MBO part No.: 0100700



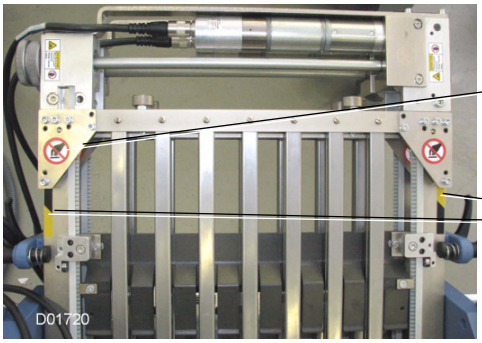
Meaning:

Rotating knives and slitter shafts.

Non-compliance may cause serious cutting injuries or even death.

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

Pos. 5 Buckle plates	MBO part No.: 0101730



Meaning:

Pinch point, moving parts.

Crush hazard.

When starting the automated format change, observe the following precautions:

- Do not reach into the buckle plates.
- Make absolutely sure that there are **no** other people on the machine.

2.14 Workplaces and space requirements for operating personnel

The machine is intended exclusively for operation by one person.

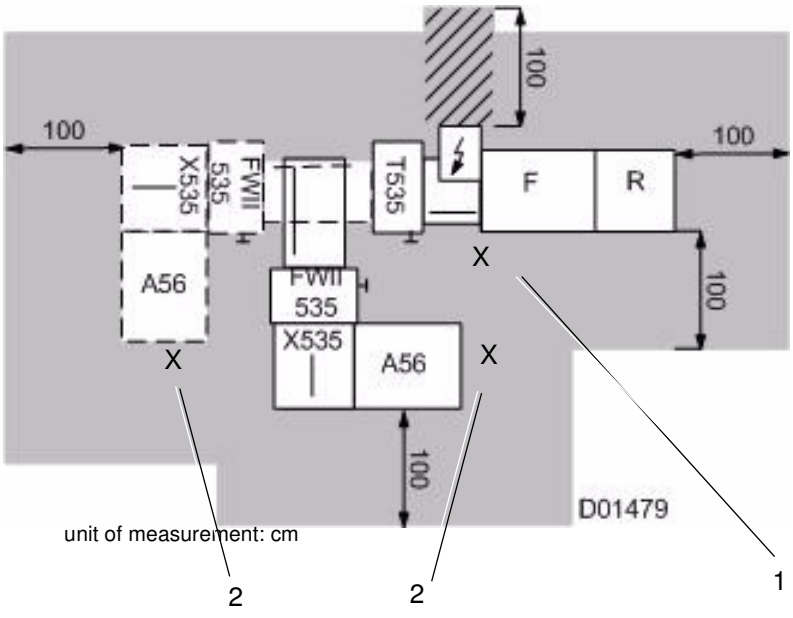
The illustration shows the most important workplaces and the work and service area of the machine.

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.

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



1 Feeder workplace 2 Delivery workplace

Figure 9: 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

1 Machine control
2 Feeder
3 Register table
4 Parallel folding unit I
5 Noise damping hoods

Figure 10: Overall view

Standard equipment

- „VARIO Control“ machine control system incl. TOUCHSCREEN.
- Sheet feed via suction wheel
- Register table with lattice.
- Sheet alignment via marble rail
- RAPIDSET, automatic plate and sheet deflector adjustment incl. COMBIPLATE.
- RAPIDSET, automatic slitter shaft and foldroller adjustment.
- Continuous sheet stop in plate 1
- Belt drive system, low maintenance, quiet
- Spiral foldrollers with standard PU roller surface covering
- Slitter shafts, stainless, easily replaced via plug bearings.
- Scoring, perforating and cutting devices for standard jobs

3.2 Technical data

3.2.1 Floor plan, configuration 44X

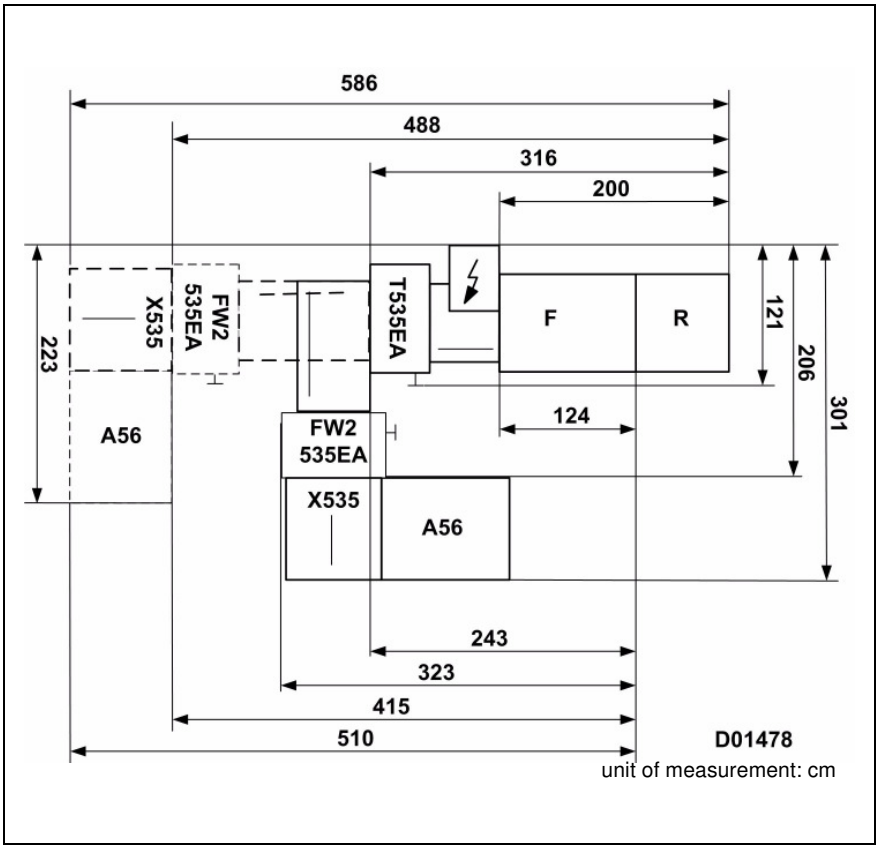


Figure 11: Floor plan T 535EA 44X

3.2.2 Characteristics

Work speed		**Minimum**	**Maximum[1)]**
	VARIO control	30 m/min	205 m/min
Sheet paper	**Format (length x width)**	**Minimum (cm)**	**Maximum (cm)**
	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
	Basis weight[2)]	**Minimum**	**Maximum**
		50 g/m²	250 g/m² 1. Falz 200 g/m² 2. Falz 175 g/m² 3. Falz 130 g/m² 4. Falz
Buckle plates	**Fold length**	**Minimum**	**Maximum**
	Combi buckle plate 1+3	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 book/offset.

3.2.3 Emissions

Airborne sound emission	Emission sound pressure level (L_{pA})[1)]	Workplace at the register table	85.5 dB
		Workplace at the delivery	86.8 dB
	Sound power level (L_{WA})[2)]	-	104 dB

Table 9: Emissions

1) Noise measurement procedure according to EN13023:2004
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)]
	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	**Transport pallet/transportation crate**		
	T535 with pile feeder	275 x 120 x 145 (cm)	
	T535 without feeder	200 x 120 x 150 (cm)	
Fork lift[6)]		**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/m²	
	Levelness[9)]	< 10 mm/m	

Table 10: Weights, fork lifts, and floor requirements

1) Machine with transport pallet/with transportation crate + 50 k
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 location where the machine is set up
9) In the area of the machine, the total difference in height of 10 mm must not be exceeded.

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)]	32 A	
Power ratings:	Folding unit 1 [4)]	5 kW	
	Folding unit 1 [5)]	4,5 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) Stationary power supply, N conductor is loaded; a fault-current circuit breaker (FI) must not beused. See Chapter
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 %
	Fuse: [3)]	32 A	
Power ratings:	Folding unit 1 [4)]	5 kW	
	Folding unit 1 [5)]	4,5 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) Stationary power supply, a fault-current circuit breaker (FI) 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 % (ohne Kondensation)
Installation altitude[1)]		Max. 800 m above sea level.

Table 14: Ambient conditions

1) Starting at an installation altitude of 800 mabove sea level, special measures must be taken for the pumps. Refer to the manufacturer regarding this issue.

4 Structure and function

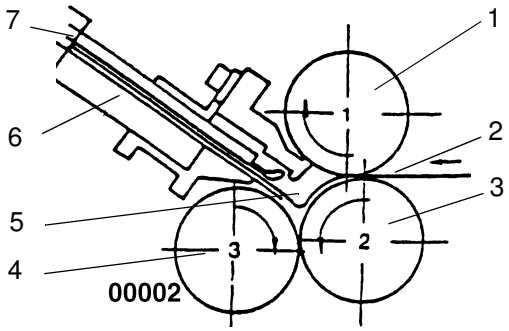
4.1 Introduction

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 predetermined pattern using pressure.
According to bookbinding terminology, the folding line is called fold.

4.1.2 Folding principles

Buckle fold principle:



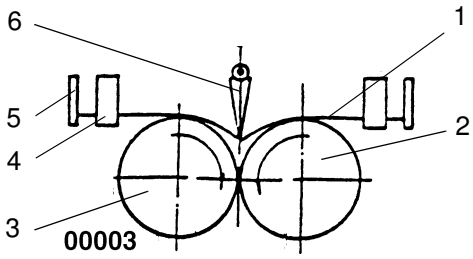
1 Upper foldroller	5 Buckling area
2 Sheet of paper	6 Buckle plate
3 Lower foldroller	7 Sheet stop
4 Lower foldroller	

Figure 12: Buckle fold 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 fold principle



1 Sheet 2 Foldroller 3 Foldroller	4 Sheet stop 5 Lateral sheet stop 6 Folding knife

Figure 13: Knife fold principle

To create a knife fold, two counter-rotating foldrollers and a vertically movable folding knife 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 the knife movement is triggered, the folding knife (4) transports the sheet of paper (1) towards 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 according to the buckle fold principle exclusively.
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 crossfold 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 units 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:

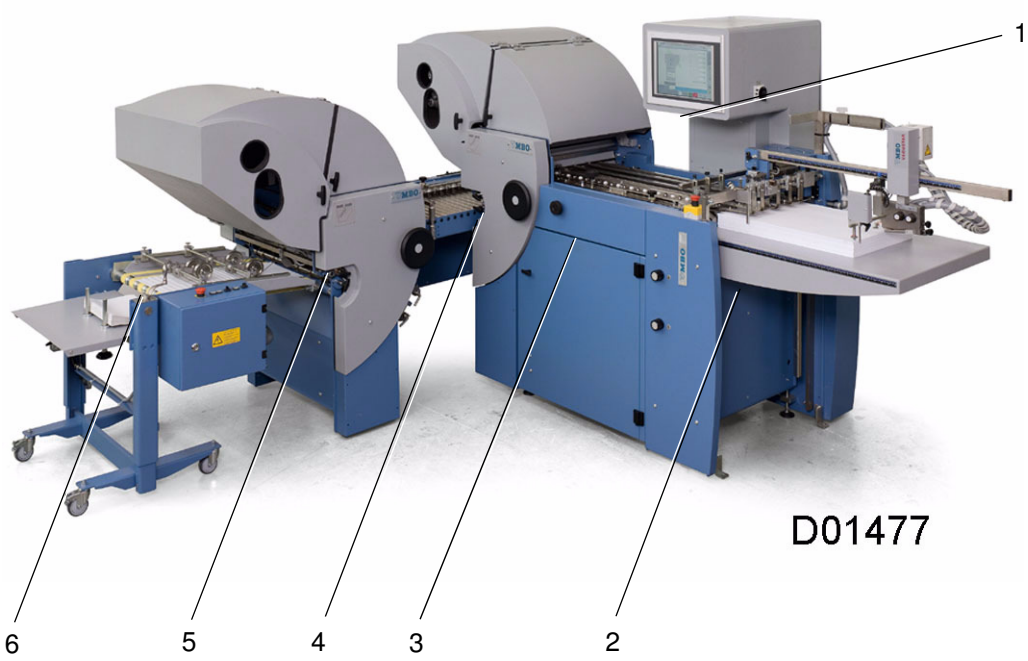
- After each folding unit.

Buckle folding machines can be used for:

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

4.2 Structure

4.2.1 Overall view



1	Machine control	4	Parallel folding unit I
2	Feeder	5	Movable buckle folding unit II
3	Register table	6	Stream delivery

Figure 14: 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

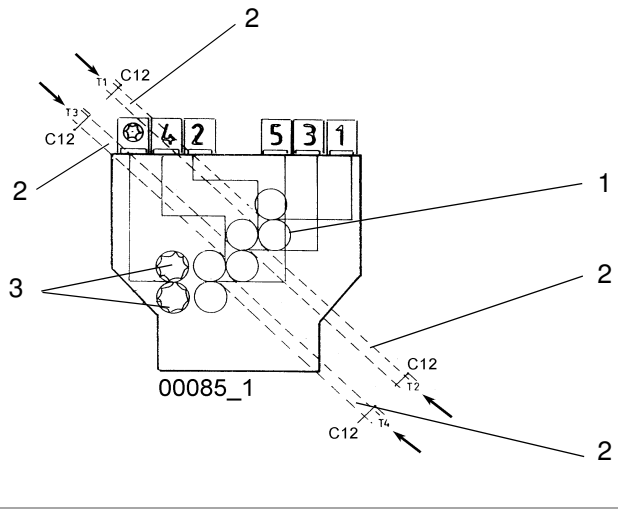
The continuous feeder is suitable for processing large to the very largest editions and medium-large sheets.
In contrast to the pile feeder, with the continuous feeder somewhat more effort is required for setup and adjustment work, and more space is required.
Thanks to the low feeder table, the sheet 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 fold, 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.



1	Foldrollers	3	Slitter shafts
2	Buckle plates		

Figure 15: 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/EA is available in the following variants:

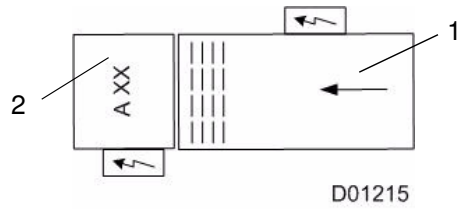
- Variants 4 and 6
- Variants 4X and 6X
- Variants 44, 46, 64 and 66
- Variants 44X, 46X, 64X and 66X

4.3.1 Variants 4 and 6

Explanation of term

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

Schematic depiction



1 Folding unit I 2 Delivery

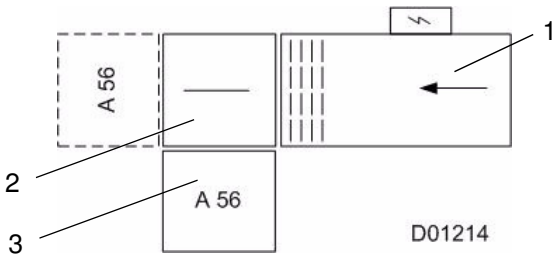
Figure 16: Variants 4 and 6

4.3.2 Variants 4X and 6X

Explanation of term

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

Schematic depiction



1 Folding unit I
2 X folding unit
3 Delivery

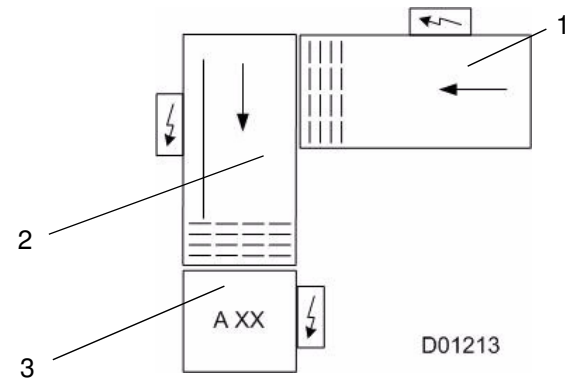
Figure 17: Variants 4X and 6X

4.3.3 Variants 44, 46, 64 and 66

Explanation of term

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

Schematic depiction



1 Folding unit I
2 Folding unit II
3 Delivery

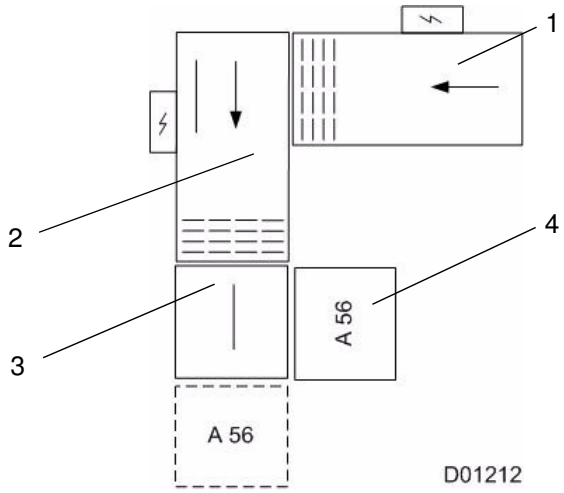
Figure 18: Variants 44, 46, 64 and 66

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

Explanation of term

The designation "T 535EA/44X" means:	
T	Buckle folding machine
535	Designation of type
E	EFFICIENCY
A	AUTOMATIC
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



1 Folding unit I
2 Folding unit II
3 X folding unit
4 Delivery

Figure 19: Variants 44X, 46X, 64X and 66X

4.4 Machine control

4.4.1 VARIO control

4.4.1.1 Standard equipment

- Intuitive graphical user interface
- Integrated catalog of fold types
- Automatic adjustment of sheet gap, sheet feed and folding speed
- Cleanly stepped speed profile (with readjustment of all folding units)
- Plain text display of errors and error location
- Operator and service diagnostics

4.4.1.2 Optional

- Connection to MBO-DATAMANAGER
- Connection to MBO-RAS (Remote Access Service)
- Gatefold control system
- Sheet monitoring over all folding units with length control, target tracking throughout the entire machine and calibration sheet cycle during setup.

4.4.2 RAPIDSET automation

The RAPIDSET electronic setup system allows partial automation of the folding machine.

It is possible to set the following automatically resp. motorized:

- Buckle plates/sheet deflector at parallel fold.
- Foldrollers/slitter shafts at parallel fold.

4.4.3 DATAMANAGER (option)

The DATAMANAGER also enables:

- Job management and machine pre-setting from an external PC.
- Integration into superior operating and adjustment data systems using CIP3/4 or JDF for the integration into a digital workflow.

4.4.4 MBO-RAS (option)

MBO-RAS (Remote Access Service) also enables remote diagnostics.

5 Operating and display elements, operating modes

5.1 Main control panel

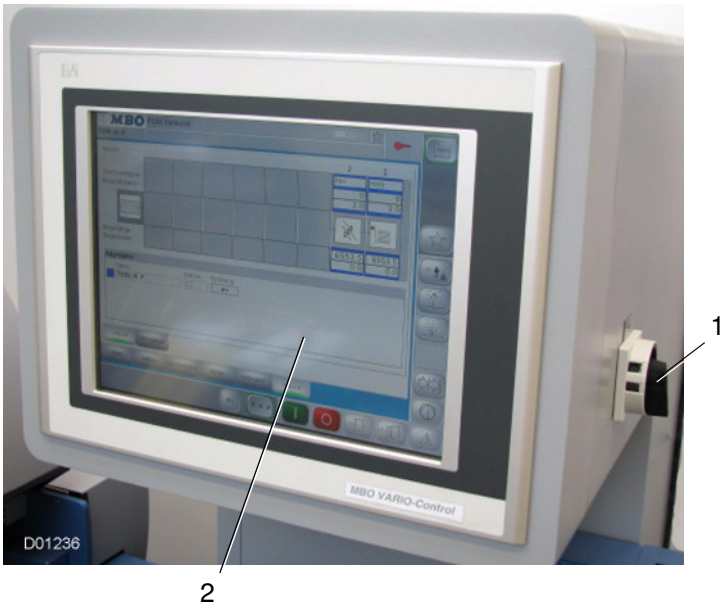


Figure 20: VARIO Control main control panel

1 Main switch
2 TOUCHSCREEN

5.1.1 Handling the TOUCHSCREEN

IMPORTANT!

- Only use your finger or a stylus pen to operate the TOUCHSCREEN.
- Ball-point pens or other metallic objects may damage the surface of the TOUCHSCREEN.

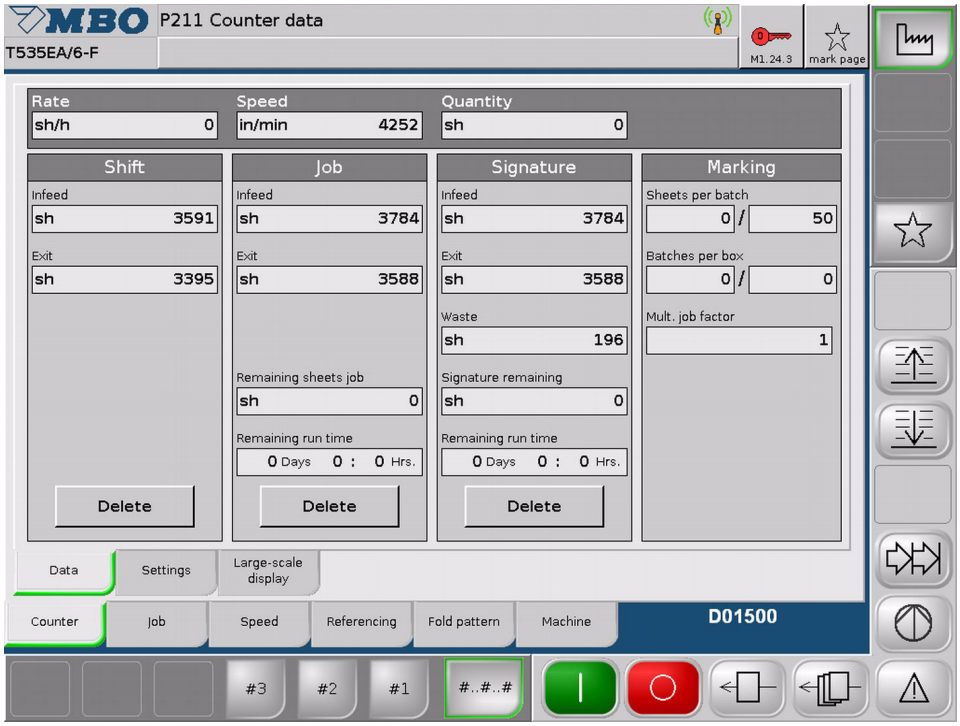


Figure 21: Handling the TOUCHSCREEN

Only use your finger or a stylus pen (MBO part number 0131900) to operate the TOUCHSCREEN.

5.1.2 <Start> menu

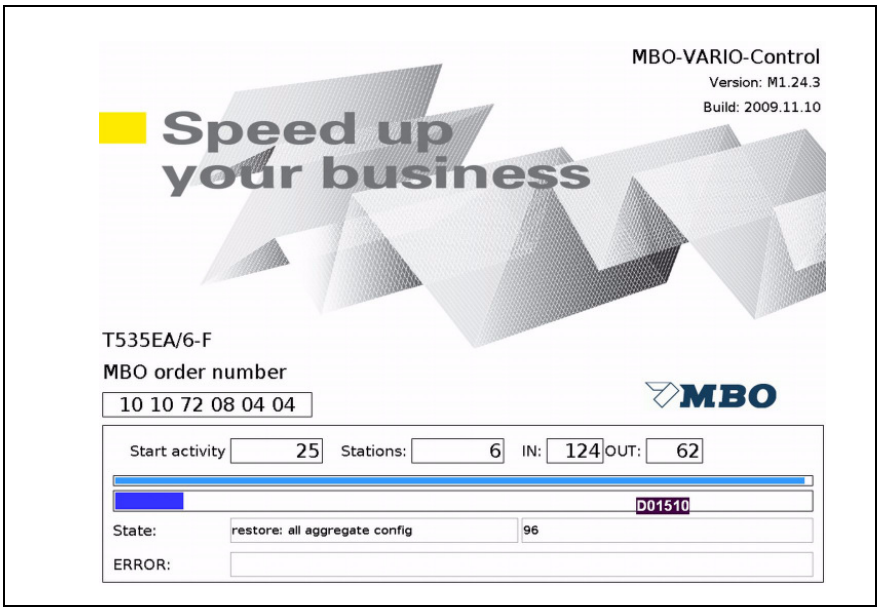


Figure 22: <Start> menu

The <Start> menu appears after the main switch is switched on and when the machine network is modified.

- The machine configuration is checked for its components.
- If no error is detected, the system automatically switches to the <Counter data> menu. See Chapter "7.4.1 Counter data"

5.1.3 Carry out calibration

CAUTION!

Danger due to automated format change.

Non-observance may cause serious injuries.

When starting the automated format change, observe the following precautions:

- Do not reach into the machine.
- Make absolutely sure that there are no other people at the machine.

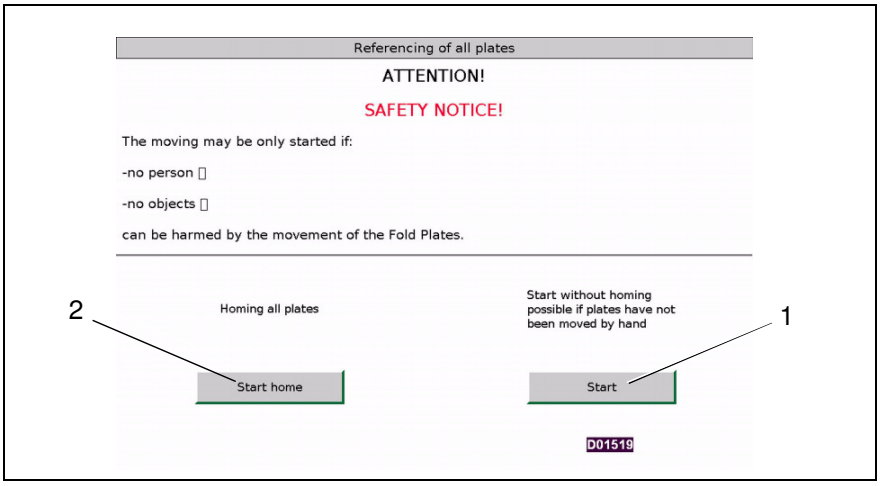


Figure 23: Carry out calibration

The <Calibration of all plates> menu appears after the <Start> menu.

If the position of the sheet stops was modified manually since the main switch was switched off, a calibration must be carried out.

Procedure:

▷ Press the <Start calibration> button (2).
All buckle plates are calibrated.
The process takes approx. 2.5 min.
Then, the display switches to the <Start> menu.
See Chapter "5.1.2 <Start> menu".

If the position of the sheet stops was not modified manually since the main switch was switched off, a calibration is **not** required.

Procedure:

▷ Press the <Start> button (1).
The display switches to the <Start> menu.
See Chapter "5.1.2 <Start> menu".

5.1.4 Overview of TOUCHSCREEN functions

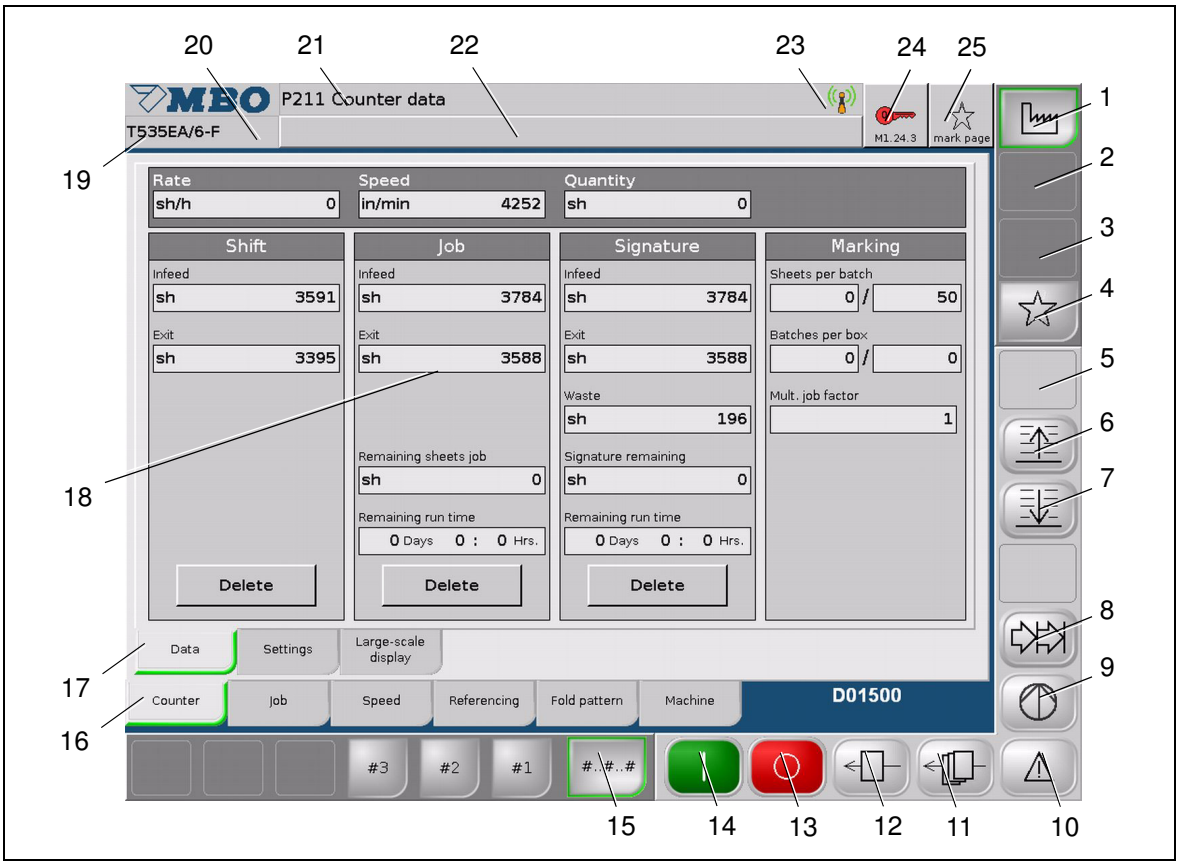


Figure 24: Overview of TOUCHSCREEN functions

1 <Production> button
2 <Service> button (password-dependent)
3 <Diagnostics> button (password-dependent)
4 <Switch favorite menus> button
5 <Automatic pile mechanism> button (option)
6 <Pile up> button
7 <Pile down> button
8 < Inching mode> button
9 <Air supply on/off> button
10 <Delete error message/Quality control> button with double function
11 <Production sheet infeed> button
12 <Single sheet infeed> button
13 <Machine stop> button
14 <Machine start> button
15 <Machine configuration> selection bar
16 <Functional groups> selection bar
17 <Functional menus> selection bar
18 <Current menu contents> selection bar
19 <Machine designation/output level> information field
20 <Roller and plate adjustment> information field
21 <Menu number and menu designation> information field
22 <Error messages / status information> information field
23 <Remote maintenance> information field
24 <Password input> button
25 <Select favorite menus> button

5.1.5 TOUCHSCREEN design

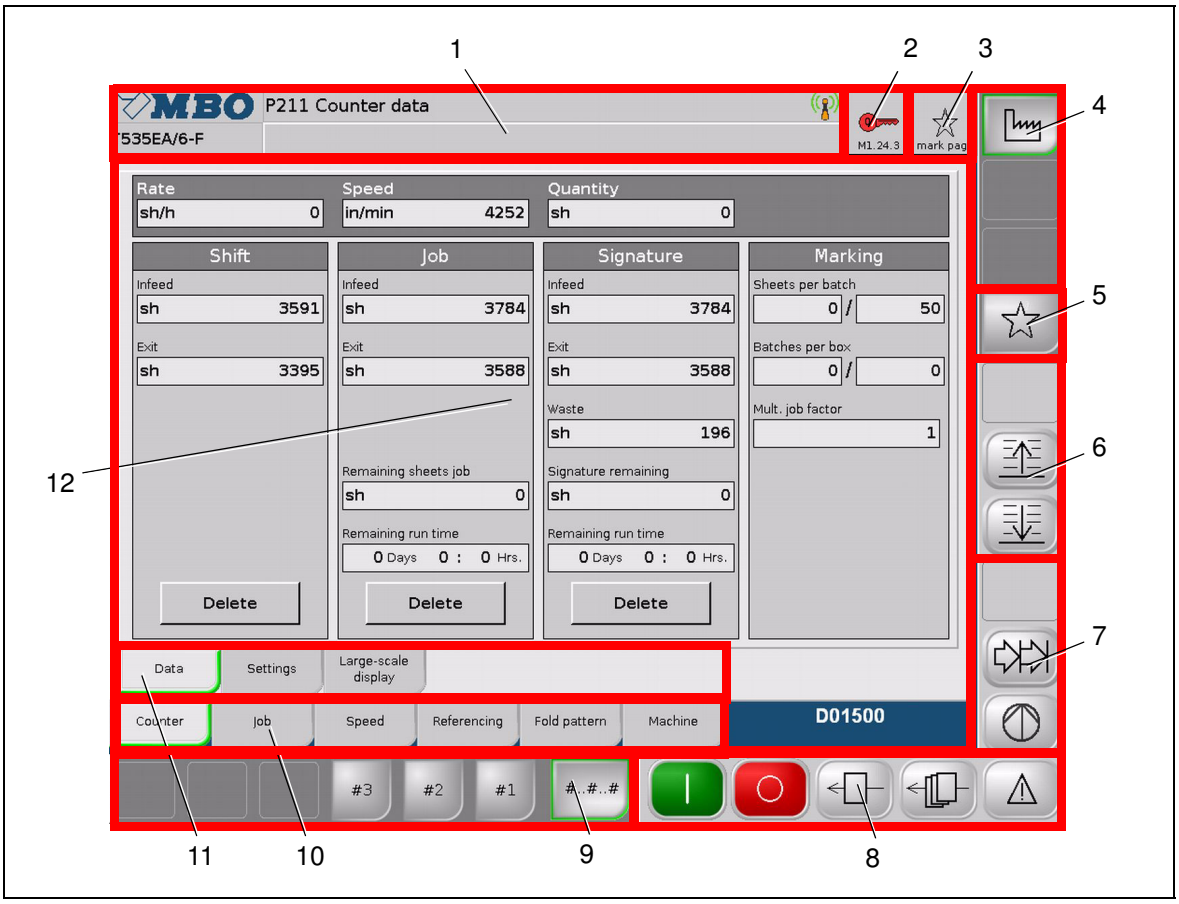


Figure 25: TOUCHSCREEN design

The TOUCHSCREEN is divided into the following functional groups:

1 <Information fields> (see Chapter "5.1.6.2 <Information fields>")
2 <Password> (see Chapter "6.12 Changing the password level"
3 <Select favorite menus> (see Chapter
4 <Select operating modes> (see Chapter "5.1.6.1 ")
5 <Switch favorite menus> (see Chapter
6 <Feeder control system> (see operating manual of feeder)
7 <Auxiliary functions> (see Chapter
8 <Machine control system> (see Chapter "7.2.3 ")
9 <Machine configuration> selection bar (see Chapter "5.1.6 ")
10 <Functional groups> selection bar (see Chapter "5.1.6 ")
11 <Functional menus> selection bar (see Chapter "5.1.6 ")
12 <Work area, shows contents of the current functional menu> (see Chapter "5.1.6 ")

5.1.6 TOUCHSCREEN navigation

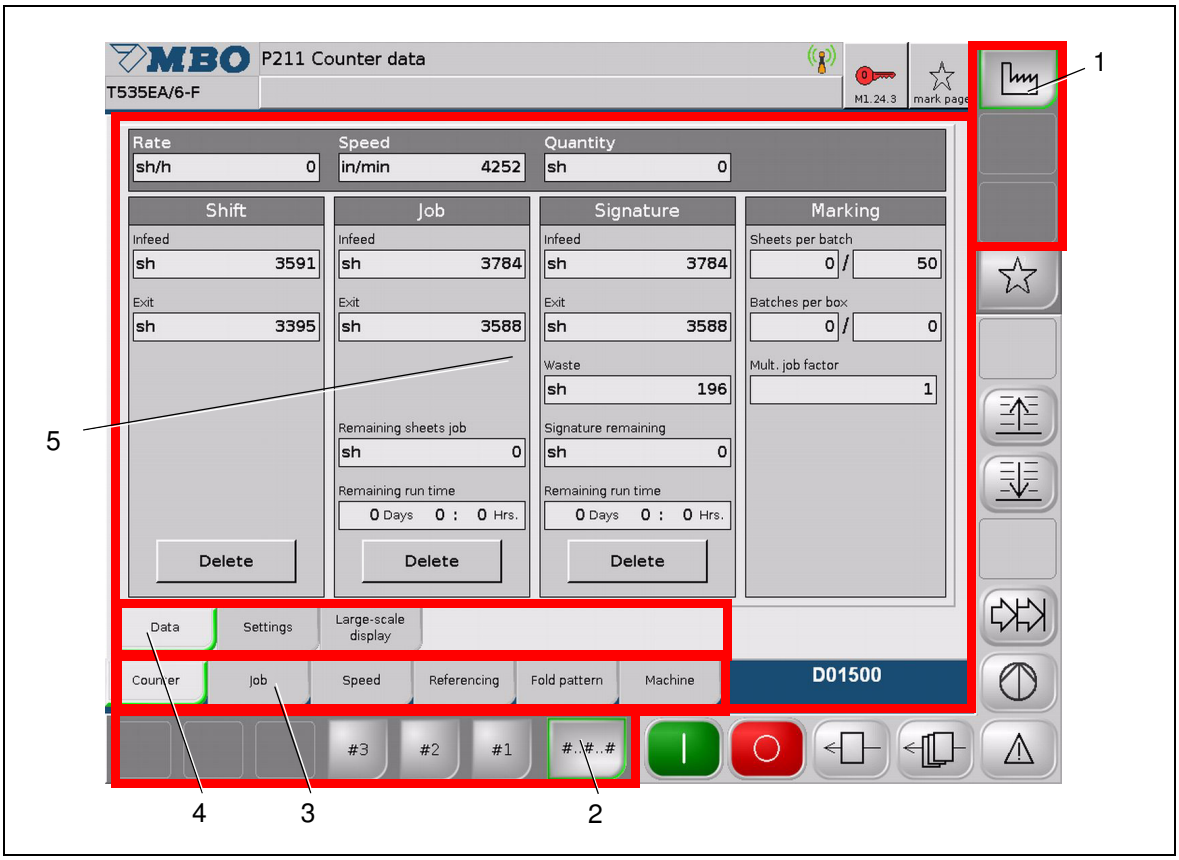


Figure 26: Navigation

The user navigates to the individual menus by means of four selection criteria.

Procedure:

First selection criterion:

<Operating mode> (1)

- Production (always visible), frame color = green
- Service (visibility is password-dependent), frame color = brown
- Diagnostics (visibility is password-dependent), frame color = blue

Second selection criterion:

<Machine configuration> (2)

- # # # = entire machine configuration.
  The global functional groups are displayed in the selection bar (3).
- # 1 = Unit 1.
  In the selection bar (3), the local functional groups of unit 1 are displayed.
- # 2 = Unit 2.
  In the selection bar (3), the local functional groups of unit 2 are displayed.
- Select the desired unit.
  The frame of the button turns the color that corresponds to the selected operating mode (1).

Third selection criterion:

<Functional groups> (3)

The present functional groups are displayed depending on the <Machine configuration> selection criterion.

▷ Select the desired functional group.
The frame of the button turns the color that corresponds to the selected operating mode (1).

Fourth selection criterion:

<Functional menus> (4)

The present functional menus are displayed depending on the <Functional groups> selection criterion.

▷ Select the desired menu.
The frame of the button turns the color that corresponds to the selected operating mode (1).

Display of menu contents:

In the work area (5), the contents of the current functional menu are displayed.

It consists of:

- Information fields = information/specifications
- Input fields = settings
- Buttons = actions

5.1.6.1 <Operating modes>

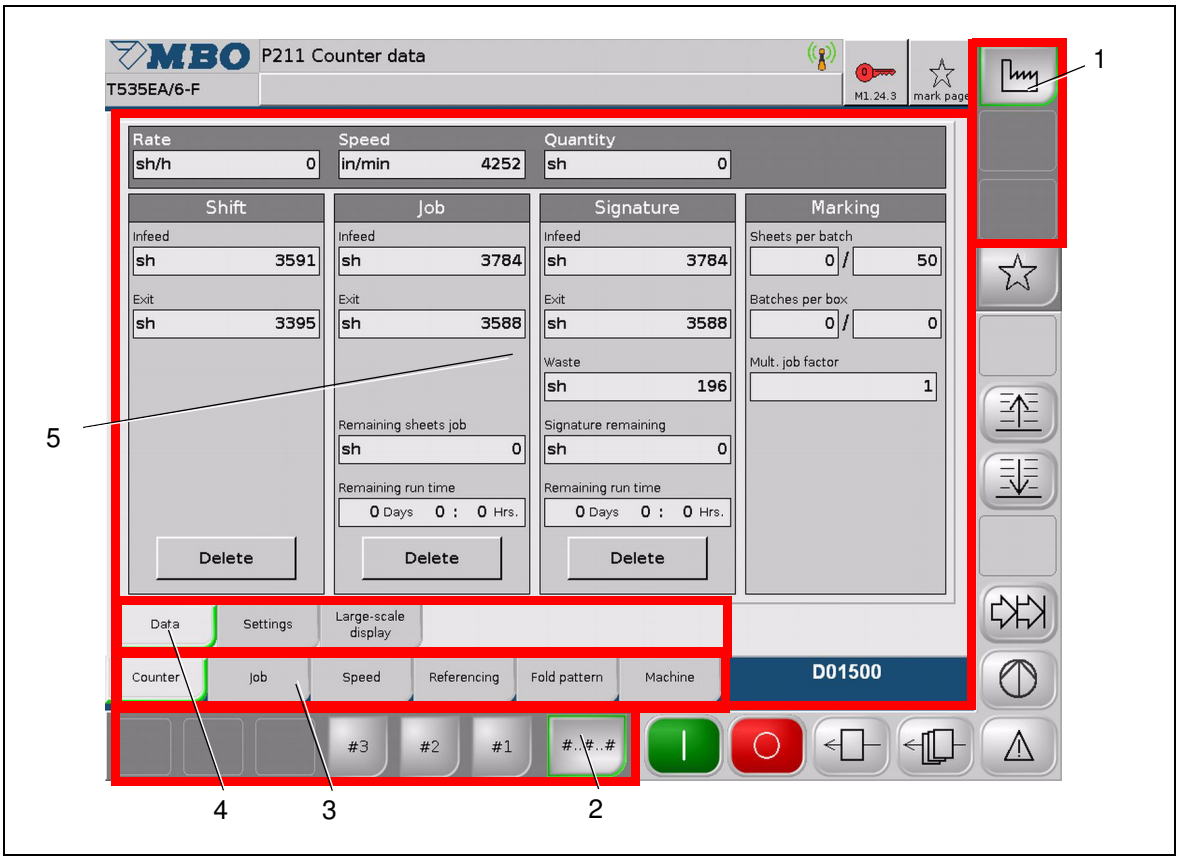


Figure 27: Operating modes

- In normal operation, the operating mode <Production> (1) is active. The button (1) is framed in green.
- The active buttons in the Machine configuration/units (2), Functional groups (3) and Functional menus (4) selection bars are also framed in green.
  The color depends on the active operating mode.
- In the work area (5), the contents of the selected functional menu (4) are displayed.

The operating modes <Diagnostics> and <Service> are not displayed unless the correct password is entered.
See Chapter "6.12 Changing the password level"

Color assignment of operating modes (1) and selection bars (2, 3, and 4)

- Production = green
- Diagnostics = blue
- Service = brown
- Error messages / status information = red

5.1.6.2 <Information fields>

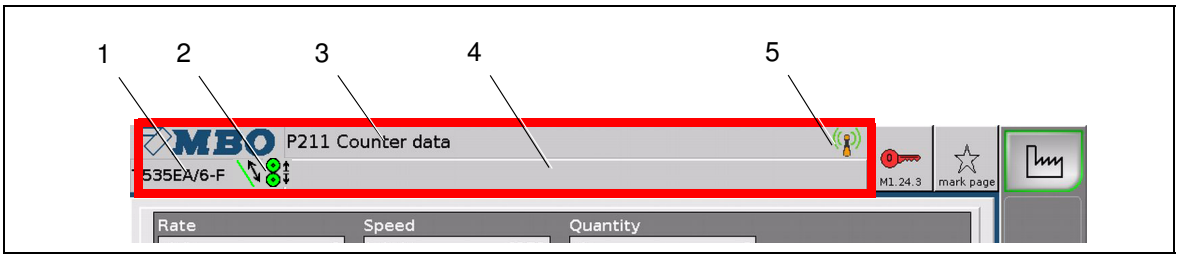


Figure 28: Information fields

1 **<Machine designation/output level> information field.**
(Hidden during roller and plate adjustment.)
While the machine is running:
Alternating display of speed and production speed.
When machine is stopped:
Display of machine designation.^

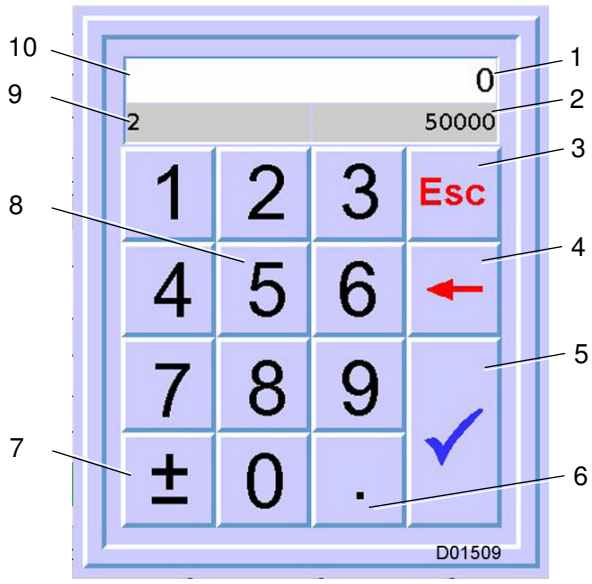
2 **<Roller and plate adjustment> information field**
Display of the corresponding symbol during the roller and plate adjustment:
Symbol flashes blue = querying the drives.
Symbol flashes green = adjusting the drives.
See Chapter "7.3.8 Starting the positioning of the buckle plates" and "7.3.9 Positioning the foldrollers"

3 **<Menu number and menu designation> information field**
Display of the current menu number and designation.

4 **<Error messages / status information> information field**
Color scheme of current error messages or status information:
Error messages = red.
Status information = blue.
Touching this line opens a list with all current messages.
See Chapter

5 **<Remote maintenance> information field**
Symbol present = remote maintenance is switched on.
Symbol flashes in color = remote maintenance is carried out.

5.1.7 Numeric input field



1	Current value	6	Input comma
2	Upper input limit	7	+/- Sign
3	Cancel	8	Number field 0-9
4	Delete last digit	9	Lower input limit
5	Enter	10	Display of unit

Figure 29: Numeric input field

Depending on the function, the structure of the input field may vary slightly.

5.1.8 Select favorite menus

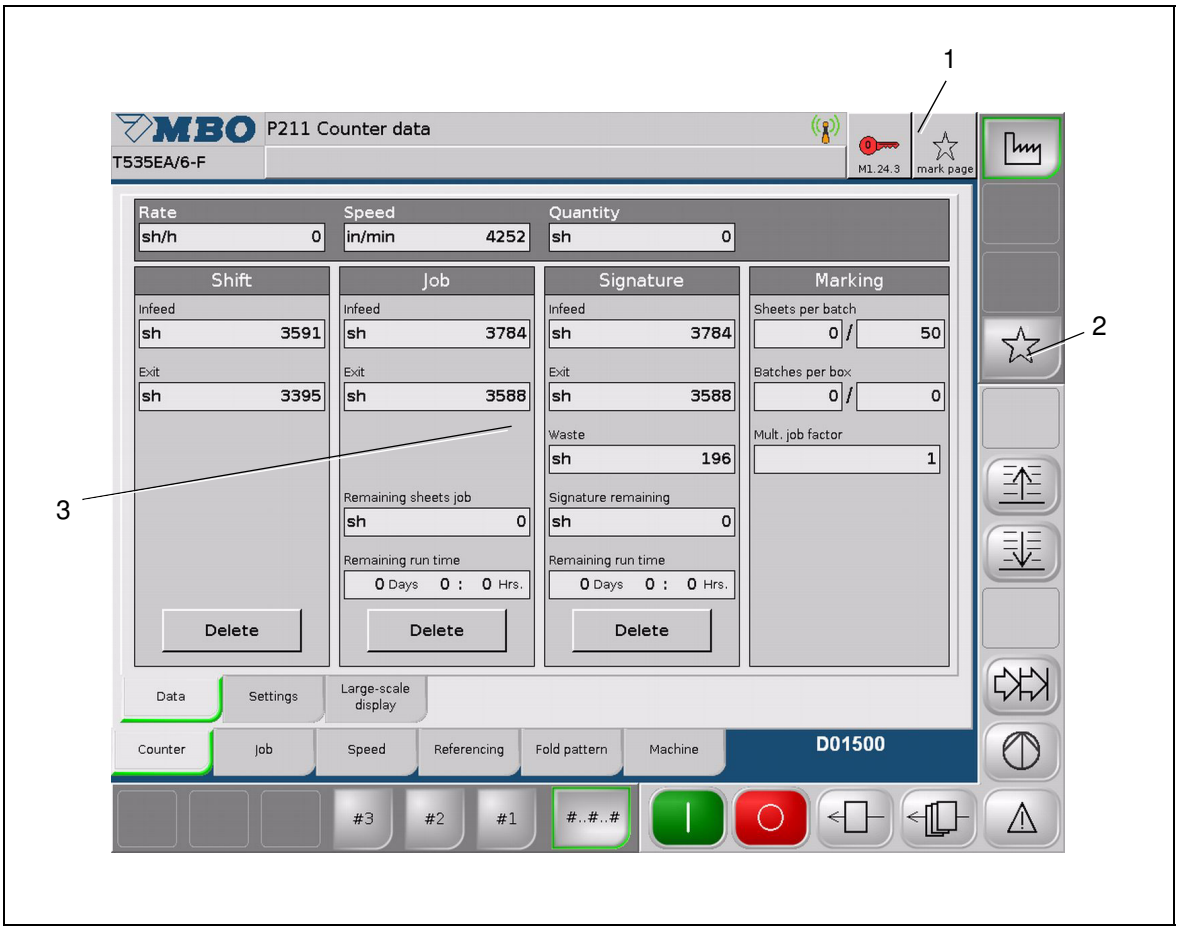


Figure 30: Select favorite menus

Switching between favorites is used to quickly switch between two favorite menus.

Procedure:

▷ Navigate via <Operating mode>, the <Machine configuration> selection bar, the <Functional groups> selection bar and the <Functional menus> selection bar to the first menu that you would like to define as a favorite menu.

▷ Press the <Select favorite menus> button (1) when the contents of the desired menu are displayed in the work area (3).
The symbol in the button (1) turns blue.

▷ Navigate via <Operating mode>, the <Machine configuration> selection bar, the <Functional groups> selection bar and the <Functional menus> selection bar to the second menu that you would like to define as a favorite menu.

▷ Press the <Select favorite menus> button (1) when the contents of the desired menu are displayed in the work area (3).
The symbol in the button (1) turns blue.

▷ By pressing the <Switch favorite menus> button (2), you can switch between these two favorite menus.

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.

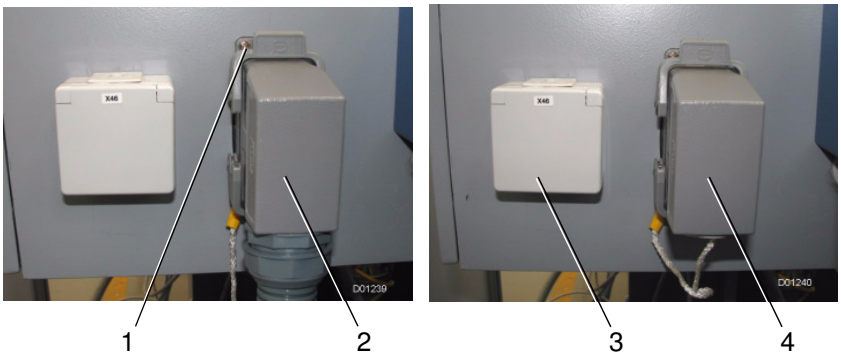
CAUTION!

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



1	Control socket	3	Socket 230 VAC (optional)
2	Control plug	4	Dummy plug

Figure 31: Machine controller operating mode

Connecting subsequent folding units:

Procedure:

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

5.2.2 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
Power supply connection	-	-	X
Initial operation	-	-	X

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

6.1.2 Safety messages

DANGER!

Danger due to hazardous 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 hazardous 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 tipping machine parts while 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 underfloor.

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 transport pallet / in a transportation 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 transport pallet / in a transportation crate.
Transport/installation/initial operation of the continuous feeder 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 Transportation"
- Unpack the machine.
  See Chapter "6.6.1 Unpack the machine"
- Setting up 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 Initial operation"
- Carrying out inspection after initial operation.
  See Chapter "6.11 Inspection after first start-up"

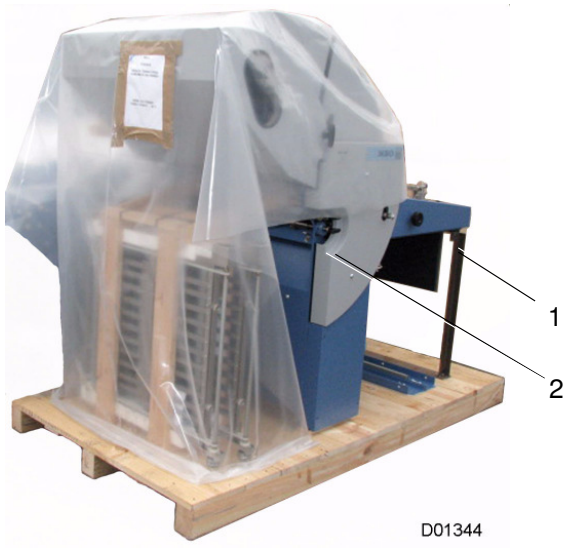
6.5 Transportation

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.



1 Shipping brace 2 Folding machine

Figure 32: Transportation

Procedure:

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

6.6 Installation

WARNING!

Danger due to insufficient properties and condition of the underfloor.

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.

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.

1 Shipping brace
2 Folding machine
3 Buckle plates

Figure 33: 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 store it properly.
▷ Remove the screws fastening the machine to the transport pallet.
▷ Remove the transport brackets.
▷ Remove the screws fastening the shipping brace (1) to the transport pallet.

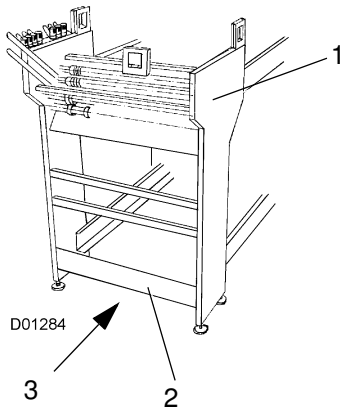
6.6.2 Installing the machine

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.



1 Side wall left (operator side)
2 Cross bar
3 Drive-in direction fork lift

Figure 34: Transportation of folding machine

Procedure:

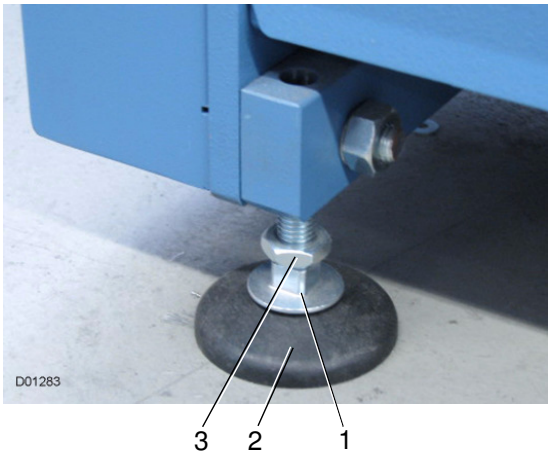
▷ Use a suitable fork lift. (For requirements, see Chapter "3.2.4 Weights, fork lifts, and floor requirements")
▷ Drive the fork lift under the cross bar (1). (See the drive-in direction for the fork lift (3).)
▷ Secure the machine against tipping.
▷ Lift the machine carefully.
▷ Screw the leveling screws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

WARNING!

Danger due to insufficient properties and condition of the underfloor.

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 35: Setting up 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 leveling out of the machine components.

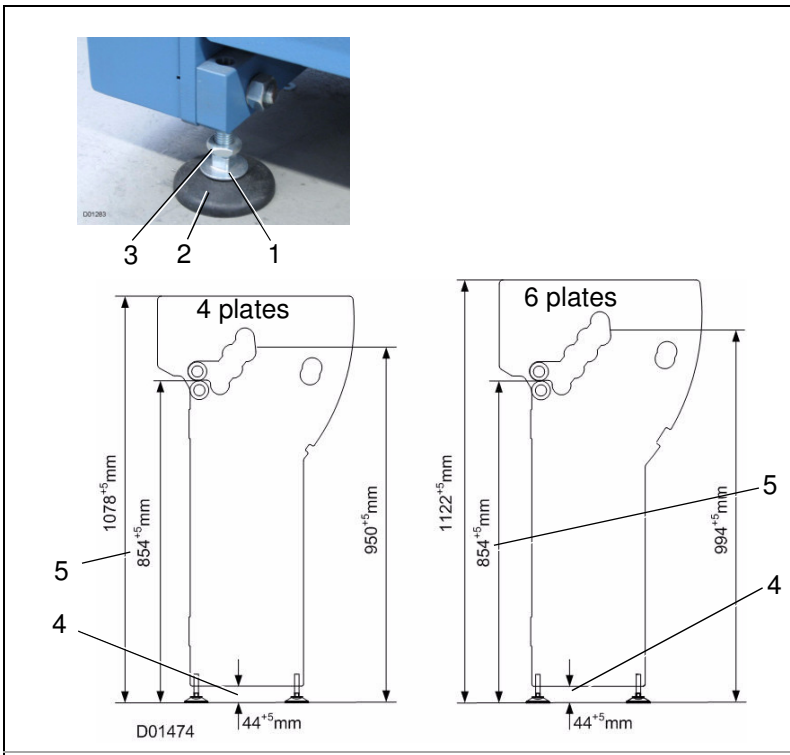
Disregard can lead to serious damage to property

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:



1	Leveling screws	4	Auxiliary dimension
2	Plate foot	5	Exit height
3	Lock nut		

Figure 36: 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 from top edge of lower slitter shaft/tape roller to the floor = 854 mm + 5 mm (33.6 in + 0.2 in).
As an auxiliary dimension (4), you can also use the distance from the bottom edge of the side plate to the floor = 44 mm + 5 mm (1.7 in + 0.2 in).

▷ Align the machine approximately.

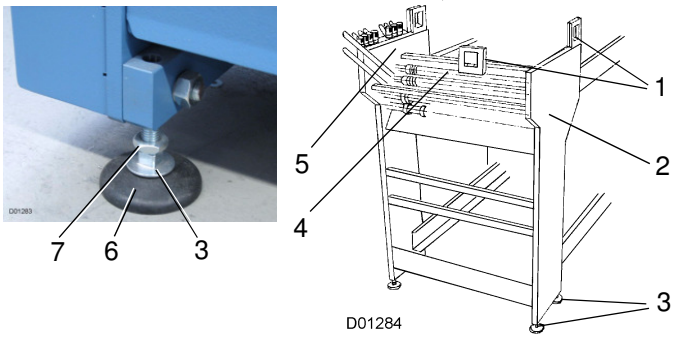
Removing the shipping brace:

▷ 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:



1	Machine spirit level	5	Side part
2	Side part	6	Plate foot
3	Leveling screws	7	Lock nut
4	Upper foldroller		

Figure 37: 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).

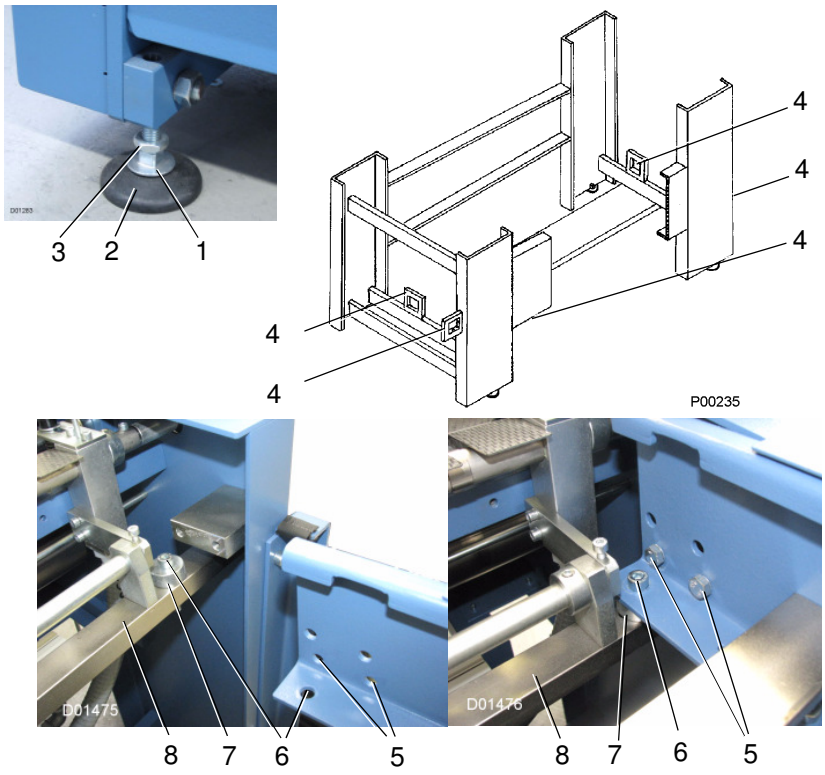
Crosswise alignment:

▷ 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:



1	Leveling screws	5	Connecting screws
2	Lock nut	6	Connecting screw
3	Plate foot	7	Distance piece
4	Alignment surfaces	8	Cross bar

Figure 38: 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.

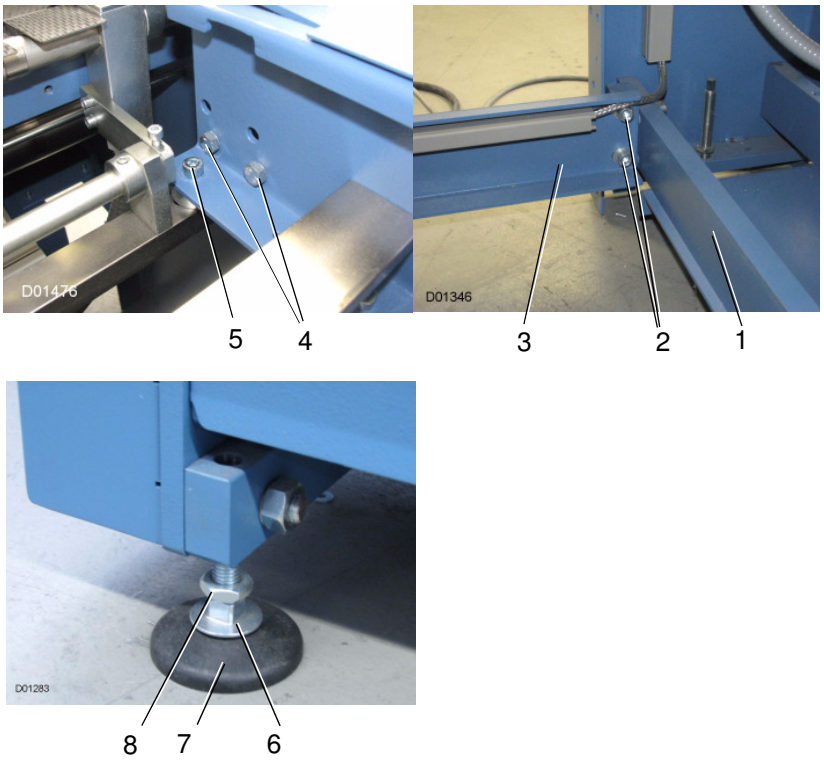
▷ Use the leveling screws (1) to adjust the correct height of the feeder so that:

- 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 with an accuracy of
0.3 mm/m =+/- 0.15 mm/m.
0.1 mm/m = +/- 0.15 mm/m.

Connecting the machine to the feeder:



1	Feeder	5	Connecting screw
2	Connecting screws	6	Leveling screws
3	Connecting brace	7	Plate foot
4	Connecting screws	8	Lock nut

Figure 39: Screwing the feeder to the machine

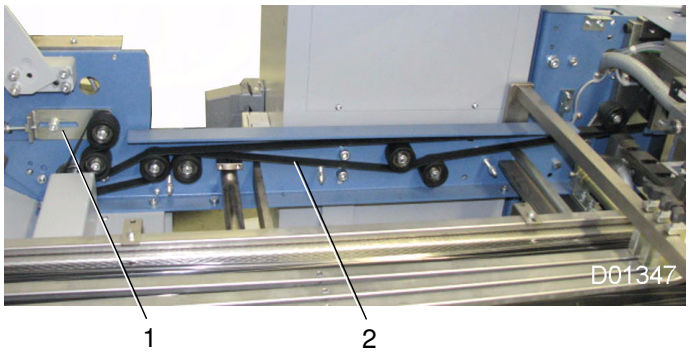
▷ Use the connecting screws (4) to screw the machine to the feeder so that it is free of tension.
▷ Use the connecting screws (5) to screw the machine to the feeder so that it is free of tension.
▷ Use the connecting screws (2) to screw the machine to the feeder so that it is free of tension.

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



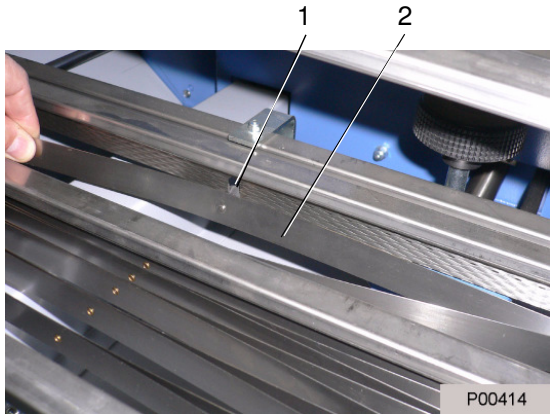
1	Belt tensioner	2	Drive belt

Figure 40: 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



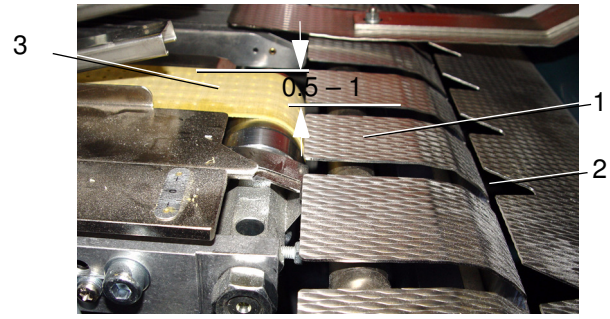
1	Mounting point	2	Lattice grate

Figure 41: 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



1 Guide plate	3 Belt
2 Screws	

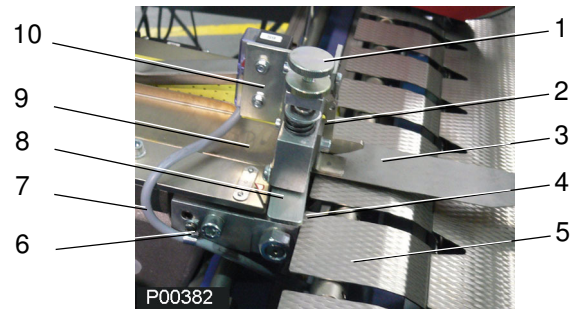
Figure 42: Checking the height adjustment of the guide plate

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



1	Knurled screw	6	Strap
2	Adjusting disk	7	Cable
3	Smoother bar	8	Pressure lever
4	Screw	9	Sidelay
5	Guide plate	10	Double-sheet control

Figure 43: 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

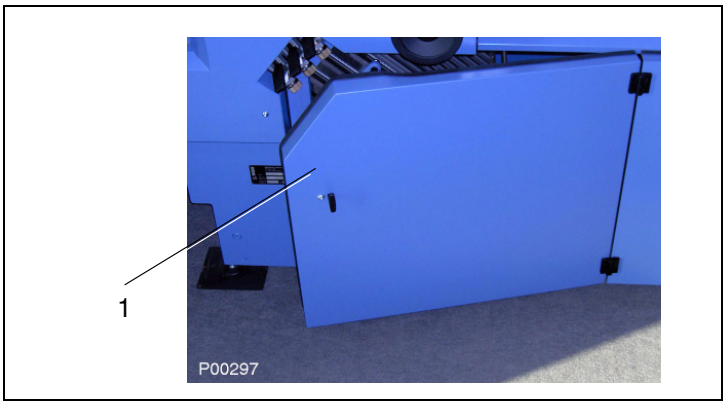
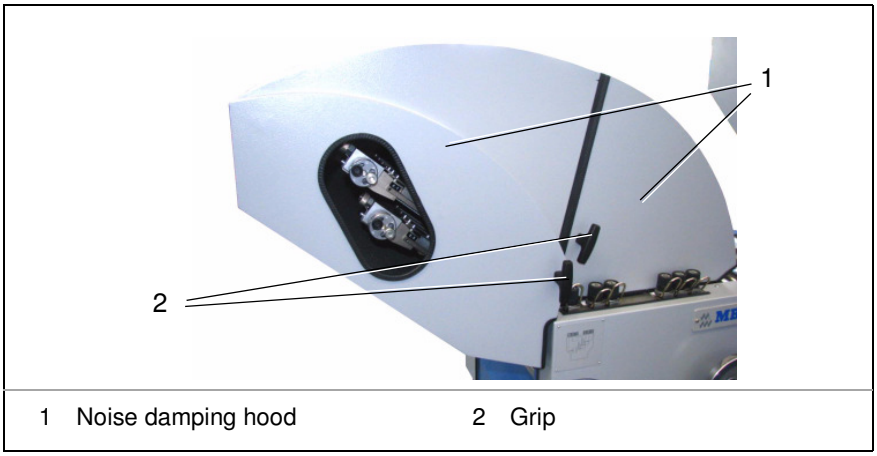


Figure 44: Door with compartment for tools

Procedure:

▷ Hang the compartment door (1) on the hinges

6.6.5 Noise damping hood

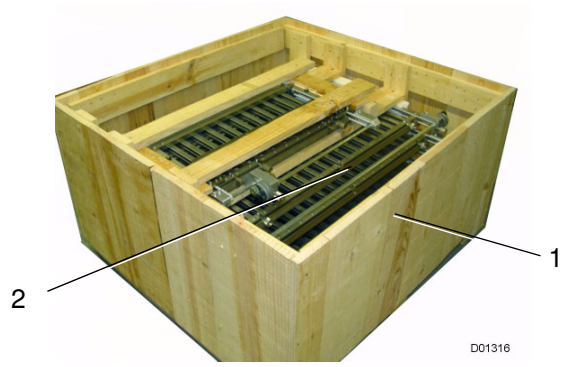


1	Noise damping hood	2	Grip

Figure 45: Noise damping hood

The noise damping hood is mounted at the factory.

6.6.6 Unpacking buckle plates



1 Transportation crate 2 Buckle plates

Figure 46: Unpacking

Procedure:

▷ Open the transportation crate.
▷ Remove the buckle plates
▷ Insert the buckle plates in their corresponding position.
See Chapter "7.9.1 Buckle plate positions"
▷ Dispose of the transportation 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.

Observe 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 hazardous 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 **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)).

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 mm^2.

6.8.1 Assembly of the main control cabinet

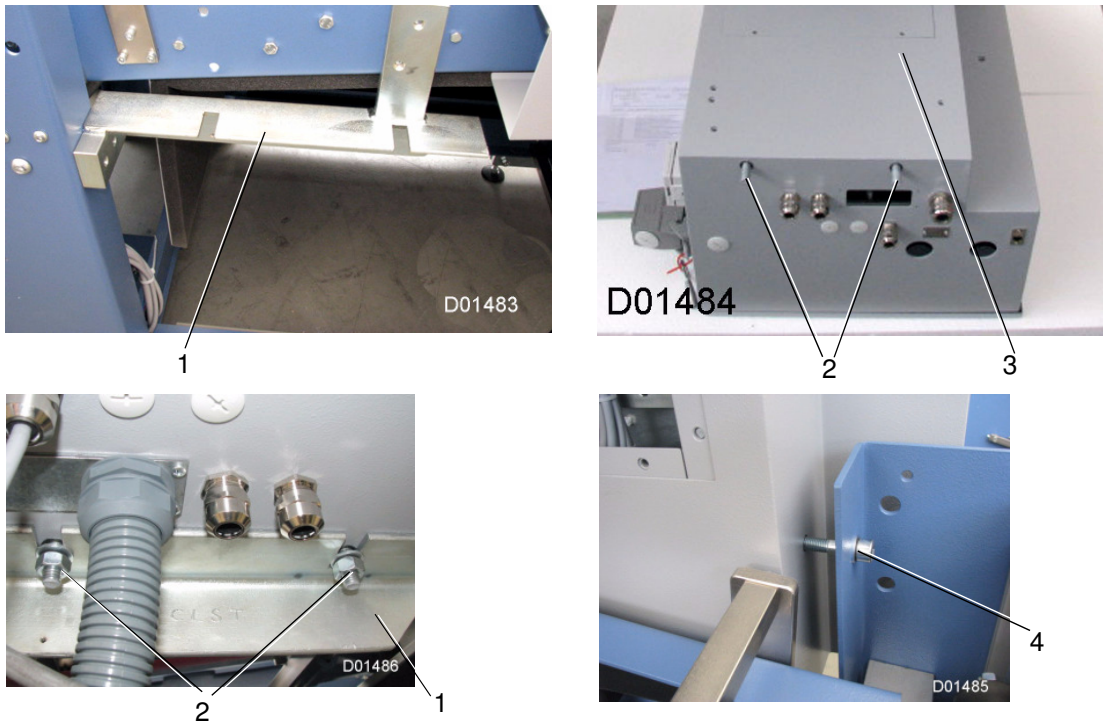
CAUTION!

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 main control cabinet and mount it properly.



1 Fastening angle
2 Threaded bolts
3 Main control cabinet
4 Screw

Figure 47: Assembly of the main control cabinet

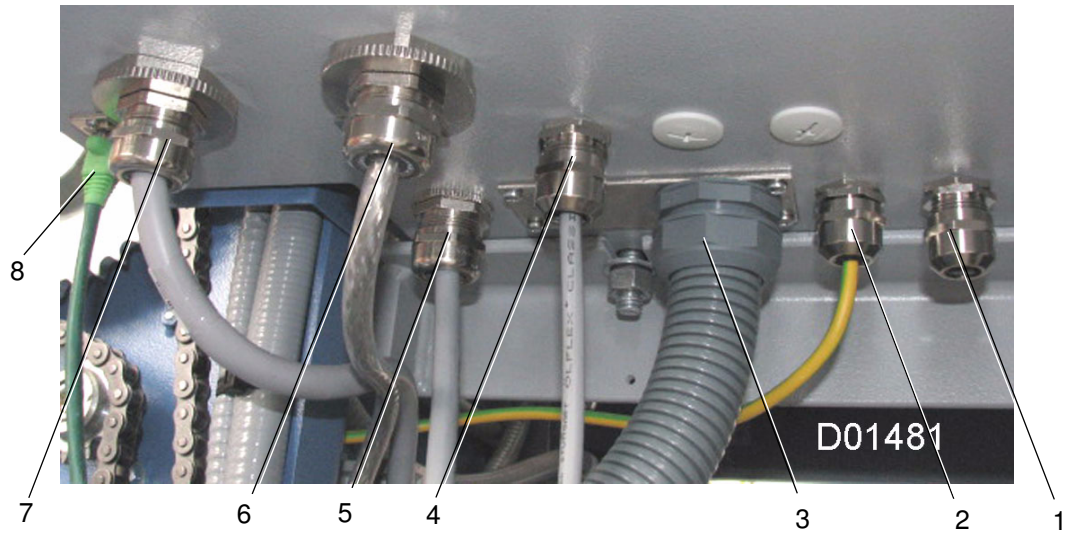
With the continuous feeder:

Procedure:

▷ Fasten the fastening angle (1) to the feeder and the register table.
▷ Transport the main control cabinet (3) to the assembly location on the pallet.
▷ Remove the nuts with the washers of the threaded bolts (2).
▷ Summon at least 3 people to lift the control cabinet (3).
▷ Insert the two threaded bolts (2) into the slots of the fastening angle (2).
▷ Slide a washer over each of the threaded bolts (2).
▷ Turn the nuts onto the threaded bolts (2) and tighten them.
▷ Fasten the main control cabinet (3) to the feeder using the screw (4).

With the pile feeder: ▷ The main control cabinet is not dismantled for transport.

6.8.2 Connecting cables



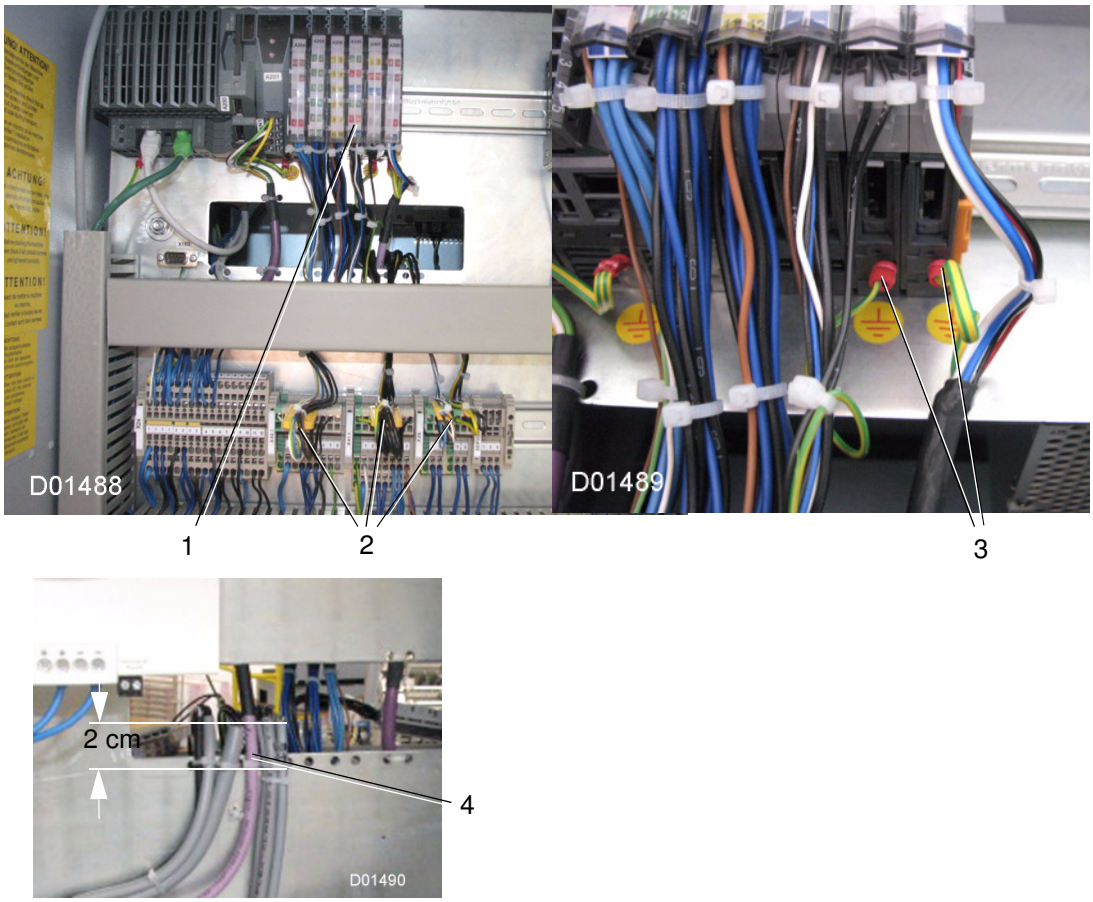
1	Equipotential bonding cable, power supply	5	Power cable
2	Equipotential bonding cable, feeder	6	Connecting line, main drive motor M2
3	Control lines, feeder	7	Connecting line, feeder motor M3
4	Connecting line, pump M1	8	Network socket, RAS X99

Figure 48: Main control cabinet, bottom, connection overview

Connecting the connecting lines:

Procedure:

▷ Open the cover on the rear of the main control cabinet.
▷ All connecting lines are marked with their specific equipment identifier (EID).
▷ 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.



1	Control lines, PLC	3	Grounding conductors
2	Control lines, clamping bar	4	Strain relief by means of cable ties

Figure 49: Main control cabinet, control lines, connection overview

Connecting control lines:

Procedure:

- ▷ All control lines are marked with their specific equipment identifier (EID).
- ▷ Insert the control lines into the main control cabinet through the cable glands with the same marking.
- ▷ Plug in the plugs of the control lines (1) according to the EID label and the wiring diagram on the PLC.
  Make sure that the grounding conductors (3) are also plugged in correctly.
- ▷ Plug in the plugs of the control lines (2) according to the EID label and the wiring diagram on the clamping bar.
- ▷ Use cable ties to fasten the control lines (4) to the partition of the main control cabinet.
  When doing so, let the cable ends stick out approx. 2 cm (0.8 in) over the edge.

6.8.3 Power supply prerequisites

CAUTION

Danger due to incorrect power supply voltage.

Non-observance may cause severe property damage.

- Verify that the specifications for supply voltage and frequency on the label match the power data for the current source.
- Connect the machine only if the supply voltage and frequency match.
- 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.

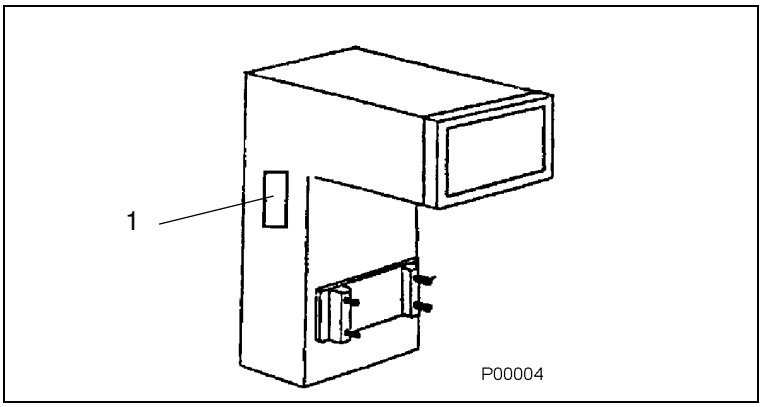


Figure 50: Label

With regard to the power supply, make sure that:

- the supply of this machine must generally be made 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 connection may ***not*** be made by a 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 agree with the specifications on the label, wiring diagram, and "Specifications" of the operating manual.
- due to the leakage currents of the EMC filter, the mains connection must be made so that it is fixed.
- due to the leakage currents of the EMC filter, no power mains with fault-current circuit breakers (FI) or a voltage fluctuation relay can be used.

- due to the leakage currents of the EMC filter, an additional protective equipotential bonding strip 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 resistances (> 50 Ohm) there is hardly any more filter effect of the EMC filter.
- the N conductor is loaded (for 400 VAC power mains).
- 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.

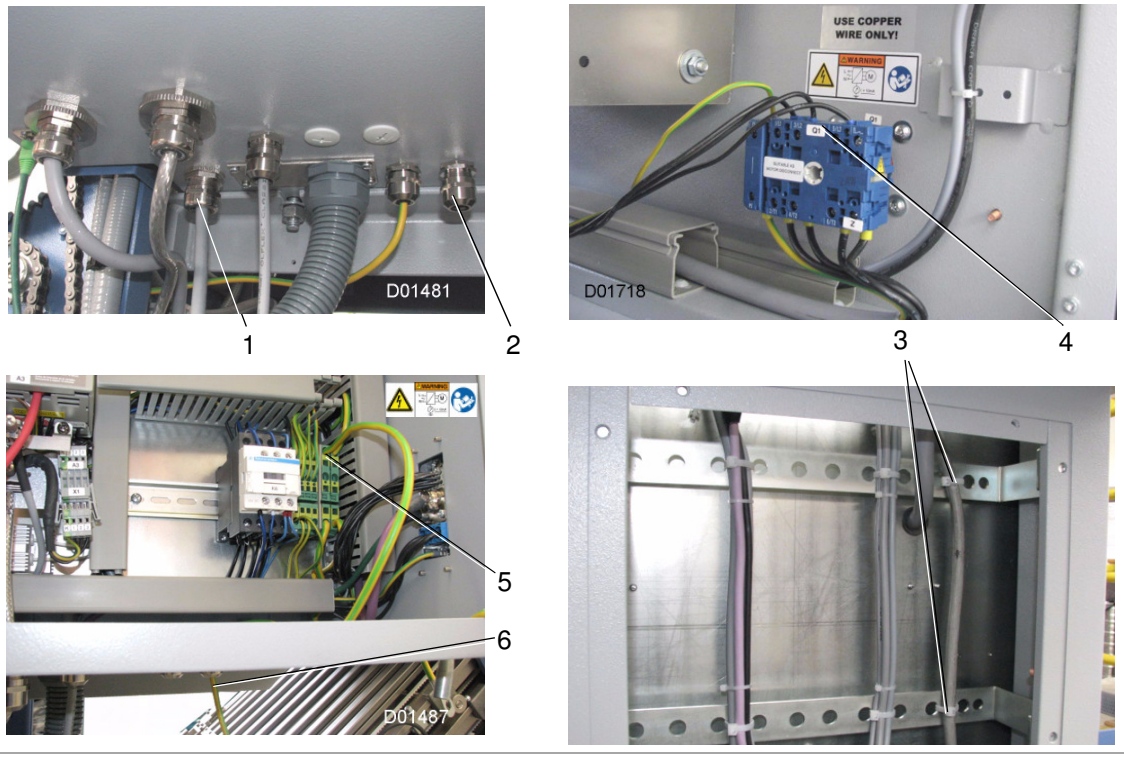
- the 230 VAC sockets of the MBO machines may be used exclusively for connecting auxiliary devices intended for this purpose, such as glue units.
- all sockets (400 VAC and 230 VAC sockets) of the MBO machines must be monitored at all times according to the corresponding federal and local codes, guidelines 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



1 Cable gland, power supply
2 Cable gland, protective equipotential bonding cable
3 Fastening points
4 Power supply to the main switch
5 Ground terminal strip
6 Protective equipotential bonding cable

Figure 51: Network connection

Procedure:

- ▷ Open the cover under the TOUCHSCREEN.
- ▷ Open the control cabinet lock to the left of the TOUCHSCREEN and swivel this off to the side.
- ▷ Insert the power cable into the main control cabinet through the cable gland (1).
- ▷ Connect the power cable to the main switch (4) according to the wiring diagram.
- ▷ Use cable ties to fasten the power cable to the fastening points (3).
- ▷ Insert the protective equipotential bonding cable (6) into the main control cabinet through the cable gland (2).
- ▷ Connect the protective equipotential bonding cable (6) to the PE connection terminal strip (5).
- ▷ Close the cover under the TOUCHSCREEN.
- ▷ Swivel the TOUCHSCREEN back to its original position and lock it using the control cabinet lock.

6.8.6 Additional equipotential bonding strip

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 mm^2 (Cu).

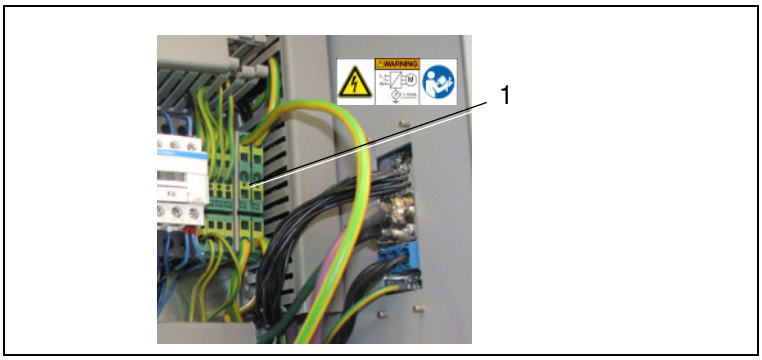


Figure 52: PE connection terminal strip

The RFI filters of the frequency converters 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).
Optimum would be AWG 7 (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 "5.2 Operating modes"

6.9 Initial operation

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 Checking the supply voltage"
- Switch on the main switch.
  See Chapter "7.2.1 Switching the main switch on/off"
- Check rotation direction of pumps.
  See Chapter "6.9.3 Checking rotation direction of pumps"
- Check rotation direction of feeder motor.
  See Chapter "6.9.4 Checking rotation direction of feeder motor"
- Check turning direction drive motor folding machine.
  See Chapter "6.9.5 Checking rotation direction drive motor of the folding machine."
- Checking machine functions
  See Chapter "6.9.7 Checking machine functions"

6.9.2 Checking the supply voltage

CAUTION

Danger due to incorrect power supply voltage.

Non-observance may cause severe property damage.

- Verify that the specifications for supply voltage and frequency on the label match the power data for the current source.
- Connect the machine only if the supply voltage and frequency match.
- 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 the power supply terminals of the main switch to ensure that the correct supply voltage is present.

6.9.3 Checking rotation direction of pumps

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

6.9.4 Checking rotation direction of feeder motor

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

6.9.5 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 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.

6.9.6 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.

6.9.7 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 "2.12.10 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 that all belts and tapes are running on correct center and are properly tensioned.
If required, readjust these.
See Service/Maintenance schedule chapter.

6.12 Changing the password level

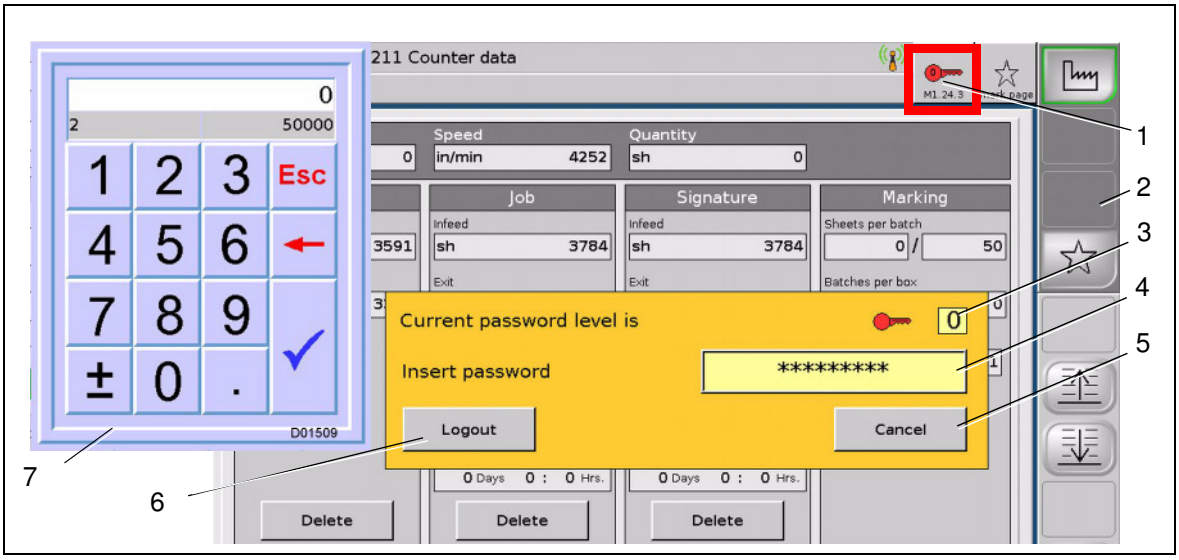


Figure 53: Changing the password level

Special diagnostic and service menus can be unlocked by entering passwords.

Procedure:

▷ Touch the password key symbol (1).
The password input window is opened.

Current password level (3):

- 0 = default setting.
  The password key symbol (1) is red.
- 1 = operator password 1 = **4712.**
  The password key symbol (1) is blue.

Enter the password:

▷ Press the password input field (4).
A numeric input field (7) opens.

▷ Enter the password <**4712**>.

- Confirm the input with the <Enter> button.
  The password key symbol (1) turns blue.
  The <Diagnostics> button (2) appears.

Canceling password input:

▷ Press the <Cancel> button (5).
The password input window is closed.

Resetting password level to 0:

▷ Press the <Logout> button (6).
The password key symbol (1) turns red.
The <Diagnostics> button (2) disappears.

6.13 Setting the language

Figure 54: Setting the language

The texts of the VARIO Control can be displayed in a wide variety of languages.

Procedure:

- Enter the operator password (1). See Chapter "6.12 "
- ▷ Press the <Diagnostics> button (2).
- ▷ In the <Machine configuration> selection bar, press the <Network> button (3).
- ▷ In the <Functional group> selection bar, press the <Languages> button (4).
- ▷ In the <Function> selection bar, press the <Languages> button (5).
- ▷ Select the desired language in the work area (6) by touching the corresponding flag.
- ▷ Reset the password level to 0.
  See Chapter "6.12 "

Changing the language means that:

- The screen texts are displayed in the selected language.
- The length and temperature numbers are displayed in the local units of measurement.

7 Adjustment and operation

7.1 Introduction

For the operation of the machine, also observe:

- The safety instructions.
  See Chapter "7.1.2 Safety messages".
- 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)
Adjusting	X	X	-
Operating	-	X	-

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

7.1.2 Safety messages

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 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.

Replace the pneumatic springs immediately if there are any signs of pressure loss.

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.

WARNUING!

Danger due to pulling out/removing the buckle plates.

The exposed, rotating foldrollers and slitter shafts make up hazardous infeed points.

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

- All adjustment or testing/inspection work may be carried out only when the machine is stopped and secured against switching on.
- Press the EMERGENCY STOP palm button.
- Always have the adjustment or testing/inspection work carried out by one individual person only.
- A crush hazard and hazard of injuries is also present when turning the machine using the safety handwheel.

WARNING!

Danger due to rotating knives and slitter shafts.

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

- Never reach into the slitter shafts while the machine is running
- 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 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 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 handwheel only.

7.2 Operating

7.2.1 Switching the main switch on/off

1 Main switch

Figure 55: Switching the main switch on/off

Switching on: Procedure:

▷ Turn the main switch (1) to switch position 1

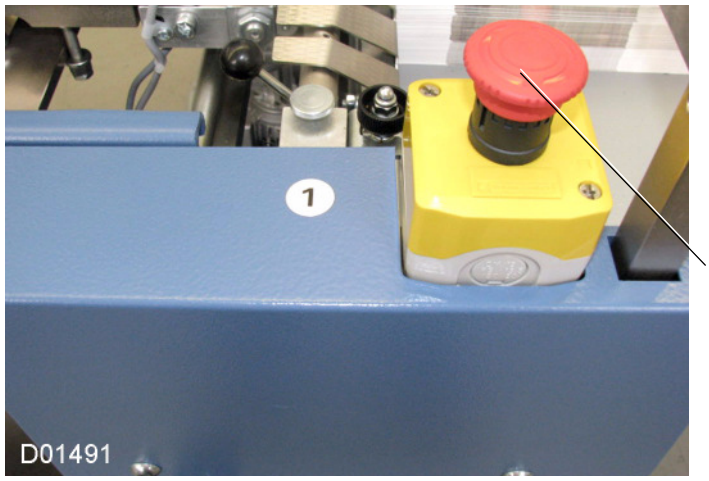
The machine control system boots up.

Switching off: Procedure:

▷ Turn the main switch (1) to switch position 0.

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

7.2.2 EMERGENCY STOP palm button



1 EMERGENCY STOP palm button

Figure 56: 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 57: Starting/stopping the machine

Starting the machine:

Procedure:

▷ Press the <Machine start> button (1).
The <Machine start> button (1) turns light green.

Stopping the machine:

Procedure:

▷ Press the <Machine stop> button (2).
The <Machine start> button (1) turns dark green.

When the machine is stopped using the <Machine stop> button, the sheet feed is stopped first.
The machine stops only after the sheets are emptied!

7.2.4 Starting/stopping the sheet feed

Figure 58: Starting/stopping the sheet feed

When the sheet feed (1 + 2) is switched on, the air supply is started automatically.

Calling up single sheets:

Procedure:

▷ Press the <Single sheet infeed> (1).
As long as the button is pressed, the frame is illuminated in green.
A single sheet is fed.

Starting production:

Procedure:

▷ Press the <Production sheet infeed start/stop> button (2).
The frame of the button turns green.
Sheets are fed continuously.

Stopping production:

Procedure:

▷ Press the <Production sheet infeed> (2) button again.
The frame of the button turns gray.
The sheet feed stops.

7.2.5 Switching the air supply on/off

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

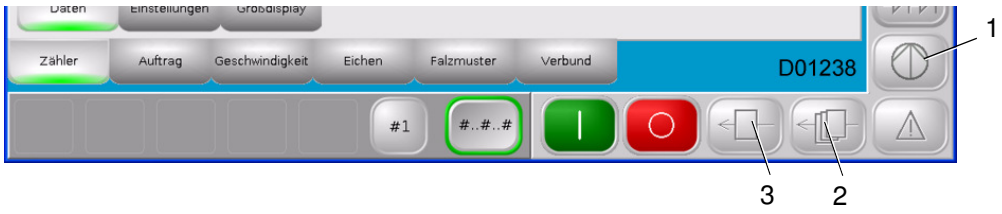


Figure 59: Switching the air supply on/off

Switch on air supply:

Procedure:

▷ Press the button (1).
The frame of the button turns green.

Switching off the air supply:

Procedure:

▷ Press the button (1).
The frame of the button turns gray.

The air supply is switched on automatically when the sheet feed (2 + 3) starts.

7.3 Brief instructions for adjusting the machine

The machine is adjusted in these work steps.

- Calibrating the machine.
  See Chapter "7.3.1 "Calibrate" machine, activating automatically."
- Adjusting the folding imposition.
  See Chapter "7.3.2 Adjusting the folding imposition"
- Deleting the counter data.
  See Chapter "7.4.2 Deleting the counter data"
- Adjusting the counter.
  See Chapter "7.4.3 Counter settings"
- Adjusting the feeder.
  See Chapter "7.5 Adjusting the feeder"
- Adjusting the suction wheel.
  See Chapter "7.6 Adjusting the suction wheel"
- Adjusting the register table.
  See Chapter "7.7 Adusting the register table"
- Changing the sheet feed data if necessary.
  See Chapter "7.4.7 Changing sheet infeed data."
- Adjusting the foldrollers/slitter shafts.
  See Chapter "7.8 Adjusting the foldrollers/slitter shafts."
- Carrying out precise adjustment of the buckle plates.
  See Chapter "7.9 Adjusting the buckle plates"
- Placing the slitters on the slitter shafts.
  See Chapter "7.10 Placing the knives on the slitter shafts"
- Paying attention to error messages.
  See Chapter "7.11 Error messages"
- Removing the paper jam.
  See Chapter "7.12 Removing the paper jam"

7.3.1 "Calibrate" machine, activating automatically.

The prerequisite for the adjustment of the folding machine is that the machine controller is put into the state "calibrate" machine.
- All sheet feed data is deleted here.
- Note required data in advance.

"Calibrate" machine is activated automatically if:

- A new folding imposition is selected.
  See Chapter "7.3.2 Adjusting the folding imposition"
- A job is activated in the job management system (optional).
  (See separate operating manual for the DATAMANAGER).

"Calibrate" machine can also be activated manually.
See Chapter "7.4.6 Calibrating"

For "Calibrate" machine, the following data are measured automatically:

- Sheet length
- Optimal suction length
- Minimal sheet gaps
- Speeds of all folding units
- Sheet monitoring of all folding units (optional)

These can be changed manually.
See Chapter "7.4.6 Calibrating".

„Calibrate" machine is ended automatically after the first sheet passes through all photo cells of the completely-adjusted Navigator combination.

7.3.2 Adjusting the folding imposition

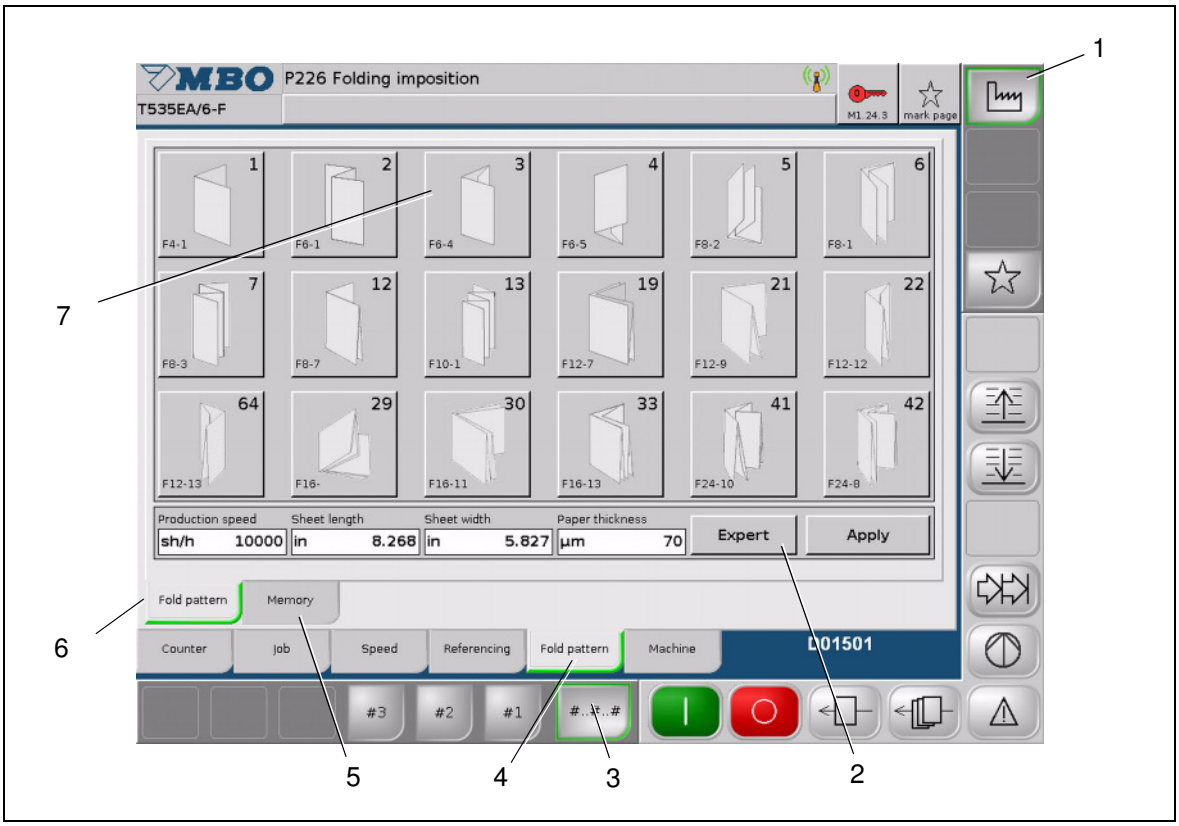


Figure 60: Adjusting the folding imposition

Procedure:

▷ Press the <Production> button (1).
▷ In the <Machine configuration> selection bar, press the <Network> button (3).
▷ In the <Functional group> selection bar, press the <Folding imposition> button (4).
▷ In the <Function> selection bar, press the <Folding imposition> button (6).
A folding imposition can be selected in <Quick mode> (7).
See Chapter "7.3.4 Quick mode".
A folding imposition can be selected in <Expert mode> (2).
See Chapter "7.3.5 Expert mode".
▷ In the <Function> selection bar, press the <Memory> button (5).
A stored folding imposition can be selected.
See Chapter "7.3.7 Folding imposition memory".

A folding imposition change means that:

- The new folding imposition data is calculated and the previous folding imposition data is deleted.
Back up the old folding imposition data beforehand.
- The machine enters the "Calibrate" machine state automatically.

7.3.3 Measuring the paper thickness

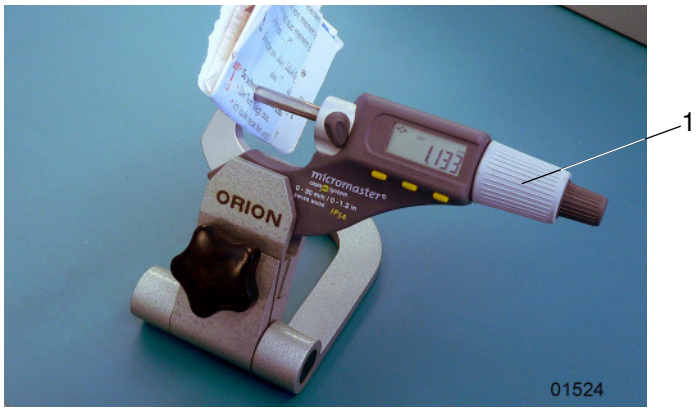


Figure 61: Measuring the paper thickness

The paper thickness is measured using the built-in digital outside micrometer.

Procedure:

▷ Set the outside micrometer to zero.
▷ Clamp 10 sheets of the paper to be processed into the outside micrometer using the knurled screw (1).
▷ Divide the value displayed by ten.
(Example: 1.133 mm / 10 = 0.113 mm = 113 microns).
▷ Enter the value <113> into the <Paper thickness> field.

7.3.4 Quick mode

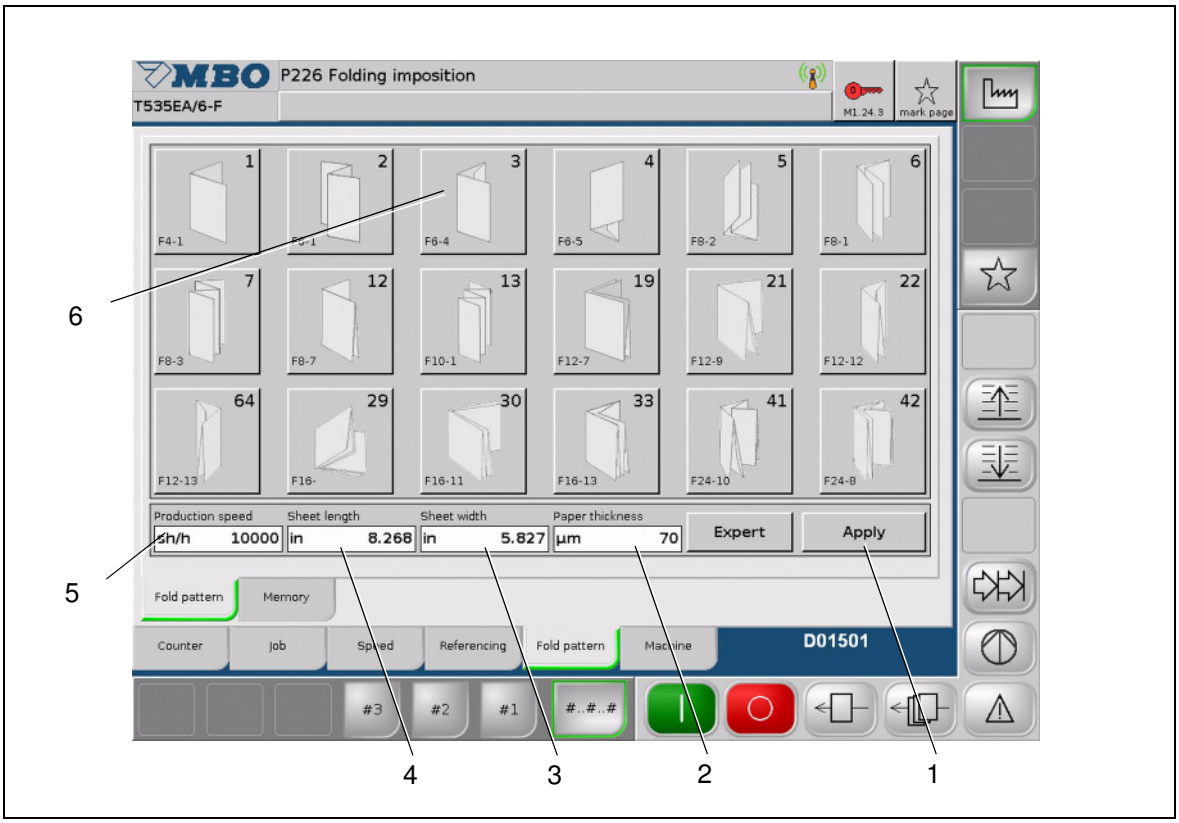


Figure 62: Quick mode

In <Quick mode>, you can select predefined folding impositions.

Procedure:

▷ Enter the desired production speed (5).
▷ Enter the measured sheet length (4).
▷ Enter the measured sheet width (3).
▷ Enter the measured paper thickness (2).
See Chapter "7.3.3 Measuring the paper thickness".
▷ Select the corresponding folding imposition (6).
▷ Press the <Apply> button (1).
The display in the work area switches to the <Plates> menu.
See Chapter "7.3.8 Starting the positioning of the buckle plates".

7.3.5 Expert mode

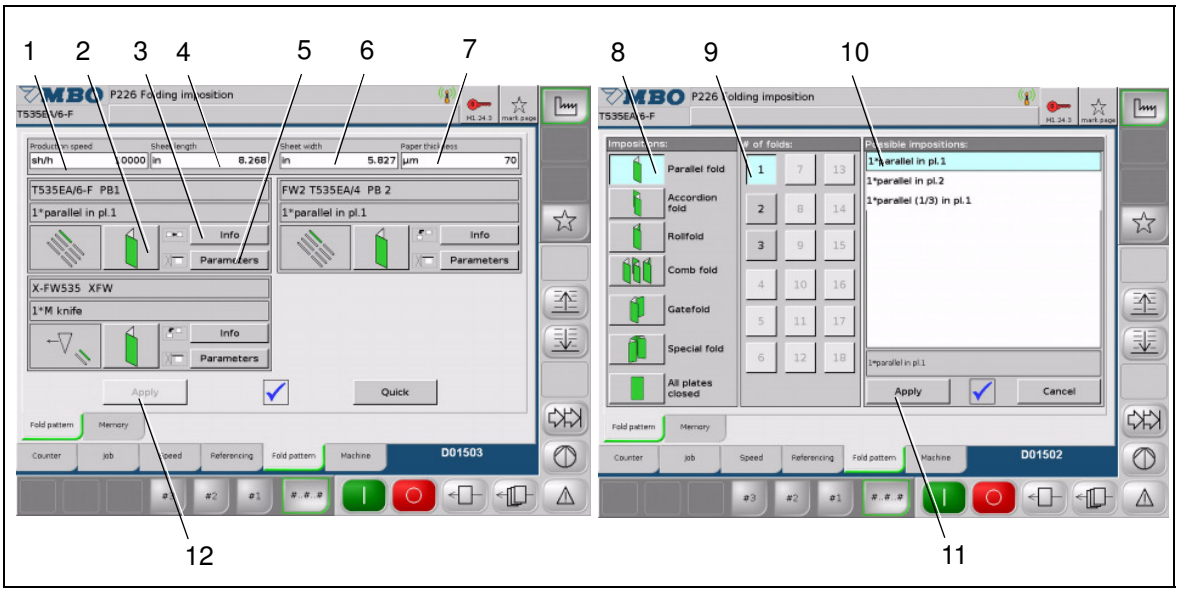


Figure 63: Expert mode

In <Expert mode>, you can select a wide variety of folding impositions.

Procedure:

- ▷ Enter the desired production speed (1).
- ▷ Enter the measured sheet length (4).
- ▷ Enter the measured sheet width (6).
- ▷ Enter the measured paper thickness (7).
  See Chapter "7.3.3 Measuring the paper thickness".
- ▷ Press the <Folding imposition> button (2).
  The folding impositions are displayed in Expert mode.
- ▷ Select a fold type (8).
- ▷ Select the number of folds (9).
- ▷ Select one of the possible folding impositions (10).
- ▷ Press the <Apply> button (11).
- ▷ Press the <Info> button (3) to display the calculated values in a submenu.
- ▷ Press the <Parameters> button (5) to open a submenu in which you can enter the sheet running, the number of rails and multiple job factor.
  See Chapter "7.3.6 Submenu folding imposition selection/Parameters"
- ▷ Press the <Apply> button (12).
  The display in the work area switches to the menu <Parameter Plates PB1>.
  See Chapter "7.3.8 Starting the positioning of the buckle plates".

7.3.6 Submenu folding imposition selection/Parameters

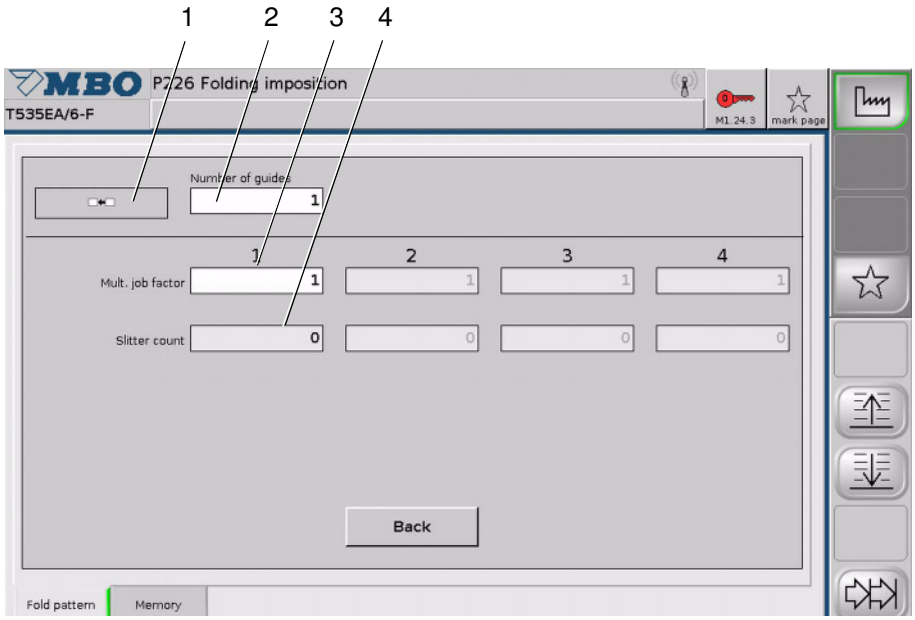


Figure 64: Submenu <Folding imposition selection/Parameters>

In the <Parameters> submenu, you can configure the following settings.
Procedure:

Display/ specification of the sheet running (1):

For certain folding impositions and suitable units, the sheet running/direction can be changed.

- 90° across a corner (default)
- In line with folding unit I

See Chapter "7.4.9 Displaying machine configuration".

Number of rails (2):

▷ Enter the <Number of rails/Sheet streams> of the current unit.

Multiple job factor (3):

▷ Enter the <Multiple job factor per rail/Sheet stream>.

Slitter count (4):

The number of cutting knives required is displayed.

The input of <Number of rails/Sheet streams> and <Multiple job factor per rail/Sheet stream> has an effect on the speed, sheet monitoring and counter data.

7.3.7 Folding imposition memory

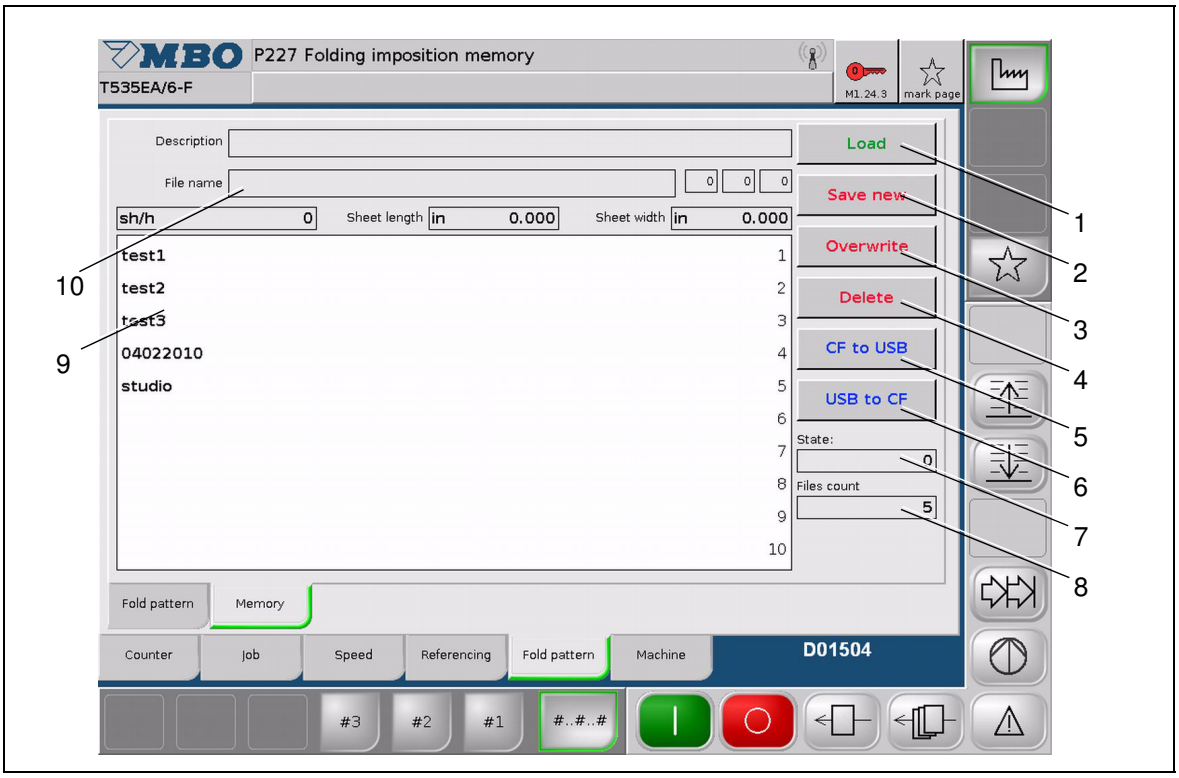


Figure 65: Folding imposition memory

In the <Folding imposition memory> menu, you can carry out various actions.

Load (1): The folding imposition selected in the selection window (9) is loaded as the current folding imposition.

Save new (2): The current folding imposition is saved in the folding imposition memory. See Chapter "7.3.7.1 Save new folding imposition".

Overwrite (3): The folding imposition selected in the selection window (9) is overwritten with the current folding imposition data.

Delete (4): The folding imposition selected in the selection window (9) is deleted from the folding imposition memory.

CF to USB (5): The folding impositions displayed in the selection window (9) are stored on an external USB stick.

USB to CF (6): The folding impositions displayed on an external USB stick are loaded into the VC control system.

7.3.7.1 Save new folding imposition

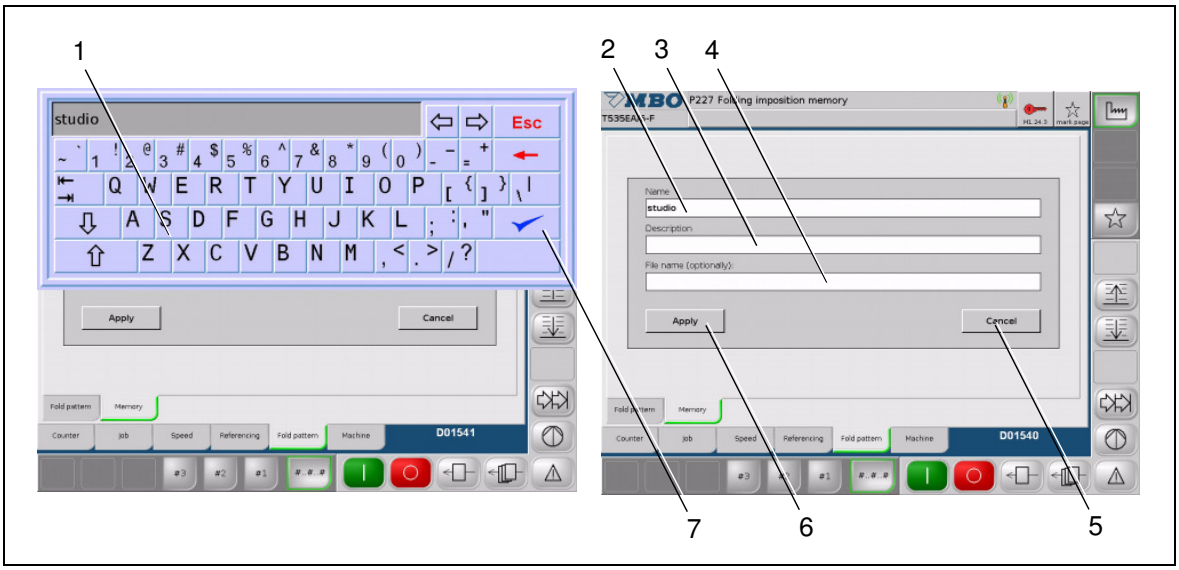


Figure 66: Save new folding imposition

In the menu <Save new folding imposition>, the texts for the name (2) of the folding imposition, the information text (3) and the file name (4) can be selected as desired.

- <Name> (2).
  If no name is entered, the file name is entered automatically.
- <Information text> (3).
  Entering the information text is optional.
- <File name> (4).
  If no file name is entered, the current date and time are entered automatically.
  We recommend entering a file name for better orientation when storing the folding impositions to a USB stick or importing them to another, VARIO controlled, machine.

Procedure:

▷ Press the desired input field to make an entry.
A submenu with an input keyboard (1) is opened. Type on the keyboard as you would a regular computer keyboard.
▷ Enter the desired text.
Confirm the input with the <Enter> button (7).
▷ Follow the same procedure to enter the texts for the additional fields.
▷ Press the <Apply> button (6) to finish the process of saving the folding imposition.
▷ Press the <Cancel> button (5) to cancel the <Save new folding imposition> process.

7.3.8 Starting the positioning of the buckle plates

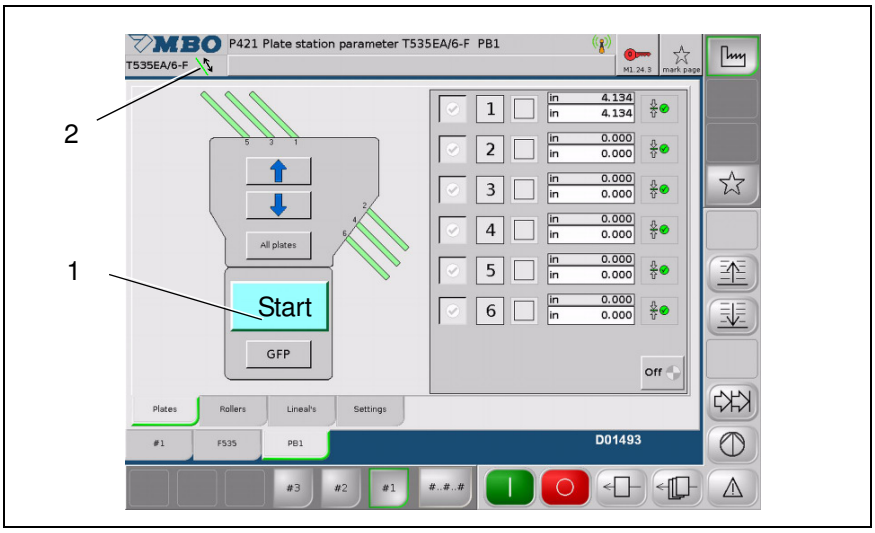


Figure 67: Changing calculated folding lengths manually

After selecting a new folding imposition, for safety reasons, the positioning of the buckle plates must be started manually.

Procedure:

CAUTION!

Danger due to automatic format change.

Non-observance may cause severe personal injuries.

When starting the automated format change, observe the following precautions:

- Do not reach into the machine.
- Make absolutely sure that there are no other people at the machine.

Starting positioning:

▷ Press the <Start> button (1).
The sheet stops are positioned.
During the plate adjustment process, the symbol (2) flashes.

The various states of the push button (1) have the following meanings:

- The button is blue and labeled with <Start>.
  Starts the positioning.
- The button is red and labeled with <Stop>.
  The positioning can be canceled.
- The button is yellow and labeled with <Homing>.
  Starts the reference run (homing) for the selected buckle plates.
  See Chapter "7.9.8 Reference run of the buckle plates".
- The button is green and labeled with <Position OK>.
  The positioning is finished.

7.3.9 Positioning the foldrollers

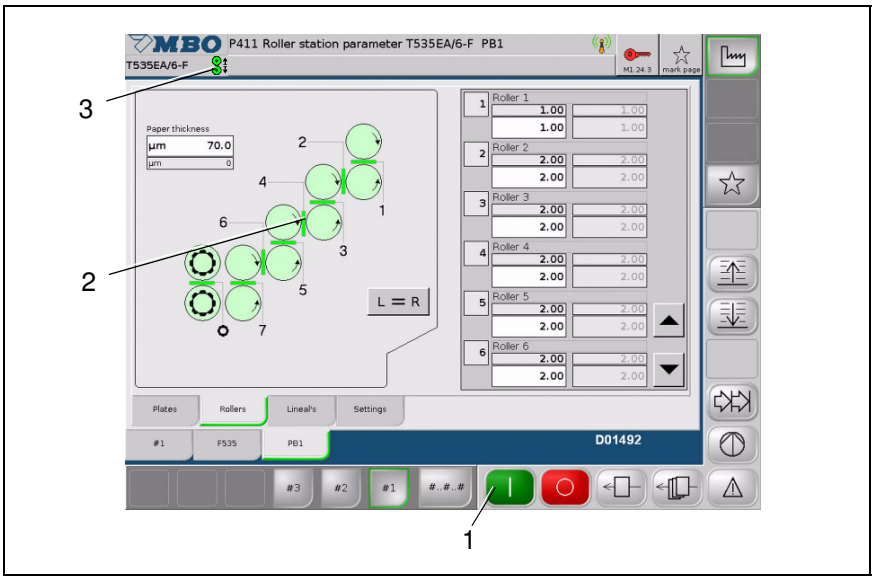


Figure 68: Positioning the foldrollers

After selecting a new folding imposition, the positioning of the foldrollers is carried out automatically when the machine starts.

Procedure:

▷ Start the machine by pressing the <Start> button (1).
The positioning takes place.
This is indicated by the flashing gray roller gap in the roller diagram (2) and the flashing green symbol (3).
The positioning is ended when the symbol (3) is no longer visible.

See also Chapter "7.8.1 Correcting the foldroller/slitter shaft adjustment".

7.4 Counter

7.4.1 Counter data

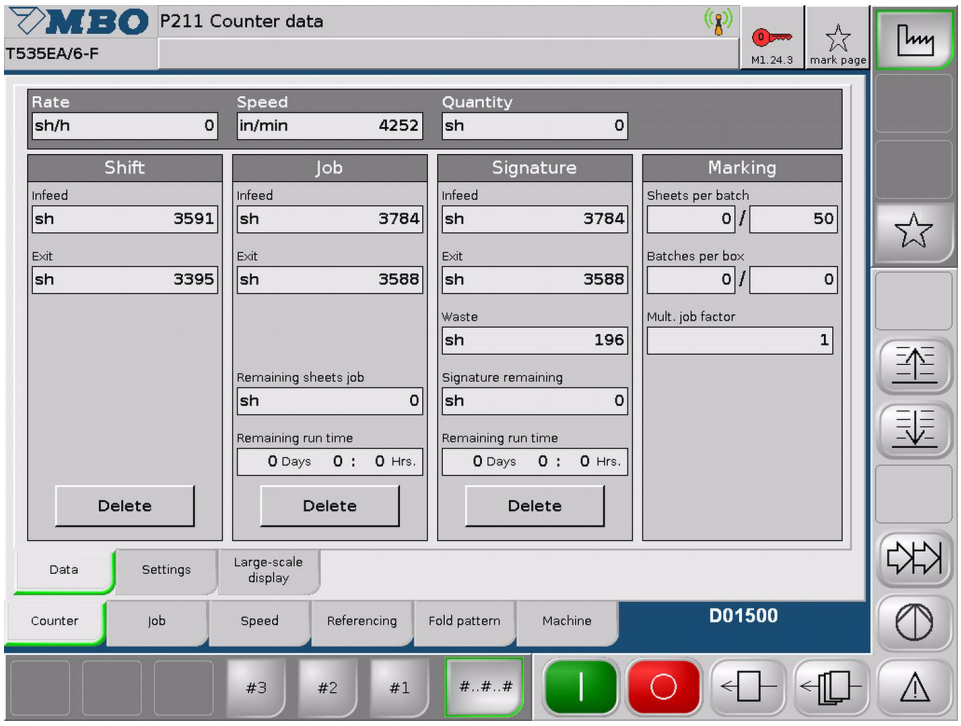


Figure 69: Deleting the counter data

The <Counter data> menu displays the current counter data divided into signature, job and shift.

The counter data of the job are displayed only if a number greater than 1 is entered in the <Number of signatures> display in the <Settings> menu.
See Chapter "7.4.3 Counter settings".

7.4.2 Deleting the counter data

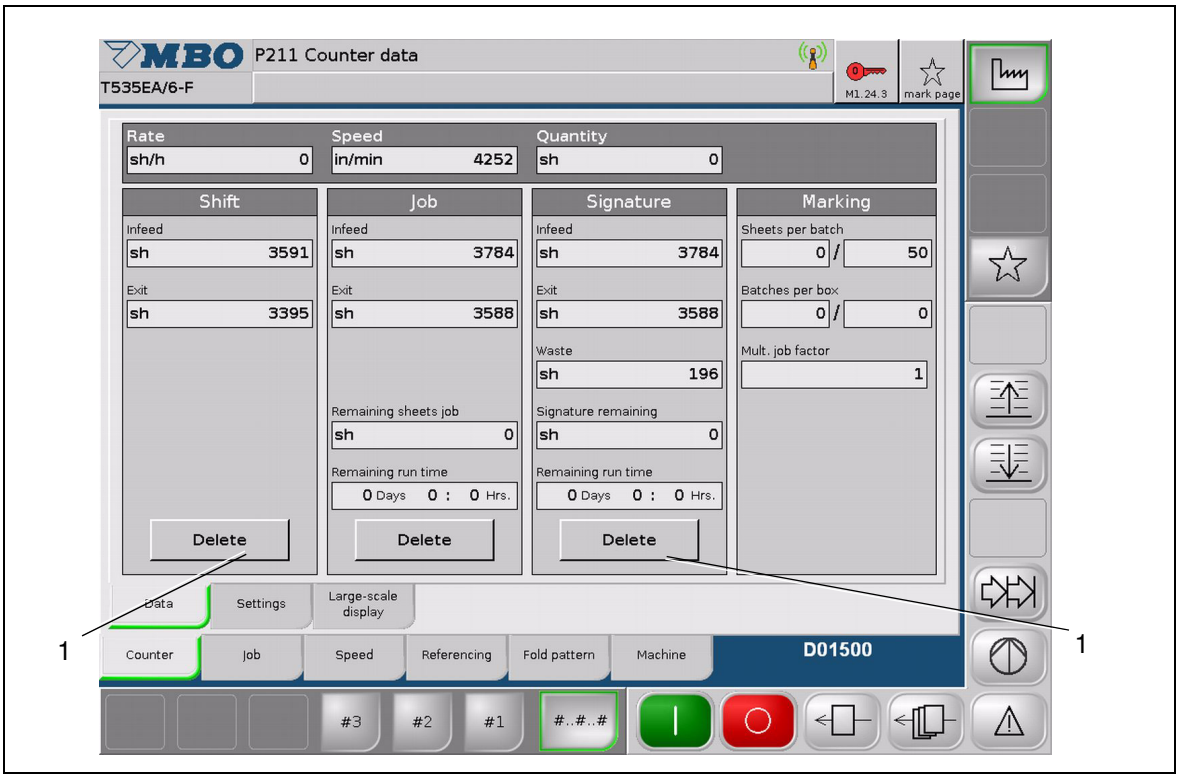


Figure 70: Deleting the counter data

The <Counter data> menu displays the current counter data divided into signature, job and shift.

When the signature, job or shift are changed, the corresponding counter data must be deleted.

Procedure:

▷ Press the corresponding <Delete> button (1).

- Deleting the counter data has no effect on any machine function.
- The counter data of the job are displayed only if a number greater than 1 is entered in the <Number of signatures> display in the <Settings> menu.
  See Chapter "7.4.3 Counter settings".

7.4.3 Counter settings

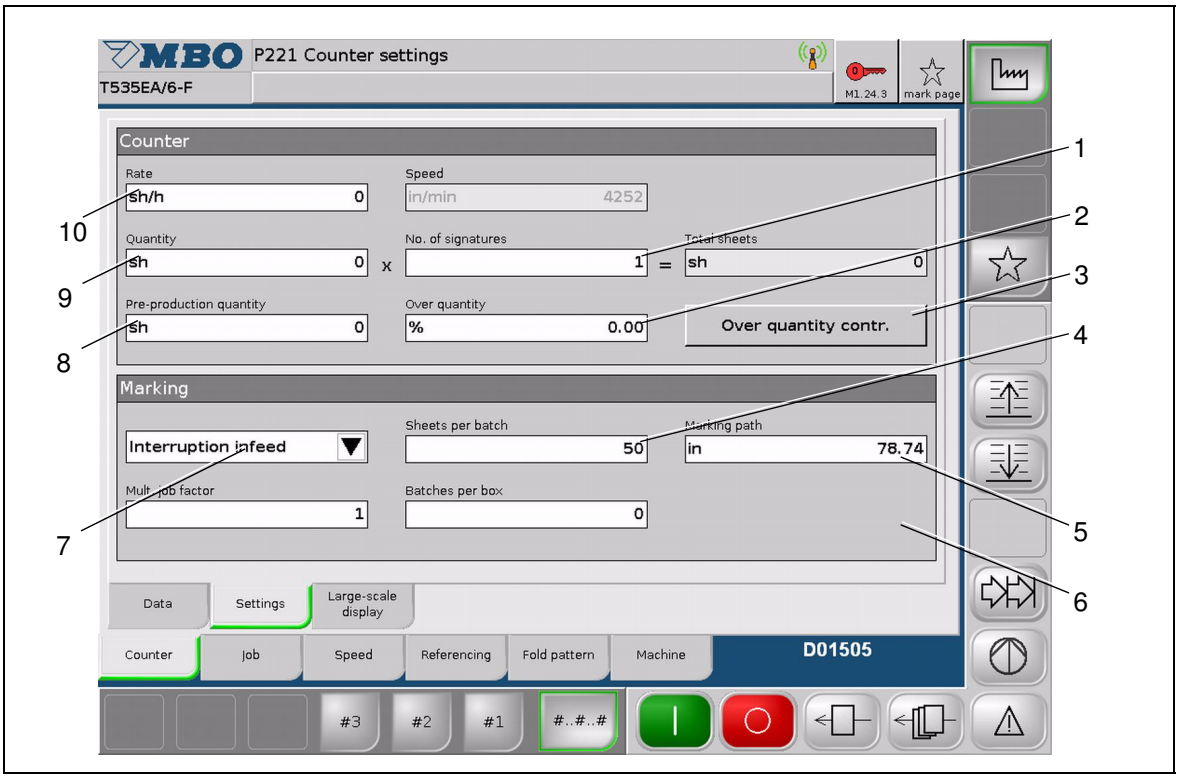


Figure 71: Counter settings

The Counter settings menu is used to configure the default counter settings.

Procedure:

▷ Enter the desired production speed (10).
▷ Enter the quantity (9).
▷ Enter the number of signatures (1).
  If you enter a number greater than 1, the job data are displayed in the <Counter data> menu.
▷ Enter the desired pre-production quantity (8).
▷ Enter the desired over quantity in percent (2).
▷ If desired, enable the over quantity control (3).
  The <Over quantity contr.> button (3) turns green.
▷ Select the desired marking (7) by double-clicking.
▷ Enter the multiple job factor (4).
▷ Enter the desired number of sheets per batch (5).
▷ Enter the desired number of batches per box (6).

7.4.4 Adjusting the large-scale display

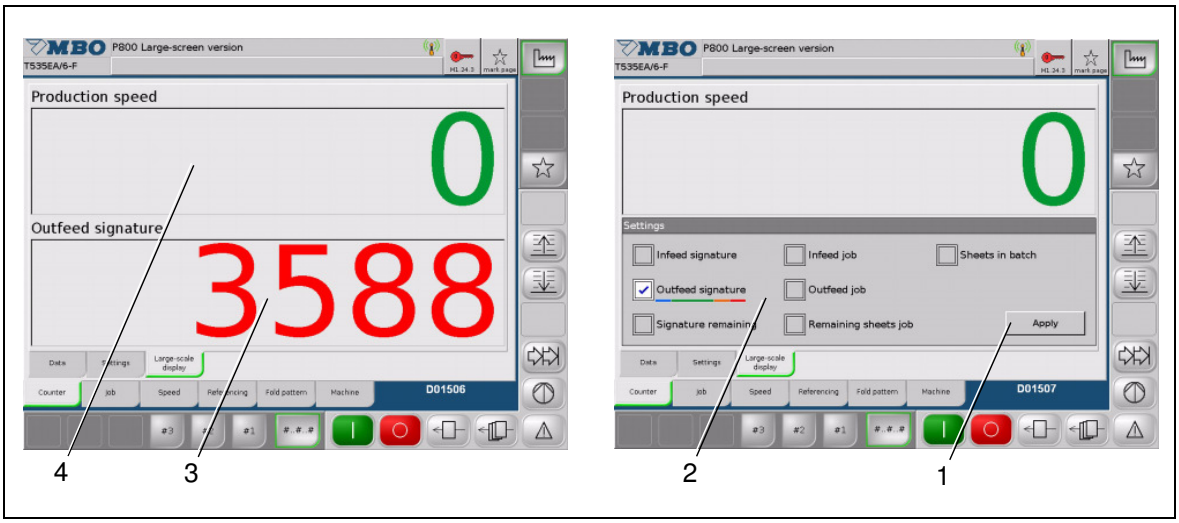


Figure 72: Adjusting the large-scale display

In the <Large-scale display> menu, the top display field (4) always displays the production speed and the lower display field (3) shows a selectable counter.

Selecting the counter:

Procedure:

▷ Click the bottom display field (3).
A selection field opens.
▷ Select the desired counter (2).
▷ Press the Apply button (1).
The selection field is closed.
The selected counter is shown in the display field (3).

If the <Outfeed signature> counter is selected, the color of the display changes according to the status of the activated over quantity control. See Chapter "7.4.3 Counter settings".

- Blue until pre-production quantity is reached.
- Green until quantity is reached.
- Orange until over quantity is reached.
- Red after over quantity is reached.

7.4.5 Job

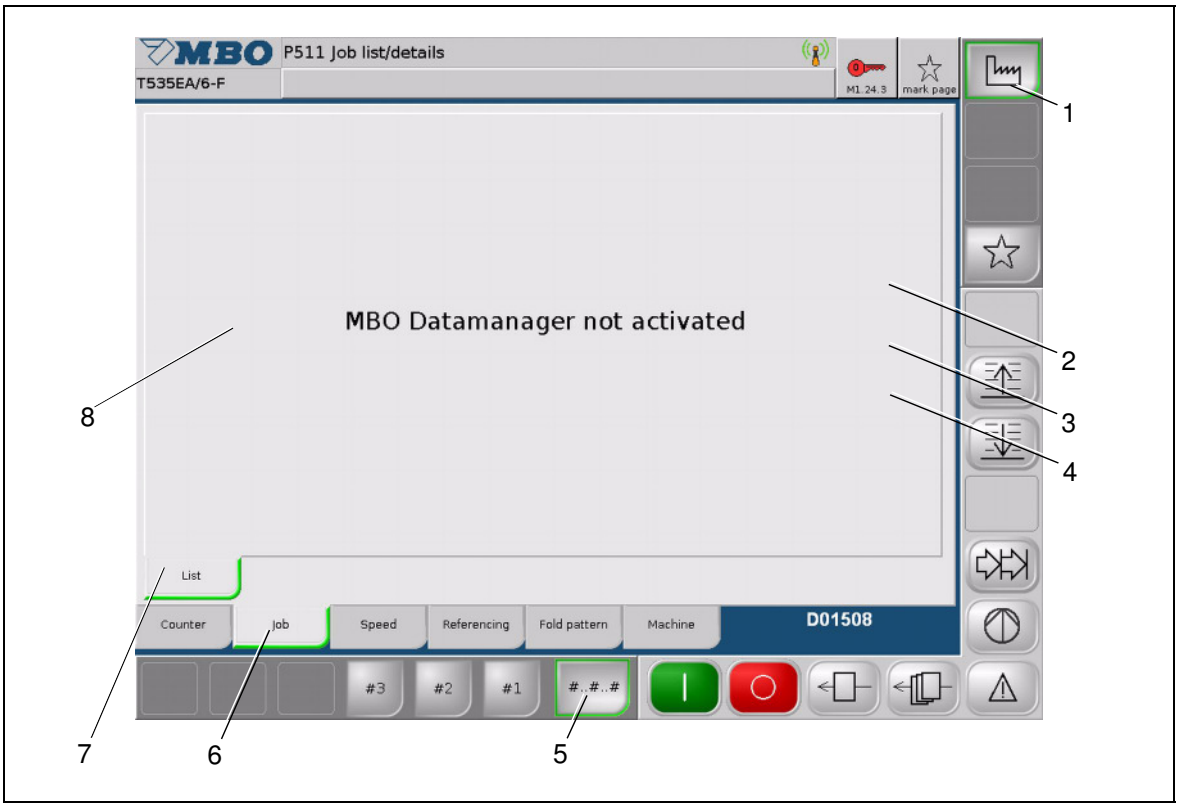


Figure 73: Job

In the <Job list/details> menu, in conjunction with the MBO-DATAMANAGER (optional), you can load prepared or stored jobs.

Procedure:

▷ Press the <Production> button (1).
▷ In the <Machine configuration> selection bar, press the <Network> button (5).
▷ In the <Functional group> selection bar, press the <Job> button (6).
If no MBO-DATAMANAGER is connected, the message <MBO DATAMANAGER not activated> appears.
For the functioning description, refer to the separate operating manual for the <MBO-DATAMANAGER>.

7.4.6 Calibrating

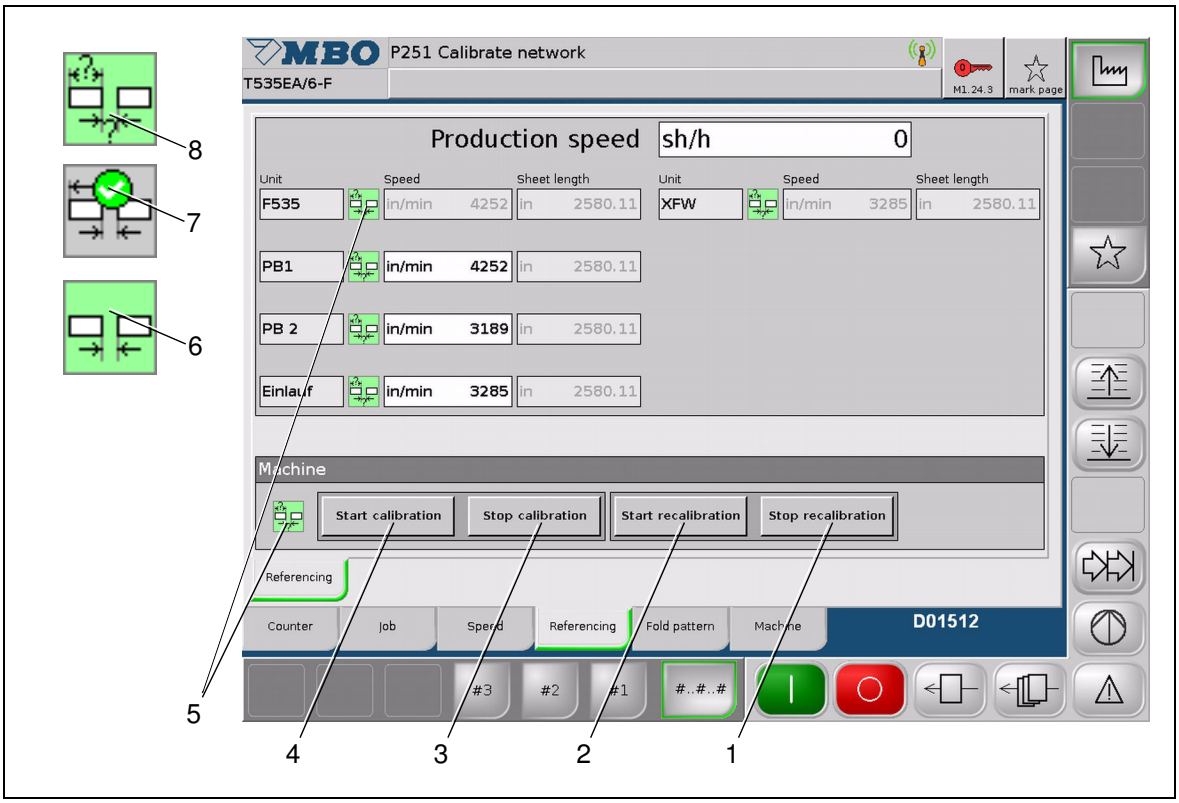


Figure 74: Calibrate network

In the <Calibrate network> menu, you can carry out various calibration functions manually.

During the calibration process, the following parameters are measured and optimized:

- Sheet length
- Optimal suction length
- Minimal sheet gap
- Speed of all folding units in the combination
- Sheet monitoring of all folding units in the network (optional)

These newly-determined parameters can be changed manually if desired.

See Chapter "7.4.7 Changing sheet infeed data."

Start calibration (4): Pressing the <Start calibration> button (4) activates the calibration process for the sheet feed data and the sheet monitoring.
The symbols (5) change from <calibrated> (7) to <Calibrate> (8).

The "Calibrate" process is ended automatically after the first sheet passes through all photo cells of the completely-adjusted VARIO network.
The symbols (5) change from <Calibrate> (8) to <calibrated> (7).

Stop calibration (3): No function:

Start recalibration (2): During <Recalibration> (2), only the values for the sheet monitoring are remeasured.
Manually changed sheet feed parameters remain intact.
The symbols (5) change from <calibrated> (7) to <Recalibration> (6).

Stop recalibration (1): No function:

7.4.7 Changing sheet infeed data.

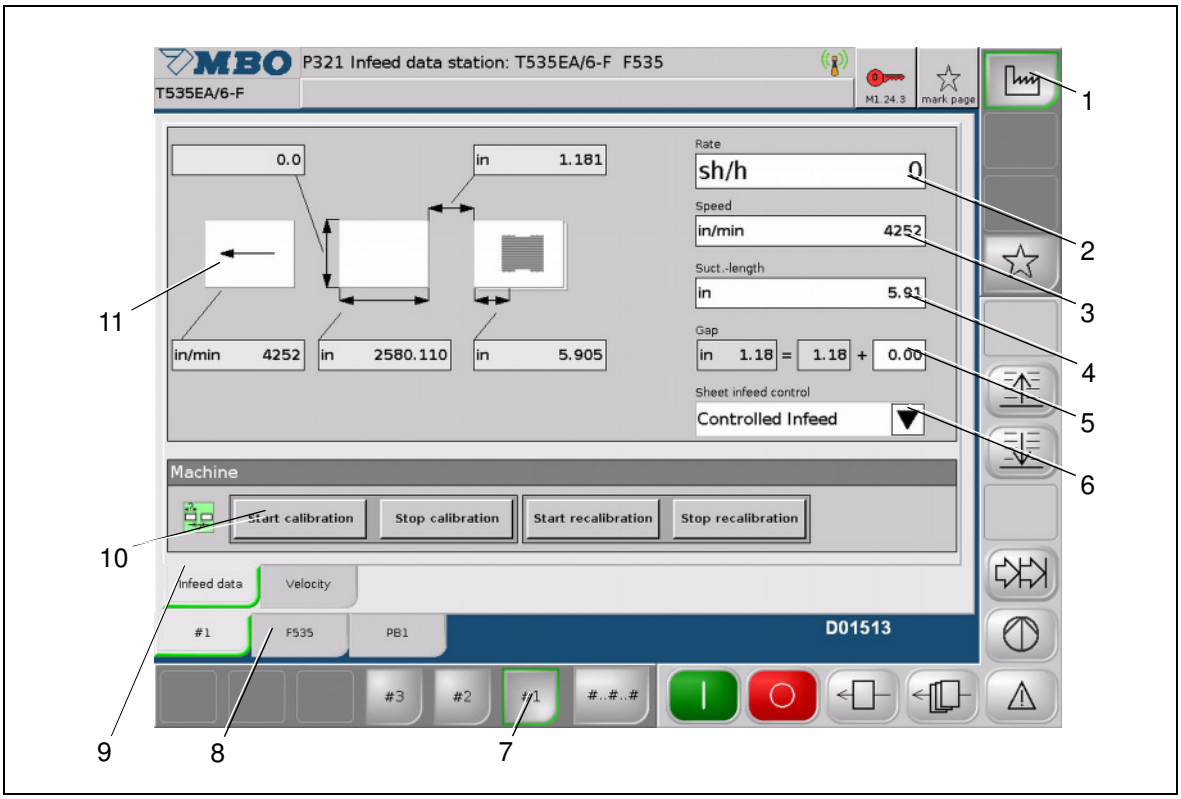


Figure 75: Changing sheet infeed data.

Procedure:

▷ Press the <Production> button (1).
▷ In the <Machine configuration> selection bar, press the <Unit 1> button (7).
▷ In the <Functional group> selection bar, press the <F535> button (8).
▷ In the <Functional menus> selection bar, press the <Infeed data> button (9).
The <Infeed data> menu is displayed.

Procedure for changes:

▷ Press the corresponding display field.
A numeric input field appears.
You can enter the new values there.

Rate (2):
- Displays the specified or calculated sheet rate per hour.
- Can be increased and decreased.
This causes a change in the speed of the network.

Speed (3):
- Shows specified speed of the machine.
Can only be increased.
The sheet gap is increased.
The production speed is not changed.

Suction length (4):
- Is calculated automatically during <Calibrate> (approximately 1/3 of the sheet length).
- Can be increased and decreased.

Sheet gap (5):
- Is calculated automatically.
- Depends on the sheet format and type of fold.
- Can only be increased (after calibration).
  The speed is not changed this way.
  The production speed is reduced.

Sheet feed control (6):

Selection window for the desired type of sheet infeed control.
- Default setting is <Automatic>.
- Cycle
- None

<Calibrate> button group (10):
- A <Calibration> and a <Recalibration> can be carried out.
  See Chapter "7.4.6 Calibrating".

7.4.8 Changing the production speed

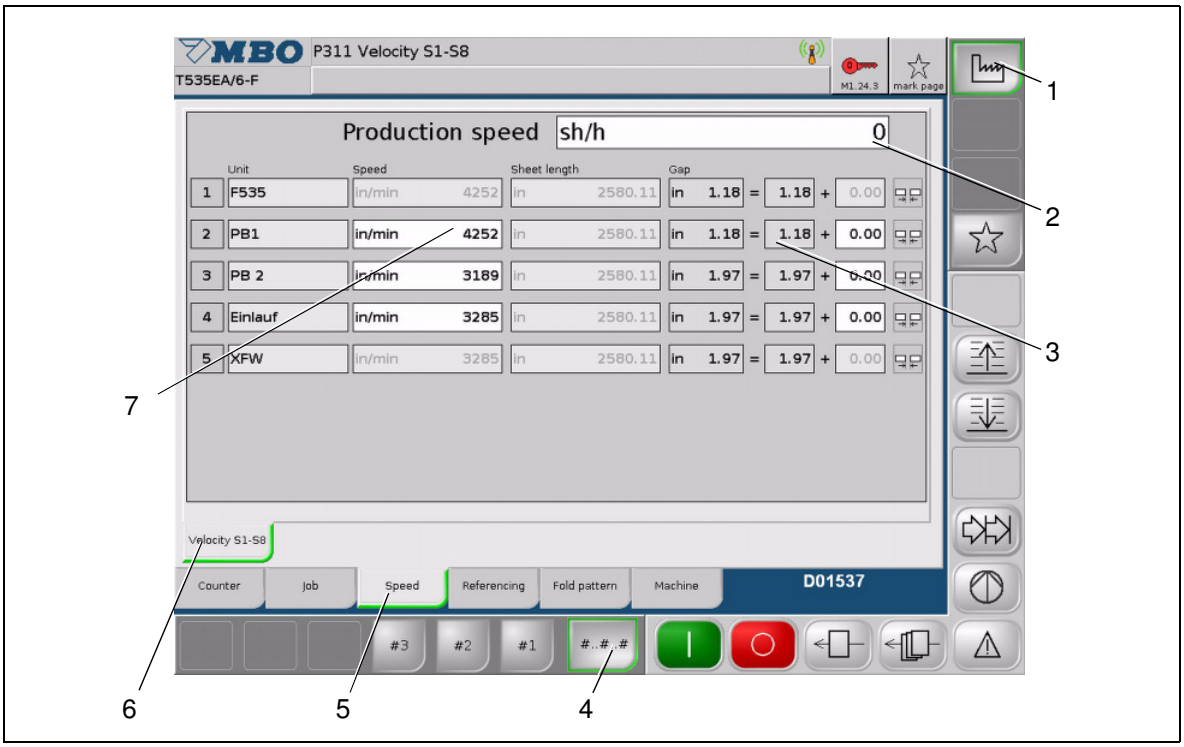


Figure 76: Speed

In the <Speed> menu, you can change the production speed for the entire machine configuration, the local speed and the local sheet gap.
The default values (set point values) are displayed.

The current values are displayed in the <Network> menu. See Chapter "7.4.9 Displaying machine configuration".

Production speed: A change of the production speed (2) causes a change in the speed of the entire machine configuration.
The sheet gap remains the same.

Speed: A change of the speed (7) causes a local change in speed, i. e. the sheet gap changes locally.
The production speed remains the same.

Sheet gap: **Feeder:**

A change of the sheet gap (3) on the feeder causes a change of the production speed.
The speed of the feeder remains the same.

Subsequent folding units

A change of the sheet gap (3) on subsequent folding units causes a local change in speed.
The production speed remains the same.

Procedure for changes:

▷ Press the corresponding display field.
The numeric input field appears.

▷ Enter the new value.

If the values entered are too small, these are corrected automatically when the <Enter> button is pressed and accepted when the <Enter> button is pressed again.

7.4.9 Displaying machine configuration

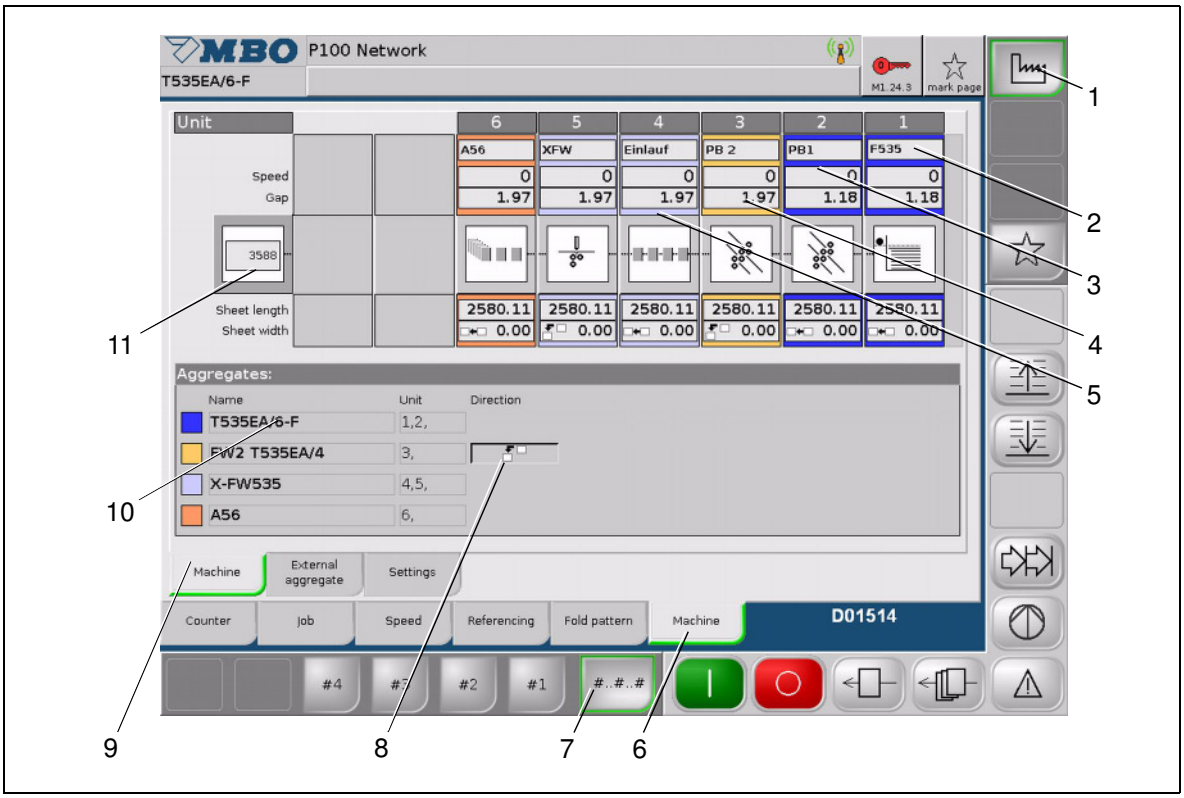


Figure 77: Displaying network

Intelligent units with Powerlink, e. g. folding unit II (PB2), are automatically detected in the network and assigned to the correct position when coupled/ uncoupled.

Procedure:

▷ Press the <Production> button (1).

▷ In the <Machine configuration> selection bar, press the <Machine configuration> button (7).

▷ In the <Functional group> selection bar, press the <Network> button (6).

▷ In the <Functional menus> selection bar, press the <Network> button (9).
The <Network> menu is displayed.
It shows the units in the network, specifying the most important folding data.

- T535EA/6-F consists of
  Unit 1 = F535 = Feeder
  Unit 2 = PB1 = Folding unit 1 = Parallel unit
- FW2 T535EA/4 consists of
  Unit 3 = PB2 = Folding unit 2 = 8 page unit
- X-FW535 consists of
  Unit 4 = Infeed
  Unit 5 = 16 page unit
- A56 consists of
  Unit 6 = A56 = Delivery (CAN unit).

Display/ specification of the sheet running (8):

For certain folding impositions and suitable units, the sheet running/direction can be changed.

- 90° across a corner (default)
- In line with folding unit I

Procedure:

▷ Change the direction by pressing the <Direction> button (8).
The selected direction is shown in the button.
Depending on this, the sheet feed data and the selection of folding impositions change.

7.4.10 Selecting the CAN unit

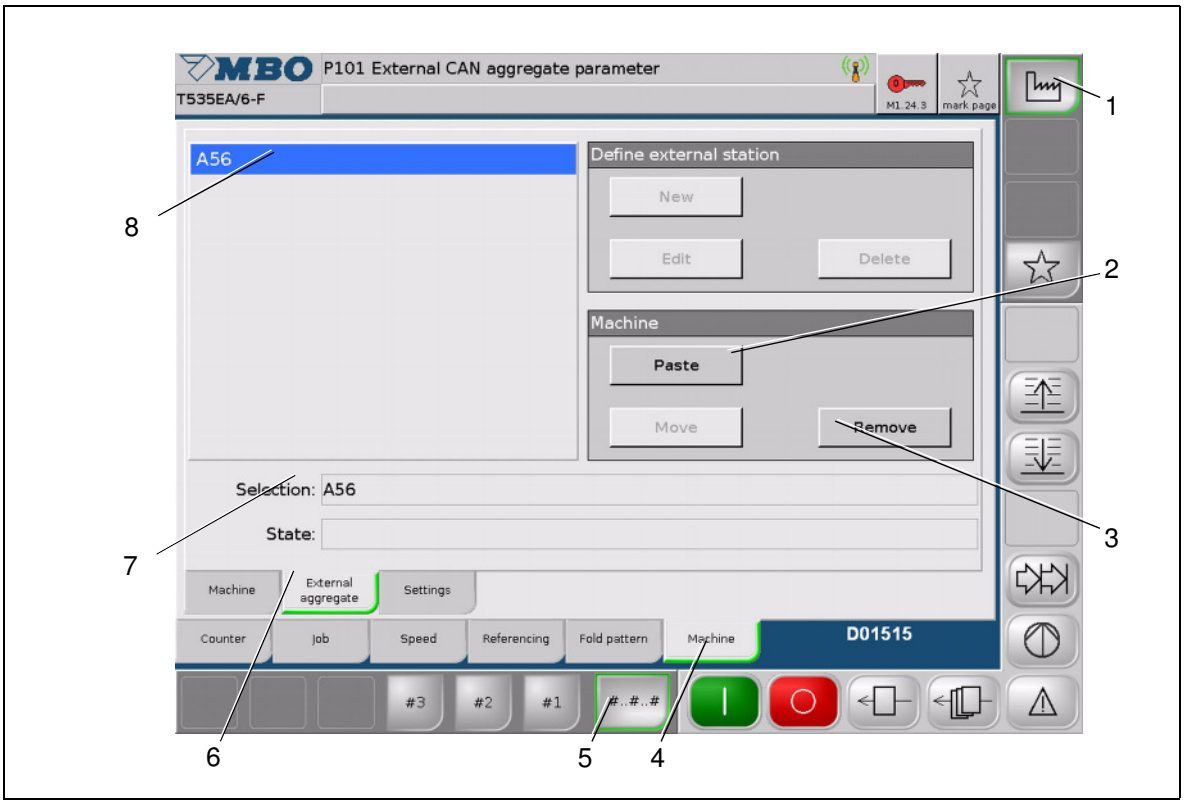


Figure 78: Changing sheet infeed data.

CAN units must be assigned manually to the network in the correct position or removed from the network, e.g. Delivery A56.

▷ Press the <Production> button (1).
▷ In the <Machine configuration> selection bar, press the <Machine configuration> button (5).
▷ In the <Functional group> selection bar, press the <Network> button (4).
▷ In the <Functional menus> selection bar, press the <CAN unit> button (6).
The <CAN unit parameters> menu is displayed.

Adding a CAN unit:

Procedure:
▷ Select the corresponding CAN unit in the selection list (8).
▷ Press the <Paste> button (2).
▷ Select the paste position.
▷ Press the <Paste> button.
The selected CAN unit is pasted into the network.

Removing a CAN unit:

Procedure:
▷ Select the corresponding CAN unit in the selection list (8).
▷ Press the <Remove> button (3).
The selected CAN unit is removed from the network.

7.4.10.1 Creating new CAN units

New CAN units can be created by MBO Service or by an authorized customer service agent only.

7.4.11 Inching mode

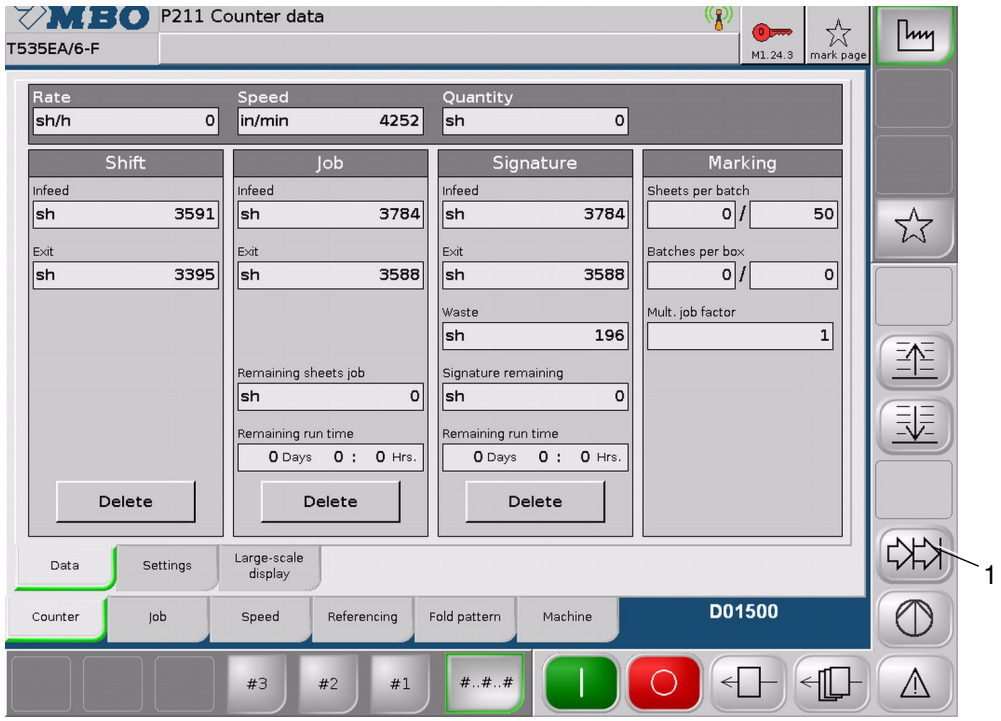


Figure 79: Inching mode

In inching mode, the machine can be operated at a reduced speed (50 m/min). However, no error messages may be pending.

Procedure:

▷ Press the <Inching> button (1).
The machine rotates at a reduced speed (50 m/min).

- If quality control is deactivated, all units in the machine network rotate.
- If quality control is activated, only the units not included in the quality control rotate.

7.4.12 Quality control

Figure 80: Quality control

The <Quality control> function is used to safely remove sheets for inspection. For this purpose, subsequent folding units can be stopped specifically.

The <Quality control> is always switched on locally on the folding unit on which the sheets are to be withdrawn.
The only exception is folding unit I.
If the <Quality control> is switched on there, folding unit II does not move.

Procedure:

Switching on:

▷ Press the <Quality control> button (1).
The information field (5) shows the blue information message <324 FW2 T535EA PB2 Quality control active>.
▷ Start the machine (4).
Folding unit I runs, while folding unit II stops.
▷ Start the folding sheet infeed as single sheets (3)/production (4).

Switching off:

▷ Press the <Quality control> button (1) once again.
The blue information message lights up in the information field (5).

7.5 Adjusting the feeder

See separate operating manual for the feeder.

7.5.1 Displaying the calculated configuration values for the feeder

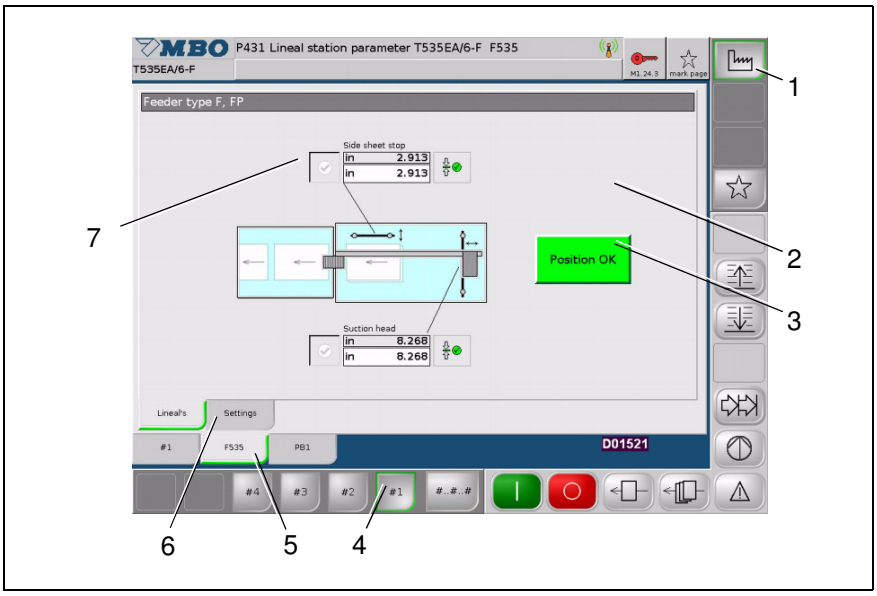


Figure 81: Displaying the calculated configuration values for the feeder

When a new folding imposition has been calculated, the setting values for the side stop (7) and the feeder head (2) are displayed in the <Rail parameters> menu.

Procedure:

▷ Press the <Production> button (1).
▷ In the <Machine configuration> selection bar, press the <Unit 1> button (4).
▷ In the <Functional group> selection bar, press the <F535> button (5).
▷ In the <Functional menus> selection bar, press the <Rails> button (6). The <Rail parameters> menu is displayed.
▷ Set the side stop according to the specified value (7).
▷ Set the feeder head according to the specified value (2).

7.6 Adjusting the suction wheel

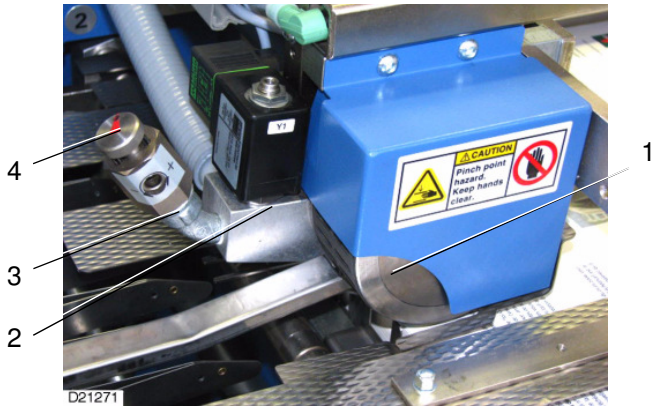
The suction wheel transports the sheets onto the register table.

CAUTION!

Danger due to pinch point.

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

Never reach below the suction wheel while the machine is running.



1	Suction wheel	3	Adjustment handle
2	Valve plate	4	Knurled screw

Figure 82: Suction wheel

Adjusting the suction power:

The suction power (vacuum)has to be adjusted depending on the properties of the paper to be processed.

Procedure:

▷ The suction power 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 power:

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

Increasing the suction power:

- For heavy papers.
- Bei schweren Papieren

Adjusting the point of suction:

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

Procedure:

For straight paper:

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

Paper with a downcurl on the lead edge:

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

Paper with a upcurl on the lead edge:

▷ Push the adjustment handle (3) downwards.This shifts the point of suction in the direction of the feeder.

7.7 Adusting the register table

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

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.

1 Tape rollers

Figure 83: Hazard area of the register table

7.7.1 Displaying the calculated setting values

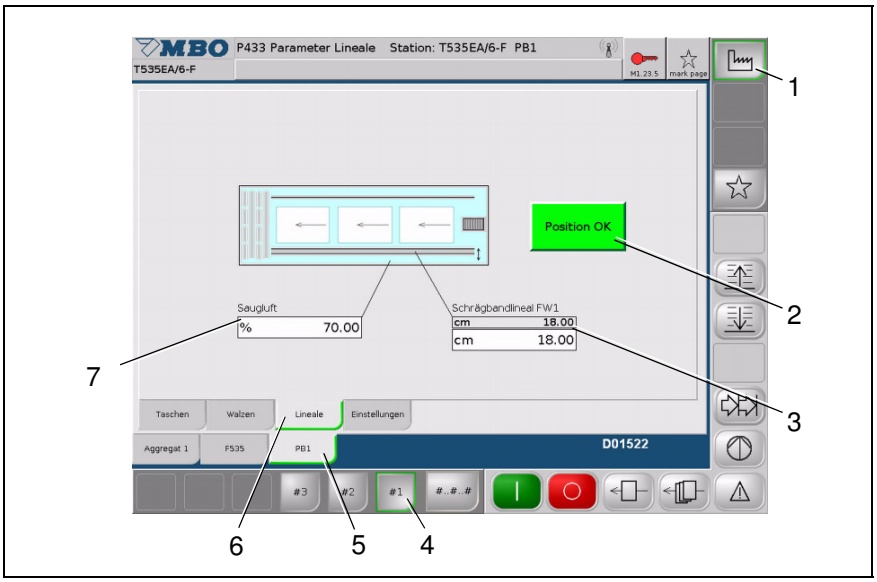


Figure 84: Displaying the calculated values

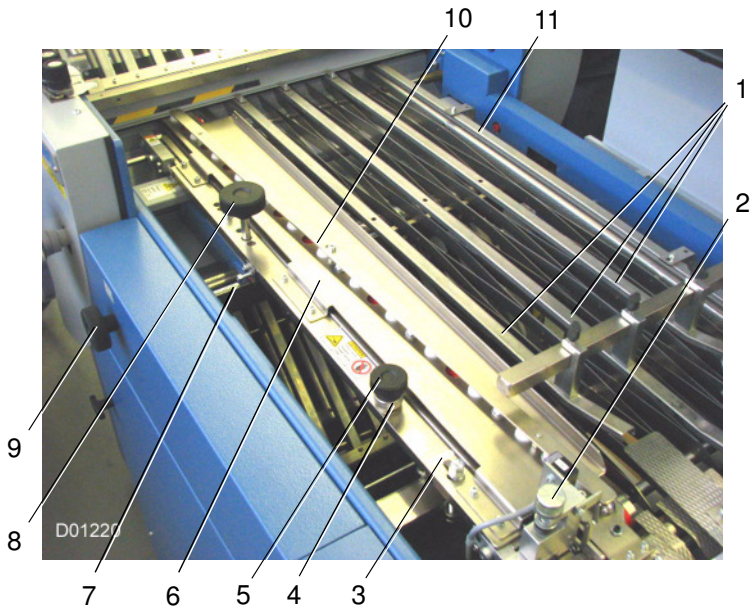
When a new folding imposition has been calculated, the setting values for the sidelay (3) are displayed in the <Rail parameters> menu.

Procedure:

▷ Press the <Production> button (1).
▷ In the <Machine configuration> selection bar, press the <Unit 1> button (4).
▷ In the <Functional group> selection bar, press the <PB1> button (5).
▷ In the <Functional menus> selection bar, press the <Rails> button (6). The <Rail parameters> menu is displayed.
▷ Set the sidelay according to the specified value (3).

The <Suction air> setting value (7) is required only for the version T535 PERFECTION with VIVAS.

7.7.2 Sheet size adjustments



1	Smoother bars	7	Scale
2	Double-sheet control	8	Knurled screw
3	Angle scale	9	Knurled screw
4	Eccentric	10	Marble rail
5	Knurled screw	11	Guide rail
6	Sidelay		

Figure 85: 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 (8) 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:

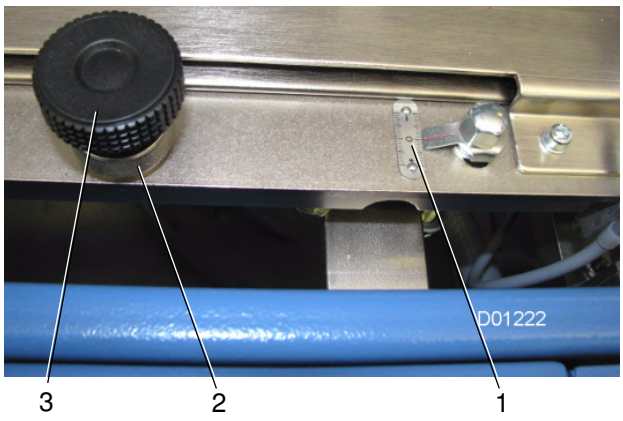
▷ Select the number of smoother bars (1) according to the paper format.

▷ 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).



1 Scale
2 Eccentric
3 Knurled screw

Figure 86: 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).

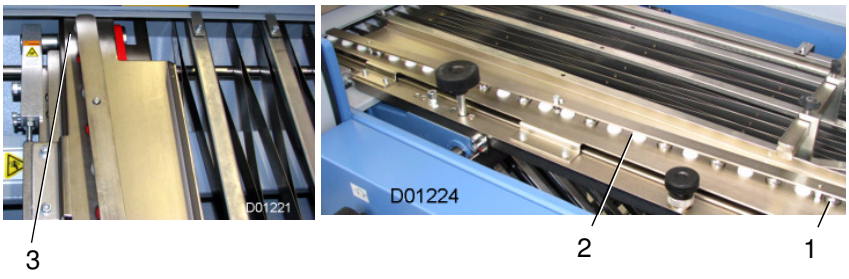
▷ Adjust the eccentric (2) using the scale (1) according to the tilt of the fold.

▷ Tighten the knurled screw (3).

▷ Check the fold.

▷ Correct if necessary.

7.7.3 Equipping the marble rail



1 First steel ball
2 Equipping the marble rail
3 Viewing window

Figure 87: 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.

7.7.4 Double-sheet control

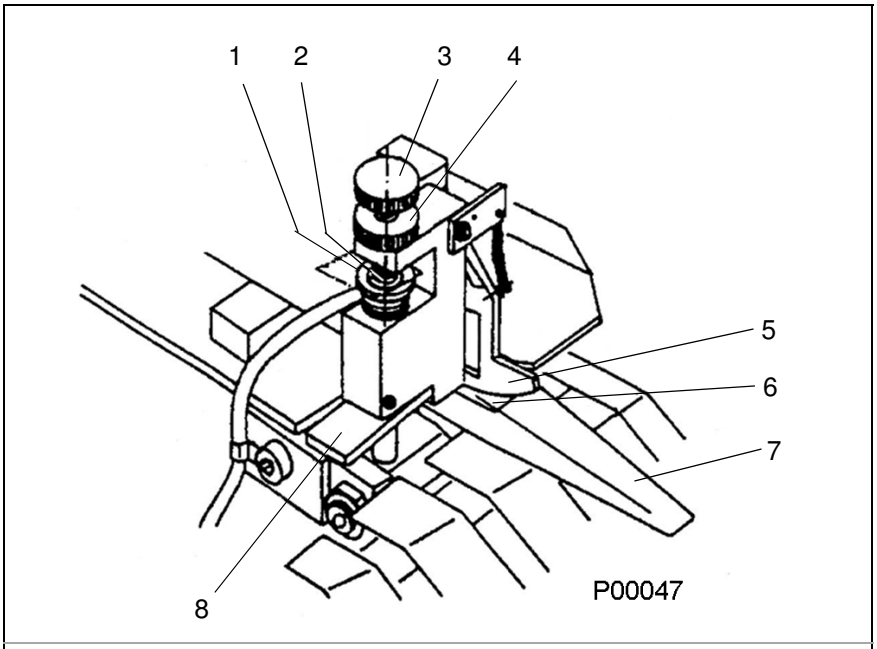
The double sheet detector works electromechanically and detects multiple paper sheets that stick to one another.

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.



1	Bolt	5	Switching segment
2	Gap	6	Transport roll
3	Knurled screw	7	Smoother bar
4	Lock nut	8	Lever

Figure 88: 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 single 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).

7.8 Adjusting the foldrollers/slitter shafts.

WARNUING!

Danger due to pulling out/removing the buckle plates.

The exposed, rotating foldrollers and slitter shafts make up hazardous infeed points.

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

- All adjustment or testing/inspection work may be carried out only when the machine is stopped and secured against switching on.
- Press the EMERGENCY STOP palm button.
- Always have the adjustment or testing/inspection work carried out by one individual person only.
- A crush hazard and hazard of injuries is also present when turning the machine using the safety handwheel.

The foldrollers take up the aligned sheet of paper from the register table. Using the slitter shafts, additional processing of the sheet can be carried out as it passes through.

7.8.1 Correcting the foldroller/slitter shaft adjustment

After the adjustment is corrected, the positioning takes place automatically when the machine is started..

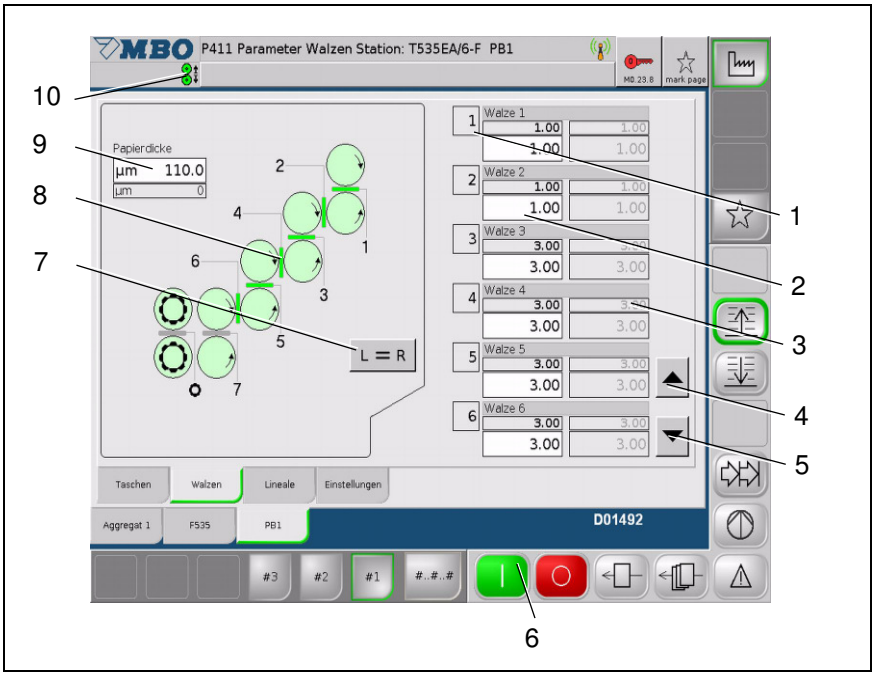


Figure 89: Correcting the adjustment of the foldrollers and slitter shafts

Procedure:

▷ Using the button (7), select whether both sides are to be changed symmetrically or the left and right side are to be changed separately.
▷ Scroll the display area (1) of the rollers upwards using button (4) or downwards using button (5).
▷ Press the display field (2) of the roller gap to be changed.
A numeric input field appears. You can enter changes in values of 1/100 paper thickness.
▷ Start the machine by pressing the button (6).
The positioning to the new values takes place automatically when the machine is running.
This is indicated by the flashing gray roller gap in the roller diagram (8) and the flashing green symbol (10).

<Paper thickness> input field (9):

If the paper thickness changes during a job/signature, the foldroller adjustment can be adapted for multiple folding units.

Procedure:

▷ Measure the paper thickness.
See Chapter "7.3.3 Measuring the paper thickness"
▷ Press the input field (9).
▷ Enter the measured value.

7.9 Adjusting the buckle plates

WARNUING!

Danger due to pulling out/removing the buckle plates.

The exposed, rotating foldrollers and slitter shafts make up hazardous infeed points.

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

- All adjustment or testing/inspection work may be carried out only when the machine is stopped and secured against switching on.
- Press the EMERGENCY STOP palm button.
- Always have the adjustment or testing/inspection work carried out by one individual person only.
- A crush hazard and hazard of injuries is also present when turning the machine using the safety handwheel.

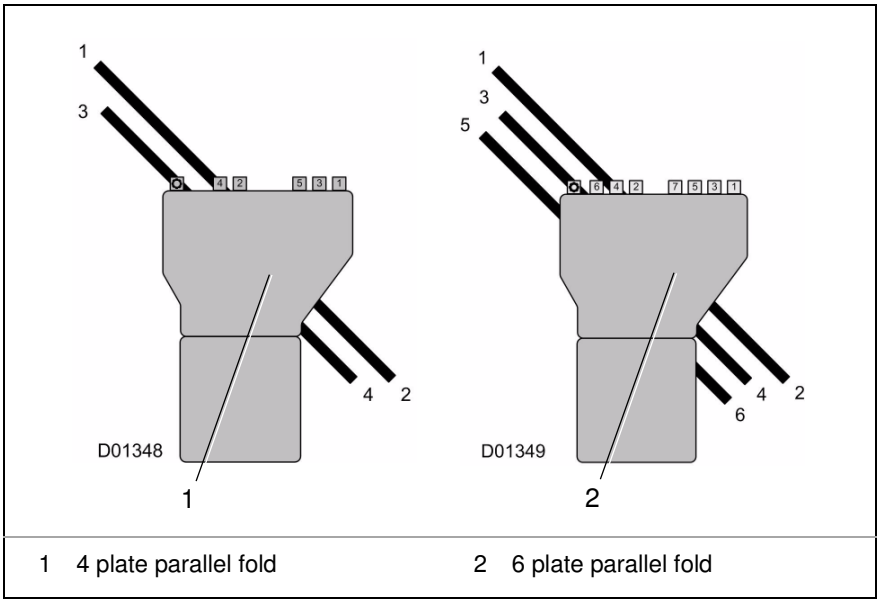
CAUTION!

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.

7.9.1 Buckle plate positions



1 4 plate parallel fold

2 6 plate parallel fold

Figure 90: Buckle plate positions

The upper buckle plates have an uneven numbering.
The lower buckle plates have an even numbering.

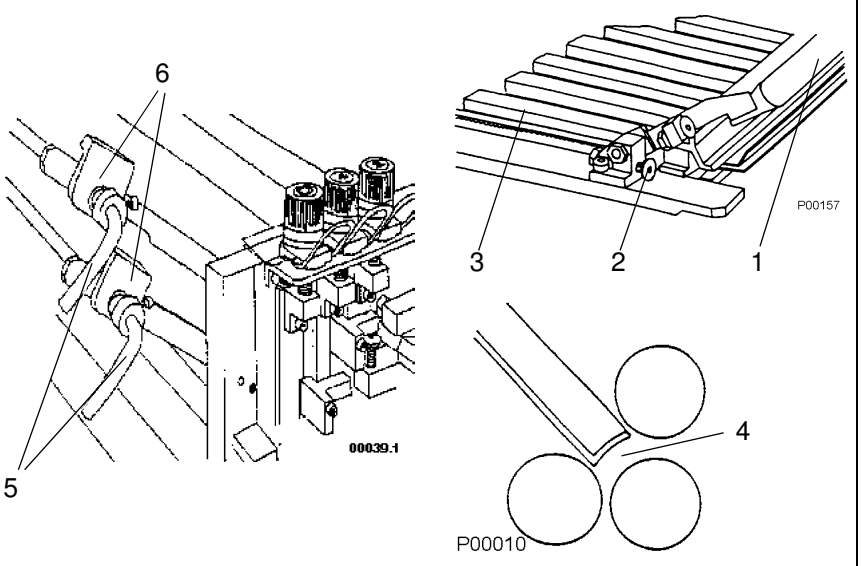
7.9.2 Buckle plate 1 (FTA3D)

The first buckle plate in Folding unit 1 is equipped with a swing deflector and a continuous sheet stop.
See Chapter "7.9.4 Sheet deflector function of buckle plate FTA3D".

7.9.3 Buckle plates 2 to 4 (6) (FTA3)

Buckle plates 2 to 4 (6) are designed as combination buckle plates FTA3.
See Chapter "7.9.5 Sheet deflector function of buckle plate FTA3".

7.9.4 Sheet deflector function of buckle plate FTA3D



1	Sheet deflector	4	Buckling area
2	Stop screw	5	Clamping lever
3	Buckle plate	6	Clamping element

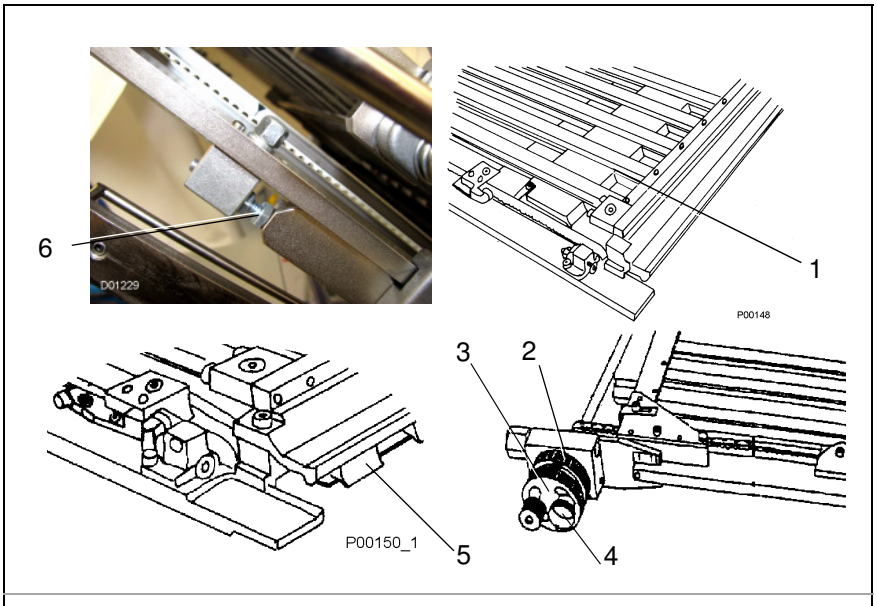
Figure 91: Sheet deflector

Sheet deflector function:

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

- ▷ Release the clamping lever (5) by turning counterclockwise.
- ▷ Retract the unneeded buckle plate (3) by approx. 25 cm (9.843 in.).
- ▷ Turn 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.

7.9.5 Sheet deflector function of buckle plate FTA3



1	Sheet stop	4	Knurled screw (metal)
2	Rear adjusting disk	5	Sheet deflector position
3	Front adjusting disk	6	Stop screw

Figure 92: 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).

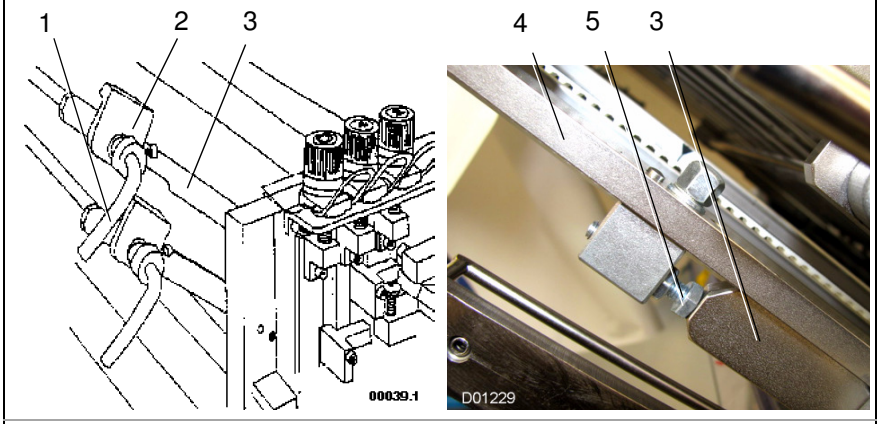
7.9.6 Inserting/removing buckle plates

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.



1 Clamping lever
2 Clamping element
3 Buckle rail
4 Buckle plate
5 Stop screws

Figure 93: Inserting buckle plate 1

Procedure:

Installation:

▷ 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.
▷ Connect the connecting lines to the buckle plate motors.

Removal:

▷ Remove the buckle plates in the opposite sequence.

7.9.7 Changing calculated folding lengths manually

The folding lengths of the buckle plates are calculated automatically when selecting a new folding imposition.
See Chapter "7.3.2 Adjusting the folding imposition".

CAUTION!

Danger due to automated format change.

Non-observance may possibly cause serious personal injuries.

When starting the automated format change, observe the following precautions:

- Do not reach into the machine.
- Make absolutely sure that there are no other people on the machine.

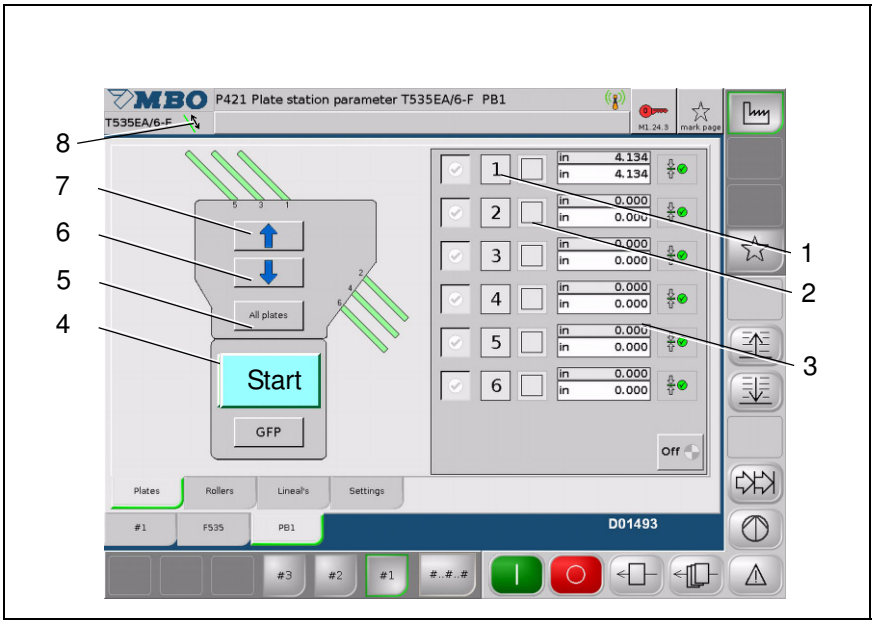


Figure 94: Changing calculated folding lengths manually

Depending on the speed, inner width adjustment and the characteristics of the paper, the folding results can deviate from the calculated values.

For this reason, the folding lengths can be adapted manually.

Procedure:

Selecting the buckle plate to be changed:

▷ Select a buckle plate in field (2) or use button (5) to select all buckle plates for a correction.

Reducing the set value:

▷ Press the button (6). Each time you press the button (6), the value in field (3) is decreased by 0.1 mm (0.003 in.).

Increasing the set value:

▷ Press the button (7). Each time you press the button (7), the value in field (3) is increased by 0.1 mm (0.003 in.).

Large changes: ▷ Press the field (3). A numeric input field appears. Here you can make larger changes.

Reposition sheet stops: ▷ Press the <Start> button (4).
The sheet stops are positioned to the modified values.
During the plate adjustment process, the symbol (4) flashes.

The various states of the push button (4) have the following meanings:

- The button is blue and labeled with <Start>.
  Starts the positioning.
- The button is red and labeled with <Stop>.
  The positioning can be canceled.
- The button is yellow and labeled with <Homing>.
  Starts the reference run (homing) for the selected buckle plates.
  See Chapter "7.9.8 Reference run of the buckle plates".
- The button is green and labeled with <Position OK>.
  The positioning is finished..

7.9.8 Reference run of the buckle plates

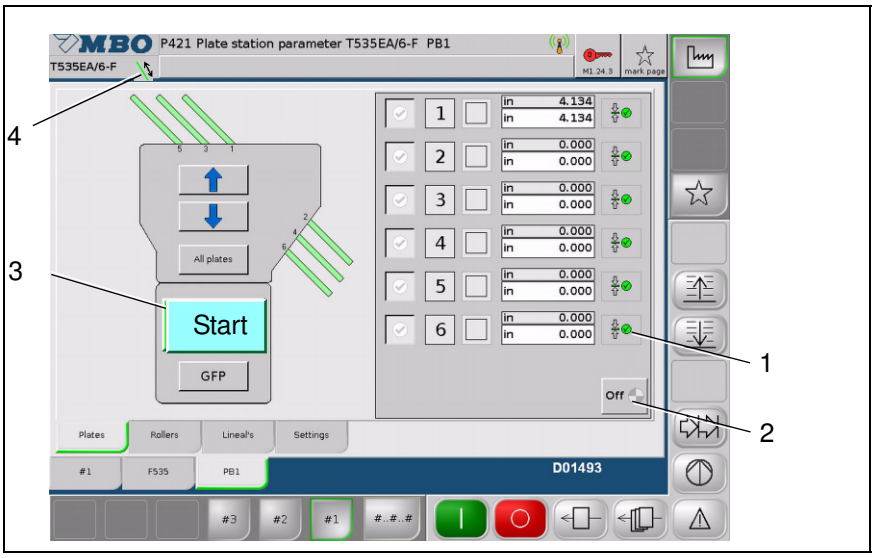


Figure 95: Changing the folding length manually

If a buckle plate has been adjusted manually on the adjusting wheel of the sheet stop, e.g. when the machine is de-energized, the actual sheet stop position no longer matches the configured value.

A new reference run of the sheet stop must be carried out.

Procedure:

▷ Press the button (2).
The text on the button changes from <off> to <on> and the button fields (1) of all plates are enabled.
▷ Press the button field (1) of the corresponding plate or select multiple plates.
Button (3) flashes yellow and the text <Homing> appears.
▷ Press the <Homing> button (3).
The sheet stops of the selected plates move automatically to the respective upper end position.
During the plate adjustment process, the symbol (4) flashes.
The sheet stops are positioned.
▷ When all sheet stops have reached the upper end position, button (3) turns blue and the <Start> text appears.
▷ Press the button (3).
The sheet stops retract to the displayed value.
During the plate adjustment process, the symbol (4) flashes.
▷ Call up a single sheet and check the fold.
Correct it if necessary.

7.9.9 Adjusting the sheet stop angle:

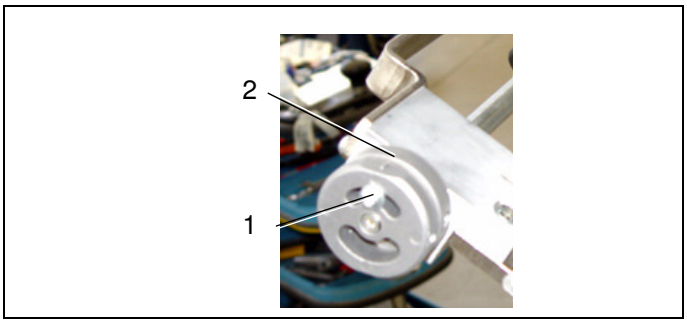


Figure 96: Modification of the sheet stop angle

Adjusting the angle:

By setting the sheet stop angle, it is possible to process some sheets which are not in a right angle (cut square).

Procedure:

▷ Loosen the screw (1).

▷ By turning the rear adjusting wheel (2), only the sheet stop on the operator side is moved.

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.

▷ The markings on the adjusting wheels provide a reference point for how far the adjustment was.

▷ Tighten the screw (1).

Angle basic setting:

Procedure:

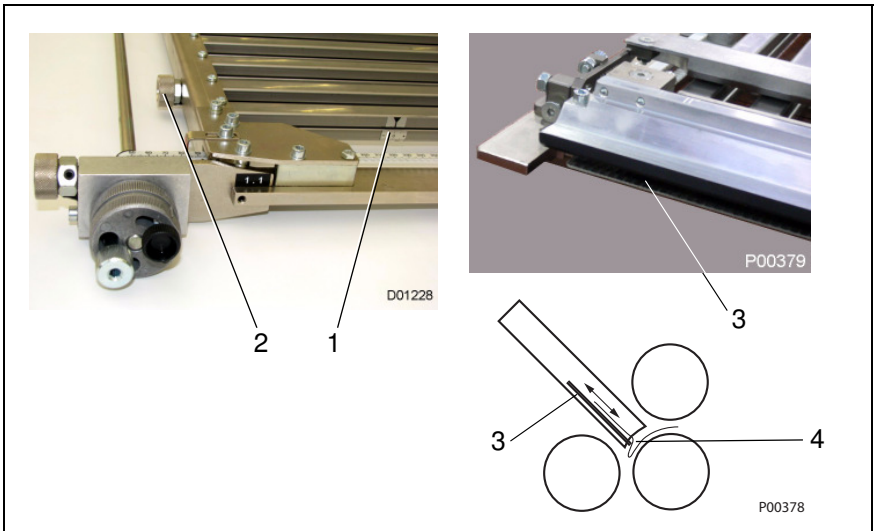
▷ Loosen the screw (1).

▷ Turn the rear adjusting wheel (2) so that the markings on the two adjusting wheels are aligned with one another.

▷ Tighten the screw (1).

Depending on the print mark, it may be necessary to change the angle of the alignment sidelay.

7.9.10 Adjusting the lower plate lip



1 Scale	3 Bottom plate lip
2 Knurled screw	4 Buckling area

Figure 97: 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).

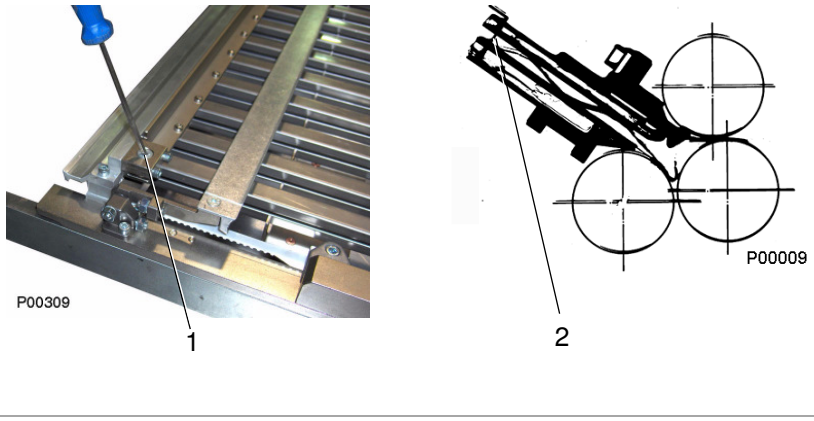
Basic setting:

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.

7.9.11 Setting of the inner width



1 Screw	2 "Inner width"

Figure 98: 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:

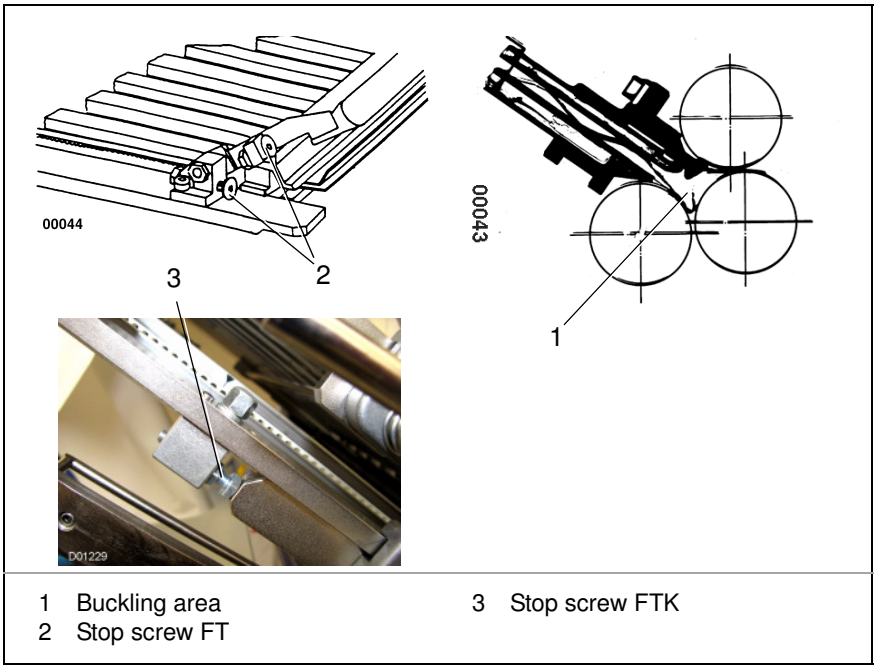
▷ The adjustment must be made on both sides equally.
▷ Turn both screws (1).

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.

7.9.12 Enlarging the buckling area



1 Buckling area
2 Stop screw FT
3 Stop screw FTK

Figure 99: Enlarging buckling area.

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

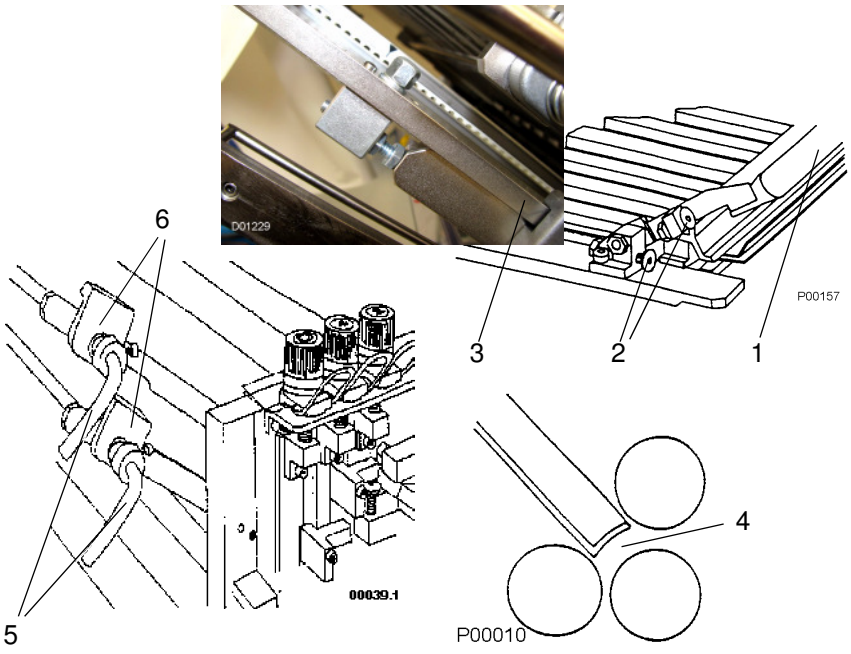
The adjustment of the stop screw (2 + 3) must never be changed.

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.

7.9.13 Enlarging the deflecting area



1	Sheet deflector	4	Deflecting area/buckling area
2	Stop screw	5	Clamping lever
3	Buckle plate	6	Clamping element

Figure 100: 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.

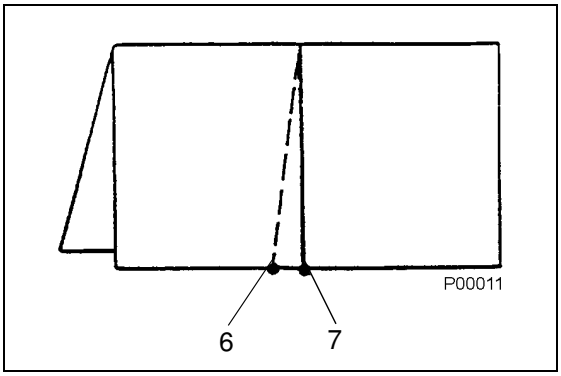


Figure 101: Correcting skewed perforations

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, distribute the setting across 2 sheet deflectors.

7.10 Placing the knives on the slitter shafts

WARNING!

Danger due to rotating knives and slitter shafts.

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

- Never reach into the slitter shafts while the machine is running
- 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.

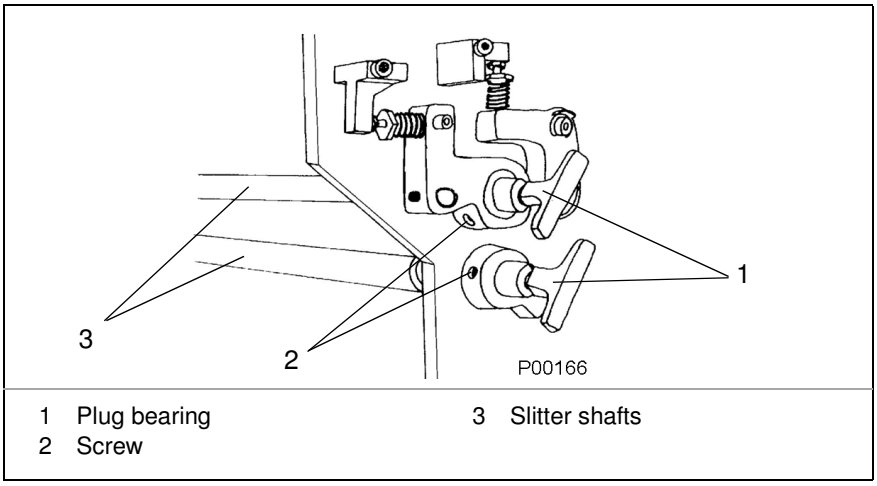
CAUTION!

Danger from incorrect mounting of the knife holder.

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

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

7.10.1 Single rear slitter shafts (standard)



1	Plug bearing	3	Slitter shafts
2	Screw		

Figure 102: Set 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).

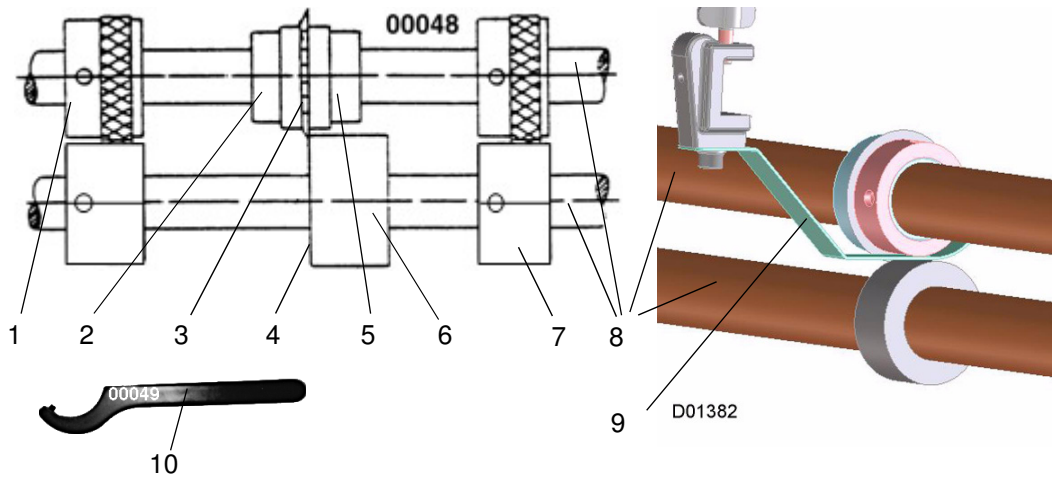
Installing the slitter shafts:

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 crossfolds 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.



1	Transport roller, rubberized	6	Counter knife
2	Nut	7	Transport roll
3	Perforating knife	8	Slitter shaft
4	Counter-knife edge of the counter knife	9	Stripper
5	Knife holder	10	Pin wrench

Figure 103: 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.

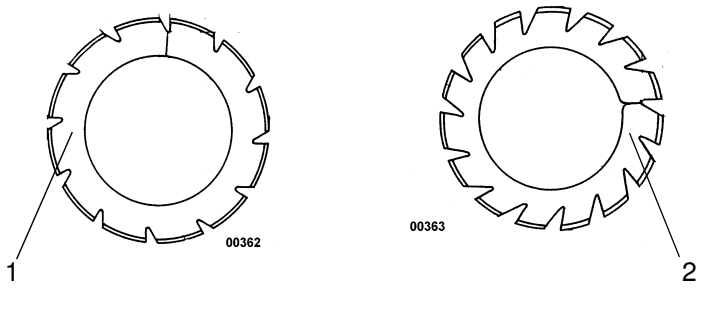
▷ Insert the stripper (8).

▷ 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:

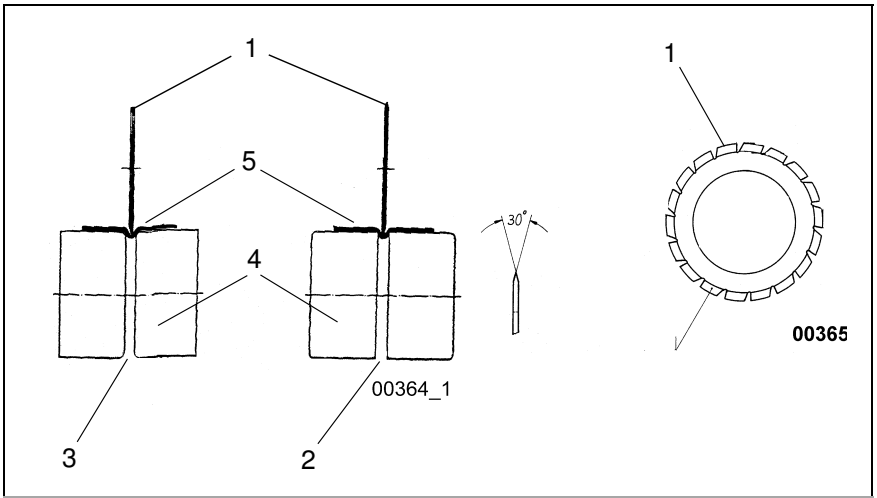


1 For Folding unit 1 and 3	2 For Folding unit 2

Figure 104: 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)



1 Perforating knife 2 Variety 1: Between cutting edges 3 Variety 2: between scoring edges	4 Cutting rollers 5 Sheets

Figure 105: V-shaped special perforating knives

V-shaped special perforating knifes 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 crossfold (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.

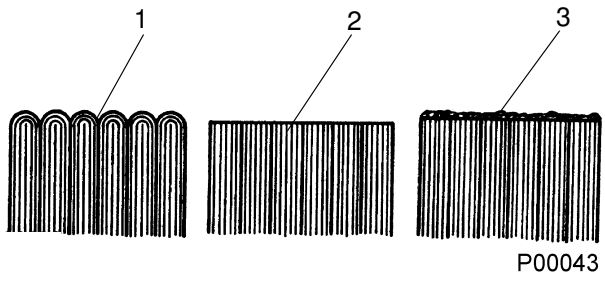
- Coordinate the gap and the mounting method to the product to be processed.
- Cutting and scoring edges must never touch the perforating knives.

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:

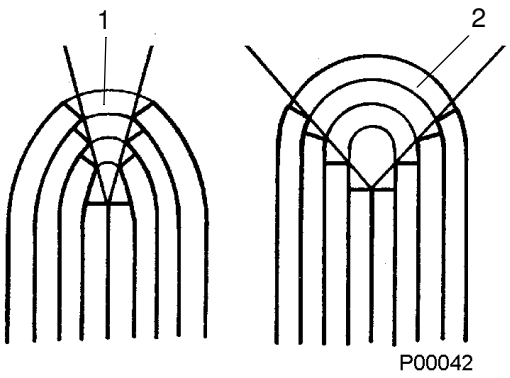


1 Gathered sheets
2 Sheets rounded off
3 Sheets with glue application

Figure 106: 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:



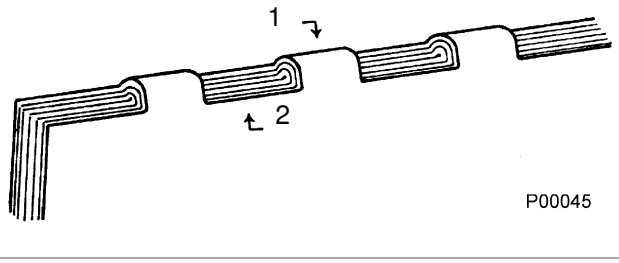
1 Notch binding process with cut perforation, small angle
2 Notch binding process with MBO punch perforation, larger angle

Table 19: 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.

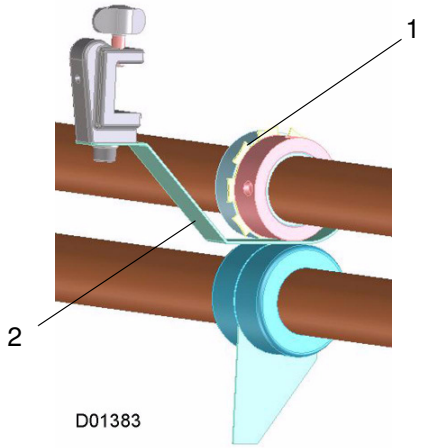


1	Connecting points	2	Punch perforation

Table 20: 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:



1	Punch perforation knife	2	Stripper

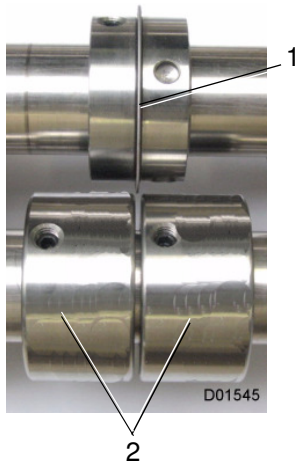
Figure 107: MBO punch perforating device

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.



1 Scoring knife
2 Transport rolls/counter-knives

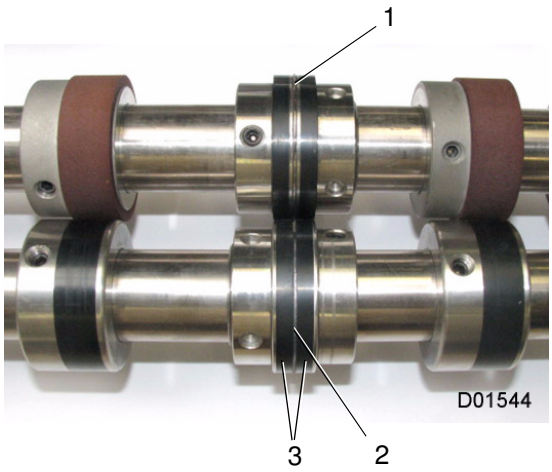
Figure 108: Creaser

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



1 Scoring knife 2 Distance pieces 0.5 mm + 1.0 mm	3 Rubber rings

Figure 109: Super-Score device

Procedure:

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

- 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 Cutting device

Folded sheets can be cut with the cutting device.

Separator cut for multiple-up production:

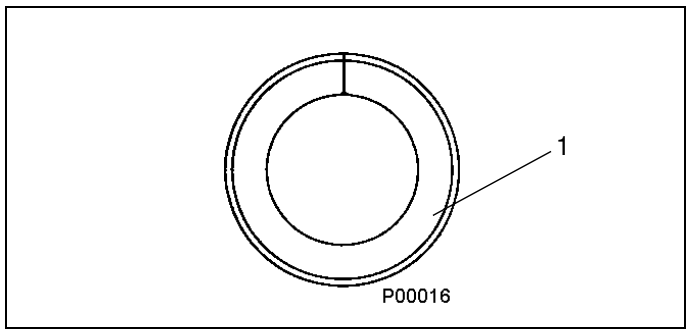
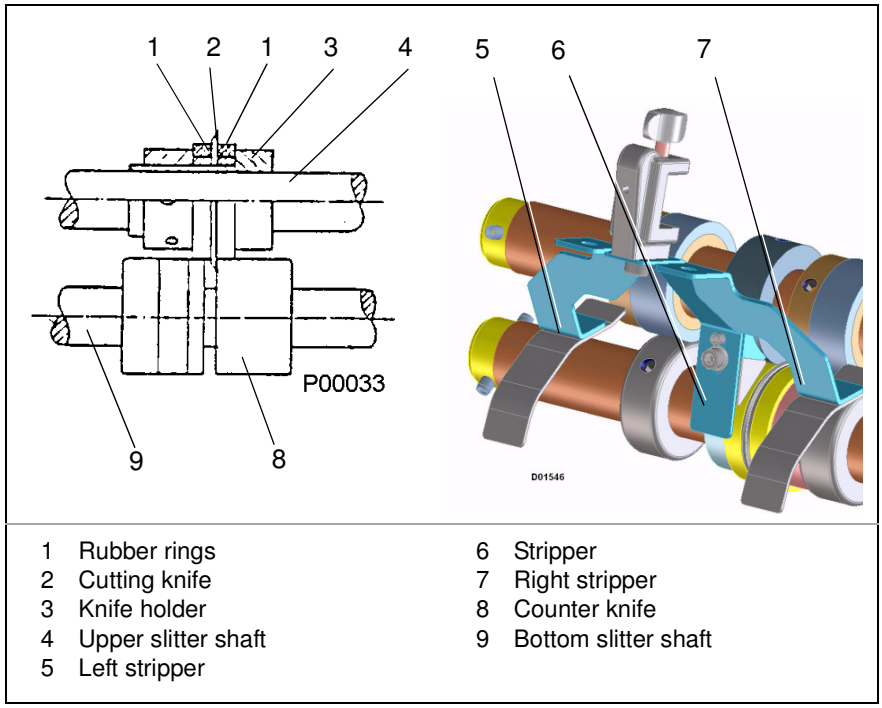


Figure 110: Cutting knives

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:



1	Rubber rings	6	Stripper
2	Cutting knife	7	Right stripper
3	Knife holder	8	Counter knife
4	Upper slitter shaft	9	Bottom slitter shaft
5	Left stripper		

Figure 111: 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.

7.10.8 Center Trim Device

Folded sheets can be separated using the center trim device.

Center trim for multiple-up production:

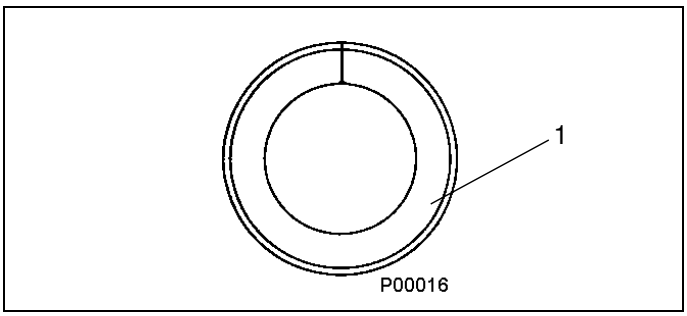
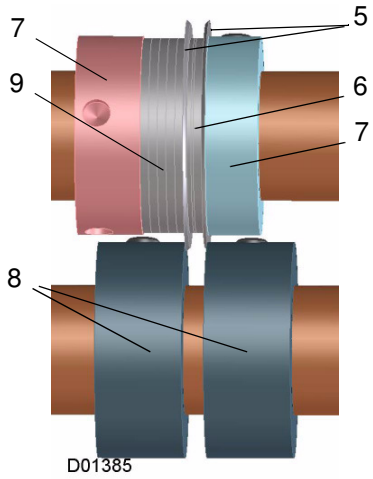
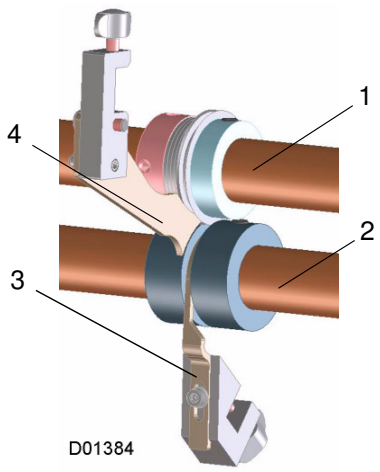


Figure 112: Cutting knives

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.





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 knives		

Figure 113: Center trim device

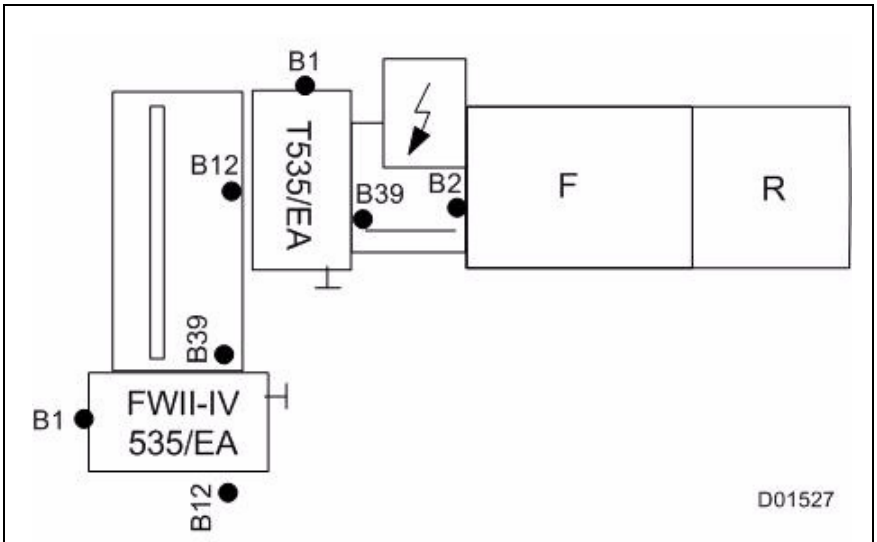
Procedure:

▷ 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 Error messages

7.11.1 Sensor positions of folding unit I and II, VC control



Position	Designation	Task
Folding unit I	Photocell B2	Sheet feed, counting functions and sheet monitoring.
	Photocell B39	Sheet feed, sheet monitoring
	Photocell B12	Sheet monitoring
	Encoder B1	Rotary pulse encoder
Folding unit II	Photocell B39	Sheet monitoring
	Photocell B12	Sheet monitoring
	Encoder B1	Rotary pulse encoder

Checking the sensor function:

Green light-emitting diode illuminated = Photocell is ready to operate.
Green and yellow light-emitting diodes illuminated = Photocell is covered. A fault is present.

7.11.2 Displaying error/informational messages

- Error messages = White text on red background.
  These have an effect on the machine function, e.g.: machine stop.
- Informational messages = White text on blue background.
  These have no effect on the machine function.

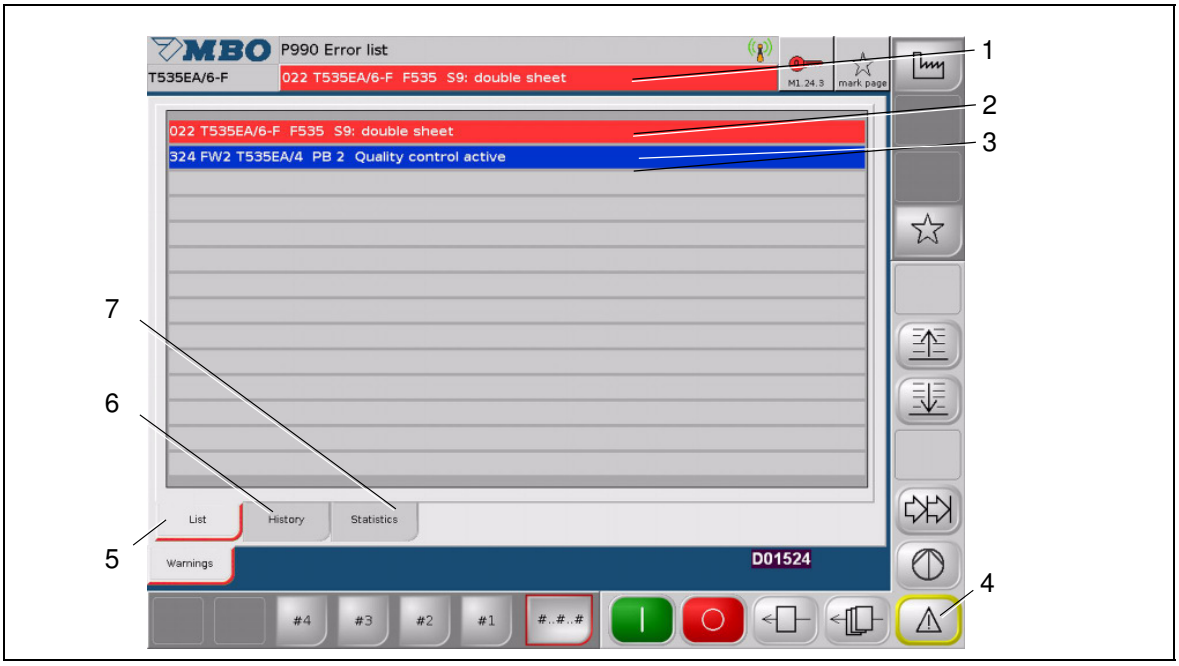


Figure 114: Error messages

Displaying error/ informational messages:

The error/informational messages are displayed in the information area of the TOUCHSCREEN.

The frame of the <Clear error message> button (4) turns yellow.

The error/informational message consists of the following:
- The error/information number
- The unit designation
- The error/information text.

If multiple error messages are pending, the one with the highest priority is displayed.

Displaying the error/ information list:

Touching the error message (1) opens an error list (5) with all currently pending error messages (2) or informational messages (3) of the machine configuration.

The frames of the buttons for:
- Selection bars <Machine configuration>, <Functional groups> and <Functional menus> are red.

Displaying history:

Pressing the History button (6) opens a list with all previous error messages (2) or informational messages (3).

Displaying statistics: Pressing the Statistics button (7) opens a list with all previous error messages (2) and their frequency.

7.11.3 Resetting error/informational messages

CAUTION!

Danger due to paper jam.

Non-compliance can cause consequential property damage (drive belts, transport tapes, foldrollers etc.).

- When removing the paper jam, turn the machine using the safety handwheel only.
- The machine may be restarted only after removing the paper jam.

Figure 115: Resetting error messages

The error messages can be reset after the cause of the fault is eliminated.

Eliminating the cause of the fault:

Procedure:

▷ Eliminate the cause of the fault.
See also Chapter "7.12 Removing the paper jam".

Resetting the error message:

Procedure:

▷ Press the <Clear error message> button (1).
The frame of the button turns gray.
The error message disappears.
The machine is ready for operation.

Resetting the informational message:

Procedure:

▷ Informational messages are displayed only for as long as they are current.
They do not have to be reset manually.

7.12 Removing the paper jam

CAUTION!

Danger due to paper jam.

Non-compliance can cause consequential property damage (drive belts, transport tapes, foldrollers etc.).

- When removing the paper jam, turn the machine using the safety handwheel only.
- The machine may be restarted only after removing the paper jam.

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 paper jam.

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

8 Maintenance

8.1 Introduction

This chapter 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 21: Qualification of personnel; Maintenance
Legend: X permitted, - not permitted

8.1.2 Safety messages

DANGER!

Danger due to hazardous 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 hazardous 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 operate the machine without protective covers.

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

The protective covers protect against danger spots.

- Operating the machine without protective covers is not permitted.
- Note that after maintenance or repair work, all protective covers have to be reinstalled.

WARTUNG!

Danger due to moving machine parts during maintenance and cleaning work.

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

- Maintenance and cleaning work must be carried out by one person only.
- Turn the main switch to the position <0>.
- Use a padlock to secure the main switch from unintentionally switching on again.
- Make absolutely sure that before the machine is switched back on, all persons are in the secured area.

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 due to removing the safety handwheel.

Non-observance may possibly cause hazard of being drawn in by the rotating shaft.

- Turn the main switch to the position <0>.
- Use a padlock to secure the main switch from unintentionally switching on again.

8.2 Service

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

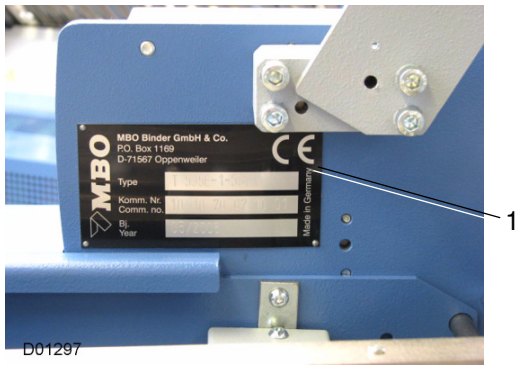
8.2.1 Ordering spare and wear parts

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.



1 Label

Figure 116: Label

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

- Commission number
- Machine type

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

8.3 Operational maintenance

WARNING!

Danger due to rotating machine parts during operational maintenance.

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

Operational maintenance must be carried out only by:

- Trained and authorized personnel
- By one person

- Turn the main switch to the position <0>.
- Use a padlock to secure the main switch from unintentionally switching on again.
- Make absolutely sure that before the machine is switched back on, all persons are in the secured area.

CAUTION!

Danger due to improper cleaning.

Non-observance may result in property damage.

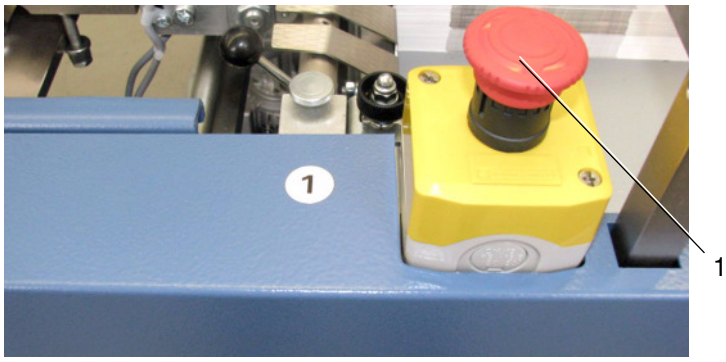
- Clean the machine after each job (at least once per week).
- Especially clean dirt (paper dust, printing powder, etc.) from moving parts.
- Do not use any aggressive chemical cleaning agents.
- Never clean the machine using compressed air (bearing damage).

8.3.1 Checking the safety devices

IMPORTANT!

- All devices for shutting down the machine in an emergency and all protecting devices 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



1 EMERGENCY STOP palm button

Figure 117: EMERGENCY STOP palm button

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.

Procedure:

- 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.

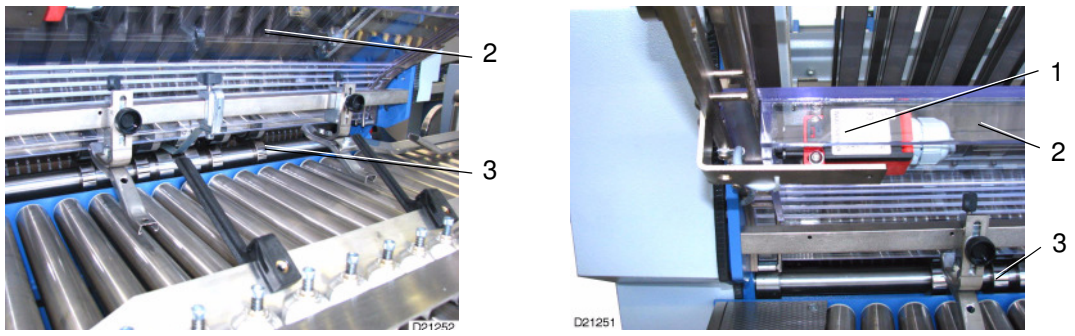
8.3.1.2 Functional test of the slitter shaft guard

WARNING!

Danger due to incorrectly adjusted safety switch at the slitter shaft guard.

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

- Never reach under the slitter shaft guard while the machine is running!
- Make sure that the opening angle of the guard stays as small as possible until the safety switch switches.
- Never dismantle, bridge or bypass safety switches.
- Ensure the proper function of the slitter shaft guard and safety switch.



1 Safety switch
2 Slitter shaft guard
3 Slitter shafts

Figure 118: 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:

Shut-off 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 pneumatic springs of the noise damping hoods

WARNING!

Danger due to automatic lowering of the open noise damping hood.

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

Check the pneumatic springs after each production / daily to ensure they are functioning properly.

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 Recommendation of cleansing agents

Flat surfaces and cavities:	Vacuum cleaner and brush.
For deposits that adhere to finished surfaces:	Solvent-free cleansing agent.
Cleaning rollers:	MBO Binder GmbH & Co. KG recommends the cleaning solution from the "Varn" company with the No.: "Varn-Wash VM 111 or VWM". 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. Please take the respective order number from the "VARN" technical data sheets.

8.3.3 Cleaning of the machine

CAUTION!
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).
- The dust layer must never exceed 1 mm.

CAUTION!
Danger due to unsuitable cleaning agents.
Non-observance may result in property damage.
Do not use any aggressive chemical cleaning agents.

CAUTION!
Danger due to use of compressed air.
Non-observance may result in bearing damage.
Never clean the machine using compressed air.

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:
▷ Remove the dirt using a vacuum cleaner.
▷ Use a brush for hard-to-reach areas.
▷ Wipe down the surfaces using a dry cloth.

8.3.4 Cleaning the foldrollers

CAUTION!

Danger due to improper use of cleaning agents.

Non-observance may result in injuries.

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

CAUTION!

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 residual risks and environmentally friendly disposal.

CAUTION!

Danger due to unsuitable cleaning agents.

Non-observance may result in property damage.

Use the roller cleaning agent "Varn-Wash VM 111" or "VWM" only.

CAUTION!

Danger caused by incorrect cleaning of the spiral foldrollers.

Non-observance may possibly cause property damage.

Note especially the special cleaning instructions for spiral foldrollers

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

- 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:

▷ WARNING! Turn the main switch to the position <0>.
Use a padlock to secure the main switch from unintentionally switching on again.
▷ NOTICE! To clean the foldrollers, use the roller cleaning agent "Varn-Wash VM 111" or "VWM" only.
▷ NOTICE! Use only linen cloths as cleaning cloths.
▷ Moisten the linen cloth using the roller cleaning agent.
NOTICE! 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.
NOTICE! Apply only a little pressure when rubbing.
▷ Dry the foldrollers with a dry linen cloth.
▷ WARNING! Remove the padlock on the main switch.
Ensure that all persons are in the secured area.
Turn the main switch to the position <1>.

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:

▷ WARNING! Turn the main switch to the position <0>.
Use a padlock to secure the main switch from unintentionally switching on again.
▷ NOTICE! To clean the HIGH-GRIP foldrollers, use the roller cleaning agent "Varn-Wash VM 111" or "VWM" only.
▷ NOTICE! Use only linen cloths as cleaning cloths.
▷ Moisten the linen cloth using the roller cleaning agent.
NOTICE! Never soak the HIGH-GRIP foldrollers with the roller soap. Penetrating roller cleaning agent can destroy the bearings.
▷ Use the linen cloth to remove the deposits on the HIGH-GRIP foldrollers.
NOTICE! Exert only slight pressure.
▷ WARNING! Remove the padlock on the main switch.
Ensure that all persons are in the secured area.
Turn the main switch to the position <1>.
▷ After cleaning the HIGH-GRIP foldrollers, switch on the machine at the main switch.
Ensure that no other persons are near the machine.
Keep hands clear.
▷ Start the machine and set the work speed to the maximum value.

- ▷ The centrifugal force produced will fling the partially dissolved ink and powder particles as well as absorbed roller cleaning agent from the roller surface covering.
- ▷ Stop the machine.
  WARNING! Turn the main switch to the position <0>.
  Use a padlock to secure the main switch from unintentionally switching on again.
- ▷ Wipe the HIGH-GRIP foldrollers with a dry linen cloth.
  NOTICE! Exert only slight pressure.
- ▷ Remove the ink and powder particles thus flung out from the machine.
- ▷ WARNING! Remove the padlock on the main switch.
  Ensure that all persons are in the secured area.
  Turn the main switch to the position <1>.

8.3.5 Cleaning the buckle plates

CAUTION!

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 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:

▷ Unplug the connecting lines of the servomotors.
▷ Remove the lower buckle plates.
▷ Vacuum these using an industrial vacuum cleaner.
▷ Reinstall the lower buckle plates.
▷ Reinsert the connecting lines of the servomotors according to the labels.

8.3.6 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.

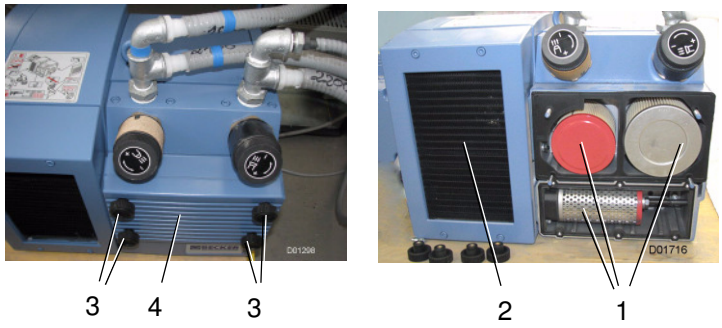
8.3.7 Cleaning/replacing the pressure vacuum pump, filter cartridges

CAUTION!

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.



1	Filter cartridges	3	Knurled screws
2	Filter	4	Cover

Figure 119: Vacuum pump filter

Due to the high loads resulting from the paper dust and printing powder, the pressure vacuum pump must be cleaned regularly.

The following time specifications apply for single-shift operation!

Procedure:

▷ Clean the filter and filter cartridges every 50 operating hours.
▷ Replace the filter cartridges every six months.

Cleaning the filter cartridges:

Procedure:
Refer also to the separate operating manual of the pressure vacuum pump.

▷ Remove the knurled screws (3).
▷ Remove the cover (4).
▷ 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 (4).
▷ Reattach the knurled screws (3).
▷ Tighten the knurled screws (3) manually only.

Replacing the filter cartridges:

Procedure:
Refer also to the separate operating manual of the pressure vacuum pump.

- ▷ Remove the knurled screws (2).
- ▷ Remove the cover (3).
- ▷ Remove the old 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.
- ▷ Reinsert the new filter cartridges (1).
- ▷ Reattach the cover (3).
- ▷ Reattach the knurled screws (2).
- ▷ Tighten the knurled screws (2) manually only.
- ▷ Dispose of the old filters in an environmentally-friendly manner.
- ▷ Maintain the pressure vacuum pump.

8.4 Maintenance

8.4.1 Safety messages

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 trained and authorized personnel with specialized technical skills and knowledge only.
- Maintenance work must be carried out by one person only.
- Observe the local occupational safety regulations.
- Observe the maintenance, service, and cleaning plan.

WARNING!

Danger due to moving machine parts during maintenance.

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

- Maintenance work must be carried out by trained and authorized personnel with specialized technical skills and knowledge only.
- Observe all local work safety regulations and electrical engineering rules
- Turn the main switch to the position <0>.
- Use a padlock to secure the main switch from unintentionally switching on again.

WARNING!

Danger due to removing the safety handwheel.

Non-observance may possibly cause hazard of being drawn in by the rotating shaft.

- Turn the main switch to the position <0>.
- Use a padlock to secure the main switch from unintentionally switching on again.

8.4.2 Maintenance intervals

The VARIO Control provides the following maintenance monitoring functions, which are specific to each unit:

- <Unit> maintenance interval.
- <Pump> maintenance interval. (Only for Unit 1)
- <Slitter shaft cassette> maintenance interval (for T535/P only).

If the defined number of hours of the maintenance interval is reached, the corresponding message appears in the information line of the TOUCHSCREEN.

To reset the message, see chapter "8.4.3 Resetting maintenance intervals".

The <Unit> maintenance interval includes all maintenance work described in the chapter "8.4 Maintenance".

The <Pump> maintenance interval includes cleaning the pump filters. See Chapter ""8.3.7 Cleaning/replacing the pressure vacuum pump, filter cartridges".

The <Slitter shaft cassette> maintenance interval includes cleaning the slitter shaft cassette (only for T535/P).

8.4.3 Resetting maintenance intervals

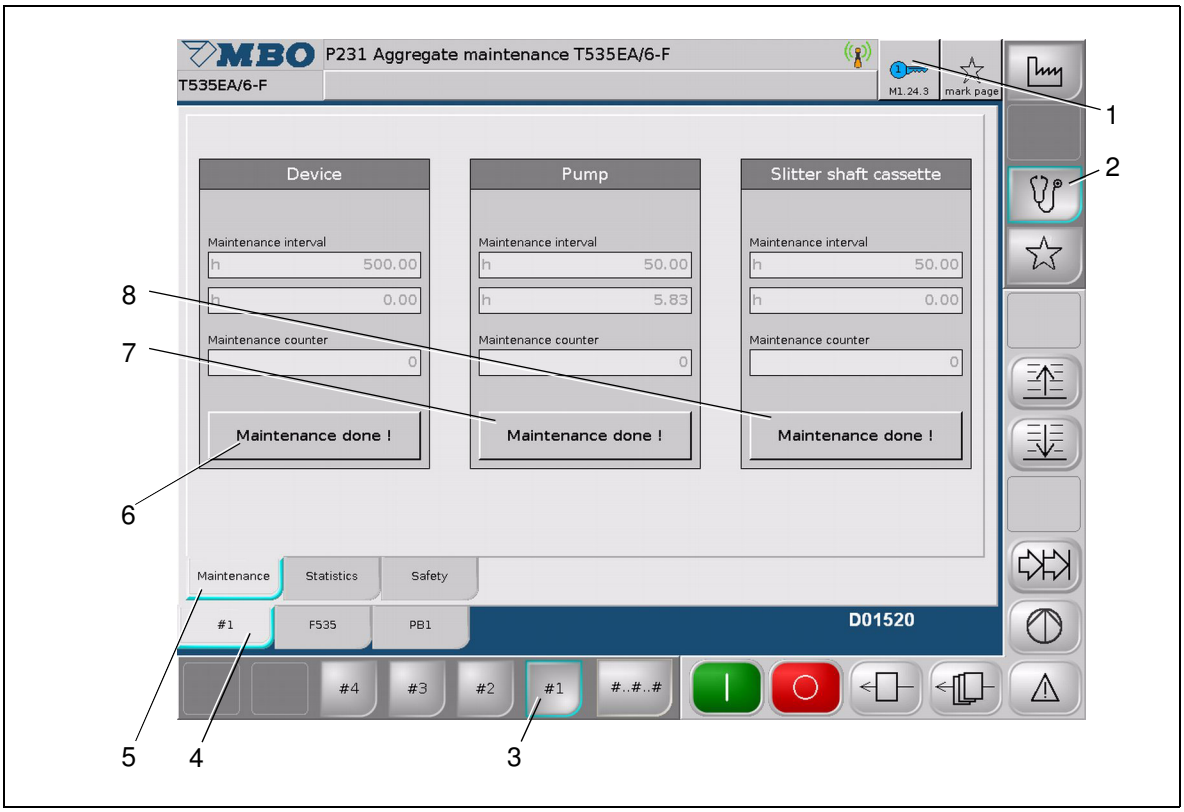


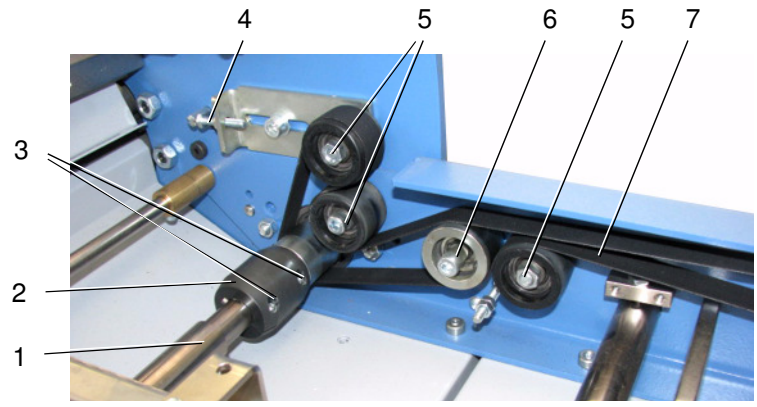
Figure 120: Resetting maintenance intervals

After the respective maintenance is carried out, this must be confirmed. This resets the internal hours counter.

Procedure:

- ▷ Enter the operator password (1). See Chapter "6.12 Changing the password level"
- ▷ Press the <Diagnostics> button (2).
- ▷ In the <Machine configuration> selection bar, press the <Unit 1> button (3).
- ▷ In the <Functional group> selection bar, press the <Unit 1> button (4).
- ▷ In the <Function> selection bar, press the <Maintenance> button (5).
- ▷ Press the respective <Maintenance done> button (6, 7 + 8).
  The corresponding hours counters are set to <zero>.
- ▷ Reset the password level.
  See Chapter "6.12 Changing the password level".

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



1	Hand wheel shaft	5	Crowned tape rollers
2	Coupling	6	Adjustable tape roller
3	Screws	7	Drive belt
4	Tensioning element		

Figure 121: 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)

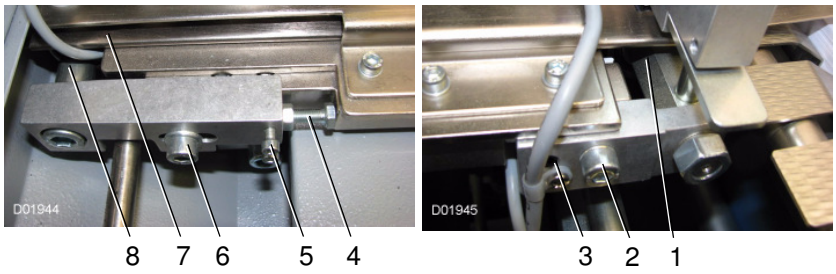
Centering the belt:
▷ Center the drive belt (7) using the adjustable tape roller (6).

Tensioning the belt:
▷ Tighten the drive belt (7) using the tensioning element (4).

Replacing the belt:
▷ Loosen the drive belt (7) using the tensioning element (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 element (4).
▷ Check that the belt is running on center.

Attaching the guard:
▷ Reinstall the guards on the drive belt (7) and handwheel shaft (1).

8.4.5 Checking the alignment tape of the register table



1	Roller	5	Leveling screws
2	Screw	6	Screw
3	Adjusting screw	7	Alignment tape
4	Tensioning screw with lock nut	8	Roller

Figure 122: 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 tape is poor, it must be replaced.

Procedure:

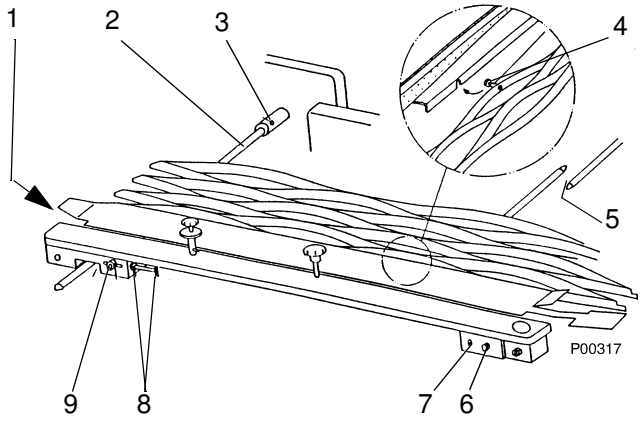
Adjusting the alignment tape on the roller (1):

- ▷ 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



1	Alignment tape	6	Screw
2	Rod	7	Screw
3	Screw	8	Screw with lock nut
4	Position to take off its hinges	9	Screw
5	Rod		

Figure 123: Replacing the alignment tape

Procedure:

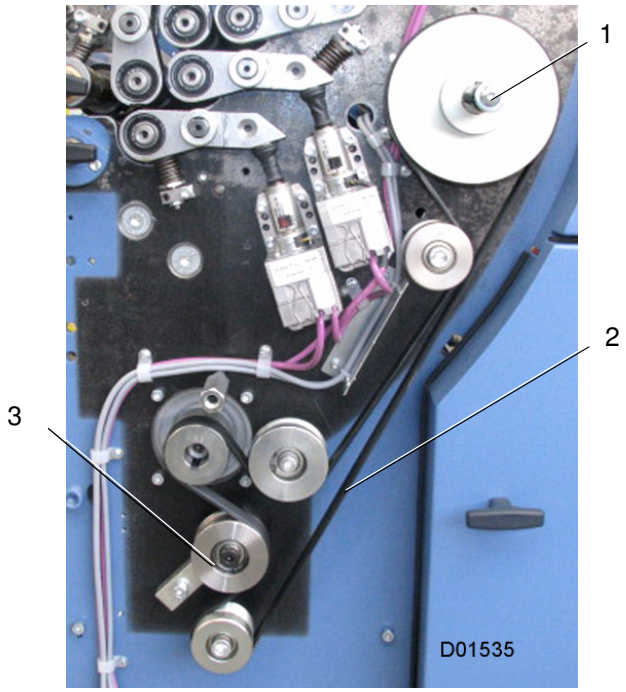
Removing the alignment tape:

- ▷ 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 "8.4.5 Checking the alignment tape of the register table"

8.4.6 Check/exchange main drive belt



1 Key
2 Poly-V belt
3 Belt tensioner

Figure 124: 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:

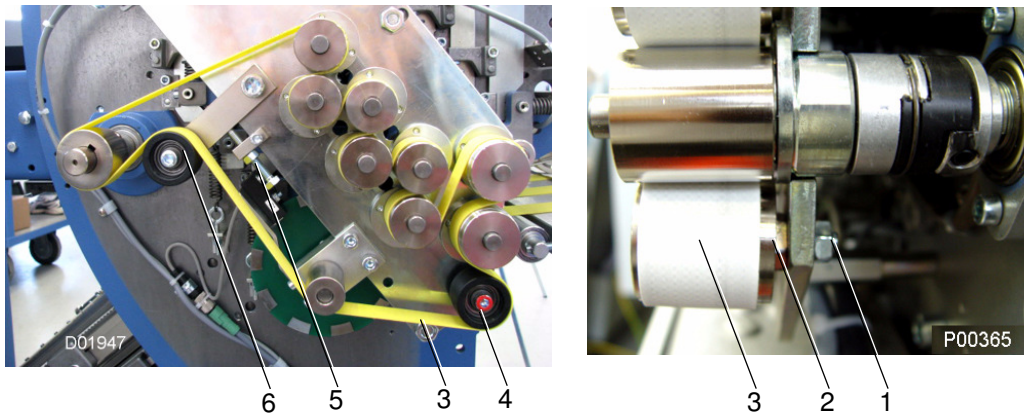
Removing the guard:
- ▷ Remove the safety handwheel (be careful of key (1)).
- ▷ Remove the guards above the main drive.

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 guards above the main drive.
- ▷ Reattach the safety handwheel (be careful of key (1)).

8.4.7 Checking the drive belt for foldrollers and slitter shafts



1	Nut	4	Adjustment roller
2	Eccentric bolt	5	Adjustment screw with lock nut
3	Drive belt	6	Tension roller

Figure 125: 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).

8.4.8 Checking the foldrollers

Procedure:

▷ Check the foldrollers weekly for contamination and damage.
▷ Check the foldrollers every six months for tension and wear.

8.4.9 Checking the buckle plates

CAUTION!

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.

Procedure:

▷ Check the sheet stop and the upper and lower plate lip weekly for wear and damage.
▷ Visually inspect all screws.

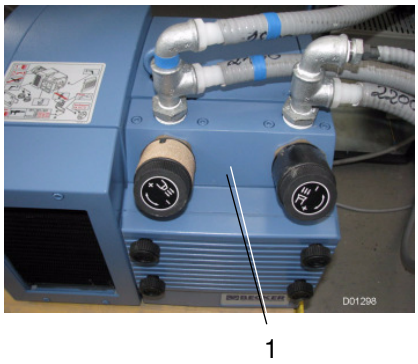
8.4.10 Maintaining the pressure vacuum pump

WARNING!

Danger due to improper maintenance.

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

- Maintenance work may be carried out by an authorized and trained specialist only.
- Observe the local occupational safety regulations and electrotechnical regulations.
- Refer to the separate operating manual of the pressure vacuum pump.



1 Pressure vacuum pump

Figure 126: Maintainance of pressure vacuum pump

Due to the high loads resulting from the paper dust and printing powder, the pressure vacuum pump must be maintained regularly.

For the procedure and corresponding maintenance intervals, refer to the separate operating manual for the pressure vacuum pump.

- The time specifications apply for single-shift operation.
- Convert the time specifications for multishift operation accordingl

8.5 Maintenance, lubrication and cleaning schedule

CAUTION!

Danger due to 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		
	8.3.3	"Cleaning of the machine"	Weekly		
	8.3.4	"Cleaning the foldrollers"	Weekly		
	8.3.5	"Cleaning the buckle plates"	Weekly		
	8.3.6	"Cleaning the optical sensors"	Weekly		
	8.3.7	Cleaning the pressure vacuum pump, filter.	Every 50 operating hours		
Maintenance	8.4.4	"Checking the drive belt for the suction wheel/suction tape"	Monthly		
	8.4.5	"Checking the alignment tape of the register table"	Monthly		
	8.4.6	"Check/exchange main drive belt".	Monthly		
	8.4.7	"Checking the drive belt for foldrollers and slitter shafts"	Monthly		
	8.3.7	Replacing the pressure vacuum pump, filter cartridges.	Every 6 months		
	8.4.8	"Checking the foldrollers"	Weekly		
	8.4.9	"Checking the buckle plates"	Weekly		

Table 22: Maintenance, lubrication and cleaning schedule

	Chapter No.:	Working process	Interval	Date	Signature
	8.4.10	"Maintaining the pressure vacuum pump" See separate operating manual of pressure vacuum pump.			

Table 22: Maintenance, lubrication and cleaning schedule

8.6 Repair

WARNING!

Danger due to improper repair.

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

- Repair work must be carried out by trained and authorized personnel with specialized technical skills and knowledge only.
- Observe the local occupational safety regulations.
- Carry out a function test after the repair.

IMPORTANT!

Only have repair work performed by MBO Service or by an authorized customer service agent.

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

9.1.2 Safety messages

CAUTION!
Danger due to incorrect storage.
Non-observance may result in property damage.
Observe the specified 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

▷ Check the premises with respect to 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 24: Qualification of personnel; Disposal
Legend: X permitted, - not permitted

10.1.2 Property damage messages

CAUTION!

Danger due to improper disposal.

Non-compliance 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.

Disposal/recycling:

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!

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