

Service Manual



Label Printer

MACH 4S

Family	Type	
MACH 4S	-	MACH 4.3S/200B
	-	MACH 4.3S/200P
	-	MACH 4.3S/200C
	MACH 4S/300B	MACH 4.3S/300B
	MACH 4S/300P	MACH 4.3S/300P
	MACH 4S/300C	MACH 4.3S/300C
	MACH 4S/600B	-
	MACH 4S/600P	-
	MACH 4S/600C	-

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1	Introduction	4
1.1	Instructions.....	4
1.1	General Safety	5
1.2	Safety Markings	5
1.3	Handling Electricity	6
1.4	Conduct during Accidents	6
2	Changing Assembly Parts.....	7
2.1	Tools.....	7
2.2	Changing the Control Panel.....	7
2.3	Dismounting the Cover.....	8
2.4	Changing the Print Mechanism	9
2.5	Changing the Printhead	10
2.6	Changing the Print Roller	12
2.7	Changing the Clutch and Brake of the Ribbon Rewinder.....	13
2.8	Changing the Brake of the Ribbon Unwinder.....	14
2.9	Changing the Drive of the Cutter.....	15
2.10	Changing the Blade of the Cutter Unit	16
2.11	Changing the Circuit Board	17
2.12	Changing the Power Supply.....	18
3	Adjustments	19
3.1	Measuring the Winding Force	19
3.1.1	Testing the Winding Force of the Clutch and Break of the Ribbon.....	19
3.1.2	Measuring the Breaking Force of the Unwinder	20
3.2	Setting the Winding Force.....	21
3.3	Adjusting the Print Mechanism.....	22
3.3.1	Adjustable Elements.....	22
3.3.2	Settings.....	23
4	Troubleshooting and Error Treatment.....	24
4.1	Failure of Device Functions.....	24
4.2	Permanently Occurring Hardware Errors	24
5	Block Diagram	25
6	Layout Diagram PCB CPU.....	26
7	Index.....	27

1.1 Instructions

Important information and the instructions in the documentation are designed as follows:

**Danger!**

Draws attention to an exceptionally great, imminent danger to your health or life due to hazardous voltages.

**Danger!**

Draws attention to a danger with high risk which, if not avoided, may result in death or serious injury.

**Warning!**

Draws attention to a danger with medium risk which, if not avoided, may result in death or serious injury.

**Caution!**

Draws attention to a danger with low risk which, if not avoided, may result in minor or moderate injury.

**Attention!**

Draws attention to potential risks of property damage or loss of quality.

**Note!**

Advices to make work routine easier or on important steps to be carried out.

**Environment!**

Gives you tips on protecting the environment.



Handling instruction



Reference to section, position, illustration number or document.



Option (accessories, peripheral equipment, special fittings).

Time

Information in the display.

1.2 General Safety

This service manual is intended for qualified service and maintenance personnel. Further information to the operation of the device can be found the Operator's and Configuration Manuals.

The following rules are for your general safety

- Keep the area during and after maintenance operations clean.
- Work safety conscientious.
- Keep dismantled parts secure during maintenance operations.
- Avoid tripping hazards.



N



Danger!

Double-pole or neutral conductor safety.



Danger!

Danger of electrocution wenn stronger currents are used by connected metallic parts.

- ▶ Do not wear clothing with metal.
- ▶ Do not wear jewelry.
- ▶ Do not wear glasses with a metal frame.



Warning!

Loose clothing can get caught in rotating parts of the device and can lead to injury.

- ▶ When operating the device avoid wearing clothing that can get caught in rotating parts.

1.3 Safety Markings



Warning!

Warning of injury due to missing or damaged safety markings.

- ▶ After maintenance operations reapply all protective parts, markings, covers, grounding cables, etc.
- ▶ Replace all defective or damaged parts.

Wear safety goggles when:

- knocking in or out pins or similar parts with a hammer
- using spring hooks
- installing or removing springs, safety rings gripping rings
- using abrasive, cleaners, solution or other chemicals

1.4 Handling Electricity

The following operations may only be performed by qualified electricians:

- Any labor performed on electrical component groups.
- Operations performed on the opened device while it is connected to the power grid.

General precautions when commencing maintenance operations:

- Locate the emergency power and/or mains switch so it is reached quickly should the need arise.
- Disconnect the power when performing the following tasks:
 - Removing or installing the power supply.
 - Performing work in the vicinity of opening power connectors.
 - Mechanical testing of power units.
 - Altering anything to do with the circuitry.
- Check that the device is not live.
- Check the work area for any potential hazards such as damp or wet floors, defective extension cords or protective conductors.

Additional precautions when dealing with open voltage supply:

- Request a second person to stay in the vicinity and operate the emergency powers or mains switch if and when required.
- Only use one hand when working with electronic circuits. Keep the other hand behind your back or in a pocket. By doing so you prevent electricity from flowing through the body.

1.5 Conduct during Accidents

- Act with exception caution and calmness.
- Do not put yourself at risk.
- Switch off the power.
- Request medical assistance or call an emergency doctor.
- If required and possible perform first aid.

2.1 Tools

- Do not use worn or damaged tools.
- Only use tools and test devices for their designed purposes.

Specialized tools(cab in-house produced):

- Test devices ribbon holders (cab part no.: 5540932)
- Assembly assistance coupling (cab part no.: 5541180)
- Cylindrical dynamometer (spring scale), 0 - 10 N (cab part no.: 5906108)

Commercial tools:

- Torx screwdriver, size TX 10/200
- Allen wrenches straight, size 2,5
- Screwdriver with parallel shaft, size 4
- Flat nose pliers

2.2 Changing the Control Panel

**Note!**

When changing the control panel B or P to a control panel C (exchange to measurement version) the dispensing edge must be removed from the device. When changing the to the other panels the dispensing edge must be mounted. (► 2.6 on page 12).

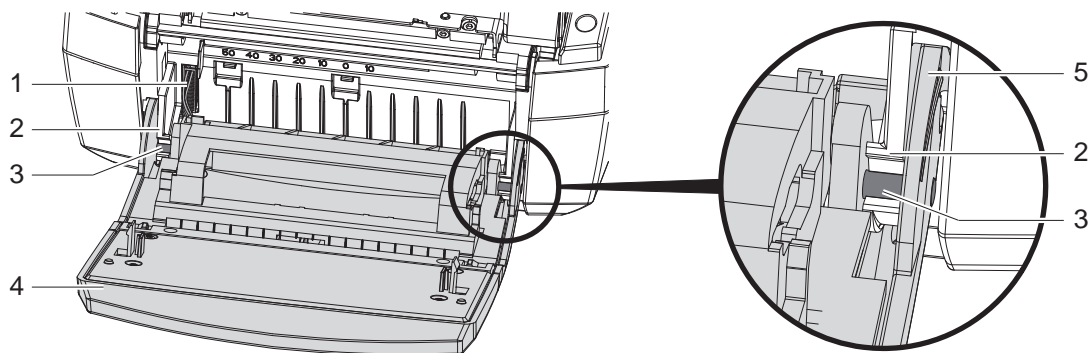


Fig. 1 Changing the control panel

1. Fold the control panel (4) down.
2. Steady the device with one hand and pull the control panel along axis (3) sturdily, releasing it from its retainer (2).
3. Take hold of the control panel over the second axis and pull it until it is released from its retainer.
4. Guide the brackets (5) next to the retainers (2) out of the device.
5. Disconnect the connector (1) from the printer and set aside the control panel.
6. Connect the connector (4) of the new control panel to the printer.
7. Guide the brackets (5) along the side of the retainers (2).
8. Lift the control panel a little.
9. Push the control panel firmly into the axis (3) of the retainer (2) until you hear the axis snap into the retainer.

2.3 Dismounting the Cover

**Danger!**

Risk of death by electrocution.

- Before opening or dismounting the cover disconnect the device from the power grid and wait at least one minute until the device has discharged.

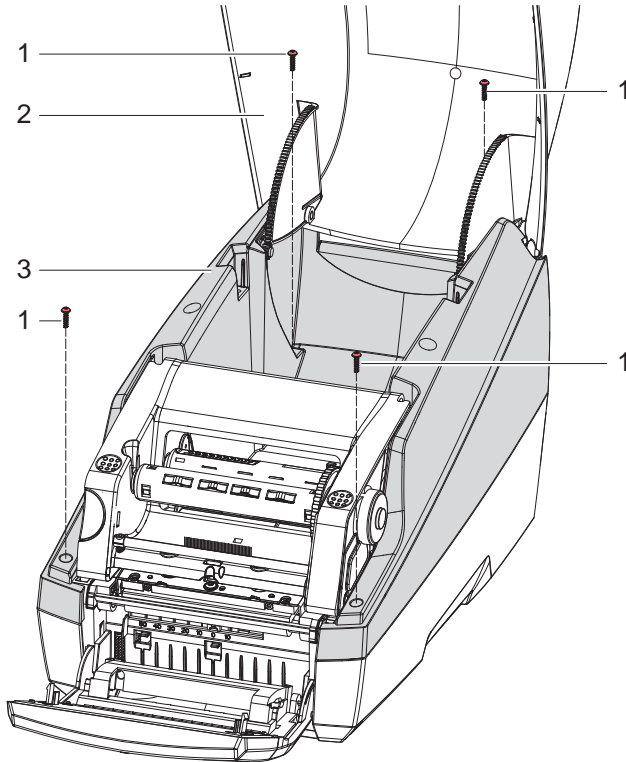


Fig. 2 Dismounting the cover

The printer cover can be dismounted completely including the front lid.

1. Open the printer cover (2) and remove the roll and material retainer.
2. Loosen 4 screws (1)
3. Remove the cover (3) with the lid (2)

To mount the cover and lid follow the above order in reverse. To make the implementation of the parts easier fold the printing modules up.

2.4 Changing the Print Mechanism

**Danger!**

Risk of death by electrocution.

- Before opening or dismounting the cover disconnect the device from the power grid and wait at least one minute until the device has discharged.

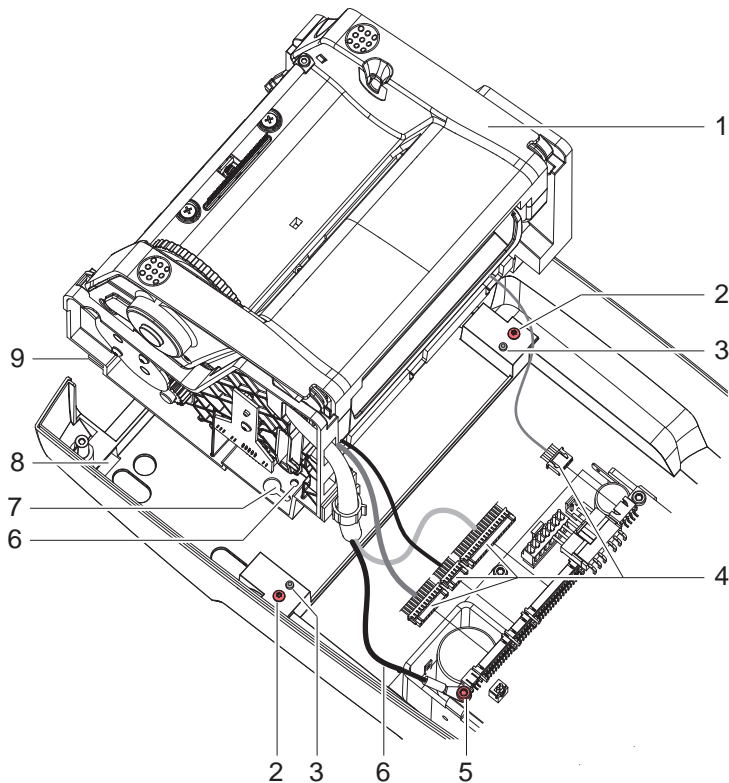


Fig. 3 Changing the print mechanism

1. Dismount the control panel (▷ 2.2 on page 7).
2. Dismount the printhead (▷ 2.5 on page 10).
3. Dismount the cover (▷ 2.3 on page 8).
4. Disconnect the cables (4) connecting the printing mechanism to the CPU circuit board.
5. Disconnect the ground wire (6) from the CPU circuit board by undoing the screw (5).
6. After loosening the two screws (2) slide and raise the print mechanism backwards until it, with the screws (2), can be lifted out of the adjustment slots (7).
7. Slide the new printing mechanism with the bracket (9) into the guides (8). Place the adjustment slots (7) onto the screws (2) pushing the unit forward until the indentations (3) snap into their counterparts (6).
8. Fasten the screws (2).
9. Fasten the ground wire (6) to the CPU circuit board with screw (5).
10. Connect cables (4) to the CPU circuit board.
11. Mount the cover and lid (▷ 2.3 on page 8).
12. Mount the printhead (▷ 2.5 on page 10).
13. Mount the control panel (▷ 2.2 on page 7).

2.5 Changing the Printhead

Changing a printhead can be completed without fine adjustments to the printer. Changing the printhead is necessary when it is worn or a change of printing resolution is needed.

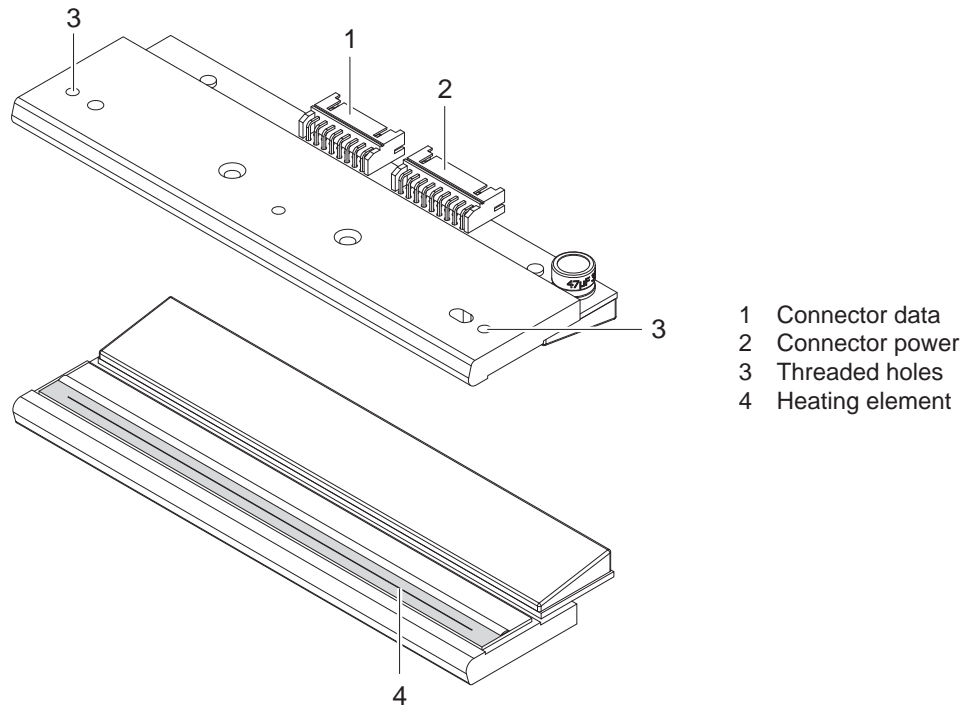


Fig. 4 Assembly of the printhead



Attention!

Damaging the printhead by electrical discharge or mechanical influences!

- ▶ Set up the printer on an grounded conduit.
- ▶ Ground yourself with e.g. an anti static bracelet.
- ▶ Do not touch the connectors (1, 2).
- ▶ Do not touch the heating element (4) with hands or hard objects.

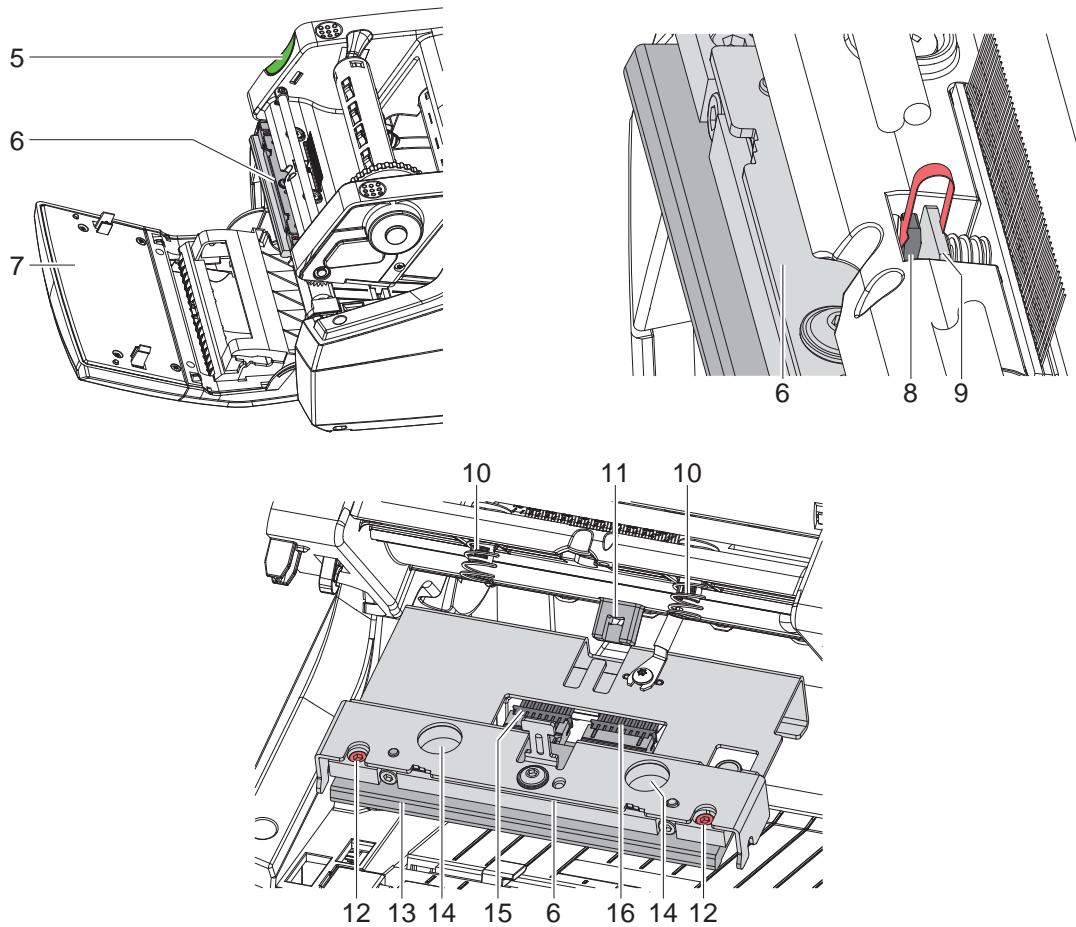


Fig. 5 Changing the printhead

Removing the printhead

1. Open the cover and fold the control panel (7) down. Push the energy regulator (5) and fold the printing module up with the printhead retainer (6).
2. Take the material out of the printer.
3. Push against the printhead retainer (6) from underneath, lifting the mounting bracket (9) over the bar (8) and then down through the slit.
4. Pull the printhead retainer (6) out of the guide (11) of the printing module.
5. Remove the printhead (13) by undoing the screws (12) of the printhead retainer (6).
6. First remove the power cable (16) and then the data cable (15).

Installing the printhead

7. Connect the data cable (15), then the power cable (16) to the new printhead.
8. Fasten the printhead (13) with the screws (12) to the printhead retainer (6).
9. Place the printhead retainer (6) with the loop into the guide (11) and push it upward against the springs (10) where the springs should land on the indentations (14). Guide the mounting bracket (9) through the slit towards the top and over the bar (8) until it locks in place.
10. Install the material once more, close the control panel and cover before use.

**Attention!**

If there is a loss of quality visible on the printed label after the exchange of the printhead adjustments need to be performed. ▢ 3.3 on page 22.

2.6 Changing the Print Roller

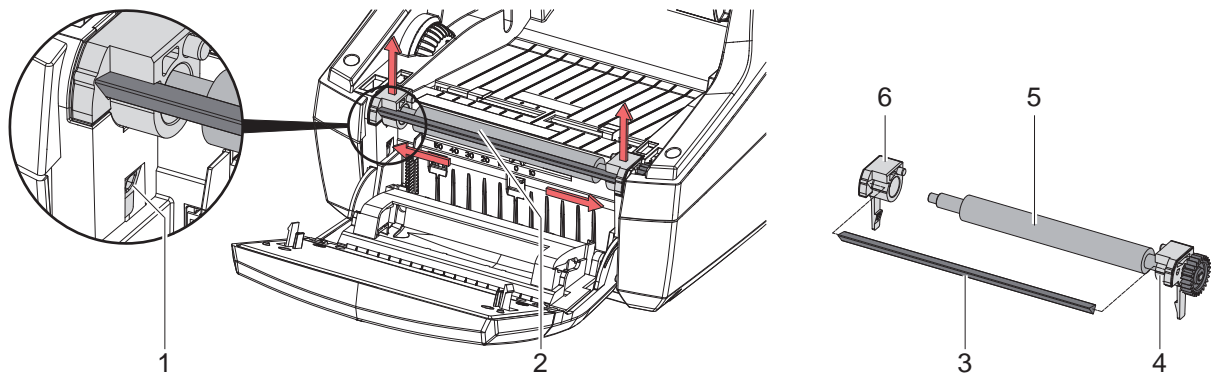


Fig. 6 Changing the print roller

1. Open the cover and fold the control panel down. Push the unlocking mechanism and fold the printing module up.
2. Through the openings on both sides, push the pressure points (1) until the print roller assembly (2) snaps out of the locking mechanism. This action lifts the print roller assembly (2) a little.
3. Lift the unlocked pressure roller assembly (2) out of the device.
4. Remove the roller locking mechanism (6) from the print roller (5) and remove the dispensing edge (3) from the roller locking mechanism (4).
5. Insert the dispensing plate (3) into the roller locking mechanism (4) of the new print roller and push the new roller locking mechanism (6) onto the print roller and the dispensing edge.



Attention!

When exchanging the control panel B or P with control panel C (► 2.2 on page 7) the dispensing edge must be removed prior to the exchange.

- Connect the roll retainer (5) to the pressure roller (4) and place the assembly group, without the dispensing edge (3), into the printer.

Follow the reverse order to achieve the opposite effect.

4. Insert the pressure roller assembly group (2) into the printer and evenly push down to lock it into place.
5. Lock the printing and control modules.

2.7 Changing the Clutch and Brake of the Ribbon Rewinder

The clutch (4) is a pre-constructed assembly group, the brake consists of the form disks (5, 7), the friction disk (6) and three springs (9).

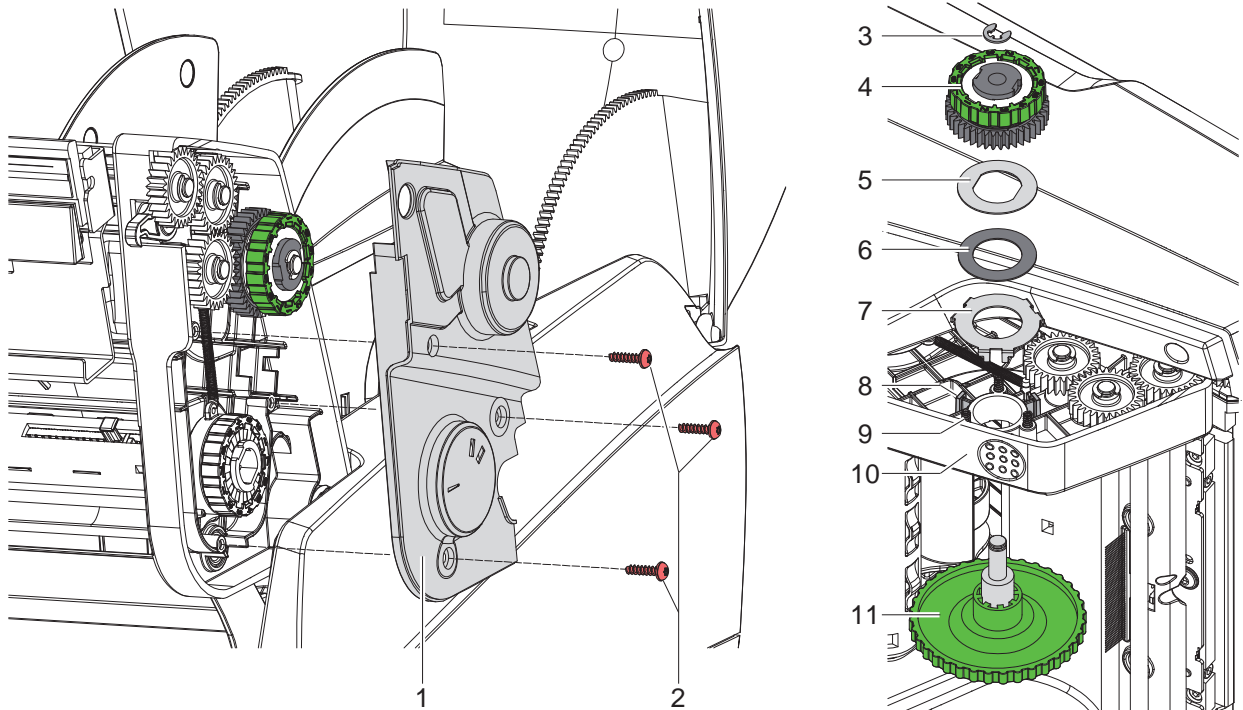


Fig. 7 Changing the clutch and brake of the ribbon rewinder

Dismounting

1. Fold up the printhead assembly group, loosen the three screws (2) and lift off the cover (1).
2. Close the printhead assembly group and lay the printer on its side.
3. Undo the snap ring (3) and remove clutch (4), form disks (5, 7), friction disk (6), springs (9) and tension wheel (11).

Mounting

1. Place the springs (9) into the frame (10).
2. Place and hold the tension wheel (11) into the frame.
3. Set the form disks (7) in line with the retainers (8) of the frame.
4. Place the friction disk (6), form disks (5) and clutch (4) as illustrated.
5. Push the clutch and tension wheel against the frame and fasten the snap ring (3) on the axis of the tension wheel (11).
6. Check the winding torque (\triangleright 3.1 on page 19) and correct the settings as necessary. (\triangleright 3.2 on page 21).
7. Fold the printhead assembly up and fasten the cover (1) with the three provided screws (2).

2.8 Changing the Brake of the Ribbon Unwinder

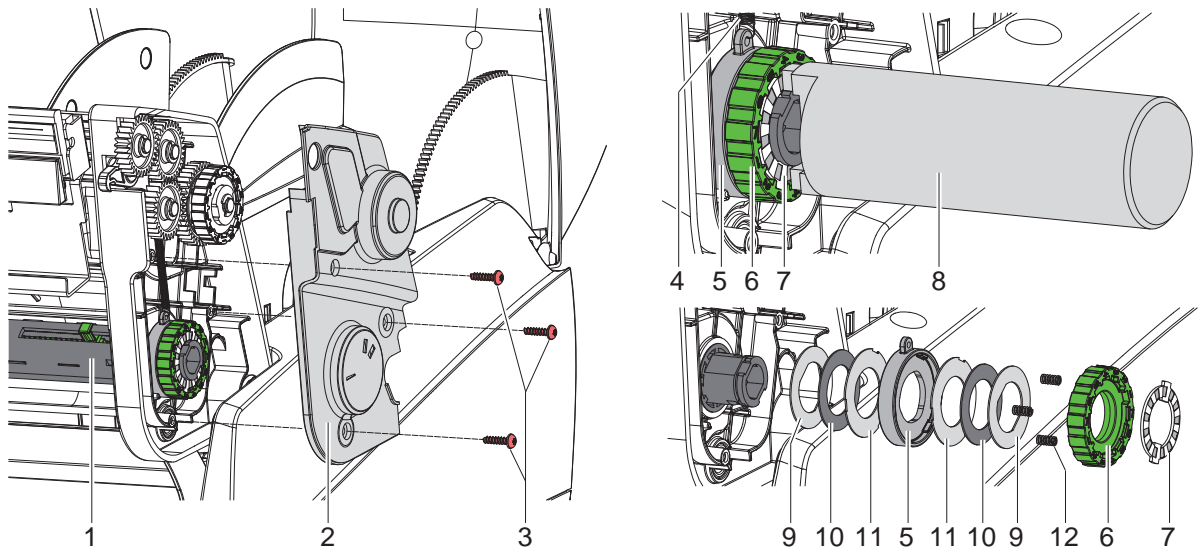


Fig. 8 Changing the brake of the ribbon unwinder

1. Fold up the printhead assembly group, undo the three screws (3) and remove the cover (2).
2. Insert the ribbon retainer (1).
3. Unhook the spring (4) from the pivot arm (5).
4. Hold the ribbon retainer (1), guide the pin of the mounting assistance (8 / Part No. 5541180) into the two allocated spaces of the retainer (6). Push the mounting assistance against the printhead assembly group and turn it counter-clockwise until the lock washer (7) releases and can be taken out.
5. Take off the retainer (6), spring (12), from disks (9, 11), friction screw (10) and pivot arm (5).
6. Set the new parts according to the illustration.



Attention!

► Place the lock washer (7) with its markings to the outside.

7. Turn the lock washer (7) with the mounting assistance (8) clockwise until it locks into place.
8. Clip the spring (4) to the pivot arm (5).
9. Check the winding torque (▷ 3.1 on page 19) and adjust the settings if necessary. (▷ 3.2 on page 21).
10. Fasten the cover (2) with the three screws (3) provided.

2.9 Changing the Drive of the Cutter

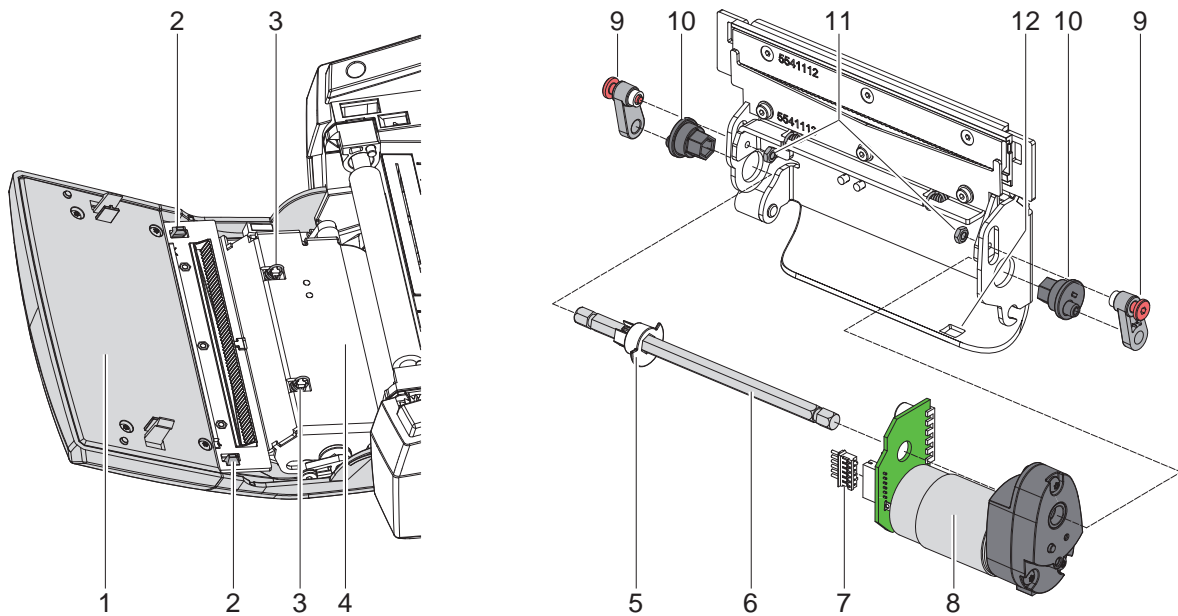


Fig. 9 Changing the drive of the cutter

1. Fold down the control panel (1), release the cutter (4) from the brackets (3) and fold this up too.
2. Unhook the springs (2).
3. Disconnect the plug (7).
4. Undo and remove the nuts (11), screws (9) with connecting rods and bearings.
5. Unlock the eccentric (10) from the shaft (6).
6. Lift out shaft (6) with the drive (8) from the base plate (12).
7. Pull the drive (8) from shaft (6).
8. To reconstruct the assembly follow these instructions in the reverse order. Place the drive into the adjustment slot of the base plate (10).



Attention!

- Align the pins of the eccentric (10) to the clock wheel (5) as illustrated.

2.10 Changing the Blade of the Cutter Unit

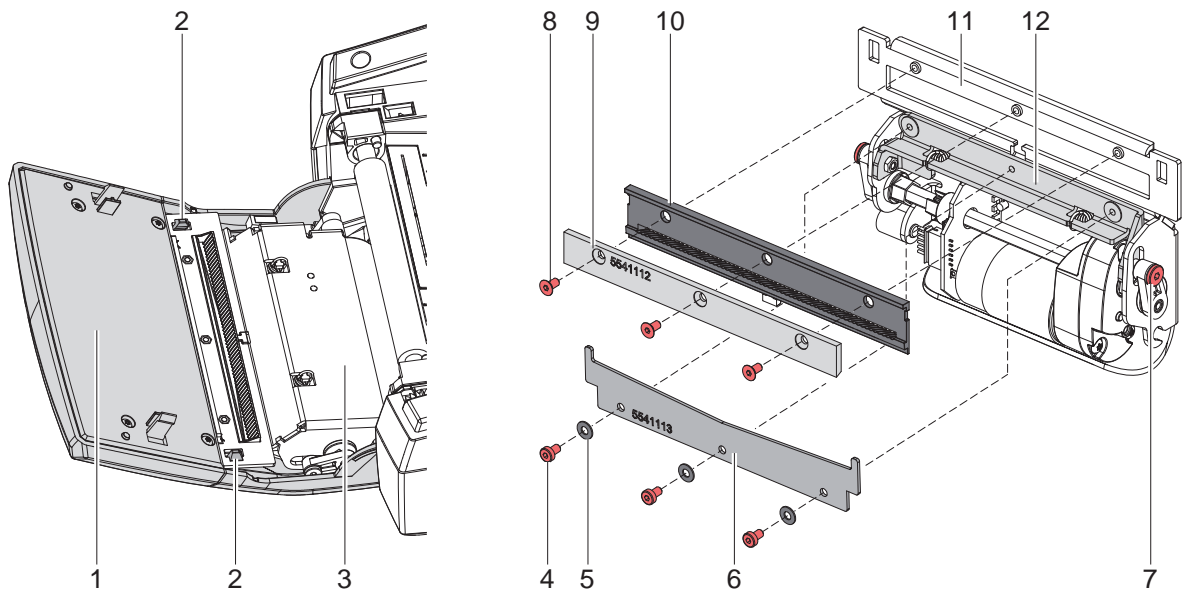


Fig. 10 Changing the blade of the cutter unit

**Danger!****Danger of lacerations!**

► Do not touch the blade without protective measures.

1. Fold down the control panel (1).
2. Release the cutter unit (3) by undoing the brackets (2) and fold it upwards.
3. Loosen the three screws (4) and the washers (5) and remove the bottom blade.
4. Loosen the three screws (8) and take off the top blade and the material guide (10).
5. Screw a new top blade and paper guide (11) to the base plate.
6. Screw a new bottom blade to the bracket (12).

**Note!**

If only the top blade (9) needs to be replaced the camp (12) with the bottom blade (6) can be hinged up from the top blade by turning the screw (7) with a hexagonal key 2.5 mm.

**Danger!****Danger of lacerations and crushing limbs!**

► While folding the panel up or down particularly when the panel is folded down the springs at the clamp are under high tension. Do not reach between the blades.

2.11 Changing the Circuit Board

**Danger!**

Danger of electrocution.

- Before opening the pinter cover disconnect the device from the power source and wait at least one minute until the device has discharged the remaining residual energy.



Fig. 11 Changing the CPU circuit board

1. If possible save the printer configuration onto an external memory medium ► Printer configuration.
2. Disconnect the printer from the power supply.
3. Disconnect all interface cables from the back of the printer.
4. Remove all removable storage mediums.
5. Remove the printer cover (► 2.3 on page 8).
6. Disconnect all push on connectors (3-7, 9) from the CPU circuit board.
7. Remove the four screws (2) of the circuit board.
8. Insert the new CPU circuit board (1) with the previous four screws (2) whilst connecting the ground wire (8).
9. Reconnect all the push on connectors (3-7, 9) to the circuit board.
10. Reassemble the cover (► 2.3 on page 8).
11. Reconnect all interface cables from the back of the printer.
12. Reestablish the power connection.
13. If required, guide the device through an update.
14. Synchronize the light barrier ► Configuration Manual.
15. If possible, load the settings from the removable storage device via the control panel ► Configuration Manual.

2.12 Changing the Power Supply

**Warning!**

Risk of death by electrocution!

- Before opening the cover plate remove the device from the power supply and wait at least one minute until the residual energy has dissipated.

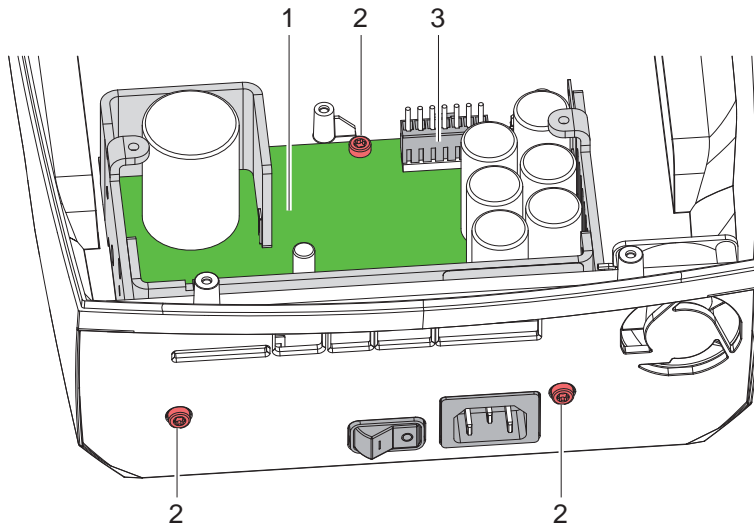


Fig. 12 Changing the power supply

1. Remove the printer from the power supply.
2. Dismount the cover with the lid (▷ 2.3 on page 8).
3. Remove the CPU circuit board (▷ 2.11 on page 17).
4. Pull off the push on connectors (3).
5. Undo three screws (2).
6. Dismount the power supply (1).
7. Insert the new power supply (1) and fasten it with screws (2).
8. Connect the push on connector (3).
9. Reassemble the CPU circuit board.
10. Reconnect the cover and lid.

3.1 Measuring the Winding Force

The measurement of the un- and re-winding torque of the ribbon is determined by the tensile force on the test material that is connected to the ribbon retainer.

The physical connection between the torque and tensile force is as follows.

$$F = M / r$$

F: force [N],

M: torque [Ncm],

r: Radius of the test material (30 mm)

3.1.1 Testing the Winding Force of the Clutch and Break of the Ribbon

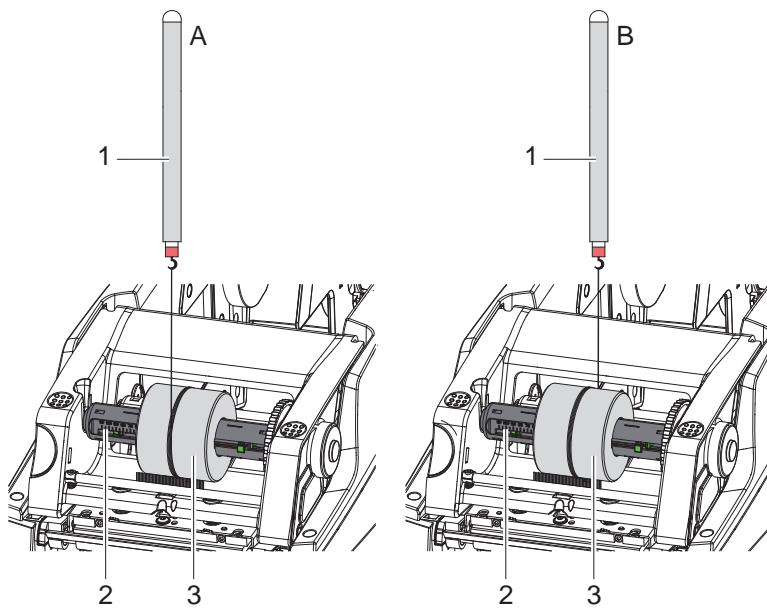


Fig. 13 Testing the winding torque of the clutch and break.

Target Value	Measurement	Torque M	Force F
Clutch of the rewinder ribbon	A	14,4 - 17,4 Ncm	4,8 - 5,8 N
Break of the rewinder ribbon	B	2,7 - 4,5 Ncm	0,9 - 1,5 N

1. Place the test device (3) on the ribbon retainer (2). Note that the Spring tip must be placed in the groove of the ribbon retainer for a true result.
2. Close the printhead assembly group and employ the spring scale connecting it to the rewinder with the test device (3) inserted.
3. To measure the clutch force wind the string around the test device (3) numerous times as illustrated in **A**.
4. Connect the spring scale [10 N] (1) to the end of the string and move it upwards vertically until the test device starts to turn.
5. Unravel the string at least one full revolution of the test device and measure the force F of the clutch from the spring scale.
6. If the torque deviates from the target values set it anew. (▷ 3.2 on page 21).
7. To measure the breaking force wind the string around the test device (3) numerous times as illustrated in **B** and repeat the process.
8. If the force of the breaking force deviates from the target values the break need to be replaced as there are no settings possible. (▷ 2.7 on page 13).

3.1.2 Measuring the Breaking Force of the Unwinder

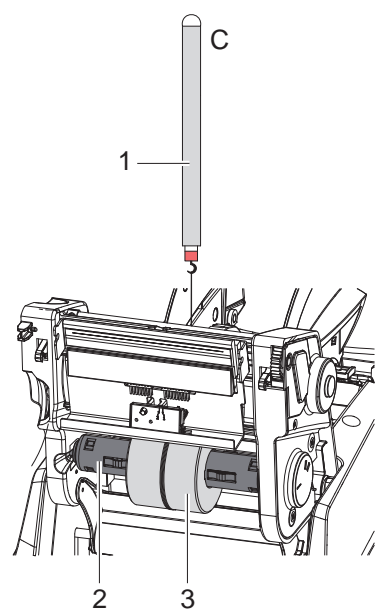


Fig. 14 Measuring the breaking force of the unwinder

Target Value	Measurement	Torque M	Force F
Break of the unwinder ribbon	C	3,9 - 4,5 Ncm	1,3 - 1,5 N

1. Insert the test device (3) onto a ribbon retainer (2). Note that the Spring tip must be placed in the groove of the ribbon retainer for a true result.
2. Open the printhead assembly group and insert the ribbon retainer (2) with the inserted test device (3) onto the rewinder.
3. To measure the breaking force wrap the string around the test device (3) as illustrated in **C**.
4. Connect the spring scale [10 N] (1) to the end of the string and pull it upwards vertically until the test device starts to turn.
5. Pull until the test device complete a full revolution and measure the force F of the break.
6. If the results deviate from the target values change the settings.(▷ 3.2 on page 21).

3.2 Setting the Winding Force

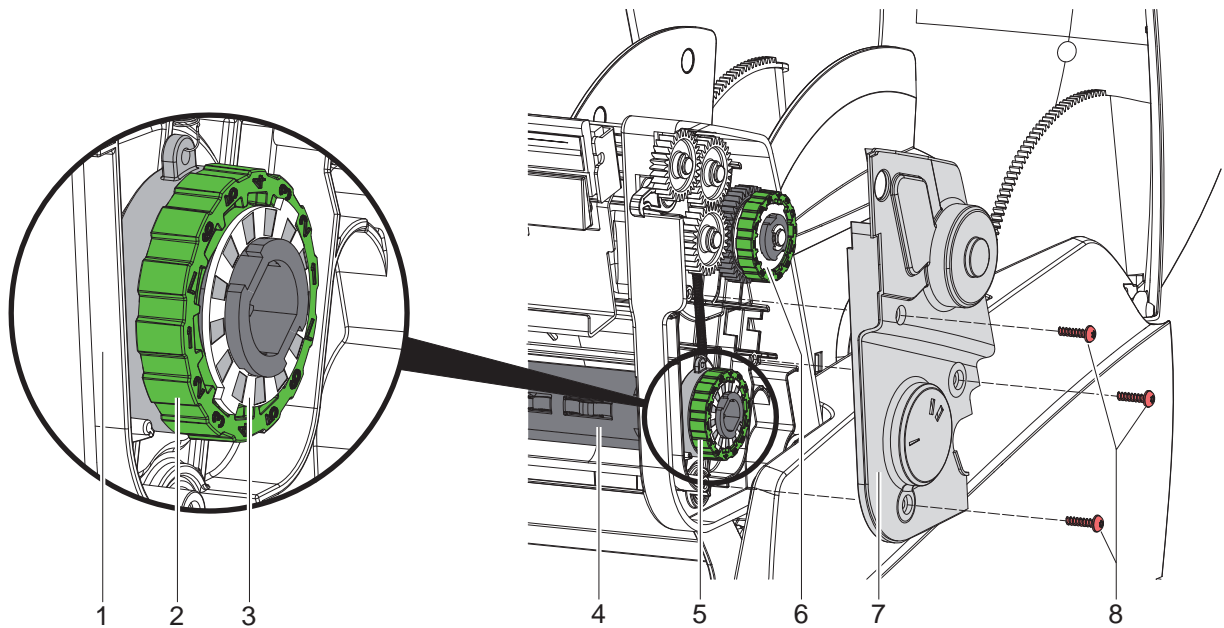


Fig. 15 Setting the winding force

The settings of the winding force of the break (5) of the unwinder and the clutch (6) of the rewinder is done in the same way.

1. Insert the ribbon retainer (4) onto the winders.
2. Fold the printhead assembly group up and undo the three screws (8) and remove the cover (7).
3. Hold the ribbon retainer, push holder (2) towards the frame (1) turning it to the desired position and let go, taking note that the straps of the locks (3) are all the way in the provided gaps.
4. Test the winding force again and compare it to the these to the test values and correct if necessary.
5. refasten the cover (7) with three screws (8).

**Note!**

The numbers of the retainer (2) are not setting values. They are an orientation when setting the winding force.

► 1: smallest winding force, 7: largest winding force

3.3 Adjusting the Print Mechanism

Changing the settings of the printing mechanism over and above a format change is only necessary when something other than the printhead is exchanged or if the printhead assembly group has been demounted or altered.

The following identifiers point towards resetting the printing mechanic:

- Printed image too light
- Printed image blotchy or spotty
- Printed image too light on one side
- Horizontal lines not parallel to the to the label edge
- Clear sideways drift of the ribbon



Note!

Check the ribbon as creases in it may cause image errors.

3.3.1 Adjustable Elements

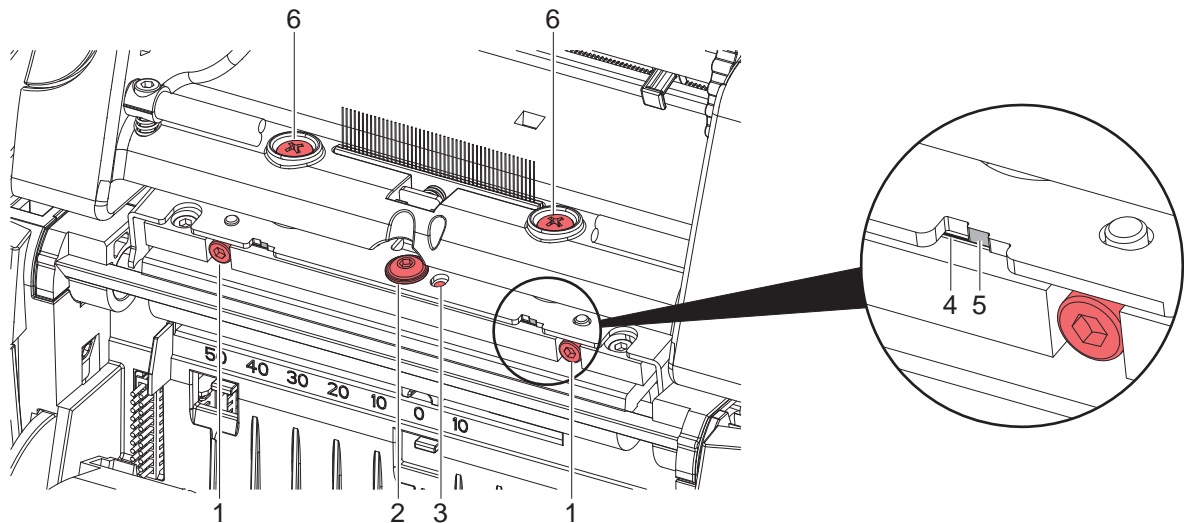


Fig. 16 Adjustable elements

Screws for horizontal settings (1)

- Turning the screw clockwise will move the printhead forward.
- Turning the screw counter clockwise will move the printhead backwards.

For an optimal image the heat element must be set to align to the highest point of the pressure roller. In this position the print image blackening is at its best. Besides that this setting allows the realignment of horizontal lines with the dispensing edge.

Screws for setting the printhead (6)

- Turning of the screws in a clockwise fashion lessens the printhead pressure to the corresponding side.
- Turning the screws counter clockwise increase the pressure.

Increasing the pressure of the print by turning screw (6) counter clockwise will darken the image on the corresponding side and shift the ribbon flow toward the opposite side.



Attention!

Turn the screw (6) counter clockwise carefully as an excess will demount parts completely.

Screw for adjusting the camber (3)

- By turning the screw clockwise the printhead will be changed minimally in the center causing pressure in the middle of the printhead.

If all else fails to decrease creases in the ribbon the printhead can be altered by turning the screw clockwise. It is recommended to proceed with the utmost caution when performing these alterations.

**Attention!**

Danger of causing damage to parts of the device.

As soon as there is a distinguishable resistance when turning the screw do not turn it more than another 90°.

The result is that the image will be lightened along the outside edges of the image compared to the middle.

3.3.2 Settings

1. Insert material (labels and ribbon) that covers the entire printing width.
2. Configure the printer to heating power 0 and printing speed 100 mm/s.
3. Turn the camber screw (3) counter clockwise until the resistance subsides. This should be about half a revolution.
4. Undo screw (2) and by turning screw (1) align the marking (4) to the middle segments (5) of the graduation.
5. Perform test prints with "test grid" labels or the like.
6. If the horizontal lines of the test grid are not parallel to the label edge adjust the alignment with screw (1).
7. Use screw (6) to adjust the printhead pressure. Turn the screw only until turning becomes easier.
8. Reduce the heat of the heating element so far that the printed image is light. By doing misalignments become easy to spot.
9. Test via a grid print increasing the pressure of the side of the printhead where the image is lighter. This is achieved by turning the screw (6) counter clockwise by about a quarter revolution or until the printed image appears evenly printed.
10. Turn screw (1) counter clockwise and push the printhead backwards until the printed image almost disappears. Now turn screw (1) clockwise until the image has reached it darkest value. Take note of the horizontal alignment.
11. Fasten screw (2).
12. Check the ribbon uptake. If the ribbons runs to the right turn the right screw (1) by a quarter revolution counter clockwise. If the ribbon runs left turn the left screw (1) counter clockwise by a quarter revolution. Test the ribbon uptake after every adjustment and wait until it has stabilized before attempting further adjustments.
13. In the case of creasing on both edges simultaneously adjust the camber of the printhead. For this carefully turn the screw (3) clockwise. Turn this screw as little as possible. A slight decrease in printing strength of the image may be expected.

**Attention!**

Danger of causing damage to the device.

As soon as there is a distinguishable resistance when turning the screw do not turn it more than another 90°.

14. If there is no camber adjustment necessary turn screw (3) clockwise until it clamps down minimally.
15. Turn down the heating energy in the configuration to 0 and test these results of the previous adjustments. With normal cab-standard material a clearcut, solid black printed image should have been achieved.

4.1 Failure of Device Functions

Function error	Possible solutions
No material transport	Check electronic connection between the CPU circuit board and the motor
	Check the drive mechanism
	Exchange the CPU circuit board
	Exchange the motor
No printed image at material transport	Check connectors of the printhead
	Inspect the printhead cable for damage
	Exchange the printhead
	Exchange the CPU circuit board
Display does not work	Check the cable connection between the CPU circuit board and the control panel
	Swap out the display
	Exchange the CPU circuit board
No communication over the interface	Check the connection from the printer to the computer
	With Ethernet connections check the validity of the IP address and the subnet mask.
	Check, and if necessary change, the interface cable
	In case of complete outage exchange the CPU circuit board
A peripheral device does not work	Check if the peripheral device is connected via programming
	Ensure the USB cable of the peripheral device is working and exchange it if necessary
	Test the peripheral device
	Exchange the CPU circuit board

Table 1 Failure of device functions

4.2 Permanently Occurring Hardware Errors

Error message	Cause	Solution
<i>Printhead thermistor defect</i>	Thermistor of the printhead broken	Exchange the printhead
<i>Voltage error</i>		
V_{BAT}	Voltage of the battery on the CPU circuit board too low	Exchange the CPU circuit board
24 V	24 V too little	Check voltage at measuring point +24V ▷ Fig. 18 on page 26: <ul style="list-style-type: none"> Voltage too low: Swap out power supply Voltage sufficient: Exchange the CPU circuit board
24 V TPH	24 V too low for printhead	Check voltage at measuring point +24V TPH ▷ Fig. 18 on page 26: <ul style="list-style-type: none"> Voltage too low: Swap out power supply Voltage sufficient: Exchange the CPU circuit board

Table 2 Hardware errors

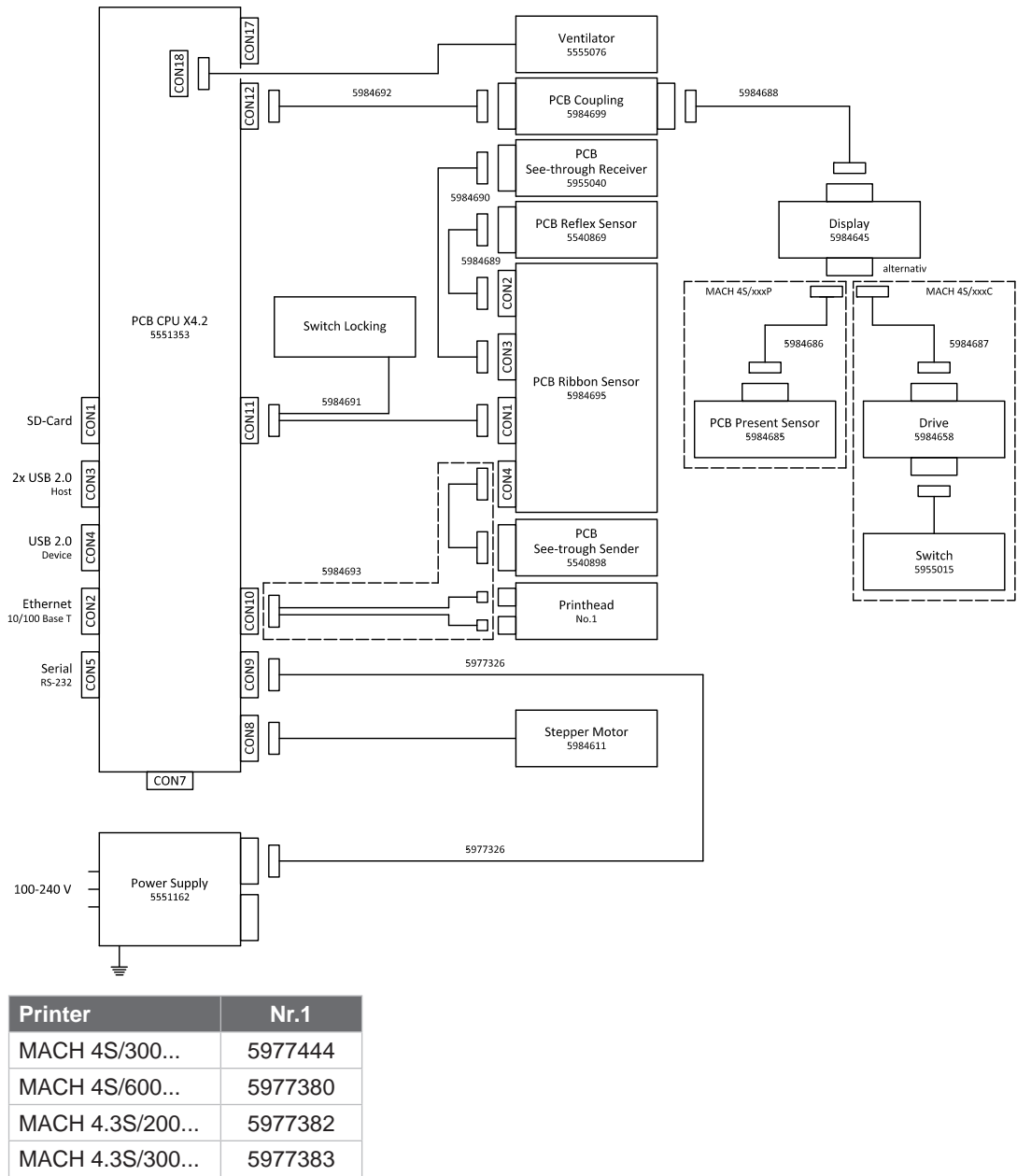


Fig. 17 Block diagram

A

Adjustable elements22

Adjusting the print mechanism22

B

Block diagram.....25

C

Changing the brake
of the ribbon unwinder 14

Changing the clutch and brake
of the ribbon rewinder..... 13

Changing the control panel.....7

Changing the drive of the cutter15

Changing the power supply 18

Changing the printhead 10

Changing the print mechanism.....9

Changing the print roller 12

D

Dismounting the cover.....8

F

Failure of device functions.....24

G

General safety5

M

Measuring the breaking force
of the unwinder20

Measuring the winding force..... 19

P

Permanently occurring hardware
errors24

S

Safety markings.....5

Settings.....23

Setting the winding force21

T

Testing the winding force 19

Tools7