RLM 419p Dry Resist Laminator
Instruction for Use

Introduction

The RLM is a small but powerful dry film laminator especially made for small companies, schools, research and development departments. All commercial laminates for PCB manufacture and mould-etching part technique can be processed. Due to adjustable pressure control and adjustable laminating speed, solder mask application is also possible without problems.

Features:

- Electrically heated lamination rollers with uniform temperature distribution
- Adjustable lamination pressure
- Wrinkle free lamination due to separation of transport and heating rollers
- patented heating roller system with sturdy ceramic heating elements
- Infra-red sensors for fast and precise temperature control
- Easy and fast mounting of resist rollers of nearly all coil diameters
- Detachable inlet table for easy access to low resist roll
- step-less adjustable laminating speed
- digitally adjustable roller temperature with actual and set-point display and programmed control behaviour
- starting 2012: Reverse drive for transport

Technical Data

Lamination width max.:	400 mm
Transport width max.:	440 mm
Lamination speed:	0.2-1.2 m/min adjustable
Resist tension:	adjustable
Lamination pressure:	adjustable
Temperature range:	20-145 °C (factory set max. temperature 120°C)
Power supply:	230 V 50 Hz, 2 kW
Weight:	38 kg
Dimensions (W x D x H):	69 x 63 x 57 cm
Laminat mounting coil inner-Ø	75 and 133 mm (3" and 5 ¼"); max. laminate width 400mm
Board thickness:	0.3 – 5 mm
Board size:	Min 50 x 50mm; max. 450mm x endless

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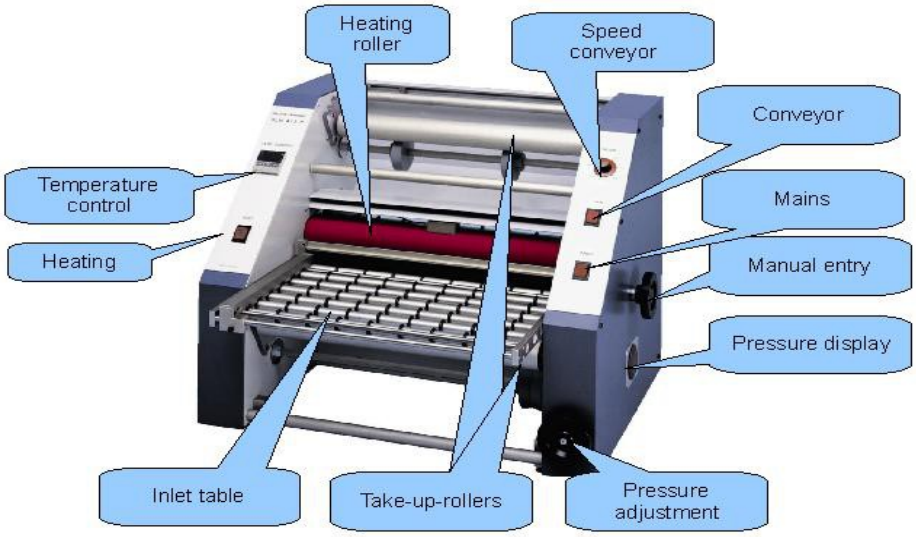
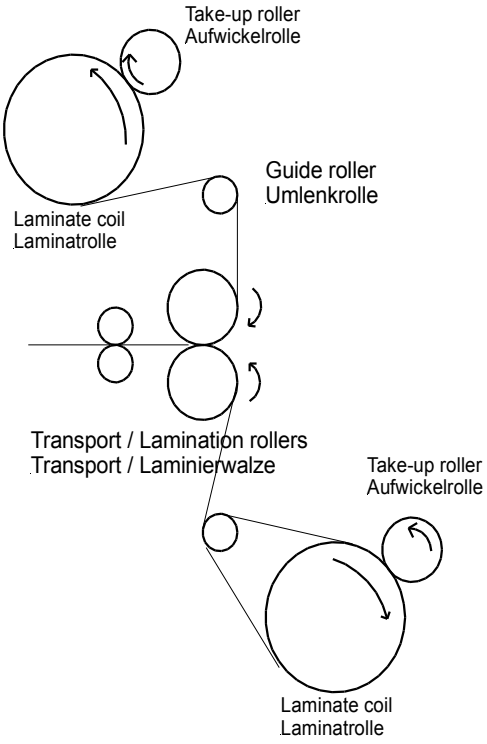
Short instructions



1. Examine the machine on delivery for any visible transport damage and if there inform shipping agent and us immediately.
2. Read the instructions carefully and follow the safety instructions. Read the information for the laminates and observe the material safety data sheets. Keep this manual in a safe place. It contains information you might later on for maintenance or cleaning.
3. Remove the packaging and set the laminator to its destination. Unpack all the accessories (2 hand wheels, power cord, 4mm Allen wrench, inlet table). Mount one hand wheel for pressure adjustment at the front of the machine and the other on the right side for manual board transport.
4. The photo laminates are light sensitive. For this reason, the RLM 419p is usually operated in a yellow light room. UV Filter foils and tubes can be purchased through us.
5. Connect the laminator to 230 V 50 Hz and do a functional test: turn on main switch - a welcome message with version number appears on the controller display. After some seconds the actual and the target temperature are displayed.
6. Turn on the transport and check the speed of adjustment.
7. Turn the heating on and control that the heating rolls warm up and the actual temperature increases in the display. Caution! Danger of burns! You can adjust the target temperature by pressing the "C" key and then use the arrow keys to adjust the desired temperature. Press OK (the green "Enter" key) to leave the temperature setting and store the value.



roller schematic

8. Mount either tenting resist or solder mask on both laminate rolls according to the roller schematic.
9. For tenting resist set pressure to 1-2 and temperature to 105°C. For solder mask set pressure to 4-5 and temperature to 115°C.
10. Set transport speed to 0.5 m / min and perform a laminating test.
11. Turn off the laminator and let the rollers cool down.

Safety Instructions

Please read the following text carefully and pay increased attention to the references on job safety and set-up. Deposit this instruction at a safe place. It contains information on maintenance or cleaning, which you will need later on as well.

Read the information for the laminates and observe the material safety data sheets.

The machines are not intended to be integrated or connected with other machines or plants. They may be operated only in appropriate areas and run only by qualified technical personnel. Children and pets are to be kept away!

Use the machine only for its intended application. This is laminating photoresist and solder mask for pcb production. Do not run the machine unattended.

Prepare preventive fire fighting measures, because the machine develops heat. Do not touch the heating rollers. Danger of burn! Don't put your fingers between heating or transport rollers.

Electrical connection

The machine is manufactured using certified parts according to the usual guidelines for electrical security. This does not release the user however of his duty to exercise diligence while handling electrically operated devices.

Avoid power peaks! Make sure heating and transport are switched off before turning on the unit. Set speed down to 0.4m/min before using the reverse transport switch. Do not quickly repeat switching on and off.

Before all maintenance work on the machine switch off the machine and pull power supply plugs.

Location

The laminator should be installed on a table where you have access to the front and rear side of the unit. Special care must be taken to avoid any UV light emission to the laminate. Even white light from normal room illumination will expose the laminate. We recommend that you install yellow safelight tubes or at least dim the room illumination during use and cover the laminator after it has cooled down. A good ventilation of the room, or even a separate air exhaust close to the laminator are recommended.

Operating

General

The laminator has control switches on the upper left and right side of the housing. To the right you see the main supply switch, the drive switch "RUN" and the speed adjustment potentiometer (4). To the left there is the digital temperature control and the HEATER switch (5).

The transport and heater switches are illuminated when turned on.

The thermostat has an LCD display and four buttons (6).

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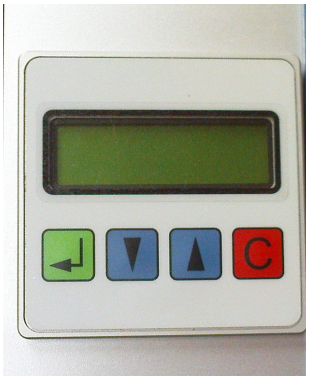
Heating

If you turn on the main switch a welcome message with version number appears on the controller display. After some seconds the actual and the target temperature are displayed. You can switch the heating on and off with the red switch called “Heater”. To adjust the temperature, press the red C button and use the arrow keys up and down to adjust the desired temperature. Then press the green Enter key. Thus the new set value is stored. A small "h" in the display indicates that the laminator is heating. If the "h" disappears, then the temperature is reached and the heating switches off. The current temperature is shown in the display.



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Temperature setting proposals are about 105°C for photoresist and 115°C for solder mask. You must determine the best setting for your application. If the temperature is too low the resist will not stick to the copper, if it is too hot the material develops vapours that could irritate your nose and throat, and the resist could lose its sensitivity to light or could be otherwise damaged.

The speed setting depends on the thermal conductivity of the material you want to laminate. As a starting value for your own tests we recommend a setting of 0.5 m/min on the potentiometer scale. A too fast speed can show the same defects like a too low temperature setting. Vice versa a too slow speed shows the same defects as a too high temperature.

Inserting the laminate

The knob at the right side of the laminator serves for turning the lamination rollers by hand (7). This is necessary because one important principal of construction of the RLM laminators is that the transport rollers are separate from the lamination rollers. So the knob serves mainly for feeding the laminate until the transport rollers can grab it. You will need this knob only once each time you mount a new coil.


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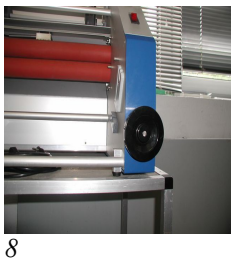
Pressure adjustment

The knob on the lower right front is used to adjust the lamination pressure (8). This is important as the RLM laminators can be used for solder mask application as well. A scale to read out the setting can be found on the outer right side of the unit, beneath the hand knob (8). In order to well press the mask into the profile between the copper traces, we recommend a setting of 4 to 5. Photoresist application is done at a setting of 1 to 2.

Attention: Set pressure to 0 every time you stop work, to avoid press marks on the rollers.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The positions 0 - 6 on the indicator scale (right hand side of the device) correspond approximately to the following values:

Scale position	Roller pressure	Application
0	approx. 4 kg	
1	approx. 6 kg	Tenting resist
2	approx. 8 kg	
3	approx. 10 kg	

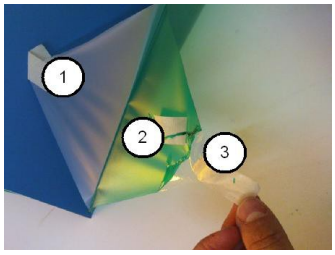
Scale position	Roller pressure	Application
4	approx. 12 kg	Solder mask
5	approx. 14 kg	
6	approx. 16 kg	

Mounting the laminate coils.

The following procedure is the same for photoresist and for solder mask laminate, but we assume you use only one type at a time on both the upper and lower coil.

Unpack the laminate rolls from their safelight boxes and mount them on the left flanges of the coil holders. See the roller schematic in order to have the right sense of coil rotation. Mount the right flanges and push them onto the coil as far as possible. The coils must not slip on the flanges. If the coils slip on the flanges, the separation foil might get between the heating rollers. Mount the coil holders back to the laminator and put the take-up rollers back in their place.

The laminate consists of three layers. These are the outer, strong and transparent polyester cover foil, the soft and sticky laminate layer itself and a thin, soft and mat plastic foil on the "inner" side of the compound. This thin foil prevents that the laminate sticks to itself when it is on the coil, but this foil must be removed before the laminate goes on the board. This separation foil will wind up on the take-up rollers.



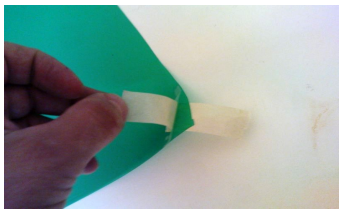
The picture on the right shows the three layers:

1 is the polyolefin-separation foil

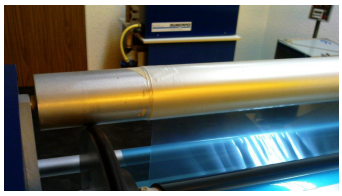
2 is the actual photo polymer

3 is the polyester-protection foil, that you normally remove before developing.

Pull the laminate off the lower coil for about 30 cm. Apply a piece of adhesive tape to the upper and lower end of the laminate compound and pull these "handles" to separate the thin separation foil from the laminate.



Put the take up roller back in its place on top of the laminate roller and fix the separation foil to the take up roller by adhesive tape. Repeat this procedure for the upper coil, with reference to the threading diagram (9). Make sure the take-up rollers are driven automatically by the rotation of the laminate coil.

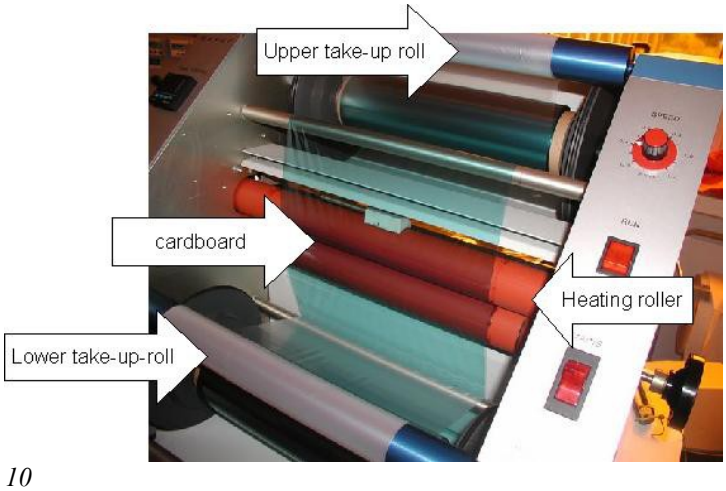


For the following step you will profit from two pieces of cardboard of approx. 300 x 300 size and 1 to 2 mm thickness.

Turn the laminator main supply on. Leave the heater and drive switch off.

Let the top laminate hang loosely over the rollers. The protective foil faces to the heating rollers, the sticky photo polymer faces to the operator. Take the lower laminate and press it in proper alignment against the top laminate.

The laminate may not be sloppy or wrinkled. You will find the wrinkles on your board again. Now take a cardboard of 30 x 30 cm and 1 mm thickness. Push it against the laminate and further between the heating rollers (in opposite to a pcb a cardboard is soft and will not permanently deform the heating rollers).



Turn the hand wheel and thus promote the

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cardboard until you feel a firm resistance. This is the point where the board is due to enter between the transport rollers. The transport rollers can be seen from the back of the laminator. Set a speed of 0.5 on the scale and turn on the transport. Keep tension on the hand wheel until you feel that the transport rollers grab the cardboard.

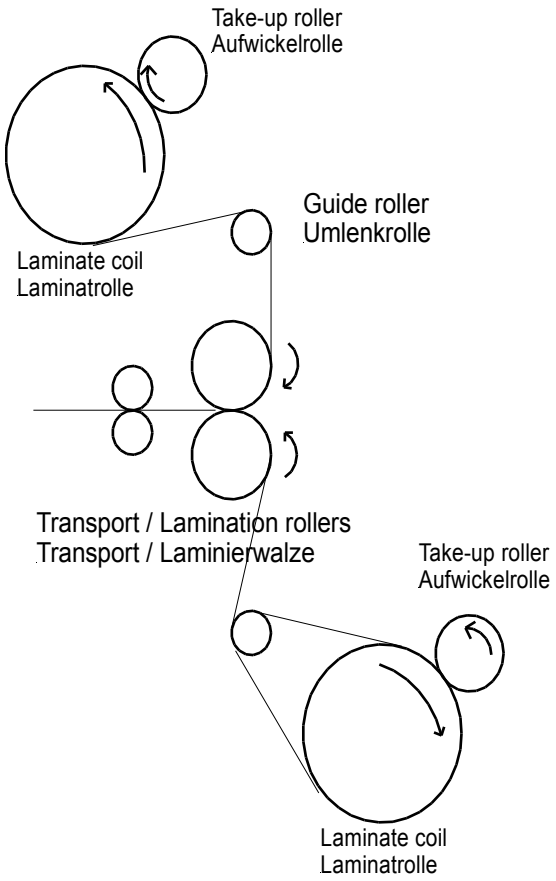
Stop the transport before the cardboard disappears completely between the heating rollers. Check that upper and lower laminate run congruent. If necessary, loosen alternately the left and right upper flange, and move these rollers till the laminate aligns properly.

If the laminate shows wrinkles after having shifted the flanges, please insert the cardboard one more time to enable the laminate to level out.

The loaded laminate will look like in picture (10):

Finally, mount the inlet roller table: Lift it at its rear, insert the front end in the middle of the unit until it goes into the two lateral pins on the housing, and lower the rear end until this snaps onto the pins as well.

It is assumed that at the end of each job you leave a piece of cardboard between the lamination rollers. This serves to keep the lamination rollers clean from molten laminate.



Roller schematic

Laminating

Now you can start operating the machine:

Turn the heaters on. Set the desired temperature and wait until the unit has heated up. Set the pressure and speed and start the transport. Let the cardboard leave the lamination rollers. Insert a PC board through the brushes of the inlet table and push it slightly until it is taken by the lamination rollers. If you do several PCBs at a time feed them one after the other with about 2 cm distance between them.

From the rear of the unit, cut the PCBs off one after the other using a sharp knife blade. Let the boards cool down before exposure.

The last sheet that you insert should always be the cardboard, with its end still between the lamination rollers. Turn the laminator off and let it cool down. If you have yellow safelight in the room you may leave the unit open. Otherwise you should cover the laminate coils from daylight.

Attention: Never cover a hot laminator!

Service and Maintenance

The laminator is almost maintenance free. It only needs cleaning, especially if there was laminate touching the lamination rollers. Use warm soapy water and a sponge to remove laminate rests from the roller surface. Never use hard or sharp tools. They could damage the silicone rubber.

There are no user serviceable parts inside the left and right blue coloured side compartments.

If once laminate should have wrapped around the transport rollers, you need to remove these side compartments to gain access to the drive sprockets.

Reverse drive for transport

New starting from 2012: If the laminate has wrapped around the transport rollers, up to now the side walls had to be removed and the rollers taken out. From year 2012, the RLM 419p is equipped with a "Reverse drive for transport button". Thus, the laminate can be easily re-moved from the laminator. The Reverse drive for transport button should only be used for this purpose! Avoid power peaks! Set speed down to 0.4m/min before using the reverse transport switch. Do not quickly repeat switching on and off.

Adjusting the Roller Brake

If you happen to notice that the transport rolls do not transport the laminate but slip, one possible reason could be a too strong roller brake. You can easily adjust this brake with an 4-size Allen key at the lower and upper laminate roll. You might have to remove the left case in order to fix the inner brake disk when turning the Allen key screw. If you turn clockwise the brake impact will be stronger, if you turn counter-clockwise, the brake impact will be less.

At the rear of the laminator is a white steel cover. Behind this cover there is the pcb with the motor control. You have to check the fuse which is mounted to the pcb, if the laminator does not transport the boards any more. Only exchange the fuse with a fuse having the the same values and characteristics.

Guarantee

All machines are submitted before distribution to examination on tightness, function and continuous operation firmness. On the machine we grant a work warranty of 12 months to our customers starting from purchase date on accuracy in material and processing. We warrant at our choice by exchange of incorrect parts or by repair of the machine in our house. Old parts change into our possession.

Disclaimer of warranty

All parts subjected to wear and the heater element are excluded from this warranty. Any direct or indirect damage resulting from over-heat or chemical reaction shall void all warranty claims. This also applies to defects to the machine caused by non-observance of this manual or of parts of it. Unauthorized repairs or interventions to the machine will result in the loss of all warranty claims.

We cannot accept subsequent claims from damage or destruction of workpieces worked on in the machine, because we have no knowledge or control over the operating conditions at your site. This is valid in a general manner also for requirements from damage to articles, buildings and persons as well as the environment.

We do not warrant that the function of the machine will meet the customer's requirements or that the operation of the machine will to this regard be error free.

In no event will we be liable to the customer for any incidental, consequential, or indirect damages of any kind, including loss of profit and prosecution for environmental pollution, even if we could have been aware of the possibility of such damages.

All information was arranged with great care. We reserve ourselves however mistake and technical changes without previous announcement.

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