

# Operating & Maintenance Instructions

## 1210 Vacuum Forming Machine

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# 1. Introduction

The 1210 will produce professional, quality and high definition vacuum formings on a smaller scale as required by model makers, development engineers and students quickly, efficiently and consistently. The machine embodies design features, manufacturing techniques and proprietary component specifications unique to our equipment. The following instructions will guide you through installation and use, please read and implement them carefully and if any further help or advice is required do not hesitate to refer back to our Technical Sales Department for assistance.



## 2. Installation

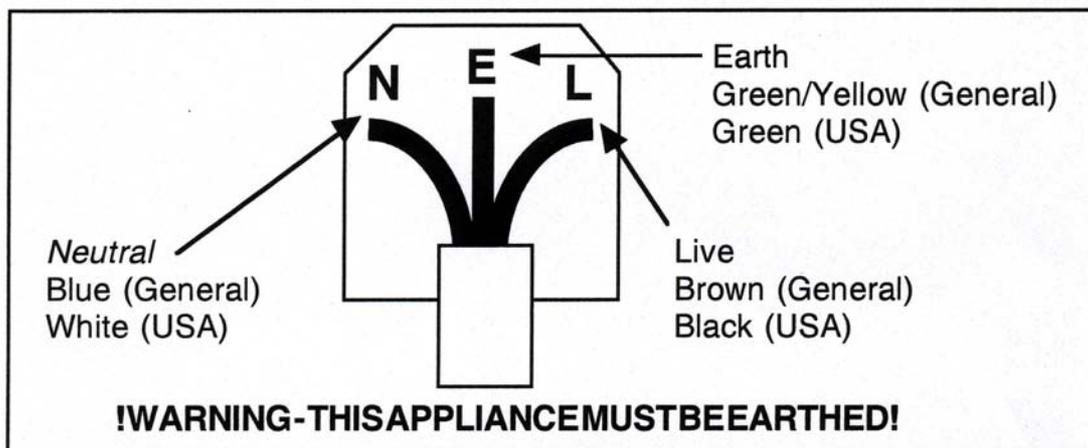
All 220-240V machines are fitted as standard with BS 1363A 13A moulded on plug tops, suitably fused. Non UK customers will need to replace the plug supplied and fit one compatible with local requirements. 110-120V machines will require a plug to conform with BS 4343 for low voltage supplies, a 1000VA supply will be required. Electrical supply to the unit must be in accordance with the details shown on the rating label.

In the event of plug replacement, for whatever reason, connections must be in line with the following:-

### !IMPORTANT!

The wires in this mains lead are coloured in accordance with the following code:

General	Earth	USA
Green & Yellow		Green
Blue	Neutral	White
Brown	Live(Hot)	Black



### General

The green and yellow wire must be connected to the terminal marked with the letter E, or the earth symbol, or coloured green and yellow or green.

The blue wire must be connected to the terminal marked with the letter N, or coloured blue or white.

The brown wire must be connected to the terminal marked with the letter L, or coloured brown or red.

### USA (115V)

The green wire must be connected to the green pin (the largest).

The white wire must be connected to the silver pin.

The black wire must be connected to the brass pin.

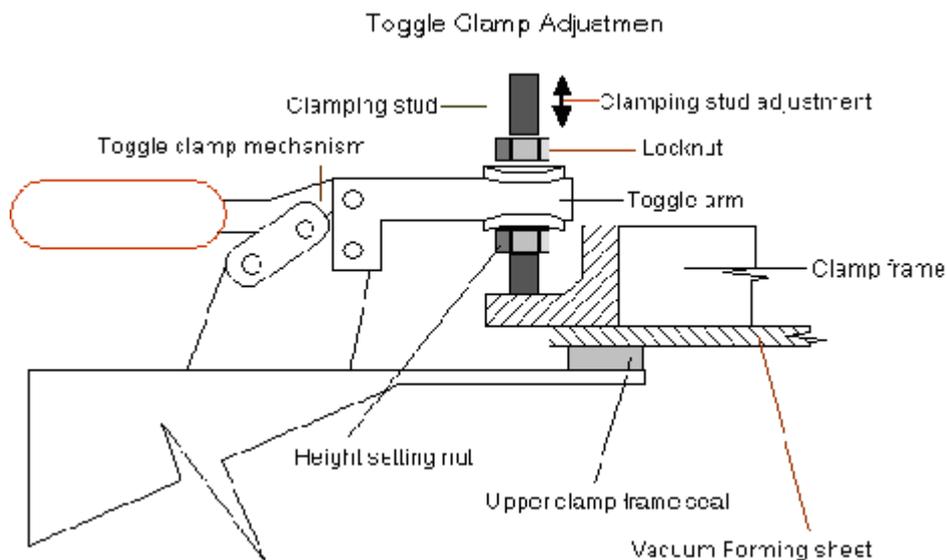


**Warning - read instructions before installation and use.**

**If in doubt about electrical supply or connection refer to your supplier or consult a qualified electrician.**

### 3. Before Starting

Remove the machine from the packaging. Position on a suitable bench and remove packing pieces from the rear of the clamp frame. Adjust the toggle clamps using the M4 locknuts so that they can be clamped comfortably but firmly when a thermoplastic sheet is in place.



#### Toggle Clamp Adjustment

Become familiar with the controls and their operation before using the machine. Sometimes it's a good idea to carry out a 'cold run' without material, to get used to the sequence in which the controls are used during vacuum forming.

## 4. Controls

Heater Canopy - Covers the heater hood when it is in the idling position.

Heater Hood - contains the ceramic element system, is pulled towards the front of the machine for the heating cycle.

Heater Slide Bars - on which the heater hood is mounted.

Clamp Frame - swings down to clamp a sheet in place and up to release it.

Toggle clamps - secure the clamp frame in place over a sheet ensuring an air tight seal.

Heat Output Indicator - illuminated when the heaters are energised; pulses on and off in a 60 second cycle when Energy (Heat) Regulator is below full.

Vacuum/Blow diverter valve - converts the air flow at the platen from vacuum to blow for releasing formings at the end of the vacuum forming process. At rest - vacuum. Pushed - blow.

Vacuum Pump On/Off switch - turns the vacuum pump on and off.

Energy (Heat) Regulator - regulates the power supplied to the elements.

Circuit Breakers - protecting the vacuum and heater circuits, they 'pop up' if there is a system overload. Push in to reset.

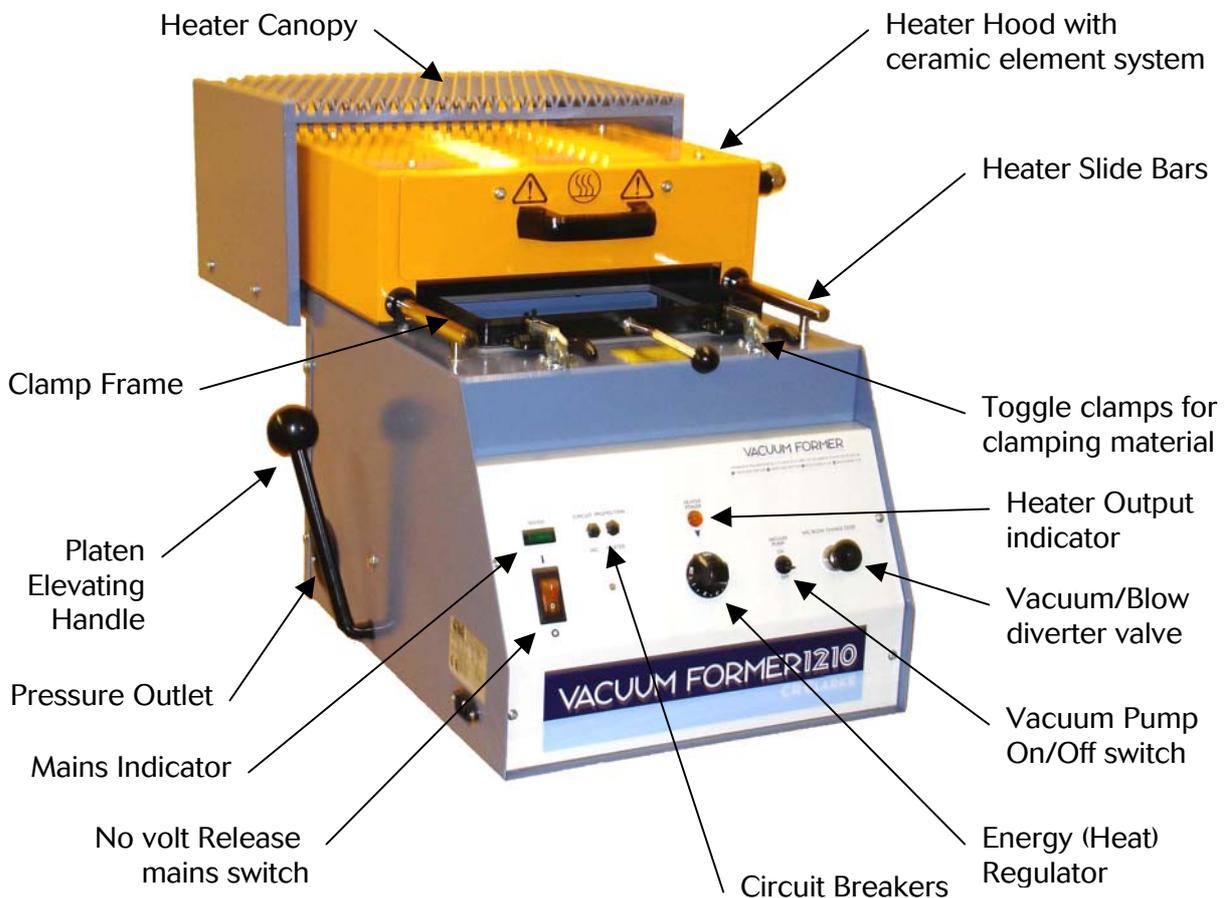
No Volt Release Mains Switch - makes power available to the machine. It will cut out and need to be reset if the power supply is interrupted. I=on, O=off.

Mains Indicator - illuminated green when there is power available to the machine.

Platen Elevating Handle - lifts and lowers the platen.

Pressure Outlet - for connecting Dip Coating Units (150R) and Dome Blowing Units (320).

Platen - moving platform onto which the mould is placed. Connected to the vacuum pump. Operated by the Platen Elevating Handle.



## 5. Health & Safety Information

The Heater Hood can become hot during use, as indicated by:



Always wear protective gloves when operating the machine.

This equipment is designed for the vacuum forming of thermoplastic sheet material of 6 mm or less thickness. It should not be used for heating any other materials or for any other process - except the supply of air for use with other compatible units via the Pressure Outlet.

Do not cover or place items on the Heater Hood and canopy while the machine is in operation or cooling down as this might impair ventilation and could lead to items becoming burnt or melting.

Do not leave the machine unattended while it is in use.

## 6. Machine checks

Plug the machine into a suitable supply, switch on at the socket and the green Mains Indicator will illuminate. Switch on the No Volt Release Mains Switch. The switch is illuminated orange when in the 'On' position.

Set the Energy Regulator to full, the Heat Output Indicator will illuminate, showing there is power to the heaters, and they are warming up. This setting will be suitable for vacuum forming most thermoplastics but, in some cases such as thick materials or foams, one of the lower settings may be needed.

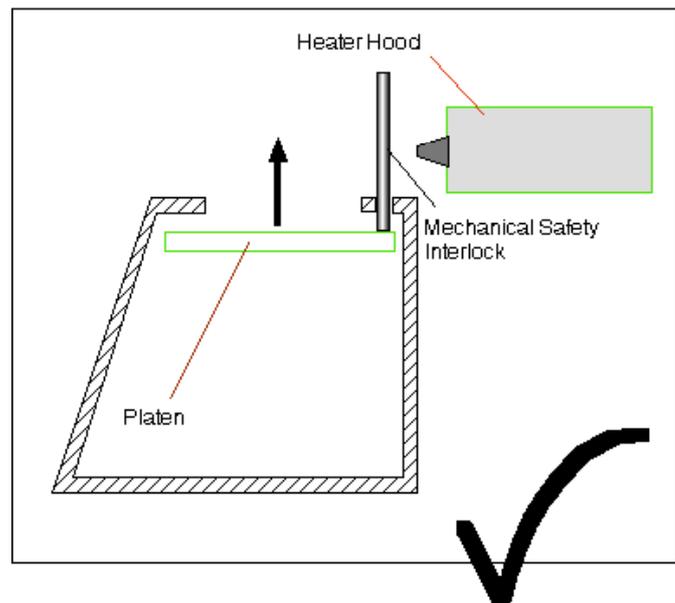
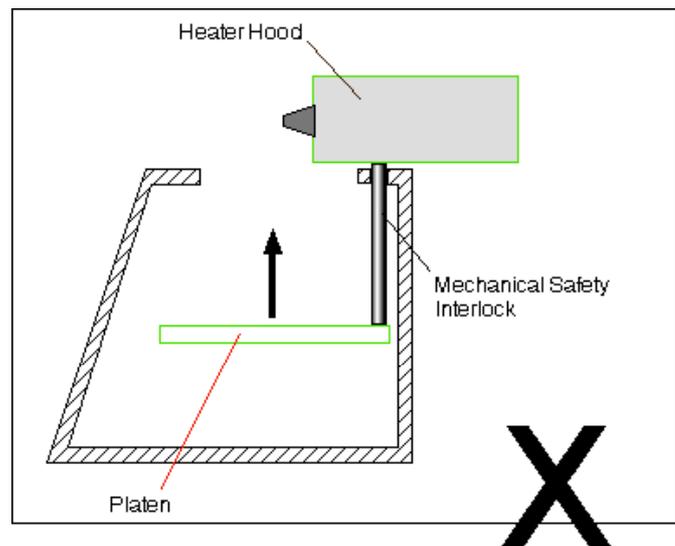
Set the Energy Regulator to off with power to the machine and switch on the vacuum pump, you will be able to hear it running.

Operate the vac/blow plunger knob and observe the different note caused by the air flowing in different directions through the platen. Turn the vacuum pump off.

Slide the heater hood fully forward to the stop and return to the idling (fully back) position, to make sure there are no obstructions to the slide track.

Pull the Platen Elevating Handle down, towards the front of the machine until it clicks into the over-centre locked position. In this position the platen will be locked in the raised position to form an air-tight seal on the under side of the clamp frame seal. Release the handle by pulling it upward - keep your hand on the handle and take care not to let it drop once it has gone back over centre (all the weight of the platen and mould is on the handle at this point).

A mechanical safety interlock is fitted to prevent the platen being raised and damaging the heaters when the Heater Hood is in the heating position. If raising the platen meets with any resistance DO NOT FORCE IT. Check that the Heater Hood is in the idling position first and then check for other obstructions.



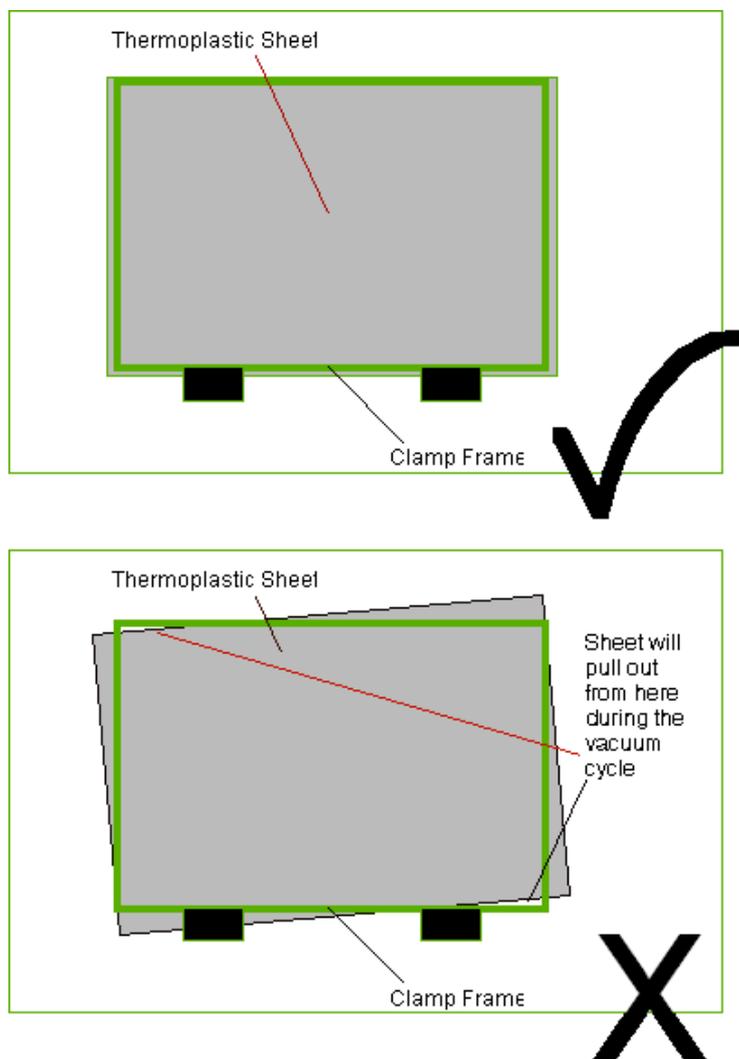
The mechanical safety interlock

## 7. Elements of the forming process

Turn the machine on as described in the previous section and turn the Energy Regulator to the desired setting. The heaters will take 10 - 15 minutes to warm up.

Place a mould mounted on a base board 204 x 280 mm on the platen\* and make sure that the platen is in the lowered position.

Place a thermoplastic sheet over the silicone rubber Clamp Frame seal, lower and clamp the Clamp Frame. Make sure that the clamp frame does not overhang the sheet at any point on it's perimeter ie. that material can be seen on the inside and the OUTSIDE of the clamp frame.



**Positioning a sheet under the clamp frame**

\* see our technical information sheet no. 4 for information on mould making and base boards.

Pull the Heater Hood to the front of the unit - over the thermoplastic sheet - and begin heating. As the material gets hot it will soften. It is ready for vacuum forming when you can easily make an indentation in the sheet with a blunt instrument, such as a screw driver handle (don't use your fingers!) or you can see the sheet sagging under its own weight\*\*.

When the sheet is ready:

Turn on the vacuum pump

Slide the Heater Hood back to its idling position

Raise the platen using the Platen Elevating Handle until it is locked in the up position - the material will drape over the mould before being pulled down onto it once the platen is locked in position.

As soon as the material has pulled all the way down over the mould, press the Vacuum/Blow Diverter Valve. The reverse air flow will push the material off the mould and it will go out of shape. This is normal and it will recover the shape of the mould as soon as the Diverter Valve is released and the vacuum pulls the material down again. Using the Blow function like this prevents the forming gripping the mould and makes subsequent Blowing operations easier. The Blow function only needs to be used for a few seconds - as soon as the forming has released from the mould, revert back to vacuum ie. let go of the Vacuum/Blow Diverter Valve.

Continue the Vacuum/Blow cycle (ie. when the forming has pulled down fully press the Vacuum/Blow Diverter Valve until the forming releases from the mould, then revert to Vacuum) until the forming has cooled and is rigid.

Release and lower the platen and switch off the Vacuum Pump. If the mould remains inside the forming, lock the platen in the up position again, turn on the Vacuum Pump and operate the Blow function before lowering the platen again.

Release the Clamp Frame Toggle Clamps, lift the Clamp Frame and remove the completed forming from the machine.

**The unit can be operated on a continuous basis, however, remember to turn the unit off at the No Volt Release Mains Switch when not in use.**

\*\*It is a good idea to record the time it takes for sheets of particular materials and thickness to reach vacuum forming temperature. These times can be used for subsequent formings, removing the need to test the sheet's readiness by hand. When recording times make sure the machine is up to its full operating temperature ie. it has been in use for more than twenty minutes

## 8. Problems with vacuum forming

Following are some of the common problems and their solutions associated with vacuum forming.

### Sheet Doesn't Pull Down over the Mould

Air may be trapped between the mould and the sheet - check that you have enough evacuation holes (resin and aluminium moulds only).

The sheet may not be hot enough - increase the heating time or power output.

The clamp frame or platen seals may need replacing - check and renew if necessary (see Fault Diagnosis later).

The vacuum pump filter may need cleaning/replacing.

The sheet may be cast acrylic, which does not vacuum form very easily or to very high definition.

### Sheet Burns or Blisters

The sheet may have become too hot - reduce the heating time or power output (turn down the Energy (Heat) Regulator).

The sheet may be hygroscopic\* and moisture in the sheet is causing it to blister, - dry the sheet thoroughly before heating.

If the sheet is thick (over 5 mm) it may need more time for the heat to soak all the way through - reduce power and increase the heating time.

### Sheet Pulls out of Clamp Frame when Raising the Platen & Mould

The sheet was not positioned correctly - see page 6.

The sheet was not hot enough - increase the heating time.

The material may not be vacuum formable - check source and type.

The mould may be too large or its edges too close to the perimeter of the forming aperture - modify the mould design.

### Webbing Occurs on the Finished Forming

The sheet may have got too hot and sagged too far during heating - reduce heating time or power output.

The design of the mould may need to be modified.\*\*

### Forming will not Release from the Mould

There may be undercuts on the mould which are holding the forming in place - check mould for undercuts.\*\*\*

The forming may have 'shrunk' onto the mould - start the blow cycle earlier.

The mould material may have bonded with the forming material - put a thin coating of silicone oil or similar on the mould before forming.

The mould may have become too hot - turn the machine off and wait for the mould to cool before attempting another forming.

The mould surface may be too rough - make sure there is a good, even finish on the mould before vacuum forming.

\* see our information sheet no. 1 Plastic Materials, page 1.3. Also see information sheet no. 3 Vacuum Forming, page 3.4 for details of which thermoplastics need pre-drying for vacuum forming

\*\* see our information sheet no. 4 Mould Making, pages 4.4 & 4.5

\*\*\*see our information sheet no. 4 Mould Making, pages 4.5

## 9. Fault diagnosis

Your 1210 should provide long and reliable service but in the event of any operational problems the following checks can be carried out to identify the source of any problems.

### Loss of vacuum

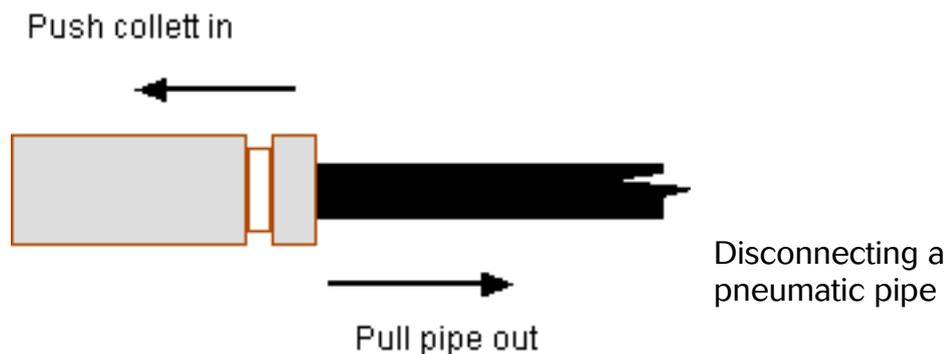
Are the toggle clamps adjusted so that an airtight seal is formed between the upper seal and the material?

Check that the lower platen seal is in good condition, stands proud of the platen edge by at least 2mm all the way around and forms an air-tight seal when the platen is elevated.

To check this, take a currency note and clamp it between the platen and the underside of the casing. The seal is good if it grips the note so that it cannot be pulled out. If the note can be pulled out without tearing it, then you need to replace the lower platen seal.

Remove the back cover and check that there are no loose or displaced pipes.

**IMPORTANT**-Disconnect from mains supply before removing any machine covers. The pneumatic lines are terminated by the use of push fit connectors. To release a pipe, push the pipe and collet firmly into the fitting and then pull the pipe out. To connect a pipe, push the end of the pipe firmly into the collet.



### Uneven heating

Ensure the machine is not in the path of any draught.

Check all heaters are intact. With the machine switched off and cold check each heater element by touching each one in turn. If one or more heaters is cracked or broken, note their position, size and wattage and replace.

Check all heaters are operational. Switch on the machine from cold and check each heater element is heating up by touching each one in turn within the first few seconds of powering the heater. If one or more heaters fails to heat up there may be a loose or corroded connection above the reflector. Note the element's position, size and wattage and replace.

### Failure to heat

If the complete heater bank is non-operational check the circuit breaker on the control panel. To reset push the circuit breaker back in.

Check the No Volt Release Mains Switch and replace if it is not operational.

Check the Energy Regulator and replace if it is not operational.

If all of the above are okay, unscrew the control panel, tilt it forward and check all the

cable terminations are intact and there are no loose wires. If any are found, refer to the wiring diagram in the back of this manual or refer back to your distributor or the manufacturer.

***IMPORTANT DISCONNECT FROM MAINS ELECTRICAL SUPPLY BEFORE SERVICING.***

**Non-operation of vacuum pump**

Check the circuit breaker on the control panel. To reset push the circuit breaker back in.

Check the No Volt Release Mains Switch and replace if it is not operational.

If both the above are okay, unscrew the control panel, tilt it forward and check all the cable terminations are intact and there are no loose wires. If any are found, refer to the wiring diagram in the back of this manual or refer back to the your distributor or the manufacturer.

**Mains indicator glows but goes out when main isolator/overload switch is operate.**

Check neutral connections within machine, power supply or extension lead (if applicable). Re-connect any loose connections.

**Low vacuum performance**

After considerable use (12 months continuous or equivalent) the vacuum pump flap valves or filter may become contaminated or blocked with residue from the forming process. Remove the control panel and identify the vacuum pump. Remove vacuum pump head and clean valves or replace filters as necessary.

***FOR SPARES AND ADVICE ON MAINTENANCE AND REPAIR, REFER TO YOUR DEALER OR THE MANUFACTURER.***

## 10. Technical specification

Cut sheet size	228 x 305mm
Max. forming aperture	204 x 280mm
Max. material thickness	6mm
Platen stroke	115mm
Vacuum (typical)	635mm
Width x Depth x Height	500x840x560mm
Weight	38kg
Heater system	Ceramic
Voltage	110-120    220-240
VA	1416    1416
Current (max)	12.9A    5.9A

***FAILURE TO OPERATE THIS EQUIPMENT IN ACCORDANCE WITH THESE INSTRUCTIONS MAY RESULT IN IMPAIRED PERFORMANCE OR FAILURE OF CERTAIN SYSTEMS***

