Formech Compac Mini – Vacuum former manual



Version overview:	
0.1	First draft
0.2	2nd Draft

Introduction

The Formech Compac Mini is a **vacuum forming** machine. Vacuum forming is a simplified version of thermoforming, where a sheet of plastic is heated to a forming temperature, stretched onto a single-surface mold, and forced against the mold by a vacuum. Normally draft angles are present in the design of the mold (a recommended minimum of 3°) to ease removal of the formed plastic part from the mold.

This document will contain all important information about how to properly use this machine within MakersPlayce.

Machine Expert	Contact	Date
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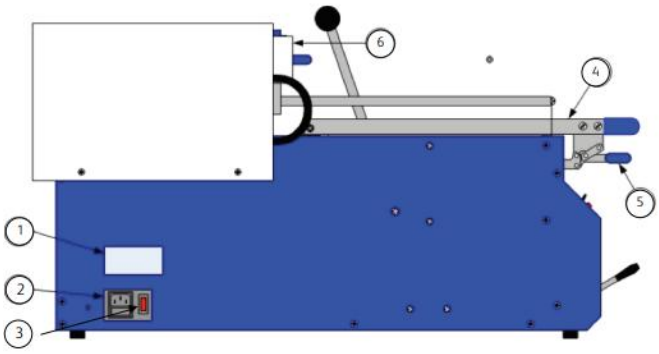
Safety rules and regulations

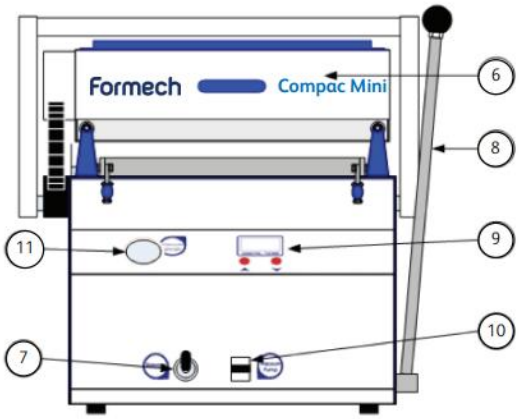
Please read and follow the below safety instructions before attempting to install or operate your machine.

- Do not operate the machine until you have been trained and are fully conversant with it.
- Read and understand all of this user manual.
- TURN OFF the machine when the machine is not in use.
- The heater and pump must NOT be left running indefinitely.
- Never remove any panels unless the electrical supply has been isolated.
- Always let the machine cool down before attempting to work on it. Some parts of the heater and heat shield become extremely hot during operation.
- Note the safety warning labels situated on the front and rear panels. Never remove any warning labels from the machine.
- Note the 'HOT SURFACES' safety labelling on the heater & heater guard. These areas can become VERY HOT.
- Only use the machine for vacuum forming plastic. It is not intended for any other purpose.
- Always turn of the fume extractor to properly ventilate the machine room and make sure that you are aware of the potential hazards from the plastics you are forming. It is the responsibility of the Machine Expert to assess the risks associated with any dangerous fumes given off and to determine any necessary precautions required such as fume extraction. Contact your plastics supplier to gain information regarding hazardous fumes.
- There is a risk of being burnt when handling heated plastics. Always allow at least 20 seconds to pass after forming to let the part cool down.
- Ensure that the area surrounding the machine is clean and frequently cleared of finished product and any scrap.
- This machine is fitted with a dry running vacuum pump.
    a) Do not lubricate.
    b) Do not allow any liquid to enter the vacuum system.
    c) Ensure that moulds are properly sealed to prevent ingress of dust into the vacuum circuit.
    d) Severe damage may be caused if the above is not observed.
- Users of this machine should complete regular competence tests.

Required knowledge before operation

No formal training necessary. The current machine expert is responsible to give required training when necessary.





1- Specification Plate
2- Power Inlet (EC)
3- Power Switch ON/OFF
4- Clamp Frame
5- Material Clamps
6- Heater Box
7- Vacuum / Pressure Valve
8- Table Lever
9- Digital timer
10- Vacuum Pump ON/OFF switch
11- Vacuum Gauge

Mechanical Specifications

Max Material Size:	305mm x 255mm
Max Forming Area:	280mm x 230mm
Max Depth of Draw:	125mm
Overall Width:	490mm
Overall Height:	440mm
Overall Length:	820mm
Weight:	35Kg

Materials and build specs

Give an explanation of what material can be processed in the machine and what advantages and disadvantages each material has. Also give the build specs, size, speed and overall information about what can be made

Materials:

The manufacturer recommends using Styrene and PVC sheets with a thickness from 1.5mm to 4.0mm. However, acrylic, polypropylene and polycarbonate can be used as well. The appropriate heating time depends on the material, the thickness, the colour and the surface finish. A warning is issued for using ABS as its surface may blister at high temperatures.

The following heating times are recommended by the manufacturer for styrene plates:

1.5mm	60 seconds
2.0mm	95 seconds
4.0mm	240 seconds

The maximum for area is 280mm x 230mm. The maximum depth of draw is 125mm.

Startup and Shutdown process

Step by step explanation of how to safely start up and shut down the machine, also how to prepare it for operation

Startup

1. Make sure the machine is plugged in. The plug is in the bottom left corner of the left side of the machine.
2. Switch the machine on with the power switch located next to the plug. The timer display on the front should turn on automatically.
3. Wait 5 minutes for the heating elements to reach operating temperature.
4. Make sure the heaters are completely retracted. (Pushed back into the machine)
5. Use the long lever on the right side of the machine to raise the table.
6. Place the mold (object you want to form) on the table.
7. Use the long lever on the right side of the machine to lower the table.
8. Open the clamps and place the plastic sheet. Make sure it covers the entirety of the hole so that it can form a seal.
9. Clamp the plastic in place.
10. Set the timer to the correct time by pressing the ‘up’ or ‘down’ buttons. In order to deactivate the timer, it must be set to 0.
11. Pull the heater over the plastic sheet. The timer will start counting down. You should see the plastic plate first rise a little, then lowers as it softens.
12. Push the heater back completely and turn on the vacuum pump with the switch on the bottom of the front panel.
13. Raise the mold table by pulling the long lever towards yourself.
14. Let the mold cool down a little bit before pulling the release lever next to the vacuum pump switch. This should help release the plastic from the mold. If the mold is still stuck to the plastic, let it cool down more, otherwise the plastic may deform.
15. Lower the table once the plastic is no longer stuck to the mold and turn of the vacuum.
16. Release the clamps and remove the finished form.

Shutdown

To shut down the machine, simply switch it off using the power button on the bottom left corner of the left panel. If the machine won’t be used for a while, consider removing the plug. If used correctly, there should be no mess to clean up.

Maintenance

This chapter states only how to keep the machine clean, lubrication and how to replace the seals. Other maintenance topics stated in the manufacturer operating manuals are: Replacing a heating element, Electrical troubleshooting and Vacuum/Pressure system troubleshooting. These topics involve the disassembly and replacement of parts. Please refer to the manufacturer for detailed information.

Cleaning

Ensure the inside of the machine and the heater tray is cleared of dust, dirt and debris. Do not allow dirt and loose particles to build up, particularly on the heater tray.

Replacing Seals

1. Remove all the existing seal and adhesive with a sharp blade. Mask off the sealing area with masking tape or similar (Mask the outside for top frames or reducing windows & the inside for table seals). Prepare the sealing area with emery cloth or similar to achieve a good surface for the new adhesive to key with. Ensure that the surface is clean from dust, dirt and grease.
2. Apply a generous bead of high modulus silicone sealant to the masked area and smooth down to give a consistent layer.
3. Cut the silicone strip in lengths long enough to overlap the corners. Do not stretch the seal strip when measuring or applying. Lay each strip on to the seal area overlapping at the corners. Ensure the seal strip is bedded down well by pressing firmly along the full length.
4. With a sharp blade cut a 45° mitre joint at all corners. Fill gaps in the joints with sealant. Remove the masking tape before the sealant has set. For best performance leave seal to set overnight.

Lubrication

The Compac Mini does not require much lubrication.

Only when the table does not move freely, apply general purpose grease to the guide bars. Only when the heater does not slide easily, apply silicon grease or fine oil the heater slide bars.

Fine tuning

To achieve the best results, multiple tests will have to be conducted per mold and per material type and thickness.
How to fine tune your timer settings:

1.

Common issues and fixes

The vacuum former is simple and straight forward. It does not have any consumables to replace.

Appendix

Formech
Perfectly formed

Desktop Vacuum Forming Machine

Compac Mini









Installation, Operating and Service Manual

For Parts, Service & Technical Assistance
Telephone: +44 (0) 1582 496 797
Fax: +44 (0) 1582 496 646

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Thank you for choosing Formech.
Please read and follow the below safety instructions before attempting to install or operate your machine.



> Do not operate the machine until you have been trained and are fully conversant with it.
> Read and understand all of this user manual.
> This is a 'single person operating' machine.
> Check your supply voltage and frequency. Make sure it is compatible with your machine. Your machine's electrical specification is on the plate on the right hand side.
> You must ensure that the machine is properly earthed and fused.
> If your machine is not equipped with a moulded mains connector then note that:

The earth wire is GREEN with a YELLOW stripe.
The live wire is BROWN
The neutral wire is BLUE

> Only suitably qualified personnel should make electrical connections
> Turn off the machine and disconnect the power supply when the machine is not in use.
> The heater and pump on this model are not intended to be left running indefinitely.
> Never remove any panels unless the electrical supply has been isolated.
> Always let the machine cool down before attempting to work on it. Some parts of the heater and heat shield become extremely hot during operation.
> Note the safety warning labels situated on the front and rear panels. Never remove any warning labels from the machine.
> Note the 'HOT SURFACES' safety labelling on the heater & heater guard. These areas can become VERY HOT.
> Only use the machine for vacuum forming plastic. It is not intended for any other purpose.
> Ensure that the area you are working in is properly ventilated and that you are aware of the potential hazards from the plastics you are forming. It is the responsibility of the owner or designated responsible person to assess the risks associated with any dangerous fumes given off and to determine any necessary precautions required such as fume extraction. Contact your plastics supplier to gain information regarding hazardous fumes.
> There is a risk of being burnt when handling heated plastics. Always wear suitable personal protective equipment such as gloves.
> Ensure that the area surrounding the machine is clean and frequently cleared of finished product and any scrap.
> This machine is fitted with a dry running vacuum pump. Do not lubricate. Do not allow any liquid to enter the vacuum system. Ensure that moulds are properly sealed to prevent ingress of dust into the vacuum circuit. Severe damage may be caused if the above is not observed.
> Daily repetitive use of this or any other machine may lead to a) fatigue and loss of concentration b) possible strains.
> Operators should be trained in the use of correct lifting techniques in order to minimise these effects.
> Users of this machine should complete regular competence tests.

Your Formech machine is supplied with:



1x Electrical cable



1x Installation/Operations/Repair Manual



EC Machinery Directive
2006/42/EC

Declaration of Conformity

We hereby certify that the machinery stipulated below complies with all the relevant provisions of the EC Machinery Directive and the National Laws and regulations adopting this Directive. Modifications to the machinery without prior approval from the undersigned will render this declaration null and void.

Machine description: Vacuum Forming Machine
Machine Function: Thermoforming of Plastic Sheet
Model Type: Compac Mini
Serial Number:
Date of Manufacture:

Is in conformity with the provisions of the following other EC Directives

2006 / 108/EC - EMC
2006 / 95/EC - LVD

Technical File Compiled by: Andrew Rony at address below

Significant harmonised standards applied:

EN ISO 12100 :	2010
EN ISO 13849 :	2006
EN 60204 - 1 :	2006
EN :	2008

Signed:

Date:
Name: Paul Vukovich
Position: Managing Director
Being the responsible person appointed by the manufacturer

1x EC Certificate of Conformity



1x Table Mesh

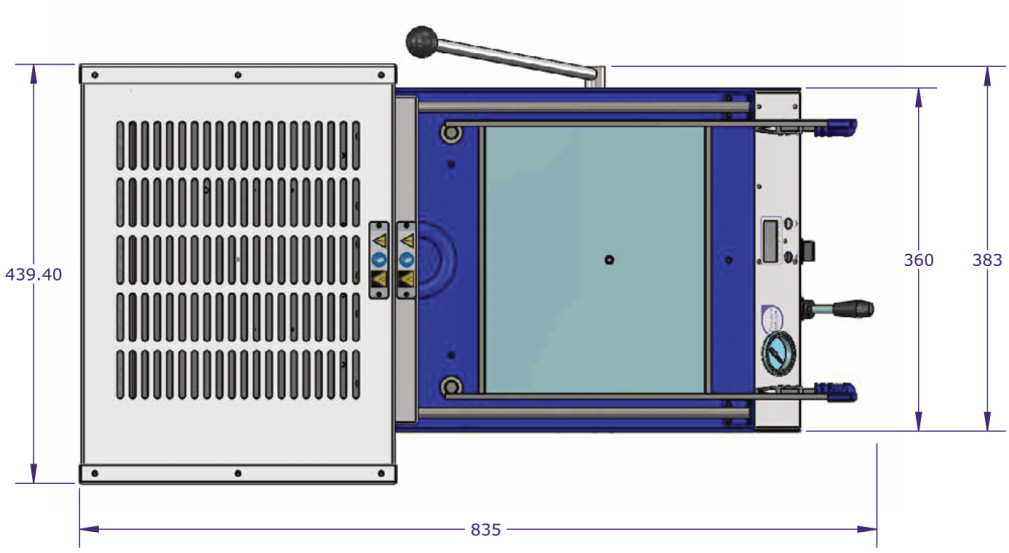
ENSURE THAT THE TABLE LEVER IS TIGHTLY SCREWED INTO THE CRANK MECHANISM ON THE RIGHT HAND SIDE OF THE MACHINE. IF OPERATED WITH THE LEVER LOOSENED YOU MAY DAMAGE THE CRANK OR THE HANDLE.

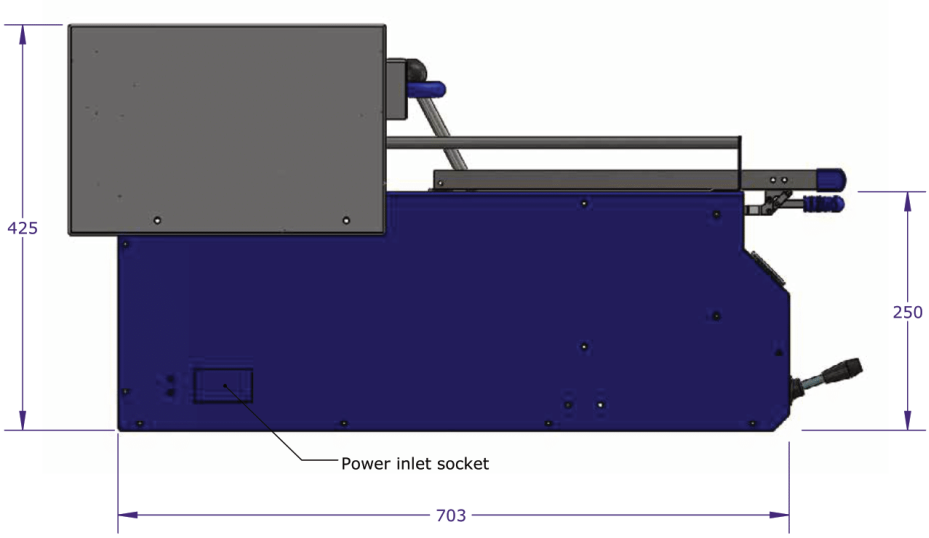




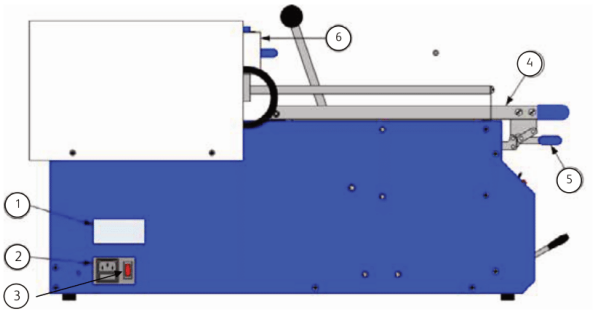
Machine footprint

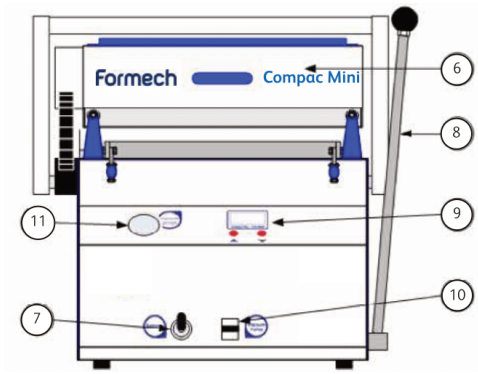
(Dimensions are in mm)





General Arrangement





1- Specification Plate
2- Power Inlet (EC)
3- Power Switch ON/OFF
4- Clamp Frame
5- Material Clamps
6- Heater Box
7- Vacuum / Pressure Valve
8- Table Lever
9- Digital timer
10- Vacuum Pump ON/OFF switch
11- Vacuum Gauge

Mechanical Specifications

Max Material Size:	305mm x 255mm
Max Forming Area:	280mm x 230mm
Max Depth of Draw:	125mm
Overall Width:	440mm
Overall Height:	425mm
Overall Length:	835mm
Weight:	35Kg

Electrical Specifications

Standard Voltage:	208V-240V ac
Frequency:	50-60Hz
Power:	1.1Kw

Transportation / Positioning

The Compac Mini will be supplied strapped to a Pallet or in a crate. The machine may be unpacked and placed on a bench, table or Compac Mini trolley. Ensure that the structure, size and load bearing capacity of the bench or table is sufficient for the machine weight. A minimum of 2 persons are required to lift the machine. In the case of the Compac Mini trolley, ensure that the 2 machine retaining screws are fitted to the under side of the trolley / Machine.

Noise emissions

Noise emissions on the Formech Compac Mini are less than 70dB(A).

Machine storage

The Formech Compac Mini must be stored in a dry environment. If the machine is not used for a long period of time, run the pump periodically (once a month).

Machine arrangement

1. Specification Plate.

This states the essential machine data & CE marking.

2. Power Inlet receptacle.

The machine is supplied complete with a power cable that plugs into this receptacle and then into a suitable power socket. If your machine is a special voltage or frequency then it may be supplied with a lead not terminated into a mains plug. See Safety section at the beginning of this manual. Note the safety labelling.

3. Power Switch ON/OFF.

This is the main switch. When in the OFF position power is cut to all functions. Before commencing any repair work always remove the mains lead from the Power Inlet Receptacle.

4. Clamp Frame.

This holds the plastic material in position during the forming and release processes.

5. Material Clamps.

These clamps fix the Clamp Frame firmly down. After placing the plastic under the clamp frame the material clamps are adjusted by tightening or loosening the blue nutlets. The levers are pulled up until they are fully over-centre. Adjustment may only be carried out while not under pressure. The rear of the clamp frame is self adjusting.

6. Heater Box.

This carries the heating elements and is drawn forward by pulling the centrally mounted handle.

7. Vacuum/Pressure Valve.

When the vacuum pump is running this valve switches between removing air from between the mould and moulding during forming (vacuum) and introducing air between the mould and moulding for finished part release (pressure).

8. Table Lever.

When pulled towards you the table will rise to the upper limit. A further application of pressure will lock the table in this position. During forming the table complete with mould is lifted into the hot plastic and locked in place to ensure a good vacuum seal. At the end of the cycle the table is returned to the lower position by pushing the handle back and away.

NOTE: A mechanical interlock designed to prevent a mould being raised into the heating elements stops the table being raised unless the heater box is fully back.

Machine arrangement (continuation)

9. Digital Timer.

When producing a quantity of mouldings using the same mould and plastic the heating time will be nearly constant for each one. In this case the timer can be used. Record the heating time for the first moulding then set the timer (in seconds) using the UP / DOWN buttons. When the heater is pulled forward the timer counts down from the set time and sounds a buzzer when zero is reached. The heater is then pushed back. The set time is stored until it is altered. If you don't want to use the timer, set the time to zero.

10. Vacuum Pump ON/OFF switch.

This turns the vacuum pump on and off. The vacuum pump evacuates the air between the plastic sheet and the mould. It also provides pressure to release the finished moulding from the mould.

11. Vacuum Gauge.

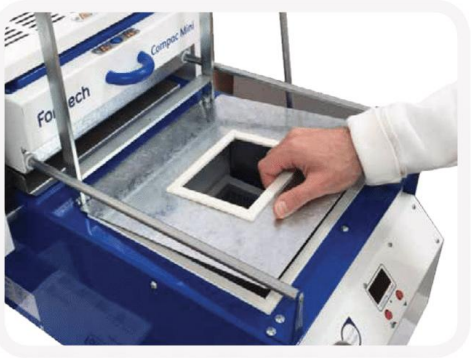
This is situated on the top LHS of the front panel and gives indication of the vacuum level achieved at the table mould area during moulding. It is usual to expect approx 20"Hg / -680mbar of vacuum. If such levels are not achieved check your mould / table configuration & clamp / plastic sealing.

Reducing Windows (optional)

Reducing windows allow the use of smaller sheet material for smaller mouldings. To fit the reducing window:



1. Lift the clamp frame and place the lower reducing window.



2. Locate the window against the clamp frame.



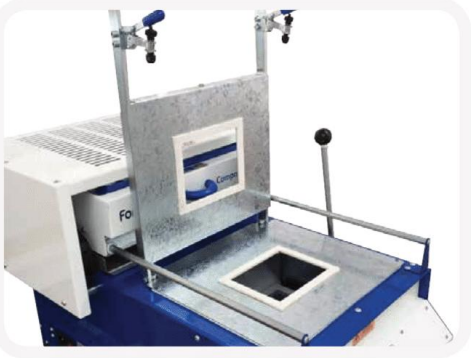
3. Place the upper reducing window in the clamp frame at the rear.



4. Then locate it at the front of the clamp frame.



5. Fit the bolt and the nut to secure the window to the clamp frame.



6. Reducing windows correctly fitted to the machine.

Basic Operation



1. Press the power switch to ON. The digital timer on the front panel will illuminate. It usually takes between 10 and 15 minutes before the heaters have reached their operating temperature.



2. With the heater fully back and the mould table in the up position place your mould onto it.



3. Place the table into the lower position by pushing the table lever away from you.



4. Position a sheet of plastic over the aperture. The plastic should be placed over the white seals around the aperture.



5. Pull the clamp frame down and close the material clamps. Depending on the plastic thickness, you may need to adjust the screws on the material clamps to properly grip the plastic.



6. Set the timer down to zero using the 'Down' button to help you establish the time for the heating cycle. If you know the cycle time, then press the 'Up' button to the right time.

Basic Operation (continuation)



7. Pull the heater forward over the plastic. As the plastic heats up, it will begin to rise slightly. It will then soften and begin to drop back.



8. Push the heater back slightly to test the softness of the plastic. Be careful the plastic might be very hot. Continue to heat until it is soft enough to form.



9. Turn on the vacuum pump and raise the table until you can feel it lock into place. The plastic will form around the mould tool.



10. Let the finished moulding cool down a little before pulling the release valve downwards to blow the part off the tool. Lower the table and switch off the vacuum.



11. If the plastic is still too soft when you try to release it, some distortion may occur. Make sure the mould is not stuck in the moulding when you lower the table.



12. Finally, release the material clamps to remove the finished moulding.

Heaters

The powerful quartz heaters are designed to heat the plastic rapidly without burning the surface. The time required to heat the plastic sheet remains fairly constant once the heaters have reached their operating temperature.

Heating cycle times vary according to a number of factors. With a little experience, timings may be easily estimated.

Some plastics such as styrene have a wide tolerance to heating times giving consistently good mouldings. Care must be taken with other materials such as ABS, as the surface will blister if the temperature limit is exceeded.

The moulding should be formed when the plastic is sufficiently relaxed to become indented by the blunt end of a pencil but not soft enough to sag.

A properly heated sheet will give an excellently defined moulding. If the sheet is not hot enough while forming the moulding will not pick up all the detail from the tool.

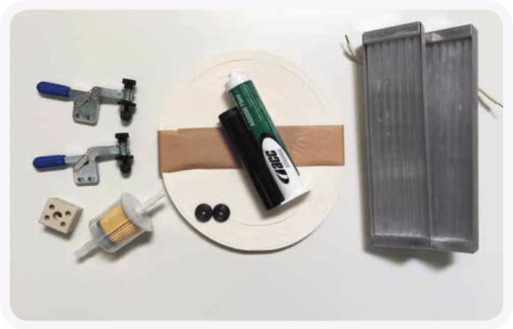
The times below were recorded using styrene at an ambient temperature of 20 degrees C
With the machine at operating temperature. Please note that these times are a guide only.
Various factors will affect the heating time including the colour and surface finish of the material.

1.5mm Thick = 60 seconds
2.0mm Thick = 95 seconds
4.0mm Thick = 240 seconds

Digital Timer - When producing a quantity of mouldings using the same mould and plastic the heating time will be nearly constant for each one. In this case the timer can be used. Record the heating time for the first moulding then set the timer (in seconds) using the UP / DOWN buttons the buttons. When the heater is pulled forward the timer counts down from the set time and sounds a buzzer when zero is reached. The heater is then pushed back. The set time is stored until it is altered. If you don't want to use the timer, set the time to zero.

Optional Extras

The following items can be purchased for your Compac Mini vacuum forming machine:



1. Service kit



2. Reducing windows



3. Compac Mini trolley

1. It is unlikely that you will need to service or repair your machine for many years provided you follow the maintenance information contained in this manual; however the table and clamp seals, which are considered to be consumable items, will need to be replaced depending on the usage of the machine. Therefore this kit contains the essential consumables (seals and pump filter) to ensure a good performance of your machine year on year.

2. Formech has available a standard size of reducing windows: 5x4'' or 125x100mm aperture. Formech can also produce special size reducing windows. For more information please contact our sales department.

3. The Formech machine trolley allows you to easily move your Compac Mini machine. The 2 locking castors assure the trolley remains in position all the time. Underneath there is also space to store plastic material and moulds. The trolley dimensions are: depth: 760mm, height: 720mm, width: 460mm

Tools

All tools should be mounted on a baseboard. They should not have undercuts and must be produced with slightly angular sides ('draft angle') to aid release. Vent holes are needed to allow the air to be evacuated from pockets and sharp angles on the tool. Providing these holes are kept small (1mm diameter or less) they will not leave marks on the surface of the finished moulding.

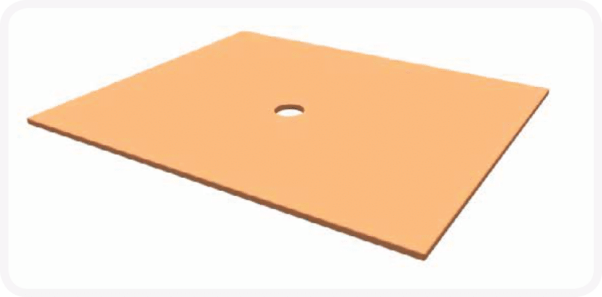
Tools made from wood or medium density fibreboard (MDF) are easily constructed and can give short runs of good quality mouldings at a low cost (see notes page 16). The use of close-grained wood will avoid grain patterns appearing on the mouldings.

Plaster of Paris may be used for one-offs but the plaster must be allowed to properly dry out. (See notes below)

Aluminium tools have the advantages of carrying fine detail and being more resistant to both distortion and surface damage. Aluminium tools should be pre-heated before use. A cool metal mould will absorb some of the heat from the plastic sheet before it can take up the full definition.

Resin tools combine most of the advantages of metal moulds with relative ease of manufacture. Various resinous materials are commercially available especially for vacuum forming tool production.

Repairs to the vacuum circuit can be costly. The use of talc as a release agent is not recommended. It may clog the vacuum pump, valves and hoses.



MDF Baseboard



Aluminium Baseboard

NOTES:

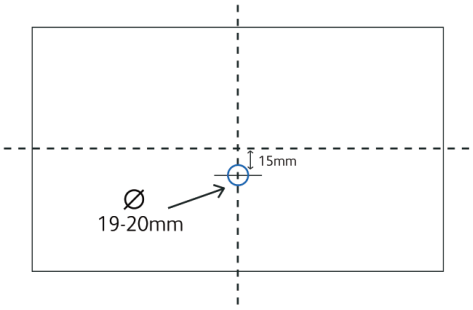
Porous mould materials such as wood and plaster should be properly sealed to prevent the vacuum pump from sucking out any moisture or sawdust, loose plaster etc. The vacuum circuit may quickly become blocked with dust or slurry if moulds are not properly sealed.

As the plastic cools after forming it will contract, gripping the tool tightly. If the tool has been made with sloping sides and has a good surface finish it will release more easily. Where the draft angle must be kept to a minimum a release agent may be used to assist release.

Sealed moulds will usually release more easily. Silicon based release agents may be used on more difficult moulds. Silicon based release agents are rapidly absorbed by porous (unsealed) moulds, rendering them ineffective.

The baseboard can be made from either MDF or aluminium and needs to be 3.00 – 4.00mm (1/8") thick. The vacuum hole can be 19.00 – 20.00mm (3/4") diameter and needs to be positioned 15mm forward of the centre of the table.

The baseboard has to be 4mm shorter in both directions than the forming aperture of the machine e.g. Forming aperture 280mm x 230mm = baseboard size 276mm x 226mm.



Plastics

Plastic sheet is commercially available in a wide variety of grades, thickness and colours. Materials such as styrene and PVC are most suited to vacuum forming. Other materials such as acrylic, polypropylene and polycarbonate will mould but difficulties may be encountered.

It is not within the scope of this manual to attempt to list all the potential problems and their solutions. It is recommended that the newcomer to vacuum forming gains experience and confidence with easily formed materials before moving onto the more difficult materials.

Formech has available a Vacuum Forming Guide which will cover some of these topics in more details. Please contact Formech to gain access to this guide.

After forming

After forming, most plastics can be subsequently heat formed to add such details as folds or clips. Although many plastics can be printed, and in some cases painted, the presence of release agent used to help free a tight moulding may make the surface resistant to further decoration.

Trimming

An ideal moulding will be ready for use when removed from the machine and requires no finishing. However, most mouldings do require trimming before they can be used.
There are numerous methods available for this process.

Thin materials can be trimmed with a sharp knife. Shaped cutting dies can be used to cut out intricate shapes. If no flange is required on the finished product then a trimming saw mounted in a pillar drill will cut the moulding in a horizontal plane to free it from the surrounding material.

In mass production environments the range of equipment available for this requirement encompasses clicking presses, roller presses, routers, horizontal band saws, water jet cutters, laser cutters and many others.

Formech has available a Vacuum Forming Guide which will cover some of these topics in more details. Please contact Formech to gain access to this guide.

Warranty

Reliability and a long service life are synonymous with the Formech brand. However, as with any machinery, certain parts will require periodic replacement.

Seals

The silicon seals applied to the mould table and to the top aperture of the machine (clamp) are seen as being consumable parts, their service life will depend on how the machine is treated and how often it is used.

The table and clamp seals are not covered by our warranty.

Heating elements

The Quartz infrared heating elements supplied with this machine are manufactured using quartz tube and therefore may break or crack with impact or physical shock.
The Quartz heating elements contain internal filaments, which become extremely hot when power is applied. The wire expands and contracts as it heats and cools.
Eventually, due to the continual expansion and contraction, the wire will fracture and a new element will be needed. This may take 10 years or more. Because of this we are unable to apply our standard warranty to Quartz heating elements. However our experience is that this form of infrared heating is durable, reliable and more resilient to shock and impact than similar ceramic products

The heating elements are not covered by our warranty.

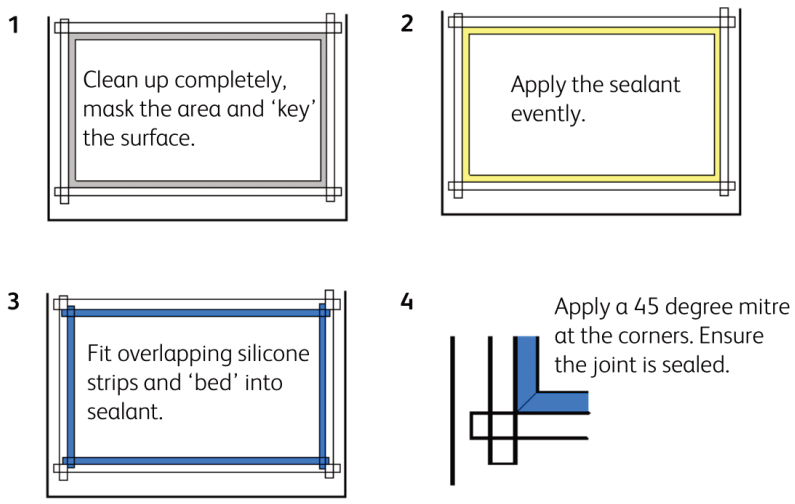
Vacuum system

The vacuum system on this machine is fairly simple but uses high quality components throughout. The life expectancy of the vacuum system will be compromised by the ingress of dirt, shavings, dust, liquid etc.



THE VACUUM CIRCUIT INCLUDING THE VACUUM PUMP WILL NOT BE COVERED BY OUR WARRANTY IF THEY ARE FOUND TO BE BLOCKED WITH FOREIGN MATTER OR CORRODED BY THE INGRESS OF LIQUID.

Replacing seals



1. Remove all the existing seal and adhesive with a sharp blade. Mask off the sealing area with masking tape or similar (Mask the outside for top frames or reducing windows & the inside for table seals). Prepare the sealing area with emery cloth or similar to achieve a good surface for the new adhesive to key with. Ensure that the surface is clean from dust, dirt and grease.

2. Apply a generous bead of high modulus silicone sealant to the masked area and smooth down to give a consistent layer.

3. Cut the silicone strip in lengths long enough to overlap the corners. Do not stretch the seal strip when measuring or applying. Lay each strip on to the seal area overlapping at the corners. Ensure the seal strip is bedded down well by pressing firmly along the full length.

4. With a sharp blade cut a 45° mitre joint at all corners. Fill gaps in the joints with sealant. Remove the masking tape before the sealant has set. For best performance leave seal to set overnight.

Replacing a heating element

Before any maintenance work is carried out, electrical supply must be locked in the OFF position or the mains lead removed.

Only a qualified electrical technician may work on any parts carrying mains voltage and should be responsible for ensuring that the machine is in a safe condition before allowing services to be restored.

If the plastic is not being heated evenly and there is an obvious cold spot then follow the below procedure.

> Switch off machine and let heater cool completely, this will take at least 15 minutes.

> Bring the heater half way forward, place hand near but not on elements to see if they are still hot. If they are, let machine cool for a further 15 minutes.

> When elements are completely cool, turn on machine and feel each element individually. The difference in temperature will quickly become noticeable. If one or more elements fail to heat then follow below.

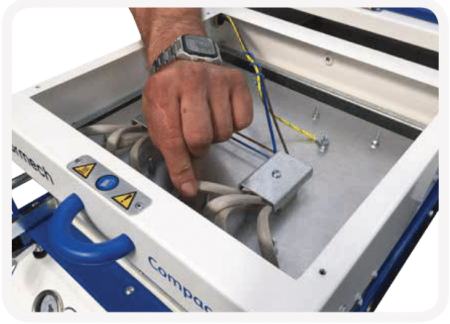


1- Unplug the machine from the mains. Bring the heater completely forward and remove the fours screws retaining the cover.

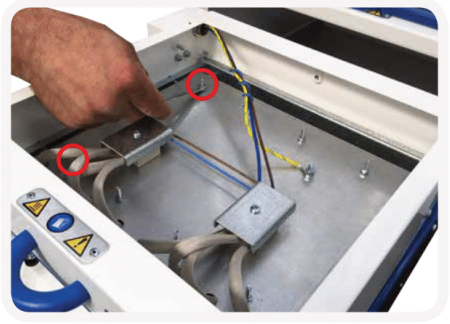


2- Remove the cover on top of the heater.

Replacing a heating element (continuation)



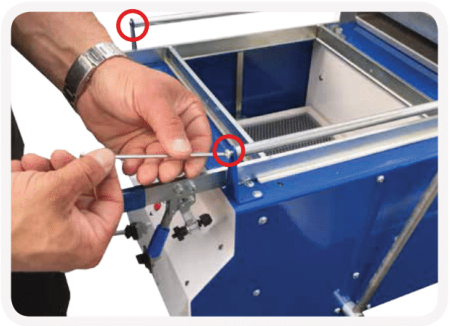
3- At this stage, check that all the element wires and interconnecting wires are fully tightened and that the fault wasn't merely a loose connection.



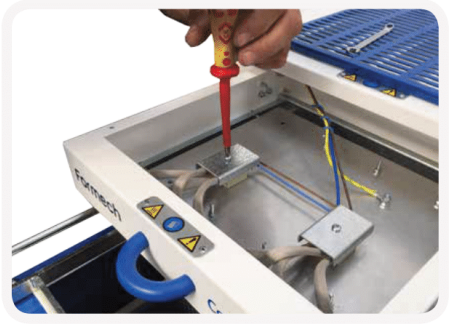
4- Remove the two nuts and washers that secure the element to the tray. At this stage you might have to loosen the heater tray to be able to catch the faulty element.



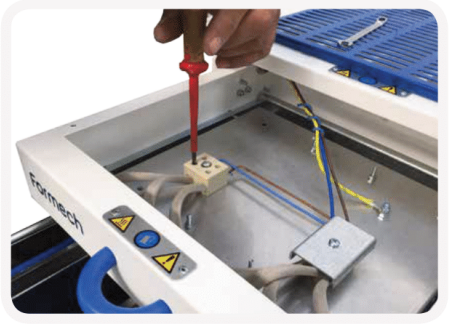
5- To do so, loosen/remove the two screws at the back of the machine.



6- Then, send the heater back to be able to remove the two screws of the heater bars at the front of the machine.



7- Bring the heater forward and remove the cap from the terminal block associated with the faulty element using a cross head screw driver.

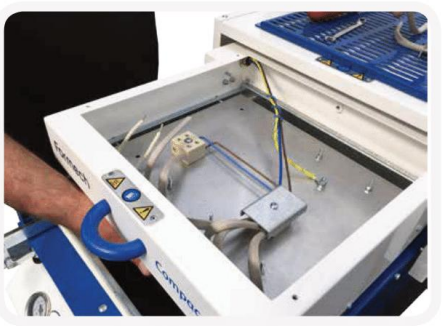


8- Loosen and remove the element wires from the appropriate connector block.

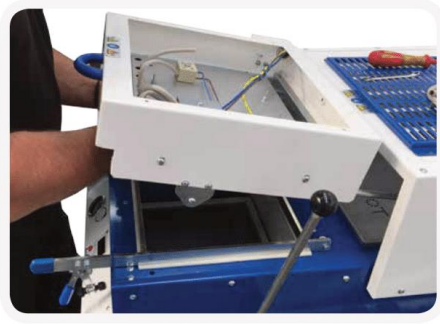
Replacing a heating element (continuation)



9- Remove the loose insulation sleeves.



10- Position your hand underneath to catch the element as it is released.



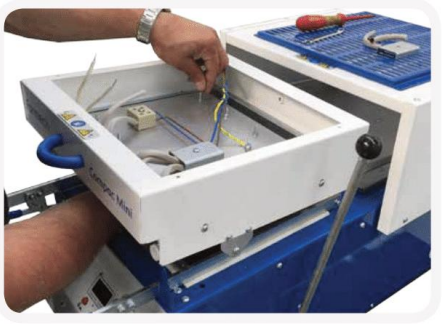
11- Carefully lift the heater tray. This might be a two person job.



12- Feed the element wires through the holes in the tray and catch the element.



13- Fit the new element.



14- Replace the two nuts and washers that secure the element to the tray.

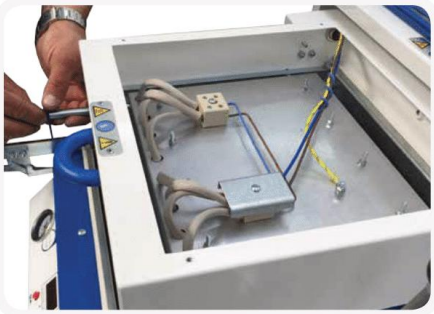
Replacing a heating element (continuation)

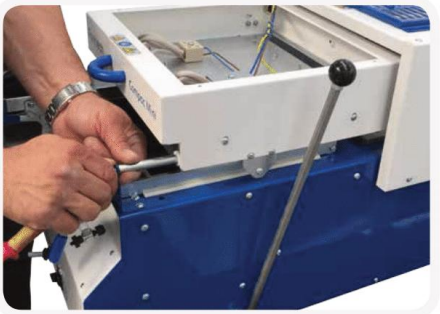


15- Put back the loose insulation sleeves.

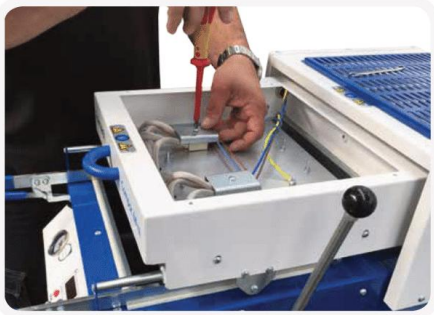


16- Replace the element wires in the connector block and tighten all connections surely.





17- Put back the two screws from the heater bars and tighten.



18- Replace the terminal block cover and make sure all is fully tightened.



19- Tighten the two screws at the back of the machine and make sure that the two bars are correctly lined up with the back of the machine.

Electrical troubleshooting

Before any maintenance work is carried out, electrical supply must be locked in the OFF position or the mains lead removed.

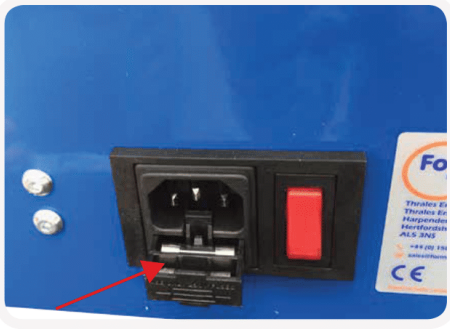
Only a qualified electrical technician may work on any parts carrying mains voltage and should be responsible for ensuring that the machine is in a safe condition before allowing services to be restored.

In the event that neither the heater nor the pump will work check that your supply is OK.

Check the fuse located under the IEC inlet socket on the left of the machine. A spare is fitted in the small plastic fuse holder. The fuse is a standard 20mm x 5mm glass fuse. It is rated at 5 Amps.

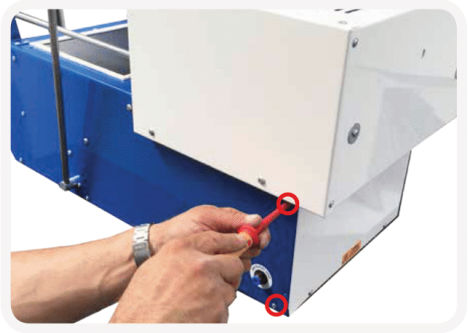


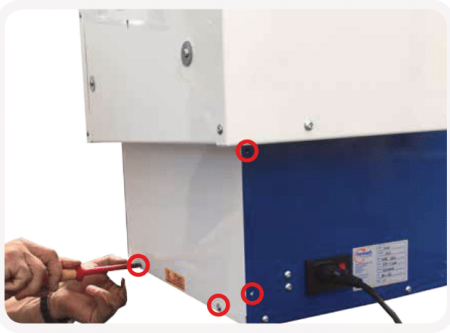
IEC inlet socket on the left of the machine.



Spare is fitted in the small plastic fuse holder.

If neither the fuse nor the mains supply are faulty then turn off the machine. Unplug the machine from the mains and remove the iec plug from the side of the machine and follow below:



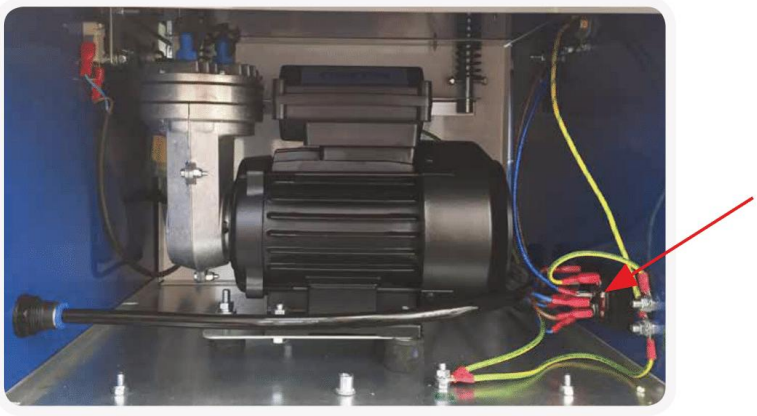


Remove the 6 self-tapping screws retaining the rear panel.

Electrical troubleshooting (continuation)

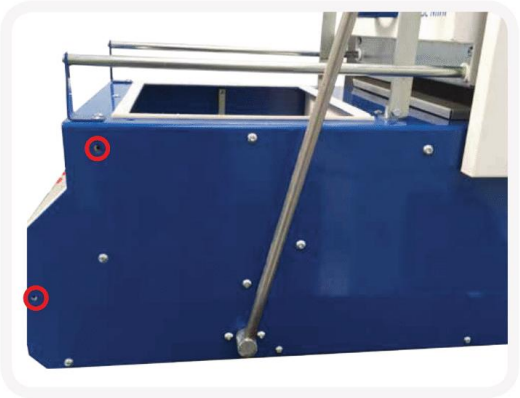
Before any maintenance work is carried out, electrical supply must be locked in the OFF position or the mains lead removed.

Only a qualified electrical technician may work on any parts carrying mains voltage and should be responsible for ensuring that the machine is in a safe condition before allowing services to be restored.



Check that the connectors on the back of the IEC socket are properly fixed. See wiring diagram if any have fallen out.

If the fault still cannot be found, then check the front of the machine:



Remove the 2 self-tapping screws on each side of the machine.

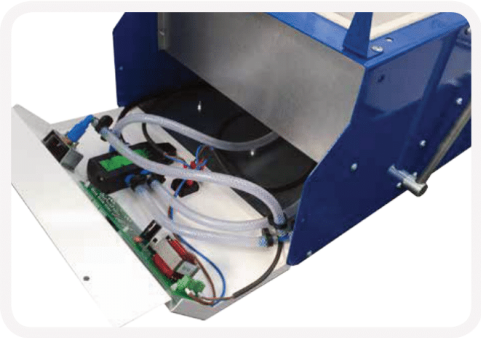


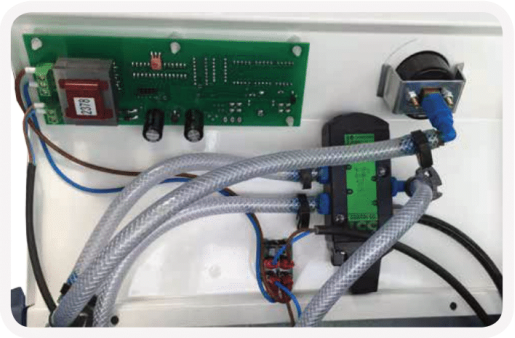
Remove the 4 self-tapping screws retaining the front panel.

Electrical troubleshooting (continuation)

Before any maintenance work is carried out, electrical supply must be locked in the OFF position or the mains lead removed.

Only a qualified electrical technician may work on any parts carrying mains voltage and should be responsible for ensuring that the machine is in a safe condition before allowing services to be restored.





Check the pump switch connections if the pump only is the problem. If all the connections are good then the switches can be checked for continuity.

Note: Continuity should be obtained between the top and bottom contacts of the switch not side to side.

If the vacuum pump motor does not run, check the electrical supply. If the motor smells strongly of burnt lacquer then it is probably burnt out and the entire pump/motor assembly needs replacing.

If the supply is present but the motor does not run, the capacitor may be faulty.

Vacuum / Pressure System

If the vacuum or pressure appears to be weak or non-existent check the following.



Raise and lock the mould table in the up position.



Take off the table mesh.



Turn the vacuum on and place your finger over the vacuum hole. Check the reading you get on the vacuum gauge.



If the vacuum gauge reads 20"Hg or higher that is normal. A lower reading indicates poor vacuum where attention is required.

The possible causes of poor vacuum are:

- The mould baseboard is restricting the vacuum hole in the table.
- NOTE: If the mould baseboard is too soft it may pull down under vacuum and block the vacuum hole.
- The mould is inadequately vented to allow trapped air to be evacuated.
- The table and clamp seals are in poor condition or the table is not locking properly at the top of its travel.
- There are holes drilled in the table.

If all the above points are OK and you can hear the pump running when you switch it on then one of the following points will be the cause of the problem. If the pump does not run, refer to the ELECTRICAL TROUBLE SHOOTING section above.

- A pipe is loose, damaged or blocked.
- The pump filter is blocked
- The vacuum/pressure valve is blocked or corroded.
- The vacuum pump is blocked or corroded.

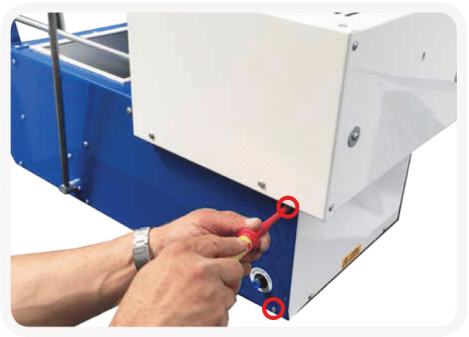
Vacuum / Pressure system (continuation)

Before any maintenance work is carried out, electrical supply must be locked in the OFF position or the mains lead removed.

Only a qualified electrical technician may work on any parts carrying mains voltage and should be responsible for ensuring that the machine is in a safe condition before allowing services to be restored.

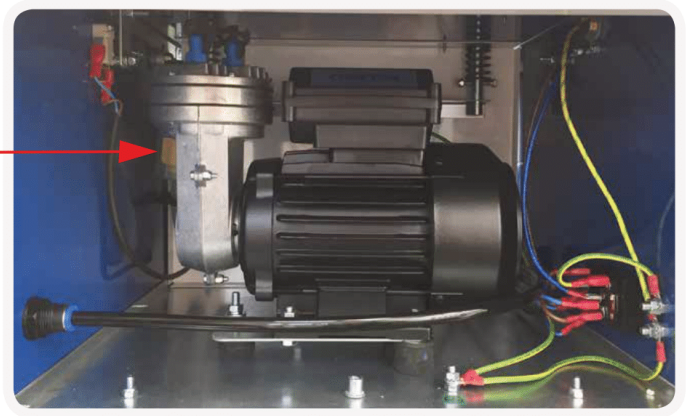
If the heater has been left in the forward position, with no plastic in the clamp frame, the table will start to overheat. The pipe attached to the back of the table will shrink and constrict the passage of air. Pipes become less flexible over time and may loosen or crack.

To check the vacuum filter:





Unplug the machine from the mains and remove the iec plug from the side of the machine. Remove the 6 self-tapping screws securing the back panel.



You will see the cylindrical vacuum filter with a pipe attached to each end. Discard the blocked filter and fit a new one.

Vacuum / Pressure system (continuation)

To check the entire vacuum system:

- Remove the 6 self-tapping screws securing the back panel.
- Remove the nut securing the motor capacitor to the left-hand side of the machine.
- Remove the 2 wires from the capacitor, terminating in the connector block next to the IEC socket.
- Remove all earth wires connected to the earth stud in the base of the machine.
- Remove the 4 nuts attaching the vacuum pump to the base.
- Remove the 6 self-tapping screws attaching the white front panel.
- Remove the 4 self-tapping screws along each bottom side of the machine.
- Rest the machine on its side and remove the 2 self-tapping screws in the base (roughly in the centre).
- Remove the base plate.
- Examine all piping carefully. Replace any suspect pipes.
- Remove the pipes from the vacuum\pressure valve. Take out the 2 fixing bolts.
- Blow through the single hose tail. You should feel air coming out of one hose tail on the opposite side. Operate the valve and air should pass freely through the other hose tail and shut off the first one.
- If the valve does not freely pass air or is otherwise malfunctioning then fit a new one or dismantle and clean the faulty part.
- If the pump runs but does not appear to produce pressure or vacuum send it back to us for further evaluation.
- Reassemble the machine taking great care to ensure that all electrical connections are tight and properly insulated.

Make certain that the earth stud is tightened fully and that all earth wires are properly fixed to it.

If you are unable to cure any problem relating to your machine, or if you wish to order spare parts please contact us at the below address, stating the model (Compac mini) the serial No. (on specification plate) and a full description of the fault or parts you need.

Cleaning

Ensure the inside of the machine and the heater tray is cleared of dust, dirt and debris. Do not allow dirt and loose particles to build up, particularly on the heater tray.

Lubrication

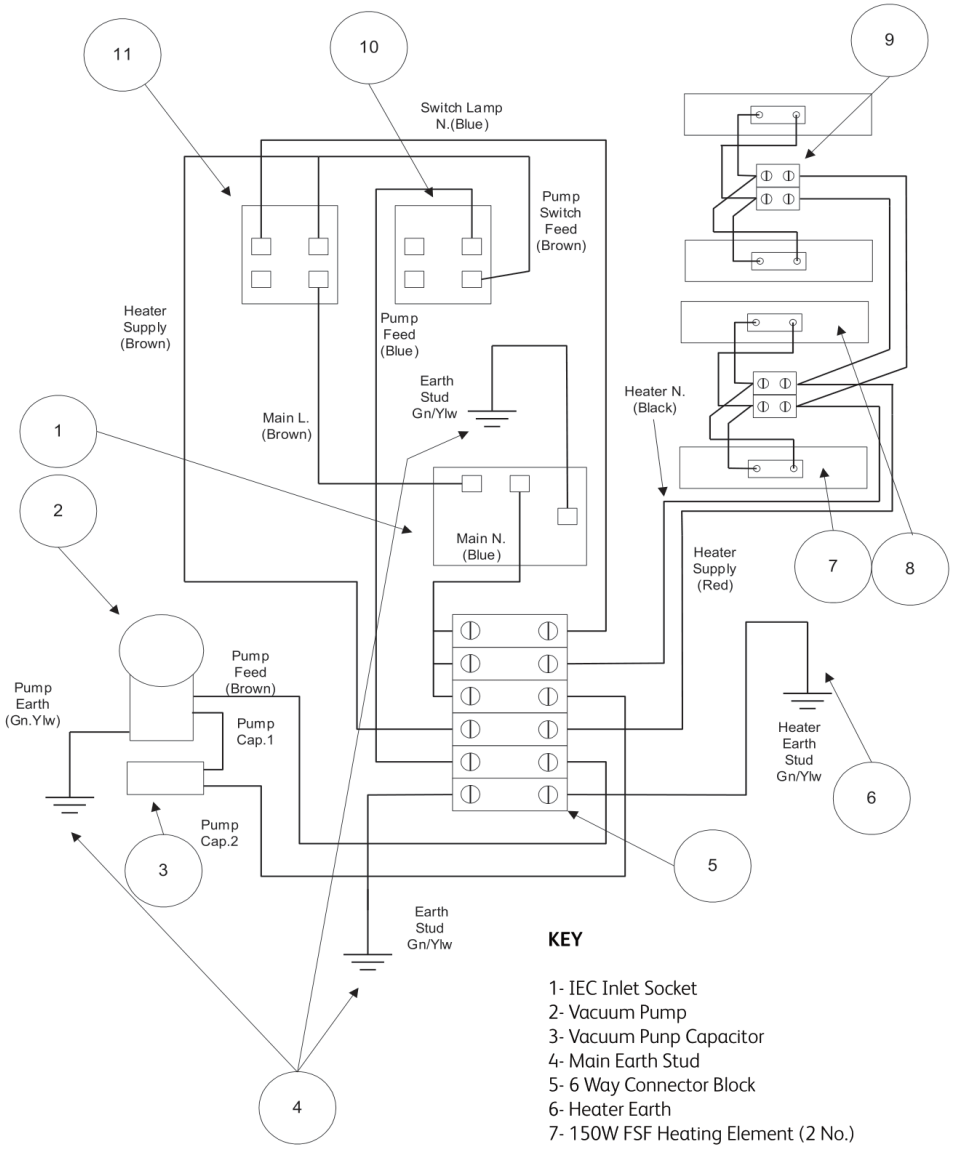
The Compac Mini requires minimum lubrication.
Apply general purpose grease to the table guide bars when required to assist with table movement.
Apply a small amount of fine silicone oil or fine oil to the heater slide bars when required to assist free movement of the heater.

Spare Parts Listing

Formech
Perfectly formed

Quantity	Description	Part No
2	Quartz Element 225W FSQ 230V	HEQ15
2	Quartz Element 250W FSQ 230V	HEQ04
2	Ceramic Terminal Block	MPP14
1	Heatproof Cable 1.5mm SiFGL	EE41
1	Heatproof Cable 1.5mm, Silicone, G/Y Earth	EE67
1	Small Blue Heater Handle	GH01
1	Cable Chain	EE70
1	Cable Chain End Bracket Set	EE71
2	Toggle Clamp Complete, Small Blue	MPP19
2	Small Clamp Upper Adjuster Nut Steel M5	MPP27
2	Small Clamp Lower Adjuster Nut Plastic M5	MPP24
2	Mini Clamp Frame Grip, Blue	GH29
1	Black Crank Handle Knob	GH25
4	Machine Rubber Mounting Foot	GH41
1	Mini Table Mesh	MPP56
1	Seal kit 'Mini' 5M Seal + Glue	SK01
1	Silicone Sealant Cartridge 85ml	MPP01
1	Vacuum Pump	PAP01
1	40mm Vacuum Panel Mount Gauge	P31
1	Small Inline Vacuum Filter	PAP04
1	Manual Lever Valve, 5/2, 1/4" Port	P01
1	1/4" Bore PVC Reinforced Hose	P13
5	1/4" BSPT to 6mm Hose Tail Elbow	P22
6	Pipe Clip - Small plastic, Type C	P18
1	Paddle Switch (Pump)	EE30
1	Timer PCB	EE22
1	Microswitch, Hi temp	EE34
1	C14 IEC Fused, Switched Socket	EE72
1	BS1363/A 3Pin Plug to C13 IEC Power Lead, 5A	EE55
1	EU(Shuko) Plug to C13 IEC Power Lead, 5A	EE54
1	NEMA6/15(N America) Plug to C13 IEC Power Lead, 5A	EE73

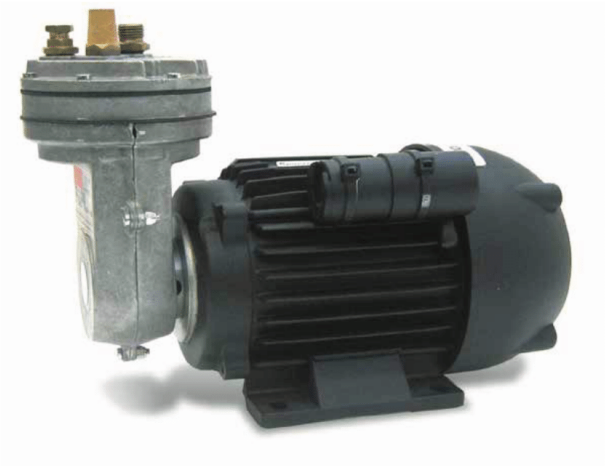
Wiring Diagram Formech Mini



KEY

1- IEC Inlet Socket
2- Vacuum Pump
3- Vacuum Punp Capacitor
4- Main Earth Stud
5- 6 Way Connector Block
6- Heater Earth
7- 150W FSF Heating Element (2 No.)
8- 125W FSF Heating Element (2 No.)
9- Ceramic Connector Block (2 No.)
10- Pump ON/OFF Switch
11- Mains ON/OFF Illuminated Switch

Vacuum Pump D351VM



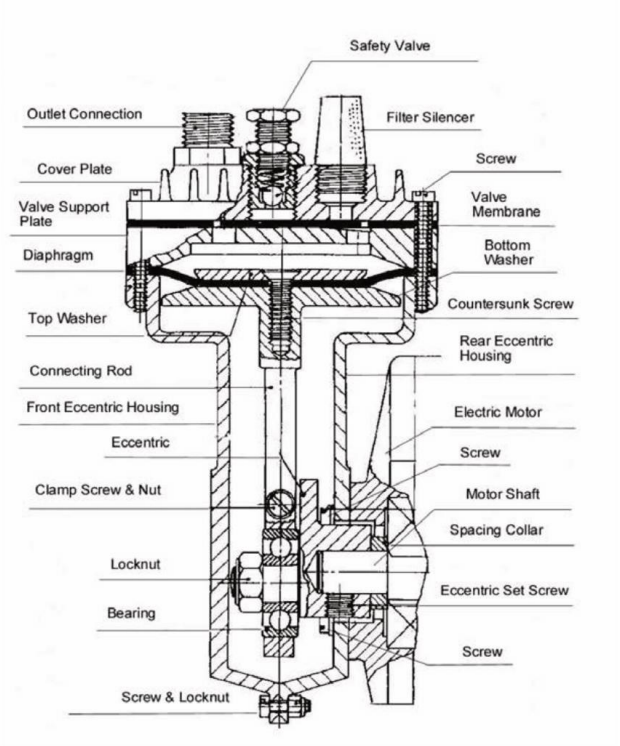
Features

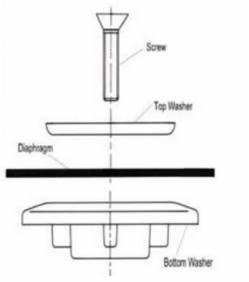
> Oil free with stainless steel valves
> Good quality, low noise
> Easily changed from pressure to vacuum and vice versa
> All models 240V single phase

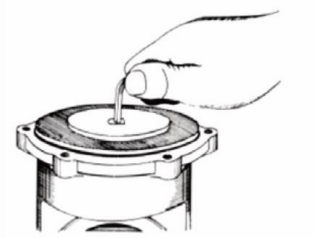
Specifications

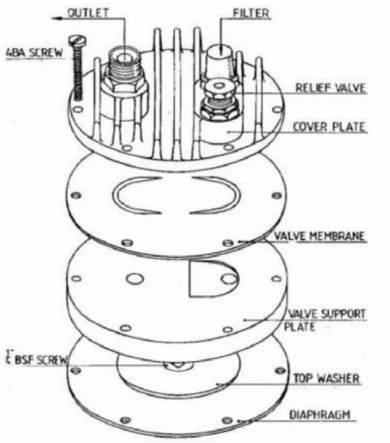
Model	Typical Applications	Typical Performance	Max Pressure
D351VM	Air supply for flame photometer	15l/min at 15psi	8l/min at 30psi

Typical arrangement









EC Machinery Directive
2006/42/EC

Declaration of Conformity

We hereby certify that the machinery stipulated below complies with all the relevant provisions of the EC Lachinery Directive and the National Laws and regulations adopting this Directive Modifictions to this machinery without prior approval from the undersigned will render this declaration null and void.

Machine description: **Vacuum Forming Machine**
Machine Function: **Thermoforming of Plastic Sheet**
Model/Type: **Compac Mini**
Serial Number:
Date of Manufacture:

Is in conformity with the provisions of the following other EC Directives:

2004 / 108/EC - EMC
2006 / 95/EC - LVD

Technical File Compiled by: Andrew Berry at address below

Formech International Limited, Unit 4, Thrales End Farm, Thrales End Lane, Harpenden
Hertfordshire AL5 3NS, United Kingdom

Significant harmonised standards applied:

EN ISO 12100 :	2010
EN ISO 13849 :	2006
EN 60204 - 1 :	2006
EN 12409:	2008

Signed: 

Date:
Name: Paul Vukovich
Position: Managing Director
Being the responsible person appointed by the manufacturer

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Europe and Rest of the World
Telephone: +44 (0) 1582 469 797
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Unit 4, Thrales End Farm, Thrales End Lane, Harpenden, Hertfordshire, AL5 3NS U.K.
Tel: +44 (0) 1582 469 797 Fax: +44 (0) 1582 469 646
Email: info@formech.com

Device Spec sheet

Formech Compac Mini — Desktop Vacuum Forming Machine

Our desktop models are the perfect first approach to vacuum forming. Easy to use, intuitive but yet very professionnal, they are the go-to models for creatives, hobbyists, students and chocolatiers. Quiet and built-in vacuum system, energy efficient quartz heaters, safety interlock and Mono HMI operating interface for the bigger desktop models (450DT & 508T) will help you achieve consistent formings.



Shown with optional trolley.





Key Features

- Safety Interlock
- Vacuum & Release
- Vacuum Gauge
- Digital Timer

Options

- Reducing Windows
- Trolley
- Starter Pack of Plastic
- Spare Parts Kit

Technical Specifications

Forming Area (mm / inches)	Sheet Size (mm / inches)	Max Depth of Draw	Max Material Thickness	Heater Type	Heating Zones	Width	Height	Depth	Weight
280 x 230mm / 11 x 9"	300 x 250mm / 12 x 10"	140mm / 5.5"	4mm / 0.15"	Quartz	1	440mm / 17.3"	425mm / 16.7"	835mm / 32.9"	33kg / 73lbs

Single Phase Power Requirements	Other Voltage (USA)	Power Consumption	Vacuum Pump Type	Pump Flow (SCFM @ 0 in. / 60Hz) (Pump flow m3 /h @ 0mbar / 50Hz)"	Mould release method	Air Requirements
208-240V / 13A	110-120V / 13A	1.1kW (1.3kW USA)	Diaphragm	1.7 (2.4)	Pump exhaust	n/a

Formech Compac Mini customers include:

- Clear Step (Medical – UK)
- Cacao Prieto (Artisan Chocolatier – USA)
- Cocoa Atelier (Artisan Chocolatier – Ireland)
- Claremont Secondary School (Education – Canada)
- Rick Jordan Chocolatier (Chocolate & Confectionery – USA)
- Hallmark Cards (Prototyping – USA)
- Lutron Electronics (Electronics – USA)
- Chicago School of Mold Making (Education - USA-
- Laney College (Education – USA)
- Motorola (R&D – USA)

For more information and product videos **formech.com**

Formech machine features and specifications are subject to change without notice as part of our continual product development programme.

Material datasheets