Floor Standing Vacuum Forming Machine

Installation, Operating and Service Manual
# Table Of Content

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Safety</td>
<td>3</td>
</tr>
<tr>
<td>Introduction</td>
<td>7</td>
</tr>
<tr>
<td>General Arrangement</td>
<td>8</td>
</tr>
<tr>
<td>Specifications</td>
<td>9</td>
</tr>
<tr>
<td>Installation</td>
<td>10</td>
</tr>
<tr>
<td>1. Electrical Connection</td>
<td>10</td>
</tr>
<tr>
<td>2. Phase Connections / Motor Rotation</td>
<td>11</td>
</tr>
<tr>
<td>3. Pneumatic Connection</td>
<td>11</td>
</tr>
<tr>
<td>4. Fitting of the Heater Guard</td>
<td>12</td>
</tr>
<tr>
<td>5. Fitting of the Stabiliser</td>
<td>12</td>
</tr>
<tr>
<td>6. Counterbalance Arms and Weights</td>
<td>13</td>
</tr>
<tr>
<td>Optional Cooling System</td>
<td>14</td>
</tr>
<tr>
<td>Operation - Main Menu Functions</td>
<td>15</td>
</tr>
<tr>
<td>Operation - Manual Functions</td>
<td>16</td>
</tr>
<tr>
<td>1. Load Saved Settings</td>
<td>16</td>
</tr>
<tr>
<td>2. Main Operation Screen</td>
<td>16</td>
</tr>
<tr>
<td>Operation - Manual Functions</td>
<td>17</td>
</tr>
<tr>
<td>1. Language Options</td>
<td>18</td>
</tr>
<tr>
<td>2. The HELP Function</td>
<td>18</td>
</tr>
<tr>
<td>3. Mould Table Drive</td>
<td>18</td>
</tr>
<tr>
<td>Operation - Settings</td>
<td>19</td>
</tr>
<tr>
<td>1. Memory Settings</td>
<td>21</td>
</tr>
<tr>
<td>2. Select The Memory Slot</td>
<td>21</td>
</tr>
<tr>
<td>3. Settings</td>
<td>21</td>
</tr>
<tr>
<td>4. Heater zone setting</td>
<td>22</td>
</tr>
<tr>
<td>5. Heater settings</td>
<td>22</td>
</tr>
<tr>
<td>6. Save settings</td>
<td>23</td>
</tr>
<tr>
<td>Operation - Heater Settings</td>
<td>24</td>
</tr>
<tr>
<td>1. Heater Controls &amp; Heater Arrangement</td>
<td>24</td>
</tr>
<tr>
<td>2. Heating Zone Control and Adjustment</td>
<td>24</td>
</tr>
<tr>
<td>Operation - Heater Settings</td>
<td>25</td>
</tr>
<tr>
<td>1. Table Speed Adjustment</td>
<td>25</td>
</tr>
<tr>
<td>2. Clamp Frame Rear Spring Adjustment</td>
<td>25</td>
</tr>
<tr>
<td>3. Clamp Frame Front Clamp Adjustment</td>
<td>25</td>
</tr>
<tr>
<td>Operation - Other Controls and User Adjustments</td>
<td>26</td>
</tr>
<tr>
<td>1. Fixing Mould Tools</td>
<td>26</td>
</tr>
<tr>
<td>2. Counterweight Adjustment, Loading &amp; Unloading.</td>
<td>27</td>
</tr>
<tr>
<td>Warranty</td>
<td>28</td>
</tr>
<tr>
<td>1. Clamp Seals</td>
<td>28</td>
</tr>
<tr>
<td>2. Heating Elements</td>
<td>28</td>
</tr>
<tr>
<td>3. Vacuum System</td>
<td>28</td>
</tr>
<tr>
<td>Fault Diagnostics / Maintenance</td>
<td>29</td>
</tr>
<tr>
<td>1. Electrical</td>
<td>29</td>
</tr>
<tr>
<td>2. Heater</td>
<td>29</td>
</tr>
<tr>
<td>3. Replacing a Heating Element</td>
<td>30</td>
</tr>
<tr>
<td>4. Auto-levelling System</td>
<td>30</td>
</tr>
<tr>
<td>5. Vacuum</td>
<td>30</td>
</tr>
<tr>
<td>6. Vacuum System</td>
<td>30</td>
</tr>
<tr>
<td>7. Pneumatics</td>
<td>32</td>
</tr>
<tr>
<td>8. Table Cylinder Maintenance.</td>
<td>32</td>
</tr>
<tr>
<td>9. Clamp &amp; Table Seals</td>
<td>32</td>
</tr>
<tr>
<td>10. To replace a damaged or worn seal</td>
<td>33</td>
</tr>
<tr>
<td>11. Panel seals</td>
<td>33</td>
</tr>
<tr>
<td>12. Cleaning</td>
<td>33</td>
</tr>
<tr>
<td>13. Lubrication</td>
<td>34</td>
</tr>
<tr>
<td>Electrical Circuit Information</td>
<td>34</td>
</tr>
<tr>
<td>Major Parts Listing 686</td>
<td>42</td>
</tr>
<tr>
<td>EC Certificate</td>
<td>43</td>
</tr>
</tbody>
</table>
Thank you for choosing Formech.
Please read and follow the below safety instructions before attempting to install or operate your machine.

Special attention should be paid to sections dealing with safety.

It is impossible to cover all aspects of thermoforming within the scope of this manual, we are therefore available to offer advice on special problems regarding thermoforming techniques, tooling and materials

1) The electrical supply to the machine must be of adequate capacity. Wiring must be to local regulations and carried out by a suitably qualified technician. THIS MACHINE MUST BE EARTHED IN ACCORDANCE WITH LOCAL REGULATIONS.

2) Ensure that the pneumatic air supply is regulated to 6 BAR or less and is properly filtered & lubricated using a good quality airline oil. A competent person must make compressed air connections.

3) Do not operate the machine until you have been trained and are fully conversant with it. Read and understand all of this User Manual. Users of this machine should complete regular competence tests.

4) Never remove any panels unless both the electrical and pneumatic supplies have been isolated. Never remove any warning labels from the machine. It is important to understand that high pressures may be present within parts of the pneumatic system even after the supply has been isolated. Special care must be taken if any parts have become jammed to ensure that all pressure is removed before attempting a repair.

5) 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.

6) When servicing the machine care must be taken to prop any heavy moving parts. This refers particularly to the mould table, clamping frame and counter balance weights. Always restrict movement of these parts before entering any part of the machine to prevent possible injury.

7) 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.

8) Only use the machine for vacuum forming and blow moulding of plastic. It is not intended for any other purpose.

9) 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.

10) Ensure that the area surrounding the machine is clean and frequently cleared of finished product and any waste.

11) This machine is fitted with a dry running vacuum pump. Do not lubricate. Do not allow any liquid to enter the vacuum system. Severe damage may be caused if the above is not observed.
Health & Safety - Hazards specific to this machine.

It is vital that any person using this machine and the person(s) responsible for the health & safety is made fully aware of the potential hazards that could arise from the use and misuse.

These can be broadly categorised as:

1. **Electric Shock.**
   This machine uses Voltages up to 415V.
   NEVER ATTEMPT ANY REPAIR UNLESS THE ELECTRICAL SUPPLY HAS BEEN LOCKED IN THE OFF POSITION.
   ONLY SWITCH ON WHEN ALL COVERS & GUARDS HAVE BEEN REPLACED.
   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.

2. **Burning.**
   Parts of this machine reach temperatures in excess of 300°C over large areas.
   WAIT UNTIL THE MACHINE HAS COOLED DOWN BEFORE SERVICE WORK COMMENCES.
   SPECIAL PRECAUTIONS MUST BE TAKEN TO ENSURE THAT ONLY THE MACHINE OPERATOR IS IN THE OPERATING AREA DURING USE.
   USE PERSONAL PROTECTIVE EQUIPMENT SUCH AS GLOVES WHEN TESTING THE HEATED PLASTIC, HANDLING HOT VACUUM FORMED PARTS, MANUALLY ASSISTING THE FORMING PROCESSS AND TOUCHING HOT SURFACES.
   INFRARED RADIATION IS EMITTED BY THE QUARTZ HEATERS, ENSURE THAT ANY EXPOSURE TO THIS TYPE OF RADIATION IS SHORT OR COMPLETELY AVOIDED.

3. **Injury from Compressed Air.**
   Pressures up to 100 PSI will be present in large volumes on this machine.
   BE EXTRA CAUTIOUS WHEN DEALING WITH COMPRESSED AIR EVEN AFTER THE MAIN SUPPLY HAS BEEN SHUT OFF DANGEROUS RESIDUAL PRESSURE MAY STILL BE PRESENT WITHIN THE SYSTEM.

4. **Toxic Fume Inhalation.**
   When large sheets of plastic are heated fumes will be given off.
   ENSURE THAT THE MACHINE IS POSITIONED IN AN ADEQUATELY VENTILATED PLACE. ASSESS THE RISKS OF THE MATERIALS TO BE FORMED PRIOR TO USE.

5. **Injury from Moving Parts.**
   Where pneumatics components are used to power moving parts there is a risk of personal injury.
   NEVER REMOVE ANY PANEL OR ATTEMPT ANY REPAIR UNLESS THE COMPRESSED AIR SUPPLY AND THE ELECTRIC SUPPLY HAS BEEN DISCONNECTED.
   BE EXTRA CAUTIOUS WHEN DEALING WITH COMPRESSED AIR. EVEN AFTER MAIN SUPPLY HAS BEEN SHUT OFF DANGEROUS RESIDUAL PRESSURE MAY STILL BE PRESENT WITHIN THE SYSTEM.
   NEVER ATTEMPT TO OVERIDE ANY CONTROL SYSTEM INTERLOCK OR SAFETY RELATED CONTROL SYSTEM SUCH AS THE 2 HANDED CONTROL SYSTEM.
HEALTH & SAFETY - Hazards specific to this machine.

6. Injury from Trapping.
There is a risk of trapping fingers and hands when loading mould tools. Ensure appropriate care is taken to
prevent trapping and use suitable personal protection. Care is required when operating the clamping frame to
ensure that fingers or hands are not trapped.
Keep hands clear of the heater rails when pulling the heater forwards.

7. Lifting, Reaching and Stretching.
TAKE CARE WITH LIFTING REACHING AND STRETCHING WHEN PERFORMING THE FOLLOWING ACTIVITIES:
-Operating the manual heater, the loading of materials and unloading of plastic formings.
-Applying manual assistance to formings during vacuum.
-Drilling holes and trimming of mouldings on the machine after forming.
-The fitting and loading of mould tools.
-Loading and fitting of reducing plates and frames.
-Fitting and adjustment of Fans.
-Replacement and maintenance of top frame and table seals.
ENSURE THAT LOCAL LIFTING AND HANDLING PROCEDURES ARE APPLIED AND MONITORED BY A PERSON
RESPONSIBLE FOR HEALTH AND SAFETY.

8. Fire.
The sheet auto-levelling system allows the level of heated plastic to be kept constant. There is a risk that
failure of the level sensors due to misuse of heaters OR the setting of the compressed air supply to a level that
exceeds the operating pressure of pneumatics valve and the machine specification may cause the plastic to be
blown into the heaters and to be ignited. Periodically monitor and check the condition of the infrared beam
sensors.
ENSURE THE COMPRESSED AIR SUPPLY IS SET TO THE RECOMMENDED LEVEL AND ONLY USE THE HEATER
FOR THE HEATING OF VACUUM FORMING PLASTIC MATERIALS.
RISK OF FIRE AS A RESULT OF HEAT AND PLASTICS PRESENTS AN EMERGENCY SITUATION. ENSURE FIRE
SAFETY TRAINING IS PERFORMED & CONTROLLED.
IT IS ESSENTIAL TO HAVE FIREFIGHTING EQUIPMENT AVAILABLE AT OR NEAR THE MACHINE. USE DRY
POWDER (BLUE) OR CARBON DIOXIDE (BLACK) FIRE EXTINGUISHERS.

Particles present in the working area may become airborne during the use of the fan cooling system, when
using an airline to blow onto plastics and when the release function is operated without tooling fitted.
ENSURE THAT THE DUST, PARTICLES AND DEBRIS IN THE WORKING AREA ARE KEPT TO A MINIMUM.
ENSURE THAT SUITABLE EYE PROTECTION IS WORN.

10. Working at Height.
When installing the fan cooling system, it is necessary to work at an appropriate height.
Ensure that adequate safety precautions are taken to prevent falling from height and that suitable, stable and
secure equipment is used to support your weight when working at height. Ensure that you DO NOT work on
your own when working at height.
ENSURE THAT LOCAL LIFTING HANDLING AND HIGH LEVEL WORKING PROCEDURES ARE APPLIED AND
MONITORED BY A PERSON RESPONSIBLE FOR HEALTH AND SAFETY.
HEALTH & SAFETY - Hazards specific to this machine.

11. Prohibited Uses

DO NOT USE THIS MACHINE FOR ANY PURPOSES OTHER THAN THE VACUUM FORMING AND BLOW MOULDING OF PLASTICS SHEET.

DO NOT USE THE HEATER TO APPLY HEAT TO ANY MATERIAL OTHER THAN PLASTIC SHEET AS PART OF THE VACUUM FORMING PROCESS SUCH AS: FOOD PRODUCTS, ALL TYPES OF PARTICLES, POWDER, DUST, ALL TYPES OF LIQUID, WOOD, PAPER, METALS AND ANY FORMS OF COMBUSTABLE MATERIALS.

DO NOT USE THE TABLE MECHANISM TO CLAMP, COMPRESS, FOLD OR APPLY FORCE TO ANY ITEM UNDER ANY CIRCUMSTANCES.

DO NOT USE THE CLAMPING FRAME TO CLAMP COMPRESS, FOLD OR APPLY FORCE TO ANY ITEM OTHER THAN THE CLAMPING OF SHEET PLASTICS AS PART OF THE VACUUM FORMING PROCESS.

DO NOT USE THE RELEASE TABLE AIR FUNCTION TO APPLY PRESSURE FOR ANY OTHER MEANS OTHER THAN TO RELEASE THE MOULDING FROM A FITTED MOULD TOOL.

DO NOT USE THE TABLE VACUUM PORT TO SUPPLY VACUUM FOR ANY OTHER MEANS OTHER THAN TO APPLY VACUUM UNDER A MOULD TOOL AS PART OF THE VACUUM FORMING PROCESS.

DO NOT ALLOW OTHER PERSONS WITHIN 1 METRE (39 INCHES) OF THE TABLE / APERTURE TRAP POINT WHEN OPERATING THE TABLE USING THE TWO HANDED CONTROL TABLE LIFT FUNCTION.

DO NOT BLOCK THE PUMP EXHAUST PORT ON THE REAR OF THE MACHINE AND DO NOT USE THIS PRESSURE OUTLET TO APPLY PRESSURE FOR ANY OTHER PURPOSE.

DO NOT USE THE TOP OF THE HEATER OR TOP OF THE HEATER GUARD TO STACK PLASTICS OR OTHER MATERIALS.

DO NOT USE THE UNDERSIDE OF THE REAR OF THE MACHINE TO STORE ANY ITEM(S).

DO NOT USE THE MACHINE TO STACK OR LEAN ITEMS AGAINST THE SIDES.

DO NOT USE THE FAN OUTPUTS TO APPLY AIRFLOW FOR ANY OTHER PURPOSE OTHER THAN THE COOLING OF VACUUM FORMINGS AS PART OF THE VACUUM FORMING OR BLOW MOULDING PROCESS.

DO NOT OBSTRUCT THE HEATER TRANSPORT WITH ANY ITEM OR USE THE TRASPORT WHEELS TO CUT OR FORM ANY ITEM OR MATERIAL.

DO NOT USE ANY OTHER PART OF THE HEATER TO MOVE THE HEATER FORWARDS AND BACKWARDS OTHER THAN THE HEATER HANDLE.

DO NOT USE THE FAN GANTRY TO HANG ANY ITEM.

DO NOT MOUNT THE FAN POSTS ON THE UNDER SIDE OF THE FAN GANTRY.

DO NOT REMOVE THE SIDE PANELS OF THIS MACHINE TO USE THE PNEUMATIC CYLINDER TO CUT, COMPRESS, BEND OR FORM ANY ITEM.

DO NOT USE OR MODIFY THE ELECTRICAL POWER IN THE CONTROL PANEL TO SUPPLY ANY OTHER DEVICE OR TO APPLY MODIFICATIONS TO THE MACHINE OR ITS FUNCTIONS.

THIS IS NOT AN EXHAUSTIVE LIST OF THE POSSIBLE MISSUSE OF THIS MACHINERY. THIS LIST IS WHAT IS CONSIDERED TO BE FORESEEABLE MISSUSE. THE USE OF THIS MACHINE MUST BE ASSESSED, MONITORED AND CONTROLLED BY THE PERSON RESPONSIBLE FOR THE HEALTH AND SAFETY IN THE ORGANISATION THAT OWNS AND OPERATES THIS MACHINE.
Introduction

The Formech 686PT is a highly versatile, manually operated Vacuum Forming Machine that will produce high definition mouldings in up to 6mm thick material. These machines are intended for use only for the vacuum forming of plastics components and for the blow moulding of heated plastics. The 686PT is ideal for prototype development work whilst also quite capable of small and large production runs.

The Formech 686PT incorporate the following features:

- Reliable and robust PLC control system and easy to use graphical touch screen with single screen forming cycle operation and 20 memory storage facility.
- Powerful quartz heaters PLC controlled in 6 heating zones.
- Heater power level standby feature allowing energy saving when heater is in rear position.
- Heater safety shutoff after idle period.
- A powerful filtered dry rotary vane vacuum pump.
- Vacuum gauge indication.
- Auto sheet levelling system – AUTO-LEVEL feature.
- AUTO-VACUUM function - triggers the Vacuum when raising the mould table.
- A powerful compressed air blow pre-stretch facility.
- A pneumatically powered mould table incorporating 2 handed manual control allowing easy and safe use of heavy mould with adjustable table speed.
- A powerful compressed air blow facility to release the moulding from the tool.
- The machine has been designed to be highly adaptable and functions such as changing a mould, or fitting reducing windows (which allow smaller sheets to be used) can be carried out in the minimum amount of time.
- Optional powerful fan cooling system.
- Optional reel feed system.
- Optional Cooling Bolster.
- Optional Vacuum Tank configuration.

This manual is the original user instructions for the Formech 686PT. It informs the user on machine safety, assembly, operation and maintenance. A more comprehensive guide to the vacuum forming process is available from Formech.
1. Heater
2. Clamp Frame Handle
3. Toggle Clamps
4. Mitsubishi touch screen
5. ‘Table Up’ Control Buttons
6. Vacuum Gauge
7. Heater Handle
8. Heater Transit Lock
9. Heater Guard
10. Counter Balance Weights
11. Self-adjusting Clamps Springs
12. Control Box with Main Switch
13. Heater Rear Supports
Specifications

Electrical supply: 220-240V, 3Wire, Single phase + Neutral + Earth, 50-60Hz.
208-220V, 3Wire, Twin Phase + Earth (Ground), 60Hz N. America.
380-415V, 5 wire, 3phase + Neutral + Earth, 50-60Hz.

Power: 8 kW
Fan Power: 550W
Air Supply: 5 Bar, Dry & Filtered.
Width: 970mm
Length: 1945mm
Height: 1180mm
Weight: 250Kg
Software revision: Rev 5.3

Noise Emissions
Noise emissions on the Formech 686PT are less than 70dB(A).

Machine Storage
The Formech 686PT must be stored in a dry environment.

Machine Transportation, Lifting and Moving.
The Formech 686PT is prepared for transportation with the heater Locked forwards and the heater guard, counterweights and accessories individually packed. All assemblies are supplied on a pallet or pallet crate with the load centre of gravity approximately central.
Before lifting, remove all separate assemblies and leave the heater fixed in its position until located at its operating site. Remove packaging where it assists with lifting and moving.
The machine may be lifted from either side taking particular care to avoid damage to the front clamping frame and panels.

ENSURE THAT LOCAL LIFTING AND HANDLING PROCEDURES ARE APPLIED AND MONITORED BY A PERSON RESPONSIBLE FOR HEALTH AND SAFETY.
Installation

The machine should be sited on a level concrete floor. Dusty or draughty areas will compromise machine performance but it is important to allow enough space (750mm) around the machine to allow access into the various panels and to ensure a good airflow to prevent overheating. During all of the following installation ensure that the power supply is properly isolated.

**Electrical Connection**

An electric supply of correct voltage, current & frequency is required. An isolating switch with facility to be locked in ‘OFF’ position and capable of handling full current should be wall mounted, within easy reach of the operator.

**380-415V Three Phase Supply.**

Using 3 phases, Neutral and Earth connections STAR configuration. 3P, N & E

The major current consuming devices within this machine are 230V single phase. For 3 phase machines each phase of a standard three phase supply should be connected to the L1 L2 & L3 of the machine isolation switch. A neutral wire of full load capacity is required in this case. An Earth stud is provided.

**220-240 V Single Phase Supply.**

Using 1 phase, Neutral and earth connection – 1P, N & E

The major current consuming devices are 230V single phase. Machines are fitted with a 3 Pole Isolator switch. Connect both Live & Neutral field feeder wires to the Switch terminations L1 (Live), L2 (Neutral). An Earth stud is provided.

**208-230 V Twin Phase Supply. (North America)**

Using 2 phases and earth connection – 2P & E

The major current consuming devices are 230V. Machines are fitted with a 3 Pole Isolator switch. Connect both Live phases of the field feeder wires to the Switch terminations L1 & L2. An Earth stud is provided.

**Important Notice on 3 phase & Neutral Connections.**

To prevent damage of components it is highly important to check that the three phase and neutral connections are correct. The machine colours for wiring are as follows:

- **Brown**  - L1 - Phase 1
- **Black**  - L2 - Phase 2
- **Grey**  - L3 - Phase 3
- **Blue**  - Neutral
- **Green/Yellow**  - Earth or Ground

After making connections to the isolator switch in the rear cabinet it is essential to verify that the phases and neutral connections are terminated correctly. The three phases must be connected to the connections L1, L2 & L3. The Blue neutral connections must be connected to the terminal labelled N.

Verify these connections using a volt-meter / multi-meter by measuring the voltage potential between the Neutral and each phase in turn. The voltage between each phase and the neutral should measure 220 – 240V ac. Once this is confirmed the Electrical box cover may be fitted and the isolator switch turned on.
Phase Connections / Motor Rotation

For all 3 Phase electrical connections the pump rotation direction is important. After switching the machine on press the Vacuum button on the operation screen and check that vacuum is present at the hole in the centre of the table. If there is no vacuum or if pressure is present then reverse 2 of the phase connections.

**THIS MACHINE MUST BE PROPERLY EARTHED IN ACCORDANCE WITH LOCAL REGULATIONS.**

Pneumatic Connection

The connection to the machine should be via a lockable shut off valve. Ensure that the pneumatic air supply is regulated to 6 BAR or less and is properly filtered. A competent person must make compressed air connections.

If flexible hoses are used it is strongly advised that they are of Nylon, canvas or wire reinforced rubber and suitably rated for pressure and temperature. Connection hose size is 12mm diameter. Threaded fittings are BSP. The machine is supplied with 12mm Nylon Hose and an addition 12mm to ½” BSPT connector. Maximum airline pressure must not exceed 6BAR or 80 PSI.

Fitting of the Heater Guard

The Heater Guard is attached to the rear rails. Remove the 2 screws from each side of the heater rail connecting links.

ENSURE THAT LOCAL LIFTING AND HANDLING PROCEDURES ARE APPLIED AND MONITORED BY A PERSON RESPONSIBLE FOR HEALTH AND SAFETY.
Fitting of the Stabiliser / Support Arrangement.

Remove the 2 screws on each side of the lower rear back panel and fit the bottom left and right support triangles with the angle returns facing inwards. See general arrangement item 13. Position the cross member support plate between the 2 triangle supports & fit the screws.

Remove the 2 screws on each side of the lower rear back panel and fit the bottom left and right support triangles with the angle returns facing inwards. See general arrangement item 13. Position the cross member support plate between the 2 triangle supports & fit the screws.

Position the cross member support plate between the 2 triangle supports & fit the screws. Ensure the 2 screws fitted under the triangle and cross member are touching the floor surface.
Installation

Counterbalance Arms and Weights

The counterbalance arms attach to the clamp frame of the machine with the screws supplied. The two counterbalance weights are normally supplied fitted to the arms and need to be set in position to balance the clamp frame. They are easily adjusted by loosening the screw with a 13mm spanner or socket. Adjustment is required if a reducing window is fitted. Adjust the weights so that the clamp frame is balanced.

COUNTERWEIGHTS ARE HEAVY ITEMS AND HENCE CARE MUST BE TAKEN TO PREVENT TRAPPING OF FINGERS.
TAKE CARE WHEN ASSEMBLING, LOADING AND UNLOADING COUNTERWEIGHT. HEAVY ITEMS CAN CAUSE CRUSHING IF MISSHANDLED, MISUSED OR IF DROPPED.
WHEN LOADING AND UNLOADING COUNTERWEIGHTS ALWAYS ENSURE THE END STOP LOCKING SPLIT PIN AND WASHER IS REPLACED AT THE END OF THE COUNTERWEIGHT ARM.
Installation

Optional Cooling System

Attaching the Cooling System

1- Fit the gantry sides to the two heater rails at the bolt holes on either side of the moulding area with the four nuts and screws supplied.

2- Fit the Gantry cross member to the top of the gantry sides with the four nuts and bolts supplied. Mount the fan on the cross member post so that the fan may be positioned behind the cross member directing the fan draft forward and away from the heater.

3- The swivel block is supplied fitted to the fan unit. Slide this onto the cross member post and tighten the grub screws and locking nuts. Never fit the fan posts on the underside of the cross member as the fan may fall and cause injury. Mounting of the fans is a 2 person operation.

4- Adjust the fan unit to the required position and tighten all the grub screws and lock nuts. Insert her cable into the clips on the gantry and route the cable down to the fan socket on the electrical box.

ENSURE THAT LOCAL LIFTING, HANDLING AND HIGH LEVEL WORKING PROCEDURES ARE APPLIED AND MONITORED BY A PERSON RESPONSIBLE FOR HEALTH AND SAFETY.

Operating the Cooling System

The corresponding FAN button on the touch screen will operate the cooling fan at the appropriate time to cool the moulding. The button changes colour when operated ON/OFF. It is worth considering the position of the fan mounting to achieve good and consistent results with different mouldings. Directing the airflow from behind the cross member down towards the centre of the moulding will reduce the cooling effect of the fan on the heater.

IT IS ESSENTIAL TO READ AND FULLY UNDERSTAND ALL THE INFORMATION IN THIS MANUAL RELATING TO SAFETY AND THE SAFETY HAZARDS SPECIFIC TO THIS MACHINE BEFORE INSTALLING AND OPERATING.

OPERATING PROCEDURES FOR THIS MACHINE MUST BE ASSESSED, MONITORED AND CONTROLLED BY THE PERSON RESPONSIBLE FOR HEALTH AND SAFETY.
This section deals with the following:

- Touch screen arrangement & operation
- Heater controls and heater arrangement
- Operating the 686PT
- Other controls and user adjustments

**Touch Screen Arrangement & Operation.**

The main functions of the Formech 686PT are operated from the touch screen.

**Main Menu**

- **Main Menu**
  - Allows entry to the **Editing Mode**.
  - Allows entry to the **Main Operating Screen**.
  - Enables the **Heaters**. Button changes to Green when enabled.

**Press**

- **LOAD CURRENT SETTINGS**:
  - This will load the most recently saved settings to the operating screen. The current loaded memory is shown at the top.

- **LOAD DEFAULT SETTINGS**:
  - This will load the default settings. These settings may be edited.

- **LOAD SAVED SETTINGS**:
  - This will load other settings stored in the memory.
LOAD SAVED SETTINGS

Allows you to choose a Job already saved in the memories available.

Press \( \text{to skip to the next 10 memory slots.} \)

Select the memory Job required to load the saved settings.

The main operation screen will load.

MAIN OPERATION SCREEN

This screen opens when a load option is selected.
This gives access to the machine function of the vacuum forming process. (See page 16 dealing with Icon descriptions)
The arrow guide the user through the main 5 machine functions of the forming cycle. Remain on this screen when performing continuous cycles.
**Operation - Manual Functions**

<table>
<thead>
<tr>
<th>Function</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Heater timer</strong></td>
<td>Shows the heater time. Press this to adjust the heater power &amp; standby settings. Changes can be saved or press 🛠️ to return to the main operation screen.</td>
</tr>
<tr>
<td><strong>Pre-Stretch</strong></td>
<td>This operation will turn on the compressed air valve to allow air to flow into the sealed cabinet. This function does not latch. Press &amp; hold to run. The Icon will change colour when pressed.</td>
</tr>
<tr>
<td><strong>Vacuum</strong></td>
<td>This operation will latch the pump and the vacuum valve on to apply vacuum to the table hole. The Icon will change colour when pressed.</td>
</tr>
<tr>
<td><strong>Fan timer</strong></td>
<td>This operation will latch the fan on for the time set for loaded settings. The fans will turn off when the time has elapsed. Pressing again will restart the timer. The timer setting can be changed in edit mode. The Icon will change colour when pressed. Press again at any time to stop the fan.</td>
</tr>
<tr>
<td><strong>Release</strong></td>
<td>This operation will apply compressed air to the table hole. This function does not latch but will unlatch the vacuum. Press &amp; hold to run. The Icon will change colour when pressed.</td>
</tr>
<tr>
<td><strong>Table down</strong></td>
<td>This operation will drive the table down. This function does not latch so it can be used to lower the table in steps if required. Also see section regarding the setting of table speed.</td>
</tr>
<tr>
<td><strong>Save</strong></td>
<td>When in the operation screen this allows the user to save the program or the times just used onto the memory and store as a new job. This function opens the settings screen. Also used on settings screens to save memory changes.</td>
</tr>
<tr>
<td><strong>Back</strong></td>
<td>This operation will exit the main operation screen and return to the main menu screen.</td>
</tr>
<tr>
<td><strong>Auto-level</strong></td>
<td>This operation enables the beam sensor to provide automatic levelling of the sheet level during heating. Compressed air is applied under the heated sheet when the beam is broken. This button latches and may be unlatched at any time.</td>
</tr>
<tr>
<td><strong>Auto-Vacuum</strong></td>
<td>This function allows the vacuum to be triggered by a limit switch mounted on the cylinder. When this feature is enabled the vacuum will be turned on automatically when the table is driven up. The switch position is adjustable.</td>
</tr>
</tbody>
</table>
Operation - Manual Functions

Note that when a feature is activated, the icon will go green, as shown below:

- **Vacuum activated**
- **Auto-level activated**

**Mould Table Drive**
The mould table drive function uses a 2 handed control safety feature.
The buttons are mounted on the front panel.
To bring the table up, press both ‘Table UP’ buttons simultaneously.

**Language Options**
Language options are selected by pressing open the flag icon located on the Main Menu screen. Press on this flag to select the language required.

**The HELP Function**
The 686PT incorporates a ‘HELP’ feature accessible by pressing the ? button on many of the user screens. Descriptions of the screen icons and buttons are shown on these screens in the language selected. Use the FORWARD button to scroll through these screens.
Basic Operation Using Default Settings

Initial Requirements

- Ensure the machine is turned on and has the appropriate air supply.
- Using the touch screen Main menu, turn the heaters **ON**. The heater button will show green . Allow between 15 and 20 for the heaters to reach operating temperature.
- Press  on the main menu. Select **LOAD DEFAULT SETTINGS** on the load screen.
- Raise the table to the top position and place your mould (mounted on a mould board) onto the table. A sheet of wire mesh is supplied with the machine to assist with Vacuum air flow under the mould tool. Fix the mould tool in place. Drive the table into the lower position by pressing the **TABLE DOWN** icon on the operating screen.
- Open the material clamps (2) & (3) and raise the clamp frame. Ensure the counterweights are set so that the clamp frame is correctly balanced.
- Position a sheet of plastic over the aperture.
- Pull the clamp frame down and close the 2 material clamps. The plastic should completely cover the white seals around the aperture. Adjust the toggle clamp screws to properly grip the plastic. The rear of the clamp is spring loaded. The pre-load spring tension at the rear of the clamping frame can be adjusted by moving the position of the two lock nuts – see section dealing with adjustment.
- After the heater has reached operating temperature the machine is ready for operation.
The Vacuum Forming Process

- Pull the Heater forwards over the clamped plastic.
- Activate the auto-level if required by touching the button so it shows green. If the plastic is sagging and not being heated evenly then the auto-level feature is used to keep the plastic level while the heater is forward and until ready to form a mould.
- As the plastic heats up it may begin to rise slightly. It will then soften and begin to drop back.
- The default time for the heating timer is 40 seconds. When performing an initial forming it will be necessary to check the progress of heating as this will vary with plastic type, thickness and colour. Push the heater back slightly to test the softness of the plastic manually or to observe its state. Continue heating until it is soft enough to form. When the plastic softness is correct push back the heater fully back.
- Press the PRE-STRETCH button to inflate the plastic before moulding if required. This feature is particularly useful if the mould is high because it keeps the plastic at a more even thickness throughout the moulding. If the moulding is quite high it may be necessary to pre-stretch the plastic before moulding takes place.
- Press the two TABLE UP buttons simultaneously and hold until the table is fully raised. Then press the VACUUM icon to latch on the vacuum. The moulding will form around the tooling.
- The AUTO-VACUUM feature may be enabled before bring the table up. This feature will start the vacuum automatically when the table rises. The trigger point of the auto-vacuum sensor may be adjusted if required.
- At the appropriate time when the plastic has formed around the mould tool the fans may be turned on to start the plastic cooling process – press the FAN icon. When the moulding is adequately cooled, press the fan icon again to turn it off.
- Once the plastic has cooled sufficiently the RELEASE icon may be pressed to blow the moulding off the mould. Too long or too soon a release may distort the moulding.
- Once released the moulding is now complete and the table may be lowered. Press the TABLE DOWN icon and ensure the moulding has released from the mould tool. Ensure the table has reached its lower position. Release the clamp frame to remove the moulding for inspection.
- Review the results and determine the parameters required to produce the forming. Use the settings mode to set and record the values for later recall.
Operation - Settings

Memory Settings
Press the settings icon

Select the Memory Slot
Press on an existing memory record or create a new position by selecting an empty memory slot as required. The settings screen will open.

Settings
- Heater settings – Opens Heater settings
- Auto Vacuum – Set Green to enable
- Auto-level – Set Green to enable
- Heat time – Set time using Pop-UP Keypad
- Fan time – Set time using Pop-UP keypad
- Save – Opens the final save screens
- Back – Returns to the previous screen

Each setting function allows editing of memory parameters.
The 2 timers are set by pressing on the timer value and entering the new value using the pop-up keypad.
The Auto-level & Auto-vacuum icons are toggle buttons – change to green to set ON.
The heater settings button will open the Heater Settings screen.
Heater settings

This screen shows the zone layout of the heater. Zones 1-6

Refer to the section on the heater arrangement to gain further understanding of setting methods.

The % power of each zone and the standby % setting can be set on this screen.

Heater Zone Settings

The power setting box shows the power level that is to be used to set each zone power. Press on this value to change the power level to be used using the pop up keypad and press on each of the zones that require this setting. The value will transfer to the zone. Change the power level to set other zones as required. Power levels can be set in 1% increments. 100% is full power.

Heater Standby Settings

The power setting box shows the power level that is to be used to set each zone power. Press on this value to change the power level to be used using the pop up keypad and press on each of the zones that require this setting. The value will transfer to the zone. Change the power level to set other zones as required. Power levels can be set in 1% increments. 100% is full power.

The back button will return to the settings screen.

The heater settings screen can be accessed at any time from the main operation screen. Press the button to return to the operating screen.
Save Settings

Press the save button when changes are complete.
The memory slot may be reviewed and changed – select the required memory position.
The Following screen will open.

final Save Editing
Press on the memory title to edit the title if required.
Press the save button when complete.

Changing Default settings
The default settings are as follows:

<table>
<thead>
<tr>
<th>Zone</th>
<th>Setting</th>
<th>Zone</th>
<th>Setting</th>
<th>Zone</th>
<th>Setting</th>
<th>Zone</th>
<th>Setting</th>
<th>Zone</th>
<th>Setting</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>70%</td>
<td>2</td>
<td>70%</td>
<td>3</td>
<td>70%</td>
<td>4</td>
<td>70%</td>
<td>5</td>
<td>70%</td>
</tr>
<tr>
<td>6</td>
<td>70%</td>
<td>7</td>
<td></td>
<td>8</td>
<td></td>
<td>9</td>
<td></td>
<td>10</td>
<td></td>
</tr>
</tbody>
</table>

Heater timer: 40 seconds
Fan timer: 50 seconds
Standby: 50%
Auto-level: ON
Auto Vacuum: ON

To change the default settings:
Load the default settings to the operation screen mode.
Press the SAVE button and edit the changes to the default settings in the settings mode.
Press the SAVE button and press the DEFAULT button on the memory selection screen to save and return to the operation screen.
Heating Zone Control and Adjustment

The heating zone control is adjusted through the touch screen. The quartz heaters are designed to heat the plastic rapidly without burning the surface. The time required to heat the plastic sheet remains fairly constant.

Heater movement is manually operated – always use the blue handle. Operators are able to send the heater partially back to check the condition of the plastic and then bring it forward to continue the heating process.

There are 6 controllable heat zones allowing the operator to either switch off zones not required or adjust the individual zone outputs in 1% increments from 0-100%.

Individual zones may be set up to provide even heat. To achieve the best results set the inner zones lower than the outer zones. The rear of the heater will always run hotter than the front. The inner zones retain heat more and outer zones lose the heat more quickly. When using reducing frames the zones not in use should be turned down or OFF.

The central 9 heating elements are specified with lower power (250W) than the outside elements to allow for centrally retained heat. Allow for this heat profile when setting.

Always push heaters over the rear heat shield when not heating plastic. Having set the heaters, slight adjustments may have to be made depending on the mould design, plastic type / thickness / colour and the machine & environment temperature / conditions.

When the heater is in the standby position (rear position) the quartz heater may be set to idle at a lower level to reduce the machine power consumption.
**Table Speed Adjustment**

Two table speed adjustments are situated on the lower left hand side of the rear panel (when viewed from the rear of the machine).

These are flow regulators to adjust the air that is exhausted from the table pneumatic cylinder. Inserting a 6mm hexagon key in the centre and rotating clockwise or anti-clockwise will adjust them.

Adjust the regulator clockwise to reduce the exhaust flow – to reduce the cylinder speed.

Adjust the regulator anti-clockwise to increase the exhaust flow – to increase the cylinder speed.

The top flow regulator will adjust the table UP speed.

The lower flow regulator will adjust the table DOWN speed.

**TAKE CARE WHEN REACHING TO THE BACK OF THE MACHINE. THERE MAY BE VERY HOT SURFACES IN THIS AREA.**

---

**Clamp Frame Rear Spring Adjustment**

The clamp frame is spring loaded at the rear. The springs are locked in place with M10 nuts. The loading of the springs may need to be adjusted, for example, when using thinner or thicker plastics materials to assist clamping or when a reducing place is fitted.

To adjust the spring loading loosen the lower nut for each spring and adjust the upper nut to suit. Tighten the lower nut to lock against the upper nut.

**TAKE CARE WHEN REACHING TO THE BACK OF THE MACHINE. THERE MAY BE VERY HOT SURFACES IN THIS AREA.**

---

**Clamp Frame Front Clamp Adjustment**

The front material clamps are manually adjustable. Loosen the black thumb screw nut at the base to allow appropriate adjustment of the top thumbscrew nut. Tighten the lower thumb screw and test that the setting is correct. Re-adjust as required. Adjustment is required for varying material thickness and reducing plates.
Fixing Mould Tools

There are four mould tool fixing points at each corner of the table to accept M6 Screws. Use these to fit full sized mould tool mounting boards, maximum thickness 5mm. Thicker tool mounting may be used if the boards are reduced in size allowing a gap between the board and aperture or if the edges are chamfered.

Further mounting holes may be inserted. Avoid the centre 120mm section along the full left to right length in the centre of the table when positioning mounting points.
Counterweight Adjustment, Loading & Unloading.

Counterweights are fitted to the rear of the clamp frame.
There are 2 counterweight arms. Each arm has 2 counterweights. Additional weights are required for machines fitted with reducing frames.
To adjust the position of the weight, hold the weight to be adjusted and loosen the retaining screw. The weight will slide along the counterweight arm to the position required. Ensure the locking screw is tightened after adjusting the counterweight position.

TAKE CARE WHEN REACHING TO THE BACK OF THE MACHINE. THERE MAY BE VERY HOT SURFACES IN THIS AREA.
COUNTERWEIGHTS ARE HEAVY ITEMS AND HENCE CARE MUST BE TAKEN TO PREVENT TRAPPING OF FINGERS.
TAKE CARE WHEN ASSEMBLING, LOADING AND UNLOADING COUNTERWEIGHT. HEAVY ITEMS CAN CAUSE CRUSHING IF MISSHANDLED, MISSUSED OR IF DROPPED.
WHEN LOADING AND UNLOADING COUNTERWEIGHTS ENSURE THE LOCKING SPLIT PIN AND WASHER ARE REPLACED AT THE END OF THE COUNTERWEIGHT ARM.

IT IS ESSENTIAL TO READ AND FULLY UNDERSTAND ALL THE INFORMATION IN THIS MANUAL RELATING TO SAFETY AND THE SAFETY HAZARDS SPECIFIC TO THIS MACHINE BEFORE OPERATING.
OPERATING PROCEDURES FOR THIS MACHINE MUST BE ASSESSED, MONITORED AND CONTROLLED BY THE PERSON RESPONSIBLE FOR HEALTH AND SAFETY.
Reliability and a long service life are synonymous with the Formech brand. However, as with any machinery, certain parts will require periodic replacement and regular maintenance and care will prolong machinery life.

**Clamp Seals**
The silicone 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. A cartridge filter is fitted to the vacuum pump inlet to prevent particle being drawn into the vacuum chamber. Monitoring of the condition of the filtering system will prolong vacuum performance. Replace the filter if it becomes degraded with dirt and particulate.

**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.**
Fault Diagnostics / Maintenance

Apart from the table and clamp seals, which are considered to be consumable items, the service and repair of your machine is likely to be minimal. This is providing that you have noted the sections regarding the vacuum system and heating elements. However, depending on usage, performance monitoring and subsequent preventative maintenance may be required to ensure that the machines performance is maintained.

**IT IS ESSENTIAL TO READ AND FULLY UNDERSTAND ALL THE INFORMATION IN THIS MANUAL RELATING TO SAFETY AND THE SAFETY HAZARDS SPECIFIC TO THIS MACHINE BEFORE PERFORMING SERVICING AND REPAIRS.**

**MAINTENANCE ACTIVITIES FOR THIS MACHINE MUST BE ASSESSED, MONITORED AND CONTROLLED BY THE PERSON RESPONSIBLE FOR HEALTH AND SAFETY.**

Electrical

**BEFORE ANY MAINTENANCE WORK IS CARRIED OUT BOTH ELECTRICAL AND AIR SUPPLIES MUST BE LOCKED IN THE OFF POSITION. 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.**

Faults on electrical & electronic modules are rare but loose connections are responsible for most electrically based failures. A logical approach to detecting the fault begins with a complete assessment of the fault scenario. Much time can be wasted looking in the wrong areas for faults.

See also section dealing with electrical circuit information.

Heater

The flexible conduits between the heaters and the control cabinet contain a number of heatproof power cables. Due to the continual motion of the heater these may eventually suffer from fatigue and require replacement.

Only the correct grade of cable should be used, and the work carried out by a skilled technician.

The Quartz heating elements should be periodically inspected particular–ly for hairline cracks. There is usually no specific reason for this occurring other than through age due to the expansion & contraction. If an element fails to heat and the terminations are correct then it will require replacement.

The element terminal connections on the element tray require periodic tightening as result of continued expansion, contraction & vibration. Remove the heater cover. Remove every terminal block cover and systematically check & tighten every terminal block screw ensuring that every wire is securely in place. This procedure may be repeated every 6-12 months depending on usage.

*For the reasons stated, the elements, associated cables, connectors, fuses and triac controllers are specifically excluded from our standard warranty.*
Replaces a Heating Element

- If the plastic is not being heated evenly and there is an obvious cold spot then the cause will need to be identified.
- Switch off machine and let heater cool completely, this will take at least 45 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 30 minutes.
- When elements are completely cool, turn on each zone individually and very carefully feel each element connected to that specific zone. The difference in temperature will be noticeable. Identify non functional elements.
- Disconnect the electrical mains supply.
- Bring the heater completely forward.
- Remove the screws securing the slotted heater cover and remove the cover.
- Remove the cap from the terminal block associated with the faulty element, loosen the terminal block screws and remove the element leads and insulation sleeves. A final check can be made at this stage by measuring the resistance of the element using a multi-meter. A faulty element will read as open circuit.
- Remove the 4 nuts and washers securing the element to the tray. Position your hand underneath the element to prevent it from falling and remove the element.
- Fit the new element, feeding the connection leads through the tray and secure it in place with the retaining nuts and washers.
- Slide on the insulation sleeves, replacing with new if perished or damaged. Ensure that the connections are fully tightened and correctly wired.
- Replace the terminal block cover and check that cabling is away from metal parts.
- Replace the slotted heater cover and fit the self tapping screws.

Auto-levelling System

The 686PT is fitted with an automatic sheet levelling system. An optical sensor directs a beam of infrared light across the machine. The system comprises of a transmitter and receiver. When the beam is broken air is pumped into the machine cabinet under the plastic lifting it until beam transmission is re-established. The optical sensors are located under the top-frame at the sides.

It is important the transmitter beam is directed at the receiver. Adjustment may be carried out by slightly bending the sensor mounting plate to ensure alignment. The receiver LED’s will show red when broken or misaligned and green when OK.

For transparent materials it is possible that the sensors will not operate correctly as the infrared will pass through the material. In such cases an optical attenuator is available that will create a narrow beam and reduce the sensitivity. Contact Formech if an attenuator is required.
Fault Diagnostics / Maintenance

Vacuum

Warning: never oil any part of the vacuum pump. It is designed to run dry and could be severely damaged by lubrication.

The vacuum circuit requires very little maintenance. The inlet filter is mounted on top of the vacuum pump situated under the table of the machine. Unclip the top cover of the filter box. The paper cartridge filter will prevent small particles and dust from entering the vacuum pump. This filter should be inspected periodically and blown out if dirty or replace if in poor condition. Do not run the machine without this filter.

Worn or damaged seals around the perimeter of the table may cause loss of vacuum. These are classed as a consumable part and require replacement after some time. To replace seals follow the procedure relating to Clamp & Table seals in this section.

Other causes of vacuum loss are loose or damaged flexible pipes or fittings, blocked filters or build up of contamination in the vacuum valves. Valves should be dismantled, cleaned and lubricated or replaced. Lubricants or other liquid may cause irreparable damage to the pump if introduced into the vacuum circuit.

Vacuum System

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

- The mould baseboard is not restricting the vacuum inlet in the drape table. If the mould baseboard is too soft it may pull down and block the vacuum inlet.
- The mould tool is adequately vented to allow trapped air to be evacuated.
- The table and clamp seals are in good order and the table is at the top of its travel.
- There are no open holes in the drape table.
- The filter box cover is correctly fitted.

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 valve is blocked.
- The vacuum pump is blocked or corroded.

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.
Fault Diagnostics / Maintenance

Pneumatics

Providing there is a good filtered regulated and lubricated air supply, using good quality airline oil, maintenance will be minimal. However, a thorough inspection of the machine is necessary from time to time. Any mechanical damage of pipes and fittings should be dealt with before reusing the machine.

Always lock air supply OFF and bleed out system air before attempting any maintenance of air system.

Other problems that cylinders and solenoid valves may suffer from are:

• Lack of electrical supply signal - Check appropriate circuitry.
• Solenoid has become open circuit - Replace with new solenoid.
• Return mechanism jammed or broken - Dismantle valve to investigate. Replace if required.
• Wet or dirty air supply - Check condition of air compressor and condensate management system.
• Internal leaks within valves & cylinder – Repair with new seals or replace.

Please specify cylinder/ valve number & model when ordering any pneumatic spare parts.

Many problems can be caused by water in the pneumatic system.

Table Cylinder Maintenance.

THE PNEUMATIC TABLE LIFT ASSEMBLY IS A POTENTIALLY HAZARDOUS AREA OF THE MACHINE TO PERFORM REPAIRS, MAINTENANCE AND ADJUSTMENTS. THE FOLLOWING GUIDELINES MUST BE FOLLOWED WHEN PERFORMING MAINTENANCE ON THIS AREA. IT IS RECOMMENDED THAT MAINTENANCE OF THIS AREA IS CONDUCTED BY QUALIFIED AND COMPETENT PERSONS.

Lift the table using the 2 handed control system to a point just below the top frame. Remove all air supply from the machine and switch off the power. Remove both side panels and fit supports on both sides between the machine base and the underside of the table and fix in place. The prop must be of suitable strength to take the weight of the table. Remove both of the 10mm air pipes that feed the cylinder from the table valve. The table will rest on the fitted props. Check that the table and props are secure.

Full access is now available to the table cylinder.

For general maintenance and cylinder removal:

• Loosen the top nut of the cylinder & allow the cylinder rod to drop.
• To remove the cylinder, remove the valve pipes, solenoid connectors and the screws retaining the cylinder base mount.
• Remove the whole assembly and remove the 4 cylinder retaining screws.
• Disassemble the cylinder and renew the seals as required.
• Reassemble the cylinder and the replace all parts.
Clamp & Table Seals

These are regarded as a consumable part and should be replaced when signs of wear become apparent. See section dealing with Vacuum.

Formech supply a kit comprising the necessary seals and sealant for the Formech 686PT. We recommend that only the correct silicone seals and sealant are used to give an effective seal.

ENSURE PRECAUTIONS ARE TAKEN TO MINIMISE EFFECTS OF REACHING AND STRETCHING AND THAT WHERE A PLATFORM OF ANY TYPE IS USED, THAT IT IS STABLE AND SECURE. ENSURE THAT SUITABLE GLOVES ARE USED IF USING SHARP TOOLS TO REMOVE EXISTING SEALS AND ADHESIVES.

To replace a damaged or worn seal

- Remove all traces of the existing seal and sealant.
- Using masking tape, make a frame inside where the seal will go (table) or outside (top frame).
- Gain a good ‘key’ to the sealing surface using an abrasive cloth or paper. Degrease the area and remove all dust.
- Cut the seal strip to the lengths required allowing for 25mm overlap at the corners.
- Apply a bead of sealant to the masked area and spread to achieve a generous and even coating.
- Bed down the strips of silicon seal until it is firmly seated into the sealant. Do not attempt to stretch the seal strip.
- Ensure the strips are straight along the sides and perpendicular at the corners. Cut through the strips at 45° where they meet at the corners with a sharp blade. Continue this process for all 4 corners.
- Apply a small amount of sealant to the mitred joints and firm together to achieve a clean, square and closed joint.
- Carefully remove the masking tape and place masking tape over the mitred corners to help keep them positioned until the sealant sets.
- Leave overnight to cure.

Panel seals

The rubber seals fitted to the side panels should be periodically inspected and replaced where necessary. Failure of these seals will prevent the correct functioning of the auto-level and pre-stretch functions.

THE MACHINE MUST BE COMPLETELY ISOLATED FROM BOTH ELECTRICAL AND AIR SUPPLIES BEFORE REMOVING SIDE PANELS.

To replace the seals remove the panel that requires service and remove the damaged seal. Apply silicone sealant to the sealing area and replace with new seal strip. Only use original parts. Allow to dry for minimum of 2 hours before refitting the panel.

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 contact number on the front of this manual stating the model, 686PT, the serial no. (on specification plate), and a full description of the fault or parts you need.
Fault Diagnostics / Maintenance

Cleaning

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

Lubrication

The 686PT requires minimum lubrication. The main lubrication area is the table guide bars situated on either side of the table. Apply general purpose grease when required to assist with table movement and prevent unnecessary wear.

Electrical Circuit Information

Overview

The following is an overview of the 686PT control circuit showing the safety related parts of the control system.

Technical information consists of the following:

P1-2. 686PT Single Phase circuit drawings.
P3-4. 686PT Twin Phase circuit drawings (USA).
P5-6. 686PT Three Phase circuit drawings.
P7. 686PT Heater tray wiring.
P8. 686PT Major components parts listing.

Interlocking devices

Rear heater limit switch, SW2
Prohibits Auto-level when closed.
Prohibits Pre-stretch, Release, and ‘Table Up’ command when open.
P7. Heater Tray Wiring Diagram
## P8. Major Parts Listing 686

<table>
<thead>
<tr>
<th>Qty</th>
<th>Description</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>9</td>
<td>Quartz Heating Element, Zone 1,2</td>
<td>250W SQE, 230V</td>
</tr>
<tr>
<td>16</td>
<td>Quartz heating Element, Zone 3,4,5,6</td>
<td>300W SQE, 230V</td>
</tr>
<tr>
<td>1</td>
<td>Heater Cabling (m)</td>
<td>1.63mm DFGL Bl /Br</td>
</tr>
<tr>
<td>1</td>
<td>Heater Cabling (m)</td>
<td>1.00mm SIFGL Brown</td>
</tr>
<tr>
<td>1</td>
<td>Heater Cabling (m)</td>
<td>2.5mm SIFGL White &amp; Blue (N)</td>
</tr>
<tr>
<td>1</td>
<td>Heater Cabling (m)</td>
<td>2.5mm SIF Blue, G/Y</td>
</tr>
<tr>
<td>1</td>
<td>Sleeving HT</td>
<td>Mar 310</td>
</tr>
<tr>
<td>1</td>
<td>Conduit PVC coated</td>
<td>SP20</td>
</tr>
<tr>
<td>1</td>
<td>Cable chain</td>
<td>Chain 300-25</td>
</tr>
<tr>
<td>1</td>
<td>Cable chain end Bracket set</td>
<td>Brkt 300-25</td>
</tr>
<tr>
<td>4</td>
<td>Wheel bearing</td>
<td>1/2” KLNJ</td>
</tr>
<tr>
<td>23</td>
<td>Ceramic Terminal Block</td>
<td>30A ceramic Block</td>
</tr>
<tr>
<td>1</td>
<td>Timer Switch</td>
<td>S1844</td>
</tr>
<tr>
<td>1</td>
<td>MCB 40A Single phase 686</td>
<td>MCB 40A Type B</td>
</tr>
<tr>
<td>1</td>
<td>MCB 6A Single phase 686</td>
<td>MCB 6A Type B</td>
</tr>
<tr>
<td>3</td>
<td>MCB, 16A Three phase 686</td>
<td>MCB 16A Type B</td>
</tr>
<tr>
<td>1</td>
<td>Isolator Switch 3Pole (1Phase / 2Phase)</td>
<td>S1376</td>
</tr>
<tr>
<td>1</td>
<td>Isolator Switch 4Pole (3Phase)</td>
<td>S1699</td>
</tr>
<tr>
<td>1</td>
<td>Fuse holder</td>
<td>L37181</td>
</tr>
<tr>
<td>1</td>
<td>20mm Fuse SA</td>
<td>20mm Fuse SA</td>
</tr>
<tr>
<td>2</td>
<td>20mm Fuse 2A</td>
<td>20mm Fuse 2A</td>
</tr>
<tr>
<td>1</td>
<td>Pump Contactor 24VDC</td>
<td>DILEM-10-G24/VDC</td>
</tr>
<tr>
<td>1</td>
<td>Contactor Overload</td>
<td>ZE6</td>
</tr>
<tr>
<td>1</td>
<td>PLC</td>
<td>FX15 30 - 686</td>
</tr>
<tr>
<td>1</td>
<td>HMI - Touch Screen</td>
<td>GT1045 - 686</td>
</tr>
<tr>
<td>1</td>
<td>Lead Comms, 1M</td>
<td>GT01-3M - 686</td>
</tr>
<tr>
<td>1</td>
<td>24VDC smpsu</td>
<td>S2524</td>
</tr>
<tr>
<td>1</td>
<td>2 POLE RELAY BASE</td>
<td>S8868</td>
</tr>
<tr>
<td>1</td>
<td>24VDC 2 POLE RELAY</td>
<td>R6482</td>
</tr>
<tr>
<td>1</td>
<td>Relay single pole 6A, 24V</td>
<td>F38.51.7.024-0050</td>
</tr>
<tr>
<td>1</td>
<td>OP pcb Htr 4 Channel</td>
<td>AG 4ch-6A</td>
</tr>
<tr>
<td>1</td>
<td>IEC shuttered outlet</td>
<td>S2174</td>
</tr>
<tr>
<td>1</td>
<td>Buzzer 12V</td>
<td>Std Buzzer</td>
</tr>
<tr>
<td>1</td>
<td>Beam Sensor</td>
<td>CX 411-P</td>
</tr>
<tr>
<td>1</td>
<td>2 Handed ctrl module Cat I</td>
<td>BAS120</td>
</tr>
<tr>
<td>2</td>
<td>Grey Button non-illuminated</td>
<td>ZB4-BAB8</td>
</tr>
<tr>
<td>2</td>
<td>N.O / N.C. Switch body</td>
<td>ZB4-BZ105</td>
</tr>
<tr>
<td>1</td>
<td>IEC shuttered outlet Snap fit</td>
<td>S2174</td>
</tr>
<tr>
<td>1</td>
<td>Auto Vac Reed switch</td>
<td>FL2</td>
</tr>
<tr>
<td>1</td>
<td>2/2 Air Valve 1/2&quot;</td>
<td>210A15</td>
</tr>
<tr>
<td>1</td>
<td>2/2 Vac Valve 1/2&quot;</td>
<td>030A17</td>
</tr>
<tr>
<td>1</td>
<td>Air silencer 1/2&quot;</td>
<td>A780 1/2’</td>
</tr>
<tr>
<td>1</td>
<td>Cylinder100Bore325 (table)</td>
<td>EA PLS 100A325</td>
</tr>
<tr>
<td>1</td>
<td>5/3 valve</td>
<td>EA S41 91 028</td>
</tr>
<tr>
<td>2</td>
<td>Sol Pilots for 5/3 valve</td>
<td>EA 189000001</td>
</tr>
<tr>
<td>2</td>
<td>Exhaust control reg</td>
<td>3/8” Hex Flow CTRL Reg</td>
</tr>
<tr>
<td>1</td>
<td>3/8” bore PVC tube (m)</td>
<td>Pipe 10/16</td>
</tr>
<tr>
<td>3</td>
<td>1/2” bore PVC tube (m)</td>
<td>Pipe 125/185</td>
</tr>
<tr>
<td>1</td>
<td>50mm Vacuum gauge</td>
<td>50mm Vac gauge</td>
</tr>
<tr>
<td>1</td>
<td>Vacuum Pump &amp; filter unit</td>
<td>VT4.16 (1P / 3P)</td>
</tr>
<tr>
<td>2</td>
<td>Toggle Clamp</td>
<td>686 Toggle Clamp</td>
</tr>
<tr>
<td>2</td>
<td>Toggle Clamp Nutlet M6 Black</td>
<td>Med Clamp Nutlet M6</td>
</tr>
<tr>
<td>2</td>
<td>Toggle Clamp Knurled Nut M6</td>
<td>Med Clamp Knurled Nut M6</td>
</tr>
<tr>
<td>2</td>
<td>Clamp Frame Grip</td>
<td>686 Clamp frame grip</td>
</tr>
<tr>
<td>1</td>
<td>5M Seal kit, 5M Top seal, 3m table seal, sealant</td>
<td>686 Seal kit A</td>
</tr>
<tr>
<td>1</td>
<td>10M Seal kit, 10M Top seal, 3m table seal, sealant</td>
<td>686 Seal Kit B</td>
</tr>
<tr>
<td>1</td>
<td>6mm x 12mm natural rubber Panel seal</td>
<td>Std Nat Rubber seal 6 x 12</td>
</tr>
<tr>
<td>1</td>
<td>Mesh</td>
<td>686 Mesh</td>
</tr>
</tbody>
</table>
E C 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 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:               686PT
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:  A. Berry at address below.

Significant harmonised standards applied:

EN ISO 12100 : 2010
EN ISO13849-1:2006
EN 60204 –1 : 2006
EN 12409: 2008

Signed

Date:    15 October 2012
Name:   Paul Vukovich
Position: Managing Director
Being the responsible person appointed by the manufacturer
For Parts, Service & Technical Assistance UK, Europe and Rest of the World
Telephone: +44 (0) 1582 469 797
Fax: +44 (0) 1582 469646
spares@formech.com

For Parts, Service & Technical Assistance North and South America
Telephone: 312.396.4072
Fax: 312.396.4073
spares@formechinc.com