Formech
Perfectly formed

Floor Standing Vacuum Forming Machine

:686

Installation, Operating and Service Manual

For Parts, Service & Technical Assistance
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Rev 8.8

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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.

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.

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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 5 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.

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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.

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3. Injury from Compressed Air.

Pressures up to 80PSI 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.

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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.

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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.

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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.

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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.

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9. Airborne Particles.

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.

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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 USE THE FAN GANTRY TO HANG ANY ITEM.

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

DO NOT OBSTRUCT THE HEATER TRANSORT WITH ANY ITEM OR USE THE TRANSPORT 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 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 SAFTEY 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.

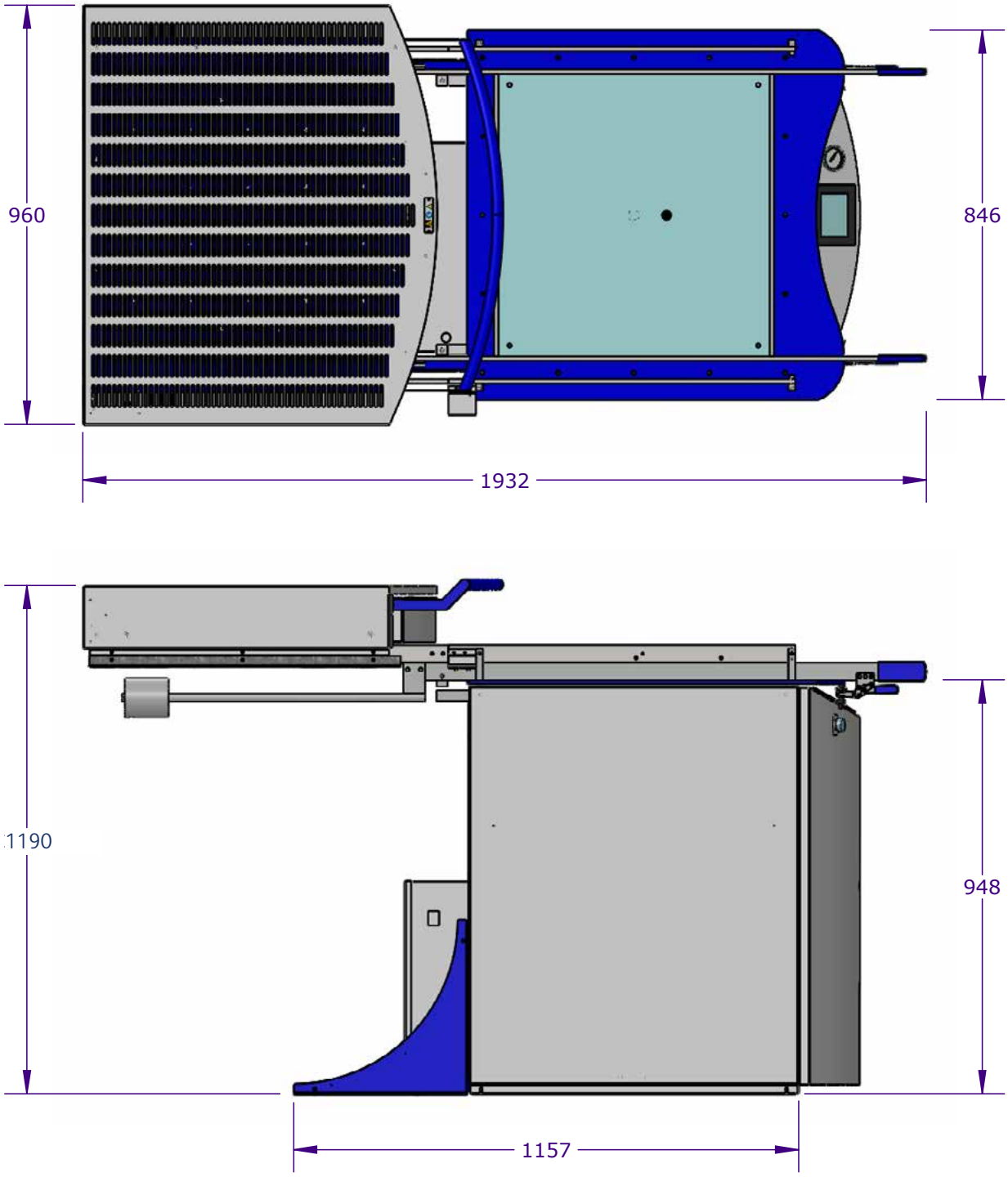
The Formech 686PT incorporate the following features:

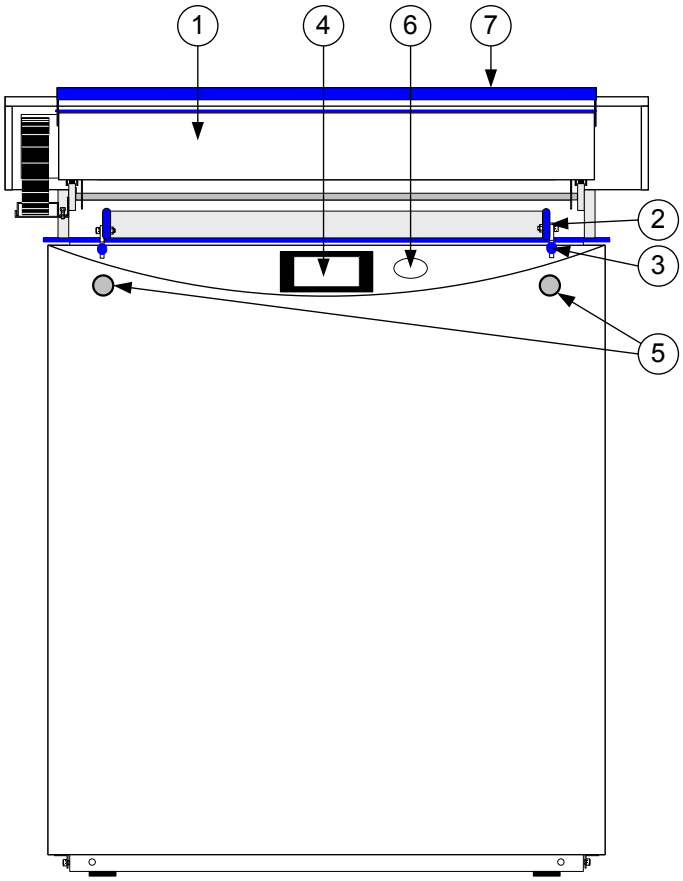
- Reliable and robust PLC control system and easy to use graphical touch screen with single screen forming cycle operation and 20 memory storage facility.
- Powerful quartz heaters PLC controlled in 6 heating zones.
- Heater power level standby feature allowing energy saving when heater is in rear position.
- 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 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 heating pyrometer
- Optional vacuum flow regulator
- Optional castor
- 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.

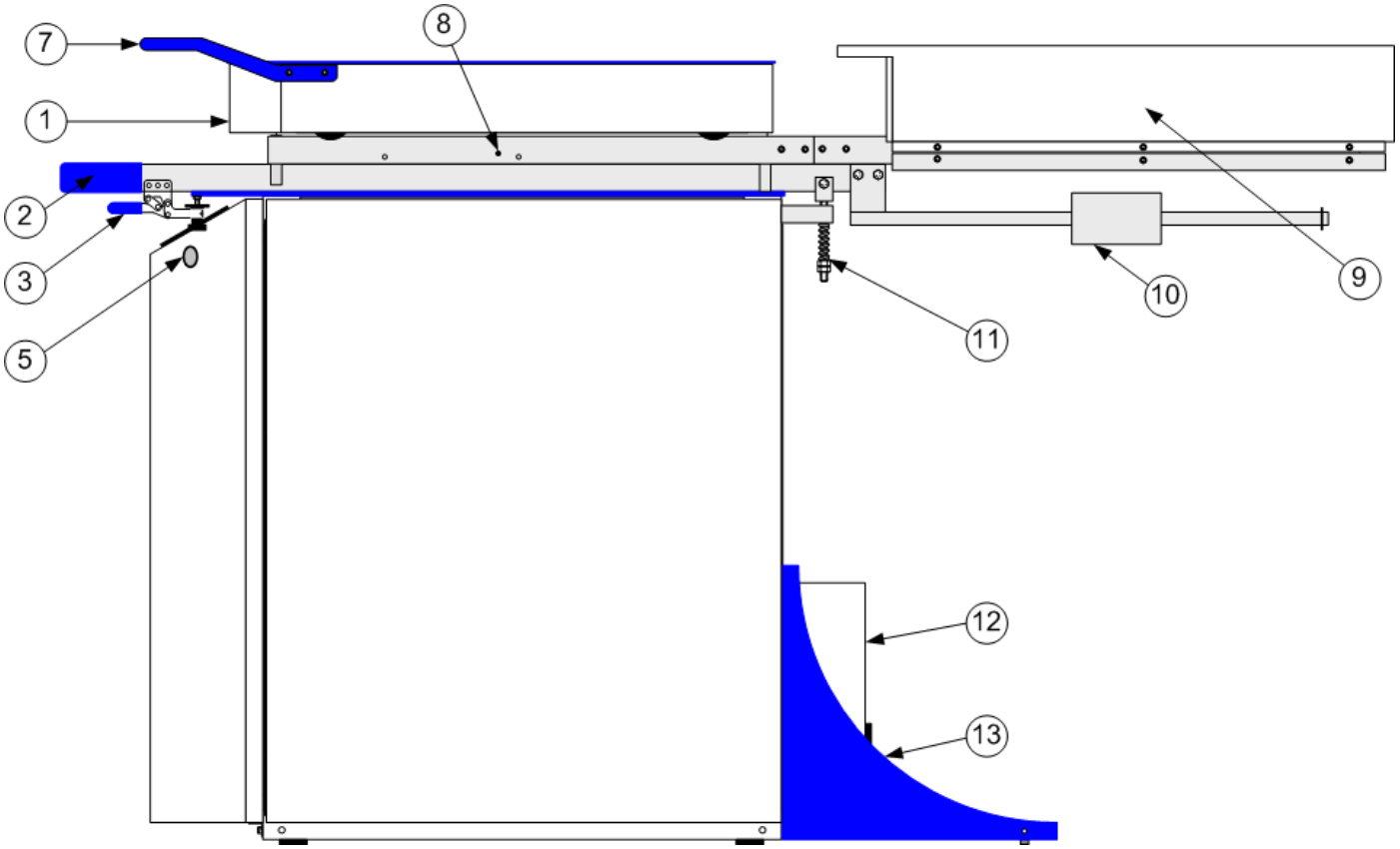
Machine footprint

(Dimensions are in mm)





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



Electrical Specifications

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 consumption: 8 kW

Mechanical Specifications

Sheet size: 686 x 660mm
Forming area: 646 x 620mm
Max depth of draw: 325mm
Max mould tool weight: 70Kg
Fan Power: 550W
Air Supply: 5 Bar, Dry & Filtered.
Overall width: 960mm
Length: 1932mm
Overall height: 1190mm
Overall height with cooling system: 2170mm
Weight: 260kg

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. If the machine is not used for a long period of time, run the pump periodically (once a month).

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.

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 colors for wiring are as follows:

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

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 5 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 5 BAR 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.

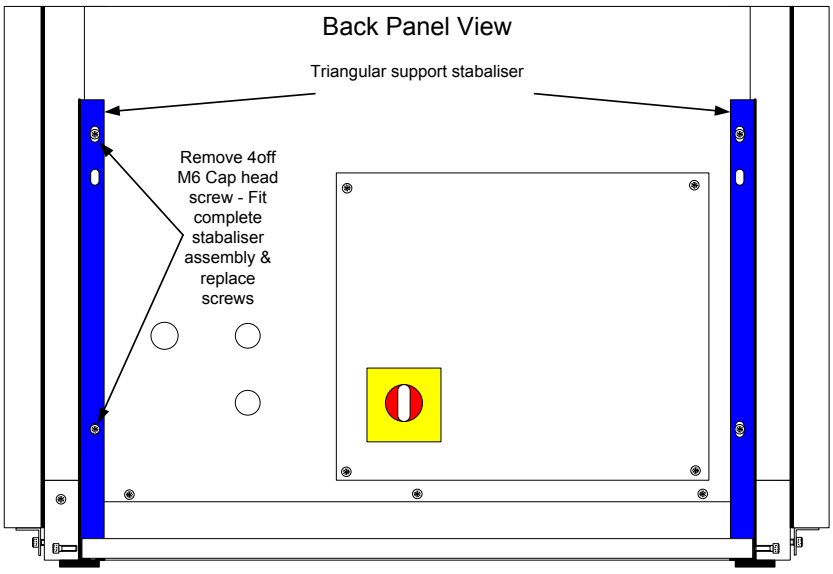
Slide the heater guard onto the links
(2 people are required to perform this lift)

Refit and tighten the screws through the rear heater rail and into the links.

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

Remove the transit lock screw on both sides of the heater.

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 p.10, item 13.

Position the cross member support plate between the 2 triangle supports & fit the screws.

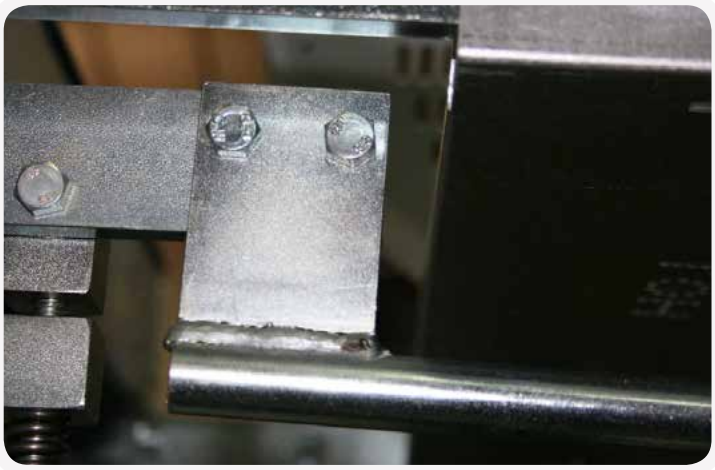
Ensure the 2 screws fitted under the triangle and cross member are touching the floor surface.

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.

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.



Fit the counterweight arm to the outside of the clamp frame.

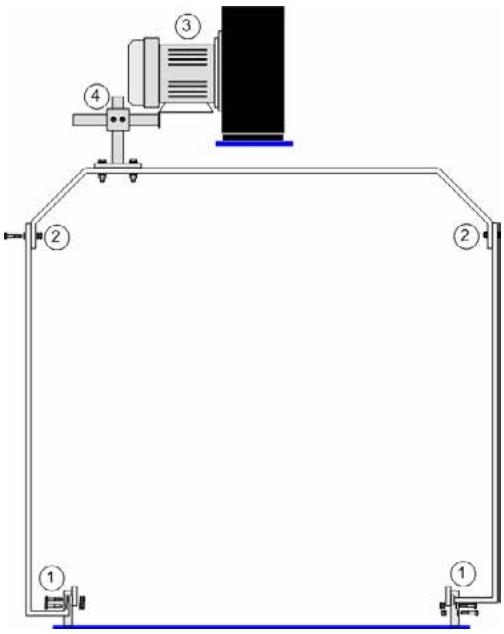
Fit the nuts and washers and ensure they are tightened fully.

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 ALWAYS ENSURE THE END STOP LOCKING SPLIT PIN AND WASHER IS REPLACED AT THE END OF THE COUNTERWEIGHT ARM.

Optional - Cooling system



A- Attaching the cooling system

1- Fit the gantry sides to the two heater rails at the boltholes 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.

B- 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.

Optional - Connecting the cooling bolster

The cooling Bolster is prefitted to the mould table. PTFE water pipes are connected between the underside of the bolster and the back panel.

Connect the feed and return pipes of the temperature controlled water supply to the 2 fittings mounted on the rear of the machine.

Fitting are are 3/8" BSP.

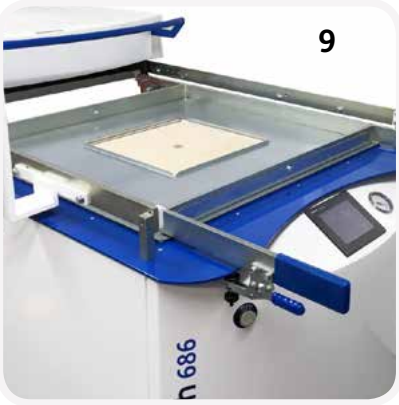
Optional - Fitting the reducing windows

Lift the clamp frame and place the lower reducing window over the two cap head screws at the rear (1&2). Place the upper reducing window in the clamp frame at the rear (3).

Hold the upper reducing window while bringing down the clamp frame (4&5). Fit the bolt and the nut on the front and back to secure the window to the clamp frame (6). Dot not tighten with a spanner.

Adjust the counterbalance weight with a 13mm spanner sliding it to the rear of the machine (7).

Adjust the toggle clamps to accomodate the extra thickness of the reducing window (8).



12mm Baseboard in position for tool mounting (9).

Optional - Vacuum Tank Configuration

The Vacuum Tank option comprises of a separate vacuum tank complete with fittings so that it can easily be connected to the main body of the machine. Simply connect the vacuum tank hose to the main body labelled port and fit the metal clip to retain the pipe.
An Oil pump is fitted to the machine internally that will continually remove air from the tank. When required the vacuum valve connects both the tank and the pump to the mould tool table.

Optional - Heating Pyrometer

The heating pyrometer is mounted on the heater and further control equipment preconfigured at part of the machine.
A pressure tank is supplied and mounted to the crossmember. Fit the rear crossmember with the pressure tank mounted. The 4mm and 8mm pipes attached to the tank must be connected to the labelled push in fittings on the rear of the machine. If the Heat Pyrometer option is supplied with the Vacuum Tank option then the pyrometer pressure tank may be fitted on top of the vacuum tank using the fittings supplied.

Optional – Castors

Castors may be fitted to the 686 to allow the machine to be moved and relocated easily. If the machine is supplied with the castor option then the two rear castors will be pre-mounted to the rear stabiliser crossmember. The main frame of the machine will have 4 further castors. There are fixing points in each corner. The mainframe castor must be fitted first.
The machine will be supplied on a pallet or crate. Move the machine so that the centre front of the machine is at the corner of the pallet and the underside of the front two corners are accessible. The two locking castors are fitted at the front of the machine by screwing in the M10 hex screw supplied to the fixing in the base using a 17mm spanner. Ensure the castor fixings are tight.
Fit the rear standard castors with the fixings in the same way by moving the machine forwards again so that the rear of the mainframe is supported by the corner of the pallet. When all fixings are tight, carefully move the machine off the pallet and continue with the installation assembly.

This section deals with the following:

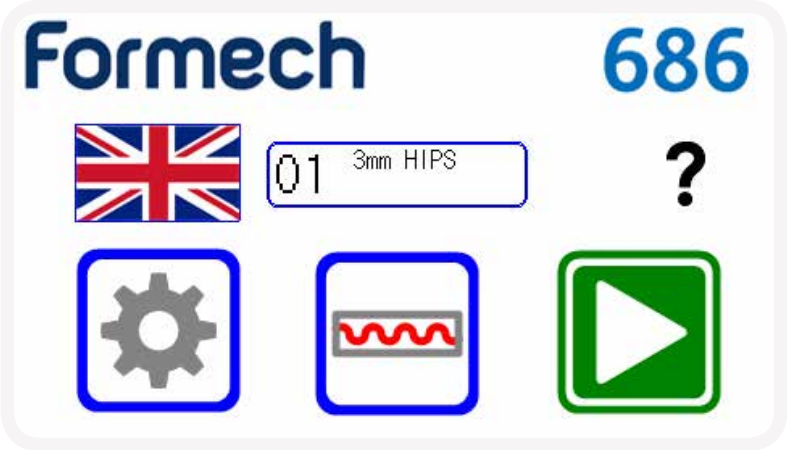
- Touch screen arrangement & operation
- Heater controls and heater arrangement
- Operating the 686PT
- Other controls and user adjustments

Air System Initialisation when powering the machine ON

When the Machine is switched ON, the system requires initialization to supply air to the table cylinder to prevent rapid movement due to depressurisation. Simply press the button on the HMI to initialize.

Touch Screen arrangement & operation

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



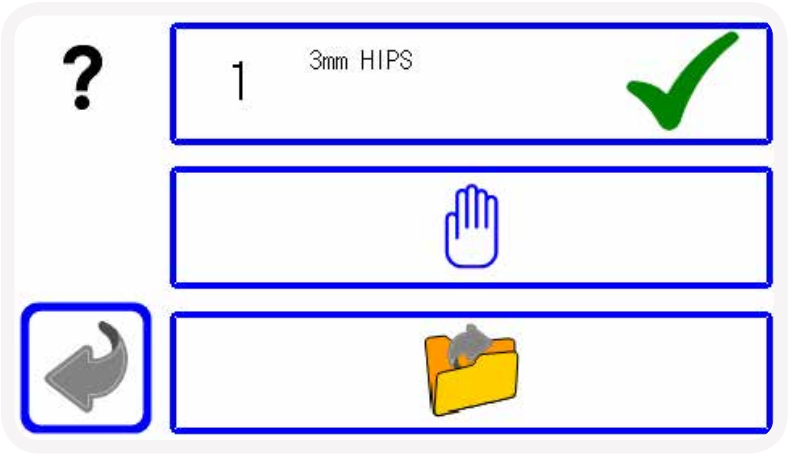
Main Menu

Allows entry to the **Editing Mode.**

Allows entry to the **Load Options Screen.**

Enables the **Heaters**. Button changes to Green when enabled.

Press flag to select language

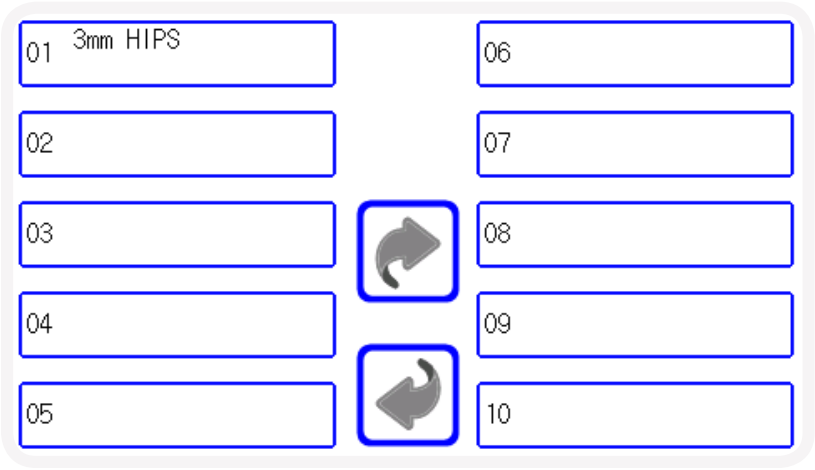


Press

Load current settings:
This will load the most recently used settings as shown in this box to the operating screen.

Operate the machine manually:
This will load the default settings heater settings only. Timers will count UP. The time parameters used may be saved and the heater power may be adjusted.

Load saved settings:
This will open the 'load settings' screen so that previously saved parameters may be loaded.



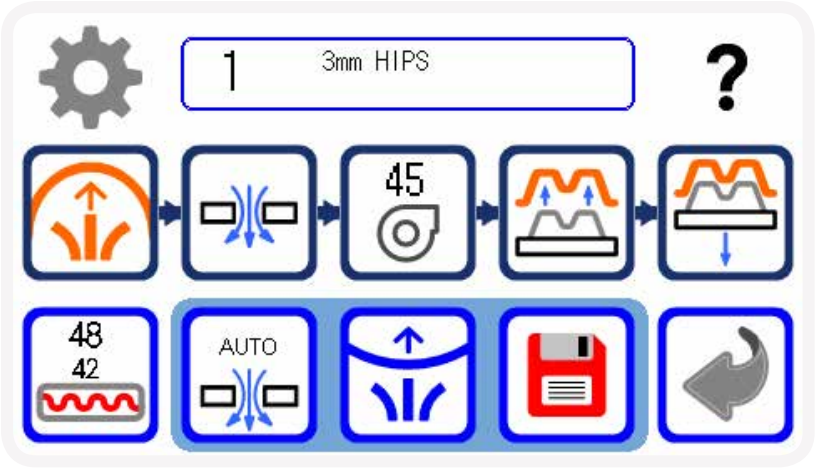
Load save settings

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

Press 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 saved job is selected giving access to the machine function of the vacuum forming process. (See page 21 below dealing with Icon descriptions)

The arrow guides the user through the main 5 machine functions of the forming cycle. Remain on this screen when performing continuous cycles.

This operating screen opens with the loaded timer settings and the job title shown in the centre of the screen. On the heater timer button, there are 2 values. The lower value shows the actual heater time set for this job memory. The top value is the COUNT DOWN timer showing how much time is remaining during the heating cycle.

When this time reaches ZERO it will continue counting and show a negative value and indicate how much extra heat time have been applied.
If the save function is pressed, the actual time used will be taken to the settings screen – this will include the negative count. These and other settings can be edited and saved as the same or other title at memory slot.

The timer values stored in memory can be changed by accessing the settings screen using the settings button on the operation screen or the main screen.

Icons descriptions

	**Heater timer** Shows the heater time. Press on the time value to adjust the heat timer on the operation screen. The time cannot be adjusted in manual mode.
	**Pre-Stretch** This operation will turn on the compressed air valve to allow air to flow into the sealed cabinet. This function does not latch. Press & hold to run. The Icon will change colour when pressed.
	**Vacuum** 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.
	**Fan timer** This operation will latch the fan on for the time set for loaded settings. The fans will turn off when the time has elapsed. The Icon will change colour when pressed. Press again at any time to stop the fan.
	**Release** This operation will apply compressed air to the table hole. This function does not latch but will unlatch the vacuum. Press & hold to run. The Icon will change colour when pressed.
	**Table down** 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.
	**Save** 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.
	**Back** This operation will exit the main operation screen and return to the main menu screen.
	**Auto-level** 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.
	**Auto-Vacuum** 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.
	**Settings** This button provides access to the settings screen where the operating parameters may be adjusted.

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 though these screens.

Basic operation using default settings

Initial requirements

- Ensure the machine is turned on and has the appropriate air supply.
- When the Machine is switched ON, the system requires initialization to supply air to the table cylinder to prevent rapid movement that can occur when the system is depressurized. Simply press the button on the HMI to initialize.
- Using the touch screen Main menu, turn the heaters **ON** The heater button will show green .
Allow between 15 and 20 minutes for the heaters to reach operating temperature.
- Press on the main menu. Select on the load options 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 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.
- When the heater has reached operating temperature the machine is ready for operation.

Manual operation screen

The Heater timer value on the HEATER button will count UP when the heater is pulled forwards and stop when pushed back.

The Fan timer value on the FAN button will also count UP then this button is pressed and the fan will run. Press the button again to stop.

The remaining operating buttons will function as stated on the icon descriptions page 21.

Heater settings may be changes via the settings button.

The Auto-level and Auto-vacuum may be enabled as required – buttons will show green when enabled.
The Save button will use the settings of the timers shown and import them to the settings screen to edit and save as required. The following section explains the vacuum forming process.

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.

• 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 with 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.

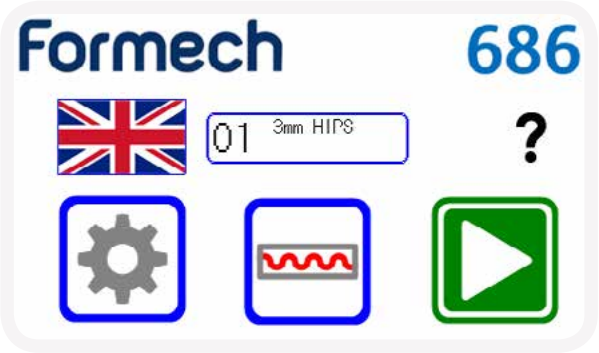
• The **AUTO-VACUUM** feature may be enabled before bring the table up. This feature will start the vacuum automatically when the table rises. The trigger point of the auto-vacuum sensor may be adjusted if required.

• 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.

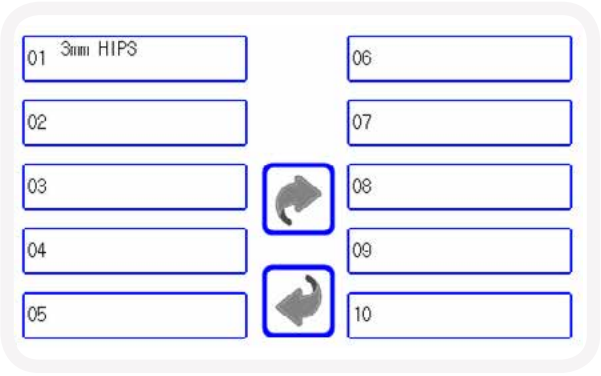
• Once released the moulding is now complete and the table may be lowered. Press the **TABLE DOWN** icon and ensure the moulding has released from the mould tool. Ensure the table has reached its lower position. Release the clamp frame to remove the moulding for inspection.

• 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.



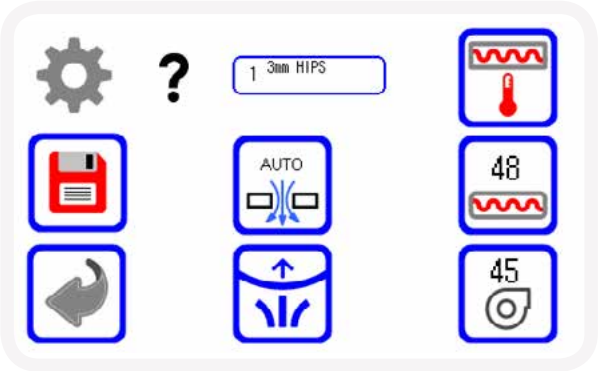
Memory settings

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.



Function settings

 Heater settings – Opens heater settings

 Auto vacuum – Set green to enable

 Auto-level – Set green to enable

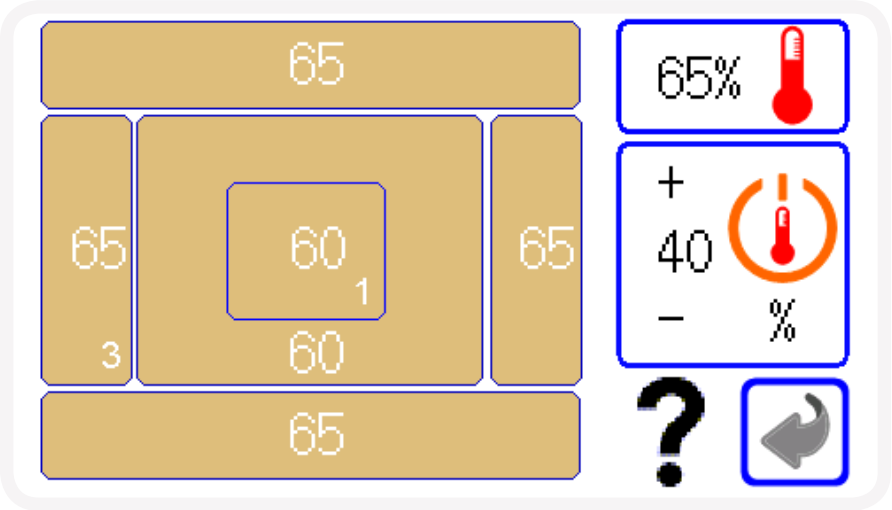
 Heat time – Set time using Pop-UP Keypad

 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 – Press & change to green to set ON.
The heater settings button will open the Heater Settings screen.

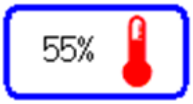


Heater settings

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 

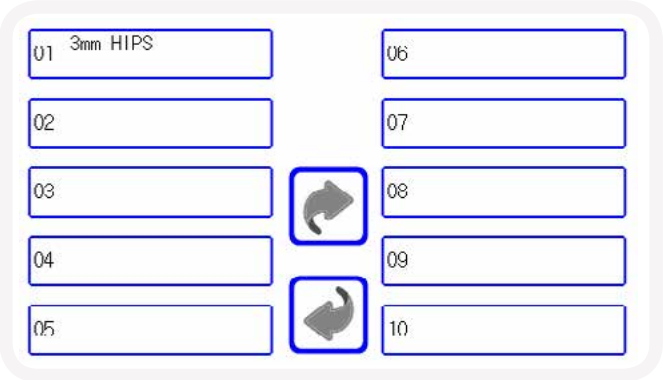
The power setting box shows the power level that is to be used to set each zone power. Press on this value to change the power level to be used using the pop up keypad and press on each of the zones that require this setting. The value will transfer to the zone. Change the power level to set other zones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

Heater standby settings 

The Heater standby setting allows the heater to idle at a lower power setting when the heater is in the rear position. The % set is a proportion of the heat profile set. When set at lower levels the heater will need slightly extra heat time to respond to the required heat level depending on the standby level set. This feature will provide significant energy savings when used continuously. The Standby settings can be adjusted using the +/- buttons. Heater standby power level is adjustable in 5 % increments.

The back button  will return to the settings screen.
The heater settings screen can be accessed from the main operation screen by pressing the settings button  and the heater settings button  .

Save settings

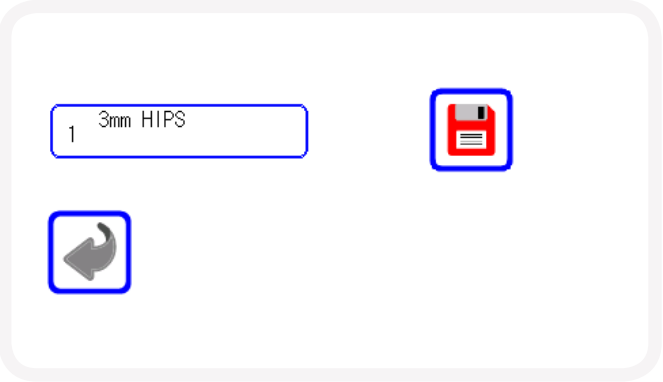


Save settings

Press the save button on the settings screen 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. There are 2 text fields.
Press the save button when complete to return to the operation screen.

Default heater settings

The default settings are as follows:

Zone 1	70 %
Zone 2	70 %
Zone 3	70 %
Zone 4	70 %
Zone 5	70 %
Zone 6	70 %
Standby	50 %

To change the default heater settings

Contact Formech if this function is required.

Vacuum Tank Option

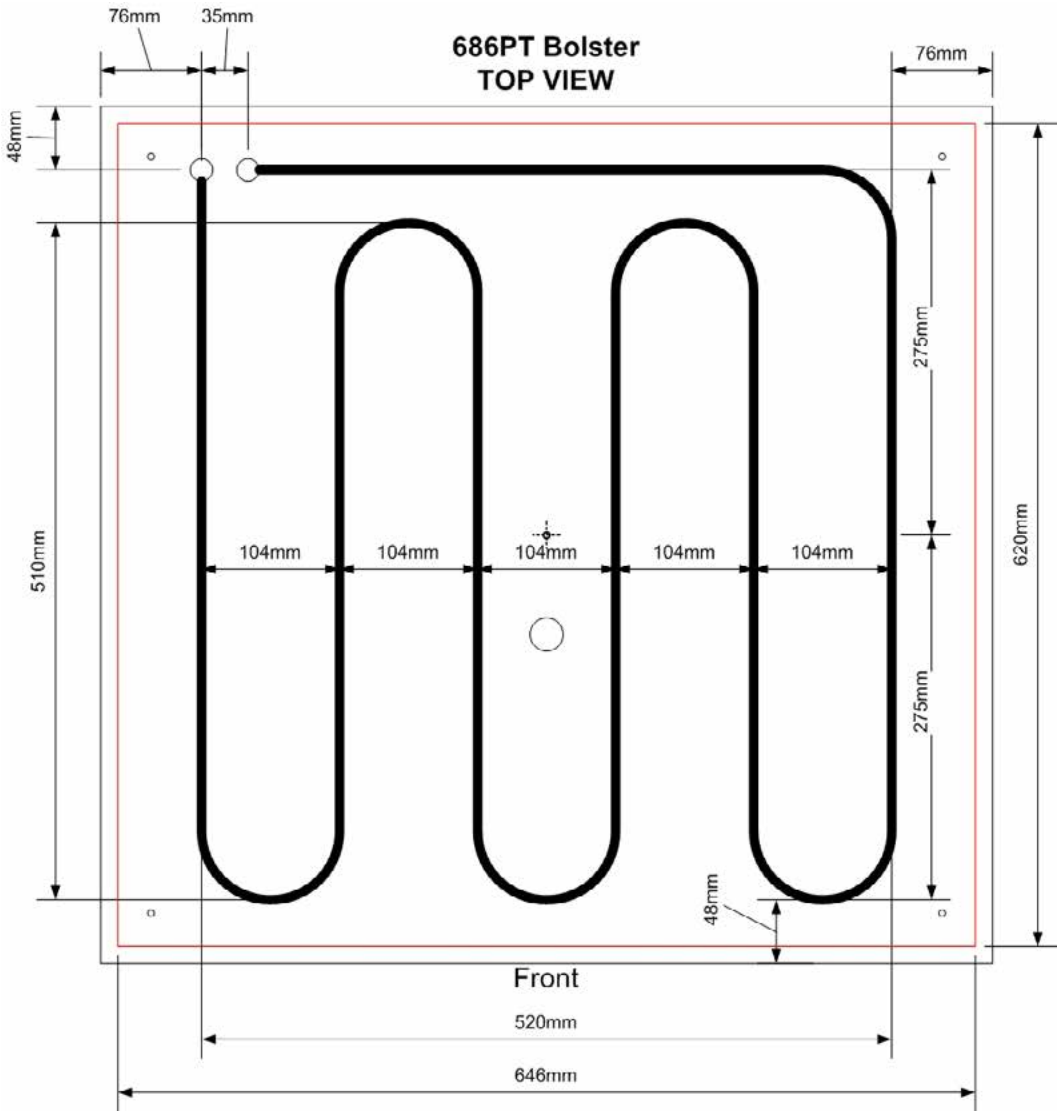
The function of the vacuum system is slightly different when the vacuum tank option is fitted.

An oil pump with higher flow rate provides a higher level of vacuum (8mbar abs). The pump is connected directly to the vacuum tank and will continually evacuate the tank when running. When vacuum is required a valve connects the tank and the pump to the mould table port when activated in the normal way from the touch screen. The Auto-vac function will operate as normal.

The 686 is designed so that the pump does not run continuously when the machine is idle. The pump will run to evacuate the tank for a default time of 6 minutes if the machine is not used or if the heater is not used. The pump will start when the heater is pulled forwards and will continue to run when the machine is being used. This run time can be increased in the help screen section if required.

Bolster Option - fixing tooling

Mould tooling or tool base boards may require fixing to the cooling bolster. The following drawing shows the position of the bolster pipework. Avoid the pipework when there is a need to insert fixing threads in the bolster plate. Pipework is 10mm Dia.

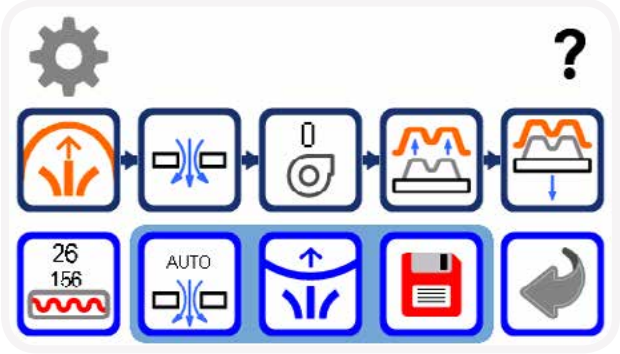


Heating Pyrometer Option

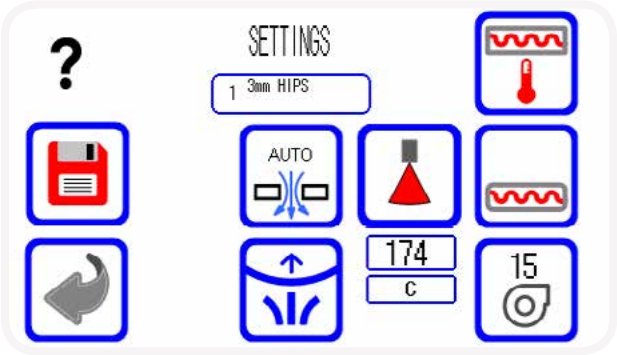
The Heating Pyrometer option allows the user to monitor the surface temperature of the plastic material. The main benefit of this is to maintain consistency of mouldings by allowing the user to identify the temperature that is required to end the heating cycle and to begin the forming. The pyrometer is situated centrally on the heater and a value of the temperature shown will be displayed on the operating screen. The buzzer can be set to operate at a target temperature in the same way as the timer. The user can choose whether to use the pyrometer or timer. The value given by the pyrometer is dependent on the colour and emissivity of the material and hence will vary with material types.

The pyrometer is supplied with compressed air to ensure it does not overheat. The pressure tank that is supplied with this option provides this air and is fitted with a pressure regulator which needs to be set at approx. 1 bar (15psi). The air supply is monitored by a pressure switch so that if the supply fails then the heater will turn off. If this occurs the icon will show on the operating screens. The pressure tank will continue to provide some air for a short while to help prevent pyrometer damage from the residual heat.

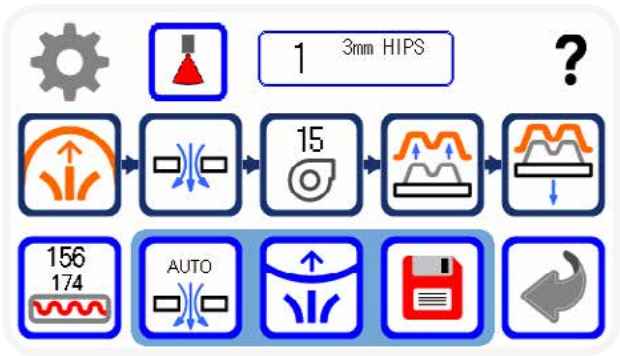
AIR Low air pressure indicator on the main and operating screens.



When the 686 is operated in the manual mode, the heater icon will show the pyrometer temperature and the timer value. The top value shows the timer value that will count up when the heater is pulled forward and the lower value is the pyrometer temperature that will change as the plastic material is heated.

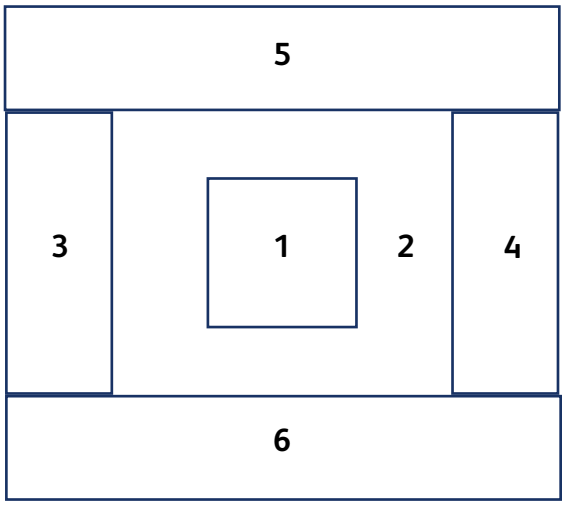


When using a saved program, the user may choose between running with the pyrometer or the timer. Enter the settings screen to set. The pyrometer / timer button will toggle between the 2 modes (Pyrometer mode shown). When the timer is selected adjust the heat time on the heater button. When pyrometer mode is selected, adjust the target temperature by pressing on the box positioned under the pyrometer button and using the pop-up keypad.
When the pyrometer mode is set, the operation screen will show the pyrometer icon at the top of the screen. For Timer mode it will show the clock face icon.
The pyrometer target temperature is shown as the lower of the 2 values in the heater icon. The upper value is the actual temperature being read by the pyrometer. When the heater is in the rear position this value will be high since it is looking at the heatshield. Operate the machine as normal and the buzzer will activate when the pyrometer temperature reaches the target setting indicating the end of the heating cycle.



Heater controls & heater arrangement

686PT Zone layout



Front

300W	300W	300W	300W	300W
300W	250W	250W	250W	300W
300W	250W	250W	250W	300W
300W	250W	250W	250W	300W
300W	300W	300W	300W	300W

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 (image 1).

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.

Image 1

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.

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.

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.

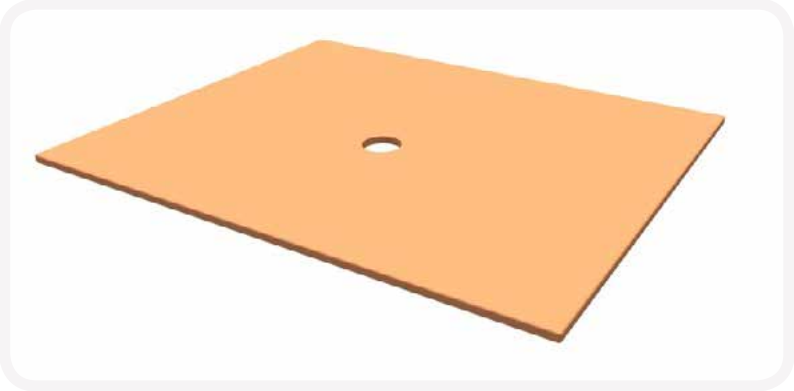
Tools made from wood or medium density fibreboard (MDF) are easily constructed and can give short runs of good quality mouldings at a low cost (see notes page 31). The use of close-grained wood will avoid grain patterns appearing on the mouldings.

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:

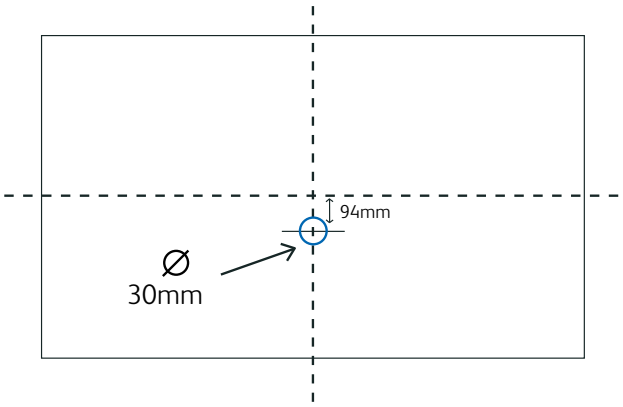
Porous mould materials such as wood and plaster should be properly sealed to prevent the vacuum pump from sucking out any moisture or sawdust, loose plaster etc. The vacuum circuit may quickly become blocked with dust or slurry if moulds are not properly sealed.

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.

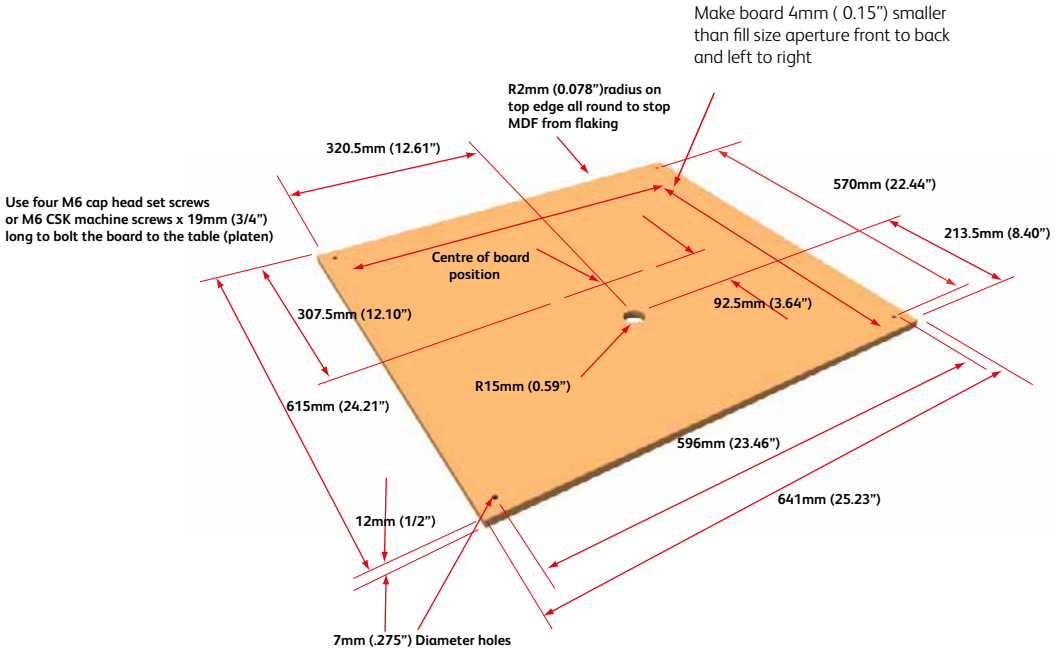
Sealed moulds will usually release more easily. Silicon based release agents may be used on more difficult moulds. Silicon based release agents are rapidly absorbed by porous (unsealed) moulds, rendering them ineffective. The use of talc as a release agent is not recommended. It may clog the vacuum circuit.

The baseboard can be made from either MDF or aluminium and needs to be 12.00mm (1/2") thick. The vacuum hole can be 30.00mm diameter and needs to be positioned 94mm forward of the centre of the table.

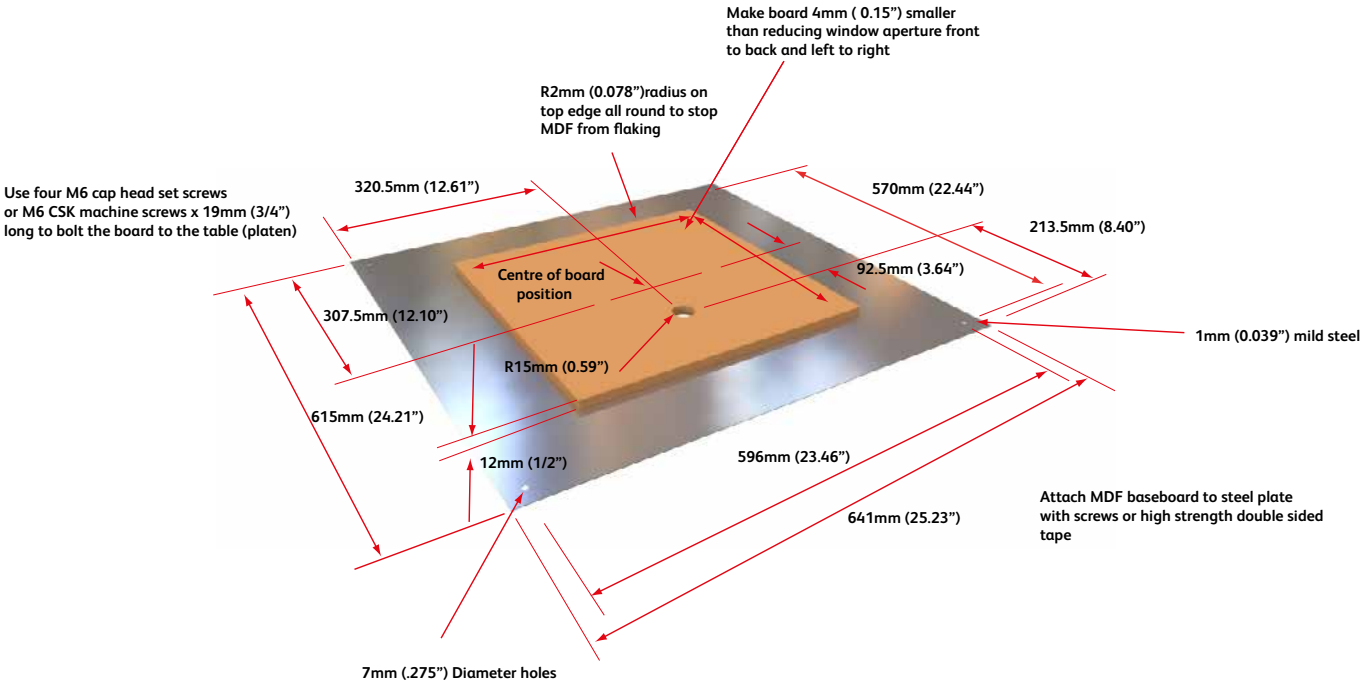
The baseboard has to be 4mm shorter in both directions than the forming aperture of the machine e.g. Forming aperture 280mm x 430mm = baseboard size 276mm x 426mm.



686 standard baseboard



686 reducing window baseboard



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.

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.

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 troubleshooting

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 cable chain / 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 particularly 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.

How to check a heating element

If you notice there is a cold area on heated plastics, it may be that a heating zone or heating element is not working correctly. In either case the first step is to check the wiring at the terminal block. It is not always obvious that they are loose or disconnected.

1- First, check that the heating zones are set correctly, set all the zones to 70 % and check for even heat and softening plastic when the heater is held over the forming are with plastic sheet fitted. Make a note of areas where the plastic remains hard to determine if it is a single element of entire zone.

2- If an entire zone is not functioning then remove the top cover and check that the wiring is not loose or has become disconnected for that particular zone. You will have to remove relevant terminal block covers to determine this. If all appears OK then set the defective zone to 100 % and check the voltage at the zone using a suitable volt meter.

3- If no voltage is present then contact Formech for service and advice.

If a single element is found to be faulty then it will require replacement. See the following page.

Replacing a heating element

Switch off the machine and let heater cool completely. Bring the heater forward. Remove all 16 machine screws from the slotted heater cover.

The two screws at the front locate into a loose bracket that needs to be supported with your hand.

Remember to replace the bracket the correct way round later on.

Remove the heater cover.

At this stage check that all the element wires and interconnecting wires are fully tightened and that the fault was not merely a loose connection.

Remove cap from terminal block associated with the faulty element using an 8mm spanner.

Replacing a heating element (continuation)

Each element has two wires, which are connected to two separate connector blocks. Loosen the connector block screws.

Remove the four nuts and washers (with a 7mm spanner) that secure the element to the tray.

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

Remove the loose insulation sleeves.

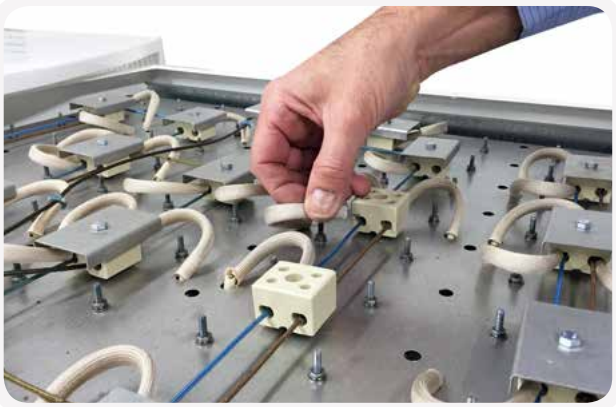
Feed the element wires through the holes in the tray.

Catch the element.

Replacing a heating element (continuation)

Removing the element.

Element case showing wires and four securing bolts. It also shows the wattage + volts.



Fitting the new element is a reversal of the previous procedure.

Tighten all connections securely.

Replace bracket with bushes on the top side.

Replace heater cover and tighten all 16 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.

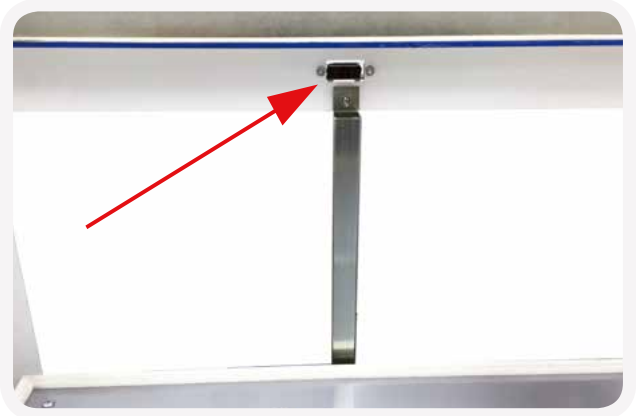
It is important the transmitter beam is directed at the receiver. Adjustment may be carried out by slightly bending the sensor mounting plate to ensure alignment. The receiver LED's will show red when broken or misaligned and green when OK.

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.

How to check the auto-level sensor

Bring the clamping frame down and the heater slightly forward from the back position to enable the auto-level.

Activate the auto-level on the touch-screen, place your hand in the center of the aperture and move it up & down until you hear the air valve turning on and off.



If the auto-level air valve is constantly blowing it may be due to misalignment or an accumulation of dust on the front of the sensor. Check the alignment and / or inspect for lens cleanliness and check again. If the air valve does not function with the test above, inspect the device lenses for heat damage and also refer to the state of the indicators on the receiver. If it is still not working, please contact Formech.

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.

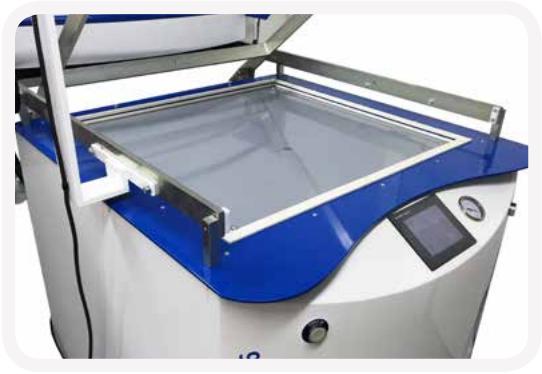
Worn or damaged seals around the perimeter of the table may cause loss of vacuum. These are classed as a consumable part and require replacement after some time. To replace seals follow the procedure relating to Clamp & Table seals in this section.

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:

Raise the table up.



Take off the table mesh.

Put a piece of plastic or the palm of your hand on top of the vacuum hole. Activate the vacuum and check the reading on your vacuum gauge.

If the vacuum gauge reads 25"Hg or higher, that is normal. A lower reading indicates poor vacuum where attention is required (see following page).

Vacuum system (continuation)

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 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.

The Vacuum filter box is mounted on the rear of the machine. Simply unlatch the spring clips and remove the filter. Light dust may be cleaned off by blowing the filter with compressed air. Replacement would be required if the filter is damaged or degraded in any way.

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 neces¬sary from time to time. Any mechanical damage of pipes and fittings should be dealt with before re using 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 ARE 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.

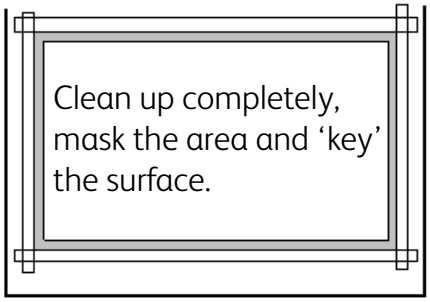
Formech supply a kit comprising the necessary seals and sealant for the Formech 686PT. We recommend that only the correct silicone seals and sealant are used to give an effective seal.

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

1



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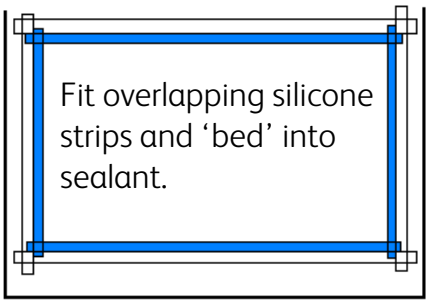
3



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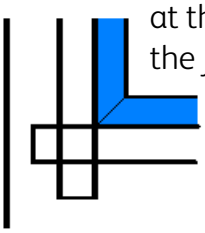


1. Remove all the existing seal and adhesive with a sharp blade. Mask off the sealing area with masking tape or similar (Mask the outside for top frames or reducing windows & the inside for table seals). Prepare the sealing area with emery cloth or similar to achieve a good surface for the new adhesive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

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.

Cleaning

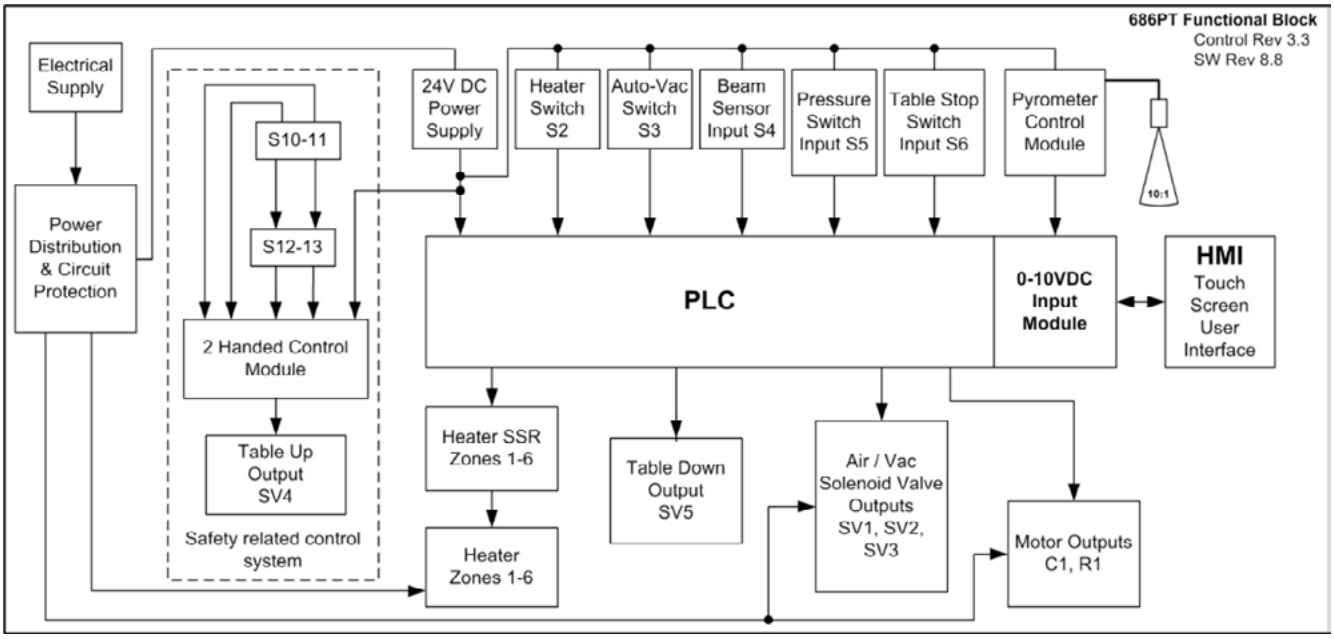
Ensure the inside of the machine and the heater tray is clear of dust, dirt and debris. Do not allow dirt and loose particles to build up, particularly on the heater tray.

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.

Overview

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

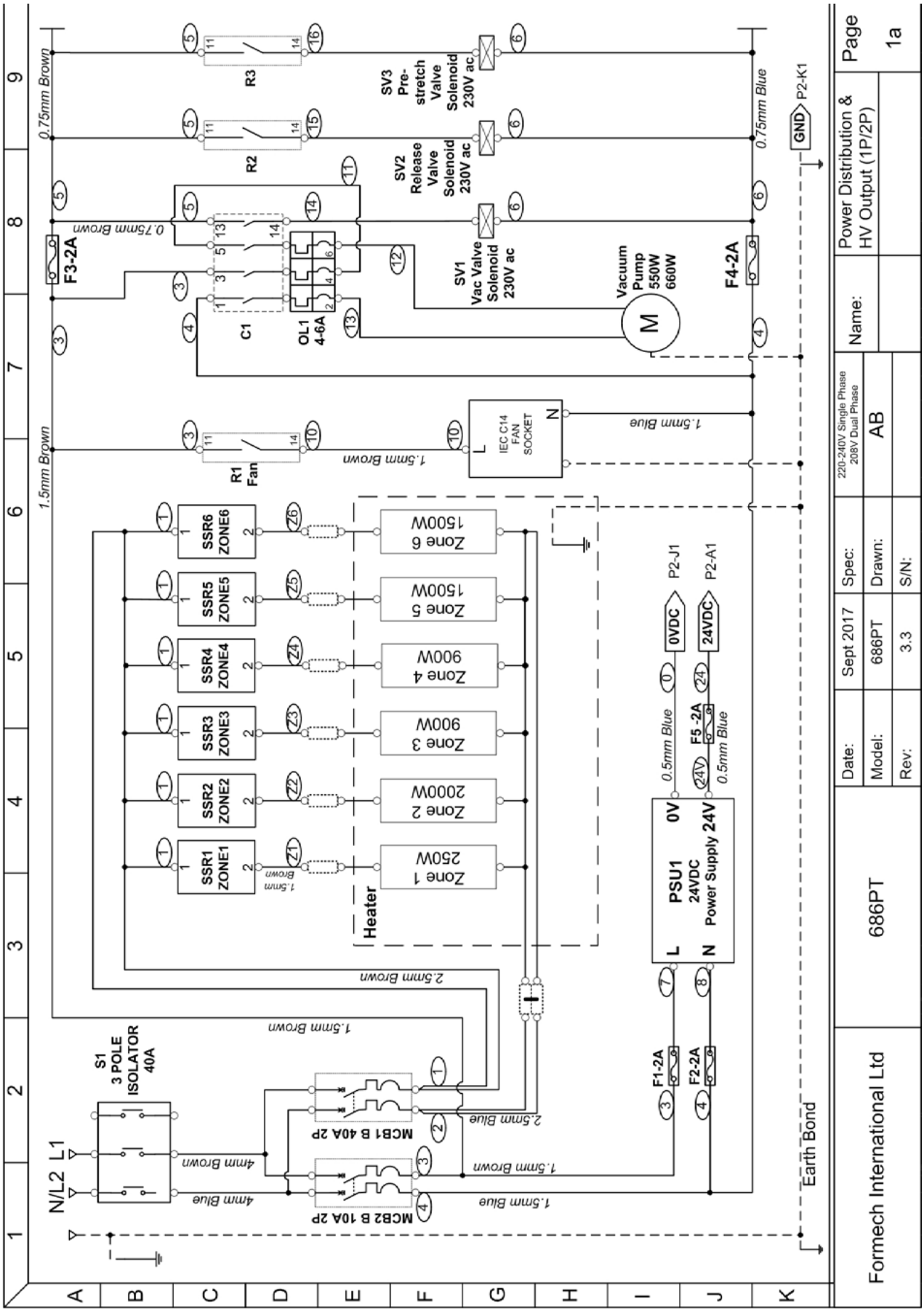


Technical information consists of the following:

1-a. 686 PT Wiring 1&2Phase HV
1-b. 686 PT Wiring 3Phase HV
1-c. 686 PT Wiring 3Phase Delta HV
1-d 686 PTVT Wiring 1&2Phase HV
1-e 686 PTVT Wiring 3Phase HV
1-f 686 PTVT Wiring 3Phase – 1P pump HV
2-a. 686 PT Wiring LV
2-b. 686 Manual Wiring LV
2-c 686 PT Pyrometer Wiring LV
2-d 686 PTVT Wiring LV
2-e 686 PTVT Pyrometer Wiring LV
P3-b. 686 PT Pnumatics
P4. Major parts listing

Interlocking devices

Rear heater limit switch, SW2, prohibits Auto-level when closed.
Rear Heater Limit switch prohibits Pre-stretch, Release, and 'Table Up' command when open.


Formech International Ltd
686PT
Date: Sept 2017
Model: 686PT
Rev: 3.3
Spec:
Drawn:
S/N:
220-240V Single Phase 208V Dual Phase
AB
Name:
Power Distribution & HV Output (1P/2P)
Page 1a
N/L2 L1
S1 3 POLE ISOLATOR 40A
MCB1 B 40A 2P
MCB2 B 10A 2P
F1-2A
F2-2A
F3-2A
F4-2A
F5 -2A
PSU1 24VDC Power Supply 24V
0V
24V
L
N
P2-J1
P2-A1
0VDC
24VDC
GND
P2-K1
SSR1 ZONE1
SSR2 ZONE2
SSR3 ZONE3
SSR4 ZONE4
SSR5 ZONE5
SSR6 ZONE6
Zone 1 250W
Zone 2 2000W
Zone 3 900W
Zone 4 900W
Zone 5 1500W
Zone 6 1500W
Heater
R1 Fan
R2
R3
C1
OL1 4-6A
SV1 Vac Valve Solenoid 230V ac
SV2 Release Valve Solenoid 230V ac
SV3 Pre-stretch Valve Solenoid 230V ac
Vacuum Pump 550W 660W
IEC.C14 FAN SOCKET
Earth Bond
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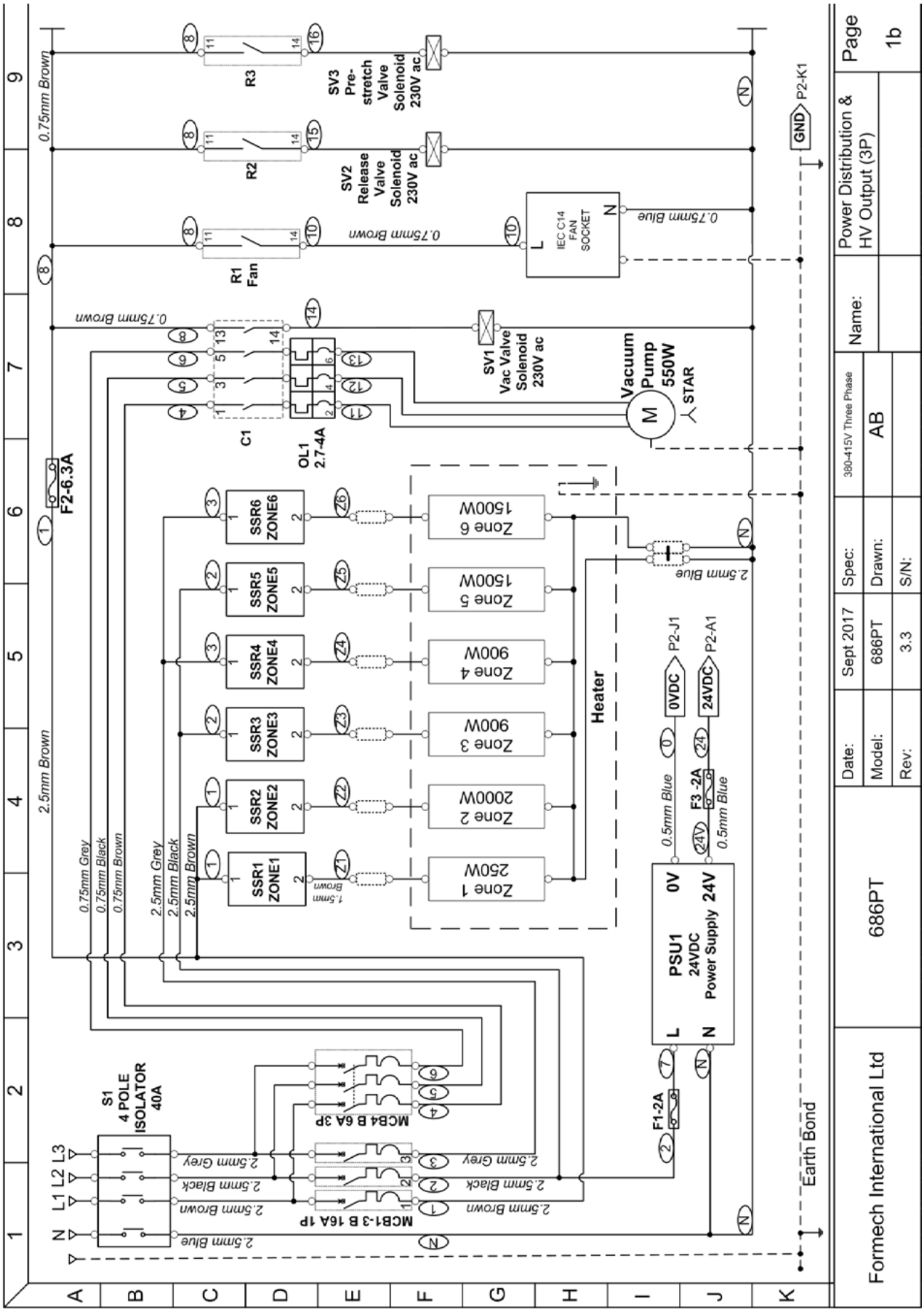
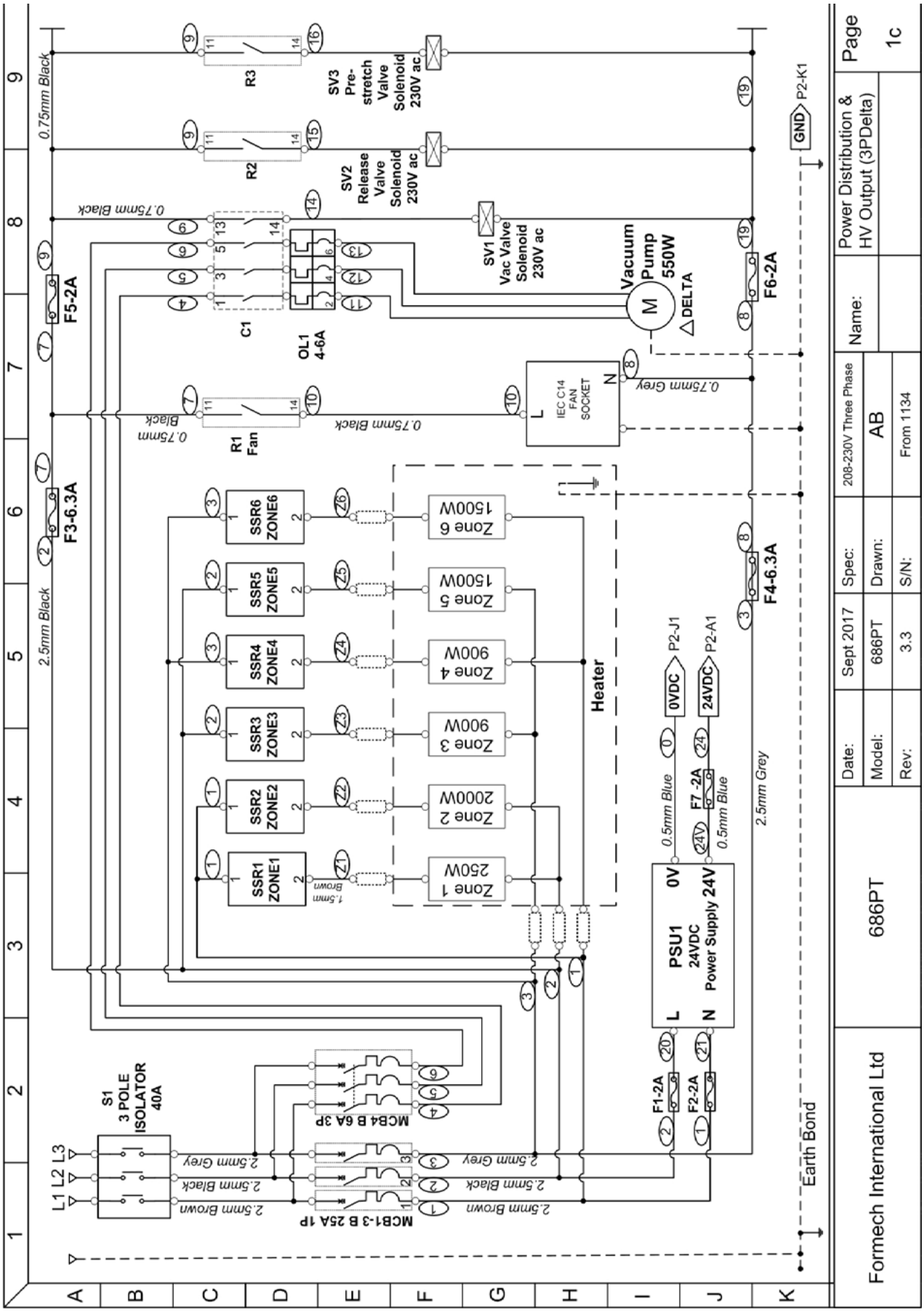
0.75mm Blue
1.5mm Brown
1.5mm Blue
2.5mm Brown
2.5mm Blue
4mm Brown
4mm Blue
0.5mm Blue


Formech International Ltd
686PT
Date: Sept 2017
Model: 686PT
Rev: 3.3
Spec:
Drawn:
S/N:
380-415V Three Phase
AB
Name:
Power Distribution & HV Output (3P)
Page 1b
Earth Bond
S1 4 POLE ISOLATOR 40A
L1 L2 L3 N
MCB4 B 6A 3P
MCB1-3 B 16A 1P
F2-6.3A
F1-2A
F3 -2A
C1
OL1 2.7-4A
R1 Fan
R2
R3
SV1 Vac Valve Solenoid 230V ac
SV2 Release Valve Solenoid 230V ac
SV3 Pre-stretch Valve Solenoid 230V ac
Vacuum Pump 550W STAR
IEC C14 FAN SOCKET
PSU1 24VDC Power Supply 0V 24V
SSR1 ZONE1
SSR2 ZONE2
SSR3 ZONE3
SSR4 ZONE4
SSR5 ZONE5
SSR6 ZONE6
Zone 1 250W
Zone 2 2000W
Zone 3 900W
Zone 4 900W
Zone 5 1500W
Zone 6 1500W
Heater
0VDC P2-J1
24VDC P2-A1
GND P2-K1
0.75mm Brown
0.75mm Blue
2.5mm Brown
2.5mm Grey
2.5mm Black
2.5mm Blue
0.75mm Grey
0.75mm Black
1.5mm Brown
0.5mm Blue


Formech International Ltd
686PT
Date: Sept 2017
Model: 686PT
Rev: 3.3
Spec:
Drawn:
S/N:
208-230V Three Phase
AB
From 1134
Name:
Power Distribution & HV Output (3PDelta)
Page 1c
S1 3 POLE ISOLATOR 40A
L1 L2 L3
MCB4 B 6A 3P
MCB1-3 B 25A 1P
F1-2A
F2-2A
F3-6.3A
F4-6.3A
F5-2A
F6-2A
F7 -2A
PSU1 24VDC Power Supply 24V
0V
24V
L
N
0VDC
24VDC
P2-J1
P2-A1
GND
P2-K1
Earth Bond
Heater
Zone 1 250W
Zone 2 2000W
Zone 3 900W
Zone 4 900W
Zone 5 1500W
Zone 6 1500W
SSR1 ZONE1
SSR2 ZONE2
SSR3 ZONE3
SSR4 ZONE4
SSR5 ZONE5
SSR6 ZONE6
R1 Fan
R2
R3
C1
OL1 4-6A
SV1 Vac Valve Solenoid 230V ac
SV2 Release Valve Solenoid 230V ac
SV3 Pre-stretch Valve Solenoid 230V ac
Vacuum Pump 550W
DELTA
IEC C14 FAN SOCKET
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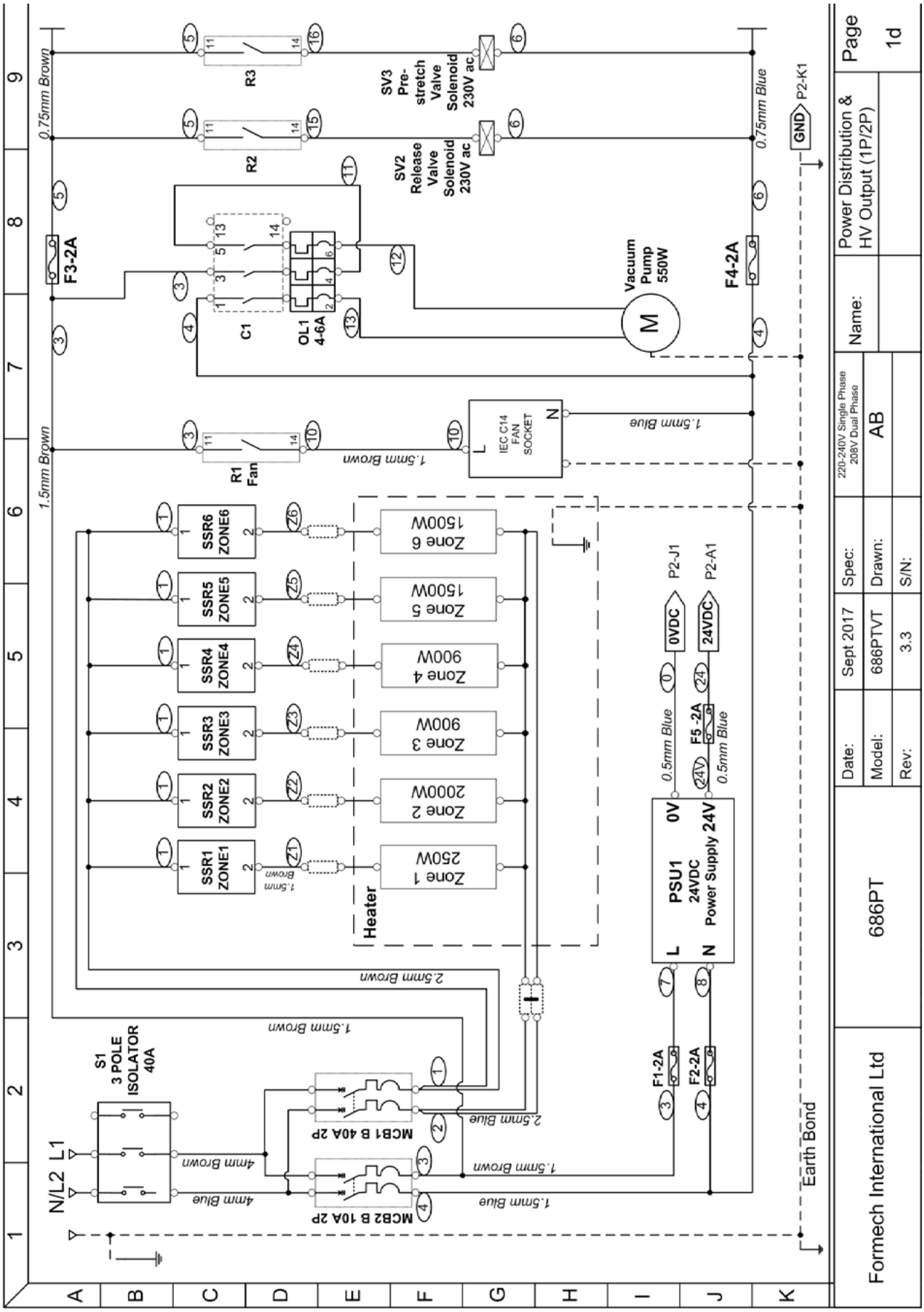
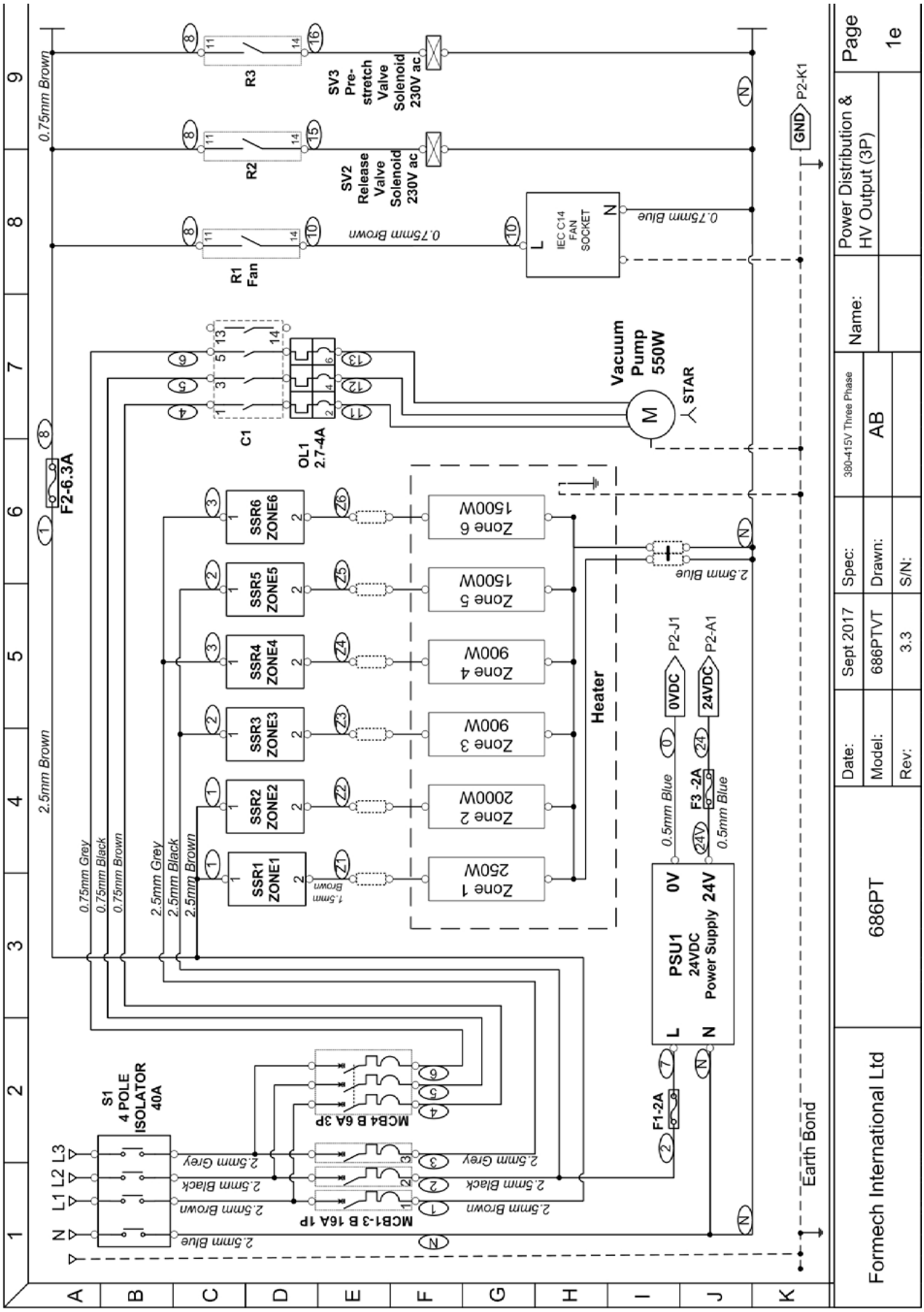
2.5mm Brown
0.5mm Blue
1.5mm Brown


Formech International Ltd
686PT
Date:
Sept 2017
Model:
686PTVT
Rev:
3.3
Spec:
Drawn:
S/N:
220-240V Single Phase
208V Dual Phase
AB
Name:
Power Distribution &
HV Output (1P/2P)
Page
1d
Earth Bond
S1
3 POLE
ISOLATOR
40A
N/L2 L1
4mm Brown
4mm Blue
MCB1 B 40A 2P
MCB2 B 10A 2P
F3-2A
F4-2A
F1-2A
F2-2A
F5 -2A
0.75mm Brown
0.75mm Blue
1.5mm Brown
R1
Fan
R2
R3
C1
OL1
4-6A
SV2
Release
Valve
Solenoid
230V ac
SV3
Pre-
stretch
Valve
Solenoid
230V ac
Vacuum
Pump
550W
IEC.C14
FAN
SOCKET
GND
P2-K1
P2-J1
P2-A1
0VDC
24VDC
0.5mm Blue
PSU1
24VDC
Power Supply
24V
0V
SSR1
ZONE1
SSR2
ZONE2
SSR3
ZONE3
SSR4
ZONE4
SSR5
ZONE5
SSR6
ZONE6
Heater
Zone 1
250W
Zone 2
2000W
Zone 3
900W
Zone 4
900W
Zone 5
1500W
Zone 6
1500W
2.5mm Brown
2.5mm Blue
1.5mm Brown
1.5mm Blue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686PT
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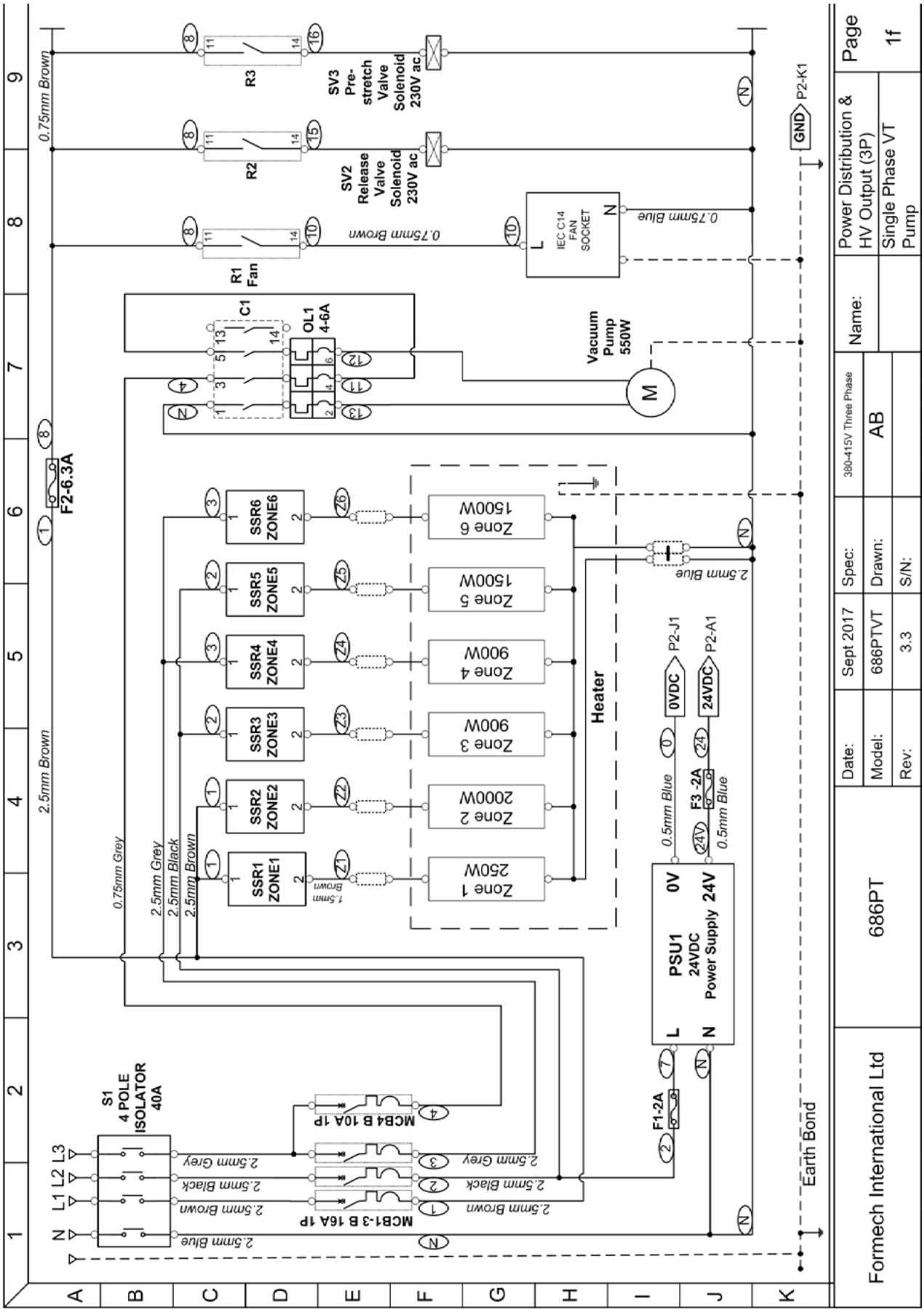
Rev: 3.3
Spec:
Drawn:
S/N:
380-415V Three Phase
AB
Name:
Power Distribution & HV Output (3P)
Page 1e
S1 4 POLE ISOLATOR 40A
L1 L2 L3 N
F2-6.3A
C1
OL1 2.7-4A
Vacuum Pump 550W
STAR
R1 Fan
R2
R3
SV2 Release Valve Solenoid 230V ac
SV3 Pre-stretch Valve Solenoid 230V ac
IEC C14 FAN SOCKET
GND
P2-K1
SSR1 ZONE1
SSR2 ZONE2
SSR3 ZONE3
SSR4 ZONE4
SSR5 ZONE5
SSR6 ZONE6
Zone 1 250W
Zone 2 2000W
Zone 3 900W
Zone 4 900W
Zone 5 1500W
Zone 6 1500W
Heater
PSU1 24VDC Power Supply
0V
24V
0VDC
24VDC
P2-J1
P2-A1
F3 -2A
F1-2A
MCB4 B 6A 3P
MCB1-3 B 16A 1P
Earth Bond
0.75mm Brown
0.75mm Blue
2.5mm Brown
2.5mm Grey
2.5mm Black
2.5mm Blue
0.75mm Grey
0.75mm Black
1.5mm Brown
0.5mm Blue


Formech International Ltd
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Date: Sept 2017
Model: 686PTVT
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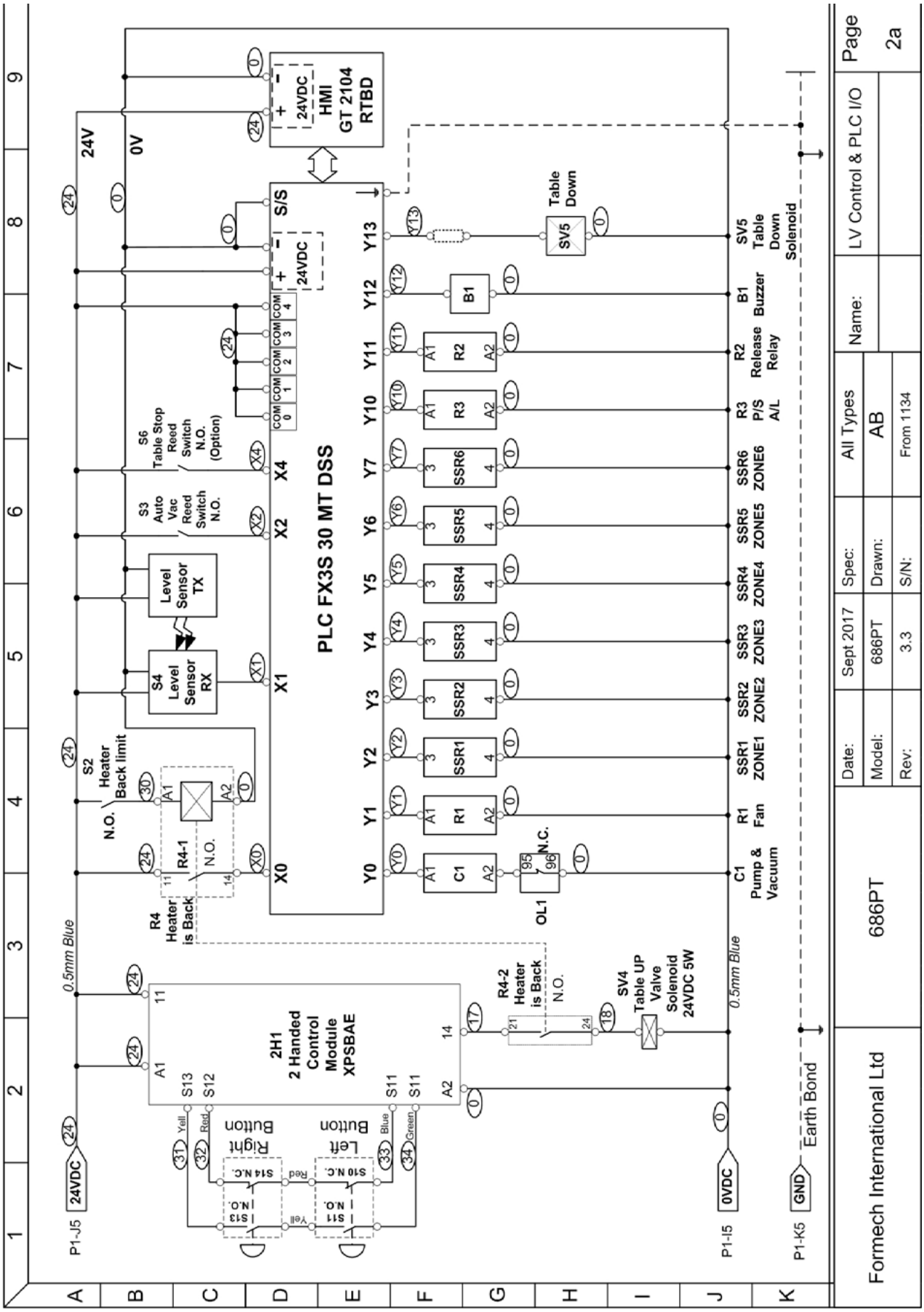
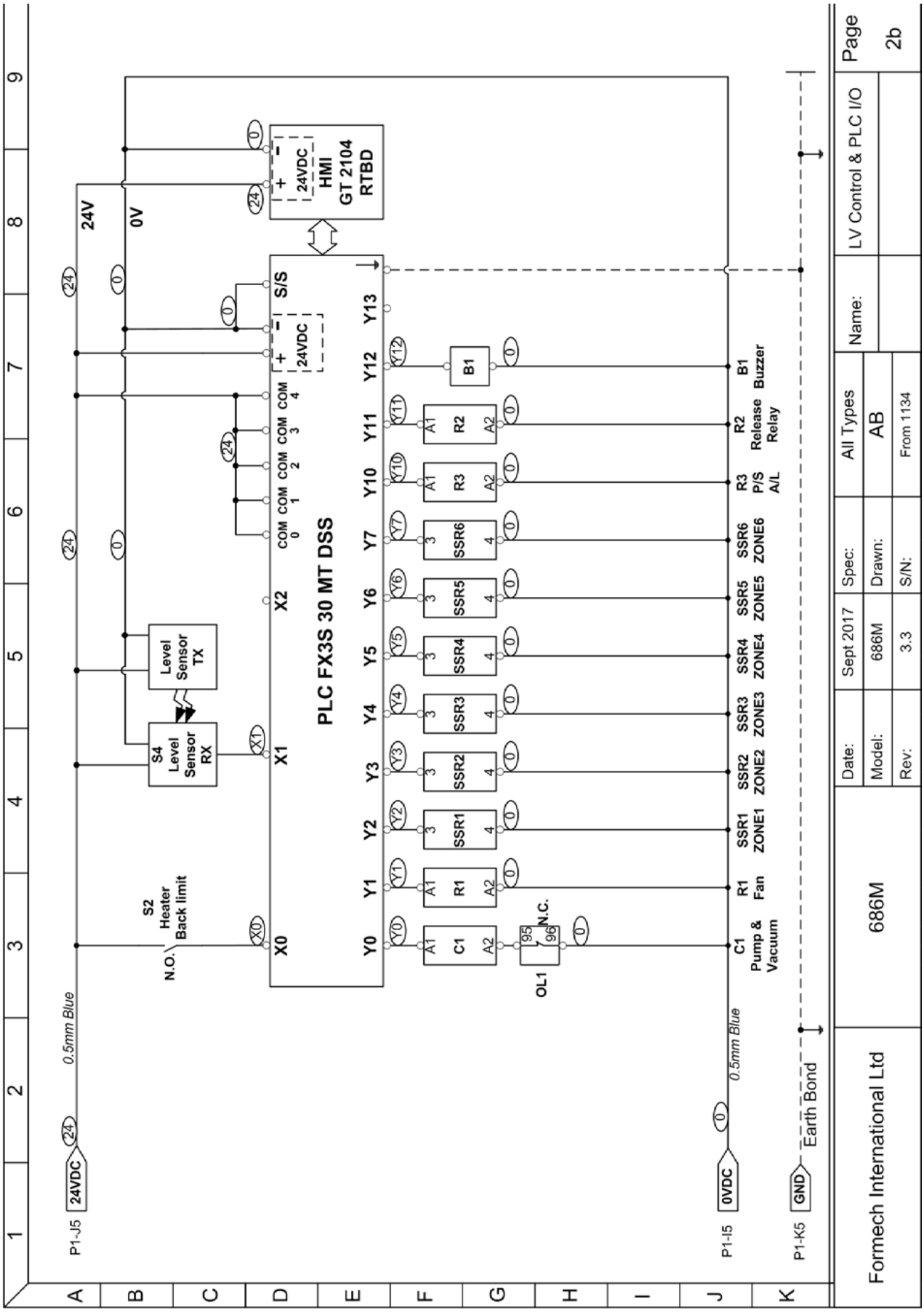
Spec:
Drawn:
S/N:
380-415V Three Phase
AB
Name:
Power Distribution & HV Output (3P)
Single Phase VT Pump
Page 1f
S1 4 POLE ISOLATOR 40A
L1 L2 L3 N
MCB1-3 B 16A 1P
MCB4 B 10A 1P
F1-2A
F2-6.3A
F3 -2A
PSU1 24VDC Power Supply
0V
24V
0VDC
24VDC
P2-J1
P2-A1
GND
P2-K1
Earth Bond
Heater
Zone 1 250W
Zone 2 2000W
Zone 3 900W
Zone 4 900W
Zone 5 1500W
Zone 6 1500W
SSR1 ZONE1
SSR2 ZONE2
SSR3 ZONE3
SSR4 ZONE4
SSR5 ZONE5
SSR6 ZONE6
C1
OL1 4-6A
Vacuum Pump 550W
R1 Fan
R2
R3
SV2 Release Valve Solenoid 230V ac
SV3 Pre-stretch Valve Solenoid 230V ac
IEC C14 FAN SOCKET
0.75mm Brown
0.75mm Blue
0.75mm Grey
2.5mm Brown
2.5mm Black
2.5mm Grey
2.5mm Blue
0.5mm Blue
1.5mm Brown


PLC FX3S 30 MT DSS
HMI GT 2104 RTBD
24VDC
24V
0V
S/S
S2 Heater Back limit
S3 Auto Vac Reed Switch N.O.
S4 Level Sensor RX
S6 Table Stop Reed Switch N.O. (Option)
Level Sensor TX
R4 Heater is Back
R4-1
N.O.
N.C.
OL1
C1 Pump & Vacuum
R1 Fan
R2 Release Relay
R3 P/S A/L
B1 Buzzer
SV5 Table Down Solenoid
SV4 Table UP Valve Solenoid 24VDC 5W
R4-2 Heater is Back
2H1 2 Handed Control Module XPSBAE
Left Button
Right Button
SSR1 ZONE1
SSR2 ZONE2
SSR3 ZONE3
SSR4 ZONE4
SSR5 ZONE5
SSR6 ZONE6
0.5mm Blue
P1-J5
P1-I5
P1-K5
0VDC
GND
Earth Bond
Formech International Ltd
686PT
Date:
Sept 2017
Model:
686PT
Rev:
3.3
Spec:
Drawn:
S/N:
All Types
AB
From 1134
Name:
LV Control & PLC I/O
Page
2a


24V
0V
24VDC
HMI
GT 2104
RTBD
S/S
PLC FX3S 30 MT DSS
X0
X1
X2
Y0
Y1
Y2
Y3
Y4
Y5
Y6
Y7
Y10
Y11
Y12
Y13
COM 0
COM 1
COM 2
COM 3
COM 4
Level Sensor TX
S4 Level Sensor RX
S2 Heater Back limit
N.O.
N.C.
OL1
C1 Pump & Vacuum
R1 Fan
SSR1 ZONE1
SSR2 ZONE2
SSR3 ZONE3
SSR4 ZONE4
SSR5 ZONE5
SSR6 ZONE6
R3 P/S A/L
R2 Release Relay
B1 Buzzer
0.5mm Blue
P1-J5
P1-I5
P1-K5
0VDC
GND
Earth Bond
Formech International Ltd
686M
Date:
Sept 2017
Model:
686M
Rev:
3.3
Spec:
Drawn:
S/N:
All Types
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From 1134
Name:
LV Control & PLC I/O
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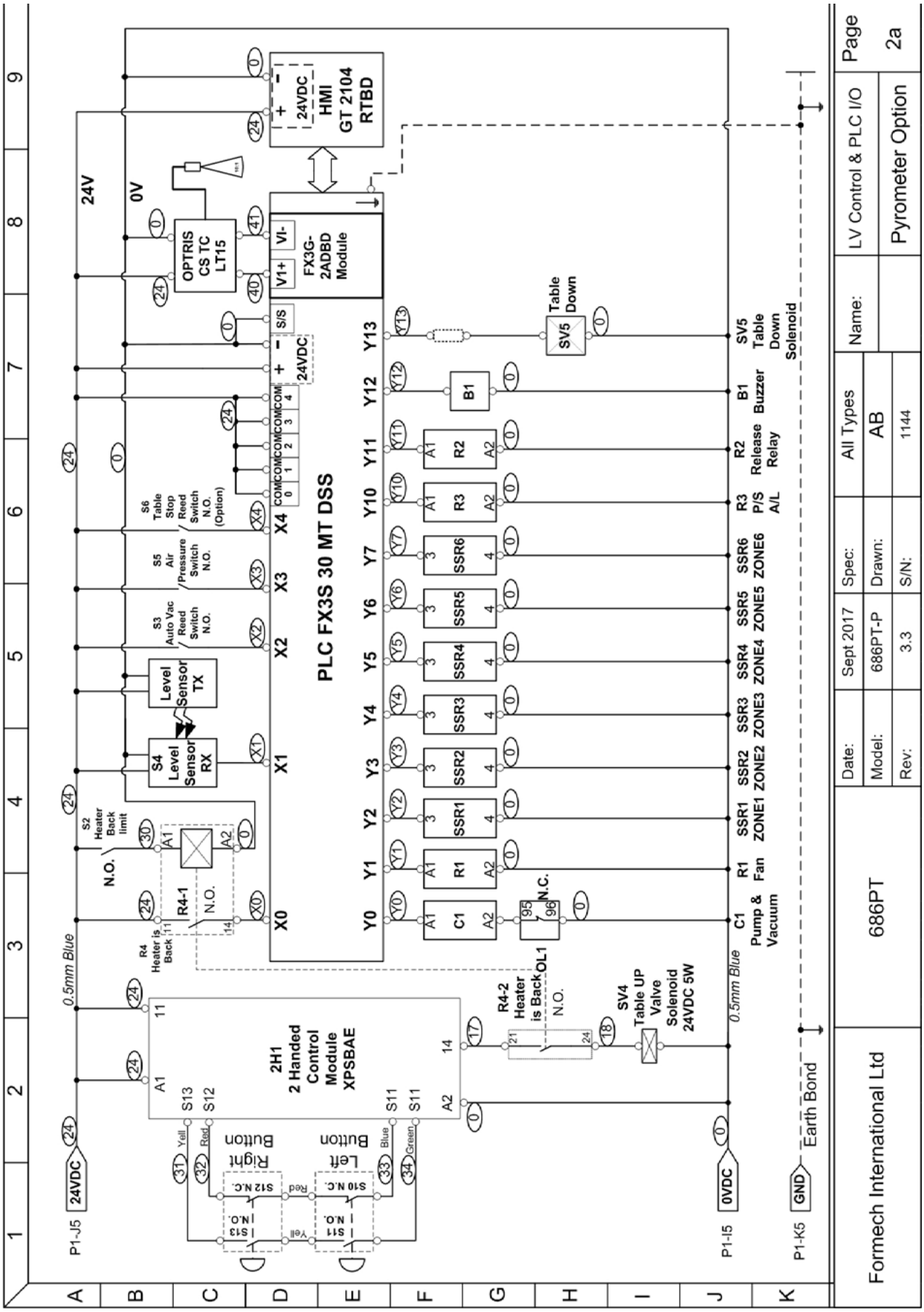
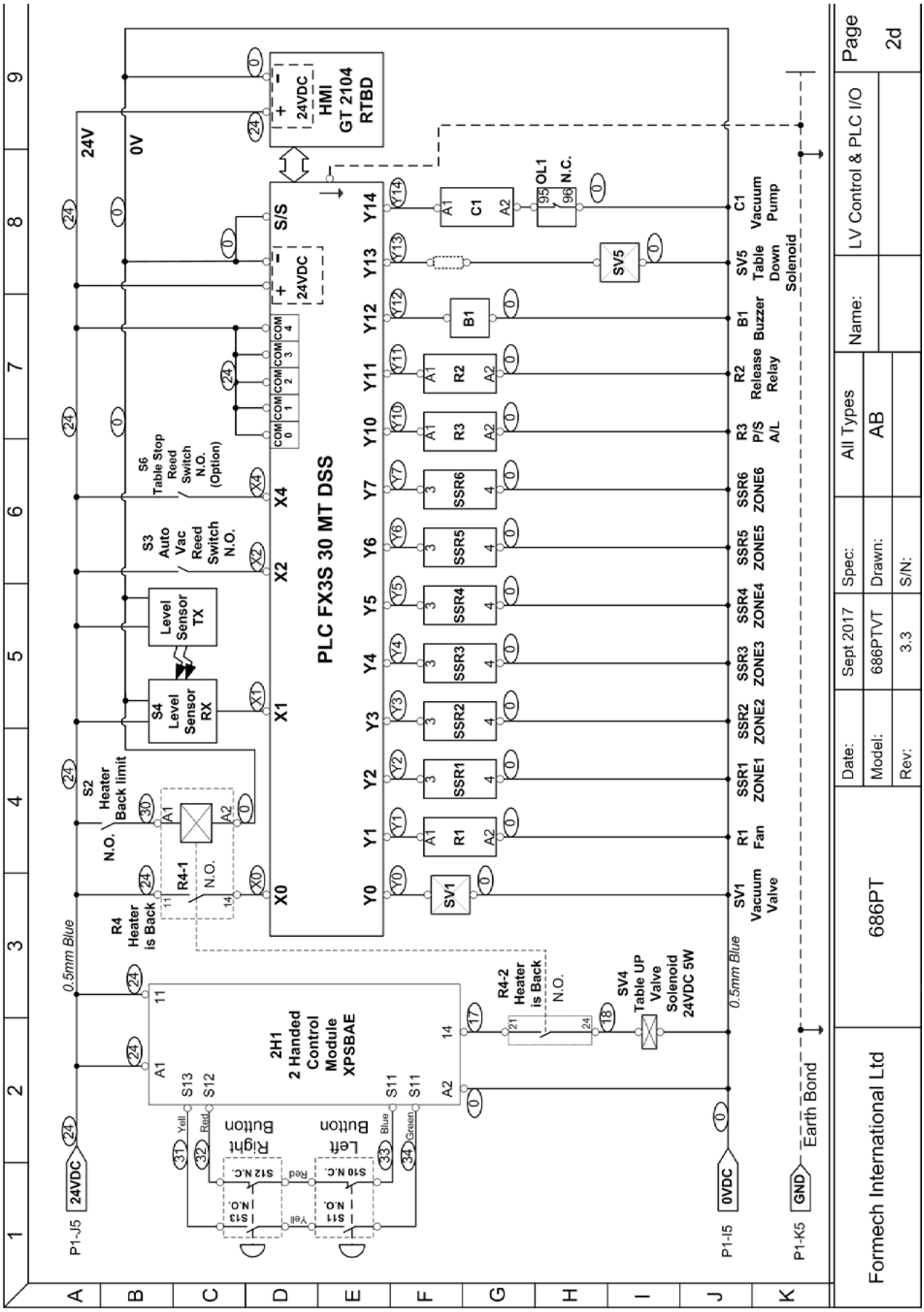
2b


Formech International Ltd
686PT
Date:
Sept 2017
Model:
686PT-P
Rev:
3.3
Spec:
Drawn:
S/N:
All Types
AB
1144
Name:
LV Control & PLC I/O
Pyrometer Option
Page
2a
PLC FX3S 30 MT DSS
24V
0V
24VDC
HMI GT 2104 RTBD
OPTRIS CS TC LT15
FX3G-2ADBD Module
2H1 2 Handed Control Module XPSBAE
Left Button
Right Button
S2 Heater Back limit
S3 Auto Vac Reed Switch N.O.
S4 Level Sensor RX
Level Sensor TX
S5 Air Pressure Switch N.O.
S6 Table Stop Reed Switch N.O. (Option)
R1 Fan
R2 Release Relay
R3 P/S A/L
R4-1
R4-2 Heater is Back
OL1
SV4 Table UP Valve Solenoid 24VDC 5W
SV5 Table Down Solenoid
B1 Buzzer
C1 Pump & Vacuum
SSR1 ZONE1
SSR2 ZONE2
SSR3 ZONE3
SSR4 ZONE4
SSR5 ZONE5
SSR6 ZONE6
0.5mm Blue
Earth Bond
P1-J5
P1-I5
P1-K5


PLC FX3S 30 MT DSS
HMI GT 2104 RTBD
2H1 2 Handed Control Module XPSBAE
Formech International Ltd
686PT
Date:
Sept 2017
Model:
686PTVT
Rev:
3.3
Spec:
All Types
Drawn:
AB
S/N:
Name:
LV Control & PLC I/O
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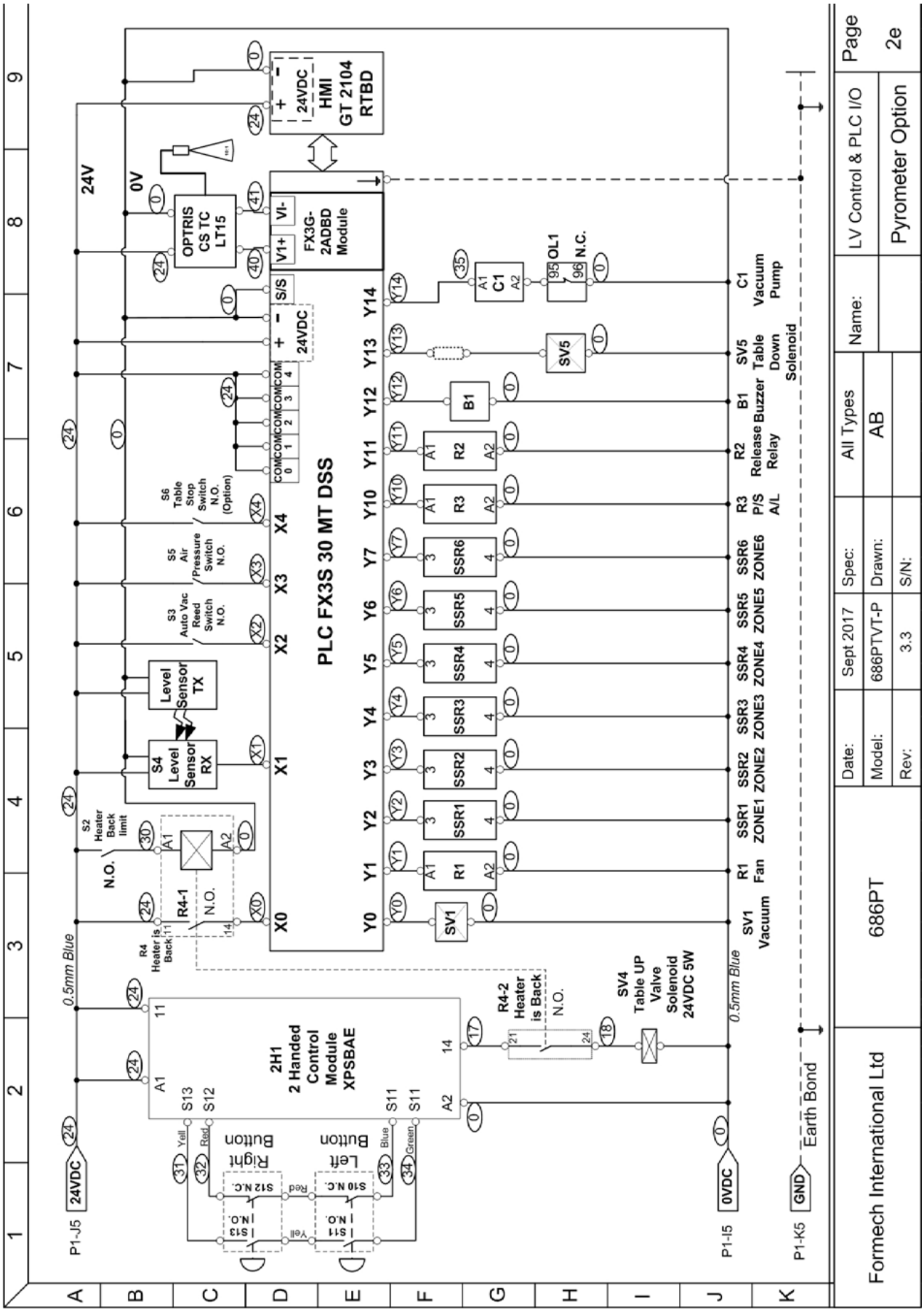
2d


24V
0V
24VDC
HMI GT 2104 RTBD
OPTRIS CS TC LT15
FX3G-2ADBD Module
V1+
V1-
S/S
PLC FX3S 30 MT DSS
X0
X1
X2
X3
X4
Y0
Y1
Y2
Y3
Y4
Y5
Y6
Y7
Y10
Y11
Y12
Y13
Y14
COM
S2 Heater Back limit
N.O.
R4 Heater is Back
R4-1
N.O.
S4 Level Sensor RX
Level Sensor TX
S3 Auto Vac Reed Switch N.O.
S5 Air Pressure Switch N.O.
S6 Table Stop Switch N.O. (Option)
SV1
SV1 Vacuum
R1 Fan
R1
SSR1 ZONE1
SSR2 ZONE2
SSR3 ZONE3
SSR4 ZONE4
SSR5 ZONE5
SSR6 ZONE6
R3 P/S A/L
R2 Release Relay
R2
B1 Buzzer
B1
SV5 Table Down Solenoid
SV5
C1 Vacuum Pump
C1
OL1
N.C.
95
96
2H1 2 Handed Control Module XPSBAE
S13
S12
S11
S11
Yell
Red
Blue
Green
Right Button
Left Button
S12 N.C.
S13 N.O.
S10 N.C.
S11 N.O.
R4-2 Heater is Back
N.O.
SV4 Table UP Valve Solenoid 24VDC 5W
0.5mm Blue
0.5mm Blue
P1-J5
24VDC
P1-I5
0VDC
P1-K5
GND
Earth Bond
Formech International Ltd
686PT
Date:
Sept 2017
Model:
686PTVT-P
Rev:
3.3
Spec:
Drawn:
S/N:
All Types
AB
Name:
LV Control & PLC I/O
Pyrometer Option
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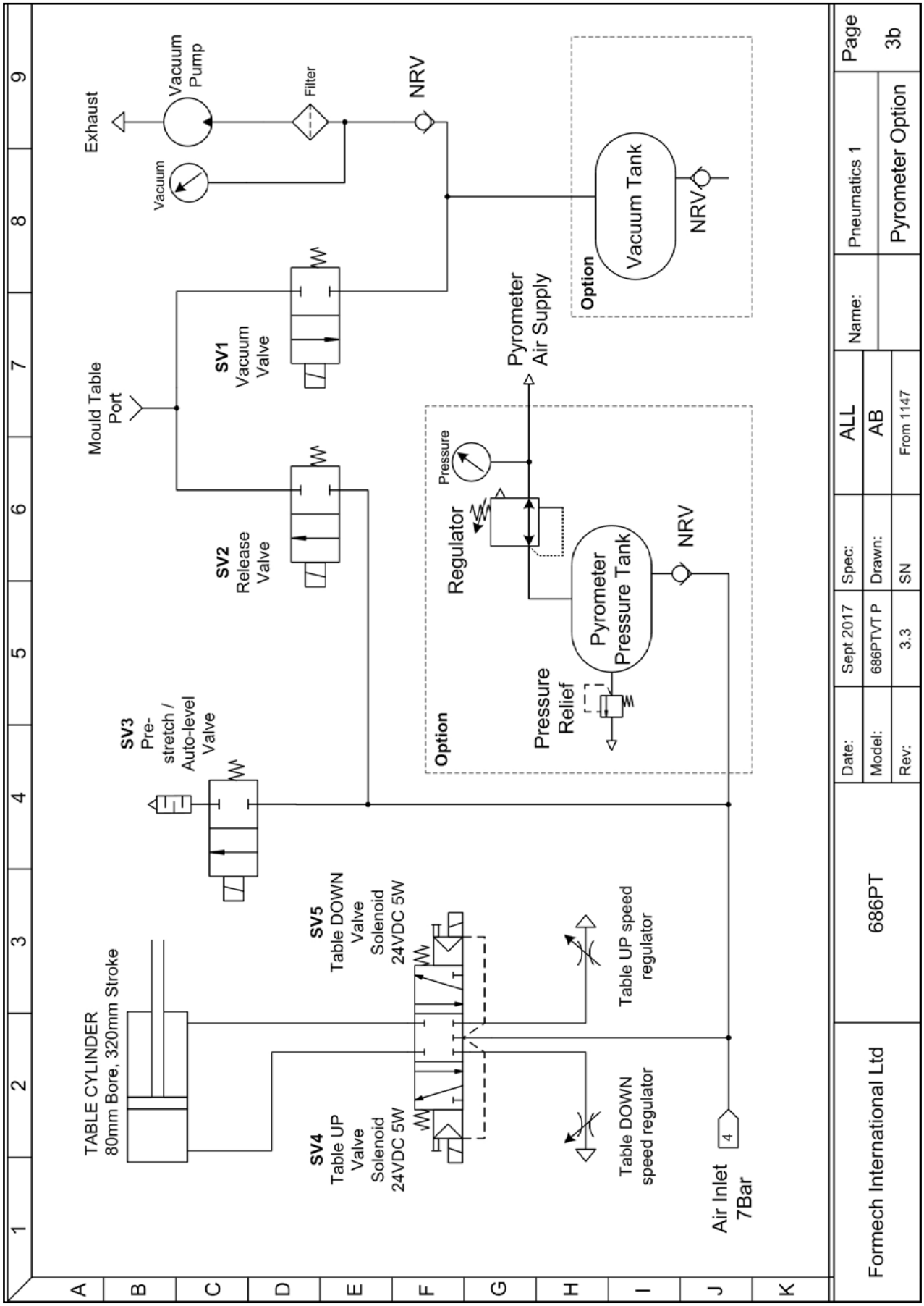
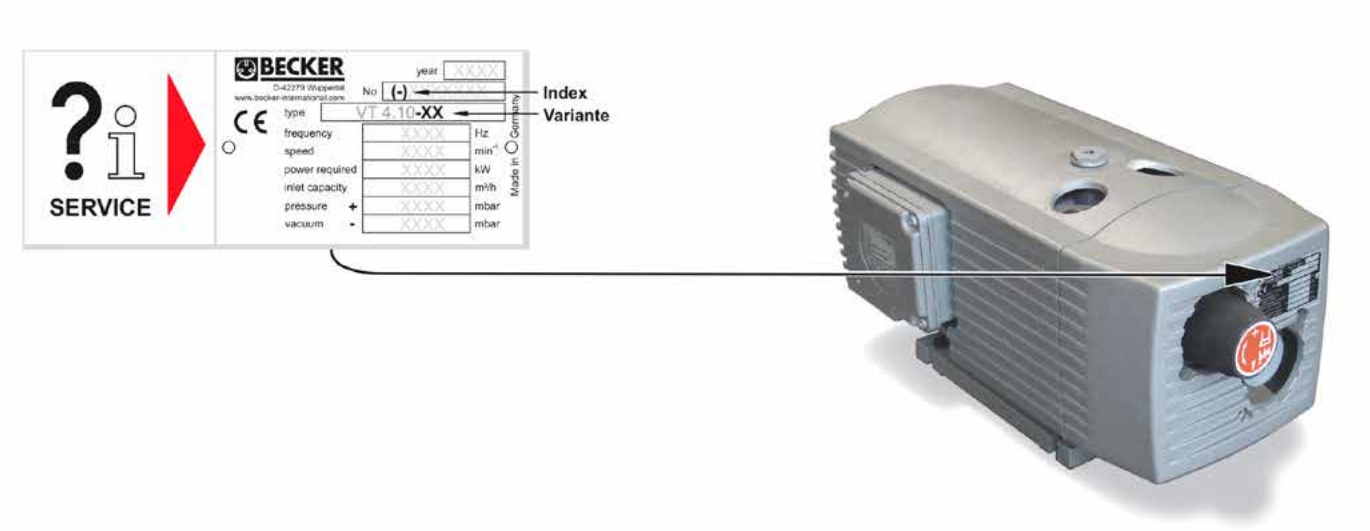
2e

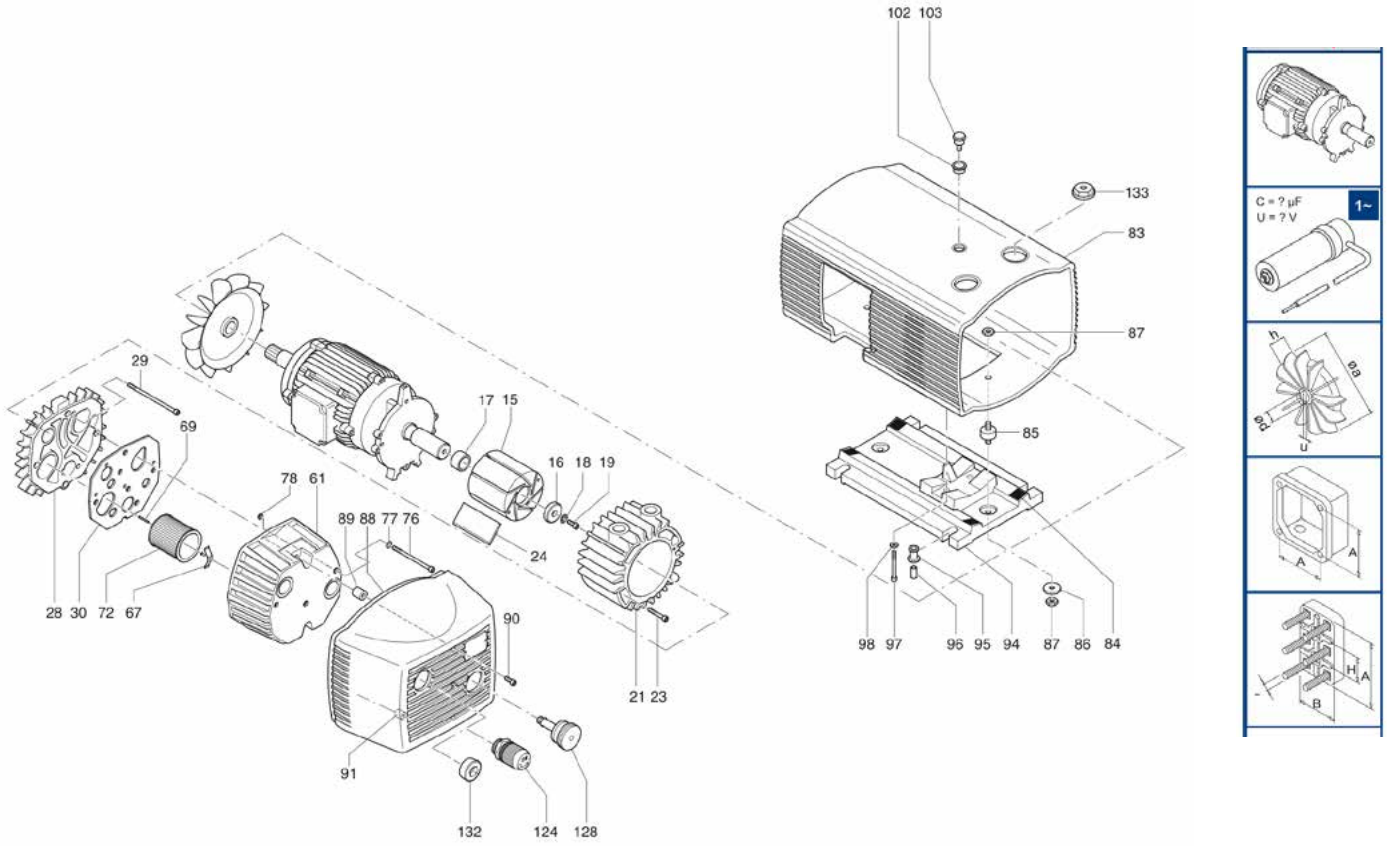

Exhaust
Vacuum Pump
Vacuum
Filter
NRV
Vacuum Tank
NRV
Option
Mould Table Port
SV1 Vacuum Valve
Pyrometer Air Supply
SV2 Release Valve
Pressure
Regulator
Pyrometer Pressure Tank
NRV
Option
SV3 Pre-stretch / Auto-level Valve
Pressure Relief
TABLE CYLINDER 80mm Bore, 320mm Stroke
SV5 Table DOWN Valve Solenoid 24VDC 5W
Table UP speed regulator
SV4 Table UP Valve Solenoid 24VDC 5W
Table DOWN speed regulator
Air Inlet 7Bar
4
Formech International Ltd
686PT
Date: Sept 2017
Model: 686PTVT P
Rev: 3.3
Spec:
Drawn:
SN
ALL
AB
From 1147
Name:
Pneumatics 1
Pyrometer Option
Page 3b

Qty	Description	Part No
9	Quartz Element 250W SQE 230V, Zone 1,2	HEQ12
16	Quartz Element 300W SQE 230V, Zone 3,4,5,6	HEQ13
1	Heatproof Cable 1.63mm Dia (solid)	EE39
1	Heatproof Cable 1.0mm SiFGL	EE40
1	Heatproof Cable 2.5mm SiFGL White (N)	EE42
1	Silicone Cable 1.0mm SiF (G/Y)	EE68
1	Glass fibre Sleeving V111	EE38
23	Ceramic Terminal Block	MPP14
1	Conduit PVC coated	EE75
1	Cable chain	EE78
1	Cable chain end Bracket set	EE79
4	Wheel bearing	GH04
1	Heater limit switch	EE83
1	MCB 10A Single / Twin phase	EE99-10A 2P
1	MCB 40A Single / Twin phase	EE99-40A 2P
1	MCB 16A Single phase 686	EE54-16A 1P
3	MCB, 6A Three Pole 686	EE100-16A 3P
1	Isolator Switch 3Pole (1Phase / 2Phase)	EE86
1	Isolator Switch 4Pole (3Phase)	EE61
1	20mm Fuse 5A	EE45-2A
2	20mm Fuse 2A	EE45-5A
1	Pump Contactor 24VDC	EE09
1	Contactor Overload (3 Phase)	EE10-4A
1	Contactor Overload (1 Phase)	EE10-6A
1	PLC FX3S-30	EE107
1	HMI - Touch Screen GT 2014	EE108
1	Communications Cable, 3M	EE66
1	24VDC Power Supply, 1A	EE01
1	Relay, 2 Pole, 6A, 24VDC	EE91
1	Relay, single pole, 6A, 24VDC	EE92
6	Solid State Relay (SSR) 250V 10A, 24VDC signal	EE93
1	Buzzer 12-24VDC	EE96
1	Beam Sensor	MPP31
1	2 Handed ctrl module Cat I	EE94
2	Grey Button non-illuminated	EE98
2	N.O / N.C. Switch body	EE97
1	Auto Vacuum Reed switch	P38
2	2/2 Air Valve 1/2"	P05
1	2/2 Vacuum Valve 1/2"	P06
1	Air silencer 1/2"	P35

Qty	Description	Part No
1	Cylinder100Bore 320 Stroke (table)	P39
1	5/3 valve	P10
2	Sol Pilots for 5/3 valve, 24VDC	P11-24VDC
2	Exhaust control reg	P12
1	3/8" bore PVC tube (m)	P14
3	1/2" bore PVC tube (m)	P15
1	50mm Vacuum gauge	P32
1	Vacuum Pump & filter unit, VT4.16	PAP07-(STATE 1P or 3P)
1	Vacuum filter Cartridge	PAP15
2	Toggle Clamp	MPP20-686
2	Toggle Clamp Lower Nut Adjuster M6 Black	MPP25
2	Toggle Clamp Upper Nut Adjuster M6	MPP28
2	Clamp Frame Grip	GH27
1	5M Seal kit, 5M Top seal, 3m table seal, sealant	SK04
1	10M Seal kit, 10M Top seal, 3m table seal, sealant	SK05
1	6mm x 12mm natural rubber Panel seal	MPP12
1	Mesh	MPP47
2	Clamp Frame Grip	GH27
1	5M Seal kit, 5M Top seal, 3m table seal, sealant	SK04
1	10M Seal kit, 10M Top seal, 3m table seal, sealant	SK05
1	6mm x 12mm natural rubber Panel seal	MPP12
1	Mesh	MPP47
1	Cylinder100 bore 308mm Stroke (Table with Bolster)	P39
1	Table Bolster Unit	686 Bolster
4	1/2” bore wired vacuum hose (m) (VT Option)	P44
1	Vacuum Pump & filter unit, U4.20 (VT Option)	PAP09-(STATE 1P or 3P)
1	Vacuum filter Cartridge for U4.20 (VT Option)	PAP16
1	Vacuum Piston Valve ½” (VT Option)	E290-384
1	3/2 Pilot Valve (VT Option)	18900033D2
1	High Temp Pyrometer Unit	CT LT15
1	Pyrometer Mirror Unit	ACCTAP
1	PLC Input Module 0-10VDC (Pyrometer Option)	FX3G 2ADBD
1	Pressure Switch (Pyrometer Option)	398-7045
1	Vacuum Tank	



Spare parts list VT 4.16



Spare parts list VT 4.16

Position	Identification No.	Description
15	020000 16300	ROTOR
16	016800 16300	CLAMPING DISC
17	911009 00000	STAR-TOLERANCE-RING
18	949203 00000	TOOTHED SPRING WASHER
19	945320 00000	SOCKET HEAD SCREW
21	000105 16300	PUMP BODY
23	945372 00000	SOCKET HEAD SCREW
24	901347 00007	CARBON VANES (KIT)
28	000705 16300	LID
29	945372 00000	SOCKET HEAD SCREW
30	008901 16300	GASKET
61	004800 27400	FILTER COVER
67	009000 16300	BLADE SPRING
69	952009 00000	LOCATING PIN
72	909519 00000	FILTER CARTRIDGE (1x - necessary quantity)
76	945325 00000	SOCKET HEAD SCREW
77	948021 00000	SEALING RING
78	913161 00000	O-RING
83	006800 27400	PROTECTING HOOD
84	060901 16300	ELASTIC PAD
85	741310 50000	RUBBER BUFFER
86	949402 00000	WASHER
87	947001 00000	HEX.NUT
88	006801 27400	PROTECTING HOOD (FRONT)
89	741310 90000	RUBBER BUFFER
90	945318 00000	SOCKET HEAD SCREW
91	951922 00000	RUBBER ELEMENT
94	015100 27400	FOOT
95	951921 00000	RUBBER ELEMENT
96	068000 27600	SPACING COLLAR
97	945323 00000	SOCKET HEAD SCREW
98	949451 00000	WASHER
102	968104 00000	RUBBER SLEEVE
103	029600 16300	BOLT
124	736001 99613	VACUUM REGULATING VALVE
128	727502 06000	BLOW-OFF VALVE
132	951232 00000	SCREW PLUG
133	951224 00000	SCREW PLUG

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:

2014/35/EU - 2014/30/EU - 2011/65/EU

Technical File Compiled by: A. 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 13849-1:2006
EN 60204-1:2006+A1:2009
EN 12409:2008+A1:2011

_____

Signed:

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

Formech
Perfectly formed

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Formech International Limited
Unit 4, Thrales End Farm, Thrales End Lane, Harpenden, Hertfordshire, AL5 3NS U.K.
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Email: info@formech.com