Cherusal®

Operation and maintenance manual Rev. A TRIMECH TECHNOLOGY PRIVATE LIMITED

CHERUSAL Model: TM-100PR-MKIV-1(CE)

PULSE HEAT MACHINE

Warning

Isolate power supply before removing side cover and electrical connections.

Printed in Singapore

Cherusal® Model TM-100PR-MKIV-1(CE)

Operation and maintenance manual

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Revision History

Document Number	MA-TM-100PR-MKIV-1(CE) (TT21-0020-TT21-0021)	
Revision	Description	Date
A	Initial Release	2021/07/26

Safety and Precautions

1) Read this operation manual to make sure of correct operation before starting installation, wiring, operation and maintenance, and inspection of the machine.
2) Turn off the power to the machine before starting installation, removal, wiring, maintenance, and inspection of the machine. Failure to turn power off may cause electrical shocks or fire hazard.
3) Only trained service personnel are to install, wire, program, and operate the machine. Personnel without such expertise should not use the machine.
4) Take precaution while moving or transporting the machine to prevent the machine from falling, otherwise damage or malfunction of the machine will result.
5) Make sure of safety when operating the machine. Incorrect operation on the machine may cause machine damage or accidents.
6) Install the machine in environments described in this operation manual. If the machine is used in places where the machine is subjected to high-temperature, high-humidity, condensation, corrosive gases, excessive vibrations, and excessive shocks, then electrical shocks, fire hazard, or malfunction will result.
7) Ensure all machines' safety covers are properly installed prior to operation.
8) During operation, do not place object along or on mechanism movement path.
9) During operation, keep clear of all fixtures or work stage and any mechanism movement path.
10) Do not attempt to open the cover without first disconnecting power supply. Service should only be carried out by qualified personnel. Have a thorough understanding on the system before operating the system.
11) Wear safety goggle and use proper tools and equipment when conducting machine maintenance or troubleshooting.

Hazardous Voltage:

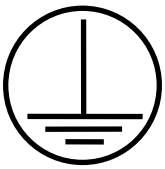
This label is to alert the user that there is a chance of heavy electric shock to the operator while handling the equipment with the power. To avoid the voltage or current hazard, disconnect power before servicing.

Crush and Cut:

This label represents the moving parts can crush and cut. Keep hands clear while operating machine.

Hot surface:

This label represents the place is hot during operation. Do not touch to avoid injury.



Earth:

This label indicates the ground point.

PE:

This label indicates the PE terminal.

Preface

Thank you for purchasing the Model TM-100PR-MKIV-1(CE) Pulse Heating Machine. This machine is specifically designed to perform soldering of FPC, PCB or LCD. This system is versatile equipment, which can be used to perform many types of processes. Other models are available for selection for specific operation. Many considerations are put into the system to ensure reliable performance.

This manual provides the information on machine components, user interface, maintenance, troubleshooting and etc. Please read this manual to have thorough understanding on the system before operating the machine.

Chapter 1: Machine Overview

This chapter describes the basic information of this product such as method of heating, machine components and features etc.

1.1 Method of Heating

This system employs current as a heating source versus the conventional method of heating using a heater rod. This method of heating is also commonly known as resistance heating, which enables spontaneous control of heat energy due to the small size of the thermode which allows almost instant heating and cooling. The entire heating process is achieved by varying the current supply to the thermode.

1.2 Machine Components

The system can be divided into the following modules:

1) Thermode assembly
2) Silicone rubber or Polyamide tape spool assembly
3) Work table assembly
4) Vision system
5) Mobile structure for transportability

1.3 Machine Features

- 7” touch screen panel for parameter input
- XYZ adjustment mechanism for CCD camera
- IR LED light source
- Air blower to accelerate cooling
- Build in vacuum ejectors to control fixture vacuum
- Levelling mechanism on work table
- Caster wheel for mobility
- Ergonomically positioned input switches

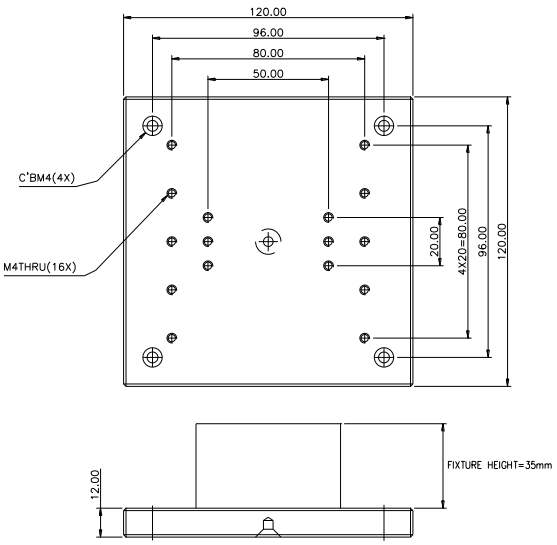
1.4 Specifications

Input voltage		220VAC±10%, 50 or 60Hz
Power		4.0kVA
Air supply		Filtered clean air, 5-7 bars
Operating ambient		18-28ºC, 40-80% humidity with no significant dust
Heating method		Pulse Heat
Bonding Force		0.8kgf ~ 25kgf
Temperature ramp profile		4 stages
Start Temp.		30-300°C
Ramp Temp.		30-550°C
Release Temp.		30-550°C
Hold period		1-100s
Ramp period		1-25s
Thermocouple type		K-type
Top Vision System	Camera	2 units of CCD
	Magnification	50x
Vacuum ejector		2 units, -650mmhg each
Max. Thermode size		75 x 3mm
Password		User pre-set
Built-in counter		Yes
Counter alarm		Yes
Program capacity		100
Levelling mechanism		Yes (confirm by using prescale paper)
Table size		120 x 120mm
User interface		Touch screen LCD
Real time temperature profile		Yes
Substrate loading/unloading		Manual
Over temperature protection		Yes
Machine Colour		Off grey and grey
Machine dimensions		600mm (L) X 790mm (W) X 1370mm (H)
Machine Weight		< 200kg

Performance of machine will be compromised if operate out of the above stated requirements.

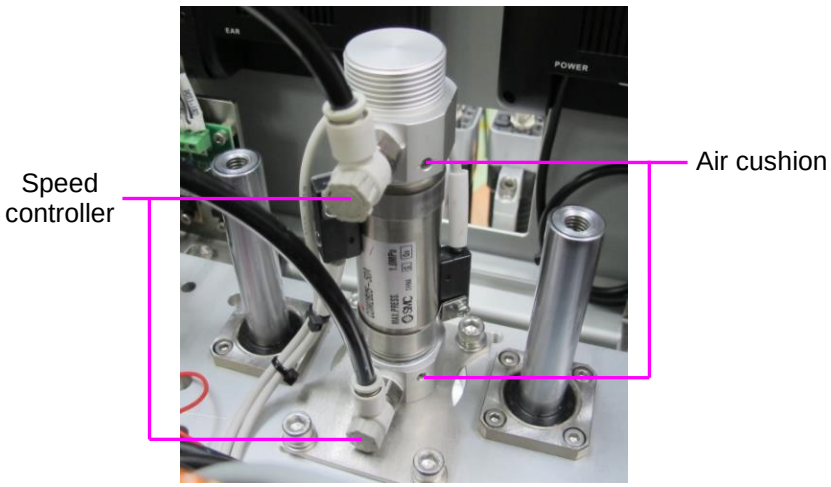
+ Specifications subject to change without prior notice

1.5 Work Table Dimensions



The recommended height for the fixture is 35 mm.

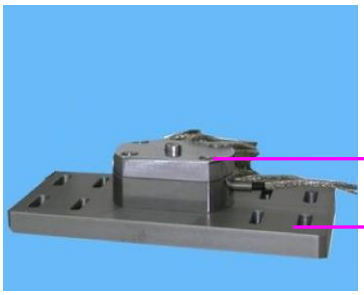
1.6 Press Cylinder



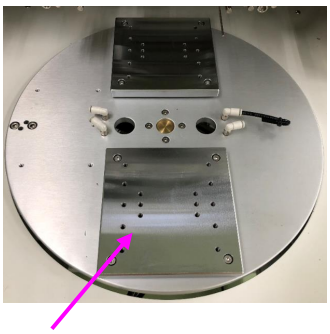
Air cylinder of bore size 25mm is used for this machine. The input pressure to the cylinder can be set by using proportional valve. A counter balance air press is being input at the return path of cylinder as a means to provide counter balance the thermode assembly weight. Speed regulators mounted on the cylinder control the speed of cylinder movement. The cylinder comes with air cushion for a softer landing. The stroke length is 50mm. Use TM-18 to determine a more accurate setting.

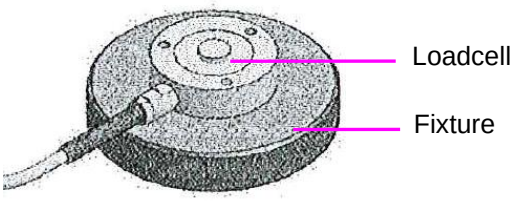
TM-18

Note: Please refer below to use appropriate loadcell fixture for force measurement.

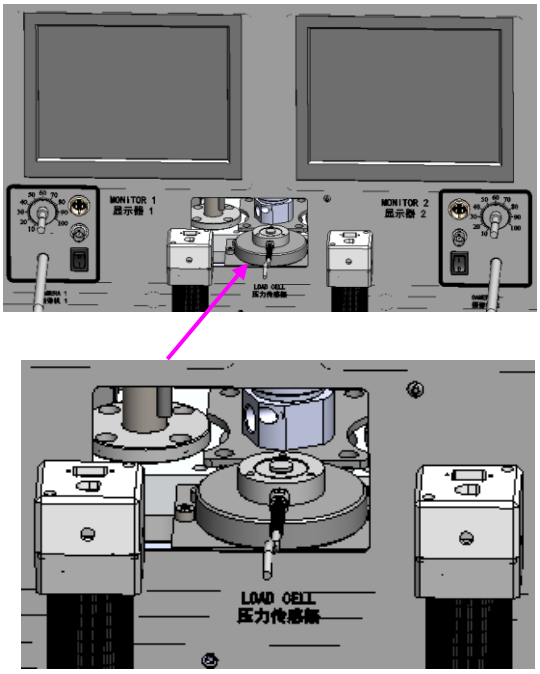


Locate this type of fixture on **work table** (as pointed at the picture below) for force measurement

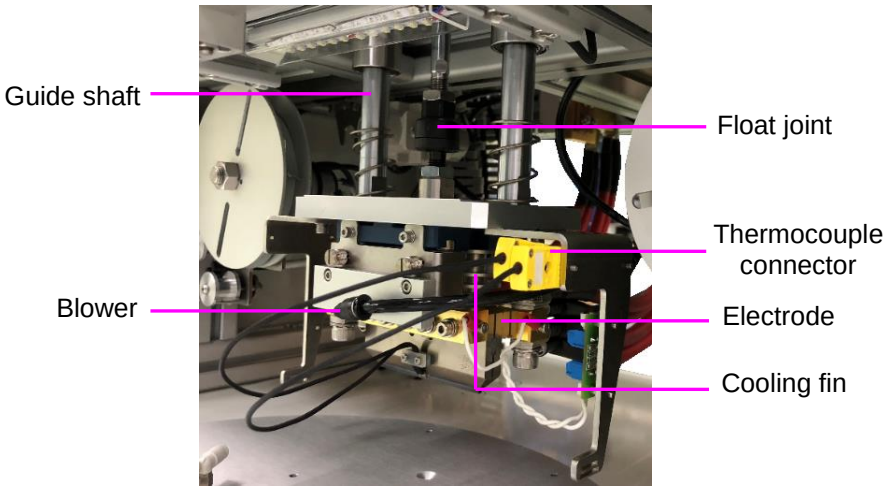




Locate this type of fixture at **front panel** (as pointed at the picture below) for force measurement



1.7 Thermode Assembly



The thermode assembly is mounted via a float joint from the cylinder and a pair of bearing and hardened shaft guides the movement vertically. The thermode assembly is well insulated with cooling fin and heat insulation material. Blower is located in front of thermode and its airflow can be adjusted. The Thermode, spot welded with a K-type thermocouple wire, is fired by the power transformer which is located at top compartment.

1.8 Thermode

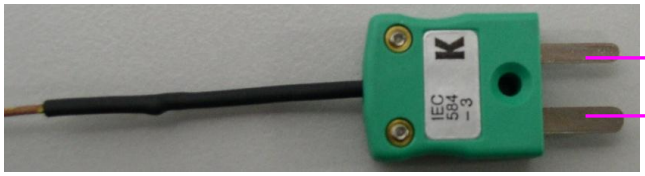
Thermode is normally made of Titanium carefully profiled to maintain even distribution of heat. The end contact surface is ground for good flatness. Titanium is chosen in most cases because of its good thermal strength and non-sticking characteristic to solder. Depending on application, other material can be used. Please seek Trimech for advice.

The heating element (thermode) must be an electrical resistance, which is a function of resistivity and physical conditions, low enough to permit a high current to flow. Good mechanical strength up to the operating temperature required. Thermode must be free from chemical attack by the environment as oxidation for example, usually increases as the temperature increases. Low expansion coefficient as the thermode will be cycling from low to high temperature during operation and any relative shift between thermode and workpiece at heating stage will not be desirable.

Temperature distribution along the thermode bond surface must be even with minimum variation as the bonding quality will be affected. All thermodes made by Trimech will go through quality test before they are delivered.

Temperature readings were taken at three different points on the thermode; left, right, and centre to compare their difference.

1.9 Thermocouple

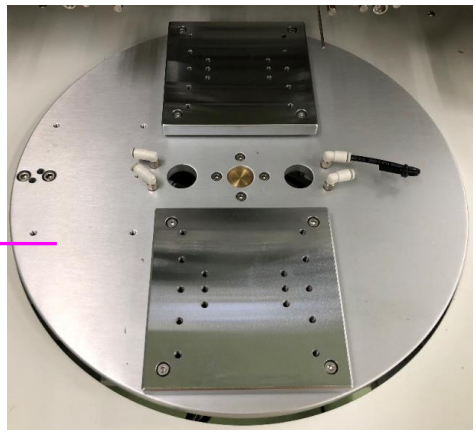


A K-type temperature probe is used as sensing device. Current is made to flow from the front to the back of the thermode, when it made direct contact with any open leads, there is no potential different between the leads and therefore the component will not be damaged. Periodical check must be carried out to check that the resistance between the thermocouple terminals is 7Ω ±0.5 @ 23.5 °C. The thermocouple wire leads are colour in red and yellow, the red wire should be connected to the negative and the yellow wire to positive.

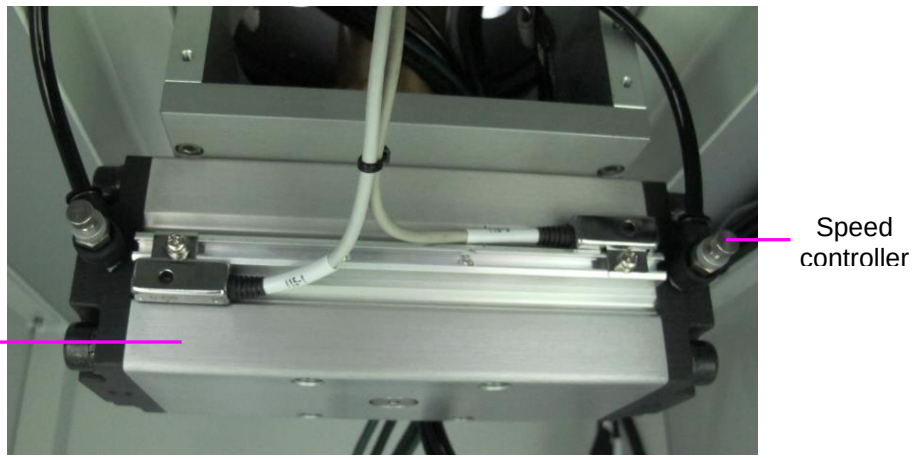
1.10 Thermocouple Connector

2 thermocouple connectors are been used in this machine. One is connected to the machine main board, the other to an over temperature board. With one connector connected to over temperature board, the machine will appear over temperature error if the temperature is too high.

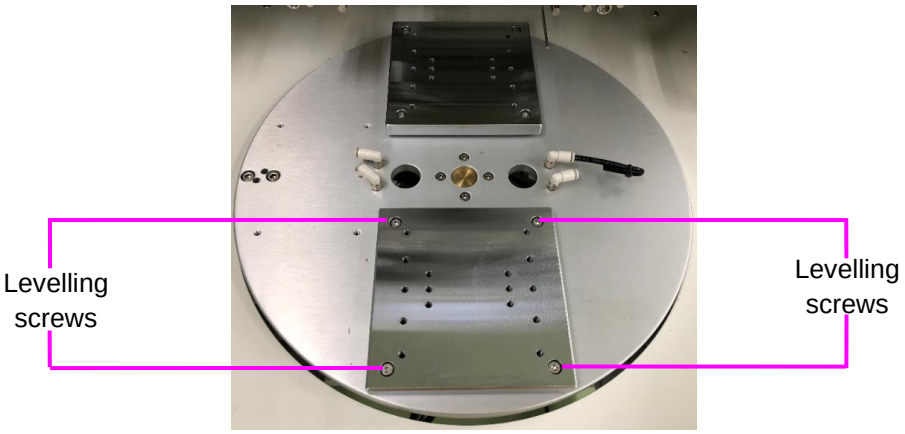
1.11 Work Table



The stage rotates in and out to operational position when activated by the two start switches located at the operator panel simultaneously. The rotary movement mechanism employs a bore sized 63mm 190° rotary cylinder. The speed of movement can be controlled by two speed control valves.

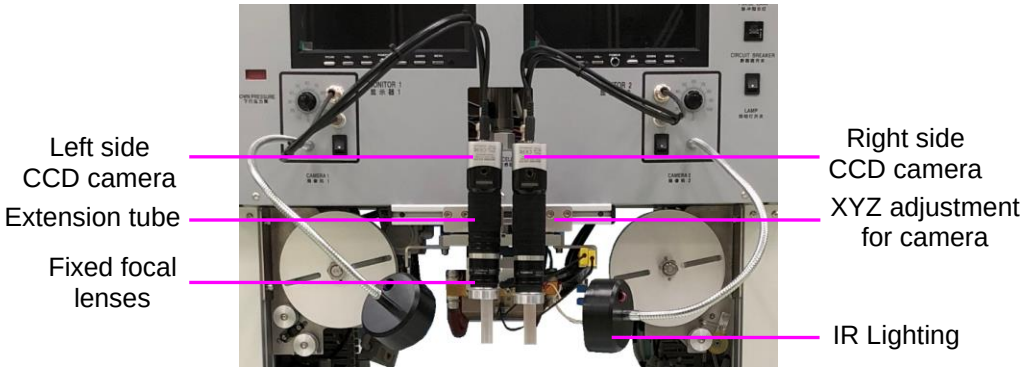


1.12 Leveling Plate



The levelling plate provides levelling of flatness between thermode and substrate. The four screws at each corner of the plate allow technician to adjust for levelness. Use Fuji prescale pressure paper to check for even pressure.

1.13 Vision System



The system comes with a pair of 1/3” CCD IR camera with a magnification of approx. 38 times. Please contact Trimech agent for bigger magnification.

The camera is mounted in an arm that can be adjusted left/right and up/down for different sizes of substrate.

1.14 Transformer

Machine transformer is designed to give consistent output energy at all times. The transformer features 4 primary tabs that will produce four levels of current output. An

indicator on the front panel lights on when the voltage is applied to the primary transformer.

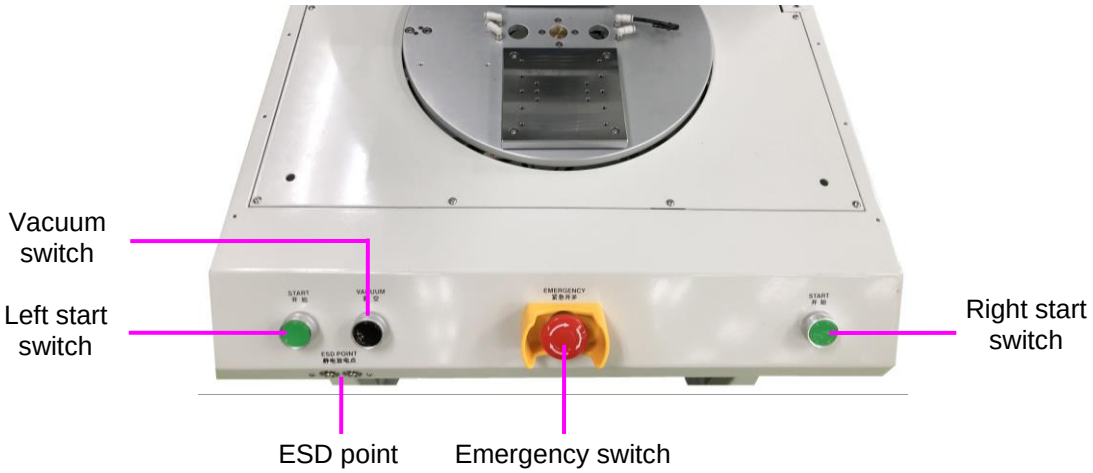
1.15 Silicon Rubber Indexing Mechanism

Silicon rubber indexing mechanism is located at the both side of the thermode assembly. A DC gear motor on the right side (Index spool) with a rotary encoder is used to index silicone rubber tape. Make sure that the encoder is free running for more accurate indexing. On the end, take up spool uses DC gear motor which provides tension to spool.

Caution: spinning of the 1) take up spool or 2) index spool is to be avoided to prevent damage to the motor due to back EMF. Slow manual rotation maybe employed to reduce the slack of the silicon tape when necessary.

The index distance is 1-100mm. The reuse frequency can be set up to 50X. For an example, when reuse frequency is set at 10, the tape will only advance when it reaches every tenth operation. The silicone rubber indexing can be disabled at the production preset page. Thread silicone or polyamide tape through guide roller and guide block on thermode assembly.

1.16 Input Panel



1) Left / Right Start Switches

The left right buttons are located at left and right side of the machine. They must be pressed simultaneously for the machine to begin production.

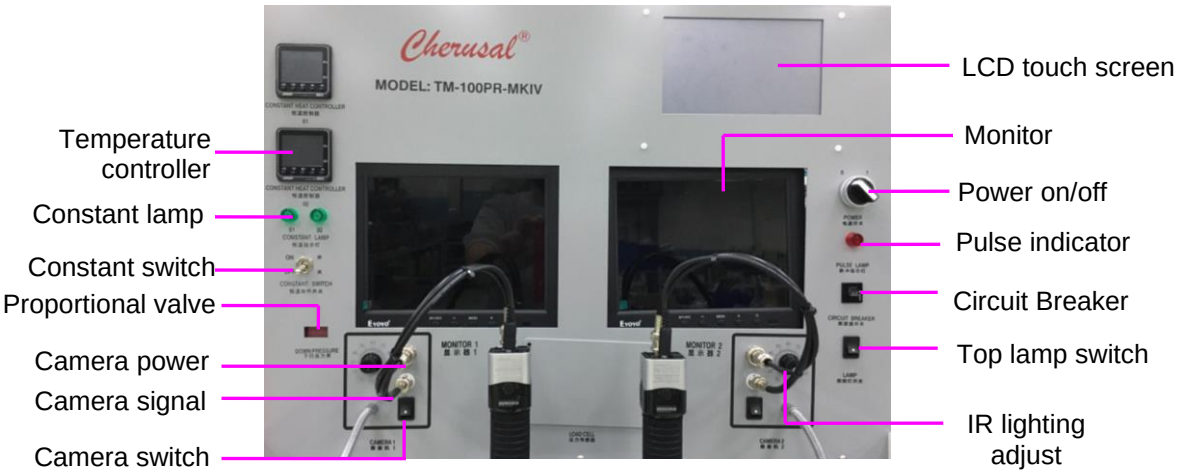
2) Vacuum Switch

Press to activate the vacuum during production. Vacuum option can be deactivated at Production Preset menu.

3) Emergency switch:

In the event of an emergency, pressing this switch stops all function and cut off power supplying to the machine. This allows the user to rectify the problem or fault before continuing. Switch off the machine before rectifying the fault. Release the emergency switch and press the main power switch to switch back on the machine again.

1.17 Control Panel



1) **Monitor:**

   Display the camera image.

2) **Proportional valve:**

   Control and display down stroke pressure in BAR. Resolution is 0.01 BAR. It is factory calibrated.

3) **Camera power/signal:**

   DC Power supply and camera signal connection for vision system.

4) **Camera switch:**

   Control the signal input to monitor.

5) **IR lighting adjust:**

   Turn the knob to adjust the IR light intensity.

6) **Top lamp switch:**

   On/off switch for top lamp located in front of the bonding head.

7) **Circuit breaker:**

   Circuit breaker is used to prevent equipment damage by excess current. Circuit breaker can be reset to normal condition manually.

8) **Pulse indicator:**

   Indicating the status of thermode firing.

9) Power on/off:

Machine on off switch. “I” indicates power ON, “O” indicates power OFF.

10) LCD touch screen:

Display and input panel for programming

11) Temperature controller:

Temperature controller is used to control the bottom heater temperature. Press or button at the controller to set the desire temperature.

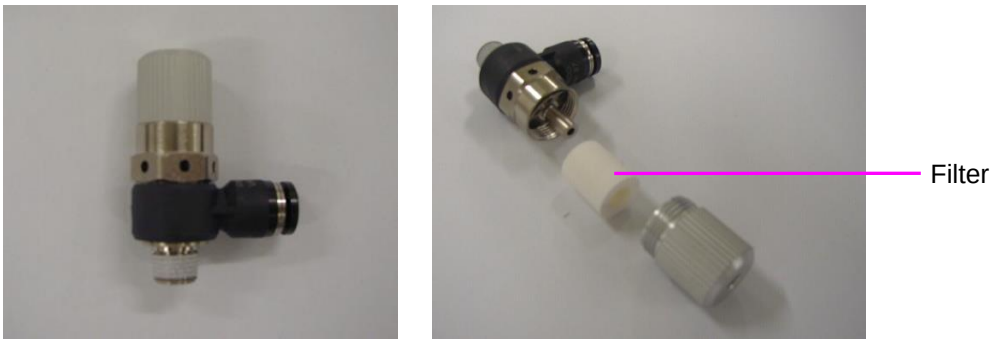
12) Constant lamp:

Indicate bottom heater firing status.

13) Constant switch:

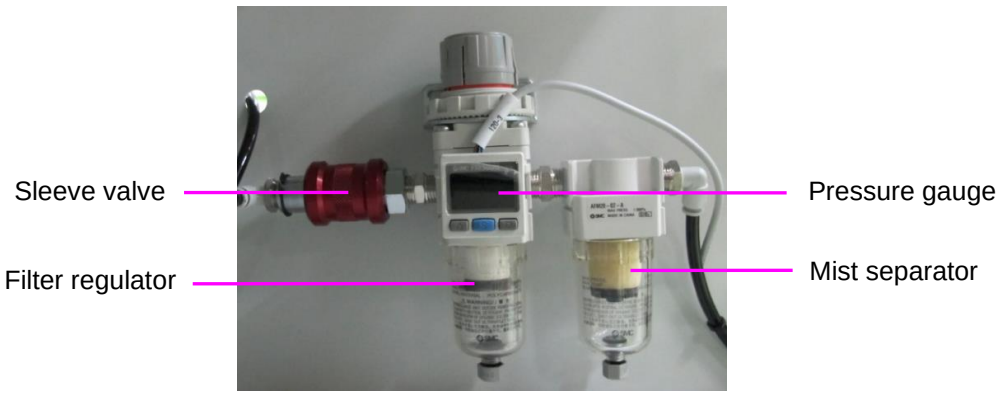
On/Off switch for bottom heater.

1.18 Vacuum Ejector



Vacuum ejectors are located on the right side of the machine, and can be controlled individually by pneumatic valve enclosed in the machine compartment. Vacuum will only be activated when the vacuum switch is activated. Vacuum outlets are placed in the centre of rotary stage for easy and neat connection. Clean the filter regularly for continuous operation of vacuum pressure of -650mmhg.

1.19 Air Service Unit



The service unit is mounted at the bottom of the machine. Mainly is used to give dry clean compressed air to the system. A sleeve on/off valve is also connected in line to facilitate setting up.

Depending on the quality of the incoming compressed air, the accumulated water in the service unit will vary. A periodical check on this water level has to be schedule in the Preventive maintenance manual.

Chapter 2: Machine Installation

This chapter describes the machine installation details.

2.1 Machine Placement

The system should be located at a well ventilation place. Please ensure the space between machine and wall at least 100mm. The space between machines should at least 200mm. Use a spirit level to set the machine foot.

2.2 Vision System

Install camera and lens, and connect all the vision system cables.

2.3 Power Supply

Caution: Ensure the power switch is turned OFF before connecting the electrical power to machine.

Connect machine power cable to factory power point which that fulfill the requirement.

2.4 Air Inlet

Caution: Before connecting the air supply to machine, ensure the On/Off valve of air service unit is turned OFF and adjust the regulator to minimum pressure. Ensure no object along or on mechanism movement path.

Connect incoming air tube to machine air inlet, and slowly adjust machine air regulator to ≥6bar after latch on the ON/OFF valve.

2.5 Machine Power Up

Before machine is powered on, ensure:

1) Machine power supply is connected.
2) Compressed air supply is connected without leakage.
3) Set ON/OFF valve at air service unit ON.
4) Emergency switches are unlatched.

Follow the instructions to power on,

Note: Before power on the machine, make sure no obstacles on the working area and all the doors of machine must be closed for safety.

1) Turn on Main Power Switch
2) Switch on backup power system (Applicable to machine with backup power system)
3) Switch on the PC (Applicable to machine with PC).

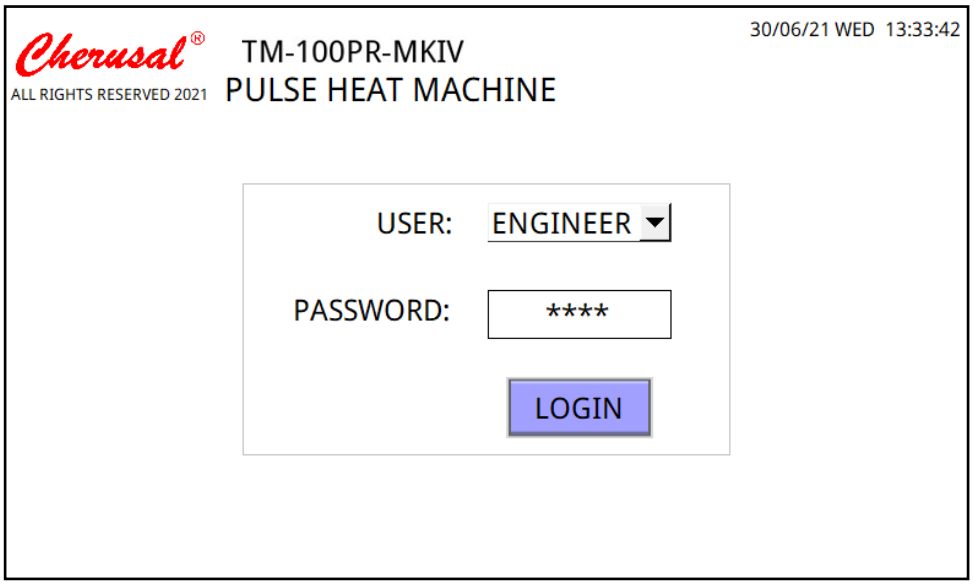
Read the manual before attempting to operate the system. The system has a friendly user interface which in most case, user would be able to navigate fairly easily without much coaching.

Chapter 3: Machine Operation

This chapter discusses the machine operation details. Please read the operation manual before operates.

3.1 User Login

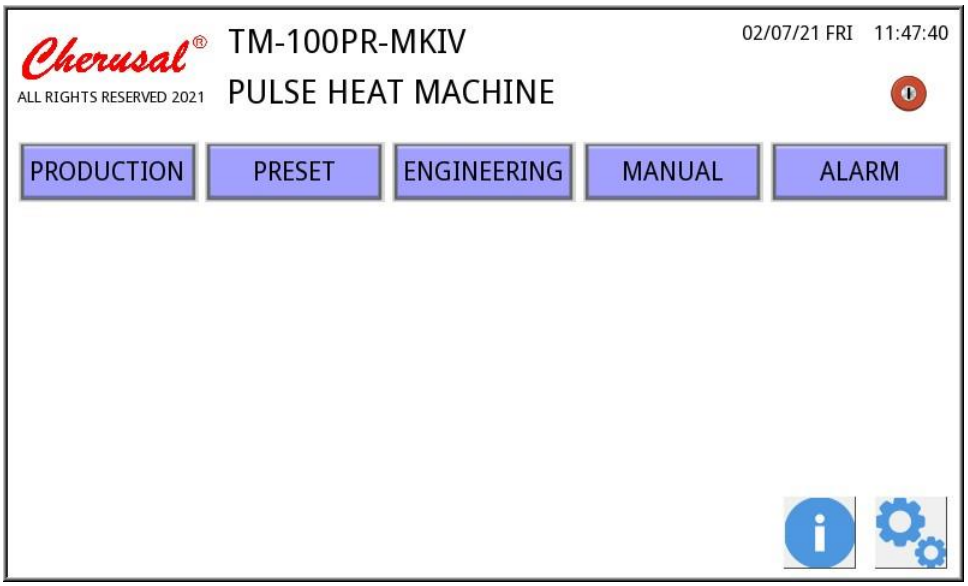
Upon powering up, system will show login page. Firstly, select user level, Operator, Engineer or Maintenance. Press enter the password and click “Enter” to login to the system. The main menu is varied according to different user level. The default password is 1111.



After log in, program main menu will be shown. The following information is based on the setting for Engineer.

3.2 Main Menu

Under the main menu page, select the mode of action. Press the button for PRODUCTION, PRESET, ENGINEERING or MANUAL.



1) **Production:**

   This menu put the system ready for production. Enter this menu to start production process.

2) **Preset:**

   This menu allows for preset of production and program parameters.

3) **Engineering:**

   This selection allows user to set machine for calibration, cycle run, format, and password reset.

4) **Manual:**

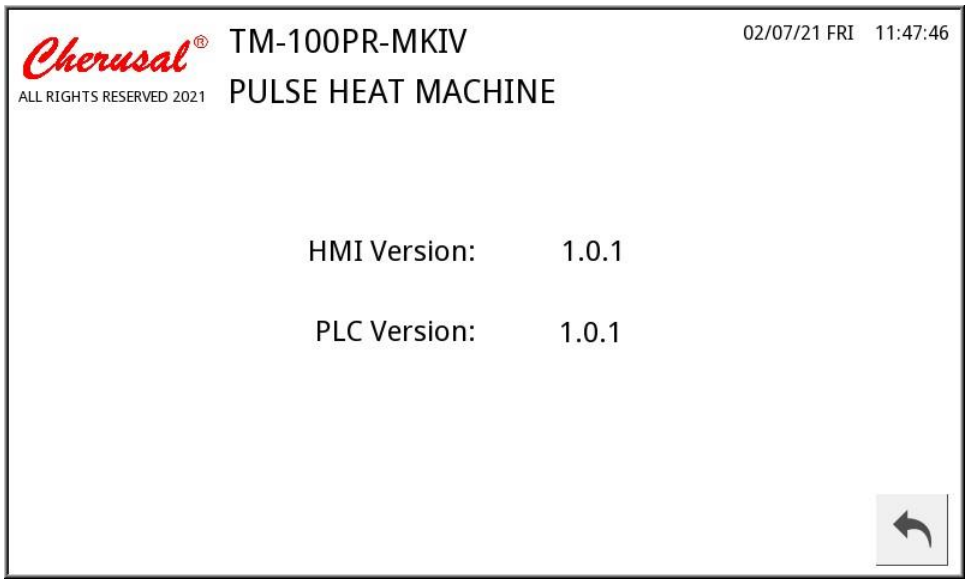
   This selection allows for manual activation of machine movement.

5) 

   Press this button to log out from current user level and return to login page.

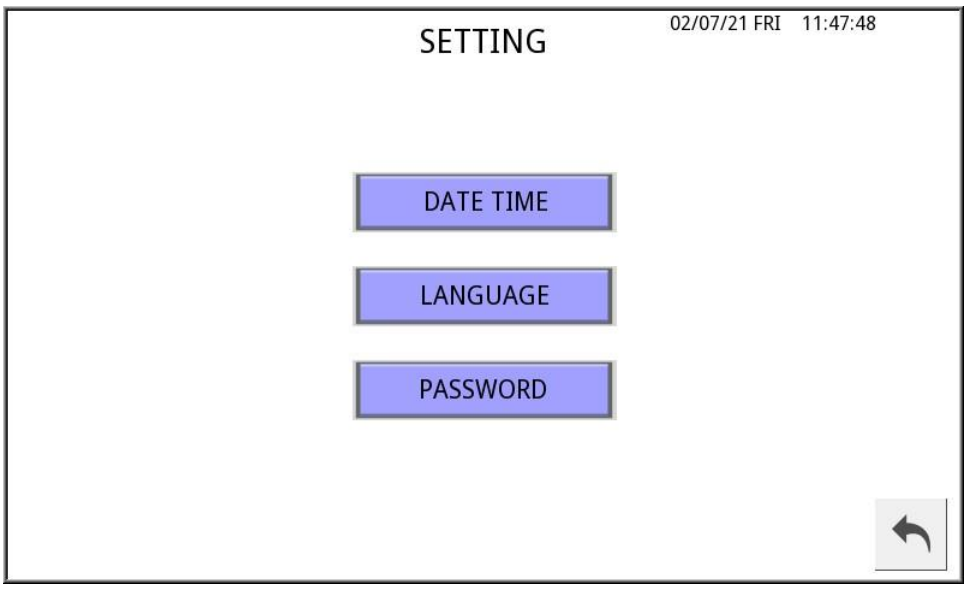
6) 

   Press to display system information.



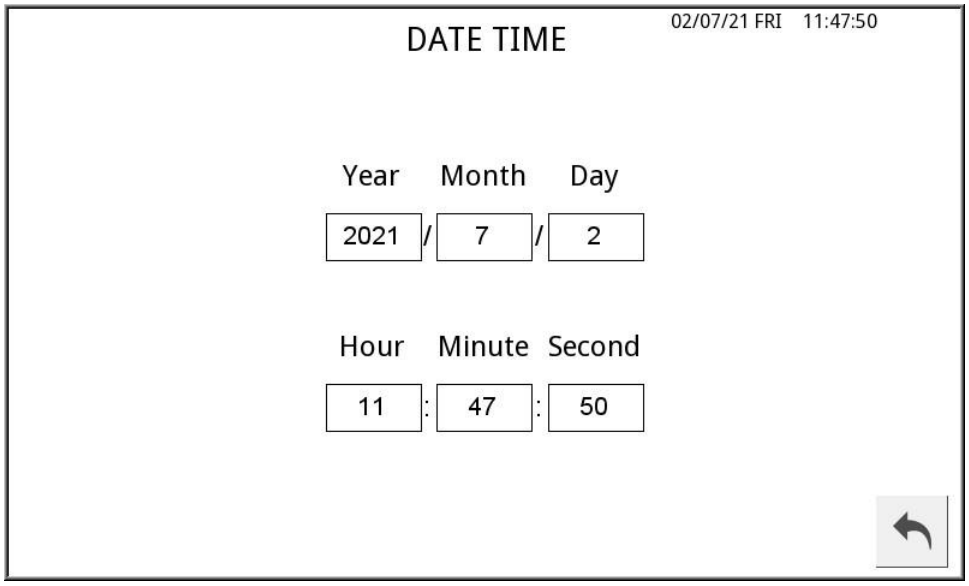
7) 

This selection allow user to change date and time, language and update software.



a) Date & Time:

This selection allow user to change system date and time.



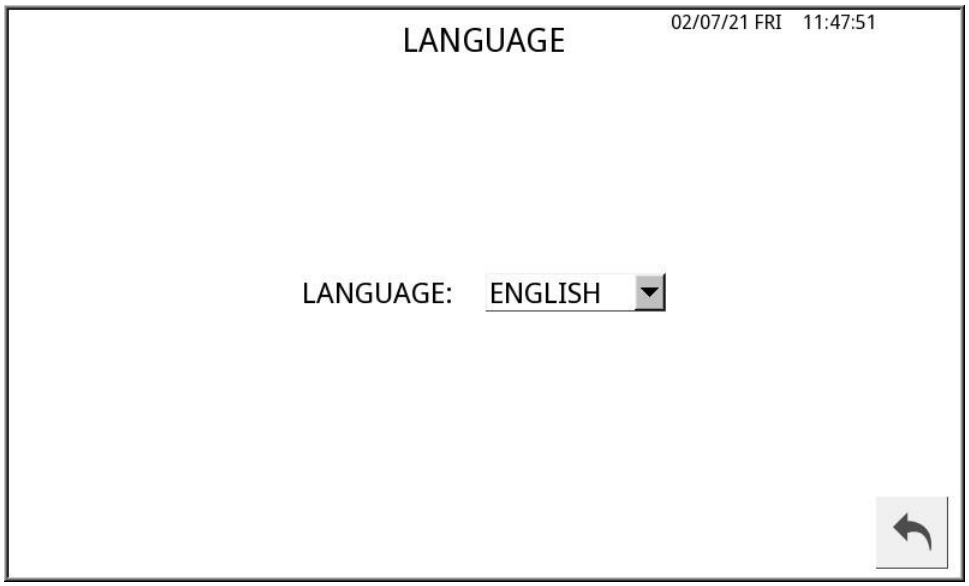
Press “Set Time”, “Up” and “Down” button will appear at screen.

Press at the box of the date or time that need to adjust, the mouse cursor will appear at the box, press “Up” or “Down” to adjust the date or time.

Press “Set Time” to save the new setting.

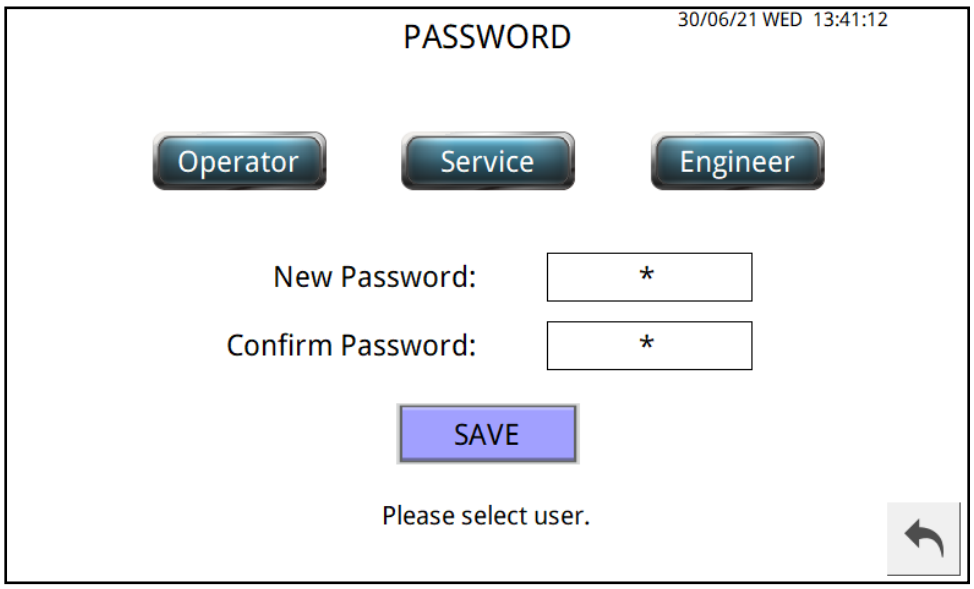
b) Language:

This selection allow user to change the system language.



Select the language from the drop down list.

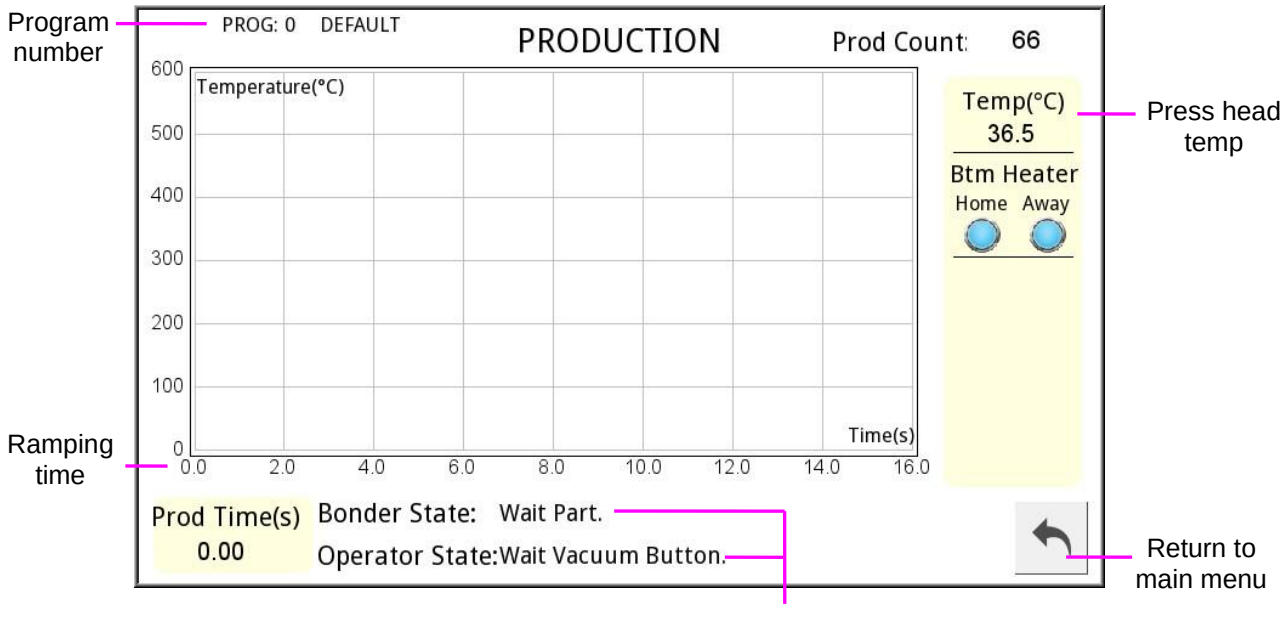
c) Password:



This menu allows changing of password. Firstly, select user (Operator/Engineer), enter password to “New Password” and “Confirm Password”. Then, press “Save” to save new password.

3.3 Production

Select “PRODUCTION” from main menu.



This selection puts machine system ready for production. Press left and right start button simultaneously to start production.

1) **Program number:**

   Indicate the current running program number.

2) **Ramping time:**

   Indicate the entire pulse heat ramping time.

3) **Press head temp:**

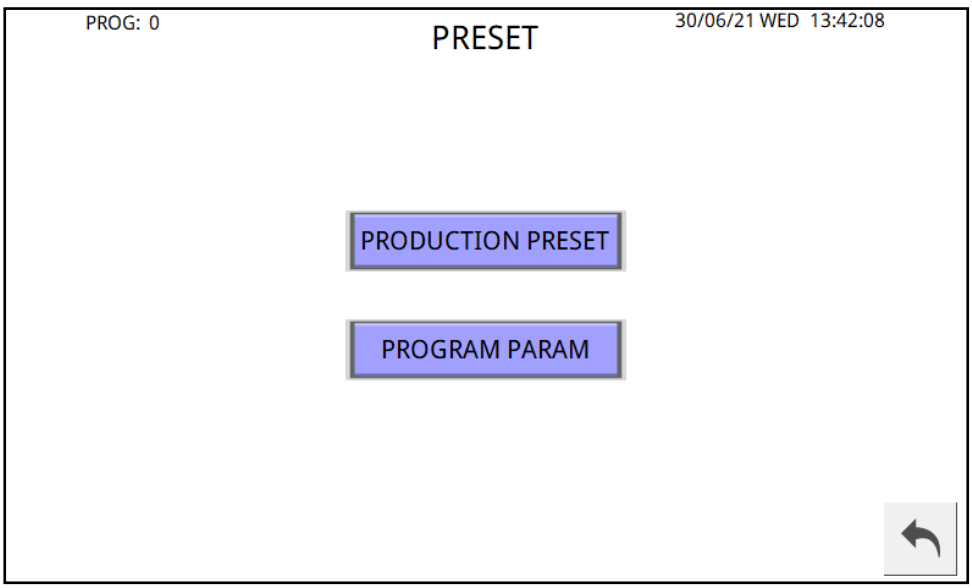
   Indicate the press head current temperature.

4) **Bonder State/ Operator State status:**

   Indicate the status.

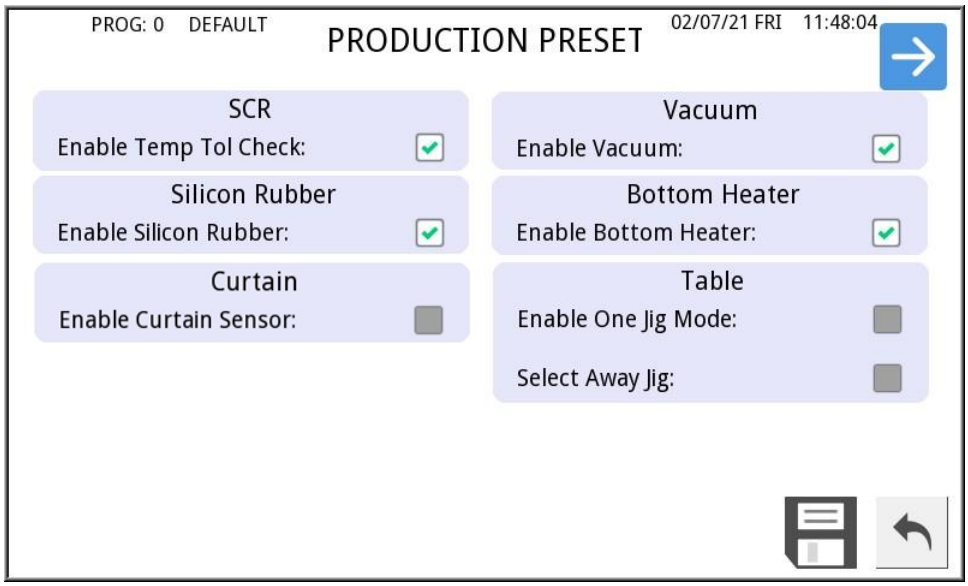
3.4 Preset

Select “PRESET” from main menu. Then, select production parameter or program parameter. Press Preset key again to return to main menu. This selection allow user to set the production parameter and program parameter.



3.4.1 Production Preset

This selection allows general production parameters to be preset such as Reset Process Counter No, Alarm Counter, Enable vacuum, Check tolerance etc. This set of parameters is saved as system program, and cannot be changed by any individual program.



1) **Active Program No:**

   Choose active program to run on the machine.

2) **SCR**

   Enable Temp Tol Check:

   When enabled, the system will check the temperature of thermode during the hold period. And when it exceeds the tolerance, the buzzer will sound. Production will stop.

3) **Enable Vacuum:**

   Enable/disable, when the box is checked it will enable vacuum to run during production. When the box is unchecked it disable it to run in production.

4) **Enable Silicon Rubber:**

   Enable/disable, when the box is checked it will enable silicon to run during production. When the box is unchecked it disable it to run in production.

5) Table:

a) Enable One Jig mode:

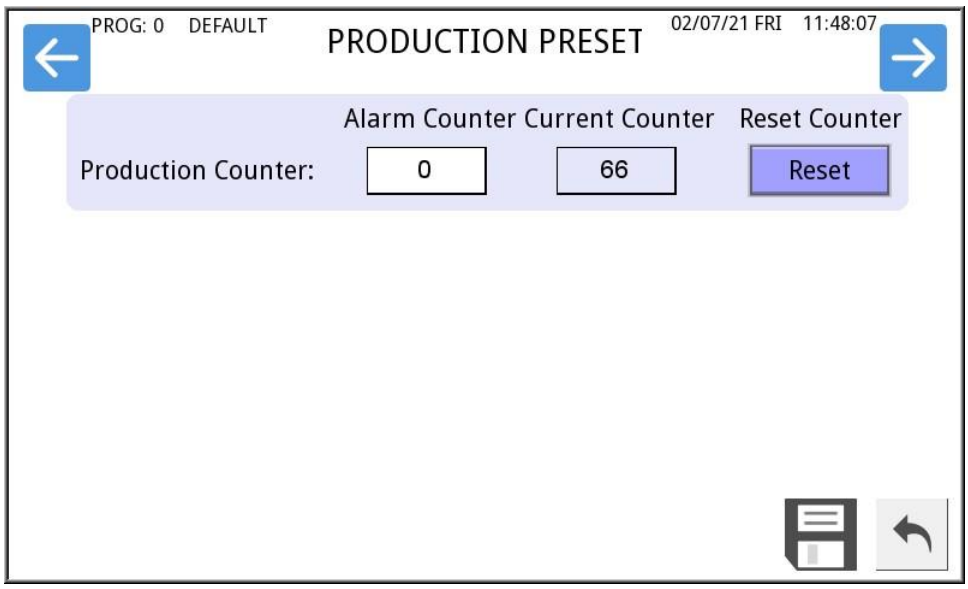
Start the single press mode, this mode is mainly suitable for small batch production, product research and development, and single press work mode.

b) Select away Jig:

This option is only applicable to the setting of the auxiliary pressure table after selecting the single pressure table mode.

6) Enable Curtain Sensor:

Upon selected it enable the curtain sensor.



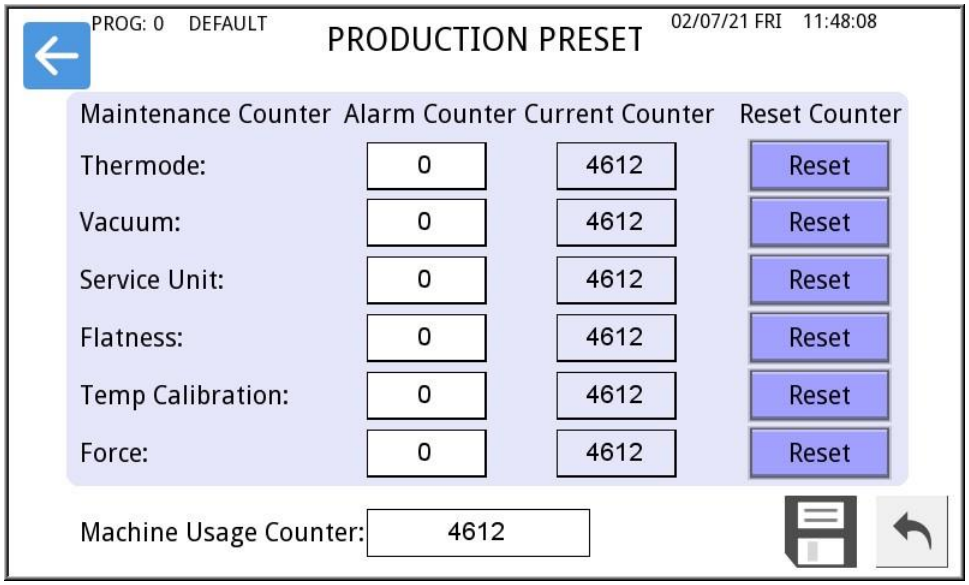
1) Table:

a) Alarm Counter:

The maximum number of alarms for this counter is 65535. This setting allows the user to perform maintenance when the maintenance count reaches the limit.

b) Current Counter:

This parameter shows the current count of the production cycle.



1) Alarm Counter:

The alarm counter has a maximum count of 65535. This setting is useful for user to perform maintenance when the maintenance count reaches the limit.

2) Current Counter:

This parameter indicates the current counter of production cycle.

3) Reset Current:

Enable this parameter resets the current counter to 0.

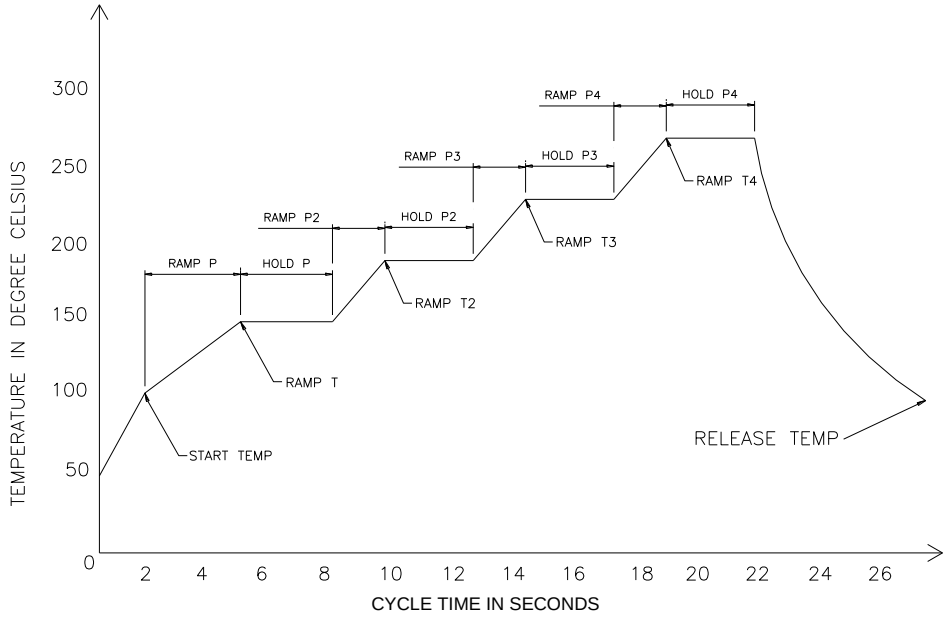
4) Machine Usage Counter:

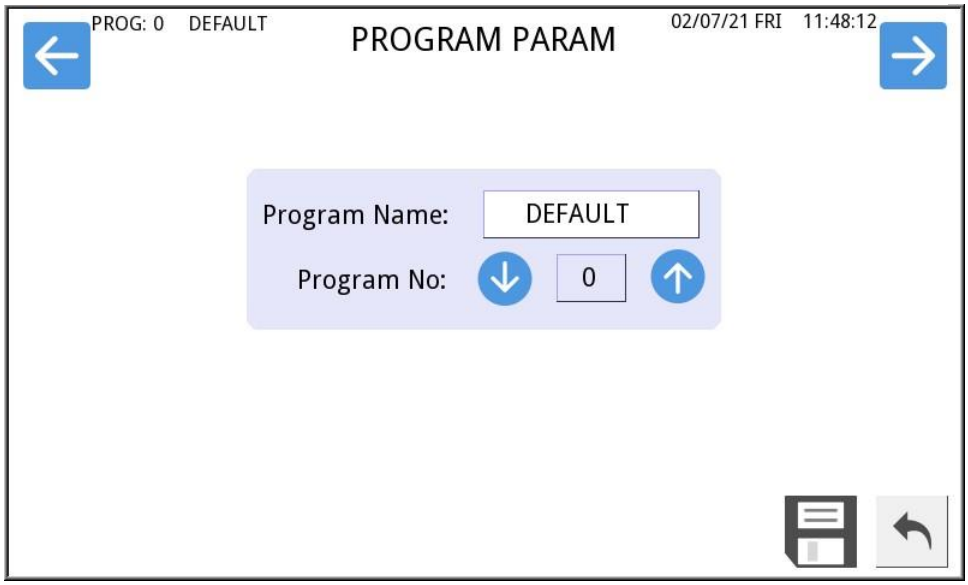
This parameter indicates the non-resettable production counter.

Press to save the current setting before leave the parameter page. Otherwise, system will ignore the changes. Press to return to main menu.

3.4.2 Program Param

This selection allows individual program parameters to be set such as Ramp Period, Ramp Temperature, Hold Period etc..





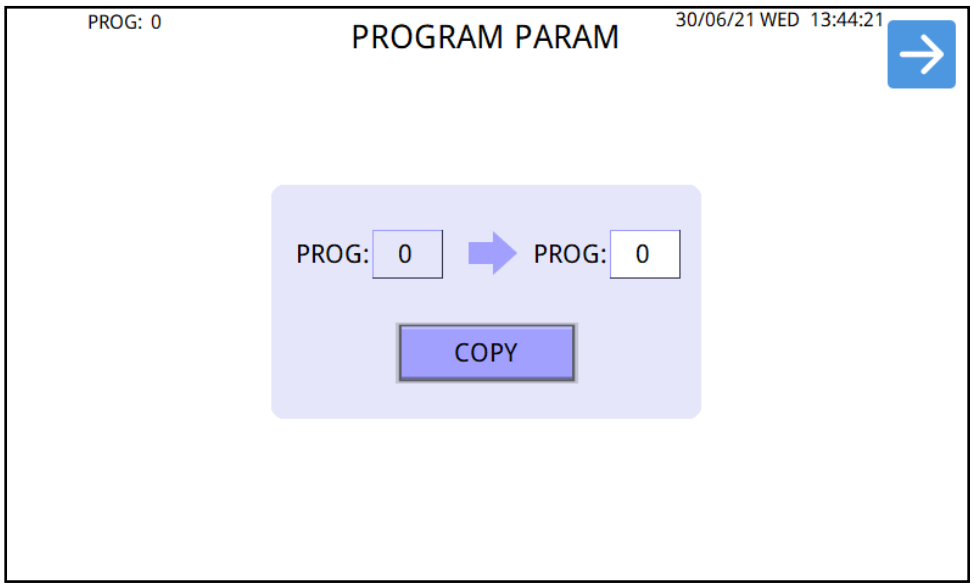
1) Program No.:

Enter program number to edit (0-19).

2) Program name:

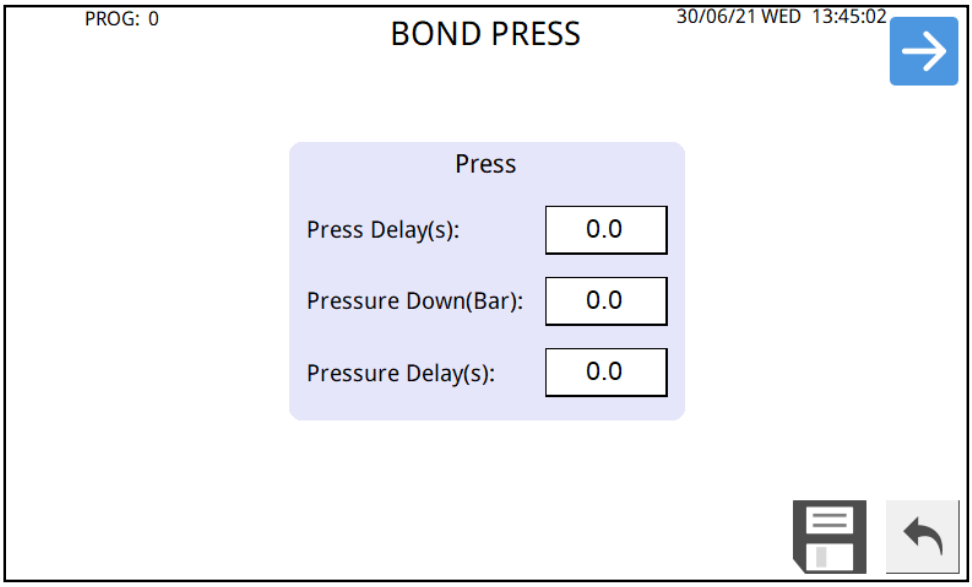
Set the program name.

Press  to save the current setting before leave the parameter page. Otherwise, system will ignore the changes. Press  to return to main menu.



1) Program page copy to another program folder.

3.4.2.1 Bond Press



1) **Press Delay (s):**

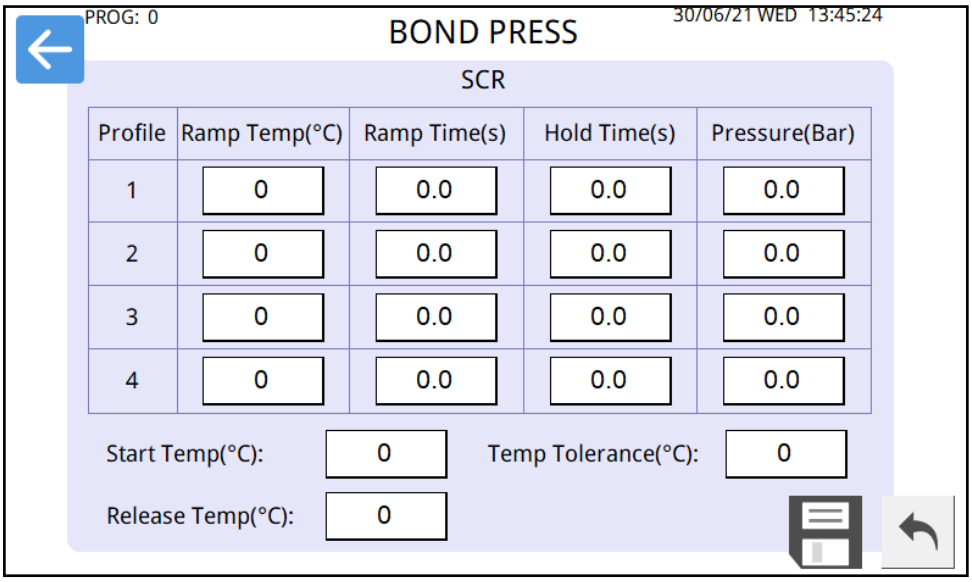
   Set the time delay for press head to move down.

2) **Pressure Delay (s):**

   Set the time delay to switch from Pressure Press to Pressure 1.

3) **Pressure Down (Bar):**

   Down stroke pressure setting when press head comes down and before it presses on the substrate.



1) Temperature:

a) Start Temp:

Start temperature in degree Celsius. When start switches are activated, the thermode will be fired to reach start temperature as the press head start to decent.

b) Release Temp:

Release temperature in degree Celsius is the temperature at thermode when the press head retract. During the cooling period, when temperature of the thermode drops to the release temperature, the blower stops and the controller activate the press head to move up, ready for the next cycle.

c) Temp Tol:

Tolerance in degree Celsius allowed during the hold period.

2) Ramp 1-4 Temp.:

Ramp Temperature in degree Celsius, is the temperature of the thermode to reach at the end of respective Ramp period.

3) **Ramp 1-4 Time:**

Time in seconds required for the thermode to reach the respective preset Ramp Temperature.

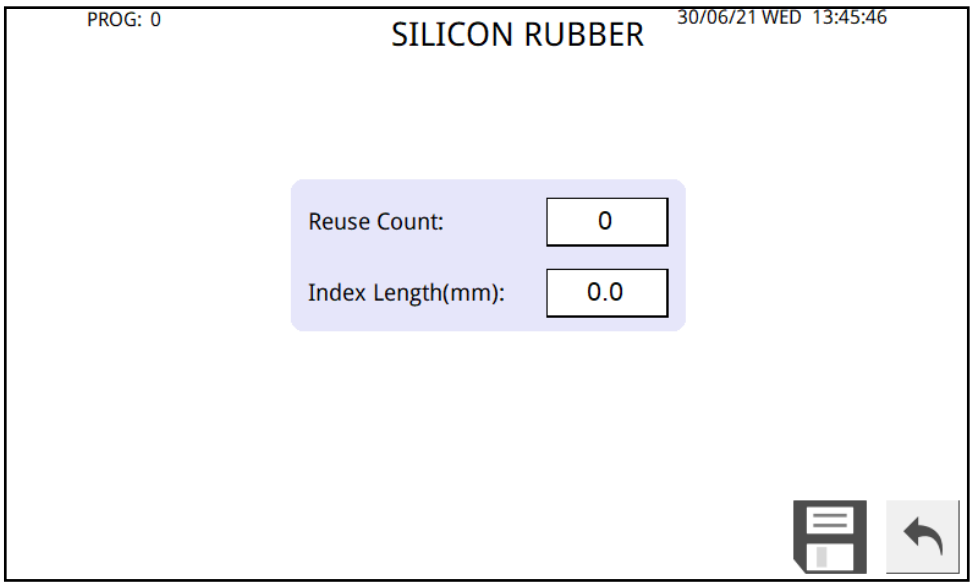
4) **Hold 1-4 Time:**

Hold Period in seconds. During the hold period, ramp temperature is maintained with the respective preset Ramp Temperature for the period preset.

5) **Pressure 1-4 (Bar):**

Down stroke pressure when press head presses on substrate. For example: pressure 1 is the press head down stroke pressure at Hold1 period and Ramp1 period.

3.4.2.2 Silicon Rubber



1) **Silicon Rubber:**

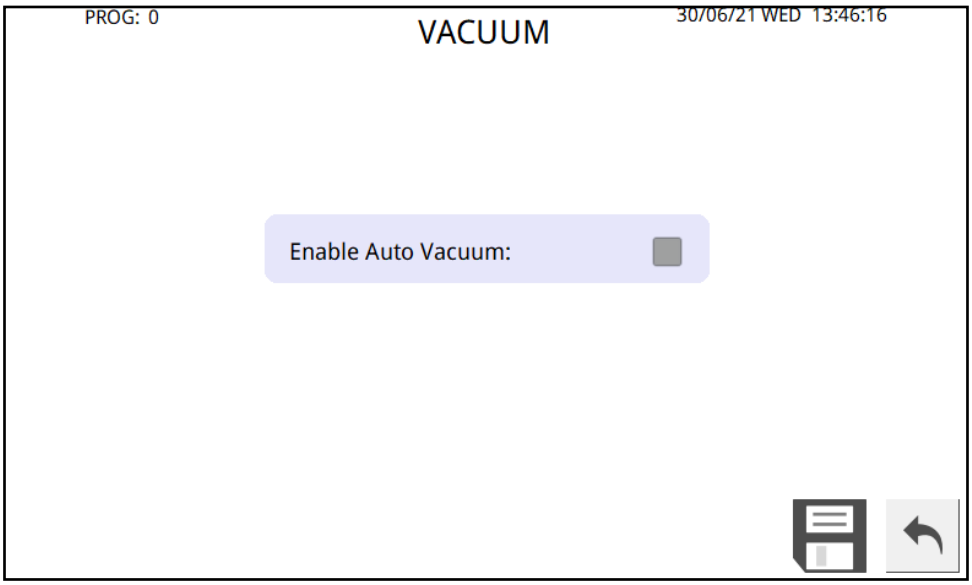
a) **SR Reuse:**

Set the number of press before silicone rubber index.

b) **Index Length (mm):**

Set the silicon rubber index length.

3.4.2.3 Vacuum

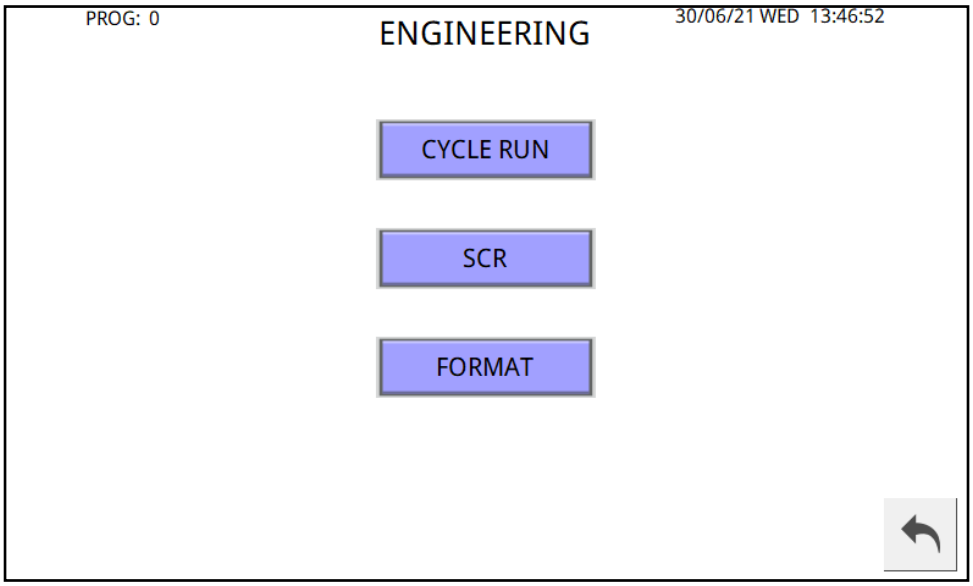


1) **Auto Vacuum:**

   Allow user to start production through only pressing the two Start switch and activate vacuum function at the same time.

3.5 Engineering

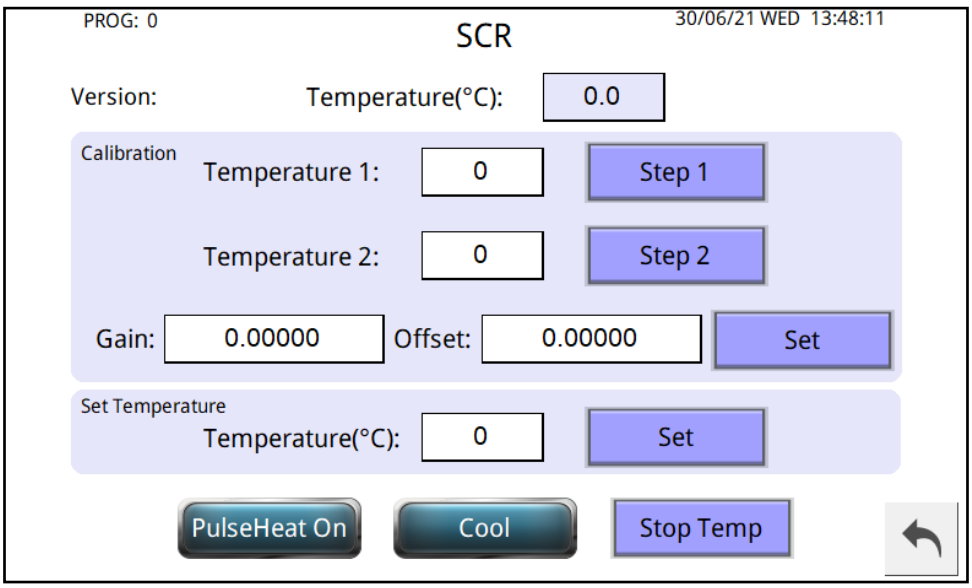
Select “Engineering” from main menu.



This selection allows user to set machine for cycle run, SCR and format.

3.5.1 SCR

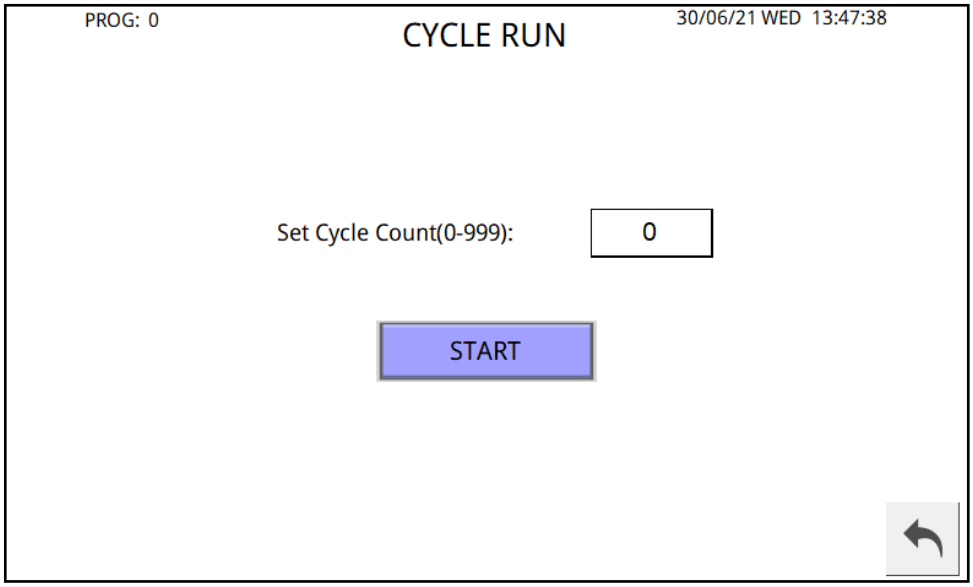
Press ‘SCR’ button to enter SCR temperature calibration page.



Refer Chapter 4, Calibration for details.

3.5.2 Cycle Run

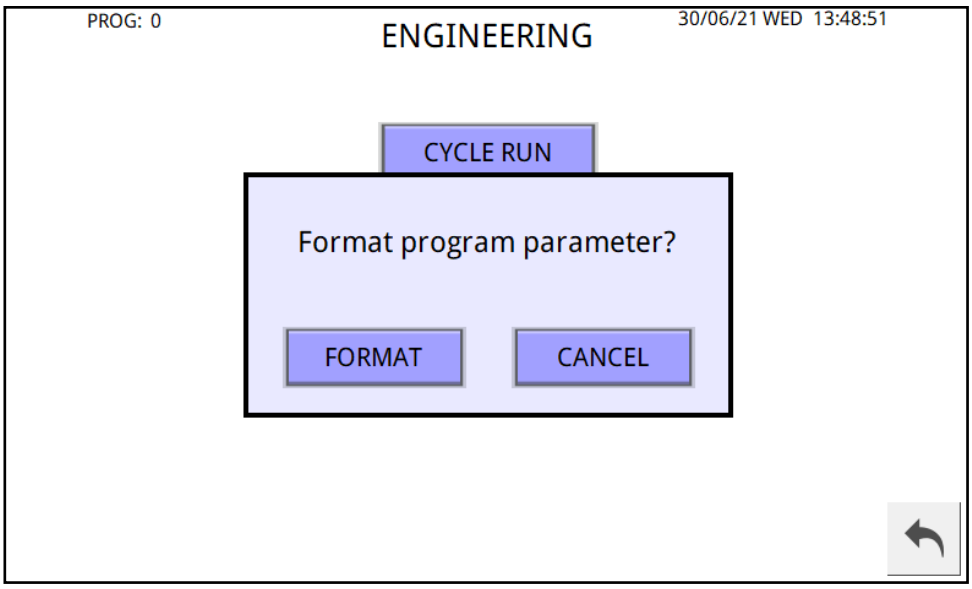
Cycle is used for reliability test at factory and during periodic maintenance.



This parameter allows the machine to cycle (repeat process) itself automatically up to 999 times. Input zero for continuous running for reliability test purpose. Press “START” to start cycle run. Press  to go back to engineering menu.

3.5.3 Format

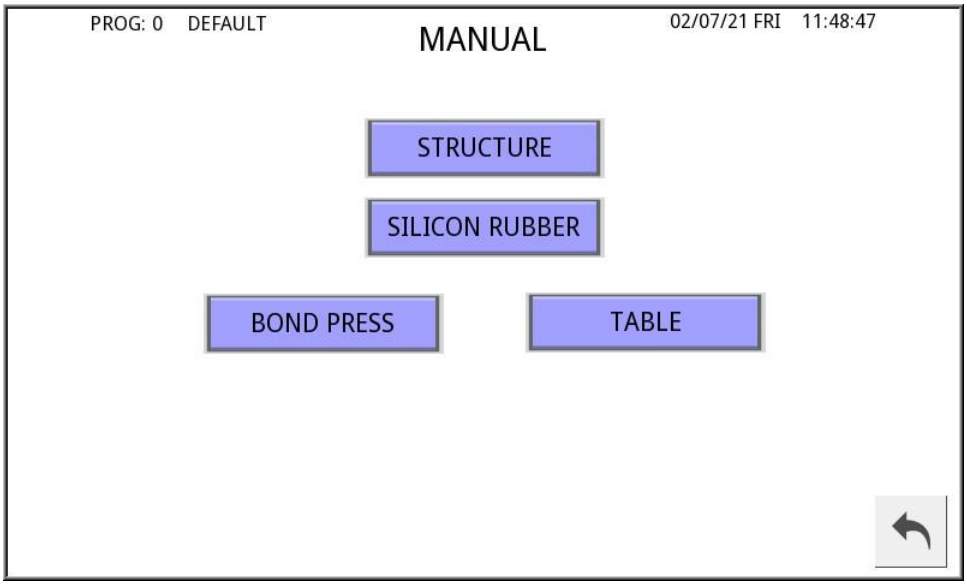
Select “Format” from main menu.



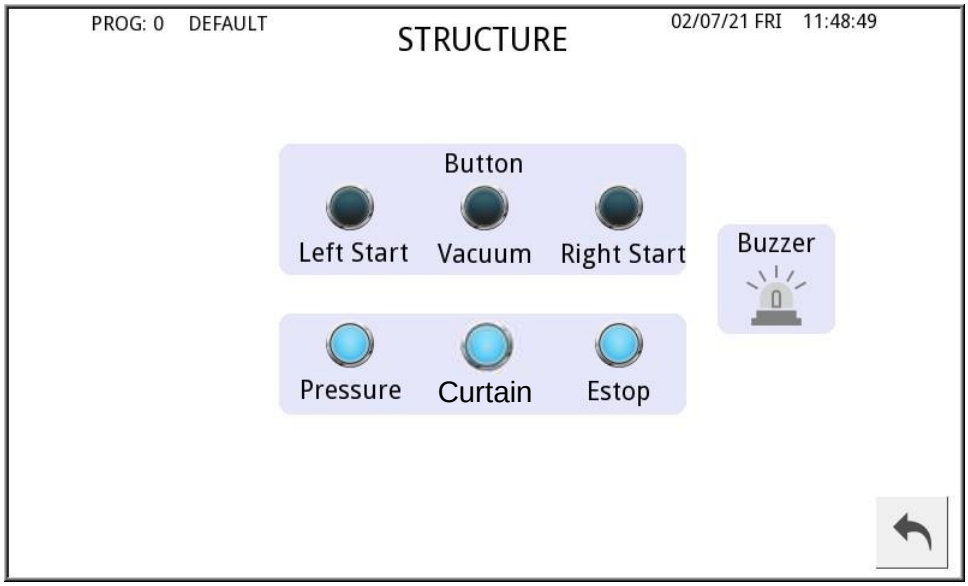
This selection erases all current preset settings, and restores the default values except password. Upon selecting “Yes” button in “FORMAT” mode, system will reload default data. Press “No” to return to sub-menu.

3.6 Manual

Select “Manual” from main menu. Under this selection, all actuators can move manually.



3.6.1 Structure

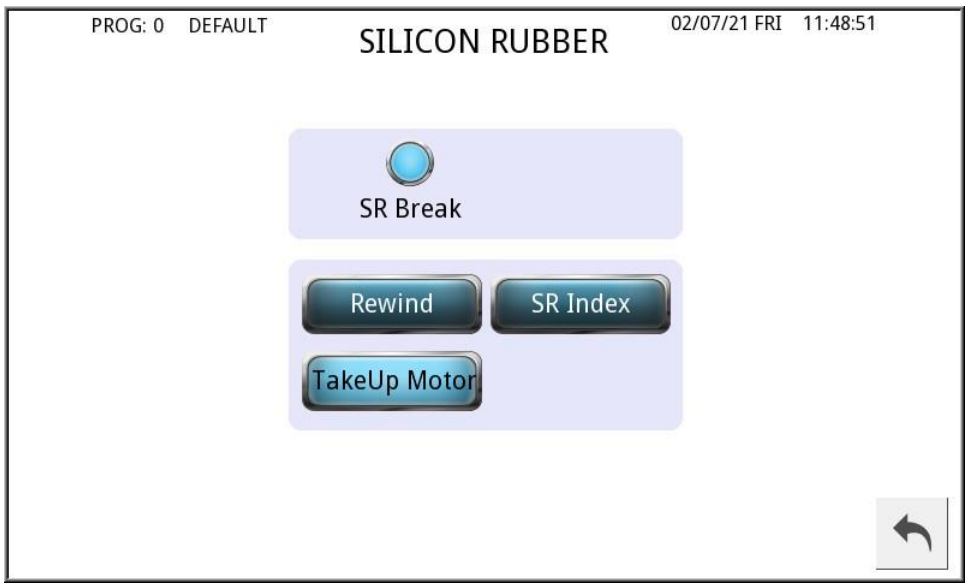


So the sensors and buttons on this page are just to help users identify whether the sensors and actuators are working properly.

1) **Siren:**

   When the machine alarms, it will make a sound.

3.6.2 Silicon Rubber



1) **Silicon Rubber:**

   a) **TkUpMtr:**

   Activate or deactivate take up motor.

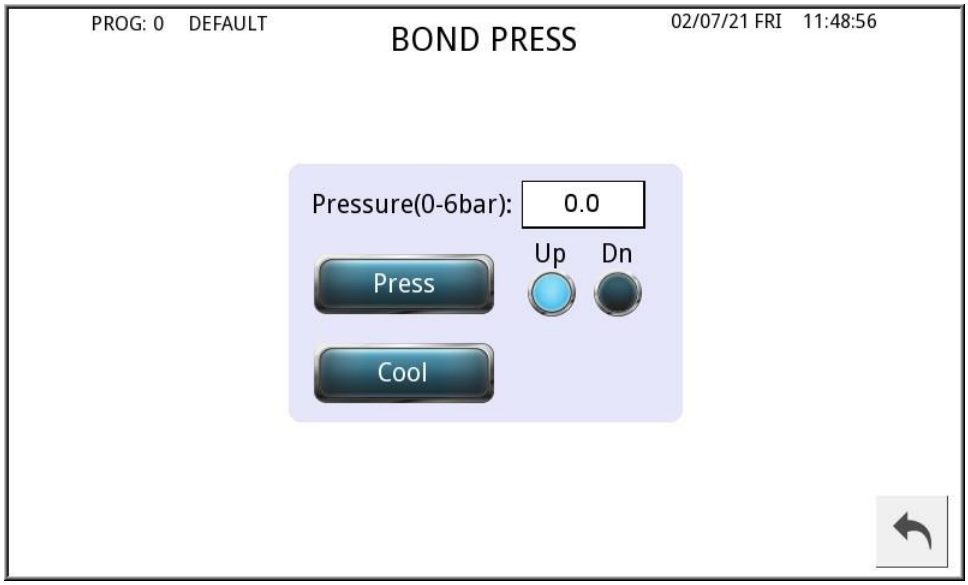
   b) **SR Indexing:**

   Press to index silicon rubber. The index length can be set at program parameter page.

   c) **Rewind:**

   Rewind the silicon tape back to the origin or desired position. To activate, press the button.

3.6.3 Bond Press



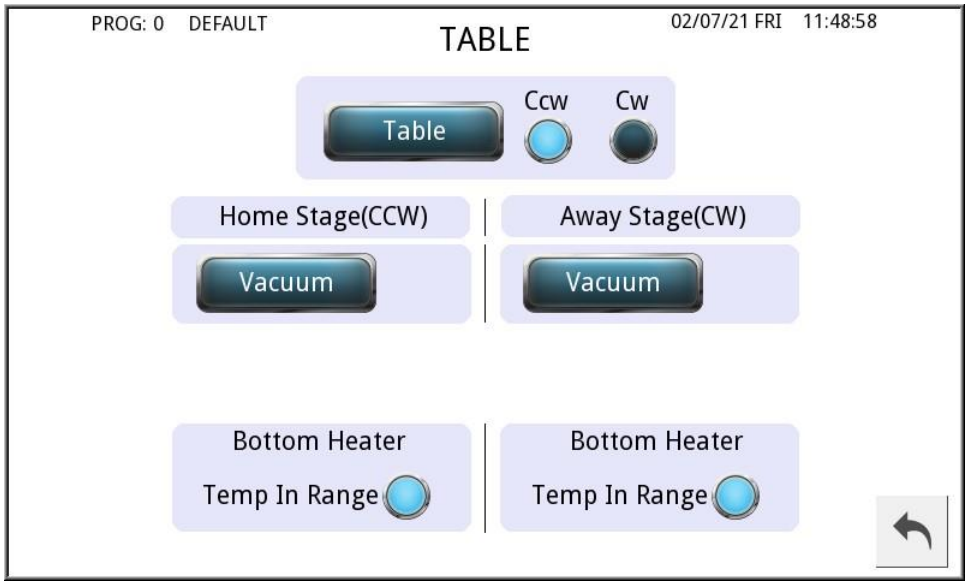
1) **Press:**

   Press to move the press head assembly up or down.

2) **Cool:**

   Press to turn on the cooling function.

3.6.4 Table



1) **Table:**

   Press to turn the table clockwise or anti clockwise.

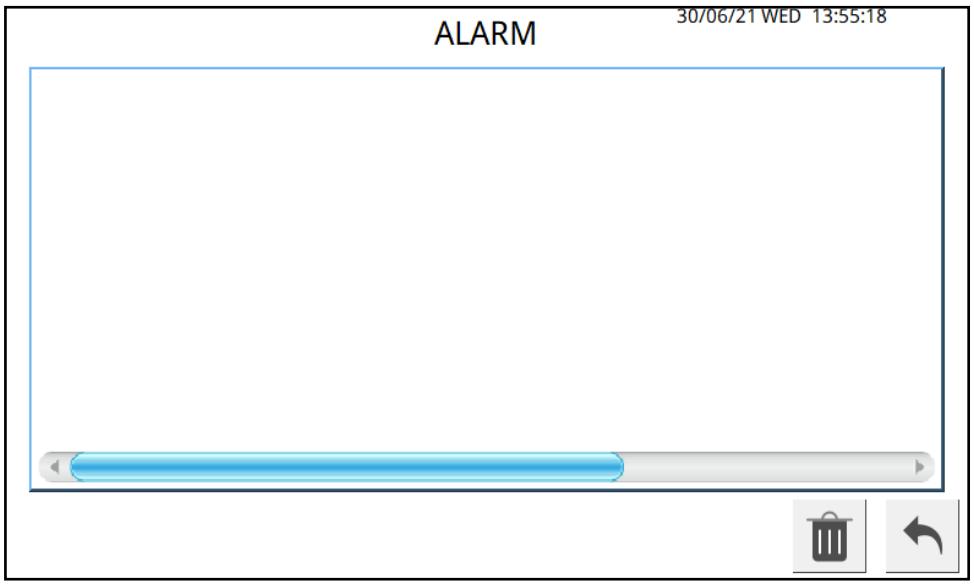
2) **VAC1/2:**

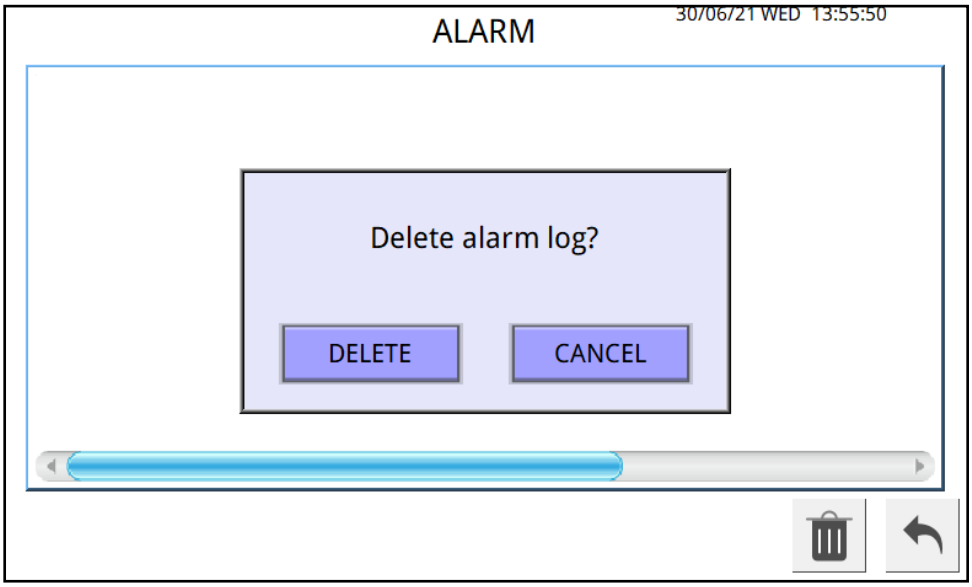
   At manual mode, activate to on vacuum 1 and vacuum 2.

3) **Bottom Heater (Temp in Range):**

   If the signal is on, it means the bottom heater temperature is within range. If the signal is off, the bottom temperature is out of range (temperature error).

3.6.5 Alarm





When click “Delete” the alarm log will be deleted. If not click “Cancel” and click “Back” to main page.

3.7 Password Recovery

In the event that the user cannot remember the entry password, please contact nearest service centre in your area for a password to re-enter to system. This is a safeguard for the system parameters setting against abuse or unauthorized settings. Or email service@cherusal.com.

3.8 Error Messages

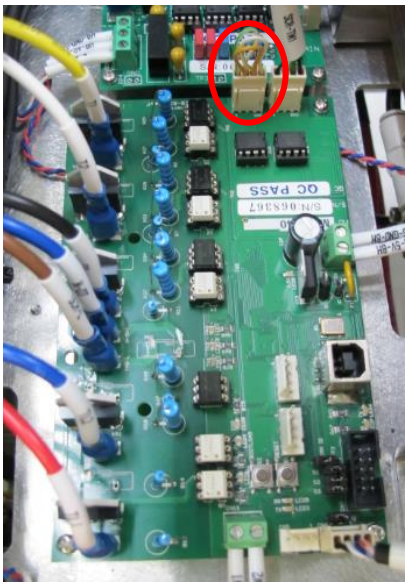
When machine is faulty, system will show error messages on LCD screen or status bar in production page.

3.8.1 Top SCR Thermode 1 Error

It indicates that the thermocouple connection is faulty. A K-type thermocouple wire is micro spot welded onto the tip of the thermode. The spot weld is protected with an insulation material from external force. The thermocouple may be detached from the thermode or broken due to prolonged use or accidents. The thermocouple connector may not be properly inserted in its respective connector. The control card senses this damage and immobilizes the system. A message “SCR Thermode 1 Error” will be displayed on the LCD and buzzer will sound. When this happens, switch off power supply and rectify fault.

3.8.2 Top SCR Thermode 2 Error

Indicate that the SCR is faulty or the jumper connector is not connected. Switch off power, replace SCR card or plug in the jumper connector (as shown in the red circle below) or engage technical personnel to check.



3.8.3 Top OverTemp Error

Over temperature error indicates that thermode has exceeded factory preset temperature range. The thermode uses two thermocouples to monitor its temperature during production. One is used for temperature profile. Other one is used to monitor the over temperature error. If the over temperature error occurs, it may be due to the faulty thermocouple or there could be an over temperature. Switch off power to the machine and rectify fault.

3.8.4 Top SCR Profile Error

Indicate the temperature, hold time or ramp time setting is out of range. Please contact TRIMECH agent.

3.8.5 Table Move Cw Timeout!

Table move clockwise direction timeout. It may due to sensor position or table move not in position. Check the sensor or cylinder if it is activated.

3.8.6 Table Move Ccw Timeout!

Table move counter clockwise direction timeout. It may due to sensor position or table move not in position. Check the sensor or cylinder if it is activated.

3.8.7 Silicon Rubber Break!

Silicon rubber break sensor detected empty.

3.8.8 Top Silicon Rubber Timeout!

Silicon rubber index timeout. Check encoder and silicon rubber status.

3.8.9 Low Pressure Error!

This indicates the incoming pressure is low, adjust the pressure to >6bar and continue production.

3.8.10 Bottom Heater Thermode 1 Error!

Note: Applicable to bottom heater feature

It indicates that the thermocouple connection for bottom heater CW location is faulty. The thermocouple connector may not be properly inserted in its respective connector or the polarity of the thermocouple is wrongly connected. The control card senses this problem and immobilizes the system. A message “Bottom Heater Thermode 1 Error” will be displayed on the LCD and buzzer will sound. When this happens, switch off power supply and rectify fault.

3.8.11 Bottom Heater Thermode 1 Error!

Note: Applicable to bottom heater feature

It indicates that the thermocouple connection for bottom heater CCW location is faulty. The thermocouple connector may not be properly inserted in its respective connector or the polarity of the thermocouple is wrongly connected. The control card senses this problem and immobilizes the system. A message “Bottom Heater Thermode 2 Error” will be displayed on the LCD and buzzer will sound. When this happens, switch off power supply and rectify fault.

3.9 Operation Sequence

The operation sequence can be selected to operate with one jig and two jigs. Access to production preset menu and scroll down to select one or two jigs sequence.

The sequence of operation is as follows for two jigs:-

1) Load part to fixture.
2) Activate the vacuum, vacuum auto on can be set.
3) Align.
4) Activate two start switches; table will rotate 180° into operation.
5) Press head delay to descent (Optional), press head descent and heat ramping cycle starts.
6) Load another part to fixture, and then repeat Step 2.
7) Cycle finish, press head retracts up.
8) Activate two start switches; table will rotate 180° into operation.
9) Unload part and repeat steps.

The sequence of operation is as follows for one jig:-

1) Load part to fixture.
2) Activate the vacuum, vacuum auto on can be set.
3) Align.
4) Activate two start switches; table will rotate 180° into operation.
5) Press head delay to descent (Optional), press head descent and heat ramping cycle starts.
6) Cycle finish and pressure head retract up and rotary table rotate out.
7) Unload parts and repeat steps.

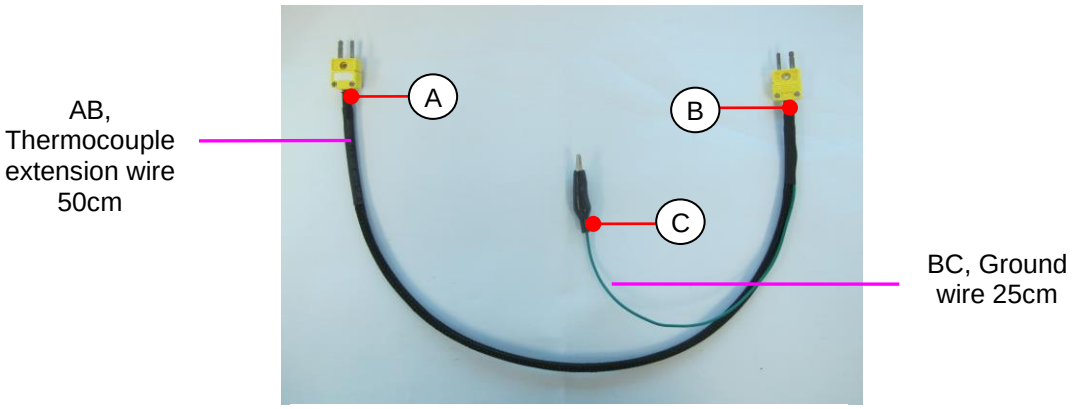
Chapter 4: Calibration

The system is factory calibrated and need only to be calibrated annually or system failure which ever come first. Calibration process must be performed by qualified technician with training provided by local servicing agent.

4.1 Temperature Calibration

The equipment is factory calibrated. For verification of the temperature or performing yearly calibration, set the system to “Calibration” mode.

Tools required for calibration: Temperature calibrator (FLUKE 714) and Thermocouple extension cable assembly (Shown below).

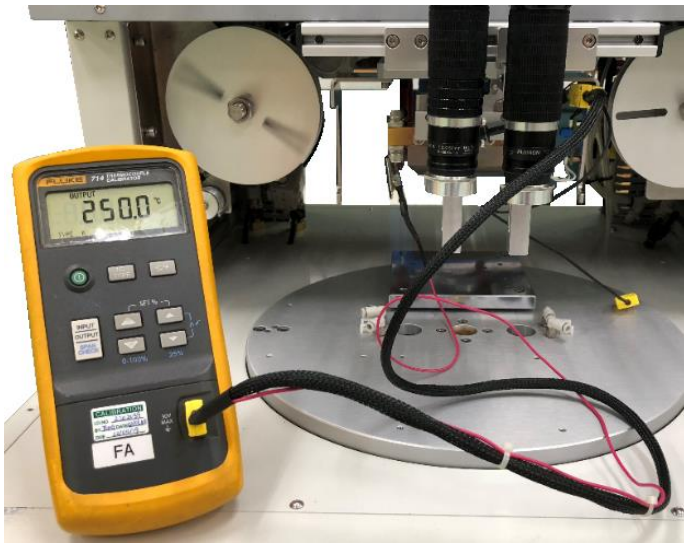


Thermocouple extension cable assembly

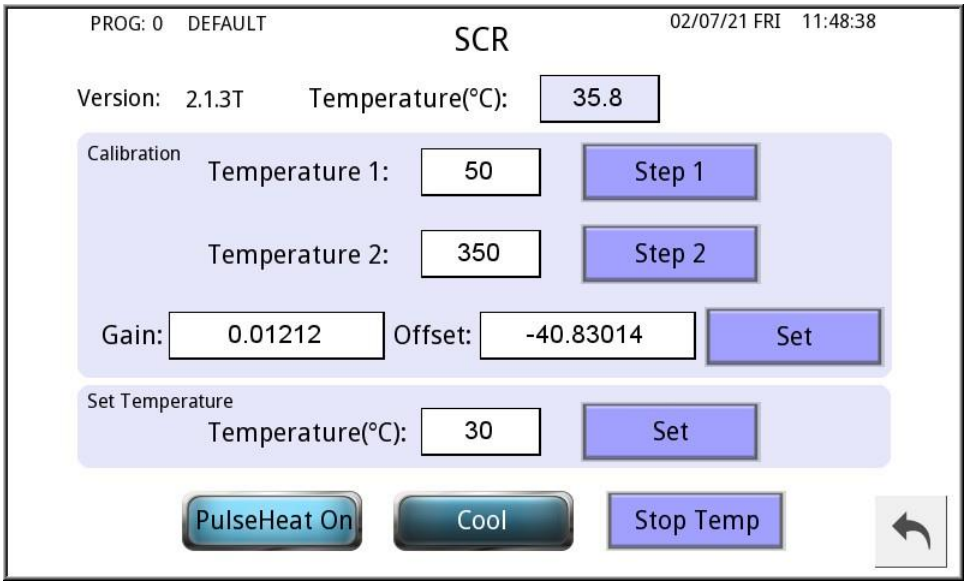
4.1.1 SCR Temperature Calibration

The procedure is as follows:

1) ON the machine for 45mins.
2) Power off machine before temperature calibration, and connect temperature calibrator (e.g. FLUKE 714) to the connector for control card of the machine.



3) Switch on calibrator and set type K for calibration.
4) Set calibrator output to 50°C.
5) Turn on the machine. At Engineering, Calibration mode, select SCR Temp.
6) Press “PulseHeat On/Off” in calibration page to turn OFF the pulse heat function.



7) Enter “Temperature 1” as 50°C and press “Step 1”. “Step 2” is enabled only after “Step 1” is pressed.
8) Set calibrator output to 350°C.
9) Enter “Temperature 2” as 350°C and press “Step 2”.

10) System will auto generate the gain and offset value.

11) After temperature calibration is completed, enter the temperature to “Set Temperature”. Then, press “Set” to check the accuracy after the temperature calibration.

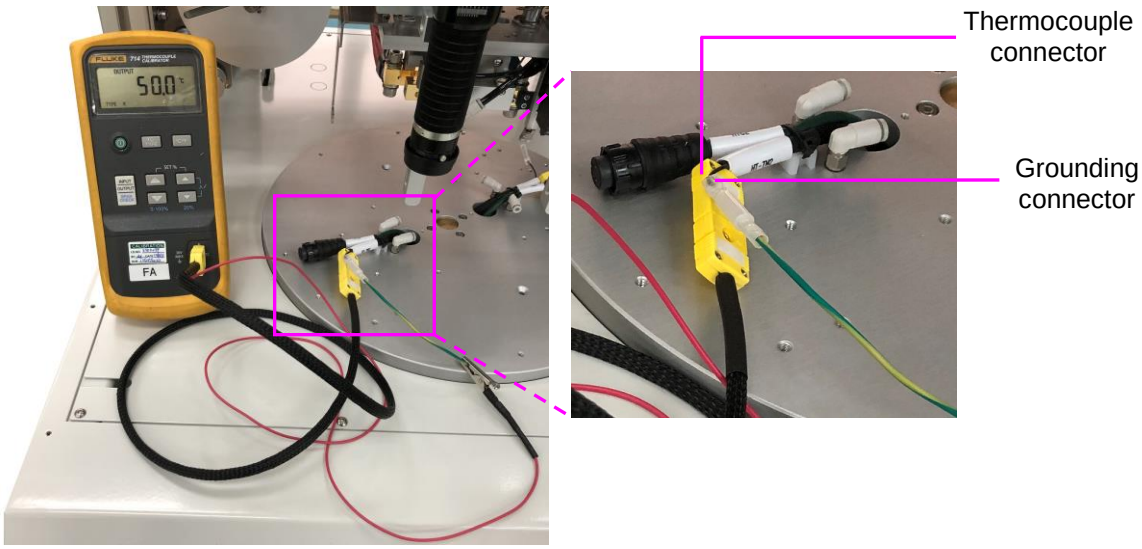
4.1.2 Bottom Temperature Calibration

Note: Applicable to bottom heater feature

The procedure is as follows:

1) ON the machine for 45mins.

2) Power off machine before temperature calibration, and connect temperature calibrator (e.g. FLUKE 714) to the bottom heater connector.

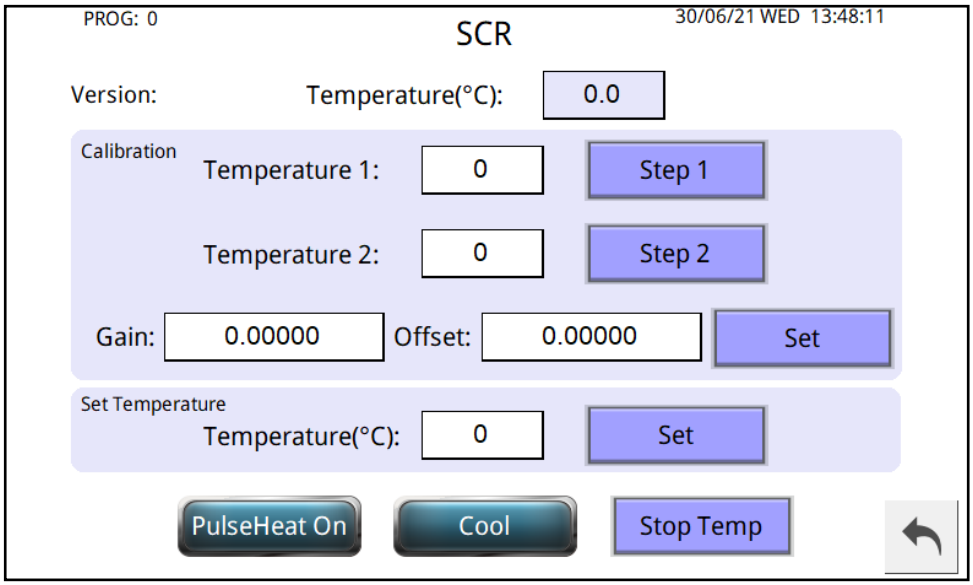


3) Switch on calibrator and set type K for calibration.

4) Set calibrator output to 50°C.

5) Turn on the machine. At Engineering, Calibration mode, select “BTM Heater”.

6) Press “Heater On/Off” in bottom heater calibration page to turn OFF the bottom heater function.



7) Enter “Temperature 1” as 50°C and press “Step 1”. “Step 2” is enabled only after “Step 1” is pressed.

8) Set calibrator output to 220°C.

9) Enter “Temperature 2” as 220°C and press “Step 2”.

10) System will auto generate the gain and offset value.

11) After temperature calibration is completed, enter the temperature to “Set Temperature”. Then, press “Set” to check the accuracy after the temperature calibration.

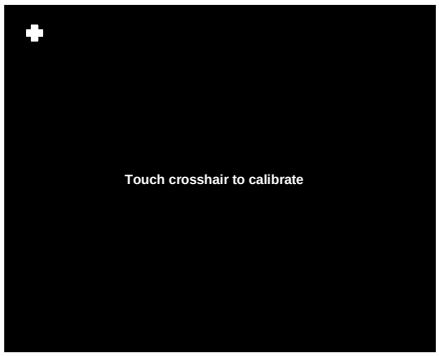
12) Click “Next” for the AW temperature calibration.

4.2 Touch Screen Calibration

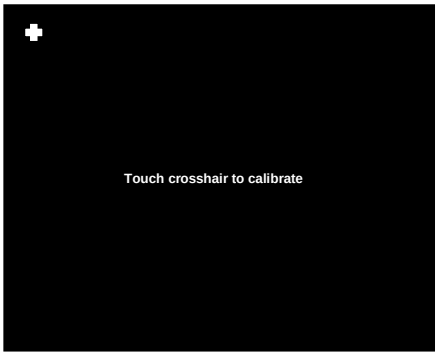
User needs to touch at any part of the screen and power on the machine. After boot up, screen will show as the picture.

1. Place your finger in the middle of the screen, and turn on the “POWER” switch.

Once you see the screen appear “Touch crosshair to calibrate”, you may let go of your finger.

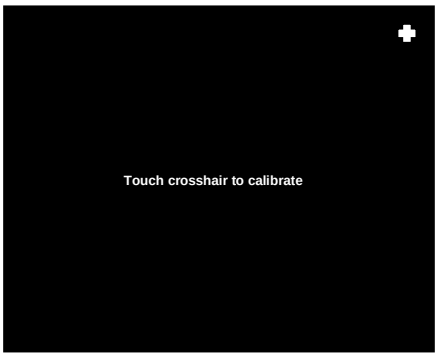


2. Touch at within the crosshair for every 1 second as prompted.

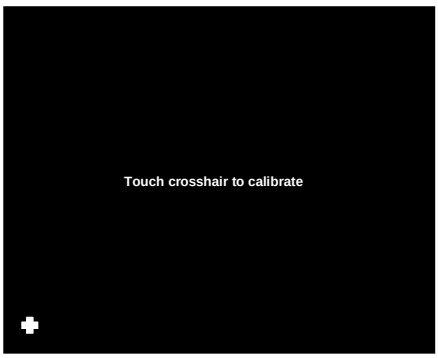


Step 1

Step 3



Step 2



Step 4

Upon touching the “crosshair” from step 1 to step 4, calibration is completed. Screen will prompt “Press OK to save result”, Press “OK” to complete the calibration.

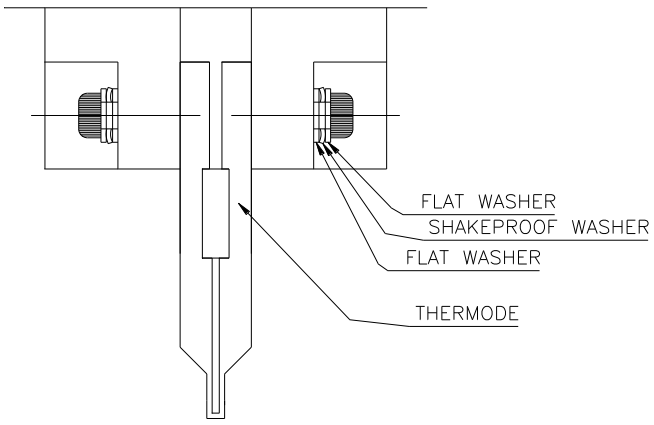
Chapter 5: Service and Maintenance

As in all machinery, service and maintenance form a very important task in an uninterrupted production environment. Periodical maintenance schedule must be drafted up and yearly calibration must be carried out. Some recommendations on maintenance are suggested here.

5.1 Thermode Mounting

The thermode is connected to the electrode holder by two or more screws, depending on the model. Slight adjustments can be made to ensure flatness to the workpiece. Flatness is important as the quality of the joint will be reflected. The thermocouple is connected via a 'K' Type thermocouple connector which is mounted on the right side of the thermode assembly. The female connector on the thermode assembly is then connected to the controller. This arrangement is designed for easy changing of the thermode. The thermode is an important part of the bonding system as the quality of the sealing depends on the evenness of the temperature across the thermode surface. The thermode is profiled and precisely machined to achieve such characteristics. The surface contact from thermode to electrode (gold plated) must be good in order not to create sparking. When sparking occurs, the contact surface will be reduced and therefore more current will be needed to fire the thermode, resulting in creating more stress on the machine.

The contact surface must be cleaned and clamping screw check for tightness. Refer to diagram below for correct method.



5.2 Thermode

The flatness of thermode surface is of utmost importance as it will affect soldering or sealing quality. Surface has to be ground and slight dents must be repaired or changed. Thermode when exposed to constant thermal stress will form a black oxide layer, this oxide layer has to be cleaned off using any solvent or a chemical.

The thermocouple wire is recommended to be changed every 200000 operations or three months, whichever come first. The condition of the spot weld must be checked periodically and changed at some specific interval devised by the process engineer. This period depends on the rate of usage and the usage pattern and preventive maintenance schedule.

The contact surface on the thermode needs to be grinded to remove any sparked points to ensure optimum flatness.

5.3 Transformer Cable

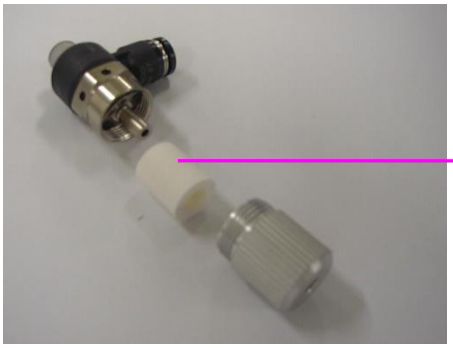
Care must be taken to ensure that transformer cable that is connecting controller and transformer to be properly secured to ensure good operation. Cable routing must be such that the secondary loop does not encompass magnetic material (steel) and not encompassed by any magnetic material. Cable should be taped together in order to reduce the size of inductive loop created by the cable.

All mounting screws and nuts must be good and shake proof washer must be used to ensure positive contact.

Transformer cable may become stiffed after prolong usage. If machine operates under harsh environment, we recommended to change it every 350000 operations or 6 months or which ever come first.

5.4 Vacuum

Vacuum ejectors located on the centre plate provide the vacuum pressure to hold down the workpiece. Clean the filter regularly to get rid of dirt that will accumulate. As the cleaning process is relative easy, we suggest that it be cleaned every day.



5.5 Fixture

Fixture is mounted on top of levelling plate normally made of non-heat conductive material.

Constant cleaning and maintenance of fixture is necessary to maintain good operations.

5.6 Setting Up

Setting up the fixture and machine for operation is a very important step as this set up will determine the quality of the product.

5.7 Thermode Maintenance

Thermode bonding surface come into direct contact with either a silicone or polyamide conformer. At elevated temperature and pressure, residue of silicone and polyamide will be deposited on the thermode surface. Clean off residue with IPA or any none toxic solvent. It is also recommended that all holding screws be tighten periodically as it may get loose over prolong usage. All holding screws use 2 washers and a shake-proof washer to make sure that it will not get loose, but still a periodic check will be necessary.

5.8 Levelness

Use pressure sensitive paper from Fuji photo as an indicator of pressure evenness. Make sure the heat platen is at room temperature and place paper between substrate and heat platen. Adjust four screws until colour on paper is even.

DO NOT use tape or any other material as a levelling spacer.

5.9 Power

Trimech recommend that the power supply is within the specified range of 220V ±10%, 50/60Hz rated at 4.5KVA. The supply must be free from momentary surge and failure. In the event that supply falls below 200V, transformer will need to work extra to supply the required current. As such, the transformer can be burn out faster than its expected life span. Big thermode temperature may not reach certain temperature range.

When supply exceed 245V, some component will be stressed and not perform at its optimum level. In some cases, damage will occur.

It is recommended that periodic maintenance of supply is carried out and if necessary, in some factory, a voltage stabiliser is to be installed.

5.10 Air Supply

Air supply should be dry and filtered. The system comes complete with an air service unit that gets rid of moisture and dust. It is recommended that all air supply to the system be fitted with a separate air service unit.

5.11 Preservation

All moving parts of the machine have to be lubricated if the machine is not being used for more than a week. Moving parts will include the entire guide rods and bushes.

Chapter 6: Troubleshooting

The following pages of troubleshooting chart offers the end user some solutions on simple adjustments which can arise due to mechanical movement or any misuse on the system.

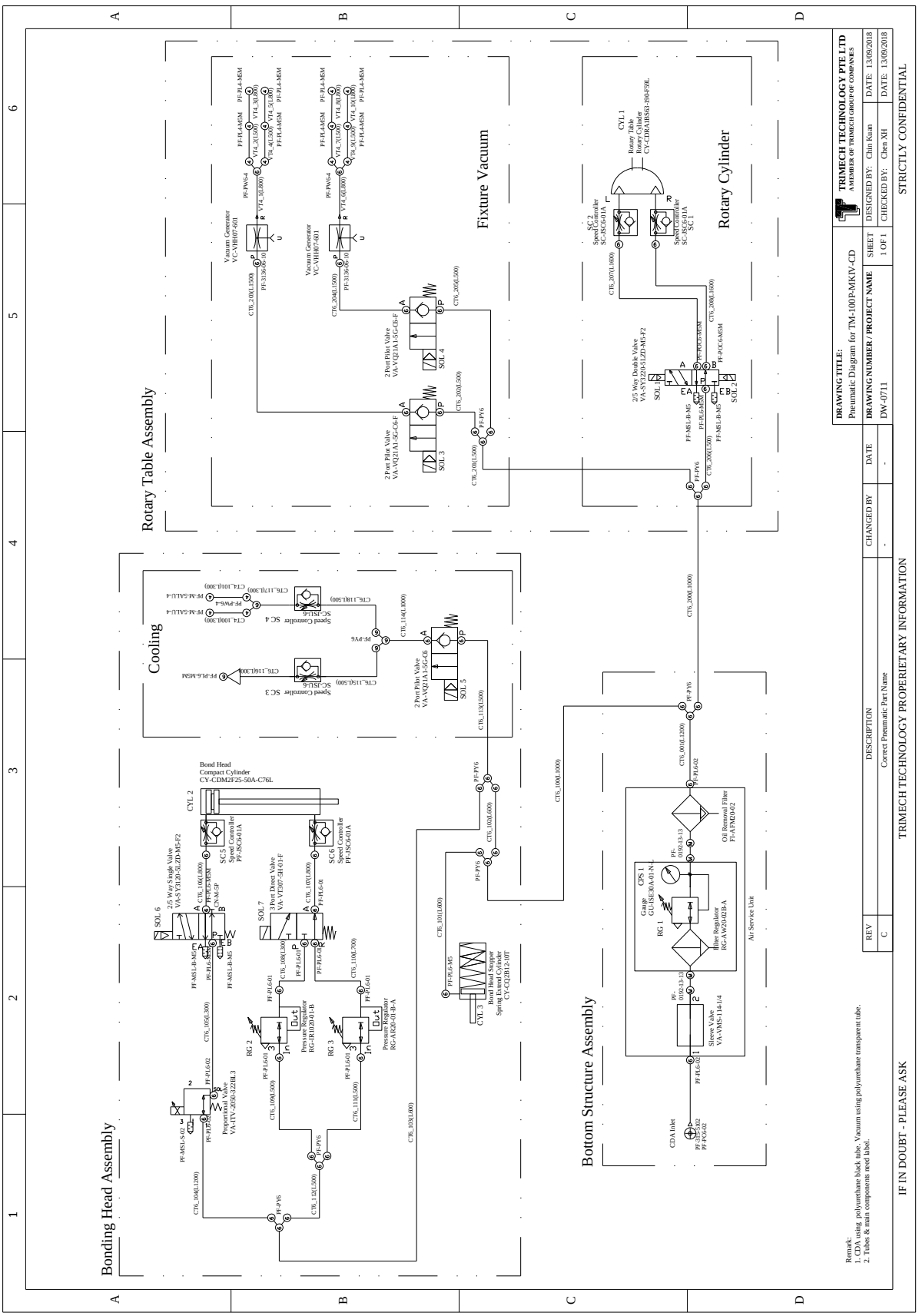
Solutions are in order of complexity and should be done in order listed. If none of the solution work, please contact TRIMECH agent or you can email the fault directly to service@cherusal.com

Symptom	Possible cause	Solution
No power	Power switch	Check that power switch is switch on.
	Power plug not plugged in	Plug in
	Circuit breaker tripped	Reset
	No power coming from main	Use multi-meter to check
Machine switch on with no display and system hanged	In coming AC out of 176V-264V range	Use multi-meter to check and rectify power supply (Voltage regulator)
	Switching power supply faulty	Check all DC voltage and rectify
Thermode error	TC worn or open	Change TC
	Wrong TC connection	Check connection
	Faulty TC connector	Check connector
Continuous beep during ramp and hold when tol. Buzzer is turn on	Transformer burn	Change
	If transformer is not burn out, check the followings:- 1) TC poor contact with thermode resulting in over ramping of temperature and therefore all connection deteriorate. 2) Thermode size bigger than spec. 3) Thermode touch onto a big heat sink during process 4)Connection path from transformer to thermode is loose 5)Power cable worn out 6)High electrical noise 7)Tolerance setting too low	1) Check and replace TC if necessary. 2)Use TM201P for bigger thermode size 3)Re-design fixture 4)Clean contact surface and tighten screws 5)Change 6)Isolate high amplitude pulse 7)Set to acceptable value

Start switch will not activate stage to retract in	Vacuum switch not activated first	Activate vacuum switch
	Air not connected	Check and connect
	Sleeve valve not turn on	Check and turn on
	Air pressure too low	Check and increase to at least 6 bar
	Solenoid valve faulty	Check that solenoid LED is turn on when activate, if not, check I/O connection or need to, change valve.
	Speed controller is fully closed	Regulate to the right flow
Press cylinder will not descent	Reed switch on rotary cylinder out of position	Readjust reed switch
	Solenoid valve faulty	Check that solenoid LED is turn on when activate, if not, check I/O connection or need to change valve.
Thermode will not ramp	Reed switch on press cylinder is not activated at down stroke	Readjust reed switch
	Thermode on/off switch is at off position	Switch on
	Heat control card faulty	Refer to agent
Cooling not activated	Solenoid valve faulty	Check that solenoid LED is turn on when activate, if not, check I/O connection or need to, change valve.
	Tubing bent	Check path from valve to blower
Pressure on press cylinder cannot be controlled	Faulty proportionate valve	Check for DC supply to valve is correct. Input voltage is correct
	Loose wiring to valve	Check
	Heat control card faulty	Refer to agent
	Pressure gauge faulty	Check
Press cylinder will not retract	Speed controller is fully closed	Regulate to the right flow
	Solenoid valve body permanently latched due to faulty spring	Change valve
Rotary cylinder will not retract or extend	Speed controller is fully closed	Regulate to the right flow
	Solenoid valve body permanently latched due to faulty spring	Change valve
	Dirt went into stage support bearing creating excessive friction	Clean bearing

Vacuum switch cannot be activated	Counter has reached it pre set alarm value.	Reset counter
	Faulty switch	check
Indexing spool will not index	Jammed silicone rubber or polyamide tape	Unwind and thread back
	Dc gear motor faulty	check
	Wiring loose	check
	Rotary encoder faulty	check
Could not enter with password	Password is wrong	Refer to agent for a master password
	Wrong programming	Refer to manual
Thermode become red hot	Worn out TC	Check and change
	Incorrect tab selection	Switch to the next relevant tab
	Heat control card faulty	Refer to agent
	Poor spot weld on TC	Check and change
No image on monitor	No power supply to monitor or CCD camera	check
	BNC cable faulty	check
	Focus distance is wrong	Refocus
	Faulty CCD camera or monitor	check
Abnormal LCD Display	Inadequate electrical discharge time	Power off and power on the system after 20 seconds
Over Temperature Error	Over Ramping of Temperature	Power off machine to allowing thermode to be cooled.
	Thermocouple faulty	Check and change thermocouple.

Chapter 7: Pneumatic Diagram



Chapter 8: Electrical Diagram

Please refer next pages for electrical diagram.

END NOTES

This technical manual is solely for reference only and most materials are from many individuals who have been working in this manufacturing field for many years. All information is true and new at the time of writing and will change as technology advance. Trimech intend to update this manual periodically and therefore welcome any suggestions at all time.