

ZST-AYB-11-22 Solar Panel Module Laminator

Instructions For Use



秦皇岛中晟太阳能科技有限公司
QINHUANGDAO ZENITHSOLAR TECHNOLOGICAL CO., LTD.

Foreword:

Thank you for purchasing ZST-AYB-11-22 model solar cell module lamination machine of our company, please accept our sincere gratitude.

In order to enable you to be familiar with and to use this equipment as soon as possible and to display its superior performance fully, before using the equipment, please read the instructions carefully.

||Attention:

※ Does not reprint this instruction booklet arbitrarily (the part or the complete content).* In the Future the revision may be carried on, but the supplement to the instruction booklet will not be informed of.

In the compilation of this instruction booklet although we make every effort to consummate unmistakably, unavoidably it has the questionable points. When you discover mistakes and the omission place, please inform us. Thank you for the cooperation.

※Contents

- 1、 Security notice
- 2、 Functional characteristic of the equipment
- 3、 Main performance and parameter of the equipment
- 4、 Matters needing attention and the operational safety
- 5、 Noun terminology
- 6、 The description of each controlling page of the touching screen's function
- 7、 System work page
- 8、 Equipment Location & Description Of Major Components
- 9、 Elementary operation of the equipment
- 10、 System failure and How to deal with
- 11、 Maintenance of equipment
- 12、 Heating system explanation
- 13、 Fitting replacement
- 14、 Urgently open cover system
- 15、 Other matters needing attention
- 16、 Material appendix

ONE: Security Notice

ZST-AYB-11-22 lamination machine are safe and reliable and strongly fault-tolerant , but the training for the operator's basic knowledge of the equipment is essential.

Please obey the rules of safe operation so as to guarantee the operator's safety and the normal operation of equipment . The operator must understand the process of the equipment fully and be familiar with the instruction for use and strictly obey requests.

1.When the device started, if heating the oil arise the police, it should be added immediately SD320 conduction oil.

2.When heating borad Temperature press over 100℃, vacuum pump can be started!

3.Before the maintenance of the equipment, all power sources must be shut off.

4.The temperature of the hot plate's working surface is very high , so the contact can cause burns .The operator must wear the insulating gloves when they lay aside and take out the lamination module.

5. In the process of starting to close the top head the operators must keep both of their hands far away from the machine meanwhile around the hot plate there must be nothing that is possible to interrupt the process.

6.In the process of the closing of the top head ,we suggest the operator be far away the equipment. If there is emergency case, please press [Urgently to Stop] button on the control desk.

7.When the equipment is under the active status, all non- operator must stand at least 1 meter from the equipment . Do not press any button at will if there is no emergency case .

8.The visitors or the layman must not operate this equipment !

TWO: Equipment Function Characteristic

1.Nimble working pattern:The equipment's working way has both the automatical way and manual way; normally it can work automatically. the efficiency is high and the stability is good; The debugging or other situations may use the manual operation when necessary.the operation simple be on foot nimble.

2.Imports the part of high disposition: The equipment main controlling unit use Japanese Mitsubishi PLC and Taiwan EV touching screen control, The low pressure electricity component uses the import or the joint capital factory production, the performance is stable and reliable and conforms to the industrial automation control standard.

3. High temperature uniformity: This equipment using the thermostable oil to heat up, The temperature control divides into the 2KW bottom merit to heat up with 16KW to adjust the merit to heat up, Temperature's controlling precision:±1 ℃, temperature uniformity tiptop ±1℃, The system saves energy and when adjusting the merit starting it attacks slightly to the electrical network. Norme work need power about 10.5KW.

4. When the heating system seems lose control of the temperature the equipment will stop heating up automatically . In heating system the oil storage insufficiency can send out the alarm and automatically stop heating up, Therefore the entire heating system is safe and reliable.

5. Emergency to uncap the system: The equipment is equipped with urgently uncapping the system, When there is urgently power-off and so on. Manual can be used to uncap the top head to take out the module and carry on the handling again.

6. Operational data statistics: The equipment can calculate times of the lamination automatically The user may act according to this parameter statistics service rate and the components replacement rate.

7. Operates the page nimbly: The device controlling procedure is easy to learn and the operation is convenient. The humanistic operation page design and parameter's establishment of each kind of craft is convenient. The realization of high accuracy control can be made when necessary.

8. Integrated controlling technology: This equipment is the collection of vacuum technique, the pneumatic actuator technology, the PID temperature controlling technology, the PLC programmable control, touching the screen operation, and the relay outputs It can accurately facilitate realization of each kind of complex craft

control and it is suitable to Mono crystalline silicon battery module and poly crystalline silicon battery module lamination production work.

9. Precise perfect vacuum instruction: At the right moment carries on the quantification to monitor the working room's vacuum state, The resistance to interference is strong, direct-viewing and reliable to guarantee lamination desired effect, When the vacuum degree appears insufficient in the working process or the negative pressure during uncapping, the system can automatically produce the alarm.

10. Establishes the emergency button: In the emergency case operator can rapidly press down to force heating up, the circulation and the vacuum pump power source to be shut off.

11. Accurate alarming system: When in the fuel tank the oil temperature surpasses the setting temperature the system will shut off heating power automatically and sent out an alarm. When in the working process there appears situation that cannot satisfy the working condition the system is able to produce correspondingly alarm promptly.

12. Top head safe system: After the top head opens arrives, the air course automatically be locked up to guarantee the equipment's and the person's safety.

THREE: Main Performance And Parameter Of Equipment

1. Working pattern: Manual, automatic two kinds of working pattern.

The automatic working pattern can realize the automatic lamination work.

Manual working pattern can realize the artificial single-shot operation of lamination work

2. Area of lamination board: 1100mm*2200mm, 300watt (1650mm*990mm) solar cell panel can be laminated one Piece each times.

3. Working voltage: System power input Three-phase AC380V/50Hz, Oil Pump And Vacuum Pump route voltage AC380V, Controlling loop voltage AC220V, Three-phase Five lines 50Hz alternating current supply. Heater voltage AC220V.

4. Equipment power: Entire machine power 23KW, Heating Power 18KW, Normal Working Power 6KW.

5. The way of heating: Through heating board made by special craft, Use the high temperature oil (SD320) to conduct heat.

6. Scope of temperature control: 130°C ~ 150°C, Maximum temperature: 160°C.

7. Precision of temperature control: ±2°C.

8. Temperature uniformity tiptop of heating board: ±2°C.

9. Equipment weight: 2850Kg.

10. Pumping air speed: Uses 100M³/H vacuum pumps, under well-sealed situation, The down chamber vacuum degree achieves 200 ~ 50Pa in 60 seconds (Thermocouple Vacuum Gauge reading).

11. Using environment: Ambient temperature 0°C ~ 45°C, relative humidity < 90%.

12. Equipment external dimensions: 2450mm×1680mm×1280mm

FOUR: Matters Needing Attention And Operational Safety

A: Equipment to start

1. The first external inspection power, the vacuum pump, heat pump motor direction of rotation to open the total power supply, Vacuum pumps can not run the reverse!

2. To start circulating pump; (Oil pressure instructions 0.1~0.4MPa)

3. Start the heater;

4. To restart vacuum when the temperature be achieved! (> 100 °C)

5. The work begin.

B: Shutdown

1. The closure of vacuum pumps;

2. The closure of the heater;

3. The heat pump can be closed when the temperature dropped to below 100 °C;

4. The closure of the total power supply.

Laminating machine in operation is completed, in addition to the main control switch equipment (power) to switch off, turn off the power of the total.

C: The safe operation

1. In order to ensure good operation of equipment, laminating machine and not in any place inside the object.
2. Off Cap must be completed under the air, otherwise not allowed off Cap, so as to avoid damage to equipment.
3. The console is installed on the left side of the emergency button, emergency use. Will enable the heating cycle, the vacuum power supply (not in the normal operation of the equipment when the press, otherwise, would stop all ongoing procedures), when troubleshooting, in accordance with the direction of the arrow buttons on the spin can be reset to restore the above Power supply.
4. If the local non-use over a period of time, should start trial operation a lot of times no lamination solar panel, to ensure that the quality of the pyramid.

Note: When the system failure, the screen will give the appropriate message, at the same time alarm buzzer sounds, the device is unable to perform other operations! When failures were excluded, the column prompted to hold down more than 5 seconds, the fault information will be removed, the system returned to normal work and can perform the next step.

FIVE: Noun Terminology

5-1 Active status terminology:

The upper vacuum chamber: Between the top head and the rubber plate connecting with the vacuum system the work room forms.

The lower vacuum chamber: the chamber formed by the lower room under the rubber board where the heating module stays connects with the vacuum system

Upper vacuum: Upper chamber vacuum production condition.

Lower vacuum: Lower chamber vacuum production condition.

Upper inflation: the process of the upper chamber transfers to the atmospheric condition from the vacuum state inflation

Lower inflation : the process of the lower chamber transfers to the atmospheric condition from the vacuum state inflation

Upper chamber instruction: Upper chamber vacuum state instruction.

Lower chamber instruction: Lower chamber vacuum state instruction. This instruction is so general that it cannot be used as the basis of the lamination's working effect

5-2 Time condition terminology:

Pulls out the vacuum: The time when automatic operation the upper and the lower chamber simultaneously pump out, the vacuum solenoid valves also open in this time scope, at the same time the vacuum chambers are pulled out.

This parameter can be modified according to the actual situation

Lamination: When automatic operation carry on the upper chamber sufficiently enters the certain pressure of the atmosphere, causes the rubber board inflation to press on the module back board and the maintaining time. The upper chamber charge valve opens in this time scope, the inflation time is the same time for the accent, then close, The lower vacuum chamber continuously maintains pulling out the vacuum, The time continuously maintains under this kind of condition is the lamination setting time. This parameter can be modified according to the actual situation

The accent presses the inflation: When automatic operation the upper chamber enters the certain pressure of the atmosphere, the air entered depends on how long the upper chamber charge valve opens. The accent presses the inflation to supposed the definite value is the time that the upper chamber charge valve opens. This parameter can be modified according to the actual situation

Uncaps the inflation: After the lamination, operator must inflate the lower vacuum chambers causes the vacuum chamber to make it return to the atmospheric condition, Simultaneously the upper chamber pulls out the

vacuum to cause the rubber board adsorption then the operator can be able to open the top head. Uncaps the inflation to supposed the definite value is the the time that the lower chamber charge valve opens for the vacuum chamber gasification time.

Attention: This parameter factory has already established the parameter. please do not modify at will!

Work number of times statistics: The equipment lamination number of times statistics, the user may act according to this parameter to count the part the replacement frequency and the equipment service rate and so on.

Setting temperature: the setting temperature for lamination working process is the essential parameter. This parameter adjusts based on use EVA. This parameter had decided PLC heats up through the PID regulating control system to guarantees this temperature's stability.

SIX: The Touches Screen Each Control Page Functional Description

6-1、 The starting machine screen introduced that



1、 Presses down 【System】

the button to enter the following page

2、【Auto】 button: The lamination machine enters to the automatic mode. This time presses down [close] the button system to start according to the setting parameter to carry on the work: The pass covers → Up and Down chamber vacuum → lamination → accentpresses (upper chamber inflation) → the upper chamber vacuum → lower chamber gasification → to uncap → the accumulation number of times to add 1, the system completes a time of lamination work;

3、【Manu】 button:

Presses down this button, the system prompt "whether it enters the manual Condition", After chooses "Yes" the system enters the manual work way, The lamination machine working process completely finished by manual. This time the system setting parameter still played the role, but the manual operation first; The system hypothesis is automatic and the manual function may separately enter the two kind of active status correspondingly, Two kind



of active statuses are locked to each other, operator only can choose one kind of active status to carry on the work,

ADD :Yazishan Industrial Park ,Beigang Town,Haigang Zone, Qinhuangdao City, Hebei Province, China Post Code:066000

Tel:+86 (0)335-8381296 8382258 8381295

Fax:+86 (0)335-8381295

Web: <http://www.solarhope.cn>

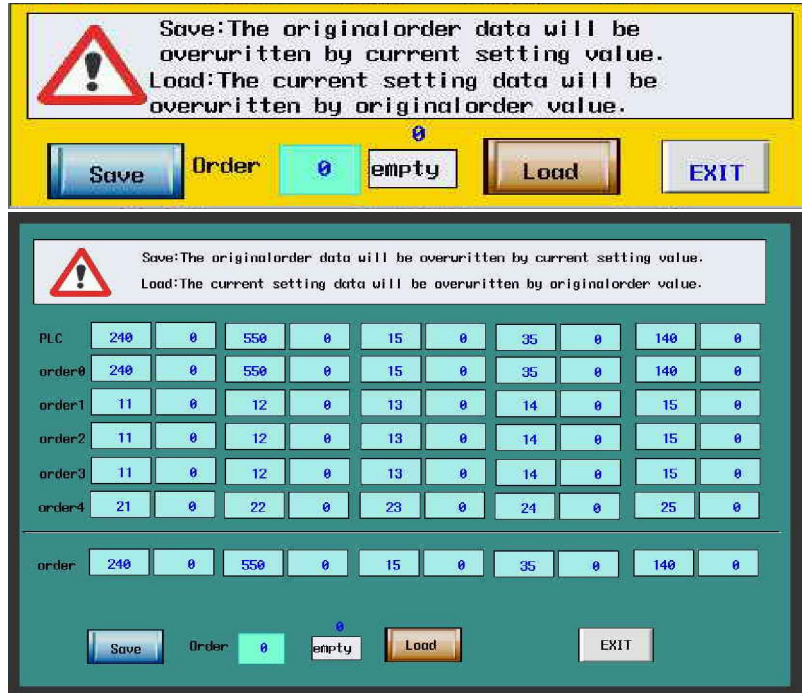
[Msn:solarhope@msn.cn](mailto:Msnsolarhope@msn.cn)

E_mail: solarhope@126.com

related details of this page are on this back page explanation 。 After chooses some kind of active status it will be able to maintain, until presses down other active status buttons or presses down the reset button to withdraw.

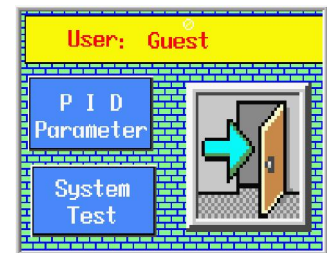
4、【Ord.】 (Order) button:

Presses down this button, the system enters "store the order form" or "Takes the order form" the operation choice, "store the order form " is making the current setting series parameter preserved "order number " in the document,coexists to PLC EPROM in order to use next time for the next time; "Takes the order form" is taking the saved in PLC in EPROM Subscribes the Order numbers document to call in PLC CPU,to work according to this parameter This work is for time the different factory EVA membrane or the different module lamination standard parameter Forms the document to save in PLC, replacing that fact that each time you should reestablish the parameter function, enhancing the production efficiency,and simultaneously had guaranteed the lamination best parameter supposes the definite value.



5、【Adv.】 (Advanced) button:

Pressing down this button, the system enters "the PID parameter" or "System debugging" that are two kind of high-level establishments operations contact surface, This function is essential parameter of our company of this The equipment debugs, Changing this parameter will cause the equipment to be unablethe work or the influence equipment lamination effect, Enters this function operation to need to have one, two levels of operations password, we suggested the factory do not change.



6、【Open】 button:

The equipment top head starts to open until achieved The upper limit position, this time uncaps the indicating lamp to change green and stop uncapping

7、【Close】 button:

Pressing this button, the equipment top head starts to shut down this button moves the button for the spot, when the operation needs continuously to hold on, otherwise the top head's movement will stop; When achieved lower limit position the pass covers the indicating lamp to change green, closes the lid tostop;

8、【Stop】 button:

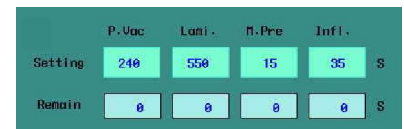
Pressing this button, regardless of equipment in automatic mode or manual active status and whatever the system enter to in, the equipment will be knocked off;

9、【Start】 button :

Pressing this button, the equipment start a new round of work wherever it stop, namely the lamination workstart, this time does not affect the automatic counter accumulation function, when automatic operation does not need to press this button;

10、 Other instruction

Parameter fence: The blue color background is the setting number while the



red background is Current carries out number

- ① Indicating lamp mark: Red color light for shut-down condition when some indicating lamp color change from red to green, indicating this active status already be changed.
- ② System prompt fence: In yellow background fence writing for system prompt content, when there is something wrong or the system alarming PLC can In produces the prompt; in this fence.



11、 Digital keyboard

When clicks on the blue color background in the digital window,the system can automatically produce the numeral The keyboard demonstrated, like right chart, Among:



- 0-9:** For the numeric keyboard, the number which needs to input Just click on the corresponding numeral then;
- CR:** In order to eliminate the key, after inputs the numeral the passable CR elimination;
- ES:** Digital input withdrawal key;
- ENT:** The carriage return confirmation key, after

Presses the number which input to become effective and to store PLC In EPORM, the system carries on the work by this parameter;

When each time input system parameter, on the top line prompts in the digital keyboard indicates the scop of number alloweb to be input (MAX: XXXX~MIN: X), you may carry on the adjustment according to the customer actual situation in the permission scope.

SEVEN: System Working Page

7-1、 The introduction of Automatic operation page

1、 System prompt fence:

Demonstrates the current system active status:

[System is Ok !]: Expressed the system work is normal

[Warning:Lawless Operation!]: The expression That system has received the illegal operational instruction, this time the system does not affect sattention;

[Warning:The temperature exceeds setting!]: Expressing the fuel tank internal heating temperature surpasses the definite number, this time the fuel tank can stop heating up, simultaneously the system produces the acousto-optics alarm.

2、 【Open】 button:

Pressing this button under the non- lamination active status the top head opens, after arriving right flank the indicating lamp turn green;

3、 【Close】 button:

This button moves the button for the spot. After uncapping, continuously presses this button, the top head starts to close; Otherwise the top head stops shutting down, after arrivsing right flank the indicating lamp turn green;

4、 【Stop】 button:

In the processing of working ,stop them all

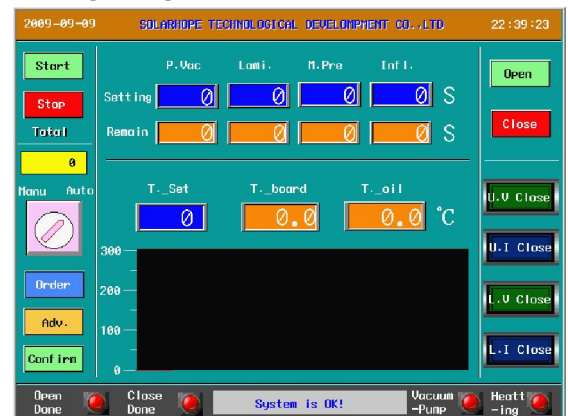
5、 【Start】 button:

After the termination the system starts to work again and will not affect the counter numner

6、 【T. _Set】 (Temperature Set)

Through the digital keyboard to set hot plate operating temperature, according to the use of the EVA temperature characteristic

7、 【T. _board】 (Temperature board)



Lamination hot plate practical work temperature

8、【T. _Oil】(Temperature Oil)

Oil temperature's actual temperature In fuel tank

9、The setting (take second as unit, completely through digital keyboard setting):

【P. Vac】: (Pumping Vacuum)The time of vacuum pump pull out the vacuum;

【Lami.】: (Lamination)After pulling out the vacuum, module lamination time;

【M.Pre】: (Modifying Pressure) The time that In the lamination process, in order to make the rubber board press on the modul smoothly , certain atmospheric pressure is needed back board in cavity;

【Inf I.】: (Inflate Time Indication) After the lamination had ended, inflate and achieve the atmospheric conditions time to the under cavity in;Attention: Only after the inflation is completed you may uncap! Otherwise because has the negative pressure force fully to uncap can destroy the module quality;

10、Remain: After the correspondingly setting time, the system starts when the work carries on the surplus time;

11、Right flank indicating lamp mark:

【Vacuum upper】: The upper chamber vacuum valve movement instructed that, The red candle stops; The green light movement, indicated the upper chamber is at pulls out the vacuum state;

【Inflate upper】: The upper chamber charge valve movement instructed that, The red candle stops; The green light's movement, indicated the upper chamber is in the inflation condition;

【Vacuum lower】: The down chamber vacuum valve movement instructed that, The red candle stops; The green light movement, indicated the down chamber is in pulling out the vacuum state;

【Inflate lower】: The donwn chamber charge valve movement instructed that, The red showing stops; The green light movement, indicated the lower chamber is in the inflation condition;

【Vacuum pump】: The vacuum pump work instructed that, The red candleexpresses the vacuum pump knock off; The green light expressed thevacuum pump is working;

【Heating】: The heating system work instructed that, The red candleexpressed the system stops heating up; The green light expressed thesystem is heating up;

12、【Total】:

The system covers -> on the lower chamber from {the pass to pull outthe vacuum -> accent to press (upper chamber gasification) & Thelamination -> upper chamber pulls out the vacuum -> lower chamber touncap the gasification -> to uncap} completes a time of lamination,the counter adds 1;

When continuously holds down the accumulation number of times fence tosurpass for 5 seconds, accumulation number of times automatic clear zero

7-2、Manual work way page introduction

1.In the manual work page, the system the parameter which establishesunder the automatic mode may act according to requests to carry onreestablishes or the adjustment, when carries on the manual work stillcould play the role, but the next flow was allowed through to operatein the page the related button manually to come to realize ahead oftime;

2.Various buttons significance:

【Open】、【Close】、【Start】、【Stop】:

The button function and the automatic page are the function quite samenot less than

【U.V Closes/Opens】: (Upper Vacuum Close/Open)When demonstrates "the pass", upper chamber vacuum solenoid valve off-position; After presses down demonstrated "opens", the upper chamber vacuum solenoid valve opens, the upper chamber is at pulls outthe vacuum state;

【U.I Close/Open】: (Upper Inflate Close/Open)When demonstrates “the pass”, upper chamber gasification solenoidvalve off-position; After presses down demonstrated “opens”, the upperchamber gasification solenoid valve opens, the upper chamber is at thegasification condition, namely adjustment lamination pressure;

【L. V closes/opens】: (Lower Vacuum Close/Open)When demonstrates “the pass”, lower chamber vacuum solenoid valveoff-position; After presses down demonstrated “opens”, the lowerchamber vacuum solenoid valve opens, the lower chamber is at pulls outthe vacuum state;



[L.I Close/Open]: (Lower **Inflate Close/Open**)When demonstrates "the pass", lower chamber gasification solenoidvalve off-position; After presses down demonstrated "opens", the lowerchamber gasification solenoid valve o pens, the lower chamber is at thegasification condition, for uncaps prepares.

7-3、Advanced user interface

The system after inputs one, two levels of Passwords enters "The PID parameter adjustment" and "the system debugging" two pages.

1、System PID parameter establishment

This page parameter for system work time Essential technical parameter, according to this equipmentdebugging knot The fruit has stored in PLC EPROM.

This algorithm and compensates the hot plate temperature for theintelligence automatic tracking the lgorithm.

Suggested the user donot have to change its establishment, otherwise can cause the systemwork not to be normal or the strict double image Loud lamination effect.

- Ts:** Time Sampling **Ka:** Filtering volume **KP:** Prorate **Ti:** Time integral **O_cyc:**Out cyc
Td:Time differential **O_max:** Operand maximum
O_min:Operand minimum

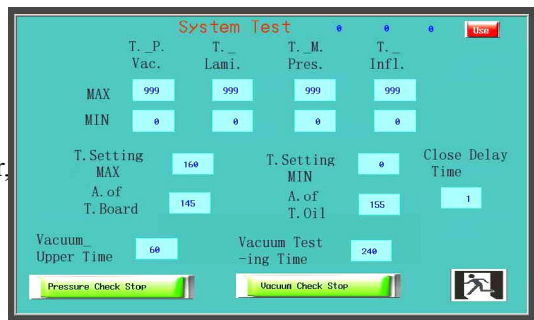


2、System debugging page

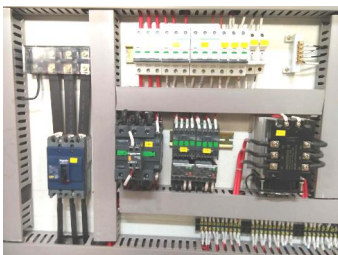
This page parameter for the system debugging time test parameter,

according to this equipment performance characteristic, adjusts some parameter value, the result has stored in PLC EPROM .Is automatic or in the manual work process in the equipment may makethe suitable revision, but the revision scope needs.In in this determination scope, suggested the user do not haveeasily to change ,its establishment, otherwise also can cause thesystem work not to be normal or the serious influence laminationeffect.

- T_P.Vac.:** Time Pumping Vacuum **T_Lami.:**Time Lamination **T_Inf I.:**Time Inflate Open
T_M.Pres.:Time Modulate Pressure Inflate **T_Setting:**Temperature Setting **P.T Open:**Press Test Open
A.of T.Oil:Alarm of Temperature Oil **A.of T. Board:**Alarm of Temperature Heating Board
V.T Open:Vacuum Test Open



EIGHT: Equipment Location & Description Of Major Components



Low Tension Control Cabinet



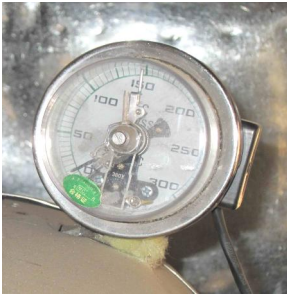
PLC&AD Module



Pneumatic Control



Heating & Oil Pump



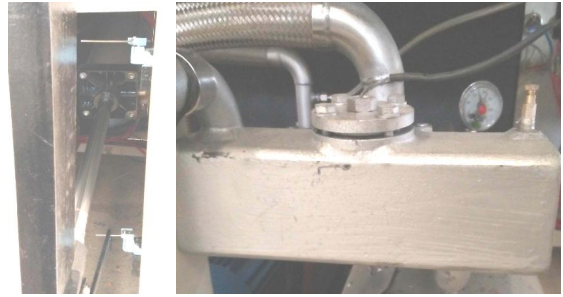
Heating Control Meter

Vacuum Pump



Vacuum Control System

Vacuum Gauge & Display



Open/Close Cover Sensor

Oil Full Sensor

NINE: Equipment Elementary Operation Method

9-1、 Basic movement principle:

Lamination machine basic movement step:

- 1、 The initial condition for the temperature achieved supposes the definite value, the vacuum pump and oil circulation pumps start working;
- 2、 Puts in treats presses the module, covers the glass cloth;
- 3、 Closed top head;
- 4、 On first the lower chamber together pulls out the vacuum, continuously achieved the request pulls out the vacuum time;
- 5、 Continues to maintain the lower chamber to pull out the vacuum,sufficiently enters the certain pressure for the vacuum chamber theatmosphere, simultaneously enters the lamination condition, maintainsthe certain pressure until the lamination time conclusion;
- 6、 The upper chamber returns to pull out the vacuum state again (rubber board to adsorb upper chamber), simultaneously under the vacuumchamber gasifies and restores to the atmospheric condition;
- 7、 Turns on the top head, takes out the module. To this, a lamination endof loop.

9-2、 Automatic running status operating procedure:

- 1、 Turns on the equipment power switch;
- 2、 The choice touches in the screen the automatic operation way page,according to 7-1 explanation establishment parameter or the adjust mentand the preservation, the preparation starts to work;
- 3、 Opens hotly oil circulation pumps the switch, opens heats up the switch;
- 4、 After the temperature arrives supposes the definite value, turns on the vacuum pump switch;
- 5、 urns on under the manual condition the top head arrives;
- 6、 Will treat orderly presses the module to put in the lamination machine;
- 7、 Presses down [**Close**] the button until to gather the lid to arrive, the lamination machine enters the automatic lamination work flow;
- 8、 After the lamination finished the lamination machine automatically to uncap, the counter adds 1 time;
- 9、 Takes out the solar cell module, the work finished.

9-3、 Manual running status operating procedure:

- 1、 Turns on the equipment power switch;
- 2、 The choice touches in the screen the manual work way page, according to 7-2 explanation establishment parameter or the adjustment and the preservation, the preparation starts to work;
- 3、 Turns on the hot oil pump switch, opens heats up the switch;
- 4、 After the hot plate temperature arrives supposes the definite value,presses down the vacuum pump switch;
- 5、 Presses down under the manual condition [**Open**] the top head arrives;
- 6、 Will treat orderly presses the module to put in the lamination machine;
- 7、 Presses down [**Close**] the button until to gather the lid to arrive;
- 8、 Presses down [**Start**] the button, the system starts the manual lamination work process:

A:First step separately presses down [**U.V Close**] and [**L.V Closes**] "opens" the condition, in this time the lower chamber starts simultaneously to pull out the vacuum; Pulls out the vacuum timer to start to time, observes this time to arrive pumps out the craft demand time;

B:Second step presses down [**U.V Open**] to Close Fettle the condition, again presses down [**U.I Close**] to Open Fettle the condition, Gasifies the solenoid valve to open, the upper chamber starts to gasify, this time [**L.V Open**] the button continuously to maintain, The system enters the lamination condition.

In the process above, the timer of "lamination" and the timer for changing the pressure are working together.

When the timer for changing pressure reaches the parameter which is setted by the manual timer , cut off the upper chamber inflation solenoid valve, then the keep the lamination process carried on, observing the demonstration of the "lamination" timekeeper goes to zero;

C:The third step: separately press [**U.V Closed**] into the open condition and press [**L.I Closed**] into the open condition .

Now the upper chamber starts to pull out to vacuum, the lower chamber starts to inflate. After the lower chamber vacuum returns to the atmospheric condition (lower chamber vacuum gauge returns to original position);

D:The fourth step: press down the button of [**Open**] ,

Now the system is open and in the working condition. After it opens in the right way, the light changes green, that is to say , it has been opened to the right position. Then the lamination process finishes;

9、 Take out the solar cell module, the work of manual lamination finishes.

TEN: System Failure And How To Deal With

Attention: Every time the breakdown service must be enrolled for the reference when it fails again in the future. Before rapairment and maintenance total power source must be gut off..

10-1、 The vacuum degree could not achieve supposed definite value

- 1、 Inspec vacuum pipeline (including attachment) whether leaks air;
- 2、 whether there is serious attrition or aging in the sealed rubber ring;
- 3、 whether the vacuum pump works normally;
- 4、 Inspect whether the upper and lower chamber inflation valve have been shut down strictly, if it is not shut down strictly, the dust may be sucked in . Gently konck it or open and close it several times frequently, it can be in the normally working condition . otherwise, this charge valve has damaged, which is must be replaced;
- 5、 Check under the studio and uper the studio in charge of Road and vacuum switching valves are in working order, if the valve is not normal that there may be solid plate of obstructions and shall be opened to remove;

10-2、 It is difficult to open and close it or it does not act

- 1、 Whether the inspection air pump pressure does achieve the standard required (generally is 0.5-0.8Mpa);
- 2、 Inspect whether the air operated pipeline and its bridge piece leak air;
- 3、 Whether the solenoid valve works normally, which can be inspected manually.
- 4、 Inspect whether the air cylinder damages.
- 5、 Check pneumatic cylinder lock is working correctly, mechanical lock whether location offset hook; If this is the case then the position should be adjusted

10-3、 When upper chamber lamination, the vacuum degree obviously drops

- 1、 Inspect whether upper chamber aerocyst (rubber board) leaks air, whether the fixed rubber board Yatiao bolt does become loose. Padlock has been loosening, whether by inhalation of laminated plastic cavity;
- 2、 Inspect whether the pipelines in the upper chamber connect closely; Under the studio to check the vacuum pipe connection is connected solid, whether it is normal for each of the valve open or closed;
- 3、 Inspect whether the electric elements in the upper chamber work normally.

ELEVEN: Methods of the maintenance of equipment

The lamination machine must be maintained periodically. It can not only prevent excessively wears, but also

ADD :Yazishan Industrial Park ,Beigang Town,Haigang Zone, Qinhuangdao City, Hebei Province, China Post Code:066000
Tel:+86 (0)335-8381296 8382258 8381295 Fax:+86 (0)335-8381295
Web: <http://www.solarhope.cn> [Msn:solarhope@msn.cn](mailto:Msnsolarhope@msn.cn) E_mail: solarhope@126.com

avoid the breakdown .

11-1、 Routine maintenance

- 1、 Inspect and guarantee the oil level of the vacuum pump in the stipulated scope, the oil level must be as high as possible, If it is found that vacuum pump oil emulsion, or black, it is important to replace the vacuum pump oil, and only the model vacuum pump oil that is suggested by the vacuum pump manufacturer . Please read the more detailed material in the vacuum pump operating notebook.
- 2、 Inspect the dust which is cumulated on the hot plate and the rubber plate .Clean it with a piece of clean cloth dipped in alcohol under the state of cooling.
- 3、 The liquid left on the hot plate can be got rid of by acetone or alcohol. Never blow the EVA on the hot plate with the sharp tool ,in order not to damage its superficial smoothness,affects the lamination module quality
- 4、 In order to prevent EVA remnant piling on the hot plate, when lamination work it must be covered with the cloth of glass to carry on the isolation.
- 5、 The hot plate need to be blow off of the remains(Is better that to use vacuum cleaner to clean dust at the same time),the hevacuum pump must be closed when that work begin , preventing other matter enters the vacuum pumpsystem.

Attention: Do not clean the hot plate under the high temperature condition, in order to avoid causing fire and be burnt by it!

- 6、 If it is found on the plastic sheet in the vacuum chamber during the fold, and laminated components found in the back of the components are obvious signs of folding or laminated led to the fold as a result of post-silicon components shifted, plastic Board must be re-laid, it is proposed that heating panels are installed.

11-2、 Each week maintenance

- 1、 Inspects the the condition of roof panel ring seal surface, whether has the dust and mark,whether the joint are cut. If necessary,it should be wiped with the flannelette which bedewed with the propyl
- 2、 Inspect whether the rubber board have damages and scours.promptly
- 3、 Inspects the vacuum pump nook of dusts and piled remaining pellet, Import and Export Inspection and metal vacuum hose is loose locking;
- 4、 Inspects all vacuum connecting pipe and the fixed marquis bind rounds,whether has becomes less crowded.
- 5、 Heat oil to check the road junction and heating fuel tank flange, such as whether the spill, oil spills must be carried out if appropriate fastening

11-3、 Each month maintenance

Change vacuum pump oil. Only can use the high quality vacuum pump oil which manufacturer setted
 Please look up the detaile in the vacuum pump handbook..

11-4、 Request

- 1、 The vacuum bleeder valve cavity essential is regularly cleaned with alcohol , clean the dust..
- 2、 Please read the vacuum pump handbook of the vacuum pump maintenance routine
- 3、 Tighten the upper chamber rubber board bolt,avoiding leaking air.between the upper and down chamber caused by rubber soften after heat

TWELVE : The explanation of hot oil heating system

12-1、 Function synopsis:

- 1、 This machine will divide the heat total output into the bottommerit (3KW) and adjustive merit (15KW) , the system will control the adjustive merit to heat automatically according to the temperature which has been set up, carry on the adjustive merit temperature control through the advanced PID control algorithm ,will be able to make it a better effect to save the energy and reduce the harmful impact. top electrical network
- 2、 Fluid position alarm device
 When the equipment at work , no oil or lack of oil may cause serious accident. fluid level will be monitored by float ball equipment which installed swollen expansionslot of the equipment, it will sound the alarm once the oil level excessively to be low in the swollen expansion slot ,that is ,sound the alarm,the touch screen will sent acousto-opticsignal to warn lack of oil , and at the same time automatically stops heating up.After

the heating system is added with oil and achieved the upper limit, the warning would be relieve by itself.

Attention: Above respectively warning item should be carried on artificially forces to test the warning, in order to make sure its reliability. The oil supplied to the heating system must be consistent with the former oil, the power source and the circulating pump power source must be cut off before adding the oil.

3、 Warning of Over tamperture

Carry on the temperature examination by the equipment which installed in the neighborhood of heating fuel tank exit, control the temperature by the thermometer which installed on the right side of the feul tank. When the actual temperature surpasses the warning number which had been set up (generally it will be set between craft temperature and the highest application temperatureheat of conduction oil), the fuel tank can automatically give order to PLC, the touche screen give the over warm alarm immediately, the indicating warning lamp of ultrawarm on the operate board begin to flash and give sound warning, the system automatically stops heating up.

Warning! Ultra warm stops heating up time does not have hotly to stop oil circulation pumping!

12-2、 Hot oiling system

- 1、 This machine is suitable domestically for, outside all trademarks heatconduction painter's shop is the heat transfer medium, its highestoperating temperature should above the practical applicationtemperature. The best use produces the factory determination the modeloil, but the different trademark heat conduction oil after has notproduced the factory to confirm strictly prohibits mixing uses.
- 2、 The heat conduction oil strictly prohibits in the use and the storageprocess mixing in the water and other liquids, the contamination andso on.
- 3、 Opens in the system all valves (oil drain valve to be an exception),from swollens the heat conduction oil the expansion slot exhaust the mouth endlessly to pour into.
- 4、 Through oil the mouth observation, stabilizes to the oil level tosollens the expansion osition.

12-3、 Users for the first time or the long time stops using after the exhaustdraining water method

11-3-1、 Starts the oil pump

Puts through the power source, confirmed the circulatory system importand export pipeline valve is at opens the condition, namely accordingto the oil pump start button, confirmed the oil pump movementdirection is whether normal

11-3-2、 Normal temperature exhaust

- 1、 Turns on the circulatory system related valve and the exhaust valve,puts through the power source, starts hotly oil circulation pumps. Theobservation oil pump movement direction, should defer to thestipulation direction noramal work.
- 2、 Close viewing system pressure,normal work press 0.1~0.4Mpa, if discovery pressure high and with has had the unusual sound, should the prompt engine off, inspect thepipeline whether has blocks the phenomenon, after waits troubleshooting to be possible reto start the oil pump.
- 3、 May operate many times, stops the oil pump until the pressure gauge instruction stably, this time proved in the system the air is basicwas removed. This time observes swollens the expansion slot oil level whether drops, if has the drop to be supposed again to make up the oilto 1/3.

11-3-3、 Elevation of temperature dehydration

Had finished after the confirmation normal temperature exhaust theninvests heats up the power source to carry on the elevation oftemperature dehydration, this time should carefully read the heatconduction oil instruction for use, and reference execution

1、 Elevation of temperature to 100-120 °C and heat preservation

Elevates temperature the preliminary stage to be supposed to control the elevation of temperature speed in 50 °C /h, closely gazes at the pressure gauge to demonstrate whether normally, if the discovery system Lower Press or the non- pressure instructed, explained in the system has produced the gas, this time should reduce the elevation of temperature speed to carry on the exhaust operation. After waits the pressure to be stable may continue to elevate temperature °C and makes the long-term heat preservation to 120°C, the soaking time length should the total oil mass and contains moisture content how many with the system in to concern.

The elevation of temperature to 120-150 °C and the heat preservation,removes in the system oil the light component volatile matter and there sidual moisture content.

- 2、 In the equivalent process sometimes can have the massive gas to carry the hot oil to well up into swollens in the expansion slot, possibly creates the trough internal heat oil overflow, this time should payattention to the security, should establish the abundant oil vessel under the overflow. In the exhaust dehydration process the operator must always persevere the post until this process to end.

11-3-4、 Elevation of temperature movement

Close the exhaust valve after the exhaust dehydration process finishes, then operation of the normal running of the heating up can start. When temperature reaches 160 °C you should make a leakage inspection to each connection spot of the circulation pipeline ,and carry on hot fastening.

12-4、 Pay attention to the following when using

11-4-1、 Analog operation

- 1、 Examine temperature excursion alarm to confirm its reliability. (With analog temperature setting method)
- 2、 Examine few oil alarm of the system to confirm its reliability. (Disconnect the oil level sensor of a signal line, equipment alarm, indicating a lack of oil)

11-4-2、 Pneumatic system

The normal circulating pressure of the machine is generally 0.5-1.2MPa. You should stop the engine in time and exam it if the pressure is discovered too high or too low in the process of operation.

- 1、 Exam if pipelines of the system are connected normally
- 2、 Exam if pipelines of the system can go smoothly.
- 3、 Exam if something has stopped the filter

11-4-3、 Other things you should pay attention to:

- 1、 It is strictly forbidden to operate in the no oil or little oil, the temperature excursion environment
- 2、 It is abnormal when the pressure is unstable or too low or too high or even no pressure at all. The operator should inspect it promptly in order to avoid causing serious accident. The normal oil circulating pressure of the machine is generally 0.1-0.4Mpa.
- 3、 Leakage phenomenon should be strictly forbidden in the whole system. Once discovered the operator must deal with it promptly. The heat conduction oil flashpoint is 190 °C, therefore suitable fire equipments should be available in system installment area. Forbid the open fire work within the corresponding scope.
- 4、 The operator should first open **the power**, then open **the oil pump**, next open **heats up**. After the engine stops **the heats up** should be first stopped then **the oil pump** .It is strictly forbidden to stop the oil pump when the temperature is above 100°C.
- 5、 In the test running stage, the operator should carry on the exhaust dehydration operation according to the procedure above when renew heat conduction oil.

THIRTEEN: Fittings replacement

Warning!Shut off the power source of the equipment before maintenance and/or maintenance equipment.

13-1、 Replacement of the rubber board

- 1、 It is suggested the operator should carry on inspection when work time accumulates up to 100 times. When cracks, blind eyes and so on were discovered in the rubber board, the operator must replace them (A rubber board template should be prepared for the sake of convenient.).
- 2、 The best use of this equipment in high-anti-anti-tear or tear silica gel plates, size: 2400mm * 1300mm, the thickness of 4mm or 3mm;
- 3、 Silica gel plate replacement method,To open the lock around the site, off Cap functions manually, slowly open (Note: Open only to high-50mm) will be on the border with the isolated site, then completely open the cover, remove the damaged rubber plate.
- 4、 To place the new flat panels in the next silicone layering, around 4-6 people will need plastic and is even being released, this time with manual clearance function will be built off site in place to ensure that every pin position smoothly under pressure to squeeze into the article , This time covered in the manual control clearance to ensure

there is sufficient pressure on the site and will be under pressure compaction.

5、 Locking the locking ring, an appropriate adjustment locking nut to ensure that the appropriate level of close, repeated several times to build switches.

Warning! Please do not replace the rubber board when hot plate high temperature, otherwise it will cause burn!

13-2、 Layering on the box under the O-gel method to replace the article:

- 1、 The tape of life in 1500 ~ 3500 times
- 2、 When the silicone be aging, the fracture will lead to a vacuum leak, especially after a high temperature above the pressure would appear tape unable to affect the restitution laminated, the tape must be replaced at this time;
- 3、 Manually open the lamination machine off Cap features above and to ensure normal air lock to prevent it from cover to open locked whereabouts;
- 4、 With the word screwdriver from the tape will pick seams open to remove debris in the tank, the new tape into the pressure tank;
- 5、 The joint of a certain oblique angle of about 45 degrees, while 704 high-temperature sealant with a good seal;
- 6、 The cover of the manual clearance about 30 minutes to maintain.

FOURTEEN: Urgently open cover system

14-1、 Urgently uncaps gathers covers the notice

When equipment normal operation, because some kind of reason accident falls the electricity, but in this time module equipment, if does not carry on prompt processing, the module possibly is damaged, there fore this equipment has provided in does not have the power source in the situation manual to turn on the top head urgently to uncap the installment (right flank cavity on kneading board to have manually under equipment uncaps instructed button), this equipment must by the specialized operator when the necessity only then may use, strictly prohibits using at will, otherwise, possibly will harm the equipment, will be serious when will cause the equipment to be unable the normal work.

14-2、 Its operation as follows

- 1、 he time is discrete, is sure not to damage the O shape packing ring.
Turns on the organism right under front door.
- 2、 Anti-clockwise rotation manual charge valve, observation gasification dial gage, lower chamber working space gasification until atmosphere.
- 3、 Holds down manually uncaps the control valve to uncap the button, turns on using the barometric pressure the top head arrives.
- 4、 Takes out the equipment in module carries on essential processing.
- 5、 Holds down the pass to cover the control valve the manual pass to cover the button, arrives using the barometric pressure the top head closure
- 6、 The turn clockwise manual charge valve, screws tight it does not have to leak air guarantees the normal operation the vacuum degree request..
- 7、 After waits trouble shooting to put through the power source, carries on the normal work production

FIFTEEN: Other Matters Needing Attention

- 1、 The hand switch covers the system two union body valve to have to join the high clean lubricating oil (to be possible to join sewing-machine oil) to guarantee its normal work;
- 2、 The air compressor regular replacement machine oil, the gas tank frequently turns on the water, in order to avoid causes in the compressed air input media pneumatic control system which contains water, affects the air cylinder the normal operation.
- 3、 Use and maintenance of vacuum pumps, please refer to the use of manual vacuum pump.

SIXTEEN: Material appendix

- 1、Electrical schematic diagram
- 2、Heat the oil circulation pump Manual
- 3、Vacuum pump instruction for use