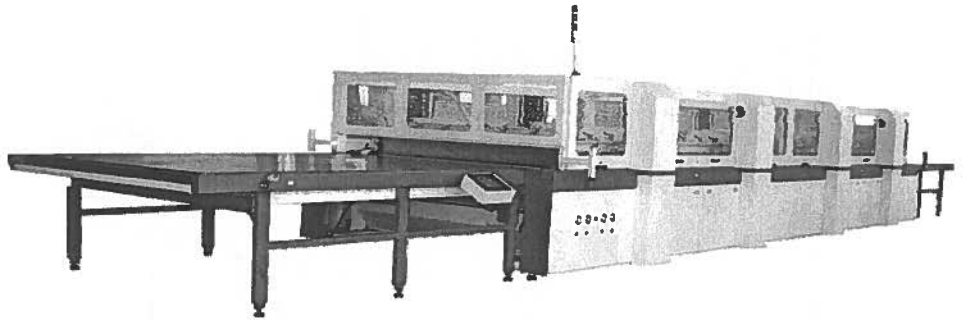


BSL2236OAC-F Automatic Laminator Technical Specification



I、Laminator model

- Model: BSL2236OAC-F
- Laminating size: (2200×3600)mm²

II、Laminator structure

- Complete machine: Loading section, first hot-pressing section, second hot-pressing section, unloading section.
- Dimension: overall length 16.8m, width 3.85m(Do not include heating station and other auxiliary equipment, if add heating station, width is around 5.07m)

1、Loading section

- Adopt rubber transport tape
- Transport stable, use encoder fix location, accurate and reliable
- Could set loading step distance
- Transmission rate: 4~13.5m continuously & adjustable

2、Hot-pressing section (Firs section and Second section)

- Use conduction oil heating
- Heating plate adopt orifice plate, milling processed to double-edged.
- Lower plate temperature uniformity is $\pm 2.0^{\circ}\text{C}$
- On heating plate surface, in the range of 1000×1000 at will, planeness tolerance value is less than 250um
- Upper chamber designed with mechanical lock, when cover opened in place, it will lock upper cover.



- Upper cover rubber sheet adopt patent anti-wrinkle technology, it could lengthen rubber sheet using life
- Safety raster+ protection net door to guarantee operator's safety.
- Cleaning brush roller is installed in the main frame to clean the attached EVA and PVB.
- Using toggle clamps to fix the rubber sheet, tensioning the rod to shorten changing time.
- Using transducer+ encoder control in the conveying system, using photovoltaic switch to locate position.
- Teflon cloth is installed in the upper cover which can cover the modules to prevent difficult clean EVA and PVB attaching on the silica sheet, also can improve the working status of the silica sheet, prolong its working life. Tightness can be adjusted according to actual use.

3、unloading phase

- Using rubber convey belt.
- Using photovoltaic sensor to locate the modules on the unloading port to prevent sliding.
- Smoothly convey, use encoder to realize precise locating.
- Process distance can be set.

4、vacuum system

- Using vacuum pump produced by Sichuan Nanguang Vacuum Equipment Co., Ltd.
- Testing the vacuum degree of the laminating chamber by Pirani gage.
- Using subpressure sensor of Keyence, Japan.
- Using national patent vacuum valve produced by Boostsolar.
- Vacuum degree: maximum vacuum 30Pa, to a degree below 120Pa within 120 seconds.

5、control system

- Siemens PLC S7-200 + touch screen control
- Has laminating time accumulation and using time accumulation.
- Laminate sectionalized, speed of pressurizing can be choosing from fast, medium and slow.
- Can storage various technical formulas for users to choose during production.
- Warning points: realize visual and sound warning for over-current、phase lacking、air source、vacuum、oil level、temperature and so on.
- System parameter curve (upper and lower vacuum degree, plat board temperature) output,



choosing touch screen with memory card to storage the time, temperature and vacuum degree into the card, these data can be transferred into the computer when required to output in picture form or data directly.

- Record main operating steps automatically
- Prompt the main operating process through lights and sounds.

III、 performance characteristics

1、 dual- heat laminating chamber system ?

- Can increase the working efficiency of the modules, adopts to continuous production of monocrystal silicon, polysilicon and noncrystalline silicon.

2、 conveying system

- Using chain conveying structure in the conveying system to realize continuous process of the loading and unloading. There are independent buttons in the loading system and unloading system to make both loading and unloading convenient, subsectional processing control system is set in the loading system, users can set a certain distance according to actual requirement, that is to say the loading system will process for a certain distance every time one pushes the button, to make the loading convenient.
- If the module exceeds the set range the system will stop loading and give a warning.
- Terminal protection switch in the unloading part

3、 control system

- Integrates semi-automatic\automatic\manual into one, can realize automatic and manual loading, laminating and unloading.
- Use PLC intelligent temperature controller, temperature control accuracy: $\pm 1^{\circ}\text{C}$; temperature control range: $30-180^{\circ}\text{C}$, maximum working temperature 175°C .
- SIMENS coding controller can realize communication with the computer, meet the requirements of modern industrial automation.
- Simple and friendly operating interface, operating platform uses high-quality touch screen, friendly interface, high sensitivity, easy to operate and learn; convenient to set parameters, multiple technical parameter display, easy to monitor
- Technical parameters automatic memory functions do not have to worry about data's lost or



reset, can provide first data for the module quality analysis.

- The system has a laminating frequency statistic function to search for the working frequency and module productivity, also can provide a preference for equipment maintenance period, debugging period and spare parts change period.
- Is a comprehensive system incorporating vacuum technology, air pressure conveying technology, PID technology, coding control and relay control system, can realize the technical laminating requirements of the monocrystal silicon and polysilicon.

IV、 safety measure

- When the operator enter the area protected by the light curtain during the process of upper cover lowering down, the process of the upper cover will stop to protect the operator's safety.
- When the upper cover reach the proper position the mechanical lock will lock automatically.
- Provide ultimate position locking bolt of the upper cover to provide mechanical protection for the operator.
- Provide manual charge system which can charge air into the upper and lower chamber when the electricity is shut down.
- Provide urged cover open system, one can open the upper cover when the electricity is shut down in emergency.
- Emergency button: There are emergency buttons in various positions of the equipment, operators can push them to stop the equipment when there is an emergency.
- Heating system over-heat protection, the equipment will be shut down and stop when the temperature exceeds the set range.
- Oil level testing and warning system in the heat conducting oil circulation to prevent danger caused by lacking oil.
- Vacuum warning system: when the vacuum degree does not reach the required level within the vacuum time, the system will give a warning.
- Unloading protection: prevent excessive unloading leads to the slide of the modules.



V、technical parameters and main configuration

NAM	Photovoltaic solar module laminator			
TYP	BSL2236OAC-F			
pare mete rs	Outline size	16800×3850×1850	weight	28T
	Power supply	AC380V3phases 5 lines	Compressed air pressure	0.6~0.8MPa 0.7 ~ 1.16 PSI
	Compressed air flow	≥400L/min	Laminated size	(2200X3600)mm ²
	Height of laminating chamber	30mm	Total capacity	140KW
	Working power	60KW	Vacuum pump speed	70L/S
	Control platform	Touch screen	Maximum heating	180°C
	Heating platform	irregularity≤250um	Temperate range	30°C--180°C
	Overall heating platform	Temperature non-uniformity ≤±1.5°C	Temperature control accuracy	±1°C
	Working temperature	Room temperature~175°C	Laminating time	Depend on the material
	Vacuum time	5~8min	Working vacuum degree	100~15Pa 0.01 ~ 0.02 PSI
	Distance of the upper cover	300mm		
MAIN	NAME	TYPE	BRAND	
SPAR	Upper/lower vacuum digital pressure sensor	AP-C31W	keyence	
PART	Air pressure sensor	AP-C33W	keyence	
S	AC contactor	LC1-D15000M7C	schneider	
	controller	CPU226CN	siemens	
	Touch screen	-----	Kunlun Tongtai	
	buttons、 switches	AR22V2R series	fuji	
	Photovoltaic switch	PZ-G×B series	keyence	
	module	EM231	siemens	



Qinhuangdao Boostsolar Photovoltaic Equipment Co., Ltd

module	EM235	siemens
gauge	SI-200×300-S	airtac
Solenoid valve	SY5120 series、VQ5300	SMC
Vacuum valve	National paten product	
Heat oil pump	RY series	Wu'an Hongtai heat oil pump factory
Convey belt	-----	Jiangyin tianxiang tape company
Silica gel plate	Thickness 4mm	Jiangyin Keqiang tape company
Teflon cloth	Thickness 0.35mm	Imported raw material,made in china

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