100MW PV Module Production Line

Pre-lamination | Laminating | After lamination

Capacity

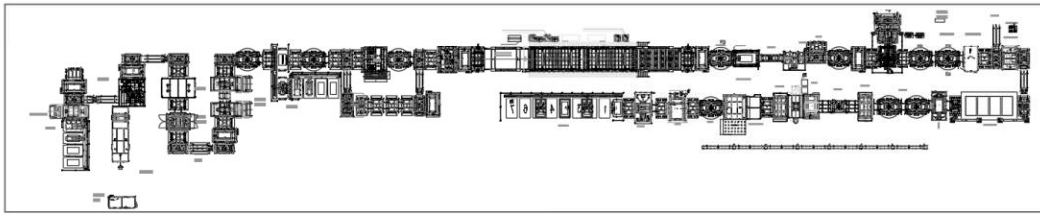
Type	Method	Line	UPH (Cell/Hr)	Capa. For each year (300-day production)
PV Module Production Line	144 half Cell	1	23Module/Hr 7200Cell/Hr	100MW

Parameters

Item	Values
Cell size	156mm-210mm
Number of busbar	9BB-12BB
Component dimension	L (2500-1640) mm , W (1400-950) mm
module type	Half cell, single /double glass, frames and without frames
Cycle	155±1s

Plant Requirements - Reference Indicators

Item	Values
floor area	2600㎡
Rated power	800kW
Air consumption	9000L/min
Required number of employees (per shift)	25/per shift



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List of Equipment in the Production Line

Tabbing | Layup | Busing | Test | Lamination

Pre-lamination Equipment

Click view quotation

Num	Name	Quantity	Function	links
1	Non-destructive Cutting Machine	1	Automatic cell cutting for 1/2,1/3 and 1/4 cut cell etc.	Click for Details
2	Auto Glass Loader	1	Places glass on the tray on the assembly line automatically	Click for Details
3	Auto MBB Cell Stringer	1	Soldering equipment for serial connection between cells，Compatible with 5BB-12BB, 156-220mm cells	Click for Details
4	Auto Layup Machine	1	Layup the finished strings	Click for Details
5	Auto Bussing Machine	1	After arranging strings, connect them to each other with a busbar (soldering)	Click for Details
6	Auto Taping Machine	1	Stick the tape between the strings to prevent the strings from shifting	Click for Details
7	Auto EVA Cutting and Layup Machine	1	Cut and layup EVA aumatically	Click for Details
8	Auto EVA/TPT Cutting and Layup Machine	1	Cut and layup second EVA and TPT aumatically	Click for Details
9	Auto Glass2 Loader	1	Places glass on the tray on the assembly line automatically，Used in the production of double glass components	Click for Details
10	Double-glass Repair Manipulator	1	Remove the second glass, and then reassemble the glass after repairing, which is suitable for the inline repairing process of double-glass modules	Click for Details
11	EL-VI Tester	1	Before lamination, complete the automatic detection and judgment of the appearance of virtual soldering, cracking, partial soldering, and missing corners, chipping, foreign objects, and alignment.	Click for Details
12	Automatic Edge Sealing Machine	1	Automatically complete the tape edge banding process of the double-glass module before lamination.	Click for Details

Laminating Equipment

Click view quotation

Num	Name	Quantity	Function	links
1	Laminator	1	Modules are encapsulated by heating and vacuuming	Click for Details

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List of Equipment in the Production Line

Assembly | Curing | Test | sorting

After lamination Equipment

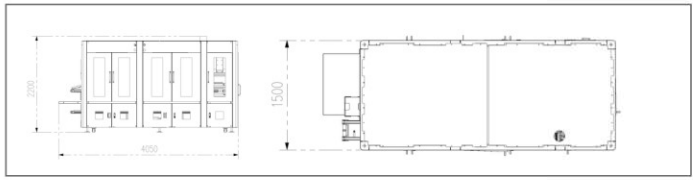
Click view quotation

Num	Name	Quantity	Function	links
1	Auto Trimming Machine	1	Automatic removal of burrs formed after lamination	Click for Details
2	90 Deg.Flipper	1	Flip the modules to an angle that is convenient for manual observation to check the quality of the modules	Click for Details
3	Auto Framing Machine	1	Automatically complete the grabbing and installation of frame	Click for Details
4	Auto Dispensing Machine for Frames	1	Automatic aluminum frame gluing	Click for Details
5	Glue Dispensing Machine for J-box on backside	1	Complete the bottom of the junction box for gluing	Click for Details
6	Glue Potting Machine for J-Box	1	Automatically pour glue into the junction box to seal the junction box	Click for Details
7	Glue Potting Manipulator	1	Realize automatic mobile glue potting	Click for Details
8	Auto J-box Soldering Machine	1	Automatic soldering junction box	Click for Details
9	Curing Manipulator	2	Before and after curing,complete fetching and placing of PV module	Click for Details
10	Auto Filing Machine	1	Realize automatic chamfering on the four sides of the modules	Click for Details
11	Hi-Pot testing Unit	1	Automatically complete the PV module Hi-pot test	Click for Details
12	Auto Calibration Machine	1	Realize the function of comparing production line modules with standard modules	Click for Details
13	IV Tester	1	Automatically complete the PV module power test	Click for Details
14	EL Tester	1	Automatic inspection of modules such as virtual soldering, cracking, partial soldering, etc.	Click for Details
15	Auto Labeling Machine	1	Automatically complete the PV module labeling	Click for Details
16	Auto Angle Protection Machine	1	Automatically completes the wrapping of the four corners of the modules	Click for Details
17	180 Deg.Flipper	2	Flip the modules 180° for easy manual inspection	Click for Details
18	Auto Sorter(7-speed)	1	Used for PV Module handling, stacking, unstacking and classified stacking.	Click for Details
19	Buffer	7	Modules buffering mechanism to prevent modules from accumulating in the production line	Click for Details
20	Conveyor	68	Automatic conveying unit for glass and PV module	Click for Details

Non-destructive Cutting Machine

Key Parameters

Quantity	**1**
Function	Automatic cell cutting for 1/2,1/3 and 1/4 cut cell etc.
Cycle	3600 pcs/h
Cell type	156-220mm，0.15-0.2mm(Thickness)， 1/2 is as standard, 1/3 is optional after upgrade
Scribing accuracy	±0.1mm
Defective rate	≤ 0.05%
Uptime	95%
Dimension	L3800mmX W1500mmX H2200mm
Rated power	9kW
Air consumption	600L/min
Weight	2500kg



Equipment Picture

Equipment Overview

Changeover convenient

- The parts needn't be replaced during a switch among different sizes of cells.
- After the first adjustment of the 1/2 and 1/3 cut cell, there is no need to replace the jigs, and automatic switching can be realized.

Humanized structure design

- The same-side return mechanism for loading and unloading, single-person loading and emptying of the material box at the same station, no need to stop when changing the material box.
- 4 double-material boxes for buffrt, replaced once every half an hour, and the feeding frequency is low.
- Upgradable box conveyor mode, support AGV trolley connecting stringer or cell buffer mechanism.

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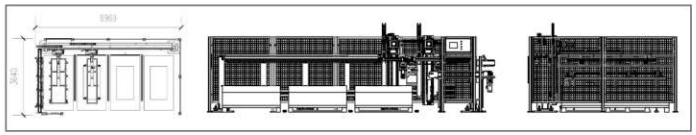
Auto Glass Loader

Key Parameters

Quantity	**1**
Function	Places glass on the tray on the assembly line automatically
Cycle	28s/module. (including paper gripping)
Component dimension	L (2500-1640) mm ， W (1400-950) mm
Robot gripping range	Height 100mm-1000mm
Weight capacity	50kg
Yield	≥99.8%
Uptime	≥95%
Dimension	L7000mm*W3650mm*H1800mm
Rated power	8.5kW
Air consumption	150l /min
Weight	1900kg



Equipment Picture

Equipment Overview

- Driven by servo motor and helical gear and chain and features high positioning accuracy and reliability.
- The suction tray is made of imported PPU and is furnished with dust cover in order to protect glass from scratch and trace.
- With vacuum detection function, the clamp can effectively prevent glass from dropping in the gripping process.

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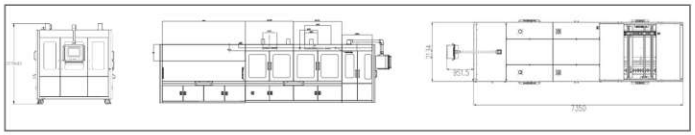
Auto MBB Cell Stringer

Key Parameters

Quantity	**1**
Function	Soldering equipment for serial connection between cells , Compatible with 5BB-12BB, 156-220mm cells
Cycle	3400±5% pcs/h(half cell)
Cell Type	half cell 156-220mm, paving and shingling can be upgraded.
Number of busbar	9BB-12BB
Ribbon size	Round ribbonφ0.25-0.45mm
Max.String length	2250mm
Cell spacing adjusted range (String length Max.)	-0.5 - 35mm adjustable, set as 0.01mm
Adjustable cell-box	Adjusted range 156-220mm
Uptime	95%
Dimension	L8300mm*W2200mm*H2300mm
Rated power	32KW
Air consumption	1000L/min
Weight	7200KG



Equipment Picture

Equipment Overview

Changeover convenient

- Simple mechanical structure, modular design, convenient switching and high equipment uptime rate.
- The switching of cells with the same bus bar spacing (the same size of ribbons) and the size difference within 10 mm only needs recipe switching in PC; the switching of cells with different bus bar spacing can be completed within 4 hours.

Expansion function

- Can upgrade string visual inspection, string EL testing, reflective ribbon, paving, shingling

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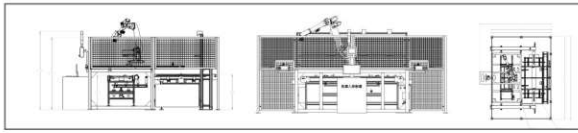
Auto Layup Machine

Key Parameters

Quantity	**1**
Function	Layup the finished strings
Cycle	5.5s/stings
Applicable Glass size	L (2500-1640) mm， W (1400-950) mm
Cell type	156-220mm, 9BB-12BB Half size cell:10 cells*12 strings/12 cells*12 strings,20cells*6strings, 24cells*6strings
Layup accuracy	±0.8mm
Breakage	< 0.02%
Conveyor height	loading 950±30mm，offloading 980±30mm，Cannot be adjusted separately
Cell strings transportation height	1220±20mm
Uptime	95%
Dimension	L4300mm*W5000mm*H2350mm
Rated power	12kW
Air consumption	350L/min
Weight	3000kg



Equipment Picture

Equipment Overview

- **Wide range of compatibility:** For full cell, half cell, 156-220mm/9BB-12BB modules
- **High precision:** use 6-axis robot and CCD to achieve high-precision layup
- **Convenient version switching:** the modules are centered and aligned with the production recipe, which can quickly realize the version switching
- **Convenient maintenance:** simple structure and low failure rate

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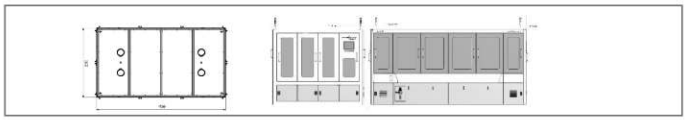
Auto Bussing Machine

Key Parameters

Quantity	**1**
Function	After arranging strings, connect them to each other with a busbar (soldering)
Cycle	22s/module
Cell Type	156-220mm, 1/2 、1/3, 9BB-12BB
Applicable Glass size	L (2500-1640) mm ， W (1400-950) mm
Adjustable string spacing	2-6mm
Busbar size	4-8mm (W) ，0.2-0.4mm (Thickness) ，Roll feed
Accuracy range	Automatic correction accuracy range: ≤±1mm Secondary layup accuracy: ≤±0.5mm
Breakage	< 0.02%
Material roll specifications	inner hole φ16mm-φ25mm, outer diameter ≤φ200mm
Uptime	95%
Dimension	L5050mm×W5050mm×H2500mm
Rated power	20kW
Air consumption	2000L/min
Weight	4000kg



Equipment Picture

Equipment Overview

Independent research and development of electromagnetic soldering device + intelligent temperature control + secondary correction to ensure soldering efficiency

Modular structure design, easy to debug

- The soldering head position adjustment rotary rod is designed on the outside of the equipment, and the position of each soldering head is individually adjustable
- For cells of the same specification, changing the number of bus bar and bus bar spacing does not require replacing the soldering head
- The rectifying suction cup holder is in the form of pulling and pulling, which can be directly compatible with 9-13 cells, no need to replace parts

Strong scalability

- Support bus bar punching function to enhance the firmness of the junction box during soldering.
- Upgradable 10 strings single bypass, 12 strings double bypass soldering function

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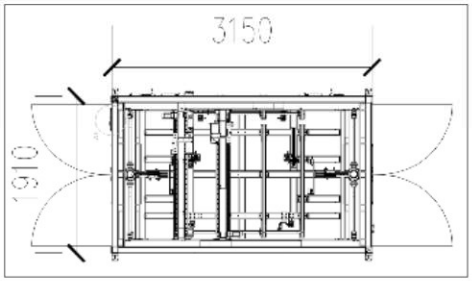
Auto Taping Machine

Key Parameters

Quantity	1
Function	Stick the tape between the strings to prevent the strings from shifting
Cycle	23±1s
Component dimension	L (2500-1640) mm ， W (1400-950) mm
Maximum applicable component weight	45kg
Accuracy	Cylinder, correction accuracy ≤ 1mm
Breakage	≤0.01%
Tape specification	5-15mm
Number of heads	4
Tape posting method	Suction pressing
Tape cutting length	20-30mm
Uptime	99%
Dimension	L3150mm*W1920mm*H1800mm
Rated power	5kW
Air consumption	300L/min
Weight	2500kg

Equipment Picture



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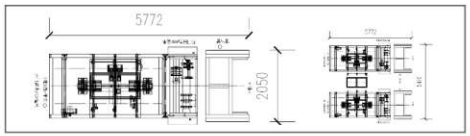
Auto EVA/TPT Cutting and Layup Machine

Key Parameters

Quantity	2
Function	EVA Cutting and Layup machine 1 set，Cut and layup EVA aumatically EVA/TPT Cutting and Layup machine 1 set,Cut and layup EVA and TPT aumatically
Cycle	23±1s
Cutting size	50-2500mm
Cutting width	1400mm
Max. Roll diameter	Roll diameter:400-850mm，Back sheet total length:1200m， EVA total length: 800m
Max. Roll weight	≥1000kg
Defective goods rate	≤0.05%
Precision request	EVA±2mm，back sheet±1mm，diagonal :1.5mm
Laying size request	±2mm
Uptime	99%
Dimension	L5280mm*W2150mm*H1650mm(two devices are side by side)
Rated power	16kW
Air consumption	9L/min
Weight	1500kg+2500kg

Equipment Picture



Equipment Overview

- EVA/BACK sheet Punch method，Air punching, which suitable for all size straight line cutting.Compatible for normal 3 line connection box cutting ,middle normal 3 line connection box cutting and half side cutting ,half length, 3 line connection box cutting,diagonal line connection box cutting.

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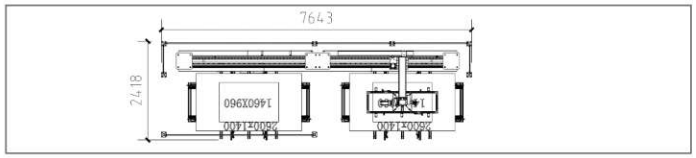
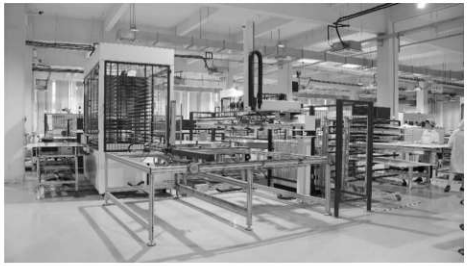
Auto Glass2 Loader

Key Parameters

Quantity	1
Function	Places glass on the tray on the assembly line automatically , Used in the production of double glass components
Cycle	28s/module. (including paper gripping)
Component dimension	L (2500-1640) mm , W (1400-950) mm
Robot gripping range	Height 850mm
Weight capacity	50kg
Yield	≥99.8%
Uptime	≥95%
Dimension	L7600mm*W2300mm*H3000mm
Rated power	4kW
Air consumption	250L/min
Weight	2000kg



Equipment Picture



Equipment Overview

Safety and Reliability

- With vacuum detection function, the clamp can effectively prevent glass from dropping in the gripping process;
- With brake function, the lifting gear does not drop at power-off state;
- The lifting and longitudinal displacement mechanism has extreme position limiting and warning function and features safety and reliability;

High positioning accuracy High space utilization

- The alignment mechanism carries out bidirectional alignment and features high positioning accuracy.
- The equipment carries out bidirectional transmission to improve space utilization.

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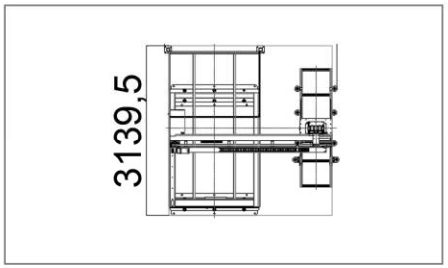
Double-glass Repair Manipulator

Key Parameters

Quantity	**1**
Function	Remove the second glass, and then reassemble the glass after repairing, which is suitable for the inline repairing process of double-glass modules
Cycle	0-18 m/min
Component dimension	L (2500-1640) mm, W (1400-950) mm
Conveyor height	950mm±50mm
Uptime	98%
Dimension	L3150mm*W2920mm*H2400mm
Rated power	1.5kW
Air consumption	150L/min
Weight	1400kg

Equipment Picture



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EL-VI Tester

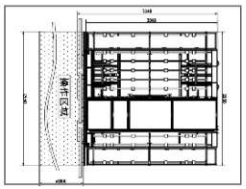
Key Parameters

Quantity	**1**
Function	Before lamination, complete the automatic detection and judgment of the appearance of virtual soldering, cracking, partial soldering, and missing corners, chipping, foreign objects, and alignment.
Cycle	23±1s/module
Cell Type	156-210mm，5BB\6BB\MBB Half cell ：6*20/6*24/6*26（156-166mm/18Xmm） 1/3 cell：5*30(210mm)
Maximum dimensions of module	L（2500-1640）mm， W（1400-950）mm
Camera resolution	EL 2040*1536, VI 4080*3072
Shooting mode	Downlighting, direct lighting, three-group scanning type
Module transfer	Long side forward(transverse transmission)
Uptime	99%
Dimension	L3240mm*W2950mm*H1930mm
Rated power	4kW
Air consumption	12L/min
Weight	2000kg

Equipment Picture

Equipment Overview

- The display system adopts AD accelerator card, fast imaging, multi-camera (4*3) to overcome the difference in depth of field and meet the layout of short-side single junction box, three-part junction box and middle three-part junction box
- Support AI-assisted defect determination, can mark cracks, fragments, virtual soldering, black spots, scratches, detection rate ≥ 95%
- The modules transmission method adopts dense roller plane transmission, and multi-point bearing modules are not deformed



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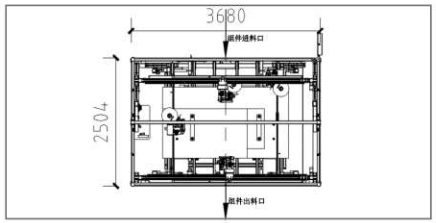
Automatic Edge Sealing Machine

Key Parameters

Quantity	1
Function	Automatically complete the tape edge banding process of the double-glass module before lamination.
Cycle	23±1s
Component dimension	L (2500-1640) mm ， W (1400-950) mm
Accuracy	±1mm
Reserved tape at the beginning	The function of reserving the beginning of the tape facilitates the personnel to remove the tape after lamination; the end length is ≥30mm
Appearance of tape after edge banding	The appearance of the tape after edge banding shall not show obvious wrinkles, wavy patterns, damage or other defects, wrinkle length ≤100mm
Uptime	99%
Dimension	L3700mm*W2500mm*H1600mm
Rated power	4.5kW
Air consumption	300L/min
Weight	2780kg

Equipment Picture



Equipment Overview

- Supports 2 edge sealing modes: one side is sealed with the whole tape, and the two ends are reserved for 30~40mm range without sealing tape
- Full sealing: the four sides of the module are fully sealed with tape, there is no gap, and the overlapping part is more than 1mm
- Half-sealed (used for corner protector): The overlap distance between the head and tail of each tape and the corner protector is ±1mm, and the length of the corner protector is 40mm. After replacing the corner protector, a jig can be used for semi-sealing.

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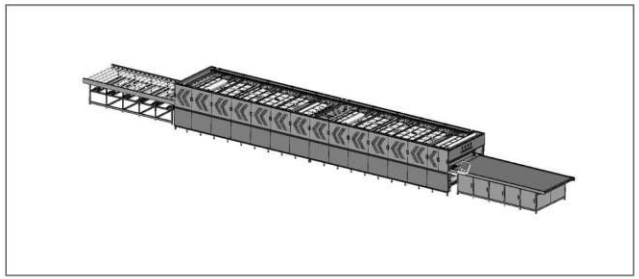
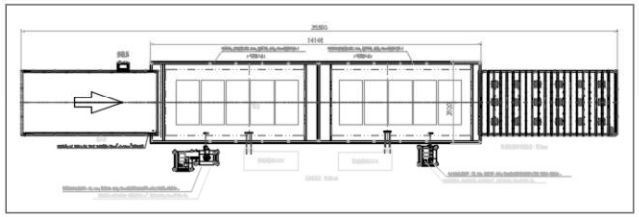
Laminator

Key Parameters

Quantity	1
Function	Modules are encapsulated by heating and vacuuming
Effective Laminated area	(5800X2700)㎡
Vacuum Pumping rate	First chamber≥600m³/H，Second chamber 70L/S
vacuum time	5～8min
Temperature controllable precision	±1℃
Heating plate surface temperature	±1.5℃
Temperature control range	control range --180℃
Vacuum degree	100～40Pa
Uptime	99%
Dimension	L25500mm×W3520mm×H1800mm
Rated power	80 KW
Air consumption	Single chamber flow rate:≥800L/min

Equipment Picture





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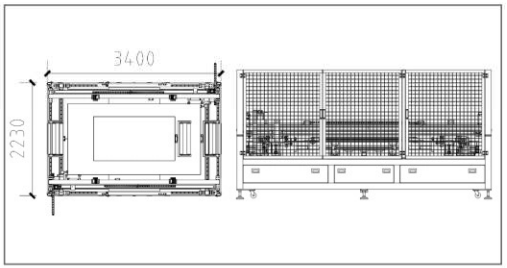
Auto Trimming Machine

Key Parameters

Quantity	1
Function	Raw edges after lamination are trimmed and recycled automatically
Cycle	28s/module
Component dimension	L (2500-1640) mm , W (1400-950) mm
Module transportation direction	Short side in, short side out
Yield	≥99.8%
Effect of trimming	After trimming, the cut surface is smooth with residual < 0.5mm, which will not cause damage to the glass
Uptime	95%
Dimension	L3400mm*W2230mm*H1800mm
Rated power	3kW
Air consumption	0.6 ~ 0.8MPa , 250L/min
Weight	1800kg

Equipment Picture



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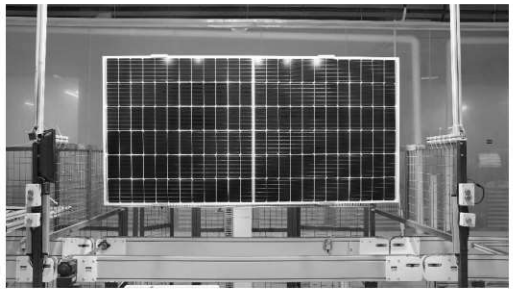
90 Deg.Flipper

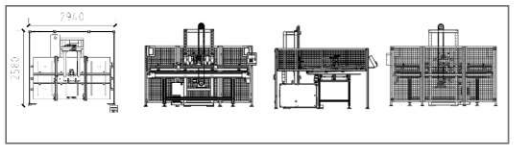
Key Parameters

Quantity	1
Function	Flip the modules to an angle that is convenient for manual observation to check the quality of the modules
Component dimension	L (2500-1640) mm ， W (1400-950) mm
Module transportation direction	Short side in, short side out
Yield	≥99.8%
Turnover effect	With a brake, the tilt motor is stable and does not shake
Uptime	98%
Dimension	L2890mm*W2530mm*H2300mm
Rated power	2.6kW
Air consumption	50L/min
Weight	900kg

- The 90° turnover inspection unit is driven by servo motor and turbine worm reducer and features structural stability and reliability and turnover stability.
- The complete machine has power-off protection and air shortage protection function and its components do not fall off in case of an emergency.

Equipment Picture





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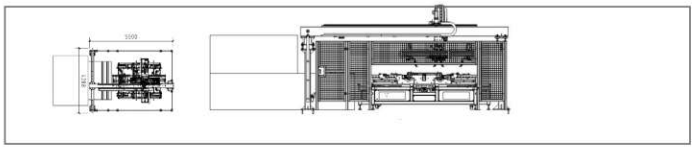
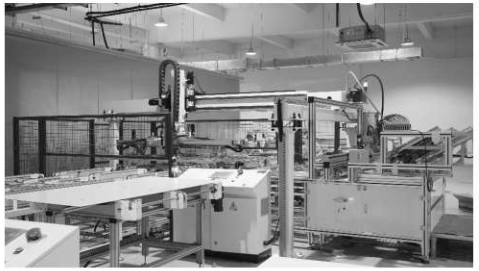
Auto Framing Machine

Key Parameters

Quantity	1
Function	Automatically complete the grabbing and installation of frame
Cycle	28s/module
Component dimension	L (2500-1640) mm , W (1400-950) mm
Module diagonal tolerance	≤1.5mm
Opposite sides length tolerance	≤1mm
Framing tolerance	≤0.3mm
Frame width specification range	30mm~50mm
Yield	≥99%
Rated power	95%
Dimension	L5560mm*W4030mm*H3000mm
Rated power	12.7kW
Air consumption	300L/min
Weight	4600kg



Equipment Picture



Equipment Overview

- Framing is driven by servo motor, transmitted by ballscrew and directed by linear track make frame positioning accurate and running steadily.
- Framing position torsion is detected by PLC instantly to ensure accuracy and non-breakage.
- Framing manipulator is driven by servo motor, transmitted by timing belt, directed by linear track to make frame positioning accurate and running steadily.
- It is equipped with frame straightening system to straighten long and short edge of the frame.

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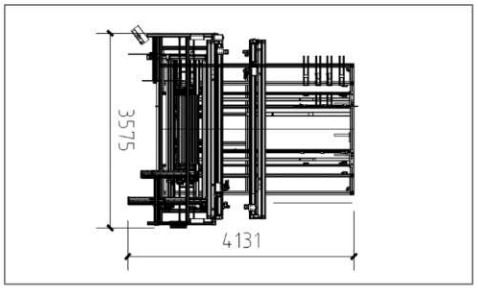
Auto Dispensing Machine for Frames

Key Parameters

Quantity	1
Function	Automatic aluminum frame gluing
Cycle	23±1s/module
Component dimension	L (2500-1640) mm， W (1400-950) mm
Maximum effective stroke	2500mm
Repeatability	±1mm
Deviation	±3 %
speed	0-700mm/s adjustable, each frame speed can be set separately
Feeding method	Storage material, can store 15 sets, compatible with no C frame
Uptime	99.8%
Dimension	L3200mm*W2900mm*H2000 mm，台面总高950mm
Rated power	2.5kW
Air consumption	160L/min
Weight	900kg

- Closed-loop control, according to the outlet pressure or glue flow rate to adjust the glue pressure in real time to ensure the uniformity of the glue.
- PF2000 electronic control precise measurement, PF2000 electronic control precise measurement, real-time display on each side of the touch screen glue out time and the plastic volume.

Equipment Picture



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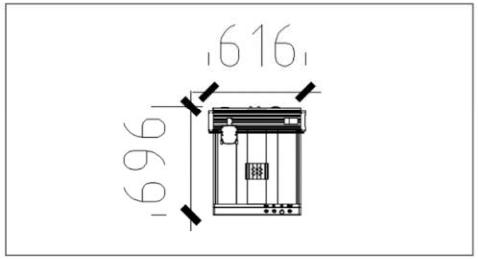
Glue Dispensing Machine for J-box on backside

Assembly | Curing | Test | sorting

Key Parameters

Quantity	1
Function	Complete the bottom of the junction box for gluing
Cycle	10s
Machine trip	X 400 mm * Y400mm * Z 100mm
Motion system repeatability	±0.05mm
Operating mode	Button mode
Uptime	99.9%
Dimension	L700mm *W620mm*H600mm
Rated power	0.8kW
Air consumption	8L/min
Weight	55kg

Equipment Picture



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