General Contents

11. Specifications

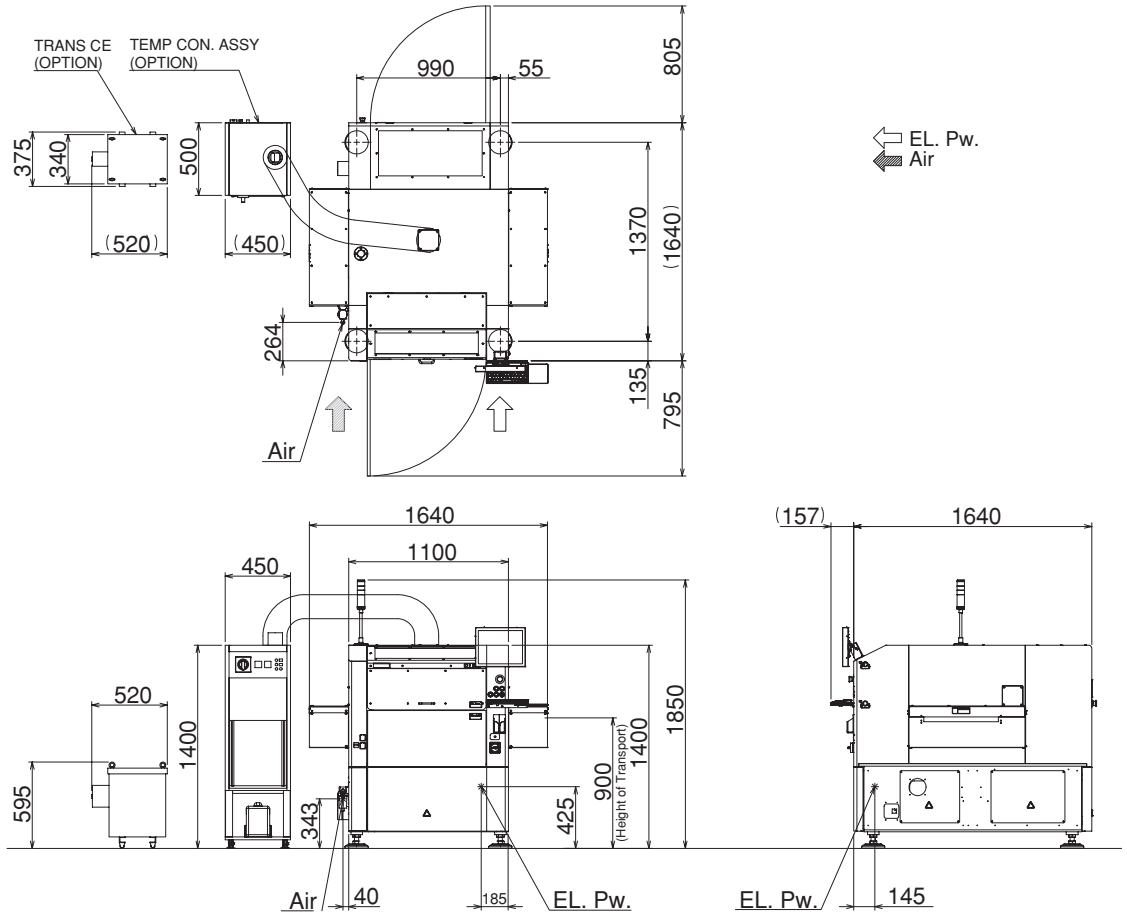
11.1 Major specifications

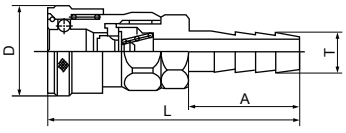
Outside dimensions	L1,640 x W1,640 x H 1,400 mm (Height and depth exclude projections, such as monitor, keyboard, and signal tower, etc.) L1,973× W1,640 × H1,400mm (carry-out side extension conveyor)
Main body weight	Approx. 1,500 kg (with standard specifications) Approx. 80 kg (air-conditioner) Approx. 60 kg (overseas voltage transformer: for air-conditioner)
Noise to be produced	78dB (A) or less

* The dimensions exclude any removable projection parts.

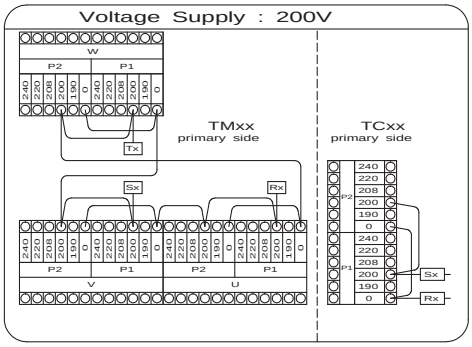
* For details about detailed dimensions or dimensions with various options installed, see the figure below.

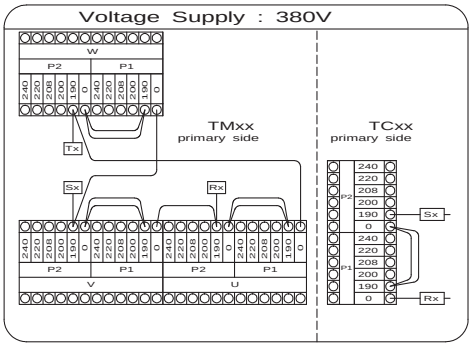
* The following figure shows the machine with various options installed, such as air-conditioner.

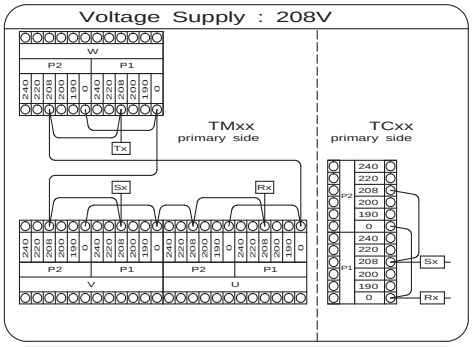


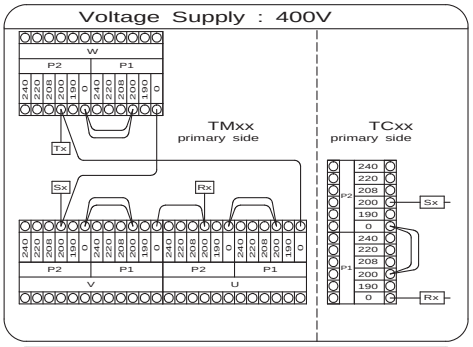
Air supply source	0.45 MPa or more (4.5 kgf/cm^2 or more), clean and dry air * Supply the air with excellent quality that has passed through the air dryer and air filter on the line side of the air supply source. (The air filter built-in this machine is intended to protect the machine. To maintain the function and performance of this machine at their optimal levels for an extended period of time, it is necessary to keep the clean and dry status on the line side of the customer's air supply source.)
Air connection coupler (Attached to the main body)	NITTO's HI coupler 30SH socket side  D: Φ26.5 mm, T: Φ11.3 mm, L:76.5 mm, A:34 mm * To maintain a sufficient air flow rate, use 3/8-inch air hose (inside diameter is Φ8 mm or more).

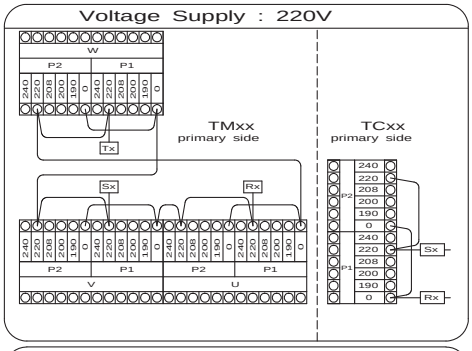
Air consumption flow rate	190 liters/min. (ANR) (Standard specifications) 290 liters/min. (ANR) (Board pickup clamp option is used.) * "ANR" is an abbreviation of "Atmosphere Normal de Reference" and shows the standard reference atmospheric status (temperature is 20°C, relative humidity is 65%, and absolute pressure is 101.3 kPa (1.03 kgf/cm2 or 760 mmHg)).
Power supply	Power supply frequency 3-phase AC 200/208/220/240/380/400/416V ±10%, 50Hz / 60Hz
	<Printer main body> Power capacity: 3.0 kVA Average power consumption: 1.0 kW (Only the main body is operated under standard conditions.)

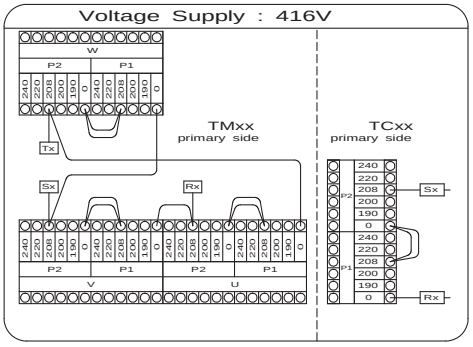


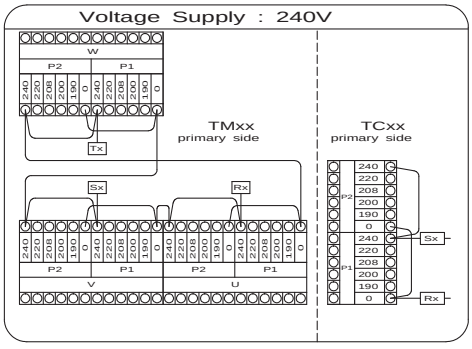




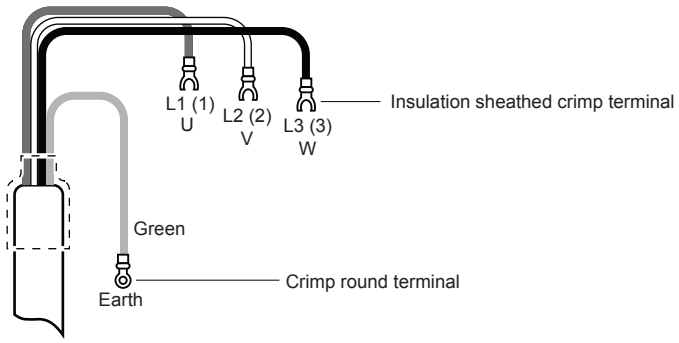








50Hz	60Hz

<table>
<tr><td rowspan="2">Power supply connection</td><td colspan="2">Power supply cable Conductor cross-sectional area is 3.5 mm^2 or more.</td></tr>
<tr><td colspan="2"> 

* To prevent electric shock accident, make sure that the main power supply is shut down securely before connecting the power supply.
* Connect the main body grounding cable securely.
* The air-conditioner needs another power supply that is separated from the printer main body.</td></tr>
<tr><td rowspan="10">Environmental conditions</td><td>Temperature</td><td>Function assurance: 15 to 30°C
Accuracy assurance: 20 to 28°C
Recommended operating temperature: 23 to 26°C</td></tr>
<tr><td>Humidity</td><td>Function assurance: 20 to 80% (No dew condensation allowed.)
Recommended operating humidity: 40 to 60%
* Keep a humidity of approx. 40% or more as static electricity prevention measures.
* When using an industrial humidifier, use water equivalent to DI water.</td></tr>
<tr><td>Atmosphere</td><td>There shall be no dirt and dust.
There shall be no organic solvent vapor, sulfurous acid gas, chlorine gas, and flammable gas.</td></tr>
<tr><td>Altitude</td><td>1,000 m or less above sea level
* This avoids that the air pressure or cosmic ray adversely affects the insulation performance.</td></tr>
<tr><td>Installation floor status</td><td>The floor withstanding load capacity shall be approx. 500 kg/m^2.
* For the floor withstanding load capacity, consult the specialists who know the installation place well with the information on equipment weight, floor sharing area, and adjuster foot positions.
* The floor shall be flat and have sufficient strength so that it does not vibrate during operation.
The floor shall have the concrete strength or its equivalent.
In particular, wooden floor, office floor, and grating are not allowed to use.
* If the floor is not concrete, consult the specialists who know the installation place well and construct the reinforcement work for the portions where the equipment feet are placed.</td></tr>
<tr><td>Ambient noise</td><td>There shall be no significant noise.
Equipment operation sound and alarm sound can be heard without fail.</td></tr>
<tr><td>Ambient light</td><td>Strong light, such as sunlight does not enter the vision system.</td></tr>
<tr><td>Immunity/Electro magnetic resistance or electro magnetic susceptibility</td><td>See “10.5 CE marking”.</td></tr>
<tr><td>Emission/electro magnetic noise production or electro magnetic noninterference</td><td>See “10.5 CE marking”.</td></tr>
</table>

Board transport speed	50 to 550 mm/sec.: 50Hz/60Hz (Transport speed settings at shipment, Low-speed: 200 mm/ sec., High-speed: 400 mm/sec.) * The transport speed may vary depending on the board weight, etc.
Printing capability	11.0 sec./cycle * YAMAHA's optimal conditions: L 180 x W 130 board size, squeegee speed 100 m/sec., rolling stroke 40 mm, over-stroke 10 mm, board hold flap is used., board separation distance 2 mm, board separation speed 2 mm/sec., cleaning work is not performed. To verify the printing capability with the customer's board, mask, and solder paste, the separate evaluation experiment is needed. For details, contact YAMAHA.
Printing accuracy (YAMAHA's evaluation test board, standard mask, and standard solder paste are used.)	Printing accuracy (3s): ± 0.025 mm Position repeatability (3s): ± 0.005 mm

Signal tower color specifications	TYPE A	TYPE B	TYPE A is YAMAHA's standard specifications while TYPE B is often used in the EU area.
	Red lamp	While lamp	Emergency stop status (emergency stop button or safety cover switch is activated.)
	Yellow lamp	Blue lamp	Stop status due to error stop (recognition error or board clamp error, etc.) or interlock.
	Green lamp	Green lamp	Automatic operation is running.
Operation panel button color specifications	TYPE A	TYPE B	TYPE A is YAMAHA's standard specifications while TYPE B is often used in the EU area.
	White	White	READY (Emergency stop status or servo ON)
	White	White	RESET (Data reset)
	Green	Green	START (Automatic operation start)
	Red	White	STOP (Automatic operation stop)
	Yellow	Blue	ERROR CLEAR (Error lock status cancellation)
Languages used on display screens and in manuals	Selected from Japanese, English, Chinese, and Korean. Make desired selections using [B00092] Display language and [B00098] Language written in manual in "1. Machine configuration". When installing this equipment in an EU country, see "10.5 CE marking".		
Entry data	100MB/machine Data entry method: Data entry unit supplied with the machine main unit		
Minimum positioning resolution settings	X-axis/Y-axis/Z-axis: 0.001 mm R-axis: 0.001°		
Mask and board correction ranges	X: ±6.4 mm Y: ±10 mm R: ±1.0°		
External interface	LAN 1 port (See "7.8 Network" and "7.9 Anti-virus measures".)		
Internal memory	Built-in 1GB Flash Card * 1 pc. * For storage of files, such as OS, printer application software, board data, mask data, squeegee data, vision data, machine information, and production history information, etc.		
External memory	USB flash memory with a capacity of 1GB or more * 1 pc. (Supplied as standard accessory.: For data backup)		
Board transport height	900 mm ± 10 mm (From the floor level to the top surface of the transport belt.)		

11.2 Printing section (3S head)

11.2.1 Printing section

Item	Specifications
Printing application pressure (printing pressure) producing system	AC servomotor + compression spring drive
Printing pressure control method	Load cell sensor is built-into the application pressure producing system to construct the feedback control circuit.
Printing pressure setting range	Setting range: 5 to 200N Control accuracy: In a range of 5 to 100N, ±2N (feedback control) In a range of 100 to 200N, ±2% (feedback control)
Squeegee printing direction	Direction perpendicular to the board transport direction (conveyor width direction)
Squeegee printing speed setting range	Setting range: 2 to 200 mm/sec.
Squeegee up/down drive system	AC servomotor * Doubles as printing application pressure (printing pressure) producing system. Solder drip prevention effect can be expected using the deceleration setting of the up/down speed.
Relationship between squeegee and mask	Mask surface follow-up effect to support one point of the squeegee center in the horizontal direction is produced (floating in the rotation direction).
Board separation process pattern	10 steps/program * The board separation speed and board separation distance shown below are combined to sequentially execute up to ten steps.
Board separation distance setting	Setting range 0.01 to 5.00 mm Control unit 0.01 mm
Board separation speed setting	Setting range 0.01 to 20.00 mm/sec. Control unit 0.01 mm/sec.

11.2.2 3S head

Item		Specifications		
Squeegee configuration		One squeegee configuration * Both ends (blade parts) of one dedicated squeegee are used in the forward and backward squeegee printing directions. * Easy cleaning work and reduction of waste solder are expected.		
Attack angle		Variable change from 45° to 65° * It is expected to set optimal conditions and improve the filling ability according to the viscosity and thixotropy of the solder.		
Squeegee		Metal squeegee or urethane squeegee (hardness 90)		
Settable rolling stroke (*)	**Attack angle**	45°	55°	65°
	Board width is 440mm or less.	50mm or less	50mm or less	50mm or less
	Board width is 460mm.	50mm or less	46mm or less	40mm or less
Over stroke		5 to 15mm		

* If the board width exceeds 440mm, the settable rolling stroke may vary depending on the attack angle.

* For details about double squeegee head (option), see “12.8.2 Double squeegee head”.

11.2.3. 3S head - Additional set

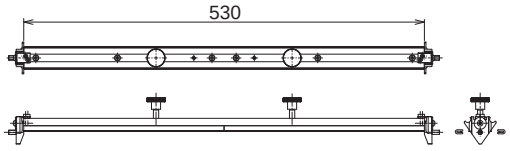
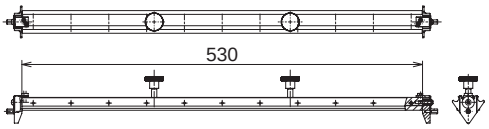
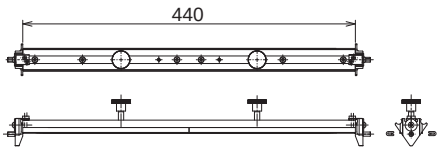
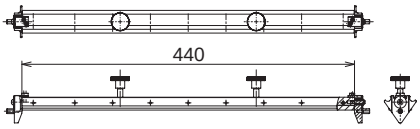
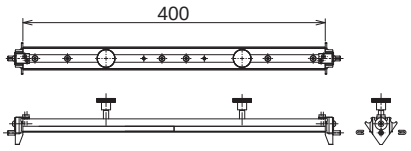
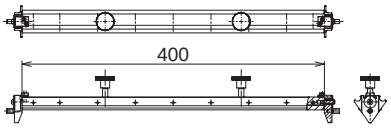
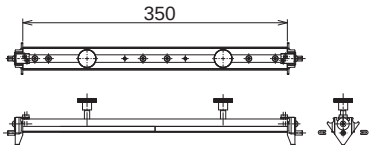
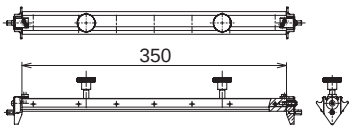
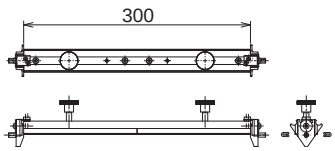
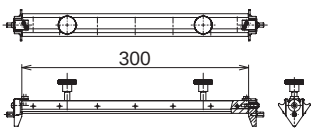
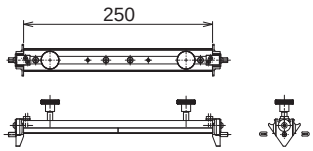
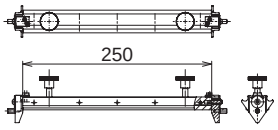
12 kinds of squeegee and holder sets for the 3S head installed in the machine at shipment from the factory are provided. Select a desired squeegee and holder set using [B00004] Squeegee & holder set installed at shipment in “1 Machine configuration”.

* Only one squeegee & holder set is installed in the 3S head.

The metal squeegee is equipped with the cover that protects the blade separated from the 3S head.

Squeegee & holder sets with different materials and lengths can be additionally arranged as spare parts for the 3S head to be included in the machine.

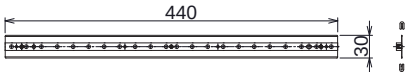
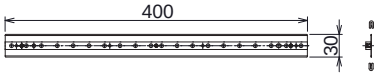
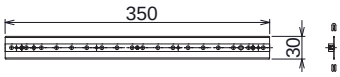
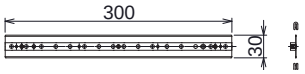
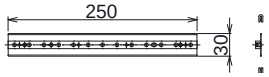
Set additional options using [B00501] to [B00556] Spare squeegee & holder set in “3. Arrangements/ -1- Squeegee & holder”.

Squeegee length	Metal squeegee & holder set	Urethane squeegee & holder set
530mm	"KHT-M71A0-00X, Metal Assy 3S 530"	"KHT-M71B0-00X, Urethane Assy 3S 530"
	B00004 B00501 	B00004 B00551 
440mm	"KHT-M71A0-10X, Metal Assy 3S 440"	"KHT-M71B0-10X, Urethane Assy 3S 440"
	B00004 B00502 	B00004 B00552 
400mm	"KHT-M71A0-20X, Metal Assy 3S 400"	"KHT-M71B0-20X, Urethane Assy 3S 400"
	B00004 B00503 	B00004 B00553 
350mm	"KHT-M71A0-30X, Metal Assy 3S 350"	"KHT-M71B0-30X, Urethane Assy 3S 350"
	B00004 B00504 	B00004 B00554 
300mm	"KHT-M71A0-40X, Metal Assy 3S 300"	"KHT-M71B0-40X, Urethane Assy 3S 300"
	B00004 B00505 	B00004 B00555 
250mm	"KHT-M71A0-50X, Metal Assy 3S 250"	"KHT-M71B0-50X, Urethane Assy 3S 250"
	B00004 B00506 	B00004 B00556 

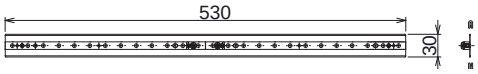
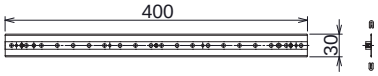
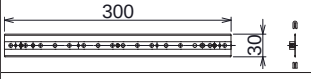
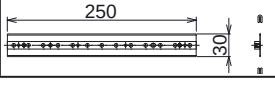
11.2.4 3S head - Additional squeegee

18 kinds of replacement squeegee single units (excluding the holder) for the 3S head are provided. Set additional options using [B00511] to [B00566] Spare squeegee single unit in “3. Arrangements/ -1- Squeegee & holder”.

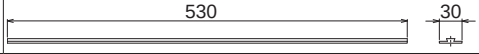
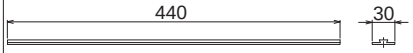
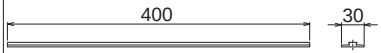
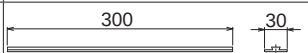
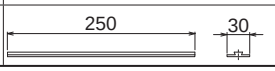
3S metal normal blade single unit

Reference No.	Class	Size/Part No., Part name	
B00511	530mm		KHT-M71AA-A0X, Metal SQG Weld 3S 530
B00512	440mm		KGY-M71EA-A0X, Metal SQG Weld 3S 440
B00513	400mm		KGY-M71DA-A0X, Metal SQG Weld 3S 400
B00514	350mm		KGY-M71CA-A0X, Metal SQG Weld 3S 350
B00515	300mm		KGY-M71BA-A0X, Metal SQG Weld 3S 300
B00516	250mm		KGY-M71AA-A0X, Metal SQG Weld 3S 250

3S metal thin plate blade single unit for half-etching mask

Reference No.	Class	Size/Part No., Part name	
B00521	530mm		KHT-M71AA-B0X, Metal SQG(S) Weld 3S 530
B00522	440mm		KGY-M71EA-B0X, Metal SQG(S) Weld 3S 440
B00523	400mm		KGY-M71DA-B0X, Metal SQG(S) Weld 3S 400
B00524	350mm		KGY-M71CA-B0X, Metal SQG(S) Weld 3S 350
B00525	300mm		KGY-M71BA-B0X, Metal SQG(S) Weld 3S 300
B00526	250mm		KGY-M71AA-B0X, Metal SQG(S) Weld 3S 250

3S urethane squeegee single unit

Reference No.	Class	Size/Part No., Part name	
B00561	530mm		KHT-M71BB-00X, Urethane SQG 3S 530
B00562	440mm		KGY-M71K3-A0X, Urethane SQG 3S 440
B00563	400mm		KGY-M71J3-A0X, Urethane SQG 3S 400
B00564	350mm		KGY-M71H3-A0X, Urethane SQG 3S 350
B00565	300mm		KGY-M71G3-A0X, Urethane SQG 3S 300
B00566	250mm		KGY-M71F3-A0X, Urethane SQG 3S 250

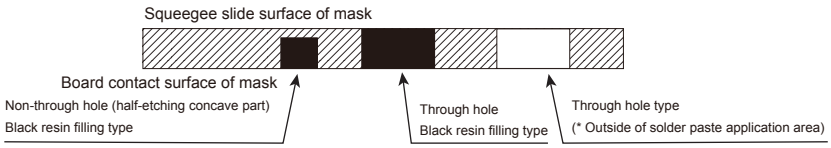
11.3 Mark recognition section

The machine is equipped with a vision camera system shown in the table below to recognize the board mark and mask mark, and inspect the printed solder paste.
Make desired selections using [B00012] Board FID mark vision camera, [B00013] Print mask vision camera, [B00011] Print inspection camera in "1. Machine configuration".

11.3.1 Board vision camera (CCD camera unit for board mark recognition)

Item	Remarks
System	Board FID mark vision camera (standard) * FID: An abbreviation of fiducial
Layout area	CX-axis above conveyor
Field-of-view	5mm x 5mm
Application	Fiducial mark detection, bad mark detection, and teaching
Kinds of marks	Circle Φ 0.5 to 2 mm (YAMAHA's recommendation), Square Φ 0.5 to 2 mm, Rhombus Φ 0.5 to 2 mm • The difference between the bright and dark portions on the mark side and background board side shall be sufficient. (The contrast shall be clear.) • There shall be no scratch on the mark surface. • It is accepted that the light reflector is located on either the mark side or background side. • There shall be no resist, silk print, and other pattern with optical property similar to the mark in an area with a width of 0.2 mm from the outer periphery of the mark (doughnut shape or frame shape). A shape to be scanned shall be unique within the detection area. * Set a detection area so that similar shapes are not included.
Mark surface	Copper foil, gold plating, solder leveler (plating)
Background material	Glass fiber reinforced epoxy resin board is optimal. * For ceramic or polyimide (flexible boards), the verification test is needed.
Detection area	Enter numeric values within the field-of-view range to set a detection area. (This eliminates waste image processing time.)
Mark layout	2 points or 4 points on board (It is preferable that the marks are located on the diagonal line.)

11.3.2 Mask vision camera (CCD camera unit for mask mark recognition)

Item	Remarks
System	Mask mark vision camera (standard)
Layout area	Side surface of main stopper, MS-axis
Field-of-view	Approx. 10 mm x 7.5 mm
Application	Mask mark detection (Marks created on the back side of the mask are detected.)
Mark specifications	Marks are formed so that images can be detected on the board contact side of the mask (back side and top side).  • The difference between the bright and dark portions on the mark and mask surface shall be sufficient. (The contrast shall be clear.) • It is preferable that the mark is the black resin (carbon) filling or through hole (* outside of the solder paste application area). It is accepted that the bright and dark portions on the mark and mask surface are reversed. When the raw material of the mask is resin or mesh woven fabric, the optical transparency shall be checked carefully. • Circle Φ 0.5 to 2 mm (YAMAHA's recommendation), Square Φ 0.5 to 2 mm, Rhombus Φ 0.5 to 2 mm • There shall be no scratch and contamination on the mark surface. • There shall be no pattern with optical property similar to the mark in an area with a width of 0.2 mm from the outer periphery of the mark (doughnut shape or frame shape). The mark shape shall be unique in the field-of-view.
Mark position	Back side of mask (Board surface side) 2 points or 4 points in a range of X: Mask center ± 255 and Y: Mask center ± 230. * It is preferable that the mask mark position corresponds to the board recognition mark.

* For details about print inspection camera, see "12.3 Print inspection camera specifications".

11.4 Cleaning system

This cleaning system is intended to automatically clean the board contact surfaces (back side and top side) of the mask after mask separation. (The manual cleaning is also possible.)
Fine solder paste residue is removed through the wiping with the non-woven fabric and suction cleaning with the blower.
The wet or dry wiping can be selected and the speed and the number of repetition cycles can also be set.
According to the board print cycles and elapsed time, the cleaning process program is executed intermittently.
Set an applicable length (board length in the conveyor transport direction or width of cleaning non-woven fabric) of the cleaning system at shipment from the factory using [B0052] Cleaner head & non-woven fabric roll in "1 Machine configuration".

Item		Specifications
System		Cleaning in cooperation between dry/wet non-woven fabric wiping and blower suction
Intermittent operation control *** Print count setting and elapsed time setting can be used together.**	**Print count setting**	• Cleaning is performed at intervals of printed boards set in the program. Cleaning method: Auto/Manual/Auto and Manual are used together. Automatic cleaning mode: Wet/dry/Wet and Wet are used together.
	Elapsed time setting	• Cleaning is performed when the elapsed time reaches the machine stop time or standby time set in the program. Cleaning method: Auto/Manual Automatic cleaning mode: Wet/Dry
Cleaning non-woven fabric		・Width of non-woven fabric: 530 mm/440 mm/360 mm/260 mm ・Outside diameter of roll: Approx. ϕ 90 mm (Approx. 30 mm roll) ・Core paper tube: Inside diameter, ϕ 25.4 mm, Paper thickness, 2 mm * Set desired items using [B00052] Cleaner head & non-woven fabric roll and [B00296 to B00299] BEMCOT paper roll for cleaning (spare) in "1. Machine configuration". * Be sure to use the cleaning non-woven fabric specified by YAMAHA that is set as described above. If other non-woven fabric is used, this may cause insufficient cleaning effect or malfunction. In particular, if the cleaning head specifications do not meet the width, serious trouble may occur in the machine unit.
Solvent tank		Front and rear, 550cc each
Solvent designation		Ethyl alcohol or isopropyl alcohol CAUTION: Use of solvent other than that shown above may cause, • Higher toxicity for human body. • Stronger flammability. • Damage to equipment part, electric circuit, or other plastic tube, or promotion of deterioration. In the worst case, fire may occur. So, do not use other solvent. Particularly, never use acetone.
Dry wiping		Forward movement speed setting: 1 to 225 m/sec. Backward movement speed setting: 1 to 225 m/sec. Forward and backward movement repetition cycles can be set.
Wet wiping		Forward movement speed setting: Specified by the machine. Backward movement speed setting: 1 to 225mm/sec. Forward and backward movement repetition cycles can be set.

* The board count control and elapsed time control can be set enabled at the same time.

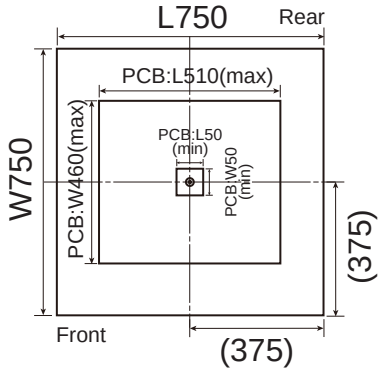
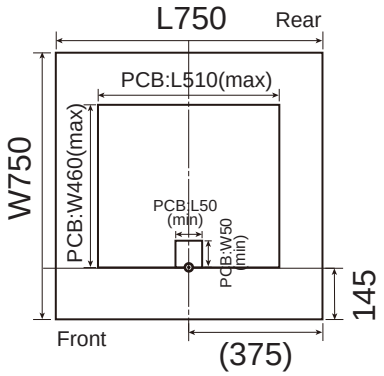
11.5 Applicable board specifications

11.5.1 Target board dimensions

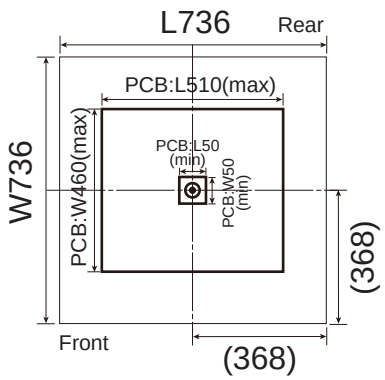
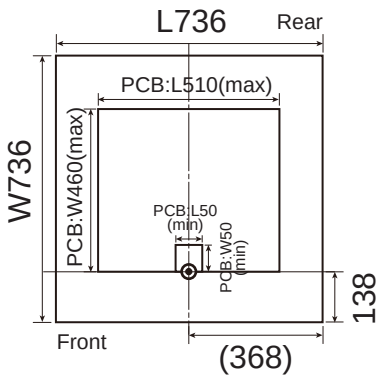
Maximum board size: L 510mm x W 460mm
Minimum board size: L 50mm x W 50mm

* The target mask to be combined with the board may vary as shown in the table below.
* "L" is a direction along the transport direction while "W" is a direction perpendicular to the transport direction.
* A printing area (L 600mm) or a board transport (L 610mm) can be supported as a custom-order item.

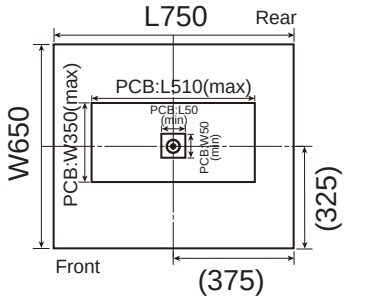
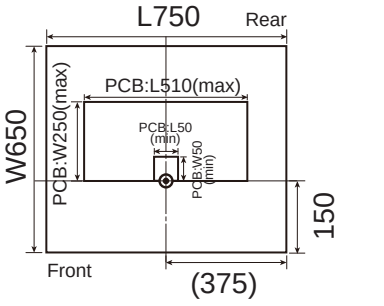
1. Mask size is L750 x W750mm.
⇒ Board size L50 x W50mm (minimum) to L510 x W460mm (maximum)

Center reference (Center basis)	Front reference (Front-edge basis)
	

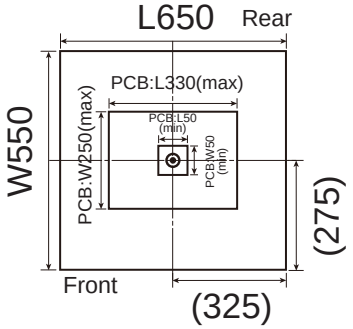
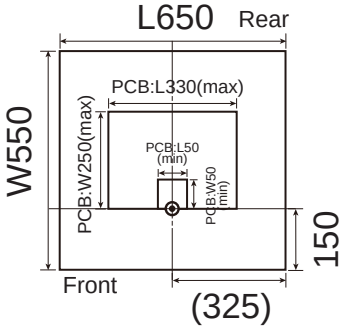
2. Mask size is L736 x W736mm.
⇒ Board size L50 x W50mm (minimum) to L510 x W460mm (maximum)

Center reference (Center basis)	Front reference (Front-edge basis)
	

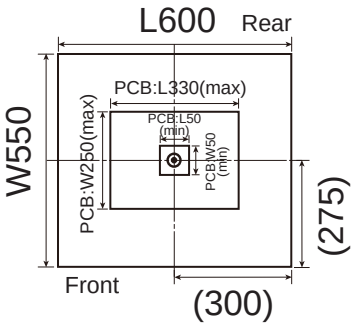
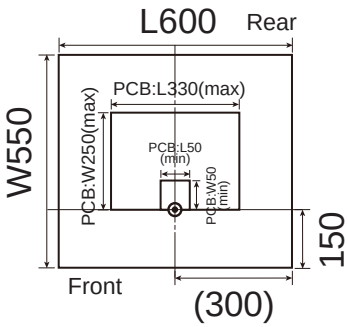
3. Mask size is L750 x W650mm.
⇒ Board size L50 x W50mm (minimum) to L510 x W350mm (maximum)

Center reference (Center basis)	Front reference (Front-edge basis)
	

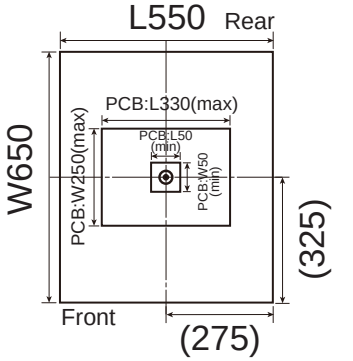
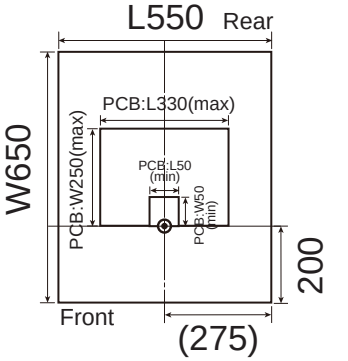
4. Mask size is L650 x W550mm.
⇒ Board size L50 x W50mm (minimum) to L330 x W250mm (maximum)

Center reference (Center basis)	Front reference (Front-edge basis)
	

5. Mask size is L600 x W550mm.
⇒ Board size L50 x W50mm (minimum) to L330 x W250mm (maximum)
For this mask size, [B00071] Mask clamp adapter (left and right paired set) in “1 Machine configuration” is required.

Center reference (Center basis)	Front reference (Front-edge basis)
	

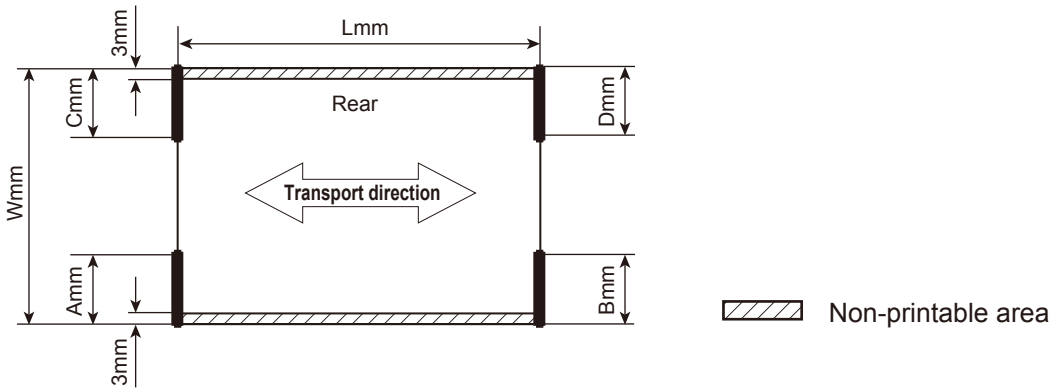
6. Mask size is L550 x W550mm.
⇒ Board size L50 x W50mm (minimum) to L330 x W250mm (maximum)
For this mask size, [B00071] Mask clamp adapter (left and right paired set) in “1 Machine configuration” is required.

Center reference (Center basis)	Front reference (Front-edge basis)
	

11.5.2 Board specifications

The target board includes non-printable areas as illustrated below. (This non-printable area is used as measures for the printed board inspection operation mode or the transport conditions of the surface mounter that becomes a post-process machine.) Additionally, 8mm-straight zones expressed by “A” to “D” are required to bring the mask in contact with the stopper.
The machine is moved to the "A" to "D" portion according to the board transport direction and conveyor reference of the machine configuration. (Either the front side or rear side of the conveyor transport system of the connected production line machines is set to the fixed reference. The conveyor of the printer also needs to be adjusted to this setting.)

* "L" is a direction along the transport direction while “W” is a direction perpendicular to the transport direction.



Board material : Glass fiber reinforced epoxy resin (For other materials, contact YAMAHA separately.)

Board thickness : 0.4 to 3.0 mm (For boards with a thickness of 1 mm or less, a board pickup clamp system (including warp prevention system: option) is required.)

Board weight : 1.0 kg/sheet or less (If the board weight exceeds this level, contact YAMAHA separately.)

Board warpage : Upper side ≤ 1.0 mm, Lower side ≤ 0.5 mm

Notch prohibited area : Board transport direction : Right SY → Left, front reference : A=8mm
Board transport direction : Left → Right, front reference : B=8mm
Board transport direction : Right → Left, rear reference : A,C=8mm
Board transport direction : Left → Right, rear reference : B,D=8mm

11.5.3 Restrictions on components on back side of board

In the double-side mounting process or jig transport printing process, there are projections (components or jigs) on the back side of the board before the printing work. The following shows allowable dimensions of such projections.

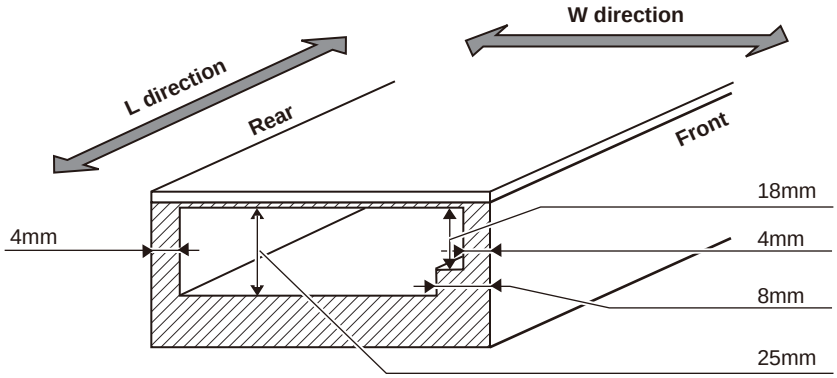
* "L" is a direction along the board transport direction while "W" is a direction perpendicular to the transport direction.

Height from back side of board: 25 mm or less

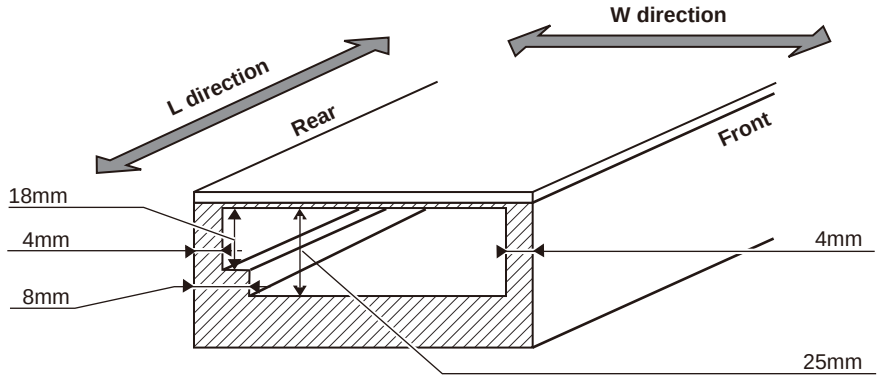
0 mm or less in an area of 4 mm from both ends in the board width directio

18 mm or less in an area of 4 to 8 mm from the conveyor end on the fixed side.

When the front is the conveyor reference:



When the rear is the conveyor reference:



11.5.4 Restrictions on slit board and through hole in board

Slit width: 3 mm or less

Through hole diameter: ϕ 3 mm or less

Sensors (reflection and transmitted light types) are laid out on the conveyor so as to check the position of the board to be transported.

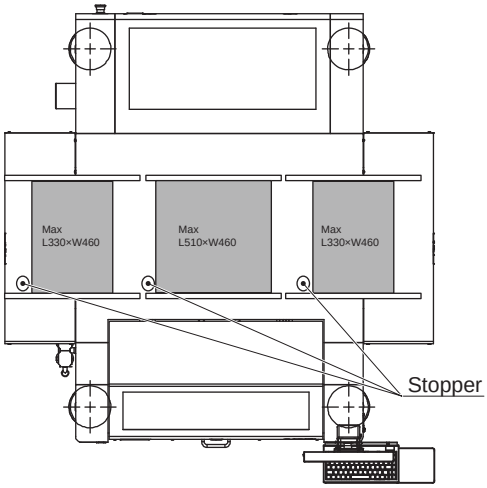
If the target board has slits or holes, the board cannot be detected correctly.

For such boards, contact YAMAHA separately.

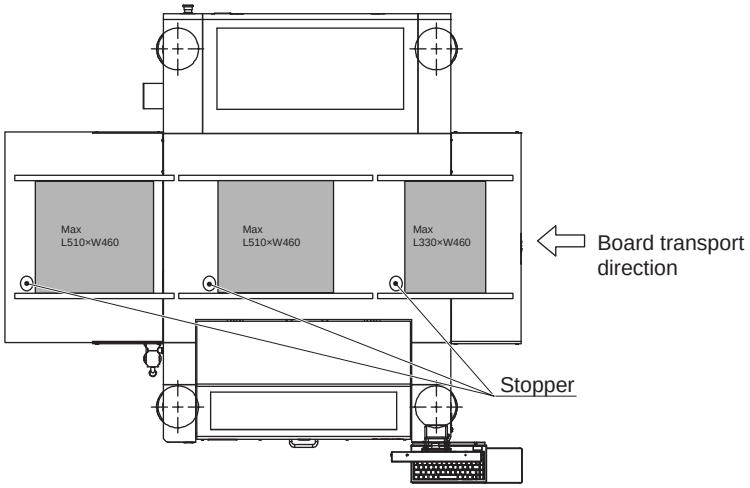
11.5.5 Permissible board dimensions for buffer

Permissible board size for entrance and exit conveyor (standard) buffer: L330mm x W460mm

Permissible board size for carry-out side extension conveyor (option) buffer: L510mm x W460mm



Standard specifications



Carry-out side extension conveyor specifications

11.6 Board transport specifications

In this equipment, the printed board at the print position and the next printing board at the standby position or in the upstream process are transported almost at the same time.
When the printed board at the print position starts unloading and the next printing board at the standby position or in the upstream process starts loading, the main stopper moves to the upstream side of the printed board while it remains moved down. When the main stopper reaches the upstream side of the printed board, it is moved up to physically separate the unloading printed board from the loading next printing board.
When the printed board reaches the conveyor exit position sensor, the main stopper moves to the normal board clamp position while it remains moved up.

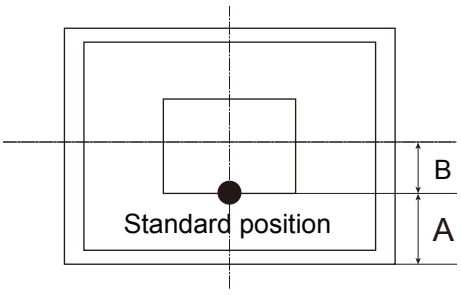
* When the customer manufactures the board backup jig, see “11.8.2 Backup plate (when the customer manufactures the jig)” for further information

11.7 Applicable mask specifications

11.7.1 Mask frame dimensions and mask references

Mask size	Maximum board size (squeegee size)	Mask reference	X-direction	Y-direction			
L750×W750	L510×W460 (L530 squeegee)	Center	Center	Center			
		Center side of machine		A	145	B	230
L736×W736	L510×W460 (L530 squeegee)	Center	Center	Center			
		Center side of machine		A	138	B	230
L750×W650	L510×W350 (L530 squeegee)	Center	Center	Center			
		Center side of machine		A	150	B	175
L650×W550	L330×W250 (L350 squeegee)	Center	Center	Center			
		Center side of machine		A	150	B	125
L600×W550*	L330×W250 (L350 squeegee)	Center	Center	Center			
		Center side of machine		A	150	B	125
L550×W650*	L330×W250 (L350 squeegee)	Center	Center	Center			
		Center side of machine		A	200	B	125

* These mask sizes are supported only when an optional mask adapter is used.



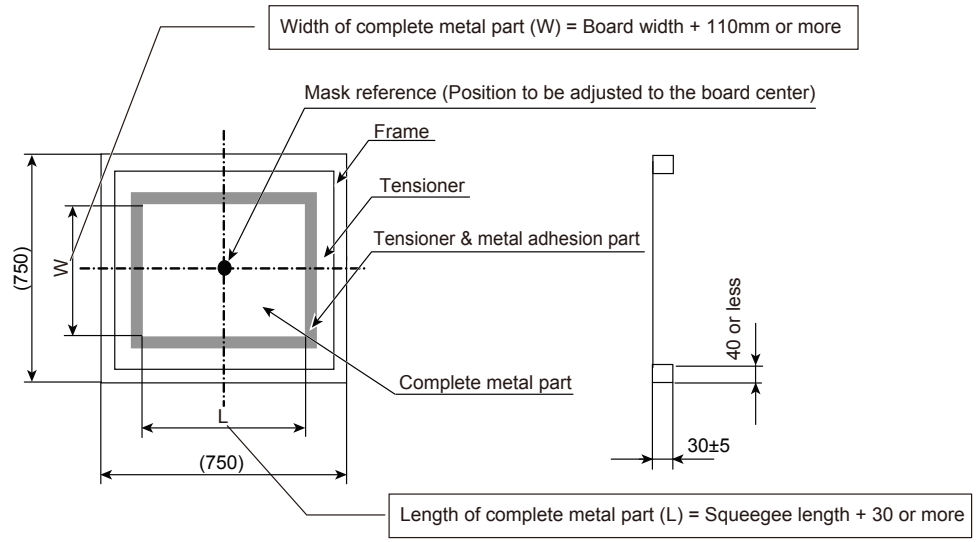
A: Distance from the outer frame of the mask
B: Distance from the mask center

Mask reference: Front
(Standard position: Position where is aligned with the center of the board on the front)

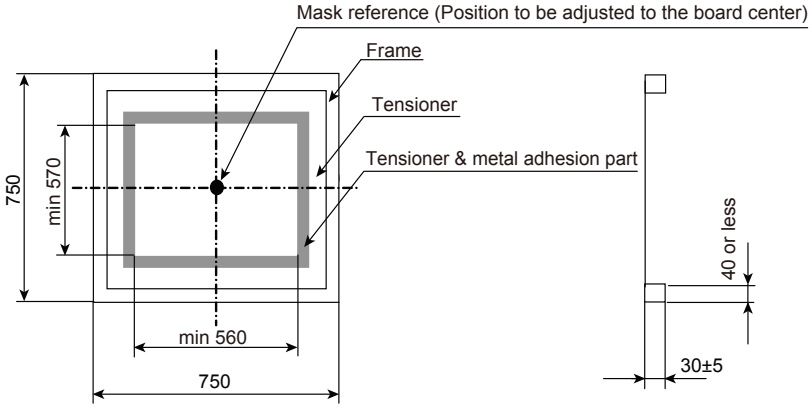
11.7.2 Mask specifications

An appropriate mask maintaining the complete metal part shown below is used according to the target board and squeegee length to be used.

- Length of complete metal part (L) = Squeegee length + 30 mm or more
- Width of complete metal part (W) = Board width + 110 mm or more

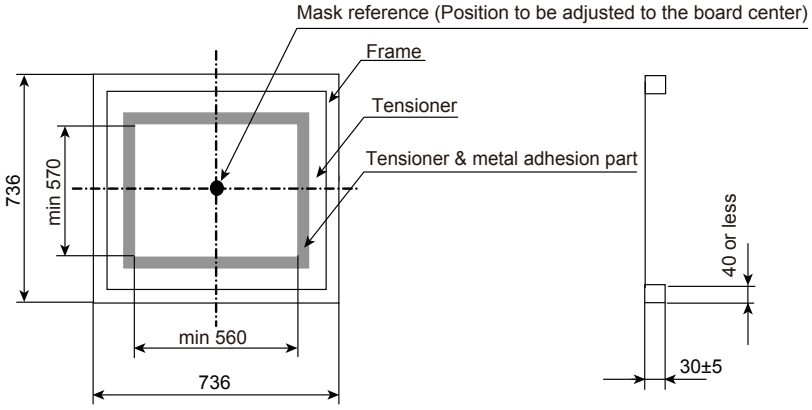


① L750 × W750 center reference (Maximum board size L510 × W460, Squeegee L530)



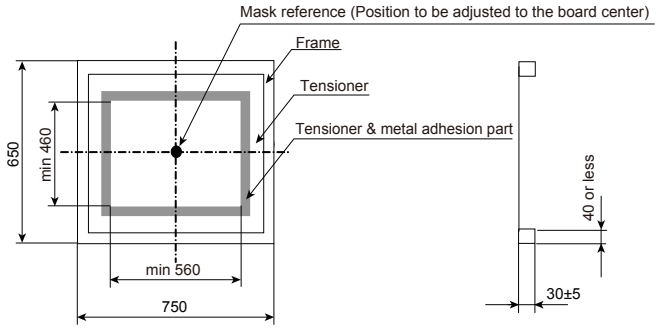
* Grind the board surface side of the mask frame.
Positional accuracy of mask reference X,Y ≤ 2 mm, R-direction ± 0.3°

② L736 × W736 center reference (Maximum board size L510 × W460, Squeegee L530)



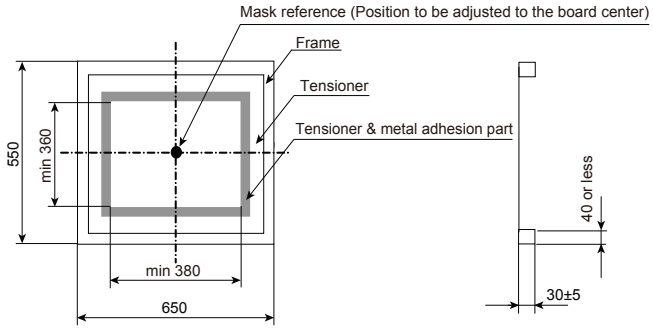
* Grind the board surface side of the mask frame.
Positional accuracy of mask reference X, Y ≤ 2 mm, R-direction ± 0.3°

③ **L750 × W650 center reference (Maximum board size L510 × W350, Squeegee L530)**



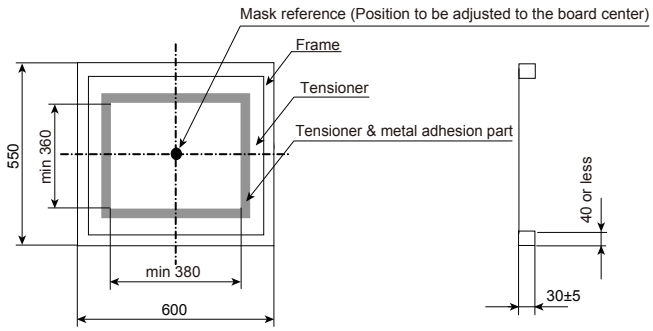
* Grind the board surface side of the mask frame.
Positional accuracy of mask reference X, Y ≤ 2 mm, R-direction ± 0.3°

④ **L650 × W550 center reference (Maximum board size L330 × W250, Squeegee L350)**



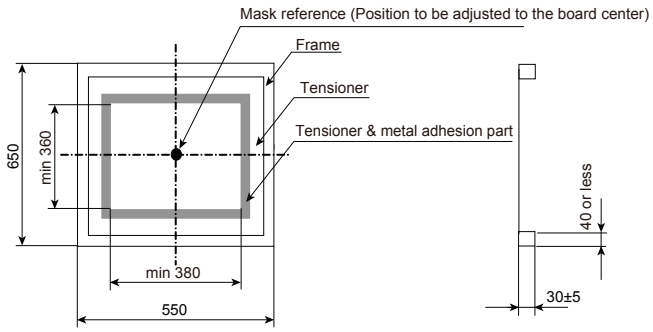
* Grind the board surface side of the mask frame.
Positional accuracy of mask reference X, Y ≤ 2 mm, R-direction ± 0.3°

⑤ **L600 × W550 center reference (Maximum board size L330 × W250, Squeegee L350)**



* Grind the board surface side of the mask frame.
Positional accuracy of mask reference X, Y ≤ 2 mm, R-direction ± 0.3°

⑥ **L550 × W650 center reference (Maximum board size L330 × W250, Squeegee L350)**



* Grind the board surface side of the mask frame.
Positional accuracy of mask reference X, Y ≤ 2 mm, R-direction ± 0.3°

11.8 Board support system

11.8.1 Matrix backup and flat type general-purpose backup

This backup supports the board from the lower portion against the printing pressure, at which the squeegee pushes the board from the upper portion during printing. Five kinds of backups are provided as shown in the table below.

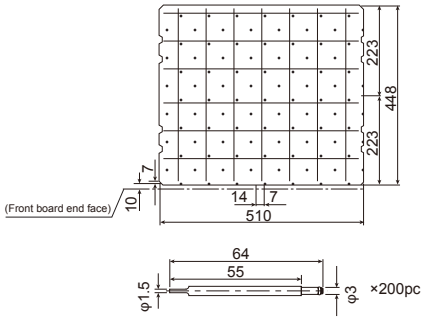
Make desired selections using [B00061 to B00067] Matrix backup XXXXX in “1. Machine configuration”.

* Normally, “AL-14” is used. When necessary, change or add the backup.

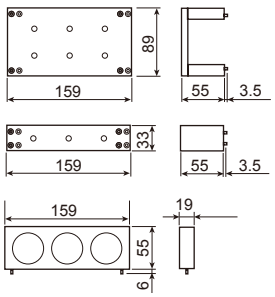
“Iron-14” and “Iron-7” can use the magnetic force fixed type magnet pin.

“Flat type general-purpose backup” does not need any pins. This ensures easy setup work.

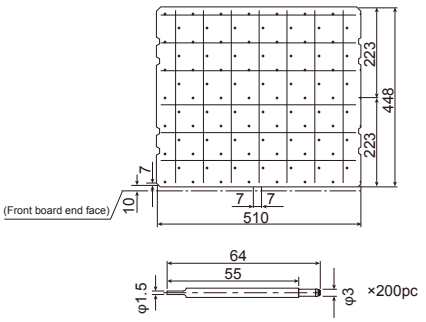
“Flat type general-purpose backup” can be used together with the pins.

<table>
<tr>
<td>B00061
Matrix backup
AL-14
Aluminum, 14 × 7
(Standard setting)</td>
<td>"KHT-M3350-AOX,Matrix P Set
 

• Aluminum
• 14×7zigzag
(14mm-pitch serial layout, half-period deviation,
7mm-pitch spacing arrangement orthorhombic lattice)
• Front and rear, 2-plate configuration

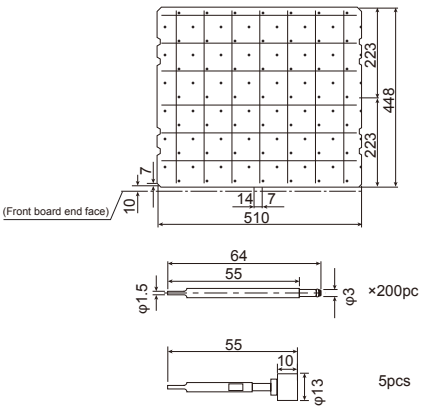
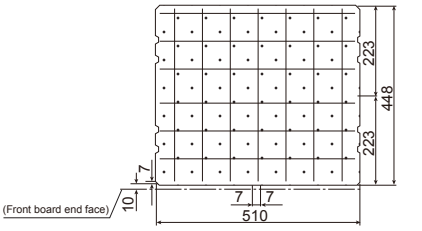
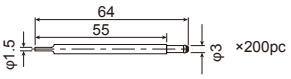
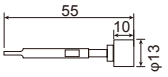
• Aluminum
• O-ring attached to φ3-insertion part</td>
</tr>
<tr>
<td>B00062
Flat type general-purpose backup
(Option)</td>
<td>"KHT-M3330-00X,Support Block Set"
 

・Aluminum
・With positioning pin

* Be sure to install the flat type general-purpose backup within the outer shape of the matrix. If the backup projects, it may interfere with the conveyor frame.</td>
</tr>
<tr>
<td>B00063
Matrix backup
AL-7
Aluminum, 7 × 7
(Option)</td>
<td>"KHT-M3350-BOX,Matrix P Set AL7"
 

• Aluminum
• 7×7 lattice
(7mm-pitch serial layout, 7mm-pitch spacing
arrangement square lattice)
• Front and rear, 2-plate configuration

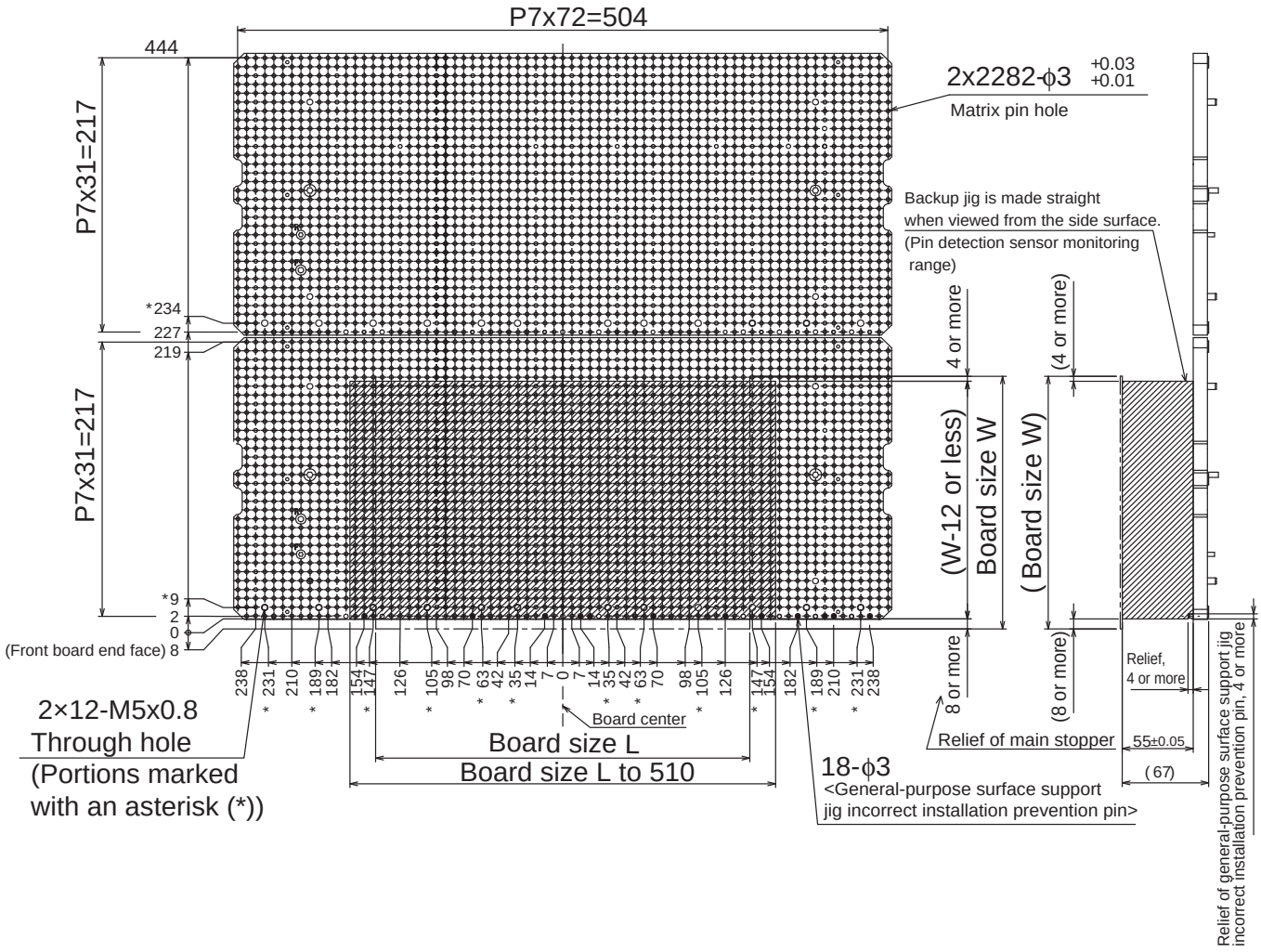
• Aluminum
• O-ring attached to φ3-insertion part</td>
</tr>
</table>

B00066 Matrix backup Iron-14 Iron, 14 × 7 (Option)	"KHT-M3350-COX,Matrix P Set FE14"  • Iron • Support for magnet • 14×7 zigzag (14mm-pitch serial layout, half-period deviation, 7mm-pitch spacing arrangement orthorhombic lattice) • Front and rear, 2-plate configuration • Aluminum • O-ring attached to φ3-insertion part • Horizontal position of magnet pin
B00067 Matrix backup Iron-7 Iron, 7 × 7 (Option)	"KHT-M3350-DOX,Matrix P Set FE7"    • Iron • Support for magnet • 7×7 lattice (7mm-pitch serial layout, 7mm-pitch spacing arrangement square lattice) • Aluminum • O-ring attached to φ3-insertion part • Horizontal position of magnet pin

11.8.2 Backup plate (when the customer manufactures the jig)

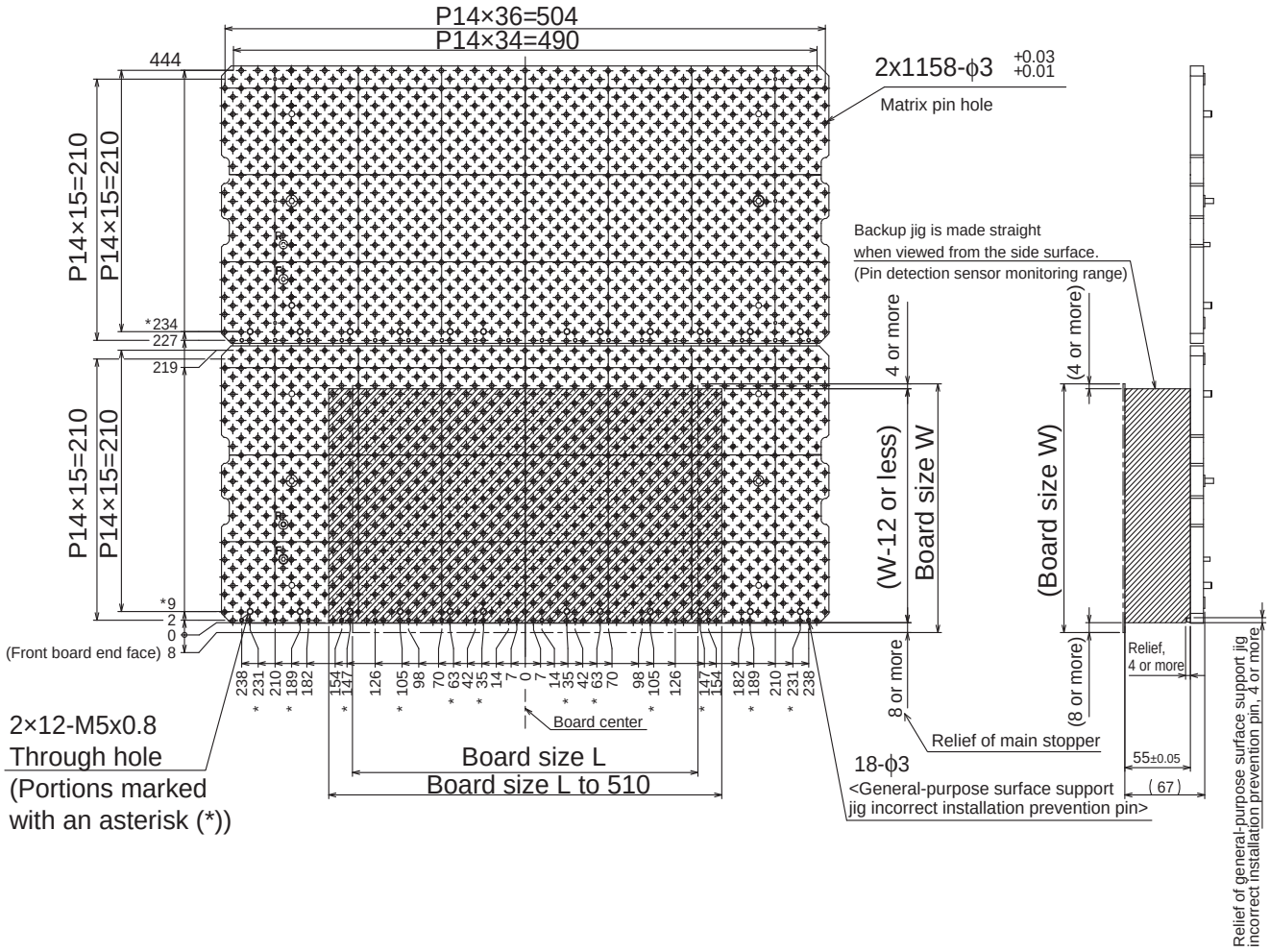
When the customer manufactures the backup jig, make the design while referring to the cautions shown below.

Manufacture specifications of backup jig to be placed on 7×7 lattice matrix plate
<R ⇔ L common high-speed simultaneous transport specifications>



1) The backup jig is so designed that it does not protrude the dimensions of the shaded portion shown in this drawing.
2) In an area of 8 mm from the front board end, the main stopper moves in the X direction during production.
   A clearance of 8 mm or more from the board end is put in the Y direction.
   When the clearance is less than 8 mm, the high-speed simultaneous transport is not performed if the interlock sensor responds.
   If the interlock sensor does not respond, the high-speed simultaneous transport is performed and the support jig may interfere with the main stopper.
   For details about manufacture specifications of support jig that makes the interlock sensor respond, consult separately.
3) An area of 4 mm from the board end on the rear side is monitored by the pin detection sensor.
   The backup jig is designed to be straight when viewed from the side surface.
4) ø3-matrix pin hole is used as knock hole for positioning.
5) The knock pin uses ø3h8-pin and its projection dimension is approx. 4 mm. The pitch tolerance of the knock pin hole is ±0.02 or less.
   (For the hole dimension tolerance, S7 and P7 are appropriate for aluminum and iron, respectively.)
6) General-purpose surface support jig incorrect installation prevention pins are provided at 18 locations on the front of the matrix plate. A relief (depth is 4 mm or more and height is 4 mm or more) is provided at this position on the back side of the jig.

Manufacture specifications of backup jig to be placed on 14×7 zigzag matrix plate
<R ⇔ L common high-speed simultaneous transport specifications>



1) The backup jig is so designed that it does not protrude the dimensions of the shaded portion shown in this drawing.
2) In an area of 8 mm from the front board end, the main stopper moves in the X direction during production.
   A clearance of 8 mm or more from the board end is put in the Y direction.
   When the clearance is less than 8 mm, the high-speed simultaneous transport is not performed if the interlock sensor responds.
   If the interlock sensor does not respond, the high-speed simultaneous transport is performed and the support jig may interfere with the main stopper.
   For details about manufacture specifications of support jig that makes the interlock sensor respond, consult separately.
3) An area of 4 mm from the board end on the rear side is monitored by the pin detection sensor.
   The backup jig is designed to be straight when viewed from the side surface.
4) ø3-matrix pin hole is used as knock hole for positioning.
5) The knock pin uses ø3h8-pin and its projection dimension is approx. 4 mm. The pitch tolerance of the knock pin hole is ±0.02 or less.
   (For the hole dimension tolerance, S7 and P7 are appropriate for aluminum and iron, respectively.)
6) General-purpose surface support jig incorrect installation prevention pins are provided at 18 locations on the front of the matrix plate. A relief (depth is 4 mm or more and height is 4 mm or more) is provided at this position on the back side of the jig.

11.9 Signal specifications

11.9.1 Machine-to-machine signal specifications (between this machine and post-process machine)

*** NEXT INTERFACE**

According to the operating conditions, such as machine combination and signal cable selection, make appropriate selections from the table shown below.
The next interference specifications need to match to the selection of the "11.8.2 Machine-to-machine signal specifications" (between this machine and pre-process machine: Previous interface).

* When connecting to other company's machine, the customer shall be held responsible for maintenance of the functions related to other company's machine.

Selection										
Next interface connector on this machine AMP: 206043-1 (Receptacle 14 pins)			GATE signal specifications		ADVANCED (extended) GATE specifications		ADVANCED (extended) GATE 2 specifications		SMEMA signal specifications	
			YAMAHA YV series or earlier (YV or earlier) and other company's machine		YAMAHA X series or later (X/Xg/YG/YS)		YAMAHA YS series (YS) or later *1		SMEMA signal compatible machine	
Pin No.	**Class**		**Signal name**		**Signal name**		**Signal name**		**Signal name**	
1	DC +24V		GATE IN (com)	Board unloading request signal input from the post-process machine	BUSY IN (com)	Status signal input showing that the post-process machine is loading the board.	Same as left.		SMEMA specifications	
2	PNP input (Judged as ON when the voltage is +24V.)		GATE IN (input)		BUSY IN (input)					
3	Relay contact output	Conducted/ Closed when turned ON.	Not used.		BA OUT (output)	Status signal output showing that this machine is ready to unload the board.	Same as left.			
4	Relay contact output		Not used.		BA OUT (output)					
5	Incorrect connection prevention function application	Key plug inserted.	Dedicated to mating designation (Blocked)		Dedicated to mating designation (Blocked)		Dedicated to mating designation (Blocked)			
6			Dedicated to mating designation (Receivable)		Dedicated to mating designation (Receivable)		Dedicated to mating designation (Receivable)			
7	DC 0V		Not used.		Not used.		Not used.			
8	Reserved.		Reserved.		Reserved.		Reserved.			
9	Relay contact output	Conducted/ Closed when turned ON.	Not used.		UR OUT (output)	Status signal output showing that this machine is running in the automatic operation mode.	Same as left			
10	Relay contact output		Not used.		UR OUT (output)					
11	DC +24V		Not used.		LR IN (com)	Status signal input showing that the post-process machine is running in the automatic operation mode.	Same as left			
12	PNP input (Judged as ON when the voltage is +24V.)		Not used.		LR IN (input)					
13	DC +24V		Not used. *2		Not used. *2		LE IN (com)	Signal input showing the board presence status at the standby position of the post process machine		
14	PNP input (Judged as ON when the voltage is +24V.)		Not used. *2		Not used. *2		LE IN (input)			

*1 The YS/YG series mounters have already been applicable to the ADVANCED GATE 2 specifications from the machine shipped in November, 2009. When connecting the YS/YG series mounter shipped before this date to the line, the machine (except for YS24) needs to be modified.

*2 This signal can be handled as the counter reset signal input. (The signal waits for replacement of the magazine rack of the unloader.)

[GATE IN]: It is judged that the unloading is requested from the post-process machine when this signal turns ON (conducts). When the work of this machine has been completed, the board is unloaded. The post-process machine outputs the relay contact (dry contact: no-voltage circuit).

[BUSY IN]: This input signal informs this machine that the post-process machine is loading the board. The post-process machine outputs the relay contact (dry contact: no-voltage circuit).

[BA OUT]: This output signal informs the post-process machine that this machine is ready to unload the board.

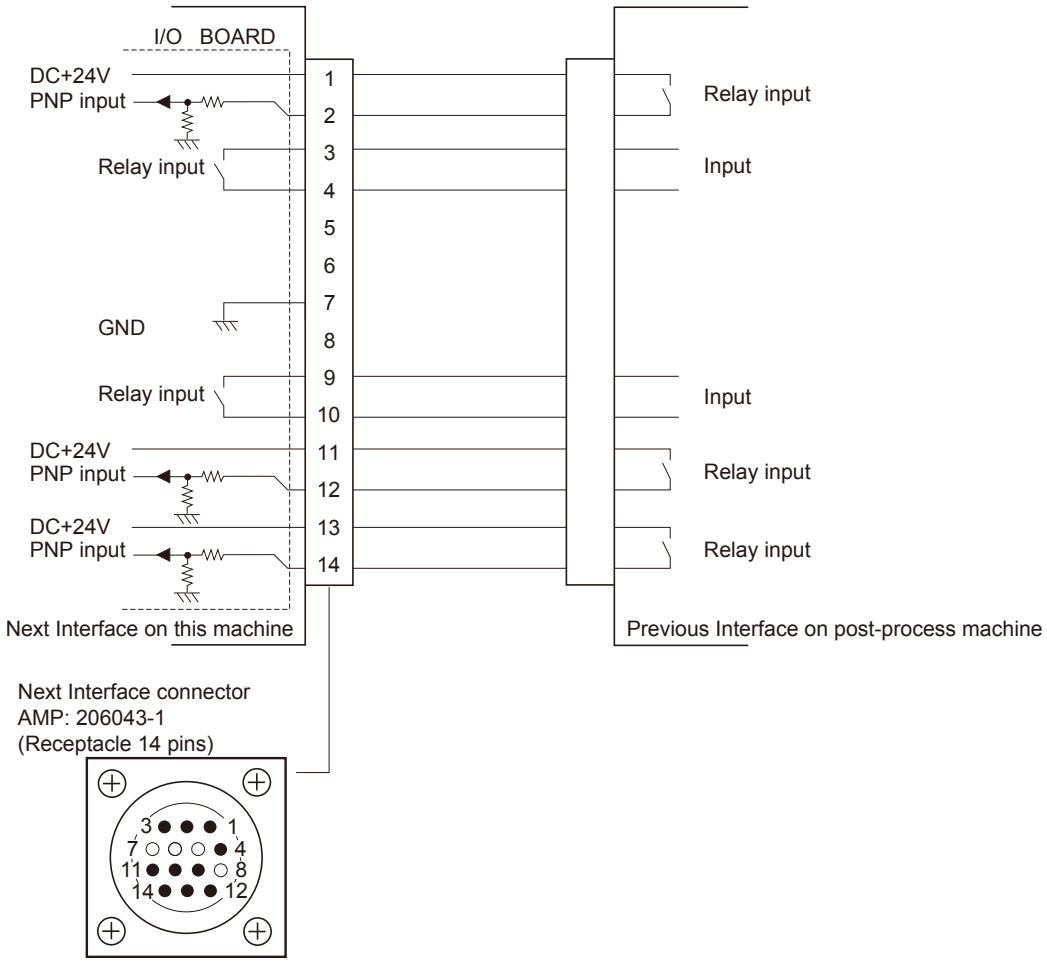
[UR OUT]: This output signal informs the post-process machine that this machine is running in the automatic operation mode.

[LR IN]: This input signal informs this machine that the post-process machine is running in the automatic operation mode. The post-process machine outputs the relay contact (dry contact: no-voltage circuit).

[LS IN]: This input signal informs this machine that there is no board at the standby position of the prost-process machine and the post-process machine is ready to receive the board. The post-process machine outputs the relay contact. The cable with the yellow marking put close to the connector is used for the machine-to-machine cable.

Machine-to-machine signal specifications (between this machine and post-process machine)

* Next Interface



11.9.2 Machine-to-machine signal specifications (between this machine and pre-process machine)

*** PREVIOUS INTERFACE**

According to the operating conditions, such as machine combination and signal cable selection, make appropriate selections from the table shown below.
The previous interference specifications need to match to the selection of the "11.9.1 Machine-to-machine signal specifications" (between this machine and post-process machine: Next interface).

* When connecting to other company's machine, the customer shall be held responsible for maintenance of the functions related to other company's machine.

Selection												
Next interface Connector on this machine AMP: 206043-1 (Receptacle, 14 pins)			GATE signal specifications			ADVANCED (extended) GATE specifications			ADVANCED (extended) GATE 2 specifications			SMEMA signal specifications
			YAMAHA YV series or earlier (YV or earlier) and other company's machine			YAMAHA X series or later (X/Xg/YG/YS)			YAMAHA YS series (YS) or later *1			SMEMA signal compatible machine
Pin No	Class		Signal name			Signal name			Signal name			Signal name
1	Relay contact output	Conducted/ Closed when turned ON.	GATE OUT (output)	Board unloading request signal output to the pre-process machine		BUSY OUT (output)	Status signal output showing that this machine is loading the board.		Same as left			SMEMA specifications
2	Relay contact output		GATE OUT (output)			BUSY OUT (output)						
3	DC +24V		Not used.			BA IN (com)	Status signal input showing that the pre-process machine is ready to unload the board.		Same as left			
4	PNP input (Judged as ON when the voltage is +24V.)		Not used.			BA IN (input)						
5	ncorrect connection prevention function application		Dedicated to mating designation (Receivable)			Dedicated to mating designation (Receivable)			Dedicated to mating designation (Receivable)			
6		Key plug inserted.	Dedicated to mating designation (Blocked)			Dedicated to mating designation (Blocked)			Dedicated to mating designation (Blocked)			
7	Reserved.		Reserved.			Reserved.			Reserved.			
8	Reserved.		Reserved.			Reserved.			Reserved.			
9	DC +24V		Not used.			UR IN (com)	Status signal input showing that the pre-process machine is running in the automatic operation mode.		Same as left.			
10	PNP input (Judged as ON when the voltage is +24V.)		Not used.			UR IN (input)						
11	Relay contact output	Conducted/ Closed when turned ON.	Not used.			LR OUT (output)	Status signal output showing that this machine is running in the automatic operation mode.		Same as left.			
12	Relay contact output		Not used.			LR OUT (output)						
13	Relay contact output	Conducted/ Closed when turned ON.	Not used.			Not used.			LE OUT (output)	Machine-to-machine board standby signal status signal output from this machine. (Mounter only)		
14	Relay contact output		Not used.			Not used.			LE OUT (output)			

*1 The YS/YG series mounters have already been applicable to the ADVANCED GATE 2 specifications from the machine shipped in November, 2009. When connecting the YS/YG series mounter shipped before this date to the line, the machine (except for YS24) needs to be modified.

[GATE OUT]: When this machine is ready for operation, it outputs this board unloading request ON (conduct) signal to the pre-process machine.

[BUSY OUT]: This output signal informs the pre-process machine that this machine is loading the board.

[BA IN]: This input signal informs this machine that the pre-process machine is ready to unload the board. The pre-process machine outputs the relay contact (dry contact: no-voltage circuit).

[UR IN]: This input signal informs this machine that the pre-process machine is running in the automatic operation mode. The pre-process machine outputs the relay contact (dry contact: no-voltage circuit).

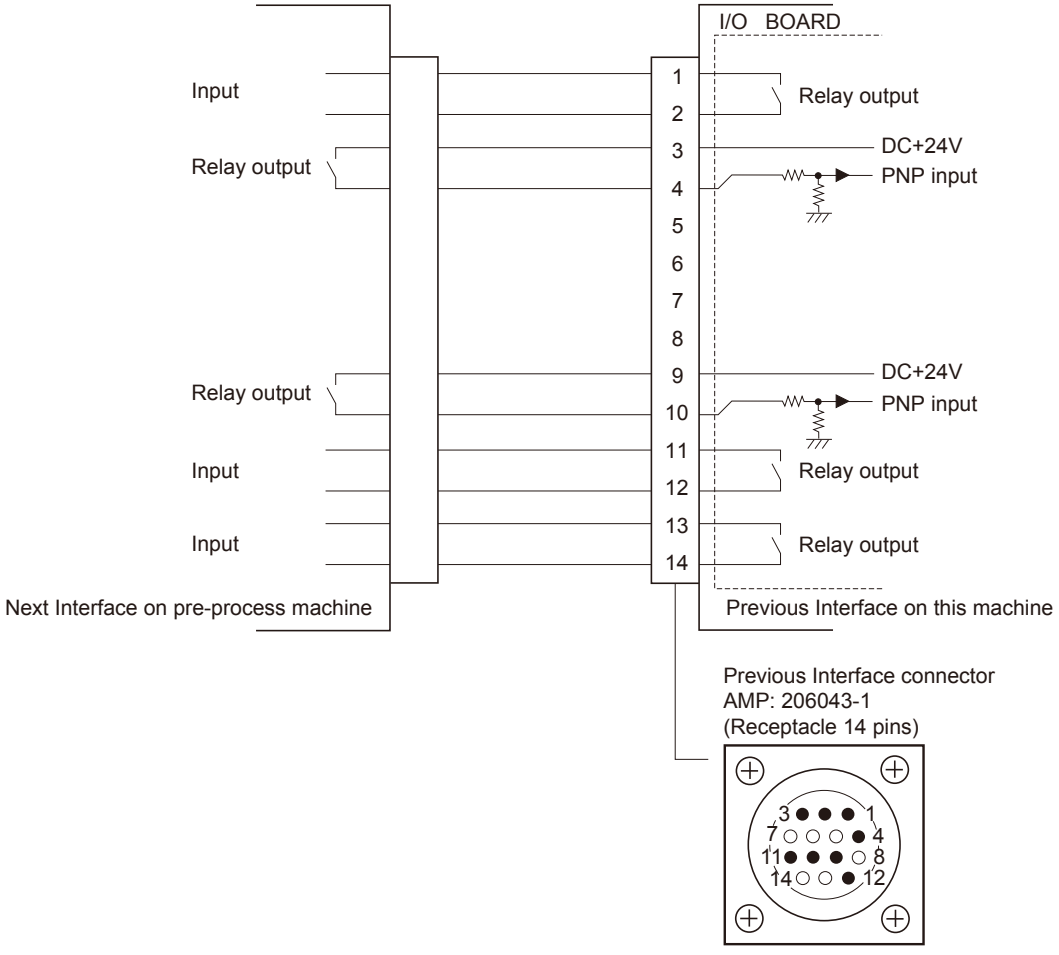
[LR OUT]: This output signal informs the pre-process machine that this machine is running in the automatic operation mode.

[LE OUT]: This signal is used for the ADVANCED (extended) GATE2 specifications. This signal is used when the machine-to-machine board standby function that is used between the mounters is set enabled.

This output signal informs the pre-process machine that the board between this machine and pre-process machine is in the standby status. The cable with the yellow marking put close to the connector is used for the machine-to-machine cable.

Machine-to-machine signal specifications (between this machine and pre-process machine)

* PREVIOUS INTERFACE



11.10 Safety design

This equipment conforms to the EU Machinery Directive 2006/42/EC (*1) and EMC Directive 2004/108/EC (CE marking).
However, this equipment does not bear CE marking if a custom-order item (with the special specifications) was installed.
For details, see “10.5 CE marking”.

11.10.1 Emergency stop system and error detection system

To ensure the safety, emergency stop system and error detection system shown in the table below are provided.

No.	System area and item	Registration name	Built-in	Remarks
01	Emergency stop on front operation console	SB31	◎	Push-lock and turn-reset switch
02	Emergency stop on rear operation console	SB32	◎	Push-lock and turn-reset switch
03	Emergency stop on Carry-out side extension conveyor (*1)	SB33	△	Push-lock and turn-reset switch
04	Emergency stop on Carry-out side extension conveyor (*2)	SB34	△	Push-lock and turn-reset switch
05	Upper safety cover on front	SQ050	◎	Mechanical switch with key
06	Lower safety cover on front	SQ051	◎	Mechanical switch with key
07	Safety cover on rear	SQ052	◎	Mechanical switch with key
08	Safety cover of carry-out side extension conveyor (*1)	SQ054	△	Mechanical switch with key
09	Safety cover of carry-out side extension conveyor (*2)	SQ055	△	Mechanical switch with key
10	Servo 1 group of servo control box	SRV1	◎	Y/Z/MS-axis error detection
11	Servo 2 group of servo control box	SRV2	◎	PU/SY/W1/W2-axis error detection
12	Servo 3 group of servo control box	SRV3	◎	X1/X2/FX/FP-axis error detection
13	Servo 4 group of servo control box	SRV4	◎	SZ/CX/W3/SR-axis error detection
14	Board table Y	SQ021	◎	Y-axis over-travel detection
15	Board camera (& inspection camera)	SQ002	◎	Camera axis over-travel detection

* Meaning of “Built-in” mark ==> ◎ : Provided. X: None △ : Option selection
* “Registration name” is described in the control wiring diagram for the maintenance support (Y-DO Web site).
* (*1) These items are used when the carry-out side extension conveyor (option) is installed on the right. The items become invalid when the board transport direction is right → left flow. The items (*1) and (*2) are set exclusively.
* (*2) These items are used when the carry-out side extension conveyor (option) is installed on the left. The items become invalid when the board transport direction is left → right flow. The items (*1) and (*2) are set exclusively.
* In addition to these items, temperature error, fan stop, and power supply error are provided as hardware related error detection items.
  For details, see the user’s manuals.

11.10.2 Pause (interlock) system and error detection system

To protect the machine or continue the operation, pause system and error detection system shown in the table below are provided.

No.	System area and item	Registration name	Built-in	Remarks
01	Board table Y	SQ022	◎	Front interference detection
02	Board table Y	SQ023	◎	Rear interference detection
03	Board table X1	SQ032	◎	Confirmation of X1-axis movement safety area
04	Board table X2	SQ033	◎	Confirmation of X2-axis movement safety area
05	Board table Z	SQ219	◎	Confirmation of Z-axis movement safety area
06	Squeegee (*1)	SQ359	◎	Confirmation of squeegee back/forth movement safety area
07	Squeegee (*1)	SQ111	◎	Confirmation of squeegee swing rotation safety area
08	PSC unit	SQ353	△	Confirmation of solder paste supply left/right movement safety area
09	Main stopper and mask camera	SQ211	◎	Detection of interference in left/right movement area
10	Board push-up	SQ212	◎	Detection of pin/block interference
11	Automatic cleaning system	VACGD	◎	Confirmation of vacuum suction force
12	Suction blower/inverter	AL0AL1	◎	Error detection
13	Air-conditioner	ACAL	△	Error detection
14	Supply air pressure	AIRPR	◎	Air pressure drop

* Meaning of “Built-in” mark ===> ◎ : Provided. × : None △ : Option selection
* “Registration name” is described in the control wiring diagram for the maintenance support (Y-DO Web site).
* (*1) This is used when the 3S head is installed and disabled when the double squeegee head is installed.
* In addition to these items, XY-axis soft limit setting and board transport error are provided as software error detection items.
  For details, see the user’s manuals.

11.10.3 Configuration of servo control axes

According to the total number of axes and machine configuration, 13 to 15 axes are controlled by the AC servo motors.

No.	Area and item	Control axis name	Motor name	Built-in	Remarks
01	Board table Y	Y	M01	◎	
02	Board table X1	X1	M02	◎	
03	Board table X2	X2	M03	◎	
04	Board table Z	Z	M04	◎	Electromagnetic brake is built-in.
05	Push-up	PU	M05	◎	Electromagnetic brake is built-in.
06	Main stopper and mask camera	MS	M06	◎	
07	Entrance conveyor width	W1	M07	◎	
08	Board table conveyor width	W2	M08	◎	Electromagnetic brake is built-in.
09	Exit conveyor width	W3	M09	◎	
10	Squeegee back/forth	SY	M10	◎	Electromagnetic brake is built-in.
11	Board camera (& inspection camera)	CX	M11	◎	
12	Squeegee up/down	SZ	M12	◎	Electromagnetic brake is built-in.
13	Squeegee swing rotation (*1)	SR	M13	◎	Electromagnetic brake is built-in.
14	PSC pot holder up/down (*2)	FP	M18	△	
15	PSC left/right movement	FX	M19	△	
Total number of axes				13 to 15	

* Meaning of “Built-in” mark ===> ◎ : Provided. × : None △ : Option selection

* “Motor name” is described in the control wiring diagram for the maintenance support (Y-DO Web site).

* (*1) This is disabled when the double squeegee head is installed.

* (*2) This is disabled when the syringe type PSC is installed.

11.10.4 Configuration of general-purpose motor

Total number of motors, 4 motors

No.	Area and item	Motor name	Built-in	Remarks
01	Entrance conveyor	M14	◎	Variable speed brushless DC motor
02	Board table conveyor	M15	◎	Variable speed brushless DC motor
03	Exit conveyor	M16	◎	Variable speed brushless DC motor
04	Suction blower (Automatic cleaning system)	M17	◎	
Total number of axes			4	

* Meaning of “Built-in” mark ===> ◎ : Provided. × : None △ : Option selection

* “Motor name” is described in the control wiring diagram for the maintenance support (Y-DO Web site).

11.10.5 Configuration of other motors

To cool the control box, motors, and cameras, FAN motors are installed at appropriate positions.